

Terminus T3 Products User Manual



JANUS REMOTE
COMMUNICATIONS

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T3 Terminus Description

The Terminus T3 is a communication control terminal with a compact, rugged enclosure that encapsulates everything needed for easy M2M integration. The multiple orderable versions allow for system deployment in different networks with little to no change in the design investment.

Powered by the Terminus Common Footprint devices, the T3 contains all circuitry required to give your application access to GSM, HSPA, EVDO, even LTE based network technology. It can receive power from a 5v source, contains two communication interfaces, and an easy to use input to control ON/OFF remotely. Additionally, Janus offers Python examples for the modems equipped with the interpreter to add scripting capabilities to your application.

T3 Connections Terminals

The 4 position terminal section serves as the power supply input. It is also the access point for the external disable input. Janus carries mating connectors for the terminal block, but the part number is referenced for the user if they need to find something we do not carry.

Pin	Description
1	External Disable
2	Ground
3	Ground
4	5V Supply

Terminal Part Number: On Shore Technology Part #OSTOQ041251

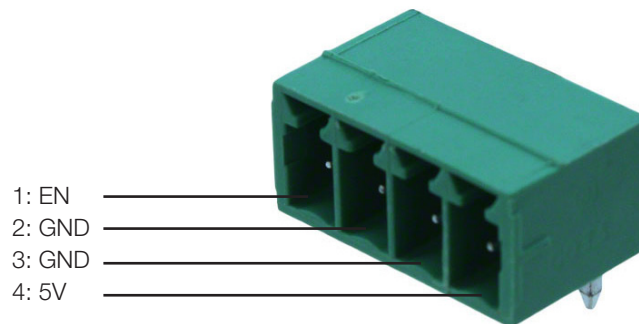


Figure 1: T3 Terminal Block Diagram

External Disable

This input signal is designed to put the unit into the lowest possible power state without needing to cut power entirely. It can be used by simply grounding the signal, then released when not needed.

This signal is internally pulled up to 5v. It should only be controlled via grounding or floating.

T3 Connections continued

RS232

The DB9 port follows the standard for RS-232 communications and gives the connections for serial interaction with hardware handshaking.

Pin	Description	Direction
1	DCD	Output
2	RXD	Output
3	TXD	Input
4	DTR	Input
5	GND	Supply
6	DSR	Output
7	RTS	Input
8	CTS	Output
9	RING	Output

USB

The USB B type port is directly connected to the modem, giving several interfaces in one connection for application ease. This port can be used for various functions, including firmware updates of the modem. This port does not provide power to the T3, which must come from the main terminal input.

LED Indicators

The T3 contains two LEDs for feedback to the user.

Status – Green LED

This LED is T3 feedback on readiness of the modem to accept commands, and is automatically controlled internally. When the unit is available for communications this will be illuminated. When the modem is not ready, either through external disable control or the use of low power AT+CFUN modes this LED will be turned off.

Logically, it is tied to the CTS (clear to send) signal.

Cellular – Amber LED

This LED is directly connected to the modem's cellular status signal. It can be user controlled through AT commands, or set to automatic control by the modem for cellular status feedback.

Please consult the modem AT command guide for control commands. AT#GPIO and AT#SLED are the common commands.

Description of status:

LED Status	Device Status
Permanently Off	Cellular radio is off
Permanently On	On/Searching
Slow Blinking (0.3 sec on / 2.7 sec off)	Registered
Fast Blinking (0.5 sec on / 0.5 sec off)	Shutting down

T3 Connections continued

Antenna Connections

These are bulkhead antenna connections for wireless communication to cellular and GPS technology.

SMA

Cellular and RX Diversity antenna connections

Pin	Description
Center Pin	Signal
Shield	Ground

MCX

GPS antenna connection

Pin	Description
Center Pin	Signal
Shield	Ground

SIM Card

HSPA910T3 and LTE910T3 Models require a SIM card

The SIM card port is located inside of the T3, on the module itself.

To insert a SIM card, please follow these instructions.

- Step 1. To access the SIM card holder, remove the four TX-10 screws from the ruggedized aluminum enclosure. These screws are located on the panel of the T3 that includes the RS232 DB9 and RF connections.
- Step 2. Slide out the panel which will include the T3 board.
- Step 3. Locate the SIM card holder on top of the Terminus Plug-In board.
- Step 4. Slide the top of the SIM card holder back to unlock, insert the SIM card and close. Slide back to the original position to lock back in place.
- Step 5. Slide the panel back into the enclosure, replace, and tighten the four TX-10 screws.

