



Report No.: SZEM181200005302 Page: 1 of 47

## **TEST REPORT**

| Application No.:          | SZEM1812000053CR  |  |  |  |
|---------------------------|---|--|--|--|
| Applicant:                | XIONG FA HANG Toy Craft Factory   |  |  |  |
| Address of Applicant:     | FENGXIN NO.1 ROAD, CHENGHAI DISTRICT SHANTOU, CHINA   |  |  |  |
| Manufacturer:             | XIONG FA HANG Toy Craft Factory   |  |  |  |
| Address of Manufacturer:  | FENGXIN NO.1 ROAD, CHENGHAI DISTRICT SHANTOU, CHINA   |  |  |  |
| Equipment Under Test (EUT | ):  |  |  |  |
| EUT Name:                 | Remote control car series   |  |  |  |
| Model No.:                | 88601, 88602. 88603, 88604, 88605, 88606, 88607, 88608, 88609, 88610,<br>88611, 88612, 88613, 88614, 88615, 88616, 88617, 88618, 88619, 88620,<br>22501, 22502, 22503, 22504, 22505, 22506, 22507, 22508, 22509, 22510,<br>22511, 22512, 22513, 22514, 22515, 22516, 22517, 22518, 22519, 22520,<br>SA-88000, 88000, 88001, 88002, 88003, 88004, 88005, 88006, 88007,<br>88008, SA-22400, 22400, 22401, 22402, 22403, 22404, 22405, 22406,<br>22407, 22408, 22410, 22600, 22601, 22602, 22603, 22604, 22605, 22500,<br>609030, 609040, 609050, 609060, 609000, 609010, 609020 ♣ |  |  |  |
| *                         | Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.   |  |  |  |
| FCC ID:                   | 2AJDV20181230   |  |  |  |
| Standard(s) :             | 47 CFR Part 15, Subpart C 15.249  |  |  |  |
| Date of Receipt:          | 2018-12-20  |  |  |  |
| Date of Test:             | 2018-12-30 to 2019-01-11  |  |  |  |
| Date of Issue:            | 2019-01-14  |  |  |  |
| Test Result:              | Pass*   |  |  |  |

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

Keny. XN

Keny Xu EMC Laboratory Manager



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|         | Revision Record |            |          |          |  |  |  |  |
|---------|-----------------|------------|----------|----------|--|--|--|--|
| Version | Chapter         | Date       | Modifier | Remark   |  |  |  |  |
| 01      |                 | 2019-01-14 |          | Original |  |  |  |  |
|         |                 |            |          |          |  |  |  |  |
|         |                 |            |          |          |  |  |  |  |

| Authorized for issue by: |                             |  |
|--------------------------|-----------------------------|--|
|                          | Bive chen                   |  |
|                          | Bill Chen /Project Engineer |  |
|                          | Evic Fu                     |  |
|                          | Eric Fu /Reviewer           |  |



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#### 2 **Test Summary**

| Radio Spectrum Technical Requirement |                                     |        |                                     |        |  |  |  |
|--------------------------------------|-------------------------------------|--------|-------------------------------------|--------|--|--|--|
| Item                                 | Standard                            | Method | Requirement                         | Result |  |  |  |
| Antenna Requirement                  | 47 CFR Part 15,<br>Subpart C 15.249 | N/A    | 47 CFR Part 15, Subpart<br>C 15.203 | Pass   |  |  |  |

| Radio Spectrum Matter Part                                 |                                     |   |   |        |  |  |  |
|--|-------------------------------------|---|---|--------|--|--|--|
| Item   | Standard                            | Method                                    | Requirement   | Result |  |  |  |
| 20dB Bandwidth   | 47 CFR Part 15,<br>Subpart C 15.249 | ANSI C63.10 (2013)<br>Section 6.9         | 47 CFR Part 15, Subpart<br>C 15.215                         | Pass   |  |  |  |
| Field Strength of the<br>Fundamental Signal<br>(15.249(a)) | 47 CFR Part 15,<br>Subpart C 15.249 | ANSI C63.10 (2013)<br>Section 6.5&6.6     | 47 CFR Part 15, Subpart<br>C 15.249(a)                      | Pass   |  |  |  |
| Restricted Band<br>Around Fundamental<br>Frequency         | 47 CFR Part 15,<br>Subpart C 15.249 | ANSI C63.10 (2013)<br>Section 6.4&6.5&6.6 | 47 CFR Part 15, Subpart<br>C 15.205 & 15.249(d) &<br>15.209 | Pass   |  |  |  |
| Radiated Emissions   | 47 CFR Part 15,<br>Subpart C 15.249 | ANSI C63.10 (2013)<br>Section 6.4&6.5&6.6 | 47 CFR Part 15, Subpart<br>C 15.209 & 15.249 (a),(d)        | Pass   |  |  |  |



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## 4 General Information

### 4.1 Details of E.U.T.

| Power supply:        | Tx:DC 9.0V by 9.0V x 1"6LR61" batteries |
|----------------------|---|
| Operation Frequency: | 2405MHz to 2475 MHz                     |
| Modulation Type:     | GFSK                                    |
| Number of Channels:  | 71                                      |
| Channel Spacing:     | 1MHz                                    |
| Antenna Type:        | Integral antenna                        |
| Antenna Gain:        | 1dBi                                    |

| Operation Fr | Operation Frequency each of channel |         |           |         |           |         |           |
|--------------|-------------------------------------|---------|-----------|---------|-----------|---------|-----------|
| Channel      | Frequency                           | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1            | 2405MHz                             | 19      | 2423MHz   | 37      | 2441MHz   | 55      | 2459MHz   |
| 2            | 2406MHz                             | 20      | 2424MHz   | 38      | 2442MHz   | 56      | 2460MHz   |
| 3            | 2407MHz                             | 21      | 2425MHz   | 39      | 2443MHz   | 57      | 2461MHz   |
| 4            | 2408MHz                             | 22      | 2426MHz   | 40      | 2444MHz   | 58      | 2462MHz   |
| 5            | 2409MHz                             | 23      | 2427MHz   | 41      | 2445MHz   | 59      | 2463MHz   |
| 6            | 2410MHz                             | 24      | 2428MHz   | 42      | 2446MHz   | 60      | 2464MHz   |
| 7            | 2411MHz                             | 25      | 2429MHz   | 43      | 2447MHz   | 61      | 2465MHz   |
| 8            | 2412MHz                             | 26      | 2430MHz   | 44      | 2448MHz   | 62      | 2466MHz   |
| 9            | 2413MHz                             | 27      | 2431MHz   | 45      | 2449MHz   | 63      | 2467MHz   |
| 10           | 2414MHz                             | 28      | 2432MHz   | 46      | 2450MHz   | 64      | 2468MHz   |
| 11           | 2415MHz                             | 29      | 2433MHz   | 47      | 2451MHz   | 65      | 2469MHz   |
| 12           | 2416MHz                             | 30      | 2434MHz   | 48      | 2452MHz   | 66      | 2470MHz   |
| 13           | 2417MHz                             | 31      | 2435MHz   | 49      | 2453MHz   | 67      | 2471MHz   |
| 14           | 2418MHz                             | 32      | 2436MHz   | 50      | 2454MHz   | 68      | 2472MHz   |
| 15           | 2419MHz                             | 33      | 2437MHz   | 51      | 2455MHz   | 69      | 2473MHz   |
| 16           | 2420MHz                             | 34      | 2438MHz   | 52      | 2456MHz   | 70      | 2474MHz   |
| 17           | 2421MHz                             | 35      | 2439MHz   | 53      | 2457MHz   | 71      | 2475MHz   |
| 18           | 2422MHz                             | 36      | 2440MHz   | 54      | 2458MHz   |         |           |

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel                   | Frequency |
|---------------------------|-----------|
| The Lowest channel(CH1)   | 2405MHz   |
| The Middle channel(CH41)  | 2445MHz   |
| The Highest channel(CH71) | 2475MHz   |



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#### 4.2 Description of Support Units

The EUT has been tested as an independent unit.

#### 4.3 Measurement Uncertainty

| No. | Item                            | Measurement Uncertainty   |  |  |
|-----|---------------------------------|---------------------------|--|--|
| 1   | Radio Frequency                 | ± 7.25 x 10 <sup>-8</sup> |  |  |
| 2   | Duty cycle                      | ± 0.37%                   |  |  |
| 3   | Occupied Bandwidth              | ± 3%                      |  |  |
| 4   | RF conducted power              | ± 0.75dB                  |  |  |
| 5   | RF power density                | ± 2.84dB                  |  |  |
| 6   | Conducted Spurious emissions    | ± 0.75dB                  |  |  |
| 7   | PE Dedicted newer               | ± 4.5dB (below 1GHz)      |  |  |
| /   | RF Radiated power               | ± 4.8dB (above 1GHz)      |  |  |
| 8   | Dedicted Courieus emission test | ± 4.5dB (Below 1GHz)      |  |  |
| 0   | Radiated Spurious emission test | ± 4.8dB (Above 1GHz)      |  |  |
| 9   | Temperature test                | ± 1 ℃                     |  |  |
| 10  | Humidity test                   | ± 3%                      |  |  |
| 11  | Supply voltages                 | ± 1.5%                    |  |  |
| 12  | Time                            | ± 3%                      |  |  |



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#### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

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Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

