
Project #: 22457-15

Company: Hubblell Control Solutions

EUT: NXRM2-H

RF Exposure Evaluation Report

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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.

1.1 Applicable Documents

Table 1.1.1: Applicable Documents

Document	Title
RSS-102 Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
KDB 447498 D01 General RF Exposure Guidance v06	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES
OET Bulletin 65 Edition 97-01	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

1.2 Criteria

Section Reference	Test Detail
FCC 47 CFR Part 1 I, 1.1310 // RSS-102, Issue 5	Radiofrequency radiation exposure limits

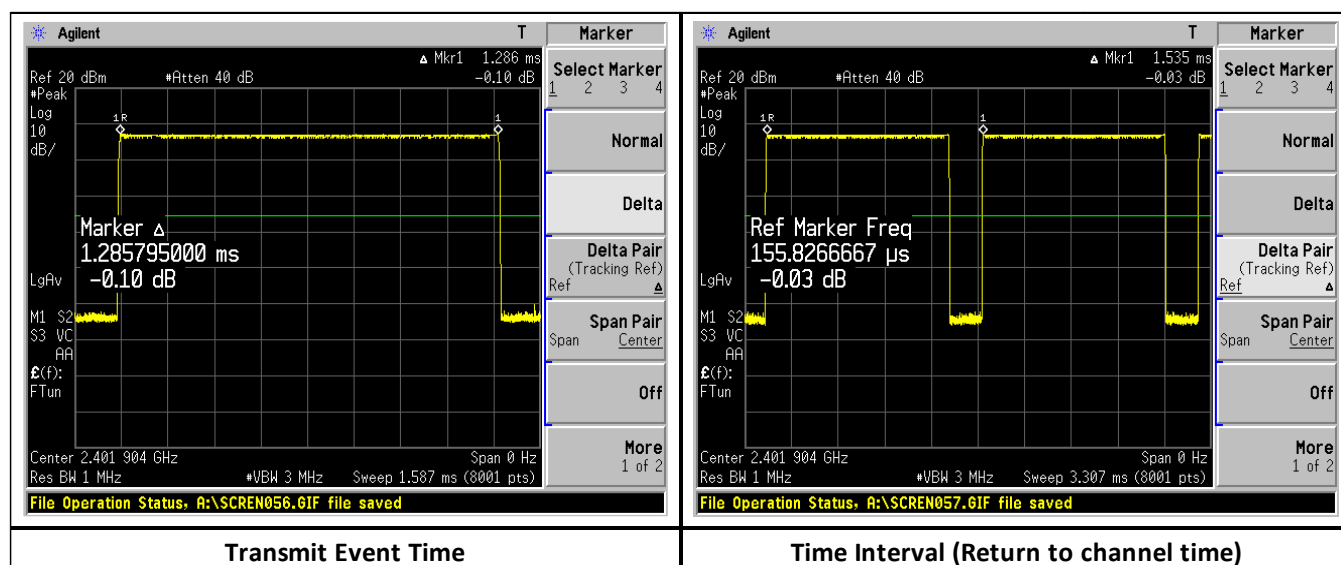
1.3 Duty Cycle Correction Factor Measurement

Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

Continuous packet transmission mode was used for the duty cycle measurement, which would represent a worst-case operating scenario.

On Time (msec)	Time Interval (msec)	Duty Cycle (On Time/Interval)	Exposure Weighing Factor (dB) (10 * Log ₁₀ (Duty Cycle))
1.286	1.535	= 0.84	= -0.77

Plotted measurements appear below:



1.4 Power to Exposure Calculation, Conducted

The EUT transmitter power is determined by conducted measurement. Safe exposure distance was calculated for the allowed maximum uncontrolled public exposure limit. Exposure weighing factor is not used to calculate EIRP, which is the worst case.

Measured Conducted Peak Power (dBm)	Exposure Weighing Factor (dB)	Antenna Gain (dBi)	Corrected Peak Power EIRP (dBm)	EIRP In Linear Terms (mW)
7.09	Not used to get worse case EIRP	5.3	12.39	17.34

1.5 RF MPE Evaluation – FCC

FCC 47 CFR Part 1 I, 1.1310, Radiofrequency radiation exposure limits.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/ <u>f</u>	2.19/ <u>f</u>	*(180/ <u>f</u> ²)	<30
30-300	27.5	0.073	0.2	<30
300-1,500			<u>f</u> /1500	<30
1,500-100,000			1.0	<30

According to table above, the MPE limit for 2400 MHz transmitter shall not exceed power density of 1 mW/cm² at a distance of 20 cm from the EUT.

Calculation:

$$\text{EIRP} = 17.34 \text{ mW} = 0.01734 \text{ W}$$

$$\text{Distance} = d = 20 \text{ cm} = 0.2 \text{ m}$$

$$\text{Power Density} = \text{EIRP} / 4\pi d^2 = 0.01734 / 4 * \pi * (0.2)^2 = 0.034 \text{ W/m}^2 = 0.0034 \text{ mW/cm}^2$$

$$\text{Power Density } 0.0034 \text{ mW/cm}^2 < 1 \text{ mW/cm}^2$$

1.6 RF MPE Evaluation – ISED Canada

RSS-102, Section 2.5.2, Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- 1) below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance)
- 2) at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz
- 3) at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance)
- 4) at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz
- 5) at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance)

Calculation:

Applying equation 4 from section 1.6 for frequency 2400 MHz:

$1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz.

$$\text{Limit} = 1.31 \times 10^{-2} \times 2400^{0.6834} = 2.7 \text{ W}$$

$$\text{EIRP} = 0.01734 \text{ W} < 2.7 \text{ W}$$

1.7 Conclusion

Based on 20 cm separation distance between the user and the EUT, FCC and IC comply with MPE limits.

End of Report