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**Guangzhou Branch**

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# TEST REPORT

The following sample(s) was/were submitted and identified on behalf of the client as:

| | |
|---|---|
| **Application No.:** | GZEM1510005509CR |
| **Applicant:** | Entertainment Robotics |
| **Manufacturer:** | JETTA(CHINA)INDUSTRIES CO.LTD |
| **Factory:** | JETTA(CHINA)INDUSTRIES CO.LTD |
| **FCC ID:** | 2AGUE-MOTOTILES |
| **Product Description:** | Moto tiles |
| **Model No.:** | C2800 |
| **Standards:** | CFR 47 PART 15 Subpart C: 2015 section 15.249 |
| **Date of Receipt:** | 2015-12-04 |
| **Date of Test:** | 2015-12-10 to 2015-12-15 |
| **Date of Issue:** | 2016-03-25 |
| **Test Result :** | **Pass*** |

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

**Jerry Chan**
**Manager**

**The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.**

**The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.**

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# 2 Version

| Revision Record | | | | |
|---|---|---|---|---|
| **Version** | **Chapter** | **Date** | **Modifier** | **Remark** |
| 00 | | 2016-03-25 | | Original Report |
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|---|---|---|---|---|
| **Authorized for issue by:** | | | | |
| **Tested By** | | (Vico Cui) / **Project Engineer** | | 2015-12-10 to 2015-12-15<br>**Date** |
| **Prepared By** | | (Karon Yang) / **Clerk** | | 2016-03-08<br>**Date** |
| **Checked By** | | (Little Xiang) / **Reviewer** | | 2016-03-09<br>**Date** |

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# 3 Test Summary

| Test | Test Requirement | Test method | Result |
|---|---|---|---|
| Field Strength of Fundamental | FCC PART 15 C section 15.249 (a) | ANSI C63.10: Clause 6.6 | PASS |
| Field Strength of Unwanted Emissions | FCC PART 15 C section 15.249 (a) section 15.249 (d) | ANSI C63.10: Clause 6.4, 6.5 and 6.6 | PASS |
| Band Edges | FCC PART 15 C section 15.249 (d) | ANSI C63.10: Clause 6.9.2 | PASS |
| Occupied Bandwidth | FCC PART 15 C section 15.215(c) | ANSI C63.10: Clause 6.9.1 | PASS |

**Remark:**
EUT: In this whole report EUT means Equipment Under Test.
Tx: In this whole report Tx (or tx) means Transmitter.
Rx: In this whole report Rx (or rx) means Receiver.
RF: In this whole report RF means Radio Frequency.
ANSI C63.10: the detail version is ANSI C63.10:2009 in the whole report.

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# 5 General Information

## 5.1 Client Information

| | |
|---|---|
| Applicant: | Entertainment Robotics |
| Address of Applicant: | Egholmsvej 2, 2830 Virum, Denmark |
| Manufacturer: | JETTA(CHINA)INDUSTRIES CO.LTD |
| Address of Manufacturer: | 333 Cai Xin Lu, Lan He Zhen, Nan Sha Qu, Guangzhou Shi, Guangdong Province, China |
| Factory: | JETTA(CHINA)INDUSTRIES CO.LTD |
| Address of Factory: | 333 Cai Xin Lu, Lan He Zhen, Nan Sha Qu, Guangzhou Shi, Guangdong Province, China |

## 5.2 General Description of E.U.T.

| | |
|---|---|
| Product Description: | Moto tiles |
| Model No.: | C2800 |

## 5.3 Details of E.U.T.

| | |
|---|---|
| Operating Frequency | 2450MHz to 2480MHz |
| Type of Modulation: | GFSK |
| Number of Channels | 31 |
| Channel Separation: | 1 MHz |
| Antenna Type | Integral |
| Antenna gain: | 0 dBi |
| Function: | Tiles used for player dancing and with radio function for monitor score |
| Power Supply: | TX/ RX DC 3.7V 1150mAh 4.255Wh rechargeable battery |
| Adapter: | Model : CGSW-0504500,<br>Input:100-240V, 50/60Hz 1.5A ,<br>Output: 5V, 4500mA |
| Power cord: | Two wires, 1.5m length DC output & AC input cable. |

## 5.4 Description of Support Units

The EUT has been test as an independent unit.

## 5.5 Other Information Requested by the Customer

None.

## 5.6 Deviation from Standards

Biconical and log periodic antennas were used instead of dipole antennas.

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## 5.7 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663
Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

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## 5.6 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

  The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC (Registration No.: 282399)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **Industry Canada (Registration No.: 4620B-1)**

  The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

  The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co. Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584，G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

  SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

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# 6 Equipment List

| RE in Chamber | | | | | | |
|---|---|---|---|---|---|---|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal. date (YYYY-MM-DD) | Cal.Due date (YYYY-MM-DD) |
| EMC0525 | Compact Semi-Anechoic Chamber | ChangZhou ZhongYu | N/A | N/A | 2014-12-05 | 2016-12-04 |
| EMC0522 | EMI Test Receiver | Rohde & Schwarz | ESIB26 | 100283 | 2016-02-01 | 2017-01-31 |
| EMC0056 | EMI Test Receiver | Rohde & Schwarz | ESCI | 100236 | 2016-02-01 | 2017-01-31 |
| EMC0528 | RI High frequency Cable | SGS | 20 m | N/A | 2014-04-19 | 2016-04-18 |
| EMC2025 | Trilog Broadband Antenna 30-1000MHz | SCHWARZBECK MESS-ELEKTRONIK | VULB 9160 | 9160-3372 | 2014-07-14 | 2017-07-13 |
| EMC0524 | Bi-log Type Antenna | Schaffner -Chase | CBL6112B | 2966 | 2013-08-31 | 2016-08-30 |
| EMC0519 | Bilog Type Antenna | Schaffner -Chase | CBL6143 | 5070 | 2014-05-04 | 2017-05-03 |
| EMC2026 | Horn Antenna 1-18GHz | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9120D | 9120D-841 | 2013-08-31 | 2016-08-31 |
| EMC0521 | 1-26.5 GHz Pre-Amplifier | Agilent | 8449B | 3008A01649 | 2016-01-25 | 2017-01-24 |
| EMC2065 | Amplifier | HP | 8447F | N/A | 2015-07-18 | 2016-07-17 |
| EMC2086 | PRE AMPLIFIER MH648A | ANRITSU CORP | MH648A | N/A | 2015-12-19 | 2016-12-18 |
| EMC2063 | Pre-amplifier 1GHz-26GHz | Compliance Direction Systems Lnc. | PAP-1G26-48 | 6279.628 | 2016-01-06 | 2017-01-05 |
| EMC0523 | Active Loop Antenna | EMCO | 6502 | 42963 | 2016-02-27 | 2018-02-26 |
| EMC2041 | Broad-Band Horn Antenna (14)15-26.5(40)GHz | SCHWARZBECK MESS-ELEKTRONI | BBHA 9170 | 9170-375 | 2014-05-26 | 2017-05-25 |
| EMC2079 | High Pass Filter(915MHz) | FSY MICROWAVE | HM1465-9SS | 009 | 2016-01-25 | 2017-01-24 |
| EMC2069 | 2.4GHz filter | Micro-Tronics | BRM 50702 | 149 | 2016-01-25 | 2017-01-24 |
| EMC0530 | 10m Semi-Anechoic Chamber | ETS | N/A | N/A | 2014-05-03 | 2016-05-02 |

| General used equipment | | | | | | |
|---|---|---|---|---|---|---|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal. date (YYYY-MM-DD) | Cal.Due date (YYYY-MM-DD) |
| EMC0006 | DMM | Fluke | 73 | 70681569 | 2015-09-17 | 2016-09-16 |
| EMC0007 | DMM | Fluke | 73 | 70671122 | 2015-09-17 | 2016-09-16 |

