

SocketModem® Cell LTE

MTSMC-Lxx Device Guide



SocketModem® Cell LTE Developer Guide

Models: MTSMC-LEU1, MTSMC-LEU1-U, MTSMC-LAT1, MTSMC-LAT1-U, MTSMC-LVW2, MTSMC-LVW2-U

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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 Cat 1 Cat 4 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 Device Guide	This document. Provides overview, safety and regulatory information, design considerations, schematics, and device information.	S000614
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
Getting Started with AT Commands for LEU1 Devices	AT Command release notes and basic operations for MTSMC-LEU1 and MTSMC-LEU1-U Devices.	S000615
Getting Started with AT Commands for LAT1 Devices	AT Command release notes and basic operations for MTSMC-LAT1 and MTSMC-LAT1-U Devices.	S000617
Telit LE910 AT Commands Reference Guide	For LAT1 and LEU1 . Lists AT Commands and parameters used to configure your device, used with firmware version 17.00.5x3	80421ST10585A Rev 3
Getting Started with AT Commands for LVW2 Devices	AT Command release notes and basic operations for MTSMC-LVW2 and MTSMC-LVW2-U Devices.	S000618 (pending)
Telit LE 910 AT Commands Reference Guide	For LVW2 . Lists AT Commands and parameters used to configure your device, used with firmware version 17.01.571	80407ST10116a Rev 12

Product Build Options

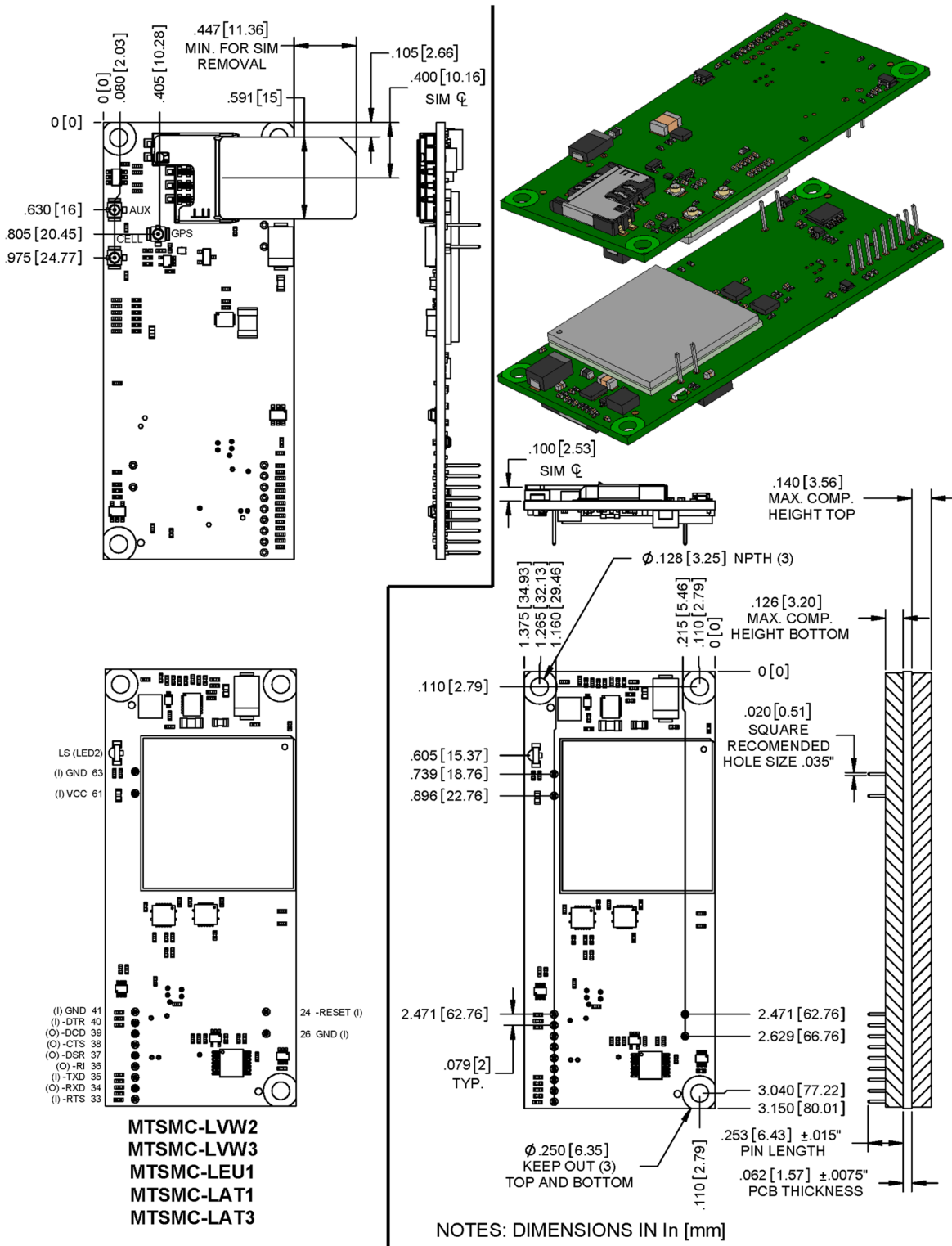
Product	Description	Carrier/Region
MTSMC-LVW2	4G LTE embedded cellular modem with GPS/GLONASS (Serial Interface)	Verizon
MTSMC-LVW2-U	4G LTE embedded cellular modem with GPS/GLONASS (USB Interface)	Verizon
MTSMC-LEU1 (RED Compliant)	4G LTE with HSPA+ fallback embedded cellular modem with GPS/GLONASS (Serial Interface)	Europe/Australia
MTSMC-LEU1-U (RED Compliant)	4G LTE with HSPA+ fallback embedded cellular modem with GPS/GLONASS (USB Interface)	Europe/Australia
MTSMC-LAT1	4G LTE with HSPA+ fallback embedded cellular modem with GPS/GLONASS (Serial Interface)	AT&T/North America
MTSMC-LAT1-U	4G LTE with HSPA+ fallback embedded cellular modem with GPS/GLONASS (USB Interface)	AT&T/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:

