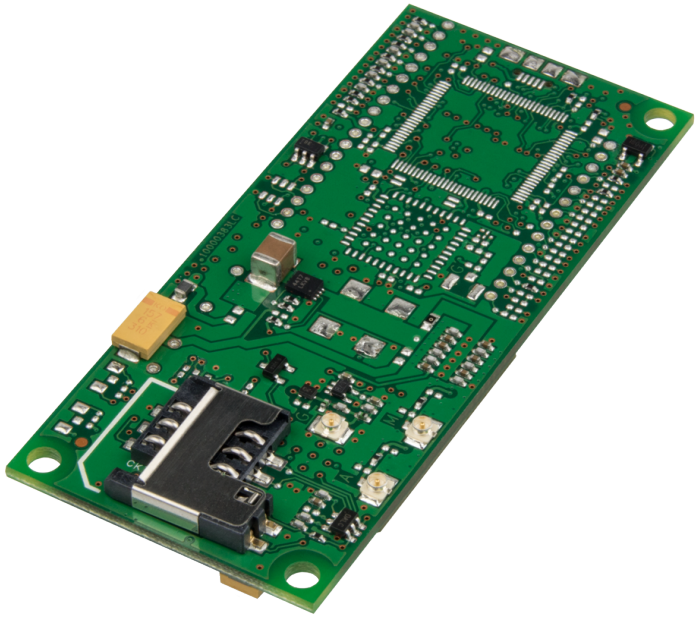
MULTITECH®



SocketModem® Cell

MTSMC-LAT3 Device Guide

SocketModem® Cell Device Guide

Models: MTSMC-LAT3, MTSMC-LAT3-U

Part Number: S000651 Rev. 1.4

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Contacting MultiTech

Sales	Support
sales@multitech.com	support@multitech.com
+1 (763) 785-3500	+1 (763) 717-5863

Website

https://www.multitech.com

Support Portal

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

Warranty

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

World Headquarters

Multi-Tech Systems, Inc.
2205 Woodale Drive, Mounds View, MN 55112
USA

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Chapter 1 – Product Overview

Overview

SocketModem Cell models are complete, ready-to-integrate communications devices that offer standards-based LTE Cat 1 performance. These quick-to-market communications devices allow developers to add wireless communication to products with a minimum of development time and expense. SocketModem Cell models are based on industry-standard open interfaces and use MultiTech's Universal Socket design.

Documentation

The following documentation is available at multitech.com/support.

Document	Description	Part Number
SocketModem Cell LAT3 Device Guide	This document. Provides overview, safety and regulatory information, design considerations, schematics, and device information.	S000651
Universal Developer Kit 2.0 Developer Guide	Information for developing with the MTUDK2 Developer Kit. Includes an overview, design considerations, schematics, and installation and operation information.	S000610
Universal Socket Developer Guide	Information for developing with the MTSMI-UDK Developer Kit. Includes an overview, design considerations, schematics, and installation and operation information.	S000342
USB Driver Installation Guide	Instructions for installing USB drivers on Linux and Windows Systems.	S000616
Telit LE910 V2 Series AT Commands Reference Guide	Lists AT Commands and parameters used to configure your device, used with firmware version 17.00.5x3	80446ST10707A Rev 2

Product Build Options

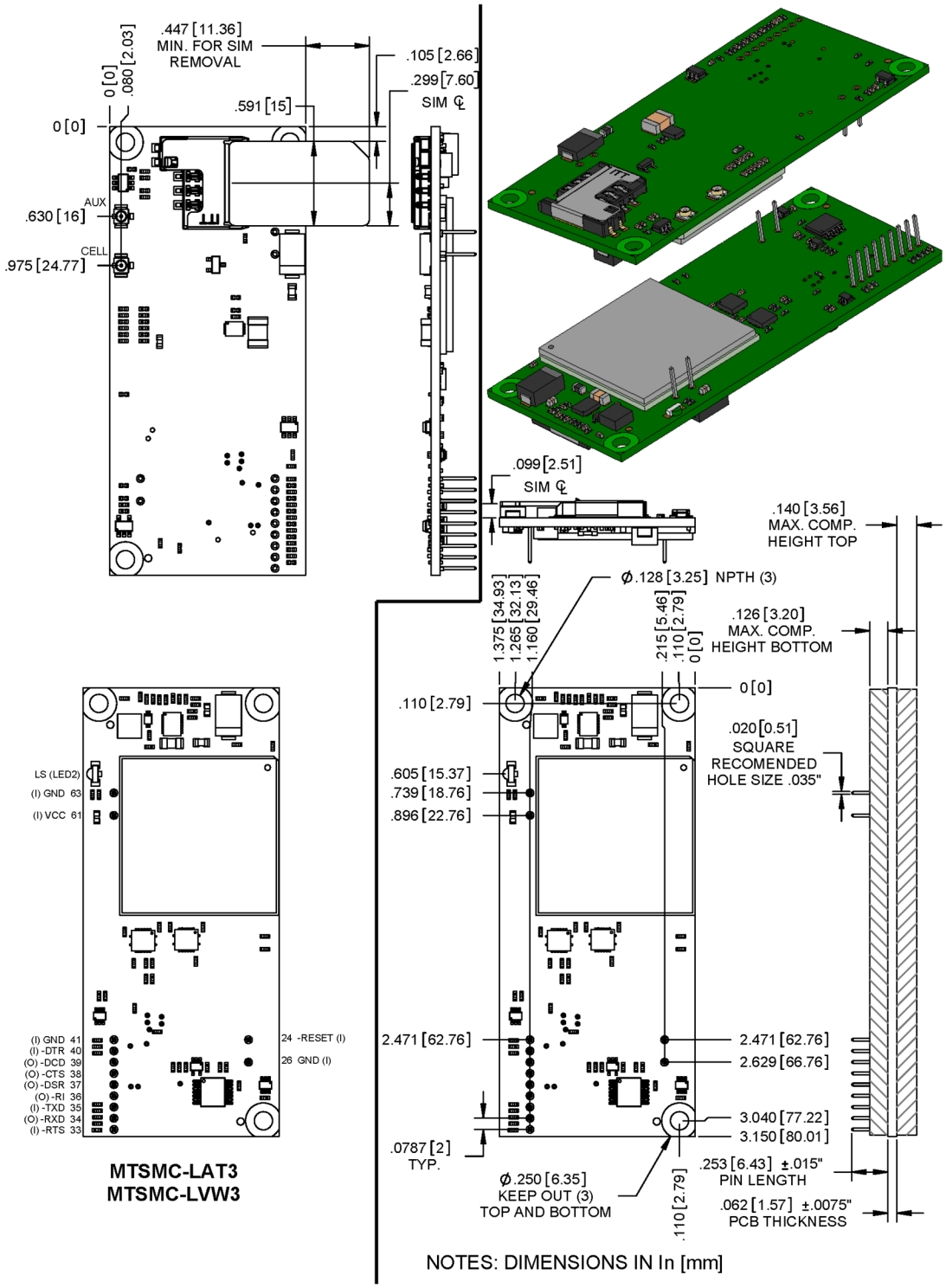
Product	Description	Carrier/Region
MTSMC-LAT3	4G LTE with HSPA+ fallback embedded cellular modem with GPS/GLONASS (Serial Interface)	AT&T/T-Mobile/North America
MTSMC-LAT3-U	4G LTE with HSPA+ fallback embedded cellular modem with GPS/GLONASS (USB Interface)	AT&T/T-Mobile/North America
Developer Kits		
Use either of the following developer kits with MTSMC devices.		
MTUDK2-ST-Cell	Developer Kit for SocketModem, and Dragonfly cellular devices.	All
MTSMI-UDK	Developer Kit for cellular, analog, BlueTooth, and WiFi SocketModems.	All

