SocketModem® Cell

MTSMC-MVW1 Device Guide
SocketModem Cell Device Guide
Models: MTSMC-MVW1, MTSMC-MVW1-U
Part Number: S000670, Version 1.2

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<table>
<thead>
<tr>
<th>Country</th>
<th>By Email</th>
<th>By Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe, Middle East, Africa:</td>
<td><a href="mailto:support@multitech.co.uk">support@multitech.co.uk</a></td>
<td>+44) 118 959 7774</td>
</tr>
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<td>U.S., Canada, all others:</td>
<td><a href="mailto:support@multitech.com">support@multitech.com</a></td>
<td>(800) 972-2439 or (763) 717-5863</td>
</tr>
</tbody>
</table>

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

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## Contents

**Chapter 1 – Chapter 1 Product Overview** ................................................................. 5  
  Product Overview ........................................................................................................ 5  
  Documentation ........................................................................................................... 5  
  Product Build Options .............................................................................................. 6  

**Chapter 2 – Mechanical Drawings** ........................................................................ 7  
  MTSMC-Mxx1 ........................................................................................................... 7  
  MTSMC-Mxx1-U ....................................................................................................... 8  

**Chapter 3 – Chapter 3 Specifications** ................................................................... 9  
  MTSMC-MVV1 and MTSMC-MVV1-U Specifications ................................................. 9  
  Powering Down Your Device .................................................................................... 10  
  UART DC Electrical Characteristics ........................................................................ 10  
  Absolute Maximum Rating ....................................................................................... 11  
  Electrical Characteristics Other Pins ...................................................................... 11  
  Pinout Specifications ............................................................................................... 11  
  Pin Availability by Build ......................................................................................... 12  
  Power Measurements ............................................................................................... 13  
  MTSMC-MVV1 Power Draw .................................................................................... 13  
  MTSMC-MVV1-U Power Draw ................................................................................ 14  
  Mounting Hardware ................................................................................................. 14  
  Recommended Parts ............................................................................................... 14  

**Chapter 4 – Carrier Specific Notice** ..................................................................... 15  
  Firmware Over the Air (FOTA) Script ...................................................................... 15  
  Verizon Requirement: Firmware Over The Air (FOTA) - Scripting ......................... 15  
  Cellular Module FOTA Script Example Process ..................................................... 15  
  FOTA Client Example Session Log ......................................................................... 17  

**Chapter 5 – Chapter 4 Antennas** .......................................................................... 19  
  Antenna System Cellular Devices .......................................................................... 19  
  Requirements for Cellular Antennas with regard to FCC/IC Compliance ............... 19  
  LTE Antenna Information ....................................................................................... 19  
  Antenna Specifications ......................................................................................... 19  
  OEM Integration ..................................................................................................... 20  
  FCC & IC Information to Consumers ................................................................... 20  
  FCC Grant Notes ................................................................................................. 20  
  Host Labeling ...................................................................................................... 20  

**Chapter 6 – Chapter 5 Safety Information** ............................................................. 21  
  Handling Precautions ......................................................................................... 21  
  Radio Frequency (RF) Safety ............................................................................. 21
Chapter 1 – Chapter 1 Product Overview

Product Overview

SocketModem Cell models are complete, ready-to-integrate communications devices that offer standards-based LTE Cat M1 performance. Designed for IoT applications, these models offer enhanced coverage and optimized power consumption. 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.

<table>
<thead>
<tr>
<th>Document</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>SocketModem Cell Cat-M1 MTSMC-MVW1 Device Guide</td>
<td>This document. Provides overview, safety and regulatory information, design considerations, schematics, and device information.</td>
<td>S000670</td>
</tr>
<tr>
<td>Universal Developer Kit 2.0 Developer Guide</td>
<td>Information for developing with the MTUDK2 Developer Kit. Includes an overview, design considerations, schematics, and installation and operation information.</td>
<td>S000610</td>
</tr>
<tr>
<td>USB Driver Installation Guide for LTE Devices</td>
<td>Instructions for installing USB drivers on Linux and Windows Systems.</td>
<td>S000616</td>
</tr>
<tr>
<td>Telit ME910C1 AT Commands Reference Guide</td>
<td>Lists AT Commands and parameters used to configure your device.</td>
<td>80529ST10815A</td>
</tr>
</tbody>
</table>
# Product Build Options

