T3 Cellular Terminal
User Manual

JANUS REMOTE COMMUNICATIONS

TABLE OF CONTENTS

DISCLAIMER

T3 Description

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

Powered by Janus Common Footprint devices, the T3 contains all circuitry required to give your application access to cellular networks data communication technology. It can receive power from a 5v source, contains two communication interfaces, and has an easy to use input to control ON/OFF remotely.

T3 Connections
Terminals

A four position 3.5 mm terminal block receptacle (On Shore Technology OSTOQ 041251) serves as the power supply input. It is also the access point for the external power disable input.

Pin	Description	Panel Label
1	External Disable	EN
2	Ground	GND
3	Ground	GND
4	5V Supply	5V

Part numbers for compatible terminal block plug: On Shore Technology OSTTJ 0411530
Wurth 691361100004

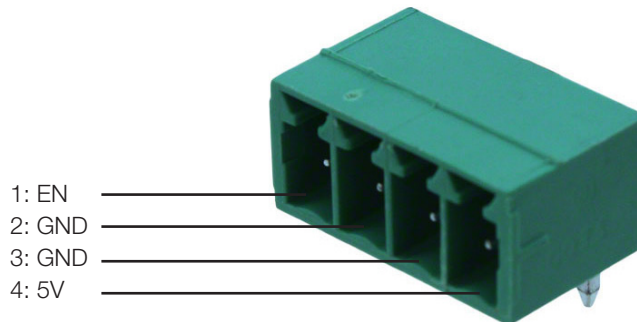1: EN
2: GND
3: GND
4: 5V

Figure 1: T3 Terminal Block Diagram

External Disable (EN pin 1)
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.

SERIAL DB9

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.

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

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

Modems in all LTE910T3s and legacy HSPA910T3s require a SIM card.

The SIM card holder is located inside the T3, on the common footprint modem device board.

To insert a SIM card, please follow these instructions.

Step 1.   To access the SIM card holder, remove the panel of the T3 that includes the SERIAL DB9 connector and RF connections. Four TX-10 screws hold this panel in place.

Step 2.   Slide out the panel which will include the T3 board.

Step 3.   Locate the SIM card holder on top of the common footprint modem board.

Step 4.   Slide the top of the SIM card holder back to unlock, insert the SIM card and close. The black plastic 'mini' (2FF) SIM card holders require the SIM to be inserted into the door, then swung down and latched. The metal 'micro' (3FF) require the SIM card to be placed flat into the holder and the door swings down to cover it and is latched into 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 T3. Plug-In User Manual can be downloaded at http://www.janus-rc.com/terminuscf.html*

Typical Operating Conditions:

The following table indicates additional power requirements for the modem that is incorporated into the T3. Operating the STATUS LED and connecting UART and/or USB communications can add to the power required by the supported modem. See the User Manual for the specific modem model for typical operating currents in addition to those listed below.

T3 Additional Power Requirements

Operating Mode	Typical	Units	Note
Status LED	3	mA	1
UART	14	mA	
USB	7 to 15	mA	2

Note:
1. *Status LED is enabled by default.*
2. *Current required for supporting USB operation varies with modem model.*

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

JANUS REMOTE COMMUNICATIONS

Mechanical Specifications:

