Report No.: 170605058GZU-002
Issued: 2017-08-21

# TEST REPORT

| | | |
|---|---|---|
| Applicant Name & Address | : | Dong Guan Bright Yin Huey Lighting Co., Ltd.<br>Dong Guan Township, Humen Town, Da Ning Manage District, Da Pan Di Indistrial Zone, DONG GUAN Guang Dong 523930, China |
| Sample Description | | |
| Product | : | 6 inches Bluetooth Speaker LED Downlight |
| FCC ID | : | 2AK53-6SLRD |
| Model No. | : | 6SLRD |
| Electrical Rating | : | 120Vac, 60Hz<br>Internal recharged battery: 3.7Vdc |
| Date Received | : | 05 June 2017 |
| Date Test Conducted | : | 05 June 2017 –17 August 2017 |
| Test standards | : | **47 CFR PART 15 Subpart C: 2016 section 15.249** |
| Test Result | : | Pass |
| Conclusion | : | The submitted samples complied with the above rules/standards. |
| Remark | : | None. |

**********End of Page**********

***Prepared and Checked By:***

Daniel.He

***Daniel He***
***Project Engineer***
***Intertek Guangzhou***

***Approved By:***

Helen Ma ***Signature***

***Helen Ma***
***Team Leader***
***Intertek Guangzhou***
***21 August 2017 Date***



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# CONTENT

## 1.0 Summary of Test

| TEST | TEST REQUIREMENT | TEST METHOD | RESULT |
|---|---|---|---|
| Antenna Requirement | FCC PART 15 C Section 15.203 | FCC PART 15 C Section 15.203 | PASS |
| Occupied Bandwidth | FCC PART 15 C section 15.215(c) | ANSI C63.10: Clause 6.9 | PASS |
| Radiated Emission | FCC PART 15 C section 15.249 (a), (d) | ANSI C63.10: Clause 6.4, 6.5 & 6.6 | PASS |
| Band Edges Measurement | FCC PART 15 C section 15.249 (d) | ANSI C63.10: Clause 6.10 | PASS |
| Conducted Emissions at Mains Terminals | FCC PART 15 C section 15.207 | ANSI C63.10: Clause 6.2 | PASS |
| **Remark :** | | | |
| N/A: not applicable. Refer to the relative section for the details.<br>EUT: In this whole report EUT means Equipment Under Test.<br>Tx: In this whole report Tx (or tx) means Transmitter.<br>Rx: In this whole report Rx (or rx) means Receiver.<br>RF: In this whole report RF means Radio Frequency.<br>ANSI C63.10: the detail version is ANSI C63.10:2013 in the whole report. | | | |

## 2.0 General Description

## 2.1 Product Description

| | |
|---|---|
| Operating Frequency | 2404-2479MHz |
| Type of Modulation: | GFSK |
| Number of Channels | 16 Channel |
| Channel Separation: | 5MHz |
| Antenna Type | PCB Layout |
| Antenna gain: | 0 dBi |
| Power Supply: | 120Vac, 60Hz<br>Internal recharged battery: 3.7Vdc |

EUT channels and frequencies list:

Test frequencies are lowest channel 0: 2404 MHz, middle channel 9: 2444 MHz and highest channel 15: 2479 MHz.

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|
| 0 | 2404 | 14 | 2474 |
| 1 | 2409 | 15 | 2479 |
| 2 | 2414 | | |
| 3 | 2419 | | |
| 4 | 2424 | | |
| 5 | 2429 | | |
| 6 | 2434 | | |
| 7 | 2439 | | |
| 8 | 2444 | | |
| 9 | 2449 | | |
| 10 | 2454 | | |
| 11 | 2459 | | |
| 12 | 2464 | | |
| 13 | 2469 | | |

## 2.2 Related Submittal(s) Grants

This is an application for certification of:
Part 15 Low Power Communications Device Transmitter

Remaining portions are subject to the following procedures:
Receiver portion of 2.4GHz: exempt from technical requirement of this Part.
Lighting mode: it was evaluated by FCC Part 15B

## 2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10:2013. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans and final tests were performed in the semi-anechoic chamber to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise.

## 2.4 Test Facility

All tests were performed at:
Room102/104, No 203, KeZhu Road, Science City, GETDD Guangzhou, China
Except Conducted Emissions was performed at:
Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, China

A2LA Certificate Number 0078.10
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch is accredited by A2LA and Listed in FCC website. FCC accredited test labs may perform both Certification testing under Parts 15 and 18 and Declaration of Conformity testing.

## 3.0 System Test Configuration

### 3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. It was powered by AC 120V/60Hz supply or powered by 3.7Vdc.

The signal is maximized through rotation and placement in the three orthogonal axes; the antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. The spurious emissions more than 20 dB below the permissible value are not reported.

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:

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 |

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 |

### 3.2 EUT Exercising Software

No special exercising software

### 3.3 Special Accessories

No special accessories used.

### 3.4 Measurement Uncertainty

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | Occupied Channel Bandwidth | 2.3% |
| 2 | Spurious Emission (TX)-Radiated | 4.7 dB (25 MHz-1 GHz) |
| | | 4.8 dB (1 GHz-18 GHz) |
| 3 | Temperature | 0.5 °C |
| 4 | Conducted Emissions at Mains Terminals | 2.58dB |
| 5 | Humidity | 0.4 % |
| 6 | Time | 1.2% |

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance – Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

### 3.5 Equipment Modification

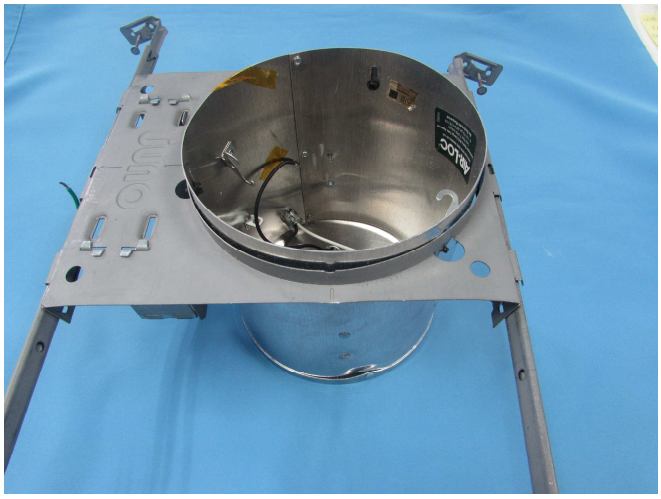
Any modifications installed previous to testing by Dong Guan Bright Yin Huey Lighting Co., Ltd. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

### 3.6 Support Equipment List and Description

The client make a continuous transmit sample for test, in actual use will with duty cycle (detail information can refer to page 12)

Metal Housing: in order to make the EUT connect with earth.



Remark: EUT should be sold without Metal housing.

## 4.0 Measurement Results

## 4.1 Antenna Requirement:

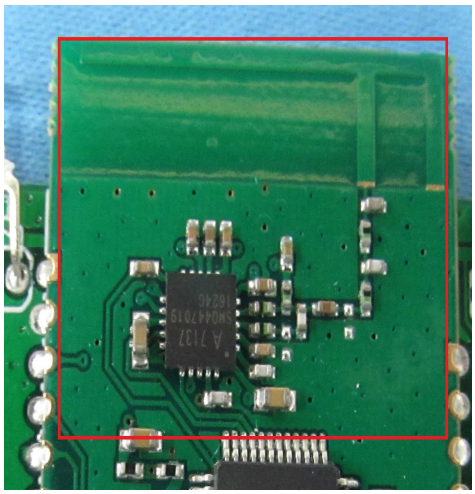
Standard requirement

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

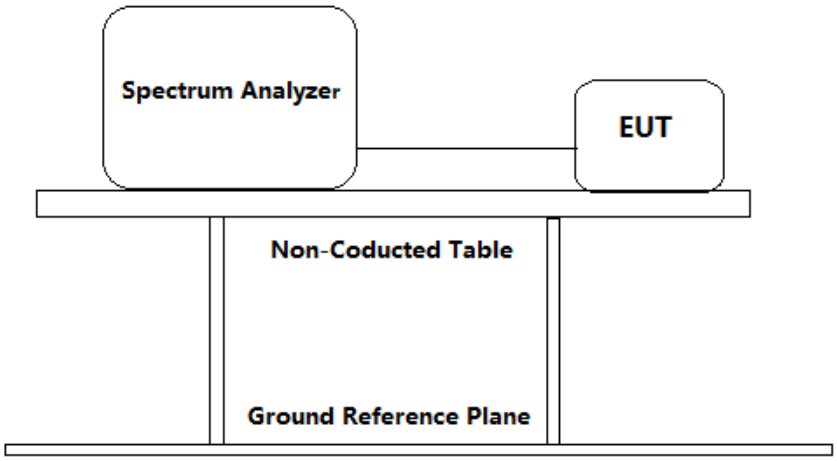
The antenna is an integral antenna and no consideration of replacement. The best case gain of the antenna is 0 dBi.



