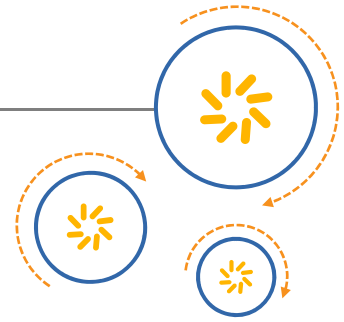




Qualcomm Technologies, Inc.



MTP9900 LAA FCC User Guide

80-P7567-4 Rev. A

July 13, 2016

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Revision history

Revision	Date	Description
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1 Introduction

1.1 Purpose

The Modem Test Platform 9900 (MTP9900 LAA) is a development small cell base station (eNB) based on the Qualcomm® FSM99xx chipset that can be enabled to support LTE and LAA in the product configuration model "MTP9900 LAA". The MTP9900 LAA allows demonstration, field trials, and system level evaluation by ODMs/OEMs to validate FSM99xx chipset functionality. The MTP9900 LAA is available only for professional installation and is not available to an end user benefitting from services provided by the MTP9900 LAA small cell base station (eNB).

In addition to complying with CFR47 Part 15.407 technical requirements, the MTP9900 LAA is designed for compliance with 3GPP Release 13 and utilizes Listen Before Talk ("LBT") for spectrum sharing in the UNII-1 and UNII-3 unlicensed spectrum bands.

1.2 Acronyms

For definitions of terms and abbreviations, refer to [Table 1-1](#).

Table 1-1 Acronyms

Acronym	Definition
eNB	small cell base station
FFA	form factor accurate
GbE	gigabit Ethernet
GPS	global positioning system
IC	integrated circuit
MMC	multi-media card
MTP	modem test platform
NL	network listen
ODM	original design manufacturer
OEM	original equipment manufacturer
OTA	over the air
RF	radio frequency
SD	secure digital
SIM	subscriber identity module
SKU	stock keeping unit
SMA	subminiature version A
SoC	system on chip
UIM	user identity module

Acronym	Definition
3GPP	3 rd generation partnership project
LTE	long term evolution
LAA	licensed assisted access

2 MTP9900 LAA Hardware

The MTP9900 LAA is a development small cell (eNB) platform based on the Qualcomm FSM99xx chipset capable of operating in LTE licensed bands (3GPP Release 13, Band 2 and Band 4 only) and LAA unlicensed bands (3GPP Release 13 Band 46: UNII-1 5170-5330 MHz and UNII-3 5725-5850 MHz frequencies only).

The MTP9900 LAA utilizes Listen Before Talk ("LBT") for spectrum sharing in the UNII-1 and UNII-3 unlicensed spectrum bands.

The MTP9900 LAA includes a Wi-Fi radio module that has been disabled through software.

2.1 MTP9900 LAA hardware model

MTP9900 LAA MCN #**10-F5230-006**

MTP9900 LAA SKU #**65-F5230-910**

MTP 9900 FCC ID # **J9CMTP9900LAA**

2.2 Hardware components

[Figure 2.1](#) presents a labeled view of major components and connection points of the MTP9900 LAA. General components and features of the MTP9900 LAA include:

- User status LEDs
- Baseband card
- RF card
- Antenna ports for LTE, LAA, GPS and Wi-Fi
- Three port 10-BaseT/100-BaseTX/1000-BaseT interfaces
- Peripheral interfaces:
 - One SIM/UIM slot (1.8V / 2.95V support)
 - One SD/MMC host port slot (1.8V / 2.95V, 4-bit) 52 MHz
 - One USB 2.0 type A connector