#### 4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC

Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

#### A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

#### • VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

#### FCC – Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

#### Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None



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## 5 Equipment List

| 20dB Bandwidth       |                         |                         |              |            |              |  |  |
|----------------------|-------------------------|-------------------------|--------------|------------|--------------|--|--|
| Equipment            | Manufacturer            | Model No                | Inventory No | Cal Date   | Cal Due Date |  |  |
| DC Power Supply      | ZhaoXin                 | RXN-305D                | SEM011-02    | 2018-09-25 | 2019-09-24   |  |  |
| Spectrum Analyzer    | Rohde & Schwarz         | FSU43                   | SEM004-08    | 2018-04-02 | 2019-04-01   |  |  |
| Measurement Software | JS Tonscend             | JS1120-2<br>BT/WIFI V2. | N/A          | N/A        | N/A          |  |  |
| Coaxial Cable        | SGS                     | N/A                     | SEM031-01    | 2018-07-12 | 2019-07-11   |  |  |
| Attenuator           | Weinschel<br>Associates | WA41                    | SEM021-09    | N/A        | N/A          |  |  |
| Signal Generator     | KEYSIGHT                | N5173B                  | SEM006-05    | 2018-09-27 | 2019-09-26   |  |  |
| Power Meter          | Rohde & Schwarz         | NRVS                    | SEM014-02    | 2018-09-25 | 2019-09-24   |  |  |

| Field Strength of the Fundamental Signal (15.249(a)) |  |                 |              |            |              |  |  |
|--|--|-----------------|--------------|------------|--------------|--|--|
| Equipment  | Manufacturer                             | Model No        | Inventory No | Cal Date   | Cal Due Date |  |  |
| 3m Semi-Anechoic<br>Chamber                          | AUDIX                                    | N/A             | SEM001-02    | 2018-03-13 | 2021-03-12   |  |  |
| Measurement Software                                 | AUDIX                                    | e3 V8.2014-6-27 | N/A          | N/A        | N/A          |  |  |
| Coaxial Cable  | SGS                                      | N/A             | SEM026-01    | 2018-07-12 | 2019-07-11   |  |  |
| Spectrum Analyzer                                    | Rohde & Schwarz                          | FSU43           | SEM004-08    | 2018-04-02 | 2019-04-01   |  |  |
| BiConiLog Antenna<br>(26-3000MHz)                    | ETS-Lindgren                             | 3142C           | SEM003-01    | 2017-06-27 | 2020-06-26   |  |  |
| Horn Antenna<br>(1-18GHz)                            | Rohde & Schwarz                          | HF907           | SEM003-07    | 2018-04-13 | 2021-04-12   |  |  |
| Horn Antenna<br>(15GHz-40GHz)                        | Schwarzbeck                              | BBHA 9170       | SEM003-15    | 2017-10-17 | 2020-10-16   |  |  |
| Pre-amplifier<br>(0.1-1300MHz)                       | HP                                       | 8447D           | SEM005-02    | 2018-09-25 | 2019-09-24   |  |  |
| Pre-Amplifier<br>(0.1-26.5GHz)                       | Compliance<br>Directions Systems<br>Inc. | PAP-0126        | SEM004-11    | 2018-09-27 | 2019-09-26   |  |  |
| Pre-amplifier<br>(18-26GHz)                          | Rohde & Schwarz                          | CH14-H052       | SEM005-17    | 2018-04-02 | 2019-04-01   |  |  |
| Pre-amplifier<br>(26GHz-40GHz)                       | Compliance<br>Directions Systems<br>Inc. | PAP-2640-50     | SEM005-08    | 2018-04-02 | 2019-04-01   |  |  |
| DC Power Supply                                      | Zhao Xin                                 | RXN-305D        | SEM011-02    | 2018-09-25 | 2019-09-24   |  |  |
| Active Loop Antenna                                  | ETS-Lindgren                             | 6502            | SEM003-08    | 2017-08-22 | 2020-08-21   |  |  |
| Band filter  | N/A                                      | N/A             | SEM023-01    | N/A        | N/A          |  |  |



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| Equipment                         | Manufacturer                             | Model No            | Inventory No | Cal Date   | Cal Due Date |
|-----------------------------------|--|---------------------|--------------|------------|--------------|
| 3m Semi-Anechoic<br>Chamber       | AUDIX                                    | N/A                 | SEM001-02    | 2018-03-13 | 2021-03-12   |
| Measurement Software              | AUDIX                                    | e3 V8.2014-6-<br>27 | N/A          | N/A        | N/A          |
| Coaxial Cable                     | SGS                                      | N/A                 | SEM026-01    | 2018-07-12 | 2019-07-11   |
| Spectrum Analyzer                 | Rohde & Schwarz                          | FSU43               | SEM004-08    | 2018-04-02 | 2019-04-01   |
| BiConiLog Antenna<br>(26-3000MHz) | ETS-Lindgren                             | 3142C               | SEM003-01    | 2017-06-27 | 2020-06-26   |
| Horn Antenna<br>(1-18GHz)         | Rohde & Schwarz                          | HF907               | SEM003-07    | 2018-04-13 | 2021-04-12   |
| Horn Antenna<br>(15GHz-40GHz)     | Schwarzbeck                              | BBHA 9170           | SEM003-15    | 2017-10-17 | 2020-10-16   |
| Pre-amplifier<br>(0.1-1300MHz)    | HP                                       | 8447D               | SEM005-02    | 2018-09-25 | 2019-09-24   |
| Pre-Amplifier<br>(0.1-26.5GHz)    | Compliance<br>Directions Systems<br>Inc. | PAP-0126            | SEM004-11    | 2018-09-27 | 2019-09-26   |
| Pre-amplifier<br>(18-26GHz)       | Rohde & Schwarz                          | CH14-H052           | SEM005-17    | 2018-04-02 | 2019-04-01   |
| Pre-amplifier<br>(26GHz-40GHz)    | Compliance<br>Directions Systems<br>Inc. | PAP-2640-50         | SEM005-08    | 2018-04-02 | 2019-04-01   |
| DC Power Supply                   | Zhao Xin                                 | RXN-305D            | SEM011-02    | 2018-09-25 | 2019-09-24   |
| Active Loop Antenna               | ETS-Lindgren                             | 6502                | SEM003-08    | 2017-08-22 | 2020-08-21   |
| Band filter                       | N/A                                      | N/A                 | SEM023-01    | N/A        | N/A          |

| RE in Chamber                     |                      |                     |               |                           |                               |  |
|-----------------------------------|----------------------|---------------------|---------------|---------------------------|-------------------------------|--|
| Test Equipment                    | Manufacturer         | Model No.           | Inventory No. | Cal. Date<br>(yyyy-mm-dd) | Cal. Due date<br>(yyyy-mm-dd) |  |
| 3m Semi-Anechoic<br>Chamber       | ETS-LINDGREN         | N/A                 | SEM001-01     | 2017-08-05                | 2020-08-04                    |  |
| MXE EMI Receiver<br>(20Hz-8.4GHz) | Agilent Technologies | N9038A              | SEM004-05     | 2018-09-25                | 2019-09-24                    |  |
| BiConiLog Antenna<br>(26-3000MHz) | ETS-LINDGREN         | 3142C               | SEM003-01     | 2017-06-27                | 2020-06-26                    |  |
| Pre-amplifier<br>(0.1-1300MHz)    | Agilent Technologies | 8447D               | SEM005-01     | 2018-04-02                | 2019-04-01                    |  |
| Measurement Software              | AUDIX                | e3 V8.2014-6-<br>27 | N/A           | N/A                       | N/A                           |  |
| Coaxial Cable                     | SGS                  | N/A                 | SEM025-01     | 2018-07-12                | 2019-07-11                    |  |



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| RE in Chamber                         |                                       |                 |               |                           |                               |  |
|---------------------------------------|---------------------------------------|-----------------|---------------|---------------------------|-------------------------------|--|
| Test Equipment                        | Manufacturer                          | Model No.       | Inventory No. | Cal. Date<br>(yyyy-mm-dd) | Cal. Due date<br>(yyyy-mm-dd) |  |
| 3m Semi-Anechoic<br>Chamber           | AUDIX                                 | N/A             | SEM001-02     | 2018-03-13                | 2021-03-12                    |  |
| EXA Signal Analyzer<br>(10Hz-26.5GHz) | Agilent Technologies<br>Inc           | N9010A          | SEM004-09     | 2018-04-13                | 2019-04-12                    |  |
| BiConiLog Antenna<br>(26-3000MHz)     | ETS-Lindgren                          | 3142C           | SEM003-01     | 2017-06-27                | 2020-06-26                    |  |
| Horn Antenna<br>(800MHz-18GHz)        | Rohde & Schwarz                       | HF907           | SEM003-07     | 2018-04-13                | 2021-04-12                    |  |
| Amplifier<br>(0.1-1300MHz)            | HP                                    | 8447D           | SEM005-02     | 2018-09-25                | 2019-09-24                    |  |
| Pre-Amplifier<br>(0.1-26.5GHz)        | Compliance Directions<br>Systems Inc. | PAP-0126        | SEM004-11     | 2018-09-27                | 2019-09-26                    |  |
| Band filter                           | N/A                                   | N/A             | N/A           | N/A                       | N/A                           |  |
| Measurement<br>Software               | AUDIX                                 | e3 V8.2014-6-27 | N/A           | N/A                       | N/A                           |  |
| Coaxial Cable                         | SGS                                   | N/A             | SEM026-01     | 2018-07-12                | 2019-07-11                    |  |

| General used equipmen              | t   |          |              |            |              |
|------------------------------------|---|----------|--------------|------------|--------------|
| Equipment                          | Manufacturer                                    | Model No | Inventory No | Cal Date   | Cal Due Date |
| Humidity/ Temperature<br>Indicator | Shanghai<br>Meteorological<br>Industry Factory  | ZJ1-2B   | SEM002-03    | 2018-09-27 | 2019-09-26   |
| Humidity/ Temperature<br>Indicator | Shanghai<br>Meteorological<br>Industry Factory  | ZJ1-2B   | SEM002-04    | 2018-09-27 | 2019-09-26   |
| Humidity/ Temperature<br>Indicator | Mingle  | N/A      | SEM002-08    | 2018-09-27 | 2019-09-26   |
| Barometer                          | Changchun<br>Meteorological<br>Industry Factory | DYM3     | SEM002-01    | 2018-04-08 | 2019-04-07   |



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## 6 Radio Spectrum Technical Requirement

#### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 Limit:

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### 6.1.2 Conclusion

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 1dBi.

