



## TEST REPORT

Issued: July 20, 2020

Name and Address  
of the Customer: NTN Corporation  
3066, Oyumida, Higashikata, Kuwana City, Mie,  
511-8678 Japan

Test Item: NTN PORTABLE VIBROSCOPE

Identification: DAT-HV0002

Serial No.: IMVN0058 / IMVN0070

FCC ID: 2AVEZHV0002

ISED Certification Number: 25934-HV0002

Sample No.: 1

Sample Condition: Good

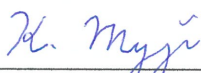
Sample Receipt Date: September 4, 2019

Test Specification: 47 CFR Part 15 Subpart C  
RSS-Gen Issue 5, RSS-247 Issue 2

Period of Testing: October 17 – December 5, 2019

Test Result: PASS

Representative  
Test Personnel:

  
(2020-07-20)

K. Miyaji (EMC Section)  
iNARTE : EMC-003627-NE

Reviewed by:

  
(2020-07-20)

H. Onishi (EMC Section)  
iNARTE : EMC-003318-NT

Other Aspects:

Abbreviations: PASS = passed  
FAIL = failed  
N/A = not applicable

Note:

This Test Report should not be reproduced except in full, without the written approval of Cosmos Corporation.  
The test result of this Test Report is based on the tests made for sample provided, and it is not applicable to individual product identical to the sample or similar product.

The judgment of this test report validates the test item only specified in "3. Summary of Test Results".

This test report is issued by private test house (Cosmos Corp.), therefore A2LA or US government does not endorse a reliability of this test report.



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## 1. Description of the Tested Sample

### 1.1 Product Description

|                                 |                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product                         | NTN PORTABLE VIBROSCOPE                                                                                                                                                                                 |
| Model (referred to as the EUT)  | DAT-HV0002                                                                                                                                                                                              |
| Manufacturer                    | NTN Corporation                                                                                                                                                                                         |
| Hardware Version                | DAT-HV0002                                                                                                                                                                                              |
| Software Version                | 1.24                                                                                                                                                                                                    |
| Type of the Equipment           | <input type="checkbox"/> Stand-alone <input checked="" type="checkbox"/> Combined Equipment<br><input type="checkbox"/> Plug-in Radio Device <input type="checkbox"/> Other ( )                         |
| Transmitter Type                | <input checked="" type="checkbox"/> WLAN (IEEE802.11b/g) <input type="checkbox"/> Bluetooth ( )<br><input type="checkbox"/> ZigBee <input type="checkbox"/> RFID ( ) <input type="checkbox"/> Other ( ) |
| Antenna Type                    | <input checked="" type="checkbox"/> Integral Antenna<br><input type="checkbox"/> Dedicated External Antenna                                                                                             |
| Number of Antenna               | 1 Antenna                                                                                                                                                                                               |
| Operating Frequency Range       | 2412 MHz to 2462 MHz                                                                                                                                                                                    |
| Type of Modulation              | <input type="checkbox"/> FHSS ( )<br><input checked="" type="checkbox"/> Other than FHSS (DSSS, OFDM)                                                                                                   |
| Type of Power Source            | <input type="checkbox"/> AC Mains <input type="checkbox"/> Dedicated AC Adaptor<br><input type="checkbox"/> DC Voltage <input checked="" type="checkbox"/> Battery                                      |
| Input Power Rating              | DC 2.4 V                                                                                                                                                                                                |
| Type of Battery (if applicable) | Nickel Metal Hydride Battery                                                                                                                                                                            |
| Thermal Limitation              | 5°C to 50°C                                                                                                                                                                                             |

### 1.2 Antenna Description

| Model           | Gain    | Antenna Type          |
|-----------------|---------|-----------------------|
| FR05-S1-N-0-104 | 1.1 dBi | Monopole Chip Antenna |



### 1.3 EUT Description

Equipment under test is as follow:

| Instrument                           | Model      | Serial No. |
|--------------------------------------|------------|------------|
| NTN PORTABLE<br>VIBROSCOPE (EUT1) *1 | DAT-HV0002 | IMVN0058   |
| NTN PORTABLE<br>VIBROSCOPE (EUT2) *2 | DAT-HV0002 | IMVN0070   |

Note:

\*1: This equipment was used during the following tests;

Band Edge Measurement (Radiated), Transmitter Spurious Emissions (Radiated) and Receiver Spurious Emission (Radiated).

