Terminus GSM864Q Hardware User Manual

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JANUS REMOTE COMMUNICATIONS

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2 REFERENCES

2.1 Telit Document List

Please refer to Telit's website at ***www.telit.com*** for the latest information on the GC864 GSM module.

2.1.1 GC864 Hardware User Guide

2.1.2 GC864 Software User Guide

2.1.3 AT Commands Reference Guide

2.1.4 Easy GPRS User Guide

2.1.5 Easy Script in Python

2.2 Janus Document List

Please refer to the Janus website, ***www.janus-rc.com***, for the latest product information on the Terminus and the CW20 GPS Module

2.2.1 NavSync CW20/CW20S GPS Receiver User Manual – Bulletin #NS13

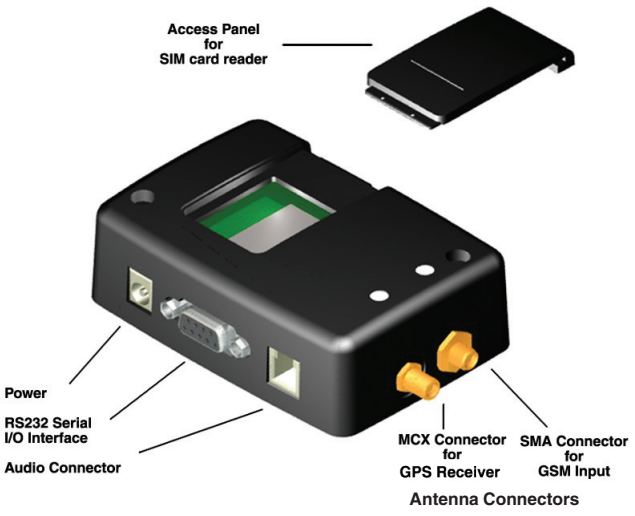
3 OVERVIEW

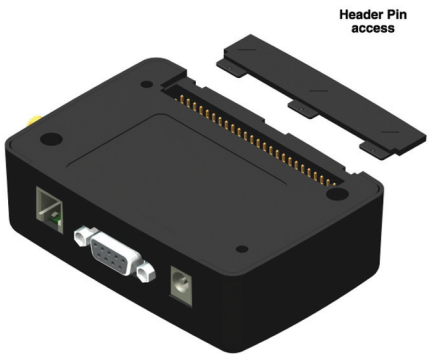
3.1 Introduction

The Terminus GSM864Q is a self-contained, quad-band GSM/GPRS terminal device designed to provide a comprehensive solution to application problems for our M2M customers. It utilizes the proven technology of the Telit GC864-Quad module for its core communications engine as well as the NavSync CW20 module for the added flexibility of GPS.

3.2 Functional Description

3.2.1 Connectors





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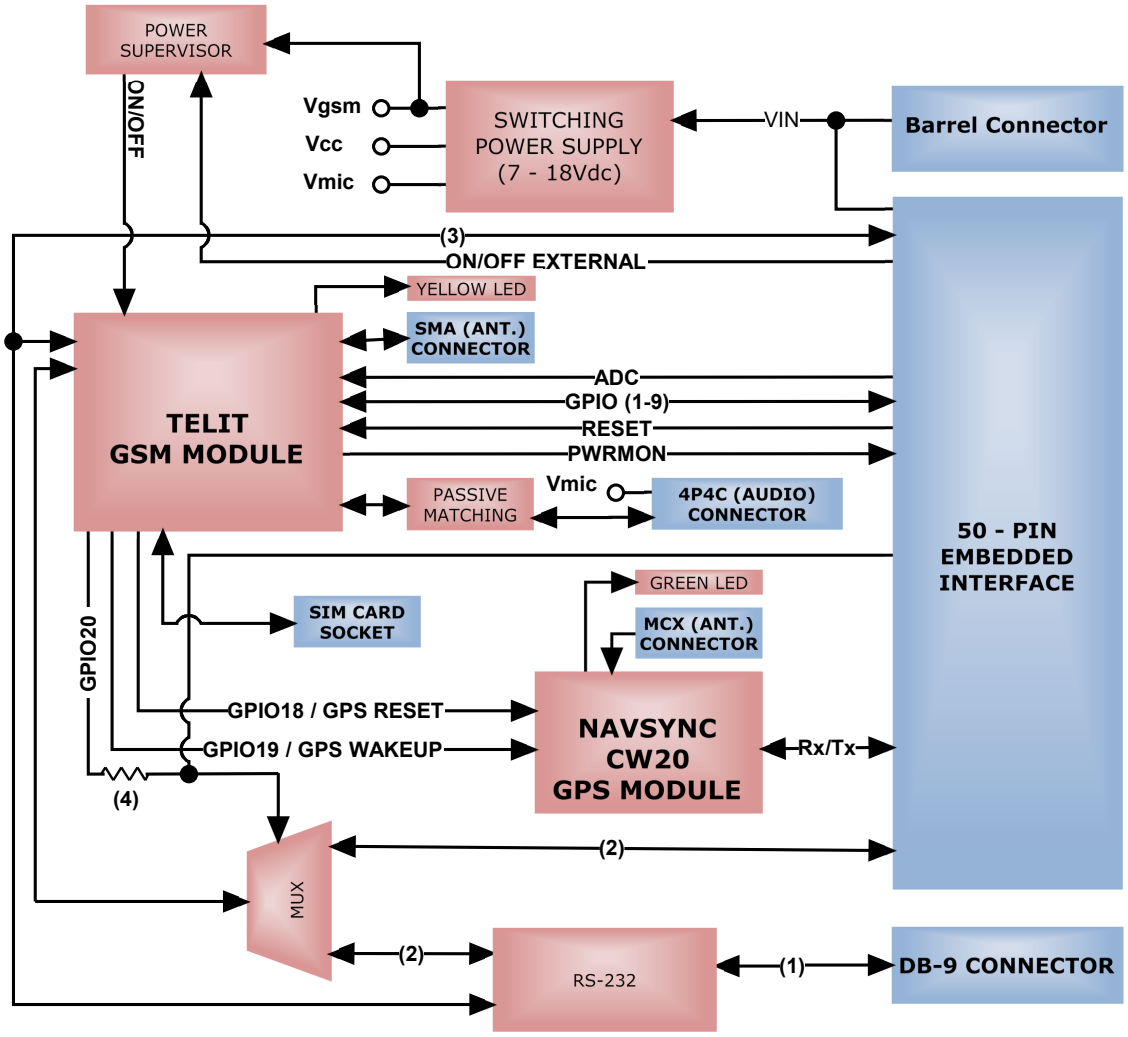
3.2.2 Block Diagram



Note:

1. *RS-232 Signals Include: RxD, TxD, CTS, RTS, DTR, DSR, RING, DCD*
2. *Only the RxD, TxD and RTS CMOS signals are multiplexed between the 50-PIN and DB9 connector. All other UART connections are shared between the 50-PIN and DB9 connector. Hardware handshaking signals can only be used if either the 50-PIN or DB9 connector is connected exclusively. Shared UART connections are all inputs so no I/O contention will occur.*
3. *CMOS Signals Include: CTS, DTR, DSR, RING, DCD.*

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3.3 Terminus Features

3.3.1 GSM Features

Audio

- Telephony, Emergency
- Half Rate, Full Rate, Enhanced Full Rate and Adaptive Multi Rate Voice CODECs (HR, FR, EFR, AMR)
- Superior Echo Cancellation & Noise Reduction
- Handset & Hands-Free Operations
- DTMF

