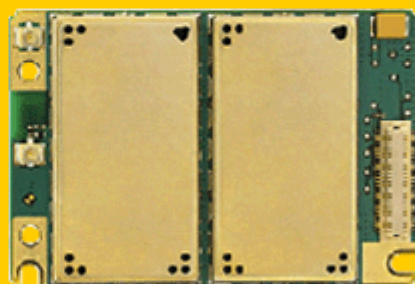




CINTERION  
WIRELESS MODULES

## HC25

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AT Command Set

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# 1. Introduction

## 1.1 Scope of the document

This document presents the AT Command Set for  
*HC25 Release 02.050.*

Before using the Cellular Engine or upgrading to a new firmware version please read the latest product information provided in the Release Notes [1].

More information is available at <http://www.cinterion.com>.

## 1.2 Related documents

- [1] HC25 Release Notes, Version 02.050
- [2] HC25 Hardware Interface Description, Version 02.050
- [3] User's Guide: Getting Started with HC25
- [4] Remote-SAT User's Guide
- [5] Multiplexer User's Guide
- [6] Multiplex Driver Developer's Guide
- [7] Multiplex Driver Installation Guide
- [8] Application Note 02: Audio Interface Design
- [9] Application Note 16: Updating HC25 Firmware
- [10] Application Note 22: Using TTY / CTM equipment with HC25
- [11] Application Note 37: GPS Antenna Integration for HC25
- [12] Application Note 39: USB Interface Description for HC25
- [13] Application Note 40: Thermal Solutions for HC25 Applications
- [14] Application Note 42: Customizing HC25 Applications
- [15] ISO/IEC10646: "Universal Multiple-Octet Coded Character Set (UCS)"; UCS2, 16 bit coding
- [16] ITU-T Recommendation V.24: List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)
- [17] ITU-T Recommendation V.250: Serial asynchronous automatic dialling and control
- [18] 3GPP TS 100 918/EN 300 918 (GSM 02.04): General on supplementary services
- [19] 3GPP TS 100 907 (GSM 02.30): Man-Machine Interface (MMI) of the Mobile Station (MS)
- [20] 3GPP TS 23.038 (GSM 03.38): Alphabets and language specific information
- [21] 3GPP TS 27.005 (GSM 07.05): Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
- [22] 3GPP TS 27.007 (GSM 07.07): AT command set for User Equipment (UE)
- [23] 3GPP TS 27.060 (GSM 07.60): Mobile Station (MS) supporting Packet Switched Services
- [24] 3GPP TS 51.011 (GSM 11.11): Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface
- [25] ETSI 102 221: Smart cards; UICC-Terminal interface; Physical and logical characteristics
- [26] 3GPP TS 31.102: 3rd Generation Partnership Project; Technical Specification Group Network and Terminals; Characteristics of the USIM application
- [27] 3GPP TS 11.14 (GSM 11.14): Specification of the SIM Application Toolkit for the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface
- [28] 3GPP TS 31.111: Universal Subscriber Identity Module (USIM) Application Toolkit (USAT)
- [29] 3GPP TS 22.101 (GSM 22.101): Service principles
- [30] Common PCN Handset Specification (CPHS) v4.2
- [31] USB.ORG: [www.usb.org/developers/docs/USB\\_LANGIDs.pdf](http://www.usb.org/developers/docs/USB_LANGIDs.pdf)
- [32] USB Class Definitions for Communication Devices, Version 1.1 January 19, 1999

## 1.3 Document Conventions

Throughout the document, the GSM engines are referred to as ME (Mobile Equipment), MS (Mobile Station), TA (Terminal Adapter), DCE (Data Communication Equipment) or facsimile DCE (FAX modem, FAX board). To control your GSM engine you can simply send AT Commands via its serial interface. The controlling device at the other end of the serial line is referred to as TE (Terminal Equipment), DTE (Data Terminal Equipment) or plainly 'the application' (probably running on an embedded system). All abbreviations and acronyms used throughout this document are based on the GSM specifications. For definitions please refer to TR 100 350 V7.0.0 (1999-08), (GSM 01.04, version 7.0.0 release 1998).

### 1.3.1 Quick Reference Table

Each AT command description includes a table similar to the example shown below. The table is intended as a quick reference to indicate the following functions:

PIN:	Is the AT command PIN protected?
+	Yes
-	No
±	Usage is dependent on conditions specified for the command, or not all command types are PIN protected (for example write command PIN protected, read command not).
	Note: The table provided in Section <a href="#">20.3, Available AT Commands and Dependency on SIM PIN</a> uses the same symbols.
MDM:	Is the AT command supported on the Modem interface?
+	Yes
-	No
APP:	Is the AT command supported on the Application interface?
+	Yes
-	No
Last:	If commands are concatenated, this AT command must be the last one.
+	Yes
-	No
	Note: See also Section <a href="#">1.5, AT Command Syntax</a> for details on concatenated AT commands.

Example:

PIN	MDM	APP	Last
-	+	+	-

### 1.3.2 Superscript Notation for Parameters And Values

**Table 1.1:** Symbols used to mark the type of parameters

Parameter type	Meaning
<param> <sup>(num)</sup>	Parameter value must be numeric type
<param> <sup>(str)</sup>	Parameter value must be string type enclosed in quotation marks.

**Table 1.2:** Symbols used to indicate the correlations with other commands

Parameter option	Meaning
<param> <sup>(+CSCS)</sup>	Parameter value has to be (is) coded according to current setting of <chset> (see <a href="#">AT+CSCS</a> for details)

**Table 1.3:** Symbols Used to Mark Different Types of Default Values of Parameters

Value option	Meaning
[x]	Default value: if the parameter is omitted, the value 'x' will be assumed
x(&F)	Factory default value, will be restored to 'x' with <a href="#">AT&amp;F</a>
x(P)	Powerup default value of a parameter which is not stored at power down
x(D)	Delivery default value of a parameter which cannot be restored automatically

## 1.4 HC25 AT Command Interpreter

HC25 features two interfaces for processing AT commands: Modem interface and Application interface. Both AT command interfaces can be assigned to the various physical and virtual interfaces of HC25. Basically, their allocation is dependent on whether the HC25 is configured for operation through its asynchronous serial interface ASC0 or as USB composite device comprising two virtual COM ports and a virtual wireless Ethernet adapter. ASC0 and USB operation are mutually exclusive: ASC0 usage disables access to the virtual USB devices and, vice versa, USB usage disables access to the ASC0 interface. The command `AT+SUSB="Startup",<start>` determines which mode to use.

This section describes the functions of the Modem interface and the Application interface as well as their allocation to the module's physical and virtual interfaces:

- **Modem interface:**  
This interface is referred to as "Modem" if queried with `AT+SQPORT`. In the quick reference tables it is named MDM.  
The Modem interface is intended particularly for circuit and packet switched transmission (HSDPA, GPRS, CSD, Fax, Voice).  
URCs relevant for data calls (RING, NO CARRIER) are issued on the modem interface, all other URCs normally only on the application interface. For further detail on URCs please refer to Section 1.8, [Unsolicited Result Code Presentation](#), and the configuration command `AT+SCFG`, parameter `<udi>`.  
The Modem interface can be assigned to one of these HC25 interfaces:
  - Asynchronous serial interface ASC0
  - A logical channel of the USB composite device. For example, in Windows XP or Windows Vista set up as "Cinterion HC25 HSDPA USB Modem" listed in the *Windows Device Manager* under *Modems*.
  - First multiplex channel if Multiplex mode is activated.
- **Application interface:**  
This interface is referred to as "Application" if queried with `AT+SQPORT`. In the quick reference tables it is named APP.  
The Application interface is designed especially for controlling the HC25, i.e. for entering AT commands, receiving URCs, or sending and receiving short messages. It cannot be used as data interface for HSDPA, GPRS, CSD and Fax.  
The Application interface can be assigned to one of these HC25 interfaces:
  - A logical channel of the USB composite device. For example, in Windows XP or Windows Vista set up as "Cinterion HC25 USB Com Port" listed in the *Windows Device Manager*, under *Ports (COM&LPT)*.
  - Second multiplex channel if Multiplex mode is activated.

Please note that URCs are normally indicated only on this interface, no matter whether the Modem interface or the Application interface was used to send the AT commands for activating their presentation. This URC management scheme is the default configuration recommended for a typical HC25 application. For further detail on URCs please refer to Section 1.8, [Unsolicited Result Code Presentation](#), and the configuration command `AT+SCFG`, parameter `<udi>`.

Bear in mind that the Modem interface and the Application interface are handled by the same AT command interpreter. As a result, AT commands entered on both interfaces are not executed in parallel but sequentially, one after the other. So, an AT command issued on one interface will be buffered on this interface to be executed after the other interface has completed processing earlier AT command(s).

When a dial-up connection is established over the Modem interface, the Application interface can be used simultaneously for any control functions. This eliminates the need for the user to enter AT commands, such as +++ and AT0, to switch back and forth between command and online mode when working on one interface only. Yet, it should be noted that the dial-up connection disables the echo on both interfaces, due to the initialization strings typically set by modems. The echo can be re-activated by executing `ATE1`.

For further detail on Multiplex mode refer to `AT+CMUX`.

## 1.5 AT Command Syntax

The "AT" or "at" prefix must be set at the beginning of each command line. To terminate a command line enter <CR>. Commands are usually followed by a response that includes "<CR><LF><response><CR><LF>". Throughout this document, only the responses are presented, <CR><LF> are omitted intentionally.

**Table 1.4:** Types of AT commands and responses

AT command type	Syntax	Function
Test command	AT+CXXX=?	The mobile equipment returns the list of parameters and value ranges set with the corresponding Write command or by internal processes.
Read command	AT+CXXX?	This command returns the currently set value of the parameter or parameters.
Write command	AT+CXXX=<...>	This command sets user-definable parameter values.
Exec(ution) command	AT+CXXX	The execution command reads non-variable parameters determined by internal processes in the GSM engine.

### 1.5.1 Using Parameters

- Optional parameters are enclosed in square brackets. If optional parameters are omitted, the current settings are used until you change them.
- Optional parameters or subparameters can be omitted unless they are followed by other parameters. If you want to omit a parameter in the middle of a string it must be replaced by a comma. See also example 1.
- A parameter value enclosed in square brackets represents the value that will be used if an optional parameter is omitted. See also example 2.
- When the parameter is a character string, e.g. <text> or <number>, the string must be enclosed in quotation marks, e.g. "Charlie Brown" or "+49030xxxx". Symbols in quotation marks will be recognized as strings.
- All spaces will be ignored when using strings without quotation marks.
- It is possible to omit the leading zeros of strings which represent numbers.
- If an optional parameter of a V.250 command is omitted, its value is assumed to be 0.

Example 1: Omitting parameters in the middle of a string

AT+CCUG?	Query current setting
+CCUG: 1,10,1	
OK	
AT+CCUG=,9	Set only the middle parameter
OK	
AT+CCUG?	Query new setting
+CCUG: 1,9,1	
OK	

## 1.6 Supported character sets

The ME supports three character sets:

1. GSM 03.38 (7 bit, also referred to as GSM alphabet or SMS alphabet),
2. UCS2 (16 bit, refer to ISO/IEC 10646), and
3. IRA (International Reference Alphabet, ITU T T.50).

Refer [AT+CSCS](#) for information about selecting the character set. Character tables can be found below.

Explanation of terms

- International Reference Alphabet (IRA)  
The International Reference Alphabet is equivalent to ASCII (American Standard Code for Information Interchange) and ISO 646, i.e. it defines a 7-bit coded character set. The mapping can be obtained from the character set tables below (UCS2 values 0x0000 to 0x007F).
- Escape sequences  
The escape sequence used within a text coded in the GSM default alphabet (0x1B) must be correctly interpreted by the TE, both for character input and output. To the module, an escape sequence appears like any other byte received or sent.
- Terminal Adapter (TA)  
TA is an equivalent to Mobile Equipment (ME) which stands for the GSM module described here. It uses GSM default alphabet as its character set.
- Terminal Equipment (TE)  
TE is the device connected to the TA via serial interface. In most cases TE is an ANSI/ASCII terminal that does not fully support the GSM default alphabet, for example MS Hyperterminal.
- TE Character Set  
The character set currently used by Terminal Equipment is selected with [AT+CSCS](#).
- Data Coding Scheme (dcs)  
DCS is part of a short message and is saved on the SIM. When writing a short message to the SIM in text mode, the dcs stored with [AT+CSMP](#) is used and determines the coded character set.

The behavior when encountering characters that are not valid characters of the supported alphabets is undefined.

Due to the constraints described below it is recommended to prefer the USC2 alphabet in any external application.

If the GSM alphabet is selected all characters sent over the serial line (between TE and TA) are in the range from 0 to 127 (7 Bit range). CAUTION: ASCII alphabet (TE) is not GSM alphabet (TA/ME) !

Several problems resulting from the use of GSM alphabet with ASCII terminal equipment:

- "@" character with GSM alphabet value 0 is not printable by an ASCII terminal program (e.g. Microsoft® Hyperterminal®).
- "@" character with GSM alphabet value 0 will terminate any C string! This is because the 0 is defined as C string end tag. Therefore, the GSM Null character may cause problems on application level when using a 'C'-function as "strlen()". This can be avoided if it is represented by an escape sequence as shown in the table below.  
By the way, this may be the reason why even network providers often replace "@" with "@=" in their SIM application.
- Other characters of the GSM alphabet are misinterpreted by an ASCII terminal program. For example, GSM "ö" (as in "Börse") is assumed to be "l" in ASCII, thus resulting in "B|rse". This is because both alphabets mean different characters with values hex. 7C or 00 and so on.
- In addition, decimal 17 and 19 which are used as XON/XOFF control characters when software flow control is activated, are interpreted as normal characters in the GSM alphabet.

When you write characters differently coded in ASCII and GSM (e.g. Ä, Ö, Ü), you need to enter escape sequences. Such a character is translated into the corresponding GSM character value and, when output later, the GSM character value can be presented. Any ASCII terminal then will show wrong responses.

**Table 1.5:** Examples for character definitions depending on alphabet

GSM 03.38 character	GSM character hex. value	Corresponding ASCII character	ASCII Esc sequence	Hex Esc sequence
Ö	5C	\	\5C	5C 35 43
"	22	"	\22	5C 32 32
@	00	NULL	\00	5C 30 30

CAUTION: Often, the editors of terminal programs do not recognize escape sequences. In this case, an escape sequence will be handled as normal characters. The most common workaround to this problem is to write a script which includes a decimal code instead of an escape sequence. This way you can write, for example, short messages which may contain differently coded characters.

## 1.6.1 GSM alphabet tables and UCS2 character values

This section provides tables for the GSM 03.38 alphabet supported by the ME. Below any GSM character find the corresponding two byte character value of the UCS2 alphabet.

(For related mapping definition see: <http://www.unicode.org/Public/MAPPINGS/ETSI/GSM0338.TXT>)

Main character table of GSM 03.38 alphabet				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	@ 0040	Δ 0394	SP 0020	0 0030	i 00A1	P 0050	¿ 00BF	p 0070
0	0	0	1	1	£ 00A3	— 005F	! 0021	1 0031	A 0041	Q 0051	a 0061	q 0071
0	0	1	0	2	\$ 0024	Φ 03A6	* 0022	2 0032	B 0042	R 0052	b 0062	r 0072
0	0	1	1	3	¥ 00A5	Γ 0393	# 0023	3 0033	C 0043	S 0053	c 0063	s 0073
0	1	0	0	4	è 00E8	Λ 039B	▣ 00A4	4 0034	D 0044	T 0054	d 0064	t 0074
0	1	0	1	5	é 00E9	Ω 03A9	% 0025	5 0035	E 0045	U 0055	e 0065	u 0075
0	1	1	0	6	ù 00F9	Π 03A0	& 0026	6 0036	F 0046	V 0056	f 0066	v 0076
0	1	1	1	7	ì 00EC	Ψ 03A8	' 0027	7 0037	G 0047	W 0057	g 0067	w 0077
1	0	0	0	8	ö 00F2 <sup>3)</sup>	Σ 03A3	( 0028	8 0038	H 0048	X 0058	h 0068	x 0078
1	0	0	1	9	ç 00E7	Θ 0398	) 0029	9 0039	I 0049	Y 0059	i 0069	y 0079
1	0	1	0	10 /A	LF [LF] <sup>2)</sup>	Ξ 039E	* 002A	: 003A	J 004A	Z 005A	j 006A	z 007A
1	0	1	1	11 /B	Ø 00D8	<sup>1)</sup>	+ 002B	; 003B	K 004B	Ä 00C4	k 006B	ä 00E4
1	1	0	0	12 /C	ø 00F8	Æ 00C6	, 002C	< 003C	L 004C	Ö 00D6	l 006C	ö 00F6
1	1	0	1	13 /D	CR [CR] <sup>2)</sup>	æ 00E6	- 002D	= 003D	M 004D	Ñ 00D1	m 006D	ñ 00F1
1	1	1	0	14 /E	À 00C5	ß 00DF	. 002E	> 003E	N 004E	Ü 00DC	n 006E	ü 00FC
1	1	1	1	15 /F	à 00E5	É 00C9	/ 002F	? 003F	O 004F	Š 00A7	o 006F	à 00E0

Figure 1.1: Main character table of GSM 03.38 alphabet

- 1) This code is an escape to the following extension of the 7 bit default alphabet table.
- 2) This code is not a printable character and therefore not defined for the UCS2 alphabet. It shall be treated as the accompanying control character.
- 3) As the standard GSM alphabet does not provide a backspace functionality the HC25 is designed to use the GSM character 08 (hex 0x08) as backspace. This allows the user to easily erase the last character when using an ASCII terminal. On the other hand, this solution requires entering the escape sequence \08 for writing the "ö" character in GSM alphabet.

Extension character table of GSM 03.38 alphabet				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0					 007C			
0	0	0	1	1								
0	0	1	0	2								
0	0	1	1	3								
0	1	0	0	4		^ 005E						
0	1	0	1	5							€ <sup>2</sup> 20AC	
0	1	1	0	6								
0	1	1	1	7								
1	0	0	0	8			{ 007B					
1	0	0	1	9			} 007D					
1	0	1	0	10 /A	␣ [LF]							
1	0	1	1	11 /B		␣						
1	1	0	0	12 /C				[ 005B				
1	1	0	1	13 /D				~ 007E				
1	1	1	0	14 /E				] 005D				
1	1	1	1	15 /F			\ 005C					

**Figure 1.2:** Extension character table of GSM 03.38 alphabet

- 1) This code value is reserved for the extension to another extension table. On receipt of this code, a receiving entity shall display a space until another extension table is defined.
- 2) This code represents the EURO currency symbol. The code value is the one used for the character 'e'. Therefore a receiving entity which is incapable of displaying the EURO currency symbol will display the character 'e' instead.
- 3) This code is defined as a Page Break character and may be used for example in compressed CBS messages. Any mobile which does not understand the 7 bit default alphabet table extension mechanism will treat this character as Line Feed.

In the event that an MS receives a code where a symbol is not represented in Figure 1.2, [Extension character table of GSM 03.38 alphabet](#) the MS shall display the character shown in the main default 7 bit alphabet table (see Figure 1.1, [Main character table of GSM 03.38 alphabet](#)).

## 1.6.2 UCS2 and GSM data coding and conversion for SMS text mode and Remote SAT

This section provides basic information on how to handle input and output character conversion for SMS text mode and Remote SAT if internal (TA) and external (TE) character representation differ, i.e. if the Data Coding Scheme and the TE character use different coding.

### 1.6.2.1 Implementing output of SIM data to Terminal (direction TA to TE)

Used character set	DCS = 7 bit GSM	DCS = 8 bit Data	DCS = 16 bit UCS2
GSM	Case 1 GSM (1:1)	Case 2 8 bit to IRA (1:2)	Case 3 UCS2 to IRA (2:4)
UCS2	Case 4 GSM to IRA (1:4)	Case 5 8 bit to IRA (1:4)	Case 6 UCS2 to IRA (2:4)

Note: The ratio of SIM bytes to output bytes is given in parentheses.

#### Case 1

Every GSM character is sent to the TE as it is (8-bit value with highest bit set to zero).

Example: 47'H, 53'H, 4D'H → 47'H, 53'H, 4D'H, displayed as "GSM"

#### Case 2

Every data byte is sent to the TE as 2 IRA characters each representing a halfbyte.

Example: B8'H (184 decimal) → 42'H, 38'H, displayed as "B8"

#### Case 3

Every 16-bit UCS2 value is sent to the TE as 4 IRA characters.

Example: C4xA7'H (50343 decimal) → 43'H, 34'H, 41'H, 37'H, displayed as "C4A7"

Problem: An odd number of bytes leads to an error because there are always two bytes needed for each USC2 character

#### Case 4

Every GSM character is sent to the TE as 4 IRA characters to show UCS2 in text mode.

Example: 41'H ("A") → 30'H, 30'H, 34'H, 31'H, displayed as "0041"

#### Case 5

Every data byte is sent to the TE as IRA representation of UCS2 (similar to case 4).

Example: B2'H → 30'H, 30'H, 42'H, 32'H, displayed as "00B2"

#### Case 6

Every 16-bit value is sent to the TE as IRA representation of it. It is assumed that number of bytes is even.

Example: C3x46'H → 43'H, 33'H, 34'H, 36'H, displayed as "C346"

### 1.6.2.2 Implementing input of Terminal data to SIM (direction TE to TA)

Used character set	DCS = 7 bit GSM	DCS = 8 bit Data	DCS = 16 bit UCS2
GSM	Case 1 GSM (1:1)	Case 2 IRA to 8 bit (2:1)	Case 3 IRA to 16 bit (4:2)
UCS2	Case 4 UCS2 to GSM (4:1)	Case 5 UCS2 to 8 bit (4:1)	Case 6 UCS2 to 16 bit (4:2)

Note: The ratio between the number of input characters and bytes stored on the SIM is given in parentheses.

#### Case 1

Every character is sent from TE to TA as GSM character (or ASCII with standard terminal emulation, e.g. Hyper-terminal).

Character value must be in range from 0 to 127 because of 7-bit GSM alphabet.

To reach maximum SMS text length of 160 characters in 140 bytes space characters will be compressed on SIM. This must be set using the parameter `<dc>` of `AT+CSMP` (add 64).

Example: "ABCDEFGH" typed is sent and stored uncompressed as → 4142434445464748'H (stored compressed as 41E19058341E91'H)

#### Case 2

Every data byte is sent as 2 IRA characters.

Maximum text length is 280 IRA characters which will be converted into 140 bytes SMS binary user data

Example: "C8" typed is sent as 43'H, 38'H → stored as C8'H

#### Case 3

Every 16-bit value is sent as 4 IRA characters.

Maximum text length is 280 IRA characters which will be converted into 70 UCS2 characters (16-bit each)

Number of IRA characters must be a multiple of four because always 4 half bytes are needed for a 16-bit value  
Example: "D2C8" typed is sent as 44'H, 32'H, 43'H, 38'H → stored as D2C8'H

#### Case 4

Every GSM character is sent as 4 IRA characters representing one UCS2 character.

Example: To store text "ABC" using UCS2 character set you have to type "004100420043".

This is sent as 30'H,30'H,34'H,31'H, 30'H,30'H,34'H,32'H, 30'H,30'H,34'H,33'H → detected as IRA representation of 3 UCS2 characters, converted to GSM character set and stored as 41'H, 42'H, 43'H.

Maximum input is 640 IRA characters representing 160 UCS2 characters when compression is active. These are converted to 160 GSM 7-bit characters.

Without compression only 140 GSM characters can be stored which are put in as 560 IRA characters.

Values of UCS2 characters must be smaller than 80'H (128 decimal) to be valid GSM characters.

Number of IRA characters must be a multiple of four. Problems:

- "41" → Error, there are four IRA characters (two bytes) needed
- "0000" → Error, not an UCS2 character
- "4142" → Error, value of UCS2 character > 7F'H
- "008B" → Error, value of UCS2 character > 7F'H

This affects the maximum input length of a string)

#### Case 5

Every UCS2 character is sent as 4 IRA characters and is converted into two 8-bit values. This means that the first two characters have to be '00'.

Example: UCS2 character 009F'H typed as "009F" is sent as 30'H,30'H,39'H,46'H → converted into 8-bit value 9F'H.

Maximum number of UCS2 characters is 140 which are represented by 560 IRA characters. Number of IRA characters must be a multiple of four.

#### Case 6

Every UCS2 character is sent as 4 IRA characters each and is converted into a 16-bit value again.

Example: UCS2 character 9F3A'H typed as "9F3A" is sent as 39'H,46'H,33'H,41'H → converted into 9F3A'H.

Maximum number of UCS2 characters is 70 which are represented by 280 IRA characters. Number of IRA characters must be a multiple of four.

Invalid UCS2 values must be prevented.

## 1.7 Communication between Customer Application and HC25

Leaving hardware flow control unconsidered the Customer Application (TE) is coupled with the HC25 (ME) via a receive and a transmit line.

Since both lines are driven by independent devices collisions may (and will) happen. For example, if the TE issues an AT command the HC25 starts sending a URC. This will probably cause the TE to misinterpret of the URC being part of the AT command's response.

To avoid this conflict the following measures must be taken:

- If an AT command is finished (with "OK" or "ERROR") the TE shall always wait at least 100 milliseconds before sending the next one.  
This gives the HC25 the opportunity to transmit pending URCs and get necessary service.  
Note that some AT commands may require more delay after "OK" or "ERROR" response, refer to the following command specifications for details.
- The TE shall communicate with the HC25 using activated echo ([ATE1](#)), i.e. the HC25 echoes characters received from the TE.  
Hence, when the TE receives the echo of the first character "A" of the AT command just sent by itself it has control both over the receive and the transmit paths.

## 1.8 Unsolicited Result Code Presentation

URC stands for Unsolicited Result Code and is a report message issued by the ME without being requested by the TE, i.e. a URC is issued automatically when a certain event occurs. Hence, a URC is not issued as part of the response related to an executed AT command.

Typical events leading to URCs are incoming calls ("RING"), waiting calls, received short messages, changes in temperature, network registration etc. For most of these messages, the ME needs to be configured whether or not to send a URC. Descriptions of these URCs are provided with the associated AT command. Only the URCs related to automatic undervoltage and overvoltage shutdown are not user definable. These URCs are described in Section 1.8.1, [Common URCs](#). A summary of all URCs can be found in Section 20.5, [Summary of Unsolicited Result Codes \(URC\)](#).

As specified in Section 1.4, [HC25 AT Command Interpreter](#) the modem interface is dedicated for data transmission (HSDPA, GPRS, CSD). The application interface is designed primarily for control functions. This implies that the majority of URCs are normally issued on the application interface, no matter which of the AT interfaces was used to send the AT command for activating their presentation. Only URCs relevant for data calls (RING, NO CARRIER) are issued on the modem interface to ensure compatability with existing modem applications.

If the interface is blocked by a running AT command, the URCs are buffered internally and issued when the interface becomes idle again. As far as supported by hardware RING line will be set for 100 ms on URC destination interface `<udi>` if an URC is buffered internal.

Enabled by default when the ME is powered up, the above URC management scheme is the recommended approach for a typical HC25 application. Yet, as an alternative to this approach, the configuration command `AT+SCFG` provides the option to determine the interface used for issuing the URCs. Refer to the `<udi>` parameter for details.

Please note that the URC routing is different if the `AT+SUSB` startup mode "None" is active. In this case all URCs are sent to the modem interface (see description of value "None" for parameter "Startup" (`<start>`) in section `AT+SUSB`). If then the multiplexer is switched on (see `AT+CMUX`), then the default URC management scheme is automatically used (`AT+SCFG` parameter "URC/DstIfc" will be set to "app" automatically). But if the multiplexer is started if `AT+SUSB` startup mode "None" is not active, then the setting of `AT+SCFG` parameter "URC/DstIfc" is not changed!

**IMPORTANT:** When using the modem interface for URC output, keep in mind that if the interface is blocked by an active data connection you are required to suspend the connection to check for pending URCs after RING line signaling.

## 1.8.1 Common URCs

This section contains all URCs not associated to a certain AT command. They cannot be defined by the user and appear automatically when the voltage conditions described below occur. Please refer to [\[2\]](#) for specifications regarding the minimum and maximum operating voltage limits. The automatic shutdown procedure is usually equivalent to the Power-down initiated with the `AT+SMSO` command, except when the voltage threshold is exceeded very quickly.

### URC 1

`^SBC: Undervoltage`

The URC indicates that the ME is close to the undervoltage threshold. If the undervoltage persists the ME keeps sending the URC up to three times within 60 seconds before switching off automatically. When the undervoltage threshold is exceeded before the 60-second period expires the ME will switch off instantly.

### URC 2

`^SBC: Overvoltage Warning`

Module close to overvoltage.

### URC 3

`^SBC: Overvoltage Shutdown`

Overvoltage threshold exceeded. Module switches off within 5 seconds after sending the URC.

## 1.9 Errors and Messages

The command result codes "+CME ERROR: [<err>](#)" and "+CMS ERROR: [<err>](#)" indicate errors related to mobile equipment or network functionality.

The format of [<err>](#) can be either numeric or verbose and is selectable via [AT+CMEE](#).

A result error code terminates the execution of the command and prevents the execution of all remaining commands that may follow on the same command line.

Using the wrong command syntax may result in errors: For example, using the execute command syntax although the command has no execute format, causes "ERROR" to be returned. Likewise, using the write command syntax although the command has no write format causes "+CME ERROR: [<err>](#)" to be returned.

See also:

- Section [2.8.1](#), [CME/CMS Error Code Overview](#)
- Section [2.4.1](#), [Verbose and numeric result codes](#)
- Section [3.2](#), [AT+CEER](#)

## 2. Configuration Commands

The AT Commands described in this chapter allow the external application to determine the HC25's behaviour under various conditions.

### 2.1 AT&F Set all current parameters to manufacturer defaults

[AT&F](#) sets all current parameters to the manufacturer defined profile.

#### Syntax

Exec Command				
AT&F[<value>]				
Response(s)				
OK				
Reference(s)				
V.250	PIN	MDM	APP	Last
	+	+	+	-

#### Parameter Description

<value> <sup>(num)</sup>	
[0]	Set all TA parameters to manufacturer defaults

#### Notes

- List of parameters reset to manufacturer default can be found in Section [20.4, Factory Default Settings Restorable with AT&F](#).
- Every ongoing or incoming call will be terminated.

## 2.2 AT&V Display current configuration

[AT&V](#) returns the status of all AT command parameters applicable to the current operating mode, including the single-letter AT command parameters not otherwise readable.

### Syntax

Exec Command
AT&V
Response(s)
... Status of all AT command parameters applicable to the current operating mode ...
OK

PIN	MDM	APP	Last
+	+	+	-

2.3      **ATQ    Set result code presentation mode**

This parameter setting determines whether or not the TA transmits any result code to the TE. Information text transmitted in response is not affected by this setting.

**Syntax**

Exec Command				
ATQ[<n>]				
Response(s)				
If <n>=0:				
OK				
If <n>=1:				
(none)				
Reference(s)				
V.250	PIN	MDM	APP	Last
	+	+	+	-

**Parameter Description**

<n> <sup>(num)</sup>	
[0] <sup>(&amp;F)</sup>	DCE transmits result code
1	Result codes are suppressed and not transmitted

## 2.4 ATV Set result code format mode

This command determines the contents of header and trailer transmitted with AT command result codes and information responses. Possible responses are described in Section 2.4.1, [Verbose and numeric result codes](#).

### Syntax

Exec Command			
ATV[<value>]			
Response(s)			
OK			
ERROR			
Reference(s)	PIN	MDM	APP
V.250	-	+	+
			Last
			-

### Parameter Description

<value> <sup>(num)</sup>	
[0]	Information response: <text><CR><LF> Short result code format: <numeric code><CR>
1(&F)	Information response: <CR><LF><text><CR><LF> Long result code format: <CR><LF><verbose code><CR>

### 2.4.1 Verbose and numeric result codes

Verbose format	Numeric format	Meaning
OK	0	command executed, no errors
CONNECT	1	link established
RING	2	ring detected
NO CARRIER	3	link not established or disconnected
ERROR	4	invalid command or command line too long
NO DIALTONE	6	no dial tone, dialling impossible, wrong mode
BUSY	7	remote station busy
CONNECT 2400/RLP	47	link with 2400 bps and Radio Link Protocol
CONNECT 4800/RLP	48	link with 4800 bps and Radio Link Protocol
CONNECT 9600/RLP	49	link with 9600 bps and Radio Link Protocol
CONNECT 14400/RLP	50	link with 14400 bps and Radio Link Protocol
ALERTING		alerting at called phone
DIALING		mobile phone is dialing

## 2.5 ATX Set CONNECT result code format

**ATX** determines whether or not the TA transmits particular result codes to the TE. It also controls whether or not the TA verifies the presence of a dial tone when it begins dialing, and whether or not engaged tone (busy signal) detection is enabled.

### Syntax

Exec Command			
ATX[<value>]			
Response(s)			
OK			
ERROR			
Reference(s)	PIN	MDM	APP
V.250	+	+	+
			Last
			-

### Parameter Description

<value> <sup>(num)</sup>	
[0] <sup>(&amp;F)</sup>	CONNECT result code only returned. Dial tone and busy detection are disabled.
1	CONNECT <text> result code returned. Dial tone and busy detection are disabled.
2	CONNECT <text> result code returned. Dial tone detection is enabled, busy detection is disabled.
3	CONNECT <text> result code returned. Dial tone detection is disabled, busy detection is enabled.
4	CONNECT <text> result code returned. Dial tone and busy detection are both enabled.



## 2.7 AT+CFUN Set phone functionality

The [AT+CFUN](#) command serves to control the functionality level of the ME. It can also be used to reset the ME.

### Syntax

Test Command			
AT+CFUN=?			
Response(s)			
+CFUN: (list of supported <fun>s) , (list of supported <rst>s)			
OK			
ERROR			
+CME ERROR: <err>			
Read Command			
AT+CFUN?			
Response(s)			
+CFUN: <fun>			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT+CFUN=<fun>[, <rst>]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
3GPP TS 27.007	-	+	+
			Last
			-

### Parameter Description

<fun> <sup>(num)</sup>	
0	Minimum functionality. TX and RX RF off. The ME logs off from the network. The SIM remains accessible for network independent functions. Note: If used the first time after power-up the <a href="#">AT+CFUN=0</a> command sometimes does not take effect. In such case, it is necessary to send <a href="#">AT+CFUN=1</a> (even though still set), followed by <a href="#">AT+CFUN=0</a> . The problem can be avoided by using <a href="#">AT+CFUN=4</a> which has the same functionality and works properly.
1 <sup>(P)</sup>	Normal functionality
4	Minimum functionality. TX and RX RF off. The ME logs off from the network. The SIM remains accessible for network independent functions.
5	Do not use.
6	Do not use.
7	Do not use.

---

`<rst>^(num)`

Due to the command syntax, you need to enter parameter `<fun>`, followed by `<rst>`, where `<fun>` needs to be set to 1.

- |     |                                                                                                 |
|-----|-------------------------------------------------------------------------------------------------|
| [0] | Do not reset the MT before setting it to <code>&lt;fun&gt;</code> power level.                  |
| 1   | ME resets and restarts. After this, PIN 1 authentication is necessary ( <code>AT+CPIN</code> ). |

## 2.8 AT+CMEE Mobile Equipment Error Message Format

AT+CMEE controls the format of the error result codes that indicates errors related to HC25 functionality. Format can be selected between plain "ERROR" output, error numbers or verbose "+CME ERROR: <err>" and "+CMS ERROR: <err>" messages.

Possible error result codes are listed in Table 2.1, General "CME ERROR" Codes (GSM 07.07) Table 2.2, GPRS related "CME ERROR" Codes (GSM 07.07) and Table 2.4, SMS related "CMS ERROR" Codes (GSM 07.05).

### Syntax

Test Command

AT+CMEE=?

Response(s)

+CMEE: (list of supported<errMode>s)

OK

Read Command

AT+CMEE?

Response(s)

+CMEE: <errMode>

OK

Exec Command

AT+CMEE

Response(s)

OK

ERROR

+CME ERROR: <err>

Write Command

AT+CMEE=<errMode>

Response(s)

OK

ERROR

+CME ERROR: <err>

Reference(s)

3GPP 27.007

PIN	MDM	APP	Last
-	+	+	-

### Parameter Description

<errMode> <sup>(num)</sup>	
0(&F)	Disable result code, i.e. only "ERROR" will be displayed.
1	Enable error result code with numeric values.
2 <sup>(P)</sup>	Enable error result code with verbose (string) values.

### Note

- The exec command performs a write command with factory default parameter setting.

## 2.8.1 CME/CMS Error Code Overview

**Table 2.1:** General "CME ERROR" Codes (GSM 07.07)

<err> Code	Text (if <a href="#">AT+CMEE=2</a> )
0	phone failure
1	no connection to phone
2	phone adapter link reserved
3	operation not allowed
4	operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network timeout
32	network not allowed - emergency calls only
40	network personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
100	unknown

**Table 2.2:** GPRS related "CME ERROR" Codes (GSM 07.07)

<err> Code	Text (if AT+CMEE=2)
103	illegal MS
106	illegal ME
107	GPRS services not allowed
111	PLMN not allowed
112	location area not allowed
113	roaming not allowed in this location area
132	service option not supported
133	requested service option not subscribed
134	service option temporary out of order
148	unspecified GPRS error
149	PDP authentication failure
150	invalid mobile class
273	minimum TFTs per PDP address violated
274	TFT precedence index not unique
275	invalid parameter combination

**Table 2.3:** Enhanced "CME ERROR" Codes

<err> Code	Text (if AT+CMEE=2)
257	network rejected request
258	retry operation
259	invalid deflected to number
260	deflected to own number
261	unknown subscriber
262	service not available
263	unknown class specified
264	unknown network message
300	resource limitation
301	subscription violation
302	TeleService not provisioned
303	error BearerService not provisioned
304	system failure
305	data missing
306	unknown alphabet
307	unexpected data value
308	unrecognized component
309	mistyped component
310	badly structured component
311	mistyped parameter
312	initiating release
320	call barred
330	SMSC address unknown

**Table 2.4:** SMS related "CMS ERROR" Codes (GSM 07.05)

<err> Code	Text (if AT+CMEE=2)
0	none
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
331	no network service
332	network timeout
340	no +CNMA acknowledgement expected
500	unknown error
512	user abort

## 2.9 AT+CSCS Select TE character set

The **AT+CSCS** write command informs the TA which character set **<chset>** is used by the TE. This enables the TA to convert character strings correctly between TE and ME character sets. See also Section 1.6, [Supported character sets](#).

Note that when the TA-TE interface is set to 8-bit operation and the used TE alphabet is 7-bit, the highest bit will be set to zero.

### Syntax

Test Command			
AT+CSCS=?			
Response(s)			
+CSCS: (list of supported<chset>s)			
OK			
Read Command			
AT+CSCS?			
Response(s)			
+CSCS: <chset>			
OK			
Write Command			
AT+CSCS=[<chset>]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
3GPP 27.007	+	+	+
			Last
			-

### Parameter Description

<chset> <sup>(str)</sup>	
"GSM"	GSM default alphabet (GSM 03.38 subclause 6.2.1). Note: This setting may cause software flow control problems since the codes used to stop and resume data flow (XOFF = decimal 19, XON = decimal 17) are interpreted as normal characters.
"UCS2"	16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; e.g. "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99.
"IRA" <sup>(&amp;F)(P)</sup>	International reference alphabet (ITU T T.50).



## 2.11 AT^SCFG Extended Configuration Settings

AT^SCFG can be used to query and configure various settings of the HC25.

The AT^SCFG read command returns a list of all supported parameters and their current values.

The AT^SCFG write command queries a configuration parameter (if no value is entered) or sets its value(s).

If not stated otherwise, then all string parameters of this command are IRA encoded, independent of the current AT+CSCS setting.

The following error messages may be returned by the AT^SCFG write commands:

- "+CME ERROR: operation temporary not allowed"  
Change of parameter value(s) temporarily not allowed.
- "+CME ERROR: invalid index"  
Invalid parameter name or value(s).
- "+CME ERROR: invalid characters in text string"  
Character set conversion of parameter value(s) failed.
- "+CME ERROR: memory failure"  
Could not allocate necessary memory or storing a parameter failed.
- "+CME ERROR: operation not allowed"  
Change of parameter value(s) not allowed
- "+CME ERROR: unknown"  
Other error

### Syntax

#### Test Command

AT^SCFG=?

#### Response(s)

```
^SCFG: "Call/ECC", (list of supported <ecc>s)
^SCFG: "Call/SyncPPP", (list of supported <sppp>s)
^SCFG: "Call/UDI", (list of supported <cudi>s)
^SCFG: "GPRS/Auth", (list of supported <gauth>s)
^SCFG: "GPRS/AutoAttach", (list of supported <gaa>s)
^SCFG: "Ident/Manufacturer", (max. string length of <manufacturer>)
^SCFG: "Ident/Product", (max. string length of <product>)
^SCFG: "MEopMode/RingOnData", (list of supported <ring>s)
^SCFG: "MEopMode/RM", (list of supported <rm>s)
^SCFG: "MESHUTDOWN/OnIgnition", (list of supported <msi>s)
^SCFG: "URC/Dstlfc", (list of supported <udi>s)
OK
```

#### Read Command

AT^SCFG?

#### Response(s)

```
^SCFG: "Call/ECC", <ecc>
^SCFG: "Call/SyncPPP", <sppp>
^SCFG: "Call/UDI", <cudi>
^SCFG: "GPRS/Auth", <gauth>
^SCFG: "GPRS/AutoAttach", <gaa>
^SCFG: "Ident/Manufacturer", <manufacturer>
^SCFG: "Ident/Product", <product>
^SCFG: "MEopMode/RingOnData", <ring>
^SCFG: "MEopMode/RM", <rm>
^SCFG: "MESHUTDOWN/OnIgnition", <msi>
^SCFG: "URC/Dstlfc", <udi>
OK
```

Write Command

Query/Configure Emergency numbers for SIM without ECC field

AT^SCFG="Call/ECC", <ecc>]

Response(s)

^SCFG: "Call/ECC", <ecc>

OK

ERROR

+CME ERROR: <err>

Write Command

PPP configuration for CS data calls

AT^SCFG="Call/SyncPPP", <sppp>]

Response(s)

^SCFG: "Call/SyncPPP", <sppp>

OK

ERROR

+CME ERROR: <err>

Write Command

Select configuration for UDI data calls

AT^SCFG="Call/UDI", <cudi>]

Response(s)

^SCFG: "Call/UDI", <cudi>

OK

ERROR

+CME ERROR: <err>

Write Command

Configure PPP authentication

AT^SCFG="GPRS/Auth", <gauth>]

Response(s)

^SCFG: "GPRS/Auth", <gauth>

OK

ERROR

+CME ERROR: <err>

Write Command

Automatic GPRS attach

AT^SCFG="GPRS/AutoAttach", <gaa>]

Response(s)

^SCFG: "GPRS/AutoAttach", <gaa>

OK

ERROR

+CME ERROR: <err>

Write Command

Configure manufacturer name:

AT^SCFG="Ident/Manufacturer", <manufacturer>]

Response(s)

^SCFG: "Ident/Manufacturer", <manufacturer>

OK

ERROR

+CME ERROR: <err>

Write Command

Configure product name:

```
AT^SCFG="Ident/Product"[, <product>]
```

Response(s)

```
^SCFG: "Ident/Product", <product>
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

Write Command

Ring on URCs and incoming data packets:

```
AT^SCFG="MEopMode/RingOnData"[, <ring>]
```

Response(s)

```
^SCFG: "MEopMode/RingOnData", <ring>
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

Write Command

Query/Configure Registration Mode:

```
AT^SCFG="MEopMode/RM"[, <rm>]
```

Response(s)

```
^SCFG: "MEopMode/RM", <rm>
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

Write Command

Enable/disable shutdown by ignition line

```
AT^SCFG="MEShutdown/OnIgnition"[, <msi>]
```

Response(s)

```
^SCFG: "MEShutdown/OnIgnition", <msi>
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

Write Command

Enable/disable radio bands

```
AT^SCFG="Radio/Band"[, <rba>][, <rbe>]
```

Response(s)

```
^SCFG: "Radio/Band", <rba>
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

Write Command

Specify frequency band group

```
AT^SCFG="Radio/Band/Group"[, <rbg>]
```

Response(s)

