SMC-GPRS-XXX

LandCell SMC Embedded Wireless Modem
GSM GPRS Universal Socket

User Manual
001-0004-829
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SECTION 1 -   PREFACE

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This manual covers the operation of the CalAmp SMC-GPRS Embedded Wireless Modem. Specifications described are typical only and are subject to normal manufacturing and service tolerances.

CalAmp reserves the right to modify the equipment, its specification or this manual without prior notice, in the interest of improving performance, reliability or servicing. At the time of publication all data is correct for the operation of the equipment at the voltage and/or temperature referred to. Performance data indicates typical values related to the particular product.

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Modem Use

The SMC-GPRS modem is designed and intended for use in fixed and mobile applications. "Fixed" assumes the device is physically secured at one location and not easily moved to another location. Please keep the cellular antenna of the SMC-GPRS at a safe distance from your head and body while the modem is in use (see below).

Important

Maintain a distance of at least 20 cm (8 inches) between the transmitter's antenna and any person while in use. This modem is designed for use in applications that observe the 20 cm separation distance.

Interference Issues

Avoid possible radio frequency (RF) interference by following these guidelines:

- The use of cellular telephones or devices in aircraft is illegal. Use in aircraft may endanger operation and disrupt the cellular network. Failure to observe this restriction may result in suspension or denial of cellular services to the offender, legal action or both.

- Do not operate in the vicinity of gasoline or diesel-fuel pumps unless use has been approved and authorized.

- Do not operate in locations where medical equipment that the device could interfere with may be in use.

- Do not operate in fuel depots, chemical plants, or blasting areas unless use has been approved and authorized.

- Use care if operating in the vicinity of protected personal medical devices, i.e., hearing aids and pacemakers.

- Operation in the presence of other electronic equipment may cause interference if equipment is incorrectly protected. Follow recommendations for installation from equipment manufacturers.

Mobile Application Safety

- Do not change parameters or perform other maintenance of the SMC-GPRS while driving.

- Road safety is crucial. Observe National Regulations for cellular telephones and devices in vehicles.

- Avoid potential interference with vehicle electronics by correctly installing the SMC-GPRS. CalAmp recommends installation by a professional.

Related Documents

[1] Cinterion Wireless Application Developer's Guide   WM_AN24_DevGuide_v07
[2] Cinterion Wireless AT Command Set, TC63i   TC63i_ATC_V01.100
[3] Cinterion Power Supply for Wireless Applications   WM_AN26_PwrSupply_v04

SECTION 2 - ABBREVIATIONS

Abbreviation	Description
APN	Access Point Name
CDMA	Code Division Multiple Access
CSD	Circuit Switched Data
CTS	Clear to Send
DCD	Data Carrier Detect
DCE	Data Communication Equipment
DTE	Data Terminal Equipment
DUN	Dial-Up Network
EDGE	Enhanced Data rates for Global Evolution
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile communication
IMEI	International Mobile Electronic Identity
LED	Light Emitting Diode
ME	Mobile Equipment
MS	Mobile Station
OTA	Over the Air
PDP	Packet Data Protocol
PPP	Point to Point Protocol
PRL	Preferred Roaming List
RSSI	Receive Signal Strength Indication
RX	Receive
TA	Terminal Adapter
TE	Terminal Equipment
TX	Transmit

SECTION 3 -   PRODUCT OVERVIEW

Module Identification

Label Information
The label contains the CalAmp part number, serial number, FCC ID, and the IMEI number.

IMEI: The International Mobile Equipment Identifier of the cellular module in decimal format.

General Description

The LandCell SMC-GPRS embedded wireless modem from CalAmp is a versatile, cost-effective wireless communications device designed for the industry-standard universal socket. Quad-band GSM/GPRS offers compatibility with cellular networks around the world.

The SMC-GPRS embedded modem is ideal for OEM customers looking to add cellular wireless communications to their products. Applications include: monitoring, metering, diagnostics, security, data collection, and other applications requiring wireless connectivity.

Features and Benefits

- Industry-standard Universal Socket open interface
- GSM/GPRS Quad-Band 850/900/1800/1900 MHz
- Supports GPRS Class 12
- TCP/IP stack access via AT commands
- Circuit Switch Data
- Short Message Service (SMS)
- Packet Data
- MMCX Antenna Connector
- Optimized for OEM applications

Catalog Part Number Breakdown

SMC-GPRS-XXX   (**XXX** = Carrier Identifier)

GEN = Generic

SMC Module Description

Top side reference

Fig. 2.1 SMC-GPRS Top Side

SMC-GPRS top side components:

1. **Power**: Green LED indicating cell module power on.

2. **DCD**: Red LED indicating Data Carrier Detect from cellular network.

3. **RF (antenna)**: MMCX socket, primary antenna connection.

4. **SIM:** SIM Card Slot (SIM card purchased separately).

5. **GSM Cell Module**

Bottom side reference
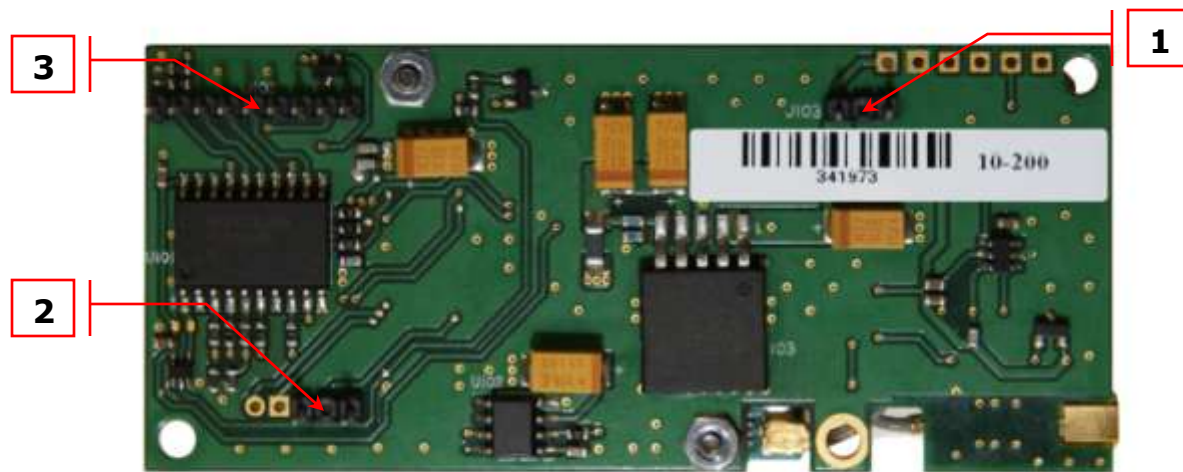
Fig. 2.2 SMC-GPRS Bottom Side

SMC-GPRS bottom side socket pins:

1. VCC/GND pins
2. –Reset/GND pins
3. SERIAL pins
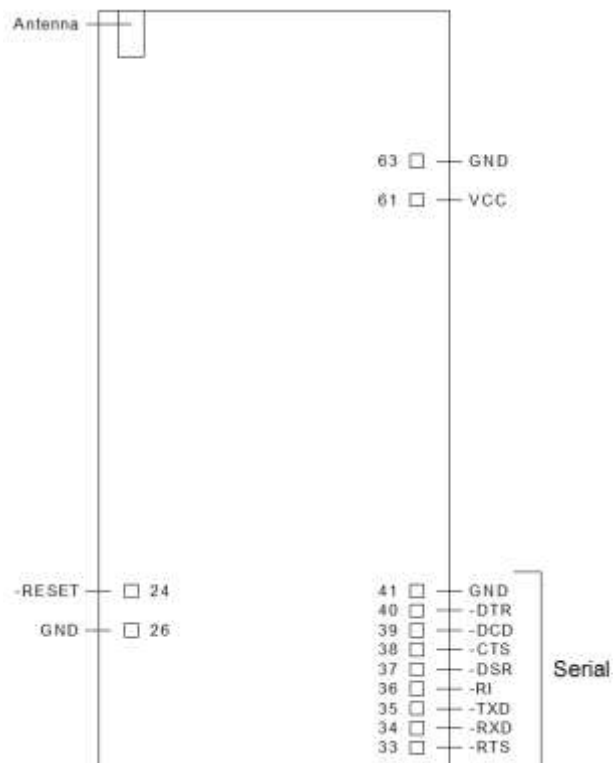
Figure 2.3 SMC Pins, Top View

Pin Descriptions

Pin #	Pin Name	I/O Type	Description
24	-RESET	Input	This signal is used to force a reset procedure by providing a low level for at least 10 ms. Data stored in volatile memory will be lost. This line must be driven by an open drain or open collector. If unused, keep line open.
26, 41, 63	GND		Ground
33	-RTS	Input	Request to Send. Signal used for hardware flow control
34	-RXD	Output	Received Data. Line used to send received data and modem responses to the DTE (Data Terminal Equipment)
35	-TXD	Input	Transmitted Data. Line used to send data and transmit commands from the DTE.
36	-RI	Output	Ring Indicator. Output low (ON) indicates the presence of a ring signal.
37	-DSR	Output	Data Set Ready. Line used to indicate modem status to the DTE.
38	-CTS	Output	Clear to Send. Line controlled by the modem to indicate whether or not the modem is ready to transmit data.
39	-DCD	Output	Data Carrier Detect. Line asserted by the DTE to indicate connection status.
40	-DTR	Input	Data Terminal Ready. Line asserted by the DTE to indicate that it is ready to transmit or receive data.
61	VCC	Power	+5 VDC ±0.25 VDC

Digital Input lines: Input High, Min 3.675 V
                              Input Low, Max 1.4 V

Digital Output Lines: Output High, Min 4.0 V
                              Output Low, Max 0.4 V

Digital Line Current Drive: 2.0 mA

-RESET Input line: Input Low, Max 0.4 V, internal 22K ohm pull-up to 3.9VDC.

NOTE: <u>VCC</u> is the maximum voltage rating on Serial UART input pins.

SECTION 4 -   DEVELOPMENT/TEST BOARD INTERFACE

Development/Test board

The Development/Test board is required to interface the SCM-GPRS modem to a standard RS232 serial connection. The SMC test board also supplies the SMC-GPRS modem with the required +5VDC supply voltage from an externally supplied 10 to 28 VDC power source, +12VDC typical.
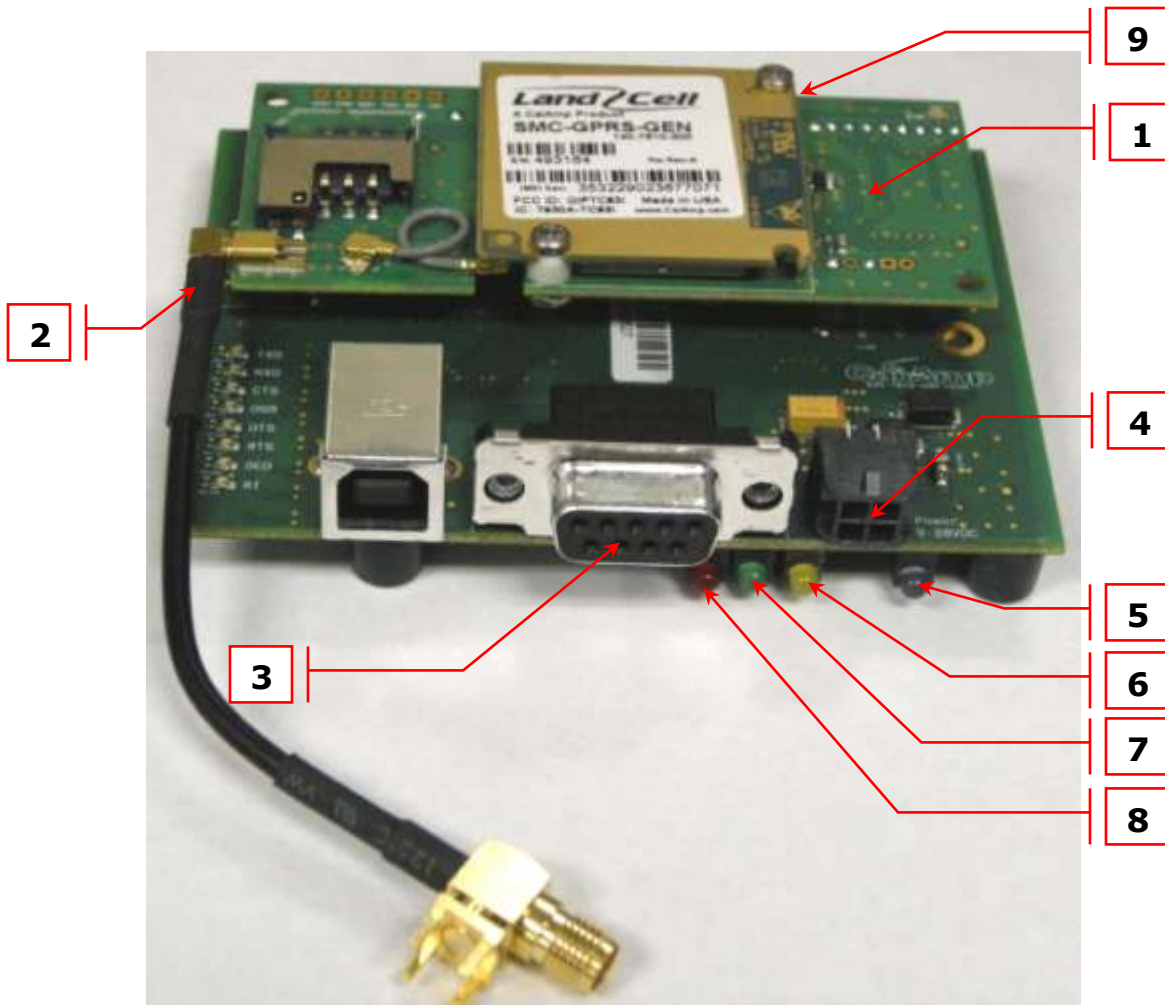
Figure 4.1 SMC modem with DK test board

SMC-GPRS test board components:

1. **SMC-GPRS modem**
2. **MMCX to SMA RF cable:** Provides connection to external antenna.
3. **RS-232 Port:** Standard D-Sub, 9 pin, female connector.
4. **Power Connector:** Molex 4-pos 3MM receptacle (lower left: GND, lower right: +VDC).
5. **Blue LED:** Power Indicator
6. **Yellow LED:** DCD Indicator
7. **Green LED:** RXD Indicator
8. **Red LED:** TXD Indicator
9. **RESET Switch**: Bottom side of DK test board (under far right mounting screw)

Note: USB connector reserved for future use.

RS-232 Serial Port Integration Parameters

Table 4.2 provides the serial cable design information for the SMC-GPRS using the DK test board.

Table 4.2 Standard RS-232 DE-9 Pin out

Pin	Name	Direction	Description
1	CD	«—	Carrier Detect
2	RX	«—	Receive Data
3	TX	—»	Transmit Data
4	DTR	—»	Data Terminal Ready
5	GND		System Ground
6	DSR	«—	Data Set Ready
7	RTS	—»	Request to Send
8	CTS	«—	Clear to Send
9	RI	«—	Ring Indicator

Note: Direction is DTE relative DCE.
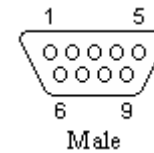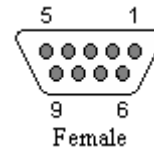
Table 4.3 Default RS-232 Communication Parameters

Bits Per Second	115,200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	Hardware

Accessories

Antenna	3" Mag Mount Antenna	L2-ANT0003
Antenna Adapter Cable	MMCX to SMA cable	497-7500-003 or 697-7500-003
Power Supply	110 VAC input DC Power Cable	150-7001-001 150-7500-002
Interface Cable	Serial Cable	L2-CAB0002

Primary Antenna

The primary antenna connection on the SMC-GPRS is a MMCX connector. Mounting options and cable lengths are user's choice and application specific.

SECTION 5 -   GETTING STARTED USING THE SMC TEST BOARD

This section describes the use of the SMC test board to set up the SMC modem for internet access using HyperTerminal and a dial-up network connection (DUN). Please refer to **Appendix B** for details on setting up a modem driver for a DUN connection.

Connecting Up the SMC Test Board

Connect the Power cable, RS232 cable, Antenna cable to the SMC test board as shown in Figure 5.1. Insert an active SIM card into the SMC modem.

Figure 5.1 SMC test board connections

HyperTerminal Settings

Open a HyperTerminal session and configure the properties for the COM port used to connect the SMC test board.

