

RADIO TEST REPORT

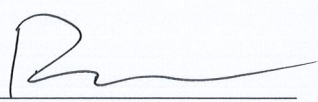
The device described below is tested by Dongguan Nore Testing Center Co., Ltd. to determine the maximum emission levels emanating from the device, the severe levels which the device can endure and E.U.T.'s performance criterion. The test results, data evaluation, test procedures, and equipment of configurations shown in this report were made in accordance with the procedures in ANSI C63.10(2013).

Applicant : DONGGUAN TOGRAN ELECTRONICS TECHNOLOGY CO.,LTD.
Address : 262 shidan Rd., 3rd industrial Area, Juzhou, Shijie Town, Dongguan city, China
Manufacturer /Factory : DONGGUAN TOGRAN ELECTRONICS TECHNOLOGY CO.,LTD.
Address : 262 shidan Rd., 3rd industrial Area, Juzhou, Shijie Town, Dongguan city, China
E.U.T. : Wireless Dongle
Brand Name : Togran
Model No. : TM173G-Dongle
FCC ID : 2AGLG-TM173GDONGLE
Measurement Standard : FCC PART 15.249: 2017
Date of Receiver : October 31, 2018
Date of Test : October 31, 2018 to November 15, 2018
Date of Report : November 15, 2018

This Test Report is Issued Under the Authority of :

Prepared by

Approved & Authorized Signer


-Rose Hu / Engineer


Lori Fan / Authorized Signatory



This test report is for the customer shown above and their specific product only. This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan Nore Testing Center Co., Ltd.

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Revision History of This Test Report

| Report Number | Description | Issued Date |
|----------------|---------------|-------------|
| NTC1810334FV00 | Initial Issue | 2018-11-15 |
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1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

| | |
|------------------------------|-------------------------|
| Product Name | : Wireless Dongle |
| Main model number | : TM173G-Dongle |
| Additional Model number | : N/A |
| Brand Name | : Togran |
| Power Supply | : DC 5V come from PC |
| Adapter | : N/A |
| Test voltage | : AC 120V 60Hz PC input |
| Model Difference Description | : N/A |
| Hardware version | : A1 |
| Software version | : V01 |
| Note | : N/A |
| Remark | : N/A |

Technical Specification:

2.4G Function:

| | |
|-------------------|---------------------------------------|
| Frequency Range | : 2403~2480MHz |
| Modulation Type | : GFSK |
| Number of Channel | : 16 |
| Antenna Type | : PCB |
| Antenna Gain | : 0 dBi (Declaration by manufacturer) |

Channel List

| Channel | Frequency MHz | Channel | Frequency MHz |
|---------|------------------|---------|------------------|
| 1 | 2403 | 9 | 2414 |
| 2 | 2426 | 10 | 2436 |
| 3 | 2441 | 11 | 2459 |
| 4 | 2463 | 12 | 2473 |
| 5 | 2407 | 13 | 2419 |
| 6 | 2422 | 14 | 2439 |
| 7 | 2445 | 15 | 2453 |
| 8 | 2466 | 16 | 2480 |

Note: The Lowest, middle, and the Highest frequency of channel were selected to perform the test. The frequency selected see below:

The Lowest frequency: 2403MHz

The middle frequency: 2441MHz

The Highest frequency: 2480MHz

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AGLG-TM173GDONGLE filing to comply with Section 15.249 of the FCC Part 15 (2017), Subpart C Rule.

1.3 Test Methodology

The radiated emission measurement was performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in semi-anechoic chamber. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters.

1.4 Equipment Modifications

Not available for this EUT intended for grant.

1.5 Support Device

| | | |
|---------------------------|---|---|
| Monitor | : | Manufacturer: LENOVO M/N: L2061wD S/N: 3M04769B1102083 |
| PC | : | P/N: QG570PA#AB2 Power Cord: 1.8m Unshielded, with core CE, FCC: DOC |
| Notebook | : | Manufacturer: IBM Model: 1834 P/N: 13N5615 |
| Adapter (For Notebook) | : | Manufacturer: Huntkey Model: HKA09019047-6D I/P: AC 100-240V 50-60Hz, 1.5A O/P: DC 19V 4.74A |
| Printer | : | Manufacturer: Lenovo M/N: 3518 |
| Keyboard | : | Manufacturer: DELL M/N: KB216d CE, FCC: DOC, IC, VCCI, RCM |
| Wireless Mouse | : | Manufacturer: TOGRAN M/N: TM173G-QI |

1.6 Test Facility and Location

Site Description

EMC Lab : Listed by CNAS, August 13, 2018
The certificate is valid until August 13, 2024
The Laboratory has been assessed and proved to
be in compliance with CNAS/CL01
The Certificate Registration Number is L5795.

Listed by A2LA, November 01, 2017
The certificate is valid until December 31, 2019
The Laboratory has been assessed and proved to
be in compliance with ISO17025
The Certificate Registration Number is 4429.01

Listed by FCC, November 06, 2017
The Designation Number is CN1214
Test Firm Registration Number: 907417

Listed by Industry Canada, June 08, 2017
The Certificate Registration Number. Is 46405-9743
Name of Firm : Dongguan Nore Testing Center Co., Ltd.
(Dongguan NTC Co., Ltd.)

Site Location : Building D, Gaosheng Science & Technology Park,
Zhouxi Longxi Road, Nancheng District, Dongguan
City, Guangdong Province, China

1.7 Summary of Test Results

| FCC Rules | Description Of Test | Uncertainty | Result |
|--------------------|-----------------------------|---------------------------|-----------|
| §15.207(a) | AC Power Conducted Emission | ±1.06dB | Compliant |
| §15.249(a)/ 15.209 | Radiated Emissions | ±3.70dB | Compliant |
| §15.249(d)/ 15.205 | Band Edge | ±1.70dB | Compliant |
| §15.215(c) | 20dB Bandwidth | ±1.42 x10 ⁻⁴ % | Compliant |
| §15.203 | Antenna Requirement | --- | Compliant |

2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 Special Accessories

Not available for this EUT intended for grant.

