**Report No: CCISE190708602**

# TEST REPORT

| | |
|---|---|
| **Applicant:** | **Binatone Electronics International Ltd.** |
| **Address of Applicant:** | Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong, China |

**Equipment Under Test (EUT)**

| | |
|---|---|
| Product Name: | Video Baby Monitor (Baby Unit) |
| Model Name.: | MBP482NXLBU, MBP482NBU, MBP482BU |
| Trade mark: | motorola |
| FCC ID: | VLJ-MBP482NBU |
| Canada IC: | 4522A-MBP482NBU |
| HVIN: | MBP482NBU |
| **Applicable standards:** | CFR47 FCC Part 15: Subpart C Section 15.247<br>CFR47 FCC Part 15: Subpart C Section 15.207<br>CFR47 FCC Part 15: Subpart C Section 15.209<br>CFR47 FCC Part 15: Subpart B Section 15.107<br>CFR47 FCC Part 15: Subpart B Section 15.109<br>RSS-247 Issue 2 February 2017<br>RSS-Gen Issue 5 April 2018<br>ICES-003 Issue 6 January 2016 |
| **Date of sample receipt:** | 08 May 2019 |
| **Date of Test:** | 08 May 2019 to 15 July 2019 |
| **Date of report issued:** | 18 July 2019 |
| **Test Result:** | PASS* |

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

Authorized Signature:


Bruce Zhang
Laboratory Manager

## Revision History

| Rev. | Issue Date | Report NO. | Effect Page | Contents |
|---|---|---|---|---|
| 00 | 18 July 2019 | CCISE190708602 | ALL | Initial Issue |
| | | | | |

***Tested by:*** Casey Chen ***Date:*** *08 May 2019 - 15 July 2019*

***Test Engineer***

***Reviewed by:*** Winner Zhang ***Date:*** *18 July 2019*

***Project Engineer***

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# 1 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

KDB 558074 D01 DTS Meas Guidance v05

| FCC Part 15, Subpart C<br>RSS-247 Issue 2 | | | |
|---|---|---|---|
| **Standard Section** | **Test Item** | **Judgment** | **Remark** |
| FCC Part 15.207(a)<br>RSS-Gen Clause 8.8 | Conducted Emission | PASS | |
| FCC Part 15.247(a)(1)<br>RSS-247 Clause 5.1(a) | 20dB Bandwidth | PASS | |
| RSS-Gen Clause 6.7 | 99% Bandwidth | PASS | |
| FCC Part 15.247(a)(1)<br>RSS-247 Clause 5.4(b) | Output Power | PASS | |
| FCC Part 15.247(d)<br>RSS-247 Clause 3.3 | Radiated Spurious Emission | PASS | |
| FCC Part 15.247(d)<br>RSS-247 Clause 5.5 | Conducted Spurious & Band Edge Emission | PASS | |
| FCC Part 15.247(a)(1)<br>RSS-247 Clause 5.1(b) | Hopping Channel Separation | PASS | |
| FCC Part 15.247(a)(1)<br>RSS-247 Clause 5.1(d) | Number of Hopping Frequency | PASS | |
| FCC Part 15.247(a)(1)<br>RSS-247 Clause 5.1(d) | Dwell Time | PASS | |
| FCC Part 15.205 | Restricted Band Edge Emission | PASS | |
| FCC Part 15.247(d) &<br>15.209(a)<br>RSS-247 Clause 5.5 | Band Edge Emission | PASS | |
| FCC Part 15.247(b)(4) &<br>15.203 | Antenna Requirement | PASS | |
| RSS-Gen Clause 6.11 | Frequency Stability | PASS | |

| FCC Part 15,Subpart B<br>ICES-003 Issue 6 | | | |
|---|---|---|---|
| **StandardSection** | **Test Item** | **Judgment** | **Remark** |
| FCC Part 15.107(a)<br>ICES-003 | Conducted Emission | PASS | Class B limit |
| FCC Part 15.109(a))<br>ICES-003 | Radiated Emission | PASS | Class B limit |

NOTE:

1) 'N/A' denotes test is not applicable in this test report
2) All tests were performed according to the procedures in ANSI C63.10: 2013 and ANSI C63.4: 2014.

## 1.1 TEST FACTORY

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

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

- FCC - Designation No.: CN1211

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- ISED – CAB identifier.: CN0021

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- CNAS - Registration No.: CNAS L6048

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

A2LA - Registration No.: 4346.01

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

## 1.2 MEASUREMENT UNCERTAINTY

| Parameters | Expanded Uncertainty |
|---|---|
| Conducted Emission (9kHz ~ 30MHz) | ±2.22 dB (k=2) |
| Radiated Emission (9kHz ~ 30MHz) | ±2.76 dB (k=2) |
| Radiated Emission (30MHz ~ 1000MHz) | ±4.28 dB (k=2) |
| Radiated Emission (1GHz ~ 18GHz) | ±5.72 dB (k=2) |
| Radiated Emission (18GHz ~ 40GHz) | ±2.88 dB (k=2) |

# 2 GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| Product Name | Video Baby Monitor (Baby Unit) |
| Trade Name | motorola |
| Model Name | MBP482NXLBU, |
| Series Model | MBP482NBU, MBP482BU |
| Model Difference | All models are fully identical except model name. |
| Product Description | The EUT is a Video Baby Monitor (Baby Unit) which supports 2.4GHz FHSS wireless technology.<br>Operation Frequency: 2405 – 2475 MHz<br>Modulation Type: FSK<br>Bit Rate of Transmitter: 2MHz, 2.5MHz, 3MHz, 4MHz, 4.5MHz<br>Number Of Channel: 32 channels (16 active channels)<br>Antenna Designation: Please see Note 4<br>Antenna Gain (dBi): 0 dBi |
| Channel List | Please refer to the Note 2. |
| Adapter | Model: S003GU0600050 (Tenpao)<br>Input: AC 100-240V~50/60Hz 150mA<br>Output: DC 6.0V@0.5A |
| Battery | N/A |
| Hardware version | N/A |
| Software version | N/A |
| Radio Hardware version | N/A |
| Radio Software version | N/A |
| Test Software | SecureCRT |
| RF Power Setting TEST Software (power class) | 1 |
| Connecting I/O Port(s) | Please refer to the User's Manual |

Note:

1 For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2

| RF Channel and Frequency | | | |
|---|---|---|---|
| **RF Channel** | **Freq.(MHz)** | **RF Channel** | **Freq.(MHz)** |
| **01** | **2405.00** | **17** | **2439.00** |
| 02 | 2407.00 | 18 | 2441.00 |
| 03 | 2409.00 | 19 | 2444.00 |
| 04 | 2411.00 | 20 | 2446.00 |
| 05 | 2413.00 | 21 | 2450.00 |
| 06 | 2415.00 | 22 | 2452.00 |
| 07 | 2418.00 | 23 | 2454.00 |
| 08 | 2420.00 | 24 | 2456.00 |
| 09 | 2422.00 | 25 | 2458.50 |
| 10 | 2424.00 | 26 | 2460.50 |
| 11 | 2426.00 | 27 | 2462.50 |
| 12 | 2428.00 | 28 | 2467.00 |
| 13 | 2430.00 | 29 | 2469.00 |
| 14 | 2433.00 | 30 | 2471.00 |
| 15 | 2435.00 | 31 | 2473.00 |
| 16 | 2437.00 | **32** | **2475.00** |

3 Note:

1) In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test;

2) Test frequencies are lowest channel: 2405 MHz, middle channel: 2439 MHz and highest channel: 2475 MHz

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| Ant | Brand | Model Name | Antenna Type | Connector | Gain (dBi) | NOTE |
|---|---|---|---|---|---|---|
| 1 | motorola | MBP482NXLBU | Integral Antenna | N/A | 0 | 2.4G Antenna |

## 2.2 DESCRIPTION OF TEST MODES

Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

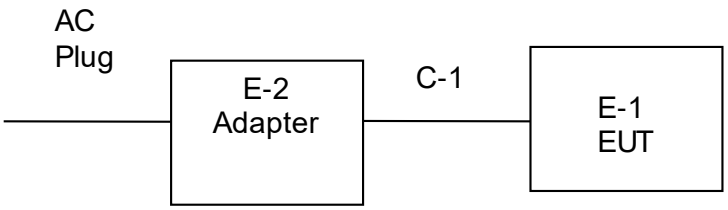
| Worst Mode | Description | Data Rate |
|---|---|---|
| Mode 1 | TX GFSK LOW CHANNEL | / |
| Mode 2 | TX GFSK MID CHANNEL | / |
| Mode 3 | TX GFSK HIGH CHANNEL | / |
| Mode 4 | Transmitting mode | / |
| Mode 5 | Charging mode | / |

Note:

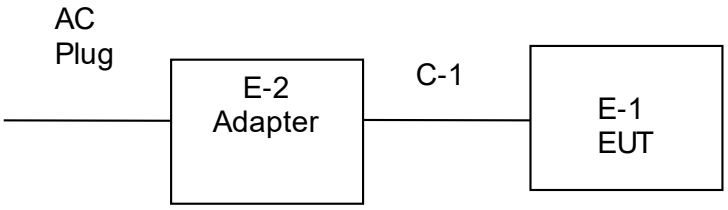
1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported
2) We have be tested for all avaiable U.S. voltage and frequencies(For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V/60Hz is shown in the report
3) Controlled using a bespoke application on the laptop PC supplied by the customer. The application was used to enable a continuous transmission mode and to select the test channels, data rates and modulation schemes as required.

## 2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiation Test Set




Conduction Test Set




## 2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | Serial No. | Note |
|---|---|---|---|---|---|
| E-2 | Adapter | Tenpao | S003GU0600050 | N/A | Accessories Equipment |
| | | | | | |

| Item | Shielded Type | Ferrite Core | Length | Note |
|---|---|---|---|---|
| C-1 | Adapter DC Cable | NO | 180cm | N/A |
| | | | | |
| | | | | |

Note:

1) The support equipment was authorized by Declaration of Confirmation.
2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
3) "YES" is means "shielded" "with core"; "NO" is means "unshielded" "without core".

## 2.5 EQUIPMENTS LIST

| Radio Spectrum Testing | | | | |
|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal. Until** |
| USB RF power sensor | DARE | RPR3006W | 15I00041SNO09 | 05.03.2020 |
| Spectrum analyzer | Agilent | N9020A | MY51110123 | 01.03.2020 |
| **Spurious Emission** | | | | |
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal. Until** |
| Loop Antenna | Schwarzbeck | FMZB1519B | 00044 | 14.03.2020 |
| Bilog Antenna | Schwarzbeck | VULB9163 | 497 | 14.03.2020 |
| Horn Antenna | Schwarzbeck | BBHA 9120D | 1805 | 21.06.2020 |
| SHF-EHF Horn Antenna | Schwarzbeck | BBHA 9170 | BBHA9170582 | 20.11.2019 |
| Pre-amplifier | HP | 8447D | 2944A09358 | 05.03.2020 |
| Pre-amplifier | CD | PAP-1G18 | 11804 | 05.03.2020 |
| EMI Test Receiver | R&S | ESRP7 | 101070 | 05.03.2020 |
| Spectrum analyzer | R&S | FSP30 | 101454 | 05.03.2020 |
| Spectrum analyzer | R&S | FSP40 | 100363 | 05.03.2020 |
| Cable | ZDECL | Z108-NJ-NJ-81 | 1608458 | 05.03.2020 |
| Cable | MICRO-COAX | MFR64639 | K10742-5 | 05.03.2020 |
| Cable | SUHNER | SUCOFLEX100 | 58193/4PE | 05.03.2020 |
| **Conducted Emission on AC Mains** | | | | |
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal. Until** |
| EMI Test Receiver | R&S | ESCI | 101189 | 05.03.2020 |
| Pulse Limiter | Schwarzbeck | OSRAM 2306 | 9731 | 05.03.2020 |
| LISN | CHASE | MN2050D | 1447 | 17.03.2020 |
| LISN | R&S | ESH3-Z5 | 8438621/010 | 20.07.2019 |

# 3 EMC EMISSION TEST

## 3.1 CONDUCTED EMISSION MEASUREMENT

### 3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

operating frequency band. In case the emission fall within the restricted band specified on Part 15. 207(a), 107(a), RSS-Gen Table3 and ICES-003 Table2 limit in the table below has to be followed. This item was performed according to the procedures in ANSI C63.10: 2013 and ANSI C63.4: 2014.

| FREQUENCY (MHz) | Conducted Emission limit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 -0.5 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 56.00 | 46.00 |
| 5.0 -30.0 | 60.00 | 50.00 |

Note:

1) The tighter limit applies at the band edges.
2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

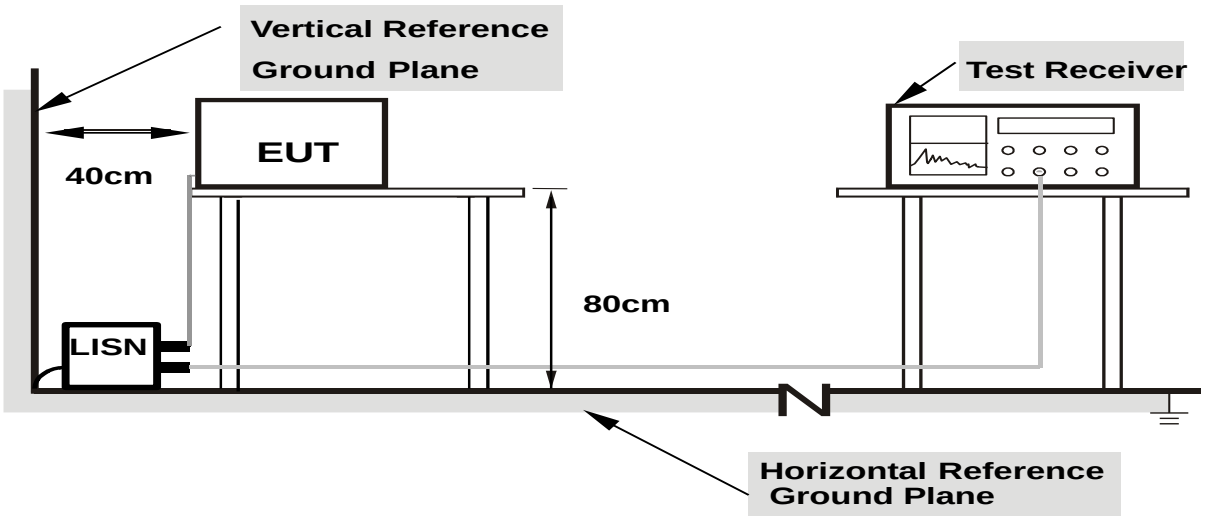
The following table is the setting of the receiver

| Receiver Parameters | Setting |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 kHz |

3.1.2 TEST PROCEDURE

a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP




**Note: 1.Support units were connected to second LISN.**
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

3.1.4 EUT OPERATING CONDITIONS

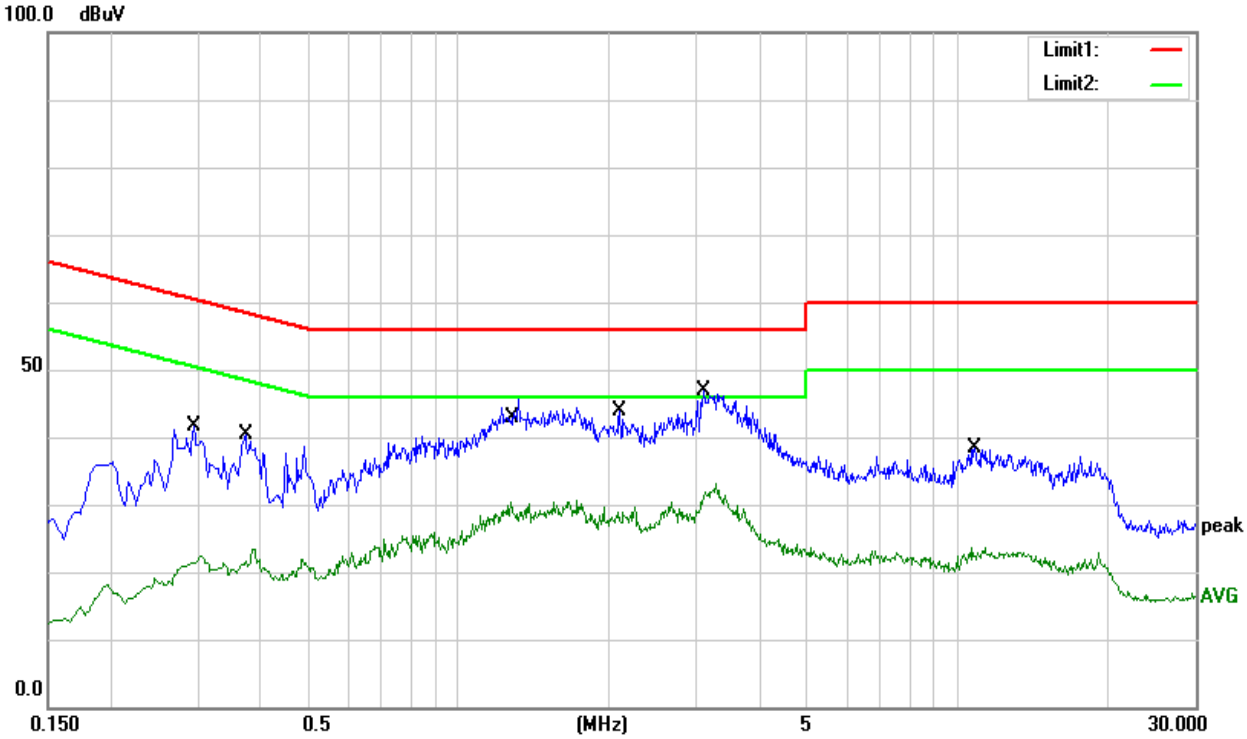
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.5 TEST RESULT

| | | | |
|---|---|---|---|
| Temperature: | 24 ℃ | Relative Humidity: | 66% |
| Test Voltage: | AC 120V/60Hz | Phase: | L |
| Test Mode: | Mode 4 | Test Date: | 2019-07-11 |
| Note: | Adapter(Tenpao) | | |

| Frequency (MHz) | Reading (dBuV) | Correct Factor(dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|
| 0.2940 | 20.82 | 20.69 | 41.51 | 60.41 | -18.90 | QP |
| 0.2940 | 1.65 | 20.69 | 22.34 | 50.41 | -28.07 | AVG |
| 0.3740 | 19.92 | 20.55 | 40.47 | 58.41 | -17.94 | QP |
| 0.3740 | 2.85 | 20.55 | 23.40 | 48.41 | -25.01 | AVG |
| 1.2700 | 25.41 | 20.13 | 45.54 | 56.00 | -10.46 | QP |
| 1.2700 | 10.17 | 20.13 | 30.30 | 46.00 | -15.70 | AVG |
| 2.1060 | 23.87 | 20.05 | 43.92 | 56.00 | -12.08 | QP |
| 2.1060 | 9.48 | 20.05 | 29.53 | 46.00 | -16.47 | AVG |
| 3.1020 | 26.82 | 19.97 | 46.79 | 56.00 | -9.21 | QP |
| 3.1020 | 13.04 | 19.97 | 33.01 | 46.00 | -12.99 | AVG |
| 10.8260 | 18.23 | 20.11 | 38.34 | 60.00 | -21.66 | QP |
| 10.8260 | 3.48 | 20.11 | 23.59 | 50.00 | -26.41 | AVG |

