MultiModem® Cell

Wireless Modem



User Guide

MultiTech® Systems

MultiModem® Cell User Guide

Wireless Modem

MTCBA-E1, MTCBA-E1-U, MTCBA-C1, MTCBA-C1-U, MTCBA-G2, MTCBA-G2-U

S000489A, Revision A

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Revision History

Revision	Date	Description
A	07/14/10	Initial release.

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To create an account and submit a Support Case on the Portal, visit https://support.multitech.com

Online Web Portal

https://support.multitech.com

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

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Warranty

To read the warranty statement for your product, please visit: http://www.multitech.com/warranty.go

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Chapter 1 – Product Description and Specifications

Product Description

The Multi-Tech MultiModem® Cell cellular modems are a 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 utilizes Multi-Tech's Universal Socket design. The Cell modem is designed with either a quad-band GSM/GPRS network or dual-band CDMA2000 1xRTT network and a broad range of interface options including RS232, RS422, or a USB interface. All MultiModem Cells can be desktop or panel mounted.



Model	Description
MTCBA-E1	Quad-band E-GPRS Class 12 performance and either RS232 serial interface or RS422 serial interface
MTCBA-E1-U	Quad-band E-GPRS Class 12 performance and USB connectivity
MTCBA-C1	Multi-band CDMA2000 1xRTT performance and either RS232 serial interface or RS422 serial interface
MTCBA-C1-U	Multi-band CDMA2000 1xRTT performance and USB connectivity
MTCBA-G2	Quad-band GPRS Class 10 performance and either RS232 serial interface or RS422 serial interface
MTCBA-G2-U	Quad-band GPRS Class 10 performance and USB connectivity

Related Documentation

MultiModem MTCBA-E1 (EDGE)

The MultiModem EDGE wireless modem delivers some of the fastest cellular wireless data speeds utilizing EDGE technology. It allows users to connect to the Internet, send and receive data up to three times faster than possible with an ordinary GSM/GPRS network making it ideal for highly data-intensive multimedia applications.

AT Commands: The MultiModem MTCBA-E1 wireless modem is configured using the EDGE AT Commands. These commands are documented in the Reference Guide for the MultiModem Wireless EDGE Modems, document number S000474*x*.

MultiModem MTCBA-C1 (CDMA)

The MultiModem CDMA wireless modem offers standards-based multi-band CDMA200 1xRTT performance. The ready-to-deploy, standalone modem allows developers to add wireless communication to products with a miniumum of development time and expense. The MultiModem CDMA wireless modem is base on industry-standard open interfaces and can be desktop or panel mounted.

AT Commands: The MultiModem MTCBA-C1 wireless modem is configured using the CDMA AT Commands. These commands are documented in the Reference Guide for the MultiModem Wireless CDMA Modems, document number S000478*x*.

MultiModem MTCBA-G2 (GPRS)

The MultiModem MTCBA-G2 wireless modem offers standards-based quad-band GPRS Class 10 performance. It allows users to connect to the Internet and send and receive data faster than possible with an ordinary GSM/GPRS network. Based on industry-standard open interfaces, the MultiModem MTCBA-G2 wireless modem is equipped with quad-band, high-speed RS232 technology, which means it can be used worldwide on all existing GSM networks.

AT Commands: The MultiModem MTCBA-G2 wireless modem is configured using the GPRS AT Commands. These commands are documented in the Reference Guide for the MultiModem Wireless GPRS Modems, document number S000463*x*.

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 and should be treated with care. The suggestions below will help you to 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 violently 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

The front panel is designed with LEDs that display modem activity. The LEDs display modem activity, such as transmit and receive data, carrier detection, link status, terminal ready indicating connection to the pc, and the power indicator. The SIM door on the right side of the modem provides access to the SIM card holder for those configurations.

	
MTCBA-E1/-U, MTCBA-G2/-U	**MTCBA-C1/-U**

LEDs

LED Indicators			
TD	**Transmit Data:** Lit when modem is transmitting data.		
RD	**Receive Data:** Lit when modem is receiving data.		
CD	**Carrier Detect:** Lit when data connection has been established.		
TR	**Terminal Ready:** Lit when modem is transmitting data.		
LS	**Link Status Dependent on Model**		
	-E1 version* (AT^SSYNC=1)	**-G2 version**	**-C1 version**
	Permanently off. ME is in one of the following modes: Power Down mode, Airplane mode Non-Cyclic Sleep mode with no temporary wake-up event in progress. ***600 ms on/600 ms off*** Limited Network Service: No SIM card inserted or no PIN entered, or network search in progress or ongoing user authentication, or network login in progress. ***75 ms on/3 sec off*** Idle mode: The mobile is registered to the GSM network (monitoring control channels and user interactions). No call is in progress. ***75 ms on/ 75 ms off/75 ms on/3 sec off*** One or more GPRS contexts activated. ***500 ms on/ 25 ms off*** Packet switched data transfer in progress. ***Permanently on*** CSD call – Connected to remote party.	**Permanently On:** Not registered on network. **200 ms on/2 sec off** Registered on network. **200 ms on/600 ms off** Registered on the network and communications in progress **100 ms on/200 ms off** Software downloaded is either corrupted or non-compatible (“bad software”)	The LS light is not active on the CDMA builds.
PWR	**Power:** Indicates presence of DC power when lit.		

Note: The Link Status (LS) LED requires an AT^SSYNC=1 command on power up or Reset in order the LED to perform as in the above table. For other EDGE AT commands, refer to the EDGE (E1) AT Command Reference Guide on your CD.

Package Contents

Note: Your wireless provider will supply the SIM card (not needed for –C1 versions).

Unbundled Package with No Accessories	Bundled Package With Accessories
1 modem 1 MultiModem CD **Note:** You must supply mounting screws, AC or DC power supply, and an antenna.	1 modem 1 antenna 1 MultiModem CD 1 RS232 or USB cable 1 power supply with serial versions **Note:** You must supply mounting screws.

