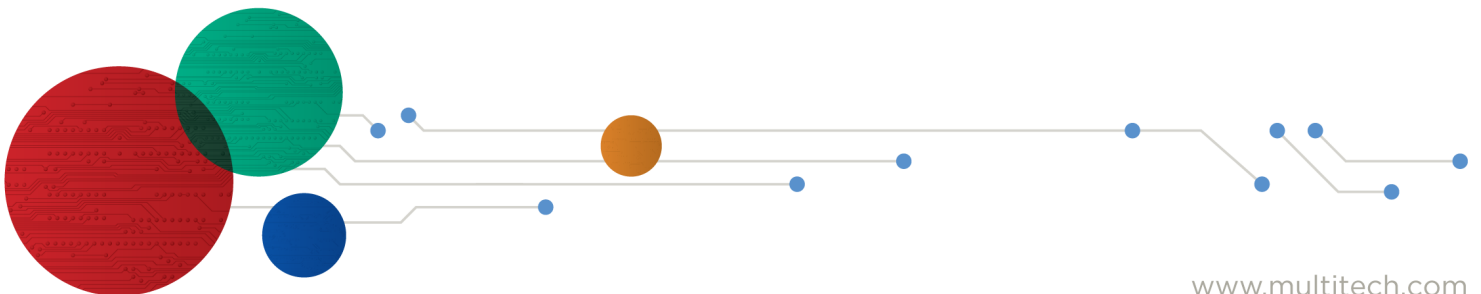


## MultiConnect® rCell 100 Cat M1/NB-IoT

### MTR-MNG2 Hardware Guide



## MultiConnect rCell 100 Series Router Hardware Guide

Model: MTR-MNG2

Part Number: S000734 1.5

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# Chapter 1 – Product Overview

## About MultiConnect rCell 100 Series Router

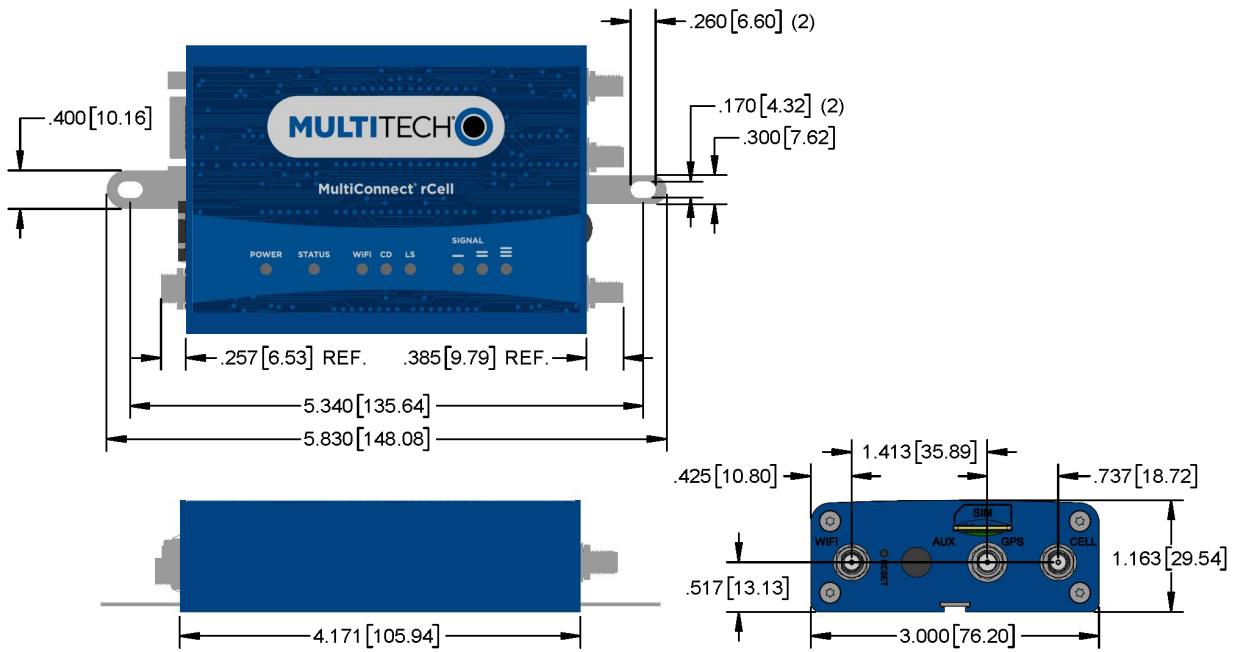
This guide describes the MultiConnect rCell 100 Series Router. Use this product to provide secure data communication between many types of devices that use legacy and the latest communication technologies. The device has an integrated cellular modem and includes 10/100 BaseT Ethernet and RS-232 serial connectivity.