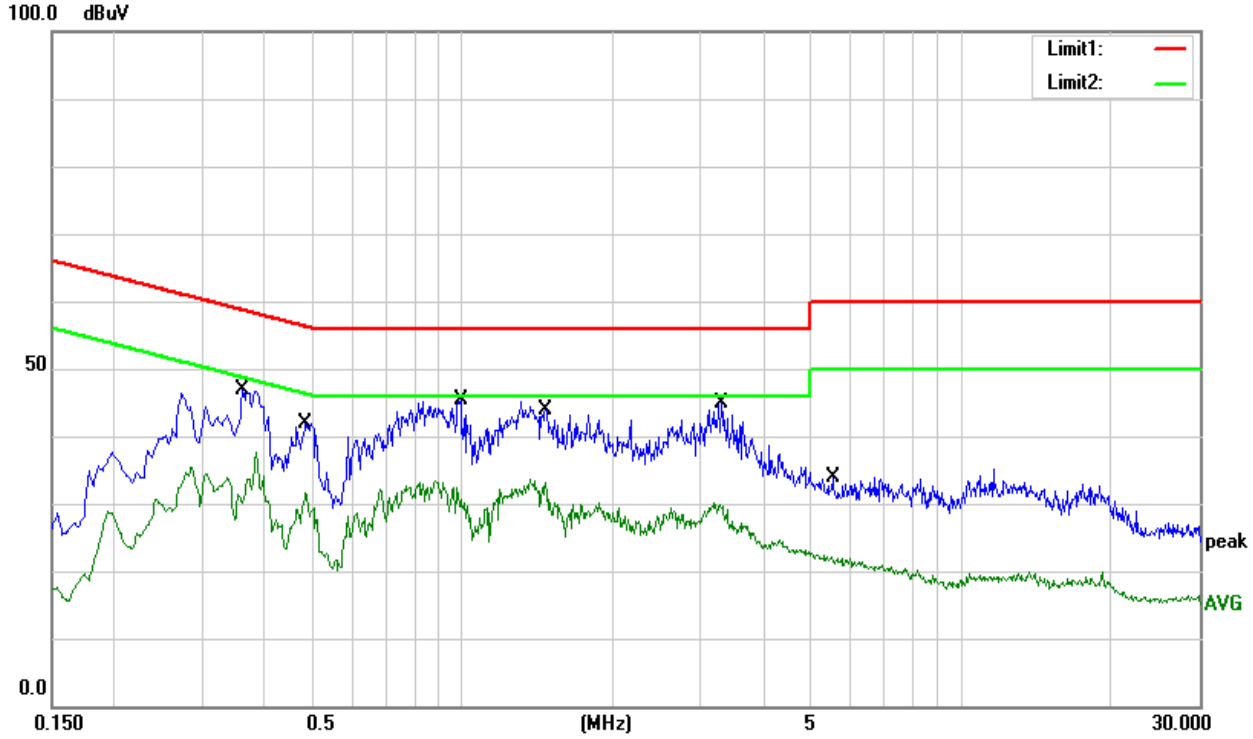
Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor )–Limit



| Temperature: | 24 ℃ | Relative Humidity: | 66% |
|---|---|---|---|
| Test Voltage: | AC 120V/60Hz | Phase: | N |
| Test Mode: | Mode 4 | Test Date: | 2019-07-11 |
| Note: | Adapter(Tenpao) | | |

| Frequency (MHz) | Reading (dBuV) | Correct Factor(dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|
| 0.3620 | 26.32 | 20.58 | 46.90 | 58.68 | -11.78 | QP |
| 0.3620 | 17.06 | 20.58 | 37.64 | 48.68 | -11.04 | AVG |
| 0.4860 | 21.47 | 20.48 | 41.95 | 56.24 | -14.29 | QP |
| 0.4860 | 11.08 | 20.48 | 31.56 | 46.24 | -14.68 | AVG |
| 0.9900 | 25.29 | 20.16 | 45.45 | 56.00 | -10.55 | QP |
| 0.9900 | 12.08 | 20.16 | 32.24 | 46.00 | -13.76 | AVG |
| 1.4660 | 23.83 | 20.11 | 43.94 | 56.00 | -12.06 | QP |
| 1.4660 | 9.97 | 20.11 | 30.08 | 46.00 | -15.92 | AVG |
| 3.2980 | 24.79 | 19.98 | 44.77 | 56.00 | -11.23 | QP |
| 3.2980 | 9.12 | 19.98 | 29.10 | 46.00 | -16.90 | AVG |
| 5.5220 | 14.02 | 19.92 | 33.94 | 60.00 | -26.06 | QP |
| 5.5220 | 1.85 | 19.92 | 21.77 | 50.00 | -28.23 | AVG |

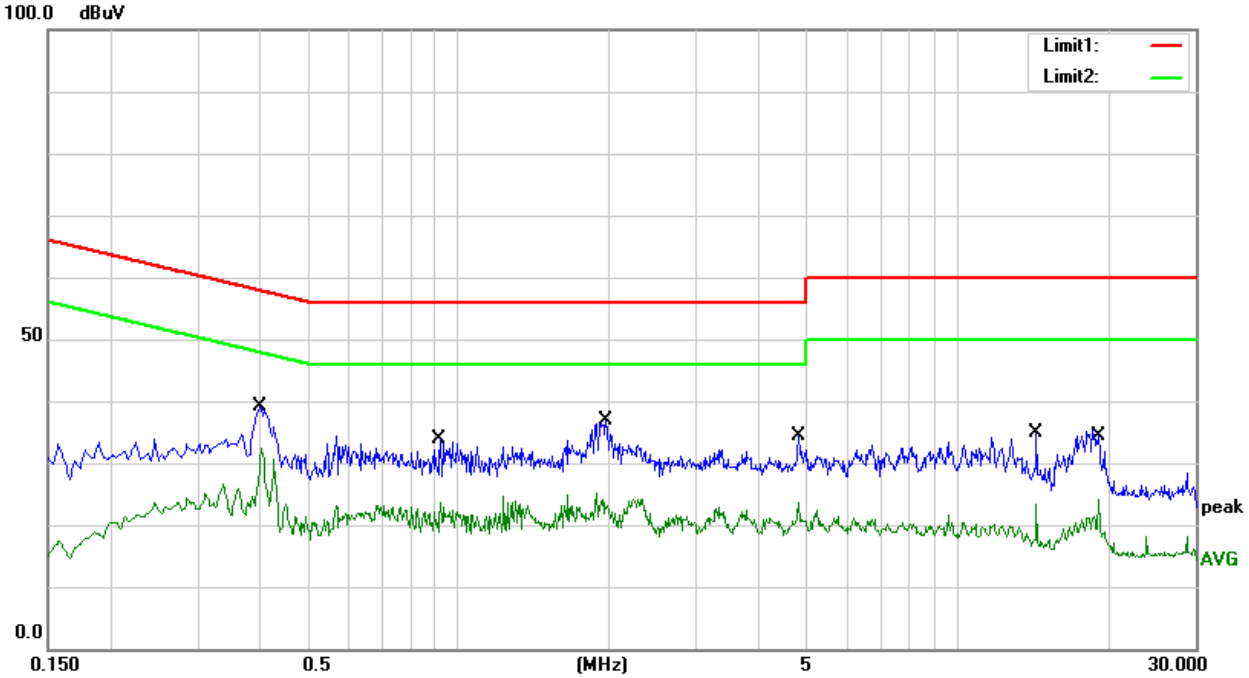
Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor )–Limit



| Temperature: | 24 ℃ | Relative Humidity: | 66% |
|---|---|---|---|
| Test Voltage: | AC 120V/60Hz | Phase: | L |
| Test Mode: | Mode 5 (Part 15B & ICES-003) | Test Date: | 2019-07-11 |
| Note: | Adapter(Tenpao) | | |

| Frequency (MHz) | Reading (dBuV) | Correct Factor(dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|
| 0.3980 | 18.56 | 20.49 | 39.05 | 57.90 | -18.85 | QP |
| 0.3980 | 11.91 | 20.49 | 32.40 | 47.90 | -15.50 | AVG |
| 0.9220 | 13.73 | 20.18 | 33.91 | 56.00 | -22.09 | QP |
| 0.9220 | 4.44 | 20.18 | 24.62 | 46.00 | -21.38 | AVG |
| 1.9700 | 16.76 | 20.06 | 36.82 | 56.00 | -19.18 | QP |
| 1.9700 | 4.17 | 20.06 | 24.23 | 46.00 | -21.77 | AVG |
| 4.7980 | 14.32 | 19.95 | 34.27 | 56.00 | -21.73 | QP |
| 4.7980 | 3.59 | 19.95 | 23.54 | 46.00 | -22.46 | AVG |
| 14.3980 | 14.99 | 19.99 | 34.98 | 60.00 | -25.02 | QP |
| 14.3980 | 3.46 | 19.99 | 23.45 | 50.00 | -26.55 | AVG |
| 19.1980 | 14.55 | 19.95 | 34.50 | 60.00 | -25.50 | QP |
| 19.1980 | 4.06 | 19.95 | 24.01 | 50.00 | -25.99 | AVG |

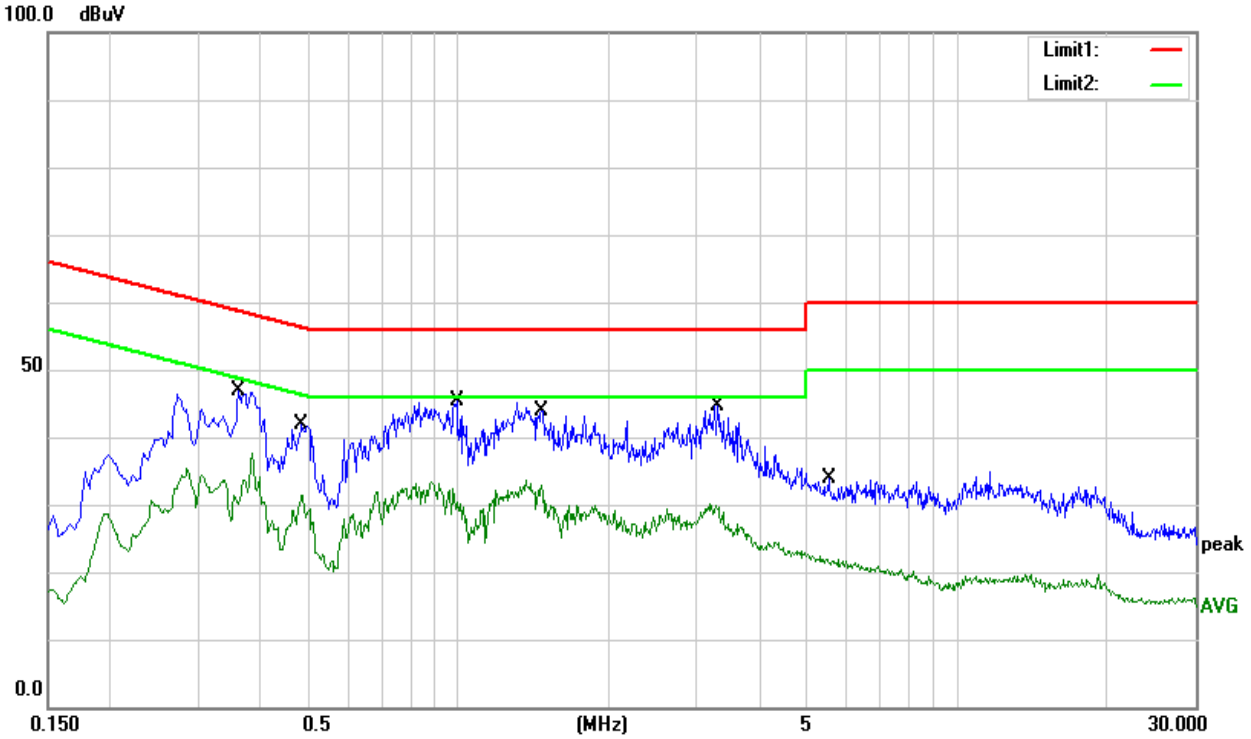
Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor )–Limit



| Temperature: | 24 ℃ | Relative Humidity: | 66% |
|---|---|---|---|
| Test Voltage: | AC 120V/60Hz | Phase: | N |
| Test Mode: | Mode 5 (Part 15B & ICES-003) | Test Date: | 2019-07-11 |
| Note: | Adapter(Tenpao) | | |

| Frequency (MHz) | Reading (dBuV) | Correct Factor(dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|
| 0.3620 | 26.22 | 20.58 | 46.80 | 58.68 | -11.88 | QP |
| 0.3620 | 16.96 | 20.58 | 37.54 | 48.68 | -11.14 | AVG |
| 0.4860 | 21.37 | 20.48 | 41.85 | 56.24 | -14.39 | QP |
| 0.4860 | 10.98 | 20.48 | 31.46 | 46.24 | -14.78 | AVG |
| 0.9900 | 25.19 | 20.16 | 45.35 | 56.00 | -10.65 | QP |
| 0.9900 | 11.98 | 20.16 | 32.14 | 46.00 | -13.86 | AVG |
| 1.4660 | 23.73 | 20.11 | 43.84 | 56.00 | -12.16 | QP |
| 1.4660 | 9.87 | 20.11 | 29.98 | 46.00 | -16.02 | AVG |
| 3.2980 | 24.69 | 19.98 | 44.67 | 56.00 | -11.33 | QP |
| 3.2980 | 9.02 | 19.98 | 29.00 | 46.00 | -17.00 | AVG |
| 5.5220 | 13.92 | 19.92 | 33.84 | 60.00 | -26.16 | QP |
| 5.5220 | 1.75 | 19.92 | 21.67 | 50.00 | -28.33 | AVG |

Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor )–Limit



## 3.2 RADIATED EMISSION MEASUREMENT

### 3.2.1 RADIATED EMISSION LIMITS

| Frequencies (MHz) | Class A (at 10m) dBuV/m | Class B (at 3m) dBuV/m |
|---|---|---|
| 30~88 | 39.0 | 40.0 |
| 88~216 | 43.5 | 43.5 |
| 216~960 | 46.5 | 46.0 |
| Above 960 | 49.5 | 54.0 |

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

| FREQUENCY (MHz) | Class A (dBuV/m) (at 3M) | | Class B (dBuV/m) (at 3M) | |
|---|---|---|---|---|
| | PEAK | AVERAGE | PEAK | AVERAGE |
| Above 1000 | 80 | 60 | 74 | 54 |

Note:
1) The tighter limit applies at the band edges.
2) Emission level (dBuV/m)=20log Emission level (uV/m).

### 3.2.2 TEST PROCEDURE

a) The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

b) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

c) The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 0.8 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

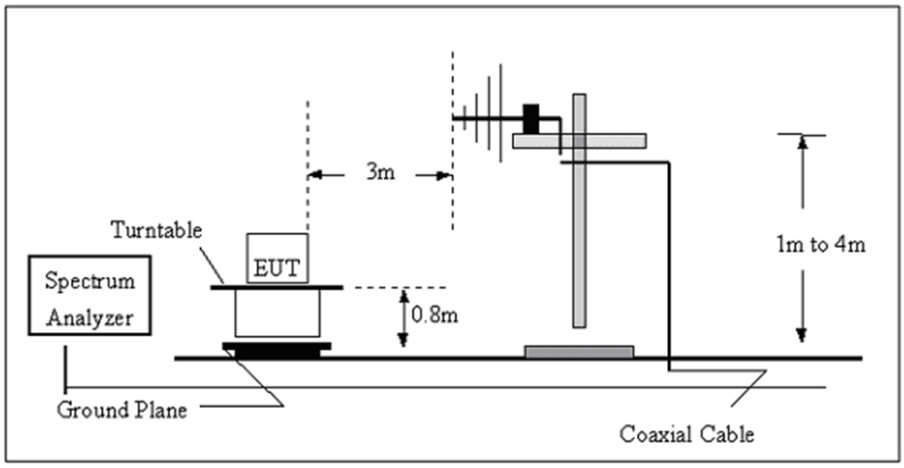
e) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

f) For the actual test configuration, please refer to the related Item –EUT Test Photos.