Set HyperTerminal properties for:

Bits per second: **115200**

Data bits: **8**
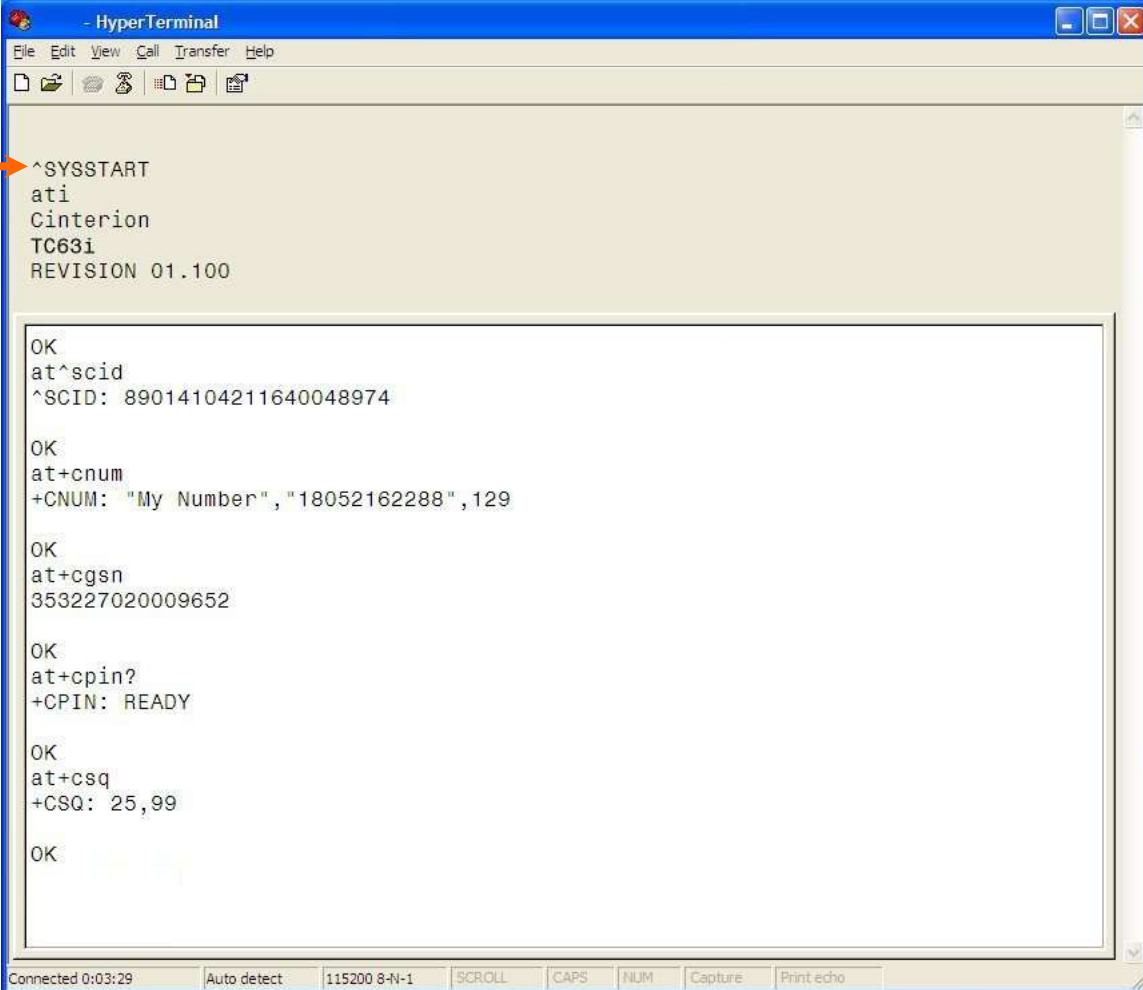
Parity: **None**

Stop bits: **1**

Flow control: **Hardware**

Verify SMC Modem Connectivity

Power on the SMC test board (+12VDC typical) and observe the HyperTerminal window for **^SYSSTART**, indicating the SMC modem successfully powered on.

Figure 5.2 HyperTerminal screen responses

The **ATI** command prints the cell module product information. If you get an Error or no communication, verify the modem is connected to the proper COM port and powered on. Refer to Figure 5.2 for all the AT commands listed below.

Confirm your SIM card is properly installed with the **AT^SCID** command. A reply of ^SCID:<20 digit CID number> indicates the modem recognizes the SIM card and displays it's ID number.

Confirm the phone number currently in the modem with the **AT+CNUM** command. It should be 11 digits i.e. 18052162288. For some carriers the phone number may not display but will respond with "OK". If the SIM card is not in the unit or not activated properly, the modem will reply with "ERROR".

Verify the modems International Mobile Equipment Identity (IMEI) number with the **AT+CGSN** command. The IMEI is used to identify GSM mobile equipment to the GSM network.
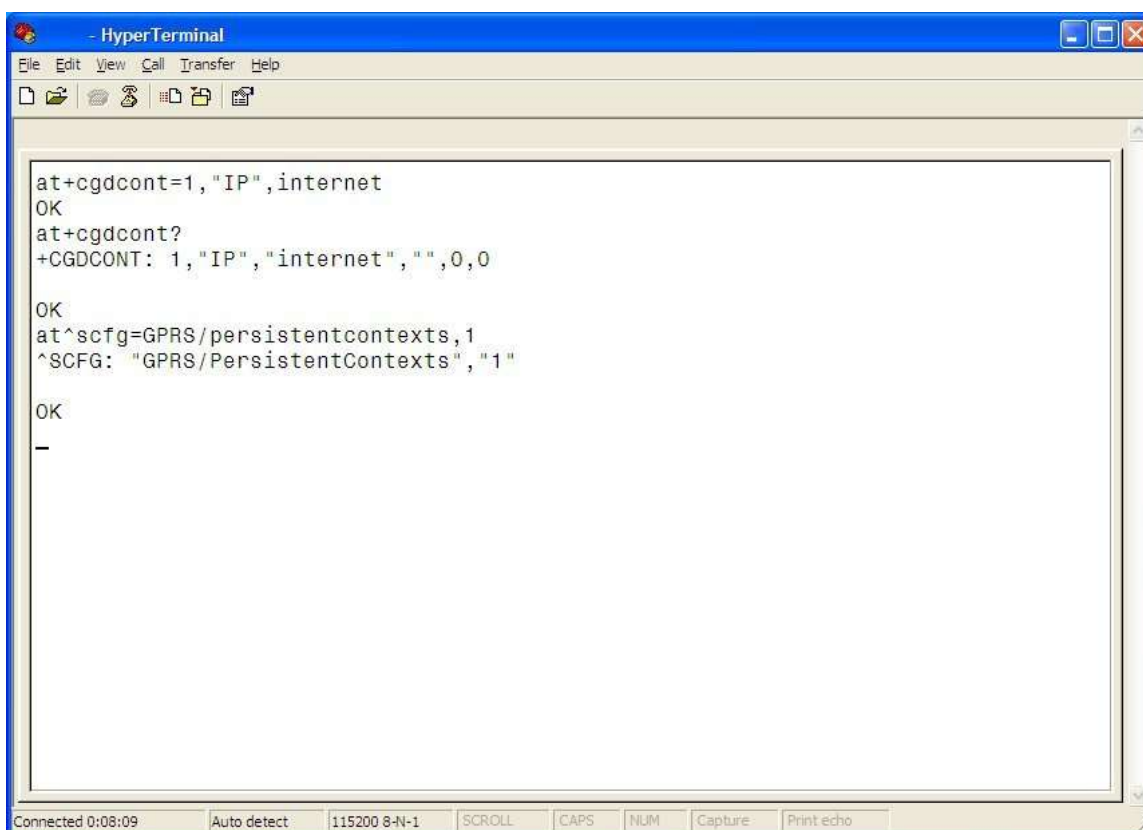
Confirm that the SIM's PIN has been authenticated by the network using the **AT+CPIN?** command. The reply should read "+CPIN: READY". See Section 6 for SIM related information if "READY" does not display.

Verify good signal strength with the **AT+CSQ** command. A typical reply is +CSQ 25, 99. The first number is signal strength and ranges from 0 to 31 (the higher the number, the stronger the signal).

Define the Packet Data Protocol (PDP) Context

Next, the Access Point Name (APN) must be defined using the PDP Context command **AT+CGDCONT=1,"IP",<apn>** command. The <apn> is the access point name for a specific cellular provider (for example AT+CGDCONT=1,"IP",internet). The **At+CGDCONT?** command can be issued to verify the PDP Context information.

The PDP context information can be set to non-volatile by issuing the **AT^SCFG=GPRS/Persistentcontexts=1** command. GPRS PDP context will not be reset by an AT&F command. Refer to Figure 5.3.

Figure 5.3 Set PDP Contexts, APN

Exit HyperTerminal before attempting to connect using a Dial-Up-Networking connection.

Connect using the Dial-Up-Network Connection

Go to the Network Connections screen and double click on the newly created Dial-Up connection (i.e. SMC-GPRS).
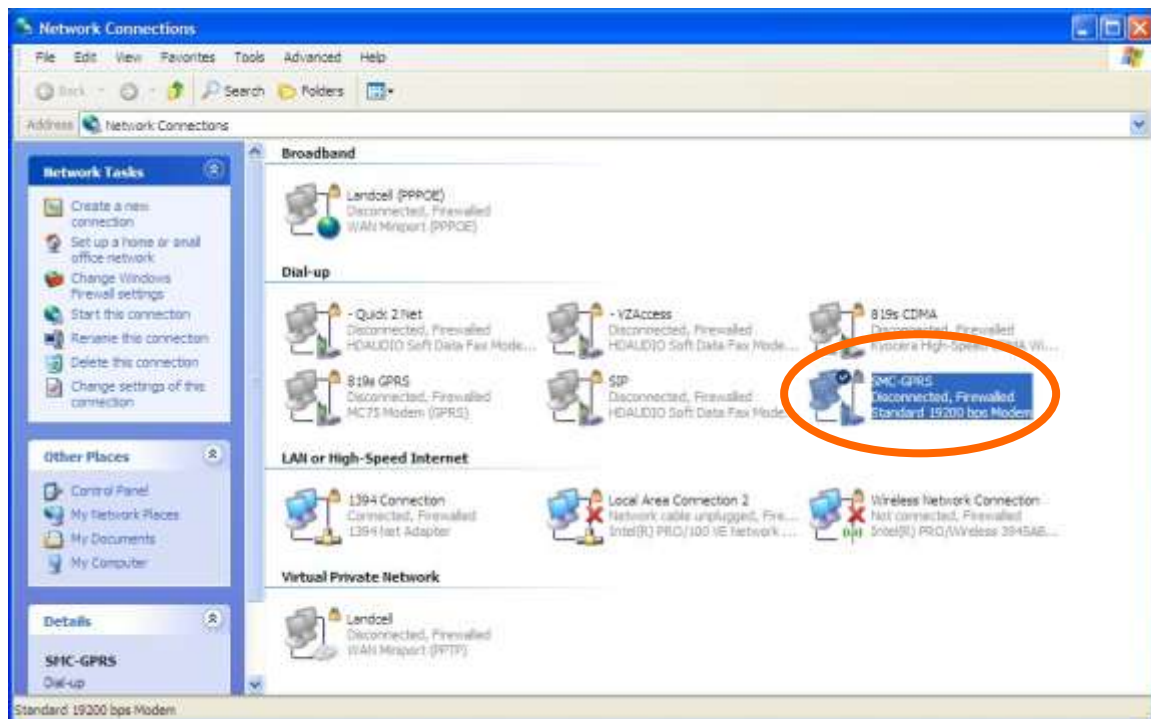
When the connect window appears, set the username and password as defined for your carrier (usually blank). Enter the phone number as ***99***1#** and click the **Dial** button.

The modem will attempt to connect to the provider network. If the configured baud rate for the COM port, the modem, and the DUN do not match, the DUN will not be able to talk to the modem properly and you will get a hardware error message. Otherwise the DUN will contact the cellular network and authenticate the user on the network.

Once connected you should be able to browse the internet thorough the DUN session. To confirm this, disable any other network connections you may have running.
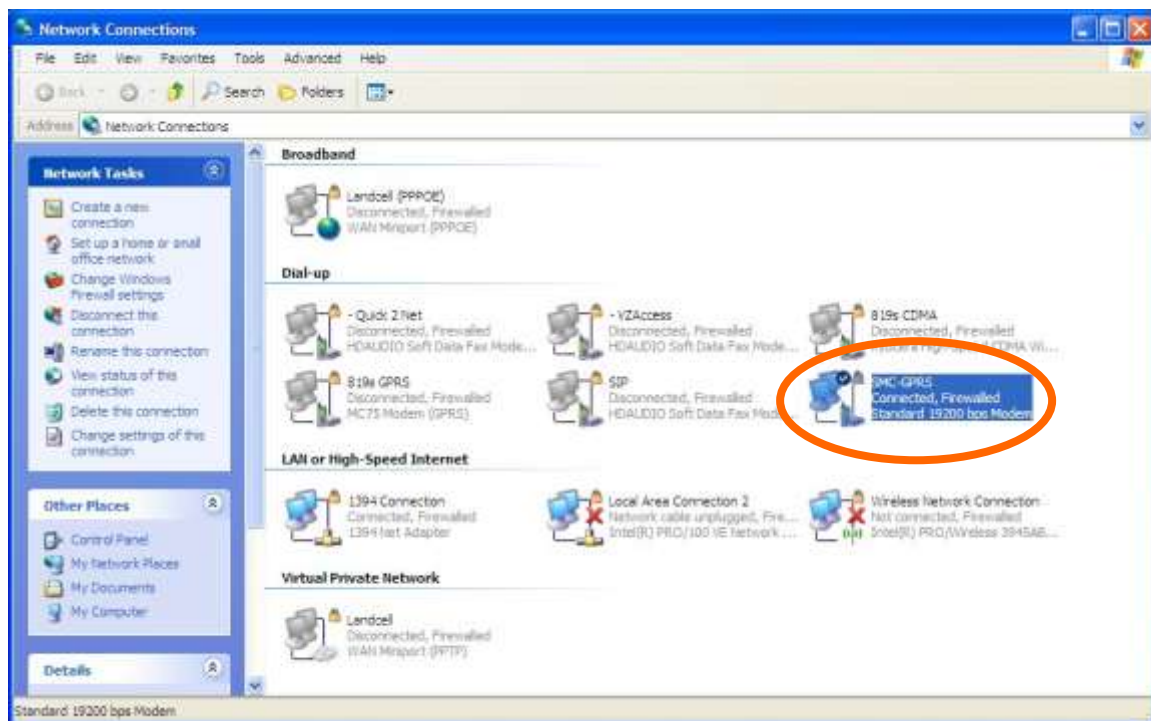
Right click on the connected Dial-Up connection icon in the task bar and select the Details tab. The status of the connection will be displayed, including the IP address assigned by the carrier network.
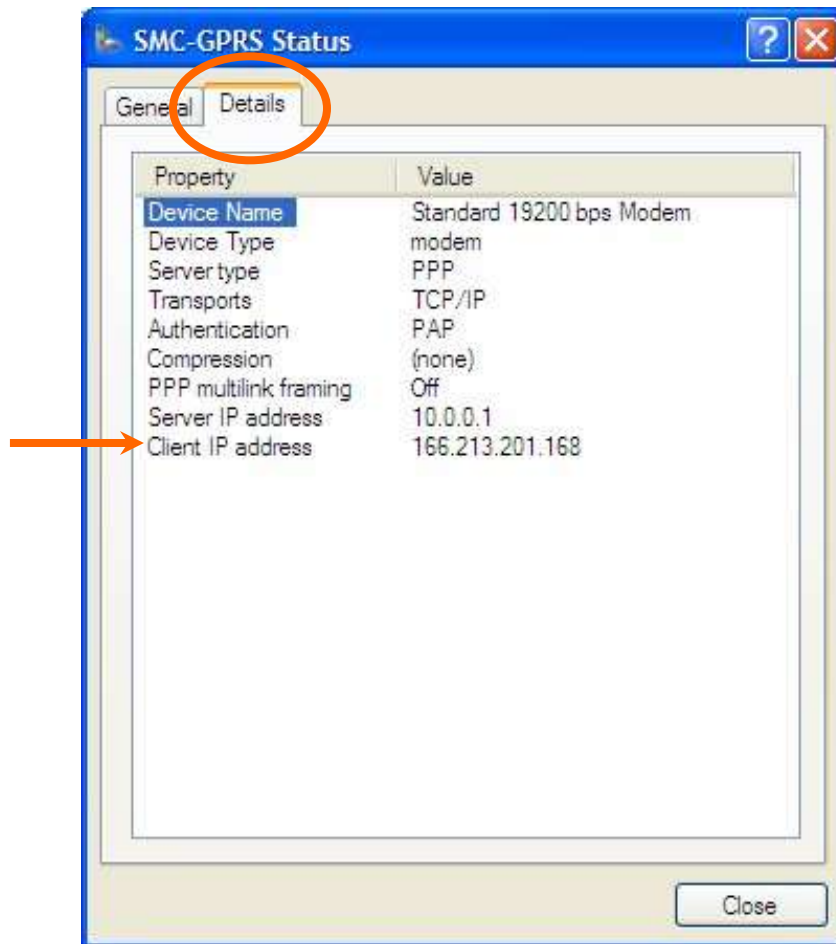
SECTION 6 - SIM CARD SPECIFIC INFORMATION

The SIM card can be used to store a Personal Idetification Number (PIN) to authenticate users on the network.

The AT+CPIN write command can be used to enter one of the passwords listed below. The read command can be used to check whether or not the ME is waiting for a password, or which type of password is required.

This may be for example the SIM PIN1 to register to the GSM network, or the SIM PUK1 to replace a disabled SIM PIN1 with a new one, or the PH-SIM PIN if the client has taken precautions for preventing damage in the event of loss or theft etc. If requested by the ME AT+CPIN may also be used for the SIM PIN2 or SIM PUK2. If no PIN1 request is pending (for example if PIN1 authentication has been done and the same PIN1 is entered again) SMC modem responds "+CME ERROR: operation not allowed"; no further action is required.