0.435

0.230

2.35

1.06

0.325

5.21

4.11

1.18

0.079
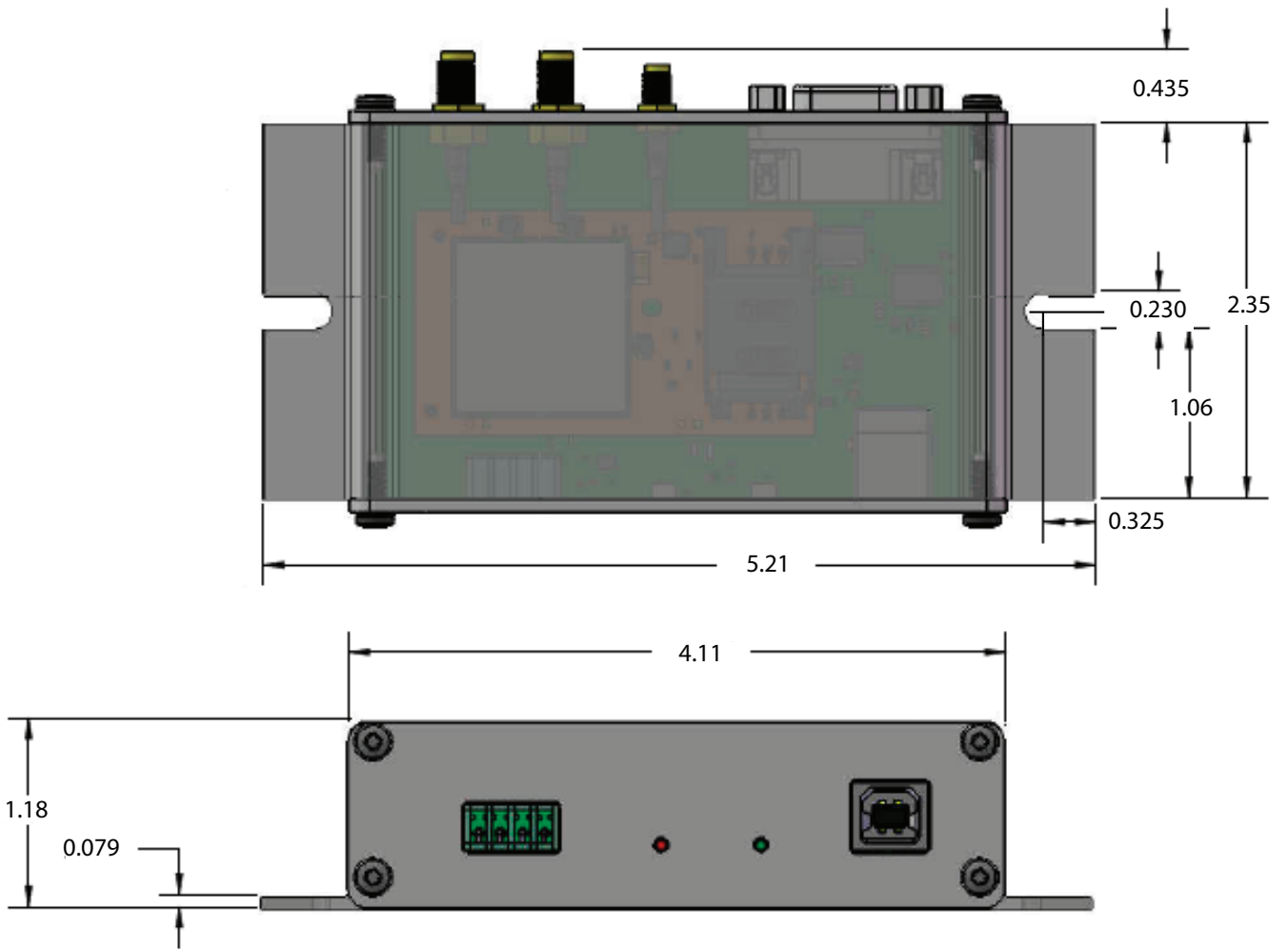
All measurements in inches unless otherwise noted.

JANUS REMOTE
COMMUNICATIONS

Getting started with the T3

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

Please confirm that you have these items before continuing.

- SIM card installed in the internal modem board.
- Power Supply with the terminal block mating connection.
- RS232 DB9 ended cable or USB B to A cable.
- Host computer running a terminal emulator (e.g. Putty, Teraterm, Minicom)
- SMA cellular antennas and GPS/GNSS antenna (optional).

Starting a Terminal Session

Step 1
- Insure that a SIM card has been placed in the modem's SIM holder. See the modem's User Manual for those models that support dual SIM card holder's.
- Attach the cellular antennas to the SMA bulkhead connectors.
- Connect a host device using an RS232 cable to the DB9 SERIAL connector or a USB cable to the USB connector.

Step 2
Apply power to the T3 via the terminal block connector. The T3 will start the modem, and you will see the amber CELLULAR LED illuminate. In a few moments the green STATUS LED should illuminate, indicating the modem is ready to accept commands.

