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FEDERAL COMMUNICATIONS COMMISSION
Registration number: 282399

Report No.: GZEM110800309301
Page: 1 of 27
FCC ID: ZYUVITALITY123

TEST REPORT

| | |
|----------------------|---|
| Application No.: | GZEM1108003093RF |
| Applicant: | SHANTOU CITY VITALITY TOYS CO., LTD |
| FCC ID: | ZYUVITALITY123 |
| Product Name: | HELICOPTER SERIES |
| Product Description: | Radio control toys with 2.4 GHz as carrier |
| Model No.: | JJ-H21, JJ-H11, JJ-H13, JJ-H15, JJ-H16, JJ-H20, JJ-H22, JJ-H23, JJ-H25, JJ-H26, JJ-H24, JJ-H27, JJ-H28, JJ-H29, JJ-H30, JJ-H31, JJ-H32, JJ-H33, JJ-H34, JJ-H35, JJ-H36, JJ-H37, JJ-H38, JJ-H39, JJ-H40, JJ-H41, JJ-H42, JJ-H43, JJ-H44, JJ-H45, JJ-H46, JJ-H47, JJ-H48, JJ-H49, JJ-H50, JJ-H11L, JJ-H13L, JJ-H15L, JJ-H16L, JJ-H20L, JJ-H21L, JJ-H22L, JJ-H23L, JJ-H24L, JJ-H25L, JJ-H26L, JJ-H27L, JJ-H28L, JJ-H29L, JJ-H30L, JJ-H31L, JJ-H32L, JJ-H33L, JJ-H34L, JJ-H35L, JJ-H36L, JJ-H37L, JJ-H38L, JJ-H39L, JJ-H40L, JJ-H41L, JJ-H42L, JJ-H43L, JJ-H44L, JJ-H45L, JJ-H46L, JJ-H47L, JJ-H48L, JJ-H49L, JJ-H50L, JJ-C001, JJ-C002, JJ-C003, JJ-C004, JJ-C005. ♣ |
| ♣ | Please refer to section 3 of this report for details |
| Standards: | FCC PART 15 Subpart C: 2010 section 15.249 |
| Date of Receipt: | 2011-08-30 |
| Date of Test: | 2011-09-01 to 2011-09-09 |
| Date of Issue: | 2011-09-16 |
| Test Result : | Pass* |

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


2011 Sep.

Strong Yao
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.


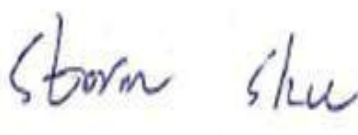

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

| Revision Record | | | | |
|-----------------|---------|------------|----------|----------|
| Version | Chapter | Date | Modifier | Remark |
| 00 | | 2011-09-16 | | Original |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| | | | | |
|--------------------------|--|---|--|----------------------------------|
| Authorized for issue by: | | | | |
| Tested By | |  (Storm Shu) / Project Engineer | | 2011-09-01 to 2011-09-09 Date |
| Prepared By | |  (Storm Shu) / Project Engineer | | 2011-09-09 Date |
| Checked By | |  Strong Yao/ Reviewer | | 2011-09-16 Date |



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, 6.6 and 6.7 | PASS |
| Occupied Bandwidth | FCC PART 15 C section 15.215(c) | ANSI C63.10: Clause 6.9 | PASS |
| Band Edges | FCC PART 15 C section 15.249 (d) | ANSI C63.10: Clause 6.9 | 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.

♣ Model No.: JJ-H21, JJ-H11, JJ-H13, JJ-H15, JJ-H16, JJ-H20, JJ-H22, JJ-H23, JJ-H25, JJ-H26, JJ-H24, JJ-H27, JJ-H28, JJ-H29, JJ-H30, JJ-H31, JJ-H32, JJ-H33, JJ-H34, JJ-H35, JJ-H36, JJ-H37, JJ-H38, JJ-H39, JJ-H40, JJ-H41, JJ-H42, JJ-H43, JJ-H44, JJ-H45, JJ-H46, JJ-H47, JJ-H48, JJ-H49, JJ-H50, JJ-H11L, JJ-H13L, JJ-H15L, JJ-H16L, JJ-H20L, JJ-H21L, JJ-H22L, JJ-H23L, JJ-H24L, JJ-H25L, JJ-H26L, JJ-H27L, JJ-H28L, JJ-H29L, JJ-H30L, JJ-H31L, JJ-H32L, JJ-H33L, JJ-H34L, JJ-H35L, JJ-H36L, JJ-H37L, JJ-H38L, JJ-H39L, JJ-H40L, JJ-H41L, JJ-H42L, JJ-H43L, JJ-H44L, JJ-H45L, JJ-H46L, JJ-H47L, JJ-H48L, JJ-H49L, JJ-H50L, JJ-C001, JJ-C002, JJ-C003, JJ-C004, JJ-C005.

According to the confirmation from the applicant, since the electrical circuit design, layout, components used and internal wiring were identical for the above items, only difference being the item numbers.

Therefore only one item **JJ-H21** was tested in this report.



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5 General Information

5.1 Client Information

Applicant: SHANTOU CITY VITALITY TOYS CO., LTD
Address of Applicant: No.22 Fengxiang Rd., Chenghai, Shantou City, Guangdong China

5.2 General Description of E.U.T.

Product Name: HELICOPTER SERIES
Model No.: JJ-H21, JJ-H11, JJ-H13, JJ-H15, JJ-H16, JJ-H20, JJ-H22, JJ-H23, JJ-H25, JJ-H26, JJ-H24, JJ-H27, JJ-H28, JJ-H29, JJ-H30, JJ-H31, JJ-H32, JJ-H33, JJ-H34, JJ-H35, JJ-H36, JJ-H37, JJ-H38, JJ-H39, JJ-H40, JJ-H41, JJ-H42, JJ-H43, JJ-H44, JJ-H45, JJ-H46, JJ-H47, JJ-H48, JJ-H49, JJ-H50, JJ-H11L, JJ-H13L, JJ-H15L, JJ-H16L, JJ-H20L, JJ-H21L, JJ-H22L, JJ-H23L, JJ-H24L, JJ-H25L, JJ-H26L, JJ-H27L, JJ-H28L, JJ-H29L, JJ-H30L, JJ-H31L, JJ-H32L, JJ-H33L, JJ-H34L, JJ-H35L, JJ-H36L, JJ-H37L, JJ-H38L, JJ-H39L, JJ-H40L, JJ-H41L, JJ-H42L, JJ-H43L, JJ-H44L, JJ-H45L, JJ-H46L, JJ-H47L, JJ-H48L, JJ-H49L, JJ-H50L, JJ-C001, JJ-C002, JJ-C003, JJ-C004, JJ-C005.

5.3 Details of E.U.T.

Operating Frequency: 2402MHz, 2442MHz, 2482MHz
Type of Modulation: GFSK
Number of Channels: 3
Antenna Type: Integral antenna
Antenna gain: 0 dBi
Function: The EUT was a set of equipment:
The EUT have three channels, and the Tx generate carrier 2402MHz, 2442MHz, and 2482MHz to control helicopter.
Power Supply: DC 6.0V (1.5V size "AA" batteries x 4)
Power cord: N/A

5.4 Description of Support Units

The EUT has been tested 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.



