

## Report on the RF Testing of:

KYOCERA Corporation  
Tablet, Model: KC-T302DT  
FCC ID: JOYKB18

## In accordance with FCC Part15 Subpart C

Prepared for: KYOCERA Corporation  
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## COMMERCIAL-IN-CONFIDENCE

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| SIGNATURE      |                            |                    |             |
|----------------|----------------------------|--------------------|-------------|
|                |                            |                    |             |
| NAME           | JOB TITLE                  | RESPONSIBLE FOR    | ISSUE DATE  |
| Hiroaki Suzuki | Deputy Manager of RF Group | Approved Signatory | 14 JUN 2019 |

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Japan Ltd. document control rules.

### EXECUTIVE SUMMARY

A sample(s) of this product was tested and found to be compliant with FCC Part15 Subpart C.



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### ACCREDITATION

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## 1 Summary of Test

### 1.1 Modification history of the test report

| Document Number | Modification History | Issue Date              |
|-----------------|----------------------|-------------------------|
| JPD-TR-19086-0  | First Issue          | Refer to the cover page |

### 1.2 Standards

CFR47 FCC Part 15 Subpart C

### 1.3 Test methods

ANSI C63.10-2013  
KDB 558074 D01 15.247 Meas Guidance v05r02

### 1.4 Deviation from standards

None

### 1.5 List of applied test(s) of the EUT

| Test item section             | Test item                                      | Condition             | Result | Remark |
|-------------------------------|------------------------------------------------|-----------------------|--------|--------|
| 15.247(a)(2)                  | DTS Bandwidth / Occupied Bandwidth (99%)       | Conducted             | PASS   | -      |
| 15.247(b)(3)                  | Maximum conducted (average) output power       | Conducted             | PASS   | -      |
| 15.247(d)                     | Band Edge Compliance of RF Conducted Emissions | Conducted             | PASS   | -      |
| 15.247(d)<br>15.205<br>15.209 | Spurious Emissions                             | Conducted<br>Radiated | PASS   | -      |
| 15.247(d)<br>15.205<br>15.209 | Restricted Bands of Operation                  | Radiated              | PASS   | -      |
| 15.247(e)                     | Transmitter Power Spectral Density             | Conducted             | PASS   | -      |
| 15.207                        | AC Power Line Conducted Emissions              | Conducted             | PASS   | -      |

### 1.6 Test information

None

### 1.7 Test set up

Table-top

### 1.8 Test period

18 April-2019 - 20-May-2019

## 2 Equipment Under Test

### 2.1 EUT information

|                            |                                                                                                                                                                                                                               |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant                  | KYOCERA Corporation<br>Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi,<br>Kanagawa, Japan<br>Phone: +81-45-943-6253 Fax: +81-45-943-6314                                                                             |
| Equipment Under Test (EUT) | Tablet                                                                                                                                                                                                                        |
| Model number               | KC-T302DT                                                                                                                                                                                                                     |
| Serial number              | N/A                                                                                                                                                                                                                           |
| Trade name                 | Kyocera                                                                                                                                                                                                                       |
| Number of sample(s)        | 1                                                                                                                                                                                                                             |
| EUT condition              | Pre-Production                                                                                                                                                                                                                |
| Power rating               | Battery: DC 3.8 V                                                                                                                                                                                                             |
| Size                       | (W) 180.0 × (D) 10.7 × (H) 270.0 mm                                                                                                                                                                                           |
| Environment                | Indoor and Outdoor use                                                                                                                                                                                                        |
| Terminal limitation        | -20°C to 60°C                                                                                                                                                                                                                 |
| Hardware Version           | DMT1                                                                                                                                                                                                                          |
| Software Version           | V0.040JS                                                                                                                                                                                                                      |
| Firmware Version           | Not applicable                                                                                                                                                                                                                |
| RF Specification           |                                                                                                                                                                                                                               |
| Protocol                   | IEEE802.11b, IEEE802.11g, IEEE802.11n (HT20),                                                                                                                                                                                 |
| Frequency range            | IEEE802.11b /11g/11n (HT20): 2412 MHz-2462 MHz                                                                                                                                                                                |
| Number of RF Channels      | 11 Channels                                                                                                                                                                                                                   |
| Modulation type            | IEEE802.11b: DSSS (DBPSK, DQPSK, CCK)<br>IEEE802.11g /11n (HT20): OFDM (BPSK, QPSK, 16QAM, 64QAM)                                                                                                                             |
| Data rate                  | IEEE802.11b: 1, 2, 5.5, 11Mbps<br>IEEE802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps<br>IEEE802.11n (HT20 LGI): 6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps<br>IEEE802.11n (HT20 SGI): 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65, 72.2Mbps |
| Channel separation         | 5 MHz                                                                                                                                                                                                                         |
| Output power               | 44.875 mW (IEEE802.11b)<br>74.817 mW (IEEE802.11g)<br>83.946 mW (IEEE802.11n: HT20)                                                                                                                                           |
| Antenna type               | Internal antenna                                                                                                                                                                                                              |
| Antenna gain               | 3.7 dBi                                                                                                                                                                                                                       |

## 2.2 Modification to the EUT

The table below details modifications made to the EUT during the test project.

| Modification State                   | Description of Modification  | Modification fitted by | Date of Modification |
|--------------------------------------|------------------------------|------------------------|----------------------|
| Model: KC-T302DT, Serial Number: N/A |                              |                        |                      |
| 0                                    | As supplied by the applicant | Not Applicable         | Not Applicable       |

## 2.3 Variation of family model(s)

### 2.3.1 List of family model(s)

Not applicable

### 2.3.2 Reason for selection of EUT

Not applicable

## 2.4 Operating channels and frequencies

| Channel | Frequency [MHz] |
|---------|-----------------|
| 1       | 2412            |
| 2       | 2417            |
| 3       | 2422            |
| 4       | 2427            |
| 5       | 2432            |
| 6       | 2437            |
| 7       | 2442            |
| 8       | 2447            |
| 9       | 2452            |
| 10      | 2457            |
| 11      | 2462            |

## 2.5 Description of test mode

The EUT had been tested under operating condition.  
There are three channels have been tested as following:

| Tested Channel [11b, 11g, 11n(HT20)] | Frequency [MHz] |
|--------------------------------------|-----------------|
| Low                                  | 2412            |
| Middle                               | 2437            |
| High                                 | 2462            |

The pre-test has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

| Tested Channel    | Modulation Type              | Data Rate      |
|-------------------|------------------------------|----------------|
| Low, Middle, High | IEEE802.11b: DSSS            | 1Mbps          |
| Low, Middle, High | IEEE802.11g: OFDM            | 6Mbps          |
| Low, Middle, High | IEEE802.11n (HT20 LGI): OFDM | MCS0 (6.5Mbps) |

The field strength of spurious emissions was measured at each position of all three axis X, Y and Z to compare the level, and the maximum noise.

The worst emission was found in X-axis and the worst case recorded.

Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports.

## 2.6 Operating flow

### - Tx mode

- i) Test program setup to the DM tool
- ii) Select a Test mode  
[IEEE802.11b, IEEE802.11g, IEEE802.11n (HT20)]  
Operating frequency: Channel Low: 2412MHz, Channel Middle: 2437MHz, Channel High: 2462MHz
- iii) Start test mode

### - Rx mode

- i) Test program setup to the DM tool
- ii) Select a Test mode  
[IEEE802.11b, IEEE802.11g, IEEE802.11n (HT20)]  
Operating frequency: Channel Low: 2412MHz, Channel Middle: 2437MHz, Channel High: 2462MHz
- iii) Start test mode

### 3 Configuration of Equipment

Numbers assigned to equipment on the diagram in “3.3 System configuration” correspond to the lists in “3.1 Equipment used” and “3.2 Cable(s) used”.

#### 3.1 Equipment used

| No. | Equipment  | Company        | Model No. | Serial No. | FCC ID / DoC | Comment |
|-----|------------|----------------|-----------|------------|--------------|---------|
| 1   | Tablet     | KYOCERA        | KC-T302DT | N/A        | JOYKB18      | EUT     |
| 2   | AC Adapter | SALOM ELECTRIC | ADT301    | JS-MHA     | N/A          | *       |

\*: AC power line Conducted Emission Test.

#### 3.2 Cable(s) used

| No. | Cable                   | Length[m] | Shield | Connector | Comment |
|-----|-------------------------|-----------|--------|-----------|---------|
| a   | DC cable for AC Adapter | 1.2       | No     | Plastic   | *       |

\*: AC power line Conducted Emission Test.

#### 3.3 System configuration



## 4 Test Result

### 4.1 DTS Bandwidth / Occupied Bandwidth (99%)

#### 4.1.1 Measurement procedure

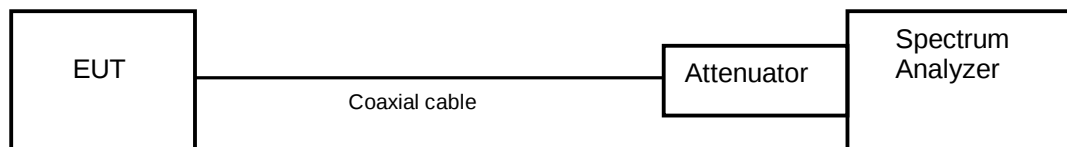
[FCC 15.247(a)(2), KDB 558074 D01 v05r02, Section 8.2]

The bandwidth at 6dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;

- a) RBW = 100kHz.
- b) VBW  $\geq 3 \times$  RBW.
- c) Sweep time = auto-couple.
- d) Detector = peak.
- e) Trace mode = max hold.

- Test configuration



#### 4.1.2 Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

#### 4.1.3 Measurement result

Date : 18-April-2019  
 Temperature : 23.0 [°C]  
 Humidity : 25.0 [%]  
 Test place : Shielded room No.4

Test engineer : Chiaki Kanno

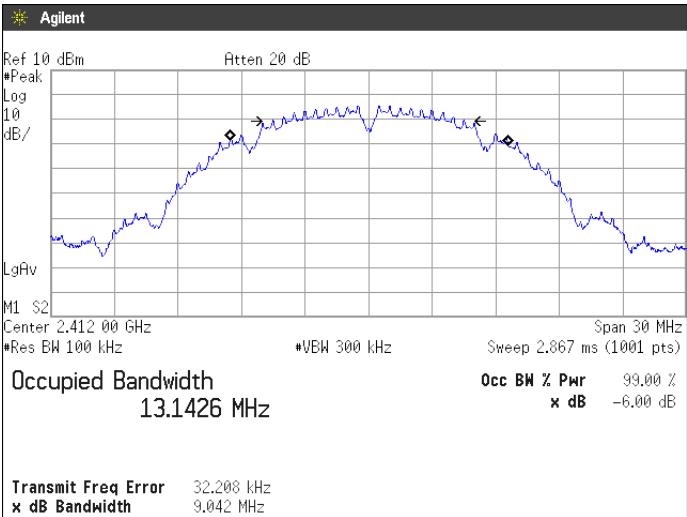
| Channel | DTS Bandwidth [MHz] |             |                    |
|---------|---------------------|-------------|--------------------|
|         | IEEE802.11b         | IEEE802.11g | IEEE802.11n (HT20) |
| Low     | 9.042               | 16.422      | 17.617             |
| Middle  | 8.589               | 16.435      | 17.624             |
| High    | 8.566               | 16.421      | 17.637             |

| Channel | Occupied Bandwidth (99%) [MHz] |             |                    |
|---------|--------------------------------|-------------|--------------------|
|         | IEEE802.11b                    | IEEE802.11g | IEEE802.11n (HT20) |
| Low     | 13.143                         | 16.531      | 17.690             |
| Middle  | 13.115                         | 16.526      | 17.694             |
| High    | 13.104                         | 16.531      | 17.693             |

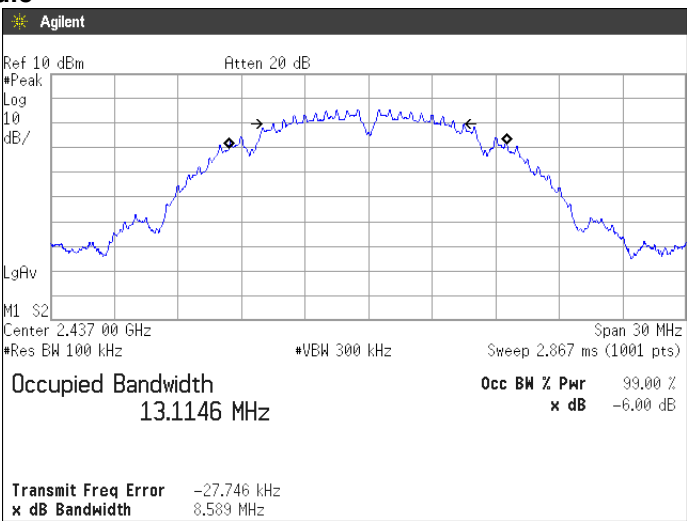
#### 4.1.4 Trace data

[IEEE802.11b]

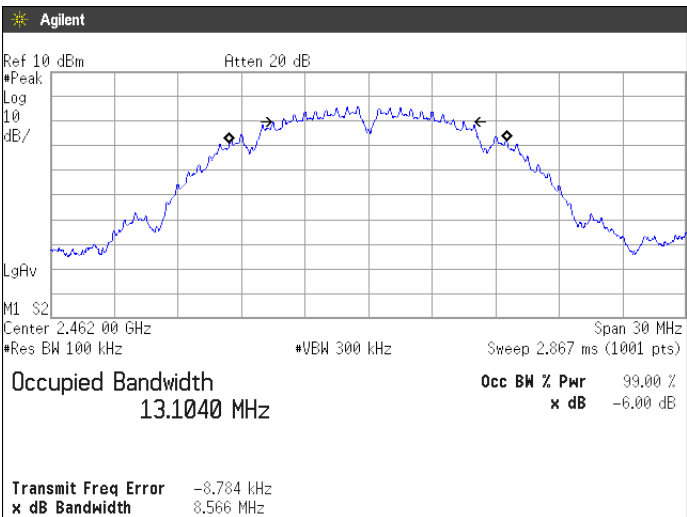
##### Channel Low



##### Channel Middle

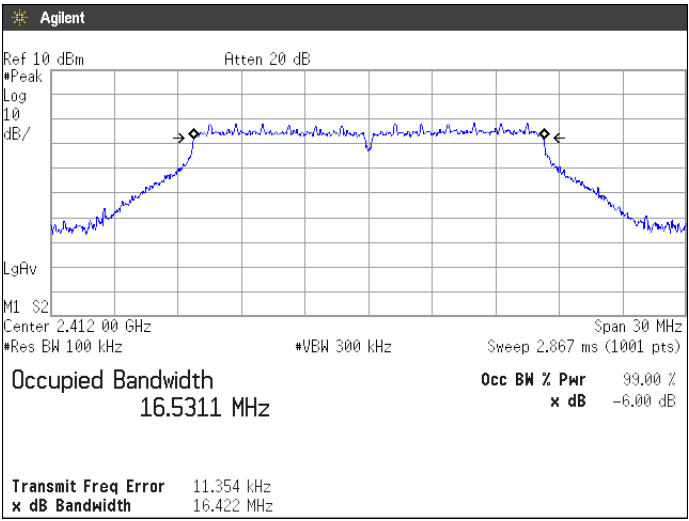


##### Channel High

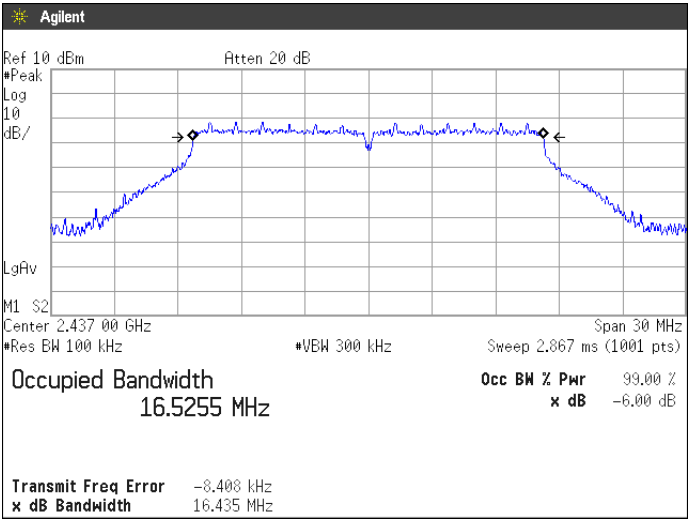


[IEEE802.11g]

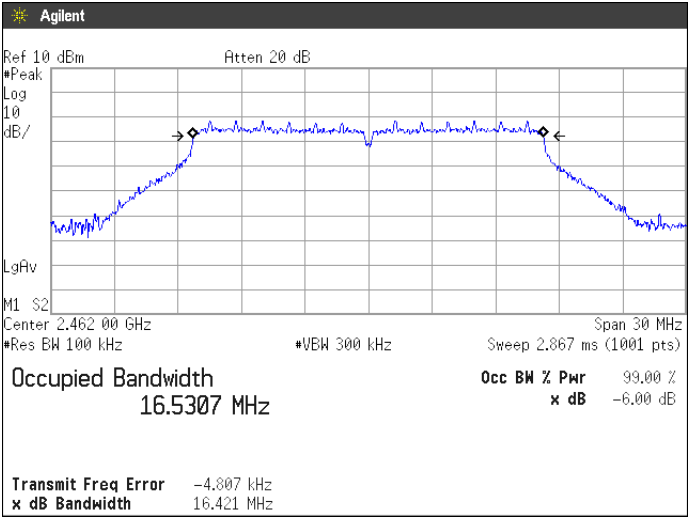
Channel Low



Channel Middle

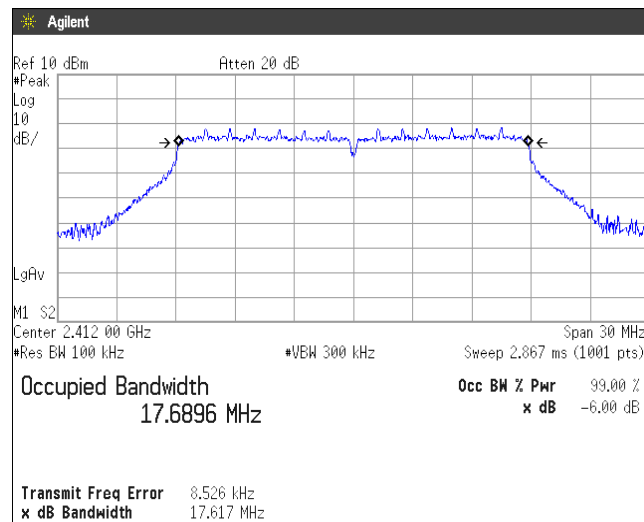


Channel High

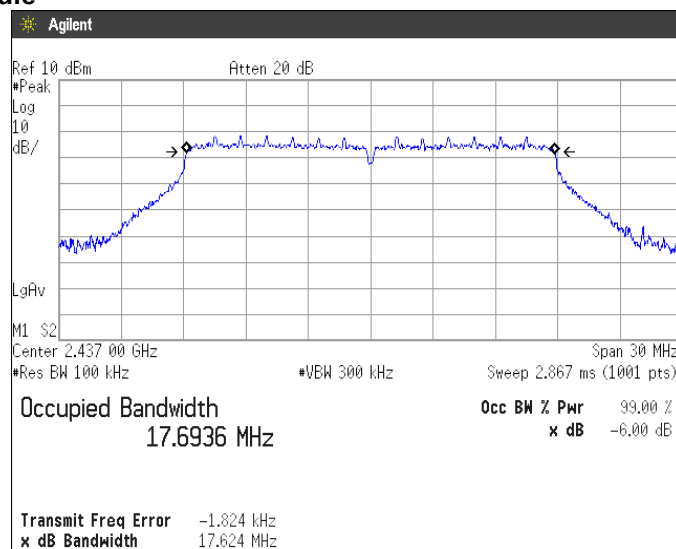


## [IEEE802.11n (HT20)]

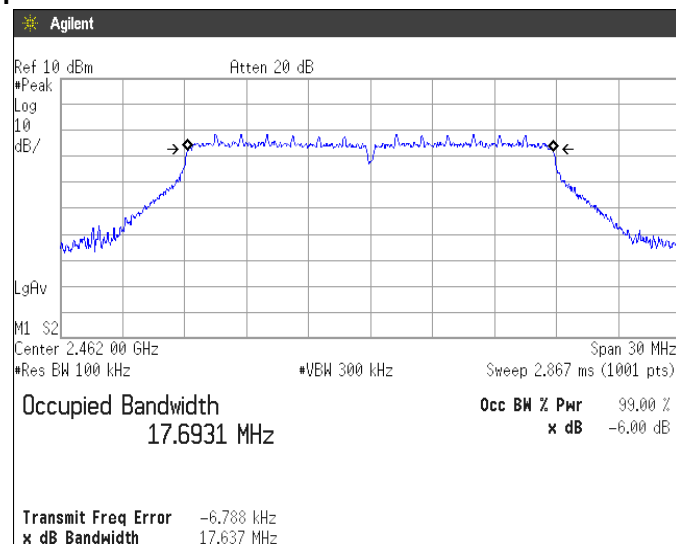
## Channel Low



## Channel Middle



## Channel High



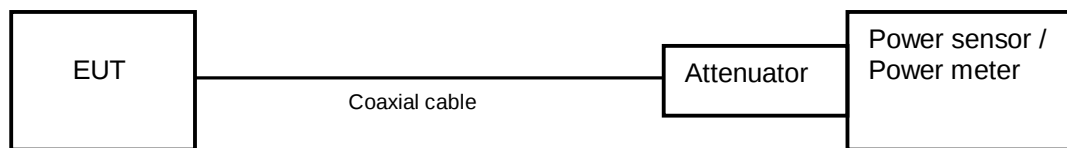
## 4.2 Maximum Conducted Output Power

### 4.2.1 Measurement procedure

[FCC 15.247(b)(3), KDB 558074 D01 v05r02, Section 8.3.1.3]

The peak power is measured with a power sensor connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

- Test configuration



### 4.2.2 Limit

1 W (1000 mW) or less

#### 4.2.3 Measurement result

Date : 18-April-2019  
 Temperature : 23.0 [°C]  
 Humidity : 25.0 [%]  
 Test place : Shielded room No.4

Test engineer : Chiaki Kanno

##### [IEEE802.11b] Battery Full

| Channel | Center Frequency (MHz) | Reading (dBm) | Factor (dB) | Level (dBm) | Output Power (mW) | Limit (mW) | Result |
|---------|------------------------|---------------|-------------|-------------|-------------------|------------|--------|
| Low     | 2412                   | 5.26          | 10.63       | 15.89       | 38.815            | ≤1000      | PASS   |
| Middle  | 2437                   | 5.55          | 10.63       | 16.18       | 41.495            | ≤1000      | PASS   |
| High    | 2462                   | 5.89          | 10.63       | 16.52       | 44.875            | ≤1000      | PASS   |

##### [IEEE802.11g] Battery Full

| Channel | Center Frequency (MHz) | Reading (dBm) | Factor (dB) | Level (dBm) | Output Power (mW) | Limit (mW) | Result |
|---------|------------------------|---------------|-------------|-------------|-------------------|------------|--------|
| Low     | 2412                   | 7.61          | 10.63       | 18.24       | 66.681            | ≤1000      | PASS   |
| Middle  | 2437                   | 8.11          | 10.63       | 18.74       | 74.817            | ≤1000      | PASS   |
| High    | 2462                   | 7.91          | 10.63       | 18.54       | 71.450            | ≤1000      | PASS   |

##### [IEEE802.11n (HT20)] Battery Full

| Channel | Center Frequency (MHz) | Reading (dBm) | Factor (dB) | Level (dBm) | Output Power (mW) | Limit (mW) | Result |
|---------|------------------------|---------------|-------------|-------------|-------------------|------------|--------|
| Low     | 2412                   | 7.22          | 10.63       | 17.85       | 60.954            | ≤1000      | PASS   |
| Middle  | 2437                   | 8.12          | 10.63       | 18.75       | 74.989            | ≤1000      | PASS   |
| High    | 2462                   | 8.61          | 10.63       | 19.24       | 83.946            | ≤1000      | PASS   |

Calculation;

Reading (dBm) + Factor (dB) = Level (dBm)

$10\log P = \text{Level (dBm)}$

$P = 10^{(\text{Maximum Peak Output Power} / 10)} \text{ (mW)}$

### 4.3 Band Edge Compliance of RF Conducted Emissions

#### 4.3.1 Measurement procedure

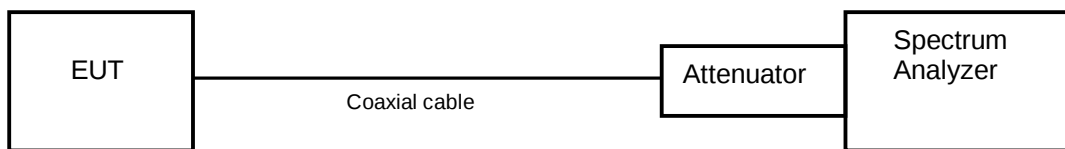
##### [FCC 15.247(d), KDB 558074 D01 v05r02, Section 8.5]

The Band Edge is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;

- a) Span = Arbitrary setting. (Setting suitable for measurement.)
- b) RBW = 100kHz.
- c) VBW  $\geq 3 \times$  RBW
- d) Sweep time = auto-couple.
- e) Detector = peak.
- f) Trace mode = max hold.