Note:

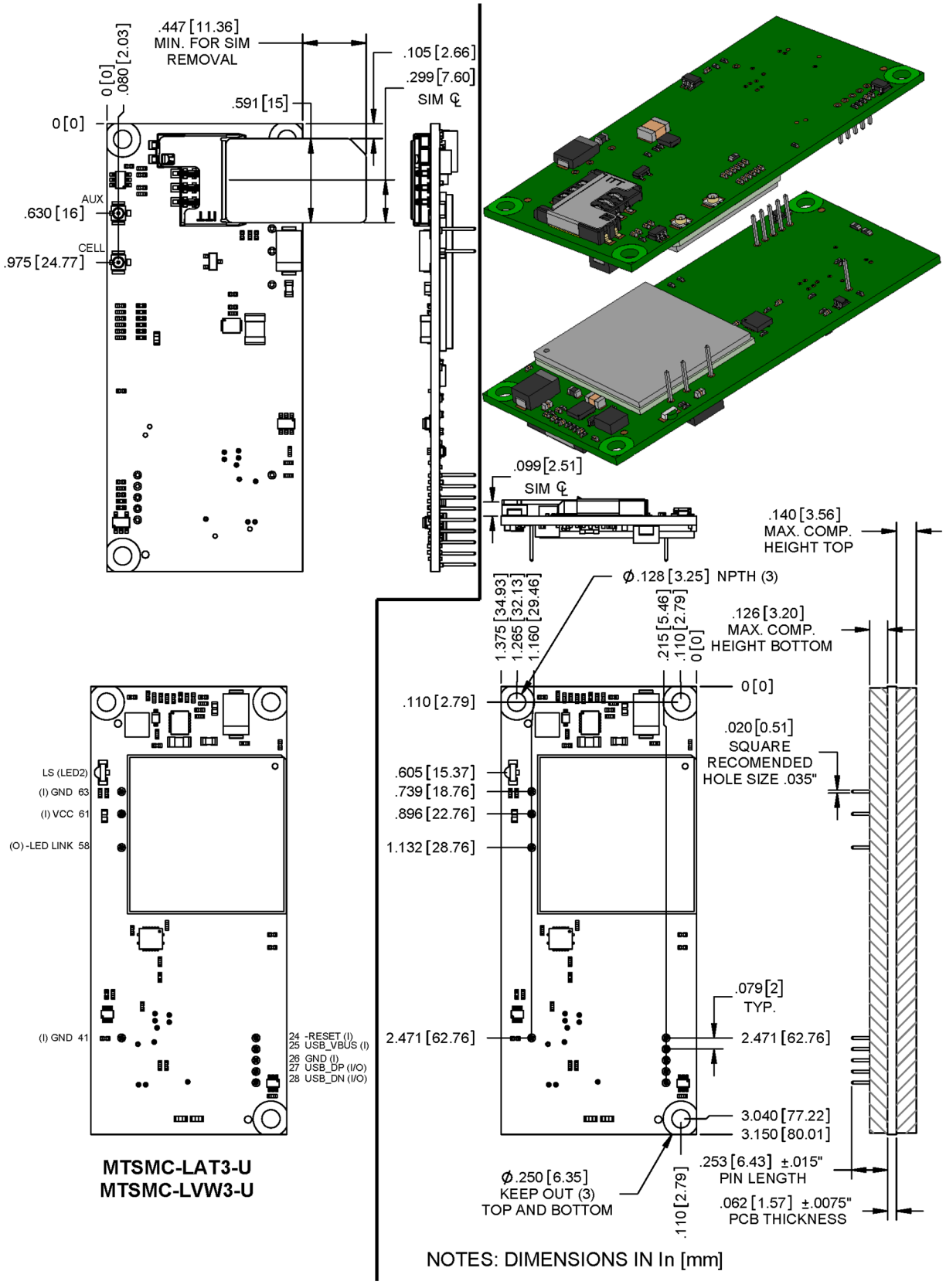
- These units ship without network activation.
- To connect them to the cellular network, you need a cellular account. For more information, refer to Account Activation.
- The complete product code may end in .Rx. For example, MTSMC-LAT3.Rx, where R is revision and x is the revision number.
- All builds can be ordered individually or in 50-packs. Add SP to the model number for a single pack.

