

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

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

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

P = RF output power (W)

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

1.1.3 Result of Maximum Permissible Exposure (5.2G)

Transmitter Chains & Receiver Chains Information				
IEEE Std. 802.11 Protocol	Number of Transmit Chains (N _{TX})	Number of Receive Chains (N _{RX})	Correlation Signals with Multiple N _{TX}	RF Output Power (dBm)
A (Port 1)	1	1	Uncorrelated	21.87
HT20(Port 1)	1	1	Uncorrelated	22.10
HT40(Port 1)	1	1	Uncorrelated	23.62
HT20	3	3	Uncorrelated	17.91
HT40	3	3	Uncorrelated	20.72
Note 1: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other. (i.e., EUT has simultaneously co-transmitting that operating 2.4GHz and 5GHz.) Note 2: RF output power specifies that Maximum Conducted (Average) Output Power.				

Worst Maximum RF Output Power Result								
Exposure Environment		General Population / Uncontrolled Exposure						
Separation Distance (cm)		20						
Power Level	1	RF Output Power (dBm)						
Modulation Mode	N _{TX}	Chain-Port 1	Chain-Port 2	Chain-Port 3	Sum Chain	Gain (dBi)	EIRP Power	PD (S) (mW/cm ²)
A (Port 1)	1	21.87	-	-	21.87	3.50	25.37	0.06851
HT20(Port 1)	1	22.10	-	-	22.10	3.50	25.60	0.07223
HT40(Port 1)	1	23.62	-	-	23.62	3.50	27.12	0.10250
HT20	3	13.17	13.15	13.11	17.91	3.62	21.53	0.02827
HT40	3	15.55	16.05	16.22	20.72	3.62	24.34	0.05400
Maximum Permissible Exposure Limit (mW/cm ²)								1
Note 1: N _{TX} = Number of Transmit Chains								

1.1.4 Result of Maximum Permissible Exposure(5.8G)

Transmitter Chains & Receiver Chains Information				
IEEE Std. 802.11 Protocol	Number of Transmit Chains (N _{TX})	Number of Receive Chains (N _{RX})	Correlation Signals with Multiple N _{TX}	RF Output Power (dBm)
A (Port 1)	1	1	Uncorrelated	25.02
HT20(Port 1)	1	1	Uncorrelated	24.91
HT40(Port 1)	1	1	Uncorrelated	23.35
HT20	3	3	Uncorrelated	24.87
HT40	3	3	Uncorrelated	25.24

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.

Worst Maximum RF Output Power Result								
Exposure Environment		General Population / Uncontrolled Exposure						
Separation Distance (cm)		20						
Power Level	1	RF Output Power (dBm)						
Modulation Mode	N _{TX}	Chain-Port 1	Chain-Port 2	Chain-Port 3	Sum Chain	Gain (dBi)	EIRP Power	PD (S) (mW/cm ²)
A (Port 1)	1	25.02	-	-	25.02	3.50	28.52	0.14149
HT20(Port 1)	1	24.91	-	-	24.91	3.50	28.41	0.13795
HT40(Port 1)	1	23.35	-	-	23.35	3.50	26.85	0.09632
HT20	3	21.51	19.88	18.33	24.87	3.62	28.49	0.14041
HT40	3	21.69	20.65	18.46	25.24	3.62	28.86	0.15273
Maximum Permissible Exposure Limit (mW/cm ²)								1

Note 1: N_{TX} = Number of Transmit Chains