MULTITECH®

DeviceHQ™

MultiConnect® rCell 100

MTR-LTE Hardware Guide

MultiConnect rCell 100 Series Router Hardware Guide

Product: MTR-LTE Models: MTR-LAT1-B07, MTR-LAT1-B08, MTR-LVW2-B07, MTR-LVW2-B08, MTR-LEU1-B07, MTR-LEU1-B08

Part Number: S000626 Version: 5.0

Copyright

Legal Notices

The MultiTech products are not designed, manufactured or intended for use, and should not be used, or sold or re-sold for use, in connection with applications requiring fail-safe performance or in applications where the failure of the products would reasonably be expected to result in personal injury or death, significant property damage, or serious physical or environmental damage. Examples of such use include life support machines or other life preserving medical devices or systems, air traffic control or aircraft navigation or communications systems, control equipment for nuclear facilities, or missile, nuclear, biological or chemical weapons or other military applications ("Restricted Applications"). Use of the products in such Restricted Applications is at the user's sole risk and liability.

MULTITECH DOES NOT WARRANT THAT THE TRANSMISSION OF DATA BY A PRODUCT OVER A CELLULAR COMMUNICATIONS NETWORK WILL BE UNINTERRUPTED, TIMELY, SECURE OR ERROR FREE, NOR DOES MULTITECH WARRANT ANY CONNECTION OR ACCESSIBILITY TO ANY CELLULAR COMMUNICATIONS NETWORK. MULTITECH WILL HAVE NO LIABILITY FOR ANY LOSSES, DAMAGES, OBLIGATIONS, PENALTIES, DEFICIENCIES, LIABILITIES, COSTS OR EXPENSES (INCLUDING WITHOUT LIMITATION REASONABLE ATTORNEYS FEES) RELATED TO TEMPORARY INABILITY TO ACCESS A CELLULAR COMMUNICATIONS NETWORK USING THE PRODUCTS.

Trademarks and Registered Trademarks

MultiTech, the MultiTech logo, DeviceHQ, xDot, and MultiConnect and Conduit are registered trademarks and mPower mCard and mDot are trademarks of Multi-Tech Systems, Inc. All other products and technologies are the trademarks or registered trademarks of their respective holders.

Contacting MultiTech

Knowledge Base

The Knowledge Base provides immediate access to support information and resolutions for all MultiTech products. Visit http://www.multitech.com/kb.go.

Support Portal

To create an account and submit a support case directly to our technical support team, visit: https://support.multitech.com.

Support

Business Hours: M-F, 8am to 5pm CT

Country	By Email	By Phone
Europe, Middle East, Africa:	support@multitech.co.uk	+(44) 118 959 7774
U.S., Canada, all others:	support@multitech.com	(800) 972-2439 or (763) 717-5863

Warranty

To read the warranty statement for your product, visit www.multitech.com/warranty.go. For other warranty options, visit www.multitech.com/es.go.

World Headquarters

Multi-Tech Systems, Inc.

2205 Woodale Drive, Mounds View, MN 55112

Phone: (800) 328-9717 or (763) 785-3500

Fax (763) 785-9874

Contents

Chapter 1 – Product Overview

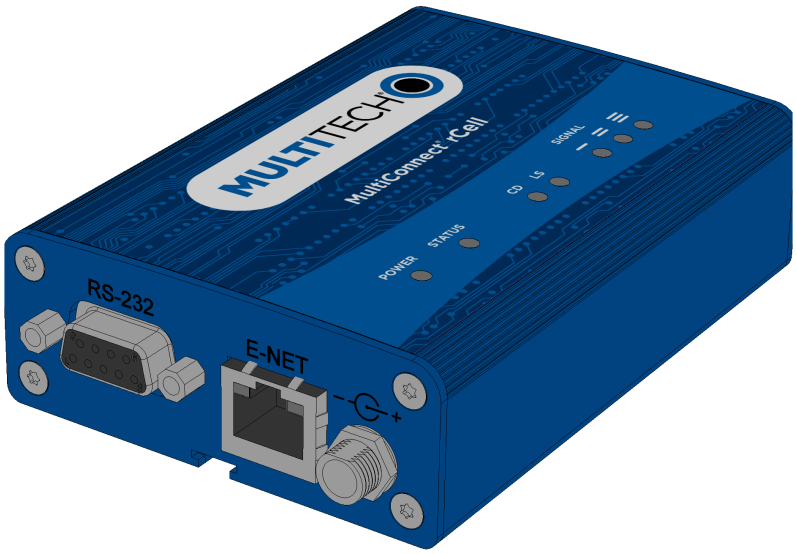
About MultiConnect rCell 100 Series Router

This guide describes the MultiConnect rCell 100 Series Router. Use the rCell family of devices to provide secure data communication between many types of devices that use legacy and the latest communication technologies. Refer to the software guide listed under **Documentation** for information on the device user interface.

Some device models support:

- GPS capability

The device has an integrated cellular modem and includes 10/100 BaseT Ethernet and RS-232 serial connectivity. An image of the device follows:



Intended use: *office/home/light industrial*

Documentation

The following documentation is available at http://www.multitech.com/brands/multiconnect-rcell-100-series.