Chapter 2 – Mechanical Drawings

MTSMC-Lxx3



MTSMC-Lxx3-U


.447 [11.36]
MIN. FOR SIM
REMOVAL
.105 [2.66]
.299 [7.60]
SIM
.591 [15]
0 [0]
.080 [2.03]
0 [0]
AUX
.630 [16]
CELL
.975 [24.77]
.099 [2.51]
SIM
.140 [3.56]
MAX. COMP.
HEIGHT TOP
Ø.128 [3.25] NPTH (3)
1.375 [34.93]
1.265 [32.13]
1.160 [29.46]
.215 [5.46]
.110 [2.79]
0 [0]
.126 [3.20]
MAX. COMP.
HEIGHT BOTTOM
0 [0]
.110 [2.79]
.020 [0.51]
SQUARE
RECOMENDED
HOLE SIZE .035"
.605 [15.37]
.739 [18.76]
.896 [22.76]
1.132 [28.76]
LS (LED2)
(I) GND 63
(I) VCC 61
(O) -LED LINK 58
(I) GND 41
24 -RESET (I)
25 USB_VBUS (I)
26 GND (I)
27 USB_DP (I/O)
28 USB_DN (I/O)
.079 [2]
TYP.
2.471 [62.76]
2.471 [62.76]
3.040 [77.22]
3.150 [80.01]
.253 [6.43] ±.015"
PIN LENGTH
.062 [1.57] ±.0075"
PCB THICKNESS
Ø.250 [6.35]
KEEP OUT (3)
TOP AND BOTTOM
.110 [2.79]
MTSMC-LAT3-U
MTSMC-LVW3-U
NOTES: DIMENSIONS IN In [mm]

Chapter 3 – Specifications

MTSMC-LAT3 and MTSMC-LAT3-U Specifications

Category	Description
General	
Standards	LTE 3GPP Release 9
	HSPA+ 21/GPRS fallback
	USB Interface is CDC-ACM compliant
TCP/IP Functions	FTP, SMTP, SSL, TCP, UDP
Frequency Bands	4G: 700 (B12/B13)/850 (B5)/AWS 1700 (B4)/1900 (B2)
	3G: 850 (B5)/1900 (B2)
Speed	
Data Speed	LTE: 10 Mbps downlink/5 Mbps uplink
	HSPA+: 21 Mbps downlink/5.76 Mbps uplink
Interface	
USB Interface	USB 2.0 high speed 480 Mbps
Serial Modem Interface	Up to 921.6 Kbps
Physical Description	
Weight	0.4 oz. (10 g)
Dimensions	Refer to Mechanical Drawing for Dimensions.
Connectors	
Antenna Connector	2 surface mount UFL connectors for cellular and Rx diversity/MIMO.
SIM	1.8V and 3V SIM holder for mini-SIM card
Environment	
Operating Temperature	-40° C to +85° C
Storage Temperature	-40° C to +85° C
Humidity	20%-90% RH, non-condensing
Power Requirements	
Input Voltage (USB Models)	5.0 VDC
Input Voltage (Serial Models)	3.3 VDC or 5.0 VDC

Category	Description
SMS	
SMS	Point-to-Point messaging
	Mobile-Terminated SMS
	Mobile-Originated SMS
Certifications and Compliance	
EMC Compliance	FCC Part 15 Class B
Radio Compliance	FCC Part 22, 24, 27
Safety Compliance	UL 60950-1 2nd ED
	cUL 60950-1 2nd ED
	IEC 60950-1 2nd ED
Network Compliance	PTCRB
Carrier	AT&T/T-Mobile

Powering Down Your 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.
2. Wait 30 seconds.
3. Power off or disconnect power.

UART DC Electrical Characteristics

Units: Volts

Applies to the following pins:

Pin	Signal Name	Pin	Signal Name
J33	-RTS	J37	-DSR
J34	-RXD	J38	-CTS
J35	-TXD	J39	-DCD
J36	-RI	J40	-DTR

Parameter	Minimum	Maximum
3.3 Volt Powered		

Parameter	Minimum	Maximum
Input Low Level	0	0.55
Input High Level	1.5	3.3
Output Low Level	0	0.55
Output High Level	2.35	3.3
5 Volt Powered		
Input Low Level	0	0.8
Input High Level	2.3	5
Output Low Level	0	0.55
Output High Level	3.7	5

Absolute Maximum Rating

All models can run with an input voltage of either 3.3V or 5V. The maximum voltage on any signal pin equals the input voltage.

Electrical Characteristics Other Pins

Pin	Signal Name	VIL Min	VIL Max	VIH Min	VIH Max	VOL Min	VOL Max	VOH Min	VOH Max
J24	-RESET	--	0.8	2.0	--	--	--	--	--
J25	USB VBUS	-0.3	0.8	2.0	8.7	--	--	--	--
J26	GND	--	--	--	--	--	--	--	--
J27	USB DP	--	0.8	2	--	--	0.3	2.8	--
J28	USB DN	--	0.8	2	--	--	0.3	2.8	--
J41	GND	--	--	--	--	--	--	--	--
J58	-LED LINK	--	--	--	--	0	0.45	2.85	3.3
J61	VCC	--	--	--	--	--	--	--	--
J63	GND	--	--	--	--	--	--	--	--

Pinout Specifications

Pin	Signal Name	Logic Level Voltage[1]	In/Out	Description
J24	–RESET	3.3 – 5.0	I	Device reset (active low)
J25	USB VBUS	3.3 – 5.0	I	USB power supply input
J26	GND	GND	GND	Ground
J27	USB DP	3.3	I/O	USB data
J28	USB DN	3.3	I/O	USB data
J33	–RTS	5.0	I	Request to send (active low)
J34	–RXD	5.0	O	Received data (active low)
J35	–TXD	5.0	I	Transmitted data (active low)
J36	–RI	5.0	O	Ring indicator (active low)
J37	–DSR	5.0	O	Data set ready (active low)
J38	–CTS	5.0	O	Clear to send (active low)
J39	–DCD	5.0	O	Data carrier detect (active low)
J40	–DTR	5.0	I	Data terminal ready (active low)
J41	GND	GND	GND	Ground
J58	–LED LINK	3.3	O	Link status (active low, can sink up to 150mA)
J61	VCC	5.0	PWR	DC input power
J63	GND	GND	GND	Ground

[1] A hyphen (-) indicates a range of acceptable logic levels.