Approvals

- Fully type approved according to R&TTE
- CE, GCF, FCC, PTCRB, IC

SMS

- Point-to-Point mobile originated and mobile terminal SMS
- Concatenated SMS supported
- SMS Cell Broadcast
- Text and PDU mode

Circuit Switched Data Transmission

- Asynchronous Transparent Circuit Switched Data (CSD) up to 14.4 kbps
- Asynchronous Non-transparent CSD up to 9.6 kbps
- V.110

GPRS Data

- GPRS Class 10
- Mobile Station Class B
- Coding Scheme 1 to 4
- PBCCH Support

Fax

- Group 3, Class 1

GSM Supplementary

- Call Forwarding
- Call Barring
- Call Waiting & Call Hold
- Advice of Charge
- Calling Line Identification Presentation (CLIP)
- Calling Line Identification Restriction (CLIR)
- Unstructured Supplementary Services Mobile Originated Data (USSD)
- Closed User Group

Additional Features

- SIM Phone book
- Fixed Dialing Number (FDN)
- Real Time Clock
- Alarm & Battery Management
- Network LED Support
- IRA Character Set
- Jamming Detection & Report
- Embedded TCP/IP Stack, including TCP/IP, UDP, SMTP and FTP protocol
- FOTA (Services available from Telit)

Python Script Support

- Integrated Python Script Interpretor (V1.5.2+)
- 2 MB of non-volatile memory
- 1.2 MB of RAM reserved for Python engine usage
- Powerful Built-In Libraries Enabling Easy Access to Telit's Hardware Features

3.3.2 GPS Features (CW20)

- Delivers enhanced tracking to -150 dBm
- Low power consumption: 19mA fully active
- 16 Channel Receiver

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4 INTERFACES

4.1 Serial Interface Connector

4.1.1 Description

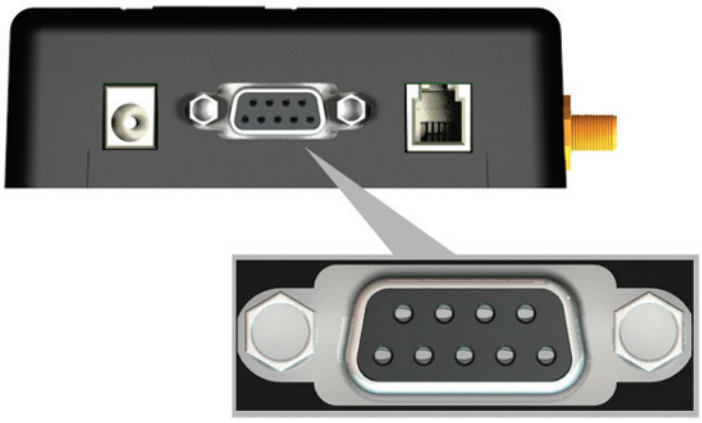
The Terminus serial interface is an RS-232 port that supports both EIA/TIA-232 and V.28/V.24 communications protocols. It accepts a standard RS-232 Sub-D, 9-pin male plug. Communications settings for this port are as follows:

- Baud Rate: 115.2kbps
- Bits: 8
- Stop Bits: 1
- Parity: none
- Hardware Handshaking: Yes

4.1.2 Pin-Out

Pin	Description	I/O	Signal Type
1	Carrier Detect (**CD**)	OUTPUT	RS-232
2	Received Data (**RxD**)	OUTPUT	RS-232
3	Transmitted Data (**TxD**)	INPUT	RS-232
4	DTE Ready (**DTR**)	INPUT	RS-232
5	Signal Ground	N/A	N/A
6	DCE Ready (**DSR**)	OUTPUT	RS-232
7	Request to Send (**RTS**)	INPUT	RS-232
8	Clear to Send (**CTS**)	OUTPUT	RS-232
9	Ring Indicator (**RI**)	OUTPUT	RS-232

4.1.3 Signal Interface Description



6) DSR 7) RTS 8) CTS 9) RI
1) CD 2) RxD 3)TxD 4) DTR 5) GND

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4 Interfaces continued

4.2 Power Supply

4.2.1 Description

The Terminus Power Supply jack accepts input voltages from 7 to 18 VDC (optionally 7 to 40 VDC for V3.10 and V4.10 models) and requires a nominal current sourcing capacity of 5W (maximum 10W). This jack accepts a barrel type plug with a receptacle for a 2.1mm center conductor.

4.2.2 Pin Out

Pin	Description
Center Pin	Supply (+)
Outer Conductor	Supply (-)

4.2.3 Power Supply Interface

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4 Interfaces continued

4.3 Audio Interface

4.3.1 Description

The Terminus audio interface is designed to accommodate a telephone handset with a 4P4C modular plug. The input circuit supports a balanced, low-impedance microphone and can supply a bias voltage of 3.0 VDC. Its characteristics are as follows:

Audio Input Circuit (Mic)

- Line Coupling: AC
- Line Type: Balanced
- Coupling Capacitor: ≥100nF
- Differential Input Resistance: 50kΩ
- Differential Input Voltage: ≤1Vp-p (365Vrms)
- Nominal Input Sensitivity: -45 dBVrms/Pa

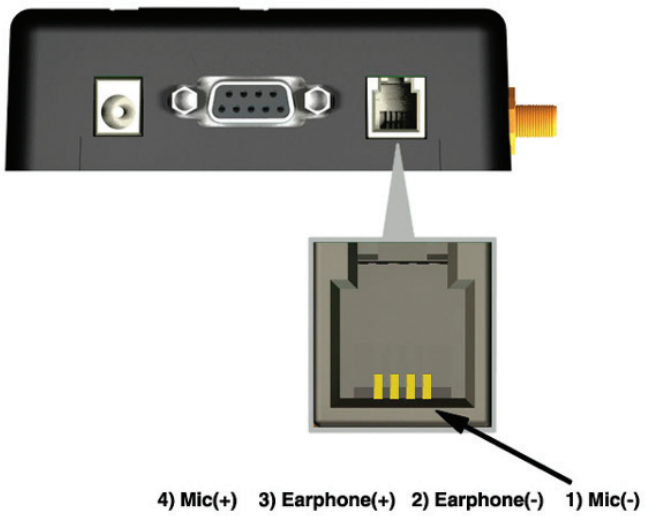
Audio Output Circuit (Earpiece or Speaker)

- Line Coupling: DC
- Line Type: Bridged
- Output Load Resistance: ≥14Ω
- Frequency Response: 150 – 4000 Hz @ -3dB
- Differential Output Voltage: 328mVrms/16Ω @ -12 dBFS
- Software Volume Control: -2dB/step, 10 steps total

4.3.2 Pin-Out

Pin	Description
1	Microphone (-)
2	Earphone (-)
3	Earphone (+)
4	Microphone (+), 3.0Vdc nominal supplied by Terminus to power handset.

