



iTegno 3845 GPRS Module

Hardware User Guide

(For firmware version AB_02_00_30N_DEF003)

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Document History

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1.0	11 April 2008	Initial Release	AB_02_00_30N_DEF003
1.1	9 Mar 2009	<ul style="list-style-type: none">• Added Antenna Specifications section• Added SAR Requirements section• Edited pin configuration table under the Serial Link Interface Cable section	AB_02_00_30N_DEF003

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1 INTRODUCTION

iTegno 3845 GPRS Modem is designed for reliable communication over GPRS and GSM for corporate and industrial usage. It provides the wireless communication link for applications such as remote control purposes and remote data monitoring and acquisition. This durable and high performing modem can be deployed in myriad Machine-to-Machine (M2M) applications including automotive systems, fleet management, automated meter reading, vending and retail, security and surveillance, industrial systems, information display, etc.

This manual provides an overview of the operation of iTegno 3845. It includes technical information on configuring the modem using a Windows-based PC via the PC's serial port (RJ-45-to-DB9 adaptor required).



1.1 Abbreviations

The following abbreviations are used in this document:

Abbreviation	Description
DC	Direct Current
V	Voltage
LED	Light Emitting Diode
DTE	Data Terminal Equipment (refers to the host terminal/ application in control)
DCE	Data Communication Equipment (refers to the device controlled by the host)

1.2 References

S/N	Document	Our Reference
1	iTegno 38XX AT Commands Guide	02000C13

2 PACKAGING

2.1 Standard Package

The standard package consists of:

- iTegno 3845 GPRS Modem with R-45 cable
- External Antenna

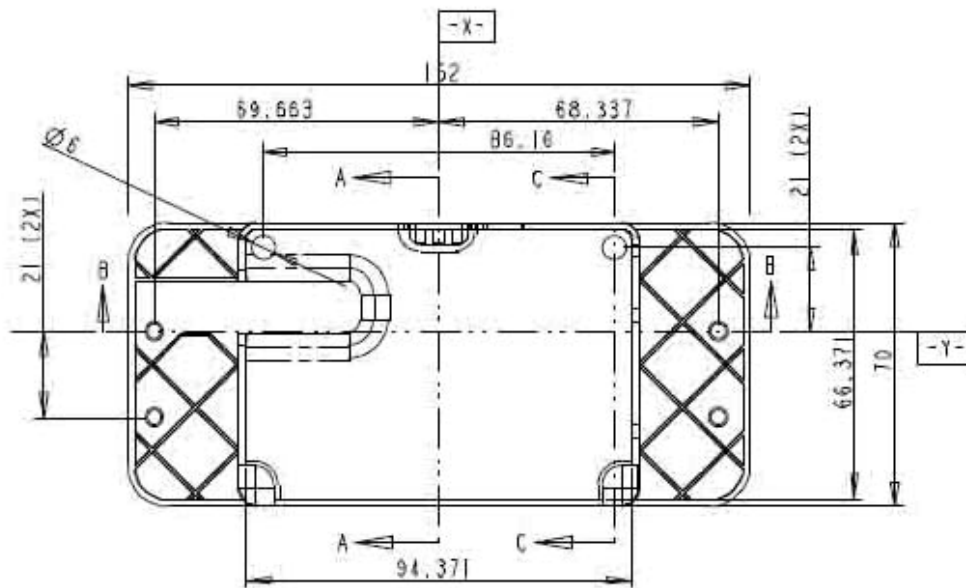


2.2 Mounting Bracket (Optional Item)

Mounting bracket for iTegno 3845 is sold separately.