Antenna location: Refer to Appendix(Internal photos)



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## 7 Radio Spectrum Matter Test Results

#### 7.1 20dB Bandwidth

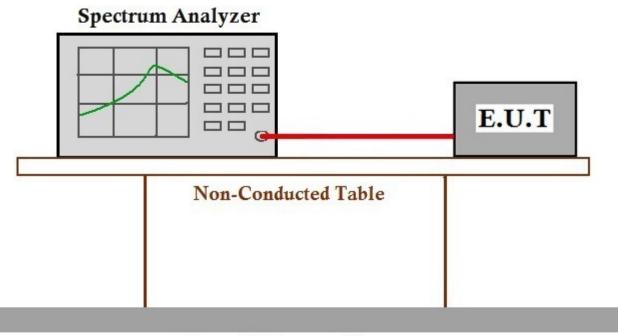
| Test Requirement | 47 CFR Part 15, Subpart C 15.215 |
|------------------|----------------------------------|
| Test Method:     | ANSI C63.10 (2013) Section 6.9   |
| Limit:           | N/A                              |

#### 7.1.1 E.U.T. Operation

Operating Environment:

Temperature:21.1 °CHumidity:68.9 % RHAtmospheric Pressure:1020mbarTest modea:TX mode\_Keep the EUT in transmitting with modulation mode.

#### 7.1.2 Test Setup Diagram



### **Ground Reference Plane**

#### 7.1.3 Measurement Procedure and Data

| Test channel | 20dB bandwidth (MHz) | Results |
|--------------|----------------------|---------|
| Lowest       | 1.2229               | Pass    |
| Middle       | 1.2084               | Pass    |
| Highest      | 1.1795               | Pass    |



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| LOW                         |                      |   |                            |             |                   |                |   |
|-----------------------------|----------------------|---|----------------------------|-------------|-------------------|----------------|---|
| Receiver                    | Spectrum 🛛           | )                                       |                            |             |                   |                |   |
| RefLevel 5.00 dl<br>Att 20  |                      | ■ RBW 30<br>s ■ VBW 100                 | i kHz<br>i kHz <b>Mode</b> | Auto FFT II | nput 1 AC         |                |   |
| PS<br>1Pk Max               |                      |   |                            |             |                   |                |   |
| 0 dBm                       |                      |   |                            | D1[1]       |                   |                | -0.42 dB                                |
|                             |                      |   |                            | M1[1]       |                   |                | 2290 MHz<br>35.79 dBm                   |
| -10 dBm                     |                      |   | M2                         |             |                   |                | 56720 GHz                               |
| -20 dBm                     |                      | N                                       | ᠕ᠰᢍ                        | L.          |                   |                |   |
| -30 dBm                     |                      | Ma                                      |                            |             |                   |                |   |
| -40 dBm                     | 640 dBm              |   |                            |             |                   |                |   |
| -50 dBm                     | ^M                   | $\sim$                                  |                            | ~~~         | $\sqrt{h_{\chi}}$ |                |   |
| -50 UBIII                   | and a                |   |                            |             | Juny .            | ٦ . ٨          |   |
| -60 dBm/                    |                      |   |                            |             |                   | ~~~~~          | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~  |
| -70 dBm                     |                      |   |                            |             |                   |                |   |
| -80 dBm                     |                      |   |                            |             |                   |                |   |
| -90 dBm                     |                      |   |                            |             |                   |                |   |
| CF 2.4052605 GHz            |                      |   | 691 pts                    |             |                   | Spar           | 1 5.0 MHz                               |
| Marker                      | X-value              |   |                            |             |                   | tion Result    |   |
| M2 1                        | 2.4052533            | GHz -16                                 | i.64 dBm                   | Measuring   |                   | 2 <sup>-</sup> | 4.12.2018<br>10:27:44  //               |
| MID                         |                      |   |                            |             |                   |                |   |
|                             | Spectrum 🗵           |   |                            |             |                   |                |   |
| Ref Level 5.00 dl<br>Att 20 |                      | RBW 30<br>s                             | ikHz<br>ikHz <b>Mode</b>   | Auto FFT II | nput 1 AC         |                |   |
| PS 20                       | ab <b>bhi</b> 66.2 p | 5 <b>• 75</b> 100                       | INDUC                      |             | input 1 AC        |                |   |
| ●1Pk Max                    |                      |   |                            | D1[1]       |                   |                | a oo a                                  |
| 0 dBm                       |                      |   |                            | D1[1]       |                   | 1.2            | 0.89 dB-<br>0840 MHz-                   |
| -10 dBm                     |                      |   | M2                         | M1[1]       |                   |                | 35.42 dBm                               |
| -20 dBm                     |                      |   | -rita-                     |             |                   | 2.444          | 56710 GHz                               |
| -30 dBm                     |                      | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | V V -0                     | m           |                   |                |   |
| D1 -36.3                    | 350 dBm              | M10                                     |                            | <u> </u>    |                   |                |   |
| -40 dBm                     |                      | m l                                     |                            |             | Vh                |                |   |
| -50 dBm                     |                      |   |                            |             | 1 m               | ~~~~^          |   |
| -68 dBm                     | v                    |   |                            |             |                   | ~ ~ ~          | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ |
| -70 dBm                     |                      |   |                            |             |                   |                |   |
| -80 dBm                     |                      |   |                            |             |                   |                |   |
|                             | 1                    |   | 1                          | 1           | 1                 |                |   |

| l -90 dBm | n — — |        |               |                |       |        |      |             |                        | _  |
|-----------|-------|--------|---------------|----------------|-------|--------|------|-------------|------------------------|----|
| 50 001    |       |        |               |                |       |        |      |             |                        |    |
| CF 2.4    | 45260 | )5 GHz |               | 691 pts Span 5 |       |        |      |             | n 5.0 M⊦               | łz |
| Marker    |       |        |               |                |       |        |      |             |                        | _  |
| Туре      | Ref   | Trc    | X-value       | Y-value        | Funct | tion   | Func | tion Result |                        |    |
| M1        |       | 1      | 2.4446671 GHz | -35.42 dBm     |       |        |      |             |                        |    |
| D1        | M1    | 1      | 1.2084 MHz    | -0.89 dB       |       |        |      |             |                        |    |
| M2        |       | 1      | 2.4452605 GHz | -16.35 dBm     |       |        |      |             |                        |    |
|           |       | )[     |               |                | Mea   | suring |      | <b>4/4</b>  | 24.12.2018<br>10:31:02 |    |



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HIGH

| Receiv                      | /er           | s   | pectrum   | X      | $\mathbf{D}$ |                     |      |       |                       |          |                             |             |                       |
|-----------------------------|---------------|---|---|--------|--------------|---------------------|------|-------|-----------------------|----------|-----------------------------|-------------|-----------------------|
| Ref Le                      | evel          | 0.00 de   | Im  |        | 🔵 RBY        | ₩ 30 kHz            |      |       |                       |          |                             |             |                       |
| 👄 Att                       |               | 15 (  | db SWT  | 63.2 μ | is 👄 VB'     | <b>W</b> 100 kHz    | Mod  | e Aut | o FFT                 | Inpu     | ut 1 AC                     |             |                       |
| PS                          |               |   |   |        |              |                     |      |       |                       |          |                             |             |                       |
| <mark>⊝</mark> 1Pk Ma       | эх            |   |   |        |              |                     |      |       |                       |          |                             |             |                       |
|                             |               |   |   |        |              |                     |      | D     | 1[1]                  |          |                             |             | 0.21 dB               |
| -10 dBm                     | ı—⊢           |   |   |        |              |                     |      |       |                       |          |                             |             | 17950 MHz             |
|                             |               |   |   |        |              | M2                  |      | M     | 1[1]                  |          |                             |             | 36.70 dBm             |
| -20 dBm                     |               |   |   |        |              | L A                 | 0.   |       | 1                     |          |                             | 2.474       | 31980 GHz             |
|                             |               |   |   |        | A            | frue ,              | M    | nn.   |                       |          |                             |             |                       |
| -30 dBm                     |               |   |   |        | M1           |                     |      | Ť     | -                     |          |                             |             |                       |
|                             | —             | 1 -37.4   | 40 dBm  |        | <b>y</b>     |                     |      | ,     | 1                     |          |                             |             |                       |
| -40 dBm                     |               |   |   | MA     |              |                     |      |       | N 0.0                 | $\wedge$ |                             |             |                       |
| -50 dBm                     |               |   |   | ۲ V    | la l         |                     |      |       | $\mathbb{Z}^{\infty}$ | $\sim$   | _                           |             |                       |
| $\lambda \Lambda \Lambda M$ |               |   | $\sim \sim $ |        | 0.           |                     |      |       |                       |          | $\mathcal{M}^{\mathcal{M}}$ |             |                       |
| -60 dBm                     | $\sim$        | $\sim \sim $ |   |        |              |                     |      |       |                       |          | - 7                         | Lr.d.A      |                       |
|                             |               |   |   |        |              |                     |      |       |                       |          |                             |             | m                     |
| -70 dBm                     | ) <u> </u>    |   |   |        |              |                     |      |       |                       |          |                             |             |                       |
|                             |               |   |   |        |              |                     |      |       |                       |          |                             |             |                       |
| -80 dBm                     | ) <del></del> |   |   |        |              |                     |      |       |                       |          |                             |             |                       |
|                             |               |   |   |        |              |                     |      |       |                       |          |                             |             |                       |
| -90 dBm                     | ) <del></del> |   |   |        |              |                     |      |       |                       |          |                             |             |                       |
|                             |               |   |   |        |              |                     |      |       |                       |          |                             |             |                       |
| CF 2.47                     | 75 GF         | lz  |   |        |              | 691                 | pts  |       |                       |          |                             | Spa         | n 5.0 MHz             |
| Marker                      |               |   |   |        |              |                     |      |       |                       |          |                             |             |                       |
|                             | Ref           |   |   | alue   |              | Y-value             |      | Func  | tion                  |          | Fund                        | tion Result |                       |
| M1                          |               | 1   |   | 743198 |              | -36.70 dB           |      |       |                       |          |                             |             |                       |
| D1<br>M2                    | M1            | 1   |   | 1.1795 |              | 0.21 (<br>-17.44 dB |      |       |                       |          |                             |             |                       |
|                             |               |   | 2,4   | 748987 | GHZ          | -17.44 dE           | viii |       |                       | _        |                             |             |                       |
|                             |               | ][]   |   |        |              |                     |      | Mea   | suring                |          |                             | 4/4         | 1.01.2019<br>15:45:58 |