Specifications

Features	MTCBA-E1/-U	MTCBA-C1/-U	MTCBA-G2/-U
Performance	**EDGE:** E-GPRS Class 10, **GPRS:** Class 12	CDMA2000 1xRTT	**GPRS;** Class 10
Band, Frequency	Quad-band GSM/GPRS/EDGE 850/900/1800/1900MHz	Dual-band 800/1900 MHz CDMA; 800 MHz and 800/1900 MHz	Quad-band, GSM/GPRS, 850/900/1800/1900 MHz,
Packet Data	**EDGE:** E-GPRS Up to 240K bps, coding scheme MCS-9, mobile station Class B, LLC layer, 4 time slots **GPRS:** Full PBCCH support, coding scheme 1-4, mobile station Class B	Up to 153.6K bps forward and reverse	Up to 85.6K bps, coding schemes CS1 to CS4
Circuit-Switched Data	Up to 14.4K bps, non-transparent	IS-95A, IS 95B up to 14.4K bps forward and reverse	GPRS up to 14.4K bps transparent and non-transparent
Short Message Services- SMS	Text & PDU, Point-to-Point (MO/MT), cell broadcast		
Antenna Connector	RF Antenna: 50 ohm SMA (female connector)		
SIM Connector	Standard 1.8 and 3V SIM receptacle	-	Standard 1.8 & 3V SIM receptacle
RS232 Connector	DE9 only on serial versions		
USB Connector* **	Type B only on USB versions		
Power Connector	2.5mm miniature (screw-on) Serial only		
Voltage	9V to 32 VDC Serial only, 5.0V USB input voltage supplied by USB connector		
Serial Power*	**Sleep** 0.028A, .26W @ 9V,0.018A, .36W @ 20V, 0.013A, 0.042W @ 32V **Typical** 0.086A, 0.80W @ 9V, 0.045A, .90W @ 20V; .032A, 1.02W @ 32V **Max** 0.305A, 2.81W @ 9V, 0.42A, 2.84W @ 20V,.094A, 3.01W @ 32V **Peak**. 2.20A @9 V, 0.850A @ 20V, 0.520A @32V	**Sleep** 0.030A, .28W @ 9V,.018A, 0.36W @ 20V, 0.013A, 0.042W @ 32V **Typical** 0.112A,.1.03W @ 9V, 0.058A, 1.16W @ 20V; 0.041A, 1.31W @ 32V **Max** 0.287A, 2.63W @ 9V, 0.171A, 3.42W @ 20V,0.113A, 3.62W @ 32V	**Sleep** 0.027A, 0.25W @ 9V, 0.017A, 0.34W @ 20V, 0.013A, 0.42W@32V **Typical** 0.084A, 0.78W @ 9V, 0.045A, 0.90W @ 20V, .032A, 1.02W @32V **Max** 0.178A, 1.64W @ 9V, 0.086A, 1.72W @ 20V, 0.058A, 1.86W @ 32V **Peak** 1.90A @ 9V, 0.840A @ 20V, 0.575A @ 32V
USB Power* **	**Sleep** 0.035A, 0.181W **Typical** 0.136A, 0.68W **Max** 0.495A, 2.38W **Peak** 1.450A	**Sleep** 0.028A, 0.141W **Typical** 0.175A, 0.858W **Max** 0.510A, 2.326W	**Sleep** 0.070A, 0.35W **Typical** 0.133A, 0.66W **Max** 0.250A, 1.23W **Peak** 1.000A
Physical Description	4.114" W x1.065"Hx2.350"D ___ lbs 12.5cmW x2.7cmH x 8.6cmD 0.__Kg		
**Operating Temperature ** **	-30° to +70° C UL listed @ 40°		
Storage Temp	-40° to +85° C		
Humidity	Relative humidity 20% to 90% noncondensing		
Certifications	**EMC Compliance** FCC Part 15 EN55022 EN55024 **Radio Compliance** FCC Part 22, 24 RSS132,133 EN301 489-1 EN301 489-7 EN301 511 AS/ACIF S042.1, S042.3 **Safety:** UL60950-1 cUL60950-1 IEC60950-1 **Network:** PTCRB	**EMC Compliance** FCC Part 15 **Radio Compliance** FCC Part 22, 24 RSS132,133 **Safety:** UL60950-1 cUL60950-1 IEC60950-1 **Network:** CDG 1&2	**CE Mark, R&TTE** **EMC Compliance:** FCC Part 5 EN55022, EN55024 **Radio Compliance** FCC Part 22, 24 RSS 132,133 EN 301 511 EN 301 489-1 EN 301 489-7 AS/ACIF S042.1, .3 **Safety:** UL60950-1 cUL 60950-1 EN 60950-1 AS/NZS 60950-1 **Network:** PTCRB, GCF

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

****** 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."

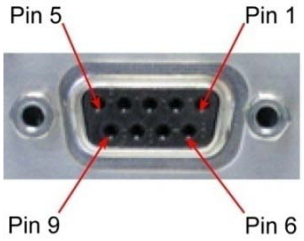
*** The USB connector replaces the serial connector on the –U versions.

9-Pin Fem-D Sub Serial Connector

The following table explains the pin functions.

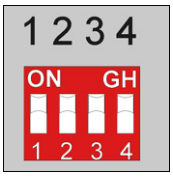
DE9 Pin Assignment			
DE9 Pins	**RS232 Signals DCE**	**RS422 Full Duplex Signals**	**Signal Direction**
Pin 1	Data Carrier Detected (DCD)	RxD-	Out
Pin 2	RXD	RxD+	Out
Pin 3	TXD	TxD+	In
Pin 4	Data Terminal Ready (DTR)	TxD-	In
Pin 5	Ground	Ground	N/A
Pin 6	Data Set Ready (DSR)	Ready To Send - (RTS-)	Out – RS232 In – RS422
Pin 7	Ready To Send (RTS)	Ready To Send + (RTS+)	In
Pin 8	Clear To Send (CTS)	Clear To Send + (CTS+)	Out
Pin 9	Ring Indicator (RI)	Clear To Send - (CTS-)	Out

Female Connector



4-Position DIP Switch

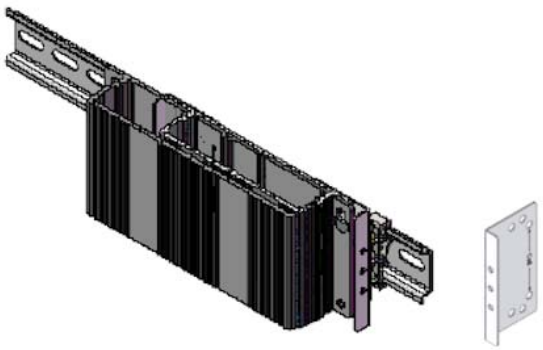
Switch Position	Up/On Down/Off	Description
Position 1	Off	DTR Reset Disabled
Position 1	On	DTR Reset Enabled
Positions 2-4		**Only valid for serial builds**
Position 2	Off	No TXD Termination
Position 2	On	TXD Diff Pair Terminated
Position 3	Off	No RTS Termination
Position 3	On	RTS Diff Pair Terminated
Position 4	Off	RS232 Mode
Position 4	On	RS422 Mode



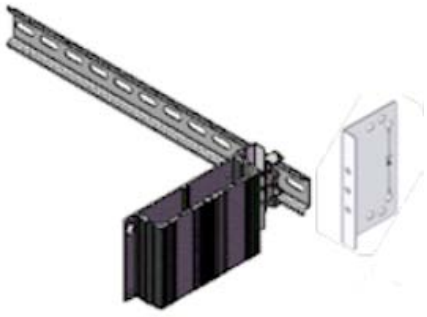
Note: Positions 2 and 3 should only be used in RS422 Mode. Enabling TXD/RTS termination may be required to avoid errors at high bit rates or long cable lengths. Multi-Tech Systems tested the cable up to 1,000 feet , but the maximum may be more with termination enabled and lower data rates.

