Extended AT Commands Manual

VERSION 2.1

FW V 2.1.3

modmax®

3G Data Modem MM - 6280IND

maxon australia. | mobility to the max.

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RF EXPOSURE COMPLIANCE

The use of this device in any other type of host configuration may not comply with the RF exposure requirements and should be avoided. During operation, a 20 cm separation distance should be maintained between the antenna, whether extended or retracted, and the user's/bystander's body (excluding hands, wrists, feet, and ankles) to ensure RF exposure compliance.

CAUTION

Change or modification without the express consent of Maxon Electronics Australia Pty. Ltd. voids the user's authority to use the equipment. These limits are designed to provide reasonable protection against harmful interference in an appropriate installation. The modem is a transmitting device with similar output power to a mobile phone. This equipment generates, uses, and can radiate radio frequency energy and, if not used in accordance with instructions, can cause harmful radiation to radio communication. Use only the supplied or an approved antenna. Unauthorized antennas, modifications, or attachments could impair call quality, damage the device, or result in violation of RF exposure regulations.

However, there is no guarantee that interference will not occur in a particular installation. If the equipment does cause harmful interference in radio and television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving radio or TV antenna
- Increase the separation distance between the equipment and the receiver
- Contact Maxon Australia Technical Support for assistance.

NOTES

The user is cautioned that changes or modifications not expressly approved by Maxon Australia could void the warrantee.

POTENTIALLY UNSAFE AREAS

Posted facilities: Turn off this device in any facility or area when posted notices require you to do so.

Blasting areas: Turn off your device where blasting is in progress. Observe restrictions and follow any regulations or rules.

Potentially explosive atmospheres: Turn off your device when you are in any area with a potentially explosive atmosphere. Obey all signs and instructions. Sparks in such areas could cause an explosion or fire, resulting in bodily injury or death.

Areas with a potentially explosive atmosphere are often but not always clearly marked. They include:

- fuelling areas such as gas or petrol stations
- below deck on boats
- transfer or storage facilities for fuel or chemicals
- vehicles using liquefied petroleum gas, such as propane or butane
- areas when the air contains chemicals or particles such as grain, dust or metal powders
- Avoid using the modem in areas that emit electromagnetic waves or enclosed metallic structures e.g. lifts.
- any other area where you would normally be advised to turn off your engine

REVISION HISTORY

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2.0	2008-05-18	Released with Firmware version 2.1.3 Added Auto Delete SMS command AT$$AUTO_DLTSMS Added SMSOPT=AB if set sms notif is skipped New Reset command with 2 states. Maxon.rssi now returns ECIO in addition to the RSSI value.
2.1	2009-06-25	Added notes for the AT$$RESET and ATZ commands plus BOOTALERT message on power up

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1. OVERVIEW

The modem is a rugged, full duplex Data and SMS modem designed to operate on 3G 850MHz networks. 3G is an efficient and secure cellular wireless technology that compliments fixed or mobile applications.

The modem incorporates RS-232 and USB drivers, AC/DC down converter.

The modem connects directly to a HOST computer utilizing a RS-232C or USB V1.1 interface. The Host signals are converted to the RS-232C or USB 1.1 signal levels.

Designed to meet the requirements for global 3G markets, the modem will operate over the following TX /RX frequency ranges:

Transmit Frequency(MHz)		Receiver Frequency(MHz)	
850MHz	2100MHz	850MHz	2100MHz
824 ~ 849	1920 ~ 1980	869 ~ 894	2110 ~ 2170

The wide range supply input voltage of 9V to 36V provides compatibility for platforms utilizing a variety of power sources or battery capacity.

NOTE: Whilst the input supply for the modem is 9–36Vdc, the modem will not power-up at 9 volts. 9.5 volts is required for power-up. MT2 then remains powered-up until the voltage drops to 9 volts.

1.1. General Description

This manual has been provided to assist users and developers integrate the Maxon with host equipment and software for current or new applications. We will update the contents when applicable.

This manual defines the communications interface between host devices to the modem.

Integration with the cellular network is as per the following diagram.

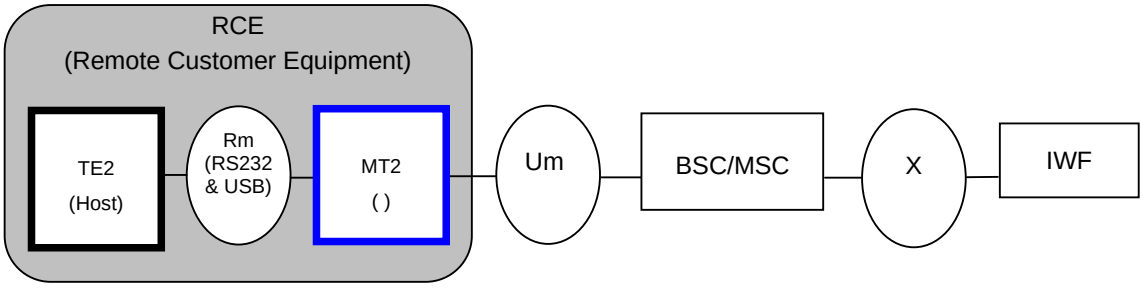


Figure 1-1 Network Integration

1.2. Terms

The following terms are used throughout this document. We have provided and explanation of these for your reference.

Table 1-1

Term	Description
<>	Field. Contents between '<' and '>' indicate the name of the field or the parameter required to complete the syntax.
<del>	Delimiter/Space. Insert a space.
AT command set	Communications command set interface between data terminal equipment (DTE) and data circuit terminating equipment (DCE).
BS	Base Station. Primarily a mobile phone tower in the carrier's domestic public cellular phone network used as the network end point for communicating with mobile stations. Depending upon the context, the term may refer to a cell, a sector within a cell, an MSC, an IWF, or other part of the cellular system.
BSC	Base Station Controller.
DCE	Same as MT2.
DTE	Same as TE2
IWF	Inter-working Function. An IWF provides the functions needed for data terminal equipment connected to a mobile termination to inter-work with terminal equipment connected to the PSTN. A physical implementation may include a pool of modems.
MO	Mobile-Originated where the SMS or the call is originated [sent] by the Mobile Station.
Mobile Station	A cellular device [e.g. this modem or a mobile phone handset] in the carrier's domestic public cellular phone network intended to be used when stationary, while in motion or during halts at unspecified points. Mobile stations may include fixed, portable (e.g., hand-held personal units) or vehicular units.
MSC	Mobile Switching Centre
MT	Mobile-Terminated where the SMS or the call is terminated [received] at the Mobile Station.
MT2	Mobile Termination 2An MT2 provides a non-ISDN (Rm) user interface, e.g., CCITT V series or CCITT X series. Same at DCE. Refers to the modem.
NVM	Non Volatile Memory. User changeable and is written at time of change or entry to a separate section of memory unaffected by power cycles. The setting value is available in all profiles.

Term	Description
PSTN	Public Switched Telephone Network refers primarily to the telephone system based on copper wires carrying voice, fax & data.
RCE	Remote Customer Equipment. Describes the MT2, Rm and TE2 as one composite system.
Rm	Hardwire Interface between MT2 and TE2.
SMS	Short text Message Service.
TE2	Terminal Equipment 2. A TE2 is a data terminal device that has a non-ISDN user-network interface, e.g., CCITT V series or CCITT X series. Same as DTE. Products which can issue AT command set and handle the response through UART or RS-232 signalling ports of the . The popular examples of MT2 are PC's, PDA and embedded systems i.e. Data Logger, PLC etc.
UART	Universal Asynchronous Receiver-Transmitter, the UART is a microchip component that handles asynchronous serial communication. Every computer contains a UART to manage the serial ports, and some internal modems such as have their own UART. UART 1(RS232 port) UART 2 (On serial for diagnostics)
UI	User Interface.
Um	Over-air interface between the MT2 and the BS.

2. AT INTERFACE DESCRIPTION

2.1. Basic Integration

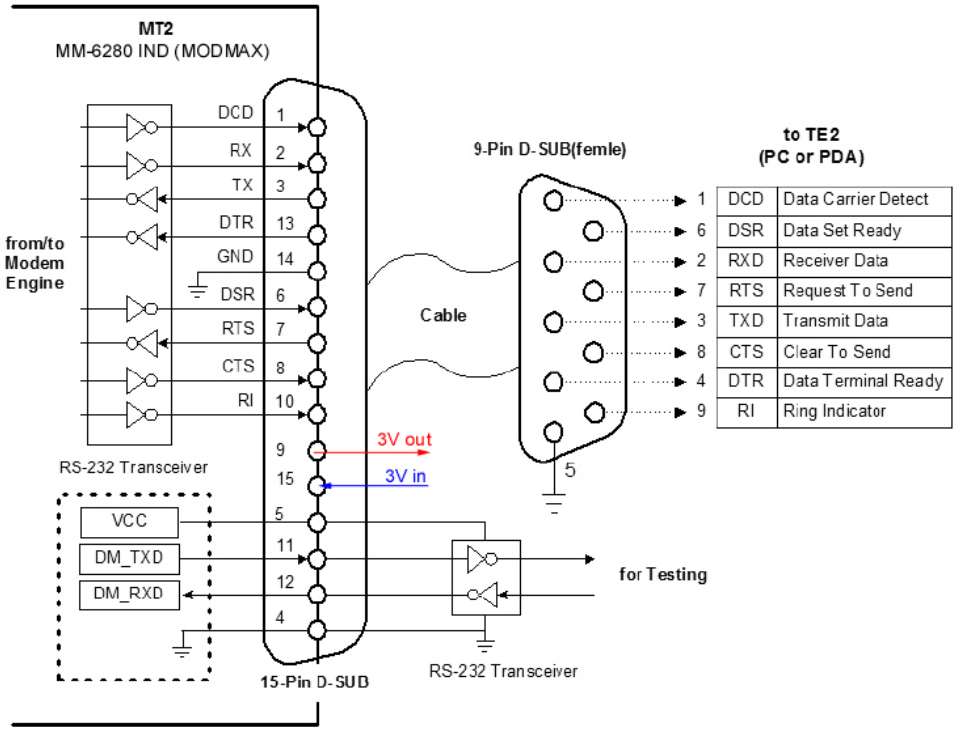
The modem supports asynchronous serial communication known as RS-232.

This chapter describes the basic integration and communication of MT2 with TE2. MT2 hereby defines and TE2 means host products which can issue AT commands and handle the response through UART or RS-232 signalling. The popular examples of TE2 are PC's, PDA's and unmanned systems such as Data Loggers, RTU's or PLC's.

2.2. Serial Interface

TE2's command and MT2's response pair is the basic interface sequence. The pairs should keep a pre-defined format and ignore the case of letters unless otherwise specified. Supports 2 serial interfaces, UART1 and UART2. UART1 serves an AT command set with ASCII character sequence and UART2 as a factory diagnostic port, serves an AT command with Async-HDLC format.

2.2.1. Pin out



2.3. Command Format

The AT command set in UART1 is based on ASCII text. The extended AT command set by Qualcomm start with “AT$QC” and the extended AT command set by Maxon Australia start with “AT$$”. All commands should finish by <CR>, 0x0d. Other formats and rules in the AT command set keep to IS-707A.

Any spaces in the AT command field are ignored and the space in the parameter field should be removed if it is not necessary unless otherwise specified.

With few exceptions the following syntax provides the given response for each AT command. Where not applicable the response is ERROR:

Table 2-2

Command	Description
AT*?**	reads current set value
AT*=?**	reads supported range of values
AT*=<value>**	changes current set value to new set value

NOTE: *** stands for the specific AT syntax.

2.4. Message Naming Convention

The following diagram shows the naming convention of messages between MT2 and TE2.

