1 Maximum Permissible Exposure

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/ 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	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/ cm²)**	**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				

1.1.2 MPE Calculation Method

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

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

E = Electric field (V/m)

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

1.1.3 Result of Maximum Permissible Exposure

RF General Information 5150~5250MHz (non-beamforming)						
Frequency Range (MHz)	**IEEE Std. 802.11 Protocol**	**Ch. Frequency (MHz)**	**Channel Number**	**Number of Transmit Chains (N_{TX})**	**RF Output Power (dBm)**	**Co-location**
5150-5250	a	5180-5240	36-48 [4]	4	23.06	Yes
5150-5250	n (HT20)	5180-5240	36-48 [4]	4	23.32	Yes
5150-5250	n (HT40)	5190-5230	38-46 [2]	4	23.05	Yes
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	4	23.13	Yes
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	4	23.08	Yes
5150-5250	ac (VHT80)	5210	48 [1]	4	19.41	Yes
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power. Note 2: 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.)						

RF General Information 5725 MHz – 5850 MHz (non-beamforming)						
Frequency Range (MHz)	**IEEE Std. 802.11 Protocol**	**Ch. Frequency (MHz)**	**Channel Number**	**Number of Transmit Chains (N_{TX})**	**RF Output Power (dBm)**	**Co-location**
5725-5850	a	5745-5825	149-165 [5]	4	24.03	Yes
5725-5850	n(HT20)	5745-5825	149-165 [5]	4	24.51	Yes
5725-5850	n(HT40)	5755-5795	151-159 [2]	4	25.13	Yes
5725-5850	ac(VHT20)	5745-5825	149-165 [5]	4	24.54	Yes
5725-5850	ac(VHT40)	5755-5795	151-159 [2]	4	24.55	Yes
5725-5850	ac(VHT80)	5775	155 [1]	4	12.36	Yes
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power. Note 2: 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.)						

RF General Information 2400 MHz – 2483.5 MHz						
Frequency Range (MHz)	**IEEE Std. 802.11 Protocol**	**Ch. Frequency (MHz)**	**Channel Number**	**Number of Transmit Chains (N_{TX})**	**RF Output Power (dBm)**	**Co-location**
2400-2483.5	b	2412-2462	1-11 [11]	4	27.07	Yes
2400-2483.5	g	2412-2462	1-11 [11]	4	24.93	Yes
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	4	24.59	Yes
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	4	22.34	Yes
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power. Note 2: 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.)						

RF General Information 5150~5250MHz (beamforming)					
Frequency Range (MHz)	**IEEE Std. 802.11 Protocol**	**Ch. Frequency (MHz)**	**Channel Number**	**Number of Transmit Chains (N_{TX})**	**RF Output Power (dBm)**
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	4	22.38
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	4	22.41
5150-5250	ac (VHT80)	5210	48 [1]	4	17.95
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.					

RF General Information 5725 MHz – 5850 MHz (beamforming)					
Frequency Range (MHz)	**IEEE Std. 802.11 Protocol**	**Ch. Frequency (MHz)**	**Channel Number**	**Number of Transmit Chains (N_{TX})**	**RF Output Power (dBm)**
5725-5850	ac(VHT20)	5745-5825	149-165 [5]	4	19.99
5725-5850	ac(VHT40)	5755-5795	151-159 [2]	4	18.05
5725-5850	ac(VHT80)	5775	155 [1]	4	14.38
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.					

Worst Maximum RF Output Power Result (non-beamforming)									
Exposure Environment		General Population / Uncontrolled Exposure							
Separation Distance (cm)		20							
Condition		**RF Output Power (dBm)**							
Modulation Mode	**N_{TX}**	**Chain port 1**	**Chain port 2**	**Chain port 3**	**Chain port 4**	**Sum Chain**	**DG (dBi)**	**EIRP Power**	**PD (S) (mW/cm²)**
5GHz	4	19.24	18.20	17.93	20.57	25.13	5.01	30.14	0.2056
2.4GHz	4	20.31	20.78	21.49	21.49	27.07	5.03	32.10	0.3228
Co-location Total									0.5284
Maximum Permissible Exposure Limit (mW/cm²)									1
Note 1: N_{TX} = Number of Transmit Chains									