



VM2500 - WiMAX Vehicular Subscriber Module (VSM) Installation Guide



WiMAX VSM
Installation Guide

6802987C01

Revision A

January 2010

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Patents

This product is covered by one or more of the patents listed on the website:
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Warranty

For the complete Motorola hardware product warranty statement, go to:
<http://www.motorola.com/enterprisemobility/warranty>.

Revision History

Changes to the original manual are listed below:

Change	Date	Description
A		Initial release

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About This Guide



Introduction

The *WiMAX VSM Installation Guide* provides general instructions for installing, setting up, operating, maintaining, and troubleshooting the WiMAX VSM.

Configurations

This guide includes the following configurations:

- F7400A model WiMAX VSM with WiFi
- F7300A model WiMAX VSM without WiFi

Chapter Descriptions

Topics covered in this guide are as follows:

- *Chapter 1, WiMAX VSM Description* provides the product overview.
- *Chapter 2, Installation* provides unpacking instructions and all required procedures for installing the WiMAX VSM.
- *Chapter 3, Configuring and Monitoring the VSM* provides the procedures that enable configuring the WiMAX VSM for best operation.
- *Chapter 4, Troubleshooting* provides details regarding possible malfunctions that may occur after first time installation of the WiMAX VSM, their probable cause and the recommended corrective action.

Notational Conventions

The following conventions are used in this document:

- *Italics* are used to highlight the following:
 - Chapters and sections in this and related documents
 - Dialog box, window and screen names
 - Drop-down list and list box names
 - Check box and radio button names
- **Bold** text is used to highlight the following:
 - Key names on a keypad
 - Button names on a screen.
- bullets (•) indicate:
 - Action items
 - Lists of alternatives
 - Lists of required steps that are not necessarily sequential
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

Related Documents

- *WiMAX VSM Basic Service Manual*, p/n 6802987C02.
- *WiMAX VSM Detailed Service Manual*, p/n 6802987C03.

Service Information

If you have a problem with your equipment, contact Motorola Enterprise Mobility support for your region. Contact information is available at: <http://www.motorola.com/enterprisemobility/contactsupport>.

When contacting Enterprise Mobility support, please have the following information available:

- Serial number of the unit
- Model number or product name
- Software type and version number

Motorola responds to calls by e-mail, telephone or fax within the time limits set forth in service agreements.

If your problem cannot be solved by Motorola Enterprise Mobility Support, you may need to return your equipment for servicing and will be given specific directions. Motorola is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

If you purchased your Enterprise Mobility business product from a Motorola business partner, please contact that business partner for support.

Safety

Before installing/using this product, the installer/operator must be familiar with the RF energy awareness information and operating instructions in the “Product Safety and RF Energy Exposure Booklet” enclosed with the WiMAX VSM (Motorola Publication part number 68P81095C99) to ensure compliance with Radio Frequency (RF) energy exposure limits.

FCC Interference

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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Chapter 1 WiMAX VSM Description

The WiMAX VSM Unit

The Motorola WiMAX Vehicular Subscriber Module (VSM) is a high/medium power infrastructure modem. Two models are available:

- F7300A without WiFi, 1.12W (29.5 ± 1 dBm) for US and Canada, and 0.5W (26 ± 1 dBm) for EU
- F7400A with WiFi, 1.12W (29.5 ± 1 dBm) for US and Canada, and 0.5W (26 ± 1 dBm) for EU (WiMAX), and 160mW (21 ± 1 dBm) for US and Canada, and 56mW (16.5 ± 1 dBm) for EU (WiFi).

See [Figure 1-1](#).



1	Modem
2	LED Indicator Panel (Front Panel)
3	Connectors Panel (Back Panel - not shown)

Figure 1-1 WiMAX VSM - General View

For detailed specifications of the VSM unit, see Appendix A: Specifications.

Modem

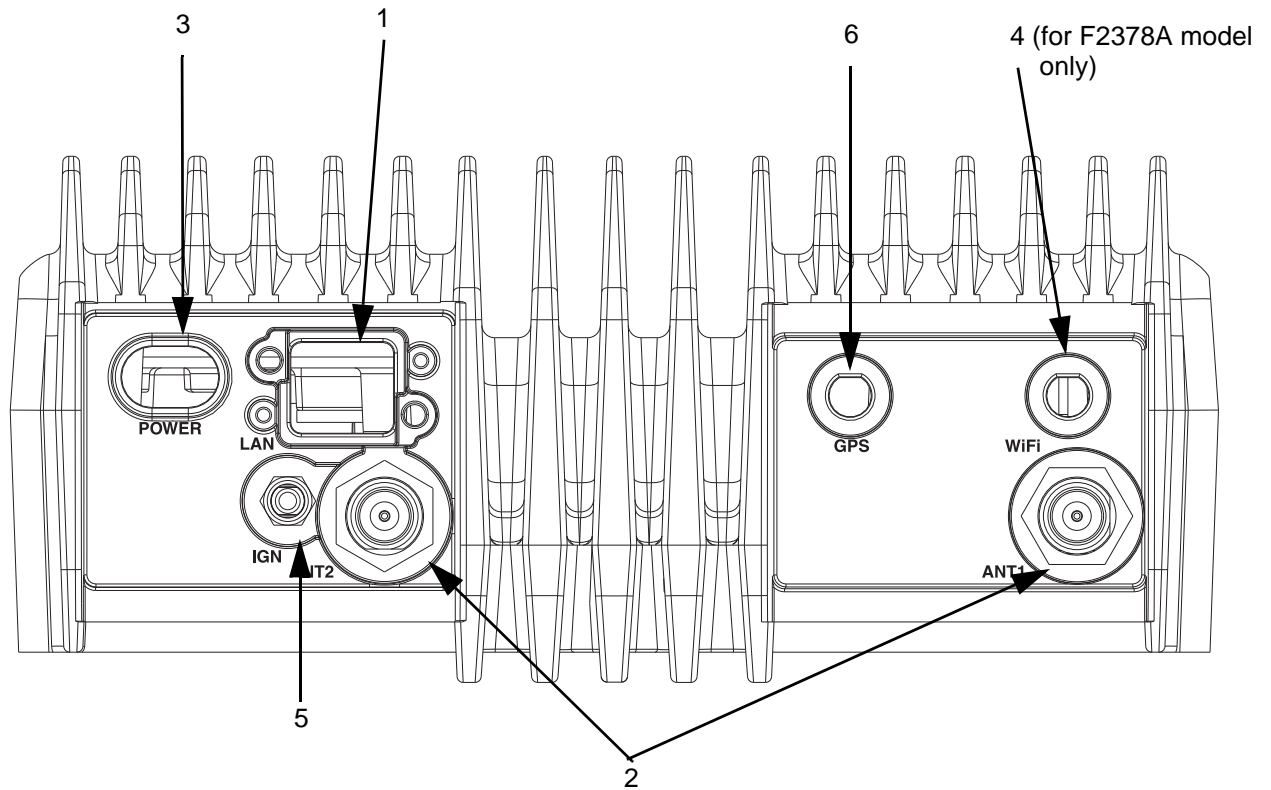
The modem has a Connectors panel (back panel) and a LED Indicator panel with On/Off button (front panel).