```
^SCFG: "Radio/Band/Group", <rbg>
```

```
OK
```

```
ERROR
```

```
+CME ERROR: <err>
```

Write Command

Network selection mode

AT^SCFG="Radio/NWSM"[, <NetworkSelectionMode>]

Response(s)

^SCFG: "Radio/NWSM", <NetworkSelectionMode>

OK

ERROR

+CME ERROR: <err>

Write Command

Configure URC destination interface:

AT^SCFG="URC/DstIfc"[, <udi>]

Response(s)

^SCFG: "URC/DstIfc", <udi>

OK

ERROR

+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

## Parameter Description

<ecc><sup>(str)</sup>

Emergency call numbers on non-ECC SIM

This parameter specifies emergency call numbers on SIM cards without ECC field. The parameter has no influence on the commonly used emergency numbers 112 and 911 which are always supported.

Please refer also to Section 7.2, [ATD](#) where you can find a list of emergency call numbers supported if no SIM is inserted.

The value range of <ecc> is "0"... "255". To select or deselect an emergency number calculate the sum of the values of all desired numbers and use the resulting value. For example, for "08" (2) and "118" (8) please enter the value (10).

Parameter is global for the ME, non-volatile and will not be reset by [AT&F](#). Any change to this parameter will take effect after reboot or SIM insertion.

"0"	No additional emergency numbers
"1"	000
"2"	08
"4"	110
"8"	118
"16"	119
"32"	999
"64"	Reserved
"128"	Reserved
"255" <sup>(D)</sup>	All additional emergency call numbers are supported.

**<sppp><sup>(str)</sup>**

PPP configuration for CS data calls

This parameter can be used to enable the asynchronous to synchronous conversion for PPP-Frames as described in RFC 1662. It is only used for CS data calls when [AT+CBST](#) is set to "transparent" and "64000bps" and "synchronous modem".

Parameter is global for all interfaces, volatile and will not be reset by [AT&F](#).

"0" <sup>(P)</sup>	asynchronous PPP
"1"	synchronous PPP

**<cudi><sup>(str)</sup>**

UDI data call configuration

This parameter can be used to change the used configuration for UDI data calls to meet specific provider requirements.

Parameter is global for all interfaces, volatile and will not be reset by [AT&F](#).

"0" <sup>(P)</sup>	generic UDI data call configuration (provider independent)
"1"	configuration 1

**<gauth><sup>(str)</sup>**

PPP authentication mechanism

This parameter can be used to configure which authentication algorithm the [AT+CGDATA](#) or [ATD\\*99#](#) commands will apply, during the PPP startup phase, for PDP contexts not yet activated.

Parameter is global for all interfaces, volatile and will not be reset by [AT&F](#).

For contexts activated with [AT+CGACT](#) please use the AT command [AT^SGAUTH](#) to configure the authentication method.

"0"	CHAP only
"1"	PAP only
"2" <sup>(P)</sup>	Try CHAP first, then PAP

**<gaa><sup>(str)</sup>**

GPRS with AutoAttach

This parameter can be used to control whether or not the ME will perform a GPRS attach immediately after power-up and registering to the network. If the setting is changed to "enabled" and the ME is not attached yet, it will not initiate an attach immediately but after the next restart and registration to the network.

Parameter is global for all interfaces, non volatile and will not be reset by [AT&F](#).

"disabled" <sup>(D)</sup>	GPRS auto attach is disabled
"enabled"	GPRS auto attach is enabled

**<manufacturer><sup>(str)</sup>**

Manufacturer name

This parameter can be used to configure the name of the product which is displayed with the commands [ATI](#), [AT+GMI](#) and [AT+CGMI](#). Maximal length of the Manufacturer name is 25 characters (or less if you use multibyte characters).

Parameter is global for all interfaces, non volatile and will not be reset by [AT&F](#).

"Siemens"<sup>(D)</sup>

`<product>`<sup>(str)</sup>

#### Product name

This parameter can be used to configure the name of the product which is displayed with the commands [ATI](#), [AT+GMM](#) and [AT+CGMM](#). Maximal length of the product name is 25 characters (or less if you use multibyte characters).

Parameter is global for all interfaces, non volatile and will not be reset by [AT&F](#).

“HC25”<sup>(D)</sup>

`<ring>`<sup>(str)</sup>

#### Ring on Data

HC25 provides an option to wake up external user applications on the ASC0 interface when the Modem interface is assigned to ASC0 (see [AT+SUSB](#)) or multiplex mode is enabled on ASC0 (see [AT+CMUX](#)).

When an external user application is using a power saving mode this should be signaled to the module by an inactive RTS line on the ASC0. In that case the ASC0 interface of HC25 can activate the RING line for 100 ms to wake up the external user application when a URC or incoming circuit switched data packets are sent by the module.

Parameter `<ring>` can be used to control the behavior of the RING line on ASC0 to indicate URCs or incoming data packets. Parameter `<ring>` is volatile and will not be reset by [AT&F](#).

“on” If the RTS line is inactive and there are URCs or incoming circuit switched data packets then the RING line will be activated once for 100 ms.

“off”<sup>(D)</sup> The RING line is not activated when URCs or incoming data packets are transmitted while the RTS line is inactive.

`<rm>`<sup>(str)</sup>

#### Registration Mode

This parameter can be used to influence the time the ME takes to register to the network. Any change to this parameter will take effect after reboot.

Parameter is global for all interfaces, non-volatile and will not be reset by [AT&F](#).

“0”<sup>(D)</sup> Normal  
When trying to register to a network the ME sleeps longer than in "Fast mode" before restarting a network scan.

“1” Fast  
"Fast mode" reduces the time the ME sleeps before restarting a network scan when trying to register.  
Advantage: If the ME is out of network service it may take less time to find a network.  
Disadvantage: Higher current consumption while the ME is out of network service.

`<msi>`<sup>(str)</sup>

MEShutdown/OnIgnition: Enable/disable shutdown by IGT line

The parameter specifies two different switching modes of the ignition line IGT: The line may either be used only to switch on the ME, or to switch it on and off.

Parameter `<msi>` is global for all interfaces, non-volatile and will not be reset by [AT&F](#).

“on” Ignition line (IGT) can be used to switch on and off the ME.

“off”<sup>(D)</sup> Ignition line (IGT) can be used to switch on the ME.

**<rba><sup>(num)</sup>**

Radio/Band: Enable/disable frequency band(s)

The parameter can be used to select or deselect one or several frequency band(s) the ME is allowed to register to.

Please note that the band selection implementation of HC25 is based on a single band group that includes all frequency bands the module is capable of. This enables the module to easily find a suitable network in any country around the world, no matter which frequency bands or band combinations and access technologies are present in a particular area.

Factory default of **<rba>** is "127", meaning that all bands are allowed. Together with the module's power-up default **AT+COPS=0** (automatic mode) this solution allows the subscriber to take advantage of a full-featured automatic network selection when trying to register.

Therefore, changes to the band configuration are recommended only if the subscriber wishes to restrict the allowed bands to a specific band or band combination, in particular to speed up the network search, and thus, to reduce the power consumption. In such case, **<rba>** may be one of the single values listed below or the sum of the values of all desired bands. For example, for 1800 MHz (2) and 850 MHz (8) please enter the value 10. When changing the **<rba>** value you can use the additional **<rbe>** parameter to make the changes take effect immediately without reboot being required (**<rbe>="1"**) or after reboot only (**<rbe>="0"**). In either case, the **<rba>** value returned by the read command **AT^SCFG="Radio/Band"** is non-volatile and will be the value used after next reboot.

Parameter is global for all interfaces, non-volatile and will not be reset by **AT&F**.

1	GSM 900
2	GSM 1800
4	GSM 850
8	GSM 1900
16	WCDMA 2100 (BC1)
32	WCDMA 1900 (BC2)
64	WCDMA 850 (BC5)

**<rbe><sup>(num)</sup>**

Radio/Band: Set frequency band(s) immediately effective

The additional **<rbe>** parameter determines when a changed **<rba>** value becomes effective.

0	<b>&lt;rba&gt;</b> takes effect after next restart.
1	<b>&lt;rba&gt;</b> takes effect immediately and will also be effective after next restart. Setting a new <b>&lt;rba&gt;</b> value and <b>&lt;rbe&gt;= 1</b> causes the ME to restart a network search and to deregister and re-register. If old and new <b>&lt;rba&gt;</b> are the same the command will be accepted without triggering a network search and without effect on the registration.

**<rbg><sup>(num)</sup>**

Radio/Band/Group: Specify frequency band group

The "Radio/Band/Group" feature is deprecated and supported only for backward compatibility. If at all, please use this parameter only if you are not using the "Radio/Band" feature. The usage of both commands is mutually exclusive. See note below for recommendations on how to change host applications based on the HC25 Release 1.

The "Radio/Band/Group" feature enables the HC25 to start searching a network inside a band combination specified by **<rbg>**. Writing **<rbg>** will immediately modify the used bands independently of the **<rba>** settings and will cause the ME to restart a network search based on the new band setting:

Writing **<rbg>** value 0 will restrict the used bands to the EU bands.

Writing **<rbg>** value 1 will restrict the used bands to the US bands.

Writing **<rbg>** value 2 will re-enable all supported bands.

Changing the bands with **<rbg>** takes effect without reboot.

Execution of the write command `AT^SCFG="Radio/Band/Group",<rbg>` causes the ME to deregister from and re-register to the network, if the new <rbg> value differs from the previous value. If old and new <rbg> are the same the command will be accepted without triggering a network search and without effect on the registration. To view the network registration status, it is useful to have the URC "+CREG" enabled. The status of the SIM PIN authentication remains unchanged, eliminating the need to enter the SIM PIN again after the change.

The read command `AT^SCFG="Radio/Band/Group"` displays only the last entered <rbg> value, but cannot display the currently used bands and allowed bands. If no value was set before the read commands returns an ERROR.

- |   |                                                                                                                                                                                                                                                                      |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | All frequency bands typically supported in European countries:<br>GSM 1800, GSM 900, WCDMA 2100.<br>Value 0 is equivalent to <rba>= 19, but <rba> remains unchanged.<br>Value 0 is volatile.                                                                         |
| 1 | All frequency bands typically supported in North American countries:<br>GSM 850, WCDMA 850, GSM 1900, WCDMA 1900.<br>Value 1 is equivalent to <rba>= 108, but <rba> remains unchanged.<br>Value 1 is volatile.                                                       |
| 2 | This option can be used to re-enable all supported bands immediately without reboot if the allowed bands have been restricted.<br>Using value 2 will change <rba> to 127 if the write command <code>AT^SCFG="Radio/Band"</code> with <rba> has not been used before. |

Example: A typical use case of "Radio/Band/Group" may be improving a change from EU to US bands. The same scenario will work in the opposite direction (US to EU).

- Precondition: All bands enabled (<rba>= 127), ME is registered in an EU band.
- Enter `AT^SCFG="Radio/Band/Group",1`. ME deregisters, changes to US band group, searches US bands only and registers in US band group.
- Enter `AT^SCFG="Radio/Band/Group",2`. ME deregisters, enables all bands, and re-registers quickly to US without searching the EU bands. Allowed bands are not restricted (<rba>= 127).

Note: As stated above, the "Radio/Band/Group" <rbg> has become obsolete. Firstly, the "Radio/Band" feature gives you greater flexibility since the single band group implementation (see <rba>) has been introduced. Secondly, using the additional "Radio/Band" parameter <rbe> with value "1" eliminates the need for the "Radio/Band/Group" <rbg>, because there is no longer a difference between the <rba> values currently allowed (and indicated) and those used after next reboot. Therefore, in applications developed with HC25 Release 1 we recommend to replace the group settings as listed below, or rather, rely on the benefits of the single band group implementation.

`AT^SCFG="Radio/Band/Group","0"` may be replaced by `AT^SCFG="Radio/Band","19","1"`.  
`AT^SCFG="Radio/Band/Group","1"` may be replaced by `AT^SCFG="Radio/Band","108","1"`.  
`AT^SCFG="Radio/Band/Group","2"` may be replaced by `AT^SCFG="Radio/Band","127","1"`.

<NetworkSelectionMode>^(str)(+CSCS)

### Network Selection Mode

This parameter allows network selection without considering the MCC.

Parameter is global for all interfaces, volatile and will not be reset by AT&F.

In order to comply with AT&T requirements regarding network selection, the application controlling the HC25 module will have to send the following AT command during the initialization phase: `AT^SCFG="Radio/NWSM","1"`

- |        |                                                      |
|--------|------------------------------------------------------|
| "0"(P) | Network selection compliant with the 3GPP standards. |
| "1"    | Network selection without considering the MCC.       |

<udi><sup>(str)</sup>

#### URC destination interface

This parameter can be used to configure the interface which will be used to output URCs. Note that the recommended approach for a typical HC25 application is using the default configuration. If you consider changing the configuration please carefully read Section 1.4, [HC25 AT Command Interpreter](#) and Section 1.8, [Unsolicited Result Code Presentation](#).

If the application port is not available, then it is not possible to select it.

If the [AT+SUSB](#) startup mode "None" is active, then the powerup value is "mdm", otherwise "app".

If the multiplexer is started with [AT+CMUX](#) and the [AT+SUSB](#) startup mode "None" is active, then automatically the value "app" will be selected.

Parameter is global for all interfaces, volatile and will not be reset by [AT&F](#).

If the modem interface is used, keep in mind, that if the interface is blocked by an active data connection, then this connection should be periodically suspended to check for pending URCs!

"mdm"	Use modem interface to output URCs
"app"	Use application interface to output URCs
"usb0-mdm"	Use modem interface to output URCs. This value is depreciated and supported for compatibility only. This value is not displayed in test command and also never returned in a response. Please use "mdm" instead.
"usb0-app"	Use application interface to output URCs. This value is depreciated and supported for compatibility only. This value is not displayed in test command and also never returned in a response. Please use "app" instead.

## 2.12 AT^SMSO Switch off mobile station

[AT^SMSO](#) initiates the power-off procedure.

### Syntax

Test Command				
AT^SMSO=?				
Response(s)				
OK				
Exec Command				
AT^SMSO				
Response(s)				
OK				
ERROR				
+CME ERROR: <a href="#">&lt;err&gt;</a>				
Reference(s)	PIN	MDM	APP	Last
--	-	+	+	+

### Note

- Do not send any other AT command after [AT^SMSO](#).

## 2.13 AT^SUSB USB Configuration

AT^SUSB can be used to query and configure various settings of the USB interface.

The AT^SUSB read command returns a list of all supported parameters and their current values.

The AT^SUSB write commands query a configuration parameter (if no value is entered) or set the value(s).

Specifications of the USB interface are provided in [2]. Advice on how integrate the HC25 into different operating systems can be found in [12].

### Syntax

#### Test Command

AT^SUSB=?

Response(s)

```
^SUSB: "Startup", (list of supported <start>s)
^SUSB: "MaxPower", (list of supported <maxpow>s)
^SUSB: "PowerSource", (list of supported <powsrc>s)
^SUSB: "Mdm/DD", (list of supported <ddType>s), (max. string length of <langId>), (max. string length of
<vendorId>), (max. string length of <productId>), (max. string length of <manufacturer>), (max. string
length of <product>), (max. string length of <serialNo>)
^SUSB: "MdmNet/DD", (list of supported <ddType>s), (max. string length of <langId>), (max. string length
of <vendorId>), (max. string length of <productId>), (max. string length of <manufacturer>), (max.
string length of <product>), (max. string length of <serialNo>)
^SUSB: "MdmNet/TO", (list of supported <mnto>s)
^SUSB: "MS/CRC", (range of supported <msrcrc>s)
^SUSB: "MS/DD", (list of supported <ddType>s), (max. string length of <langId>), (max. string length of
<vendorId>), (max. string length of <productId>), (max. string length of <manufacturer>), (max. string
length of <product>), (max. string length of <serialNo>)
^SUSB: "MS/OnEject", (list of supported <msoe>s)
^SUSB: "MS/WProt", (list of supported <mswprot>s)
OK
```

#### Read Command

AT^SUSB?

Response(s)

```
^SUSB: "Startup", <start>
^SUSB: "MaxPower", <maxpow>
^SUSB: "PowerSource", <powsrc>
^SUSB: "Mdm/DD", <ddType>[, <langId>, <vendorId>, <productId>, <manufacturer>,
<product>, <serialNo>]
^SUSB: "MdmNet/DD", <ddType>[, <langId>, <vendorId>, <productId>, <manufacturer>,
<product>, <serialNo>]
^SUSB: "MdmNet/TO", <mnto>
^SUSB: "MS/CRC", <msrcrc>
^SUSB: "MS/DD", <ddType>[, <langId>, <vendorId>, <productId>, <manufacturer>, <product>,
<serialNo>]
^SUSB: "MS/OnEject", <msoe>
^SUSB: "MS/WProt", <mswprot>
OK
ERROR
+CME ERROR: <err>
```

Write Command

Startup configuration:

AT^SUSB="Startup"[, <start>]

Response(s)

^SUSB: "Startup", <start>

OK

ERROR

+CME ERROR: <err>

Write Command

Maximum power:

AT^SUSB="MaxPower"[, <maxpow>]

Response(s)

^SUSB: "MaxPower", <maxpow>

OK

ERROR

+CME ERROR: <err>

Write Command

Power source:

AT^SUSB="PowerSource"[, <powsrc>]

Response(s)

^SUSB: "PowerSource", <powsrc>

OK

ERROR

+CME ERROR: <err>

Write Command

"Mdm" device descriptor configuration:

AT^SUSB="Mdm/DD"[, <ddType>[, <langId>, <vendorId>, <productId>, <manufacturer>, <product>, <serialNo>]]

Response(s)

^SUSB: "Mdm/DD", <ddType>[, <langId>, <vendorId>, <productId>, <manufacturer>, <product>, <serialNo>]

OK

ERROR

+CME ERROR: <err>

Write Command

"MdmNet" device descriptor configuration:

AT^SUSB="MdmNet/DD"[, <ddType>[, <langId>, <vendorId>, <productId>, <manufacturer>, <product>, <serialNo>]]

Response(s)

^SUSB: "MdmNet/DD", <ddType>[, <langId>, <vendorId>, <productId>, <manufacturer>, <product>, <serialNo>]

OK

ERROR

+CME ERROR: <err>

Write Command

Modem Class request timeout period:

AT^SUSB="MdmNet/TO"[, <mnto>]

Response(s)

^SUSB: "MdmNet/TO", <mnto>

OK

ERROR

+CME ERROR: <err>

Write Command

Query Mass Storage CRC:

AT^SUSB="MS/CRC"

Response(s)

^SUSB: "MS/CRC", <mscrc>

OK

ERROR

+CME ERROR: <err>

Write Command

Mass Storage device descriptor configuration:

AT^SUSB="MS/DD"[, <ddType>[, <langId>, <vendorId>, <productId>, <manufacturer>, <product>, <serialNo>]]

Response(s)

^SUSB: "MS/DD", <ddType>[, <langId>, <vendorId>, <productId>, <manufacturer>, <product>, <serialNo>]

OK

ERROR

+CME ERROR: <err>

Write Command

Query usable Mass Storage size:

AT^SUSB="MS/FSize"

Response(s)

^SUSB: "MS/FSize", <msfs>

OK

ERROR

+CME ERROR: <err>

Write Command

Configure the mode after Mass Storage eject:

AT^SUSB="MS/OnEject"[, <msoe>]

Response(s)

^SUSB: "MS/OnEject", <msoe>

OK

ERROR

+CME ERROR: <err>

Write Command

Mass Storage write protection:

AT^SUSB="MS/WProt"[, <mswprot>]

Response(s)

^SUSB: "MS/WProt", <mswprot>

OK

Write Command

(Continued)

Mass Storage write protection:

AT^SUSB="MS/WProt"[, <mswprot>]

Response(s)

ERROR

+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

## Parameter Description

<start><sup>(str)</sup>

USB startup configuration

This parameter can be used to control the USB startup enumeration. Any change takes effect the next time the ME is re-enumerated.

Parameter is global for all interfaces, non-volatile and will not be reset by AT&F.

"MS"

On power-up the HC25 enumerates as USB mass storage device. The Product ID for the mass storage device is 0x0041.

The mass storage can be used with standard drivers typically integrated in most operating systems.

When you are finished using the mass storage you can easily switch over to composite device operation. To do so, use the Eject option. Under Windows XP, for example, open the Windows Explorer, right-click the "Removable Disk" drive and select "Eject". This deactivates the mass storage and, at the same time, activates the USB composite communication device without any need to restart the ME. Parameter <msoe> determines the type of USB composite communication device to activate when the mass storage is ejected.

The option "Safely Remove the Hardware" commonly used for USB devices under Windows terminates the mass storage function without activating the composite device function.

"MdmNet"<sup>(D)</sup>

On power-up the HC25 enumerates as USB composite communication device with the following virtual ports: modem port, application port (VCOM) and wireless network adapter (NET).

The Product ID for this enumeration is 0x0040.

The "MdmNet" enumeration mode is intended for PC based Windows operating systems and is fully supported by the HC25 USB driver package supplied by Cinterion Wireless Modules GmbH for Windows XP and Windows Vista.

"Mdm"

On power-up the HC25 enumerates as USB composite communication device supporting modem port and application port (VCOM), but no wireless network adapter (NET).

The Product ID for this enumeration is 0x0047.

The "Mdm" enumeration mode is not supported by the HC25 USB driver package supplied by Cinterion GmbH for Windows XP and Windows Vista.

Before selecting "Mdm" carefully read the information provided in [12]. See also notes below.

"None"

On power-up the modem port is assigned to ASC0. The application port is only available if the multiplexer is started (see AT+CMUX). All URcs are routed to the modem interface (for details see AT^SCFG parameter "URC/Dstlfc" (<udi>) and Section 1.8, Unsolicited Result Code Presentation).

Please note that the HC25 enumerates as USB composite communication device, but neither the virtual USB ports nor the wireless network adapter (NET) are operational.

The Product ID for this enumeration is the same as for "MdmNet".

<maxpow>^(str)

Maximum power

Maximum power consumption of the USB device from the USB bus. This parameter is reported to a USBhost as part of the USB enumeration.

Only even values are supported. Odd values are truncated.

Any change of this parameter becomes active with the next device enumeration.

Parameter is global for all interfaces, non-volatile and will not be reset by AT&F.

0...10<sup>(D)</sup>...500                      Device maximum power consumption in mA

<powsrc>^(str)

Power source

This parameter can be used to specify the power source. Any change of this parameter becomes active with the next device enumeration.

Parameter is global for all interfaces, non-volatile and will not be reset by AT&F.

"BUS"                                      Device enumerates as bus powered device.

"SELF"<sup>(D)</sup>                                  Device enumerates as self powered device.

<mnto>^(str)

Modem and Modem/Net Class Request timeout

This parameter specifies the time the HC25 waits for a Communication Device Class request from the host. Any change takes effect the next time the ME is restarted.

Parameter is global for all interfaces, non-volatile and will not be reset by AT&F.

"0"                                          No timeout supervision

100...10000<sup>(D)</sup>...65535                  Timeout in ms  
If no Communication Device Class request is received within the specified time the ME enumerates as mass storage device.  
This is typically the case if you have not yet installed the supplied HC25 USB drivers on Windows XP or Windows Vista, or if you select an enumeration mode not supported by the operating system and then reboot the ME on the same system (e.g. "Mdm" on a Windows system or "MdmNet" on a non-Windows system). See notes below.

<msfs>^(str)

Mass storage size

This parameter reports the usable USB mass storage size.

0...2147483647                          Usable mass storage size in bytes.

<mscrc>^(str)

Mass storage CRC value

This parameter reports the USB mass storage CRC value.

00000000...FFFFFFFF                  ASCII hex CRC value up to 8 digits long; if CRC recalculation is not finished yet, then a ASCII question mark is appended.

<msoe><sup>(str)</sup>

#### Mode on mass storage eject

This parameter determines the type of USB composite communication device to activate when the mass storage is ejected.

Parameter is global for all interfaces, non-volatile and will not be reset by [AT&F](#).

“MdmNet”<sup>(D)</sup> After ejecting the mass storage the HC25 enumerates as USB composite communication device with modem port, application port (VCOM) and wireless network adapter (NET).

“Mdm” After ejecting the mass storage the HC25 enumerates as USB composite communication device with modem port and application port (VCOM).  
The “Mdm” enumeration mode is not supported by the HC25 USB driver package supplied by Cinterion GmbH for Windows XP and Windows Vista.  
Before selecting “Mdm” carefully read the information provided in [\[12\]](#). See also notes below.

<mswprot><sup>(str)</sup>

#### Mass storage write protection

This parameter can be used to enable or disable the USB mass storage write protection. communication device (modem). Any change of this parameter becomes active immediately.

Parameter is global for all interfaces, non-volatile and will not be reset by [AT&F](#).

“Enabled” Mass storage is write protected

“Disabled”<sup>(D)</sup> Mass storage is not write protected

<ddType><sup>(str)</sup>

#### Device descriptor type

This parameter determines whether to use the Cinterion standard USB Device Descriptor configuration (default) or a Device Descriptor configuration customized by the application manufacturer.

Parameter is global, stored non-volatile in ME and not reset by [AT&F](#). Setting will be active after HC25 restart.

“0”<sup>(D)</sup> Cinterion standard USB Device Descriptor.  
If <ddType>=0 is set all other parameters related to the device descriptor configuration cannot be changed and are not displayed by the read command.

“1” Customer specific USB Device Descriptor.  
If <ddType>=1 is set all other parameters related to the device descriptor configuration can be changed and are displayed by the read command.  
Customizing the USB Device Descriptor configuration requires a unique Vendor ID obtained from the USB Implementers Forum. For information please refer to <http://www.usb.org>.  
*Attention!* You may need an appropriate driver (e.g. for use under Windows a customized INF file must be present in which all the contained strings must be identical with the strings given for the customized device descriptor configuration parameters). *Otherwise you may not longer be able to access the module!*

<langId><sup>(str)</sup>

#### Language ID

Please refer to [USB.ORG](http://USB.ORG) [\[31\]](#) to find the language IDs currently defined for USB devices.

Parameter is displayed and can be set only if Device descriptor type <ddType> is set to “1”.

Parameter is global, stored non-volatile in ME and not reset by [AT&F](#). Setting will be active after HC25 restart.

Parameter length: maximum 4 hexadecimal characters.

**<vendorId><sup>(str)</sup>**

### Vendor ID

This parameter represents the hexadecimal encoded Vendor ID obtained from the USB Implementers Forum. The Vendor ID will, together with the Product ID, be transmitted to the host during initialization. The given Vendor ID must be included in the INF file needed for Windows.

Parameter is displayed and can be set only if Device descriptor type **<ddType>** is set to "1".

Parameter is global, stored non-volatile in ME and not reset by **AT&F**. Setting will be active after HC25 restart.

Parameter length: maximum 4 hexadecimal characters.

**<productId><sup>(str)</sup>**

### Product ID

Hexadecimal encoded Product ID (PID) defined by the application manufacturer to identify the USB device.

The Product ID will, together with the Vendor ID, be transmitted to the host during initialization. The given Product ID must be included in the INF file needed for Windows.

Parameter is displayed and can be set only if Device descriptor type **<ddType>** is set to "1".

Parameter is global, stored non-volatile in ME and not reset by **AT&F**. Setting will be active after HC25 restart.

Parameter length: maximum 4 hexadecimal characters.

**<manufacturer><sup>(str)(+CSCS)</sup>**

### Manufacturer name

Manufacturer string defined by the application manufacturer. The same string shall be included in the INF file needed for Windows.

Parameter is displayed and can be set only if Device descriptor type **<ddType>** is set to "1".

Parameter is global, stored non-volatile in ME and not reset by **AT&F**. Setting will be active after HC25 restart.

Parameter length: maximum 25 characters.

**<product><sup>(str)(+CSCS)</sup>**

### Product string

Optional product name defined by the application manufacturer. It is recommended to include the same string into the INF file.

Parameter is displayed and can be set only if Device descriptor type **<ddType>** is set to "1".

Parameter is global, stored non-volatile in ME and not reset by **AT&F**. Setting will be active after HC25 restart.

Parameter length: maximum 25 characters.

**<serialNo><sup>(str)(+CSCS)</sup>**

### Device's serial number

Serial number. If not used please use a empty string.

A serial number has several advantages. For example, it enables the host to assign the same virtual COM port to same USB device even though the device is connected to another USB port. This eliminates the need for the host to load the driver again.

Parameter is displayed and can be set only if Device descriptor type **<ddType>** is set to "1".

Parameter is global, stored non-volatile in ME and not reset by **AT&F**. Setting will be active after HC25 restart.

Parameter length: maximum 25 characters.

## Note

- When changing the USB enumeration parameters take care to choose the right configuration depending on the type of USB drivers used. Keep in mind that "Mdm" makes the ME inaccessible with the Windows XP and Windows Vista USB drivers supplied by Cinterion Wireless Modules GmbH.  
If alternate usage with different USB drivers is necessary during application development, take care not to change all three enumeration parameters **<start>**, **<msoe>** and **<mnto>** for only one specific driver setup. In particular, we strongly recommend to configure **<start>** and **<msoe>** for different USB enumeration modes. This gives you the flexibility to easily revert to the enumeration mode needed when you connect the

ME to a USB host based on another driver setup. For example, if `<start>` equals "Mdm" select "MdmNet" for `<msoe>` or vice versa.

Also, do not set `<mnto>` = "0" because the timeout enables the ME to enumerate as mass storage if the drivers required by the currently selected enumeration mode are not found. Depending on whether drivers are installed you can then decide how to proceed: installing the USB drivers if required, or, if the drivers are already installed, ejecting the mass storage to revert to the composite device enumeration needed.

Of course, if you do not wish to operate the ME with different drivers the "MdmNet" and "Mdm" enumeration modes should not be different for `<start>` and `<msoe>`.

## 3. Status Control Commands

The AT Commands described in this chapter allow the external application to obtain various status information from the HC25.

### 3.1 AT^SIND Extended Indicator Control

The **AT^SIND** command controls the presentation of Indicator Event Reports. You can enable / disable URCs to be output each time when the value of the related indicator changes, you can request the current status of all indicators, and you can also query the status of a single indicator.

#### Syntax

##### Test Command

AT^SIND=?

Response(s)

^SIND: (<indDescr>, list of supported <indValue>s)[, (<indDescr>, list of supported <indValue>s)[, ...]], (list of supported <mode>s)  
OK

##### Read Command

AT^SIND?

Response(s)

^SIND: <indDescr>, <mode>, <indValue>  
[^SIND: <indDescr>, <mode>, <indValue>]  
...  
OK  
ERROR  
+CME ERROR: <err>

##### Write Command

AT^SIND=<indDescr>, <mode>

Response(s)

^SIND: <indDescr>, <mode>, <indValue>

In case of: <indDescr>="eons" and <mode>=2

^SIND: <indDescr>, <mode>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>

In case of: <indDescr>="nitz" and <mode>=2

^SIND: <indDescr>, <mode>, <nitzUT>, <nitzTZ>, <nitzDST>

OK  
ERROR  
+CME ERROR: <err>

##### Reference(s)

--

PIN	MDM	APP	Last
-	+	+	-

## Unsolicited Result Codes

### URC 1

Format of the standard indicator:

+CIEV: [<indDescr>](#), [<indValue>](#)

Value of an indicator has changed.

### URC 2

Format of the "eons" indicator:

+CIEV: [<indDescr>](#), [<indValue>](#), [<eonsOperator>](#), [<servProvider>](#),  
[<servProviderType>](#)

One URC is issued for each new LAI (Location Area Information) broadcast by the network.

### URC 3

Format of the "nitz" indicator:

+CIEV: [<indDescr>](#), [<nitzUT>](#), [<nitzTZ>](#), [<nitzDST>](#)

## Parameter Description

[<indDescr>](#)<sup>(str)</sup>

String values and their [<indValue>](#) ranges.

"signal"	Channel bit error rate of the signal received: The parameter is always set to value 99. See also <a href="#">AT+CSQ</a> .
"service"	Service availability: 0 Not registered to any network. 1 Registered to home network or, if "roam"=1 then registered to another network.
"sounder"	Sounder activity: Reports every event that causes the ME to generate a tone. 0 Tone generator not active. 1 Tone generator active. Value 1 means for example: Incoming call - ME is ringing. Note that in this case the URC "+CIEV: sounder" will be output only if ringing tones are enabled with <a href="#">AT^SRTC</a> . Waiting call - ME generates waiting call tone (if call waiting is enabled). Outgoing call - ME generates BUSY tone. Playback of ringing tones when tested with <a href="#">AT^SRTC</a> .
"message"	Unread short message at memory location <a href="#">&lt;mem1&gt;</a> . Refer to <a href="#">AT+CPMS</a> . 0 No unread message(s) available. 1 Unread message(s) available.
"call"	Call in progress: 0 No call. 1 At least one MO or MT call is in state "active" (connection established).
"roam"	Roaming indicator: 0 Registered to home network or not registered. 1 Registered to other network.
"smsfull"	Capacity of storage for received short messages: 0 The short message memory location <a href="#">&lt;mem3&gt;</a> is still free or has just become free again. Refer to <a href="#">AT+CPMS</a> . 1 All memory locations of <a href="#">&lt;mem3&gt;</a> are used up.

"rssi"	<p>Received signal (field) strength:</p> <ul style="list-style-type: none"> <li>0 Signal strength <math>\leq</math> -112 dBm</li> <li>1 - 4 Signal strength in 15 dB steps</li> <li>5 Signal strength <math>\geq</math> -51 dBm</li> <li>99 Signal strength not known or not detectable</li> </ul> <p>Received signal (field) strength can also be obtained with <a href="#">AT+CSQ</a>. However, the signal strength is scaled to value range 0..31 by this command.</p>
"audio"	<p>Activity of the built-in audio unit:</p> <ul style="list-style-type: none"> <li>0 Audio unit not active.</li> <li>1 Audio unit is active, for example: <ul style="list-style-type: none"> <li>MO voice call: Indicator is output with value 1 when dialing starts.</li> <li>MT voice call: Indicator is output with value 1 when call is answered.</li> </ul> </li> </ul>
"eons"	<p>Enhanced Operator Name String (EONS) Indication:</p> <p>The Enhanced Operator Name String indicator feature allows the HC25 to output various operator names for different PLMN identities via URC. It also allows the output of a different operator name based on a subset of the registered network by using a range of Location Area Codes (LACs) or a single LAC.</p> <p>The presentation of the "eons" indicator is determined by network activity. For example, the indicator appears every time a location update occurs or a NITZ information is sent, no matter whether or not the status of the EONS information has changed. This means that the same EONS information may be reported several times.</p> <p>The EONS tables are stored in the SIM card and will be read at power-up. Following are the SIM Elementary Files that are affected by the introduction of EONS feature in the SIM card:</p> <ul style="list-style-type: none"> <li>EF<sub>SST</sub> (SIM Service Table) - describes which features are active.</li> <li>EF<sub>OPL</sub> (Operator PLMN List) - contains the PLMN identification and location ID together with the index of the corresponding PNN record</li> <li>EF<sub>PNN</sub> (PLMN Network Name) - contains the full and short form version of the network name for the registered PLMN</li> </ul> <p>If the Operator Name Source is CPHS Operator Name String long and short form, refer to <a href="#">&lt;indValue&gt;</a>, the following two SIM Elementary Files will be used:</p> <ul style="list-style-type: none"> <li>EF<sub>ONString</sub> (Operator Name String) - contains the name of the PLMN operator who issued the SIM.</li> <li>EF<sub>OPShort</sub> (Operator Name Short form) - contains a short form of the name of the PLMN operator who issued the SIM.</li> </ul>
"nitz"	<p>Network Identity and Time Zone indication:</p> <p>This indicator shows the time relevant information elements of an MM Information (MMI) or GMM Information (GMMI) message received from the network (see GSM 24.008, ch. 9.2.15a and 9.4.19). The network usually sends a NITZ indicator when the mobile attaches to the network, when it enters a location area with different time zone or when a daylight change occurs.</p> <p>A NITZ indicator may consist of the following parameters: Universal Time (UT), local Time Zone (TZ), Daylight Saving Time (DST). All information elements of MMI/GMMI are optional and therefore, the presentation of the parameters <a href="#">&lt;nitzUT&gt;</a>, <a href="#">&lt;nitzTZ&gt;</a>, <a href="#">&lt;nitzDST&gt;</a> varies with the network. For example, the network may send all three parameters UT, TZ, DST, or only UT and TZ or only TZ.</p> <p>UT is indicated in usual date/time format and represents the current world time (GMT) at the moment when sent.</p> <p>TZ is given as a positive (east) or negative (west) offset from UT in units of 15 minutes.</p> <p>DST shows the number of hours added to the local TZ because of daylight saving time (summertime) adjustment. Usually DST is 1 hour but it can be also 2 hours in certain locations.</p> <p>Example for time and time zone with DST: +CIEV: nitz,"04/07/23,13:39:20",-28,1</p>

In this example TZ is -28, showing a time offset of -7 hours (west) to Universal Time/GMT (which never changes for DST). DST is 1 which indicates that one hour was added to TZ because of Daylight Saving Time. If a network does not send the DST parameter the TZ value would be -32 (8 hours west) as would be done in winter:

+CIEV: nitz,"04/11/23,13:39:20",-32

Please be aware that although the last NITZ value can be looked up again via "AT^SIND=nitz,2" the returned values may be out of date. Especially the UT value is obsolete because there is no internal NITZ clock and therefore no continuation of UT.

NITZ values are lost when the module detaches from network. Also when a manual network selection fails and the module automatically falls back to the previous network the NITZ values cannot be recalled. Nevertheless an indicated time zone is valid until a new MMI/GMMI will trigger another NITZ indication.

"simstatus"

SIM Status Indication:

The SIM Status indicator allows the HC25 to output the status of the subscriber identity module (SIM) via URC.

0 SIM card removed.

Note: Another way to verify the SIM card connection is the "[^SCKS](#)" URC enabled with [AT^SCKS](#).

1 SIM card inserted.

5 SIM initialization completed - ME has finished reading SIM data.

"psinfo"

Packet Switched Status Indication

"psinfo" indicates the status of the module related to packet switched data calls.

0 GPRS/EGPRS not available in currently used cell

1 GPRS available in currently used cell

2 GPRS attached

3 EGPRS available in currently used cell

4 EGPRS attached

5 camped on WCDMA cell

6 WCDMA PS attached

7 camped on HSDPA-capable cell

8 PS attached in HSDPA capable cell

"vcall"

Incoming call is a video call

0 No incoming video call.

1 The incoming call is a video call.

**<indValue><sup>(num)</sup>**

Integer type value in the range stated above for the corresponding [<indDescr>](#).

Notes specific to the EONS feature:

If the indicator is "eons", the [<indValue>](#) is a type associated to the operator name according to GSM 22.101 [\[29\]](#). This type depends on the source of the operator name.

Priority of types associated to the operator names is defined as follows (the type listed first has the highest priority). If a type cannot be indicated the next one will be used.

0 Not registered.

1 EF-OPL and EF-PNN (alphanumeric format, can contain up to 24 characters.)

2 Operator Name String in long and short format according to Common PCN Handset Specification (CPHS) [\[30\]](#) (alphanumeric format, can contain up to 16 characters).

3 Name information received by the NITZ service long and short form (alphanumeric format, can contain up to 16 characters). The short form will be displayed only if EF<sub>OPShort</sub> from CPHS is available.

4 Any operator name stored internal to the ME (alphanumeric format, can contain up to 16 characters).

5 Broadcast MCC-MNC (numeric format which consists of a 3-digit country code plus a 2- or 3-digit network code).  
If the type is 2, 4 or 5, **AT+COBS** with the appropriate **<mode>** displays the same operator name.

**<mode>**<sup>(num)</sup>

0(&F)(P)	Disables the presentation of a specific URC.
1	Enables the presentation of a specific URC. The URC will be buffered in the TA when the TA-TE link is reserved (e.g. in online data mode), and flushed to the TE when the TA-TE link is free again. Otherwise, the URC will be forwarded directly to the TE.
2	Requests the presentation mode of the URC status and the current value of a single indicator type.

**<eonsOperator>**<sup>(str)(+CSCS)</sup>

Operator in format which depends on the type associated to the operator name. Refer to **<indValue>**.

**<servProvider>**<sup>(str)(+CSCS)</sup>

Service Provider Name according to the status settings (SIM Service No. 17) in the SIM Service Table (SST) of the SIM.  
Service Provider Name (SPN) will be read from EF<sub>SPN</sub>. Service Provider Display Information (SPDI) will be read from EF<sub>SPDI</sub> list.

**<servProviderType>**<sup>(num)</sup>

Service Provider Type according to Registered Public Land Mobile Network (RPLMN) and Home Public Land Mobile Network (HPLMN).

0	No Service Provider Information available.
1	Service Provider Name will be displayed. RPLMN is the HPLMN.
2	Service Provider Display Information will be displayed. One list entry is equal to the RPLMN.

**<nitzUT>**<sup>(str)(+CSCS)</sup>

Universal Time delivered as part of the "nitz" Indicator. Refer to **<indDescr>**.

**<nitzTZ>**<sup>(num)</sup>

Time Zone delivered as part of the "nitz" Indicator. Refer to **<indDescr>**.

**<nitzDST>**<sup>(num)</sup>

Adjustment for Daylight Saving Time as part of the "nitz" Indicator. Refer to **<indDescr>**.

## 3.2 AT+CEER Extended Error Report

AT+CEER returns an extended error report regarding the reason of the last

- call release
- failure to set up a call (both mobile originated or terminated)
- failure to modify a call by using Supplementary Services
- failed attempt to activate, register, query, deactivate or deregister a Supplementary Service
- unsuccessful GPRS attach or unsuccessful PDP context activation
- GPRS detach or PDP context deactivation

≠The release cause report <report> is a single line containing the cause information given by GSM network in textual format.

### Syntax

Test Command			
AT+CEER=?			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Exec Command			
AT+CEER			
Response(s)			
+CEER: <report>			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.07	+	+	+
			Last
			-

### Parameter Description

<report><sup>(str)</sup>

release cause report

Reason for the last call failure to setup or release (listed in Section 3.2.1, [List of status codes for the extended error report](#)).

Both CS and PS domain call types are reported. Cause data is captured from Call Manager events and cached locally to later use by this command.

### 3.2.1 List of status codes for the extended error report

CS internal cause lookup

no cause information available (default)

phone is offline

no service available

network release, no reason given

received incoming call

CS internal cause lookup

client ended call

UIM not present

access attempt already in progress

access failure, unknown source

concur service not supported by network

no response received from network

GPS call ended for user call

SMS call ended for user call

data call ended for emergency call

rejected during redirect or handoff

lower-layer ended call

call origination request failed

client rejected incoming call

client rejected setup indication

network ended call

no funds available

no service available

full service not available

maximum packet calls exceeded

video connection lost

video protocol closed after setup

video protocol setup failure

internal error

CS network cause lookup

unassigned/unallocated number

no route to destination

channel unacceptable

operator determined barring

normal call clearing

user busy

no user responding

user alerting, no answer

call rejected

number changed

non selected user clearing

destination out of order

invalid/incomplete number

facility rejected

response to status enquiry

normal, unspecified

no circuit/channel available

CS network cause lookup

network out of order

temporary failure

switching equipment congestion

access information discarded

requested circuit/channel not available

resources unavailable, unspecified

quality of service unavailable

requested facility not subscribed

incoming calls barred within the CUG

bearer capability not authorized

bearer capability not available

service/option not available

bearer service not implemented

ACM  $\geq$  ACM max

requested facility not implemented

only RDI bearer is available

service/option not implemented

invalid transaction identifier value

user not member of CUG

incompatible destination

invalid transit network selection

semantically incorrect message

invalid mandatory information

message non-existent/not implemented

message type not compatible with state

IE non-existent/not implemented

conditional IE error

message not compatible with state

recovery on timer expiry

protocol error, unspecified

interworking, unspecified

CS network reject lookup

IMSI unknown in HLR

illegal MS

IMSI unknown in VLR

IMEI not accepted

illegal ME

GPRS services not allowed

GPRS and non GPRS services not allowed

MS identity cannot be derived

implicitly detached

CS network reject lookup
PLMN not allowed
location area not allowed
roaming not allowed
GPRS services not allowed in PLMN
no suitable cells in location area
MSC temporary not reachable
network failure
MAC failure
synch failure
congestion
GSM authentication unacceptable
service option not supported
requested service option not subscribed
service option temporary out of order
call cannot be identified
no PDP context activated
semantically incorrect message
invalid mandatory information
message type non-existent
message type not compatible with state
information element non-existent
message not compatible with state
RR release indication
RR random access failure
RRC release indication
RRC close session indication
RRC open session failure
low level failure
low level failure no redial allowed
invalid SIM
no service
timer T3230 expired
no cell available
wrong state
access class blocked
abort message received
other cause
timer T303 expired
no resources
release pending
invalid user data

PS internal cause lookup

invalid connection identifier

invalid NSAPI

invalid primary NSAPI

PDP establish timeout

invalid field

SNDTCP failure

RAB setup failure

no GPRS context

PDP activate timeout

PDP modify timeout

PDP inactive max timeout

PDP lowerlayer error

PDP duplicate

access technology change

PDP unknown reason

CS PS network cause lookup

LLC or SNDTCP failure

insufficient resources

missing or unknown APN

unknown PDP address or PDP type

user authentication failed

activation rejected by GGSN

activation rejected, unspecified

service option not supported

requested service option not subscribed

service option temporary out of order

NSAPI already used (not sent)

regular deactivation

QoS not accepted

network failure

reactivation required

feature not supported

semantic error in the TFT operation

syntactical error in the TFT operation

unknown PDP context

PDP context without TFT already activated

semantic errors in packet filter

syntactical errors in packet filter

invalid transaction identifier

semantically incorrect message

invalid mandatory information

---

CS PS network cause lookup
message non-existent/not implemented
message type not compatible with state
IE non-existent/not implemented
conditional IE error
message not compatible with state
protocol error, unspecified

### 3.3 AT+CPAS Mobile equipment activity status

The [AT+CPAS](#) execute command indicates the activity status of the ME.

#### Syntax

Test Command				
AT+CPAS=?				
Response(s)				
+CPAS: (list of supported<pas>s)				
OK				
Exec Command				
AT+CPAS				
Response(s)				
+CPAS: <pas>				
OK				
Reference(s)				
GSM 07.07	PIN	MDM	APP	Last
	-	+	+	-

#### Parameter Description

<pas> <sup>(num)</sup>	
0	Ready
3	Incoming call (ringing)
4	Call in progress

**3.4 AT+WS46 Select wireless network**

The [AT+WS46](#) command is intended for reading the current status of the network selection. The write command has no effect. To select the network please use the [AT+COPS](#) command.

**Syntax**

Test Command			
AT+WS46=?			
Response(s)			
+WS46: (list of supported<n>s)			
OK			
Read Command			
AT+WS46?			
Response(s)			
<n>			
OK			
Write Command			
AT+WS46=[<n>]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.07	-	+	+
			Last
			-

**Parameter Description**

<n> <sup>(num)</sup>	
12	GSM Digital Cellular Systems (GERAN only)
22	UTRAN only
25	3GPP Systems (both GERAN and UTRAN)

## 4. Serial Interface Control Commands

The AT Commands described in this chapter allow the external application to determine various settings related to the HC25's serial interface.

### 4.1 AT\Q Flow control

HC25 always uses RTS/CTS hardware flow control. [AT\Q](#) exists for compatibility reasons only, though usage will not take effect.

#### Syntax

Exec Command
AT\Q[<n>]
Response(s)
OK

PIN	MDM	APP	Last
-	+	+	-

#### Parameter Description

<n> <sup>(num)</sup>	
[3] <sup>(&amp;F)</sup>	RTS/CTS hardware flow control

## 4.2 AT&C Set Data Carrier Detect (DCD) line mode

AT&C determines how the state of the DCD line reflects the ME's internal activity.

### Syntax

Exec Command

AT&C[<value>]

Response(s)

OK

PIN	MDM	APP	Last
+	+	+	-

### Parameter Description

<value><sup>(num)</sup>

[0]	DCD line shall always be on.
1	DCD line shall be on only when data carrier signal is present.
2(&F)	Setting winks (briefly transitions off, then back on) the DCD line when data calls end.

4.3      **AT&D    Set Data Terminal Ready (DTR) line mode**

AT&D determines how the ME responds if DTR line is changed from ON to OFF state during data mode.

**Syntax**

Exec Command				
AT&D[<value>]				
Response(s)				
OK				
	PIN	MDM	APP	Last
	+	+	+	-

**Parameter Description**

<value> <sup>(num)</sup>	
[0]	ME ignores status of DTR line.
1	ON->OFF on DTR: Change to command mode while retaining the connected call.
2(&F)	ON->OFF on DTR: Disconnect (CSD or PPP) data call and change to command mode. During OFF state of the DTR line auto-answer is disabled.

4.4 AT&S Set Data Set Ready (DSR) line mode

AT&S determines how the ME sets the DSR line depending on its communication state.

Syntax

Exec Command				
AT&S[<value>]				
Response(s)				
OK				
Reference(s)				
V.250	PIN	MDM	APP	Last
	-	+	+	-

Parameter Description

<value> <sup>(num)</sup>	
[0] <sup>(&amp;F)</sup>	DSR line is always ON
1	ME in command mode: DSR is OFF. ME in data mode: DSR is ON.

The [ATE](#) command determines whether or not the TA echoes characters received from TE during command state.

Exec Command  
ATE[<value>  
Response(s)  
OK

Reference(s)	PIN	MDM	APP	Last
V.250	-	+	+	-

<value> <sup>(num)</sup>	
0	Echo mode off
[1] <sup>(&amp;F)</sup>	Echo mode on

## 4.6 AT+IPR Set local bit rate

ME uses fixed bit rate of 115200 for its asynchronous serial interface. Therefore, [AT+IPR](#) exists for compatibility reasons only and its usage will not take effect.

### Syntax

Test Command			
AT+IPR=?			
Response(s)			
+IPR: (list of supported <a href="#">&lt;rate&gt;</a> s)			
OK			
Read Command			
AT+IPR?			
Response(s)			
+IPR: <a href="#">&lt;rate&gt;</a>			
OK			
Write Command			
AT+IPR= <a href="#">&lt;rate&gt;</a>			
Response(s)			
OK			
ERROR			
+CME ERROR: <a href="#">&lt;err&gt;</a>			
Reference(s)	PIN	MDM	APP
V.250	-	+	+
			Last
			-

### Command Description

The test command returns the values of the supported fixed bit rates.

The read command returns the current bit rate of the interface.

### Parameter Description

<a href="#">&lt;rate&gt;</a> <sup>(num)</sup>
bit rate per second (bps)
300
600
1200
2400
4800
9600
14400
19200
28800
38400
57600

---

115200

230400

## 4.7 AT+CMUX Enter Multiplex Mode

Multiplex mode according to GSM 07.10 and 3G TS 27.010 enables a serial interface to be partitioned into virtual channels. It can be used either on the USB interface or the asynchronous serial interface ASC0 of the HC25 module.

Multiplex mode can be started only on the Modem interface ("MDM"). This may be either the virtual modem port of the USB composite device or the ASC0 interface. In either case, the Modem interface ("MDM") will be mapped to the first multiplex channel, and the Application interface ("APP") will be mapped to the second multiplex channel. As a result, the functions of the first and second multiplex channel are the same as described in Section 1.4, [HC25 AT Command Interpreter](#) for the Modem interface and the Application interface. The third multiplex channel is reserved for GPS and will be used for NMEA output if the GPS receiver is switched on and NMEA output is enabled with [AT^SGPSS](#).

The HC25 module incorporates an internal multiplexer and thus integrates all the functions needed to implement full-featured multiplex solutions. For the application on top, customers have the flexibility to create their own multiplex programs conforming to the multiplexer protocol. To help system integrators save the time and expense of designing multiplexer applications, Cinterion Wireless Modules GmbH offers WinMux, a ready-to-use multiplex driver for Windows 2000, Windows XP and Windows Vista. Another approach is to develop customized solutions based on the sources of the WinMux driver.

Refer to [5] which provides a detailed description of the multiplex architecture and step-by-step instructions of how to install and configure the Multiplex mode. The WinMux driver and its source files can be supplied on request. Please contact your local distributor to obtain the latest installation software and user's guide.

### Syntax

#### Test Command

```
AT+CMUX=?
Response(s)
+CMUX: (list of supported<mode>s)
OK
```

#### Read Command

```
AT+CMUX?
Response(s)
+CMUX: <mode>
OK
ERROR
+CME ERROR: <err>
```

#### Write Command

```
AT+CMUX=<mode>
Response(s)
OK
ERROR
+CME ERROR: <err>
```

#### Reference(s)

GSM 07.07, GSM 07.10, 3G TS 27.010

PIN	MDM	APP	Last
-	+	-	+

### Parameter Description

<mode><sup>(num)</sup>

Multiplexer transparency mechanism

0 Basic option

<subset><sup>(num)</sup>

Subparameters defined in GSM07.07 are adjusted for control and logical channels as follows

0                                      UIH frames used only (control channel)

### Notes

- The write command is used to enter the multiplex mode. The setup of the logical channels is initiated by the TE, i.e. the TE acts as initiator. This means that the TE shall ensure that logical channels are established before any further actions on the channels can be started.
- There is a timeout of five seconds, if the multiplexer protocol is enabled and no multiplexer control channel is established. The ME returns to AT command mode.
- The parameter maximum frame size (N1) of [AT+CMUX](#) in GSM 07.10 is set to 98 bytes by default. All other parameters are not available. See [\[5\]](#) for further details on the frame size.
- Activation of the multiplexer may change the port which is used to output URCs. Please refer to [AT^SCFG](#) parameter "URC/DstIfc" ([<udi>](#)) and Section [1.8, Unsolicited Result Code Presentation](#) for details.

## 4.8 AT^SQPORT Query Port Type

[AT^SQPORT](#) enables the host application to query the type of virtual COM port it is connected to. Further details on the different types of virtual HC25 interfaces can be found in Section 1.4, [HC25 AT Command Interpreter](#).

### Syntax

Test Command			
AT^SQPORT=?			
Response(s)			
OK			
Read Command			
AT^SQPORT?			
Response(s)			
<type>			
OK			
Exec Command			
AT^SQPORT			
Response(s)			
<type>			
OK			
Reference(s)	PIN	MDM	APP
--	-	+	+
			Last
			-

### Parameter Description

<type> <sup>(str)</sup>	
“Modem”	The virtual COM port is defined for use as a modem, mainly intended for dial-up connections. Using AT commands is not recommended except for the dialing command <a href="#">ATD</a> .
“Application”	The virtual COM port is defined as application interface. It is recommended that this interface be used for controlling the HC25, e.g. for entering AT commands, receiving URCs, or sending and receiving short messages. URCs are indicated only on this interface, no matter which of the two interfaces was used to send the AT commands for activating their presentation. For further detail on URCs please refer to Section 1.8, <a href="#">Unsolicited Result Code Presentation</a> .

## 5. Security Commands

The AT Commands described in this chapter allow the external application to determine various security related settings.

### 5.1 AT+CLCK Facility lock

**AT+CLCK** can be used to lock, unlock or interrogate a network or ME **<facility>**. The command can be aborted when network facilities are being set or interrogated.

#### Syntax

Test Command											
AT+CLCK=?											
Response(s)											
+CLCK: list of supported <b>&lt;facility&gt;</b> s											
OK											
Write Command											
AT+CLCK= <b>&lt;facility&gt;</b> , <b>&lt;mode&gt;</b> [, <b>&lt;password&gt;</b> ][, <b>&lt;class&gt;</b> ]											
Response(s)											
if <b>&lt;mode&gt;</b> is not equal 2 and command successful:											
OK											
if <b>&lt;mode&gt;</b> = 2 and command successful:											
+CLCK: <b>&lt;status&gt;</b> [, <b>&lt;class&gt;</b> ]											
[+CLCK: <b>&lt;status&gt;</b> [, <b>&lt;class&gt;</b> ]]											
[+CLCK: ...]											
OK											
ERROR											
+CME ERROR: <b>&lt;err&gt;</b>											
Reference(s)											
GSM 07.07, GSM 02.04, GSM 02.88, GSM 03.88, GSM 04.88											
		<table> <tr> <th>PIN</th><th>MDM</th><th>APP</th><th>Last</th></tr> <tr> <td>+</td><td>+</td><td>+</td><td>-</td></tr> </table>		PIN	MDM	APP	Last	+	+	+	-
PIN	MDM	APP	Last								
+	+	+	-								

#### Parameter Description

<b>&lt;facility&gt;</b> <sup>(str)</sup>	
Phone security locks set by client or factory	
Primarily intended for the client to take safety precautions, "SC" can be configured individually.	
Parameter <b>&lt;class&gt;</b> is not applicable to security locks.	
See examples below for further details.	
"SC"	SIM (lock SIM cards). SIM requests password upon ME power-up and when this lock command is issued. <b>&lt;password&gt;</b> : SIM PIN1.
"FD"	SIM fixed dialing memory: If the mobile is locked to "FD", only the phone numbers stored to the "FD" memory can be dialled. (Capacity of FD phonebook depending on the SIM card). <b>&lt;password&gt;</b> : SIM PIN 2. If a lock on the SIM fixed dialing memory is active, the following applies:

- Outgoing voice, data or fax calls can be made only to numbers stored in "FD" phonebook.  
Result code depends on the type of the call:  
for voice calls, indication is "+CME ERROR: call barred".  
for data and fax calls, indication is "NO CARRIER".
- Access to defined Supplementary Services such as Call barring, Call waiting, Call forwarding, Call hold and Multiparty is possible only if the exact corresponding public MMI \*# code for the desired service is stored in the fixed dialing number phone book, and used with ATD.  
Indication is "+CME ERROR: call barred".  
Setting call forwarding using command AT+CCFC is possible only if <number> is stored in "FD" phonebook.
- Access to Unstructured Supplementary Services ("USSD") with ATD is possible only if the exact desired USSD string is stored in the fixed dialing number phone book.  
Indication is "+CME ERROR: call barred".  
However please note that the USSD command AT+CUSSD is not barred while the "FD" lock is active.
- SMS can be sent only to phone numbers which are stored in the "fixed dialing numbers" phonebook "FD".  
Indication is "+CMS ERROR: operation not allowed".
- GPRS commands can be used only if the "fixed dialing numbers" phonebook "FD" contains an entry with phone number "\*99#". This single entry enables all GPRS commands, including AT commands and modem compatibility commands like "ATD\*99\*\*\*1#" or "ATD\*98\*\*\*1#".  
Indication is "+CME ERROR: call barred".

#### Supplementary Service Call Barring:

Supplementary Service "Call Barring" allows to specify conditions under which calls will be disallowed by the network.

The availability of the Supplementary Services varies with the network. To benefit from call barring the client will need to subscribe them, though a limited number of call barring types may be included in the basic tariff package.

When you attempt to set a <facility> or <class> which is not provisioned, not yet subscribed to, or not supported by the module, the setting will not take effect regardless of the response returned. The responses in these cases vary with the network (for example "OK", "+CME ERROR: operation not allowed", "+CME ERROR: operation not supported" etc.). To make sure check the extended error response with AT+CEER and the lock status with <mode>=2.

<password>: Network password supplied from the provider or operator. Usually there is one password which applies to all call barring options. For details contact your provider.

"AO"	BAOC (Bar All Outgoing Calls)
"OI"	BOIC (Bar Outgoing International Calls)
"OX"	BOIC-exHC (Bar Outgoing International Calls except to Home Country)
"AI"	BAIC (Bar All Incoming Calls)
"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country)
"AB"	All Barring services (applicable only for <mode>=0)
"AG"	All outGoing barring services (applicable only for <mode>=0)
"AC"	All inComing barring services (applicable only for <mode>=0)

<mode> <sup>(num)</sup>	
0	Unlock
1	lock
2	Query status

**<status><sup>(num)</sup>**

0	Lock is inactive
1	Lock is active

**<password><sup>(str)</sup>**

Password string used to lock and to unlock a [<facility>](#). Length and authority for passwords depend on the [<facility>](#) in question and are therefore listed in the section on parameter [<facility>](#). Passwords can be modified with [AT+CPWD](#).

**<class><sup>(num)</sup>**

Integer or sum of integers each representing a class of information, i.e. a bearer service, telecommunication service or bearer service group as defined in "GSM 02.04".

1	Voice
2	Class 2 ("data") comprises all those individual data classes between 16 and 128, that are supported both by the network and the MS. This means, a setting made for class 2 applies to all individual data classes (if supported). In addition, you can assign a different setting to a specific class. For example, you can activate Call Forwarding for all data classes, but deactivate it for data class 64, "dedicated packet access".
4	Fax
8	SMS
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD access
1...[7]...255	Combination of some of the above classes. For example, the default setting 7 represents the sum of the integers 1, 2 and 4 (voice, data and fax). The value 255 covers all classes. If parameter "class" is omitted, the default value 7 is used.

### Notes

- The [AT+CLCK](#) command offers the full range of [<class>](#) parameters according to the GSM specifications. However, when you attempt to use a service option which is not provisioned or not yet subscribed to, the setting will not take effect regardless of the response returned. The responses in these cases vary with the network (for example "OK", "Operation not allowed", "Operation not supported" etc.). To make sure check the extended error response with [AT+CEER](#) and the lock status with [<mode>=2](#).
- The command has been implemented with the full set of [<class>](#) parameters according to GSM 07.07. For actual applicability of a desired Call barring service to a specific service or service group (a specific [<class>](#) value) please consult table A.1 of GSM 02.04.
- If an outgoing Fax or Data Call is rejected due to an active "call barring" supplementary service, the call will be terminated with result code NO CARRIER. Under the same conditions, an outgoing Voice call will be terminated with result code NO DIALTONE.
- If an invalid [<password>](#) is entered several times in succession, a delay incremented after each failed attempt will increase the time to wait before the input of the [<password>](#) is accepted. To avoid blocking the serial interface the running [AT+CLCK](#) command is aborted after a short timeout and returns "+CME ERROR: unknown" (+CME ERROR: 100). If then the [AT+CLCK](#) command is issued once again execution is denied with "+CME ERROR: operation temporary not allowed" (+CME ERROR: 256). For details regarding the delay see Section [5.2.1, What to do if PIN or password authentication fails?](#)

- If the user tries to set a lock although it is already active or, the other way round, tries to unlock an inactive lock, the response will be OK, but the `<password>` will not be checked or verified.
- As stated above `<class>` 2 is intended only to send the data classes 16/32/64/128 to the network. However, the responses returned when the subscriber sets or queries the lock refer only to the status of the data classes received from the network. This means that the responses will display only those data classes between 16 and 128 which are supported by the network and currently activated. There will be no output for class 2, nor for classes which are not supported or not set.
- The parameter `<class>` will not be sent to the network if `<mode>`=2. Therefore it may happen that the response of the query command contains information about classes which were not requested, or it shows only the inactive status of the class 1 or 255. This means that the status is valid for all classes.
- For PN (Network Personalisation) value of `<facility>` parameter refer to `AT^SCSL` command.
- Upper-case and lower-case characters cannot be used together for the `<facility>` parameter. For example, you can write either "FD" or "fd", but not "Fd".

### Example

Lock SIM card (`<facility>`= "SC")

```
AT+CLCK="SC",1,"9999"
```

OK

The "SC" parameter enables or disables the SIM PIN authentication (PIN 1) when you power up the GSM engine  
SIM card locked. As a result, SIM PIN 1 must be entered to enable ME to register to the GSM network.

