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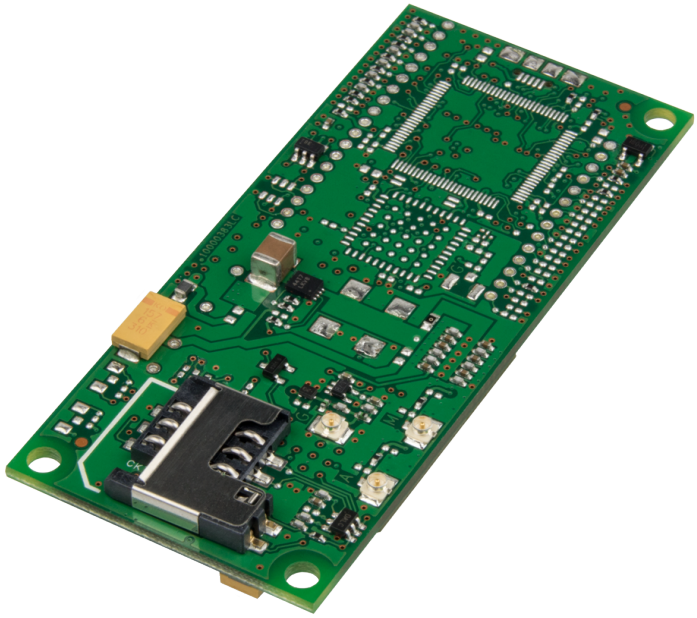

SocketModem® Cell

MTSMC-LSP3 Device Guide

SocketModem® Cell Device Guide

Models: MTSMC-LSP3, MTSMC-LSP3-U

Part Number: S000703, Version 1.3

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Knowledge Base

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

Support Portal

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

Support

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

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

Warranty

To read the warranty statement for your product, visit https://www.multitech.com/legal/warranty. For other warranty options, visit www.multitech.com/es.go.

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Chapter 1 – Product Overview

Product Overview

SocketModem Cell models are complete, ready-to-integrate communications devices that offer standards-based LTE 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 LTE CAT1 MTSMC-LSP3 Device Guide	This document. Provides overview, safety and regulatory information, design considerations, schematics, and device information.	S000703
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
USB Driver Installation Guide	Instructions for installing USB drivers on Linux and Windows Systems.	S000616
Telit LE920x4/LE910Cx Series AT Commands Reference Guide	Lists AT Commands and parameters used to configure your device.	80490ST10778A Rev. 4

