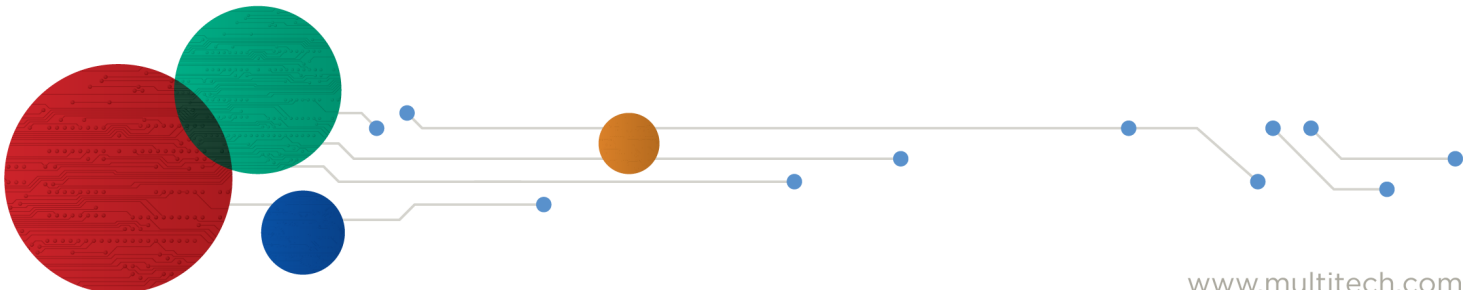


SocketModem® Cell

MTSMC-Lxx Device Guide



SocketModem® Cell Device Guide

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

Part Number: S000614 Rev.n 1.12

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Warranty

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

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Contents

Chapter 1 – Product Overview	6
Overview	6
Documentation	6
Product Build Options	7
Chapter 2 – Mechanical Drawings	8
MTSMC-Lxxx	8
MTSMC-Lxxx-U	9
Chapter 3 – Specifications	10
MTSMC-LAT1 and MTSMC-LAT1-U Specifications	10
MTSMC-LVW2 and MTSMC-LVW2-U Specifications	11
MTSMC-LEU1 and MTSMC-LEU1-U Specifications	12
Frequency Bands (LEU1)	13
LE910 Telit Transmission Output Power	15
Underwriters Laboratories, Inc. Required Global Positioning System (GPS) Statement	15
Powering Down Your Device	15
UART DC Electrical Characteristics	15
Absolute Maximum Rating	16
Electrical Characteristics Other Pins	16
Pinout Specifications	17
Pin Availability by Build	17
Power Measurements	19
MTSMC-LAT1 Power Draw	19
MTSMC-LAT1-U Power Draw	19
MTSMC-LVW2 Power Draw	20
MTSMC-LVW2-U Power Draw	20
MTSMC-LEU1 Power Draw	20
MTSMC-LEU1-U Power Draw	21
Mounting Hardware	22
Recommended Parts	22
Chapter 4 – Antennas	23
Antenna System Cellular Devices	23
Requirements for Cellular Antennas with regard to FCC/IC Compliance	23
FCC Requirements	23
Antenna Overview	23
EAD Antenna	23
Cellular Antenna	24
LTE Antenna MISO	26

Selecting Antennas	26
Placing External Antennas	26
Placing GPS Antennas	26
Antenna Approvals and Safety Considerations	26
Power Draw	26
GPS Antenna	27
MultiTech Ordering Part Numbers	27
Specifications	27
Placing GPS Antennas	27
OEM Integration	27
FCC & IC Information to Consumers	27
FCC Grant Notes.....	27
Host Labeling.....	28
Chapter 5 – Safety Information	29
Handling Precautions	29
Power Supply Caution.....	29
Radio Frequency (RF) Safety	29
Sécurité relative aux appareils à radiofréquence (RF).....	29
Interference with Pacemakers and Other Medical Devices	30
Potential interference.....	30
Precautions for pacemaker wearers	30
Vehicle Safety.....	30
Device Maintenance	31
Notice regarding Compliance with FCC, EU, and Industry Canada Requirements for RF Exposure.....	31
User Responsibility.....	31
Chapter 6 – Regulatory Information.....	32
EMC, Safety, and Radio Equipment Directive (RED) Compliance	32
47 CFR Part 15 Regulation Class B Devices	32
Industry Canada Class B Notice.....	32
MTSMC-LAT1 and MTSMC-LAT1-U	33
FCC Part 15.....	33
FCC Parts 22, 24, and 27	33
MTSMC-LVW2 and MTSMC-LVW2-U	35
FCC Part 15.....	35
FCC Parts 27	35
MTSMC-LAT1 and MTSMC-LAT1-U	36
MTSMC-LVW2 and MTSMC-LVW2-U	38
Chapter 7 – Environmental Notices.....	40
Waste Electrical and Electronic Equipment Statement	40
WEEE Directive.....	40
Instructions for Disposal of WEEE by Users in the European Union	40

