

**1 Test Sample Description:**

Product Name: Pot Receiver

Functional Description: The device is a rechargeable battery-powered RF transceiver that controls the solenoid valve on industrial abrasive blasting equipment based on signals received from a paired transceiver.

Power supply: Internal Battery

**LoRa:**

Frequency Range: 903 – 927 MHz

Mode of operation: DTS

Antenna Description: ISM 868/915MHz Flexible, Peak Gain (dBi) =1 dBi

Transmitter Category: Portable (A transmitting device designed to be used in other than fixed locations and to generally be used in such a way that the RF source's radiating structure(s) is/are within 20 centimeters of the body of the user.)

**Reference Standards**

§ 1.1310: Radiofrequency radiation exposure limits.

§ 2.1093: Radiofrequency radiation exposure evaluation: portable devices.

§ 1.1307(b)(3)(i)(b): For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section)

KDB 447498 D01 General RF Exposure Guidance v06

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## 2 Determination of exemption.

As per KDB 447498 D01 General RF Exposure Guidance v06 clause 4.3. General SAR test exclusion guidance

The standalone 1-g and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition(s), listed below, is (are) satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.

The minimum test separation distance defined in 4.1 f) is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.

Step a) For 100 MHz to 6 GHz and test separation distances  $\leq 50$  mm

The 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$[(\text{max power of channel (mW)}) / (\text{min test separation distance (mm)})] \times \sqrt{f(\text{GHz})} \leq 3.0 \text{ for } 1 - g \text{ SAR or } \leq 7.5 \text{ for } 10 - g \text{ extremity SAR}$$

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm is applied to determine SAR test exclusion.

## 3 Calculation:

Test separation distance: 5 mm

- Using the tune-up tolerance 17.0 dBm output power and a duty cycle of 6%, this calculation is:

$$(50 \text{ mW} * 0.06 / 5 \text{ mm}) * \text{sqrt}(0.927) = 0.6 < 3.0$$

- During pairing, the duty cycle increases to 37.5%, but the output power decreases to 10 mW and the exposure remains low:

$$(10 \text{ mW} * 0.375 / 5 \text{ mm}) * \text{sqrt}(0.927) = 0.7 < 3.0$$

TX (Mode)	Frequency (MHz)	Max Conducted RF Output (measured) 100% Duty Cycle (dBm)	Max. antenna gain (dBi)	EIRP 100% Duty Cycle (dBm)	EIRP 100% Duty Cycle (mW)	EIRP time average 6% Duty Cycle (mW)	Result	Limit for 1 - g SAR	Limit for 10 - g extremity SAR	Conclusion
LoRa 500 KHz DTS	903.0	15.26	1	16.26	42.3	2.54	0.5	3	7.5	Exempt for SAR
	915.0	15.53	1	16.53	45	2.7	0.5	3	7.5	Exempt for SAR
	927.0	15.26	1	16.26	42.3	2.54	0.5	3	7.5	Exempt for SAR
Tune-Up tolerance output power		17	1	18	63.1	3.8	0.7	3	7.5	Exempt for SAR

#### **4 MPE Separation distance justification:**

The pot receiver is connected to an abrasive blasting "pot", simply referred to in industry as a "blast pot". Since it is connected to the blast pot using a very short cable extending from the pot receiver, it is accurate to say that the pot receiver is located where the blast pot is located.

Due to the destructive nature of the abrasive blasting environment, operators are forced to position their blast pot out of their working area, or else they would risk blasting their own equipment, causing costly damage and downtime. To allow operators sufficient distancing from their blast pot (and therefore the pot receiver), blast hoses are sold in lengths no shorter than 50 feet, and in most cases lengths of 200 to 300 feet are used due to the setup requirements of most jobs. It is also unsafe for any other individuals on site to stand near a blast pot due to the noise, dust, high-pressure air, and significant risk of blasting media wearing down the inside of the hose, causing it to break, fly around, and cause bodily harm.

Due to these pre-established industry requirements for abrasive blasting setups, its only during paring process pot receiver come within 0.5 cm to an individual.

#### **5 Conclusion:**

The Pot Receiver is for professional use in industrial locations, and the general public is not exposed to the radio.

EUT meet SAR exemption limit