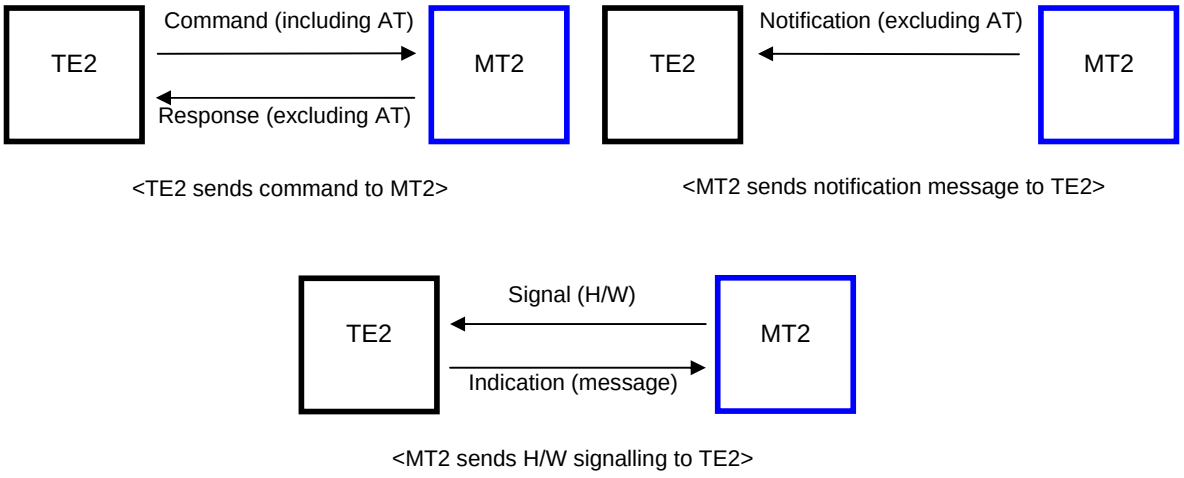


Figure 2-2 Naming convention diagram

3. BASIC INTERFACE CONFIGURATION

3.1. Baud Rate Set-up

This section provides basic information on setting the data communication rate [baud rate] on the Rm interface between MT2 and TE2.

3.2. Serial Interface

The default transfer rate is set to 115200bps with support to 230400bps. On the RS232 Serial connection.

NOTE: changes to +IPR rate are written to default NV memory in F0 profile independent of the &W command. Use &W command to write +IPR changes to F1-5 user profiles.

3.3. USB Interface

Autobaud is intrinsic within the functionality of USB. However the +IPR setting may be useful to limit baud rate for specific applications. USB automatically negotiates the maximum baud rate available.

Table 3-3 Read command

Command	**TE2**	**→**	**MT2**	**+IPR=?**
Response	TE2	←	MT2	+IPR: <value>
Value	+IPR: (1200, 2400, 4800, 9600, 19200), (45, 50, 75, 110, 150, 300, 600, 38400, 57600, 115200, 230400) [(<supported_autodetectable_rates>), (<supported_fixed-only_rates>)] Default: 115200			

Table 3-4 Read command

Command	**TE2**	**→**	**MT2**	**+IPR?**
Response	TE2	←	MT2	+IPR: <value>

Table 3-5 baud rate Set command

Command	**TE2**	**→**	**MT2**	**+IPR=<value>**
Response	TE2	←	MT2	<result_code> (OK | ERROR)

Connect Speed: This command will allow setting the "Connect Response" during an incoming or outgoing circuit switched call. When the option is set modem displays baud rate with connect message.

Special: Set command

Command	**TE2**	**→**	**MT2**	**$$Connect_Baud=<value>**
Response	TE2	←	MT2	$$ Connect_Baud = <value> <result_code> (OK | ERROR) 1: Modem displays baud rate set by +IPR command together with Connect message after a circuit switched connection is established. E.g. If IPR is set to 19200, the connect message should display Connect 19200. 0: Displays only connect message. In this case the modem only display Connect after a circuit switched connection is established.

3.4. IO Functions

To Change the IO functions of the modem use the AT$$IO_FUNCTION command

Table 3-6 Read command

Command	**TE2**	**→**	**MT2**	**$$IO_FUNCTION?**
Response	TE2	←	MT2	$$IO_FUNCTION: <value>

Table 3-7 Set command

Command	**TE2**	**→**	**MT2**	**$$IO_FUNCTION =<value>**
Value	0, Disable IO_Function 1, Activate SMSIO Functions (Default Value) 2, Data State Report functions A. Serial 1(DCD Pin) Pin is high. In connection state B. Serial 1(DCD Pin) is low on disconnection state			

3.5. AT Notification Options

MT2 will send all notification/notify commands including SMS to TE2 as determined by the $$NOTIFCNT value.

Notification count (AT$$NOTIFCNT)

Table 3-8 Read command

Command	**TE2**	**→**	**MT2**	**$$NOTIFCNT?**
Response	TE2	←	MT2	$$NOTIFCNT: <value>

Command	TE2	→	MT2	$$NOTIFCNT?
Value	0: No notification (No boot alert message, No SMS message notification. Notifies of incoming data calls.) 1: No boot alert message on start-up but notifies when SMS message is received. Notifies of incoming data calls 2: Notify Once (default) Boot up alert message on start-up and notifies when SMS message is received. Notifies of incoming data calls			

Table 3-9 Set command

Command	TE2	→	MT2	$$NOTIFCNT=<value>
Response	TE2	←	MT2	$$NOTIFCNT: 1 | 0 (Success | Failure)

4. SIGNAL INFORMATION

4.1. MT SMS

Table 4-10

Status	Signal	Action
Idle, Data	AT	SMS Notification to Serial and USB ports
	Buzzer	$$SMSNOTIF value “0”: No alert $$SMSNOTIF value “1”: Buzzer alerts 4 times initially only $$SMSNOTIF value “2”: Buzzer alerts 4 times initially followed by once every two sec. $$SMSNOTIF value “3”: Buzzer alerts 4 times initially only

4.2. MT DATA

Table 4-11

Signal	Action
AT	‘RING’ notification
Ring Buzzer	Audible Ring (excepting where $$RCV_MODE is 1)

5. INTERFACE ENVIRONMENT

5.1. MT2 Basic Operational State.

This command set enables the user to set up and/or confirm MT2's basic operational environment.

5.1.1.1. Boot alert

After power up MT2 notifies TE2 it is active on the network and in idle state by this command.

Set command

Command	**TE2**	→	**MT2**	**$$BOOT_ALERT=<value>**
Response	TE2	←	MT2	$$BOOT_ALERT= <value> <result_code> (OK | ERROR)

Table 5-12 Notification command

Command	**TE2**	→	**MT2**	**AT$$BOOT_ALERT?**
Notify	TE2	←	MT2	$$TELSTRA 3G
VALUE				0 – Disable boot alert 1 – Enable Boot alert

Note:

If you switch off flow control (AT+IFC=0,0) and set ignore DTR circuit (AT&D0) the boot alert message will not show up on serial port when the modem powers up with firmware R2.1.3.

5.1.1.2. Lock order

If the IMEI or the IMSI stored in MT2 is invalid, MT2 sends this command to TE2.

Table 5-13 Notification command

Notify	**TE2**	←	**MT2**	**+CERROR: NO CARRIER**

5.1.1.3. SMS TE2 emergency MO registration alert (AT$$EMMOREG)

This command is used for basic monitoring of TE2 condition. MT2 can be set to look for $$TE2ALIVE command from TE2. If MT2 doesn't receive $$TE2ALIVE command from TE2 within the time frame as set by this $$EMMOREG command, MT2 will assume a problem exists at TE2. MT2 automatically sends an SMS alert message to a user defined mobile number.

$$EMMOREG functionality is disabled after the first alert SMS message to prevent continual SMS transmittal.

NOTE: To re-enable this feature the modem requires the $$EMMOREG Set command to be re-entered.

The applicable TI for this function is; 4098 (text message).

Table 5-14 Read command

Command	**TE2**	→	**MT2**	**$$EMMOREG?**
Response	TE2	←	MT2	$$EMMOREG: period,terminatednumber,TI,msg
Value	period: 5 – 300 (seconds) terminatednumber: mobile number TI: Teleservice Identifier (4098) msg: User data			

Table 5-15 Set command

Command	**TE2**	→	**MT2**	**$$EMMOREG=<period,terminatednumber,TI,msg>**
Command	TE2	→	MT2	$$EMMOREG=CANCEL (Disable – No $$TE2ALIVE command expected by MT2)
Response	TE2	←	MT2	$$EMMOREG: 1 | 0 (Success | Failure)

5.1.1.4. TE2 active command (AT$$TE2ALIVE)

If $$EMMOREG command has been enabled in MT2 then TE2 must transmit $$TE2ALIVE command to MT2 within the time frame value specified in the $$EMMOREG command.

Table 5-16

Command	**TE2**	→	**MT2**	**$$TE2ALIVE**
Response	TE2	←	MT2	<result_code> (OK | ERROR)

5.1.1.5. Power Reset (AT$$RESET)

Command to reset Modem, which is utilised to perform an immediate or scheduled soft power-off/on cycle.

Table 5-17 Read command

Command	**TE2**	→	**MT2**	**$$RESET?**
Response	TE2	←	MT2	$$RESET: <value>, <on/off>
Value	time: 0~12960000 (minutes) **(0: Periodic Power Reset Disabled - Default)**			
On/off	0: will execute time only in idle state, IPStack in listening state connecting using $$IPCTOS command not the $$CNS command 1: will execute timer in all states			

Table 5-18 Set command (scheduled reset)

Command	**TE2**	→	**MT2**	**$$RESET=<value>,<on/off>**
Response	TE2	←	MT2	$$RESET: <time>, <on/off> <result_code> (OK | ERROR)

Table 5-19 Execute command (performs immediate reset)

Command	**TE2**	→	**MT2**	**$$RESET**

Command	TE2	→	MT2	$$RESET
Response	TE2	←	MT2	$$RESET: 1 | 0 (Success | Failure)

Note:

Using the new format with the old firmware R1.1.17 will cause the modem to hang. For older firmware (R1.1.17 please use AT$$RESET=n where n is in minutes)

5.1.1.6. Current time (AT$$TIME)

This command enables the user to view the current date, time and day.

Table 5-20 Read command

Command	TE2	→	MT2	$$TIME
Response	TE2	←	MT2	$$TIME: <yyyy-mm-dd,HH:MM:SS,sss(Day of Week)>
Value	sss: milliseconds Day of Week: SUN, MON, TUE, WED, THU, FRI, SAT			

5.1.1.7. Software version (AT$$SWVER)

This command enables the user to view the MT2 software version.

Table 5-21 Read command

Command	TE2	→	MT2	$$SWVER?
Response	TE2	←	MT2	$$SWVER: <software_version>
Example	software_version: (example: CHM628 R1.1.18 [Jul 09 2007 15:35:17])			

5.2. Power Conservation Commands

5.2.1.1. Sleep mode control (AT$$SLEEP_ENABLE)

This command is used for control of the Sleep mode of the engine. This is useful to reduce the current draw for power conservation applications. The engine constantly cycles through 'sleep'/'idle' modes when value is 1. This setting has no effect on the ability of the MT2 to MT or MO calls.

Table 5-22 Read command

Command	TE2	→	MT2	$$SLEEP_ENABLE?
Response	TE2	←	MT2	$$SLEEP_ENABLE: <value>
Value:	0: Sleep mode disable **1: Sleep mode enable (Default)**			

Table Error! No text of specified style in document.**-23 Set command**

Command	TE2	→	MT2	$$SLEEP_ENABLE=<value>
Response	TE2	←	MT2	$$SLEEP_ENABLE: <value><result_code> (OK | ERROR)

5.2.1.2. LED control (AT$$EXT_LED)

This command is used for control of the LED's on-time. Changes made to this function are written to NV memory and will be present in all profiles.

Table 5-24 Read command

Command	**TE2**	**→**	**MT2**	**$$EXT_LED?**
Response	TE2	←	MT2	$$EXT_LED: <value>
Value	Time: 0~255 seconds **(0: Continuous LED ON - Default)**			

Table 5-25 Set command

Command	**TE2**	**→**	**MT2**	**$$EXT_LED=<value>**
Response	TE2	←	MT2	$$EXT_LED: <value> <result_code> (OK | ERROR)

5.2.1.3. RS232C Transceiver power-down control (AT$$RS232_PWRDOWN)

This command is used for control of the RS232C Transceiver Power Down function. When there are no valid signal transmissions on all receiver and transmitter inputs for 30 seconds, the transceivers are shut off, reducing current draw for power conservation applications.

TE2 can activate resumption of RS232 power up via dummy AT command. MT2 activity such as MT calls or MT SMS or AT Alerts will wake RS232 from power-down and pass these to TE2.

