FCC ID: 2BBDIVBKC5001

Maximum Permissible Exposure (MPE)

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency(RF) Radiation as specified in §1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
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
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

MPE Calculation Method

E (V/m) $= \frac{\sqrt{30 * P * G}}{d}$ Power Density: *Pd* (W/m²) $= \frac{E^2}{377}$

E = Electric field (V/m)

P = Average 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

$Pd = \frac{30 * P * G}{377 * D^2}$

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.

Bluetooth module 1

BT:

Measurement Result

Operation Frequency: 2402MHz~2480MHz
Power density limited: 1mW/ cm^2
Antenna Type: Chip antenna
Antenna gain:2.27dBi;
R=20cm
mW=10^(dBm/10)
antenna gain Numeric=10^(dBi/10)= 10^(2.27/10)=1.69

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain (dBi)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
2402	GFSK	8.92	8±1	9	7.943	2.27	1.69	0.0027	1
2441		8.79	8±1	9	7.943	2.27	1.69	0.0027	1
2480		8.12	8±1	9	7.943	2.27	1.69	0.0027	1
2402	π/4-DQPSK	7.35	7±1	8	6.310	2.27	1.69	0.0021	1
2441		7.15	7±1	8	6.310	2.27	1.69	0.0021	1
2480		6.18	7±1	8	6.310	2.27	1.69	0.0021	1
2402	8-DPSK	7.95	7±1	8	6.310	2.27	1.69	0.0021	1
2441		7.66	7±1	8	6.310	2.27	1.69	0.0021	1
2480		6.69	7±1	8	6.310	2.27	1.69	0.0021	1

BLE:

Measurement Result

Operation Frequency: 2402MHz~2480MHz
Power density limited: 1mW/ cm^2
Antenna Type: Chip antenna
Antenna gain:2.27dBi;
R=20cm
mW=10^(dBm/10)
antenna gain Numeric=10^(dBi/10)= 10^(2.27/10)=1.69

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain (dBi)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
2402	BLE 1M	3.81	3±1	4	2.512	2.27	1.69	0.0008	1
2440		3.48	3±1	4	2.512	2.27	1.69	0.0008	1
2480		2.42	3±1	4	2.512	2.27	1.69	0.0008	1
2402	BLE 2M	3.82	3±1	4	2.512	2.27	1.69	0.0008	1
2440		3.50	3±1	4	2.512	2.27	1.69	0.0008	1
2480		2.48	3±1	4	2.512	2.27	1.69	0.0008	1

Bluetooth module 2

BT:

Measurement Result

Operation Frequency: 2402MHz~2480MHz
Power density limited: 1mW/ cm^2
Antenna Type: PCB antenna
Antenna gain:1.03dBi;
R=20cm
mW=10^(dBm/10)
antenna gain Numeric=10^(dBi/10)= 10^(1.03/10)=1.27

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK	-2.44	-2±1	-1	0.794	1.03	1.27	0.0002	1
2441		0.41	1±1	2	1.585	1.03	1.27	0.0004	1
2480		3.24	3±1	4	2.512	1.03	1.27	0.0006	1
2402	π/4-DQPSK	-4.06	-4±1	-3	0.501	1.03	1.27	0.0001	1
2441		-1.38	-1±1	0	1.000	1.03	1.27	0.0003	1
2480		1.43	1±1	2	1.585	1.03	1.27	0.0004	1
2402	8-DPSK	-3.62	-3±1	-2	0.631	1.03	1.27	0.0002	1
2441		-0.94	0±1	1	1.259	1.03	1.27	0.0003	1
2480		1.72	1±1	2	1.585	1.03	1.27	0.0004	1

BLE:

Measurement Result

Operation Frequency: 2402MHz~2480MHz
Power density limited: 1mW/ cm2
Antenna Type: PCB antenna
Antenna gain:1.03dBi;
R=20cm
mW=10^(dBm/10)
antenna gain Numeric=10^(dBi/10)= 10^(1.03/10)=1.27

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	BLE 1M	-2.22	-2±1	-1	0.794	1.03	1.27	0.0002	1
2440		-0.12	0±1	1	1.259	1.03	1.27	0.0003	1
2480		2.37	2±1	3	1.995	1.03	1.27	0.0005	1

