



# GSM/GPRS Modem User's Manual



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## Chapter 1 **É-TEK** GSO /GRTS Modem Overview

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### 1.1 Product Description

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**É-TEK** GSM/GPRS Modem is a industrial external MODEM which can transmit data based on GPRS (General Packet Radio Service). Self-contained E-GSM/GSM-GPRS 850/1900 dual-band. Give your full 2.5G GSM/GPRS Voice and data application. It also provides the function of USSD data terminal. Housed in a rugged metallic casing, the modem is build to withstand the toughest environments applications such as power plant control and outer door data gathering.

### 1.2 Product Features

Model	Channel	Rate	IP Function
TD-8011	Circuit Channel	14.4K	None
TD-8012	CLASS 2	28.8K	None
TD-8013	CLASS 10	48K	None
TD-8014	CLASS 10	48K	Available

### 1.3 Product Features

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#### 1.31 Product standard

- Dual Band GSM/GPRS (GSM850/1900MHz)
- Compatible to ETSI GSM Phase 2+

#### 1.32 Voice function

- Telephony and Emergency calls
- Full rate, enhanced full rate and half rate (FR/EFR/HR)
- Echo canceling and noise eliminating
- Speakerphone
- Dual tone multi frequency function (DTMF)

#### 1.33 Data Function

##### **GSM Data/Fax features:**

- Data circuit asynchronous, transparent and non transparent up to 14,400 bits/s
- Automatic fax group 3 (Class 1 and Class 2)

##### **GPRS Data/Fax features** (It Cannot Be Applied in TD-8012)

- Coding schemes: CS1 to CS4
- PBCCH support

### **1.34 Message Service**

- Point to point (MT/MO)
- EMS

### **1.35 GSM Supplementary Service**

- Call Forwarding, Call Barring
- Multiparty
- Call Waiting and Call Hold
- USSD

### **1.36 Other Operation**

- Software upgrade through XMODEM
- SIM, Network and Service Provider Locks
- Real Time Clock
- Alarm Management
- VCS2 Character set Management

### **1.37 Antenna**

- Frequency range: Dual Band GSM 850/PCS 1900 Mhz
- Impedance: 50 Ohms
- Gain (antenna + cable): 0 dBi
- VSWR (antenna + cable): -10 dB

### **1.38 Power Supply**

- 12V DC 1A

### **1.39 Environmental and mechanism**

- Operating temperature range: -20 °C to +55 °C
- Storage temperature range: -25 °C to +70 °C
- Overall dimensions: 96 × 54 × 25mm
- Weight: 105g

## Chapter 2 Hardware Installation

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### 2.1 Standard Shipment Contents

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Contents	Description
GSM/GPRS MODEM	One set
User's Manual	GSM/GPRS MODEM User's Manual
Power Adaptor	12V DC Power Adaptor
Standard RS-232 Cable	DB-9F to DB-9M Cable
Antenna	Dual Band Antenna

If any item above are not received, please contact us or our sales agent.

### 2.2 Connecters

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- External Antenna Connector
- Standard RS-232 Serial Interface (DB9-F to DB9-F)
- Power Plug
- Sliding SIM Holder

## 2.3 LEDs Indicators

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LED Status	LED light activity	Modem status
On	LED ON Permanent	Modem is switched on Not registered on the network
	LED Flashing Slowly	Idle mode Connected to the network
	LED Flashing Rapidly	Transmission mode
OFF	LED OFF	Modem is switched off.

## 2.4 Hardware Installation

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### 2.41 MODEM Quick Start

To set up the modem, do the following:

- Press SIM card holder ejector (yellow button) with a sharp object (the tip of a pen for example).
- Insert the SIM card in the holder.
- Verify the SIM card fits in the holder properly.
- Connect the antenna to the SMA connector.
- Connect both sides of the serial and control cable
- Connect the power adaptor to the power supply, and plug into the Modem.
- Now the modem is ready to work. Refer to Chapter 3 for some AT commands to configure the modem.

### 2.42 Checking the communication with the modem

- Connect the RS232 link between the DTE (port COM) and the modem(DCE).
- Configure the RS232 port of the DTE as follows:
  - ◆ Bits per second: 115200 bps or 9600 bps
  - ◆ Data bits: 8
  - ◆ Parity: None None
  - ◆ Stop bits: 1
  - ◆ Flow control: Hardware Flow control control.
- Using a communication software such as Hyperterminal program, enter the AT command. The response of the modem must be OK displayed in the Hyperterminal window.
- If the communication cannot be established with the modem, do the following:
  - ◆ Check the RS232 connection between the DTE and the modem (DCE),
  - ◆ Check the configuration of the port COM used on the DTE.

### 2.43 Verifying the received signal strength

To verify the received signal strength, do the following:

- Using a communication software such as HyperTerminal program, enter the AT command AT+CSQ. Value appears for the received signal strength.
- Verify the result with the values given in the table below:

Value of Received Signal Strength (AT+CSQ Response)	Interpretation of the Received Signal Strength
0-10	Insufficient
11-31	Sufficient
Greater than 99	Insufficient

### 2.44 Verifying the network registration of the modem

- Make sure a valid SIM card has been previously inserted in the SIM card holder of the modem.
- Using a communication software such as HyperTerminal program, enter the following AT command: AT+CREG? . Value appears as a response.
- Verify the result with the values given in the table below:

Value	Network registration
0,1	Yes
0,5	Yes (registered roaming)

If the modem is not registered, perform the following procedure:

- Check the connection between the modem and the antenna.
- Verify the signal strength to determine the strength of the received signal (refer to paragraph 2.43)

## Chapter 3 AT Commands for the Modem

The table below reminds the main AT commands required for getting started the modem:

Description	AT Commands	Modem's Response	Comment
Description	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).
MODEM Synchronization Checking	AT+CREG?	CREG=<mode>, 1	Modem synchronised on the network.
		CREG=<mode>, 2	Synchronization lost, resynchronization attempt.
		CREG=<mode>, 0	Modem not synchronized on the network, no synchronization attempt.
Receiving an incoming call	ATA	OK	Answer the call.
Initiate a call	ATD<phone number>; (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.
Initiate an emergency call	ATD112; (Don't forget the « ; » at the end for «voice» call)	OK	Communication established.
Communication loss		NO CARRIER	
Hang up	ATH	OK	
Store the parameters in EEPROM	AT&W		The configuration settings are stored in EEPROM.