- Test configuration



#### 4.3.2 Limit

In any 100 kHz bandwidth outside the frequency band the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

#### 4.3.3 Measurement result

Date : 18-April-2019

Temperature : 23.0 [°C]

Humidity : 25.0 [%]

Test place : Shielded room No.4

Test engineer :

Chiaki Kanno

##### [IEEE802.11b]

| Channel | Frequency (MHz) | RF Power Level (dBm) | Band-edge Frequency (MHz) | Band-edge Level (dBm) | Difference Level (dBm) | Limit (dBm)                         | Result |
|---------|-----------------|----------------------|---------------------------|-----------------------|------------------------|-------------------------------------|--------|
| Low     | 2412.00         | -4.45                | 2399.92                   | -56.13                | 51.68                  | At least 20dB below from peak of RF | PASS   |
| High    | 2462.00         | -4.21                | 2487.58                   | -64.90                | 60.69                  | At least 20dB below from peak of RF | PASS   |

##### [IEEE802.11g]

| Channel | Frequency (MHz) | RF Power Level (dBm) | Band-edge Frequency (MHz) | Band-edge Level (dBm) | Difference Level (dBm) | Limit (dBm)                         | Result |
|---------|-----------------|----------------------|---------------------------|-----------------------|------------------------|-------------------------------------|--------|
| Low     | 2412.00         | -11.70               | 2399.52                   | -47.67                | 35.97                  | At least 20dB below from peak of RF | PASS   |
| High    | 2462.00         | -11.53               | 2484.22                   | -60.74                | 49.21                  | At least 20dB below from peak of RF | PASS   |

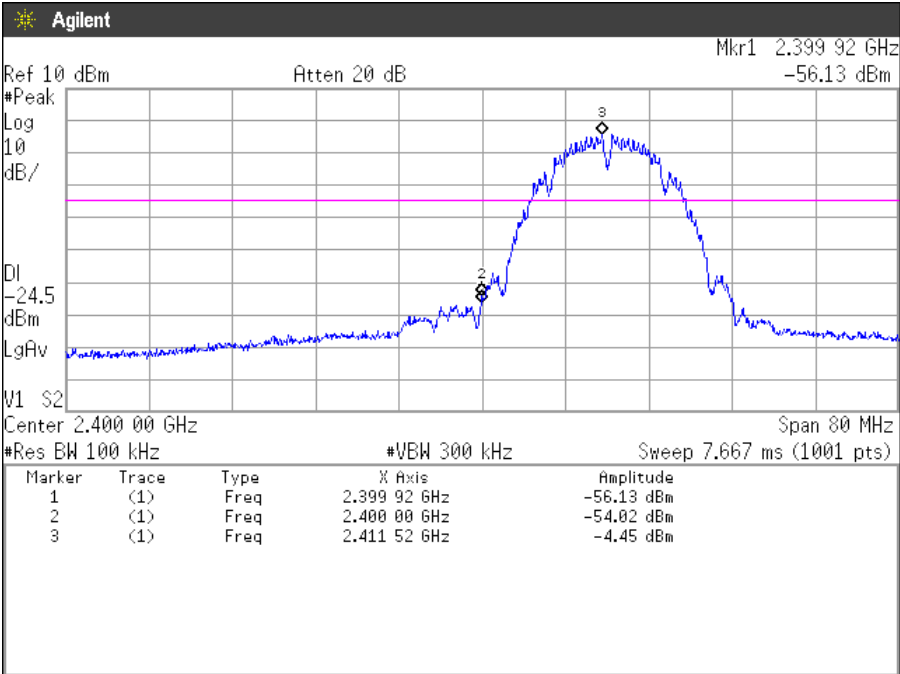
##### [IEEE802.11n (HT20)]

| Channel | Frequency (MHz) | RF Power Level (dBm) | Band-edge Frequency (MHz) | Band-edge Level (dBm) | Difference Level (dBm) | Limit (dBm)                         | Result |
|---------|-----------------|----------------------|---------------------------|-----------------------|------------------------|-------------------------------------|--------|
| Low     | 2412.00         | -11.68               | 2399.92                   | -46.86                | 35.18                  | At least 20dB below from peak of RF | PASS   |
| High    | 2462.00         | -11.57               | 2483.58                   | -59.37                | 47.80                  | At least 20dB below from peak of RF | PASS   |

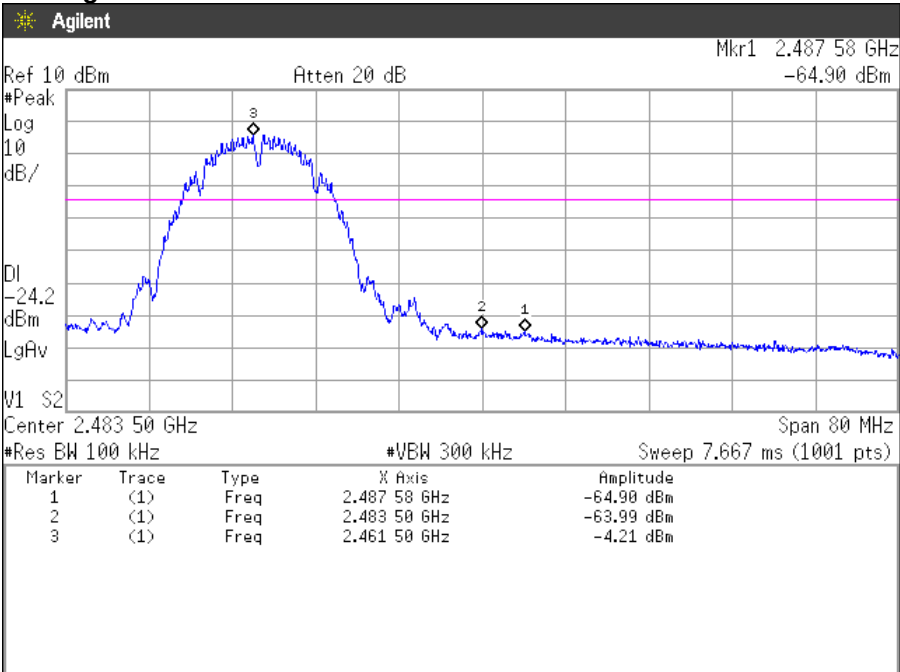
#### 4.3.4 Trace data

[IEEE802.11b]

##### Channel Low

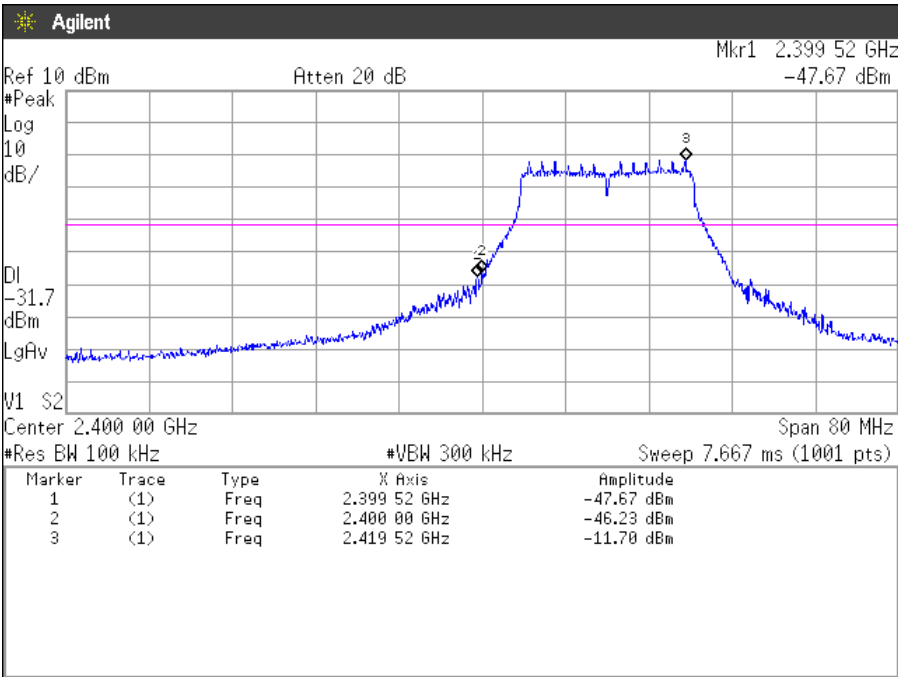


##### Channel High

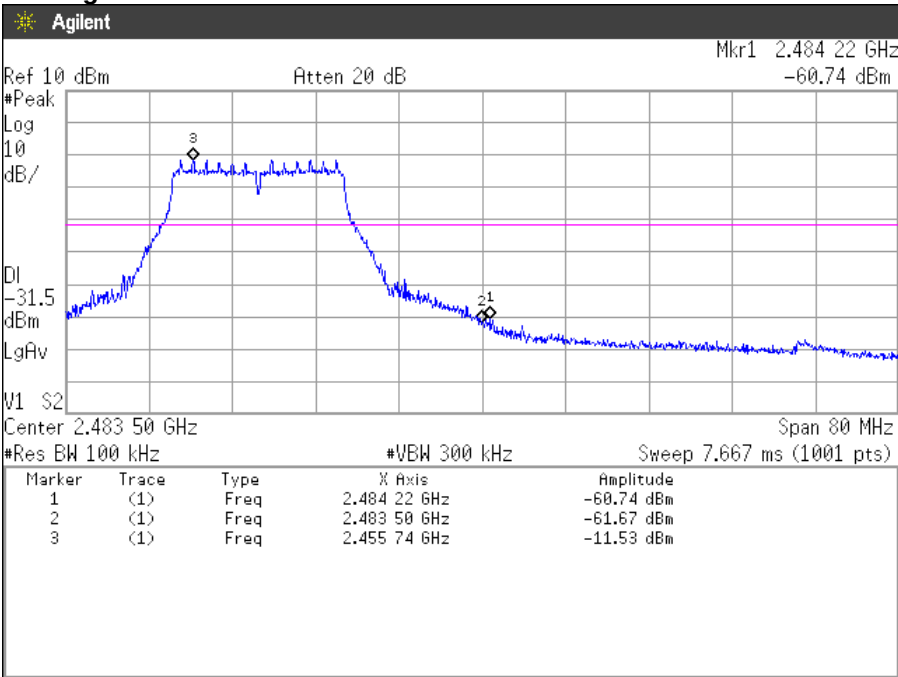


[IEEE802.11g]

Channel Low

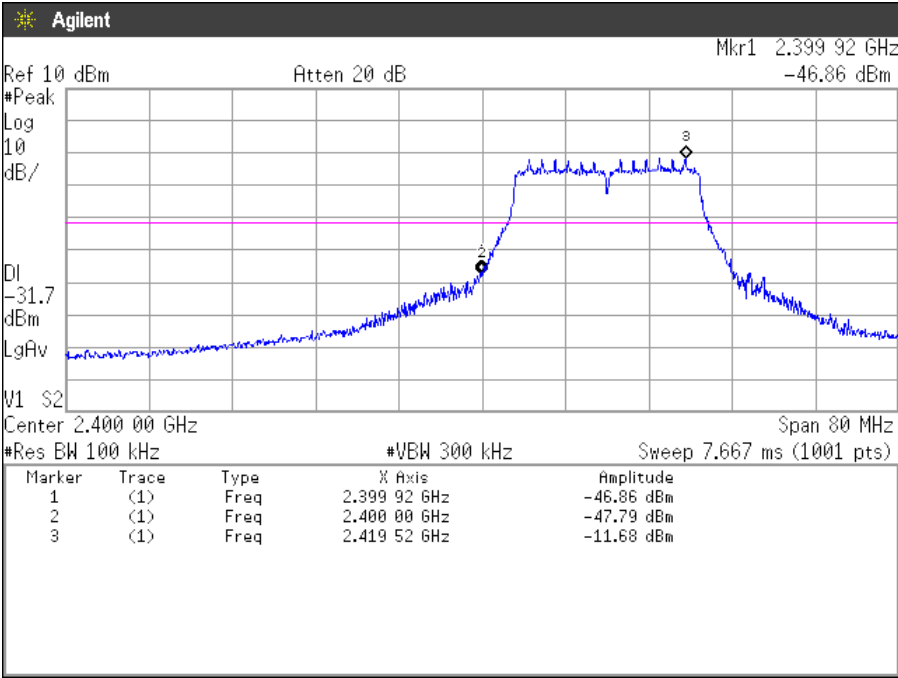


Channel High

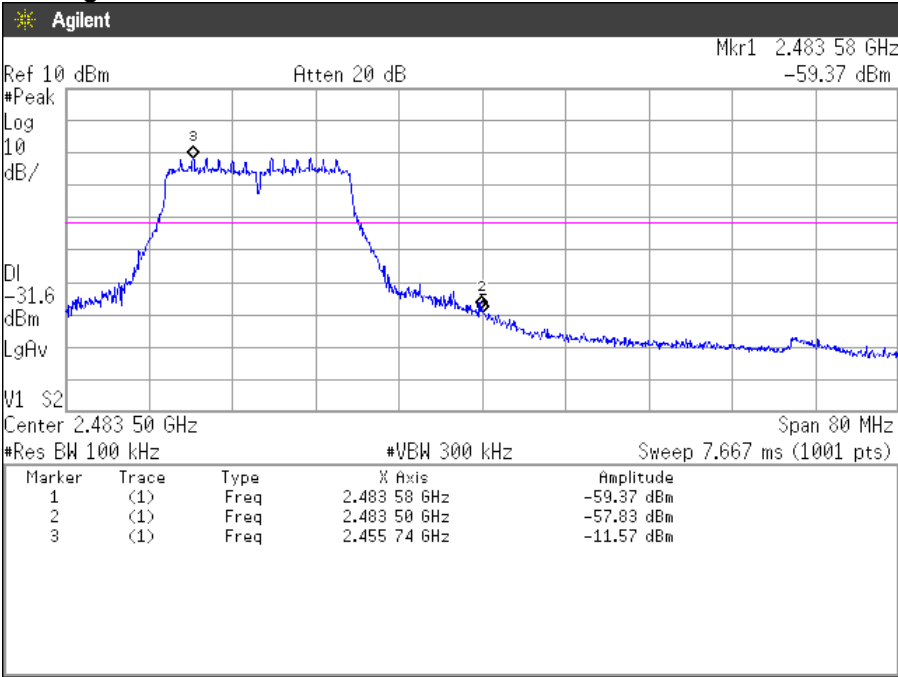


[IEEE802.11n (HT20)]

Channel Low



Channel High



#### 4.4 Spurious emissions - Conducted -

##### 4.4.1 Measurement procedure

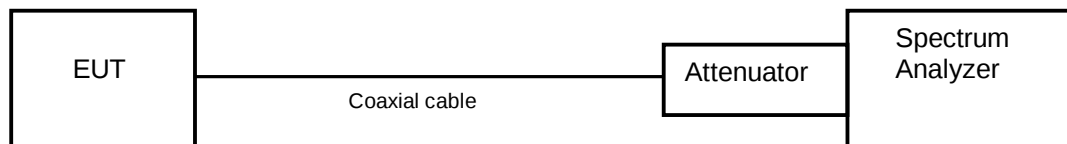
###### [FCC 15.247(d), KDB 558074 D01 v05r02, Section 8.5]

The spurious emissions (Conducted) are measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;

- a) Span = wide enough to fully capture the emission being measured.
- b) RBW = 100 kHz.
- c) VBW  $\geq$  RBW.
- d) Sweep time = auto-couple.
- e) Detector = peak.
- f) Trace mode = max hold.

- Test configuration



##### 4.4.2 Limit

In any 100 kHz bandwidth outside the frequency band the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

**4.4.3 Measurement result**

Date : 18-April-2019

Temperature : 23.0 [°C]

Humidity : 25.0 [%]

Test place : Shielded room No.4

Test engineer :

Chiaki Kanno**[IEEE802.11b、IEEE802.11g、IEEE802.11n (HT20)]**

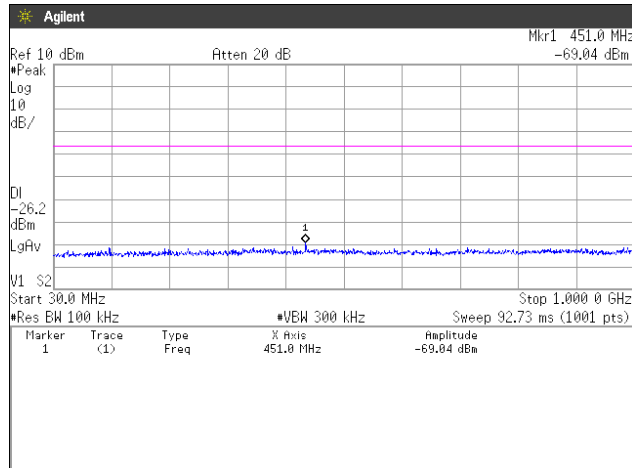
| Channel | Frequency<br>[MHz] | Limit<br>[dB]                       | Results Chart      | Result |
|---------|--------------------|-------------------------------------|--------------------|--------|
| Low     | 2412               | At least 20dB below from peak of RF | See the trace Data | PASS   |
| Middle  | 2437               | At least 20dB below from peak of RF | See the trace Data | PASS   |
| High    | 2462               | At least 20dB below from peak of RF | See the trace Data | PASS   |

#### 4.4.4 Trace data

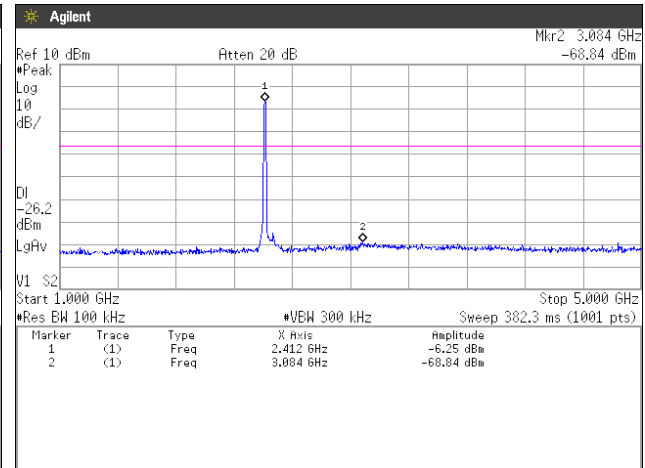
[IEEE802.11b]

Channel Low

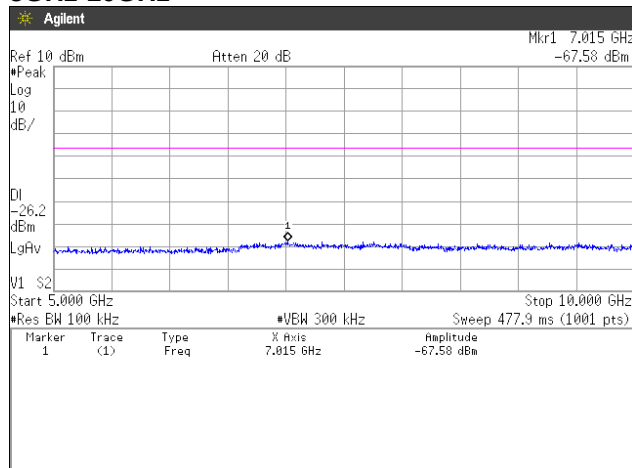
30MHz-1GHz



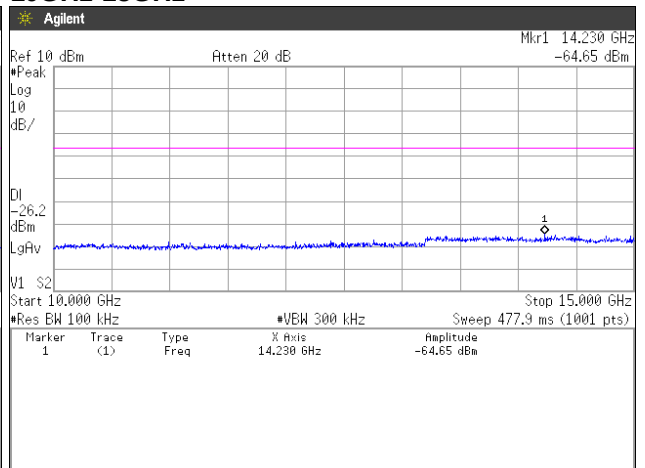
1GHz-5GHz



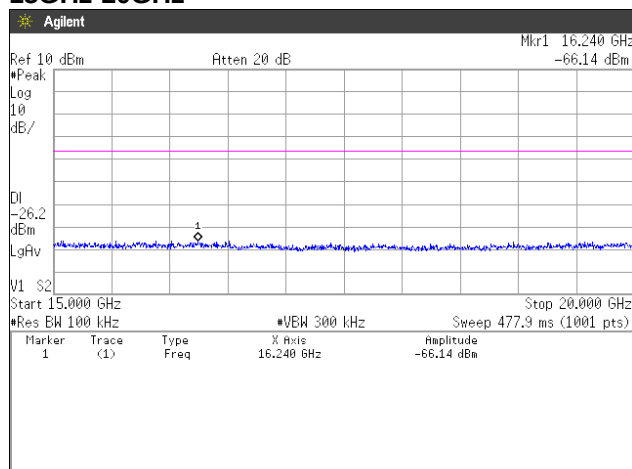
5GHz-10GHz



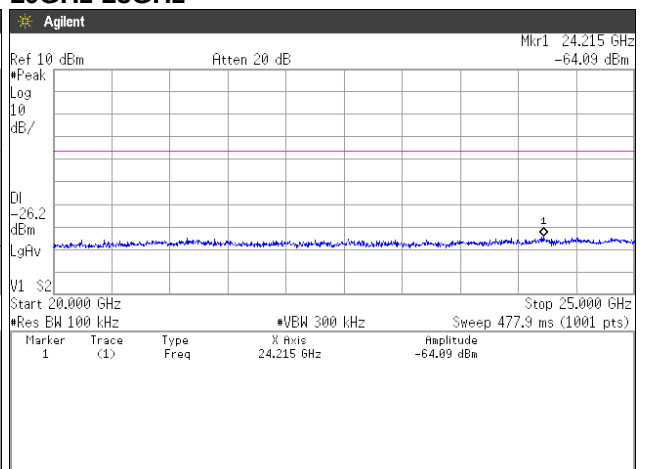
10GHz-15GHz



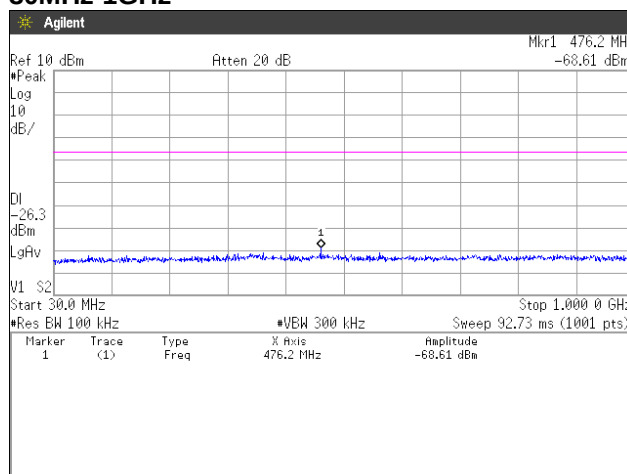
15GHz-20GHz



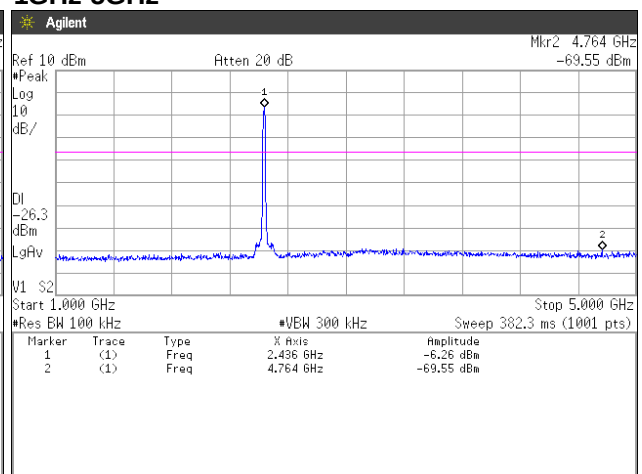
20GHz-25GHz



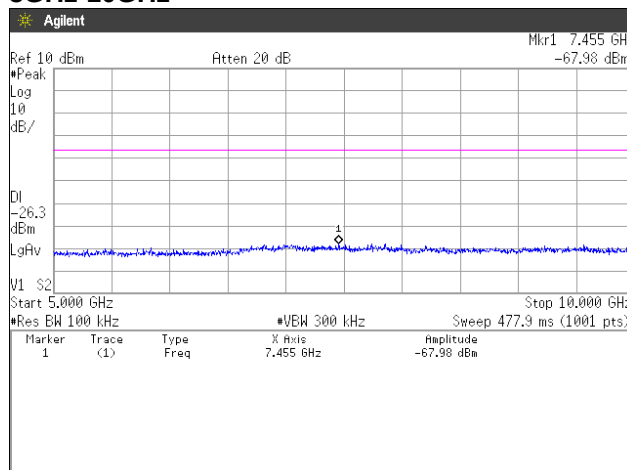
### Channel Middle 30MHz-1GHz



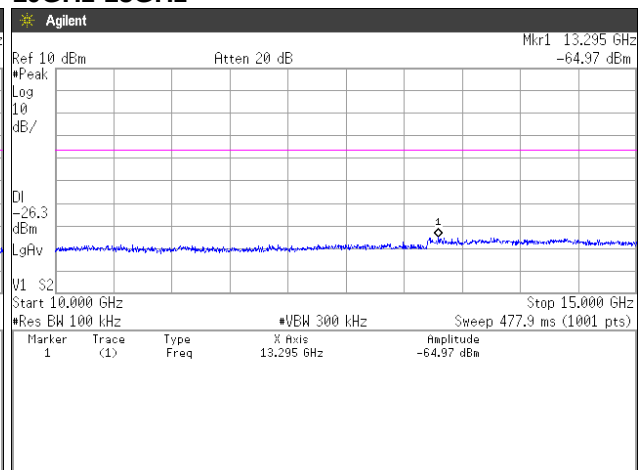
### 1GHz-5GHz



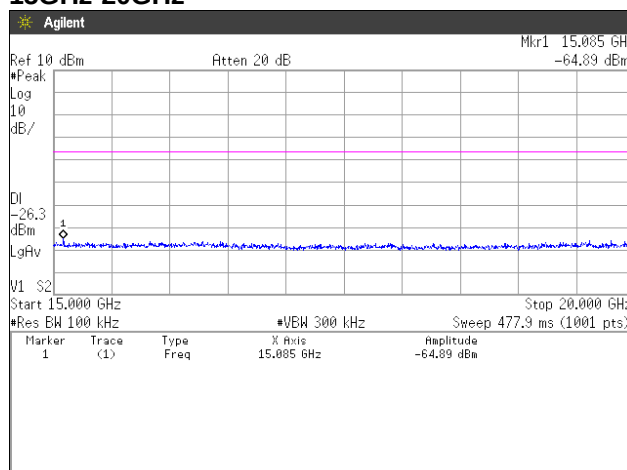
### 5GHz-10GHz



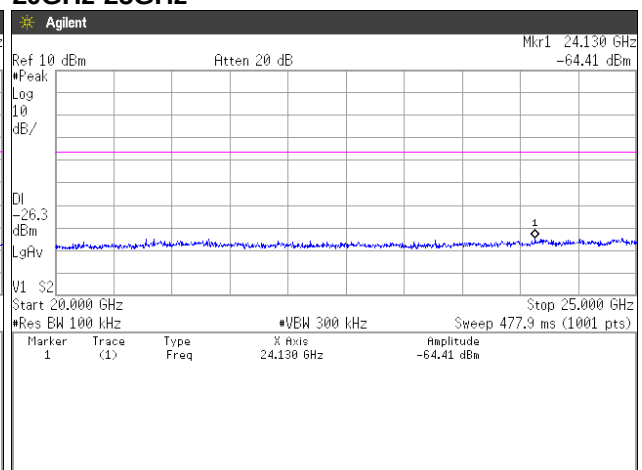
### 10GHz-15GHz

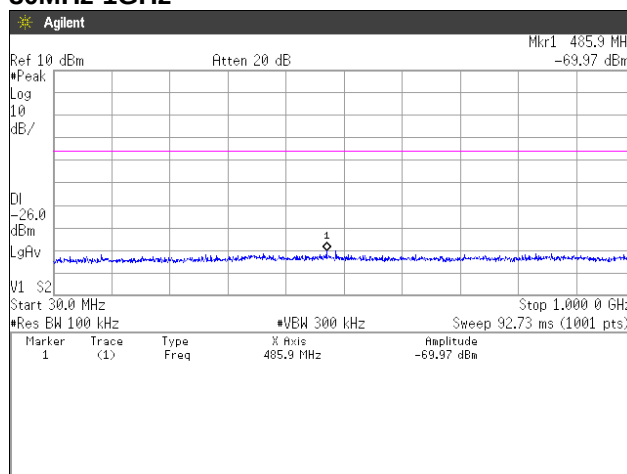
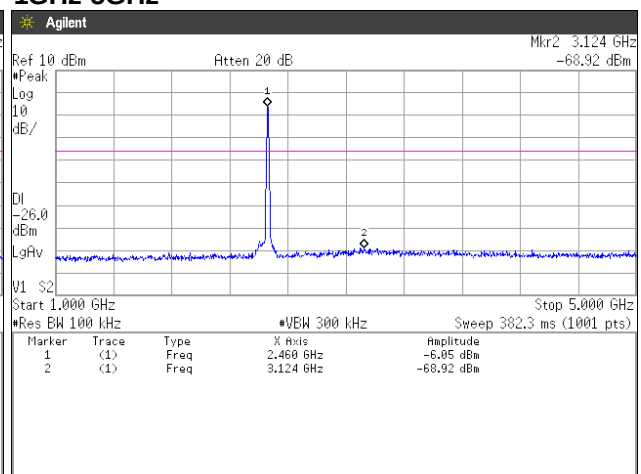
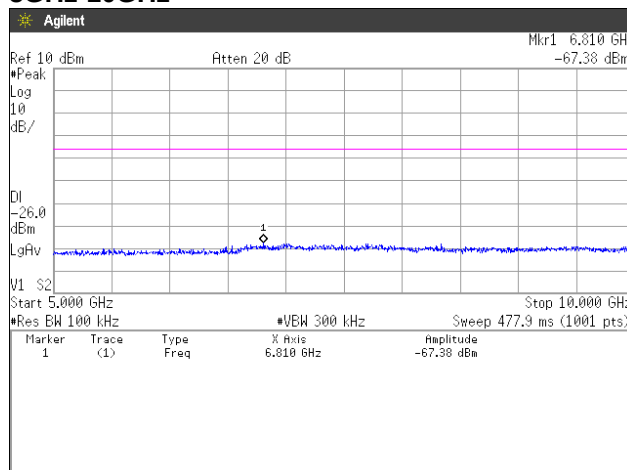
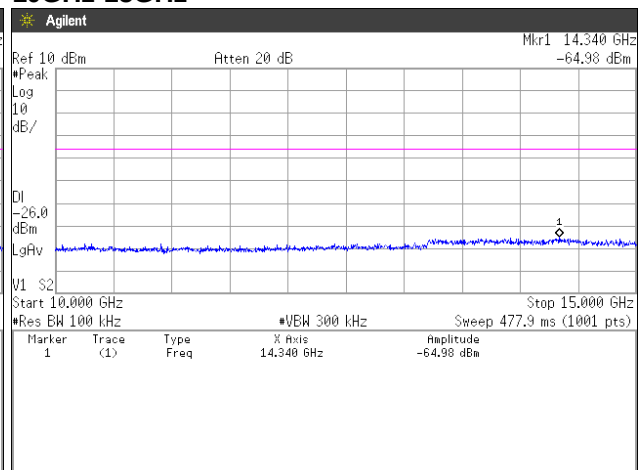
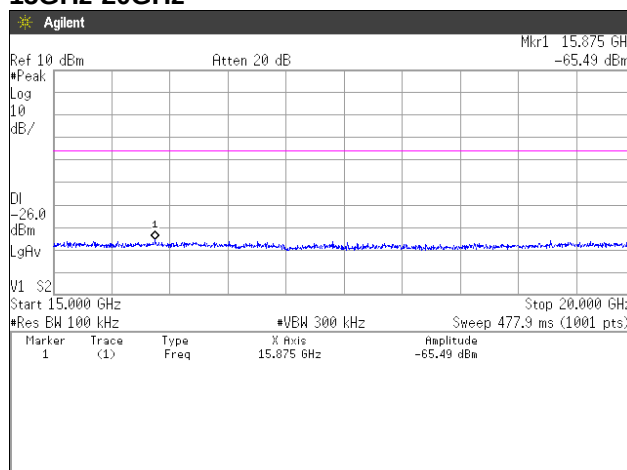
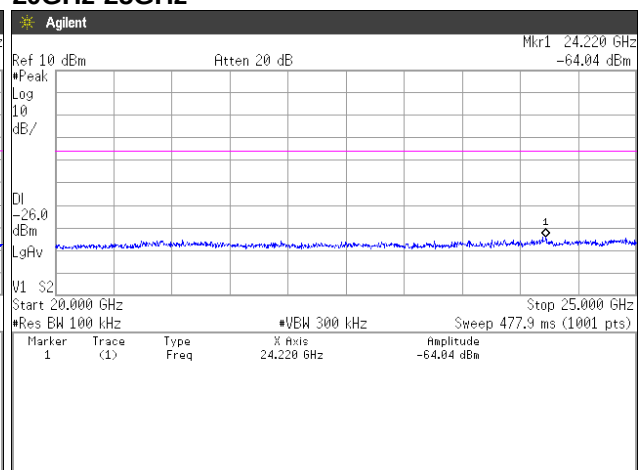


