

1 Human Exposure Assessment

1.1 Maximum Permissible Exposure

1.1.1 Limit of Maximum Permissible Exposure

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 ²)	Averaging Time E ² , H ² or S (minutes)
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
300-1500	-	-	F/300	6
1500-100,000	-	-	5	6
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 ²)	Averaging Time E ² , H ² or S (minutes)
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
300-1500	-	-	F/1500	30
1500-100,000	-	-	1.0	30
Note 1: f = frequency in MHz ; *Plane-wave equivalent power density				
Note 2: For the applicable limit, see FCC 1.1310				

1.1.2 MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

E = Electric field (V/m)

G = EUT Antenna numeric gain (numeric)

The formula can be changed to

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

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

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

P = RF output power (W)

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

1.2 Result of Maximum Permissible Exposure

For 2.4GHz Band:

Configuration 802.11b

<Ant.1>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2412	1.82	1.5205	24.56	285.7591	0.0568	1	Complies

<Ant.2>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2462	2.38	1.7298	26.94	494.3107	0.0983	1	Complies

Configuration 802.11g
<Ant.1>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2437	1.82	1.5205	28.67	736.2071	0.1465	1	Complies

<Ant.2>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2437	2.12	1.6293	29.08	809.0959	0.1610	1	Complies

<Ant.1+2, CDD>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2437	3.15	2.0654	31.95	1566.7511	0.3117	1	Complies

Configuration 802.11n 20MHz
<MCS0, Ant.1>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2437	2.99	1.9907	28.42	695.0243	0.1383	1	Complies

<MCS0, Ant.2>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2437	2.12	1.6293	28.77	753.3556	0.1499	1	Complies

<MCS0, Ant.1+2, CDD>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2437	3.15	2.0654	32.73	1874.9945	0.3730	1	Complies

Configuration 802.11n 40MHz
<MCS0, Ant.1>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2437	2.99	1.9907	23.21	209.4112	0.0417	1	Complies

<MCS0, Ant.2>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2437	2.12	1.6293	23.58	228.0342	0.0454	1	Complies

<MCS0, Ant.1+2, CDD>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
2.4GHz WLAN	2437	3.15	2.0654	26.80	478.6301	0.0952	1	Complies

For 5GHz Band 1 ~ Band 4:

Configuration 802.11a

<6 Mbps, Ant.1+2+3+4, CDD>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
5GHz WLAN	5240	6.16	4.1305	32.50	1778.2794	0.3538	1	Complies

Configuration 802.11ac 20MHz
<Nss1 MCS0, Ant.1+2+3+4, CDD>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
5GHz WLAN	5240	6.16	4.1305	32.33	1710.0153	0.3402	1	Complies

<Nss2 MCS0, Ant.1+2+3+4, TxBF>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
5GHz WLAN	5240	3.51	2.2439	30.54	1132.4004	0.2253	1	Complies

<Nss3 MCS0, Ant.1+2+3+4, TxBF>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
5GHz WLAN	5240	5.7	3.7154	32.79	1901.0783	0.3782	1	Complies

Configuration 802.11ac 40MHz
<<Nss1 MCS0, Ant.1+2+3+4, CDD>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
5GHz WLAN	5795	6.77	4.7534	32.95	1972.4227	0.3924	1	Complies

<Nss2 MCS0, Ant.1+2+3+4, TxBF>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
5GHz WLAN	5230	3.29	2.1330	30.75	1188.5022	0.2364	1	Complies

<Nss3 MCS0, Ant.1+2+3+4, TxBF>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
5GHz WLAN	5230	5.43	3.4914	32.97	1981.5270	0.3942	1	Complies

Configuration 802.11ac 80MHz
<<Nss1 MCS0, Ant.1+2+3+4, CDD>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
5GHz WLAN	5290	5.79	3.7931	28.86	769.1304	0.1530	1	Complies

<Nss2 MCS0, Ant.1+2+3+4, TxBF>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
5GHz WLAN	5210	3.4	2.1878	26.72	469.8941	0.0935	1	Complies

<Nss3 MCS0, Ant.1+2+3+4, TxBF>

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average output Power (dBm)	Average output Power (mW)	Power Density(S) (mW/cm ²)	Limit of power density (S) (mW/cm ²)	Test Result
5GHz WLAN	5290	5.24	3.3420	28.13	650.1297	0.1293	1	Complies