Each time a password is entered with AT+CPIN the module starts reading data from the SIM. The duration of reading varies with the SIM card. This may cause a delay of several seconds before all commands which need access to SIM data are effective.

AT+CPIN=<pin>[, <new pin>]

<pin>: Password (string type), usually SIM PIN1. If the requested password was a Pin Unlock Code (PUK), such as SIM PUK1 or PH-FSIM PUK or another password, then <pin> must be followed by <new pin>.

<new pin>: If the requested code was a PUK: specify a new password or restore the former disabled password. See section "What to do if PIN or password authentication fails?" for more information about when you may need to enter the PUK.

Successful PIN authentication only confirms that the entered PIN was recognized and correct. The output of the result code OK does not necessarily imply that the mobile is registered to the desired network. Typical example: PIN was entered and accepted with OK, but the ME fails to register to the network. This may be due to missing network coverage, denied network access with currently used SIM card, no valid roaming agreement between home network and currently available operators etc. The SMC modem offers various options to verify the present status of network registration: For example, the AT+COPS command indicates the currently used network. With AT+CREG you can also check the current status and activate an unsolicited result code which appears whenever the status of the network registration changes (e.g. when the ME is powered up, or when the network cell changes).

The <pin> and <new pin> can also be entered in quotation marks (e.g. "1234").

To check the number of remaining attempts to enter the passwords use the AT^SPIC command.

See AT+CPWD and AT^SPWD for information on passwords.

See AT+CLCK and AT^SLCK for information on lock types.

What to do if PIN or password authentication fails?

PIN1 / PUK1:
After three failures to enter PIN 1, the SIM card is blocked (except for emergency calls). +CME ERROR: 12 will prompt the client to unblock the SIM card by entering the associated PUK (= PIN Unblocking Key / Personal Unblocking Key). After ten failed attempts to enter the PUK, the SIM card will be invalidated and no longer operable (the device will respond with: +CME ERROR: 770, which stands for: SIM invalid - network reject). In such a case, the card needs to be replaced. PIN1 consists of 4 to 8 digits, PUK1 is an 8-digit code only. To unblock a disabled PIN1 you have two options:

• You can enter AT+CPIN=PUK1,new PIN1.
• You can use the ATD command followed by the GSM code **05*PUK*newPIN*newPIN#;.

PIN2 / PUK2:
PIN2 prevents unauthorized access to the features listed in AT+CPIN2. The handling of PIN2 varies with the provider. PIN2 may either be a specific code supplied along with an associated PUK2, or a default code such as 0000. In either case, the client is advised to replace it with an individual code. Incorrect input of PUK2 will permanently block the additional features subject to PIN2 authentification, but usually has no effect on PIN1. PIN2 consists of 4 digits, PUK2 is an 8-digit code only. To unblock a disabled PIN2 you have two options:

• You can enter AT+CPIN2=PUK2,new PIN2.
• You can use the ATD command followed by the GSM code **052*PUK2*newPIN2*newPIN2#;.

Phone lock:
If the mobile was locked to a specific SIM card (= "PS" lock or phone lock), the PUK that came with the SIM card cannot be used to remove the lock. After three failed attempts to enter the correct password, ME returns +CPIN: PH-SIM PUK (= response to read command AT+CPIN?), i.e. it is now waiting for the Master Phone Code. This is an 8-digit device code associated to the IMEI number of the mobile which can only by obtained from the manufacturer or provider. When needed, contact Cinterion Wireless Modules GmbH and request the Master Phone Code of the specific module. There are two ways to enter the Master Phone code:

• You can enter AT+CPIN=Master Phone Code
• You can use the ATD command followed by the GSM code *#0003*Master Phone Code#;.

Usually, the Master Phone Code will be supplied by mail or e-mail. If the received number is enclosed in the *# codes typically used for the ATD option, it is important to crop the preceding *#0003* characters and the appended #. Example: You may be given the string *#0003*12345678#. When prompted for the PH-SIM PUK simply enter 12345678. If incorrectly input, the Master Phone Code is governed by a specific timing algorithm: (n-1)*256 seconds (see table below). The timing should be considered by system integrators when designing an individual MMI.

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

SIM locks:
These are factory set locks, such as "PF", "PN", "PU", "PP", "PC". An 8-digit unlocking code is required to operate the mobile with a different SIM card, or to lift the lock. The code can only be obtained from the provider. Failure to enter the password is subject to the same timing algorithm as the Master Phone Code (see Table above).

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

SECTION 7 -   CALL SETUP INFORMATION

This section provides a brief look at setting up variuos call scienerios using the SMC-GPRS modem with the SMC Development/Test board and HyperTerminal. In general, each call scienerio requires a set of initialization commands to set up the SMC modem for the specific call type. See related documents **[1]** and **[2]** for more detailed descriptions and examples for all call types.

Types of calls:

- Circuit Switched Data (CSD)
- General Packet Radio Service (GPRS)
- Short Message Service (SMS)
- Internet Services
     Socket Client & Server for TCP, Client for UDP
     FTP Client
     HTTP Client
     SMTP Client
     POP3 Client

Circuit Switched Data (CSD)

Before proceeding, be sure the cellular provider account can support CSD calls. Before making a CSD call be sure that flow control is enabled using the **AT\Q3** command. All other initialization settings listed below are optional.

AT+CSNS=4 enables calls received without bearer capability element to be accepted as data calls.

ATX determines whether the ME detects the presence of dial tone and busy signal. If ATX>0 the CONNECT result code will include the transmission speed.

The **ATS0** command specifies the number of rings before the ME automatically answers incoming data calls. ATS0=3 sets the SMC modem to answer on the third ring.

The **ATS7** command specifies the number of seconds the ME will wait for the completion of call setup when answering or originating a call.

The **ATS10** command sets the time (tenths of seconds) the ME remains connected after having indicated the absence of the data carrier. ATS10=10 would set a 1 second time period.

ATS18 enables extended call release reports indicated every time a fax or data call is released or fails to be established. This is useful especially for MT single numbering scheme calls or calls received from analog devices. An odd number enables the presentation of the extended call release report. Any even number disables this feature.

Use **AT+CRC** to enable or disable the extended format of result codes for incoming call indication. In the case of CSD calls AT+CRC=1 can be used to replace the factory default result code "RING" with the extended format "+CRING REL ASYNC" or "+CRING FAX".

Use **AT+CR** to enable or disable an intermediate result code to report information about the connection when a call is being answered. In a data connection this is the result code "+CR: REL ASYNC" which is presented before the CONNECT result code.

Select **ATV0** to set the short format (numeric code) or **ATV1** to set the long format (verbose code) of result codes. In case of using the command without parameter the value will be set to 0.

Generally, only **AT+CBST=0** (auto bauding) and **AT+CBST = 7** (9600 bps, [V.110]) are supported and provide reliable performance. All other settings can be tried, but depending on the network problems may be encountered.

Once a data connection is established, the ME first enters the data mode (online mode). With the escape sequence +++ you can switch from data to command mode without dropping the line. The command ATO returns from command to data mode.

The escape sequence must be preceded and followed by a pause of at least 1000 ms. The +++ characters must be entered in quick succession, all within 1000 ms.

To end a call, the caller or the called party may use the commands ATH or AT+CHUP. The response to ATH and AT+CHUP is "OK" while the remote party is given "NO CARRIER".

CSD Incoming Calls

Depending on the basic initialization, an incoming CSD call is indicated either by the URC "RING" (if AT+CRC=0) or the extended URC format "+CRING: REL ASYNC" (if AT+CRC=1).

An incoming data call can be accepted by entering the command **ATA** or by using the autoanswer mode if enabled with ATS0≠000. Depending on the module's basic initialization, connection setup is indicated by the result code "CONNECT" (if ATX0) or "CONNECT <text>" (if ATX>0), where <text> gives the transmission speed, for example "CONNECT 9600/RLP". In addiditon, the CONNECT result code may be preceded by the intermediate result code "+CR: REL ASYNC" if the ME is initialized with AT+CR=1.

CSD Outgoing Calls

The commands used to dial out are ATD, ATDI and ATDL. Do not attach a semicolon ";" at the end of the dial string. Dialing from the phonebooks is not supported for data connections.

When dialing a data call number, the following responses can be returned:
    CONNECT (if ATX0) or CONNECT <text> (if ATX>0)
    NO CARRIER
    BUSY
    NO DIALTONE

The response is given when the connection has been set up successfully ("CONNECT"), or when it fails ("NO CARRIER", "BUSY", "NO DIALTONE").

If the module is initialized with AT+CR=1, the additional intermediate result "+CR: REL ASYNC" appears before the CONNECT result code.

When the TA-TE link is reserved (data mode), any URCs, for example an incoming SMS, will be indicated by a BREAK only. The URC itself will be transmitted as soon as the TA-TE link is free again. This means, the URC will be output either when the user switches from data to command mode with +++, or when the line is dropped.

General Packet Radio Service (GPRS)

Before proceeding, be sure the cellular account SIM is provisioned with GPRS data services and all necessary initialization commands have been executed. The module must then be attached to the GPRS service, allowing the device to be accessable by the network, but no data transmission is yet possible. Before activating the PDP context, network provider specific context parameters have to be defined. Afterwards the context can be activated and the module can enter the GPRS data mode. At this point data can be exchanged between module and network.

Listed below are initial settings suggested for using GPRS.

AT+CGREG? queries the status of GPRS network registration. AT+CREG=1 will enable network activation.

AT+CGSMS specifies the service or service preferences the MT shall use when sending MO SMS messages. AT+CGSMS=0 will select GPRS service.

AT^SGAUTH sets the authentication type for the PPP connection. The default value is 3 (PAP and CHAP). To configure the LLC-PDU-length and the GPRS multislot class use AT^SGCONF

The **AT^SCFG** command is used for the following GPRS related settings. Note that AT^SCFG settings illustrated in the examples are valid only if GSM character set is active.

"GPRS/ATS0/withAttach" (on/off)
Specifies whether or not ME will automatically attempt to perform a GPRS attach after receiving the command ATS0=<n> with parameter n>0.

"GPRS/RingOnIncomingData (on/off)
Specifies if RING line shall be activated when ME receives GPRS IP packets during CYCLIC SLEEP mode AT+CFUN=7 or 8. This solution ensures that incoming GPRS IP packets will prompt the application to wake up from power saving.

"URC/Ringline/ActiveTime" (0/1/2): Specifies duration of RING activation to indicate URCs or incoming GPRS IP packets.

GPRS Attach/Detach

The **AT+CGATT** command enables the ME to attach (=1) or to detach (=0) from the GPRS service. If the ME is already in the requested state, the command is ignored and OK response is returned. Any active PDP Contexts will automatically be deactivated, if the ME detaches from the GPRS service.

If the ME is not able to attach for more than 5 minutes or to detach for more than 1 minute, the command returns "ERROR" or "+CME ERROR: unknown", but the ME is still trying to attach/ detach.

Define the GPRS Context

Exact settings of GPRS context and Quality of Service Profiles are provisioned by the network provider and must be requested before defining the GPRS context. Every PDP context has a context identifier <cid>. The context identifiers are numbered sequentially and have to start with value 1.

AT+CGDCONT is used to define a context ID and specify the PDP type and Access Point Name (APN). The PDP type describes the protocol to be used between the ME and the network. The APN specifies the gateway between mobile network and the internet.

GPRS PDP Context activation/ deactivation

The **AT+CGACT=<state>,<cid>** command activates (state=1) and deactivates (state=0) a specified PDP Context. If a PDP Context is already in the requested state, the state of this context remains unchanged.

If the ME is not yet attached to the GPRS service, the attach will be done before the context activation is executed. If no <cid> is specified (e.g. AT+CGACT=1 or AT+CGACT=0), all defined contexts become activated/deactivated.

In many networks AT+CGACT=1 does not work any longer. Many networks require user name and password for context activation. However these parameters are only handed to module during the PPP traffic and not by AT command. Since the PPP traffic only starts when entering the data mode, it is necessary to enter data mode before the actual PDP context activation request is sent to the network. Use **ATD*99***<cid>#** to do so.

The command **AT+CGPADDR=<cid>** shows the PDP address, which was assigned to the module during the activation process. The address may be static or dynamic.

GPRS Data Mode

Use the **ATD*99***<cid>#** command to go into GPRS data mode.

The PDP context (parameter <cid>) must be defined before via AT+CGDCONT.
If ATD*99***<cid># is entered without specifying a parameter, default parameters
will be used.

When entering the GPRS data mode, PPP traffic between the module and the application is transferred. Therefore the application must be capable of handling PPP protocol.

Entering **+++** will switch from data mode or PPP online mode to command mode

Entering **ATO** or **AT+CGDATA** will switch from command mode to data mode

Short Message Service (SMS)

SMS is a service to transfer short messages between a GSM Mobile Stations (MS) and an Short-Message-Entity (SME) via a Service Center (SC). SMC modems support two modes: text mode and Protocal Data Unit (PDU) mode. The minimal requirements to send a short message are:

- Service center address of the provider
- Destination address
- Content of the message

To write or send short messages in text mode the SMC modem must be configured to use text mode, and the service center address must be set.

Writing or sending a short message in PDU mode requires all attributes of the short message to be coded in PDU format.

Initializing SMS

SMC modems support two character sets: the GSM default alphabet defined in GSM 03.38 (7 bit) and the UCS2 character set defined in ISO/IEC10646. To choose one of them use the command **AT+CSCS=<chset>,** where chset is "GSM" or "UCS2".

AT+CMGF sets the SMS message format. Choose AT+CMGF=1 for text mode, or AT+CMGF=0 for PDU mode.

AT+CSDH enables the presentation of text mode parameters in the result codes of SMS reading and listing commands.

AT+CSMP command changes the text mode parameters. You can set the following SMS parameters: first octet, service center time stamp, validity period and the protocol identifier.

The **AT+CSCA** command is used to specify the service center address supplied by the service provider when in text mode. In PDU mode, it is possible to code the service center address in the PDU itself. Therefore, setting the service center address with AT+CSCA is optional.

AT+CSMS is used to select the message service. If you want to use SMS features specified in GSM 07.05 Phase 2+, you need to enable Phase 2+ functionality with "AT+CSMS".

AT+CNMI is used to enable the presentation of URCs when the module receives a short message, a cell broadcast message or statusreport.

AT^SMGO is used to enable the presentation of URCs when the SMS storage is full.

AT+CPMS is used to select the preferred storage for short messages.

AT+CGSMS selects preferences for transmitting MO short messages over GPRS or circuit switched services.

AT^SSCONF enables or disables the presentation of the parameters <ra> and <tora> fpr status reports in the result codes of SMS reading and listing commands.

If you want to receive cell broadcast messages activate the URC presentation for CBS with **AT+CNMI** and subscribe to a CBS channel with **AT+CSCB**.

The **AT^SM20** command specifies different modes of responses returned when sending and writing short messages: AT^SM20=,0 causes the ME return "+CMS ERROR: <err>" when writing or sending of short messages fails. AT^SM20=,1 (factory default) causes the ME to return "OK" no matter whether or not the SMS command was succesfully executed.

Writing SMS

AT+CMGF Select SMS message format
AT^SMGO Set or query SMS overflow presentation mode or query SMS overflow
AT+CSMP Set SMS text mode parameters
AT+CMGW Write SMS message to memory

Reading SMS

AT+CMGL List SMS messages from preferred storage
AT^SMGL List SMS messages from preferred storage (does not change status)
AT+CMGR Read SMS message
AT^SMGR Read SMS message (does not change status)

Deleting SMS

AT+CMGL List SMS messages from preferred store (optional)
AT+CMGD Delete SMS message (mandatory)

Sending SMS

AT+CMGS Send SMS message
AT+CMSS Send SMS message from storage

Receiving SMS

AT+CMGR Read SMS message
AT+CNMA New SMS message acknowledge to ME/TE, only phase 2+

SMS Status Report

There are two ways to activate the presentation of status reports:

    - When using PDU mode, status reports can be enabled with the first octet of the PDU.
    - When using text mode, you can switch it on with the first parameter (<fo>) of AT+CSMP

To be notified when a status report is received, activate the URC presentation with AT+CNMI.

Internet Services

The modem has an embedded TCP/IP stack that is driven by AT commands and enables the host application to easily access the Internet. The advantage of this solution is that it eliminates the need for the application manufacturer to implement their own TCP/IP and PPP stacks, thus minimizing cost and time to integrate Internet connectivity into a new or existing host application. This Section is a reference guide to all the AT commands and responses defined for use with the TCP/IP stack. Access is provided to the following Internet Services:

1. Socket Client and Server for TCP, Client for UDP
2. FTP Client
3. HTTP Client
4. SMTP Client
5. POP3 Client

Step-by-step instructions on how to configure and use TCP/IP communications:

- First of all, create a connection profile with AT^SICS. The connection profile is a set of basic parameters which determines the type of connection to use for an Internet service. Up to 6 connection profiles can be defined, each identified by the <conProfileId>.

- Secondly, use AT^SISS to create a service profile based on one of the connection profiles. Up to 10 service profiles can be defined, each identified by the <srvProfileId>. The service profile specifies the type of Internet service to use, i.e. Socket, FTP, HTTP, or one of the email services SMTP or POP3. To assign a connection profile to a service profile, the <conProfileId> of AT^SICS must be entered as "conId" value of the AT^SISS parameter <srvParmTag>. This offers great flexibility to combine connection profiles and service profiles. For example, you may have one connection profile (CSD or GPRS) specified with AT^SICS which can be associated with an SMTP service profile for sending emails and a POP3 service profile for retrieving emails.

