



26 January 2016

Federal Communications Commission
Authorization and Evaluation Branch
7435 Oakland Mills Road
Columbia, MD 21046

Subject: Limited Modular Approval Request for 2AGSF-S001

Dear Application Examiner,

Sensor Industries is requesting limited modular approval for the following module, 2AGSF-S001

The following paragraphs detail the requirements for modules and explain how the module meets those requirements. Where requirements are not met a justification for a limited modular approval is presented.

FCC §15.212 Requirements for Single Modular Transmitters (includes RSS GEN Section 3.2.2)

(a) Single modular transmitters consist of a completely self-contained radiofrequency transmitter device that is typically incorporated into another product, host or device. Split modular transmitters consist of two components: a radio front end with antenna (or radio devices) and a transmitter control element (or specific hardware on which the software that controls the radio operation resides). All single or split modular transmitters are approved with an antenna. All of the following requirements apply, except as provided in paragraph (b) of this section.

(1) Single modular transmitters must meet the following requirements to obtain a modular transmitter approval.

(i) The radio elements of the modular transmitter must have their own shielding. The physical crystal and tuning capacitors may be located external to the shielded radio elements.

The transmitter of the 2AGSF-S001 module is shielded by means of metalized shield. It is bonded to the ground plane of the PCB at multiple locations. The wavelength at 900MHz is ~33cm. The shielding is designed so that any gaps are shorter than 1/20 of the wavelength. The PCB has been designed with a solid ground plane under the RF components to work in conjunction with the shield to provide an effective Rf shield for the module.



(ii) 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.

All data inputs are buffered through the embedded processor. All data inputs are for sensing only and have no affect on the modulation scheme being used. There are no modulation inputs on the device.

(iii) The modular transmitter must have its own power supply regulation.

The module contains its own power supply regulation and the rf reference oscillator is contained within the module. Power supply regulation is provided via the CC1110 SOC. This device uses internal voltage regulators to generate the proper voltages for the internal circuitry from the wide input range of 2.0V to 3.9V.

(iv) The modular transmitter must comply with the antenna and transmission system requirements of §§15.203, 15.204(b) 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). The “professional installation” provision of §15.203 is not applicable to modules but can apply to limited modular approvals under paragraph (b) of this section.

The module utilizes a permanently attached wire antenna with a gain of 0dB.

(v) The modular transmitter must be tested in a stand-alone configuration, i.e., the module must not be inside another device during testing for compliance with part 15 requirements. Unless the transmitter module will be battery powered, it must comply with the AC line conducted requirements found in §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 §15.27(a)). The length of these lines shall be the 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 and commercially available (see §15.31(i)).

Test data contained in this application is for the device tested in a stand-alone configuration. Radiated spurious emissions data demonstrating compliance with the requirements of Part 15 of the FCC rules for intentional radiators and RSS GEN/RSS 210 has been provided.

The module is intended for battery powered host systems. The device would be limited to



battery powered devices.

(vi) The modular transmitter must be equipped with either a permanently affixed label or must be capable of electronically displaying its FCC identification number.

(A) If using a permanently affixed label, the modular transmitter must be labeled with its own FCC identification number, and, if the FCC identification number 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.

(B) If the modular transmitter uses an electronic display of the FCC identification number, the information must be readily accessible and visible on the modular transmitter or on the device in which it is installed. If the module is installed inside another device, then the outside of the device into which the module is installed must display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC certified transmitter module(s)." Any similar wording that expresses the same meaning may be used. The user manual must include instructions on how to access the electronic display. A copy of these instructions must be included in the application for equipment authorization.

The module is labeled with a permanent etched copper FCC ID on the PCB as shown in the attachment for this application. The module is intended to be used in only Sensor Industries host devices and all labeling will be controlled and applied by Sensor Industries.

(vii) The modular transmitter must comply with any specific rules or operating requirements that ordinarily apply to a complete 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.

The module complies with the specific rules and operating requirements for which certification is sought. The module is intended to be used in only Sensor Industries host devices and all complete transmitter devices will be controlled by Sensor Industries.

(viii) The modular transmitter must comply with any applicable RF exposure requirements in its final configuration.

The module meets the requirements for a portable device that may be used at separation distances of less than 5mm from the human body.

RSS GEN Checklist		
Modular approval requirement	Yes	No *
(a) The radio elements must have the radio frequency circuitry must be shielded. Physical/discrete and tuning capacitors may be located external to the shield, but must be on the module assembly.	✓	X
(b) The module shall have buffered modulation/data input(s) (if such inputs are provided) to ensure that the module will comply with the requirements set out in the applicable RSS standard under conditions of excessive data rates or over-modulation.	✓	X
(c) The module shall have its own power supply regulation on the module. This is to ensure that the module will comply with the requirements set out in the applicable standard regardless of the design of the power supplying circuitry in the host device which houses the module.	✓	X
(d) The module shall comply with the provisions for external power amplifiers and antennas detailed in this standard. The equipment certification submission shall contain a detailed description of the configuration of all antennas that will be used with the module.	✓	X
(e) The module shall be tested for compliance with the applicable standard in a stand-alone configuration, i.e. the module must not be inside another device during testing.	✓	X
(f) The module shall comply with the Category I equipment labelling requirements.	✓	X
(g) The module shall comply with applicable RSS-102 exposure requirements, which are based on the intended use/configurations.	✓	X
(h) Is the modular device for an Industry Canada licensed exempt service?	✓	X

* Please refer to the previous sections for a detailed explanation if the answer is "No."