\*2: This equipment was used during the following tests;

6 dB Bandwidth, Maximum Peak Conducted Output Power and E.I.R.P., Conducted Spurious Emission, Band Edge Measurement (Conducted), Power Spectral Density and Occupied Bandwidth.



## 2. General Information

### 2.1 Test Methodology

All measurement subject to the present test report is carried out according to the procedures in ANSI C63.10-2013.

### 2.2 Test Facility

The measurement was carried out at the following facility.

Cosmos Corporation EMC Lab. Oonoki  
3571-2 Oonoki, Watarai-cho, Watarai-gun, Mie-ken 516-2102, Japan

- ☒ Semi anechoic Chamber 3 m (COAC3M-01)
- ☐ Shielded Room (COSR-01)
- ☒ Measurement Room

Cosmos Corporation EMC Lab. Oonoki is accredited in accordance with the International Standard ISO/IEC 17025 by the following accreditation bodies and the test facility is registered by the following bodies.

Accreditation: A2LA Accredited Laboratory No. 2900.01  
VLAC Accredited Laboratory. No. VLAC-039-2  
FCC Designation No. JP5198  
ISED Canada CAB identifier : JP0007

Registration: ISED Canada Registration No. 3958E

### 2.3 Traceability

The calibration of measurement equipment used in the test subject to the present report is designed and operated to ensure that the measurement is traceable to national standards of measurement or equivalent abroad.



### 3. Summary of Test Results

These test results are the test results of the condition specified with “4. Test Condition”.

| FCC Section | ISED Section    | Test Item                                        | FCC Result | ISED Result |
|-------------|-----------------|--------------------------------------------------|------------|-------------|
| 15.207      | RSS-Gen 8.8     | AC Power Line Conducted Emission                 | N/A *      | N/A *       |
| 15.209      | RSS-Gen 8.9     | Transmitter Spurious Emission (Radiated)         | PASS       | PASS        |
| 15.247(a)   | RSS-247 5.2(1)  | 6 dB Bandwidth                                   | PASS       | PASS        |
| 15.247(b)   | RSS-247 5.4     | Maximum Peak Conducted Output Power and E.I.R.P. | PASS       | PASS        |
| 15.247(d)   | RSS-247         | Conducted Spurious Emission                      | PASS       | PASS        |
| 15.247(d)   | ---             | Band Edge Measurement                            | PASS       | ---         |
| 15.247(e)   | RSS-247 5.2(2)  | Power Spectral Density                           | PASS       | PASS        |
| ---         | RSS-Gen Annex A | Occupied Bandwidth                               | ---        | PASS        |
| ---         | RSS-Gen 7.3     | Receiver Spurious Emission (Radiated)            | ---        | PASS        |

Note:

\*: The EUT is battery-operated equipment.

\*: This item is not applicable because the operation is not performed when USB cable is connected.



## 4. Test Condition

### 4.1 Mode of Operation

Mode of operation : Wireless LAN

Note:

The EUT makes communication emission with the maximum RF power by a special test program.  
Setting: +11dBm

#### Worst Case Mode

|                                                  |                                                                                               |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Transmitter Spurious Emission (Radiated)         | Below 1 GHz:<br>IEEE802.11b, 11Mbps, 1ch and 6ch<br>Above 1 GHz:<br>IEEE802.11g, 54Mbps, 11ch |
| 6 dB Bandwidth                                   | IEEE802.11b, 11Mbps, 6ch                                                                      |
| Maximum Peak Conducted Output Power and E.I.R.P. | IEEE802.11g, 54Mbps, 1ch                                                                      |
| Conducted Spurious Emission                      | IEEE802.11g, 54Mbps, 11ch                                                                     |
| Band Edge Measurement                            | IEEE802.11g, 54Mbps, 1ch                                                                      |
| Power Spectral Density                           | IEEE802.11b, 11Mbps, 1ch                                                                      |
| Occupied Bandwidth                               | IEEE802.11g, 54Mbps, 6ch                                                                      |
| Receiver Spurious Emission (Radiated)            | Rx, 1ch                                                                                       |