4.3.3 Signal Description



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4 Interfaces continued

4.4 Embedded Interface

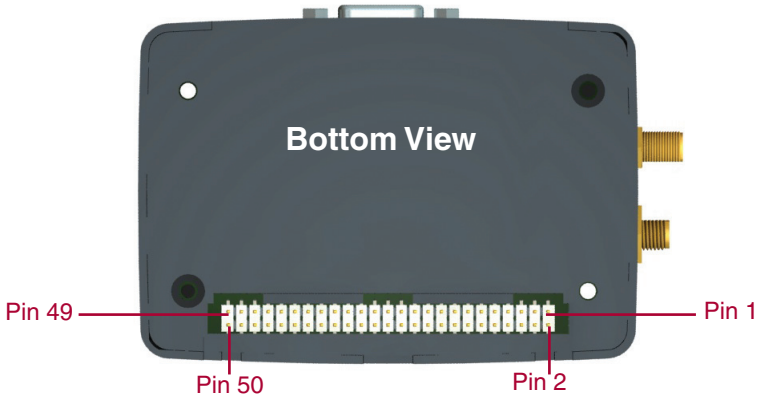
4.4.1 Description

The Embedded Interface is a 50 pin dual row header that allows a user to access many of the available ports and features of the Terminus through a single interface. The connector is located on the bottom of the unit such that it can be integrated with an application PC board. A ribbon cable with a tabbed header connector such as the Samtec HCSD-25-D-1 can also be used. This interface can be functionally divided up into the following groups: General Purpose I/O interface, the ADC interface, Terminus Control interface and GPS Receiver interface. The pin designations and specifications for this interface are shown below.

4.4.2 Pin-Out

Pin	Description	I/O	Signal Type	Note
1	3.165 Vdc Output (*refer to* ***Supply Specification***)	OUTPUT	N/A	
3	RESET	INPUT	Internal Pull-up	1
5	ON/OFF	INPUT	Internal Pull-up	1
7	PWRMON	OUTPUT	2.8V_CMOS	
9	UART_SEL	INPUT	2.8V_CMOS	
11	ADC1	INPUT	ANALOG	
13	GPIO1	BI-DIR	2.8V_CMOS	
15	GPIO2	BI-DIR	2.8V_CMOS	
17	GPIO3	BI-DIR	2.8V_CMOS	
19	GPIO4	BI-DIR	2.8V_CMOS	
21	GPIO5	BI-DIR	2.8V_CMOS	
23	GPIO6	BI-DIR	2.8V_CMOS	
25	GPIO7	BI-DIR	2.8V_CMOS	
27	GPIO8	BI-DIR	2.8V_CMOS	
29	GPIO9	BI-DIR	2.8V_CMOS	
31	DCE Ready (**DSR**)	OUTPUT	2.8V_CMOS	
33	Clear to Send (**CTS**)	OUTPUT	2.8V_CMOS	

4.4.3 Signal Description



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4.4.3 Signal Description continued

Pin	Description	I/O	Signal Type	Note
35	Ring Indicator (**RI**)	OUTPUT	2.8V_CMOS	
37	Carrier Detect (**CD**)	OUTPUT	2.8V_CMOS	
39	DTE Ready (**DTR**)	INPUT	2.8V_CMOS	
41	Request to Send (**RTS**)	INPUT	2.8V_CMOS	
43	GPS_RxD	INPUT	2.8V_CMOS	2, 3
45	Received Data (**RxD**)	OUTPUT	2.8V_CMOS	
47	GPS_TxD	OUTPUT	2.8V_CMOS	2, 3
49	Transmitted Data (**TxD**)	INPUT	2.8V_CMOS	
2,4,6,8	Supply (+) (7 - 18 VDC)	N/A	N/A	
10,12,14,16,18, 20,22,24,26,28, 30,32,34,36,38, 40,42,44,46,48,50	Supply (-) (GND)	N/A	N/A	

Notes:

1. It is required that this input be controlled by an Open Collector/Drain output.
Do not use an external pull-up resistor, a pull-up is included internal to the Terminus.

2. This signal is only available by option, otherwise No Connection.

3. NMEA GPS inerface of the Inernal CW20 GPS receiver. UART settings 9600 Baud, no Parity, 8 bits, 1 stop bit.

4.4.4 Signal Details

4.4.4.1 General Purpose Input / Output

Terminus GPIO are configurable as input, output, and special function. Configuration is controlled by the Customer specific application via AT commands sent on the UART interface. The following table describes GPIO configuration options.

GPIO	Configuration	Alternate Function
1	Input / Output	
2	Input / Output	Jamming Detect Output
3	Input / Output	
4	Input / Output	RF Transmission Control
5	Input / Output	RFTX monitor output
6	Input / Output	alarm output
7	Input / Output	buzzer output
8	Input / Output	
9	Input / Output	

4.4.4.2 Analog to Digital Converter

ADC	Description
1	Analog to Digital Converter Input

4.4.4.3 Reset Pin

RESET PIN:

Input Logic State	Description
High-Z	Terminus Active State
0	Terminus Reset State

Notes:

1. *It is required that this input be controlled by an Open Collector/Drain output.*
Do not use an external pull-up resistor, a pull-up is included internal to the Terminus.
2. *The RESET pin is offered as a means to reset the Terminus when and if the Terminus becomes unresponsive.*
The RESET pin is not intended to be used as a means of turning the Terminus off. Use the ON/OFF pin to turn the Terminus on or off.
3. *RESET state must be held for at least 200ms before returning to active state.*

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4.4.4 Signal Details continued

4.4.4.4 ON/OFF Pin

ON/OFF PIN:

Input Logic State	Description
High-Z	Terminus turned ON or OFF after Input returns to this state.
0	Toggle Terminus ON or OFF

Notes:

1. *It is required that this input be controlled by an Open Collector/Drain output. Do not use an external pull-up resistor, a pull-up is included internal to the Terminus.*
2. *The ON/OFF pin is offered as a means to power-on and power-down the Terminus. When the Terminus powers-down it informs the cell tower that it is powering down and will not be communicating with the tower any more. This is considered a controlled power-down.*
3. *After toggling the power state of the Terminus, wait until PWRMON indicates chosen state before toggling the power state again.*
4. *Optionally the Terminus may be powered-down with the use of AT commands.*

4.4.4.5 PWRMON Pin

PWRMON PIN:

Output Logic State	Description
0	Terminus powered-down
1	Terminus powered-on

Notes:

1. *Used in conjunction with ON/OFF pin to control power-on and power-down state.*

4.4.4.6 UART_SEL Pin

UART_SEL PIN:

Input Logic State	Description
1	Terminus UART interface routed to DB9 connector (RS-232 internally pulled high)
0	Terminus UART interface routed to EMBEDDED connector (2.8V_CMOS)

4.5 Internal Interfaces

The following section describes all signals that are exposed internally for control of UART selection and GPS functionality.

4.5.1 UART_SELECT

GPIO 20 is internally connected to the UART_SEL pin of the 50-pin interface. This allows a Python script to control which UART interface is used. **Warning!** *If controlling UART_SEL via 50 pin interface you cannot control via GPIO 20. If you do this, you will damage GPIO 20.* Please refer to Section 4.4.4.6 for logic table.

4.5.2 GPS Reset

When using a GPS enabled Terminus, GPIO 18 is internally connected to the RESET input of the CW20 GPS module. This allows the application to reset the GPS receiver to a power-on state.

Input Logic State	Description
0	GPS module in run state
1	GPS module in reset state

4.5.3 GPS WAKEUP

When using a GPS enabled Terminus GPIO 19 is internally connected to the WAKEUP input of the CW20 GPS module. This allows the application to wake the GPS receiver after the module has entered sleep mode. For further definition of the CW20 sleep mode, please refer to the user guide.