2.4GWIFI:

Measurement Result

Operation Frequency: 2412MHz~2462MHz (20M)
2422MHz~2452MHz (40M)
Power density limited: 1mW/ cm^2
Antenna Type: Chip antenna
Antenna gain:2.27dBi;
R=20cm
mW=10^(dBm/10)
antenna gain Numeric=10^(dBi/10)= 10^(2.27/10)=1.69

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2412	11b	15.60	16±1	17	50.119	2.27	1.69	0.0168	1
2437		15.78	16±1	17	50.119	2.27	1.69	0.0168	1
2462		15.93	16±1	17	50.119	2.27	1.69	0.0168	1
2412	11g	14.63	14±1	15	31.623	2.27	1.69	0.0106	1
2437		14.87	14±1	15	31.623	2.27	1.69	0.0106	1
2462		14.91	14±1	15	31.623	2.27	1.69	0.0106	1
2412	11n20	13.40	13±1	14	25.119	2.27	1.69	0.0084	1
2437		13.55	13±1	14	25.119	2.27	1.69	0.0084	1
2462		13.88	13±1	14	25.119	2.27	1.69	0.0084	1
2422	11n40	13.78	13±1	14	25.119	2.27	1.69	0.0084	1
2437		13.58	13±1	14	25.119	2.27	1.69	0.0084	1
2452		13.89	13±1	14	25.119	2.27	1.69	0.0084	1

5G WIFI:
Operation Frequency: WIFI 802.11a/n/ac(HT20): 5180-5240MHz;,5745-5825MHz;
WIFI 802.11n/ac (HT40): 5190-5230MHz; 5755-5795MHz;
WIFI 802.11ac (HT80):5210-5210MHz; 5775-5775MHz
Power density limited: 1mW/cm
Antenna Type: Chip antenna
Antenna gain :5.18dBi

SISO-5.2G

modulation	Antenna	Channel Freq. (MHz)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain (dBi)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11a	Ant 1	5180	12.22	12±1	13.00	19.953	5.18	3.30	0.0131	1
	Ant 1	5200	11.57	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 1	5240	11.31	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 2	5180	10.71	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 2	5200	10.89	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 2	5240	11.72	11±1	12.00	15.849	5.18	3.30	0.0104	1
802.11n20	Ant 1	5180	11.91	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 1	5200	11.45	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 1	5240	11.22	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 2	5180	9.64	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5200	9.82	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5240	10.56	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11n40	Ant 1	5190	8.35	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 1	5230	8.96	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 2	5190	6.76	6±1	7.00	5.012	5.18	3.30	0.0033	1
	Ant 2	5230	7.38	7±1	8.00	6.310	5.18	3.30	0.0041	1
802.11ac20	Ant 1	5180	11.03	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 1	5200	11.40	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 1	5240	11.10	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 2	5180	9.64	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5200	9.79	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5240	10.55	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11ac40	Ant 1	5190	8.41	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 1	5230	8.68	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 2	5190	5.89	5±1	6.00	3.981	5.18	3.30	0.0026	1
	Ant 2	5230	6.47	6±1	7.00	5.012	5.18	3.30	0.0033	1
802.11ac80	Ant 1	5210	6.25	6±1	7.00	5.012	5.18	3.30	0.0033	1
	Ant 2	5210	4.95	4±1	5.00	3.162	5.18	3.30	0.0021	1