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# 7 Test Results

## 7.1 E.U.T. Operation

**Test Voltage:** DC 3.7V

**Temperature:** 20.0 -25.0 °C

**Humidity:** 38-50 % RH

**Atmospheric Pressure:** 1000 -1010 mbar

**Test frequencies and frequency range:** According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

**Number of fundamental frequencies to be tested in EUT transmit band**

| Frequency range in which device operates | Number of frequencies | Location in frequency range of operation |
|---|---|---|
| 1 MHz or less | 1 | Middle |
| 1 MHz to 10 MHz | 2 | 1 near top and 1 near bottom |
| More than 10 MHz | 3 | 1 near top, 1 near middle and 1 near bottom |

**Frequency range of radiated emission measurements**

| Lowest frequency generated in the device | Upper frequency range of measurement |
|---|---|
| 9 kHz to below 10 GHz | 10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower |
| At or above 10 GHz to below 30 GHz | 5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower |
| At or above 30 GHz | 5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified |

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EUT channels and frequencies list:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|
| 1 | 2450 | 28 | 2477 |
| 2 | 2451 | 29 | 2478 |
| 3 | 2452 | 30 | 2479 |
| 4 | 2453 | 31 | 2480 |
| 5 | 2454 | | |
| 6 | 2455 | | |
| 7 | 2456 | | |
| 8 | 2457 | | |
| 9 | 2458 | | |
| 10 | 2459 | | |
| 11 | 2460 | | |
| 12 | 2461 | | |
| 13 | 2462 | | |
| 14 | 2463 | | |
| 15 | 2464 | | |
| 16 | 2465 | | |
| 17 | 2466 | | |
| 18 | 2467 | | |
| 19 | 2468 | | |
| 20 | 2469 | | |
| 21 | 2470 | | |
| 22 | 2471 | | |
| 23 | 2472 | | |
| 24 | 2473 | | |
| 25 | 2474 | | |
| 26 | 2475 | | |
| 27 | 2476 | | |

Test frequencies are the lowest channel: 1 channel (2450MHz), middle channel: 17 channel (2466MHz) and highest channel: 31 channel (2480MHz).

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## 7.2 Antenna Requirement

**Standard requirement**

15.203 requirement:

For intentional device. According to 15.203. 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.

**EUT Antenna**

The antenna is an PCB Antenna integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0 dBi.

**Test result: The unit does meet the FCC requirements.**

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## 7.3 Field Strength of Fundamental& Field Strength of Unwanted Emissions& Band Edge

Test Requirement: FCC Part15 C section 15.249

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental Frequency (MHz) | Field Strength of Fundamental (dBμV/m @ 3m) | Field Strength of Harmonics (dBμV/m @ 3m) |
|---|---|---|
| 902 to 928 | 94.0 | 54.0 |
| 2400 to 2483.5 | 94.0 | 54.0 |
| 5725 to 5875 | 94.0 | 54.0 |
| 24000 to 24250 | 108.0 | 68.0 |

(d) Emissions 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.

Limits: The fundamental frequency rang is in the frequency band of the EUT is 2450MHz ~ 2480MHz.

The limit for Average field strength dBμV/m for the fundamental frequency = 94.0 dBμV/m.

The limit for Peak field strength dBμV/m for the fundamental frequency = 114.0 dBμV/m.

No fundamental is allowed in the restricted bands.

The limit for average field strength dBμV/m for the harmonics = 54.0 dBμV/m.

The limit for peak field strength dBμV/m for the harmonics = 74.0 dBμV/m.

Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or 54.0 dBμV/m in 15.209. Here the limit for the other emission is 54.0 dBμV/m.

Test Method: ANSI C63.10: Clause 6.4, 6.5 and 6.6 for Field Strength of Fundamental& Field Strength of Unwanted Emissions

ANSI C63.10: Clause 6.9.2 for Band Edge

Status: Pre-test the EUT in continuous transmitting mode with setup as stand-alone in X, Y, Z threes axes, found the worst case is X axes and report the data.

Measurement Distance: 3m (Semi-Anechoic Chamber)

Frequency range: 9 kHz – 25 GHz for transmitting mode.

Test instrumentation resolution bandwidth
9 kHz (9 kHz - 30 MHz), 120 kHz (30 MHz - 1000 MHz), 1 MHz (1000 MHz – 25 GHz)

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**Test Procedure:**

1)9 kHz to 30 MHz emissions:

For testing performed with the loop antenna, testing was performed in accordance to ANSI C63.10. The centre of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT, During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

2)30 MHz to 1 GHz emissions:

For testing performed with the bi-log type antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360º, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

3)1 GHz to 25 GHz emissions:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2007 was used to perform radiated emission test above 1 GHz.

For testing performed with the horn antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360º, the antenna height scan between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

**Test Configuration:**

1) 9 kHz to 30 MHz emissions:

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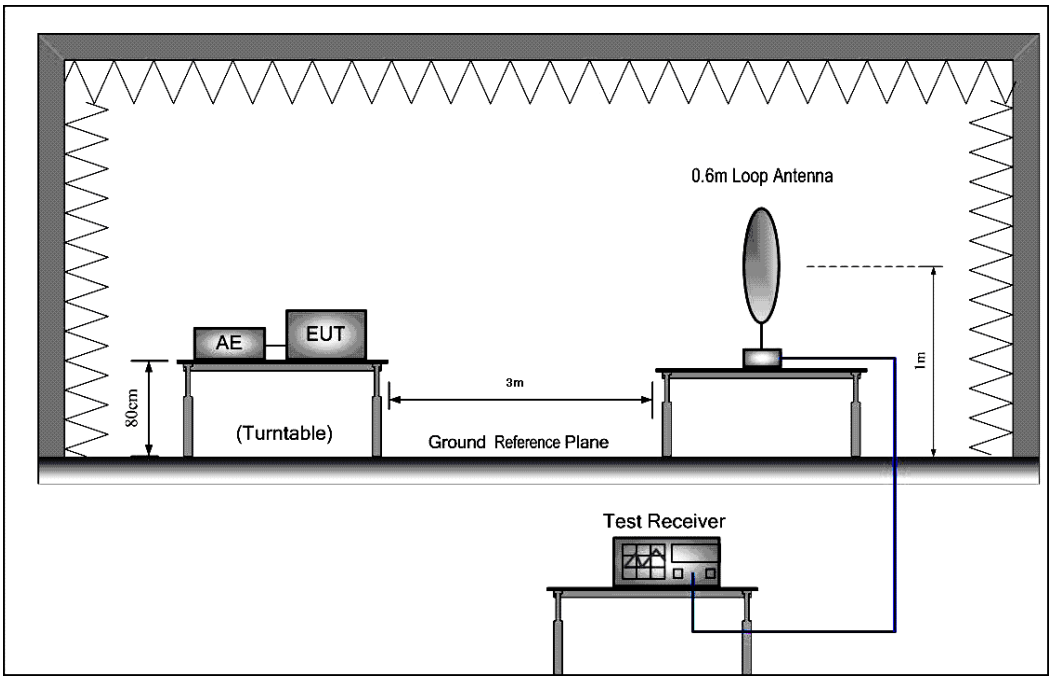