```
AT+CLCK="SC",0,"9999"
```

OK

Unlocks SIM card.  
When powered up, ME registers to the GSM network without requesting SIM PIN1.  
Note: Depending on the services offered by the provider, this feature is not supported by all SIM card types. If so, the command returns "ERROR" when you attempt to unlock the card.

To query the status of the SIM card lock:

```
AT+CLCK="SC",2
```

```
+CLCK: 1
```

OK

Query the status of SIM card lock.  
SIM card is locked. SIM PIN1 must be entered to enable ME to register to the GSM network.

## 5.2 AT+CPIN PIN Authentication

[AT+CPIN](#) controls network authentication of the HC25.

The read command returns an alphanumeric string indicating whether or not network authentication is required.

The write command allows the HC25 to store the entered password. This may be for example the SIM PIN1 to register to the GSM network, or the SIM PUK1 to replace a disabled SIM PIN1 with a new one, or the PH-SIM PIN if the client has taken precautions for preventing damage in the event of loss or theft etc.

If no PIN1 request is pending (for example if PIN1 authentication has been done and the same PIN1 is entered again) HC25 responds "+CME ERROR: operation not allowed"; no further action is required.

Each time a password is entered with [AT+CPIN](#) the module starts reading data from the SIM. The duration of reading varies with the SIM card. This may cause a delay of several seconds before all commands which need access to SIM data are effective. See Section [20.1, Restricted access to SIM data after SIM PIN authentication](#) for further detail.

### Syntax

Test Command			
AT+CPIN=?			
Response(s)			
OK			
Read Command			
AT+CPIN?			
Response(s)			
+CPIN: <a href="#">&lt;code&gt;</a>			
OK			
ERROR			
+CME ERROR: <a href="#">&lt;err&gt;</a>			
Write Command			
AT+CPIN= <a href="#">&lt;pin&gt;</a> [, <a href="#">&lt;new pin&gt;</a> ]			
Response(s)			
OK			
ERROR			
+CME ERROR: <a href="#">&lt;err&gt;</a>			
Reference(s)	PIN	MDM	APP
GSM 07.07	-	+	+
			Last
			-

### Parameter Description

[<pin>](#)<sup>(str)</sup>

Password (string type), usually SIM PIN1.

If the requested password was a PUK, such as SIM PUK1 or PH-FSIM PUK or another password, then [<pin>](#) must be followed by [<new pin>](#).

[<new pin>](#)<sup>(text)</sup>

If the requested code was a PUK: specify a new password or restore the former disabled password. See Section [5.2.1, What to do if PIN or password authentication fails?](#) for more information about when you may need to enter the PUK.

`<code>`<sup>(text)</sup>

#### SIM PIN authentication

READY	PIN has already been entered. No further entry needed.
SIM PIN	ME is waiting for SIM PIN1.
SIM PUK	ME is waiting for SIM PUK1 if PIN1 was disabled after three failed attempts to enter PIN1.
SIM PIN2	ME is waiting for PIN2.
SIM PUK2	ME is waiting for PUK2 to unblock a disabled PIN2.
Phone security locks set by client or factory	
PH-SIM PIN	ME is waiting for phone-to-SIM card password if "PS" lock is active and the client inserts other SIM card than the one used for the lock. ("PS" lock is also referred to as phone or antitheft lock).
PH-FSIM PIN	ME is waiting for phone-to-very-first-SIM card. Necessary when "PF" lock was set. When powered up the first time, ME locks itself to the first SIM card put into the card holder. As a result, operation of the mobile is restricted to this one SIM card (unless the PH-FSIM PUK is used as described below).
PH-FSIM PUK	ME is waiting for phone-to-very-first-SIM card unblocking password to be given. Necessary when "PF" lock is active and other than first SIM card is inserted.
PH-NET PIN	ME is waiting for network personalisation password
PH-NET PUK	ME is waiting for network personalisation unblocking password
PH-NETSUB PIN	ME is waiting for network subset personalisation password
PH-NETSUB PUK	ME is waiting for network subset unblocking password
PH-SP PIN	ME is waiting for service provider personalisation password
PH-SP PUK	ME is waiting for service provider personalisation unblocking password
PH-CORP PIN	ME is waiting for corporate personalisation password
PH-CORP PUK	ME is waiting for corporate personalisation un-blocking password

#### Notes

- Successful PIN authentication only confirms that the entered PIN was recognized and correct. The output of the result code OK does not necessarily imply that the mobile is registered to the desired network. Typical example: PIN was entered and accepted with OK, but the ME fails to register to the network. This may be due to missing network coverage, denied network access with currently used SIM card, no valid roaming agreement between home network and currently available operators etc. HC25 offers various options to verify the present status of network registration: For example, the [AT+COPS](#) command indicates the currently used network. With [AT+CREG](#) you can also check the current status and activate an unsolicited result code which appears whenever the status of the network registration changes (e.g. when the ME is powered up, or when the network cell changes).
- `<pin>` and `<new pin>` can also be entered in quotation marks (e.g. "1234").
- See [AT+CPWD](#) for information on passwords.
- See [AT+CLCK](#) for information on lock types.
- See [AT+CPBS](#) for information on write access to the FD phonebook with PIN2
- PIN2 can be entered after at least first usage of protected functionality or along with the command used for accessing the PIN2 dependent feature
- If the SIM PIN is entered on the ASC0 interface immediately after restarting the module it is possible that the [AT+CPIN](#) write command returns "+CME ERROR: operation not allowed", although the PIN has been accepted and PIN authentication completes successfully. To avoid the error response please wait at least 2 seconds before entering the PIN.

## 5.2.1 What to do if PIN or password authentication fails?

### PIN1 / PUK1:

After three failures to enter PIN 1, the SIM card is blocked (except for emergency calls). "+CME ERROR: SIM PUK required" will prompt the client to unblock the SIM card by entering the associated PUK (= PIN Unblocking Key / Personal Unblocking Key). After ten failed attempts to enter the PUK, the SIM card will be invalidated and no longer operable. In such a case, the card needs to be replaced. PIN1 consists of 4 to 8 digits, PUK1 is an 8-digit code only.

To unblock a disabled PIN1 you have two options:

- You can enter [AT+CPIN=PUK1,new PIN1](#).
- You can use the [ATD](#) command followed by the GSM code `**05*PUK*newPIN*newPIN#;`.

### PIN2 / PUK2:

PIN2 prevents unauthorized access to the features listed in [AT+CPIN](#). The handling of PIN2 varies with the provider. PIN2 may either be a specific code supplied along with an associated PUK2, or a default code such as 0000. In either case, the client is advised to replace it with an individual code. Incorrect input of PUK2 will permanently block the additional features subject to PIN2 authentication, but usually has no effect on PIN1. PIN2 consists of 4 digits, PUK2 is an 8-digit code only.

To unblock a disabled PIN2 you have two options:

- You can enter [AT+CPIN=PUK2,new PIN2](#).
- You can use the [ATD](#) command followed by the GSM code `**052*PUK2*newPIN2*newPIN2#;`.

### SIM locks:

These are factory set locks, such as "PF", "PN", "PU", "PP", "PC". An 8-digit unlocking code is required to operate the mobile with a different SIM card, or to lift the lock. The code can only be obtained from the provider.

If incorrectly input, the password is governed by a specific timing algorithm:  $(n-1) \cdot 256$  seconds (see table below).

Number of failed attempts	Time to wait before next input is allowed
1st failed attempt	No time to wait
2nd failed attempt	4 seconds
3rd failed attempt	3 * 256 seconds
4th failed attempt	4 * 256 seconds
5th failed attempt	5 * 256 seconds
6th failed attempt and so forth	6 * 256 seconds and so forth

### Call barring:

Supported modes are "AO", "OI", "OX", "AI", "IR", "AB", "AG", "AC". If the call barring password is entered incorrectly three times, the client will need to contact the service provider to obtain a new one.

### Related sections:

"+CME ERROR: [<err>](#)" values are specified at Section [2.8.1, CME/CMS Error Code Overview](#). For further instructions and examples see [AT+CLCK](#) and [AT+CPWD](#).

For a complete list of Star-Hash codes please refer Section [20.2, Star-Hash \(\\*#\) Network Commands](#).

## 5.3 AT+CPWD Change Password

AT+CPWD allows to define a new password for a password protected *<facility>* lock function. Each password is a string of digits, the length of which varies with the associated *<facility>*. The test command returns a list of pairs which represent the available facilities and the maximum length of the associated password. See AT commands AT+CLCK for more information on the various lock features.

To delete a password use the following syntax: `at+cpwd=<facility>,<old password>`

### Syntax

Test Command			
AT+CPWD=?			
Response(s)			
+CPWD: list of supported ( <i>&lt;facility&gt;</i> , <i>&lt;password length&gt;</i> )			
OK			
Write Command			
AT+CPWD= <i>&lt;facility&gt;</i> , <i>&lt;old password&gt;</i> [, <i>&lt;new password&gt;</i> ]			
Response(s)			
New password has been registered for the facility lock function.			
OK			
If parameter <i>&lt;old password&gt;</i> was not correct:			
+CME ERROR: 16 (+CME ERROR: incorrect password)			
If the password for the selected <i>&lt;facility&gt;</i> has been invalidated due to too many failed attempts:			
+CME ERROR: ...			
If the network provider or network operator doesn't supply the Network Password:			
+CME ERROR: 258 (+CME ERROR: retry operation)			
If error is related to ME functionality:			
+CME ERROR: <i>&lt;err&gt;</i>			
Reference(s)		PIN	MDM
GSM 07.07		+	+
		APP	Last
		+	-

### Parameter Description

<i>&lt;facility&gt;</i> <sup>(str)</sup>	
Phone security locks set by client or factory:	
Primarily intended for the client to take safety precautions, passwords "SC" (SIM PIN) and "P2" (SIM PIN2) are usually predefined, but can be configured individually.	
"SC"	<p>SIM PIN. SIM requests password upon ME power-up and when this lock command is issued.</p> <p>If incorrectly entered three times, the SIM PUK is required to perform authentication. Input of the SIM PUK password is possible only with AT command AT+CPIN or ATD. For further details please refer to Section 5.2.1, <a href="#">What to do if PIN or password authentication fails?</a>.</p> <p><i>&lt;password length&gt;</i>: 4 to 8 digits.</p>
"P2"	<p>SIM PIN 2, e.g. required for authentication with facility lock "FD" (cf. AT+CLCK).</p> <p>If incorrectly entered three times, the SIM PUK 2 is required to perform authentication. Input of the SIM PUK 2 password is possible only with AT command AT+CPIN or ATD. For further detail please refer to Section 5.2.1, <a href="#">What to do if PIN or password authentication fails?</a>.</p> <p><i>&lt;password length&gt;</i>: 4 to 8 digits.</p>

### Supplementary Service Call Barring:

The call barring supplementary service allows to specify conditions under which calls will be disallowed by the network.

The availability of the supplementary services varies with the network. To benefit from call barring the client will need to subscribe them, though a limited number of call barring types may be included in the basic tariff package.

**<password length>**: ThenNetwork password needs to be supplied from the network provider or network operator. Usually there is one 4 digit password which applies to all call barring options. For details contact your provider.

"AO"	BAOC (Bar All Outgoing Calls)
"OI"	BOIC (Bar Outgoing International Calls)
"OX"	BOIC-exHC (Bar Outgoing International Calls except to Home Country)
"AI"	BAIC (Bar All Incoming Calls)
"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country)
"AB"	All Barring services
"AG"	All outGoing barring services
"AC"	All inComing barring services

**<password length>**<sup>(num)</sup>

4...8	Length of password. The range of permitted length for a password depends on the associated <b>&lt;facility&gt;</b> . It is available from the test command response, or in the description of parameter <b>&lt;facility&gt;</b> . If the entered password is longer then the maximum password length it will be stripped to the maximum length and the remaining digits will be ignored.
-------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**<old password>**<sup>(str)</sup>

Password specified for the facility.

Parameter **<old password>** can be ignored if no old password was allocated to the facility.

Take into account that a password may have already been set by factory, or that the service is subject to a password issued by the provider. See notes above or contact provider.

**<new password>**<sup>(str)</sup>

New password. Mandatory, if **<old password>** was an unblocking key (PUK).

### Note

- As stated above there is usually a one 4-digit password for all call barring facilities. To change the password please use only the "AB" **<facility>** (All Barring services).

### Examples

#### EXAMPLE 1

To change PIN2

```
AT+CPWD="P2","0000","8888"
OK
```

(where "0000" = old PIN2 and "8888" = new PIN2)  
PIN2 password has been changed to "8888"

#### EXAMPLE 2

To set the password used to enable or disable Call Barring:

```
AT+CPWD="AB","0000","3333"
OK
```

Requests the network to change the password for the call barring supplementary service.  
Even though issued for "AB" only the request applies to all other call barring services, too.

## 5.4 AT^SCSL Customer SIM Lock

The **AT^SCSL** command is designed to manage the Customer SIM Lock feature. This feature allows application manufacturers to lock a mobile to specific operators by activating a Network Personalization ("PN"). If the lock is enabled the mobile will accept only SIM cards from the given operators.

The lock is activated by specifying the mobile country codes and mobile networks codes on command line. The Customer SIM Lock feature is protected by depersonalization key.

### Syntax

Test Command

AT^SCSL=?

Response(s)

OK

Write Command

AT^SCSL=<facility>, <action>[, <password>, <data>]

Response(s)

If <action>=2 and no Customer SIM Lock has been programmed yet:  
^SCSL: ""

If <action>= 2, Customer SIM Lock is effective and command is successful:  
^SCSL: <data>[:<data>:<data>: ...]

If <action>=4 and no Customer SIM Lock has been programmed yet:  
^SCSL: <password>

If <action>=4 and Customer SIM Lock is set:  
^SCSL: ERROR

OK

ERROR

+CME ERROR: <err>

Reference(s)

--

PIN

MDM

APP

Last

-

+

+

-

### Parameter Description

<facility> <sup>(str)</sup>	
"PN"	Network Personalisation (= Customer SIM Lock)
<action> <sup>(num)</sup>	
0	Delete programmed SIM lock data and disable the personalization. Required parameters: <facility>="PN", <action>=0, <password>. Removing the Customer SIM Lock deletes all <data>, i.e. the entire list of operators. To make the change take effect the ME must be restarted.
1	Program given Customer SIM lock data and activate lock. Required parameters: <facility>="PN", <action>=1, <password>, <data>. To make the change take effect the ME must be restarted.
2	Request Customer SIM Lock status. Required parameters: <facility>="PN", <action>=2.

- 3 Set Customer SIM Lock into prepared state (Autolock). In this case, the SIM lock data will be read from the first inserted SIM card and stored. Required parameters: `<facility>="PN"`, `<action>=3`, `<password>`. Setting the lock into prepared state will remove all `<data>`, i.e. the entire list of operators. To make the change take effect the ME must be restarted.
- 4 Request the depersonalization key, allowed if Customer SIM Lock has not already been programmed. Otherwise returns "ERROR". Required parameters: `<facility>="PN"`, `<action>=4`.

`<password>`<sup>(str)</sup>

8-digit depersonalization key associated with the device.

The depersonalization key is necessary for programming a Customer SIM Lock. It can also be used to unblock a Customer SIM Lock in order to operate the mobile with a SIM other than the one associated with the Customer SIM Lock. See note below.

The `<password>` is unique for each device. To find out the `<password>` it is necessary to execute the `AT^SCSL` write command with `<action>=4`. Keep in mind that if a SIM lock is set, reading the `<password>` with `<action>=4` is no longer possible, and will only return "ERROR". To allow for any later changes, it is the responsibility of the manufacturer to hold a database with the module specific passwords. To avoid unauthorized use, the `<password>` should not be provisioned to end users.

The password is not needed for `<action>=2` and `<action>=4`.

`<data>`<sup>(str)</sup>

Data of the allowed network operators.

Each operator code consists of the "Mobile Country Code" MCC and the "Mobile Network Code" MNC, both separated by a dot, e.g. MCC1.MNC1. If more than one operator is entered on the same line, then a colon must be set between each operator code, e.g. MCC1.MNC1:MCC2.MNC2:MCC3.MNC3. For example, for the three operators T-Mobile D, Vodafone D2 and E-Plus you would enter the following data: 262.01:262.02:262.03

New operator entries will not be added to an existing list, but overwrite the all old entries. If you need to add new operator entries please send the complete list once again.

## Notes

- Usage of the Customer SIM lock features may be restricted by existing facility locks, such as a factory set SIM lock.
- Reprogramming an active SIM lock is possible, but overwrites previous settings.
- As described above the depersonalization key (`<password>`) is needed for programming a Customer SIM Lock with `AT^SCSL`.

It can also be used to unblock an existing Customer SIM Lock in order to operate the mobile with a SIM other than the one associated with the Customer SIM Lock. In such case, if the user inserts an unsupported SIM and enters PIN1 the ME returns OK, although access to SIM related commands (such as dialing out, access to phonebooks, SMS etc.) will be denied. If then the read command `AT+CPIN?` is executed the ME will request the PH-NET PIN, i.e. the `<password>`. After entering the `<password>` the ME can be operated with the new SIM. To avoid unauthorized use, the `<password>` should not be provisioned to end users.

## Example

The example shows how to read out the `<password>` first. After this, configuring and removing the Customer SIM Lock is possible.

```
AT^SCSL="PN",4
^SCSL: 12345678
OK
```

```
AT^SCSL="PN",2
^SCSL: ""
OK
```

```
AT^SCSL="PN",1,"12345678","262.01:262.02"
OK
```

Check the `<password>`. If no Customer SIM Lock has been programmed yet the module specific `<password>` will be returned.

Request status.  
SIM Lock disabled.

Program Customer SIM Lock.

```
AT^SCSL="PN",2
^SCSL: "262.01:262.02"
OK
AT^SCSL="PN",4
OK
AT^SCSL="PN",0,"12345678"
OK
```

Request status

SIM Lock is enabled and takes effect after restart.

Checking the [<password>](#) will now return "ERROR" only.

Remove Customer SIM Lock.

## 6. Identification Commands

The AT Commands described in this chapter allow the external application to obtain various identification information related to the HC25 and linked entities.

### 6.1 ATI Display product identification information

The [ATI](#) execute command delivers a product information text.

The 'Revision' information consists of the following parts: Version xx and variant yy of software release.

#### Syntax

Exec Command				
ATI				
Response(s)				
Siemens				
HC25				
REVISION xx.yyy				
OK				
Exec Command				
ATI				
Response(s)				
OK				
Reference(s)	PIN	MDM	APP	Last
V.250	-	+	+	-

#### Notes

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Manufacturer", then instead of "Siemens" the changed value will be returned (for details please refer to description of parameter [<manufacturer>](#)).
- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Product", then instead of "HC25" the changed value will be returned (for details please refer to description of parameter [<product>](#)).

## 6.2 AT+CGMI Request manufacturer identification

[AT+CGMI](#) returns a manufacturer identification text. See also: [AT+GMI](#).

### Syntax

Test Command				
AT+CGMI=?				
Response(s)				
OK				
Exec Command				
AT+CGMI				
Response(s)				
Siemens				
OK				
Reference(s)	PIN	MDM	APP	Last
GSM 07.07	-	+	+	-

### Note

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Manufacturer", then instead of "Siemens" the changed value will be returned (for details please refer to description of parameter [<manufacturer>](#)).

## 6.3 AT+GMI Request manufacturer identification

[AT+GMI](#) returns a manufacturer identification text. See also: [AT+CGMI](#).

### Syntax

Test Command				
AT+GMI=?				
Response(s)				
OK				
Exec Command				
AT+GMI				
Response(s)				
Siemens				
OK				
Reference(s)	PIN	MDM	APP	Last
V.250	-	+	+	-

### Note

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Manufacturer", then instead of "Siemens" the changed value will be returned (for details please refer to description of parameter [<manufacturer>](#)).

## 6.4 AT+CGMM Request model identification

[AT+CGMM](#) returns a product model identification text. Command is identical with [AT+GMM](#).

### Syntax

Test Command				
AT+CGMM=?				
Response(s)				
OK				
Exec Command				
AT+CGMM				
Response(s)				
HC25				
OK				
Reference(s)	PIN	MDM	APP	Last
GSM 07.07	-	+	+	-

### Note

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Product", then instead of "HC25" the changed value will be returned (for details please refer to description of parameter [<product>](#)).

## 6.5 AT+GMM Request model identification

[AT+GMM](#) returns a product model identification text. Command is identical with [AT+CGMM](#).

### Syntax

Test Command				
AT+GMM=?				
Response(s)				
OK				
Exec Command				
AT+GMM				
Response(s)				
HC25				
OK				
Reference(s)	PIN	MDM	APP	Last
V.250	-	+	+	-

### Note

- If the user changed the setting of the [AT^SCFG](#) parameter "Ident/Product", then instead of "HC25" the changed value will be returned (for details please refer to description of parameter [<product>](#)).

## 6.6 AT+CGMR Request revision identification of software status

[AT+CGMR](#) delivers a product firmware version identification. Command is identical with [AT+GMR](#).

### Syntax

Test Command				
AT+CGMR=?				
Response(s)				
OK				
Exec Command				
AT+CGMR				
Response(s)				
REVISION <a href="#">&lt;xx.yyy&gt;</a>				
OK				
Reference(s)	PIN	MDM	APP	Last
GSM 07.07	-	+	+	-

### Parameter Description

<a href="#">&lt;xx.yyy&gt;</a> <sup>(str)</sup>
Version xx and variant yyy of software release.

## 6.7 AT+GMR Request revision identification of software status

[AT+GMR](#) delivers a product firmware version identification. Command is identical with [AT+CGMR](#).

### Syntax

Test Command				
AT+GMR=?				
Response(s)				
OK				
Exec Command				
AT+GMR				
Response(s)				
REVISION <a href="#">&lt;xx.yyy&gt;</a>				
OK				
Reference(s)	PIN	MDM	APP	Last
V.250	-	+	+	-

### Parameter Description

<a href="#">&lt;xx.yyy&gt;</a> <sup>(text)</sup>
Version xx and variant yyy of software release.

## 6.8 AT+CGSN Request International Mobile Equipment Identity (IMEI)

[AT+CGSN](#) delivers the International Mobile Equipment Identity (IMEI). Command is identical with: [AT+GSN](#).

### Syntax

Test Command				
AT+CGSN=?				
Response(s)				
OK				
Exec Command				
AT+CGSN				
Response(s)				
<sn>				
OK				
Reference(s)	PIN	MDM	APP	Last
GSM 07.07	-	+	+	-

### Parameter Description

<sn> <sup>(str)</sup>
International Mobile Equipment Identity (IMEI) used to identify a GSM mobile equipment to the GSM network

## 6.9 AT+GSN Request International Mobile Equipment Identity (IMEI)

[AT+GSN](#) delivers the International Mobile Equipment Identity (IMEI). Command is identical with [AT+CGSN](#)

### Syntax

Test Command				
AT+GSN=?				
Response(s)				
OK				
Exec Command				
AT+GSN				
Response(s)				
<sn>				
OK				
Reference(s)	PIN	MDM	APP	Last
V.250	-	+	+	-

### Parameter Description

<sn> <sup>(str)</sup>
International Mobile Equipment Identity (IMEI) used to identify a GSM mobile equipment to the GSM network.

## 6.10 AT+CIMI Request International Mobile Subscriber Identity (IMSI)

**AT+CIMI** delivers the International Mobile Subscriber Identity (IMSI). The IMSI permits the TE to identify the individual SIM attached to the ME.

### Syntax

Test Command			
AT+CIMI=?			
Response(s)			
OK			
Exec Command			
AT+CIMI			
Response(s)			
<imsi>			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.07	+	+	+
			Last
			-

### Parameter Description

<imsi> <sup>(str)</sup>
International MobileSubscriber Identity (string without quotes).

## 7. Call related Commands

The AT Commands described in this chapter are related to Mobile Originated (MOC, i.e. outgoing) Calls and Mobile Terminated (MTC, i.e. incoming) Calls.

### 7.1 ATA Answer a call

#### Syntax

Exec Command			
ATA			
Response(s)			
In case of data call, if successfully connected (TA switches to data mode):			
CONNECT <text>			
In case of voice call, if successfully connected:			
OK			
When TA returns to command mode after call release:			
OK			
If no connection:			
NO CARRIER			
Reference(s)	PIN	MDM	APP
V.250	+	+	±
			Last
			-

#### Command Description

TA causes remote station to go off-hook (e.g. answer call).

#### Parameter Description

<text> <sup>(str)</sup>
Connection status
Output only if <a href="#">ATX</a> parameter setting with value greater 0. Connection speed values:
"9600"
"14400"
"28800"
"57600"
"64000"

#### Notes

- The command may be aborted generally by receiving a character during execution. It can't be aborted in some connection setup states, such as handshaking.
- See also [ATX](#) for <text>.
- If an incoming call is no longer available (already disconnected/hanged up)a "NO CARRIER" result code will be given.

## 7.2 ATD Mobile originated call to specified number

### Syntax

Exec Command			
ATD<n>[<mgs>][;]			
Response(s)			
If busy (parameter setting ATX3 or ATX4):			
BUSY			
If a connection cannot be set up:			
NO CARRIER			
NO ANSWER			
OK			
If successfully connected and non-voice call (TA switches to online data mode):			
CONNECT <text>			
When TA returns to command mode after call release:			
OK			
If voice call (successfully or not):			
OK			
Reference(s)	PIN	MDM	APP
V.250	±	+	±
			Last
			-

### Command Description

This command can be used to set up outgoing voice, data or fax calls. It also serves to control Supplementary Services. The termination character ";" is mandatory to set up voice calls or to send \*# codes for Supplementary Services. It must not be used for data and fax calls.

Additional notes on the responses returned after dialing with ATD:

- For data connections, call setup always terminates when the call has been established (indicated by the result code "CONNECT <text>"), or when it fails (indicated by "NO CARRIER" or "BUSY") at the modem port.
- For voice calls the ME responds once the call setup is completed either successfully or unsuccessfully with ("OK").

### Parameter Description

<n> (text)
String of dialing digits and optional V.250 modifiers: 0-9, *, #, +, A, B, C The following V.250 modifiers are ignored: ,(comma), T, P, !, W ,@
<mgs> (str)
String of GSM modifiers:
I Activates CLIR (disables presentation of own phone number to called party)
i Deactivates CLIR (enables presentation of own phone number to called party)
G Activate Closed User Group explicit invocation for this call only.
g Deactivate Closed User Group explicit invocation for this call only.

---

### Notes

- The command may be aborted generally when receiving a character during execution. It cannot be aborted in some connection setup states, such as handshaking.
- See also [ATX](#) for [<text>](#).
- Emergency calls:  
If no SIM is inserted, call numbers 000, 08, 110, 112, 118,119, 911 and 999 cause an emergency call setup.  
If a SIM with ECC file is inserted, 112 and 911 and all additional call numbers stored in the ECC file cause an emergency call setup.  
If a SIM without ECC file is inserted, call numbers 112 and 911 and in addition all call numbers enabled with [AT^SCFG](#), "Call/ECC", parameter [<ecc>](#) will cause an emergency call setup.

## 7.3 ATD><mem><n> Mobile originated call using specific memory and index number

### Syntax

Exec Command			
ATD><mem><n>;			
Response(s)			
ERROR			
+CME ERROR: <err>			
If no dialtone (parameter ATX2 or ATX4):			
NO DIALTONE			
If busy (parameter setting ATX3 or ATX4):			
BUSY			
If connection cannot be set up:			
NO CARRIER			
When TA returns to command mode after call release:			
OK			
If voice call setup successful or not:			
OK			
Reference(s)	PIN	MDM	APP
V.250	+	+	+
			Last
			-

### Command Description

TA attempts to set up an outgoing call to the specified number.

### Parameter Description

<mem> (text)	
Phonebook storage:	
For detailed description of storages see <a href="#">AT+CPBS</a> .	
FD	Fixed dialing phonebook
SM	SIM phonebook
ON	MSISDN list
ME	Mobile Equipment Phonebook
LD	Last number dialed phonebook
MC	Missed (unanswered received) calls list
RC	Received calls list
EN	Emergency numbers
DC	Dialled calls list
<n> (num)	

Integer type memory location in the range of locations available in the selected memory, i.e. the index number returned by [AT+CPBR](#).

### Notes

- This command may be aborted generally by receiving a character during execution. Abortion is not possible during some states of connection setup such as handshaking.
- See [ATX](#) for setting result code and call monitoring parameters.

### Examples

#### EXAMPLE 1

To query the location number of the phonebook entry:

```
AT+CPBR=1,xx
```

TA returns the entries available in the active phonebook.

#### EXAMPLE 2

To dial a number from the SIM phonebook, for example the number stored to location 15:

```
ATD>"SM15";  
OK
```

#### EXAMPLE 3

To dial a phone number stored in the last dial memory on the SIM card:

```
ATD>"LD9";  
OK
```

## 7.4 ATD><n> Mobile originated call from active memory using index number

### Syntax

Exec Command			
ATD><n>;			
Response(s)			
ERROR			
+CME ERROR: <err>			
If no dialtone (parameter ATX2 or ATX4):			
NO DIALTONE			
If busy (parameter setting ATX3 or ATX4):			
BUSY			
If connection cannot be set up:			
NO CARRIER			
When TA returns to command mode after call release:			
OK			
If successfully connected:			
OK			
If csv call successfully or not:			
OK			
Reference(s)	PIN	MDM	APP
V.250	+	+	+
			Last
			-

### Command Description

TA attempts to set up an outgoing call to the stored number.

### Parameter Description

<n> <sup>(str)</sup>
Integer type memory location in the range of locations available in the selected memory, i.e. the index number returned by <a href="#">AT+CPBR</a> .

### Note

- This command may be aborted generally by receiving a character during execution. Abortion is not possible during some states of connection setup such as handshaking.

## 7.5 ATD><str> Mobile originated call from active memory using corresponding field

### Syntax

Exec Command			
ATD><str>;			
Response(s)			
ERROR			
+CME ERROR: <err>			
If no dialtone (parameter ATX2 or ATX4):			
NO DIALTONE			
If busy (parameter setting ATX3 or ATX4):			
BUSY			
If connection cannot be set up:			
NO CARRIER			
When TA returns to command mode after call release:			
OK			
If successfully connected:			
OK			
If csv call successfully or not:			
OK			
Reference(s)	PIN	MDM	APP
V.250	+	+	+
			Last
			-

### Command Description

This command searches the active phonebook for a given string <str> and dials the assigned phone number.

### Parameter Description

<str>^(str)(+CSCS)

String type value ("x"), which should equal an alphanumeric field in at least one phonebook entry in the searched memories; used character set should be the one selected with AT+CSCS. <str> can contain escape sequences as described in chapter "Supported character sets".

If AT+CSCS is set to "UCS2", with respect to the coding of UCS2-characters only phonebook entries that contain an alphanumeric string with a size less than the half of the parameter <tlength> from AT+CPBW can be dialed.

### Note

- This command may be aborted generally by receiving a character during execution. Abortion is not possible during some states of connection setup such as handshaking.

## 7.6 ATH Disconnect existing data connection

### Syntax

Exec Command				
ATH[<n>]				
Response(s)				
OK				
Reference(s)				
V.250	PIN	MDM	APP	Last
	+	+	-	-

### Command Description

Disconnect existing data (csd) call from command line by local TE and terminate call.

### Parameter Description

<n> <sup>(num)</sup>	
[0]	disconnect from line and terminate call

## 7.7 AT+CHUP Hang up call

### Syntax

Test Command				
AT+CHUP=?				
Response(s)				
OK				
ERROR				
+CME ERROR: <err>				
Exec Command				
AT+CHUP				
Response(s)				
OK				
ERROR				
+CME ERROR: <err>				
Reference(s)	PIN	MDM	APP	Last
GSM 07.07	-	+	+	-

### Command Description

Cancels all active, waiting and held calls.

### Note

- [AT+CHUP](#) supports only voice calls. Data or Fax connections can be disconnected with [ATH](#) only.

## 7.8 AT^SHUP Hang up call(s) indicating a specific GSM04.08 release cause

### Syntax

Test Command	
AT^SHUP=?	
Response(s)	
OK	
Write Command	
AT^SHUP=<cause>[, <cn>]	
Response(s)	
OK	
ERROR	
NO CARRIER	
Reference(s)	
--	
	PIN MDM APP Last
	+ + ± -

### Command Description

The write command serves to end one specific call or all calls known to the ME, indicating a specific GSM04.08 release cause specified by the user. The command can be used for voice, fax and data calls in any call status (i.e. any calls listed by [AT+CLCC](#)).

### Parameter Description

<cause> <sup>(num)</sup>	
release cause	
Release cause from GSM04.08 to be indicated to the network.	
The HC25 will release the selected connection(s) with release cause indication "cause" and location "user" (0) in the "disconnect" protocol message to the GSM Network. It depends on the network whether or not the release cause will be forwarded to the remote party.	
1	Send GSM04.08 release cause "unassigned (unallocated) number"
16	Send GSM04.08 release cause "normal call clearing "
17	Send GSM04.08 release cause "user busy "
18	Send GSM04.08 release cause "no user responding "
21	Send GSM04.08 release cause "call rejected"
27	Send GSM04.08 release cause "destination out of order "
31	Send GSM04.08 release cause "normal, unspecified"
88	Send GSM04.08 release cause "incompatible destination"

`<cn>(num)`

call number

The "call number" is an optional index into the list of current calls available via [AT+CLCC](#). AT command [AT^SHUP](#) will terminate the call identified by the specified call number. The default call number "0" is not assigned to any call, but signifies "all calls". As "0" is the default value, it may be omitted.

With [AT^SHUP](#), Calls will be terminated regardless of their current call status, which may be any of the states allowed by [AT+CLCC](#).

[0]	Terminate all known calls
1...7	Terminate the specific call number <a href="#">&lt;cn&gt;</a>

#### Notes

- It depends on the network whether or not a delivered release cause will be forwarded to the remote party.
- With [AT^SHUP](#), calls will be terminated regardless of their current call status, which may be any of the states allowed by [AT+CLCC](#).

## 7.9      **ATS0**    Set number of rings before automatically answering a call

### Syntax

Read Command				
ATS0?				
Response(s)				
<n>				
OK				
ERROR				
Write Command				
ATS0=<n>				
Response(s)				
OK				
ERROR				
Reference(s)				
V.250	PIN	MDM	APP	Last
	+	+	+	-

### Parameter Description

<n> (num)	
000(&F)	Automatic answer mode is disabled.
001-255	Enable automatic answering after specified number of rings.

### Notes

- This command works for MT data and fax calls.
- If <n> is set to higher values, the calling party may hang up before the call is automatically answered.
- The correlation between [ATS7](#) and [ATS0](#) is important.  
Example: Call setup may fail if ATS7=30 and ATS0=20.



## 7.11 ATS7 Set number of seconds to wait for connection completion

[ATS7](#) specifies the number of seconds the TA will wait for the completion of the call setup when answering or originating a data call. Also referred to as "no answer timeout". To put it plainly, this is the time to wait for the carrier signal. If no carrier signal is received within the specified time, the TA hangs up.

### Syntax

Read Command				
ATS7?				
Response(s)				
<n>				
OK				
Write Command				
ATS7=<n>				
Response(s)				
OK				
ERROR				
Reference(s)	PIN	MDM	APP	Last
V.250	+	+	+	-

### Parameter Description

<n> <sup>(num)</sup>
Number of seconds to wait for connection completion
001...50 <sup>(&amp;F)</sup> ...255

### Notes

- Command [ATS7](#) is only applicable to data calls.
- The correlation between [ATS7](#) and [ATS0](#) is important. If the called party has specified a high value for [ATS0=<n>](#) call setup may fail.  
Example: Call setup may fail if ATS7=30 and ATS0=20.

This command specifies the amount of time, in seconds, that the DCE shall pause, during signalling of call addressing information to the network (dialling), when a "," (comma) dial modifier is encountered in a dial string.

Read Command				
ATS8?				
Response(s)				
<n>				
OK				
Write Command				
ATS8=<n>				
Response(s)				
OK				
ERROR				
Reference(s)		PIN	MDM	APP
V.250		+	+	+
				Last
				-

No effect for GSM.

<n> (num)	
0	DCE does not pause when "," encountered in dial string
1...2 <sup>(&amp;F)</sup> ...255	Number of seconds to pause





## 7.15    +++    Switch from data mode to command mode

### Syntax

Exec Command				
+++				
Response(s)				
OK				
Reference(s)				
V.250	PIN	MDM	APP	Last
	-	+	-	-

### Command Description

This command is only available during a CSD call or a GPRS connection. The +++ character sequence causes the TA to cancel the data flow over the AT interface and switch to command mode. This allows you to enter AT commands while maintaining the data connection to the remote device or, accordingly, the GPRS connection. To prevent the +++ escape sequence from being misinterpreted as data, it must be preceded and followed by a pause of at least 1000 ms. The +++ characters must be entered in quick succession, all within 1000 ms.

### Notes

- To return from command mode to data or PPP online mode: Enter [ATO](#).
- The DTR function mode 1 provides the same functionality as "+++" (see [AT&D](#)).

## 7.16 AT+CLCC List of current calls

The execute command lists all current calls. If the command is successful, but no calls are available, no information response is sent to TE.

### Syntax

Test Command

AT+CLCC=?

Response(s)

OK

Exec Command

AT+CLCC

Response(s)

[+CLCC: <idx>, <dir>, <stat>, <mode>, <empty>[, <number>, <type>[, <alpha>]]]

[+CLCC: <idx>, <dir>, <stat>, <mode>, <empty>[, <number>, <type>[, <alpha>]]]

[+CLCC: ...]

OK

ERROR

+CME ERROR: <err>

Reference(s)

GSM 07.07

PIN	MDM	APP	Last
+	+	+	-

### Parameter Description

<idx> <sup>(num)</sup>	
Call identification number as described in GSM02.30 subclause 4.5.5.1; this number can be used in <a href="#">AT+CHLD</a> command operations	
<dir> <sup>(num)</sup>	
0	Mobile originated call (MOC)
1	Mobile terminated call (MTC)
<stat> <sup>(num)</sup>	
State of the call	
0	Active
1	Held
2	Dialing (MOC)
3	Alerting (MOC)
4	Incoming (MTC)
5	Waiting (MTC)
<mode> <sup>(num)</sup>	
Bearer/teleservice	
0	Voice
1	Data
2	Fax

**<empty>**<sup>(num)</sup>

0	Call is not one of multiparty (conference) call parties
1	Call is one of multiparty (conference) call parties

**<number>**<sup>(str)</sup>

Phone number in format specified by **<type>**

**<type>**<sup>(num)</sup>

Type of address octet

128	Restricted <b>&lt;number&gt;</b> includes unknown type and format.
145	Dialing string <b>&lt;number&gt;</b> includes international access code character '+'
129	Otherwise

**<alpha>**<sup>(str)(+CSCS)</sup>

Alphanumeric representation of **<number>** corresponding to the entry found in phonebook.  
The maximum displayed length of **<alpha>** is 14 characters.

### Note

- For alphanumeric representation the number stored in phonebook must be identical to the number transported over the network, then the associated name will be recognized.

## 7.17 AT^SLCC Extended list of current calls

AT^SLCC covers essentially the same information as GSM 07.07 command AT+CLCC, with the following extensions:

- The additional write command allows to activate Event reporting for the list of current calls.
- The additional read command returns an indication whether event reporting is active for the current interface.
- The exec command returns, like AT+CLCC, a list of current calls. If the command is successful, but no calls are available, no information response is sent to the TE.

### Syntax

Test Command				
AT^SLCC=?				
Response(s)				
^SLCC: (list of supported<n>s)				
OK				
Read Command				
AT^SLCC?				
Response(s)				
^SLCC: <n>				
OK				
Exec Command				
AT^SLCC				
Response(s)				
[^SLCC: <idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]]]				
[^SLCC: <idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]]]				
[^SLCC: ...]				
OK				
ERROR				
+CME ERROR: <err>				
Write Command				
AT^SLCC=[<n>]				
Response(s)				
OK				
ERROR				
+CME ERROR: <err>				
Reference(s)	PIN	MDM	APP	Last
--	+	+	+	-

### Unsolicited Result Code

Unsolicited Call Status information

if the list of current calls is empty:

^SLCC:

if one or more calls are currently in the list:

^SLCC: <idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]]  
 [^SLCC: <idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]]]  
 [... ]

^SLCC:

URC "[^SLCC](#)" displays the list of current calls as displayed with the execute command [AT^SLCC](#). The list is displayed in the state it has at the time of display, not in the state it had when the signal was generated.

The URC's occurrence indicates call status changes for any of the calls in the list of current calls.

If multiple displays of identical list configurations occur, this happens because of short intermediate states of the list, that have already been overridden by new transitions and states. Thus, it is guaranteed that the configuration displayed is always the current configuration at the time of the last display.

The list of active calls displayed with this URC will always be terminated with an empty line preceded by prefix "[^SLCC](#):", in order to indicate the end of the list.

### Parameter Description

[<n>](#)<sup>(num)</sup>

<a href="#">[0]</a> <sup>(&amp;F)</sup>	Presentation of URC " <a href="#">^SLCC</a> " disabled
1	Presentation of URC " <a href="#">^SLCC</a> " enabled

[<idx>](#)<sup>(num)</sup>

Call identification number as described in GSM02.30 subclause 4.5.5.1; this number can be used in [AT+CHLD](#) command operations.

[<dir>](#)<sup>(num)</sup>

0	Mobile originated call (MOC)
1	Mobile terminated call (MTC)

[<stat>](#)<sup>(num)</sup>

state of the call

0	Active
1	Held
2	Dialing (MOC)
3	Alerting (MOC)
4	Incoming (MTC)
5	Waiting (MTC)

[<mode>](#)<sup>(num)</sup>

bearer/teleservice

0	Voice
1	Data
2	Fax

[<empty>](#)<sup>(num)</sup>

0	Call is not one of multiparty (conference) call parties
1	Call is one of multiparty (conference) call parties

[<Reserved>](#)<sup>(num)</sup>

0	Reserved
---	----------

[<number>](#)<sup>(str)</sup>

Phone number in format specified by [<type>](#)

`<type>(num)`

Type of address octect

145	Dialing string <code>&lt;number&gt;</code> includes international access code character '+'
128	number is restricted
129	Otherwise

`<alpha>(str)(+CSCS)`

Alphanumeric representation of `<number>` corresponding to the entry found in phonebook.

Due to time constraints on the necessary evaluation of the phonebook, this parameter may show a default value during early call phases (e.g. for `<stat>`= "dialing", "incoming" or "alerting"), even if a phonebook entry is present for the number concerned.

### Notes

- Some parameters of the `AT+CHLD` command, as well as some situations where the call status in the network changes very quickly (e.g. the transition between `<stat>`= "unknown", "dialing" and "alerting" for a call to a reachable subscriber within the registered network) may lead to quasi-simultaneous changes to the states of one or several calls in the list, possibly leading to multiple displays of identical list configurations.
- If multiple displays of identical list configurations occur, this happens because of intermediate states of the list, that have already been overridden by new transitions and states. Thus, it is guaranteed that the configuration displayed in such cases is the current configuration at the time of the last display.
- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

## 7.18 AT+CR Service reporting control

AT+CR configures the TA whether or not to transmit an intermediate result code +CR: <serv> to the TE when a call is being set up.

Setting the value of <mode> to 1 may lead to connection failure, if the application (e.g. WinFax) waits for default result code/URC.

### Syntax

Test Command			
AT+CR=?			
Response(s)			
+CR: (list of supported <mode>s)			
OK			
ERROR			
Read Command			
AT+CR?			
Response(s)			
+CR: <mode>			
OK			
ERROR			
Write Command			
AT+CR=<mode>			
Response(s)			
OK			
ERROR			
Reference(s)	PIN	MDM	APP
GSM 07.07	+	+	+
			Last
			-

### Intermediate Result Code

If enabled, an intermediate result code is transmitted during connect negotiation when the TA has determined the speed and quality of service to be used, before any error control or data compression reports are transmitted, and before any final result code (e.g. CONNECT) appears.

+CR: <serv>

### Parameter Description

<mode> <sup>(num)</sup>	
0(&F)	Disable
1	Enable
<serv> <sup>(str)</sup>	
"REL ASYNC"	Asynchronous non-transparent
"GPRS"	GPRS
"SYNC"	Fax connection

## 7.19 AT+CRC Set Cellular Result Codes for incoming call indication

The **AT+CRC** command controls whether or not to use the extended format of incoming call indication. **<mode>=1** may lead to connection failure, if the application (e.g. WinFax) waits for the default URC.

### Syntax

Test Command

AT+CRC=?

Response(s)

+CRC: (list of supported<mode>s)

OK

ERROR

Read Command

AT+CRC?

Response(s)

+CRC: <mode>

OK

ERROR

Exec Command

AT+CRC

Response(s)

OK

ERROR

Write Command

AT+CRC=[<mode>]

Response(s)

OK

ERROR

Reference(s)

GSM 07.07

PIN	MDM	APP	Last
+	+	+	-

### Unsolicited Result Codes

URC 1

RING

Indicates incoming call to the TE if **<mode>=0**.

URC 2

+CRING: <type>

Indicates incoming call to the TE if **<mode>=1**.

### Parameter Description

<mode> <sup>(num)</sup>	
[0](&F)	Disable extended format
1	Enable extended format

<type><sup>(str)</sup>

"REL ASYNC"	Asynchronous non-transparent
"FAX"	Facsimile
"VOICE"	Voice

## 7.20 AT+CBST Select bearer service type

The **AT+CBST** write command selects the bearer service **<name>**, the data rate **<speed>** and the connection element **<ce>** to be used when data calls are originated. The settings also apply to mobile terminated data calls. See GSM 02.02[1].

### Syntax

Test Command			
AT+CBST=?			
Response(s)			
+CBST: (list of supported<speed>s), (list of supported<name>s), (list of supported<ce>s)			
OK			
Read Command			
AT+CBST?			
Response(s)			
+CBST: <speed>, <name>, <ce>			
OK			
Write Command			
AT+CBST=<speed>[, <name>[, <ce>]]			
Response(s)			
OK			
ERROR			
Reference(s)	PIN	MDM	APP
GSM 07.07	+	+	+
			Last
			-

### Parameter Description

<speed> <sup>(num)</sup>	
[0] <sup>(&amp;F)</sup>	Autobauding
7	9600 bps (V.32)
12	9600 bps (V.34)
14	14400 bps (V.34)
16	28800 bps (V.34)
17	33600 bps (V.34)
39	9600 bps (V.120)
43	14400 bps (V.120)
48	28800 bps (V.120)
51	56000 bps (V.120)
71	9600 bps (V.110)
75	14400 bps (V.110)
80	28800 bps (V.110 or X.31 flag stuffing)
81	38400 bps (V.110 or X.31 flag stuffing)
83	56000 bps (V.110 or X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI or RDI service in order to get FTM)
84	64000 bps (X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI service in order to get FTM)

116 64000 bps (bit transparent)  
134 64000 bps (multimedia)

<name><sup>(num)</sup>

0(&F) Asynchronous modem  
1 Synchronous modem  
4 Asynchronous (RDI)

<ce><sup>(num)</sup>

0 Transparent  
1(&F) Non-transparent

## 7.20.1 Parameter configurations supported by AT+CBST

**Table 7.1:** Parameter configurations supported by [AT+CBST](#)

<speed>	GSM	WCDMA	SYNC.	ASYNC.	TRANSP.	NON-TRANSP.
0	+	+		+		+
7	+			+	+	+
12	+			+	+	+
14	+	+		+	+	+
16		+		+		+
17		+		+		+
39	+			+		+
43	+	+		+		+
48		+		+		+
51		+		+		+
71	+			+		+
75	+	+		+		+
80	+	+		+		+
81	+	+		+		+
83	+	+		+		+
84		+		+		+
116		+	+		+	
134		+	+		+	

## 7.21 AT+CRLP Select radio link protocol parameters for originated non-transparent data calls

The [AT+CRLP](#) write command sets radio link protocol (RLP) parameters used when non-transparent data calls are originated. The read command returns the current settings for the supported RLP version 0 till 2.

### Syntax

#### Test Command

AT+CRLP=?

#### Response(s)

+CRLP: (list of supported<iws>s), (list of supported<mws>s), (list of supported<T1>s), (list of supported<N2>s), (list of supported<ver>s)  
OK

#### Read Command

AT+CRLP?

#### Response(s)

+CRLP: <iws>, <mws>, <T1>, <N2>, <ver>  
+CRLP: <iws>, <mws>, <T1>, <N2>, <ver>  
+CRLP: <iws>, <mws>, <T1>, <N2>, <ver>  
OK

#### Write Command

AT+CRLP=[<iws>[, <mws>[, <T1>[, <N2>[, <ver>]]]]]

#### Response(s)

OK  
ERROR  
+CME ERROR: <err>

#### Reference(s)

GSM 07.07

PIN	MDM	APP	Last
+	+	+	-

### Parameter Description

<iws><sup>(num)</sup>

Interworking window size (IWF to MS)

0...61<sup>(&F)</sup>

0...240<sup>(&F)</sup>...488 for <ver>=2

<mws><sup>(num)</sup>

Mobile window size (MS to IWF)

0...61<sup>(&F)</sup>

0...240<sup>(&F)</sup>...488 for <ver>=2

<T1><sup>(num)</sup>

Acknowledgement timer (T1 in 10 ms units)

38...48<sup>(&F)</sup>...255

42...52<sup>(&F)</sup>...255 for <ver>=2

---

**<N2><sup>(num)</sup>**

Re-transmission attempts N2

1...6<sup>(&F)</sup>...255

**<ver><sup>(num)</sup>**

RLP version number

0...2

## 7.22 ATP Select pulse dialing

### Syntax

Exec Command				
ATP				
Response(s)				
OK				
Reference(s)				
V.250	PIN	MDM	APP	Last
	+	+	+	-

### Note

- No effect for GSM.

## 7.23 ATT Select tone dialing

### Syntax

Exec Command				
ATT				
Response(s)				
OK				
Reference(s)				
V.250	PIN	MDM	APP	Last
	+	+	+	-

### Note

- No effect for GSM.

## 7.24 AT+ES Synchronous Data Mode Configuration

This command enables the Synchronous Data Mode

### Syntax

Test Command

AT+ES=?

Response(s)

+ES: list of supported <orig\_rqst>values, , list of supported <ans\_fbk>values

OK

ERROR

+CME ERROR: <err>

Read Command

AT+ES?

Response(s)

+ES:[<orig\_rqst>], [, <ans\_fbk>]

OK

ERROR

+CME ERROR: <err>

Write Command

AT+ES=[<orig\_rqst>], [, <ans\_fbk>]

Response(s)

OK

ERROR

+CME ERROR: <err>

Reference(s)

ITU-T V.80ter

PIN	MDM	APP	Last
±	+	+	-

### Parameter Description

<orig_rqst> <sup>(num)</sup>	
Requested mode	
6 <sup>(D)</sup>	Initiate Synchronous Access mode when connection is completed, and Data Suite is entered
<ans_fbk> <sup>(num)</sup>	
Fallback mode answerer	
8 <sup>(D)</sup>	Initiate Synchronous Mode when connection is completed, and Data Suite is entered

## 7.25 AT+ESA Synchronous access mode configuration

This command configures the Synchronous access Mode

### Syntax

Test Command

AT+ESA=?

Response(s)

+ESA: (list of supported <trans\_idle>values), , , (list of supported <crc\_type>values), (list of supported <nrzi\_en>values), (list of supported <syn1>values),

OK

ERROR

+CME ERROR: <err>

Read Command

AT+ESA?

Response(s)

+ESA: <trans\_idle>, , , <crc\_type>, <nrzi\_en>, <syn1> ,

OK

ERROR

+CME ERROR: <err>

Write Command

AT+ESA=[<trans\_idle>][,<trans\_idle>][,<trans\_idle>][,<trans\_idle>][<crc\_type>][<nrzi\_en>][<syn1>]

Response(s)

OK

ERROR

+CME ERROR: <err>

Reference(s)

ITU-T V.80ter

PIN	MDM	APP	Last
+	+	+	-

### Parameter Description

<trans\_idle><sup>(num)</sup>

transmitted\_bit\_sequence

specifies the bit sequence transmitted by the DCE when a transmit data buffer underrun condition occurs, while operating in Transparent sub-Mode.

0 In Transparent sub-Mode, DCE transmits 8-bit SYN sequence on idle. DCE receiver does not hunt for synchronization sequence

<crc\_type><sup>(num)</sup>

CRC checking

0 CRC generation and checking disabled

<nrzi\_en><sup>(num)</sup>

nrzi encoding

0 NRZI encoding and decoding disabled

---

<syn1><sup>(num)</sup>

When <trans\_idle>=0, specifies the 8-bit transmit idle sequence to be used by the DCE. When <trans\_idle>=1, specifies the 8-bit synchronization sequence to be used by the DCE. When <trans\_idle>=2, specifies first 8 bits of 16-bit synchronization sequence to be used by the DCE

0 - 255

## 7.26 AT+CSTA Select type of address

Set command selects the type of number for further dialling commands [ATD](#) according to GSM/UMTS specifications. Test command returns values supported a compound value.

### Syntax

Test Command				
AT+CSTA=?				
Response(s)				
+CSTA: (list of supported<type>s)				
OK				
Read Command				
AT+CSTA?				
Response(s)				
+CSTA: <type>				
OK				
Write Command				
AT+CSTA=<type>				
Response(s)				
OK				
ERROR				
Reference(s)	PIN	MDM	APP	Last
GSM 07.07	+	+	+	-

### Parameter Description

<type> <sup>(num)</sup>	
145	when dialling string includes international access code character "+"
129	otherwise

## 8. Network Service Commands

The AT Commands described in this chapter are related to various network services. More commands related to this area can be found in Chapter 9., [Supplementary Service Commands](#).

### 8.1 AT+COPN Read operator names

The [AT+COPN](#) command returns the list of operator names from the ME. Each operator code [<numericn>](#) that has an alphanumeric equivalent [<alphan>](#) in the ME memory is returned.

#### Syntax

Test Command				
AT+COPN=?				
Response(s)				
OK				
ERROR				
+CME ERROR: <a href="#">&lt;err&gt;</a>				
Exec Command				
AT+COPN				
Response(s)				
+COPN: <a href="#">&lt;numericn&gt;</a> , <a href="#">&lt;alphan&gt;</a>				
+COPN: ...				
OK				
ERROR				
+CME ERROR: <a href="#">&lt;err&gt;</a>				
Reference(s)	PIN	MDM	APP	Last
GSM 07.07	+	+	+	-

#### Parameter Description

[<numericn>](#)<sup>(str)</sup>

Operator in numeric format; GSM location area identification number.

[<alphan>](#)<sup>(str)</sup>

Operator in long alphanumeric format; can contain up to 16 characters.

## 8.2 AT+COPS Operator Selection

**AT+COPS** queries the present status of the HC25's network registration and allows to determine whether automatic or manual network selection shall be used. Additional service is available with **AT^SOPS**.

Three operator selection modes are available with **AT+COPS**:

- **Automatic**  
HC25 searches for the home operator automatically. If successful the HC25 registers to the home network. If the home network is not found, HC25 goes on searching. If a permitted operator is found, HC25 registers to this operator.  
If no operator is found the HC25 remains unregistered.
- **Manual**  
Desired operator can be determined using the **AT+COPS** write command. If the operator is found, HC25 registers to it immediately. If the selected operator is forbidden, the HC25 remains unregistered.
- **Manual/automatic**  
The ME first tries to find the operator determined via **AT+COPS** write command. If the ME fails to register to this operator, then it starts to select another (permitted) operator automatically.

The **AT+COPS** test command lists sets of five parameters, each representing an operator present in the network. A set consists of

- an integer indicating the availability of the operator,
- long alphanumeric format of the operator's name,
- short alphanumeric format of the operator's name,
- numeric format representation of the operator and
- an integer indicating the access technology of the operator.

Any of the parameters may be unavailable and will then be an empty field (,). The list of operators comes in the following order: Home network, networks referenced in SIM and other networks.

The operator list is followed by a list of the supported **<mode>**s and **<format>**s. These lists are delimited from the operator list by two commas.

The response to the **AT+COPS** test command is dependent on the settings made with **<mode>** and **<Act>**. If **<mode>** equals "0" and **<Act>** is omitted (automatic selection mode for both parameters) the **AT+COPS** test command will return a list of operators with the supported **<Act>**s. If **<Act>** is explicitly set (i.e. restricted to UTRAN or GSM) the **AT+COPS** response contains only a list of operators with the selected RAT type.

The response to the **AT+COPS** read command depends on the registration status. If the ME is not registered, the read command returns only the current **<mode>**. If the ME is registered the response returns the currently selected operator, the currently set format and the currently used **<Act>**.

The **AT+COPS** write command forces an attempt to select and register to a network operator (see note below). If the selected operator is not available, no other operator will be selected (except **<mode>**=4). The selected operator name **<format>** will apply to further read commands, too.

The **AT+COPS** exec command returns OK and has no effect on the current **<mode>**.

### Syntax

Test Command

AT+COPS=?

Response(s)

