MultiConnect® rCell 100 Series Router User Guide

MultiConnect® rCell 100 Series Router User Guide

Model: MTR-H5

Part Number: S000566 Version: 1.0.6

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Contacting Multi-Tech

Knowledge Base

The Knowledge Base provides immediate access to support information and resolutions for all Multi-Tech 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, 9am 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

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Product Overview

About MultiConnect rCell 100 Series Router

This guide describes the MultiConnect rCell 100 Series router. The rCell family of routers is carrier approved and ready-to-deploy. You can use your device to provide secure data communication between many types of devices that use legacy as well as the latest communication technologies. Some device models support Bluetooth and Wi-Fi communication to devices with these technologies. Also some device models support GPS. The router has an integrated cellular modem and includes 10/100BaseT Ethernet and RS-232 serial connectivity. An image of the device follows:

Items bundled with the device: 1 Taoglas GW.11.A153 Wi-Fi antenna, 2 Laird Hepta-SM MAF94300 antennas, 1 Trimble GPS antenna 66800-52 and 1 Globtek GT-41052-1509 100-240 9V 1.7A power supply.

Documentation

The following table describes additional documentation for your device. The documentation is available on the Multi-Tech Installation Resources website at www.multitech.com/setup/product.go.

Document	Description
User Guide	This document. Provides an overview, safety and regulatory information, schematics and general device information.
AT Commands	You can configure the device using the HSPA+ AT Commands. These commands are documented in the Reference Guide part number S000528.

Product Build Options

Product	Description
MTR-H5-B07	Supports HSPA+
MTR-H5-B08	Supports HSPA+ and GPS
MTR-H5-B09	Supports HSPA+, Wi-Fi, and Bluetooth
MTR-H5-B10	Supports HSPA+, Wi-Fi, Bluetooth, and GPS.

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 router is ready for use.
WiFi	Infrastructure mode - The WiFi LED is lit when WiFi AP mode is enabled, unlit when disabled. - The LED flashes rapidly to indicate traffic. Client mode: - The WiFi LED is lit when WiFi client mode is enabled. - The WiFi LED blinks slowly when associated with an Access Point. - The WiFi LED flashes rapidly to indicate traffic.
CD	Carrier Detect. When lit, indicates data connection has been established.
LS	Link Status. OFF—There is no power to the cellular radio. Continuously Lit—Powered and connected, but not transmitting or receiving. Slow Blink (-0.2Hz) —Powered and searching for a connection. Faster Blink (-3Hz)—Transmitting or receiving.

LED Indicators	
SIGNAL	Signal strength for cellular. 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).

Side Panels

The device has connectors on either side. The figure that follows shows the side which has a SIM card holder, as well as Wi-Fi, Auxiliary, GPS and cellular antenna connectors. It also has a reset button. Depending on the model of your device, the following items may or may not appear:

- Aux connector
- GPS connector
- Wi-Fi connector
- SIM card slot.

The side panel of the device follows:
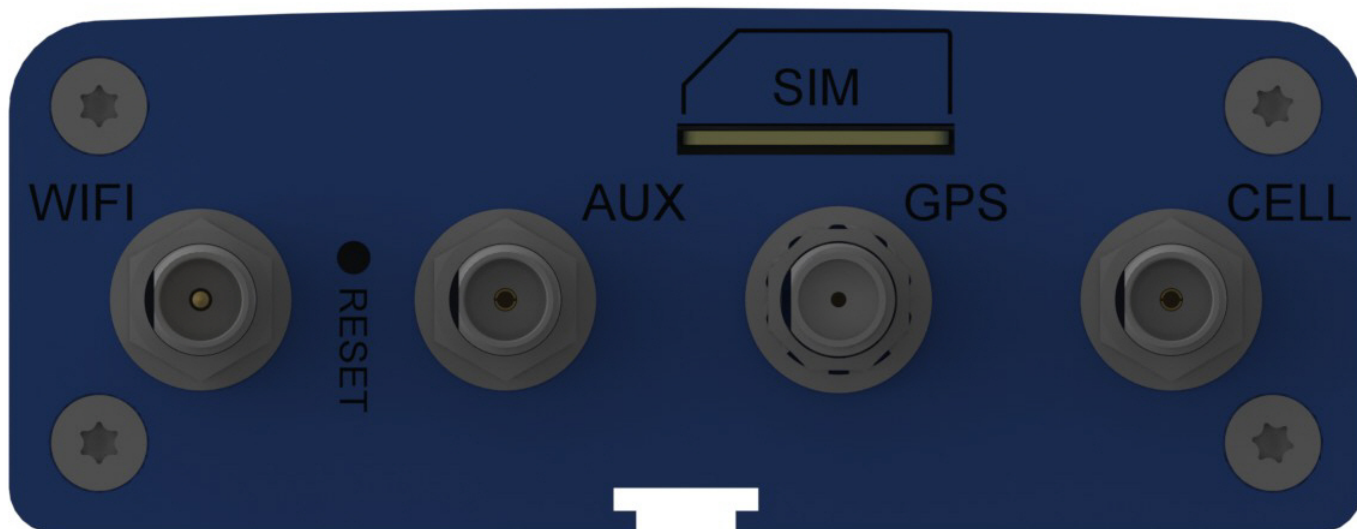
The figure that follows shows the other side of the device, with its RS-232 connector, Ethernet jack, and power connector.

