**Report No.:** DDT-R19092704-1E5

**Issued Date:** Oct. 30, 2019

# FCC AND IC CERTIFICATION TEST REPORT

## FOR

| | | |
|---|---|---|
| **Applicant** | : | Harman International Industries, Inc. |
| **Address** | : | 8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES |
| **Equipment under Test** | : | USB Wireless Dongle |
| **Model No.** | : | QUANTUM600TM |
| **Trade Mark** | : | JBL |
| **FCC ID** | : | APIJBLQ600TM |
| **IC** | : | 6132A-JBLQ600TM |
| **Manufacturer** | : | Harman International Industries, Inc. |
| **Address** | : | 8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES |


**Issued By: Dongguan Dongdian Testing Service Co., Ltd.**

**Add:** No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

**Tel:** +86-0769-38826678, **E-mail:** ddt@dgddt.com, http://www.dgddt.com


REPORT

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# TEST REPORT DECLARE

| | | |
|---|---|---|
| **Applicant** | : | Harman International Industries, Inc. |
| **Address** | : | 8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES |
| **Equipment under Test** | : | USB Wireless Dongle |
| **Model No.** | : | QUANTUM600TM |
| **Trade mark** | : | JBL |
| **Manufacturer** | : | Harman International Industries, Inc. |
| **Address** | : | 8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES |

**Test Standard Used:**

FCC Rules and Regulations Part 15 Subpart C, RSS-210 Issue 9 August 2016.

## Test procedure used:

ANSI C63.10:2013, RSS-Gen Issue 5, Apr. 2018.

**We Declare:**

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

**After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC&IC standards.**

| | | | |
|---|---|---|---|
| **Report No:** | DDT-R19092704-1E5 | | |
| **Date of Receipt:** | Oct. 08, 2019 | **Date of Test:** | Oct. 08, 2019 ~ Oct. 30, 2019 |

***Prepared By:*** ***Approved By:***

Sam Li

***Sam Li/Engineer***

Damon Hu

***Damon Hu/EMC Manager***

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

# Revision history

| Rev. | Revisions | Issue Date | Revised By |
|---|---|---|---|
| --- | Initial issue | Oct. 30, 2019 | |
| | | | |

# 1. Summary of test results

| The EUT have been tested according to the applicable standards as referenced below. | | |
|---|---|---|
| **Description of Test Item** | **Standard** | **Results** |
| 20dB Bandwidth and 99% Bandwidth | FCC Part 15: 15.215<br>ANSI C63.10:2013<br>RSS-210 Issue 9<br>RSS-Gen Issue 5 | PASS |
| Radiated Emission | FCC Part 15: 15.209<br>FCC Part 15: 15.249<br>ANSI C63.10:2013<br>RSS-210 Issue 9<br>RSS-Gen Issue 5 | PASS |
| Band Edge Compliance | FCC Part 15: 15.205<br>FCC Part 15: 15.249<br>ANSI C63.10:2013<br>RSS-210 Issue 9<br>RSS-Gen Issue 5 | PASS |
| Power Line Conducted Emission | FCC Part 15: 15.207<br>ANSI C63.10:2013<br>RSS-Gen Issue 5 | N/A |
| Antenna requirement | FCC Part 15: 15.203<br>RSS-Gen Issue 5 | PASS |
| Note: N/A is an abbreviation for Not Applicable. | | |

# 2. General test information

## 2.1. Description of EUT

| | | |
|---|---|---|
| EUT* Name | : | USB Wireless Dongle |
| Model Number | : | QUANTUM600TM |
| EUT function description | : | Please reference user manual of this device |
| Power supply | : | DC 5V |
| Operation frequency | : | 2403.35MHz-2479.35MHz |
| Modulation | : | π/4-DQPSK |
| Antenna Type | : | Antenna 1: Dedicated FPC antenna, maximum PK gain: 0.88 dBi<br>Antenna 2: Dedicated FPC antenna, maximum PK gain: 0.88 dBi<br>The two antennas are not support the MIMO mode. |
| Sample Type | : | Series production |

Note: EUT is the ab. of equipment under test.

EUT channels and frequencies list:

| Channel information | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 1 | 2403.35 | 14 | 2429.35 | 27 | 2455.35 |
| 2 | 2405.35 | 15 | 2431.35 | 28 | 2457.35 |
| 3 | 2407.35 | 16 | 2433.35 | 29 | 2459.35 |
| 4 | 2409.35 | 17 | 2435.35 | 30 | 2461.35 |
| 5 | 2411.35 | 18 | 2437.35 | 31 | 2463.35 |
| 6 | 2413.35 | 19 | 2439.35 | 32 | 2465.35 |
| 7 | 2415.35 | 20 | 2441.35 | 33 | 2467.35 |
| 8 | 2417.35 | 21 | 2443.35 | 34 | 2469.35 |
| 9 | 2419.35 | 22 | 2445.35 | 35 | 2471.35 |
| 10 | 2421.35 | 23 | 2447.35 | 36 | 2473.35 |
| 11 | 2423.35 | 24 | 2449.35 | 37 | 2475.35 |
| 12 | 2425.35 | 25 | 2451.35 | 38 | 2477.35 |
| 13 | 2427.35 | 26 | 2453.35 | 39 | 2479.35 |

## 2.2. Accessories of EUT

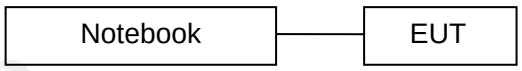
| Description of Accessories | Manufacturer | Model number | Description | Remark |
|---|---|---|---|---|
| Type C cable | Harman | N/A | Length: 156cm, unshielded | N/A |
| AUX cable | Harman | N/A | Length: 139cm, unshielded | N/A |

## 2.3. Assistant equipment used for test

| Assistant equipment | Manufacturer | Model number | EMC Compliance | SN |
|---|---|---|---|---|
| Notebook | Lenovo Beijing Co. Ltd. | ThinkPad | FCC/CE | TP00015A |

## 2.4. Block diagram of EUT configuration for test

Tx Mode:




Test software: VMIdebug-1.1.6.56.exe
The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.

| Tested mode, channel, information | | | |
|---|---|---|---|
| Mode | Channel | Setting Tx Power | Frequency (MHz) |
| π/4-DQPSK Tx mode | CH 1 | 0x13 | 2403.35 |
| | CH 20 | 0x13 | 2441.35 |
| | CH 39 | 0x13 | 2479.35 |

## 2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature range: | 21-25℃ |
| Humidity range: | 40-75% |
| Pressure range: | 86-106kPa |

## 2.6. Deviations of test standard

No Deviation.

## 2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel: +86-0769-38826678, http://www.dgddt.com, Email: ddt@dgddt.com

CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01

Designation Number: CN1182; Test Firm Registration Number: 540522

Industry Canada site registration number: 10288A-1

## 2.8. Measurement uncertainty

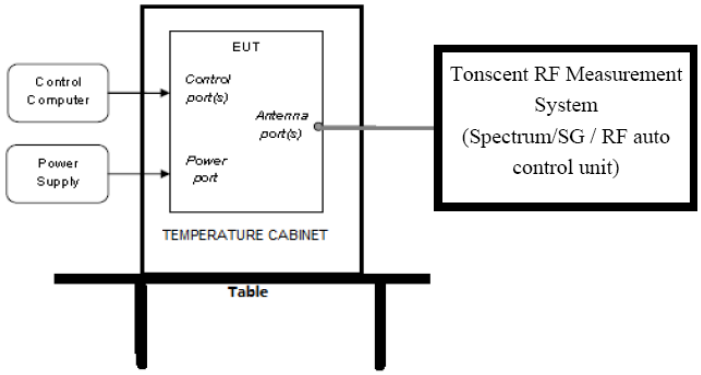
| Test Item | Uncertainty |
|---|---|
| Bandwidth | 1.1% |
| Peak Output Power (Conducted) (Spectrum analyzer) | 0.86dB (10MHz ≤ f < 3.6GHz); |
| | 1.38dB (3.6GHz≤ f < 8GHz) |
| Peak Output Power (Conducted) (Power Sensor) | 0.74dB |
| Power Spectral Density | 0.74dB (10MHz ≤ f < 3.6GHz); |
| | 1.38dB (3.6GHz≤ f < 8GHz) |
| Conducted spurious emissions | 0.86dB (10MHz ≤ f < 3.6GHz); |
| | 1.40dB (3.6GHz≤ f < 8GHz) |
| | 1.66dB (8GHz≤ f < 22GHz) |
| Uncertainty for radio frequency (RBW<20kHz) | $3\times10^{-8}$ |
| Temperature | 0.4℃ |
| Humidity | 2% |
| Uncertainty for Radiation Emission test (30MHz-1GHz) | 4.70dB (Antenna Polarize: V) |
| | 4.84dB (Antenna Polarize: H) |
| Uncertainty for Radiation Emission test (1GHz-18GHz) | 4.10dB (1-6GHz) |
| | 4.40dB (6GHz-18GHz) |
| Uncertainty for Power line conduction emission test | 3.32dB (150kHz-30MHz) |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. | |

## 3. Equipment used during test

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|
| **RF Connected Test (Tonscend RF Measurement System)** | | | | | |
| Spectrum analyzer | R&S | FSU26 | 200071 | Sep. 29, 2019 | 1 Year |
| Wideband Radio Communication tester | R&S | CMW500 | 117491 | Jun. 25, 2019 | 1 Year |
| Vector Signal Generator | Agilent | E8267D | US49060192 | Sep. 29, 2019 | 1 Year |
| Vector Signal Generator | Agilent | N5182A | MY48180737 | Jun. 25, 2019 | 1 Year |
| Power Sensor | Agilent | U2021XA | MY55150010 | Jun. 28, 2019 | 1 Year |
| Power Sensor | Agilent | U2021XA | MY55150011 | Jun. 28, 2019 | 1 Year |
| DC Power Source | MATRIS | MPS-3005L-3 | D813058W | Jun. 25, 2019 | 1 Year |
| RF Cable | Micable | C10-01-01-1 | 100309 | Sep. 29, 2019 | 1 Year |
| Temp&Humi Programmable | ZHIXIANG | ZXGDJS-150L | ZX170110-A | Sep. 29, 2019 | 1 Year |
| Test Software | JS Tonscend | JS1120-3 | Ver.2.7 | N/A | N/A |
| **Radiation 1#chamber** | | | | | |
| EMI Test Receiver | R&S | ESU8 | 100316 | Sep. 29, 2019 | 1 Year |
| Spectrum analyzer | Agilent | E4447A | MY50180031 | Jun. 25, 2019 | 1 Year |
| Trilog Broadband Antenna | Schwarzbeck | VULB9163 | 9163-462 | Nov. 09, 2018 | 1 Year |
| Active Loop antenna | Schwarzbeck | FMZB-1519 | 1519-038 | Sep. 29, 2019 | 1 Year |
| Double Ridged Horn Antenna | R&S | HF907 | 100276 | Nov. 16, 2018 | 1 Year |
| Broad Band Horn Antenna | Schwarzbeck | BBHA 9170 | 790 | Sep. 29, 2019 | 1 Year |
| Pre-amplifier | A.H. | PAM-0118 | 360 | Sep. 29, 2019 | 1 Year |
| Pre-amplifier | TERA-MW | TRLA-0040 G35 | 101303 | Sep. 29, 2019 | 1 Year |
| RF Cable | HUBSER | CP-X2+ CP-X1 | W11.03+ W12.02 | Sep. 29, 2019 | 1 Year |
| RF Cable | N/A | SMAJ-SMA J-1M+ 11M | 17070133+17070131 | Sep. 29, 2019 | 1 Year |
| MI Cable | HUBSER | C10-01-01-1 M | 1091629 | Sep. 29, 2019 | 1 Year |
| Test software | Audix | E3 | V 6.11111b | N/A | N/A |
| **Power Line Conducted Emissions Test** | | | | | |
| EMI Test Receiver | R&S | ESU8 | 100316 | Sep. 29, 2019 | 1 Year |
| LISN 1 | R&S | ENV216 | 101109 | Sep. 29, 2019 | 1 Year |
| LISN 2 | R&S | ESH2-Z5 | 100309 | Sep. 29, 2019 | 1 Year |
| Pulse Limiter | R&S | ESH3-Z2 | 101242 | Sep. 29, 2019 | 1 Year |
| CE Cable 1 | HUBSER | N/A | W10.01 | Sep. 29, 2019 | 1 Year |
| Test software | Audix | E3 | V 6.11111b | N/A | N/A |