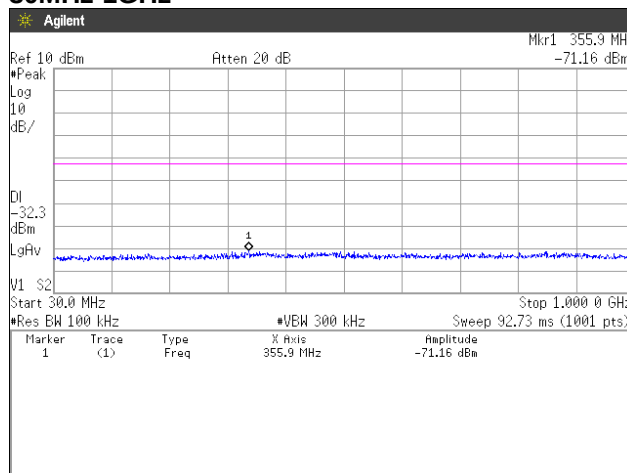
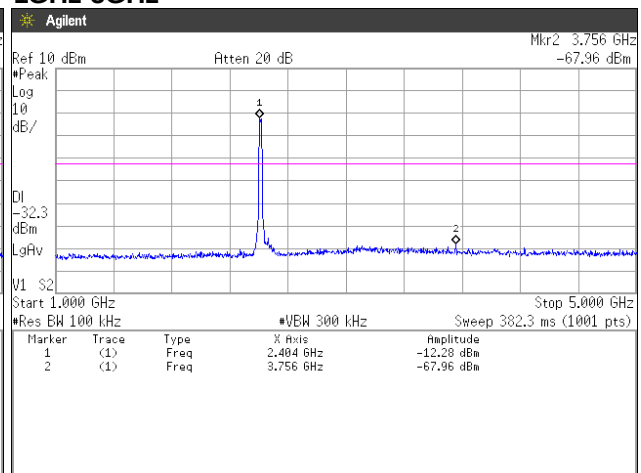
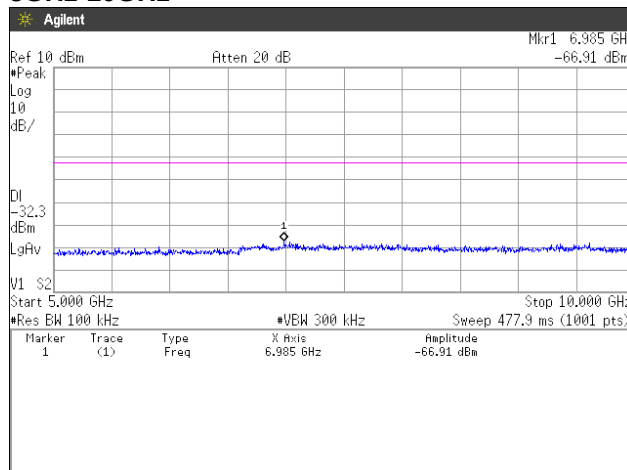
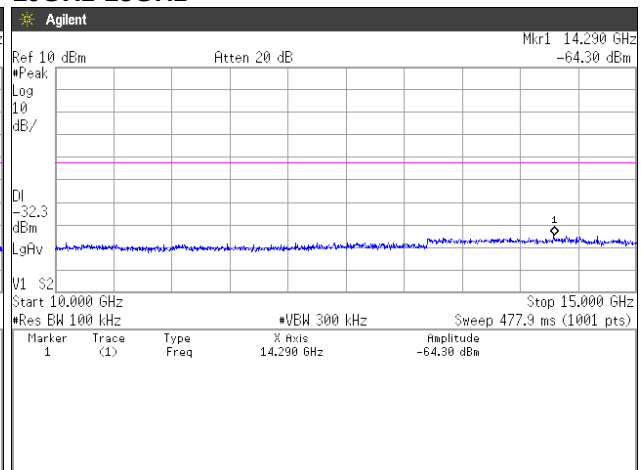
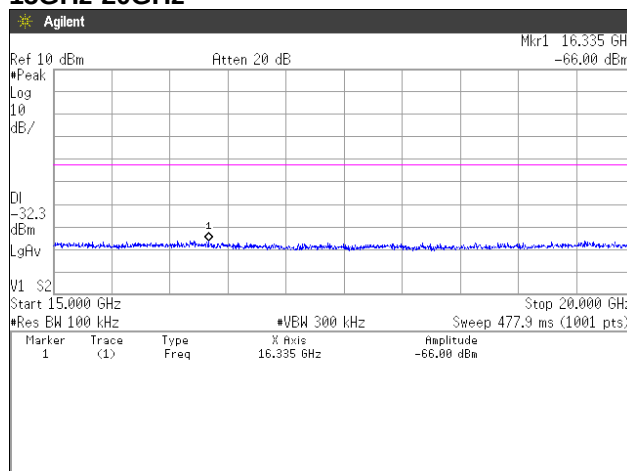
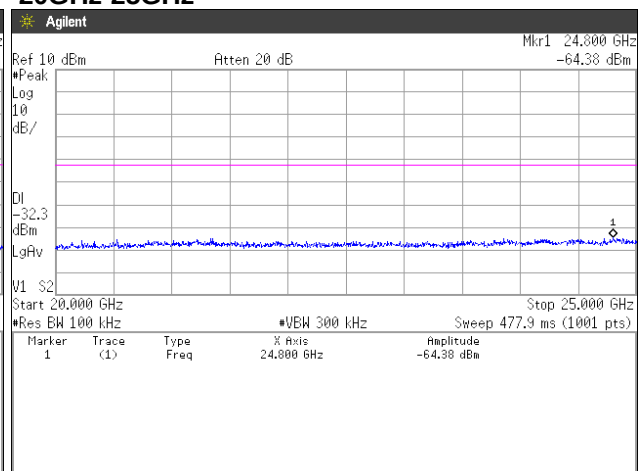
### 15GHz-20GHz

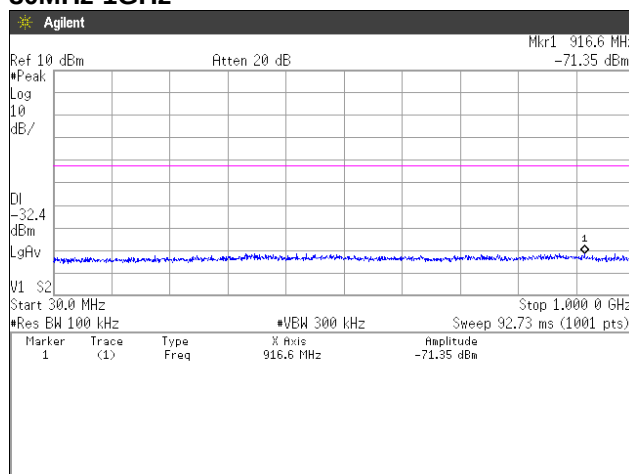
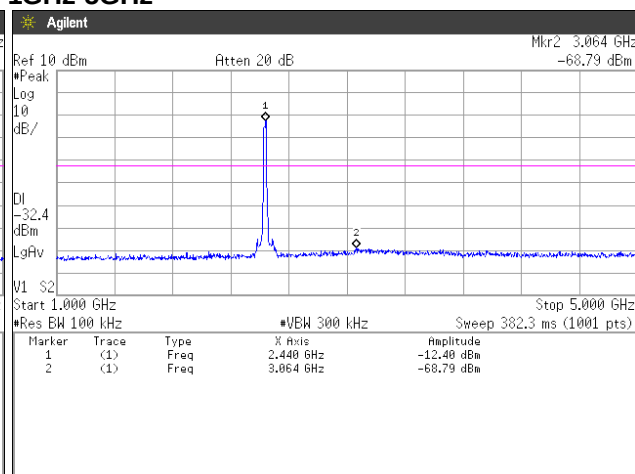
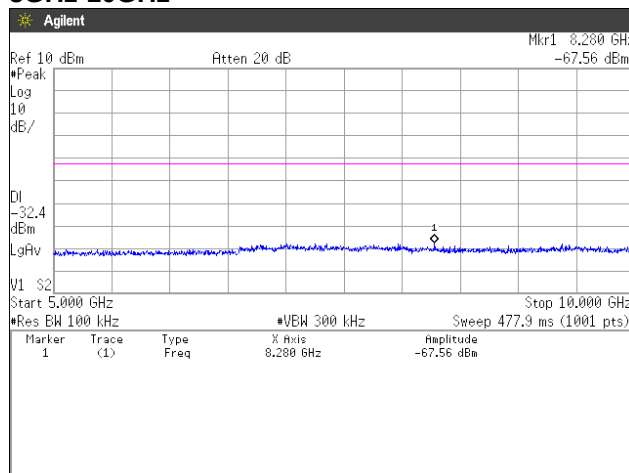
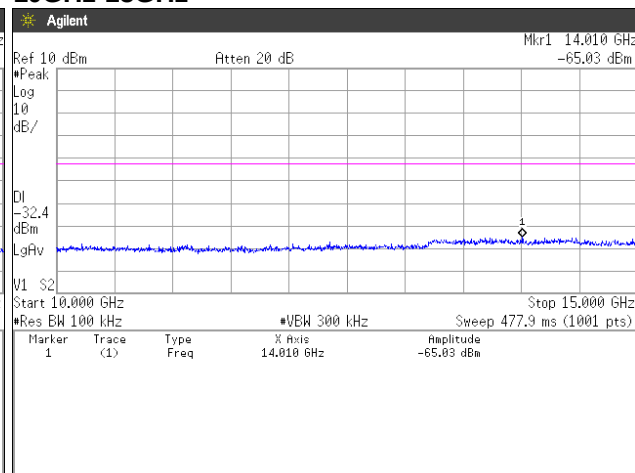
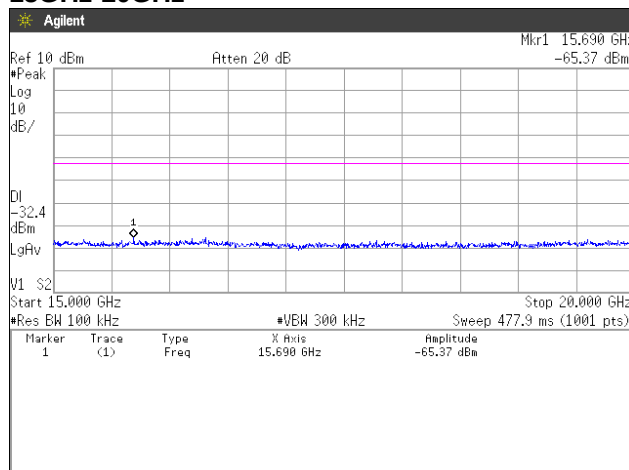
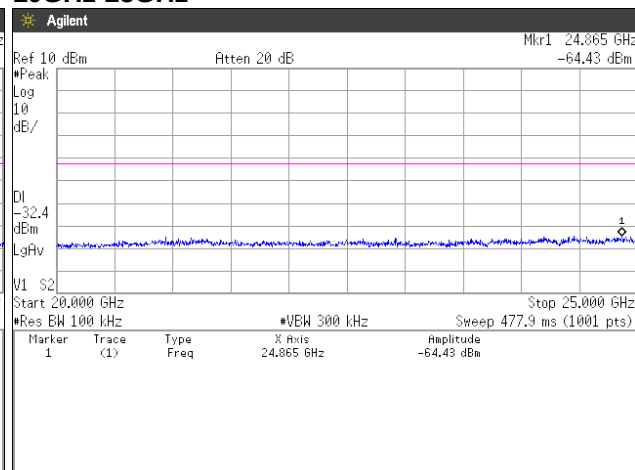


### 20GHz-25GHz

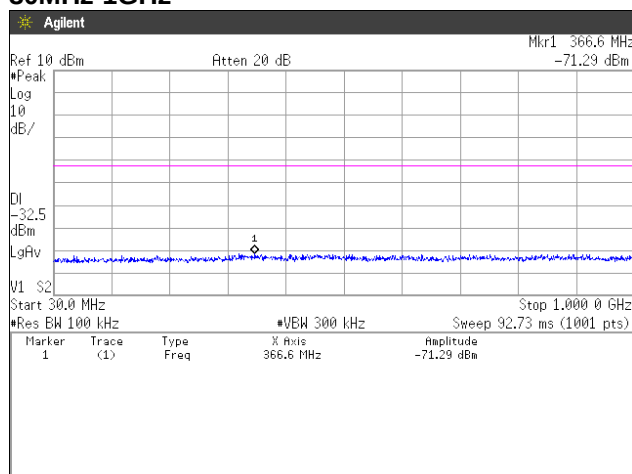


**Channel High  
30MHz-1GHz****1GHz-5GHz****5GHz-10GHz****10GHz-15GHz****15GHz-20GHz****20GHz-25GHz**

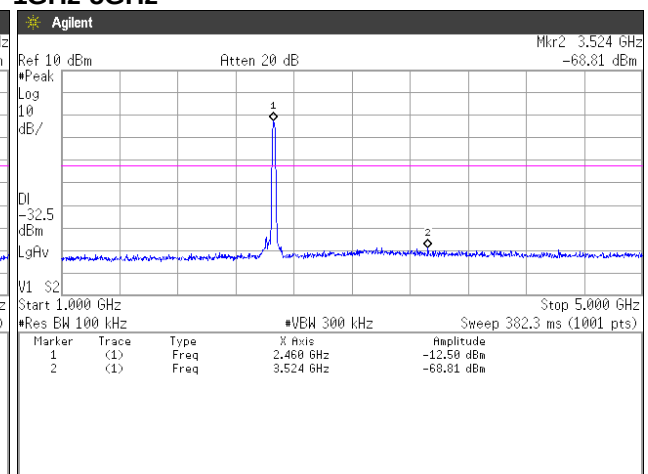
**[IEEE802.11g]  
Channel Low  
30MHz-1GHz****1GHz-5GHz****5GHz-10GHz****10GHz-15GHz****15GHz-20GHz****20GHz-25GHz**

**Channel Middle**  
**30MHz-1GHz****1GHz-5GHz****5GHz-10GHz****10GHz-15GHz****15GHz-20GHz****20GHz-25GHz**

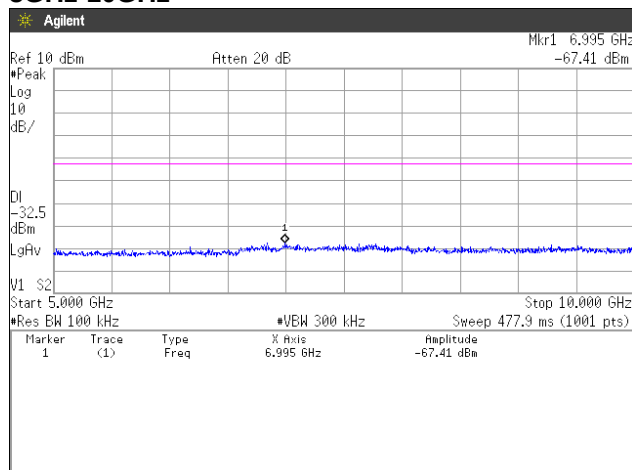
### Channel High 30MHz-1GHz



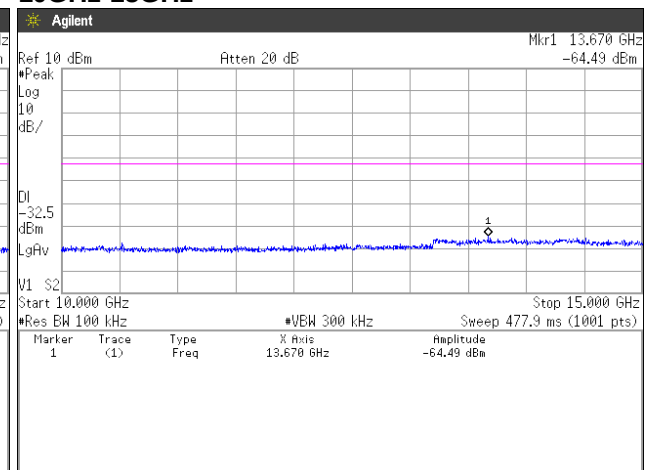
### 1GHz-5GHz



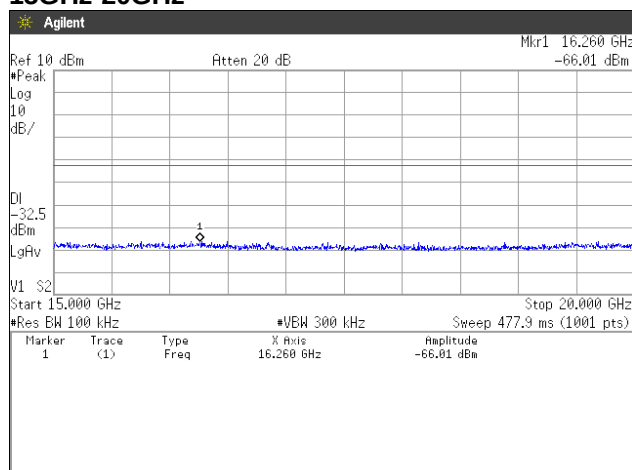
### 5GHz-10GHz



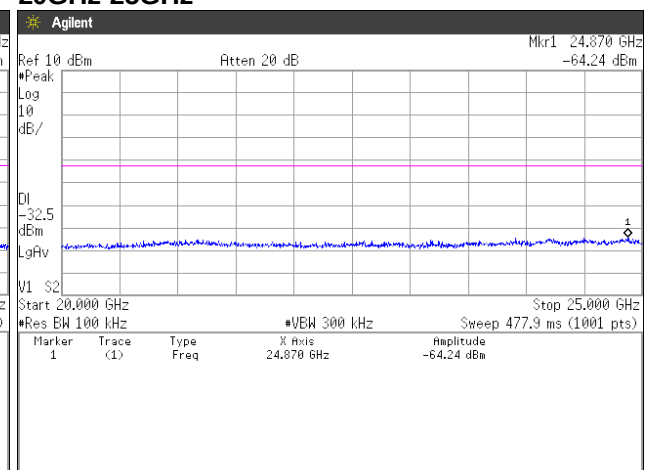
### 10GHz-15GHz



### 15GHz-20GHz



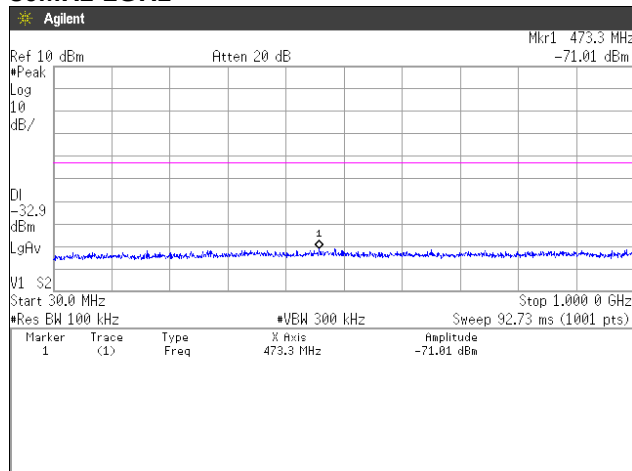
### 20GHz-25GHz



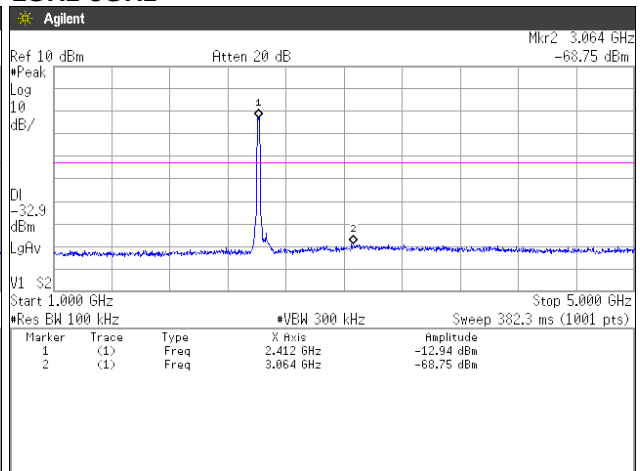
## [IEEE802.11n (HT20)]