Product Build Options

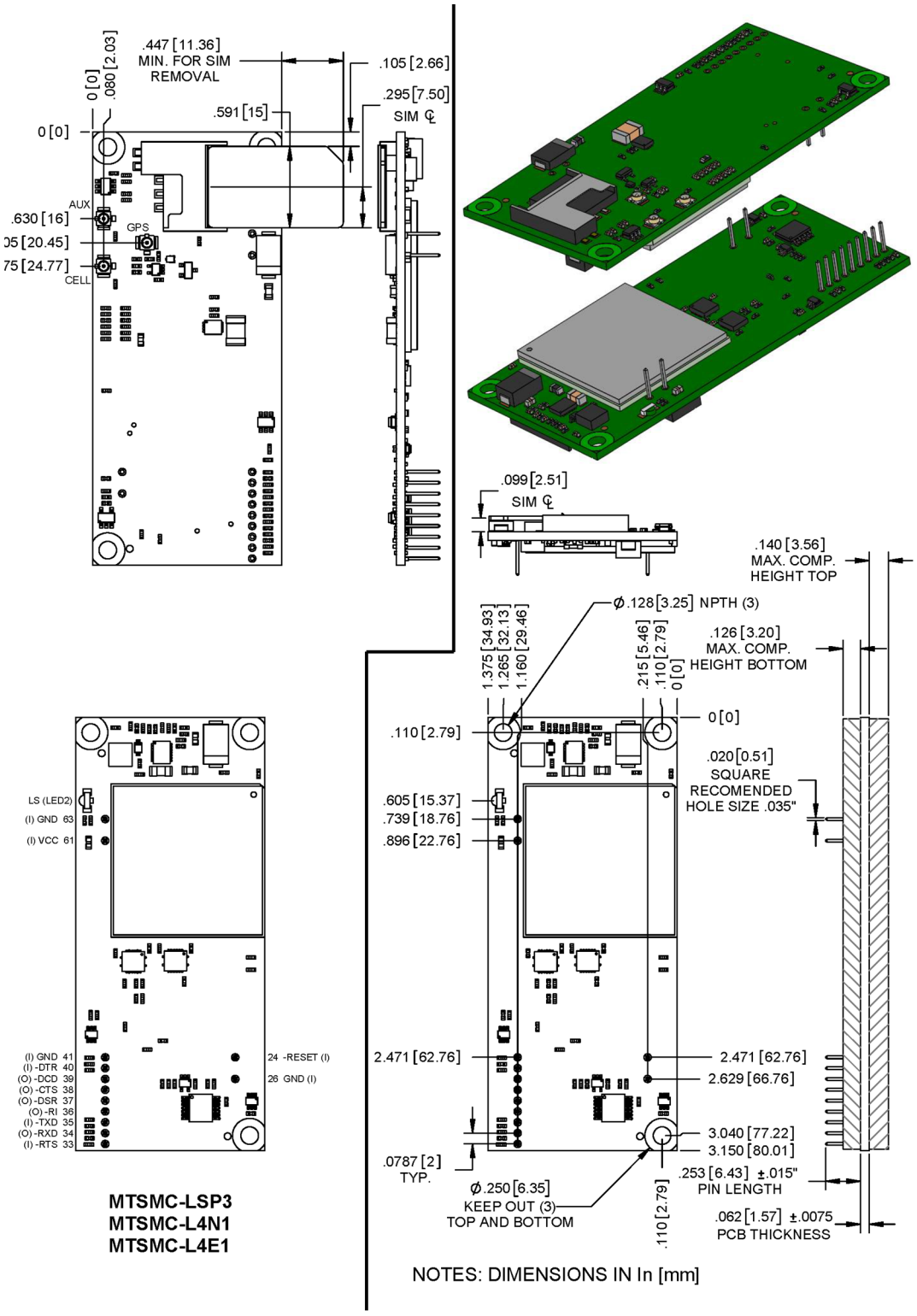
Product	Description	Carrier/Region
MTSMC-LSP3	Embedded LTE Cat 1 serial modem with GNSS	Sprint
MTSMC-LSP3-U	Embedded LTE Cat 1 USB modem with GNSS	Sprint
Developer Kits		
MTUDK2-ST-Cell	Developer Kit for SocketModem, and Dragonfly cellular devices.	All

Note:

