



Registration number: W6R22209-22106-C-7  
 FCC ID: GX9HYGWGEN2

**3.2 Equivalent isotropic radiated power (EIRP)**

FCC Rule: 15.247(b)(3)

2.4GHz WiFi

EIRP = max. conducted output power + antenna gain

EIRP = 20.10 dBm+ 2.37 dBi [antenna gain claimed by manufacturer] = 22.47 dBm = 176.60 mW

Zigbee

EIRP = max. conducted output power + antenna gain

EIRP = 12.86 dBm+ 1.2389 dBi [antenna gain claimed by manufacturer] = 14.0989 dBm = 25.70 mW

**3.3 Exemption Limits for Routine Evaluation according to 47 CFR FCC Part 2 Subpart J, section 2.1091**

FCC OET Bulletin 65 Edition 97.01 determines the equations for predicting RF fields and applicable limits.

The prediction for power density in the far-field but will over-predict power density in the near field, where it could be used for walking a “worst case” or conservative prediction.

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 limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20 cm normally can be maintained between the user and the device.

**MPE Calculation Method**

**(A) Limits for Occupational/Controlled Exposure**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

**(B) Limits for General Population/Uncontrolled Exposure**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

\*Plane-wave equivalent power density

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E = Electric field (V/m) P = output power (W) G = EUT Antenna numeric gain (numeric)  
 d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

mW/cm<sup>2</sup>.

Established separation distance is 20 cm.

Band	Mode	Channel	Conducted Power with DF		Combine (dBm)	Antenna Gain (dBi)	Power density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Ratio
			Antenna A (dBm)	Antenna B (dBm)					
2.4GHz	802.11b	Ch 1 : 2412 MHz	18.82	18	-	-	-	-	-
		Ch 6 : 2437 MHz	18.34	20.1	-	ANTB: 2.37	ANTB: 0.0351	1	ANTB: 0.0351
		Ch 11 : 2462 MHz	17.76	19.97	-	-	-	-	-
	802.11g	Ch 1 : 2412 MHz	11.39	11.74	-	-	-	-	-
		Ch 6 : 2437 MHz	13.1	14.07	-	ANTB: 2.37	ANTB: 0.0088	1	ANTB: 0.0088
		Ch 11 : 2462 MHz	12.04	13.99	-	-	-	-	-
	802.11n 20M	Ch 1 : 2412 MHz	9.76	10.4	13.10	-	-	-	-
		Ch 6 : 2437 MHz	10.05	10.45	13.26	Combine: 5.66	Combine: 0.0155	1	Combine: 0.0155
		Ch 11 : 2462 MHz	9.69	10.53	13.14	-	-	-	-
	802.11n 40M	Ch 1 : 2422 MHz	5.02	9.54	10.85	-	-	-	-
		Ch 4 : 2437 MHz	7.21	8.68	11.02	Combine: 5.66	Combine: 0.0092	1	Combine: 0.0092
		Ch 7 : 2452 MHz	6.79	8.79	10.91	-	-	-	-

	Channel	Conducted Power with DF (dBm)	Antenna Gain (dBi)	Power density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Ratio
2.4GHz Zigbee	Ch 11 : 2405 MHz	11.40	-	-	-	-
	Ch 18 : 2440 MHz	8.82	-	-	-	-
	Ch 25 : 2475 MHz	12.86	1.2389	0.0051	1	0.0051

Simultaneous evaluation-

$$0.0351 (2.4G \text{ WLAN}) + 0.0051 (\text{Zigbee}) + 0.0327 (5G \text{ WLAN}) = 0.0729 < 1$$



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**3.6 Automatic Discontinuation of transmission, FCC 15.407 (c)**

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure.

This function will be declared by manufacturer.

**3.7 Reserved, FCC 15.407 (d)**

**3.8 Indoor Operation Restriction, FCC 15.407 (e)**

Within the 5.15–5.25 GHz band, U- NII devices will be restricted to indoor operations to reduce any potential for harmful interference to co-channel MSS operations. This equipment has to be declared by manufacturer of the final product as content of the user manual.