## Channel Low

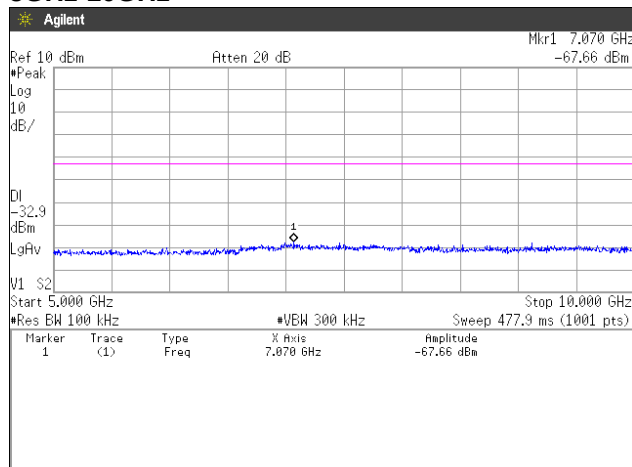
## 30MHz-1GHz



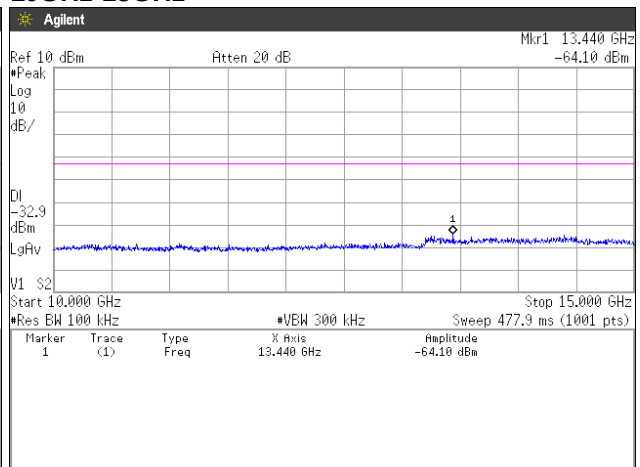
## 1GHz-5GHz



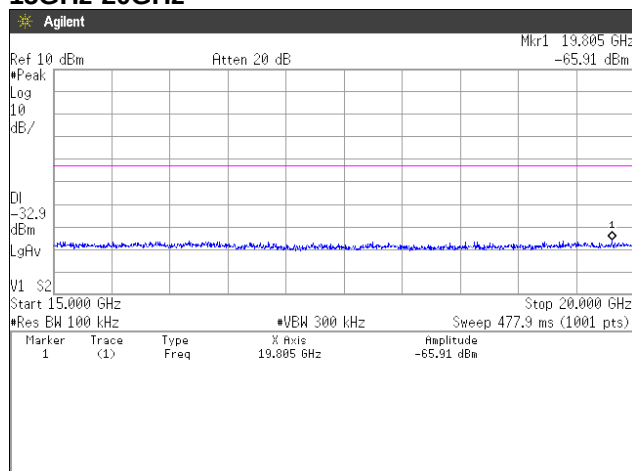
## 5GHz-10GHz



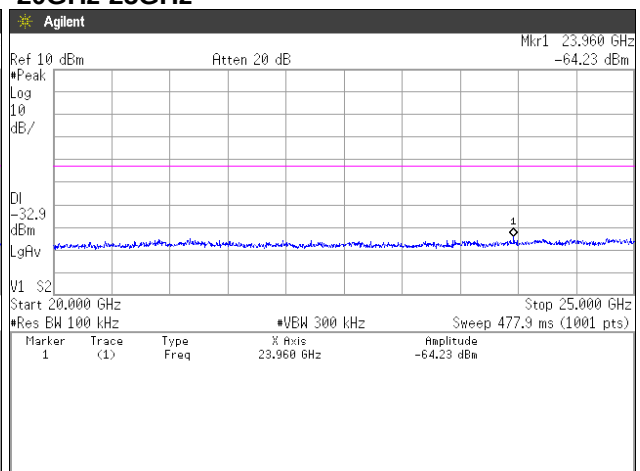
## 10GHz-15GHz



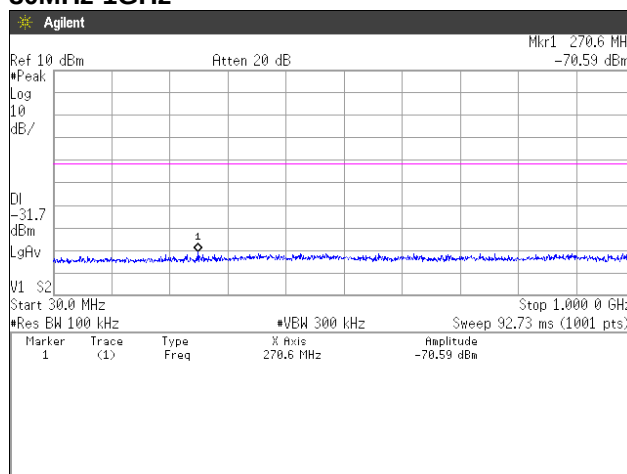
## 15GHz-20GHz



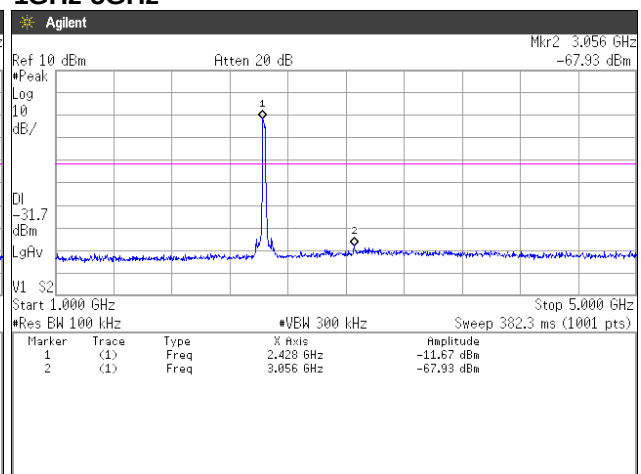
## 20GHz-25GHz



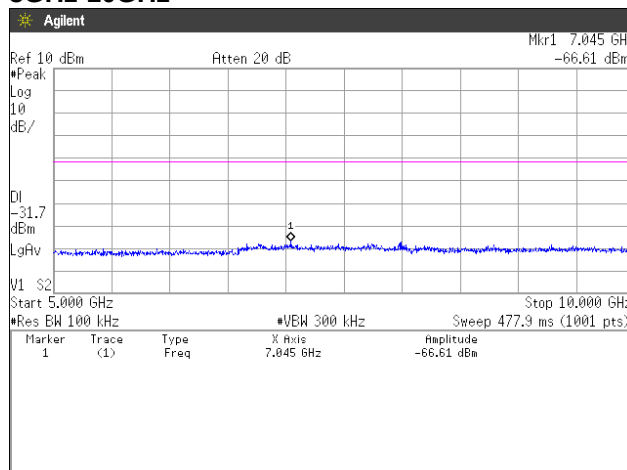
### Channel Middle 30MHz-1GHz



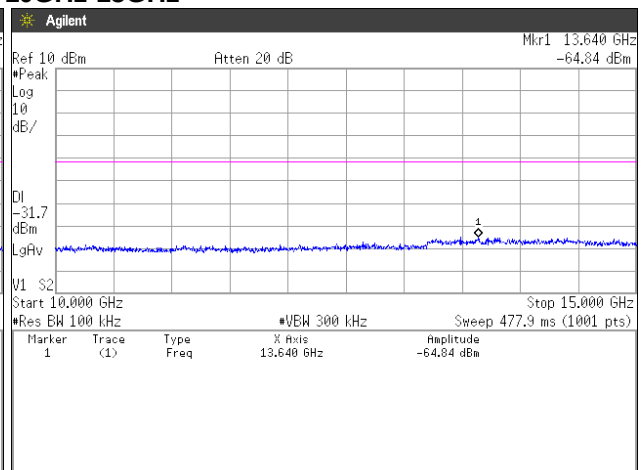
### 1GHz-5GHz



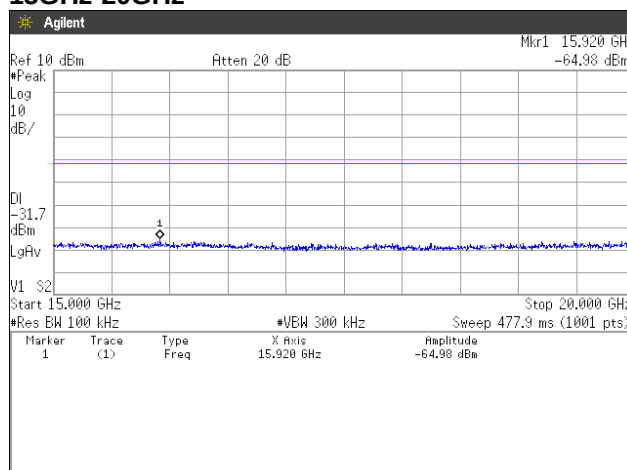
### 5GHz-10GHz



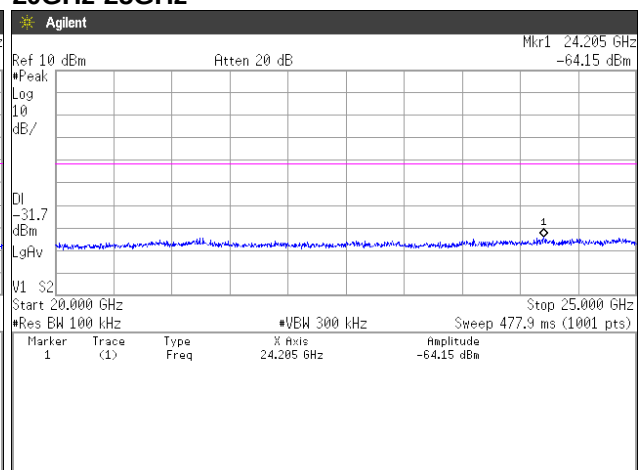
### 10GHz-15GHz



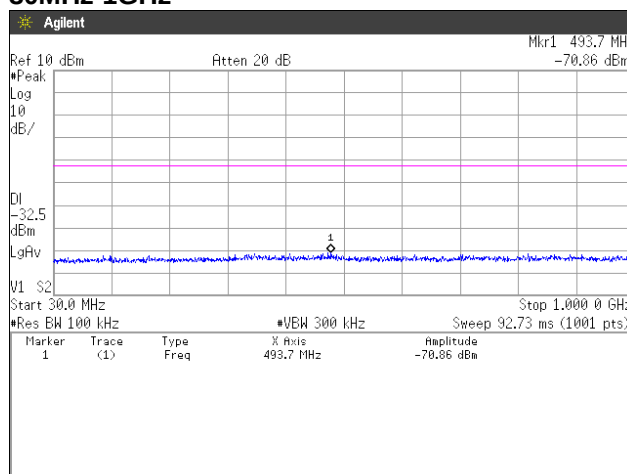
### 15GHz-20GHz



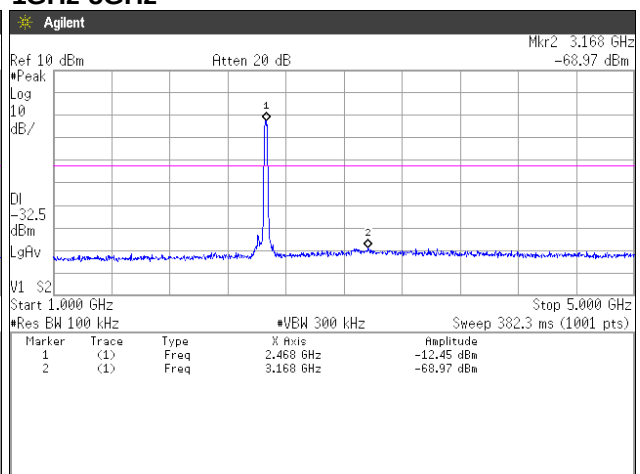
### 20GHz-25GHz



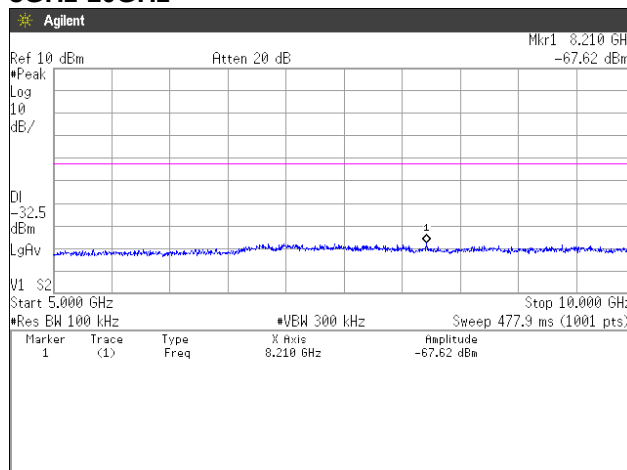
### Channel High 30MHz-1GHz



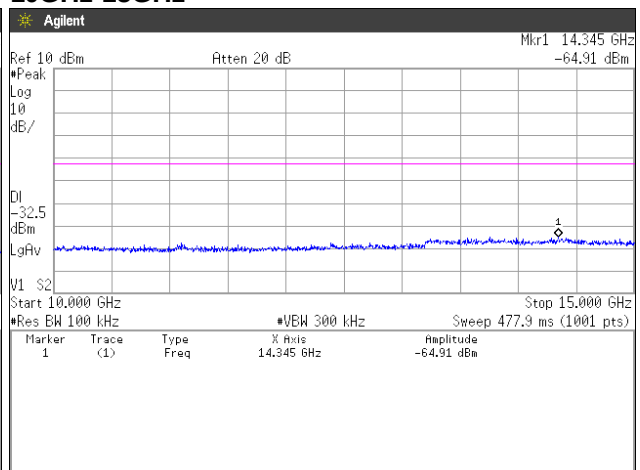
### 1GHz-5GHz



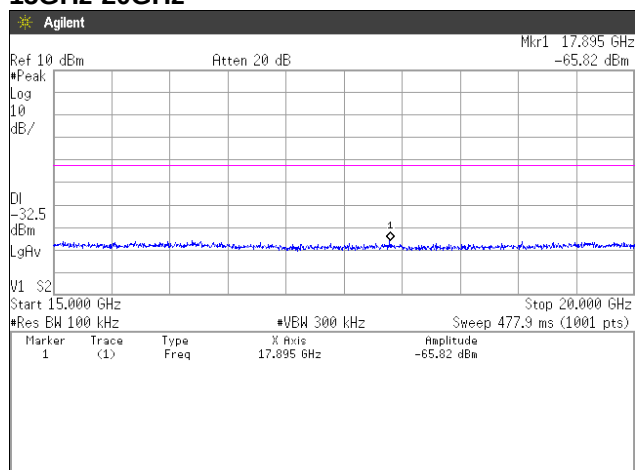
### 5GHz-10GHz



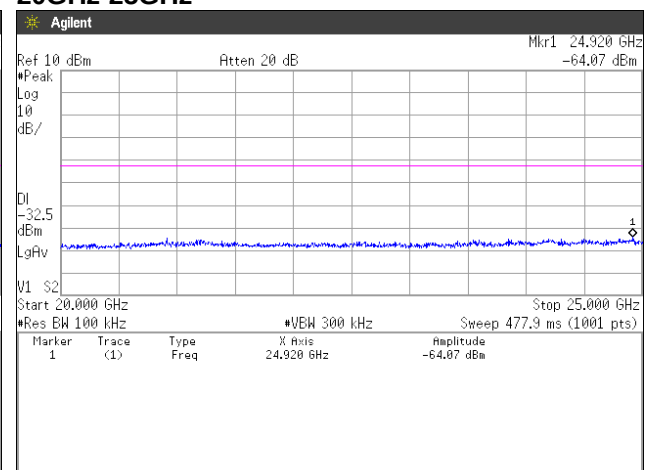
### 10GHz-15GHz



### 15GHz-20GHz



### 20GHz-25GHz



#### 4.5 Spurious Emissions - Radiated -

##### 4.5.1 Measurement procedure

[FCC 15.247(d), 15.205, 15.209, KDB 558074 D01 v05r02, Section 8.6]

Test was applied by following conditions.

|                           |                                                                                                                                  |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Test method               | : ANSI C63.10                                                                                                                    |
| Frequency range           | : 9 kHz to 25 GHz                                                                                                                |
| Test place                | : 3m Semi-anechoic chamber                                                                                                       |
| EUT was placed on         | : Styrofoam table / (W) 1.0 × (D) 1.0 × (H) 0.8 m (below 1 GHz)<br>Styrofoam table / (W) 0.6 × (D) 0.6 × (H) 1.5 m (above 1 GHz) |
| Antenna distance          | : 3 m                                                                                                                            |
| Test receiver setting     | Below 1 GHz                                                                                                                      |
| - Detector                | : Average (9 kHz-90 kHz, 110 kHz-490 kHz), Quasi-peak                                                                            |
| - Bandwidth               | : 200 Hz, 120 kHz                                                                                                                |
| Spectrum analyzer setting | Above 1 GHz                                                                                                                      |
| - Peak                    | : RBW=1 MHz, VBW=3 MHz, Span=0 Hz, Sweep=auto                                                                                    |
| - Average                 | : RBW=1 MHz, VBW=10 Hz, Span=0 Hz, Sweep=auto<br>Display mode=Linear                                                             |

##### Average Measurement Setting [VBW]

| Mode              | Duty Cycle (%) | T <sub>on</sub> (us) | T <sub>off</sub> (us) | Determined VBW Setting  |
|-------------------|----------------|----------------------|-----------------------|-------------------------|
| IEEE802.11b       | 99.03          | 1022                 | 10                    | 10Hz (Duty Cycle ≥ 98%) |
| IEEE802.11g       | 99.42          | 1364                 | 8                     | 10Hz (Duty Cycle ≥ 98%) |
| IEEE802.11n(HT20) | 99.38          | 1276                 | 8                     | 10Hz (Duty Cycle ≥ 98%) |

Although these tests were performed other than open area test site, adequate comparison measurements

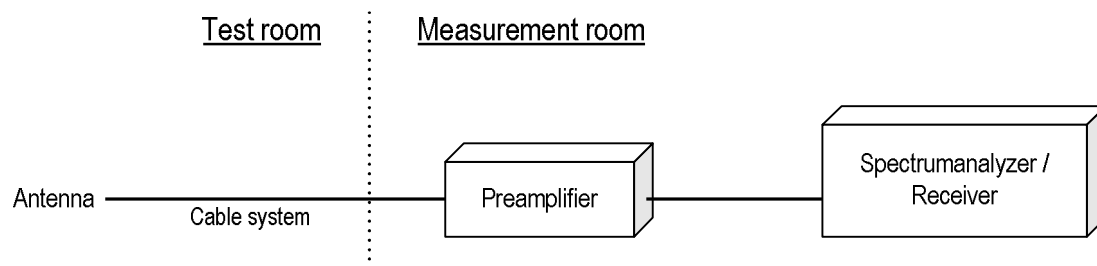
were confirmed against 30 m open area test site.

Therefore, sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

Radiated emission measurements are performed at 3m distance with the broadband antenna (Loop antenna, Biconical antenna, Log periodic antenna and Double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1m to 4m and stopped at height producing the maximum emission. As for the Loop antenna, it is positioned with its plane vertical, and the center of the Loop antenna is 1m above the ground plane.

The EUT is Placed on a turntable, which is 0.8m/1.5m above ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. The test results represent the worst case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation. Sufficient time for the EUT, support equipment, and test equipment are allowed in order for them to warm up to their normal operating condition.

- Test configuration



#### 4.5.2 Calculation method

[9 kHz to 150 kHz]

Emission level = Reading + (Ant factor + Cable system loss)

Margin = Limit – Emission level

[150 kHz to 25 GHz]

Emission level = Reading + (Ant factor + Cable system loss - Amp. Gain)

Margin = Limit – Emission level

Example:

Limit @ 4824.0 MHz : 74.0 dBuV/m (Peak Limit)

S.A Reading = 49.5 dBuV Cable system loss = 8.4 dB

Result = 49.5 + 8.4 = 45.1 dBuV/m

Margin = 74.0 - 45.1 = 16.1 dB

#### 4.5.3 Limit

| Frequency<br>[MHz] | Field strength  |               | Distance<br>[m] |
|--------------------|-----------------|---------------|-----------------|
|                    | [uV/m]          | [dBuV/m]      |                 |
| 0.009-0.490        | 2400 / F [kHz]  | 20logE [uV/m] | 300             |
| 0.490-1.705        | 24000 / F [kHz] | 20logE [uV/m] | 30              |
| 1.705-30           | 30              | 29.5          | 30              |
| 30-88              | 100             | 40.0          | 3               |
| 88-216             | 150             | 43.5          | 3               |
| 216-960            | 200             | 46.0          | 3               |
| Above 960          | 500             | 54.0          | 3               |

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level [dBuV/m] = 20log Emission [uV/m]
3. As shown in 15.35(b), for frequencies above 1000 MHz, 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 20 dB under any condition modulation.



Japan

#### 4.5.4 Test data

Date : 23 April-2019  
Temperature : 19.0 [°C]  
Humidity : 25.0 [%]  
Test place : 3m Semi-anechoic chamber

Test engineer : Chiaki Kanno

Date : 26 April-2019  
Temperature : 21.2 [°C]  
Humidity : 44.1 [%]  
Test place : 3m Semi-anechoic chamber

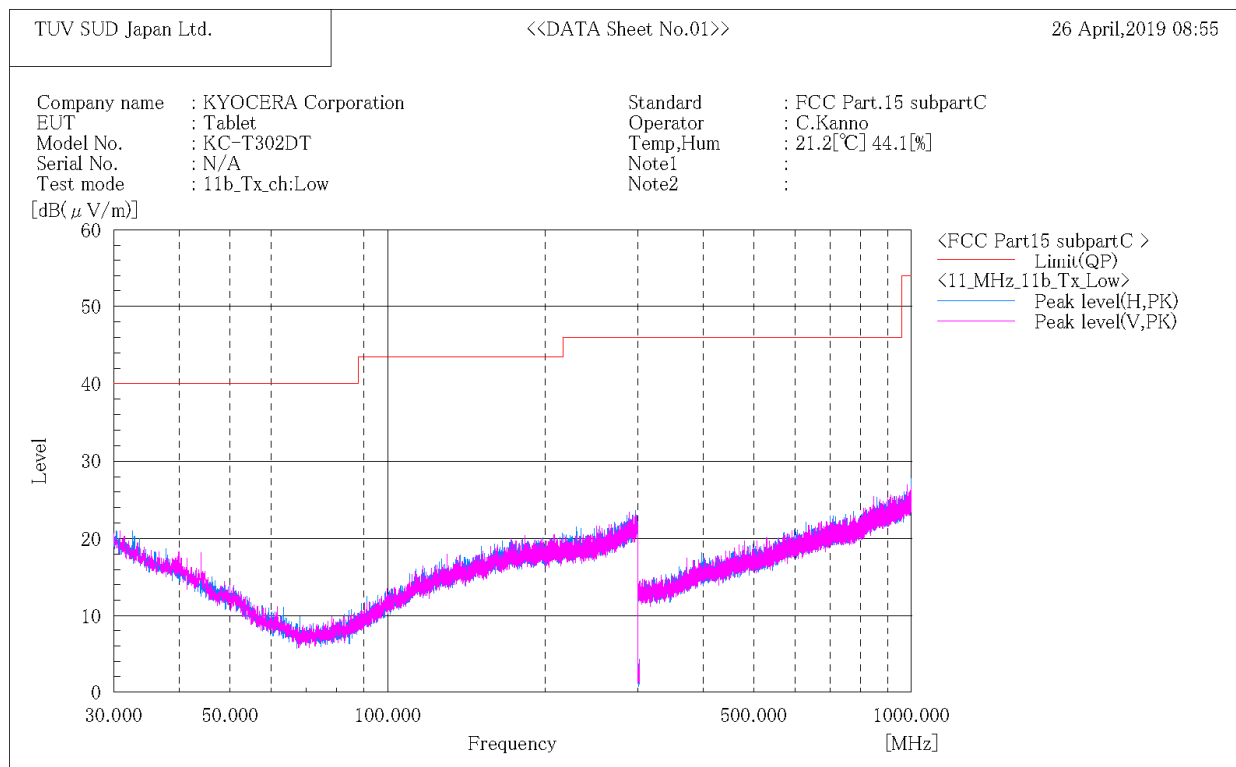
Test engineer : Chiaki Kanno

## 4.5.4.1 Transmission mode - With camera

[11b]

Channel Low  
BELOW 1GHz

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



## Final Result

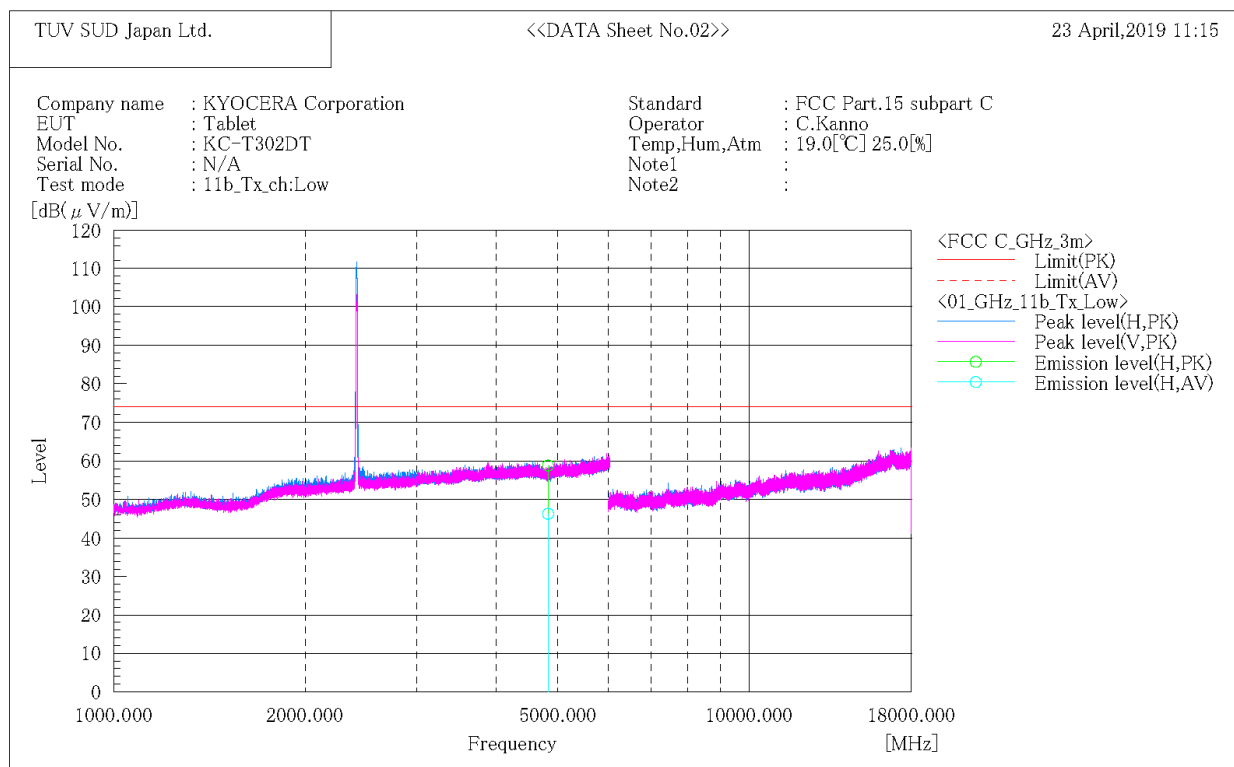
| No. | Frequency (P) | c. f      | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

## Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

**[11b]  
Channel Low  
ABOVE 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



## Final Result

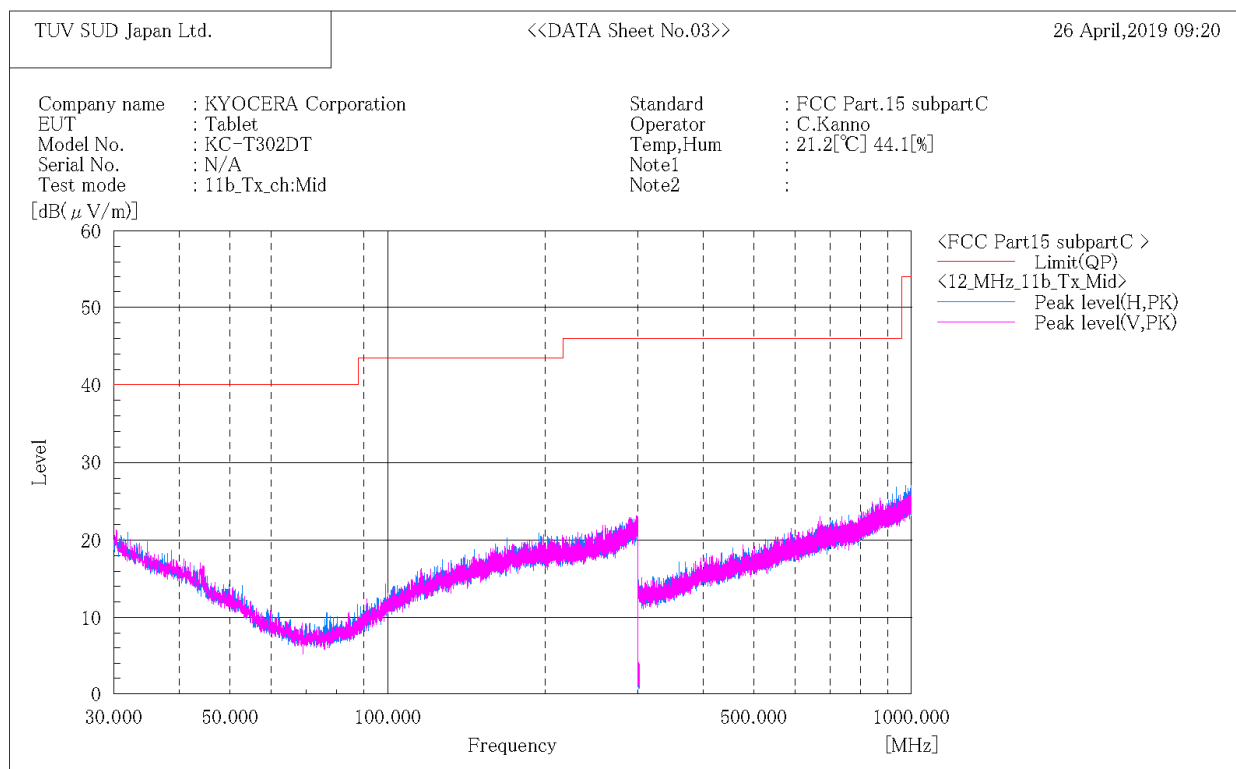
| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] | Remark |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|--------|
| 1   | 4824.000        | H   | 48.5                | 36.0                | 10.3          | 58.8                 | 46.3                 | 74.0                | 54.0                | 15.2           | 7.7            | 128.0       | 83.0      |        |

## Note:

- Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
- No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

**[11b]**  
**Channel Middle**  
**BELOW 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



Final Result

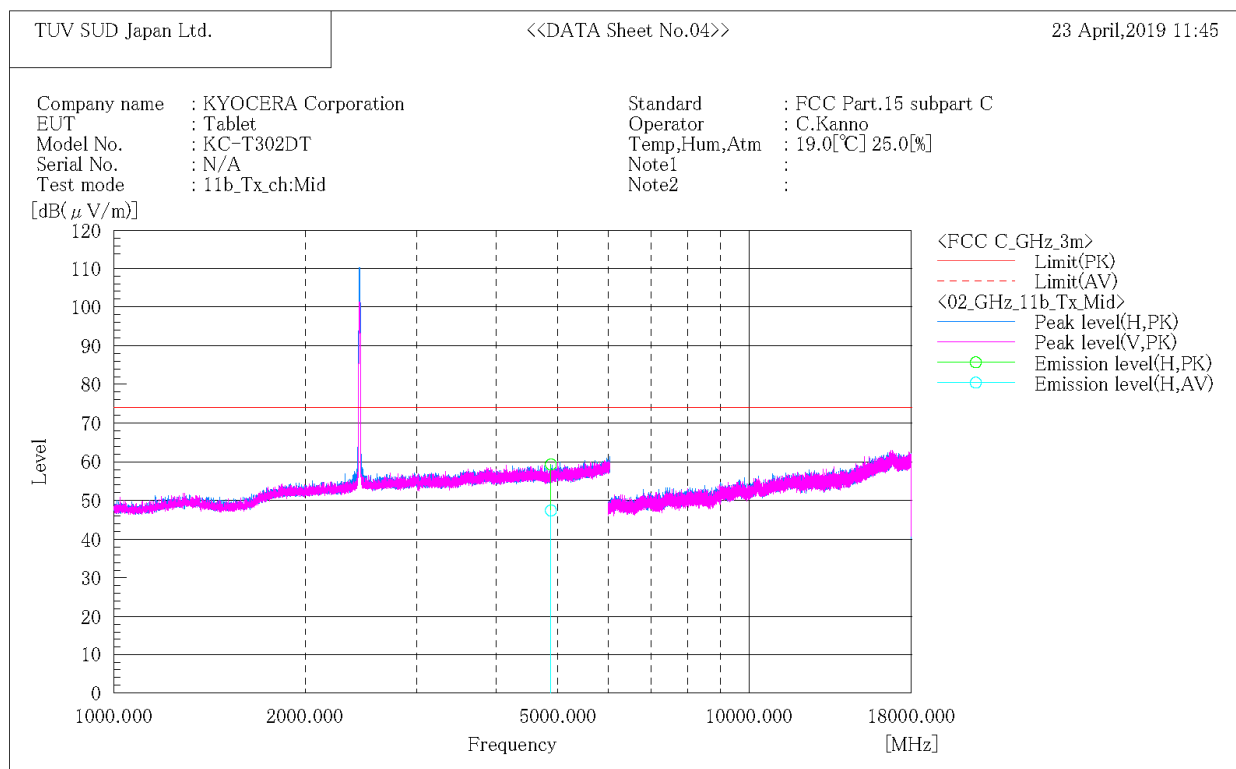
| No. | Frequency (P) | c.f       | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [°]   |

