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

No. 1 Workshop, M-10, Middle section, Science & Technology Park,
Shenzhen, Guangdong, China 518057
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# 1 Cover Page

# *RF TEST REPORT*

| | |
|---|---|
| **Application No.:** | SZEM1709009932CR(SHEM1708005676CR) |
| **Applicant:** | HCS (Suzhou) Limited |
| **FCC ID:** | 2AGOFRC377A |
| **Equipment Under Test (EUT):**<br>**NOTE:** The following sample(s) submitted was/were identified on behalf of the client as | |
| **Product Name:** | Remote control |
| **Model No.(EUT):** | RC3773001/01BR |
| **Standards:** | FCC PART 15 Subpart C: 2016 |
| **Date of Receipt:** | 2017-08-25 |
| **Date of Test:** | 2017-08-25 to 2017-09-18 & 2017-11-02 to 2017-11-07 |
| **Date of Issue:** | 2017-11-10 |
| **Test Result:** | **Pass*** |

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

Jack Zhang
EMC Laboratory 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. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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| Revision | | | | |
|---|---|---|---|---|
| **Version** | **Chapter** | **Date** | **Modifier** | **Remark** |
| 00 | / | 2017-11-10 | / | Original |
| | | | | |
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| | | | | |
|---|---|---|---|---|
| **Authorized for issue by:** | | | | |
| **Engineer** | | Foray Chen | | 2017-11-10 |
| | | **Foray Chen /Project Engineer** | | Date |
| **Reviewer** | | Eric Fu | | 2017-11-10 |
| | | **Eric Fu /Reviewer** | | Date |

# 2 Test Summary

| Test Item | Test Requirement | Test method | Result |
|---|---|---|---|
| Antenna Requirement | FCC Part 15, Subpart C Section 15.203 | --- | PASS |
| Duty Cycle | FCC Part 15, Subpart C Section 15.35(c) | ANSI C63.10 (2013) Section 7.5 | PASS |
| AC Power Line Conducted Emission | FCC Part 15, Subpart C Section 15.207 | ANSI C63.10 (2013) Section 6.2 | N/A |
| Field Strength of the Fundamental Signal | FCC Part 15, Subpart C Section 15.249 (a) | ANSI C63.10 (2013) Section 6.6 | PASS |
| Radiated Spurious Emissions and Band-edge | FCC Part 15, Subpart C Section 15.249 (a) &15.209&15.205 | ANSI C63.10 (2013) Section 6.4&6.5&6.6&6.10 | PASS |
| 20dB Bandwidth | FCC Part 15, Subpart C Section 15.215 (c) | ANSI C63.10 (2013) Section 6.9.2 | PASS |

Remark:

N/A: This EUT is powered by battery only; therefore the test on mains terminals is not applicable.

# 3 Contents

# 4 General Information

## 4.1 Client Information

| | |
|---|---|
| Applicant: | HCS (Suzhou) Limited |
| Address of Applicant: | 19F-20F, Building B-3rd, No.209 Zhuyuan Road, New District, Suzhou, P.R.China. |
| Manufacturer: | HCS (Suzhou) Limited |
| Address of Manufacturer: | 19F-20F, Building B-3rd, No.209 Zhuyuan Road. |
| Factory: | WuJiang Century Billion Electronic Technology Co., Ltd |
| Address of Factory: | No.149, Tuncun West Road, Tongli Town, Wujiang County, Suzhou City, Jiangsu Province, P.R.China |

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

| | |
|---|---|
| Product Description: | Portable product with BT function |
| Power Supply:: | DC 3V by 2* AA.LR6 batteries for transmitter<br>Supply the EUT with fully charged battery during the testing. |

## 4.3 Technical Specifications:

| | |
|---|---|
| Operation Frequency: | 2402MHz~2480MHz |
| Bluetooth Version: | BT 4.0 BLE mode |
| Modulation Technique: | GFSK |
| Number of Channel: | 40 |
| Antenna Type | Dipole Antenna |
| Antenna Gain | -3 dBi |

## 4.4 Description of Support Units

The EUT has been tested independently.

## 4.5 Test Mode

| Test Mode | Description of Test Mode |
|---|---|
| Engineering Mode: | Using test software to control EUT working in continuous transmitting and receiving, and select channel and modulation type |

## 4.6 Test Location

All tests were performed at:

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

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057

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

No tests were sub-contracted.

## 4.7 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 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.: G-823, R-4188, T-1153 and C-2383 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.

**• Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

## 4.8 Measurement Uncertainty

| No. | Parameter | Measurement Uncertainty |
|---|---|---|
| 1 | Radio Frequency | < ±1 x $10^{-5}$ |
| 2 | Total RF power, conducted | < ±1.5 dB |
| 3 | RF power density, conducted | < ±3 dB |
| 4 | Spurious emissions, conducted | < ±3 dB |
| 5 | All emissions, radiated | < ±6 dB (Below 1GHz)<br>< ±6 dB (Above 1GHz) |
| 6 | Temperature | < ±1°C |
| 7 | Humidity | < ±5 % |
| 8 | DC and low frequency voltages | < ±3 % |

# 5 Equipments Used during Test

| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
|---|---|---|---|---|---|
| **Conducted Test** | | | | | |
| Spectrum Analyzer | R&S | FSP-30 | SHEM002-1 | 2017-04-24 | 2018-04-23 |
| Spectrum Analyzer | Agilent | N9020A | SHEM181-1 | 2017-07-03 | 2018-07-02 |
| Power meter | R&S | NRP | SHEM057-1 | 2016-12-29 | 2017-12-28 |
| Power Sensor | R&S | NRP-Z22 | SHEM136-1 | 2017-07-22 | 2018-07-21 |
| Power Sensor | R&S | NRP-Z91 | SHEM057-2 | 2016-12-29 | 2017-12-28 |
| Signal Generator | R&S | SMR40 | SHEM058-1 | 2017-07-03 | 2018-07-02 |
| Signal Generator | Agilent | N5182A | SHEM182-1 | 2017-07-03 | 2018-07-02 |
| Communication Tester | R&S | CMW500 | SHEM183-1 | 2017-07-03 | 2018-07-02 |
| Switcher | Tonscend | JS0806 | SHEM184-1 | / | / |
| Splitter | Anritsu | MA1612A | SHEM185-1 | / | / |
| Coupler | e-meca | 803-S-1 | SHEM186-1 | / | / |
| High-low Temp Cabinet | Suzhou Zhihe | TL-40 | SHEM087-1 | 2017-09-13 | 2018-09-12 |
| AC Power Stabilizer | WOCEN | 6100 | SHEM045-1 | 2017-01-14 | 2018-01-13 |
| DC Power Supply | QJE | QJ30003SII | SHEM046-1 | 2017-01-14 | 2018-01-13 |
| **Radiated Test** | | | | | |
| EMI test receiver | R&S | ESU40 | SHEM051-1 | 2017-09-26 | 2018-09-25 |
| Spectrum Analyzer | R&S | FSP-30 | SHEM002-1 | 2017-04-24 | 2018-04-23 |
| Loop Antenna (9kHz-30MHz) | Schwarzbeck | FMZB1519 | SHEM135-1 | 2017-04-10 | 2018-04-09 |
| Antenna (25MHz-2GHz) | Schwarzbeck | VULB9168 | SHEM048-1 | 2017-02-28 | 2018-02-27 |
| Antenna (25MHz-3GHz) | Schwarzbeck | HL562 | SHEM010-1 | 2017-02-28 | 2018-02-27 |
| Horn Antenna (1-8GHz) | Schwarzbeck | HF906 | SHEM009-1 | 2016-09-24 | 2018-09-23 |
| Horn Antenna (1-18GHz) | Schwarzbeck | BBHA9120D | SHEM050-1 | 2017-01-14 | 2018-01-13 |
| Horn Antenna (14-40GHz) | Schwarzbeck | BBHA 9170 | SHEM049-1 | 2017-02-13 | 2018-01-15 |
| Pre-amplifier (9KHz-2GHz) | CLAVIIO | BDLNA-0001-412010 | SHEM164-1 | 2017-08-22 | 2018-08-21 |
| Pre-amplifier (1-26.5GHz) | CLAVIIO | BDLNA-0118-352810 | SHEM050-2 | 2017-08-22 | 2018-08-21 |
| Band filter | LORCH | 9BRX-875/X150-SR | SHEM156-1 | / | / |
| Band filter | LORCH | 13BRX-1950/X500-SR | SHEM083-2 | / | / |
| Band filter | LORCH | 5BRX-2400/X200-SR | SHEM155-1 | / | / |
| Band filter | LORCH | 5BRX-5500/X1000-SR | SHEM157-2 | / | / |
| High pass Filter | Wainwright | WHK3.0/18G-100SS | SHEM157-1 | / | / |
| High pass Filter | Wainwright | WHKS1700-3SS | SHEM157-3 | / | / |
| Semi/Fully Anechoic | ST | 11*6*6M | SHEM078-2 | 2017-07-22 | 2018-07-21 |
| RE test Cable | / | RE01, RE02, RE06 | / | 2016-12-29 | 2017-12-28 |