# 4. 20dB Bandwidth and 99% Bandwidth

## 4.1. Block diagram of test setup




## 4.2. Limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

## 4.3. Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Set the spectrum analyzer as follows:

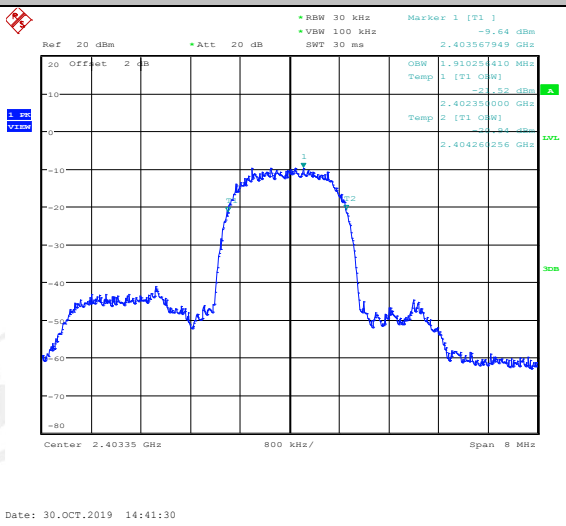
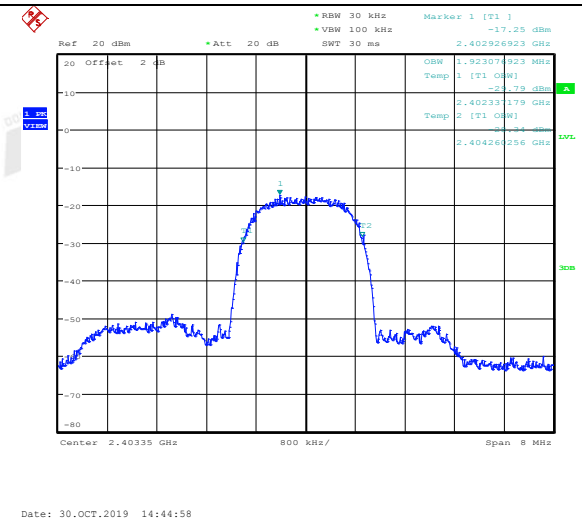
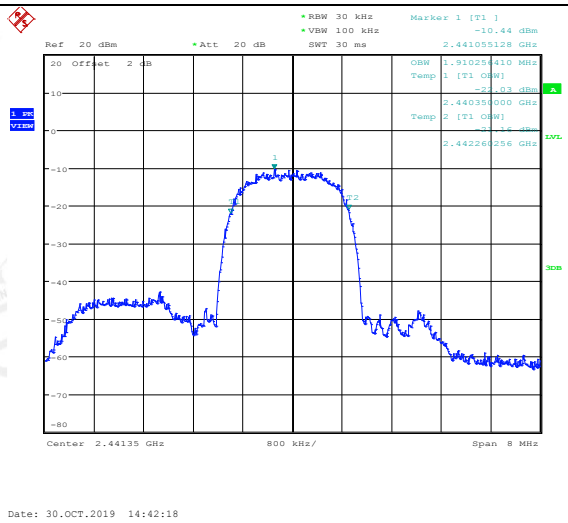
| | |
|---|---|
| RBW: | 30kHz |
| VBW: | 100kHz |
| Detector Mode: | Peak |
| Sweep time: | auto |
| Trace mode | Max hold |

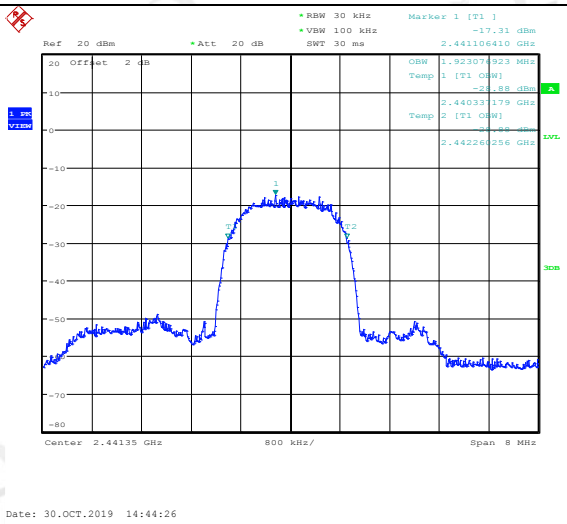
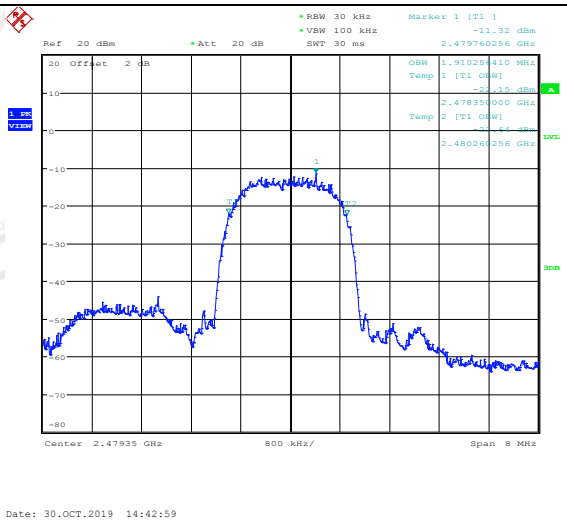
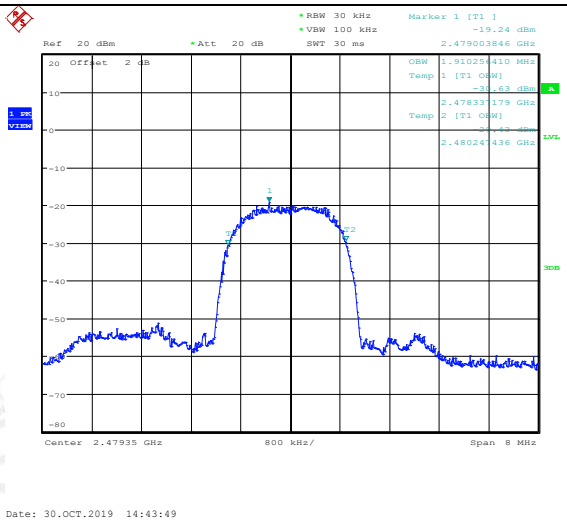
(3) Allow the trace to stabilize, measure the 20dB and 99% bandwidth of signal.

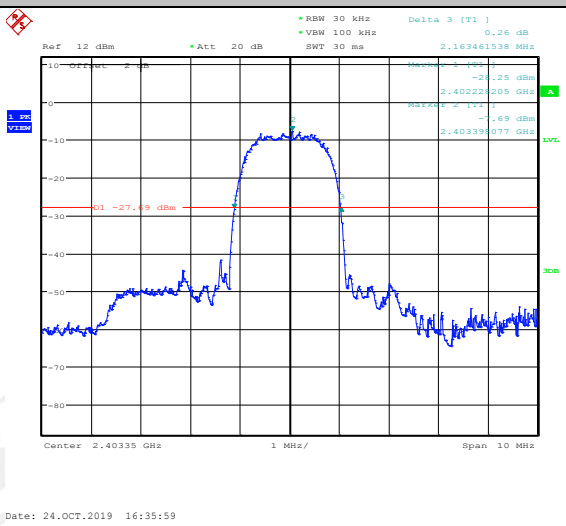
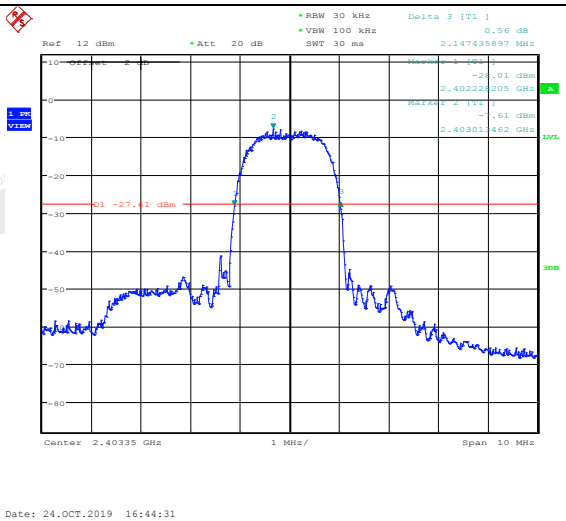
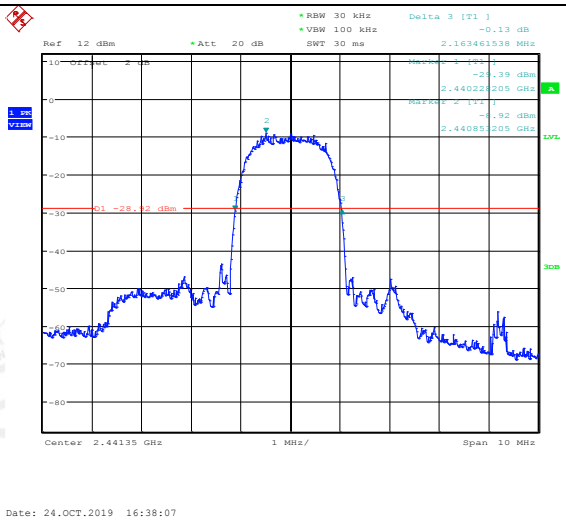
## 4.4. Test Result