5.7 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



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 recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

- **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 and C-2584)**

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 and C-2584 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 01:2006-10 and Rules of procedure IECEE 02:2006-10, and the relevant IECEE CB-Scheme Operational documents.



6 Equipment Used during Test

| RE in Chamber | | | | | | |
|---------------|---|-----------------------------|------------|------------|--------------|----------------------|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal.Due date | Calibration Interval |
| | | | | | (YYYY-MM-DD) | |
| EMC0525 | Compact Semi-Anechoic Chamber | ChangZhou ZhongYu | N/A | N/A | 2012-09-06 | 2Y |
| EMC0522 | EMI Test Receiver | Rohde & Schwarz | ESIB26 | 100283 | 2012-01-17 | 1Y |
| EMC0056 | EMI Test Receiver | Rohde & Schwarz | ESCI | 10036 | 2012-06-01 | 1Y |
| EMC0514 | Coaxial cable | SGS | N/A | N/A | 2011-12-08 | 1Y |
| EMC2025 | Trilog Broadband Antenna 30-3000MHz | SCHWARZBECK MESS-ELEKTRONIK | VULB 9163 | 9163-450 | 2011-10-28 | 1Y |
| EMC0524 | Bi-log Type Antenna | Schaffner -Chase | CBL6112B | 2966 | 2011-12-20 | 1Y |
| EMC0519 | Bilog Type Antenna | Schaffner -Chase | CBL6143 | 5070 | 2011-12-20 | 1Y |
| EMC2026 | Horn Antenna 1-18GHz | R&S | BBHA 9120D | 9120D-841 | 2011-10-28 | 1Y |
| EMC0518 | Horn Antenna | Rohde & Schwarz | HF906 | 100096 | 2012-08-29 | 1Y |
| EMC0521 | 1-26.5 GHz Pre-Amplifier | Agilent | 8449B | 3008A01649 | 2012-01-17 | 1Y |
| EMC0049 | Amplifier | Agilent | 8447D | 2944A10862 | 2012-04-21 | 1Y |
| EMC0075 | 310N Amplifier | Sonoma | 310N | 272683 | 2011-10-25 | 1Y |
| EMC0523 | Active Loop Antenna | EMCO | 6502 | 42963 | 2011-11-17 | 1Y |
| EMC2041 | Broad-Band Horn Antenna(14)15-26.5(40)GHz | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9170 | 9170-375 | 2012-06-01 | 1Y |
| EMC0530 | 10m Semi-Anechoic Chamber | ETS | N/A | N/A | 2012-05-10 | 2Y |

| General used equipment | | | | | | |
|------------------------|----------------|--------------|-----------|------------|--------------|----------------------|
| No. | Test Equipment | Manufacturer | Model No. | Serial No. | Cal.Due date | Calibration Interval |
| | | | | | (YYYY-MM-DD) | |
| EMC0006 | DMM | Fluke | 73 | 70681569 | 2011-12-16 | 1Y |
| EMC0007 | DMM | Fluke | 73 | 70671122 | 2011-12-16 | 1Y |



7 Test Results

7.1 E.U.T. Operation

Power supply: DC 6.0V
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 |



EUT channels and frequencies list:

| Channel | Frequency (MHz) |
|---------|-----------------|
| 0 | 2402 |
| 1 | 2442 |
| 2 | 2482 |

Test frequencies are the lowest channel: 0 channel(2402 MHz), middle channel: 1 channel(2442 MHz) and highest channel: 2 channel(2482 MHz)



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 integral antenna and no consideration of replacement. The best case gain of the antenna is 0 dBi.

Test result: The unit does meet the FCC requirements.



7.3 Field Strength of Fundamental& Field Strength of Unwanted Emissions

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 2402MHz ~ 2482MHz.

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, 6.6 and 6.7

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 30 MHz – 25 GHz for transmitting mode.
Test instrumentation resolution bandwidth
120 kHz (30 MHz - 1000 MHz), 1 MHz (1000 MHz – 26 GHz)

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:

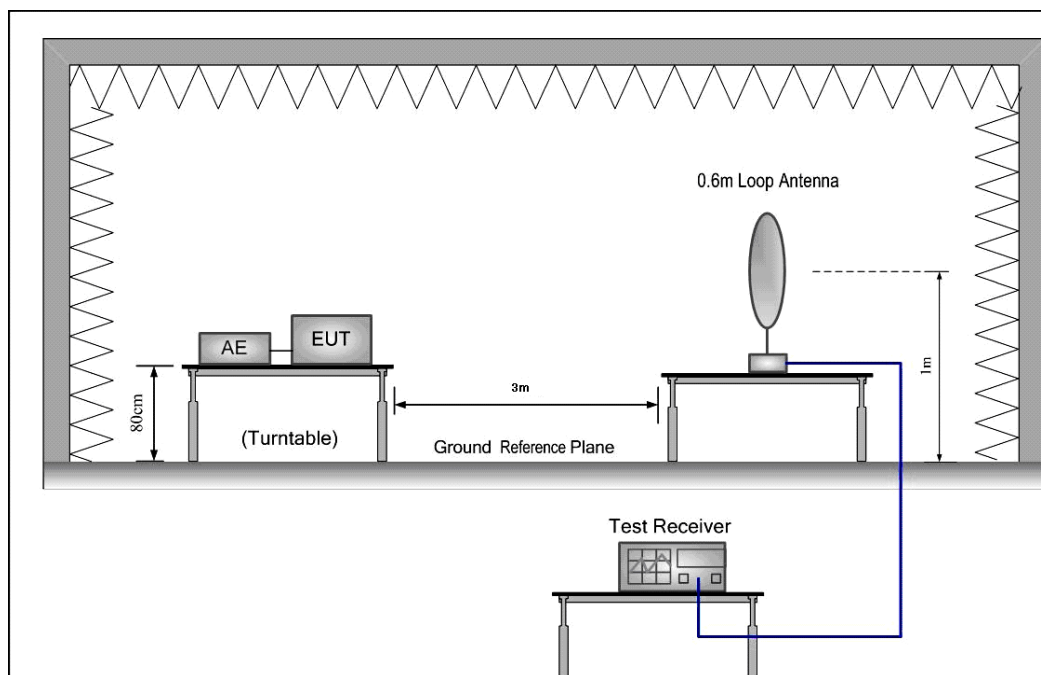
For testing performed with the bi-log type antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna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

3) 1 GHz to 25 GHz emissions:

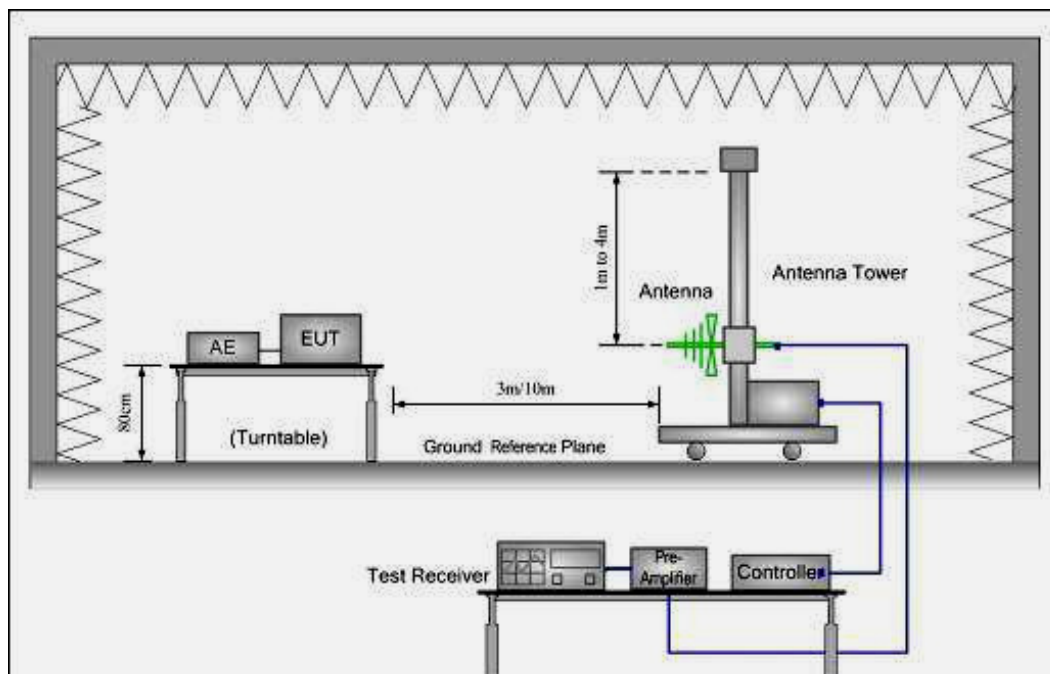
For testing performed with the horn antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360°, the antenna height scan between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

Test Configuration:

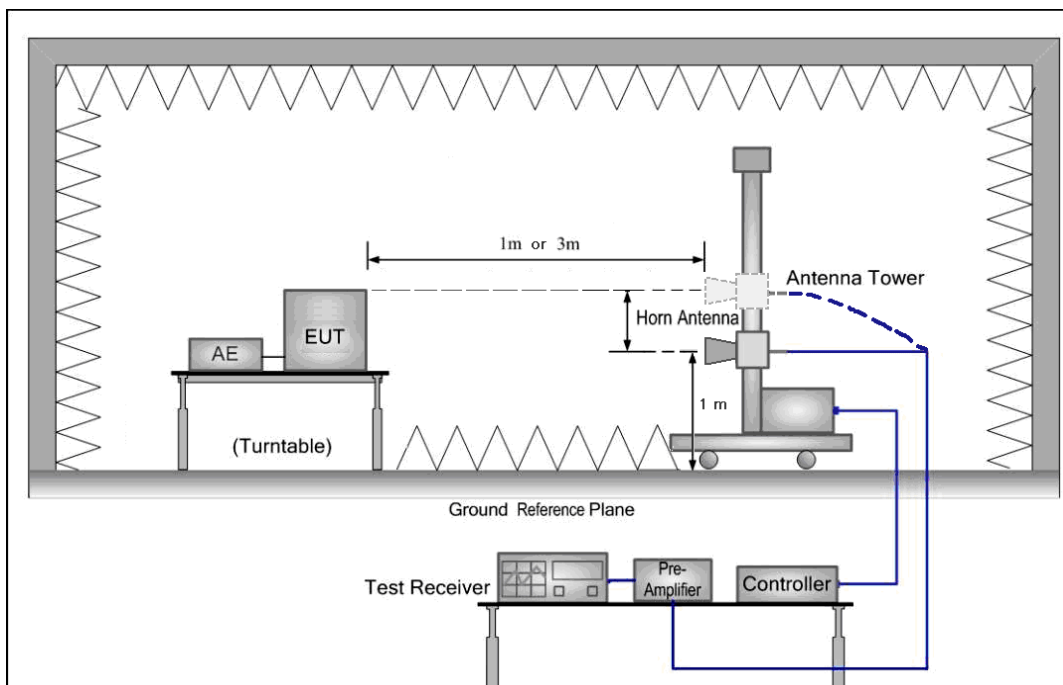
1) 9 kHz to 30 MHz emissions:



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 & Pre-amplifier. The basic equation with a sample calculation is as follows:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Preamplifier Factor}$$



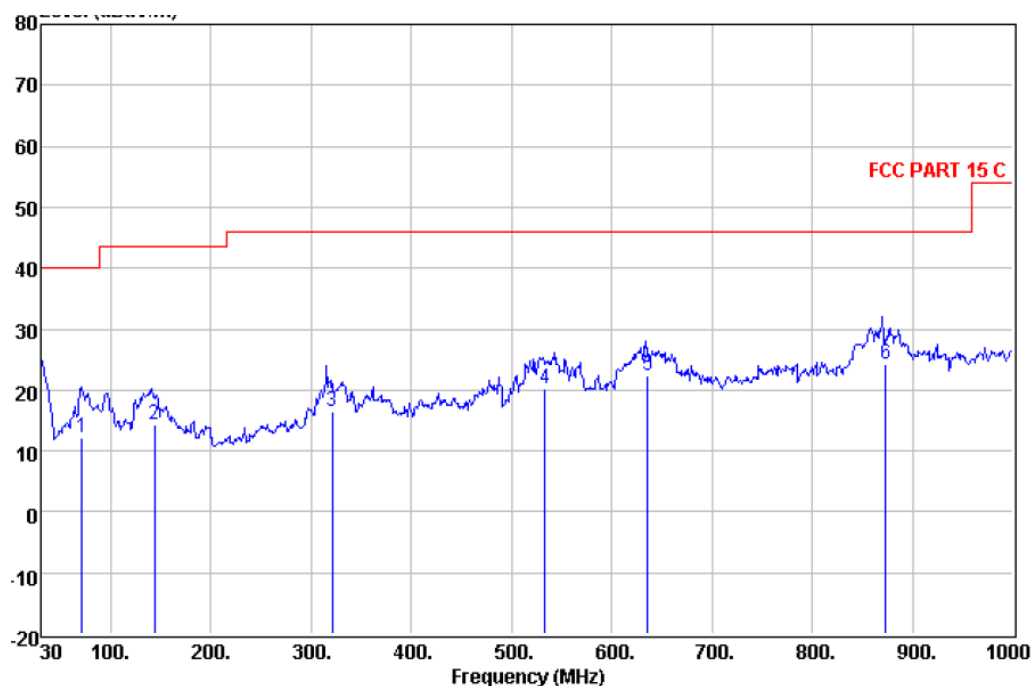
Test at low Channel in transmitting status

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

Vertical:

Peak scan

Level (dB μ V/m)