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Carrier/Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTSMC-MVW1</td>
<td>Embedded LTE Cat M1 serial modem with GNSS</td>
<td>Verizon</td>
</tr>
<tr>
<td>MTSMC-MVW1-U</td>
<td>Embedded LTE Cat M1 USB modem with GNSS</td>
<td>Verizon</td>
</tr>
</tbody>
</table>

**Developer Kits**

Use either of the following developer kits with MTSMC devices.

<table>
<thead>
<tr>
<th>Developer Kit</th>
<th>Description</th>
<th>Carrier/Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTUDK2-ST-Cell</td>
<td>Developer Kit for SocketModem, and Dragonfly cellular devices.</td>
<td>All</td>
</tr>
</tbody>
</table>

**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-MVW1.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-Mxx1
MTSMC-Mxx1-U

MTSMC-MAT1-U
MTSMC-MVV1-U

NOTES: DIMENSIONS IN [mm]

MECHANICAL DRAWINGS
## Chapter 3 – Chapter 3 Specifications

### MTSMC-MVW1 and MTSMC-MVW1-U Specifications

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>LTE UE Category M1, 3GPP release 13 compliant</td>
</tr>
<tr>
<td></td>
<td>3GPP Rel. 12 Power Saving Mode (PSM)</td>
</tr>
<tr>
<td></td>
<td>USB Interface is CDC-ACM compliant</td>
</tr>
<tr>
<td>TCP/IP Functions</td>
<td>SSL, IPv4/IPv6 stack with TCP and UDP protocol</td>
</tr>
<tr>
<td>Frequency Bands</td>
<td>4G: 700 (B13) / AWS 1700 (B4)</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td></td>
</tr>
<tr>
<td>Data Speed</td>
<td>300 Kbps downlink/ 375 Kbps uplink</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td></td>
</tr>
<tr>
<td>USB Interface</td>
<td>USB 2.0 high speed</td>
</tr>
<tr>
<td>Serial Modem Interface</td>
<td>Up to 921.6 Kbps</td>
</tr>
<tr>
<td><strong>Physical Description</strong></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>0.4 oz. (10 g)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Refer to Mechanical Drawing for Dimensions</td>
</tr>
<tr>
<td><strong>Connectors</strong></td>
<td></td>
</tr>
<tr>
<td>Antenna Connector</td>
<td>One surface mount UFL connector for cellular, one for GNSS</td>
</tr>
<tr>
<td>SIM</td>
<td>1.8 V and 3 V SIM holder for mini-SIM card</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40° C to +80° C</td>
</tr>
<tr>
<td>Humidity</td>
<td>20%-90% RH, non-condensing</td>
</tr>
<tr>
<td><strong>Power Requirements</strong></td>
<td></td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>3.1 V to 3.5 V, normal is 3.3 V</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>3.3-5 VDC</td>
</tr>
<tr>
<td><strong>SMS</strong></td>
<td></td>
</tr>
<tr>
<td>SMS</td>
<td>Cell broadcast messaging</td>
</tr>
<tr>
<td></td>
<td>Mobile-Terminated SMS</td>
</tr>
<tr>
<td></td>
<td>Mobile-Originated SMS</td>
</tr>
</tbody>
</table>
### 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:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Pin</th>
<th>Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>J33</td>
<td>-RTS</td>
<td>J37</td>
<td>-DSR</td>
</tr>
<tr>
<td>J34</td>
<td>-RXD</td>
<td>J38</td>
<td>-CTS</td>
</tr>
<tr>
<td>J35</td>
<td>-TXD</td>
<td>J39</td>
<td>-DCD</td>
</tr>
<tr>
<td>J36</td>
<td>-RI</td>
<td>J40</td>
<td>-DTR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.3 Volt Powered</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Low Level</td>
<td>0</td>
<td>0.55</td>
</tr>
<tr>
<td>Input High Level</td>
<td>1.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Output Low Level</td>
<td>0</td>