Document	Description	Part Number
Hardware Guide	This document provides overview, safety and regulatory information, design considerations, schematics, and general hardware information.	S000626
Software Guide	This document provides instructions and information on how to properly configure your device through its user interface.	S000720
API Developer Guide	You can use the rCell API to manage configurations, poll statistics, and issue commands. Documentation is available on the MultiTech Developer Resources website at: www.multitech.net/developer/software/mtr-software/mtr-api-reference/.	N/A

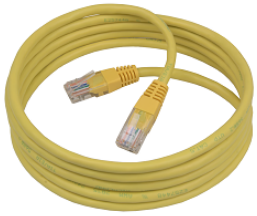
Document	Description	Part Number
Getting Started with AT Commands for LEU1 Devices	AT Command release notes and basic operations for LEU1 and LEU1-U Devices.	S000615
Getting Started with AT Commands for LAT1 Devices	AT Command release notes and basic operations for LAT1 and LAT1-U Devices.	S000617
Getting Started with AT Commands for LVW2 Devices	AT Command release notes and basic operations for LVW2 and LVW2-U Devices.	S000618
Telit LE910 AT Commands Reference Guide	Lists AT Commands and parameters used to configure your device. (Applies to LAT1 and LEU1 devices, not LVW2)	80421ST10585A Rev 3
Telit LE910 AT Commands Reference Guide	Lists AT Commands and parameters used to configure your device. (Applies to LVW2, not LAT1 or LEU1.)	80407ST10116a Rev 12

Product Build Options

Product	Description	Carrier/Region
MTR-LAT1-B07	LTE router - cellular data only	AT&T/North America
MTR-LAT1-B08	LTE router - cellular data and GPS	AT&T/North America
MTR-LVW2-B07	LTE router - cellular data only	Verizon/North America
MTR-LVW2-B08	LTE router - cellular data and GPS	Verizon/North America
MTR-LEU1-B07	LTE router - cellular data only (RED compliant)	Europe/Australia
MTR-LEU1-B08	LTE router - cellular data and GPS	Europe/Australia

Package Contents

Your MTR-LTE package includes the following:

Contents	Description
	1 - Power Supply with Removable Blades
	1 - Ethernet Cable RJ45 6-ft.
	2 - Cellular Antennas
	1 - GPS Antenna (B08 models only)
Customer Notices	Legal and Support Information
	Extended Services
 	1 - Mounting Tab and Bracket
	4 - Rubber Feet

Note: The above information does not apply to the Router Only option.

Descriptions of LEDs

The top panel contains the following LEDs:

- Power and Status LEDs—The Power LED indicates that DC power is present and the Status LED blinks when the unit is functioning normally.
- Modem LEDs—Two modem LEDs indicate carrier detection and link status.
- Signal LEDs—Three signal LEDs display the signal strength level of the wireless connection.
- Ethernet LEDs—These LEDs are not on the top panel. See the section Ethernet LED Descriptions for descriptions of these LEDs.

LED Indicators	
POWER	Indicates presence of DC power when lit.
STATUS	The LED is a solid light when the device is booting up, saving the configuration, restarting, or updating the firmware. When the Status LED begins to blink, the router is ready for use.
CD	Carrier Detect. When lit, indicates data connection has been established.
LS	Link Status (older versions of LAT1 and LEU1 may behave differently) Continuously Lit — Not registered Slow Blink (-0.2Hz) — Registered or connected
SIGNAL	Signal strength for cellular (RSSI range: 0 - 31) ALL OFF — Unit is off, not registered on network, or extremely weak signal (0 <= RSSI < 6). 1 Bar “ON” — Very weak signal (7 <= RSSI <14). 1 Bar and 2 Bar “ON” — Weak signal (15 <= RSSI <23). 1 Bar, 2 Bar, and 3 Bar “ON” — Good signal (24 <= RSSI >= 31).

Ethernet LED Descriptions

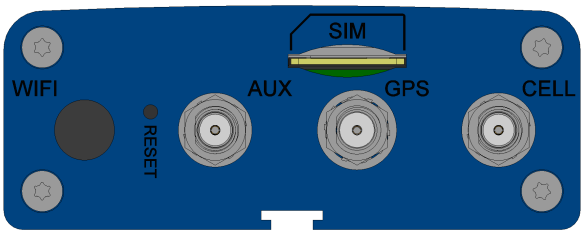
Two Ethernet LEDs are physically on the RJ-45 connector(s). The table that follows describes these LEDs.

Ethernet Link	Right LED on Ethernet connector. Blinks when there is transmit and receive activity on the Ethernet link. It shows a steady light when there is a valid Ethernet connection.
Ethernet Speed	Left LED on Ethernet connector. Lit when the Ethernet is linked at 100 Mbps. If it is not lit, the Ethernet is linked at 10 Mbps.

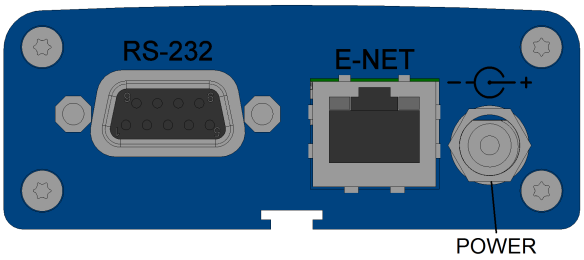
Side Panel Connectors

The device has connectors on both sides of the housing. The right side of the device contains a SIM card holder, a reset button, a GPS antenna connector, and a cellular-auxiliary antenna connector pair. Depending on the model of your device, the GPS antenna connector may or may not be present.

The following shows the right side panel of the device:



The following shows the left side panel of the device. It includes an RS-232 connector, an Ethernet connector, and the power receptacle.

