

**MultiTech**<sup>®</sup>  
Systems



# QuickCarrier<sup>™</sup> USB-D EV-DO

MTD-EV3 User Guide

## QuickCarrier USB-D MTD-EV3 User Guide

Models: MTD-EV3

Part Number: S000570, Version 1.2.4

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

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U.S., Canada, all others:	<a href="mailto:support@multitech.com">support@multitech.com</a>	(800) 972-2439 or (763) 717-5863

#### Warranty

To read the warranty statement for your product, visit [www.multitech.com/warranty.go](http://www.multitech.com/warranty.go). For other warranty options, visit [www.multitech.com/es.go](http://www.multitech.com/es.go).

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# Contents

<b>Product Overview .....</b>	<b>5</b>
Overview .....	5
Documentation .....	5
MTD-EV3 Specifications .....	5
Dimensions.....	6
Link Status LED .....	6
Turning the Device On or Off.....	7
Power Draw.....	7
<b>Safety Notices and Warnings .....</b>	<b>8</b>
General Safety.....	8
Radio Frequency (RF) Safety .....	8
Sécurité relative aux appareils à radiofréquence (RF).....	8
Interference with Pacemakers and Other Medical Devices .....	9
Potential interference.....	9
Precautions for pacemaker wearers .....	9
Device Maintenance .....	9
User Responsibility.....	10
<b>Activation and Carrier Specific Information.....</b>	<b>11</b>
Account Activation for Cellular Devices .....	11
Device Phone Number .....	11
Creating a Windows Dial-Up Connection.....	11
Notice for Devices that Use Aeris Radios.....	11
<b>Using Linux .....</b>	<b>12</b>
Shell Commands.....	12
Testing Serial Ports.....	12
Create a PPP Connection .....	12
Example.....	12
<b>Basic Operations .....</b>	<b>14</b>
Interacting with Your Device Overview .....	14
Related Documentation .....	14
Before You Begin.....	14
Using Command Mode and Online Data Mode.....	14
Verifying Signal Strength.....	15
Example .....	16
Checking Network Registration.....	16
Reading, Writing, and Deleting Messages .....	16
Reading Text Messages.....	16

Sending Text Messages ..... 16

Deleting Messages ..... 17

**Regulatory Statements ..... 18**

47 CFR Part 15 Regulation Class B Devices ..... 18

Industry Canada Class B Notice..... 18

EMC, Safety, and R&TTE Directive Compliance ..... 18

International Modem Restrictions ..... 19

Other Countries..... 19

**Environmental Notices..... 20**

Waste Electrical and Electronic Equipment Statement ..... 20

WEEE Directive..... 20

Instructions for Disposal of WEEE by Users in the European Union ..... 20

Restriction of the Use of Hazardous Substances (RoHS) ..... 21

REACH Statement ..... 22

Registration of Substances..... 22

Substances of Very High Concern (SVHC) ..... 22

Information on HS/TS Substances According to Chinese Standards ..... 23

Information on HS/TS Substances According to Chinese Standards (in Chinese) ..... 24

**Index..... 25**

# Product Overview

## Overview

The QuickCarrier USB-D is a cellular dongle designed and built for M2M applications.

## Documentation

The following documentation is available on the Multi-Tech Installation Resources website at [www.multitech.com/setup/product.go](http://www.multitech.com/setup/product.go).