Mounting Bracket with iTegno 3845



Mounting Bracket Dimension

3 HARDWARE INTERFACE

3.1 Overview

The general interfaces are shown in the figure below:



Modem Interface Overview

3.2 Status Indicator

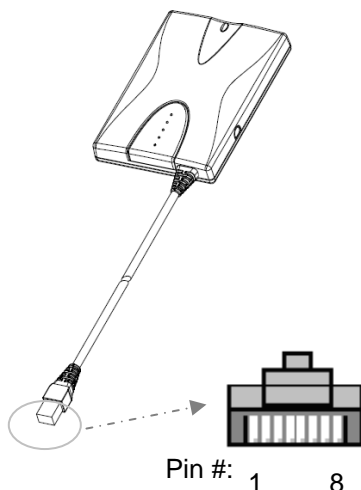
The status indicator indicates the operational status of the modem. The table below describes the modem's operational status in various LED light status:

LED Light Status	Modem Status
LED ON permanently	Modem is switched on but is not registered on the network
LED ON and flashing slowly	Modem is switched on and registered to the network. However, there is no active communication in progress.
LED ON and flashing quickly	Modem is switched on and registered to the network with active communication in progress.
LED OFF	Modem is switched off.

3.3 Serial Link Interface Cable

The iTegno 3845 communicates with other devices via the RJ-45 cable. The 8-pin RJ-45 plug consists of:

- Power input and Ground
- RJ-45 (RS-232) serial link connection



Pin#	Signal	I/O	Description
1	V+	I	DC Power Input
2	DCD	O	RS-232 Data Carrier Detect
3	DTR	I	RS-232 Data Terminal Ready
4	GND	-	Ground
5	RXD	I	RS-232 Receive Serial Data
6	TXD	O	RS-232 Transmit Serial Data
7	CTS	O	RS-232 Clear To Send
8	RTS	I	RS-232 Request To Send

RJ-45 Pin Assignments

3.4 Power Supply Interface

The table below shows the power supply pin assignment from the modem interface cable.

Pin	Description
1	DC Power Input
4	Ground

The power supply rating is:

Power Supply	Voltage
Minimum Voltage Input	5V
Maximum Voltage Input	32V

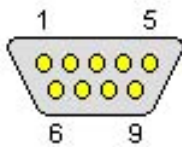
A regulated 5VDC input voltage is recommended for operating the modem. A power voltage exceeding 32V supplied to the modem may result in permanent damage.

3.5 RJ-45 (RS-232) Link Interface

The default RJ-45 link settings for the modem are:

Item	Settings
Baud Rate	115200 bps
Data bits	8
Parity	None
Stop bits	1
Flow Control	Hardware

To interface iTegno 3845 to a DTE device via standard DB 9 Pin RS-232 serial port connector, map the interface cable pins as follow:



PC DB9 Pinout (Male)

RJ-45 Pin#	PC DB 9 Pin# (Male)	Signal
2	1	DCD
3	4	DTR
4	5	Ground
5	2	RXD
6	3	TXD
7	8	CTS
8	7	RTS

RS-232 Link Mapping

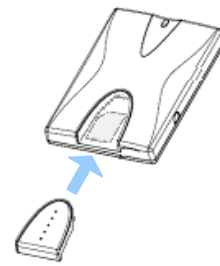
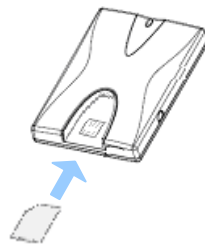
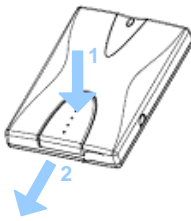
3.6 SIM Cover and SIM Tray

The following steps describe the insertion of SIM Card to the Modem.

Step 1. Gently press down and slide out the SIM cover as shown.

Step 2. Insert SIM Card with the metallic part facing down and the clipped corner in the left.

Step 3. Replace SIM Cover accordingly.



Inserting the SIM Card

3.7 GSM Antenna Interface

The GSM antenna interface is an MMCX (Female) connector.

To attach the external antenna to the modem, align it with the MMCX connector and press down until a “click” sound is heard.

4 GETTING STARTED

4.1 Setting up the modem

Step 1: Prepare the SIM Card.

Before using the modem, you must contact a network operator to get a personal SIM card. Do acquire the GPRS APN, User-ID and Password from your network operator.

Step 2: Insert SIM card into the modem.

Please refer to Chapter 3.6 "SIM Cover and SIM Tray" for more detailed information.

Step 3: Connect the antenna to the modem.

