

Request for grant of Modular Approval (MA) for the Axiometric MeshStamp® and request for Limited Modular Approval (LMA) for the Axiometric MeshStamp®

The Axiometric MeshStamp® is a general-purpose node which is part of a MeshPlus® wireless mesh networking system or a StarPlus™ wireless star networking system. MeshPlus® and StarPlus™ are proprietary frequency hopping spread spectrum (FHSS) networks operating in the unlicensed 902 MHz to 928 MHz ISM band

MeshPlus® and StarPlus™ wireless networks are used in commercial and industrial applications such as automatic utility meter reading, municipal lighting, and commercial agriculture systems. MeshPlus® and StarPlus™ networks use proprietary communications protocols and only interoperate with other MeshPlus® and StarPlus™ devices designed by Axiometric. They are not marketed to the general public for consumer applications.

Axiometric is requesting the grant of a Modular Approval and a Limited Modular Approval for the MeshStamp®.

Axiometric designed the MeshStamp® to meet the requirements for Modular Approval (MA). MeshStamp® units with a MA will be marketed to commercial customers for evaluation of MeshPlus® Networks for use in their application.

Axiometric also intends to design and obtain FCC type acceptance for products incorporating the MeshStamp®. Examples of these products are PDA devices incorporating the MeshStamp® and Gateways incorporating the MeshStamp®. These products typically require an antenna mounted to the outside of the enclosure of the device that incorporates the MeshStamp®. A coax cable connection from the MeshStamp® antenna typically connector connects to a bulkhead antenna connector. These applications are appropriate for a MeshStamp® with a limited modular approval.

Compliance of the MeshStamp® for Modular Approval:

1. The modular transmitter must have its own RF shielding. This is intended to ensure that the module does not have to rely upon the shielding provided by the device into which it is installed in order for all modular transmitter emissions to comply with Part 15 limits. It is also intended to prevent coupling between the RF circuitry of the module and any wires or circuits in the device into which the module is installed. Such coupling may result in non-compliant operation.

There is an RF shield covering the radio transmitter portion of the MeshStamp®

2. The modular transmitter must have buffered modulation/data inputs (if such inputs are provided) to ensure that the module will comply with Part 15 requirements under conditions of excessive data rates or over-modulation.

No modulation / data inputs are provided. The MeshStamp® processor controls the data rate and FSK deviation frequency ensuring excessive data rates or over-modulation cannot occur.

3. The modular transmitter must have its own power supply regulation. This is intended to ensure that the module will comply with Part 15 requirements regardless of the design of the power supplying circuitry in the device into which the module is installed.

The MeshStamp® is powered by an input DC voltage of 3.6V to 7.0V. Linear regulators provide 3.3V to the processor section and radio module.

4. The modular transmitter must comply with the antenna requirements of Section 15.203 and 15.204(c). The antenna must either be permanently attached or employ a "unique" antenna coupler (at all connections between the module and the antenna, including the cable). Any antenna used with the module must be approved with the module, either at the time of initial authorization or through a Class II permissive change. The "professional installation" provision of Section 15.203 may not be applied to modules.

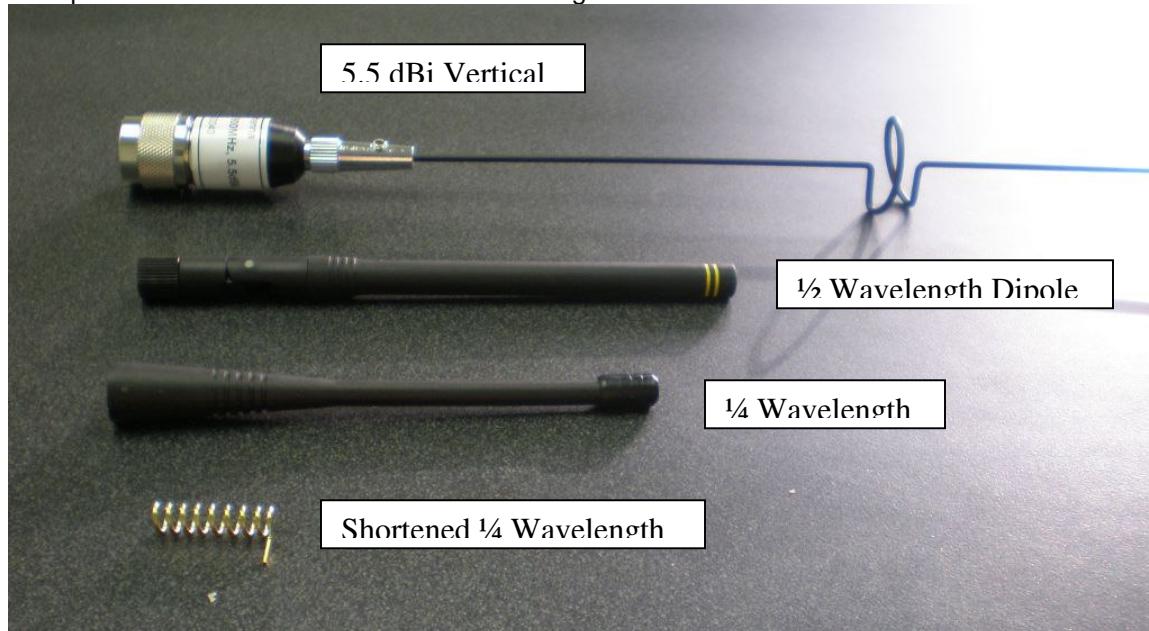
This requirement is met fully for the modular approval. In the limited modular approval case, the final product incorporating the MeshStamp® as designed and controlled by Axiometric will fully meet this requirement. Compliance testing was performed with a 5.5 dBi gain vertical antenna. This antenna was chosen since it had the highest gain of the vertical type of antennas under consideration.