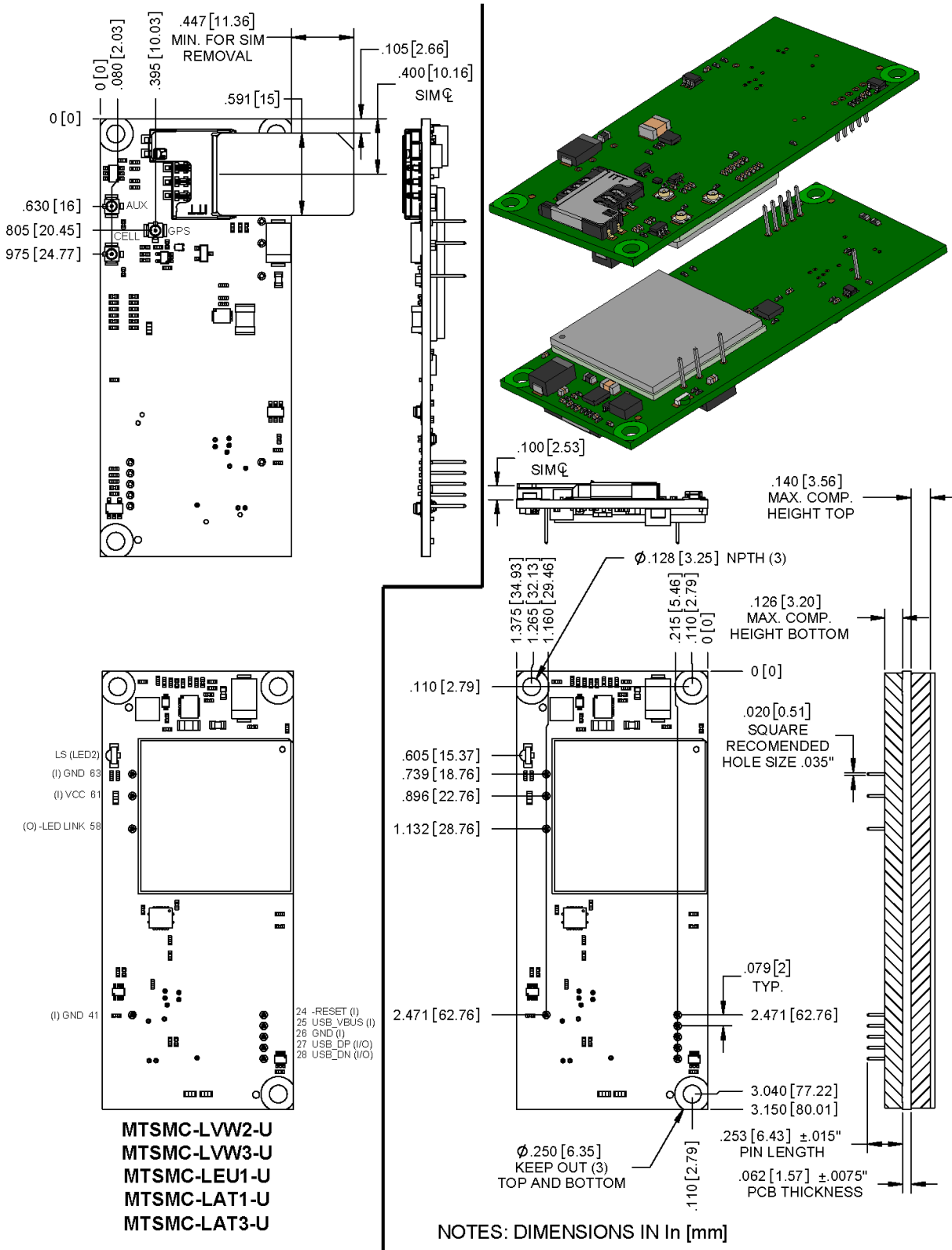
- These units ship without network activation.
- To connect them to the cellular network, you need a cellular account. For more information, refer to Account Activation.
- The complete product code may end in .Rx. For example, MTSMC-LAT1.Rx, where R is revision and x is the revision number.
- All builds can be ordered individually or in 50-packs. Add SP to the model number for a single pack.

Chapter 2 – Mechanical Drawings

MTSMC-Lxxx



MTSMC-Lxxx-U



Chapter 3 – Specifications

MTSMC-LAT1 and MTSMC-LAT1-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 (B17)/850 (B5)/AWS 1700 (B4)/1900 (B2)
	3G: 850 (B5)/1900 (B2)
	2G: 850/1900
Speed	
Data Speed	LTE: 100 Mbps downlink/50 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	3 surface mount UFL connectors for cellular, Rx diversity/MIMO, and GPS
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	3.3 - 5 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

MTSMC-LVW2 and MTSMC-LVW2-U Specifications

Category	Description
General	
Standards	LTE 3GPP Release 9
	USB Interface is CDC-ACM compliant
TCP/IP Functions	FTP, SMTP, SSL, TCP, UDP
Frequency Bands	4G: 700 (B13) / AWS 1700 (B4)
Speed	
Data Speed	LTE: 100 Mbps downlink/50 Mbps uplink
Interface	
USB Interface	USB 2.0 high speed compatible
UART Interface	0-1.8V
Physical Description	
Weight	0.4 oz. (10 g)
Dimensions	Refer to Mechanical Drawing for Dimensions.
Connectors	
Antenna Connector	3 surface mount UFL connectors for cellular, Rx diversity/MIMO, and GPS
SIM	1.8V and 3V SIM holder for mini-SIM card
Environment	
Operating Temperature	-40° C to +85° C