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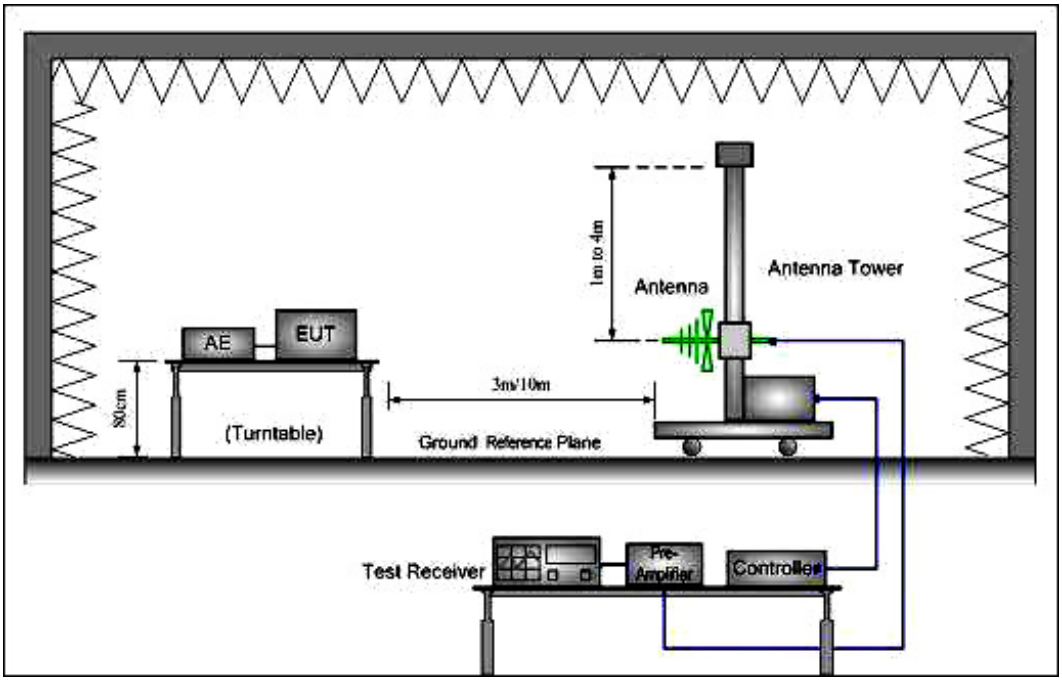
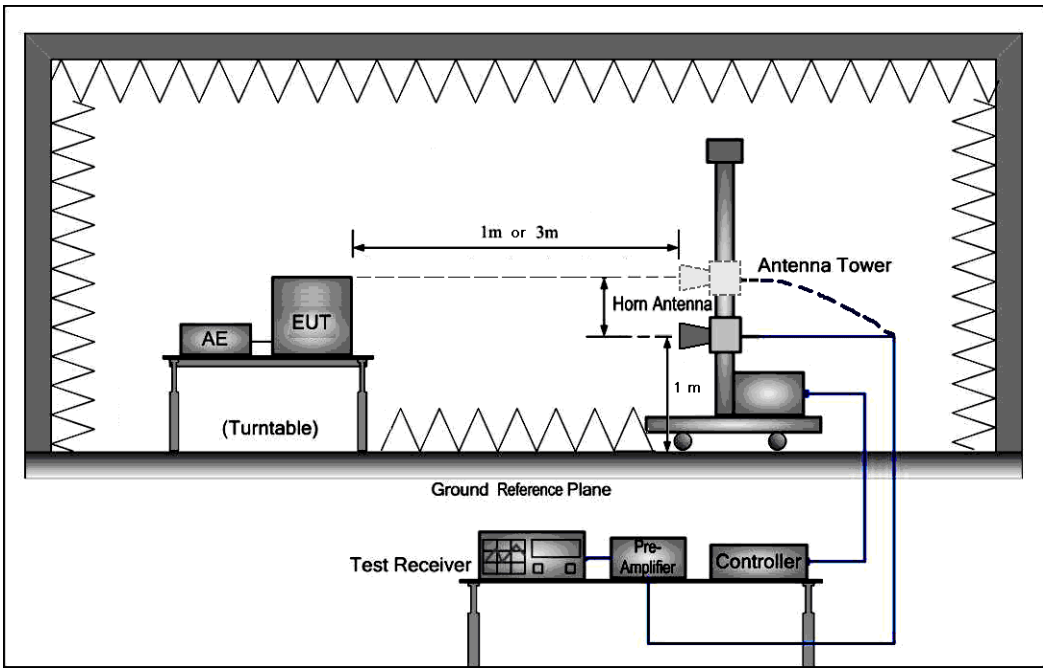
2) 30 MHz to 1 GHz emissions:




3) 1 GHz to 25 GHz emissions:




The field strength is calculated by adding the Antenna Factor, Cable Loss & Per-amplifier. The basic equation with a sample calculation is as follows:

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

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**Test at low Channel in transmitting status**

9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

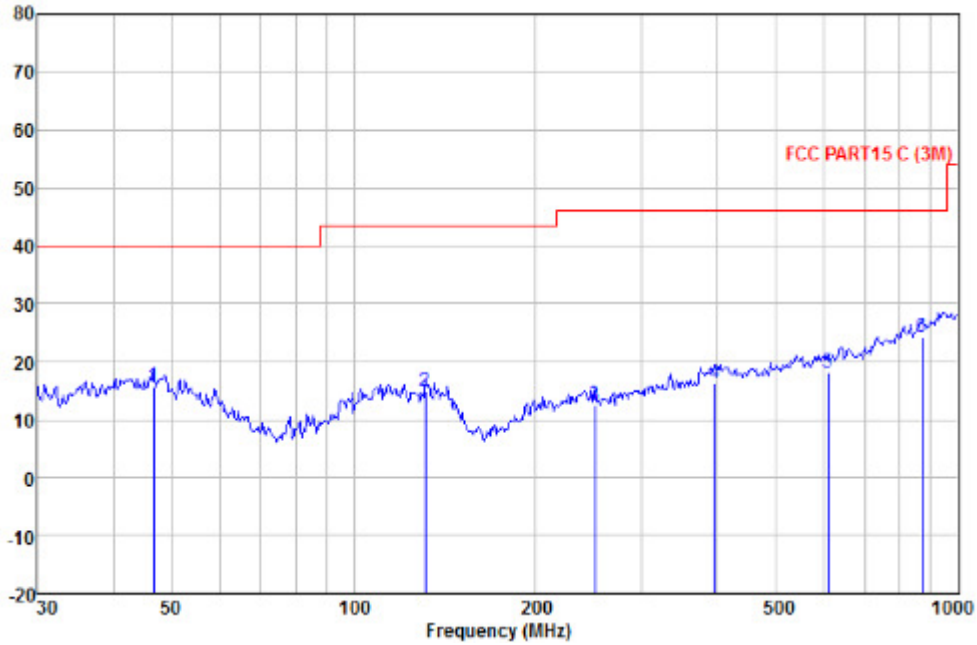
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