## 4.2 Occupied Bandwidth:

| | |
|---|---|
| Test Requirement: | FCC PART 15 C section 15.215(c)<br>(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<br>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<br>operated |
| Test Method: | ANSI C63.10: Clause 6.9 |
| Test Status: | Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).<br>Pre-test the EUT supplied by AC mode and B/O mode, find worse case in AC mode. |

Test Configuration:




Test Procedure:

The transmitter was operated at its maximum carrier power measured under normal test conditions.

a) The instrument center frequency was set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer was between 1.5 times and 5.0 times the OBW(20 dB Bandwidth).
b) The nominal IF filter bandwidth (3 dB RBW) was in the range of 1% to 5% of the OBW, and VBW was approximately three times the RBW.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope was more than [10 log (OBW/RBW)] below the reference level.
d) Step a) through step c) might require iteration to adjust within the specified range.
e) The dynamic range of the instrument at the selected RBW was more than 10 dB below the target "−20 dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW was at least 30 dB below the reference value.
f) Peak detection and max hold mode (until the trace stabilizes) was used.
g) Used the 20dB bandwidth function of the instrument and reported the measured bandwidth.
h) The occupied bandwidth was reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division was clearly labeled. Tabular data was reported in addition to the plot(s).

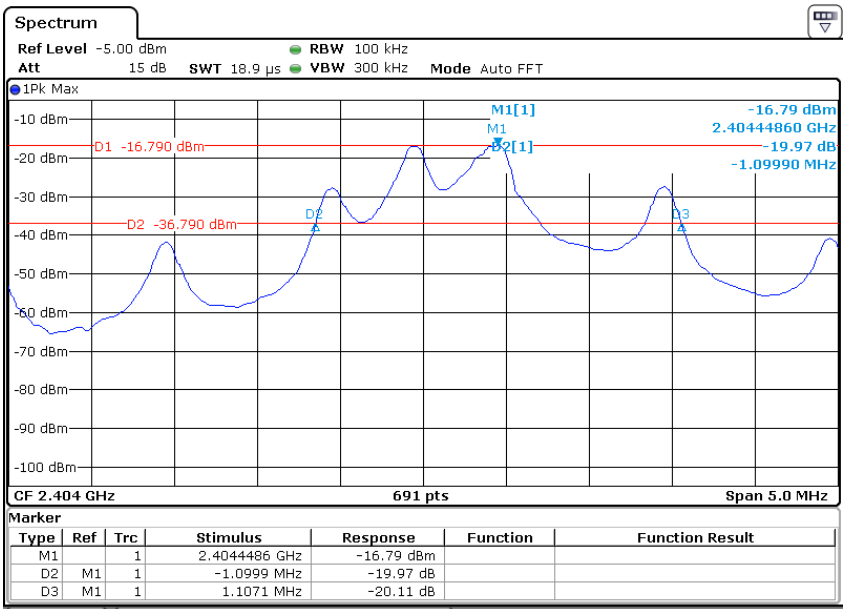
20 dB bandwidth:

| Frequency (MHz) | Measured 20 dB bandwidth (MHz) | Limit (MHz) | Result |
|---|---|---|---|
| 2404 | 2.206 | / | Pass |
| 2444 | 2.214 | / | Pass |
| 2479 | 2.236 | / | Pass |

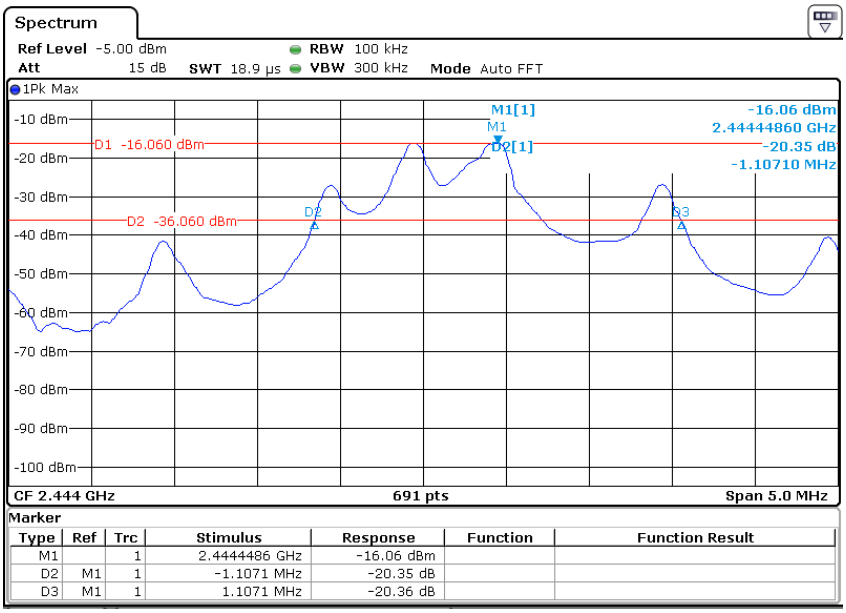
**20dB bandwidth:**

Result plot as follows:

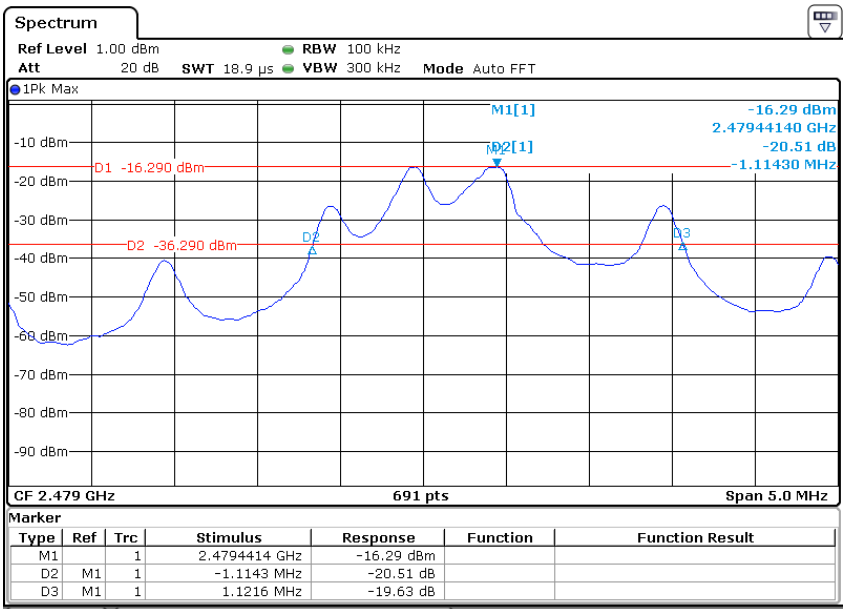
2404MHz




2444MHz



2479MHz




| Type | Ref | Trc | Stimulus | Response | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.4794414 GHz | -16.29 dBm | | |
| D2 | M1 | 1 | -1.1143 MHz | -20.51 dB | | |
| D3 | M1 | 1 | 1.1216 MHz | -19.63 dB | | |

## 4.7 Radiated Emission

Test Requirement: FCC PART 15 C section 15.249 (a), (d)

(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 |

**Note:** The limits shown in the above table are based on measurements using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using a CISPR quasi-peak detector.

(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§ 15.209, whichever is the lesser attenuation.

Test Method: ANSI C63.10: Clause 6.4, 6.5 and 6.6

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
Pre-test the EUT supplied by AC mode and B/O mode, find worse case in AC mode.

Test site: Measurement Distance: 3m (Semi-Anechoic Chamber)

Limit: The field strength of radiated emission outside of the specified frequency bands, except for harmonics at a distance of 3 meters shall not exceed the following values:

| Frequency (MHz) | Field Strength (dBμV/m @ 3m) |
|---|---|
| 30-88 | 40.0 |
| 88-216 | 43.5 |
| 216-960 | 46.0 |
| Above 960 | 54.0 |

Detector: For Peak and Quasi-Peak value:
200 Hz for 9 kHz to 150 kHz

9 kHz for 150 kHz to 30 MHz
120 kHz for 30 MHz to 1GHz
RBW = 1 MHz for f ≥ 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak for f ≥ 1 GHz, QP for f < 1 GHz
Trace = max hold

According 15.35(c), when the field strength (or envelope power) is not constant or it is in pulses, and an average detector is specified to be used, the value of field strength or power shall be determined by averaging over one complete pulse train, including blanking intervals within the pulse train, as long as the pulse train does not exceed 0.1 seconds. In cases where the pulse train exceeds 0.1 second, the average value of field strength or output power shall be determined during a 0.1 second interval during which the field strength or power is at its maximum value.