Note: Except for RESET, connect unused I/O pins to GND. If RESET is unused, connect it to VCC

Pin Availability by Build

Pin	Signal Name	Serial Only	USB Only
J24	–RESET	X	X
J25	USB VBUS		X
J26	GND	X	X
J27	USB DP		X
J28	USB DN		X
J33	–RTS	X	
J34	–RXD	X	
J35	–TXD	X	
J36	–RI	X	

Pin	Signal Name	Serial Only	USB Only
J37	–DSR	X	
J38	–CTS	X	
J39	–DCD	X	
J40	–DTR	X	
J41	GND	X	X
J58	–LED LINK		X
J61	VCC	X	X
J63	GND	X	X

Power Measurements

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

Note:

The following notes apply to the following tables.

- Tx Pulse: The average peak current during a GSM850 transmission burst period or HSDPA/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.).
- Maximum Power: The continuous current during maximum data rate with the radio transmitter at maximum power.
- Inrush Charge: The input current during power up, or a reset.

MTSMC-LAT3 Power Draw

Radio Protocol	Sleep Mode with Connection to Live Network (Active SIM installed)	Sleep Mode Current (Amps)	Cellular Connection Idle (No Data) (Amps)	(AVG) Measured Current (Amps) at Max Power	TX Pulse (AVG) Amplitude Current (Amps) for GSM850 or Peak Current for HSDPA/LTE)	Total Inrush Charge Measured in Millicoulomb (mC)
3.3 Volts						
WCDMA	49 mA	21 mA	26 mA	558 mA	632 mA	1.57 mC
LTE	27 mA	33 mA	34 mA	401 mA	N/A	N/A
5 Volts						
WCDMA	12 mA	12 mA	18 mA	556 mA	328 mA	1.46 mC
LTE	13 m	20 mA	19 mA	400 mA	N/A	N/A

MTSMC-LAT3-U Power Draw

Radio Protocol	Connection to Live Network (Active SIM Installed)	Sleep Mode Current (Amps)	Cellular Connection Idle (No Data) (Amps)	(AVG) Measured Current (Amps) at Max Power	TX Pulse (AVG) Amplitude Current (Amps) for GSM850 or Peak Current for HSDPA/LTE)	Total Inrush Charge Measured in Millicoulomb (mC)
3.3 Volts						
WCDMA	50 mA	N/A	50 mA	984 mA	1.05 Amps	1.71 mC

Radio Protocol	Connection to Live Network (Active SIM Installed)	Sleep Mode Current (Amps)	Cellular Connection Idle (No Data) (Amps)	(AVG) Measured Current (Amps) at Max Power	TX Pulse (AVG) Amplitude Current (Amps) for GSM850 or Peak Current for HSDPA/LTE)	Total Inrush Charge Measured in Millicoulomb (mC)
LTE	58 mA	N/A	67 mA	694 mA	784 mA	1.71 mC
5 Volts						
WCDMA	45 mA	N/A	30 mA	595 mA	680 mA	1.59 mC
LTE	37 mA	N/A	32 mA	432 mA	496 mA	1.59 mC

Mounting Hardware

The board has three mounting holes at corners. Use #4 or M3 hardware for mounting the SocketModem to the board. Refer to *Dimensions* for more information.

Recommended Parts

Manufacturer	Part	Part Number
PEM (Penn Engineering & Manufacturing)	Surface Mount Standoff	SMTSO-M3-4ET
RAF Electronic Hardware	3/16” Hex Female Standoff	2051T-440-S-12-Zinc
RAF Electronic Hardware	4.5mm Hex Female Standoff	1251-3005-S-12-Zinc

Chapter 4 – Antennas

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 the performance is not compromised. Devices were approved with the following antenna(s) and for alternate antennas meeting the given specifications.

The antenna system is defined as the UFL 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.

LTE Antenna Information

The cellular radio portion of the device is approved with the following antenna or for alternate antennas meeting the given specifications.

Manufacturer:	EAD Ltd.
Description:	LTE Antenna with SMA-Male Connector
Model Number:	WTR7270
MultiTech Part Number:	45009760L

MultiTech ordering information:

Model	Quantity
ANLTE3-2HRA	2
ANLTE3-10HRA	10
ANLTE3-50HRA	50

Antenna Specifications

Category	Description
Frequency Range	690-960 MHz
	1710-2700 MHz
Power Rating	10 W
VSWR	< 2.0:1
Gain	1 dBi
Radiating Element	1/2 wave element

Category	Description
Polarization	Linear

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.

Antenna Approvals and Safety Considerations

Note the following:

- Network operators conduct antenna diversity tests.
- There are no EMC concerns about antenna diversity.
- All antennas need to have a minimum flammability rating.
- Safety requirements depend on your final product.
- Unless otherwise noted, antennas certified by MultiTech are not approved for outdoor use. Do not extend these antennas outside of any building.

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 3, Dec 2010; 7.1.2 and 7.1.3

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:

Contains FCC ID: {Add the device FCC ID}
Contains IC: {Add the device IC ID}

For device specific FCC and IC ID information refer to the FCC and ID grant information topics in the *Regulatory Information* chapter. For additional labeling requirements and label examples, refer to the *Labels* chapter.

Chapter 5 – Safety Information

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.
- Switch OFF your wireless device when in an aircraft. Using portable electronic devices in an aircraft may endanger aircraft operation, disrupt the cellular network, and is illegal. Failing to observe this restriction may lead to suspension or denial of cellular services to the offender, legal action, or both.
- Switch OFF your wireless device when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.
- Switch OFF your wireless device in hospitals and any other place where medical equipment may be in use.

Sécurité relative aux appareils à radiofréquence (RF)

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

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

Interference with Pacemakers and Other Medical Devices

Potential interference

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 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

When using your device in a vehicle:

- Do not use this device while driving.
- Respect national 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 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.

Device Maintenance

Do not attempt to disassemble the device. There are no user serviceable parts inside.

When maintaining your device:

- Do not misuse the device. Follow instructions on proper operation and only use as intended. Misuse could make the device inoperable, damage the device and/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 explosion or fire and may result in property damage, severe injury, and/or death.
- Do not expose your device to any extreme environment where the temperature or humidity is high. Such exposure could result in damage to the device or fire. Refer to the device specifications regarding recommended operating temperature and humidity.
- Do not expose the device to water, rain, or spilled beverages. 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.