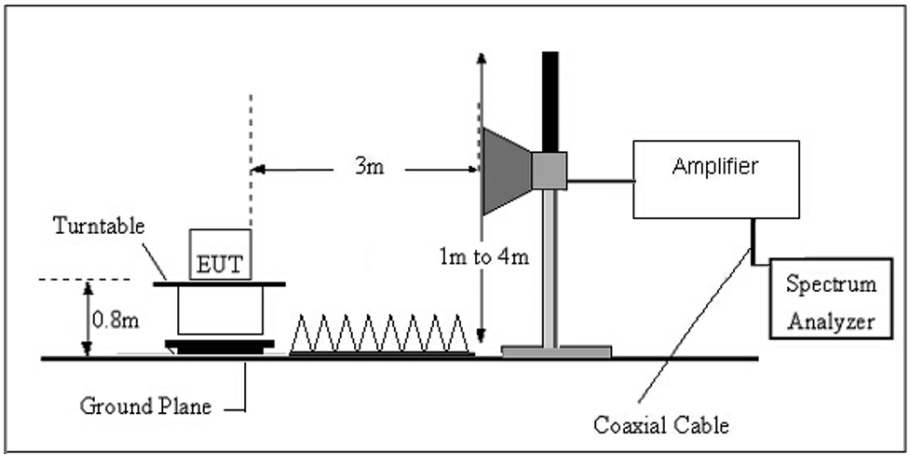
*Note: Both horizontal and vertical antenna polarities were testedand performed pretest to three orthogonal axis. The worst case emissions were reported*

### 3.2.3 TEST SETUP

a) Radiated Emission Test-Up Frequency 30MHz~1GHz




b) Radiated Emission Test-Up Frequency Above 1GHz




### 3.2.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

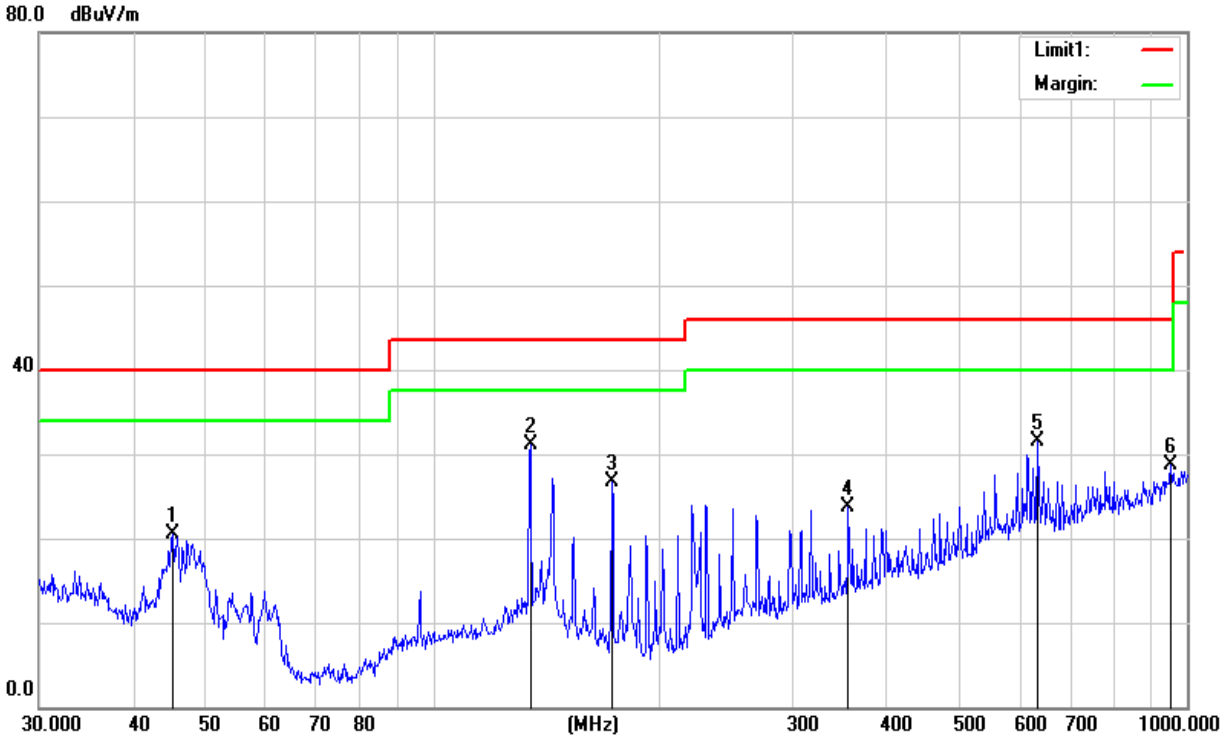
3.2.5 TEST RESULTS

Between 30-1000MHz:

| | | | |
|---|---|---|---|
| Temperature: | 25℃ | Relative Humidity: | 55% |
| Pressure: | 1010hPa | Phase: | Horizontal |
| Test Voltage: | AC 120V/60Hz | Test Mode: | Mode 5 (Part 15B & ICES-003) |
| Note: | Adapter(Tenpao) | Test Date: | 2019-07-11 |

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Results (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 45.2165 | 39.58 | -19.01 | 20.57 | 40.00 | -19.43 | QP |
| 2 | 134.5592 | 48.65 | -17.54 | 31.11 | 43.50 | -12.39 | QP |
| 3 | 172.5988 | 46.11 | -19.36 | 26.75 | 43.50 | -16.75 | QP |
| 4 | 355.4273 | 37.14 | -13.34 | 23.80 | 46.00 | -22.20 | QP |
| 5 | 633.9072 | 37.84 | -6.39 | 31.45 | 46.00 | -14.55 | QP |
| 6 | 952.0937 | 29.04 | -0.36 | 28.68 | 46.00 | -17.32 | QP |

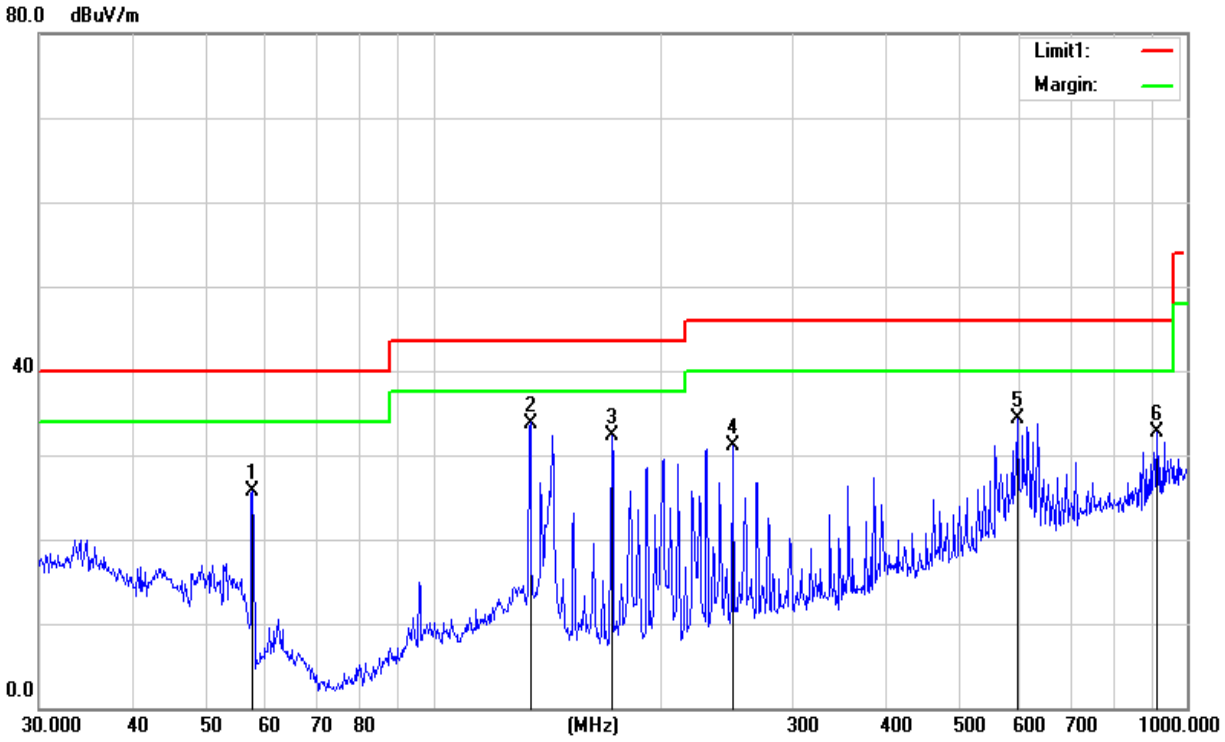
**Remark:**
**1. All readings are Quasi-Peak .**
**2. Margin = Result (Result =Reading + Factor )–Limit**



| | | | |
|---|---|---|---|
| Temperature: | 25℃ | Relative Humidity: | 55% |
| Pressure: | 1010hPa | Phase: | Vertical |
| Test Voltage: | AC 120V/60Hz | Test Mode: | Mode 5 (Part 15B & ICES-003) |
| Note: | Adapter(Tenpao) | Test Date: | 2019-07-11 |

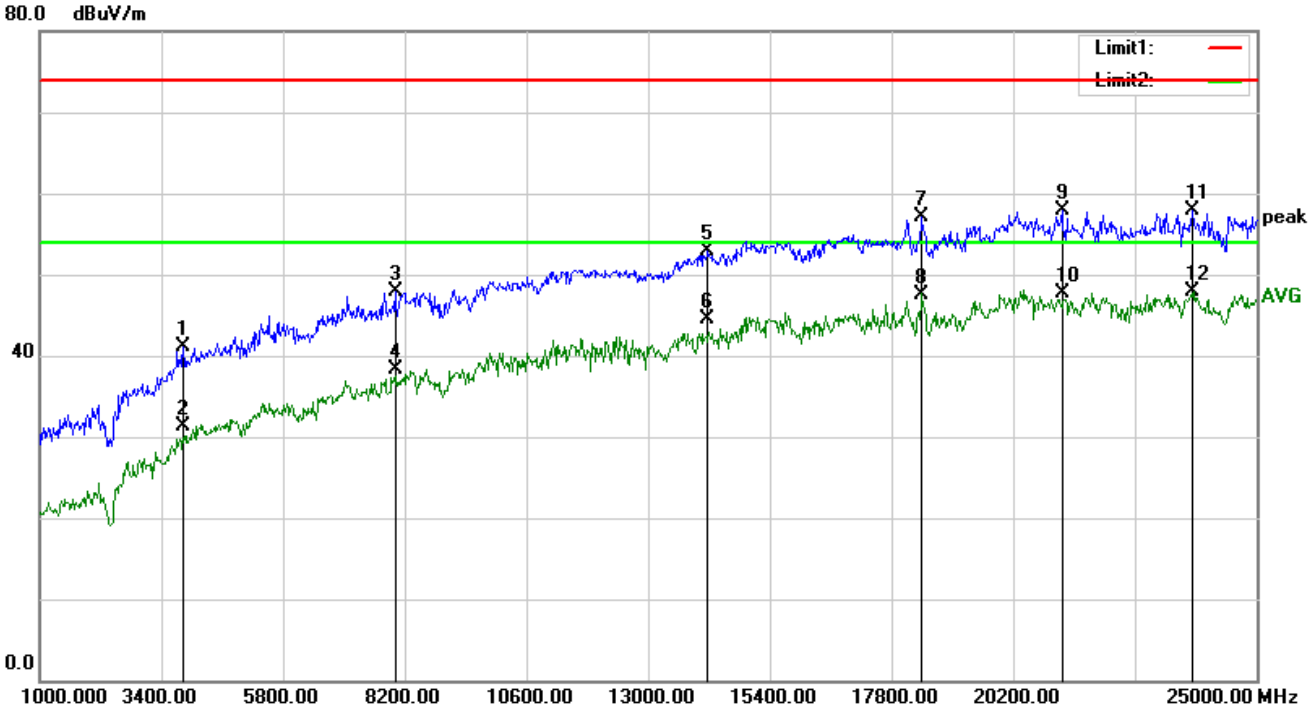
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Results (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 57.5940 | 49.33 | -23.65 | 25.68 | 40.00 | -14.32 | QP |
| 2 | 134.5592 | 51.34 | -17.54 | 33.80 | 43.50 | -9.70 | QP |
| 3 | 172.5988 | 51.58 | -19.36 | 32.22 | 43.50 | -11.28 | QP |
| 4 | 249.4250 | 47.44 | -16.41 | 31.03 | 46.00 | -14.97 | QP |
| 5 | 595.1330 | 41.38 | -7.05 | 34.33 | 46.00 | -11.67 | QP |
| 6 | 912.8620 | 34.43 | -1.82 | 32.61 | 46.00 | -13.39 | QP |

**Remark:**
**1. All readings are Quasi-Peak .**
**2. Margin = Result (Result =Reading + Factor )–Limit**



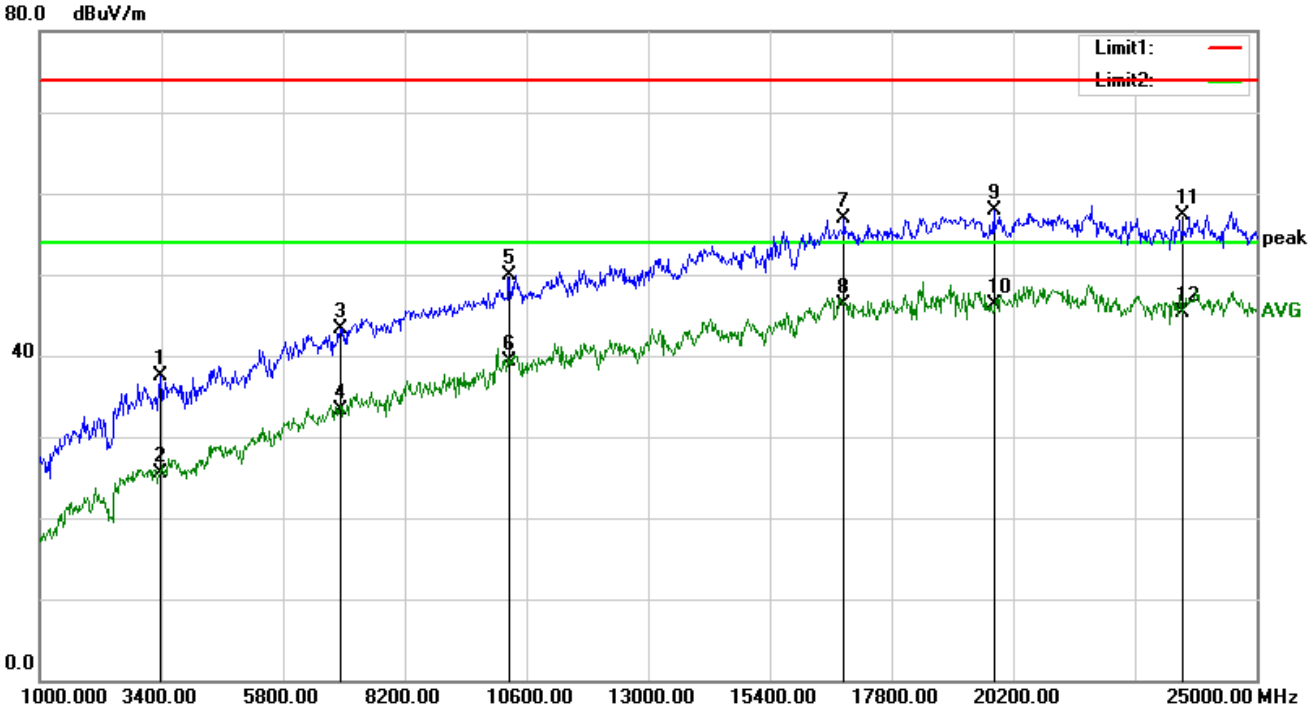
Above 1GHz:

| Temperature: | 22.4 ℃ | Relative Humidity: | 68% |
|---|---|---|---|
| Pressure: | 1010hPa | Phase: | Horizontal |
| Test Mode: | Mode 5 (Part 15B & ICES-003) | Test Date: | 2019-07-11 |
| Note: | Adapter(Tenpao) | | |




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 3832.000 | 40.17 | 0.91 | 41.08 | 74.00 | -32.92 | peak |
| 2 | 3832.000 | 30.34 | 0.91 | 31.25 | 54.00 | -22.75 | AVG |
| 3 | 8008.000 | 37.19 | 10.64 | 47.83 | 74.00 | -26.17 | peak |
| 4 | 8008.000 | 27.71 | 10.64 | 38.35 | 54.00 | -15.65 | AVG |
| 5 | 14176.000 | 11.54 | 41.27 | 52.81 | 74.00 | -21.19 | peak |
| 6 | 14176.000 | 3.15 | 41.27 | 44.42 | 54.00 | -9.58 | AVG |
| 7 | 18400.000 | 16.52 | 40.50 | 57.02 | 74.00 | -16.98 | peak |
| 8 | 18400.000 | 7.10 | 40.50 | 47.60 | 54.00 | -6.40 | AVG |
| 9 | 21160.000 | 17.40 | 40.50 | 57.90 | 74.00 | -16.10 | peak |
| 10 | 21160.000 | 7.14 | 40.50 | 47.64 | 54.00 | -6.36 | AVG |
| 11 | 23728.000 | 17.43 | 40.50 | 57.93 | 74.00 | -16.07 | peak |
| 12 | 23728.000 | 7.32 | 40.50 | 47.82 | 54.00 | -6.18 | AVG |

| | | | |
|---|---|---|---|
| Temperature: | 22.4 ℃ | Relative Humidity: | 68% |
| Pressure: | 1010hPa | Phase: | Vertical |
| Test Mode: | Mode 5 (Part 15B & ICES-003) | Test Date: | 2019-07-11 |
| Note: | Adapter(Tenpao) | | |




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 3376.000 | 39.01 | -1.54 | 37.47 | 74.00 | -36.53 | peak |
| 2 | 3376.000 | 27.06 | -1.54 | 25.52 | 54.00 | -28.48 | AVG |
| 3 | 6928.000 | 33.96 | 9.30 | 43.26 | 74.00 | -30.74 | peak |
| 4 | 6928.000 | 23.94 | 9.30 | 33.24 | 54.00 | -20.76 | AVG |
| 5 | 10264.000 | 35.94 | 13.97 | 49.91 | 74.00 | -24.09 | peak |
| 6 | 10264.000 | 25.25 | 13.97 | 39.22 | 54.00 | -14.78 | AVG |
| 7 | 16864.000 | 17.40 | 39.43 | 56.83 | 74.00 | -17.17 | peak |
| 8 | 16864.000 | 6.90 | 39.43 | 46.33 | 54.00 | -7.67 | AVG |
| 9 | 19816.000 | 17.38 | 40.50 | 57.88 | 74.00 | -16.12 | peak |
| 10 | 19816.000 | 5.85 | 40.50 | 46.35 | 54.00 | -7.65 | AVG |
| 11 | 23536.000 | 16.88 | 40.50 | 57.38 | 74.00 | -16.62 | peak |
| 12 | 23536.000 | 4.80 | 40.50 | 45.30 | 54.00 | -8.70 | AVG |

## 3.3 RADIATED SPURIOUS EMISSION MEASUREMENT

### 3.3.1 RADIATED EMISSION LIMITS

in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) and RSS-247 Issue 2 limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

LIMITS OF RADIATED EMISSION MEASUREMENT (1000MHz-25GHz)

| FREQUENCY (MHz) | (dBuV/m) (at 3M) | |
|---|---|---|
| | PEAK | AVERAGE |
| Above 1000 | 74 | 54 |

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

For Radiated Emission

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Detector | Peak/AV |
| Start Frequency | 1000 MHz(Peak/AV) |
| Stop Frequency | 10th carrier hamonic(Peak/AV) |
| RB / VB (emission in restricted | 1 MHz /3MHz |