## 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.	S000734
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: <a href="http://www.multitech.net/developer/software/mtr-software/mtr-api-reference/">www.multitech.net/developer/software/mtr-software/mtr-api-reference/</a> .	N/A
Telit ME910C1 AT Commands Reference Guide	Lists AT Commands and parameters used to configure your device. (Applies to MNG2 devices)	80529ST10815A

## Dimensions



DIMENSIONS IN In [mm]

## 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.
- Wi-Fi—Indicates if the device is serving as a Wi-Fi access point or acting as a Wi-Fi client. Not all models support Wi-Fi.
- 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 device is ready for use.
Wi-Fi	Infrastructure mode: <ul style="list-style-type: none"> <li>■ The Wi-Fi LED is lit when Wi-Fi AP mode is enabled, unlit when disabled.</li> <li>■ The LED flashes rapidly to indicate traffic.</li> </ul> Client mode: <ul style="list-style-type: none"> <li>■ The Wi-Fi LED is lit when Wi-Fi client mode is enabled.</li> <li>■ The Wi-Fi LED blinks slowly when associated with an Access Point.</li> <li>■ The Wi-Fi LED flashes rapidly to indicate traffic.</li> </ul>
CD	Carrier Detect. When lit, indicates data connection has been established.
LS	Link Status OFF —No power to the cellular radio Continuously Lit — Transmitting or receiving Slow Blink (-0.2Hz) — Registered or connected LED Fast Blink (-3Hz) — Not registered or searching for connection
SIGNAL	Signal strength for cellular (RSSI range: 0 - 31) ALL OFF — Unit is off, not registered on network, or extremely weak signal ( $0 \leq \text{RSSI} < 6$ ). 1 Bar "ON" — Very weak signal ( $7 \leq \text{RSSI} < 14$ ). 1 Bar and 2 Bar "ON" — Weak signal ( $15 \leq \text{RSSI} < 23$ ). 1 Bar, 2 Bar, and 3 Bar "ON" — Good signal ( $24 \leq \text{RSSI} \leq 31$ ).

## Ethernet LED Descriptions

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

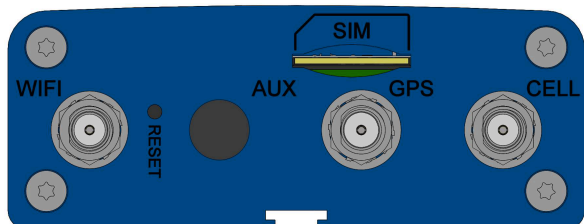
Ethernet Link	Right LED on Ethernet connector. Blinks when there is transmit and receive activity on the Ethernet link. It shows a steady light when there is a valid Ethernet connection.
Ethernet Speed	Left LED on Ethernet connector. Lit when the Ethernet is linked at 100 Mbps. If it is not lit, the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