Please refer to Chapter 3.7 "GSM Antenna Interface" for more detailed information.

Step 4: Connect the modem communication interface to your device.

Connect the modem serial link interface (Pin #2 to Pin #8) to your device. Please refer to Chapter 3.3 "Serial Link Interface Cable" for more detailed information.

Step 5: Power up the modem.

Connect Pin #1 and Pin #4 of the interface cable RJ-45 plug to the input voltage and ground respectively. The status indicator LED will light up instantly. The modem is now ready to use.

Step 6: Communicate with the modem.

The modem is now ready to communicate with your device. From your device, send **AT<Enter>** command to modem. If device received an **OK** response from modem, the communication is successfully established.

The following are some other AT command examples you can use:

AT Command	Description
AT+CPIN?	To check whether SIM Lock is enabled
AT+CPIN=xxxx	To enter a PIN code if SIM lock is enabled
AT+CSQ	To query and verify the current received signal strength
AT+CREG?	To check on modem registration to the network
AT+CGMR	To query for modem firmware version number

Please refer to the iTegno 38XX AT Commands Guide for more information on communicating with the modem using AT Commands.

4.2 Interfacing Modem with HyperTerminal Software

This section suggests examples for some basic functions using HyperTerminal:

1. Sending Short Messages (SMS)
2. Reading Short Messages (SMS)

4.2.1 Configuring HyperTerminal for Modem

Step 1

Connect the iTegno 3845 GPRS Modem to the PC COM port and run HyperTerminal software.

From the Taskbar, click [Start], followed by “All Programs” → Accessories → Communications → “HyperTerminal”.



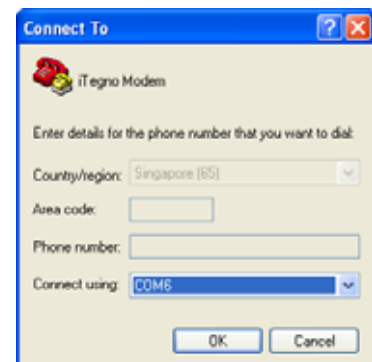
Step 2

You will be prompted to enter a description for the new connection. Enter a name for the connection (e.g. “iTegno Modem”) and click [OK] to continue.



Step 3

In the “Connect to” dialog box, select the PC COM port number, which is connected to the modem, and click [OK] to continue.

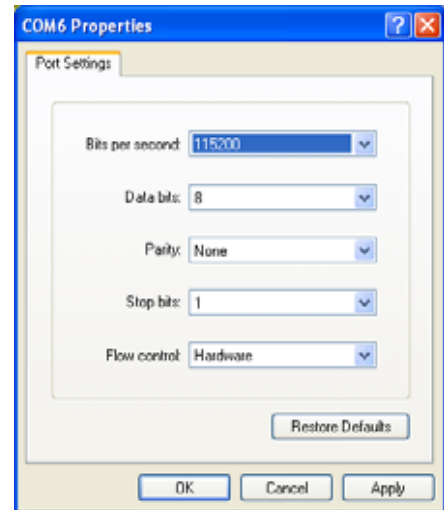


Step 4

In the next prompted dialog box, enter the COM port settings which is configured in the modem and click [OK] to continue.

Note: Default settings for the modem are:

Item	Settings
Baud Rate	115200 bps
Data bits	8
Parity	None
Stop bits	1
Flow Control	Hardware

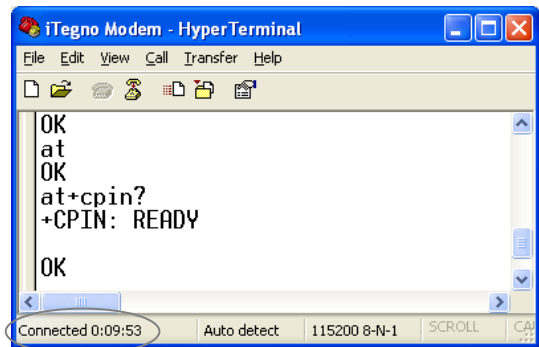


Step 5

The “Connected” text in HyperTerminal status bar indicates that the PC is ready to communicate with the modem.