DIN Rail Mounting

Your modem can be mounted in a rack enclosure using the DIN Mounting kit supplied with your product.



Vertical Mounting



Perpendicular Mounting

Chapter 2 – Activation and Installation

Activate Your Wireless Account

Please refer to the wireless account Activation Notices included with your unit and located on the MultiModem CD. Choose the one for your wireless network provider and follow the directions to activate your account.

Phone Numbers for the Wireless Modem

Every wireless modem will have its own unique phone number. The phone number may simply be given to you by your wireless service provider or it may be on the SIM card or both. Wireless provider implementations may vary.

Insert the SIM Card into Holder [if required]

The MultiModem requires the power supply connection to begin operation. It also requires a SIM card (Subscriber Identity Module) to operate on a GSM network. To install the SIM, do the following:

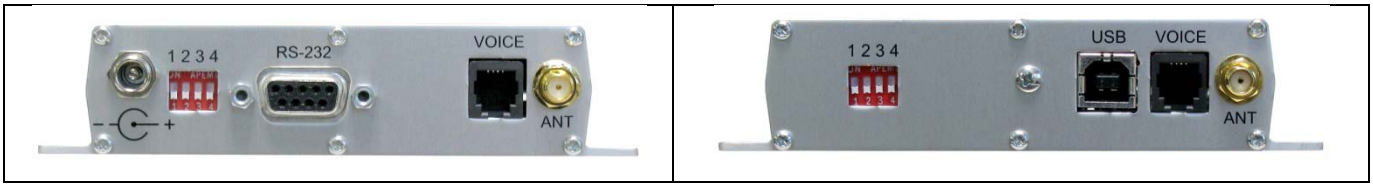
1. Using a small Phillips screwdriver, remove the two SIM door screws and remove the SIM door.

   Note: When changing a SIM, ensure that power is removed from the unit.



2. Insert the SIM card into the card holder. The above graphic illustrates the correct SIM card orientation.
3. Verify that the SIM card fits into the holder properly and then replace the cover.

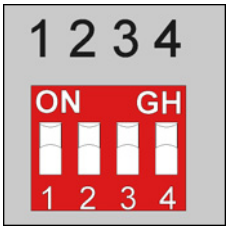
Connect the Antenna, Serial or USB Cable, Power, Optional Power or Voice Cable



1. Connect a suitable antenna to the ANT connector on the right side of the unit (see antenna specifications in Chapter 1).
2. If you are connecting to a serial interface, connect a serial cable to the RS232 connector on the back of the unit and connect the other end of the serial cable to the serial port on your PC.

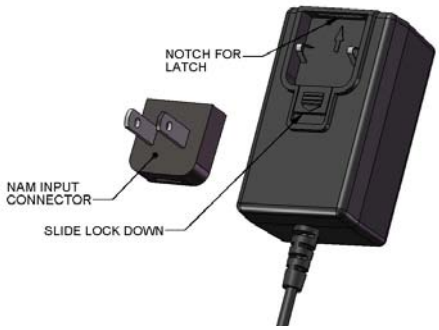
   If you are connecting to an USB interface, connect an USB cable to the USB connector on the back of the unit and the other end to the USB port on your PC.
3. Set the 4-position DIP Switch on the back of the unit to the configuration of your unit.

Switch Position	Up/On Down/Off	Description
Position 1	Off	DTR Reset Disabled
Position 1	On	DTR Reset Enabled
Positions 2-4		**Only valid for serial builds**
Position 2	Off	No TXD Terminiation
Position 2	On	TXD Diff Pair Terminated
Position 3	Off	No RTS Termination
Position 3	On	RTS Diff Pair Terminated
Position 4	Off	RS232 Mode
Position 4	On	RS422 Mode



Note: Positions 2 and 3 should only be used in RS422 Mode. Enabling TXD/RTS termination may be required to avoid errors at high bit rates or long cable lengths. Multi-Tech Systems tested the cable up to 1,000 feet , but the maximum may be more with termination enable and lower data rates.

4. If you are connecting a hand set to the unit for voice communication, connect an RJ11 cable from the hand set to the VOICE connector on the back of the unit. To adjust the volume of the hand set, refer to the appropriate AT Command Reference Guide on your product CD.
5. Depending on the power source, connect either the power supply module with the appropriate blade or the optional DC power cable. If you are using the power supply module, remove the protective shipping cover. Attach the appropriate interchangeable blade piece to the power supply module.



Screw-on the power lead from the power supply module to the power connection on the modem. Now, plug the power supply into your power source.

For Optional Direct DC Power

- Screw-on the DC power cable to the power connector on the modem.
- Then attach the two wires at the other end of the DC power cable to a DC fuse/terminal block on a vehicle in which you are mounting the MultiModem.
- Connect red wire to the "+" (positive) terminal and black wire to the "–" (negative) terminal. Be sure the GND connection is correct.

Warning: Over-voltage protection is provided on the device. To ensure complete protection, you may want to add additional filtering to the DC input.

Note: For automotive application: according to the type of application, you can use permanent "+" or key-switched "+" source. Connect the power supply to its source (for example, in a mobile situation, to the vehicle's DC fuse/terminal block).

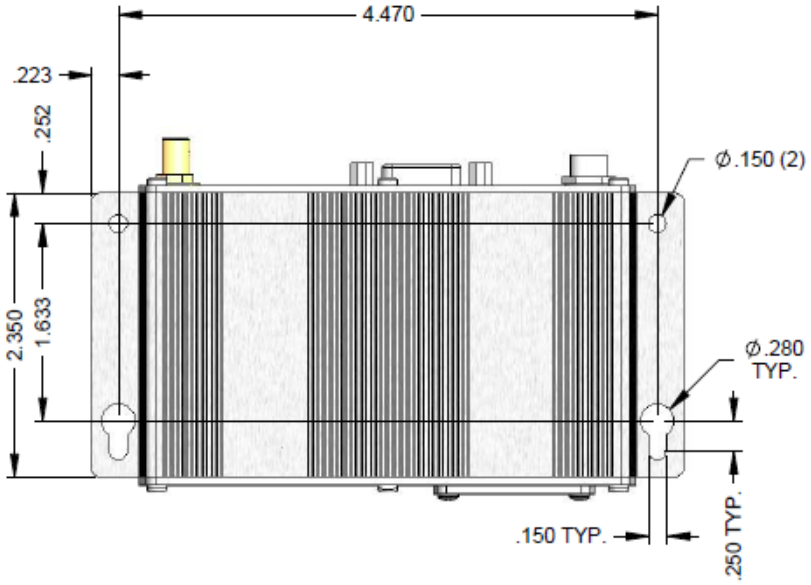
Optional Mounting

The Cell can be panel mounted with screws spaced according to the measurement shown.