Quasi-peak measurement

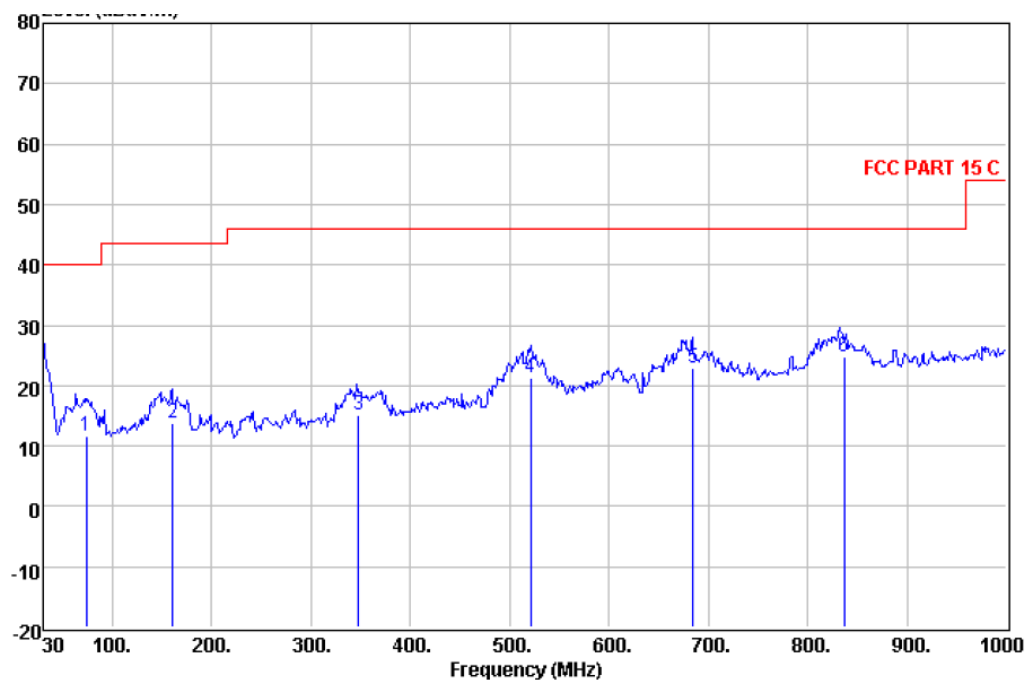
| Freq | ReadAntenna | Cable | Preamp | Over | Limit | | |
|---------|-------------|--------|--------|--------|--------------|--------|--------------|
| MHz | Level | Factor | Loss | Factor | Level | Limit | Line Remark |
| | dB μ V | dB/m | dB | dB | dB μ V/m | dB | dB μ V/m |
| 70.874 | 34.54 | 4.69 | 0.81 | 27.79 | 12.25 | -27.75 | 40.00 QP |
| 143.320 | 30.06 | 10.41 | 1.18 | 27.45 | 14.20 | -29.30 | 43.50 QP |
| 321.250 | 28.34 | 13.52 | 1.87 | 27.24 | 16.49 | -29.51 | 46.00 QP |
| 532.960 | 27.82 | 18.02 | 2.47 | 28.16 | 20.15 | -25.85 | 46.00 QP |
| 635.520 | 28.98 | 18.80 | 2.67 | 28.19 | 22.26 | -23.74 | 46.00 QP |
| 873.320 | 27.20 | 20.73 | 3.39 | 26.97 | 24.35 | -21.65 | 46.00 QP |



Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

| Freq | ReadAntenna | Cable | Preamp | Over | Limit | Limit | Remark |
|---------|-------------|--------|--------|--------|--------|--------|----------|
| MHz | Level | Factor | Loss | Factor | Level | Limit | Line |
| | dBuV | dB/m | dB | dB | dBuV/m | dB | dBuV/m |
| 73.250 | 33.70 | 5.01 | 0.84 | 27.78 | 11.77 | -28.23 | 40.00 QP |
| 160.960 | 31.05 | 8.90 | 1.23 | 27.38 | 13.80 | -29.70 | 43.50 QP |
| 348.020 | 26.43 | 14.29 | 1.95 | 27.43 | 15.24 | -30.76 | 46.00 QP |
| 521.440 | 29.56 | 17.50 | 2.45 | 28.12 | 21.39 | -24.61 | 46.00 QP |
| 685.023 | 29.50 | 18.65 | 2.77 | 27.95 | 22.97 | -23.03 | 46.00 QP |
| 836.520 | 28.42 | 20.47 | 3.25 | 27.30 | 24.84 | -21.16 | 46.00 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) | Preamplifier factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
|-----------------|------------------------|-----------------|--------------------------|----------------------|-------------------------|----------------|----------------------|
| 2402.000 | 27.58 | 5.00 | 35.04 | 84.22 | 81.77 | 114.00 | V |
| 3358.000 | 28.42 | 6.38 | 34.55 | 47.52 | 47.76 | 74.00 | V |
| 4204.000 | 30.20 | 7.30 | 34.30 | 47.08 | 50.52 | 74.00 | V |
| 4780.000 | 31.48 | 7.60 | 34.30 | 46.86 | 51.86 | 74.00 | V |
| 2402.000 | 27.58 | 5.00 | 35.04 | 86.23 | 83.78 | 114.00 | H |
| 3205.000 | 28.68 | 5.90 | 34.62 | 46.65 | 46.61 | 74.00 | H |
| 4231.000 | 30.25 | 7.23 | 34.30 | 46.41 | 49.59 | 74.00 | H |
| 5185.000 | 31.94 | 7.83 | 34.30 | 46.99 | 52.45 | 74.00 | H |

Average Measurement:

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamplifier factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
|-----------------|------------------------|-----------------|--------------------------|----------------------|-------------------------|----------------|----------------------|
| 2402.000 | 27.58 | 5.00 | 35.04 | 82.55 | 80.09 | 94.00 | V |
| 3358.000 | 28.42 | 6.38 | 34.55 | 35.77 | 36.01 | 54.00 | V |
| 4204.000 | 30.20 | 7.30 | 34.30 | 34.68 | 37.88 | 54.00 | V |
| 4780.000 | 31.48 | 7.60 | 34.30 | 34.20 | 38.98 | 54.00 | V |
| 2402.000 | 27.58 | 5.00 | 35.04 | 85.12 | 82.66 | 94.00 | H |
| 3205.000 | 28.68 | 5.90 | 34.62 | 34.22 | 34.18 | 54.00 | H |
| 4231.000 | 30.25 | 7.23 | 34.30 | 32.53 | 35.71 | 54.00 | H |
| 5185.000 | 31.94 | 7.83 | 34.30 | 34.15 | 39.63 | 54.00 | H |



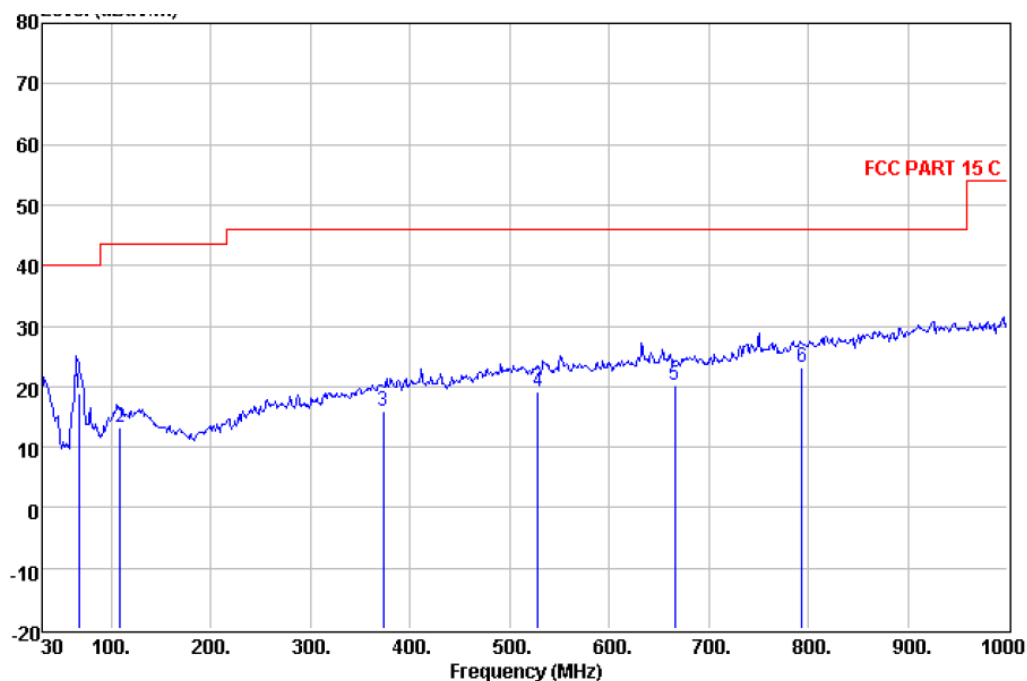
Test at middle Channel in transmitting status