Category	Description
Storage 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
Certifications and Compliance	
EMC Compliance	FCC Part 15 Class B
Radio Compliance	FCC Part 27
Safety Compliance	UL 60950-1 2nd ED
	cUL 60950-1 2nd ED
	IEC 60950-1 2nd ED
Carrier	Verizon

MTSMC-LEU1 and MTSMC-LEU1-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	Refer to the following Frequency Bands table for details.
Speed	
Data Speed	LTE: 100 Mbps downlink/50 Mbps uplink
	HSPA+: 42 Mbps downlink/5.76 Mbps uplink
Interface	
USB Interface	USB 2.0 high speed compatible
UART Interface	0-1.8V
Physical Description	
Weight	0.4 oz. (10 g)
Dimensions	Refer to Mechanical Drawing for Dimensions.

Category	Description
Connectors	
Antenna Connector	3 surface mount UFL connectors for cellular, Rx diversity/MIMO, and GPS
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	3.3-5 VDC
SMS	
SMS	Point-to-Point messaging
	Mobile-Terminated SMS
	Mobile-Originated SMS
Certifications and Compliance	
EMC Compliance	EN55022 Class B, EN55024
Radio Compliance	EN 301 511, EN 301 489-1, EN 301 489-52, CE RED Radio/SAR
Safety Compliance	IEC 60950-1 2nd ED
	AS/NZS 60950.1

Frequency Bands (LEU1)

Mode	Freq. TX (MHz)	Freq. RX (MHz)	Channels	TX - RX offset
EGSM900	890 - 915	935 - 960	0 - 124	45 MHz
	880 - 890	925 - 935	975 - 1023	45 MHz
DCS1800	1710 - 1785	1805 - 1880	512 - 885	95MHz
WCDMA850 (band V)	824 - 849	869 - 894	Tx: 4132 - 4233 Rx: 4357 - 4458	45MHz
WCDMA900 (band VIII)	880 - 915	925 - 960	Tx: 2712 - 2863 Rx: 2937 - 3088	45MHz
WCDMA2100 (band I)	1920 - 1980	2110 - 2170	Tx: 9612 - 9888 Rx: 10562 - 10838	190MHz

Mode	Freq. TX (MHz)	Freq. RX (MHz)	Channels	TX - RX offset
LTE800 (band XX)	832 - 862	791 - 821	Tx: 24150 - 24449 Rx: 6150 - 6449	-41MHz
LTE1800 (band III)	1710 - 1785	1805 - 1880	Tx: 19200 - 19949 Rx: 1200 - 1949	95MHz
LTE2600 (band VII)	2500 - 2570	2620 - 2690	Tx: 20750 - 21449 Rx: 2750 - 3449	120MHz

LE910 Telit Transmission Output Power

Band	Power Class
GSM 850/900 MHz	4 (2W)
DCS 1800, PCS 1900 MHz	1 (1W)
EDGE, 850/900 MHz	E2 (0.5W)
EDGE, 1800/1900 MHz	Class E2 (0.4W)
WCDMA/FDD 800/850/900, 1900/2100 MHz	Class 3 (0.25W)
LTE FDD 700/800/850/900, 1800/1900/2100/2600 MHz	Class 3 (0.2W)

Underwriters Laboratories, Inc. Required Global Positioning System (GPS) Statement

Note the following information required by Underwriters Laboratories: Underwriters Laboratories, Inc.

Underwriters Laboratories Inc. (“UL”) has not tested the performance or reliability of the Global Positioning System (“GPS”) hardware, operating software or other aspects of this product. UL has only tested for fire, shock or casualties as outlined in UL’s Standard(s) for Safety. UL60950-1 Certification does not cover the performance or reliability of the GPS hardware and GPS operating software. UL MAKES NO REPRESENTATIONS, WARRANTIES OR CERTIFICATIONS WHATSOEVER REGARDING THE PERFORMANCE OR RELIABILITY OF ANY GPS RELATED FUNCTIONS OF THIS PRODUCT.

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

Pin	Signal Name	Pin	Signal Name
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
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

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

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	

Pin	Signal Name	Serial Only	USB Only
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-LAT1 Power Draw

Radio Protocol	Sleep Mode w/ Connection to Live Network (Active SIM Installed) (Amps)	Sleep Mode Current (Amps)	Cellular Connection Idle (No Data) (Amps)	(AVG) Measured Current (Amps) at Max Power
3.3 Volts				
WCDMA	0.0049	0.021	0.026	0.558
LTE	0.027	0.033	0.034	0.401
5 Volts				
WCDMA	0.012	0.012	0.018	0.556
LTE	0.013	0.020	0.019	0.4000

MTSMC-LAT1-U Power Draw

Radio Protocol	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					
GPRS	N/A	0.056	0.750	3.48	2.65
LTE	N/A	0.048	0.909	N/A	N/A
5 Volts					
GPRS	N/A	0.032	0.293	2	3.64
LTE	N/A	0.029	0.560	N/A	N/A

MTSMC-LVW2 Power Draw

Radio Protocol	Sleep Mode Current (If Applicable) (Amps)	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	TX Pulse (Avg) Amplitude Current (Amps)) for GSM850 or Peak Current for HSDPA/LTE	Total Inrush Charge Measured in Millicoulombs (mC)
3.3 Volts					
LTE	0.006	0.026	0.691	0.768	1.24
5 Volts					
LTE	0.004	0.015	0.445	0.492	1.24