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.

Specifications

MTR-H5

Category	Description
General	
Performance	HSPA+ GPRS/EDGE
Frequency Bands	Tri-Band 850/900/2100 MHz Quad Band 850/900/1800/1900 MHz
Radio	
Cellular	Telit HE910-D
Wi-Fi, Bluetooth	Murata LBEE5ZSTNC-523

Category	Description
Speed	
Packet Data	Up to 7.2 Mbps downlink/5.76 Mbps uplink
SMS	
SMS	Point-to-Point Messaging Mobile-Terminated SMS Mobile-Originated SMS
Connectors	
Cellular	Female SMA connectors for cellular
WiFi	Reverse polarity male SMA connector for Wi-Fi
SIM Holder	Standard 1.8 and 3 V SIM receptacle
GPS	Female SMA connector
Power Requirements	
Voltage	7 V to 32 V DC
Physical Description	
Dimensions	Dimensions are shown in the section "Dimensions" that follows.
Weight	8.2 ounces or 230 grams
Environment	
Operating Temperature	-40° C to +85° C
Humidity	Relative humidity 15% to 93% non-condensing
Certifications, Compliance, Warranty	
EMC Compliance	EN55022 Class B EN55024
Safety Compliance	UL 60950-1 IEC 60950-1
Network Compliance	GCF
Warranty	Two years

*UL Listed @ 40° C, limited by power supply. UL Certification does not apply or extend to an ambient above 40° C and has not been evaluated by UL for ambient greater than 40° C.

UL has evaluated this device for use in ordinary locations only. Installation in a vehicle or other outdoor locations has not been evaluated by UL. UL Certification does not apply or extend to use in vehicles or outdoor applications or in ambient above 40° C.

Note: The radio's 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.

