

RF Exposure evaluation

FCC ID: 2AABK-SKY002

Exposure category: General population/uncontrolled environment

EUT Type: Production Unit

Device Type: Mobile Device

1. Reference

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

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

KDB447498 D01: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies

2. Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
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 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density

3. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

Where: 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

4. Antenna Information

SKY002 can only use antennas certificated as follows provided by manufacturer.

Antenna model	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
D104SC WIFI antenna V01	FPC antenna	2.4GHz – 2.5 GHz 5.1GHz – 5.8 GHz	2.00 dBi

5. Conducted power and Manufacturing Tolerance

TestMode	Antenna	Channel	Result[dBm]	Tune up [dBm]
11B	Ant1	2412	11.50	11±1
		2437	11.34	11±1
		2462	10.94	11±1
11G	Ant1	2412	14.20	14±1
		2437	14.13	14±1
		2462	13.65	14±1
11N20SISO	Ant1	2412	13.82	14±1
		2437	13.73	14±1
		2462	13.36	14±1
11N40SISO	Ant1	2422	12.18	12±1
		2437	12.09	12±1
		2452	11.86	12±1

Test Mode	Antenna	Channel	Result[dBm]	Tune-Up[dBm]
11A	Ant1	5180	8.78	9±1
		5200	9.32	9±1
		5240	9.28	9±1
		5260	9.27	9±1
		5280	9.33	9±1
		5320	9.73	9±1

		5500	9.87	9±1
		5580	9.88	9±1
		5700	10.95	10±1
		5745	10.44	10±1
		5785	10.09	10±1
		5825	9.37	10±1
11N20SISO	Ant1	5180	9.23	9±1
		5200	9.27	9±1
		5240	9.15	9±1
		5260	9.11	9±1
		5280	9.13	9±1
		5320	9.56	9±1
		5500	9.87	9±1
		5580	9.79	9±1
		5700	10.98	10±1
		5745	10.39	10±1
		5785	9.98	10±1
		5825	9.32	10±1
11N40SISO	Ant1	5190	9.67	9±1
		5230	9.63	9±1
		5270	9.42	10±1
		5310	9.83	10±1
		5510	10.27	10±1
		5550	10.29	10±1
		5670	10.03	10±1
		5755	10.83	10±1
		5795	10.27	10±1

6. Standalone MPE Result

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r=20\text{cm}$, as well as the gain of the used antenna is 2dBi, the RF power density can be obtained.

2.4GHz WLAN

Modulation Type	Output power		Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
IEEE 802.11b	12.00	15.8489	1.5849	0.0050	1.0000
IEEE 802.11g	15.00	31.6228	1.5849	0.0100	1.0000
IEEE 802.11n HT20	15.00	31.6228	1.5849	0.0100	1.0000
IEEE 802.11n HT40	13.00	19.9526	1.5849	0.0063	1.0000

5GHz WLAN Band 1

Modulation Type	Output power		Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
IEEE 802.11a	10.00	10.0000	1.5849	0.0032	1.0000
IEEE 802.11n HT20	10.00	10.0000	1.5849	0.0032	1.0000
IEEE 802.11n HT40	10.00	10.0000	1.5849	0.0032	1.0000

5GHz WLAN Band 2A

Modulation Type	Output power		Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
IEEE 802.11a	10.00	10.0000	1.5849	0.0032	1.0000
IEEE 802.11n HT20	10.00	10.0000	1.5849	0.0032	1.0000
IEEE 802.11n HT40	11.00	12.5893	1.5849	0.0040	1.0000

5GHz WLAN Band 2C

Modulation Type	Output power		Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
IEEE 802.11a	11.00	12.5893	1.5849	0.0040	1.0000
IEEE 802.11n HT20	11.00	12.5893	1.5849	0.0040	1.0000
IEEE 802.11n HT40	11.00	12.5893	1.5849	0.0040	1.0000

5GHz WLAN Band 3

Modulation Type	Output power		Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
IEEE 802.11a	11.00	12.5893	1.5849	0.0040	1.0000
IEEE 802.11n HT20	11.00	12.5893	1.5849	0.0040	1.0000
IEEE 802.11n HT40	11.00	12.5893	1.5849	0.0040	1.0000

Remark:

- 1. Output power (Average) including turn-up tolerance;*
- 2. Output power was adjust to duty cycle at 100% if measured duty cycle less than 98%;*
- 3. MPE evaluate distance is 20cm from user manual provide by manufacturer.*

7. Conclusion

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

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