**30 MHz~1 GHz Field Strength of Unwanted Emissions.Quasi-Peak Measurement**

Vertical:

Peak scan

Level (dBµV/m)




Quasi-peak measurement

| Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 46.666 | 28.38 | 18.76 | 1.06 | 32.40 | 15.80 | 40.00 | -24.20 | QP |
| 131.297 | 32.22 | 13.55 | 1.50 | 32.40 | 14.87 | 43.50 | -28.63 | QP |
| 250.301 | 30.48 | 12.18 | 2.16 | 32.34 | 12.48 | 46.00 | -33.52 | QP |
| 394.855 | 29.89 | 16.10 | 2.79 | 32.40 | 16.38 | 46.00 | -29.62 | QP |
| 607.787 | 29.39 | 18.13 | 3.21 | 32.60 | 18.13 | 46.00 | -27.87 | QP |
| 869.130 | 31.16 | 21.20 | 3.96 | 32.04 | 24.28 | 46.00 | -21.72 | QP |

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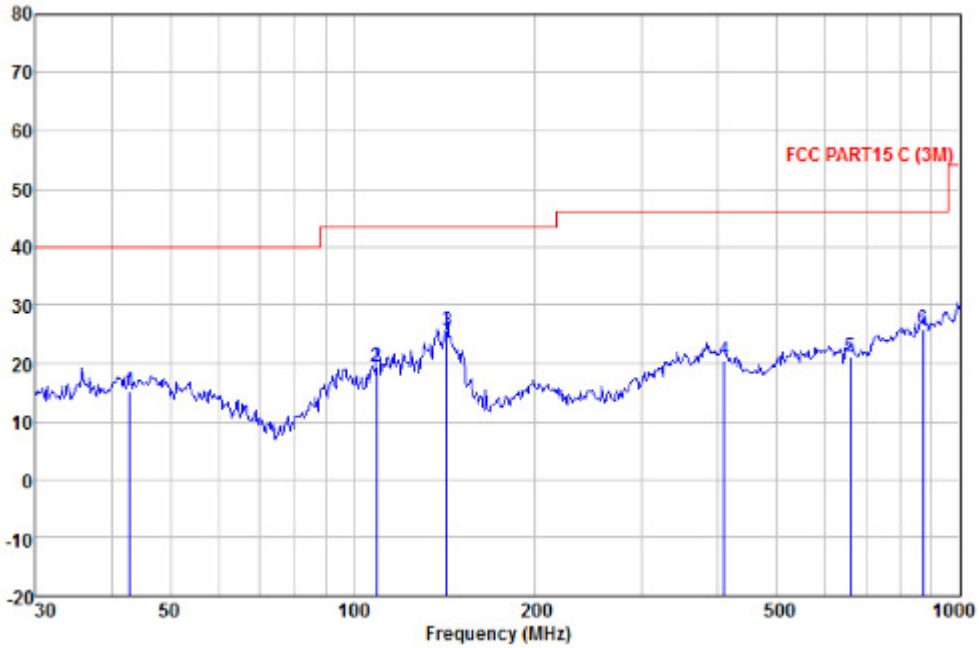
**Horizontal:**

Peak scan

Level (dBµV/m)




Quasi-peak measurement

| Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 42.900 | 27.52 | 19.15 | 1.02 | 32.40 | 15.29 | 40.00 | -24.71 | QP |
| 109.412 | 34.97 | 15.40 | 1.42 | 32.40 | 19.39 | 43.50 | -24.11 | QP |
| 142.824 | 45.16 | 11.29 | 1.57 | 32.40 | 25.62 | 43.50 | -17.88 | QP |
| 408.946 | 33.72 | 16.35 | 2.81 | 32.41 | 20.47 | 46.00 | -25.53 | QP |
| 661.151 | 32.29 | 17.97 | 3.41 | 32.60 | 21.07 | 46.00 | -24.93 | QP |
| 869.130 | 32.66 | 21.20 | 3.96 | 32.04 | 25.78 | 46.00 | -20.22 | QP |

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**1~25 GHz Field Strength of Fundamental & Field Strength of Unwanted Emissions.**

Peak & Average Measurement

| **Peak Measurement:** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Frequency (MHz)** | **Antenna factors (dB/m)** | **Cable loss (dB)** | **Preamp factor (dB)** | **Reading Level (dBμV)** | **Emission Level (dBμV/m)** | **Limit (dBμV/m)** | **Antenna polarization** |
| 1371.15 | 25.44 | 5.14 | 38.34 | 46.90 | 39.14 | 74.00 | V |
| 2450.00 | 27.56 | 6.84 | 38.26 | 82.36 | 78.50 | 114.00 | V |
| 3824.76 | 29.58 | 10.34 | 38.58 | 43.37 | 44.71 | 74.00 | V |
| 5379.50 | 31.84 | 11.77 | 38.52 | 43.64 | 48.73 | 74.00 | V |
| 2229.65 | 27.96 | 6.47 | 38.22 | 44.13 | 40.34 | 74.00 | H |
| 2450.00 | 27.56 | 6.84 | 38.26 | 79.92 | 76.06 | 114.00 | H |
| 2875.99 | 28.44 | 7.71 | 38.35 | 44.49 | 42.29 | 74.00 | H |
| 4512.97 | 30.76 | 11.10 | 38.58 | 44.79 | 48.07 | 74.00 | H |
| **Average Measurement:** | | | | | | | |
| **Frequency (MHz)** | **Antenna factors (dB/m)** | **Cable loss (dB)** | **Preamp factor (dB)** | **Reading Level (dBμV)** | **Emission Level (dBμV/m)** | **Limit (dBμV/m)** | **Antenna polarization** |
| 1371.15 | 25.44 | 5.14 | 38.34 | 38.85 | 31.09 | 54.00 | V |
| 2450.00 | 27.56 | 6.84 | 38.26 | 51.37 | 47.51 | 94.00 | V |
| 3824.76 | 29.58 | 10.34 | 38.58 | 34.83 | 36.17 | 54.00 | V |
| 5379.50 | 31.84 | 11.77 | 38.52 | 34.92 | 40.01 | 54.00 | V |
| 2229.65 | 27.96 | 6.47 | 38.22 | 36.28 | 32.49 | 54.00 | H |
| 2450.00 | 27.56 | 6.84 | 38.26 | 50.39 | 46.53 | 94.00 | H |
| 2875.99 | 28.44 | 7.71 | 38.35 | 35.66 | 33.46 | 54.00 | H |
| 4512.97 | 30.76 | 11.10 | 38.58 | 34.04 | 37.32 | 54.00 | H |

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**Band Edge:**

| Peak Measurement: | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
| 2400.00 | 27.58 | 6.56 | 38.25 | 45.26 | 41.15 | 74.00 | V |
| 2483.50 | 27.55 | 6.99 | 38.26 | 45.64 | 41.92 | 74.00 | V |
| 2400.00 | 27.58 | 6.56 | 38.25 | 43.93 | 39.82 | 74.00 | H |
| 2483.50 | 27.55 | 6.99 | 38.26 | 43.97 | 40.25 | 74.00 | H |
| **Average Measurement:** | | | | | | | |
| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
| 2400.00 | 27.58 | 6.56 | 38.25 | 35.56 | 31.45 | 54.00 | V |
| 2483.50 | 27.55 | 6.99 | 38.26 | 36.70 | 32.98 | 54.00 | V |
| 2400.00 | 27.58 | 6.56 | 38.25 | 34.49 | 30.38 | 54.00 | H |
| 2483.50 | 27.55 | 6.99 | 38.26 | 35.19 | 31.47 | 54.00 | H |