2.3 Description of test modes

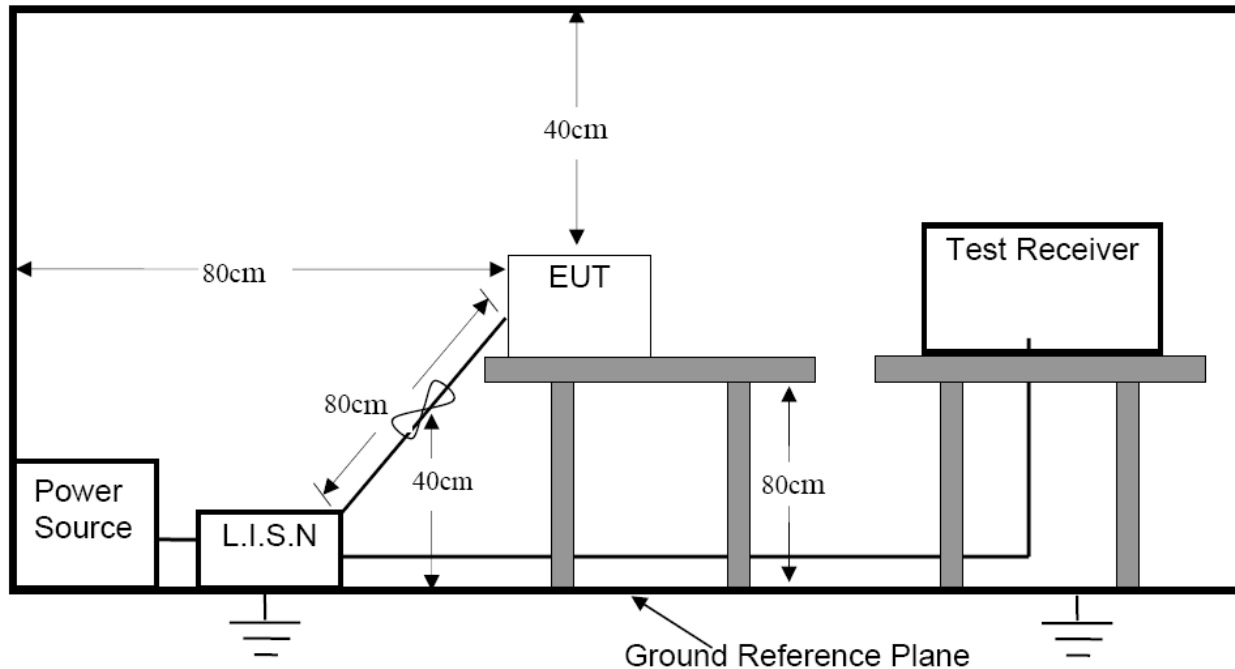
The EUT has been tested under operating condition. The Lowest, middle and highest frequencies were chosen for testing.

2.4 EUT Exercise

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

3. Conducted Emissions Test

3.1 Test SET-UP (Block Diagram of Configuration)



3.2 Test Condition

Test Requirement: FCC Part 15.207

Frequency Range: 150KHz ~ 30MHz

Detector: RBW 9KHz, VBW 30KHz

Operation Mode: TX

3.3 Measurement Results

PASS

Please refer to following the test plots of the worst case: Low channel.



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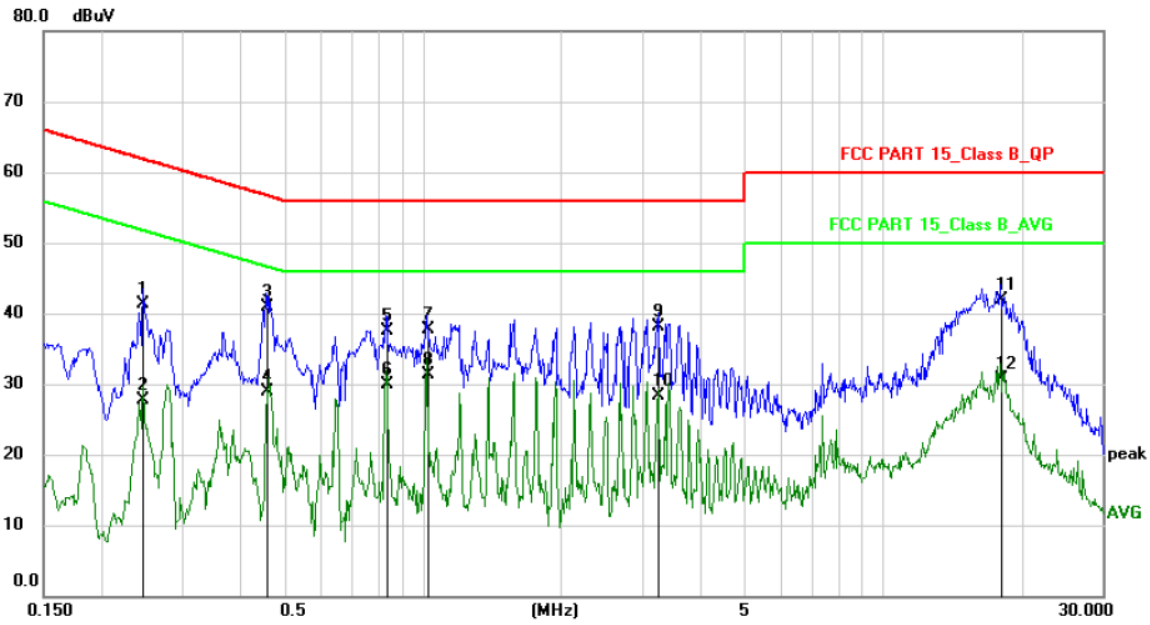
Conducted Emission Measurement

File :TM173G-Dongle

Data :#5

Date: 2018-11-7

Time: 12:24:57



Site

Phase: **L1**

Temperature: 26

Limit: FCC PART 15_Class B_QP

Power: AC120V/60Hz

Humidity: 50 %

EUT: Wireless Dongle

M/N: TM173G-Dongle

Mode: TX Mode

Note:

| No. Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV | Limit dBuV | Over dB | Detector | Comment |
|---------|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1 | 0.2467 | 30.79 | 10.61 | 41.40 | 61.87 | -20.47 | QP | |
| 2 | 0.2467 | 17.19 | 10.61 | 27.80 | 51.87 | -24.07 | AVG | |
| 3 | 0.4580 | 30.28 | 10.62 | 40.90 | 56.73 | -15.83 | QP | |
| 4 | 0.4580 | 18.28 | 10.62 | 28.90 | 46.73 | -17.83 | AVG | |
| 5 | 0.8336 | 26.96 | 10.64 | 37.60 | 56.00 | -18.40 | QP | |
| 6 | 0.8336 | 19.26 | 10.64 | 29.90 | 46.00 | -16.10 | AVG | |
| 7 | 1.0220 | 27.05 | 10.65 | 37.70 | 56.00 | -18.30 | QP | |
| 8 * | 1.0220 | 20.75 | 10.65 | 31.40 | 46.00 | -14.60 | AVG | |
| 9 | 3.2418 | 27.45 | 10.65 | 38.10 | 56.00 | -17.90 | QP | |
| 10 | 3.2418 | 17.65 | 10.65 | 28.30 | 46.00 | -17.70 | AVG | |
| 11 | 17.9859 | 31.33 | 10.67 | 42.00 | 60.00 | -18.00 | QP | |
| 12 | 17.9859 | 20.13 | 10.67 | 30.80 | 50.00 | -19.20 | AVG | |



