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1.0 Maximum Permissible Exposure Evaluation (Supplements the test report.)

The measured power is considered for the intended use of the device and resulting RF exposure to the user.

1.2 Criteria

Section Reference	Date
KDB 447498 D01 Mobile Portable RF Exposure v05r01 // RSS-102 Issue 4 March 2010, Notice 2013 DRS0911	2015-02-24

1.3 Procedure

Using measurement of peak power and considering the intended application, determine the permissible exposure level, applicability of exclusion, or whether additional exposure tests (SAR) are indicated. When applicable justify conclusion for selected exposure level and separation distance.

1.4 Power to Exposure Calculation

For 2.4 GHz radio power is determined by conducted measurement. For RFID radio power is determined from the measured field strength and with antenna gain included by default. Due to low fundamental power the source duty cycle was not evaluated for either radio. SAR exemption method was applied for 20 mm spacing.

Table 1.4.1 Power Calculation for Exposure, 2.4 GHz Radio (Highest frequency 2.480 GHz)

Measured Conducted Power mW	Calculated Peak EIRP dBm	Source Duty Cycle Factor dB	Antenna Gain dBi	Calculated EIRP dBm	EIRP In Linear Terms mW
0.56	-2.51	0.0	1.5	-1.01	0.8

Table 1.4.2 Power Calculation for Exposure, 13.56 MHz RFID Radio (Highest frequency 13.56 MHz)

Measured Field Strength dBµV/m at 1 m (Peak Detection)	Field Strength Restated for dBµV/m at 3 m (Peak Detection)	Source Duty Cycle Factor dB	Calculated Average Power dBµV/m at 3 m	EIRP In Linear Terms mW
57.74	48.2	0.0	48.2	0.0000198

1.5 SAR Exemption Calculation – 3.0 Criteria, 2.4 GHz Band Radio

Applicable requirement: KDB 447498 Clause 4.3.1 Section 1

Calculation (max power including tune up tolerance = 0.56 mW):

$[(0.8\ mW)/(20\ mm)] \cdot [\sqrt{2.480\ (GHz)}] = 0.063$

$0.063 \leq 3.0$

Therefore, the device meets the applicable FCC SAR exemption requirements.

This device meets the SAR Evaluation Exemption criteria in RSS-102 Clause 2.5.1, based on the output power being less than 20 mW for general public use (2.2 GHz – 3.0 GHz).

1.6 SAR Exemption Calculation – 13.56 MHz RFID Radio

Applicable requirement: KDB 447498 Clause 4.3.1 Section 3

Calculation (max power including tune up tolerance = 0.0000198 mW):

Step 1.

$P_{mW} = 3.0 \times d_{mm} / \sqrt{f} = 3.0 \times 50 / \sqrt{0.01356} = 1288.13$ mW

Step 2.

2) At 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B:[27]

   a) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm)·($f_{(MHz)}$/150)] mW, at 100 MHz to 1500 MHz

   = 1288 mW + [(5mm - 50mm) x (13.56 / 150)] mW

   = 1284 mW Power Threshold for Frequency 100 MHz to 1500 MHz

Step 3.

3) At frequencies below 100 MHz, the following may be considered for SAR test exclusion, and as illustrated in Appendix C:[28]

   b) The power threshold determined by the equation in a) for 50 mm and 100 MHz is multiplied by ½ for *test separation distances* ≤ 50 mm

   = 1284 mW x 0.5

   = 642 mW Power Threshold for Frequency < 100 MHz

Result.

Max Power 0.0000198 mW < 642 mW Power Threshold

Therefore, the device meets the applicable FCC SAR exemption requirements.

This device meets the SAR Evaluation Exemption criteria in RSS-102 Clause 2.5.1, based on the output power being less than 200 mW for general public use (13.56 MHz).

Signed:

Eric Lifsey

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