<td>0.55</td>
</tr>
<tr>
<td>Output High Level</td>
<td>2.35</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>5 Volt Powered</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Low Level</td>
<td>0</td>
<td>0.8</td>
</tr>
</tbody>
</table>
**Parameter** | **Minimum** | **Maximum**
--- | --- | ---
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**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>VIL Min</th>
<th>VIL Max</th>
<th>VIH Min</th>
<th>VIH Max</th>
<th>VOL Min</th>
<th>VOL Max</th>
<th>VOH Min</th>
<th>VOH Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>J24</td>
<td>–RESET</td>
<td>--</td>
<td>0.8</td>
<td>2.0</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>J25</td>
<td>USB VBUS</td>
<td>-0.3</td>
<td>0.8</td>
<td>2.0</td>
<td>8.7</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>J26</td>
<td>GND</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>J27</td>
<td>USB DP</td>
<td>--</td>
<td>0.8</td>
<td>2</td>
<td>--</td>
<td>--</td>
<td>0.3</td>
<td>2.8</td>
<td>--</td>
</tr>
<tr>
<td>J28</td>
<td>USB DN</td>
<td>--</td>
<td>0.8</td>
<td>2</td>
<td>--</td>
<td>--</td>
<td>0.3</td>
<td>2.8</td>
<td>--</td>
</tr>
<tr>
<td>J41</td>
<td>GND</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>J58</td>
<td>-LED LINK</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0</td>
<td>0.45</td>
<td>2.85</td>
<td>3.3</td>
</tr>
<tr>
<td>J61</td>
<td>VCC</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>J63</td>
<td>GND</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Pinout Specifications**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Logic Level Voltage</th>
<th>In/Out</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J24</td>
<td>–RESET</td>
<td>3.3 – 5.0</td>
<td>I</td>
<td>Device reset (active low)</td>
</tr>
<tr>
<td>J25</td>
<td>USB VBUS</td>
<td>3.3 – 5.0</td>
<td>I</td>
<td>USB power supply input</td>
</tr>
<tr>
<td>J26</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>J27</td>
<td>USB DP</td>
<td>3.3</td>
<td>I/O</td>
<td>USB data</td>
</tr>
<tr>
<td>J28</td>
<td>USB DN</td>
<td>3.3</td>
<td>I/O</td>
<td>USB data</td>
</tr>
<tr>
<td>J33</td>
<td>–RTS</td>
<td>5.0</td>
<td>I</td>
<td>Request to send (active low)</td>
</tr>
<tr>
<td>J34</td>
<td>–RXD</td>
<td>5.0</td>
<td>O</td>
<td>Received data (active low)</td>
</tr>
<tr>
<td>J35</td>
<td>–TXD</td>
<td>5.0</td>
<td>I</td>
<td>Transmitted data (active low)</td>
</tr>
<tr>
<td>J36</td>
<td>–RI</td>
<td>5.0</td>
<td>O</td>
<td>Ring indicator (active low)</td>
</tr>
<tr>
<td>J37</td>
<td>–DSR</td>
<td>5.0</td>
<td>O</td>
<td>Data set ready (active low)</td>
</tr>
<tr>
<td>J38</td>
<td>–CTS</td>
<td>5.0</td>
<td>O</td>
<td>Clear to send (active low)</td>
</tr>
</tbody>
</table>
### Pin Specifications

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Logic Level Voltage</th>
<th>In/Out</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J39</td>
<td>–DCD</td>
<td>5.0</td>
<td>O</td>
<td>Data carrier detect (active low)</td>
</tr>
<tr>
<td>J40</td>
<td>–DTR</td>
<td>5.0</td>
<td>I</td>
<td>Data terminal ready (active low)</td>
</tr>
<tr>
<td>J41</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>J58</td>
<td>–LED LINK</td>
<td>3.3</td>
<td>O</td>
<td>Link status (active low, can sink up to 150mA)</td>
</tr>
<tr>
<td>J61</td>
<td>VCC</td>
<td>5.0</td>
<td>PWR</td>
<td>DC input power</td>
</tr>
<tr>
<td>J63</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