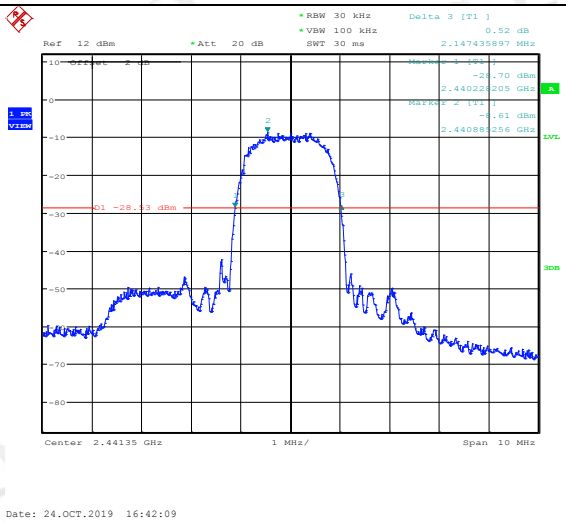
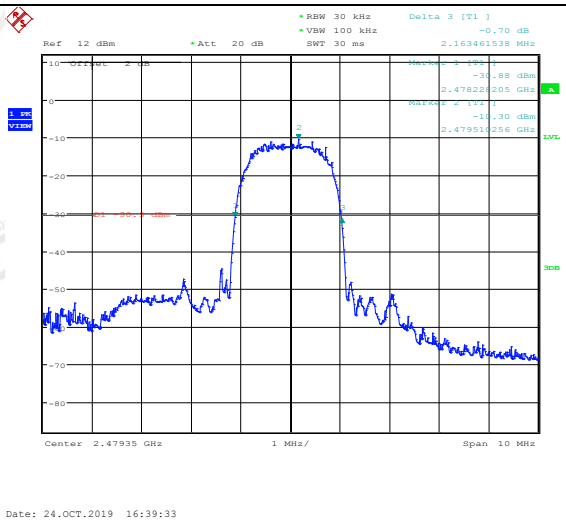
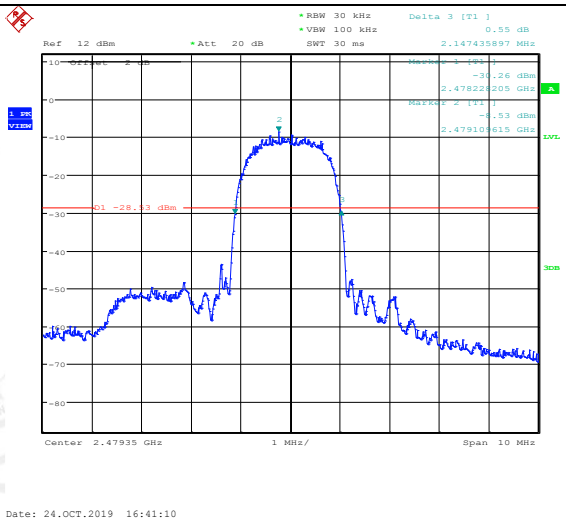
| Test Mode | Freq. (MHz) | Antenna | 99% bandwidth Result (MHz) | 20dB bandwidth Result (MHz) | Conclusion |
|---|---|---|---|---|---|
| π/4-DQPSK | 2403.35 | Ant1 | 1.910 | 2.163 | PASS |
| | 2403.35 | Ant2 | 1.923 | 2.147 | PASS |
| | 2441.35 | Ant1 | 1.910 | 2.163 | PASS |
| | 2441.35 | Ant2 | 1.923 | 2.147 | PASS |
| | 2479.35 | Ant1 | 1.910 | 2.163 | PASS |
| | 2479.35 | Ant2 | 1.910 | 2.147 | PASS |

## 4.5. Original test data

| 99% bandwidth | |
|---|---|
| π/4-DQPSK 2403.35 MHz Ant1 |   |
| π/4-DQPSK 2403.35 MHz Ant2 |   |
| π/4-DQPSK 2441.35 MHz Ant1 |   |

| | |
|---|---|
| π/4-DQPSK 2441.35 MHz Ant2 |  |
| π/4-DQPSK 2479.35 MHz Ant1 |  |
| π/4-DQPSK 2479.35 MHz Ant2 |  |

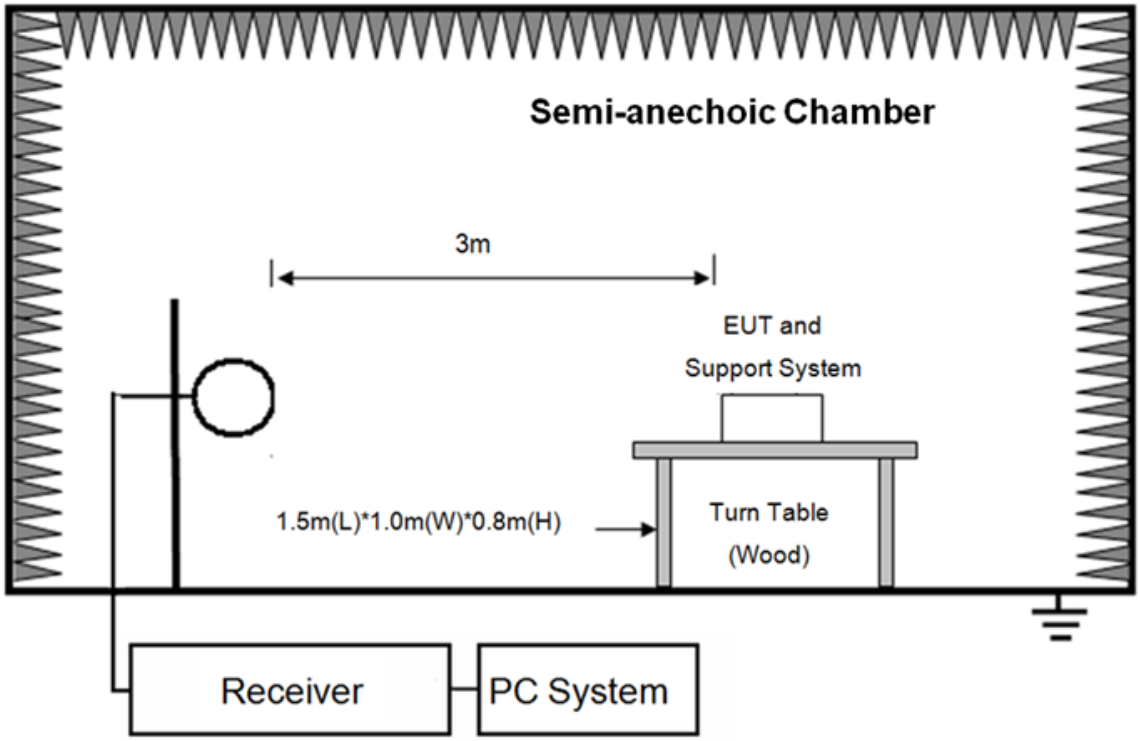
| 20dB bandwidth | |
|---|---|
| π/4-DQPSK 2403.35 MHz Ant1 |  |
| π/4-DQPSK 2403.35 MHz Ant2 |  |
| π/4-DQPSK 2441.35 MHz Ant1 |  |

| | |
|---|---|
| π/4-DQPSK 2441.35 MHz Ant2 |  |
| π/4-DQPSK 2479.35 MHz Ant1 |  |
| π/4-DQPSK 2479.35 MHz Ant2 |  |

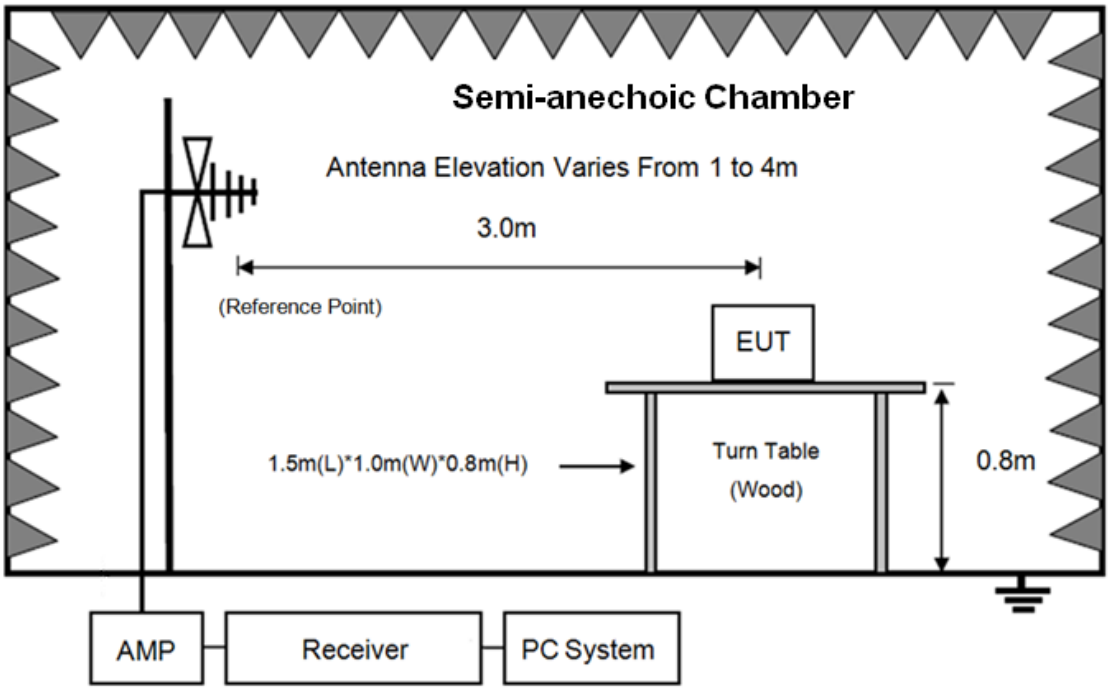
# 5. Radiated emission

## 5.1. Block diagram of test setup

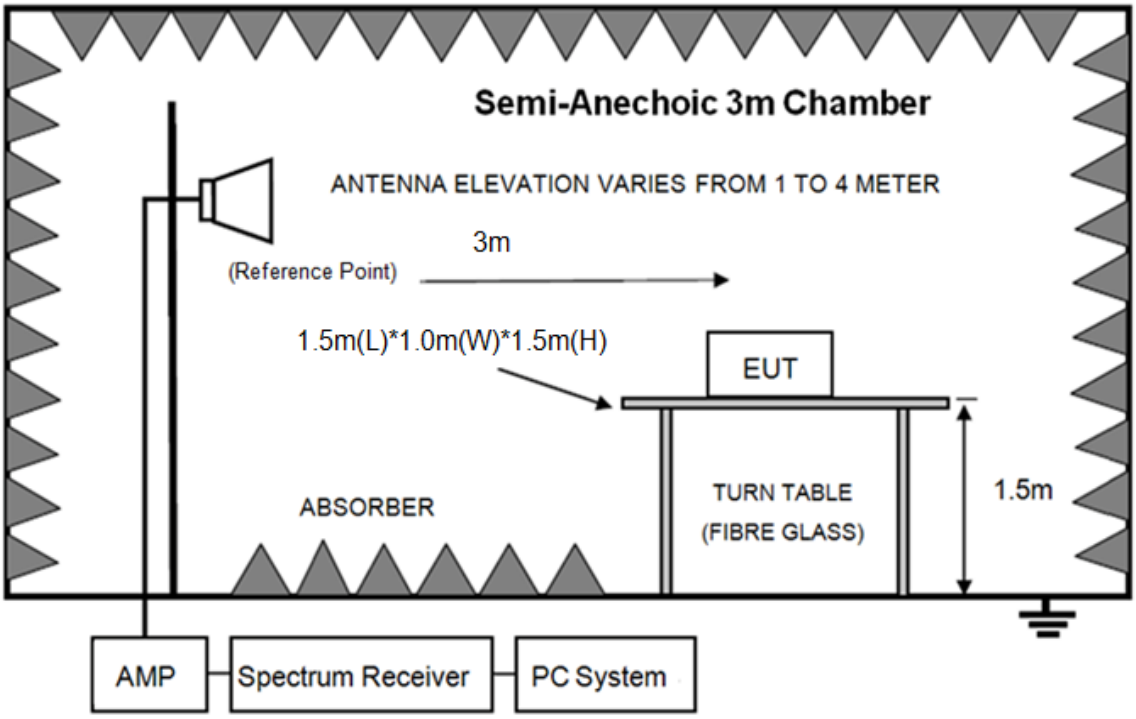
In 3m Anechoic Chamber Test Setup Diagram for 9kHz-30MHz




In 3m Anechoic Chamber Test Setup Diagram for 30MHz-1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz




Note: For harmonic emissions test an appropriate high pass filter was inserted in the input port of AMP.