- Once the connection profile and the service profile are created, an Internet session can be opened by entering the AT^SISO write command and the desired <srvProfileId>. Wait for the resulting URC.

- The next command determines the action to be performed, for example reading data with AT^SISR or writing data with AT^SISW. Wait for the resulting URC.

- Finally, to end a session, enter the AT^SISC write command and the <srvProfileId>.

Maximum number of profiles defined / used:

- Up to 6 connection profiles can be created (with AT^SICS).

- Up to 10 service profiles can be created (with AT^SISS), but the number of parallel profiles of the same service type is limited as listed below. If the maximum number of a service profile type is already defined, any attempt to set up another profile for the same type will be denied with "+CME ERROR: unknown".

  - Maximum 3 HTTP profiles

  - Maximum 6 socket profiles: Only 2 instances can be opened for listener, meaning that if 2 listeners are established another 4 instances can be opened for clients. Also, the socket service can accept an incoming connection only when at least one service profile is still free (not yet created with AT^SISS), otherwise the incoming connection will be rejected from the listener. If there is no listener established all 6 socket profiles can be configured as client.

  - 1 FTP profile

  - 1 POP3 profile

  - 1 SMTP profile

- The TCP/IP stack of TC63i supports using several service profiles at the same time, provided all of them are running on the same connection profile. For example, it is possible to download files from an FTP server, while sending and receiving emails at the same time.

- GPRS connections established over the Dial-Up Network do not use the embedded TCP/IP stack of TC63i and can be active at the same time. This allows the user to have two parallel GPRS connections: for example, for sending or receiving emails over a GPRS connection enabled by the TCP/IP stack while, at the same time, surfing the Internet over a Dial-Up Network GPRS connection.

Address notation
Server addresses must be provided as IP addresses in standard dot-format (e.g. "192.168.1.2") or as server address names resolvable by a DNS server (e.g. "smtp.myserver.de" or "pop3.myserver.de").

Inactivity timeouts
Inactivity timeouts are not part of the Internet AT command functionality implemented in the modem and, if desired, are the responsibility of the host application. It is recommended that the host application validates URCs and AT command responses and reacts adequately, for example by sending a close message or starting a timer.

SECTION 8 - SMC MODEM MODULE PROFILES

In addition to the default profile, you can store an individual one with AT&W. To alternate between the two profiles enter either ATZ (loads user profile) or AT&F (restores factory profile).

NOTE: Every ongoing or incoming call will be terminated.

Table 8.1: Profile Commands

AT&V	Returns the current parameter setting. The configuration varies depending on whether or not PIN authentication has been done.
AT&W	Stores the currently set parameters to a user defined profile in the non-volatile memory. The user defined profile will be restored automatically after power-up. Use **ATZ** to restore user profile and **AT&F** to restore factory settings. Until the first use of **AT&W**, **ATZ** works as **AT&F**. **AT&W** stores all global settings and the current local settings of the interface, on which the command is executed.
AT&F	Sets all current parameters to the manufacturer defined profile. Refer to Section 8, Table 8.1.
ATZ	Sets all current parameters to the user profile stored with **AT&W**. If a connection is in progress, it will be terminated.

SECTION 9 -   COMMON AT COMMAND REFERENCE GUIDE

Below you will find a reference guide of the AT commands most commonly used in day-to-day operation of the modem.

Table 9.1: Common AT Commands

Command	Description
Configuration Commands	
AT&F	Set all current parameters to manufacturer defaults
AT&V	Display current configuration
AT&W	Stores current configuration to user defined profile
AT^SCFG	Extended Configuration Settings Example to enable Persistent Context when setting APN: **AT^SCFG=GPRS/PersistentContexts, 1**
ATZ	Sets all current parameters to the user profile stored with AT&W. If a connection is in progress, it will be terminated.
Serial Interface Control Commands	
AT+IPR	Set fixed local baud rate The write command specifies the bit rate to be used for the interface. When you set a fixed-rate, make sure that both TE (DTE) and TA (DCE) are configured to the same rate. Example**: AT+IPR=19200** sets the modem baud rate to 19200.
Security Commands	
AT+CPIN?	PIN Authentication status. Example response; +CPIN: READY
Identification Commands	
ATI	Display product identification Example: SIEMENS TC65 REVISION 02.000
AT+CGSN	Request International Mobile Equipment Identity (IMEI) This is the module IMEI number located on the top label.
AT+CNUM	Read own numbers Example response; +CNUM: "My Number", "18052054436", 129
AT^SCID	Display SIM card identification number Example response; ^SCID: 89014104211640012345
Call Related Commands	
ATA	Answer a Call
ATD	Mobile originated call to specified number ATD<phone number>; for voice call test. Example: **ATD15075551234;** ATD<phone number> for data call. Example: **ATD15075551234**
ATD*99***1#	Establish a GPRS connection by service code 99 and using CID 1.
ATH	Disconnect exsiting connection
ATO	Switch from command mode (ie AT commands) to data mode/PPP online mode. This command is only available during a CSD call or a GPRS connection. The +++ character sequence causes the TA to cancel the data flow over the AT interface and switch to command mode. This allows you to enter AT commands while maintaining the data connection to the remote device or, accordingly, the GPRS connection. To prevent the +++ escape sequence from being misinterpreted as data, it must be preceded and followed by a pause of at least 1000 ms. The +++ characters must be entered in quick succession, all within 1000 ms.
+++	Switch from data mode to command mode

Network Service Commands	
AT+CSQ	Signal Quality Example response; +CSQ: 25,0 has an RSSI of -63 dBm

At^SMONG	Cell Info Table
	Example response:
	`  GPRS Monitor`
	`  BCCH G PBCCH PAT MCC MNC NOM TA RAC     # Cell #`
	`  0637 1 -    4   234 05  2   00 0B`
	BCCH - ARFCN of BCCH carrier
	G - GPRS status:
	     0 GPRS not available in currently used cell
	     1 GPRS available in currently used cell
	     2 GPRS attached
	PBCCH - If PBCCH is present, indication of ARFCN, else ''-''
	PAT - Priority Access Threshold (GSM Rec. 04.08 / 10.5.2.37b)
	     0 Packet access is not allowed in the cell
	     1 Spare, shall be interpreted as "000" (packet access not allowed)
	     2 Spare, shall be interpreted as "000" (packet access not allowed)
	     3 Packet access is allowed for priority level 1
	     4 Packet access is allowed for priority level 1 to 2
	MCC - Mobile Country Code
	MNC - Mobile Network Code
	NOM - Network Operation Mode (1...3)
	TA - Timing Advance Value
	RAC - Routing Area Code (as hexadecimal value)

GPRS Service Commands	
AT+CGACT	PDP context activate or dactivate ? - Read command returns the current activation states for all the defined PDP contexts. =0 – Write command is used to deactivate the specified PDP context. =1 - Write command is used to activate the specified PDP context.
AT+CGATT	GPRS attach or detach ? - Read command returns the current GPRS service state. =0 – Write command is used to detach the MT to the GPRS service. =1 - Write command is used to attach the MT to the GPRS service.
AT+CGDATA	Enter GPRS data state =? - List of supported <L2P>s =<L2P>,<cid>, Example: **AT+CGDATA="PPP",1**
AT+CGDCONT	Define PDP Context =? - Read command returns the current settings for each defined PDP context. =<cid>, "IP",<APN>,<PDP Address>,0,<PDP Header Commpression> Example: **AT+CGDCONT=1,"IP",isp.cingular** sets 'isp.cingular' as the APN
AT+CGPADDR	Show PDP address =<cid>, Example response; +CGPADDR: 1, "15.144.187.50"
Miscellaneous Commands	
A/	Repeat previous command line

SECTION 10 - AT COMMAND REFERENCE

All modem functions are controlled using the same industry-standard AT commands that are used to control landline modems. A knowledge of all these commands is not required by most users, but are provided here as a reference.

AT Command Types

There are several types of AT commands as defined in the following list;

- Configuration Commands
- Status Control Commands
- Serial Interface Control Commands
- Security Commands
- Identification Commands
- Call Related Commands
- Network Service Commands
- Internet Service Commands
- GPRS Commands
- Short Message Service (SMS) Commands
- SIM Related Commands
- Hardware Related Commands

The parameters set by the various AT commands in this section are applied to all subsequent calls and will be used each time you place a call. As such, your custom settings (if not saved in a profile) will be available until you power down the modem. These settings are lost upon powerdown if not saved. For further information, refer to the Cinterion TC63i AT Command Set document available from Cinterion.

Command Line Syntax

The "AT" or "at" prefix must be set at the beginning of each command line. To terminate a command line enter <CR>. Commands are usually followed by a response or, result codes, that includes "<CR><LF><response><CR><LF>".

Table: 10.1 Command Syntax

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

Commands may be edited using the backspace key, but the backspace will not delete the AT attention command at the beginning of the command line.

Result Codes

After issuing a command, a result code will typically be displayed on the screen to inform you if the command was successful, unsuccessful, improperly formatted, etc. When in the command mode, thirteen possible result codes may be returned. The result codes can be set to display as either digits or words by accessing the Verbose command, **ATV**. The digit code is returned when the Verbose mode is OFF (ATV0); the word code is returned when Verbose is ON (ATV1). See table 10.2 for more information on Verbose format.

Table: 10.2 Result Codes

Numeric	Verbose	Description
0	OK	Command executed without errors.
1	CONNECT	Link established.
2	RING	Ring detected.
3	NO CARRIER	Link not established or disconnected.
4	ERROR	Invalid command or command line too long.
6	NO DIALTONE	No dial tone, dialling impossible, wrong mode.
7	BUSY	Remote station busy.
47	CONNECT 2400/RLP	Link with 2400 bps and Radio Link Protocol.
48	CONNECT 4800/RLP	Link with 4800 bps and Radio Link Protocol.
49	CONNECT 9600/RLP	Link with 9600 bps and Radio Link Protocol.
50	CONNECT 14400/RLP	Link with 14400 bps and Radio Link Protocol.
	ALERTING	Alerting at called phone
	DIALING	Mobile phone is dialing
	^SYSSTART	Modem power up indication

Configuration Commands

These commands control the basic configuration of the modem. The parameters can only be read back by the AT&V command when in command state. The following table shows the command format.

Table 10.3: Configuration Commands

Command	Description
AT&F	Sets all current parameters to the manufacturer defined profile.
AT&V	Returns the current parameter setting. The configuration varies depending on whether or not PIN authentication has been done and whether or not Multiplex mode is enabled
AT&W	Stores the currently set parameters to a user defined profile in the non-volatile memory.
ATQ	Set result code presentaion mode: 0 - DCE transmits result code 1 - Result codes are suppressed and not transmitted
ATV	This command determines the contents of header and trailer transmitted with AT command result codes and information responses. 0 – Numeric Result Code information response 1 – Verbose Result Code information response
ATX	Set CONNECT result code format and call monitoring: 0 - CONNECT result code only returned, dial tone and busy detection are both disabled. 1 - CONNECT <text> result code only returned, dial tone and busy detection are both disabled. 2 - CONNECT <text> result code returned, dial tone detection is enabled, busy detection is disabled.

	3 - CONNECT <text> result code returned, dial tone detection is disabled, busy detection is enabled. 4 - CONNECT <text> result code returned, dial tone and busy detection are both enabled.
AT\V	Set CONNECT result code format: 0 - CONNECT <text> result code returned without RLP trailer. 1 - CONNECT <text> result code returned with RLP trailer.
ATZ	Sets all current parameters to the user profile stored with **AT&W**. If a connection is in progress, it will be terminated.
AT+CFUN	Sets phone functionality: **AT+CFUN=0** NON-CYCLIC SLEEP mode **AT+CFUN=1** Full functionality **AT+CFUN=7** CYCLIC SLEEP mode, In this mode, the serial interface is shortly enabled while CTS is active. If characters are recognized on the serial interface, the ME stays active for 2 seconds after the last character was sent or received. ME exits SLEEP mode only, if AT+CFUN=1 is entered. **AT+CFUN=9** CYCLIC SLEEP mode, In this mode, the serial interface is shortly enabled while CTS is active. If characters are recognized on the serial interface, the ME stays active after the last character was sent or received for at least the time, which can be configured by AT^SCFG="PowerSaver/Mode9/Timeout",<psm9to> (temporary wakeup). In contrast to SLEEP mode 7 assertion of RTS can also be used to temporarily wake up the ME. **AT+CFUN=1,1** will re-start the SMC modem and clear volitile memory.
AT^SMSO	Initiates the power-off procedure.
AT+GCAP	Request complete TA capabilities list.
AT+CMEE	Mobile Equipment Error Message Format: **AT+CMEE=0** Disable result code, i.e. only "ERROR" will be displayed. **AT+CMEE=1** Enable error result code with numeric values. **AT+CMEE=2** Enable error result code with verbose (string) values.
AT+CSCS	Select TE character set: **AT+CSCS="GSM"** GSM default alphabet (GSM 03.38 subclause 6.2.1); Note: This setting may cause software flow control problems since the codes used to stop and resume data flow (XOFF = decimal 19, XON = decimal 17) are interpreted as normal characters. **AT+CSCS="UCS2"** 16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; e.g. "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99, $(AT R97)$
AT^SCFG	Extended Configuration Settings: The **AT^SCFG?** read command returns a list of all supported parameters and their current values. The **AT^SCFG=** write command queries a configuration parameter (if no value is entered) or sets its value(s). Input of parameter names is always coded in GSM character set, parameter values are expected to be given as specified via AT+CSCS.
AT^SM20	Sets M20 compatibility mode: **AT^SM20=**<CallMode>, <CmgwMode> 0 - Set compatibility to Siemens mobile phones. 1 - Default mode

Status Control Commands

The AT Commands described in this section allow the external application to obtain various status information from the modems cellular module.

Table 10.4: Status Control Commands

Command	Description
AT+CMER	Mobile Equipment Event Reporting: **AT+CMER=**<mode>,0,0,<ind>,0 *Mode:* 0 - Discard "+CIEV" and "^SLCC" URCs. 1 - Discard "+CIEV" and "^SLCC" URCs when TA-TE link is reserved, e.g. in online data mode. Otherwise they are forwarded directly to the TE. 2 - Buffer "+CIEV" and "^SLCC" URCs in the TA while TA-TE link is reserved, e.g. in online data mode, and flush them to the TE afterwards. Otherwise they are forwarded directly to the TE. 3 - Forward "+CIEV" and "^SLCC" URCs directly to the TE. If SMC modem is in online data mode, URCs are signaled via sending BREAK (100ms) and stored in a buffer. Once it is back in command mode e.g. after +++ was entered, all URCs stored in the buffer will be output. *Ind:* 0 - Disable indicator event reporting. 2 - Enable indicator event reporting.
AT+CIND	The command controls the presentation of Indicator Event Reports related to various functions such as battery charge level, signal quality, service availability, sound generation, indication of unread short messages, full SMS storage, call in progress or roaming activities.
AT^SIND	The read command provides a list of all indicators supported by AT+CIND and AT^SIND. Each indicator is represented with its registration mode and current value. The write command can be used to select a single indicator in order to modify its registration and to view the current value.
AT+CEER	The command returns an extended error report regarding the reason of the last; • call release • failure to set up a call (both mobile originated or terminated) • failure to modify a call by using Supplementary Services • failed attempt to activate, register, query, deactivate or deregister a Supplementary Service • unsuccessful GPRS attach or unsuccessful PDP context activation • GPRS detach or PDP context deactivation
ATS18	Controls the presentation of extended call release reports for circuit switched fax and data calls. Extended call release reports related to voice calls are controlled via AT+CEER.
AT+CPAS	Mobile equipment activity status: 0 - Ready 3 - Incoming call (ringing) 4 - Call in progress or call hold

Serial Interface Control Commands

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

Table 10.5: Serial Interface Control Commands

Command	Description
AT\Q	Flow control: 0 - Disable flow control 1 - XON/XOFF software flow control 2 - Only CTS by DCE (TA) 3 - RTS/CTS hardware flow control Recommended for the following procedures: incoming or outgoing data calls, fax calls, MUX mode. Often, the initialization routine of Fax programs includes enabling RTS/CTS handshake, eliminating the need to issue AT\Q3 once again.
AT&C	Set circuit Data Carrier Detect (DCD) function mode: 0 - DCD line is always ON 1 - DCD line is ON in the presence of data carrier only
AT&D	Set circuit Data Terminal Ready (DTR) function mode: 0 - TA ignores status of DTR. 1 - ON->OFF on DTR: Change to command mode while retaining the connected call. 2 - ON->OFF on DTR: Disconnect data call, change to command mode. During state DTR = OFF auto-answer is off.
AT&S	Set circuit Data Set Ready (DSR) function mode: 0 - DSR line is always ON 1 - TA in command mode: DSR is OFF. TA in data mode: DSR is ON.
ATE	Enable command echo: 0 - Echo mode off 1 - Echo mode on
AT+ICF	Serial Interface Character Framing: =5,1 7 bits, even parity, 1 stop bit =5,0 7 bits, odd parity, 1 stop bit =2,1 8 bits, even parity, 1 stop bit =3 8 bits, no parity, 1 stop bit =2,0 8 bits, odd parity, 1 stop bit =1 8 bits, no parity, 2 stop bits
AT+IFC	Set Flow Control separately for data directions: **AT+IFC=**<TEflowcontrol>, <TAflowcontrol> *TEflowcontrol:* 0 - none 1 - XON/XOFF, terminate flow control in the Cellular Engine 2 - RTS line 3 - XON/XOFF, evaluate flow control in the Cellular Engine and pass it through (over the air) to the opposite TE *TAflowcontrol:* 0 - none 1 - XON/XOFF 2 - CTS line

AT+ILRR	Set TE-TA local rate reporting: 0 - Disables reporting of local port rate 1 - Enables reporting of local port rate 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200, 230400, 460800 rates supported
AT+IPR	Set fixed local rate: 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200, 230400, 460800 rates supported
AT^STPB	Transmit Parity Bit (for 7E1 and 7O1 only): 0 - The parity bit will not be transmitted over the air and will be replaced with 0. This mode is the default setting if 7E1 or 7O1 is activated with AT+ICF. 1 - In a data connection 8 bits will be transmitted, including the parity bit, i.e. the parity bit will be properly transmitted over the air. The setting shall be used if problems are encountered when TC65 is running in the default 7E1 or 7O1 mode enabled with AT+ICF. In this case, AT^STPB=1 shall be set in addition to the 7E1 or 7O1 settings selected with AT+ICF.