The average correction factor was computed by analyzing the on time in 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train, therefore the average value of fundamental frequency was: Average = Peak value + 20log (Duty cycle), where the duty factor is calculated from following formula:

2404MHz:

The duration of one cycle:1.942ms

Effective period of the cycle =0.391ms

DC =0.394/1.942=0.203 or 20.3%

Therefore, the averaging factor is found by 20lg0.203= -13.86

2444MHz:

The duration of one cycle:1.942ms

Effective period of the cycle =0.377ms

DC =0.377/1.942=0.194 or 19.4%

Therefore, the averaging factor is found by 20lg0.194= -14.24

2479MHz:

The duration of one cycle:1.957ms

Effective period of the cycle =0.391ms

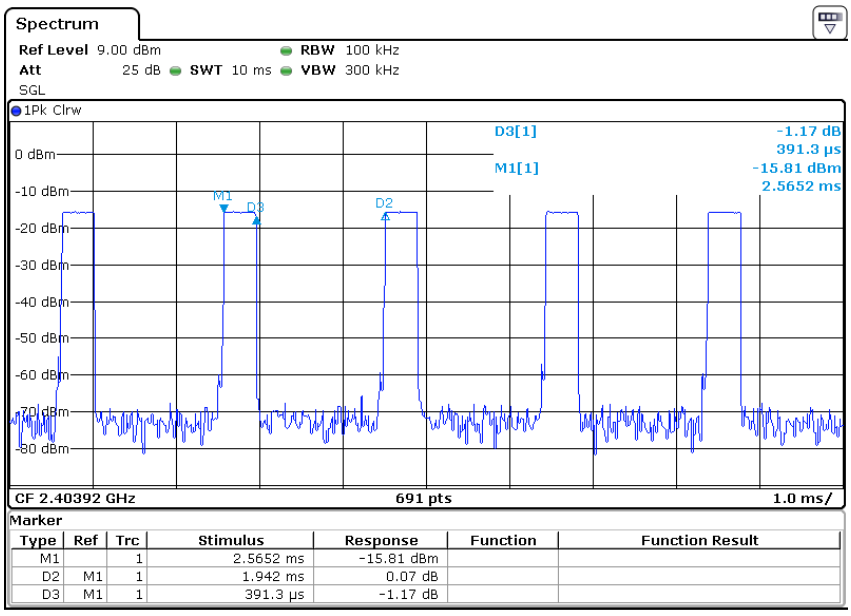
DC =0.391/1.957=0.199 or 19.9%

Therefore, the averaging factor is found by 20lg0.199= -13.99

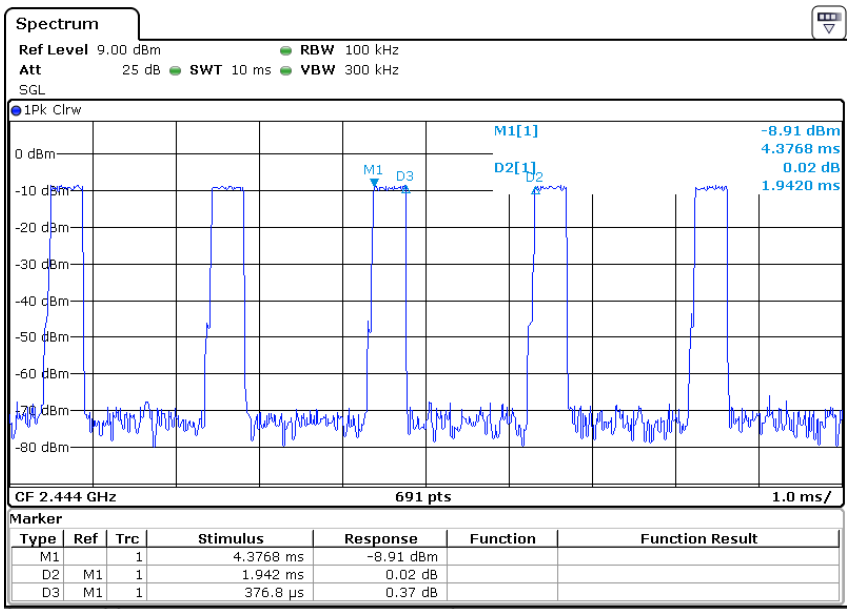
Pre-test all button, the worst case is button “PAIR”, and record the data


Please refer to below plots for more details.

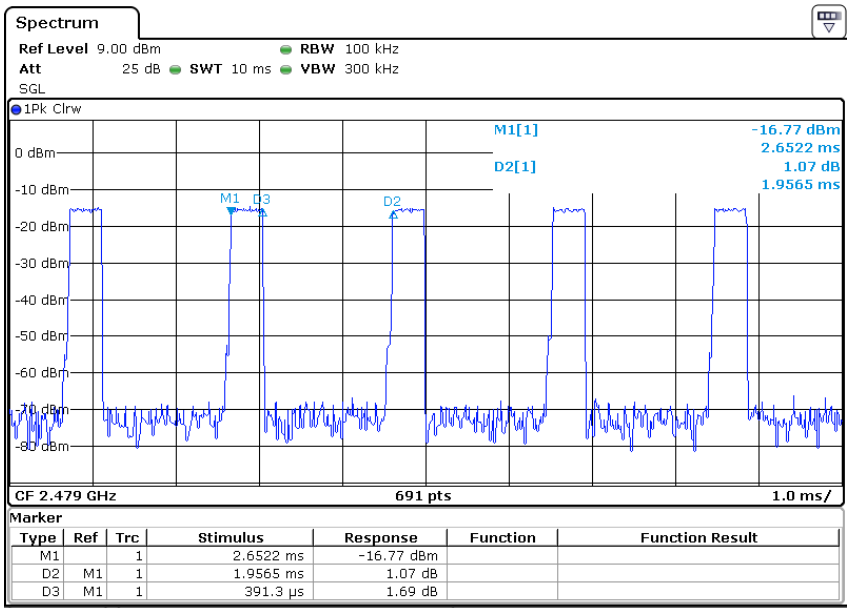
2404MHz:



2444MHz:




2479MHz:



Field Strength Calculation: The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below:

FS = RA + AF + CF - AG + PD + AV

FS = RA + Correct Factor + AV

FS = Field Strength in dBµV/m

Where:

RA = Receiver Amplitude (including preamplifier) in dBµV

AF = Antenna Factor in dB

CF = Cable Attenuation Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in –dB

Correct Factor = AF + CF – AG + PD

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m.

RA = 62.0 dBµV

AF = 7.4 dB

CF = 1.6 dB

AG = 29.0 dB

PD = 0 dB

AV = -10 dB

Correct Factor = 7.4 + 1.6 – 29.0 + 0 = -20 dB

FS = 62 + (-20) + (-10) = 32 dBµV/m

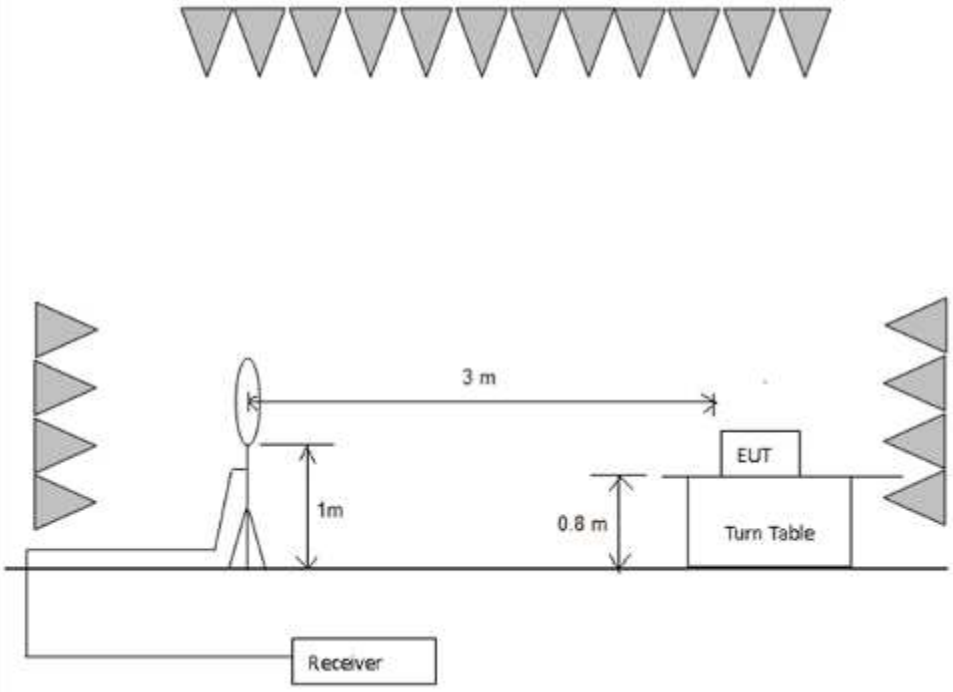
Remark: Above the 1GHz, spectrum used the RBW 1MHz(1/RBW=1us) for test, which is shorter than the width of one pulse, so PD=0dB

Section 15.205 Restricted bands of operation.