```
+COPS: [list of present operators (<opStatus>, long alphanumeric <oper>s, short alphanumeric  
<oper>s, numeric <oper>s, <Act>], , (list of supported <mode>s), (list of supported <format>s)  
OK  
ERROR  
+CME ERROR: <err>
```

### Read Command

AT+COPS?

Response(s)

+COPS:<mode>[, <format>[, <oper>][, <AcT>]]

OK

ERROR

+CME ERROR: <err>

### Exec Command

AT+COPS

Response(s)

OK

### Write Command

AT+COPS=<mode>[, <format>[, <oper>][, <AcT>]]

Response(s)

OK

ERROR

+CME ERROR: <err>

Reference(s)

GSM 07.07

PIN

MDM

APP

Last

+

+

+

-

## Parameter Description

<opStatus><sup>(num)</sup>

Status

0	Unknown
1	Operator available
2	Current operator
3	Operator forbidden

<oper><sup>(str)</sup>

Operator

If test command: Operator name in long alphanumeric format, short alphanumeric format and numeric format.  
If read command: Operator name as per <format>.  
If write command: Operator name in numeric format.

<mode><sup>(num)</sup>

0 <sup>(P)</sup>	Automatic mode; <oper> field is ignored.
1	Manual operator selection The tref ref="cops"/> write command requires <oper> in numeric format, i.e. <format> shall be 2. The AT+COPS read command returns the current <mode>, the currently selected <oper> and the currently used <AcT>. If the ME is not registered the AT+COPS read command returns only the currently set <mode>.
2	Manually deregister from network and remain unregistered until <mode>=0 or 1 or 4 is selected.
3	Set only <format> (for AT+COPS read command).
4	Automatic / manual selection; if manual selection fails, automatic mode (<mode>=0) is entered (<oper> field will be present).

**<AcT><sup>(num)</sup>**

Access technology also referred to as RAT (Radio Access Technology)

By delivery default, the **<AcT>** parameter is set to an automatic selection mode which enables the ME to select either UTRAN (UMTS) or GSM, depending on the network coverage. This automatic mode for selecting **<AcT>** remains enabled until you explicitly set either "0" for GSM or "2" for UTRAN. This means, setting the **<AcT>** parameter is a restriction, i.e. it forces the ME to select either UTRAN only or GSM only. If the selected **<AcT>** is not available, the ME cannot register to a network.

The automatic **<AcT>** selection mode can be restored any time by executing the **AT+COPS** write command without choosing a specific **<AcT>**, i.e. simply by omitting the **<AcT>** value. When you do so, it does not matter, which value(s) you select for other **AT+COPS** parameters. For example, an easy way is setting **AT+COPS=0**, which means both PLMN and RAT are automatically selected. Another way is giving the **AT+COPS** write command with any **<mode>**, **<format>**, or **<oper>**, but **<AcT>** omitted.

The **<AcT>** setting remains unchanged upon power-up, in contrast to **<mode>** that is always restored to "0" after power-up. Yet, please consider that the **AT+COPS?** read command does not reflect whether **<AcT>** was omitted or explicitly set. This is because the response to the **AT+COPS?** read command will always indicate the currently used **<AcT>**.

0	GSM
2	UTRAN

**<format><sup>(num)</sup>**

0(&F)	Long alphanumeric format of <b>&lt;oper&gt;</b> . Can be up to 16 characters long.
1	Short alphanumeric format of <b>&lt;oper&gt;</b> . Can be up to 8 characters long.
2	Numeric format of <b>&lt;oper&gt;</b> . This is the GSM Location Area Identification (LAI) number, which consists of the 3-digit Mobile Country Code (MCC) plus the 2- or 3-digit Mobile Network Code (MNC).

#### Note

- It is not recommended to use the **AT+COPS** command before passing the CHV (card holder verification) / SIM PIN1 verification. This is because after PIN1 verification the module will automatically try to register to the network as though **AT+COPS** were 0, regardless of the settings done before with or without SIM, such as **AT+COPS=2** which remains unchanged. Also, the test command should only be used after PIN1 authentication.

## 8.3 AT^SOPS Extended Operator Selection

[AT^SOPS](#) queries the present status of the HC25's network registration. Since basic operator selection services are available with [AT+COPS](#) this command uses the methods of the Enhanced Operator Name String (EONS) specification while handling operator name strings. Additional [EONS related information](#) is available with [AT^SIND](#).

[AT^SOPS](#) test command lists sets of five parameters, each representing an operator present in the network. A set consists of

1. an integer indicating the availability of the operator,
2. specification of the source of the operator name [<eonsOperator>](#),
3. operator name according to EONS Table,
4. Service Provider Name from the SIM Service Table and
5. numeric format representation of the operator.

Any of the parameters may be unavailable and will then be an empty field (,,).

The list of operators comes in the following order: Home network, networks referenced in SIM and other networks.

After the operator list the HC25 returns lists of supported [<mode>](#)s and [<format>](#)s. These lists are delimited from the operator list by two commas.

If the test command is used while an ongoing GPRS transfer, traffic will be interrupted for up to one minute.

Command settings are effective over all serial interfaces of the HC25.

### Syntax

Test Command				
AT^SOPS=?				
Response(s)				
^SOPS:[list of present operator( <a href="#">&lt;opStatus&gt;</a> , <a href="#">&lt;eonsType&gt;</a> , <a href="#">&lt;eonsOperator&gt;</a> , <a href="#">&lt;servProvider&gt;</a> , <a href="#">&lt;servProviderType&gt;</a> , <a href="#">&lt;opName&gt;</a> , <a href="#">&lt;acT&gt;</a> )s ], , (list of supported <a href="#">&lt;mode&gt;</a> )s, (list of supported <a href="#">&lt;format&gt;</a> )s				
OK				
ERROR				
+CME ERROR: <a href="#">&lt;err&gt;</a>				
Reference(s)				
--				
		PIN	MDM	APP
		+	+	+
		Last		
		-		

### Parameter Description

<a href="#">&lt;opStatus&gt;</a> <sup>(num)</sup>	
Status	
0	unknown
1	operator available
2	current operator
3	operator forbidden

<a href="#">&lt;eonsType&gt;</a> <sup>(num)</sup>	
Specification of the source of the operator name <a href="#">&lt;eonsOperator&gt;</a> . Details of <a href="#">EONS-supplied operator name types</a> are available at <a href="#">AT^SIND</a> .	

<eonsOperator>

Operator name; format depends on the source of the operator name, specified by <eonsType>.

<servProvider><sup>(str)</sup>

Service Provider Name according to setting of Service No. 17 in the SIM Service Table (EF<sub>SST</sub>).  
Service Provider Name (SPN) will be read from EF<sub>SPN</sub>. Service Provider Display Information (SPDI) will be read from EF<sub>SPDI</sub> list.

<servProviderType><sup>(num)</sup>

Service Provider Type according to Registered Public Land Mobile Network (RPLMN) and Home Public Land Mobile Network (HPLMN).

0	No Service Provider Information available.
1	Service Provider Name will be displayed. RPLMN is the HPLMN.
2	Service Provider Display Information will be displayed. One list entry is equal to the RPLMN.

<opName>

Operator

Operator name in numerical presentation contains the GSM Location Area Identification (LAI) number, which consists of the 3-digit Mobile Country Code (MCC) plus the 2- or 3-digit Mobile Network Code (MNC).  
Parameter is stored non-volatile to the SIM.

<mode><sup>(num)</sup>

Parameter is not applicable.

<acT><sup>(num)</sup>

Access technology selected

0	GSM
2 <sup>(D)</sup>	UTRAN

<format><sup>(num)</sup>

Parameter is not applicable.

### Note

- The AT^SOPS Test command is only accepted by the module after a valid pin has been entered.

## 8.4 AT+CREG Network registration

The **AT+CREG** command serves to verify the network registration status of the ME. For this purpose two types of URCs are available.

The **AT+CREG** read command returns the URC presentation mode **<n>** and an integer **<stat>** that shows the registration status of the ME. The **AT+CREG** exec command sets the URC presentation mode **<n>** to the factory default value.

### Syntax

#### Test Command

AT+CREG=?

Response(s)

+CREG: (list of supported<n>s)

OK

#### Read Command

AT+CREG?

Response(s)

+CREG: <n>, <stat>[, <lac>, <ci>]

OK

ERROR

+CME ERROR: <err>

#### Exec Command

AT+CREG

Response(s)

OK

ERROR

+CME ERROR: <err>

#### Write Command

AT+CREG=[<n>]

Response(s)

OK

ERROR

+CME ERROR: <err>

#### Reference(s)

GSM 07.07

#### PIN MDM APP Last

-	+	+	-
---	---	---	---

### Unsolicited Result Codes

#### URC 1

If **<n>**=1 and there is a change in the ME network registration status:

+CREG: <stat>

#### URC 2

If **<n>**=2 and there is a change in the ME network registration status or a change of the network cell:

+CREG: <stat>[, <lac>, <ci>]

## Parameter Description

**<n><sup>(num)</sup>**

[0] <sup>(&amp;F)</sup>	Disable +CREG URC
1	Enable URC +CREG:<stat> to report status of network registration
2	Enable URC +CREG:<stat>[,<lac>,<ci>] to report status of network registration including location information. Optional parameters <lac> and <ci> will not be displayed during calls or if these values have not changed since last AT+CREG read command or since last indication by +CREG URC.

**<stat><sup>(num)</sup>**

0	Not registered, ME is currently not searching for new operator There is a technical problem. User intervention is required. Yet, emergency calls can be made if any network is available. Probable causes: <ul style="list-style-type: none"> <li>• no SIM card available</li> <li>• no PIN entered</li> <li>• no valid Home PLMN entry found on the SIM</li> </ul>
1	Registered to home network
2	Not registered, but ME is currently searching for a new operator The ME searches for an available network. Failure to log in until after more than a minute may be due to one of the following reasons: <ul style="list-style-type: none"> <li>• No network available or insufficient Rx level.</li> <li>• The ME has no access rights to the networks available.</li> <li>• Networks from the SIM list of allowed networks are around, but login fails due to one of the following reasons: <ul style="list-style-type: none"> <li>- #11 ... PLMN not allowed</li> <li>- #12 ... Location area not allowed</li> <li>- #13 ... Roaming not allowed in this location area</li> </ul> After this, the search will be resumed (if automatic network search is enabled).</li> <li>• The Home PLMN or an allowed PLMN is available, but login is rejected by the cell (reasons: Access Class or LAC).</li> </ul> If at least one network is available, emergency calls can be made.
3	Registration denied <ul style="list-style-type: none"> <li>• Authentication or registration fails after Location Update Reject due to one of the following reasons: <ul style="list-style-type: none"> <li>- #2 ... IMSI unknown at HLR</li> <li>- #3 ... Illegal MS</li> <li>- #6 ... Illegal ME</li> </ul> Either the SIM or the MS or the ME are unable to log into any network. User intervention is required. Emergency calls can be made, if any network is available.</li> </ul>
4	Unknown (not used)
5	Registered, roaming The ME is registered at a foreign network (national or international network)

**<lac><sup>(str)</sup>**

Two byte location area code in hexadecimal format (e.g. "00C3" equals 193 in decimal).

<ci><sup>(str)</sup>

Two byte cell ID in hexadecimal format.

### Example

AT+CREG=1	Activates URC mode.
OK	
AT+COPS=0	Forces ME to automatically search network operator.
OK	
+CREG: 2	URC reports that ME is currently searching.
+CREG: 1	URC reports that operator has been found.

## 8.5 AT+CSQ Signal quality

The [AT+CSQ](#) execute command indicates the quality of the received signal strength.

### Syntax

Test Command				
AT+CSQ=?				
Response(s)				
+CSQ: (list of supported<rssi>s), (list of supported<ber>s)				
OK				
Exec Command				
AT+CSQ				
Response(s)				
+CSQ: <rssi>,<ber>				
OK				
Reference(s)	PIN	MDM	APP	Last
GSM 07.07	+	+	+	-

### Parameter Description

<rssi> <sup>(num)</sup>	
0	-113 dBm or less
1	-111 dBm
2..30	-109... -53 dBm
31	-51 dBm or greater
99	not known or not detectable
<ber> <sup>(num)</sup>	
99	The indication of the channel bit error rate is not supported. The value is always 99.

### Note

- After using network related commands such as [AT+CCWA](#), [AT+CCFC](#), users are advised to wait 3s before entering [AT+CSQ](#). This is recommended to be sure that any network access required for the preceding command has finished.

## 8.6 AT+CPOL Preferred Operator List

The [AT+CPOL](#) read command returns the list of the preferred operators. The [AT+CPOL](#) write command allows to edit the list of the preferred operators. If [<index>](#) is given but [<operator>](#) is left out, the entry is deleted.

### Syntax

Test Command			
AT+CPOL=?			
Response(s)			
+CPOL: (list of supported <a href="#">&lt;index&gt;</a> s), (list of supported <a href="#">&lt;format&gt;</a> s)			
OK			
ERROR			
+CME ERROR: <a href="#">&lt;err&gt;</a>			
Read Command			
AT+CPOL?			
Response(s)			
+CPOL: <a href="#">&lt;index&gt;</a> , <a href="#">&lt;format&gt;</a> , <a href="#">&lt;operator&gt;</a>			
+CPOL: ...			
OK			
ERROR			
+CME ERROR: <a href="#">&lt;err&gt;</a>			
Write Command			
AT+CPOL= <a href="#">&lt;index&gt;</a> [, <a href="#">&lt;format&gt;</a> , <a href="#">&lt;operator&gt;</a> ]			
Response(s)			
OK			
ERROR			
+CME ERROR: <a href="#">&lt;err&gt;</a>			
Reference(s)	PIN	MDM	APP
GSM 07.07	+	+	+
			Last
			-

### Parameter Description

<a href="#">&lt;index&gt;</a> <sup>(num)</sup>	
The order number of the operator in the SIM preferred operator list.	
<a href="#">&lt;format&gt;</a> <sup>(num)</sup>	
2	Numeric format
<a href="#">&lt;operator&gt;</a> <sup>(str)</sup>	
Operator in numeric format (GSM Location Area Identification number which consists of a 3-digit country code plus a 2- or 3-digit network code).	

### Note

- If you enter [AT+CPOL=?](#) immediately after the CHV, you get the URC: "+CME ERROR: operation not allowed". In addition the [AT+CPOL](#) command is blocked until the ME is restarted. You get at any time the faulty response: "+CME ERROR: operation not allowed". The preferred operator list will not be shown. To avoid this problem and to check the status of SIM initialization after CHV you can activate the "^SIND: sim-status" URC provided by [AT^SIND](#).

## 8.7 AT^SMONI Monitor idle mode

The [AT^SMONI](#) command supplies information of the serving cell. To retrieve the information use the execute command.

### Syntax

Test Command				
AT^SMONI=?				
Response(s)				
OK				
Exec Command				
AT^SMONI				
Response(s)				
See: Section <a href="#">8.7.1</a> , <a href="#">AT^SMONI responses</a>				
OK				
Reference(s)	PIN	MDM	APP	Last
--	-	+	+	-

### Notes

- The parameters LAC and cell are presented as hexadecimal digits, the remaining parameters are composed of decimal digits.
- If the BS supports frequency hopping during a connection, the dedicated channel (parameter chann) is not stable. This mode is indicated by chann = 'h'.

### 8.7.1 AT^SMONI responses

ME is not connected:

a) ME is camping on a 2G cell:

```
^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,NCC,BCC,GPRS
Example:
^SMONI: 2G,71,-61,262,02,0143,83BA,33,3,6,G
```

b) ME is camping on a 3G cell:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev
Example:
^SMONI: 3G,10564,296,7,-79,262,02,0143,3B2F,-92,-78
```

c) ME is searching and could not (yet) find a suitable 2G cell:

```
^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,NCC,BCC,GPRS
Example:
^SMONI: 2G,SEARCH
```

d) ME is searching and could not (yet) find a suitable 3G cell:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev
Example:
^SMONI: 3G,SEARCH
```

ME is connected (Call in progress):

a:) 2G cell:

```
^SMONI: ACT,ARFCN,BCCH,MCC,MNC,LAC,cell,C1,NCC,BCC,GPRS
```

Example:

```
^SMONI: 2G,673,-80,262,07,4EED,A500,35,7,4,G
```

b:) 3G cell:

```
^SMONI: ACT,UARFCN,PSC,EC/n0,RSCP,MCC,MNC,LAC,cell,SQual,SRxLev
```

Example:

```
^SMONI: 3G,10564,96,7,-79,262,02,0143,3B2F,-92,-78
```

Columns for Serving Cell (2G parameters):

Column	Description
ARFCN	ARFCN (Absolute Radio Frequency Channel Number) of the BCCH carrier
BCCH	Receiving level of the BCCH carrier in dBm
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
LAC	Location Area Code, see note
cell	Cell ID
C1	Coefficient for base station selection
NCC	PLMN colour code
BCC	Base station colour code
GPRS	GPRS state

Columns for Serving Cell (3G parameters):

Column	Description
UARFCN	UARFCN (UTRAN Absolute Radio Frequency Channel Number) of the BCCH carrier
PSC	Primary Synchronisation Code
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSCP	Received Signal Code Power in dBm
MCC	Mobile Country Code (first part of the PLMN code)
MNC	Mobile Network Code (second part of the PLMN code)
LAC	Location Area Code, see note
cell	Cell ID
SQual	Quality value for base station selection in dB (see 3GPP 25.304)
SRxLev	RX level value for base station selection in dB (see 3GPP 25.304)

## 8.7.2 Service States

Depending on the service state, an additional textual output is generated (refer also to the response examples):

- 'SEARCH' (Searching) - The MS is searching, but could not (yet) find a suitable cell. This output appears after restart of the MS or after loss of coverage.

## 8.8 AT^SMONP Monitor neighbour cells

The [AT^SMONP](#) supplies information of neighbour cells. To retrieve the information use the execute command.

### Syntax

Test Command				
AT^SMONP=?				
Response(s)				
OK				
Exec Command				
AT^SMONP				
Response(s)				
See: Section <a href="#">8.8.1</a> , <a href="#">AT^SMONP responses</a>				
OK				
Reference(s)	PIN	MDM	APP	Last
--	-	+	+	-

### Notes

- Due to the fact that not all necessary information of the neighbour cells can be decoded during a connection, there are several constraints to be considered:
  - Only neighbour cells that have already been visible in IDLE mode will be further updated, as long as they are still included in the list.
  - Though new neighbour cells can be added to the list (e.g. due to handover), their C1 and C2 parameters cannot be displayed until the connection is released. In this case "-" is presented for C1 and C2.
- The neighbour cells have the same PLMN as the serving cell. In case of searching for a network the serving cell can change and the ME shows different sets of neighbour cells depending on the PLMN of the serving cell.
- In case of a 2G serving cell the ME shows 2G and 3G neighbour cells. If 3G is available then no neighboring 2G cells are shown.
- Not all parameters are shown. The output is still under development and will be changed in future releases. Unsupported parameters are signed as "-".

### 8.8.1 AT^SMONP responses

Response of [AT^SMONP](#):

```
2G:
ARFCN1, BCCH1
ARFCN2, BCCH2
...
ARFCNn, BCCHn
3G:
UARFCN1, PSC1, EC/n01, RSCP1
UARFCN2, PSC2, EC/n02, RSCP2
...
UARFCNn, PSCn, EC/n0n, RSCPn

Example:
```

```
2G:
8,-110
12,-110
51,-110
55,-110
59,-110
67,-110
75,-110
737,-110
744,-110
746,-110
3G:
10564,296,6,-68
10564,96,35,-83
```

Columns for 2G paramaters:

Column	Description
ARFCN	Absolute Radio Frequency Channel Number of the BCCH carrier
BCCH	Receiving level of the BCCH carrier in dBm

Columns for 3G paramaters:

Column	Description
UARFCN	UTRAN Absolute Radio Frequency Channel Number of the BCCH carrier
PSC	Primary Synchronisation Code
EC/n0	Carrier to noise ratio in dB = measured Ec/Io value in dB. Please refer to 3GPP 25.133, section 9.1.2.3, Table 9.9 for details on the mapping from EC/n0 to EC/Io.
RSCP	Received Signal Code Power in dBm

## 8.9 AT^SNWS Network Selection

The **AT^SNWS** command is obsolete and supported only for backward compatibility. It was intended for HC25 release 1 as an extra option to perform a band scan across all frequency bands and manually select a network, because **AT+COPS** was always determined by the band most recently used and therefore started searching either across the GSM 850, WCDMA 850, PCS 1900, WCDMA 1900 bands or across the DCS 1800, EGSM 900, WCDMA 2100 bands.

The **AT^SNWS** command may still be used to manually select a network, but is no longer recommended. Due to the single band group solution introduced with HC25 release 2 the same function is now fully available with **AT+COPS**. For more information on the single band group scheme please refer to the "Radio/Band" parameter **<rba>** of the **AT^SCFG** command.

The **AT^SNWS** write command forces an attempt to select and register to the given operator. If the selected operator is not found, the ME reverts to the band previously used and tries to register again.

The **AT^SNWS** test command enforces a multiple band selection in order to find all available networks. This procedure will take a few seconds depending on the amount of available networks. During this time the serving cell will be lost because of band changing. After the scan the ME reverts to the previously used network. The test command returns a list of all operators currently available. The response consists of several sets of five parameters, where each set is representing a visible operator. Each set contains the following information:

- an integer indicating the availability of the operator,
- long alphanumeric format of the operator's name,
- short alphanumeric format of the operator's name,
- numeric format representation of the operator and
- an integer indicating the access technology of the operator.

Any of the parameters may be unavailable and will then be an empty field (,). The list of operators comes in the following order: Home network, networks referenced in SIM and other networks. The operator list is followed by a list of the supported **<mode>**s and **<format>**s. These lists are delimited from the operator list by two commas.

### Syntax

#### Test Command

AT^SNWS=?

#### Response(s)

^SNWS: [list of present operators (**<opStatus>**, long alphanumeric **<oper>**s, short alphanumeric **<oper>**s, numeric **<oper>**s , **<AcT>**], , (supported **<mode>**), (supported **<format>**)

OK

ERROR

+CME ERROR: **<err>**

#### Write Command

AT^SNWS=**<mode>**, **<format>**, **<oper>**[, **<AcT>**]

#### Response(s)

OK

ERROR

+CME ERROR: **<err>**

PIN	MDM	APP	Last
+	+	+	-

### Parameter Description

**<opStatus><sup>(num)</sup>**

Status

0	Unknown
1	Operator available
2	Current operator
3	Operator forbidden

**<oper><sup>(str)</sup>**

Operator

If test command: Operator name in long alphanumeric format, short alphanumeric format and numeric format.  
If write command: Operator name in numeric format.

**<mode><sup>(num)</sup>**

1	Manual operator selection Write command requires <b>&lt;oper&gt;</b> in numeric format, i.e. <b>&lt;format&gt;</b> shall be 2.
---	-----------------------------------------------------------------------------------------------------------------------------------

**<AcT><sup>(num)</sup>**

Access technology selected

0	GSM
2 <sup>(D)</sup>	UTRAN

If the parameter is omitted in the **AT^SNWS** write command, the ME will register to the given operator using the **<AcT>** determined with the last **AT+COPS** or **AT^SNWS** write command. This means that the found **<AcT>** is either the one explicitly specified by the user, or if **<mode>** of **AT+COPS** is set to automatic, it is automatically assigned. Likewise, the **AT^SNWS** test command will show the operators either with the **<AcT>** explicitly selected or automatically assigned.

**<format><sup>(num)</sup>**

2	Numeric format of <b>&lt;oper&gt;</b> . This is the GSM Location Area Identification (LAI) number, which consists of the 3-digit Mobile Country Code (MCC) plus the 2- or 3-digit Mobile Network Code (MNC).
---	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

### Notes

- It is not recommended to use the **AT^SNWS** command before passing the CHV (card holder verification) / SIM PIN1 verification. Also, the test command should only be used after PIN1 authentication.
- It is not recommended to use the **AT^SNWS** command when an active connection is established.
- If the PLMN given in the **AT^SNWS** write command equals the PLMN the ME is registered to please use **AT+COPS** read command after using **AT^SNWS** write command to check **<mode>** parameter.

## 9. Supplementary Service Commands

The AT Commands described in this chapter are related to the Supplementary Services offered by the GSM network.

### 9.1 AT+CACM Accumulated call meter (ACM) reset or query

#### Syntax

Test Command

AT+CACM=?

Response(s)

OK

Read Command

AT+CACM?

Response(s)

+CACM: <acm>

OK

ERROR

+CME ERROR: <err>

Write Command

AT+CACM=[<passwd>]

Response(s)

OK

ERROR

+CME ERROR: <err>

Reference(s)

GSM 07.07

PIN	MDM	APP	Last
-----	-----	-----	------

+	+	+	-
---	---	---	---

#### Command Description

The read command returns the current ACM value.

The write command resets the Advice of Charge related to the accumulated call meter (ACM) value in SIM file EF(ACM). ACM contains the total number of home units for both the current and preceding calls.

#### Parameter Description

<acm><sup>(str)</sup>

Three bytes of the current ACM value in hexadecimal format (e.g. "00001E" indicates decimal value 30) 000000 - FFFFFFFF.

<passwd><sup>(str)</sup>

SIM PIN2

## 9.2 AT+CAMM Accumulated call meter maximum (ACMmax) set or query

### Syntax

Test Command			
AT+CAMM=?			
Response(s)			
OK			
Read Command			
AT+CAMM?			
Response(s)			
+CAMM: <acmmax>			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT+CAMM=<acmmax>[, <passwd>]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.07	+	+	+
			Last
			-

### Command Description

The read command returns the current ACMmax value.

The write command sets the Advice of Charge related to the accumulated call meter maximum value in SIM file EF (ACMmax). ACMmax contains the maximum number of home units allowed to be consumed by the subscriber.

### Parameter Description

<acmmax> <sup>(str)</sup>
Three bytes of the max. ACM value in hexadecimal format (e.g. "00001E" indicates decimal value 30) 000000 disable ACMmax feature 000001-FFFFFF.
<passwd> <sup>(str)</sup>
SIM PIN2

## 9.3 AT+CAOC Advice of Charge information

### Syntax

Test Command			
AT+CAOC=?			
Response(s)			
+CAOC: (list of supported<mode>s)			
OK			
Read Command			
AT+CAOC?			
Response(s)			
+CAOC: <mode>			
OK			
Exec Command			
AT+CAOC			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT+CAOC=[<mode>]			
Response(s)			
ERROR			
+CME ERROR: <err>			
If <mode>=0, TA returns the current <ccm> value.			
+CAOC: <ccm>			
OK			
Reference(s)	PIN	MDM	APP
GSM 07.07	+	+	+
			Last
			-

### Unsolicited Result Code

+CCCM: <ccm>

When activated, an unsolicited result code is sent when the CCM value changes, but not more often than every 10 seconds.

### Command Description

The write command sets the Advice of Charge supplementary service function mode.

### Parameter Description

<mode> <sup>(num)</sup>	
0	query CCM value
1	deactivate the unsolicited reporting of <ccm> value
2	activate the unsolicited reporting of <ccm> value

---

`<CCM>`<sup>(str)</sup>

Three bytes of the current CCM value in hexadecimal format (e.g. "00001E" indicates decimal value 30); bytes are similarly coded as ACMmax value in the SIM 000000-FFFFFF.

## 9.4 AT+CCUG Closed User Group

### Syntax

#### Test Command

AT+CCUG=?

Response(s)

OK

#### Read Command

AT+CCUG?

Response(s)

+CCUG: <n>, <index>, <info>

OK

ERROR

+CME ERROR: <err>

#### Write Command

AT+CCUG=[<n>][, <index>][, <info>]

Response(s)

OK

ERROR

+CME ERROR: <err>

#### Reference(s)

GSM 07.07, GSM 02.85, GSM 03.85,  
GSM 04.85

PIN	MDM	APP	Last
+	+	+	-

### Command Description

The Test command returns the supported parameters.

The Read command returns if the Explicit CUG invocation is activated (in parameter <n>), which CUG <index> is chosen, and if Preferential Group or Outgoing Access is suppressed (in parameter <info>).

The write command serves to activate or deactivate the explicit CUG invocation, to set the desired index, and to specify if Preferential Group or Outgoing Access shall be suppressed.

### Parameter Description

<n><sup>(num)</sup>

explicit CUG invocation options

0 <sup>(D)</sup>	Deactivate explicit CUG invocation
1	Activate explicit CUG invocation

<index><sup>(num)</sup>

0-9	explicit selection of CUG index
10 <sup>(D)</sup>	No index (preferred CUG taken from subscriber data)

<info><sup>(num)</sup>

state of the call

0 <sup>(D)</sup>	no information
1	suppress outgoing access

- |   |                                                |
|---|------------------------------------------------|
| 2 | suppress preferential CUG                      |
| 3 | Suppress preferential CUG and Outgoing Access. |

### Notes

- The active settings for omitted parameters are retained without changes.
- Explicit CUG invocation means that at each call setup, CUG information is added to the called number.
- Upon delivery, settings are predefined with  
`<n>=0`,  
`<index>=10`,  
`<info>=0`.  
These delivery defaults cannot be recalled automatically.
- When starting a call with `ATD`, Parameter 'G' or 'g' of command `ATD` will have no effect if the option selected for this single call is identical to the option already selected with `AT+CCUG`.
- Current settings are saved in the ME automatically.
- `ATZ` or `AT&F` do not influence the current settings.
- some combinations of parameters may lead to rejection of CUG calls by the network. For more information, please consult GSM 04.85

## 9.5 AT+CCFC Call forwarding number and conditions control

**AT+CCFC** controls the call forwarding supplementary service. Registration, erasure, activation, deactivation and status query are supported.

### Syntax

Test Command

AT+CCFC=?

Response(s)

+CCFC: (list/range of supported **<reason>**s)

OK

Write Command

AT+CCFC=**<reason>**, **<mode>**[, **<number>**, **<type>**][, **<class>**][, **<sub-number>**, **<sub-type>**][, **<time>**]

Response(s)

If **<mode>** is not equal 2 and command successful:

OK

If **<mode>**= 2, **<reason>** is not equal 2 and command successful:

+CCFC: **<status>**, **<class>**[, **<number>**, **<type>**, **<sub-number>**, **<sub-type>**]

OK

If **<mode>**= 2, **<reason>**= 2 and command successful:

+CCFC: **<status>**, **<class>**[, **<number>**, **<type>**, **<sub-number>**, **<sub-type>**, **<time>**]

OK

If error is related to ME functionality

ERROR

+CME ERROR: **<err>**

Reference(s)

GSM 07.07, GSM 02.04, GSM 02.82,  
GSM 03.82, GSM 04.82

PIN	MDM	APP	Last
+	+	+	-

### Parameter Description

**<reason>**<sup>(num)</sup>

Reason for call forwarding

0	unconditional
1	mobile busy
2	no reply
3	not reachable
4	all call forwarding (includes reasons 0, 1, 2 and 3)
5	all conditional call forwarding (includes reasons 1, 2 and 3)

**<mode>**<sup>(num)</sup>

Network operation to be performed for Supplementary service "call forwarding"

0	disable call forwarding (disable service)
1	enable call forwarding (enable service)
2	query status of call forwarding (query service status)

- |   |                                                                                         |
|---|-----------------------------------------------------------------------------------------|
| 3 | register <a href="#">&lt;number&gt;</a> and activate call forwarding (register service) |
| 4 | erase <a href="#">&lt;number&gt;</a> and deactivate call forwarding (erase service)     |

[<number>](#)<sup>(str)</sup>

String type phone number of forwarding address in format specified by [<type>](#). If you select [<mode>](#)= 3, the phone [<number>](#) will be registered in the network. This allows you to disable / enable CF to the same destination without the need to enter the phone number once again. Depending on the services offered by the provider the registration may be mandatory before CF can be used. The number remains registered in the network until you register another number or erase it using [<mode>](#) = 4.

[<type>](#)<sup>(num)</sup>

Type of address octect

- |     |                                                                                                |
|-----|------------------------------------------------------------------------------------------------|
| 145 | dialing string <a href="#">&lt;number&gt;</a> includes international access code character '+' |
| 129 | otherwise                                                                                      |

[<class>](#)<sup>(num)</sup>

Integer or sum of integers each representing a class of information, i.e. a bearer service, telecommunication service or bearer service group as defined in "GSM 02.04"

- |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1             | voice                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2             | data<br><a href="#">&lt;class&gt;</a> 2 (data) comprises all those <a href="#">&lt;class&gt;</a> values between 16 and 128, that are supported both by the network and the MS. This means, a setting made for <a href="#">&lt;class&gt;</a> 2 applies to all remaining data classes (if supported). In addition, you can assign a different setting to a specific class. For example, you can activate call forwarding for all data classes, but deactivate it for a specific data class. |
| 4             | fax                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 8             | SMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 16            | data circuit sync                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 32            | data circuit async                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 64            | dedicated packet access                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 128           | dedicated PAD access                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1...[7]...255 | combination of some of the above classes. For example, the default setting 7 represents the sum of the integers 1, 2 and 4 (CF for voice, data and fax). The value 255 covers all classes. If the <a href="#">&lt;class&gt;</a> parameter is omitted, the default value 7 is used.                                                                                                                                                                                                        |

[<sub-number>](#)<sup>(str)</sup>

String type phone number of sub address in format specified by [<type>](#).

[<sub-type>](#)<sup>(num)</sup>

Type of sub-address octect

- |     |                                         |
|-----|-----------------------------------------|
| 145 | international access code character '+' |
| 129 | otherwise                               |

[<time>](#)<sup>(num)</sup>

- |               |                                                                                                                            |
|---------------|----------------------------------------------------------------------------------------------------------------------------|
| 5...[20]...30 | Time to wait before call is forwarded, rounded to a multiple of 5 sec. (only for <a href="#">&lt;reason&gt;</a> =no reply) |
|---------------|----------------------------------------------------------------------------------------------------------------------------|

<status><sup>(num)</sup>

0	Call forwarding not active
1	Call forwarding active

### Notes

- For some networks, the interrogation command will return the same result for each requested class.
- You can register, disable, enable and erase <reason> 4 and 5 as described above. However, querying the status of <reason> 4 and 5 with AT+CCFC will result in an error.
- Most networks will not permit registration of new parameters for conditional call forwarding (reasons 1,2,3,5) while unconditional call forwarding is enabled.
- The AT+CCFC command offers a broad range of call forwarding options according to the GSM specifications. However, when you attempt to set a call forwarding option which is not provisioned or not yet subscribed to, the setting will not take effect regardless of the response returned. The responses in these cases vary with the network (for example "OK", "Operation not allowed", "Operation not supported" etc.). To make sure check the call forwarding status with <mode>=2.
- Some networks may choose to have certain call forwarding conditions permanently enabled (e.g. forwarding to a mailbox if the mobile is not reachable). In this case, erasure or deactivation of call forwarding for these conditions will not be successful, even if the CCFC request is answered with response "OK".
- The command has been implemented with the full set of <class> parameters according to GSM 07.07. For actual applicability of SS "call forwarding" to a specific service or service group (a specific <class> value) please consult table A.1 of GSM 02.04.
- There is currently no release of GSM standard "GSM 02.04", in which the call forwarding supplementary service is defined as applicable to SMS services.
- It may happen that the response of the query command shows only the inactive status of the class 1 or 255 instead of each requested class. This means, that the status is valid for all classes.
- As stated above <class> 2 is intended only to send the data classes 16/32/64/128 to the network. However, the responses returned when the subscriber sets or queries call forwarding refer only to the status of the data classes received from the network. This means that the responses will display only those data classes between 16 and 128 which are supported by the network and currently activated. There will be no output for class 2, nor for classes which are not supported or not set.
- The parameter <class> will not be sent to the network if <mode>=2. Therefore it may happen that the response of the query command contains information about classes which were not requested, or it shows only the inactive status of the class 1 or 255. This means that the status is valid for all classes.

### Example

Please note that when you configure or query call forwarding without specifying any classes, the settings will refer to classes 1, 2 and 4 only (=default). The handling of classes is equivalent to AT+CLCK.

- To register the destination number for unconditional call forwarding (CFU):

```
at+ccfc=0,3,"+493012345678",145
OK
```

The destination number will be registered for voice, data and fax services (default <class> 7). In most networks, the registration will also cause call forwarding to be activated for these <class> values.

- To query the status of CFU without specifying <class>:

```
at+ccfc=0,2
+CCFC: 1,1,"+493012345678",145
+CCFC: 1,4,"+493012345678",145
OK
```

- To erase the registered CFU destination number:

```
at+ccfc=0,4
OK
```

Now, when you check the status, no destination number will be indicated:

```
at+ccfc=0,2
+CCFC: 0,1
+CCFC: 0,4
OK
```

- To query the status of CFU for all classes:

```
at+ccfc=0,2,,255
+CCFC: 0,255
OK
```

- **<reason>** 4 or 5 cannot be used to query the status of all call forwarding reasons (see also notes above):