MTSMC-LVW2-U Power Draw

Radio Protocol	Sleep Mode Current (If Applicable) (Amps)	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	TX Pulse (Avg) Amplitude Current (Amps)) for GSM850 or Peak Current for HSDPA/LTE	Total Inrush Charge Measured in Millicoulombs (mC)
3.3 Volts					
LTE	N/A	0.049	0.766	N/A	1.72
5 Volts					
LTE	N/A	0.027	0.500	N/A	1.57

MTSMC-LEU1 Power Draw

Radio Protocol	Sleep Mode Current (If Applicable) (Amps)	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	TX Pulse (Avg) Amplitude Current (Amps)) for GSM850 or Peak Current for HSDPA/LTE	Total Inrush Charge Measured in Millicoulombs (mC)
3.3 Volts					
EGSM 900Mhz	0.012	0.031	0.549	2.42	1.13
LTE	0.010	0.059	0.990	N/A	N/A
5 Volts					
EGSM 900Mhz	0.006	0.018	0.236	1.34	1.09
LTE	0.004	0.049	0.610	N/A	N/A

MTSMC-LEU1-U Power Draw

Radio Protocol	Sleep Mode Current (If Applicable) (Amps)	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	TX Pulse (Avg) Amplitude Current (Amps)) for GSM850 or Peak Current for HSDPA/LTE	Total Inrush Charge Measured in Millicoulombs (mC)
3.3 Volts					
EGSM 900Mhz	N/A	0.0561	0.780	2.75	1.65
LTE	N/A	0.075	0.980	N/A	N/A
5 Volts					
EGSM 900Mhz	N/A	0.030	0.285	1.50	1.42
LTE	N/A	0.043	0.610	N/A	N/A

Mounting Hardware

The board has three mounting holes at corners. Use #4 or M3 hardware for mounting the SocketModem to the board. Refer to the Mechanical Drawings 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.

This device has been designed to operate with the antennas listed below and having a maximum gain for 850 MHz of ≤ 6.4 dBi, for 1700 MHz of ≤ 6.5 dBi, and for 1900 MHz of ≤ 3 dBi. Antennas not included in this list or that have a gain greater than specified are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

PTCRB 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 maintain the same specifications.

Antenna Overview

- For MTSMC-LAT1 models, we tested with the Laird LTE Antenna.
- For MTSMC-LEU1 or MTSMC-LVW2 models, we tested with the Wieson LTE Antenna

EAD Antenna Used with -LAT1 and -LVW2 Models

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

Manufacturer:	Embedded Antenna Systems, Ltd. (EAD)
Description:	Dipole Blade Antenna for LTE

MultiTech ordering information:

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

LTE Antenna Specifications

Category	Description	
Frequency Range	698-806 MHz	
	824-894 MHz	
	880-960 MHz	
	1710-1880 MHz	
	1850-1990 MHz	
	1920-2170 MHz	
	2100-2500 MHz	
	2500-2690 MHz	
Impedance	50 Ohms	
VSWR	< 2.5:1	
Typical Radiated Gain	Low band	0.5 dBi (698-960 MHz)
	High band	2.2 dBi (1710-2700 MHz)
Radiation	Omni-directional	
Polarization	Linear	

Wieson Antenna

Devices were approved with the following antenna:

Manufacturer:	Wieson
Description:	LTE GY115HT467-017
Model Number:	11320Y11194A1

MultiTech ordering information:

Model	Quantity
ANLTE2-1HRA	1
ANLTE2-10HRA	10
ANLTE2-50HRA	50

Antenna Specifications

Category	Description
Frequency Range	.069~0.96GHz, 1.71~2.17GHz, 2.3GHz~2.69GHz
Impedance	50 Ohms
VSWR	VSWR should not exceed 3:1 at any point across the bands of operation
Peak Gain	3.8 dBi

Category	Description
Radiation	Omni-directional
Polarization	Linear Vertical

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.

GPS Antenna Specifications

Manufacturer:	Trimble
Description:	GPS Antenna with low noise amplifier
Model Number:	66800-52
Multi-Tech Part Number:	45009665L

MultiTech Ordering Information

Model	Quantity
ANGPS-1MM	1
ANGPS-10MM	10
ANGPS-50MM	50

Antenna Specifications

Category	Description
Frequency Range	1575.24 MHz
Impedance	50 Ohms
VSWR	2.0:1 max
Gain	10-30 dBi
LNA Current Consumption	40 mA max
Noise Figure	< 2dB
Polarization	RHCP
Input voltage	3.0V MM 0.2V

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.

Power Supply Caution

CAUTION: Do not replace the power supply with one designed for another product; doing so can damage the modem and void your warranty.

CAUTION: Pour garantir une protection continue contre les risques d'incendie, remplacez les fusibles uniquement par des fusibles du même type et du même calibre.

Note: Serial models include power supply but USB models do not.

Radio Frequency (RF) Safety

Due to the possibility of radio frequency (RF) interference, it is important that you follow any special regulations regarding the use of radio equipment. Follow the safety advice given below.

- Operating your device close to other electronic equipment may cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.
- Different industries and businesses restrict the use of cellular devices. Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or where blasting operations are in process. Follow restrictions for any environment where you operate the device.
- Do not place the antenna outdoors.
- Switch OFF your wireless device when in an aircraft. Using portable electronic devices in an aircraft may endanger aircraft operation, disrupt the cellular network, and is illegal. Failing to observe this restriction may lead to suspension or denial of cellular services to the offender, legal action, or both.
- Switch OFF your wireless device when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.
- Switch OFF your wireless device in hospitals and any other place where medical equipment may be in use.