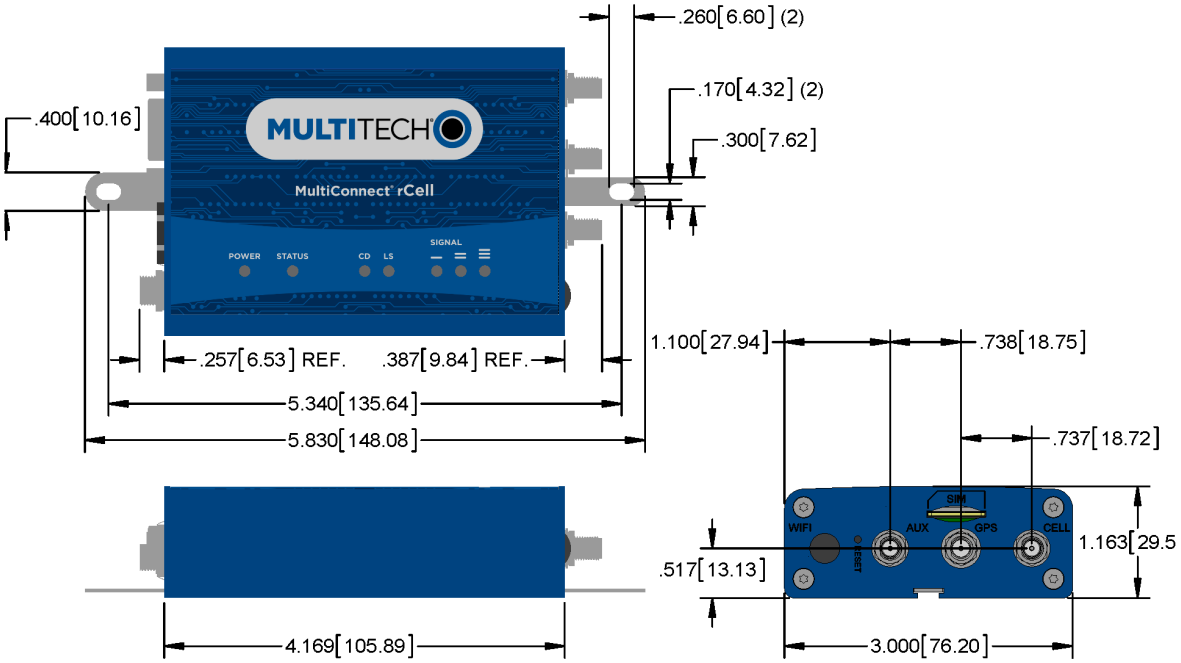


The following table describes the items on the two side panels:

Label	Description
CELL, AUX	Cellular antenna inputs. Use with the 2 Laird LTE DBA6927C1-FSMAM antennas or (for the LEU1 only) with the 2 Wieson Technologies LTE GY115HT467-017 supplied with the device if ordered as a bundle. ■ CELL - Primary. AUX - Diversity.
GPS	GPS antenna input. Use with the Trimble GPS antenna 66800-52 supplied with the device when ordered as a bundle. Used only on the B08 models.
SIM	Receptacle for a SIM card (Subscriber Identity Module).
RESET	Resets the device. Refer to **Resetting the Device** or **Resetting User Defined Settings to the Device**.
RS-232	DE 9-pin, female-D Sub through-hole connector.
E-NET	RJ-45 receptacle for standard Ethernet 10/100 Base-T (RJ-45 connecter has two Ethernet LEDs).
Power 	7-32 VDC power receptacle for provided power cord. The device uses a minimum 7V 1.0A power supply.

Chapter 2 – LTE Specifications

Dimensions



DIMENSIONS IN In [mm]

Specifications

Category	MTR-LAT1 (North America AT&T, T-Mobile)	MTR-LVW2 (North America Verizon)	MTR-LEU1 (EU Carriers)
General			
Performance	LTE Cat. 3GPP Release 9		
Frequency Bands (MHz)	4G LTE: 700 (B17) / 850 (B5) / AWS1700 (B4) /1900 (B2)	4G LTE: Single-mode: 700 (B13) / AWS1700 (B4)	See the following Frequency Bands table for details.
	3G UMTS | HSPA+:850 (B5) / 1900(B2)		
	2G: GSM | GPRS | EDGE: 850/1900		
Cellular radio module	Telit LE910-NAG	Telit LE910-SVG	Telit LE910-EUG
GPS radio module	SKYTRAQ Venus638LP (for B08 models only)		

Category	MTR-LAT1 (North America AT&T, T-Mobile)	MTR-LVW2 (North America Verizon)	MTR-LEU1 (EU Carriers)
Cellular packet data	Up to 100 Mbps downlink (Theoretical maximum - actual performance may be affected by multiple environmental factors.)		
	Up to 50 Mbps uplink (See above note.)		
Diversity/MIMO	Rx Diversity and MIMO DL 2x2		
SMS	Point-to-Point messaging, Mobile terminated SMS, Mobile originated SMS		
Connectors			
Cellular	Female SMA connector		
GPS	Female SMA connector		
SIM Holder	Mini-SIM standard 1.8 V and 3 V	Mini-SIM standard 1.8 V and 3 V	Mini-SIM standard 1.8 V and 3 V
eNet (LAN)	RJ-45, 10/100 Base T		
GPS	Female SMA connector		
RS-232	DCE 9-pin, female connector		
Power	25 mm miniature locking power jack (screw on)		
Power Requirements[1]			
Voltage	7 V to 32 V DC		
Physical Description			
Dimensions	4.17” x 3.0” x 1.15” (10.6cm x 7.6cm x 2.9cm)		
Weight	0.51 lbs (0.231 Kg)		
Chassis type	Aluminum		
Environment			
Operating Temperature[2]	-40° C to +60° C		
Storage Temperature[2]	-40° C to +85° C		
Humidity	Relative humidity 15% to 93% non-condensing		
Certifications, Compliance, Warranty			
Regulatory	FCC Class B (U.S.), IC (Canada)	FCC Class B (U.S.)	CE Mark, RED (EU)
Safety	UL60950-1, UL 201, cUL60950-1	UL60950-1, UL 201	IEC60950-1(EU)
Network	PTCRB, AT&T, T-Mobile	Verizon (pending)	Telstra, EU carriers
Quality	Designed and built-in ISO 9001/13485 facilities		
	MIL-STD-810: High Temp, Low Temp, Cold Dwell, Random, and Sine vibration		
	SAE J1455: Random and Sine vibration		

[1]Optional power supply must be a Listed ITE power supply marked LPS or Class 2 rated 1.0 A minimum. Certification does not apply or extend to voltages outside certified range, and has not been evaluated by UL for operating voltages beyond tested range.

