

## RF EXPOSURE EVALUATION

### 1. PRODUCT INFORMATION

FCC ID	2A92O5GV0-1A
Product Description	Vibration Monitor
Model Name	5GV0-1A
Frequency Band (Operating)	<input checked="" type="checkbox"/> GPRS/EDGE 850: 824.2MHz-848.8 MHz <input checked="" type="checkbox"/> GPRS/EDGE 1900: 1850.2MHz-1909.8 MHz <input checked="" type="checkbox"/> UMTS Band II: 1852.4MHz-1907.6 MHz <input checked="" type="checkbox"/> UMTS Band IV: 1712.4 MHz -1752.6 MHz <input checked="" type="checkbox"/> UMTS Band V: 826.4 MHz -846.6 MHz <input checked="" type="checkbox"/> LTE Band 2:1850 MHz -1909.9 MHz <input checked="" type="checkbox"/> LTE Band 4:1710 MHz -1754.9 MHz <input checked="" type="checkbox"/> LTE Band 5:824 MHz -848.9 MHz <input checked="" type="checkbox"/> LTE Band 7:2500 MHz -2569.9 MHz <input checked="" type="checkbox"/> LTE Band 12:699 MHz -715.9 MHz <input checked="" type="checkbox"/> LTE Band 13:777 MHz -786.9 MHz <input checked="" type="checkbox"/> LTE Band 25:1850 MHz -1914.9 MHz <input checked="" type="checkbox"/> LTE Band 26A:824.7 MHz -848.3 MHz <input checked="" type="checkbox"/> LTE Band 26B: 814.7 MHz-823.3 MHz <input checked="" type="checkbox"/> Bluetooth: 2402 MHz-2480 MHz <input type="checkbox"/> Others (NFC:13.56MHz)
Device Category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others:
Antenna Diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. Output Power	GPRS 850: 32.12dBm; GPRS 1900: 30.51dBm UMTS BAND V: 22.14dBm; UMTS BAND II:21.02dBm; UMTS BAND IV: 23.04dBm LTE BAND 2: 23.32dBm LTE BAND 4: 23.99dBm LTE BAND 5: 23.08dBm LTE BAND 7: 22.09dBm

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Attestation of Global Compliance(Shenzhen)Co., Ltd

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	LTE BAND 12: 23.48dBm LTE BAND 13: 24.18dBm LTE BAND 25: 23.96dBm LTE BAND 26A: 23.69dBm LTE BAND 26 B: 21.73dBm
<b>Antenna Gain</b>	GPRS 850: 2.15dBi; GPRS 1900: 1.8dBi UMTS BAND V: 2.15dBi; UMTS BAND II: 1.8dBi; UMTS BAND IV: 2.5dBi LTE BAND 2: 1.8dBi; LTE BAND 4: 2.5dBi; LTE BAND 5: 2.15dBi LTE BAND 7: 3.2dBi; LTE BAND 12: 3.5dBi; LTE BAND 13: 4.6dBi LTE BAND 25: 1.8dBi; LTE BAND 26A: 2.15dBi; LTE BAND 26 B: 2.15dBi
<b>Minimum Assessment Distance</b>	23.1cm
<b>Evaluation Applied</b>	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation
<b>Evaluation Result</b>	Pass

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## 2. PORTABLE DEVICE EVALUATION METHOD AND LIMIT

Following FCC KDB 447498 D01 “General SAR test exclusion guidance” The corresponding SAR Exclusion Threshold condition, listed below:

- 1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:  
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]  $[\sqrt{f(\text{GHz})}]$   
 $\leq 3.0$  for 1-g SAR, and  $\leq 7.5$  for 10-g extremity SAR, where
  - $f(\text{GHz})$  is the RF channel transmit frequency in GHz.
  - Power and distance are rounded to the nearest mW and mm before calculation.
  - The result is rounded to one decimal place for comparison The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm is applied to determine SAR test exclusion.
- 2) At 100 MHz to 6 GHz and for test separation distances  $> 50$  mm, the SAR test exclusion threshold is determined according to the following:
  - a) [Threshold at 50 mm in step 1) + (test separation distance - 50mm)  $(f(\text{MHz})/150)$ ] mW, at 100MHz to 1500 MHz;
  - b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)-10] mW at  $> 1500$  MHz and  $\leq 6$  GHz;
- 3) At frequencies below 100 MHz, the following may be considered for SAR test exclusion.
  - a) The threshold at the corresponding test separation distance at 100 MHz in step 2) is multiplied by  $[1 + \log(100/f(\text{MHz}))]$  for test separation distances  $> 50$  mm and  $< 200$  mm.
  - b) The threshold determined by the equation in a) for 50 mm and 100 MHz is multiplied by 1/2 for test separation distances  $\leq 50$  mm.
  - c) SAR measurement procedures are not established below 100 MHz. When SAR test exclusion cannot be applied, a KDB inquiry is required to determine SAR evaluation requirements for any test results to be acceptable.