User Responsibility

- Respect all local regulations for operating your wireless device.
- Use the security features to block unauthorized use and theft.
- End user must operate product per country laws and rules.

Chapter 6 – Regulatory Information

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 Grant

FCC Grant Part 22, 24, and 27

FCC Identifier	RI7LE910NAV2
Equipment Class	PCS Licensed Transmitter
Notes	LE910-NA V2 LTE/3G Module
FCC Rule Parts	22H, 24E, 27
Approval	Single Modular

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designator
22H	826.4 - 846.6	0.229	1.0 PM	4M08F9W
22H	826.4 - 846.6	0.18	1.0 PM	4M08F9W
22H	826.4 - 846.4	0.154	1.0 PM	4M08F9W
24E	1932.4 - 1987.6	0.232	1.0 PM	4M09F9W
24E	1932.4 - 1987.6	0.182	1.0 PM	4M09F9W
24E	1932.4 - 1987.6	0.158	1.0 PM	4M09F9W
24E	1850.7 - 1909.3	0.218	1.0 PM	1M09G7D
24E	1850.7 - 1909.3	0.185	1.0 PM	1M08W7D
24E	1851.5 - 1908.5	0.218	1.0 PM	2M69G7D
24E	1851.5 - 1908.5	0.18	1.0 PM	2M69W7D

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designator
24E	1852.5 - 1907.5	0.219	1.0 PM	4M47G7D
24E	1852.5 - 1907.5	0.185	1.0 PM	4M47W7D
24E	1855.0 - 1905.0	0.214	1.0 PM	8M97G7D
24E	1855.0 - 1905.0	0.179	1.0 PM	8M96W7D
24E	1857.5 - 1902.5	0.22	1.0 PM	13M5G7D
24E	1857.5 - 1902.5	0.182	1.0 PM	13M4W7D
24E	1860.0 - 1900.0	0.219	1.0 PM	17M9G7D
24E	1860.0 - 1900.0	0.189	1.0 PM	17M9W7D
27	1710.7 - 1754.3	0.205	1.0 PM	1M08G7D
27	1710.7 - 1754.3	0.175	1.0 PM	1M08W7D
27	1711.5 - 1753.5	0.199	1.0 PM	2M69G7D
27	1711.5 - 1753.5	0.174	1.0 PM	2M69W7D
27	1712.5 - 1752.5	0.2	1.0 PM	4M47G7D
27	1712.5 - 1752.5	0.17	1.0 PM	4M47W7D
27	1715.0 - 1750.0	0.203	1.0 PM	8M97G7D
27	1715.0 - 1750.0	0.169	1.0 PM	8M97W7D
27	1717.5 - 1747.5	0.205	1.0 PM	13M5G7D
27	1717.5 - 1747.5	.0173	1.0 PM	13M4W7D
27	1720.0 - 1745.0	0.203	1.0 PM	18M0G7D
27	1720.0 - 1745.0	0.173	1.0 PM	18M0W7D
27	699.7 - 715.3	0.191	1.0 PM	1M09G7D
27	699.7 - 715.3	0.156	1.0 PM	1M08W7D
27	700.5 - 714.5	0.193	1.0 PM	2M69G7D
27	700.5 - 714.5	0.157	1.0 PM	2M69W7D
27	701.5 - 713.5	0.189	1.0 PM	4M46G7D
27	701.5 - 713.5	0.157	1.0 PM	4M47W7D
27	704.0 - 711.0	0.19	1.0 PM	8M98G7D
27	704.0 - 711.0	0.156	1.0 PM	8M98W7D
27	779.5 - 784.5	0.194	1.0 PM	4M47G7D
27	779.5 - 784.5	0.157	1.0 PM	4M47W7D
27	782.0 - 782.0	0.188	1.0 PM	8M96G7D
27	782.0 - 782.0	0.155	1.0 PM	8M95W7D
22H	824.7 - 848.3	0.191	1.0 PM	1M09G7D

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designator
22H	824.7 - 848.3	0.156	1.0 PM	1M08W7D
22H	825.5 - 847.5	0.195	1.0 PM	2M69G7D
22H	825.5 - 847.5	0.157	1.0 PM	2M69W7D
22H	826.5 - 846.5	0.189	1.0 PM	4M47G7D
22H	826.5 - 846.5	0.157	1.0 PM	4M47W7D
22H	829.0 - 844.0	0.19	1.0 PM	8M97G7D
22H	829.0 - 844.0	0.156	1.0 PM	8M97W7D
27	706.5 - 713.5	0.195	1.0 PM	4M48G7D
27	706.5 - 713.5	0.161	1.0 PM	4M48W7D
27	709.0 - 711.0	0.197	1.0 PM	8M96G7D
27	709.0 - 711.0	0.164	1.0 PM	8M95W7D

Power listed is conducted. The maximum antenna gain including cable loss for compliance with radiated power limits, RF exposure requirements and the categorical exclusion requirements of 2.1091 is 5.22 dBi for part 22H, 3.31 dBi for part 24E and 6.45 dBi for part 27. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operated in conjunction with any antenna or transmitter not described under this FCC id, except in accordance with FCC multi-transmitter product procedures. The final product operating with this transmitter must include operating instructions and antenna installation instructions, for end-users and installers to satisfy RF exposure compliance requirements. Compliance of this device in all final product configurations is the responsibility of the Grantee. Installation of this device into specific final products may require the submission of a Class II permissive change application containing data pertinent to RF Exposure, spurious emissions, ERP/EIRP, and host/module authentication, or new application if appropriate.

This device contains GSM functions that are not operational in the 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.

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

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.

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.

Chapter 7 – Environmental Notices

Waste Electrical and Electronic Equipment Statement

Note: This statement may be used in documentation for your final product applications.

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 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



REACH-SVHC Statement

Registration of Substances

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, visit:
https://multitech.com/approvals-and-certifications/.

Compliance for Hazardous Substances (ROHS3)

Multi-Tech Systems, Inc. confirms that all products comply with the chemical concentration limitations set forth for ROHS3 for the 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, visit:
https://multitech.com/approvals-and-certifications/.