REACH-SVHC Statement	40
Registration of Substances.....	40
Compliance for Hazardous Substances (ROHS3)	40
Chapter 8 – Labels.....	41
Approvals and Certifications	41
Example Labels.....	41
Chapter 9 – Using Connection Manager	43
Installing Connection Manager	43
Setting Up a Serial Device in Windows Device Manager	44
Connecting a Device.....	46
Uninstalling Connection Manager.....	47
Connection Manager User Interface.....	49
Main tab.....	49
Settings tab	50
Connection tab.....	50
Details tab	50
Terminal tab.....	50
Charts tab.....	50
Troubleshooting	51
Serial COM port is not available in the Serial Modem Settings.....	51
Device is not detected ("No Device")	51
USB Modem is not detected.....	51
Connection Manager is not working, and a device connected to the computer is not detected.....	51
Connection Manager displays "Device Error" status for a serial device	51
System Cannot Connect to Serial Device.....	52
Index.....	55

Chapter 1 – Product Overview

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 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

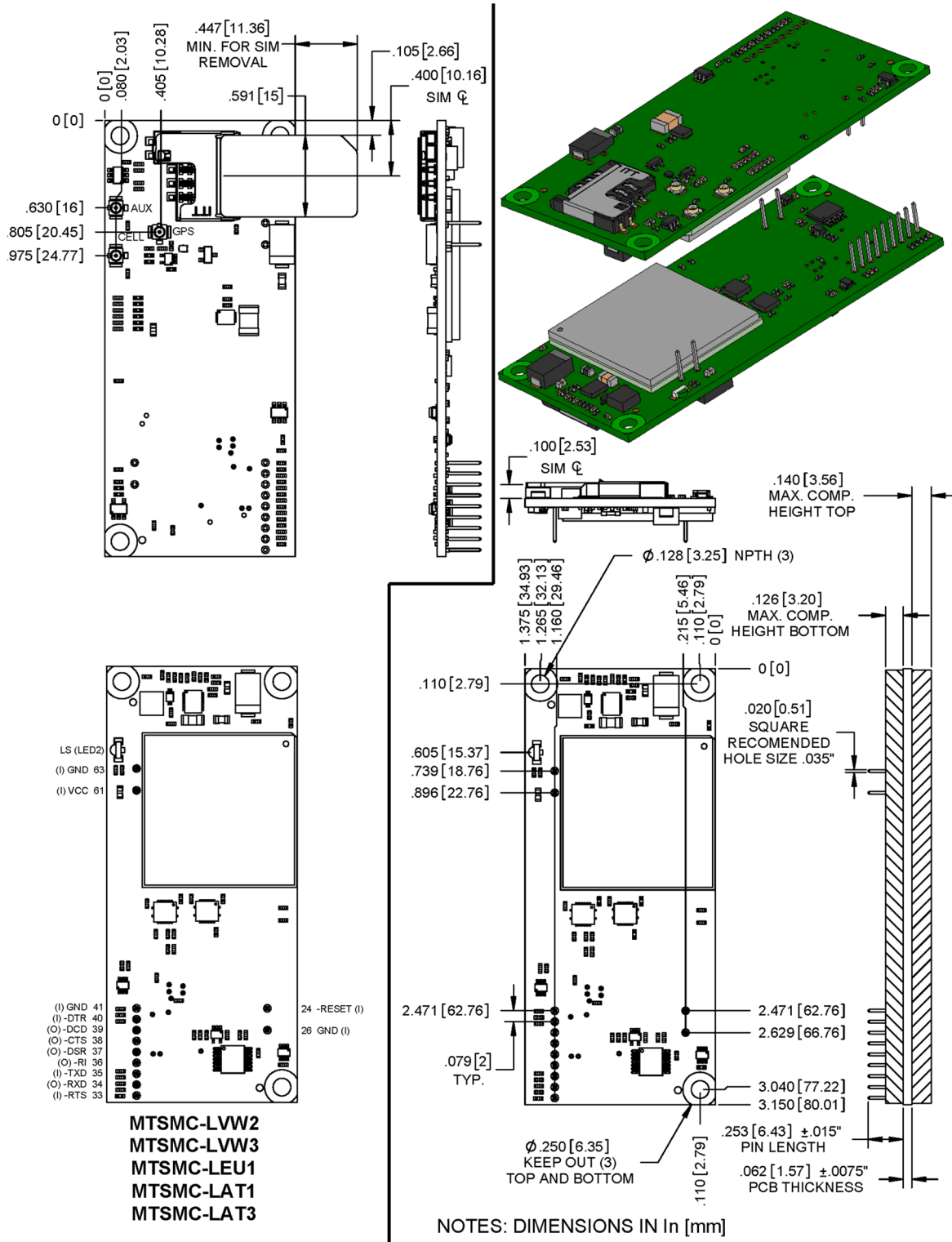
Product	Description	Carrier/Region
MTSMC-LVW2	4G LTE embedded cellular modem with GPS/GLONASS (Serial Interface)	Verizon
MTSMC-LVW2-U	4G LTE embedded cellular modem with GPS/GLONASS (USB Interface)	Verizon
MTSMC-LEU1 (RED Compliant)	4G LTE with HSPA+ fallback embedded cellular modem with GPS/GLONASS (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:

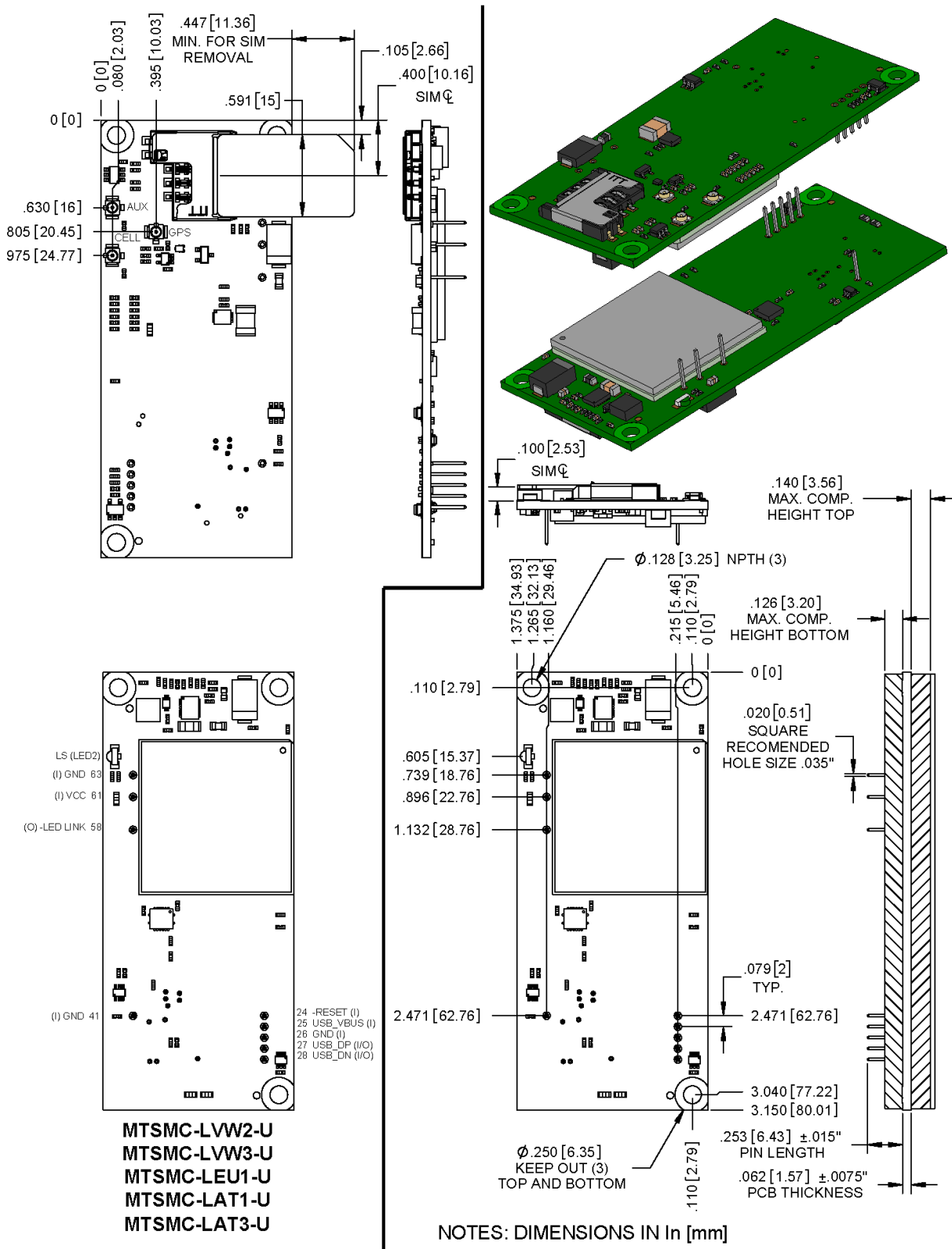
- These units ship without network activation.
- To connect them to the cellular network, you need a cellular account. For more information, refer to Account Activation.
- The complete product code may end in .Rx. For example, MTSMC-LAT1.Rx, where R is revision and x is the revision number.
- All builds 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 (USB Models)	5.0 VDC
Input Voltage (Serial Models)	3.3 VDC or 5.0 VDC

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

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

Category	Description
Environment	
Operating Temperature	-40° C to +85° C
Storage Temperature	-40° C to +85° C
Humidity	20%-90% RH, non-condensing
Power Requirements	
Input Voltage (USB Models)	5.0 VDC
Input Voltage (Serial Models)	3.3 VDC or 5.0 VDC
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

Category	Description
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
Storage Temperature	-40° C to +85° C
Humidity	20%-90% RH, non-condensing
Power Requirements	
Input Voltage (USB Models)	5.0 VDC
Input Voltage (Serial Models)	3.3 VDC or 5.0 VDC
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	45MHz
			Rx: 4357 - 4458	

Mode	Freq. TX (MHz)	Freq. RX (MHz)	Channels	TX - RX offset
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
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:

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

UART DC Electrical Characteristics

Units: Volts

Applies to the following pins:

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

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

Absolute Maximum Rating

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

Electrical Characteristics Other Pins

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

Pinout Specifications

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

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

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

Pin Availability by Build

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

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

Power Measurements

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

Note:

The following notes apply to the following tables.

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

MTSMC-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 *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 U.FL 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.

FCC Requirements

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

Antenna 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

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	

Cellular Antenna

Cellular devices were approved with the following antenna:

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

MultiTech ordering information:

Model	Quantity
ANLTE2-2HRA	1
ANLTE2-10HRA	10
ANLTE2-50HRA	50

Cellular 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 MISO

LTE devices use Multiple Input and Single output (MISO) to improve the downlink connection (cell tower to mobile). It has no effect on the uplink (mobile to cell tower).

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

Selecting Antennas

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

Placing External Antennas

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

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

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

Placing GPS Antennas

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

Antenna Approvals and Safety Considerations

Note the following:

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

Power Draw

There are no significant power draw differences.

GPS Antenna

Manufacturer:	Trimble
Description:	GPS Antenna with low noise amplifier
Model Number:	66800-52

MultiTech Ordering Part Numbers

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

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

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.

OEM Integration

FCC & IC Information to Consumers

The user manual for the consumer must contain the statements required by the following FCC and IC regulations: 47 C.F.R. 15.19(a)(3), 15.21, 15.105 and RSS-Gen Issue 3, Dec 2010; 7.1.2 and 7.1.3

FCC Grant Notes

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

FCC Definitions

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

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

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

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

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

Host Labeling

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

Contains FCC ID: {Add the device FCC ID}

Contains IC: {Add the device IC ID}

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

Chapter 5 – Safety Information

Handling Precautions

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

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 cellulaires. S'il

ne respecte pas cette consigne, le responsable peut voir son accès aux services cellulaires suspendu ou interdit, peut être poursuivi en justice, ou les deux.

- Éteignez votre appareil sans fil à proximité des pompes à essence ou de diesel avant de remplir le réservoir de votre véhicule de carburant.
- Éteignez votre appareil sans fil dans les hôpitaux ou dans toutes les zones où des appareils médicaux sont susceptibles d'être utilisés.

Interference with Pacemakers and Other Medical Devices

Potential interference

Radio frequency energy (RF) from cellular devices can interact with some electronic devices. This is electromagnetic interference (EMI). The FDA helped develop a detailed test method to measure EMI of implanted cardiac pacemakers and defibrillators from cellular devices. This test method is part of the Association for the Advancement of Medical Instrumentation (AAMI) standard. This standard allows manufacturers to ensure that cardiac pacemakers and defibrillators are safe from cellular device EMI.

The FDA continues to monitor cellular devices for interactions with other medical devices. If harmful interference occurs, the FDA will assess the interference and work to resolve the problem.

Precautions for pacemaker wearers

If EMI occurs, it could affect a pacemaker in one of three ways:

- Stop the pacemaker from delivering the stimulating pulses that regulate the heart's rhythm.
- Cause the pacemaker to deliver the pulses irregularly.
- Cause the pacemaker to ignore the heart's own rhythm and deliver pulses at a fixed rate.

Based on current research, cellular devices do not pose a significant health problem for most pacemaker wearers. However, people with pacemakers may want to take simple precautions to be sure that their device doesn't cause a problem.

- Keep the device on the opposite side of the body from the pacemaker to add extra distance between the pacemaker and the device.
- Avoid placing a turned-on device next to the pacemaker (for example, don't carry the device in a shirt or jacket pocket directly over the pacemaker).

Vehicle Safety

When using your device in a vehicle:

- Do not use this device while driving.
- Respect national regulations on the use of cellular devices in vehicles.
- If incorrectly installed in a vehicle, operating the wireless device could interfere with the vehicle's electronics. To avoid such problems, use qualified personnel to install the device. The installer should verify the vehicle electronics are protected from interference.
- Using an alert device to operate a vehicle's lights or horn is not permitted on public roads.
- UL evaluated this device for use in ordinary locations only. UL did NOT evaluate this device for installation in a vehicle or other outdoor locations. UL Certification does not apply or extend to use in vehicles or outdoor applications.

Device Maintenance

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

When maintaining your device:

- Do not misuse the device. Follow instructions on proper operation and only use as intended. Misuse could make the device inoperable, damage the device and/or other equipment, or harm users.
- Do not apply excessive pressure or place unnecessary weight on the device. This could result in damage to the device or harm to users.
- Do not use this device in explosive or hazardous environments unless the model is specifically approved for such use. The device may cause sparks. Sparks in explosive areas could cause explosion or fire and may result in property damage, severe injury, and/or death.
- Do not expose your device to any extreme environment where the temperature or humidity is high. Such exposure could result in damage to the device or fire. Refer to the device specifications regarding recommended operating temperature and humidity.
- Do not expose the device to water, rain, or spilled beverages. It is not waterproof. Exposure to liquids could result in damage to the device.
- Using accessories, such as antennas, that MultiTech has not authorized or that are not compliant with the device accessory specifications may invalidate the warranty.