Connectors Panel

The WiMAX VSM Connectors panel consist of the following (see [Figure 1-2](#)):

- 1 LAN/Ethernet communication cable connector (RJ45)
- 2 RF cable TNC type connectors (WiMAX)
- DC power cable connector
- 1 RF cable reverse SMA type connector (WiFi) (for F2387A model only)
- Ignition cable connector

- 1 RF cable SMA type connector (GPS)



1	LAN/Ethernet communication connector (RJ45)
2	2 RF TNC type connectors (WiMAX)
3	DC power connector
4	RF reverse SMA type connector (WiFi)
5	Ignition connector
6	RF SMA type connector (GPS)

Figure 1-2 Connectors Panel

LED Indicator Panel with On/Off Button

A set of five LEDs is used for diagnostics and testing of the unit (see [Figure 1-3](#)).



1	WiFi
2	WiMAX
3	GPS
4	LAN
5	PWR
6	On/Off

Figure 1-3 LED Indicators Panel

LED Indicators Functions

Table 1-1 describes the functions of the LED indicators on the VSM front panel.

Table 1-1 LED Indicators Functions

LED Name	WiFi	WiMAX	GPS	LAN	PWR
LED Status					
Solid Green	WiFi is Available	Connected	GPS Data Available	Link Established	Power On
Blinking Green	Rx/Tx Activity	Connecting/ Registering	-	-	-
Solid Orange	-	-	GPS Data is not available (searching for signal)	-	No ignition On/Off switch is pressed but ignition is Off
Blinking Orange	-	Scanning	-	Ethernet activity	-
Solid Red	-	Failure/ Overheat	Failure	-	Standby External power is connected to the system
Turned Off	WiFi if off	WiMAX is off	Location feature is off	No link	No DC power

Control

The On/Off button is used to turn the VSM On or Off.

Chapter 2 Installation

Unpacking and Inspecting the Shipment

Unpack your shipment and check the contents to ensure that you have received all the specified items.

Thoroughly inspect the equipment for shipping damage as soon as possible after delivery. Report any damage you find to your Motorola Customer Service representative immediately.

Safety and General Information

A properly installed VSM unit minimizes service calls. When mounting the VSM unit components, consider the following factors:

- The mounting surface must have sufficient strength to support the equipment being mounted and to prevent it from becoming loose over time.
- Do not attach components to any part of the vehicle subjected to excessive vibration.
- Do not mount the VSM unit on a flat surface where the unit could become partially submersed in water.
- The proposed location of the equipment being mounted or wires/cables attached must not interfere with driver/passenger seating or leg space.
- Select a location such that heat from the unit does not damage any wiring or any other plastic or heat-sensitive parts of the automobile.
- Use the supplied mounting hardware.
- Leave sufficient space around the VSM unit for air flow and installation.
- Select a location that permits routing the cables as directly as possible.
- Ensure that the cables are not stretched, and not subject to heat from the engine, transmission housing or heating ducts.
- Crimp connectors securely.
- Do not run cables over sharp edges that may cause excessive wear or chaffing of the cable insulation.
- Do not install components in locations where they may cause interference to the operation of the vehicle's controls.

- Only qualified personnel may install communication equipment.
- Ensure secure tightening of cable connectors.

NOTE Install this product in a vehicle in accordance with the vehicle manufacturer's guidelines and the instructions detailed in this manual. Use only the Motorola parts specified in this manual.

Check the required mounting locations. It might be necessary to penetrate the bulkhead to reach the battery. Before drilling commences, ensure cable clearance on the opposite side of the bulkhead and do not install the vehicle's Electronic Control Modules (ECM's) on the opposite side of the bulkhead. Protect the cable where it passes through the bulkhead by using a grommet or similar protective measures.



CAUTION Installing the VSM at the end of the vehicle above the exhaust pipe may cause the VSM to overheat.



WARNING! VEHICLES EQUIPPED WITH AIR BAGS

An air bag inflates with great force. **DO NOT** place objects, including communications equipment, in the area over the air bag or in the air bag deployment area. If the communication equipment is improperly installed and the air bag inflates, this could cause serious injury.

If necessary, contact the vehicle manufacturer for air bag information specific to the vehicle.



WARNING! Verify that none of the vehicle's systems are affected by use of the unit, e.g. cruise control, ABS breaking, traction control, engine management, direction indicators, lights, etc.



WARNING! Use existing openings through the bulkhead to avoid drilling. If drilling is a must, verify not to damage the Vehicle Electronic Control Modules (ECM's), fuel pipes, brake pipes, and/or cable looms.



WARNING! For vehicles equipped with electronic braking systems, see "ANTI-SKID BRAKING PRECAUTIONS", Motorola publication 68P81109E34.

It is mandatory that modems installed in vehicles fuelled by liquefied petroleum gas conform to the National Fire Protection Association standard NFPA 58, which applies to vehicles with a liquid propane (LP) gas container in the trunk or other sealed off space within the interior of the vehicle. The NFPA 58 requires the following:

- (1) The space in which the LP gas container and its fittings are located must be isolated by a seal from the space containing modem equipment.
- (2) Removable (outside) filling connections shall be used.
- (3) The container space shall be vented to the outside.

Planning the Installation

Planning is the key to fast, easy and safe installation.



IMPORTANT Take the following points into consideration when selecting a location and planning the installation.

Installation Constraints

Refer to the Safety Instructions in “Product Safety and RF Energy Exposure Booklet for Mobile Two-Way Radios in Vehicles or as Fixed Site Control” P/N 6881095C99.

The WiMAX VSM must be installed in the car’s trunk, on the floor or the side walls (cooling fins facing up, or to the side).



IMPORTANT The VSM **must not** be installed with the cooling fins facing down. Failure to comply may cause overheat problems and performance degradation.

Figure 2-1 shows a typical WiMAX VSM installation in a car.