```
at+ccfc=4,2
error
at+ccfc=5,2
error
```

## 9.6 AT+CCWA Call Waiting

The **AT+CCWA** write command controls the call waiting supplementary service according to GSM 02.83. Activation, deactivation and status query are supported. The read command returns the current value of **<n>**.

### Syntax

#### Test Command

AT+CCWA=?

Response(s)

+CCWA: (list of supported **<n>**s)

OK

#### Read Command

AT+CCWA?

Response(s)

+CCWA: **<n>**

OK

#### Write Command

AT+CCWA=[[**<n>**][, **<mode>**][, **<class>**]]

Response(s)

If **<mode>** is not equal 2 and command successful:

OK

If **<mode>**= 2 and command successful:

+CCWA: **<status>**, **<class>**

[+CCWA: **<status>**, **<class>**]

[+CCWA: ...]

OK

If error is related to ME functionality

ERROR

+CME ERROR: **<err>**

#### Reference(s)

GSM 07.07, GSM 02.04, GSM 02.83,  
GSM 03.83, GSM 04.83

PIN	MDM	APP	Last
+	+	+	-

### Unsolicited Result Code

Indication of a call that is currently waiting and can be accepted.

+CCWA: **<calling number>**, **<type of number>**[, **<class>**], [, **<CLI validity>**]

If **<n>**=1 and the call waiting supplementary service is enabled in the network, URC "+CCWA" indicates a waiting call to the TE. It appears while the waiting call is still ringing.

### Parameter Description

**<n>**<sup>(num)</sup>

Switch URCS "+CCWA" for call waiting on/off

0 Disable display of URCS "+CCWA"

1 Enable display of URCS "+CCWA"

#### <mode><sup>(num)</sup>

Network operation to be performed for Supplementary service call waiting

0	Disable call waiting (disable service)
1	Enable call waiting (enable service)
2	Query status of call waiting (query service status)

#### <class><sup>(num)</sup>

Integer or sum of integers each representing a class of information, i.e. a bearer service, telecommunication service or bearer service group as defined in "GSM 02.04".

In the write command, parameter <class> specifies the class of the active call during which an incoming call of any class is to be regarded as a waiting call.

In URC "+CCWA: <calling number>, <type of number>[, <class>], [, <CLI validity>]", parameter <class> specifies the class of the waiting call.

1	Voice
2	Data <class> 2 (data) comprises all those <class> values between 16 and 128, that are supported both by the network and the MS. This means, a setting made for <class> 2 applies to all remaining data classes (if supported). In addition, you can assign a different setting to a specific class. For example, you can activate call waiting for all data classes, but deactivate it for a specific data class.
4	Fax
[7]	Voice, data and fax (1+2+4)
8	SMS
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD access
1...[7]...255	Combination of some of the above classes. For example, the default setting 7 represents the sum of the integers 1, 2 and 4 (CF for voice, data and fax). The value 255 covers all classes. If parameter "class" is omitted, the default value 7 is used.

#### <status><sup>(num)</sup>

0	Call waiting service is not active
1	Call waiting service is active

#### <calling number><sup>(str)</sup>

Phone number of waiting caller in the format specified by parameter <type of number>.

#### <type of number><sup>(num)</sup>

Type of address octet in integer format (refer to GSM 04.08, subclause 10.5.4.7)

145	<calling number> includes international access code character '+'
128	number restricted
129	Otherwise

#### <CLI validity><sup>(num)</sup>

0	CLI valid
---	-----------

- |   |                       |
|---|-----------------------|
| 1 | CLI has been withheld |
| 2 | CLI is not available  |

### Notes

- With the AT+CHLD command, it is possible to establish a multiparty call or to set the active voice call on hold and then accept a waiting voice call (not possible with fax and data call). See also [AT+CHLD](#)
- Users should be aware that if call waiting is activated (`<mode>=1`), the presentation of URCs needs to be enabled, too (`<n>=1`).  
Otherwise, on the one hand, a waiting caller would be kept waiting due to lack of BUSY signals, while, on the other hand, the waiting call would not be indicated to the called party.
- The AT+CCWA command offers a broad range of options according to the GSM specifications. However, when you attempt to enable call waiting for a `<class>` for which the service is not provisioned or not supported, the setting will not take effect regardless of the response returned. The responses in these cases vary with the network (for example "OK", "Operation not allowed", "Operation not supported" etc.). To make sure check the current call waiting settings with `<mode>=2`.
- The AT+CCWA command has been implemented with the full set of `<class>` parameters according to GSM 07.07. For actual applicability of SS call waiting to a specific service or service group (a specific `<class>` value) please consult table A.1 of GSM 02.04
- Despite the specifications stated in GSM 02.04 call waiting is not handled uniformly among all networks: GSM 02.04, Annex A, provides the following specification:  
"The applicability of call waiting refers to the telecommunication service of the active call and not of the waiting call. The incoming, waiting, call may be of any kind." Nevertheless, networks do differ on the actual implementation of the service. For example, the activation of call waiting for `<class>` 4, "fax", causes some networks to send a call waiting indication if a call "of any kind" comes in during an active fax call, but others may (with the same settings active) indicate a waiting fax call during any kind of active call. Thus, the only reliable way to receive or prevent a call waiting indication under any circumstances and in any network, is to activate or deactivate call waiting for all tele- and bearer services (`<class>` 255).
- As stated above `<class>` 2 is intended only to send the data classes 16/32/64/128 to the network. However, the responses returned when the subscriber sets or queries call waiting refer only to the status of the data classes received from the network. This means that the responses will display only those data classes between 16 and 128 which are supported by the network and currently activated. There will be no output for class 2, nor for classes which are not supported or not set.
- The parameter `<class>` will not be sent to the network if `<mode>= 2`. Therefore it may happen that the response of the query command contains information about classes which were not requested or it shows only the inactive status of the class 1 or 255. This means, that the status is valid for all classes.

## 9.7 AT+CHLD Call Hold and Multiparty

### Syntax

Test Command				
AT+CHLD=?				
Response(s)				
+CHLD: (list of supported <n>s)				
OK				
Write Command				
AT+CHLD=[<n>]				
Response(s)				
OK				
ERROR				
+CME ERROR: <err>				
Reference(s)	PIN	MDM	APP	Last
GSM 07.07	+	+	+	-

### Command Description

TA controls the Supplementary Services Call Hold and Multiparty. Calls can be put on hold, recovered, released, and added to a conversation.

Like for all Supplementary Services, the availability and detailed functionality of Call Hold and Multiparty services depends on the configuration of the GSM network. The HC25 can only request the service, but the network decides whether and how the request will be answered.

### Parameter Description

<n> <sup>(num)</sup>	
0	Release all held calls or set User Determined User Busy (UDUB) for a waiting call: <ul style="list-style-type: none"> <li>If a call is waiting, release the waiting call. The calling party will receive a "BUSY" indication (Supplementary Service User Determined User Busy "UDUB")</li> <li>Otherwise, terminate all held calls (if any).</li> </ul>
1	Terminate all active calls (if any) and accept "the other call" as the active call: <ul style="list-style-type: none"> <li>If a call is waiting, the waiting call will be accepted.</li> <li>Otherwise, if a held call is present, the held call becomes active.</li> </ul>
1X	Terminate a specific call X (X= 1-7). The call may be active, held or waiting. The remote party of the terminated call will receive a "NO CARRIER" indication. Parameter X is the call number <idx> of the targeted call in the list of current calls available with AT command <a href="#">AT+CLCC</a> .
2	Place all active calls on hold (if any) and accept "the other call" as the active call: <ul style="list-style-type: none"> <li>If a call is waiting, the waiting call will be accepted.</li> <li>Otherwise, if a held call is present, the held call becomes active.</li> </ul>
2X	Place all active calls except call X (X= 1-7) on hold. Parameter X is the call number <idx> of the targeted call in the list of current calls available with AT command <a href="#">AT+CLCC</a> .

- |   |                                                                                                   |
|---|---------------------------------------------------------------------------------------------------|
| 3 | Add a held call to the active calls in order to set up a conference (multiparty) call.            |
| 4 | Connects the two calls of a multiparty call and disconnects the subscriber from both calls (ECT). |

### Notes

- The **AT+CHLD** command offers a broad range of options according to the GSM specifications. However, if you attempt to invoke an option which is not provisioned by the network, or not subscribed to, invocation of this option will fail. The responses in these cases may vary with the network (for example "Operation not allowed", "Operation not supported" etc.).
- The handling of the supplementary service Call hold and Multiparty varies with the types of calls. This is because only voice calls can be put on hold, while data or fax calls cannot. The following procedures apply: With **AT+CHLD=2** the user can simultaneously place a voice call on hold and accept another waiting voice, data or fax call. If the waiting call is a data or fax call, it is also possible to put the voice call on hold. The user needs to wait for the RING signal and manually answer the data / fax call with ATA. To switch back from the active data or fax call to the held voice call the active call must be terminated with **AT+CHLD=1**. If all active and held calls are voice calls it is possible to switch back and forth with **AT+CHLD=2**.
- In conflict situations, e.g. when a waiting call comes while there are already held calls, the above procedures apply to the waiting call only. For example, **<n>=0** rejects the waiting call, but does not affect the held calls.
- See also the **AT+CCWA** command for details on how to display waiting calls.

### Example

<pre>at+cpin="9999" OK +CREG: 2 +CREG: 1,"0145","0016" at+ccwa=1,1,1 OK atd"1234567"; OK +CCWA: "+491791292364",145,32,,0 at+chld=2 OK RING RING RING ATA OK CONNECT 9600/RLP hello +++ OK at+clcc +CLCC: 1,0,1,0,0,"03038639268",129 +CLCC: 2,1,0,1,0,"+491791292364",145 OK at+chld=1 OK at+clcc +CLCC: 1,0,0,0,0,"03038639268",129 OK</pre>	<p>The mobile is now registered. You activate the indication of waiting calls during voice calls.</p> <p>You make a voice call.</p> <p>You receive a URC indicating a waiting data call. You put the voice call on hold.</p> <p>You now receive the RING of the data call.</p> <p>You accept the data call.</p> <p>The data connection is set up.</p> <p>With "+++" you go in command mode.</p> <p>You interrogate the status of all established calls.</p> <p>The active data call is terminated and the held voice call becomes active.</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

## 9.8 AT+CLIP Calling Line Identification Presentation

This command refers to the GSM supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call.

The [AT+CLIP](#) write command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network.

The [AT+CLIP](#) read command gives the status of [<n>](#), and also triggers an interrogation of the provision status of the CLIP service according to GSM 02.81 (given in [<m>](#)).

### Syntax

Test Command			
AT+CLIP=?			
Response(s)			
+CLIP: (list of supported<n>s)			
OK			
ERROR			
+CME ERROR: <err>			
Read Command			
AT+CLIP?			
Response(s)			
+CLIP: <n>, <m>			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT+CLIP=<n>			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.07, GSM 02.81	+	+	+
			Last
			-

### Unsolicited Result Code

+CLIP: <number>, <type>, , [, <alpha>][, <CLI validity>]

When CLIP is enabled at the TE (and is permitted by the calling subscriber), this URC is delivered after every "RING" or "+CRING" URC when a mobile terminated voice call occurs. For data calls the URC is delivered only once.

### Parameter Description

<n> <sup>(num)</sup>	
[0] <sup>(&amp;F)</sup>	Suppress unsolicited result codes
1	Display unsolicited result codes
<m> <sup>(num)</sup>	
0	CLIP not provisioned

1	CLIP provisioned
2	Unknown

**<number><sup>(str)</sup>**

String type phone number of calling address in format specified by **<type>**.

**<type><sup>(num)</sup>**

Type of address octet in integer format; 145 when dialing string includes international access code character "+", otherwise 129.

TA shall return the recommended value 128 for **<type>** (TON/NPI unknown in accordance with GSM 04.08 subclause 10.5.4.7).

**<alpha><sup>(str)</sup>**

String type alphanumeric representation of **<number>** corresponding to the entry found in phonebook; used character set is the one selected with **AT+CSCS**.

**<CLI validity><sup>(num)</sup>**

0	CLI valid
1	CLI has been withheld by the originator.
2	CLI is not available due to interworking problems or limitations of originating network. <b>&lt;number&gt;</b> shall be an empty string ("") and <b>&lt;type&gt;</b> value will not be significant.

When CLI is not available ( **<CLI validity>**=2), **<number>** shall be an plus string ("+") and **<type>** value will be "145". Nevertheless, TA shall return the recommended value 128 for **<type>** (TON/NPI unknown in accordance with GSM 04.08 subclause 10.5.4.7).

When CLI has been withheld by the originator, (**<CLI validity>**=1) and the CLIP is provisioned with the "override category" option (refer GSM 02.81 and GSM 03.81), **<number>** and **<type>** is provided. Otherwise, TA shall return the same setting for **<number>** and **<type>** as if the CLI was not available.

### Note

- For alphanumeric representation the number stored in the phonebook must be identical to the number transported via the network - then the associated name will be recognized.

## 9.9 AT+CLIR Calling Line Identification Restriction

The [AT+CLIR](#) command refers to the GSM supplementary service CLIR (Calling Line Identification Restriction).

### Syntax

Test Command

AT+CLIR=?

Response(s)

+CLIR: (list of supported <n>s)

OK

Read Command

AT+CLIR?

Response(s)

+CLIR<n>, <m>

OK

ERROR

+CME ERROR: <err>

Write Command

AT+CLIR=[<n>]

Response(s)

+CLIR: <n>, <m>

OK

ERROR

+CME ERROR: <err>

Reference(s)

GSM 07.07

PIN	MDM	APP	Last
+	+	+	-

### Parameter Description

<n> <sup>(num)</sup>	
Parameter shows the settings for outgoing calls:	
[0] <sup>(P)</sup>	Presentation indicator is used according to the subscription of the CLIR service
1	CLIR invocation
2	CLIR suppression
<m> <sup>(num)</sup>	
Parameter shows the subscriber CLIR service status in the network:	
0	CLIR not provisioned
1	CLIR provisioned in permanent mode
2	Unknown (e.g. no network, etc.)
3	CLIR temporary mode presentation restricted
4	CLIR temporary mode presentation allowed

### Note

- The settings made with [AT+CLIR=1](#) or [AT+CLIR=2](#) are used for all outgoing calls until the ME is switched off or [AT+CLIR=0](#) is used.

## 9.10 AT+COLP Connected Line Identification Presentation

This command refers to the GSM supplementary service COLP (Connected Line Identification Presentation) that enables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobile originated voice call. The command enables or disables the presentation of the COL at the TE. It has no effect on the execution of the supplementary service COLR in the network.

### Syntax

Test Command

AT+COLP=?

Response(s)

+COLP: (list of supported <n>s)

OK

Read Command

AT+COLP?

Response(s)

+COLP: <n>, <m>

OK

ERROR

+CME ERROR: <err>

Write Command

AT+COLP=[<n>]

Response(s)

OK

ERROR

+CME ERROR: <err>

Reference(s)

GSM 07.07

PIN	MDM	APP	Last
+	+	+	-

### Unsolicited Result Code

Call response format:

+COLP: <number>, <type>[, <sub-number>][, <sub-type>][, <alpha>]

### Parameter Description

<n> <sup>(num)</sup>	
0	Disable - suppress unsolicited result codes
1	Enable - display unsolicited result codes
<m> <sup>(num)</sup>	
0	COLP not provisioned (no presentation)
1	COLP provisioned
2	Unknown
<number> <sup>(str)</sup>	
String type phone number of connected address in format specified by <type>	

`<type>`<sup>(num)</sup>

Type of address octet in integer format; 145 when dialling string includes international access code character "+", otherwise 129.

`<sub-number>`<sup>(str)</sup>

String type phone number of sub address in format specified by `<sub-type>`.

`<sub-type>`<sup>(num)</sup>

Type of sub-address octet

145	international access code character '+'
129	otherwise

`<alpha>`<sup>(str)</sup>

String type alphanumeric representation of `<number>` corresponding to the entry found in phonebook; used character set is the one selected with `AT+CSCS`.

### Note

- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

## 9.11 AT+CPUC Price per unit and currency table

### Syntax

Test Command			
AT+CPUC=?			
Response(s)			
OK			
Read Command			
AT+CPUC?			
Response(s)			
+CPUC: <currency>, <ppu>			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT+CPUC=<currency>, <ppu>[, <passwd>]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.07	+	+	+
			Last
			-

### Command Description

Read command returns the current parameters of PUC.

Write command sets the parameters of Advice of Charge related price per unit and currency table. SIM PIN2 is usually required to set the parameters.

### Parameter Description

<currency><sup>(str)(+CSCS)</sup>

Three-character currency code (e.g. "GBP", "EUR"). If the currency name is longer than three characters, all characters will be cut off after the third position. Before they are written to the SIM Card, these characters are converted to the standard GSM alphabet.

<ppu><sup>(str)</sup>

Price per unit; dot is used as a decimal separator (e.g. "2.66"). The length is limited to 20 characters. If the string length is exceeded, the command is terminated with an error. This string may only contain digits and a dot. Leading zeros are removed from the string. The minimum and maximum value are determined by the structure of the SIM-PUCT file. The maximum price per unit value is 999 999 999.00. When successfully entered, this value is rounded to maximum accuracy.

Note: Due to storage in mantisse (range 0-4095) and exponent (-7 to 7) it is possible that rounding errors occur.

<passwd><sup>(str)</sup>

SIM PIN2. String parameter which can contain any combination of characters. The maximum string length is limited to 8 characters. If this value is exceeded, the command terminates with an error message. If the PIN2 is incorrect, a CME error (+CME ERROR: incorrect password) is output.

## 9.12 AT+CSSN Supplementary service notifications

### Syntax

Test Command				
AT+CSSN=?				
Response(s)				
+CSSN: (list of supported<n>s), (list of supported<m>s)				
OK				
Read Command				
AT+CSSN?				
Response(s)				
+CSSN: <n>, <m>				
OK				
Write Command				
AT+CSSN=<n>[, <m>]				
Response(s)				
OK				
ERROR				
+CME ERROR: <err>				
Reference(s)				
GSM 07.07				
		PIN	MDM	APP
		+	+	+
				Last
				-

### Unsolicited Result Codes

#### URC 1

+CSSI: <code 1>

When <n>=1 and a supplementary service notification is received after a mobile originated call setup, intermediate result code "+CSSI: <code 1>" is sent to TE before any other MO call setup result codes

#### URC 2

+CSSU: <code 2>

When <m>=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, unsolicited result code "+CSSU: <code 2>" is sent to TE.

### Command Description

The write command enables or disables the presentation of URCs for supplementary services.

### Parameter Description

<n> <sup>(num)</sup>	
0(&F)	Suppress "+CSSI" URCs
1	Activate "+CSSI" URCs
<m> <sup>(num)</sup>	
0(&F)	Suppress "+CSSU" URCs
1	Activate "+CSSU" URCs

`<code 1>`<sup>(num)</sup>

0	unconditional call forwarding is active
1	some of the conditional call forwardings are active
2	call has been forwarded
3	Waiting call is pending
5	Outgoing call are barred

`<code 2>`<sup>(num)</sup>

0	The incoming call is a forwarded call.
2	call has been put on hold (during a voice call).
3	call has been retrieved (during a voice call).
5	Held call was terminated by other party
10	additional incoming call forwarded

**Note**

- URCs will be displayed only if the call concerned is a voice call, but some URCs will be displayed as well as for data calls (like "+CSSU"=0).

## 9.13 AT+CUSD Unstructured supplementary service data

**AT+CUSD** allows control of the Unstructured Supplementary Service Data (USSD) according to GSM 02.90. Both network and mobile initiated operations are supported. The interaction of this command with other commands based on other GSM supplementary services is described in the GSM standard.

Parameter **<n>** is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) "+CUSD: <m>[<str\_urc>[<dcs>]]" to the TE.

When parameter **<str\_write>** is given, a mobile initiated USSD string or a response USSD string to a network initiated operation is sent to the network. The response USSD string from the network is returned in a subsequent unsolicited result code "+CUSD"

### Syntax

Test Command			
AT+CUSD=?			
Response(s)			
+CUSD: (list of supported<n>s)			
OK			
Read Command			
AT+CUSD?			
Response(s)			
+CUSD: <n>			
OK			
Write Command			
AT+CUSD=<n>[, <str_write>[, <dcs>]]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)		PIN	MDM
GSM 07.07, GSM 02.90, GSM 03.90, GSM 04.90		+	+
		APP	Last
		+	-

### Unsolicited Result Code

+CUSD: <m>[<str\_urc>[<dcs>]]

URC "+CUSD" indicates an USSD response from the network, or network initiated operation

### Parameter Description

<n> <sup>(num)</sup>	
0(&F)	Disable the result code presentation in the TA
1	Enable the result code presentation in the TA
2	Cancel session (not applicable to read command response)
<str_write> <sup>(str)(+CSCS)</sup>	
String type USSD-string (when <str_write> parameter is not given, network is not interrogated). For the write command, only <dcs>= 15 is supported.	

`<str_urc>^(str)(+CSCS)`

String type USSD-string .

If `<dc>` indicates that GSM 03.38 default alphabet is used TA converts GSM alphabet into current TE character set according to rules of GSM 07.05 Annex A. Otherwise in case of invalid or omitted `<dc>` conversion of `<str_ur>` is not possible.

`<dc>^(num)`

GSM 03.38 Cell Broadcast Data Coding Scheme in integer format (default 15). In case of an invalid or omitted `<dc>` from the network side (MT) `<dc>` will not be given out.

`<m>^(num)`

0	No further user action required (network initiated USSD-Notify, or no further information needed after mobile initiated operation)
1	Further user action required (network initiated USSD-Request, or further information needed after mobile initiated operation). If <code>&lt;m&gt;=1</code> , then user input has to be done with an additional <code>AT+CUSD=1</code> command <code>&lt;ESC&gt;</code> .
2	USSD terminated by network.
3	other local client has responded, this means the interface was not idle and an busy was send to the network already
4	operation not supported
5	network time out

### Notes

- When a USSD string is sent via `ATD`, a "`AT+CUSD=1`" is executed implicitly.
- It is recommended to finalize or escape a pending USSD user interaction before further actions are done to prevent blocking situations.

## 10. GPRS Commands

This chapter describes AT commands that a TE (Terminal Equipment, e.g. an application running on a controlling PC) may use to control the HC25 acting as GPRS Mobile Termination (MT).

### 10.1 AT+CGATT PS attach or detach

The execution command is used to attach the MT to, or detach the MT from, the Packet Domain service. After the command has completed, the MT remains in V.25ter command state. If the MT is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned.

Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

The read command returns the current Packet Domain service state.

The test command is used for requesting information on the supported Packet Domain service states.

#### Syntax

Test Command			
AT+CGATT=?			
Response(s)			
+CGATT: (list of supported <state>s)			
OK			
Read Command			
AT+CGATT?			
Response(s)			
+CGATT: <state>			
OK			
Write Command			
AT+CGATT=[<state>]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
3GPP 27.007	+	+	+
			Last
			-

#### Parameter Description

<state> <sup>(num)</sup>	
Indicates the state of PS attachment.	
0 <sup>(P)</sup>	detached
[1]	attached

#### Note

- If the currently used access technology is GSM and an CS call is in progress, then the write command returns "+CME ERROR: GPRS services not allowed".

## 10.2 AT+CGACT PDP context activate or deactivate

### Syntax

Test Command			
AT+CGACT=?			
Response(s)			
+CGACT: (list of supported <state>s)			
OK			
ERROR			
+CME ERROR: <err>			
Read Command			
AT+CGACT?			
Response(s)			
+CGACT: [<cid>, <state>]			
[+CGACT: <cid>, <state>]			
...			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT+CGACT=<state>[, <cid>[, <cid>]]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
3GPP 27.007	+	+	+
			Last
			-

### Command Description

The test command is used for requesting information on the supported PDP context activation states.

The read command returns the current activation states for all the defined PDP contexts.

The write command is used to activate or deactivate the specified PDP context(s). After the command has completed, the MT remains in V.250 command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the MT is not GPRS attached when the activation form of the command is executed, the MT first performs a GPRS attach and then attempts to activate the specified contexts. If no <cid>s are specified the activation/deactivation form of the command activates/deactivates all defined contexts.

### Parameter Description

<state> <sup>(num)</sup>	
Indicates the state of PDP context activation.	
0	deactivated
1	activated
<cid> <sup>(num)</sup>	
PDP Context Identifier is a numeric parameter which specifies a particular PDP context definition. This parameter is used in other PDP context related commands.	
1...16	

---

**Note**

- A maximum of 3 contexts can be activated at the same time, no matter on which interface. Trying to activate more than 3 contexts will cause "+CME ERROR: no network service" or "+CME ERROR: phone failure". Note that, depending on the provider, the number of activated contexts may be further restricted. Remember that contexts may be activated implicitly by using the [ATD\\*99#](#) GPRS compatibility command without specifying a [<cid>](#).

## 10.3 AT+CGDATA Enter data state

### Syntax

Test Command			
AT+CGDATA=?			
Response(s)			
+CGDATA: (list of supported <L2P>s)			
OK			
Write Command			
AT+CGDATA=[<L2P>[, <cid>]]			
Response(s)			
CONNECT			
NO CARRIER			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
3GPP 27.007	+	+	-
			Last
			+

### Command Description

The test command is used for requesting information on the supported layer 2 protocols to be used between the TE and MT.

The write command causes the MT to perform all actions which are necessary to establish communication between the TE and the network using one or more GPRS PDP types. This may include performing a GPRS attach and one or more PDP context activations. Commands following the [AT+CGDATA](#) command in the AT command line will not be processed by the MT.

If the write command is successful, the MT issues the intermediate result code CONNECT and enters V.250 online data state.

The application that initiates the PPP mode must be designed to start all LCP configure requests in accordance with TS 27.060 par 9.1. Otherwise the MT remains, after the CONNECT, infinitely in a waiting state.

After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the command state is reentered and the MT returns the final result code OK.

If the <L2P> parameter value is unacceptable to the MT, the MT returns ERROR or +CME ERROR.

In the event of erroneous termination or a failure to start up, the command state is reentered and the MT returns NO CARRIER, or if enabled +CME ERROR.

### Parameter Description

<L2P> <sup>(str)</sup>	
Layer 2 protocol to be used between the TE and MT.	
["PPP"]	Layer 2 protocol PPP
<cid> <sup>(num)</sup>	
Parameter specifies a particular PDP context definition and is also used in other PDP context-related commands.	
Secondary PDP contexts are not supported.	
If parameter is not specified, then the first defined primary context is used.	
1...16	

### 10.3.1 Automatic deactivation of PDP context during dial-up PPP

When using the AT+CGDATA write command or [ATD\\*99#](#) the MT issues the intermediate result code CONNECT and enters V.250ter online data state. In V.250 online data state, first some LCP protocol exchange between MT and TE is performed to set up the PPP link. After successfully establishing the PPP link, the MT performs the PDP context activation procedure if the context is not already activated. As a result, the MT is in a "PDP context activated" state within the PLMN, the PPP link is established on the mobile side and the mobile is ready for IP data transfer.

If the TE wants to close the LCP link the MT may perform an LCP termination request procedure on PPP level. After this LCP termination procedure the MT deactivates the PDP context automatically and the MT returns to V.250 command mode and issues the final result code NO CARRIER.

If DTR is configured to disconnect data connections ([AT&D2](#)), then the application should not toggle DTR during the implicit PDP context deactivation and before "NO CARRIER" is received.

## 10.4 AT+CGDCONT Define PDP Context

### Syntax

#### Test Command

AT+CGDCONT=?

#### Response(s)

+CGDCONT: (range of supported <cid>s), <PDP\_type>, , , (list of supported <d\_comp>s), (list of supported <h\_comp>s)  
OK  
ERROR  
+CME ERROR: <err>

#### Read Command

AT+CGDCONT?

#### Response(s)

+CGDCONT: [<cid>, <PDP\_type>, <APN>, <PDP\_addr>, <d\_comp>, <h\_comp>]  
[+CGDCONT: <cid>, <PDP\_type>, <APN>, <PDP\_addr>, <d\_comp>, <h\_comp>]  
[+CGDCONT: ...]  
OK  
ERROR  
+CME ERROR: <err>

#### Write Command

AT+CGDCONT=<cid>[, <PDP\_type>[, <APN>[, <PDP\_addr>[, <d\_comp>[, <h\_comp>]]]]]

#### Response(s)

OK  
ERROR  
+CME ERROR: <err>

#### Reference(s)

3GPP 27.007

PIN	MDM	APP	Last
+	+	+	-

### Command Description

The test command returns supported values as a compound value.

The read command returns the current settings for each defined PDP context.

The write command specifies the parameters for a PDP context identified by the context identifier <cid>. The number of contexts that may be in a defined state at the same time is given by the range returned by the test command. A special form of the write command (AT+CGDCONT=<cid>) causes the values for context <cid> to become undefined.

### Parameter Description

<cid><sup>(num)</sup>

PDP Context Identifier

Parameter specifies a particular PDP context definition. This parameter is used in other PDP context-related commands.

1...16

<PDP\_type><sup>(str)</sup>

Packet Data Protocol type

Specifies the type of the packet data protocol.

"IP" Internet Protocol (IETF STD 5)

<APN><sup>(str)</sup>

### Access Point Name

The logical name that is used to select the GGSN or the external packet data network. If the value is null or omitted, then the subscription value will be requested.

<PDP\_addr><sup>(str)</sup>

### Packet Data Protocol address

Identifies the MT in the address space applicable to PDP (e.g. IP V4 address for PDP type IP). If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested. The read command will continue to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using [AT+CGPADDR](#).

<d\_comp><sup>(num)</sup>

### Data Compression

Controls the PDP data compression (applicable for Subnetwork Dependent Convergence Protocol (SNDCP) only) 3GPP TS 44.065

[0]	off
-----	-----

<h\_comp><sup>(num)</sup>

### Header Compression

Controls the PDP header compression 3GPP TS 44.065, 3GPP TS 25.323

[0]	off
1	on

### Note

- All context definitions will be stored non volatile.

## 10.5 AT+CGPADDR Show PDP address

### Syntax

#### Test Command

AT+CGPADDR=?

#### Response(s)

```
[+CGPADDR: (list of defined <cid>s)]
OK
```

#### Exec Command

AT+CGPADDR

#### Response(s)

```
[+CGPADDR: <cid>, <PDP_address>]
[+CGPADDR: ...]
OK
ERROR
+CME ERROR: <err>
```

#### Write Command

AT+CGPADDR=<cid>[, <cid>[, ...]]

#### Response(s)