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

**[11b]**  
**Channel Middle**  
**ABOVE 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



## Final Result

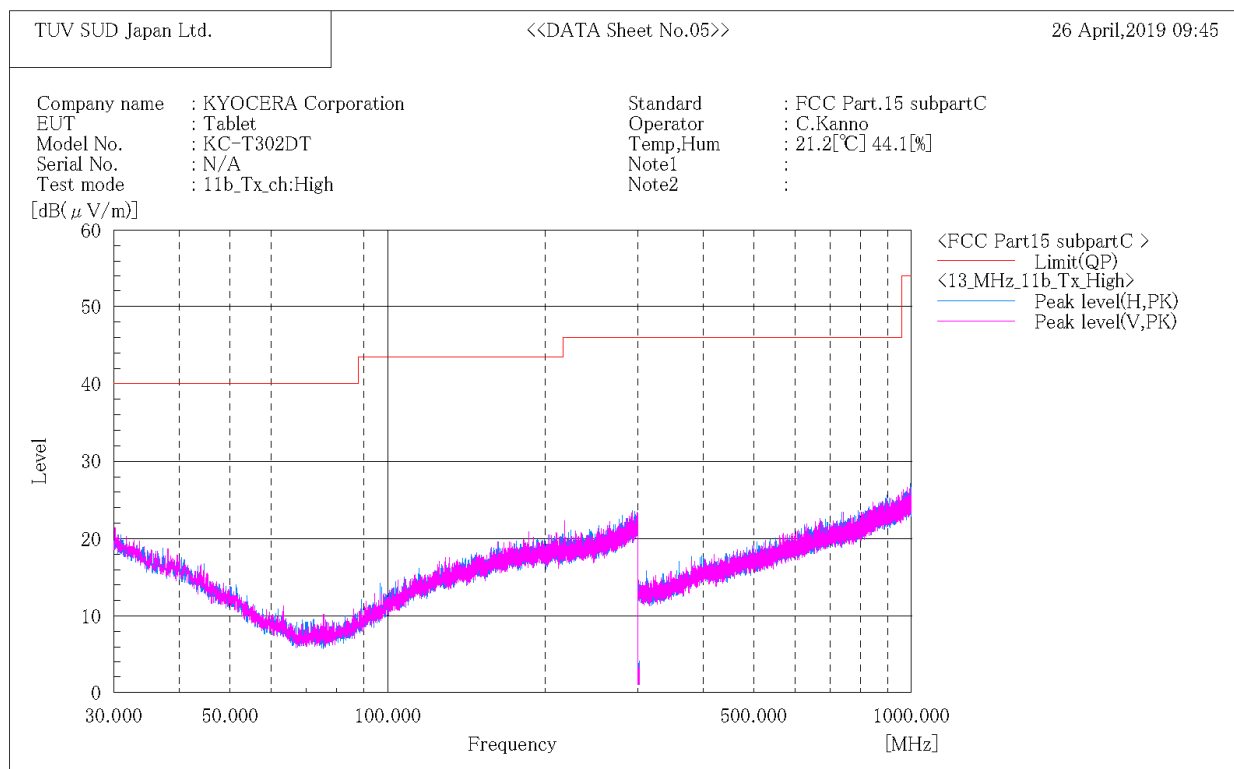
| No. | Frequency (P) | Reading PK | Reading AV | c.f       | Result PK  | Result AV  | Limit PK   | Limit AV   | Margin PK | Margin AV | Height | Angle | Remark |
|-----|---------------|------------|------------|-----------|------------|------------|------------|------------|-----------|-----------|--------|-------|--------|
|     | [MHz]         | [dB(μV)]   | [dB(μV)]   | [dB(1/m)] | [dB(μV/m)] | [dB(μV/m)] | [dB(μV/m)] | [dB(μV/m)] | [dB]      | [dB]      | [cm]   | [°]   |        |
| 1   | 4874.000      | H          | 48.7       | 36.8      | 10.6       | 59.3       | 47.4       | 74.0       | 54.0      | 14.7      | 6.6    | 134.0 | 52.0   |

## Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

**[11b]**  
**Channel High**  
**BELOW 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



Final Result

| No. | Frequency (P) | c.f       | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

Note:

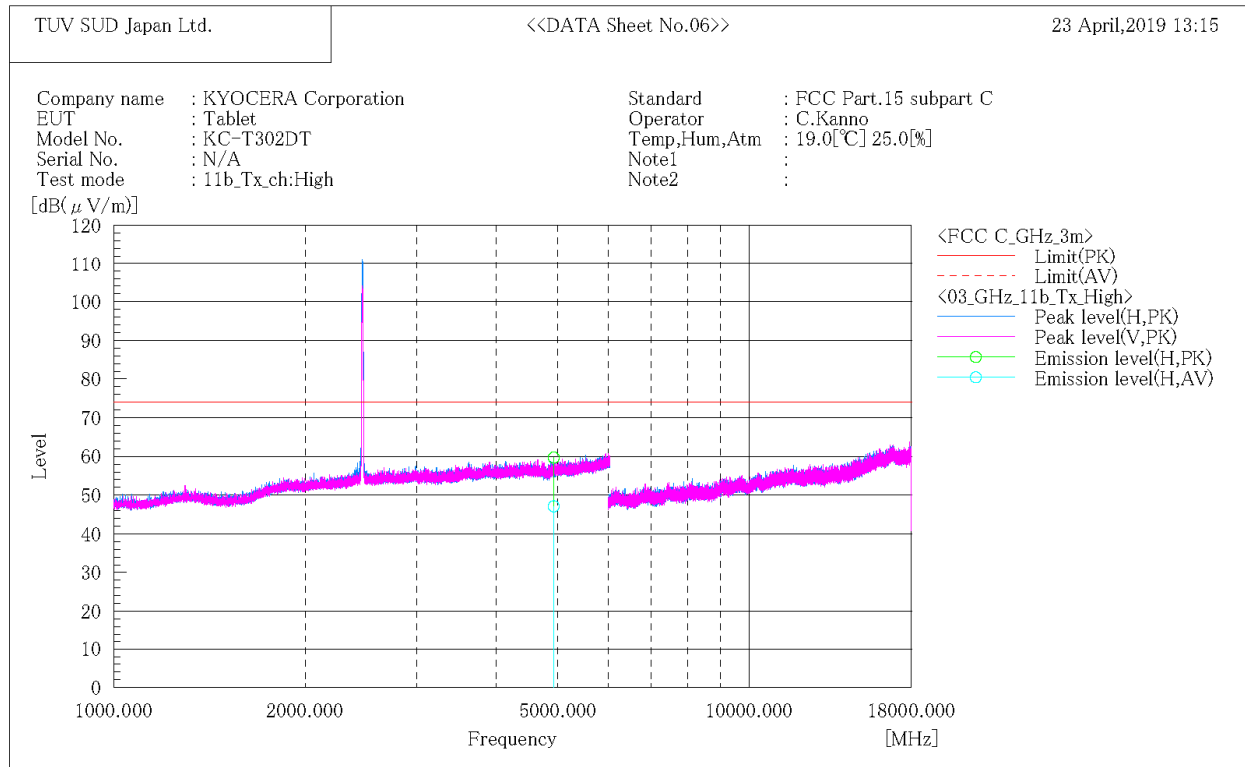
1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.



Japan

[11b]  
Channel High  
ABOVE 1GHz

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



Final Result

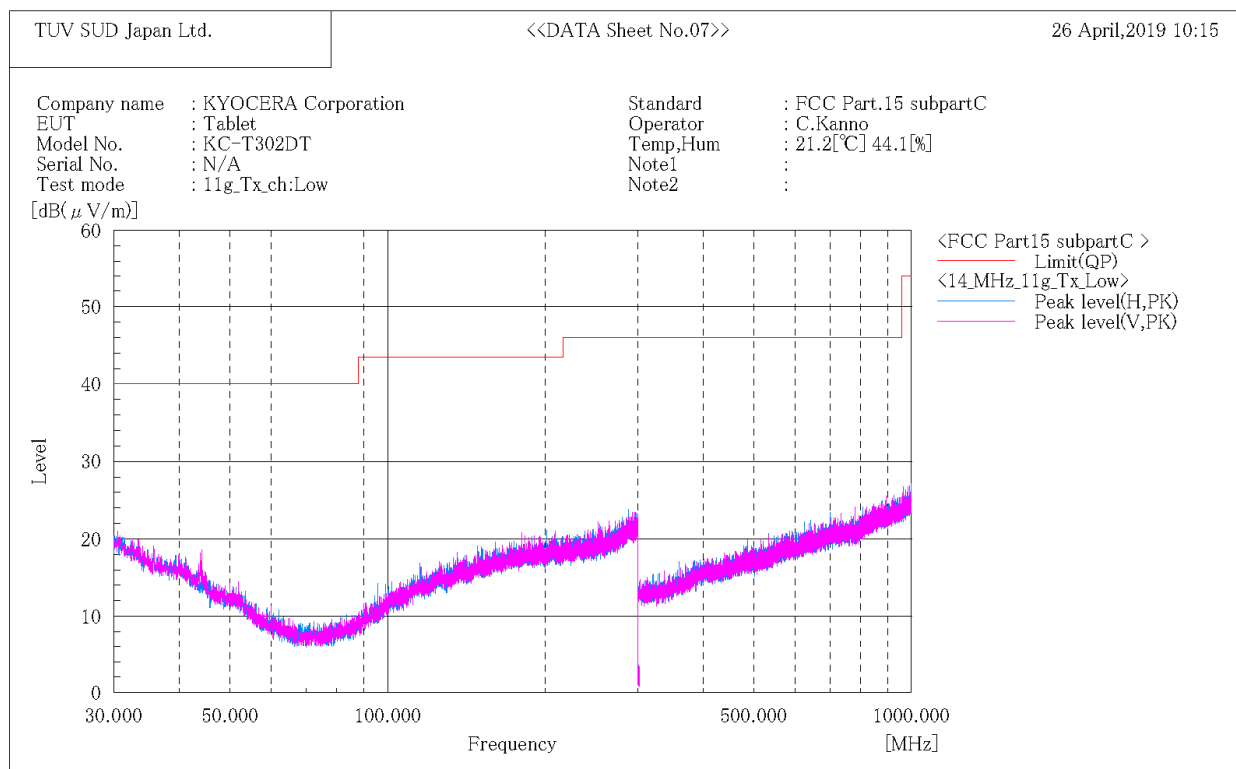
| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] | Remark |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|--------|
| 1   | 4924.000        | H   | 48.8                | 36.2                | 10.9          | 59.7                 | 47.1                 | 74.0                | 54.0                | 14.3           | 6.9            | 119.0       | 76.0      |        |

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

**[11g]**  
**Channel Low**  
**BELOW 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



Final Result

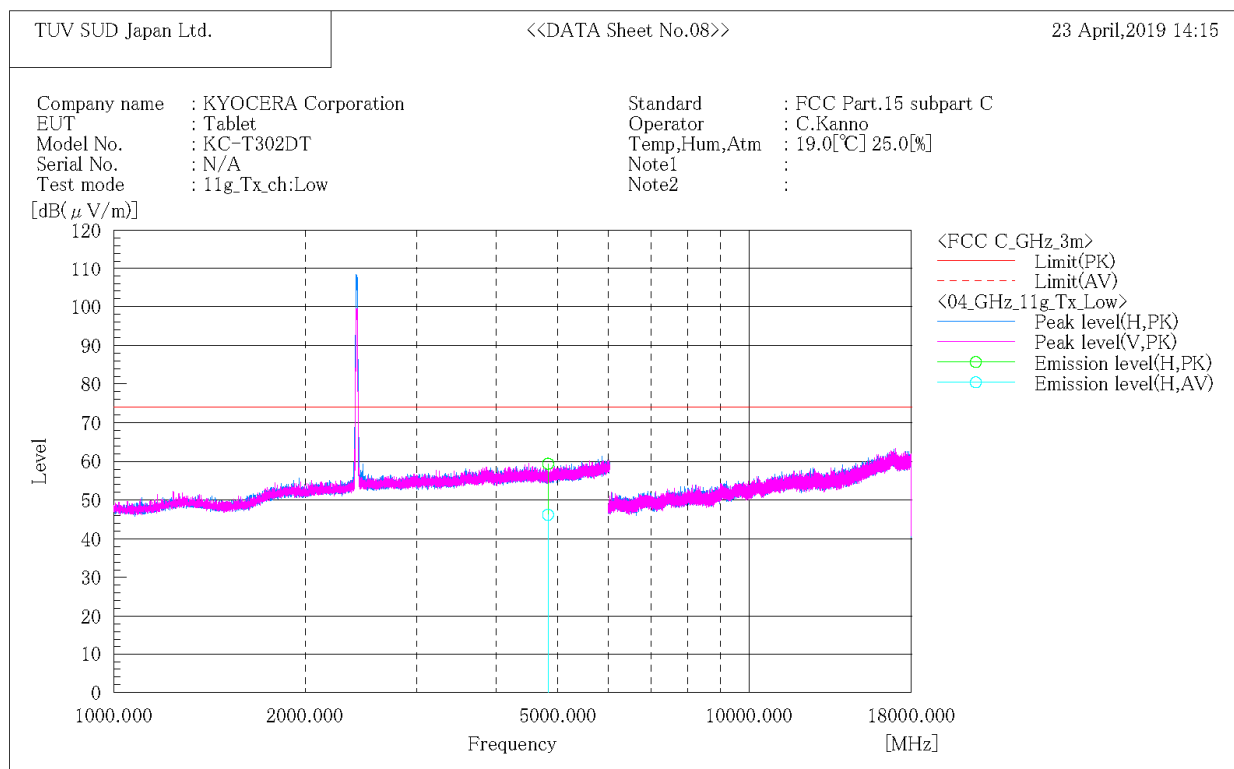
| No. | Frequency (P) | c.f       | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

**[11g]  
Channel Low  
ABOVE 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



## Final Result

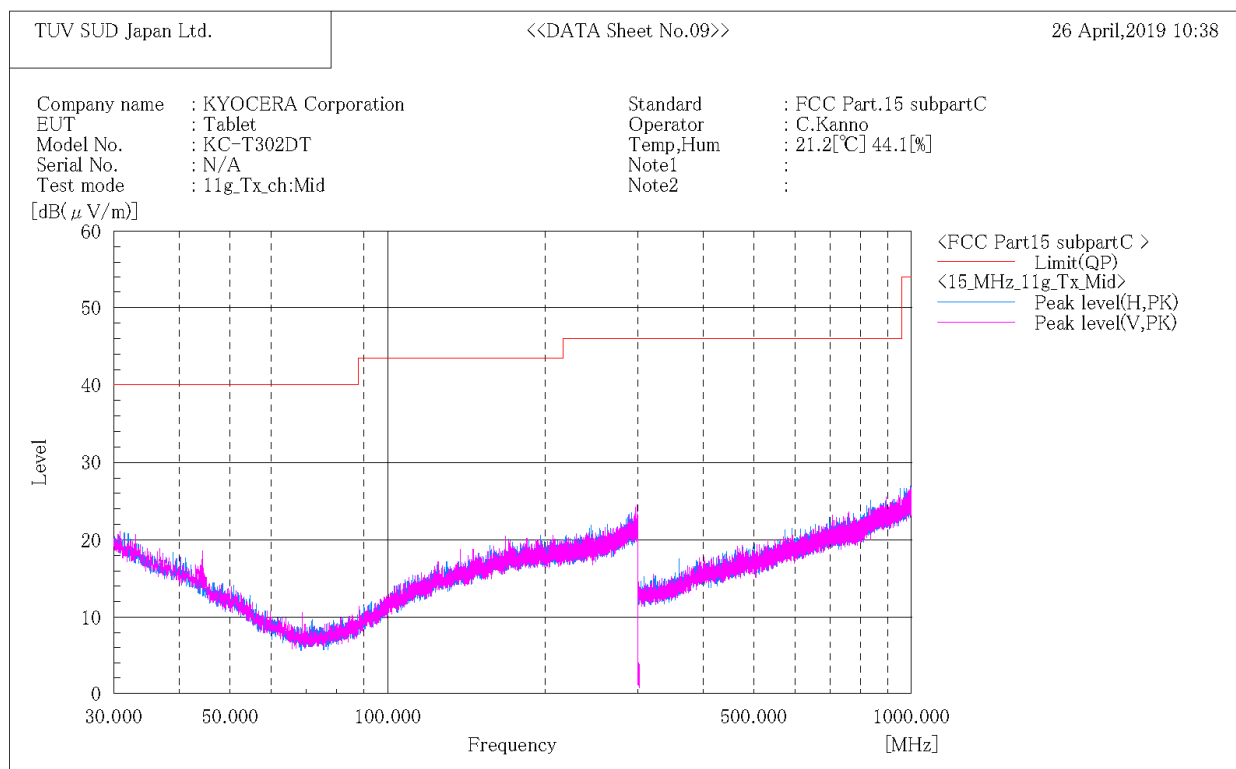
| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] | Remark |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|--------|
| 1   | 4824.000        | H   | 49.1                | 35.9                | 10.3          | 59.4                 | 46.2                 | 74.0                | 54.0                | 14.6           | 7.8            | 100.0       | 304.0     |        |

## Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

**[11g]**  
**Channel Middle**  
**BELOW 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



**Final Result**

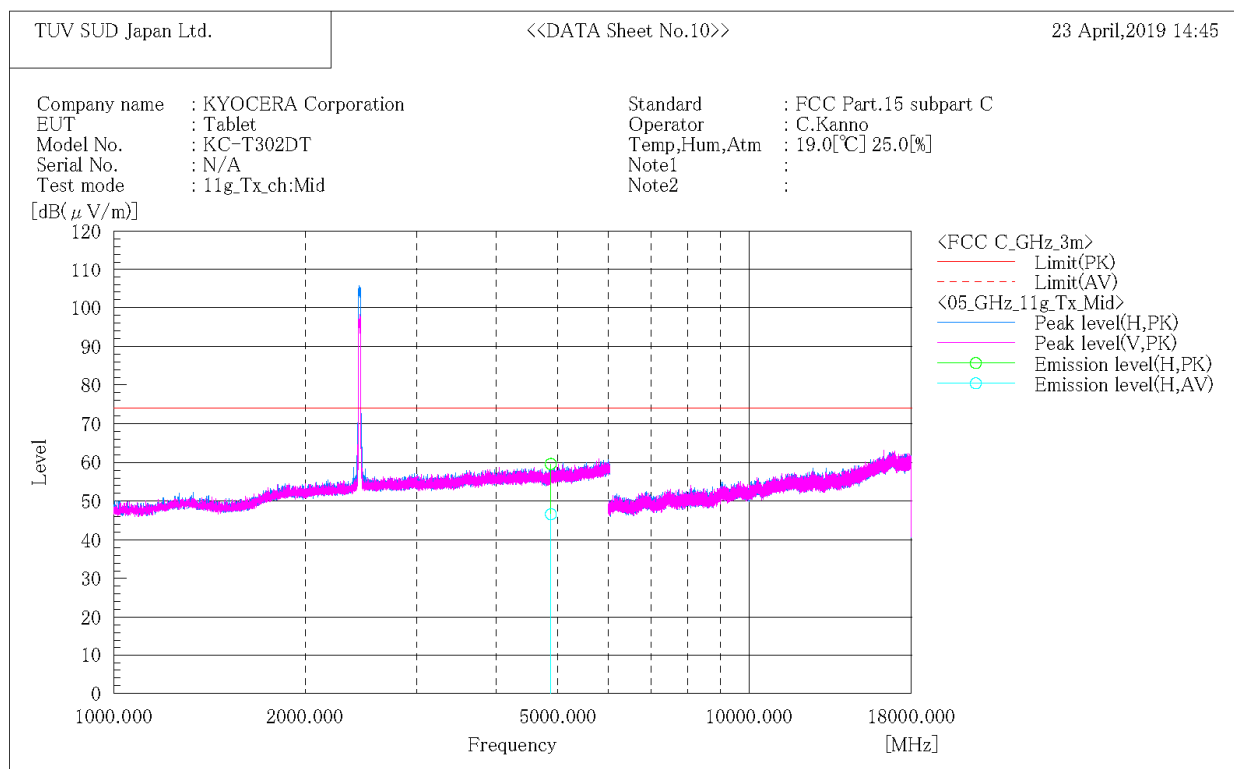
| No. | Frequency (P) | c.f       | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

**Note:**

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

**[11g]**  
**Channel Middle**  
**ABOVE 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



## Final Result

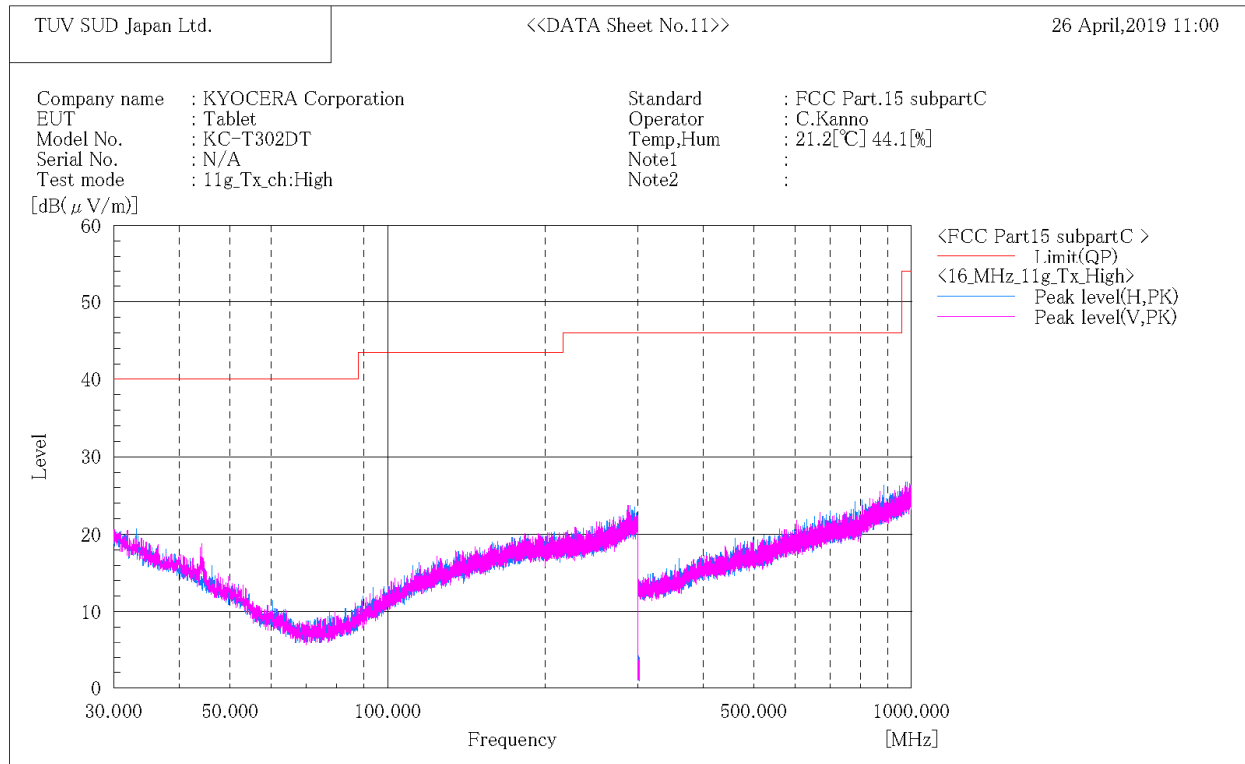
| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] | Remark |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|--------|
| 1   | 4874.000        | H   | 49.0                | 36.0                | 10.6          | 59.6                 | 46.6                 | 74.0                | 54.0                | 14.4           | 7.4            | 100.0       | 0.0       |        |

## Note:

- Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
- No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

[11g]  
Channel High  
BELOW 1GHz

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



Final Result

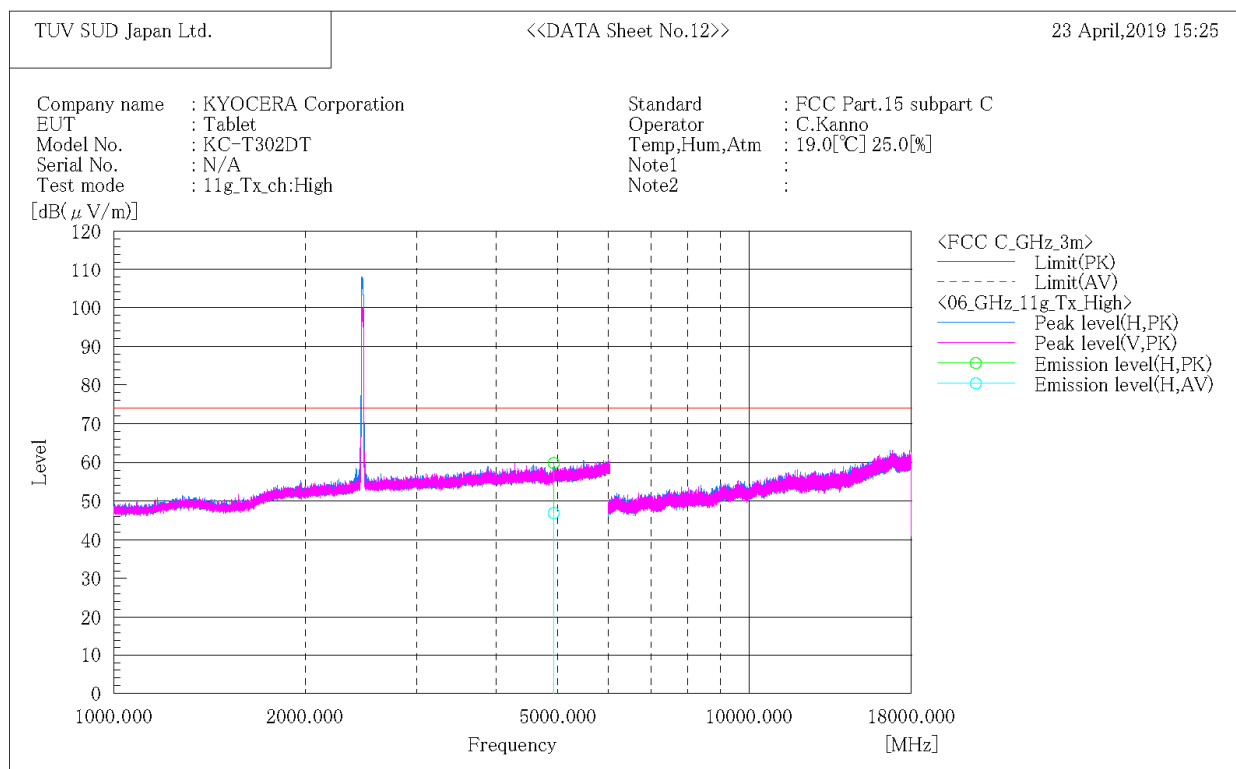
| No. | Frequency (P) | c.f       | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

**[11g]  
Channel High  
ABOVE 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



## Final Result

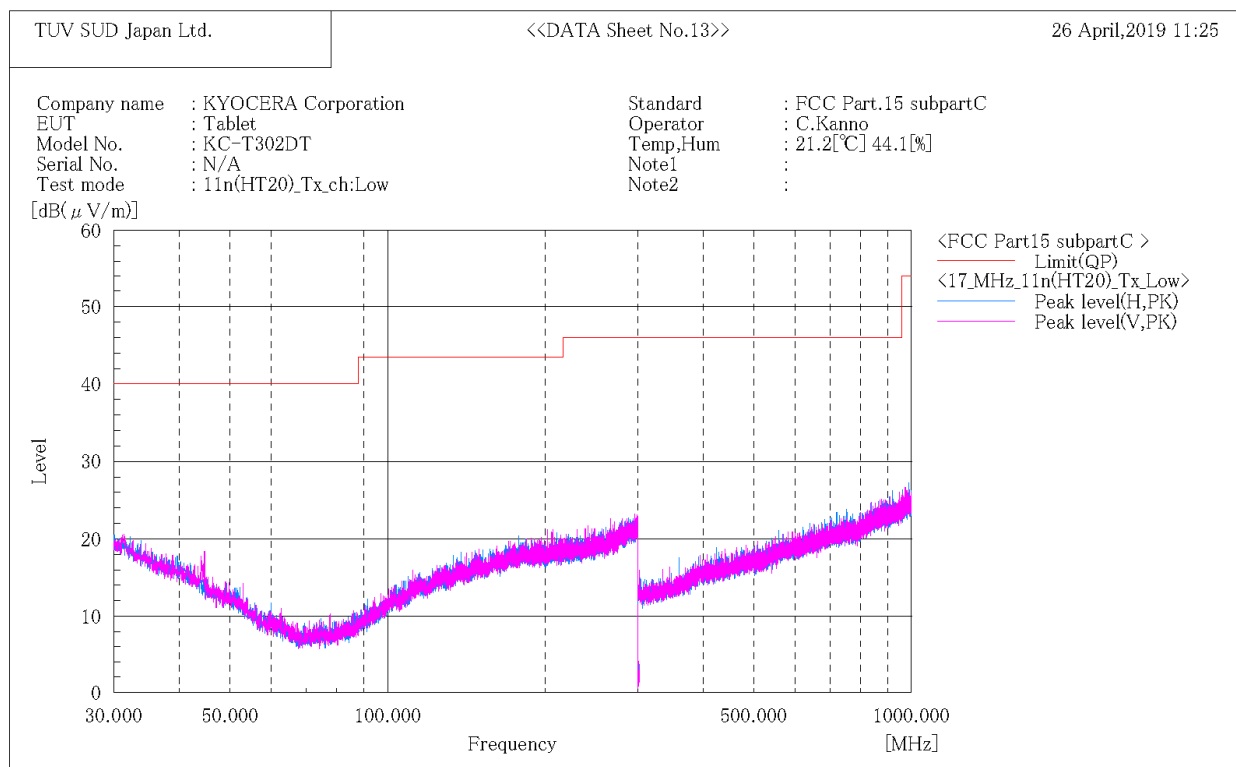
| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] | Remark |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|--------|
| 1   | 4924.000        | H   | 48.9                | 36.0                | 10.9          | 59.8                 | 46.9                 | 74.0                | 54.0                | 14.2           | 7.1            | 100.0       | 0.0       |        |

## Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

**[11n(HT20)]**  
**Channel Low**  
**BELOW 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



Final Result

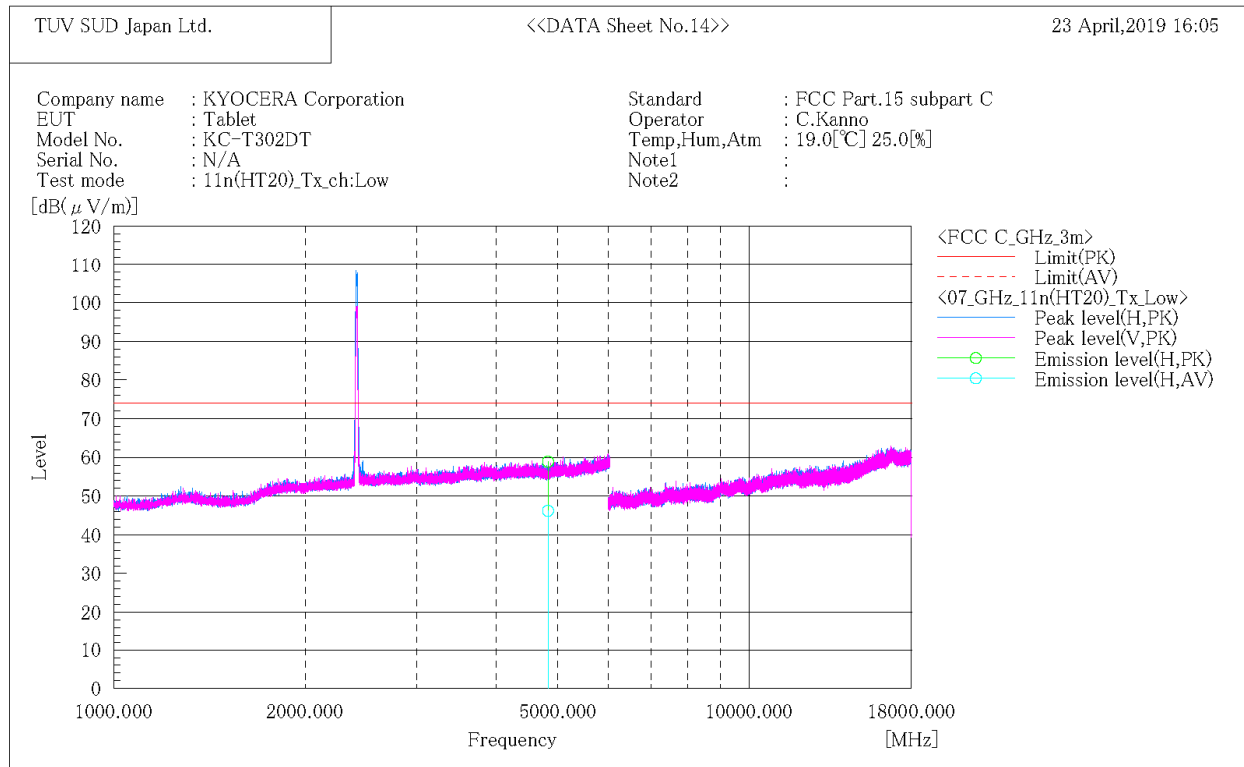
| No. | Frequency (P) | c.f       | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

**[11n(HT20)]**  
**Channel Low**  
**ABOVE 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



## Final Result

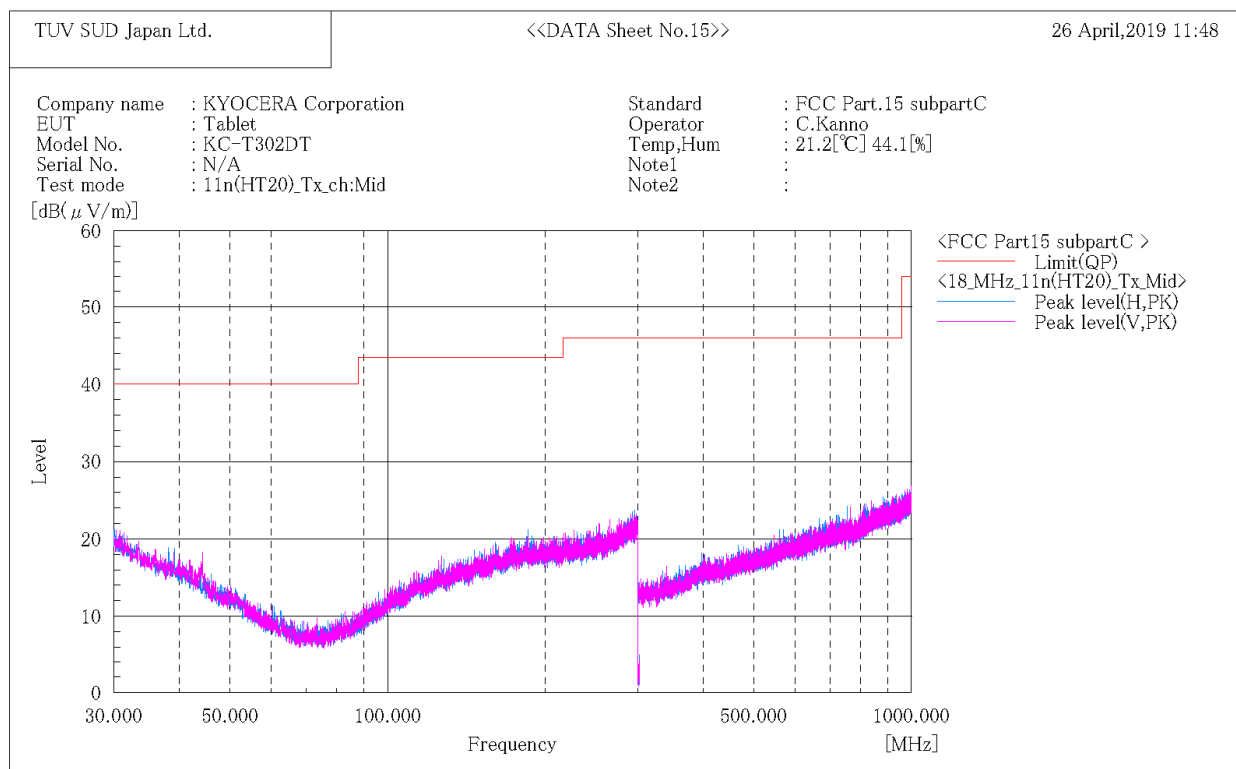
| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] | Remark |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|--------|
| 1   | 4824.000        | H   | 48.6                | 35.9                | 10.3          | 58.9                 | 46.2                 | 74.0                | 54.0                | 15.1           | 7.8            | 100.0       | 0.0       |        |

## Note:

- Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
- No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

**[11n(HT20)]**  
**Channel Middle**  
**BELOW 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



Final Result

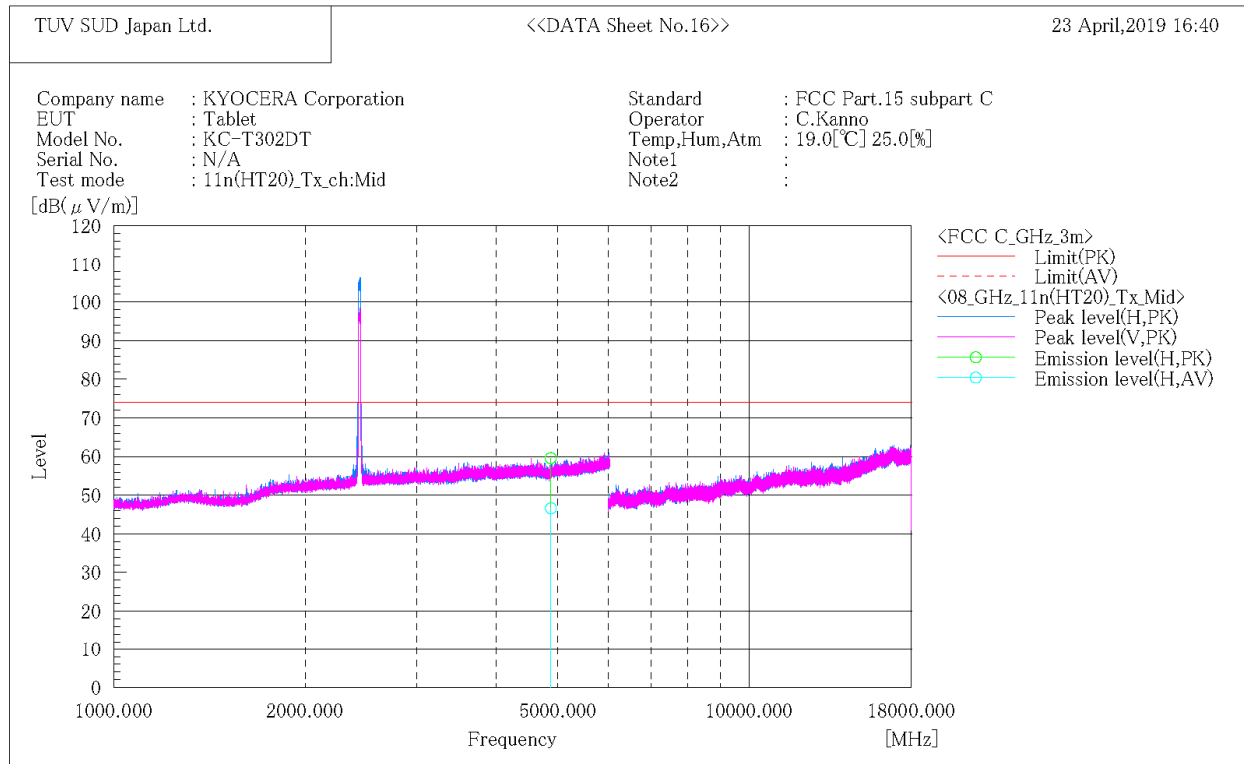
| No. | Frequency (P) | c.f       | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.

**[11n(HT20)]**  
**Channel Middle**  
**ABOVE 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



## Final Result

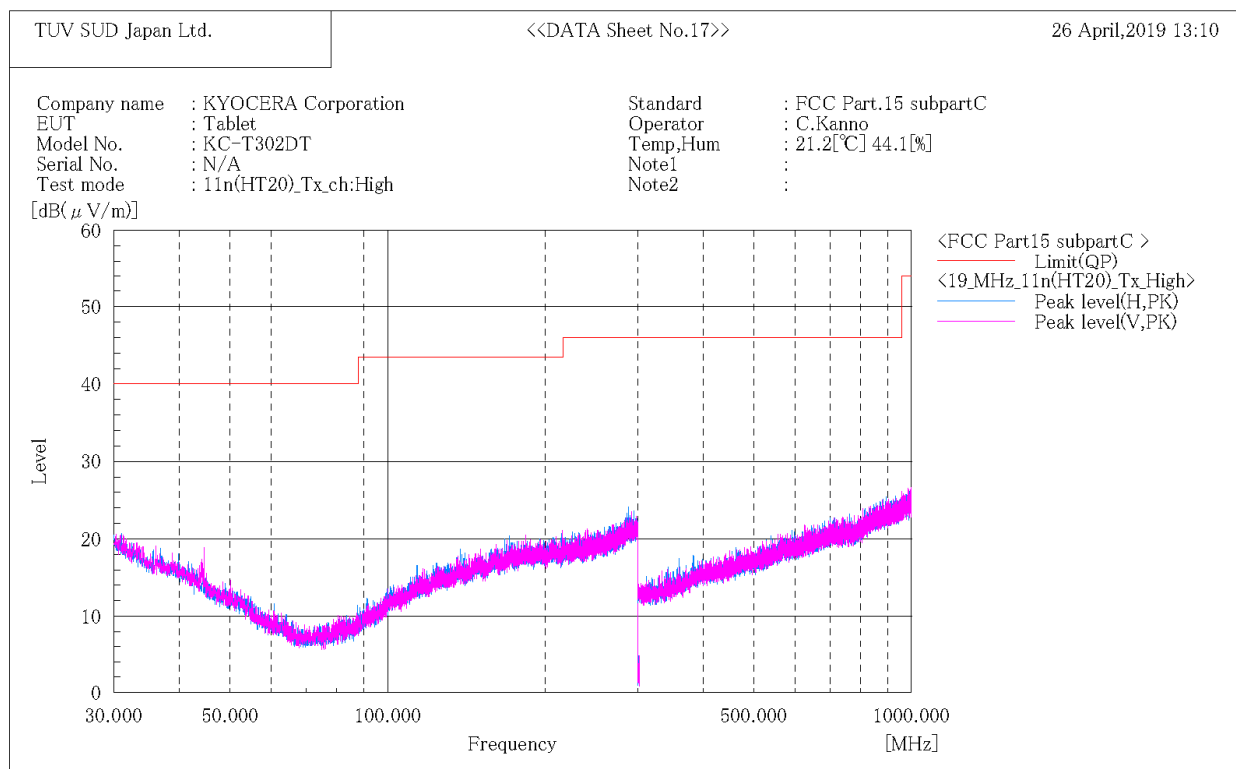
| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] | Remark |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|--------|
| 1   | 4874.000        | H   | 49.0                | 36.0                | 10.6          | 59.6                 | 46.6                 | 74.0                | 54.0                | 14.4           | 7.4            | 100.0       | 0.0       |        |

## Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

**[11n(HT20)]**  
**Channel High**  
**BELOW 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
 [ 3m Semi-anechoic chamber ]



Final Result

| No. | Frequency (P) | c.f       | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

Note:

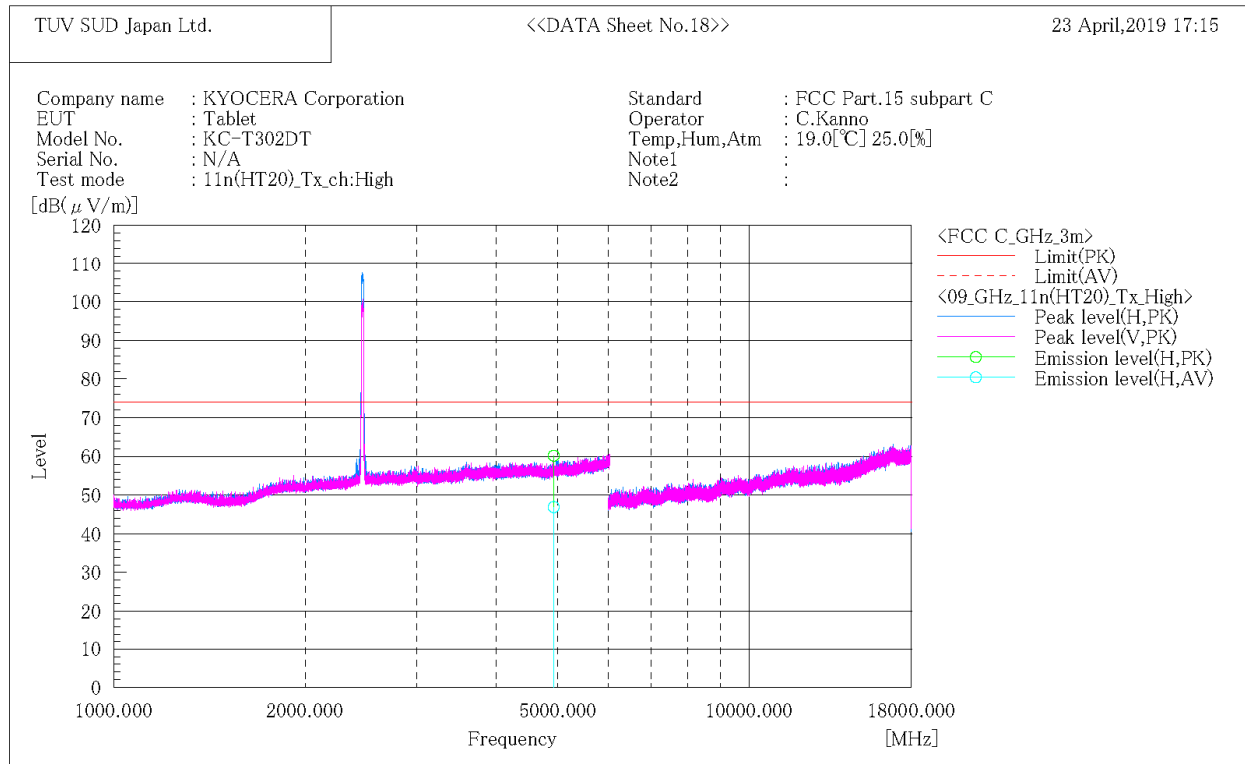
1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz at the 3 meters distance.



Japan

[11n(HT20)]  
Channel High  
ABOVE 1GHz

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



Final Result

| No. | Frequency [MHz] | (P) | Reading PK [dB(μV)] | Reading AV [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Result AV [dB(μV/m)] | Limit PK [dB(μV/m)] | Limit AV [dB(μV/m)] | Margin PK [dB] | Margin AV [dB] | Height [cm] | Angle [°] | Remark |
|-----|-----------------|-----|---------------------|---------------------|---------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|-------------|-----------|--------|
| 1   | 4924.000        | H   | 49.3                | 36.0                | 10.9          | 60.2                 | 46.9                 | 74.0                | 54.0                | 13.8           | 7.1            | 100.0       | 0.0       |        |

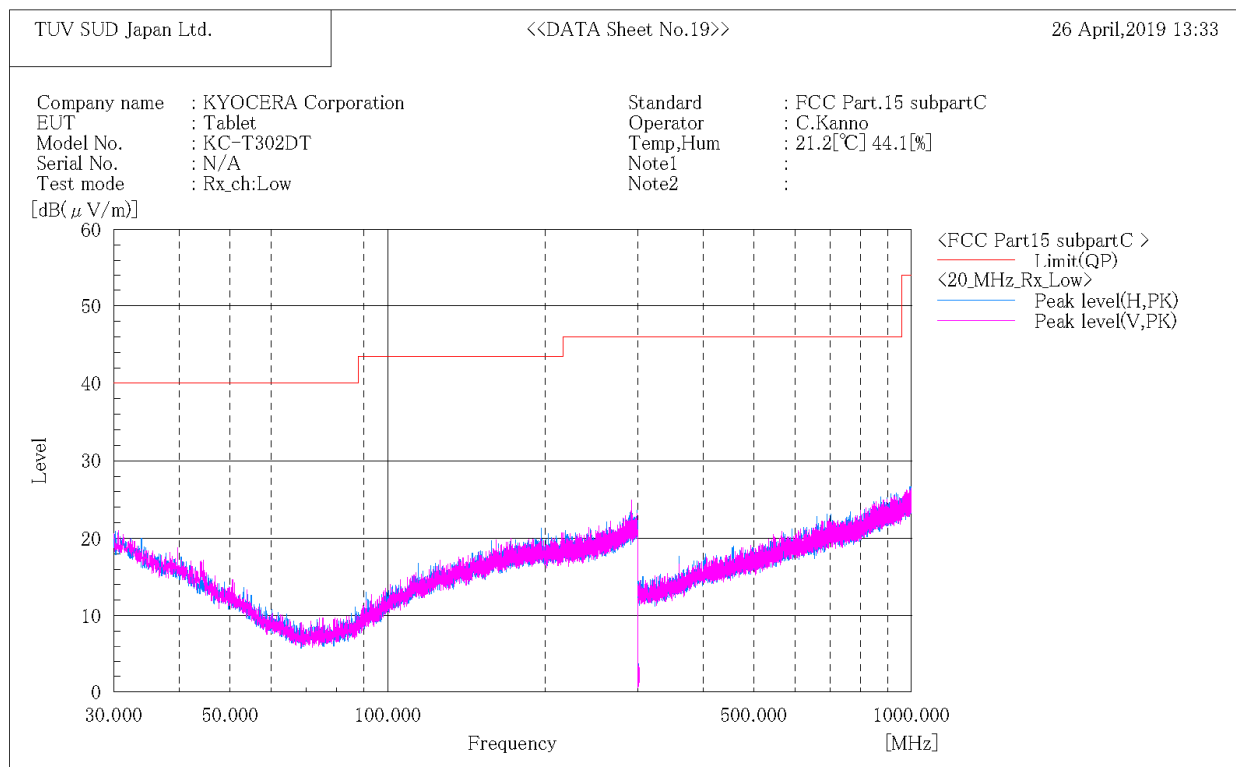
Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

#### 4.5.4.2 Receive mode

##### Channel Low BELOW 1GHz

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



#### Final Result

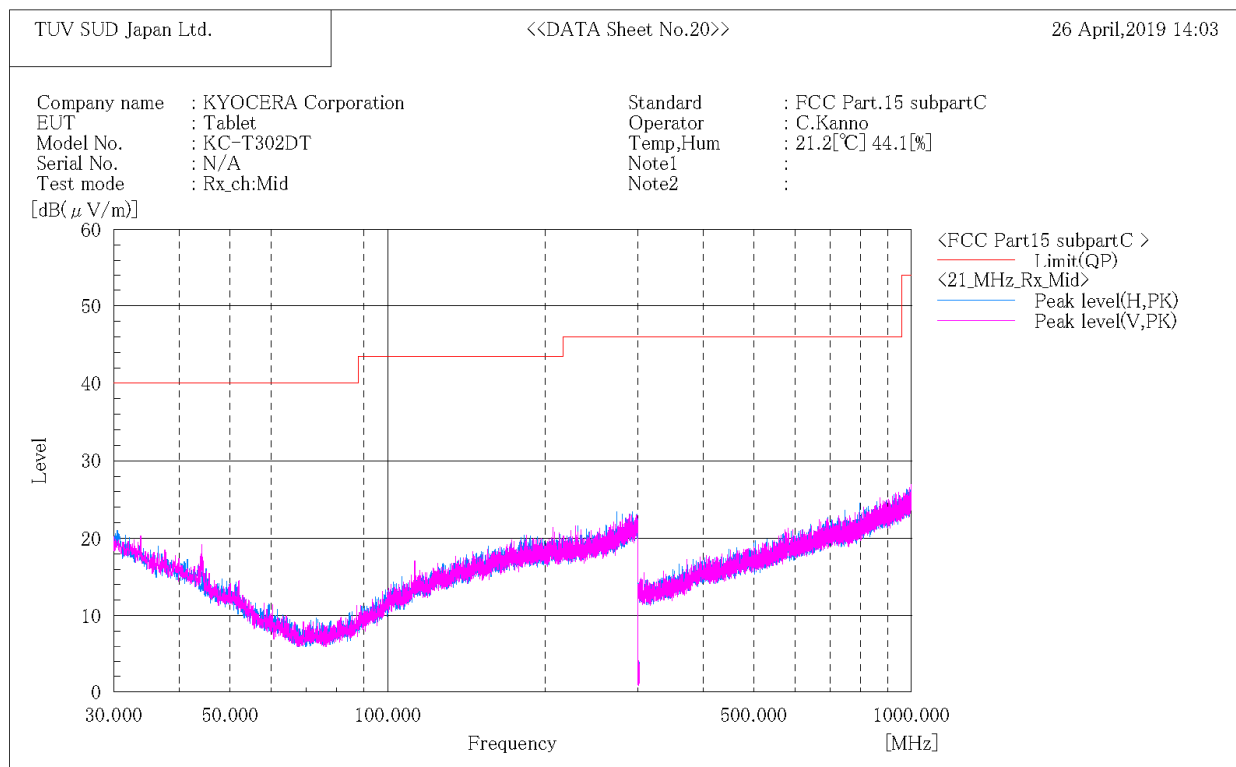
| No. | Frequency (P) | c.f       | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

#### Note:

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz and 1GHz to 25GHz at the 3 meters distance.

## Channel Middle BELOW 1GHz

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



### Final Result

| No. | Frequency (P) | c. f      | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

### Note:

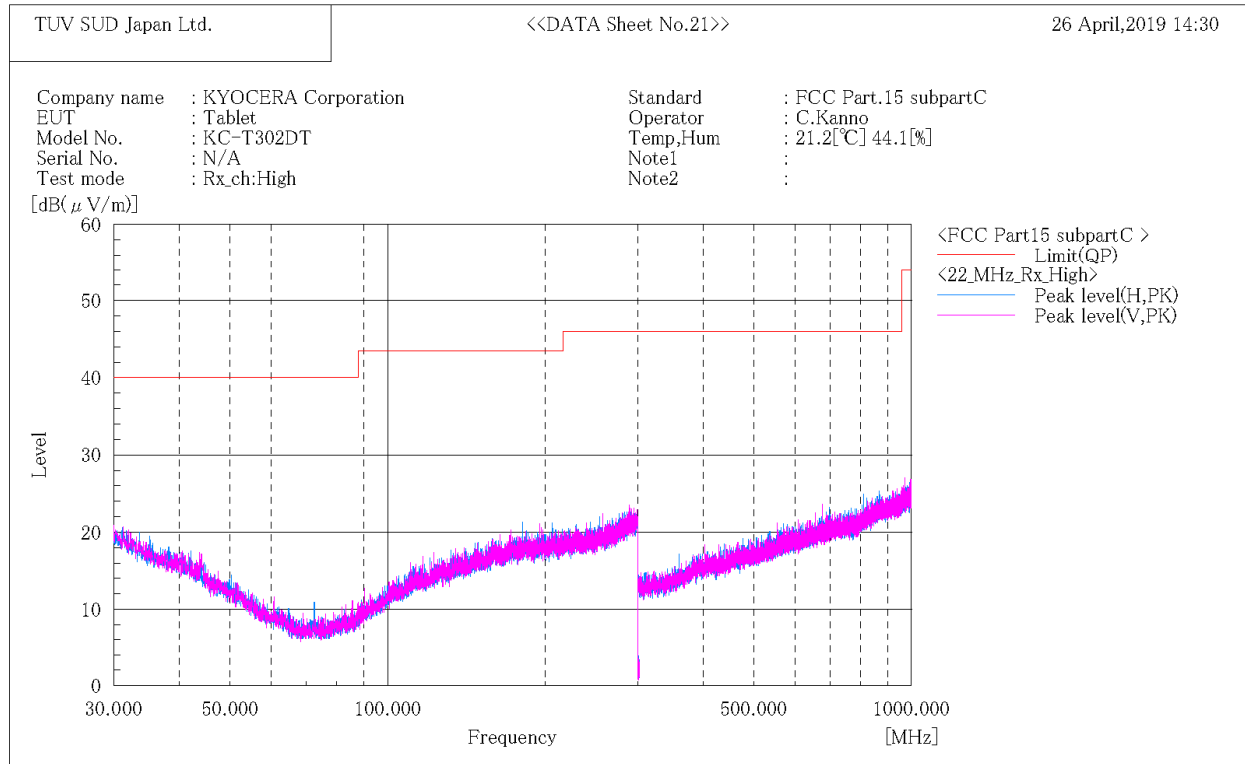
1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz and 1GHz to 25GHz at the 3 meters distance.



Japan

**Channel High  
BELOW 1GHz**

\*\*\*\*\* RADIATED EMISSION \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



**Final Result**

| No. | Frequency (P) | c.f       | Height | Angle |
|-----|---------------|-----------|--------|-------|
|     | [MHz]         | [dB(1/m)] | [cm]   | [° ]  |

**Note:**

1. Emission Level (Margin) = Limit - [Reading + Factor ( Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 1000MHz and 1GHz to 25GHz at the 3 meters distance.