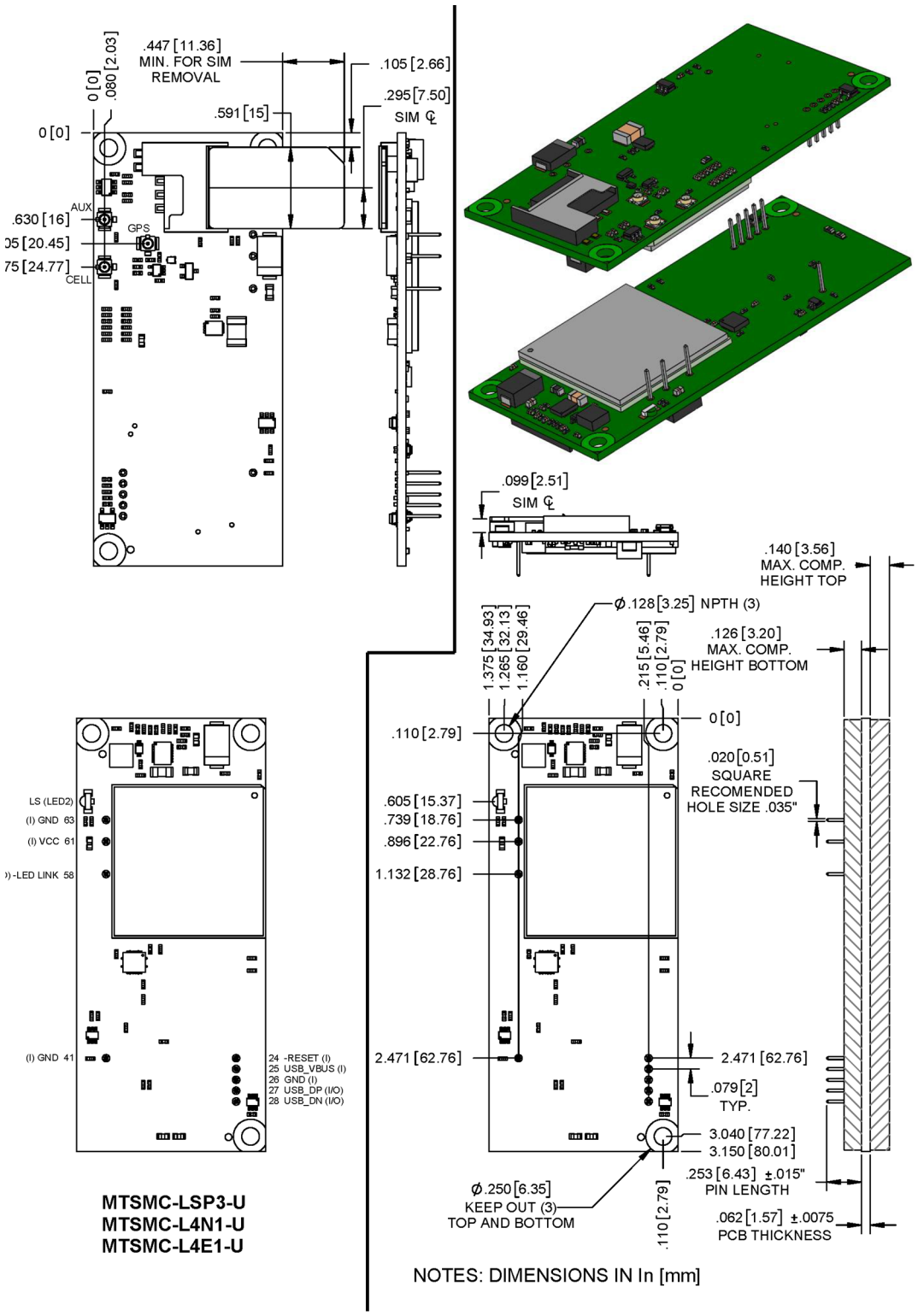
- These units ship without network activation.
- To connect them to the cellular network, you need a cellular account. For more information, refer to Account Activation.
- The complete product code may end in .Rx. For example, MTSMC-LSP3.Rx, where R is revision and x is the revision number.
- All builds can be ordered individually or in 50-packs. Add SP to the model number for a single pack.

Chapter 2 – Mechanical Drawings

MTSMC-LSP3



MTSMC-LSP3-U


.447 [11.36]
MIN. FOR SIM
REMOVAL
.105 [2.66]
.295 [7.50]
SIM ℄
.591 [15]
0 [0]
.080 [2.03]
AUX
GPS
CELL
.630 [16]
.099 [2.51]
SIM ℄
.140 [3.56]
MAX. COMP.
HEIGHT TOP
Ø.128 [3.25] NPTH (3)
.126 [3.20]
MAX. COMP.
HEIGHT BOTTOM
1.375 [34.93]
1.265 [32.13]
1.160 [29.46]
.215 [5.46]
.110 [2.79]
0 [0]
.020 [0.51]
SQUARE
RECOMENDED
HOLE SIZE .035"
.605 [15.37]
.739 [18.76]
.896 [22.76]
1.132 [28.76]
2.471 [62.76]
.079 [2]
TYP.
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
LS (LED2)
(I) GND 63
(I) VCC 61
-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)
MTSMC-LSP3-U
MTSMC-L4N1-U
MTSMC-L4E1-U
NOTES: DIMENSIONS IN In [mm]

Chapter 3 – Specifications

MTSMC-LSP3 and MTSMC-LSP3-U Specifications

Category	Description
General	
Standards	LTE FDD Cat 1, 3GPP release 10 compliant
	USB Interface is CDC-ACM compliant
TCP/IP Functions	FTP, TCP, UDP, SMTP stack, IPv4/IPv6 stack
Frequency Bands	4G: 1900 (B2/B25) / AWS 1700 (B4) / 850 (B5/B26) / B12 (700)
Speed	
Data Speed	LTE: 10 Mbps downlink/ 5 Mbps uplink
Interface	
USB Interface	USB 2.0 HS/HSIC
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, Rx diversity/MIMO
SIM	1.8V and 3V SIM holder for mini-SIM card
Environment	
Operating Temperature	-40° C to +85° C
Humidity	20%-90% RH, non-condensing
Power Requirements	
Input Voltage	3.3-5 VDC
SMS	
SMS	Point-to-Point messaging
	Mobile-Terminated SMS
	Mobile-Originated SMS