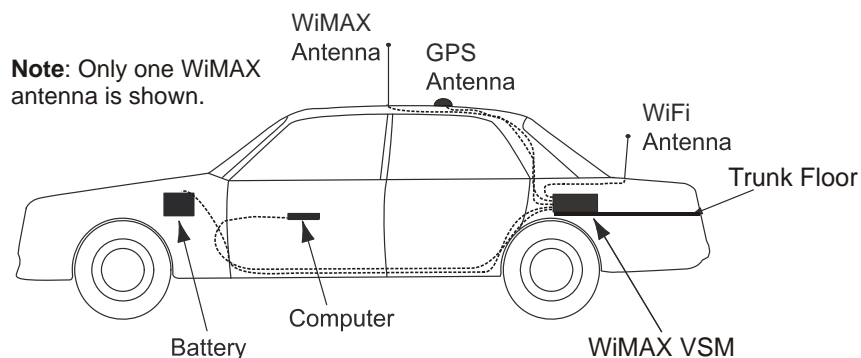


Figure 2-1 WiMAX VSM - Typical Car Installation

Before beginning the installation process make sure that the space available at the installation site is adequate for the modem and its accessories. Each installation configuration requires a different area for mounting the modem without obstruction.

When choosing a location, ensure easy installation and replacement of the unit.

Figure 2-2 gives the WiMAX VSM dimensions.



Figure 2-2 WiMAX VSM - Dimensions

Cables Routing

- Before running a wire or drilling a hole, inspect the vehicle and determine how and where you intend to mount the antenna, modem, and the input/output device.
- Plan wire and cable routing to provide maximum protection from overheating, battery acid, moving parts and sharp edges.
- Keep cables away from ignition circuits to reduce noise pickup in the radio equipment.
- Verify that the cables are of sufficient length. Do not connect two short lengths with a connector; doing so results in signal loss. Refrain from loose excess in the cables, but leave enough slack to allow reconnection if necessary.
- Do not run cables externally or underneath floor mats.
- Do not locate cables where the driver or passengers can kick them or where they can interfere with operation of the driver's foot pedals.
- When routing the cable, refrain from creating sharp bends or kinks.

Drilling Holes

- Where possible, use existing holes in the bulkhead, the trunk wall and the channels above or beneath the doors. Run cables parallel to existing car cables if appropriate.
- If you must drill holes, verify not to damage other wiring, break lines or gas lines.

- When drilling a hole in the roof, take care not to snag the roof liner.
- To prevent rusting after drilling, remove all metal burrs and residue, and completely clean the area to ensure the removal of all steel dust.
- Insert rubber grommets in all drilled holes to protect cables.

Tools and Equipment

- #2 Phillips screwdriver
- Electrical drill and drill bit set
- X-acto knife or equivalent
- Wire stripper
- Long nose pliers
- Small side cutters
- Crimping tool
- Wrench set, including 8 mm for tray to unit attachment
- 3 mm Allen wrench set for unit to tray attachment
- Soldering iron and solder
- Electrical tape

Antennas

WiMAX Antennas

Use the following WiMAX antennas (2 identical antennas) with the VSM:

- Kit No. FHN7278A

The antennas are supplied with a 12 feet coaxial cable and a TNC male connector, not mounted (see [Figure 2-3](#)).



Figure 2-3 *WiMAX Antenna*

WiFi Antenna

Use one of the following WiFi antennas with the VSM:

- Kit No. FHN7279A
- Kit No. FAF5261A

The antenna is supplied with a 12 feet coaxial cable and a reversed SMA male connector (see [Figure 2-4](#)).



FHN7279A



FAF5261A

Figure 2-4 *WiFi Antennas*

GPS Antenna

Use the following GPS antenna with the VSM:

- Amphenol P/N SA1904-04-000-R (Kit No. FHN7280A)

The antenna is supplied with a 13 feet RG174 cable and a SMA male connector (see [Figure 2-5](#)).



Figure 2-5 GPS Antenna

Cables

The following cables are supplied with the WiMAX VSM (see [Figure 2-6](#)).

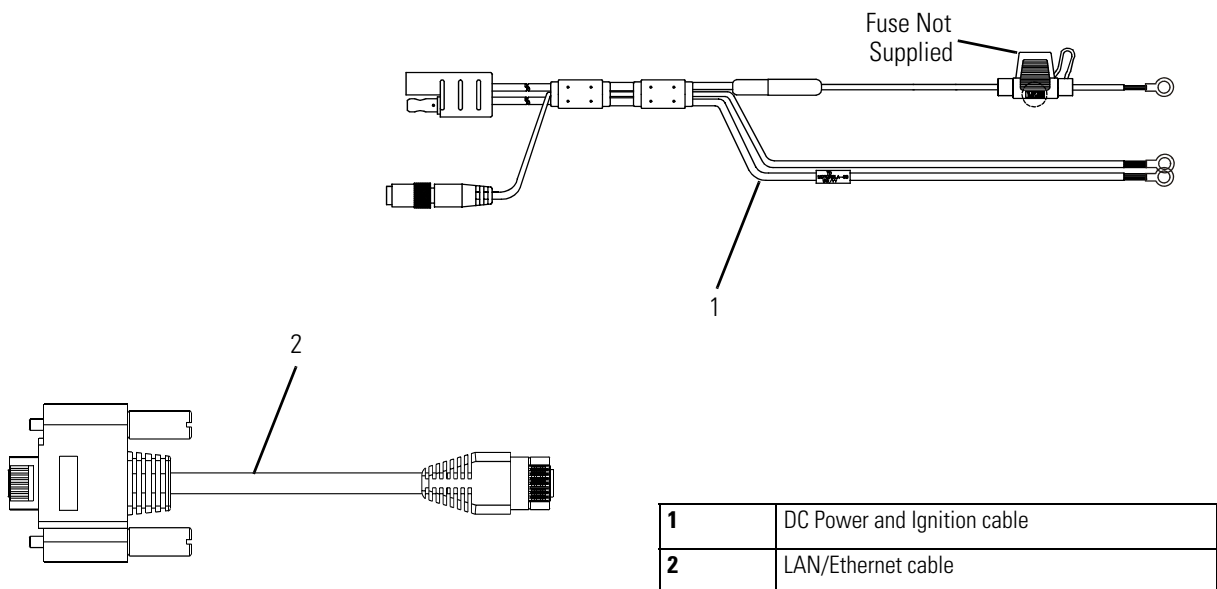


Figure 2-6 Cables

Mounting Tray

Use the tray for mounting the VSM securely on a flat surface.

