4RF

Aprisa *LTE*

Module: LM003 UIP4RF55

User Manual

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Version 1.0

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RoHS and WEEE Compliance

The Aprisa LTE is fully compliant with the European Commission's RoHS (Restriction of Certain Hazardous Substances in Electrical and Electronic Equipment) and WEEE (Waste Electrical and Electronic Equipment) environmental directives.

Restriction of hazardous substances (RoHS)

The RoHS Directive prohibits the sale in the European Union of electronic equipment containing these hazardous substances: lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBBs), and polybrominated diphenyl ethers (PBDEs).

4RF has worked with its component suppliers to ensure compliance with the RoHS Directive which came into effect on the 1st July 2006.

End-of-life recycling programme (WEEE)

The WEEE Directive concerns the recovery, reuse, and recycling of electronic and electrical equipment. Under the Directive, used equipment must be marked, collected separately, and disposed of properly.

4RF has instigated a programme to manage the reuse, recycling, and recovery of waste in an environmentally safe manner using processes that comply with the WEEE Directive (EU Waste Electrical and Electronic Equipment 2002/96/EC).

4RF invites questions from customers and partners on its environmental programmes and compliance with the European Commission's Directives (sales@4RF.com).

Compliance General

The Aprisa UIP4RF55 module operates within frequency bands that are controlled through spectrum license managed by the carriers[1] . Devices using these frequencies must meet the FCC regulatory requirements in addition to any requirements put in place by the carriers.

It is the responsibility of the user, before operating the equipment, to ensure that where required the appropriate regulatory and regional carrier requirements have been met.

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

Equipment authorizations sought by 4RF are based on the Aprisa UIP4RF55 module being installed at a fixed restricted access location and operated within the environmental profiles defined in Table 1; operation outside these criteria may invalidate the authorizations and / or license conditions.

Table 1 General Compliance

Environmental	Storage: EN 300 019-1-1 Class 1.2
	Transportation: EN 300 019-1-2 Class 2.3
	Stationary use: EN 300 019-1-3 Class 3.3
	Mobile use: EN 300 019-1-5 Class 5.1
Vehicle	ISO 7637-2, ISO 16750-2 (12V Code D 24V Code E)
	Shock & Vibration: SAE J1455
Safety	UL 62368-1, Class 1 division 2, Groups ABCD for hazardous locations

Compliance United States of America FCC

The Aprisa LTE router may contain an UIP4RF55 LTE module and/or a WLAN Network module certified to Federal Communications Commission (FCC) specifications defined in Table 2:

Table 2 USA Compliance

WWAN (LTE)	47 CFR Parts 22, 24, 27, 90 and 96
	This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

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[1] The carriers are the mobile phone carriers such as Verizon, AT&T, Vodafone etc.

Symbols

	ISO 7000-0434B	Exposure Warning Avertissement d'exposition
	IEC 60417-5041	Potential hot surface hazard Risque potentiel de surface chaude
	ISO 7000-0434B	Read the instructions Lis les instructions

RF Exposure Warning

WARNING:

To comply with FCC/ISED regulations limiting maximum RF output power, human exposure to RF radiation, and possible antenna co-location interaction, the antenna gains and resulting EIRP must not exceed those stipulated in Table 3.

At least 20 cm (8 inches) separation distance between any antenna used with this device and the general public must be maintained at all times when using antennas with gain up to the Maximum MPE Antenna Gain values shown below.

Where the LTE and Wi-Fi antennas are co-located or combined, the lower co-located antenna gain figure must be used.

Not all bands shown are available in all Aprisa UIP4RF55 devices nor are they all available for use in the USA.

For example, in the case of LTE Band 8 in the USA the antenna gain for uncontrolled exposure of the general public is limited to 6 dBi (4 dBi if co-located with Wi-Fi) but the antenna gain may be increased to 12 dBi if the installation prevents occupational/controlled exposure closer than 50 cm (20 inches) to the antenna. Refer FCC OET Bulletin 65 "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields".