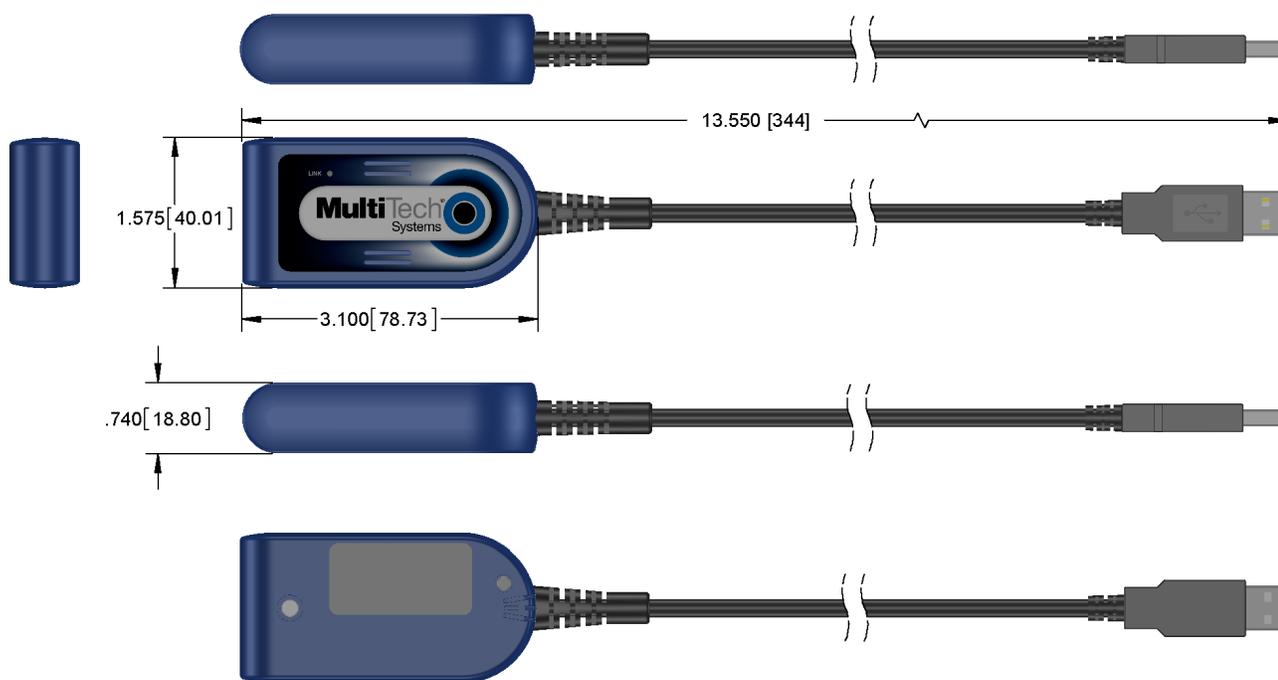
Document	Description
QuickCarrier USB-D MTD-EV3 User Guide	This document. Provides an overview, specification, safety and regulatory information, and basic operations.
USB Driver Installation Guide EV3 and C2 Devices	Instructions for installing USB drivers on Linux and Windows Systems (Part number S000569)
EV-DO and CDMA AT Commands Reference Guide	Configure your device with the EV-DO and CDMA AT Commands Reference Guide (Part number S000546)

## MTD-EV3 Specifications

Category	MTD-EV3-xx
<b>General</b>	
Features	Dual 800/1900 MHz bands
<b>Speed</b>	
Data Speed	Up to 3.1 Mbps downlink/1.8 Mbps uplink
<b>Interface and Antenna</b>	
USB Interface	USB 2.0 high speed compatible
Antenna	Internal
<b>Environment</b>	
Operating Temperature	-40° C to +50° C
Storage Temperature	-40° C to +85° C
Humidity	15%-93% RH, non-condensing
<b>Power Requirements</b>	
Operating Voltage	5 volts from USB port
Input Power	Via USB Bus
<b>SMS</b>	

Category	MTD-EV3-xx
SMS	Text mode and PDU mode per 3GPP TS27.005 set for SMS.
	Mobile-Terminated SMS
	Mobile-Originated SMS
<b>Certifications and Compliance</b>	
EMC Compliance	FCC Part 15 Class B
Radio Compliance	FCC Part 22
	FCC Part 24
	RSS 132
	RSS 133
Safety Compliance	UL 60950-1
	cUL 60950-1

## Dimensions



ALL DIMENSIONS IN In [mm]

**MTD-EV3**

## Link Status LED

Link Status	Description
Off	No power to unit.

Link Status	Description	
On	Continuously lit	Powered on.
	Slow blink (-0.2Hz)	Registered on network.

