LOW COST GSM MODEM

- Dual Band 900 / 1800 MHz
- Fax, SMS and Data
- Integral SIM Card holder
- Siemens TC-35i GSM Engine
- Rugged Extruded Aluminium Enclosure
- Compact Form Factor 86 x 54 x 25mm
- RS232 Interface with Auto baud rate detection
- SMA Antenna Connection
- LED Indication of Operation

Description

The low cost TMAS GSM Modem is ideal for a wide range of applications. The modem can be used to make circuit switched data calls, making the unit suitable for remote dial-up systems where a fixed phone line is not available. The SMS functionality enables the sending and receipt of text messages. A common use for this functionality is an SMS server for the automated sending and receipt of bulk text messages.

The modem implements the highly reliable Siemens TC35i GSM Engine. This ensures high quality and reliable operation along with compatibility with all standard GSM networks. The modem provides support for the Siemens TC35i AT command list, also available for download from the RF Solutions website.

The TMAS modem is supplied in a rugged extruded aluminium enclosure making it suitable for use in a wide range of industrial and demanding environments. The unit connects directly to a PC or terminal device via the DB-9 RS232 Cable interface. The integral SIM card holder accepts standard SIM cards of all network operators. The only other connections required are to 6-40Vdc power supply and Antenna (supplied separately).

Part Numbering

Part Number	Description
GSM-T35I	Dual Band GSM Modem
GSM20-ANT	Antenna with 2.5 Metre Coax, SMA connector
CABLE-RS232	RS232 Cable 9 Way D-Type Male to Female
SIMCARD	Vodafone Pay as you talk SIM Card, £1.00 Credit, 10p/Text

Table of Contents

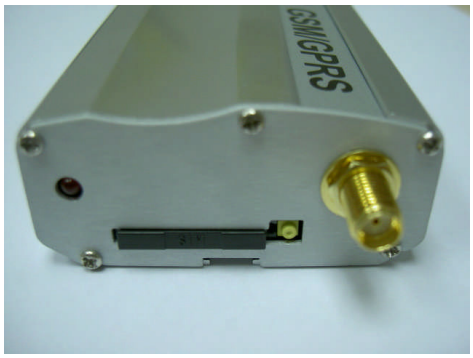
1 Key Features

Features	Implementation
Transmission	Data, SMS, Fax
Power supply	Single supply voltage Min: 6Vdc Max: 40Vdc
GSM class	Small MS
Frequency bands	• Dual Band E-GSM 900 and GSM 1800 • Compliant to GSM Phase 2/2+
Transmit power	• Class 4 (2W) for EGSM900 • Class 1 (1W) for GSM1800
SIM card reader	Internal
External antenna	Connected via antenna SMA connector
SMS	MT, MO, CB, Text and PDU mode
CSD DATA	• CSD transmission rates: 2.4, 4.8, 9.6, 14.4 kbps, nontransparent,V.110 • Unstructured Supplementary Services Data (USSD) support
FAX	Group 3: Class 1, Class 2
Serial interface	• RS-232 interface, bi-directional bus for AT commands and data • Multiplex ability according to GSM 07.10 Multiplexer protocol • Baud rates from 300bps to 115,200bps • Autobauding supports: 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200bps
Supported SIM card	3V
Phonebook management	Supported phonebook types: FD, LD, MC, RC, ON, ME
Reset of Terminal TMAS GSM	Reset via AT command
Real time clock	Implemented (clock frequency 32.768kHz)
Environmental Temperature:	• Normal operation: -20℃ to +55℃ • Humidity: max. 80% relative humidity
Size	86mmx54mmx25mm (Casing Dimension)
Weight	82g (Approx.)

2 Interface description

The TMAS GSM Terminal provides the following connectors for power supply, interfacing and antenna:

- 2.1mm DC power connector (centre/inner pin is positive)
- 9-pin (female) D-SUB plug for RS-232 serial interface
- SMA connector for antenna (radio interface)
- SIM card holder



2.1 Power Supply

The power supply of the TMAS GSM Terminal has to be a single voltage source of Vin=6V providing a peak current of up to 500mA during transmission.
The terminal can be turned on by just plug in a 6VDC power supply. The terminal power supply circuit automatically generates a low pulse signal not less than 100ms in order to wake up the Siemens TC35i GSM engine.
In order for the terminal to shut down properly, wait for 10s after sending AT^SMSO before switching off the power supply. This time is needed for the module to be safely logged off from the network and finish saving data to the internal memory.