Table 3 Antenna Compliance Requirements

| Operating Mode	Tx Freq Range (MHz)	Max Time-Avg Cond. Power (dBm)	Maximum MPE Antenna Gain [b]	
			Standalone (dBi)	Co-located (dBi)
LTE B2	1850 - 1910	24	8	6
LTE B4	1710 – 1755	24	6	4
LTE B5	824 – 849	24	6	4
LTE B7	2500 – 2570	23.8 [a]	9	4
LTE B8 (USA)	880 – 915 (897.5 – 900.5)	24	6	6
LTE B12	699 – 716	24	6	4
LTE B13	777 – 787	24	6	4
LTE B20	832 - 862	24	N/A	6
LTE B25	1850 - 1915	24	6	4
LTE B26	814 – 849	24	6	4
LTE B30	2305 – 2315	24	1 [c]	1 [c]
LTE B41	2496 – 2690	23.8 [a]	9	4

a   Includes 0.8 dB offset from single-cell tolerance for UL CA.

b   Antenna gain above the co-located maximum gain value must not be used when the Wi-Fi module is fitted unless the Wi-Fi and cellular antennas are separated by more than 20 cm.

c   Important: The FCC and IC have a strict EIRP limit in Band 30 for mobile and portable stations in order to protect adjacent satellite radio, aeronautical mobile telemetry, and deep space network operations. Mobile and portable stations must not have antenna gain exceeding 1 dBi in Band 30. Additionally, both the FCC and IC prohibit the use of external vehicle-mounted antennas for mobile and portable stations in this band. Fixed stations may use antennas with higher gain in Band 30 due to relaxed EIRP limits. UIP4RF55 modules used as fixed subscriber stations in Canada or fixed customer premises equipment (CPE) stations in the United States may have an antenna gain up to 10 dBi in Band 30, however, the use of outdoor antennas or outdoor station installations are prohibited except if professionally installed in locations that are at least 20 meters from roadways or in locations where it can be shown that the ground power level of -44 dBm per 5 MHz in the bands 2305–2315 MHz and 2350–2360 MHz or -55 dBm per 5 MHz in the bands 2315–2320 MHz and 2345–2350 MHz will not be exceeded at the nearest roadway. For the purposes of this notice, a roadway includes a highway, street, avenue, parkway, driveway, square, place, bridge, viaduct or trestle, any part of which is intended for use by the general public for the passage of vehicles.

Mobile carriers often have limits on total radiated power (TRP), which requires an efficient antenna. The end product with an embedded module must output sufficient power to meet the TRP requirement but not too much to exceed FCC/IC's EIRP limit. If you need assistance in meeting this requirement, please contact 4RF.

Installation

The Aprisa UIP4RF55 module is intended for installation in the Aprisa LTE router by a qualified technician. The module must be unpacked at a static protected workstation. Ensure that the Aprisa LTE is powered off. Open the Aprisa LTE case and locate the LTE M.2 module slot. This is a M.2 standard Slot B notched PCI Express NGFF 75 pin position connector on the Aprisa LTE main board.

Insert the Aprisa UIP4RF55 module into the slot at a 45 degree angle taking care that the Label is oriented as shown in the illustration below. Check that the flexible printed circuit (FPC) connector inserted full into the socket. Gently press down on the module and install the retention screw.
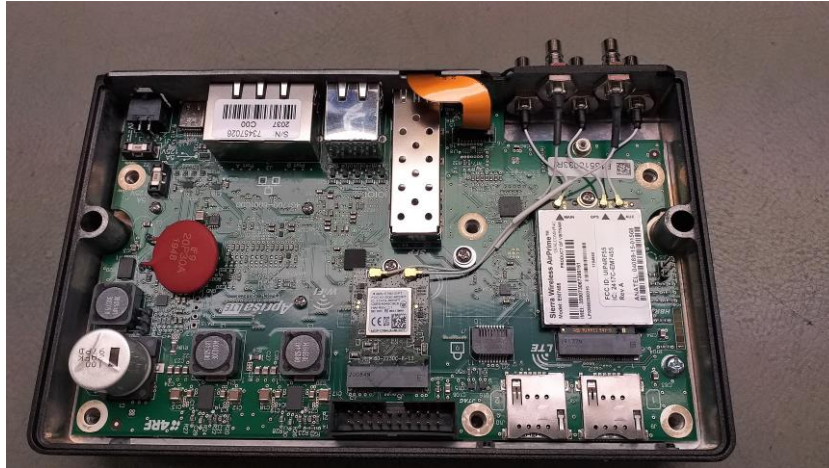
The module has three RF connectors:

