

Maximum Permissible Exposure Report

1. Product Information

FCC ID	2ANSJYL-007WM3GR
Product name	3G alarm system
Model number	YL-007M3FX, YL-007M3GS1, YL-007WM3GR, YL-007WM3FX, YL-007M3GR, YL-007W3G7, YL-007WM2
Power supply	DC 7.4V by Lithium ion polymer battery (500mAh) Recharge Voltage: DC 12.0V 1A or 1.2A by AC/DC Adapter
Modulation Type	GMSK for GSM/GPRS, GMSK/8PSK for EDGE, QPSK for UMTS
Antenna Type	Internal Antenna
Antenna Gain	2.0dBi (max.) For all GSM Band 2.0dBi (max.) For all WCDMA Band
Hardware version	VER:2.0
Software version	3GCN_EN3GW1.0
GSM/EDGE/GPRS Operation Frequency Band	GSM850/PCS1900/GPRS850/GPRS1900/EDGE850/EDGE1900
UMTS Operation Frequency Band	Device supported UMTS FDD Band II/V
GSM/EDGE/GPRS	Supported GSM/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 8
DC-HSUPA Release Version	Not Supported
2.4G WLAN	Supported 802.11b/802.11g/802.11n
Operation frequency	IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz IEEE 802.11n HT40:2422-2452MHz
Modulation Type	IEEE 802.11b: DSSS (CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM,QPSK,BPSK)
Channel Number	11 Channels for WIFI 20MHz Bandwidth(802.11b/g/n-HT20) 7 Channels for WIFI 40MHz Bandwidth(802.11n-HT40)
Antenna Type	Internal Antenna
Antenna Gain	1.0dBi (Max.)
433MHz Operation frequency	433.92MHz
Modulation Type	ASK
Channel Number	1
Antenna Type	Internal Antenna
Antenna Gain	0dBi (Max)
RFID Operation frequency	125KHz
Modulation Type	OOK
Channel Number	1
Antenna Type	Internal Antenna
Antenna Gain	0dBi (Max)
Extreme temp. Tolerance	-20°C to +40°C
Extreme vol. Limits	6.66 VDC to 8.14 VDC (nominal: 7.40VDC)
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

YL-007WM3GR 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	Internal Antenna	700 MHz - 2000 MHz	2.0dBi (Max.) For all GSM Band 2.0dBi (Max.) For all WCDMA Band
Antenna 1	Internal Antenna	2400 MHz – 2500 MHz	1.0dBi (Max.) For 2.4GWLAN
Antenna 2	Internal Antenna	433.92MHz	0.0dBi (Max.) For 433MHz
Antenna 3	Internal Antenna	125KHz	0.0dBi (Max.) For RFID

6. Conducted Power

<GSM Conducted Power>

General Note:

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing, further SAR test reduction and MPE.
2. According to October 2013TCB Workshop, for GSM / GPRS / EGPRS, the number of time slots to test for SAR or MPE should correspond to the highest frame-average maximum output power configuration, considering the possibility of operation.

Conducted Power Measurement Results (GSM850/1900)

GSM 850		Burst Average power (dBm)			/	Frame 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
GSM		32.69	32.83	32.79	-9.03dB	23.66	23.80	23.76
GPRS (GMSK)	1TX slot	32.54	32.48	32.54	-9.03dB	23.51	23.45	23.51
	2TX slot	30.78	30.21	30.32	-6.02dB	24.76	24.19	24.30
	3TX slot	29.65	29.65	29.45	-4.26dB	25.39	25.39	25.19
	4TX slot	27.52	27.48	27.25	-3.01dB	24.51	24.47	24.24
EGPRS (8PSK)	1TX slot	26.48	26.82	26.51	-9.03dB	17.45	17.79	17.48
	2TX slot	23.08	23.19	23.32	-6.02dB	17.06	17.17	17.30
	3TX slot	22.54	22.48	22.22	-4.26dB	18.28	18.22	17.96
	4TX slot	20.18	20.65	20.45	-3.01dB	17.17	17.64	17.44
GSM 1900		Burst Average power (dBm)			/	Frame Average power (dBm)		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		512/ 1850.2	661/ 1880	810/ 1909.8		512/ 1850.2	661/ 1880	810/ 1909.8
GSM		30.48	30.59	30.55	-9.03dB	21.45	21.56	21.52
GPRS (GMSK)	1TX slot	30.65	30.85	30.65	-9.03dB	21.62	21.82	21.62
	2TX slot	28.71	28.62	28.48	-6.02dB	22.69	22.60	22.46
	3TX slot	27.32	27.18	27.51	-4.26dB	23.06	22.92	23.25
	4TX slot	25.49	25.05	25.45	-3.01dB	22.48	22.04	22.44
EGPRS (8PSK)	1TX slot	25.51	25.15	25.62	-9.03dB	16.48	16.12	16.59
	2TX slot	23.59	23.65	23.55	-6.02dB	17.57	17.63	17.53
	3TX slot	21.23	21.32	21.48	-4.26dB	16.97	17.06	17.22
	4TX slot	19.55	19.48	19.39	-3.01dB	16.54	16.47	16.38