For the Modular Approval case:

A unique antenna coupler, a reverse polarity SMA connector, is attached to the MeshStamp®. One of two antennas will be supplied with the MeshStamp® for connection to the connector: a $\frac{1}{2}$ wavelength vertical dipole antenna or a $\frac{1}{4}$ wavelength vertical antenna. The supplied antenna will be the only one authorized for use with the MeshStamp®. Both antennas have a unique antenna connector to mate to the MeshStamp®. For some products designed and manufactured exclusively by Axiometric, a shortened $\frac{1}{4}$ wavelength antenna is permanently attached to the MeshStamp® instead of the antenna coupler. For other products designed exclusively by Axiometric, the reverse polarity SMA connector is mounted to the enclosure and connected to the MeshStamp by a short run of coaxial cable. In all of these cases, the antenna supplied by Axiometric is the only antenna authorized for use by the customer. Antennas are pictured below.

For the Limited Modular Approval case:

Axiometric intends to embed the MeshStamp® into products designed and manufactured exclusively by Axiometric. Some of these applications require using a coax cable to route the RF signal from the MeshStamp® to an antenna mounted to the enclosure of the new product. The anticipated antennas for this case is the 5.5 dBi gain vertical.



5. The modular transmitter must be tested in a stand-alone configuration, i.e., the module must not be inside another device during testing. This is intended to demonstrate that the module is capable of complying with Part 15 emission limits regardless of the device into which it is eventually installed. Unless the transmitter module will be battery powered, it must comply with the AC line conducted requirements found in Section 15.207. AC or DC power lines and data input/output lines connected to the module must not contain ferrites, unless they will be marketed with the module (see Section 15.27(a)). The length of these lines shall be length typical of actual use or, if that length is unknown, at least 10 centimeters to insure that there is no coupling between the case of the module and supporting equipment. Any accessories, peripherals, or support equipment connected to the module during testing shall be unmodified or commercially available (see Section 15.31(i)).

The MeshStamp® was tested in a stand-alone configuration. The MeshStamp® is battery powered.

6. The modular transmitter must be labeled with its own FCC ID number, and, if the FCC is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: XYZMODEL1" or "Contains FCC ID: XYZMODEL1." Any similar wording that expresses the same meaning may be used. The Grantee may either provide such a label, an example of which must be included in the application for equipment authorization, or, must provide adequate instructions along with the module which explain this requirement. In the latter case, a copy of these instructions must be included in the application for equipment authorization.

The MeshStamp® has a label with the FCC ID number. The requirements for proper labeling are contained in the user's manual.

7. The modular transmitter must comply with any specific rule or operating requirements applicable to the transmitter and the manufacturer must provide adequate instructions along with the module to explain any such requirements. A copy of these instructions must be included in the application for equipment authorization. For example, there are very strict operational and timing requirements that must be met before a transmitter is authorized for operation under Section 15.231. For instance, data transmission is prohibited, except for operation under Section 15.231(e), in which case there are separate field strength level and timing requirements. Compliance with these requirements must be assured.

15.231 is not applicable to the MeshStamp®

8. The modular transmitter must comply with any applicable RF exposure requirements. For example, FCC Rules in Sections 2.1091, 2.1093 and specific Sections of Part 15, including 15.319(i), 15.407(f), 15.253(f) and 15.255(g), require that Unlicensed PCS, UNII and millimeter wave devices perform routine environmental evaluation for RF Exposure to demonstrate compliance. In addition, spread spectrum transmitters operating under Section 15.247 are required to address RF Exposure compliance in accordance with Section 15.247(b)(4). Modular transmitters approved under other Sections of Part 15, when necessary, may also need to address certain RF Exposure concerns, typically by providing specific installation and operating instructions for users, installers and other

interested parties to ensure compliance.

Specific instructions for RF exposure are addressed in the user's guide.