# 6 Test Results

## 6.1 E.U.T. test conditions

**Requirements:** 15.31(e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

**Operating Environment:**

| | |
|---|---|
| Temperature: | 20.0 -25.0 °C |
| Humidity: | 35-75 % RH |
| Atmospheric Pressure: | 99.2 -102kPa |

**Test frequencies:** 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:

| Frequency range over which device operates | Number of frequencies | Location in the range of operation |
|---|---|---|
| 1 MHz or less | 1 | Middle |
| 1 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 |

Pursuant to Part 15.31(c) For swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.
Test frequency is the lowest channel: 0 channel (2402MHz), middle channel: 19 channel (2440MHz) and highest channel: 40 channel (2480MHz) with fixed at channel.

## 6.2 Antenna Requirement

**Standard requirement:**

15.203 requirement:

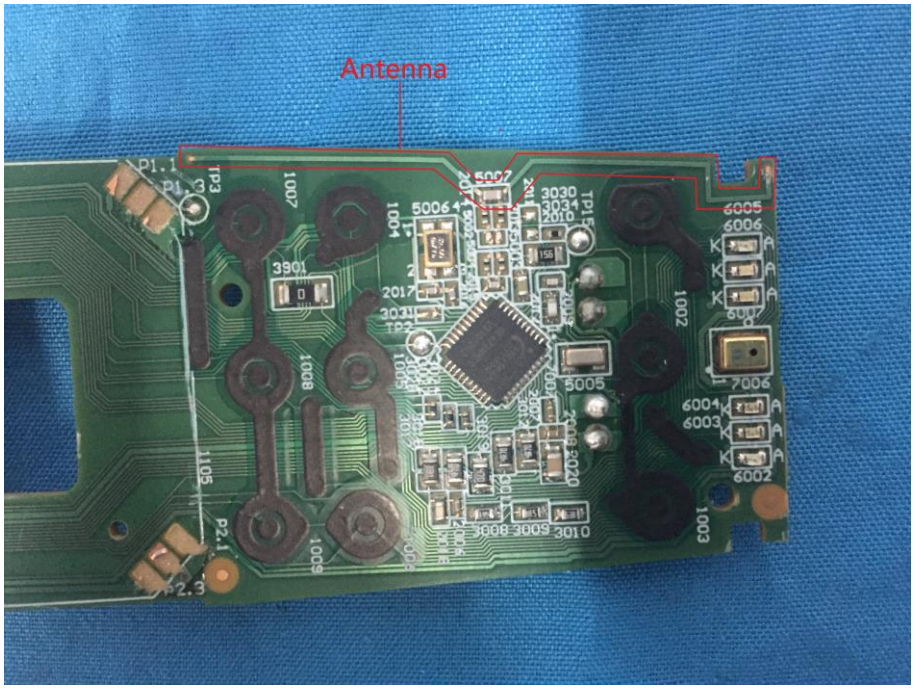
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit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

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**EUT Antenna:**

The antenna is Dipole Antenna. The gain of the antenna is less than -3 dBi.



## 6.3 Conducted Emissions on Mains Terminals

**Frequency Range:** 150 KHz to 30 MHz

**Class/Severity:** Class B

**Limit:**

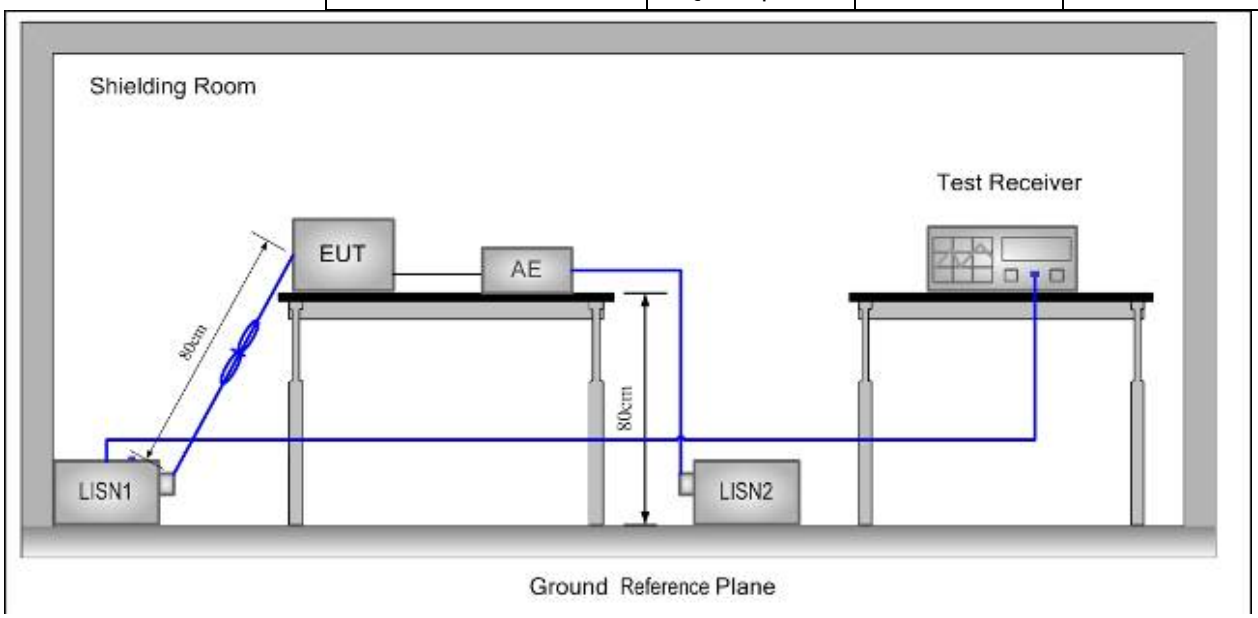
| Frequency range MHz | Class B Limits: dB (μV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

Note2: The lower limit is applicable at the transition frequency.