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### 7.2 Field Strength of the Fundamental Signal (15.249(a))

| Test Requirement      | 47 CFR Part 15, Subpart C 15.249(a) |
|-----------------------|-------------------------------------|
| Test Method:          | ANSI C63.10 (2013) Section 6.5&6.6  |
| Measurement Distance: | 3m                                  |
| Limit:                |                                     |

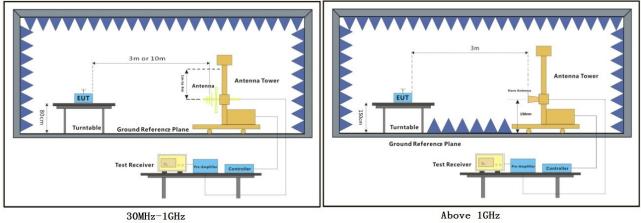
| Frequency         | Limit (dBuV/m @3m) | Remark        |
|-------------------|--------------------|---------------|
|                   | 94.0               | Average Value |
| 2400MHz-2483.5MHz | 114.0              | Peak Value    |

#### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature:21.1 °CHumidity:68.9 % RHAtmospheric Pressure:1020 mbarTest modea:TX mode\_Keep the EUT in transmitting with modulation mode.

#### 7.2.2 Test Setup Diagram







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#### 7.2.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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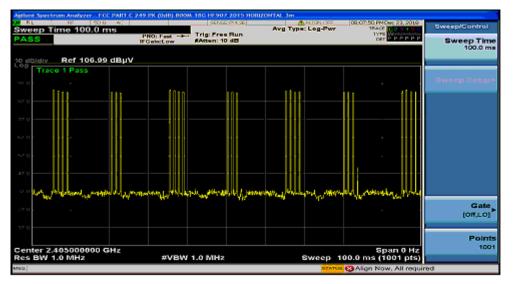


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Average value:

|                    | Average value=Peak value + PDCF  |
|--------------------|----------------------------------|
| Calculate Formula: | PDCF=20 log(Duty cycle)          |
|                    | Duty cycle= T on time / T period |
|                    | Ton time =1.155ms                |
| Test data:         | T period =29.8ms                 |
|                    | PDCF value= -28.23dB             |

Duty cycle test plots:





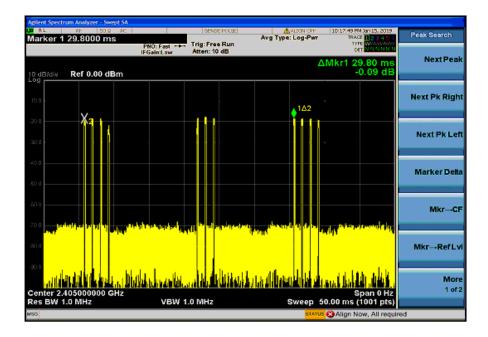
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|                                  |                           | PER (008) 800M-18G HE 907 2015 |   |   |               |
|----------------------------------|---------------------------|--------------------------------|---|---|---------------|
| Marker 1 $\Delta$ 16             |                           | 50,55,50,3                     | Avg Type: Log-Pwr   | 00,05:54 PMOec 23, 2019<br>18ACE 11 23 4 10<br>1778 | Marker        |
| PASS                             | 1                         | GeincLow #Atten: 10 dB         |   | DET P P P P P P                                     | Select Marker |
|                                  | 106.99 dBµV               |                                |   | ΔMkr1 165.0 μs<br>0.69 dB                           | ,             |
| Trace 1 P                        | 142                       |                                |   |   | Norma         |
| × 0<br>* 0                       |                           |                                |   | -   | Deit          |
| wn                               |                           |                                |   |   | Fixed         |
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| Center 2.40500<br>Res BW 1.0 Mil | 00000 GHz<br>Hz           | #VBW 1.0 MHz                   | Sweep 1   | Span 0 Hz<br>5.000 ms (1001 pts)                    | Mon<br>1 of   |
| 1912                             |                           |                                | STATU   | Align Now, All requir                               | ed            |



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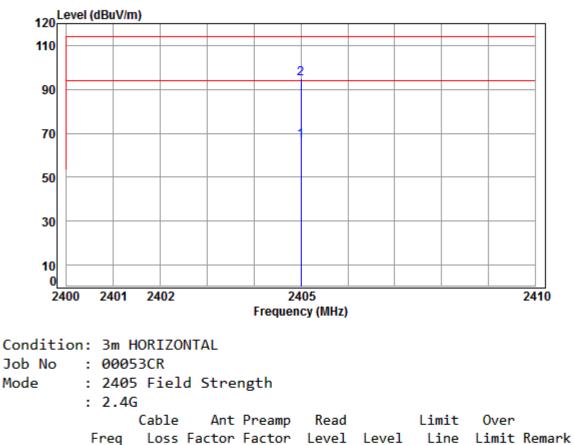
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Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



| МН                           | z dB | dB/m | dB | dBuV | dBuV/m | dBuV/m | dB |   |
|------------------------------|------|------|----|------|--------|--------|----|---|
| 1 av 2405.00<br>2 pp 2405.00 |      |      |    |      |        |        |    | - |



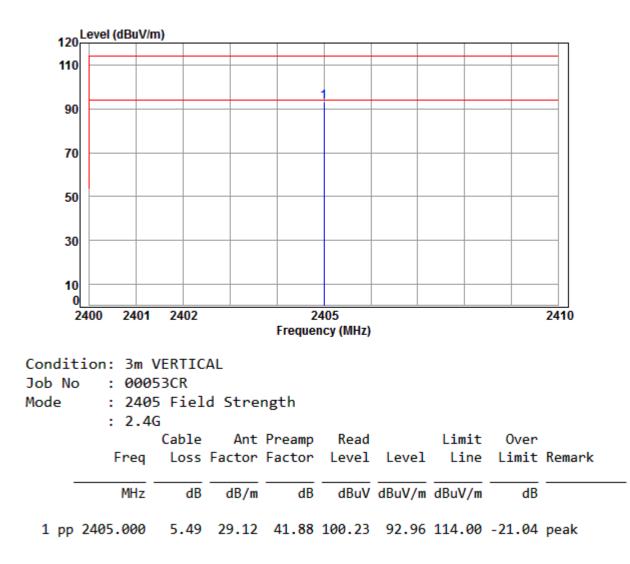
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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:Low





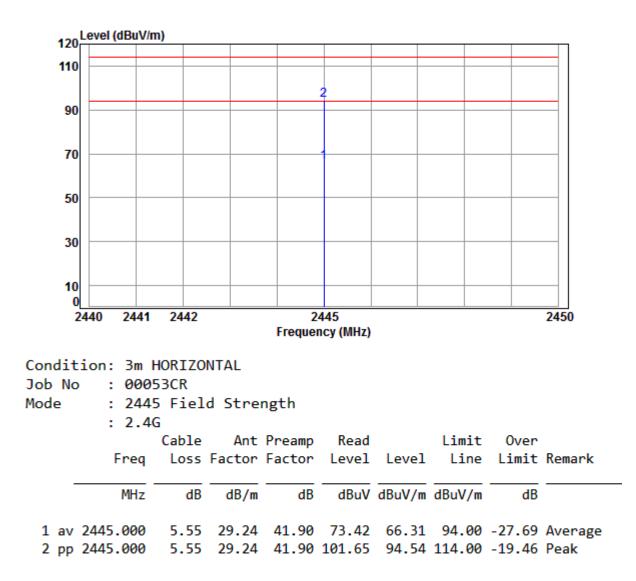
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Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle





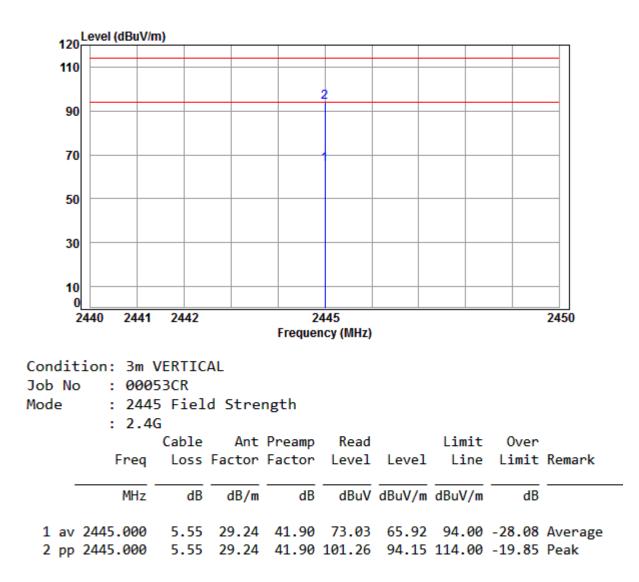
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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:middle





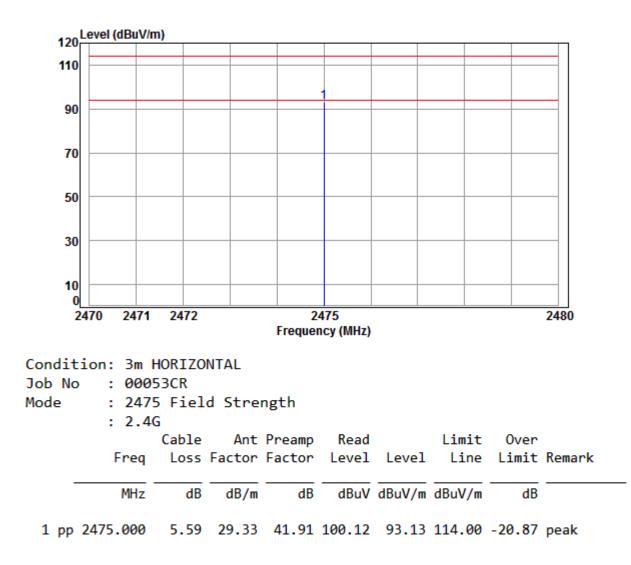
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Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:High





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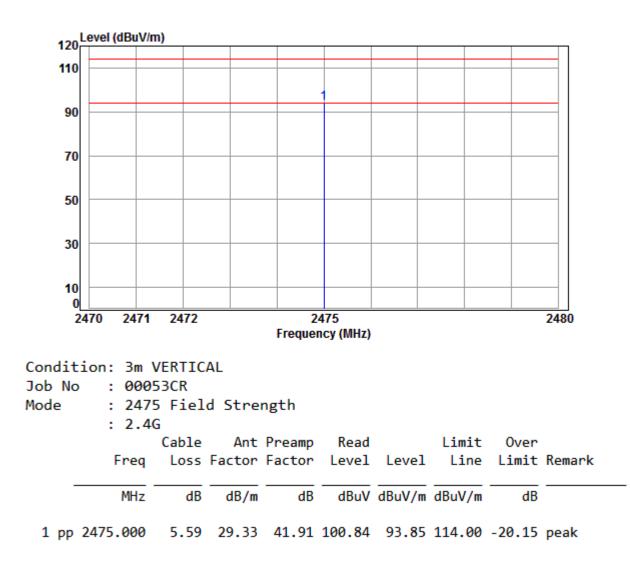
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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

2) The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the above measurement data were shown in the report.





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### 7.3 Restricted Band Around Fundamental Frequency

**Test Requirement** 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209 ANSI C63.10 (2013) Section 6.4&6.5&6.6 Test Method: Measurement Distance: 3m Limit:

| Frequency   | Limit (dBuV/m @3m) | Remark           |  |  |  |  |
|---|--------------------|------------------|--|--|--|--|
| 30MHz-88MHz   | 40.0               | Quasi-peak Value |  |  |  |  |
| 88MHz-216MHz  | 43.5               | Quasi-peak Value |  |  |  |  |
| 216MHz-960MHz 46.0 Quasi-peak Value   |                    |                  |  |  |  |  |
| 960MHz-1GHz   | 54.0               | Quasi-peak Value |  |  |  |  |
| Above 1GHz 54.0 Average Value   |                    |                  |  |  |  |  |
| Above 1GHz 74.0 Peak Value  |                    |                  |  |  |  |  |
| Emission radiated outside of the specified frequency bands, except for harmonics, shall |                    |                  |  |  |  |  |

be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.



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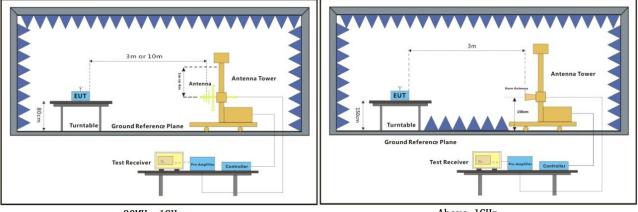
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#### 7.3.1 E.U.T. Operation

**Operating Environment:** 

Temperature: 19.5 °C Humidity: 54.7 % RH Atmospheric Pressure: 1020 mbar Test mode a:TX mode\_Keep the EUT in transmitting with modulation mode.

#### 7.3.2 Test Setup Diagram



#### 30MHz-1GHz

Above 1GHz

#### 7.3.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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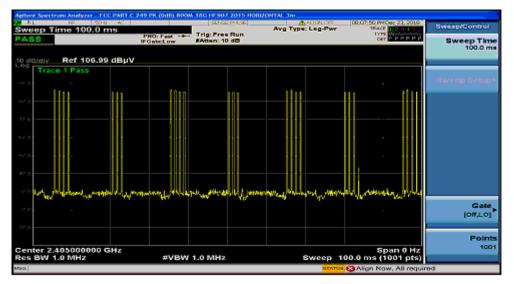


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Average value:

|                    | Average value=Peak value + PDCF  |
|--------------------|----------------------------------|
| Calculate Formula: | PDCF=20 log(Duty cycle)          |
|                    | Duty cycle= T on time / T period |
|                    | Ton time =1.155ms                |
| Test data:         | T period =29.8ms                 |
|                    | PDCF value= -28.23dB             |

Duty cycle test plots:





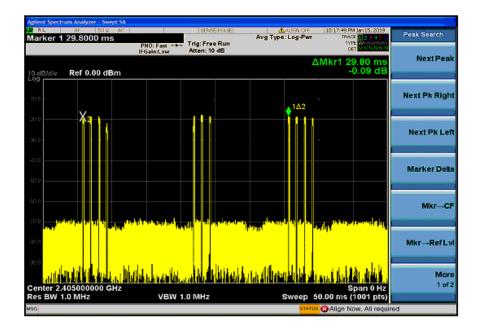
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|  | 49.PK (04B) 800M-18G 19:907 2015 2                  |                   |                                 |               |
|--|---|-------------------|---------------------------------|---------------|
| arker 1 ∆ 165.000 µs                   | SERVER SUITE  | Avg Type: Log-Pwr | 18ACE DESIGNED                  | Marker        |
| ASS                                    | PRO: Fest Trig: Free Run<br>#Geis:Low #Atten: 10 dB |                   | OFF P P P P P                   | Select Marker |
| Ref 106.99 dBµV                        |   |                   | ΔMkr1 165.0 μs<br>0.69 dB       | 1             |
|  |   | -                 |                                 | Norma         |
| 7 U                                    |   |                   |                                 | Deit          |
| 20                                     |   |                   | · · ·                           | Fixed         |
|  | low into home while                                 |                   | D. el. and D                    | o             |
| zu                                     | dhea taannha sila dhahana                           | waterstallight    | udue entreither periodistik     | Properties    |
| enter 2,405000000 GHz<br>es BW 1.0 MHz | #VBW 1.0 MHz  | ewaan 6           | Span 0 Hz<br>.000 ms (1001 pts) | Mor<br>1 of   |
| a by to why                            | #VB4V 1.0 MHz                                       |                   | Alian Now, All require          |               |





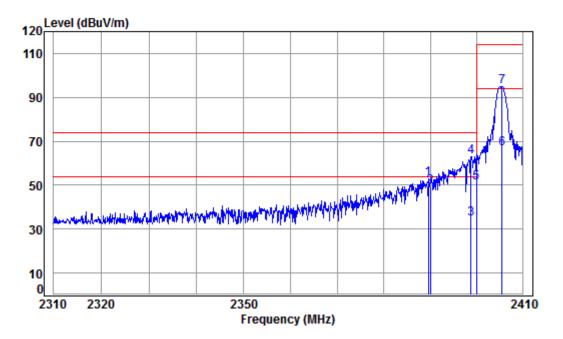
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Report No.: SZEM181200005302 Page: 29 of 47

Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



#### Condition: 3m HORIZONTAL

| Job No | : | 00053CR        |
|--------|---|----------------|
| Mode   | : | 2405 Band edge |
|        | : | 2.4G           |

|      |            | -     |        |        |        |        |        |        |         |
|------|------------|-------|--------|--------|--------|--------|--------|--------|---------|
|      |            | Cable | Ant    | Preamp | Read   |        | Limit  | 0ver   |         |
|      | Freq       | Loss  | Factor | Factor | Level  | Level  | Line   | Limit  | Remark  |
|      |            |       |        |        |        |        |        |        |         |
|      | MHz        | dB    | dB/m   | dB     | dBuV   | dBuV/m | dBuV/m | dB     |         |
|      |            |       |        |        |        |        |        |        |         |
| 1    | 2389.659   | 5.47  | 29.08  | 41.87  | 60.10  | 52.78  | 74.00  | -21.22 | peak    |
| 2    | 2390.000   | 5.47  | 29.08  | 41.87  | 56.79  | 49.47  | 74.00  | -24.53 | Peak    |
| 3    | 2398.792   | 5.49  | 29.10  | 41.88  | 42.12  | 34.83  | 54.00  | -19.17 | Average |
| 4 pł | c 2398.792 | 5.49  | 29.10  | 41.88  | 70.35  | 63.06  | 74.00  | -10.94 | peak    |
| 5    | 2400.000   | 5.49  | 29.11  | 41.88  | 58.21  | 50.93  | 74.00  | -23.07 | peak    |
| 6 pp | 2405.612   | 5.50  | 29.12  | 41.88  | 73.96  | 66.70  | 54.00  | 12.70  | Average |
| 7    | 2405.612   | 5.50  | 29.12  | 41.88  | 102.19 | 94.93  | 114.00 | -19.07 | peak    |
|      |            |       |        |        |        |        |        |        | -       |



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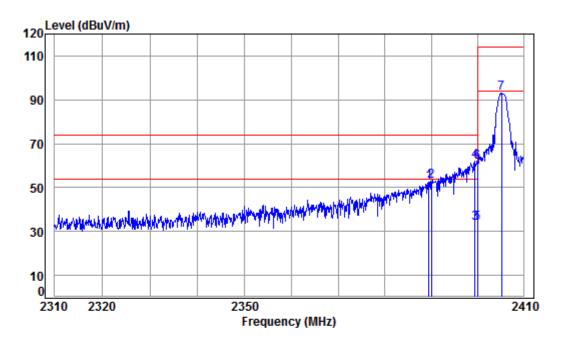
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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



#### Condition: 3m VERTICAL

| Job No : 000530 | JR. |
|-----------------|-----|
|-----------------|-----|

| Mode | : 240<br>: 2.40 | 5 Band<br>G | edge   |        |        |        |        |        |         |
|------|-----------------|-------------|--------|--------|--------|--------|--------|--------|---------|
|      |                 | Cable       | Ant    | Preamp | Read   |        | Limit  | 0ver   |         |
|      | Freq            | Loss        | Factor | Factor | Level  | Level  | Line   | Limit  | Remark  |
|      | MHz             | dB          | dB/m   | dB     | dBuV   | dBuV/m | dBuV/m | dB     |         |
| 1    | 2389.457        | 5.47        | 29.08  | 41.87  | 59.68  | 52.36  | 74.00  | -21.64 | peak    |
| 2    | 2390.000        | 5.47        | 29.08  | 41.87  | 60.39  | 53.07  | 74.00  | -20.93 | Peak    |
| 3 av | 2399.503        | 5.49        | 29.11  | 41.88  | 41.10  | 33.82  | 54.00  | -20.18 | Average |
| 4 pp | 2399.503        | 5.49        | 29.11  | 41.88  | 69.33  | 62.05  | 74.00  | -11.95 | peak    |
| 5    | 2400.000        | 5.49        | 29.11  | 41.88  | 40.85  | 33.57  | 54.00  | -20.43 | Average |
| 6    | 2400.000        | 5.49        | 29.11  | 41.88  | 69.08  | 61.80  | 74.00  | -12.20 | peak    |
| 7    | 2405.205        | 5.50        | 29.12  | 41.88  | 100.22 | 92.96  | 114.00 | -21.04 | peak    |



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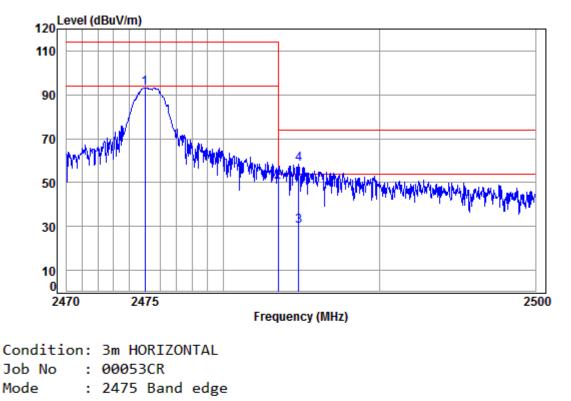
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Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



: 2.4G Cable Ant Preamp Read Limit 0ver Loss Factor Factor Limit Remark Freq Level Level Line MHz dB dBuV dBuV/m dBuV/m dB dB/m dB 1 2475.000 5.59 29.33 41.91 100.12 93.13 114.00 -20.87 peak 2 2483.500 5.60 29.35 41.91 57.26 50.30 74.00 -23.70 peak 5.60 29.36 41.91 36.98 30.03 54.00 -23.97 Average 3 av 2484.805 5.60 29.36 41.91 65.21 58.26 74.00 -15.74 peak 4 pp 2484.805



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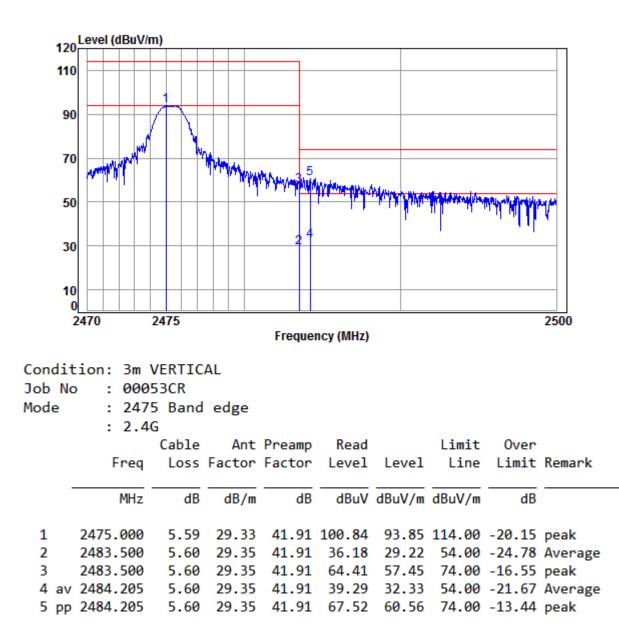
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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:High





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### 7.4 Radiated Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d) ANSI C63.10 (2013) Section 6.4&6.5&6.6 Test Method: Measurement Distance: 3m Limit:

| Frequency(MHz) | Field strength<br>(microvolts/meter) | Limit<br>(dBuV/m) | Detector | Measurement Distance<br>(meters) |
|----------------|--------------------------------------|-------------------|----------|----------------------------------|
| 0.009-0.490    | 2400/F(kHz)                          | -                 | -        | 300                              |
| 0.490-1.705    | 24000/F(kHz)                         | -                 | -        | 30                               |
| 1.705-30       | 30                                   | -                 | -        | 30                               |
| 30-88          | 100                                  | 40.0              | QP       | 3                                |
| 88-216         | 150                                  | 43.5              | QP       | 3                                |
| 216-960        | 200                                  | 46.0              | QP       | 3                                |
| 960-1000       | 500                                  | 54.0              | QP       | 3                                |
| Above 1000     | 500                                  | 54.0              | AV       | 3                                |



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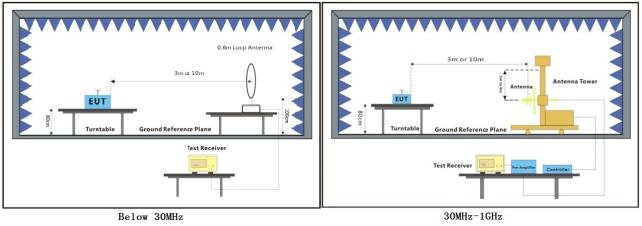
Report No.: SZEM181200005302 Page: 34 of 47

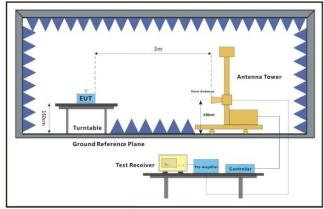
#### 7.4.1 E.U.T. Operation

Operating Environment:

Temperature:21.1 °CHumidity:68.9 % RHAtmospheric Pressure:1020 mbarTest modea:TX mode\_Keep the EUT in transmitting with modulation mode.