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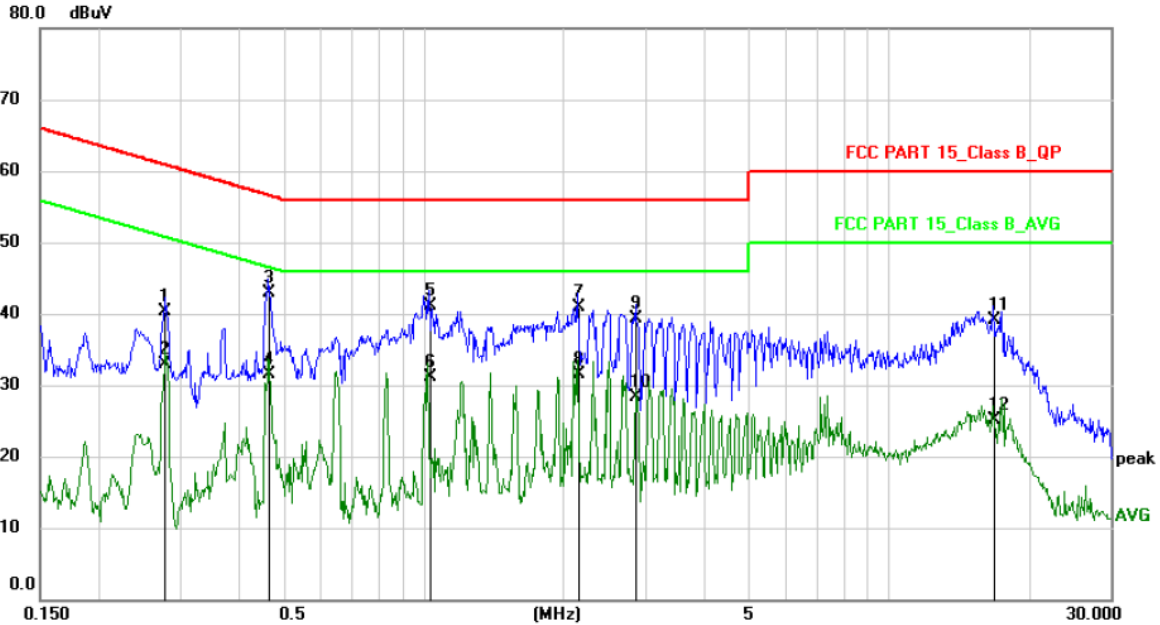
Conducted Emission Measurement

File: TM173G-Dongle

Data: #6

Date: 2018-11-7

Time: 12:33:37



Site

Phase: **N**

Temperature: 26

Limit: FCC PART 15_Class B_QP

Power: AC120V/60Hz

Humidity: 50 %

EUT: Wireless Dongle

M/N: TM173G-Dongle

Mode: TX Mode

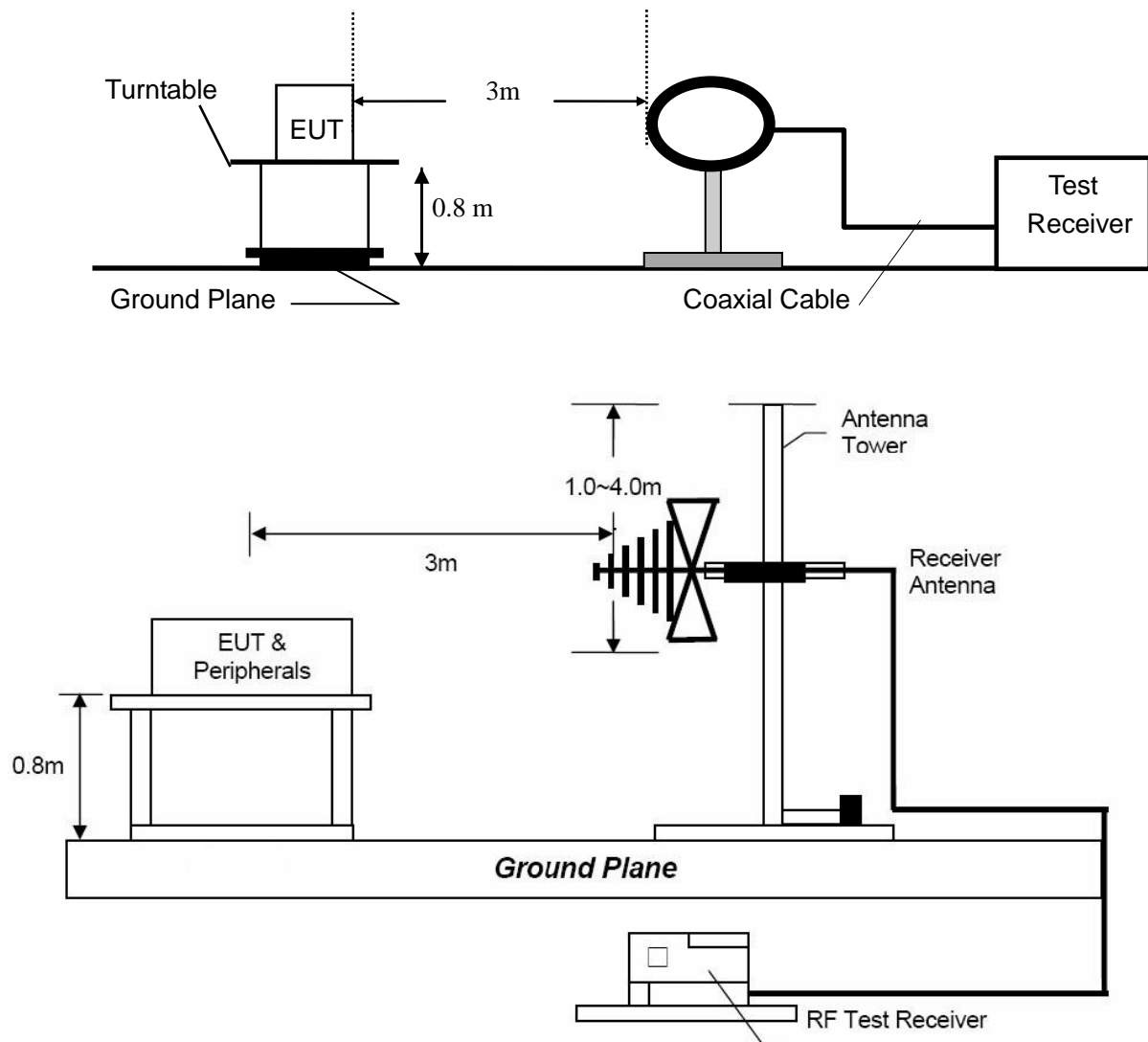
Note:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV | Limit dBuV | Over dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1 | | 0.2787 | 29.69 | 10.61 | 40.30 | 60.85 | -20.55 | QP | |
| 2 | | 0.2787 | 22.39 | 10.61 | 33.00 | 50.85 | -17.85 | AVG | |
| 3 | * | 0.4660 | 32.28 | 10.62 | 42.90 | 56.58 | -13.68 | QP | |
| 4 | | 0.4660 | 20.98 | 10.62 | 31.60 | 46.58 | -14.98 | AVG | |
| 5 | | 1.0300 | 30.55 | 10.65 | 41.20 | 56.00 | -14.80 | QP | |
| 6 | | 1.0300 | 20.45 | 10.65 | 31.10 | 46.00 | -14.90 | AVG | |
| 7 | | 2.1459 | 30.25 | 10.65 | 40.90 | 56.00 | -15.10 | QP | |
| 8 | | 2.1459 | 20.85 | 10.65 | 31.50 | 46.00 | -14.50 | AVG | |
| 9 | | 2.8620 | 28.65 | 10.65 | 39.30 | 56.00 | -16.70 | QP | |
| 10 | | 2.8620 | 17.75 | 10.65 | 28.40 | 46.00 | -17.60 | AVG | |
| 11 | | 16.8379 | 28.43 | 10.67 | 39.10 | 60.00 | -20.90 | QP | |
| 12 | | 16.8379 | 14.43 | 10.67 | 25.10 | 50.00 | -24.90 | AVG | |