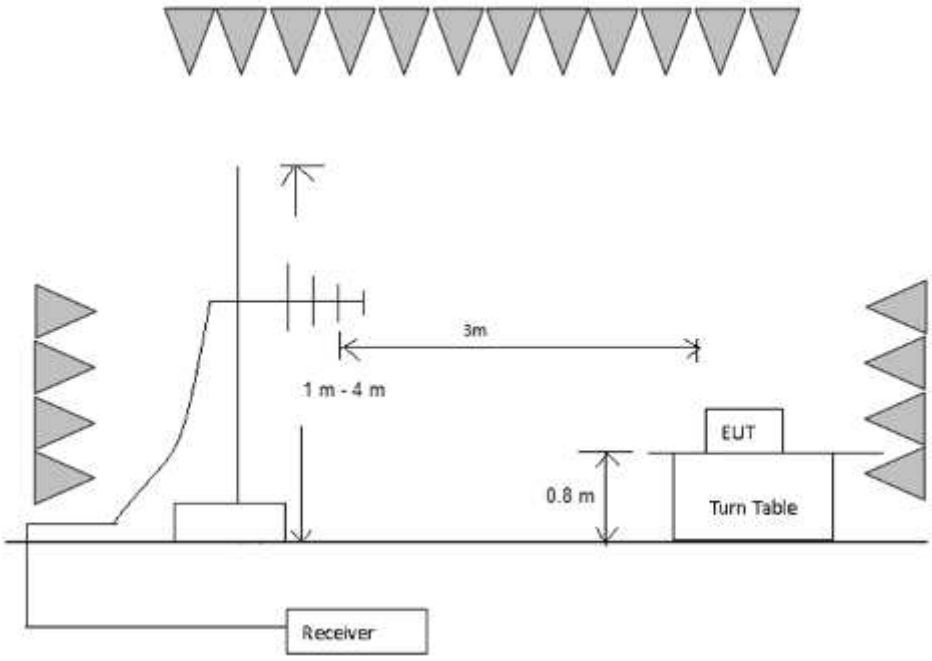
| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| [1]0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 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 | 10.6 - 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 - 156.52525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 240 - 285 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 322 - 335.4 | 3600 - 4400 | |
| 13.36 - 13.41 | | | |

Test Configuration:

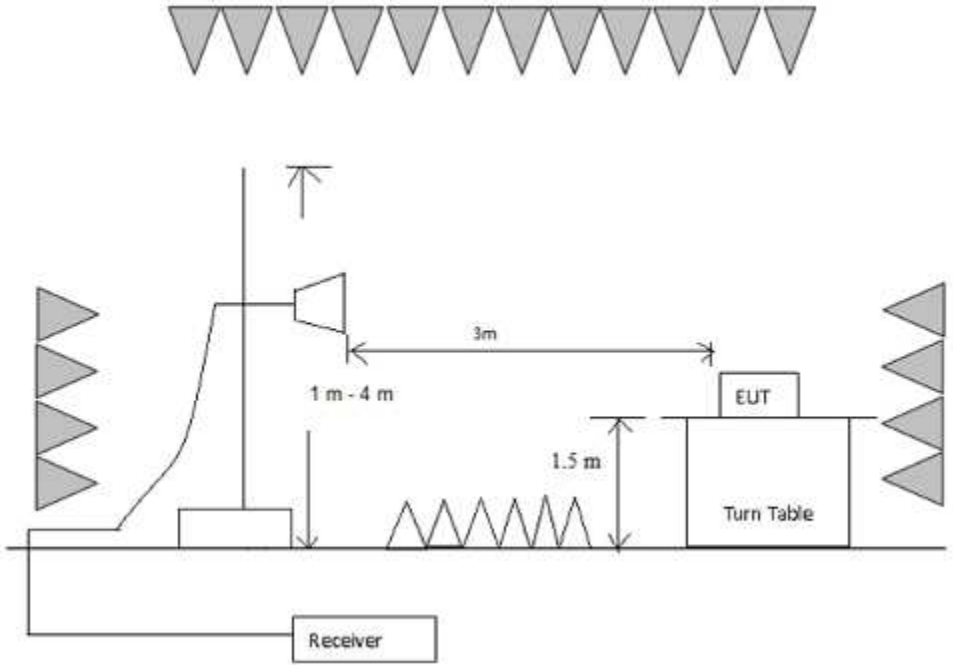
1) 9 kHz to 30 MHz emissions:




2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 25 GHz emissions:




**Test Procedure:**

1) 9 kHz to 30 MHz emissions:

For testing performed with the loop antenna. The centre of the loop was positioned 1 m above the ground and positioned with its plane vertical at the special 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. 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 16-1-4:2010 was used to perform radiated emission test above 1 GHz.

For testing performed with the horn antenna. 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.

4) The receiver was scanned from 9 kHz to 25 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak

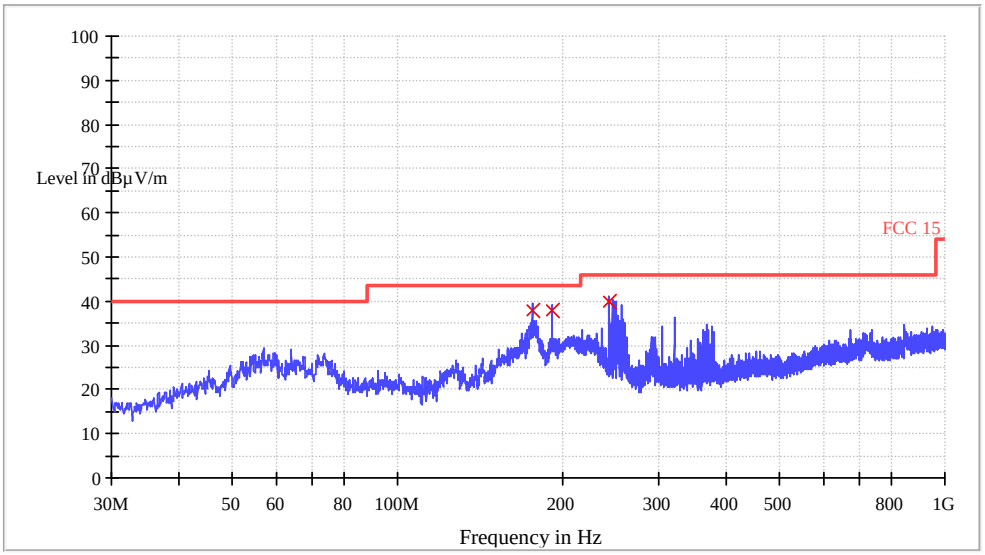
detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of 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.

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.

**2404MHz:**

**Radiated Emissions (Below 1GHz)**

Test Curve and test data
Horizontal:




Quasi-peak measurement:

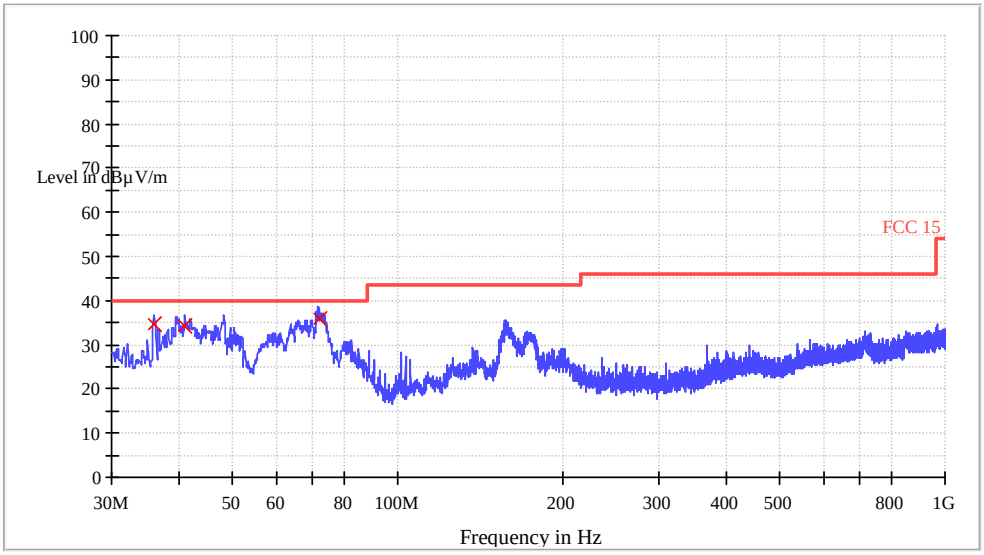
| Frequency (MHz) | Receiver Reading Level (dBµV) | Correction factors (dB/m) | Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 176.00 | 27.6 | 10.5 | 38.1 | 43.5 |
| 191.88 | 26.0 | 11.9 | 37.9 | 43.5 |
| 244.08 | 26.1 | 13.9 | 40.0 | 46.0 |

Remark:

Final Test Level =Receiver Reading + Correction Factor

Correction Factor = Antenna Factor + Cable Loss.

Vertical:




Quasi-peak measurement:

| Frequency (MHz) | Receiver Reading Level (dBµV) | Correction factors (dB/m) | Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 36.00 | 22.7 | 11.9 | 34.6 | 40.0 |
| 71.92 | 26.1 | 9.8 | 35.9 | 40.0 |
| 410.76 | 21.0 | 13.4 | 34.4 | 40.0 |

Remark:

Final Test Level =Receiver Reading + Correction Factor

Correction Factor = Antenna Factor + Cable Loss.