For Band edge

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak/AV |
| Start/Stop Frequency | Lower Band Edge: 2300 to 2422 MHz<br>Upper Band Edge: 2452 to 2500 MHz |
| RB / VB (emission in restricted band) | 1 MHz /3MHz |

| Receiver Parameter | Setting |
|---|---|
| Start ~ Stop Frequency | 9kHz~90kHz / RB 200Hz for PK & AV |
| Start ~ Stop Frequency | 90kHz~110kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 110kHz~490kHz / RB 200Hz for PK & AV |
| Start ~ Stop Frequency | 490kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

3.3.2 TEST PROCEDURE

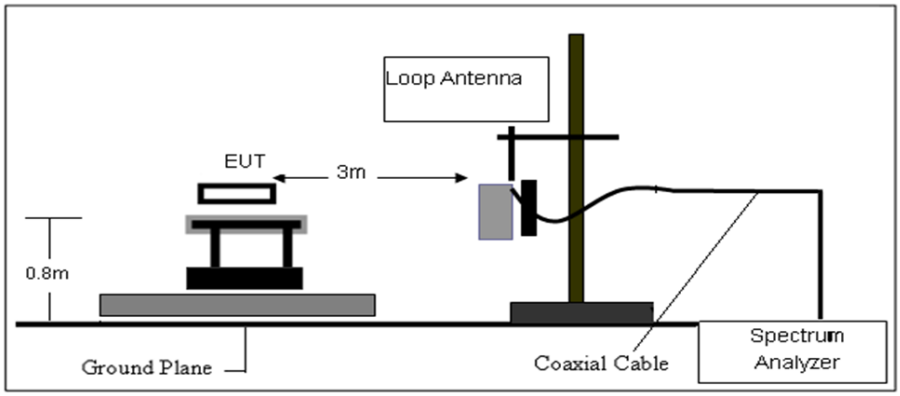
a) The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b) The EUT was placed on the top of a rotating table 0.8 meters(above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c) The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarizations of the antenna are set to make the measurement
d) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f) For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

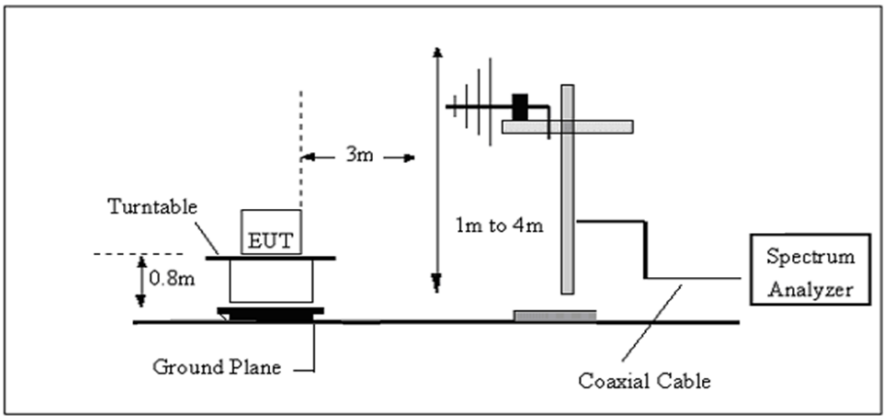
*Both horizontal and vertical antenna polarities were tested and performed test to three orthogonal axis. The worst case emissions were reported*

### 3.3.3 TEST SETUP

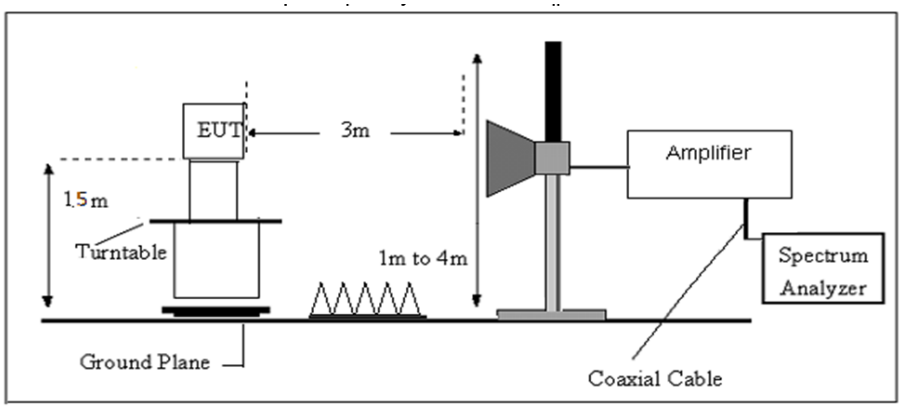
a) Radiated Emission Test-Up Frequency Below 30MHz




b) Radiated Emission Test-Up Frequency 30MHz~1GHz




c) Radiated Emission Test-Up Frequency Above 1GHz




### 3.3.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

### 3.3.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:
FS = RA + AF + CL - AG
Where
FS = Field Strength
CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude
AG = Amplifier Gain
AF = Antenna Factor
For example

| Frequency | FS | RA | AF | CL | AG | Factor |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV/m) | (dBμV/m) | (dB) | (dB) | (dB) | (dB) |
| 300 | 40 | 58.1 | 12.2 | 1.6 | 31.9 | -18.1 |

Factor=AF+CL-AG

### 3.3.6 TEST RESULT

9KHz-30MHz

| Temperature: | 23.2 ℃ | Relative Humidtity: | 56% |
|---|---|---|---|
| Test Voltage: | AC 120V/60Hz | Polarization: | -- |
| Test Mode: | TX Mode | | |

| Freq. | Reading | Limit | Margin | State | Test Result |
|---|---|---|---|---|---|
| (MHz) | (dBuV/m) | (dBuV/m) | (dB) | P/F | |
| -- | -- | -- | -- | -- | PASS |
| -- | -- | -- | -- | -- | PASS |

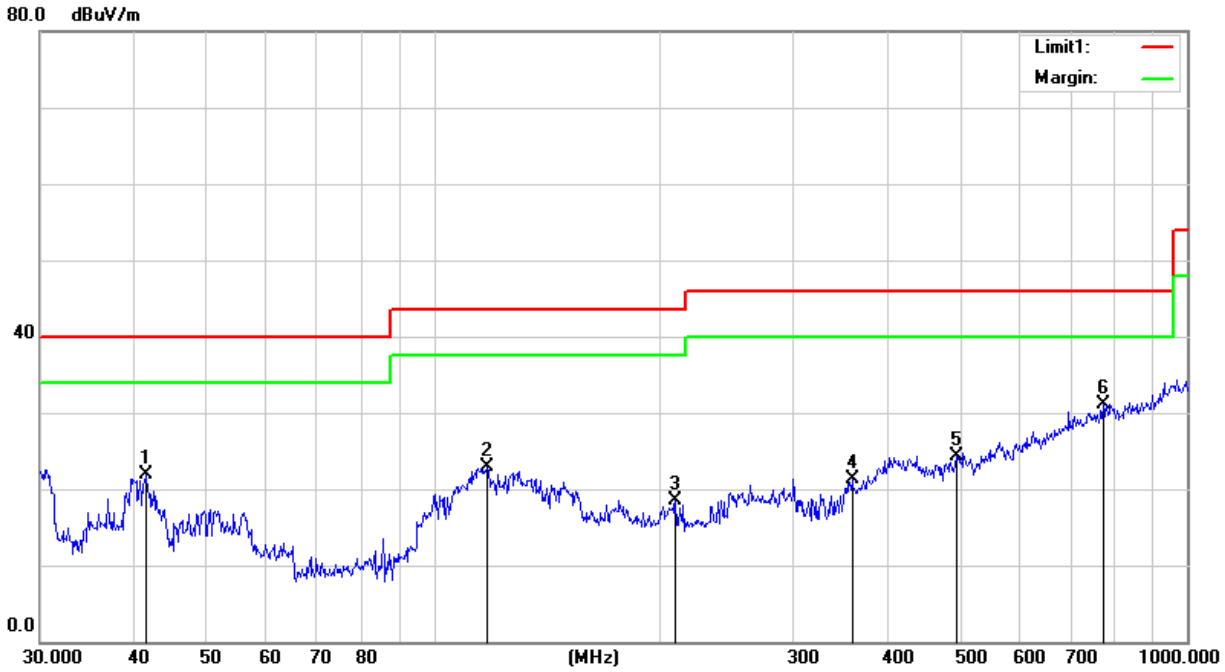
Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

(30MHz - 1000MHz)

| | | | |
|---|---|---|---|
| Temperature: | 23.2 ℃ | Relative Humidtity: | 56% |
| Test Voltage: | AC 120V/60Hz | Polarization: | Horizontal |
| Test Mode: | Mode 1/2/3 (Mode 3 worst mode) | Test Date: | 2019-07-11 |
| Note: | Adapter(Tenpao) | | |

| Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|
| (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 41.4215 | 39.06 | -17.06 | 22.00 | 40.00 | -18.00 | QP |
| 117.7724 | 40.64 | -17.83 | 22.81 | 43.50 | -20.69 | QP |
| 209.3130 | 38.36 | -19.78 | 18.58 | 43.50 | -24.92 | QP |
| 359.1860 | 34.47 | -13.17 | 21.30 | 46.00 | -24.70 | QP |
| 494.1983 | 33.40 | -9.05 | 24.35 | 46.00 | -21.65 | QP |
| 774.1584 | 34.31 | -3.25 | 31.06 | 46.00 | -14.94 | QP |

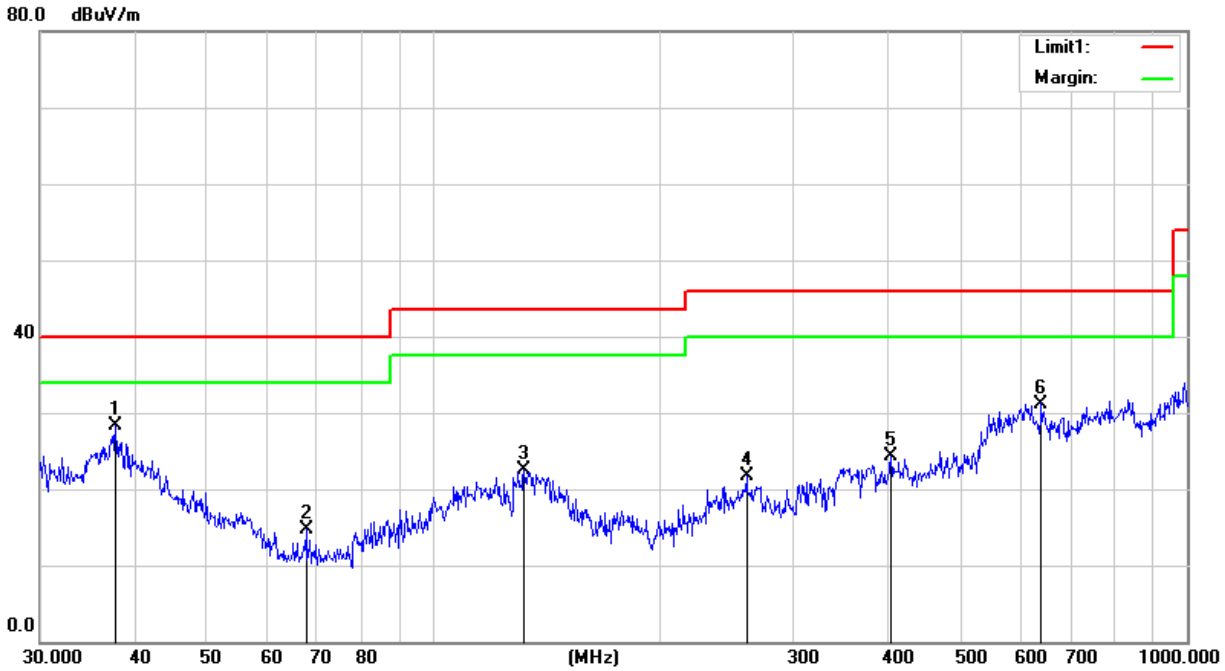
Remark:
1. Margin = Result (Result =Reading + Factor )–Limit



| Temperature: | 23.2 ℃ | Relative Humidtity: | 56% |
|---|---|---|---|
| Test Voltage: | AC 120V/60Hz | Polarization: | Vertical |
| Test Mode: | Mode 1/2/3 (Mode 3 worst mode) | Test Date: | 2019-07-11 |
| Note: | Adapter(Tenpao) | | |

| Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|
| (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 37.8121 | 43.42 | -15.20 | 28.22 | 40.00 | -11.78 | QP |
| 67.6751 | 38.93 | -24.16 | 14.77 | 40.00 | -25.23 | QP |
| 131.7572 | 40.01 | -17.54 | 22.47 | 43.50 | -21.03 | QP |
| 260.1444 | 36.82 | -15.07 | 21.75 | 46.00 | -24.25 | QP |
| 404.6664 | 35.45 | -11.15 | 24.30 | 46.00 | -21.70 | QP |
| 640.6110 | 37.55 | -6.35 | 31.20 | 46.00 | -14.80 | QP |

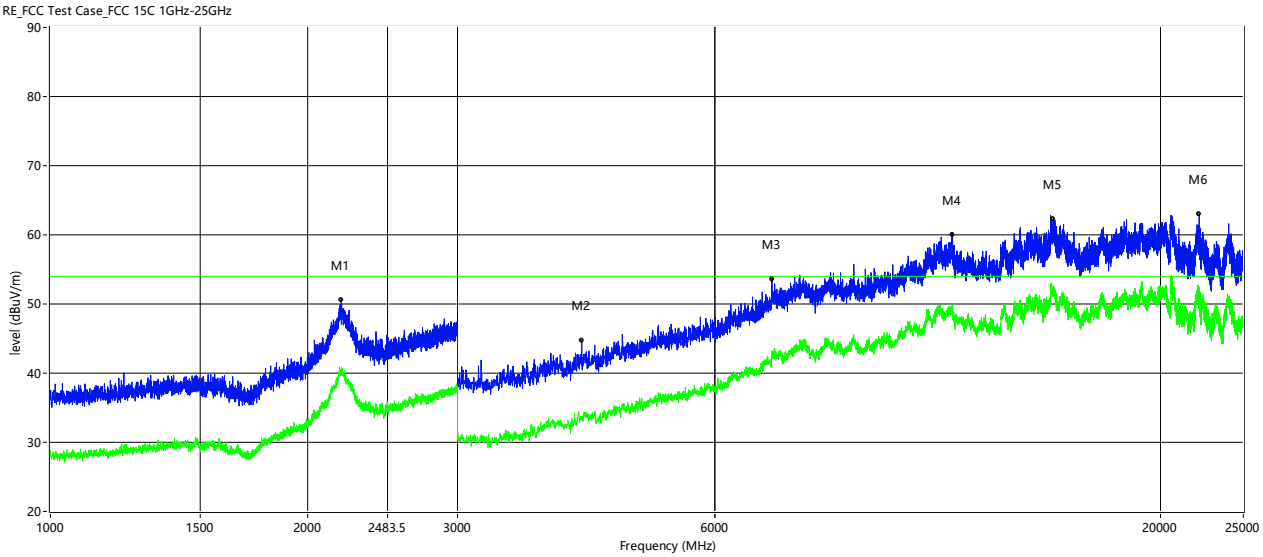
Remark:.
1. Margin = Result (Result =Reading + Factor )–Limit



(1000MHz-25GHz) Restricted band and Spurious emission Requirements

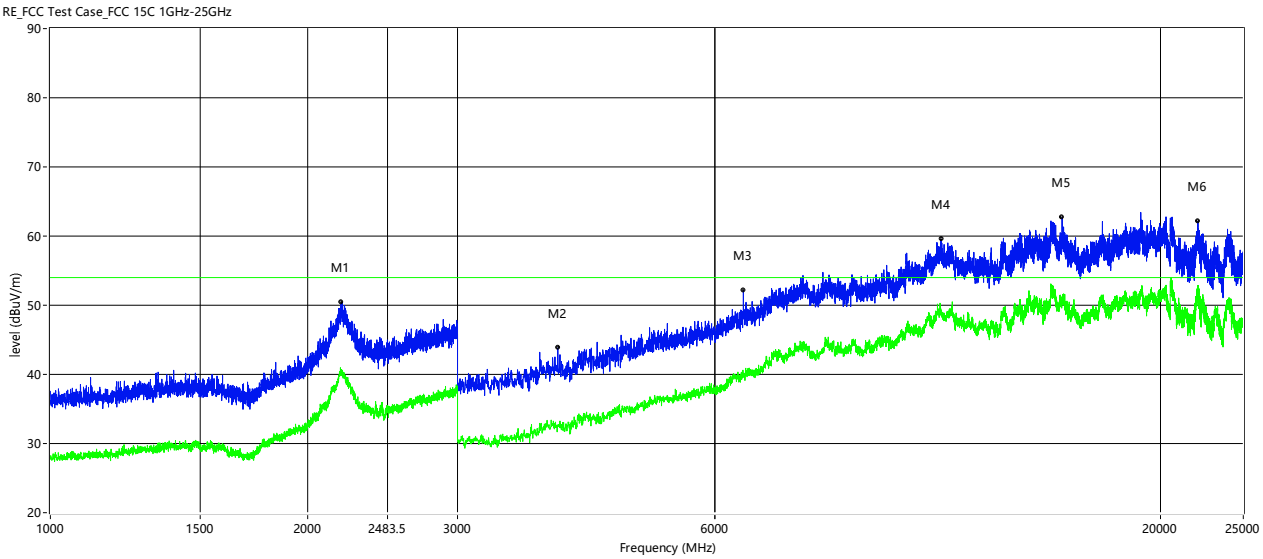
**CH Low**

vertical




| Frequency (MHz) | Peak Level (dBuV/m) | Q-peak Level (dBuV/m) | Average Level (dBuV/m) | Factor (dB) | PK Limit (dBuV/m) | QP Limit (dBuV/m) | AV Limit (dBuV/m) | Over Limit (dB) | ANT | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| 2192.000 | 50.57 | -- | 39.97 | 10.13 | 74.0 | -- | 54.0 | -14.03 | Vertical | Pass |
| 4195.000 | 44.64 | -- | 33.46 | -6.75 | 74.0 | -- | 54.0 | -20.54 | Vertical | Pass |
| 7007.500 | 53.64 | -- | 42.98 | 2.39 | 74.0 | -- | 54.0 | -11.02 | Vertical | Pass |
| 11410.000 | 60.00 | -- | 48.64 | 9.72 | 74.0 | -- | 54.0 | -5.36 | Vertical | Pass |
| 14961.250 | 62.22 | -- | 50.57 | 12.46 | 74.0 | -- | 54.0 | -3.43 | Vertical | Pass |
| 22194.749 | 63.02 | -- | 51.34 | 9.88 | 74.0 | -- | 54.0 | -2.66 | Vertical | Pass |