Electrical Specifications: Absolute Maximum Ratings:

Parameter	Minimum	Nominal	Maximum	Unit	Note
Storage Temperature	-40	-	85	°C	1
Supply (Supply & Enable Input)	0	-	6	Volt	1,2
VIN (RS-232 Inputs)	-25	-	25	Volt	1

Notes:

- 1) 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.
- 2) The supply inputs are protected from transients beyond the Recommended Operating Conditions. If transients persist the supply will be latched in a disable state until the input is lowered.

Recommended Operating Conditions:

Parameter	Minimum	Nominal	Maximum	Unit	Note
Operational Temperature:	-40	25	85	°C	
Supply	4.75	5.0	5.25	Volt	
Peak Supply Current	2.0	-	-	Amp	1

Note:

- 1) Peak Supply Current specification is stated as the minimum amount of current the external power supply must be able to supply during the TX burst of the embedded cellular radio. Please refer to the Plug-In User Manual for power supply characteristics of the embedded Plug-In Module in the Terminus T3. Plug-In User Manual can be downloaded at <http://www.janus-rc.com/terminuscf.html>

Typical Operating Conditions - HSPA910T3:

Mode	Type	Average (mA) ^{1, 2}	Description
Terminal Disabled	-	0.14	External Disable Grounded, modem off.
Using: RS-232			
AT+CFUN=1	WCDMA GSM	34 -	Idle, no call in progress. Full functionality of the module
AT+CFUN=4	WCDMA GSM	33 -	Disabled TX and RX; module is not registered on the network
AT+CFUN=5	WCDMA GSM	10 -	Full functionality with power saving; Module registered on the network can receive incoming calls and SMS
AT+CFUN=0	WCDMA GSM	10 -	Minimum functionality. In this mode the AT interface is not accessible. Must be woken up externally by SMS or Socket attempt.
Using: USB			
AT+CFUN=1	WCDMA GSM	38 -	Idle, no call in progress. Full functionality of the module.
AT+CFUN=4	WCDMA GSM	37 -	Disabled TX and RX; module is not registered on the network
AT+CFUN=0	WCDMA GSM-	5	Full functionality with power saving; Module registered on the network can receive incoming calls and SMS
Using: RS-232 & USB			
AT+CFUN=1	WCDMA GSM	51 -	Idle, no call in progress. Full functionality of the module.
AT+CFUN=4	WCDMA GSM	51 -	Disabled TX and RX; module is not registered on the network
AT+CFUN=5	WCDMA GSM	11 -	Full functionality with power saving; Module registered on the network can receive incoming calls and SMS
AT+CFUN=0	WCDMA GSM	10 -	Minimum functionality. In this mode the AT interface is not accessible. Must be woken up externally by SMS or Socket attempt.

Note:

- 1) Average Supply Current specification is stated as the maximum average current the Terminus T3 terminal can draw while maintaining junction temperatures within the internal power supply IC's specifications. It is the applications responsibility to maintain operation within this limit to maintain reliable operation over the life of this terminal product.
- 2) Values taken with GPS turned OFF. When GPS is used, expect a 20mA increase during operating states.

Electrical Specifications continued
Cellular Antenna Specifications:

Parameter	Description
HSPA910T3	
Frequency Range	Depending on frequency bands provided by the network operator, the customer should use the most suitable antenna for those frequencies.
Bandwidth	70MHz in GSM850 80 MHz in GSM900 170 MHz in DCS & 140 MHz PCS 70 MHz in WCDMA850 80 MhHz in WCDMA900 460 MHz in WCDMA1700 140 MHz in WCDMA1900 250 MHz in WCDMA2100
Gain	Gain < 3dBi
Impedance	50Ω
Input Power	>33 dBm (2W) peak power in GSM >24 dBm Average power in WCDMA
VSWR Absolute Max	≤ 5:1
VSWR Recommended	≤ 5:1
EVDO910T3	
Frequency Range	Depending on frequency bands provided by the network operator, the customer should use the most suitable antenna for those frequencies.
Bandwidth	70MHz in CDMA BC0 140 MHz in CDMA BC
Gain	Gain < 5dBi
Impedance	50Ω
Input Power	> 24.4 dBm in CDMA
VSWR Absolute Max	≤ 5:1
VSWR Recommended	≤ 2:1
CDMA910T3	
Frequency Range	Depending on frequency bands provided by the network operator, the customer should use the most suitable antenna for those frequencies.
Bandwidth	70MHz in CDMA BC0 140 MHz in CDMA BC
Gain	Gain < 5dBi
Impedance	50Ω
Input Power	> 24.4 dBm in CDMA
VSWR Absolute Max	≤ 5:1
VSWR Recommended	≤ 2:1