[2]For information regarding extended range, please contact MultiTech.

Installation in outdoor locations has not been evaluated by UL. UL Certification does not apply or extend to outdoor applications.

Note: Radio performance may be affected at the temperature extremes. This is considered normal. There is no single cause for this function. Rather, it is the result of an interaction of several factors, such as the ambient temperature, the operating mode, and the transmit power.

Frequency Bands (LEU1)

Mode	Freq. TX (MHz)	Freq. RX (MHz)	Channels	TX - RX offset
EGSM900	890 - 915	935 - 960	0 - 124	45 MHz
	880 - 890	925 - 935	975 - 1023	45 MHz
DCS1800	1710 - 1785	1805 - 1880	512 - 885	95MHz
WCDMA850 (band V)	824 - 849	869 - 894	Tx: 4132 - 4233 Rx: 4357 - 4458	45MHz
WCDMA900 (band VIII)	880 - 915	925 - 960	Tx: 2712 - 2863 Rx: 2937 - 3088	45MHz
WCDMA2100 (band I)	1920 - 1980	2110 - 2170	Tx: 9612 - 9888 Rx: 10562 - 10838	190MHz
LTE800 (band XX)	832 - 862	791 - 821	Tx: 24150 - 24449 Rx: 6150 - 6449	-41MHz
LTE1800 (band III)	1710 - 1785	1805 - 1880	Tx: 19200 - 19949 Rx: 1200 - 1949	95MHz
LTE2600 (band VII)	2500 - 2570	2620 - 2690	Tx: 20750 - 21449 Rx: 2750 - 3449	120MHz

LE910 Telit Transmission Output Power

Band	Power Class
GSM 850/900 MHz	4 (2W)
DCS 1800, PCS 1900 MHz	1 (1W)
EDGE, 850/900 MHz	E2 (0.5W)
EDGE, 1800/1900 MHz	Class E2 (0.4W)
WCDMA/FDD 800/850/900, 1900/2100 MHz	Class 3 (0.25W)
LTE FDD 700/800/850/900, 1800/1900/2100/2600 MHz	Class 3 (0.2W)

Power Draw

MTR-LAT1-B08 Power Draw

Radio Protocol	Sleep Mode Current (If Applicable) (Amps)	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	TX Pulse (Avg) Amplitude Current (Amps)) for GSM850 or Peak Current for HSDPA/LTE	Total Inrush Charge Measured in Millicoulombs (mC)
9.0 Volts					
GSM 850Mhz	NA	0.185	0.329	0.900	1.53
LTE	NA	0.193	0.488	NA	1.53
20.0 Volts					
GSM 850Mhz	NA	0.094	0.160	0.455	.721
LTE	NA	0.100	0.232	NA	.721
32.0 Volts					
GSM 850Mhz	NA	0.062	0.103	0.370	1.91
LTE	NA	0.065	0.154	NA	1.91

MTR-LEU1-B08 Power Draw

Radio Protocol	Sleep Mode Current (If Applicable) (Amps)	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	TX Pulse (Avg) Amplitude Current (Amps)) for GSM850 or Peak Current for HSDPA/LTE	Total Inrush Charge Measured in Millicoulombs (mC)
9.0 Volts					
EGSM 900Mhz	NA	0.185	0.305	1.05	0.118
LTE	NA	0.181	0.487	0.580	0.118

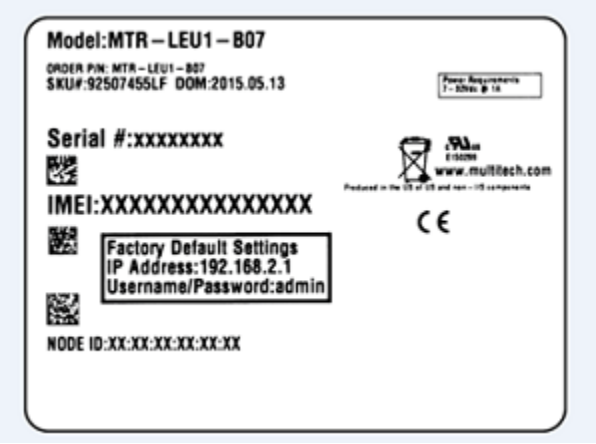
Radio Protocol	Sleep Mode Current (If Applicable) (Amps)	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	TX Pulse (Avg) Amplitude Current (Amps)) for GSM850 or Peak Current for HSDPA/LTE	Total Inrush Charge Measured in Millicoulombs (mC)
20.0 Volts					
EGSM 900Mhz	NA	0.095	0.149	0.505	0.106
LTE	NA	0.101	0.236	0.316	0.106
32.0 Volts					
EGSM 900Mhz	NA	0.063	0.097	0.300	0.281
LTE	NA	0.069	0.153	0.228	0.281