Table 5-26 Read command

Command	**TE2**	**→**	**MT2**	**$$RS232_PWRDOWN?**
Response	TE2	←	MT2	$$RS232_PWRDOWN: <value>
Value	**0: Power Down disabled (Default)** **1: Power Down enabled. The modem should go in power save modem after 30 seconds on inactivity on the RS232. An incoming AT command, SMS or data call should wake the modem up. The modem will not go into sleep mode while in a packet data or circuit switched call.** **Sleep mode will work only when modem is idle.**			

Table 5-27 Set command

Command	**TE2**	**→**	**MT2**	**$$RS232_PWRDOWN=<value>**
Response	TE2	←	MT2	$$RS232_PWRDOWN: <value> <result_code> (OK | ERROR)

5.3. Low Battery Voltage Notification

MT2 transmits low battery notifications to TE2 and initiates MO SMS alerts by this command where the voltage drops to user determined $$LOWBATT 1 set point or reaches the factory default set points.

NOTE: Whilst the input supply for the is 9–36Vdc, the modem will not power-up at 9 volts. 9.5 volts is required for power-up. MT2 then remains powered-up until the voltage drops to 9 volts.

5.3.1.1. SMS low battery voltage set point (AT$$LOWBATT_VTG)

This command also sets the SMS Auto Voltage Alert value. (For remote user SMS notification activation please see SMS Auto Voltage Alert).

Table 5-28 Read command

Command	**TE2**	→	**MT2**	**$$LOWBATT_VTG?**
Response	TE2	←	MT2	$$LOWBATT_VTG: <value1>
Value1	**610: Default – voltage point set for $$LOWBATT 1 notification** xxxx: 4 digit number representing voltage to 2 decimal points x100 (i.e. 12.8 volts would be represented as 1280, 9VDC would be 0900) Value range is from 0910 to 3600. E: If the first digit entered is a zero it is ignored in the response.			

Table 5-29 Set command

Command	**TE2**	→	**MT2**	**$$LOWBATT_VTG=<value>**
Response	TE2	←	MT2	$$LOWBATT_VTG: <value> <result_code> (OK | ERROR)

5.3.1.2. Low battery notification (AT$$LOWBATT)

Table 5-30 Notification command

Notify	**TE2**	←	**MT2**	**$$LOWBATT: <value>**
Value	0: normal state (voltage above 9.1VDC or that set by $$LOWBATT_VTG) 1: Low Battery (voltage has dropped to the point set at $$LOWBATT_VTG) 2: Power-off sequence initiated - battery voltage has reached 5.8VDC			

NOTE: When the power supply to MT2 reaches 9.1 volts the modem will power up and send a $$LOWBATT 1 notification to TE2. It does not send SMS alert at this time. SMS alert is automatically reinstated once the voltage exceeds the $$LOWBATT 1 set point PLUS 10% as seen by the modem.

The following shows MT2's responses against the battery level.

Table 5-31 Responses

Battery Level	**MT2**
Batt level=1	a) Notifies TE2 with AT: $$LOWBATT:1 b) Notifies local user: buzzer (repetition approx every 2 minutes) c) Notifies with MO SMS if enabled
Batt level=2	Transmits $$LOWBATT:2 to TE2 Executes MT2 power-down sequence

NOTE: Tolerance of voltage readings is +/-0.4V on average.

NOTE: Modem will auto power up once supply voltage reaches 6.5VDC.

5.4. Visual/Audible Call Alert Options

5.4.1.1. Receiving notification mode option (AT$$RCV_MODE))

This command is used for selecting preferred mode of incoming call alert.

Table 5-32 Read command

Command	**TE2**	→	**MT2**	**$$RCVMODE?**
Response	TE2	←	MT2	$$RCV_MODE: <value>
Value	**0: LED with Ring (Default)** 1: LED only 2: Ring Only			

Table 5-33 Set command

Command	**TE2**	→	**MT2**	**$$RCV_MODE=<value>**
Response	TE2	←	MT2	$$RCV_MODE: 1 | 0 (Success | Failure)

5.4.1.2. Ringer volume control (AT$$RINGLVL)

The command is used to test or set ringer volume level. MT2 applies new setting after TE2 reads or changes the volume setting.

This command causes the MT2 to ring once at current or set level.

Table 5-34 Read command

Command	**TE2**	→	**MT2**	**$$RINGLVL?**
Response	TE2	←	MT2	$$RINGLVL: <value>
Value	ring level: (0~4) (0: mute) **Default: 2**			

Table 5-35 Set command

Command	**TE2**	→	**MT2**	**$$RINGLVL=<value>**
Response	TE2	←	MT2	<result_code> (OK | ERROR)

5.4.1.3. Ringer melody selection (AT$$RINGIDX)

This command is used to test or set ringer melody. MT2 applies new setting when TE2 reads or changes the ringer melody setting.

This command causes the MT2 to ring once at current or set level.

Table 5-36 Read command

Command	**TE2**	→	**MT2**	**$$RINGIDX?**
Response	TE2	←	MT2	$$RINGIDX: <value>
Value	Current melody Index (0~4) **Default: 0**			

Table 5-37 Set command

Command	**TE2**	→	**MT2**	**$$RINGIDX=<value>**

Command	TE2	→	MT2	$$RINGIDX=<value>
Response	TE2	←	MT2	<result_code> (OK | ERROR)

5.5. Network Relational Settings

5.5.1.1. Roaming indicator information (AT$$ROAMIND)

This command is used for reading Roaming Indicator Information.

Table 5-38 Read command

Command	TE2	→	MT2	$$ROAMIND
Response	TE2	←	MT2	$$ROAMIND: <value>
Value	0: Not Roaming 1: Roaming inside preferred roaming list 2: Roaming outside preferred roaming list			

5.5.1.2. Antenna Signal Level report schedule (AT$$ANTSET)

The command is used for reading or setting the notification period of $$ANTLVL notification in seconds. If no changes are monitored $$ANTLVL does not report to $$ANTSET values.

Table 5-39 Read command

Command	TE2	→	MT2	$$ANTSET?
Response	TE2	←	MT2	$$ANTSET: <value>
Value	0: Read once 1~43200: Notification every <x> seconds			

Table 5-40 Set command

Command	TE2	→	MT2	$$ANTSET=<value>
Response	TE2	←	MT2	<result_code> (OK | ERROR)

5.5.1.3. Antenna Signal Level (AT$$ANTLVL)

The antenna level range is 0 (no service) to 7 (strong signal). If no changes are monitored $$ANTLVL does not report to $$ANTSET values.

Table 5-41 Notification command

Notify	TE2	←	MT2	$$ANTLVL: <value>
Value	0-7: 0 (no service) to 7 (strong signal)			

If MT2 doesn't receive a response (ACK) against ANTLVL, MT2 notifies two more times at the set interval irrespective to any changes to the level.

5.5.1.4. Modem scheduled Information (AT$$Ping)

Scheduled information will include Antenna Signal, EC\Io, Time, RSCP Level and Location

Example output: RSSI[79], TIME[2007-07-18,08:20:21,WED],

ECIO:-13 ,RSCP[-71], L0151 R01 CI1CA5 SRB0----

Read command

Command	**TE2**	→	**MT2**	**$$PING?**
Response	TE2	←	MT2	$$PING: <value>
Value	1~43200: Notification every <x> seconds. The modem sends a notification continuously (at set interval). The notification should include RSSI, Time, EC\Io, RSCP and location. 0 – disables this feature			

Table 5-42 Set command

Command	**TE2**	→	**MT2**	**$$PING=<value>**
Response	TE2	←	MT2	<result_code> (OK | ERROR)

5.5.1.5. RSSI inquiry (AT$$RSSI)

The command is used for reading the current RSSI value of the signal.

The RSSI LED will be OFF when RSSI is less than -105dBm, flashing when in-between the -95dBm and -105dBm, and ON when greater than or equal to -95dBm.

NOTE: the higher the negative number i.e. the further away from ZERO, the weaker the received signal. The smaller the number i.e. the closer to ZERO, the stronger the received signal.

A flashing RSSI LED indicates potential need for an alternative antenna, relocating the antenna to a site more suited to signal acquisition, or elevation of the antenna to improve signal acquisition, or a combination of all the above.

A consistent RSSI reading of -95dBm or better [number closer to '0'] is advisable.

Table 5-43 Read Command

Command	**TE2**	→	**MT2**	**$$RSSI?**
Response	TE2	←	MT2	$$RSSI: <value>
Value	RSSI: (-dBm)			

5.5.1.6. Reading MT2 state (AT$$CURRSTATE)

This command displays current MT2 state information.

Table 5-44 Read command

Command	**TE2**	→	**MT2**	**$$CURRSTATE**
Response	TE2	←	MT2	$$CURRSTATE: <value>

Command	TE2	→	MT2	$$CURRSTATE
Value	-1: Offline 0: Idle state 1: Initialisation state 2: Alert state 3:Conversation state 4: Access state 5: Paging state			

5.5.1.7. RF information (AT$$RFINFO)

This command enables user to acquire RF information between MT2 and the on-air system. MT2 transmits the following messages according to an argument status between MT2 and the on-air system.

Table 5-45 Set command

Command	TE2	→	MT2	$$RFINFO=<interval_value>
Response	TE2	←	MT2	$$RFINFO:<CHAN,RX,[TX_ADJ],[TX],[FER],PN,EcIo>
Value	Interval: MT2's response cycle in seconds Interval 1: One time report(response) Interval x: Report per x seconds (2 - 255) **Interval 0: No reporting (Default)**			
Report	CHAN: Channel number(ex:779) RX: RX power (dBm) (ex:-60) [TX_ADJ]: Adjust value (dB), response on traffic status [TX]: TX power(dBm), response on traffic status [FER]: Frame error rate(%), response on traffic status PN: PN number no in best eclo(ex:470) EcIo: BestEcIo, (dB) RSCP			

5.5.1.8. Location information (AT$$LOCATION)

This command enables user to acquire location information from the on-air system. MT2 transmits the following messages according to an argument status between MT2 and the on-air system.

Example: $$LOCATION: MCC:505, MNC:01, WCDMA: 850 L0151 R01 CI1CA5 SRB0- PSC:426

Table 5-46 Read command

Command	TE2	→	MT2	$$LOCATION?
Response	TE2	←	MT2	$$LOCATION: <SID, NID, Reg_zone, Base_id, Pilot_pn>

6. DIAGNOSTIC COMMANDS

These commands are used for testing and diagnostic purposes. They can not be used in the calling state.

6.1.1.1. Ring test (AT$$DIAG_RING)

This command is used to confirm MT2 ring alert function.

Table 6-47 Execute Command

Command	**TE2**	→	**MT2**	**$$DIAG_RING=<value>**
Response	TE2	←	MT2	$$DIAG_RING: 1 | 0 (Success | Failure)
Value	1 – 20000 Ringing time in sec 0: stop test			

6.1.1.2. LED test (AT$$DIAG_LED)

NOTE: This function incorporates a soft power reset.

This command is used to check MT2 LED lamps function and requires MT2 to be in the off-line command state. All LED are tested apart from PWR. After command has been issued the LED are turned off, then come on one by one. This is followed by a soft power reset.

Table 6-48 Execute Command

Command	**TE2**	→	**MT2**	**$$DIAG_ LED=1**
Response	TE2	←	MT2	$$DIAG_LED: 1 (response back when test starts) $$DIAG_LED: (response when the tests finishes) OK (Modem resets power) (After power up the following notification is effected) $$TELSTRA 3G

6.1.1.3. RSSI LED response (AT$$RSSI_LEVEL)

The command is used to read or set the RSSI values governing the performance of the RSSI LED.

The RSSI LED will be OFF when RSSI is less than the lower_value, flashing when in-between the upper_value and the lower_value, and ON when greater that the upper_value.

NOTE: the higher the negative number i.e. the further away from ZERO, the weaker the received signal. The smaller the number i.e. the closer to ZERO, the stronger the received signal. Therefore lower value refers to a weaker signal than upper value.

A flashing RSSI LED when default values are set indicates potential need for an alternative antenna, relocating the antenna to a site more suited to signal acquisition, or elevation of the antenna to improve signal acquisition, or a combination of all the above.

Table 6-49 Read Command

Command	**TE2**	→	**MT2**	**$$RSSI_LEVEL?**
Response	TE2	←	MT2	$$RSSI_LEVEL: <upper_value>, <lower_value>

Command	TE2	→	MT2	$$RSSI_LEVEL?
Value	Default settings in –dBm units: **Upper: 95** (-dBm) Stronger **Lower: 120** (-dBm) Weaker			

Table 6-50 Set Command

Command	TE2	→	MT2	$$RSSI_LEVEL=<upper_value>,<lower_value>
Response	TE2	←	MT2	$$RSSI_LEVEL: <upper_value>, <lower_value>
Value	Upper: 20 ~ 100 (-dBm) Lower: 50 ~ 120 (-dBm) E: upper_value must be a lower number than the lower_value			

6.1.2. Led Description

Power:

On when modem has power and signal is above or better than -95dbm.

