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OptiDuo RFID Radio Modular Approach	D0000063168

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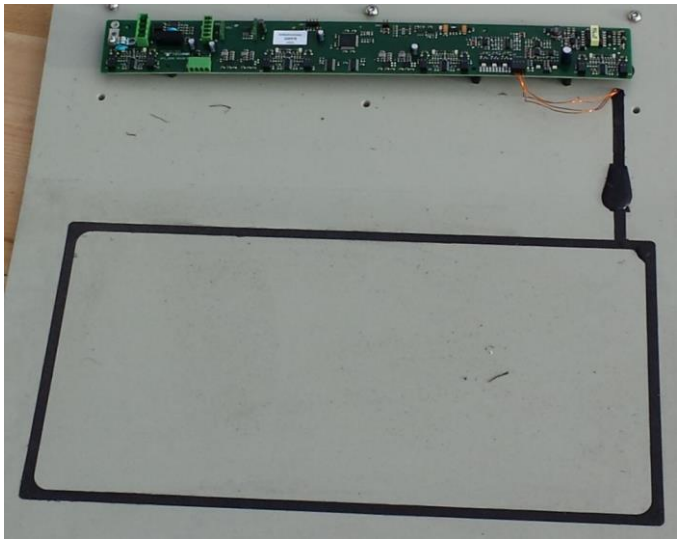
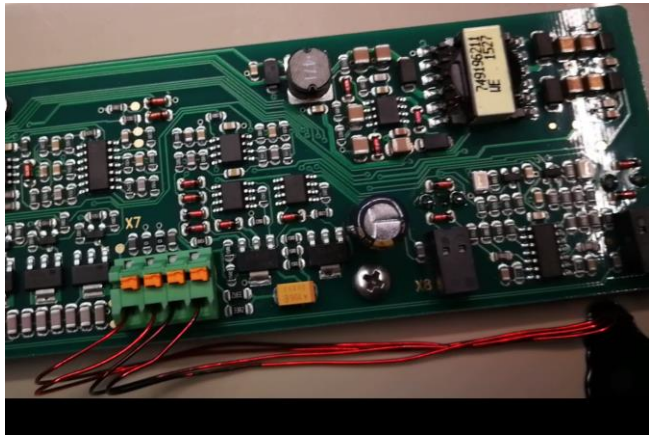
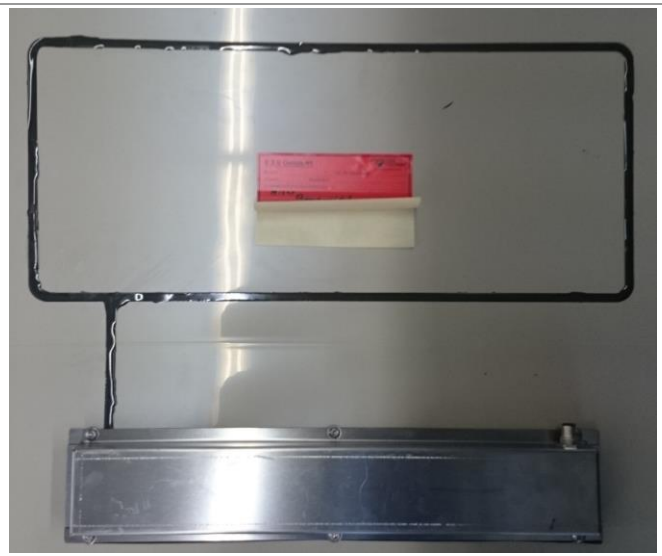
FCC 15 part 15.212 - FCC modular radio approval