Input Logic State	Description
0	Required state when GPS module in run state
1	Input must be held high for at least 1 ms to exit Sleep state

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4 Interfaces continued

4.6 LED Status Indicators

4.6.1 Description

The LED Status Indicators are located on the top of the housing near the end where the antenna jacks are. There are 2 LED indicators; GSM Status and GPS Status.

4.6.2 GSM LED Status (Yellow)

LED Status	Device Status
Permanently Off	Device Off
Fast Blinking (0.5 sec on/0.5 sec off)	Net search/ Not registered/Turning Off
Slow Blinking (0.3 sec on/ 2.7 sec off)	Registered, Full Service
Permanently On	A call is active

4.6.3 GPS (Green)

LED Status	Device Status
Permanently Off	NMEA sentences disabled, No power to unit, GPS not present
Blinking	Receiver Activated, NMEA sentences enabled

4.7 RF Interface

4.7.1 Description

There are two RF interfaces on the Terminus – the GSM antenna jack and the GPS antenna jack (the non-GPS version will only have one). The specifications and requirements for these are as follows:

4.7.2 GSM Antenna

4.7.2.1 GSM Antenna Interface:

Type:
SMA - FEMALE

Pin	Description
Center Pin	GSM Signal
Outer Conductor	SIGNAL Ground

4.7.2.2 GSM Antenna Specifications

Frequency range	Depending on frequency band(s) provided by the network operator, the customer shall use the most suitable antenna for that/those band(s)
Bandwidth	70 MHz in GSM850 80 MHz in GSM900 170 MHz in DCS 140 MHz PCS band
Gain	< 3dBi
Impedance	50 ohm
Input power	> 2 W peak power
VSWR (absolute max)	<= 10:1
VSWR (recommended)	<= 2:1

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4 Interfaces continued

4.7 RF Interface continued

4.7.2 GSM Antenna continued

4.7.2.3 GSM Antenna Installation Guidelines

1. Install the antenna in a place covered by the GSM signal.
2. The Antenna must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operated in conjunction with any other transmitting antenna.
3. Antenna shall not be installed inside metal cases.
4. Antenna shall be installed according to manufacturer instructions.

Caution: DO NOT OVER-TIGHTEN ANTENNAS. Do not exceed 5 in.lbs force as over-tightening may damage the unit.

4.7.3 GPS Antenna

4.7.3.1 GPS Antenna Interface

Type:

MCX - FEMALE

Pin	Description
Center Pin	GPS Signal, 3.7 Vdc nominal supplied from Terminus to power active antenna.
Outer Conductor	Signal ground

Note: GPS Antenna Interface only available by option, otherwise not populated.

4.7.3.2 GPS Active Antenna Specifications:

Input Voltage Range	3.4 to 4.2 Vdc
Frequency range	1575.42 ± 3 MHz
Gain	Depends on cable type and length
Impedance	50 ohm
VSWR	<= 1.5:1

Note: GPS Antenna Interface only available by option, otherwise GPS Antenna not required.

4.7.3.3 GPS Antenna Installation Guidelines

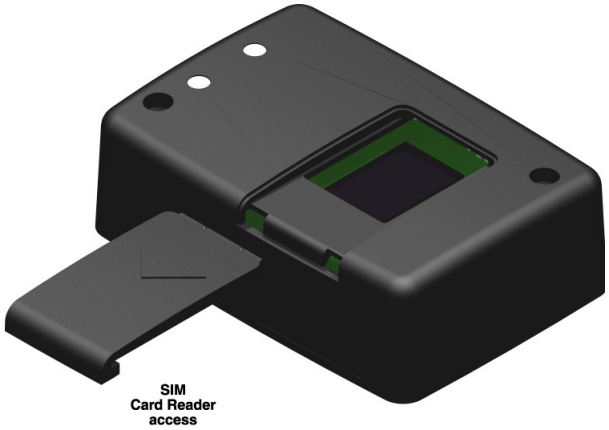
1. Install the antenna with a clear sky view.
2. Antenna shall not be installed inside metal cases.
3. Antenna shall be installed also according to Antenna manufacturer instructions.

Caution: DO NOT OVER-TIGHTEN ANTENNAS. Do not exceed 5 in.lbs force as over-tightening may damage the unit.

4.8 SIM Card Interface

4.8.1 Description

The SIM Card Interface allows the Terminus to accept the subscriber card provided by the cellular telephone provider. It can accommodate a 1.8V or 3.0V SIM card and complies with the Phase 2 GSM 11.14 standard.



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5 TECHNICAL SPECIFICATIONS

5.1 Electrical Specifications

5.1.1 GSM Module Specification

- Quad-band EGSM 850 / 900 / 1800 / 1900 MHz
- Output Power: Class 4 [2W] @ 850 / 900 MHz, Class 1 [1W] @ 1800 / 1900 MHz
- Control via AT commands according to GSM 07.05, 07.07 and proprietary Telit
- Serial Port Multiplexer GSM 7.10
- TCP/IP stack access via AT commands
- Sensitivity: -107 dBm (type.) @ 850 / 900 MHz, -106 dBm (typ.) @ 1800 / 1900 MHz

5.1.2 GPS Module Specifications

GPS Channels	16		
Frequency	1575.42 MHz – L1 C/A Code		
TTFF Cold Start @ -135 dBm	46 seconds		1, 6
TTFF Warm Start @ -141 dBm	34 seconds		1, 6
TTFF Hot Start @ -141 dBm	5 seconds		1, 6
Re-acquisition time @ -147 dBm	<3 seconds		2
Acquisition Sensitivity (fix not available)	TTFF (Hot) with all signals at -138 dBm: 30 s TTFF (Hot) with all signals at -141 dBm: 41 s		3
Acquisition Sensitivity (fix available) (dBm)	-147 dBm		4
Tracking Sensitivity (dBm)	-150 dBm		5
Static Accuracy	1.2 m 3.1 m	50% Confidence (CEP) 95% Confidence	6
Maximum Horizontal Speed	515 m/s		7
Maximum Vertical Speed	15 m/s		8
Maximum Altitude	18 Km		7
Maximum Acceleration (g)	2 g		

Notes:

1. *These are RMS values*
2. *Maximum Sensitivity -147 dBm*
3. *Simulator Test, all signals at specified power level.*
4. *Estimated*
5. *Simulator Test, continuous fix with all signals at specified power level.*
6. *Open-sky, 24 hrs statistic, active antenna (signal range is between 30 to 49 dB/Hz).*
7. *Limited by International Traffic in Arms Regulation (ITAR)*
8. *Defined by navigation integrity check*

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5 Technical Specifications continued

5.1.3 I/O Level Specification

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Unit	Note
VIN (DIGITAL INPUTS)	-0.3	-	3.6	Volt	
VIN (ANALOG INPUT)	-0.3	-	+3.00V	Volt	
Storage Temperature	-40	-	85	°C	
Supply (+) referenced to Supply(-)	0	-	24	V	

Operation of the device at these or any other conditions beyond those listed under Recommended Operating Conditions is not implied. Exposure to Absolute Maximum Rating conditions for extended periods of time may affect device reliability.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit	Note
Temperature	-30	-	65	°C	8
Supply (+) referenced to Supply (-)	7	-	18V	Volt	1
3.165 VDC Output	3	-	3.3V	Volt	2

Recommended Operating Conditions - Interface Levels (2.8V CMOS)

Parameter	Min	Typ	Max	Unit
Input Voltage High - Vih	2.1	-	3.3	Volt
Input Voltage Low - Vil	0	-	0.5	Volt
Output Voltage High - Voh	2.2	-	3.0	Volt
Output Voltage Low - Vol	0	-	0.35	Volt

Typical Current Source/Sink capability = 1mA/1uA

Recommended Operating Conditions - RESET pin

Parameter	Min	Typ	Max	Unit
Input Voltage High - Vih_rst	2.0	-	2.2	Volt
Input Voltage Low - Vil_rst	0	-	0.2	Volt

It is required that this input be controlled by an Open Collector/Drain output. Do not use an external pull-up resistor, a pull-up is included internal to the Terminus.

