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AmericanTCB
6731 Whittier Avenue
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Attn: Director of Certification

RE: FCC ID: MCQ-50M1380/ IC: 1846A-50M1380 submittal as modular device

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 Wi-Wave module is designed such that all RF components and circuitry are placed on the top surface (component side) of the PCB. No RF related circuitry is present on the bottom surface of the PCB. A formed metal shield is soldered onto the top of the PCB and covers all RF components and circuitry.

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.

The user data enters the Wi-Wave module by way of the USB data port. The USB formatted data is first processed by the USB Peripheral Controller and then presented to the Wi-Fi Baseband Controller which is implemented in an FPGA. This FPGA buffers all of the user data that is to be transmitted. After buffering the user data, the baseband controller packetizes and transmits the user data at data rates that are completely controlled by the baseband controller and its associated software. The user has no access to either the baseband controller or its software.

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 entire RF section of the Wi-Wave modular transmitter is powered by dedicated, low drop out regulators. These regulators include a dual output 2.85V +/-5% low drop out regulator used to power the small signal RF circuitry, and a 2.875V +/-5% low drop out regulator used to power the RF power amplifier circuitry. These regulators are supplied from the system +3.3V power and are capable of maintaining their respective output voltages with a system input voltage of $V_{in} > 2.995V$. The system input voltage, V_{in} , of the Wi-Wave module is specified as 3.3V +/- 9% (3.003V to 3.597V).

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 Wi-Wave module uses two U.FL type of antenna connectors. The U.FL connectors provide for unique antenna cable connections used to support external antennas.



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- 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 Wi-Wave module is designed to be compliant with all relevant FCC requirements without any additional shielding or filtering. As tested, the Wi-Wave module was mounted on top of a carrier board which provided the +3.3VDC power to the module and a standard USB interface to communicate with the module. These interfaces are made available via the PCIe Express Mini Card edge connector; no cabling is involved. The carrier board drives the +3.3VDC from an on card DC-to-DC converter which is, in turn, powered by an external 12VDC power supply which is AC mains powered. There are no additional filters associated with the module and/or carrier board. Nor is there any additional shielding associated with the setup -- beyond the shield that is soldered to the module.

- 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 Wi-Wave module will have the following label attached in plain view: (SAMPLE LABEL)



In addition, the Hardware Reference Manual, which ships with the Wi-Wave module, will contain the following text:

"If the FCC ID is not visible when 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 FCC ID. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: MCQ-50M1380/IC: 1846A-50M1380."



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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.

There are no operational requirements for 15.247

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.

The Wi-Wave module complies with the RF exposure limits for humans as called out in RSS-102. It is exempt from RF evaluation based on its operating frequency of 2.4 GHz, and effective radiated power less than the 3 watt requirement for a mobile device (>20 cm separation) operating at 2.4 GHz.