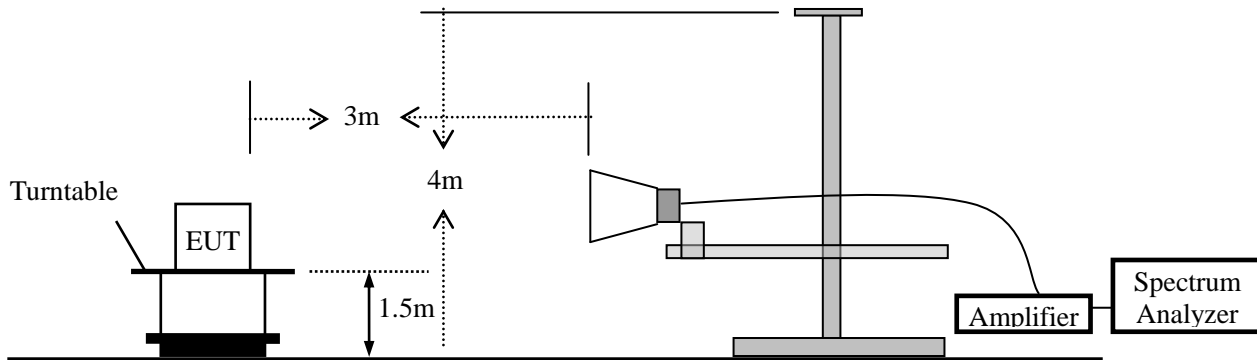
4. Radiated Emission Test

4.1 Test SET-UP (Block Diagram of Configuration)

4.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz



4.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



4.2 Measurement Procedure

- Blow 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.
- For the radiated emission test above 1GHz:
The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

| Frequency Band (MHz) | Level | Resolution Bandwidth | Video Bandwidth |
|----------------------|---------|----------------------|-----------------|
| 30 to 1000 | QP | 120 kHz | 300 kHz |
| Above 1000 | Peak | 1 MHz | 3 MHz |
| | Average | 1 MHz | 10 Hz |

4.3 Limit

| Frequency range MHz | Distance Meters | Field Strengths Limit (15.209) | |
|---------------------|-----------------|---|--|
| | | $\mu\text{V/m}$ | |
| 0.009 ~ 0.490 | 300 | 2400/F(kHz) | |
| 0.490 ~ 1.705 | 30 | 24000/F(kHz) | |
| 1.705 ~ 30 | 30 | 30 | |
| 30 ~ 88 | 3 | 100 | |
| 88 ~ 216 | 3 | 150 | |
| 216 ~ 960 | 3 | 200 | |
| Above 960 | 3 | 500 | |
| Frequency range MHz | Distance Meters | Field Strengths Limit (15.249) | |
| | | mV/m (Field strength of fundamental) | $\mu\text{V/m}$ (Field strength of Harmonics) |
| 902 ~ 928 | 3 | 50 | 500 |
| 2400 ~ 2483.5 | 3 | 50 | 500 |
| 5725 ~ 5875 | 3 | 50 | 500 |
| 24000 ~ 2425000 | 3 | 250 | 2500 |

- Remark: (1) Emission level (dB) μV = 20 log Emission level $\mu\text{V/m}$
(2) The smaller limit shall apply at the cross point between two frequency bands.
(3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
(4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.
(5) Sample of data calculate:
Level=Reading + Factor; Margin= Level-Limit
Factor=CF+AF+AG
Where CF=Cable attenuation factor in dB
AF= Antenna factor in dB
AG=Amplifier Gain in dB

4.4 Measurement Results

PASS

Please refer to following the test plots of the worst case: Low channel.



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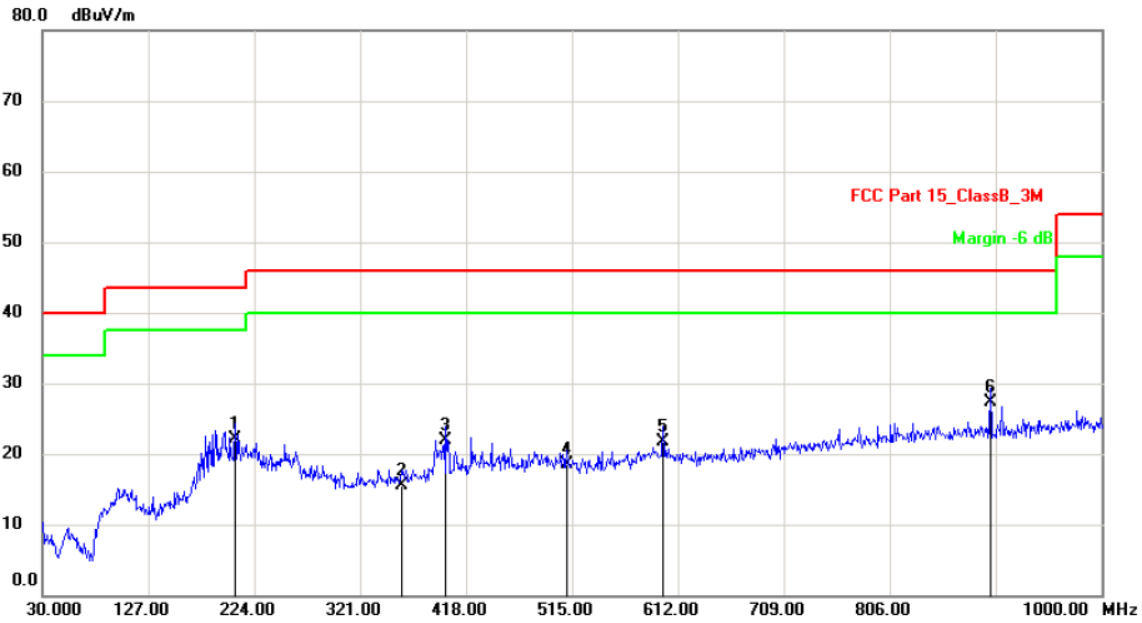
Radiated Emission Measurement

File : TM173G-Dongle

Data : #1

Date: 2018-11-6

Time: 10:10:11



Site: 3m Chamber

Limit: FCC Part 15_ClassB_3M

EUT: Wireless Dongle

M/N: TM173G-Dongle

Mode: TX

Note:

Polarization: **Horizontal**

Temperature: 26

Power: AC 120V/60Hz

Humidity: 47 %

Distance: 3m

| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | Antenna | Table | |
|-----|-----|----------|---------|---------|----------|--------|--------|---------|--------|---------|
| | | MHz | Level | Factor | ment | | | Height | Degree | |
| | | | dBuV | dB/m | dBuV/m | dBuV/m | dB | cm | degree | Comment |
| 1 | | 206.5399 | 35.52 | -13.32 | 22.20 | 43.50 | -21.30 | QP | | |
| 2 | | 358.8299 | 24.74 | -9.14 | 15.60 | 46.00 | -30.40 | QP | | |
| 3 | | 399.5700 | 31.01 | -9.11 | 21.90 | 46.00 | -24.10 | QP | | |
| 4 | | 510.1500 | 25.25 | -6.75 | 18.50 | 46.00 | -27.50 | QP | | |
| 5 | | 598.4200 | 26.83 | -5.03 | 21.80 | 46.00 | -24.20 | QP | | |
| 6 | * | 898.1500 | 28.62 | -1.22 | 27.40 | 46.00 | -18.60 | QP | | |