Dimensions
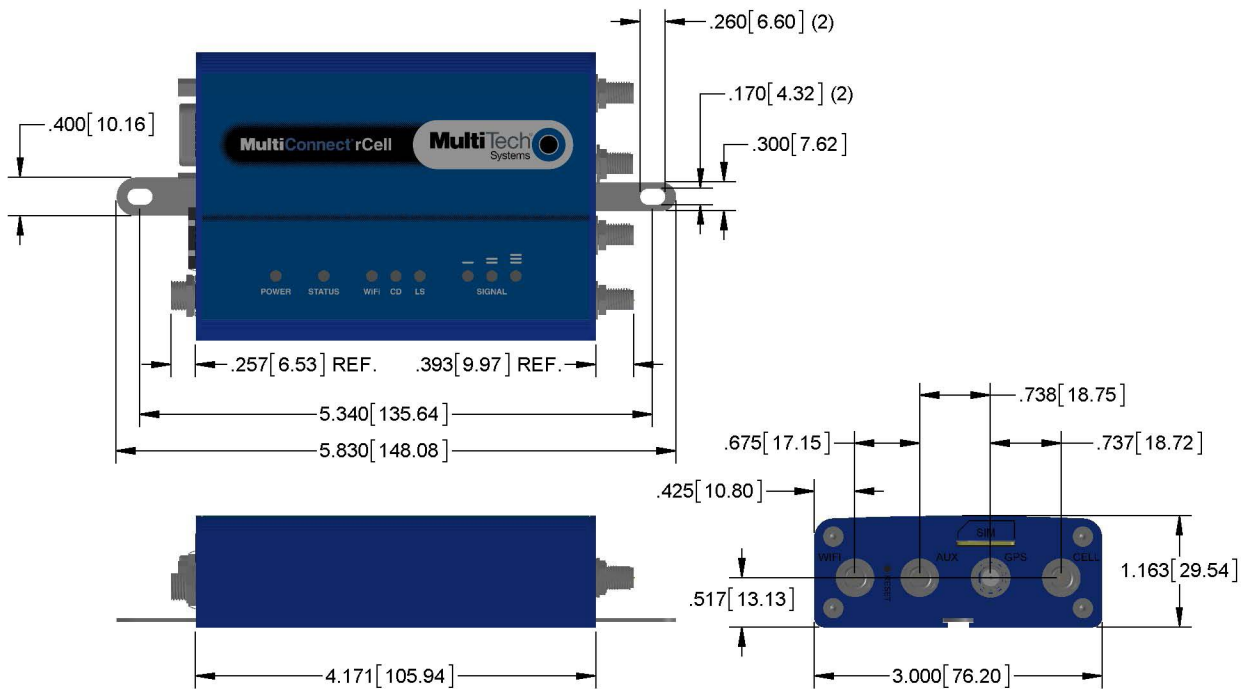
Label locations

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

Power Draw

GPRS

	Typical	Maximum	Peak TX	Peak Rst (Inrush Current)
7 volts				
	0.305A, 2.14W	0.495A, 3.47W	1.74A	2.30A

9 volts				
	0.230A, 2.12W	0.332, 3.05W	1.28A	4.12A
20 volts				
	0.111A, 2.22W	0.164A, 3.28W	.520A	3.03A
32 volts				
	0.075A, 2.40W	0.112A, 3.58W	0.337A	2.50A

HSPA

	Typical	Maximum	Peak TX	Peak Rst (Inrush Current)
7 volts				
	0.417A, 2.92W	0.625A, 4.38W	0.792A	2.30A
9 volts				
	0.272A, 2.52W	0.455, 4.18W	0.588A	4.12A
20 volts				
	0.140A, 2.80W	0.216A, 4.32W	.320A	3.03A
32 volts				
	0.090A, 2.88W	0.155A, 4.96W	0.250A	2.50A

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

RF Specifications

	GSM 850	EGSM	GSM 1800	GSM 1900
Frequency RX	869 to 894 MHz	900 925 to 960 MHz	1805 to 1800 MHz	1930 to 1990 MHz
Frequency TX	824 to 849 MHz	880 to 915 MHz	1710 to 1785 MHz	1850 to 1910 MHz

Safety Warnings

Lithium Battery

■ A lithium battery 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. If the battery fails, the board must be sent back to Multi-Tech 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 Multi-Tech 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: Pour réduire les risques d'incendie, utiliser uniquement des conducteurs de télécommunications 26 AWG au de section supérleure.

Ethernet Ports

CAUTION: Ethernet ports and command ports are not designed to be connected to a public telecommunication network.

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

Radiofrequency 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 the 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 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. If an alternate antenna is used, consult user documentation for required antenna specifications.

Compliance of the device with the FCC 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.

Cellular 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. If changes are made to the device's certified antenna system, then recertification will be required by specific network carriers.

Cellular Antenna Information

Authorized Antenna/Antenna Specifications for Cellular Bands

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

Manufacturer:	Laird Technologies.
Description:	HEPTA-SM
Model Number:	MAF94300

Multi-Tech ordering information:

Model	Quantity
ANHB-1HRA	1
ANHB-10HRA	10
ANHB-50HRA	50

3G Antenna Requirements/Specifications

Category	Description	
Frequency Range	824 – 960 MHz / 1710 – 1990 MHz / 1920 – 2170 MHz	
Impedance	50 Ohms	
VSWR	VSWR should not exceed 2.0:1 at any point across the bands of operation	
Typical Radiated Gain	850 MHz	3.17 dBi
	950 MHz	3.51 dBi
	1800 MHz	3.55 dBi
	1900 MHz	3.0 dBi
	2100 MHz	3.93 dBi
Radiation	Omni-directional	
Polarization	Linear Vertical	

GPS Antennas

GPS 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 ± 0.2V

Bluetooth and Wi-Fi Antenna Specifications

Manufacturer: Taoglas Antenna Solutions

Manufacturer's Model Number: GW.11.A153

Category	Description
Frequency Range	2.4000 to 2.4835 GHz
Impedance	50 Ohms
VSWR	VSWR should not exceed 2.0:1 at any point across the bands of operation
Peak Radiated Gain	2.3 dBi on azimuth plane
Radiation	Omni-directional
Polarization	Linear Vertical
Connector	RP-SMA(M)

Multi-Tech Ordering Information

Model Number	Quantity
ANWF-1HRA	1
ANWF-10HRA	10
ANWF-50HRA	50

Installing and Using the Router

Installing the Router

1. To use the router's cellular features, connect a suitable antenna to the antenna connector.
2. Some routers support Wi-Fi. To use the router's Wi-Fi access point features, install a suitable antenna to the Wi-Fi antenna connector on the router.