Chapter 8 – 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

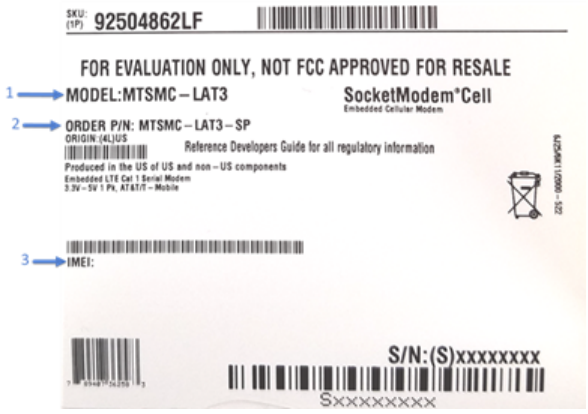
Note: Actual labels vary depending on the regulatory approval markings and content.

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.

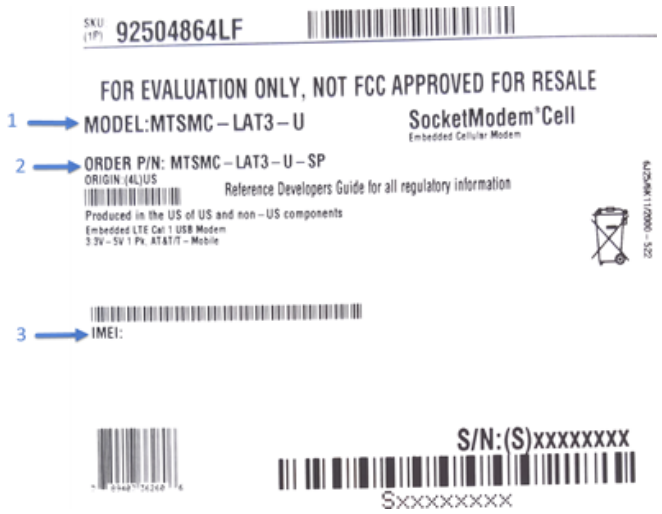
The label shown is not than actual size.

1 - Multi-Tech Model Identification.
2 - Multi-Tech Ordering Part Number.
3 - IMEI (International Mobile Equipment Identity).

MTSMC-LAT3 Package Label



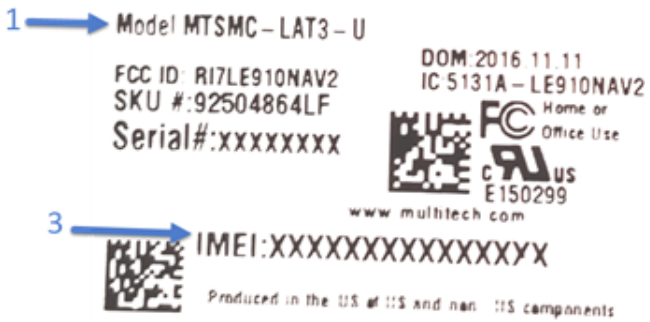
MTSMC-LAT3-U Package Label



MTSMC-LAT3 Device Label



MTSMC-LAT3-U Device Label



Chapter 9 – 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. 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.

Note: The –L6G1 radio establishes a connection automatically as soon as the device is plugged into a PC with Windows OS. No configuration or connection steps are required with this device.

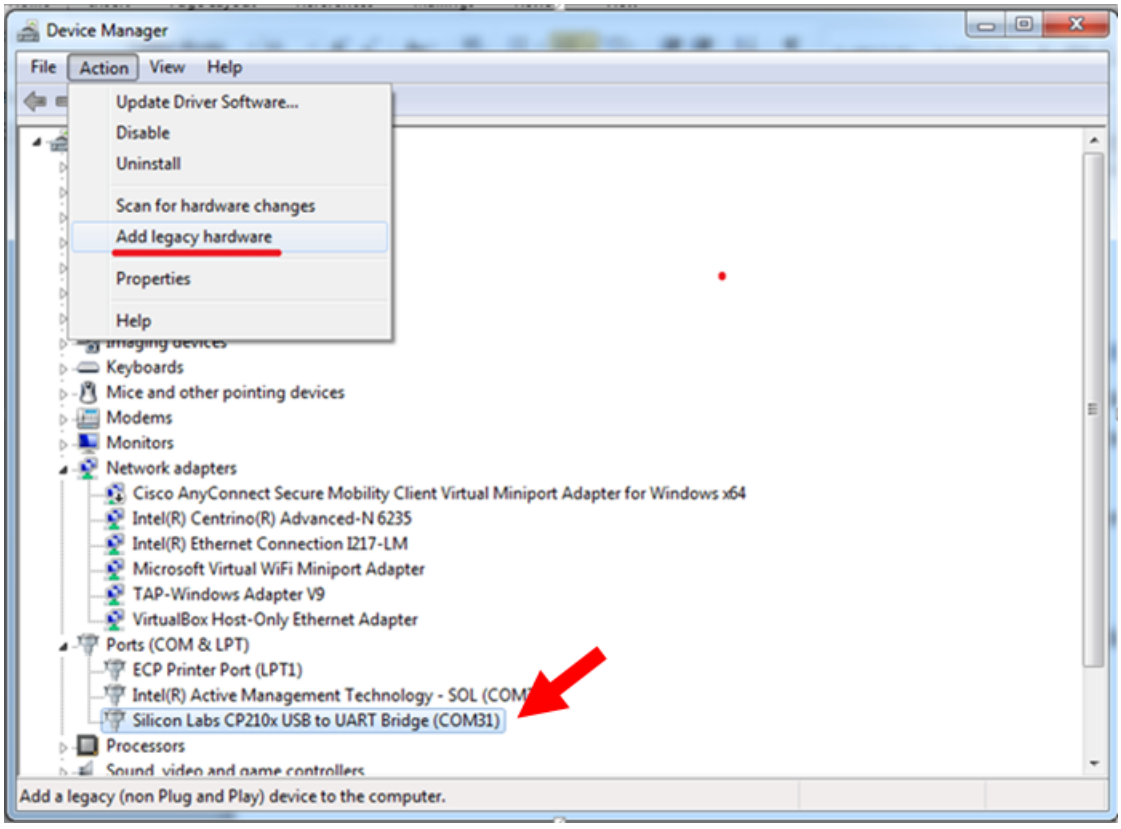
Setting Up a Serial Device in Windows Device Manager

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.
- If you have a serial device, set up the device in Device Manager. Refer to Setting Up a Serial Device in Windows Device Manager.