Flat Surface Mounting

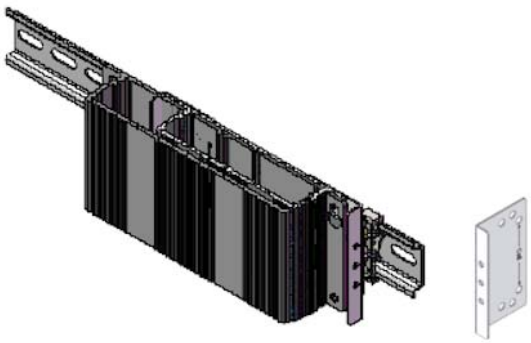
The Cell can be panel mounted with screws spaced according to the measurements showing.

Note: Use either #4 or #6 pan head screws for all four mount locations.

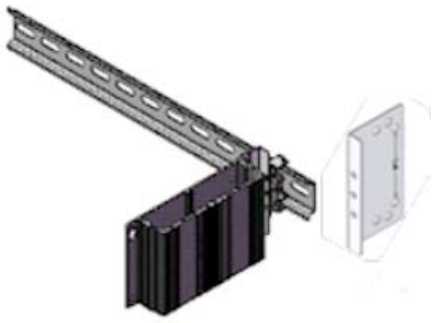


DIN Rail Mounting

Your Cell can be mounted in a rack enclosure using the DIN Mounting kit supplied with your product.



Vertical Mounting



Perpendicular Mounting

USB CDC-ACM Virtual COM Port Installation

Windows XP (SP3 or greater), VISTA, 2003 Server, Windows 7 (32-bit or 64-bit), Linux (Kernel 2.6.xx using CDC-ACM module) are supported.

For Linux, a 2.6.28 kernel or greater is required. The standard CDC-ACM driver will work.

Note: Certain levels of Windows have an issue with their CDC-ACM driver (Usbser.sys). If you are having connection problems (file download, web pages not loading) your version of Usbser.sys must be updated. Microsoft article 925681 documents this issue and provides a fix.

After installing the virtual com port, the correct modem driver may be installed to the com port (for the USB versions, make sure the USB port of the Cell is connected with a SIM card before the modem driver is installed).

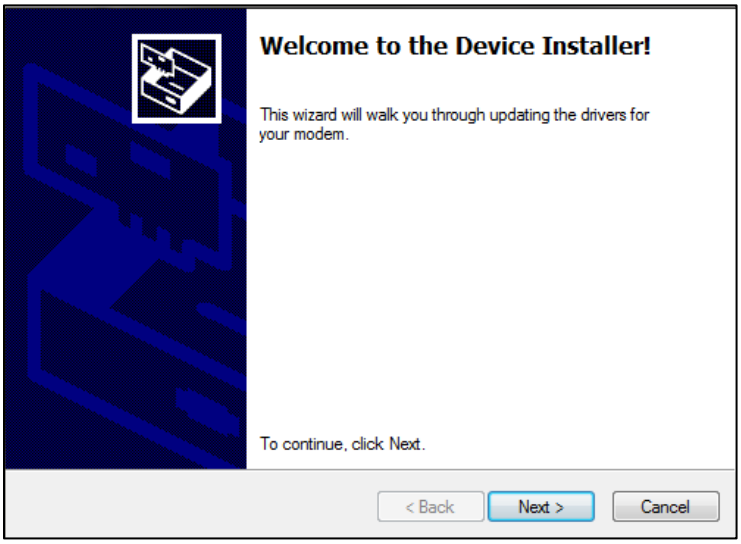
Install Virtual COM Port

Your product CD contains an installer program for current Windows operating systems (Windows XP and newer only) . For Windows, run the automatic installer from your product CD or run install.bat from the VCOM_autoinstall directory on your product CD.

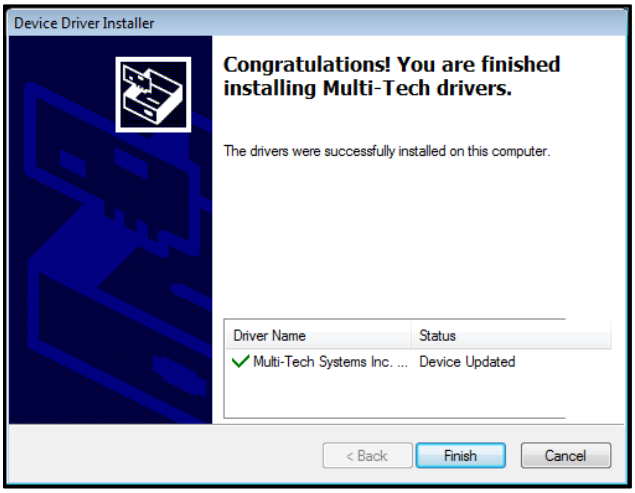
1. For USB versions of the Cell, ensure that the USB cable is connected to your PC.
2. For GSM versions of the Cell, ensure that the SIM card is installed prior to powering up.
3. If any Windows Install Wizard pops up, close or cancel the wizard.
4. Insert the product CD into a compatible drive.
5. Click on the **Preinstall Windows Drivers** button from the main splash screen of the CD.



6. Windows may pop-up a User Account Control window. Select the YES button to continue with the driver installation.
7. Click on the next button to start the driver pre-installation.



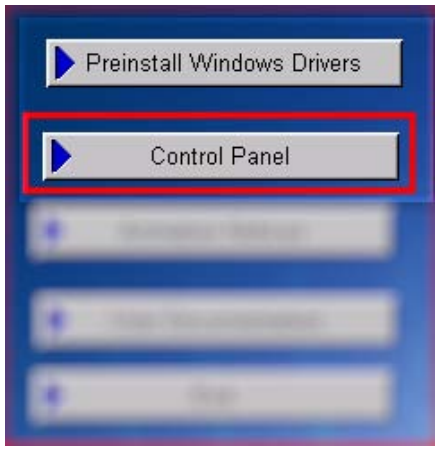
8. There will be a transitory screen, then the process will complete. Click on the **Finish** button.