Sécurité relative aux appareils à radiofréquence (RF)

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

- Utiliser l'appareil à proximité d'autres équipements électroniques peut causer des interférences si les équipements ne sont pas bien protégés. Respectez tous les panneaux d'avertissement et les recommandations du fabricant.
- Certains secteurs industriels et certaines entreprises limitent l'utilisation des appareils cellulaires. Respectez ces restrictions relatives aux équipements radio dans les dépôts de carburant, dans les usines de produits chimiques, ou dans les zones où des dynamitages sont en cours. Suivez les restrictions relatives à chaque type d'environnement où vous utiliserez l'appareil.
- Ne placez pas l'antenne en extérieur.

- Éteignez votre appareil sans fil dans les avions. L'utilisation d'appareils électroniques portables en avion est illégale: elle peut fortement perturber le fonctionnement de l'appareil et désactiver le réseau cellulaire. S'il ne respecte pas cette consigne, le responsable peut voir son accès aux services cellulaires suspendu ou interdit, peut être poursuivi en justice, ou les deux.
- Éteignez votre appareil sans fil à proximité des pompes à essence ou de diesel avant de remplir le réservoir de votre véhicule de carburant.
- Éteignez votre appareil sans fil dans les hôpitaux ou dans toutes les zones où des appareils médicaux sont susceptibles d'être utilisés.

Interference with Pacemakers and Other Medical Devices

Potential interference

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. Unless the device is IP67 rated, 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.

Notice regarding Compliance with FCC, EU, and Industry Canada Requirements for RF Exposure

The antenna intended for use with this unit meets the requirements for mobile operating configurations and for fixed mounted operations, as defined in 2.1091 of the FCC rules for satisfying RF exposure compliance. This device also meets the European RF exposure requirements of EN 62311. If an alternate antenna is used, consult user documentation for required antenna specifications.

Compliance of the device with the FCC, EU and IC rules regarding RF Exposure was established and is given with the maximum antenna gain as specified above for a minimum distance of 20 cm between the devices radiating structures (the antenna) and the body of users. Qualification for distances closer than 20 cm (portable operation) would require re-certification.

Wireless devices could generate radiation. Other nearby electronic devices, like microwave ovens, may also generate additional radiation to the user causing a higher level of RF exposure.

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

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



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

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

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

47 CFR Part 15 Regulation Class B Devices

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

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

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

Industry Canada Class B Notice

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

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

This device complies with Industry Canada 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.

FCC Grant Information

MTSMC-LAT1 and MTSMC-LAT1-UMTCDDT-LAT1

FCC Part 15

FCC Identifier:	RI7LE910NA
Equipment Class:	Part 15 Class Computing Device Peripheral
Notes:	LTE/3G/2G Module
FCC Rule Parts:	15B
Approval:	Single Modular

FCC Parts 22, 24, and 27

FCC Identifier:	RI7LE910NA
Equipment Class:	PCS Licensed Transmitter
Notes:	LTE/3G/2G Module
Approval:	Single Modular

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designators
22H	824.4-848.2	1.64059	1.0 PM	248KGXW
22H	824.4-848.2	0.42554	1.0 PM	248KG7W
24E	1850.2-1909.8	0.93325	1.0 PM	253KGXW
24E	1850.2-1909.8	0.23439	1.0 PM	246KG7W
22H	826.4-846.6	0.21727	1.0 PM	4M16G9W
22H	826.4-846.6	0.20845	1.0 PM	4M18G9W
22H	826.4-846.6	0.20989	1.0 PM	4M17G9W
24E	1852.4-1907.6	0.22336	1.0 PM	4M15G9W
24E	1852.4-1907.6	0.19231	1.0 PM	4M17G9W
24E	1852.4-1907.6	0.18155	1.0 PM	4M17G9W
27	706.5-713.5	0.18408	1.0 PM	4M52G7W
27	706.5-713.5	0.16406	1.0 PM	4M52D7W
27	709-711.0	0.18967	1.0 PM	8M98G7W
27	709-711.0	0.17458	1.0 PM	9M01D7W
22H	826.5-846.5	0.20559	1.0 PM	4M51G7W

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designators
22H	826.5-846.5	0.16904	1.0 PM	4M50D7W
22H	829.0-844.0	0.19409	1.0 PM	9M00G7W
22H	829.0-844.0	0.16331	1.0 PM	9M00D7W
27	1712.5-1752.5	0.17378	1.0 PM	4M51G7W
27	1712.5-1752.5	0.17906	1.0 PM	4M51D7W
27	1715.0-1750.0	0.1803	1.0 PM	9M01G7W
27	1715.0-1750.0	0.1766	1.0 PM	8M89D7W
27	1720.0-1745.0	0.18113	1.0 PM	17M9G7W
27	1720.0-1745.0	0.19454	1.0 PM	18M0D7W
24E	1852.5-1907.5	0.19815	1.0 PM	4M50G7W
24E	1852.5-1907.5	0.18793	1.0 PM	4M51D7W
24E	1855.0-1905.0	0.18155	1.0 PM	9M01G7W
24E	1855.0-1905.0	0.18323	1.0 PM	8M97D7W
24E	1860.0-1900.0	0.1803	1.0 PM	17M9G7W
24E	1860.0-1900.0	0.17579	1.0 PM	17M9D7W

Single Modular Approval. Power output listed is conducted. This device is approved for mobile and fixed use with respect to RF exposure compliance, and may only be marketed to OEM installers. The antenna(s) used for this transmitter, as described in this filing, must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operate in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures. Installers and end-users must be provided with operating conditions for satisfying RF exposure compliance. Maximum permitted antenna gain/cable loss: 700 MHz: 8.74 dBi, 850MHz: 6.93 dBi, 1700MHz: 5.0 dBi, 1900MHz: 2.51 dBi.