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

Vertical:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

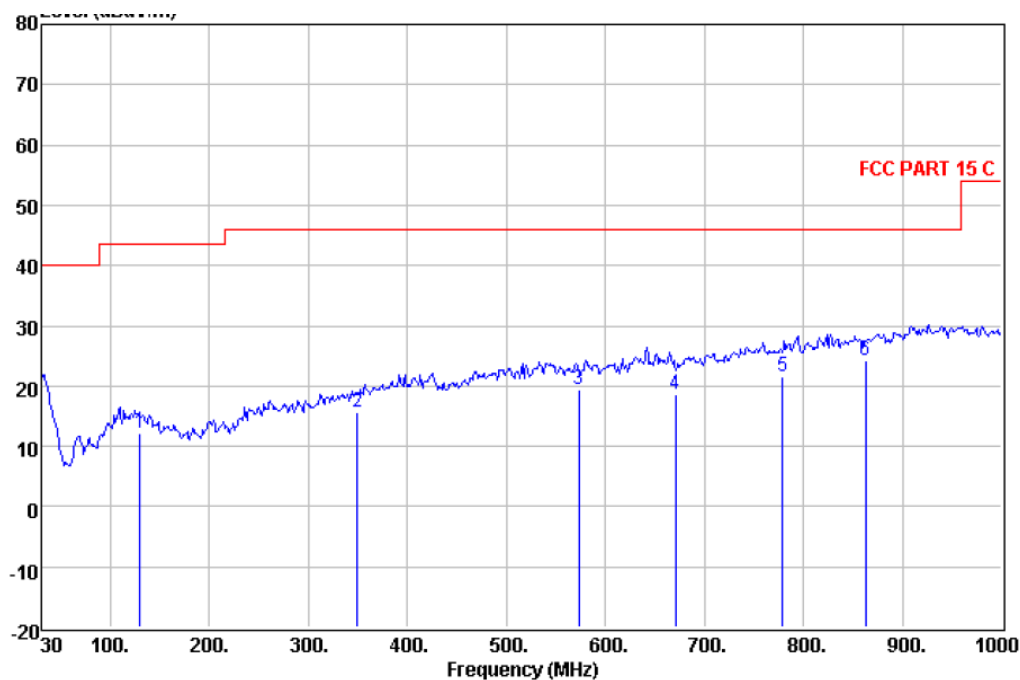
| Freq | ReadAntenna | Cable | Preamp | | Over | Limit | |
|---------|-------------|--------|--------|--------|--------|--------|-------------|
| MHz | Level | Factor | Loss | Factor | Level | Limit | Line Remark |
| | dBuV | dB/m | dB | dB | dBuV/m | dB | dBuV/m |
| 66.860 | 41.46 | 4.54 | 0.77 | 27.80 | 18.97 | -21.03 | 40.00 QP |
| 108.570 | 28.07 | 11.81 | 1.04 | 27.63 | 13.29 | -30.21 | 43.50 QP |
| 373.380 | 26.25 | 15.31 | 2.02 | 27.60 | 15.98 | -30.02 | 46.00 QP |
| 528.580 | 27.11 | 17.82 | 2.46 | 28.14 | 19.25 | -26.75 | 46.00 QP |
| 666.320 | 27.18 | 18.45 | 2.73 | 28.04 | 20.32 | -25.68 | 46.00 QP |
| 793.390 | 27.70 | 19.97 | 3.07 | 27.64 | 23.10 | -22.90 | 46.00 QP |



Horizontal:

Peak scan

Level (dB μ V/m)



Quasi-peak measurement

| Freq | ReadAntenna | Cable | Preamp | Over | Limit | Limit | Remark |
|---------|-------------|--------|--------|--------|--------------|--------|----------|
| MHz | Level | Factor | Loss | Factor | Level | Limit | Line |
| | dB μ V | | dB | | dB μ V/m | dB | |
| 129.910 | 26.65 | 12.00 | 1.13 | 27.51 | 12.27 | -31.23 | 43.50 QP |
| 349.130 | 26.77 | 14.34 | 1.95 | 27.44 | 15.62 | -30.38 | 46.00 QP |
| 573.200 | 26.84 | 18.42 | 2.55 | 28.30 | 19.51 | -26.49 | 46.00 QP |
| 671.170 | 25.70 | 18.30 | 2.74 | 28.02 | 18.72 | -27.28 | 46.00 QP |
| 778.840 | 26.36 | 19.80 | 3.03 | 27.68 | 21.51 | -24.49 | 46.00 QP |
| 863.230 | 27.47 | 20.57 | 3.36 | 27.06 | 24.34 | -21.66 | 46.00 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 |
|-----------------|------------------------|-----------------|--------------------|----------------------|-------------------------|----------------|----------------------|
| 2442.000 | 27.57 | 5.00 | 35.01 | 86.91 | 84.47 | 114.00 | V |
| 3871.000 | 29.67 | 7.00 | 34.35 | 47.00 | 49.32 | 74.00 | V |
| 4807.000 | 31.53 | 7.65 | 34.30 | 46.95 | 51.83 | 74.00 | V |
| 5563.000 | 32.07 | 7.95 | 34.30 | 48.67 | 54.39 | 74.00 | V |
| 2442.000 | 27.57 | 5.00 | 35.01 | 91.03 | 88.58 | 114.00 | H |
| 3421.000 | 28.61 | 6.48 | 34.52 | 48.22 | 48.78 | 74.00 | H |
| 4384.000 | 30.51 | 7.10 | 34.30 | 47.04 | 50.35 | 74.00 | H |
| 5140.000 | 32.04 | 7.77 | 34.30 | 48.33 | 53.83 | 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 |
|-----------------|------------------------|-----------------|--------------------|----------------------|-------------------------|----------------|----------------------|
| 2442.000 | 27.57 | 5.00 | 35.01 | 85.91 | 83.47 | 94.00 | V |
| 3871.000 | 29.67 | 7.00 | 34.35 | 33.19 | 35.51 | 54.00 | V |
| 4807.000 | 31.53 | 7.65 | 34.30 | 33.39 | 38.27 | 54.00 | V |
| 5563.000 | 32.07 | 7.95 | 34.30 | 34.45 | 40.17 | 54.00 | V |
| 2442.000 | 27.57 | 5.00 | 35.01 | 90.03 | 87.58 | 94.00 | H |
| 3421.000 | 28.61 | 6.48 | 34.52 | 34.76 | 35.33 | 54.00 | H |
| 4384.000 | 30.51 | 7.10 | 34.30 | 32.33 | 35.64 | 54.00 | H |
| 5140.000 | 32.04 | 7.77 | 34.30 | 34.88 | 40.39 | 54.00 | H |