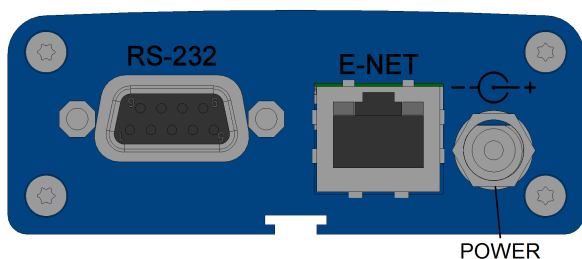
## Side Panel Connectors

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 Wi-Fi/Bluetooth, GPS, and cellular antenna connector. Depending on the model of your device, the GPS and/or Wi-Fi connectors 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	Cellular antenna inputs. Use with 1 Cat M1 LTE antenna. <ul style="list-style-type: none"> <li>■ CELL - Primary.</li> </ul>
GPS	GPS antenna input. Use with 1 GPS antenna (varies with model).
WIFI	Wi-Fi/Bluetooth antenna input. Use with 1 Wi-Fi/Bluetooth antenna (varies with model).
SIM	Receptacle for a SIM card (Subscriber Identity Module).
RESET	Resets the device. Refer to <b>Resetting the Device</b> or <b>Resetting User Defined Settings to the Device</b> .
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 connector has two Ethernet LEDs).
Power	7-32 VDC power receptacle for provided power cord. The device uses a minimum 7V 1.0A power supply.

## Product Build Options

Product	Description	Carrier/Region
MTR-MNG2-B07	LTE Cat M1/NB-IoT cellular router with fallback, without accessory kit	Global
MTR-MNG2-B07-WW	LTE Cat M1/NB-IoT cellular router with fallback, with accessory kit	Global
MTR-MNG2-B10	LTE Cat M1/NB-IoT cellular router with Wi-Fi, Bluetooth and GPS, with fallback, without accessory kit	Global
MTR-MNG2-B10-WW	LTE Cat M1/NB-IoT cellular router with Wi-Fi, Bluetooth and GPS, with fallback, with accessory kit	Global

## MNG2 Specifications

Category	Description
<b>General</b>	
Standards	LTE UE Category M1/NB1, 3GPP release 13 compliant
	Dual mode: M1 & NB1 + 2G, Half Duplex FDD
TCP/IP Functions	FTP, HTTPS, DNS, DHCP, SMTP, SNMP, SNTP, SSL, TCP, UDP
SMS over IMS	Point-to-Point messaging, Mobile terminated SMS, Mobile originated SMS
<b>Frequency Bands</b>	
Europe	4G: B3 (1800), B8 (900), B20 (800) 2G: B2 (1900), B3 (1800), B5 (850), B8 (900)
North America, Verizon	4G: B4 (AWS1700), B13 (700)
North America, AT&T	4G: B2 (1900), B4 (AWS1700), B12 (700), B13 (700)
<b>Speed</b>	
Data Speed	LTE Cat M1: Up to 375 kbps uplink / Up to 300 kbps downlink
	NB1: Up to 20 kbps uplink (single-tone), 250 kbps (multi-tone) / Up to 250 kbps downlink
<b>Interface</b>	
USB Interface	USB 2.0 high speed 480 Mbps
Serial Modem Interface	Up to 921.6 Kbps
<b>Connectors</b>	
Cellular	Female SMA connector
Wi-Fi/Bluetooth	Reverse-polarity male SMA connector
GPS	Female SMA connector
SIM Holder	Mini SIM (2FF)

Category	Description
Ethernet (LAN)	RJ-45, 10/100 Base T
RS-232	DCE 9-pin, female connector
Power	25 mm miniature locking power jack (screw on)
<b>Power Requirements<sup>1</sup></b>	
Voltage	7 to 32 VDC
<b>Physical Description</b>	
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
<b>Environment</b>	
Operating Temperature <sup>2</sup>	-40° C to +80° C
Storage Temperature <sup>2</sup>	-40° C to +85° C
Humidity	Relative humidity 15% to 93% non-condensing
<b>Certifications, Compliance, Warranty</b>	
Regulatory	CE mark, RED (EU), EMC and Radio Compliance, FCC Part 15 Class B, FCC Part 22H, FCC Part 24E, FCC Part 27, IC Class B
Safety	IEC 60950-1(EU), IEC 62368-1 (EU), UL 60950-1 2nd ED, cUL 60950-1, UL/cUL
Network	EU carriers, Verizon, AT&T, PTCRB

<sup>1</sup>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.