**Test site/setup:** Test instrumentation set-up:

| Frequency Range | Detector | RBW | VBW |
|---|---|---|---|
| 9KHz to 150Hz | Quasi-peak | 200Hz | 500Hz |
| 150KHz to 30MHz | Quasi-peak | 9kHz | 30kHz |




**Test Procedure:**

1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN, which was bonded to the ground reference plane in the same way as the LISN for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not

exceeded

3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance was between the closest points of the LISN and the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m. All other units of the EUT and associated equipment were at least 0.8 m from the LISN.

Remark: Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected. Please see the attached Quasi-peak and Average test results.

**Test Result:** N/A

Test Data:

Note: This EUT is powered by battery only; therefore the AC Conducted Emission test is not applicable.

## 6.4 Duty Cycle

In order to assist with the determination of the average level of fundamental and spurious emissions field strength, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

Duty cycle= T on time / Period

Duty factor = 20 * log (Duty cycle)

**Test Data**

TX Duty cycle: 1.360/10 = 13.6 %

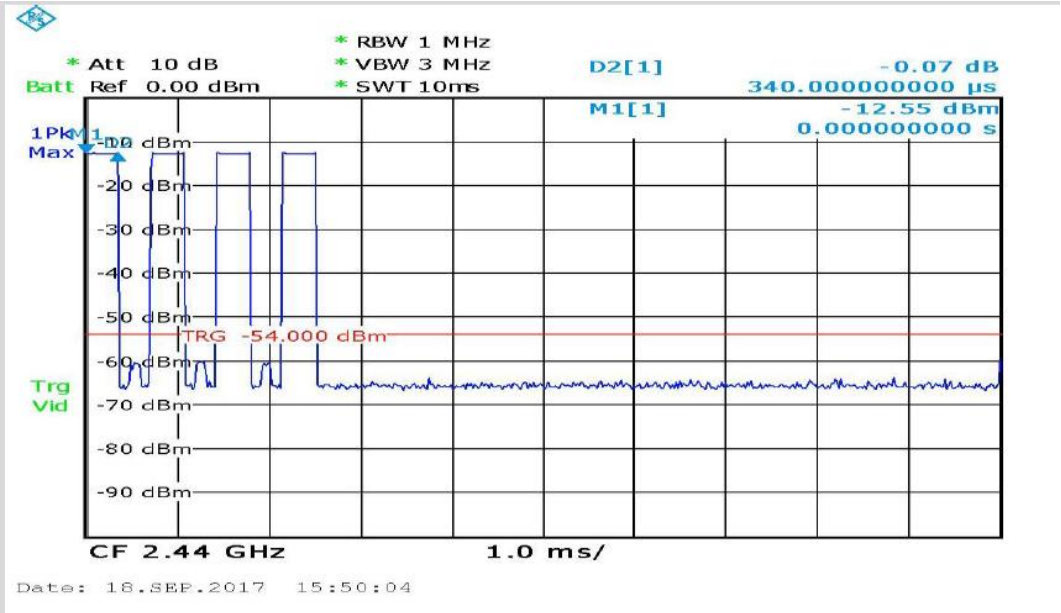
Corresponding FCC duty cycle correction factor is 20 * Log10(0.1360) = -17.32 dB.

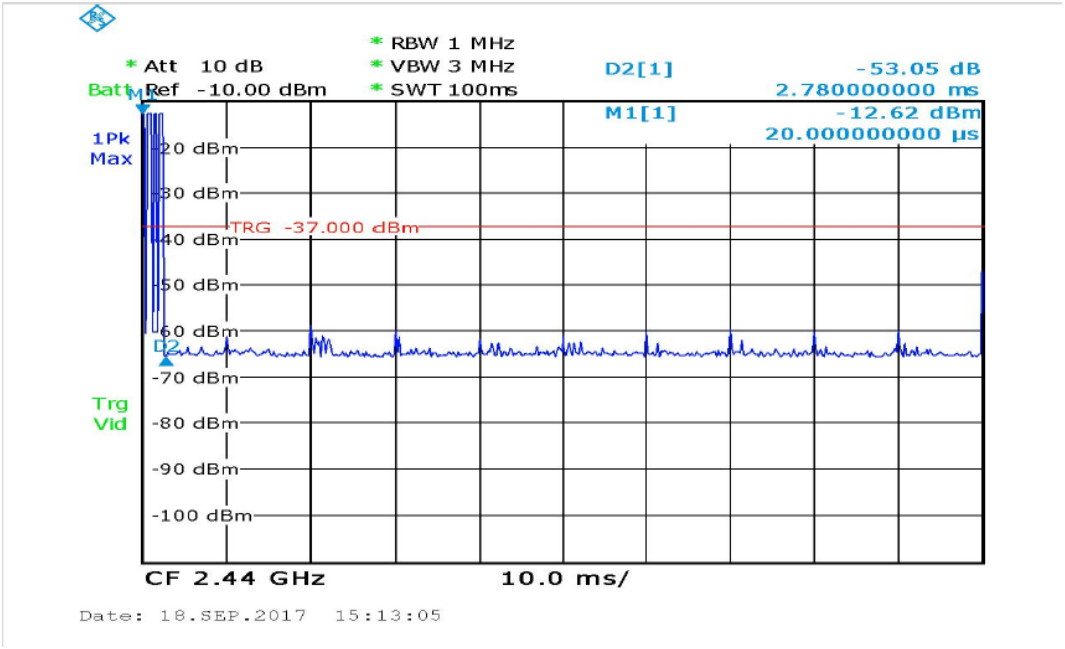
It is also possible to calculate the max duty cycle for an individual BLE channel.

The BLE standard requires a minimum number of used channels of 2. The pulses or the TX power will be equally spread over the 2 channels, so the max duty cycle per individual channel will be -17.32 – 6 = -23.32 dB. FCC will limit the correction factor to 20 dB.