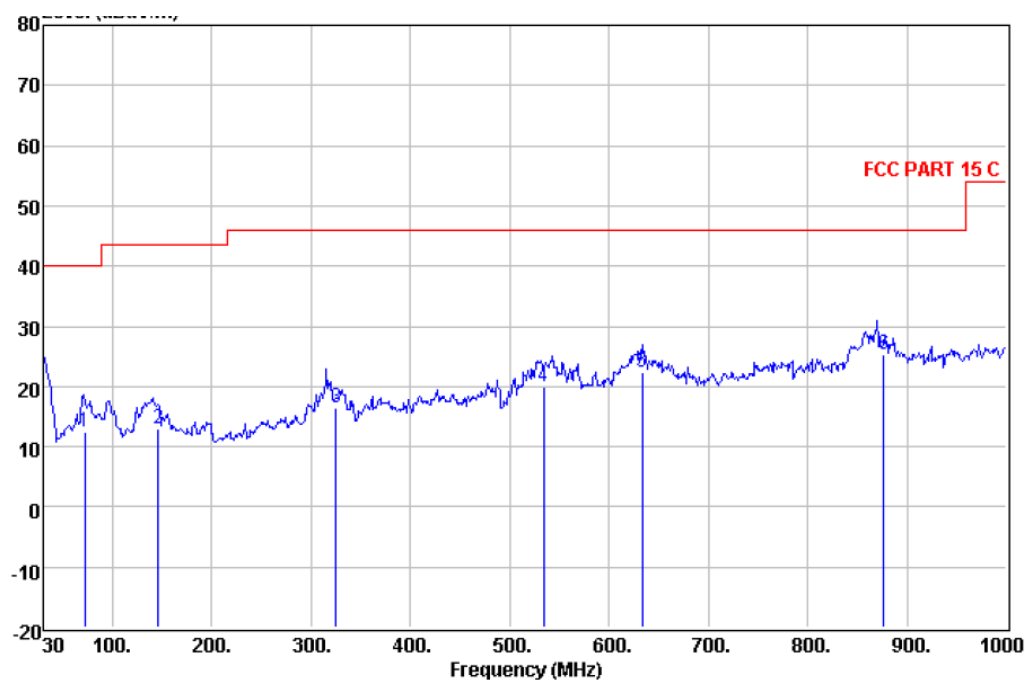
Test at high Channel in transmitting status

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

Vertical:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

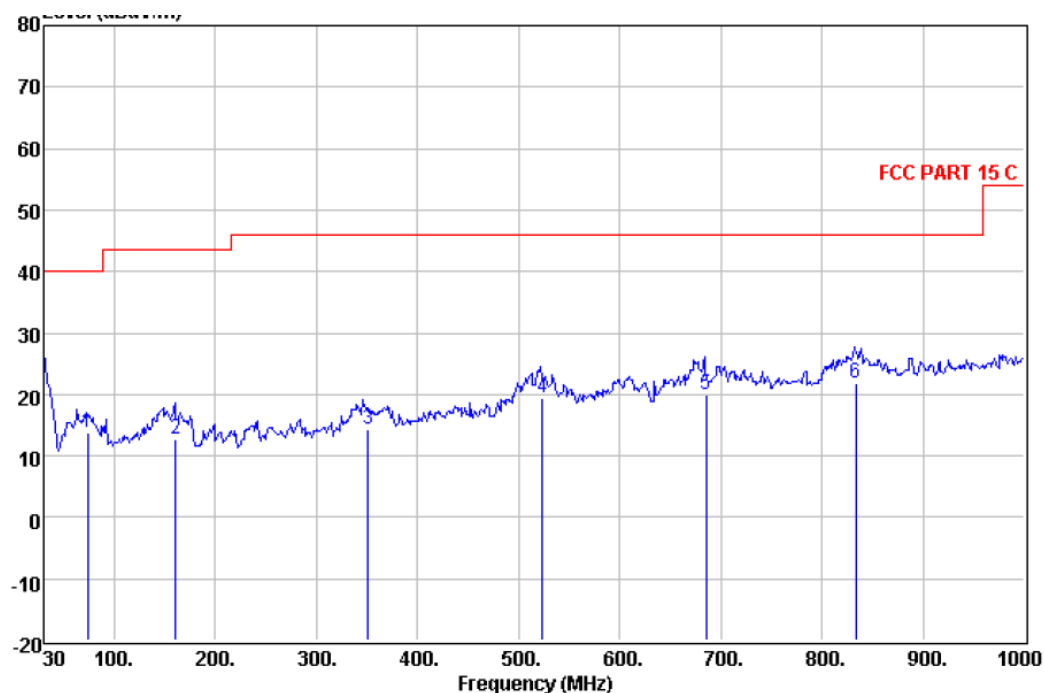
| Freq | ReadAntenna | Cable | Preamp | Over | Limit | Line | Remark |
|---------|-------------|--------|--------|--------|--------|--------|----------|
| MHz | Level | Factor | Loss | Factor | Level | Limit | |
| | dBuV | dB/m | dB | dB | dBuV/m | dB | dBuV/m |
| 71.690 | 34.52 | 4.79 | 0.82 | 27.78 | 12.35 | -27.65 | 40.00 QP |
| 145.700 | 29.18 | 10.06 | 1.18 | 27.44 | 12.98 | -30.52 | 43.50 QP |
| 325.201 | 28.35 | 13.61 | 1.88 | 27.27 | 16.57 | -29.43 | 46.00 QP |
| 533.750 | 27.72 | 18.02 | 2.47 | 28.17 | 20.04 | -25.96 | 46.00 QP |
| 633.520 | 29.00 | 18.80 | 2.66 | 28.20 | 22.26 | -23.74 | 46.00 QP |
| 876.970 | 28.19 | 20.77 | 3.41 | 26.94 | 25.43 | -20.57 | 46.00 QP |



Horizontal:

Peak scan

Level (dB μ V/m)



Quasi-peak measurement

| Freq | ReadAntenna | Cable | Preamp | Over | Limit | | |
|------------|-------------|-------|--------|--------------|-------|--------------|----------|
| Level | Factor | Loss | Factor | Level | Limit | Line | Remark |
| dB μ V | dB/m | dB | dB | dB μ V/m | dB | dB μ V/m | |
| MHz | | | | | | | |
| 73.360 | 35.70 | 5.01 | 0.84 | 27.78 | 13.77 | -26.23 | 40.00 QP |
| 160.920 | 30.06 | 8.90 | 1.22 | 27.38 | 12.80 | -30.70 | 43.50 QP |
| 350.740 | 25.44 | 14.40 | 1.95 | 27.45 | 14.34 | -31.66 | 46.00 QP |
| 523.300 | 27.44 | 17.58 | 2.45 | 28.12 | 19.35 | -26.65 | 46.00 QP |
| 685.201 | 26.50 | 18.65 | 2.77 | 27.95 | 19.97 | -26.03 | 46.00 QP |
| 833.690 | 25.43 | 20.53 | 3.22 | 27.30 | 21.88 | -24.12 | 46.00 QP |