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

### Pin Availability by Build

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Serial Only</th>
<th>USB Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>J24</td>
<td>–RESET</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>J25</td>
<td>USB VBUS</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J26</td>
<td>GND</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>J27</td>
<td>USB DP</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J28</td>
<td>USB DN</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J33</td>
<td>–RTS</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J34</td>
<td>–RXD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J35</td>
<td>–TXD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J36</td>
<td>–RI</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J37</td>
<td>–DSR</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J38</td>
<td>–CTS</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J39</td>
<td>–DCD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J40</td>
<td>–DTR</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J41</td>
<td>GND</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>J58</td>
<td>–LED LINK</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J61</td>
<td>VCC</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>J63</td>
<td>GND</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
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 an LTE connection.
- **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-MVW1 Power Draw

<table>
<thead>
<tr>
<th>Radio Protocol</th>
<th>Sleep Mode Current (if applicable), with Live SIM installed</th>
<th>Power Save Mode (PSM)</th>
<th>Live Connection with SIM Installed, No Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.3 Volts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTE</td>
<td>7 mA</td>
<td>3 mA</td>
<td>15 mA</td>
</tr>
<tr>
<td><strong>5 Volts</strong></td>
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<tr>
<td>LTE</td>
<td>6 mA</td>
<td>3 mA</td>
<td>14 mA</td>
</tr>
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<table>
<thead>
<tr>
<th>Radio Protocol</th>
<th>Average Measured Current (Amps) at Maximum Power</th>
<th>TX Pulse (Avg) Amplitude Current (Amps) for GSM850 or Peak Current for HSDPA/LTE</th>
<th>Total Inrush Charge Measured in Millicoulombs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.3 Volts</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>LTE</td>
<td>155 mA</td>
<td>380 mA</td>
<td>1.43 mC</td>
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<tr>
<td><strong>5 Volts</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>LTE</td>
<td>154 mA</td>
<td>360 mA</td>
<td>1.48 mC</td>
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MTSMC-MVW1-U Power Draw

<table>
<thead>
<tr>
<th>Radio Protocol</th>
<th>Sleep Mode Current (if applicable)</th>
<th>Cellular Connection Idle No Data</th>
<th>Average Measured Current (Amps) at Maximum Power</th>
<th>TX Pulse (Avg) Amplitude Current (Amps) Peak Current for LTE</th>
<th>Total Inrush Charge Measured in Millicoulombs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.3 Volts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTE</td>
<td>3 mA</td>
<td>34 mA</td>
<td>192 mA</td>
<td>420 mA</td>
<td>1.48 mC</td>
</tr>
<tr>
<td><strong>5 Volts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTE</td>
<td>3 mA</td>
<td>33 mA</td>
<td>132 mA</td>
<td>212 mA</td>
<td>1.46 mC</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Part</th>
<th>Part Number</th>
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<tbody>
<tr>
<td>PEM (Penn Engineering &amp; Manufacturing)</td>
<td>Surface Mount Standoff</td>
<td>SMTSO-M3-4ET</td>
</tr>
<tr>
<td>RAF Electronic Hardware</td>
<td>3/16” Hex Female Standoff</td>
<td>2051T-440-S-12-Zinc</td>
</tr>
<tr>
<td>RAF Electronic Hardware</td>
<td>4.5mm Hex Female Standoff</td>
<td>1251-3005-S-12-Zinc</td>
</tr>
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Chapter 4 – Carrier Specific Notice

Firmware Over the Air (FOTA) Script

Verizon Requirement: Firmware Over The Air (FOTA) - Scripting

At times, your device may require a critical update to radio firmware for devices connecting to the network. To stay compliant to Verizon’s LTE requirements you must implement FOTA. Failure to perform a critical update could result in losing access to the Verizon network.

MultiTech has developed a script for customers to use in order to initiate a FOTA update from the (the customer’s) local host processor (pull FOTA).