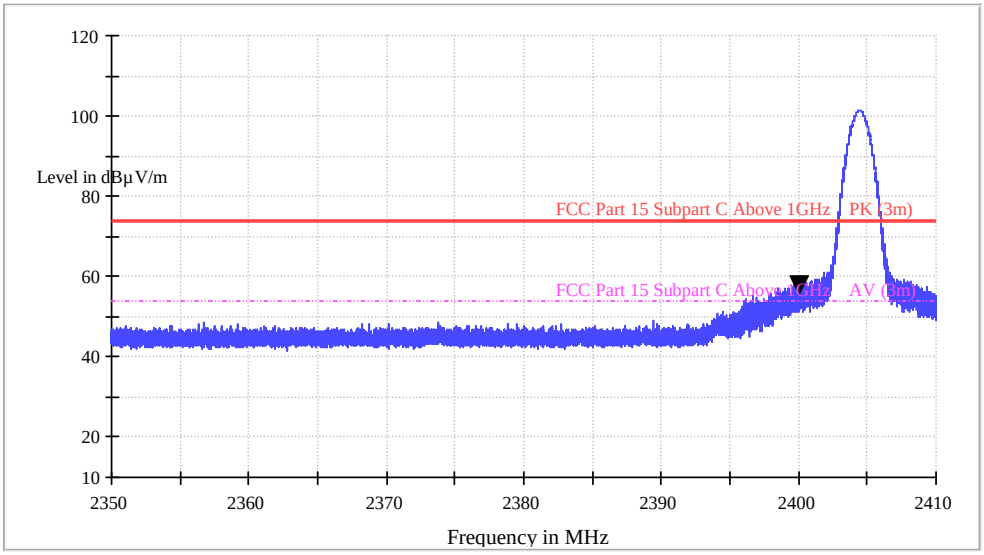
**Radiated Emissions (Above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Correction Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| Horizontal | 2404.000 | 110.7 | -8.9 | 101.8 | 114.0 | -12.2 |
| Horizontal | 4809.060 | 44.8 | -0.5 | 44.3 | 74.0 | -29.7 |
| Horizontal | 9739.594 | 43.4 | 6.3 | 49.7 | 74.0 | -24.3 |
| Vertical | 2404.000 | 112.6 | -8.9 | 103.7 | 114.0 | -10.3 |
| Vertical | 4809.060 | 46.0 | -0.5 | 45.5 | 74.0 | -28.5 |
| Vertical | 9739.594 | 47.4 | 6.3 | 53.7 | 74.0 | -20.3 |

| Polarization | Frequency (MHz) | Peak Value (dBµV) | Average Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| Horizontal | 2404.000 | 101.8 | -13.9 | 87.9 | 94.0 | -6.1 |
| Horizontal | 4809.060 | 44.3 | -13.9 | 30.4 | 54.0 | -23.6 |
| Horizontal | 9739.594 | 49.7 | -13.9 | 35.8 | 54.0 | -18.2 |
| Vertical | 2404.000 | 103.7 | -13.9 | 89.8 | 94.0 | -4.2 |
| Vertical | 4809.060 | 45.5 | -13.9 | 31.6 | 54.0 | -22.4 |
| Vertical | 9739.594 | 53.7 | -13.9 | 39.8 | 54.0 | -14.2 |

Notes:
1. AT frequencies equal to or less than 1000MHz, quasi-peak detector was used, above 1000MHz, Peak detector was used.
2. All measurements were made at 3 meter.
3. Horn antenna is used for the emission over 1000MHz.
4. Final Test Level =Receiver Reading + Correction Factor
   Correction Factor = Antenna Factor + Cable Loss –Preamplifier Factor.
5. Harmonic Emissions was tested with filter (Product name: MICRO-TRONICS, model name: BRM50702), other radiated emissions were found below the reference noise level
6. Final Test Level (AV) =PK + Average Factor
7. When Peak emission level was below AV limit, the AV emission level did not be recorded.

Band Edge test:
Horizontal

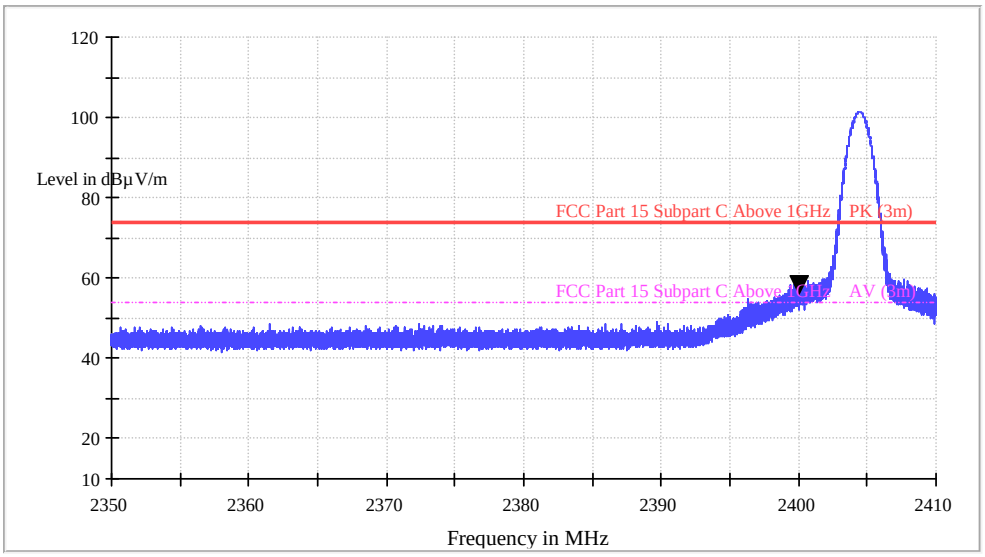



| Frequency (MHz) | PK Reading Level (dBµV/m) | Correction factors (dB/m) | PK Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 2400.00 | 58.6 | -2.3 | 56.3 | 74.0 |

| Frequency (MHz) | AV Emission Level (dBµV/m) | Correction factors (dB/m) | AV Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 2400.00 | 48.7 | -2.3 | 46.4 | 54.0 |

Remark:
Final Test Level =Receiver Reading + Correction Factor
Correction Factor = Antenna Factor + Cable Loss –Preamplifier Factor.

Vertical




| Frequency (MHz) | PK Reading Level (dBµV/m) | Correction factors (dB/m) | PK Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 2400.00 | 58.7 | -2.3 | 56.4 | 74.0 |

| Frequency (MHz) | AV Emission Level (dBµV/m) | Correction factors (dB/m) | AV Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 2400.00 | 48.8 | -2.3 | 46.5 | 54.0 |

Remark:

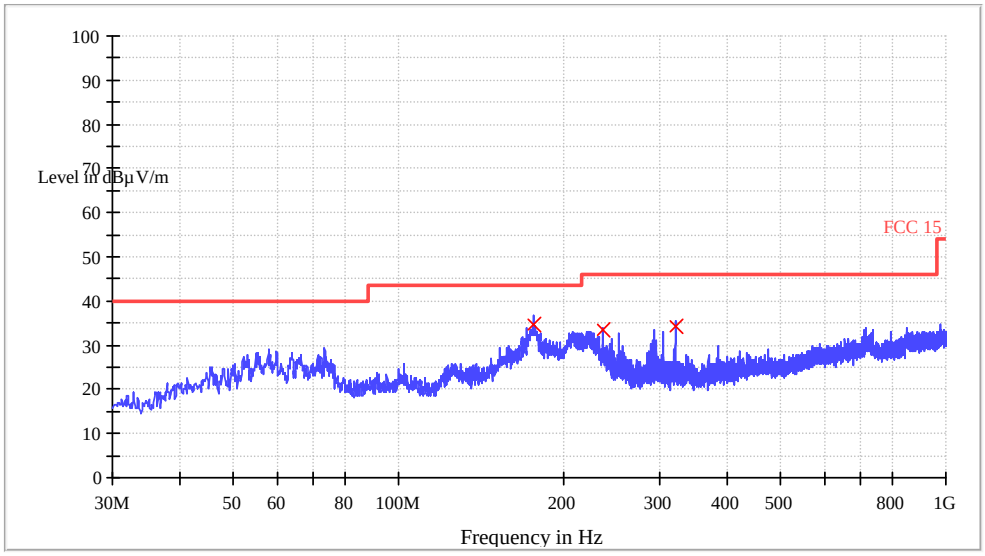
Final Test Level =Receiver Reading + Correction Factor

Correction Factor = Antenna Factor + Cable Loss –Preamplifier Factor.