MTSMC-LVW2 and MTSMC-LVW2-U

FCC Part 15

FCC Identifier:	RI7LE910SV
Equipment Class:	Part 15 Class Computing Device Peripheral
Notes:	LTE Module
FCC Rule Parts:	15B
Approval:	Single Modular

FCC Parts 27

FCC Identifier:	RI7LE910SV
Equipment Class:	Licensed Non-Broadcast Station Transmitter
Notes:	LTE Module
Approval:	Single Modular

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designators
27	779.5 - 784.5	0.19543	14.0 Hz	5M52G7D
27	779.5 - 784.5	0.20749	14.0 Hz	4M53D7D
27	782.0 - 782.0	0.19231	14.0 Hz	8M95G7D
27	782.0 - 782.0	0.17824	14.0 Hz	8M95D7D
27	1712.5-1752.5	0.22856	27.0 Hz	4M52G7D
27	1712.5-1752.5	0.21928	27.0 Hz	4M53D7D
27	1715.0-1752.5	0.22336	27.0 Hz	8M95G7D
27	1715.0-1752.5	0.19123	27.0 Hz	8M94D7D
27	1720.0-1745.0	0.21928	27.0 Hz	17M9G7D
27	1720.0-1745.0	0.20559	27.0 Hz	17M9D7D

Single Modular Approval. Power output listed is conducted. This device is approved for mobile and fixed use with respect to RF exposure compliance, and may only be marketed to OEM installers. The antenna(s) used for this transmitter, as described in this filing, must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operate in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures. Installers and end-users must be provided with operating conditions for satisfying RF exposure compliance. Maximum permitted antenna gain/cable loss: LTE Band 4: 5.0 dBi, LTE Band 13: 9.16 dBi.

Industry Canada Certification

MTSMC-LAT1 and MTSMC-LAT1-UMTCDT-LAT1

Certification Number/No. de Certification	5131A-LE910NA
Type of Radio Equipment/Genre de Matériel	Advanced Wireless Services Equipment/Matériel des services sans fil évolués (1710-1755 MHz and 2110-2155 MHz)
	Cellular Mobile GSM/ Téléphone cellulaire mobile GSM (824-849 MHz)
	Cellular Mobile New Technologies/Téléphone cellulaire mobile - Nouvelles technologies (824-849 MHz)
	PCS Mobile/Téléphone mobile SCP (1850-1910 MHz)
	Mobile Broadband Service (MBS)/Matériel du service mobile à large bande (SMLB) (698-756 and (777-787)
	Modular Approval/Approbation modulaire
Model/Modèle	LE910-NAG

Specification/Charge	Issue/Édition	From Frequency/Départ des Fréquences	To Frequency/À Fréquence	Emmission Designation/Designation D'émission	Minimum Power	Maximum Power
RSS130	1.0	709 M	711 M	8M98G7W	189.67 mW	189.67 mW
RSS132	3.0	826.5 M	846.5 M	4M51G7W	205.59 mW	205.59 mW
RSS132	3.0	824.2 M	848.2 M	248KG7W	425.54 mW	425.54 mW
RSS133	6.0	1.85 G	1.91 G	253KGXW	933.25 mW	933.25 mW
RSS132	3.0	826.4 M	846.6 M	4M17G9W	209.89 mW	209.89 mW
RSS130	1.0	706.5 M	713.5 M	4M52D7W	164.06 mW	164.06 mW
RSS132	3.0	826.4 M	846.6 M	4M16G9W	217.27 mW	217.27 mW
RSS132	3.0	826.5 M	846.5 M	4M50D7W	169.04 mW	169.04 mW
RSS133	6.0	1.85 G	1.91 G	246KG7W	234.39 mW	234.39 mW
RSS133	6.0	1.852 G	1.908 G	4M17G9W	181.55 mW	181.55 mW

Specification/Classification des Charges	Issue/Édition	From Frequency/Département Fréquences	To Frequency/À Fréquences	Emission Designation/Designation D'émission	Minimum Power	Maximum Power
RSS132	3.0	829 M	844 M	9M00D7W	163.31 mW	163.31 mW
RSS139	2.0	1.713 G	1.752 G	4M51G7W	173.78 mW	173.78 mW
RSS133	6.0	1.852 G	1.908 G	4M17G9W	192.31 mW	192.31 mW
RSS139	2.0	1.72 G	1.745 G	18M0D7W	194.54 mW	194.54 mW
RSS139	2.0	1.713 G	1.752 G	4M51D7W	179.06 mW	179.06 mW
RSS133	6.0	1.852 G	1.908 G	4M50G7W	198.15 mW	198.15 mW
RSS132	3.0	829 M	844 M	9M00G7W	194.09 mW	194.09 mW
RSS132	3.0	826.4 M	846.6 M	4M18G9W	208.45 mW	208.45 mW
RSS139	2.0	1.72 G	1.745 G	17M9G7W	181.13 mW	181.13 mW
RSS133	6.0	1.86 G	1.9 G	17M9G7W	180.3 mW	180.3 mW
RSS130	1.0	709 M	711 M	9M01D7W	174.58 mW	174.58 mW
RSS139	2.0	1.715 G	1.75 G	8M89D7W	176.6 mW	176.6 mW
RSS133	6.0	1.852 G	1.908 G	4M51D7W	187.93 mW	187.93 mW
RSS133	6.0	1.852 G	1.908 G	4M15G9W	223.36 mW	223.36 mW
RSS133	6.0	1.855 G	1.905 G	9M01G7W	181.55 mW	181.55 mW
RSS139	2.0	1.715 G	1.75 G	9M01G7W	180.3 mW	180.3 mW
RSS132	3.0	824.2 M	848.2 M	248KGXW	1.641 W	1.641 W
RSS130	1.0	706.5 M	713.5 M	4M52G7W	184.08 mW	184.08 mW