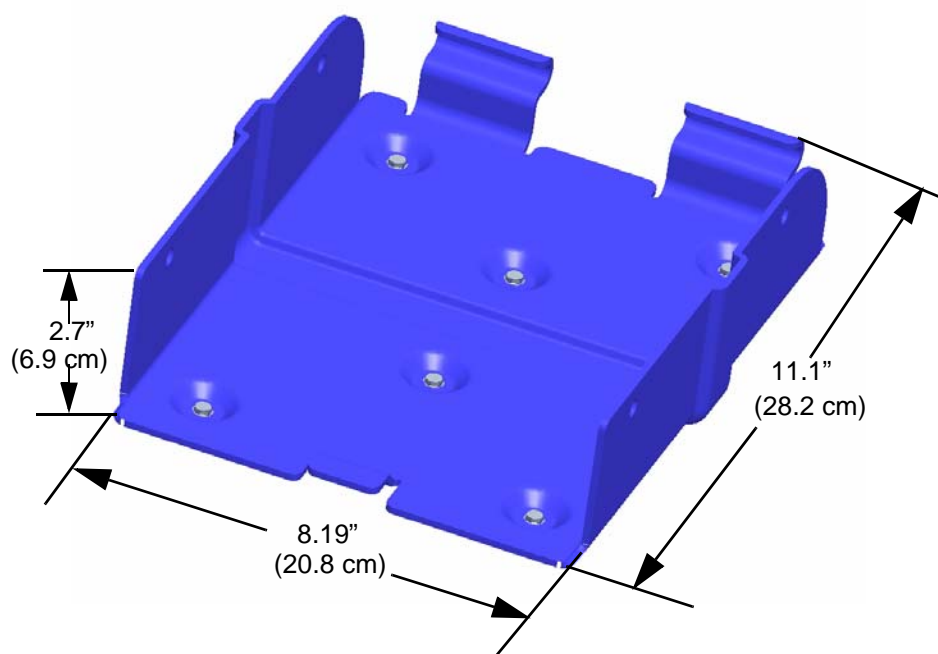


Figure 2-7 Tray Dimensions

Modem Installation Process

Process 2-1 describes the steps for the modem installation.

Process 2-1 Modem Installation Process

1	Ensure adequate space for the installation. (See Planning the Installation on page 2-3)
2	Install the antennas. (See Antennas Mounting on page 2-10).
3	Route the cables. (See Planning the Installation on page 2-3 and Cables Routing and Connection Procedure on page 2-12)
4	Install the tray and the unit. (See Modem Installation Procedure on page 2-11 .)
5	Connect the DC Power and Ignition cable. (See DC Power and Ignition Cable Installation on page 2-12)
6	Connect the two WiMAX cables. (See WiMAX Antenna Cable Installation on page 2-13)
7	Connect the WiFi cable. (See WiFi Antenna Cable Installation on page 2-13)

Process 2-1 *Modem Installation Process (Continued)*

8	Connect the GPS cable (see GPS Antenna Cable Installation on page 2-13)
9	Connect the LAN/Ethernet cable. (See LAN/Ethernet Cable Installation on page 2-14)
10	Place caps on unused connector(s). (See Cap Installation on page 2-14)

Antennas Mounting

Process 2-2 gives general instructions for mounting all types of antennas.

Process 2-2 *How to Mount the Antennas*

1	Mount the antennas in accordance with the instructions provided with the each antenna kit and with the Product Safety and RF Energy Exposure Booklet for Mobile Two-Way Radios Installed in Vehicles or as Fixed Site Control Stations (6881095C99) enclosed with the product.
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Special Antennas Installation Considerations

General Antenna Installation Safety Considerations



WARNING! The WiMAX and WiFi antennas must be installed in a location that will ensure a distance of at least 8" (20cm) between them and any bystander.

WiMAX Antennas

NOTE The WiMAX antennas must be installed on the vehicle's roof. For best performance, the minimum distance between the two WiMAX antennas should be 39.4" (1m).

WiFi Antenna



CAUTION The WiFi Antenna must be installed on the vehicle's trunk hood to ensure at least 40 dB isolation between this antenna and the WiMAX antennas. Failure to comply may result system performance degradation.

GPS Antenna

NOTE The GPS antenna must be installed on the vehicle's roof. For best GPS performance, the minimum distance between this antenna and other antennas should be at least 11.8" (30 cm).

Modem Installation Procedure

Process 2-3 describes how to install the modem on a flat surface.

Process 2-3 How to Install the Modem on a Flat Surface

- 1 Position the tray in the desired location. Mark the positions of the six bottom mounting holes (1) using the tray as a template. Be careful not to affect the tray. See [Figure 2-8](#).

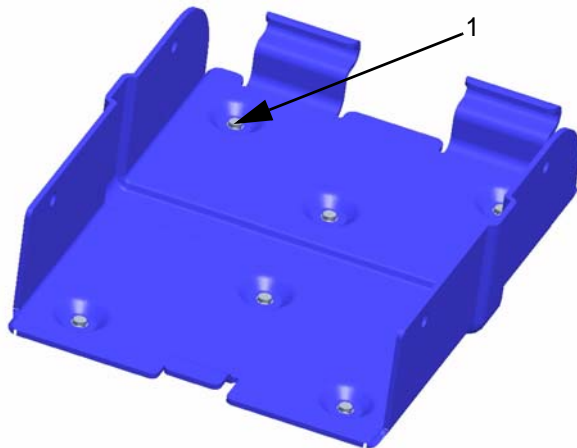


Figure 2-8 Mounting Tray

- 2 Centerpunch the marked spots and fix the tray in position using the self-drilling supplied screws.
- 3 Slide the VSM onto the tray, first inserting the Connectors panel (1). Press the VSM down until it is fully seated in the tray. Fasten the VSM into the mounting tray using the supplied 4 screws (2). See [Figure 2-9](#).

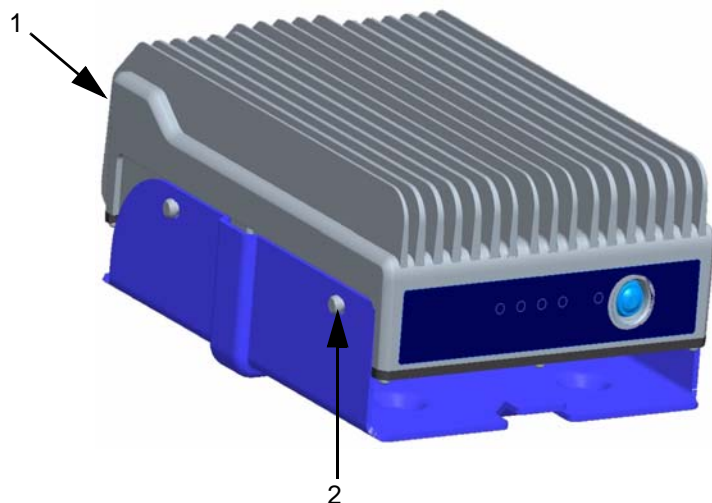


Figure 2-9 VSM in the Mounting Tray

Cables Routing and Connection Procedure

DC Power and Ignition Cable Installation

NOTE The VSM supports 12 V vehicle batteries, i.e. 13.8 V \pm 20% DC vehicle batteries.