Perform a simple check on the connection between HyperTerminal and the modem:

- Enter **AT<Enter>** command.
- An **OK** response (displayed on HyperTerminal) indicates that the connection is successfully established.



4.2.2 Sending Short Messages (SMS)

Step 1

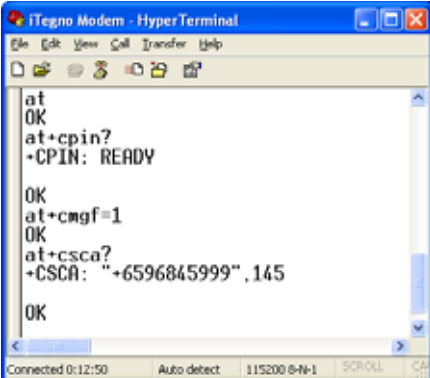
Set short message format as Text mode.

AT+CMGF=1<Enter>

Step 2

Check whether SMS center (SMSC) number is set to SIM card.

AT+CSCA?<Enter>



```
iTegno Modem - Hyper Terminal
File Edit View Call Transfer Help
[at]
OK
at+cpin?
-CPIN: READY

OK
at+cmgf=1
OK
at+cscs?
+CSCA: "+6596845999",145

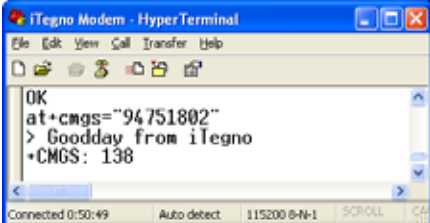
OK
Connected 0:12:50 Auto detect 115200 8-N-1 SCROLL CA
```

Step 3

Send a message to a phone number.

AT+CMGS= "Phone number"<Enter>

>Goodday from iTegno<Ctrl-Z>



```
iTegno Modem - Hyper Terminal
File Edit View Call Transfer Help
[at]
OK
at+cmgs="94751802"
> Goodday from iTegno
+CMGS: 138

Connected 0:50:49 Auto detect 115200 8-N-1 SCROLL CA
```

Step 4

Wait for **+CMGS** for the result of sending SMS.

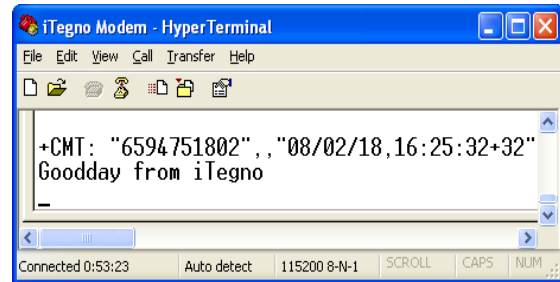
+CMGS: <mr> indicates that the SMS has been sent successfully.

4.2.3 Receiving Short Messages (SMS)

Step 1

Set short message format as Text mode.

AT+CMGF=1<Enter>



Step 2

Set modem to forward received SMS to HyperTerminal directly.

AT+CNMI=2,2,0,0,0<Enter>

Step 3

Save the current settings.

AT&W<Enter>

New incoming SMS will be displayed on the HyperTerminal.

5 TECHNICAL SPECIFICATIONS

5.1 General Features

Feature	Specification
Standard	<ul style="list-style-type: none"> • Quad-band: GSM 850/ EGSM900/ DCS1800/ PCS1900 • Compliant to ETSI GSM Phase 2+
Data	<ul style="list-style-type: none"> • Asynchronous, transparent and non-transparent • Maximum speed: up to 14.4kbps • Point-to-point (MO/MT) • Text /PDU • Cell Broadcast
GPRS	<ul style="list-style-type: none"> • Terminal Class B • Multislot Class 10 • Data rates: Downlink – up to 85.6 kbps Uplink – up to 42.8 kbps
Fax	<ul style="list-style-type: none"> • Group 3 • Fax 2.0 • Max speed (kbps): up to 9.6kbps
Host Protocol	<ul style="list-style-type: none"> • AT Commands compliant to GSM 07.07, 07.05 • iWOW Proprietary AT Commands
Firmware Stack	<ul style="list-style-type: none"> • TCP/IP and UDP/IP • MMS