In an upcoming release, MultiTech LTE Category M1, devices for Verizon, will allow the customer to initiate a FOTA update from a remote server (push FOTA) as required and communicated by Verizon.

If your device does not include local processing capabilities, you will be required to upgrade when that release becomes available.

Below is an example of a FOTA process for the ME910C1-NV cellular module you could implement in your host system. You may implement the process below or implement your own FOTA solution.

In the example below, your host system application periodically accesses a file placed on an FTP server of your choosing and reads file contents to determine if a firmware update is required.

Cellular Module FOTA Script Example Process

1. Set up an FTP server to contain a folder for future module firmware files.
2. Assign a unique username/password to access the FTP server.
3. Create and place a file on your FTP server named firmwarecheck.csv to be downloaded and read by ME910C1-NV FTP client host application. Include the following types of information in the file. You can include additional information as needed.
   a. The firmware version and build your ME910C1-NV device should currently be using.
   b. Path on current FTP server where firmware update file resides.
   c. The date/time interval at which the host application should next perform a FOTA check in.
   d. FTP server IP address which the host application should access during next FOTA check in.
   e. Credentials for the FTP server where host application should next perform a FOTA check in.
4. Before deploying devices with an ME910C1-NV, create code in the host system code to perform the following sequence at a defined interval (nightly, weekly, daily, monthly).
   a. Issue following command to Telit ME910C1-NV to configure socket connection settings:
      AT#SCFG=1,3,300,90,600,50
   b. If data APN has not previously been programmed, issue the following command:
      AT+CGDCONT=3,"IPV4V6","CorrectAPNForAccount"
      If the data APN has been previously programmed, go to Step 4.c.
   c. Issue the following command to check for signal presence:
      AT+CSQ
   d. Issue the following command to check for registration presence:
e. If signal and registration are present, issue the following command to establish data connection:
   AT+SGACT=3,1
   If signal and registration are not present, check antenna for proper connection and SIM for correct orientation.
   
f. Issue following command to create FTP session:
   AT#FTPOPEN="204.26.122.49","username","password",1,3

   g. Have the host application issue the following command to download the firmwarecheck.csv file, read its contents, and take actions based on those contents:
   AT#FTPGET="firmwarecheck.csv"

   h. Have host system issue the following command to Telit ME910C1-NV to determine current firmware file version and firmware build:
   AT+GMR
   AT#CFVR

   i. If version/build indicated in responses are the same as indicated in firmwarecheck.csv: Go to Step 4.s.

   j. If current firmware version is older than version indicated in firmwarecheck.csv: Continue to next step.

   k. Issue the following command to Telit ME910C1-NV to download the file indicated in the firmwarecheck.csv file and wait for OK response (which indicates the file has been downloaded):
   AT#FTPGETOTA="Name-Of-Firmware-File-Here.bin",0

   l. After file is downloaded issue following command to Telit ME910C1-NV to close FTP session:
   AT#FTPCLOSE

   m. After closing FTP, issue following command to Telit ME910C1-NV to disconnect data session:
   AT#SGACT=3,0

   n. After closing data session, issue following command to Telit ME910C1-NV to apply downloaded file:
   AT#OTAUP=0

   o. Before continuing, wait for ME910C1-NV to reset a total of three times and/or wait a fixed period of time to ensure module has enough time to apply downloaded firmware. The time needed varies depending on the size of your firmware file.

   p. Issue the following command to Telit ME910C1-NV to determine current firmware version.
   AT+GMR

   q. If version matches value indicated in firmwarecheck.csv: Go to Step 4.t.
   If version does not match value indicated in firmwarecheck.csv issue, appropriate commands listed earlier as needed in order to attempt to download and process the firmware file again.

   r. Issue following command to Telit ME910C1-NV to close FTP session:
   AT#FTPCLOSE

   s. Issue following command to Telit ME910C1-NV to close data session:
   AT#SGACT=3,0

   t. End Process

Note:

- Before deploying the device, thoroughly test your chosen FOTA implementation for functionality.
Before performing any module firmware update to devices in the field, first thoroughly test the new module firmware to ensure compatibility with your existing application.