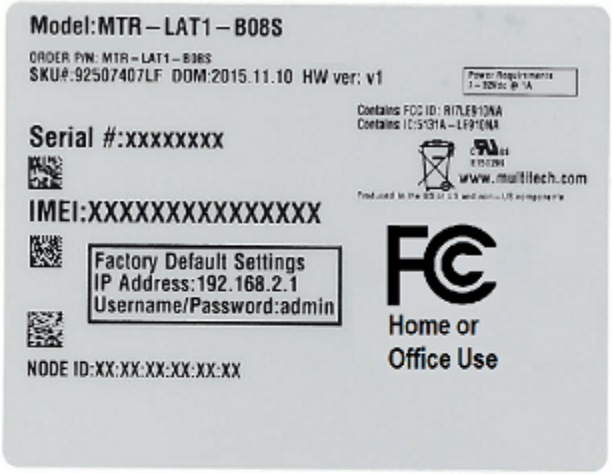
MTR-LVW2-B08 Power Draw

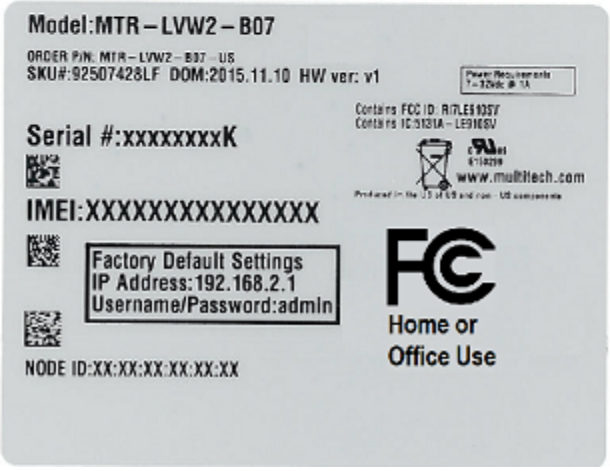
Radio Protocol	Sleep Mode Current (If Applicable) (Amps)	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	TX Pulse (Avg) Amplitude Current (Amps)) for GSM850 or Peak Current for HSDPA/LTE	Total Inrush Charge Measured in Millicoulombs (mC)
9.0 Volts					
LTE	NA	0.174	0.442	0.528	0.856
20.0 Volts					
LTE	NA	0.094	0.214	0.288	0.860
32.0 Volts					
LTE	NA	0.062	0.138	0.204	2.74

Regulatory Information Labels

The images that follow show where you can find regulatory information for your device.



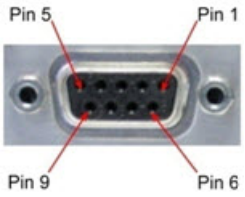




RF Specifications LTE

Device	Supported RF Technologies
MTR-LAT1	GSM/GPRS/Edge 850, GSM/GPRS/Edge 1900, UMTS/HSPA+ 850, UMTS/HSPA+ 1900, LTE 700, LTE 850, LTE 1700, LTE 1900
MTR-LEU1	GSM/GPRS/Edge 900, GSM/GPRS/Edge 1800, UMTS/HSPA+ 850, UMTS/HSPA+ 900, UMTS/HSPA+ 2100, LTE 800, LTE 1800, LTE 2600
MTR-LVW2	LTE 700, LTE 1700

RS-232 9-Pin Female Connector



Pin	Abbreviation	Description	In/Out
1	CD	Carrier Detect	O
2	RX	Receive	O
3	TX	Transmit	I
4	DTR	Data Terminal Ready	I
5	GND	Ground	--
6	DSR	Data Set Ready	O
7	RTS	Request to Send	I
8	CTS	Clear to Send	O
9	RI	Ring Indicator	O

Chapter 3 – Safety Warnings

Lithium Battery

- A lithium battery (3V, coin cell, CR1632) located within the product provides backup power for the timekeeping. This battery has an estimated life expectancy of ten years.
- When this battery starts to weaken, the date and time may be incorrect.
- Battery is not user replaceable. If the battery fails, the device must be sent back to MultiTech Systems for battery replacement.
- Lithium cells and batteries are subject to the Provisions for International Transportation. Multi-Tech Systems, Inc. confirms that the Lithium batteries used in the MultiTech product(s) referenced in this manual comply with Special Provision 188 of the UN Model Regulations, Special Provision A45 of the ICAO-TI/IATA-DGR (Air), Special Provision 310 of the IMDG Code, and Special Provision 188 of the ADR and RID (Road and Rail Europe).

CAUTION: Risk of explosion if this battery is replaced by an incorrect type. Dispose of batteries according to instructions.
Attention: Risque d'explosion si vous remplacez la batterie par un modèle incompatible. Jetez les piles usagées selon les instructions.

User Responsibility

Respect all local regulations for operating your wireless device. Use the security features to block unauthorized use and theft.

Power Supply Caution

CAUTION: Do not replace the power supply with one designed for another product; doing so can damage the modem and void your warranty. Adapter shall be installed near the equipment and shall be easily accessible.
CAUTION: Pour garantir une protection continue contre les risques d'incendie, remplacez les fusibles uniquement par des fusibles du même type et du même calibre. L'adaptateur doit être installé à proximité de l'appareil et doit être facilement accessible.

Device Maintenance

Do not attempt to disassemble the device. There are no user serviceable parts inside.

When maintaining your device:

- Do not misuse the device. Follow instructions on proper operation and only use as intended. Misuse could make the device inoperable, damage the device and/or other equipment, or harm users.
- Do not apply excessive pressure or place unnecessary weight on the device. This could result in damage to the device or harm to users.
- Do not use this device in explosive or hazardous environments unless the model is specifically approved for such use. The device may cause sparks. Sparks in explosive areas could cause explosion or fire and may result in property damage, severe injury, and/or death.
- Do not expose your device to any extreme environment where the temperature or humidity is high. Such exposure could result in damage to the device or fire. Refer to the device specifications regarding recommended operating temperature and humidity.

- Do not expose the device to water, rain, or spilled beverages. Unless the device is IP67 rated, it is not waterproof. Exposure to liquids could result in damage to the device.
- Do not place the device alongside computer discs, credit or travel cards, or other magnetic media. The information contained on discs or cards may be affected by the device.
- Using accessories, such as antennas, that MultiTech has not authorized or that are not compliant with MultiTech's accessory specifications may invalidate the warranty.

If the device is not working properly, contact MultiTech Technical Support.