**2444MHz:**

**Radiated Emissions (Below 1GHz)**

Test Curve and test data
Horizontal:




Quasi-peak measurement:

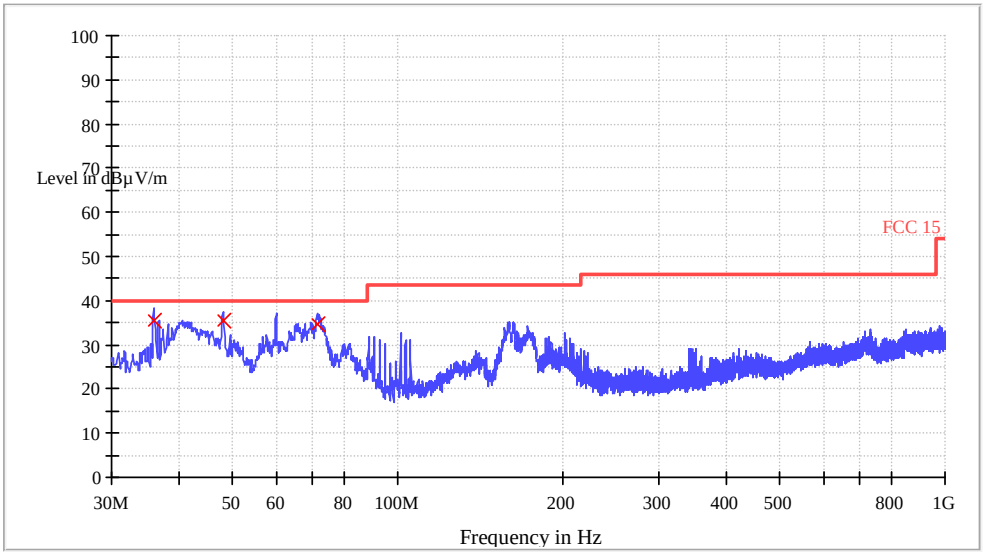
| Frequency (MHz) | Receiver Reading Level (dBµV) | Correction factors (dB/m) | Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 176.00 | 24.2 | 10.5 | 34.7 | 43.5 |
| 235.44 | 19.8 | 13.7 | 33.5 | 46.0 |
| 319.92 | 18.6 | 15.8 | 34.4 | 46.0 |

Remark:

Final Test Level =Receiver Reading + Correction Factor

Correction Factor = Antenna Factor + Cable Loss.

Vertical:




Quasi-peak measurement:

| Frequency (MHz) | Receiver Reading Level (dBµV) | Correction factors (dB/m) | Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 35.92 | 23.7 | 11.9 | 35.6 | 40.0 |
| 47.96 | 21.2 | 14.1 | 35.3 | 40.0 |
| 71.60 | 24.7 | 9.8 | 34.5 | 40.0 |

Remark:

Final Test Level =Receiver Reading + Correction Factor

Correction Factor = Antenna Factor + Cable Loss.

**Radiated Emissions (Above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Correction Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| Horizontal | 2444.000 | 107.9 | -7.2 | 100.7 | 114.0 | -13.3 |
| Horizontal | 4888.750 | 42.0 | -0.5 | 41.8 | 74.0 | -32.2 |
| Horizontal | 9776.425 | 43.3 | 6.3 | 49.6 | 74.0 | -24.4 |
| Vertical | 2444.000 | 109.3 | -7.2 | 102.1 | 114.0 | -11.9 |
| Vertical | 4888.750 | 45.6 | -0.5 | 45.1 | 74.0 | -28.9 |
| Vertical | 9776.425 | 46.3 | 6.3 | 52.6 | 74.0 | -21.4 |

| Polarization | Frequency (MHz) | Peak Value (dBµV) | Average Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| Horizontal | 2444.000 | 100.7 | -14.2 | 86.5 | 94.0 | -7.5 |
| Horizontal | 4888.750 | 41.8 | -14.2 | 27.6 | 54.0 | -26.4 |
| Horizontal | 9776.425 | 49.6 | -14.2 | 35.4 | 54.0 | -18.6 |
| Vertical | 2444.000 | 102.1 | -14.2 | 87.9 | 94.0 | -6.1 |
| Vertical | 4888.750 | 45.1 | -14.2 | 30.9 | 54.0 | -23.1 |
| Vertical | 9776.425 | 52.6 | -14.2 | 38.4 | 54.0 | -15.6 |

Notes:
1. AT frequencies equal to or less than 1000MHz, quasi-peak detector was used, above 1000MHz, Peak detector was used.
2. All measurements were made at 3 meter.
3. Horn antenna is used for the emission over 1000MHz.
4. Final Test Level =Receiver Reading + Correction Factor
   Correction Factor = Antenna Factor + Cable Loss –Preamplifier Factor.

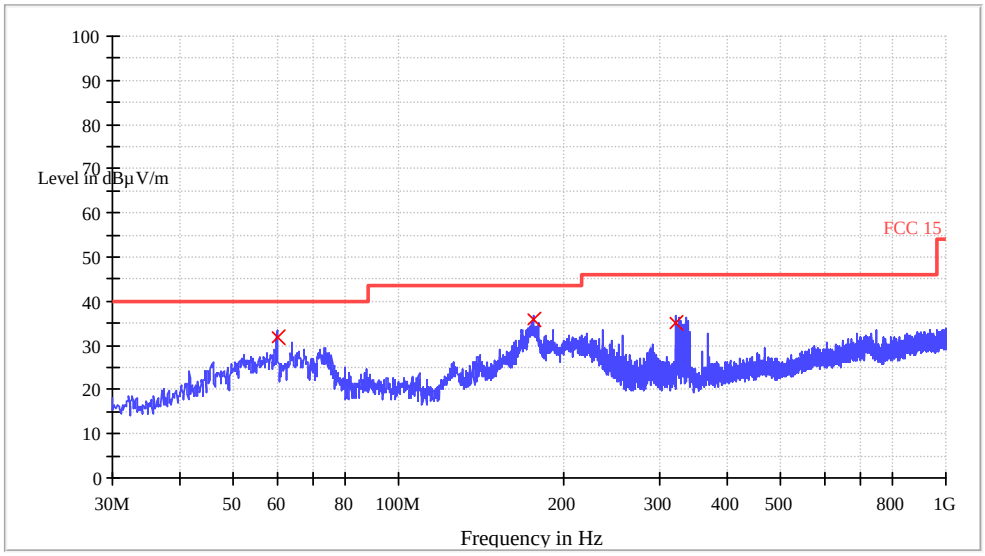
5. Harmonic Emissions was tested with filter (Product name: MICRO-TRONICS, model name: BRM50702), other radiated emissions were found below the reference noise level

6. Final Test Level (AV) =PK + Average Factor
7. When Peak emission level was below AV limit, the AV emission level did not be recorded.

**2479MHz:**

**Radiated Emissions (Below 1GHz)**

Test Curve and test data
Horizontal:




Quasi-peak measurement:

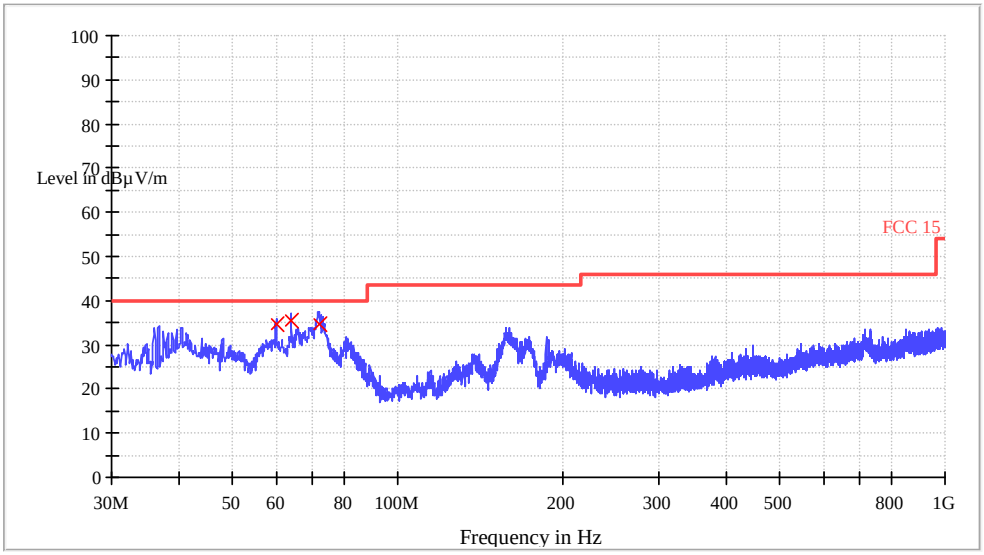
| Frequency (MHz) | Receiver Reading Level (dBµV) | Correction factors (dB/m) | Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 59.96 | 19.1 | 12.8 | 31.9 | 40.0 |
| 176.00 | 25.3 | 10.5 | 35.8 | 43.5 |
| 321.08 | 19.3 | 15.9 | 35.2 | 46.0 |

Remark:

Final Test Level =Receiver Reading + Correction Factor

Correction Factor = Antenna Factor + Cable Loss.

Vertical:




Quasi-peak measurement:

| Frequency (MHz) | Receiver Reading Level (dBµV) | Correction factors (dB/m) | Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 60.08 | 21.9 | 12.8 | 34.7 | 40.0 |
| 63.96 | 23.9 | 11.7 | 35.6 | 40.0 |
| 72.00 | 25.0 | 9.8 | 34.8 | 40.0 |

Remark:

Final Test Level =Receiver Reading + Correction Factor

Correction Factor = Antenna Factor + Cable Loss.