So, Duty factor =20 dB

**Test plot as follows:**





## 6.5 Field Strength of the Fundamental Signal

Test Site: Measurement Distance: 3m

Receiver Setup:

| Frequency | Detector | RBW | VBW | Remark |
|---|---|---|---|---|
| Above 1GHz | Peak | 1MHz | 3MHz | Peak |

Limit:

| Frequency | Limit (dBuV/m) | Remark |
|---|---|---|
| 2400-2483.5 MHz | 114 | Peak |
| | 94 | Average |

Test Setup:

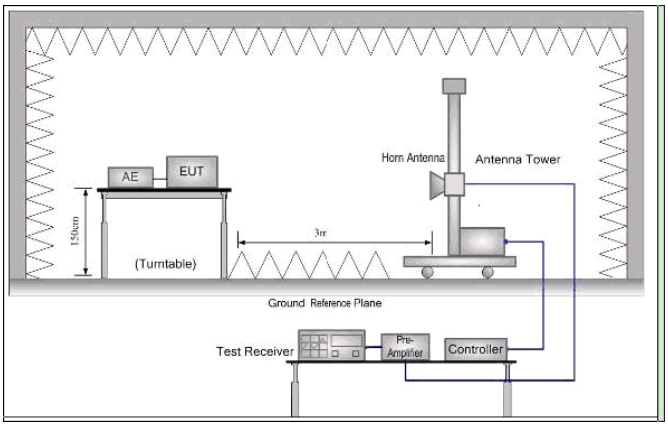



Figure 1. Above 1 GHz

Test Procedure:

a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. Repeat above procedures until all frequencies measured was complete.

Test Results: Pass

**Test Data**

| Item | Freq. | Read Level | Factor | Result Level | Limit Line | Over Limit | Detector | Polarity |
|---|---|---|---|---|---|---|---|---|
| (Mark) | (MHz) | (dBμV) | (dB/m) | (dBμV/m) | (dBμV/m) | (dB) | | |
| 1 | 2402 | 106.15 | -3.92 | 102.23 | 114 | -11.77 | PK | Horizontal |
| 2 | 2402 | 93.06 | -3.91 | 89.15 | 114 | -24.85 | PK | Vertical |
| 3 | 2402 | 86.15 | -3.92 | 82.23 | 94 | -11.77 | Average | Horizontal |
| 4 | 2402 | 73.06 | -3.91 | 69.15 | 94 | -24.85 | Average | Vertical |
| 5 | 2440 | 105.9 | -3.97 | 101.93 | 114 | -12.07 | PK | Horizontal |
| 6 | 2440 | 92.38 | -3.97 | 88.41 | 114 | -25.59 | PK | Vertical |
| 7 | 2440 | 85.9 | -3.97 | 81.93 | 94 | -12.07 | Average | Horizontal |
| 8 | 2440 | 72.38 | -3.97 | 68.41 | 94 | -25.59 | Average | Vertical |
| 9 | 2480 | 106.13 | -4.01 | 102.12 | 114 | -11.88 | PK | Horizontal |
| 10 | 2480 | 96.68 | -4.01 | 92.67 | 114 | -21.33 | PK | Vertical |
| 11 | 2480 | 86.13 | -4.01 | 82.12 | 94 | -11.88 | Average | Horizontal |
| 12 | 2480 | 76.68 | -4.01 | 72.67 | 94 | -21.33 | Average | Vertical |

Remark:

1) The basic equation with a sample calculation is as follows: Level = Read Level + Factor.
2) Average= Peak-20dB

(The Factor is calculated by adding the Antenna Factor, Cable Loss and Preamp Factor)

## 6.6 Radiated Spurious Emissions and Band-edge

**Frequency Range:** 9KHz to 25GHz

**Test site/setup:** Measurement Distance: 3m
Test instrumentation set-up:

| Frequency Range | Detector | RBW | VBW |
|---|---|---|---|
| 0.009MHz-0.090MHz | Peak | 10kHz | 30kHz |
| 0.009MHz-0.090MHz | Average | 10kHz | 30kHz |
| 0.090MHz-0.110MHz | Quasi-peak | 10kHz | 30kHz |
| 0.110MHz-0.490MHz | Peak | 10kHz | 30kHz |
| 0.110MHz-0.490MHz | Average | 10kHz | 30kHz |
| 0.490MHz -30MHz | Quasi-peak | 10kHz | 30kHz |
| 30MHz-1GHz | Quasi-peak | 100kHz | 300kHz |
| Above 1GHz | Peak | RBW=1MHz | VBW≥RBW |
| | Average | | VBW=10Hz |

Sweep=Auto

**15.209 Limit:**

| Frequency | Limit (dBuV/m) |
|---|---|
| 0.009MHz-0.490MHz | 128.5 ~ 93.8 |
| 0.490MHz-1.705MHz | 73.8 ~63.0 |
| 1.705MHz-30MHz | 69.5 |
| 30MHz-88MHz | 40.0 |
| 88MHz-216MHz | 43.5 |
| 216MHz-960MHz | 46.0 |
| 960MHz-1GHz | 54.0 |
| Above 1GHz | 54.0 |