```
[+CGPADDR: <cid>, <PDP_address>]
[+CGPADDR: ...]
OK
ERROR
+CME ERROR: <err>
```

#### Reference(s)

3GPP 27.007

PIN	MDM	APP	Last
+	+	+	-

### Command Description

The test command returns a list of defined <cid>s.

The exec command returns a list of PDP addresses for all defined GPRS contexts.

The write command returns a list of PDP addresses for the specified context identifiers. If a context is not defined, then no output line is generated for it.

### Parameter Description

<cid><sup>(num)</sup>

A numeric parameter which specifies a particular PDP context definition (see [AT+CGDCONT](#) command).

<PDP\_address><sup>(str)</sup>

A string that identifies the MT in the address space applicable to the PDP. The address may be static or dynamic.

## 10.6 AT+CGQMIN Quality of Service Profile (Minimum acceptable)

### Syntax

#### Test Command

AT+CGQMIN=?

#### Response(s)

+CGQMIN: <PDP\_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s)  
OK  
ERROR  
+CME ERROR: <err>

#### Read Command

AT+CGQMIN?

#### Response(s)

+CGQMIN: [<cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>]  
[+CGQMIN: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>]  
[+CGQMIN: ...]  
OK  
ERROR  
+CME ERROR: <err>

#### Write Command

AT+CGQMIN=<cid>[, <precedence>[, <delay>[, <reliability>[, <peak>[, <mean>]]]]]

#### Response(s)

OK  
ERROR  
+CME ERROR: <err>

#### Reference(s)

3GPP 27.007

PIN	MDM	APP	Last
+	+	+	-

### Command Description

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

The read command returns the current settings for each context for which a QOS was explicitly specified.

This command allows the TE to specify a minimum acceptable profile which is checked by the MT against the negotiated profile returned in the Activate PDP Context Accept message.

The set command specifies a profile for the context identified by the context identification parameter, <cid>.

A special form of the set command, AT+CGQMIN= <cid> causes the minimum acceptable profile for context number <cid> to become undefined. In this case no check is made against the negotiated profile.

### Parameter Description

<cid><sup>(num)</sup>

Parameter specifies a particular PDP context definition. The parameter is also used in other PDP context-related commands.

1...16

<precedence><sup>(num)</sup>

Precedence class

[0] network subscribed value

- |   |                                                                                              |
|---|----------------------------------------------------------------------------------------------|
| 1 | High Priority<br>Service commitments shall be maintained ahead of precedence classes 2 and 3 |
| 2 | Normal priority<br>Service commitments shall be maintained ahead of precedence class 3       |
| 3 | Low priority<br>Service commitments shall be maintained                                      |

<delay><sup>(num)</sup>

#### Delay class

The delay parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the GPRS network(s).

[0] network subscribed value

1..4 SDU size: 128 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	

SDU size: 1024 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	

<reliability><sup>(num)</sup>

#### Reliability class

[0] network subscribed value

- |   |                                                                                                  |
|---|--------------------------------------------------------------------------------------------------|
| 1 | Non real-time traffic, error-sensitive application that cannot cope with data loss               |
| 2 | Non real-time traffic, error-sensitive application that can cope with infrequent data loss       |
| 3 | Non real-time traffic, error-sensitive application that can cope with data loss, GMM/SM, and SMS |
| 4 | Real-time traffic, error-sensitive application that can cope with data loss                      |
| 5 | Real-time traffic, error non-sensitive application that can cope with data loss                  |

<peak><sup>(num)</sup>

Peak throughput class (in octets per second).

[0] network subscribed value

- |   |                          |
|---|--------------------------|
| 1 | Up to 1 000 (8 kbit/s).  |
| 2 | Up to 2 000 (16 kbit/s). |
| 3 | Up to 4 000 (32 kbit/s). |
| 4 | Up to 8 000 (64 kbit/s). |

5	Up to 16 000 (128 kbit/s).
6	Up to 32 000 (256 kbit/s).
7	Up to 64 000 (512 kbit/s).
8	Up to 128 000 (1024 kbit/s).
9	Up to 256 000 (2048 kbit/s).

<mean><sup>(num)</sup>

Mean throughput class(in octets per hour).

[0]	network subscribed value
1	100 (~0.22 bit/s)
2	200 (~0.44 bit/s)
3	500 (~1.11 bit/s)
4	1 000 (~2.2 bit/s)
5	2 000 (~4.4 bit/s)
6	5 000 (~11.1 bit/s)
7	10 000 (~22 bit/s)
8	20 000 (~44 bit/s)
9	50 000 (~111 bit/s)
10	100 000 (~0.22 kbit/s)
11	200 000(~0.44 kbit/s)
12	500 000(~1.11 kbit/s)
13	1 000 000 (~2.2 kbit/s)
14	2 000 000 (~4.4 kbit/s)
15	5 000 000 (~11.1 kbit/s)
16	10 000 000 (~22 kbit/s)
17	20 000 000 (~44 kbit/s)
18	50 000 000 (~111 kbit/s)
31	best effort

<PDP\_type><sup>(str)</sup>

Packet Data Protocol Type

“IP” Internet Protocol (IETF STD 5)

### Notes

- Definitions of parameters can be found in 3GPP 23.107.
- All QOS settings will be stored non volatile.

## 10.7 AT+CGEQMIN 3G Quality of Service Profile (Minimum acceptable)

### Syntax

#### Test Command

AT+CGEQMIN=?

#### Response(s)

+CGEQMIN: <PDP\_type>, (list of supported <Traffic class>s), (list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s), (list of supported <Delivery order>s), (list of supported <Maximum SDU size>s), (list of supported <SDU error ratio>s), (list of supported <Residual bit error ratio>s), (list of supported <Delivery of erroneous SDUs>s), (list of supported <Transfer delay>s), (list of supported <Traffic handling priority>s)  
OK

#### Read Command

AT+CGEQMIN?

#### Response(s)

+CGEQMIN: [<cid>, <Traffic class>, <Maximum bitrate UL>, <Maximum bitrate DL>, <Guaranteed bitrate UL>, <Guaranteed bitrate DL>, <Delivery order>, <Maximum SDU size>, <SDU error ratio>, <Residual bit error ratio>, <Delivery of erroneous SDUs>, <Transfer delay>, <Traffic handling priority>]  
[+CGEQMIN: <cid>, <Traffic class>, <Maximum bitrate UL>, <Maximum bitrate DL>, <Guaranteed bitrate UL>, <Guaranteed bitrate DL>, <Delivery order>, <Maximum SDU size>, <SDU error ratio>, <Residual bit error ratio>, <Delivery of erroneous SDUs>, <Transfer delay>, <Traffic handling priority>]  
[+CGEQMIN: ...]

#### Write Command

AT+CGEQMIN=<cid>[, <Traffic class>[, <Maximum bitrate UL>[, <Maximum bitrate DL>[, <Guaranteed bitrate UL>[, <Guaranteed bitrate DL>[, <Delivery order>[, <Maximum SDU size>[, <SDU error ratio>[, <Residual bit error ratio>[, <Delivery of erroneous SDUs>[, <Transfer delay>[, <Traffic handling priority>]]]]]]]]]

#### Response(s)

OK  
ERROR  
+CME ERROR: <err>

#### Reference(s)

3GPP TS 27.007

PIN	MDM	APP	Last
+	+	+	-

### Command Description

The test command returns values supported as a compound value.

The read command returns the current settings for each defined context for which a QOS was explicitly specified.

The write command allows the TE to specify a Quality of Service Profile for the context identified by the context identification parameter <cid> which is checked by the MT against the negotiated profile returned in the Activate/Modify PDP Context Accept message.

A special form of the write command, AT+CGEQMIN=<cid> causes the requested profile for context number <cid> to become undefined.

### Parameter Description

<cid><sup>(num)</sup>

Parameter specifies a particular PDP context definition. The parameter is also used in other PDP context-related commands.

1...16

<Traffic class><sup>(num)</sup>

0	conversational
1	streaming
2	interactive
3	background
[4]	subscribed value

<Maximum bitrate UL><sup>(num)</sup>

This parameter indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as 32 (e.g. [AT+CGEQMIN=...,32,...](#)).

[0] subscribed value

1...512

<Maximum bitrate DL><sup>(num)</sup>

This parameter indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as 32 (e.g. [AT+CGEQMIN=...,32,...](#)).

[0] subscribed value

1...16000

<Guaranteed bitrate UL><sup>(num)</sup>

This parameter indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as 32 (e.g. [AT+CGEQMIN=...,32,...](#)).

[0] subscribed value

1...512

<Guaranteed bitrate DL><sup>(num)</sup>

This parameter indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as 32 (e.g. [AT+CGEQMIN=...,32,...](#)).

[0] subscribed value

1...16000

<Delivery order><sup>(num)</sup>

This parameter indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

0	no
1	yes
[2]	subscribed value

<Maximum SDU size><sup>(num)</sup>

This parameter indicates the maximum allowed SDU size in octets.

[0] subscribed value  
10...1520 (value needs to be divisible by 10 without remainder)

<SDU error ratio><sup>(str)</sup>

This parameter indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as "mEe". As an example a target SDU error ratio of  $5 \cdot 10^{-3}$  would be specified as "5E3" (e.g. [AT+CGEQMIN=..., "5E3", ...](#)).

["0E0"] subscribed value  
"1E2"  
"7E3"  
"1E3"  
"1E4"  
"1E5"  
"1E6"  
"1E1"

<Residual bit error ratio><sup>(str)</sup>

This parameter indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as "mEe". As an example a target residual bit error ratio of  $5 \cdot 10^{-3}$  would be specified as "5E3" (e.g. [AT+CGEQMIN=..., "5E3", ...](#)).

["0E0"] subscribed value  
"5E2"  
"1E2"  
"5E3"  
"4E3"  
"1E3"  
"1E4"  
"1E5"  
"1E6"  
"6E8"

<Delivery of erroneous SDUs><sup>(num)</sup>

This parameter indicates whether SDUs detected as erroneous shall be delivered or not.

0 no  
1 yes  
2 no detect  
[3] subscribed value

<Transfer delay><sup>(num)</sup>

This parameter indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds.

[0] subscribed value

---

10...150	(value needs to be divisible by 10 without remainder)
200...950	(value needs to be divisible by 50 without remainder)
1000...4000	(value needs to be divisible by 100 without remainder)

`<Traffic handling priority>(num)`

This parameter specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of the other bearers.

[0]	subscribed
1	
2	
3	

`<PDP_type>(str)`

Packet Data Protocol Type

"IP"	Internet Protocol (IETF STD 5)
------	--------------------------------

### Notes

- Definitions of parameters can be found in 3GPP 23.107.
- All QOS settings will be stored non volatile.

## 10.8 AT+CGREG GPRS Network Registration Status

**AT+CGREG** write command enables presentation of URC "+CGREG: <stat>" when <n>=1 and ME's GPRS network registration status changes.

**AT+CGREG** read command queries the current URC presentation status <n> and an integer <stat> which shows whether the network has currently indicated the registration of the ME.

### Syntax

Test Command			
AT+CGREG=?			
Response(s)			
+CGREG: (list of supported <n>s)			
OK			
Read Command			
AT+CGREG?			
Response(s)			
+CGREG: <n>, <stat>			
OK			
Write Command			
AT+CGREG=[<n>]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
3GPP 27.007	+	+	+
			Last
			-

### Unsolicited Result Code

+CGREG: <stat>

Indicates a change in the ME's GPRS network registration status.

### Parameter Description

<n> <sup>(num)</sup>	
0(&F)(P)	Disable GPRS network registration URC
1	Enable GPRS network registration URC "+CGREG: <stat>"
<stat> <sup>(num)</sup>	
0	Not registered, ME is not currently searching an operator to register to. The ME is in GMM state GMM-NUL or GMM-DEREGISTERED-INITIATED. GPRS service is disabled, the ME is allowed to attach to GPRS if requested by the user.
1	Registered, home network. The ME is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED INITIATED on the home PLMN

- 
- |   |                                                                                                                                                                                                                                                                                                                              |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | Not registered, but ME is currently trying to attach or searching an operator to register to. The ME is in GMM state GMM-DEREGISTERED or GMM-REGISTERED-INITIATED. The GPRS service is enabled, but an allowable PLMN is currently not available. The ME will start a GPRS attach as soon as an allowable PLMN is available. |
| 3 | Registration denied. The ME is in GMM state GMM-NULL. The GPRS service is disabled, the ME is not allowed to attach to GPRS if requested by the user.                                                                                                                                                                        |
| 4 | Unknown                                                                                                                                                                                                                                                                                                                      |
| 5 | Registered, roaming. The ME is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED on a visited PLMN.                                                                                                                                                                                                         |

## 10.9 AT+CGQREQ Quality of Service Profile (Requested)

### Syntax

Test Command				
AT+CGQREQ=?				
Response(s)				
+CGQREQ: <PDP_type>, (list of supported <precedence>s), (list of supported <delay>s), (list of supported <reliability>s), (list of supported <peak>s), (list of supported <mean>s)				
OK				
Read Command				
AT+CGQREQ?				
Response(s)				
+CGQREQ: [<cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>]				
[+CGQREQ: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean>]				
[+CGQREQ: ...]				
Write Command				
AT+CGQREQ=<cid>[, <precedence>[, <delay>[, <reliability>[, <peak>[, <mean>]]]]]				
Response(s)				
OK				
ERROR				
+CME ERROR: <err>				
Reference(s)	PIN	MDM	APP	Last
3GPP 27.007	+	+	+	-

### Command Description

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

The read command returns the current settings for each defined context for which a QOS was explicitly specified.

This command allows the TE to specify a Quality of Service Profile that is used when the MT sends an Activate PDP Context Request message to the network.

The set command specifies a profile for the context identified by the context identification parameter, <cid>.

A special form of the set command, +CGQREQ=<cid> causes the requested profile for context number <cid> to become undefined.

### Parameter Description

<cid> <sup>(num)</sup>	
Parameter specifies a particular PDP context definition. The parameter is also used in other PDP context-related commands.	
1...16	
<precedence> <sup>(num)</sup>	
Precedence class	
[0]	network subscribed value
1	High Priority
	Service commitments shall be maintained ahead of precedence classes 2 and 3

- 2 Normal priority  
Service commitments shall be maintained ahead of precedence class 3
- 3 Low priority  
Service commitments shall be maintained

<delay><sup>(num)</sup>

#### Delay class

This parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the network(s).

- [0] network subscribed value  
1..4 with SDU size = 128 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	-

with SDU size = 1024 octets:

Delay Class	Mean Transfer Delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	-

<reliability><sup>(num)</sup>

#### Reliability class

- [0] network subscribed value
- 1 Non real-time traffic, error-sensitive application that cannot cope with data loss
- 2 Non real-time traffic, error-sensitive application that can cope with infrequent data loss
- 3 Non real-time traffic, error-sensitive application that can cope with data loss, GMM/SM, and SMS
- 4 Real-time traffic, error-sensitive application that can cope with data loss
- 5 Real-time traffic, error non-sensitive application that can cope with data loss

<peak><sup>(num)</sup>

#### Peak throughput class in octets per second

- [0] network subscribed value
- 1 Up to 1 000 (8 kbit/s)
- 2 Up to 2 000 (16 kbit/s)
- 3 Up to 4 000 (32 kbit/s)
- 4 Up to 8 000 (64 kbit/s)
- 5 Up to 16 000 (128 kbit/s)

6	Up to 32 000 (256 kbit/s)
7	Up to 64 000 (512 kbit/s)
8	Up to 128 000 (1024 kbit/s)
9	Up to 256 000 (2048 kbit/s)

`<mean>(num)`

Mean throughput class  
in octets per hour

[0]	network subscribed value
1	100 (~0.22 bit/s)
2	200 (~0.44 bit/s)
3	500 (~1.11 bit/s)
4	1 000 (~2.2 bit/s)
5	2 000 (~4.4 bit/s)
6	5 000 (~11.1 bit/s)
7	10 000 (~22 bit/s)
8	20 000 (~44 bit/s)
9	50 000 (~111 bit/s)
10	100 000 (~0.22 kbit/s)
11	200 000 (~0.44 kbit/s)
12	500 000 (~1.11 kbit/s)
13	1 000 000 (~2.2 kbit/s)
14	2 000 000 (~4.4 kbit/s)
15	5 000 000 (~11.1 kbit/s)
16	10 000 000 (~22 kbit/s)
17	20 000 000 (~44 kbit/s)
18	50 000 000 (~111 kbit/s)
31	best effort

`<PDP_type>(str)`

Packet Data Protocol type

“IP” Internet Protocol (IETF STD 5)

### Notes

- Definitions of parameters can be found in 3GPP 23.107.
- All QOS settings will be stored non volatile.

## 10.10 AT+CGEQREQ 3G Quality of Service Profile (Requested)

### Syntax

#### Test Command

AT+CGEQREQ=?

#### Response(s)

+CGEQREQ: <PDP\_type>, (list of supported <Traffic class>s), (list of supported <Maximum bitrate UL>s), (list of supported <Maximum bitrate DL>s), (list of supported <Guaranteed bitrate UL>s), (list of supported <Guaranteed bitrate DL>s), (list of supported <Delivery order>s), (list of supported <Maximum SDU size>s), (list of supported <SDU error ratio>s), (list of supported <Residual bit error ratio>s), (list of supported <Delivery of erroneous SDUs>s), (list of supported <Transfer delay>s), (list of supported <Traffic handling priority>s)

OK

#### Read Command

AT+CGEQREQ?

#### Response(s)

+CGEQREQ: [<cid>, <Traffic class>, <Maximum bitrate UL>, <Maximum bitrate DL>, <Guaranteed bitrate UL>, <Guaranteed bitrate DL>, <Delivery order>, <Maximum SDU size>, <SDU error ratio>, <Residual bit error ratio>, <Delivery of erroneous SDUs>, <Transfer delay>, <Traffic handling priority>]

[+CGEQREQ: <cid>, <Traffic class>, <Maximum bitrate UL>, <Maximum bitrate DL>, <Guaranteed bitrate UL>, <Guaranteed bitrate DL>, <Delivery order>, <Maximum SDU size>, <SDU error ratio>, <Residual bit error ratio>, <Delivery of erroneous SDUs>, <Transfer delay>, <Traffic handling priority>]

[+CGEQREQ: ...]

#### Write Command

AT+CGEQREQ=<cid>[, <Traffic class>[, <Maximum bitrate UL>[, <Maximum bitrate DL>[, <Guaranteed bitrate UL>[, <Guaranteed bitrate DL>[, <Delivery order>[, <Maximum SDU size>[, <SDU error ratio>[, <Residual bit error ratio>[, <Delivery of erroneous SDUs>[, <Transfer delay>[, <Traffic handling priority>]]]]]]]]]

#### Response(s)

OK

ERROR

+CME ERROR: <err>

#### Reference(s)

3GPP TS 27.007

PIN	MDM	APP	Last
+	+	+	-

### Command Description

The test command returns values supported as a compound value.

The read command returns the current settings for each defined context for which a QOS was explicitly specified.

The write command allows the TE to specify a Quality of Service Profile for the context identified by the context identification parameter <cid> which is used when the MT sends an Activate PDP Context Request message to the network.

A special form of the write command, AT+CGEQREQ=<cid> causes the requested profile for context number <cid> to become undefined.

## Parameter Description

<cid><sup>(num)</sup>

Parameter specifies a particular PDP context definition. The parameter is also used in other PDP context-related commands.

1...16

<Traffic class><sup>(num)</sup>

0	conversational
1	streaming
2	interactive
3	background
[4]	subscribed value

<Maximum bitrate UL><sup>(num)</sup>

This parameter indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as 32 (e.g. [AT+CGEQREQ=...,32,...](#)).

[0] subscribed value

1...512

<Maximum bitrate DL><sup>(num)</sup>

This parameter indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as 32 (e.g. [AT+CGEQREQ=...,32,...](#)).

[0] subscribed value

1...16000

<Guaranteed bitrate UL><sup>(num)</sup>

This parameter indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as 32 (e.g. [AT+CGEQREQ=...,32,...](#)).

[0] subscribed value

1...512

<Guaranteed bitrate DL><sup>(num)</sup>

This parameter indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as 32 (e.g. [AT+CGEQREQ=...,32,...](#)).

[0] subscribed value

1...16000

<Delivery order><sup>(num)</sup>

This parameter indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

0	no
1	yes
[2]	subscribed value

<Maximum SDU size><sup>(num)</sup>

This parameter indicates the maximum allowed SDU size in octets.

[0]	subscribed value
10...1520	(value needs to be divisible by 10 without remainder)

<SDU error ratio><sup>(str)</sup>

This parameter indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as "mEe". As an example a target SDU error ratio of  $5 \cdot 10^{-3}$  would be specified as "5E3" (e.g. [AT+CGEQREQ=..., "5E3", ...](#)).

["0E0"]	subscribed value
"1E2"	
"7E3"	
"1E3"	
"1E4"	
"1E5"	
"1E6"	
"1E1"	

<Residual bit error ratio><sup>(str)</sup>

This parameter indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as "mEe". As an example a target residual bit error ratio of  $5 \cdot 10^{-3}$  would be specified as "5E3" (e.g. [AT+CGEQREQ=..., "5E3", ...](#)).

["0E0"]	subscribed value
"5E2"	
"1E2"	
"5E3"	
"4E3"	
"1E3"	
"1E4"	
"1E5"	
"1E6"	
"6E8"	

<Delivery of erroneous SDUs><sup>(num)</sup>

This parameter indicates whether SDUs detected as erroneous shall be delivered or not.

0	no
1	yes
2	no detect
[3]	subscribed value

<Transfer delay><sup>(num)</sup>

This parameter indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds.

[0]	subscribed value
-----	------------------

---

10...150	(value needs to be divisible by 10 without remainder)
200...950	(value needs to be divisible by 50 without remainder)
1000...4000	(value needs to be divisible by 100 without remainder)

`<Traffic handling priority>(num)`

This parameter specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of the other bearers.

[0]	subscribed
1	
2	
3	

`<PDP_type>(str)`

Packet Data Protocol Type

"IP"	Internet Protocol (IETF STD 5)
------	--------------------------------

### Notes

- Definitions of parameters can be found in 3GPP 23.107.
- All QOS settings will be stored non volatile.

## 10.11 AT+CGSMS Select service for MO SMS messages

### Syntax

Test Command			
AT+CGSMS=?			
Response(s)			
+CGSMS: (list of supported <service>s)			
OK			
Read Command			
AT+CGSMS?			
Response(s)			
+CGSMS: <service>			
OK			
Write Command			
AT+CGSMS=<service>			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
3GPP 27.007	+	+	+
			Last
			-

### Command Description

The test command is used for requesting information on which services and service preferences can be set by using the [AT+CGSMS](#) write command

The read command returns the currently selected service or service preference.

The write command is used to specify the service or service preference that the MT will use to send MO SMS messages.

### Parameter Description

<service> <sup>(num)</sup>	
A numeric parameter which indicates the service or service preference to be used. Parameter is global for all interfaces and non-volatile.	
0	GPRS
1	Circuit switched
2 <sup>(D)</sup>	GPRS preferred (use circuit switched SMS transfer if mobile is not GPRS attached)
3	Circuit switched preferred (use GPRS if circuit switched is not available)

## 10.12 ATD\*99# Request GPRS service

This command causes the MT to perform whatever actions are necessary to establish a communication between the TE and the external PDN.

The V.250 'D' (Dial) command causes the MT to enter the V.250 online data state and, with the TE, to start the specified layer 2 protocol. No further commands may follow on the AT command line. GPRS attachment and PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the [AT+CGATT](#) and [AT+CGACT](#) commands.

To confirm acceptance of the command before entering the V.250 online data state command will respond with CONNECT.

The application that initiates the PPP mode must be designed to start all LCP configure requests in accordance with TS 27.060 par 9.1. Otherwise the MT remains, after the CONNECT, infinitely in a waiting state.

When the layer 2 protocol has terminated, either as a result of an orderly shut down of the PDP or an error, the MT enters V.250 command state and returns NO CARRIER (for details refer to Section [10.3.1, Automatic deactivation of PDP context during dial-up PPP](#)).

### Syntax

Exec Command			
ATD*99[* [<called_address>][* [<L2P>][* [<cid>]]]]#			
Response(s)			
CONNECT			
NO CARRIER			
Reference(s)	PIN	MDM	APP
3GPP TS 27.007	+	+	-
			Last
			+

### Parameter Description

<called_address> <sup>(str)</sup>	
IP V4 address in the form w.x.y.z, which identifies the called party; if it is provided, the MT will automatically set up a virtual call to the specified address after the context has been activated.	
<L2P> <sup>(str)</sup>	
Layer 2 protocol to be used between the TE and MT.	
"PPP"	layer 2 protocol PPP
"1"	layer 2 protocol PPP
<cid> <sup>(num)</sup>	
Parameter specifies a particular PDP context definition (see <a href="#">AT+CGDCONT</a> command).	
Secondary PDP contexts are not supported.	
[1]...16	

## 10.13 AT^SGAUTH Set type of authentication for PDP-IP connections

### Syntax

#### Test Command

AT^SGAUTH=?

#### Response(s)

^SGAUTH: (range of supported <cid>s), (list of supported <auth\_type>s), ,  
OK  
ERROR  
+CME ERROR: <err>

#### Read Command

AT^SGAUTH?

#### Response(s)

^SGAUTH: <cid>, <auth\_type>[, <user>]  
^SGAUTH: <cid>, <auth\_type>[, <user>]  
...  
OK  
ERROR  
+CME ERROR: <err>

#### Write Command

AT^SGAUTH=<cid>[, <auth\_type>[, <passwd>[, <user>]]]

#### Response(s)

OK  
ERROR  
+CME ERROR: <err>

PIN	MDM	APP	Last
+	+	+	-

### Parameter Description

<cid><sup>(num)</sup>

Parameter specifies a particular PDP context definition. This is also used in other PDP context-related commands.

1...16

<auth\_type><sup>(num)</sup>

Indicates the types of authentication to be used for the specified context. If CHAP is selected another parameter <passwd> needs to be specified. If PAP is selected two additional parameters <passwd> and <user> need to be specified.

[0]	none
1	PAP
2	CHAP

<passwd><sup>(str)</sup>

Parameter specifies the password used for authentication. It is required for the authentication types PAP and CHAP.

---

`<user>`<sup>(str)</sup>

Parameter specifies the user name used for authentication. It is required for the authentication type PAP.

**Note**

- All settings will be stored non volatile.

## 11. FAX Commands

This chapter describes the AT commands used for fax communications.

If the ME is acting as a fax modem for a PC based fax application (e.g. "WinFax") it is necessary to select the proper Service Class (Fax Class) provided by the ME. The ME reports its Service Class capabilities, i.e. the current setting and the range of services available. This is provided by the [AT+FCLASS](#) command.

### 11.1 AT+FCLASS Set the Service Class of a facsimile DCE

[AT+FCLASS](#) sets the ME to a particular mode of operation (data, fax). This allows the ME to process information in a manner suitable for that type of information.

#### Syntax

Test Command			
AT+FCLASS=?			
Response(s)			
(list of supported <a href="#">&lt;n&gt;s</a> )			
OK			
Read Command			
AT+FCLASS?			
Response(s)			
<a href="#">&lt;n&gt;</a>			
OK			
Write Command			
AT+FCLASS= <a href="#">&lt;n&gt;</a>			
Response(s)			
OK			
Reference(s)	PIN	MDM	APP
EIA/TIA-592-A	+	+	+
			Last
			-

#### Parameter Description

<a href="#">&lt;n&gt;</a> <sup>(num)</sup>	
0	Data (e.g. EIA/TIA-602 or ITU V.250)
1	Fax class 1 (EIA/TIA-578-A, Service Class 1)

The **AT+FAR** command can be used to disable the DCE's ability to adaptively detect the selected message carrier or V.21 control message and to adjust +FRM processing accordingly.

Test Command				
AT+FAR=?				
Response(s)				
+FAR: (list of supported <n>s)				
OK				
Read Command				
AT+FAR?				
Response(s)				
+FAR: <n>				
OK				
Exec Command				
AT+FAR				
Response(s)				
OK				
Write Command				
AT+FAR=<n>				
Response(s)				
OK				
Reference(s)				
EIA/TIA-592-A	PIN	MDM	APP	Last
	+	+	+	-

0 Adaptive reception disabled.

# 11.3 AT+FDD Double Escape Character Replacement

The [AT+FDD](#) command specifies how to use the (DLE) (SUB) pair to encode consecutive (1/0) (1/0) in data.

## Syntax

Test Command			
AT+FDD=?			
Response(s)			
+FDD: (list of supported <a href="#">&lt;v&gt;s</a> )			
OK			
Read Command			
AT+FDD?			
Response(s)			
+FDD: <a href="#">&lt;v&gt;</a>			
OK			
Exec Command			
AT+FDD			
Response(s)			
OK			
Write Command			
AT+FDD= <a href="#">&lt;v&gt;</a>			
Response(s)			
OK			
Reference(s)	PIN	MDM	APP
EIA/TIA-592-A	+	+	+
			Last
			-

## Parameter Description

<a href="#">&lt;v&gt;</a> <sup>(num)</sup>
0-1

11.4
   AT+FCL
   Carrier Loss Timeout

The [AT+FCL](#) command specifies the duration (time\*100 millisecond) used by DCE to terminate the session if no activity is detected on the carrier, i.e. the OTA interface.

Syntax

Test Command			
AT+FCL=?			
Response(s)			
+FCL: (list of supported <n>s)			
OK			
Read Command			
AT+FCL?			
Response(s)			
+FCL: <n>			
OK			
Exec Command			
AT+FCL			
Response(s)			
OK			
Write Command			
AT+FCL=<n>			
Response(s)			
OK			
Reference(s)	PIN	MDM	APP
EIA/TIA-592-A	+	+	+
			Last
			-

Parameter Description

<n> <sup>(num)</sup>
Time
0-255

11.5     **AT+FIT   DTE Inactivity Timeout**

The **AT+FIT** command specifies the duration (in second) used by the DCE to terminate the session if the DTE fails to respond.

**Syntax**

Test Command			
AT+FIT=?			
Response(s)			
+FIT: (list of supported <t>s), (list of supported <a>s)			
OK			
Read Command			
AT+FIT?			
Response(s)			
+FIT: <t>, <a>			
OK			
Exec Command			
AT+FIT			
Response(s)			
OK			
Write Command			
AT+FIT=<t><a>			
Response(s)			
OK			
Reference(s)	PIN	MDM	APP      Last
EIA/TIA-592-A	+	+	+      -

**Parameter Description**

<t> <sup>(num)</sup>
Time
0-255
<a> <sup>(num)</sup>
Action
0, 1; Action 0 and 1 are treated the same, i.e. terminate the T.31 session

## 11.6 AT+FTS Transmit silence

[AT+FTS](#) directs DCE to stop the transmission for the specified amount of time (in 10 millisecond increments).

### Syntax

Test Command

AT+FTS=?

Response(s)

+FTS: (list of supported [<Time>](#)s)

OK

ERROR

Write Command

AT+FTS=[<Time>](#)

Response(s)

OK

In on-hook mode:

ERROR

Reference(s)

TIA/EIA-578

PIN

MDM

APP

Last

+

+

+

-

### Parameter Description

[<Time>](#)<sup>(num)</sup>

No. of 10 millisecond intervals

0...255

### Note

- Used for Fax Class 1 only

## 11.7 AT+FRS Receive Silence

**AT+FRS** directs the DCE to listen for silence from the remote end and report back OK when silence has been detected for the specified amount of time (in 10 millisecond increments). Command is abortable.

### Syntax

Test Command				
AT+FRS=?				
Response(s)				
+FRS: (list of supported <Time>s)				
OK				
ERROR				
Write Command				
AT+FRS=<Time>				
Response(s)				
OK				
If error is related to ME functionality:				
ERROR				
Reference(s)	PIN	MDM	APP	Last
TIA/EIA-578	+	+	+	-

### Parameter Description

<Time> <sup>(num)</sup>
Number of 10 millisecond intervals
0...255

### Note

- Used for Fax Class 1 only



**11.9 AT+FRM Receive message**

**AT+FRM** directs the DCE to receive T.30 facsimile message data using the specified modulation scheme. Command is abortable.

**Syntax**

Test Command				
AT+FRM=?				
Response(s)				
(list of <mod>s)				
OK				
Write Command				
AT+FRM=<mod>				
Response(s)				
CONNECT				
If error is related to ME functionality:				
ERROR				
Reference(s)	PIN	MDM	APP	Last
TIA/EIA-578	+	+	-	-

**Parameter Description**

<mod> <sup>(num)</sup>	
Modulation scheme	
72	V.29 - 7200 bps
73	V.17 - 7200 bps
74	V.17 - 7200 bps
96	V.29 - 9600 bps
97	V.17 - 9600 bps
98	V.17 - 9600 bps

**AT+FTH** directs the DCE to transmit T.30 HDLC data using the modulation scheme "3".

Test Command

AT+FTH=?

Response(s)

In off-hook mode only:  
+FTH: (list of <mod>s)  
OK  
In on-hook mode:  
ERROR

Write Command

AT+FTH=<mod>

Response(s)

CONNECT

Reference(s)

TIA/EIA-578

PIN	MDM	APP	Last
+	+	-	-

<mod> <sup>(num)</sup>	
Modulation scheme	
3	Clause 2/V.21 - 300 bps

**AT+FRH** directs the DCE to transmit T.30 HDLC data using the specified modulation scheme "3".

Test Command			
AT+FRH=?			
Response(s)			
In off-hook mode only:			
+FRH: (list of <mod>s)			
OK			
In on-hook mode:			
ERROR			
Write Command			
AT+FRH=<mod>			
Response(s)			
CONNECT			
If error is related to ME functionality			
ERROR			
Reference(s)	PIN	MDM	APP
TIA/EIA-578	+	+	-

<mod> <sup>(num)</sup>	
Modulation scheme	
3	Clause 2/V.21 - 300 bps

- Used for Fax Class 1 only.

## 12. Short Message Service (SMS) Commands

The AT Commands described in this chapter allow an external application to use the Short Message Service with the HC25.

### 12.1 SMS parameters

#### Parameter Description

`<ackpdu>(num)`

Format is same for `<pdu>` in case of SMS, but without GSM 24.11 SC address field and parameter shall be bounded by double quote characters like a normal string type parameter

`<alpha>(str)(+CSCS)`

String type alphanumeric representation of `<da>` or `<oa>` corresponding to the entry found in phonebook; this feature is not supported

`<ct>(num)`

Command Type

GSM 03.40 TP-Command-Type in integer format

[0]...255

`<da>(str)(+CSCS)`

Destination Address

GSM 03.40 TP- Destination-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by `<toda>`

`<data>(num)(+CSCS)`

User Data

In case of SMS: GSM 03.40 TP-User-Data in text mode responses; format:

- If `<dcs>` indicates that GSM 03.38 default alphabet is used and `<fo>` indicates that GSM 03.40 TP-User-Data-Header-Indication is not set: ME/TA converts GSM alphabet into current TE character set according to rules covered in Annex A.
- If `<dcs>` indicates that 8-bit or UCS2 data coding scheme is used, or `<fo>` indicates that GSM 03.40 TP-User-Data-Header-Indication is set: ME/TA converts each 8-bit octet into hexadecimal numbers containing two IRA characters (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)).

In case of CBS: GSM 03.41 CBM Content of Message in text mode responses; format:

- If `<dcs>` indicates that GSM 03.38 default alphabet is used: ME/TA converts GSM alphabet into current TE character set according to rules covered in Annex A.
- If `<dcs>` indicates that 8-bit or UCS2 data coding scheme is used: ME/TA converts each 8-bit octet into hexadecimal numbers containing two IRA characters.

`<dt>(num)`

Discharge Time

GSM 03.40 TP-Discharge-Time in time-string format: "yy/MM/dd,hh:mm:ss+zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone. For example, 6th of May 1994, 22:10:00 GMT+2 hours equals "94/05/06,22:10:00+08"

**<index><sup>(num)</sup>**

Integer type; value in the range of location numbers supported by the associated memory. Indexing starts from 0.

**<length><sup>(num)</sup>**

Message Length

Integer type value indicating in PDU mode ([AT+CMGF=0](#)), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length).

**<mem1><sup>(str)</sup>**

Memory to be used when listing, reading and deleting messages:

"SM"	SIM message storage
"ME"	Mobile Equipment message storage
"MT"	Same as "ME" storage

**<mem2><sup>(str)</sup>**

Memory to be used when writing and sending messages:

"SM"	SIM message storage
"ME"	Mobile Equipment message storage
"MT"	Same as "ME" storage

**<mem3><sup>(str)</sup>**

Received messages will be placed in this memory storage if routing to TE is not set. See command [AT+CNMI](#) with parameter [<mt>=2](#).

"SM"	SIM message storage
"ME"	Mobile Equipment message storage
"MT"	Same as "ME" storage

**<mid><sup>(num)</sup>**

Message Identifier

GSM 03.41 CBM Message Identifier in integer format

**<mn><sup>(num)</sup>**

Message Number

GSM 03.40 TP-Message-Number in integer format

**<mr><sup>(num)</sup>**

Message Reference

GSM 03.40 TP-Message-Reference in integer format

**<oa><sup>(str)(+CSCS)</sup>**

Originating Address

GSM 03.40 TP-Originating-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by [<toa>](#)

**<page>**<sup>(num)</sup>

Page Parameter

GSM 03.41 CBM Page Parameter bits 4-7 in integer format

**<pages>**<sup>(num)</sup>

Page Parameter

GSM 03.41 CBM Page Parameter bits 0-3 in integer format

**<pdu>**<sup>(num)</sup>

In the case of SMS: GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into hexadecimal numbers containing two IRA characters (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)). In the case of CBS: [<ra>](#) GSM 03.40 TP-Recipient-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted into characters; type of address given by [<tora>](#)

**<ra>**<sup>(str)(+CSCS)</sup>

Recipient Address

GSM 03.40 TP-Recipient-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (refer to command [AT+CSCS](#)); type of address given by [<tora>](#)

**<sca>**<sup>(str)(+CSCS)</sup>

Service Center Address

GSM 04.11 RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (refer to command [AT+CSCS](#)); type of address given by [<tosca>](#)

**<scts>**<sup>(num)</sup>

Service Centre Time Stamp

GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format (refer [<dt>](#))

**<sn>**<sup>(num)</sup>

Serial Number

GSM 03.41 CBM Serial Number in integer format

**<st>**<sup>(num)</sup>

Status

GSM 03.40 TP-Status in integer format

0...255

**<stat>**<sup>(str)</sup>

Message status

3GPP 27.005 Interface of SMS and CB. Indicates the status of message in memory.

Description	text mode (<mode>=1)	PDU mode (<mode>=0)	Default
Received unread messages	"REC UNREAD"	0	for SMS reading commands
Received read messages	"REC READ"	1	
Stored unsent messages	"STO UNSENT"	2	for SMS writing commands
Stored sent messages	"STO SENT"	3	
All messages	"ALL"	4	

<toda><sup>(num)</sup>

Type of Destination Address

GSM 04.11 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)

0...255

<toa><sup>(num)</sup>

Type of Originating Address

GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<ora><sup>(num)</sup>

Type of Recipient Address

GSM 04.11 TP-Recipient-Address Type-of-Address octet in integer format (default refer <toda>)

<osca><sup>(num)</sup>

Type of Service Center Address

GSM 04.11 RP SC address Type-of-Address octet in integer format (default refer <toda>)

## 12.2 AT+CMGC Send an SMS command

### Syntax

Test Command

AT+CMGC=?

Response(s)

OK

Write Command

If text mode (see [AT+CMGF=1](#))

AT+CMGC=<fo>, <ct>[, <pid>[, <mn>[, <da>[, <toda>]]]]<CR> Text can be entered <CTRL-Z>/<ESC>

Response(s)

+CMGC: <mr>[, <scts>]

If sending fails

ERROR

+CMS ERROR: <err>

Write Command

If PDU mode (see [AT+CMGF=0](#))

AT+CMGC=<length><CR> PDU can be entered <CTRL-Z>/<ESC>

Response(s)

+CMGC: <mr>[, <ackpdu>]

OK

ERROR

+CMS ERROR: <err>

Reference(s)

GSM 07.05

PIN	MDM	APP	Last
+	+	+	-

### Note

- After invoking the commands [AT+CMGW](#), [AT+CMGS](#) or [AT+CMGC](#) it is necessary to wait for the prompt ">" before entering text or PDU. After the prompt a timer will be started to observe the input.

## 12.3 AT+CMGD Delete short message

The write command deletes a short message from the preferred message storage [<mem1>](#) location [<index>](#).

### Syntax

Test Command

AT+CMGD=?

Response(s)

OK

Write Command

AT+CMGD=[<index>](#)

Response(s)

OK

ERROR

+CMS ERROR: [<err>](#)

Reference(s)

GSM 07.05

PIN

MDM

APP

Last

+

+

+

-

### Notes

- If there is no short message stored at the selected index, the response is OK too.
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.

## 12.4 AT+CMGF Select SMS message format

### Syntax

Test Command				
AT+CMGF=?				
Response(s)				
+CMGF: (list of supported<mode>s)				
OK				
Read Command				
AT+CMGF?				
Response(s)				
+CMGF: <mode>				
OK				
Write Command				
AT+CMGF=<mode>				
Response(s)				
OK				
Reference(s)				
GSM 07.05	PIN	MDM	APP	Last
	+	+	+	-

### Command Description

The write command specifies the input and output format of the short messages.

### Parameter Description

<mode> <sup>(num)</sup>	
[0] <sup>(&amp;F)</sup>	PDU mode
1	Text mode

## 12.5 AT+CMGL List SMS messages from preferred store

The write command returns messages with status value `<stat>` from message storage `<mem1>` to the TE. If the status of the message is 'received unread', the status in the storage changes to 'received read'. The execute command is the same as the write command with the given default for `<stat>`.

### Syntax

#### Test Command

AT+CMGL=?

Response(s)

+CMGL: (list of supported `<stat>`s)

OK

#### Exec Command

AT+CMGL

Response(s)

+CMGL: (see write command for default of `<stat>`)

OK

#### Write Command

AT+CMGL=`<stat>`

Response(s)

Output if text mode (`AT+CMGF=1`) and command successful:

For SMS- SUBMITs and/or SMS-DELIVERs

+CMGL: `<index>`, `<stat>`, `<oa>/<da>`, [`<alpha>`], [`<scts>`]], `<toa>/<toda>`, `<length>`  
`<data>`

[...]

OK

For SMS-STATUS-REPORTs

+CMGL: `<index>`, `<stat>`, `<fo>`, `<mr>`, [`<ra>`], [`<tora>`], `<scts>`, `<dt>`, `<st>`

[...]

OK

For SMS-Commands

+CMGL: `<index>`, `<stat>`, `<fo>`, `<ct>`

[...]

OK

Output if PDU mode `AT+CMGF=0` and command successful:

For SMS-SUBMITs and/or SMS-DELIVERs

+CMGL: `<index>`, `<stat>`, [`<alpha>`], `<length>`  
`<pdu>`

[...]

OK

If error is related to ME functionality

ERROR

+CMS ERROR: `<err>`

#### Reference(s)

GSM 07.05

PIN

MDM

APP

Last

+

+

+

-

---

### **Notes**

- The selected `<mem1>` can contain different types of SMS (e.g. SMS-DELIVERs, SMS-SUBMITs, SMS-STATUS-REPORTs and SMS-COMMANDs), the response may be a mix of the responses of different SM types. TE application can recognize the response format by examining the third response parameter.
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.
- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

## 12.6 AT+CMGR Read SMS messages

The write command returns SMS message with location value `<index>` from message storage `<mem1>` to the TE. If status of the message is 'received unread', status in the storage changes to 'received read'.

### Syntax

Test Command

AT+CMGR=?

Response(s)

OK

Write Command

AT+CMGR=<index>

Response(s)

Output if text mode (`AT+CMGF=1`) and command successful:

For SMS-DELIVER

```
+CMGR: <stat>, <oa>, [<alpha>], <scts>[, <toa>, <fo>, <pid>, <dc>, <sca>, <tosca>,
<length>]
<data>
[... ]
OK
```

For SMS-SUBMIT

```
+CMGR: <stat>, <da>, [<alpha>][, <toda>, <fo>, <pid>, <dc>, [<vp>], <sca>, <tosca>, <length>]
<data>
[... ]
OK
```

For SMS-STATUS-REPORT

```
+CMGR: <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st>
<data>
[... ]
OK
```

For SMS-Commands

```
+CMGR: <stat>, <fo>, <ct>[, <pid>, [<mn>], [<da>], [<toda>], <length>]
<data>
[... ]
OK
```

Output if PDU mode (`AT+CMGF=0`) and command successful:

For SMS-SUBMITs and/or SMS-DELIVERs

```
+CMGR: <stat>, [<alpha>], <length>
<pdu>
[... ]
OK
ERROR
+CMS ERROR: <err>
```

Reference(s)

GSM 07.05

PIN	MDM	APP	Last
+	+	+	-

#### Notes

- If [AT+CMGR](#) is used to read an empty record the response is: OK.
- If [AT+CMGR](#) is used to read a non-existent record index the response is: "+CMS ERROR: 321" (invalid memory index).
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.
- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

## 12.7 AT+CMGS Send Short Message

The write command transmits a short message from TE to network (SMS-SUBMIT). After invoking the write command wait for the prompt ">" and then start to write the message. To send the message simply enter <CTRL-Z>. After the prompt a timer will be started to observe the input. To abort sending use <ESC>. Abortion is acknowledged with "OK", though the message will not be sent. The message reference <mr> is returned to the TE on successful message delivery. The value can be used to identify the message in a delivery status report provided as an unsolicited result code.

### Syntax

Test Command			
AT+CMGS=?			
Response(s)			
OK			
Write Command			
If text mode (see AT+CMGF=1)			
AT+CMGS=<da>[, <toda>]<CR> Text can be entered. <CTRL-Z>/<ESC>			
Response(s)			
+CMGS: <mr>[, <scts>]			
OK			
ERROR			
+CMS ERROR: <err>			
Write Command			
If PDU mode (see AT+CMGF=0)			
AT+CMGS=<length><CR> PDU can be entered. <CTRL-Z>/<ESC>			
Response(s)			
+CMGS: <mr>[, <ackpdu>]			
OK			
ERROR			
+CMS ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.05	+	+	+
			Last
			-

### Notes

- Note that some providers do not recognize an @ symbol used in a short message. A widely used alternative is typing "\*" as defined in GSM 03.40 (GPP TS 23.40).
- Message Length in Text Mode  
The maximum length of a short message depends on the used coding scheme: It is 160 characters if the 7 bit GSM coding scheme is used, and 140 characters according to the 8 bit GSM coding scheme.

## 12.8 AT+CMGW Write Short Messages to Memory

The execute and write commands transmit a short message (either SMS-DELIVER or SMS-SUBMIT) from TE to memory storage [<mem2>](#). Memory location [<index>](#) of the stored message is returned. Message status will be set to 'stored unsent' unless otherwise given in parameter [<stat>](#).

After invoking the execute or write command wait for the prompt ">" and then start to write the message. To save the message simply enter [<CTRL-Z>](#).

To abort writing use [<ESC>](#). Abortion is acknowledged with "OK", though the message will not be saved.

### Syntax

Test Command

AT+CMGW=?

Response(s)

OK

Exec Command

If text mode (see [AT+CMGF=1](#)):

AT+CMGW

Response(s)

[<CR>](#) Text can be entered. [<CTRL-Z>/<ESC>](#)

+CMGW: [<index>](#)

OK

ERROR

+CMS ERROR: [<err>](#)

Write Command

If textmode (see [AT+CMGF=1](#)):

AT+CMGW=[<oa>/<da>](#) [, [[<toa>/<toda>](#)] [, [<stat>](#)]] [<CR>](#) Text can be entered. [<CTRL-Z>/<ESC>](#)

Response(s)

+CMGW: [<index>](#)

OK

ERROR

+CMS ERROR: [<err>](#)

Write Command

If PDU mode (see [AT+CMGF=0](#)):

AT+CMGW=[<length>](#) [, [<stat>](#)] [<CR>](#) PDU can be entered. [<CTRL-Z>/<ESC>](#)

Response(s)

+CMGW: [<index>](#)

OK

If writing fails see notes below.

Reference(s)

GSM 07.05

PIN

MDM

APP

Last

+

+

+

-

### Notes

- Note that some providers do not recognize an @ symbol used in a short message. A widely used alternative is typing "\*" as defined in GSM 03.40 (GPP TS 23.40).
- Message Length in Text Mode  
The maximum length of a short message depends on the used coding scheme: It is 160 characters if the 7 bit GSM coding scheme is used, and 140 characters according to the 8 bit GSM coding scheme.

## 12.9 AT+CMMS More Messages to Send

The [AT+CMMS](#) write command controls the continuity of the SMS relay protocol link. When the feature is enabled (and supported by network) multiple messages can be sent much faster as the link is kept open.

### Syntax

Test Command			
AT+CMMS=?			
Response(s)			
+CMMS: (list of supported) <a href="#">&lt;mode&gt;</a> s			
Read Command			
AT+CMMS?			
Response(s)			
+CMMS: <a href="#">&lt;mode&gt;</a>			
OK			
Write Command			
AT+CMMS= <a href="#">&lt;mode&gt;</a>			
Response(s)			
OK			
ERROR			
+CMS ERROR: <a href="#">&lt;err&gt;</a>			
Reference(s)	PIN	MDM	APP
GSM 07.05	+	+	+
			Last
			-

### Parameter Description

<a href="#">&lt;mode&gt;</a> <sup>(num)</sup>	
[0]	Disable
1	Keep link enabled until the time between the response of the latest message send command ( <a href="#">AT+CMGS</a> , <a href="#">AT+CMSS</a> , etc.) and the next send command exceeds 1-5 seconds. Then the ME will close the link and TA switch <a href="#">&lt;mode&gt;</a> automatically back to <a href="#">&lt;mode&gt;</a> 0.
2	Enable (if the time between the response of the latest message send command and the next send command exceeds 1-5 seconds. Then the ME will close the link, but TA will not switch automatically back to <a href="#">&lt;mode&gt;</a> =0).

### Note

- After issuing the read command a delay of 5-10 seconds is required before issuing the write command, otherwise the "+CMS ERROR: 500" will appear.

## 12.10 AT+CMSS Send short messages from storage

The write command sends message with location value **<index>** from message storage **<mem2>** to the network (SMS-SUBMIT or SMS-COMMAND). If new recipient address **<da>** is given for SMS-SUBMIT, it shall be used instead of the one stored with the message. Reference value **<mr>** is returned to the TE on successful message delivery. Value can be used to identify message upon unsolicited delivery status report result code. If the optional parameter **<da>** is given, the old status of the short message at **<index>** remains unchanged (see **<stat>**).

### Syntax

Test Command

AT+CMSS=?

Response(s)

OK

Write Command

If text mode (**AT+CMGF=1**):

AT+CMSS=**<index>**[, **<da>**[, **<toda>**]]

Response(s)

+CMSS: **<mr>**[, **<scts>**]

OK

If sending fails

ERROR

+CMS ERROR: **<err>**

Write Command

If PDU mode (**AT+CMGF=0**):

AT+CMSS=**<index>**[, **<da>**[, **<toda>**]]

Response(s)

+CMSS: **<mr>**[, **<ackpdu>**]

OK

ERROR

+CMS ERROR: **<err>**

Reference(s)

GSM 07.05

PIN

MDM

APP

Last

+

+

+

-

## 12.11 AT+CNMA New Message Acknowledgement to ME/TE, only phase 2+

The write / execute command confirms successful receipt of a new message (SMS-DELIVER or SMS-STATUS-REPORT) routed directly to the TE. If ME does not receive acknowledgement within required time (network time-out), it will send RP-ERROR to the network. In this case routing to the TE will be disabled automatically by setting both **<mt>** and **<ds>** values of **AT+CNMI** to zero.

### Syntax

Test Command			
AT+CNMA=?			
Response(s)			
+CNMA: (list of supported <n>s)			
OK			
Exec Command			
AT+CNMA			
Response(s)			
OK			
ERROR			
+CMS ERROR: <err>			
Write Command			
AT+CNMA=<n>			
Response(s)			
OK			
ERROR			
+CMS ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.05	+	+	+
			Last
			-

### Parameter Description

<n> <sup>(num)</sup>	
Parameter required only for PDU mode.	
0	Command operates similarly as in text mode.
1	Send positive (RP-ACK) acknowledgement to the network. Accepted only in PDU mode.
2	Send negative (RP-ERROR) acknowledgement to the network. Accepted only in PDU mode.

### Note

- The execute / write command shall only be used when **AT+CSMS** parameter **<service>** equals 1 (= phase 2+) and appropriate URC has been issued by the module, i.e.:  
**<+CMT>** for **<mt>**=2 incoming message classes 0,1,3 and none;  
**<+CMT>** for **<mt>**=3 incoming message classes 0 and 3;  
**<+CDS>** for **<ds>**=1.

## 12.12 AT+CNMI New short Message Indication

The write command selects the procedure how the receipt of new short messages from the network is indicated to the TE when TE is active, e.g. DTR signal is ON. If TE is inactive (e.g. DTR signal is OFF), message receiving should be done as specified in GSM 03.38. If the DTR signal is not available or the state of the signal is ignored, reliable message transfer can be assured by using **AT+CNMA** acknowledgment procedure. The rules **<mt>=2** and **<mt>=3** for storing received messages are possible only if phase 2+ compatibility is activated with **AT+CSMS=1**. The parameter **<ds>=1** is also only available in phase 2+.

### Syntax

Test Command				
AT+CNMI=?				
Response(s)				
+CNMI: (list of supported <mode>s), (list of supported <mt>s), (list of supported <bm>s), (list of supported <ds>s), (list of supported <bfr>s)				
OK				
Read Command				
AT+CNMI?				
Response(s)				
+CNMI: <mode>, <mt>, <bm>, <ds>, <bfr>				
OK				
Write Command				
AT+CNMI=[<mode>][,<mt>][,<bm>][,<ds>][,<bfr>]				
Response(s)				
OK				
ERROR				
+CMS ERROR: <err>				
Reference(s)	PIN	MDM	APP	Last
GSM 07.05	+	+	+	-

### Unsolicited Result Codes

#### URC 1

<mt>=1,2 or 3 - indication only:

+CMTI: <mem3>, <index>

Indicates that new message has been received

#### URC 2

<mt>=1,2 or 3 - directly routed message (PDU mode enabled):

+CMT: <length><CR><LF><pdu>

Indicates that new message has been received

#### URC 3

<mt>=1,2 or 3 - directly routed message (text mode enabled):

+CMT: <oa>, <scts>[, <tooa>, <fo>, <pid>, <dcs>, <sca>, <tosca>, <length>]<CR><LF><data>

Indicates that new message has been received

#### URC 4

<bm>=2 (PDU mode enabled):

+CBM: <length><CR><LF><pdu>

Indicates that new cell broadcast message has been received

#### URC 5

<bm>=2 (text mode enabled):

+CBM: <sn>, <mid>, <dc>, <page>, <pages><CR><LF><data>

Indicates that new cell broadcast message has been received

#### URC 6

<ds>=1 (PDU mode enabled):

+CDS: <length><CR><LF><pdu>

Indicates that new SMS status report has been received

#### URC 7

<ds>=1 (text mode enabled):

+CDS: <fo>, <mr>[, <ra>][, <tora>], <scts>, <dt>, <st>

Indicates that new SMS status report has been received

#### URC 8

<ds>=2:

+CDSI: <mem3>, <index>

Indicates that new SMS status report has been received

### Parameter Description

<mode><sup>(num)</sup>

[0] <sup>(&amp;F)</sup>	Buffer unsolicited result codes in the TA. If TA result code buffer is full, indications can be buffered in some other place or the oldest indications may be discarded and replaced with the new received indications.
1	Discard indication and reject new received message unsolicited result codes when TA-TE link is reserved (e.g. in on-line data mode). Otherwise forward them directly to the TE.
2	Buffer unsolicited result codes in the TA when TA-TE link is reserved (e.g. in online data mode) and flush them to the TE after reservation. Otherwise forward them directly to the TE.

<mt><sup>(num)</sup>

Rules for storing received short messages depend on the relevant data coding method (refer to GSM 03.38), preferred memory storage setting ([AT+CPMS](#)) and this value.

[0] <sup>(&amp;F)</sup>	No SMS-DELIVER indications are routed to the TE.
1	Class 0 SMS-DELIVERs are routed directly to the TE using unsolicited result codes. For all other messages the following applies: If SMS-DELIVER is stored in ME/TA, indication of the memory location is routed to the TE using unsolicited result code.

- |   |                                                                                                                                                                                                                                           |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | SMS-DELIVERs, except class 2 messages and messages in the message waiting indication group (store message) are routed directly to the TE using unsolicited result code.                                                                   |
| 3 | Class 0 and 3 SMS-DELIVERs are routed directly to the TE using unsolicited result codes defined in <a href="#">&lt;mt&gt;=2</a> . Messages of other data coding schemes result in indication as defined in <a href="#">&lt;mt&gt;=1</a> . |

[<bm>](#)<sup>(num)</sup>

Rules for storing received CBMs depend on the relevant data coding method (refer to GSM 03.38), the setting of Select CBM Types ([AT+CSCB](#)) and this value:

- |                                         |                                                                       |
|-----------------------------------------|-----------------------------------------------------------------------|
| <a href="#">[0]</a> <sup>(&amp;F)</sup> | No CBM indications are routed to the TE.                              |
| 2                                       | New CBMs are routed directly to the TE using unsolicited result code. |

[<ds>](#)<sup>(num)</sup>

- |                                         |                                                                                                                                 |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">[0]</a> <sup>(&amp;F)</sup> | No SMS-STATUS-REPORTs are routed to the TE.                                                                                     |
| 1                                       | SMS-STATUS-REPORTs are routed to the TE using unsolicited result code.                                                          |
| 2                                       | If SMS-STATUS-REPORT is routed into ME/TA, indication of the memory location is routed to the TE using unsolicited result code. |

[<bfr>](#)<sup>(num)</sup>

- |                                         |                                                                                                                                         |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">[1]</a> <sup>(&amp;F)</sup> | TA buffer of unsolicited result codes defined within this command is cleared when <a href="#">&lt;mode&gt;</a> changes from 0 to 1...3. |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|

[<index>](#)<sup>(num)</sup>

Integer type; value in the range of location numbers supported by the associated memory

### Notes

- With [<mt>=2,3](#) and [<ds>=1](#) messages routed directly to the TE (either short messages or status reports) have to be acknowledged with [AT+CNMA](#). To do this, GSM Phase 2+ has to be enabled (see [AT+CSMS](#)).
- If Phase 2+ is enabled and either a short message or a status report is not acknowledged within the required time, then [<mt>](#) and [<ds>](#) will be set to zero. See [AT+CNMA](#) for further detail.

## 12.13 AT+CPMS Preferred SMS message storage

The write command selects memory storages [<mem1>](#), [<mem2>](#), [<mem3>](#) to be used for reading, writing, etc.

### Syntax

Test Command

AT+CPMS=?

Response(s)

+CPMS: (list of supported [<mem1>s](#)), (list of supported [<mem2>s](#)), (list of supported [<mem3>s](#))  
OK

Read Command

AT+CPMS?

Response(s)

+CPMS: [<mem1>](#), [<used1>](#), [<total1>](#), [<mem2>](#), [<used2>](#), [<total2>](#), [<mem3>](#), [<used3>](#), [<total3>](#)  
OK  
ERROR  
+CMS ERROR: [<err>](#)

Write Command

AT+CPMS=[<mem1>](#)[, [<mem2>](#)[, [<mem3>](#)]]

Response(s)

+CPMS: [<used1>](#), [<total1>](#), [<used2>](#), [<total2>](#), [<used3>](#), [<total3>](#)  
OK  
ERROR  
+CMS ERROR: [<err>](#)

Reference(s)

GSM 07.05

PIN	MDM	APP	Last
+	+	+	-

### Parameter Description

[<used1>](#)<sup>(num)</sup>

Number of messages currently in [<mem1>](#)

[<used2>](#)<sup>(num)</sup>

Number of messages currently in [<mem2>](#)

[<used3>](#)<sup>(num)</sup>

Number of messages currently in [<mem3>](#)

[<total1>](#)<sup>(num)</sup>

Number of messages storable in [<mem1>](#)

[<total2>](#)<sup>(num)</sup>

Number of messages storable in [<mem2>](#)

[<total3>](#)<sup>(num)</sup>

Number of messages storable in [<mem3>](#)

## Notes

- The Mobile Equipment storage "ME" offers space for 255 short messages, see [<mem1>](#).
- The [<mem1>](#), [<mem2>](#) and [<mem3>](#) parameter will be stored in non-volatile memory.
- Incoming Class 1 short messages (ME specific) will be preferably stored to "ME" and may be transferred to the "SM" storage if "ME" is used up.  
Incoming Class 2 messages (SIM specific) will be stored to the SIM card only, no matter whether or not there is free "ME" space. For more information regarding SIM and ME specific message classes refer to the following specifications: GSM 03.38 and 3GPP TS23038.
- While [<mem3>](#) equals "SM" and [<mem1>](#) equals "ME" it is possible that, after deleting short messages from "ME", the freed space on "ME" is reclaimed for new incoming short messages, when there is no space left on the "SM" storage. As it is often the clients concern to have received short messages stored only to the SIM card, inconsistent settings should be generally avoided. This can be achieved simply by using the same parameter for all memory indices.
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.

## 12.14 AT+CSCA SMS Service Center Address

Write command updates the SMSC address, through which mobile originated SMS are transmitted. In text mode, setting is used by send and write commands. In PDU mode, setting is used by the same commands, but only when the length of the SMSC address coded into the `<pdu>` parameter equals zero.

### Syntax

Test Command				
AT+CSCA=?				
Response(s)				
OK				
Read Command				
AT+CSCA?				
Response(s)				
+CSCA: <code>&lt;sca&gt;</code> , <code>&lt;tosca&gt;</code>				
OK				
Write Command				
AT+CSCA= <code>&lt;sca&gt;</code> [, <code>&lt;tosca&gt;</code> ]				
Response(s)				
OK				
Reference(s)	PIN	MDM	APP	Last
GSM 07.05	+	+	+	-

### Notes

- This command writes the service center address to non-volatile memory.
- The SMS service center address should be entered as specified by the service provider.

## 12.15 AT+CSCB Select Cell Broadcast Message Indication

The test command returns the supported **<operation>**s as a compound value.

The read command displays the accepted message types.

Depending on the **<operation>** parameter, the write command adds or deletes the message types accepted by the ME.

### Syntax

#### Test Command

AT+CSCB=?

Response(s)

+CSCB: (list of supported **<operation>**s)

OK

ERROR

+CMS ERROR: **<err>**

#### Read Command

AT+CSCB?

Response(s)

+CSCB: **<operation>**, **<mids>**, **<dcss>**

OK

ERROR

+CMS ERROR: **<err>**

#### Write Command

AT+CSCB=[**<operation>**[, **<mids>**[, **<dcss>**]]]

Response(s)

OK

ERROR

+CMS ERROR: **<err>**

#### Reference(s)

GSM 07.05

PIN	MDM	APP	Last
+	+	+	-

### Parameter Description

**<operation>**<sup>(num)</sup>

Add/delete operation

0(&F)

Add new message types defined in **<mids>** to the list of accepted message types by ME and replace types defined in **<dcss>**.

In case of using this operation code without parameters default (0-65535) range will be added to the list of **<mids>**.

1

Delete message types defined in **<mids>** from the list of accepted message types by ME and replace types defined in **<dcss>**.

In case of using this operation code without parameters all **<mids>**s and **<dcss>**s will be deleted.

(for more see notes)

**<mids>**<sup>(str)</sup>

Cell Broadcast Message ID specification

All different possible combinations of CBM message identifiers; e.g. "0,1,5,320-478,922".

---

`<dcss>`<sup>(str)</sup>

CBM data coding scheme specification

All different possible combinations of CBM data coding schemes (e.g. "0-3,5"). If default empty string is used all CBMs are received independent of their dcsc.

A given `<dcss>` replaces any former value and is used for consecutive requests.

#### **Note**

- The `<operation>` parameter shown in the `AT+CSCB` read command response retains the value last used in the write command. This way, the read command response always reflects the last action done: 0 means that the last action was adding new channel(s), 1 means that the last action was deleting channel(s).

## 12.16 AT+CSMP Set SMS text Mode Parameters

The write command selects values for additional parameters needed when the short message is sent to the network or placed in a storage when text format message mode is selected.

It is possible to set the validity period starting from the time when the short message is received by the SMSC (**<vp>** is in range 0... 255) or define the absolute time of the validity period termination (**<vp>** is a string). The format of **<vp>** is given by **<fo>**. If TA supports the enhanced validity period format, see GSM 03.40), it shall be given as a hexadecimal coded string (e.g. **<pdu>**) with quotes.

### Syntax

Test Command			
AT+CSMP=?			
Response(s)			
OK			
Read Command			
AT+CSMP?			
Response(s)			
+CSMP: <fo>, <vp>/ <scts>, <pid>, <dcs>			
OK			
Write Command			
AT+CSMP=<fo>[, <vp>/<scts>[, <pid>[, <dcs>]]]			
Response(s)			
+CSMP: <index>			
OK			
If sending fails			
ERROR			
+CMS ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.05	+	+	+
			Last
			-

### Parameter Description

<fo> <sup>(num)</sup>
First Octet
depending on the command or result code: first octet of GSM 03.40 SMS-DELIVER, SMS-SUBMIT, SMS-STATUS-REPORT, or SMS-COMMAND in integer format
0...255
<vp> <sup>(num)</sup>
Depending on SMS-SUBMIT <fo> setting: GSM 03.40 TP-Validity-Period either in integer format or in time-string format (refer <dt>)
0...255
<dcs> <sup>(num)</sup>
Data Coding Scheme
GSM 03.38 SMS Data Coding Scheme, or Cell Broadcast Data Coding Scheme in integer format
0(&F)...247

---

`<pid>^(num)`

Protocol Identifier

GSM 03.40 TP-Protocol-Identifier in integer format

0(&F)...255

### Notes

- When storing a SMS DELIVER from the TE to the preferred memory storage in text mode (using the [AT+CMGW](#) write command), `<vp>` field can be used for `<scts>`.
- The command writes the parameters to the non-volatile memory.

## 12.17 AT+CSMS Select Message Service

### Syntax

Test Command			
AT+CSMS=?			
Response(s)			
+CSMS: (list of supported<service>s)			
OK			
Read Command			
AT+CSMS?			
Response(s)			
+CSMS: <service>, <mt>, <mo>, <bm>			
OK			
Write Command			
AT+CSMS=<service>			
Response(s)			
+CSMS: <mt>, <mo>, <bm>			
OK			
ERROR			
+CMS ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.05	+	+	+
			Last
			-

### Parameter Description

<service> <sup>(num)</sup>	
0(&F)	GSM 03.40 and GSM 03.41 (the syntax of SMS AT commands is compatible with GSM 07.05 Phase 2 version 4.7.0; Phase 2+ features which do not require new command syntax may be supported, e.g. correct routing of messages with new Phase 2+ data coding schemes)
1	GSM 03.40 and GSM 03.41 (the syntax of SMS AT commands is compatible with GSM 07.05 Phase 2+ version; the requirement of <service> setting 1 is mentioned under corresponding command descriptions).

<mt> <sup>(num)</sup>	
Mobile Terminated Messages:	
0	Type not supported
1	Type supported

<mo> <sup>(num)</sup>	
Mobile Originated Messages:	
0	Type not supported
1	Type supported

<bm><sup>(num)</sup>

Broadcast Type Messages:

0	Type not supported
1	Type supported

**Note**

- Phase 2+ (<service>=1) must be set before acknowledging incoming short messages with [AT+CNMA](#) is possible. Acknowledgements are required for directly routed messages delivered using "+CMT" and "+CDS" URCs. Direct routing is used for certain message classes when <mt>=2, <mt>=3 or <ds>=1.

## 12.18 AT^SMGL List Short Messages from preferred store without setting status to REC READ

The write command lists messages stored in [<mem1>](#) without changing their status to "read". The execute command is identical to the write command with default [<stat>](#) (for defaults see "Section 12.1, [SMS parameters](#)").

### Syntax

Test Command			
AT^SMGL=?			
Response(s)			
(list of supported <a href="#">&lt;stat&gt;</a> s)			
Exec Command			
AT^SMGL			
Response(s)			
^SMGL: (same as write command with default <a href="#">&lt;stat&gt;</a> )			
OK			
Write Command			
AT^SMGL=[ <a href="#">&lt;stat&gt;</a> ]			
Response(s)			
same as <a href="#">AT+CMGL</a>			
Reference(s)	PIN	MDM	APP
--	+	+	+
			Last
			-

### Notes

- The selected [<mem1>](#) can contain different types of SMs (e.g. SMS-DELIVERs, SMS-SUBMITs, SMS-STATUS-REPORTs and SMS-COMMANDs), the response may be a mix of the responses of different SM types. TE application can recognize the response format by examining the third response parameter.
- Users should be aware that error will occur when using this AT command quickly after SIM PIN authentication due to the fact the SIM data may not yet be accessible.

## 13. SIM related Commands

The AT commands described in this chapter are related to the Subscriber Identity Module (SIM) connected to HC25.

Note:

If using data from the SIM please bear in mind that the content of all Elementary Files is *subject to change* at any moment!

This is because the network can change the SIM's data in the background via the SIM Application Toolkit (SAT) procedure "Data download to SIM". For a detailed description please refer to GSM 11.14, [27].

To get informed that changing Elementary Files has taken place the TA needs to hook to the SAT Proactive Command "REFRESH". To achieve this, the AT command interface of SAT, i.e. Remote-SAT, needs to be activated. An overview is given at Chapter 14., [SIM Application Toolkit \(SAT\) Commands](#), additional information is available with the document "Remote-SAT User Guide" [4].

### 13.1 AT+CRSM Restricted SIM Access

[AT+CRSM](#) offers easy access of the Elementary Files on the SIM. Access to the SIM database is restricted to the commands listed with parameter [<command>](#).

All parameters of [AT+CRSM](#) are used as defined by the specifications listed below. HC25 handles internally all required SIM interface locking and file selection routines.

As response to the command, the HC25 sends the actual SIM information parameters and response data. "+CME ERROR" may be returned if the command cannot be passed to the SIM, e.g. if the SIM is not inserted. Failures to execute the command on the SIM will be reported by the [<sw1>](#) and [<sw2>](#) parameters.

Please beware of *possible changes to Elementary Files* by the network at any time, refer Chapter 13., [SIM related Commands](#).

#### Syntax

Test Command

AT+CRSM=?

Response(s)

OK

Write Command

AT+CRSM=[<command>](#)[, [<fileID>](#)[, [<P1>](#), [<P2>](#), [<P3>](#)[, [<data>](#)][, [<pathId>](#)]]

Response(s)

+CRSM: [<sw1>](#),[<sw2>](#)[,[<response>](#)]

OK

ERROR

+CME ERROR: [<err>](#)

Reference(s)

3GPP TS 27.007, 3GPP TS 31.102,  
ETSI TS 102 221, GSM 11.11

PIN	MDM	APP	Last
-	+	+	-

#### Parameter Description

[<command>](#)<sup>(num)</sup>

SIM command number.

176

READ BINARY

178	READ RECORD
192	GET RESPONSE
214	UPDATE BINARY
220	UPDATE RECORD
242	STATUS

**<fileID><sup>(num)</sup>**

Identifier for an elementary data file on SIM, if used by [<command>](#).

**<P1><sup>(num)</sup>**

Parameter to be passed on by the HC25 to the SIM.

0...255

**<P2><sup>(num)</sup>**

Parameter to be passed on by the HC25 to the SIM.

0...255

**<P3><sup>(num)</sup>**

Parameter to be passed on by the HC25 to the SIM.

0...255

**<data><sup>(str)</sup>**

Information which shall be written to the SIM (hexadecimal character format).

**<pathId><sup>(str)</sup>**

Contains the directory path of an elementary file on a UICC in hexadecimal format (e.g. "7F105F50").

Up to 3 Dedicated Files (DFs) can be listed.

The [<pathId>](#) parameter is applicable only to UICCs.

Some types of UICCs may have Dedicated Files which are not unique, because the same FileID is allocated to several applications on the UICC and this way used twice or even more times. Therefore, to access UICC files of SIM applications please use the optional parameter [<pathId>](#). UICC files of USIM applications are accessible without any need for the [<pathId>](#) parameter.

**<sw1><sup>(num)</sup>**

Status information from the SIM about the execution of the actual command. It is returned in both cases, on successful or failed execution of the command.

0...255

**<sw2><sup>(num)</sup>**

Status information from the SIM about the execution of the actual command. It is returned in both cases, on successful or failed execution of the command.

0...255

---

`<response>`<sup>(str)</sup>

Response data in case of a successful completion of the previously issued command.  
"STATUS" and "GET RESPONSE" commands return data, which gives information about the currently selected elementary data field. This information includes the type of file and its size.  
After "READ BINARY" or "READ RECORD" commands the requested data will be returned.  
`<response>` is empty after "UPDATE BINARY" or "UPDATE RECORD" commands.

## 13.2 AT+CSIM Generic SIM Access

[AT+CSIM](#) allows direct control of the SIM.

Compared to Restricted SIM Access command [AT+CRSM](#), the definition of [AT+CSIM](#) allows the ME to take more control over the SIM interface.

However, the SIM Application Toolkit functionality is not supported by [AT+CSIM](#). Therefore the following SIM commands cannot be used: TERMINAL PROFILE, ENVELOPE, FETCH and TEMINAL RESPONSE.

### Syntax

Test Command

AT+CSIM=?

Response(s)

OK

Write Command

AT+CSIM=<length>, <command>

Response(s)

+CSIM: <length>,<response>

OK

ERROR

+CME ERROR: <err>

Reference(s)

3GPP TS 27.007, 3GPP TS 31.102,  
ETSI TS 102 221, GSM 11.11

PIN

MDM

APP

Last

-

+

+

-

### Parameter Description

<length><sup>(num)</sup>

Length of <command> or <response> string.

<command><sup>(str)</sup>

Command passed on by the ME to the SIM.  
Parameter length: maximum 260 Bytes.

<response><sup>(str)</sup>

Response data of the command returned by the SIM.  
Parameter length: maximum 257 Bytes.

### Example

The following examples explain how to use [AT+CSIM](#).

AT+CSIM=14, "A0A40000027F10"

+CSIM: 4, "9F19"

OK

AT+CSIM=14, "A0A40000026F3A"

+CSIM: 4, "9F0F"

OK

AT+CSIM=16, "A0C000000F000000"

Select DF-Telecom

Command successful, length '19' of the response data

Select EF-ADN (Abbreviated dialling numbers)

Command successful, length '0F' of the response data

Get Response

---