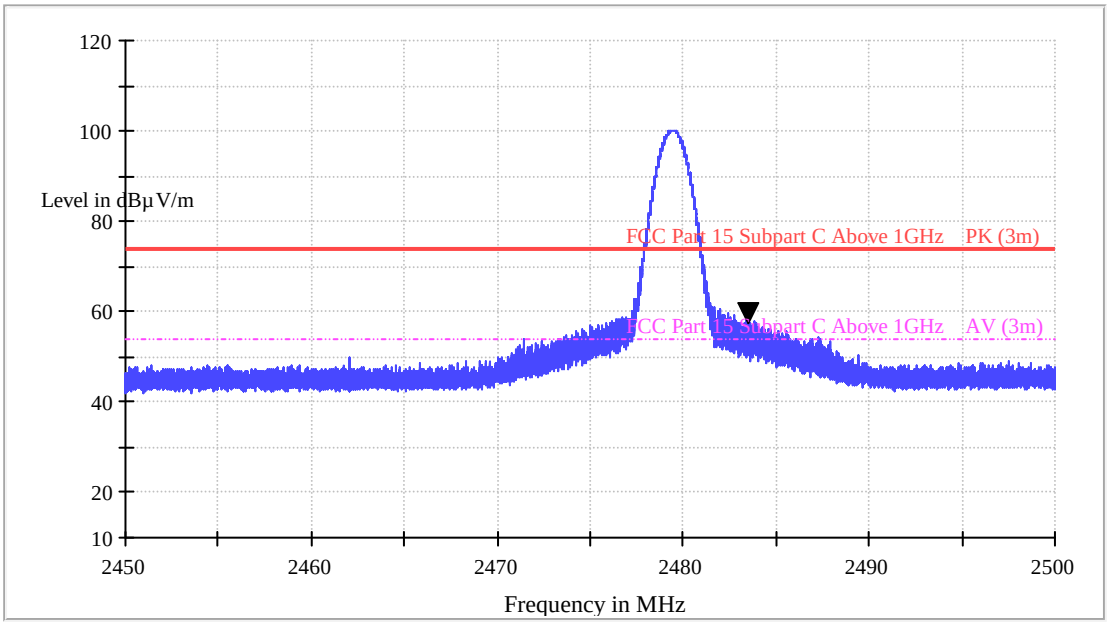
**Radiated Emissions (Above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Correction Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| Horizontal | 2479.000 | 109.4 | -7.2 | 102.2 | 114.0 | -11.8 |
| Horizontal | 4958.875 | 43.0 | -0.5 | 42.5 | 74.0 | -31.5 |
| Horizontal | 9916.739 | 45.1 | 7.3 | 52.4 | 74.0 | -21.6 |
| Vertical | 2479.000 | 109.5 | -7.2 | 102.3 | 114.0 | -11.7 |
| Vertical | 4958.875 | 45.1 | -0.5 | 44.6 | 74.0 | -29.4 |
| Vertical | 9916.739 | 42.8 | 7.3 | 50.1 | 74.0 | -23.9 |

| Polarization | Frequency (MHz) | Peak Value (dBµV) | Average Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| Horizontal | 2479.000 | 102.2 | -14.0 | 88.2 | 94.0 | -5.8 |
| Horizontal | 4958.875 | 42.5 | -14.0 | 28.5 | 54.0 | -25.5 |
| Horizontal | 9916.739 | 52.4 | -14.0 | 38.4 | 54.0 | -15.6 |
| Vertical | 2479.000 | 102.3 | -14.0 | 88.3 | 94.0 | -5.7 |
| Vertical | 4958.875 | 44.6 | -14.0 | 30.6 | 54.0 | -23.4 |
| Vertical | 9916.739 | 50.1 | -14.0 | 36.1 | 54.0 | -17.9 |

Notes:
1. AT frequencies equal to or less than 1000MHz, quasi-peak detector was used, above 1000MHz, Peak detector was used.
2. All measurements were made at 3 meter.
3. Horn antenna is used for the emission over 1000MHz.
4. Final Test Level =Receiver Reading + Correction Factor
   Correction Factor = Antenna Factor + Cable Loss –Preamplifier Factor.
5. Harmonic Emissions was tested with filter (Product name: MICRO-TRONICS, model name: BRM50702), other radiated emissions were found below the reference noise level
6. Final Test Level (AV) =PK + Average Factor
7. When Peak emission level was below AV limit, the AV emission level did not be recorded.

Band Edge test:
Horizontal




| Frequency (MHz) | PK Reading Level (dBµV/m) | Correction factors (dB/m) | PK Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 2483.5 | 59.9 | -2.1 | 57.8 | 74.0 |

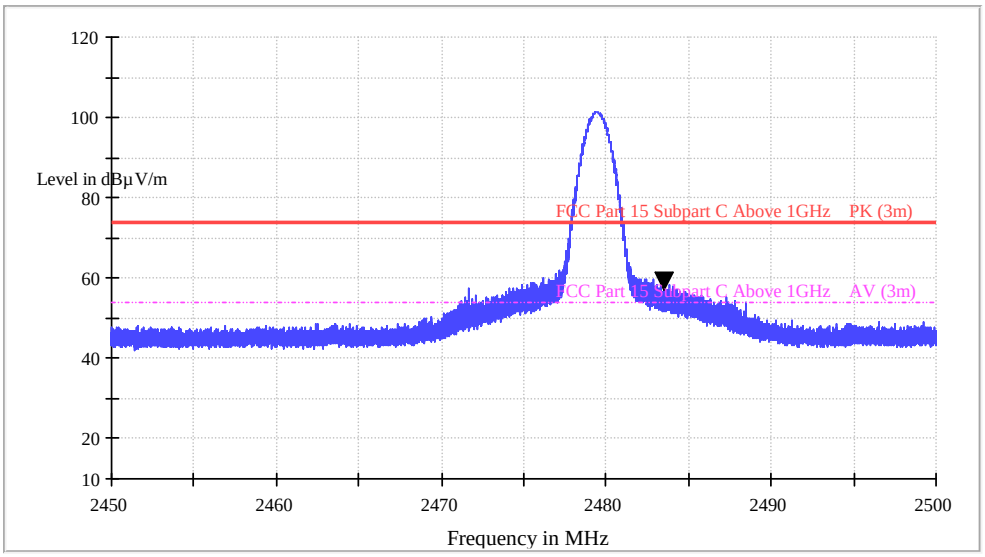
| Frequency (MHz) | AV Emission Level (dBµV/m) | Correction factors (dB/m) | AV Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 2483.5 | 48.9 | -2.1 | 46.8 | 54.0 |

Remark:

Final Test Level =Receiver Reading + Correction Factor

Correction Factor = Antenna Factor + Cable Loss –Preamplifier Factor.

Vertical




| Frequency (MHz) | PK Reading Level (dBµV/m) | Correction factors (dB/m) | PK Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 2483.5 | 59.6 | -2.1 | 57.5 | 74.0 |

| Frequency (MHz) | AV Emission Level (dBµV/m) | Correction factors (dB/m) | AV Emission Level (dBµV/m) | Limit (dBµV/m) |
|---|---|---|---|---|
| 2483.5 | 48.6 | -2.1 | 46.5 | 54.0 |

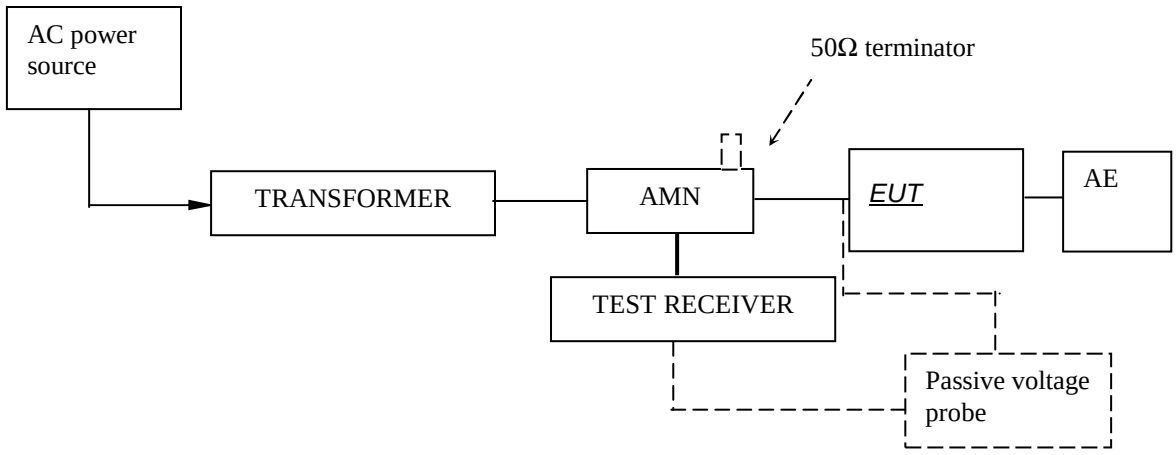
Remark:

Final Test Level =Receiver Reading + Correction Factor

Correction Factor = Antenna Factor + Cable Loss –Preamplifier Factor.

## 4.9 Conducted Emission Test

Test Configuration:




Test Setup and Procedure

Test was performed according to ANSI C63.10 Clause 6.2. The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane (Ground Reference Plane).And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The EUT keeps a distance of at least 0.8m from any other of the metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT.

During the test, 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.

The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.

Pre-test in the three channels: 2404MHz, 2444MHz and 2479MHz and found the conducted emission on 2404MHz was the worst case, so below test data was for 2404MHz.

