Report No.: 160720149GZU-002
Issued: 2016-12-06

# TEST REPORT

| | | |
|---|---|---|
| Applicant Name & Address | : | SUNWAY INDUSTRIES(HONG KONG)CO.LTD<br>UNIT C, 16/F., CHINAWEAL CENTRE, 414-424 JAFFE ROAD, WANCHAI, HONG KONG |
| Sample Description | | |
| Product | : | Kitchen Machine (Cooking Blender) |
| FCC ID | : | 2AJMC-1280025848821 |
| Model No. | : | SPM-128L |
| Electrical Rating | : | AC 120V/60Hz |
| Date Received | : | 22 July 2016 |
| Date Test Conducted | : | 23 July 2016 – 30 October 2016 |
| Test standards | : | **47 CFR PART 15 Subpart C: 2015 section 15.247** |
| Test Result | : | Pass |
| Conclusion | : | The submitted samples complied with the above rules/standards. |
| Remark | : | TRF No.: FCC BT 4.0-a<br>Effective date: 01 July 2016 |

***Prepared and Checked By:***

Sky Zhu

***Sky Zhu***
***Project Engineer***
***Intertek Guangzhou***

***Approved By:***

Helen Ma ***Signature***

***Helen Ma***
***Team Leader***
***Intertek Guangzhou***
***06 December 2016 Date***



Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
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# CONTENT

## 1.0 Summary of Test

| TEST | TEST REQUIREMENT | TEST METHOD | RESULT |
|---|---|---|---|
| Antenna Requirement | FCC PART 15 C section 15.247 (c) and Section 15.203 | FCC PART 15 C section 15.247 (c) and Section 15.203 | PASS |
| 6 dB Bandwidth (DTS bandwidth) | FCC PART 15 C section 15.247 (a)(2) | ANSI C63.10: Clause 11.8 | PASS |
| Maximum Peak Conducted Output Power | FCC PART 15 C section 15.247(b)(3) | ANSI C63.10: Clause 11.9.1.2 | PASS |
| Peak Power Spectral Density | FCC PART 15 C section 15.247(e) | ANSI C63.10: Clause 11.10.2 | PASS |
| Out of Band Conducted Emissions | FCC PART 15 C section 15.209 &15.247(d) | ANSI C63.10: Clause 11.11 | PASS |
| Out of Band Radiated Emission | FCC PART 15 C section 15.209 &15.247(d) | ANSI C63.10: Clause 11.11, 6.4, 6.5 and 6.6 | N/A |
| Radiated Emissions in Restricted Bands | FCC PART 15 C section 15.209 &15.247(d) | ANSI C63.10: Clause 11.12.1, 6.4, 6.5 and 6.6 | PASS |
| Band Edges Measurement | FCC PART 15 C section 15.247 (d) &15.205 | ANSI C63.10: Clause 11.11 and 11.13 | 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.
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 C63.10:2013 in the whole report.

## 2.0 General Description

## 2.1 Product Description

| | |
|---|---|
| Operating Frequency | 2402 MHz to 2480 MHz |
| Type of Modulation: | GFSK |
| Number of Channels | 40 Channels |
| Channel Separation: | 2 MHz |
| Antenna Type | Integral |
| Antenna gain: | 1.5 dBi |
| Speciality: | Bluetooth 4.0 with BLE (Bluetooth Low Energy) |
| Power Supply: | AC 120V,60Hz |
| Power cord: | 1.1 m x 3 wires unscreened AC supply cable |

EUT modulation and data packet during test:

The EUT has been tested on the Modulation of GFSK with 1 Mbps data rate.

EUT channels and frequencies list:

Test frequencies are lowest channel 0: 2402 MHz, middle channel 19: 2440 MHz and highest channel 39: 2480 MHz.

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| 0 | 2402 | 14 | 2430 | 28 | 2458 |
| 1 | 2404 | 15 | 2432 | 29 | 2460 |
| 2 | 2406 | 16 | 2434 | 30 | 2462 |
| 3 | 2408 | 17 | 2436 | 31 | 2464 |
| 4 | 2410 | 18 | 2438 | 32 | 2466 |
| 5 | 2412 | 19 | 2440 | 33 | 2468 |
| 6 | 2414 | 20 | 2442 | 34 | 2470 |
| 7 | 2416 | 21 | 2444 | 35 | 2472 |
| 8 | 2418 | 22 | 2446 | 36 | 2474 |
| 9 | 2420 | 23 | 2448 | 37 | 2476 |
| 10 | 2422 | 24 | 2450 | 38 | 2478 |
| 11 | 2424 | 25 | 2452 | 39 | 2480 |
| 12 | 2426 | 26 | 2454 | / | / |
| 13 | 2428 | 27 | 2456 | / | / |

## 2.2 Related Submittal(s) Grants

This is an application for certification of:
This is an application for certification of:
DTS- Part 15 Digital Transmission Systems

Remaining portions are subject to the following procedures:
1. Receiver portion of BLE: exempt from technical requirement of this Part.
2. The food maker function: exempt from FCC requirement.

## 2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10. 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 of the tests are performed at:
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch. Located at Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, 510663, China. This test facility and site measurement data have been fully placed on file with the FCC, test firm registration number is 549654.

## 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. During testing, AC power line was manipulated to produce worst case emissions. It was powered by AC 120V/60Hz supply.

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. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. 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

The test was performed under “MT 7601USB” which was provided by manufacture.

### 3.3 Special Accessories

No special accessories used.

### 3.4 Measurement Uncertainty

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | RF output power (conducted) | 1.1 dB |
| 2 | Occupied Channel Bandwidth | 2.3% |
| 3 | Power Spectral Density | 1.5dB |
| 4 | Spurious Emission (TX)-Radiated | 4.7 dB (25 MHz-1 GHz) |
| | | 4.8 dB (1 GHz-18 GHz) |
| 5 | Spurious Emission (TX)-Conducted | 1.5 dB |
| 6 | Spurious Emission (RX) -Radiated | 4.7 dB (25 MHz-1 GHz) |
| | | 4.8 dB (1 GHz-25 GHz) |
| 7 | Spurious Emission (RX)-Conducted | 1.5 dB |
| 8 | Temperature | 0.5 °C |
| 9 | Humidity | 0.4 % |
| 10 | 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 "SUNWAY INDUSTRIES(HONG KONG)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

This product was tested with corresponding accessories as below:
Supplied by Intertek:

| Description | Manufacturer | Model No. | SN/Certificate NO |
|---|---|---|---|
| NoteBook | Lenovo | T143 | PB-FR45R |

## 4.0 Measurement Results

## 4.1 Antenna Requirement:

Standard requirement

15.203 requirement:

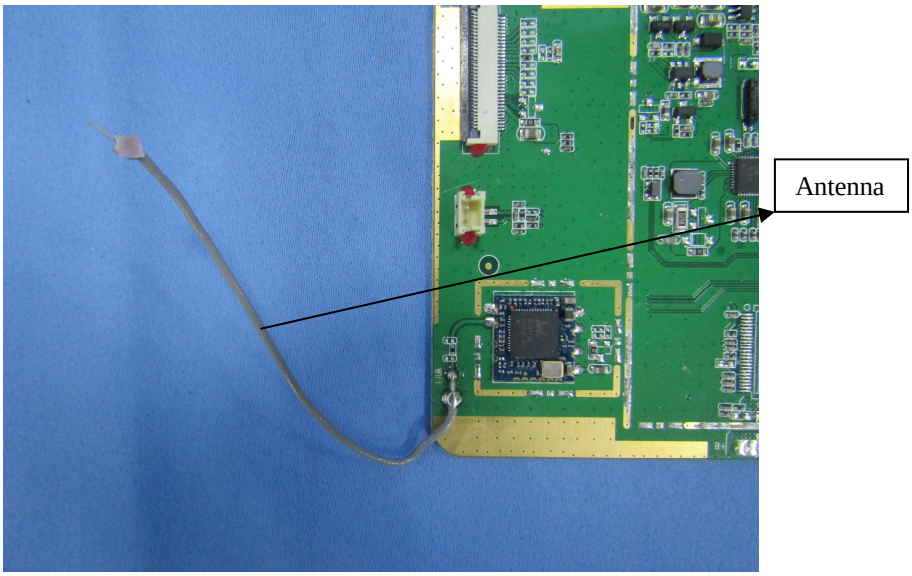
For intentional device. According to 15.203 an intentional radiator shall be designed to Ensure that no antenna other than that furnished by the responsible party shall be used with the device.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz bands that are used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna

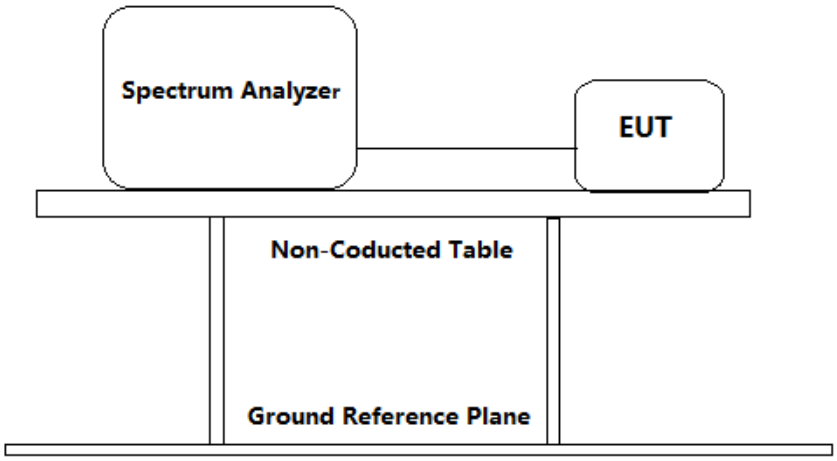
The antenna is an integral antenna and no consideration of replacement. The best case gain of the antenna is 1.5 dBi.



## 4.2 6 dB Bandwidth (DTS bandwidth):

| | |
|---|---|
| Test Requirement: | FCC Part 15 C section 15.247<br>(a)(2)Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. |
| Test Method: | ANSI C63.10: Clause 11.8 |
| 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). Following channel(s) was (were) selected for the final test as listed below. |

Test Configuration:




Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =0.5 dB) from the antenna port to the spectrum.
2. Set the spectrum analyzer:
   a) Set RBW = 100 kHz
   b) Set the VBW≥ [3 × RBW]
   c) Detector = peak.
   d) Trace mode = max hold.
   e) Sweep = auto couple
   f) Allow the trace to stabilize.
   g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are

attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

h) Span=2*BW~5*BW

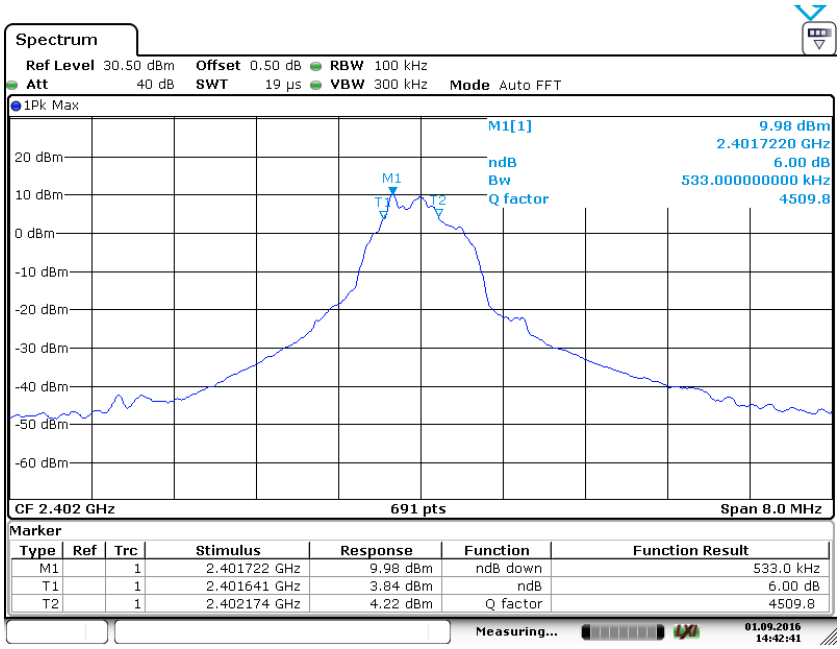
3. Repeat until all the test status is investigated.
4. Report the worst case.

| Channel No. | Frequency (MHz) | Measured 6dB bandwidth (kHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| 0 | 2402 | 533 | ≥500 | Pass |
| 19 | 2440 | 533 | | Pass |
| 39 | 2480 | 533 | | Pass |

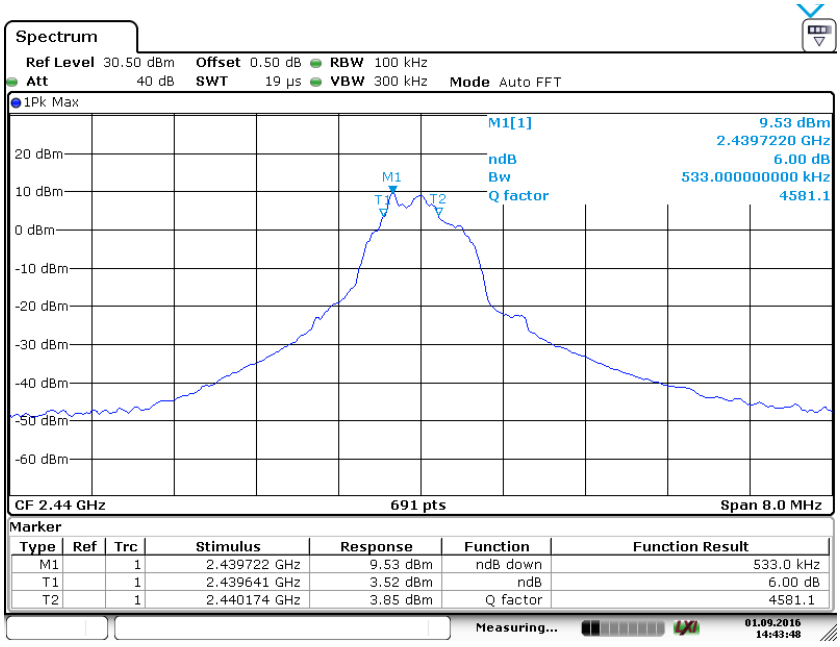
Test result: The unit does meet the FCC requirements.

Result plot as follows:

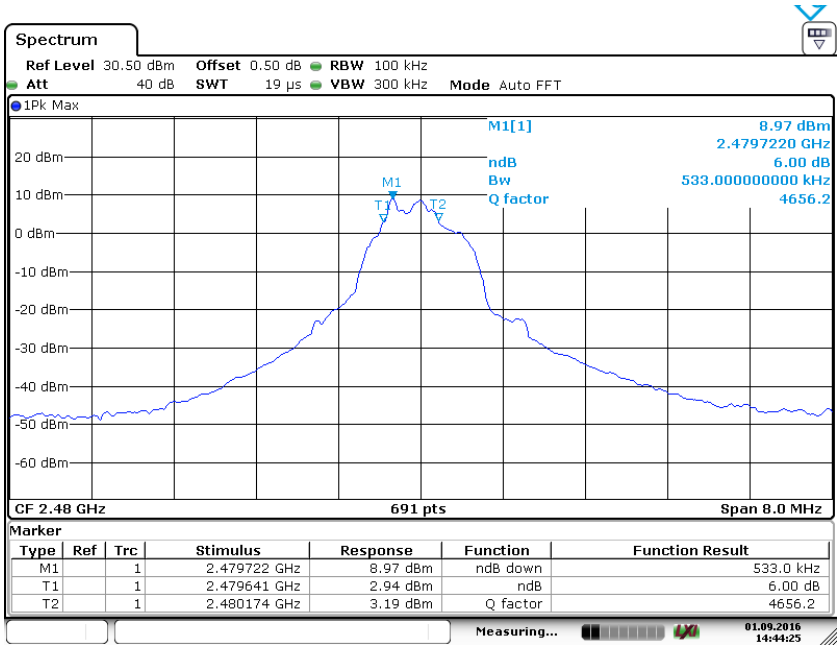
**Lowest channel (2.402 GHz):**




**Middle Channel (2.440 GHz):**



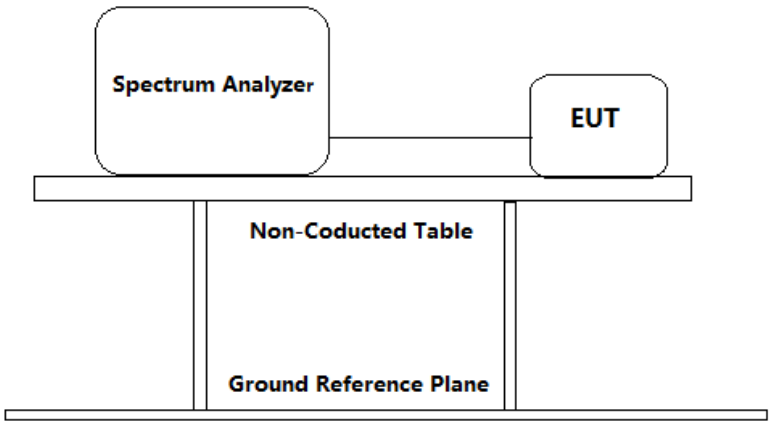
**Highest Channel (2.480 GHz):**



## 4.3 Maximum Peak Conducted Output Power

| | |
|---|---|
| Test Requirement: | FCC Part 15 C section 15.247<br>(b)(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.<br>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. |
| Test Method: | ANSI C63.10: Clause 11.9.1.1(RBW ≥ DTS bandwidth) |
| 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). Following channel(s) was (were) selected for the final test as listed below. |

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =0.5 dB) from the antenna port to the spectrum.
2. Set the spectrum analyzer:
   a) Set the RBW = 1 MHz（RBW≥DTS bandwidth）.
   b) Set the VBW≥[3 × RBW].
   c) Set the span≥10 MHz[3 × RBW].
   d) Detector = peak.
   e) Sweep time = auto couple.
   f) Trace mode = max hold.
   g) Allow trace to fully stabilize.
   h) Use peak marker function to determine the peak amplitude level.
3. Repeat until all the test status is investigated.
4. Report the worst case.

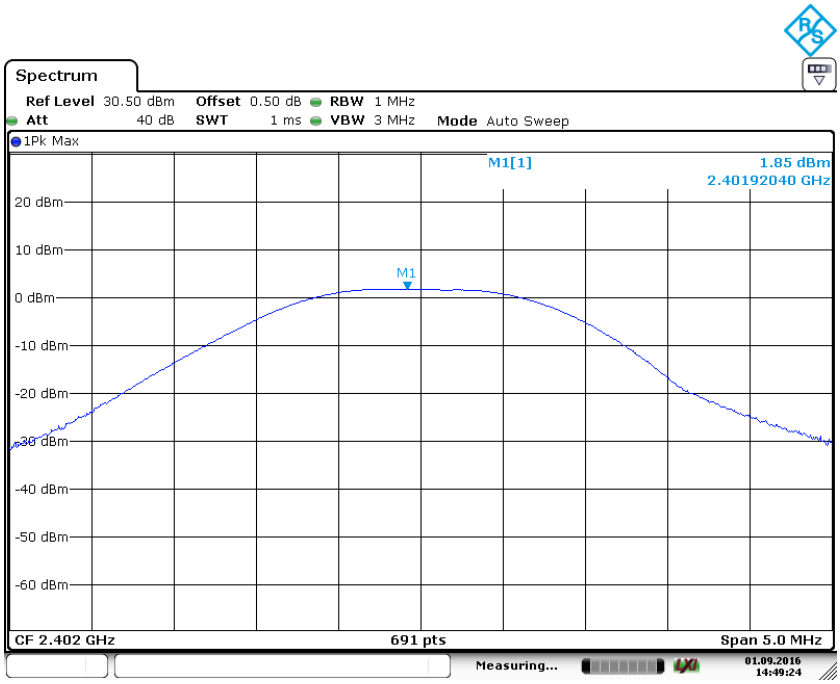
**Test result:**

| Channel No. | Frequency (MHz) | Measured Channel Power (dBm) | Limit | Result |
|---|---|---|---|---|
| 0 | 2402 | 1.85 | 1W (30 dBm) | Pass |
| 19 | 2440 | 1.28 | | Pass |
| 39 | 2480 | 0.48 | | Pass |

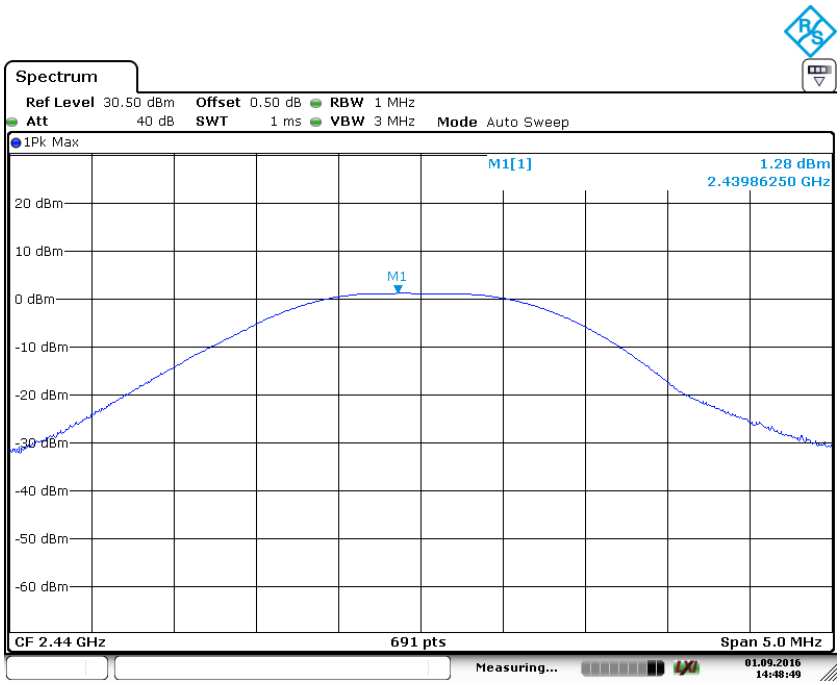
Remark: Level = Read Level + Cable Loss.

Result plot as follows:

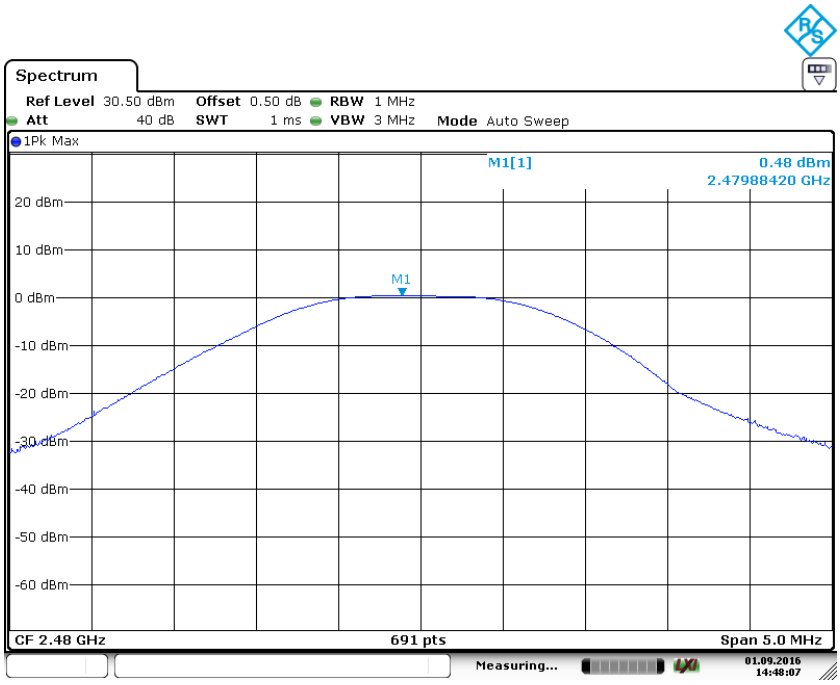
**Lowest channel (2.402 GHz):**



**Middle Channel (2.440 GHz):**




**Highest Channel (2.480 GHz):**



## 4.4 Peak Power Spectral Density

Test Requirement: FCC Part 15 C section 15.247

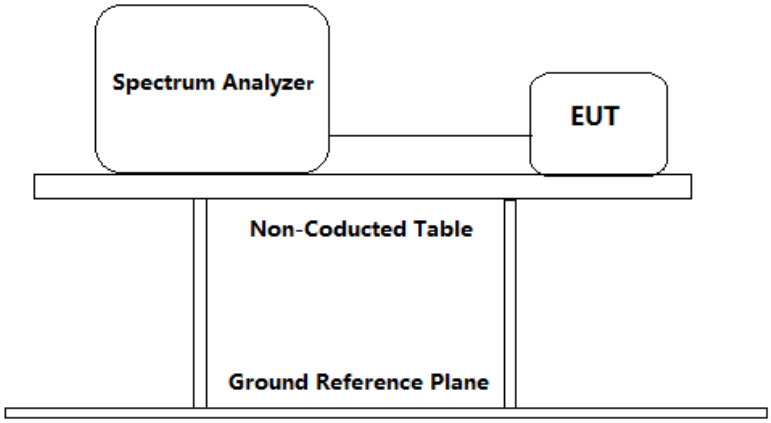
(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Method: ANSI C63.10: Clause 11.10.2

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). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =0.5 dB) from the antenna port to the spectrum analyzer or power meter.
2. Set the spectrum analyzer:
   a) Set analyzer center frequency to DTS channel center frequency.
   b) Set the span= 1.5 × DTS bandwidth.
   c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
   d) Set the VBW ≥ [3 × RBW].
   e) Detector = peak.
   f) Sweep time = auto couple.
   g) Trace mode = max hold.
   h) Allow trace to fully stabilize.
   i) Use the peak marker function to determine the maximum amplitude level within the RBW.
   j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.
3. Measure the Power Spectral Density of the test frequency with special test status.
4. Repeat until all the test status is investigated.
5. Report the worst case.

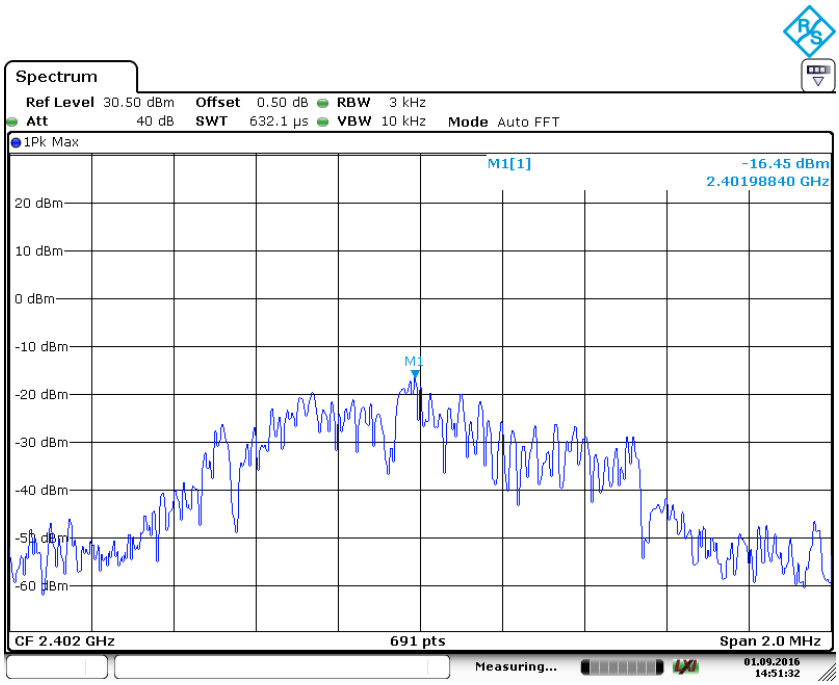
**Test result:**

| Channel No. | Frequency (MHz) | Measured Peak Power Spectral Density (dBm/3 kHz) | Limit | Result |
|---|---|---|---|---|
| 0 | 2402 | -16.45 | 8 dBm/3 kHz | Pass |
| 19 | 2440 | -16.98 | | Pass |
| 39 | 2480 | -17.78 | | Pass |

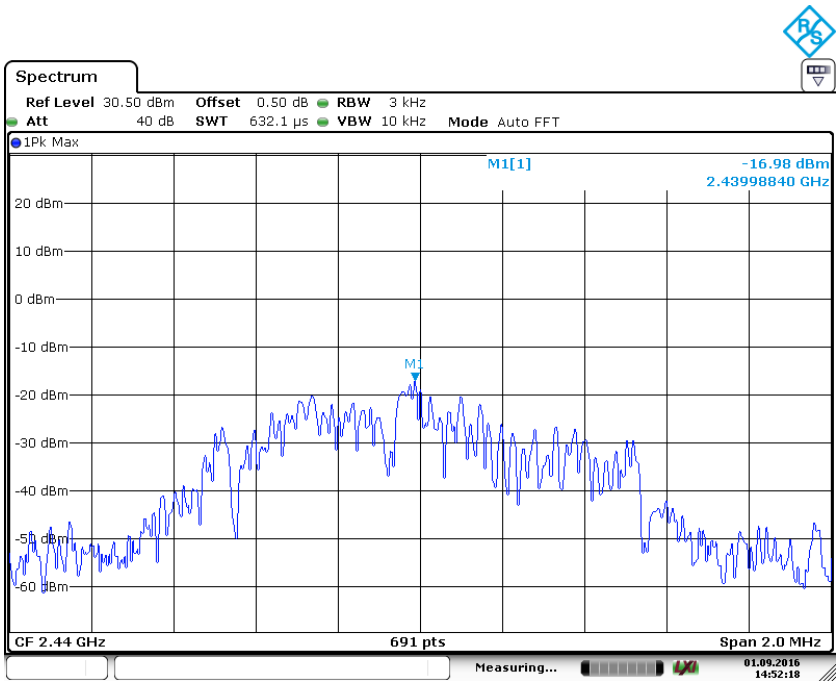
Test result: Level = Read Level + Cable Loss.

**Result plot as follows:**

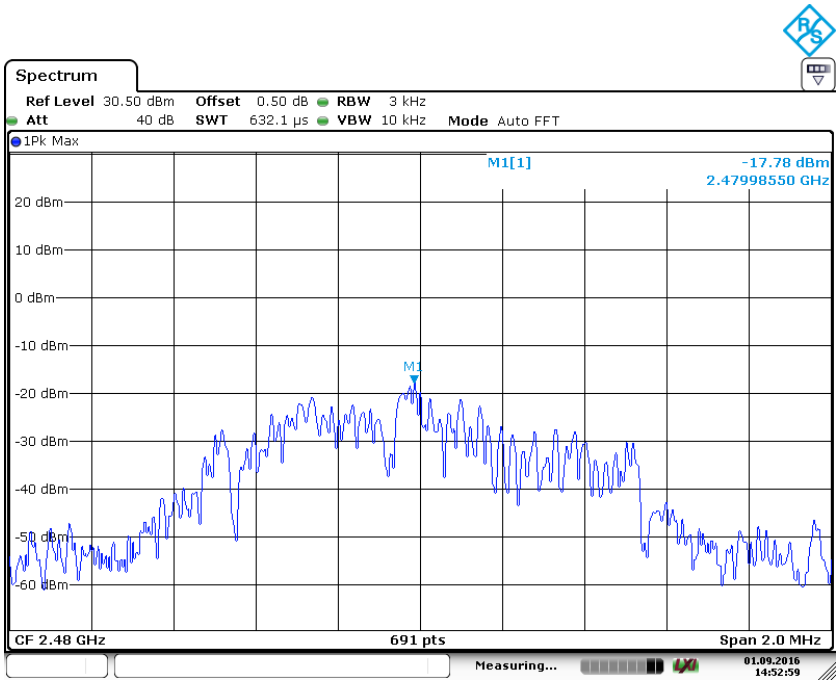
**Lowest channel (2.402 GHz):**



**Middle Channel (2.440 GHz):**




**Highest Channel (2.480 GHz):**



## 4.5 Out of Band Conducted Emissions

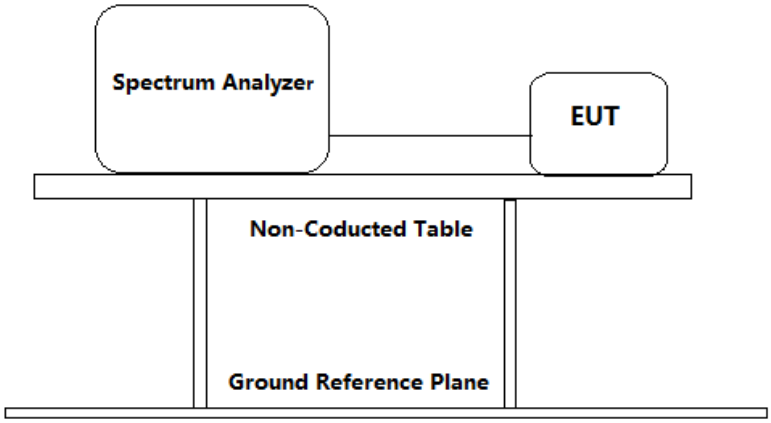
Test Requirement: FCC Part 15 C section 15.247

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits.

Test Method: ANSI C63.10: Clause 11.11

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). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:




Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable (cable loss =0.5dB) from the antenna port to the spectrum analyzer or power meter.
2. Establish a reference level by using the following procedure:
   a) Set instrument center frequency to DTS channel center frequency.
   b) Set the span to ≥ 1.5 × DTS bandwidth.
   c) Set the RBW = 100 kHz.
   d) Set the VBW ≥ [3 × RBW].
   e) Detector = peak.
   f) Sweep time = auto couple.

g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level

3. Emission level measurement

a) Set the center frequency and span to encompass frequency range to be measured.

b) Set the RBW = 100 kHz.

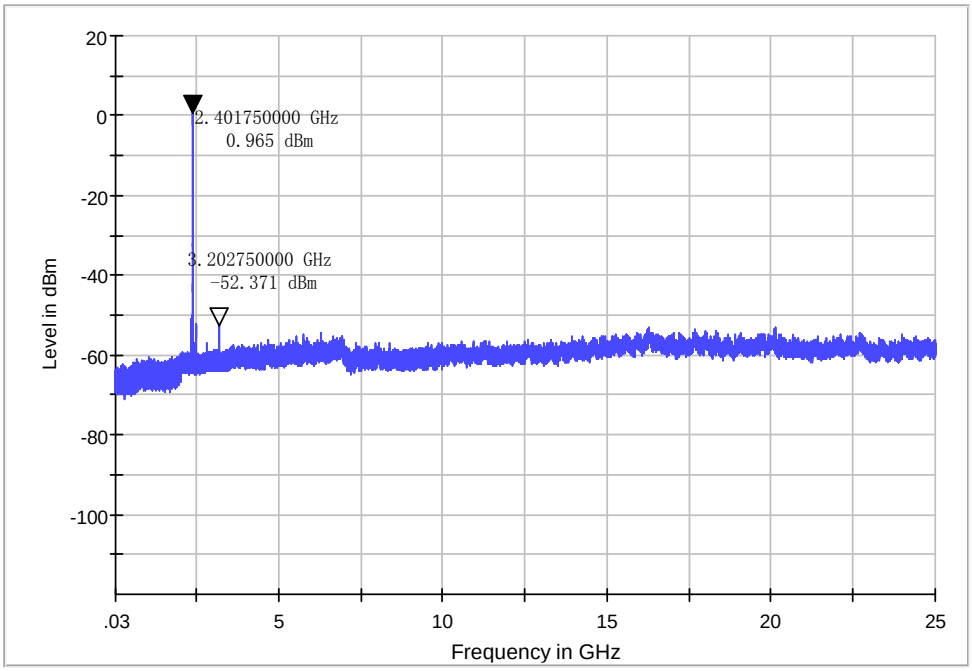
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

4. Measure the Conducted unwanted Emissions of the test frequency with special test status.
5. Repeat until all the test status is investigated.
6. Report the worst case.

Result plot as follows:

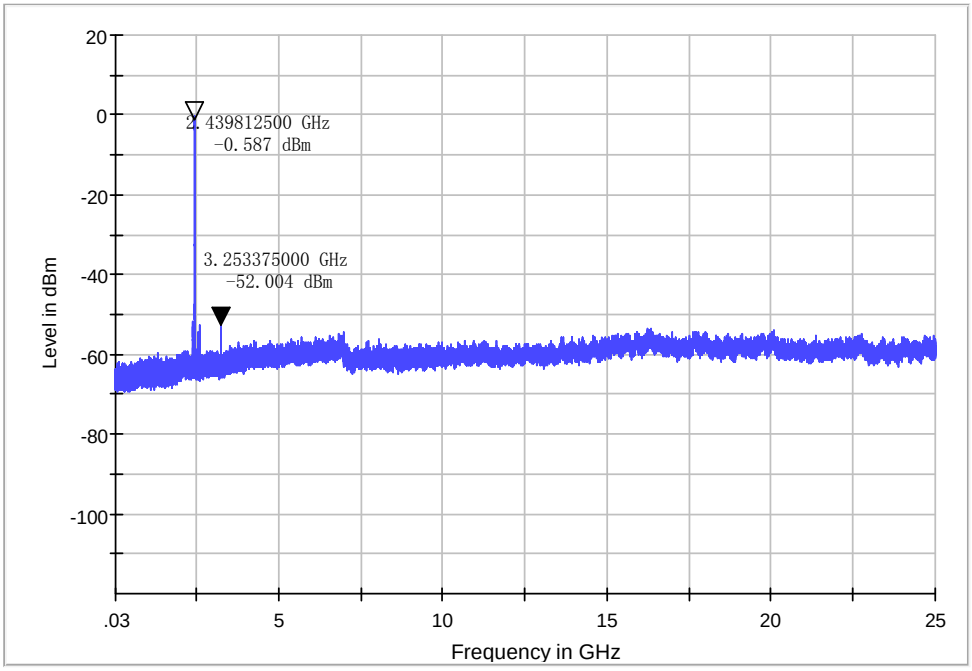
**Lowest channel (2.402 GHz):**

30 MHz to 1 GHz:




In any 100 kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

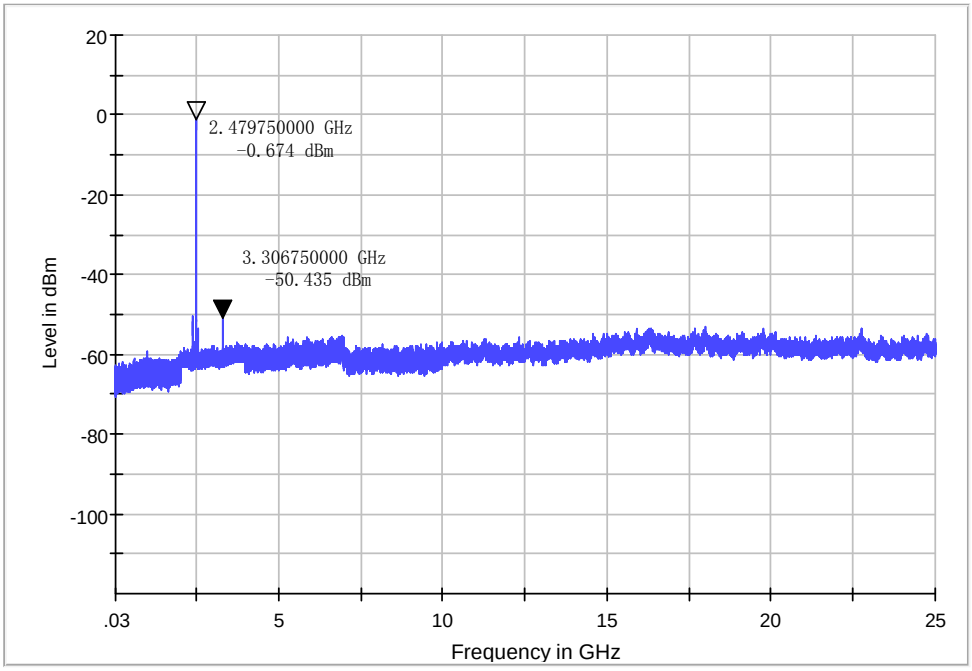
**Middle Channel (2.440 GHz):**




In any 100 kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

**Highest Channel (2.480 GHz):**

30 MHz to 1 GHz:




In any 100 kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

## 4.6 Out of Band Radiated Emissions

For out of band radiated emissions into Non-Restricted Frequency Bands were performed at a 3m separation distance to determine whether these emissions complied with the 20dB attenuation requirement.

[×] Not required, since all emissions are more than 20dB below fundamental
[ ] See attached data sheet

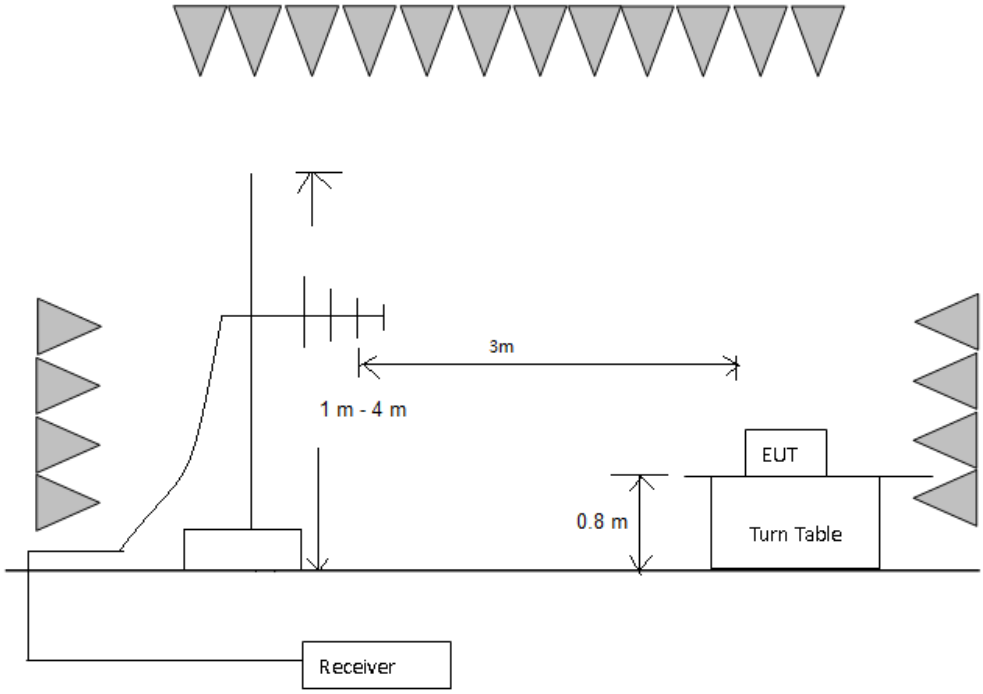
## 4.7 Radiated Emissions in Restricted Bands

| | |
|---|---|
| Test Requirement: | FCC Part 15 C section 15.247<br>(d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)). |
| Test Method: | ANSI C63.10: Clause 11.12.1, 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). Following channel(s) was (were) selected for the final test as listed below. |
| Test site: | Measurement Distance: 3m (Semi-Anechoic Chamber) |
| Limit: | 40.0 dBμV/m between 30MHz & 88MHz;<br>43.5 dBμV/m between 88MHz & 216MHz;<br>46.0 dBμV/m between 216MHz & 960MHz;<br>54.0 dBμV/m above 960MHz. |
| Detector: | For Peak and Quasi-Peak value:<br>RBW =<br>1 MHz for f ≥ 1 GHz,<br>200 Hz for 9 kHz to 150 kHz<br>9 kHz for 150 kHz to 30 MHz<br>120 kHz for 30 MHz to 1GHz<br>VBW ≥ RBW<br>Sweep = auto<br>Detector function = peak for f ≥ 1 GHz, QP for f < 1 GHz<br>Trace = max hold<br><br>For AV value:<br>RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz<br>VBW=3 MHz<br>Detector function=AV detector<br>Sweep = auto<br>Trace = max hold |

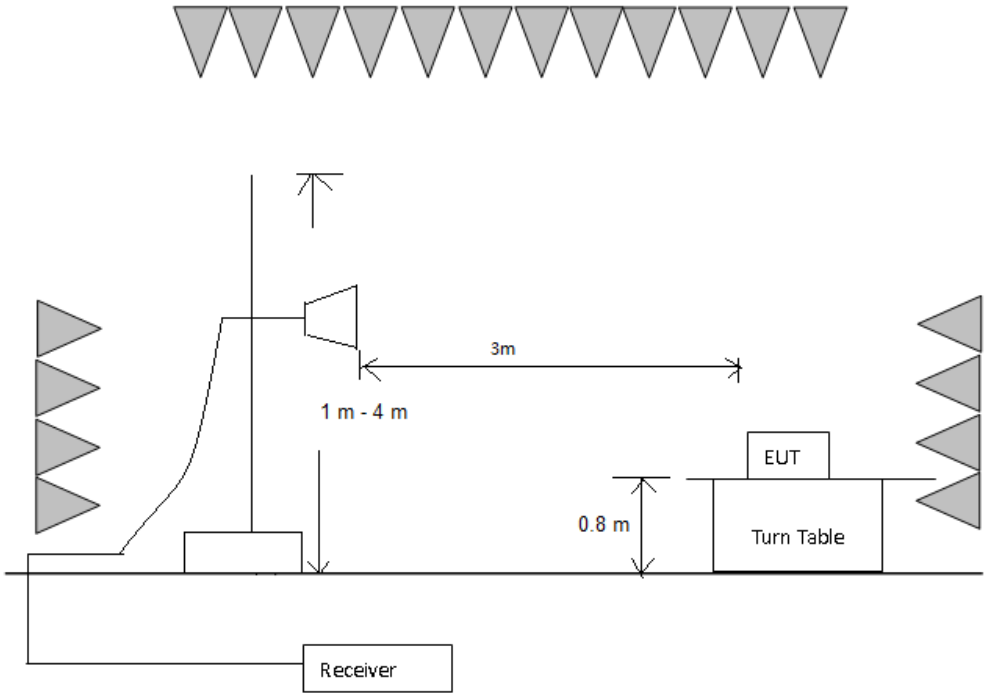
Section 15.205 Restricted bands of operation.
(a) Except as shown in paragraph (d) of this section. Only spurious emissions are permitted in any of the frequency bands listed below:

| 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 | 10.6 - 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) 30 MHz to 1 GHz emissions:




2) 1 GHz to 40 GHz emissions:




**Test Procedure:**

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.

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.

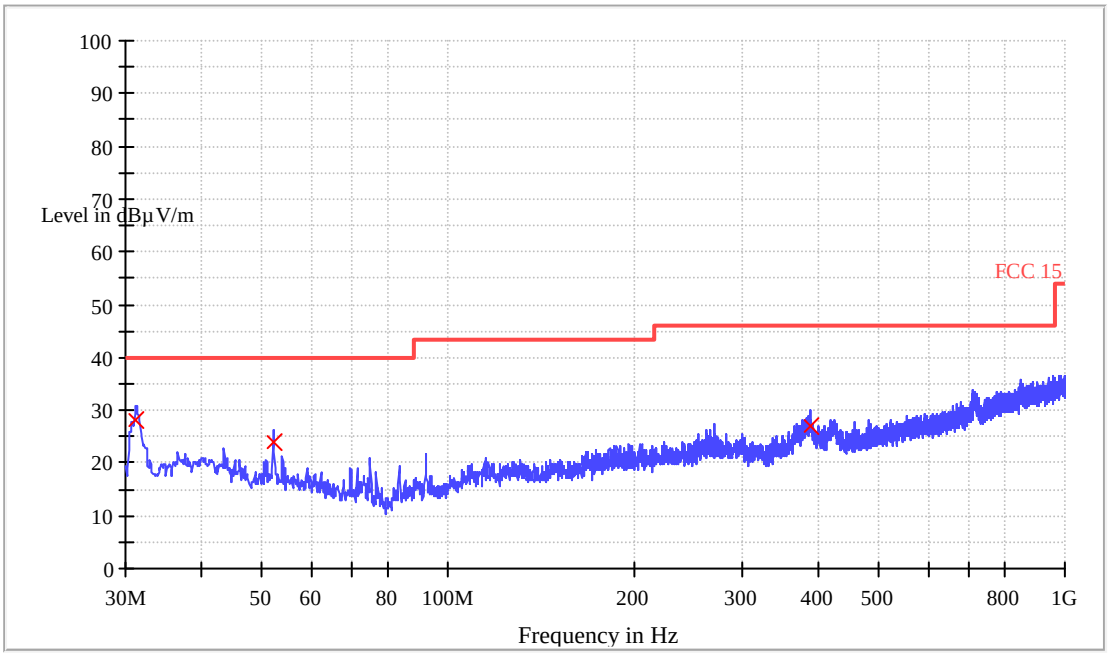
9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

Test at Channel 0 (2.402 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

**Vertical:**

Quasi-peak measurement

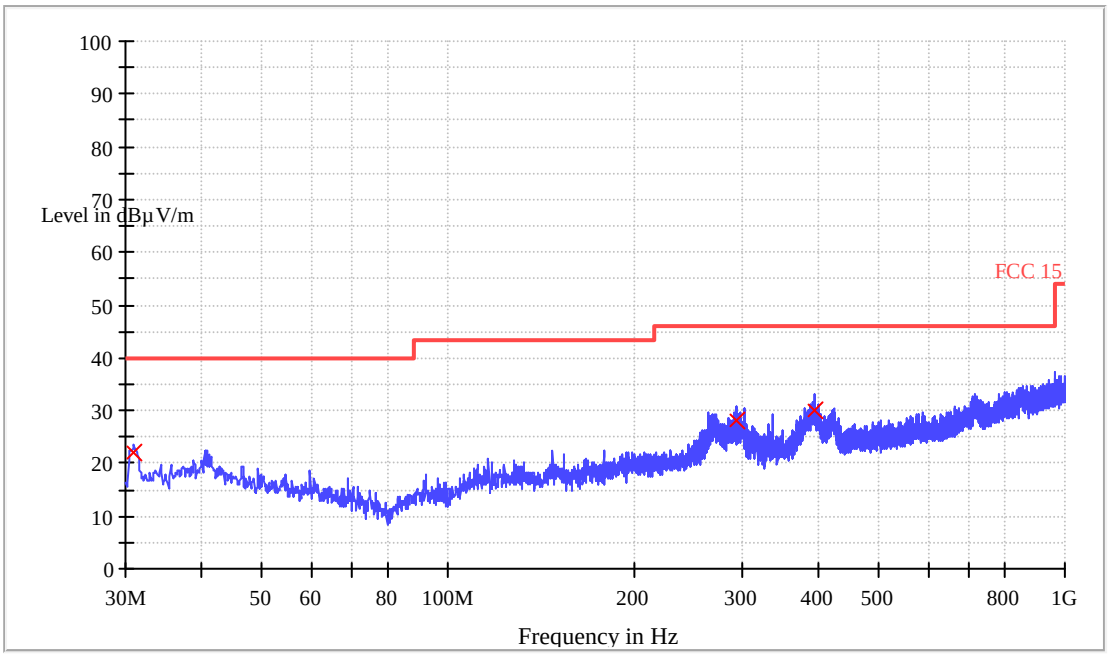



## QP

| Frequency (MHz) | QuasiPeak (dBµV/m) | Bandwidth (kHz) | Pol | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV/m) |
|---|---|---|---|---|---|---|
| 31.240000 | 28.0 | 120.000 | V | 13.3 | 12.0 | 40.0 |
| 52.200000 | 24.1 | 120.000 | V | 11.7 | 15.9 | 40.0 |
| 386.200000 | 27.0 | 120.000 | V | 18.7 | 19.0 | 46.0 |

**Horizontal:**

Quasi-peak measurement




## QP

| Frequency (MHz) | QuasiPeak (dBµV/m) | Bandwidth (kHz) | Pol | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV/m) |
|---|---|---|---|---|---|---|
| 31.000000 | 21.9 | 120.000 | H | 13.2 | 18.1 | 40.0 |
| 292.480000 | 28.1 | 120.000 | H | 17.1 | 17.9 | 46.0 |
| 393.400000 | 30.0 | 120.000 | H | 18.8 | 16.0 | 46.0 |

1~25 GHz Radiated Emissions. Peak & Average Measurement

| Polarization | Frequency (MHz) | PK Net at 3m (dBµV/m) | AV Net at 3m (dBµV/m) | Correction Factor (dB) | PK Limit at 3m (dBµV/m) | PK Margin (dB) | AV Limit at 3m (dBµV/m) | AV Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Horizontal | 4804.280 | 44.0 | / | -0.5 | 74.0 | / | 54.0 | -10.0 |
| Horizontal | 7206.400 | 47.3 | / | 4.9 | 74.0 | / | 54.0 | -6.7 |
| Horizontal | 9848.000 | 51.2 | / | 7.1 | 74.0 | / | 54.0 | -2.8 |
| Vertical | 4804.600 | 43.5 | / | 0.2 | 74.0 | / | 54.0 | -10.5 |
| Vertical | 10272.800 | 49.8 | / | 7.7 | 74.0 | / | 54.0 | -4.2 |
| Vertical | 10855.200 | 50.0 | / | 8.0 | 74.0 | / | 54.0 | -4.0 |

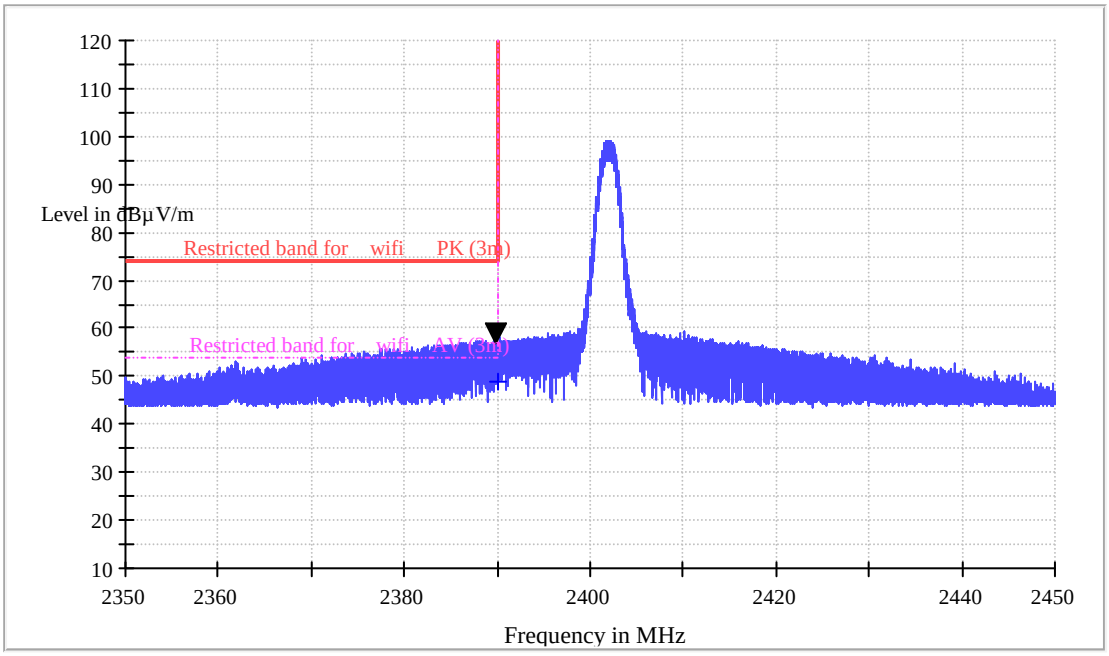
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Correction Factor

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

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Band Edge test Restricted Bands
Horizontal



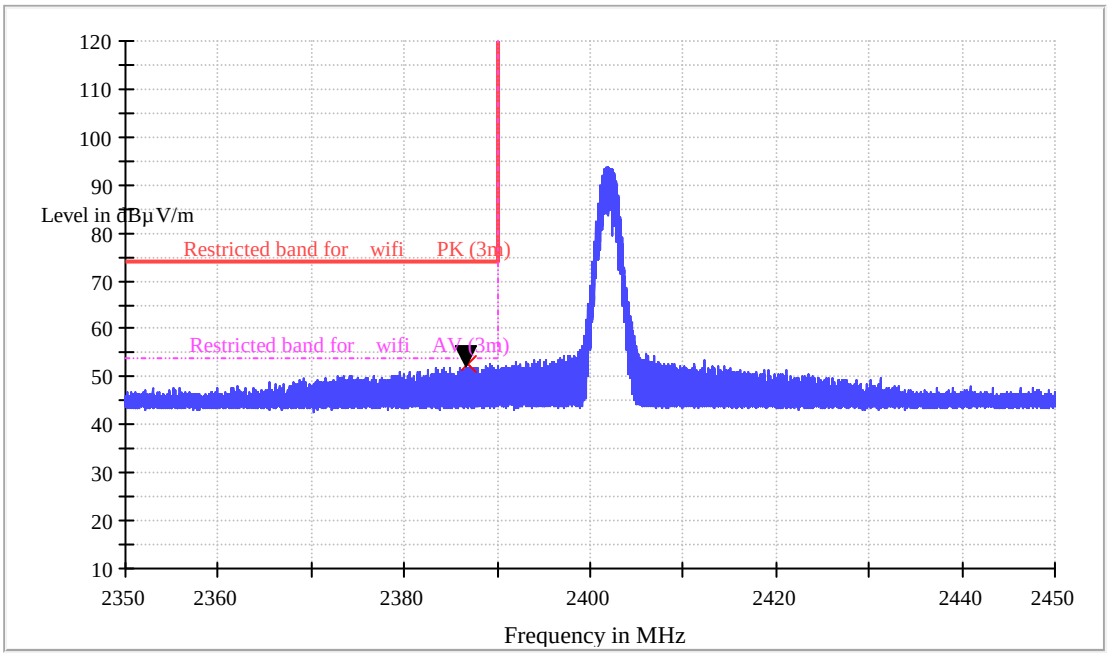

## Result Table_Single

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|
| 2390.000000 | 57.4 | 1000.0 | 1000.000 | 150.0 | H | 1.0 | -2.3 | 74 |

## Result Table_Single

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|
| 2390.000000 | 49.1 | 1000.0 | 1000.000 | 150.0 | H | 1.0 | -2.3 | 54 |

Vertical




## Result Table_Single

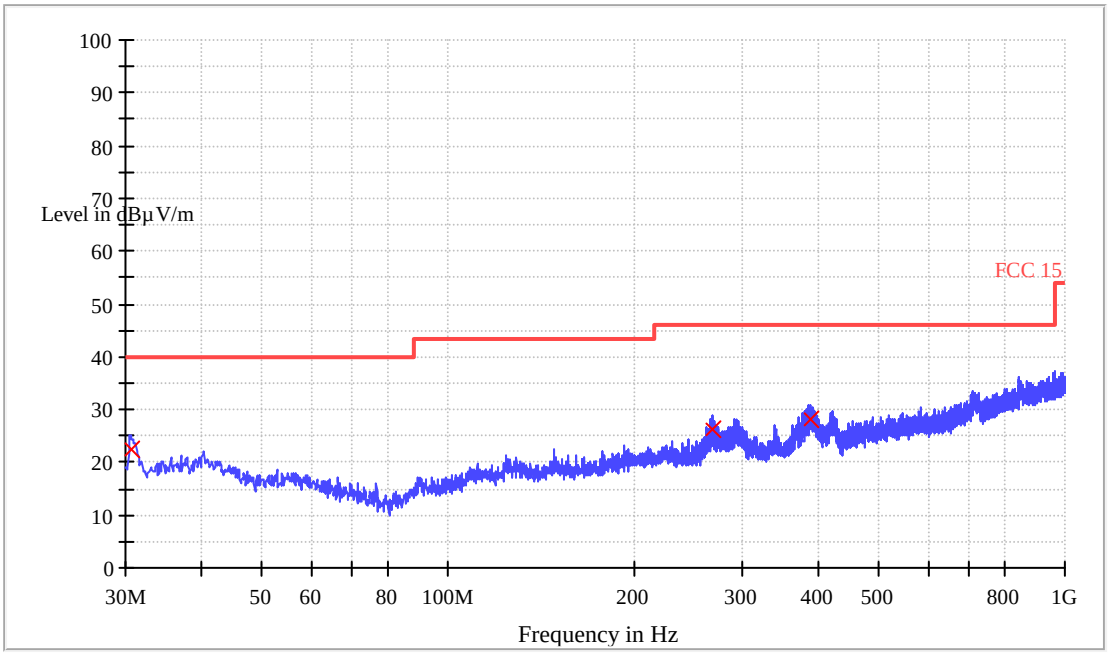
| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 2386.800000 | 52.5 | --- | 1000.0 | 1000.000 | 150.0 | V | 1.0 | -2.3 | 54 |

Test at Channel 19 (2.440 GHz) in transmitting status

30 MHz~1 GHz Radiated Emissions .Quasi-Peak Measurement

**Vertical:**

Quasi-peak measurement

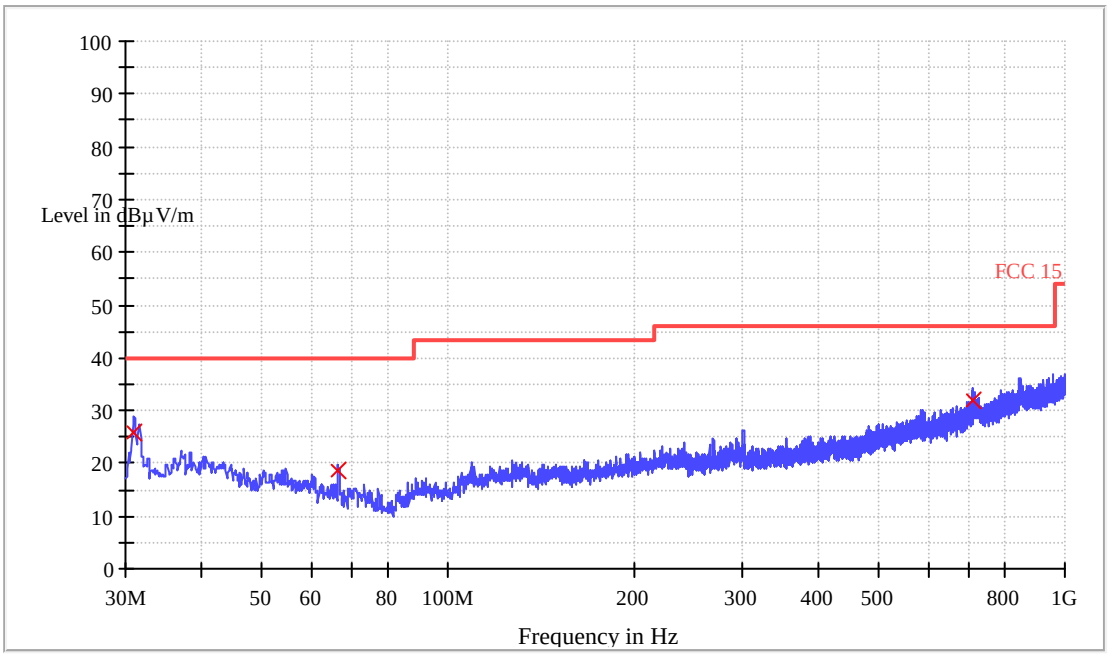



## QP

| Frequency (MHz) | QuasiPeak (dBµV/m) | Bandwidth (kHz) | Pol | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV/m) |
|---|---|---|---|---|---|---|
| 30.680000 | 22.6 | 120.000 | H | 13.1 | 17.4 | 40.0 |
| 268.000000 | 26.2 | 120.000 | H | 16.0 | 19.8 | 46.0 |
| 386.640000 | 28.2 | 120.000 | H | 18.7 | 17.8 | 46.0 |

**Horizontal:**

Quasi-peak measurement




## QP

| Frequency (MHz) | QuasiPeak (dBµV/m) | Bandwidth (kHz) | Pol | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV/m) |
|---|---|---|---|---|---|---|
| 31.000000 | 25.9 | 120.000 | V | 13.2 | 14.1 | 40.0 |
| 66.320000 | 18.6 | 120.000 | V | 9.7 | 21.4 | 40.0 |
| 709.120000 | 31.9 | 120.000 | V | 23.9 | 14.1 | 46.0 |

1~25 GHz Radiated Emissions. Peak & Average Measurement

| Polarization | Frequency (MHz) | PK Net at 3m (dBµV/m) | AV Net at 3m (dBµV/m) | Correction Factor (dB) | PK Limit at 3m (dBµV/m) | PK Margin (dB) | AV Limit at 3m (dBµV/m) | AV Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Horizontal | 4880.200 | 43.0 | / | -0.5 | 74.0 | / | 54.0 | -11.0 |
| Horizontal | 7702.800 | 48.4 | / | 4.7 | 74.0 | / | 54.0 | -5.6 |
| Horizontal | 9879.200 | 49.1 | / | 7.2 | 74.0 | / | 54.0 | -4.9 |
| Vertical | 4880.000 | 44.8 | / | 1.4 | 74.0 | / | 54.0 | -9.2 |
| Vertical | 7650.800 | 47.6 | / | 4.6 | 74.0 | / | 54.0 | -6.4 |
| Vertical | 10381.200 | 50.0 | / | 7.8 | 74.0 | / | 54.0 | -4.0 |

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 + Correction Factor

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

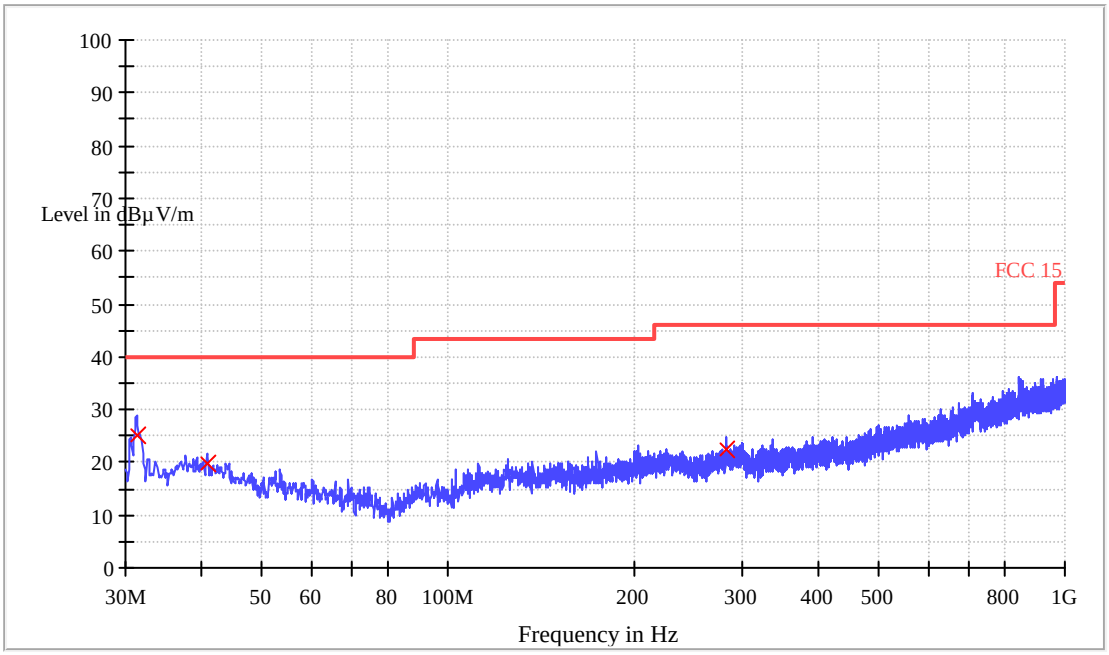
Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 39 (2.480 GHz) in transmitting status

30 MHz~1 GHz Radiated Emissions .Quasi-Peak Measurement

**Vertical:**

Quasi-peak measurement

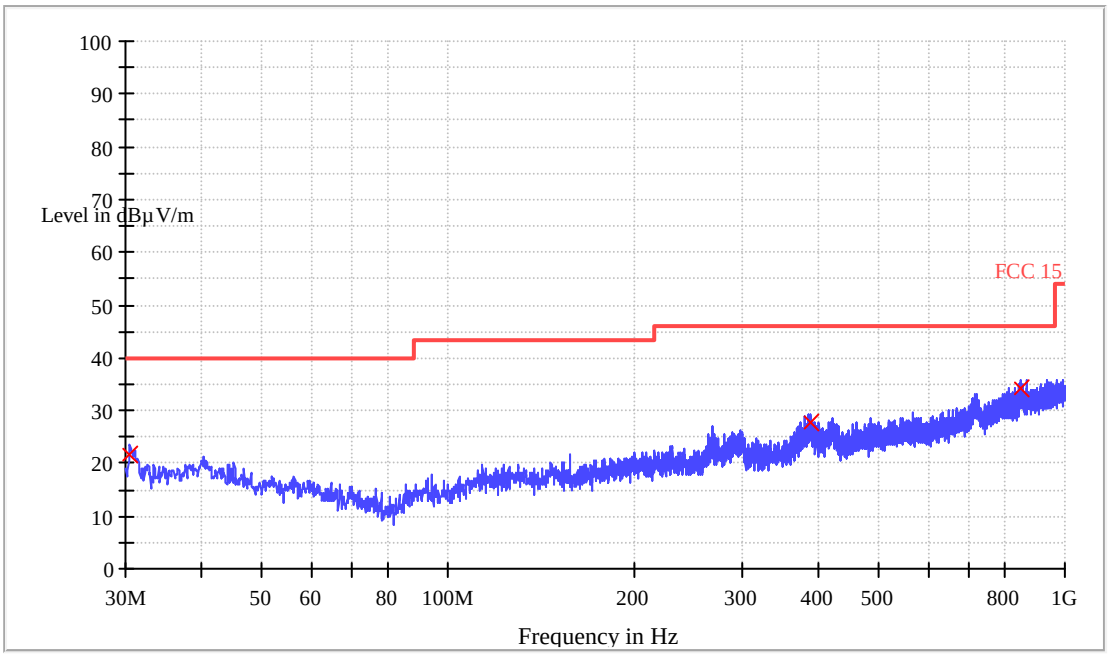



## QP

| Frequency (MHz) | QuasiPeak (dBµV/m) | Bandwidth (kHz) | Pol | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV/m) |
|---|---|---|---|---|---|---|
| 31.360000 | 25.3 | 120.000 | V | 13.3 | 14.7 | 40.0 |
| 40.720000 | 19.8 | 120.000 | V | 15.7 | 20.2 | 40.0 |
| 282.640000 | 22.3 | 120.000 | V | 16.5 | 23.7 | 46.0 |

**Horizontal:**

Quasi-peak measurement




## QP

| Frequency (MHz) | QuasiPeak (dBµV/m) | Bandwidth (kHz) | Pol | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV/m) |
|---|---|---|---|---|---|---|
| 30.560000 | 21.6 | 120.000 | H | 13.0 | 18.4 | 40.0 |
| 386.520000 | 27.8 | 120.000 | H | 18.7 | 18.2 | 46.0 |
| 849.080000 | 34.1 | 120.000 | H | 27.3 | 11.9 | 46.0 |

1~25 GHz Radiated Emissions. Peak & Average Measurement

| Polarization | Frequency (MHz) | PK Net at 3m (dBµV/m) | AV Net at 3m (dBµV/m) | Correction Factor (dB) | PK Limit at 3m (dBµV/m) | PK Margin (dB) | AV Limit at 3m (dBµV/m) | AV Margi (dB) |
|---|---|---|---|---|---|---|---|---|
| Horizontal | 4960.200 | 45.1 | / | 2.4 | 74.0 | / | 54.0 | -8.9 |
| Horizontal | 7602.800 | 47.6 | / | 4.6 | 74.0 | / | 54.0 | -6.4 |
| Horizontal | 9848.000 | 50.9 | / | 7.1 | 74.0 | / | 54.0 | -3.1 |
| Vertical | 4960.400 | 45.6 | / | 2.4 | 74.0 | / | 54.0 | -8.4 |
| Vertical | 7639.600 | 47.6 | / | 4.6 | 74.0 | / | 54.0 | -6.4 |
| Vertical | 9960.000 | 49.1 | / | 7.4 | 74.0 | / | 54.0 | -4.9 |

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

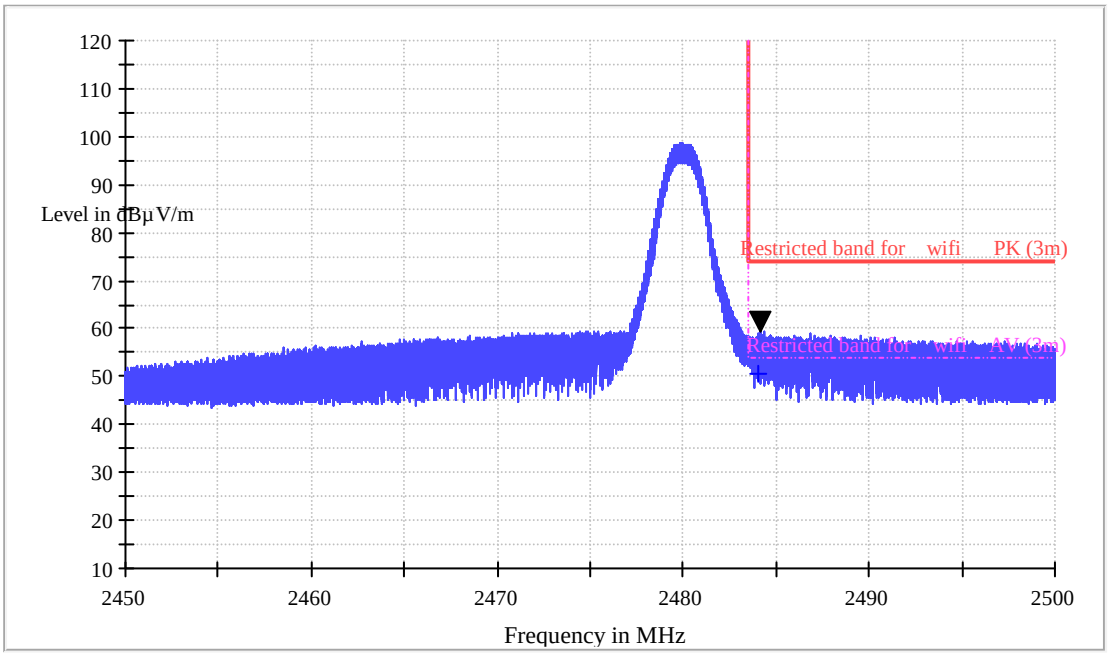
Final Test Level =Receiver Reading + Correction Factor

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

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Band Edge test Restricted Bands

Horizontal



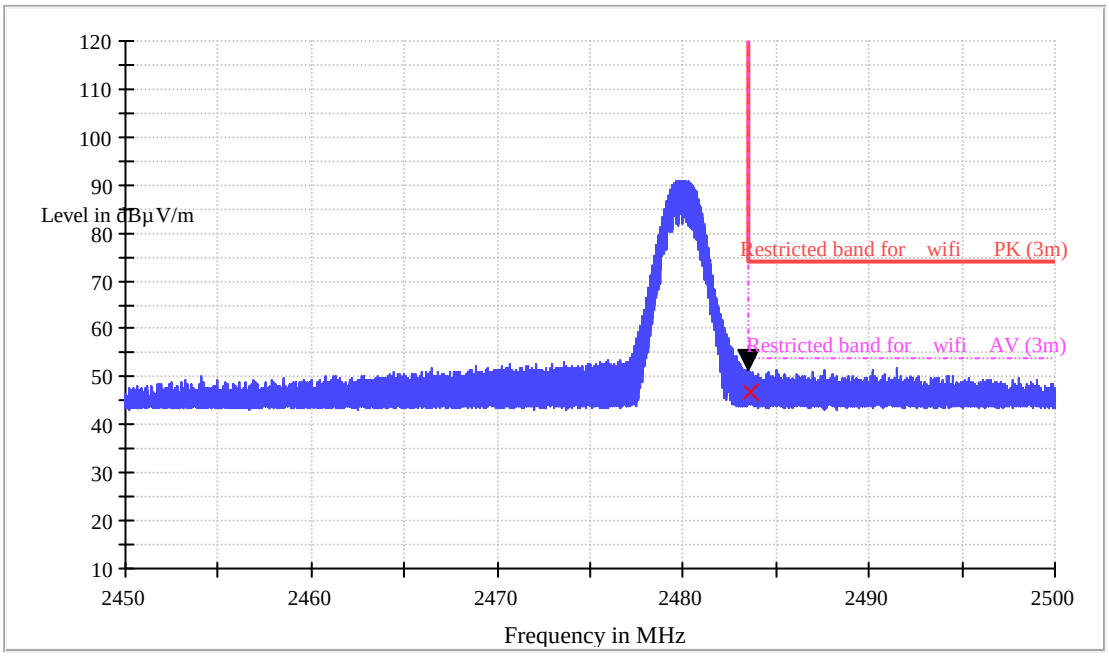

## Result Table_Single

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|
| 2484.000000 | 59.6 | 1000.0 | 1000.000 | 150.0 | H | 359.0 | -2.1 | 74 |

## Result Table_Single

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|
| 2484.000000 | 52.9 | 1000.0 | 1000.000 | 150.0 | H | 359.0 | -2.1 | 54 |

Vertical

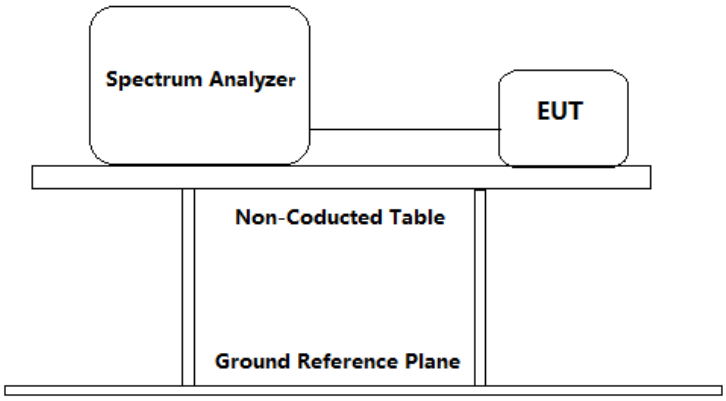



## Result Table_Single

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|
| 2483.600000 | 51.8 | 1000.0 | 1000.000 | 150.0 | V | 1.0 | -2.1 | 54 |

## 4.8 Band Edges Requirement

| | |
|---|---|
| Test Requirement: | FCC Part 15 C section 15.247<br>(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits. |
| Frequency Band: | 2400 MHz to 2483.5 MHz |
| Test Method: | ANSI C63.10: Clause 11.11 and 11.13 |
| 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). Following channel(s) was (were) selected for the final test as listed below. |
| Test Configuration: | For Band Edges Emission in Radiated mode, Please refer to clause 4.7 |




Test Procedure: For Band Edges Emission in Radiated mode, Please refer to clause 4.7

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer.

   a) Set instrument center frequency to the frequency of the emission to be measured (must be within 2 MHz of the authorized band edge).
   b) Set the center frequency and span to encompass frequency range to be measured.
   c) RBW = 100 kHz.
   d) VBW ≥ [3 × RBW].
   e) Detector = peak.

f) Sweep time = auto.
g) Trace mode = max hold.
h) Allow sweep to continue until the trace stabilizes (required measurement time may increase for low-duty-cycle applications).
i) For radiated Band-edge emissions within a restricted band and within 2 MHz of an authorized band edge, integration method is considered.

2. Repeat until all the test status is investigated.
3. Report the worst case.

**Test result with plots as follows:**

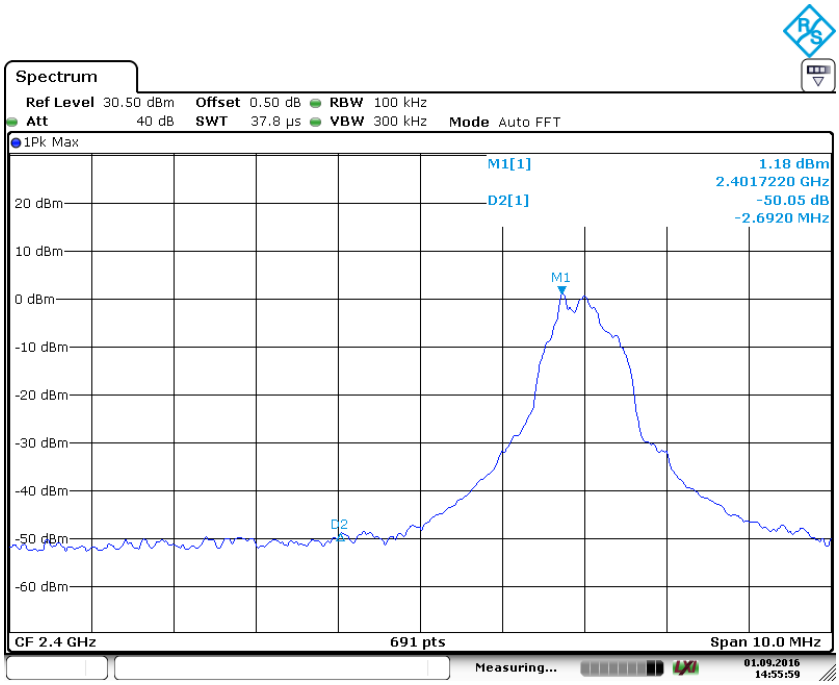
**For conduct mode:**

The band edges was measured and recorded Result:

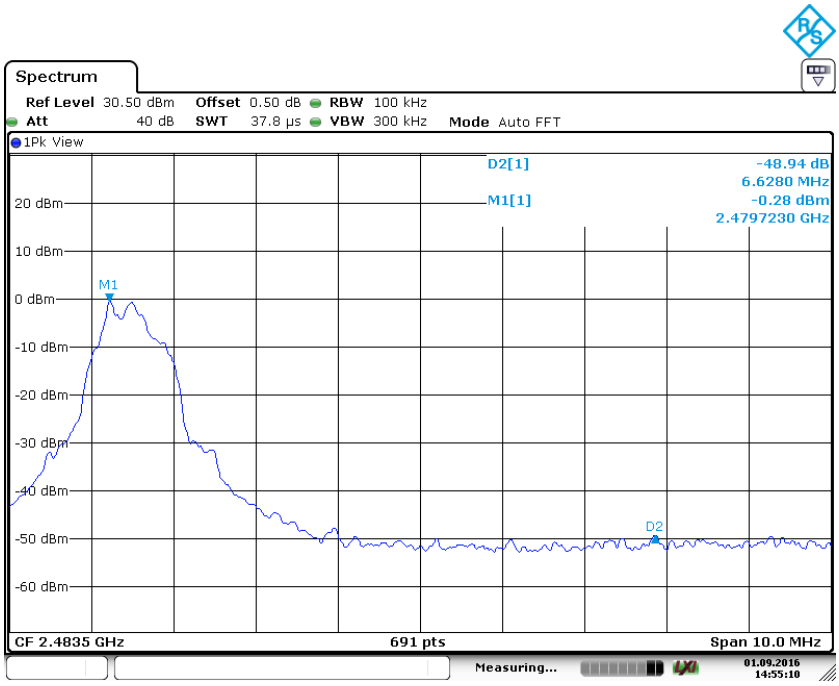
The Lower Edges attenuated more than 20dB.