```
+CSIM: 34,"000002306F3A040011F0220102011C9000"  
OK
```



<SimStatus><sup>(num)</sup>

0	SIM connection error
1	SIM inserted (refer to note)

<MCC><sup>(num)</sup>

The MCC (Mobile Country Code) of a SIM that is not supported by HC25.

#### Notes

- <SimStatus> reflects the status of the SIM and the card holder tray.
- <MCC> specifies the MCC (Mobile Country Code) of a SIM that is not supported by HC25.

#### Example

AT^SCKS=1	Activates the presentation of unsolicited result code ^SCKS
OK	

Now, after removing a card tray the following URCs appear:

^SCKS: 0	No SIM card found
----------	-------------------

## 14. SIM Application Toolkit (SAT) Commands

This chapter offers a brief reference to AT commands and responses related to the HC25's SIM Application Toolkit (SAT) implementation. A consistent and detailed description can be found in the "Remote-SAT User's Guide" [4]. For further advice contact the Application Engineering Department at Cinterion Wireless Modules GmbH.

ETSI specification GSM 11.14 [27] defines SAT and 3GPP TS 31.111 [28] defines USAT in detail.

SIM Application Toolkit (SAT) is a technology that allows an application running on the SIM/UICC to control the Mobile Equipment (ME). Remote-SAT (RSAT) provides a link between applications located on the SIM/UICC and a customer application (TA). The purpose of RSAT is to allow the TA to send AT commands to the SAT interface and to display all SAT activities on the user interface of the customer application.

Two groups of commands are exchanged between the SAT located on the HC25 and the SIM Application running on the SIM/UICC:

- Proactive commands are sent from the SIM application to the HC25's SAT, such as "DISPLAY TEXT".
- Envelope commands are sent from the HC25's SAT to the SIM application, such as "MENU SELECTION".

### 14.1 AT^SSTA SAT Interface Activation

The `AT^SSTA` write command can be used to specify the Remote-SAT activation mode `<mode>` and, if Explicit Response mode is enabled, to explicitly activate the Remote SAT interface. Removing and inserting the SIM does not affect the activation status.

SAT commands which are not using the AT interface (non MMI related SAT commands, e.g. PROVIDE LOCAL INFORMATION) are executed without activating Remote-SAT.

The read command can be used to request the current operating status and the used alphabet of the Remote-SAT interface.

#### Syntax

##### Test Command

`AT^SSTA=?`

Response(s)

`^SSTA: (list of supported <state>s), (list of supported <Alphabet>s)`

OK

##### Read Command

`AT^SSTA?`

Response(s)

`^SSTA: <state>, <Alphabet>, <allowedInstance>, <SatProfile>, <userTOut>, <AppMode>`

OK

##### Write Command

`AT^SSTA=<mode>[, <Alphabet>]`

Response(s)

OK

Reference(s)

--

PIN

MDM

APP

Last

-

+

+

-

## Parameter Description

**<state><sup>(num)</sup>**

HC25 Remote-SAT interface states

0	RESET
1	OFF
2	IDLE
3	PAC
4	WAIT

**<Alphabet><sup>(num)</sup>**

Parameter is stored non-volatile and takes effect after next restart of the ME.

0 <sup>(D)</sup>	GSM character set Input of a character requests one byte, e.g. "Y".
1	UCS2 To display the 16 bit value of characters represented in UCS2 alphabet a 4 byte string is required, e.g. "0059" is coding the character "Y". For details please refer to ISO/IEC 10646.

**<allowedInstance><sup>(num)</sup>**

0	Not applicable
1	SAT may be started on this instance via the write version of this command.

**<SatProfile><sup>(str)</sup>**

SAT profile according to GSM 11.14 [\[27\]](#) or USAT profile according to 3GPP TS 31.111 [\[28\]](#)  
The profile tells the SIM Application which features (e.g. proactive commands) are supported by the SIM Application Toolkit implementation of the HC25.  
There are different profiles available for 2G and 3G SIM applications. The returned profile depends of the possibilities of the used SIM card.  
In case of no SIM is inserted, the GSM profile will be returned for compatibility reasons to older products until SIM is inserted!

**<userTOut><sup>(str)</sup>**

User timeout in seconds.  
To limit the time Remote-SAT is kept in states PAC or WAIT, any ongoing (but unanswered) proactive command will be aborted automatically after 5 minutes. In this case, the terminal response is either "ME currently unable to process command", or if applicable, "No response from user". In addition a URC "Terminate Proactive Command" will be sent to the external application. This value shall not be changed by the TA.

**<AppMode><sup>(str)</sup>**

Mode of SIM Application.  
This paramter shows which kind of SIM application is running currently.

"1"	2G Application (GSM SAT)
"2"	3G Application (USAT)

<mode><sup>(num)</sup>

Select Remote SAT activation mode.

Parameter is stored non-volatile and takes effect after next restart of the ME. Removing and inserting the SIM does not affect the activation status.

0<sup>(D)</sup>

Automatic response (AR) mode.

All commands and responses are exchanged automatically between the ME and the SIM application. This eliminates the need to enter any Remote SAT AT commands incl. the [AT^SSTA](#) command.

If AR mode is enabled the ME enters the OFF state (<state>=1) after reboot.

1

Explicit response (ER) mode.

This mode is intended for use with an MMI. If ER mode is enabled the MMI is required to handle, via the module's Remote-SAT interface, all commands and responses transmitted to or from the SIM.

If ER mode is enabled the ME enters the IDLE state (<state>= 2) after reboot.

## 14.2 ^SSTN SAT Notification

### Unsolicited Result Codes

#### URC 1

Proactive Command notification

^SSTN: `<cmdType>`

Every time the SIM Application issues a Proactive Command, via the ME, the TA will receive a notification. This indicates the type of Proactive Command issued.

`AT^SSTGI` must then be used by the TA to request the parameters of the Proactive Command from the ME. Upon receiving the ^SSTGI response from the ME, the TA must send `AT^SSTR` to confirm the execution of the Proactive Command and provide any required user response, e.g. a selected menu item.

#### URC 2

Terminate Proactive Command notification

^SSTN: `<cmdTerminateValue>`

When the SIM application has issued a Proactive Command to the ME, it is possible that this command will be terminated later. URC "`^SSTN`" is sent with a different Proactive Command type number (added terminate offset 100) to indicate the termination of the specified command.

The state changes to idle. Therefore the TA should avoid sending any further commands related to the terminated Proactive Command, e.g. `AT^SSTGI` or `AT^SSTR`.

#### URC 3

Notification that SIM Application has returned to main menu

^SSTN: 254

Notification to the TA when the SIM Application has finished a command cycle and again enters its main menu, which was transferred with an URC "`^SSTN: 37`" (SET UP MENU) at start up.

This URC should be used to open this menu on the screen.

The TA does not need to respond directly, i.e. `AT^SSTR` is not required.

#### URC 4

SIM reset notification

^SSTN: 255

Notification to the TA if a Proactive Command "REFRESH - SIM Reset" has been issued by the SIM Application, please refer to `AT^SSTGI`.

This URC should be used to set the TAs application to its initial state since the SIM Application will start from the beginning, too.

The TA does not need to respond directly, i.e. related `AT^SSTGI` and `AT^SSTR` are neither required nor allowed.

Since the ME is still busy on SIM access the ME may respond with "+CME ERROR: SIM blocked" or "+CME ERROR: SIM busy" on following PIN required AT Commands for a while. Then TA shall retry until the ME responds with "OK". The time needed for this process depends on the SIM and may take more than 10 seconds.

### Parameter Description

`<cmdType>`<sup>(num)</sup>

Proactive Command number

`<cmdTerminateValue>`<sup>(num)</sup>

Defined as `<cmdType>` + terminate offset. The terminate offset equals 100.

## 14.3 AT^SSTGI SAT Get Information

Regularly this command is used upon receipt of an URC "[^SSTN](#)" to request the parameters of the Proactive Command.

Then the TA is expected to acknowledge the [AT^SSTGI](#) response with [AT^SSTR](#) to confirm that the Proactive Command has been executed. [AT^SSTR](#) will also provide any user information, e.g. a selected menu item. The Proactive Command type value specifies to which "[^SSTN](#)" the command is related.

### Syntax

Test Command				
AT^SSTGI=?				
Response(s)				
<a href="#">^SSTGI</a> : (list of supported <a href="#">&lt;state&gt;s</a> ), (list of supported <a href="#">&lt;cmdType&gt;s</a> )				
OK				
Read Command				
AT^SSTGI?				
Response(s)				
<a href="#">^SSTGI</a> : <a href="#">&lt;state&gt;</a> , <a href="#">&lt;cmdType&gt;</a>				
OK				
Write Command				
AT^SSTGI= <a href="#">&lt;cmdType&gt;</a>				
Response(s)				
OK				
ERROR				
+CME ERROR: <a href="#">&lt;err&gt;</a>				
Reference(s)	PIN	MDM	APP	Last
--	-	+	+	-

### Parameter Description

<a href="#">&lt;state&gt;</a> <sup>(num)</sup>	
HC25 Remote-SAT interface states	
0	RESET
1	OFF
2	IDLE
3	PAC
4	WAIT
<a href="#">&lt;cmdType&gt;</a> <sup>(num)</sup>	
Related Proactive Command	

## 14.4 AT^SSTR SAT Response

The TA is expected to acknowledge the [AT^SSTGI](#) response with [AT^SSTR](#) to confirm that the Proactive Command has been executed. [AT^SSTR](#) will also provide any user information, e.g. a selected menu item.

### Syntax

Test Command				
AT^SSTR=?				
Response(s)				
^SSTR: (list of supported <state>s), (list of supported <cmdType>s)				
OK				
Read Command				
AT^SSTR?				
Response(s)				
^SSTR: <state>, <cmdType>				
OK				
Write Command				
AT^SSTR=<cmdType>, <status>[, <inputNumber>][, <inputString>]				
Response(s)				
OK				
Reference(s)				
--	PIN	MDM	APP	Last
	-	+	+	-

### Parameter Description

<state> <sup>(num)</sup>	
HC25 Remote-SAT interface states	
0	RESET
1	OFF
2	IDLE
3	PAC
4	WAIT
<cmdType> <sup>(num)</sup>	
Number related to Proactive Command or event type according to GSM 11.14 <a href="#">[27]</a> .	
<status> <sup>(num)</sup>	
Command status return regarding the type of action that has taken place, e.g. action performed by the user. Values are in accordance with GSM 11.14 <a href="#">[27]</a> .	
<inputNumber> <sup>(num)</sup>	
Response number entered by user	
<inputString> <sup>(str)</sup>	
Response string entered by user	

## 15. Phonebook Commands

The AT commands described in this chapter allow the external application to access the phonebooks located in the HC25's memory or on the attached Subscriber Identity Module (SIM).

### 15.1 AT+CNUM Read own numbers

[AT+CNUM](#) returns the subscribers own number(s) from the SIM.

#### Syntax

Test Command				
AT+CNUM=?				
Response(s)				
OK				
Exec Command				
AT+CNUM				
Response(s)				
[+CNUM: [ <a href="#">&lt;alpha&gt;</a> ], <a href="#">&lt;number&gt;</a> , <a href="#">&lt;type&gt;</a> ]				
[+CNUM: ... ]				
OK				
ERROR				
+CME ERROR: <a href="#">&lt;err&gt;</a>				
Reference(s)	PIN	MDM	APP	Last
GSM 07.07	+	+	+	-

#### Parameter Description

[<alpha>](#)<sup>(str)</sup>

Optional alphanumeric string associated with [<number>](#).

[<number>](#)<sup>(str)</sup>

Phone number in format specified by [<type>](#).

[<type>](#)<sup>(str)</sup>

Type of address octet, see also: [AT+CPBR <type>](#).

#### Notes

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned. See Section 20.1, [Restricted access to SIM data after SIM PIN authentication](#) for further detail.
- For alphanumeric representation the number stored in the phonebook must be identical to the number transported over the network - then the associated name will be recognized.

## 15.2 AT+CPBF Find phonebook entries

The **AT+CPBF** write command returns phonebook entries (from the current phonebook memory storage selected with **AT+CPBS**) which alphanumeric field start with string **<findtext>**.

Entry fields returned are location number **<location>**, phone number stored there **<number>** (of format **<type>**) and text **<text>** associated with the number.

The **AT+CPBF** test command returns the maximum lengths of **<nlength>** and **<tlength>** fields.

### Syntax

Test Command			
AT+CPBF=?			
Response(s)			
+CPBF: <nlength>, <tlength>			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT+CPBF=<findtext>			
Response(s)			
+CPBF: <location>, <number>, <type>, <text>			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP Last
--	+	+	+

### Parameter Description

**<location>**<sup>(num)</sup>

The location number in the range of location numbers of phonebook memory.

**<number>**<sup>(str)</sup>

Phone number in format specified by **<type>**, it may be an empty string.

**<type>**<sup>(num)</sup>

Type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi). Please consider that for types other than 129 or 145 dialing from phonebook with **ATD<mem><n>** is, depending on the network, not always possible (refer to GSM 04.08 subclause 10.5.4.7 for details). See also **<type>** of **AT+CPBW**.

Possible values are:

128	Restricted <b>&lt;number&gt;</b> includes unknown type and format.
145	Dialing string <b>&lt;number&gt;</b> includes international access code character '+'. National number. Network support of this type is optional.
161	National number. Network support of this type is optional.
177	Network specific number, ISDN format.
209	Dialing string <b>&lt;number&gt;</b> has been saved as ASCII string and includes non-digit characters other than "*", "#" or "+". Note that phonebook entries saved with this type cannot be dialed.

255                      Dialing string [<number>](#) is a command to control a Supplementary Service, i.e. "\*", "#" codes are contained. Network support of this type is optional.

129                      Otherwise.

[<text>](#)<sup>(str)(+CSCS)</sup>

Text assigned to a phone number. The maximum length for this parameter is given with test command response parameter [<tlength>](#).

If using an ASCII terminal characters which are coded differently in ASCII and GSM have to be entered via escape sequences as described in Section 1.6, [Supported character sets](#).

[<findtext>](#)<sup>(str)(+CSCS)</sup>

String for finding the [<text>](#) in the active phonebook.

[<nlength>](#)<sup>(num)</sup>

Maximum length of phone number for "normal" locations. Depending on the storage a limited number of locations with extended memory is available per phonebook. These locations allow storing numbers with twice the standard length, which is 2\*[<nlength>](#) digits for normal numbers, but only [<nlength>](#) digits for numbers saved with [<type>](#)=209.

[<tlength>](#)<sup>(num)</sup>

Maximum length of [<text>](#) assigned to the telephone number. The value indicated by the test command is given in octets. If [<text>](#) is given as GSM characters each character corresponds to one octet. If the [<text>](#) string is given in UCS2, the maximum number of characters depends on the coding scheme used for the alpha field of the SIM according to GSM 11.11, Annex B [24]. In the worst case the number of UCS2 characters is at least one less than half the number of GSM characters.

## Notes

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned. See Section 20.1, [Restricted access to SIM data after SIM PIN authentication](#) for further detail.
- The search in the dialled calls (DC) phonebook is not supported.

#### Example

```
AT+CPBF=?
```

```
+CPBF: 40,16
```

```
AT+CPBF="cha"
```

```
+CPBF:1,"+999999",145,"Charlie"
```

First run the [AT+CPBF](#) test command to find out the lengths of [<nlength>](#) and [<tlength>](#) in the active phonebook.

HC25 returns the supported values, where 40 is the maximum length of the phone number and 16 is the maximum length of the associated text.

Then use the [AT+CPBF](#) write command to find any text string in the phonebook.

## 15.3 AT+CPBR Read from phonebook

AT+CPBR serves to read one or more entries from the phonebook selected with AT command AT+CPBS.

The AT+CPBR test command returns the location range supported by the current phonebook storage, the maximum length of <number> field and the maximum length of <text> field.

Note: Length information may not be available while SIM storage is selected. If storage does not offer format information, the format list contains empty parentheses.

The AT+CPBR write command determines the phonebook entry to be displayed with <location1> or a location range from <location1> to <location2>. Hence, if no <location2> is given only the entry at <location1> will be displayed.

If no entries are found at the selected location "+CME ERROR: not found" will be returned.

### Syntax

Test Command			
AT+CPBR=?			
Response(s)			
+CPBR: (1-<maxloc>), <nlength>, <tlength>			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT+CPBR=<location1>[, <location2>]			
Response(s)			
[+CPBR: <location1>, <number>, <type>, <text>]			
[+CPBR: <location2>, <number>, <type>, <text>]			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.07, GSM 11.11	+	+	+
			Last
			-

### Parameter Description

<location1><sup>(num)</sup>

The first (lowest) location number within phonebook memory where to start reading. The maximum range supported by the current phonebook is given in the test command response.

If <location1> exceeds the upper bound <maxloc> (as indicated by the test command), command will respond with "+CME ERROR: invalid index".

<location2><sup>(num)</sup>

The last (highest) location number within phonebook memory where to stop reading. The maximum range supported by the current phonebook is given in the test command response.

If both <location1> and <location2> are in the range indicated by the test command parameter <max-loc>, the list of entries will be output and terminated with "OK".

If <location2> exceeds the range indicated by the test command parameter <maxloc>, no list of entries will be shown and the output is terminated with "+CME ERROR: invalid index".

<number><sup>(str)</sup>

Phone number in format specified by <type>, it may be an empty string.

`<type>(num)`

Type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi). Please consider that for types other than 129 or 145 dialing from phonebook with `ATD<mem><n>` is, depending on the network, not always possible (refer to GSM 04.08 subclause 10.5.4.7 for details). See also `<type>` of [AT+CPBW](#).

Possible values are:

128	Restricted <code>&lt;number&gt;</code> includes unknown type and format.
145	Dialing string <code>&lt;number&gt;</code> includes international access code character '+'. National number. Network support of this type is optional.
161	Network specific number, ISDN format.
177	Dialing string <code>&lt;number&gt;</code> has been saved as ASCII string and includes non-digit characters other than "*", "#" or "+". Note that phonebook entries saved with this type cannot be dialed.
209	Dialing string <code>&lt;number&gt;</code> is a command to control a Supplementary Service, i.e. "*", "#" codes are contained. Network support of this type is optional.
255	Otherwise.
129	

`<text>(str)(+CSCS)`

Text assigned to a phone number. The maximum length for this parameter is given with test command response parameter `<tlength>`.

If using an ASCII terminal characters which are coded differently in ASCII and GSM have to be entered via escape sequences as described in Section 1.6, [Supported character sets](#).

`<maxloc>(num)`

Maximum location number for the currently selected storage. For phonebooks located on the SIM this value depends on the SIM card type.

`<nlength>(num)`

Maximum length of phone number for "normal" locations. Depending on the storage a limited number of locations with extended memory is available per phonebook. These locations allow storing numbers with twice the standard length, which is  $2 \times \text{<nlength>}$  digits for normal numbers, but only `<nlength>` digits for numbers saved with `<type>=209`.

`<tlength>(num)`

Maximum length of `<text>` assigned to the telephone number. The value indicated by the test command is given in octets. If `<text>` is given as GSM characters each character corresponds to one octet. If the `<text>` string is given in UCS2, the maximum number of characters depends on the coding scheme used for the alpha field of the SIM according to GSM 11.11, Annex B [24]. In the worst case the number of UCS2 characters is at least one less than half the number of GSM characters.

## Notes

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned. See Section 20.1, [Restricted access to SIM data after SIM PIN authentication](#) for further detail.
- When storing a supplementary service command to the phonebook along with a "+" within the phone number please note that the ME will not display the "+" after restart, but correctly handles the phone number as international type.
- When emergency number ("EN") phonebook is selected by `AT+CPBS` write command the numbers 911 and 112 must always be output by using `AT+CPBR` write command. For more details about emergency numbers see notes in `ATD` dial command.

#### Example

```
AT+CPBR=?
```

```
+CPBR: (1-100),20,17
```

```
AT+CPBR =1,3
```

```
+CPBR:1,"+999999",145,"Charlie"
```

```
+CPBR:2,"+777777",145,"Bill"
```

```
+CPBR:3,"+888888",145,"Arthur"
```

First run the [AT+CPBR](#) test command to find out the maximum range of entries stored in the active phonebook.

HC25 returns the supported values, where 100 is the supported range of location numbers, 20 is the length of the phone number and 17 is the maximum length of the associated text.

Then use the [AT+CPBR](#) write command to display the phonebook entries sorted by location numbers.

## 15.4 AT+CPBS Select phonebook memory storage

**AT+CPBS** selects the active phonebook storage, i.e. the phonebook storage that all subsequent phonebook commands will be operating on.

The read command returns the currently selected **<storage>**, the number of **<used>** entries and the **<total>** number of entries available for this storage. The test command returns all supported **<storage>**s as compound value.

### Syntax

#### Test Command

AT+CPBS=?

Response(s)

+CPBS: (list of supported **<storage>**s)

OK

ERROR

+CME ERROR: **<err>**

#### Read Command

AT+CPBS?

Response(s)

+CPBS: **<storage>**, **<used>**, **<total>**

OK

ERROR

+CME ERROR: **<err>**

#### Exec Command

All records of the "MC", "RC", "DC" and "LD" phonebooks will be deleted.

AT+CPBS

Response(s)

OK

ERROR

+CME ERROR: **<err>**

#### Write Command

AT+CPBS=**<storage>**

Response(s)

OK

ERROR

+CME ERROR: **<err>**

#### Write Command

For write access to FD phonebook

AT+CPBS=**<storage>**, **<pin>**

Response(s)

OK

ERROR

+CME ERROR: **<err>**

Reference(s)

GSM07.07

PIN	MDM	APP	Last
+	+	+	-

## Parameter Description

<storage><sup>(str)</sup>

"SM" <sup>(&amp;F)</sup>	SIM phonebook Capacity: depending on SIM card Location: SIM
"DC"	Dialled calls list Capacity: max. 10 entries Location: ME <a href="#">AT+CPBW</a> command is not applicable to this storage.
"FD"	Fixed dialing phonebook Capacity: depending on SIM card Location: SIM
"LD"	Last number dialed phonebook. Stores all call numbers dialed with ATD. Capacity: max. 10 entries, depending on SIM Location: SIM <a href="#">AT+CPBW</a> command is not applicable to this storage.
"MC"	Missed (unanswered received) calls list Capacity: max. 10 entries Location: ME <a href="#">AT+CPBW</a> command is not applicable to this storage.
"ME"	Mobile Equipment Phonebook Capacity: max. 250 entries Location: ME
"RC"	Received calls list Capacity: max. 10 entries Location: ME <a href="#">AT+CPBW</a> command is not applicable to this storage.
"EN"	Emergency number Capacity: max. 50 entries Location: SIM or ME <a href="#">AT+CPBW</a> command is not applicable to this storage.
"ON"	MSISDN list Capacity: depending on SIM card Location: SIM
"VM"	CPHS voice mailbox phonebook Capacity: 1 or 2 entries, depending on SIM card 1 - Line 1 mailbox 2 - Line 2 mailbox Location: SIM

<used><sup>(num)</sup>

Value indicating the number of used locations in selected memory storage.

<total><sup>(num)</sup>

Value indicating the maximum number of locations allowed in the selected memory storage.

## Notes

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned. See Section 20.1, [Restricted access to SIM data after SIM PIN authentication](#) for further detail.
- To get write access to the "FD" phonebook the following input is required: AT+CPBS="FD","PIN2"
- When using "EN" phonebook the numbers 911 and 112 must always be output by using [AT+CPBR](#) write command. For more details about emergency numbers see notes in [ATD](#) dial command.

## 15.5 AT+CPBW Write into phonebook

The **AT+CPBW** write command can be used to create, edit and delete a phonebook entry at a **<location>** of the active storage selected with **AT+CPBS**.

If **<storage>="FD"** (SIM fixed dialing numbers) is selected, PIN2 authentication has to be performed prior to any write access.

The **AT+CPBW** test command returns the location range supported by the current storage, the maximum length of the **<number>** field, the range of supported **<type>** values and the maximum length of the **<text>** field. Note: The length may not be available while SIM storage is selected. If storage does not offer format information, the format list contains empty parentheses.

### Syntax

Test Command			
AT+CPBW=?			
Response(s)			
+CPBW: (1-<maxloc>), <nlength>, (list of supported <type>s), <tlength>			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT+CPBW=[<location>][, <number>[, <type>[, <text>]]]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.07, GSM 04.08	+	+	+
			Last
			-

### Parameter Description

**<location>**<sup>(num)</sup>

Location number within phonebook memory. The maximum range supported by each storage type is indicated in the test command response. If **<location>** is not given, the first free entry will be used.

If **<location>** is given as the only parameter, the phonebook entry specified by **<location>** is deleted.

**<number>**<sup>(str)</sup>

Phone number in format specified by **<type>**. Parameter must be present, although it may be an empty string. Alphabetic characters are not permitted. **<number>** may contain dialstring modifiers "\*", "#" or "+".

If other printable non-alphabetic characters are used the entry needs to be saved with **<type>=209**. Otherwise, if **<type>=209** is not used any non-digit characters other than "\*", "#" or "+" will be removed from the string and only accepted modifiers from the GSM alphabet will be saved.

A **<number>** saved with **<type>=209** requires double memory. In order to fit into a standard location, the number needs to be reduced to a maximum length of **<nlength>/2**, including all digits and dial string modifiers. Extended locations may be used as stated below for **<nlength>**.

**<type><sup>(num)</sup>**

Type of address octet, which defines the used type of number (ton) and the numbering plan identification (npi). Please consider that for types other than 129 or 145 dialing from phonebook with **ATD<mem><n>** is, depending on the network, not always possible (refer GSM 04.08 subclause 10.5.4.7 for details).

If **<type>** is not specified the unknown **<type>=129** is used. If **<number>** contains a leading "+" **<type>=145** (international) is used.

Supported values are:

128	Restricted <b>&lt;number&gt;</b> includes unknown type and format.
145	Dialing string <b>&lt;number&gt;</b> includes international access code character "+".
161	National number. The network support for this type is optional.
209	Dialing string <b>&lt;number&gt;</b> will be saved as ASCII string. This is the default value, if <b>&lt;type&gt;</b> is not specified explicitly and characters other than "*", "#" or "+" are included in <b>&lt;number&gt;</b> . Note that phonebook entries saved with this type cannot be dialed.
255	Dialing string <b>&lt;number&gt;</b> is a command to control a Supplementary Service, i.e. "*", "#" codes are contained. Network support of this type is optional.
129	Unknown number. If <b>&lt;type&gt;</b> is unknown and the <b>&lt;number&gt;</b> contains a leading "+", then this sign is removed.

**<text><sup>(str)(+CSCS)</sup>**

Text assigned to the phone number. The maximum length of this parameter is given in the test command response **<tlength>**. When using an ASCII terminal, characters which are coded differently in ASCII and GSM have to be entered via escape sequences as described in Section 1.6, [Supported character sets](#).

**<maxloc><sup>(num)</sup>**

Maximum number of locations supported by the currently selected storage. For phonebooks located on SIM, this value varies depending on the SIM card. See [AT+CPBS](#) for typical values.

**<nlength><sup>(num)</sup>**

Maximum length of phone number for "normal" locations. Depending on the storage, a limited number of locations with extended memory is available per phonebook. These locations allow storing numbers with twice the standard length, which is 2\***<nlength>** digits for normal numbers, but only **<nlength>** digits for numbers saved with parameter **<type>= 209**. If all extended locations of the selected phonebook are used up, then any attempt to write a number which requires extended memory will be denied with "+CME ERROR: memory full".

**<tlength><sup>(num)</sup>**

Maximum length of **<text>** assigned to the telephone number. The value indicated by the test command is given in octets. If the **<text>** string is given in GSM characters, each character corresponds to one octet. If the **<text>** string is given in UCS2, the maximum number of characters depends on the coding scheme used for the alpha field of the SIM. In the worst case the number of UCS2 characters is at least one less than half the number of GSM characters.

For a detailed description please refer to GSM 11.11, Annex B [\[24\]](#).

## Notes

- Users should be aware that when using this AT command quickly after SIM PIN authentication the SIM data may not yet be accessible, resulting in a short delay before the requested AT command response is returned. See Section 20.1, [Restricted access to SIM data after SIM PIN authentication](#) for further detail.
- See for more details [AT+CPBS](#) select command which phonebook **<storage>** is possible to write by the user.

## Examples

### EXAMPLE 1

Make a new phonebook entry at the first free location

```
AT+CPBW=,"+431234567",145,"international"
```

### EXAMPLE 2

Delete entry at location 1

```
AT+CPBW=1
```

### EXAMPLE 3

The following examples are provided to illustrate the effect of writing phonebook entries with different types of dial string modifiers in [<number>](#)

```
AT+CPBW=5,"12345678",,"Arthur"  
AT+CPBW=6,"432!+-765()&54*654#",,"John"  
AT+CPBW=7,"432!+-765()&54*654#",129,"Eve"  
AT+CPBW=8,"432!+-765()&54*654#",145,"Tom"  
AT+CPBW=9,"432!+-765()&54*654#",209,"Richard"
```

### EXAMPLE 4

Read phonebook entries from locations 5 - 9 via [AT+CPBR](#)

```
+CPBR:5,"12345678",129,"Arthur"  
+CPBR:6,"432!+-765()&54*654#",209,"John"  
+CPBR:7,"432+76554*654#",129,"Eve"  
+CPBR:8,"+432+76554*654#",145,"Tom"  
+CPBR:9,"432!+-765()&54*654#",209,"Richard"
```

## 16. GPS Commands

### 16.1 AT^SGPSS GPS Switch

The [AT^SGPSS](#) command can be used to turn on/off the GPS receiver, control the supply voltage of the GPS antenna and enable/disable NMEA output on the third Multiplexer channel.

Before activating NMEA output be sure that the ME operates in Multiplex mode. This is because the ME has a dedicated NMEA port which is the third Multiplex channel. For details on Multiplex mode please refer to the [AT+CMUX](#) command and [3]. Keep in mind that if Multiplex mode is active the Modem interface is mapped to the first Multiplex channel and the Application interface to the second Multiplex channel. GPS related AT commands can be executed either on the first or second Multiplex channel, but we recommend to use the second channel (the Application interface). The third Multiplex channel does not accept any AT commands.

The ME may be connected to an active or passive GPS antenna. Active GPS antennas need an extra power supply. Therefore, take care to use the appropriate [<state>](#) value for starting and stopping NMEA output. Details on how to connect and handle active or passive antennas can be found in [2].

#### Syntax

Test Command

AT^SGPSS=?

Response(s)

^SGPSS: (list of supported [<state>s](#))

Read Command

AT^SGPSS?

Response(s)

^SGPSS: [<state>](#)

Write Command

AT^SGPSS=[<state>](#)

Response(s)

OK

ERROR

+CME ERROR: [<err>](#)

PIN	MDM	APP	Last
-	+	+	-

#### Parameter Description

[<state>](#)<sup>(num)</sup>

Turning on/off GPS receiver, antenna voltage supply, NMEA output

0	GPS receiver off, antenna voltage supply off.
1	For passive GPS antennas only: GPS receiver on, NMEA output off, antenna voltage supply off (GPS IDLE mode).
2	For passive GPS antennas only: GPS receiver on, NMEA output on, antenna voltage supply off.

- 
- |   |                                                                                                               |
|---|---------------------------------------------------------------------------------------------------------------|
| 3 | For active GPS antennas only:<br>GPS receiver on, NMEA output off, antenna voltage supply on (GPS IDLE mode). |
| 4 | For active GPS antennas only:<br>GPS receiver on, NMEA output on, antenna voltage supply on.                  |

**Note**

- After getting the first position fix the GPS receiver will start to output NMEA data at the rate specified with the parameter `<NmeaFrequency>` of the `AT^SGPSC` command. Before that, without a position fix, empty NMEA data will be output every second.

After startup, the GPS receiver will try to load the GPGAA and GPGSA data of all satellites in view and calculate a position fix when at least 2 satellites (2D fix) or 3 satellites (3D fix) are found. For each satellite identified with GPGAA and GPGSA the GPS receiver will start to load the related Ephemeris and Almanach data. Therefore, it is possible that, after startup, Ephemeris and Almanach data for a specific satellite are accessible some time after the satellite's GPGAA and GPGSA data. Applications which require position fix, Ephemeris and Almanach data all at the same time, for example to display a large map, are required to wait until the GPS receiver has completed loading all data.

## 16.2 AT^SGPSC GPS Configuration

**AT^SGPSC** is a configuration command that can be used to set GPS parameters.

### Syntax

Test Command

AT^SGPSC=?

Response(s)

OK

Read Command

AT^SGPSC?

Response(s)

^SGPSC: EmrgServicesPrio, <prio>

^SGPSC: NMEAFrequency, <NmeaFrequency>

Write Command

Setting behavior of the mobile within an emergency call.

AT^SGPSC="EmrgServicesPrio", <prio>

Response(s)

OK

ERROR

+CME ERROR: <err>

Write Command

Setting frequency of NMEA message output.

AT^SGPSC="NMEAFrequency", <NmeaFrequency>

Response(s)

OK

ERROR

+CME ERROR: <err>

PIN	MDM	APP	Last
-	+	+	-

### Parameter Description

<prio><sup>(num)</sup>

This parameter determines the behavior of the mobile during an emergency call.

1<sup>(D)</sup>

When an emergency call is detected any on-going positioning sessions are terminated and only Control Plane NI-RL position requests (Network Induced Location Requests) are accepted while the call is in progress.

<NmeaFrequency><sup>(num)</sup>

This parameter specifies the frequency of NMEA message output on the third Multiplex channel (in seconds). Changing the parameter requires that fix GPS position data is already available. Trying to change it before the first fix will be denied with "ERROR".

If a position fix is available the <NmeaFrequency> can be changed any time, regardless of the current <state> selected with AT^SGPSS. However, if at the time of reactivating the GPS receiver (AT^SGPSS=2 or 4) there is no position fix yet, then empty NMEA data will be output every second. After getting a position fix the GPS receiver will start to output NMEA messages at the given <NmeaFrequency>.

1<sup>(P)</sup>

Every second an NMEA message will to be output.

- 
- |    |                                                                                                                     |
|----|---------------------------------------------------------------------------------------------------------------------|
| 2  | Every two seconds an NMEA message will to be output.                                                                |
| >2 | Every n seconds an NMEA message will be output. The GPS receiver enters IDLE mode during the NMEA output intervals. |

**Note**

- Setting the GPS receiver into IDLE state is a trade-off between trying to save power and maintaining or getting a position fix. The longer the time set with `<NmeaFrequency>`, the more time will be required to get a position fix.

## 17. Audio Commands

The AT Commands described in this chapter are related to the HC25's audio interface.

### 17.1 ATL Set monitor speaker loudness

[ATL](#) is implemented for V.250ter compatibility reasons only, and has no effect.

#### Syntax

Exec Command				
ATL[<val>]				
Response(s)				
OK				
Reference(s)	PIN	MDM	APP	Last
V.250	+	+	+	-

#### Parameter Description

<val> <sup>(num)</sup>
------------------------

### 17.2 ATM Set monitor speaker mode

[ATM](#) is implemented for V.250ter compatibility reasons only, and has no effect.

#### Syntax

Exec Command				
ATM[<val>]				
Response(s)				
OK				
Reference(s)	PIN	MDM	APP	Last
V.250	+	+	+	-

#### Parameter Description

<val> <sup>(num)</sup>
------------------------

## 17.3 AT+CMUT Mute control

The [AT+CMUT](#) command mutes the microphone input. The command can be used in all audio modes (1 to 6) and during a voice call only. See [AT^SNFS](#) for more details on the various audio modes. During an active call, users should be aware that when they switch back and forth between different audio modes the value of [<mute>](#) does change.

### Syntax

Test Command			
AT+CMUT=?			
Response(s)			
+CMUT: (list of supported<mute>s)			
OK			
Read Command			
AT+CMUT?			
Response(s)			
+CMUT: <mute>			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT+CMUT=<mute>			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.07	-	+	+
			Last
			-

### Parameter Description

<mute> <sup>(num)</sup>	
0	Mute off
1	Mute on

### Note

- When a voice connection will be established or an other audio mode will be started by [AT^SNFS](#) command during an active voice call then mute will be switched off.

## 17.4 AT+VTS DTMF and tone generation

**AT+VTS** is intended to send ASCII characters which cause the Mobile Switching Center (MSC) to transmit DTMF tones to a remote subscriber. The command can only be used during active voice calls and offers the following variant:

- **AT+VTS=<dtmf>[,<duration>]** allows to send a single DTMF tone. The duration can be individually determined during the call.

### Syntax

Test Command			
AT+VTS=?			
Response(s)			
+VTS: (list of supported<dtmf>s), (list of supported<duration>s)			
OK			
Write Command			
AT+VTS=<dtmf>[, <duration>]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
GSM 07.07	-	+	+
			Last
			-

### Parameter Description

<dtmf><sup>(str)</sup>

ASCII character in the set 0...9,#,\*, A, B, C, D. The string must be enclosed in quotation marks ("...").

<duration><sup>(num)</sup>

Tone duration in 1/10 seconds with tolerance. If not specified the default value (300 ms) is used.

The minimum duration of DTMF signals is 300ms. DTMF tones below 300ms cannot be generated.

1...[3]...255

## 17.5 AT^SNFI Set microphone path parameters

**AT^SNFI** controls the microphone settings. Read and write parameters of this command are related to the current audio mode. The write command works only in audio modes 2 to 6 to configure with **AT^SNFS**. Audio mode 1 is write protected for **AT^SNFI**.

### Syntax

Test Command			
AT^SNFI=?			
Response(s)			
^SNFI: (list of supported <micAmp1>s), (list of supported <micAmp2>s), (list of supported <micTxVol>s)			
OK			
Read Command			
AT^SNFI?			
Response(s)			
^SNFI: <micAmp1>, <micAmp2>, <micTxVol>			
OK			
ERROR			
+CME ERROR: <err>			
Write Command			
AT^SNFI=<micAmp1>, <micAmp2>, <micTxVol>			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
--	-	+	+
			Last
			-

### Parameter Description

<micAmp1><sup>(num)</sup>

First analogue amplifier, 0 dB or +24 dB.

0 <sup>(D)</sup>	0 dB
1	24 dB

<micAmp2><sup>(num)</sup>

Second analogue amplifier, adjustable in 22 steps of 1.5 dB from -6 dB to +25.5 dB.  
(0 = -6 dB, 21 = +25.5 dB, 22 steps of 1.5 dB).

0...21

<micTxVol><sup>(num)</sup>

Multiplication factor for digital gain of uplink speech.

The digital gain has a valid range from -84 dB to +12 dB and can be calculated according to following formula:

Gain = 20 \* LOG( <micTxVol> / 16384 )

The value 16384 for <micTxVol> corresponds to unity gain and the value 0 to mute state.

0...65535

---

**Notes**

- CAUTION! When you adjust audio parameters avoid exceeding the maximum allowed level. Bear in mind that exposure to excessive levels of noise can cause physical damage to users!
- All audio parameters handled by [AT^SNFI](#) and [AT^SNFO](#) will be stored volatile for the current audio mode.

## 17.6 AT^SNFO Set audio output parameter (loudspeaker path)

**AT^SNFO** controls the audio output path amplification. The read and write parameters of this commands are related to the current audio mode configured by **AT^SNFS**. The write command works only in audio modes 2 to 6. Audio mode 1 is write protected for **AT^SNFO**.

### Syntax

Test Command

AT^SNFO=?

Response(s)

^SNFO: (list of supported <cdcRxGain>s) , (list of supported <rxVol>s) , (list of supported <stGain>s)

OK

Read Command

AT^SNFO?

Response(s)

^SNFO: <cdcRxGain>, <rxVol>, <stGain>

OK

ERROR

+CME ERROR: <err>

Write Command

AT^SNFO=<cdcRxGain>, <rxVol>, <stGain>

Response(s)

OK

ERROR

+CME ERROR: <err>

Reference(s)

--

PIN

-

MDM

+

APP

+

Last

-

### Parameter Description

<cdcRxGain><sup>(num)</sup>

<cdcRxGain> is basis for digital gain of downlink speech for the purpose of speaker or driver sensitivity adjustment. The digital gain has a valid range of resulting gain from -84 dB to +12 dB. The resulting gain has to be calculated according to following formula:

Gain = 20 \* LOG ( <cdcRxGain> / 16384 )

<cdcRxGain> value of 16384 corresponds to unity gain and the value 0 to mute state.

0...65535

<rxVol><sup>(num)</sup>

<rxVol> is the speaker volume gain control (digital gain).

There are 42 volume gain levels covering the range from -50 dB to +12 dB which are adjustable in steps of 1.5 dB (-50 dB means mute).

(0 = mute, 1 = -48 dB, 41 = +12 dB, 42 steps of 1.5 dB).

0...41

`<stGain>(num)`

Multiplication factor for digital gain of the loop-back from speech TX to speech RX path (side tone gain).  
The digital gain has a valid range from -96 dB to 0 dB and can be calculated according to following formula:

Gain = 20 \* LOG( `<stGain>` / 16384 ) - 12 dB

`<stGain>` value 16384 results in -12 dB of gain and the value 0 in side tone muting.

0...65535

### Notes

- CAUTION! When you adjust audio parameters avoid exceeding the maximum allowed level. Bear in mind that exposure to excessive levels of noise can cause physical damage to users!
- All audio parameters handled by `AT^SNFI` and `AT^SNFO` will be stored volatile for the current audio mode.

## 17.7 AT^SNFS Select audio hardware set

The [AT^SNFS](#) write command serves to set the audio mode required for the connected equipment. Each audio mode can be assigned to a specific interface.

The [AT^SNFS](#) read command delivers the last configured audio mode. When TTY/CTM mode is activated by [AT^SNFTTY](#) configured and delivered audio mode is invalid, because TTY/CTM mode is defined as an own internal audio mode.

### Syntax

Test Command
AT^SNFS=?
Response(s)
^SNFS: (list of supported <audMode>s)
OK
Read Command
AT^SNFS?
Response(s)
^SNFS: <audMode>
OK
ERROR
+CME ERROR: <err>
Write Command
AT^SNFS=<audMode>
Response(s)
OK
ERROR
+CME ERROR: <err>
Reference(s)
--
PIN
-
MDM
+
APP
+
Last
-

### Parameter Description

<audMode> <sup>(num)</sup>	
[1]	Audio mode 1: Standard mode optimized for the reference handset, that can be connected to the analog interface (see "HC25 Hardware Interface Description" for information on this handset). Note: The default parameters are determined for type approval and are not adjustable with AT commands.
2	Audio mode 2: Customer specific mode. This mode will be used for router applications.
3	Audio mode 3: Customer specific mode. This mode will be used for a user handset.
4	Audio mode 4: Customer specific mode. This mode will be used for a mono-headset.
5	Audio mode 5: Customer specific mode. This mode will be used for a speakerphone.
6	Audio mode 6: Customer specific mode. This mode will be used for a transparent application.

#### Notes

- Audio mode 1 will be active each time after module is powered up.
- The write command can be used during a voice call to switch back and forth between different modes. This allows the user, for example, to switch handsfree operation (speakerphone) on and off.
- After the sequence `AT^SNFTTY=1` has been invoked the `AT^SNFS` read command does still indicate the last active audio mode.
- Value returned by the `AT^SNFS` read command is however no more valid if HC25 is operating in TTY/CTM mode after invoking the `AT^SNFTTY=1` AT sequence.
- After switching back from TTY/CTM mode to the no-TTY/CTM mode the audio mode in use before activating TTY/CTM mode becomes back active.

## 17.8 AT^SNFTTY Signal TTY/CTM audio mode capability

HC25 offers an integrated implementation of CTM modem (Cellular Text Telephone Modems). The benefit of CTM is that text characters typed on a TTY device (Text Telephone Type-writer) can be transformed into special audio burst signals for reliable transmission via the existing speech channels of a cellular phone system. The internal CTM modem supports a baud rate of 45.45bps. An automatic recognition of TTY devices isn't supported. If CTM mode is activated, the ME will set the necessary bearer capability bit on outgoing (mobile originated) calls, and incoming calls with this bearer capability bit set are accepted. The TE needs to decode the special audio burst signals.

If CTM mode is disabled, the ME will clear the bearer capability bit on mobile originated calls, and incoming calls with the bearer capability bit set are rejected because the HC25 expects that CTM coded speech data cannot be decoded by the TE.

Designed to set the module's speech system into CTM mode, the [AT^SNFTTY](#) command allows a TTY device to be connected to the audio interfaces of HC25.

Related documents: Refer to the relevant standards, such as 3GPP TS 26.226 (ETSI TS 126 226) and 3GPP TS 26.231 (ETSI TS 126 231). 3GPP documentation can be retrieved, for example, from <http://www.3gpp.org/specs/specs.htm>. Application Note 22 "Using TTY/CTM equipment" supplies information needed to connect TTY/CTM equipment to the HC25.

Requirements for using TTY/CTM features:

- TTY/CTM functionality requires an own audio mode with all audio parameters set to their factory default. This will be reached by a specific internal audio mode for TTY/CTM activated with [AT^SNFTTY](#). When TTY/CTM mode is activated the audio mode indicated by the [AT^SNFS](#) read command is invalid.

### Syntax

Test Command

[AT^SNFTTY=?](#)

Response(s)

[^SNFTTY](#): (list of supported [<audioState>s](#))  
OK

Read Command

[AT^SNFTTY?](#)

Response(s)

[^SNFTTY](#): [<audioState>](#)  
OK  
ERROR  
+CME ERROR: [<err>](#)

Write Command

[AT^SNFTTY=<audioState>](#)

Response(s)

OK  
ERROR  
+CME ERROR: [<err>](#)

Reference(s)

--

PIN

MDM

APP

Last

-

+

+

-

### Parameter Description

[<audioState>](#)<sup>(num)</sup>

0<sup>(P)</sup>

Audio path is in normal speech mode.

1

Audio path is in TTY/CTM mode.

The [AT^SNFTTY=1](#) write command has to be set before dialing with [ATD](#).

## 17.9 AT^SRTC Ring tone configuration

The **AT^SRTC** test command returns a list of ranges for parameter **<event>**, **<number>** and **<volume>**.

The **AT^SRTC** read command returns the current ring tone configuration parameter ring tone melody **<number>** and ring tone volume **<volume>** for the incoming **<event>**s voice call, fax call and SMS.

The **AT^SRTC** write command allows to configure parameter ring tone melody **<number>** and ring tone volume **<volume>** for ring tone events **<event>** voice call, fax call and SMS.

The **AT^SRTC** execution command starts the ring tone test using current settings for fax calls. Please call **AT^SRTC** execution command again to stop ring tone test.

The settings can be changed no matter whether or not the ME is ringing. The selected parameters are saved in the volatile RAM memory and, thus, to select again after each Power Down.

### Syntax

#### Test Command

AT^SRTC=?

#### Response(s)

^SRTC: (list of supported **<event>**s) , (list of supported **<number>**s) , (list of supported **<volume>**s)  
OK

#### Read Command

AT^SRTC?

#### Response(s)

^SRTC: 0, **<number>**, **<volume>**  
^SRTC: 1, **<number>**, **<volume>**  
^SRTC: 2, **<number>**, **<volume>**  
OK  
ERROR  
+CME ERROR: **<err>**

#### Exec Command

AT^SRTC

#### Response(s)

OK  
ERROR  
+CME ERROR: **<err>**

#### Write Command

AT^SRTC=**<event>**, **<number>**, **<volume>**

#### Response(s)

OK  
ERROR  
+CME ERROR: **<err>**

#### Reference(s)

--

PIN	MDM	APP	Last
-	+	+	-

## Parameter Description

**<event><sup>(num)</sup>**

Ring tone melodies for incoming Voice calls, Fax calls or SMS messages are supported. Melody will be played from the audio output.

0	Ring alert for incoming Voice calls.
1	Ring alert for incoming Fax calls.
2	Ring alert for incoming SMS messages.

**<number><sup>(num)</sup>**

Type or number of ring tone melody. You have a choice of ring tone melody or mute. Ring tone melody will be played from the audio output. **<number>=0** is only intended for muting.

0 <sup>(D)</sup>	No ringing alert melody.
1	Melody #1 active.
2	Melody #2 active.
3	Melody #3 active.
4	Melody #4 active.
5	Melody #5 active.
6	Melody #6 active.
7	Melody #7 active.
8	Melody #8 active.
9	Melody #9 active.

**<volume><sup>(num)</sup>**

The volume of ring tone melodies varies from 0 dB to mute.

0 <sup>(D)</sup>	Mute.
1	Volume level 1, set to -12dB.
2	Volume level 2, set to -8dB.
3	Volume level 3, set to -4dB.
4	Volume level 4, set to 0dB.

## Note

- The ring tone factory setting are **AT^SRTC=0,0,0** (ring tones for incoming voice call is muted), **AT^SRTC=1,0,0** (ring tones for incoming fax call is muted) and **AT^SRTC=2,0,0** (ring tones for incoming SMS is muted). To activate ring tones please use the write command. After applying a firmware update or a new start of module please activate ring tone again because it is stored in the volatile memory. When the incoming fax call event was configured before with **<number>=0** it's possible to mute a running tone (for example during a incoming call) by calling of **AT^SRTC** execution command. Otherwise please call **AT^SRTC** execution command two times.

## 18. Hardware Related Commands

The AT commands described in this chapter are related to the hardware interface of the HC25. Further information regarding this interface is available in the "HC25 Hardware Interface Description" [2].

### 18.1 AT^SLED LED Feature

The `AT^SLED` command controls the LED function provided by the two status pins (STATUS0 and STATUS1) of the HC25. Each pin acts as a current sink and can be used to control a connected LED. The electrical specifications of the status pins and advice on how to install the LED circuit can be found in [2]. The LEDs indicate the states listed below:

LED connected to STATUS0 line:

- Lights steadily (if `<mode>=1`) or flashes (depending on `<flash_period>` if `<mode>=2`) when the ME is registered to the GSM network and either awake or in power saving state.
- Flashes at 1Hz and 50% duty cycle (0.5s on, 0.5s off) when the ME is awake and not registered to any network.
- Flashes at approx. 0.25 Hz and approx. 50% duty cycle (2s on, 2s off) when the ME is in power saving state and not registered to any network.  
When the ME is in power saving state and not registered, the flashing frequency may be less than 0.25Hz and the duty cycle may vary, for example between 45% and 55%. These variations are not regular.
- If not registered the ME checks, at the beginning of each flash period, whether it is awake or in power saving state, ie. whether to flash at 1Hz or at 0.25Hz. This means that a 1Hz or at 0.25Hz flash period always reflects the state that was valid before flashing has started. If a state transition occurs during a flash period (from awake to power saving or vice versa) then the flash period may vary. In the worst case, the LED will indicate a transition from power saving to awake after 4s.
- Is off if the ME is not registered to the GSM network, but registered to the UMTS, or if `<mode>=0`.
- While the STATUS0 signal is active the STATUS1 signal is inactive.

LED connected to STATUS1 line:

- Lights steadily (if `<mode>=1`) or flashes (depending on `<flash_period>` if `<mode>=2`) when the ME is registered to the UMTS network and either awake or in power saving state.
- Is off if the ME is not registered to the UMTS network, or if `<mode>=0`.
- While the STATUS1 signal is active the STATUS0 signal is inactive.

#### Syntax

Test Command