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



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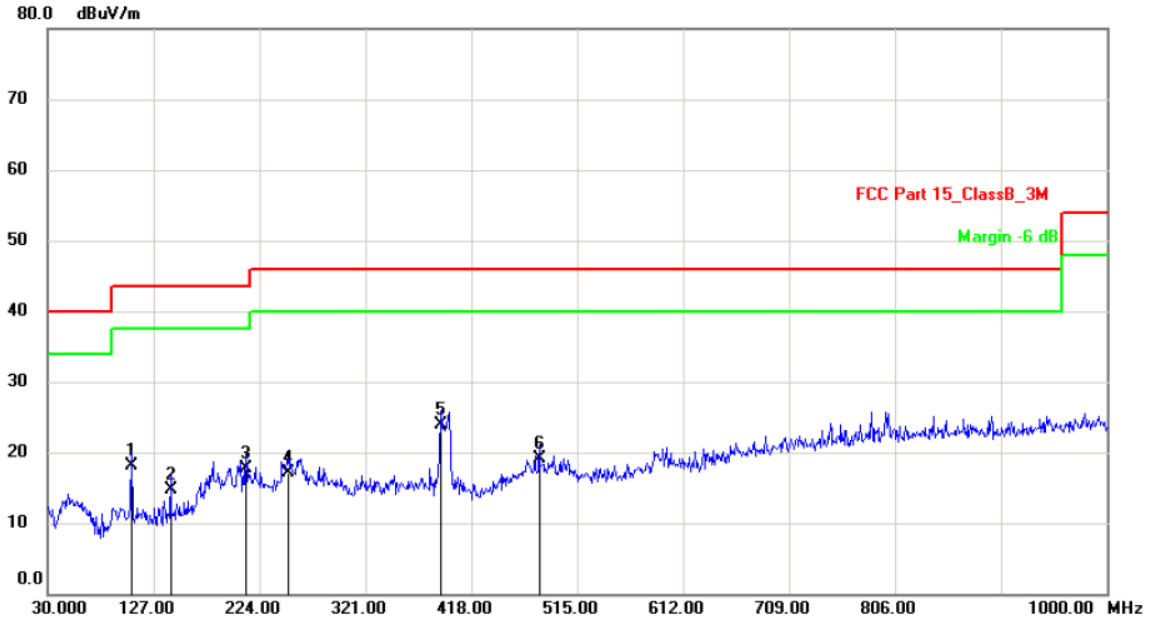
Radiated Emission Measurement

File : TM173G-Dongle

Data : #2

Date: 2018-11-6

Time: 10:18:36



Site: 3m Chamber

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part 15_ClassB_3M

Power: AC 120V/60Hz

Humidity: 47 %

EUT: Wireless Dongle

Distance: 3m

M/N: TM173G-Dongle

Mode: TX

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | Antenna Height | Table Degree | |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | cm | degree | Comment |
| 1 | | 106.6300 | 34.22 | -16.02 | 18.20 | 43.50 | -25.30 | QP | | |
| 2 | | 142.5200 | 33.40 | -18.60 | 14.80 | 43.50 | -28.70 | QP | | |
| 3 | | 211.3900 | 34.01 | -16.21 | 17.80 | 43.50 | -25.70 | QP | | |
| 4 | | 250.1900 | 30.89 | -13.69 | 17.20 | 46.00 | -28.80 | QP | | |
| 5 | * | 389.8700 | 35.05 | -11.15 | 23.90 | 46.00 | -22.10 | QP | | |
| 6 | | 480.0800 | 28.31 | -9.21 | 19.10 | 46.00 | -26.90 | QP | | |

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.

Frequency Range: 1-25GHz
Test Result: PASS
Measured Distance: 3m
Test By: Sance

Test Date : November 13, 2018
Temperature : 21 °C
Humidity : 55 %

| Freq. (MHz) | Ant.Pol. (H/V) | Reading Level(dBuV) | | Factor (dB/m) | Emission Level (dBuV) | | Limit 3m (dBuV/m) | | Margin (dB) | |
|--------------------------------|-------------------|------------------------|-------|------------------|--------------------------|-------|----------------------|-------|----------------|--------|
| | | PK | AV | | PK | AV | PK | AV | PK | AV |
| Operation Mode: TX Mode (Low) | | | | | | | | | | |
| 2403 | V | 76.73 | 33.52 | 0.13 | 76.86 | 33.65 | 114.00 | 94.00 | -37.14 | -60.35 |
| 4806 | V | 59.52 | 32.03 | 6.32 | 65.84 | 38.35 | 74.00 | 54.00 | -8.16 | -15.65 |
| 7209 | V | 44.59 | 30.79 | 10.44 | 55.03 | 41.23 | 74.00 | 54.00 | -18.97 | -12.77 |
| --- | | | | | | | | | | |
| 2403 | H | 85.67 | 33.42 | 0.13 | 85.80 | 33.55 | 114.00 | 94.00 | -28.20 | -60.45 |
| 4806 | H | 52.8 | 31.78 | 6.32 | 59.12 | 38.10 | 74.00 | 54.00 | -14.88 | -15.90 |
| 7209 | H | 46.22 | 30.71 | 10.44 | 56.66 | 41.15 | 74.00 | 54.00 | -17.34 | -12.85 |
| --- | | | | | | | | | | |
| Operation Mode: TX Mode (Mid) | | | | | | | | | | |
| 2441 | V | 84.79 | 33.12 | 0.24 | 85.03 | 33.36 | 114.00 | 94.00 | -28.97 | -60.64 |
| 4882 | V | 58.8 | 31.39 | 6.60 | 65.40 | 37.99 | 74.00 | 54.00 | -8.60 | -16.01 |
| 7323 | V | 52.2 | 31.23 | 10.55 | 62.75 | 41.78 | 74.00 | 54.00 | -11.25 | -12.22 |
| --- | | | | | | | | | | |
| 2441 | H | 81.28 | 33.19 | 0.24 | 81.52 | 33.43 | 114.00 | 94.00 | -32.48 | -60.57 |
| 4882 | H | 54.32 | 31.11 | 6.60 | 60.92 | 37.71 | 74.00 | 54.00 | -13.08 | -16.29 |
| 7323 | H | 50.19 | 31.05 | 10.55 | 60.74 | 41.60 | 74.00 | 54.00 | -13.26 | -12.4 |
| --- | | | | | | | | | | |
| Operation Mode: TX Mode (High) | | | | | | | | | | |
| 2480 | V | 85.28 | 33.2 | 0.34 | 85.62 | 33.54 | 114.00 | 94.00 | -28.38 | -60.46 |
| 4960 | V | 51.63 | 30.88 | 6.89 | 58.52 | 37.77 | 74.00 | 54.00 | -15.48 | -16.23 |
| 7440 | V | 50.86 | 31.32 | 10.6 | 61.46 | 41.92 | 74.00 | 54.00 | -12.54 | -12.08 |
| --- | | | | | | | | | | |
| 2480 | H | 82.5 | 33.28 | 0.34 | 82.84 | 33.62 | 114.00 | 94.00 | -31.16 | -60.38 |
| 4960 | H | 57.85 | 31.06 | 6.89 | 64.74 | 37.95 | 74.00 | 54.00 | -9.26 | -16.05 |
| 7440 | H | 47.33 | 31.47 | 10.6 | 57.93 | 42.07 | 74.00 | 54.00 | -16.07 | -11.93 |

