

FCC RF Exposure Evaluation

1. Product Information

FCC ID	2ARC7-FT6FR6
Product Name	Wireless Monitor
Test Model	FT6/FR6
Power Supply	Input: DC 12V, 1000mA For AC Input: 100-240V, 50/60Hz, 0.5A Output: DC 12V, 1000mA, 12W
Modulation Type	IEEE 802.11n: OFDM
Antenna Type	External Antenna
Antenna Gain	Antenna 0: External Antenna; 0dBi(Max.) Antenna 1: External Antenna; 0dBi(Max.)
Hardware Version	/
Software Version	/
Frequency Range	5180MHz-5230MHz/5745MHz-5795MHz
Channel Number	4 channels for 20MHz bandwidth(5180MHz-5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz) 5 channels for 20MHz bandwidth(5745MHz-5825MHz) 2 channels for 40MHz bandwidth(5755MHz~5795MHz)
Exposure Category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Device

2. Evaluation Method and Limit

Systems operating under the provisions of FCC 47 CFR 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.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Refer Evaluation Method

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1093](#): Radiofrequency radiation exposure evaluation: portable devices

3. 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

4. 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

5. Antenna Information

FT6/FR6 can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Note
Antenna 0	External Antenna	5000 MHz – 6000 MHz	0dBi	WLAN Antenna
Antenna 1	External Antenna	5000 MHz – 6000 MHz	0dBi	WLAN Antenna

6. Conducted Power Results

[5.2GWIFI Max Conducted Power]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)		
			SISO (ANT 0)	SISO (ANT 1)	MIMO (ANT 0 + ANT 1)
11N20	36	5180	15.16	15.24	18.21
	40	5200	14.81	13.87	17.38
	48	5240	14.25	13.44	16.87
11N40	38	5190	15.26	13.84	17.62
	46	5230	14.72	13.85	17.32

[5.8WIFI Max Conducted Power]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)		
			SISO (ANT 0)	SISO (ANT 1)	MIMO (ANT 0 + ANT 1)
11N20	149	5745	13.85	12.35	16.17
	157	5785	13.55	11.53	15.67
	165	5825	13.12	11.81	15.52
11N40	151	5755	14.38	12.79	16.67
	159	5795	13.91	12.97	16.48

Note: The EUT can simultaneous transmit at 802.11n mode.

7.Manufacturing Tolerance

5.2GWIFI (ANT 0)

IEEE 802.11n HT20			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	15.0	15.0	15.0
Tolerance \pm (dB)	1.0	1.0	1.0
IEEE 802.11n40			
Channel	Channel 38	Channel 46	/
Target (dBm)	15.0	15.0	/
Tolerance \pm (dB)	1.0	1.0	/

5.2GWIFI (ANT 1)

IEEE 802.11n HT20			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	15.0	14.0	14.0
Tolerance \pm (dB)	1.0	1.0	1.0
IEEE 802.11n40			
Channel	Channel 38	Channel 46	/
Target (dBm)	14.0	14.0	/
Tolerance \pm (dB)	1.0	1.0	/

5.2GWIFI (ANT 0 + ANT 1)

IEEE 802.11n HT20			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	18.0	17.0	17.0
Tolerance \pm (dB)	1.0	1.0	1.0
IEEE 802.11n40			
Channel	Channel 38	Channel 46	/
Target (dBm)	17.0	17.0	/
Tolerance \pm (dB)	1.0	1.0	/

5.8GWIFI (ANT 0)

IEEE 802.11n HT20			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	14.0	14.0	14.0
Tolerance \pm (dB)	1.0	1.0	1.0
IEEE 802.11n40			
Channel	Channel 151	Channel 159	/
Target (dBm)	14.0	14.0	/
Tolerance \pm (dB)	1.0	1.0	/

5.8GWIFI (ANT 1)

IEEE 802.11n HT20			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	12.0	12.0	12.0
Tolerance \pm (dB)	1.0	1.0	1.0
IEEE 802.11n40			
Channel	Channel 151	Channel 159	/
Target (dBm)	12.0	12.0	/
Tolerance \pm (dB)	1.0	1.0	/

5.8GWIFI (ANT 0 + ANT 1)

IEEE 802.11n HT20			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	16.0	16.0	16.0
Tolerance \pm (dB)	1.0	1.0	1.0
IEEE 802.11n40			
Channel	Channel 151	Channel 159	/
Target (dBm)	16.0	16.0	/
Tolerance \pm (dB)	1.0	1.0	/

8. Evaluation Results

8.1 Standalone MPE

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 refer to antenna information, the RF power density can be obtained.

Mode	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
5.2G WIFI (ANT 0)	16.0	39.81	0	1.0	0.008	1.0
5.2G WIFI (ANT 1)	16.0	39.81	0	1.0	0.008	1.0
5.8G WIFI (ANT 0)	15.0	31.62	0	1.0	0.006	1.0
5.8G WIFI (ANT 1)	13.0	19.95	0	1.0	0.004	1.0

Remark:

1. The worst case results were recorded.
2. Output power including tune-up tolerance;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer;
4. $MPE \text{ values} = PG/4\pi R^2$;
5. The maximum permissible exposure for 300~1500MHz is $f/1500 \text{ mW/cm}^2$, for 1500~100,000MHz is 1.0 mW/cm^2 .

8.2 Simultaneous Transmission MPE

The sample supports 2 antennas. The WIFI mode of 802.11n can simultaneous transmit. According to KDB447498 D01 General RF Exposure Guidance v06 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Mode	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
5.2G WIFI (MIMO)	19.0	79.43	0	1.0	0.016	1.0
5.8G WIFI (MIMO)	17.0	50.12	0	1.0	0.010	1.0

9. 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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