Category	Description
Certifications and Compliance	
EMC and Radio Compliance	FCC Part 15 Class B
	FCC Part 22
	FCC Part 24
	FCC Part 27
Safety Compliance	UL 60950-1 2nd ED
Carrier	Sprint

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 or pull 3G_ONOFF signal low:

1. Issue the AT#SHDN command.
2. Wait 30 seconds.
3. Power off or disconnect power.

Note: If you send AT#SHDN and do not remove power AND the 3G_ONOFF line is high, the radio restarts after 60 seconds.

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		
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

Parameter	Minimum	Maximum
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)

Pin	Signal Name	Logic Level Voltage[1]	In/Out	Description
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.

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	
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-LSP3 Power Draw

Radio Protocol	Sleep Mode	Live Connection with SIM Installed, No Data	Cellular Connection Idle, No Data	Average Measured Current at Maximum Power	TX Pulse (Avg) Amplitude Current for GSM850 or Peak Current for HSDPA/LTE	Total Inrush Charge Measured in Millicoulombs
3.3 Volts						
LTE	11 mA	29 mA	86 mA	855 mA	948 mA	0.457 mC
5 Volts						
LTE	7 mA	18 mA	55 mA	551 mA	624 mA	0.520 mC

MTSMC-LSP3-U Power Draw

Radio Protocol	Live Connection with SIM Installed, No Data	Cellular Connection Idle, No Data	Average Measured Current at Maximum Power	TX Pulse (Avg) Amplitude Current for GSM850 or Peak Current for HSDPA/LTE	Total Inrush Charge Measured in Millicoulombs
3.3 Volts					
LTE	44 mA	102 mA	985 mA	1.11A	0.457 mC
5 Volts					
LTE	25 mA	69 mA	603 mA	676 mA	0.520 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 antenna system is defined as the UFL connection point from the device through the cable and antenna. Device performance depends on implementation and antenna system design. Integrating the antenna system is a critical part of the design process; therefore, it is essential to consider it early so the performance is not compromised.

Requirements for Cellular Antennas with regard to FCC/IC Compliance

The antenna must be the same type, with similar performance and in- and out-of-band radiation patterns as the listed antenna. The antenna used must stay below the FCC/IC maximum gain.

For our bundles, MultiTech may change antennas over time. The listed antenna(s) is used as a reference or was shipping when this document was last updated.

LTE Antenna

The cellular radio portion of the device is approved with the following antenna or for alternate antennas meeting the given specifications. If using a different antenna, ensure

Manufacturer:	Wieson Technologies
Description:	LTE Antenna
Model Number:	GY115-Big Type

MultiTech ordering information:

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

LTE Antenna Diversity

Antenna diversity uses two receive antennas to improve the downlink connection (cell tower to mobile). It has no effect on the uplink (mobile to cell tower).

Antenna diversity is useful in environments where the signal arrives at the device after bouncing off or around buildings or other objects. The bounced signal may be attenuated by going through semi-transparent (to the signal) objects. Each signal alteration can change its magnitude, phase, orientation, or polarization. This complex environment can exist in cities, inside buildings or in traffic. In this environment, signal paths from the cell tower form an interference pattern of peaks and nulls. These peaks and nulls can be very close together.

Antenna diversity provides an advantage in complex environments because if one receive antenna has a poor signal due to an interference null pattern, the other antenna is likely not in the null and has better reception. The radio compares the reception from both receive antennas and uses the one with the strongest signal.

Important: You must deploy with two antennas, unless your carrier 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

Note the following:

- Carriers 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.

Diversity and 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:

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 Statement chapter.

Chapter 5 – Safety Information

Handling Precautions

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

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.
- Do not place the device alongside computer discs, credit or travel cards, or other magnetic media. The information contained on discs or cards may be affected by the device.
- Using accessories, such as antennas, that MultiTech has not authorized or that are not compliant with MultiTech's 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.