Electrical Specifications continued

Cellular Antenna Specifications:

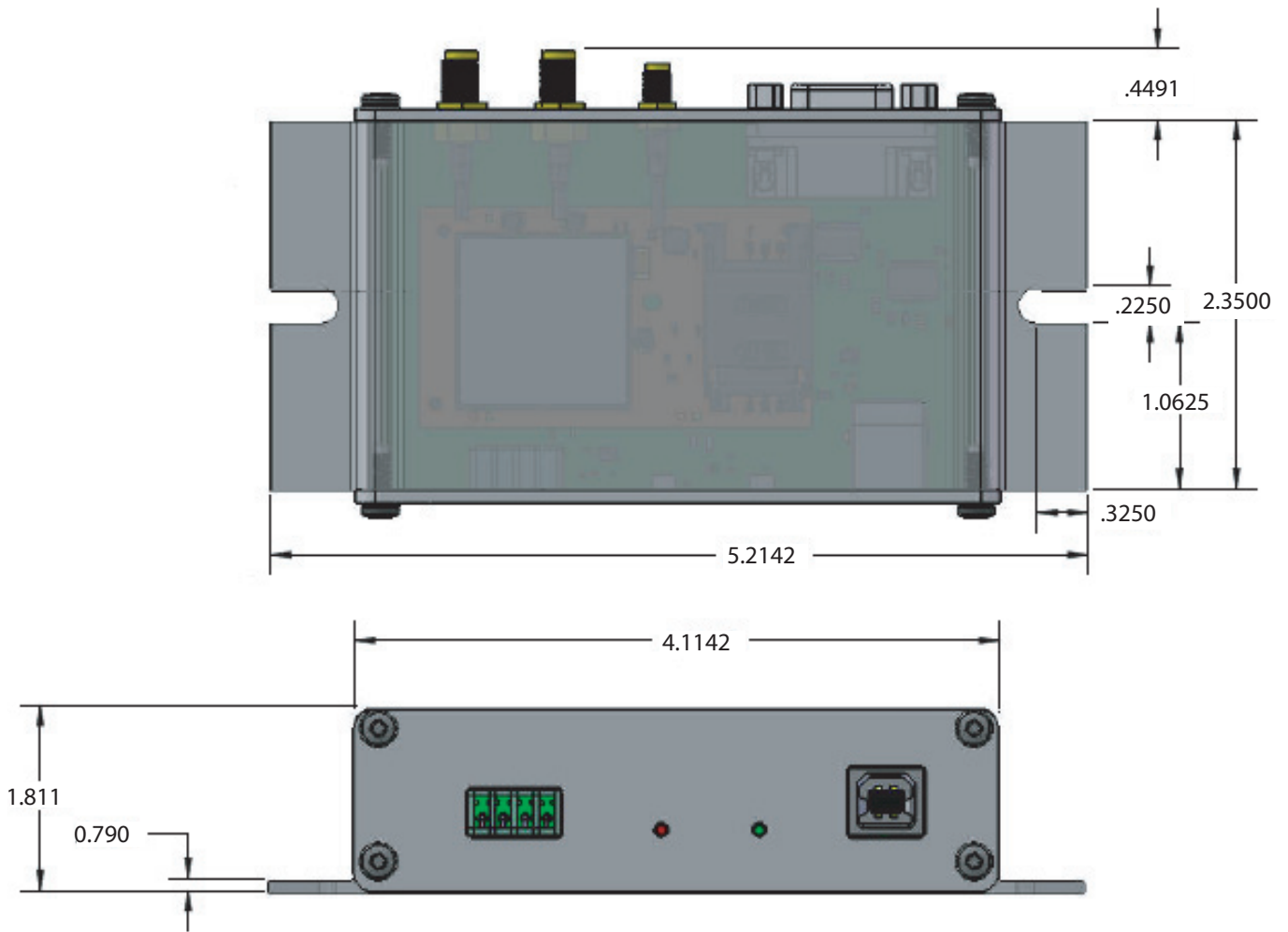
Parameter	Description
LTE910T3 – AT&T	
Frequency Range	Depending on frequency bands provided by the network operator, the customer should use the most suitable antenna for those frequencies.
Bandwidth	GSM850: 70Mhz GSM1900 (PCS): 140Mhz WCDMA 1900 (B2): 140Mhz WCDMA 850 (B5): 70Mhz LTE 1900 (B2): 140Mhz LTE 1700 (B4): 445Mhz LTE 850 (B5): 70Mhz LTE 700 (B17): 42Mhz
Gain	Gain < 3dBi
Impedance	50Ω
Input Power	>33 dBm (2W) peak power in GSM >24 dBm Average power in WCDMA & LTE
VSWR Absolute Max	≤ 10:1
VSWR Recommended	≤ 2:1