### 4.2 Additional Equipment

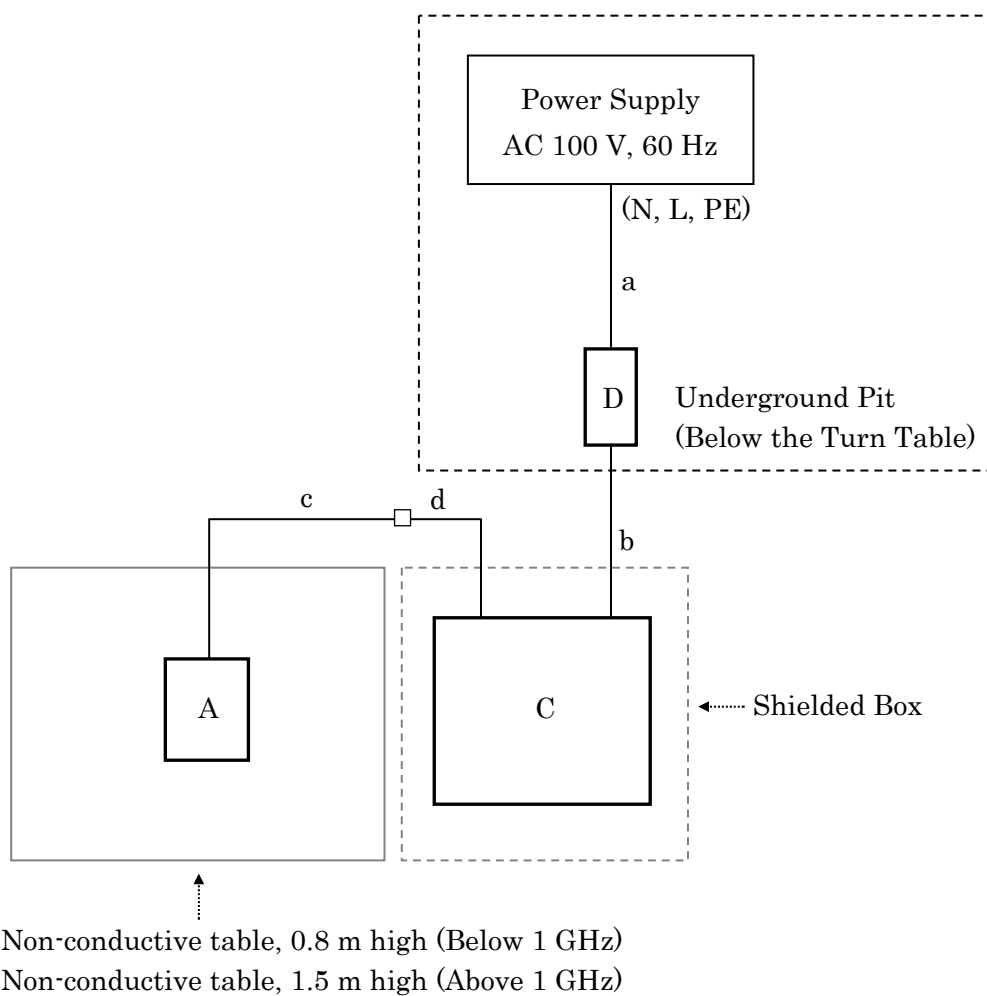
The equipment was tested together with additional peripherals.  
The following peripherals were used during the tests:

| Instrument        | Model           | Serial No. | Manufacturer |
|-------------------|-----------------|------------|--------------|
| Personal Computer | HP x2 210 G2 PC | 5CD70812S3 | HP           |
| AC Adapter        | TPN-CA01        | ---        | HP           |