## 5.2. Limit

| FREQUENCY MHz | DISTANCE Meters | FIELD STRENGTHS LIMIT | |
|---|---|---|---|
| | | μV/m | dB(μV)/m |
| 30 ~ 88 | 3 | 100 | 40.0 |
| 88 ~ 216 | 3 | 150 | 43.5 |
| 216 ~ 960 | 3 | 200 | 46.0 |
| 960 ~ 1000 | 3 | 500 | 54.0 |
| Above 1000MHz | 3 | 74.0 dB(μV)/m (Peak)<br>54.0 dB(μV)/m (Average) | |
| Field Strength of Fundamental emission for 2.4GHz-2.4835GHz | 3 | 94.0 dB(μV)/m (Average)<br>114.0 dB(μV)/m(Peak) | |
| Field Strength of Harmonics | 3 | 74.0 dB(μV)/m (Peak)<br>54.0 dB(μV)/m (Average) | |

Remark:

(1) Emission level dBμV = 20 log Emission level μV/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

(4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000MHz, radiated emission limits in these three bands are based on measurements employing an average detector.

## 5.3. Test Procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.

(2) Setup EUT and assistant system according clause 2.3 and 4.2

(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.

(a) Change work frequency or channel of device if practicable.

(b) Change modulation type of device if practicable.

(c) Change power supply range from 85% to 115% of the rated supply voltage

(d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions

(4) Spectrum frequency from 9kHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9kHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.

(5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10:2013 on Radiated Emission test.

(6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 kHz.

(7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure. Peak detector is used for both PK and AV test.

(8) For fundamental frequency test, set spectrum analyzer’s RBW=3MHz, VBW=10MHz. peak detector for PK, RMS detector for AV, Read the Level in spectrum analyzer and record.

## 5.4. Test result

**PASS. (See below detailed test result)**

All the emissions except fundamental emission from 9kHz to 25GHz were comply with 15.209 limit.

Note1: According exploratory test no any obvious emission was detected from 9kHz to 30MHz and 18GHz to 25GHz, so the final test was performed with frequency range from 30MHz to 18GHz and recorded in below.

Note2: For emissions below 1GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1GHz, the final test was only performed with EUT working in π/4-DQPSK, Tx Ant1 2403.35MHz mode.

Note3: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

## Field Strength of the Fundamental Signal

| Freq. (MHz) | Read level (dBμV) | Antenna Factor (dB/m) | PRM Factor(dB) | Cable Loss (dB) | Result Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Detector type | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| π/4-DQPSK Tx mode Ant1 | | | | | | | | | |
| 2403.35 | 105.31 | 29.12 | 43.29 | 3.75 | 94.89 | 114.00 | -19.11 | Peak | HORIZONTAL |
| 2403.35 | 101.00 | 29.12 | 43.29 | 3.75 | 90.58 | 94.00 | -3.42 | Average | HORIZONTAL |
| 2403.35 | 100.16 | 29.12 | 43.29 | 3.75 | 89.74 | 114.00 | -24.26 | Peak | VERTICAL |
| 2441.35 | 104.31 | 29.19 | 43.33 | 3.80 | 93.97 | 114.00 | -20.03 | Peak | HORIZONTAL |
| 2441.35 | 100.31 | 29.19 | 43.33 | 3.80 | 89.97 | 94.00 | -4.03 | Average | HORIZONTAL |
| 2441.35 | 99.67 | 29.19 | 43.33 | 3.80 | 89.33 | 114.00 | -24.67 | Peak | VERTICAL |
| 2479.35 | 103.95 | 29.26 | 43.37 | 3.86 | 93.70 | 114.00 | -20.30 | Peak | HORIZONTAL |
| 2479.35 | 99.88 | 29.26 | 43.37 | 3.86 | 89.63 | 94.00 | -4.37 | Average | HORIZONTAL |
| 2479.35 | 99.25 | 29.26 | 43.37 | 3.86 | 89.00 | 114.00 | -25.00 | Peak | VERTICAL |
| π/4-DQPSK Tx mode Ant2 | | | | | | | | | |
| 2403.35 | 105.31 | 29.12 | 43.29 | 3.75 | 94.89 | 114.00 | -19.11 | Peak | HORIZONTAL |
| 2403.35 | 101.00 | 29.12 | 43.29 | 3.75 | 90.58 | 94.00 | -3.42 | Average | HORIZONTAL |
| 2403.35 | 100.16 | 29.12 | 43.29 | 3.75 | 89.74 | 114.00 | -24.26 | Peak | VERTICAL |
| 2441.35 | 104.76 | 29.19 | 43.33 | 3.80 | 94.42 | 114.00 | -19.58 | Peak | HORIZONTAL |
| 2441.35 | 100.22 | 29.19 | 43.33 | 3.80 | 89.88 | 94.00 | -4.12 | Average | HORIZONTAL |
| 2441.38 | 99.67 | 29.19 | 43.33 | 3.80 | 89.33 | 114.00 | -24.67 | Peak | VERTICAL |
| 2479.35 | 104.97 | 29.26 | 43.37 | 3.86 | 94.72 | 114.00 | -19.28 | Peak | HORIZONTAL |
| 2479.35 | 100.00 | 29.26 | 43.37 | 3.86 | 89.75 | 94.00 | -4.25 | Average | HORIZONTAL |
| 2479.35 | 99.10 | 29.26 | 43.37 | 3.86 | 88.85 | 114.00 | -25.15 | Peak | VERTICAL |
| Result: Pass | | | | | | | | | |

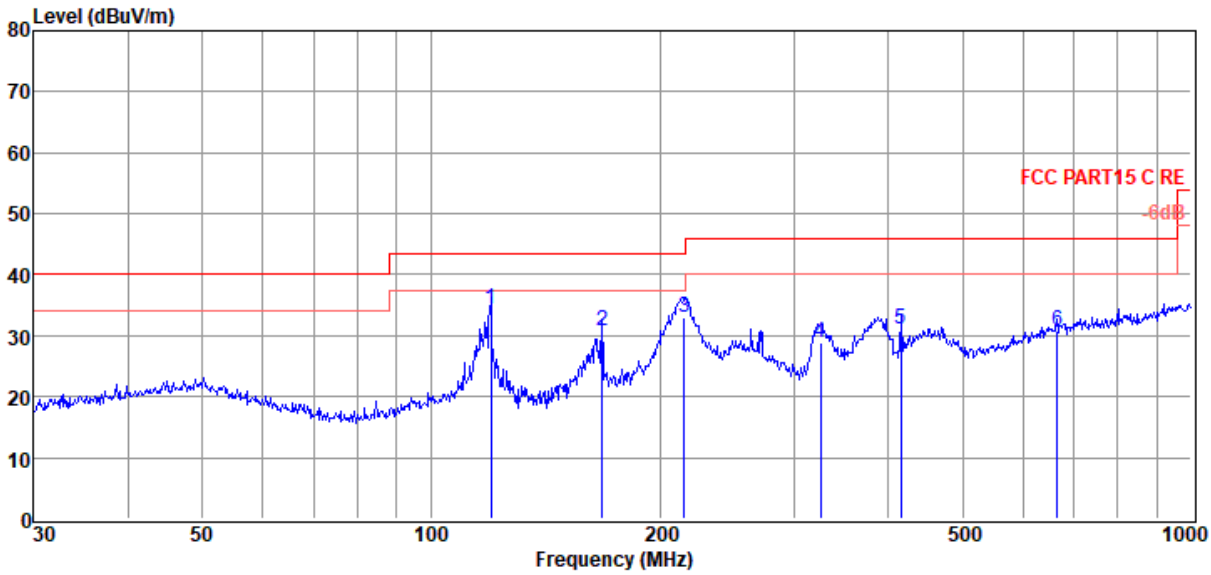
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

## Radiated Emission test (below 1GHz)

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2019 RE1# Report Data\Q19092704-1E QUANTUM600\FCC BELOW1G.EM6 | |
| **Test Date** | : 2019-10-12 | **Tested By** | : Jacky |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : DC 5V | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:101.4kPa | **Antenna/Distance** | : 2018 VULB 9163 1#/3m/HORIZONTAL |
| **Memo** | : | | |

Data: 2



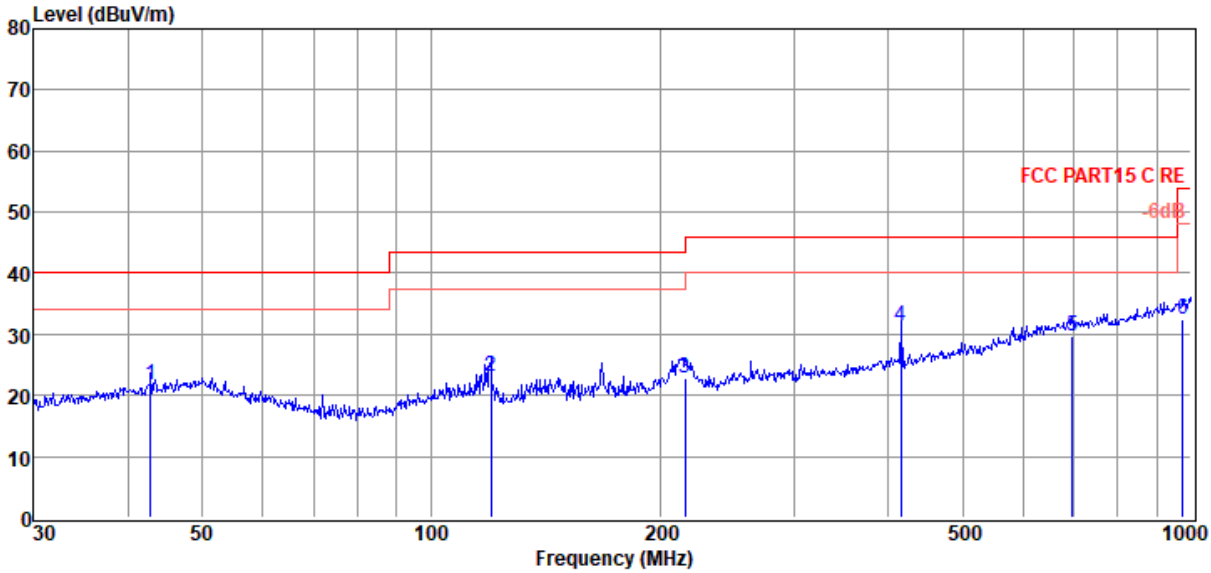

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 119.86 | 20.21 | 9.73 | 4.30 | 34.24 | 43.50 | -9.26 | QP | HORIZONTAL |
| 2 | 167.82 | 17.18 | 8.88 | 4.65 | 30.71 | 43.50 | -12.79 | QP | HORIZONTAL |
| 3 | 215.27 | 16.23 | 11.87 | 4.87 | 32.97 | 43.50 | -10.53 | QP | HORIZONTAL |
| 4 | 325.60 | 9.23 | 14.46 | 5.28 | 28.97 | 46.00 | -17.03 | QP | HORIZONTAL |
| 5 | 414.72 | 9.76 | 15.84 | 5.56 | 31.16 | 46.00 | -14.84 | QP | HORIZONTAL |
| 6 | 665.80 | 4.96 | 19.58 | 6.28 | 30.82 | 46.00 | -15.18 | QP | HORIZONTAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2019 RE1# Report Data\Q19092704-1E QUANTUM600\FCC BELOW1G.EM6 | |
| **Test Date** | : 2019-10-12 | **Tested By** | : Jacky |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : DC 5V | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:101.4kPa | **Antenna/Distance** | : 2018 VULB 9163 1#/3m/VERTICAL |
| **Memo** | : | | |

Data: 1




| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 42.75 | 4.15 | 13.76 | 3.80 | 21.71 | 40.00 | -18.29 | QP | VERTICAL |
| 2 | 119.86 | 9.18 | 9.73 | 4.30 | 23.21 | 43.50 | -20.29 | QP | VERTICAL |
| 3 | 216.02 | 6.13 | 11.89 | 4.87 | 22.89 | 46.00 | -23.11 | QP | VERTICAL |
| 4 | 414.72 | 9.89 | 15.84 | 5.56 | 31.29 | 46.00 | -14.71 | QP | VERTICAL |
| 5 | 696.86 | 3.24 | 20.05 | 6.37 | 29.66 | 46.00 | -16.34 | QP | VERTICAL |
| 6 | 975.75 | 2.93 | 22.54 | 7.06 | 32.53 | 54.00 | -21.47 | QP | VERTICAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