LTE910T3 – Verizon	
Frequency Range	Depending on frequency bands provided by the network operator, the customer should use the most suitable antenna for those frequencies.
Bandwidth	LTE 1700 (B4): 445Mhz LTE 700 (B13): 41Mhz
Gain	Gain < 3dBi
Impedance	50Ω
Input Power	>24 dBm Average power
VSWR Absolute Max	≤ 10:1
VSWR Recommended	≤ 2:1

GPS Antenna Specifications:

Parameter	Description
GPS Enabled Units	
Input Voltage Range	2.85V
Frequency Range	1575.42± 2 MHz
Gain	=< 15dB overall at the connector (Antenna and LNA included)
Impedance	50Ω
VSWR	TBD
Current Consumption	30mA Max, 20mA Typ

Mechanical Specifications:



All measurements in inches unless otherwise noted.

Getting started with the T3

This will take you through the basic steps required to power the Terminus T3 and communicate with the modem.

Please confirm that you have these items before continuing. If you are evaluating the GSM or HSPA based T3 ensure that you have an active SIM card. If evaluating the CDMA or EVDO based T3 you will not have a SIM card, but will need an account attached to your device's MEID which can be found on the bottom of the T3. You can evaluate the basic functions without these steps, but in order to fully evaluate cellular connectivity it is required.

- Power Supply with the terminal block mating connection
- RS232 DB9 ended cable or USB B to A cable
- SMA Cellular Antenna

Starting a Terminal Session

Step 1

- Attach the cellular antenna to the SMA bulkhead connector.
- If applicable, insert the SIM card to the modem's SIM holder.
- Connect the RS232 cable or USB cable to the DB9 or USB connection, respectively.

Step 2

Apply power to the T3 via the terminal blocks. The T3 will begin booting the modem, and you will see the amber LED illuminate. In a few moments the green LED should illuminate, indicating the modem is ready to accept commands.

Step 3 – Using RS232

Open HyperTerminal or an equivalent terminal emulator and start a new session. Use the following settings as they are the default for T3 communications.

Bits per second: 115200
Data Bits: 8
Parity: None
Stop Bits: 1
Flow control: Hardware

Step 3 – Using USB

If this is the first time using this modem type on your PC, you should see several virtual COM ports appear in the device manager. You will want to download the USB drivers for your modem type, which can be found on the Janus-RC website.

Once the drivers are installed and the ports are available, you can open a terminal session with the following settings as they are the default for T3 communications.

Bits per second: 115200
Data Bits: 8
Parity: None
Stop Bits: 1
Flow control: None

Getting started with the T3 continued

Starting a Terminal Session continued

Step 4

Click on the “Call” button in HyperTerminal to make the connection. In the window you should now be able to send AT commands. To make sure you have a proper connection, type “AT” into the window (without quotes), and press Enter. You should receive a response of “OK”.

If you do not receive that response, go back and check to make sure you’ve selected the correct COM port, as well as the settings.

Step 5

The next thing is to set the modem for proper operation and wait for registration. Although the modems are factory set by default to work in a wide range, ensuring these are set is still a good idea.