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

**Test Configuration:** Receive antenna scan height 1 m - 4 m. polarization Vertical / Horizontal

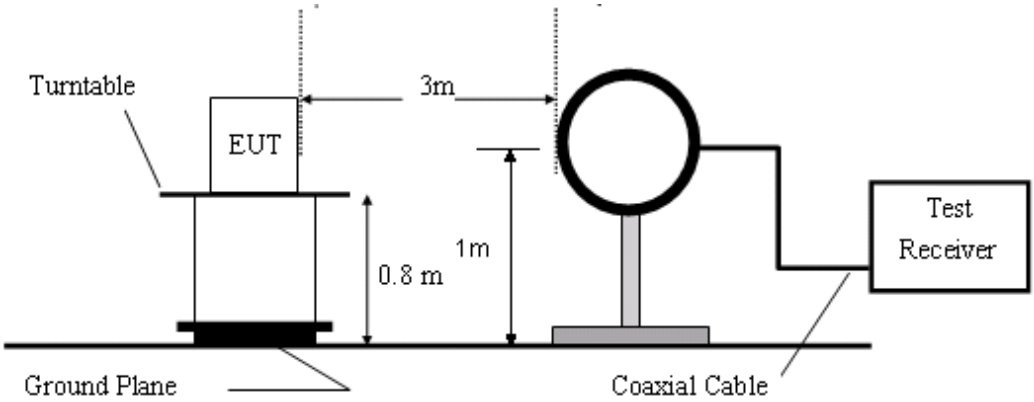



Figure1. 30MHz to 1GHz radiated emissions test configuration

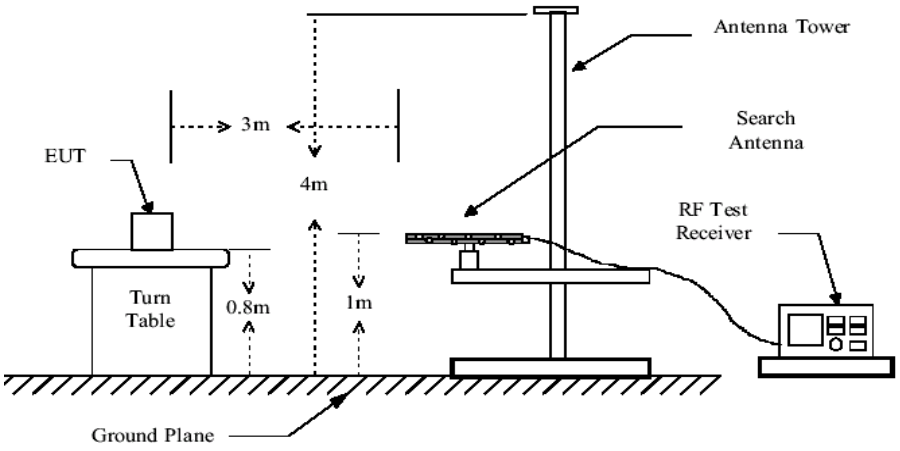



**Figure2. 30MHz to 1GHz radiated emissions test configuration**

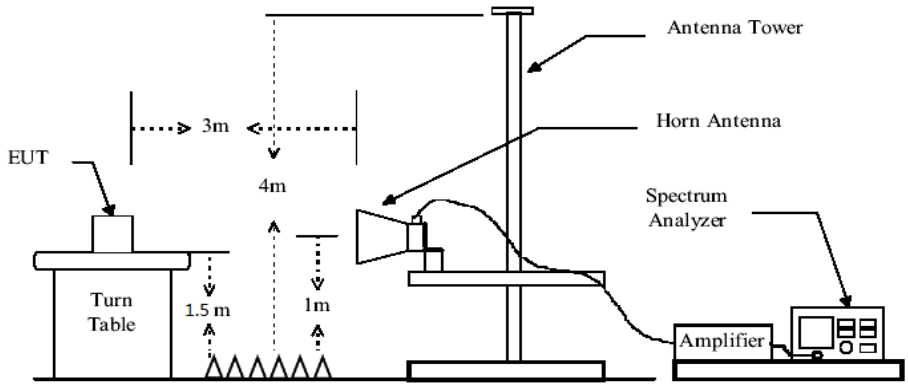



**Figure3. Above 1GHz radiated emissions test configuration**

**Test Procedure:** The procedure used was ANSI Standard C63.10:2013. The receiver was scanned from 9KHz to 25GHz.When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

Low noise amplifier was used below 1GHz, High pass Filter was used above 3GHz.

Between 1G and 3GHz, we did not use any amplifier or filter.

Test were performed for their spatial orthogonal(X, Y, Z), the worst test data (X orthogonal) was submitted.

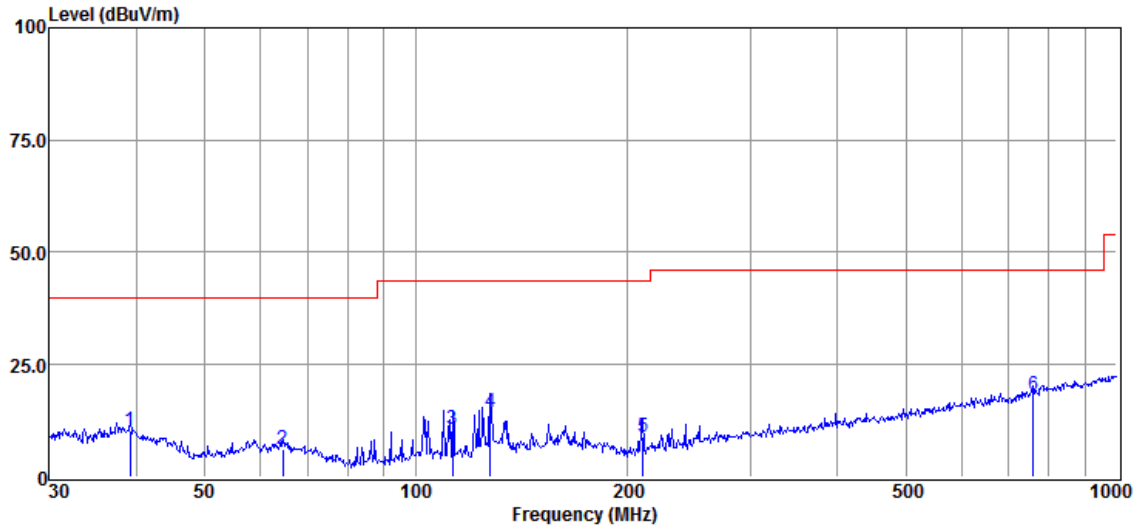
1) For this intentional radiator operates below 25 GHz. the spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency. And above the third harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 5rd harmonic.
2) As shown in Section, for frequencies above 1000MHz. 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.

**Test Result:** Pass

### 6.6.1 Radiated Spurious Emissions

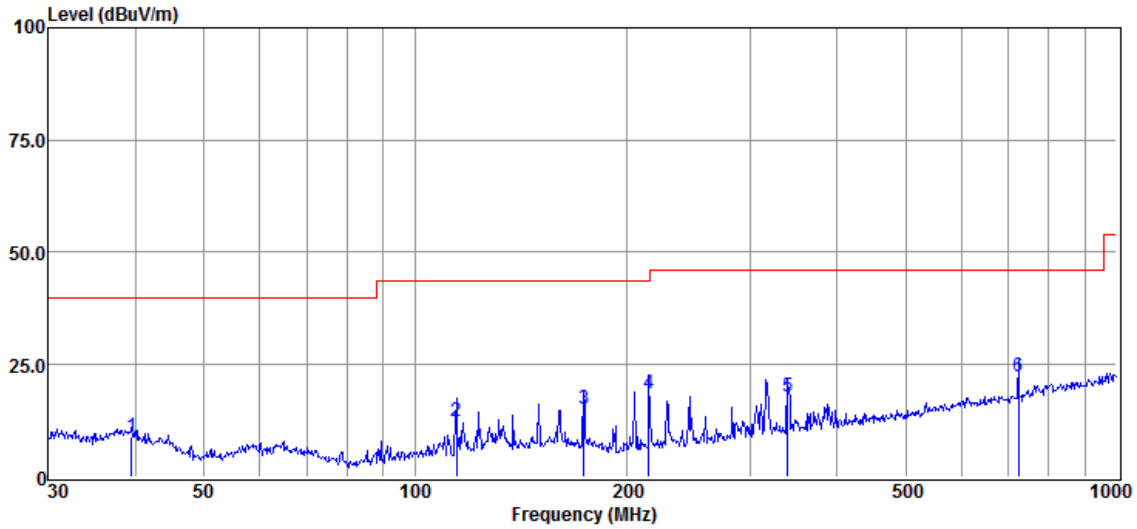
30MHz-1GHz:

Vertical:




| Item | Freq. | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Result Level | Limit Line | Over Limit | Detector |
|---|---|---|---|---|---|---|---|---|---|
| (Mark) | (MHz) | (dBµV) | (dB/m) | (dB) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | |
| 1 | 39.16 | 36.51 | 16.23 | 42.68 | 0.22 | 10.28 | 40.00 | -29.72 | QP |
| 2 | 64.66 | 36.66 | 12.03 | 42.69 | 0.32 | 6.32 | 40.00 | -33.68 | QP |
| 3 | 112.92 | 43.28 | 9.72 | 42.70 | 0.51 | 10.81 | 43.50 | -32.69 | QP |
| 4 | 127.67 | 44.45 | 12.19 | 42.64 | 0.57 | 14.57 | 43.50 | -28.93 | QP |
| 5 | 210.79 | 40.90 | 9.89 | 42.48 | 0.71 | 9.02 | 43.50 | -34.48 | QP |
| 6 | 760.70 | 37.62 | 21.27 | 42.60 | 1.91 | 18.20 | 46.00 | -27.80 | QP |

