MultiModem[®] Cell Wireless Modem

MTCBA-H3-U1 MTCBA-EV1-U1-N3 User Guide





MultiModem[®] Cell User Guide Wireless Modem MTCBA-H3-U1, MTCBA-EV1-U1-N3 Part Number S000512A, Revision A

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Revision History

Revision	Date	Description
Α	10/17/11	Initial release.

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Online Web Portal <u>https://support.multitech.com</u>

The Knowledge Base provides immediate answers to your questions and gives you access to support resolutions for all Multi-Tech products. Visit our support area on the website for other support services.

Knowledge Base and Support Services <u>www.multitech.com/support.go</u>

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Warranty

To read the warranty statement for your product, visit:

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Chapter 1 – Product Description and Specifications

Product Description

The Multi-Tech MultiModem[®] Cell cellular modems are ready-to-deploy, standalone modems that provide wireless data communication and integrate seamlessly with virtually any application. The MultiModem Cell cellular modem is based on industry-standard open interface and uses Multi-Tech's Universal Socket design.

The Cell modem is designed with either a quad-band GSM/GPRS/HSPA network or dual-band EV-DO, CDMA2000 1xRTT/EV-DO network. The modems include a USB interface. If desired, you can mount the modem on a flat surface, such as a desktop or panel.



Model	Description
MTCBA-H3-U1	The MTCBA-H3-U1 wireless modem offers fast cellular data speeds by using HSPA technology. The modem is equipped with quad-band technology and can be used on all existing GSM networks, and most HSPA networks.
MTCBA-EV1-U1-N3	The MTCBA-EV1-U1-N3 CDMA wireless modem offers standards-based multi-band EV-DO, CDMA2000 1xRTT performance. The ready-to-deploy, standalone modem allows developers to add wireless communication to products with a minimum of development time and expense. The MultiModem Cell EV-DO wireless modem is based on industry-standard open interfaces and can be desktop or panel mounted.

Related Documentation

MultiModem MTCBA-H3-U1

Use the HSPA-H3 AT commands to configure the MTCBA-H3-U1 modem. These commands are documented in the HSPA-H3 AT Commands Reference Guide part number S000505x.

MultiModem MTCBA-EV1-U1-N3

Use the CDMA 1xEVDO AT commands for EV1 models to configure the MTCBA-EV1-U1-N3 modem. These commands are documented in CDMA 1xEVDO AT Commands Reference Guide part number S000506x.

Safety

General Safety

The modem is designed for and intended to be used in fixed and mobile applications. "Fixed" means that the device is physically secured at one location and is not able to be easily moved to another location. "Mobile" means that the device is designed to be used in other than fixed locations.

Caution: Maintain a separation distance of at least 20 cm (8 inches) between the transmitter's antenna and the body of the user or nearby persons. The Modem is not designed for or intended to be used in portable applications within 20 cm (8 inches) of the body of the user.

RF Interference Issues

It is important to follow any special regulations regarding the use of radio equipment due in particular to the possibility of radio frequency, RF, interference. Please follow the safety advice given below carefully.

- Switch OFF your MultiModem when in an aircraft. The use of cellular telephones in an aircraft may endanger the operation of the aircraft, disrupt the cellular network and is illegal. Failure to observe this instruction may lead to suspension or denial of cellular telephone services to the offender, or legal action or both.
- Switch OFF your MultiModem when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.
- Switch OFF your MultiModem in hospitals and any other place where medical equipment may be in use.
- Respect restrictions on the use of radio equipment in fuel depots, chemical plants or where blasting operations are in progress.
- There may be a hazard associated with the operation of your MultiModem close to inadequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufacturers of the medical device to determine if it is adequately protected.
- Operation of your MultiModem close to other electronic equipment may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.

Vehicle Safety

- Do not use your MultiModem while driving.
- Respect national regulations on the use of cellular telephones in vehicles. Road safety always comes first.
- If incorrectly installed in a vehicle, the operation of MultiModem telephone could interfere with the correct functioning of vehicle electronics. To avoid such problems, be sure that qualified personnel have performed the installation. Verification of the protection of vehicle electronics should be part of the installation.
- The use of an alert device to operate a vehicle's lights or horn on public roads is not permitted.

