

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 noncompliant operation.

The transmitter used in the system is a standard Bluetooth radio (PBA 313 05) with equipped with a shielding box on the upper side. Shielding on the PCB-side is assured by a GND plane in one of the inner layers of the PCB.



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 radio frequency characteristics of the module are identical to those of Bluetooth. A Gaussian-shaped, binary FSK modulation is applied with a BT product of 0.5. The modulation index is between 0.28 and 0.35, corresponding to a frequency deviation of 140 kHz to 175 kHz. This is a characteristic of the used transmitter which can not be influenced. The module is made for industrial applications with specified maximum data rate. There are two interfaces implemented. One is a 1-bit logical input and the other one is a SPI-interface able to handle 32bit information in in- and outputdirection. If the trigger rate is too high the module is able to store one event until the last event is transmitted. If there would be a second event during this time the module would transmit an error message.

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 10V is connected to a DC/DC converter to create a regulated 3V (nominal) supply voltage for the module. The 10V is monitored at the module. The 3V regulator on the module will be turned on at a voltage of $>7,6V$ and turned off at a voltage of $<3,6V$. The supply voltage for the transmitter is generated with a low-dropout regulator out of the regulated 3V supply and is slightly lower than the 3V. In practice it's also possible to feed the system with a regulated 3.1V supply where also the supply for the transmitter will be generated by the low-dropout regulator.

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 connection pads for the antenna are especially designed for a customized antenna made for this module. There are no additional antenna connectors mounted. The antenna is part of the module.

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)).

Tests have been done at CETECOM test laboratories in Saarbrücken, Germany.

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

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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.

The RF behaviour of the module is defined by the used standard BT Radio. This can't be influenced (shielding effects neglected) from the device where the module would be mounted in.