Flashing when modem has power and signal is between -95 to -120dBm.

Turn off when signal is below -120dbm or no signal.

CRT:

On when modem has a circuit switched data connection established. Flashing when there is an incoming circuit switched data call.

PKT:

On when modem has a packet data session (dormant).

Flashing when sending and receiving data.

TX/DTR:

Idle – On when a host is present or as set by &D0 setting.

Off when a host is not present or as set by &D0

Circuit Switched Data Connection:

Flashing when transmitting data during a circuit switched connection.

Off when not transmitting data in a circuit switched connection.

RX:

Flashing when receiving data during a circuit switched connection.

Off when not receiving data in a circuit switched `.

7. DATA CALL SET-UP

The following tables describe MO data call procedures.

Call released or failed (Uses DTR pin)

Table 7.51 Notification command

Notify	**TE2**	←	**MT2**	**NO CARRIER**

7.1. Data Calls

SIM Card with Data Number enabled (Contact Telstra and ask to activate Code 2620 on the SIM account)

7.1.1.1. MO data call

Table 7.52

Command	**TE2**	→	**MT2**	
Command	TE2	→	MT2	ATD<phone_number>
Notify	TE2	←	MT2	CONNECT (Data call connected) Connect <Speed> if connect_baud is set. NO CARRIER (Data call failure)
Value	phone_number: for Packet Switched Data: *99# (Australia – requires authentication) This requires setting up an APN (Please refer to MM-6280IND-HSDPA AT Commands manual) for Circuit Switched Data: You will need a data number (Code 2620 activated on the SIM account)			

7.1.1.2. MT Data Call

Notify	**TE2**	←	**MT2**	**AT: RING** **Buzzer: Audible (excepting where $$RCV_MODE is 1)** **CRT LED: ON for duration of ring and when MT data call in progress. CRT LED should be off otherwise**
Command	TE2	→	MT2	ATA (answer data call)
Notify	TE2	←	MT2	CONNECT (Data call connected) CONNECT <SPEED> if connect_baud is enabled. NO CARRIER (Data call failure)
Call State				
Command	TE2	→	MT2	+++ (escape command to go to off-line command state) ATH (release call)
Notify	TE2	←	MT2	NO CARRIER

8. SMS commands

8.1.1. General Configuration Commands

8.1.1.1. Select Message Service +CSMS

Set command selects messaging service <service>. It returns the types of messages supported by the ME: <mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages. If chosen service is not supported by the ME (but is supported by the TA), final result code +CMS ERROR: <err> shall be returned. See chapter Message Service Failure Result Code for a list of <err> values.

Also read command returns supported message types along the current service setting.

Test command returns a list of all services supported by the TA.

Table 1. +CSMS action command syntax

Command	Possible response(s)
+CSMS=<service>	+CSMS: <mt>,<mo>,<bm> +CMS ERROR: <err>
+CSMS?	+CSMS: <service>,<mt>,<mo>,<bm>
+CSMS=?	+CSMS: (list of supported <service>s)
Value	<service> 0 : 3GPP TS 23.040 and 3GPP TS 23.041 1 :
	<mt> 0 : type not support 1 : type support
	<mo> 0 : type not support 1 : type support
	<bm> 0 : type not support 1 : type support

8.1.1.2. Preferred Message Storage +CPMS

Set command selects memory storages <mem1>, <mem2> and <mem3> to be used for reading, writing, etc. If chosen storage is not appropriate for the ME (but is supported by the TA), final result code +CMS ERROR: <err> shall be returned. See chapter Message Service Failure Result Code for a list of possible <err> values.

Test command returns lists of memory storages supported by the TA.

Table 24. +CPMS action command syntax

Command	Possible response(s)
+CPMS=<mem1>[,<mem2>[,<mem3>]]	+CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3> *+CMS ERROR: <err>*
+CPMS?	+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>, <mem3>,<used3>,<total3> *+CMS ERROR: <err>*
+CPMS=?	+CPMS: (list of supported <mem1>s),(list of supported <mem2>s), (list of supported <mem3>s)

8.1.1.3. Message Format +CMGF

Set command tells the TA, which input and output format of messages to use. <mode> indicates the format of messages used with send, list, read and write commands and unsolicited result codes resulting from received messages. Mode can be either PDU mode (entire TP data units used) or text mode (headers and body of the messages given as separate parameters). Text mode uses the value of parameter <chset> specified by command Select TE C haracter Set +CSCS to inform the character set to be used in the message body in the TA-TE interface.

Test command returns supported modes as a compound value.

Table 3. +CMGF action command syntax

Command	Possible response(s)
+CMGF=[mode]	+CMGF: mode
+CMGF?	+CMGF: mode
+CMGF=?	+CMGF: (list of supported <mode>s)
Value	<mode> 0 : PDU mode (default when implemented) 1 : text mode

8.1.1.4. Message Service Failure Result Code +CMS ERROR

Final result code +CMS ERROR: <err> indicates an error related to mobile equipment or network. The operation is similar to ERROR result code. None of the following commands in the same command line is executed. Neither ERROR nor OK result code shall be returned. ERROR is returned normally when error is related to syntax or invalid parameters.

Table 4. <err> values used by common messaging commands:

value	Description
0...127	3GPP TS 24.011 clause E.2 values
128...255	3GPP TS 23.040 clause 9.2.3.22 values.
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	(U)SIM not inserted
311	(U)SIM PIN required
312	PH-(U)SIM PIN required
313	(U)SIM failure
314	(U)SIM busy
315	(U)SIM wrong
316	(U)SIM PUK required
317	(U)SIM PIN2 required
318	(U)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
…511	other values in range 256…511 are reserved
512…	manufacturer specific

8.1.1.5. Informative Examples

Setting up a TA supporting SMS:

```
AT+CSMS=?                  (inquiry of available services in TA)
+CSMS: (0)                    OK
AT+CSMS=0;+CPMS=?             (set  SMS; query available memories)
+CSMS: 1,1,1           (all MT, MO and CBM supported)
+CPMS: ("BM","ME","SM"),("ME","SM"),("ME","SM") (CBM, ME and (U)SIM memories
OK                      for reading, ME and (U)SIM memories for writing)
AT+CPMS="ME","ME","ME";+CMGF=?     (set ME memory; query available message
formats)
+CPMS: "ME",5,99,"ME",5,99,"ME",5,99 (five messages in ME, 99 total space)
+CMGF: (0,1)                  (both text and PDU mode implemented)
OK
AT+CMGF=1;+CSCS=?             (select text mode; query available TE character
sets)
+CSCS: ("IRA","PCCP437","8859-1")
OK
AT+CSCS="PCCP437"             (select PC code page 437)
OK
```

Message Configuration Commands

8.1.1.6. Service Centre Address +CSCA

Set 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 <pdu> parameter equals zero

Table 5. +CSCA action command syntax

Command	Possible response(s)
+CSCA=<sca>[,[tosca>]	
+CSCA	+CSCA: <sca>,<tosca>
+CSCA=?	

8.1.1.7. Set Text Mode Parameters +CSMP

Set command is used to select values for additional parameters needed when SM 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 when the SM 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 EVPF, see 3GPP TS 23.040 , it shall be given as a hexadecimal coded string (refer e.g. <pdu>) with double quotes.

NOTE: When storing a SMS-DELIVER from the TE to the preferred memory storage in text mode (refer command Write Message to Memory +CMGW), <vp> field can be used for <scts>.

Table 6. +CSMP action command syntax

Command	Possible response(s)
+CSMP=[<fo>[,<vp>[,<pid>[,<dcs>]]]]	
+CSMP?	+CSMP: <fo>,<vp>,<pid>,<dcs>
+CSMP=?	

8.1.1.8. Show Text Mode Parameters +CSDH

Set command controls whether detailed header information is shown in text mode result codes.

Test command returns supported values as a compound value

Table 7. +CSDH action command syntax

Command	Possible response(s)
+CSDH=[<show>]	
+CSDH?	+CSDH: <show>
+CSDH=?	+CSDH: (list of supported <show>s)
Value	<show>: 0 do not show header values defined in commands +CSCA and +CSMP (<sca>, <tosca>, <fo>, <vp>, <pid> and <dcs>) nor <length>, <toda> or <tooa> in +CMT, +CMGL, +CMGR result codes for SMS-DELIVERs and SMS-SUBMITs in text mode; for SMS-COMMANDs in +CMGR result code, do not show <pid>, <mn>, <da>, <toda>, <length> or <cdata> 1 show the values in result codes

8.1.1.9. Informative Examples

```
In this example, the volatile parameter settings of TA are used to construct
messages in text mode. SMSC address setting is used also in PDU mode

AT+CRES                  (restore settings from non-volatile memory to volatile
memory)
OK
AT+CSMP?;+CSCA?          (query SM parameters)
+CSMP: 17,167,0,0        (default values for SMS-SUBMIT)
+CSCA: "+358501234567",145   (SMSC address)
OK
```

Message Receiving and Reading commands

8.1.1.10. New Message Indications to TE +CNMI

Set command selects the procedure, how receiving of new 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 3GPP TS 23.038 .

NOTE 1: When DTR signal is not available or the state of the signal is ignored (V.25ter command &D0), reliable message transfer can be assured by using +CNMA acknowledgement procedure.

<mode> controls the processing of unsolicited result codes specified within this command, <mt> sets the result code indication routing for SMS-DELIVERs, <bm> for CBMs and <ds> for SMS-STATUS-REPORTs. <bfr> defines the handling method for buffered result codes when <mode> 1, 2 or 3 is enabled. If ME does not support requested item (although TA does), final result code +CMS ERROR: <err> is returned. See chapter Message Service Failure Result Code for a list of <err> values.

Test command gives the settings supported by the TA as compound values.

NOTE 2: Command Select Message Service +CSMS should be used to detect ME support of mobile terminated SMs and CBMs, and to define whether a message routed directly to TE should be acknowledged or not (refer command +CNMA).

Table 8. +CNMA action command syntax

Command	Possible response(s)
+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]	*+CMS ERROR: <err>*
+CNMI?	+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr>
+CNMI=?	+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)
Value	<mode> NOTE : The buffering mechanism may as well be located in the ME; the setting affects only to unsolicited result codes specified within this command): 0 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 on-line data mode) and flush them to the TE after reservation. Otherwise forward them directly to the TE. 3 Forward unsolicited result codes directly to the TE. TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode. NOTE 4: It is possible that ME/TA result code buffer is in volatile memory. In this case messages may get lost if the power of ME/TA is switched off before codes are sent to TE. Thus, it is not recommended to use direct message routing (<mt>=2 or 3, <bm>=2 or 3, or <ds>=1) with <mode> value 0 or 2. <mt> the rules for storing received SMs depend on its data coding scheme (refer 3GPP TS 23.038), preferred memory storage (+CPMS) setting and this value; NOTE 5: If AT command interface is acting as the only display device, the ME must support storing of class 0 messages and messages in the message waiting indication group (discard message); 0 No SMS-DELIVER indications are routed to the TE. 1 If SMS-DELIVER is stored into ME/TA, indication of the memory location is routed to the TE using unsolicited result code: +CMTI: <mem>,<index> 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: +CMT: [<alpha>],<length><CR><LF><pdu> (PDU mode enabled); or +CMT: <oa>, [<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>, <length>]<CR><LF><data> (text mode enabled; about parameters in italics, refer command Show Text Mode Parameters +CSDH) If ME has its own display device then class 0 messages and messages in the message waiting indication group (discard message) may be copied to both ME display and to TE. In this case, ME shall send the acknowledgement to the network. Class 2 messages and messages in the message waiting indication group (store message) result in indication as defined in <mt>=1. 3 Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1. <bm> the rules for storing received CBMs depend on its data coding scheme (refer 3GPP TS 23.038), the setting of Select CBM Types (+CSCB) and this value

	0 No CBM indications are routed to the TE.
	
	1 If CBM is stored into ME/TA, indication of the memory location is routed to the TE using unsolicited result code:
	
	`+CBMI: <mem>,<index>`
	
	2 New CBMs are routed directly to the TE using unsolicited result code:
	
	`+CBM: <length><CR><LF><pdu>` (PDU mode enabled); or
	
	`+CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>` (text mode enabled)
	
	If ME supports data coding groups which define special routing also for messages other than class 3 (e.g. (U)SIM specific messages), ME may choose not to route messages of such data coding schemes into TE (indication of a stored CBM may be given as defined in `<bm>`=1).
	