If the device is not working properly, contact MultiTech Technical Support.

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.
- End user must operate product per country laws and rules.

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 downloaded at <https://multitech.com/product-support/>.

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.

MTSMC-LAT1 and MTSMC-LAT1-U

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

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designators
22H	826.5-846.5	0.20559	1.0 PM	4M51G7W
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 multi0-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.

MTSMC-LAT1 and MTSMC-LAT1-U

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/Ca hier des Charges	Issue/Édit ion	From Frequency/D e Fréquences	To Frequency/ À Fréquence s	Emission Designation/Design ation D'émission	Minimu m 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/Ca hier des Charges	Issue/Édit ion	From Frequency/D e Fréquences	To Frequency/ À Fréquence s	Emission Designation/Design ation D'émission	Minimu m 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/Ca hier des Charges	Issue/Édit ion	From Frequency/D e Fréquences	To Frequency/ À Fréquence s	Emission Designation/Design ation D'émission	Minimu m 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/Ca hier des Charges	Issue/Édit ion	From Frequency/D e Fréquences	To Frequency/ À Fréquence s	Emission Designation/Design ation D'émission	Minimu m 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/Cahier des Charges	Issue/Édition	From Frequency/Dé 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.

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.

Chapter 7 – Environmental Notices

Waste Electrical and Electronic Equipment Statement

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

WEEE Directive

The WEEE Directive places an obligation on EU-based manufacturers, distributors, retailers, and importers to take-back electronics products at the end of their useful life. A sister directive, ROHS (Restriction of Hazardous Substances) complements the WEEE Directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE Directive covers all MultiTech products imported into the EU as of August 13, 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, contact your local city office, your household waste disposal service or where you purchased the product.

July, 2005



REACH-SVHC Statement

Registration of Substances

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

For the current REACH-SVHC statement and additional regulatory documents, visit:

<https://multitech.com/approvals-and-certifications/>.

Compliance for Hazardous Substances (ROHS3)

Multi-Tech Systems, Inc. confirms that all products comply with the chemical concentration limitations set forth for ROHS3 for the regulations for CE and UKCA. Following the standard - EN IEC 63000:2018.

For the current Certificate of Compliance for Hazardous Substances and additional regulatory documents, visit:

<https://multitech.com/approvals-and-certifications/>.

Chapter 8 – Labels

Approvals and Certifications

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

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

Example Labels

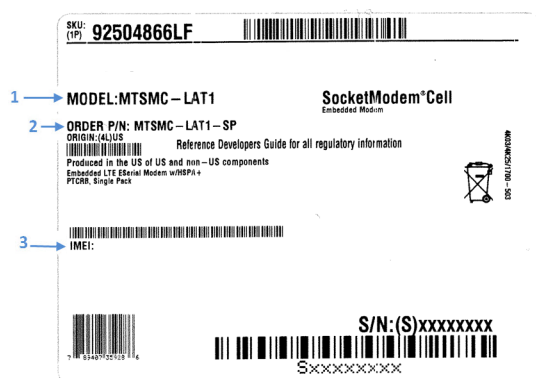
Note: Actual labels vary depending on the regulatory approval markings and content.

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

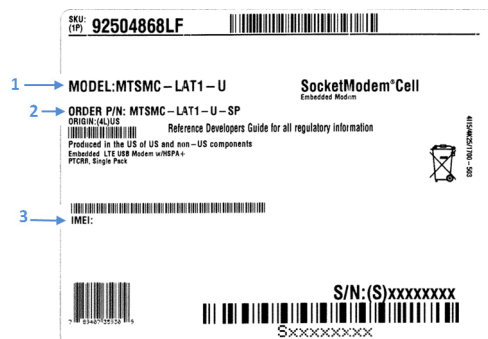
The label shown is not than actual size.