In the above example you might consider placing on the FTP server one file for every IMEI you deploy. Then have host application read module IMEI to determine which IMEI file on the FTP server to read. This would allow you to control which specific IMEIs you want to update by changing the contents of the file on server for the device IMEI.

FOTA Client Example Session Log

Example of updated from firmware version 30.00.001-B026 to version 30.00.001-B026_FOTA

[ Tue Jan 09 13:18:18.344 2018 ] AT+GMM
[ Tue Jan 09 13:18:19.046 2018 ] 30.00.001-B026
[ Tue Jan 09 13:18:19.046 2018 ]
[ Tue Jan 09 13:18:19.560 2018 ] AT#SCFG=1,3,300,90,600,50
[ Tue Jan 09 13:18:21.120 2018 ] OK
[ Tue Jan 09 13:18:22.384 2018 ] +CEREG: 0,1
[ Tue Jan 09 13:18:22.899 2018 ] AT#SGACT=3,1
[ Tue Jan 09 13:18:23.101 2018 ] #SGACT: 100.82.36.41,38.0.16.20.176.102.243.25.0.0.0.2.116.124.129.1
[ Tue Jan 09 13:18:23.616 2018 ] AT#FTPOPEN="204.26.122.49","USERNAME","PASSWORD",1,3
[ Tue Jan 09 13:18:25.457 2018 ] AT#FTPGET="firmwarecheck.csv"
[ Tue Jan 09 13:18:27.742 2018 ] AT#CFVR
[ Tue Jan 09 13:18:27.750 2018 ] #CFVR: 1
[ Tue Jan 09 13:18:27.750 2018 ] OK
[ Tue Jan 09 13:18:27.750 2018 ] OK
[Tue Jan 09 13:18:32.430 2018] AT#FTPGETOTA="30.00.001-B026_to_B026-FOTA.bin",0
[Tue Jan 09 13:18:37.001 2018] OK
[Tue Jan 09 13:18:37.516 2018] AT#FTPCLOSE
[Tue Jan 09 13:18:37.843 2018] OK
[Tue Jan 09 13:18:38.358 2018] AT#SGACT=3,0
[Tue Jan 09 13:18:38.545 2018] OK
[Tue Jan 09 13:18:39.060 2018] AT#OTAUP=0
[Tue Jan 09 13:21:27.456 2018] 30.00.001-B026_FOTA
[Tue Jan 09 13:21:27.456 2018]
Chapter 5 – 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.

LTE Antenna Information

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

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

MultiTech ordering information:

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<tr>
<th>Model</th>
<th>Quantity</th>
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<tbody>
<tr>
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<td>2</td>
</tr>
<tr>
<td>ANLTE3-10HRA</td>
<td>10</td>
</tr>
<tr>
<td>ANLTE3-50HRA</td>
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</tbody>
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Antenna Specifications

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<tr>
<th>Category</th>
<th>Description</th>
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</thead>
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<tr>
<td>Frequency Range</td>
<td>690-960 MHz</td>
</tr>
<tr>
<td></td>
<td>1710-2700 MHz</td>
</tr>
<tr>
<td>Power Rating</td>
<td>10 W</td>
</tr>
<tr>
<td>VSWR</td>
<td>&lt; 2.0:1</td>
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</table>
### Category Description

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain</td>
<td>1 dBi</td>
</tr>
<tr>
<td>Radiating Element</td>
<td>1/2 wave element</td>
</tr>
<tr>
<td>Polarization</td>
<td>Linear</td>
</tr>
</tbody>
</table>

## 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:


### 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 6 – Chapter 5 Safety Information

Handling Precautions

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

Radio Frequency (RF) Safety

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

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

Sécurité relative aux appareils à radiofréquence (RF)

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

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

**User Responsibility**

Respect all local regulations for operating your wireless device. Use the security features to block unauthorized use and theft.
47 CFR Part 15 Regulation Class B Devices