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 Information

FCC Part 15

FCC Identifier:	RI7LE910C1NS
Equipment Class:	PCS Licensed Transmitter
Notes:	Wireless Module
Approval:	Single Modular

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designators
24E	1850.7 -1909.3	0.271	2.5 PM	1M08G
24E	1850.7 -1909.3	0.211	2.5 PM	2M69G
24E	1851.5 -1908.5	0.213	2.5 PM	2M69W
24E	1852.5 -1907.5	0.261	2.5 PM	4M48G
24E	1852.5 -1907.5	0.209	2.5 PM	4M48W
24E	1855.0 -1905.0	0.265	2.5 PM	8M93G
24E	1855.0 -1905.0	0.231	2.5 PM	4M91W
24E	1857.5 - 1902.5	0.264	2.5 PM	13M4G
24E	1857.5 - 1902.5	0.229	2.5 PM	5M07W
24E	1860.0 - 1900.0	0.241	2.5 PM	17M9G
24E	1860.0 - 1900.0	0.183	2.5 PM	5M13W
27	1710.7 - 1754.3	0.234	2.5 PM	1M08G
27	1710.7 - 1754.3	0.184	2.5 PM	1M08W
27	1711.5 - 1753.5	0.227	2.5 PM	2M69G
27	1711.5 - 1753.5	0.195	2.5 PM	2M69W
27	1712.5 - 1752.5	0.222	2.5 PM	4M48G
27	1712.5 - 1752.5	0.17	2.5 PM	4M49W
27	1715.0 - 1750.0	0.245	2.5 PM	8M93G
27	1715.0 - 1750.0	0.209	2.5 PM	4M93W
27	1717.5 - 1747.5	0.252	2.5 PM	13M4G
27	1717.5 - 1747.5	0.218	2.5 PM	5M04W
27	1720.0 - 1745.0	0.2355	2.5 PM	17M8G
27	1720.0 - 1745.0	0.172	2.5 PM	5M15W
22H	824.7 - 848.3	0.212	2.5 PM	1M08G
22H	824.7 - 848.3	0.159	2.5 PM	1M08W

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designators
22H	825.5 - 847.5	0.218	2.5 PM	2M69G
22H	825.5 - 847.5	0.168	2.5 PM	2M69W
22H	826.5 - 846.5	0.217	2.5 PM	4M49G
22H	826.5 - 846.5	0.167	2.5 PM	4M49W
22H	829.0 - 844.0	0.224	2.5 PM	8M94G
22H	829.0 - 844.0	0.187	2.5 PM	4M93W
27	699.7 - 715.3	0.186	2.5 PM	1M08G
27	699.7 - 715.3	0.155	2.5 PM	1M09W
27	700.5 - 714.5	0.186	2.5 PM	2M69G
27	700.5 - 714.5	0.151	2.5 PM	2M69W
27	701.5 - 713.5	0.182	2.5 PM	4M48G
27	701.5 - 713.5	0.146	2.5 PM	4M48W
27	704.0 - 711.0	0.193	2.5 PM	8M96G
27	704.0 - 711.0	0.176	2.5 PM	4M95W
24E	1850.7 - 1914.3	0.242	2.5 PM	1M08G
24E	1850.7 - 1914.3	0.193	2.5 PM	1M08W
24E	1851.5 - 1913.5	0.244	2.5 PM	2M69G
24E	1851.5 - 1913.5	0.204	2.5 PM	2M69W
24E	1852.5 - 1912.5	0.244	2.5 PM	4M48G
24E	1852.5 - 1912.5	0.192	2.5 PM	4M48W

Ouput power is conducted. Single Modular Approval. This device is approved for mobile and fixed use with respect to RF exposure compliance. The antenna of this transmitter must provide a separation distance of at least 20 cm from all persons. Installers and end-users must be provided with antenna installation instructions and transmitter operating conditions and instructions for satisfying RF exposure compliance. 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. Multi-transmitter, supporting simultaneous transmission configurations, have not been evaluated and shall be evaluated according to KDB Publication 447498 and §15.31(h) and §15.31(k) composite system and § 2.1 end product terms and concepts. 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, emissions and host/module authentication, or new application if appropriate.

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, please contact your local city office, your household waste disposal service or where you purchased the product.

July, 2005

REACH 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

The latest **197** substances restricted per the REACH Regulation were **last updated January 2019**. Refer to the following for the most current candidate list of substances: http://echa.europa.eu/candidate-list-table.

Restriction of the Use of Hazardous Substances (RoHS)

Multi-Tech Systems, Inc.