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### 3. MOBILE DEVICE EVALUATION METHOD AND LIMIT

Human exposure to RF emissions from mobile devices (47 CFR §2.1091) may be evaluated based on the MPE limits adopted by the FCC for electric and magnetic field strength and/or power density, as appropriate, since exposures are assumed to occur at distances of 20 cm or more from persons.

#### LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE

Frequency Range (MHz)	E-field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (Minutes)
0.3 -- 1.34	614	1.63	(100)*	30
1.34 -- 30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30 -- 300	27.5	0.073	0.2	30
300 -- 1500	--	--	f/1500	30
1500 -- 100,000	--	--	1.0	30

\*Note:

1. f= Frequency in MHz \* Plane-wave Equivalent Power Density
2. The averaging time for General Population/Uncontrolled exposure to fixed transmitters is not applicable for mobile and portable transmitters. See 47 CFR §§2.1091 and 2.1093 on source-based time-averaging requirement for mobile and portable transmitters.

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

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

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#### 4. MEASUREMENT RESULT

A minimum test separation distance  $\geq 20$  cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits. The distance must be at least 23.1 cm and fully supported by the operating and installation configurations of the transmitter and its antenna(s), according to the source-based time-averaged maximum power requirements of § 2.1091(d)(2). In cases where cable losses or other attenuations are applied to determine compliance, the most conservative operating configurations and exposure conditions must be evaluated.

Test Mode	Frequency (MHz)	Antenna Gain (linear)	Tune-up Tolerance	Max Tune up Power (dBm)	Max Tune up Power (mW)	Power Density (mW/cm <sup>2</sup> )	Power Density Limit (mW/cm <sup>2</sup> )
BT	2480	1.58	-1.5±1	-0.5	0.891	0.000212	1.000
GPRS 850	824.2	1.64	32.5±1	33.5	2238.721	0.548	0.549
GPRS 1900	1909.8	1.51	30.0±1	31.0	1258.925	0.286	1.000
WCDMA 850	846.6	1.64	22.0±1	23.0	199.526	0.049	0.564
WCDMA 1700	1712.4	1.78	22.5±1	23.5	223.872	0.060	1.000
WCDMA 1900	1852.4	1.51	21.0±1	22.0	158.489	0.036	1.000
LTE BAND 2	1860	1.51	22.5±1	23.5	223.872	0.051	1.000
LTE BAND 4	1732.5	1.78	23.0±1	24.0	251.189	0.067	1.000
LTE BAND 5	844	1.64	22.5±1	23.5	223.872	0.055	0.563
LTE BAND 7	2510	2.09	21.5±1	22.5	177.828	0.056	1.000
LTE BAND 12	704	2.24	22.2±1	23.2	208.930	0.070	0.469
LTE BAND 13	782	2.88	23.5±1	24.5	281.838	0.122	0.521
LTE BAND 25	1855	1.51	22.0±1	23.0	199.526	0.045	1.000
LTE BAND 26A	841.5	1.64	22.0±1	23.0	199.526	0.049	0.561
LTE BAND 26B	816.5	1.64	22.0±1	23.0	199.526	0.049	0.544

Simultaneous transmission of:

Test Mode	Frequency (MHz)	Antenna Gain (linear)	Max Tune up Power (dBm)	Max Tune up Power (mW)	Power Density (mW/cm <sup>2</sup> )	Power Density Limit (mW/cm <sup>2</sup> )
GPRS 850	824.2	1.64	33.5	2238.721	0.548	0.549
BT	2480	1.58	-0.5	0.891	0.000212	1.000

Note:

1. The GPRS 850 and BT can transmit simultaneously:  $0.548/0.549+0.000212/1=0.996878259 < 1.000$
2. Only the worst case recorded.

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