

Maximum Permissible Exposure Report

1. Product Information

FCC ID:	2AVK9-30358
Product name	TVSurf
Test Model	30358
Power supply	For adapter Input: AC 100-240V, 50/60Hz, 0.5A Max For adapter Output: DC 5V, 2A
Operation frequency	2.412-2.462GHz for 2.4G WIFI 5180MHz-5240MHz for 5.2G WIFI
Antenna Type	FPC Antenna
Antenna Gain	2.0 dBi
Hardware version	IK-S905Y2_V1.0(2020.02.20)
Software version	Android 9.0
Channel Number	11 channels for 20MHz bandwidth (2412~2462MHz) 7 channels for 40MHz bandwidth (2422~2452MHz) 4 channels for 20MHz bandwidth(5180MHz-5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
Channel Spacing	5MHz
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Device

2. Evaluation Method

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. Limit

3.1 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 1 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 2.1091](#): Radiofrequency radiation exposure evaluation: mobile 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

C2M can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
Antenna	Internal Antenna	2400-2500MHz/5100-5250MHz	2.0 dBi	WiFi Antenna

6. Conducted Power

[2.4GWIFI Max Conducted Power]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
IEEE 802.11b	1	2412	12.08
	6	2437	12.80
	11	2462	13.44
IEEE 802.11g	1	2412	12.67
	6	2437	13.56
	11	2462	13.86
IEEE 802.11n HT20	1	2412	12.93
	6	2437	13.85
	11	2462	14.17
IEEE 802.11n HT40	3	2422	12.84
	6	2437	13.25
	9	2452	13.51

[5..2GWIFI Max Conducted Power]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
11A	36	5180	12.28
	40	5200	12.45
	48	5240	12.80
11N20 SISO	36	5180	11.97
	40	5200	12.85
	48	5240	13.64
11N40 SISO	38	5190	11.68
	46	5230	12.95
11AC20 SISO	36	5180	12.47
	40	5200	13.03
	48	5240	13.92
11AC40 SISO	38	5190	12.12
	46	5230	12.91
11AC80 SISO	42	5210	12.34

7. Measurement Results

2.4GWIFI

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	12.0	12.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	12.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	12.0	13.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	12.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

5.2GWIFI

11A (5.2G) (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	12.0	12.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N20 SISO (5.2G) (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	12.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N40 SISO (5.2G) (Average)			
Channel	Channel 38	Channel 46	/
Target (dBm)	11.0	12.0	/
Tolerance $\pm$ (dB)	1.0	1.0	/
11AC20 SISO (5.2G) (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11AC40 SISO (5.2G) (Average)			
Channel	Channel 38	Channel 46	/
Target (dBm)	12.0	12.0	/

Tolerance ±(dB)	1.0	1.0	/
11AC80 SISO (5.2G) (Average)			
Channel	Channel 42	/	/
Target (dBm)	12.0	/	/
Tolerance ±(dB)	1.0	/	/

8. Evaluation Results

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.

2.4GWIFI

Band/Mode	RF output power		Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
IEEE 802.11b	14.0	25.1189	2.0	0.0079	1.0000
IEEE 802.11g	14.0	25.1189	2.0	0.0079	1.0000
IEEE 802.11n HT20	15.0	31.6228	2.0	0.0100	1.0000
IEEE 802.11n HT40	14.0	25.1189	2.0	0.0079	1.0000

5.2GWIFI

Band/Mode	RF output power		Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
IEEE 802.11a	13.0	19.9526	2.0	0.0063	1.0000
IEEE 802.11n20	14.0	25.1189	2.0	0.0079	1.0000
IEEE 802.11n40	13.0	19.9526	2.0	0.0063	1.0000
IEEE 802.11ac20	14.0	25.1189	2.0	0.0079	1.0000
IEEE 802.11ac40	13.0	19.9526	2.0	0.0063	1.0000
IEEE 802.11ac80	13.0	19.9526	2.0	0.0063	1.0000

Remark:

1. Output power including turn-up tolerance;
2. Output power is burst average power;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer;
4. $MPE \text{ values} = PG/4\pi R^2$

9. Conclusion

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

-----THE END OF REPORT-----