Maintenance of the Wireless MultiModem

Your wireless MultiModem is the product of advanced engineering, design, and craftsmanship. Treat it with care. The suggestions that follow help ensure you can enjoy this product for many years.

- Do not expose the MultiModem to any extreme environment where the temperature or humidity is high.
- Do not attempt to disassemble the MultiModem. There are no user serviceable parts inside.
- Do not expose the MultiModem to water, rain, or spilled beverages. It is not waterproof.
- Do not abuse your MultiModem by dropping, knocking, or shaking it. Rough handling can damage it.
- Do not place the MultiModem alongside computer discs, credit or travel cards, or other magnetic media. The information contained on discs or cards may be affected by the phone.

- The use of accessories not authorized by Multi-Tech or not compliant with Multi-Tech's accessory
 specifications may invalidate the warranty of the MultiModem.
- In the unlikely event of a fault in the MultiModem, contact Multi-Tech Technical Support.

Handling Precautions

All devices must be handled with certain precautions to avoid damage due to the accumulation of static charge. Although input protection circuitry has been incorporated into the devices to minimize the effect of this static build up, proper precautions should be taken to avoid exposure to electrostatic discharge during handling and mounting.

Front Panel Overview

The front panel includes an LED that indicates the status of the link. Another LED indicates whether the modem has power.

The SIM door on the right side of the modem provides access to the SIM card holder if needed.



LEDs

LS	When lit, indicates the radio module has power.
PWR	When lit, the unit is receiving power from the USB connection.

Package Contents

Note: For the MTCBA-H3-U1 modem, your wireless provider supplies the SIM card.

Unbundled Package without Accessories

1 modem

Note: You must supply mounting screws, USB cable, and an antenna.

Bundled Package with Accessories

1 modem 1 antenna USB cable **Note:** You must supply mounting screws

Specifications

Feature	MTCBA-H3-U1	MTCBA-EV1-U1-N3
Standard	HSPA	CDMA2000 1xRTT EV-DO Rev A, Rev 0
Band, Frequency	Quad-band HSUPA/HSDPA/UMTS	Dual-band 800/1900 MHz bands with receive
	850/900/1900/2100MHz	diversity support on both bands
	Quad-band GPRS/EDGE 850/900/1800/1900MHz	
Packet Data	HSDPA data service of up to 7.2 Mbps	Peak download 3.1 Mbps, peak upload 1.8 Mbps
	HSUPA data service of up to 5.76 Mbps	
	UMTS up to 384 Kbps	
Circuit-Switched	Up to 14.4K bps, non-transparent	Not applicable
Data		
Short Message	Text and PDU, Point-to-Point (MO/MT), cell	Point-to-Point (MO/MT)
Services (SMS)	broadcast	
Antenna Connector	RF Antenna: 50 ohm SMA (female connector)	RF Antenna: 50 ohm SMA (female connector)
SIM Connector	Standard 1.8 and 3V SIM receptacle	Not applicable
USB Connector	Туре В	Туре В
Voltage	5.0V USB input voltage supplied by USB	5.0V USB input voltage supplied by USB
	connector	connector
	500mA nominal current	500mA nominal current
USB Power	GSM850	800Mhz CDMA 2000 US Cellular 900Mhz
	Sleep 0.097A, 0.487W	Sleep 0.070A, 0.353W
	Typical 0.190A, .0946W	Typical 0.210A, 1.04W
	Max .680A, 3.24W	Max 0.700A, 3.33W
	Peak 1.400A	Peak .950
	HSDPA	US PCS 1900Mhz
	Sleep 0.097A, 0.487W	Sleep 0.070A, 0.353W
	Typical 0.428A, 2.08W	Typical 0.265A, 1.31W
	Max .700, 3.33W	Max 0.825A, 3.88W
	Peak .930A	Peak .1.09A
	Inrush current: 1.08A	Inrush current: 1.04A
Physical	4.75″ W x 1.58″H x 2.89″D 5.2oz	4.75" W x 1.58"H x 2.89"D 5.2oz
Description	12.06cmW x 4.01cmH x 7.34cmD 0.147Kg	12.06cmW x 4.01cmH x 7.34cmD 0.147Kg
Operating	-10° to 55° C	-10° to 55° C
Temperature		
Storage	-40° to 85° C	-40° to 85° C
Temperature		
Humidity	Relative humidity 20% to 90% noncondensing	Relative humidity 20% to 90% noncondensing