Conducted Power Measurement Results (WCDMA Band II/V)

WCDMA Band II		Burst Average power (dBm)			/	Frame Average power (dBm)		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		9262/ 1852.4	9400/ 1880	9538/ 1907.6		9262/ 1852.4	9400/ 1880	9538/ 1907.6
RMC		23.81	23.77	23.69	-9.03dB	14.78	14.74	14.66
HSDPA	Sub -Test 1	23.25	23.51	23.45	-9.03dB	14.22	14.48	14.42
	Sub -Test 2	22.32	22.26	22.26	-6.02dB	16.30	16.24	16.24
	Sub -Test 3	21.45	21.34	21.32	-4.26dB	17.19	17.08	17.06
	Sub -Test 4	21.22	21.01	21.22	-3.01dB	18.21	18.00	18.21
HSUPA	Sub -Test 1	23.21	23.62	23.51	-9.03dB	14.18	14.59	14.48
	Sub -Test 2	22.25	22.44	22.65	-6.02dB	16.23	16.42	16.63
	Sub -Test 3	21.65	21.36	21.21	-4.26dB	17.39	17.10	16.95
	Sub -Test 4	21.36	21.15	21.51	-3.01dB	18.35	18.14	18.50
WCDMA Band V		Burst Average power (dBm)			/	Frame Average power (dBm)		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		4132/ 826.4	4183/ 836.6	4233/ 846.6		4132/ 826.4	4183/ 836.6	4233/ 846.6
RMC		23.88	23.79	23.91	-9.03dB	14.85	14.76	14.88
HSDPA	Sub -Test 1	23.51	23.69	23.78	-9.03dB	14.48	14.66	14.75
	Sub -Test 2	22.22	22.77	22.69	-6.02dB	16.20	16.75	16.67
	Sub -Test 3	21.62	21.59	21.55	-4.26dB	17.36	17.33	17.29
	Sub -Test 4	21.23	21.22	21.31	-3.01dB	18.22	18.21	18.30
HSUPA	Sub -Test 1	23.69	23.67	23.69	-9.03dB	14.66	14.64	14.66
	Sub -Test 2	22.49	22.54	22.48	-6.02dB	16.47	16.52	16.46
	Sub -Test 3	21.68	21.78	21.59	-4.26dB	17.42	17.52	17.33
	Sub -Test 4	21.32	21.55	21.44	-3.01dB	18.31	18.54	18.43

Notes:

1) Division Factors

To frame average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

2) GPRS 3TX slot used for MPE as highest frame average power.

<2.4G WLAN Conducted Power>

Test Mode	Channel	Frequency (MHz)	Measured Peak Output Power (dBm)
IEEE 802.11b	1	2412	17.59
	6	2437	17.45
	11	2462	17.21
IEEE 802.11g	1	2412	16.45
	6	2437	16.33
	11	2462	16.18
IEEE 802.11n HT20	1	2412	15.29
	6	2437	15.51
	11	2462	15.48
IEEE 802.11n HT40	3	2422	14.65
	6	2437	14.78
	9	2452	14.33

7. Manufacturing Tolerance

GSM 850 (GMSK) (Burst Average Power)				
Channel		128	190	251
GSM	Target (dBm)	32.0	32.0	32.0
	Tolerance ±(dB)	1.0	1.0	1.0
GPRS	1 Txslot	Target (dBm)	32.0	32.0
		Tolerance ±(dB)	1.0	1.0
	2 Txslot	Target (dBm)	30.0	30.0
		Tolerance ±(dB)	1.0	1.0
	3 Txslot	Target (dBm)	29.0	29.0
		Tolerance ±(dB)	1.0	1.0
	4 Txslot	Target (dBm)	27.0	27.0
		Tolerance ±(dB)	1.0	1.0
EGPRS	1 Txslot	Target (dBm)	26.0	26.0
		Tolerance ±(dB)	1.0	1.0
	2 Txslot	Target (dBm)	23.0	23.0
		Tolerance ±(dB)	1.0	1.0
	3 Txslot	Target (dBm)	22.0	22.0
		Tolerance ±(dB)	1.0	1.0
	4 Txslot	Target (dBm)	20.0	20.0
		Tolerance ±(dB)	1.0	1.0
GSM 1900 (GMSK) (Burst Average Power)				
Channel		512	661	810
GSM	Target (dBm)	30.0	30.0	30.0
	Tolerance ±(dB)	1.0	1.0	1.0
GPRS	1 Txslot	Target (dBm)	30.0	30.0
		Tolerance ±(dB)	1.0	1.0
	2 Txslot	Target (dBm)	28.0	28.0
		Tolerance ±(dB)	1.0	1.0
	3 Txslot	Target (dBm)	27.0	27.0
		Tolerance ±(dB)	1.0	1.0
	4 Txslot	Target (dBm)	25.0	25.0
		Tolerance ±(dB)	1.0	1.0
EGPRS	1 Txslot	Target (dBm)	25.0	25.0
		Tolerance ±(dB)	1.0	1.0
	2 Txslot	Target (dBm)	23.0	23.0
		Tolerance ±(dB)	1.0	1.0
	3 Txslot	Target (dBm)	21.0	21.0
		Tolerance ±(dB)	1.0	1.0
	4 Txslot	Target (dBm)	19.0	19.0
		Tolerance ±(dB)	1.0	1.0