	3 Class 3 CBMs are routed directly to TE using unsolicited result codes defined in `<bm>`=2. If CBM storage is supported, messages of other classes result in indication as defined in `<bm>`=1
	
	`<ds>`
	0 No SMS-STATUS-REPORTs are routed to the TE.
	
	1 SMS-STATUS-REPORTs are routed to the TE using unsolicited result code:
	
	`+CDS: <length><CR><LF><pdu>` (PDU mode enabled); or
	
	`+CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>` (text mode enabled)
	
	2 If SMS-STATUS-REPORT is stored into ME/TA, indication of the memory location is routed to the TE using unsolicited result code:
	
	`+CDSI: <mem>,<index>`
	
	`<bfr>`
	0 TA buffer of unsolicited result codes defined within this command is flushed to the TE when `<mode>` 1...3 is entered (`OK` response shall be given before flushing the codes).
	
	1 TA buffer of unsolicited result codes defined within this command is cleared when `<mode>` 1...3 is entered.

8.1.1.11. List Messages +CMGL

Execution command returns messages with status value `<stat>` from message storage `<mem1>` to the TE. About text mode parameters in italics, refer command Show Text Mode Parameters `+CSDH`. If status of the message is 'received unread', status in the storage changes to 'received read'. If listing fails, final result code `+CMS ERROR: <err>` is returned. See chapter Message Service Failure Result Code for `<err>` values.

NOTE: If 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.

Table 9. +CMGL action command syntax

Command	Possible response(s)
+CMGL[=<stat>]	**if text mode (+CMGF=1), command successful and SMS-SUBMITs and/or SMS-DELIVERs:** +CMGL:<index>,<stat>,<oa/da>,[<callback_num>],<alpha>,[<scts>]*[,<tooa/toda>,<length>]*<CR><LF><data>[<CR><LF> +CMGL:<index>,<stat>,<da/oa>,[<callback_num>],<alpha>,<scts>*[,<tooa/toda>,<length>]*<CR><LF><data>[...]] **if text mode (+CMGF=1), command successful and SMS-STATUS-REPORTs:** +CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> [<CR><LF> +CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> [...]] **if text mode (+CMGF=1), command successful and SMS-COMMANDs:** +CMGL: <index>,<stat>,<fo>,<ct>[<CR><LF> +CMGL: <index>,<stat>,<fo>,<ct>[...]] **if text mode (+CMGF=1), command successful and CBM storage:** +CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages> <CR><LF><data>[<CR><LF> +CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages> <CR><LF><data>[...]] **otherwise:** *+CMS ERROR: <err>*
+CMGL=?	+CMGL: (list of supported <stat>s)

8.1.1.12. Read Message +CMGR

Execution command returns message with location value <index> from message storage <mem1> to the TE. About text mode parameters in italics, refer command Show Text Mode Parameters +CSDH. If status of the message is 'received unread', status in the storage changes to 'received read'. If reading fails, final result code +CMS ERROR: <err> is returned. See chapter Message Service Failure Result Code for <err> values.

Table 10. +CMGR action command syntax

Command	Possible response(s)
+CMGR=<index>	**if text mode (+CMGF=1), command successful and SMS-DELIVER:** +CMGR:<stat>,<oa>,[<callback_num>],<alpha>,<scts>*[,<tooa>,<fo>,<pid>,<dcs>, <sca>,<tosca>,<length>]*<CR><LF><data> **if text mode (+CMGF=1), command successful and SMS-SUBMIT:** +CMGR:<stat>,<da>,[<callback_num>],<alpha>*[,<toda>,<fo>,<pid>*

	,<dcs>,[<vp>], <sca>,<tosca>,<length><CR><LF><data> **if text mode (+CMGF=1), command successful and SMS-STATUS-REPORT:** +CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> **if text mode (+CMGF=1), command successful and SMS-COMMAND:** +CMGR: <stat>,<fo>,<ct>*[,<pid>,[<mn>],[<da>],[<toda>],<length> <CR><LF><cdata>]* **if text mode (+CMGF=1), command successful and CBM storage:** +CMGR: <stat>,<sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data> **otherwise:** *+CMS ERROR: <err>*
+CMGR=?	

8.1.1.13. New Message Acknowledgement to ME/TA +CNMA

Execution command confirms correct reception of a new message (SMS-DELIVER or SMS-STATUS-REPORT) which is routed directly to the TE. This acknowledgement command (causing ME to send RP-ACK to the network) shall be used when +CSMS parameter <service> equals 1. TA shall not send another +CMT or +CDS result code to TE before previous one is acknowledged.

If ME does not get acknowledgement within required time (network timeout), ME should respond as specified in 3GPP TS 24.011 to the network. ME/TA shall automatically disable routing to TE by setting both <mt> and <ds> values of +CNMI to zero.

If command is executed, but no acknowledgement is expected, or some other ME related error occurs, final result code +CMS ERROR: <err> is returned. See chapter Message Service Failure Result Code for a list of <err> values.

NOTE: In case that a directly routed message must be buffered in ME/TA (possible when +CNMI parameter <mode> equals 0 or 2) or AT interpreter remains too long in a state where result codes cannot be sent to TE (e.g. user is entering a message using +CMGS), acknowledgement (RP-ACK) must be sent to the network without waiting +CNMA command from TE. Later, when buffered result codes are flushed to TE, TE must send +CNMA acknowledgement for each result code. In this way, ME/TA can determine if message should be placed in non-volatile memory and routing to TE disabled (+CNMA not received). Refer command +CNMI for more details how to use <mode> parameter reliably.

Mandatory when <service> value 1 of command Select Message Service +CSMS is supported.

Table 11. +CNMA action command syntax

Command	Possible response(s)
If text mode (+CMGF=1): +CNMA	*+CMS ERROR: <err>*
+CNMA=?	

8.1.1.14. Informative Examples

Setting new message indications:

```
AT+CNMI=?       (query new message unsolicited result code modes)
+CNMI: (0-2),(0-3),(0-3),(0,1),(0,1)
OK
AT+CNMI=2,1,0,1,0  (send SM and status report indications to TE
OK                  when TA in command mode, otherwise buffer)
```

In this example, the TA is set so that it should send an unsolicited result code +CMTI: <mem>,<index> to the TE when a new SMS-DELIVER is received from the network and stored successfully to storage <mem>, and an unsolicited result code +CDS:... when a SMS-STATUS-REPORT is received. These result codes are routed to the TE when TA is in command mode, but buffered when in on-line data mode. Now, if new SM is received, it can be read as follows (text mode with no detailed header information; GSM 7 bit default alphabet used in message body):

```
+CMTI: "ME",2       (new message received in index 2)
AT+CMGR=2       (read the message)
+CMGR: "REC UNREAD","+358507654321","Mr. Jones","95/07/03,17:38:15+04"
This is the Mr. Jones testing
OK
```

In the next example all messages of storage <mem1> are listed (text mode with no detailed header information; GSM 7 bit default alphabet used in message bodies):

```
AT+CMGL="ALL"       (read all SMs)
+CMGL: 1,"REC READ","+358501234567","Mr. Smith","95/07/03,17:45:03+04"
This is the body of the message.
+CMGL: 2,"STO UNSENT","+358501234567","Mr. Smith",
This is the body of the reply.
OK
```

The next example shows a method to read new CBMs received from the network (text mode; GSM 7 bit default alphabet used in message bodies):

```
AT+CNMI=2,,2,,0                 (CBMs will be sent to the TE)
OK
AT+CPMS="BM";+CMGL (select CBM memory for reading; list all unread CBMs)
+CMGL: 1,"REC UNREAD",100,40,1,3   (first page of three page weather
information)
Weather in Finland 3rd of July 1995
+CMGL: 2,"REC UNREAD",100,40,2,3   (second page of three page weather
information)
Helsinki: cloudy, snow storms, -20 degrees Celsius, wind -14 m/s NE
+CMGL: 3,"REC UNREAD",100,40,3,3   (third page of three page weather
information)
Tampere: sunny, 40 degrees Celsius, wind 1 m/s SW
OK
```

Message Sending and Writing Commands

8.1.1.15. 3G Send Message +CMGS

Execution command sends message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally (when +CSMS <service> value is 1 and network supports) <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME

error, final result code +CMS ERROR: <err> is returned. See chapter Message Service Failure Result Code for a list of <err> values. This command should be abortable.

- entered text (3GPP TS 23.040 TP-Data-Unit) is sent to address <da> and all current settings (refer Set Text Mode Parameters +CSMP and Service Centre Address +CSCA) are used to construct the actual PDU in ME/TA.
- the TA shall send a four character sequence <CR><LF><greater_than><space> (IRA 13, 10, 62, 32) after command line is terminated with <CR>; after that text can be entered from TE to ME/TA.
- the DCD signal shall be in ON state while text is entered.
- the echoing of entered characters back from the TA is controlled by V.25ter echo command E.
- the entered text should be formatted as follows:
  - if <dcs> (set with +CSMP) indicates that 3GPP TS 23.038 GSM 7 bit default alphabet is used and <fo> indicates that 3GPP TS 23.040 TP-User-Data-Header-Indication is not set:
    - if TE character set other than "HEX" (refer command Select TE Character Set +CSCS in 3GPP TS 27.007): ME/TA converts the entered text into the GSM 7 bit default alphabet according to rules of Annex A; backspace can be used to delete last character and carriage returns can be used (previously mentioned four character sequence shall be sent to the TE after every carriage return entered by the user);
    - if TE character set is "HEX": the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into the GSM 7 bit default alphabet characters. (e.g. 17 (IRA 49 and 55) will be converted to character Π (GSM 7 bit default alphabet 23)).
  - if <dcs> indicates that 8-bit or UCS2 data coding scheme is used or <fo> indicates that 3GPP TS 23.040 TP-User-Data-Header-Indication is set: the entered text should consist of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octet (e.g. two characters 2A (IRA 50 and 65) will be converted to an octet with integer value 42).
- sending can be cancelled by giving <ESC> character (IRA 27).
- <ctrl-Z> (IRA 26) must be used to indicate the ending of the message body.

Table 12. +CMGS action command syntax

Command	Possible response(s)
if text mode (+CMGF=1): +CMGS=<da> [,<callback_num>] [,<toda>] <CR> ***text is entered***<ctrl-Z/ESC>	**if text mode (+CMGF=1) and sending successful:** +CMGS: <mr>[,<scts>] **if sending fails:** *+CMS ERROR: <err>* *<Cmotech □□>* AT+CMGS="dest_addr"[,"callback_addr"] [,<toda>]
+CMGS=?	

8.1.1.16. 3G Send Message from Storage +CMSS

Execution command sends message with location value <index> from preferred message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). If new recipient address <da> is given 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. Optionally (when +CSMS <service> value is 1 and network supports) <scts> is returned. Values can be used to identify

message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. See chapter Message Service Failure Result Code for a list of <err> values. This command should be abortable.

Table 13. +CMSS action command syntax

Command	Possible response(s)
+CMSS=<index>[,<da>[,<toda>]]	**if text mode (+CMGF=1) and sending successful:** +CMSS: <mr>[,<scts>] **if sending fails:** *+CMS ERROR: <err>*
+CMSS=?	

8.1.1.17. Send Message Telstra SMS MO (AT+MMC)

This section covers MT2 syntax requirements and options for MO SMS on the Telstra network.

Table 8-53 Execute command

Command	**TE2**	**→**	**MT2**	**+MMC<del>SMSMO<del><rcv_number><del><call_back><del><msg><CR>**
Description		<del>: space <rcv_number>: Recipient number <call_back>: Callback number (optional) <msg>: Message, each byte of msg has to have the code larger than 0x1F, so it will be available with 0x20		
Response	TE2	←	MT2	Before sending: +MMC SMSMO OK
Value	After sending:			SENDING SUCCESS!: The SMS has been sent SENDING FAIL!: Sending the SMS has failed

8.1.1.18. Write Message to Memory +CMGW

Execution command stores message (either SMS-DELIVER or SMS-SUBMIT) to memory storage <mem2>. Memory location <index> of the stored message is returned. By default message status will be set to 'stored unsent', but parameter <stat> allows also other status values to be given. The entering of text is done similarly as specified in command Send Message +CMGS. If writing fails, final result code +CMS ERROR: <err> is returned. See chapter Message Service Failure Result Code for <err> values.