## Turning the Device On or Off

This USB-powered device does not have a power button. Connecting the device to a computer's USB port turns it on. Disconnecting it or shutting off the computer, turns it off.

**Note:** When reconnecting the device, use the same USB port that you used when installing drivers. Otherwise, you may need to re-install the driver.

## Power Draw

Radio Protocol	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	Peak TX Amplitude Current (Amps)	Total Inrush Charge Measured in Millicoulomb
<b>5 Volts</b>				
US Cellular 800Mhz	0.046	0.576	0.636	1.16
US PCS 1900 Mhz	0.036	0.592	0.648	1.16

**Note:**

- **Peak Tx:** Peak current during CDMA.
- **Maximum Power:** Continuous current during maximum data rate with the radio transmitter at maximum power.
- **Inrush Charge:** Total inrush charge at power on.

# Safety Notices and Warnings

---

## General Safety

The modem is designed for and intended to be used in fixed and mobile applications. Fixed means the device is physically secured at one location and cannot be easily moved to another location. Mobile means the device is 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 user's body.

**Attention:** Maintenir une distance d'au moins 20 cm (8 po) entre l'antenne du récepteur et le corps de l'utilisateur ou à proximité de personnes. Le modem n'est pas conçu pour, ou destinés à être utilisés dans les applications portables, moins de 20 cm du corps de l'utilisateur.

## 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.

## Sécurité relative aux appareils à radiofréquence (RF)

À cause du risque d'interférences de radiofréquence (RF), il est important de respecter toutes les réglementations spéciales relatives aux équipements radio. Suivez les conseils de sécurité ci-dessous.

- Utiliser l'appareil à proximité d'autres équipements électroniques peut causer des interférences si les équipements ne sont pas bien protégés. Respectez tous les panneaux d'avertissement et les recommandations du fabricant.
- Certains secteurs industriels et certaines entreprises limitent l'utilisation des appareils cellulaires. Respectez ces restrictions relatives aux équipements radio dans les dépôts de carburant, dans les usines de produits chimiques, ou dans les zones où des dynamitages sont en cours. Suivez les restrictions relatives à chaque type d'environnement où vous utiliserez l'appareil.
- Ne placez pas l'antenne en extérieur.
- Éteignez votre appareil sans fil dans les avions. L'utilisation d'appareils électroniques portables en avion est illégale: elle peut fortement perturber le fonctionnement de l'appareil et désactiver le réseau cellulaire. S'il

ne respecte pas cette consigne, le responsable peut voir son accès aux services cellulaires suspendu ou interdit, peut être poursuivi en justice, ou les deux.

- Éteignez votre appareil sans fil à proximité des pompes à essence ou de diesel avant de remplir le réservoir de votre véhicule de carburant.
- Éteignez votre appareil sans fil dans les hôpitaux ou dans toutes les zones où des appareils médicaux sont susceptibles d'être utilisés.

## 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).

## Device Maintenance

When maintaining your device:

- Do not attempt to disassemble the device. There are no user serviceable parts inside.
- Do not expose your device to any extreme environment where the temperature or humidity is high.
- Do not expose the device to water, rain, or spilled beverages. It is not waterproof.
- Do not place the device alongside computer discs, credit or travel cards, or other magnetic media. The information contained on discs or cards may be affected by the device.
- Using accessories, such as antennas, that Multi-Tech has not authorized or that are not compliant with Multi-Tech's accessory specifications may invalidate the warranty.

If the device is not working properly, contact Multi-Tech Technical Support.

## User Responsibility

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

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# Activation and Carrier Specific Information

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## Account Activation for Cellular Devices

Some Multi-Tech cellular modems are pre-configured to operate on a specific cellular network. Before you can use the modem, you must set up a cellular data account with your service provider. Each service provider has its own process for adding devices to their network. Refer to Multi-Tech's Cellular Activation site <http://www.multitech.com/activation.go> for step-by-step instructions on activating your cellular modem with your service provider.

## Device Phone Number

Every device has a unique phone number. Your service provider supplies a phone number when you activate your account, or if your device has a SIM card, the phone number may be on it. Wireless service provider implementation may vary. Consult with your service provider to get the phone number for your device.