Each time the terminal is shut down, data will be written from the volatile memory to flash memory. The guaranteed maximum number of write cycles is limited to 100,000.

2.2 RS232 Interface

Via RS-232 interface, the host controller controls the TMAS GSM/GPRS Terminal and transports data. The table below shows the pin assignment of RS-232 (D-SUB 9-pin female).

Pin no.	Signal name	I/O	Function
1	/DCD	O	Data Carrier Detected
2	/RXD	O	Receive Data
3	/TXD	I	Transmit Data
4	/DTR	I	Data Terminal Ready
5	GND	-	Ground
6	/DSR	O	Data Set Ready
7	/RTS	I	Request To Send
8	/CTS	O	Clear To Send
9	/RI	O	Ring Indication

TMAS GSM/GPRS Terminal is designed for use as DCE. Based on the conventions for DCE-DTE connection, it communicates with the user application (DTE) using the following signals:

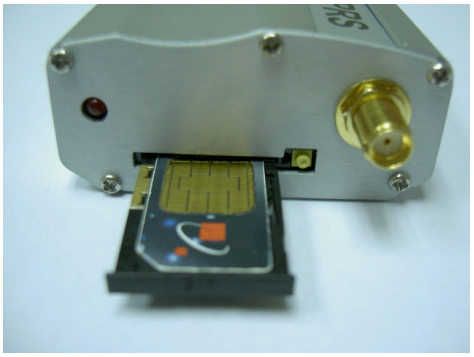
- Pin TxD @ application sends data to TxD of TMAS GSM/GPRS Terminal
- Pin RxD @ application receives data from RxD of TMAS GSM/GPRS Terminal

The RS-232 interface is implemented as a serial asynchronous transmitter and receiver conforming to ITU-T V.24 Interchange Circuits DCE. It is configured for 8 data bits, no parity and 1 stop bit, and can be operated at bit rates from 300bps to 115Kbps. Autobauding supports bit rates from 4.8Kbps to 115Kbps. Hardware handshake using the /RTS and /CTS signals and XON/XOFF software flow control are supported.

In addition, the modem control signals /DTR, /DSR, /DCD and /RING are available. The modem control signal RING (Ring Indication) can be used to indicate to the cellular device application, that a call or Unsolicited Result Code (URC) is received. There are different modes of operation, which can be set with AT commands.

2.3 SIM Interface

The SIM interface is intended for 3V SIM cards in accordance with GSM 11.12 Phase 2. The card holder is a 5 wire interface according to GSM 11.11. A sixth pin has been added to detect whether or not a SIM card is inserted.



Removing and inserting the SIM card during operation requires the software to be reinitialized. Therefore, after reinserting the SIM card it is necessary to restart the terminal.

Note:

- No guarantee can be given, nor nay liability accepted, if loss of data is encountered after removing the SIM card during operation.
- No guarantee can be given for properly initializing any SIM card that the user inserts after having removed a SIM card during operation. In this case, the application must restart the terminal.

2.4 Radio Interface

An internal RF cable is connected from the antenna reference point (antenna connector type GSC from Murata) to the SMA (female) connector. To attach the antenna to the TMAS GSM/GPRS Terminal, turn smoothly and slowly to the SMA (male) connector of antenna at clockwise direction.

Both single band and dual band antenna can be used for TMAS GSM/GPRS Terminal as long as it comes with the SMA (male) connector.