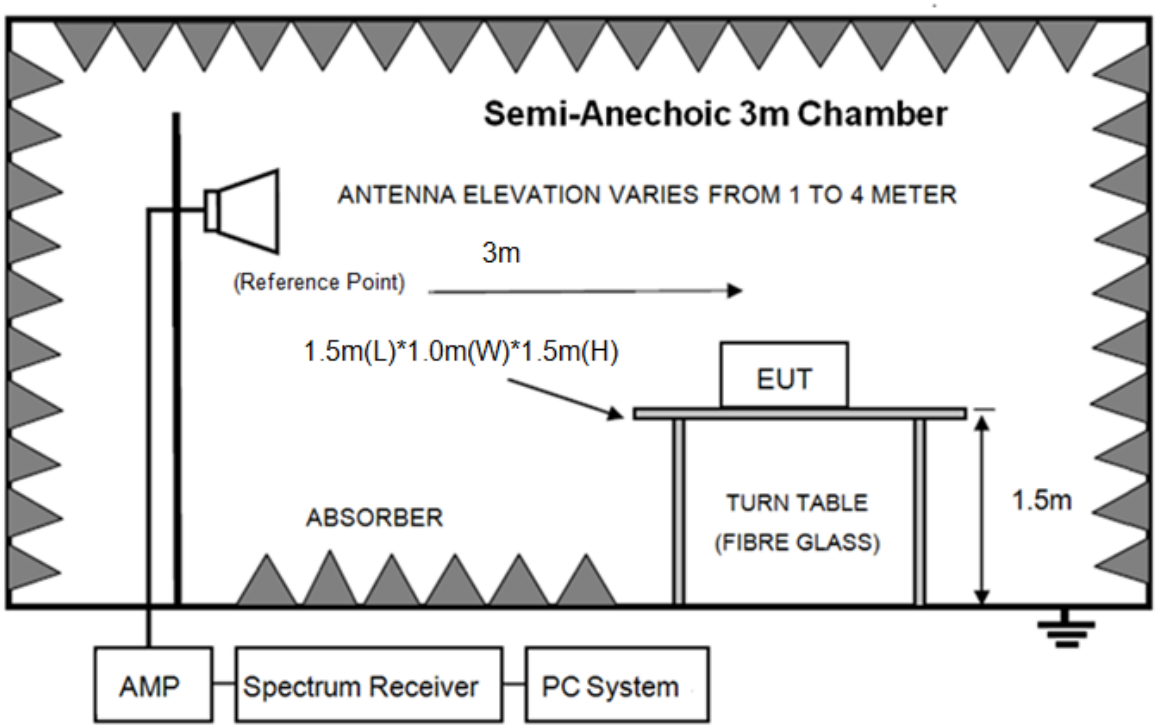
## Radiated Emission test (above 1GHz)

| Freq. (MHz) | Read level (dBμV) | Antenna Factor (dB/m) | PRM Factor(dB) | Cable Loss (dB) | Result Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Detector type | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| π/4-DQPSK Tx mode 2403.35MHz | | | | | | | | | |
| 6440.00 | 46.67 | 35.23 | 43.05 | 6.41 | 45.26 | 74.00 | -28.74 | Peak | HORIZONTAL |
| 7205.00 | 48.90 | 35.73 | 43.23 | 6.40 | 47.80 | 74.00 | -26.20 | Peak | HORIZONTAL |
| 10401.00 | 44.78 | 37.64 | 42.69 | 8.84 | 48.57 | 74.00 | -25.43 | Peak | HORIZONTAL |
| 11846.00 | 45.60 | 38.18 | 42.63 | 9.08 | 50.23 | 74.00 | -23.77 | Peak | HORIZONTAL |
| 12951.00 | 46.28 | 38.28 | 42.84 | 10.63 | 52.35 | 74.00 | -21.65 | Peak | HORIZONTAL |
| 14005.00 | 43.42 | 40.20 | 41.76 | 11.10 | 52.96 | 74.00 | -21.04 | Peak | HORIZONTAL |
| 5845.00 | 44.87 | 34.58 | 43.14 | 6.45 | 42.76 | 74.00 | -31.24 | Peak | VERTICAL |
| 7970.00 | 44.84 | 36.28 | 43.17 | 7.30 | 45.25 | 74.00 | -28.75 | Peak | VERTICAL |
| 9874.00 | 46.03 | 37.33 | 43.19 | 8.64 | 48.81 | 74.00 | -25.19 | Peak | VERTICAL |
| 11880.00 | 46.69 | 38.14 | 42.64 | 9.09 | 51.28 | 74.00 | -22.72 | Peak | VERTICAL |
| 13070.00 | 45.17 | 38.40 | 42.75 | 10.74 | 51.56 | 74.00 | -22.44 | Peak | VERTICAL |
| 13971.00 | 43.72 | 40.13 | 41.79 | 11.09 | 53.15 | 74.00 | -20.85 | Peak | VERTICAL |
| π/4-DQPSK Tx mode 2441.35MHz | | | | | | | | | |
| 7324.00 | 47.09 | 35.80 | 43.28 | 6.54 | 46.15 | 74.00 | -27.85 | Peak | HORIZONTAL |
| 9636.00 | 44.89 | 37.19 | 43.08 | 8.44 | 47.44 | 74.00 | -26.56 | Peak | HORIZONTAL |
| 11251.00 | 45.59 | 38.06 | 41.95 | 9.03 | 50.73 | 74.00 | -23.27 | Peak | HORIZONTAL |
| 13070.00 | 45.64 | 38.40 | 42.75 | 10.74 | 52.03 | 74.00 | -21.97 | Peak | HORIZONTAL |
| 14141.00 | 43.85 | 40.23 | 41.75 | 11.12 | 53.45 | 74.00 | -20.55 | Peak | HORIZONTAL |
| 16334.00 | 43.71 | 41.74 | 42.44 | 10.41 | 53.42 | 74.00 | -20.58 | Peak | HORIZONTAL |
| 7800.00 | 46.01 | 36.14 | 43.24 | 7.10 | 46.01 | 74.00 | -27.99 | Peak | VERTICAL |
| 10775.00 | 44.57 | 37.59 | 41.90 | 8.94 | 49.20 | 74.00 | -24.80 | Peak | VERTICAL |
| 12016.00 | 46.83 | 38.00 | 42.68 | 9.13 | 51.28 | 74.00 | -22.72 | Peak | VERTICAL |
| 13529.00 | 45.42 | 39.07 | 42.26 | 10.92 | 53.15 | 74.00 | -20.85 | Peak | VERTICAL |
| 14889.00 | 43.08 | 40.61 | 41.71 | 11.21 | 53.19 | 74.00 | -20.81 | Peak | VERTICAL |
| 15875.00 | 44.34 | 41.03 | 42.44 | 10.35 | 53.28 | 74.00 | -20.72 | Peak | VERTICAL |
| π/4-DQPSK Tx mode 2479.35MHz | | | | | | | | | |
| 5420.00 | 45.25 | 34.24 | 43.28 | 6.01 | 42.22 | 74.00 | -31.78 | Peak | HORIZONTAL |
| 7919.00 | 45.89 | 36.24 | 43.19 | 7.24 | 46.18 | 74.00 | -27.82 | Peak | HORIZONTAL |
| 10605.00 | 44.85 | 37.66 | 42.30 | 8.90 | 49.11 | 74.00 | -24.89 | Peak | HORIZONTAL |
| 12951.00 | 45.72 | 38.28 | 42.84 | 10.63 | 51.79 | 74.00 | -22.21 | Peak | HORIZONTAL |
| 14464.00 | 43.42 | 40.29 | 41.73 | 11.16 | 53.14 | 74.00 | -20.86 | Peak | HORIZONTAL |
| 15076.00 | 43.28 | 40.67 | 41.75 | 11.14 | 53.34 | 74.00 | -20.66 | Peak | HORIZONTAL |
| 5199.00 | 44.91 | 34.06 | 43.48 | 5.78 | 41.27 | 74.00 | -32.73 | Peak | VERTICAL |
| 7851.00 | 46.03 | 36.18 | 43.22 | 7.16 | 46.15 | 74.00 | -27.85 | Peak | VERTICAL |
| 10316.00 | 44.69 | 37.59 | 42.81 | 8.82 | 48.29 | 74.00 | -25.71 | Peak | VERTICAL |
| 12016.00 | 45.72 | 38.00 | 42.68 | 9.13 | 50.17 | 74.00 | -23.83 | Peak | VERTICAL |
| 13274.00 | 44.52 | 38.69 | 42.53 | 10.82 | 51.50 | 74.00 | -22.50 | Peak | VERTICAL |
| 14464.00 | 43.73 | 40.29 | 41.73 | 11.16 | 53.45 | 74.00 | -20.55 | Peak | VERTICAL |
| Result: Pass | | | | | | | | | |

Note: 1. 30MHz~25GHz: (Scan with Ant1 and Ant2, the worst case is Ant1)
2. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
3: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

# 6. Band Edge Compliance

## 6.1. Block diagram of test setup




## 6.2. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz and 5725MHz to 5850MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

## 6.3. Test Procedure

Same with clause 8.3 except change investigated frequency range from 2310MHz to 2415MHz and 2472MHz to 2500MHz.

Remark: All restriction band have been tested, and only the worst case is shown in report.

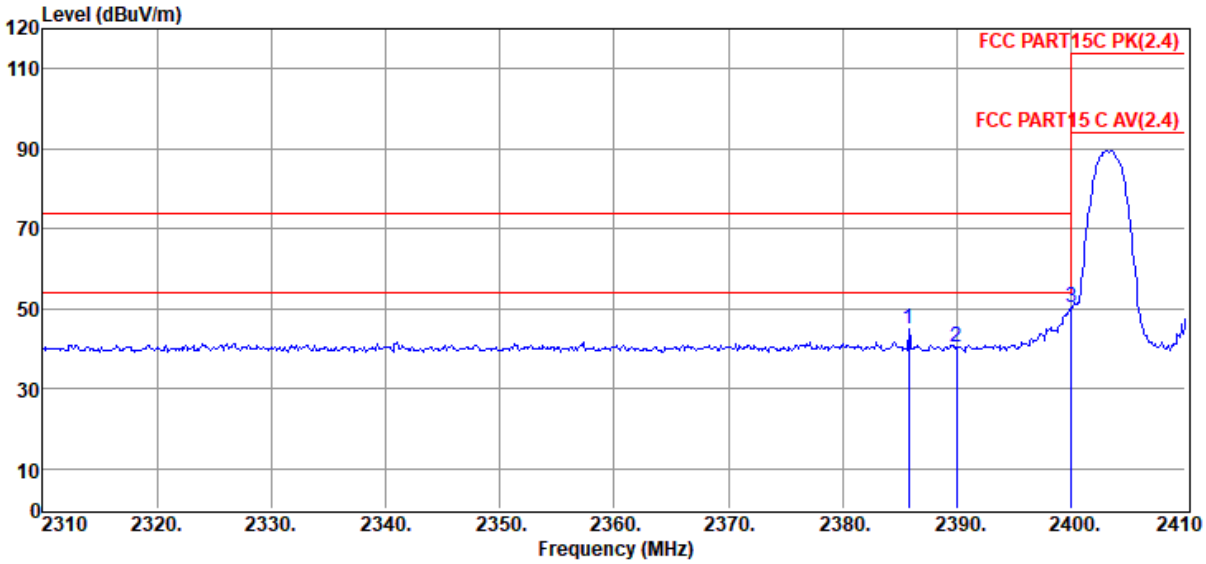
## 6.4. Test result

**PASS. (See below detailed test result)**

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2019 RE1# Report Data\Q19092704-1E QUANTUM600\FCC ABOVE 1G DOWNGLE.EM6 | |
| **Test Date** | : 2019-10-20 | **Tested By** | : Jacky |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : DC 5V | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:101.4kPa | **Antenna/Distance** | : 2018 HF 907/3m/VERTICAL |
| **Memo** | : 2403.35 power 0x13 ANT1 | | |

