

1 Human Exposure Assessment

1.1 Maximum Permissible Exposure

1.1.1 Limit of Maximum Permissible Exposure

	Limits for Occ	cupational / Controlle	d Exposure						
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Power Density (S) Strength (H) (A/m) (mW/ cm²)		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)*	6					
30-300	61.4	0.163	1.0	6					
300-1500	-	- F/300							
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) 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)*	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

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RF Field Strength Limits for Controlled Use Devices (Controlled Environment)									
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)							
0.003-1	600	4.9	-	6					
1-10	600/f	4.9/ <i>f</i>	-	6					
10-30	60	4.9/ <i>f</i>	-	6					
30-300	60	0.163	10*	6					
300-1500	3.54 f 0.5	0.0094 f 0.5	f/30	6					
1500-15000	137	0.364	50	6					
15000-150000	137	0.364	50	616000/f 1.2					
150000-300000	0.354 f 0.5	9.4 x 10-4 f 0.5	3.33 x 10-4 f	616000/f 1.2					
RF Field Streng	th Limits for Devices	Used by the Genera	I Public (Uncontrolle	ed Environment)					
Frequency Range	Electric Field	Magnetic Field	Power Density	Averaging Time					

Frequency Range (MHz)	Electric Field Magnetic Field Power Density (V/m rms) (A/m rms) (W/m2)		Averaging Time (minutes)	
0.003-1	280	2.19	-	6
1-10	1-10 280/ <i>f</i>		2.19/f -	
10-30	10-30 28		-	6
30-300 28		0.073 2*		6
300-1500 1.585 f ^{0.5}		0.0042 f ^{0.5}	f/150	6
1500-15000	61.4	0.163	10	6

0.163

 $616000/f^{\frac{1.2}{1.2}}$ $0.158 f^{0.5}$ $4.21 \times 10^{-4} f^{0.5}$ $6.67 \times 10^{-5} f$ 150000-300000 Note 1: f is frequency in MHz.

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1.1.2 MPE Calculation Method

Note 2: For the applicable limit, see IC RSS-102

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

$$E = Electric field (V/m)$$

15000-150000

G = EUT Antenna numeric gain (numeric) The formula can be changed to

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

Power Density: Pd (W/m²) = $\frac{E^2}{377}$

P = RF output power (W)

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

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 $616000/f^{1.2}$

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FCC EMF Test Report

1.1.3 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)	Co-location					
а	1	1	Correlated	23.43	N/A					
n (HT20)	3	3	Uncorrelated	27.99	N/A					
n (HT40)	3	3	Uncorrelated	28.10	N/A					

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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									
onment	General Population / Uncontrolled Exposure								
Separation Distance (cm)			20						
1		RF Output Power (dBm)							
N _{TX}	Chain- Port 1	Chain- Port 2	Chain- Port 3	-	Sum Chain	Gain (dBi)	EIRP Power	PD (S) (mW/cm²)	
1	23.43	-	-	-	23.43	2.08	25.51	0.0708	
3	23.24	23.37	23.05	-	27.99	2.08	30.07	0.2023	
3	23.32	23.62	23.01	-	28.10	2.08	30.18	0.2071	
Maximum Permissible Exposure Limit (mW/cm²)								1	
	1 N _{TX} 1 3 3	N _{TX} Chain-Port 1 1 23.43 3 23.24 3 23.32	N _{TX} Chain-Port 1 Chain-Port 2 1 23.43 - 3 23.24 23.37 3 23.32 23.62	N _{TX} Chain-Port 1 Port 2 Chain-Port 3 1 23.43 - 3 23.24 23.37 23.05 3 23.32 23.62 23.01	1 RF Output F N _{TX} Chain-Port 1 Port 2 Chain-Port 3 - 1 23.43 3 23.24 23.37 23.05 - 3 23.32 23.62 23.01 -	N _{TX} Chain-Port 1 Port 2 Port 3 Chain-Port 3 Port 3 Sum Chain Chain Port 3 1 23.43 - - 23.43 3 23.24 23.37 23.05 - 27.99 3 23.32 23.62 23.01 - 28.10	N _{TX}	N _{TX} Chain-Port 1 Chain-Port 2 Chain-Port 3 - Sum Chain (dBi) Gain (dBi) EIRP Power 1 23.43 - - - 23.43 2.08 25.51 3 23.24 23.37 23.05 - 27.99 2.08 30.07 3 23.32 23.62 23.01 - 28.10 2.08 30.18	

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

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FCC EMF Test Report

1.1.4 Result of Maximum Permissible Exposure-(5.2G)

	Transmitter Chains & Receiver Chains Information									
а	1	1	Correlated	14.92	N/A					
n (HT20)	3	3	Uncorrelated	15.34	N/A					
n (HT40)	3	3	Uncorrelated	16.94	N/A					

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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 Permissible Exposure Result									
Exposure Environment		General Population / Uncontrolled Exposure							
Separation Dist	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) (W/m²)
11A5.2G-20M	1	14.92	-	-	-	14.92	2.08	17.00	0.0100
11N5.2G-20M	3	10.15	11.26	10.21	-	15.34	2.08	17.42	0.0110
11N5.2G-40M	3	12.30	12.61	11.52	-	16.94	2.08	19.02	0.0159
Maximum Permissible Exposure Limit (mW/cm²)								1	
Note 1: N _{TX} = Number of Transmit Chains									

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