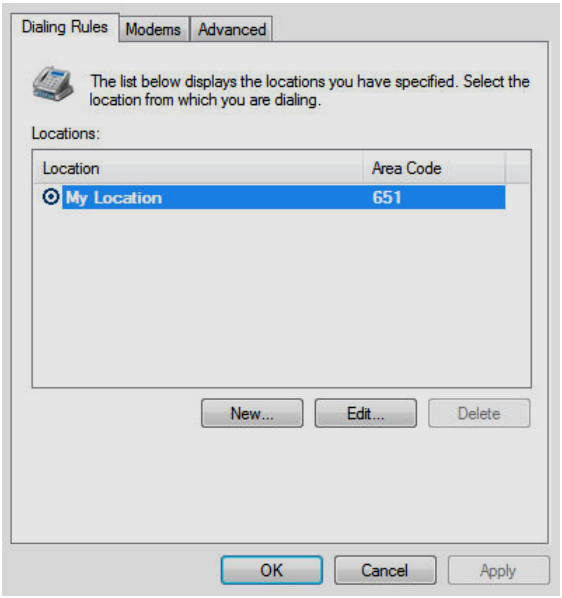
9. Next, continue with installing the modem driver.

Install the Modem Driver

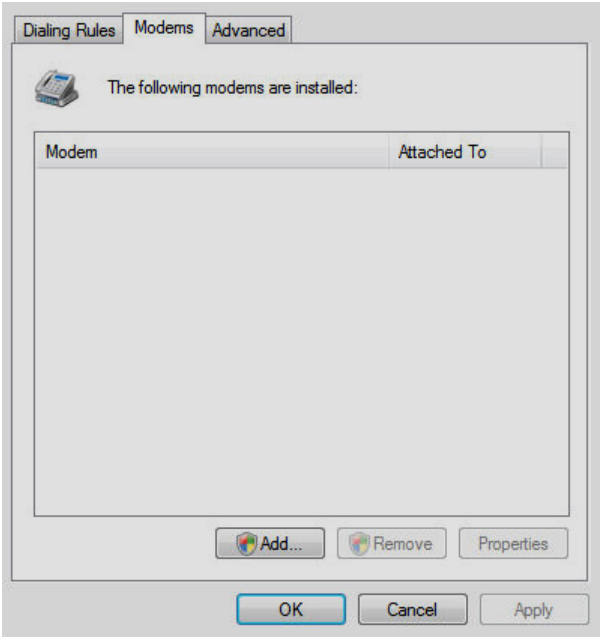
1. Click on the **Control Panel** button from the main splash screen on the CD.



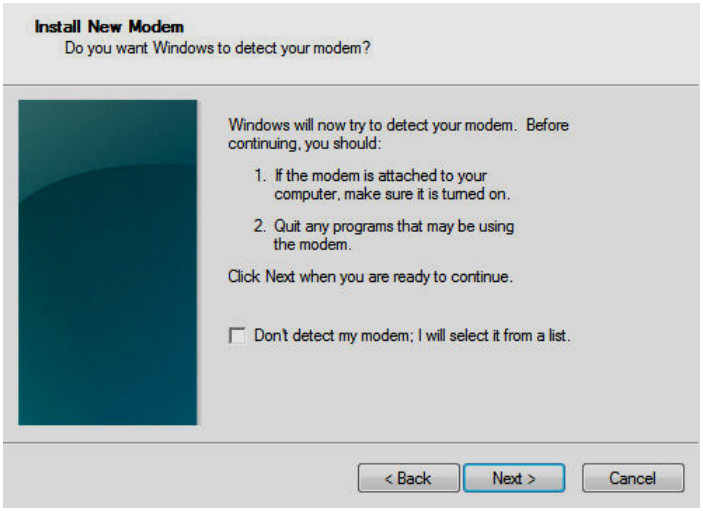
2. The **Control Panel** is displayed, double-click on **Phone and Modem Options** icon. Then click on the **Modems** tab.



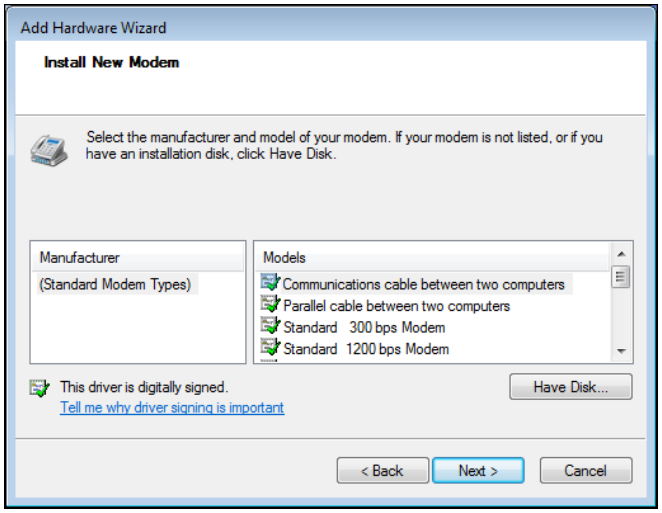
3. When this **Phone and Modem Options** screen appears, click on the **Add** button.



4. On the Install New Modem screen, click **Don't detect my modem, I will select it from a list**. Then click **Next >**.

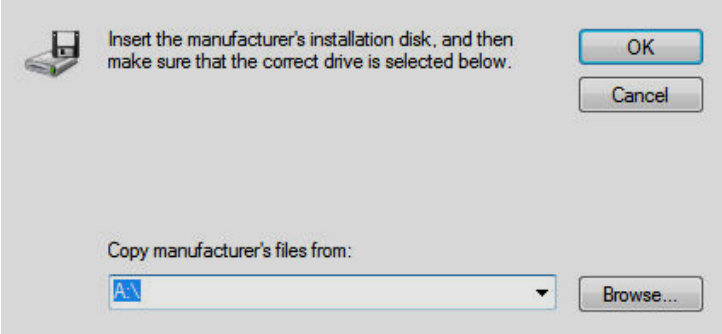


5. On the **Install New Modem** screen, click the **Have Disk** button to browse for the driver file on the MultiModem CD.

