

# TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID: 2AF4X-VAR-FIRO

Equipment Under Test : FIRO  
Model Name : VARRAM-FIRO-01  
Applicant : VARRAM SYSTEM Co., Ltd.  
Manufacturer : VARRAM SYSTEM Co., Ltd.  
Date of Receipt : 2018.08.22  
Date of Test(s) : 2018.11.28 ~ 2018.12.20  
Date of Issue : 2019.01.02

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Murphy Kim

Date:

2019.01.02

Technical  
Manager:



Harim Lee

Date:

2019.01.02

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**SGS Korea Co., Ltd. (Gunpo Laboratory)** 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 <http://www.sgsgroup.kr>

## 1. General Information

### 1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

Phone No. : +82 31 688 0901

Fax No. : +82 31 688 0921

### 1.2. Details of applicant

Applicant : VARRAM SYSTEM Co., Ltd.

Address : 57, Techno 11-ro, Yuseong-gu, Daejeon, Korea, 34036

Contact Person : Jung, Ju-yong

Phone No. : +82 70 8797 8920

### 1.3. Details of manufacturer

Company : Same as applicant

Address : Same as applicant

### 1.4. Description of EUT

<b>Kind of Product</b>	FIRO
<b>Model Name</b>	VARRAM-FIRO-01
<b>Power Supply</b>	DC 3.7 V
<b>Frequency Range</b>	2 402 MHz ~ 2 480 MHz (Bluetooth Low Energy)
<b>Modulation Technique</b>	GFSK
<b>Number of Channels</b>	40 channels (Bluetooth Low Energy)
<b>Antenna Type</b>	DIELECTRIC CHIP Antenna
<b>Antenna Gain</b>	0.5 dBi
<b>H/W Version</b>	1.0
<b>S/W Version</b>	1.0

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### 1.5. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL013363	2019.01.02	Initial

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## 2. RF Exposure Evaluation

### 2.1. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

#### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time
(A) Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	*100	6
3.0 – 30	1842/f	4.89/f	*900/f <sup>2</sup>	6
30 – 300	61.4	0.163	1.0	6
300 – 1 500	-	-	f/300	6
1 500 – 100 000	-	-	5	6
(B) Limits for General Population/Uncontrolled Exposure				
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 – 1 500	-	-	f/1500	30
<b>1 500 – 100 000</b>	-	-	<b>1.0</b>	<b>30</b>

#### 2.1.1. Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where  $P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = gain of antenna in linear scale

$\pi$  = 3.1416

R = distance between observation point and center of the radiator in cm

$P_d$  the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

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RTT5041-19(2017.07.10)(0)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

### 2.1.2. Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data  
 Test Mode : Normal Operation

### 2.1.3. Output Power into Antenna & RF Exposure Evaluation Distance

#### Bluetooth

#### - Maximum tune up tolerance

Operating Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
2 402 ~ 2 480	-8.5	0.5	0.000 032	1

Remark :

- The power density Pd (5th column) at a distance of 20 cm calculated from the friis transmission formula is far below the limit of 1 mW/cm<sup>2</sup>.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 cm between the radiator and your body.
- The antenna gain of this transmitter is less than 6 dB i and must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.

**- End of the Test Report -**

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