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**Test at middle Channel in transmitting status**

**9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement**

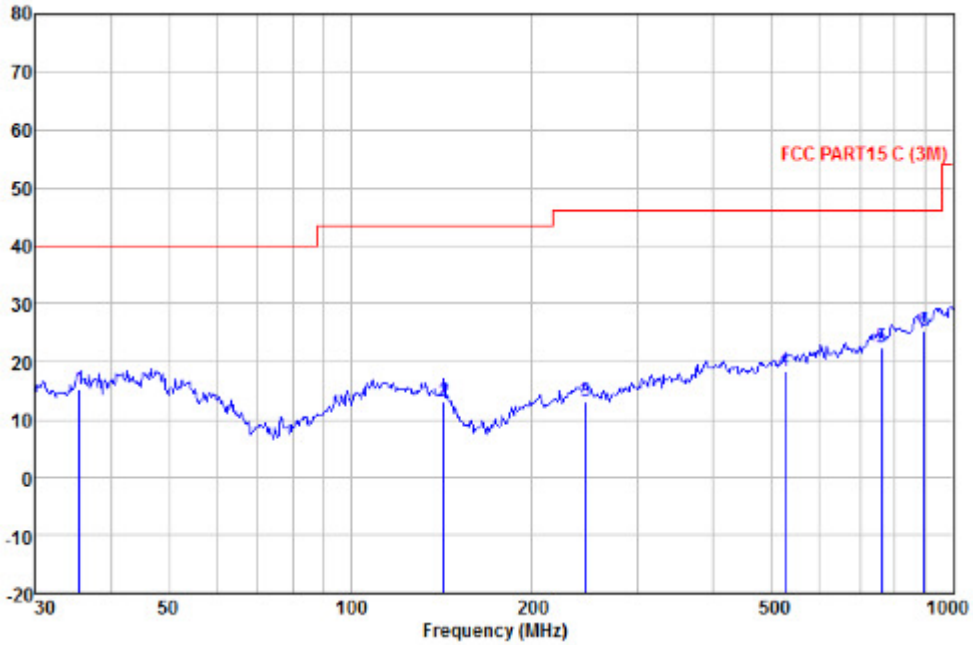
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

**30 MHz~1 GHz Field Strength of Unwanted Emissions.Quasi-Peak Measurement**

Vertical:

Peak scan

Level (dBµV/m)




Quasi-peak measurement

| Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 35.499 | 28.68 | 18.03 | 0.92 | 32.40 | 15.23 | 40.00 | -24.77 | QP |
| 142.824 | 32.70 | 11.29 | 1.57 | 32.40 | 13.16 | 43.50 | -30.34 | QP |
| 245.090 | 30.78 | 12.60 | 2.10 | 32.35 | 13.13 | 46.00 | -32.87 | QP |
| 524.554 | 31.18 | 16.52 | 3.11 | 32.52 | 18.29 | 46.00 | -27.71 | QP |
| 760.704 | 32.31 | 18.80 | 3.71 | 32.48 | 22.34 | 46.00 | -23.66 | QP |
| 893.857 | 33.51 | 19.67 | 3.99 | 31.94 | 25.23 | 46.00 | -20.77 | QP |

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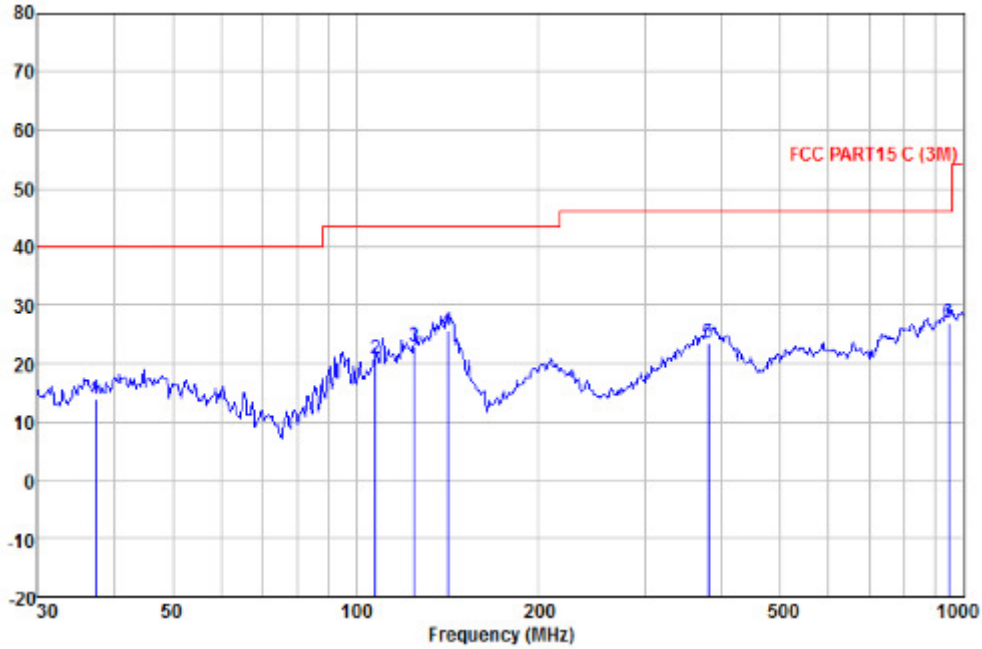
**Horizontal:**

Peak scan

Level (dBµV/m)




Quasi-peak measurement

| Freq | ReadLevel | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 37.285 | 27.03 | 18.35 | 0.96 | 32.40 | 13.94 | 40.00 | -26.06 | QP |
| 107.888 | 36.70 | 15.04 | 1.42 | 32.40 | 20.76 | 43.50 | -22.74 | QP |
| 125.007 | 39.44 | 14.30 | 1.47 | 32.40 | 22.81 | 43.50 | -20.69 | QP |
| 141.826 | 44.67 | 11.65 | 1.56 | 32.40 | 25.48 | 43.50 | -18.02 | QP |
| 379.914 | 37.50 | 15.60 | 2.76 | 32.39 | 23.47 | 46.00 | -22.53 | QP |
| 945.440 | 33.41 | 21.00 | 4.08 | 31.59 | 26.90 | 46.00 | -19.10 | QP |

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1~25 GHz Field Strength of Fundamental & Field Strength of Unwanted Emissions.