Recommended Operating Conditions - ADC1 pin

Parameter	Min	Typ	Max	Unit
Input Voltage Range	0	-	2	Volt
AD Conversion	-	-	11	Bits
Resolution	-	-	< 1	mV

5.1.4 Terminus Electrical Specifications

Power Supply	Min	Typ	Max	Unit	Note
Voltage Range	7	12	18	Vdc	1
Average Current (Registered, Power Savings) with GPS	-	12	-	mA (typ)	3, 4, 9
Average Current (Registered, No Traffic) with GPS	-	25	-	mA (typ)	5, 6, 9
Average Current (GPRS Class 10) with GPS	-	146	-	mA (typ)	9
Power	-	-	10	Watts	7

Note:

1. *7-40V Vin by option. Please contact a sales representative for more information about ordering Terminus with GPS option.*
2. *Max current draw of 25mA on the 3.165Vdc output.*
3. *GPS in Sleep mode. Refer to CW20 User Guide.*
4. *GSM Module in Power Saving Function Mode (AT+CFUN=0).*
5. *GPS Tracking.*
6. *GSM Module in Power Saving Function Mode (AT+CFUN=1).*
7. *The GSM system is made in a way that the RF transmission is not continuous. It is packed into bursts at a base frequency of about 216 Hz and the relative current peaks can be as high as 670mA @ Vin = 12Vdc.*
8. *GSM module is fully functional (able to make and receive voice calls, data calls, SMS and make GPRS traffic) over the full temperature range. Temperatures outside the range -20°C - +55°C might slightly deviate from ETSI specifications.*
9. *GPS Active antenna current removed from measurement.*

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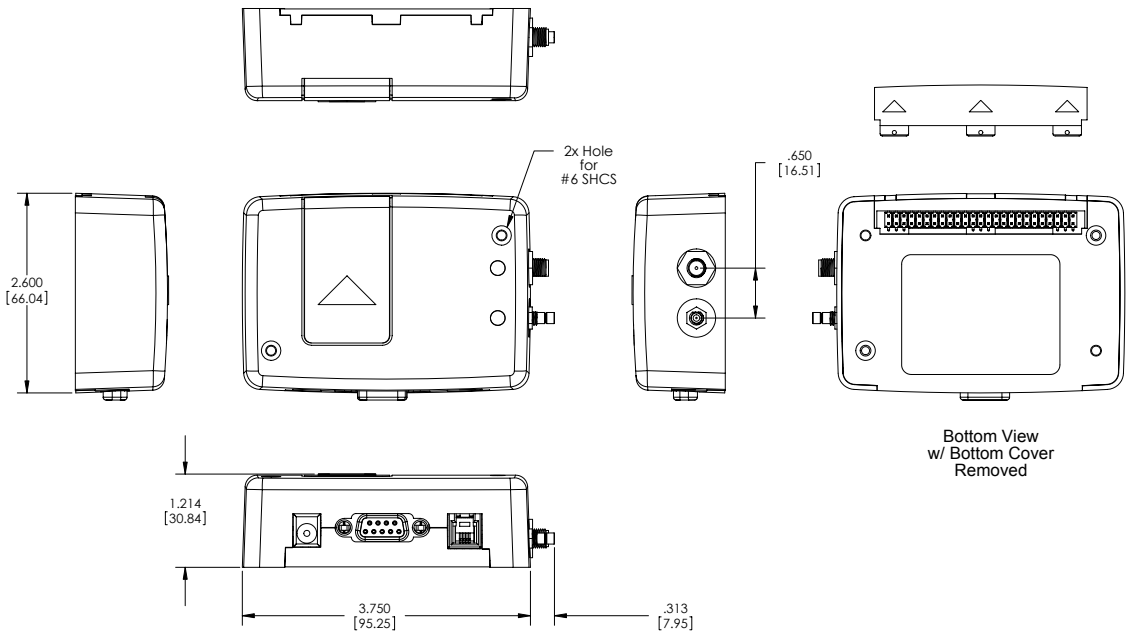
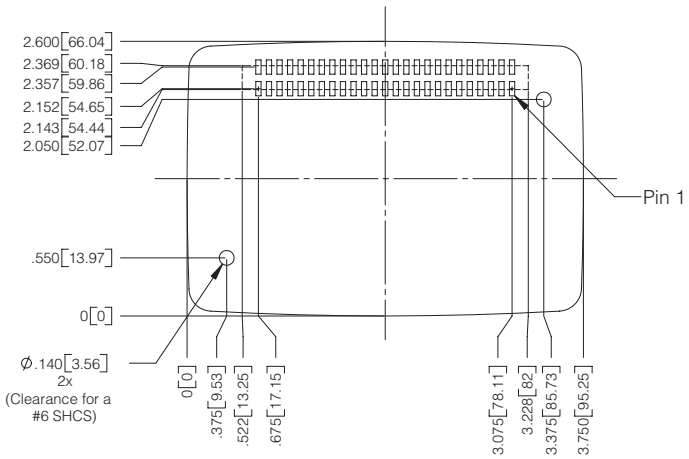
5 Technical Specifications continued

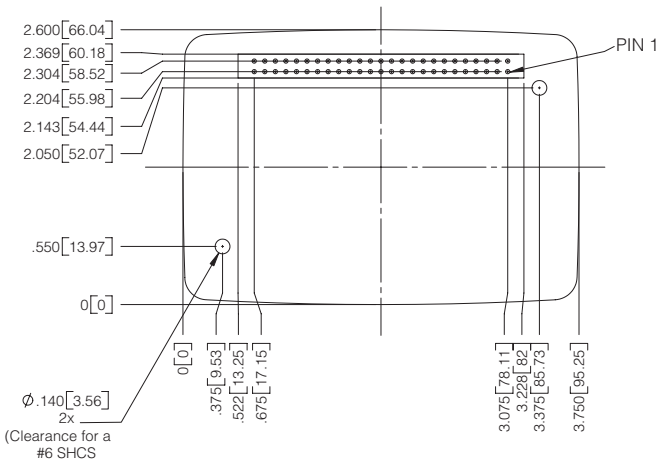
5.2 GC864Q Mechanical Dimensions



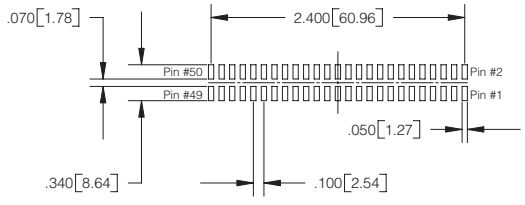
Mounting GSM864Q Terminus in your application



Mechanical Dimensions
(Top View)

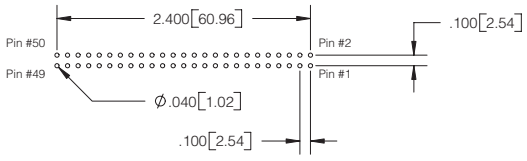


Mechanical Dimensions
(Top View)



Pad Dimensions for
recommended connector,
Samtec P/N SSW-125-22-S-D-VS
(Top View)

Recommended Surface Mount Footprint



Hole Dimensions for
recommended connector,
Samtec P/N SSQ-125-XX-X-D
(Top View)

Recommended Thru-Hole Footprint

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6. AT COMMAND GUIDELINES

The basic AT commands used to control Terminus operation are defined in this section. Please refer to Telit AT Command Guide for detailed command definition.

