Request For Modular Approval

DA 00-1407 "PART 15 UNLICENSED MODULAR TRANSMITTER APPROVAL" provides guidelines for obtaining modular approval. OmniSense LLC is seeking Limited Modular Approval (LMA) for its S-1 wireless transceiver module and is providing this cover letter as requested in DA 00-1407.

LMA is sought because the module does not meet the requirement of having its own RF shielding. OmniSense LLC is seeking a waiver of this requirement based on the following observations and stipulations:

1. The module will not be resold. It will only be incorporated into OmniSense LLC's own products, and OmniSense LLC will therefore retain control over the final installation of the device, such that compliance of the end product is assured
2. All compliance testing was done with no shielding, and the module met the applicable regulations in all instances with significant margin.
3. In one expected use of the module it will be incorporated into a "gateway" device which is AC wall transformer powered. During testing of the module it was tested in this configuration for FCC Class B conducted emissions and compliance was verified. It was also tested for radiated harmonics in this configuration and it was verified that there was little difference in harmonic power between the standalone module and the "gateway" which incorporated the module.
4. The module's maximum measured conducted power is 8.5 dBm, well below the 1 Watt/30dBm maximum allowed, further reducing the need for RF shielding.
5. The module will be used in three OmniSense Products and was tested in all the configurations in which it would be used. Specifically it will be used in the following products:
    a. Sensor – as a Sensor the module will operate standalone from a battery with no additional circuitry. The S-1 module was tested in this configuration.
    b. Gateway – as a Gateway the S-1 module will connect to an adjacent PCB via a connector. A Gateway was tested as described in (3) above.
    c. Installer – as an Installer the module will operate standalone with no additional circuitry in a plastic enclosure in virtually the same configuration as a Sensor with the following exception :
        i. It has an audible alarm/beeper
        ii. It has a connecter for optional 9600 baud serial interface. The S-1 module was tested both with (configured as a Gateway) and without (configured as a Sensor) a device connected to the interface and we noted decreased emissions when tested with the interface terminated on the Gateway.

The requirements listed in DA 00-1407 have been copied here and our responses are provided.

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.

The module does not have its own RF shielding. We are therefore seeking LMA for the reasons outlined above.

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.*

   All data inputs pass through a microcontroller which digitally controls the RF transceiver chip.

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 transceiver chip used is the Nordic NRF905. Its specification states in part "nRF905 is an extremely robust RF device due to internal voltage regulators". The nRF905 has an on-chip 1.8 Volt regulator ensuring stable and predictable RF performance over a wide 1.9-3.6V external supply range.

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*

   The antenna is soldered to the PCB and is therefore permanently attached.

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 module will be used both in standalone battery powered applications and in AC wall transformer powered applications. It was tested in both configurations as described above.

6. *The modular transmitter must be labeled with its own FCC ID number, and, if the FCC ID 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 module has the text "FCC ID RY20001" silk-screened on the PCB. When this is not visible because the module is incorporated inside another device the following label will be used:

   Contains Transmitter Module FCC ID: RY20001

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.*

   OmniSense LLC will not sell the module to 3rd parties and will only use it in its own products. Furthermore there is no known way to manipulate the module's external digital control signals to result in non-compliant transmitter behavior.

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.

See our response to **DA 00-705, RF Exposure Compliance Requirements**.