

Maximum Permissible Exposure Report

1. Product Information

FCC ID	2AUZZ-AWA
Name of EUT	AW1-A
Model Number	5466
Model Declaration	N/A
Test Model	5466
Modulation Type	QPSK for UMTS; QPSK, 16QAM for LTE
Antenna Gain	3.0dBi for WCDMA Band II; 3.0dBi for WCDMA Band IV; 3.0dBi for WCDMA Band V; 3.0dBi for LTE Band 2; 3.0dBi for LTE Band 4; 3.0dBi for LTE Band 12;
Hardware version	L1V50MG
Software version	DSP: V03; MCU: 04A4
UMTS Operation Frequency Band	UMTS FDD Band II/IV/V
LTE Operation Frequency Band	LTE FDD band 2, 4, 12
WCDMA Release Version	R8
HSDPA Release Version	Release 8
HSUPA Release Version	Release 6
DC-HSUPA Release Version	Not Supported
LTE Release Version	R9
LTE/UMTS Power Class	Class 3
WLAN FCC Modulation Type	QPSK for UMTS; QPSK, 16QAM for LTE
WLAN FCC Operation frequency	WCDMA Band 2/4/5 LTE Band 2/4/12
Antenna Type	FPC Antenna For 2G,3G,4G Ceramic Antenna For BT,WLAN
BT Modulation Type	3.0dBi for WCDMA Band II; 3.0dBi for WCDMA Band IV; 3.0dBi for WCDMA Band V; 3.0dBi for LTE Band 2; 3.0dBi for LTE Band 4; 3.0dBi for LTE Band 12;
Extreme temp. Tolerance	-20°C to +60°C
GPS function	Support and only RX
FM function	Not Supported
NFC Function	Not Supported
Extreme vol. Limits	5.4VDC to 6.6VDC (nominal: 6.0VDC)
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

5466 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 1	External Antenna	600 MHz – 3000 MHz	3.0dBi for WCDMA Band II; 3.0dBi for WCDMA Band IV; 3.0dBi for WCDMA Band V; 3.0dBi for LTE Band 2; 3.0dBi for LTE Band 4; 3.0dBi for LTE Band 12;	WCDMA/LTE Antenna

6. Conducted Power

[WCDMA Max Average Power]

Test Mode	Channel	Frequency (MHz)	Max Average Power (dBm)
WCDMA Band II	Low	1852.4	23.56
	Middle	1880	23.03
	High	1907.6	23.90
WCDMA Band IV	Low	1712.4	23.63
	Middle	1732.6	23.67
	High	1752.6	24.22
WCDMA Band V	Low	826.4	25.08
	Middle	836.4	25.11
	High	846.6	25.06

[LTE Max Average Power]

Test Mode		Channel	Frequency (MHz)	Max Average Power (dBm)
LTE	Band 2	LCH	1850.7	21.80
		MCH	1880.0	22.71
		HCH	1909.3	20.76
	Band 4	LCH	1710.7	22.23
		MCH	1732.5	21.81
		HCH	1754.3	21.88
	Band 12	LCH	699.7	19.45
		MCH	707.5	18.98
		HCH	715.3	19.09

7. Manufacturing Tolerance

[WCDMA Max Average Power]

Test Mode		Channel	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
WCDMA	Band II	LCH	23.56	23.0±1.0
		MCH	23.03	23.0±1.0
		HCH	23.90	23.0±1.0
	Band IV	LCH	23.63	23.0±1.0
		MCH	23.67	23.0±1.0
		HCH	24.22	23.5±1.0
	Band V	LCH	25.08	24.5±1.0
		MCH	25.11	24.5±1.0
		HCH	25.06	24.5±1.0

<LTE Max Average Power>

Test Mode		Channel	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
LTE	Band 2	LCH	21.80	21.0±1.5
		MCH	22.71	22.0±1.5
		HCH	20.76	20.0±1.5
	Band 4	LCH	22.23	22.0±1.5
		MCH	21.81	21.0±1.5
		HCH	21.88	21.0±1.5
	Band 12	LCH	19.45	19.0±1.5
		MCH	18.98	18.0±1.5
		HCH	19.09	19.0±1.5

8. Measurement Results

8.1 Standalone MPE Evaluation

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.

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
WCDMA Band II	24.00	251.1886	3.000	1.9953	0.0998	1.0000
WCDMA Band IV	24.50	281.8383	3.000	1.9953	0.1119	0.5493
WCDMA Band V	25.50	354.8134	3.000	1.9953	0.1409	0.4660
LTE Band 2	23.50	223.8721	3.000	1.9953	0.0889	1.0000
LTE Band 4	23.50	223.8721	3.000	1.9953	0.0889	1.0000
LTE Band 12	20.50	112.2018	3.000	1.9953	0.0446	0.4717

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 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.

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