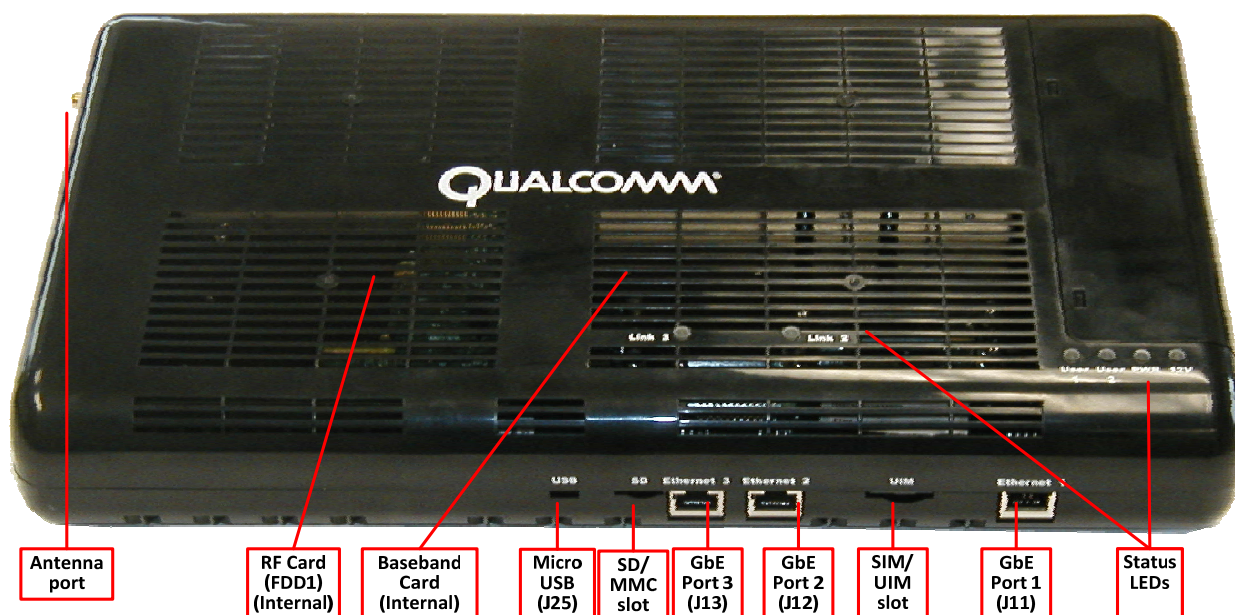


Figure 2.1 MTP9900 LAA external ports

2.3 LEDs

The MTP9900 LAA includes 4 LEDs on the front lower right side of the box, and two on the front side of the box toward the bottom.

Table 2-1 MTP9900 LAA LEDs

Label	Color	Function
User1	Red	Function defined by OEM/ODM
User2	Green	Function defined by OEM/ODM
PWR	Green	When lit, power to the subsystem is good
12V	Blue	When lit, main input power (12v) is good
Link 3	Green	When lit and/or flashing, GbE port #3 out of the GbE switch has link and is active
Link 2	Green	When lit and/or flashing, Ethernet port #1 out of the GbE switch has link and is active

2.4 Antenna port SMA connectors

RF card connector port mapping and band switching information is provided in this section. [Figure 2.2](#) accompanies [Table 2-2](#) to depict the antenna connector SMA locations and their functionality.

NOTE: When attaching antennas or cables on SMA connectors, apply a torque value no greater than 8 in-lbs or 90 N-cm.



Figure 2.2 MTP9900 LAA antenna ports (sides and back)

Table 2-2 MTP9900 LAA antenna port functionality

Antenna port	Functionality	Notes
A6	LTE B2/B4 access primary	Rx / Tx (data)
A8	LTE B2/B4 network listen (NL)	Rx Only (NL)
A4	LTE B2/B4 access secondary	Rx / Tx (data)
A1	Wi-Fi MIMO1	Rx / Tx (active/passive scan)
A2	Wi-Fi MIMO2	Rx Only (passive scan)
A3	Wi-Fi MIMO3	Unused
A9	GPS	Rx Only
A10	LAA B46a/B46d access primary	Rx (NL/sense)
A12	LAA B46a/B46d access secondary	Tx (data)

2.5 Outdoor antenna installation instructions

Outdoor installation of the MTP9900 LAA requires a professional installer. Installation outdoors must not be done by consumers or end users.

WARNING: Failure to install the specified outdoor antenna per the restrictions noted in this document may result in operation out of compliance with FCC Part 15 rules.

2.5.1 Outdoor installation required parts

- Directional patch antenna
Manufacturer: Terrawave Solutions
Model: M6060060MP1D43602
Available at www.terrawave.com
Phone: 210-375-8482

This antenna part, which is available from Terrawave, includes the required tilting mount for outdoor pole/mast or wall mounting. Professional installers must ensure any equivalent antenna used in place of the above referenced model has the same or lower peak gain and equivalent directional pattern as shown on the M6060060MP1D43602 antenna specification sheet. The key parameters are:

- ☐ Peak gain not exceeding 6 dB in 5 GHz.
- ☐ Vertical gain pattern with normalized loss at +60 degrees elevation of at least 15 dB.
- ☐ Installed with 30 degrees or more of downward tilt angle from the horizon.
- Weather enclosure for MTP9900 LAA:
AC-powered enclosure, such as Ventev VA01-12-0055 or the equivalent.
- Tilt angle tool.

2.5.2 Antenna placement considerations

- There is no limitation to the antenna installation height. It is recommended to install the antenna at least 5 meters from the ground and away from pathways/walkways or other traffic areas.
- It is recommended to install the outdoor antenna facing away from metallic structures, such as chain-link fences.

2.5.3 Antenna installation instructions

1. Once the desired location is identified, attach the articulating mount to the wall or pole/mast using the provided mounting brackets or screws.
2. Use the tilt angle tool to set a downward tilt angle of at least 30 degrees from horizontal (see [Figure 2.3](#)). Tighten the mount joint screws to ensure permanent placement at the required angle.
3. Affix the patch antenna assembly to the mount front plate using the provided mounting screws.
4. Complete the installation of the MTP9900 LAA in the weather enclosure and the connection of the antenna cables as shown in [Figure 2.3](#).