Note: The –L6G1 radio establishes a connection automatically as soon as the device is plugged into a PC with Windows OS. No configuration or connection steps are required with this device.

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.

   Note: For –L6G1 radios, dial number is disabled.

   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.

      Note: For –L6G1 radios, dial number is disabled.

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

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.

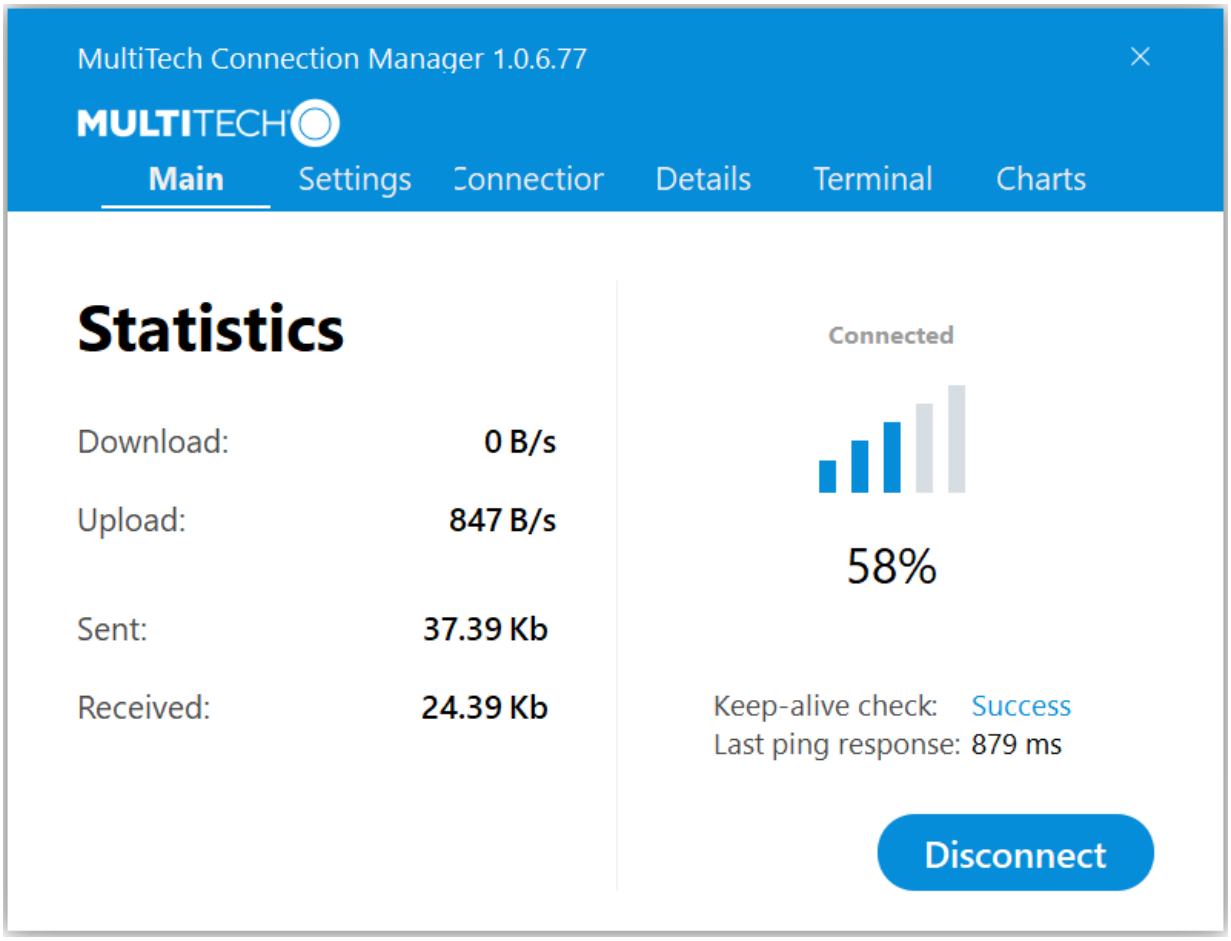
Connection Manager and the installed drivers are removed from the computer.

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.

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 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

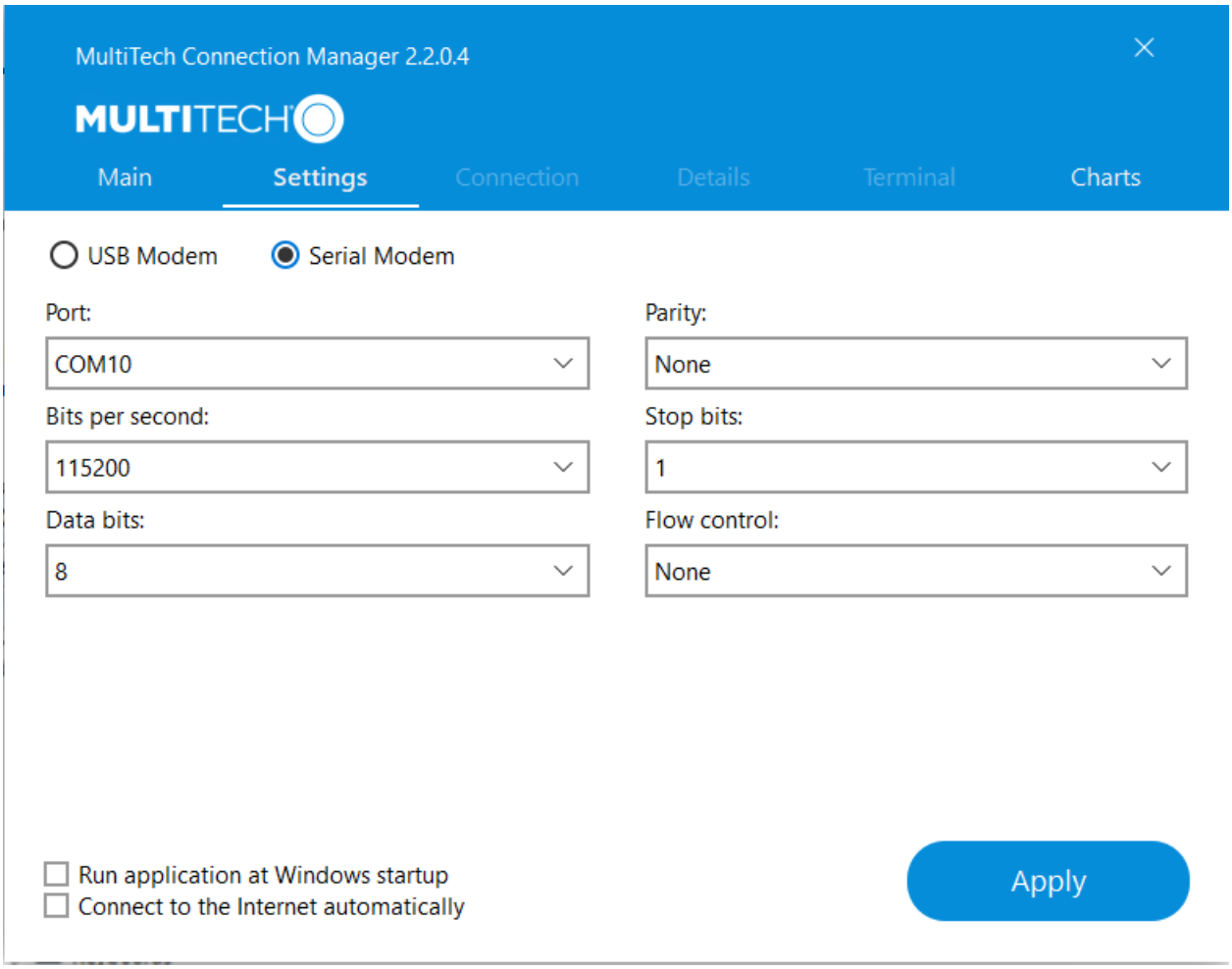
This error has the following causes and solutions.