3 Operating Modes

The table below briefly summarizes the various operating modes of the TMAS GSM terminal

Mode	Function
SLEEP	Various power saving modes set by AT+CFUN command. Software is active to minimum extent. If the Terminal was registered to the GSM network in IDLE mode, it remains, in SLEEP mode, registered and pageable from the BTS. Power saving can be chosen at different levels. The NON-CYCLIC SLEEP mode (AT+CFUN=0) disables the AT interface. The CYCLIC SLEEP mode AT+CFUN=5, 6, 7 and 8 alternatively activate and deactivate the AT interface to allow permanent access to all AT commands.
GSM IDLE	Software is active. Once registered to the GSM network, paging with BTS Is carried out. The Terminal is ready to send and receive.
GSM TALK	Connection between two subscribers is in progress. Power consumption depends on network coverage individual settings, such as DTX off/on, FR/EFR/HR, hopping sequences, antenna.

3.1 Status LED

A red LED displays the operating status of the terminal.
The table below summarizes the coding of the red LED status

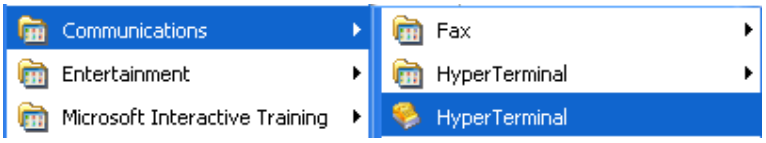
Operating status	LED
Power Down	Off
Not registered to the net (missing SIM, PIN, net)	Fast Blinking
Standby (registered to the net)	Slow Flash (75ms On / 3s Off)
Sleep mode (Power save mode, registered to the net)	Off
Talk mode, GPRS data	On

4 Basic Setup Information

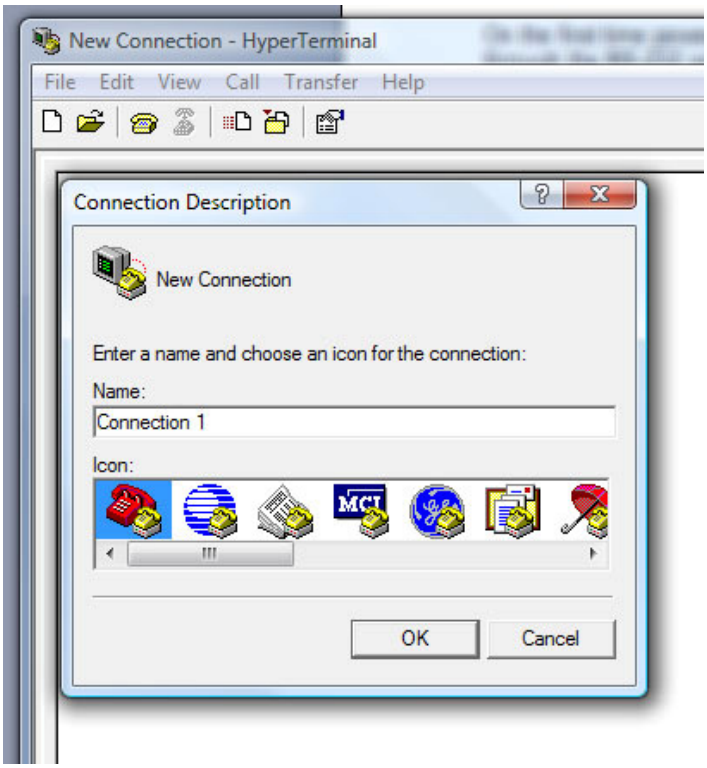
4.1 Modem functionality Test

On the first time power-up you can use terminal communications program to communicate with the modem through the RS-232 serial port. Following example is using the HyperTerminal in Windows XP.