Certifications	EMC Compliance	EMC Compliance
	FCC Part 15 Class B	FCC Part 15 Class B
	EN55022 Class B	
	EN55024	Radio Compliance
		FCC Part 22, 24
	Radio Compliance	RSS 132, 133
	FCC Part 22, 24	
	RSS 132, 133	Safety
	EN301 489-1	UL60950-1 Second edition
	EN301 489-7	IEC60950-1:2005 (Second edition with EN 60950-
	EN301 489-24	1:2006+A11:2009)
	Safety	
	UL60950-1 2nd Ed.	
	IEC60950-1: 2005 (Second edition with EN 60950-	
	1:2006+A11:2009)	
	Network Compliance	
	PTCRB	
	AT&T	

Chapter 2 - Activating and Installing the Modem

Activating Your Wireless Account

To activate your wireless account:

- 1. Go to Multi-Tech's Cellular Activation website at http://www.multitech.com/activation.go.
- 2. From the Select Your Product drop-down list, select the model of your modem.
- 3. Follow the directions on the notice.

Determining the Phone Number for the Wireless Modem

Every wireless modem has a unique phone number. Your wireless service provider may give you this number. Or the number may be on the SIM card. Wireless provider implementations may vary.

Inserting the SIM Card for GSM Network Operation

The MultiModem requires the power supply connection to begin operation. The MTCBA-H3-U1 modem also requires a SIM card (Subscriber Identity Module) to operate on a GSM network.

To install the SIM:

- 1. Before you change the SIM, remove power from the unit.
- 2. To open the SIM door, press down on the tab on the top of the door and pry open the door.
- 3. Insert the SIM card into the card holder. The following illustration shows the correct SIM card orientation.



4. Verify that the SIM card fits into the holder properly and then close the door.

Connecting the Antenna and USB Cable



- 1. Connect a suitable antenna to the ANT connector.
- 2. The USB cable uses 500mA from the USB power line. Connect one end of the USB cable to your computer or other USB high power device, such as a hub. Connect the other end to the modem USB connector.

Mounting the Modem on a Flat Surface

You can mount the modem on a flat surface, if desired. To properly place mounting screws, use the measurements shown in the illustration that follows.

Use #6 pan head screws for all mount locations.



ALL DIMENSIONS IN INCHES [mm]

Installing the Huawei Driver

The following instructions help you install the Huawei driver for a computer using the Windows 7 operating system. Computer operating systems can differ. As such, you may need to modify the instructions in this section to allow for your computer's unique setup. Use these steps as a guideline to install the driver for all Windows operating systems.

- 1. From the Multi-Tech website, download drivers to a folder on your local PC.
- 2. From this folder, select **DriverSetup.exe** file.

rganize 🔻 📑 Open	Burn New folder		Ē	H • 🔟
Favorites	Name	Date modified	Туре	Size
	🔒 WinVista	5/25/2011 2:50 PM	File folder	
🔒 Libraries	길 WinVista64	5/25/2011 2:50 PM	File folder	
Documents	길 WinXp	5/25/2011 2:50 PM	File folder	
J Music	퉬 WinXp64	5/25/2011 2:50 PM	File folder	
E Pictures	levsetup.dll	8/8/2007 11:55 AM	Application extens	136 KB
Videos	📑 devsetup.exe	8/8/2007 11:55 AM	Application	116 KB
	devsetup2k.exe	2/17/2009 6:03 PM	Application	228 KB
🖳 Computer	🔜 devsetup32.exe	2/17/2009 4:19 PM	Application	228 KB
🏭 Local Disk (C:)	🔜 devsetup64.exe	2/17/2009 4:19 PM	Application	309 KB
🙀 Tech Pubs (\\NASSE	船 DriverSetup.exe	11/27/2008 8:48 AM	Application	308 KB
	船 DriverUninstall.exe	11/27/2008 8:45 AM	Application	308 KB
📮 Network	Install.log	5/25/2011 1:18 PM	Text Document	67 KB
	🚳 LocateDevice.dll	8/8/2007 11:55 AM	Application extens	2 KB
	ReadMe(ch).txt	8/8/2007 11:53 AM	Text Document	5 KB
	ReadMe(en).txt	8/8/2007 11:53 AM	Text Document	4 KB
	release notes.txt	2/17/2009 7:36 PM	Text Document	7 KB