5.2 Mechanical Characteristics

Feature	Specification
Dimension (mm)	94.2 x 66.0 x 14.5
Weight (g)	58
Lead-free	Yes
Cooling Mechanism	Internal Dual Flow Air Convection
Power Supply Interface	Via interface cable
Communication Port	RJ-45 interface cable Baud rates from 110 to 115200 bps
External Antenna Interface	MMCX Connector (Female)

5.3 Electrical Characteristics

Current Consumption				
Operating Mode	Conditions	Inom	I _{max}	Unit
Modem OFF/ Backup		50	100	uA
Modem IDLE	DRX = 6 (Ave) with SLEEP mode enabled	3	-	mA
GPRS Data (3Rx/ 2Tx)	EGSM – PCL 5 (Ave)	420	460	mA
	DCS/ PCS – PCL 0 (Ave)	380	420	mA

Above values taken at 25°C

Power Supply	
Operating Voltage Range	5V to 32V DC

SIM Interface	
SIM Card support	1.8V, 3V

5.4 RF Performance

Feature	Specification
Frequency Band	<ul style="list-style-type: none"> GSM 850/ EGSM900/ DCS1800/ PCS1900
Sensitivity	<ul style="list-style-type: none"> GSM 850: -102dBm EGSM 900: -102dBm DCS 1800: -100dBm PCS 1900: -100dBm
Output power	<ul style="list-style-type: none"> GSM 850: Class 4, 2W (33dBm) EGSM 900: Class 4, 2W (33dBm) DCS 1800: Class 1, 1W (30dBm) PCS 1900: Class 1, 1W (30dBm)

5.5 Environmental Characteristics

Feature	Specification
Operating Temperature Range	-20°C to +55°C
Storage Temperature Range	-40°C to +85°C

5.6 Antenna Specifications

Frequency Band	EGSM 900	DCS 1800	GSM 850	PCS 1900
Tx Frequency	880-915 MHz	1710-1785 MHz	824-849 MHz	1850-1910 MHz
Rx Frequency	925-960 MHz	1805-1880 MHz	869-894 MHz	1930-1990 MHz
Impedance	50 ohm			
VSWR Rx max	1.5 : 1			
VSWR Tx max	1.5 : 1			
Typical Radiated Gain	0 dBi in one direction at least			
Antenna Interface	MMCX Connector (Female)			

The optimum operating frequency depends on the application. A dual-band or a quad band antenna must operate in the above frequency bands.

6 TROUBLESHOOTING

This section suggests the possible solutions for common problems encountered when using the iTegno 3845 GPRS modem.

6.1 Is my modem powered up?

- Check whether the LED on the modem is lighted up. If it is not lighted up, check whether the modem is supplied with the correct voltage range (between 5V to 32VDC).

6.2 Is my SIM card SIM Lock enabled?

- Use **AT+CPIN?** to request for PIN Status, or
- **AT+CLCK="SC",0,"password"** to disable SIM LOCK.

6.3 What is my SIM card PIN code?

If you have forgotten or lost your PIN code, or, you have not received such a code, please contact your network service provider for assistance.

6.4 Unable to register to the network

- Check the modem status indicator. The LED should be blinking if the modem is registered to the network.
- Use **AT+CREG?** command to request for the registration status.
- Check the signal strength of the network using **AT+CSQ** command. You should receive a +CSQ response (+CSQ: <rsqi>, <ber>). If the rssi value is 99, it means the network is unknown or undetectable. The ideal rssi value should be 8 to 31. An rssi value less than 8 has weaker signal strength.