**3.9 Equivalent isotropic radiated power, FCC 15.407 (f)**

FCC Rule: 15.407(b)(3)

NII-1

Test exclusion = max. conducted output power + antenna gain

Test exclusion = 13.58 dBm+(7.69 dBi [antenna gain claimed by manufacturer]) = 21.27 dBm = 133.97 mW

NII-2A

Test exclusion = max. conducted output power + antenna gain

Test exclusion = 13.83 dBm+(8 dBi [antenna gain claimed by manufacturer]) = 21.83 dBm = 152.41 mW

NII-2C

Test exclusion = max. conducted output power + antenna gain

Test exclusion = 12.73 dBm+(9.44 dBi [antenna gain claimed by manufacturer]) = 22.17 dBm = 164.82 mW

NII-3

Test exclusion = max. conducted output power + antenna gain e

Test exclusion = 13.25 dBm+(8.58 dBi [antenna gain claimed by manufacturer]) = 21.83 dBm = 152.41 mW

Test equipment used: ETSTW-RE 055



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**3.10 Exemption Limits for Routine Evaluation according to 47 CFR FCC Part 2 Subpart J, section 2.1091**

FCC OET Bulletin 65 Edition 97.01 determines the equations for predicting RF fields and applicable limits.

The prediction for power density in the far-field but will over-predict power density in the near field, where it could be used for walking a “worst case” or conservative prediction.

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 limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20 cm normally can be maintained between the user and the device.

**(A) Limits for Occupational/Controlled Exposure**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

**(B) Limits for General Population/Uncontrolled Exposure**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

\*Plane-wave equivalent power density

E = Electric field (V/m) P = output power (W) G = EUT Antenna numeric gain (numeric)  
 d = Separation distance between radiator and human body (m)  
 The formula can be changed to mW/m<sup>2</sup>.

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

Established separation distance is 20 cm.



# Worldwide Testing Services(Taiwan) Co., Ltd.

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Band	Mode	Channel	Conducted power with DF		Combine (dBm)	Antenna Gain (dBi)	Power density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Ratio
			Antenna A (dBm)	Antenna B (dBm)					
NII-1	802.11a	Ch 36 : 5180 MHz	11.32	11.36	-	-	-	-	-
		Ch 44 : 5220 MHz	11.75	11.76	-	-	-	-	-
		Ch 48 : 5240 MHz	11.86	12.1	-	Antenna B: 6.08	Antenna B: 0.0131	1	0.0131
	802.11n 20M	Ch 36 : 5180 MHz	10.09	9.98	13.05	-	-	-	-
		Ch 44 : 5220 MHz	10.48	10.37	13.44	-	-	-	-
		Ch 48 : 5240 MHz	10.6	10.54	13.58	Combine: 7.69	Combine: 0.0266	1	0.0266
	802.11n 40M	Ch 38 : 5190 MHz	8.29	8.26	11.29	-	-	-	-
		Ch 46 : 5230 MHz	8.79	8.68	11.75	Combine: 7.69	Combine: 0.0175	1	0.0175
	802.11ac	Ch 42 : 5210 MHz	6.15	6.21	9.19	Combine: 7.69	Combine: 0.0097	1	0.0097
NII-2A	802.11a	Ch 52 : 5260 MHz	11.72	11.76	-	-	-	-	-
		Ch 60 : 5300 MHz	11.84	11.78	-	-	-	-	-
		Ch 64 : 5320 MHz	11.97	11.86	-	Antenna A: 3.59	Antenna A: 0.0071	1	0.0071
	802.11n 20M	Ch 52 : 5260 MHz	10.44	10.72	13.59	-	-	-	-
		Ch 60 : 5300 MHz	10.54	10.77	13.67	-	-	-	-
		Ch 64 : 5320 MHz	10.82	10.81	13.83	Combine: 8	Combine: 0.0304	1	0.0304
	802.11n 40M	Ch 54 : 5270 MHz	8.84	9.17	12.02	-	-	-	-
		Ch 62 : 5310 MHz	9.08	9.28	12.19	Combine: 8	Combine: 0.0208	1	0.0208
	802.11ac	Ch 58 : 5210 MHz	6.72	6.88	9.81	Combine: 8	Combine: 0.0121	1	0.0121
NII-2C	802.11a	Ch 100 : 5500 MHz	11.19	10.99	-	Antenna A: 5.21	Antenna A: 0.0087	1	0.0087
		Ch 116 : 5580 MHz	10.44	10.42	-	-	-	-	-
		Ch 140 : 5700 MHz	10.83	10.94	-	-	-	-	-
	802.11n 20M	Ch 100 : 5500 MHz	9.71	9.72	12.73	Combine: 9.44	Combine: 0.0327	1	0.0327
		Ch 116 : 5580 MHz	9.02	9.16	12.10	-	-	-	-
		Ch 140 : 5700 MHz	9.6	9.8	12.71	-	-	-	-
	802.11n 40M	Ch 102 : 5510 MHz	8.16	8.12	11.15	Combine: 9.44	Combine: 0.0227	1	0.0227
		Ch 110 : 5550 MHz	7.56	7.42	10.50	-	-	-	-
		Ch 134 : 5670 MHz	7.84	7.97	10.92	-	-	-	-
	802.11ac	Ch 106 : 5530 MHz	6.24	5.66	8.97	Combine: 9.44	Combine: 0.0138	1	0.0138
Ch 122 : 5610 MHz		5.74	5.23	8.50	-	-	-	-	



