

Maximum Permissible Exposure Report

1. Product Information

FCC ID : 2ALZEUSF7

EUT : Cellphone signal booster

Equipment Type : Wideband Consumer Boosterr

Test Model : AN-USF7

Power Supply : For AC Adapter:
Input: AC 100-240V,50/60Hz, 0.6A
Output: DC 12V \pm 2.0A, 24W

Hardware Version : V4.1

Software Version : V4.1

Frequency Range : Lower 700MHz (B12)
Uplink: 698~716MHz, Downlink: 728~746 MHz
Upper 700MHz (B13)
Uplink: 776~787MHz, Downlink: 746~757 MHz
Cellular Band (B5)
Uplink: 824~849MHz, Downlink: 869~894 MHz
PCS Band (B2)
Uplink: 1850~1910MHz, Downlink: 1930~1990 MHz
AWS Band (B4)
Uplink: 1710~1755MHz, Downlink: 2110~2155 MHz

Operating Temperature : -25°C~+55°C

Exposure category : General population/uncontrolled environment

EUT Type : Production Unit

Device Type : fixed Device

Mode	Frequency Band(MHz)	Max. Antenna Gain(dBi)	Cable loss(dB)
DOWN LINK	728-746	7	2.19
	746-757	7	2.19
	869-894	7	2.19
	2110-2155	8.5	2.5
	1930-1960	8.5	2.5
Mode	Frequency (MHz)	Antenna Gain(dBi)	Cable loss(dB)
UP LINK	698-716	9	5.49
	776-787	9	5.49
	824-849	9	5.49
	1710-1755	10.5	6.25
	1850-1910	10.5	6.25

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 and Conducted Output Power

PCS Band

Mode	Frequency (MHz)	Signal Type	Output Power (dBm)	Cable Loss	Power to Antenna (mW)
Uplink	1882.28	CW	19.40	6.25	20.65
		AWGN	19.40	6.25	20.65
Downlink	1948.12	CW	8.32	2.5	3.82
		AWGN	8.48	2.5	3.96

AWS Band

Mode	Frequency (MHz)	Signal Type	Output Power (dBm)	Cable Loss	Power to Antenna (mW)
Uplink	1731.87	CW	19.59	6.25	21.58
		AWGN	19.05	6.25	19.05
Downlink	2153.83	CW	7.70	2.5	3.31
		AWGN	7.59	2.5	3.23

Cellular band

Mode	Frequency (MHz)	Signal Type	Output Power (dBm)	Cable Loss	Power to Antenna (mW)
Uplink	831.200	CW	19.38	5.49	24.49
		AWGN	19.19	5.49	23.44
Downlink	875.985	CW	7.97	2.19	3.78
		AWGN	7.79	2.19	3.63

Lower 700MHz band

Mode	Frequency (MHz)	Signal Type	Output Power (dBm)	Cable Loss	Power to Antenna (mW)
Uplink	701.168	CW	19.54	5.49	25.41
		AWGN	20.85	5.49	34.36
Downlink	736.568	CW	7.21	2.19	3.17
		AWGN	7.11	2.19	3.10

Upper 700MHz band

Mode	Frequency (MHz)	Signal Type	Output Power (dBm)	Cable Loss	Power to Antenna (mW)
Uplink	781.170	CW	19.16	5.49	23.28
		AWGN	19.86	5.49	27.35
Downlink	751.060	CW	8.26	2.19	4.04
		AWGN	8.45	2.19	4.23

6. Measurement Results

PCS Band

Uplink (AWAG Signal)	
Frequency (MHz)	1882.28
Target (dBm)	20.0
Tolerance \pm (dB)	1.0
Downlink (AWAG Signal)	
Frequency (MHz)	1948.12
Target (dBm)	9.0
Tolerance \pm (dB)	1.0

AWS Band

Uplink (CW Signal)	
Frequency (MHz)	1731.87
Target (dBm)	20.0
Tolerance \pm (dB)	1.0
Downlink (CW Signal)	
Frequency (MHz)	2153.83
Target (dBm)	8.0
Tolerance \pm (dB)	1.0

Cellular Band

Uplink (CW Signal)	
Frequency (MHz)	831.200
Target (dBm)	20.0
Tolerance \pm (dB)	1.0
Downlink (CW Signal)	
Frequency (MHz)	875.985
Target (dBm)	8.0
Tolerance \pm (dB)	1.0

Lower 700 Band

Uplink (CW Signal)	
Frequency (MHz)	701.168
Target (dBm)	21.0
Tolerance \pm (dB)	1.0
Downlink (CW Signal)	
Frequency (MHz)	736.568
Target (dBm)	8.0
Tolerance \pm (dB)	1.0

Upper 700 Band

Uplink (CW Signal)	
Frequency (MHz)	781.170
Target (dBm)	20.0
Tolerance \pm (dB)	1.0
Downlink (CW Signal)	
Frequency (MHz)	751.060
Target (dBm)	9.0
Tolerance \pm (dB)	1.0

7. Limits for General /Uncontrolled Exposure

Maximum permissible exposure :

the report recorded the worst result of Outdoor Antenna (PTE-LO-700-2500), Indoor Antenna(PTE-PN-800-2500)

PCS Band

Band/Mode	RF output power		Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
Uplink	20.0	100.0000	10.5	0.2232	1.0
Downlink	9.0	7.9432	8.5	0.0112	1.0

AWS Band

Band/Mode	RF output power		Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
Uplink	20.0	100.0000	10.5	0.2232	1.0
Downlink	8.0	6.3096	8.5	0.0089	1.0

Cellular Band

Band/Mode	RF output power		Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
Uplink	20.0	100.0000	9	0.1580	0.55
Downlink	8.0	6.3096	7	0.0063	0.58

Lower 700 Band

Band/Mode	RF output power		Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
Uplink	21.0	125.8925	9	0.1989	0.47
Downlink	8.0	6.3096	7	0.0063	0.49

Upper 700 Band

Band/Mode	RF output power		Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
Uplink	20.0	100.0000	9	0.1580	0.52
Downlink	9.0	7.9432	7	0.0079	0.50

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

8. Evaluation Results

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

Simultaneous Transmission MPE

Not need consider simultaneous transmission

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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