- Note:** (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Factor
(3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
(4) Data of measurement within this frequency range shown “ ---” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
(5) Measurement uncertainty : ± 3.7 dB.
(6) Horn antenna used for the emission over 1000MHz.
(7) Due to the highest Peak emission level below AVG limit, therefore, the AVG emission level is deemed to meet the requirements, no AVG result record.

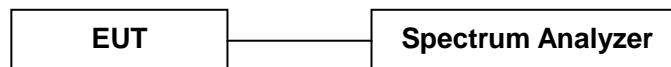
5. 20dB Bandwidth

5.1 Measurement Procedure

The 20dB bandwidth of the emission was contained within the frequency band designated which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered, FCC Rule 15.215(c):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. Use the spectrum 20dB down delta function to measure the bandwidth.

5.2 Test SET-UP (Block Diagram of Configuration)



5.3 Measurement Results

Refer to attached data chart.

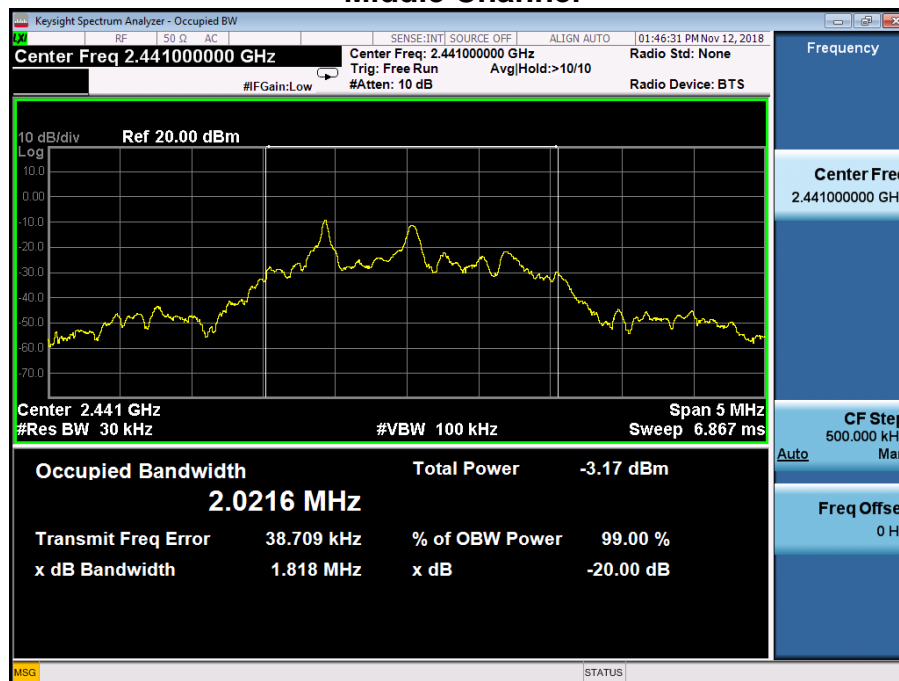
| | | | |
|--------------------|-------|---------------|-------------------|
| RBW: | 30KHz | VBW: | 100KHz |
| Spectrum Detector: | PK | Temperature : | 22 °C |
| Test By: | Sance | Humidity : | 54 % |
| Test Result: | PASS | Test Date : | November 12, 2018 |

| Channel frequency (MHz) | 20dB Down BW(kHz) |
|-------------------------|-------------------|
| 2403 | 1833 |
| 2441 | 1818 |
| 2480 | 1828 |

Lowest Channel



Middle Channel



Highest Channel



6. Band Edge

6.1 Measurement Procedure

Same as Radiated Emission Test.

6.2 Limit

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

6.3 Measurement Results

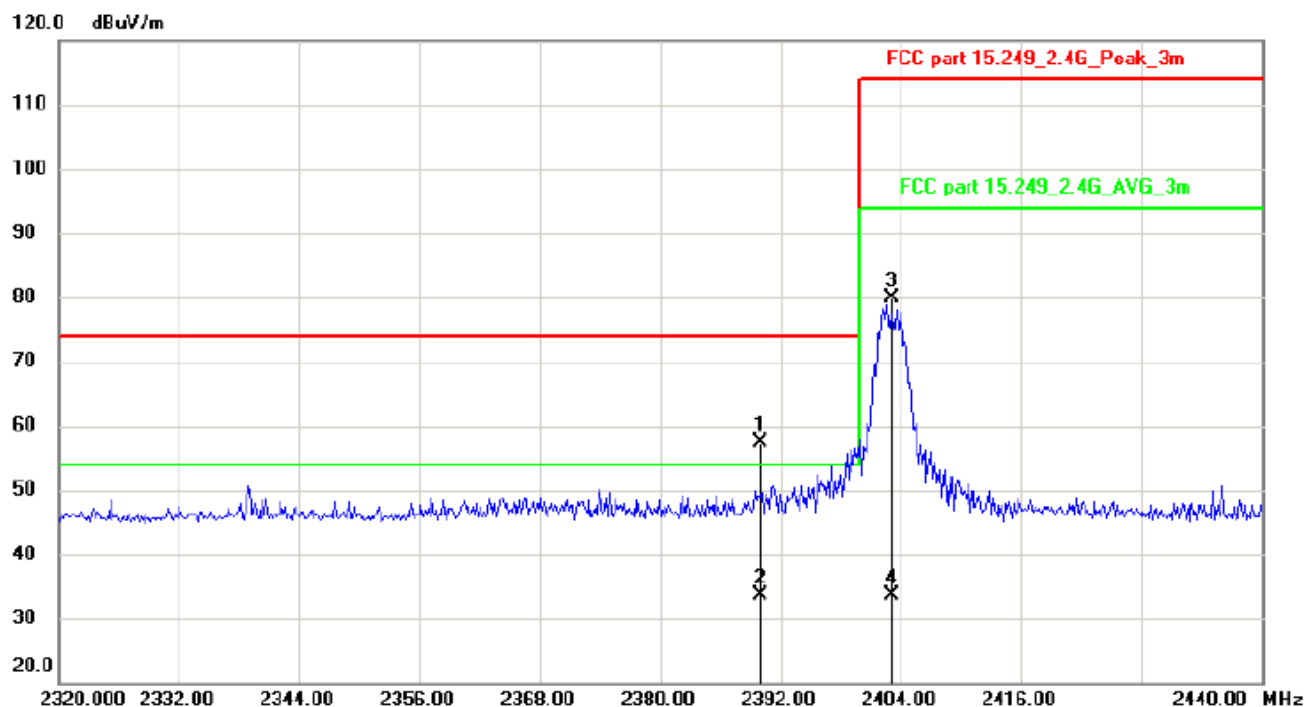
| | | | |
|--------------------|---------|-------------|-------------------|
| Operation Mode: | TX Mode | Test Date : | November 13, 2018 |
| Temperature : | 21 °C | Humidity : | 55 % |
| Test Result: | PASS | Test By: | Sance |
| Measured Distance: | 3m | | |