   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 ETHERNET 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 DE9 connector (9-pin) of the RS232 cable to the RS232 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.

   The Status LED is a solid ON when the router is booting up, saving a configuration, or updating firmware. 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 an Internet browser. In the browser's address field, type the default address for the router: http://192.168.2.1.
   b. A login page opens. In the **usernam**e field, type the default user name: admin (all lower-case).
   c. In the **password** field, type the default password: admin (all lower-case).
   d. Click **Login**. The Web Management Home page opens. Online documentation included with the web management interface describes how to configure your router

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.

Activating the Account for Wireless Devices

Refer to Multi-Tech's Cellular Activation Web site at http://www.multitech.com/activation.go for information on activating your cellular modem.

Note: If you need remote access to your MultiConnect device over the Internet for remote configuration, ensure that your wireless network provider has provisioned mobile terminated data and fixed or dynamic public IP address in which they can configure the network to redirect any incoming connection to that predefined IP.

Installing the SIM Card

If you want to operate the router on a GSM/HSPA 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.
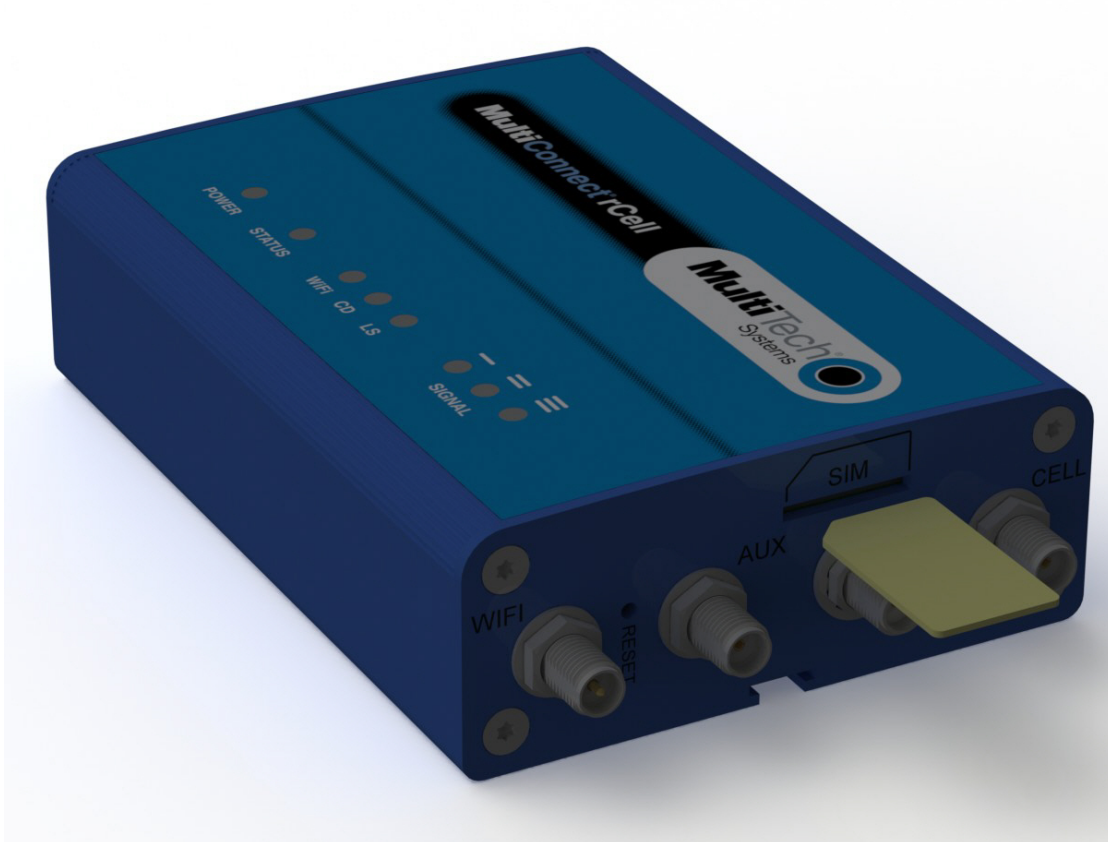
3.   To remove the SIM, push the edge of the card in. When released, the card pops out of the device.