3. The Program Compatibility Assistant window appears.



- 4. Select This program installed correctly.
- 5. Plug the USB cable into the PC.

6. When the Driver Software Installation window states "Your device is ready to use", your modem is installed.



Verifying That Your Modem is Properly Installed

- After you have successfully installed the MultiModem driver, you return to the Phone and Modems Options window. Make sure that the modem is now listed under the column Modem and Attached To (the correct com port).
- 2. Select the modem and then click Properties.
- 3. A Properties window opens for the Multi-Tech modem. Click the Diagnostics tab.

In the middle of the window, click **Query Modem**. Windows queries the Multi-Tech modem. If the query is successful a group on the tab appears, showing the columns **Command** and **Response**.

- 4. If this process passes, your modem is properly installed and ready for use. To close the Properties window, click **OK**.
- 5. To close the Phone and Modems Options window, click OK.

Chapter 3 – Using the Wireless Modem

Using AT Commands to Verify Signal Strength and Roaming Status

You can use AT commands to operate, configure, and query your modem. Reference guides document the AT commands. You can download these guides from the Multi-Tech website.

To verify signal strength and roaming status, you must use a terminal application such as HyperTerminal. To open this program in Windows XP, go to **Start > All Programs > Accessories > Communications > HyperTerminal**. Other Windows operating systems have similar paths to HyperTerminal. See your system's online Help if you cannot find HyperTerminal.

Verifying Signal Strength

To verify signal strength:

1. Open a terminal program of your choosing.

2. Type AT+CSQ

The modem responds with the received signal strength (rssi) and the channel bit error rate (ber).

RSSI ranges from 0 to 31.

Signal Strength Verification – RSSI	
AT+CSQ xx Values	Signal Strength
0 - 10	Weak or Insufficient
11 - 20	Average
21 - 31	Exceptional
99	No signal

BER ranges from 0 to 7 (Seven is the highest error rate).

Checking Network Registration and Roaming Status

To verify that the MultiModem is registered on the wireless network:

1. Open HyperTerminal.

2. Type AT+CREG?

The modem responds in one of the following ways:

Network Registration Verification	
Value	Network Registration Status
0,0	The modem is not registered on any network
	If not registered, verify the signal strength. The received signal might
	not be strong enough for the modem to register.
0,1	The modem is registered on the home network.
0,5	The modem is registered on a network and it is roaming.

Checking the Modem's Identity

Use the ATI command. This command uses the capital letter I (not L) after AT.

• Type ATIO. The command ends in a zero.

The manufacturing data displays, for example: Huawei Modem Multiband G850 1900

• Type ATI3

The software version displays, for example: 651_09gg...

Connecting to the Internet

You configure Internet access in Windows Dial-Up Networking (DUN) of the computer that the MultiModem Cell is serving.

For a GPRS network, create an Access Point Name in the Phone and Modem Options dialog in Windows Control Panel and then create your Windows Dial-Up Connection (DUN).

The following instructions help you configure the connection for a computer using the Windows 7, Windows Vista and Windows XP operating systems. Computers can differ. As such, you may need to modify the instructions in this section to allow for your computer's unique setup. Use these steps as a guideline to set up an Internet connection through your wireless service provider for all operating systems.

Connecting to a CDMA/EVDO Network for Internet Access

After activating your wireless account, you can establish your Internet connection through a Windows dial-up session. Setup procedures vary according to the type of wireless service provider used.