Specification/Charge des Charges	Issue/Édition	From Frequency/Départ des Fréquences	To Frequency / À Fréquences	Emission Designation/Designation D'émission	Minimum Power	Maximum Power
RSS133	6.0	1.86 G	1.9 G	17M9D7W	175.79 mW	175.79 mW
RSS133	6.0	1.855 G	1.905 G	8M97D7W	183.23 mW	183.23 mW

Certification of equipment means only that the equipment has met the requirements of the above noted specification. License applications, where applicable to use certified equipment, are acted on accordingly by the Industry Canada issuing office and will depend on the existing radio environment, service and location of operation. This certificate is issued on condition that the holder complies and will continue to comply with the requirements and procedures issued by Industry Canada. The equipment for which this certificate is issued shall not be manufactured, imported distributed, leased, offered for sale or sold unless the equipment complies with the applicable technical specifications and procedures issued by Industry Canada.

La certification du matériel signifie seulement que le matériel a satisfait aux exigences de la norme indiquée ci-dessus. Les demandes de licences nécessaires pour l'utilisation du matériel certifié sont traitées en conséquence par le bureau de délivrance d'Industrie Canada et dépendent des conditions radio ambiantes, du service et de l'emplacement d'exploitation. Le présent certificat est délivré à la condition que le titulaire satisfasse et continue de satisfaire aux exigences et aux procédures d'Industrie Canada. Le matériel à l'égard duquel le présent certificat est délivré ne doit pas être fabriqué, importé, distribué, loué, mis en vente ou vendu à moins d'être conforme aux procédures et aux spécifications techniques applicable publiées par Industrie Canada.

MTSMC-LVW2 and MTSMC-LVW2-U

Certification Number/No. de Certification	5131A-LE910SV
Type of Radio Equipment/Genre de Matériel	Advanced Wireless Services Equipment/Matériel des services sans fil évolués (1710-1755 MHz and 2110-2155 MHz) Mobile Broadband Service (MBS)/Matériel du service mobile à large bande (SMLB) (698-756 and (777-787) Modular Approval/Approbation modulaire
Model/Modèle	LE910-SVG

Specification/Charge des Charges	Issue/Édition	From Frequency/Départ des Fréquences	To Frequency / À Fréquences	Emission Designation/Designation D'émission	Minimum Power	Maximum Power
BETS1	1.0	782 M	782 M	8M95D7W	178.24 mW	178.24 mW
RSS139	2.0	1.72 G	1.745 G	17M9G7W	219.28 mW	219.28 mW

Specification/Charger des Charges	Issue/Édition	From Frequency/Départ des Fréquences	To Frequency/À Fréquences	Emission Designation/Designation D'émission	Minimum Power	Maximum Power
RSS130	1.0	779.5 M	784.5 M	5M52G7W	195.43 mW	195.43 mW
RSS130	1.0	779.5 M	784.5 M	4M53D7W	207.49 mW	207.49 mW
RSS139	2.0	1.72 G	1.745 G	17M9D7W	205.59 mW	205.59 mW
RSS130	1.0	782 M	782 M	8M95G7W	192.31 mW	192.31 mW
RSS139	2.0	1.715 G	1.75 G	8M94D7W	192.31 mW	192.31 mW
RSS139	2.0	1.715 G	1.75 G	8M95G7W	223.36 mW	223.36 mW
RSS139	2.0	1.713 G	1.752 G	4M53D7W	219.28 mW	219.28 mW
RSS139	2.0	1.713 G	1.752 G	4M52G7W	228.56 mW	228.56 mW

Certification of equipment means only that the equipment has met the requirements of the above noted specification. License applications, where applicable to use certified equipment, are acted on accordingly by the Industry Canada issuing office and will depend on the existing radio environment, service and location of operation. This certificate is issued on condition that the holder complies and will continue to comply with the requirements and procedures issued by Industry Canada. The equipment for which this certificate is issued shall not be manufactured, imported distributed, leased, offered for sale or sold unless the equipment complies with the applicable technical specifications and procedures issued by Industry Canada.

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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 chemicals¹:

- 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)

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

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

Information on HS/TS Substances According to Chinese Standards

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

Hazardous/Toxic Substance/Elements

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

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

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

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

依照中国标准的有毒有害物质信息

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

有害/有毒物质/元素

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

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

O 表示不含该物质或者该物质的含量水平在上述限量要求之内。

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-LAT1 Package Label



MTSMC-LAT1-U Package Label



MTSMC-LAT1 Device Label



MTSMC-LAT1-U Device Label



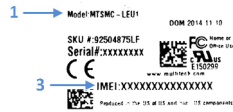
MTSMC-LEU1 Package Label



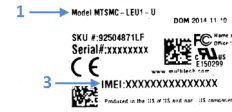
MTSMC-LEU1-U Package Label



MTSMC-LEU1 Device Label



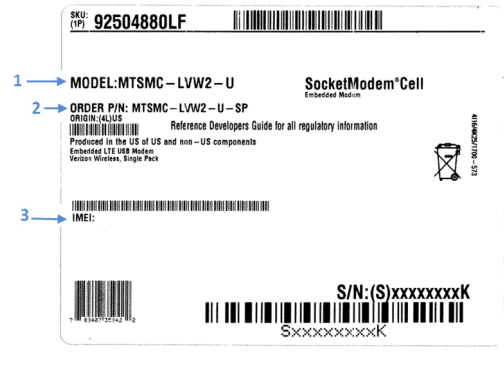
MTSMC-LEU1-U Device Label



MTSMC-LVW2 Package Label



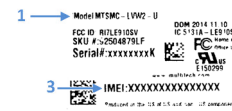
MTSMC-LVW2-U Package Label



MTSMC-LVW2 Device Label



MTSMC-LVW2-U Device Label



Chapter 9 – Using Connection Manager

Use Connection Manager to:

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

Note:

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

Installing Connection Manager

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

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

To install Connection Manager and the device drivers:

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

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

Note: This page appears only on Windows 10.