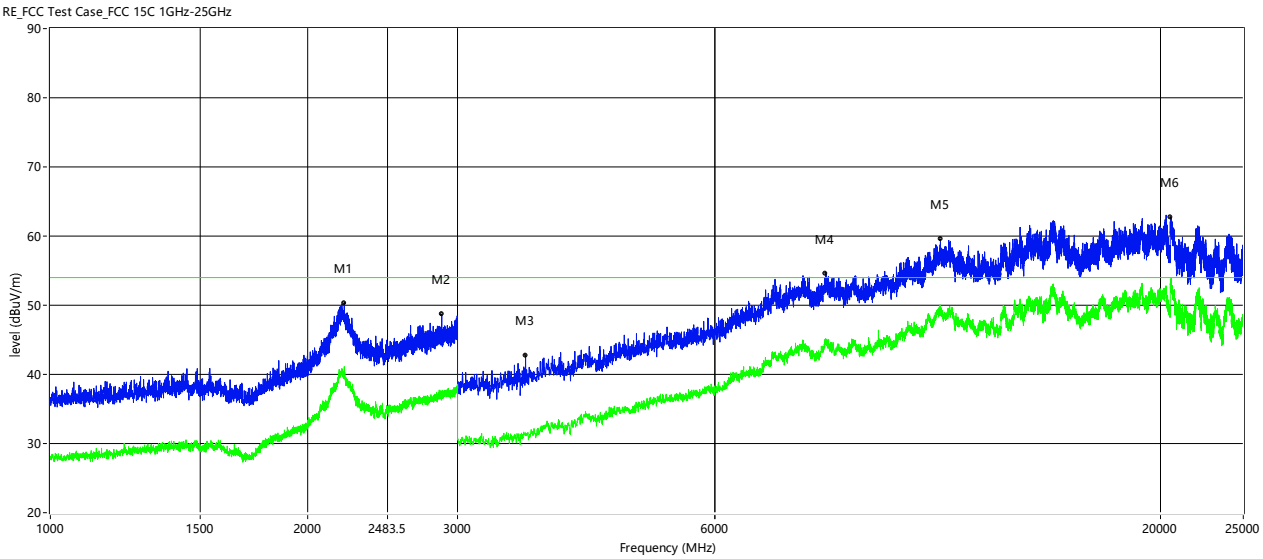
Horizontal




| Frequency (MHz) | Peak Level (dBuV/m) | Q-peak Level (dBuV/m) | Average Level (dBuV/m) | Factor (dB) | PK Limit (dBuV/m) | QP Limit (dBuV/m) | AV Limit (dBuV/m) | Over Limit (dB) | ANT | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| 2192.500 | 50.44 | -- | 40.44 | 10.13 | 74.0 | -- | 54.0 | -13.56 | Horizontal | Pass |
| 3932.500 | 43.84 | -- | 32.65 | -8.27 | 74.0 | -- | 54.0 | -21.35 | Horizontal | Pass |
| 6487.500 | 52.16 | -- | 39.86 | 0.56 | 74.0 | -- | 54.0 | -14.14 | Horizontal | Pass |
| 11065.000 | 59.55 | -- | 49.07 | 9.97 | 74.0 | -- | 54.0 | -4.93 | Horizontal | Pass |
| 15332.500 | 62.68 | -- | 50.75 | 11.74 | 74.0 | -- | 54.0 | -3.25 | Horizontal | Pass |
| 22119.500 | 62.12 | -- | 51.37 | 9.88 | 74.0 | -- | 54.0 | -2.63 | Horizontal | Pass |

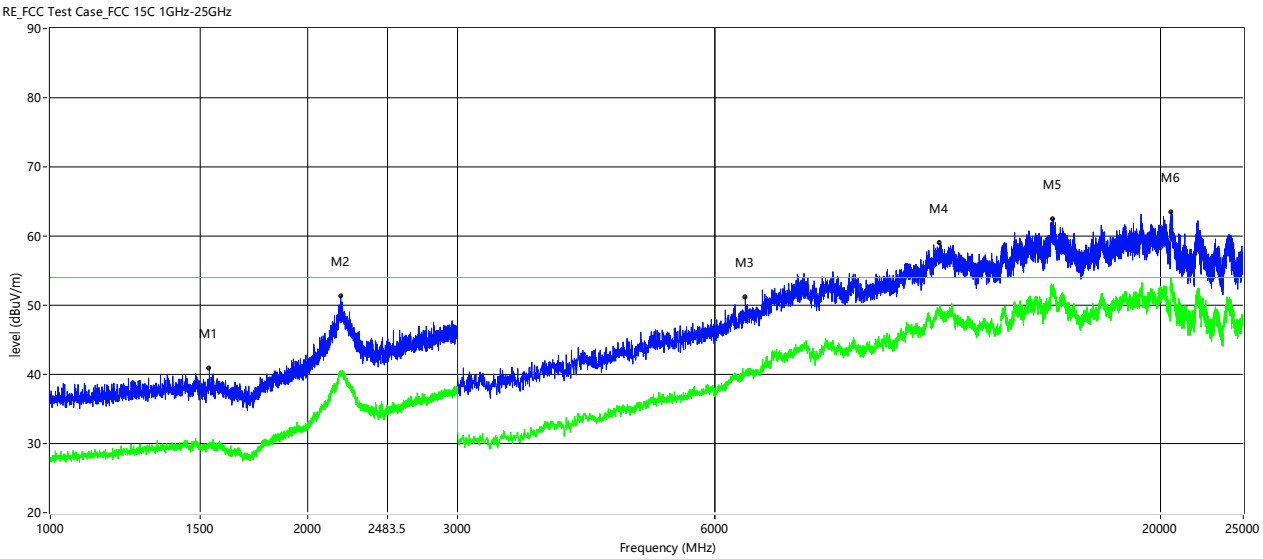
**CH Middle**

vertical




| Frequency (MHz) | Peak Level (dBuV/m) | Q-peak Level (dBuV/m) | Average Level (dBuV/m) | Factor (dB) | PK Limit (dBuV/m) | QP Limit (dBuV/m) | AV Limit (dBuV/m) | Over Limit (dB) | ANT | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| 2210.000 | 50.35 | -- | 41.13 | 9.62 | 74.0 | -- | 54.0 | -12.87 | Vertical | Pass |
| 2875.000 | 48.69 | -- | 36.72 | 7.11 | 74.0 | -- | 54.0 | -17.28 | Vertical | Pass |
| 3605.000 | 42.77 | -- | 31.55 | -9.79 | 74.0 | -- | 54.0 | -22.45 | Vertical | Pass |
| 8097.500 | 54.55 | -- | 45.15 | 5.13 | 74.0 | -- | 54.0 | -8.85 | Vertical | Pass |
| 11040.000 | 59.54 | -- | 49.53 | 10.10 | 74.0 | -- | 54.0 | -4.47 | Vertical | Pass |
| 20544.500 | 62.75 | -- | 51.44 | 14.09 | 74.0 | -- | 54.0 | -2.56 | Vertical | Pass |

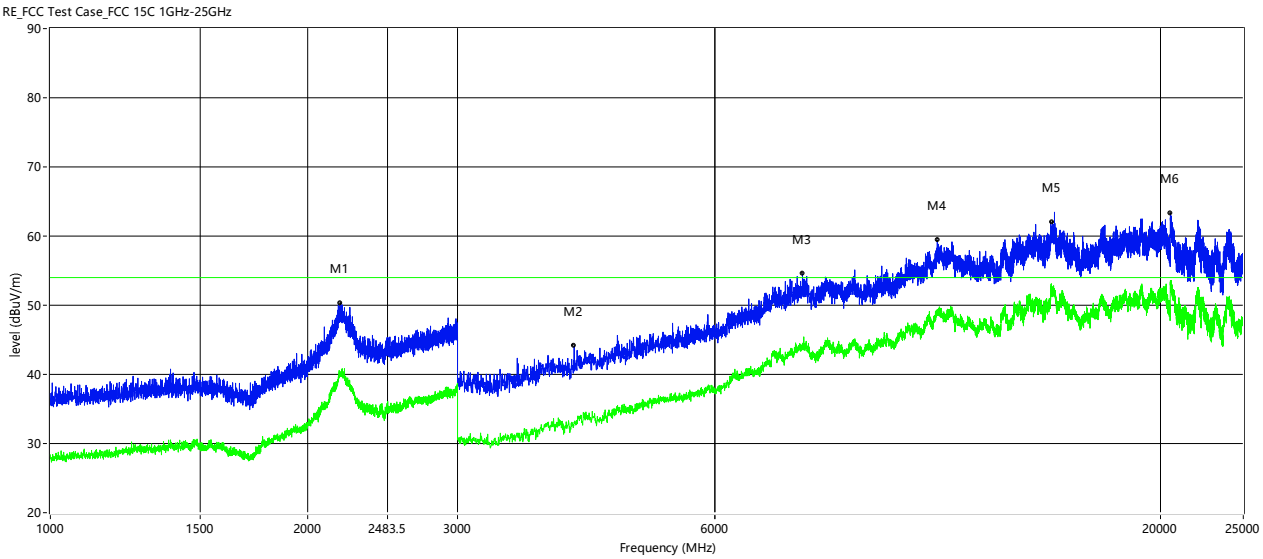
Horizontal




| Frequency (MHz) | Peak Level (dBuV/m) | Q-peak Level (dBuV/m) | Average Level (dBuV/m) | Factor (dB) | PK Limit (dBuV/m) | QP Limit (dBuV/m) | AV Limit (dBuV/m) | Over Limit (dB) | ANT | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| 1536.000 | 40.85 | -- | 30.25 | 0.36 | 74.0 | -- | 54.0 | -23.75 | Horizontal | Pass |
| 2189.000 | 51.25 | -- | 40.48 | 10.10 | 74.0 | -- | 54.0 | -13.52 | Horizontal | Pass |
| 6522.500 | 51.12 | -- | 40.44 | 0.70 | 74.0 | -- | 54.0 | -13.56 | Horizontal | Pass |
| 11030.000 | 58.96 | -- | 49.49 | 10.16 | 74.0 | -- | 54.0 | -4.51 | Horizontal | Pass |
| 14967.500 | 62.45 | -- | 50.90 | 12.44 | 74.0 | -- | 54.0 | -3.10 | Horizontal | Pass |
| 20574.251 | 63.38 | -- | 51.39 | 14.13 | 74.0 | -- | 54.0 | -2.61 | Horizontal | Pass |

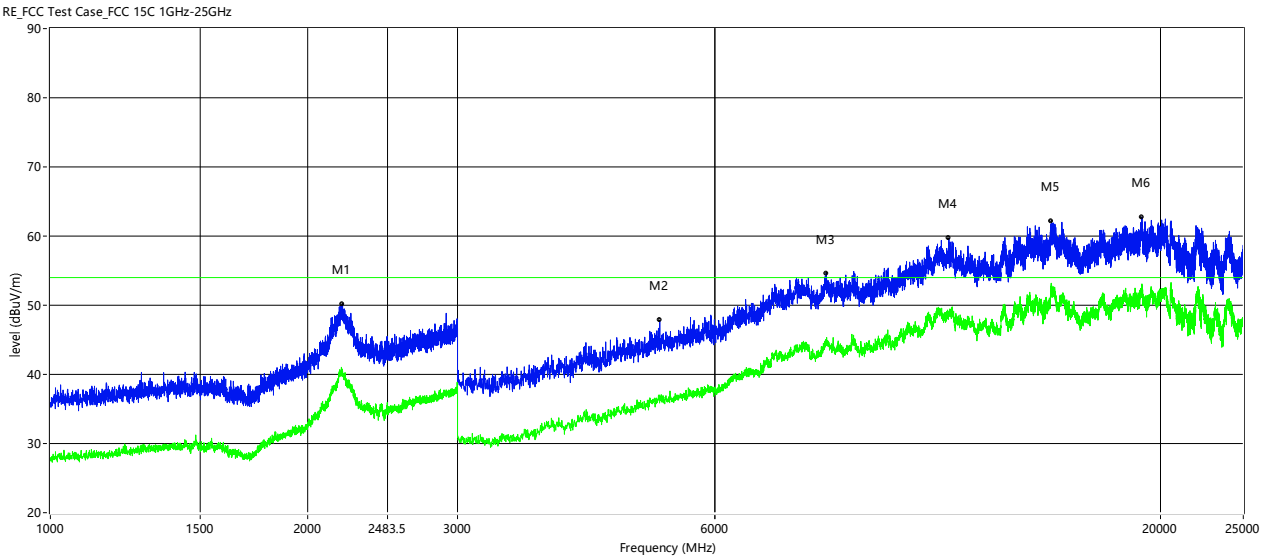
## CH High

vertical




| Frequency (MHz) | Peak Level (dBuV/m) | Q-peak Level (dBuV/m) | Average Level (dBuV/m) | Factor (dB) | PK Limit (dBuV/m) | QP Limit (dBuV/m) | AV Limit (dBuV/m) | Over Limit (dB) | ANT | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| 2188.500 | 50.31 | -- | 39.90 | 10.10 | 74.0 | -- | 54.0 | -14.10 | Vertical | Pass |
| 4110.000 | 44.07 | -- | 33.11 | -7.52 | 74.0 | -- | 54.0 | -20.89 | Vertical | Pass |
| 7610.000 | 54.51 | -- | 44.53 | 4.29 | 74.0 | -- | 54.0 | -9.47 | Vertical | Pass |
| 10947.500 | 59.42 | -- | 49.41 | 10.01 | 74.0 | -- | 54.0 | -4.59 | Vertical | Pass |
| 14932.500 | 62.05 | -- | 51.04 | 12.54 | 74.0 | -- | 54.0 | -2.96 | Vertical | Pass |
| 20537.500 | 63.28 | -- | 51.47 | 14.08 | 74.0 | -- | 54.0 | -2.53 | Vertical | Pass |

Horizontal

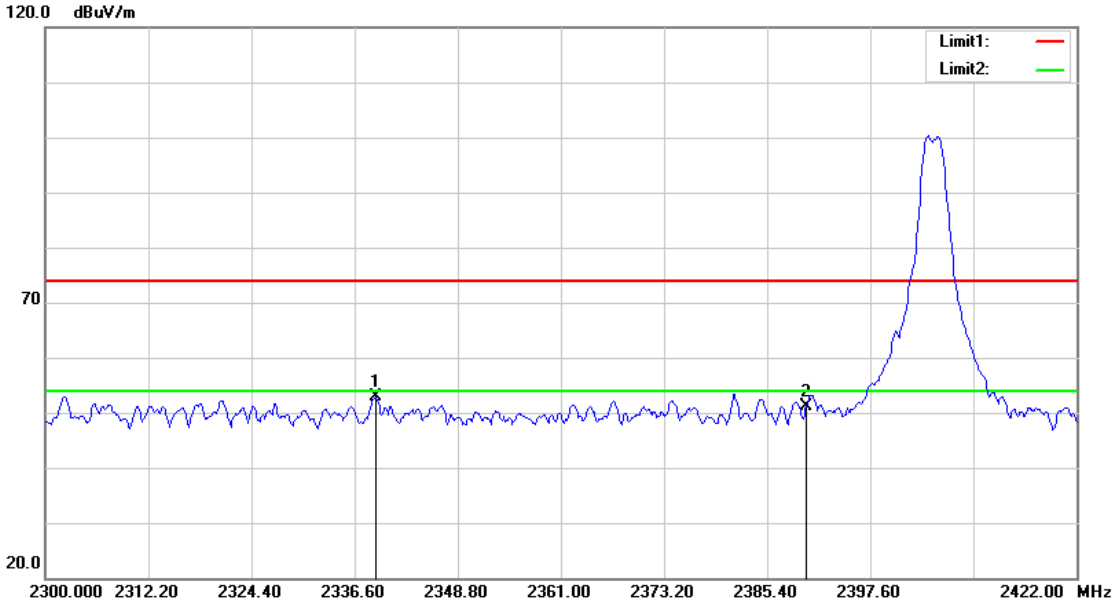



| Frequency (MHz) | Peak Level (dBuV/m) | Q-peak Level (dBuV/m) | Average Level (dBuV/m) | Factor (dB) | PK Limit (dBuV/m) | QP Limit (dBuV/m) | AV Limit (dBuV/m) | Over Limit (dB) | ANT | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| 2200.000 | 50.21 | -- | 40.53 | 10.19 | 74.0 | -- | 54.0 | -13.47 | Horizontal | Pass |
| 5177.500 | 47.82 | -- | 36.72 | -3.53 | 74.0 | -- | 54.0 | -17.28 | Horizontal | Pass |
| 8112.500 | 54.64 | -- | 45.02 | 5.01 | 74.0 | -- | 54.0 | -8.98 | Horizontal | Pass |
| 11297.500 | 59.67 | -- | 48.34 | 9.59 | 74.0 | -- | 54.0 | -5.66 | Horizontal | Pass |
| 14892.500 | 62.19 | -- | 51.10 | 12.53 | 74.0 | -- | 54.0 | -2.90 | Horizontal | Pass |
| 19020.249 | 62.75 | -- | 51.33 | 15.22 | 74.0 | -- | 54.0 | -2.67 | Horizontal | Pass |