6.1 AT Command Format

A command line is a string of characters sent from a DTE or emulation software to the Terminus while the modem is in a command state. A command line has a prefix, a command, and a terminator. Each command line must begin with the character sequence AT and must be terminated by a carriage return and line feed (ie ASCII Carriage Return <13> and ASCII LineFeed <10>). Commands entered in upper case or lower case are accepted, but both the A and T must be of the same case, i.e., “AT” = ASCII 065, 084 or “at” = ASCII 097, 116. The command is a string of commands restricted to printable ASCII characters (032 - 126). Standardized GSM commands start with a “+” character and proprietary commands can start with one of the following characters, “@”, “#”, “$” or “*”. Space characters (ASCII 032) in a command are ignored and control characters other than defined terminator characters CR (ASCII 013) and LF (ASCII 010) in the command string will cause an ERROR result code. The default terminator is the ASCII <CR> character followed by the ASCII <LF> character. The command line interpretation begins upon receipt of the carriage return and line feed characters.

If a syntax error is found anywhere in a command line command, the remainder of the line will be ignored and the ERROR result code will be returned.

Most commands entered with parameters out of range will not be accepted and the ERROR response will be returned to the DTE or emulation software.

Commands will only be accepted by the modem once the previous command has been fully executed, which is normally indicated by the return of an appropriate result code.

6.2 AT Command Example

Example AT Commands

AT#BND=3<cr><lf>	// select default band
AT&P0<cr><lf>	//save profile

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7. OPERATION

7.1 Setting Up a Terminal Emulator for use with the Terminus

7.1.1 To interface with the Terminus connect the Serial Interface RS-232 port to a PC and use a terminal emulation program such as Microsoft® Hyperterminal. Set the interface parameters as follows:

- Baud Rate: 115.2 kbps
- Bits: 8
- Stop Bits: 1
- Parity: None
- Hardware Handshaking: Yes

7.1.2 Set Terminus to Auto-bauding

- Enter AT<cr> from terminal and wait for OK
- Enter AT+IPR=0<cr> and wait for OK
- Terminus is now set for auto data rate detection

7.2 Powering ON/OFF

7.2.1 The Terminus is turned ON automatically once DC power is applied. If the Terminus is turned OFF using one of the methods described below, it can be turned back ON again through one of two methods:

- pull ON/OFF signal (pin 5 of 50 pin straight header) to ground, then release.
- press the ON/OFF switch, then release

The Terminus is fully operational after 4 seconds. Logging onto a network may take longer than this and is outside the control of the Terminus.

7.2.2 There are three ways to switch OFF the Terminus as described below.

- Use the appropriate AT command (AT#SHDN)
- Pull ON/OFF signal to ground, then release
- Press ON/OFF switch (SW1), then release

7.3 Setting Up Service – Network Settings

7.3.1 The network settings for the Terminus will vary depending on the cellular carrier you are using. Below are two of the North American cases for these settings.

For T-mobile® & MNVO (Raco®, Sensor Logic®, Nexaira® Jasper Wireless®) enter:

AT#SELINT=2 //use of most recent AT command set
AT#STIA=2,10 or AT#STIA=1 // enable SAT – SIM Application Tool-Kit
AT#BND=3 // default bands to 850/1900
AT#AUTOBND=1 // enable Quad band system selection
AT#PLMNMODE=1 // enable EONS (enhanced operator naming scheme)
AT&P0 // save profile
AT&W0 // save setting
AT#ENS=0

For AT&T/Cingular® & MNVO (Kore®, Aeris®, nPhase®) enter:

AT#SELINT=2 //use of most recent AT command set
AT#ENS=1 // AT&T/Cingular configuration
(SAT, BND, AUTONBND, PLMNMODE, plus Cingular® specific ENS requirements)

If the Terminus is being used in a different country or with a different carrier please refer to the Telit AT Command reference document regarding the use of the AT#BND command to set the proper frequency band.

Important: After entering either of the sets of settings above power the Terminus OFF and then ON. It is now ready for use.

7.3.2 Check network status (assuming you have a valid SIM card installed)

Enter AT+CREG? <cr> And wait for response

Response will be +CREG:0,1 or +CREG:1,1 meaning device is registered on its home network. If response is different than this please refer to the Telit AT Command Reference document for more information.

7.3.3 Check signal quality

Enter AT+CSQ<cr> And wait for response +CSQ:<rssi>,<ber>

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7. OPERATION continued

7.4 Making a Voice Call

7.4.1 Voice call mode allows you to use a telephone handset to communicate with a properly equipped subscriber unit.

- To set the call mode to voice enter AT+FCLASS=8<cr> and wait for response OK
- To set the audio path of the Terminus to internal (for handset use) enter AT#CAP=2
- To dial the phone number enter ATD 8885551234; <cr>
- To disconnect the call enter ATH<cr>

7.5 Sending an SMS

7.5.1 SMS (Select Message Service) mode allows you to send a text message (max 160 characters) to a SMS capable subscriber unit.

- To set the message mode to text enter AT+CMGF=1<cr>
- To enter the receiving subscriber unit phone number and message enter:
  1. AT+CMGS=8885551234
  2. Wait for response">" then enter message text
  3. Enter "ctrl z" <cr> to end message

7.6 Making a GPRS Data Call

(internet connectivity)

7.6.1 GPRS is a data service that uses Packet Data Protocol (PDP).

- To set up the PDP context parameters enter:
  AT+CGDCONT=1, "IP", "APN","0.0.0.0",0,0<cr> where APN is specific to the service provider being used.
- Enter AT+CGQMIN=1,0,0,0,0,0
  1. This sets the minimum Quality of Service profile
- Enter AT+CGQREQ=1,0,0,3,0,0
  1. This sets up the desired Quality of Service profile
- Enter AT#SGACT=1,1,"v", "p" where v is your user ID and p is your password.
  If Password & User Name are not required, omit "v" and "p" (ex: AT#SGACT=1,1)
  1. This activates the PDP context
- Enter AT#SD=1,0,IPP,IPA,0,0
  1. Look for response "CONNECT". This opens a remote connection via socket
  2. IPP = the remote host port to contact provided by carrier (0 to 65535)
  3. IPA = the IP address given to you by your service provider in the format:
     "xxx.xxx.xxx.xxx"
- **At this point a data session is active and data can be sent from the Terminus to the remote device and visa versa.**
  1. To exit the data session send the characters"+++" and wait for the OK response
- Enter AT#SH=1 to close the socket

7.7 Additional Instructions

On utilizing different commands for other applications than those described here, please refer to the following documents:

Telit AT Commands Reference Guide
Telit GC864 Software User Guide
Telit Easy GPRS User Guide

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8. Open Frame Options

8.1 Open Frame Design Considerations

The Terminus includes an embedded interface with a 50-pin dual row header that allows integrator to access many of the available ports and features through a single interface. Integration of the Terminus into a customer specific application circuit is achieved via the 50-pin header.