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

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

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

<table>
<thead>
<tr>
<th>FCC Identifier:</th>
<th>RI7ME910C1NV</th>
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<tbody>
<tr>
<td>Equipment Class:</td>
<td>Licensed Non-Broadcast Station Transmitter</td>
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<tr>
<td>Notes:</td>
<td>ME910C1-NV LTE Module CAT M</td>
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<tr>
<td>Approval:</td>
<td>Single Modular</td>
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</table>

<table>
<thead>
<tr>
<th>FCC Rule Part</th>
<th>Frequency Range (MHz)</th>
<th>Output Watts</th>
<th>Frequency Tolerance</th>
<th>Emission Designator</th>
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<td>27</td>
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<td>0.19999</td>
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<td>1M19G7D</td>
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<tr>
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<td>1710 - 1755</td>
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<td>1.0 PM</td>
<td>1M10W7D</td>
</tr>
</tbody>
</table>
Chapter 8 – 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

After careful review of the legislation and specifically the definition of an “article” as defined in EC Regulation 1907/2006, Title II, Chapter 1, Article 7.1(a)(b), it is our current view that Multi-Tech Systems, Inc. products would be considered as “articles.” In light of the definition in § 7.1(b) which requires registration of an article only if it contains a regulated substance that “is intended to be released under normal or reasonably foreseeable conditions of use,” our analysis is that Multi-Tech Systems, Inc. products constitute nonregisterable articles for their intended and anticipated use.

Substances of Very High Concern (SVHC)

Per the candidate list of Substances of Very High Concern (SVHC) published October 28, 2008 we have reviewed these substances and certify the Multi-Tech Systems, Inc. products are compliant per the EU “REACH” requirements of less than 0.1% (w/w) for each substance. If new SVHC candidates are published by the European Chemicals Agency, and relevant substances have been confirmed to be greater than 0.1% (w/w), Multi-Tech Systems, Inc. will provide updated compliance status.
Multi-Tech Systems, Inc. also declares it has been duly diligent in ensuring that the products supplied are compliant through a formalized process which includes collection and validation of materials declarations and selective materials analysis where appropriate. This data is controlled as part of a formal quality system and will be made available upon request.

**Restriction of the Use of Hazardous Substances (RoHS)**

Multi-Tech Systems, Inc.

Certificate of Compliance

2011/65/EU

Multi-Tech Systems, Inc. confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2011/65/EU of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS).

These MultiTech products do not contain the following banned chemicals:\(^1\):

- Lead, \([\text{Pb}] < 1000 \text{ PPM}\)
- Mercury, \([\text{Hg}] < 1000 \text{ PPM}\)
- Hexavalent Chromium, \([\text{Cr+6}] < 1000 \text{ PPM}\)
- Cadmium, \([\text{Cd}] < 100 \text{ PPM}\)
- Polybrominated Biphenyl, \([\text{PBB}] < 1000 \text{ PPM}\)
- Polybrominated Diphenyl Ether, \([\text{PBDE}] < 1000 \text{ PPM}\)

Environmental considerations:

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

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

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

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**MTSMC-MVVW Package Label**

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**MTSMC-MVVW-U Package Label**
MTSMC-MVW1 Device Label

1. Model: MTSMC-MVW1
2. FCC ID: RI7ME910C1NV
3. SKU: #92504821LF
4. Serial#: xxxxxxxx

MTSMC-MVW1-U Device Label

1. Model: MTSMC-MVW1-U
2. FCC ID: RI7ME910C1NV
3. SKU: #92504823LF
4. Serial#: xxxxxxxx

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Chapter 10 – Using Connection Manager

Use Connection Manager to install device drivers, activate your device on your carrier’s network, and connect your device to your carrier’s network.

Connection Manager can install drivers and connect your device regardless of your CDMA network, however, activation is only supported with Verizon, Aeris, Sprint, and some CDMA Regional Carriers. If you cannot activate your device with Connection Manager, refer to Account Activation for Cellular Devices.

Connection Manager supports the following Windows versions:

- Windows 7 and 8 and Windows 10, both 32-bit and 64-bit versions

Installing Connection Manager and Connecting a Device

Follow these steps in order. Attempting to plug in the device before the appropriate drivers are installed can cause the connection to fail.