Peak & Average Measurement

| **Peak Measurement:** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Frequency (MHz)** | **Antenna factors (dB/m)** | **Cable loss (dB)** | **Preamp factor (dB)** | **Reading Level (dBμV)** | **Emission Level (dBμV/m)** | **Limit (dBμV/m)** | **Antenna polarization** |
| 2466.00 | 27.56 | 6.91 | 38.26 | 87.09 | 83.30 | 114.00 | V |
| 3653.46 | 29.22 | 9.60 | 38.56 | 44.08 | 44.34 | 74.00 | V |
| 4117.79 | 30.05 | 11.08 | 38.60 | 44.16 | 46.69 | 74.00 | V |
| 5791.65 | 32.54 | 12.09 | 38.51 | 43.66 | 49.78 | 74.00 | V |
| 1557.25 | 25.07 | 5.53 | 38.28 | 45.05 | 37.37 | 74.00 | H |
| 2466.00 | 27.56 | 6.91 | 38.26 | 81.22 | 77.43 | 114.00 | H |
| 3516.59 | 28.99 | 8.99 | 38.54 | 44.37 | 43.81 | 74.00 | H |
| 8904.99 | 36.90 | 15.63 | 39.32 | 41.49 | 54.70 | 74.00 | H |
| **Average Measurement:** | | | | | | | |
| **Frequency (MHz)** | **Antenna factors (dB/m)** | **Cable loss (dB)** | **Preamp factor (dB)** | **Reading Level (dBμV)** | **Emission Level (dBμV/m)** | **Limit (dBμV/m)** | **Antenna polarization** |
| 2466.00 | 27.56 | 6.91 | 38.26 | 52.41 | 48.62 | 94.00 | V |
| 3653.46 | 29.22 | 9.60 | 38.56 | 35.77 | 36.03 | 54.00 | V |
| 4117.79 | 30.05 | 11.08 | 38.60 | 34.91 | 37.44 | 54.00 | V |
| 5791.65 | 32.54 | 12.09 | 38.51 | 34.74 | 40.86 | 54.00 | V |
| 1557.25 | 25.07 | 5.53 | 38.28 | 37.56 | 29.88 | 54.00 | H |
| 2466.00 | 27.56 | 6.91 | 38.26 | 49.61 | 45.82 | 94.00 | H |
| 3516.59 | 28.99 | 8.99 | 38.54 | 35.59 | 35.03 | 54.00 | H |
| 8904.99 | 36.90 | 15.63 | 39.32 | 32.98 | 46.19 | 54.00 | H |

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**Band Edge:**

| Peak Measurement: | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
| 2400.00 | 27.58 | 6.56 | 38.25 | 45.16 | 41.05 | 74.00 | V |
| 2483.50 | 27.55 | 6.99 | 38.26 | 45.60 | 41.88 | 74.00 | V |
| 2400.00 | 27.58 | 6.56 | 38.25 | 43.08 | 38.97 | 74.00 | H |
| 2483.50 | 27.55 | 6.99 | 38.26 | 43.58 | 39.86 | 74.00 | H |
| **Average Measurement:** | | | | | | | |
| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
| 2400.00 | 27.58 | 6.56 | 38.25 | 36.64 | 32.53 | 54.00 | V |
| 2483.50 | 27.55 | 6.99 | 38.26 | 37.10 | 33.38 | 54.00 | V |
| 2400.00 | 27.58 | 6.56 | 38.25 | 34.66 | 30.55 | 54.00 | H |
| 2483.50 | 27.55 | 6.99 | 38.26 | 35.69 | 31.97 | 54.00 | H |

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**Test at high Channel in transmitting status**

**9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement**

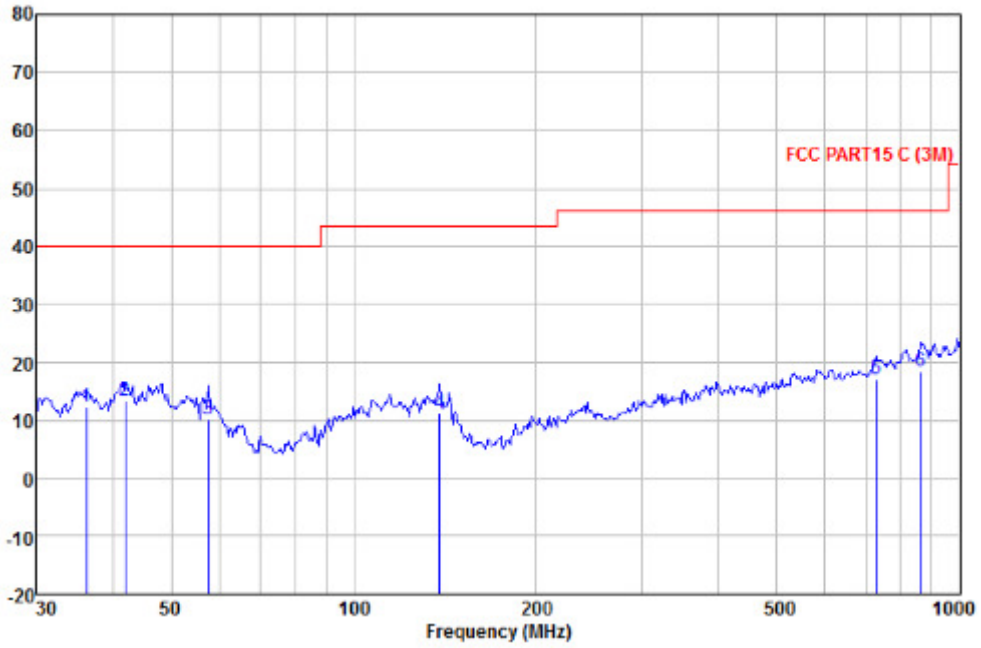
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

**30 MHz~1 GHz Field Strength of Unwanted Emissions.Quasi-Peak Measurement**

Vertical:

Peak scan

Level (dBµV/m)




Quasi-peak measurement

| Freq | ReadLevel | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 36.254 | 25.73 | 18.13 | 0.92 | 32.40 | 12.38 | 40.00 | -27.62 | QP |
| 42.007 | 25.81 | 19.00 | 1.01 | 32.40 | 13.42 | 40.00 | -26.58 | QP |
| 57.594 | 25.94 | 15.41 | 1.10 | 32.40 | 10.05 | 40.00 | -29.95 | QP |
| 138.874 | 29.94 | 12.25 | 1.54 | 32.40 | 11.33 | 43.50 | -32.17 | QP |
| 729.358 | 26.04 | 20.10 | 3.56 | 32.54 | 17.16 | 46.00 | -28.84 | QP |
| 863.056 | 25.74 | 20.80 | 3.95 | 32.09 | 18.40 | 46.00 | -27.60 | QP |

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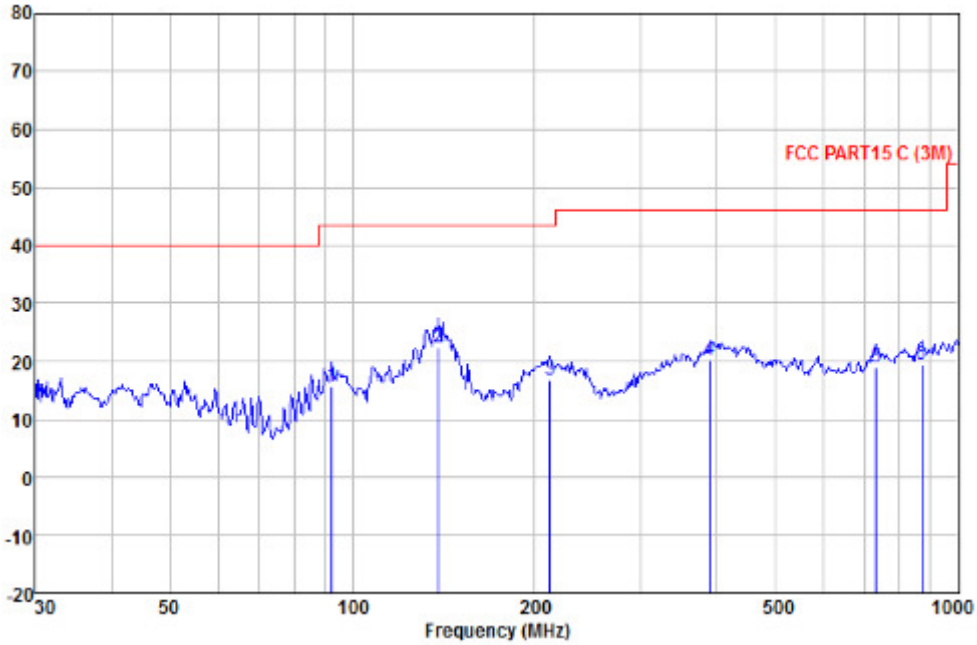
**Horizontal:**