**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 |
|-----------------|------------------------|-----------------|--------------------|----------------------|-------------------------|----------------|----------------------|
| 2482.005 | 27.55 | 4.90 | 34.99 | 75.51 | 72.97 | 114.00 | V |
| 3169.000 | 28.71 | 5.86 | 34.63 | 48.32 | 48.25 | 74.00 | V |
| 3853.000 | 29.65 | 6.90 | 34.35 | 46.73 | 48.93 | 74.00 | V |
| 4501.000 | 30.72 | 7.20 | 34.30 | 47.72 | 51.34 | 74.00 | V |
| 2482.005 | 27.55 | 4.90 | 34.99 | 76.99 | 74.46 | 114.00 | H |
| 3142.000 | 28.70 | 5.84 | 34.65 | 50.04 | 49.94 | 74.00 | H |
| 3934.000 | 29.79 | 7.08 | 34.32 | 49.89 | 52.43 | 74.00 | H |
| 5383.000 | 31.84 | 8.03 | 34.30 | 50.80 | 56.37 | 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 |
|-----------------|------------------------|-----------------|--------------------|----------------------|-------------------------|----------------|----------------------|
| 2482.005 | 27.55 | 4.90 | 34.99 | 74.53 | 71.99 | 94.00 | V |
| 3169.000 | 28.71 | 5.86 | 34.63 | 35.67 | 35.61 | 54.00 | V |
| 3853.000 | 29.65 | 6.90 | 34.35 | 33.12 | 35.31 | 54.00 | V |
| 4501.000 | 30.72 | 7.20 | 34.30 | 35.72 | 39.34 | 54.00 | V |
| 2482.005 | 27.55 | 4.90 | 34.99 | 75.87 | 73.34 | 94.00 | H |
| 3142.000 | 28.70 | 5.84 | 34.65 | 39.04 | 38.94 | 54.00 | H |
| 3934.000 | 29.79 | 7.08 | 34.32 | 37.89 | 40.43 | 54.00 | H |
| 5383.000 | 31.84 | 8.03 | 34.30 | 39.80 | 45.37 | 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.

Test result: The unit does meet the FCC requirements.



7.4 Occupied Bandwidth & Band Edge

Test Requirement: FCC Part 15 C section 15.249

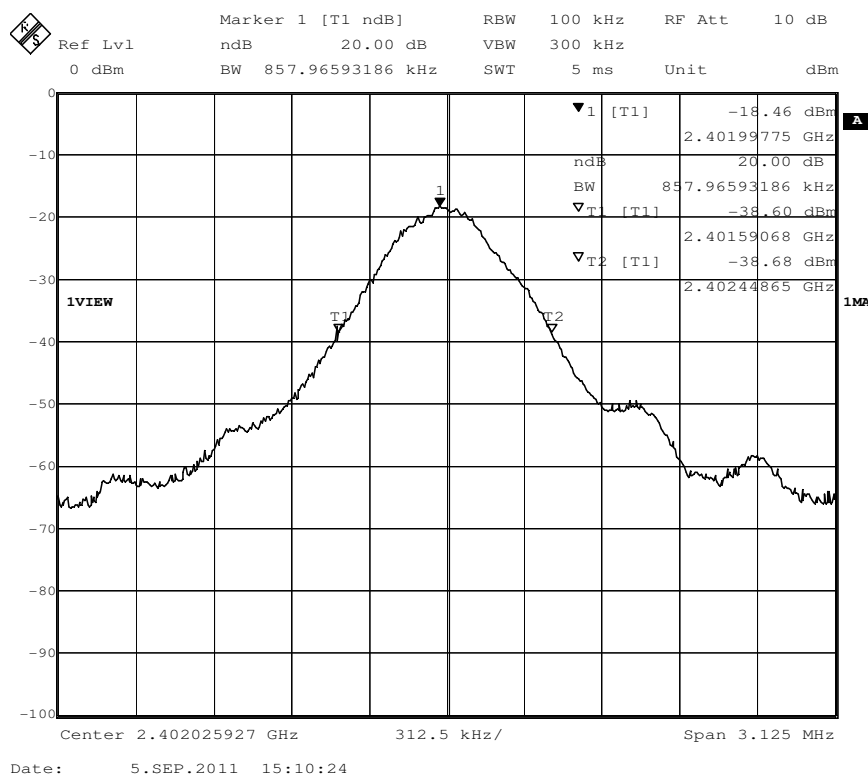
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test Method: ANSI C63.10: Clause 6.9

Operation within the band 2.400 to 2.4835 GHz

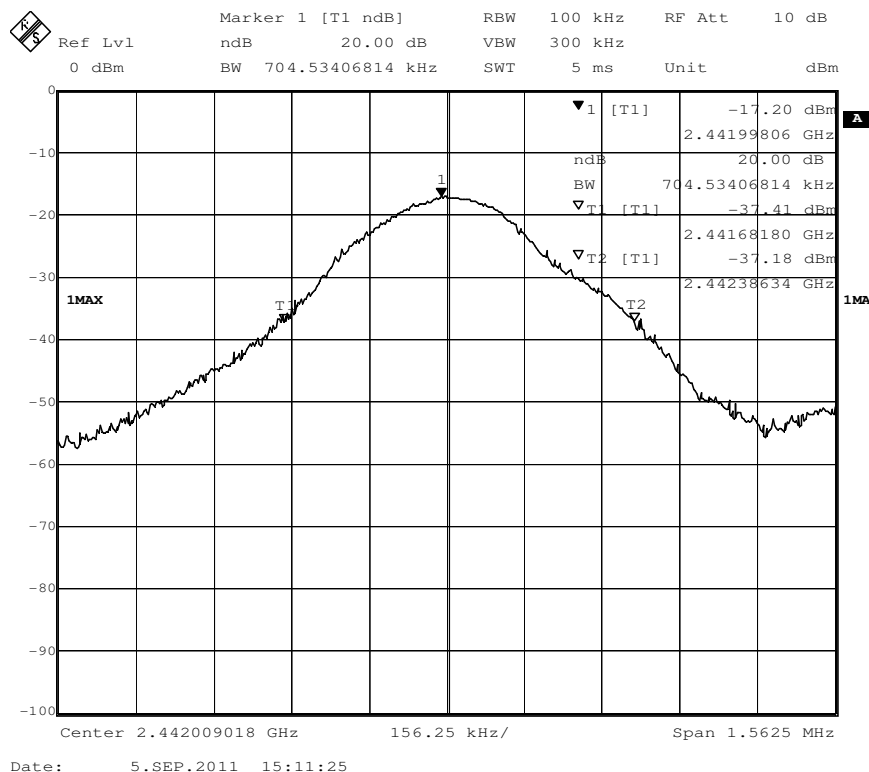
Method of measurement: A small sample of the transmitter output was fed into the Spectrum Analyzer and the attached plot was taken.