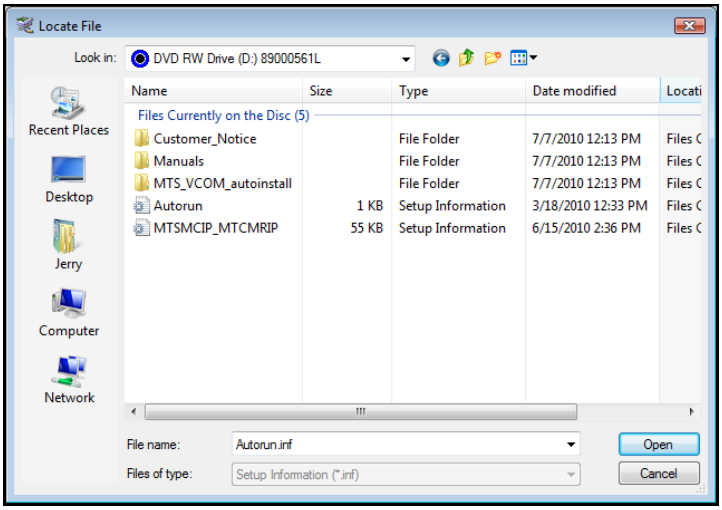


Then click **Next>**.

6. Make sure that the MultiModem CD is inserted into your CD-ROM, browse to your MultiModem CD.

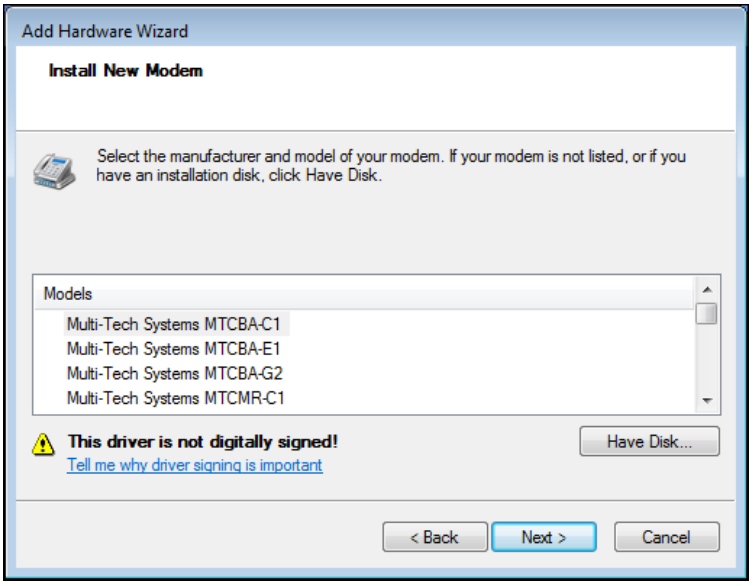


7. Select the **MTSMCIP_MTCMRIP.INF** file.



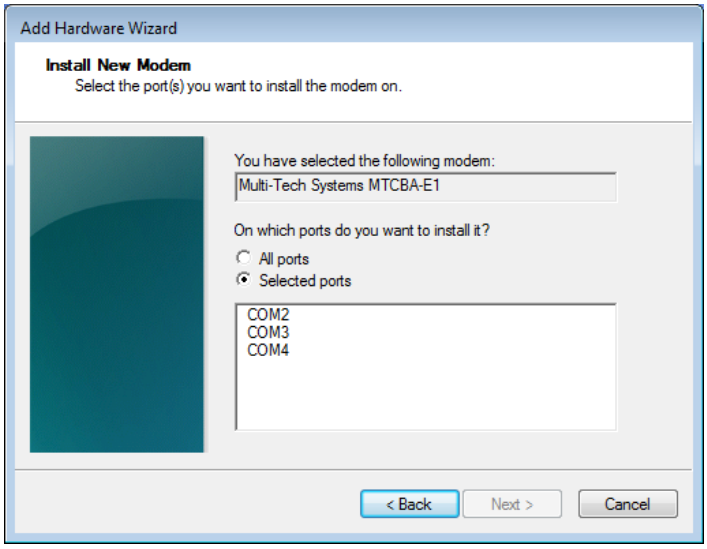
Then click **OK.**

8. In the Models window, scroll down the list of Models and select the model that is applicable to your modem.



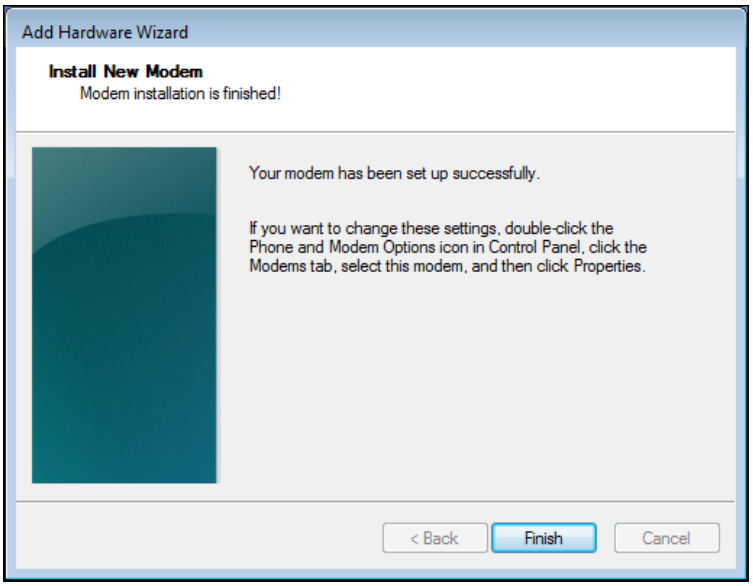
Once you have selected your model, click on **Next>**.

9. You will now have to choose which com port the MultiModem is connected to.



If you know exactly which port your modem is on, click on that port; otherwise, go to **Device Manager > Ports (COM & LPT)** to verify which port the **MultiModem Cell MTCBA-X-U** is installed on. Click **Next >**.

10. To finish the install, click on **Finish**.



You have now successfully installed the MultiModem driver to your PC.

Verifying That Your Modem Has Been Installed Successfully

1. After you have successfully installed the MultiModem driver as stated above, you should be brought back to the *Phone and Modems Options* screen. Make sure that the modem is now listed under the columns **Modem** and **Attached To** (the correct com port).
2. Highlight the modem and then click on **Properties**.
3. A **Properties** screen will open for the Multi-Tech modem. Click on the tab labeled **Diagnostics**.
4. In the middle of the screen, click on the **Query Modem** button. Windows will now try to query the Multi-Tech modem. If this process passes, the second box on this screen will show the columns **Command** and **Response**.
   Note: To make sure that the modem is correctly being queried, look at the LED lights of the modem after you click on *Query Modem*. The TR light should come on and the TD and RD lights should flicker.
5. If this process passes, then the modem should be properly installed and ready for use. Click **OK** to close the modem *Properties* window. Then click on **OK** to close the *Phone and Modem Options* window.