Before You Begin

- Make sure you have one CDMA capable MultiModem Cell modem.
- The modem must receive a proper signal and have network registration through the wireless provider's network.
- Install the Multi-Tech drivers for your particular model on a computer running Windows 7, Vista or XP.

Connecting to an GSM/GPRS/HSPA Network for Internet Access

After you insert the SIM card and complete all other setup steps, establish an Internet connection through a Windows dial-up session.

Before You Begin

- Make sure you have one HSPA capable MultiModem cell modem.
- The MultiModem modem has a HSPA capable network and an active SIM card.
- The modem must receive a proper signal and have network registration through the wireless provider's network.
- Install the Multi-Tech drivers on a computer running Windows 7, Vista or XP.

Setting the Access Point Name (APN) for MTCBA-H3-U1

So your MTCBA-H3-U1 modem can connect to your provider's network, set the modem's APN. The APN is a server name that your account is setup on with your provider. You provider gives you the APN. Some APNs include:

- AT&T; PROXY, or INTERNET, or PUBLIC
- T-Mobile: INTERNET2. VOICESTREAM.COM, INTERNET3.VOICESTREAM.COM, EPC.Tmobile.com or WAP.VOICESTREAM.COM

To set the APN:

- 1. From the **Start** button, select **Control Panel**.
- 2. In Control Panel, double-click Phone and Modem Options.
- 3. In the **Phone and Modem Options** window, click the **Modems** tab. Highlight your Cell modem listed in the table and then click **Properties**.
- 4. A Properties window for your modem opens. For Windows Vista and later operating systems, click Change Settings.
- 5. Click the Advanced tab.
- 6. From the Extra Settings group, in the Extra initialization commands text box, enter:
 - a. AT+CGDCONT=1,"IP","<APN>"
 - b. For <APN>, enter in the correct APN for your account.

For example: AT+CGDCONT=1"IP","ISP.AT&T"

- 7. To close the Properties window, click **OK**.
- 8. To close the Phone and Modems Options window click OK.

Creating a Dial-Up Connection in Windows Vista and XP

- 1. From the **Start** button, select **Control Panel**.
- 2. In the Control Panel, double click Network Connections.
- 3. From the Network Connections window, in the Network Tasks group, click Create a new connection.
- 4. The New Connection Wizard opens, and steps you through the setup of an Internet connection. To begin, click **Next**.
- 5. On the Network Connection Type pane, select Connect to the Internet. Click Next.
- 6. On the Getting Ready pane, select Set up my connection manually. Click Next.
- 7. On the Internet Connection pane, select **Connect using a dial-up modem**. Click **Next**.

After clicking Next, you may be asked to select which modem to use. If you have more than one modem installed in your computer, select the proper Multi-Tech wireless modem.

- 8. On the Connection Name pane, in the ISP Name box, type in a name for your new connection. Use any name you desire, then click **Next**.
- **9.** On the Phone Number to Dial pane, type the number that the modem can use to connect to your provider's Internet service.
 - For HSPA modems, type in the number ***99***1#**. Then click **Next**.
 - For EV-DO modems, type in the number **#777.** Then click **Next**.

- On the Connection Availability pane, specify if this connection is for anyone's use or for your use only. Click Next.
- **11.** On the Internet Account Information pane, type the user name and the password for your account. In many cases, a user name and a password are not required. However, some wireless providers require this information. Check with your provider to determine if the user name and password are required.
- **12.** Check the following options if you want to active them:
 - Check the box if you want this account name and password to be used by everyone.
 - Check the box if you want this as your default Internet connection.
 - Click Next.
- **13.** On the Completing the New Connection Wizard pane, indicate if you want to add a shortcut to your desktop. Click **Finish**.
- 14. A Connection window appears on your desktop. Click **Properties**.
- **15.** The Properties window opens, where you can make your connection.

Note: Make sure that Use dialing rules is not selected. Click OK.

- **16.** Once back at the Connection window, to connect, click **Dial**.
- **17.** The modem connects to your provider's Internet service. Once connected, the connection status icon appears in your system tray.