Certificate of Compliance

2015/863

Multi-Tech Systems, Inc. confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2015/863 of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS).

These MultiTech products do not contain the following banned chemicals[1]:

- Lead, [Pb] < 1000 PPM
- Mercury, [Hg] < 100 PPM
- Cadmium, [Cd] < 100 PPM
- Hexavalent Chromium, [Cr+6] < 1000 PPM
- Polybrominated Biphenyl, [PBB] < 1000 PPM
- Polybrominated Diphenyl Ethers, [PBDE] < 1000 PPM
- Bis(2-Ethylhexyl) phthalate (DEHP): < 1000 ppm
- Benzyl butyl phthalate (BBP): < 1000 ppm
- Dibutyl phthalate (DBP): < 1000 ppm
- Diisobutyl phthalate (DIBP): < 1000 ppm

Environmental considerations:

- Moisture Sensitivity Level (MSL) =1
- Maximum Soldering temperature = 260C (in SMT reflow oven)

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

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

Chapter 8 – Sprint Activation and OMA-DM Commands (LSP3)

All applications interacting with Sprint approved MultiTech devices must be written in a manner where they do not interfere/interrupt the Sprint Hands-Free Activation (HFA) process or OMA-DM processes.

If the MultiTech device will be co-located with any other transmitters you will be required to submit your device to an FCC approved lab for additional testing.

If the Sprint approved MultiTech device/circuit board is embedded into another device/circuit board be aware you must perform EMC and safety testing on your end device.

For additional information refer to:

- *S000729 Telit Sprint OMA-DM AT Commands* available at www.multitech.com/documents/publications/reference-guides/S000729_Telit_Sprint_DG_OMADM-AT_commands.pdf
- For mLinux models, go to: http://www.multitech.net/developer/software/mlinux/using-mlinux/mlinux-cellular-connection/lsp-device-sprint-lte-activation/

Chapter 9 – 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.

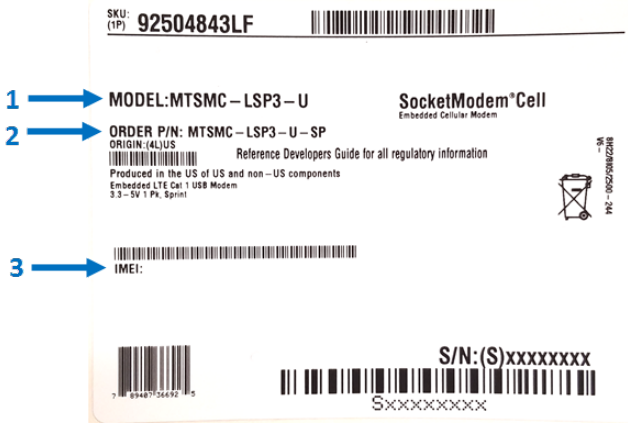
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Label images shown here are not actual size.

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

MTSMC-LSP3 Package Label

MTSMC-LSP3-U Package Label



MTSMC-LSP3 Device Label

MTSMC-LSP3-U Device Label

Chapter 10 – Using Connection Manager

Use Connection Manager to:

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

Note:

- Connection Manager can install drivers and connect your device regardless of your cellular network; however, activation is only supported with Verizon, Aeris, Sprint, and some regional carriers. If you cannot activate your device with Connection Manager, refer to *Account Activation for Cellular Devices.*

- Switch the firmware in your device to a different carrier (if supported by your device).
- Manage cellular connection and automatically reconnect with the keep-alive feature.
- View device details.
- View line charts of signal level and data rates.
- Use a terminal window for communicating with and troubleshooting the device.

Installing Connection Manager

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

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

To install Connection Manager and the device drivers:

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

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

   Note: This page appears only on Windows 10.