Chapter 3 – Using Your Wireless Modem

Phone Numbers for the Wireless Modem

- Every wireless modem will have its own *unique ph*one number.
- The phone number may simply *be given to you by yo*ur wireless service provider or it may be on the SIM card or both. Wireless provider implementations may vary.

Examples of Useful AT Commands

A Note About HyperTerminal

In order to verify signal strength and roaming status, you must use a terminal application such as HyperTerminal. To open this program in Windows Vista or 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 it.

A Note About AT Commands

AT commands can be used to operate, configure, and query your modem. AT commands for the MultiModem Cells are published in separate Reference Guides included on the MultiModem CD and posted on the Multi-Tech web site.

The following two commands let you query signal strength and roaming status.

Verifying Signal Strength

Using **HyperTerminal**, type **AT+CSQ**
The modem responds with the received signal strength (rssi).
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

In this procedure, you will verify that the MultiModem has been registered on the wireless network. Using **HyperTerminal**, type **AT+CREG?**

The modem will respond in one of the following ways:

Network Registration Verification	
Value	**Network Registration Status**
0,0	The modem is not registered on any network
0,1	The modem is registered on the home network
0,5	The modem is registered on a network and it is roaming

Note: If the modem indicates that it is not registered, verify the signal strength to determine if the problem is the strength of the received signal.

Checking the Modem's Identity

Use the **ATI** command (Note: This command is illustrated using the capital letter I after **AT**)

- Type **ATI0** (Note: The command ends in a zero)
  The manufacturing data displays. For example: Wavecom Modem Multiband G850 1900
- Type **ATI3**
  The software version displays. For example: 651_09gg...
- Type **ATI6**
  Displays modem data features. For example: data rates, data modes, fax classes.

Connecting to the Internet

The Multi-Tech MultiModem Cell is designed for a GPRS wireless network. Internet access can be setup in Windows Dial-Up Networking (DUN) of the computer that the MultiModem Cell is serving. For a GPRS network, you have to 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).

Connecting to a CDMA Network for Internet Access

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

Requirements

- One CDMA capable MultiModem Cell modem
- The modem must be getting a proper signal and be showing a network registration through the wireless provider's network
- A PC running Windows Vista or XP with the Multi-Tech drivers installed for your particular model

The following instructions are for Windows Vista or XP. Every PC may have slight differences which may cause the instructions to be different. Use these instructions as a guide to help you understand what is required to set up an Internet connection through your wireless service provider for all operating systems.

Connecting to an EDGE/GPRS Network for Internet Access

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

Requirements

- One EDGE capable MultiModem Cell modem
- The MultiModem Cell modem should have an EDGE capable network and an active SIM card
- The modem must be getting a proper signal and be showing a network registration through the wireless provider's network
- A PC running Windows 7, Vista or XP with the Multi-Tech drivers installed

The following instructions are for Windows 7, Vista and XP. Every PC may have slight differences which may cause the instructions to be different. Use these instructions as a guide to help you understand what is required to set up an Internet connection through your wireless service provider for all operating systems.

Set the Access Point Name (APN) into the Modem's Properties on your PC

In order for your EDGE modem to connect to your provider's network, you must tell the modem the APN to which it will connect. The APN is a server name that your account is setup on with your provider. Your APN will be given to you by your provider. Here are some well known APNs:

- AT&T; PROXY, or INTERNET, or PUBLIC
- T-Mobile: INTERNET2. VOICESTREAM.COM, or INTERNET3.VOICESTREAM.COM, or WAP.VOICESTREAM.COM
- Rogers AT&T of Canada: INTERNET.COM

Setting up an Access Point Name (APN)

- Click on the **Start** button and then **Control Panel**.
- In Control Panel, double-click on Phone and Modem Options.
- In the **Phone and Modem Options** screen, click on the **Modems** tab. Highlight your Cell modem listed in the table and then click on **Properties**.
- A **Properties** window for your modem will display. For Windows Vista and later operating systems, click on the

  Change Settings button.
- Click on the **Advanced** tab. You should see an **Extra Settings** box. In the Extra initialization commands text box, enter:

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

  For <APN>, enter in the correct APN for your account.

  For example: **AT+CGDCONT=1"IP","ISP.AT&T"**
- Click **OK** to close the Properties window. Then click **OK** to close the Phone and Modems Options window.

Create Your Dial-Up Connection in Windows Vista and XP

1. Click on **Start** and then click on **Control Panel**.
2. In the *Control Panel*, double-click on **Network Connections**.
3. On the *Network Connections* screen on the left-hand side under **Network Tasks**, click on **Create a new connection**.
4. The *New Connection Wizard* should appear. It will walk you through setting up your Internet connection. Click on **Next >** to begin.
5. On the *Network Connection Type* screen, select **Connect to the Internet**, and then click **Next >**.
6. On the *Getting Ready* screen, select **Set up my connection manually**, and then click **Next >**.
7. On the *Internet Connection* screen, select **Connect using a dial-up modem**, and then click **Next >**.
   Note: After clicking on Next, you may or may not be asked to select which modem to use. If you have more than one modem installed in your PC, you will be required to select the proper modem to use. If asked, please select the Multi-Tech wireless modem that has been installed.
8. On the *Connection Name* screen in the **ISP Name** box, type in a name for your new connection. You can give it any name that you would like. After you have typed in a name, click **Next >**.
9. On the *Phone Number to Dial* screen, type in the number that specifies to the modem to connect to your provider's Internet service.

   Type in the number ***99***1#**.
   Then click **Next>**.

   For CDMA modems, type in the number **#777.**
   Then click **Next >**.
10. On the *Connection Availability* screen, specify if this connection is for anyone's use or for your use only by checking the appropriate button. Choose your preference, and then click **Next>**.
11. On the *Internet Account Information* screen, type the user name and the password for your account. In many cases, a user name and a password are not required, but some wireless providers require it. Check with your provider to see if they are needed.

    Check the following two options if you would like them activated:
    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. Then click **Next >**.
12. On the *Completing the New Connection Wizard* screen, your last task is to place a check in the box if you would like to add a shortcut to your desktop. Then click **Finish**.
13. A *Connection* screen displays on your desktop. Click the **Properties** button on the bottom of this screen.
14. The *Properties* window will open for you to make your connection.

    Important: Make sure that *Use dialing rules* is not selected, and then click **OK**.
15. Once back at your *Connection* screen, click the **Dial** button at the bottom of the screen to start the connection.
16. The connection will now tell the modem to connect to your provider's Internet service. Once connected, you should see the connection status icon in your system tray at the bottom right-hand corner of your screen.