### 4.3 Configuration

|          | Equipment                            | Model                         |          | Cable         | Length | Shield |
|----------|--------------------------------------|-------------------------------|----------|---------------|--------|--------|
| <b>A</b> | EUT1<br>(NTN PORTABLE<br>VIBROSCOPE) | DAT-HV0002<br>(S/N: IMVN0058) | <b>a</b> | AC power cord | 1.0 m  | ×      |
|          |                                      |                               | <b>b</b> | DC power cord | 1.8 m  | ×      |
|          |                                      |                               | <b>c</b> | USB Cable     | 1.0 m  | ○      |
| <b>B</b> | EUT2<br>(NTN PORTABLE<br>VIBROSCOPE) | DAT-HV0002<br>(S/N: IMVN0070) | <b>d</b> | USB Cable     | 2.0 m  | ○      |
|          |                                      |                               |          |               |        |        |
|          |                                      |                               |          |               |        |        |
| <b>C</b> | Personal Computer                    | HP x2 210 G2 PC               |          |               |        |        |
| <b>D</b> | AC Adapter                           | TPN-CA01                      |          |               |        |        |

Transmitter Spurious Emission (Radiated)  
Receiver Spurious Emission (Radiated) / Band Edge Measurement

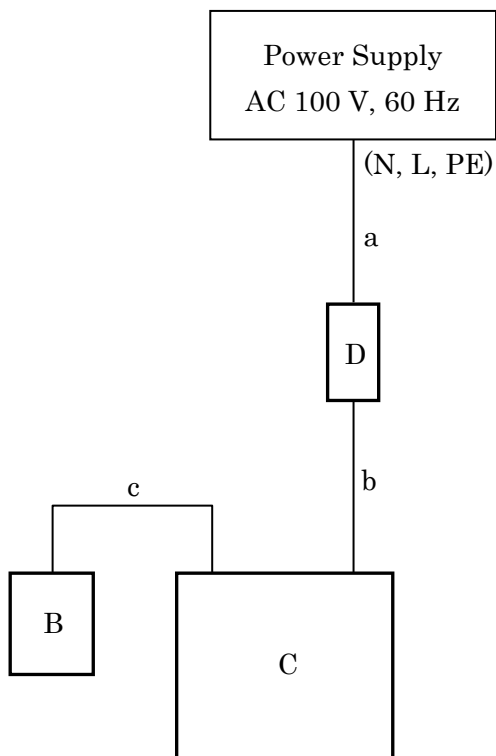


□ Connector



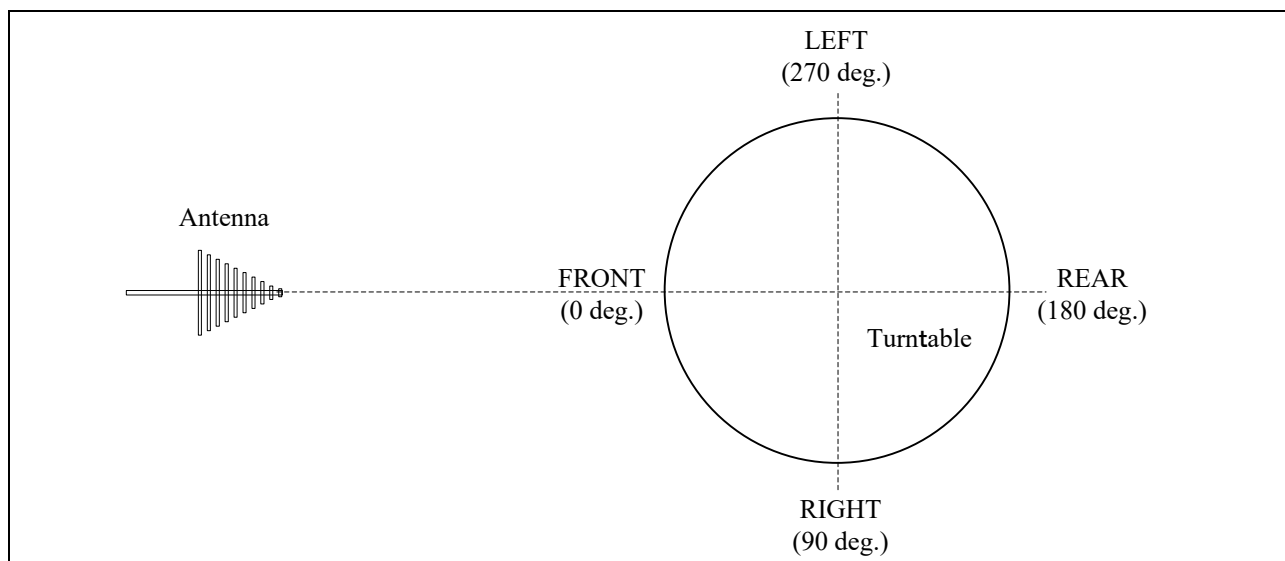
#### 4.3 Configuration (Continued)