MIMO-5.2G

modulation	Antenna	Channel Freq. (MHz)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Directional Antenna Gain (dBi)	Directional Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11ac20	Ant1	5180	10.32	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5180	9.86	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5180	13.11	13±1	14.00	25.119	8.19	6.59	0.0329	1
	Ant1	5200	9.27	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5200	9.71	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5200	12.51	12±1	13.00	19.953	8.19	6.59	0.0262	1
	Ant1	5240	10.80	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5240	9.47	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5240	13.20	13±1	14.00	25.119	8.19	6.59	0.0329	1
802.11ac40	Ant1	5190	10.15	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5190	9.87	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5190	13.02	13±1	14.00	25.119	8.19	6.59	0.0329	1
	Ant1	5230	10.82	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5230	9.57	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5230	13.25	13±1	14.00	25.119	8.19	6.59	0.0329	1
802.11ac80	Ant1	5210	9.41	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5210	9.51	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5210	12.47	12±1	13.00	19.953	8.19	6.59	0.0262	1
802.11n20	Ant1	5180	10.51	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5180	9.80	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5180	13.18	13±1	14.00	25.119	8.19	6.59	0.0329	1
	Ant1	5200	9.37	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5200	9.66	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5200	12.53	12±1	13.00	19.953	8.19	6.59	0.0262	1
	Ant1	5240	10.80	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5240	9.25	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5240	13.10	13±1	14.00	25.119	8.19	6.59	0.0329	1
802.11n40	Ant1	5190	9.99	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5190	9.82	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5190	12.92	12±1	13.00	19.953	8.19	6.59	0.0262	1
	Ant1	5230	10.85	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5230	9.51	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5230	13.24	13±1	14.00	25.119	8.19	6.59	0.0329	1

SISO-5.3G

modulation	Antenna	Channel Freq. (MHz)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain (dBi)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11a	Ant 1	5260	10.24	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5280	10.04	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5320	9.77	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5260	9.11	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5280	9.74	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5320	10.75	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11n20	Ant 1	5260	10.13	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5280	9.72	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 1	5320	9.44	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5260	9.05	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5280	9.64	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5320	10.62	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11n40	Ant 1	5270	8.29	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 1	5310	7.72	7±1	8.00	6.310	5.18	3.30	0.0041	1
	Ant 2	5270	7.38	7±1	8.00	6.310	5.18	3.30	0.0041	1
	Ant 2	5310	8.54	8±1	9.00	7.943	5.18	3.30	0.0052	1
802.11ac20	Ant 1	5260	10.1	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5280	9.68	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 1	5320	9.59	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5260	8.98	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 2	5280	9.68	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5320	10.67	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11ac40	Ant 1	5270	8.07	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 1	5310	7.77	7±1	8.00	6.310	5.18	3.30	0.0041	1
	Ant 2	5270	7.42	7±1	8.00	6.310	5.18	3.30	0.0041	1
	Ant 2	5310	8.57	8±1	9.00	7.943	5.18	3.30	0.0052	1
802.11ac80	Ant 1	5290	7.64	7±1	8.00	6.310	5.18	3.30	0.0041	1
	Ant 2	5290	5.77	5±1	6.00	3.981	5.18	3.30	0.0026	1

MIMO-5.3G

modulation	Antenna	Channel Freq. (MHz)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Directional Antenna Gain (dBi)	Directional Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11ac20	Ant1	5260	10.75	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5260	9.44	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5260	13.15	13±1	14.00	25.119	8.19	6.59	0.0329	1
	Ant1	5280	11.38	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant2	5280	9.62	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5280	13.60	13±1	14.00	25.119	8.19	6.59	0.0329	1
	Ant1	5320	10.71	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5320	9.62	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5320	13.21	13±1	14.00	25.119	8.19	6.59	0.0329	1
802.11ac40	Ant1	5270	11.37	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant2	5270	9.62	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5270	13.59	13±1	14.00	25.119	8.19	6.59	0.0329	1
	Ant1	5310	11.40	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant2	5310	9.72	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5310	13.65	13±1	14.00	25.119	8.19	6.59	0.0329	1
802.11ac80	Ant1	5290	10.94	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5290	9.44	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5290	13.26	13±1	14.00	25.119	8.19	6.59	0.0329	1
802.11n20	Ant1	5260	11.15	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant2	5260	9.50	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5260	13.41	13±1	14.00	25.119	8.19	6.59	0.0329	1
	Ant1	5280	11.39	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant2	5280	9.71	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5280	13.64	13±1	14.00	25.119	8.19	6.59	0.0329	1
	Ant1	5320	10.94	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5320	9.75	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5320	13.40	13±1	14.00	25.119	8.19	6.59	0.0329	1
802.11n40	Ant1	5270	11.52	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant2	5270	9.60	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5270	13.68	13±1	14.00	25.119	8.19	6.59	0.0329	1
	Ant1	5310	11.44	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant2	5310	9.72	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Sum	5310	13.67	13±1	14.00	25.119	8.19	6.59	0.0329	1