NOTE: SMS-COMMANDs and SMS-STATUS-REPORTs can not be stored in text mode.

Table 14. +CMGW action command syntax

Command	Possible response(s)
if text mode (+CMGF=1): +CMGW[=<oa/da>[,<tooa/toda>[,<stat>]]]	+CMGW: <index> *+CMS ERROR: <err>* *<Cmotech □□>* AT+CMGW="phone number",,"STO SEND","callback number" AT+CMGW="phone number",,"STO UNSENT","callback number"

[,<callback_num>] [,<timestamp>] <CR> ***text is entered***<ctrl-Z/ESC>	AT+CMGW="phone number",,"REC UNREAD","callback number", "timestamp" AT+CMGW="phone number",,"REC READ","callback number","timestamp"
+CMGW=?	

8.1.1.19. Delete Message +CMGD

Execution command deletes message from preferred message storage <mem1> location <index>. If <delflag> is present and not set to 0 then the ME shall ignore <index> and follow the rules for <delflag> shown below. If deleting fails, final result code +CMS ERROR: <err> is returned. See chapter Message Service Failure Result Code for <err> values.

Test command shows the valid memory locations and optionally the supported values of <delflag>.

<delflag>: an integer indicating multiple message deletion request as follows:

0 (or omitted)	Delete the message specified in <index>
1	Delete all read messages from preferred message storage, leaving unread messages and stored mobile originated messages (whether sent or not) untouched
2	Delete all read messages from preferred message storage and sent mobile originated messages, leaving unread messages and unsent mobile originated messages untouched
3	Delete all read messages from preferred message storage, sent and unsent mobile originated messages leaving unread messages untouched.
4	Delete all messages from preferred message storage including unread messages.

Table 15. +CMGD action command syntax

Command	Possible response(s)
+CMGD=<index>[,<delflag>]	*+CMS ERROR: <err>*
+CMGD=?	+CMGD: (list of supported <index>s)[,(list of supported <delflag>s)]

8.1.1.20. Send Command +CMGC

Execution command sends a command message from a TE to the network (SMS-COMMAND). The entering of text (3GPP TS 23.040 TP-Command-Data) is done similarly as specified in command Send Message +CMGS, but the format is fixed to be a sequence of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octets (refer +CMGS). Message reference value <mr> is returned to the TE on successful message delivery. Optionally (when +CSMS <service> value is 1 and network supports) <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. See chapter Message Service Failure Result Code for a list of <err> values. This command should be abortable.

Table 16. +CMGC action command syntax

Command	Possible response(s)
if text mode (+CMGF=1): +CMGC=<fo>,<ct>[,<pid>[,<mn>[,<da>[,<toda>]]]]<CR> ***text is entered***<ctrl-Z/ESC>	**if text mode (+CMGF=1) and sending successful:** +CMGC: <mr>[,<scts>] **if sending fails:** *+CMS ERROR: <err>*
+CMGC=?	

8.1.1.21. More Messages to Send +CMMS

Set command controls the continuity of SMS relay protocol link. When feature is enabled (and supported by network) multiple messages can be sent much faster as link is kept open.

Test command returns supported values as a compound value.

Table 17. +CMMS action command syntax

Command	Possible response(s)
+CMMS=[<n>]	
+CMMS?	+CMMS: <n>
+CMMS=?	+CMMS: (list of supported <n>s)
Value	<n> 0 disable 1 keep enabled until the time between the response of the latest message send command (+CMGS, +CMSS, etc.) and the next send command exceeds 1-5 seconds (the exact value is up to ME implementation), then ME shall close the link and TA switches <n> automatically back to 0 2 enable (if the time between the response of the latest message send command and the next send command exceeds 1-5 seconds (the exact value is up to ME implementation), ME shall close the link but TA shall not switch automatically back to <n>=0)

8.1.1.22. Informative Examples

An example of sending a GSM 7 bit default alphabet message in text mode and a SMS-STATUS-REPORT is wanted:

```
AT+CNMI?                (check that status reports are routed to TE)
+CNMI: 2,1,0,1,0
OK
AT+CSMP=49,167,0,0        (status report wanted; otherwise default settings)
OK
AT+CMGS="+358501234567"      (start editing a message)
> This the first line.       (edit first line and press carriage return)
> This is the last line.^Z   (edit second line and send message by pressing
control-Z)
+CMGS: 10              (success: message reference 10 returned from SMSC)
OK
+CDS: 2,10,"+358501234567",145,"95/07/04/13:12:14+04",
"95/07/04/13:12:20+04",0  (status report of successful message delivery
received)
```

Storing an unsent message in memory, sending it from there, and deleting it:

```
AT+CPMS?            (check memory settings)
+CPMS: "ME",4,10,"ME",4,10,"ME",4,10
OK
AT+CMGW="9501231234"   (write message)
> This is the message body^Z
+CMGW: 7            (index number in storage returned)
OK
AT+CMSS=7           (send from storage)
+CMSS: 12           (success: reference value 12 sent from SC)
OK
AT+CMGD=7           (delete message)
OK
```

9. SMS Processing Options

9.1.1. SMS Send and Receive Options

9.1.1.1. SMS Mail Notification Option (SMSOPT=AB)

A value is set to skip SMS notification message

Notify	TE2	←	MT2	Message (message only)
Response	TE2	←	MT2	$$SMSOPT=AB A ADDED VALUE FOR SMS NOTIFICATION, B IS THE OLD VALUES 0~3 OPTIONS
Value	0: SMS sent notification On 1: SMS sent notification Off			

9.1.1.2. SMS FORMAT (send and receive)AT$$SMSOPT

Read command

Command	TE2	→	MT2	$$SMSOPT?
Response	TE2	←	MT2	$$SMSPOT: <value>
Value	**0: SMS structure (Send and Receive is as per 3G standards)** 1: At+MMC SMSMO (same format as MM5100 for send and receive. 2: +CGMR Format. 3. Sending/Receiving format is same as MM5100 but modem should only pass the message to host. Received SMS: <time stamp>: <orig_number>: Originating number <call_back>: Callback number <user_data>: **Message** With this option set the message appear as below. No other information is displayed. Only user data is passed to the host. Even User Data before the message is not displayed. With Option 3 set. **Message** **Message → no other information is passed except user data or the message.**				

Table 9-54 Set command

Command	TE2	→	MT2	$$SMSOPT=<value>
Response	TE2	←	MT2	<result_code> (OK | ERROR)

9.1.1.3. SMS Mail Notification Option (SMSOPT=1)

Notify	**TE2**	**←**	**MT2**	**Received SMS:** **<time stamp>:** **<orig_number>: Originating number** **<call_back>: Callback number** **<user_data>: Message**

9.1.1.4. SMS Mail Notification Option (SMSOPT=2)

Notify	**TE2**	**←**	**MT2**	Typical response to "AT+CMGR" command: **Message sent was "**Hello World**" from mobile** +61 2 400000000 **Please note I have shown white-space characters as ASCII decimal in red as {} (32 = sp, 13 = cr).** +CMGR:{32}"REC{32}READ","+61400000000",,"07/02/02,16:44:24+44",145,4,0,0,"+61418706700",145,{13}{13}Hello{32}World{13} **Date format is** yy/mm/dd

9.1.1.5. SMS Mail Notification Option (SMSOPT=3)

Notify	**TE2**	**←**	**MT2**	**Message (message only)**

9.1.1.6. Illustrative example

To turn SMS send alerts off and to use SMSOPT 1 you need to send the following command
AT$$SMSOPT=11

To turn SMS send alerts ON and to use SMSOPT 2 you need to send the following command
AT$$SMSOPT=02

9.1.2. Auto delete Messages in ME Memory

9.1.2.1. Auto Delete Messages in ME memory($$AUTO_DLTSMS)

Table 9-55 Read command

Command	**TE2**	→	**MT2**	**$$AUTO_DLTSMS**
Response	TE2	←	MT2	$$SMSNOTIF: <value>
Value	0: Auto delete is turned off 1: Auto delete is turned on			

Table 9-56 Set command

Command	**TE2**	→	**MT2**	**$$AUTO_DLTSMS=<value>**
Response	TE2	←	MT2	<result_code> (OK | ERROR)

9.1.3. SMS Notifications

9.1.3.1. SMS Notification ($$SMSNOTIF)

Table 9-57 Read command

Command	**TE2**	→	**MT2**	**$$SMSNOTIF?**
Response	TE2	←	MT2	$$SMSNOTIF: <value>
Value	0: No Alert 1: Alert			

Table 9-58 Set command

Command	**TE2**	→	**MT2**	**$$SMSNOTIF=<value>**
Response	TE2	←	MT2	<result_code> (OK | ERROR)

10. Modem SMS Remote Reporting

10.1.1. SMS Auto Voltage Alert

Maxon have integrated advanced technology within MT2 for the MT2 to automatically initiate an SMS, to alert the user to voltage attaining a user defined level.

This section provides detail that allows the user to set an input voltage value that when reached will prompt MT2 to automatically send an SMS to a user-defined mobile phone number.

NOTE: Whilst the input supply for the is 9–36Vdc, the modem will not power-up at 9 volts. 9.5 volts is required for power-up. MT2 then remains powered-up until the voltage drops to 9 volts.

10.1.1.1. Auto Voltage Alert SMS Site Name (AT$$SITE_NAME)

This command allows you to add or modify the site name for each MT2. This could be useful if multiple units have been deployed so as to identify each unit.

The 'Site Name' where set, is only included in the SMS LOWBATT notification.

Table 10-59 Read command

Command	**TE2**	→	**MT2**	**$$SITE_NAME?**
Response	TE2	←	MT2	$$SITE_NAME: <value>
Value	**<blank>: Default – no site name set** <text>: Site name for this modem as entered using the set command			

Table 10-60 Set command

Command	**TE2**	→	**MT2**	**$$SITE_NAME=<value>**
Response	TE2	←	MT2	$$SITE_NAME: <value> <result_code> (OK or ERROR)

10.1.1.2. SMS $$LOWBATT 1 set point (AT$$LOWBATT_VTG)

This command also sets the MT2 to TE2 $$LOWBATT 1 notification value.

Table 10-61 Read command

Command	**TE2**	→	**MT2**	**$$LOWBATT_VTG?**
Response	TE2	←	MT2	$$LOWBATT_VTG: <value>
Value1	**810: (Default)** xxxx: User definable 4 digit number representing voltage to 2 decimal points x100 (ie 12.8 volts would be represented as 1280, 9 volts would be 0900) Value range is from 0910 to 3600. E: If the first digit entered is a zero it is ignored in the response.			

Table 10-62 Set command

Command	**TE2**	→	**MT2**	**$$LOWBATT_VTG=<value1>,**
Response	TE2	←	MT2	<result_code> (OK | ERROR)

10.1.1.3. SMS $$LOWBATT 1 set recipient number (AT$$AUTO_SMS)

Table 10-63 Read command

Command	**TE2**	**→**	**MT2**	**$$AUTO_SMS?**
Response	TE2	←	MT2	$$AUTO_SMS: <value>
Value	**<blank>: (Default) – no number set. Modem will not send SMS notifications.** 04xxxxxxxx, Mobile phone number.			

Table 10-64 Set command

Command	**TE2**	**→**	**MT2**	**$$AUTO_SMS=<value1>,<value2>,<value3>**
Response	TE2	←	MT2	$$AUTO_SMS: < value> <result_code> (OK | ERROR)

NOTE: When the power supply to MT2 reaches 9.5 volts the modem will power up and send a $$LOWBATT 1 notification to TE2. It does not send SMS alert at this time. SMS alert is automatically reinstated once the voltage exceeds the $$LOWBATT 1 set point PLUS 10% as seen by the modem. E.g. if low batt was set to 0910, the modem will only reinstate SMS alert once the voltage is has reached above 10.01volts.

10.1.2. SMS Remote Report Requests

Maxon have integrated advanced technology within MT2 for the MT2 to automatically reply by SMS, to SMS interrogation for specific operating information.

This reporting system will enhance the ability of the user to remotely interrogate important operating features via SMS.