Test Data

At main terminal: Pass

Tested Wire: Live Operation Mode: transmitting at 2404MHz

EDIT PEAK LIST (Final Measurement Results)

Trace1: FCC15QP
Trace2: FCC15AV
Trace3: ---

| TRACE | | FREQUENCY | LEVEL dBµV | | DELTA LIMIT dB |
|---|---|---|---|---|---|
| 2 | Average | 150 kHz | 42.32 | L1 | -13.67 |
| 1 | Quasi Peak | 190 kHz | 55.04 | L1 | -8.99 |
| 2 | Average | 2.682 MHz | 30.94 | L1 | -15.05 |
| 1 | Quasi Peak | 2.766 MHz | 36.18 | L1 | -19.81 |

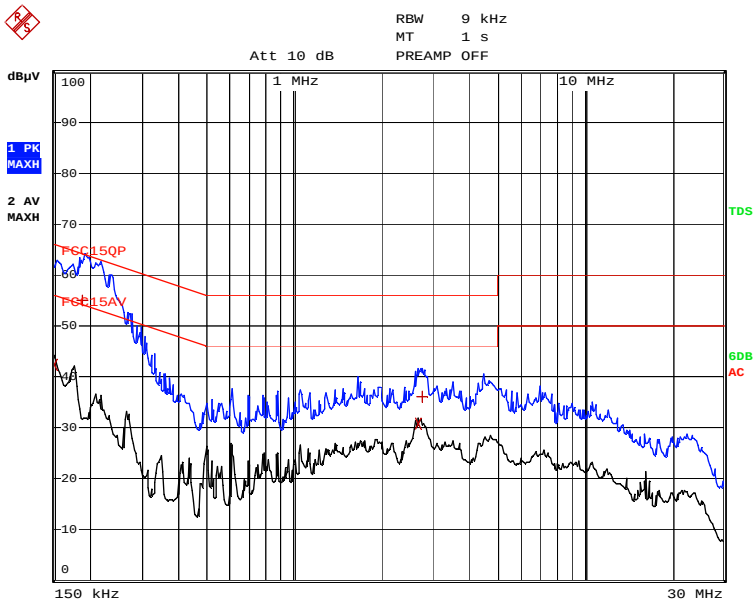
Tested Wire: Neutral Operation Mode: transmitting at 2404MHz

EDIT PEAK LIST (Final Measurement Results)

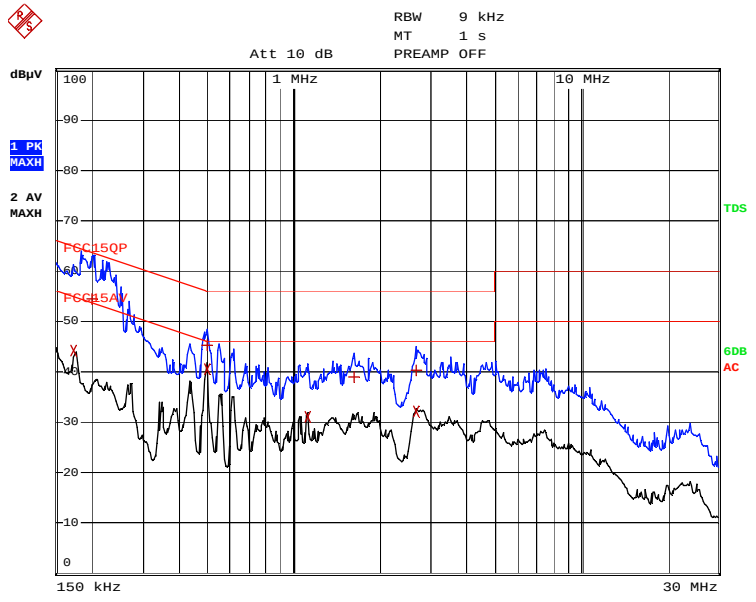
Trace1: FCC15QP
Trace2: FCC15AV
Trace3: ---

| TRACE | | FREQUENCY | LEVEL dBµV | | DELTA LIMIT dB |
|---|---|---|---|---|---|
| 2 | Average | 174 kHz | 44.16 | L1 | -10.60 |
| 1 | Quasi Peak | 202 kHz | 54.37 | L1 | -9.15 |
| 1 | Quasi Peak | 498 kHz | 45.31 | L1 | -10.72 |
| 2 | Average | 498 kHz | 40.61 | L1 | -5.41 |
| 2 | Average | 1.114 MHz | 30.99 | L1 | -15.00 |
| 1 | Quasi Peak | 1.618 MHz | 38.90 | L1 | -17.09 |
| 1 | Quasi Peak | 2.674 MHz | 40.17 | L1 | -15.82 |
| 2 | Average | 2.682 MHz | 32.12 | L1 | -13.87 |

Emission Curve
Tested Wire: Live




Tested Wire: Neutral



## 5.0 Test Equipment List

**Radiated Emission/Radio**

| Equipment No. | Equipment | Model | Manufacturer | Cal. Due date (MM-DD-YYYY) | Calibration Interval |
|---|---|---|---|---|---|
| EM030-04 | 3m Semi-Anechoic Chamber | 9×6×6 $m^3$ | ETS‧LINDGREN | 2018/5/1 | 1Y |
| EM031-02 | EMI Test Receiver (9 kHz~7 GHz) | R&S ESR7 | R&S | 2018/3/27 | 1Y |
| EM031-03 | Signal and Spectrum Analyzer (10 Hz~40 GHz) | R&S FSV40 | R&S | 2018/5/18 | 1Y |
| EM011-04 | Loop antenna (9 kHz-30 MHz) | HFH2-Z2 | R&S | 2018/6/14 | 1Y |
| EM061-03 | TRILOG Super Broadband test Antenna (30 MHz-1.5 GHz）(TX) | VULB 9161 | SCHWARZBECK | 2018/6/7 | 1Y |
| EM033-01 | TRILOG Super Broadband test Antenna(30 MHz-3 GHz）(RX) | VULB 9163 | SCHWARZBECK | 2017/9/8 | 1Y |
| EM033-02 | Bouble-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)(RX) | R&S HF907 | R&S | 2018/6/7 | 1Y |
| EM033-03 | High Frequency Antenna & preamplifier(18 GHz~26.5 GHz) (RX) | R&S SCU-26 | R&S | 2018/5/4 | 1Y |
| EM033-04 | High Frequency Antenna & preamplifier (26 GHz-40 GHz) | R&S SCU-40 | R&S | 2018/5/4 | 1Y |
| EM031-02-01 | Coaxial cable(9 kHz-1 GHz) | N/A | R&S | 2018/5/18 | 1Y |
| EM033-02-02 | Coaxial cable(1 GHz-18 GHz) | N/A | R&S | 2018/5/18 | 1Y |
| EM033-04-02 | Coaxial cable(18 GHz~40 GHz) | N/A | R&S | 2018/5/25 | 1Y |
| EM031-01 | Signal Generator (9 kHz~6 GHz) | SMB100A | R&S | 2018/8/1 | 1Y |
| EM085-02 | Signal Generator (10MHz-40GHz) | 68369B | Wiltron | 2018/5/31 | 1Y |
| EM040-01 | Band Reject/Notch Filter | WRHFV | Wainwright | N/A | 1Y |
| EM040-02 | Band Reject/Notch Filter | WRCGV | Wainwright | N/A | 1Y |
| EM040-03 | Band Reject/Notch Filter | WRCGV | Wainwright | N/A | 1Y |
| EM022-03 | 2.45 GHz Filter | BRM50702 | Micro-Tronics | 2018/5/9 | 1Y |
| SA016-16 | Programmable Temperature & Humidity Test Chamber | MHU-800LJ | TERCHY | 2017/10/21 | 1Y |
| SA016-22 | Climatic Test Chamber | C7-1500 | Vötsch | 2017/10/21 | 1Y |
| SA012-74 | Digital Multimeter | FLUKE175 | FLUKE | 2017/10/13 | 1Y |
| EM010-01 | Regulated DC Power supply | PAB-3003A | GUANHUA | N/A | 1Y |
| SA040-22 | Regulated DC Power supply | IT6721 | ITECH | 2017/9/18 | 1Y |
| EM084-06 | Audio Analyzer | 8903B | HP | 2018/4/3 | 1Y |
| EM084-07 | Modulation Analyzer | 8901B | HP | 2018/6/15 | 1Y |
| EM045-01-01 | EMC32 software (RE/RS) | V10.01.00 | R&S | N/A | N/A |
| EM045-01-09 | EMC32 software (328/893) | V9.26.01 | R&S | N/A | N/A |

**Conducted emission at the mains terminals**

| Equipment No. | Equipment | Model | Manufacturer | Cal. Due date (YYYY-MM-DD) | Calibration Interval |
|---|---|---|---|---|---|
| EM080-05 | EMI receiver | ESCI | R&S | 2018/7/24 | 1Y |
| EM006-05 | LISN | ENV216 | R&S | 2018/6/4 | 1Y |
| EM006-06 | LISN | ENV216 | R&S | 2017/9/18 | 1Y |
| EM006-06-01 | Coaxial cable | / | R&S | 2018/4/6 | 1Y |
| EM004-04 | EMC shield Room | 8m×3m×3m | Zhongyu | 2018/1/23 | 1Y |