| Freq. (MHz) | Ant.Pol. (H/V) | Reading Level(dBuV) | | Factor (dB/m) | Emission Level (dBuV) | | Limit 3m (dBuV/m) | | Margin (dB) | |
|----------------|-------------------|------------------------|-------|------------------|--------------------------|-------|----------------------|-------|----------------|--------|
| | | PK | AV | | PK | AV | PK | AV | PK | AV |
| 2390.0 | H | 57.22 | 33.65 | 0.09 | 57.31 | 33.74 | 74.00 | 54.00 | -16.69 | -20.26 |
| 2390.0 | V | 64.85 | 32.66 | 0.09 | 64.94 | 32.75 | 74.00 | 54.00 | -9.06 | -21.25 |
| 2483.5 | H | 60.93 | 33.28 | 0.35 | 61.28 | 33.63 | 74.00 | 54.00 | -12.72 | -20.37 |
| 2483.5 | V | 50.91 | 33.38 | 0.35 | 51.26 | 33.73 | 74.00 | 54.00 | -22.74 | -20.27 |

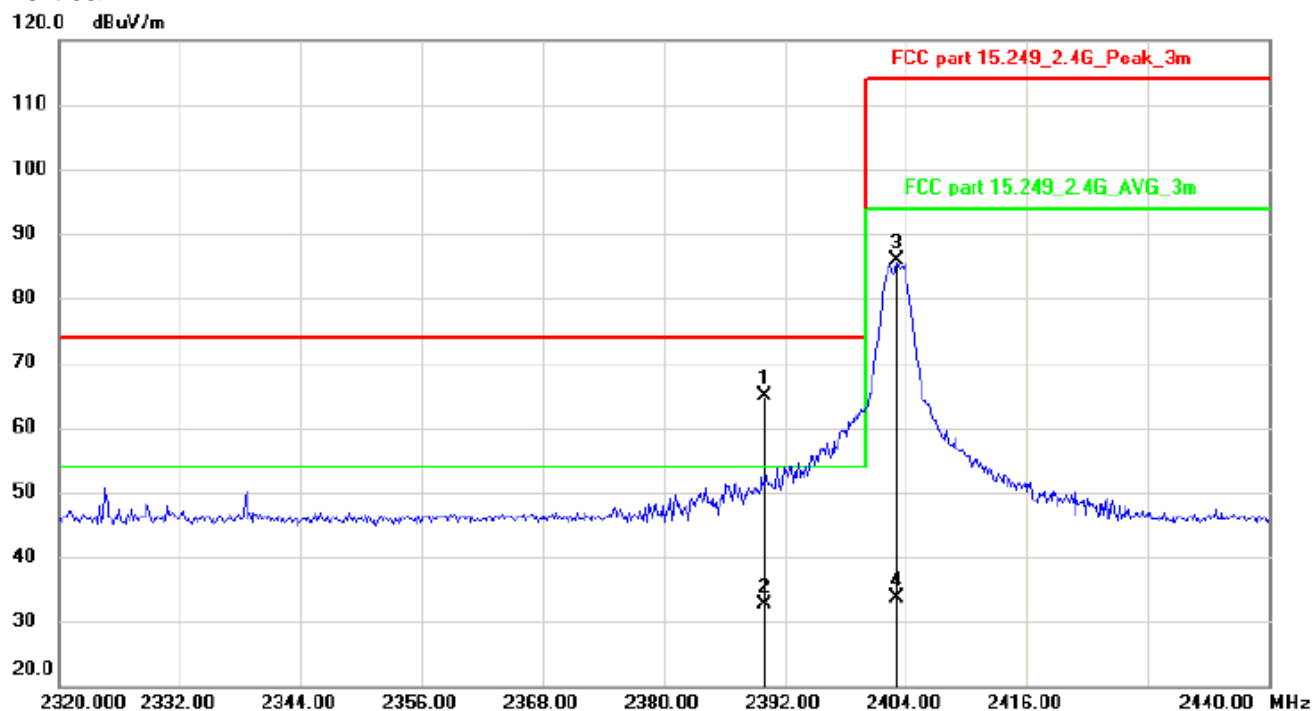
Note: (1) Emission Level= Reading Level + Factor
 (2) Factor= Antenna Gain + Cable Loss – Amplifier Gain
 (3) Horn antenna used for the emission over 1000MHz.