## 4.6 Restricted Band of Operation

### 4.6.1 Measurement procedure

[FCC 15.247(d), 15.205, 15.209, KDB 558074 D01 v05r02, Section 8.6]

Test was applied by following conditions.

|                           |   |                                                                                                                                |
|---------------------------|---|--------------------------------------------------------------------------------------------------------------------------------|
| Test method               | : | ANSI C63.10                                                                                                                    |
| Test place                | : | 3m Semi-anechoic chamber                                                                                                       |
| EUT was placed on         | : | Styrofoam table / (W) 1.0 × (D) 1.0 × (H) 0.8 m (below 1 GHz)<br>Styrofoam table / (W) 0.6 × (D) 0.6 × (H) 1.5 m (above 1 GHz) |
| Antenna distance          | : | 3m                                                                                                                             |
| Spectrum analyzer setting | : |                                                                                                                                |
| - Peak                    | : | RBW=1 MHz, VBW=3 MHz, Span=Arbitrary setting, Sweep=auto                                                                       |
| - Average                 | : | RBW=1 MHz, VBW=10 Hz, Span=Arbitrary setting, Sweep=auto<br>Display mode=Linear                                                |

Average Measurement Setting [VBW]

| Mode              | Duty Cycle (%) | T <sub>on</sub> (us) | T <sub>off</sub> (us) | Determined VBW Setting  |
|-------------------|----------------|----------------------|-----------------------|-------------------------|
| IEEE802.11b       | 99.03          | 1022                 | 10                    | 10Hz (Duty Cycle ≥ 98%) |
| IEEE802.11g       | 99.42          | 1364                 | 8                     | 10Hz (Duty Cycle ≥ 98%) |
| IEEE802.11n(HT20) | 99.38          | 1276                 | 8                     | 10Hz (Duty Cycle ≥ 98%) |

Although these tests were performed other than open area test site, adequate comparison measurements

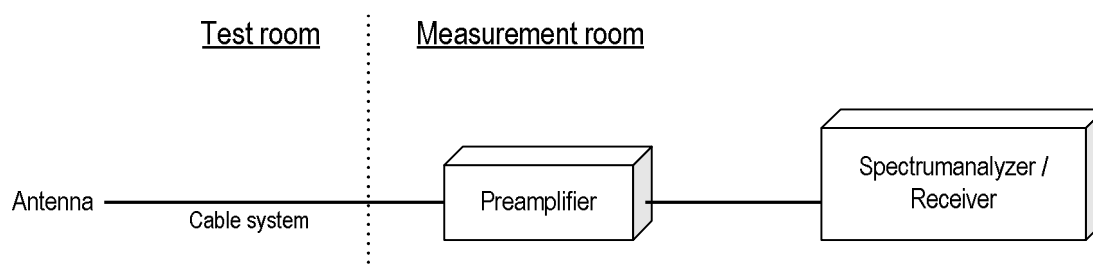
were confirmed against 30 m open area test site.

Therefore, sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

Radiated emission measurements are performed at 3m distance with the broadband antenna (Double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1m to 4m and stopped at height producing the maximum emission.

The EUT is Placed on a turntable, which is 0.8m/1.5m above ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. The test results represent the worst case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation. Sufficient time for the EUT, support equipment, and test equipment are allowed in order for them to warm up to their normal operating condition.

- Test configuration



#### 4.6.2 Limit

Emission at the boundary of the restricted band provided by 15.205 shall be lower than 15.209 limit.

#### 4.6.3 Measurement Result

##### [IEEE802.11b、IEEE802.11g、IEEE802.11n (HT20)]

| Channel | Frequency [MHz] | Results Chart      | Result |
|---------|-----------------|--------------------|--------|
| Low     | 2412            | See the Trace Data | Pass   |
| High    | 2462            | See the Trace Data | Pass   |

#### 4.6.4 Test data

Date : 20-May-2019

Temperature : 19.3 [°C]

Humidity : 55.3 [%]

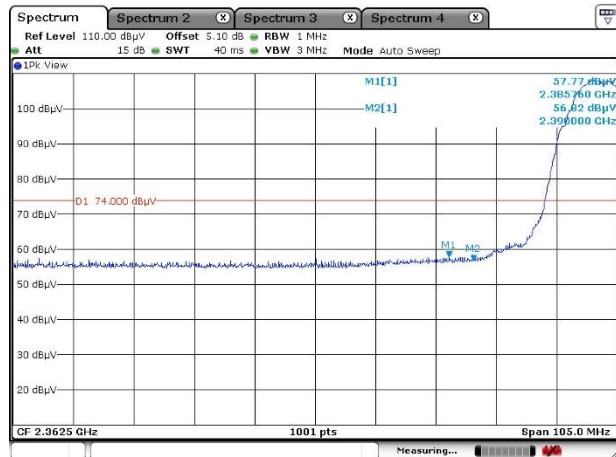
Test place : 3m Semi-anechoic chamber

Test engineer :

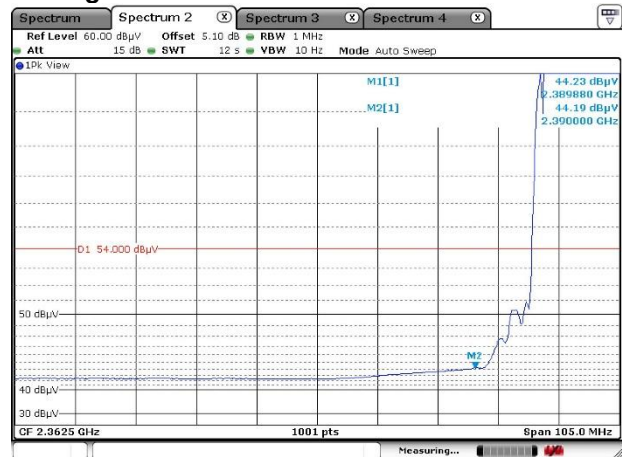
Chiaki Kanno

[IEEE802.11b]

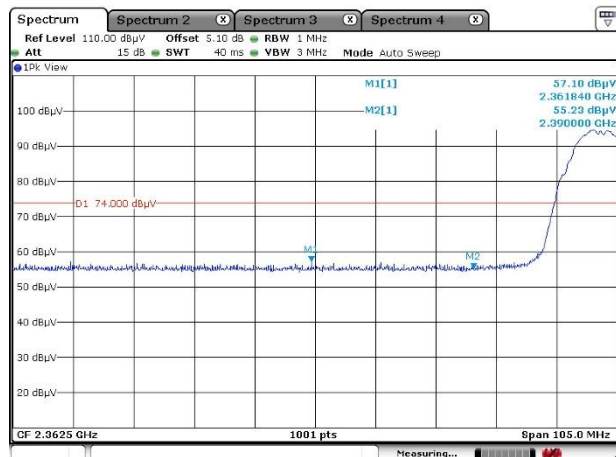
## Channel Low Horizontal Peak



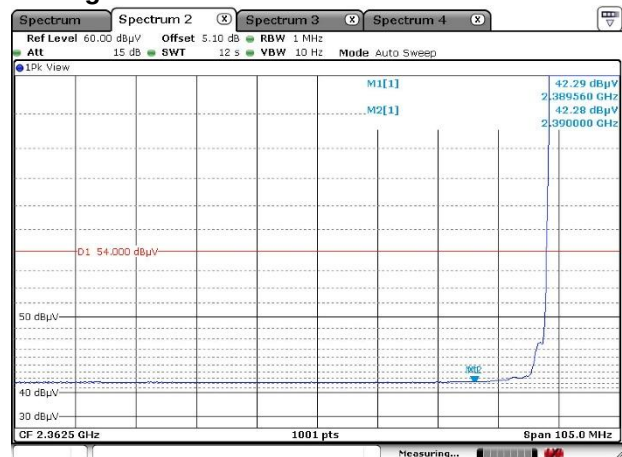
## Average



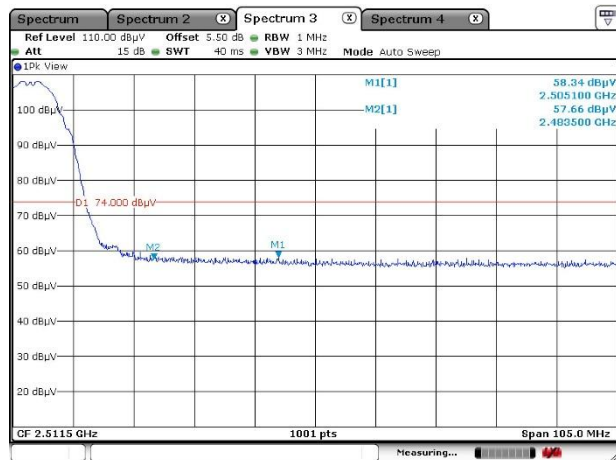
## Vertical Peak



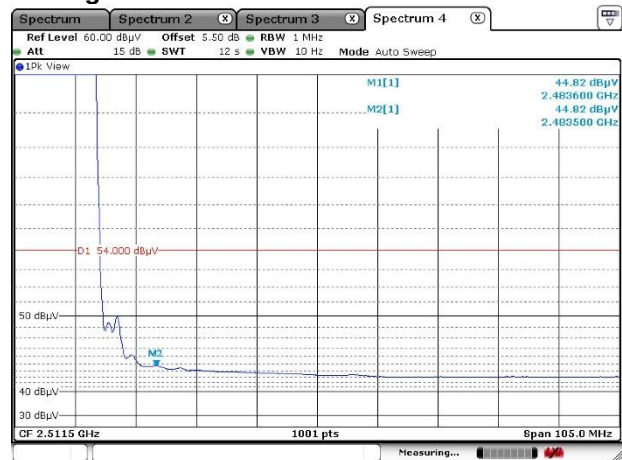
## Average



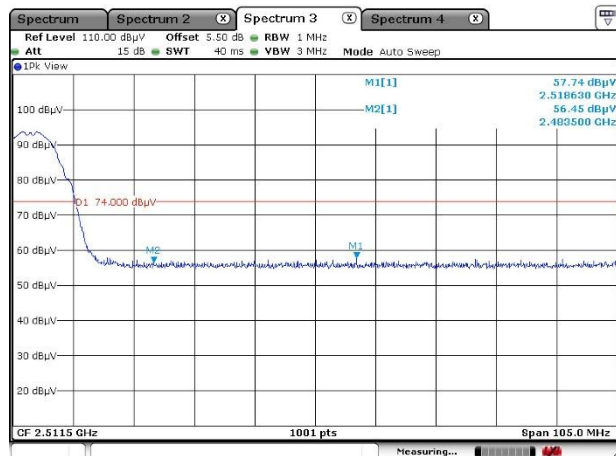
### Channel High Horizontal Peak



### Average



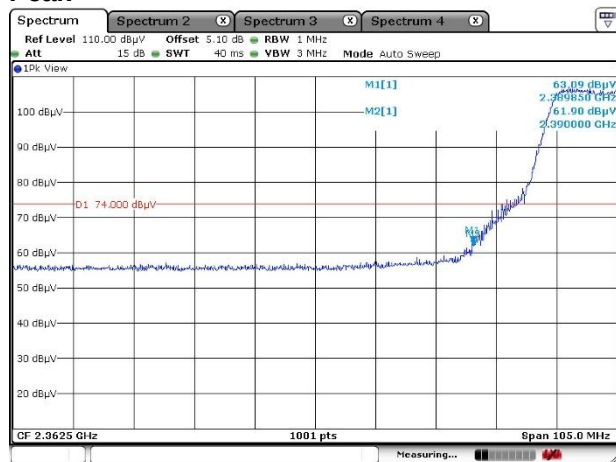
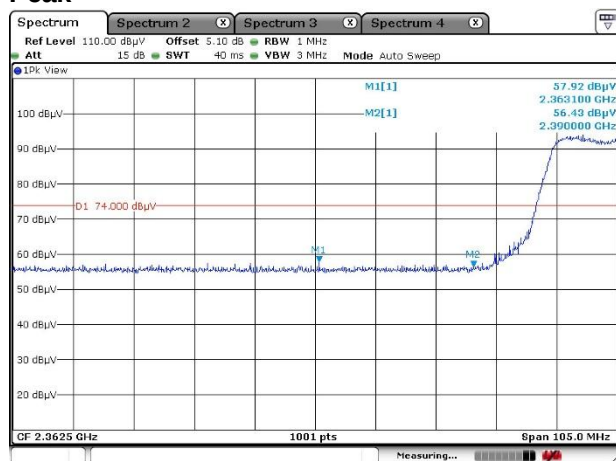
### Vertical Peak



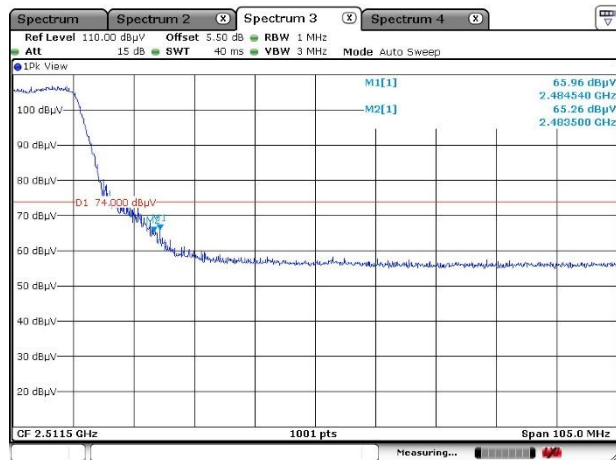
### Average



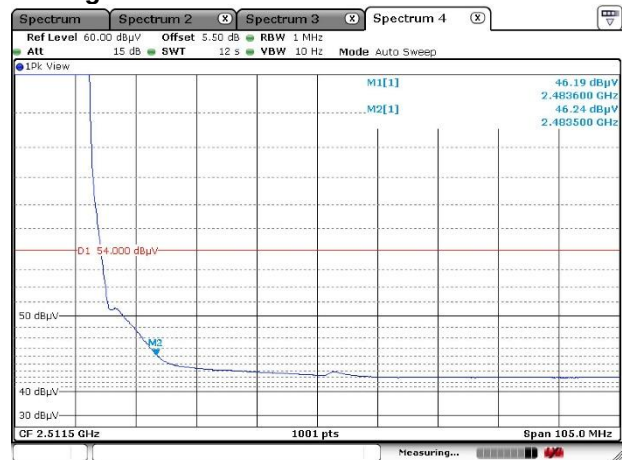
[IEEE802.11g]

**Channel Low  
Horizontal  
Peak****Average****Vertical  
Peak****Average**

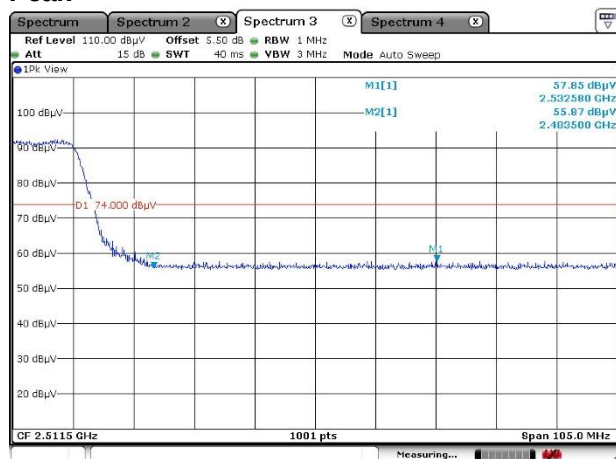
### Channel High Horizontal Peak



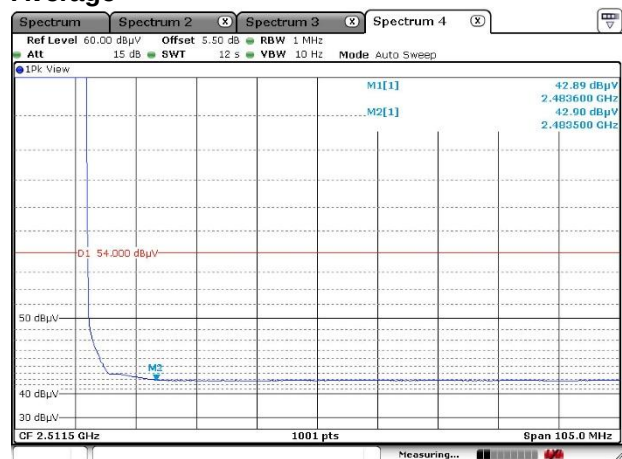
### Average



### Vertical Peak

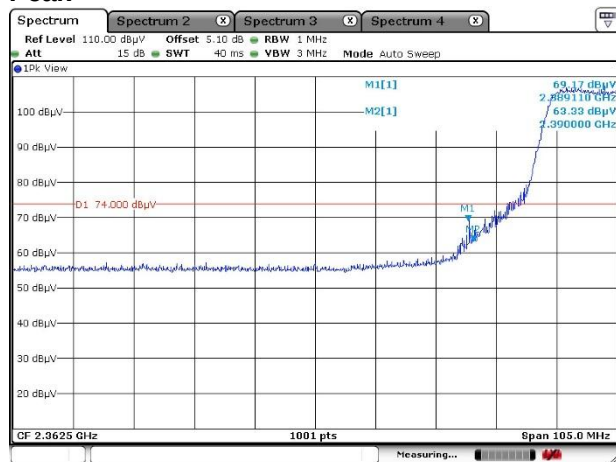


### Average



[IEEE802.11n (HT20)]

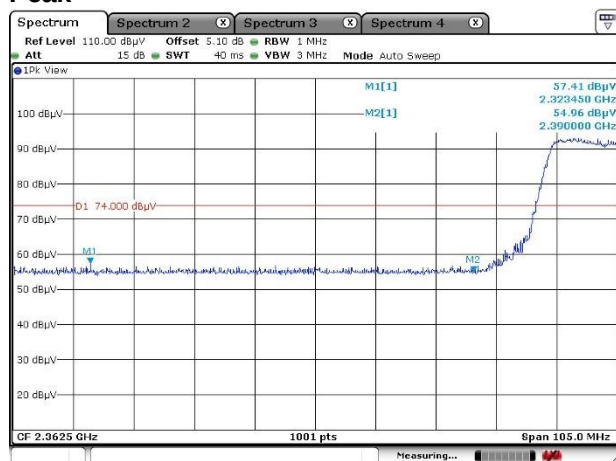
### Channel Low Horizontal Peak



### Average



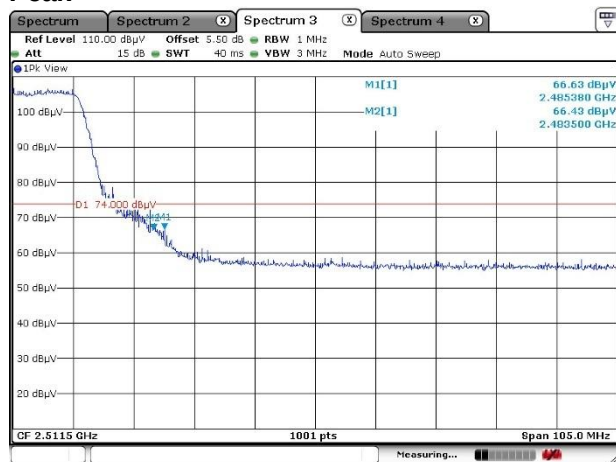
### Vertical Peak



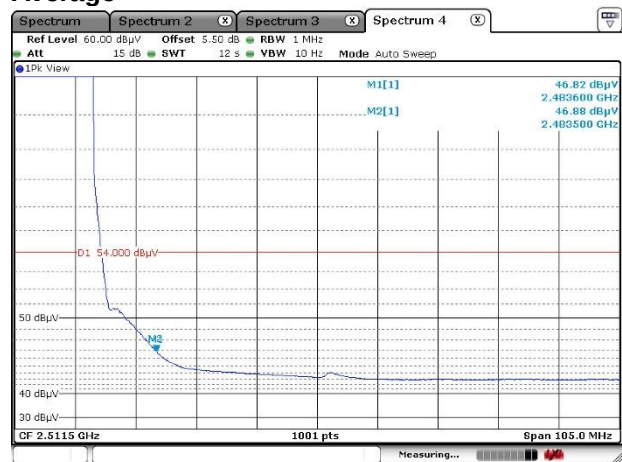
### Average



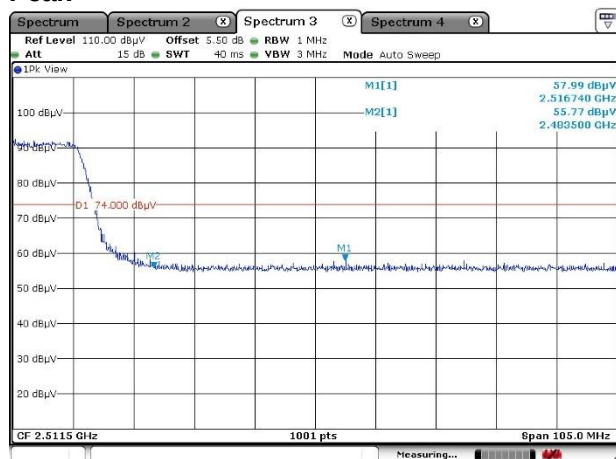
## Channel High Horizontal Peak



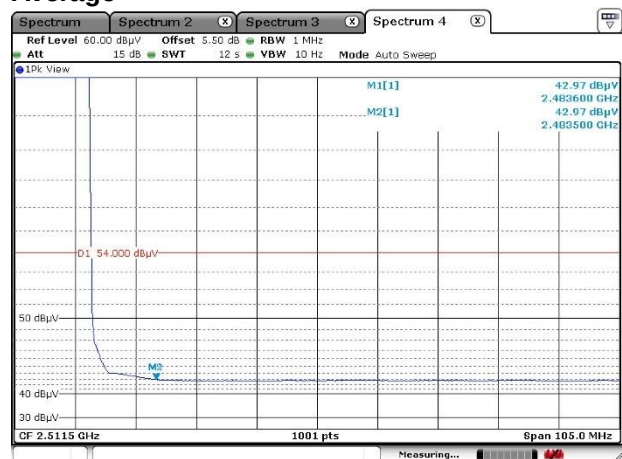
## Average



## Vertical Peak



## Average



#### 4.7 Transmitter Power Spectral Density

##### 4.7.1 Measurement procedure

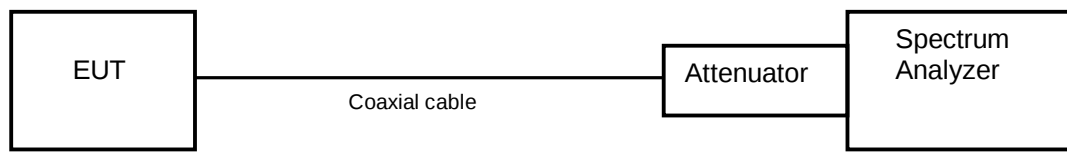
[FCC 15.247(e), KDB 558074 D01 v05r02, Section 8.4]

The peak power is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;

- a) Span = 1.5 times the 6 dB bandwidth.
- b) RBW = 3kHz - 100kHz.
- c) VBW  $\geq 3 \times$  RBW.
- d) Sweep time = auto-couple.
- e) Detector = peak.
- f) Trace mode = max hold.

- Test configuration



##### 4.7.2 Limit

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band.

##### 4.7.3 Measurement result

Date : 18-April-2019  
Temperature : 23.0 [°C]  
Humidity : 25.0 [%]  
Test place : Shielded room No.4

Test engineer : Chiaki Kanno

**[IEEE802.11b]**

| Channel | Center Frequency (MHz) | Reading (dBm) | Factor (dB) | Level (dBm) | Limit (dBm) | Margin (dBm) | Result |
|---------|------------------------|---------------|-------------|-------------|-------------|--------------|--------|
| Low     | 2412                   | -18.50        | 10.63       | -7.87       | 8.00        | 15.87        | PASS   |
| Middle  | 2437                   | -18.40        | 10.63       | -7.77       | 8.00        | 15.77        | PASS   |
| High    | 2462                   | -18.84        | 10.63       | -7.21       | 8.00        | 15.21        | PASS   |

Calculation;

Transmitter Power Spectral Density Level (Margin) = Limit – (Reading + Factor)

**[IEEE802.11g]**

| Channel | Center Frequency (MHz) | Reading (dBm) | Factor (dB) | Level (dBm) | Limit (dBm) | Margin (dBm) | Result |
|---------|------------------------|---------------|-------------|-------------|-------------|--------------|--------|
| Low     | 2412                   | -24.55        | 10.63       | -13.92      | 8.00        | 21.92        | PASS   |
| Middle  | 2437                   | -24.57        | 10.63       | -13.94      | 8.00        | 21.94        | PASS   |
| High    | 2462                   | -25.09        | 10.63       | -14.46      | 8.00        | 22.46        | PASS   |

Calculation;

Transmitter Power Spectral Density Level (Margin) = Limit – (Reading + Factor)

**[IEEE802.11n (HT20)]**

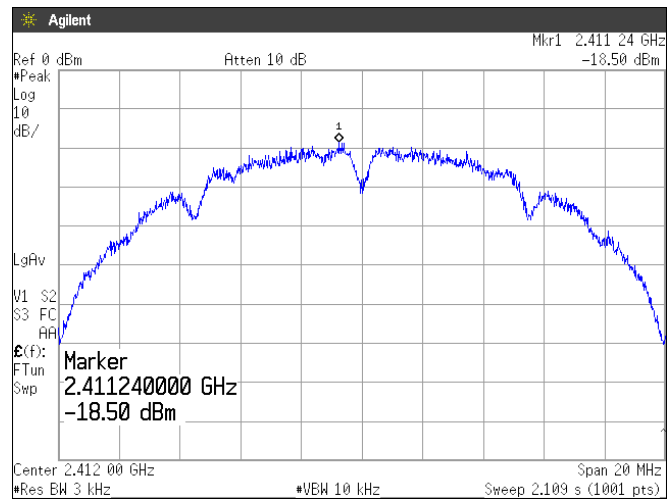
| Channel | Center Frequency (MHz) | Reading (dBm) | Factor (dB) | Level (dBm) | Limit (dBm) | Margin (dBm) | Result |
|---------|------------------------|---------------|-------------|-------------|-------------|--------------|--------|
| Low     | 2412                   | -25.95        | 10.63       | -15.32      | 8.00        | 23.32        | PASS   |
| Middle  | 2437                   | -25.50        | 10.63       | -14.87      | 8.00        | 22.87        | PASS   |
| High    | 2462                   | -25.30        | 10.63       | -14.67      | 8.00        | 22.67        | PASS   |

Calculation;

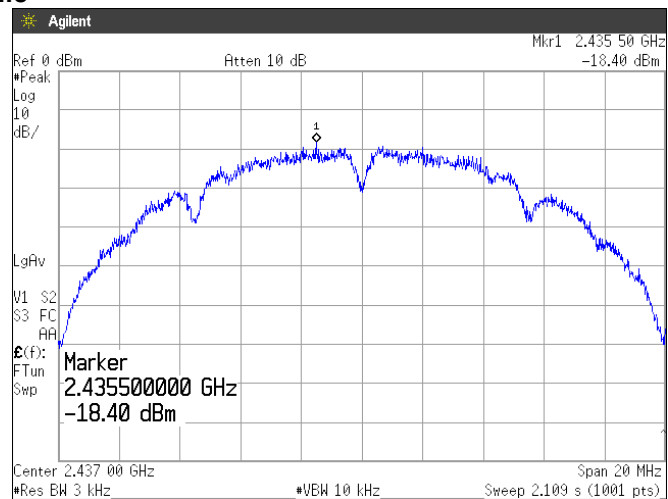
Transmitter Power Spectral Density Level (Margin) = Limit – (Reading + Factor)

## 10.4 Trace data [IEEE802.11b]

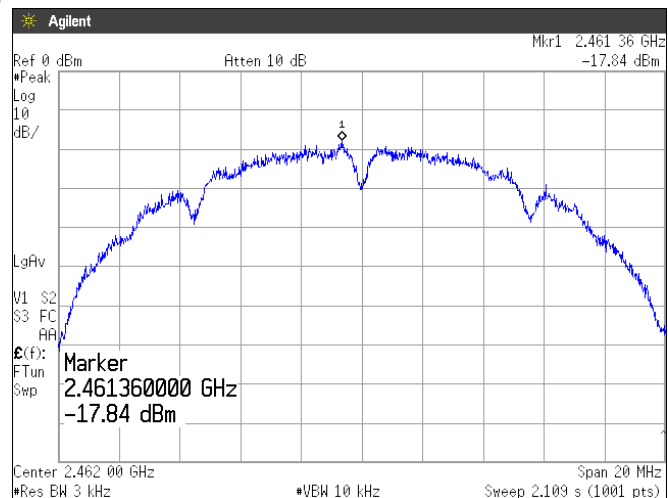
### Channel Low



### Channel Middle

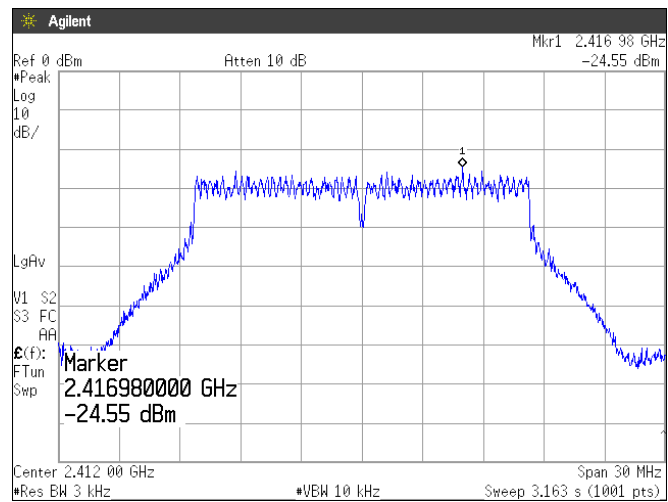


### Channel High

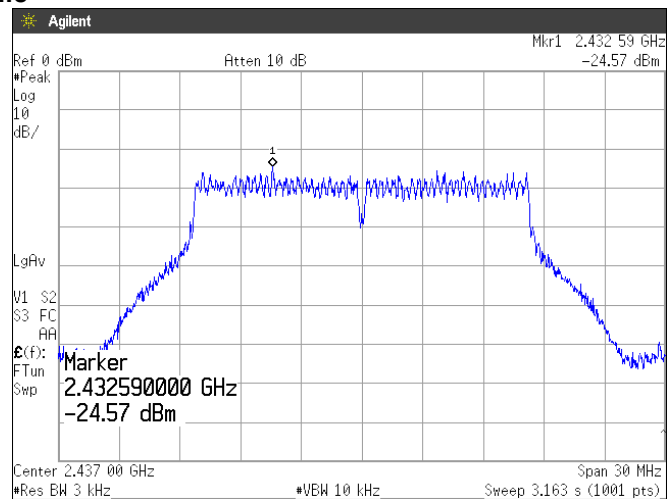


[IEEE802.11g]

