

# FCC ID: 2AWV6-STV6985

## 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 <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposure</b>				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f <sup>2</sup>	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

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

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.

BT:

### Measurement Result

Operation Frequency: 2402MHz~2480MHz

Power density limited:  $1\text{mW}/\text{cm}^2$

Antenna Type: PCB Antenna

antenna gain: 1.77 dBi;

R=20cm

$\text{mW}=10^{(\text{dBm}/10)}$

antenna gain Numeric= $10^{(\text{dBi}/10)}=10^{(1.77/10)}=1.5$

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm <sup>2</sup> )	Power density Limits (mW/cm <sup>2</sup> )
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	DH5	7.391	8±1	9	7.943	1.77	1.50	0.0024	1
2441		8.966	8±1	9	7.943	1.77	1.50	0.0024	1
2480		8.133	8±1	9	7.943	1.77	1.50	0.0024	1
2402	2DH5	6.876	7±1	8	6.310	1.77	1.50	0.0019	1
2441		7.615	7±1	8	6.310	1.77	1.50	0.0019	1
2480		6.084	7±1	8	6.310	1.77	1.50	0.0019	1
2402	3DH5	7.075	7±1	8	6.310	1.77	1.50	0.0019	1
2441		7.733	7±1	8	6.310	1.77	1.50	0.0019	1
2480		6.474	7±1	8	6.310	1.77	1.50	0.0019	1

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm <sup>2</sup> )	Power density (mW/cm <sup>2</sup> )
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK(1M)	2.56	3.5±1	4.5	2.818	1.77	1.50	0.0008	1
2440		4.431	3.5±1	4.5	2.818	1.77	1.50	0.0008	1
2480		3.398	3.5±1	4.5	2.818	1.77	1.50	0.0008	1

## 2.4G WIFI:

Operation Frequency: WIFI 802.11b/g/n20/n40: 2412-2462MHz,  
Power density limited:  $1\text{mW}/\text{cm}^2$

Antenna Type: FPCB Antenna

antenna gain: 3.83 dBi;

R=20cm

$\text{mW}=10^{(\text{dBm}/10)}$

antenna gain Numeric= $10^{(\text{dBi}/10)}=10^{(3.83/10)}=2.42$

Antenna	Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm <sup>2</sup> )	Power density Limits (mW/cm <sup>2</sup> )
			(dBm)		tune-up power		Gain			
					(dBm)	(mW)	(dBi)	Numeric		
Ant 1	2412	802.11b	16.15	16±1	17	50.119	3.83	2.42	0.0241	1
Ant 2	2412	802.11b	15.78	16±1	17	50.119	3.83	2.42	0.0241	1
Ant 1	2437	802.11b	15.77	16±1	17	50.119	3.83	2.42	0.0241	1
Ant 2	2437	802.11b	15.59	16±1	17	50.119	3.83	2.42	0.0241	1
Ant 1	2462	802.11b	16.35	16±1	17	50.119	3.83	2.42	0.0241	1
Ant 2	2462	802.11b	15.38	16±1	17	50.119	3.83	2.42	0.0241	1
Ant 1	2412	802.11g	12.53	13±1	14	25.119	3.83	2.42	0.0121	1
Ant 2	2412	802.11g	12.49	13±1	14	25.119	3.83	2.42	0.0121	1
Ant 1	2437	802.11g	12.46	13±1	14	25.119	3.83	2.42	0.0121	1
Ant 2	2437	802.11g	12.25	13±1	14	25.119	3.83	2.42	0.0121	1
Ant 1	2462	802.11g	12.49	13±1	14	25.119	3.83	2.42	0.0121	1
Ant 2	2462	802.11g	13.11	13±1	14	25.119	3.83	2.42	0.0121	1
Ant 1	2412	802.11n(HT20)	10.96	11±1	12	15.849	3.83	2.42	0.0076	1
Ant 2	2412	802.11n(HT20)	11	11±1	12	15.849	3.83	2.42	0.0076	1
Ant 1	2437	802.11n(HT20)	10.59	11±1	12	15.849	3.83	2.42	0.0076	1
Ant 2	2437	802.11n(HT20)	10.44	11±1	12	15.849	3.83	2.42	0.0076	1
Ant 1	2462	802.11n(HT20)	10.68	11±1	12	15.849	3.83	2.42	0.0076	1
Ant 2	2462	802.11n(HT20)	10.59	11±1	12	15.849	3.83	2.42	0.0076	1
Ant 1	2422	802.11n(HT40)	9.64	10±1	11	12.589	3.83	2.42	0.0060	1
Ant 2	2422	802.11n(HT40)	10.13	10±1	11	12.589	3.83	2.42	0.0060	1
Ant 1	2437	802.11n(HT40)	9.88	10±1	11	12.589	3.83	2.42	0.0060	1
Ant 2	2437	802.11n(HT40)	9.84	10±1	11	12.589	3.83	2.42	0.0060	1
Ant 1	2452	802.11n(HT40)	9.57	10±1	11	12.589	3.83	2.42	0.0060	1
Ant 2	2452	802.11n(HT40)	9.36	10±1	11	12.589	3.83	2.42	0.0060	1