WCDMA Band II (QPSK) (Burst Average Power)					
Channel			9262	9400	9538
RCM	Target (dBm)		23.0	23.0	23.0
	Tolerance ±(dB)		1.0	1.0	1.0
HSDPA	Sub –Test 1	Target (dBm)	23.0	23.0	23.0
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 2	Target (dBm)	22.5	22.5	22.5
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 3	Target (dBm)	21.0	21.0	21.0
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 4	Target (dBm)	21.5	21.5	21.5
		Tolerance ±(dB)	1.0	1.0	1.0
HSUPA	Sub –Test 1	Target (dBm)	23.0	23.0	23.0
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 2	Target (dBm)	22.5	22.5	22.5
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 3	Target (dBm)	21.0	21.0	21.0
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 4	Target (dBm)	21.5	21.5	21.5
		Tolerance ±(dB)	1.0	1.0	1.0
WCDMA Band V (QPSK) (Burst Average Power)					
Channel			4132	4183	4233
RCM	Target (dBm)		23.0	23.0	23.0
	Tolerance ±(dB)		1.0	1.0	1.0
HSDPA	Sub –Test 1	Target (dBm)	23.0	23.0	23.0
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 2	Target (dBm)	22.0	22.0	22.0
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 3	Target (dBm)	21.0	21.0	21.0
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 4	Target (dBm)	21.0	21.0	21.0
		Tolerance ±(dB)	1.0	1.0	1.0
HSUPA	Sub –Test 1	Target (dBm)	23.0	23.0	23.0
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 2	Target (dBm)	22.5	22.5	22.5
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 3	Target (dBm)	21.0	21.0	21.0
		Tolerance ±(dB)	1.0	1.0	1.0
	Sub –Test 4	Target (dBm)	21.5	21.5	21.5
		Tolerance ±(dB)	1.0	1.0	1.0

2.4GWLAN

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	17.0	17.0	17.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.0	15.0	15.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	14.0	14.0	14.0
Tolerance ±(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					
GPRS850	30.00	1000.0000	2.0000	1.5849	37.5%	0.1183	1.0000
GPRS1900	28.00	630.9573	2.0000	1.5849	37.5%	0.0746	1.0000
WCDMA Band V	22.00	158.4893	2.0000	1.5849	50.0%	0.0250	1.0000
WCDMA Band II	22.00	158.4893	2.0000	1.5849	50.0%	0.0250	1.0000

Antenna 1

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11b	18.00	63.0957	1.000	1.2589	100%	0.0158	1.0000
IEEE 802.11g	17.00	50.1187	1.000	1.2589	100%	0.0126	1.0000
IEEE 802.11n HT20	16.00	39.8107	1.000	1.2589	100%	0.0100	1.0000
IEEE 802.11n HT40	15.00	31.6228	1.000	1.2589	100%	0.0079	1.0000

Remark:

1. Output power (Average) 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 = $PG/4\pi R^2 * \text{Duty Cycle}$;
5. MPE limits for GPRS850 refer 824MHz as it is lowest frequency.

Antenna 2 and Antenna 3

According to KDB 412172 D01 Determining ERP and EIRP format;
 $\text{eirp} = p_t \times g_t = (E \times d)^2/30$

Where:

p_t = transmitter output power in watts,

g_t = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m,

d = measurement distance in meters (m).

Antenna 2:

EIRP = -9.95dBm = 0.10119mW

Antenna 3

EIRP = -23.96dBm = 0.00402mW

Modulation Type	EIRP Output power		Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
433MHz	-9.95	0.10119	100%	0.0001	0.2886
RFID	-23.96	0.00402	100%	0.0001	0.9789

8.2 Simultaneous Transmission MPE

The sample only support one GSM&WCDMA modular, one 433MHz TX modular, one 2.4GWLAN modular and one RFID TX modular, they supports difference antenna, need consider simultaneous transmission;

Maximum Simultaneous transmission MPE Ratio for EUT.

Maximum MPE Ratio _{2.4GWLAN}	Maximum MPE Ratio _{NFC}	Maximum MPE Ratio ₄₃₃	Maximum MPE Ratio _{GSM}	Σ MPE ratios	Limit	Results
0.0158	0.0001	0.0001	0.1183	0.13	1.0	PASS

Remark:

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

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-----