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

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

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

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

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

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

    Note:

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

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

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

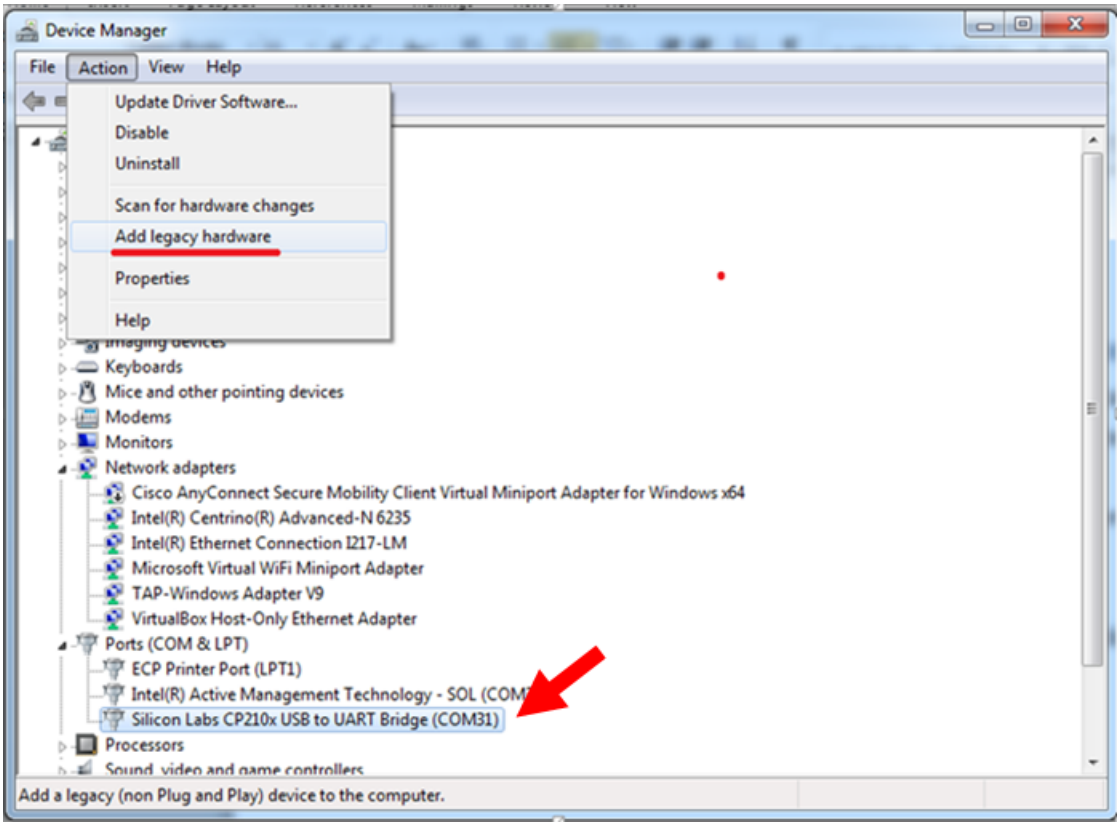
Setting Up a Serial Device in Windows Device Manager

To set up the device in Windows Device Manager:

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

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

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



5. In the **Add Hardware Wizard**:

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

      Important: Make sure that you select *only* **Standard 33600 bps Modem**. Selecting another model may cause your device to work incorrectly or fail.

   f. Select your COM port, then click **Next**.
   g. Click **Finish**.
   h. Go to **Device Manager** > **Modems** and confirm that the device is added.

6. To verify that the device is set up correctly, query the device:

   a. Go to **Device Manager** > **Modems**, right-click **Standard 33600 bps Modem**, and select **Properties**.
   b. On the **Diagnostics** tab, click **Query Modem**.

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

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

To connect the device to your carrier's network, refer to Connecting a Device.

Connecting a Device

Before You Begin

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

To connect your device to the carrier's network:

1. Open Connection Manager.

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

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

   You may need to ask the carrier for these settings.

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

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

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

      Note:

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

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

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

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

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

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

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

Note:

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

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

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

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

Note:

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

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

Uninstalling Connection Manager

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

Before You Begin

Make sure that Connection Manager is not running.

To uninstall Connection Manager:

1. In Windows, go to **Control Panel > Programs > Programs and Features**.
2. Right-click **MultiTech Connection Manager** and select **Uninstall**.
3. Click **Yes** to confirm that you want to uninstall Connection Manager.

   The native Windows WWAN AutoConfig service is automatically enabled.

