

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>

RTT5041-19(2017.07.10)(0)

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

A4(210 mm x 297 mm)

INDEX

| <u>Table of Contents</u> | Page |
|---------------------------------|------|
| 1. General Information ----- | 3 |
| 2. RF Exposure Evaluation ----- | 5 |

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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

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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

| | |
|----------------------|--|
| Kind of Product | FIRO |
| Model Name | VARRAM-FIRO-01 |
| Power Supply | DC 3.7 V |
| Frequency Range | 2 402 MHz ~ 2 480 MHz (Bluetooth Low Energy) |
| Modulation Technique | GFSK |
| Number of Channels | 40 channels (Bluetooth Low Energy) |
| Antenna Type | DIELECTRIC CHIP Antenna |
| Antenna Gain | 0.5 dBi |
| H/W Version | 1.0 |
| S/W Version | 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 ²) | 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 ² | 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 ² | 30 |
| 30 – 300 | 27.5 | 0.073 | 0.2 | 30 |
| 300 – 1 500 | - | - | f/1500 | 30 |
| 1 500 – 100 000 | - | - | 1.0 | 30 |

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

Where P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d the limit of MPE, 1 mW/cm². 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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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 ²) | Limits (mW/cm ²) |
|---------------------------|--|---------------------|--|------------------------------|
| 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/cm².
- 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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