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<b>NII-3</b>	<b>802.11a</b>	Ch 149 : 5745 MHz	11.27	11.26	-	-	-	-	
		Ch 157 : 5785 MHz	11.36	11.81	-	Antenna B: 6.1	Antenna B: 0.012	1	0.012
		Ch 165 : 5825 MHz	10.98	11.46	-	-	-	-	-
	<b>802.11n 20M</b>	Ch 149 : 5745 MHz	9.95	10.2	13.09	-	-	-	-
		Ch 157 : 5785 MHz	10	10.47	13.25	Combine: 8.58	Combine: 0.0303	1	0.0303
		Ch 165 : 5825 MHz	9.8	10.38	13.11	-	-	-	-
	<b>802.11n 40M</b>	Ch 151 : 5755 MHz	8.29	8.6	11.46				
		Ch 159 : 5795 MHz	8.53	8.79	11.67	Combine: 8.58	Combine: 0.0211	1	0.0211
	<b>802.11ac</b>	Ch 155: 5775 MHz	6.25	5.89	9.08	Combine: 8.58	Combine: 0.0116	1	0.0116

Simultaneous evaluation-  
 $0.0351 (2.4G\ WLAN)+0.0051 (Zigbee)+0.0327 (5G\ WLAN)=0.0729 < 1$



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## 10 Maximum Permissible Exposure

### 10.1 Exemption Limits for Routine Evaluation according to 47 CFR FCC Part 2 Subpart J, section 2.1091

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### MPE Calculation Method

#### (A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

#### (B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

\*Plane-wave equivalent power density

E = Electric field (V/m) P = output power (W) G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

The formula can be changed to mW/cm<sup>2</sup>.



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Band	Frequency (MHz)	Max output power		Antenna Gain	Power density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Ratio
		(dBm)	(W)	(dBi)			
WCDMA Band 2	1852.4	22.91	0.1954	4.11	0.1001	1	0.1001
WCDMA Band 5	836.6	23.73	0.2360	3.61	0.1078	0.5577	0.1933
LTE Band 2	1857.5	22.61	0.1824	4.11	0.0935	1	0.0935
LTE Band 4	1715	23.64	0.2312	1.89	0.0711	1	0.0711
LTE Band 5	836.5	23.98	0.2500	3.64	0.115	0.5577	<b>0.2062</b>
LTE Band 7	2507.5	22.35	0.1718	2.15	0.0561	1	0.0561

From the peak EUT RF output power, the minimum mobile separation distance,  $d=0.2$  m, as well as the gain of the used antenna, the RF power density can be obtained.