

1. RF Exposure Requirements

1.1 General Information

Client Information

Applicant: Shenzhen Jimi IOT Co., Ltd
Address of applicant: 3-4/F, Block A, Building #7, Shenzhen International Innovation Valley,
Dashi 1st Road, Nanshan District, Shenzhen, Guangdong, China

Manufacturer: Shenzhen Jimi IOT Co., Ltd
Address of manufacturer: 3-4/F, Block A, Building #7, Shenzhen International Innovation Valley,
Dashi 1st Road, Nanshan District, Shenzhen, Guangdong, China

General Description of EUT:

Product Name: VEHICLE GPS TRACKER
Trade Name: JIMI
Model No.: X3-MN
Adding Model(s): /
Rated Voltage: Input: DC 9-36V
Battery: DC3.7V
Battery: 450mAh
FCC ID: 2AMLFJM-X3-MN XXX
Equipment Type: Mobile device

Technical Characteristics of EUT:

2G

Support Networks: GSM, GPRS
Support Band: GSM850/PCS1900
Uplink Frequency: GSM/GPRS 850: 824~849MHz
GSM/GPRS 1900: 1850~1910MHz
Downlink Frequency: GSM/GPRS 850: 869~894MHz
GSM/GPRS 1900: 1930~1990MHz
Max RF Output Power: GSM850: 33.03dBm, GSM1900: 29.71dBm
Type of Emission: GSM850: 244KGXW, GSM1900: 246KGXW
Type of Modulation: GMSK
Type of Antenna: Integral Antenna
Antenna Gain: GSM850:-0.81dBi; GSM1900: 1.26dBi
GPRS/EDGE Class: Class 12

1.2 RF Exposure Exemption

According to §1.1307(b)(3) and 447498 D04 Interim General RF Exposure Guidance v01, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Option A: FCC Rule Part 1.1307 (b)(3)(i)(A): The available maximum time-averaged power is no more than 1mW, regardless of separation distance.

Option B: FCC Rule Part 1.1307 (b)(3)(i)(B): The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Option C: FCC Rule Part 1.1307 (b)(3)(i)(C): The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$
1.34-30	$3,450 R^2/f^2$
30-300	$3.83 R^2$
300-1,500	$0.0128 R^2 f$
1,500-100,000	$19.2 R^2$

For Multiple RF sources: FCC Rule Part 1.1307(b)(3)(ii):

- (A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required).
- (B) In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

1.3 Calculated Result

Radio Access Technology	Min. Frequency	Max. Radiated Power	Tune-Up EIRP	Option	Min. Distance	Tune-Up ERP		Exposure Limit	Ratio	Result
	(MHz)	(dBm)	(dBm)		(cm)	(dBm)	(mW)	(mW)		Pass/Fail
GSM850	824.20	29.27	--	B	20	29.50	845.28	1681.368	0.50	Pass
GSM1900	1850.2	27.46	27.5	B	20	25.35	342.77	3060	0.11	Pass

Note: 1. $ERP = EIRP - 2.15 \text{ dB}$; $EIRP = \text{Output Power} + \text{Antenna gain}$

2. Option A, B and C refers as clause 1.2.

3. For option B, $P_{th}(\text{mW})$ convert to Exposure Limit(mW); For option C, $ERP(\text{W})$ convert to Exposure Limit(mW).

4. $\text{Ratio} = \text{Tune-Up ERP}(\text{mW}) / \text{Exposure Limit}(\text{mW})$

Mode for Simultaneous Multi-band Transmission:

Radio Access Technology	Ratio 1	Ratio 2	Simultaneous Ratio	Limit	Result
					Pass/Fail
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Note: GSM850 and GSM1900 can't transmit at the same time.

Result: Pass