The DC Power cable is equipped with 5-Ampere fuse (slow-blow). Verify that the vehicle electrical system can support current values larger than that.

Connect the fuse in the red wire to the power source using the shortest practical length.

The unit is only for use with a negative ground system.



CAUTION Insert the fuse after making and carefully inspect all connections.

See [Figure 2-10](#) before routing or connecting the DC Power and Ignition cable and use the following process.

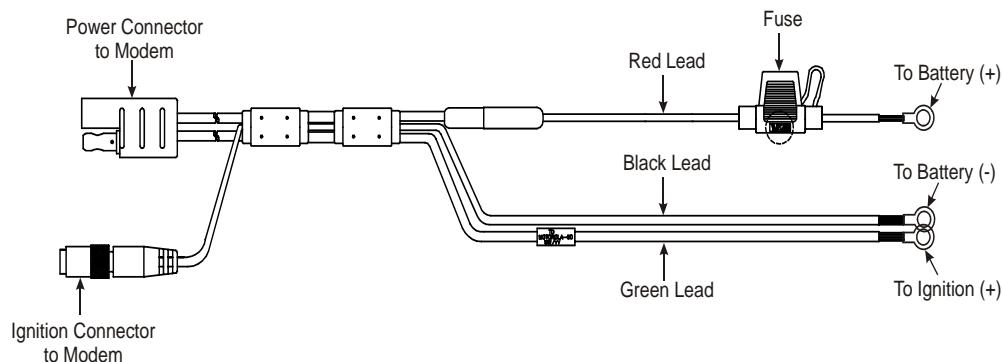


Figure 2-10 DC Power and Ignition Cable Routing Into Engine Compartment

Process 2-4 describes how to install the DC power and ignition cable.

Process 2-4 How to Install the DC Power and Ignition Cable

1	Route the DC Power cable's leads through the bulkhead and into the engine compartment. Use an existing opening or, if necessary, drill a 2 cm (26/32 inch) diameter hole through the bulkhead. Insert a grommet into the hole to prevent damage to the DC Power cable.
2	Cut the black lead to the desired length and connect it to the negative (-) battery terminal.
3	On the engine side of the bulkhead, connect the red (A+) lead to the vehicle's battery as follows: <ol style="list-style-type: none"> a. Cut the long red lead to the desired length. Verify that the fuse holder is at a distance of 20-30 cm away from the connection point, ensuring that it is not close to any hot engine component. b. Mount the fuse holder using the provided mount, and dress wires as necessary. Connect the red lead plug adaptor (on the fuse holder) to the matching receptacle on the red lead of the DC Power cable. c. Remove the fuse from the fuse holder and connect the red lead of the DC Power cable to the positive (+) battery terminal. Cable tie the wire every 4" (10 cm) along its length, do not tie to existing vehicle systems. d. Insert the fuse into the fuse holder.


Process 2-4 *How to Install the DC Power and Ignition Cable (Continued)*

5	Verify that the cables in the engine compartment do not obstruct any of the vehicle controls or touch hot or moveable parts of the engine.
6	For ignition installation, perform the following steps: <ol style="list-style-type: none"> a. Cut the green lead to the desired length. b. Connect the green lead of the DC Power cable to ignition (+). Cable tie the wire every 4" (10 cm) along its length, do not tie to existing vehicle systems. c. Verify that the voltage is high with ignition on, during cranking and while vehicle is running. When ignition is off, the voltage is low.
7	Connect the DC Power cable connector and the Ignition connector to POWER connector and IGN connector on the Connectors panel. Do not use pliers or any other metallic tool for tightening. Hand tighten only!


WiMAX Antenna Cable Installation

NOTE The installation procedures for both WiMAX antenna cables are identical.

Process 2-5 *How to Install the WiMAX Antenna Cable*

1	 The WiMAX antennas are supplied with a 12 feet cable. Do not trim this cable after routing it. Form a service loop to any cable excess length. Use plastic cable ties to secure the cable. The field team should assemble the TNC connector (provided) after routing the RF cable.
2	Connect the RF cables from the antennas to ANT1/ANT2 connector on the Connectors panel (the order of connection is not important). Do not use pliers or any other metallic tool for tightening. Hand tighten only! Fully tighten the antenna cable connector.

WiFi Antenna Cable Installation**Process 2-6** *How to Install the WiFi Antenna Cable*

1	 When assembling, trim the RF cable as short as possible, so as to provide minimal loss and best coverage. The field team should assemble the SMA connector (provided) after routing the RF cable.
2	Connect the RF cable from the antenna to WIF11 connector on the Connectors panel. Do not use pliers or any other metallic tool for tightening. Hand tighten only! Fully tighten the antenna cable connector.

GPS Antenna Cable Installation

NOTE The GPS antenna cable is part of the GPS antenna assembly.

Process 2-7 *How to Install the GPS Antenna Cable*

1	Connect the RF cable from the antenna to GPS connector on the Connectors panel. Do not use pliers or any other metallic tool for tightening. Hand tighten only! Fully tighten the antenna cable connector.
----------	--

LAN/Ethernet Cable Installation

Process 2-8 How to Install the LAN/Ethernet Cable

- 1 Connect the LAN/Ethernet cable from the LAN connector on the Connectors panel to the input/output device. **Verify that the cable P/N label is facing the opposite side of the VSM cooling fins.** See [Figure 2-11](#).
Do not use pliers or any other metallic tool for tightening. Hand tighten only!



Figure 2-11 LAN Cable Connector Installation

Cap Installation

Process 2-9 How to Install Cap(s) on Unused Connector(s)

- 1 Screw cap(s) on unused port(s) to protect connector(s).

Chapter 3 Configuring and Monitoring the VSM

Introduction

The WiMAX VSM is basically a plug and play modem and will, most of the time, access the network without any configuration.

Some service providers require special security configuration.

This chapter provides required security configuration procedures and other general configuration procedures that may be done by your system administrator after the modem installation completion.

In addition, this chapter describes some basic WiMAX VSM operation indications that appear on your computer and enable you to monitor your WiMAX VSM operation.