3.3.7 TEST RESULTS (RESTRICTED BAND)

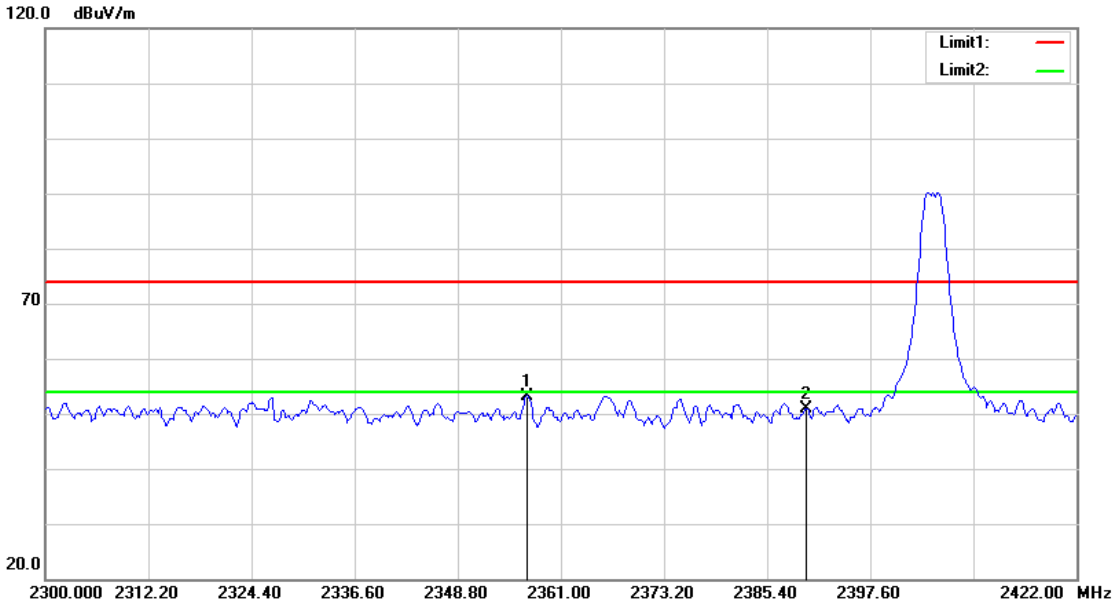
**CH Low**

Horizontal




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 2339.040 | 25.74 | 27.05 | 52.79 | 74.00 | -21.21 | peak |
| 2 | 2390.000 | 23.98 | 27.23 | 51.21 | 74.00 | -22.79 | peak |

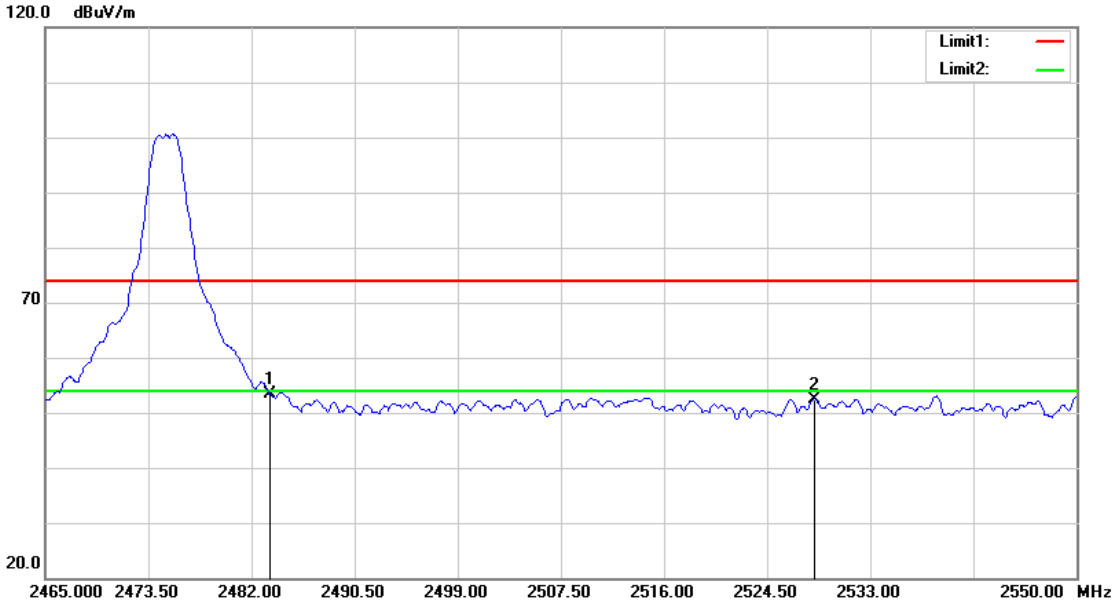
Vertical




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 2356.974 | 26.14 | 27.11 | 53.25 | 74.00 | -20.75 | peak |
| 2 | 2390.000 | 23.69 | 27.23 | 50.92 | 74.00 | -23.08 | peak |

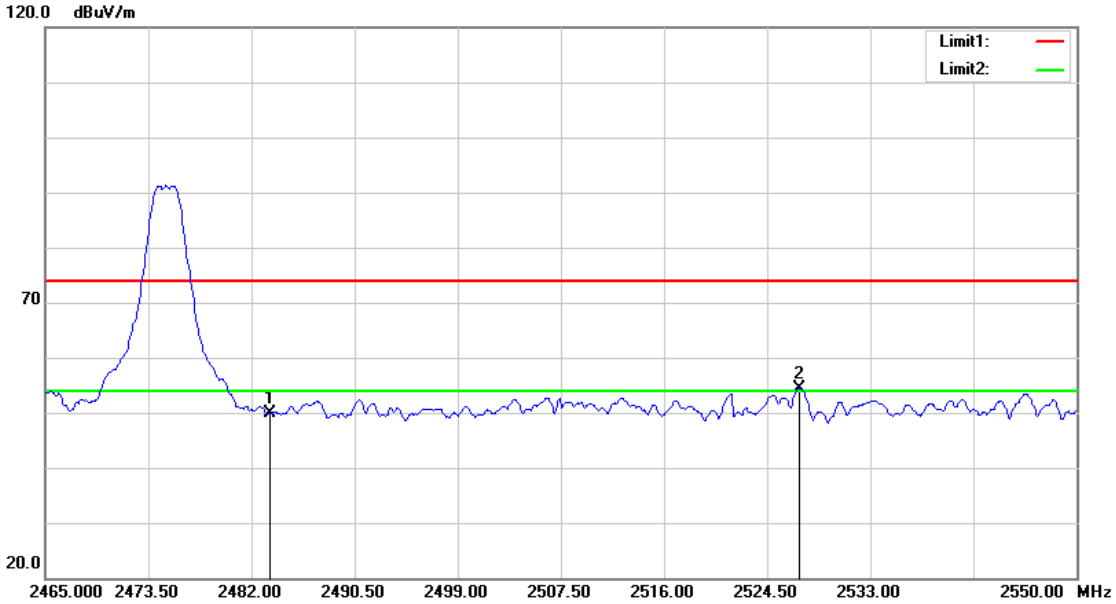
**CH High**

Horizontal




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 2483.500 | 25.73 | 27.54 | 53.27 | 74.00 | -20.73 | peak |
| 2 | 2528.410 | 24.87 | 27.63 | 52.50 | 74.00 | -21.50 | peak |

Vertical




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 2483.500 | 22.24 | 27.54 | 49.78 | 74.00 | -24.22 | peak |
| 2 | 2527.135 | 26.81 | 27.63 | 54.44 | 74.00 | -19.56 | peak |

# 4 CONDUCTED SPURIOUS & BAND EDGE EMISSION

## 4.1 APPLIED PROCEDURES / LIMIT

According to FCC Part 15.247(d) and RSS-247 Clause 5.5, in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

## 4.2 TEST PROCEDURE

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak |
| Start/Stop Frequency | 30 MHz to 10th carrier harmonic |
| RB / VB (emission in restricted band) | 100 KHz/300 KHz |
| Trace-Mode: | Max hold |

For Band edge

| Spectrum Parameter | Setting |
|---|---|
| Detector | Peak |
| Start/Stop Frequency | Lower Band Edge: 2300 to 2422 MHz<br>Upper Band Edge: 2452 to 2500 MHz |
| RB / VB (emission in restricted band) | 100 KHz/300 KHz |
| Trace-Mode: | Max hold |

## 4.3 DEVIATION FROM STANDARD

No deviation.

## 4.4 TEST SETUP


The EUT which is powered by the Adapter, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.
Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

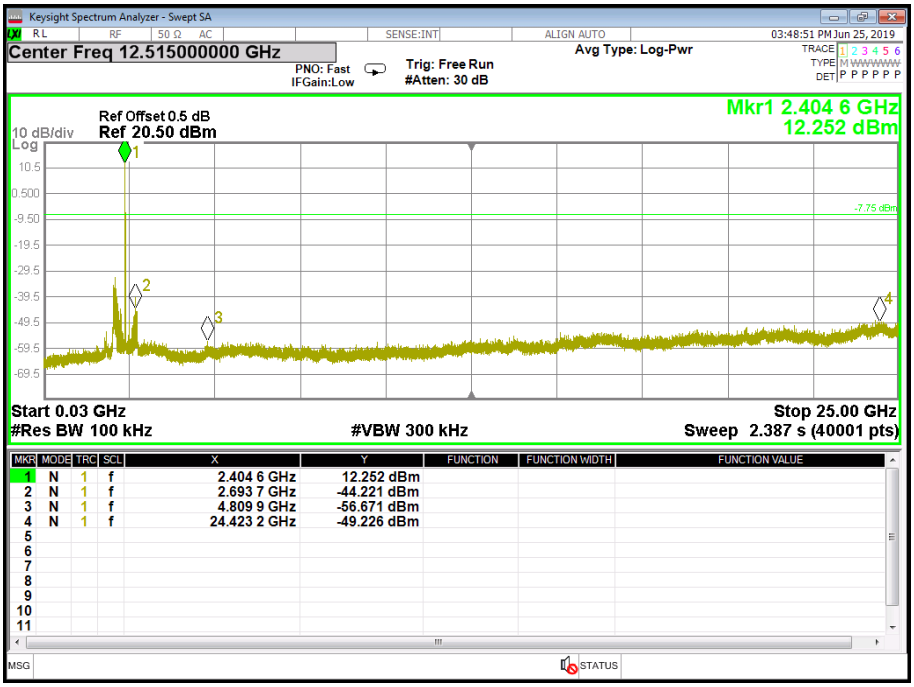
## 4.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

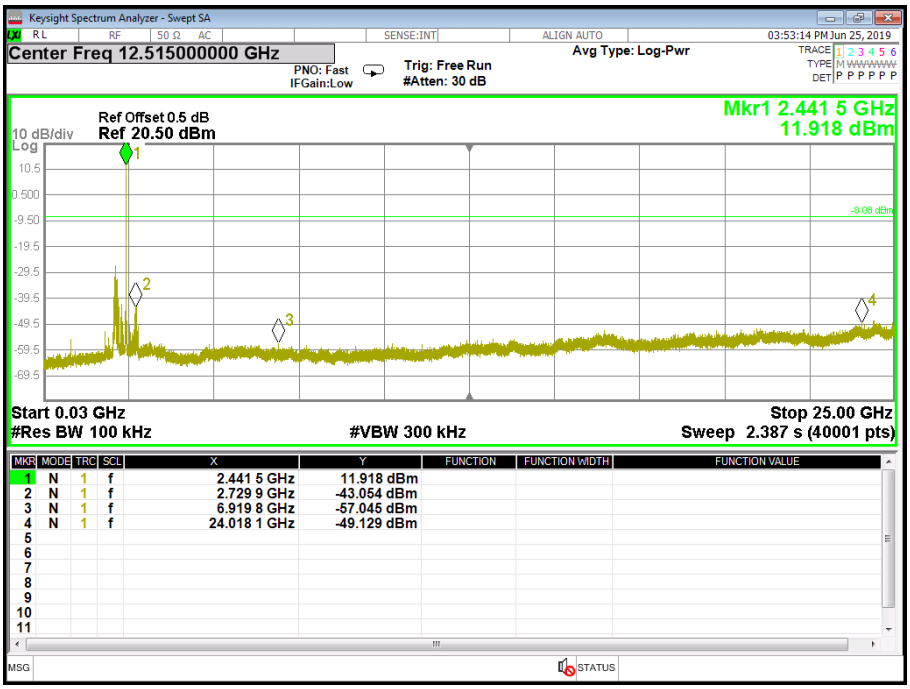
## 4.6 TEST RESULTS

| | | | |
|---|---|---|---|
| Temperature : | 25 ℃ | Relative Humidity : | 60% |
| Test Voltage : | AC 120V/60Hz | Test Mode : | TX Mode |

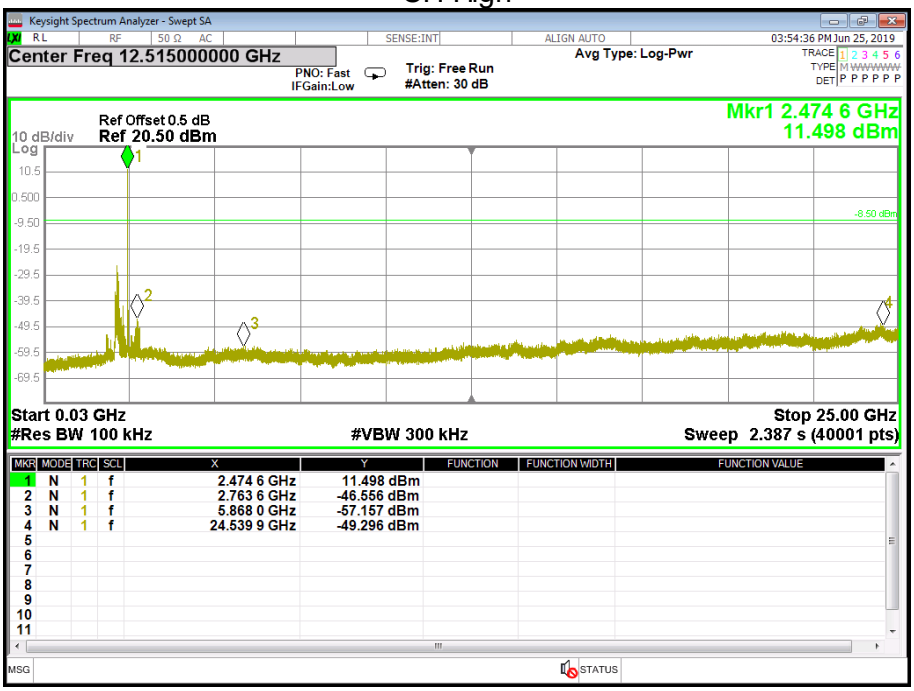
CH Low




CH Middle

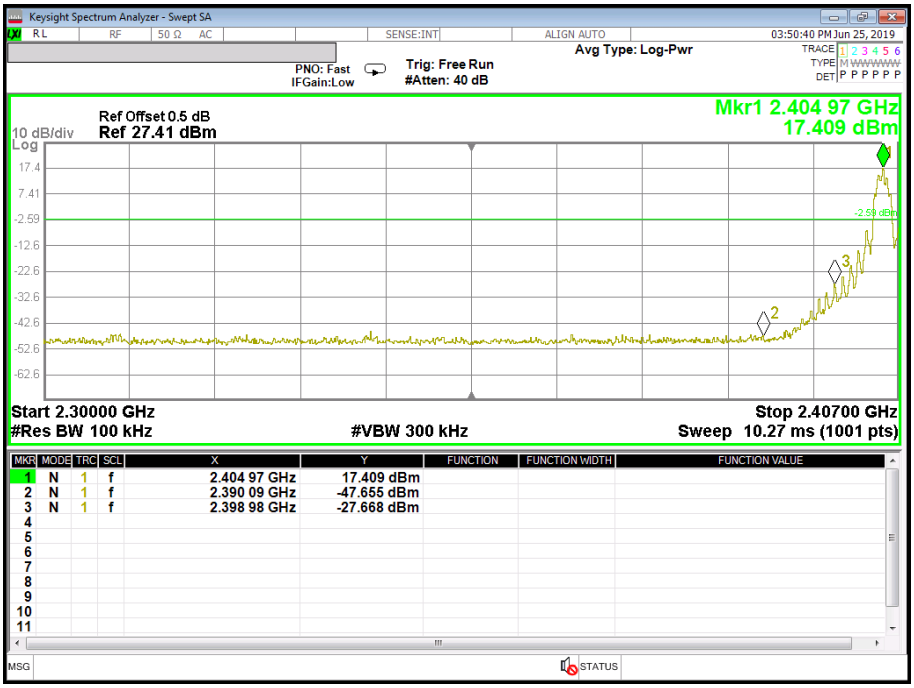


CH High

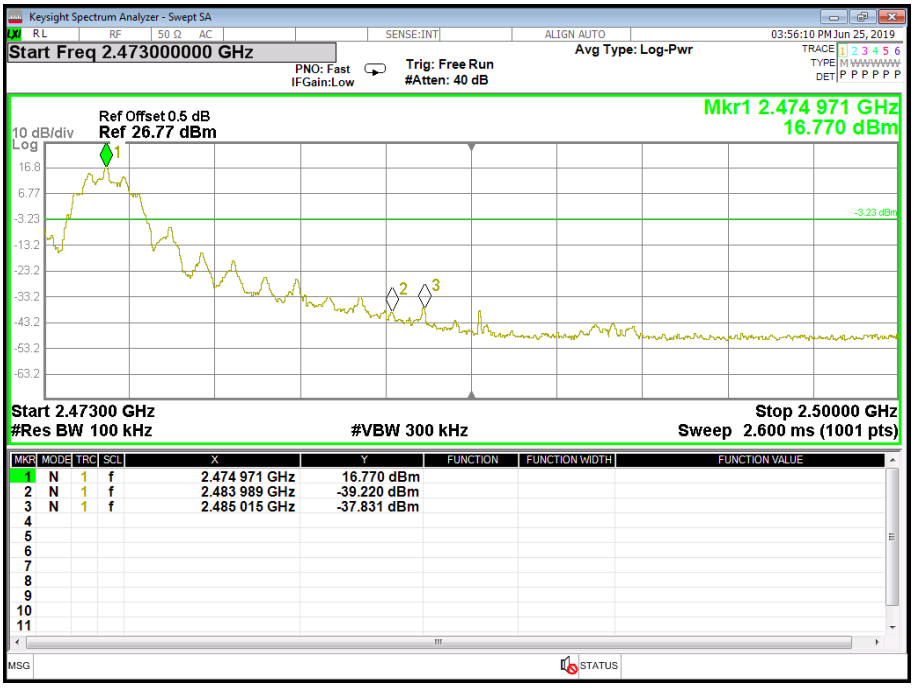

Keysight Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
03:54:36 PM Jun 25, 2019
Ref Offset 0.5 dB
10 dB/div
Ref 20.50 dBm
Log
Mkr1 2.474 6 GHz
11.498 dBm
-8.50 dBm
Start 0.03 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
1 N 1 f 2.474 6 GHz 11.498 dBm
2 N 1 f 2.763 6 GHz -46.556 dBm
3 N 1 f 5.868 0 GHz -57.157 dBm
4 N 1 f 24.539 9 GHz -49.296 dBm
MSG
STATUS

Band edge

CH Low

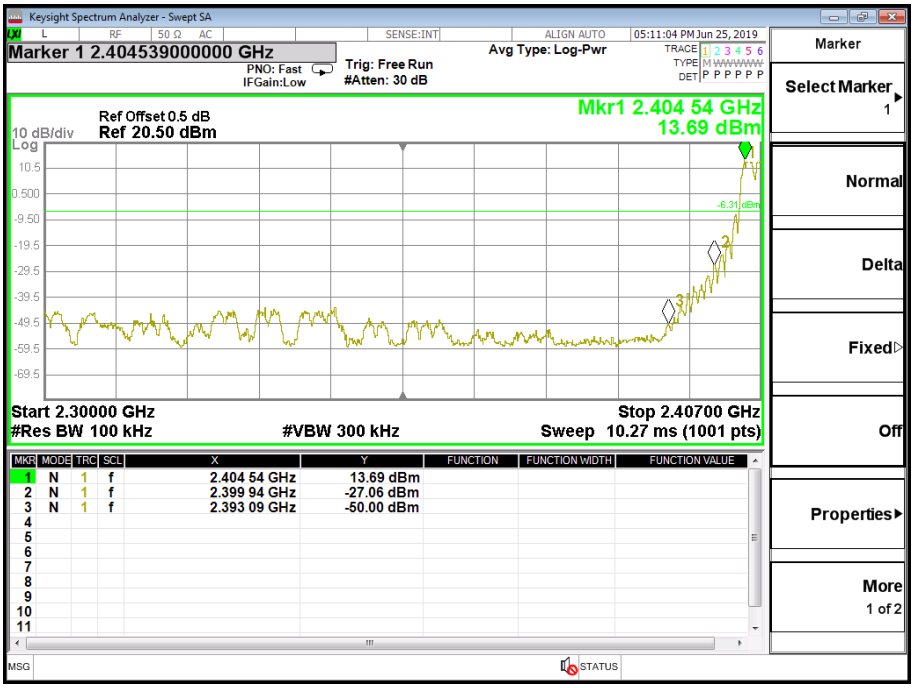



CH High

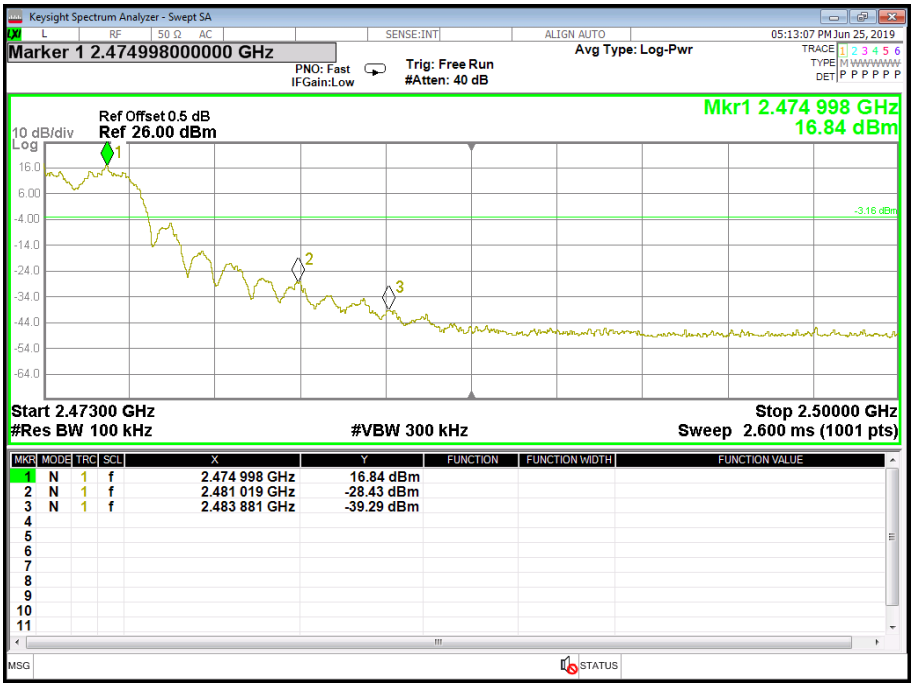


Hopping Band edge

CH Low




CH High



# 5 NUMBER OF HOPPING CHANNEL

## 5.1 APPLIED PROCEDURES / LIMIT

| FCC Part 15.247,Subpart C<br>RSS-247 Issue 2 | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| FCC Part 15.247(a)(1)<br>RSS-247 Clause 5.1(d) | Number of Hopping Channel | ≥15 | 2400-2483.5 | PASS |

| Spectrum Parameters | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > Operating FrequencyRange |
| RB | 1MHz |
| VB | 1MHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

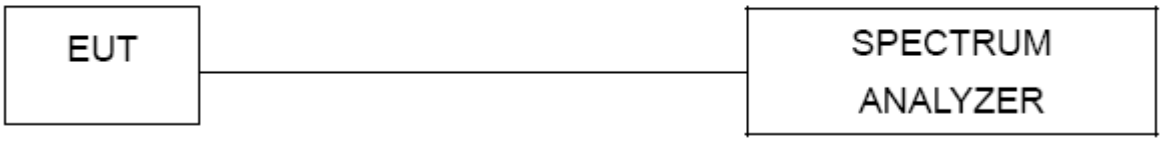
## 5.2 TEST PROCEDURE

1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below
2) Spectrum Setting : RBW= 1MHz, VBW=1MHz, Sweep time = Auto.

## 5.3 DEVIATION FROM STANDARD

No deviation.

## 5.4 TEST SETUP




## 5.5 EUT OPERATION CONDITIONS

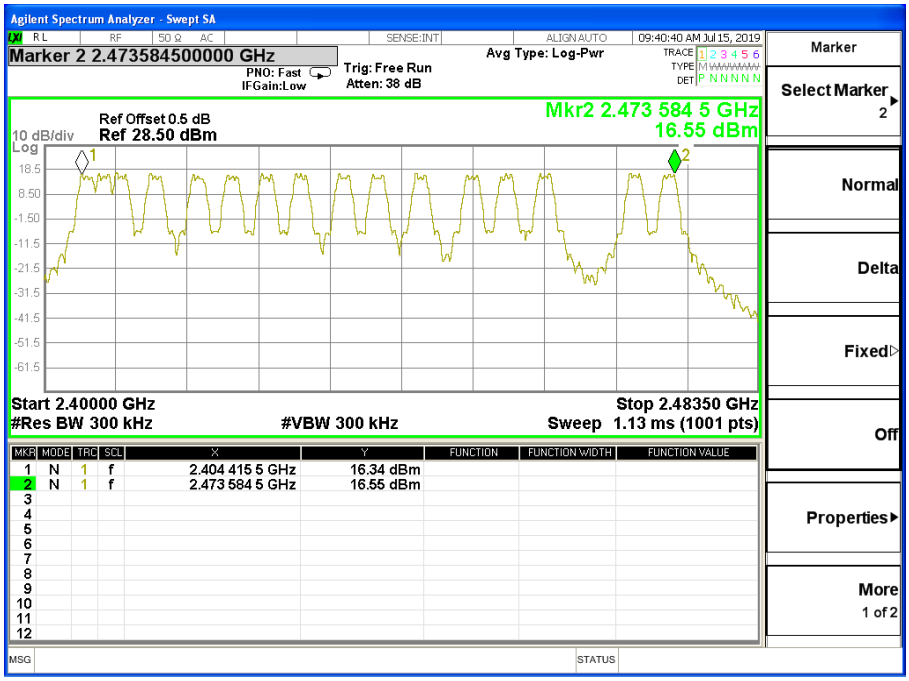
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

## 5.6 TEST RESULTS

| | | | |
|---|---|---|---|
| Temperature: | 25 ℃ | Relative Humidity: | 60% |
| Test Voltage: | AC 120V/60Hz | Test Mode: | Hopping mode |

Number of Hopping Channel 16

Hopping channel



# 6 AVERAGE TIME OF OCCUPANCY

## 6.1 APPLIED PROCEDURES / LIMIT

| FCC Part 15.247,Subpart C<br>RSS-247 Issue 2 | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| FCC Part 15.247(a)(1)<br>RSS-247 Clause 5.1(d) | Average Time of Occupancy | 0.4sec | 2400-2483.5 | PASS |

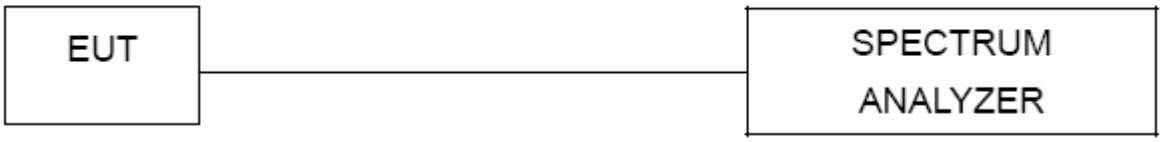
## 6.2 TEST PROCEDURE

1) The transmitter output (antenna port) was connected to the spectrum analyzer
2) Set RBW =1MHz/VBW =3MHz.
3) Use a video trigger with the trigger level set to enable triggering only on full pulses.
4) Sweep Time is more than once pulse time.
5) Set the center frequency on any frequency would be measure and set the frequency span to zero span.
6) Measure the maximum time duration of one single pulse.
7) Measure the maximum burst number of one hopping period.
8) A Period Time = 16*0.4=6.4 S

## 6.3 DEVIATION FROM STANDARD

No deviation.

## 6.4 TEST SETUP




## 6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

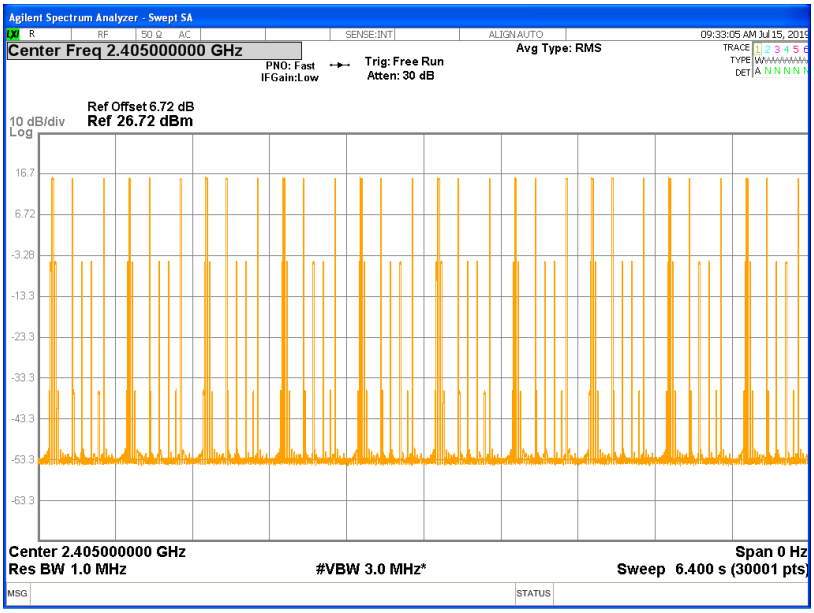
## 6.6 TEST RESULTS

| | | | |
|---|---|---|---|
| Temperature: | 25 ℃ | Relative Humidity: | 60% |
| Test Voltage: | AC 120V/60Hz | Test Mode: | Hopping mode |

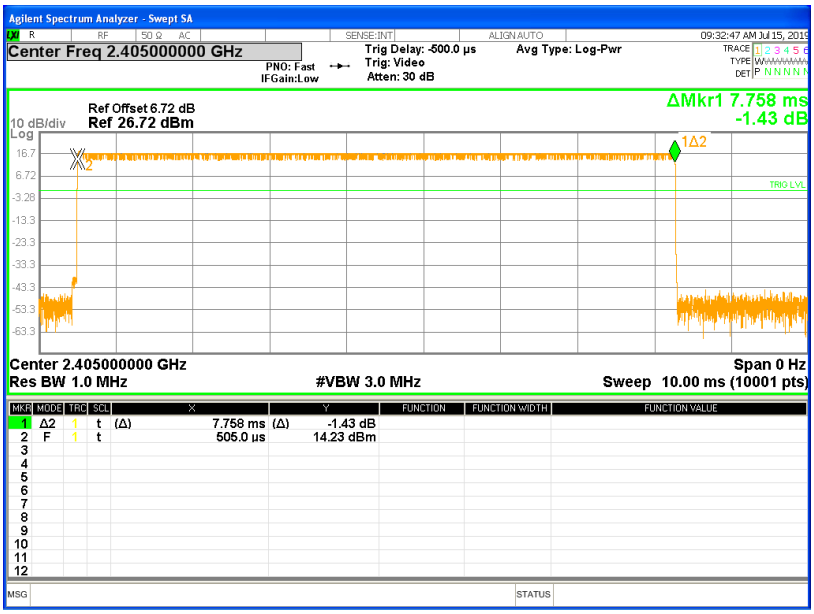
| Frequency (MHz) | Pulse Duration(ms) | Pulse number | Dwell Time(s) | Limits(s) |
|---|---|---|---|---|
| CH Low | 7.76 | 40.00 | 0.3103 | 0.4 |
| CH Middle | 7.76 | 40.00 | 0.3103 | 0.4 |
| CH High | 7.76 | 40.00 | 0.3103 | 0.4 |

## CH Low

### Dwell Time

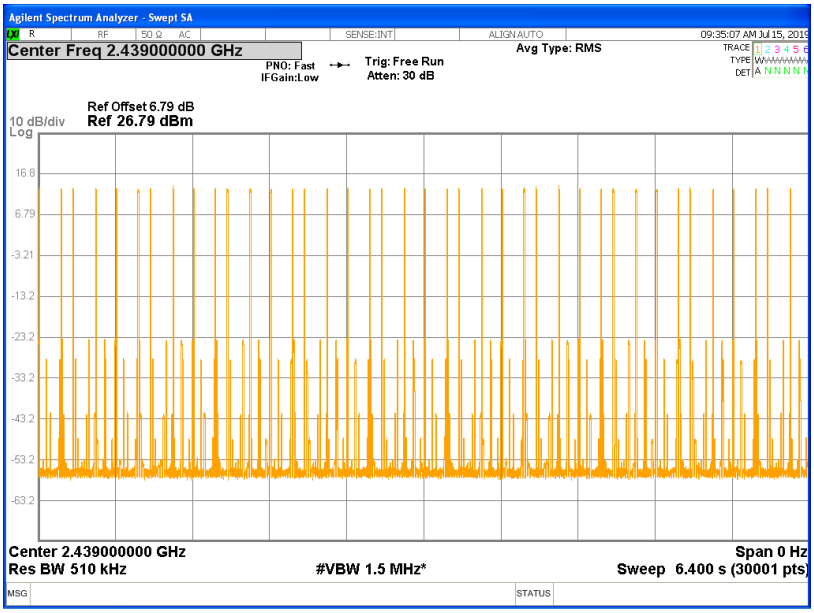



### One Pulse

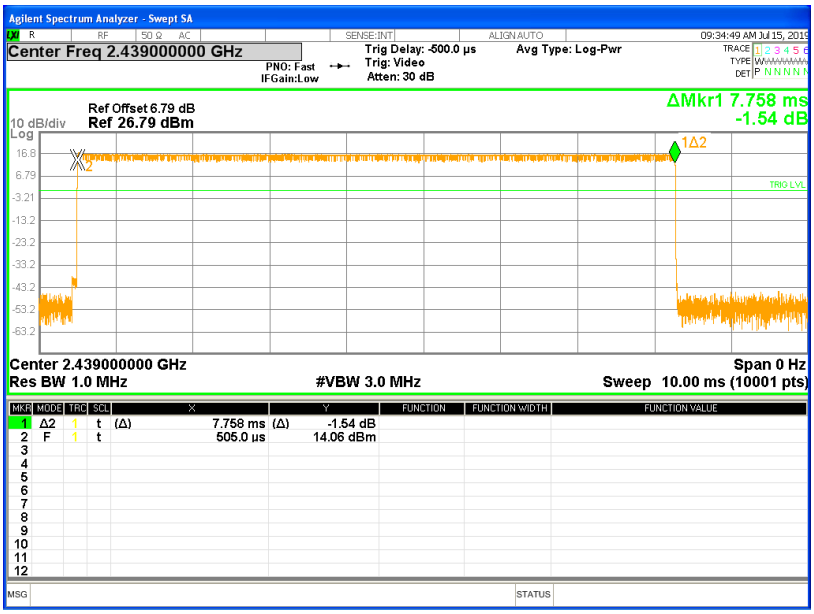


## CH Middle

### Dwell Time

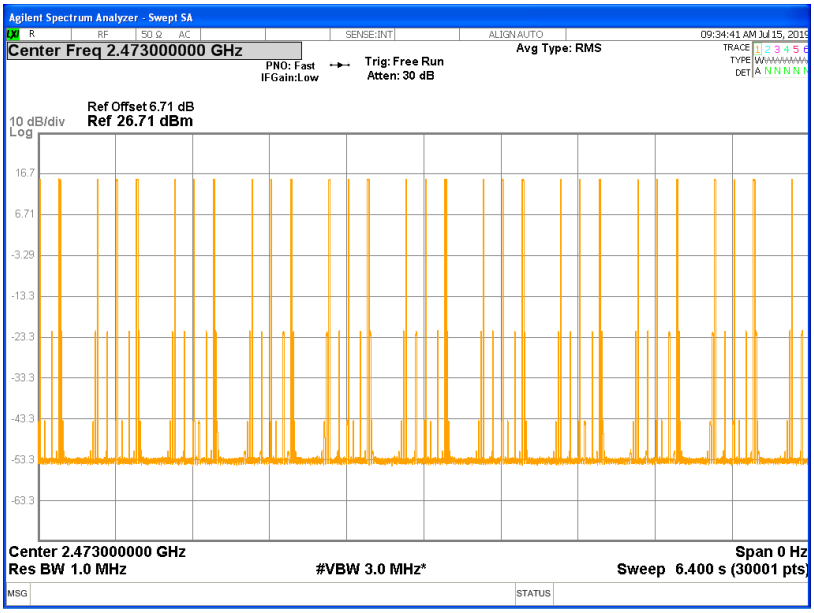



### One Pulse

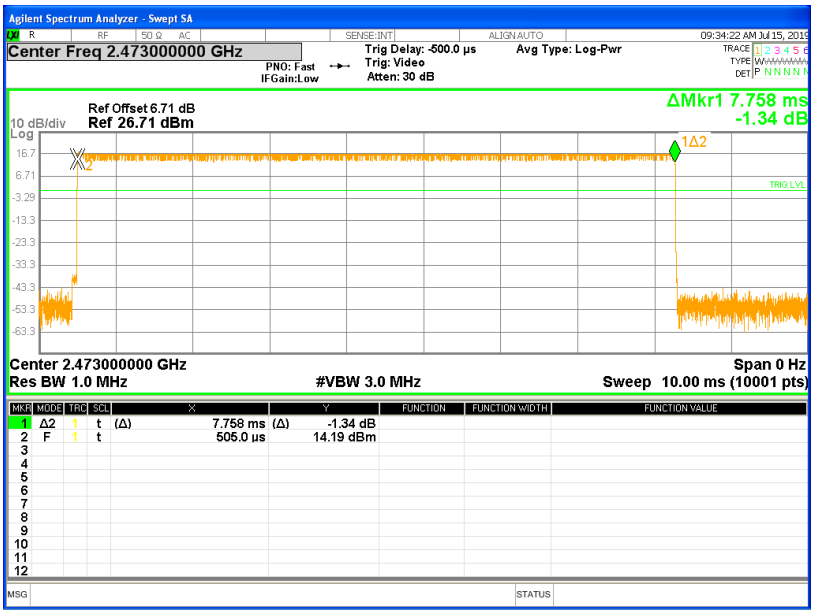


## CH High

### Dwell Time




### One Pulse



# 7 HOPPING CHANNEL SEPARATION MEASUREMEN

## 7.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > 20 dB Bandwidth or Channel Separation |
| RB | 30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation) |
| VB | 100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation) |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

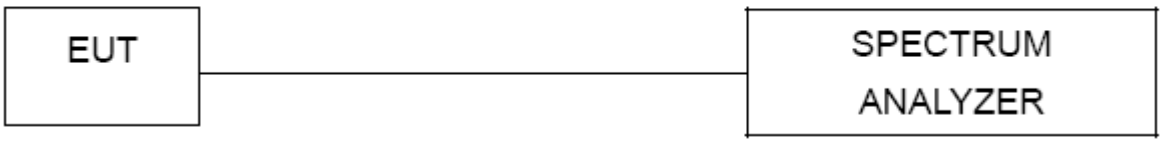
## 7.2 TEST PROCEDURE

1) The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2) The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
3) The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

## 7.3 DEVIATION FROM STANDARD

No deviation.