Step 3 – Using RS232
Open a terminal emulator application and connect using the following default communication parameters:

Baud: 115200 bps

Data Bits: 8

Parity: None

Stop Bits: 1

Flow control: Hardware

Step 3 – Using USB
The USB connection requires drivers that support multiple port instantiations. USB driver files and instructions can be found at the Telit website: www.telit.com/evkevb-drivers/

When the drivers are installed you can open an AT command terminal session to one of the instantiated modem ports.

Step 4
Once connected to the modem you should be able to send AT commands. To make sure you have a proper connection, type "AT" into the terminal (without quotes), and press Enter. You should receive a response of "OK".

Step 5
Insure that the proper carrier firmware and APN are set. See the specific modem User Manual for details.

- Modems generally support multiple firmware loads depending on the carrier, e.g. AT&T centric or Verizon.
- Default APN's are usually set, but if using another carrier, an MVNO, or a specilised account (e.g. static IP) you would need to change the APN.

Step 6

Network registration on 4G (LTE) networks can be checked by issuing the AT command:

```
AT+CEREG?
```

Modems may also support 2G or 3G fallback; registration on these networks can be checked by issuing the AT command:

```
AT+CREG?
```

A response of `+CREG: 0,1` or `+CREG: 0,5` indicates the device is registered on 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 on the SIM card is active.

Step 7

Check the signal quality by entering AT command:

```
AT+CSQ
```

The response will be `+CSQ: <rssi>,<ber>` where `<rssi>` indicates signal strength.

An `<rssi>` value of >=10 in typical applications is acceptable 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 (Short Message Service) mode allows you to send a text message to an SMS capable subscriber unit.

- Set the SMS mode to text by entering the AT command:

```
AT+CMGF=1
```

This must be entered every power cycle.

- Enter the receiving subscriber unit phone number and message enter the AT command:

```
AT+CMGS=<da>
```

where <da> is the destination address (phone number) of the SMS message recipient in a quoted string.

Example:

```
AT+CMGS="8885551234"
```

- Wait for response ">" then enter the message text. Carriage returns (the 'Enter' key) will be embedded in the message text.

Enter a <Ctrl-z> character to end the message text and send the SMS message.

Data connections can be made using an external host using a protocol such as PPP, NCM, MBIM or QMI. These implementations are beyond the scope of this document.

You can also send and receive data using AT commands that utilize the modem's internal TCP/IP stack.

A summary of this procedure is below.

- In all cases, the proper APN must be set. To set a new APN use the AT command:

  `AT+CGDCONT=<cid>, "IPV4V6",<apn>`

  where

  `<cid>` is the context ID, generally 1 for all but Verizon which uses 3.

  `<apn>` is the APN string (quoted).

- After registering on a network you activate the context using the AT command

  `AT#SGACT=<cid>,1`

  again where

  `<cid>` is the context ID

  The modem will return IP addresse(s) assigned by the carrier.

- Open a socket connection using the AT command:

  `AT#SD=1,0,<rPort>,<IPaddr>`

  where

  `<rPort>` is the destination port

  `<IPaddr>` is a string (quoted) with a dotted IP address or a host name to be resolved via DNS.

- At this point a data session is active and data can be sent to the remote device and visa versa.
- To exit the data session and return to command mode, send the escape character sequence "+++" and wait for the OK response.
- Enter the command:

  `AT#SH=1`

  to close the socket.

GPS

On modems that support GPS/GNSS, location data can be returned to the AT command port.

- Send command:

  `AT$GPSP=1`

  to power the GPS receiver. This will also apply bias to the GPS antenna.

GPS data can be accessed by two methods.

- Send command

  `AT$GPSACP`

  This will report GPS time, location, and a few other parameters.

- Send a command to enable a NMEA message stream. As an example, send the command:

  `AT$GPSNMUN=1,1,1,1,1,1,1`

  to enable a number of NMEA messages to stream to the AT command port.

  You can terminate the NMEA stram by entering:

  `AT$GPSNMUN=0`

  at any time.

There are many options available, please see the AT Command Guide for the module used on the modem for more details.

T3 Cellular Terminal User Manual

T3 Models & Ordering

Ordering	Description
LTE910T3 v15.00	(Cat.1 AT&T / Verizon)
LTE910T3 v20.00	(Cat.M1 AT&T / Verizon / Worldwide)

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
01	12/22/20	Update Available T3 Models, Getting Started and Ordering Information
02	12/12/23	Updated Mechanical Dimensions