Security Commands

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

Table 10.6: Security Commands

Command	Description
AT+CPIN	PIN Authentication: **AT+CPIN?** command returns an alphanumeric string indicating whether or not network authentication is required. **AT+CPIN=**<pin>,<new pin> command allows the modem to store the entered password.
AT+SPIC	Display PIN counter: Command used to find out whether the ME is waiting for a password and, if so, how many attempts are left to enter the password.
AT+CLCK	Facility lock: Command can be used to lock, unlock or interrogate a network or ME <facility>. The command can be aborted when network facilities are being set or interrogated. The facility for the SIM PIN is "**SC**".
AT+CPWD	Change Password: **AT+CPWD=**<facility>, <old password>, <new password> Command allows user to define a new password for a password protected <facility> lock function. Each password is a string of digits, the length of which varies with the associated <facility>. The test command returns a list of pairs which represent the available facilities and the maximum length of the associated password. The facility for the SIM PIN is "**SC**".

Identification Commands

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

Table 10.7: Identification Commands

Command	Description
ATI	The execute command delivers product information text. The 'Revision' information consists of the following parts: Version xx and variant yy of software release.
AT+CGMI	Request manufacturer identification (GSM 07.07)
AT+GMI	Request manufacturer identification (V.250)
AT+CGMM	Request model identification (GSM 07.07)
AT+GMM	Request model identification (V.250)
AT+CGMR	Request revision identification of software status (GSM 07.07)
AT+GMR	Request revision identification of software status (V.250)
AT+CGSN	Request International Mobile Equipment Identity (IMEI) (GSM 07.07)
AT+GSN	Request International Mobile Equipment Identity (IMEI) (V.250)
AT+CIMI	Request International Mobile Subscriber Identity (IMSI) (GSM 07.07)

Call Related Commands

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

Table 10.8: Call Related Commands

Command	Description
ATA	Answer a call: TA causes remote station to go off-hook (e.g. answer call).
ATD	Mobile originated call to specified number: This command can be used to set up outgoing voice, data or fax calls. **ATD**<n><mgsm> *n:* String of dialing digits and optional V.250 modifiers: 0-9, *, #, +, A, B, C The following V.250 modifiers are ignored: ,(comma), T, P, !, W ,@ Emergency call : <n> = 112, 911 or 08, standardized GSM emergency number (no SIM needed). *mgsm(optional):* String of GSM modifiers: I - Activates CLIR (disables presentation of own phone number to called party) i - Deactivates CLIR (enables presentation of own phone number to called party) G - Activate Closed User Group explicit invocation for this call only. g - Deactivate Closed User Group explicit invocation for this call only.
ATDI	Mobile originated call to ISDN number: ISDN number: String with maximum length of 20 characters. Allowed characters: +, 0-9, A, B, C.
ATDL	Redial last number used in the ATD command.
ATH	Disconnect existing connection
AT+CHUP	Cancels all active and held calls. (Hang up call)
AT+SHUP	Hang up call(s) indicating a specific GSM04.08 release cause.
ATS0	Set number of rings before automatically answering a call: =000 Automatic answer mode is disabled. =001-255 Enable automatic answering after specified number of rings.
ATS6	Set pause before blind dialing: =000 to 255

ATS7	Set number of seconds to wait for connection completion: =000 to 060
ATS8	Set number of seconds to wait for comma dialing modifier: =0 DCE does not pause when "," encountered in dial string =1 to 255 Number of seconds to pause
ATS10	Set disconnect delay after indicating the absence of data carrier: =001 to 254 Number of tenths of seconds of delay
ATO	Switch from command mode to data mode / PPP online mode: ATO is the corresponding command to the +++ escape sequence: When you have established a CSD call or a GPRS connection and TA is in command mode, ATO causes the TA to resume the data or GPRS connection and takes you back to data mode or PPP online mode.
+++	Switch from data mode to command mode: This command is only available during a CSD call or a GPRS connection. The +++ character sequence causes the TA to cancel the data flow over the AT interface and switch to command mode. This allows you to enter AT commands while maintaining the data connection to the remote device or, accordingly, the GPRS connection. To prevent the +++ escape sequence from being misinterpreted as data, it must be preceded and followed by a pause of at least 1000 ms. The +++ characters must be entered in quick succession, all within 1000 ms.
AT+CBST	Select bearer service type: **AT+CBST=**<speed> *speed:* =1 300 bps (V.21) =2 1200 bps (V.22) =4 2400 bps (V.22bis) =6 4800 bps (V.32) =7 9600 bps (V.32) =14 14400 bps (V.34) =65 300 bps (V.110) =66 1200 bps (V.110) =68 2400 bps (V.110) =70 4800 bps (V.110) =71 9600 bps (V.110) =75 14400 bps (V.110)
AT+CRLP	Select radio link protocol parameters for originated non-transparent data calls.
AT+CLCC	List current calls of ME: The execute command returns a list of current calls of ME. If command is successful, but no calls are available, no information response is sent to TE.
AT+CR	Service reporting control: Configures the TA whether or not to transmit an intermediate result code +CR: <serv> to TE when a call is being set up. =0 Disable =1 Enable Setting the value to 1 may lead to connection failure, if the application (e.g. WinFax) waits for default result code/URC.
At+CRC	Set Cellular Result Codes for incoming call indication: The command controls whether or not to use the extended format of incoming call indication. =0 Disable extended format =1 Enable extended format Setting the value to 1 may lead to connection failure, if the application (e.g. WinFax) waits for default result code/URC.

	Single Numbering Scheme: The command enables the ME to accept incoming calls when no bearer capability information is provided with the call, e.g. single numbering scheme calls or calls originating from analog devices. =0 Voice: Each call received without bearer element is assumed to be speech =2 Fax: Each call received without bearer element is assumed to be an incoming fax. =4 Data: Each call received without bearer element is assumed to be a data call. Please take into account that the bearer service parameters set with AT+CBST applies to all data calls including those received without bearer capability.
AT+CSNS	
AT^SCNI	List Call Number Information: TA returns a list of current calls of ME.
AT^SLCD	Display Last Call Duration: TA returns last call duration or current call duration.
AT^STCD	Display Total Call Duration: TA returns total call duration (accumulated duration of all calls).
ATP	Select pulse dialing.
ATT	Select tone dialing.

Network Service Commands

The AT Commands described in this section are related to various network services. For futher information, refer to the Cinterion TC63i AT Command Set document available from Cinterion **[2]**.

Table 10.9: Network Service Commands

Command	Description
AT+COPN	Read operator names: The command returns the list of operator names from the ME.
AT+COPS	Operator Selection: The command queries (?) the present status of the modem's network registration and sets whether automatic or manual network selection shall be used. **AT+COPS=**<mode>, <format>, <oper> *mode:* 0 - Automatic mode; <oper> field is ignored. 1 - Manual operator selection Write command requires <oper> in numeric format, i.e. <format> shall be 2. Read command returns the current <mode> and the currently selected <oper>. If no operator is selected, <format> and <oper> are omitted. 2 - Manually deregister from network and remain unregistered until <mode>=0 or 1 or 4 is selected. 3 - Set only <format> (for AT+COPS read command). 4 - Automatic / manual selection; if manual selection fails, automatic mode (<mode>=0) is entered (<oper> field will be present). *format:* 0 - Long alphanumeric format of <oper>. Can be up to 16 characters long. 2 - Numeric format of <oper>. This is the GSM Location Area Identification (LAI) number, which consists of the 3-digit Mobile Country Code (MCC) plus the 2- or 3-digit Mobile Network Code (MNC). *oper:* Name in numeric format

AT^SOPS	Extended Operator Selection similar to At^COPS.
AT+CREG	Network registration: The read (?) command serves to verify the network registration status of the ME. 0 - Not registered, ME is currently not searching for new operator and user intervention is required. Yet, emergency calls can be made if any network is available. 1 - Registered to home network 2 - Not registered, but ME is currently searching for a new operator 3 - Registration denied, Either the SIM or the MS or the ME are unable to log into any network. No further attempt is made to search or log into a network. User intervention is required. Emergency calls can be made, if any network is available. 4 - Unknown (not used) 5 - Registered, roaming. The ME is registered at a foreign network (national or international network) The write command is as follows: =0 Disable +CREG Unsolicited Result Codes (URC) =1 Enable URC +CREG:<stat> to report status of network registration =2 Enable URC +CREG:<stat>[,<lac>,<ci>] to report status of network registration including location information. Optional parameters <lac> and <ci> will not be displayed during calls or if these values have not changed since last AT+CREG read command or since last indication by +CREG URC
AT+CSQ	Signal quality: The execute command indicates the received signal strength <rssi> and the channel bit error rate <ber>. *rssi:* 0 -113 dBm or less 1 -111 dBm 2..30 -109... -53 dBm 31 -51 dBm or greater 99 not known or not detectable *ber:* 0..7 as RXQUAL values 99 not known or not detectable
AT^SMONC	Cell Monitoring: The execute command delivers cell information containing 9 values from a maximum of 7 base stations. The first base station is the serving cell.
AT^SMOND	Cell Monitoring: The execute command can be used to obtain status information of the service cell and up to six neighbour cells. The advantage over other cell monitoring commands is that AT^SMOND delivers more detailed information about the received signal strength.
AT^MONI	Monitor idle mode and dedicated mode: The command supplies information of the serving/dedicated cell. There are two ways to retrieve the information: once on request by using the execute command or automatically every <period> seconds by using the write command. To stop the periodic presentation type "AT" or "at". =1 to 254 periods in seconds

AT^MONP	Monitor neighbour cells: The command supplies information of up to six neighbour cells. There are two ways to retrieve the information: once on request by using the execute command or automatically every \<period\> seconds by using the write command. To stop the periodic presentation type "AT" or "at". =1 to 254 periods in seconds
AT^SMONG	GPRS Monitor: The command supplies GPRS specific cell information. There are two ways to retrieve the information: once on request by using the execute command or automatically every \<period\> seconds by using the write command. To stop the periodic presentation type "AT" or "at". =1,1 to 100 periods in seconds
AT^SHOM	Display Homezone: The returns the homezone state. The result is valid only, if network registration state \<stat\> is 1 (registered) (see AT+CREG). 0 - ME is out of Homezone 1 - ME is within the Homezone
AT^SPLM	Read the PLMN list: The execute command returns the list of operators from the ME.
AT+CPOL	Preferred Operator List: The read command returns the list of the preferred operators. The write command allows user to edit the list of the preferred operators. If \<index\> is given but \<operator\> is left out, the entry is deleted. An operator can be only once in the list. **AT+CPOL=**\<index\>, 2, \<operator\> *index:* The order number of the operator in the SIM preferred operator list. *operator:* Operator in numeric format (GSM Location Area Identification number which consists of a 3-digit country code plus a 2- or 3-digit network code).
AT^SPLR	Read entry from the preferred operators list: The write command returns used entries from the SIM list of preferred operators with \<indexa\> between \<index1\> and \<index2\>. If \<index2\> is not given, only entry at \<index1\> is returned. The test command returns the whole index range supported by the SIM. **AT^SPLR=**\<index1\>, \<index2\> *index1:* Location number to start reading from *index2:* Location number where to stop reading
AT^SPLW	Write an entry to the preferred operators list: The write command writes an entry to the SIM list of preferred operators at location number \<index\>. If \<index\> is given but \<oper\> is left out, the entry is deleted. An operator can be only once in the list. Test command returns the whole index range supported by the SIM. **AT^SPLW=**\<index\>, \<oper\> *index:* location number *oper:* Operator in numeric format (GSM Location Area Identification number which consists of a 3-digit country code plus a 2- or 3-digit network code).

Internal Internet Service Commands

A brief description of the internet service commands are provided in Table 10.10. For futher information, refer to the Cinterion TC63i AT Command Set document available from Cinterion **[2]**.

Table 10.10: Internet Service Commands

Command	Description
AT^SICC	Internet Connection Close: The write command releases a connection opened with AT^SICO and restores the previously set inactivity timeout "inactTO" of the selected connection profile.
AT^SICI	Internet Connection Information: The read command requests the current status of the Internet connection profiles currently defined with AT^SICS. The write command displays the status of the specified Internet connection profile.
AT^SICO	Internet Connection Open: The write command opens a connection profile (also referred to as bearer). A connection opened with AT^SICO remains open until closed with AT^SICC or, in case of inactivity, disconnected by the network.
AT^SICS	Internet Connection Setup Profile: The command serves to create and edit Internet connection profiles.
AT^SISS	Internet Service Setup Profile: The command serves to set up the necessary parameters in the Internet service profiles.
AT^SISE	Internet Service Error Report: The write command returns the current error status of the specified Internet service profile.
AT^SISO	Internet Service Open: The write command starts the Internet session configured by the service profile.
AT^SISC	Internet Service Close: The write command performs all necessary action to release all properties activated by AT^SISO.
AT^SISI	Internet Service Information: The read command requests the current status of all defined Internet service profiles. The write command requests the status of the specified Internet service profile.
AT^SISR	Internet Service Read Data: The write command triggers reading data via the Internet service configured with AT^SISS.
AT^SISW	Internet Service Write Data: The write command triggers writing data via the Internet service configured configured with AT^SISS.
At^SISX	Internet Service Execution: The write command sends ICMP (Internet Control Message Protocol) Echo Requests to a target IP address or host name (also referred to as Ping command). AT^SISX="Ping",0,<host name or IP address>

GPRS Commands

This Section describes AT Commands that a TE (Terminal Equipment, e.g. an application running on a controlling PC) may use to control the modem acting as a GPRS Mobile Termination (MT).

A brief description of the GPRS commands are provided in Table 10.11. For futher information, refer to the Cinterion TC63i AT Command Set document available from Cinterion **[2]**.