Use a digital or mechanical level to adjust downward tilt angle of the front mounting plate to achieve **30 degrees or more of downward tilt angle**.

The face of the patch antenna must be tilted at least 30 degrees down from horizontal as shown.

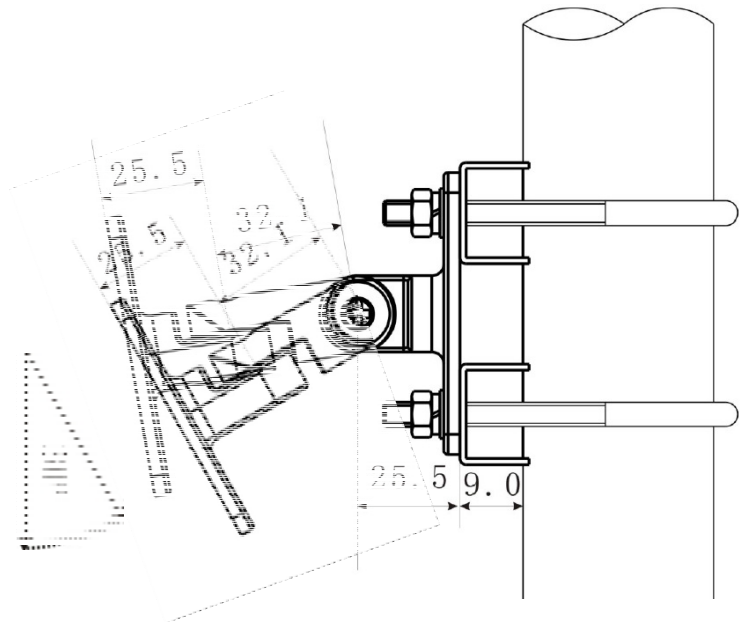


Figure 2.3 Outdoor antenna installation

Table 2-3 Outdoor antenna cable connections

Patch antenna cable labels	MTP9900 LAA antenna ports
1A	A1 WiFi MIMO 1 Tx/Rx
2B	A2 WiFi MIMO 2 Rx Only
3C	A10 LAA Primary Tx/Rx
4D	A12 LAA Secondary Tx/Rx

NOTE: Fasten SMA connectors using applied torque no greater than 90 N-cm.

3 MTP9900 LAA Usage

3.1 Power requirements

The MTP9900 LAA ships with a 12 V power supply unit that includes a power adapter and cable. This equipment provides the power requirements for the unit.

3.2 Powering on the MTP9900 LAA

1. Connect Ethernet cable to Ethernet port 2 of MTP9900 LAA, for backhaul connectivity.
2. Attach the wall plug of the power supply unit into an electrical socket.
3. Attach the other end of the power supply unit into the power input jack of the MTP9900 LAA.

The MTP9900 LAA powers on, the 12 V LED turns blue, and the PWR LED turns green. The MTP9900 LAA is ready for further use in supported LTE and LAA bands.

4 Regulatory Information

4.1 Federal Communication Commission Interference Statement

This MTP900 LAA 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.

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 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 which the device receiving interference is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This transmitter must NOT be co-located or operated in conjunction with any other antenna or transmitter.

4.2 Max EIRP compliance for indoor & outdoor deployments

- **Indoor deployment use case:** For indoor deployment of the LAA small cell MTP9900 LAA, an omni-directional antenna with a maximum of 6 dBi antenna gain will be used. This ensures compliance as per FCC max. EIRP limit of 36 dBm for indoor systems.
- **Outdoor deployment use case:** For outdoor deployment of the LAA small cell MTP9900 LAA, an omni-directional antenna system will not be used. In addition to the max EIRP limit of 36dBm, the outdoor use case antenna system will consist of means to keep the max. EIRP at elevation angles > 30 degrees from horizon, to be less than 21 dBm. This will be achieved by using an antenna with the gain characteristics equivalent to the directional patch antenna

model referenced in the previous section. The antenna must be installed with a downward tilt angle of at least 30 degrees.

- **FCC Caution:** Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

4.3 Radiation exposure statement

The MTP9900 LAA device complies with the FCC RF exposure limits set forth for an uncontrolled environment and is for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

This device is intended only for OEM/ODM under the following conditions:

- The antenna must be installed such that 20 cm is maintained between the antenna and users.
- The device may not be co-located with any other transmitter or antenna except in accordance with FCC multi-transmitter guidance.
- Only antennas approved for use with the MTP9900 LAA may be used.

4.4 Notes about user manual

The OEM/ODM integrator must NOT provide information to the end user regarding how to install or remove the devices' RF card in the user manual or any other form of documentation of another end product based on this MTP9900 LAA device. Any version of user manual based on this user manual shall include all required regulatory information and warnings.