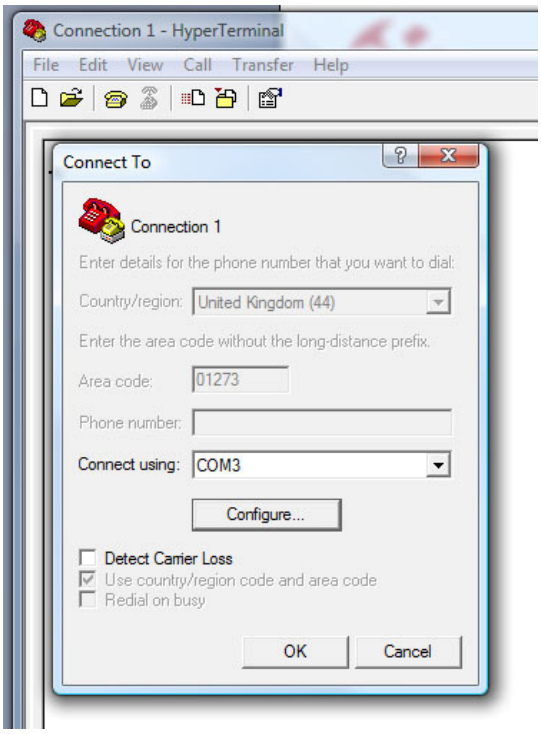
4.1.1 Select Hyperterminal from the Start Menu

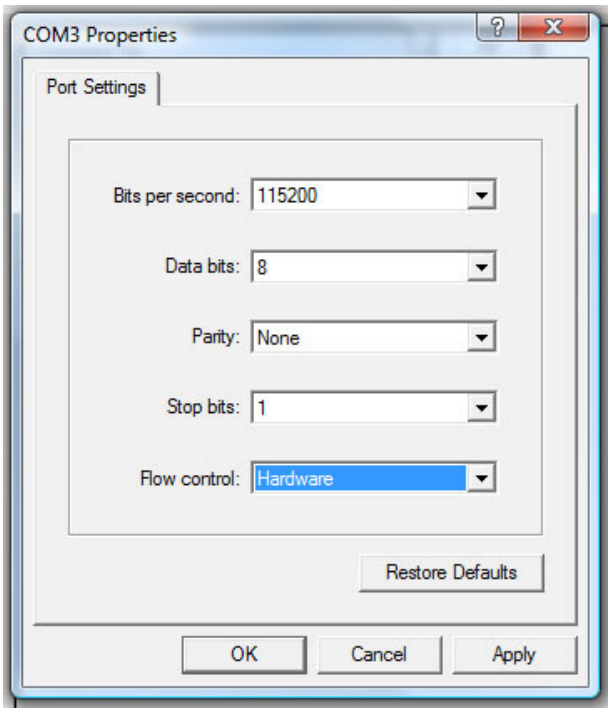


4.1.2 Start the HyperTerminal program and assign any name for a new session.

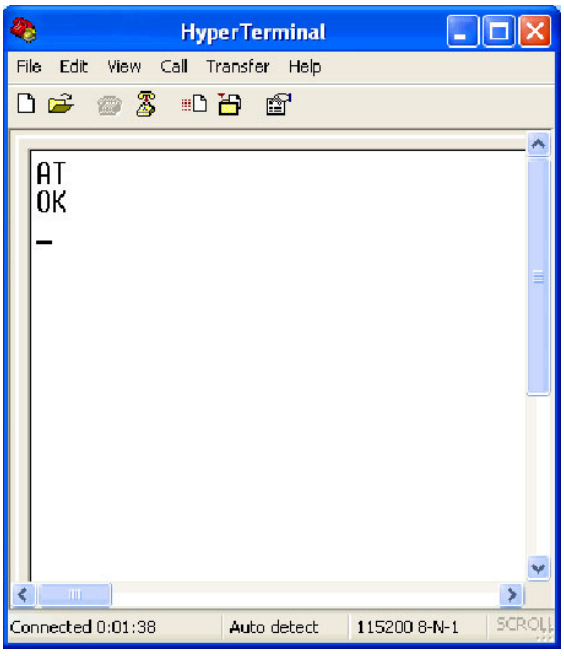


4.1.3 Choose the Com port connected to the modem. The unit features auto bauding so any baud rate from 1.2 to 115.2 Kbps can be used, 8bits, no parity bit, 1 stop bit)





4.1.4 On the terminal screen, type “AT” to check the “OK” response from the modem



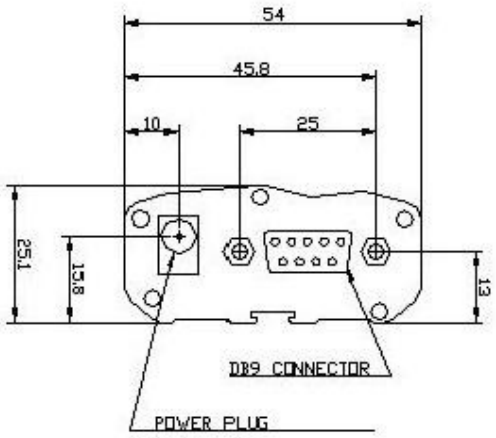
4.2 Basic AT Command List

The commands in the table below can be used for basic control of the GSM modem.