Prior to Configuration

1. Connect a LAN/Ethernet cable between the VSM and your computer.
2. Turn the VSM On.
3. Verify your computer is On and open your web browser.
4. In the web address field, enter the VSM IP address (<http://192.168.15.1>) and press “Enter”.

5. The following login window appears.

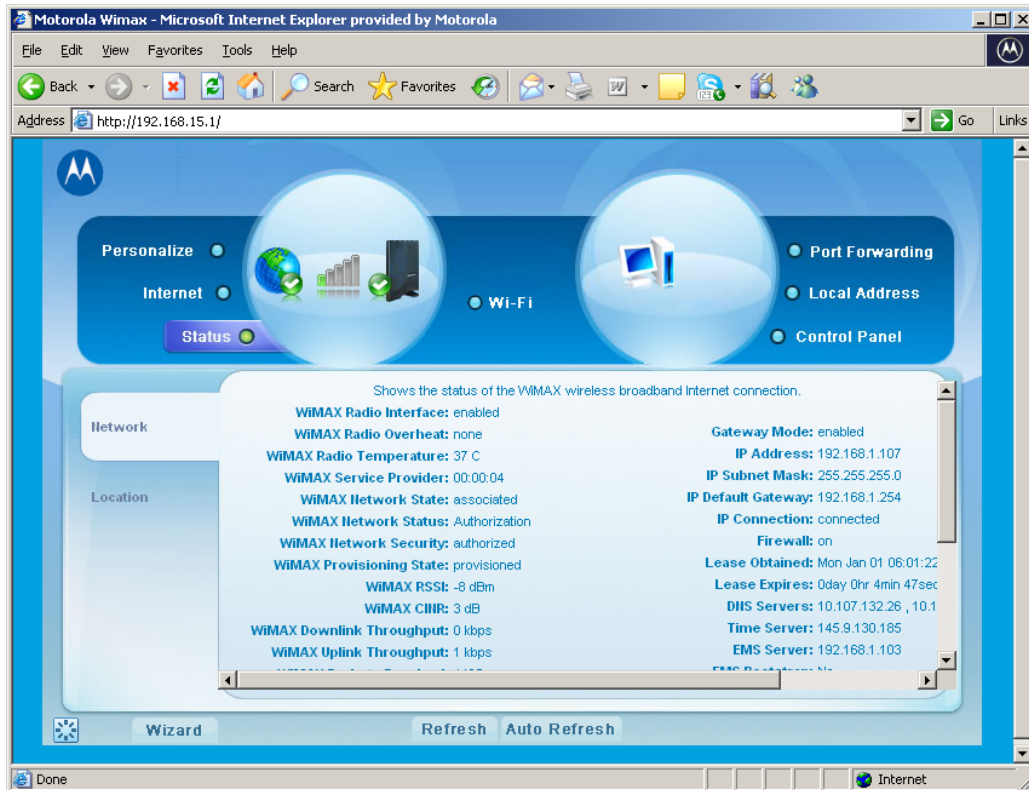


NOTE The default password is motorola.

6. Click the "Login" button to open the configuration application Wizard.

The Configuration Wizard

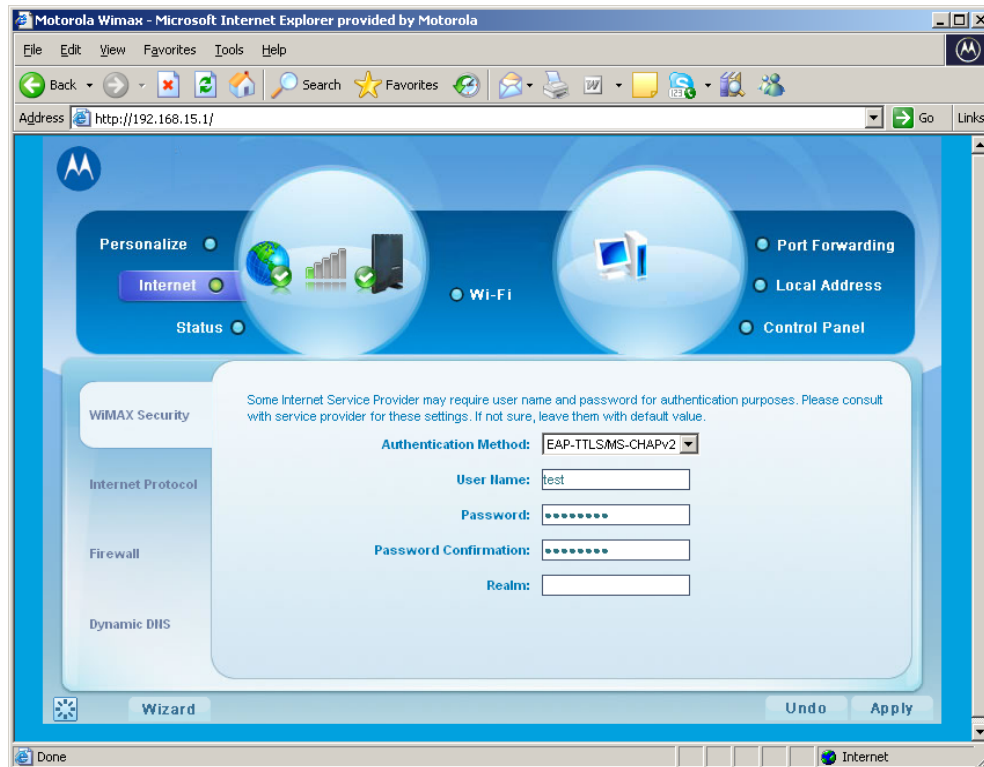
After login, the following wizard window appears.



Configuring the WiMAX VSM Security

NOTE If required by your service provider, you will need to configure your WiMAX VSM security settings.