50-pin Header exposes the following connections:

- Power Supply
- AT Command Serial Port
- All GPIOs
- Rx and Tx for GPS

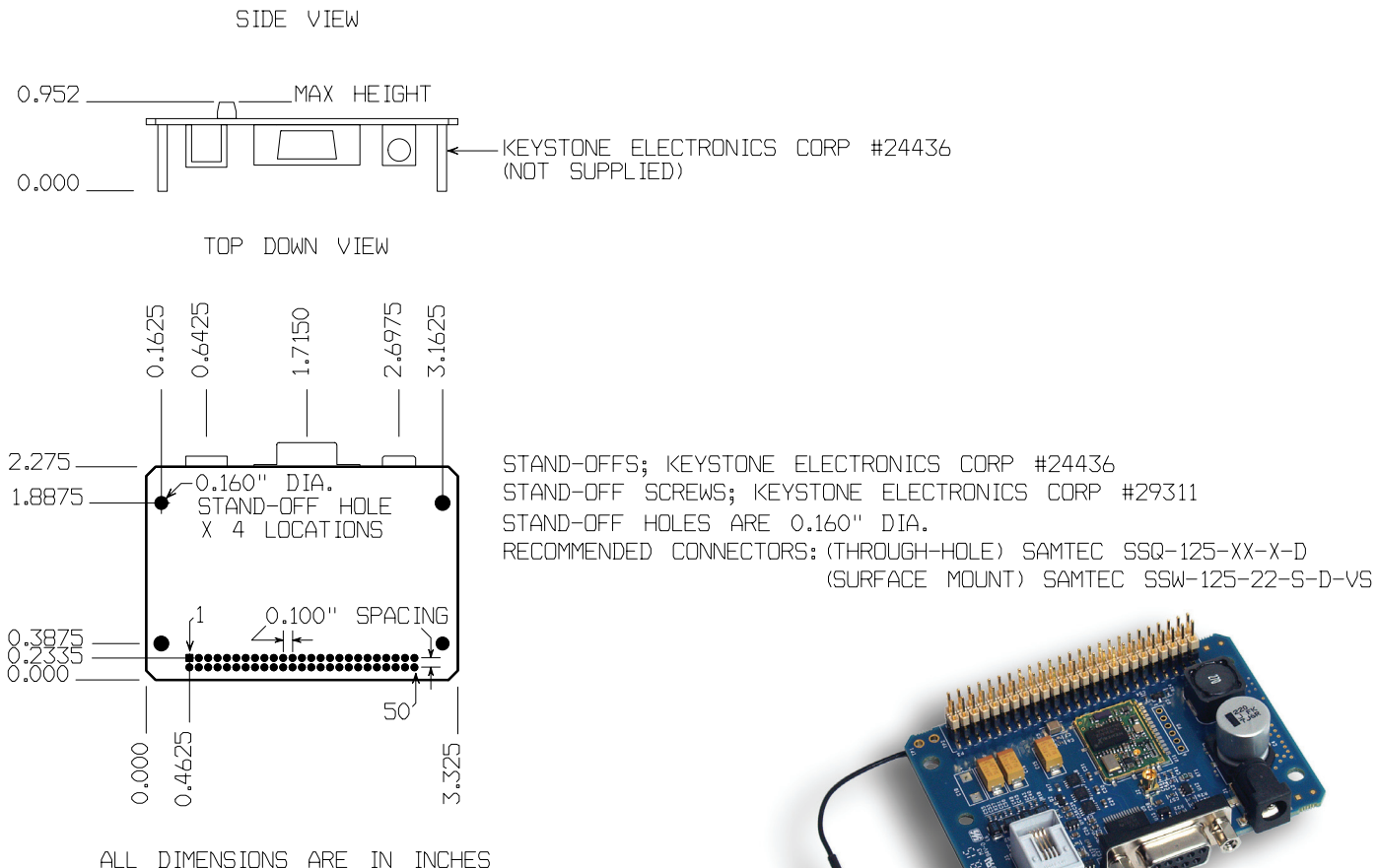
If your application requires handset connection, integrator will need to use 4P4C Audio connector.

The Open Frame version of the Terminus is supplied with the approved GSM RF cable.

To maintain certification, antenna connection must be made through the provided GSM antenna cable. This cable has a bulk panel mount SMA(F) connector.

Optional GPS option exposes the GPS antenna connection via a MMCX(F) connector. Please consult sales department to order GPS cable and active antenna.

8.2 Open Frame Diagram



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9. Python©

9.1 Introduction

9.1.1 What is Python?

First released by Guido van Rossum in 1991, Python is a clear and powerful dynamic object-oriented programming language used in a wide variety of application domains. It offers strong support for integration with other languages and tools, comes with extensive standard libraries, and can be learned in a few days. Python versions are available for Windows™, Linux/Unix™, Mac™ OS X, OS/2, Amiga™, Palm Handhelds, and other platforms. It has an open source license that makes it free to use and distribute, even for commercial applications.

9.1.2 Telit's Python Implementation

The ability to create and execute embedded applications adds versatility and power to the Terminus. Telit chose the Python scripting language to implement this functionality and produced a complete software platform called Telit Easy Script to enable the development of M2M applications. Using Telit Easy Script allows the customer to easily create, install and execute programs on their Telit modules. The Telit Easy Script implementation offers:

- Python script interpreter engine
- Around 3MB of non-volatile memory for user scripts and data
- 1.2MB of RAM reserved for Python engine usage
- Integrated TCP-IP stack

Telit developed the modules with built-in interfaces, which provide communication between the Python script and the Telit module. The interfaces are dedicated to M2M applications. Refer to the Telit Easy Script in Python document for a detailed discussion of these modules.

The Telit Python implementation uses version 1.5.2+ which includes use of all Python statements and almost all built-in types and functions (see Telit document for details). The plus on the version number indicates the addition of version 2.0 string handling methods. Please refer to Telit Document: Easy Script in Python.

9.2 Python Development Tools

The Telit Python package (available at www.janus-rc.com) includes an integrated development environment (IDE) to make developing scripts more straightforward. This IDE includes a full editor, an interactive debugger and a compiler. A PC running Windows 2000 or XP is required to run these tools.

9.2.1 Installing the IDE

Execute the file TelitPy1.5.2+_V4.1.exe to install Telit Python package and let the installer use the default settings. The Python compiler package is contained in the installation. The Telit Python package is placed in the folder C:\Program Files\Python\. The correct path in the Windows Environmental variables will be set up automatically.

