



Test Report

Date : 2021-06-08
No. : HM20020027

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3.1.7 RF Exposure

RF Exposure

Test Requirement: FCC 47CFR 2.1093
 Test Date: 2021-05-06
 Mode of Operation: Tx mode

Requirements:

In 15.407(f), an equipment shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the limits in §§ 1.1310 and 2.1093 of this chapter.

Applications to the Commission for construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities must contain a statement confirming compliance with the limits unless the facility, operation, or transmitter is categorically excluded, as discussed below. Technical information showing the basis for this statement must be submitted to the Commission upon request.

According to § 1.1310: The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	* 100	6
3.0-30	1842/f	4.89/f	* 900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* 100	30
1.34-30	824/f	2.19/f	* 180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density



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Test Results:

An MPE evaluation for was performed in order to show that the device was compliant with §2.1091. The maximum power density was calculated for each transmitter at a separation distance of 20cm. For each transmitter the maximum RF exposure at a 20 cm distance using the formula:

$$\text{Power Density} = (\text{Conducted Power} * \text{Ant. Gain}) / (4\pi * (20\text{cm})^2)$$

Results:

The EUT separation distances is $\geq 20\text{cm}$

The Maximum conducted output power = 18.50 dBm @5825MHz (802.11ac VHT20 - MIMO)

Tune-up power = 19.0dBm (79.43mW)

The Maximum e.i.r.p. = 19.0 dBm + 6.0 dBi = 25.0 dBm (316.23 mW)

$$\text{Power Density} = 0.06291 \text{ mW/cm}^2$$

$$\text{MPE Limit at 5825 MHz} = 1.0 \text{ mW/cm}^2$$

Simultaneous transmission Evaluation

5 GHz Wi-Fi + 2.4 GHz Bluetooth

Refer to Report No. 20/01-0031

The Maximum conducted output power = 7.79 dBm @ 2441 MHz (Bluetooth – 8DPSK)

Tune-up power = 8.00 dBm (6.31 mW)

The 2.4 GHz Bluetooth Maximum e.i.r.p. = 8.00 dBm + 0.29 dBi = 8.29 dBm (6.75 mW)

$$\text{Power Density} = 0.00134 \text{ mW/cm}^2$$

$$\text{MPE Limit at 2441 MHz} = 1.0 \text{ mW/cm}^2$$

$$5 \text{ GHz Wi-Fi} + 2.4 \text{ GHz Bluetooth} = 0.06291 + 0.00134 = 0.06425 \text{ mW/cm}^2$$

Therefore, the RF Exposure evaluation can be exempted.