Horizontal:




| Item | Freq. | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Result Level | Limit Line | Over Limit | Detector |
|---|---|---|---|---|---|---|---|---|---|
| (Mark) | (MHz) | (dBµV) | (dB/m) | (dB) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | |
| 1 | 39.44 | 35.08 | 16.25 | 42.68 | 0.22 | 8.87 | 40.00 | -31.13 | QP |
| 2 | 114.52 | 44.84 | 9.78 | 42.69 | 0.51 | 12.44 | 43.50 | -31.06 | QP |
| 3 | 173.81 | 45.22 | 11.71 | 42.53 | 0.65 | 15.05 | 43.50 | -28.45 | QP |
| 4 | 215.27 | 50.34 | 10.09 | 42.47 | 0.72 | 18.68 | 43.50 | -24.82 | QP |
| 5 | 339.59 | 45.07 | 14.01 | 42.23 | 0.90 | 17.75 | 46.00 | -28.25 | QP |
| 6 | 724.26 | 42.40 | 20.65 | 42.43 | 1.81 | 22.43 | 46.00 | -23.57 | QP |

**Above 1GHz:**

**Lowest Channel(2402MHz)**

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | polarization |
|---|---|---|---|---|---|---|---|---|
| 1 | 4804 | 39.33 | 6.18 | 45.51 | 54 | -8.49 | peak | Horizontal |
| 2 | 7206 | 37.1 | 10.63 | 47.73 | 54 | -6.27 | peak | Horizontal |
| 3 | 9608 | 33.48 | 14.38 | 47.86 | 54 | -6.14 | peak | Horizontal |
| 4 | 4804 | 35.68 | 6.18 | 41.86 | 54 | -12.14 | peak | Vertical |
| 5 | 7206 | 36.11 | 10.63 | 46.74 | 54 | -7.26 | peak | Vertical |
| 6 | 9608 | 37.56 | 14.38 | 51.94 | 54 | -2.06 | peak | Vertical |

**Middle Channel(2440MHz)**

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | polarization |
|---|---|---|---|---|---|---|---|---|
| 1 | 4880 | 34.41 | 6.97 | 41.38 | 54 | -12.62 | peak | Horizontal |
| 2 | 7320 | 35.75 | 11.12 | 46.87 | 54 | -7.13 | peak | Horizontal |
| 3 | 9760 | 34.37 | 14.35 | 48.72 | 54 | -5.28 | peak | Horizontal |
| 4 | 4880 | 34.38 | 6.97 | 41.35 | 54 | -12.65 | peak | Vertical |
| 5 | 7320 | 37.56 | 11.12 | 48.68 | 54 | -5.32 | peak | Vertical |
| 6 | 9760 | 33.9 | 14.35 | 48.25 | 54 | -5.75 | peak | Vertical |

**Highest Channel(2480MHz)**

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | polarization |
|---|---|---|---|---|---|---|---|---|
| 1 | 4960 | 38.7 | 7.49 | 46.19 | 54 | -7.81 | peak | Horizontal |
| 2 | 7440 | 36.08 | 11.65 | 47.73 | 54 | -6.27 | peak | Horizontal |
| 3 | 9920 | 36.37 | 14.4 | 50.77 | 54 | -3.23 | peak | Horizontal |
| 4 | 4960 | 37.78 | 7.49 | 45.27 | 54 | -8.73 | peak | Vertical |
| 5 | 7440 | 36.91 | 11.65 | 48.56 | 54 | -5.44 | peak | Vertical |
| 6 | 9920 | 33.49 | 14.4 | 47.89 | 54 | -6.11 | peak | Vertical |

Remark: 1) Emission = Receiver Reading + Factor

2) Factor = Antenna Factor + Cable Loss -Pre-amplifier Factor.

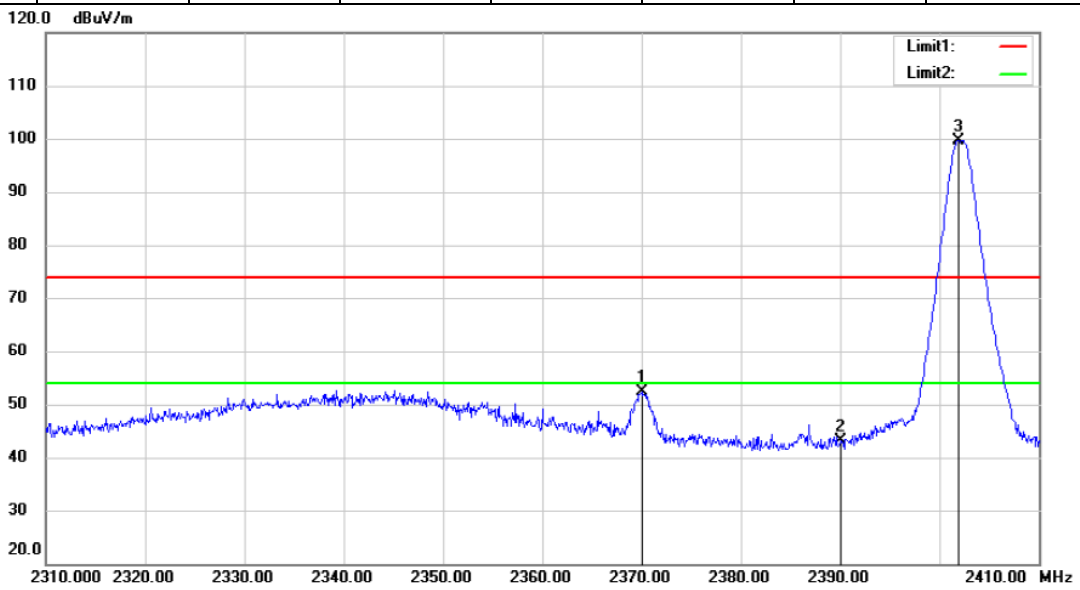
3) If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

### 6.6.2 Radiated Band-edge

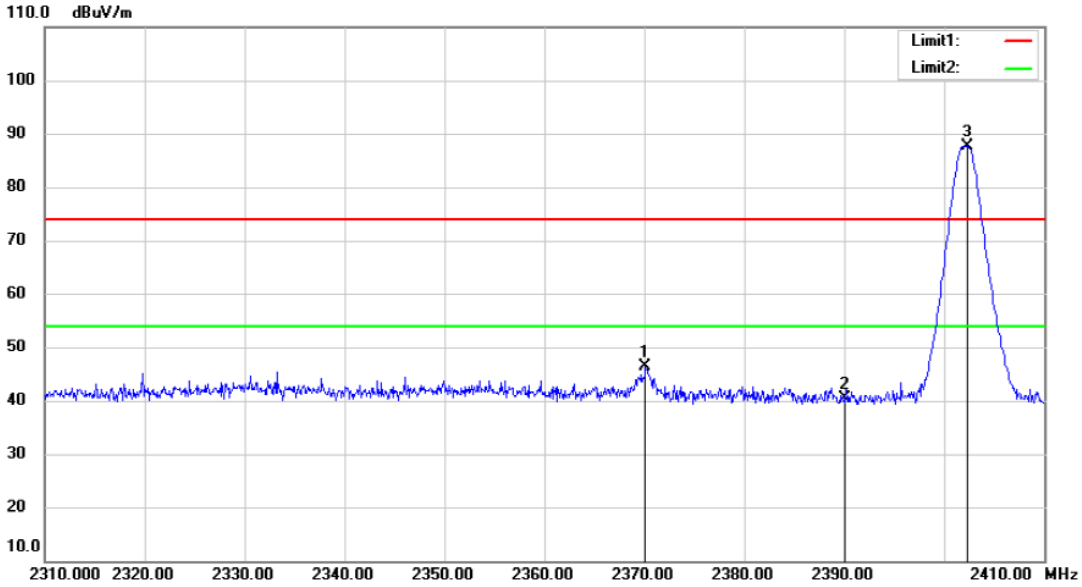
Lowest Channel (2402MHz)

