
QuickCarrier™ USB MT100UCC



MT100UCC-H5 Developer's Guide

USB QuickCarrier Developer's Guide

MT100UCC-H5

S000513, Revision H

Copyright

This publication may not be reproduced, in whole or in part, without prior expressed written permission from Multi-Tech Systems, Inc. All rights reserved.

Copyright © 2019 by Multi-Tech Systems, Inc.

Multi-Tech Systems, Inc. makes no representation or warranties with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose.

Furthermore, Multi-Tech Systems, Inc. reserves the right to revise this publication and to make changes from time to time in the content hereof without obligation of Multi-Tech Systems, Inc., to notify any person or organization of such revisions or changes. Check Multi-Tech's Web site for current versions of our product documentation.

Trademarks and Logos

QuickCarrier is a trademark of Multi-Tech Systems, Inc. SocketModem, Multi-Tech and the Multi-Tech logo are registered trademarks of Multi-Tech Systems, Inc. Windows is a registered trademark of Microsoft in the U.S. and other countries. Other trademarks and trade names mentioned in this publication belong to their respective owners.

Contacting Multi-Tech

Knowledge Base

The Knowledge Base provides immediate access to support information and resolutions for all Multi-Tech products. Visit <http://www.multitech.com/kb.go>.

Support Portal

To create an account and submit a support case directly to our technical support team, visit: <https://support.multitech.com>

Technical Support

Business Hours: M-F, 9am to 5pm CT

Country	By Email	By Phone
Europe, Middle East, Africa:	support@multitech.co.uk	+(44) 118 959 7774
U.S., Canada, all others:	support@multitech.com	(800) 972-2439 or (763) 717-5863

World Headquarters

Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, Minnesota 55112
Phone: 763-785-3500 or 800-328-9717
Fax: 763-785-9874

Warranty

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

Contents

Chapter 1 – Overview	6
Product Ordering Guide.....	6
AT Commands	6
Chapter 2 – Design Considerations	7
USB Power Considerations	7
Noise Suppression Design Considerations	7
Mounting Hardware	7
Electromagnetic Interference (EMI) Considerations	8
Electrostatic Discharge Control	8
Chapter 3 – Antenna System and Device Labeling.....	9
Antenna Specifications	9
Coax Cables Specifications	9
OEM Integration.....	10
FCC Grant Notes	10
Grant Limitations	10
KDB 447498 Section 8.....	10
FCC Definitions	11
Host Labeling	11
Labeling Requirements	11
Approvals and Certification	11
QuickCarrier USB Label.....	11
Chapter 4 – Safety Notices	12
RF Safety	12
Interference with Pacemakers and Other Medical Devices	12
Vehicle Safety	13
Cellular Device Maintenance.....	13
Handling Precautions.....	13
Your Responsibility	13
Chapter 5 – Regulatory Information	14
EMC, Safety, and R&TTE Directive Compliance.....	14
EMC Requirements for the United States	14
EMC Requirements for Industry Canada	15

South African Statement	15
Korea Class B Statement.....	15
Waste Electrical and Electronic Equipment Statement	16
WEEE Directive	16
Instructions for Disposal of WEEE by Users in the European Union	16
Restriction of the Use of Hazardous Substances (RoHS)	17
Chapter 6 – MT100UCC-H5 Models	18
Technical Specifications.....	18
Mechanical Drawing.....	20
Pin-Out Specifications	21
Power Draw	21
Application Notes.....	23
LED Interface	23
RF Performances.....	23
Frequency Bands Supported	24
Chapter 7 – Account Activation.....	25
ESN, IMEI Information	25
Chapter 8 – Using Connection Manager	26
Installing Connection Manager	26
Setting Up a Serial Device in Windows Device Manager.....	27
Connecting a Device	29
Before You Begin	29
Uninstalling Connection Manager	30
Before You Begin	30
Connection Manager User Interface.....	31
Main tab	31
Settings tab.....	32
Connection tab	32
Details tab.....	32
Terminal tab	32
Charts tab	32
Troubleshooting.....	32
Serial COM port is not available in the Serial Modem Settings.....	32
Device is not detected ("No Device")	33
MultiConnect Cell USB Modem is not detected.....	33
Connection Manager is not working, and a device connected to the computer is not detected.....	33

Connection Manager displays "Device Error" status for a serial device33

Chapter 1 – Overview

The QuickCarrier USB is a complete, ready-to-integrate communications device that offers 2G and 3G cellular connectivity options. These quick-to-market devices combine a network approved cellular SocketModem® and a USB carrier card in one compact design. With its 4-pin USB interface the QuickCarrier USB embedded cellular modem cables to an existing device's internal USB port and can be secured using the four mounting holes located at the corners of the printed circuit board. Embedding M2M connectivity into your Windows® or Linux device has never been this quick or this easy.

Product Ordering Guide

Product	Description	Region
MT100UCC-H5	Penta-band HSPA+ Embedded USB Modem	Global
MT100UCC-AK	Accessory kit. Includes USB cables, antenna cable, and antenna	Not applicable

AT Commands

Multi-Tech provides the following AT Command Guides:

For Product	Reference Guides Title and Document Product Number
MT100UCC-H5	H5 AT Commands Reference Guide (S000574)

All reference guides are available at www.mt.com.

Chapter 2 – Design Considerations

USB Power Considerations

- Use a high speed USB cable that is as short as possible. It is recommended that you use a 12 inch cable. Some computers with high speed USB connectors run additional cables to the mother board. The additional length can then cause enumeration issues.
- If possible, connect directly to the USB connector on the motherboard.
- Use USB 3.0 ports if available because these ports are typically rated for more current.
- The peak current measurements—which you can find in the power draw section for your model—show that transmit spikes can happen. Although the bulk caps on the MT100UCC handle these spikes in most cases, review your power design with the spikes in mind.
- Your device may not power up on all Host PCs or host USB devices due to the higher current requirements of the cellular radio. Check your particular USB host port or PC motherboard's electrical specs for details on max current capabilities of the particular USB port you are trying to use.
- Depending on your design, you may be able to use a dual USB cable to share the current between two low power USB ports or create a custom USB cable that provides external power.

Noise Suppression Design Considerations

Adhere to engineering noise-suppression practices when designing a printed circuit board (PCB) containing the QuickCarrier USB modem. Noise suppression is essential to the proper operation and performance of the modem and surrounding equipment.

Any OEM board design that contains the QuickCarrier should consider both on-board and off-board generated noise that can affect digital signal processing. Both on-board and off-board generated noise that is coupled on-board can affect interface signal levels and quality. Noise in frequency ranges that affect modem performance is of particular concern.

On-board generated electromagnetic interference (EMI) noise that can be radiated or conducted off-board is equally important. This type of noise can affect the operation of surrounding equipment. Most local government agencies have stringent certification requirements that must be met for use in specific environments.

Proper PC board layout (component placement, signal routing, trace thickness and geometry, etc.) component selection (composition, value, and tolerance), interface connections, and shielding are required for the board design to achieve desired modem performance and to attain EMI certification.

Other aspects of proper noise-suppression engineering practices are beyond the scope of this developer's guide. The developer should consult noise suppression techniques described other sources, such as technical publications, electronics and electrical engineering text books, and component supplier application notes.

Mounting Hardware

Use #4 or M2/M3 hardware to mount the QuickCarrier modem to the board.

Electromagnetic Interference (EMI) Considerations

The following guidelines are offered specifically to help minimize EMI generation. Some of these guidelines are the same as, or similar to, the general guidelines but are mentioned again to reinforce their importance. In order to minimize the contribution of the QuickCarrier-based design to EMI, the designer must understand the major sources of EMI and how to reduce them to acceptable levels.

- Keep traces carrying high frequency signals as short as possible.
- Provide a good ground plane or grid. In some cases, a multilayer board may be required with full layers for ground and power distribution.
- Decouple power from ground with decoupling capacitors as close to the QuickCarrier power pins as possible.
- Eliminate ground loops, which are unexpected current return paths to the power source and ground.
- Locate high frequency circuits in a separate area to minimize capacitive coupling to other circuits.
- Locate cables and connectors so as to avoid coupling from high frequency circuits.
- Lay out the highest frequency signal traces next to the ground grid.
- If a multilayer board design is used, make no cuts in the ground or power planes and be sure the ground plane covers all traces.
- Minimize the number of through-hole connections on traces carrying high frequency signals.
- Avoid right angle turns on high frequency traces. Forty-five degree corners are good; however, radius turns are better.
- On 2-layer boards with no ground grid, provide a shadow ground trace on the opposite side of the board to traces carrying high frequency signals. This will be effective as a high frequency ground return if it is three times the width of the signal traces.
- Distribute high frequency signals continuously on a single trace rather than several traces radiating from one point.

Electrostatic Discharge Control

All electronic devices should be handled with certain precautions to avoid damage due to the accumulation of static charge.

See the ANSI/ESD Association Standard (ANSI/ESD S20.20-1999) – a document “for the Development of an Electrostatic Discharge Control for Protection of Electrical and Electronic Parts, Assemblies and Equipment.” This document covers ESD Control Program Administrative Requirements, ESD Training, ESD Control Program Plan Technical Requirements (grounding/bonding systems, personnel grooming, protected areas, packaging, marking, equipment, and handling), and Sensitivity Testing.

Multi-Tech Systems, Inc. strives to follow all of these recommendations. Input protection circuitry has been incorporated into the Multi-Tech devices to minimize the effect of this static buildup, proper precautions should be taken to avoid exposure to electrostatic discharge during handling.

Multi-Tech uses and recommends that others use anti-static boxes that create a faraday cage (packaging designed to exclude electromagnetic fields). Multi-Tech recommends that you use our packaging when returning a product and when you ship your products to your customers.

Chapter 3 – Antenna System and Device Labeling

The cellular 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 QuickCarrier, then recertification will be required by specific network carriers such as Sprint. The Antenna System is defined as the UFL connection point from the QuickCarrier to the specified cable specifications and specified antenna specifications.

Antenna Specifications

HSPA / UMTS Antenna Requirements/Specifications

Category	Description
Frequency Range	824 – 960 MHz / 1710 – 1990 MHz / 1920 – 2170 MHz
Impedance	50 Ohms
VSWR	VSWR shall not exceed 2.0:1 at any point across the bands of operation
Typical Radiated Gain (to meet PTCRB)	Requirements 0 / 2 dBi on azimuth plane
Maximum Radiated Gain allowed by FCC	5.0/4.3 dBi
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. Note: 2100MHz is not used by the North America carriers.

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.

Coax Cables Specifications

Category	Description
Cable Type	Coaxial Cable
Attenuation	<1.0db
Connector Impedance	50 ohm
Maximum Cable Length	16" (40 cm)

You can order optional antenna cables from Multi-Tech Systems, Inc.

OEM Integration

FCC Grant Notes

The OEM should follow all the grant notes listed below. Otherwise, further testing and device approvals may be necessary.

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. Power output listed is conducted.

This device is a mobile device with respect to RF exposure compliance. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons, and must not be collocated or operate in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product guidelines. Installers and end-users must be provided with specific information required to satisfy RF exposure compliance for installations and final host devices. (See note under Grant Limitations.) Compliance of this device in all final host configurations is the responsibility of the Grantee.

Grant Limitations

This device has been granted modular approval for mobile applications. Portable applications may require further RF exposure (SAR) evaluations. Examples of mobile devices include wireless routers, desktop computers, utility meters, etc. Examples of portable applications include devices such as a laptop, USB dongle, mobile phone, tablet PC, and any device that can be worn on the body during use.

Your final product with this embedded device may need to pass FCC Part 15B.

This device has not been evaluated or approved for simultaneous transmission. Any simultaneous transmission conditions should be evaluated per the current FCC KDB 447498 requirements. Simultaneous transmission requirements for mobile devices are contained in Section 8.

KDB 447498 Section 8

Transmitters and modules certified for mobile or portable exposure conditions and categorically excluded by § 2.1091(c) can be incorporated in mobile host devices without further testing or certification when:

The closest separation among all simultaneous transmitting antennas is ≥ 20 cm;

or

The antenna separation distance and MPE compliance boundary requirements that enable all simultaneous transmitting antennas incorporated within the host to comply with MPE limits are specified in the application filing of at least one of the certified transmitters incorporated in the host device. In addition, when transmitters certified for portable use are incorporated in a mobile host device the antenna(s) must be ≥ 5 cm from all other simultaneous transmitting antennas.

All antennas in the final product must be at least 20 cm from users and nearby persons.

If the host device requires further authorization, consult an accredited FCC laboratory for guidance.

FCC Definitions

Portable: (§2.1093) — A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

Mobile: (§2.1091) — A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

Host Labeling

The following statements are required to be on the host label:

- This device contains FCC ID: {Add the FCC ID of the specific device}
- This device contains equipment certified under IC ID: {Add the IC ID of the specific device}

For labeling examples, see Cellular Approvals and Labeling Requirements.

Labeling Requirements

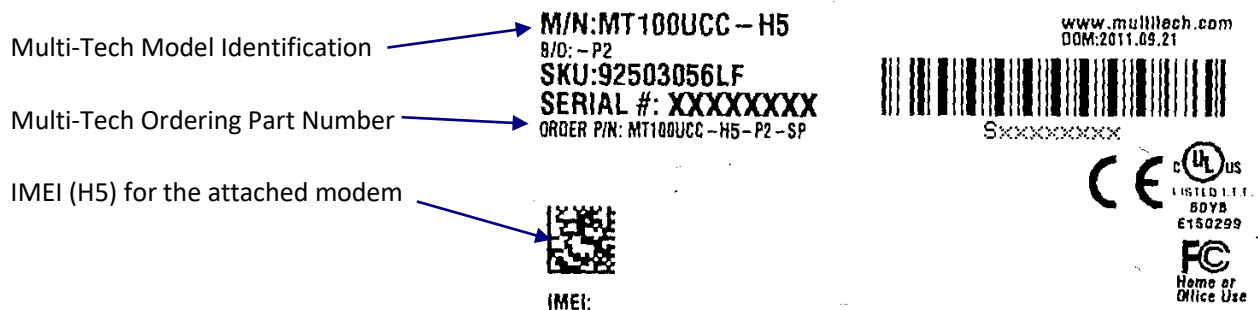
Approvals and Certification

The Multi-Tech SocketModem is an Industry and/or Carrier Approved modem. In most cases, when integrated and used with an antenna system that was part of the Multi-Tech modem certification, no additional approvals or certifications are required (however, EV-DO has a few exceptions) for the device you develop as long as the following are met:

- **PTCRB Requirements (GPRS and HSPA+ only)**
The antenna system **cannot** be altered.
- **Model Identification**
The Multi-Tech model identification allows the carrier to verify the modem as one of its approved models. This information is located on the modem's label.

QuickCarrier USB Label

Note: The label is shown larger than actual size.



Chapter 4 – Safety Notices

Note to OEMs: The following safety statements may be used in your final product documentation.

RF Safety

Remote modems are cellular devices. 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.

Caution: A separation distance of at least 20 cm must be maintained between the modem 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 of the body of the user. Check your local standards regarding safe distances, etc.

- Operating a cellular modem 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 have their own restrictions governing the use of cellular devices. Please observe local restrictions of the environment where you intend to operate the cell modem.
- Under no circumstances should the antenna be placed outdoors.

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 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).

Vehicle Safety

- Do not use your cellular device while driving. Respect national regulations on the use of cellular telephones in vehicles. Road safety always comes first.
- If it is incorrectly installed in a vehicle, operating the cellular device could interfere with the correct functioning of vehicle electronics. Only qualified personnel should install the device. The installation process should verify that vehicle electronics are protected from interference.
- Using an alert device to operate a vehicle's lights or horn is not permitted on public roads.
- UL has evaluated this device for use in ordinary locations only. UL did not evaluate installation in a vehicle or other outdoor locations. UL Certification does not apply or extend to use in vehicles or outdoor applications or in ambient temperatures above 40° C.

Cellular Device Maintenance

Your cellular device 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 attempt to disassemble the cellular device. There are no user serviceable parts inside.
- Do not expose the cellular device to water, rain, or spilled beverages. It is not waterproof.
- Do not place the cellular device alongside computer discs, credit or travel cards, or other magnetic media. The phone may affect the information contained on discs or cards.
- Using accessories not authorized by Multi-Tech or not compliant with Multi-Tech's accessory specifications may invalidate the warranty of the cellular device.
- In the unlikely event of a fault in the cellular device, contact Multi-Tech Tech Support.

Handling Precautions

To avoid damage due to the accumulation of static charge, use proper precautions when handling any cellular device. Although input protection circuitry has been incorporated into the devices to minimize the effect of static build-up, use proper precautions to avoid exposure to electronic discharge during handling and mounting the device.

Your Responsibility

This cellular device is your responsibility. Please respect all local regulations. Become familiar with and use the security features to block unauthorized use and theft.

Chapter 5 – Regulatory Information

EMC, Safety, and R&TTE Directive Compliance



Some models have received CE certification. If you need CD compliance, check with your sales representative.

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.

EMC Requirements for the United States

47 CFR – FCC Part 15 Regulation – Class B

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.

EMC Requirements for 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 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.

South African Statement

This modem must be used in conjunction with an approved surge protection device.

Korea Class B Statement

Equipment (Residential Use)

이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

Waste Electrical and Electronic Equipment Statement

Note to OEMs: This statement is included for your information. You can use it in your final product documentation.

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 chemicals¹:

- 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)

¹Lead 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.

Chapter 6 – MT100UCC-H5 Models

The QuickCarrier USB HSPA is an embedded USB cellular modem uses HSPA technology to deliver some of the fastest cellular data speeds. These quick-to-market devices combine a network approved cellular SocketModem and a USB carrier card in one compact design. With its 4-pin USB interface the QuickCarrier USB embedded cellular modem cables to an existing device's internal USB port and can be secured using the four mounting holes located at the corners of the printed circuit board. Embedding M2M connectivity into your Windows or Linux device has never been this quick or this easy.

Technical Specifications

The QuickCarrier USB HSPA cellular modem meets the following specifications:

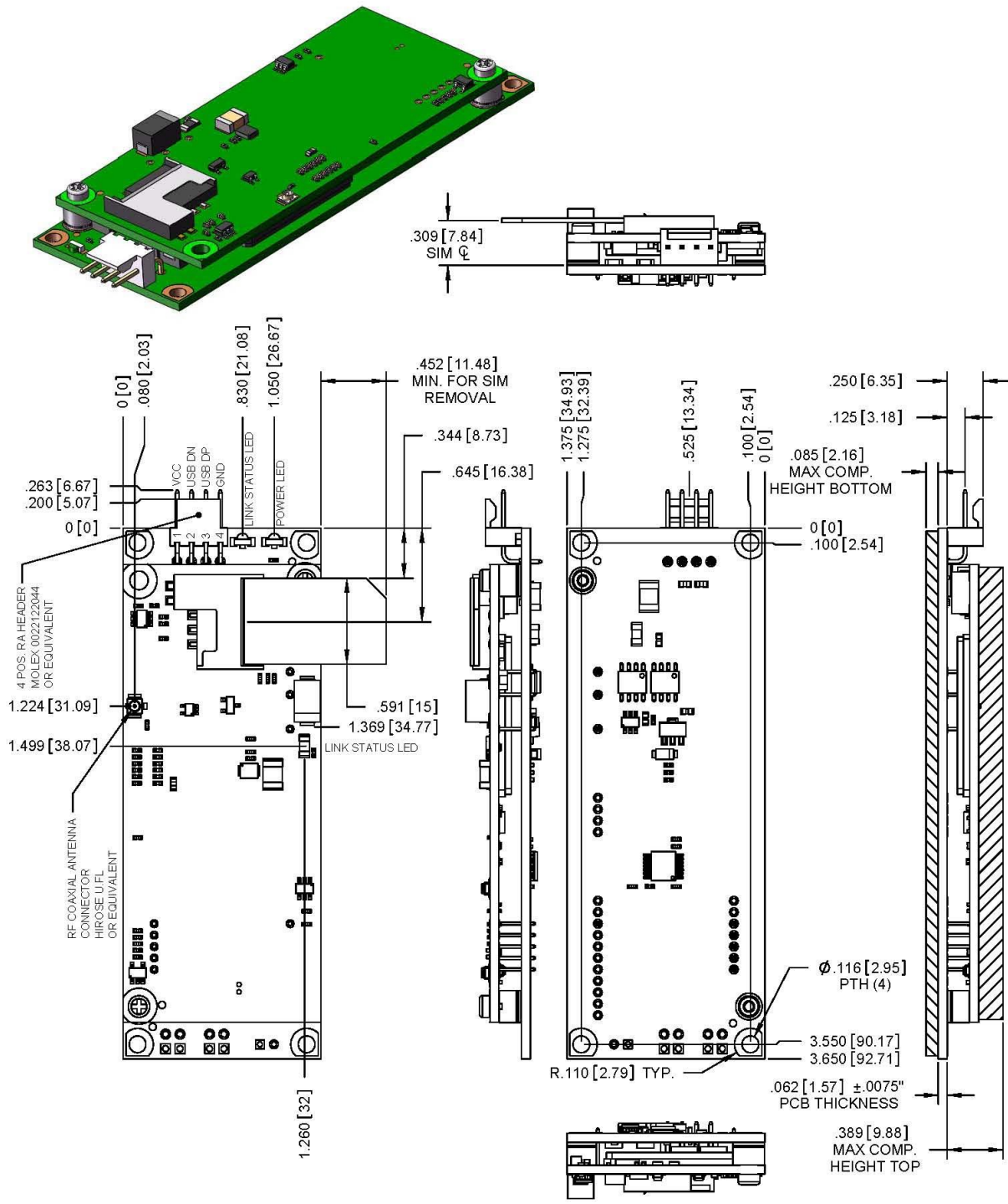
Category	Description
Standards	High Speed Packet Access (HSPA) Circuit-Switched (CS) domain data service based on UMTS and GSM
Frequency Bands	HSUPA / HSDPA / UMTS Triple-band: 2100/1900/850 MHz with Rx diversity GSM/GPRS/EDGE 850/900/1800/1900MHz
Data Speed	HSPA+ Models: HSPA+ data up to 21.0 Mbps downlink / 5.76 Mbps uplink Penta-band HSPA: 850/900/1700/1900/2100 MHz Quad-band GSM/GPRS/EDGE: 850/900/1800/1900 MHz
Driver Support	Windows and Linux
USB Interface	USB 2.0 Low/Full/High Speed Compliant
Weight	1.536 oz (43.5 g)
Dimensions	3.650" x 1.375" (92.71 mm x 34.925 mm)
Operating Temperature	-30° C to +85° C
Storage Temperature	-40° to +85° C
Humidity	20% to 90% non-condensing
Input Power	USB bus powered 5VDC user-supplied through 2-pin header (optional)
Operating Voltage	Supply Range: 4.55V to 5.5V 1.1A nominal current Device may be damaged if voltage exceeds 5.5V
SMS	Point-to-Point messaging Mobile-Terminated SMS Mobile-Originated SMS
Antenna Connector	2 x UFL, cellular and RX diversity
SIM Holder	Standard 1.8 / 3V SIM card holder

Category	Description
Compliance	<p>EMC Compliance FCC Part 15 Class B EN 55022 Class B EN 55024</p> <p>Radio Compliance FCC Part 22 FCC Part 24 RSS 132 RSS 133 EN 301 511 EN 301 489-1 EN 301 489-7 EN 301 489-24</p> <p>Safety Compliance UL 60950-1 cUL 60950-1 EN 60950-1 AS/NZ 60950-1</p> <p>Network Compliant Socket Modem PTCRB AT&T Others pending</p>
Warranty	2 years

Note: The radio's performance may be affected at the temperature extremes. This is considered normal. The radio is designed to automatically fallback in class and reduces transmitter power to avoid damage to the radio. There is no single cause for this function. Rather, it is the result of an interaction of several factors, such as the ambient temperature, the operating mode and the transmit power.

You may need to reduce the temperature range if airflow is limited around the cellular radio. Test and verify the temperature range if the QuickCarrier USB is designed into an enclosed chassis.

Mechanical Drawing



DIMENSIONS IN In [mm]

MT100UCC-H5

Pin-Out Specifications

Pin(s)	Signal Name	Logic Level Voltage	I/O	Description
JP2-1	VCC	5.0	PWR	DC input power
JP2-2	USB DN	3.3	I/O	USB data
JP2-3	USB DP	3.3	I/O	USB data
JP2-4	GND	GND	GND	Ground

Power Draw

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

Radio Protocol	AT command used to set radio function and power mode	Radio Idle, SIM installed and connected to tower (Amps)	Agilent Connection No Data (Amps)
5 Volts			
GSM850	AT+CFUN=1	51mA	52mA
HSDPA	AT+CFUN=1	51mA	51mA

Radio Protocol	IP Connection to Agilent with Data								
	Low Power			Half Power			Max Power		
	Measured Current (Amps)	MS Transmit Burst or Power Control Level	(GSM) Xmit Pwr or (HSDPA) Ch. Pwr Meas. (avg)	Measured Current (Amps)	MS Xmit Level Burst or Pwr Cntrl Level	(GSM) Xmit Pwr or (HSDPA) Ch. Pwr Meas. (avg)	Measured Current (Amps)	Peak Reset Current (InRush) Duration	(GSM) Xmit Pwr or (HSDPA) Ch. Pwr Meas. (avg)
5 Volts									
GSM850	96mA	28	1.58	98mA	15	10.02	324mA	0	29.89
HSDPA	222mA	Alternating bits	--	197mA	Active bits	--	486mA	All up bits	--

Radio Protocol	Peak TX Amplitude Current (Amps) 577uS duration (GSM850)	Peak Reset Current (InRush) (Amps)	Peak Reset Current (InRush) Duration
5 Volts			
GSM850	1.39A	520mA	32mS
HSDPA	466mA	520mA	32mS

Maximum: The continuous current during maximum data rate with the radio transmitter at maximum power.

Peak TX: The peak current during a GSM850 transmission burst period or HSDPA connection.

In-Rush Current: The input current during power up or a reset.

Powering Down Your Device

CAUTION: Failing to properly shutdown the device before removing power may corrupt your device's file system.

To properly power down your device, use the following sequence:

1. Issue the AT#SHDN command.
2. Wait 30 seconds.
3. Power off the device. Disconnect power from the device.

Application Notes

LED Interface

The LED signal indicates the working status of the QuickCarrier.

Power LED

Signal	Description
OFF	No power to the unit
ON	The unit is functioning

Link Status LED

Signal	Description	
OFF	No power to the unit	
ON	Continuously lit	Powered and connected, but not transmitting or receiving.
	Slow blink (-0.2Hz)	Powered and searching for a connection.
	Faster blink (-3Hz)	Transmitting or receiving.

For non-IP builds, to ensure that the Link Status LED works properly, issue the following AT Command sequence to the GPIO:

```
AT#GPIO=1,0,2
```

```
AT#SLED=2
```

RF Performances

The module's radio transceiver meets the requirements of 3GPP Release 5 & 6.
All values indicated are conducted.

Receiver Features

Category	Description
GSM 850 Sensitivity	< -106 dBm
E-GSM 900 Sensitivity	< -106 dBm
DCS 1800 Sensitivity	< -105 dBm
PCS 1900 Sensitivity	< -105 dBm
UMTS Band 1 2100 Sensitivity	< -109 dBm
UMTS Band II 1900 Sensitivity	< -109 dBm
UMTS Band V 850 Sensitivity	< -110 dBm
UMTS Band VI 800 Sensitivity	< -110 dBm

Transmitter Features

Category	Description
Maximum output power (GSM 850 / GSM 900)	+32 dBm \pm 1 dBm GSMK mode (class 4) +27 dBm \pm 1 dBm 8PSK mode (class E2)
Maximum output power (DCS 1800 / PCS 1900)	+29 dBm \pm 1 dBm GSMK mode (class 1) +26 dBm \pm 1 dBm 8PSK mode (class E2)

Category	Description
Maximum output power (UMTS Band II 1900, V 850, &VI 800)	+23 dBm \pm 1 dBm (class 3)
Maximum output power (UMTS Band I 2100)	+23 dBm \pm 1 dBm (class 3)

RF Connection and Antenna

The RF connector on the QuickCarrier is a UFL standard type. See Chapter 1 for [Antenna](#) details.

Frequency Bands Supported

UMTS Frequency Band Support

Band	Frequencies
Band I UMTS 2100	Tx: 1920 – 1980 MHz Rx: 2110 – 2170 MHz
Band II UMTS 1900	Tx: 1850 – 1910 MHz Rx: 1930 – 1990 MHz
Band V UMTS 850	Tx: 824 – 849 MHz Rx: 869 – 894 MHz

GSM Frequency Band Support

Band	Frequencies
GSM 850	Tx: 824 – 849 MHz Rx: 869 – 894 MHz
EGSM 900	Tx: 880– 915 MHz Rx: 925 – 960 MHz
GSM 1800	Tx: 1710 – 1785 MHz Rx: 1805 – 1880 MHz
GSM 1900	Tx: 1850 – 1910 MHz Rx: 1930 – 1990 MHz

Chapter 7 – Account Activation

Some Multi-Tech cellular modems have been pre-configured to operate on a specific cellular network, such as Sprint and Verizon Wireless.

However, before you can begin to use the modem, you must set up a cellular data account with your cellular network provider. Please refer to Multi-Tech's Cellular Activation Web site <http://www.multitech.com/activation.go> for information on activating your cellular modem.

ESN, IMEI Information

The cellular carrier will ask you for device identification information:

- **For GPRS/HSPA+:** The modem's 15-character IMEI (International Mobile Equipment Identity) number is printed on the modem's label.

Refer to the device labels on the next page for the location of the device identification.

IMPORTANT: Both the QuickCarrier USB and the modem include labels. When the cellular carrier asks you to provide the modem's model identification, give the Multi-Tech cellular model identification, not the host device model.

Chapter 8 – Using Connection Manager

Use Connection Manager to:

- Install the latest device drivers.
- Activate and connect your device to your carrier’s network.

Note:

- Connection Manager can install drivers and connect your device regardless of your cellular network; however, activation is only supported with Verizon, Aeris, Sprint, and some regional carriers. If you cannot activate your device with Connection Manager, refer to *Account Activation for Cellular Devices*.
- MTD-H5 models use SIM-based activation. If you do not have a SIM card, contact your carrier.
- Switch the firmware in your device to a different carrier (if supported by your device).
- Manage cellular connection and automatically reconnect with the keep-alive feature.
- View device details.
- View line charts of signal level and data rates.
- Use a terminal window for communicating with and troubleshooting the device

Installing Connection Manager

Connection Manager installs the appropriate drivers for USB devices along with the application. Serial devices do not require drivers.

Note: Attempting to plug in the device before the appropriate drivers are installed can cause the connection to fail.

To install Connection Manager and the device drivers:

1. Go to <https://www.multitech.com/support/connection-manager>.
2. Click **Connection Manager**.
3. Open or unzip the **Connection Manager** file and run the installer (.msi file).
4. In the MultiTech Connection Manager Setup Wizard, read the end-user license agreement and check **I accept the terms in the License Agreement**.
5. Click **Next** to have the installer automatically disable the native WWAN AutoConfig service in Windows.

The WWAN AutoConfig service manages mobile broadband connections. Connection Manager requires that this service be disabled.

Note: This page appears only on Windows 10.

6. If a MultiTech device is connected to the computer, disconnect it and click **Next**.
7. If you use a USB device, check **Install the modem driver**.

CAUTION: Unless you are certain that the drivers for your USB device are already installed on the computer, make sure that you check **Install the modem driver**. Failure to do this will cause the application to incorrectly detect your device or not detect the device at all.

Note: Because serial devices do not require drivers, it does not matter if you check or uncheck **Install the modem driver** for a serial device.

8. To specify a folder for Connection Manager, use the default folder or click **Change** to browse to the folder you want to use.
9. Click **Install**.

A separate wizard opens for installing Telit drivers. Some MultiTech devices use embedded modules from Telit Wireless Solutions to provide cellular connectivity; these devices require Telit drivers.

10. Select **Complete** setup type.
11. When the drivers are installed, click **Finish**.
12. In the Setup Wizard, click **Finish**.

Note:

- To open Connection Manager after installation, check Start the MultiTech Connection Manager when the installation is finished.
- After the drivers are installed, you need to restart your computer if prompted by Windows.

If using a USB device, you can connect the device to the carrier's network with Connection Manager. Refer to [Connecting a Device](#).

If using a serial device, you need to set up the device in Windows Device Manager before connecting the device. Refer to [Setting Up a Serial Device in Windows Device Manager](#).

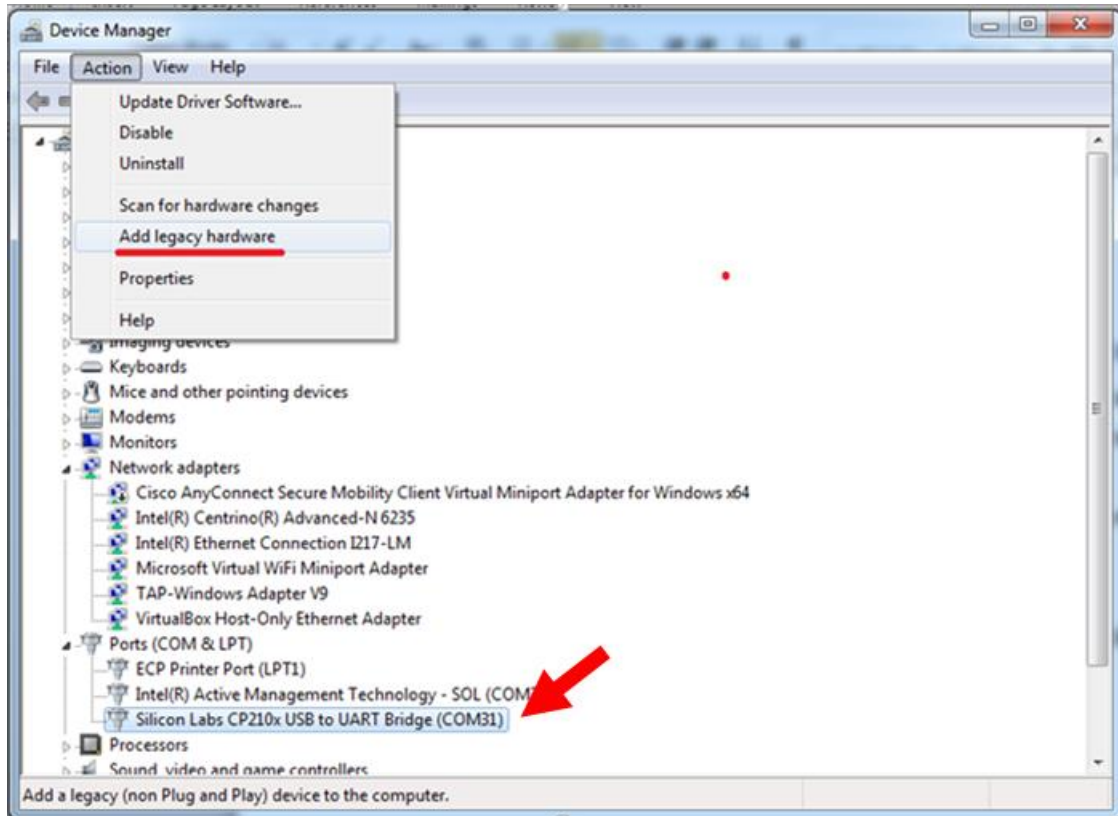
Setting Up a Serial Device in Windows Device Manager

To set up the device in Windows Device Manager:

1. Make sure that your desired COM port for the serial device is available.
2. Connect the serial device to the PC.
3. Go to **Control Panel > Device Manager**. Make a note of the COM port number for the connected device (in **COM Ports**).

Example: The COM port is **COM31**.

4. Go to **Action > Add legacy hardware**.



5. In the Add Hardware Wizard:
 - a. Click **Next**.
 - b. Select **Install the hardware that I manually select from a list**, then click **Next**.
 - c. Select **Modems**, then click **Next**.
 - d. Check **Don't detect my modem; I will select it from a list**, then click **Next**.
 - e. Select **Standard Modem Types**, then select **Standard 33600 bps Modem** on the right.

Important: Make sure that you select *only* **Standard 33600 bps Modem**. Selecting another model may cause your device to work incorrectly or fail.
 - f. Select your COM port, then click **Next**.
 - g. Click **Finish**.
 - h. Go to **Device Manager > Modems** and confirm that the device is added.
6. To verify that the device is set up correctly, query the device:
 - a. Go to **Device Manager > Modems**, right-click **Standard 33600 bps Modem**, and select **Properties**.
 - b. On the **Diagnostics** tab, click **Query Modem**.

Note: The device cannot be queried if the Connection Manager is running and using the device's port.

If the device is ready, diagnostic information from the device appears in the box above.

To connect the device to your carrier's network, refer to [Connecting a Device](#).

Connecting a Device

Before You Begin

- Make sure that your device is connected to the computer where Connection Manager is installed.
- Set up the device in Device Manager. Refer to [Setting Up a Serial Device in Windows Device Manager](#).

To connect your device to the carrier's network:

1. Open Connection Manager.

Connection Manager automatically detects the connected device, and the **Detect** button on the **Main** tab changes to **Connect**. If the application cannot detect the device automatically, click **Detect** to initiate device detection manually.

2. If you are connecting the device to this computer for the first time, on the **Connection** dialog box, provide values for the connection settings, such as the dial number and access point name (APN).

You may need to ask the carrier for these settings.

- a. To monitor Internet connectivity, have Connection Monitor send periodic pings to a host, check **Enable keep-alive** and enter the IP address or host name to ping in the **Host to ping** box. For example, you can enter the host name **google.com** or IP address **8.8.8.8**.

If the keep-alive check fails, Connection Manager automatically reconnects. When the keep-alive feature is enabled, the Connection Manager's **Main** tab displays the keep-alive check status and when the last ping response was received.

- b. If your device supports dual carriers, switch the firmware to the desired carrier by selecting the carrier in the **MNO Firmware** list. For example, if your device can switch the firmware between AT&T and Verizon, select **Verizon** in the list.

Note:

- The MNO Firmware list doesn't appear if your device doesn't support carrier firmware switching.
- When you change the carrier firmware, the modem automatically restarts to apply the selected firmware.

- c. To save the settings, click **Apply**.

You can change the connection settings on the **Connection** tab. The **Dial number**, **APN**, **User name**, and **Password** cannot be changed after the device is connected.

3. On the **Settings** tab, select **USB Modem** or **Serial Modem** depending on whether you are connecting a USB or serial device.

4. If you are connecting a serial device, provide the serial settings on the **Settings** tab:

- a. In the **Modem type** list, select the appropriate modem type.
- b. For the other settings, provide the values that match the serial-port settings for the device in Device Manager.

For **Port**, expand **Ports** and notice the COM port number next to the device name. Right-click the device name, select **Properties**, and find the values for the other settings on the **Port Settings** tab.

- c. To save the settings, click **Apply**.

Note:

- Settings displayed for a USB device on the **Settings** tab are determined automatically and cannot be changed.
- To set the application to run during Windows startup, check **Run application at Windows startup**.
- To automatically connect to the Internet, check **Connect to the Internet automatically**.

Selecting **Run application at Windows startup** and **Connect to the Internet automatically** is useful in scenarios where Connection Manager is running on a remote computer. If a power failure occurs on the computer, these settings ensure the application will restart and reconnect to the Internet when power is restored.

5. On the **Main** tab, click **Connect**.

When a connection is established, the **Main** tab displays the download and upload speeds, the amount of traffic sent and received, **Connected** status, and the signal strength percentage and bars. The statistics on connection speeds and traffic are available only during a current connection session.

Note:

- For serial modems, the signal strength is available only when the device is *not* connected to the carrier's network. When connection to the network is established, the last signal strength value is displayed.
 - View the details for the current connection on the **Details** tab.
6. To disconnect the device from the carrier's network, click **Disconnect**.

Uninstalling Connection Manager

Along with uninstalling Connection Manager, the installed device drivers are also removed.

Before You Begin

Make sure that Connection Manager is not running.

To uninstall Connection Manager:

1. In Windows, go to **Control Panel > Programs > Programs and Features**.
2. Right-click **MultiTech Connection Manager** and select **Uninstall**.
3. Click **Yes** to confirm that you want to uninstall Connection Manager.
The native Windows WWAN AutoConfig service is automatically enabled.
4. When the message "Are you sure you want to uninstall this product?" appears, click **Yes**.

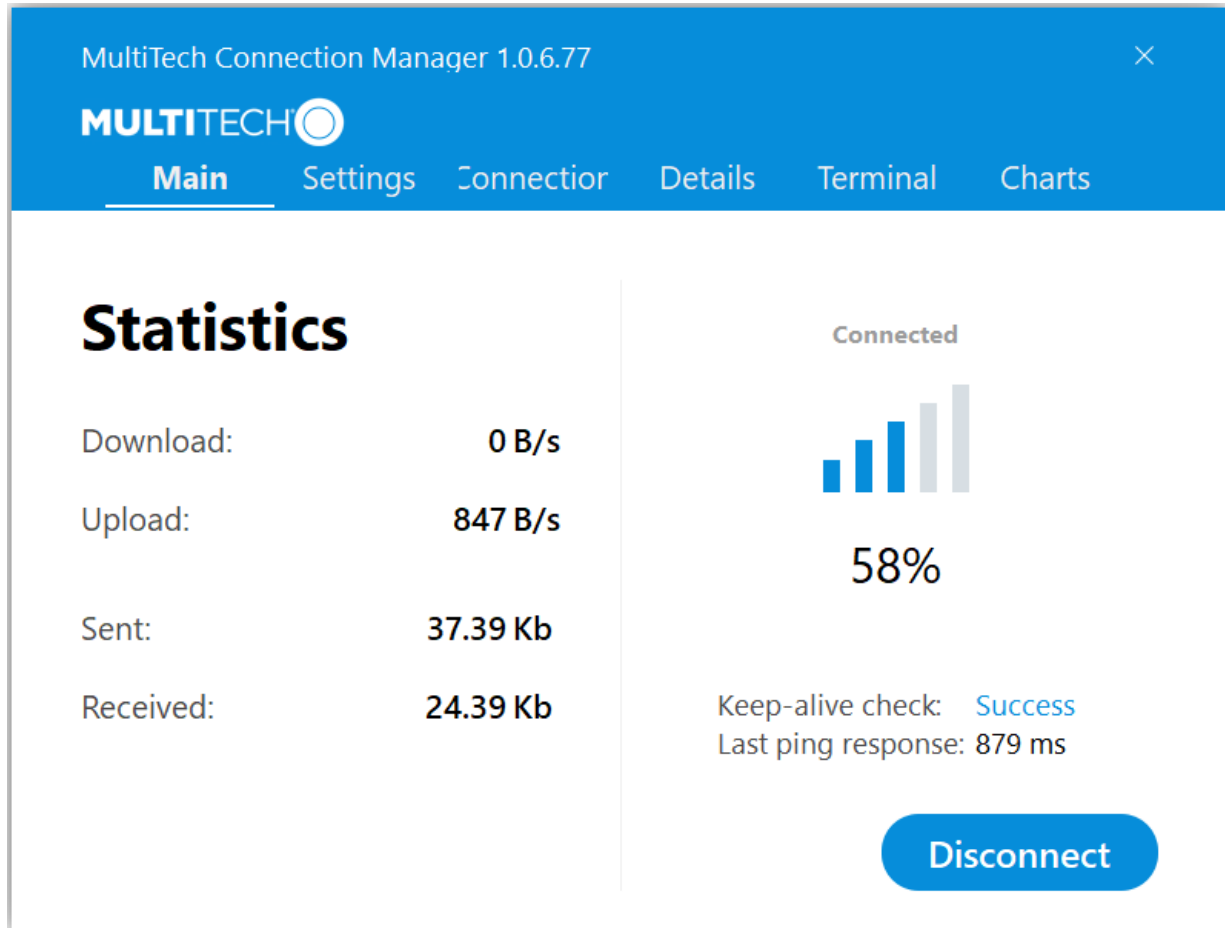
Connection Manager and the installed drivers are removed from the computer.

Note: The steps above describe how to uninstall Connection Manager using Control Panel. You can also uninstall the application by using the installer file (.msi). Double-click the file, in the MultiTech Connection Manager Setup Wizard, click Next, and then select Remove on the next two pages.

Connection Manager User Interface

Connection Manager consists of the following tabs:

- Main
- Settings
- Connection
- Details
- Terminal
- Charts



Main tab

The **Main** tab displays the following:

- Status of device connection: Searching, Connecting, Connected, Disconnecting, or Disconnected
- The action button, which changes according to the current device connection status: **Detect**, **Connect**, or **Disconnect**
- Signal strength bars and percentage indicator (only when connection to the carrier's network is established)

Note: The signal strength is displayed for a serial device only when the device is not connected to the carrier's network.

- Connection statistics: download and upload speeds, amount of traffic sent and received (only when connection to the carrier's network is established)
- The keep-alive check status and when the last ping response was received if **Enable keep-alive check** is checked on the **Connection** tab.

Settings tab

Use the **Settings** tab to specify the type of device: **USB Modem** or **Serial Modem**.

- If **USB Modem** is selected, the tab displays USB settings. These settings cannot be edited.
- If **Serial Modem** is selected, the tab displays the serial settings that match the serial-port settings for the device. You can edit these settings.

The **Settings** tab also contains the **Run application at Windows startup** and **Connect to the Internet automatically** options.

- Check **Run application at Windows startup** to open Connection Manager when Windows starts.
- Check **Connect to the Internet automatically** to set Connection Manager to connect to the carrier's network automatically each time the application opens.

Connection tab

The **Connection** tab displays the following:

- The carrier-provided connection settings.
- The **Enable keep-alive check** box. Check this box to monitor connectivity to the Internet. Check **Enable keep-alive check** and enter the IP address or host name to ping in the **Host to ping** box. Connection Monitor will send periodic pings to the host. If the keep-alive feature fails, Connection Manager will automatically reconnect.
- The **MNO firmware** list. If your device supports dual carriers, you can switch the firmware to the other carrier by selecting the carrier in this list.

Note: The **Connection** tab isn't available if Connection Manager doesn't detect a device.

Details tab

The **Details** tab displays the modem details when a device is detected and the connection details when a connection is established.

Terminal tab

The **Terminal** tab contains a terminal window to communicate with the connected device by entering AT commands. For details, refer to the AT Commands reference guide for your device.

Note: When a serial device is connected to the carrier's network, the terminal window isn't available.

Charts tab

The **Charts** tab contains line charts that graphically represent signal strength and download and upload speeds for the 2-hour interval.

Troubleshooting

Serial COM port is not available in the Serial Modem Settings

Close Connection Manager and reopen it.

Device is not detected ("No Device")

After following the steps to activate your device, the **Main** tab still indicates "No Device."

Try the following steps:

1. Click the **Settings** tab and make sure that the appropriate modem type is selected: USB or Serial.
2. If you are connecting a serial device, make sure that all serial modem settings correspond to the serial modem and serial port configuration.
3. Restart Connection Manager.
4. Disconnect and reconnect the device.

MultiConnect Cell USB Modem is not detected

1. Check the Power and LS LEDs on the device. If they are not continuously lit, then the problem is with the power supply. Check the cable and connections.
2. USB device: Make sure that the device is connected to the PC and that the correct USB cable is in use.

Connection Manager is not working, and a device connected to the computer is not detected

Connection Manager cannot detect a connected device because the required drivers are not installed. The most likely cause is that **Install the modem drivers** was not checked during the installation.

Uninstall and re-install Connection Manager. During the installation, make sure that you check **Install the modem driver**. Refer to [Uninstalling Connection Manager](#) and [Installing Connection Manager](#).

Connection Manager displays "Device Error" status for a serial device

This error has the following causes and solutions.

Cause	Solution
Connection Manager cannot open the COM port that the device was installed on because the port is being used by another program.	If possible, free up the COM port for the device.
The wrong COM port is specified for the device on the Settings tab.	On the Settings tab, select the COM port that matches the port that the device is installed on and click Apply . You can look up the port in Device Manager in Windows. In Device Manager, expand Modems , right-click the name of your device, and select Properties . Note the port on the Modem tab.