4. When the message "Are you sure you want to uninstall this product?" appears, click **Yes**.

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

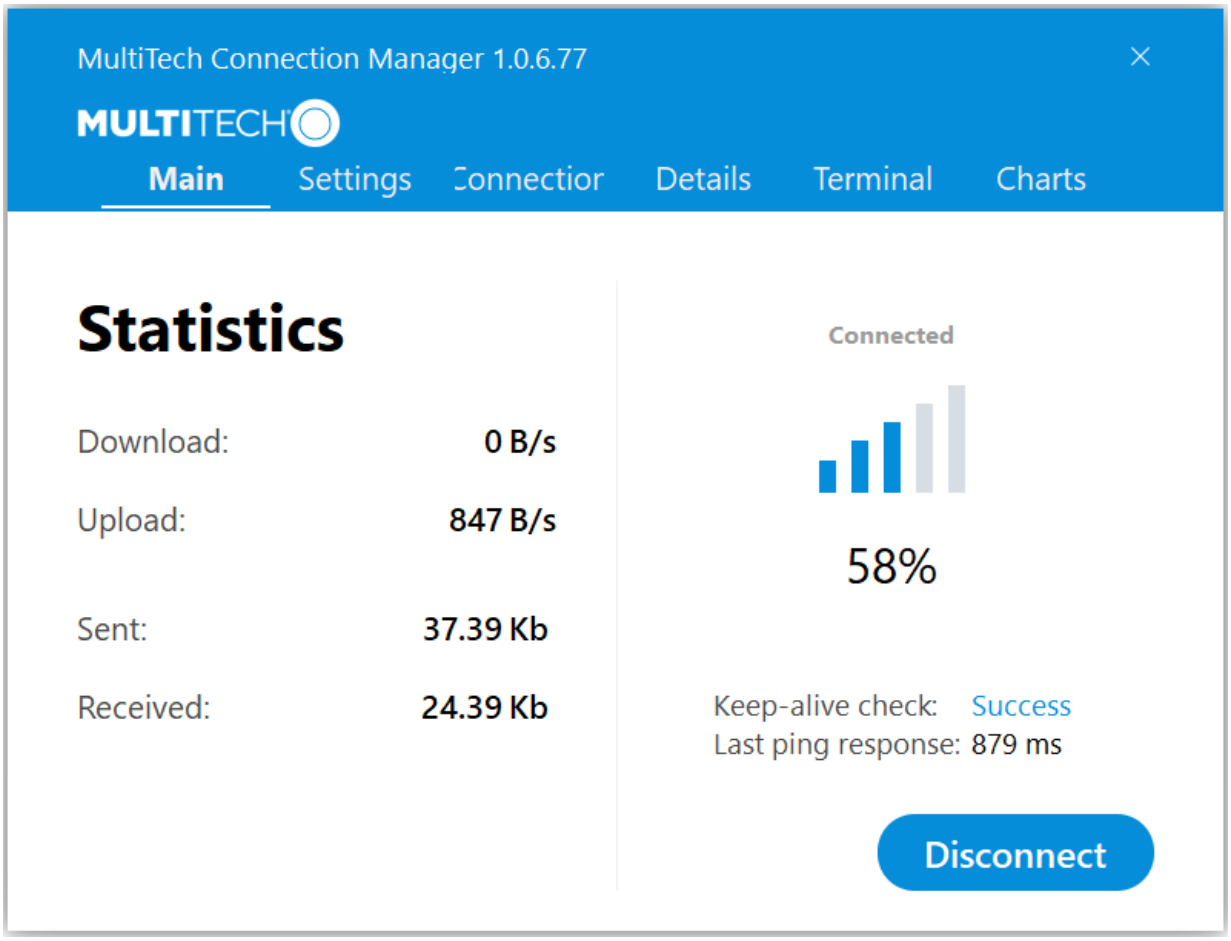
Note: The steps above describe how to uninstall Connection Manager using Control Panel. You can also uninstall the application by using the installer file (.msi). Double-click the file, in the MultiTech Connection Manager Setup Wizard, click **Next**, and then select **Remove** on the next two pages.

Connection Manager User Interface

Connection Manager consists of the following tabs:

- Main
- Settings

- Connection
- Details
- Terminal
- Charts



Main tab

The **Main** tab displays the following:

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

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

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

Settings tab

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

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

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

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

Connection tab

The **Connection** tab displays the following:

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

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

Details tab

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

Terminal tab

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

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

Charts tab

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

Troubleshooting

Serial COM port is not available in the Serial Modem Settings

Close Connection Manager and reopen it.

Device is not detected ("No Device")

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

Try the following steps:

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

MultiConnect Cell USB Modem is not detected

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

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

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

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

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

This error has the following causes and solutions.

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

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