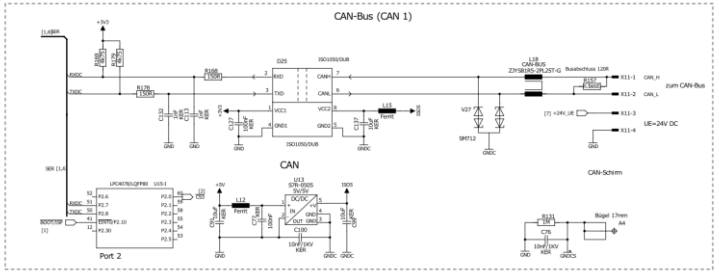
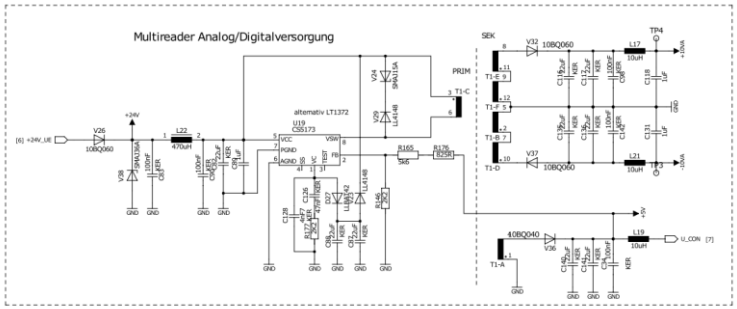
Discussion of requirements of '47 Part 15 part 15.212 - FCC modular radio approval' in reference to the OptiDuo positioning system

Requirements review

FCC 15 part 15.212	Investigation/Comments	Status
(a) Single modular transmitters consist of a completely self-contained radiofrequency transmitter device that is typically incorporated into another product, host or device.	OptiDuo positioning module (called AFC_SENS) is a single modular transmitter. The evidences for that statement are in text below	PASSED
Split modular transmitters consist of two components: a radio front end with antenna (or radio devices) and a transmitter control element (or specific hardware on which the software that controls the radio operation resides).	N/A	N/A

All single or split modular transmitters are approved with an antenna. All of the following requirements apply, except as provided in paragraph (b) of this section.	AFC_SENS is equipped with antenna, which is fixed connected to the transceiver/receiver PCB board.  *Figure 1*  *Figure 2*	PASSED

FCC 15 part 15.212	Investigation/Comments	Status
(1) Single modular transmitters must meet the following requirements to obtain a modular transmitter approval.	-	-
(i) The radio elements of the modular transmitter must have their own shielding. The physical crystal and tuning capacitors may be located external to the shielded radio elements.	 *Figure 3*	PASSED

FCC 15 part 15.212	Investigation/Comments	Status
(ii) 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.	No modulation inputs AFC_SENS has CAN bus for communication with the OptiDuo control module.  *Figure 4*	PASSED
(iii) The modular transmitter must have its own power supply regulation.	AFC_SENS module is supplied with 24Vdc (terminal X11: 24Vdc pin 3, GND pin 4) and the receiver/transceiver part is supplied from the on-board voltage regulator.  	PASSED
(iv) The modular transmitter must comply with the antenna and transmission system requirements of §§15.203, 15.204(b) and 15.204(c).	-	
§15.203 Antenna requirement.		
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.		PASSED

FCC 15 part 15.212	Investigation/Comments	Status
The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.	The antenna board is also fixture for the AFC_SENS PCB and that protect against use other antenna. Connection with AFC_SENS PCB is via terminal block and not with a standard RF socket.	PASSED
The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	Only that set (antenna with fixture board) can be used as a spare part for the AFC_SENS	PASSED
This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236.	N/A	N/A
Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	N/A	N/A

FCC 15 part 15.212	Investigation/Comments	Status
§15.204 External radio frequency power amplifiers and antenna modifications. (b) A transmission system consisting of an intentional radiator, an external radio frequency power amplifier, and an antenna, may be authorized, marketed and used under this part. Except as described otherwise in this section, when a transmission system is authorized as a system, it must always be marketed as a complete system and must always be used in the configuration in which it was authorized.	**N/A**	N/A
§15.204 External radio frequency power amplifiers and antenna modifications. (c) An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator. An intentional radiator may be authorized with multiple antenna types. Exceptions to the following provisions, if any, are noted in the rule section under which the transmitter operates, e.g., §15.255(b)(1)(ii) of this part. (1) The antenna type, as used in this paragraph, refers to antennas that have similar in-band and out-of-band radiation patterns. (2) Compliance testing shall be performed using the highest gain antenna for each type of antenna to be certified with the intentional radiator. During this testing, the intentional radiator shall be operated at its maximum available output power level. (3) Manufacturers shall supply a list of acceptable antenna types with the application for equipment authorization of the intentional radiator. (4) Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with, and used with, that intentional radiator. No retesting of this system configuration is required. The marketing or use of a system configuration that employs an antenna of a different type, or that operates at a higher gain, than the antenna authorized with the intentional radiator is not permitted unless the procedures specified in §2.1043 of this chapter are followed.	N/A	N/A
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).	Antenna is permanently connected to the base. The connection cable are part of antenna	PASSED
The “professional installation” provision of §15.203 is not applicable to modules but can apply to limited modular approvals under paragraph (b) of this section.	N/A	N/A