<sup>2</sup>UL tested for use at the recommended ambient temperature (T<sub>mra</sub>) of 60° C when using a fused cord and 40° C when using the optional power supply. Additionally, if the MTR is installed in a plastic case, the T<sub>mra</sub> is up to 50° C or 40° C if used with the optional power supply.

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.

## Transmission Output Power

### For Telit ME910C1 (MNG2)

Band	Power Class
Cat M1 (LTE) - All bands	3 (23dBm ±2dB)
Cat NB1 (LTE) - All bands	3 (23dBm ±2dB)

Band	Power Class
GPRS (GMSK) - GSM850, GSM900	4 (33dBm $\pm$ 2dB)
EDGE (8PSK)- GSM850, GSM900	E2 (27dBm $\pm$ 2dB)

## Power Draw

### MTR-MNG2-B10 Power Draw

Radio Protocol	Cellular Call Box Connection No Data (mA)	Average Measured Current (mA) at Maximum Power <sup>1</sup>	TX Pulse (Avg) Amplitude Current (mA) for GSM850 or Peak Current for HSDPA/LTE <sup>2</sup>	Total Inrush Charge Measured in Millicoulombs (mC) <sup>3</sup>
<b>9.0 Volts</b>				
GSM 850 Mhz	282	415	1030	.832
LTE	305	370	432	.832
<b>12.0 Volts</b>				
GSM 850 Mhz	211	300	725	.737
LTE	227	272	352	.737
<b>24.0 Volts</b>				
GSM 850Mhz	115	158	355	.812
LTE	123	145	220	.812

<sup>1</sup>**Max Power:** The continuous current during maximum data rate with the radio transmitter at maximum power.

<sup>2</sup>**Tx Pulse:** The average peak current during a GSM850 or LTE transmission burst period. The transmission burst duration for GSM850 can vary, depending on what transmission scheme is being deployed (GPRS Class 8, Class 10, GSM, etc.).

<sup>3</sup>**Total Inrush Charge:** The total inrush charge at power on expressed in Millicoulombs (mC).

**Note:** Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.

## Chapter 2 – Safety Warnings

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### 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. 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 3 – Antenna Information

### Antenna

Devices were approved with the following antenna or for alternate antennas meeting the given specifications:

Manufacturer:	Wieson
Description:	LTE Antenna with SMA-Male Connector
Model Number	GY115IE002-001

#### MultiTech ordering information:

Model	Quantity
ANLTE4-1HRA	1
ANLTE4-2HRA	2
ANLTE4-10HRA	10
ANLTE4-50HRA	50

### Antenna Specifications

Category	Description
Frequency Range	0.698 - 0.96 GHz 1.710 - 2.170 GHz 2.30 - 2.69 GHz
VSWR	3:1 maximum
Gain	2.06 dBi
Impedance	50Ω nominal
Radiation	Omni-directional
Polarization	Linear, vertical

## Chapter 4 – Installing the Device

### Installing the SIM Card

If you want to operate the device 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 device. 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.

### Installing the Device

1. To use the device's cellular features, connect a suitable antenna to the CELL connector.
2. Some devices support Wi-Fi. To use the device's Wi-Fi access point features, install a suitable antenna to the Wi-Fi antenna connector on the device.  
The Wi-Fi antenna connection is reverse polarity. If you use a standard antenna on the Wi-Fi connector, you can damage the antenna and the connector.  
Five Wi-Fi devices can concurrently use your Wi-Fi access point.
3. Using an Ethernet cable, connect one end of the cable to the E-NET connector on the back of the device 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 device. Then connect the other end to the serial port on the desired device.
5. Some devices support the use of a GPS receiver. If you are using a GPS receiver with the device, attach the GPS cable to the GPS connector on the device.
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 device.

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 device by using your device'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 device: `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 tab through the groove.
3. To secure the tab to the desired surface, place and tighten two screws in the holes on either end of the mounting tab. The dimensions illustration in this guide shows the mounting tab, as well as the dimensions for placement of the screws.

## 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 5 – 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.

### 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.

### 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 Règlement 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.

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



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<sup>1</sup>:

- 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)

<sup>1</sup>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, Inc.** 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。