SISO-5.6G

modulation	Antenna	Channel Freq. (MHz)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain (dBi)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11a	Ant 1	5500	10.76	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5600	11.94	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 1	5700	10.50	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 2	5500	9.44	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5600	9.52	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5700	10.31	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11n20	Ant 1	5500	10.60	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5600	11.83	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 1	5700	10.24	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 2	5500	9.24	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5600	9.44	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5700	9.15	9±1	10.00	10.000	5.18	3.30	0.0066	1
802.11n40	Ant 1	5510	10.23	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5590	11.85	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 1	5670	11.15	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 2	5510	7.13	7±1	8.00	6.310	5.18	3.30	0.0041	1
	Ant 2	5590	7.49	7±1	8.00	6.310	5.18	3.30	0.0041	1
	Ant 2	5670	6.88	6±1	7.00	5.012	5.18	3.30	0.0033	1
802.11ac20	Ant 1	5500	10.67	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5600	11.80	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 1	5700	10.53	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 2	5500	9.31	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5600	9.49	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5700	10.18	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11ac40	Ant 1	5510	10.11	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5590	11.89	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 1	5670	11.25	11±1	12.00	15.849	5.18	3.30	0.0104	1
	Ant 2	5510	8.05	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 2	5590	8.41	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 2	5670	8.00	7±1	8.00	6.310	5.18	3.30	0.0041	1
802.11ac80	Ant 1	5530	10.52	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5610	12.40	12±1	13.00	19.953	5.18	3.30	0.0131	1
	Ant 2	5530	7.14	7±1	8.00	6.310	5.18	3.30	0.0041	1
	Ant 2	5610	7.20	7±1	8.00	6.310	5.18	3.30	0.0041	1

MIMO-5.6G

modulation	Antenna	Channel Freq. (MHz)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Directional Antenna Gain (dBi)	Directional Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11ac20	Ant1	5500	8.12	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Ant2	5500	8.82	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Sum	5500	11.49	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant1	5600	9.56	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5600	8.37	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Sum	5600	12.02	12±1	13.00	19.953	8.19	6.59	0.0262	1
	Ant1	5700	10.95	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5700	7.29	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5700	12.50	12±1	13.00	19.953	8.19	6.59	0.0262	1
802.11ac40	Ant1	5510	8.37	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Ant2	5510	8.70	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Sum	5510	11.55	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant1	5590	9.28	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5590	8.43	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Sum	5590	11.89	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant1	5670	10.80	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5670	7.15	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5670	12.36	12±1	13.00	19.953	8.19	6.59	0.0262	1
802.11ac80	Ant1	5530	7.93	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Ant2	5530	8.15	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Sum	5530	11.05	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant1	5610	7.71	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Ant2	5610	6.24	6±1	7.00	5.012	8.19	6.59	0.0066	1
	Sum	5610	10.05	10±1	11.00	12.589	8.19	6.59	0.0165	1
802.11n20	Ant1	5500	8.22	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Ant2	5500	8.52	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Sum	5500	11.38	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant1	5600	9.53	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5600	8.60	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Sum	5600	12.10	12±1	13.00	19.953	8.19	6.59	0.0262	1
	Ant1	5700	10.63	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5700	7.26	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5700	12.27	12±1	13.00	19.953	8.19	6.59	0.0262	1
802.11n40	Ant1	5510	8.44	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Ant2	5510	8.74	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Sum	5510	11.60	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant1	5590	9.22	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5590	8.34	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Sum	5590	11.81	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant1	5670	10.81	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5670	7.07	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5670	12.34	12±1	13.00	19.953	8.19	6.59	0.0262	1