## Creating a Windows Dial-Up Connection

Each version of the Windows operating system has different steps for creating dial-up Internet connections. Consult Windows Help for the specific steps for your version.

You may need the phone number, username, and password for your carrier.

## Notice for Devices that Use Aeris Radios

One component of your device is a radio. A radio algorithm prevents your device from repeatedly attempting to connect to the network when the radio:

- cannot establish a packet data connection or
- fails to access the application server.

When writing applications for your devices, ensure that your applications do not interfere with the radio's connection retry algorithm. If you fail to do so, Aeris might block network access for your devices.

After your devices reach the end of their commercial lifespan, you must remove them from the Aeris network. To do so, remove power from the devices and remove their antennas. If your devices continue to attempt to register with the network after you cancel device subscriptions, Aeris can bill you for any traffic generated by those devices.

# Using Linux

---

## Shell Commands

### Testing Serial Ports

To test the serial ports created by the driver, type in a shell:

```
cat /dev/ttyUSBx &  
# echo -en "ATE0\r" > /dev/ttyUSBx  
# echo -en "AT\r" > /dev/ttyUSBx
```

**Note:** Sending ATE0 is required, to avoid issues in the terminal output. It prevents the sending/receiving spurious characters to/from the modem when used with the Linux commands “echo” and “cat”

## Create a PPP Connection

Most recent Linux distributions have GUI tools for creating PPP connections; the following instructions are for creating a PPP connection through command line interface.

PPP support must be compiled into the kernel; pppd and chat programs are also required.

pppd needs two scripts: the first script performs the environment setting and calls the second script, which is used by the chat program. For creating a PPP connection type:

```
# pppd file /etc/pppd_script &
```

### Example

```
# Debug info from pppd  
debug  
#kdebug 4  
# Most phones don't reply to LCP echos  
lcp-echo-failure 3  
lcp-echo-interval 3  
# Keep pppd attached to the terminal  
# Comment this to get daemon mode pppd  
nodetach  
# The chat script (be sure to edit that file, too!)  
connect "/usr/sbin/chat -v -f /etc/chatscripts/gprs_connect/etc/chatscripts/evdo_connect"  
# Serial Device to which the modem is connected  
/dev/ttyUSBttyACM  
# Serial port line speed  
115200  
dump  
# The phone is not required to authenticate  
#noauth  
user <insert here the correct username for authentication>  
name <insert here the name of the connection>  
password <insert here the correct password for authentication>  
# If you want to use the GPRSEV-DO link as your gateway  
defaultroute
```

```
# pppd must not propose any IP address to the peer
#noipdefault
ipcp-accept-local
ipcp-accept-remote
# Keep modem up even if connection fails
#persist
# Hardware flow control
crtstcts
# Ask the peer for up to 2 DNS server addresses
usepeerdns
# No ppp compression
novj
nobsdcomp
novjccomp
nopcomp
noaccomp
# For sanity, keep a lock on the serial line
lock
# Show password in debug messages
show-password
```

This script calls the option *connect* using the script *evdo\_connectgprs\_connect*, for example: After launching a PPP connection is possible to use ftp protocol or other utilities that allow the access to the Internet.

# Basic Operations

---

## Interacting with Your Device Overview

This section describes how to use AT commands to interact with your device. Using terminal software such as Kermit, you can issue AT commands to communicate with and configure your modem. The AT commands let you establish, read and modify device parameters and help you control how the device operates. This section documents basic interactions with your device, such as verifying signal strength and network registrations, sending and reading SMS text messages, and sending and receiving data.

Generally, USB modems are used as unintelligent bit pipes. In Windows, this means you create a dial-up network connection that uses the Windows IP stack to use the modem to create a PPP connection to the cellular network. The modem is assigned an IP address from the cellular carrier. This connection provides Internet access and is the basis for TCP/IP communication for sending and receiving email, creating TCP/UDP Sockets, or putting and getting files from an FTP server.