An SMS is sent to a specific identified by its directory number. The MT2 automatically replies to the SMS request originator with specific requested detail.

For further details on the values associated with the specific commands see reference within this manual.

10.1.2.1. SMS Remote Report Request Site Name (AT$$REMOTE_CTRL)

Note: This command is not to be confused with the site name reference used with the $$LOWBATT report function.

This command is used to change the default SMS Remote Report Request site name from 'maxon' to a user defined name. Once changed all Remote Report Request MO SMS from the user must also reflect the change.

Table 10-65 Read command

Command	**TE2**	**→**	**MT2**	**$$REMOTE_CTRL?**
Response	TE2	←	MT2	$$REMOTE_CTRL: <VALUE>
Value	**<MAXON>: Default**			

Table 10-66 Set command

Command	**TE2**	**→**	**MT2**	**$$REMOTE_CTRL=<VALUE>**

Command	TE2	→	MT2	$$REMOTE_CTRL=<VALUE>
Response	TE2	←	MT2	$$REMOTE_CTRL: <VALUE><.> (USE UPPER CASE – must be followed by a 'full stop' as noted) <result_code> (OK or ERROR)

10.1.2.2. Read ALL request

This command incorporates the VBATT, RSSI, LOCATION & SWVER SMS automated response request in one command.

Table 10-67 Read Command

Command from SMS phone	**Enter directory number of specific MT2** **Enter message "<remote_ctrl_value>.all" (not case sensitive)** **Send message**
Response from MT2	<directory_number><report><time_date_stamp><remote_ctrl_value>
Value	directory_number: phone number of remote MT2 report: lists reports of VBATT, RSSI, LOCATION & SWVER time_date_stamp: hour day month, remote_ctrl_value: default or user defined name

'Site name' is only incorporated within the 'remote_ctrl_value.all' request response and not the individual request responses that follow.

10.1.2.3. VBATT request

Read supply voltage at remote MT2.

Table 10-68 Read command

Command from SMS phone	**Enter directory number of specific MT2** **Enter message "maxon.vbatt" (not case sensitive)** **Send message**
Response from MT2	<directory_number> VBATT: <time_date_stamp>
Value	directory_number: phone number of remote MT2 time_date_stamp: hour day month

10.1.2.4. RSSI request

Read RSSI at remote MT2.

Table 10-69 Read command

Command from SMS phone	**Enter directory number of specific MT2** **Enter message "maxon.rssi" (not case sensitive)** **Send message**

Command from SMS phone	**Enter directory number of specific MT2** **Enter message "maxon.rssi" (not case sensitive)** **Send message**
Response from MT2	<directory_number> RSSI:, ECNO, <time_date_stamp>
Value	directory_number: phone number of remote MT2 time_date_stamp: hour day month

10.1.2.5. LOCATION request

Read location information based on arguments between MT2 and Network.

Table 10-70 Read command

Command from SMS phone	**Enter directory number of specific MT2** **Enter message "maxon.location" (not case sensitive)** **Send message**
Response from MT2	<directory_number> LOCATION: <time_date_stamp>
Value	directory_number: phone number of remote MT2 time_date_stamp: hour day month

10.1.2.6. SWVER request

Request Software Version information from the remote MT2.

Table 10-71 Read command

Command from SMS phone	**Enter directory number of specific MT2** **Enter message "maxon.swver" (not case sensitive)** **Send message**
Response from MT2	<directory_number> SWVER: <see $$SWVER>.<time_date_stamp>
Value	directory_number: phone number of remote MT2 time_date_stamp: hour day month

10.1.2.7. DEBUG SCREEN request

Read debug information based on arguments between MT2 and Network.

Table 10-72 Read command

Command from SMS phone	**Enter directory number of specific MT2** **Enter message "maxon.dbgscrn" (not case sensitive)** **Send message**
Value	directory_number: time_date_stamp: hour day

10.1.2.8. Remote Reset

Reset the modem.

Table 10-73 Read command

Command from SMS phone	**Enter directory number of specific MT2** **Enter message "maxon.reset" (not case sensitive)** **Send message**
Value	Modem will reset

11. NVM vs. USER PROFILE STORAGE

The following table indicates for each command listed, where it is saved.

X: Not Supported

O: Supported

Table 11.74

No.	Command	NV	User Profile	Remarks
1	$$ANTSET	X	X	
2	$$AUTO_SMS	O	X	
3	$$SMSOPT	O	X	
4	$$EXT_LED	0	X	
5	$$LOWBATT_VTG	O	X	
6	$$NOTIFCNT	O	X	
7	$$PHONE1, $$PHONE2, $$PHONE3	O	X	
8	$$RCV_MODE	O	X	
9	Input SMS commands	O	X	
10	$$RESET	O	X	
11	$$RFINFO	X	X	
12	$$RINGIDX	O	X	
13	$$RINGLVL	O	X	
14	$$RS232_PWRDOWN	O	X	
15	$$SMSNOTIF	O	X	
16	&Fn	O	O	
17	+IPR	O	O	
18	S Register	X	0	

12. TIA/EIA/IS-707A AT COMMAND SET

12.1.1. User modified profiles & NVM changes

12.1.1.1. User Profile store (AT&Wn)

This command is used for saving the current operating profile as a User Profile.

Table 12.75 Set command

Command	**TE2**	→	**MT2**	**&W<value>**
Response	TE2	←	MT2	(OK | ERROR)
Value	1~5 User Profiles slots available. **0 is Factory Default and is unavailable**			

12.1.1.2. User Profile recall (AT&Fn)

This command is used for confirming or recalling the User Profile. At each power up of modem or &Fn command the profile set by &Fn is loaded into the working area of Memory.

If user has not saved a profile to &Fn an attempt to load that profile using &Fn will elicit an ERROR response.

&F0 cannot be written to, using &W0 command. An attempt to write to that profile using &W0 will elicit an ERROR response.

Table 12.76 Read command

Command	**TE2**	→	**MT2**	**&F?**
Response	TE2	←	MT2	&F: <value>
Value	0~5 **(0: Factory Default Profile)**			

Table 12.77 Set command

Command	**TE2**	→	**MT2**	**&F<value>**
Response	TE2	←	MT2	(OK | ERROR)

12.2. Basic AT Commands

The following table specifies the basic AT parameters to be supported for the data service. Exceptions to EIA/TIA-602 are indicated by square brackets. Default settings are shown in bold.

12.2.1. Basic AT Parameters

Table 12.78 Basic AT parameters

Parameter	Description	Packet Data	STU-III
E0	Do not echo command set in command state or online command state.	O	N/A
E1	**Echo command set in command state or online command state.**	O	N/A
L0	**Low speaker volume.**	N/A	N/A
L1	Low speaker volume.	N/A	N/A
L2	Med speaker volume.	N/A	N/A
L3	High speaker volume.	N/A	N/A
M0	**Speaker off.**	N/A	N/A
M1	Speaker on until carrier reported (support of this feature is optional).	N/A	N/A
Q0	**Return result codes.**	R	R
Q1	Do not return result codes.	R	N/A
V0	Display result codes as numbers.	R	R
V1	**Display result codes as words.**	R	R
X1	Enable additional result code CONNECT <rate>. Disable dial tone and busy detection.[1]	N/A	N/A
X2	Enable additional result codes CONNECT <rate> and NO DIALTONE. Disable busy detection. Enable dial tone detection.[1]	N/A	N/A
X3	Enable additional result codes CONNECT <rate> and BUSY. Enable busy detection. Disable dial tone detection.[1]	N/A	N/A
X4	**Enable additional result codes CONNECT <rate>, BUSY and NO DIALTONE. Enable busy and dial tone detection.[1]**	N/A	N/A
Z0	Reset to default user configuration. **Note: ATZ with firmware R2.1.3 clears the +CSCA settings. You have to enter the +CSCA values again to be able to send SMS messages.**	R	N/A
&C0	**Circuit 109 (CF) always ON.**	R	N/A

Parameter	Description	Packet Data	STU-III
&C1	**Circuit 109 (CF) ON in accordance with the specified service. DCD line is High during a circuit switched call.**	R	N/A
&C2	**Circuit 109 (CF) ON. DCD is always high. This line toggles low for 1 second when the circuit switched call is disconnected.**	R	N/A
&C3	**Circuit 109 (CF) ON. DCD is Low. High when modem has successfully established a PPP Data (packet switched) call (only applies to IP STACK)**	R	N/A
&C4	**Circuit 109 (CF) ON. DCD is Low. High when modem has successfully established a PPP Data and opened a socket with remote server(packet switched) call (only applies to IP STACK)**	R	N/A
&D0	Ignore circuit 108/2 (CD).	R	N/A
[&D1]	Enter online command state following ON-to-OFF transition of circuit 108/2. See service specific AT command processing for service state transitions.	R	N/A
&D2	**Enter command state following On to Off transition of circuit 108/2. See service specific AT command processing for service state processing requirements.**	R	N/A
T	Select tone dialling.	N/A	N/A
&F0	**Set to factory-defined configuration. Effect is implementation dependent.**	O	N/A

12.2.2. Basic S registers

The following table specifies the basic S registers to be supported for the data services. Exceptions to EIA/TIA-602 are indicated by square brackets. Default settings are shown in bold.

Table 12.79 Basic S-registers

Register	Value	Description	Packet Data	STU-III
S0	[1 to 255] **0**	Automatic answering. [Enable automatic answering after (Value: 1) x 6 seconds.] **0: Not Answer**	N/A	N/A
S3	13	Carriage Return character.	O	N/A
S4	10	Line Feed character.	O	N/A
S5	8	Backspace character.	O	N/A
S6	2 to 10 **2**	Pause before blind dialling.	N/A	N/A

Register	Value	Description	Packet Data	STU-III
S7	1 to 255 **[50]**	Number of seconds to establish end-to-end data connection.	O	N/A
S8	0 to 255 **2**	Number of seconds to pause when "," is encountered in dial string.	N/A	N/A
[S9]	0 to 255 **6**	Carrier detect threshold in increments of 0.1 seconds.	N/A	N/A
S10	1 to 254 **[14]** [255]	Number of tenths of a second from carrier loss to disconnect. [255: Disable carrier detect.]	N/A	N/A
[S11]	50-255 **95**	DTMF tone duration and spacing in milliseconds. : Only AT command originated DTMF tones are supported.	N/A	N/A

12.2.3. Basic action command set

The following table specifies the Basic action command set to be supported for the data services. Exceptions to EIA/TIA-602 are indicated by square brackets. Default settings are shown in bold.

Table 12.80 Basic action commands

Command	Description
A/	Re-execute previous command.
A	Enter the online state. See service specific processing for further details.
D<dial string>	Causes the MT2 to transition from the command state to the online state. The <dial string> is optional. For circuit switched data services, the dial string may contain the following characters: Digits 0 to 9, *, #, A, B, C, and D. The dial string may contain the following dial modifiers: T Tone dialling [ignore] P Pulse dialling [ignore] , Pause during dialling W Wait for dial tone @ Wait for quiet answer ! Hook flash [$] Wait for billing tone (for credit-card calls) ; After dialling, the IWF enters the online command state and maintains the connection
H0	Causes the MT2 to transition from online command state to command state. Use of the digit '0' is optional (see EIA/TIA-602).
O0	Causes the MT2 to transition from online command state to online state. Use of the digit '0' is optional (see EIA/TIA-602).

12.2.4. Basic result codes

The following table specifies the Basic Result Codes to be supported for the data services. Exceptions to EIA/TIA-602 are indicated by square brackets. Default settings are shown in bold.

The ERROR result code shall be returned for all command sets which do not comply with the syntax rules of 5.1 of EIA/TIA-615, or Section 5 of EIA/TIA-602.