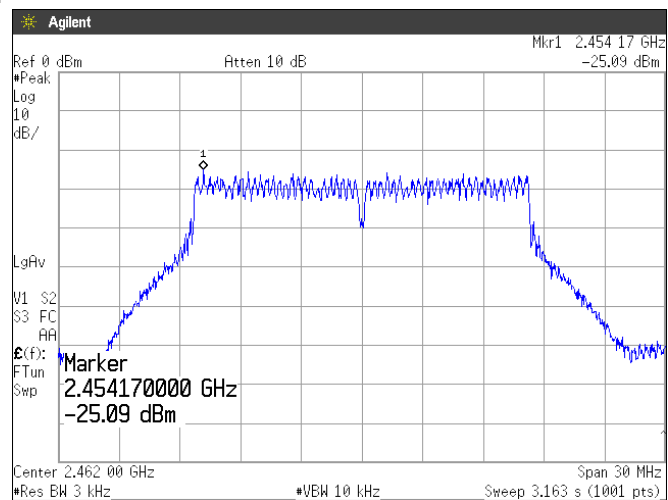
## Channel Low



## Channel Middle

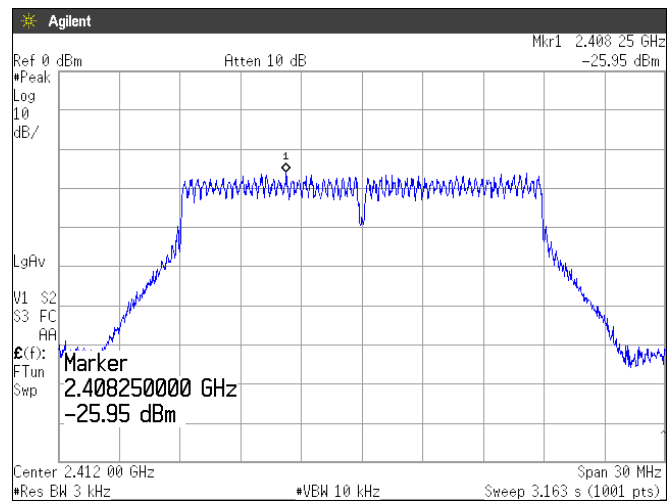


## Channel High

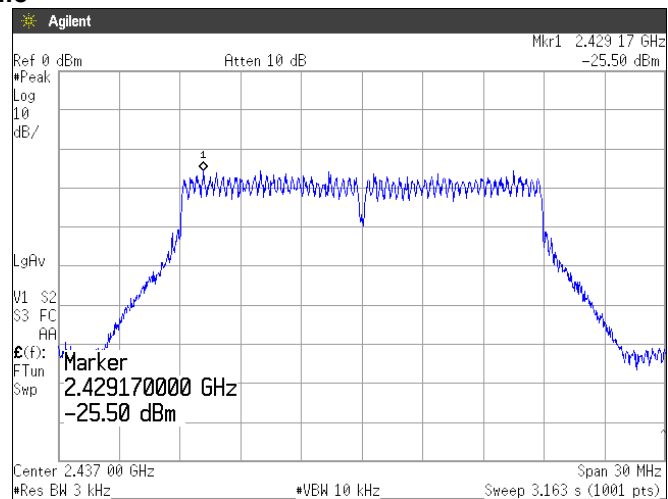


## [IEEE802.11n (HT20)]

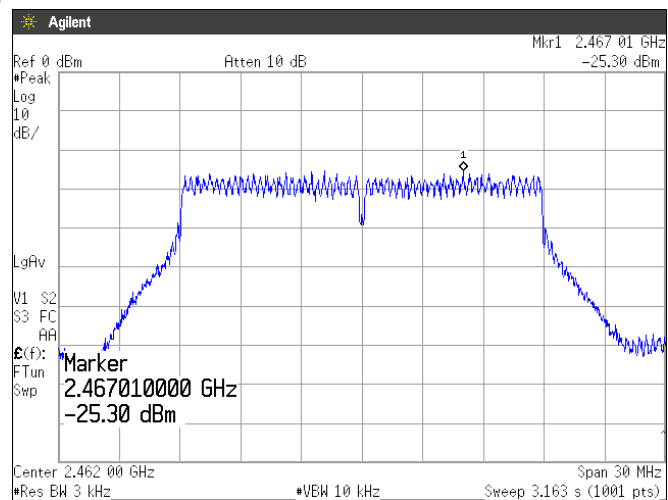
## Channel Low



## Channel Middle



## Channel High



## 4.8 AC Power Line Conducted Emissions

### 4.8.1 Measurement procedure

#### [FCC 15.207]

Test was applied by following conditions.

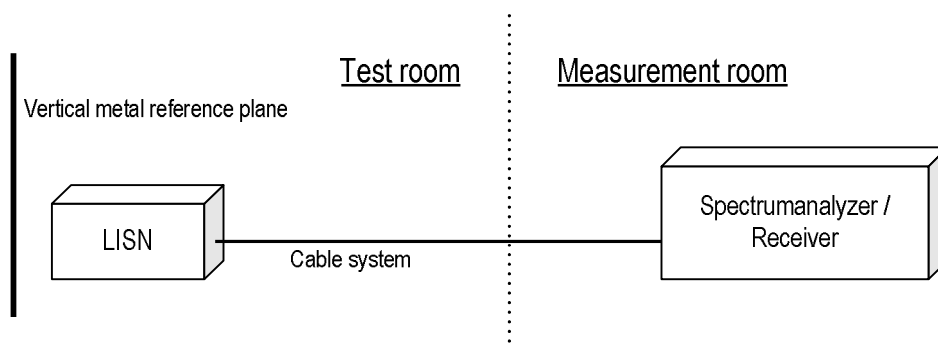
|                                |                                             |
|--------------------------------|---------------------------------------------|
| Test method                    | : ANSI C63.10                               |
| Frequency range                | : 0.15 MHz to 30 MHz                        |
| Test place                     | : 3m Semi-anechoic chamber                  |
| EUT was placed on              | : FRP table / (W) 2.0 × (D) 1.0 × (H) 0.8 m |
| Vertical Metal Reference Plane | : (W) 2.0 × (H) 2.0 m, 0.4 m away from EUT  |
| Test receiver setting          |                                             |
| - Detector                     | : Quasi-peak, Average                       |
| - Bandwidth                    | : 9 kHz                                     |

EUT and peripherals are connected to 50Ω/50 μH Line Impedance Stabilization Network (LISN) which are connected to reference ground plane, and are placed 80cm away from EUT. Excess of AC power cable is bundled in center.

LISN for peripheral is terminated in 50Ω.

EUT operating mode is selected to emit the maximum noise. Overall frequency range is investigated with spectrum analyzer using peak detector. Maximum emission configuration is determined by manipulating the EUT, peripherals, interconnecting cables. Then, emission measurements are performed with test receiver in above setting to each current-carrying conductor of the mains port. Sufficient time for EUT, peripherals and test equipment is provided in order for them to warm up to their normal operating condition. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits.

#### - Test configuration



### 4.8.2 Calculation method

Emission level = Reading + (LISN. Factor + Cable system loss)

Margin = Limit – Emission level

Example:

Limit @ 0.403 MHz: 57.8 dBμV(Quasi-peak)  
: 47.8 dBμV(Average)

(Quasi peak) Reading = 22.7 dBμV c.f. = 10.4 dB

Emission level = 22.7 + 10.4 = 33.1 dBμV

Margin = 57.8 – 33.1 = 24.7 dB

(Average) Reading = 6.5 dBμV c.f. = 10.4 dB

Emission level = 6.5 + 10.4 = 16.9 dBμV

Margin = 47.8 – 16.9 = 30.9 dB

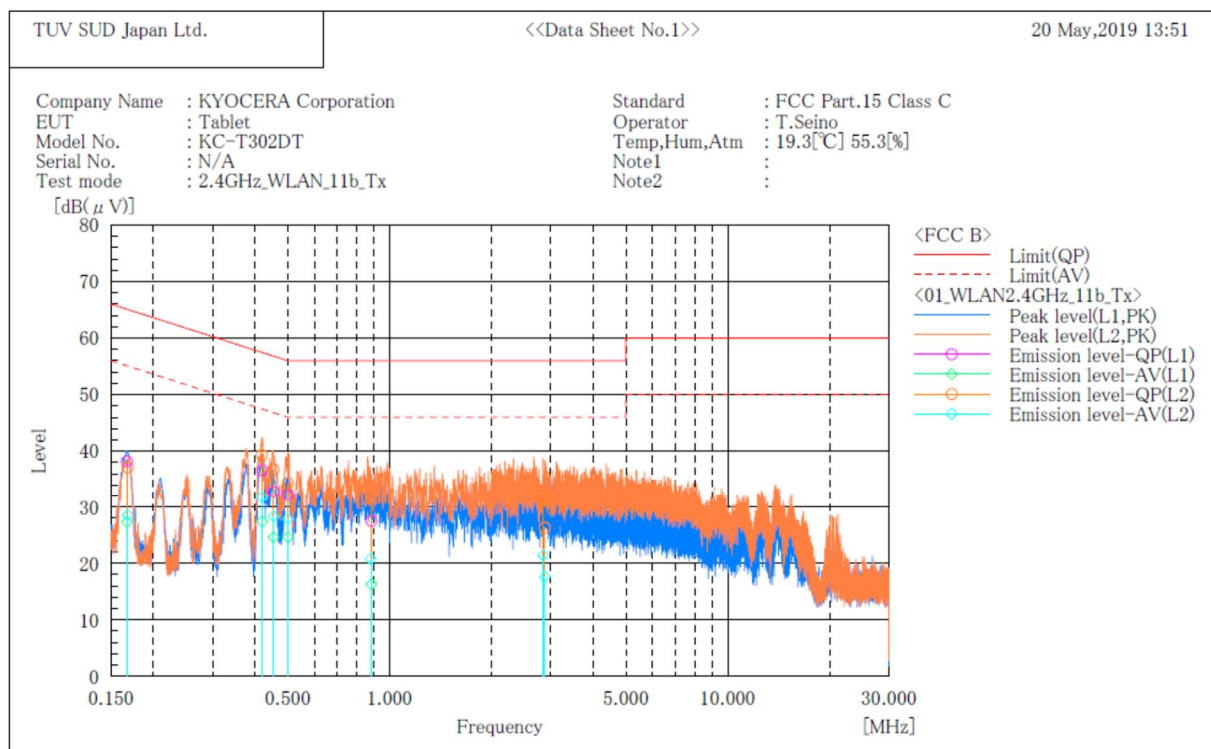
### 4.8.3 Limit

| Frequency<br>[MHz] | Limit     |           |
|--------------------|-----------|-----------|
|                    | QP [dBuV] | AV [dBuV] |
| 0.15-0.5           | 66-56*    | 56-46*    |
| 0.5-5              | 56        | 46        |
| 5-30               | 60        | 50        |

\*: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

### 4.8.4 Test data

\*\*\*\*\* CONDUCTED EMISSION at MAINS PORT \*\*\*\*\*  
[ 3m Semi-anechoic chamber ]



#### Final Result

##### --- L1 Phase ---

| No. | Frequency<br>[MHz] | Reading<br>QP<br>[dB(μV)] | Reading<br>AV<br>[dB(μV)] | c. f<br>[dB] | Result<br>QP<br>[dB(μV)] | Result<br>AV<br>[dB(μV)] | Limit<br>QP<br>[dB(μV)] | Limit<br>AV<br>[dB(μV)] | Margin<br>QP<br>[dB] | Margin<br>AV<br>[dB] |
|-----|--------------------|---------------------------|---------------------------|--------------|--------------------------|--------------------------|-------------------------|-------------------------|----------------------|----------------------|
| 1   | 0.167              | 27.7                      | 16.8                      | 10.5         | 38.2                     | 27.3                     | 65.1                    | 55.1                    | 26.9                 | 27.8                 |
| 2   | 0.420              | 26.2                      | 17.0                      | 10.4         | 36.6                     | 27.4                     | 57.4                    | 47.4                    | 20.8                 | 20.0                 |
| 3   | 0.454              | 22.4                      | 14.2                      | 10.4         | 32.8                     | 24.6                     | 56.8                    | 46.8                    | 24.0                 | 22.2                 |
| 4   | 0.501              | 21.8                      | 14.2                      | 10.4         | 32.2                     | 24.6                     | 56.0                    | 46.0                    | 23.8                 | 21.4                 |
| 5   | 0.884              | 17.1                      | 5.9                       | 10.4         | 27.5                     | 16.3                     | 56.0                    | 46.0                    | 28.5                 | 29.7                 |

##### --- L2 Phase ---

| No. | Frequency<br>[MHz] | Reading<br>QP<br>[dB(μV)] | Reading<br>AV<br>[dB(μV)] | c. f<br>[dB] | Result<br>QP<br>[dB(μV)] | Result<br>AV<br>[dB(μV)] | Limit<br>QP<br>[dB(μV)] | Limit<br>AV<br>[dB(μV)] | Margin<br>QP<br>[dB] | Margin<br>AV<br>[dB] |
|-----|--------------------|---------------------------|---------------------------|--------------|--------------------------|--------------------------|-------------------------|-------------------------|----------------------|----------------------|
| 1   | 0.168              | 26.6                      | 18.0                      | 10.5         | 37.1                     | 28.5                     | 65.1                    | 55.1                    | 28.0                 | 26.6                 |
| 2   | 0.419              | 28.9                      | 21.4                      | 10.4         | 39.3                     | 31.8                     | 57.5                    | 47.5                    | 18.2                 | 15.7                 |
| 3   | 0.454              | 26.4                      | 17.9                      | 10.4         | 36.8                     | 28.3                     | 56.8                    | 46.8                    | 20.0                 | 18.5                 |
| 4   | 0.500              | 24.0                      | 17.5                      | 10.4         | 34.4                     | 27.9                     | 56.0                    | 46.0                    | 21.6                 | 18.1                 |
| 5   | 0.879              | 21.1                      | 10.4                      | 10.4         | 31.5                     | 20.8                     | 56.0                    | 46.0                    | 24.5                 | 25.2                 |
| 6   | 2.851              | 20.5                      | 10.9                      | 10.5         | 31.0                     | 21.4                     | 56.0                    | 46.0                    | 25.0                 | 24.6                 |
| 7   | 2.877              | 15.8                      | 7.1                       | 10.5         | 26.3                     | 17.6                     | 56.0                    | 46.0                    | 29.7                 | 28.4                 |



Japan

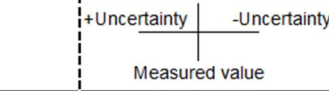
## 5 Antenna requirement

According to FCC 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 antenna is a special antenna mounted inside of the EUT. Therefore, the EUT complies with the antenna requirement of FCC section 15.203.

## 6 Measurement Uncertainty

Expanded uncertainties stated are calculated with a coverage Factor  $k=2$ .  
Please note that these results are not taken into account when measurement uncertainty considerations contained in ETSI TR 100 028 Parts 1 and 2 determining compliance or non-compliance with test result.

| Test item                                  | Measurement uncertainty |
|--------------------------------------------|-------------------------|
| Conducted emission, AMN (9 kHz – 150 kHz)  | $\pm 3.8$ dB            |
| Conducted emission, AMN (150 kHz – 30 MHz) | $\pm 3.3$ dB            |
| Radiated emission (9 kHz – 30 MHz)         | $\pm 3.1$ dB            |
| Radiated emission (30 MHz – 1000 MHz)      | $\pm 4.9$ dB            |
| Radiated emission (1 GHz – 6 GHz)          | $\pm 4.8$ dB            |
| Radiated emission (6 GHz – 18 GHz)         | $\pm 5.1$ dB            |
| Radiated emission (18 GHz – 40 GHz)        | $\pm 5.8$ dB            |
| Radio Frequency                            | $\pm 1.4 \cdot 10^{-8}$ |
| RF power, conducted                        | $\pm 0.6$ dB            |
| Temperature                                | $\pm 0.6$ °C            |
| Humidity                                   | $\pm 1.2$ %             |
| Voltage (DC)                               | $\pm 0.4$ %             |
| Voltage (AC, <10kHz)                       | $\pm 0.2$ %             |

| Judge | Measured value and standard limit value                                                                                                                                                                                                                                               |  |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| PASS  | <b>Case1</b><br> <p>Standard limit value</p> <p>+Uncertainty   -Uncertainty</p> <p>Measured value</p> <p>Even if it takes uncertainty into consideration, a standard limit value is fulfilled.</p> |  |
|       | <b>Case2</b><br> <p>Although measured value is in a standard limit value, a limit value won't be fulfilled if uncertainty is taken into consideration.</p>                                         |  |
| FAIL  | <b>Case3</b><br> <p>Although measured value exceeds a standard limit value, a limit value will be fulfilled if uncertainty is taken into consideration.</p>                                        |  |
|       | <b>Case4</b><br> <p>Even if it takes uncertainty into consideration, a standard limit value isn't fulfilled.</p>                                                                                   |  |

## 7 Laboratory Information

Testing was performed and the report was issued at:

**TÜV SÜD Japan Ltd. Yonezawa Testing Center**

Address: 5-4149-7 Hachimanpara, Yonezawa-shi, Yamagata, 992-1128 Japan  
Phone: +81-238-28-2881  
Fax: +81-238-28-2888

**Accreditation and Registration**

NVLAP

LAB CODE: 200306-0

VLAC

Accreditation No.: VLAC-013

BSMI

Laboratory Code: SL2-IN-E-6018, SL2-A1-E-6018

Innovation, Science and Economic Development Canada

| Site number | Facility                         | Expiration date  |
|-------------|----------------------------------|------------------|
| 4224A-4     | 3 m Semi-anechoic chamber        | 27-November-2020 |
| 4224A-5     | 10 m Semi-anechoic chamber No. 1 | 27-November-2020 |
| 4224A-6     | 10 m Semi-anechoic chamber No. 2 | 14-December-2019 |

VCCI Council

| Registration number | Expiration date |
|---------------------|-----------------|
| A-0166              | 03-July-2019    |

## Appendix A. Test Equipment

### Antenna port conducted test

| Equipment         | Company              | Model No. | Serial No. | Cal. Due    | Cal. Date   |
|-------------------|----------------------|-----------|------------|-------------|-------------|
| Spectrum analyzer | Agilent Technologies | E4440A    | US44302655 | 31-Jul-2019 | 02-Jul-2018 |
| Attenuator        | Weinschel            | 56-10     | J4180      | 31-Jul-2019 | 12-Jul-2018 |
| Power meter       | ROHDE&SCHWARZ        | NRP2      | 103269     | 31-Aug-2019 | 01-Aug-2018 |
| Power sensor      | ROHDE&SCHWARZ        | NRP-Z81   | 102467     | 31-Aug-2019 | 01-Aug-2018 |

### Radiated emission

| Equipment                   | Company              | Model No.         | Serial No.      | Cal. Due    | Cal. Date   |
|-----------------------------|----------------------|-------------------|-----------------|-------------|-------------|
| EMI Receiver                | ROHDE&SCHWARZ        | ESCI              | 100765          | 30-Sep-2019 | 20-Sep-2018 |
| Spectrum analyzer           | Agilent Technologies | E4440A            | US44302655      | 31-Jul-2019 | 02-Jul-2018 |
|                             | ROHDE&SCHWARZ        | FSV40             | 101731          | 31-Dec-2019 | 07-Dec-2018 |
| Preamplifier                | SONOMA               | 310               | 372170          | 30-Sep-2019 | 20-Sep-2018 |
| Loop antenna                | ROHDE&SCHWARZ        | HFH2-Z2           | 100515          | 28-Feb-2019 | 20-Feb-2018 |
| Attenuator                  | TDC                  | TAT-43B-06        | N/A(S209)       | 31-Jul-2019 | 11-Jul-2018 |
| Biconical antenna           | Schwarzbeck          | VHA9103/BBA9106   | VHA91032155     | 31-Aug-2019 | 06-Aug-2018 |
| Log periodic antenna        | Schwarzbeck          | UHALP9108A        | 0560            | 31-Aug-2019 | 06-Aug-2018 |
| Attenuator                  | TAMAGAWA.ELEC        | CFA-01/6dB        | N/A(S465)       | 31-May-2020 | 17-May-2019 |
| Attenuator                  | TAMAGAWA.ELEC        | CFA-10/3dB        | N/A(S503)       | 31-Jul-2019 | 11-Jul-2018 |
| Preamplifier                | TSJ                  | MLA-100M18-B02-40 | 1929118         | 31-Jan-2020 | 17-Jan-2019 |
| Double ridged guide antenna | ETS LINDGREN         | 3117              | 00224193        | 31-Jan-2020 | 23-Jan-2019 |
| Attenuator                  | Agilent Technologies | 8491B             | MY39268633      | 31-Mar-2020 | 08-Mar-2019 |
| DRGH antenna                | A.H.Systems Inc.     | SAS-574           | 469             | 31-Aug-2019 | 24-Aug-2018 |
| Preamplifier                | TSJ                  | MLA-1840-B03-35   | 1240332         | 31-Aug-2019 | 24-Aug-2018 |
| Notch filter                | Micro-Tronics        | BRM50702          | 045             | 31-May-2020 | 16-May-2019 |
| Microwave cable             | HUBER+SUHNER         | SUCOFLEX104/9m    | MY30037/4       | 31-Jan-2020 | 16-Jan-2019 |
|                             |                      | SUCOFLEX104/1m    | my24610/4       | 31-Jan-2020 | 16-Jan-2019 |
|                             |                      | SUCOFLEX104/8m    | SN MY30031/4    | 31-Jan-2020 | 16-Jan-2019 |
|                             |                      | SUCOFLEX104       | MY32976/4       | 31-Jan-2020 | 16-Jan-2019 |
|                             |                      | SUCOFLEX104/1.5m  | MY19309/4       | 31-Jan-2020 | 16-Jan-2019 |
|                             |                      | SUCOFLEX104/7m    | 41625/6         | 31-Jan-2020 | 16-Jan-2019 |
| PC                          | DELL                 | DIMENSION E521    | 75465BX         | N/A         | N/A         |
| Software                    | TOYO Corporation     | EP5/RE-AJ         | 0611193/V5.6.0  | N/A         | N/A         |
| Absorber                    | RIKEN                | PFP30             | N/A             | N/A         | N/A         |
| 3m Semi an-echoic Chamber   | TOKIN                | N/A               | N/A(9002-NSA)   | 31-May-2019 | 21-May-2018 |
| 3m Semi an-echoic Chamber   | TOKIN                | N/A               | N/A(9002-SVSWR) | 31-May-2019 | 22-May-2018 |

**Conducted emission at mains port**

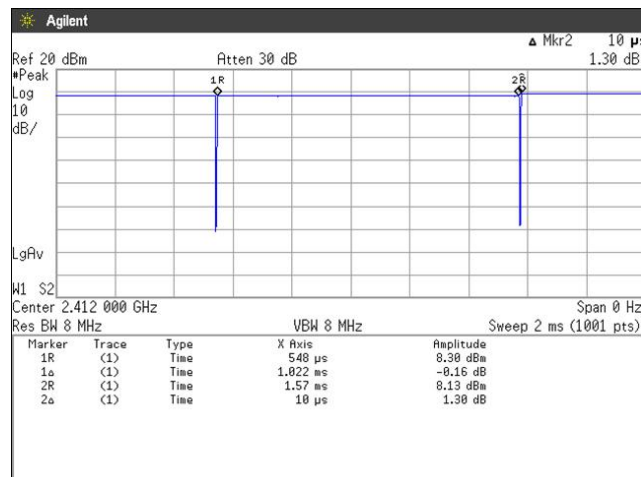
| Equipment                            | Company                         | Model No.   | Serial No.      | Cal. Due    | Cal. Date   |
|--------------------------------------|---------------------------------|-------------|-----------------|-------------|-------------|
| EMI Receiver                         | ROHDE&SCHWARZ                   | ESCI        | 100765          | 30-Sep-2019 | 20-Sep-2018 |
| Attenuator                           | HUBER+SUHNER                    | 6810.01.A   | N/A (S411)      | 31-Jan-2020 | 17-Jan-2019 |
| Line impedance stabilization network | Kyoritsu Electrical Works, Ltd. | TNW-407F2   | 12-17-110-2     | 31-May-2020 | 16-May-2019 |
| Coaxial cable                        | FUJIKURA                        | 5D-2W/4m    | N/A (S350)      | 31-Jan-2020 | 16-Jan-2019 |
| Coaxial cable                        | FUJIKURA                        | 5D-2W/1m    | N/A (S193)      | 31-Jan-2020 | 16-Jan-2019 |
| Coaxial cable                        | HUBER+SUHNER                    | RG214/U/10m | N/A (S194)      | 31-Jan-2020 | 16-Jan-2019 |
| PC                                   | DELL                            | DIMENSION   | 75465BX         | N/A         | N/A         |
| Software                             | TOYO Corporation                | EP5/CE-AJ   | 0611193/V5.4.11 | N/A         | N/A         |

\*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.

## Appendix B. Duty Cycle

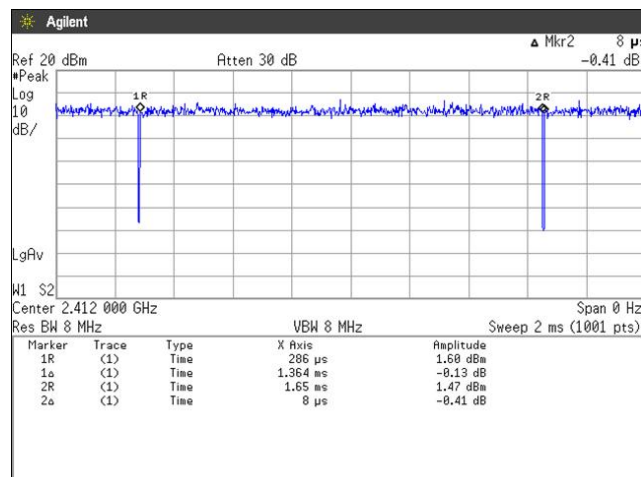
### [Plot & Calculation]

11b



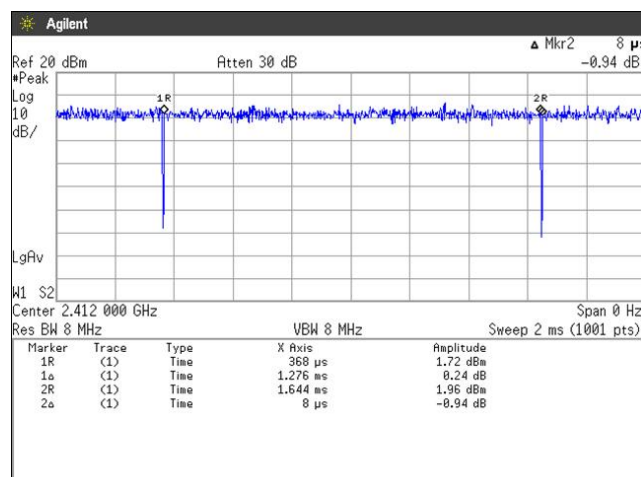
$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff}) = 1022[\mu\text{s}] / (1022[\mu\text{s}] + 10[\mu\text{s}]) = 99.03\%$$

11g



$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff}) = 1364[\mu\text{s}] / (1364[\mu\text{s}] + 8[\mu\text{s}]) = 99.42\%$$

11n (HT20)



$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff}) = 1276[\mu\text{s}] / (1276[\mu\text{s}] + 8[\mu\text{s}]) = 99.38\%$$