    You should now be able to open Internet Explorer or any other browser of your preference to surf the Internet.

Disconnecting the Connection:

1. To disconnect the connection, right click on the connection icon in your system tray at the bottom right-hand corner of your screen.
2. Scroll up and click on **Disconnect**.
   You should now be disconnected from the Internet.

Generic Dial-Up Method - Non-Windows

1. If CDMA, dial onto the network using **AT#777**
2. If GPRS/EDGE:
   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. dial onto the network using **AT*99***1#**

Serial Baud Rate

Your MultiModem Cell is defaulted to a serial baud rate of 115200 from the factory. To enjoy faster baud rates, you can manually set the modem to a higher speed (230400, 460800, or 921600) using the **AT+IPR=<baudspeed>**. However, you must make sure the host serial port is capable of the new speed. If the new speed is set and the host hardware is not capable of the higher speed, you will need to find a host that is capable.

Appendix A – Regulatory Compliance

CE

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

The cellular/wireless performance is completely dependent 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 certified antenna system of the MultiModem, then recertification will be 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

CDMA RF Specifications

	CDMA 800	CDMA 1900
Frequency RX	869 to 894 MHz	1930 to 1990 MHz
Frequency TX	824 to 849 MHz	1850 to 1910 MHz

CDMA Antenna Requirements/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
Antenna Loss	Free space not to exceed -3dB
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.

GSM/EGSM RF Specifications

	GSM 850	EGSM 900	GSM 1800	GSM 1900
Frequency RX	869 to 894 MHz	925 to 960 MHz	1805 to 1880 MHz	1930 to 1990 MHz
Frequency TX	824 to 849 MHz	880 to 915 MHz	1710 to 1785 MHz	1850 to 1910 MHz

GSM 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
Antenna Loss	Free space not to exceed -3db
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

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.

Antennas Available from Multi-Tech Systems, Inc.

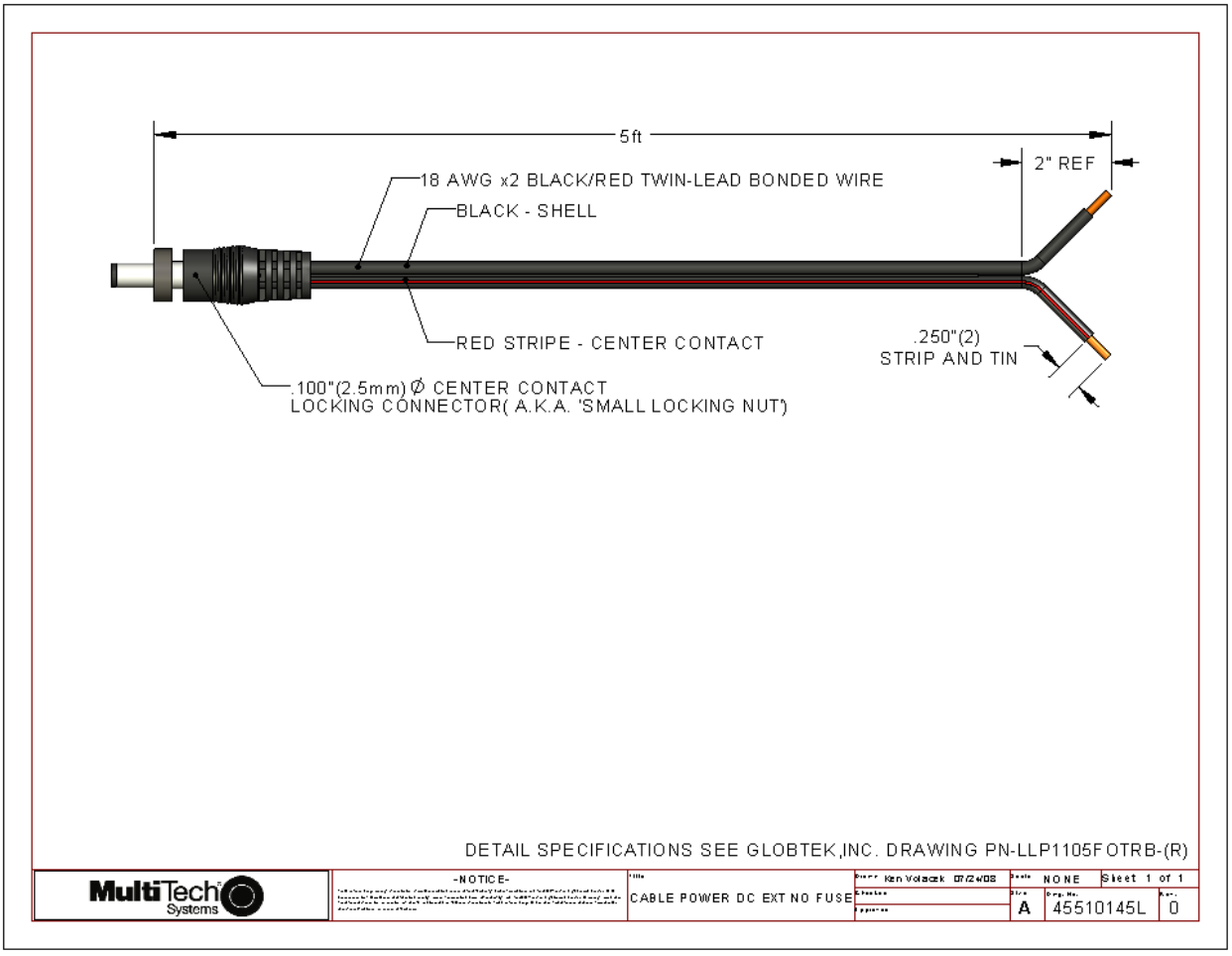
Quad Band Description	Qty	Part Number
Hinged Right Angle 800/900/1800/1900 MHz Cellular Modem Antenna	1	ANQB-1HRA
Hinged Right Angle 800/900/1800/1900 MHz Cellular Modem Antenna	10	ANQB-10HRA
Hinged Right Angle 800/900/1800/1900 MHz Cellular Modem Antenna	50	ANQB-50HRA

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 – DC Power Cable

DC Power Cable Dimensions



Appendix D – 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 (i.e., tin-lead solder alloys containing more than 85% lead).
   b. Lead in electronic ceramic parts (e.g., piezoelectronic devices).
2. Moisture Sensitivity Level (MSL) – Analysis is based on the components/material used on the board.

C – RoHS

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。

成分名称	有害/有毒物质/元素					
	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
IC	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
LED	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。