Vehicle Safety

When using your device in a vehicle:

- Do not use this device while driving.
- Respect national regulations on the use of cellular devices in vehicles.
- If incorrectly installed in a vehicle, operating the wireless device could interfere with the vehicle's electronics. To avoid such problems, use qualified personnel to install the device. The installer should verify the vehicle electronics are protected from interference.
- Using an alert device to operate a vehicle's lights or horn is not permitted on public roads.
- UL evaluated this device for use in ordinary locations only. UL did NOT evaluate this device for installation in a vehicle or other outdoor locations. UL Certification does not apply or extend to use in vehicles or outdoor applications.

Radio Frequency (RF) Safety

Due to the possibility of radio frequency (RF) interference, it is important that you follow any special regulations regarding the use of radio equipment. Follow the safety advice given below.

- Operating your device close to other electronic equipment may cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.
- Different industries and businesses restrict the use of cellular devices. Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or where blasting operations are in process. Follow restrictions for any environment where you operate the device.
- Do not place the antenna outdoors.
- Switch OFF your wireless device when in an aircraft. Using portable electronic devices in an aircraft may endanger aircraft operation, disrupt the cellular network, and is illegal. Failing to observe this restriction may lead to suspension or denial of cellular services to the offender, legal action, or both.
- Switch OFF your wireless device when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.
- Switch OFF your wireless device in hospitals and any other place where medical equipment may be in use.

Interference with Pacemakers and Other Medical Devices

Potential interference

Radio frequency energy (RF) from cellular devices can interact with some electronic devices. This is electromagnetic interference (EMI). The FDA helped develop a detailed test method to measure EMI of implanted cardiac pacemakers and defibrillators from cellular devices. This test method is part of the Association for the

Advancement of Medical Instrumentation (AAMI) standard. This standard allows manufacturers to ensure that cardiac pacemakers and defibrillators are safe from cellular device EMI.

The FDA continues to monitor cellular devices for interactions with other medical devices. If harmful interference occurs, the FDA will assess the interference and work to resolve the problem.

Precautions for pacemaker wearers

If EMI occurs, it could affect a pacemaker in one of three ways:

- Stop the pacemaker from delivering the stimulating pulses that regulate the heart's rhythm.
- Cause the pacemaker to deliver the pulses irregularly.
- Cause the pacemaker to ignore the heart's own rhythm and deliver pulses at a fixed rate.

Based on current research, cellular devices do not pose a significant health problem for most pacemaker wearers. However, people with pacemakers may want to take simple precautions to be sure that their device doesn't cause a problem.

- Keep the device on the opposite side of the body from the pacemaker to add extra distance between the pacemaker and the device.
- Avoid placing a turned-on device next to the pacemaker (for example, don’t carry the device in a shirt or jacket pocket directly over the pacemaker).

Notice regarding Compliance with FCC, EU, and Industry Canada Requirements for RF Exposure

The antenna intended for use with this unit meets the requirements for mobile operating configurations and for fixed mounted operations, as defined in 2.1091 of the FCC rules for satisfying RF exposure compliance. This device also meets the European RF exposure requirements of EN 62311. If an alternate antenna is used, consult user documentation for required antenna specifications.

Compliance of the device with the FCC, EU and IC rules regarding RF Exposure was established and is given with the maximum antenna gain as specified above for a minimum distance of 20 cm between the devices radiating structures (the antenna) and the body of users. Qualification for distances closer than 20 cm (portable operation) would require re-certification.

Wireless devices could generate radiation. Other nearby electronic devices, like microwave ovens, may also generate additional radiation to the user causing a higher level of RF exposure.

Chapter 4 – Antenna Information

Antenna System Cellular Devices

The cellular/wireless performance depends on the implementation and antenna design. The integration of the antenna system into the product is a critical part of the design process; therefore, it is essential to consider it early so the performance is not compromised. Devices were approved with the following antenna(s) and for alternate antennas meeting the given specifications.

The antenna system is defined as the UFL connection point from the device to the specified cable specifications and specified antenna specifications.

EAD Antenna Used with -LAT1 and -LVW2 Models

The cellular radio portion of the device is approved with the following antenna or for alternate antennas meeting the given specifications.

Manufacturer:	Embedded Antenna Systems, Ltd. (EAD)
Description:	Dipole Blade Antenna for LTE

MultiTech ordering information:

Model	Quantity
ANLTE3-2HRA	2
ANLTE3-10HRA	10
ANLTE3-50HRA	50

LTE Antenna Specifications

Category	Description	
Frequency Range	698-806 MHz	
	824-894 MHz	
	880-960 MHz	
	1710-1880 MHz	
	1850-1990 MHz	
	1920-2170 MHz	
	2100-2500 MHz	
	2500-2690 MHz	
Impedance	50 Ohms	
VSWR	< 2.5:1	
Typical Radiated Gain	Low band	0.5 dBi (698-960 MHz)
	High band	2.2 dBi (1710-2700 MHz)

Category	Description
Radiation	Omni-directional
Polarization	Linear

LTE Antenna Used with -LEU1 Models

The cellular radio portion of the device is approved with the following antenna or for alternate antennas meeting the given specifications.

Manufacturer:	Wieson Technologies
Description:	LTE Antenna
Model Number:	GY115HT467-017
MultiTech Part Number:	95218146LF

MultiTech ordering information:

Model	Quantity
ANLTE2-2HRA	2
ANLTE2-10HRA	10
ANLTE2-50HRA	50

LTE Antenna Specifications

Category	Description
Frequency Range	690-960 MHz
	1710-2170 MHz
	2300-2690 MHz
Impedance	50 Ohms
VSWR	3:1
Peak Radiated Gain	3.5 dBi
Radiation	Omni-directional
Polarization	Linear

GPS Antenna Specifications

Manufacturer:	Trimble
Description:	GPS Antenna with low noise amplifier
Model Number:	66800-52
Multi-Tech Part Number:	45009665L