| MK. | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1 | 2370 | 56.27 | -3.83 | 52.44 | 54 | -1.56 | Peak | Horizontal |
| 2 | 2390 | 47.08 | -3.89 | 43.19 | 54 | -10.81 | Peak | Horizontal |
| 3 | 2401.9 | 103.48 | -3.91 | 99.57 | 54 | 45.57 | Peak | Horizontal |
| 1 | 2370.1 | 50.09 | -3.83 | 46.26 | 54 | -7.74 | Peak | Vertical |
| 2 | 2390 | 44.21 | -3.89 | 40.32 | 54 | -13.68 | Peak | Vertical |
| 3 | 2402.3 | 91.53 | -3.92 | 87.61 | 54 | 33.61 | Peak | Vertical |

**Horizontal:**



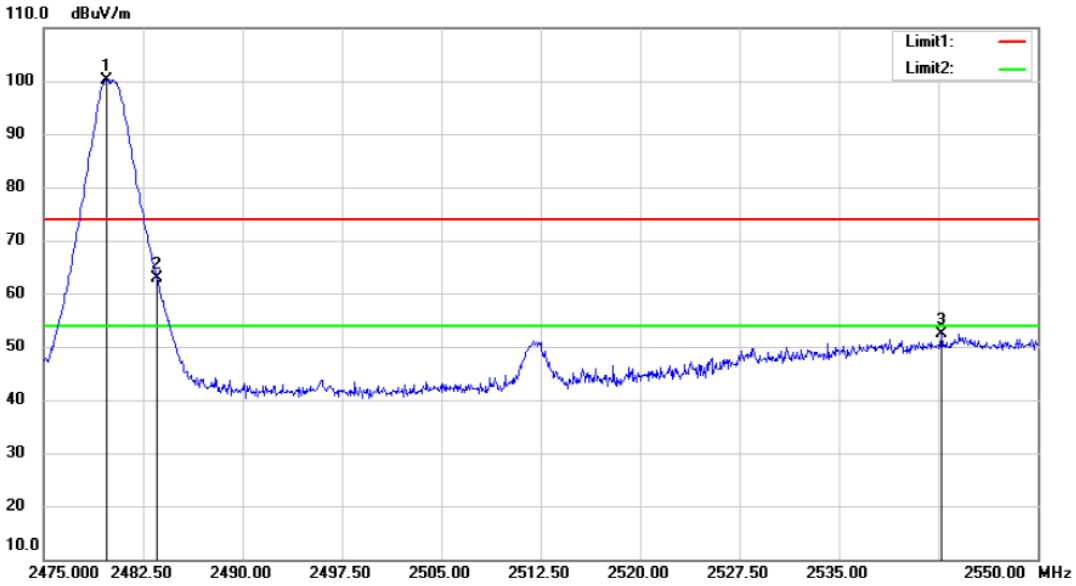
Vertical:



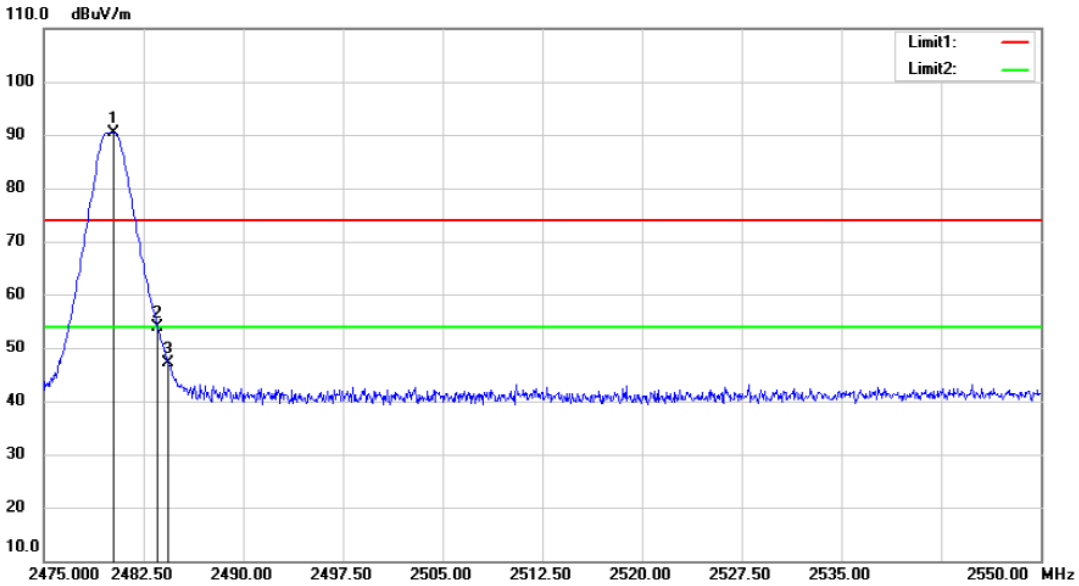
Highest Channel (2480MHz)

| MK. | Frequency (MHz) | Reading (dBuV/m) | Corrected factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1 | 2479.725 | 104.08 | -4.01 | 100.07 | 54 | 46.07 | Peak | Horizontal |
| 2 | 2483.5 | 66.79 | -4.01 | 62.78 | 74 | -11.22 | Peak | Horizontal |
| 2 | 2483.5 | 46.79 | -4.01 | 42.78 | 54 | -11.22 | Average | Horizontal |
| 3 | 2542.725 | 56.03 | -3.55 | 52.48 | 54 | -01.52 | Peak | Horizontal |
| 1 | 2480.25 | 94.43 | -4 | 90.43 | 54 | 36.43 | Peak | Vertical |
| 2 | 2483.5 | 57.9 | -4.01 | 53.89 | 54 | -0.11 | Peak | Vertical |
| 3 | 2484.375 | 51.17 | -4.02 | 47.15 | 54 | -6.85 | Peak | Vertical |

**Horizontal:**



Vertical:




Remark: 1. Test Level = Receiver Reading + Antenna Factor + Cable Loss- Preamplifier Factor

2. No any other emission which falls in restricted bands can be detected and be reported.

3. If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

4. Average= Peak-20dB

All frequencies within the “Restricted bands” have been evaluated to compliance. Section 15.205 Restricted bands of operation.

Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

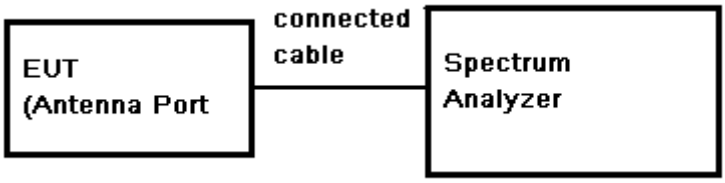
| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| [1]0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.5 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.52525 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 156.7 - 156.9 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 162.0125 - 167.17 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 167.72 - 173.2 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 240 - 285 | 3600 - 4400 | ([2]) |
| 13.36 - 13.41 | 322 - 335.4 | | |

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

[2] Above 38.6

## 6.7 20dB Bandwidth

**Test Configuration:**




**Test Procedure:**

1. Place the EUT on the table and set it in Engineering mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = approximately 1 % to 5 % of the OBW (set 30 kHz), VBW =3* RBW, Span=2MHz, Sweep=auto
4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured was complete.

**Limit:** N/A

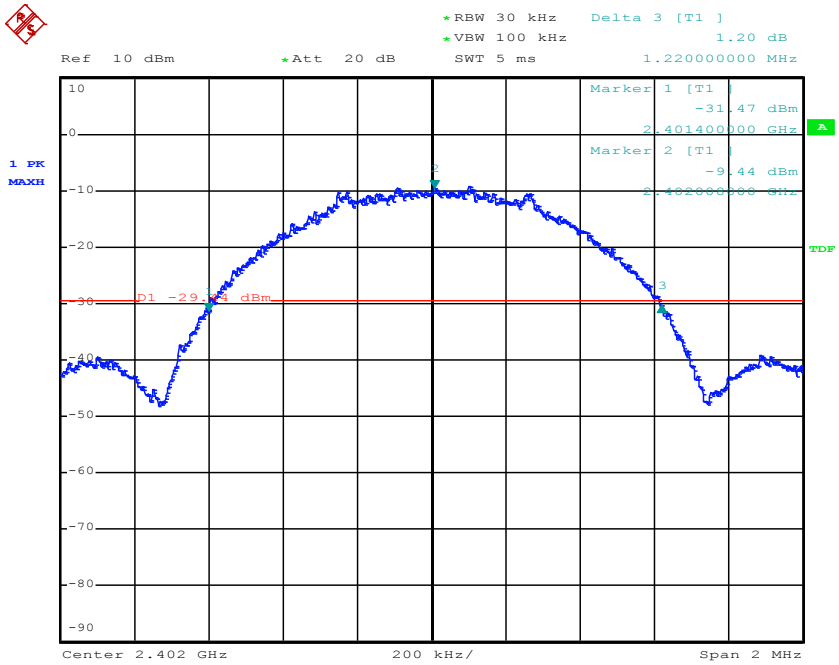
**Test Result:** Pass

**Test Data:**

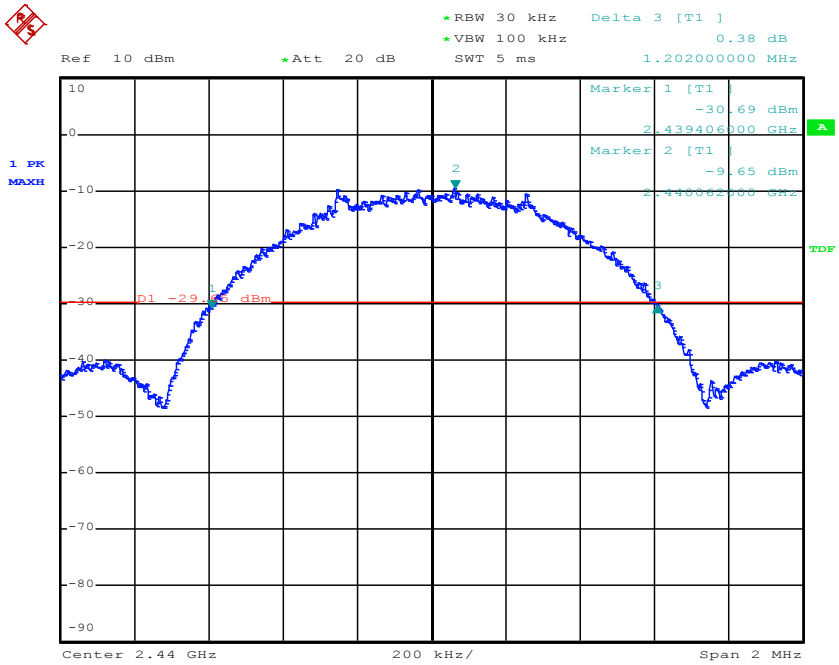
| CH | Frequency (MHz) | Bandwidth (MHz) | Result |
|---|---|---|---|
| Low | 2402 | 1.22 | PASS |
| Mid | 2440 | 1.202 | PASS |
| High | 2480 | 1.22 | PASS |

**Test plot as follows:**

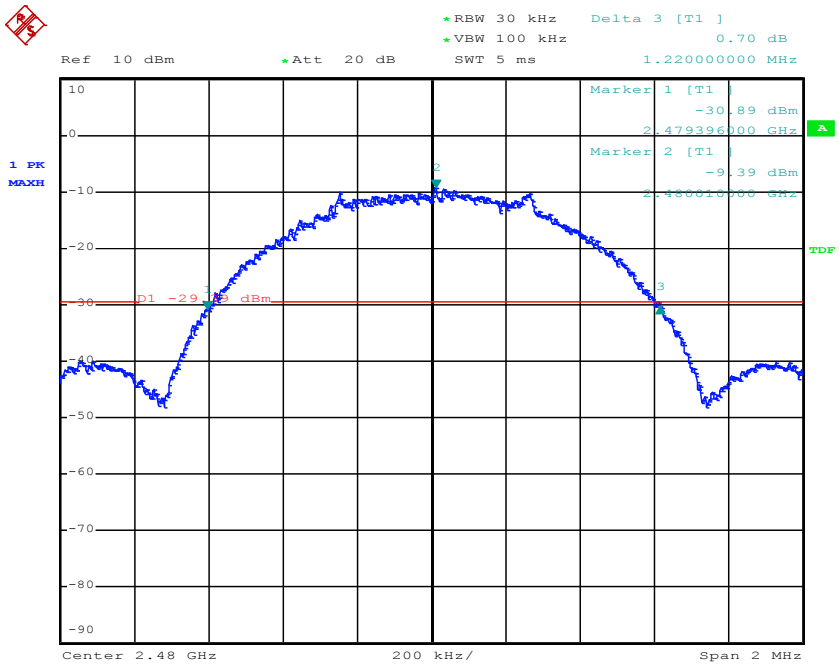
**Channel: Lowest**




**Channel: Middle**



**Channel: High**



# 7 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

# 8 EUT Constructional Details

Refer to the < External Photos> & < Internal Photos>.

**--End of the Report--**