

RADIO FREQUENCY EXPOSURE

1. Limit

According to §1.1310 and §2.1091 RF exposure is calculated.

Table: Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Power Density (S) (mW/cm ²)
0.3–1.34	*(100)
1.34–30	*(180/f ²)
30–300	0.2
300–1500	f/1500
1500–100,000	1.0

F = frequency in MHz

* = Plane-wave equivalent power density

Maximum Permissible Exposure

The MPE was calculated at 20cm to show compliance with the power density limit.

$$S = PG/4\pi R^2$$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna.

Note:

1. Manufacturer declared that the maximum antenna gain is 2.5dBi (Max.) for 2412~2462MHz when single antenna transmits.

Because signal is correlated, the maximum antenna gain when two antennas simultaneously transmit is 5.51dBi (Max.) for 2412~2462MHz by calculating.

2. Manufacturer declared that the nearest distance between human and the EUT is 20cm.

3. Only record worst case data.

2 Test Results

Standalone MPE

Test	Mode	Channel	ANT Power (dBm)	ANT Max. Tune Up Power (dBm)	ANT Max. Tune Up Power (mW)	ANT MPE (mW/cm ²)	Limit (mW/cm ²)
802.11b	Chain 0	1	18.45	18.0±1.0	79.4328	0.0281	1.0
		6	18.26	18.0±1.0	79.4328	0.0281	1.0
		11	18.59	18.0±1.0	79.4328	0.0281	1.0
	Chain 1	1	18.59	18.0±1.0	79.4328	0.0281	1.0
		6	18.44	18.0±1.0	79.4328	0.0281	1.0
		11	18.54	18.0±1.0	79.4328	0.0281	1.0

Test	Mode	Channel	ANT Power (dBm)	ANT Max. Tune Up Power (dBm)	ANT Max. Tune Up Power (mW)	ANT MPE (mW/cm ²)	Limit (mW/cm ²)
802.11g	Chain 0	1	17.54	17.0±1.0	63.0957	0.0223	1.0
		6	17.26	17.0±1.0	63.0957	0.0223	1.0
		11	17.54	17.0±1.0	63.0957	0.0223	1.0
	Chain 1	1	17.23	17.0±1.0	63.0957	0.0223	1.0
		6	17.52	17.0±1.0	63.0957	0.0223	1.0
		11	17.40	17.0±1.0	63.0957	0.0223	1.0

Test	Mode	Channel	ANT Power (dBm)	ANT Max. Tune Up Power (dBm)	ANT Max. Tune Up Power (mW)	ANT MPE (mW/cm ²)	Limit (mW/cm ²)
802.11n20	Chain 0	1	16.36	16.0±1.0	50.1187	0.0177	1.0
		6	16.40	16.0±1.0	50.1187	0.0177	1.0
		11	16.54	16.0±1.0	50.1187	0.0177	1.0
	Chain 1	1	16.10	16.0±1.0	50.1187	0.0177	1.0
		6	16.20	16.0±1.0	50.1187	0.0177	1.0
		11	16.05	16.0±1.0	50.1187	0.0177	1.0

Test	Mode	Channel	ANT Power (dBm)	ANT Max. Tune Up Power (dBm)	ANT Max. Tune Up Power (mW)	ANT MPE (mW/cm ²)	Limit (mW/cm ²)
802.11n40	Chain 0	3	15.42	15.0±1.0	39.8107	0.0141	1.0
		6	15.36	15.0±1.0	39.8107	0.0141	1.0
		9	15.19	15.0±1.0	39.8107	0.0141	1.0
	Chain 1	3	15.16	15.0±1.0	39.8107	0.0141	1.0
		6	15.09	15.0±1.0	39.8107	0.0141	1.0
		9	15.21	15.0±1.0	39.8107	0.0141	1.0

Simultaneous transmission MPE

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

$\sum \sum$ of MPE ratios ≤ 1.0

Mode	Channel No.	Frequency (MHz)	\sum MPE ratios	Limit	Results
Chain 0+Chain 1					
IEEE 802.11b	1	2412	N/A	1.000	Pass
	6	2442	N/A	1.000	Pass
	11	2462	N/A	1.000	Pass
IEEE 802.11g	1	2412	N/A	1.000	Pass
	6	2442	N/A	1.000	Pass
	11	2462	N/A	1.000	Pass
IEEE 802.11n HT20	1	2412	0.0354	1.000	Pass
	6	2442	0.0354	1.000	Pass
	11	2462	0.0354	1.000	Pass
IEEE 802.11n HT40	3	2422	0.0282	1.000	Pass
	6	2442	0.0282	1.000	Pass
	9	2452	0.0282	1.000	Pass

Note: The estimation distance is 20cm.

Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.