MultiTech Ordering Information

Model	Quantity
ANGPS-1MM	1
ANGPS-10MM	10
ANGPS-50MM	50

Antenna Specifications

Category	Description
Frequency Range	1575.24 MHz
Impedance	50 Ohms
VSWR	2.0:1 max
Gain	10-30 dBi
LNA Current Consumption	40 mA max
Noise Figure	< 2dB
Polarization	RHCP
Input voltage	3.0V M M 0.2V

Chapter 5 – Installing the Router

Installing the Router

1. To use the router's cellular features, connect two suitable antennas to both the CELL and AUX connectors.
2. You must use diversity because this device requires two antennas.
3. Using an Ethernet cable, connect one end of the cable to the E-NET connector on the back of the router and the other end to your computer, either directly or through a switch or hub.
4. If you are connecting to a serial interface, connect the DE-9 connector (9-pin) of the RS-232 cable to the RS-232 connector on the router. Then connect the other end to the serial port on the desired device.
5. Some routers support the use of a GPS receiver. If you are using a GPS receiver with the router, attach the GPS cable to the GPS connector on the router.
6. Attach a power cable to your power supply module.
7. Screw-on the power lead from the power supply module into the power connection on the router.
8. Plug the power supply into your power source.

   The POWER LED lights after the device powers up.

   When the Status LED begins to blink, the device is ready for use.
9. You can configure your router by using your router's web management interface. You might need to change the IP address of your computer to be in the same IP and subnet mask range as the device.

   a. Open a web browser. In the browser's address field, type the default address for the router: http://192.168.2.1. (If the browser displays a message that there is a problem with the website's security certificate, ignore this and click **Continue to the webpage**).

   b. On first-time power up of the device, its Web UI displays the initial setup in commissioning mode requiring a **username** and **password** for the first administrative user. Enter your desired username and password. Refer to **First-Time Setup** for more details.

   c. If you are not powering up the device for the first time and simply upgrading the firmware of your device, your existing logins are still active.

Mounting the Device

1. Locate the groove on the bottom of the modem.
2. Slide the mounting rod through the groove.
3. To secure the rod to the desired surface, place and tighten two screws in the holes on either end of the mounting rod. The dimensions illustration in this guide shows the mounting rod, as well as the dimensions for placement of the screws.

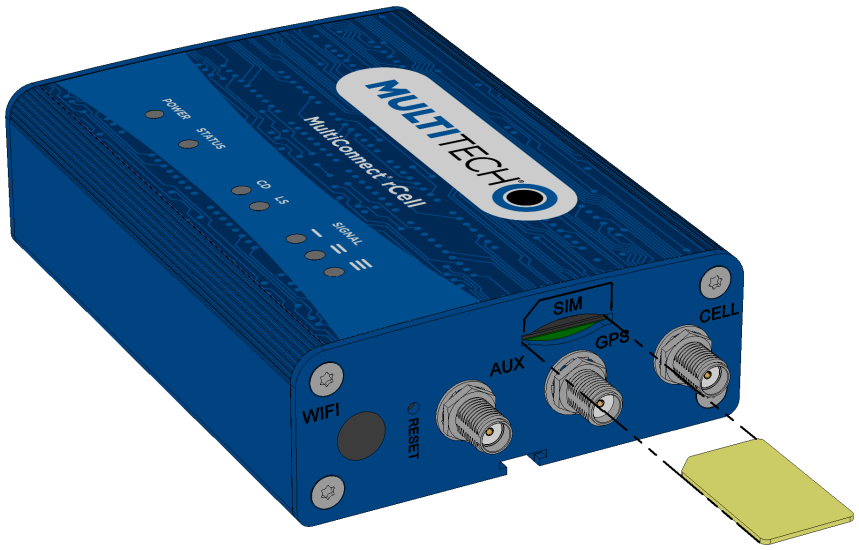
Installing the SIM Card

If you want to operate the router on a particular network, install a SIM card (Subscriber Identity Module).

To install the SIM:

1. Locate the SIM card slot on the side of the router. The slot is labeled SIM.

2. Push the SIM card into the slot until it snaps into place.



3. To remove the SIM, push the edge of the card in. When released, the card pops out of the device.

Resetting the Device

You need:

- A pin, paperclip, or similar thin object that can fit into the reset hole

The following is the default condition for the RESET button on the device. You can program a change to the behavior of the button if needed.

To reset the device:

1. Find the hole labeled RESET. The reset button is recessed into the case.
2. Use the pin to press and release the RESET button as follows:

   Reset options:

   - To reboot, press RESET for less than 3 seconds.
   - To reboot and restore user-defined defaults (if previously set), press RESET for 3 to 29 seconds.
   - To reboot, restore factory settings, and erase user-defined defaults, press RESET for 30 seconds or longer.

     The device restarts in commissioning mode. The system automatically removes all user accounts.

     Enter a new username and password to create your new administrative account. (Refer to **User Accounts** in the appropriate software guide for details on username and password requirements.)

Note: The device reboots when restoring settings.

Restoring User Defined Settings to the Device

You can restore user defined settings to your device.

You need:

- A pin, paperclip, or similar thin object that can fit into the reset hole

1. Locate the hole in the panel labeled RESET. The reset button is recessed into the housing.
2. Use the pin to press in the button for about 3 seconds and then release the reset button.
   a. If you do not press in the button long enough, the device will reset, but the user defined settings will not be restored.
   b. If you hold it too long, factory default settings will be restored.

Chapter 6 – Appendix: Regulatory Information

47 CFR Part 15 Regulation Class B Devices

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

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

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada Class B Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Reglement Canadien sur le matériel brouilleur.