- Main RF path
- GNSS (GPS, GLONASS, Galileo, etc)
- Auxiliary RF connector

The module does not have integrated antennas.
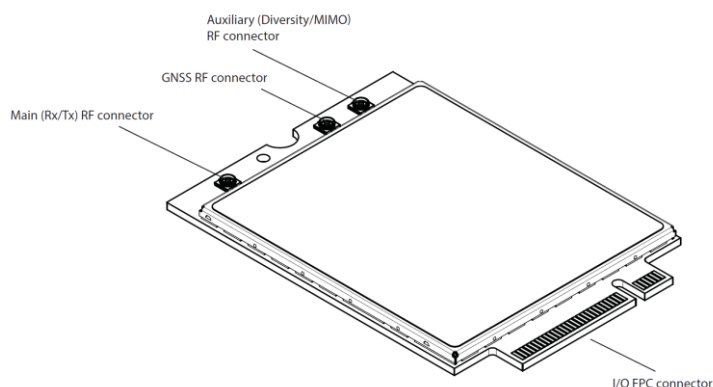
Attach the three miniature microwave coaxial connectors using tweezers. Refer to Murata HSC documentation (MM4829-2702RA4) for mechanical details.

Confirm that the label on the base of the Aprisa LTE properly reflects the installed modules. Consult 4RF if there is a discrepancy.

CAUTION: Electro Static Discharge (ESD) can damage or destroy the sensitive electrical components in the LTE router.

Open Source License Statement

This product contains open source software. Full details and license terms are provided in the separate document *Aprisa LTE Open Source License Statement*. This document is available at www.4rf.com/oss and at www.github.com/4rf/lte.

Trademarks and Service

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Service

All hardware maintenance must be completed by 4RF or an authorized service centre.

Do not attempt to carry out repairs to any boards or parts.

Return faulty Aprisa UIP4RF55 modules to 4RF or an authorized service centre.

For more information on maintenance and training, please contact 4RF Customer Services at support@4rf.com.

CAUTION: Electro Static Discharge (ESD) can damage or destroy the sensitive electrical components in the LTE router.

Product End Of Life

End-of-Life Recycling Programme (WEEE)

The WEEE Directive concerns the recovery, reuse, and recycling of electronic and electrical equipment. Under the Directive, used equipment must be marked, collected separately, and disposed of properly.

4RF has implemented an end-of-life recycling programme to manage the reuse, recycling, and recovery of waste in an environmentally safe manner using processes that comply with the WEEE Directive (EU Waste Electrical and Electronic Equipment 2002/96/EC).

The WEEE Symbol Explained

This symbol appears on Electrical and Electronic Equipment (EEE) as part of the WEEE (Waste EEE) directive. It means that the EEE may contain hazardous substances and must not be thrown away with municipal or other waste.

WEEE Must Be Collected Separately

You must not dispose of electrical and electronic waste with municipal and other waste. You must separate it from other waste and recycling so that it can be easily collected by the proper regional WEEE collection system in your area.

YOUR ROLE in the Recovery of WEEE

By separately collecting and properly disposing of WEEE, you are helping to reduce the amount of WEEE that enters the waste stream.

One of the aims of the WEEE directive is to divert EEE away from landfill and encourage recycling. Recycling EEE means that valuable resources such as metals and other materials (which require energy to source and manufacture) are not wasted. Also, the pollution associated with accessing new materials and manufacturing new products is reduced.

EEE Waste Impacts the Environment and Health

Electrical and electronic equipment (EEE) contains hazardous substances which have potential effects on the environment and human health.