Peak scan

Level (dBµV/m)




Quasi-peak measurement

| Freq | ReadLevel | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 92.462 | 35.09 | 11.60 | 1.32 | 32.40 | 15.61 | 43.50 | -27.89 | QP |
| 138.874 | 41.01 | 12.25 | 1.54 | 32.40 | 22.40 | 43.50 | -21.10 | QP |
| 211.527 | 36.18 | 11.13 | 1.93 | 32.39 | 16.85 | 43.50 | -26.65 | QP |
| 389.355 | 33.85 | 16.10 | 2.78 | 32.39 | 20.34 | 46.00 | -25.66 | QP |
| 730.880 | 27.80 | 20.10 | 3.56 | 32.54 | 18.92 | 46.00 | -27.08 | QP |
| 869.130 | 26.31 | 21.20 | 3.96 | 32.04 | 19.43 | 46.00 | -26.57 | QP |

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**1~25 GHz Field Strength of Fundamental & Field Strength of Unwanted Emissions.**

**Peak & Average Measurement**

| **Peak Measurement:** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Frequency (MHz)** | **Antenna factors (dB/m)** | **Cable loss (dB)** | **Preamp factor (dB)** | **Reading Level (dBμV)** | **Emission Level (dBμV/m)** | **Limit (dBμV/m)** | **Antenna polarization** |
| 1993.40 | 26.09 | 6.34 | 38.20 | 46.25 | 40.48 | 74.00 | V |
| 2480.00 | 27.56 | 6.98 | 38.26 | 80.33 | 76.61 | 114.00 | V |
| 5112.49 | 32.08 | 11.57 | 38.54 | 45.41 | 50.52 | 74.00 | V |
| 8355.94 | 36.42 | 15.26 | 39.08 | 45.07 | 57.67 | 74.00 | V |
| 1533.65 | 25.12 | 5.49 | 38.29 | 47.20 | 39.52 | 74.00 | H |
| 2480.00 | 27.56 | 6.98 | 38.26 | 81.25 | 77.53 | 114.00 | H |
| 3943.39 | 29.80 | 10.85 | 38.59 | 44.33 | 46.39 | 74.00 | H |
| 5112.49 | 32.08 | 11.57 | 38.54 | 44.50 | 49.61 | 74.00 | H |
| **Average Measurement:** | | | | | | | |
| **Frequency (MHz)** | **Antenna factors (dB/m)** | **Cable loss (dB)** | **Preamp factor (dB)** | **Reading Level (dBμV)** | **Emission Level (dBμV/m)** | **Limit (dBμV/m)** | **Antenna polarization** |
| 1993.40 | 26.09 | 6.34 | 38.20 | 37.86 | 32.09 | 54.00 | V |
| 2480.00 | 27.56 | 6.98 | 38.26 | 50.16 | 46.44 | 94.00 | V |
| 5112.49 | 32.08 | 11.57 | 38.54 | 37.69 | 42.80 | 54.00 | V |
| 8355.94 | 36.42 | 15.26 | 39.08 | 37.04 | 49.64 | 54.00 | V |
| 1533.65 | 25.12 | 5.49 | 38.29 | 38.10 | 30.42 | 54.00 | H |
| 2480.00 | 27.56 | 6.98 | 38.26 | 50.47 | 46.75 | 94.00 | H |
| 3943.39 | 29.80 | 10.85 | 38.59 | 34.68 | 36.74 | 54.00 | H |
| 5112.49 | 32.08 | 11.57 | 38.54 | 36.75 | 41.86 | 54.00 | H |

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**Band Edge:**

| **Peak Measurement:** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Frequency (MHz)** | **Antenna factors (dB/m)** | **Cable loss (dB)** | **Preamp factor (dB)** | **Reading Level (dBμV)** | **Emission Level (dBμV/m)** | **Limit (dBμV/m)** | **Antenna polarization** |
| 2400.00 | 27.58 | 6.56 | 38.25 | 47.59 | 43.48 | 74.00 | V |
| 2483.50 | 27.55 | 6.99 | 38.26 | 45.63 | 41.91 | 74.00 | V |
| 2400.00 | 27.58 | 6.56 | 38.25 | 43.57 | 39.46 | 74.00 | H |
| 2483.50 | 27.55 | 6.99 | 38.26 | 44.12 | 40.40 | 74.00 | H |
| **Average Measurement:** | | | | | | | |
| **Frequency (MHz)** | **Antenna factors (dB/m)** | **Cable loss (dB)** | **Preamp factor (dB)** | **Reading Level (dBμV)** | **Emission Level (dBμV/m)** | **Limit (dBμV/m)** | **Antenna polarization** |
| 2400.00 | 27.58 | 6.56 | 38.25 | 38.20 | 34.09 | 54.00 | V |
| 2483.50 | 27.55 | 6.99 | 38.26 | 39.26 | 35.54 | 54.00 | V |
| 2400.00 | 27.58 | 6.56 | 38.25 | 35.76 | 31.65 | 54.00 | H |
| 2483.50 | 27.55 | 6.99 | 38.26 | 36.40 | 32.68 | 54.00 | H |

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 Loss –Preamplifier Factor.

2). As shown in Section, for frequencies above 1000 MHz. the above 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.

3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

4). For Radiated Emissions fall in the restricted bands (2400MHz is worse case than 2390MHz and report it as above), which set out in Section 15.205 Restricted bands.

Also there is not any other emission which falls in restricted bands can be detected and reported.

**Test result: The unit does meet the FCC requirements.**

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## 7.4 Occupied Bandwidth

Test Requirement: FCC Part 15 C section 15.215(c)

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Method: ANSI C63.10: Clause 6.9.1

Operation within the band 2.400 to 2.4835 GHz

Method of measurement: A small sample of the transmitter output was fed into the Spectrum Analyzer and the attached plot was taken.