1. Test in the lowest frequency 2.402 GHz

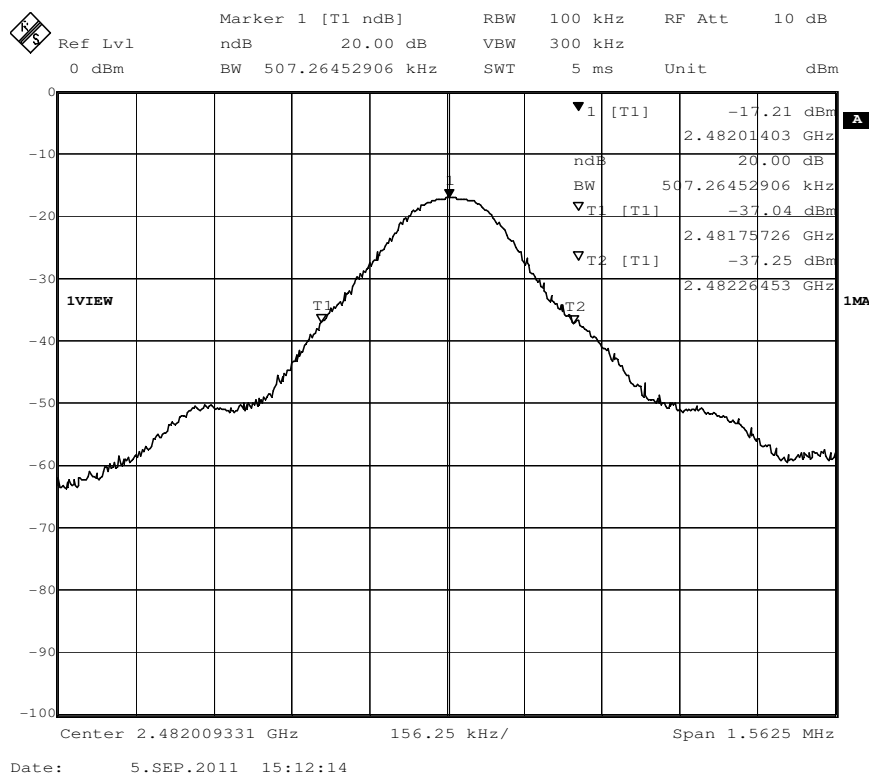




2. Test in the middle frequency 2.442 GHz



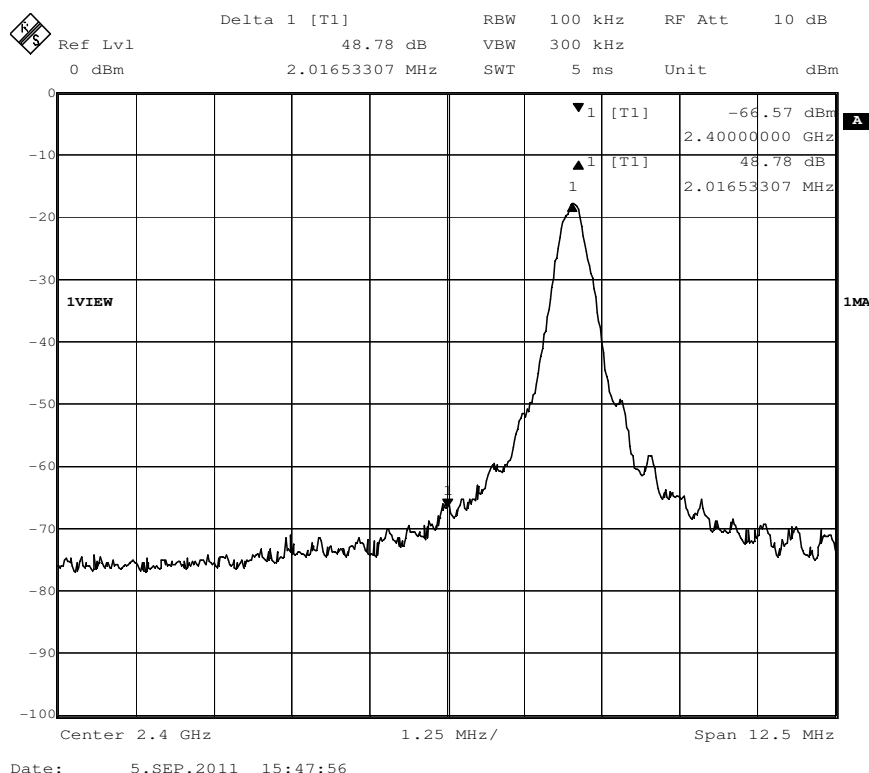
3. Test in the highest frequency 2.482 GHz



The Band Edge Emission as below:

Band Edge 2.4 GHz

Detector mode: Peak



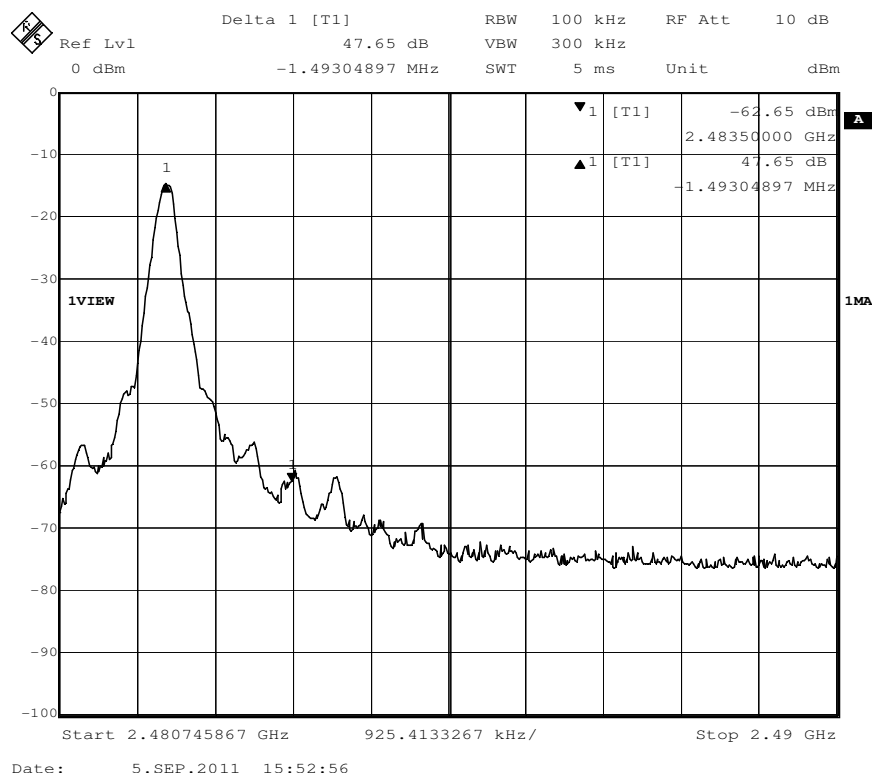
For 2.400 GHz band edge checked with 2.402 GHz frequency operated, the delta shown at the plots are -48.78 dB for peak detector mode

With the peak value 81.77 dB μ V/m and average value at 80.09 dB μ V/m for the fundamental, the spurious emission level at 2.400 GHz were 32.99 dB μ V/m for peak and 31.31 dB μ V/m for average which is below the limit 74.0 dB μ V/m for peak and 54.0 dB μ V/m for average.



Highest Band Edge 2.4835GHz

Detector mode: Peak



For 2.4835 GHz bandage checked with 2.482 GHz frequency operated, the delta shown at the plots are -47.65 dB for peak detector mode.

With the peak value 72.97 dB μ V/m and average value at 71.99 dB μ V/m for the fundamental, the spurious emission level at 2.4835 GHz were 25.32 dB μ V/m for peak and 24.34 dB μ V/m for average. It is below the limit 74.0 dB μ V/m for peak and 54.0 dB μ V/m for average.

The test result for the Emissions radiated outside of the specified frequency bands; please refer to the section 7.2.1 of this report.

The results: The unit does meet the FCC requirements.

End of the report