In Linux, PPPD is used to dial the modem and create the connection to the cellular TCP/IP network. This provides Internet access for sending and receiving email, creating TCP/UDP Sockets, or putting and getting files from an FTP server.

## Related Documentation

Related documentation for using EV-DO EV3 devices:

- EV-DO EV3 AT Commands Reference Guide (S000546) provides for additional information on AT commands available for your device. The Introduction chapter describes command formatting, syntax, and other basic information.

## Before You Begin

Before you begin:

- If you have not done so, install any drivers. Refer to the separate driver installation guide for your device.
- Power up your device and ensure it is connected to the computer that you use to issue AT commands.
- Install terminal software that can communicate with the device, such as HyperTerminal, TerraTerm, Kermit, or Putty.

## Using Command Mode and Online Data Mode

Modems have two operation modes, command and online data. When you power up the modem it is in command mode and ready to accept AT commands.

Use AT commands to communicate with and configure your modem. They allow you to establish, read, and modify device parameters and control how the modem works. The device can also generate responses to AT commands that help determine the modem's current state.

If the modem is in online data mode, it only accepts the Escape command (+++).

To send the modem AT Commands from terminal emulation software, set the software to match the modem's default data format, which is:

- Speed: 115,200 bps

- Data bits: 8
- Parity: none
- Stop bit: 1
- Flow control: hardware

To confirm you are communicating with the device:

- Type **AT** and press **Enter**.

If the device responds with OK, you are communicating with the device.

## Verifying Signal Strength

To verify the device signal strength, enter:

### AT+CSQ

The command indicates signal quality, in the form:

+CSQ: <rssI>,<ber>

Where:

<b>&lt;rssI&gt;</b>	Received signal strength indication.
<b>0</b>	(-113) dBm or less
<b>1</b>	(-111) dBm
<b>2-30</b>	(-109) dBm - (-53) dBm / 2 dBm per step
<b>31</b>	(-51) dBm or greater
<b>99</b>	Not known or not detectable
<b>&lt;ber&gt;</b>	Bit error rate, in percent
<b>0</b>	Less than 0.2%
<b>1</b>	0.2% to 0.4%
<b>2</b>	0.4% to 0.8%
<b>3</b>	0.8% to 1.6%
<b>4</b>	1.6% to 3.2%
<b>5</b>	3.2% to 6.4%
<b>6</b>	6.4% to 12.8%
<b>7</b>	More than 12.8%
<b>99</b>	Not known or not detectable

**Note:** Signal strength of 10 or higher is needed for successful packet data sessions.

## Example

A example response to AT+CSQ:

```
+CSQ: 15,1
```

## Checking Network Registration

Before establishing a packet data connection, verify the is device registered on the network. To do this enter the network registration report read command:

```
AT+CREG?
```

If the device returns:

```
+CREG: 0,1
```

The device is registered.

If the device returns:

```
+CREG: 0,2
```

The device is in a network searching state.

## Reading, Writing, and Deleting Messages

### Reading Text Messages

To read a text message in text mode:

1. **Put the device in text mode.**

```
Enter: AT+CMGF=1
```

2. **Read message.**

```
Enter: AT+CMGR=1
```

Example response:

```
+CMGR: "REC UNREAD","+16155554562z`z","","13/09/05,13:39:40-20"
```

```
How are you?
```

```
OK
```

### Sending Text Messages

To send a text message in text mode:

1. **Put the device in text mode.**

```
Enter:
```

```
AT+CMGF=1
```

The device responds.

```
OK
```

2. **Enter the recipient's number and your message.**

Enter:

```
AT+CMGS="#####"
```

```
>Your message here
```

where ##### is the recipient's number.

### 3. Send the message.

Enter CTRL+Z.