FCC 15 part 15.212	Investigation/Comments	Status
(v) The modular transmitter must be tested in a stand-alone configuration, i.e., the module must not be inside another device during testing for compliance with part 15 requirements. Unless the transmitter module will be battery powered, it must comply with the AC line conducted requirements found in §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 §15.27(a)). The length of these lines shall be the 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 and commercially available (see §15.31(i)).	See report 1811796-001 Ed4	PASSED
(vi) The modular transmitter must be equipped with either a permanently affixed label or must be capable of electronically displaying its FCC identification number.	[2018-07-17] New label for the AFC_SENS. Update in progress [2019-02-19] Label created	PASSED
(A) If using a permanently affixed label, the modular transmitter must be labeled with its own FCC identification number, and,	[2018-07-17] New label for the AFC_SENS. Update in progress [2019-02-19] Label created	PASSED
if the FCC identification 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" or "Contains FCC ID: XYZMODEL1." Any similar wording that expresses the same meaning may be used.	[2018-07-17] Update the OptiDuo type plate with text **"Contains FCC ID: XYZMODEL1."**. Update in progress [2019-02-19] Label created with text **"Contains FCC ID: UCS-OPTIDUOV1"**	PASSED
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.		PASSED

FCC 15 part 15.212	Investigation/Comments	Status
(B) If the modular transmitter uses an electronic display of the FCC identification number, the information must be readily accessible and visible on the modular transmitter or on the device in which it is installed. If the module is installed inside another device, then the outside of the device into which the module is installed must display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains FCC certified transmitter module(s).” Any similar wording that expresses the same meaning may be used. The user manual must include instructions on how to access the electronic display. A copy of these instructions must be included in the application for equipment authorization.	N/A	N/A
(vii) The modular transmitter must comply with any specific rules or operating requirements that ordinarily apply to a complete 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.	N/A	N/A
(viii) The modular transmitter must comply with any applicable RF exposure requirements in its final configuration.	-	-
(2) Split modular transmitters must meet the requirements in paragraph (a)(1) of this section, excluding paragraphs (a)(1)(i) and (a)(1)(v), and the following additional requirements to obtain a modular transmitter approval.	N/A	N/A
(i) Only the radio front end must be shielded. The physical crystal and tuning capacitors may be located external to the shielded radio elements. The interface between the split sections of the modular system must be digital with a minimum signaling amplitude of 150 mV peak-to-peak.	N/A	N/A
(ii) Control information and other data may be exchanged between the transmitter control elements and radio front end.	N/A	N/A
(iii) The sections of a split modular transmitter must be tested installed in a host device(s) similar to that which is representative of the platform(s) intended for use.	N/A	N/A

FCC 15 part 15.212	Investigation/Comments	Status
(iv) Manufacturers must ensure that only transmitter control elements and radio front end components that have been approved together are capable of operating together. The transmitter module must not operate unless it has verified that the installed transmitter control elements and radio front end have been authorized together. Manufacturers may use means including, but not limited to, coding in hardware and electronic signatures in software to meet these requirements, and must describe the methods in their application for equipment authorization.	N/A	N/A
(b) A limited modular approval may be granted for single or split modular transmitters that do not comply with all of the above requirements, e.g., shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation, if the manufacturer can demonstrate by alternative means in the application for equipment authorization that the modular transmitter meets all the applicable part 15 requirements under the operating conditions in which the transmitter will be used. Limited modular approval also may be granted in those instances where compliance with RF exposure rules is demonstrated only for particular product configurations. The applicant for certification must state how control of the end product into which the module will be installed will be maintained such that full compliance of the end product is always ensured.	N/A	N/A