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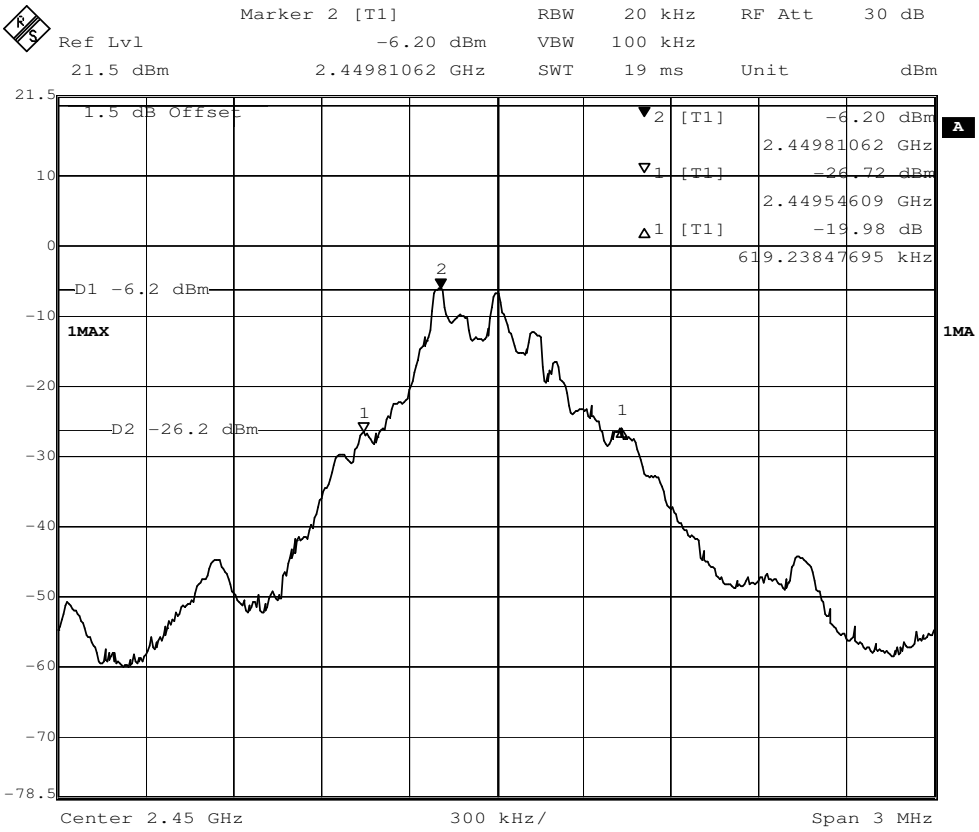
## 1.Test in the lowest frequency 2.450 GHz

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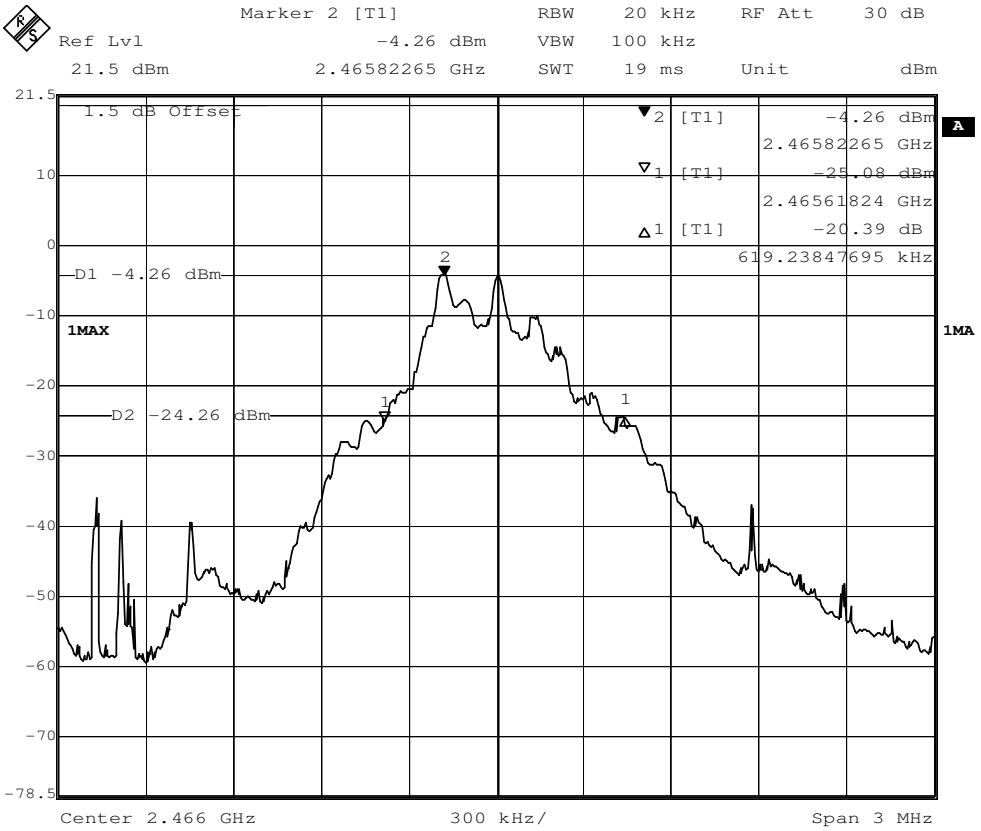
## 2.Test in the middle frequency 2.466 GHz

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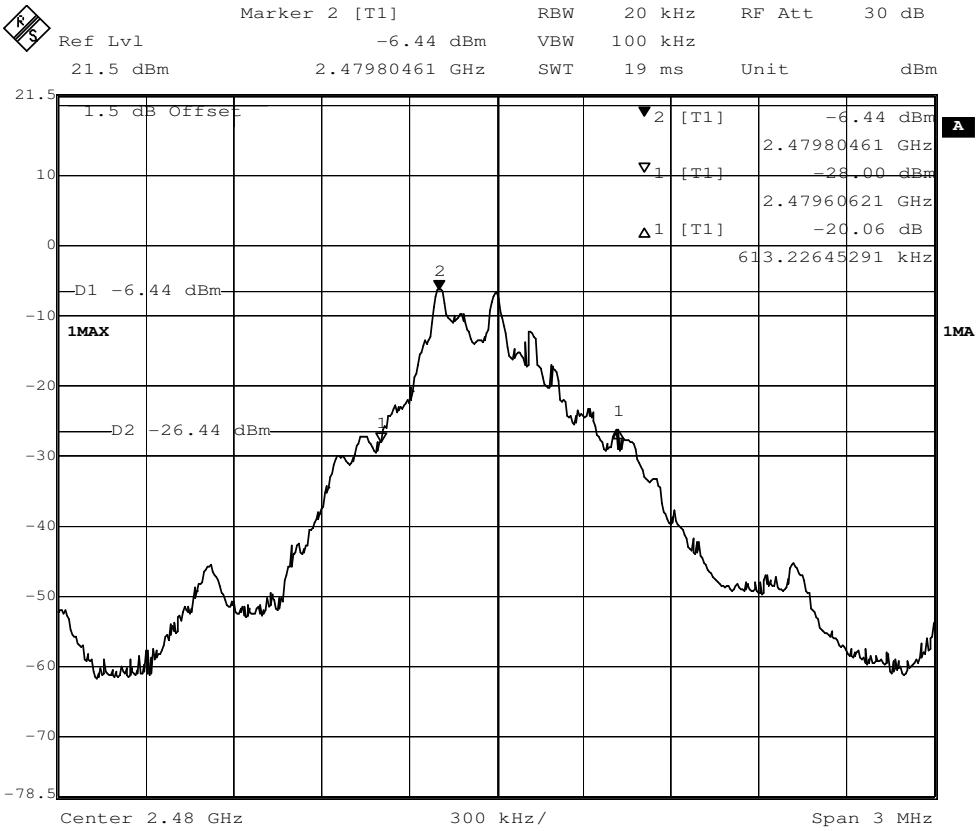
**3.Test in the highest frequency 2.480 GHz**




**The results: The unit does meet the FCC requirements.**

**--End of the report--**

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