## Chapter 4 Troubleshooting

This section of the document describes possible problems encountered when using the Modem and their solutions.

### 4.1 No connection with the modem through the serial link

If the modem does not answer through the serial link, refer to the table below for possible causes and solutions.

If the modem returns...	Then ask	Action
Nothing	Is the modem powered correctly?	Provide a power supply in the range of 5 V (5.5 V for GPRS Class 10) to 32 V.
	Does the serial cable follow correctly pin assignment shown in paragraph 1.2.1.3.	Connect the cable by following pin assignment given in paragraph 1.2.1.3.
	Is the communication program properly configured?	Ensure the setting of the communication program is fit to setting of modem. Modem factory setting is: Data bits = 8 Parity = none Stop bits = 1 Baud = 115200 bps or 9600bps Flow control = Hardware
	Is there another program interfering with the communication program (i.e. Conflict on communication port access)	Close the application (e.g. mouse or printer driver).

## 4.2 Receiving "ERROR" Message

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If the modem return a message of ERROR upon an attempted transmission of data, or voice signals, then refer to the table below for possible causes and solutions.

If the modem returns...	Then ask	Action
<b>ERROR</b>	Is the modem registered on the network?	Refer to paragraph 4.4 to verify that the modem is registered on the network.
	Is the modem receiving an incoming call or is it already in communication?	End any incoming by using ATH command.
	Is the selected bearer type is supported by the called party? Is the selected bearer type is supported by the network?	Enter AT+CMEE to view the extended error code. Note: Refer to Table 15. Ensure that the selected bearer type is supported by the called party.Ensure that the semicolon (;) is entered immediately after the phone number in the AT command. e.g. ATD#####;
	Is the received signal strong enough?	Refer to paragraph 3.4 to verify the strength of the received signal.
	Is the antenna properly connected?	Refer to paragraph 2.3 for antenna requirements

### 4.3 Receiving "No carrier" Message

If the modem return a message of No carrier upon an attempted transmission of data, or voice signals, then refer to the table below for possible causes and solutions.

If the modem returns...	Then ask	Action
No carrier	Is the received signal strong enough?	Refer to paragraph 4.3 to verify the strength of the received signal.
	Is the antenna properly connected?	Refer to paragraph 3.4 for antenna requirements.
No carrier (when trying to issue a voice communication)	Is the semicolon (;) entered immediately after the phone number in the AT command?	Ensure that the semicolon (;) is entered immediately after the phone number in the AT command. e.g. ATD#####;
No carrier (when trying to issue a data communication)	Is SIM card configured for data / fax calls?	Configure the SIM card for data / fax calls (Ask your network provider if necessary).
	Is the selected bearer type supported by the called party? Is the selected bearer type supported by the network?	

## Appendix A: Standard Definition of RS-232 Interface

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RS-232 PIN	I/O	RS-232 Standard	Description
1	O	CD	Data Carrier Detect
2	O	RXD	Receive serial data
3	I	TXD	Transmit serial data
4	I	DTR	Data Terminal Ready
5	-	GND	Ground
6	O	DSR	Data Set Ready
7	O	CTS	Clear To Send
8	I	RTS	Request To Send
9	O	RI	Ring Indicator

## Appendix B: Interpretation of extended error code

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Error Code	Diagnostic	Hint
0	Phone failure	Call your technical support.
3	Operation not allowed	
4	Operation not supported	
10	SIM not inserted	If SIM card is inserted, check the SIM card if it is clean and properly inserted.
11	SIM PIN required	Enter PIN code.
12	SIM PUK required	Enter PUK code. <b>Note: Call your network provider if you don't know this code.</b>
13	SIM Failure	Check validity of your SIM card. If SIM card damaged, call your network provider.
16	Incorrect password	Check the code you entered.
17	SIM PIN2 required	Enter PIN2 code.
18	SIM PUK2 required	Enter PUK2 code (call your network provider if you don't know this code).
26	Dial string too long	Check your phone number (max 20 digits).

30	No network service	No action.
32	Network not allowed Emergency calls only	No action.
40	Network personalization PIN required (Network lock)	Enter Network lock code (call your network provider if you don't know this code).
103	Illegal MS (#3)	No action.
106	Illegal ME (#6)	No action.
107	GPRS services not allowed (#7)	Contact your network provider to subscribe to the GPRS services.
111	PLMN area not allowed (#11)	
112	Location area not allowed (#12)	
113	Roaming not allowed in this location area (#13)	
132	Service option not supported (#32)	
133	Requested service option not subscribed (#33)	Call your network provider to subscribe to the requested service option.
134	Service option temporarily out of order (#34)	
148	Unspecified GPRS error	
149	PDP authentication failure	Call your network provider to know the right authentication parameters.
150	Invalid mobile class	Change the class of the mobile to a valid one.

#### FCC STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

#### FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, Human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation.