MULTITECH®

SocketModem® MTQ

MTQ-MNG6-B02 Device Guide

SocketModem® MTQ Device Guide

Models: MTQ-MNG6-B02

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1 About the rCell 500

SocketModem® MTQ embedded cellular modems are complete, ready-to-integrate communications devices ideal for customers looking to add 4G-LTE cellular communications to their IoT/M2M solutions. These communications devices enable easy technology transitions and allow developers to add wireless communication to products with a minimum of development time and expense. SocketModem MTQ modems are carrier approved and end-device certified, decreasing time to market while saving customers money.

Overview

MultiTech SocketModem MTQ embedded cellular modem is a complete, ready-to-integrate communications device ideal for customers looking to add 4G-LTE cellular communications to their IoT/M2M solutions. These communications devices enable easy technology transitions and allow developers to add wireless communication to products with a minimum of development time and expense. The MultiTech SocketModem MTQ embedded cellular modems are carrier approved and end-device certified, decreasing time to market while saving customers money.

The SocketModem MTQ maintains interoperability with legacy systems that use a 40-pin connector and forward mounting hole. All SocketModem MTQ software is open source.

Important: The MTQ-MNG6-B02 must be configured for Cat M1 use only. Use AT#WS46=0 to ensure the device is in Cat M1 mode.

Build Options

Ordering Part Number	Description	Region
MTQ-MNG6-B02	Embedded LTE Cat M1 with GNSS and 2G fallback	Australia, Canada, European Union, United Kingdom, United States
MTQ-MNG6-B02-SP	LTE Cat M1 SoM with GNSS (single pack)	Australia, Canada, European Union, United Kingdom, United States

Note:

- Devices ship without network activation. To connect devices to the cellular network, contact your service provider and request the correct SIM cards.
- The complete ordering part number may include an ".Rx" designation. For example, MTSMC-MNG6.Rx, where x is the hardware revision number.

Firmware Over the Air (FOTA) for Verizon

Also known as Firmware Update Over the Air (FUOTA). At times, your device may require a critical update to radio firmware for devices connecting to the network. To stay compliant to Verizon's requirements you must implement FOTA. Failure to perform a critical update could result in losing access to the Verizon network. For information and examples go to https://multitech.com/verizon-firmware-over-the-air-fota.

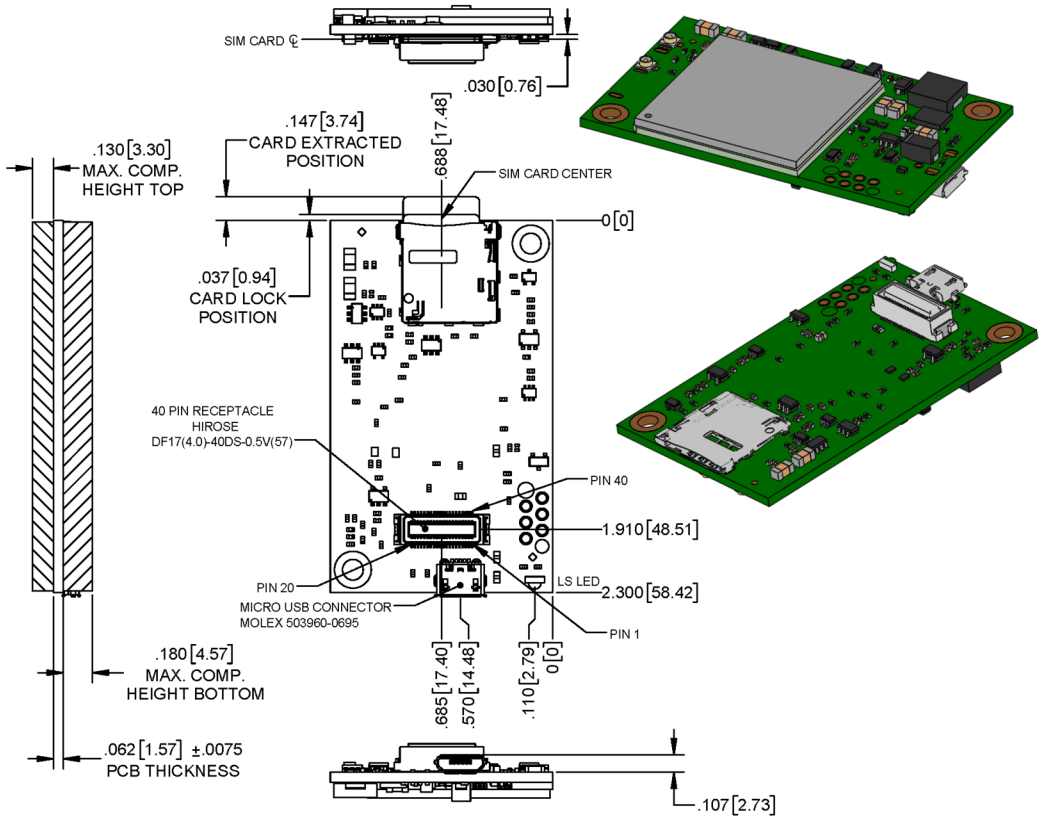
Additional Documentation

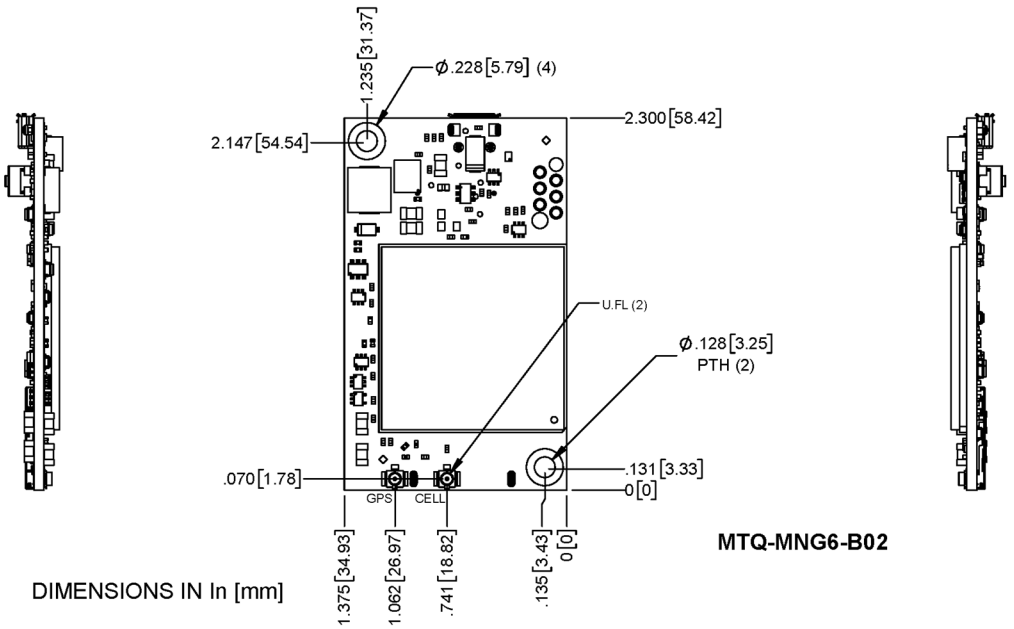
Additional documentation is available at https://multitech.com/all-products/cellular/embedded-modems/multitech-socketmodem-mtq-iot-cellular-embedded-modem-and-system-on-module/. Select your model to find the documents specific for that device.

Document	Description	Part Number
Device Guide SocketModem MTQ MTQ-MNG6-B02	This document. Provides hardware specifications and developer information.	S000809
Developer Guide Universal Developer Kit MTUDK2-ST-CELL.R1	Information for developing with the MTUDK2-ST-CELL.R1 Developer Kit. Includes an overview, design considerations, schematics, and installation and operation information.	S000779
AT Commands Manual	Provides AT commands and parameters used to configure your device.	80617ST10991A

2 Diagrams

MTQ-MNG6 Mechanical Drawing





3 Specifications

Specifications

Category	Description
General	
Standards	LTE UE Category M1
	3GPP Rel. 14 Compliant
	3GPP Rel. 13 eDRx
	3GPP Rel. 13 extended coverage
	3GPP Rel. 12 PSM
Frequency Bands	4G Bands: B1, B2, B3, B4, B5, B8, B8_US, B12, B13, B18, B19, B20, B25, B26, B27, B28, B66
	2G Bands: B2, B3, B5, B8
LED	One, link status
Speed	
Data Speed	LTE Cat M1: Up to 1 Mbps uplink / Up to 588 Kbps downlink
	EGPRS (2G Fallback): Up to 210 Kbps uplink / Up to 264 Kbps downlink
Interface	
USB Interface	USB 2.0 high speed
UART	Full UART
Physical Description	
Weight	0.6 oz (17g)
Dimensions	Refer to Mechanical Drawings for details.
Connectors	
Antenna	2 surface mount U.FL: cellular, GNSS
SIM Holder	1.8 V and 3 V Micro 3FF
Pin header	40-pin female for USB or UART
Environment	
Operating Temperature	-40° C to +85° C
Storage Temperature	-40° C to +85° C
Humidity	20%-90% RH, non-condensing
Power Requirements	

Category	Description
Input Voltage (using micro-USB connector)	5.0 VDC
Input Voltage (using 40-pin connector)	3.3 VDC or 5.0 VDC
Certifications and Compliance	
EMC and Radio Compliance	FCC Part 15 Class B
	FCC Part 22H, 24E, 27, 90
	IC Class B
	CE Mark, RED (EU)
	RCM
	UKCA
Safety Compliance	UL 62368-1
	cUL 62368-1
	IEC 62368-1
Network Compliance	PTCRB
Carrier	AT&T/Verizon/T-Mobile

Note:

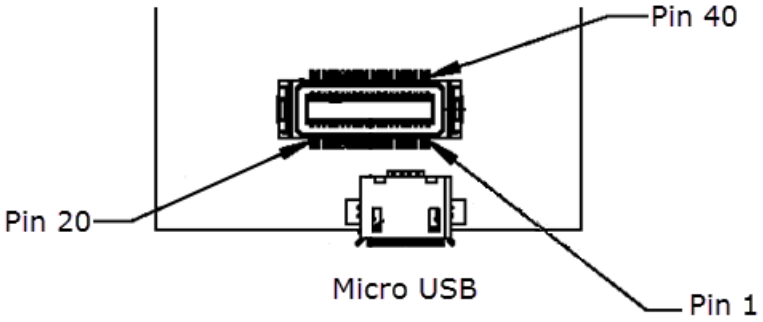
- The battery management circuit is designed for single cell Li-Ion/Li-Poly technology. Acceptability of the battery charge circuit for charging specific batteries/cells is to be determined in the end product.
- Acceptability of the battery charge circuit for charging specific batteries/cells is to be determined in the end product.
- Radio performance may be affected by temperature extremes. This is normal.
- Device has been tested up to +85° C. UL Recognized @ 85° C.

Descriptions of LEDs

The Link Status LED is located on the SIM side of the device to the right of the Micro USB Connector in the lower right corner.

LED Indicators	
LS	Link Status ■ OFF —No power to the cellular radio ■ Slow Blink (200 ms High/1800 ms Low) — Not registered/searching for network connection ■ Slow Blink (1800 ms High/200 ms Low) — Idle ■ Fast Blink (125 ms High/125 ms Low) — Connected/data transfer

40-Pin Connector Definitions



Pin Minimum and Maximum Voltage

Unless otherwise specified in the Pin Definitions table:

	Minimum High Voltage	Maximum Low Voltage	Maximum Input
Serial Input Signals	2.0V	0.8V	6.5V
Serial Output Signals	2.4V	0.55	--

Pin Definitions

Pin	Signal Name	Logic Level Voltage[1]	Max Voltage	In/Out	Description
1	NC				
2	NC				
3	NC				
4	NC				
5	GND	GND		GND	Ground Connection

Pin	Signal Name	Logic Level Voltage[1]	Max Voltage	In/Out	Description
6	USB-DATA+	See USB 2.0 Spec for levels	3.6V	I/O	USB Data+ connection to cellular module
7	USB-DATA-				USB Data- connection to cellular module
8	VCC-IN	3.3 VDC or 5.0 VDC +/- 5%	5.25V	Power Input	Main Power
9	RADIO_RXD	0 - 3V		O	Cellular Radio UART Data Output
10	RADIO_DCD	0 - 3V		O	Cellular Radio UART Data Carrier Detect
11	RADIO_RI	0 - 3V		O	Cellular Radio UART Ring indicator
12	RADIO_CTS	0 - 3V		O	Cellular Radio UART Clear to Send (flow control)
13	GND	GND		GND	Ground Connection
14	NC				
15	NC				
16	NC				
17	NC				
18	NC				
19	NC				
20	NC				
21	NC				
22	NC				
23	NC				
24	NC				
25	NC				
26	NC				
27	NC				C
28	GND	GND		GND	Ground Connection
29	RADIO_RTS	0 - 3V		I	Cellular Radio UART Request to Send (flow control)
30	RADIO_DSR	0 - 3V		O	Cellular Radio UART Data Set Ready

Pin	Signal Name	Logic Level Voltage[1]	Max Voltage	In/Out	Description
31	RADIO_DTR	0 - 3V		I	Cellular Radio UART Data Terminal Ready
32	RADIO_TXD	0 - 3V		I	Cellular Radio UART Serial data input from DTE
33	VCC-IN	3.3 VDC or 5.0 VDC +/- 5%		Power Input	Main Power
34	LINK_STATUS	3V		O	Cellular radio link status LED. Open drain outputs with 47K pull up to 3V.
35	RESET	0 - VCC input (VCC-IN)		I	Radio reset. Input has an internal pull-up resistor. Drive with an open drain output. Active low.
36	GND	GND		GND	Ground Connection
37	GND				
38	NC				
39	NC				
40	NC				

40-Pin Connector

Manufacturer	Hirose Electric Co LTD
Description	.5MM 40 PN B>B RECEPTACLE
Model Number	DF17(4.0)-40DP-0.5V(57)

Use with:

Manufacturer	Hirose Electric Co LTD
Description	.5mm 40 pin B.B header PLUG
Model Number	DF17(2.0)-40DP-0.5V(57)

Electrical Characteristics

Operating Conditions

Parameter	Minimum Volts	Maximum Volts
Supply Range - Vcc	3.3 VDC +/- 5%	5.0 VDC +/- 5%

Absolute Maximum Rating

Parameter	Minimum Volts	Maximum Volts
Voltage at any signal pin	-0.3	5.5

DC Electrical Characteristics

Parameter	Conditions	Minimum Volts	Maximum Volts
Digital signal input low level	CMOS port I_{IO}=+8 mA	-0.3	0.9
Digital signal input high level	CMOS port I_{IO}=+8 mA	2.1	5.5
Output low level voltage for an I/O pin	CMOS port I_{IO}=+8 mA	-	0.4
Output high level voltage for an I/O pin		V_{DD}-0.4	-
Output low level voltage for an I/O pin	TTL port I_{IO}=+8 mA	-	0.4
Output high level voltage for an I/O pin		2.4	-
Output low level voltage for an I/O pin	I_{IO}=+20 mA	-	1.3(1)
Output high level voltage for an I/O pin		V_{DD}-1.3(1)	-
Output low level voltage for an I/O pin	I_{IO}=+6 mA	-	0.4(1)
Output high level voltage for an I/O pin		V_{DD}-0.4(1)	-
Output low level voltage for an I/O pin	I_{IO}=+4 mA	-	0.4(2)
Output high level voltage for an I/O pin		V_{DD}-0.4(2)	-
RESET (low active) input low	CMOS port I_{IO}=+8 mA	-	0.99
RESET (low active) input high	CMOS port I_{IO}=+8 mA	2.31	-
RESET (low active) input high	CMOS port I_{IO}=+8 mA	5.00	-

(1) Guaranteed by characterization results, not tested in production.

(2) Guaranteed by design, not tested in production.

MTQ-MNG6-B02 Power Draw

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

Radio Protocol	PSM Mode (CPSMS)	eDRX Mode	eDRX Mode with CFUN=5	Cellular Connection Idle (No Data) (Amps)	Average Measured Current at Max Power	TX Pulse (AVG) Amplitude Current for Peak Current for LTE	Total Inrush Charge measured	Total Inrush Charge DURATION during Power up
3.3 VDC with Device on the Developer Board								
GSM 850 UDK Card	N/A	N/A	N/A	41 mA	290 mA	1.9 A	0.196 mC	1.38 mS
LTE BAND 12 UDK Card 707.5Mhz	21 mA	40 mA	N/A	53 mA	355 mA	896 mA	0.196 mC	1.38 mS
5.0 VDC with Device on the Developer Board								
GSM 850 UDK Card	N/A	N/A	N/A	40 mA	274 mA	1.78 A	0.254 mC	1.35 mS
LTE BAND 12 UDK Card 707.5Mhz	21 mA	39 mA	N/A	41 mA	350 mA	888 mA	0.254 mC	1.35 mS
5.0 VDC with Device USB Only								
GSM850 USB Only	N/A	N/A	N/A	40 mA	304 mA	1.79 A	0.10 mC	2.06 mS
LTE BAND 12 USB Only 707.5Mhz	19 mA	44 mA	N/A	43 mA	383mA	1.1 A	0.10 mC	2.06 mS

Note:

Maximum Power: The continuous current during maximum data rate with the radio transmitter at maximum power.
Tx Pulse: The average peak current during a GSM850 transmission burst period or LTE connection. The transmission burst duration for GSM850 can vary, depending on what transmission scheme is being deployed (GPRS Class 8, Class 10, GSM, etc.).
Inrush Charge: The total inrush charge at power on.

4 Antenna Information

Antenna System Cellular Devices

The cellular/wireless performance depends on the implementation and antenna design. The integration of the antenna system into the product is a critical part of the design process. Therefore, it is essential to consider it early so that the performance is not compromised. Devices were approved with the antenna(s) described below and for alternate antennas meeting the given specifications.

The antenna system is defined as the U.FL connection point from the device to the specified cable specifications and specified antenna specifications.

FCC Requirements

There cannot be any alteration to the authorized antenna system. The antenna system must be the same type with similar in-band and out-of-band radiation patterns and should not exceed the maximum gain information detailed in the FCC Grant.

Antenna

Devices were approved with the following antenna:

Manufacturer:	Wieson
Description:	LTE Antenna with SMA-Male Connector
Model Number	GY115IE002-001

MultiTech ordering information:

Model	Quantity
ANLTE4-1HRA	1
ANLTE4-2HRA	2
ANLTE4-10HRA	10
ANLTE4-50HRA	50

Antenna Specifications

Category	Description
Frequency Range	0.698 - 0.96 GHz 1.710 - 2.170 GHz 2.30 - 2.69 GHz
VSWR	3:1 maximum
Gain	2.06 dBi

Category	Description
Impedance	50Ω nominal
Radiation	Omni-directional
Polarization	Linear, vertical

LTE Antenna MISO

LTE devices use multiple input and single output (MISO) to improve the downlink connection (cell tower to mobile). It has no effect on the uplink (mobile to cell tower).

Important: Always connect all included antennas for increased downlink bandwidth and better signal handling in diverse locations. You must deploy with two antennas, unless your network operator has authorized you to deploy with one antenna.

Selecting Antennas

Select an antenna based on your product and application. Typically, both antennas are the same and either can be the main receive antenna.

Placing External Antennas

Antennas are usually a quarter wavelength apart from each other. With multiband radios where the quarter wavelengths in each band are diverse from each other, this rule may not be practical. Choose spacing based on the band used most often or the band with connection difficulty. Some environments are harsher on particular bands. MultiTech products have antenna connectors at the best spacing for the product size.

Placing antennas in close proximity to each other is not optimal, but you can do it if necessary. It depends on the signal strength to and from each antenna.

If the antennas are too close together for your application, use a similar antenna on a short cable for the second receive only antenna.

Placing GPS Antennas

GPS antennas need a clear view of the sky. Position the GPS antenna so the diversity antennas do not block its view of the sky.

Antenna Approvals and Safety Considerations

- Network operators conduct antenna diversity tests.
- There are no EMC concerns about antenna diversity.
- All antennas that contain plastics require a minimum flammability rating (UL94-HB).
- Safety requirements depend on your final product.
- Unless otherwise noted, antennas are not approved for outdoor use. Do not extend any antenna outside of any building, dwelling, or campus.

Power Draw

There are no significant power draw differences.

OEM Integration

FCC & IC Information to Consumers

The user manual for the consumer must contain the statements required by the following FCC and IC regulations: 47 C.F.R. 15.19(a)(3), 15.21, 15.105 and RSS-Gen Issue 4 Sections 8.3 and 8.4.

FCC Grant Notes

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

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.

Actual content pending Grant: *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.*

Note: Host design configurations constituting a device for portable use (<20 cm from human body) require separate FCC/IC approval.

Note: Only use antennas approved respectively as listed for the unlicensed radios (Bluetooth/Wi-Fi)

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 additional labeling requirements, see the product's Labeling Requirements. For the FCC and IC IDs, see specific certificate information in the Regulatory Information chapter.

5 Safety Instructions

Handling Precautions

To avoid damage due to the accumulation of static charge use proper precautions, such as an ESD strap, when handling any cellular device to avoid exposure to electronic discharge during handling and mounting the device.

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.
- Turn off your wireless device when in an aircraft. Using portable electronic devices in an aircraft may endanger aircraft operation, disrupt the cellular network, and may be illegal. Failing to observe this restriction may lead to suspension or denial of cellular services to the offender, legal action, or both.
- Turn off your wireless device when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.
- Turn 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 cellulaires. 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.

General Safety

The device 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 device 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.

Interference with Pacemakers and Other Medical Devices

Radio frequency 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 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

When using your device in a vehicle:

- Do not use this device while driving.
- Respect local regulations on the use of cellular devices in vehicles.
- If incorrectly installed in a vehicle, operating the wireless device could interfere with the vehicle's electronics. To avoid such problems, use qualified personnel to install the device. The installer should verify that the 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 evaluated this device for use in ordinary locations only. UL did *not* evaluate this device for installation in a vehicle or other outdoor locations. UL certification does not apply or extend to use in vehicles or outdoor applications.

Operation Safety

CAUTION: Read all instructions and safety information before installing or using this device.

Attention: Lisez toutes les instructions et consignes de sécurité avant d'installer ou d'utiliser cet appareil.

- Follow all local laws, regulations, and rules for operating a wireless device.
- Use the device security features to block unauthorized use and theft.
- Unless otherwise noted, antennas are not approved for outdoor use. Do not extend any antenna outside of any building, dwelling, or campus.
- Do not attempt to disassemble the device. There are no user-serviceable parts inside.
- Do not misuse the device. Follow instructions on proper operation and only use as intended. Misuse could make the device inoperable, damage the device or other equipment, or harm users.
- Do not apply excessive pressure or place unnecessary weight on the device. This could result in damage to the device or harm to users.
- Do not use this device in explosive or hazardous environments unless the model is specifically approved for such use. The device may cause sparks. Sparks in explosive areas could cause an explosion or fire that may result in property damage, severe injury, or death.
- Do not expose the device to any extreme environment where the temperature or humidity is high. Such exposure could result in damage to the device or cause a fire. See the device specifications for recommended operating temperature and humidity.
- Do not expose the device to water, rain, or other liquids. It is not waterproof. Exposure to liquids could result in damage to the device.
- Using accessories, such as antennas, that MultiTech has not authorized or that are not compliant with the device accessory specifications may invalidate the warranty.

If the device is not working properly, contact MultiTech technical support.

6 Labels

Approvals and Certifications

This device is an industry and/or carrier approved modem. In most cases, when integrated and used with an antenna system that was part of the MultiTech modem certification, additional approvals or certifications are not required for the device that you develop as long as the following requirements are met:

- **PTCRB Requirements:** The antenna system cannot be altered. The antenna system must be the same type with similar in-band and out-of-band radiation patterns and maintain the same specifications. Refer to the FCC grant information for details.
- **Model Identification:** The MultiTech model identification allows the carrier to verify the modem as one of its approved models. This information is located on the modem's label below the bar code.

Example Labels

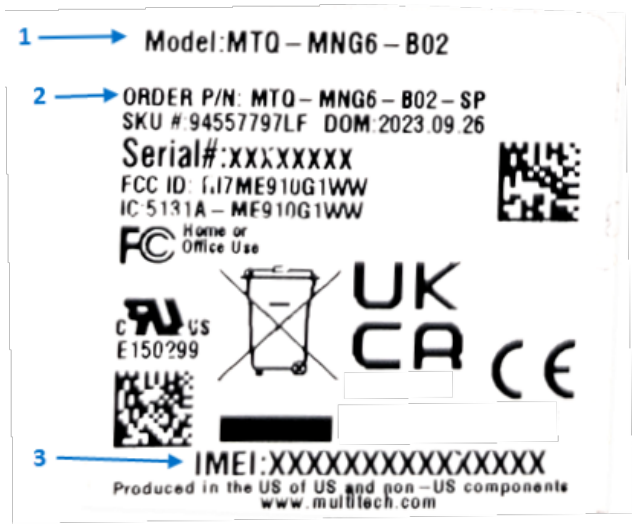
Note: Actual labels vary depending on the regulatory approval markings and content.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

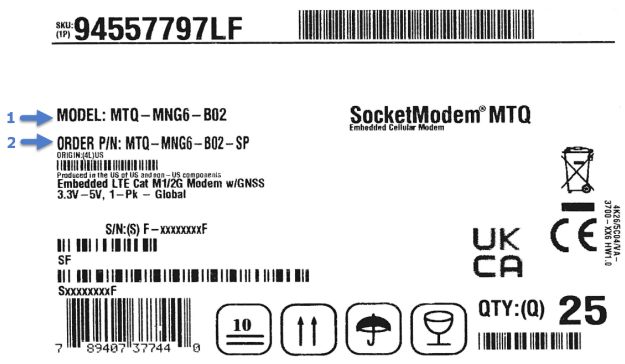
The label shown is not the actual size.

1 - MultiTech Model Identification
2 - MultiTech Ordering Part Number
3 - IMEI

Device Label



Package Label



7 Regulatory Information

FCC 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.

FCC Interference Notice

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Grant Information

FCC Identifier:	RI7ME910G1WW
Equipment Class:	PCS Licensed Transmitter
Notes:	ME910G1-WW LTE Module CAT M
Approval:	Single Modular

FCC Rule Part	Frequency Range (MHz)	Power Output (mW)	Frequency Tolerance (PPM)	Emission Designator
22H	824.2 - 848.8	1.79	2.5 PM	246KGXW
22H	824.2 - 848.8	2.1	2.5 PM	246KGXW
22H	824.2 - 848.8	0.61	2.5 PM	248KG7W
22H	824.1 - 848.9	0.19	2.5 PM	129KG7D
22H	824.1 - 848.9	0.21	2.5 PM	190KG7D
22H	824.7 - 848.3	0.22	2.5 PM	1M10G7D
22H	824.7 - 848.3	0.22	2.5 PM	1M10W7D
22H	824.1 - 848.9	0.24	2.5 PM	132KG7D
22H	824.1 - 848.9	0.22	2.5 PM	191KG7D
22H	824.7 - 848.3	0.23	2.5 PM	1M10G7D
22H	824.7 - 848.3	0.24	2.5 PM	931KW7D
24E	1850.2 - 1909.8	1.22	2.5 PM	244KGXW
24E	1850.2 - 1909.8	1.1	2.5 PM	246KGXW
24E	1850.2 - 1909.8	0.47	2.5 PM	247KG7W
24E	1850.1 - 1909.9	0.21	2.5 PM	127KG7D
24E	1850.1 - 1909.9	0.24	2.5 PM	191KG7D
24E	1850.7 - 1909.3	0.23	2.5 PM	1M10G7D
24E	1850.7 - 1909.3	0.23	2.5 PM	926KW7D
24E	1850.1 - 1914.9	0.22	2.5 PM	129KG7D
24E	1850.1 - 1914.9	0.23	2.5 PM	191KG7D
24E	1850.7 - 1914.3	0.23	2.5 PM	1M11G7D
24E	1850.7 - 1914.3	0.24	2.5 PM	936KW7D
27	1710.1 - 1754.9	0.22	2.5 PM	130KG7D
27	1710.1 - 1754.9	0.23	2.5 PM	191KG7D
27	1710.7 - 1754.3	0.24	2.5 PM	1M10G7D
27	1710.7 - 1754.3	0.23	2.5 PM	940KW7D
27	699.1 - 715.9	0.19	2.5 PM	128KG7D

FCC Rule Part	Frequency Range (MHz)	Power Output (mW)	Frequency Tolerance (PPM)	Emission Designator
27	699.1 - 715.9	0.23	2.5 PM	184KG7D
27	699.7 - 715.3	0.22	2.5 PM	1M10G7D
27	699.7 - 715.3	0.2	2.5 PM	938KW7D
27	777.1 - 786.9	0.19	2.5 PM	129KG7D
27	777.1 - 786.9	0.23	2.5 PM	184KG7D
27	779.5 - 784.5	0.2	2.5 PM	1M10G7D
27	779.5 - 784.5	0.2	2.5 PM	939KW7D
90	814.1 - 823.9	0.2	2.5 PM	127KG7D
90	814.1 - 823.9	0.21	2.5 PM	190KG7D
90	814.7 - 823.3	0.22	2.5 PM	1M10G7D
90	814.7 - 823.3	0.21	2.5 PM	925KW7D

Output power is conducted.

This grant is valid only when the module is sold to OEM integrators and must be installed by the OEM integrators. This device is to be used only for mobile and fixed application. 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 co-located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter evaluation procedures as documented in this filing. End-users may not be provided with the module installation instructions. OEM integrators and end-users must be provided with transmitter operating conditions for satisfying RF exposure compliance.

The highest antenna gain including cable loss, must not exceed 8.0 dBi for Band 2 and Band 25, 5.0 dBi for Band 4 and Band 66, 9.4 dBi for Band 5, 8.7 dBi for Band 12, 9.1 dBi for Band 13, 9.3 dBi for Band 26, 6.9 dBi for GPRS/EDGE 824-849MHz Band, 2.5 dBi for GPRS/EDGE 1850-1910MHz Band . This device contains functions that are not operational in U.S. Territories. This filing is only applicable for U.S. operations.

Industry Canada Class B Notice

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

This device complies with Industry Canada license-exempt RSS standard(s). The operation is permitted for the following two conditions:

1. The device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

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

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

Canadian Limitations

Notice: This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

Notice: The REN assigned to each terminal equipment provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed five.

Limitations canadiennes

Avis: Cet équipement respecte les spécifications techniques des équipements terminaux d'Industrie Canada. Cette conformité est confirmée par le numéro d'enregistrement. L'abréviation IC précédant le numéro d'enregistrement signifie que l'enregistrement a été effectué conformément à une Déclaration de Conformité indiquant que les spécifications techniques d'Industrie Canada ont été respectées. Ceci n'indique pas que cet équipement a été approuvé par Industrie Canada.

Avis: L'IES (indice d'équivalence de la sonnerie) attribué à chaque terminal fournit une indication du nombre maximal de terminaux pouvant être connectés à une interface téléphonique. La terminaison d'une interface peut être constituée de n'importe quelle combinaison d'appareils à la seule condition que la somme des indices d'équivalence de sonnerie de l'ensemble des appareils ne dépasse pas cinq.

EU EMC, Safety, and Radio Equipment Directive (RED) Compliance

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

- Council Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment; and
- Council Directive 2014/53/EU on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

MultiTech declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU. The declaration of conformity may be downloaded at https://multitech.com/product-support/.

EU EMC, Safety, and Radio Equipment Regulations (UKCA)

For models designated for use in the UK, the following applies:

UK CA

The UKCA mark is to confirm conformity with the relevant UKCA harmonization legislation:

2017 No 1206	The Radio Equipment Regulations 2017
2016 No 1101	The Electrical Equipment Safety Regulations 2016
2016 No 1091	The Electromagnetic Compatibility Regulations 2016
2012 No 3032	The Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

MultiTech declares that this device is in compliance with the essential requirements and other relevant provisions of the above regulations. The UKCA Declaration of Conformity may be requested at https://multitech.com/product-support/.

Australia Regulatory Compliance Mark (RCM)

This product complies with the requirements of the Regulatory Compliance Mark (RCM) for Electrical Regulatory Authorities Council (ERAC), Electrical Equipment Safety System (EESS), and the Australian Communications and Media Authority (ACMA) for Electromagnetic Compatibility (EMC).

8 Environmental Notices

EU WEEE Directive

The Waste from Electrical and Electronic Equipment (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 MultiTech 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, contact your local city office, your household waste disposal service or where you purchased the product.

July, 2005

EU REACH-SVHC Statement

Multi-Tech Systems, Inc. confirms that none of its products or packaging contain any of the Substances of Very High Concern (SVHC) on the REACH Candidate List, in a concentration above the 0.1% by weight allowable limit.

For the current REACH-SVHC statement and additional regulatory documents, go to https://multitech.com/approvals-and-certifications/.

EU RoHS 3 Directive

Multi-Tech Systems, Inc. confirms that all products comply with the chemical concentration limitations set forth in the Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS 3) regulations for CE and UKCA, following the standard EN IEC 63000:2018.

For the current Certificate of Compliance for Hazardous Substances and additional regulatory documents, go to https://multitech.com/approvals-and-certifications/.

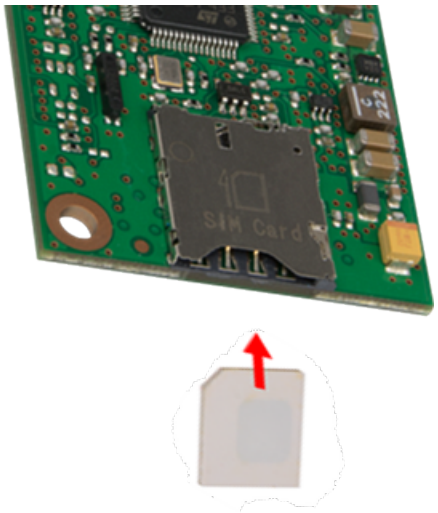
Chapter 9 Getting Started

Getting Started

Installing a SIM Card on a SocketModem

When using the SocketModem with a developer board, install the SIM card before mounting the SocketModem on the developer board.

With the contact side facing down, align the notched edge as shown on the SocketModem's SIM holder and slide the SIM card completely into the SIM holder.



Device Drivers

Install drivers on your computer before connecting the device.

The cellular radio's USB device driver is available on your model's page.

- Go to https://multitech.com/all-products/cellular/embedded-modems/multitech-socketmodem-mtq-iot-cellular-embedded-modem-and-system-on-module/ and click on your model. Download the driver from Downloads.
- The USB Driver Installation Guide (S000616) is included in the driver download and is also available under Manuals on your model's page.

USB Cable Recommendations

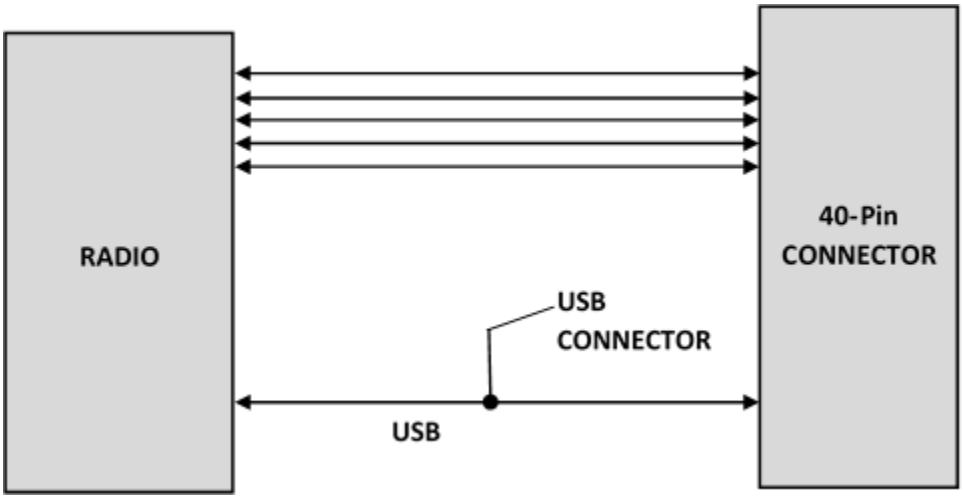
To avoid enumeration or power issues if your device has a USB connector:

- Use a high-speed USB cable that is as short as possible.
- Use a well-shielded cable with at least 24 AWG wire pair for power/ground and 28 AWG wire pair for data lines.

- If possible, use a USB port that connects directly to the motherboard rather than a USB port with added cabling inside the computer chassis.
- Use USB 3.0 ports if available. These ports are typically rated for more current.
- The USB cable is available through MultiTech. The part number is CA-USB-A-MICRO-B-3.

Communications Flow

No Processor Model (B02)



Note:

- When the USB interface is used via the 40-pin connector or the USB connector, the serial interface to the radio will not function.
- Switching between the USB interface and serial port requires a reset. The cellular radio checks for a USB connection upon reset. If USB is not present, it will only use the serial port. If USB is present upon reset, it will only use USB.

Communicating with the Device

Following are three options for communicating with the device.

- Install USB drivers and plug into the micro USB connector. No need for a host board.
- Access the device's USB interface via pins 6 and 7 of the 40-pin connector. Data pins 6 and 7 are in parallel with the micro USB connector on the device. There is no connection to pins 6 and 7 on the developer board.
- Establish serial communication using Multitech developer board MTUDK2. See the Developer Guide, Universal Developer Kit MTUDK2-ST-CELL.R1 (part number S000799) for more information.

Configuring Device Firmware for Your Cellular Network

Before connecting to a cellular network, you need to configure the device for that cellular network. This step is required only the first time you use the device and if you change cellular carrier.

Important: Configure the device for Cat M1 use only. Use AT#WS46=0 to ensure the device is in Cat M1 mode. Failure to set the device for Cat M1 use only may delay network registration times and cause the device to be used in a manner for which it was not approved.

Carrier Values

- 0 AT&T/other networks
- 1 Verizon
- 2 ROW (Other global).
- 3 Australia

Checking the Cellular Network

To check the device's current cellular network:

```
AT#FWSWITCH?
```

Setting the Cellular Network

To set the cellular network, issue the following:

```
AT#FWSWITCH=<carrier value>,1,1,
```

Where carrier value is the 1, 2, 3, or 4 depending on your network.

The device automatically reboots twice. After the second reboot, the device is ready for configuring the data connection.

Note: For the Link status (LS) LED to function, you must issue the command AT#GPIO=1,0,2 any time you use the firmware switch command (AT#FWSWITCH=0 or AT#FWSWITCH=1).

For more information on AT#FWSWITCH, refer to the AT command reference guide.

Examples

```
AT#FWSWITCH=1,1,1
OK
AT
OK
```

To switch carrier networks:

From AT&T to Verizon:

```
AT#FWSWITCH=1,1,1
```

From Verizon to AT&T:

```
AT#FWSWITCH=0,1,1
```

Configuring a Data Connection

Configure the device before making a cellular data connection. Configuration changes are saved automatically.

Note: Configure the data connection when initially setting up the device, when changing SIM card, or if recommended by your carrier.

Configuring Packet Data Protocol

Use a Packet Data Protocol (PDP) context to configure the device to use your carrier's packet data services. Multiple PDP contexts are stored in an ordered list. Generally, a carrier approves only one PDP context in the list to configure and use for a data connection with their network.

To view the current PDP context list use the following AT command:

```
AT+CGDCONT?`
```

Example

```
AT+CGDCONT?
+CGDCONT: 1,"IPV4V6","","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
+CGDCONT: 2,"IPV4V6","vzwadmin","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
+CGDCONT:
3,"IPV4V6","vzwinternet","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
+CGDCONT: 4,"IPV4V6","vzwapp","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
+CGDCONT: 5,"IPV4V6","vzwclass6","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0
+CGDCONT: 6,"IPV4V6","vzwiotts","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0

OK`
```

Before configuring a PDP context use the following to stop the device from automatically connecting to the cellular network and registering:

```
AT+COPS=2
```

After configuring the PDP context(s) use the following to resume automatic connection and registration:

```
AT+COPS=0
```

Configuring APN

The Access Point Name (APN) is a string in the PDP context that defines the network path for cellular data connectivity. The APN must match the carrier's value provided with the SIM

Configuring Verizon APN

Verizon automatically pushes the necessary PDP context details, including the APN, to the device. If the APN is not pushed automatically, use the following AT commands to set the APN.

```
AT+COPS=2
AT+CGDCONT=1,"IPV4V6","<APN>"
AT+COPS=0
```

Where < APN> is the APN Verizon provided with the SIM.

Verizon Example

```
AT+COPS=2
OK
AT+CGDCONT=1,"IPV4V6","mw01.vzwstatic"
OK
AT+COPS=0
OK
```

Configuring APN for AT&T and Other Networks

AT&T and other networks may not pushes PDP context details, including the APN, to the device. Use the following AT commands to set the APN.

```
AT+COPS=2
AT+CGDCONT=1,"IPV4V6","<APN>"
AT+COPS=0
```

Where <APN> is the APN your carrier provided with the SIM.

AT&T Example

```
AT+COPS=2
OK
AT+CGDCONT=1,"IPV4V6","broadband"
OK
AT+COPS=0
OK
```

Registering the Device on a Cellular Network

When configured with AT+COPS=0 the device automatically attempts to register with a carrier network. With the SIM and device properly configured and good reception network registration takes less than a minute. Otherwise, it may take more than 5 minutes.

To determine the device's registration status, use one of the following three AT commands. If any return n,1 or n,5 then the device registered with the network automatically:

```
AT+CREG?
AT+CEREG?
AT+CGREG?
```

Return Values

- n,0 = Time-out or not searching
- n,1 = Registered
- n,2 = Searching
- n,3 = Carrier denied connection (contact carrier for guidance)
- n,5 = Registered, roaming

If the device has not registered with the network, wait a few minutes before issuing one of the AT+C*REG commands again.

Examples

```
AT+CREG?
+CREG: 0,1

OK
AT+CEREG?
+CEREG: 0,1

OK
AT+CGREG?
+CGREG: 0,1

OK
```

Testing Cellular Data

Once the device is configured and registered with the cellular network, activate a PDP context and conduct a ping test to ensure the device is sending and receiving data.

Activating a PDP Context

Before sending data, activate a carrier specific PDP context with the following.

```
AT#SGACT=1,1
```

Example

```
AT#SGACT=1,1
#SGACT: 100.72.154.34,38.0.16.20.176.134.63.233.0.0.0.0.187.242.184.1

OK
```

Conducting a Ping Test

After activating the PDP context, use AT#PING to verify network connectivity.

```
AT#PING="<Domain or IP Address>"
```

Example:

```
AT#PING="8.8.8.8"
#PING: 01,"8.8.8.8",0,114
#PING: 02,"8.8.8.8",0,114
#PING: 03,"8.8.8.8",1,114
#PING: 04_Cel,"8.8.8.8",2,114

OK
```

Configuring Low Power Options

See Power Down the Device for lowest power consumption.

To configure PSM:

```
AT+CPSMS
```

To configure eDRX:

```
AT+CEDRXS
```

To set device functionality:

```
AT+CFUN
```

Note: See the AT commands reference guide for AT command details.

Power Down the Device

CAUTION: Failing to properly power down 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 or hold the reset line (pin 35) LOW.
2. Wait for 30 seconds or until RADIO_VDD (pin 27) goes LOW.
3. Remove power to the MTQ.

Device RESET (Pin 35)

Note: Take note of how your software controls this pin to avoid unnecessary power cycling.

The RESET pin takes care of properly powering up and powering down the cellular radio module.

Holding the RESET pin LOW for >50ms initiates a power up or power down sequence, depending on its previous state.

RESET Function on Initial Power Up

Regardless of the RESET pin's state, the cell radio initiates a power up sequence on the first power up. At the end of the power up cycle, the state of the RESET pin is sampled again.

- The full power up cycle may take up to 30 seconds before all AT commands are available.
- If the RESET pin is LOW when the radio completes the power up sequence, the radio initiates a power down sequence.

RESET Function when the Radio Module is Powered

If the RESET pin is LOW, the radio initiates a power down sequence.

- The full power down cycle may take up to 65 seconds, during which time the radio is properly deregistered.
- If the RESET pin is in a continuous LOW state, the radio will stay off.
- You can monitor the state of RADIO_VDD (pin 27); when this pin goes LOW, the radio power is off.

- If the RESET pin is set to HIGH, it will initiate a power up sequence.

Chapter 10 Using Connection Manager

Use Connection Manager to:

- Install the latest device drivers.
- 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, and some regional carriers.
- 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.

Note: If you have an older version of Connection Manager, uninstall it before installing a new version. For details, refer to Uninstalling Connection Manager.

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://multitech.com/all-products/software-management/connection-manager/.
2. Click **Connection Manager**.
3. Open or unzip the **Connection Manager** file and run the installer (.msi file).
4. On the MultiTech Connection Manager Setup Wizard Welcome Panel, click **Next**.
5. Read the end-user license agreement and check **I accept the terms in the License Agreement**. Click **Next**.
6. 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 in Windows 10 and Windows 11.
7. If any Multichannel device is connected to the computer, disconnect it and click **Next**.
8. 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.

9. To specify a folder for Connection Manager, use the default folder or click **Change** to browse to the folder you want to use. Click **Next**.
10. Click **Install**. Windows may prompt you to allow the installer to make changes to your computer. Click **Yes**.
11. In the Setup Wizard, click **Finish**.

    Note: To open Connection Manager automatically after installation, check **Start the MultiTech Connection Manager when the installation is finished**.

If using a USB device, you can connect the device to the carrier's network with Connection Manager. See Connecting a Device.

If using a serial device, you need to set up the device in Windows Device Manager before connecting the device. See Setting Up a Serial Device in Windows Device Manager.

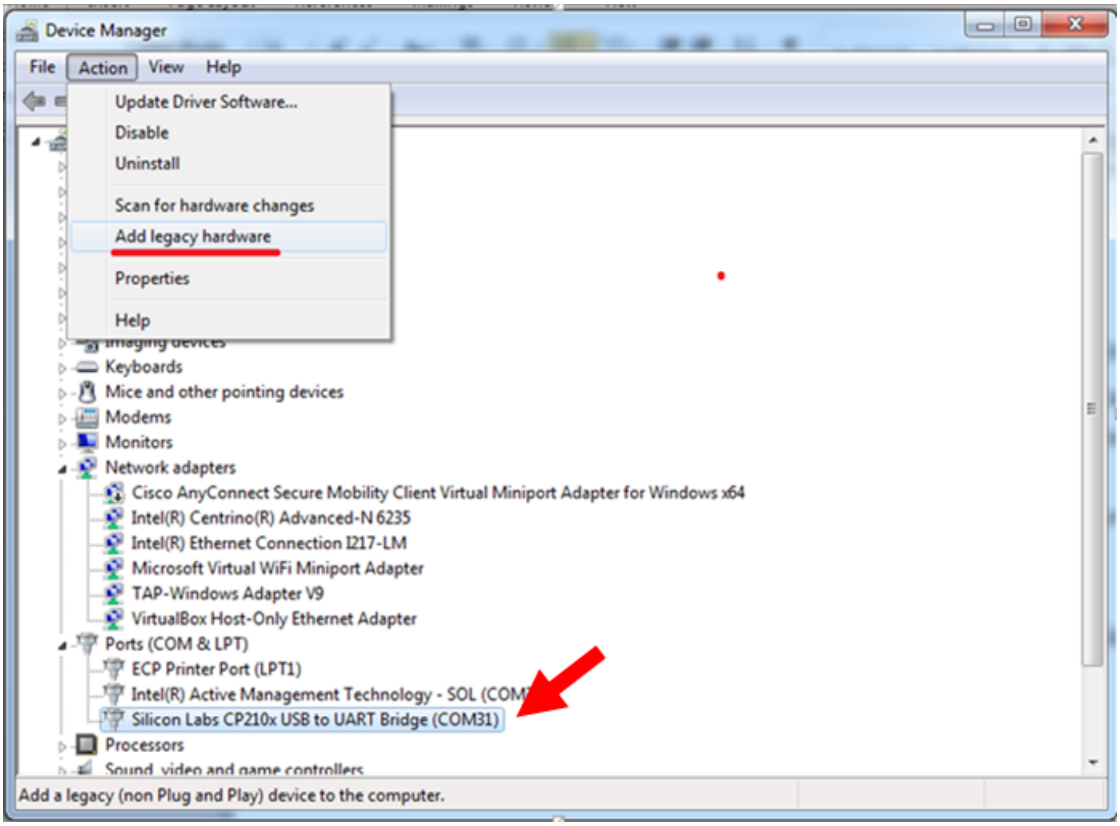
Setting Up a Serial Device in Windows Device Manager

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, see Connecting a Device.

Connecting a Device

Prerequisite:

- Make sure that your device is connected to the computer where Connection Manager is installed.
- If you have a serial device, set up the device in Device Manager. See 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.

To disconnect the device from the carrier's network, click **Disconnect**.

Important: Disconnect the device in Connection Manager before disconnecting a device from the computer.

Uninstalling Connection Manager

Prerequisite:

Make sure that Connection Manager is not running.

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

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**.

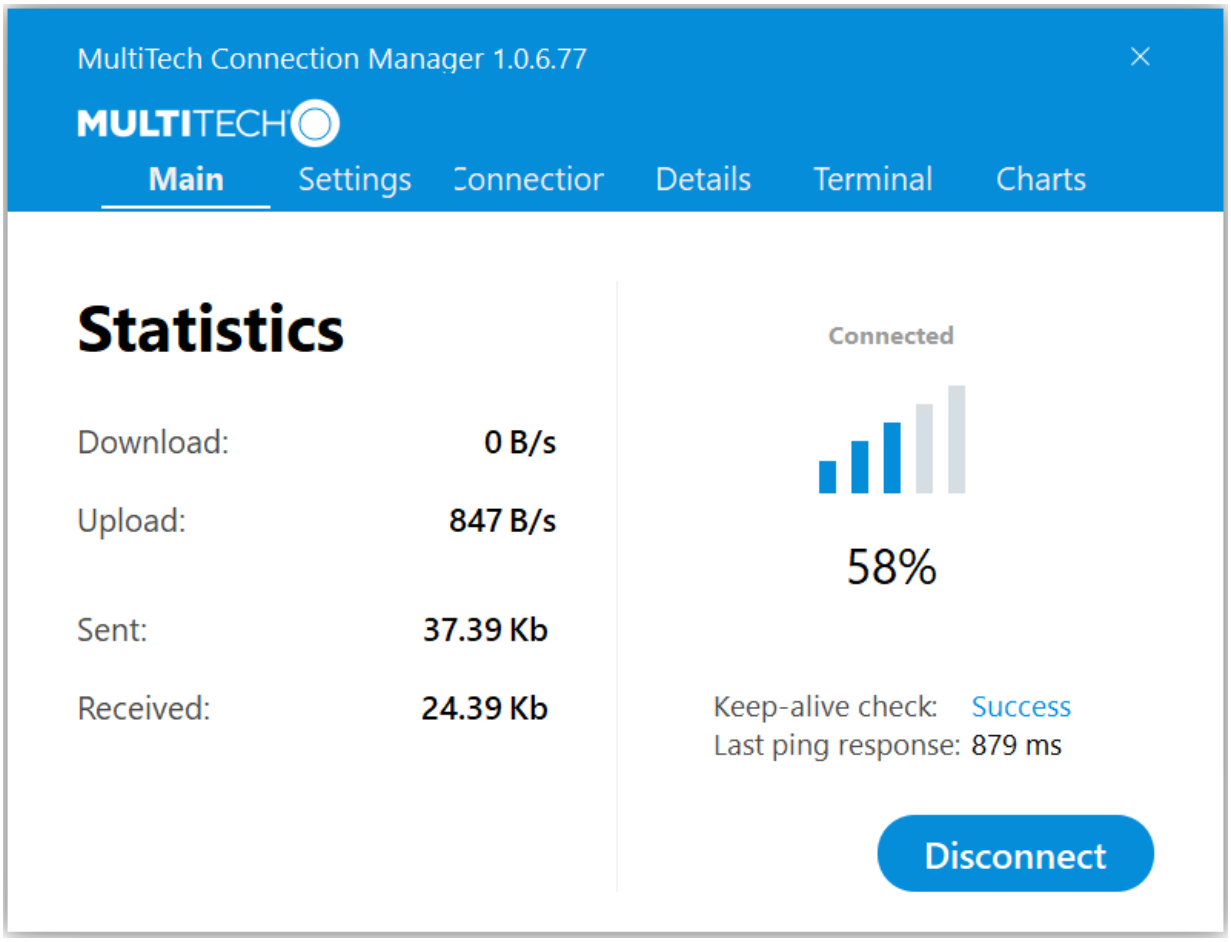
Connection Manager and the installed drivers are removed from the computer.

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, see 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 two-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.

USB Modem is not detected

1. Check the LS LED and Power LED (if available) on the device.

   If they are not continuously lit, then the problem is with the power supply. Check the cable and connections.

   If the LS LED is not blinking, 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 reinstall Connection Manager. During the installation, make sure that you check **Install the modem driver**. See Uninstalling Connection Manager and Installing Connection Manager.

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

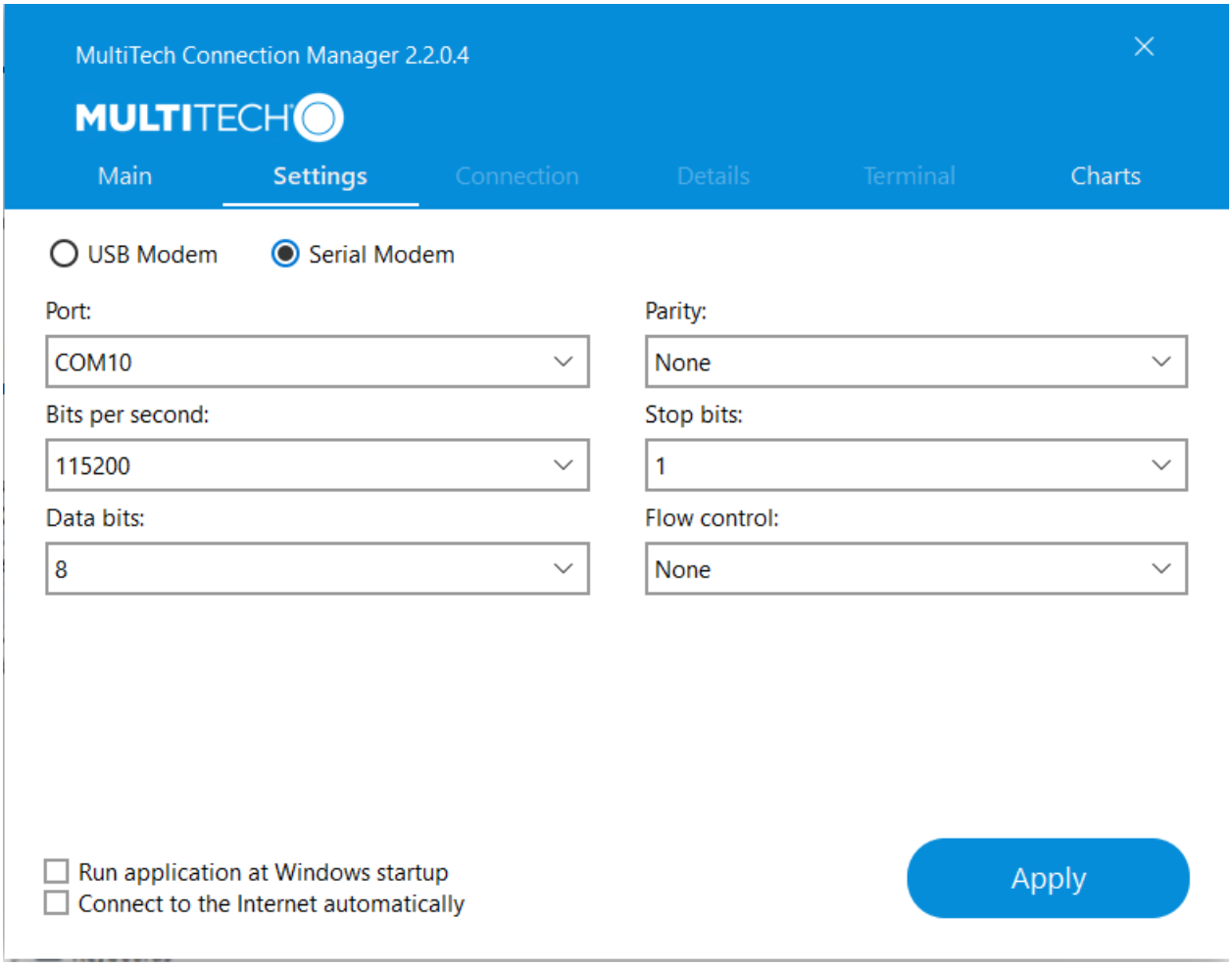
This error has the following causes and solutions.

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.

System Cannot Connect to Serial Device

If your system cannot establish a connection with a serial device, verify Connection Manager settings match modem and serial port settings on the computer.

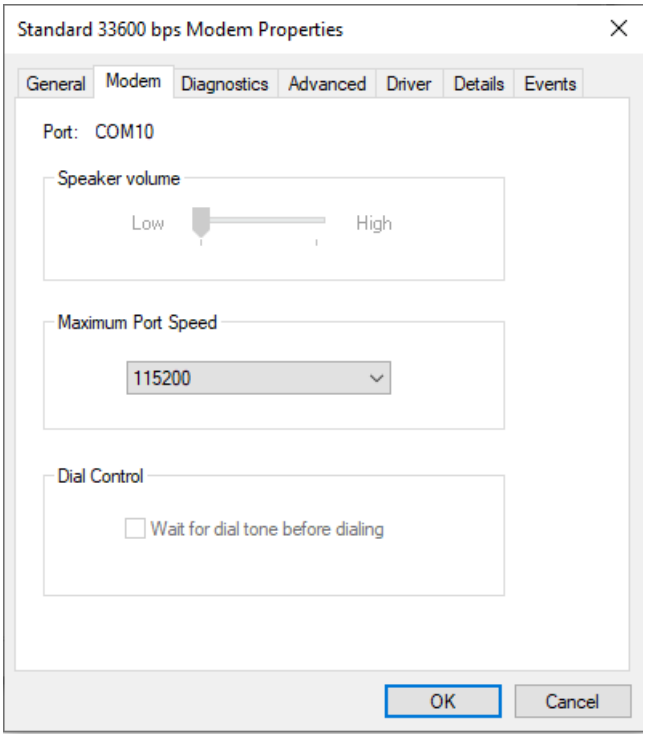
In **Connection Manager**, click the **Settings** tab.



In **Device Manager**, open **Modems** and then right-click on your device and select open the **Properties**.

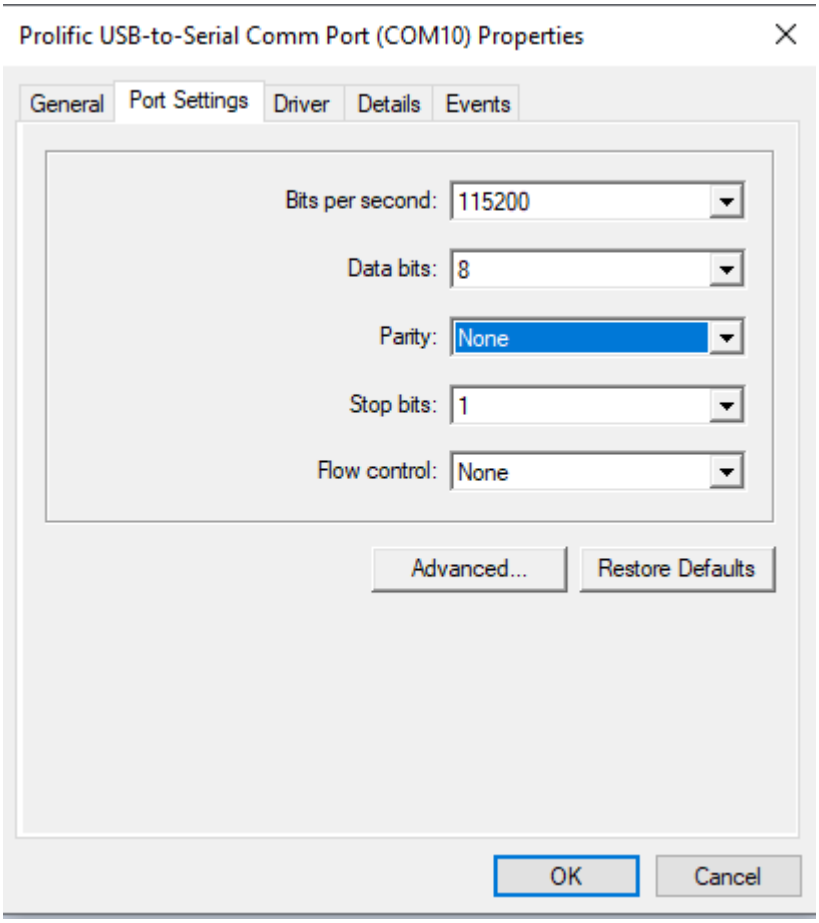
Note: If Modems and Ports don't appear in Device Manager, open the **View** Menu and select **Show hidden devices**.

Click the **Modem** tab to confirm the **Maximum Port Speed** matches Bits per second setting in Connection Manager.



In **Device Manager**, open **Ports (COM & LPT)** and then right-click on the Com Port used by your device and select **Properties.**

Click the Port Settings tab to confirm the **Bits per second, Date bits, Parity, Stop bits** and **Flow control** match those settings in Connection Manager.


Prolific USB-to-Serial Comm Port (COM10) Properties
General
Port Settings
Driver
Details
Events
Bits per second:
115200
Data bits:
8
Parity:
None
Stop bits:
1
Flow control:
None
Advanced...
Restore Defaults
OK
Cancel

Warranty

To read the warranty statement for your product, go to https://www.multitech.com/warranty.

Contact Information

General Information	info@multitech.com https://multitech.com/contact-us/
Sales	+1 (763) 785-3500 sales@multitech.com
Technical Support Portal	+1 (763) 717-5863 https://support.multitech.com
Website	www.multitech.com
World Headquarters	2205 Woodale Drive Mounds View, MN 55112 USA

Revision History

Revision Number	Description	Revision Date
1.3	Updated information on how to power down the device and functions of the device reset pin.	March 2025
1.2	Updated marketing branding.	January 2025
1.1	Updated Carrier Specific Notice, Firmware Over the Air (FOTA).	August 2024
1.0	Original publication.	November 2023