Setting up Wi-Fi and GPS

Some models have Wi-Fi capability. If your device supports this feature, you need to use the device's web management interface to enable Wi-Fi. Then, see the online help file for information on working with Wi-Fi.

If your model can support a GPS, also see the online help file for information on working with a GPS.

Resetting the Device

To reset the device, when desired:

1.   Find the hole in the panel labeled RESET. The reset button is recessed into the case.

2. To access the reset button, find a pin or similar thin object that can fit through the reset hole.
3. Use the pin to quickly press and release the RESET button.
4. Release the pin from the reset button. The device reboots.

Resetting the Device to Factory Defaults

You can reset the device so that custom configuration settings are cleared and replaced with default configuration settings. Default settings can include OEM specific settings. To reset the device to factory default settings:

1. Press and Hold the button until the Status LED becomes solid..
2. Release the button for the reset to complete
3. The device reboots.

Regulatory Information

Industry Canada and FCC

This device complies with Industry Canada licence-exempt RSS standard(s) and part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme avec Industrie Canada RSS exemptes de licence standard (s) et la partie 15 des règles de la FCC. Son fonctionnement est soumis aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et

2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

> **Warning:** Changes or modifications to this radio device not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
> **Note:** In Wi-Fi operation, the modem cannot operate on Channels 12, 13, or 14 due to FCC regulations.

FCC and IC Antenna Requirements Toward License Exempt Radio Transmitters (Bluetooth/Wlan)

The license-exempt Blutooth/WLAN radio transmitter contained in this equipment may only be operated with an antenna of a type, a maximum gain and the required antenna impedance as approved and specified below. To reduce potential radio interference to other users, choose the antenna type and it's gain so that the equivalent isotropically radiated power (EIRP) is not more than that necessary for successful communication.

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 R&TTE Directive Compliance

$C \in 0682$

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

Council Directive 2004/108/EC of 15 December 2004 on the approximation of the laws of Member States relating to electromagnetic compatibility;
and
Council Directive 2006/95/EC of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;
and
Council Directive 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

Restriction of the Use of Hazardous Substances (RoHS)

Multi-Tech Systems, Inc

Certificate of Compliance

2011/65/EU

Multi-Tech Systems confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2011/65/EU of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS).

These Multi-Tech products do not contain the following banned chemicals[1]:

- Lead, [Pb] < 1000 PPM
- Mercury, [Hg] < 1000 PPM
- Hexavalent Chromium, [Cr+6] < 1000 PPM
- Cadmium, [Cd] < 100 PPM
- Polybrominated Biphenyl, [PBB] < 1000 PPM
- Polybrominated Diphenyl Ether, [PBDE] < 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

After careful review of the legislation and specifically the definition of an "article" as defined in EC Regulation 1907/2006, Title II, Chapter 1, Article 7.1(a)(b), it is our current view Multi-Tech Systems, Inc. products would be considered as "articles". In light of the definition in § 7.1(b) which requires registration of an article only if it contains a regulated substance that "is intended to be released under normal or reasonably foreseeable conditions of use," Our analysis is that Multi-Tech Systems, Inc. products constitute nonregisterable articles for their intended and anticipated use.

Substances of Very High Concern (SVHC)

Per the candidate list of Substances of Very High Concern (SVHC) published October 28, 2008 we have reviewed these substances and certify the Multi-Tech Systems, Inc. products are compliant per the EU "REACH" requirements of less than 0.1% (w/w) for each substance. If new SVHC candidates are published by the European Chemicals Agency, and relevant substances have been confirmed, that exceeds greater than 0.1% (w/w), Multi-Tech Systems, Inc. will provide updated compliance status.

Multi-Tech Systems, Inc. also declares it has been duly diligent in ensuring that the products supplied are compliant through a formalized process which includes collection and validation of materials declarations and selective materials analysis where appropriate. This data is controlled as part of a formal quality system and will be made available upon request.

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 Multi-Tech 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+)	Polybromi nated Biphenyl (PBB)	Polybrominat ed 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。