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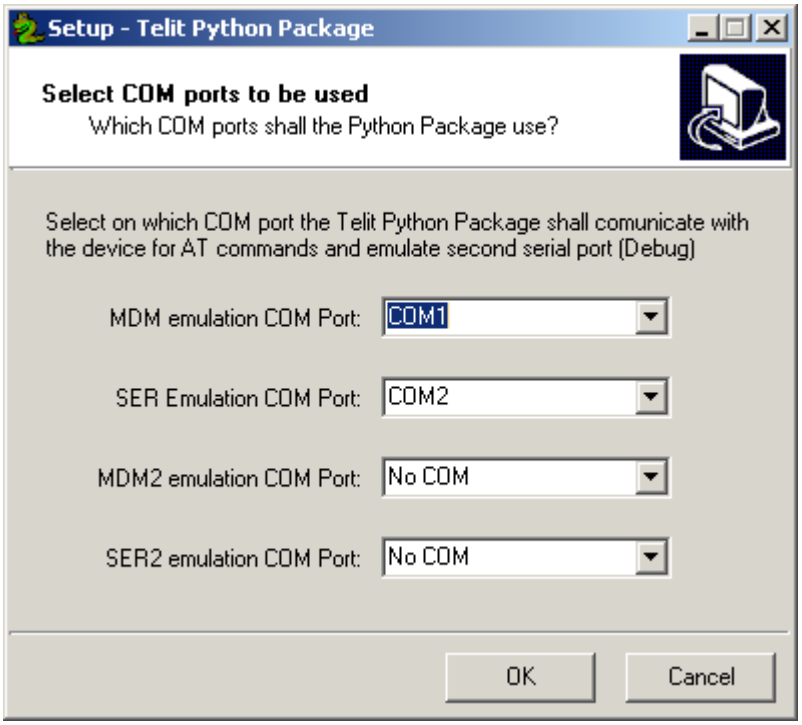
9.2.2 Setting Up the IDE

The only required setup is to configure the COM ports with the COM Port Selection Tool as shown.



MDM emulation COM Port: This is the only port that must be assigned. The MDM assignment is used for the following tasks:

1. When executing script from IDE the IDE sends and receives AT commands sent via the MDM module Example: res = MDM.send('AT+CREG?',0) The command AT+CREG? Would be sent to the Terminus via COM1. This means that the Terminus must be connected to COM1.
2. Script files are downloaded to module from the IDE or Windows File Explorer via COM1.

All other Modules SER, MDM2 and SER2 are the COM ports that will need to be assigned if you use the IDE to run your script and you have used these modules in your code.

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9. Python© continued

9.3 Python and Terminus

Python scripts are text files stored in NVM inside the Telit module. The file system inside the module can write and read files. The Python script is executed at the lowest priority to make sure this does not interfere with GSM/GPRS normal operations. Four steps are required to create a script for controlling the Terminus via the Python engine. These are: Write the Python script; Compile and download the Python script into the module's NVM; Enable the Python script; and Execute the Python script.

- Write Python script

  You can write and test the Python script directly from the IDE. Refer to section 3.1 of the Telit Easy Script in Python document for a short example.

- Compile and Download Python script

  When the Pythonwin IDE is installed on the PC it adds the file types .py and .pyo to the Windows file systems and associates them with the Pythonwin tools. It also installs two programs, a compiler and a file loader, that are then accessible from the Windows file menu. This makes working with Python script files fairly easy.
  To compile a script just right-click on the .py filename from Windows Explorer and select compile from the pop-up menu. This then creates the .pyo file. Multiple files can be compiled at the same time by selecting them all, then selecting compile.
  To download the compiled files from the computer to the Terminus, just select the .pyo file(s) in Windows Explorer and right-click. Select download from the pop-up menu. The compiled Python script(s) will be moved into the Terminus' NVM.

- Enable Python script

  To enable the Python script the Terminus script mode must first be set by sending the AT#STARTMODESCR=1,10 command. This tells the Terminus to start running the script only after waiting for 10 seconds to see if there is any AT command traffic on the serial port.

- Execute Python script

  Once the start mode is set use the AT#ESCRIPT="yourscriptname" command to execute the script and then restart the Terminus. The script will run after 10 seconds and it will run every time the Terminus is started.
  To disable the script type in AT#ESCRIPT="" during the 10 second interval after power up.

- Other Useful Commands

  AT#RSCRIPT - Read an uploaded script
  AT#LSCRIPT - List saved Python scripts
  AT#ESCRIPT? - Shows the currently enabled script

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10 APPENDICES

10.1 Approvals

10.1.1 PTCRB Certification

The Terminus is PTCRB Certified; Lab: Cetecom, Inc.; Date: 7/27/2007

10.1.2 FCC

10.1.3 CE

10.2 Safety Recommendations (for Information only)

10.2.1 General

Your Terminus GSM864Q terminal is based on the GSM standard for cellular technology. This standard is universal and covers Europe, Asia, United States and Africa which is the most used telecommunication standard.

10.2.2 Antenna Care and Replacement

Do not use the Terminus with a damaged antenna.

Buy the antenna from an approved suppliers list. Using unauthorized antennas, modifications, or attachments could damage the Terminus and may violate local RF emission regulations or invalidate type approval.

Caution: DO NOT OVER-TIGHTEN ANTENNAS. Refer to Section 4.7 for torque specifications.

10.3 Abbreviations

AC	**A**lternating **C**urrent
ADC	**A**nalog **T**o **D**igital **C**onverter
BER	**B**it **E**rror **R**ate
CD	**C**arrier **D**etect
CSD	**C**ircuit **S**witched **D**ata
CTS	**C**lear **T**o **S**end
DB	**D**eci**b**el
DBFS	**D**eci**b**els **F**ull **S**cale
DC	**D**irect **C**urrent
DCE	**D**ata **C**ommunications **E**quipment
DSR	**D**ata **S**et **R**eady
DTMF	**D**ual-**t**one **m**ulti-**f**requency
DTR	**DT**E **R**eady
FDN	**F**ixed **D**ialing **N**umber
GPIO	**G**eneral **P**urpose **I**nput **O**utput
GPRS	**G**eneral **P**acket **R**adio **S**ervice
GSM	**G**lobal **S**ystem **M**obile
ITAR	**I**nternational **T**raffic **I**n **A**rm **R**egulation
LED	**L**ight **E**mitting **D**iode
M2M	**M**achine **T**o **M**achine
PBCCH	**P**acket **B**roadcast **C**ontrol **C**hannel
PDU	**P**rotocol **D**ata **U**nit
RF	**R**adio **F**requency
RI	**R**ing **I**ndicator
RSSI	**R**eceived **S**ignal **S**trength **I**ndication
RTS	**R**equest **T**o **S**end
RxD	**R**eceived **D**ata
SMS	**S**hort **M**essage **S**ervice
TTFF	**T**ime **T**o **F**irst **F**ix
TxD	**T**ransmitted **D**ata
USSD	**U**nstructured **S**upplementary **S**ervice **D**ata
VSWR	**V**oltage **S**tanding **W**ave **R**atio
WAAS	**W**ide **A**rea **A**ugmentation **S**ystem

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10. APPENDICES continued

10.4 Ordering Information

Ordering Information	Terminus Description
GSM864Q V1.10	GPS Terminal
GSM864Q V2.10	Non-GPS Terminal
GSM864Q V3.10	GPS Terminal HV
GSM864Q V4.10	Non-GPS Terminal HV
GSM864Q V5.10	GPS Terminal Open Frame
GSM864Q V6.10	Non-GPS Terminal Open Frame

10.5 Revision History

Revision	Revision Date	Note
R00	02/09/09	V1.1 Manual
R01	04/14/09	Addition of AT Command Guidelines & Revision Updates
R02	08/12/09	Addition of Open Frame Option & Antenna Guidelines

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Terminus GSM864Q Hardware User Manual

Janus Remote Communications
Division of The Connor-Winfield Corporation
2111 Comprehensive Drive • Aurora, Illinois 60505
630.499.2121 • Fax: 630.851.5040
www.janus-rc.com