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

MTSMC-LAT1 Package Label



MTSMC-LAT1-U Package Label



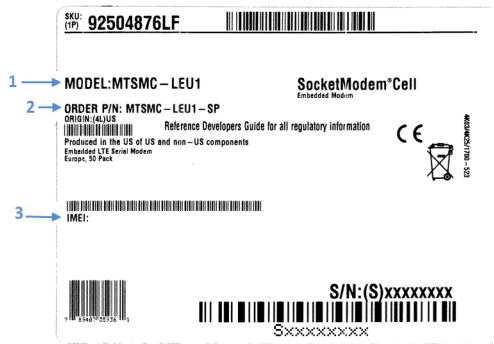
MTSMC-LAT1 Device Label



MTSMC-LAT1-U Device Label



MTSMC-LEU1 Package Label



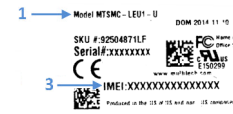
MTSMC-LEU1-U Package Label



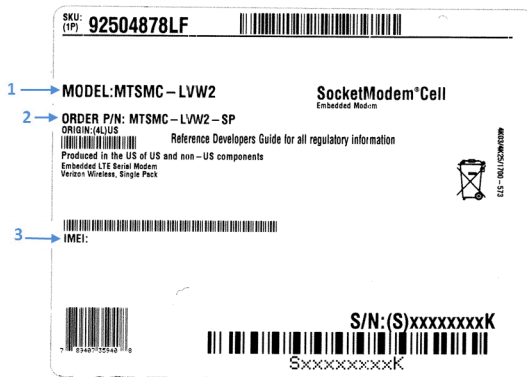
MTSMC-LEU1 Device Label



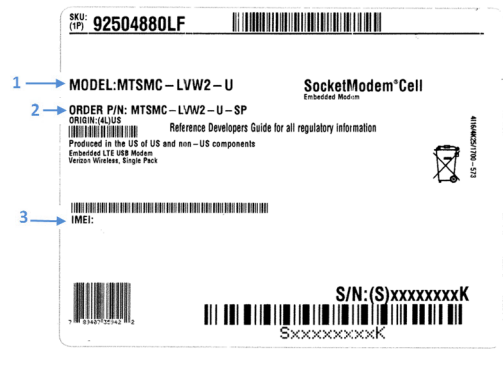
MTSMC-LEU1-U Device Label



MTSMC-LVW2 Package Label



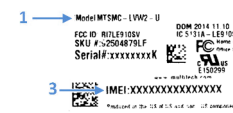
MTSMC-LVW2-U Package Label



MTSMC-LVW2 Device Label



MTSMC-LVW2-U Device Label



Chapter 9 – Using Connection Manager

Use Connection Manager to:

- Install the latest device drivers.
- Connect your device to your carrier's network.

Note: Connection Manager can install drivers and connect your device regardless of your cellular network; however, activation is only supported with Verizon, Aeris, and some regional carriers.

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

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

Installing Connection Manager

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

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

To install Connection Manager and the device drivers:

1. Go to <https://multitech.com/all-products/software-management/connection-manager/>.
2. Click Connection Manager.
3. Open or unzip the Connection Manager file and run the installer (.msi file).
4. On the MultiTech Connection Manager Setup Wizard Welcome Panel, click Next.
5. Read the end-user license agreement and check I accept the terms in the License Agreement. Click Next.
6. Click Next to have the installer automatically disable the native WWAN AutoConfig service in Windows.

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

Note: This page appears in Windows 10 and Windows 11.

7. If any Multichannel device is connected to the computer, disconnect it and click Next.
8. If you use a USB device, check Install the modem driver.

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

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

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

10. Click Install. Windows may prompt you to allow the installer to make changes to your computer. Click Yes.
11. In the Setup Wizard, click Finish.
Note: To open Connection Manager automatically after installation, check Start the MultiTech Connection Manager when the installation is finished.

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

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

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

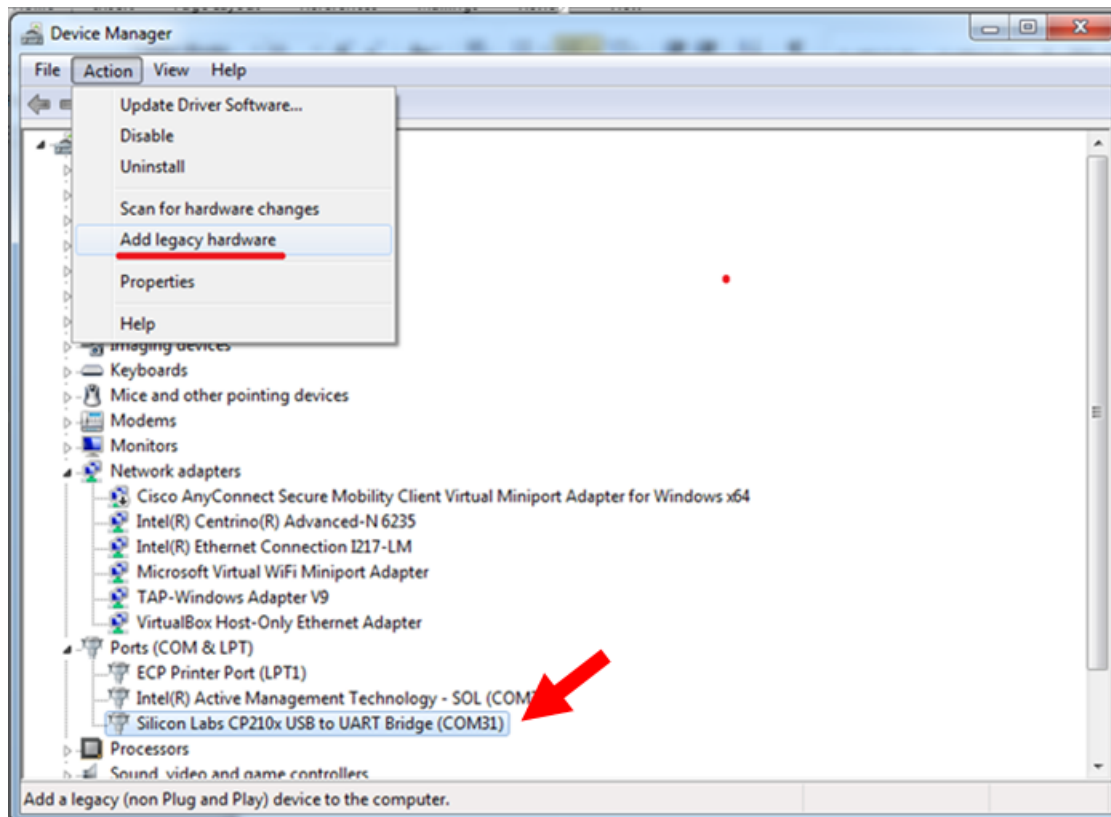
Setting Up a Serial Device in Windows Device Manager

