Maximum Permissible Exposure Report

1. Product Information

FCC ID	2AWF3ES-C11
Name of EUT	3G Car DVR
Model Number	ES-C11
Model Declaration	N/A
Test Model	ES-C11
Modulation Type	GMSK for GSM/GPRS; 8-PSK for EDGE; QPSK for UMTS
Antenna Gain	0dBi (max.) For GSM 850; 0dBi (max.) For PCS 1900; 0dBi for WCDMA Band II; 0dBi for WCDMA Band V;
Hardware version	/
Software version	/
GSM/EDGE/GPRS Operation Frequency Band	GPRS850/GPRS1900/EDGE850/EDGE1900
UMTS Operation Frequency Band	UMTS FDD Band II/ V
GSM/EDGE/GPRS	Supported GPRS/EDGE
GSM Release Version	R99
GSM/EDGE/GPRS Power Class	GSM850:Power Class 4/ PCS1900:Power Class 1
GPRS/EDGE Multislot Class	GPRS/EDGE: Multi-slot Class 12
GPRS operation mode	Class B
WCDMA Release Version	R99
HSDPA Release Version	Release 8
HSUPA Release Version	Release 7
DC-HSUPA Release Version	Not Supported
Antenna Type	Internal Antenna For 2G,3G
GPS function	Support and only RX
FM function	Not Supported
NFC Function	Not Supported
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

ES-D4 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	600 MHz – 3000 MHz	0 dBi	GSM/WCDMA

6. Conducted Power

[GSM Max Average Power]

Test Mode	Channel	Frequency (MHz)	Max Average Power (dBm)
GSM 850	Low	824.2	32.42
	Middle	836.6	32.38
	High	848.8	32.39
GSM 1900	Low	1850.2	32.40
	Middle	1880.0	32.37
	High	1909.8	32.41

[WCDMA Max Average Power]

Test Mode	Channel	Frequency (MHz)	Max Average Power (dBm)
WCDMA Band II	Low	1852.4	23.43
	Middle	1880	23.53
	High	1907.6	23.48
WCDMA Band V	Low	826.4	22.27
	Middle	836.4	22.09
	High	846.6	22.58

7. Manufacturing Tolerance

[GSM Max Average Power]

Test Mode	Channel	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
GSM 850	LCH	32.42	32.0±1.0
	MCH	32.38	32.0±1.0
	HCH	32.39	32.0±1.0
GSM 1900	LCH	32.40	32.0±1.0
	MCH	32.37	32.0±1.0
	HCH	32.41	32.0±1.0

[WCDMA Max Average Power]

Test Mode		Channel	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
WCDMA	Band II	LCH	23.43	23.0±1.0
		MCH	23.53	23.0±1.0
		HCH	23.48	23.0±1.0
	Band V	LCH	22.27	22.0±1.0
		MCH	22.09	22.0±1.0
		HCH	22.58	22.0±1.0

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 =20cm, 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/cm2)	MPE Limits (mW/cm2)
	dBm	mW				
GSM 850	33.00	1995.2623	0	1.00	0.3969	0.549
GSM 1900	33.00	1995.2623	0	1.00	0.3969	1.000
WCDMA Band II	24.00	251.1886	0	1.00	0.0500	1.000
WCDMA Band V	23.00	199.5262	0	1.00	0.0397	0.551

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.

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