SISO-5.8G

modulation	Antenna	Channel Freq. (MHz)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain (dBi)	Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11a	Ant 1	5745	10.16	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5785	9.40	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 1	5825	9.02	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5745	9.00	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 2	5785	9.95	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5825	10.52	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11n20	Ant 1	5745	10.05	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5785	9.58	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 1	5825	9.06	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5745	8.84	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 2	5785	9.87	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5825	10.45	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11n40	Ant 1	5755	10.30	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5795	9.53	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5755	9.15	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5795	10.21	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11ac20	Ant 1	5745	10.08	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5785	9.26	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 1	5825	8.87	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 2	5745	8.96	8±1	9.00	7.943	5.18	3.30	0.0052	1
	Ant 2	5785	9.80	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5825	10.50	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11ac40	Ant 1	5755	10.10	10±1	11.00	12.589	5.18	3.30	0.0083	1
	Ant 1	5795	9.56	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5755	9.18	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5795	10.28	10±1	11.00	12.589	5.18	3.30	0.0083	1
802.11ac80	Ant 1	5775	9.44	9±1	10.00	10.000	5.18	3.30	0.0066	1
	Ant 2	5775	9.39	9±1	10.00	10.000	5.18	3.30	0.0066	1

MIMO-5.8G

modulation	Antenna	Channel Freq. (MHz)	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Directional Antenna Gain (dBi)	Directional Antenna Gain Numeric	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
802.11ac20	Ant1	5745	10.25	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5745	7.13	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5745	11.97	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant1	5785	9.43	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5785	7.55	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5785	11.60	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant1	5825	8.52	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Ant2	5825	7.20	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5825	10.92	10±1	11.00	12.589	8.19	6.59	0.0165	1
802.11ac40	Ant1	5755	10.51	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5755	7.48	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5755	12.26	12±1	13.00	19.953	8.19	6.59	0.0262	1
	Ant1	5795	9.78	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5795	7.46	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5795	11.78	11±1	12.00	15.849	8.19	6.59	0.0208	1
802.11ac80	Ant1	5775	9.79	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5775	7.16	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5775	11.68	11±1	12.00	15.849	8.19	6.59	0.0208	1
802.11n20	Ant1	5745	10.49	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5745	7.36	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5745	12.21	12±1	13.00	19.953	8.19	6.59	0.0262	1
	Ant1	5785	9.65	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5785	7.23	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5785	11.62	11±1	12.00	15.849	8.19	6.59	0.0208	1
	Ant1	5825	9.42	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5825	8.22	8±1	9.00	7.943	8.19	6.59	0.0104	1
	Sum	5825	11.87	11±1	12.00	15.849	8.19	6.59	0.0208	1
802.11n40	Ant1	5755	10.40	10±1	11.00	12.589	8.19	6.59	0.0165	1
	Ant2	5755	7.43	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5755	12.17	12±1	13.00	19.953	8.19	6.59	0.0262	1
	Ant1	5795	9.60	9±1	10.00	10.000	8.19	6.59	0.0131	1
	Ant2	5795	7.50	7±1	8.00	6.310	8.19	6.59	0.0083	1
	Sum	5795	11.69	11±1	12.00	15.849	8.19	6.59	0.0208	1

SIMULTANEOUS TRANSMISSIONS

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE. To comply with the MPE, the fraction of the MPE in terms of E^2, H^2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity. In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^{n} \frac{S_i}{MPE_i} \leq 1$$

Band	Antenna	tune-up power (dBm)	Antenna Gain (dBi)	Separation distance (cm)	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)	Evaluation result	Power density Limits	Verdict
BT module 1	Ant1	9	2.27	20	0.002665	1	0.118390	1	PASS
BT module 2	Ant1	4	1.03	20	0.000633	1			
Wi-Fi 2.4G	Ant1	17	2.27	20	0.016816	1			
Wi-Fi 5.2G 802.11a	Ant1	11	5.18	20	0.008255	1			
	Ant2	10	5.18	20	0.006557	1			
Wi-Fi 5.3G 802.11ac20 MIMO	Ant1	12	8.19	20	0.020784	1			
	Ant2	10	8.19	20	0.013114	1			
Wi-Fi 5.6G 802.11ac20 MIMO	Ant1	11	8.19	20	0.016509	1			
	Ant2	8	8.19	20	0.008274	1			
Wi-Fi 5.8G 802.11ac20 MIMO	Ant1	11	8.19	20	0.016509	1			
	Ant2	8	8.19	20	0.008274	1			

Note: 8.19dBi is the directional gain value for 5G.

Conclusion:

For the max result : 0.118390≤ 1.0 for Max Power Density, compliance RF exposure.

Signature:  **Date:** 2025-04-27

NAME AND TITLE (Please print or type): alex li/Manager

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