You can open an Internet browser to access the Internet.

Creating a Dial-Up Connection in Windows 7

- 1. From the Start button, select Control Panel.
- 2. From the Adjust your computer's settings window, select Network and Internet.
- 3. From the Network and Internet window, select Network and Sharing Center.
- 4. In the window that appears, in the Change your networking settings group, select **Set up a new connection or network**.
- 5. In the Choose a connection option window, select Set up a dial up connection. Click Next.
- 6. In the window that appears, type the information about the connection that you received from your Internet service provider, including:

Service provider

Dial-up phone number

User name

Password

Connection name

7. Click Connect.

Disconnecting

- 1. To disconnect, click on the connection icon in your system tray.
- 2. Right click on your current connection.
- 3. Select Disconnect. The modem disconnects from the Internet.

Using a Generic Dial-Up Method to Connect

Users of computers that are not running a Windows operating system can use a generic dial-up method to connect to the Internet.

- 1. If EV-DO, use ATD#777 to dial into the network.
- 2. If HSPA:
 - a. To set up an Access Point Name (APN) enter:

AT+CGDCONT=1,"IP","<APNSERVER>"

where <APNSERVER> is the APN server supplied by your carrier.

b. Use **ATD*99***1#** to dial into the network.

Appendix A - Regulatory Compliance

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EMC, Safety, and R&TTE Directive Compliance

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

Council Directive 2004/108/EC of 31 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.

International Modem Restrictions

Some dialing and answering defaults and restrictions may vary for international modems. Changing settings may cause a modem to become non-compliant with national telecom requirements in specific countries. Also note that some software packages may have features or lack restrictions that may cause the modem to become non-compliant.

FCC Part 15 Class B Statement

This equipment has been tested and found to comply with the limits for a **Class B** digital device, pursuant to 47 CFR Part 15 regulations. The stated limits in this regulation 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.
- Plug 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.

This device complies with Part 15 of the CFR 47 rules. Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

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

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.

Appendix B - Cellular Information

Antenna System for Cellular Devices

Wireless performance depends on 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 performance is not compromised. If you make changes to the certified antenna system of the MultiModem, then recertification is required by specific network carriers such as Sprint. The antenna system is defined as the UFL connection point from the MultiModem to the specified cable specifications and specified antenna specifications.

FCC Requirements for the Antenna

The antenna gain, including cable loss, for the radio you are incorporating into your product design must not exceed the requirements at 850 MHz and 1900 MHz as specified by the FCC grant for mobile operations and fixed mounted operations as defined in 2.1091 and 1.1307 of the FCC rules for satisfying RF exposure compliance. The antenna used for transmitting must be installed to provide a separation distance of at least 20cm from all persons and must not transmit simultaneously with any other antenna transmitters. User and installers must be provided with antenna installation instructions and transmitter operating conditions to satisfying RF exposure compliance.

Antenna Specifications

Frequency Range	824 – 894 MHz / 1850 – 1990 MHz
Impedance	50 Ohms
VSWR	VSWR shall not exceed 2.0:1 at any point across the bands of operation
Typical Radiated Gain	3 dBi on azimuth plane
Radiation	Omni-directional
Polarization	Vertical
TRP/TIS	The total radiated power (TRP) at the antenna shall be no less than +21/20 dBm for PCS/Cell channels respectively, and the total isotropic sensitivity (TIS) at the antenna shall be no less than -104/104 dBm for PCS/Cell channels respectively.

CDMA/EVDO Antenna Requirements/Specifications

GSM/HSPA/GPRS Antenna Requirements/Specifications

Frequency Range	824 – 960 MHz / 1710 – 1990 MHz
Impedance	50 Ohms
VSWR	VSWR shall not exceed 2.0:1 at any point across the bands of operation
Typical Radiated Gain	3 dBi on azimuth plane
Radiation	Omni-directional
Polarization	Vertical
TRP/TIS	Including cable loss the total radiate power (TRP) at the antenna shall be no less than
	+22/24.5 dBm for 850/1900 MHz respectively, and the total isotropic sensitivity (TIS) at the
	antenna shall be no less than -99/101.5 dBm for 850/1900 MHz respectively.