Table 10.11: GPRS Commands

Command	Description
AT+CGACT	PDP context activate or deactivate: The test command is used for requesting information on the supported PDP context activation states. The read command returns the current activation states for all the defined PDP contexts. The write command is used to activate or deactivate the specified PDP context(s). After the command has completed, the MT remains in V.250 command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the MT is not GPRS attached when the activation form of the command is executed, the MT first performs a GPRS attach and then attempts to activate the specified contexts. If no <cid>s are specified the activation/deactivation form of the command activates/deactivates all defined contexts. =0 deactivated =1 activated
AT+CGANS	Manual response to a network request for PDP context activation: The write command requests the MT to respond to a network request for GPRS PDP context activation which has been signaled to the TE by the RING or CRING unsolicited result code. The <response> parameter allows the TE to accept or reject the request. =0 the request is rejected and the MT returns OK to the TE =1 accept and request that the PDP context be activated
AT+CGATT	GPRS attach or detach: The test command is used for requesting information on the supported GPRS service states. The read command returns the current GPRS service state. The write command is used to attach the MT to, or detach the MT from the GPRS service. After the command has completed, the MT remains in V.250 command state. If the MT is already in the requested state, the command is ignored and the OK response is returned. Any active PDP contexts will be automatically deactivated when the attachment state changes to detached. =0 detached =1 attached

AT+CGAUTO	Automatic response to a network request for PDP context activation: The test command returns the values of <n> supported by the MT as a compound value. The write command disables or enables an automatic positive response (auto-answer) to the receipt of a Request PDP Context Activation message from the network. It also provides control over the use of the V.250 basic commands ATS0, ATA and ATH for handling network requests for PDP context activation. =0 Disable automatic response for network requests for GPRS PDP context activation. GPRS network requests are manually accepted or rejected by the AT+CGANS command. =1 Enable automatic response for network requests for GPRS PDP context activation. GPRS requests are automatically accepted according to the description below. =3 Modem compatibility mode. The automatic acceptance of both GPRS and incoming CSD calls is controlled by the ATS0 command. Manual control uses the ATA and ATH commands, respectively, to accept or reject GPRS network requests or incoming CSD calls.
AT+CGDATA	Enter data state: The test command is used for requesting information on the supported layer 2 protocols to be used between the TE and MT. The write command causes the MT to perform all actions which are necessary to establish communication between the TE and the network using one or more GPRS PDP types. This may include performing a GPRS attach and one or more PDP context activations. Commands following the AT+CGDATA command in the AT command line will not be processed by the MT. ="PPP" layer 2 protocol PPP supported
AT+CGDCONT	Define PDP Context: The test command returns supported values as a compound value. The read command returns the current settings for each defined PDP context. The write command specifies the parameters for a PDP context identified by the context identifier <cid>. The number of contexts that may be in a defined state at the same time is given by the range returned by the test command. A special form of the write command (AT+CGDCONT=<cid>) causes the values for context <cid> to become undefined. **AT+CGDCONT=**<cid>,"IP",<APN>,<PDP_addr>,0,<h_comp> *cid:* PDP Context Identifier, 1 or 2 *APN:* Access Point Name *PDP_addr:* Packet Data Protocol address *h_comp:* 0 - header compression off 1 - header compression on
AT+CGEQMIN	3G Quality of Service Profile (Minimum acceptable)
AT+CGEQREQ	3G Quality of Service Profile (Requested)
AT+CGPADDR	Show PDP address
AT+CGQMIN	Quality of Service Profile (Minimum acceptable)
AT+CGQREG	Quality of Service Profile (Requested)

AT+CGREG	GPRS network registration status: The read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT. The write command controls the presentation of an unsolicited result code "+CGREG: <stat>" when <n>=1 and there is a change in the MT's GPRS network registration status.
AT+CGSMS	Select service for MO SMS messages: The test command is used for requesting information on which services and service preferences can be set by using the AT+CGSMS write command The read command returns the currently selected service or service preference. The write command is used to specify the service or service preference that the MT will use to send MO SMS messages. If parameter <service> is not given, the current value remains unchanged. =0 GPRS =1 Circuit switched =2 GPRS preferred (use circuit switched SMS transfer if GPRS SMS transfer is not possible, for example when the mobile is not GPRS attached or the network does not support SMS over GPRS) =3 Circuit switched preferred (use GPRS if circuit switched is not available)
AT^SGACT	Query all PDP context activations: The test command returns supported interfaces and states. The read command lists the activation states for all activated PDP contexts of the ME. Contexts, which are created internally by the GPRS modem compatibility commands, will displayed only, if they are activated. The Output of this command is unsorted. The exec command returns the sum of all activated PDP contexts of the ME.
AT^SGAUTH	Set type of authentication for PPP connection: =0 none =1 PAP =2 CHAP =3 PAP and CHAP
AT^SGCONF	Configuration of GPRS related Parameters: **AT^SGCONF=**<llc_pdu_length_U>,<llc_pdu_length_I>,<GPRS msclass> *llc_pdu_length_U:* 0 - no negotiation with network (500 will be used) 140...1520 - lower values diminish performance *llc_pdu_length_I:* 0 - no negotiation with network (500 will be used) 140...1520 - lower values diminish performance *GPRS msclass:* GPRS Multislot Class. The parameter can be changed only when the MT is detached, otherwise ''CME ERROR: operation temporary not allowed'' will be returned. The value can be one of the classes indicated with the Test command. The value set is volatile and powerup value is the maximum allowed.
ATA	Manual response to a network request for PDP context activation: The command may be used to accept a network request for a PDP context activation announced by the unsolicited result codes "RING" or "+CRING: GPRS".

ATD	Request GPRS or GPRS IP service: This command causes the MT to perform whatever actions are necessary to establish a communication between the TE and the external PDN. Request GPRS service: **ATD*99*** *<L2P>* ***** *<cid>* **#** *L2P:* blank – non PPP "PPP" - layer 2 protocol PPP "1" - layer 2 protocol PPP *cid:* 1 – typically, set by AT+CGDCONT command. Request GPRS IP service: **ATD*98*** *<cid>* **#** *cid:* 1 – typically, CID defined by AT+CGDCONT command.
ATH	Manual rejection of a network request for PDP context activation: The command may be used to deactivate all PDP contexts which are active or online on the same interface.
ATS0	Automatic response to a network request for PDP context activation: The Automatic answer command may be used to turn off (n=0) and on (n>0) the automatic response to a network request for a PDP context activation. =000 Disables automatic answer mode. =001-255 Enables automatic answering after specified number of rings.

Short Message Service (SMS) Commands

The AT Commands described in this section allow an external application to use the Short Message Service with the modem.

A brief description of the GPRS commands are provided in Table 10.12. For futher information, refer to the Cinterion TC63i AT Command Set document available from Cinterion **[2]**.

Table 10.12: SMS Command Reference

Command	Description
AT+CMGC	Send an SMS command
AT+CMGD	Delete SMS message
AT+CMGF	Select SMS message format
AT+CMGL	List SMS messages from preferred store
AT+CMGR	Read SMS messages
AT+CMGS	Send SMS message
AT+CMGW	Write SMS messages to memory
AT+CMSS	Send SMS messages from storage
AT+CNMA	New SMS message acknowledge to ME/TE, only phase 2+
AT+CNMI	New SMS message indications
AT+CPMS	Preferred SMS message storage
AT+CSCA	SMS service centre address
AT+CSCB	Select Cell Broadcast Message Indication
AT+CSDH	Show SMS text mode parameters
AT+CSMP	Set SMS text mode parameters
AT+CSMS	Select Message Service
AT^SCML	List Concatenated SMS messages from preferred store
AT^SCMR	Read concatenated SMS messages

AT^SCMS	Send concatenated SMS messages
AT^SCMW	Write concatenated SMS messages to memory
AT^SLMS	List SMS Memory Storage
AT^SMGL	List SMS messages from preferred store without setting status to REC READ
AT^SMGO	Set or query SMS overflow presentation mode or query SMS overflow
AT^SMGR	Read SMS message without setting status to REC READ
AT^SSCONF	SMS Command Configuration
AT^SSDA	Set SMS Display Availability
AT^SSMSS	Set Short Message Storage Sequence

SIM Related Commands

The AT commands described in this section are related to the Subscriber Identity Module (SIM) connected to the modem.

A brief description of the SIM related commands are provided in Table 10.13. For futher information, refer to the Cinterion TC63i AT Command Set document available from Cinterion **[2]**.

Table 10.13: SIM Related Commands

Command	Description
AT+CRSM	Restricted SIM Access: The command offers easy access of the Elementary Files on the SIM. Access to the SIM database is restricted to the commands which are listed; 176 READ BINARY 178 READ RECORD 192 GET RESPONSE 214 UPDATE BINARY 220 UPDATE RECORD 242 STATUS
AT^SXSM	Extended SIM Access: AT^SXSM extends AT+CRSM with additional SIM commands; 136 RUN GSM ALGORITHM Start the authentication mechanism and cipher key generation on the SIM. It runs the algorithms A3 and A8 using a 16 byte random number and the subscriber authentication key Ki, which is stored in the SIM.
AT^SCKS	Query SIM and Chip Card Holder Status: This command controls the SIM connection presentation mode and queries the connection status of the SIM and the card holder tray of the modem.
AT^SSET	Indicate SIM data ready: After power-up and personalization (PIN entry if required) the ME starts reading data from SIM. The AT^SSET command controls the presentation of the "^SSIM READY" URC which indicates, on the corresponding serial channel, when the ME has finished reading SIM data. Afterwards all commands that depend on SIM data fields can be used.
AT^SCID	Display SIM card identification number: TA returns the card identification number in SIM as string type.
AT+CXXCID	Display card ID: TA returns the card identification number in SIM as string type.

Hardware Related Commands

The AT Commands described in this section are related to the modems's hardware interface.

A brief description of hardware related commands are provided in Table 6.14. For futher information, refer to the Cinterion TC63i AT Command Set document available from Cinterion **[2]**.

Table 10.14: Hardware Related Commands

Command	Description
AT+CCLK	Real Time Clock: Format is "yy/mm/dd,hh:mm:ss", where the characters indicate the two last digits of the year, followed by month, day, hour, minutes, seconds; for example 6th of July 2005, 22:10:00 hours equals to "05/07/06,22:10:00" Factory default is "02/01/01,00:00:00" Write command: =<time> • <time> is retained if the device enters the Power Down mode via AT^SMSO. • <time> will be reset to its factory default if power is totally disconnected. In this case, the clock starts with <time>= "02/01/01,00:00:00" upon next power-up. • Each time SMC modem is restarted it takes 2s to re-initialize the RTC and to update the current time. Therefore, it is recommended to wait 2s before using the commands AT+CCLK and AT+CALA (for example 2s after ^SYSSTART has been output).
AT+CALA	Set alarm time: The write command can be used to set an alarm time in the ME or to clear a programmed alarm. When the alarm time is reached and the alarm is executed the ME returns an Unsolicited Result Code (URC) and the alarm time is reset to "00/01/01,00:00:00".
AT^SCTM	Set critical operating temperature presentation mode or query temperature: Use this command to monitor the temperature range of the module. The write command enables or disables the presentation of URCs to report critical temperature limits. Write command: =0 Presentation of URCs is disabled (except for <m> equal to -2 or +2). =1 Presentation of URCs is enabled. Read command: -2 Below lowest temperature limit (causes immediate switch-off) -1 Below low temperature alert limit 0 Normal operating temperature 1 Above upper temperature alert limit 2 Above uppermost temperature limit (causes immediate switch-off)

Factory Default AT Command values

Table 10.15: AT Command Factory Defaults

Configuration Commands	
ATQ	<n>=0
ATV	<value>=1
ATX	<value>=4
AT\V	<value>=1
AT+CFUN	<fun>=1
AT+CMEE	<errMode>=0
AT+CSCS	<chset>="GSM"
AT^SM20	<CallMode>=1, <CmgwMode>=1
Status Control Commands	
AT+CMER	<mode>=0, <keyp>=0, <disp>=0, <ind>=0, <bfr>=0
AT+CIND	<mode>=1
ATS18	<n>=0
Serial Interface Control Commands	
AT\Q	<n>=0
AT&C	<value>=1
AT&D	<value>=2
AT&S	<value>=0
ATE	<value>=1
AT+ILRR	<value>=0
AT^STPB	<n>=0
Call related Commands	
ATS0	<n>=000
ATS6	<n>=000
ATS7	<n>=060
ATS8	<n>=0
ATS10	<n>=002
AT+CBST	<speed>=7, <name>=0, <ce>=1
AT+CRLP	<iws>=61,<mws>=61,<T1>=78,<N2>=6
AT^SLCC	<n>=0
AT+CR	<mode>=0
AT+CRC	<mode>=0
Network Service Commands	
AT+COPS	<format>=0
AT+CREG	<n>=0
AT^SALS	<view>=0, <line>=1
GPRS Commands	
AT+CGAUTO	<n>=3
AT+CGSMS	<service>=3
AT^SGAUTH	<auth>=3
ATS0	<n>=000

	Short Message Service (SMS) Commands	
AT+CMGF	<mode>=0	
AT+CNMI	<mode>=0, <mt>=0, <bm>=0, <ds>=0, <bfr>=1	
AT+CSDH	<show>=0	
AT+CSMP	<fo>=17, <vp>=167, <dcs>=0, <pid>=0	
AT+CSMS	<service>=0	
AT^SMGO	<n>=0	
AT^SSCONF	<ra>=0	
AT^SSDA	<da>=0	
AT^SSMSS	<seq>=0	
SIM related Commands		
AT^SCKS	<mode>=0	
AT^SSET	<n>=0	
Hardware related Commands		
AT^SCTM	<n>=0	
AT^SSPI	<connectionState>=0, <delayOne>=0, <delayTwo>=0	
Miscellaneous Commands		
ATS3	<n>=013 Command Line termination character	
ATS4	<n>=010 Response Formatting character	
ATS5	<n>=008 Command Line Editing character	

SECTION 11 - SPECIFICATIONS

Product specifications are subject to change without notice.

General Specifications

Interface Connectors:	Universal Socket Connectivity
LED Indicators:	Power & DCD
Antenna Interface:	Primary Antenna: MMCX, female, 50 ohms
Size:	3.150 x 1.375 x 0.527 in.
Weight:	0.8 oz.
Power Input:	5VDC ±0.25VDC; 400 mA (TX average), 1400 mA (TX burst)
Maximum TX Power:	GSM/GPRS: +33 dBm min. / +30 dBm min (1900MHz)
Rx Sensitivity:	GSM/GPRS: -108 dBm typical, -102 dBm min.
Frequencies:	Cellular: TX: 824-849 MHz Rx: 869-894 MHz PCS: TX: 1850-1910 MHz Rx: 1930-1990 MHz
Temperature:	Operating: -30°C to +65°C 100% Duty Cycle Storage: -40°C to +85°C
Operating Humidity	0 – 85% non-condensing
Transport Protocols:	Serial UART data rates from 300 bps to 230.4 kbps
Command Protocol:	Cinterion TC63i AT Command set
Certifications:	FCC ID: QIPTC63I Industry Canada ID: 7830A-TC63I PTCRB Approved

NOTE: Power consumption while transmitting is dependent on the TX power level of the cellular module. The TX power level of the module is controlled by the cellular base station.

Data Transmission Specifications

Internet Services	TCP, UDP, HTTP, FTP, SMTP, POP3
GPRS Data Transmission	GPRS Class 12 Mobile Station Class B PBCCH support Coding scheme CS 1-4
CSD Data Transmission	Up to 14.4 kbps V.110 Non-transparent mode USSD support
Specifications for SMS	Point-to-point MO and MT SMS cell broadcast Text and PDU mode

Mechanical Specifications

The following section describes in detail the exterior dimensions of the SMC-GPRS. All of the drawings below are the approximate actual size. The drawings may be used as layout reference, but it is advised that a physical comparison be made to the modem before proceeding with the mounting process.

TOP VIEW

3.150
3.040
.110
1.375
1.265
Ø.116
2X
.110

.216 MAX HEIGHT
.100 MAX COMPONENT DEPTH
.249 PIN DEPTH

BOTTOM VIEW

2.468
.158
.165
.215
.215
.215
.737
.158
2.471
.630
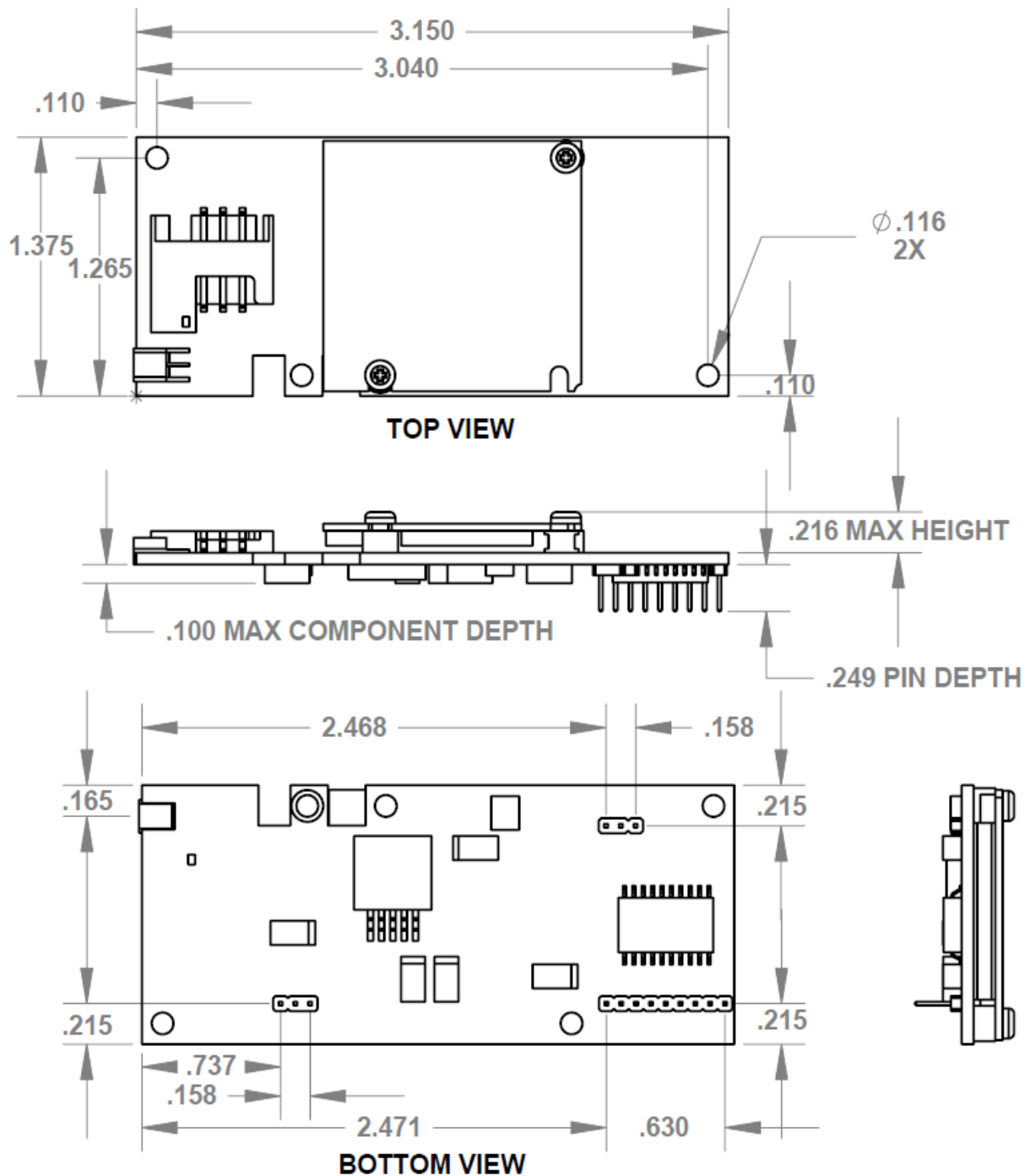
All dimensions in inches.

