

7. Measurement Data (continued)

**7.11. Public Exposure to Radio Frequency Energy Levels (15.247(i) (1.1307 (b)(1))
RSS-GEN 5.5, RSS 102**

Requirement: (15.247(i))

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission’s guidelines. Devices are subject to the radio frequency radiation exposure requirements specified in 47CFR 1.1307(b), FCC 47 CFR 2.1091 and 47 CFR 2.1093, as appropriate. All equipment shall be considered to operate in a “general population/uncontrolled” environment.

Conclusion: The device under test is meets radio frequency radiation exposure requirements specified in 47CFR 1.1307(b), § 2.1091 and § 2.1093.

Measurement Results – 2.4 GHz

802.11b Mode Channel Frequency	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm2)	Result
				(mW/cm2)	(W/m2)		
				(1)	(2)		
2412	20.0	23.32	2.5	0.0759549	0.7595488	1	Compliant
2437	20.0	23.59	2.5	0.0808848	0.8088484	1	Compliant
2462	20.0	23.81	2.5	0.0851003	0.8510035	1	Compliant

802.11g Mode Channel Frequency	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm2)	Result
				(mW/cm2)	(W/m2)		
				(1)	(2)		
2412	20.0	21.08	2.5	0.0453828	0.4538285	1	Compliant
2437	20.0	20.34	2.5	0.0382544	0.3825438	1	Compliant
2462	20.0	20.43	2.5	0.0390385	0.3903849	1	Compliant

HT20 Mode Channel Frequency	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm2)	Result
				(mW/cm2)	(W/m2)		
				(1)	(2)		
2412	20.0	21.73	2.5	0.0526749	0.5267491	1	Compliant
2437	20.0	20.34	2.5	0.0382288	0.3822885	1	Compliant
2462	20.0	20.31	2.5	0.0379630	0.3796296	1	Compliant

HT40 Mode Channel Frequency	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm2)	Result
				(mW/cm2)	(W/m2)		
				(1)	(2)		
2422	20.0	20.01	2.5	0.0354355	0.3543550	1	Compliant
2437	20.0	19.60	2.5	0.0322836	0.3228365	1	Compliant
2452	20.0	19.57	2.5	0.0320604	0.3206043	1	Compliant

7. Measurement Data (continued)

7.11. Public Exposure to Radio Frequency Energy Levels (15.247(i) (1.1307 (b)(1))
RSS-GEN 5.5, RSS 102

Measurement Results – 5 GHz

802.11a Mode Channel Frequency	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm ²)	Result
				(mW/cm ²)	(W/m ²)		
				(4)			
5745	20.0	23.09	2.5	0.0720211	0.7202112	1	Compliant
5785	20.0	21.49	2.5	0.0498657	0.4986566	1	Compliant
5825	20.0	19.14	2.5	0.0289926	0.2899262	1	Compliant

HT20 Mode Channel Frequency	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm ²)	Result
				(mW/cm ²)	(W/m ²)		
				(4)			
5745	20.0	23.59	2.5	0.0809225	0.8092253	1	Compliant
5785	20.0	21.81	2.5	0.0537027	0.5370272	1	Compliant
5825	20.0	19.90	2.5	0.0345362	0.3453618	1	Compliant

HT40 Mode Channel Frequency	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm ²)	Result
				(mW/cm ²)	(W/m ²)		
				(4)			
5745	20.0	23.54	2.5	0.0799325	0.7993247	1	Compliant
5785	20.0	22.37	2.5	0.0610970	0.6109701	1	Compliant

$$PD = \frac{OP + AG}{(4 \times \pi \times d^2)}$$

PD = Power Density
 OP = DUT Output Power (dBm)
 AG = Antenna Gain (dBi)
 D = MPE Distance

- Reference CFR 2.1093(b): For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the installer. All other mobile and unlicensed transmitting devices are categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use, except as specified in §§ 1.1307(c) and 1.1307(d) of this chapter.
- Section 7.4 of this test report.
- Data supplied by the client.
- Power density is calculated from field strength measurement and antenna gain.
- Reference CFR 1.1310, Table 1: Limits for Maximum Permissible Exposure (MPE), Section (B): Limits for General Population/Uncontrolled Exposure.

7. Measurement Data (continued)

**7.11. Public Exposure to Radio Frequency Energy Levels (15.247(i), (1.1307 (b)(1))
RSS-GEN 5.5, RSS 102 (cont.)**

Simultaneous Transmission of 2.4 GHz and 5.8 GHz WiFi Radios. The highest levels for each of the modes of operation are summed in the following table.

Worse Case Mode of Operation		MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density		Limit (mW/cm ²)	Result
Mode	MHz				(mW/cm ²)	(W/m ²)		
		(1)	(2)	(3)	(4)		(5)	
802.11b	2462	20.0	23.81	2.50	0.0851003	0.8510035	1	Compliant
802.11a HT20	5745	20.0	23.59	2.50	0.0809225	0.8092253	1	Compliant
DECT	1921.536	20.0	19.83	0.50	0.0214650	0.2146496	1	Compliant
Zigbee	2405	20.0	0.68	3.00	0.0004642	0.0046423	1	Compliant
SUM		20.0	N/A	N/A	0.1879521	1.8795207	1	Compliant

Using Directional Gain = $G_{ant} + 10 * \log_{10} (N_{ant} / N_{ss})$ dBi where N_{ant} is the number of MIMO Antennas, and N_{ss} is the number of spatial streams (1). A consideration for Antenna Array Gain is also calculated in the following table.

Worse Case Mode of Operation		MPE Distance (cm)	DUT Output Power (dBm)	DUT Array Antenna Gain (dBi)	Power Density		Limit (mW/cm ²)	Result
Mode	MHz				(mW/cm ²)	(W/m ²)		
		(1)	(2)	(3)	(4)		(5)	
802.11b	2462	20.0	23.81	7.3	0.2553010	2.5530105	1	Compliant
802.11a HT20	5745	20.0	23.59	7.3	0.2427676	2.4276758	1	Compliant
DECT	1921.536	20.0	19.83	0.5	0.0214650	0.2146496	1	Compliant
Zigbee	2405	20.0	0.68	3.0	0.0004642	0.0046423	1	Compliant
SUM		20.0	N/A	N/A	0.5199978	5.1999782	1	Compliant

However, based upon a recent study by the FCC and KDB 662911 D01 published 5-28-2013, Array Gain for IEEE 802.11 device with antenna arrays less than 4 or channel widths greater than 40 MHz, the value for Array Gain is 0 dB.