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.

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.

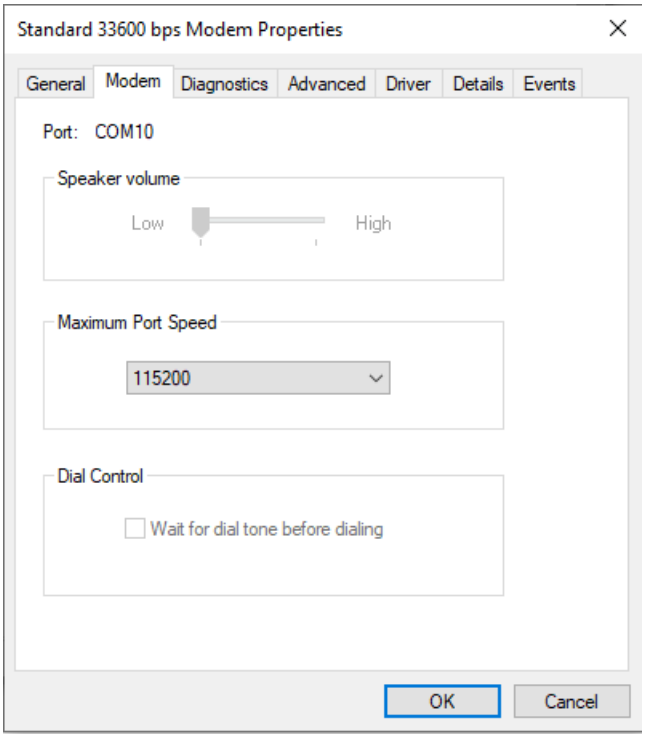
In Connection Manager, click on the Settings tab.



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

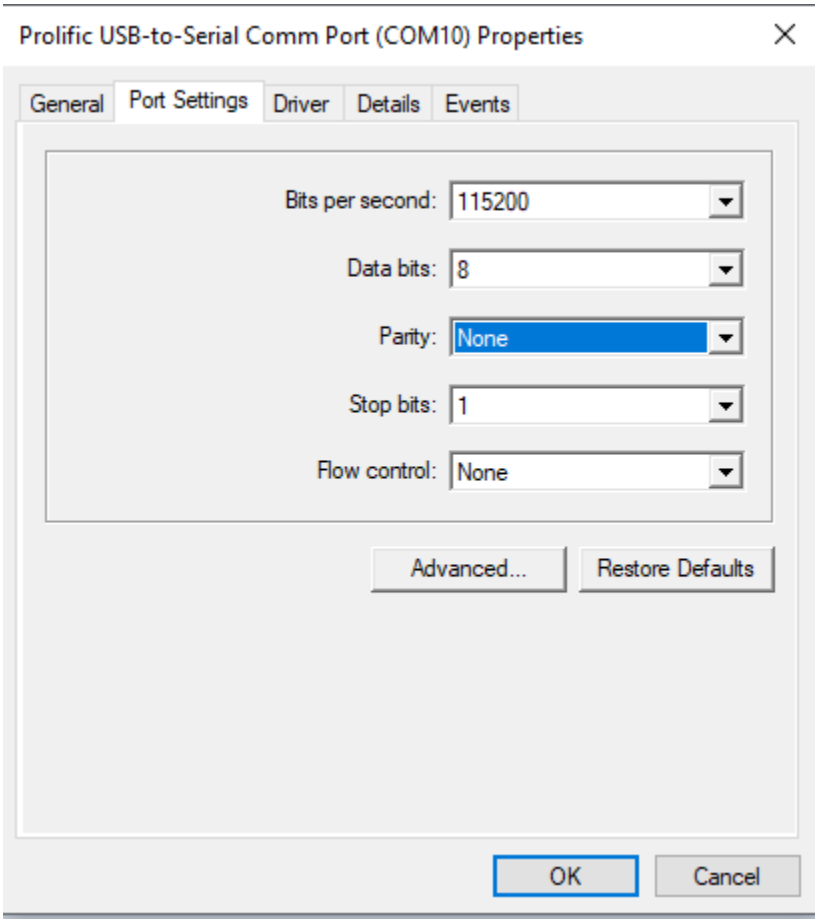
> Note: If Modems and Ports don't appear in Device Manager, open the View Menu and select Show hidden devices.

Click on 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 on 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

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