SECTION 12 - SERVICE AND SUPPORT

Product Warranty, RMA and Contact Information

CalAmp guarantees that every SMC-GPRS Cellular Modem will be free from physical defects in material and workmanship for one (1) year from the date of purchase when used within the limits set forth in the Specifications section of this manual.

The manufacturer's warranty statement is available in Appendix 1. If the product proves defective during the warranty period, contact CalAmp Customer Service to obtain a Return Material Authorization (RMA).

RMA Request

Contact Customer Service:
CalAmp
299 Johnson Avenue, Ste.110
Waseca, MN 56093
Tel: 507-833-8819 ext. 6707
Fax: 507-833-6748

BE SURE TO HAVE THE EQUIPMENT MODEL AND SERIAL NUMBER, AND BILLING AND SHIPPING ADDRESSES ON HAND WHEN CALLING.

When returning a product, mark the RMA clearly on the outside of the package. Include a complete description of the problem and the name and telephone number of a contact person. RETURN REQUESTS WILL NOT BE PROCESSED WITHOUT THIS INFORMATION.

For units in warranty, customers are responsible for shipping charges to CalAmp Wireless DataCom. For units returned out of warranty, customers are responsible for all shipping charges. Return shipping instructions are the responsibility of the customer.

Product Documentation

CalAmp reserves the right to update its products, software, or documentation without obligation to notify any individual or entity. Product updates may result in differences between the information provided in this manual and the product shipped. For the most current product documentation, visit www.calamp.com for datasheets, programming software and user manuals.

Technical Support

M-F 7:30 AM to 4:30 PM CDT

CalAmp Wireless DataCom
299 Johnson Avenue, Ste.110
Waseca, MN 56093
Tel: 507-833-8819
E-mail: supportIMC@calamp.com

APPENDIX A – POWER SUPPLY DESIGN INFORMATION

Power Supply Issues

Because of its high current consumption during transmission, power supply design for the SMC-GPRS modem should be focused on the transmitting mode (dedicated mode). More information can be found in related document **[3]**.

Power Consumption for GSM/GPRS Cell Module

Due to the maximum RF power levels of approx. 2W the power supply current is modulated with 2A (approx.) pulses of 0.577ms every 4.6ms. During the receive only time period, current GSM call consumption is lower than 100mA. An example current profile is illustrated in Figure 1. The measured values refer to the GSM 900MHz band at maximum power level with a real 50Ohm load.
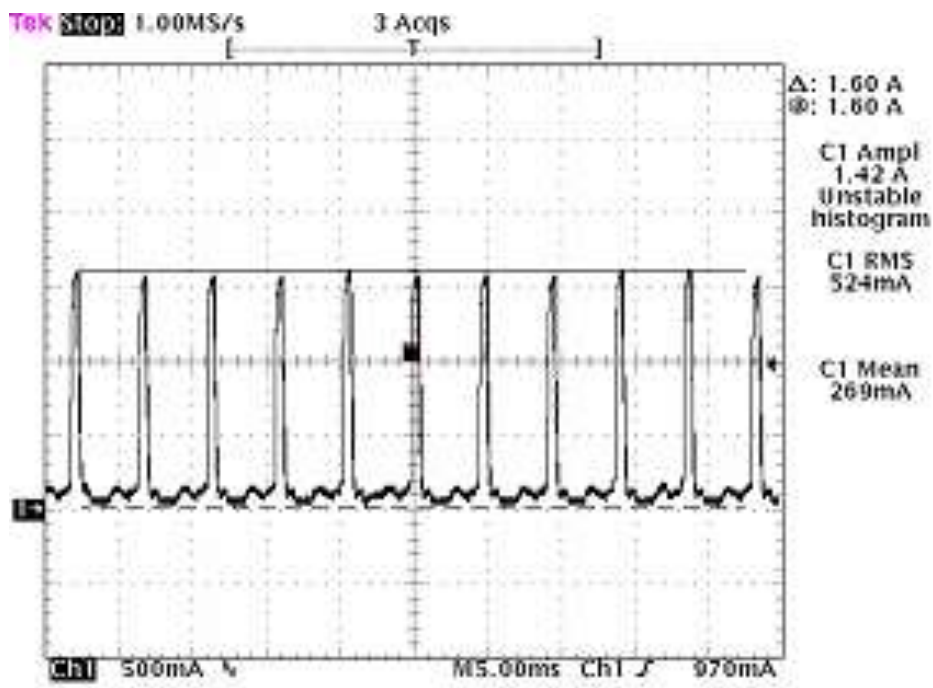
Figure 1: Current Peak Example

During a GSM call the module transmits in one timeslot, receives in one or two timeslots and is idle for 5-6 timeslots. In all it transmits for 577µs and is idle or receiving for 4.03ms.

Taking worst case figures into account, this adds up to an average current consumption of about 500mA for 1Tx timeslot at GSM.

Power Losses and Voltage Drops for GSM/GPRS Cell Module

The cell modules are specified to operate with specific voltage supplies. Voltage supplies may range from 3.2V to 4.5V as measured on the module's power connector.

To be on the safe side, it should be assumed that the voltage drop during the TX burst does not exceed 400mV. This means that if the cell module requires a minimum voltage supply of 3.2V, the power supply solution should provide at least 3.6V to the cell module.

The SMC-GPRS modem has a built in 3A linear supply which regulates the 5VDC input down to 3.9VDC for the cell module.

SMC-GPRS Power Supply Requirements

The SMC-GPRS modem is designed with a 3A linear supply with two 100uF capacitors on the output. The 5VDC input voltage level should not dip below 4.6VDC during TX bursts to ensure proper regulation for the 3.9VDC supplied to the cell module and for the serial port buffer IC (supplied by the 5VDC input line).

Figure 2 shows an example of a 5VDC source supply dipping to 4.72VDC during these TX burst cycles. The 3.9VDC regulated line to the cell module stays relatively constant.
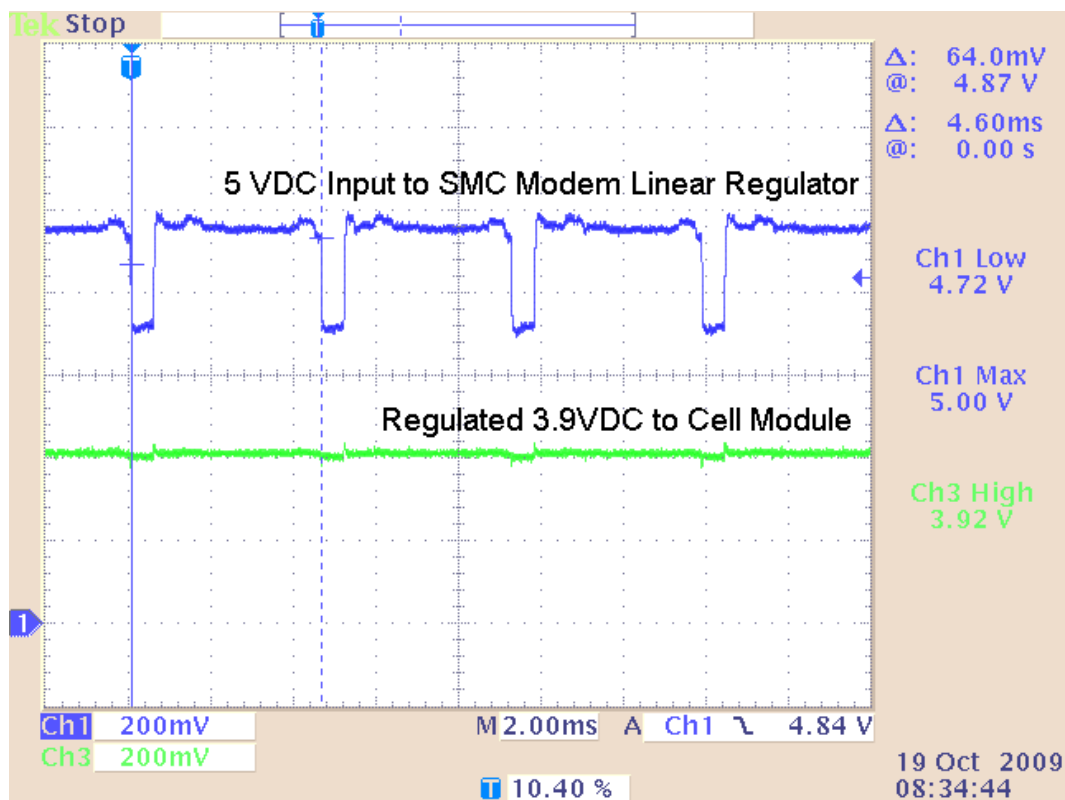
Figure 2: Voltage drop during TX bursts

The regulator on the SMC-GPRS modem will provide a post filtering effect, lowering external supply ripple to the cell module. The current draw on the 5VDC external supply during these TX burst cycles can be 1.4 Amps.

SMC-GPRS Power Supply Considerations

Ideally, the external 5VDC supply should be able to provide the 1.4A current required by the SMC-GPRS modem when the TX bursts occur. When this is not a practical design alternative, a mix between a linear regulator and capacitor supply may be an alternative approach. Figure 3 shows the basic block diagram.
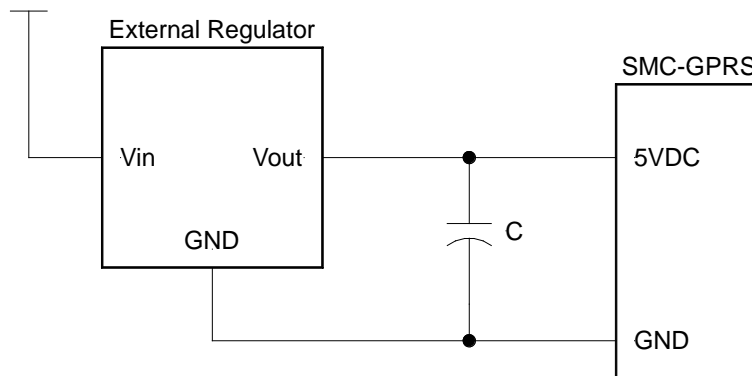

Figure 3: Regulator/Capacitor Block Diagram

In a mixed power supply solution there are two components that can supply the current for the module if operated in parallel. These components are usually a big capacitor and a power supply circuit. With this solution power is supplied from both the capacitor and the external regulator.

$$C = (Icap \times dT) / dU$$

Icap   Amps, current required by capacitor
dU Volts, voltage change across capacitor
dT 577µs, discharge time (TX burst timing)

Ipeak = Isupply + Icap (1.4A TX burst current)

For example, if the regulator supply is designed to provide 500mA to cover the average power needs of the SMC-GPRS modem, the capacitor will need to supply the 900mA needed during TX bursts. Assuming a 400mV change across the capacitor we have;

$$C = (0.9A \times 577µs) / 0.4V$$

$$C = 1298µF$$

The table below shows the required capacitor values for different capacitor current requirements using the same voltage drop across the capacitor.
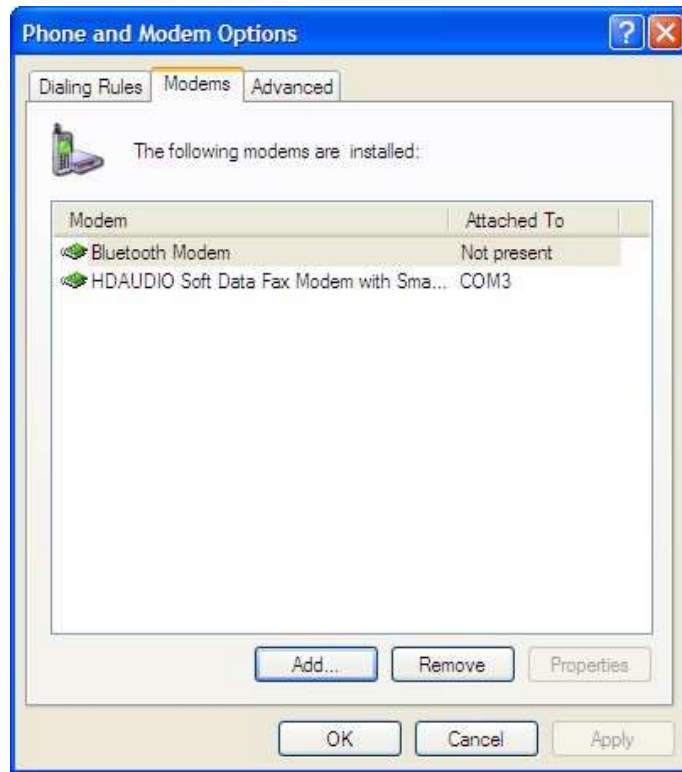
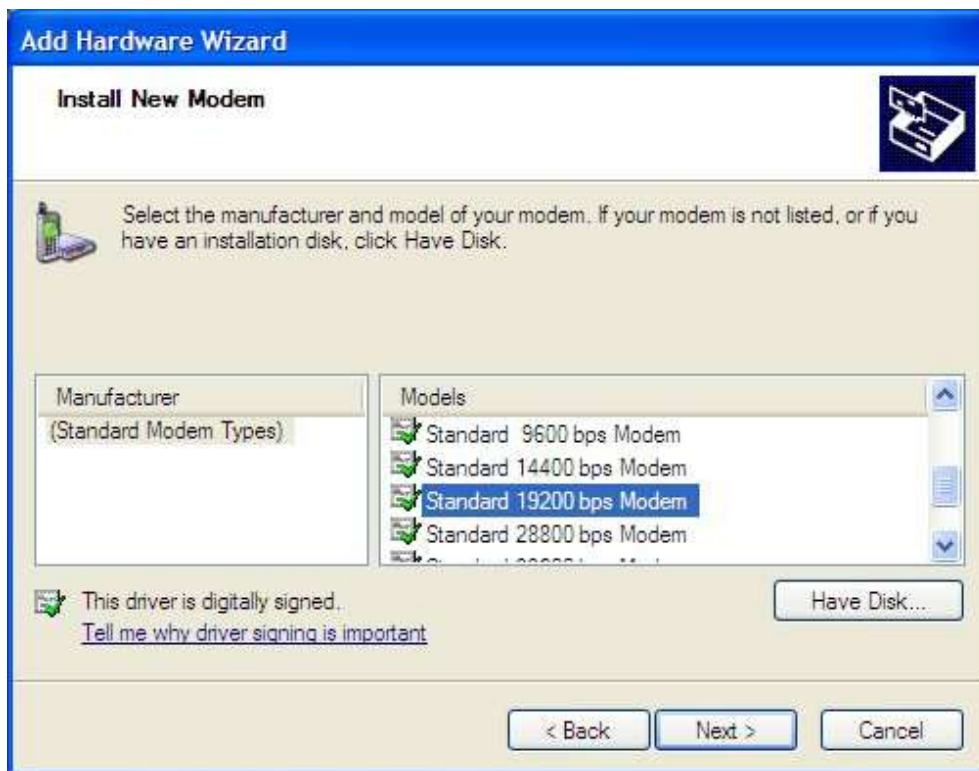| Isupply, Amps	Icap, Amps	C, µF
0.5	0.9	1298
0.6	0.8	1154
0.7	0.7	1010
0.8	0.6	866
0.9	0.5	721
1.0	0.4	577