6.5 Cannot enter AT Commands or no communication between device and modem

- Check whether the modem is powered up.
- Check whether the SIM Lock is turned on.
- Check whether the communication interface port is connected properly.
- Check whether the port settings are correct. Ensure that both modem and your device are communicating with the same settings (such as baud rate, data bits, stop bits and parity). Note that the modem default port settings are:

Item	Settings
Baud Rate	115200 bps
Data bits	8
Parity	None
Stop bits	1
Flow Control	Hardware

- Try isolating your device by connecting the modem to a Windows-based PC with HyperTerminal and test the communication between the modem and PC. Please refer to Chapter 4.2 “Interfacing Modem with HyperTerminal Software” for the setup instructions.

6.6 Cannot send SMS using AT+CMGS command

- Check whether the modem is powered up.
- Check whether the SIM Lock is turned on.
- Check whether the modem is registered to the network.
- Try putting the SIM card into a mobile phone and/or another modem to send an SMS. If the SMS cannot be sent, check with your network service provider on the status of the SIM card.
- Verify that the SMS Service Centre Number is correct using **AT+CSCA?** command.
- Ensure that the modem is set to text message mode. You may do so using **AT+CMGF=1** command. Please refer to Chapter 4.2.2 “Sending Short Messages (SMS)” for more details.

6.7 Cannot connect to GPRS

- Check whether the modem is powered up.
- Check whether the SIM Lock is turned on.
- Check whether the modem is registered to the network.
- Check whether the SIM card supports GPRS Service. You can verify it with the network service provider. If the SIM card supports GPRS service, check whether the APN settings are correct. Use **AT+CGDCONT?** command to query or assign the APN settings. Ensure that it is correct by confirming the APN with your network service provider.

7 SAFETY INFORMATION

7.1 SAR Requirement

Based on the FCC radiation exposure limits, and the standards EN50385 and EN50383, a minimum safety operating distance between the device and human body must be maintained. A 203mm (8inches) separation distance between the iTegno modem and human body must be maintained at all times during device operation.

Please refer to section 5.6 for more information on the antenna specifications.

7.2 General Safety

It is very important to follow any regulations regarding the use of radio equipment especially due to the possibility of Radio Frequency (RF) interference. Please follow the safety advice given below carefully:

- Switch off your GPRS Modem when in an aircraft. The use of cellular telephones in an aircraft may endanger the operation of the aircraft, disrupt the cellular network and is illegal. Failure to observe this instruction may lead to suspension or denial of cellular telephone services to the offender, legal action or both.
- Switch off your GPRS Modem when at a refuelling point.
- Switch off your GPRS Modem in hospitals and at any other place where medical equipment may be in use.
- Respect restrictions on the use of radio equipment in fuel depots, chemical plants or where blasting operations are in progress.
- There may be hazards associated with the operation of your GPRS Modem close to inadequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufacturers of the medical device to determine if it is adequately protected.
- Operation of your GPRS Modem close to other electronic equipment may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers recommendations.

7.3 Vehicle Safety

If incorrectly installed in a vehicle, the operation of the GPRS Modem could interfere with the proper functioning of vehicle electronics. Ensure that only qualified personnel perform the installation to avoid such problems. Verification of the protection of vehicle electronics should form part of the installation.

7.4 Care and Maintenance

Your GPRS Modem is the product of advanced engineering, design and craftsmanship and should be treated with care. The suggestions below will help you to enjoy this product for many years.

- Do not expose the GPRS Modem to any extreme environment where the temperature or humidity is high.
- Do not attempt to disassemble the GPRS Modem. There are no user serviceable parts inside.
- Do not expose the GPRS Modem to water, rain or split beverages. It is not waterproof.
- Do not abuse your GPRS Modem by dropping, knocking, or violent shaking. Rough handling can damage it.
- Do not place the GPRS Modem alongside computer discs, credit or travel cards or other magnetic media. The information contained on discs or cards may be affected by the frequency emitted by the modem.
- The use of third party equipment and/or accessories, not made or authorised by iWOW Connections Pte Ltd may invalidate the warranty of iTegno 3845 GPRS Modem.

Do contact us in the unlikely event of a fault.

8 SUPPORT/ CONTACT US

For online support (FAQs and drivers download), please visit www.iTegno.com.

For technical support, please contact our distributors/resellers or email us at developers@iTegno.com.

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