GSM and HSPA

For T-Mobile & MVNO

- AT#SELINT=2 – This makes use of the most recent AT command set
- AT#ENS=1 – Ensures some automatic settings used

CDMA and EVDO

These units require some extra steps that are thoroughly detailed in our Provisioning App Note found here: http://www.janus-rc.com/Documentation/JA01-AN111_Provisioning-CDMA.pdf

Step 6

Check the network status by entering “AT+CREG?” without the quotations and press ENTER.

The response will be +CREG: 0,1 or +CREG: 0,5 meaning the device is registered to the home network or roaming, respectively. If the response is different than this please refer to the AT Command guide as well as verify the account is active.

Step 7

Check the signal quality by entering “AT+CSQ” without the quotations and press ENTER.

The response will be +CSQ: <rsqi>,<ber>

<rsqi> Signal Strength

99 Not known or detectable

0-31 dBm = (rsqi*2) – 113

Example: A result of 31 indicates -51dBm or greater.

An rssi value of ≥ 10 in typical applications is fine and you will usually see about 12-20 in normal to good signal, but note that worst case it can be lower but still register and perform normal functions.

Sending an SMS

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

- Set the SMS mode to text. This must be entered every power cycle.
AT+CMGF=1<cr>
- To enter the receiving subscriber unit phone number and message enter:
AT+CMGS=”8885551234”
Wait for response”>” then enter message text
Enter “ctrl z” <cr> to end the message

Getting started with the T3 continued

Making a GPRS data call (socket dial)

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

- 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.
- Activate the PDP context
Enter `AT#SGACT=1,1,"v", "p"`
Where v is your user ID and p is your password.
If there are none required for your account you can leave them blank.
- Open the socket connection
Enter `AT#SD=1,0,IPP,IPA,0,0,0`
Look for response "CONNECT". This opens a remote connection via socket
IPP = the remote host port of the server you are trying to connect to. (0 to 65535)
IPA = the IP address of the server you are trying to connect to 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.
- To exit the data session and return to command mode, send the characters"+++" and wait for the OK response
- Enter `AT#SH=1` to close the socket

GPS

HSPA910T3

The data can be acquired in two methods.

Method 1:

- Send command `AT$GPSP=1<cr>`
- Send command `AT$GPSACP<cr>`

`$GPSACP` can retrieve GPS data at any point when `$GPSP=1`

Method 2:

- Configure Unsolicited NMEA Data:
- Send command to enable NMEA stream
`AT$GPSNMUN=<enable><gga><gll><gsa><gsv><rmc><vtg><cr>`
Select parameter "1" to enable or "0" to disable for your NMEA stream requirements
EXAMPLE: `AT$GPSNMUN=1,1,1,1,1,1,1`
- Start NMEA Stream:
Send command `AT$GPSP=1<cr>`
- End NMEA Stream:
Send command `AT$GPSP=0<cr>`

Getting started with the T3 continued GPS continued

EVDO910T3

The data can be acquired in two methods.

Method 1:

- Send command AT\$GPSP=1<cr>
- Send command AT\$GPSACP<cr>

\$GPSACP can retrieve GPS data at any point when \$GPSP=1

Method 2:

- Configure Unsolicited NMEA Data:
- Send command to enable NMEA stream
AT\$GPSNMUN=<enable><gga><gll><gsa><gsv><rmc><vtg><cr>
Select parameter "3" to enable or "0" to disable for your NMEA stream requirements
EXAMPLE: AT\$GPSNMUN=3,1,1,1,1,1,1
- Start NMEA Stream:
Send command AT\$GPSP=1<cr>
- End NMEA Stream:
Send command AT\$GPSP=0<cr>

Terminus T3 Products User Manual



Terminus Models & Ordering

Ordering	Description
HSPA910T3 v1.00	HSPA+/UMTS/EDGE/GPRS/GSM (AT&T Certified)
EVDO910T3 v3.00	EV-DO (Verizon)
CDMA910T3 v2.00	CDMA-1xRTT (Sprint)
CDMA910T3 v3.00	CDMA-1xRTT (Verizon)
CDMA910T3 v4.00	CDMA-1xRTT (Aeris)
LTE910T3 v1.00	LTE (AT&T)
LTE910T3 v2.00	LTE (Sprint)
LTE910T3 v3.00	LTE (Verizon)

Revision History

Revision	Revision Date	Note
A00	07/01/15	Advanced Release - User Manual
A01	07/23/15	Terminal Block update and Mechanical Dimensions update
00	05/25/17	Update from Advanced to Release and Overall edits/updates

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