Data: 42



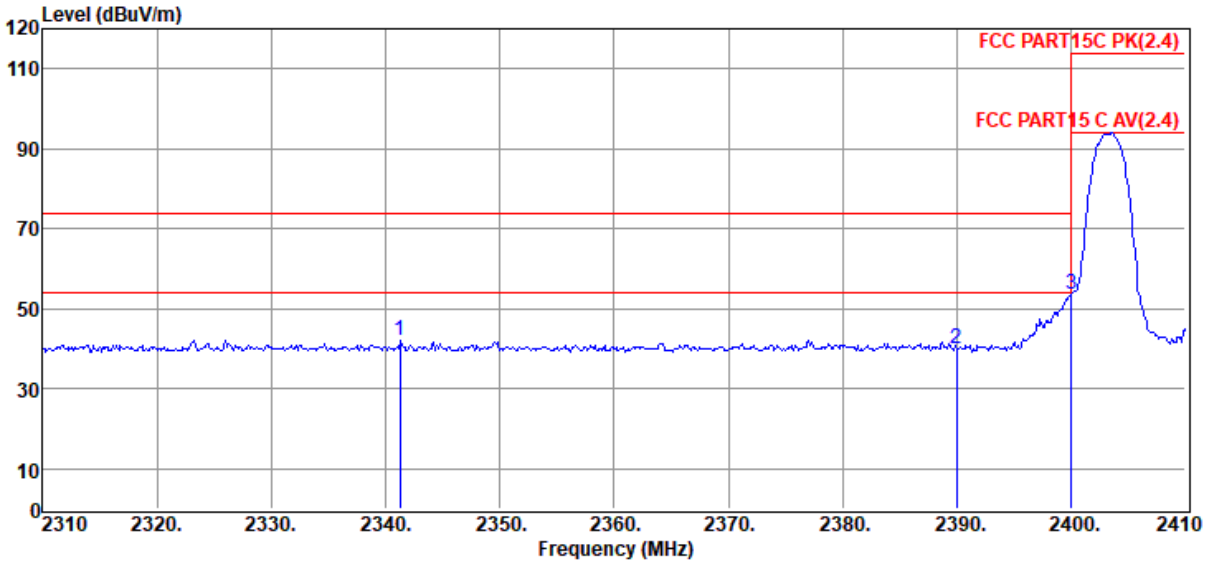

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2385.80 | 55.52 | 29.09 | 43.27 | 3.72 | 45.06 | 74.00 | -28.94 | Peak | VERTICAL |
| 2 | 2390.00 | 50.96 | 29.10 | 43.27 | 3.73 | 40.52 | 74.00 | -33.48 | Peak | VERTICAL |
| 3 | 2400.00 | 60.79 | 29.12 | 43.28 | 3.74 | 50.37 | 74.00 | -23.63 | Peak | VERTICAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2019 RE1# Report Data\Q19092704-1E QUANTUM600\FCC ABOVE 1G DOWNGLE.EM6 | |
| **Test Date** | : 2019-10-20 | **Tested By** | : Jacky |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : DC 5V | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:101.4kPa | **Antenna/Distance** | : 2018 HF 907/3m/HORIZONTAL |
| **Memo** | : 2403.35 power 0x13 ANT1 | | |

Data: 43



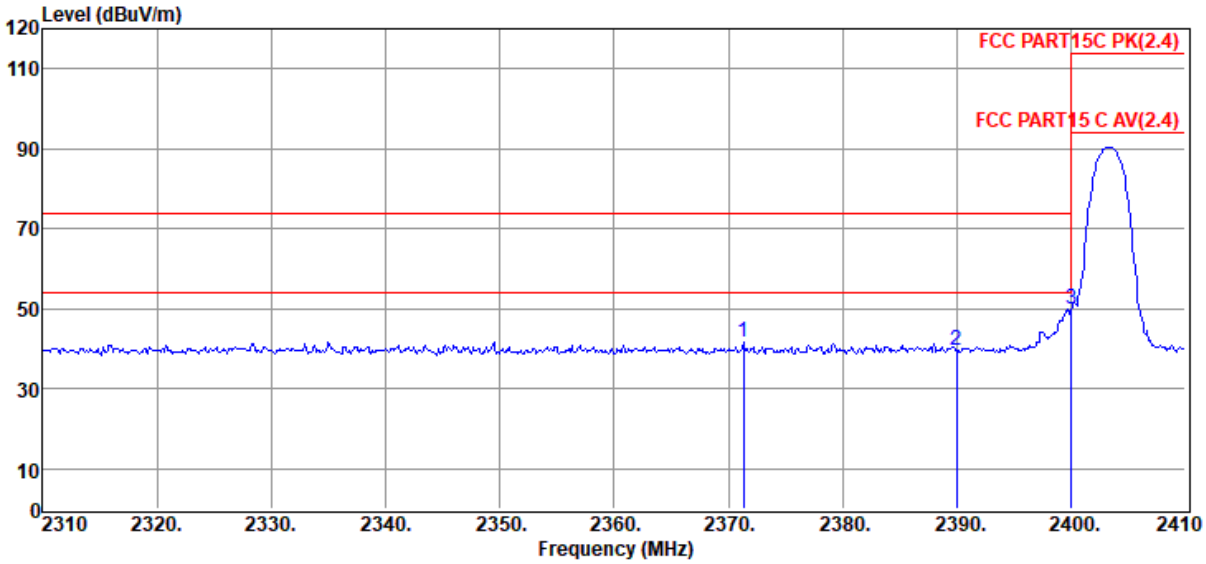

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2341.30 | 52.61 | 29.01 | 43.22 | 3.65 | 42.05 | 74.00 | -31.95 | Peak | HORIZONTAL |
| 2 | 2390.00 | 50.63 | 29.10 | 43.27 | 3.73 | 40.19 | 74.00 | -33.81 | Peak | HORIZONTAL |
| 3 | 2400.00 | 63.94 | 29.12 | 43.28 | 3.74 | 53.52 | 74.00 | -20.48 | Peak | HORIZONTAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2019 RE1# Report Data\Q19092704-1E QUANTUM600\FCC ABOVE 1G DOWNGLE.EM6 | |
| **Test Date** | : 2019-10-20 | **Tested By** | : Jacky |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : DC 5V | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:101.4kPa | **Antenna/Distance** | : 2018 HF 907/3m/VERTICAL |
| **Memo** | : 2403.35 power 0x13 ANT2 | | |

Data: 44



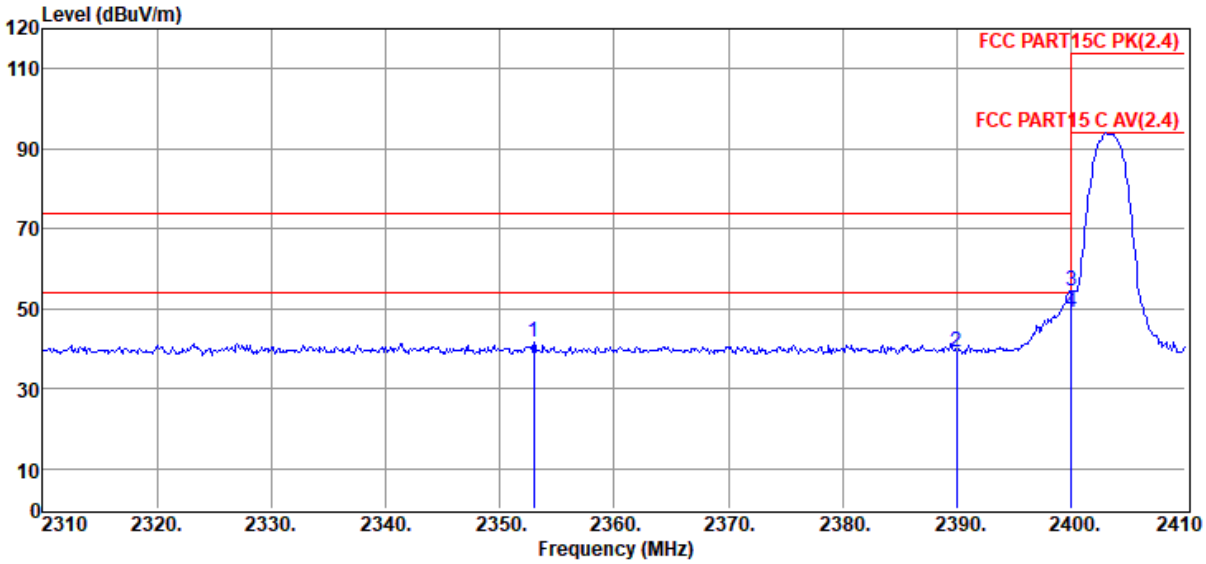

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2371.30 | 52.19 | 29.06 | 43.25 | 3.70 | 41.70 | 74.00 | -32.30 | Peak | VERTICAL |
| 2 | 2390.00 | 50.00 | 29.10 | 43.27 | 3.73 | 39.56 | 74.00 | -34.44 | Peak | VERTICAL |
| 3 | 2400.00 | 60.32 | 29.12 | 43.28 | 3.74 | 49.90 | 74.00 | -24.10 | Peak | VERTICAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2019 RE1# Report Data\Q19092704-1E QUANTUM600\FCC ABOVE 1G DOWNGLE.EM6 | |
| **Test Date** | : 2019-10-20 | **Tested By** | : Jacky |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : DC 5V | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:101.4kPa | **Antenna/Distance** | : 2018 HF 907/3m/HORIZONTAL |
| **Memo** | : 2403.35 power 0x13 ANT2 | | |