## 7.4 TEST SETUP




## 7.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

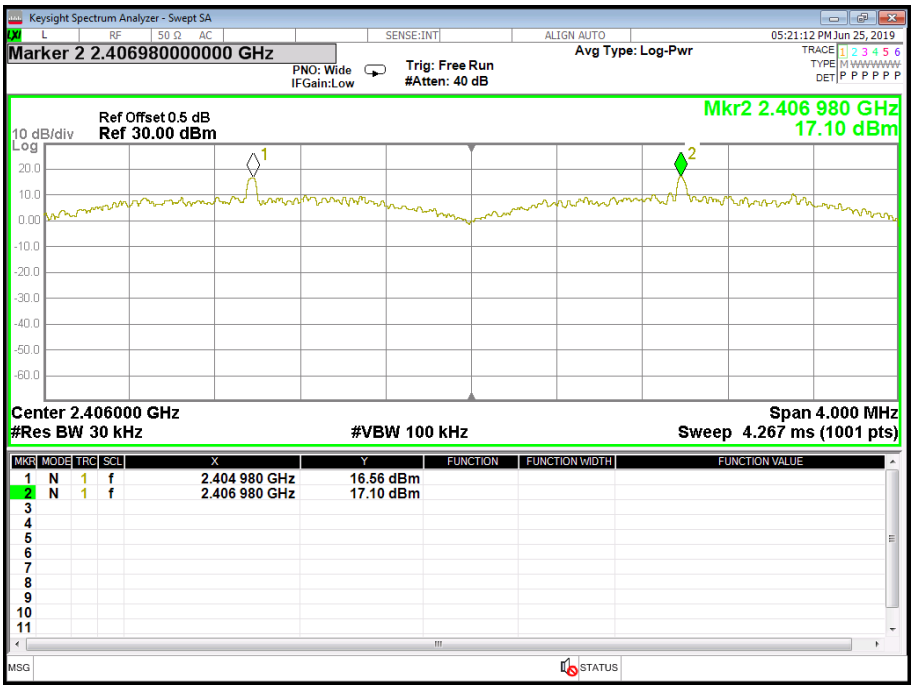
## 7.6 TEST RESULTS

| Temperature: | 25 ℃ | Relative Humidity: | 60% |
|---|---|---|---|
| Test Voltage: | AC 120V/60Hz | Test Mode: | Hopping mode |

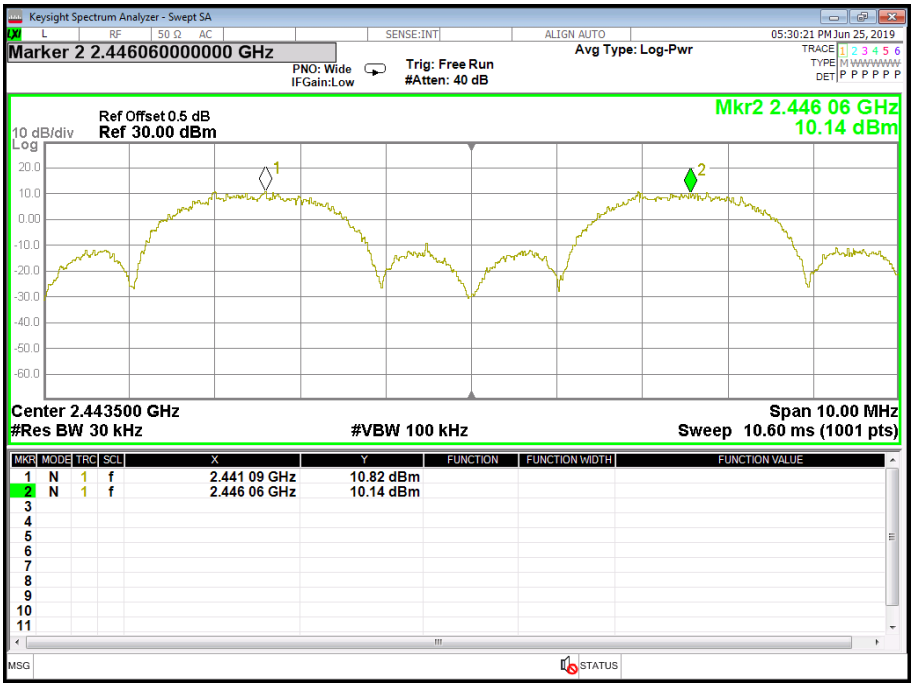
| Test Mode | Frequency | Ch. Separation (MHz) | Limit | Result |
|---|---|---|---|---|
| TX | CH Low | 2.000 | 1.456 | Complies |
| | CH Middle | 4.970 | 1.410 | Complies |
| | CH High | 2.024 | 1.415 | Complies |

Ch. Separation Limits: > two-thirds 20dB bandwidth

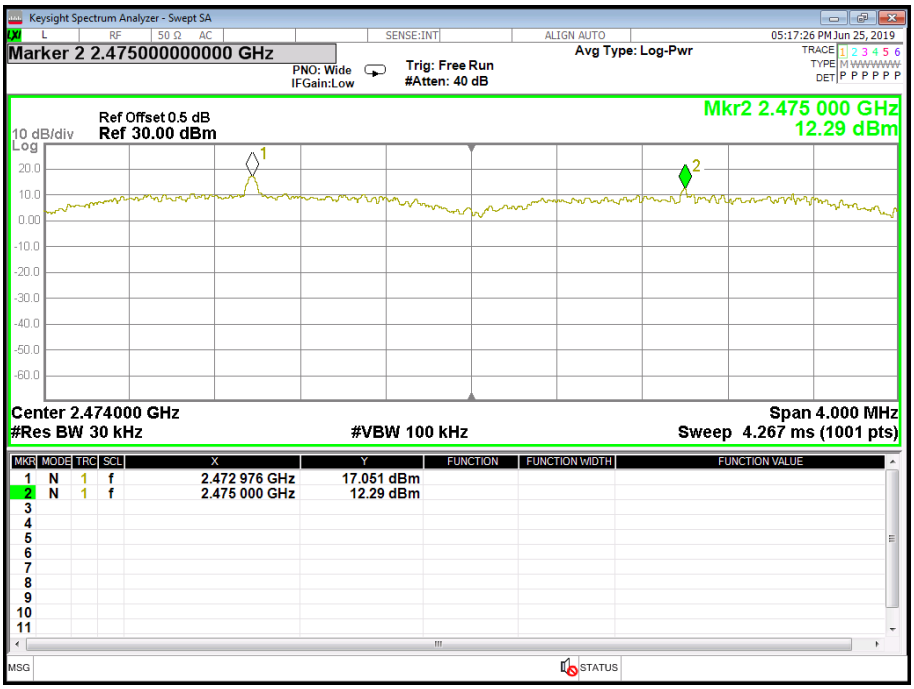
**CH Low**



## CH Middle




## CH High



# 8 BANDWIDTH TEST

## 8.1 APPLIED PROCEDURES / LIMIT

| FCC Part 15.247,Subpart C<br>RSS-247 Issue 2 & RSS-Gen Issue 5 | | | | |
|---|---|---|---|---|
| **Section** | **Test Item** | **Limit** | **Frequency Range (MHz)** | **Result** |
| FCC Part 15.247(a)(1)<br>RSS-247 Clause 5.1(a) | Bandwidth | (20dB Bandwidth) | 2400-2483.5 | PASS |
| RSS-Gen Clause 6.7 | 99% Bandwidth | - | 2400-2483.5 | PASS |

## 8.2 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 1% - 5% OBW, VBW≥3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥6 dB.

## 8.3 DEVIATION FROM STANDARD

No deviation.

## 8.4 TEST SETUP


## 8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

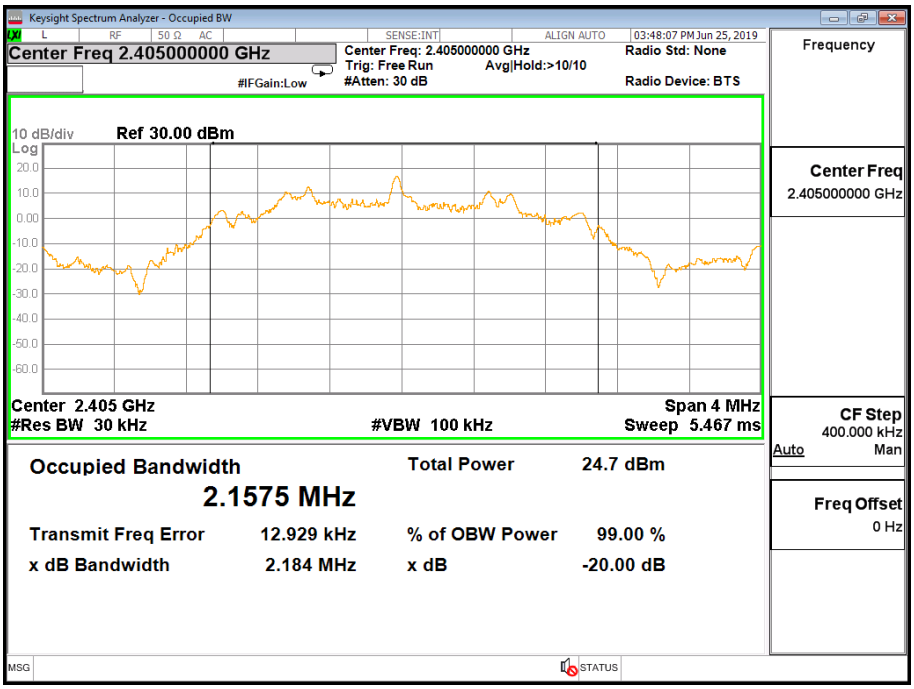
## 8.6 TEST RESULTS

| Temperature: | 25 ℃ | Relative Humidity: | 60% |
|---|---|---|---|
| Test Voltage: | AC 120V/60Hz | Test Mode: | TX Mode |

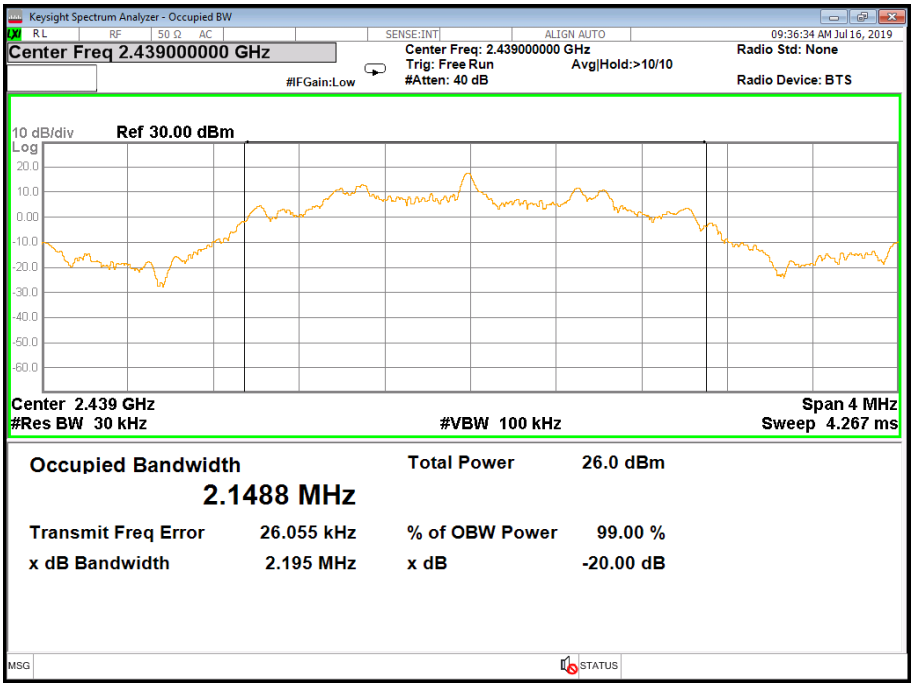
Remark: PEAK DETECTOR IS USED

| Test Mode | Frequency (MHz) | 20dB Bandwidth (MHz) | 99% Bandwidth (MHz) | Limit of 20dB Bandwidth (MHz) | Result |
|---|---|---|---|---|---|
| TX | CH Low | 2.184 | 2.1575 | N/A | PASS |
| | CH Middle | 2.195 | 2.1488 | N/A | PASS |
| | CH High | 2.123 | 2.1608 | N/A | PASS |

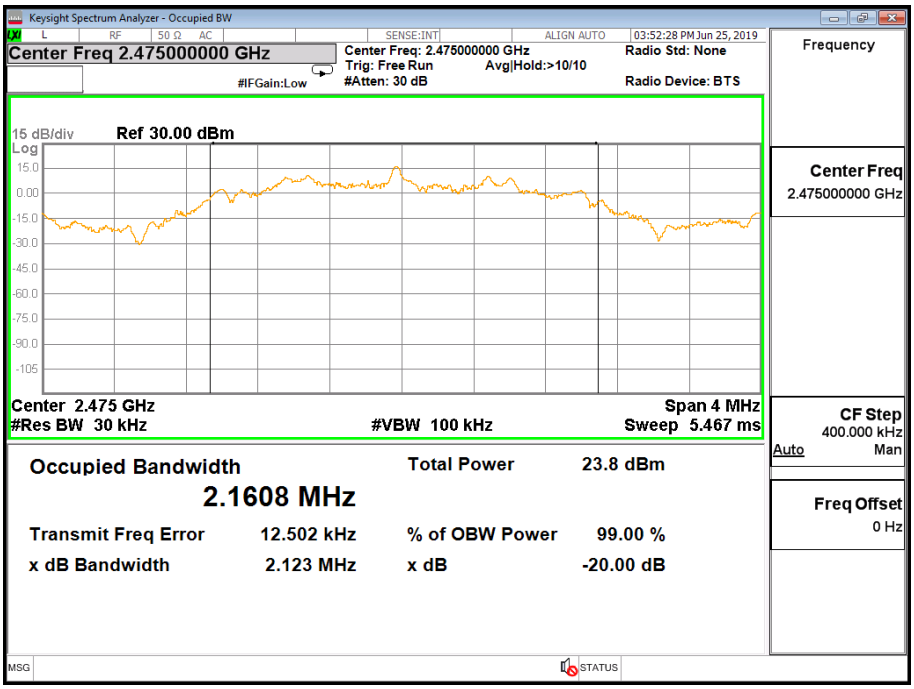
**CH Low**



## CH Middle




## CH High



# 9 PEAK OUTPUT POWER TEST

## 9.1 APPLIED PROCEDURES / LIMIT

| FCC Part 15.247,Subpart C<br>RSS-247 Issue 2 | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| FCC Part 15.247(a)(1)<br>RSS-247<br>Clause 5.4(b) | Output Power | 1 W or 0.125W<br>if channel separation > 2/3 bandwidthprovided thesystems operatewith an output power no greater than125 mW(20.97dBm) | 2400-2483.5 | PASS |

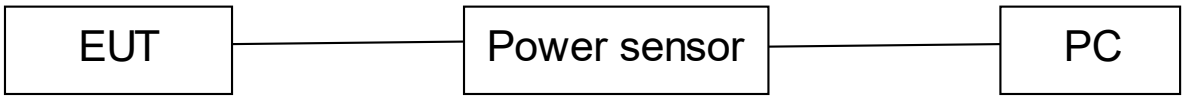
## 9.2 TEST PROCEDURE

a. The EUT was directly connected to the Power Sensor&PC

## 9.3 DEVIATION FROM STANDARD

No deviation.

## 9.4 TEST SETUP




## 9.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

## 9.6 TEST RESULTS

| | | | |
|---|---|---|---|
| Temperature： | 25℃ | Relative Humidity： | 60% |
| Test Voltage ： | AC 120V/60Hz | | |

| Test Channel | Frequency (MHz) | Conducted Output Power | | Limit (dBm) |
|---|---|---|---|---|
| | | Peak(dBm) | AVG(dBm) | |
| Low | 2405 | 19.00 | 17.52 | 20.97 |
| Middle | 2439 | 19.07 | 17.59 | 20.97 |
| High | 2475 | 19.13 | 17.65 | 20.97 |

Note:

1) The cable loss and antenna gain are taken into account in results.
2) Antenna gain(G): 0 dBi
3) The max e.i.r.p = conducted power + antenna gain = 19.13 dBm

# 10 ANTENNA REQUIREMENT

## 10.1 STANDARD REQUIREMENT

15.203 and RSS-Gen Issue 5 requirement: For intentional device, according to 15.203 and RSS-Gen Issue 5: 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.

## 10.2 EUT ANTENNA

The EUT antenna is Integral Antenna. It comply with the standard requirement.