The Upper Edges attenuated more than 20dB.

Channel 0: 2.402 GHz

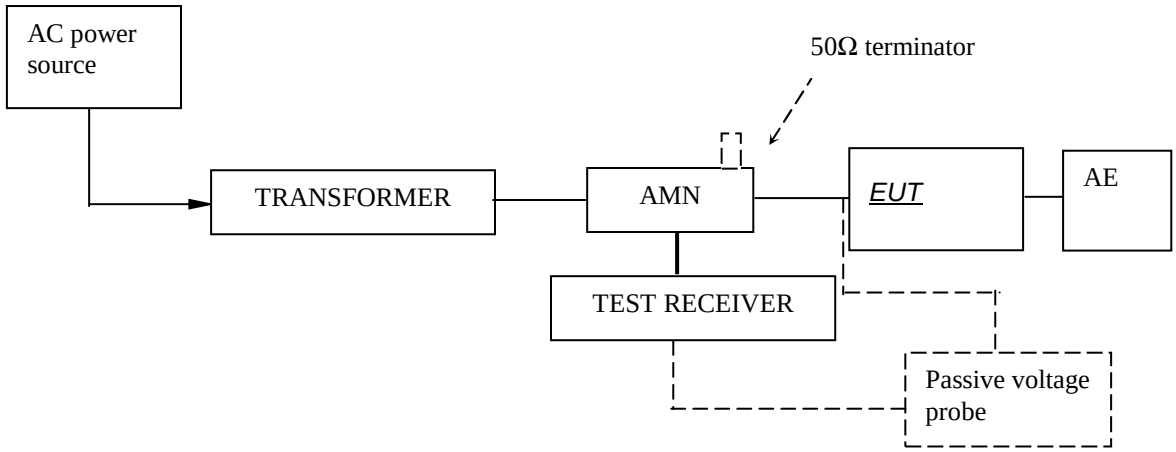



Channel 39: 2.480 GHz



## 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 on all modes and only the worst case data had been report.

Worst Case Test Data

At main terminal: Pass

Tested Wire: Live Operation Mode: transmitting at 2440MHz

EDIT PEAK LIST (Final Measurement Results)

Trace1: FCC15QP
Trace2: FCC15AV
Trace3: ---

| TRACE | | FREQUENCY | LEVEL dBµV | | DELTA LIMIT dB |
|---|---|---|---|---|---|
| 1 | Quasi Peak | 154 kHz | 61.95 | L1 | -3.82 |
| 2 | Average | 166 kHz | 40.20 | L1 | -14.95 |
| 1 | Quasi Peak | 386 kHz | 35.91 | L1 | -22.23 |
| 1 | Quasi Peak | 4.39 MHz | 36.40 | L1 | -19.59 |
| 1 | Quasi Peak | 12.09 MHz | 42.12 | L1 | -17.87 |
| 1 | Quasi Peak | 15.63 MHz | 37.46 | L1 | -22.53 |

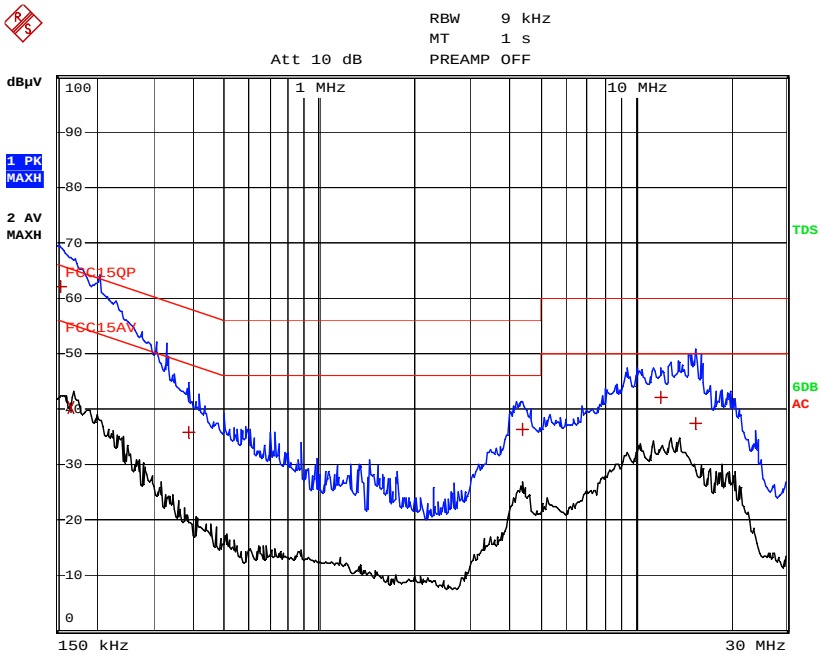
Tested Wire: Neutral Operation Mode: transmitting at 2440MHz

EDIT PEAK LIST (Final Measurement Results)

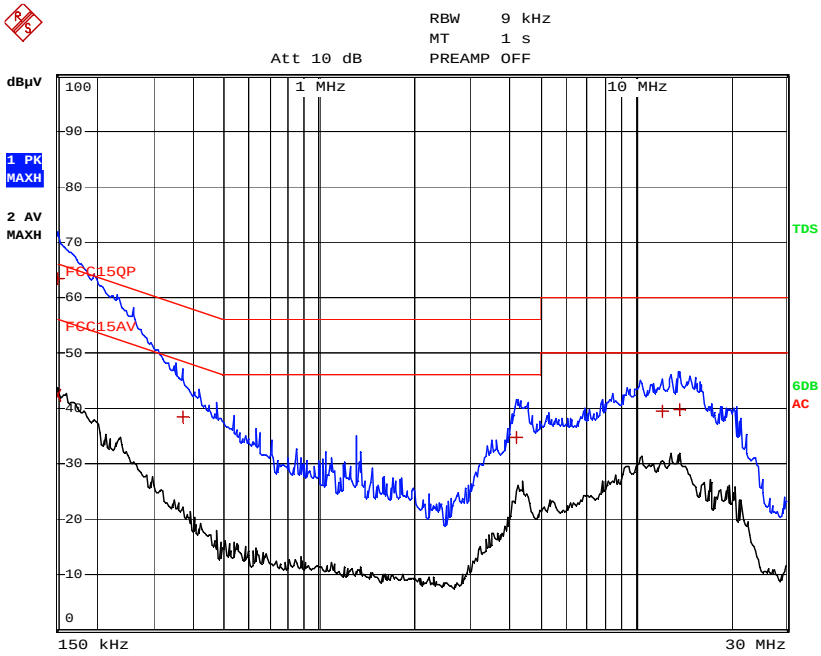
Trace1: FCC15QP
Trace2: FCC15AV
Trace3: ---

| TRACE | | FREQUENCY | LEVEL dBµV | | DELTA LIMIT dB |
|---|---|---|---|---|---|
| 1 | Quasi Peak | 150 kHz | 63.50 | L1 | -2.49 |
| 2 | Average | 150 kHz | 42.30 | L1 | -13.69 |
| 1 | Quasi Peak | 370 kHz | 38.48 | L1 | -20.01 |
| 1 | Quasi Peak | 4.214 MHz | 34.80 | L1 | -21.19 |
| 1 | Quasi Peak | 12.182 MHz | 39.51 | L1 | -20.48 |
| 1 | Quasi Peak | 13.786 MHz | 39.69 | L1 | -20.30 |

Emission Curve
Tested Wire: Live




Tested Wire: Neutral



## 5.0 Test Equipment List

**Radiated Emission**

| Equipment No. | Equipment | Model | Manufacturer | Cal. Due date (YYYY-MM-DD) | Calibration Interval |
|---|---|---|---|---|---|
| EM030-04 | 3m Semi-Anechoic Chamber | 9×6×6 $m^3$ | ETS·LINDGREN | 2017/5/9 | 1Y |
| EM031-02 | EMI Test Receiver (9 kHz~7 GHz) | R&S ESR7 | R&S | 2017/6/7 | 1Y |
| EM031-03 | Signal and Spectrum Analyzer (10 Hz~40 GHz) | R&S FSV40 | R&S | 2017/6/3 | 1Y |
| EM011-04 | Loop antenna (9 kHz-30 MHz) | HFH2-Z2 | R&S | 2017/6/6 | 1Y |
| EM061-03 | TRILOG Super Broadband test Antenna (30 MHz-1.5 GHz）(TX) | VULB 9161 | SCHWARZBECK | 2017/6/6 | 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 | 2017/6/6 | 1Y |
| EM033-03 | High Frequency Antenna & preamplifier(18 GHz~26.5 GHz) (RX) | R&S SCU-26 | R&S | 2017/4/1 | 1Y |
| EM033-04 | High Frequency Antenna & preamplifier (26 GHz-40 GHz) | R&S SCU-40 | R&S | 2017/4/1 | 1Y |
| EM031-02-01 | Coaxial cable(9 kHz-1 GHz) | N/A | R&S | 2017/5/30 | 1Y |
| EM033-02-02 | Coaxial cable(1 GHz-18 GHz) | N/A | R&S | 2017/5/30 | 1Y |
| EM033-04-02 | Coaxial cable(18 GHz~40 GHz) | N/A | R&S | 2017/4/1 | 1Y |
| EM031-01 | Signal Generator (9 kHz~6 GHz) | SMB100A | R&S | 2017/6/11 | 1Y |
| SZ180-10 | Signal Generator (10MHz-40GHz) | 68369B | Wiltron | 2017/5/23 | 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 | 2017/5/9 | 1Y |
| SA016-16 | Programmable Temperature & Humidity Test Chamber | MHU-800LJ | TERCHY | 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 | 2017/3/29 | 1Y |
| EM084-07 | Modulation Analyzer | 8901B | HP | 2017/6/5 | 1Y |

**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 | 2017/7/26 | 1Y |
| EM006-05 | LISN | ENV216 | R&S | 2017/9/18 | 1Y |
| EM006-06 | LISN | ENV216 | R&S | 2017/9/18 | 1Y |
| EM006-06-01 | Coaxial cable | / | R&S | 2017/4/11 | 1Y |
| EM004-04 | EMC shield Room | 8m×3m×3m | Zhongyu | 2017/1/25 | 1Y |