Calculation: RF-Exposure for 915 MHz transmitter

Type identification: **IUH-F192-V1-FR2-02**

In accordance to the **CFR Part 47, §1.1310** and **RSS-102 Issue 5**

S: Limit for power density according to
- CFR Part 47, §1.1310: 6.02 W/m^2
- RSS-102 Issue 5, Table 4: 2.74 W/m^2

P: 457.1 mW (averaged), method of measurement refer next page

G: 7.0 dBi = 5

D: Duty cycle: 100 % = 1

R: Distance in what the limit of S has to be reached: 0.3 m (refer also to the manufacturers installation / user manual)

$$S = \frac{P \cdot G \cdot D}{4 \cdot \pi \cdot R^2} \Rightarrow \underline{\underline{S}} = \frac{0.4571W \cdot 5.0 \cdot 1}{4 \cdot \pi \cdot (0.3m)^2} = \underline{\underline{2.02 \frac{W}{m^2}}}$$

The value of the power density is below the limit of CFR Part 47, §1.1310 for the "General population / Uncontrolled Exposure" and below the limit of RSS-102 Issue 5, Table 4 "General Public (uncontrolled environment)".
Base of the above calculations is the lowest possible frequency in combination with the highest output power of the EUT.

Method of measurement (average output power)

Because the EUT has no antenna connector, which presents the power delivered to the antenna, the average value of the field strength was measured. The method of measurement is described under clause 5.6.1 (final measurement (30 MHz to 1 GHz)) of this test report F152117E1 with the exception that an average detector was used. According to [1] with this the field strength value the radiated power of the EUT was calculated. After subtraction of the antenna gain, which was declared by the manufacturer the average output power was calculated. The used formulas are listed below.

Test results (average output power)

Ambient temperature	22 °C	Relative humidity	36 %

Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied with 24 V DC by an external power supply.

Test results: The test results were calculated with the following formula:

Result [dBµV/m] = reading [dBµV] + cable loss [dB] + antenna factor [dB/m]

Radiated field strength at 3 m OATS (average)									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dBµV/m	dBµV/m	dB	dBµV	dB/m	dB	cm	deg	
902.750	128.8	Carrier	-	102.9	22.5	3.4	104	1	Vert.
914.750	128.8	Carrier	-	102.6	22.8	3.4	101	3	Vert.
927.250	128.1	Carrier	-	101.3	23.4	3.4	100	1	Vert.
Measurement uncertainty				+2.2 dB / -3.6 dB					

The average output power was calculated with the following formula:

Calculated average output power [W] = (field strength [V/m] * measuring distance [m])^2 / 30

This average output power was converted in dBm and the antenna gain was subtracted to get the conducted average output power value.

Frequency	Field strength		Radiated average power		Antenna gain	Conducted average output power	
MHz	dBµV/m	V/m	W	dBm	dBi	dBm	mW
902.750	128.8	2.76	2.291	33.6	7.0	26.6	457.1
914.750	128.8	2.76	2.291	33.6	7.0	26.6	457.1
927.250	128.1	2.55	1.950	32.9	7.0	25.9	389.0

Test equipment used (see chapter 6 of F152117E1):

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