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Attn: Reviewing Engineer,
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RE: Modular Ubitag V2.0HH, FCC ID SEAMOD21HH

To the Reviewing Engineer:

The following outlines how Ubisense's Modular Ubitag V2.0HH module meets the FCC's requirements 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.

The Modular Ubitag V2.0HH device is equipped with a metal RF shield enclosure that is soldered to the PCB and physically encompasses the entire RF circuit, including the frequency-determining element.

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 to the Modular Ubitag V2.0HH are buffered, interfaced and controlled by the on-board microcontroller. There are no direct connections between the external interfaces of the module and the modulation circuits within the radio, and so the radio will never experience excessive data rates or over-modulation.

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 Modular Ubitag V2.0HH receives power from the host system. The 2.3-5.25V input power rail is filtered and regulated on board the Modular Ubitag V2.0HH to generate an internal 2.1V domain. The power regulation topology may be seen in the block diagram attached to this application.

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 Modular Ubitag V2.0HH has two integral antennas, a UWB antenna and a 2.4GHz antenna. Both are permanently attached to the module PCB.

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 Modular Ubitag V2.0HH was able to be tested in a standalone configuration where only power was supplied by feed wires. There were no ferrites located on the power supply feed lines.

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 Modular Ubitag V2.0HH will be labelled as “FCC ID: SEAMOD21HH” on the module’s RF shield. Examples of the labelling used on the module are included in the submitted package. The User’s Manual also outlines the labelling requirements when embedding this module.

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.

The local microcontroller contained on the Modular Ubitag V2.0HH controls all parameters critical to meeting the requirements of Part 15. Users who will be integrating this module into their own devices will not have the capability to operate the module outside of the Part 15 requirements. In particular, in accordance with Part 15.519, the firmware in the microcontroller ensures that the Modular Ubitag V2.0HH will cease transmission within 10 seconds unless it receives an acknowledgement from an associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by Modular Ubitag V2.0HH at least every 10 seconds or it will cease transmitting.

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.

There are no RF exposure requirements for UWB devices operating under subpart F, or for 2.4GHz devices operating under Part 15.249 of the FCC Rules and Regulations.

Sincerely,

A handwritten signature in black ink, consisting of a large, stylized 'A' followed by a series of loops and a final flourish.

Dr Andy Ward
Chief Technology Officer