Data: 45



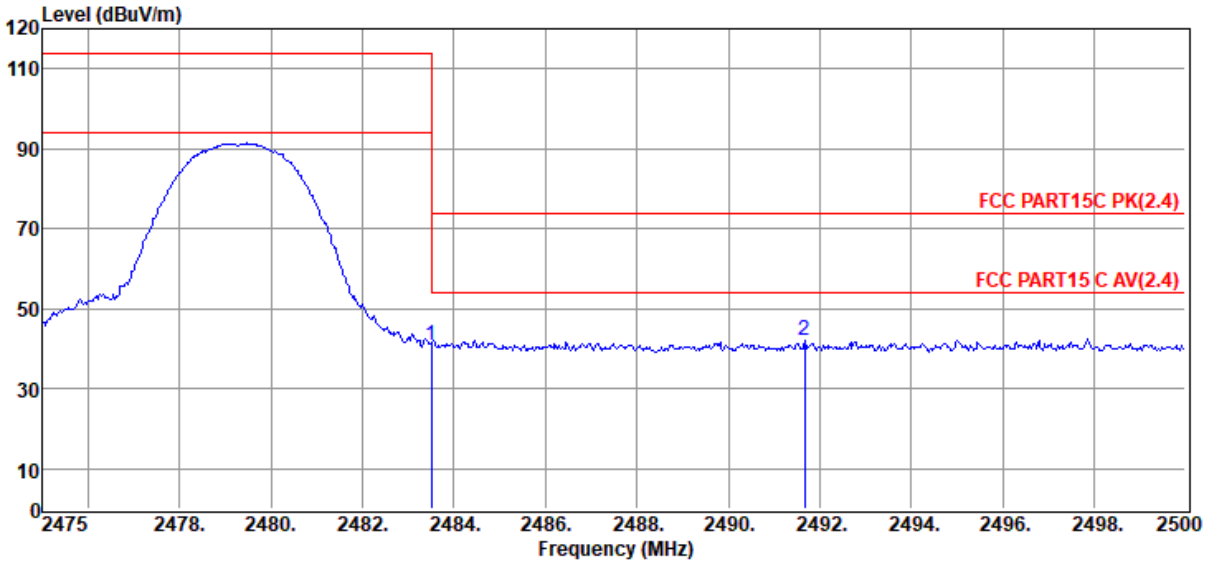

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2353.00 | 51.99 | 29.03 | 43.23 | 3.67 | 41.46 | 74.00 | -32.54 | Peak | HORIZONTAL |
| 2 | 2390.00 | 49.52 | 29.10 | 43.27 | 3.73 | 39.08 | 74.00 | -34.92 | Peak | HORIZONTAL |
| 3 | 2400.00 | 64.92 | 29.12 | 43.28 | 3.74 | 54.50 | 74.00 | -19.50 | Peak | HORIZONTAL |
| 4 | 2400.00 | 59.47 | 29.12 | 43.28 | 3.74 | 49.05 | 54.00 | -4.95 | Average | HORIZONTAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2019 RE1# Report Data\Q19092704-1E QUANTUM600\FCC ABOVE 1G DOWNGLE.EM6 | |
| **Test Date** | : 2019-10-20 | **Tested By** | : Jacky |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : DC 5V | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:101.4kPa | **Antenna/Distance** | : 2018 HF 907/3m/HORIZONTAL |
| **Memo** | : 2479.35 power 0x13 ANT1 | | |

Data: 46



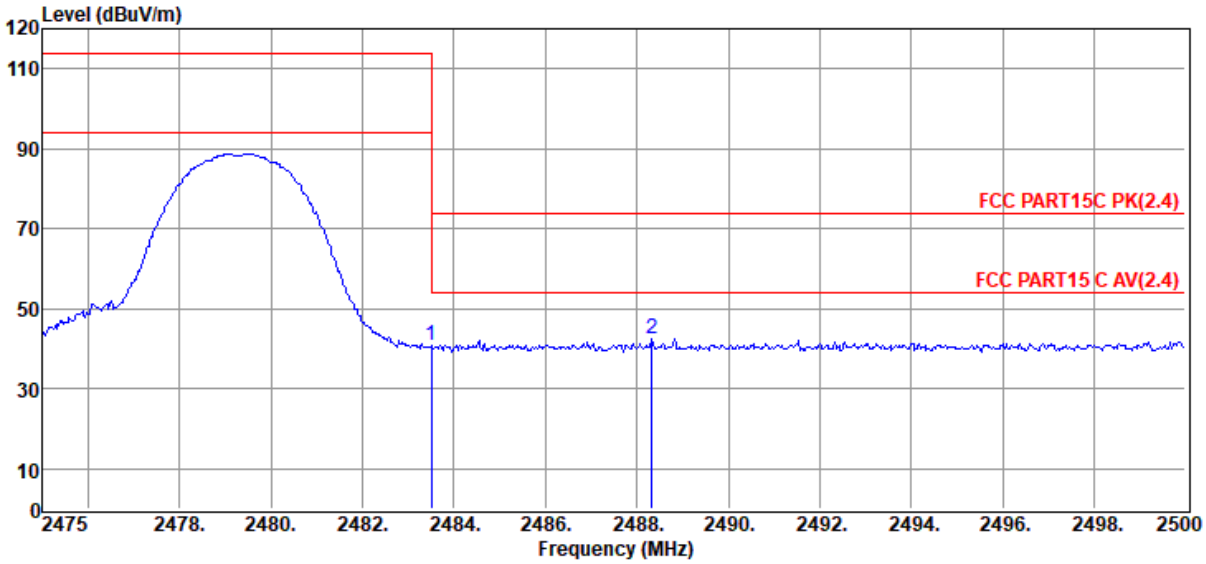

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.50 | 51.20 | 29.27 | 43.37 | 3.87 | 40.97 | 74.00 | -33.03 | Peak | HORIZONTAL |
| 2 | 2491.68 | 52.15 | 29.29 | 43.38 | 3.88 | 41.94 | 74.00 | -32.06 | Peak | HORIZONTAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2019 RE1# Report Data\Q19092704-1E QUANTUM600\FCC ABOVE 1G DOWNGLE.EM6 | |
| **Test Date** | : 2019-10-20 | **Tested By** | : Jacky |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : DC 5V | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:101.4kPa | **Antenna/Distance** | : 2018 HF 907/3m/VERTICAL |
| **Memo** | : 2479.35 power 0x13 ANT1 | | |

Data: 47



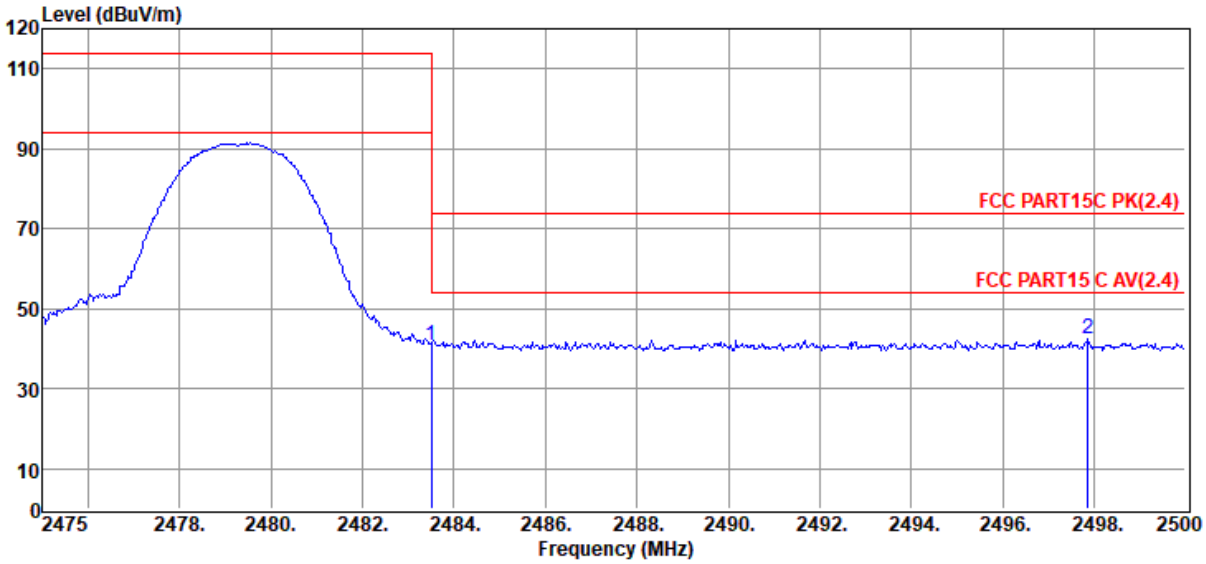

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.50 | 51.18 | 29.27 | 43.37 | 3.87 | 40.95 | 74.00 | -33.05 | Peak | VERTICAL |
| 2 | 2488.33 | 52.58 | 29.28 | 43.38 | 3.87 | 42.35 | 74.00 | -31.65 | Peak | VERTICAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2019 RE1# Report Data\Q19092704-1E QUANTUM600\FCC ABOVE 1G DOWNGLE.EM6 | |
| **Test Date** | : 2019-10-20 | **Tested By** | : Jacky |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : DC 5V | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:101.4kPa | **Antenna/Distance** | : 2018 HF 907/3m/HORIZONTAL |
| **Memo** | : 2479.35 power 0x13 ANT2 | | |

Data: 48



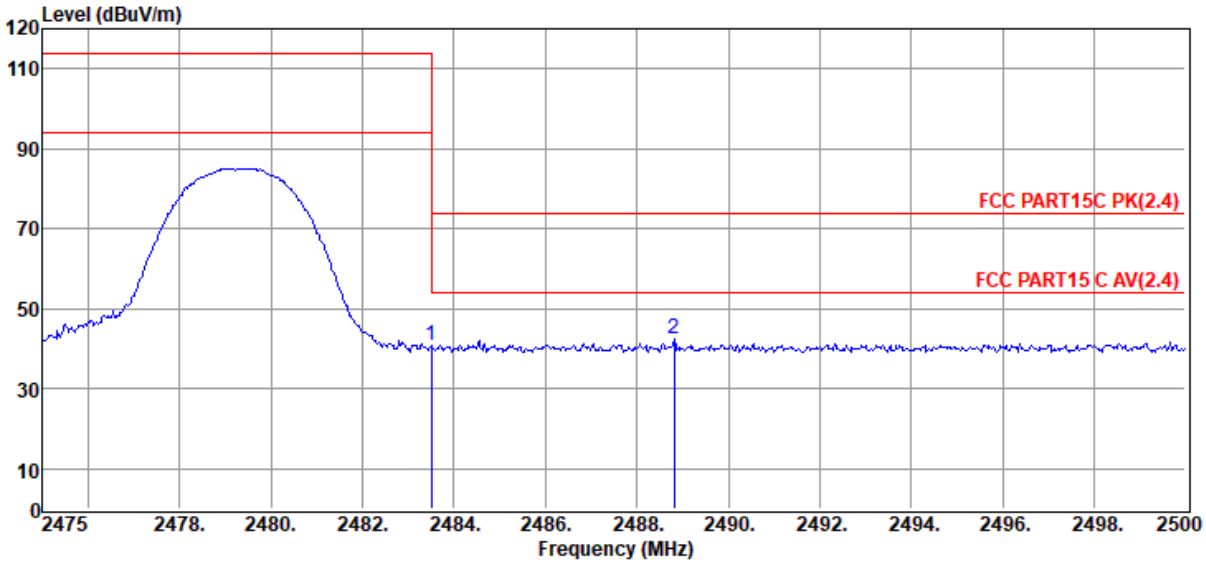

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.50 | 51.13 | 29.27 | 43.37 | 3.87 | 40.90 | 74.00 | -33.10 | Peak | HORIZONTAL |
| 2 | 2497.88 | 52.47 | 29.30 | 43.39 | 3.89 | 42.27 | 74.00 | -31.73 | Peak | HORIZONTAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 3m Chamber 1# | D:\2019 RE1# Report Data\Q19092704-1E QUANTUM600\FCC ABOVE 1G DOWNGLE.EM6 | |
| **Test Date** | : 2019-10-20 | **Tested By** | : Jacky |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : DC 5V | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:101.4kPa | **Antenna/Distance** | : 2018 HF 907/3m/VERTICAL |
| **Memo** | : 2479.35 power 0x13 ANT2 | | |