## 5G WIFI:

Operation Frequency: WIFI 802.11a/ac/n(HT20): 5180-5240MHz; 5745-5825MHz;

WIFI 802.11ac/n(HT40): 5190-5230MHz; 5755-5795MHz;

WIFI 802.11ac80:5210-5210MHz; 5775-5775MHz

Power density limited: 1mW/cm

Antenna Type: FPCB Antenna

antenna gain:5.85dBi;

R=20cm

$mW=10^{(dBm/10)}$

antenna gain Numeric= $10^{(dBi/10)}=10^{(5.85/10)}=3.85$

## 5.2G

Antenna	Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm <sup>2</sup> )	Power density (mW/cm <sup>2</sup> )
			(dBm)		tune-up power		Gain			
					(dBm)	(mW)	(dBi)	Numeric		
Ant 1	5180	802.11a	10.36	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5200	802.11a	10	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5240	802.11a	9.67	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5180	802.11a	10.03	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5200	802.11a	9.91	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5240	802.11a	10	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5180	802.11ac20	9.43	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5200	802.11ac20	10.12	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5240	802.11ac20	9.82	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5180	802.11ac20	10.16	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5200	802.11ac20	10.15	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5240	802.11ac20	10.2	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5190	802.11ac40	9.99	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5230	802.11ac40	9.99	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5190	802.11ac40	10.14	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5230	802.11ac40	9.98	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5210	802.11ac80	9.77	9±1	10	10.000	5.85	3.85	0.0077	1
Ant 2	5210	802.11ac80	9.81	9±1	10	10.000	5.85	3.85	0.0077	1
Ant 1	5180	802.11n(HT20)	9.43	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5200	802.11n(HT20)	9.34	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5240	802.11n(HT20)	9.86	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5180	802.11n(HT20)	10.2	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5200	802.11n(HT20)	10.14	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5240	802.11n(HT20)	9.98	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5190	802.11n(HT40)	9.93	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5230	802.11n(HT40)	10	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5190	802.11n(HT40)	10.1	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5230	802.11n(HT40)	9.96	10±1	11	12.589	5.85	3.85	0.0096	1

## 5.8G

Antenna	Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm <sup>2</sup> )	Power density (mW/cm <sup>2</sup> )
			(dBm)		tune-up power		Gain			
					(dBm)	(mW)	(dBi)	Numeric		
Ant 1	5745	802.11a	9.46	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5785	802.11a	9.89	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5825	802.11a	9.8	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5745	802.11a	10.33	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5785	802.11a	10.33	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5825	802.11a	10.35	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5745	802.11ac20	9.57	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5785	802.11ac20	10.01	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5825	802.11ac20	9.91	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5745	802.11ac20	10.45	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5785	802.11ac20	10.41	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5825	802.11ac20	10.44	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5755	802.11ac40	9.69	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5795	802.11ac40	9.68	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5755	802.11ac40	10.16	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5795	802.11ac40	10.38	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5775	802.11ac80	9.55	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5775	802.11ac80	10.25	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5745	802.11n(HT20)	9.57	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5785	802.11n(HT20)	9.07	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5825	802.11n(HT20)	9.92	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5745	802.11n(HT20)	10.5	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5785	802.11n(HT20)	10.39	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5825	802.11n(HT20)	10.54	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5755	802.11n(HT40)	9.72	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 1	5795	802.11n(HT40)	10.73	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5755	802.11n(HT40)	10.11	10±1	11	12.589	5.85	3.85	0.0096	1
Ant 2	5795	802.11n(HT40)	10.32	10±1	11	12.589	5.85	3.85	0.0096	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

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

### Max. SIMULTANEOUS TRANSMISSIONS MODE

Band	Antenna	SISO					MIMO		Verdict
		tune-up power	Antenna	Separation distance (cm)	Evaluation result	Power density	Evaluation result	Power density Limits	
		(dBm)	Gain (dBi)		(mW/cm <sup>2</sup> )	(mW/cm <sup>2</sup> )			
BT+Wi-Fi 2.4G N20	Ant1	12	3.83	20	0.007616	1	0.017607	1	PASS
	Ant2	12	3.83	20	0.007616	1			
	BT	9	1.77	20	0.002375	1			
BT+Wi-Fi 5.2G AC20	Ant1	11	5.85	20	0.009632	1	0.021639	1	PASS
	Ant2	11	5.85	20	0.009632	1			
	BT	9	1.77	20	0.002375	1			
BT+Wi-Fi 5.8G AC20	Ant1	11	5.85	20	0.009632	1	0.021639	1	PASS
	Ant2	11	5.85	20	0.009632	1			
	BT	9	1.77	20	0.002375	1			

**Signature:**

**Date:** 2022-12-23



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