APPENDIX B – CREATING A DIAL-UP NETWORKING CONNECTION

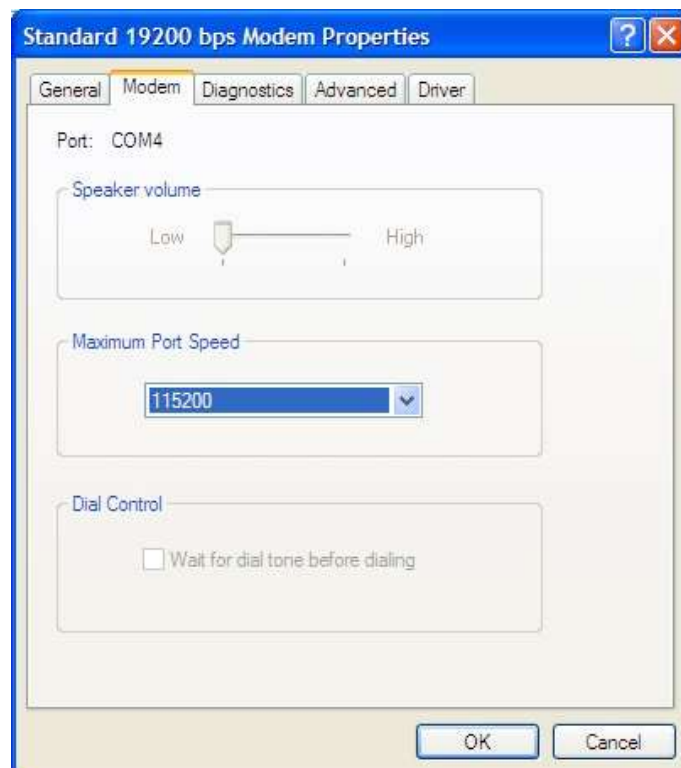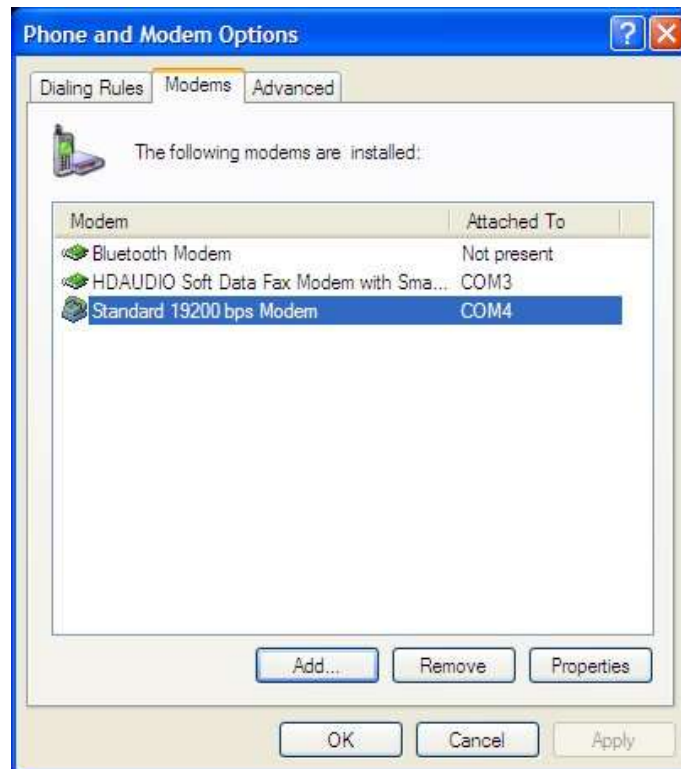## Windows XP
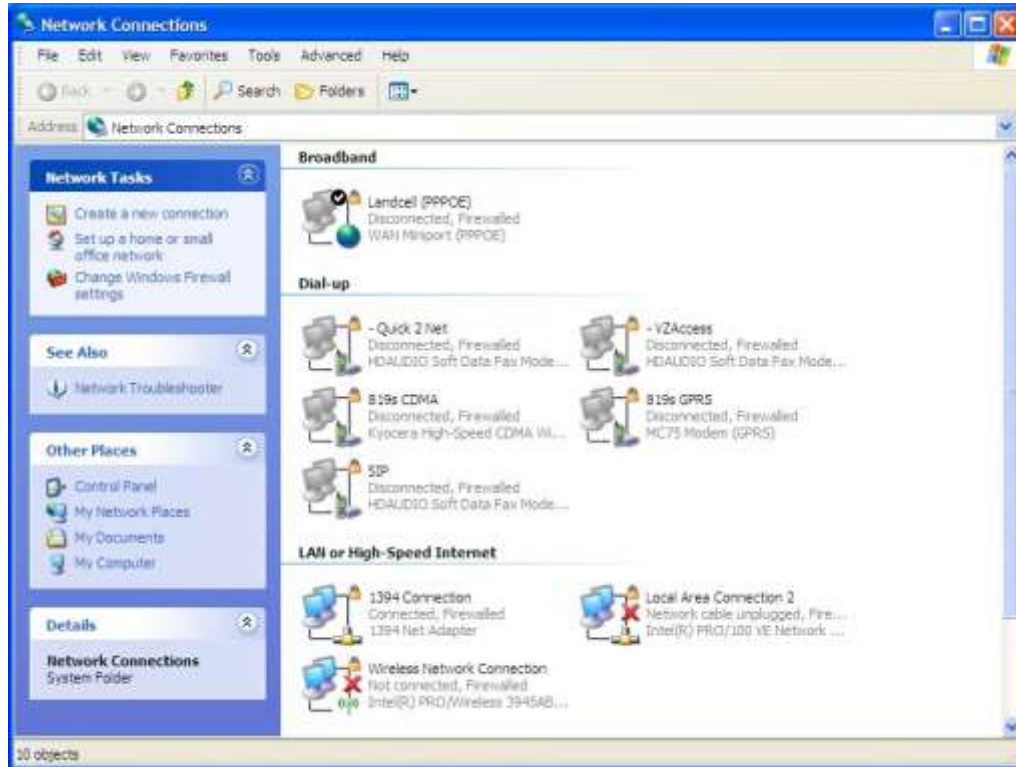
Add Standard Windows Modem
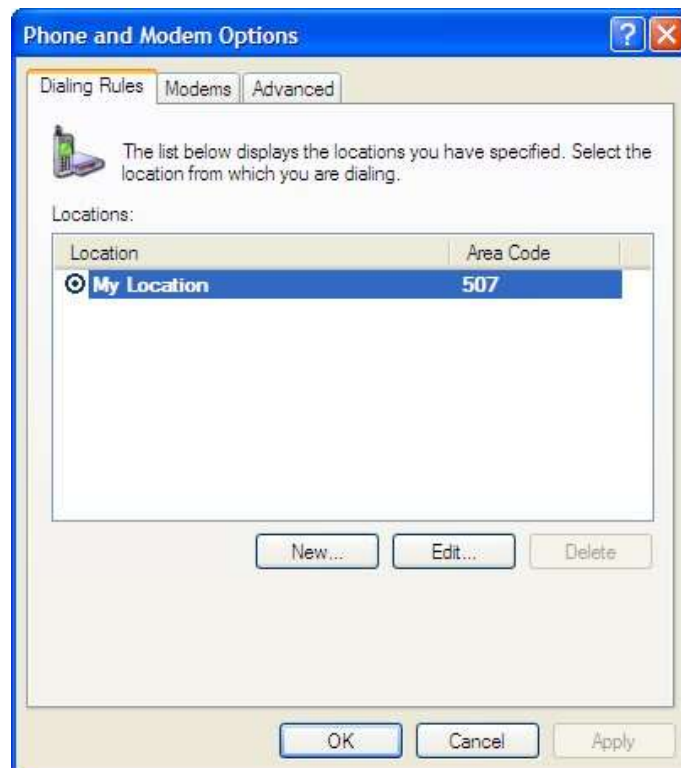
Configuring the Modem

Create a Dial-Up Networking (DUN) Connection

New Connection Wizard

Network Connection Type
What do you want to do?

○ **Connect to the Internet**
Connect to the Internet so you can browse the Web and read email.

○ **Connect to the network at my workplace**
Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location.

○ **Set up a home or small office network**
Connect to an existing home or small office network or set up a new one.

○ **Set up an advanced connection**
Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it.

[< Back] [Next >] [Cancel]

New Connection Wizard

Getting Ready
The wizard is preparing to set up your Internet connection.

How do you want to connect to the Internet?

○ **Choose from a list of Internet service providers (ISPs)**

○ **Set up my connection manually**
For a dial-up connection, you will need your account name, password, and a phone number for your ISP. For a broadband account, you won't need a phone number.

○ **Use the CD I got from an ISP**

[< Back] [Next >] [Cancel]

New Connection Wizard

Internet Connection
How do you want to connect to the Internet?

◉ **Connect using a dial-up modem**
This type of connection uses a modem and a regular or ISDN phone line.

○ **Connect using a broadband connection that requires a user name and password**
This is a high-speed connection using either a DSL or cable modem. Your ISP may refer to this type of connection as PPPoE.

○ **Connect using a broadband connection that is always on**
This is a high-speed connection using either a cable modem, DSL or LAN connection. It is always active, and doesn't require you to sign in.

[< Back] [Next >] [Cancel]

New Connection Wizard

Select a Device
This is the device that will be used to make the connection.

You have more than one dial-up device on your computer.

Select the devices to use in this connection:

☐ Modem - HDAUDIO Soft Data Fax Modem with SmartCP (COM3)
☑ Modem - Standard 19200 bps Modem (COM4)

[< Back] [Next >] [Cancel]

New Connection Wizard

Connection Name
What is the name of the service that provides your Internet connection?

Type the name of your ISP in the following box.

ISP Name

SMC-GPRS

The name you type here will be the name of the connection you are creating.

[< Back] [Next >] [Cancel]

New Connection Wizard

Phone Number to Dial
What is your ISP's phone number?

Type the phone number below.

Phone number:

*99***1#

You might need to include a "1" or the area code, or both. If you are not sure you need the extra numbers, dial the phone number on your telephone. If you hear a modem sound, the number dialed is correct.

[< Back] [Next >] [Cancel]

New Connection Wizard

Internet Account Information
You will need an account name and password to sign in to your Internet account.

Type an ISP account name and password, then write down this information and store it in a safe place. (If you have forgotten an existing account name or password, contact your ISP.)

User name:

Password:

Confirm password:

☑ Use this account name and password when anyone connects to the Internet from this computer

☐ Make this the default Internet connection

< Back   Next >   Cancel

New Connection Wizard

Completing the New Connection Wizard

You have successfully completed the steps needed to create the following connection:

SMC-GPRS
• Share with all users of this computer
• Use the same user name & password for everyone

The connection will be saved in the Network Connections folder.

☐ Add a shortcut to this connection to my desktop

To create the connection and close this wizard, click Finish.

< Back   Finish   Cancel
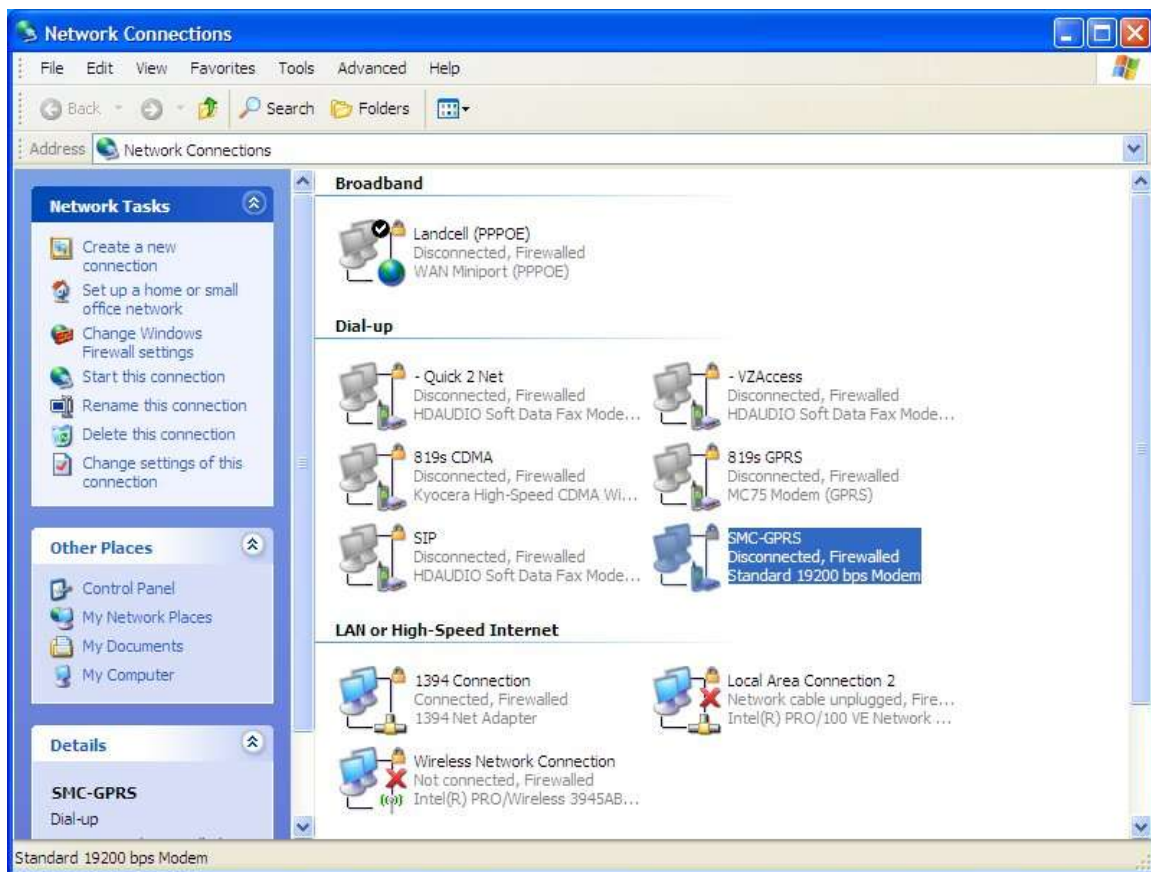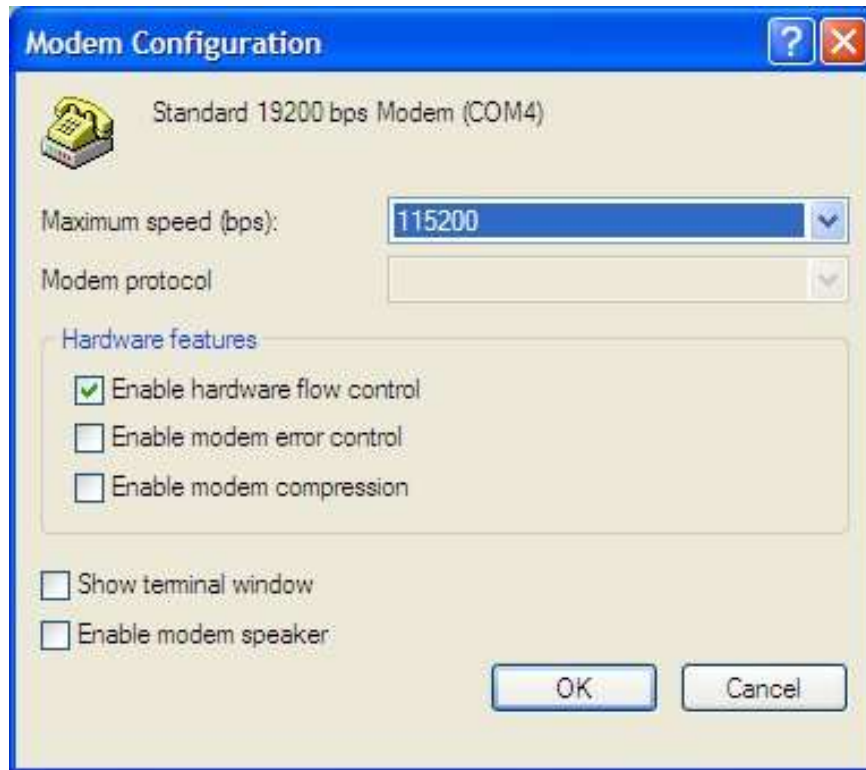
APPENDIX C – WARRANTY STATEMENT

CalAmp warrants to the original purchaser for use ("Buyer") that data telemetry products manufactured by DRL ("Products") are free from defects in material and workmanship and will conform to DRL's published technical specifications for a period of, except as noted below, one (1) year from the date of shipment to Buyer. DRL makes no warranty with respect to any equipment not manufactured by DRL, and any such equipment shall carry the original equipment manufacturer's warranty only. DRL further makes no warranty as to and specifically disclaims liability for, availability, range, coverage, grade of service or operation of the repeater system provided by the carrier or repeater operator. Any return shipping charges for third party equipment to their respective repair facilities are chargeable and will be passed on to the Buyer.

If any Product fails to meet the warranty set forth above during the applicable warranty period and is returned to a location designated by DRL. DRL, at its option, shall either repair or replace such defective Product, directly or through an authorized service agent, within thirty (30) days of receipt of same. No Products may be returned without prior authorization from DRL. Any repaired or replaced Products shall be warranted for the remainder of the original warranty period. Buyer shall pay all shipping charges, handling charges, fees and duties for returning defective Products to DRL or DRL's authorized service agent. DRL will pay the return shipping charges if the Product is repaired or replaced under warranty, exclusive of fees and duties. Repair or replacement of defective Products as set forth in this paragraph fulfills any and all warranty obligations on the part of DRL.

This warranty is void and DRL shall not be obligated to replace or repair any Products if (i) the Product has been used in other than its normal and customary manner; (ii) the Product has been subject to misuse, accident, neglect or damage or has been used other than with DRL approved accessories and equipment; (iii) unauthorized alteration or repairs have been made or unapproved parts have been used in or with the Product; or (iv) Buyer failed to notify DRL or DRL's authorized service agent of the defect during the applicable warranty period. DRL is the final arbiter of such claims.

THE AFORESAID WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED AND IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. DRL AND BUYER AGREE THAT BUYER'S EXCLUSIVE REMEDY FOR ANY BREACH OF ANY OF SAID WARRANTIES IT AS SET FORTH ABOVE. BUYER AGREES THAT IN NO EVENT SHALL DRL BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, SPECIAL, INDIRECT OR EXEMPLARY DAMAGES WHETHER ON THE BASIS OF NEGLIGENCE, STRICT LIABILITY OR OTHERWISE. The purpose of the exclusive remedies set forth above shall be to provide Buyer with repair or replacement of non-complying Products in the manner provided above. These exclusive remedies shall not be deemed to have failed of their essential purpose so long as DRL is willing and able to repair or replace non-complying Products in the manner set forth above.

This warranty applies to all Products sold worldwide. Some states do not allow limitations on implied warranties so the above limitations may not be applicable. You may also have other rights, which vary from state to state.

EXCEPTIONS

ONE YEAR: Labor to replace defective parts in repeaters or base stations
THIRTY DAY: Tuning and adjustment of telemetry radios
NO WARRANTY: Fuses, lamps and other expendable parts

Effective 1/2008