Table 12.81Basic result codes

Numeric	Verbal	Description	Packet Data	STUIII
0	OK	Command executed.	R	R
1	CONNECT	Entering online state.	R	R
2	RING	Alerting signal received from network.	N/A	N/A
3	NO CARRIER	Unable to activate the service or call terminated.	R	N/A
4	ERROR	Command not recognized or could not be executed.	R	R
6	NO DIALTONE	No dial tone detected within time-out period.	N/A	N/A
7	BUSY	Reorder (Busy signal) received.	R	N/A
8	NO ANSWER	Five seconds of silence not detected after ring back when @ dial modifier is used.	N/A	N/A

12.3. Extended AT Command Sets

12.3.1. Extended AT configuration command set

Table 12.82 Extended AT configuration command set

Command	Value per	Description	Packet Data
+DR	IS-131	Data Compression Reporting. This extended-format numeric parameter controls whether or not the extended-format "+DR:" intermediate result code is transmitted from the IWF over the Um interface. **0: Off (Default)** 1: On	O
+DS	IS-131	Data Compression. This extended-format compound parameter controls the V.42bis data compression function on the PSTN link (if provided in the IWF). **0,0,2048,6 (Default)**	O
+ES	ITU-T V.80 Ter	Enables the Synchronous Mode Values per spec <orig_rqst> – 6 <orig_fbk> – Undefined <ans_fbk> –1	N/A

Command	Value per	Description	Packet Data
+GCAP	IS-131	This extended-format command causes the MT2 to transmit one or more lines of information text in a specific format. The content is a list of additional capabilities command +<name>s, which is intended to permit the user of the MT2 to identify the minimum capabilities of the MT2. An MT2 conforming to this standard shall include the following items, as a minimum, in the result code for the +GCAP command: **+CIS707, +MS, +ES, +DS, +FCLASS (Default)**	O
+GMI	IS-131	This command causes the MT2 to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the MT2 to identify the manufacturer. Typically, the text will consist of a single line containing the name of the manufacturer, but manufacturers may choose to provide more information if desired (e.g., address, telephone number for customer service, etc.). **Maxon Electronics Australia Pty. Ltd.**	O
+GMM	IS-131	This command causes the MT2 to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the MT2 to identify the specific model of the device. Typically, the text will consist of a single line containing the name of the product, but manufacturers may choose to provide any information desired. **Model (Default)**	O
+GMR	IS-131	This command causes the MT2 to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the MT2 to identify the version, revision level or date, or other pertinent information of the device. Typically, the text will consist of a single line containing the version of the product, but manufacturers may choose to provide any information desired. **HW Model: <value>, S/W VER: <value>**	O
+GSN	IS-131	This command causes the MT2 to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the MT2 to identify the individual device. Typically, the text will consist of a single line containing a manufacturer determined alpha-numeric string, but manufacturers may choose to provide any information desired.	O

Command	Value per	Description	Packet Data
+ICF	IS-131	TE2-MT2 Character Framing. This extended-format compound parameter is used to determine the local serial port start-stop (asynchronous) character framing that the MT2 shall use while accepting TE2 command set and while transmitting information text and result codes to the TE2, if this is not automatically determined (see +IPR). +ICF? Shows current settings +ICF=? Shows supported range +ICF=<format_value,parity_value> sets value <format> valid numeric values 0 auto detect [NOT SUPPORTED] 1 8Data 2Stop 2 8Data 1Parity 1Stop **3 8Data 1Stop (Default)** 4 7Data 2Stop 5 7Data 1Parity 1Stop 6 7Data 1Stop <parity> defined numeric values 0 odd 1 even 2 Mark [NOT SUPPORTED] **3 space (Default)**	R

Command	Value per	Description	Packet Data
+IFC	IS-131	TE2-MT2 Local Flow Control. This extended-format compound parameter is used to control the operation of local flow control between the TE2 and MT2 [1]. <c_by_t> Description 0 None 1 Xon/Xoff local DC1/DC3 on circuit 103; do not pass DC1/DC3 characters to the remote DCE. **2 Circuit 133 (Ready for Receiving) (Default)** 3 Xon/Xoff global DC1/DC3 on circuit 103 with DC1/DC3 characters being passed through to the remote DCE in addition to being acted upon for local flow control <t_by_c> Description 0 None 1 Xon/Xoff local DC1/DC3 on circuit 104 **2 Circuit 106 (Clear to Send/Ready for Sending) (Default)** <c_by_t>: specifies the method to be used by the DTE to control the flow of received data from the DCE; <t_by_c>: specifies the method to be used by the DCE to control the flow of transmitted data from the DTE. AT+IFC=<[[c_by_t]DCE_DTE]>,<[[t_by_c]DTE_DCE]> +IFC? Shows current settings +IFC=? Shows supported range +IFC=<c_by_t,t_by_c> sets value	R

Command	Value per	Description	Packet Data
+IPR	IS-131	Fixed Rm Rate. This numeric extended-format parameter specifies the data rate at which the MT2 will accept command set, in addition to 1200 bit/s or 9600 bit/s (as required in EIA/TIA-602). It may be used to select operation at rates at which the MT2 is not capable of automatically detecting the data rate being used by the TE2. **115200bps. (Default)** +IPR? Displays current set value. +IPR=? Displays range of (supported autodetectable rates), (list of supported fixed-only rates). e.g. +IPR: (1200, 2400, 4800, 9600, 19200), (45, 50, 75, 110, 150, 300, 600, 38400, 57600, 115200, 230400) +IPR=<value> Set value E: Changes to +IPR rate are written to default NV memory in F0 profile independent of the &W command. Use &W command to write +IPR changes to F1-5 user profiles.	R

13. Multiplexing

13.1.1. RM3 (AT$$NOTI_DS)

Command to activate the RM3 feature of the modem, which will open a UDP channel of communication with the modem and can be used to send direct AT commands to the modem, during packet data session. In Idle state modem will not use UDP for notification.

Communication between MT2 and PC will be as follow

From MT2 to PC IP Address 0.0.0.1 and port 33333

From PC to MT2 IP Address 1.1.1.1 and port 33333

Table 13-83 Read command

Command	**TE2**	→	**MT2**	**$$NOTI_DS?**
Response	TE2	←	MT2	$$NOTI_DS: <value>
Value	0: Not Active, 1: Active			

Table 13-84 Set command

Command	**TE2**	→	**MT2**	**$$NOTI_DS**
Response	TE2	←	MT2	$$NOTI_DS=<value>

14. CELLULAR EXTENDED AT COMMAND SET

AT command lines containing the command set specified start with “AT” and end with a carriage return. Default configurations appear in boldface type.

14.1.1. Cellular AT parameter commands

Table 14.85 AT parameter commands

Command	Description	Packet Data	STUIII
+CDS	Um Interface Data Compression. This extended-format compound parameter controls the V.42bis data compression function on the Um interface. The command format is the same as for the TIA/EIA/IS-131 +DS command. **0,1,2048,6 (Default)** Range: (0-0),(1-1),(512-65535),(6-250)	N/A	N/A
+CBC?	Battery Charge. Read-only. Returns <BCS>,<BCL> BCS: (S=source) 0: Response to BCS will always be 0 since MT2 cannot discriminate between battery and other power supply sources. BCL: (L=level) n.n: Current source level in Volts	O	N/A
+CRC=<value>	Cellular Result Codes (see Table 4.4.2-1). 0: Disable Cellular Result Codes 1: Enable Cellular Result Codes	N/A	N/A
+CFC=<value>	Um Interface Fax Compression. **0: No compression (Default)** Range not supported: 1: V.42bis compression with parameters as set by the +CDS command 2: Modified Read compression	N/A	N/A

14.1.2. Cellular identification AT command extensions

Table 14.86 Cellular identification AT command extensions

Command	Value per	Description	Packet Data	STUIII
+CGMI	IS-131	This command causes the IWF to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the IWF to identify the manufacturer. Typically, the text will consist of a single line containing the name of the manufacturer, but manufacturers may choose to provide more information if desired (e.g., address, telephone number for customer service, etc.).	N/A	N/A
+CGMM	IS-131	This command causes the IWF to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the IWF to identify the specific model of the device. Typically, the text will consist of a single line containing the name of the product, but manufacturers may choose to provide any information desired.	N/A	N/A
+CGMR	IS-131	This command causes the IWF to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the IWF to identify the version, revision level or date, or other pertinent information of the device. Typically, the text will consist of a single line containing the version of the product, but manufacturers may choose to provide any information desired.	N/A	N/A
+CGSN	IS-131	This command causes the IWF to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the IWF to identify the individual device. Typically, the text will consist of a single line containing a manufacturer determined alpha-numeric string, but manufacturers may choose to provide any information desired.	N/A	N/A

14.1.3. Cellular result codes for Asynchronous data services

Table 14.87 Cellular result codes for Asynchronous data services

Result Code	Description	Packet Data	STUIII
+CRC=<value>	Cellular Result Codes 0: Disable Cellular Result Codes 1: Enable Cellular Result Codes	N/A	N/A
+CERROR: BAD REQUEST	Intercept received after call origination.	N/A	N/A
+CERROR: INIT FAILED <failed command>	Initialization string failed.	N/A	N/A
+CERROR: LINK FAIL	Mobile station has declared a loss of the Traffic Channel.	N/A	N/A
+CERROR: NO SERVICE	Origination was attempted while the mobile station was not able to monitor a Paging Channel.	N/A	N/A
+CERROR: NO <service option> SERVICE	The indicated service option was rejected. The <service option> shall be “ASYNC” or “FAX.”	N/A	N/A
+CERROR: PAGE FAIL	Mobile station received a page but not an alert.	N/A	N/A
+CERROR: PAGED	Mobile station attempted to originate after receiving a page.	N/A	N/A
+CERROR: RELEASE	Indicates call release.	N/A	N/A
+CERROR: RETRY	Reorder received after call origination.	N/A	N/A
+CPROG: ANSWER	Indicates remote DCE has answered.	N/A	N/A
+CPROG: BONGTONE	Billing Tone was detected.	N/A	N/A
+CPROG: DIALING <number>	Indicates PSTN Dialling.	N/A	N/A
+CPROG: DIALTONE	Dial tone was detected.	N/A	N/A
+CPROG: QUIET ANSWER	Indicates Quiet Answer.	N/A	N/A
+CPROG: RINGING	Indicates PSTN Ringing.	N/A	N/A
+CPROG: VOICE	Voice detected on the PSTN connection.	N/A	N/A
RING <service option>	Specifies active service option. The <service option> shall be “ASYNC”, “FAX” or “STU-III.”	N/A	N/A

15. DM COMMAND (DIAGNOSTIC MODE)

All the AT command set can be used at UART2 DM port with Async-HDLC format except the periodic report command set such as RFINFO and ANTLVL. The DM command set has the command/response structure in Async-HDLC format. The command/response packet format is described in the following tables.

NOTE: The last character of the Request Field should be "0x0D".

Table 15.88 Request packet

Field	Length(bytes)	Description
Command code	1	Cmd Code (0xC8)
Request field	Variable	ASCII Cmd (This field should finish with 0x0d)
Frame check	2	16-bit CRC
Ending flag	1	0x7E

Table 15.89 Response packet

Field	Length(bytes)	Description
Command code	1	Cmd Code(0xC8)
Length	2	Packet length
Response Filed	Variable	ASCII
Frame check	2	16-bit CRC
Ending flag	1	0x7E

16. CARRIER COMMAND OPTIONS

16.1.1. Debug screen (AT$$DBGSCRN)

This command reads Debug Screen Data for the purpose of a field test.

Table 16-90 Read command

Command	**TE2**	→	**MT2**	**$$DBGSCRN**
Response	TE2	←	MT2	$$DBGSCRN: <value>
Value	**MCC:** Country Code, **MNC**: Network Code, **WCDMA**: Frequency **CH**: Channel, **DRX:** Discontinuous Reception :WCDMA: System **Rx:** Receive signal **Tx:** Sending Signal **RSCP**: Base Station signal **Ciphering:** x **Intergaty:** x , **PC:** power class **PSC:** Scrambling code **ECIO:** Error Check and Correction **GL1**: GSM Layer 1 Status **WL1**:WCDMA Layer 1 Status **RR :** GSM RR Status **RRC:** WCDMA RRC Status **MM:** MM Status, **GMM:** GMM Status **GRR:** GRR Status **REG:** Reg status **Network Status:** Network Revision, mm system information, Network operation mode, Temporary Mobile Subscriber Identity **Location:** Location code, serving PLMN, Cell Identity, Signalling Radio Bearer Example MCC:505, MNC:01, WCDMA: 850 CH:4436, DRX1280M [C7 P7 U-] :WCDMA R-54, T+0, RSCP[-57], c1i1, PC:PC03, PSC:426 ECIO:-3 GL1:INACTIVE WL1:PCH_SLP RR :INACTIVE RRC:DISCONNEC MM:19MM_IDLE, GMM:REGISTRED GRR:NULL REG:IDLE REL99, ATT1, NMO2, TMSI:A8382C54 L0151 R01 CI1CA5 SRB0----			