

December 4th, 2008.

AmericanTCB
6731 Whittier Avenue
McLean VA 22101

Attn: Director of Certification

RE: FCC ID: LVCTR03 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 FCC Part 15 and Industry Canada 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.

All parts of the RF circuit are shielded. The module consist of 3 boards:

- Antenna board with the antenna coil for generating the RF H-field.
- Antenna controller board, containing the transmitter, receiver and carrier frequency crystal oscillator.
- Digital board, containing the microprocessor, serial communication circuits and the power supplies.

The 3 boards are stacked in the order listed, with multi-pin interconnections.

The antenna coil (two turns, app. 78 mm in diameter) is completely covered by a shield, and the center of the PCB acts as a shield for the receiver front end. The antenna controller board has a continuous ground plane, and the majority of the circuit is placed on the underside of the board. The ground plane on the digital board acts as a shield for the antenna controller. The ground connection between the digital board and the antenna controller is made by multiple ground connections in the 80 pin connector in the center of the board, and through 3 brass stand-offs. The digital board contains no RF circuits, and the CPU core is placed on the top side of the board. The bottom of the digital board contains only IO connectors, decoupling capacitors and a battery socket. The rear side of the antenna board is covered by a ferrite rubber shield to eliminate influence from nearby metal surfaces.

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 and Industry Canada requirements under conditions of excessive data rates or over-modulation.

There is no direct connection from the outside to the modulation circuit. The on-board microprocessor receives commands and data packets and modulates the RF field accordingly.

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



The module regulates the incoming power before feeding it to the transmitter and controller circuit. The module is designed to operate from input voltages from 8Vdc to 24Vdc. This voltage gets regulated to 4.6V, which is used for powering the analog receiver circuit. The 4.6V is regulated down to 3.3V for powering the transmitter and digital control circuits.

4. The modular transmitter must comply with the antenna requirements of FCC Sections 15.203 and 15.204(c) and Industry Canada requirements. 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 FCC Section 15.203 may not be applied to modules.

The antenna is connected to the antenna controller through a 32 pin miniature board to board connector.

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 FCC Part 15 and Industry Canada 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 FCC 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 FCC 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 FCC Section 15.31(i)).

The module is a stand alone unit, not requiring support equipment for its operation. The unit was tested without any additional shielding or ferrites.

6. The modular transmitter must be labeled with its own FCC ID / IC number, and, if the FCC ID / IC 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 / IC: XXX-YYYY” or “Contains FCC ID: XYZMODEL1 / IC: XXX-YYYY.” Any similar wording that expresses the same meaning may be used. The Applicant 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.

A label with the modules FCC ID number is permanently attached to the digital controller board next to the power-supply/comms connector. If the module is integrated in a device, the device will be fitted with a label as specified in the user manual:

"IMPORTANT FCC NOTICE

When the Tri-Reader 3 is installed into a device, such that the FCC ID number on the Tri-Reader 3 is not visible from the outside of the device, an additional label must be provided. This

additional label must be placed on the outside of the device so as to be visible before installation of the device.

This label must show the following wording:

"Contains FCC ID: LVCTR03"

This must be a permanent label that has a life expectancy at least equal to that of the life of the equipment to which it is attached. The text must be legible, with good contrast and a minimum of 8 point type size.

This is a mandatory legal requirement of the FCC. Failure to provide such marking invalidates the FCC's authorization for operation of the Tri-Reader 3."

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 FCC Section 15.231 and Industry Canada specifications. For instance, data transmission is prohibited, except for operation under FCC Section 15.231(e), in which case there are separate field strength level and timing requirements. Compliance with these requirements must be assured.

We are not aware of any such requirements. The module operates in compliance with the protocol specified in ISO14443.

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 FCC 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. Refer to Industry Canada RSS-GEN Section 7.1.1 and 7.1.2 for Industry Canada requirements.

The module meets the RF exposure requirements. The module operates at 13.56MHz, where the absorption rate in the human body is very low. The emitted magnetic field strength is compliant with ISO14443.