Description	AT commands	Modem response	Comments
Network Registration Checking	AT+CREG?	CREG=<mode>,1	Modem registered to the network
		CREG=<mode>,2	Registration lost, re-registration attempt
		CREG=<mode>,0	Modem not registration on the network, no registration attempt
Receiving signal strength	AT+CSQ	+CSQ: 20,0	The first parameter has to be at least 15 for normal communication
Receiving an incoming call		RING	An incoming call is waiting
	ATA		Answer the call
		OK	
Make a call	ATD1234567;		Don't forget the « ; » at the end for « voice » call
		OK	Communication established
		CME ERROR : 11	PIN code not entered (with + CMEE = 1 mode)
		CME ERROR : 3	AOC credit exceeded or a communication is already established
		CME ERROR : 10	Cannot read the SIM card
Make an emergency call	ATD 112;		Don't forget the « ; » at the end for « voice » call
		OK	
Communication loss		NO CARRIER	
Hang up	ATH		
		OK	
Enter PIN code	AT+CPIN=1234		
		OK	PIN Code accepted
		+CME ERROR : 16	Incorrect PIN Code (with +CMEE = 1 mode)
		+CME ERROR : 3	PIN already entered (with +CMEE = 1 mode)
Saves parameters in non-volatile memory	AT&W		
		OK	The configuration settings are stored

5 Mechanical Characteristics

Weight	82g
Dimension	86mmx54mmx25mm
Temperature range	-20℃ to +55℃
Air humidity	Maximum 80% relative humidity
Casing material	Aluminium alloy



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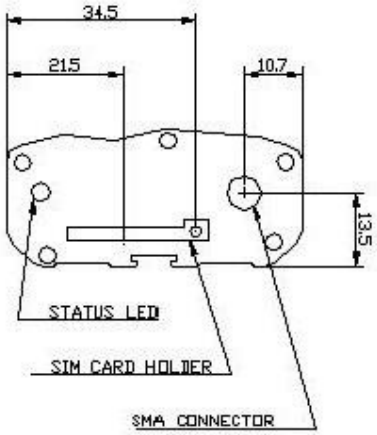

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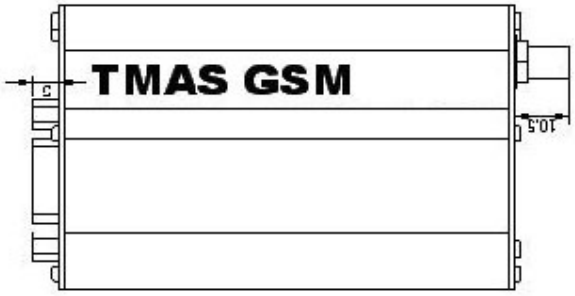

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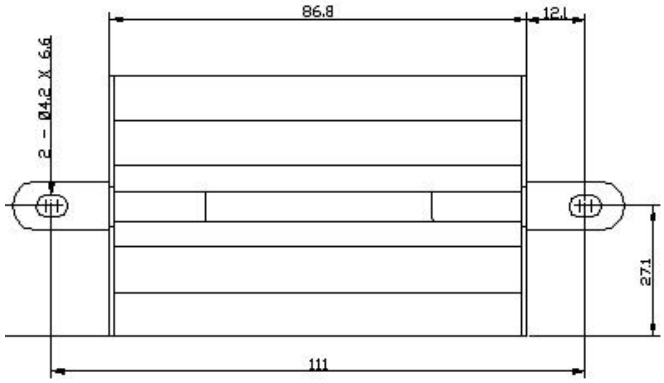

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