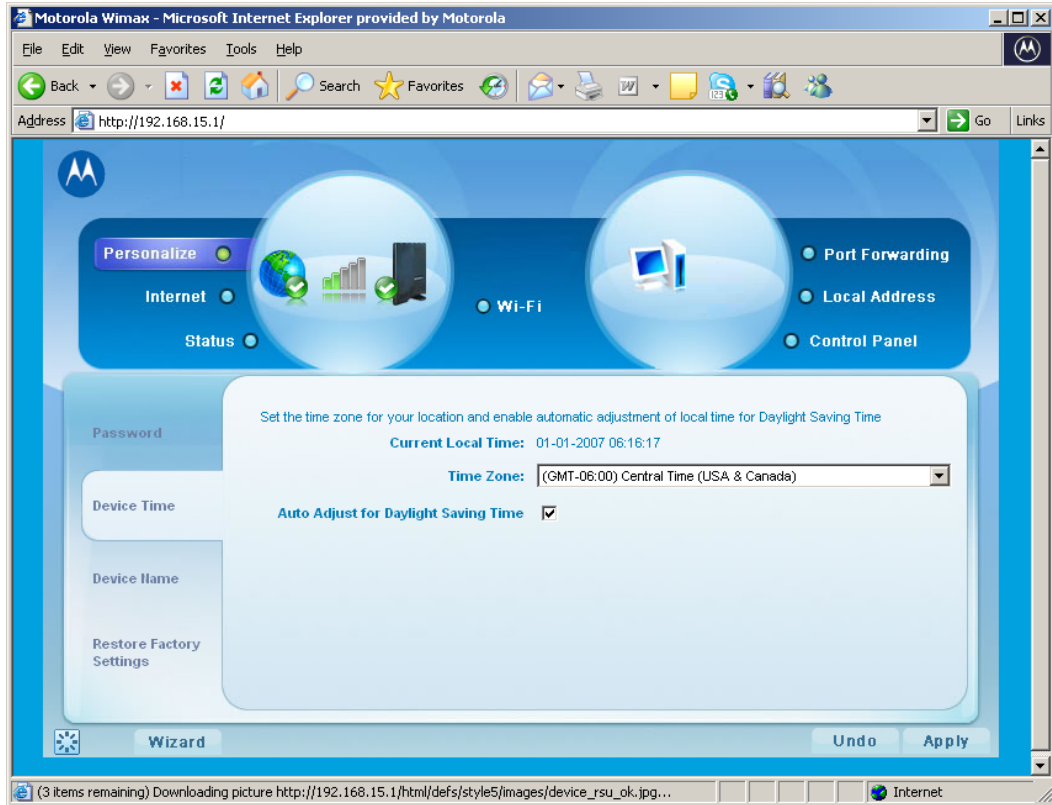
1. In the upper part of the window, click on the “Internet” tab. The following window appears.



2. Verify that the WiMAX Security tab is selected.
3. Using the pull-down menu, select the authentication method.
4. According to the selected authentication method, fill in the required user name and password.
5. When finished, click “Apply”.

Configuring the WiMAX VSM Time Zone

1. In the upper part of the window, click on the “Personalize” tab. The following window appears.



2. Verify that the “Device Time” tab is selected.
3. Using the pull-down menu, select the required Time Zone.
4. If required, check the “Auto Adjust for Daylight Saving Time” checkbox.
5. When finished, click “Apply”.

Monitoring the WiMAX VSM Operation

NOTE Verify that the Status Utility is installed on your computer.

When your VSM is up and running, the following signal strength icon is displayed on the status tray.

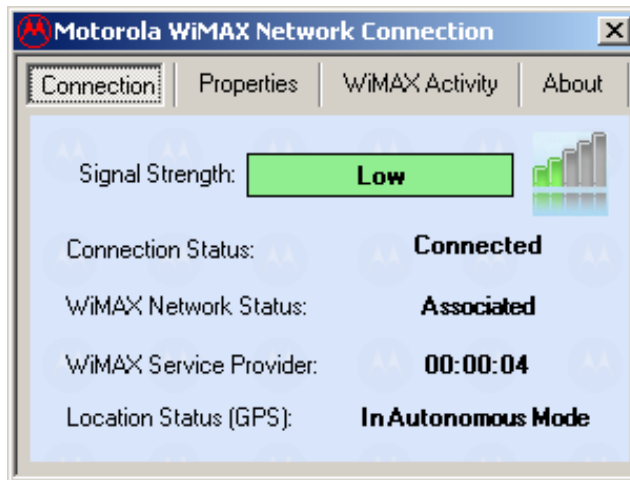


This icon displays the received signal strength and enables the access into the status utility screens.

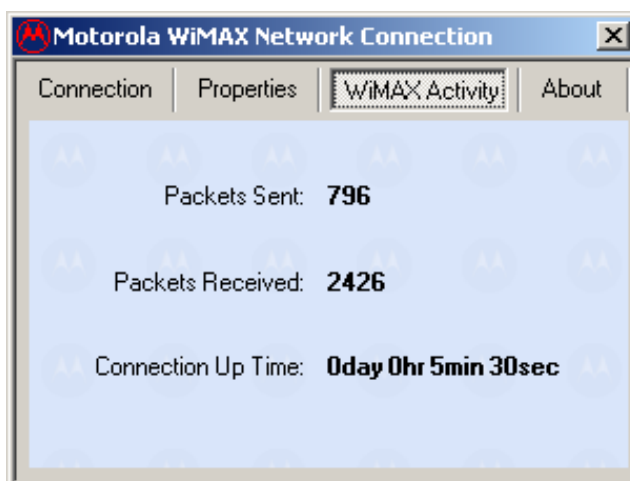
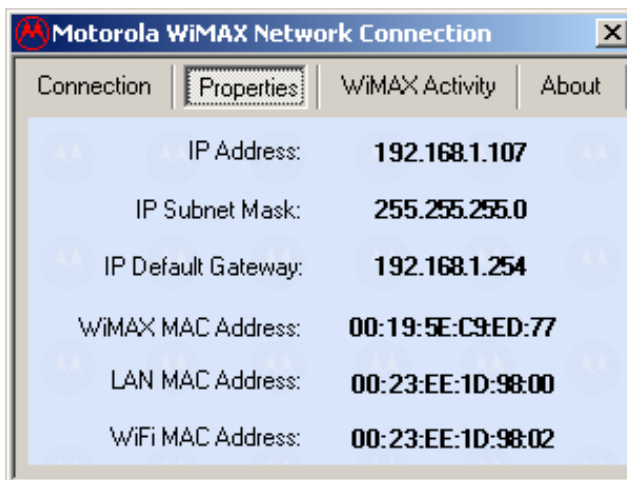
1. Move your mouse over the signal strength icon. The following information message is displayed.