2. Click Connection Manager.
3. Open or unzip the Connection Manager file and run the installer (.msi file).
4. If installing a USB device, follow the prompts to install the Telit drivers. Make sure that the Telit drivers are fully installed before plugging in the device.
5. If installing a serial device, refer to Setting Up a Serial Device.
6. Once the drivers are installed, plug in the device and click Next in the Connection Manager installation window.
7. Open Connection Manager.
8. In the Settings tab, select USB Modem or Serial Modem for your device.
9. If you are connecting a serial device, confirm that the serial settings match those listed for the device under Device Manager > Comm Ports.
10. If desired, set the application to load during Windows startup and automatically connect to the internet:
   a. Click Settings and check the boxes for Run application at Windows startup and Connect to the Internet automatically.
   b. Click Apply.
11. If desired, set Connection Manager to re-connect when a connection is lost:
   a. Click Connection and check Enable keep-alive.
   b. Enter an address to ping in the Host to ping box (for example, 8.8.8.8 which is www.google.com).
      Note: If the keep-alive fails, Connection Manager automatically reconnects. When you start the computer, Connection Manager launches and establishes a connection.
12. In the Connection tab, enter the Dial number and APN if different from the default. The dial number and APN is provided by the carrier for the SIM card.
13. Click Apply to save settings.
14. Click Main, then click Connect to start your connection.
       Note: The dial number and APN settings cannot be modified after the device is connected.
15. Browse to a website to confirm the device has Internet access.

**Setting Up a Serial Device**

1. Connect the serial device to the PC.
2. Navigate to **Control Panel > Device Manager**. Make note of the COM port number for the connected device (in COM Ports).
   Example: COM port is **COM31**.
3. In the **Action** drop-down menu, select **Add legacy hardware** to add a new device.
4. Navigate through **Add Hardware Wizard**.
   a. Click **Next** on the Welcome page.
   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 **Have Disk**, then click **Next**.
f. Click **Browse** and select the installation folder.
   **Example:** `C:\Program Files (x86)\Multi-Tech Systems\Multi-Tech Connection Manager`.

   g. The list of available TELIT models appears. Select the model number for your device, then click **Next**.
h. Select the COM port that you noted from COM ports, then click **Next**.

i. Click **Finish** to exit the Wizard.

j. Navigate to **Device Manager > Modems** and confirm that the device is added.

### Troubleshooting

**Serial COM port is not available in the Serial Modem Settings**

This can happen if the modem was installed while Connection Manager was running.

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.
Index

A
activation .................................................................30
antenna
  cellular devices ..................................................19
  LTE .....................................................................19
AT#SHDN .................................................................10

B
build options ................................................................6

C
certification
  FCC .....................................................................25
  Class B ..................................................................24
connection manager ..................................................30 33

d
device
  maintenance ..........................................................22
  documentation ........................................................5

e
electrical characteristics, pins ....................................11

F
FCC
  grant notes ..........................................................20
  FCC certification ....................................................25
  FCC Notice
    Class B .............................................................24

H
hazardous substances ................................................27
host labeling .............................................................20

I
interférence des radiofréquences ..................................21

K
KDB 447498 Section 8 ...............................................20

L
labeling
  host ....................................................................20
  labels ...................................................................28
  LTE
    antenna ..............................................................19

M
maintenance ................................................................22
mechanical drawings ..................................................7 8
model location ..........................................................28
mounting hardware .....................................................14

O
overview ...................................................................30

P
power down ............................................................10
power draw ............................................................13
  MTSMC-LVW3-U ..................................................14
  MTSMC-MVW1 .....................................................13

R
radio frequency interference ........................................21
RoHS .......................................................................27

S
safety
  RF interference .....................................................21
  vehicle ..................................................................22
shutdown ...................................................................10
specifications .............................................................9
static .......................................................................21
sécurité
  interférences RF ..................................................21
INDEX

T
troubleshooting .......................................................... 33

U
user responsibility ..................................................... 23

V
vehicle safety ............................................................. 22