PTCRB Requirements for the Antenna

Do not alter 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.

Antennas Available from Multi-Tech Systems, Inc.

Quad Band Description	Qty	Part Number
Hinged Right Angle 800/900/1800/1900 MHz Cellular Modem Antenna	1	ANQB-1HRA
Hinged Right Angle 800/900/1800/1900 MHz Cellular Modem Antenna	10	ANQB-10HRA
Hinged Right Angle 800/900/1800/1900 MHz Cellular Modem Antenna	50	ANQB-50HRA
Dual Band Description	Qty	Part Number
Hinged Right Angle 900/1800 MHz Cellular Modem Antenna	1	ANF1-1HRA
Hinged Right Angle 900/1800 MHz Cellular Modem Antenna	10	ANF1-10HRA
Hinged Right Angle 900/1800 MHz Cellular Modem Antenna	50	ANF1-50HRA
Hinged Right Angle 800/1900 MHz Cellular Modem Antenna	1	ANCF2-1HRA
Hinged Right Angle 800/1900 MHz Cellular Modem Antenna	10	ANCF2-10HRA
Hinged Right Angle 800/1900 MHz Cellular Modem Antenna	50	ANCF2-501HRA
Mag Mount Dual Band Description	Qty	Part Number
Mag Mount 900/1800 MHz 1/2 Wave Cellular Antenna, 12.5"	1	ANF1-1MMHW
Mag Mount 900/1800 MHz 1/2 Wave Cellular Antenna, 12.5"	10	ANF1-10MMHW
Mag Mount 900/1800 MHz 1/2 Wave Cellular Antenna, 12.5"	50	ANF1-50MMHW
Mag Mount 900/1800 MHz 1/4 Wave Cellular Antenna, 4"	1	ANF1-1MMQW
Mag Mount 900/1800 MHz 1/4 Wave Cellular Antenna, 4"	10	ANF1-10MMQW
Mag Mount 900/1800 MHz 1/4 Wave Cellular Antenna, 4"	50	ANF1-50MMQW
Mag Mount 850/1900 MHz 1/2 Wave Cellular Antenna, 12.5"	1	ANCF2-1MMHW
Mag Mount 850/1900 MHz 1/2 Wave Cellular Antenna, 12.5"	10	ANCF2-10MMHW
Mag Mount 850/1900 MHz 1/2 Wave Cellular Antenna, 12.5"	50	ANCF2-50MMHW
Mag Mount 850/1900 MHz 1/4 Wave Cellular Antenna, 4"	1	ANCF2-1MMQW
Mag Mount 850/1900 MHz 1/4 Wave Cellular Antenna, 4"	10	ANCF2-10MMQW
Mag Mount 850/1900 MHz 1/4 Wave Cellular Antenna, 4"	50	ANCF2-50MMQW

Appendix C – Environmental Information

Waste Electrical and Electronic Equipment (WEEE) Statement

July, 2005

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.



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 reasonable 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 a part of a formal quality system and will be made available upon request.

Restriction of the Use of Hazardous Substances (RoHS)

Multi-Tech Systems, Inc.

Certificate of Compliance

2002/95/EC

Multi-Tech Systems, Inc. confirms that this product now complies with the chemical concentration limitations set forth in the directive **2002/95/EC** of the European Parliament (Restriction Of the use of certain Hazardous Substances in electrical and electronic equipment - **RoHS**)

These Multi-Tech Systems, Inc. products do not contain the following banned chemicals:

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

Moisture Sensitivity Level (MSL) =1

Maximum Soldering temperature = 260C (wave only)

Notes:

- 1. Lead usage in some components is exempted by the following RoHS annex; therefore, higher lead concentration could be found.
 - a. Lead in high melting temperature type solders (that is, tin-lead solder alloys containing more than 85% lead).
 - b. Lead in electronic ceramic parts (for example, piezoelectronic devices).
- 2. Moisture Sensitivity Level (MSL) Analysis is based on the components/material used on the board.