This device complies with Industry Canada license-exempt RSS standard(s). The operation is permitted for the following two conditions:

1. the device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

FCC Interference Notice

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Requirements for Cellular Antennas with regard to FCC/IC Compliance

There cannot be any alteration to the authorized antenna system. The antenna system must maintain the same specifications. The antenna must be the same type, with similar in-band and out-of-band radiation patterns. This device has been designed to operate with the antennas listed below and having a maximum gain for 850 Mhz of <= 6.4 dBi , for 1700 Mhz of <= 6.5 dBi, and for 1900 Mhz of <= 3 dBi. Antennas not included in this list or that have a gain greater than specified are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

EMC, Safety, and Radio Equipment Directive (RED) Compliance

CE

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

> Council Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment;
> and
> Council Directive 2014/53/EU on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

MultiTech declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU. The declaration of conformity may be requested at https://support.multitech.com.

Restriction of the Use of Hazardous Substances (RoHS)

Multi-Tech Systems, Inc.

Certificate of Compliance

2015/863

Multi-Tech Systems, Inc. confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2015/863 of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS).

These MultiTech products do not contain the following banned chemicals[1]:

- Lead, [Pb] < 1000 PPM
- Mercury, [Hg] < 100 PPM
- Cadmium, [Cd] < 100 PPM
- Hexavalent Chromium, [Cr+6] < 1000 PPM
- Polybrominated Biphenyl, [PBB] < 1000 PPM
- Polybrominated Diphenyl Ethers, [PBDE] < 1000 PPM
- Bis(2-Ethylhexyl) phthalate (DEHP): < 1000 ppm
- Benzyl butyl phthalate (BBP): < 1000 ppm
- Dibutyl phthalate (DBP): < 1000 ppm
- Diisobutyl phthalate (DIBP): < 1000 ppm

Environmental considerations:

- Moisture Sensitivity Level (MSL) =1
- Maximum Soldering temperature = 260C (in SMT reflow oven)

[1]Lead usage in some components is exempted by the following RoHS annex, therefore higher lead concentration would be found in some modules (>1000 PPM);

- Resistors containing lead in a glass or ceramic matrix compound.

REACH Statement

Registration of Substances

Multi-Tech Systems confirms that none of its products or packaging contain any of the Substances of Very High Concern (SVHC) on the REACH Candidate List, in a concentration above the 0.1% by weight allowable limit

The latest **197** substances restricted per the REACH Regulation were **last updated January 2019**. Refer to the following for the most current candidate list of substances: http://echa.europa.eu/candidate-list-table.

Waste Electrical and Electronic Equipment Statement

WEEE Directive

The WEEE Directive places an obligation on EU-based manufacturers, distributors, retailers, and importers to take-back electronics products at the end of their useful life. A sister directive, ROHS (Restriction of Hazardous Substances) complements the WEEE Directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE Directive covers all MultiTech products imported into the EU as of August 13, 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

July, 2005

Information on HS/TS Substances According to Chinese Standards

In accordance with China's Administrative Measures on the Control of Pollution Caused by Electronic Information Products (EIP) # 39, also known as China RoHS, the following information is provided regarding the names and concentration levels of Toxic Substances (TS) or Hazardous Substances (HS) which may be contained in Multi-Tech Systems Inc. products relative to the EIP standards set by China's Ministry of Information Industry (MII).

Hazardous/Toxic Substance/Elements

Name of the Component	Lead (PB)	Mercury (Hg)	Cadmium (CD)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Printed Circuit Boards	O	O	O	O	O	O
Resistors	X	O	O	O	O	O
Capacitors	X	O	O	O	O	O
Ferrite Beads	O	O	O	O	O	O
Relays/Opticals	O	O	O	O	O	O
ICs	O	O	O	O	O	O
Diodes/ Transistors	O	O	O	O	O	O
Oscillators and Crystals	X	O	O	O	O	O
Regulator	O	O	O	O	O	O
Voltage Sensor	O	O	O	O	O	O
Transformer	O	O	O	O	O	O
Speaker	O	O	O	O	O	O
Connectors	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
Screws, Nuts, and other Hardware	X	O	O	O	O	O
AC-DC Power Supplies	O	O	O	O	O	O
Software /Documentation CDs	O	O	O	O	O	O
Booklets and Paperwork	O	O	O	O	O	O
Chassis	O	O	O	O	O	O

X Represents that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/Txxx-2006 Requirements for Concentration Limits.
O Represents that no such substances are used or that the concentration is within the aforementioned limits.

Information on HS/TS Substances According to Chinese Standards (in Chinese)

依照中国标准的有毒有害物质信息

根据中华人民共和国信息产业部 (MII) 制定的电子信息产品 (EIP) 标准－中华人民共和国《电子信息产品污染控制管理办法》（第 39 号），也称作中国 RoHS, 下表列出了 Multi-Tech Systems, Inc. 产品中可能含有的有毒物质 (TS) 或有害物质 (HS) 的名称及含量水平方面的信息。

有害/有毒物质/元素

成分名称	铅 (PB)	汞 (Hg)	镉 (CD)	六价铬 (CR6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板	O	O	O	O	O	O
电阻器	X	O	O	O	O	O
电容器	X	O	O	O	O	O
铁氧体磁环	O	O	O	O	O	O
继电器/光学部件	O	O	O	O	O	O
ICs	O	O	O	O	O	O
二极管/晶体管	O	O	O	O	O	O
振荡器和晶振	X	O	O	O	O	O
调节器	O	O	O	O	O	O
电压传感器	O	O	O	O	O	O
变压器	O	O	O	O	O	O
扬声器	O	O	O	O	O	O
连接器	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
螺丝、螺母以及其它五金件	X	O	O	O	O	O
交流-直流电源	O	O	O	O	O	O
软件/文档 CD	O	O	O	O	O	O
手册和纸页	O	O	O	O	O	O
底盘	O	O	O	O	O	O

X 表示所有使用类似材料的设备中有害/有毒物质的含量水平高于 SJ/Txxx-2006 限量要求。
O 表示不含该物质或者该物质的含量水平在上述限量要求之内。