To set up the device in Windows Device Manager:

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

Example: The COM port is COM31.

4. Go to Action > Add legacy hardware.



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

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

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

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

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

Connecting a Device

Before You Begin

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

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

To connect your device to the carrier's network:

1. Open Connection Manager.

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

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

You may need to ask the carrier for these settings.

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

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

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

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

Note:

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

- c. To save the settings, click Apply.

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

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

3. On the Settings tab, select USB Modem or Serial Modem depending on whether you are connecting a USB or serial device.
4. If you are connecting a serial device, provide the serial settings on the Settings tab:
 - a. In the Modem type list, select the appropriate modem type.

- b. For the other settings, provide the values that match the serial-port settings for the device in Device Manager.

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

- c. To save the settings, click Apply.

Note:

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

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

5. On the Main tab, click Connect.

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

Note:

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

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

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

Uninstalling Connection Manager

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

Before You Begin

Make sure that Connection Manager is not running.

To uninstall Connection Manager:

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

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

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

Connection Manager User Interface

Connection Manager consists of the following tabs:

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

The screenshot shows the MultiTech Connection Manager 1.0.6.77 interface. The top bar is blue with the MultiTech logo and a close button. Below the bar are tabs for Main, Settings, Connector, Details, Terminal, and Charts. The Main tab is active, displaying a 'Statistics' section on the left and a 'Connected' status section on the right. The statistics show 0 B/s download, 847 B/s upload, 37.39 Kb sent, and 24.39 Kb received. The connection status shows a signal strength bar chart, a 58% indicator, and a 'Keep-alive check: Success' with a 'Last ping response: 879 ms'. A blue 'Disconnect' button is located at the bottom right.

Main tab

The Main tab displays the following:

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

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

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

Settings tab

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

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

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

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

Connection tab

The Connection tab displays the following:

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

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

Details tab

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

Terminal tab

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

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

Charts tab

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

Troubleshooting

Serial COM port is not available in the Serial Modem Settings

Close Connection Manager and reopen it.

Device is not detected ("No Device")

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

Try the following steps:

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

USB Modem is not detected

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

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

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

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

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

This error has the following causes and solutions.

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

System Cannot Connect to Serial Device

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

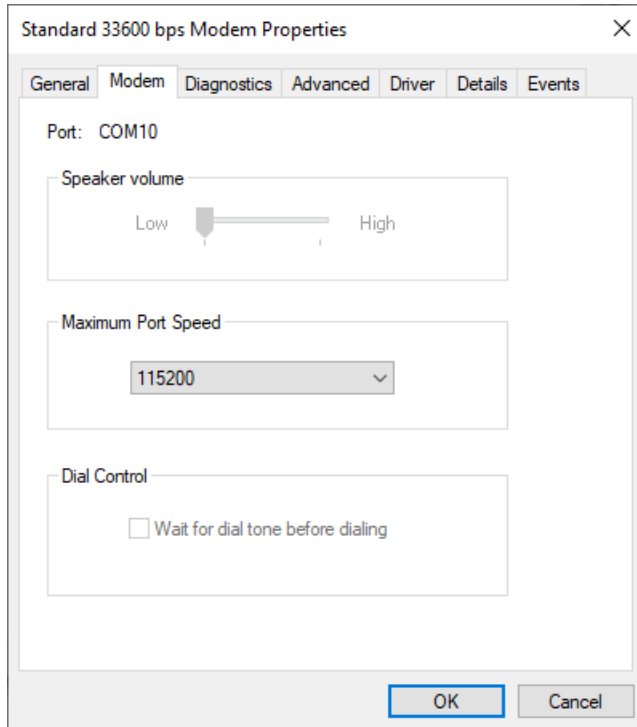
In Connection Manager, click on the Settings tab.