Data: 49

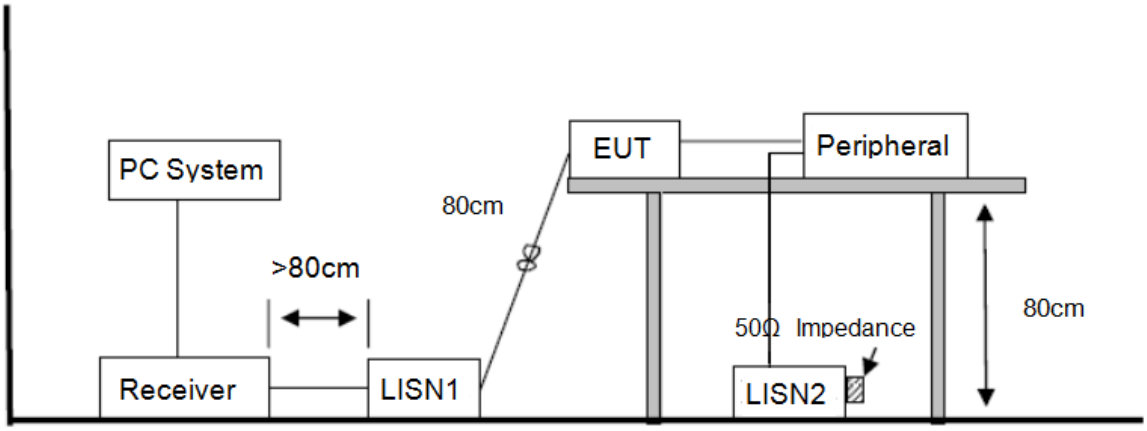



| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss dB | Result Level (dBµV/m) | Limit Line (dBµV/m) | Over Limit (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2483.50 | 51.11 | 29.27 | 43.37 | 3.87 | 40.88 | 74.00 | -33.12 | Peak | VERTICAL |
| 2 | 2488.83 | 52.58 | 29.28 | 43.38 | 3.87 | 42.35 | 74.00 | -31.65 | Peak | VERTICAL |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

# 7. Power Line Conducted Emission

## 7.1. Block diagram of test setup




## 7.2. Power Line Conducted Emission Limits

| Frequency | Quasi-Peak Level dB(μV) | Average Level dB(μV) |
|---|---|---|
| 150kHz ~ 500kHz | 66 ~ 56* | 56 ~ 46* |
| 500kHz ~ 5MHz | 56 | 46 |
| 5MHz ~ 30MHz | 60 | 50 |

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

## 7.3. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.
The EUT configuration and worse cable configuration of the above highest emission levels were

recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

## 7.4. Test Result

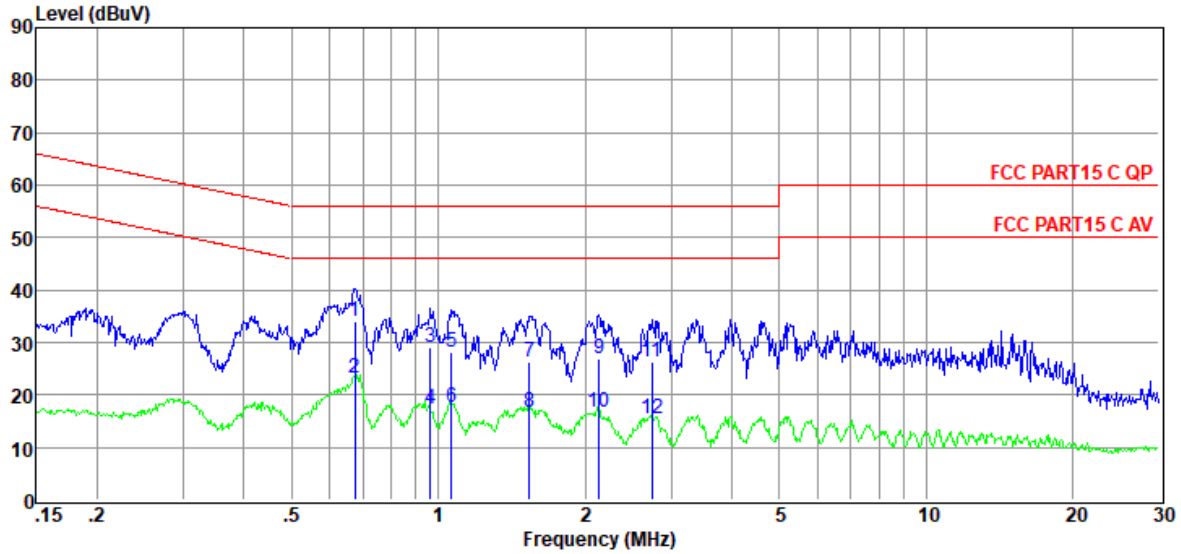
## PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.
Note2: "-----" means Peak detection; "-----" means Average detection.
Note3: Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/60Hz, recorded worst case.

# TR-4-E-010 Conducted Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 1# Shield Room | D:\2019 CE report data\Q19092704-1E\CE.EM6 | |
| **Test Date** | : 2019-10-12 | **Tested By** | : Van |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : AC 120V/60Hz | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:100.1KPa | **LISN** | : 2018 ENV216/LINE |
| **Memo** | : | | |

Data: 57



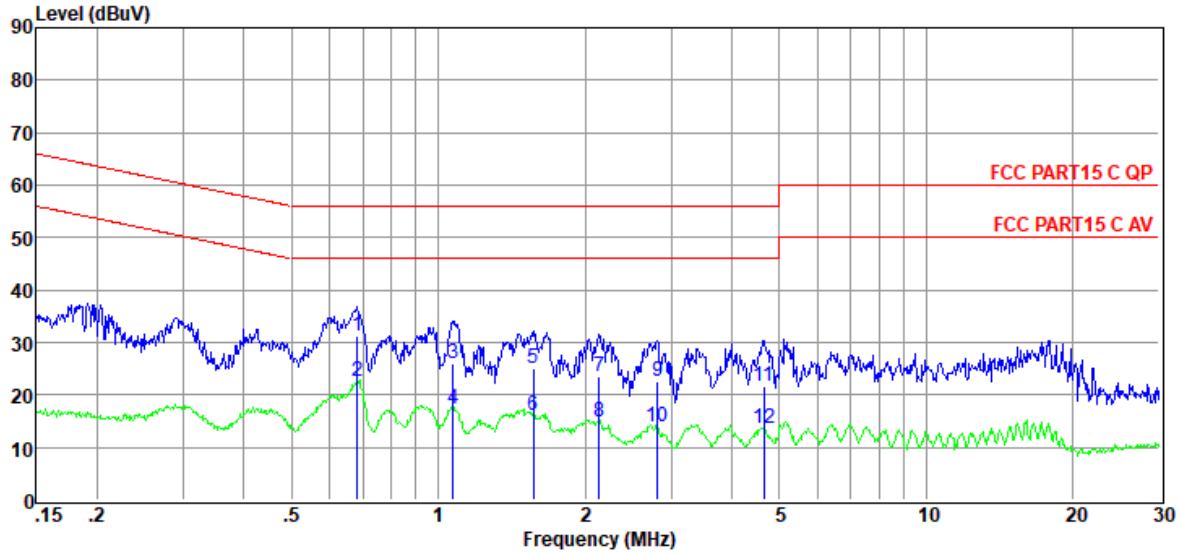

| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | LISN Factor (dB) | Cable Loss (dB) | Pulse Limiter Factor (dB) | Result Level (dBµV) | Limit Line (dBµV) | Over Limit (dB) | Detector | Phase |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.68 | 14.36 | 9.64 | 0.03 | 9.86 | 33.89 | 56.00 | -22.11 | QP | LINE |
| 2 | 0.68 | 3.65 | 9.64 | 0.03 | 9.86 | 23.18 | 46.00 | -22.82 | Average | LINE |
| 3 | 0.96 | 9.46 | 9.64 | 0.09 | 9.87 | 29.06 | 56.00 | -26.94 | QP | LINE |
| 4 | 0.96 | -2.23 | 9.64 | 0.09 | 9.87 | 17.37 | 46.00 | -28.63 | Average | LINE |
| 5 | 1.07 | 8.62 | 9.64 | 0.10 | 9.87 | 28.23 | 56.00 | -27.77 | QP | LINE |
| 6 | 1.07 | -2.01 | 9.64 | 0.10 | 9.87 | 17.60 | 46.00 | -28.40 | Average | LINE |
| 7 | 1.54 | 6.59 | 9.65 | 0.07 | 9.87 | 26.18 | 56.00 | -29.82 | QP | LINE |
| 8 | 1.54 | -2.87 | 9.65 | 0.07 | 9.87 | 16.72 | 46.00 | -29.28 | Average | LINE |
| 9 | 2.13 | 7.41 | 9.65 | 0.05 | 9.87 | 26.98 | 56.00 | -29.02 | QP | LINE |
| 10 | 2.13 | -2.82 | 9.65 | 0.05 | 9.87 | 16.75 | 46.00 | -29.25 | Average | LINE |
| 11 | 2.74 | 6.79 | 9.66 | 0.04 | 9.87 | 26.36 | 56.00 | -29.64 | QP | LINE |
| 12 | 2.74 | -4.06 | 9.66 | 0.04 | 9.87 | 15.51 | 46.00 | -30.49 | Average | LINE |

Note: 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

# TR-4-E-010 Conducted Emission Test Result

| | | | |
|---|---|---|---|
| **Test Site** | : DDT 1# Shield Room | D:\2019 CE report data\Q19092704-1E\CE.EM6 | |
| **Test Date** | : 2019-10-12 | **Tested By** | : Van |
| **EUT** | : USB Wireless Dongle | **Model Number** | : QUANTUM600TM |
| **Power Supply** | : AC 120V/60Hz | **Test Mode** | : Tx mode |
| **Condition** | : Temp:24.5'C,Humi:55%,Press:100.1KPa | **LISN** | : 2018 ENV216/NEUTRAL |
| **Memo** | : | | |

Data: 58




| Item (Mark) | Freq. (MHz) | Read Level (dBµV) | LISN Factor (dB) | Cable Loss (dB) | Pulse Limiter Factor (dB) | Result Level (dBµV) | Limit Line (dBµV) | Over Limit (dB) | Detector | Phase |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.68 | 11.61 | 9.64 | 0.04 | 9.86 | 31.15 | 56.00 | -24.85 | QP | NEUTRAL |
| 2 | 0.68 | 2.93 | 9.64 | 0.04 | 9.86 | 22.47 | 46.00 | -23.53 | Average | NEUTRAL |
| 3 | 1.07 | 6.44 | 9.64 | 0.10 | 9.87 | 26.05 | 56.00 | -29.95 | QP | NEUTRAL |
| 4 | 1.07 | -2.35 | 9.64 | 0.10 | 9.87 | 17.26 | 46.00 | -28.74 | Average | NEUTRAL |
| 5 | 1.57 | 5.40 | 9.66 | 0.07 | 9.87 | 25.00 | 56.00 | -31.00 | QP | NEUTRAL |
| 6 | 1.57 | -3.52 | 9.66 | 0.07 | 9.87 | 16.08 | 46.00 | -29.92 | Average | NEUTRAL |
| 7 | 2.13 | 3.90 | 9.67 | 0.05 | 9.87 | 23.49 | 56.00 | -32.51 | QP | NEUTRAL |
| 8 | 2.13 | -4.75 | 9.67 | 0.05 | 9.87 | 14.84 | 46.00 | -31.16 | Average | NEUTRAL |
| 9 | 2.81 | 3.06 | 9.68 | 0.03 | 9.87 | 22.64 | 56.00 | -33.36 | QP | NEUTRAL |
| 10 | 2.81 | -5.72 | 9.68 | 0.03 | 9.87 | 13.86 | 46.00 | -32.14 | Average | NEUTRAL |
| 11 | 4.65 | 2.10 | 9.70 | 0.08 | 9.88 | 21.76 | 56.00 | -34.24 | QP | NEUTRAL |
| 12 | 4.65 | -6.18 | 9.70 | 0.08 | 9.88 | 13.48 | 46.00 | -32.52 | Average | NEUTRAL |

Note: 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

# 8. Antenna Requirements

## 8.1. Limit

For intentional device, according to FCC 47 CFR 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.

## 8.2. Result

The antennas used for this product are dedicated FPC antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0.88 dBi.

**END OF REPORT**