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

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

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

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

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

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

Note:

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

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

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

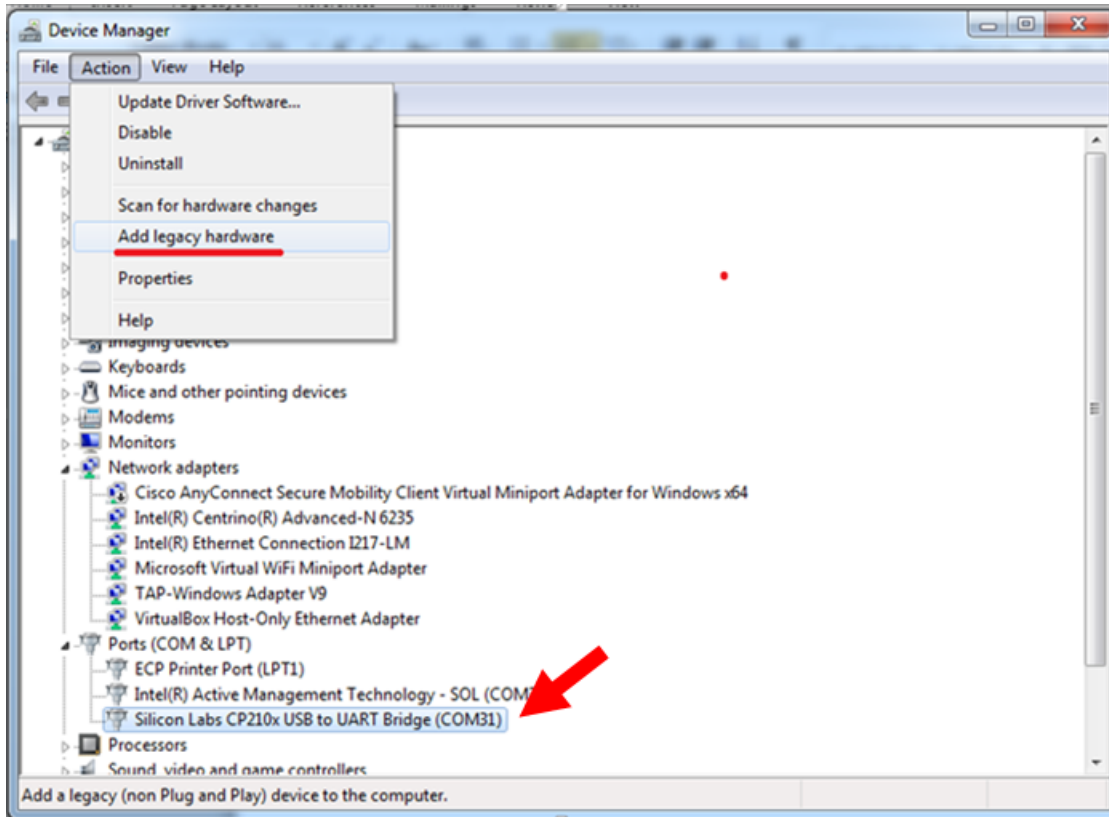
Setting Up a Serial Device in Windows Device Manager

To set up the device in Windows Device Manager:

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

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

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



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

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

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

- f. Select your COM port, then click **Next**.
 - g. Click **Finish**.
 - h. Go to **Device Manager > Modems** and confirm that the device is added.
6. To verify that the device is set up correctly, query the device:
- a. Go to **Device Manager > Modems**, right-click **Standard 33600 bps Modem**, and select **Properties**.
 - b. On the **Diagnostics** tab, click **Query Modem**.

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

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

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

Connecting a Device

Before You Begin

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

To connect your device to the carrier's network:

1. Open Connection Manager.

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

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

You may need to ask the carrier for these settings.

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

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

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

Note:

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

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

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

3. On the **Settings** tab, select **USB Modem** or **Serial Modem** depending on whether you are connecting a USB or serial device.
4. If you are connecting a serial device, provide the serial settings on the **Settings** tab:
 - a. In the **Modem type** list, select the appropriate modem type.
 - b. For the other settings, provide the values that match the serial-port settings for the device in Device Manager.

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

Note:

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

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

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

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

Note:

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

Uninstalling Connection Manager

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

Before You Begin

Make sure that Connection Manager is not running.

To uninstall Connection Manager:

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

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

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

Connection Manager User Interface

Connection Manager consists of the following tabs:

- Main
- Settings

- Connection
- Details
- Terminal
- Charts

Main tab

The **Main** tab displays the following:

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

Note: The signal strength is displayed for a serial device only when the device is not connected to the carrier's network.
- Connection statistics: download and upload speeds, amount of traffic sent and received (only when connection to the carrier's network is established)
- The keep-alive check status and when the last ping response was received if **Enable keep-alive check** is checked on the **Connection** tab.

Settings tab

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

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

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

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

Connection tab

The **Connection** tab displays the following:

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

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

Details tab

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

Terminal tab

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

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

Charts tab

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

Troubleshooting

Serial COM port is not available in the Serial Modem Settings

Close Connection Manager and reopen it.

Device is not detected ("No Device")

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

Try the following steps:

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

MultiConnect Cell USB Modem is not detected

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

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

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

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

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

This error has the following causes and solutions.

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

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