#### 7.4.2 Test Setup Diagram





Above 1GHz





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#### 7.4.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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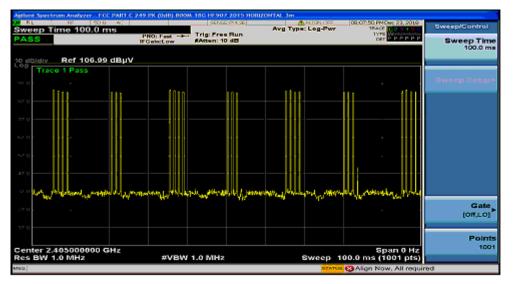


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Average value:

|                    | Average value=Peak value + PDCF  |
|--------------------|----------------------------------|
| Calculate Formula: | PDCF=20 log(Duty cycle)          |
|                    | Duty cycle= T on time / T period |
|                    | Ton time =1.155ms                |
| Test data:         | T period =29.8ms                 |
|                    | PDCF value= -28.23dB             |

Duty cycle test plots:





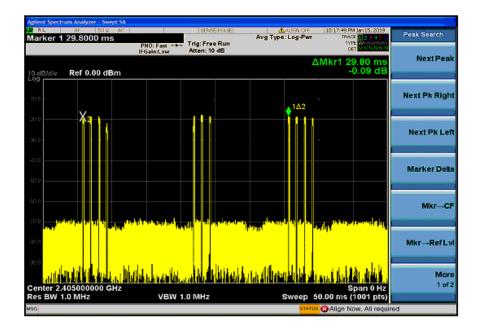
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| AL RE 50.0 AC                          | 56866320436                     |                      | 09:06:54 PM Oec 22, 2019            | Marker        |
|--|---------------------------------|----------------------|-------------------------------------|---------------|
| arker 1 ∆ 165.000 µs                   | PRO: Fest Trig: Free Run        | Avg Type: Log-Pwr    | 18ACE 1 2 3 4 10 0<br>1798 00000000 | Marker        |
| ASS                                    | IF GalacLow AAtten: 10 dB       |                      | orr PPPPPP                          | Select Marker |
| Ref 106.99 dBµV                        |                                 |                      | ΔMkr1 165.0 μs<br>0,69 dB           | ,             |
| Trace 1 Pass                           |                                 |                      |                                     | Norma         |
| × 0 X2                                 |                                 | 7                    |                                     | Dell          |
| 7.U                                    |                                 |                      |                                     | Den           |
| 70                                     |                                 |                      |                                     | Fixed         |
| 7.0                                    |                                 |                      |                                     | 0             |
| militad internationality               | Ulyani hadinayarahariyaniyahada | instrumption and the | hter have have been apply           | Properties    |
| 2.0                                    |                                 |                      |                                     | Mo            |
| enter 2.405000000 GHz<br>es BW 1.0 MHz | #VBW 1.0 MHz                    | Sweep 5              | Span 0 Hz<br>5.000 ms (1001 pts)    | 1 of          |



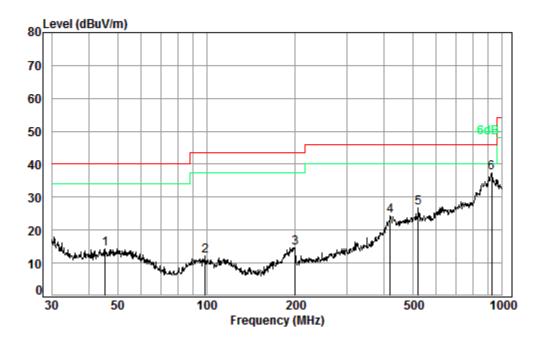


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30MHz~1GHz QP value: Mode: a; Polarization: Horizontal



Condition: 3m HORIZONTAL Job No. : 00053CR Test mode: a

检验检测专用章 spection & Testing Services ds Technical S

Shenzhen P

|     | Freq     |      |       | Preamp<br>Factor |       |        |        | Over<br>Limit |
|-----|----------|------|-------|------------------|-------|--------|--------|---------------|
|     | MHz      | dB   | dB/m  | dB               | dBuV  | dBuV/m | dBuV/m | dB            |
| 1   | 45.38    | 0.72 | 15.64 | 27.61            | 25.55 | 14.30  | 40.00  | -25.70        |
| 2   | 99.18    | 1.19 | 13.93 | 27.51            | 24.45 | 12.06  | 43.50  | -31.44        |
| 3   | 199.99   | 1.40 | 16.50 | 27.53            | 24.19 | 14.56  | 43.50  | -28.94        |
| 4   | 419.11   | 2.29 | 22.86 | 27.76            | 26.81 | 24.20  | 46.00  | -21.80        |
| 5   | 520.89   | 2.62 | 25.05 | 27.84            | 26.83 | 26.66  | 46.00  | -19.34        |
| 6 p | p 922.52 | 3.62 | 29.92 | 27.00            | 30.82 | 37.36  | 46.00  | -8.64         |

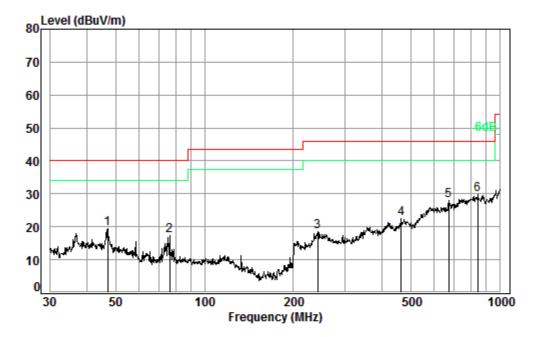


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Report No.: SZEM181200005302 39 of 47 Page:

Mode: a; Polarization: Vertical



Condition: 3m VERTICAL Job No. : 00053CR Test mode: a

| csc | Freq     |      |       | Preamp<br>Factor |       |        |        |        |
|-----|----------|------|-------|------------------|-------|--------|--------|--------|
|     | MHz      | dB   | dB/m  | dB               | dBuV  | dBuV/m | dBuV/m | dB     |
| 1   | 46.99    | 0.75 | 15.12 | 27.61            | 31.08 | 19.34  | 40.00  | -20.66 |
| 2   | 76.24    | 0.99 | 12.29 | 27.51            | 31.69 | 17.46  | 40.00  | -22.54 |
| 3   | 241.68   | 1.63 | 18.83 | 27.53            | 25.48 | 18.41  | 46.00  | -27.59 |
| 4   | 463.97   | 2.46 | 23.86 | 27.83            | 23.93 | 22.42  | 46.00  | -23.58 |
| 5   | 670.49   | 2.84 | 27.54 | 27.59            | 25.04 | 27.83  | 46.00  | -18.17 |
| 6 p | p 839.18 | 3.37 | 29.03 | 27.28            | 24.72 | 29.84  | 46.00  | -16.16 |



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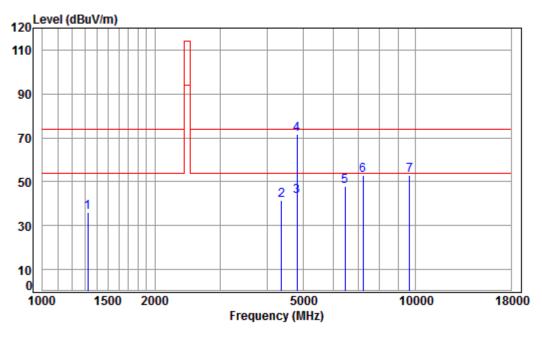
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Report No.: SZEM181200005302 Page: 40 of 47

Above 1GHz

Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



| Condition: | 3m HORIZONTAL |
|------------|---------------|
| Job No :   | 00053CR       |

| Mode | e : 2405 TX SE |       |        |        |       |        |        |        |         |
|------|----------------|-------|--------|--------|-------|--------|--------|--------|---------|
|      | : 2.4          | G     |        |        |       |        |        |        |         |
|      |                | Cable | Ant    | Preamp | Read  |        | Limit  | 0ver   |         |
|      | Freq           | Loss  | Factor | Factor | Level | Level  | Line   | Limit  | Remark  |
|      | MHz            | dB    | dB/m   | dB     | dBuV  | dBuV/m | dBuV/m | dB     |         |
| 1    | 1323.614       | 4.88  | 25.06  | 41.28  | 47.60 | 36.26  | 74.00  | -37.74 | peak    |
| 2    | 4367.058       | 7.41  | 33.60  | 42.39  | 42.78 | 41.40  | 74.00  | -32.60 | peak    |
| 3 av | 4810.000       | 7.90  | 34.17  | 42.47  | 43.86 | 43.46  | 54.00  | -10.54 | Average |
| 4 pp | 4810.000       | 7.90  | 34.17  | 42.47  | 72.09 | 71.69  | 74.00  | -2.31  | peak    |
| 5    | 6470.026       | 11.48 | 35.08  | 41.24  | 42.48 | 47.80  | 74.00  | -26.20 | peak    |
| 6    | 7215.000       | 10.07 | 36.41  | 40.71  | 47.26 | 53.03  | 74.00  | -20.97 | peak    |
| 7    | 9620.000       | 10.75 | 37.52  | 37.72  | 42.22 | 52.77  | 74.00  | -21.23 | peak    |



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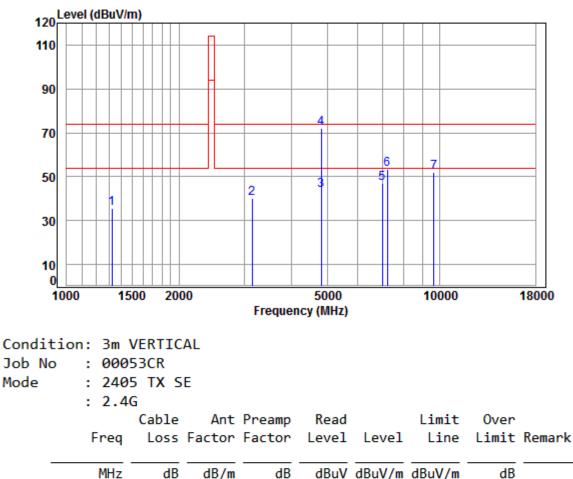
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Report No.: SZEM181200005302 Page: 41 of 47

Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



|      | MHz      | dB    | dB/m  | dB    | dBuV  | dBuV/m | dBuV/m | dB     |         |
|------|----------|-------|-------|-------|-------|--------|--------|--------|---------|
| 1    | 1323.614 | 4.88  | 25.06 | 41.28 | 46.90 | 35.56  | 74.00  | -38.44 | peak    |
| 2    | 3141.145 | 6.12  | 31.57 | 42.14 | 44.38 | 39.93  | 74.00  | -34.07 | peak    |
| 3 av | 4810.000 | 7.90  | 34.17 | 42.47 | 44.15 | 43.75  | 54.00  | -10.25 | Average |
| 4 pp | 4810.000 | 7.90  | 34.17 | 42.47 | 72.38 | 71.98  | 74.00  | -2.02  | peak    |
| 5    | 6995.172 | 10.14 | 36.49 | 40.86 | 41.28 | 47.05  | 74.00  | -26.95 | peak    |
| 6    | 7215.000 | 10.07 | 36.41 | 40.71 | 47.51 | 53.28  | 74.00  | -20.72 | peak    |
| 7    | 9620.000 | 10.75 | 37.52 | 37.72 | 41.28 | 51.83  | 74.00  | -22.17 | peak    |



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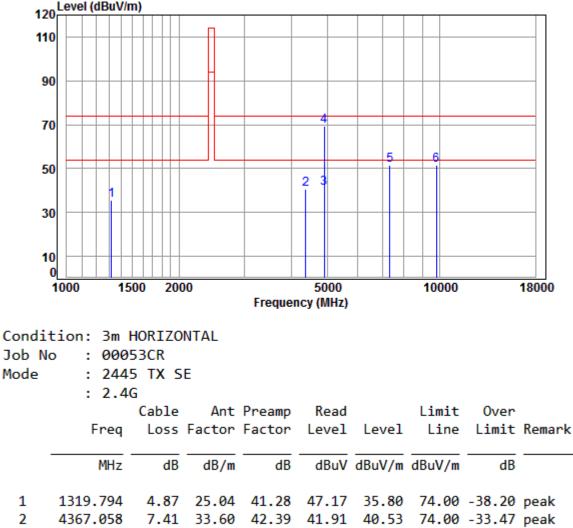
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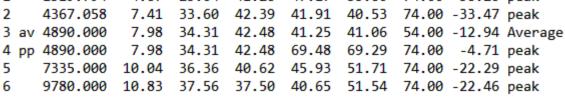
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Report No.: SZEM181200005302 Page: 42 of 47

Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle







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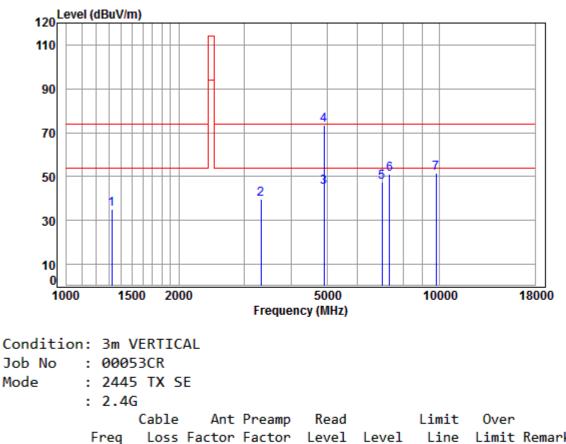
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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:middle



|      |          | CaDIC | Anc    | i i camp | neau  |        | LTUITC | over   |         |
|------|----------|-------|--------|----------|-------|--------|--------|--------|---------|
|      | Freq     | Loss  | Factor | Factor   | Level | Level  | Line   | Limit  | Remark  |
|      | MHz      | dB    | dB/m   | dB       | dBuV  | dBuV/m | dBuV/m | dB     |         |
| 1    | 1323.614 | 4.88  | 25.06  | 41.28    | 46.37 | 35.03  | 74.00  | -38.97 | peak    |
| 2    | 3318.471 | 6.29  | 31.89  | 42.18    | 43.57 | 39.57  | 74.00  | -34.43 | peak    |
| 3 av | 4890.000 | 7.98  | 34.31  | 42.48    | 45.32 | 45.13  | 54.00  | -8.87  | Average |
| 4 pp | 4890.000 | 7.98  | 34.31  | 42.48    | 73.55 | 73.36  | 74.00  | -0.64  | peak    |
| 5    | 6995.172 | 10.14 | 36.49  | 40.86    | 41.82 | 47.59  | 74.00  | -26.41 | peak    |
| 6    | 7335.000 | 10.04 | 36.36  | 40.62    | 45.22 | 51.00  | 74.00  | -23.00 | peak    |
| 7    | 9780.000 | 10.83 | 37.56  | 37.50    | 40.86 | 51.75  | 74.00  | -22.25 | peak    |
|      |          |       |        |          |       |        |        |        |         |



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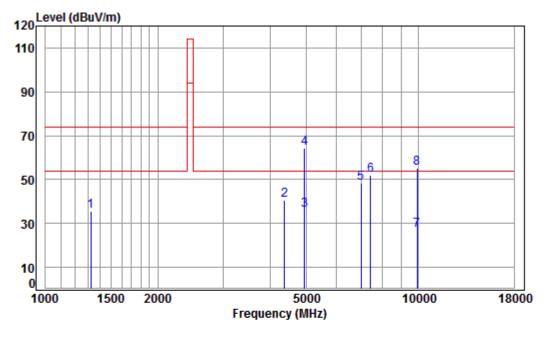
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Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



| Condition: | 3m HORIZONTAL |
|------------|---------------|
| Job No :   | 00053CR       |
| Mode :     | 2475 TX SE    |

: 2475 TX SE 2 10

|      | : 2.4    | G     |        |        |       |        |        |        |         |
|------|----------|-------|--------|--------|-------|--------|--------|--------|---------|
|      |          | Cable | Ant    | Preamp | Read  |        | Limit  | 0ver   |         |
|      | Freq     | Loss  | Factor | Factor | Level | Level  | Line   | Limit  | Remark  |
| -    |          |       |        |        |       |        |        |        |         |
|      | MHz      | dB    | dB/m   | dB     | dBuV  | dBuV/m | dBuV/m | dB     |         |
|      |          |       |        |        |       |        |        |        |         |
| 1    | 1323.614 | 4.88  | 25.06  | 41.28  | 46.94 | 35.60  | 74.00  | -38.40 | peak    |
| 2    | 4367.058 | 7.41  | 33.60  | 42.39  | 41.90 | 40.52  | 74.00  | -33.48 | peak    |
| 3 av | 4950.000 | 8.04  | 34.41  | 42.49  | 36.03 | 35.99  | 54.00  | -18.01 | Average |
| 4 pp | 4950.000 | 8.04  | 34.41  | 42.49  | 64.26 | 64.22  | 74.00  | -9.78  | peak    |
| 5    | 6995.172 | 10.14 | 36.49  | 40.86  | 42.45 | 48.22  | 74.00  | -25.78 | peak    |
| 6    | 7425.000 | 10.02 | 36.33  | 40.57  | 46.19 | 51.97  | 74.00  | -22.03 | peak    |
| 7    | 9900.000 | 10.89 | 37.58  | 37.34  | 15.79 | 26.92  | 54.00  | -27.08 | Average |
| 8    | 9900.000 | 10.89 | 37.58  | 37.34  | 44.02 | 55.15  | 74.00  | -18.85 | peak    |



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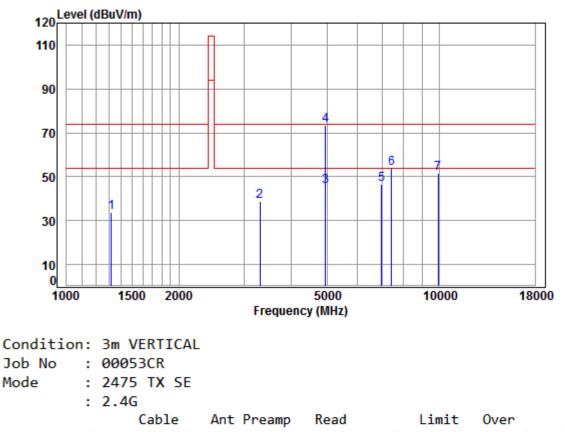
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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:High



|      |          | Capie | Ant    | Preamp | reau  |        | LTWTC  | over   |         |
|------|----------|-------|--------|--------|-------|--------|--------|--------|---------|
|      | Freq     | Loss  | Factor | Factor | Level | Level  | Line   | Limit  | Remark  |
|      | MHz      | dB    | dB/m   | dB     | dBuV  | dBuV/m | dBuV/m | dB     |         |
| 1    | 1319.794 | 4.87  | 25.04  | 41.28  | 45.08 | 33.71  | 74.00  | -40.29 | peak    |
| 2    | 3299.344 | 6.28  | 31.86  | 42.17  | 42.91 | 38.88  | 74.00  | -35.12 | peak    |
| 3 av | 4950.000 | 8.04  | 34.41  | 42.49  | 45.46 | 45.42  | 54.00  | -8.58  | Average |
| 4 pp | 4950.000 | 8.04  | 34.41  | 42.49  | 73.69 | 73.65  | 74.00  | -0.35  | peak    |
| 5    | 6974.982 | 10.20 | 36.43  | 40.87  | 40.96 | 46.72  | 74.00  | -27.28 | peak    |
| 6    | 7425.000 | 10.02 | 36.33  | 40.57  | 48.00 | 53.78  | 74.00  | -20.22 | peak    |
| 7    | 9900.000 | 10.89 | 37.58  | 37.34  | 40.48 | 51.61  | 74.00  | -22.39 | peak    |
|      |          |       |        |        |       |        |        |        |         |



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Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

2) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.



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Report No.: SZEM181200005302 Page: 47 of 47

#### **Photographs** 8

#### 8.1 Test Setup

Refer to Setup Photos

### 8.2 EUT Constructional Details (EUT Photos)

Refer to EUT external and internal photos

- End of the Report -



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