The device responds:

```
+CMGS: 255
```

```
OK
```

For example:

```
AT+CMGF=1
```

```
OK
```

```
AT+CMGS="6155554563"
```

```
> How are you? <CTRL+Z to send>
```

```
+CMGS: 255
```

```
OK
```

## Deleting Messages

To delete one text message, enter:

```
AT+CMGD=I,#
```

where I is the index in the select storage and # is the delflag option. Enter:

- |   |   |
|---|---|
| 0 | Deletes message in the specified index.   |
| 1 | Deletes all read messages. Leaves unread messages and stored device-originated messages.                            |
| 2 | Deletes all read and sent device-originated messages. Leaves unread messages and unsent device-originated messages. |
| 3 | Deletes all read messages and sent and unsent device-originated messages. Leaves unread messages.                   |
| 4 | Deletes all messages.   |

For example:

```
AT+CMGD=1 (delete message at index 1)
```

```
AT+CMGD=2 (delete message at index 2 )
```

```
AT+CMGD=1,0
```

```
AT+CMGD=1,1
```

```
AT+CMGD=1,2
```

```
AT+CMGD=1,3
```

```
AT+CMGD=1,4
```

# Regulatory Statements

## 47 CFR Part 15 Regulation Class B Devices

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

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

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

## Industry Canada Class B Notice

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

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

This device complies with Industry Canada RSS Appliance radio exempt from licensing. The operation is permitted for the following two conditions:

1. the device may not cause harmful interference, and
2. the user of the device must accept any interference suffered, even if the interference is likely to jeopardize the operation.

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

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

## EMC, Safety, and R&TTE Directive Compliance

The image shows the CE mark logo, which consists of the letters 'C' and 'E' in a stylized font, followed by the number '0682'. This indicates that the product complies with the EMC, Safety, and R&TTE directives.

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.

## 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 regulatory 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.

## Other Countries

The above country-specific information does not cover all countries with specific regulations; they are included to show you how each country may differ. If you have trouble determining your own country's requirements, check with Multi-Tech's Technical Support for assistance.

# Environmental Notices

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## 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



## 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<sup>1</sup>:

- 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)

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

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

## REACH Statement

### Registration of Substances

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.

## Information on HS/TS Substances According to Chinese Standards

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

### Hazardous/Toxic Substance/Elements

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

**X** Represents that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/Txxx-2006 Requirements for Concentration Limits.

**O** Represents that no such substances are used or that the concentration is within the aforementioned limits.

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

### 依照中国标准的有毒有害物质信息

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

### 有害/有毒物质/元素

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

X 表示所有使用类似材料的设备中有害/有毒物质的含量水平高于 SJ/Txxx-2006 限量要求。

O 表示不含该物质或者该物质的含量水平在上述限量要求之内。

# Index

<b>A</b>		<b>L</b>	
account activation.....	11	LEDs.....	6
activation		link status.....	6
cellular devices.....	11	Linux	
AT Command documents.....	5	overview.....	14
		PPP connection.....	12
		shell commands.....	12
<b>C</b>		<b>M</b>	
Chinese hazardous substances		maintenance.....	9
Chinese version.....	24	modem	
English version.....	23	safety.....	8
Class B.....	18		
Industry Canada.....	18	<b>N</b>	
command mode.....	14	network registration	
		check.....	16
<b>D</b>		<b>O</b>	
data bits.....	14	online data mode.....	14
delete text messages.....	17		
device		<b>P</b>	
maintenance.....	9	parity.....	14
dialing restrictions.....	19	power.....	7
dial-up connection.....	11	draw.....	7
dimensions.....	6		
documentation.....	5 14	<b>R</b>	
		radio frequency interference.....	8
<b>F</b>		read text messages.....	16
FCC Notice		RoHS.....	21
Class B.....	18		
<b>G</b>		<b>S</b>	
general regulatory.....	19	safety	
		modem.....	8
<b>H</b>		RF interference.....	8
hazardous substances.....	21	signal strength	
		verify.....	15
<b>I</b>		specifications.....	5
Industry Canada		speed.....	14
Class B.....	18	stop bits.....	14
interférence des radiofréquences.....	8	sécurité	
Internet connection.....	11		

interférences RF.....	8	<b>U</b>	
		user responsibility.....	10
<b>T</b>		<b>V</b>	
temperatures .....	5	verify communication .....	14
text messages		<b>W</b>	
delete .....	17	Windows	
read.....	16	overview .....	14
turn on/off .....	7		