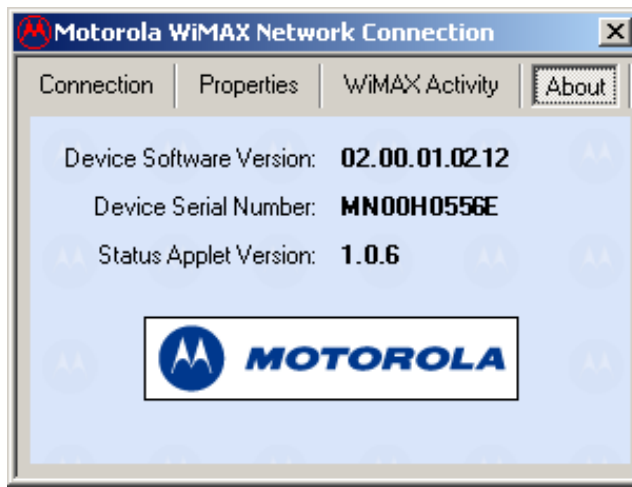


2. To access the status utility, double click the signal strength icon.
3. The following “Connection” screen is displayed as a default.



4. Click the upper tabs to receive the required system information you need.





5. To close the status utility, click the X button on the upper right corner of the screen.

Chapter 4 Troubleshooting

Introduction

Motorola has made every effort to ensure that this product is of excellent quality. However, if you experience any problems with the product, please contact your local Motorola representative with product related information.

For complete information on ordering required parts and kits, contact your local customer service representative and refer to [Appendix B, Reference](#).

Troubleshooting

This paragraph, gives details regarding possible malfunctions that may occur after first time installation of the WiMAX VSM, their probable cause and the recommended corrective action.

Malfunction	Probable Cause	Corrective Action
WiMAX VSM does not turn On.	1. Power cable is not properly connected.	1. Check the cable connections, connect as required and turn the VSM On. Verify that the Power LED is lit red.
	2. Ignition connector is not properly connected.	2. Power LED is lit orange. Reconnect the ignition connector and press the On/Off button on the VSM.
WiMAX VSM does not have a link when using a laptop.	LAN/Ethernet cable is not connected.	Connect the LAN/Ethernet cable and make sure that LAN LED is green.
No GPS reception.	GPS antenna is not connected (GPS LED is solid orange).	Connect the GPS antenna again. Verify that the GPS LED is green.

Malfunction	Probable Cause	Corrective Action
No WiMAX connection.	WiMAX antenna/s are not connected (WiMAX LED is blinking orange).	Connect the WiMAX antenna/s. Verify that the WiMAX LED is green.
No WiFi connection.	WiFi antenna is not connected (WiFi LED is off).	Connect the WiFi antenna/s. Verify that the WiFi LED is green.
No LAN/Ethernet connection.	LAN/Ethernet connector on the VSM is not installed correctly (LAN LED is off).	Check the installation of the connector. Refer to How to Install the LAN/Ethernet Cable on page 2-14 . Verify that the LAN LED is green.

Appendix A Specifications

Physical

Dimensions (Modem)	11.4"x7.9"x3.66" (29cm x 20cm x 9.3cm)
Weight (Modem)	12.3 Pounds (5.6 Kg)

Communication Ports

Amphenol	Ethernet/LAN connector
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RF Ports

WiMAX	Two TNC connectors for diversity
WiFi	One SMA connector
GPS	One SMA connector

LEDs

LED Name	WiFi	WiMAX	GPS	LAN	PWR
LED Status					
Solid Green	WiFi is Available	Connected	GPS Data Available	Link Established	Power On
Blinking Green	Rx/Tx Activity	Connecting/ Registering	-	-	-
Solid Orange	-	-	GPS Data is not available (searching for signal)	-	No ignition On/Off switch is pressed but ignition is Off
Blinking Orange	-	Scanning	-	Ethernet activity	-
Solid Red	-	Failure/ Overheat	Failure	-	Standby External power is connected to the system
Turned Off	WiFi if off	WiMAX is off	Location feature is off	No link	No DC power

Operating Temperature

Ambient temperature -30°C to +60°C

Power

Input Voltage 11 to 16.60 VDC

RF Power Modes

WiMAX (US and Canada)	Pout = 29.5dBm
WiMAX (EU)	Pout = 26dBm
WiFi (US and Canada)	Pout = 21dBm
WiFi (EU)	Pout = 16.5dBm

Power Consumption Amplifiers are Class AB.

Modem Standby	≤ 1 A RMS
Modem Transmit	≤ 3 A RMS during transmission

WiMAX Antenna

Type	Collinear dipole array
Frequency	2.5 - 2.7 GHz
Physical	Fiberglass U.V. stable
Impedance	50 Ohms (nominal)
Polarization	Vertical Linear
Height	17inches (43cm)
Azimuth pattern	Omni-directional
Elevation beamwidth	15 deg

WiFi Antenna

Type	Collinear dipole array
Frequency	2.4 - 2.5 GHz
Physical	Stainless steel
Impedance	50 Ohms (nominal)
Polarization	Vertical Linear
Height	9 inches (23cm)
Azimuth pattern	Omni-directional
Elevation beamwidth	30 deg

GPS Antenna

Type	Active patch antenna
Frequency	1575.42MHz
Impedance	50 Ohms (nominal)
Polarization	Circular RHCP
System Gain	28 dB

Communication Channel Packet Error Rate

Packet Error Rate	10.0%
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RF Characteristics

Frequency	
WiMAX	2.495 - 2.690 GHz
WiFi	2.412 - 2.442 GHz
Bandwidth	
WiMAX	5 MHz 10 MHz
WiFi	22 MHz
Output transmit power	
WiMAX band (US and Canada)	29.5 dBm average
WiMAX band (EU)	26 dBm average
WiFi band (US and Canada)	21 dBm average
WiFi band (EU)	16.5 dBm average
Receiver Packet Error Rate (PER)	
WiMAX	-72.9 dBm @ 64 QAM 3/4
WiFi	-65 dBm @ 54Mbps
Frequency Stability	
WiMAX & WiFi	+/- 10 ppm over temperature range

Appendix B Reference

Replacement Parts

Replace damaged parts with identical replacement parts.

For complete information on ordering required parts and kits, contact your local customer service representative.

Replacement Parts List

Kit/Part Number	Description
Antennas	
FHN7278A	WiMAX Antenna, 2
FHN7279A	WiFi Antenna
FAF5261A	WiFi Antenna
FHN7280A	GPS Antenna
Tray & Screws	
0312002B14	Mounting Screw, Tray to Car, 6
0375671A02	Mounting Screw, VSM to Tray, 4
0771837Y45	Tray
Cables	
3071815Y61	LAN/Ethernet Cable (177"/450 cm)
3088705V02	DC Power & Ignition Cable (177"/450 cm)
Caps	
3889608V06	Cap for SMA Connector, 2
3288022U27	Cap for TNC Connector, 2

Kit Replacement Parts List

Kit/Part Number	Description
F7400A	WiMAX VSM Modem with WiFi
F7300A	WiMAX VSM Modem without WiFi



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