The screenshot shows the MultiTech Connection Manager 2.2.0.4 interface. The title bar includes the version number and a close button. The main menu has tabs for Main, Settings (selected), Connection, Details, Terminal, and Charts. Under the Settings tab, there are two radio buttons: USB Modem (unselected) and Serial Modem (selected). Below these are six dropdown menus arranged in two columns. The left column contains: Port (COM10), Bits per second (115200), and Data bits (8). The right column contains: Parity (None), Stop bits (1), and Flow control (None). At the bottom left, there are two checkboxes: 'Run application at Windows startup' and 'Connect to the Internet automatically', both of which are unchecked. A blue 'Apply' button is located at the bottom right.

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

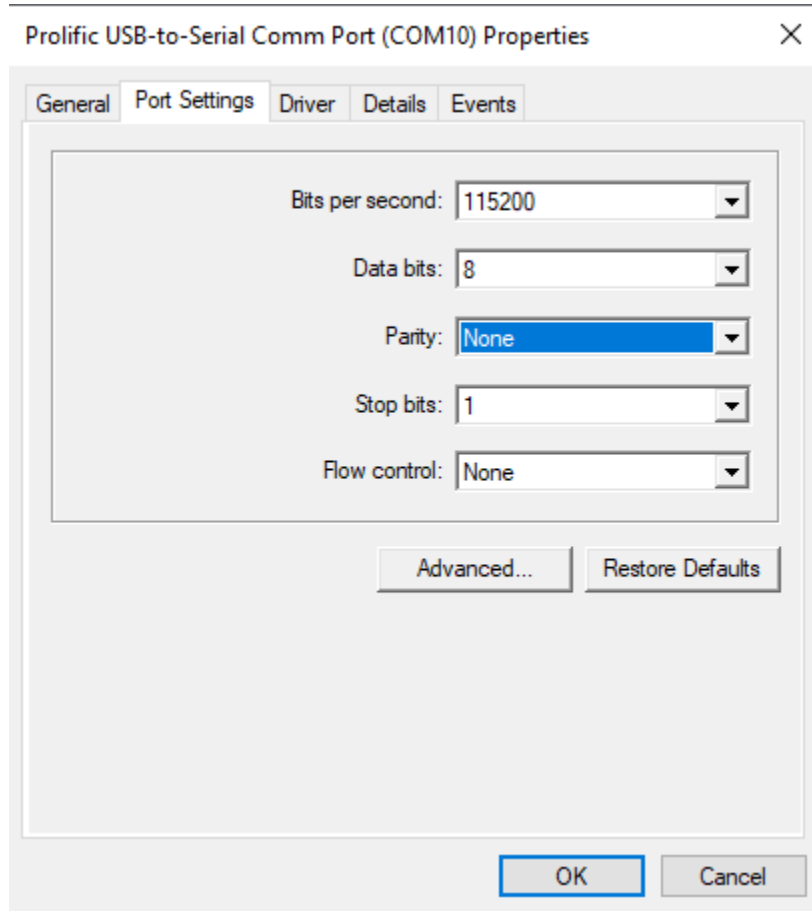
Note: If Modems and Ports don't appear in Device Manager, open the View Menu and select Show hidden devices.

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



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

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



Index

A	
activation.....	43
antenna	24
cellular devices.....	23
diversity.....	26
GPS.....	27
LTE.....	23
AT#SHDN.....	15
B	
build options	7
C	
certification	
FCC	33 35
Industry Canada	36 38
Class B	
Industry Canada	32
Connection Manager	
Charts tab.....	49
connecting device to carrier's network	46
Connection tab.....	49
Details tab.....	49
installation	43
installation of device drivers.....	43
Main tab.....	49
overview	43
Settings tab	49
Terminal tab.....	49
troubleshooting	51
uninstalling.....	47
D	
device	
connecting to carrier's network with Connection Manager	46
device drivers	
installation for use with Connection Manager	43
diversity.....	26
documentation.....	6
E	
electrical characteristics, pins	16
F	
FCC	
antenna requirements	23
grant notes.....	27
FCC certification	33
MTSMC-LVW2.....	35
MTSMC-LVW2-U	35
G	
GPS.....	15
antenna.....	27
H	
hazardous substances	40
host labeling.....	27
I	
Industry Canada	36
Class B	32
MTSMC-LVW2.....	38
MTSMC-LVW2-U	38
interférence des radiofréquences.....	29
K	
KDB 447498 Section 8	27
L	
labeling	
host	27
labels	41
LTE	
antenna.....	23
M	
mechanical drawings.....	8 9

model location	41	vehicle	30
mounting hardware	22	sécurité	
MTSMC-LAT1	19	interférences RF	29
MTSMC-LAT1-U	19	shutdown	15
MTSMC-LEU1	20	specifications.....	10 11 12
MTSMC-LEU1-U	21	static.....	29
MTSMC-LVW2	20 35 38		
MTSMC-LVW2-U	20 35 38		
		T	
P		troubleshooting	
power down	15	Connection Manager	51
power draw	19 20 21		
PTCRB	23	U	
		UL	15
R			
RoHS	40	V	
		vehicle safety	30
S			
safety			