```
AT^SLED=?
```

Response(s)

```
^SLED: (list of supported <mode>s), (range of supported <flash_period>s)  
OK
```

Read Command

```
AT^SLED?
```

Response(s)

```
^SLED: <mode>[, <flash_period>]  
OK
```

Write Command			
AT^SLED=<mode>[, <flash_period>]			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)		PIN	MDM
--		-	+
		APP	Last
		+	-

**Parameter Description**

<mode> <sup>(num)</sup>	
LED operating mode	
0 <sup>(P)</sup>	LED feature is disabled.
1	LED lights steadily when the ME is registered to the network and either awake or in power saving state.
2	LED is flashing when the ME is registered to the network and either awake or in power saving state. The duration of flashing can be configured using the parameter <flash_period>.
<flash_period> <sup>(num)</sup>	
LED flash period	
1...10 <sup>(P)</sup> ...50	LED flash period (in milliseconds) if <mode>=2. LED off-time between flashing is approximately 4 seconds and is not configurable.

## 18.2 AT^SBV Battery/Supply Voltage

The [AT^SBV](#) execute command allows to monitor the supply (or battery) voltage of the module. The voltage is continuously measured at intervals depending on the operating mode of the RF interface. The duration of a measurement period ranges from 0.5s in TALK / DATA mode up to 50s when HC25 is in IDLE mode or Limited Service (deregistered). The displayed value is averaged over the last measuring period before the [AT^SBV](#) command was executed.

The measurement is related to the test points of BATT+ and GND, both accessible on the bottom of the module. Refer to [1] for information on the module's test points.

### Syntax

Test Command			
AT^SBV=?			
Response(s)			
OK			
ERROR			
+CME ERROR: <err>			
Exec Command			
AT^SBV			
Response(s)			
^SBV: <value>			
OK			
ERROR			
+CME ERROR: <err>			
Reference(s)	PIN	MDM	APP
--	-	+	+
			Last
			-

### Parameter Description

<value> <sup>(num)</sup>
Supply (or battery) voltage in mV

## 18.3 AT^SCTM Set critical operating temperature presentation mode or query temperature

Use this command to monitor the temperature range of the module. The write command enables or disables the presentation of URCs to report critical temperature limits.

CAUTION: During the first 15 seconds after start-up, the module operates in an automatic report mode: URCs can be always displayed regardless of the selected mode [<n>](#).

### Syntax

Test Command				
AT^SCTM=?				
Response(s)				
^SCTM: (list of supported <a href="#">&lt;n&gt;</a> s)				
OK				
Read Command				
AT^SCTM?				
Response(s)				
^SCTM: <a href="#">&lt;n&gt;</a> , <a href="#">&lt;m&gt;</a>				
OK				
ERROR				
+CME ERROR: <a href="#">&lt;err&gt;</a>				
Write Command				
AT^SCTM= <a href="#">&lt;n&gt;</a>				
Response(s)				
OK				
ERROR				
+CME ERROR: <a href="#">&lt;err&gt;</a>				
Reference(s)	PIN	MDM	APP	Last
--	-	+	+	-

### Unsolicited Result Code

URCs will be automatically sent to the TA when the temperature reaches or exceeds the critical level, or when it is back to normal.

^SCTM\_B: [<m>](#)

for module (board) temperature

### Command Description

The read command returns:

- the URC presentation mode
- information about the current temperature range of the module

Select [<n>](#) to enable or disable the presentation of the URCs. Please note that the setting will not be stored upon Power Down, i.e. after restart or reset, the default [<n>](#)=0 will be restored. To benefit from the URCs [<n>](#)=1 needs to be selected every time you reboot the GSM engine.

## Parameter Description

<n> <sup>(num)</sup>	
0(&F)(P)	Presentation of URCs is disabled (except for <m> equal to -2 or +2).
1	Presentation of URCs is enabled.

<m> <sup>(num)</sup>	
-2	Below lowest temperature limit (causes immediate switch-off)
-1	Below low temperature alert limit
0	Normal operating temperature
1	Above upper temperature alert limit
2	Above uppermost temperature limit (causes immediate switch-off)

## Notes

- Please refer to the "Hardware Interface Description" for specifications on critical temperature ranges.
- To avoid damage the module will shut down once the critical temperature is exceeded. The procedure is equivalent to the power-down initiated with [AT^SMSO](#).
- URCs indicating the alert level "1" or "-1" are intended to enable the user to take appropriate precautions, such as protect the module from exposure to extreme conditions, or save or back up data etc. The presentation of "1" or "-1" URCs depends on the settings selected with the write command:  
If <n>=0: Presentation is enabled for 15 s time after the module was switched on. After 15 s operation, the presentation will be disabled, i.e. no URCs will be generated.  
If <n>= 1: Presentation of "1" or "-1" URCs is always enabled.
- Level "2" or "-2" URCs are followed by immediate shutdown. The presentation of these URCs is always enabled, i.e. they will be output even though the factory setting [AT^SCTM=0](#) was never changed.
- If the temperature limit is exceeded while an emergency call is in progress the engine continues to measure the temperature and to deliver alert messages, but deactivates the shutdown functionality. Once the call is terminated full temperature control will be resumed. If the temperature is still out of range ME switches off immediately.

## Examples

### EXAMPLE 1

URCs issued when the operating temperature is out of range:

^SCTM_B: 1	Caution: Module close to overtemperature limit.
^SCTM_B: 2	Alert: Module is above overtemperature limit and switches off.
^SCTM_B: -1	Caution: Module close to undertemperature limit.
^SCTM_B: -2	Alert: Module is below undertemperature limit and switches off.

### EXAMPLE 2

URCs issued when the temperature is back to normal (URC is output once):

^SCTM_B: 0	Module back to normal temperature.
------------	------------------------------------

## 19. Miscellaneous Commands

The AT Commands described in this chapter are related to various areas.

### 19.1 ATS3 Set command line termination character

The [ATS3](#) command determines the character recognized by the TA to terminate an incoming command line. It is also generated for result codes and information text, along with the [ATS4](#) parameter.

#### Syntax

Read Command				
ATS3?				
Response(s)				
<n>				
OK				
Write Command				
ATS3=<n>				
Response(s)				
OK				
ERROR				
Reference(s)	PIN	MDM	APP	Last
V.250	-	+	+	-

#### Parameter Description

<n> (num)
command line termination character
000...13(&F)...127

#### Note

- Using a value other than the default 13 may cause problems when entering commands.

The [ATS4](#) command determines the character generated by the TA for result code and information text, along with the [ATS3](#) parameter .

Read Command			
ATS4?			
Response(s)			
<n>			
OK			
Write Command			
ATS4=<n>			
Response(s)			
OK			
ERROR			
Reference(s)			
V.250			

<n><sup>(num)</sup>  
response formatting character  
000...10<sup>(&F)</sup>...127



## 19.4 AT^SFDL Enter Firmware Download Mode

The [AT^SFDL](#) command allows the application manufacturer to download HC25 firmware into the module by starting the download process from the host application or a customer-designed download program. The download can be done over the USB interface.

For this purpose, the HC25 firmware update file must be available in the format \*.USF. The file can be requested from Cinterion Wireless Modules GmbH. The firmware file consists of records to be transferred one by one from the host application to the module.

This manual only describes the handling of the [AT^SFDL](#) command. All technical requirements and steps to prepare the host application for this download solution can be found in the Application Note "Updating Firmware". An example for developing an appropriate download program is included.

The [AT^SFDL](#) execute command causes the module to enter the firmware download mode (this may take some milliseconds). After entering the download mode the module sends the start pattern HEX 0x01 ("ANSWER\_OK") to the application to indicate its ready state. Next, the application shall start to send the records of the firmware file. Each record received on the module is acknowledged to the host application. Once all records are successfully received, the module shuts down automatically.

If a valid firmware is still installed, but the [AT^SFDL](#) command is issued without sending any firmware afterwards the module will stay in ready state. In this case it must be switched off.

### Syntax

Test Command				
AT^SFDL=?				
Response(s)				
OK				
Exec Command				
AT^SFDL				
Response(s)				
OK				
Reference(s)	PIN	MDM	APP	Last
--	-	+	+	+

## 20. Appendix

### 20.1 Restricted access to SIM data after SIM PIN authentication

The following commands can be used only after data from the SIM have been read successfully for the first time. Reading starts after successful SIM authentication has been performed, and may take up to 30 seconds depending on the SIM used. While the read process is in progress, an attempt to use any of the following commands will result in "+CME Error: 14" (SIM busy).

The "^SIND: simstatus" URC enabled with [AT^SIND](#) can be used to notify the user when the ME has finished reading the SIM card and SIM data are accessible after SIM PIN authentication.

Ø ... AT Command not available

- ... AT command accessible immediately after PIN entry has returned OK

+ ... AT command fully accessible after SIM PIN authentication has been completed

AT Command	Exec	Test	Read	Write
<a href="#">AT+CMGL</a>	+	-	Ø	+
<a href="#">AT+CMGR</a>	Ø	-	Ø	+
<a href="#">AT+CSCA</a>	Ø	-	+	-
<a href="#">AT+CNUM</a>	+	+	Ø	Ø
<a href="#">AT+CPBF</a>	Ø	+	Ø	+
<a href="#">AT+CPBR</a>	Ø	+	Ø	+
<a href="#">AT+CPBS</a>	Ø	+	+	+
<a href="#">AT+CPBW</a>	Ø	+	Ø	+

## 20.2 Star-Hash (\*#) Network Commands

The following command strings can be sent to the network via [ATD](#) and have to be terminated with a semicolon. The command strings are defined with GSM 2.30 [\[19\]](#).

**Table 20.1:** Star-Hash (\*#) Command Overview

Star-Hash Code	Functionality	Response, also refer to Table <a href="#">20.3</a>
Phone Security		
*#06#	Query IMEI	<IMEI> OK
**04[2]*oldPin[2]*newPin[2]*new-Pin[2]#	Change SIM pwd	+CME ERROR: <a href="#">&lt;err&gt;</a> / OK
**05[2]*unblKey[2]*newPin[2]*new-Pin[2]#	Change/Unblocking SIM pwd	+CME ERROR: <a href="#">&lt;err&gt;</a> / OK
*[*]03*[ZZ]*oldPw*newPw*newPw#	Registration of net password	+CME ERROR: <a href="#">&lt;err&gt;</a> / OK
Phone number presentation		
*#30#	Check status of CLIP (Calling Line Identification Presentation)	+CLIP : <n>,<m> OK (see <a href="#">AT+CLIP</a> )
*#31#	Check status of CLIR (Calling Line Identification Restriction)	+CLIR : <n>,<m> OK (see <a href="#">AT+CLIR</a> )
*31#<Phonenumber>[:]	Suppress CLIR	(see <a href="#">AT+CLIR</a> )
#31#<Phonenumber>[:]	Activate CLIR	(see <a href="#">AT+CLIR</a> )
*#76#	Check status of COLP (Connected Line Identification Presentation)	+COLP : 0,<m> OK (where <m> = active or not active)
*#77#	Check status of COLR (Connected Line Identification Restriction)	+COLR : 0,<m> OK (where <m> = active or not active)
Call forwarding		
(choice of *,#,*,*,*,##)21*DN*BS#	Act/deact/int/reg/eras CFU	+CCFC : <status>, <class> [...] (see: <a href="#">AT+CCFC</a> )
(choice of *,#,*,*,*,##)67*DN*BS#	Act/deact/int/reg/eras CF busy	see above
(choice of *,#,*,*,*,##)61*DN*BS*T#	Act/deact/int/reg/eras CF no reply	see above
(choice of *,#,*,*,*,##)62*DN*BS#	Act/deact/int/reg/eras CF no reach	see above
(choice of *,#,*,*,*,##)002*DN*BS*T#	Act/deact/int/reg/eras CF all	see above
(choice of *,#,*,*,*,##)004*DN*BS*T#	Act/deact/int/reg/eras CF all cond.	see above
Call waiting		
(choice of *,#,*,*)43*BS#	Activation/deactivation/int WAIT	+CCWA : <status>, <class> [...]. (Refer to <a href="#">AT+CCWA</a> )
Call barring		
(choice of *,#,*,*)33*Pw*BS#	Act/deact/int BAOC	+CLCK : <status>, <class> [...].(Refer to <a href="#">AT+CLCK</a> )
(choice of *,#,*,*)331*Pw*BS#	Act/deact/int BAOIC	see above
(choice of *,#,*,*)332*Pw*BS#	Act/deact/int BAOIC exc.home	see above

Star-Hash Code	Functionality	Response, also refer to Table 20.3
(choice of *,#,*)35*Pw*BS#	Act/deact/int. BAIC	see above
(choice of *,#,*)351*Pw*BS#	Act/deact/int BAIC roaming	see above
#330*Pw*BS#	Deact. All Barring Services	see above
#333*Pw*BS#	Deact. All Outg.Barring Services	see above
#353*Pw*BS#	Deact. All Inc.Barring Services	see above
Call Hold / Multiparty		
C[C] in call	Call hold and multiparty	+CME ERROR: <err> / OK
USSD messages		
[C]...[C]#	Send USSD message	+CME ERROR: <err> / OK
C[C] (excluded 1[C])	Send USSD message	+CME ERROR: <err> / OK

**Table 20.2:** Abbreviations of Codes and Parameters used in Table 20.1

Abbreviation	Meaning	Value
ZZ	Type of supplementary services: Barring services All services	330 Not specified
DN	Dialing number	String of digits 0-9
BS	Basic service equivalent to parameter class: Voice FAX SMS SMS+FAX Data circuit asynchron Data circuit synchron Dedicated PAD access Dedicated Packet access Data circuit asynchron+PAD Data circuit synchron+Packet Data circuit asynchron+synchron+Packet+PAD All Services	11 13 16 12 25 24 27 26 21 22 20 --
T	Time in seconds	In contrast to <a href="#">AT+CCFC</a> , parameter T has no default value. If T is not specified, an operator defined default or the last known value may be used, depending on the network operator.
PW	Password	--
C	Character of TE character set (e.g. asterisk, hash or digit in case of USSD, or digits in case of held calls or multiparty calls)	--

**Table 20.3:** Star-Hash Command Response Parameters

Parameter	Meaning
<m>	Mode: 0 = not active, 1 = active
<n>	Unsolicited result code: 0 = presentation disabled, 1 = presentation enabled
<status>	Status: 0 = not active, 1 = active
<class>	Represents BS = basic service, refer to <a href="#">AT+CCFC</a> , <a href="#">AT+CLCK</a>

---

Parameter	Meaning
<fac>	Facility lock, refer to <a href="#">AT+CLCK</a>
<reason>	Call forwarding reason

For exact specification of format and parameters for Star-Hash commands refer to GSM 02.04, Table 3.2 [\[18\]](#) and GSM 02.30, Annex C [\[19\]](#).

**Table 20.4:** Star-Hash Commands for Supplementary Services

Star-Hash Code	Abbreviations in Table <a href="#">20.1</a>	Functionality
*	act	Activate (except for CLIR, see list above)
**	reg	Register and activate
*#	int	Check status (interrogate)
#	deact	Deactivate (except for CLIR, see list above)
##	eras	Unregister and deactivate

## 20.3 Available AT Commands and Dependency on SIM PIN

- ∅ ... Command not available  
 - ... Command does not require PIN1  
 + ... Command requires PIN1  
 ± ... Command sometimes requires PIN1

**Table 20.5:** Available AT Commands and Dependency on SIM PIN

AT Command	Exec	Test	Read	Write
Configuration Commands				
AT&F	+	∅	∅	∅
AT&V	+	∅	∅	∅
ATQ	+	∅	∅	∅
ATV	-	∅	∅	∅
ATX	+	∅	∅	∅
ATZ	+	∅	∅	∅
AT+CFUN	∅	-	-	-
AT+CMEE	-	-	-	-
AT+CSCS	∅	+	+	+
AT+GCAP	+	+	∅	∅
AT^SCFG	∅	-	-	-
AT^SMSO	-	-	∅	∅
AT^SUBS	∅	-	-	-
Status Control Commands				
AT^SIND	∅	-	-	-
AT+CEER	+	+	∅	∅
AT+CPAS	-	-	∅	∅
AT+WS46	∅	-	-	-
Serial Interface Control Commands				
AT\Q	-	∅	∅	∅
AT&C	+	∅	∅	∅
AT&D	+	∅	∅	∅
AT&S	-	∅	∅	∅
ATE	-	∅	∅	∅
AT+IPR	∅	-	-	-
AT+CMUX	∅	-	-	-
AT^SQPORT	-	-	-	∅
Security Commands				
AT+CLCK	∅	+	∅	+
AT+CPIN	∅	-	-	-
AT+CPWD	∅	+	∅	+

AT Command	Exec	Test	Read	Write
AT^SCSL	Ø	-	Ø	-
Identification Commands				
ATI	-	Ø	Ø	Ø
AT+CGMI	-	-	Ø	Ø
AT+GMI	-	-	Ø	Ø
AT+CGMM	-	-	Ø	Ø
AT+GMM	-	-	Ø	Ø
AT+CGMR	-	-	Ø	Ø
AT+GMR	-	-	Ø	Ø
AT+CGSN	-	-	Ø	Ø
AT+GSN	-	-	Ø	Ø
AT+CIMI	+	+	Ø	Ø
Call related Commands				
ATA	+	Ø	Ø	Ø
ATD	±	Ø	Ø	Ø
ATD><mem><n>	+	Ø	Ø	Ø
ATD><n>	+	Ø	Ø	Ø
ATD><str>	+	Ø	Ø	Ø
ATH	+	Ø	Ø	Ø
AT+CHUP	-	-	Ø	Ø
AT^SHUP	Ø	+	Ø	+
ATS0	Ø	Ø	+	+
ATS6	Ø	Ø	+	+
ATS7	Ø	Ø	+	+
ATS8	Ø	Ø	+	+
ATS10	Ø	Ø	+	+
ATO	+	Ø	Ø	Ø
+++	-	Ø	Ø	Ø
AT+CLCC	+	+	Ø	Ø
AT^SLCC	+	+	+	+
AT+CR	Ø	+	+	+
AT+CRC	+	+	+	+
AT+CBST	Ø	+	+	+
AT+CRLP	Ø	+	+	+
ATP	+	Ø	Ø	Ø
ATT	+	Ø	Ø	Ø
AT+ES	Ø	-	±	±
AT+ESA	Ø	-	+	+
AT+CSTA	Ø	+	+	+

AT Command	Exec	Test	Read	Write
Network Service Commands				
AT+COPN	+	+	Ø	Ø
AT+COPS	+	+	+	+
AT^SOPS	Ø	+	Ø	Ø
AT+CREG	-	-	-	-
AT+CSQ	+	+	Ø	Ø
AT+CPOL	Ø	+	+	+
AT^SMONI	-	-	Ø	Ø
AT^SMONP	-	-	Ø	Ø
AT^SNWS	Ø	+	Ø	+
Supplementary Service Commands				
AT+CACM	Ø	+	+	+
AT+CAMM	Ø	+	+	+
AT+CAOC	+	+	+	+
AT+CCUG	Ø	+	+	+
AT+CCFC	Ø	+	Ø	+
AT+CCWA	Ø	+	+	+
AT+CHLD	Ø	+	Ø	+
AT+CLIP	Ø	+	+	+
AT+CLIR	Ø	+	+	+
AT+COLP	Ø	+	+	+
AT+CPUC	Ø	+	+	+
AT+CSSN	Ø	+	+	+
AT+CUSD	Ø	+	+	+
GPRS Commands				
AT+CGATT	Ø	+	+	+
AT+CGACT	Ø	+	+	+
AT+CGDATA	Ø	+	Ø	+
AT+CGDCONT	Ø	+	+	+
AT+CGPADDR	+	+	Ø	+
AT+CGQMIN	Ø	+	+	+
AT+CGEQMIN	Ø	+	+	+
AT+CGREG	Ø	+	+	+
AT+CGQREQ	Ø	+	+	+
AT+CGEQREQ	Ø	+	+	+
AT+CGSMS	Ø	+	+	+
ATD*99#	+	Ø	Ø	Ø
AT^SGAUTH	Ø	+	+	+

AT Command	Exec	Test	Read	Write
FAX Commands				
AT+FCLASS	Ø	+	+	+
AT+FAR	+	+	+	+
AT+FDD	+	+	+	+
AT+FCL	+	+	+	+
AT+FIT	+	+	+	+
AT+FTS	Ø	+	Ø	+
AT+FRS	Ø	+	Ø	+
AT+FTM	Ø	+	Ø	+
AT+FRM	Ø	+	Ø	+
AT+FTH	Ø	+	Ø	+
AT+FRH	Ø	+	Ø	+
Short Message Service (SMS) Commands				
AT+CMGC	Ø	+	Ø	+
AT+CMGD	Ø	+	Ø	+
AT+CMGF	Ø	+	+	+
AT+CMGL	+	+	Ø	+
AT+CMGR	Ø	+	Ø	+
AT+CMGS	Ø	+	Ø	+
AT+CMGW	+	+	Ø	+
AT+CMMS	Ø	+	+	+
AT+CMSS	Ø	+	Ø	+
AT+CNMA	+	+	Ø	+
AT+CNMI	Ø	+	+	+
AT+CPMS	Ø	+	+	+
AT+CSCA	Ø	+	+	+
AT+CSCB	Ø	+	+	+
AT+CSMP	Ø	+	+	+
AT+CSMS	Ø	+	+	+
AT^SMGL	+	+	Ø	+
SIM related Commands				
AT+CRSM	Ø	-	Ø	-
AT+CSIM	Ø	-	Ø	-
AT^SCKS	Ø	-	-	-
SIM Application Toolkit (SAT) Commands				
AT^SSTA	Ø	-	-	-
^SSTN	Ø	Ø	Ø	Ø
AT^SSTGI	Ø	-	-	-
AT^SSTR	Ø	-	-	-

AT Command	Exec	Test	Read	Write
Phonebook Commands				
AT+CNUM	+	+	Ø	Ø
AT+CPBF	Ø	+	Ø	+
AT+CPBR	Ø	+	Ø	+
AT+CPBS	+	+	+	+
AT+CPBW	Ø	+	Ø	+
GPS Commands				
AT^SGPSS	Ø	-	-	-
AT^SGPSC	Ø	-	-	-
Audio Commands				
ATL	+	Ø	Ø	Ø
ATM	+	Ø	Ø	Ø
AT+CMUT	Ø	-	-	-
AT+VTS	Ø	-	Ø	-
AT^SNFI	Ø	-	-	-
AT^SNFO	Ø	-	-	-
AT^SNFS	Ø	-	-	-
AT^SNFTTY	Ø	-	-	-
AT^SRTC	-	-	-	-
Hardware Related Commands				
AT^SLED	Ø	-	-	-
AT^SBV	-	-	Ø	Ø
AT^SCTM	Ø	-	-	-
Miscellaneous Commands				
ATS3	Ø	Ø	-	-
ATS4	Ø	Ø	-	-
ATS5	Ø	Ø	-	-
AT^SFDL	-	-	Ø	Ø

## 20.4 Factory Default Settings Restorable with AT&F

**Table 20.6:** Factory Default Settings Restorable with AT&F

AT Command	Factory Defaults
Configuration Commands	
ATQ	<n>=0
ATV	<value>=1
ATX	<value>=0
AT+CMEE	<errMode>=0
AT+CSCS	<chset>="IRA"
Status Control Commands	
AT^SIND	<mode>=0
Serial Interface Control Commands	
AT\Q	<n>=3
AT&C	<value>=2
AT&D	<value>=2
AT&S	<value>=0
ATE	<value>=1
Call related Commands	
ATS0	<n>=000
ATS6	<n>=2
ATS7	<n>=050
ATS8	<n>=2
ATS10	<n>=014
AT^SLCC	<n>=0
AT+CR	<mode>=0
AT+CRC	<mode>=0
AT+CBST	<speed>=0, <name>=0, <ce>=1
AT+CRLP	<iws>=61, <mws>=61, <T1>=48, <N2>=6
Network Service Commands	
AT+COPS	<format>=0
AT+CREG	<n>=0
Supplementary Service Commands	
AT+CLIP	<n>=0
AT+CSSN	<n>=0, <m>=0
AT+CUSD	<n>=0
GPRS Commands	
AT+CGREG	<n>=0

AT Command	Factory Defaults
Short Message Service (SMS) Commands	
AT+CMGF	<mode>=0
AT+CNMI	<mode>=0, <mt>=0, <bm>=0, <ds>=0, <bfr>=1
AT+CSCB	<operation>=0
AT+CSMP	<dc>=0, <pid>=0
AT+CSMS	<service>=0
SIM related Commands	
AT+SCKS	<mode>=0
Phonebook Commands	
AT+CPBS	<storage>="SM"
Hardware Related Commands	
AT+SCTM	<n>=0
Miscellaneous Commands	
ATS3	<n>=013
ATS4	<n>=010
ATS5	<n>=008

## 20.5 Summary of Unsolicited Result Codes (URC)

**Table 20.7:** Summary of Unsolicited Result Codes (URC)

AT Command	URC
Unsolicited Result Code Presentation	
	^SBC: Undervoltage
	^SBC: Overvoltage Warning
	^SBC: Overvoltage Shutdown
Status Control Commands	
AT^SIND	+CIEV: <indDescr>, <indValue>
AT^SIND	+CIEV: <indDescr>, <indValue>, <eonsOperator>, <servProvider>, <servProviderType>
AT^SIND	+CIEV: <indDescr>, <nitzUT>, <nitzTZ>, <nitzDST>
Call related Commands	
AT^SLCC	if the list of current calls is empty: ^SLCC: if one or more calls are currently in the list: ^SLCC: <idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]] [ ^SLCC: <idx>, <dir>, <stat>, <mode>, <empty>, <Reserved>[, <number>, <type>[, <alpha>]]] [...] ^SLCC:
AT+CRC	RING
AT+CRC	+CRING: <type>
Network Service Commands	
AT+CREG	+CREG: <stat>
AT+CREG	+CREG: <stat>[, <lac>, <ci>]
Supplementary Service Commands	
AT+CAOC	+CCCM: <ccm>
AT+CCWA	+CCWA: <calling number>, <type of number>[, <class>], [, <CLI validity>]
AT+CLIP	+CLIP: <number>, <type>, [, <alpha>], [, <CLI validity>]
AT+COLP	+COLP: <number>, <type>[, <sub-number>], [, <sub-type>], [, <alpha>]
AT+CSSN	+CSSI: <code 1>
AT+CSSN	+CSSU: <code 2>
AT+CUSD	+CUSD: <m>[<str_urc>[<dcs>]]
GPRS Commands	
AT+CGREG	+CGREG: <stat>
Short Message Service (SMS) Commands	
AT+CNMI	+CMTI: <mem3>, <index>
AT+CNMI	+CMT: <length><CR><LF><pdu>

AT Command	URC
AT+CNMI	+CMT: <oa>, <scts>[, <tooa>, <fo>, <pid>, <dcsc>, <sca>, <tosca>, <length>]<CR><LF><data>
AT+CNMI	+CBM: <length><CR><LF><pdu>
AT+CNMI	+CBM: <sn>, <mid>, <dcsc>, <page>, <pages><CR><LF><data>
AT+CNMI	+CDS: <length><CR><LF><pdu>
AT+CNMI	+CDS: <fo>, <mr>[, <ra>][, <tora>], <scts>, <dt>, <st>
AT+CNMI	+CDSI: <mem3>, <index>
SIM related Commands	
AT^SCKS	^SCKS: <SimStatus>
AT^SCKS	^SCRD: <MCC>
SIM Application Toolkit (SAT) Commands	
^SSTN	^SSTN: <cmdType>
^SSTN	^SSTN: <cmdTerminateValue>
^SSTN	^SSTN: 254
^SSTN	^SSTN: 255
Hardware Related Commands	
AT^SCTM	^SCTM_B: <m>

## 20.6 AT Commands Supported Only on the Modem Interface

**Table 20.8:** AT Commands Supported Only on the Modem Interface

AT Command
Serial Interface Control Commands
<a href="#">AT+CMUX</a>
Call related Commands
<a href="#">ATH</a>
<a href="#">ATO</a>
<a href="#">+++</a>
GPRS Commands
<a href="#">AT+CGDATA</a>
<a href="#">ATD*99#</a>
FAX Commands
<a href="#">AT+FTM</a>
<a href="#">AT+FRM</a>
<a href="#">AT+FTH</a>
<a href="#">AT+FRH</a>

## 20.7 Alphabetical List of AT Commands

**Table 20.9:** Alphabetical List of AT Commands

AT Command	Description	Section and Page
+++	Switch from data mode to command mode	Section 7.15, page 116
^SSTN	SAT Notification	Section 14.2, page 255
AT&C	Set Data Carrier Detect (DCD) line mode	Section 4.2, page 72
AT&D	Set Data Terminal Ready (DTR) line mode	Section 4.3, page 73
AT&F	Set all current parameters to manufacturer defaults	Section 2.1, page 26
AT&S	Set Data Set Ready (DSR) line mode	Section 4.4, page 74
AT&V	Display current configuration	Section 2.2, page 27
AT+CACM	Accumulated call meter (ACM) reset or query	Section 9.1, page 151
AT+CAMM	Accumulated call meter maximum (ACMmax) set or query	Section 9.2, page 152
AT+CAOC	Advice of Charge information	Section 9.3, page 153
AT+CBST	Select bearer service type	Section 7.20, page 125
AT+CCFC	Call forwarding number and conditions control	Section 9.5, page 157
AT+CCUG	Closed User Group	Section 9.4, page 155
AT+CCWA	Call Waiting	Section 9.6, page 162
AT+CEER	Extended Error Report	Section 3.2, page 63
AT+CFUN	Set phone functionality	Section 2.7, page 32
AT+CGACT	PDP context activate or deactivate	Section 10.2, page 178
AT+CGATT	PS attach or detach	Section 10.1, page 177
AT+CGDATA	Enter data state	Section 10.3, page 180
AT+CGDCONT	Define PDP Context	Section 10.4, page 182
AT+CGEQMIN	3G Quality of Service Profile (Minimum acceptable)	Section 10.7, page 188
AT+CGEQREQ	3G Quality of Service Profile (Requested)	Section 10.10, page 197
AT+CGMI	Request manufacturer identification	Section 6.2, page 94
AT+CGMM	Request model identification	Section 6.4, page 95
AT+CGMR	Request revision identification of software status	Section 6.6, page 96
AT+CGPADDR	Show PDP address	Section 10.5, page 184
AT+CGQMIN	Quality of Service Profile (Minimum acceptable)	Section 10.6, page 185
AT+CGQREQ	Quality of Service Profile (Requested)	Section 10.9, page 194
AT+CGREG	GPRS Network Registration Status	Section 10.8, page 192
AT+CGSMS	Select service for MO SMS messages	Section 10.11, page 201
AT+CGSN	Request International Mobile Equipment Identity (IMEI)	Section 6.8, page 97
AT+CHLD	Call Hold and Multiparty	Section 9.7, page 165
AT+CHUP	Hang up call	Section 7.7, page 107
AT+CIMI	Request International Mobile Subscriber Identity (IMSI)	Section 6.10, page 98
AT+CLCC	List of current calls	Section 7.16, page 117
AT+CLCK	Facility lock	Section 5.1, page 81
AT+CLIP	Calling Line Identification Presentation	Section 9.8, page 167
AT+CLIR	Calling Line Identification Restriction	Section 9.9, page 169
AT+CMEE	Mobile Equipment Error Message Format	Section 2.8, page 34

AT Command	Description	Section and Page
<a href="#">AT+CMGC</a>	Send an SMS command	Section <a href="#">12.2</a> , page <a href="#">220</a>
<a href="#">AT+CMGD</a>	Delete short message	Section <a href="#">12.3</a> , page <a href="#">221</a>
<a href="#">AT+CMGF</a>	Select SMS message format	Section <a href="#">12.4</a> , page <a href="#">222</a>
<a href="#">AT+CMGL</a>	List SMS messages from preferred store	Section <a href="#">12.5</a> , page <a href="#">223</a>
<a href="#">AT+CMGR</a>	Read SMS messages	Section <a href="#">12.6</a> , page <a href="#">225</a>
<a href="#">AT+CMGS</a>	Send Short Message	Section <a href="#">12.7</a> , page <a href="#">227</a>
<a href="#">AT+CMGW</a>	Write Short Messages to Memory	Section <a href="#">12.8</a> , page <a href="#">228</a>
<a href="#">AT+CMMS</a>	More Messages to Send	Section <a href="#">12.9</a> , page <a href="#">229</a>
<a href="#">AT+CMSS</a>	Send short messages from storage	Section <a href="#">12.10</a> , page <a href="#">230</a>
<a href="#">AT+CMUT</a>	Mute control	Section <a href="#">17.3</a> , page <a href="#">275</a>
<a href="#">AT+CMUX</a>	Enter Multiplex Mode	Section <a href="#">4.7</a> , page <a href="#">78</a>
<a href="#">AT+CNMA</a>	New Message Acknowledgement to ME/TE, only phase 2+	Section <a href="#">12.11</a> , page <a href="#">231</a>
<a href="#">AT+CNMI</a>	New short Message Indication	Section <a href="#">12.12</a> , page <a href="#">232</a>
<a href="#">AT+CNUM</a>	Read own numbers	Section <a href="#">15.1</a> , page <a href="#">258</a>
<a href="#">AT+COLP</a>	Connected Line Identification Presentation	Section <a href="#">9.10</a> , page <a href="#">170</a>
<a href="#">AT+COPN</a>	Read operator names	Section <a href="#">8.1</a> , page <a href="#">134</a>
<a href="#">AT+COPS</a>	Operator Selection	Section <a href="#">8.2</a> , page <a href="#">135</a>
<a href="#">AT+CPAS</a>	Mobile equipment activity status	Section <a href="#">3.3</a> , page <a href="#">69</a>
<a href="#">AT+CPBF</a>	Find phonebook entries	Section <a href="#">15.2</a> , page <a href="#">259</a>
<a href="#">AT+CPBR</a>	Read from phonebook	Section <a href="#">15.3</a> , page <a href="#">262</a>
<a href="#">AT+CPBS</a>	Select phonebook memory storage	Section <a href="#">15.4</a> , page <a href="#">265</a>
<a href="#">AT+CPBW</a>	Write into phonebook	Section <a href="#">15.5</a> , page <a href="#">267</a>
<a href="#">AT+CPIN</a>	PIN Authentication	Section <a href="#">5.2</a> , page <a href="#">85</a>
<a href="#">AT+CPMS</a>	Preferred SMS message storage	Section <a href="#">12.13</a> , page <a href="#">235</a>
<a href="#">AT+CPOL</a>	Preferred Operator List	Section <a href="#">8.6</a> , page <a href="#">144</a>
<a href="#">AT+CPUC</a>	Price per unit and currency table	Section <a href="#">9.11</a> , page <a href="#">172</a>
<a href="#">AT+CPWD</a>	Change Password	Section <a href="#">5.3</a> , page <a href="#">88</a>
<a href="#">AT+CR</a>	Service reporting control	Section <a href="#">7.18</a> , page <a href="#">122</a>
<a href="#">AT+CRC</a>	Set Cellular Result Codes for incoming call indication	Section <a href="#">7.19</a> , page <a href="#">123</a>
<a href="#">AT+CREG</a>	Network registration	Section <a href="#">8.4</a> , page <a href="#">140</a>
<a href="#">AT+CRLP</a>	Select radio link protocol parameters for originated non-transparent data calls	Section <a href="#">7.21</a> , page <a href="#">127</a>
<a href="#">AT+CRSM</a>	Restricted SIM Access	Section <a href="#">13.1</a> , page <a href="#">245</a>
<a href="#">AT+CSCA</a>	SMS Service Center Address	Section <a href="#">12.14</a> , page <a href="#">237</a>
<a href="#">AT+CSCB</a>	Select Cell Broadcast Message Indication	Section <a href="#">12.15</a> , page <a href="#">238</a>
<a href="#">AT+CSCS</a>	Select TE character set	Section <a href="#">2.9</a> , page <a href="#">38</a>
<a href="#">AT+CSIM</a>	Generic SIM Access	Section <a href="#">13.2</a> , page <a href="#">248</a>
<a href="#">AT+CSMP</a>	Set SMS text Mode Parameters	Section <a href="#">12.16</a> , page <a href="#">240</a>
<a href="#">AT+CSMS</a>	Select Message Service	Section <a href="#">12.17</a> , page <a href="#">242</a>
<a href="#">AT+CSQ</a>	Signal quality	Section <a href="#">8.5</a> , page <a href="#">143</a>
<a href="#">AT+CSSN</a>	Supplementary service notifications	Section <a href="#">9.12</a> , page <a href="#">173</a>

AT Command	Description	Section and Page
<a href="#">AT+CSTA</a>	Select type of address	Section <a href="#">7.26</a> , page <a href="#">133</a>
<a href="#">AT+CUSD</a>	Unstructured supplementary service data	Section <a href="#">9.13</a> , page <a href="#">175</a>
<a href="#">AT+ES</a>	Synchronous Data Mode Configuration	Section <a href="#">7.24</a> , page <a href="#">130</a>
<a href="#">AT+ESA</a>	Synchronous access mode configuration	Section <a href="#">7.25</a> , page <a href="#">131</a>
<a href="#">AT+FAR</a>	Adaptive Rate Control	Section <a href="#">11.2</a> , page <a href="#">206</a>
<a href="#">AT+FCL</a>	Carrier Loss Timeout	Section <a href="#">11.4</a> , page <a href="#">208</a>
<a href="#">AT+FCLASS</a>	Set the Service Class of a facsimile DCE	Section <a href="#">11.1</a> , page <a href="#">205</a>
<a href="#">AT+FDD</a>	Double Escape Character Replacement	Section <a href="#">11.3</a> , page <a href="#">207</a>
<a href="#">AT+FIT</a>	DTE Inactivity Timeout	Section <a href="#">11.5</a> , page <a href="#">209</a>
<a href="#">AT+FRH</a>	Receive Data Using HDLC Framing	Section <a href="#">11.11</a> , page <a href="#">215</a>
<a href="#">AT+FRM</a>	Receive message	Section <a href="#">11.9</a> , page <a href="#">213</a>
<a href="#">AT+FRS</a>	Receive Silence	Section <a href="#">11.7</a> , page <a href="#">211</a>
<a href="#">AT+FTH</a>	Transmit Data Using HDLC Framing	Section <a href="#">11.10</a> , page <a href="#">214</a>
<a href="#">AT+FTM</a>	Transmit message	Section <a href="#">11.8</a> , page <a href="#">212</a>
<a href="#">AT+FTS</a>	Transmit silence	Section <a href="#">11.6</a> , page <a href="#">210</a>
<a href="#">AT+GCAP</a>	Request complete TA capabilities list	Section <a href="#">2.10</a> , page <a href="#">39</a>
<a href="#">AT+GMI</a>	Request manufacturer identification	Section <a href="#">6.3</a> , page <a href="#">94</a>
<a href="#">AT+GMM</a>	Request model identification	Section <a href="#">6.5</a> , page <a href="#">95</a>
<a href="#">AT+GMR</a>	Request revision identification of software status	Section <a href="#">6.7</a> , page <a href="#">96</a>
<a href="#">AT+GSN</a>	Request International Mobile Equipment Identity (IMEI)	Section <a href="#">6.9</a> , page <a href="#">97</a>
<a href="#">AT+IPR</a>	Set local bit rate	Section <a href="#">4.6</a> , page <a href="#">76</a>
<a href="#">AT+VTS</a>	DTMF and tone generation	Section <a href="#">17.4</a> , page <a href="#">276</a>
<a href="#">AT+WS46</a>	Select wireless network	Section <a href="#">3.4</a> , page <a href="#">70</a>
<a href="#">AT\Q</a>	Flow control	Section <a href="#">4.1</a> , page <a href="#">71</a>
<a href="#">AT^SBV</a>	Battery/Supply Voltage	Section <a href="#">18.2</a> , page <a href="#">288</a>
<a href="#">AT^SCFG</a>	Extended Configuration Settings	Section <a href="#">2.11</a> , page <a href="#">40</a>
<a href="#">AT^SCKS</a>	Query SIM and Chip Card Holder Status	Section <a href="#">13.3</a> , page <a href="#">250</a>
<a href="#">AT^SCSL</a>	Customer SIM Lock	Section <a href="#">5.4</a> , page <a href="#">90</a>
<a href="#">AT^SCTM</a>	Set critical operating temperature presentation mode or query temperature	Section <a href="#">18.3</a> , page <a href="#">289</a>
<a href="#">AT^SFDL</a>	Enter Firmware Download Mode	Section <a href="#">19.4</a> , page <a href="#">294</a>
<a href="#">AT^SGAUTH</a>	Set type of authentication for PDP-IP connections	Section <a href="#">10.13</a> , page <a href="#">203</a>
<a href="#">AT^SGPSC</a>	GPS Configuration	Section <a href="#">16.2</a> , page <a href="#">272</a>
<a href="#">AT^SGPSS</a>	GPS Switch	Section <a href="#">16.1</a> , page <a href="#">270</a>
<a href="#">AT^SHUP</a>	Hang up call(s) indicating a specific GSM04.08 release cause	Section <a href="#">7.8</a> , page <a href="#">108</a>
<a href="#">AT^SIND</a>	Extended Indicator Control	Section <a href="#">3.1</a> , page <a href="#">58</a>
<a href="#">AT^SLCC</a>	Extended list of current calls	Section <a href="#">7.17</a> , page <a href="#">119</a>
<a href="#">AT^SLED</a>	LED Feature	Section <a href="#">18.1</a> , page <a href="#">286</a>
<a href="#">AT^SMGL</a>	List Short Messages from preferred store without setting status to REC READ	Section <a href="#">12.18</a> , page <a href="#">244</a>
<a href="#">AT^SMONI</a>	Monitor idle mode	Section <a href="#">8.7</a> , page <a href="#">145</a>
<a href="#">AT^SMONP</a>	Monitor neighbour cells	Section <a href="#">8.8</a> , page <a href="#">147</a>

AT Command	Description	Section and Page
<a href="#">AT^SMSO</a>	Switch off mobile station	Section <a href="#">2.12</a> , page <a href="#">49</a>
<a href="#">AT^SNFI</a>	Set microphone path parameters	Section <a href="#">17.5</a> , page <a href="#">277</a>
<a href="#">AT^SNFO</a>	Set audio output parameter (loudspeaker path)	Section <a href="#">17.6</a> , page <a href="#">279</a>
<a href="#">AT^SNFS</a>	Select audio hardware set	Section <a href="#">17.7</a> , page <a href="#">281</a>
<a href="#">AT^SNFTTY</a>	Signal TTY/CTM audio mode capability	Section <a href="#">17.8</a> , page <a href="#">283</a>
<a href="#">AT^SNWS</a>	Network Selection	Section <a href="#">8.9</a> , page <a href="#">149</a>
<a href="#">AT^SOPS</a>	Extended Operator Selection	Section <a href="#">8.3</a> , page <a href="#">138</a>
<a href="#">AT^SQPORT</a>	Query Port Type	Section <a href="#">4.8</a> , page <a href="#">80</a>
<a href="#">AT^SRTC</a>	Ring tone configuration	Section <a href="#">17.9</a> , page <a href="#">284</a>
<a href="#">AT^SSTA</a>	SAT Interface Activation	Section <a href="#">14.1</a> , page <a href="#">252</a>
<a href="#">AT^SSTGI</a>	SAT Get Information	Section <a href="#">14.3</a> , page <a href="#">256</a>
<a href="#">AT^SSTR</a>	SAT Response	Section <a href="#">14.4</a> , page <a href="#">257</a>
<a href="#">AT^SUSB</a>	USB Configuration	Section <a href="#">2.13</a> , page <a href="#">50</a>
<a href="#">ATA</a>	Answer a call	Section <a href="#">7.1</a> , page <a href="#">99</a>
<a href="#">ATD</a>	Mobile originated call to specified number	Section <a href="#">7.2</a> , page <a href="#">100</a>
<a href="#">ATD*99#</a>	Request GPRS service	Section <a href="#">10.12</a> , page <a href="#">202</a>
<a href="#">ATD&gt;&lt;mem&gt;&lt;n&gt;</a>	Mobile originated call using specific memory and index number	Section <a href="#">7.3</a> , page <a href="#">102</a>
<a href="#">ATD&gt;&lt;n&gt;</a>	Mobile originated call from active memory using index number	Section <a href="#">7.4</a> , page <a href="#">104</a>
<a href="#">ATD&gt;&lt;str&gt;</a>	Mobile originated call from active memory using corresponding field	Section <a href="#">7.5</a> , page <a href="#">105</a>
<a href="#">ATE</a>	Enable command echo	Section <a href="#">4.5</a> , page <a href="#">75</a>
<a href="#">ATH</a>	Disconnect existing data connection	Section <a href="#">7.6</a> , page <a href="#">106</a>
<a href="#">ATI</a>	Display product identification information	Section <a href="#">6.1</a> , page <a href="#">93</a>
<a href="#">ATL</a>	Set monitor speaker loudness	Section <a href="#">17.1</a> , page <a href="#">274</a>
<a href="#">ATM</a>	Set monitor speaker mode	Section <a href="#">17.2</a> , page <a href="#">274</a>
<a href="#">ATO</a>	Switch from command mode to data mode	Section <a href="#">7.14</a> , page <a href="#">115</a>
<a href="#">ATP</a>	Select pulse dialing	Section <a href="#">7.22</a> , page <a href="#">129</a>
<a href="#">ATQ</a>	Set result code presentation mode	Section <a href="#">2.3</a> , page <a href="#">28</a>
<a href="#">ATS0</a>	Set number of rings before automatically answering a call	Section <a href="#">7.9</a> , page <a href="#">110</a>
<a href="#">ATS10</a>	Set disconnect delay after indicating the absence of data carrier	Section <a href="#">7.13</a> , page <a href="#">114</a>
<a href="#">ATS3</a>	Set command line termination character	Section <a href="#">19.1</a> , page <a href="#">291</a>
<a href="#">ATS4</a>	Set response formatting character	Section <a href="#">19.2</a> , page <a href="#">292</a>
<a href="#">ATS5</a>	Write command line editing character	Section <a href="#">19.3</a> , page <a href="#">293</a>
<a href="#">ATS6</a>	Set pause before blind dialing	Section <a href="#">7.10</a> , page <a href="#">111</a>
<a href="#">ATS7</a>	Set number of seconds to wait for connection completion	Section <a href="#">7.11</a> , page <a href="#">112</a>
<a href="#">ATS8</a>	Set number of seconds to wait for comma dialing modifier	Section <a href="#">7.12</a> , page <a href="#">113</a>
<a href="#">ATT</a>	Select tone dialing	Section <a href="#">7.23</a> , page <a href="#">129</a>
<a href="#">ATV</a>	Set result code format mode	Section <a href="#">2.4</a> , page <a href="#">29</a>
<a href="#">ATX</a>	Set CONNECT result code format	Section <a href="#">2.5</a> , page <a href="#">30</a>
<a href="#">ATZ</a>	Reset all current parameters to the default configuration	Section <a href="#">2.6</a> , page <a href="#">31</a>