Low channel

Horizontal



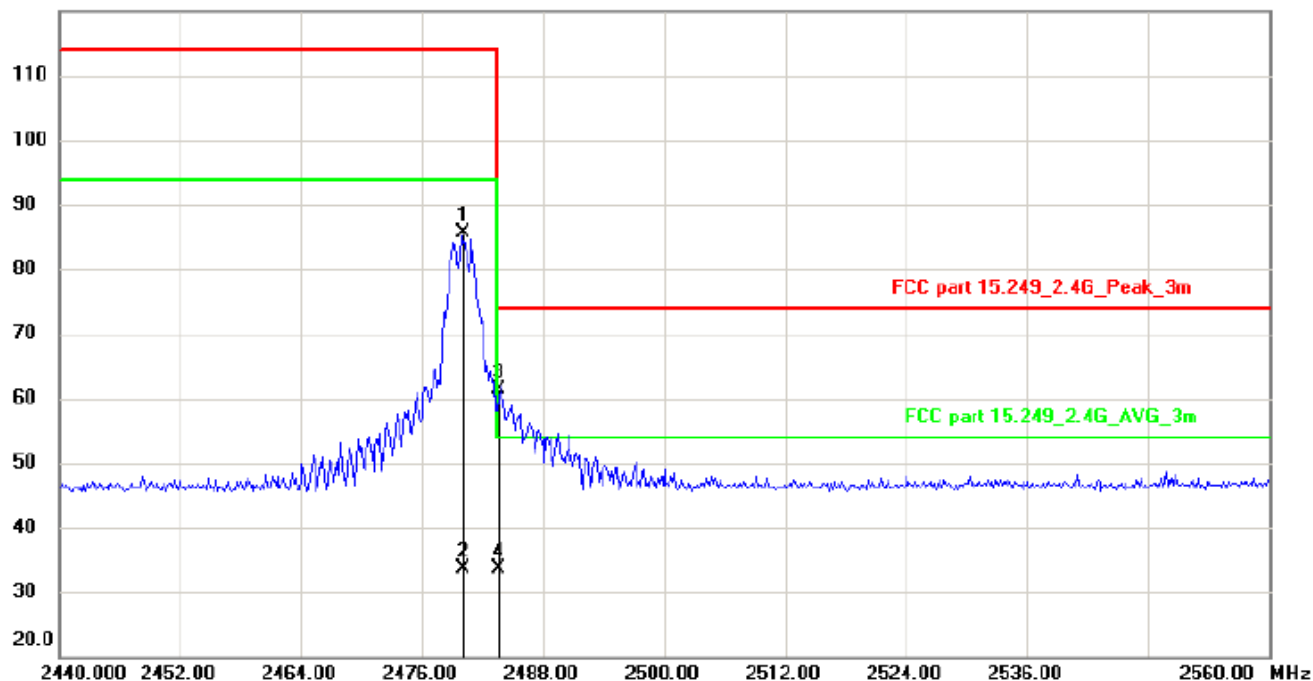
Vertical



High channel

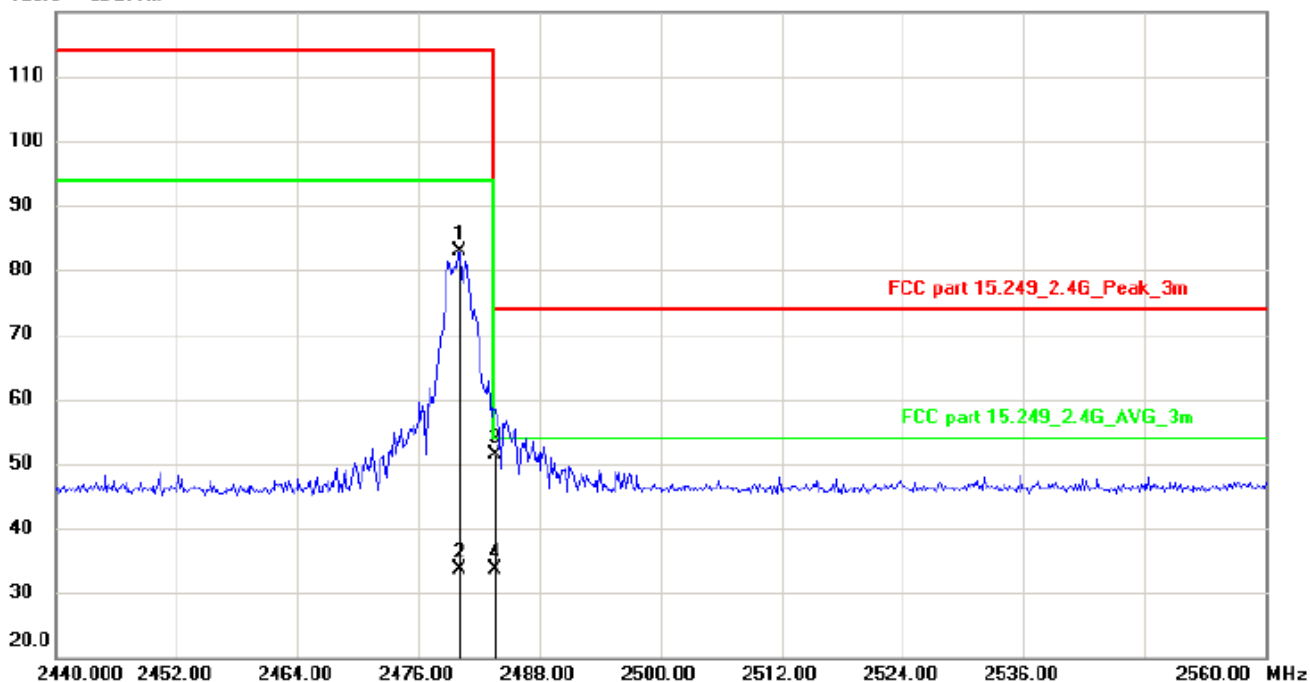
Horizontal

120.0 dBuV/m



Vertical

120.0 dBuV/m



7. Antenna requirement

7.1 Measurement Procedure

According to of FCC part 15C section 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

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

7.2 Measurement Results

The antenna is PCB antenna and no consideration of replacement, and the best case gain of the antenna is 0dBi. So, the antenna is consider meet the requirement.

8. Test Equipment List

| Description | Manufacturer | Model Number | Serial Number | Characteristics | Calibration Date | Calibration Due Date |
|-----------------------------|-----------------|--------------|---------------|-----------------|------------------|----------------------|
| Test Receiver | Rohde & Schwarz | ESCI7 | 100837 | 9KHz~7GHz | Mar. 14, 2018 | Mar. 13, 2019 |
| Antenna | Schwarzbeck | VULB9162 | 9162-010 | 30MHz~7GHz | Mar. 15, 2018 | Mar. 14, 2019 |
| Cable | Huber+Suhner | CBL2-NN-1M | 22390001 | 9KHz~7GHz | Mar. 14, 2018 | Mar. 13, 2019 |
| Cable | Huber+Suhner | CIL02 | N/A | 9KHz~7GHz | Mar. 14, 2018 | Mar. 13, 2019 |
| RF Cable | Huber+Suhner | SF-104 | MY16559/4 | 9KHz~25GHz | Apr. 25, 2018 | Apr. 24, 2019 |
| Power Amplifier | HP | HP 8447D | 1145A00203 | 100KHz~1.3GHz | Mar. 14, 2018 | Mar. 13, 2019 |
| Horn Antenna | Schwarzbeck | BBHA9170 | 9170-242 | 15GHz~40GHz | Mar. 14, 2018 | Mar. 13, 2019 |
| Horn Antenna | Com-Power | AH-118 | 071078 | 1GHz~18GHz | Mar. 15, 2018 | Mar. 14, 2019 |
| RF Cable | Huber+Suhner | SF-104 | N/A | 9KHz~40GHz | Apr. 25, 2018 | Apr. 24, 2019 |
| Loop antenna | Daze | ZA30900A | 0708 | 9KHz~30MHz | Apr. 25, 2018 | Apr. 24, 2019 |
| Spectrum Analyzer | Rohde & Schwarz | FSU26 | 200409/026 | 20Hz~26.5GHz | Apr. 25, 2018 | Apr. 24, 2019 |
| Spectrum Analyzer | Rohde & Schwarz | FSV40 | 101003 | 10Hz~40GHz | Apr. 06, 2018 | Apr. 05, 2019 |
| Pre-Amplifier | EMCI | EMC 184045 | 980102 | 18GHz~40GHz | Nov. 03, 2018 | Nov. 02, 2019 |
| Pre-Amplifier | Agilent | 8449B | 3008A02964 | 1GHz~26.5GHz | Apr. 25, 2018 | Apr. 24, 2019 |
| L.I.S.N. | Rohde & Schwarz | ENV 216 | 101317 | 9KHz~30MHz | Mar. 14, 2018 | Mar. 13, 2019 |
| Temporary antenna connector | TESCOM | SS402 | N/A | 9KHz-25GHz | N/A | N/A |
| Power Meter | Anritsu | ML2495A | 1139001 | 100k-65GHz | Nov. 03, 2018 | Nov. 02, 2019 |
| Power Sensor | Anritsu | MA2411B | 100345 | 300M-40GHz | Nov. 03, 2018 | Nov. 02, 2019 |

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

---End---