

Maximum Permissible Exposure Report

1. Product Information

FCC ID:	2AMHALA-9026
Product name	Response
Name of EUT	3G GPS Tracker
Model number	LA-9026
Power supply	DC 12V from battery
Modulation Type	GMSK for GSM/GPRS, 8-PSK for EDGE, QPSK for UMTS
Antenna Type	External Antenna
Antenna Gain	2.0dBi (max.) For GSM 850; 2.0dBi (max.) For GSM 900; 2.0dBi (max.) For DCS 1800; 2.0dBi (max.) For PCS 1900; 2.0dBi (max.) For WCDMA Band II 2.0dBi (max.) For WCDMA Band V
UMTS Operation Frequency Band	Device supported UMTS FDD Band II/V
HSDPA Release Version	Release 6
HSUPA Release Version	Release 6
DC-HSUPA Release Version	Not Supported
WCDMA Release Version	R99
Hardware version	CCTR805_UC20V7
Software version	805_3G
GPS function	Support and only RX
GSM/EDGE/GPRS	Supported GSM/GPRS/EDGE
GSM/EDGE/GPRS Power Class	GSM850:Power Class 4/ PCS1900:Power Class 1
GSM/EDGE/GPRS Operation Frequency	GSM850 :824.2MHz-848.8MHz/PCS1900:1850.2MHz-1909.8MHz
GSM/EDGE/GPRS Operation Frequency Band	GSM850/PCS1900/GPRS850/GPRS1900/EDGE850/EDGE1900
GSM Release Version	R99
GPRS/EDGE Multislot Class	GPRS/EDGE: Multi-slot Class 12
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	10.20VDC to 13.80VDC (nominal: 12.00VDC)
GPRS operation mode	Class B
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

LA-9026 can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Antenna 0	External Antenna	800 MHz – 2000 MHz	2.00 dBi

6. Conducted Power

GSM 850		Burst Conducted power (dBm)			/	Average power (dBm)		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		128/824.2	190/836.6	251/848.8		128/824.2	190/836.6	251/848.8
GPRS (GMSK)	1TX slot	32.80	32.82	32.79	-9.03dB	23.77	23.79	23.76
	2TX slot	30.62	30.64	30.62	-6.02dB	24.60	24.62	24.60
	3TX slot	28.30	28.27	28.26	-4.26dB	24.04	24.01	24.00
	4TX slot	26.86	26.88	26.85	-3.01dB	23.85	23.87	23.84
EGPRS (8PSK)	1TX slot	26.24	26.24	26.25	-9.03dB	17.21	17.21	17.22
	2TX slot	23.76	23.79	23.80	-6.02dB	17.74	17.77	17.78
	3TX slot	22.26	22.23	22.24	-4.26dB	18.00	17.97	17.98
	4TX slot	20.45	20.51	20.51	-3.01dB	17.44	17.50	17.50
GSM 1900		Burst Conducted power (dBm)			/	Burst Conducted power (dBm)		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		512/1850.2	661/1880	810/1909.8		512/1850.2	661/1880	810/1909.8
GPRS (GMSK)	1TX slot	29.80	29.82	29.79	-9.03dB	20.77	20.79	20.76
	2TX slot	27.16	27.14	27.15	-6.02dB	21.14	21.12	21.13
	3TX slot	25.52	25.50	25.49	-4.26dB	21.26	21.24	21.23
	4TX slot	24.65	24.65	24.63	-3.01dB	21.64	21.64	21.62
EGPRS (8PSK)	1TX slot	25.06	25.10	25.11	-9.03dB	16.03	16.07	16.08
	2TX slot	23.33	23.34	23.32	-6.02dB	17.31	17.32	17.30
	3TX slot	21.72	21.77	21.74	-4.26dB	17.46	17.51	17.48
	4TX slot	19.42	19.41	19.40	-3.01dB	16.41	16.40	16.39

Item	band	WCDMA Band II result (dBm)			WCDMA Band V result (dBm)		
		Channel/Frequency(MHz)			Channel/Frequency(MHz)		
		9262/ 1852.4	9400/ 1880	9538/ 1907.6	4132/ 826.4	4183/ 836.6	4233/ 846.6
RMC	12.2kbps RMC	23.73	23.47	23.34	23.68	23.58	23.54
HSDPA	Sub –Test 1	23.48	23.53	23.32	23.52	23.51	23.28
	Sub –Test 2	22.65	22.75	22.22	22.79	22.36	22.77
	Sub –Test 3	22.17	21.62	21.41	21.65	21.52	21.49
	Sub –Test 4	20.97	21.12	21.51	21.15	21.91	21.51
HSUPA	Sub –Test 1	22.31	22.03	22.36	22.48	22.97	22.28
	Sub –Test 2	21.04	21.43	20.98	21.10	21.61	21.46
	Sub –Test 3	21.48	21.83	21.80	21.96	21.67	22.37
	Sub –Test 4	20.68	20.54	21.09	20.44	20.76	20.66
	Sub –Test 5	21.57	21.23	21.35	21.08	21.28	21.26

7. Manufacturing Tolerance

GSM 850 GPRS (GMSK) (Burst Average Power)				
Channel		128	190	251
1 Txslot	Target (dBm)	32.0	32.0	32.0
	Tolerance ±(dB)	1.0	1.0	1.0
2 Txslot	Target (dBm)	30.0	30.0	30.0
	Tolerance ±(dB)	1.0	1.0	1.0
3 Txslot	Target (dBm)	28.0	28.0	28.0
	Tolerance ±(dB)	1.0	1.0	1.0
4 Txslot	Target (dBm)	26.0	26.0	26.0
	Tolerance ±(dB)	1.0	1.0	1.0
GSM 850 EDGE (8PSK) (Burst Average Power)				
Channel		128	190	251
1 Txslot	Target (dBm)	26.0	26.0	26.0
	Tolerance ±(dB)	1.0	1.0	1.0
2 Txslot	Target (dBm)	23.0	23.0	23.0
	Tolerance ±(dB)	1.0	1.0	1.0
3 Txslot	Target (dBm)	22.0	22.0	22.0

4 Txslot	Tolerance $\pm$ (dB)	1.0	1.0	1.0
	Target (dBm)	20.0	20.0	20.0
	Tolerance $\pm$ (dB)	1.0	1.0	1.0
GSM 1900 GPRS (GMSK) (Burst Average Power)				
Channel		512	661	810
1 Txslot	Target (dBm)	29.0	29.0	29.0
	Tolerance $\pm$ (dB)	1.0	1.0	1.0
2 Txslot	Target (dBm)	27.0	27.0	27.0
	Tolerance $\pm$ (dB)	1.0	1.0	1.0
3 Txslot	Target (dBm)	25.0	25.0	25.0
	Tolerance $\pm$ (dB)	1.0	1.0	1.0
4 Txslot	Target (dBm)	24.0	24.0	24.0
	Tolerance $\pm$ (dB)	1.0	1.0	1.0
GSM 1900 EDGE (8PSK) (Burst Average Power)				
Channel		512	661	810
1 Txslot	Target (dBm)	25.0	25.0	25.0
	Tolerance $\pm$ (dB)	1.0	1.0	1.0
2 Txslot	Target (dBm)	23.0	23.0	23.0
	Tolerance $\pm$ (dB)	1.0	1.0	1.0
3 Txslot	Target (dBm)	21.0	21.0	21.0
	Tolerance $\pm$ (dB)	1.0	1.0	1.0
4 Txslot	Target (dBm)	19.0	19.0	19.0
	Tolerance $\pm$ (dB)	1.0	1.0	1.0

UMTS

UMTS Band V			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	23.0	23.0	23.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 1)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	23.0	23.0	23.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 2)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	22.0	22.0	22.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 3)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	21.0	21.0	21.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 4)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	21.0	21.0	21.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 1)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	22.0	22.0	22.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 2)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	21.0	21.0	21.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 3)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	21.0	21.0	21.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 4)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	20.0	21.0	21.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 5)			

Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	22.0	22.0	22.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

UMTS Band II			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	23.0	23.0	23.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band II HSDPA(sub-test 1)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	23.0	23.0	23.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band II HSDPA(sub-test 2)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	22.0	22.0	22.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band II HSDPA(sub-test 3)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	23.0	23.0	23.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band II HSDPA(sub-test 4)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	21.0	21.0	21.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band II HSUPA(sub-test 1)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	22.0	22.0	22.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band II HSUPA(sub-test 2)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	21.0	21.0	21.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band II HSUPA(sub-test 3)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	21.0	21.0	21.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band II HSUPA(sub-test 4)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	20.0	20.0	20.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
UMTS Band II HSUPA(sub-test 5)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	21.0	21.0	21.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

8. Measurement 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.

Antenna 0

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
GSM850	25.98	396.2780	2.00	1.5849	25%	0.1250	0.5667
GSM1900	21.99	158.1248	2.00	1.5849	50%	0.0499	1.0000
UMTS Band V	24.00	251.1886	2.00	1.5849	100%	0.0792	0.5667
UMTS Band II	24.00	251.1886	2.00	1.5849	100%	0.0792	1.0000

Remark:

1. Output power (Average) including turn-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;

8.2 Simultaneous Transmission MPE

The sample supports two antenna, one antenna support GSM/UMTS, the other antenna supports GPS receiver antenna, no 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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