6 dB Bandwidth / Maximum Peak Conducted Output Power and E.I.R.P. /  
Conducted Spurious Emission / Power Spectral Density /  
Occupied Bandwidth / Band Edge Measurement





#### 4.4 EUT Angle





## 5. Test Result

### 5.1 Transmitter Spurious Emission (Radiated) (15.209, RSS-Gen 8.9)

#### 5.1.1 Setting Remarks

The test was performed in accordance with ANSI C63.10 clause 6.5 and 6.6.

In the frequency range from 30 MHz to 25 GHz (as 10th harmonics), the electric field strength was measured in accordance with ANSI C63.10-2013.

The test setup was made in accordance with ANSI C63.10-2013 on the table installed in a semi-anechoic chamber. The non-conductive table was placed on the turntable, and the EUT was put on the non-conductive table. The EUT was measured at 1 m to 4 m height of the antenna.

The turntable was fully rotated. The highest radiation from the equipment was recorded.

The measurement was carried out with both horizontal and vertical antenna polarization.

The test receiver with Peak, Quasi Peak and Average detector is in accordance with CISPR 16-1-1.

The measurement was carried out with the measuring distance of 3 m.

Setting Condition of Test receiver

| Frequency range | Detector   | RBW     |
|-----------------|------------|---------|
| 30 MHz to 1 GHz | Quasi peak | 120 kHz |
| 1 GHz to 25 GHz | Peak       | 1 MHz   |
|                 | Average    | 1 MHz   |

#### 5.1.2 Limit

| Frequency range    | Field Strength (Distance) |                |
|--------------------|---------------------------|----------------|
|                    | [ $\mu$ V/m]              | [dB $\mu$ V/m] |
| 30 MHz to 88 MHz   | 100 (3 m)                 | 40.0 (3 m)     |
| 88 MHz to 216 MHz  | 150 (3 m)                 | 43.5 (3 m)     |
| 216 MHz to 960 MHz | 200 (3 m)                 | 46.0 (3 m)     |
| Above 960 MHz      | 500 (3 m)                 | 53.9 (3 m)     |



### 5.1.3 Test Detail

**Result: PASS**

|                                   |   |                   |                   |
|-----------------------------------|---|-------------------|-------------------|
| Uncertainty of measurement result | : | ±4.30 dB          |                   |
| Engineer                          | : | K. Miyaji         |                   |
| Date of testing                   | : | November 16, 2019 | November 19, 2019 |
| Room temperature                  | : | 23°C              | 24°C              |
| Relative humidity                 | : | 47%               | 51%               |
|                                   |   |                   |                   |
| Date of testing                   | : | November 20, 2019 | November 22, 2019 |
| Room temperature                  | : | 22°C              | 22°C              |
| Relative humidity                 | : | 44%               | 49%               |
|                                   |   |                   |                   |
| Date of testing                   | : | November 29, 2019 | December 2, 2019  |
| Room temperature                  | : | 20°C              | 21°C              |
| Relative humidity                 | : | 47%               | 50%               |
|                                   |   |                   |                   |
| Date of testing                   | : | December 4, 2019  | December 5, 2019  |
| Room temperature                  | : | 22°C              | 20°C              |
| Relative humidity                 | : | 43%               | 42%               |

#### Sample Calculation

$$\begin{aligned}\text{Result} &= \text{Reading} + \text{c.f} \\ &= 35.1 + (-5.8) \\ &= 29.3\end{aligned}$$

$$\begin{aligned}\text{Margin} &= \text{Limit} - \text{Result} \\ &= 46.0 - 29.3 \\ &= 16.7\end{aligned}$$

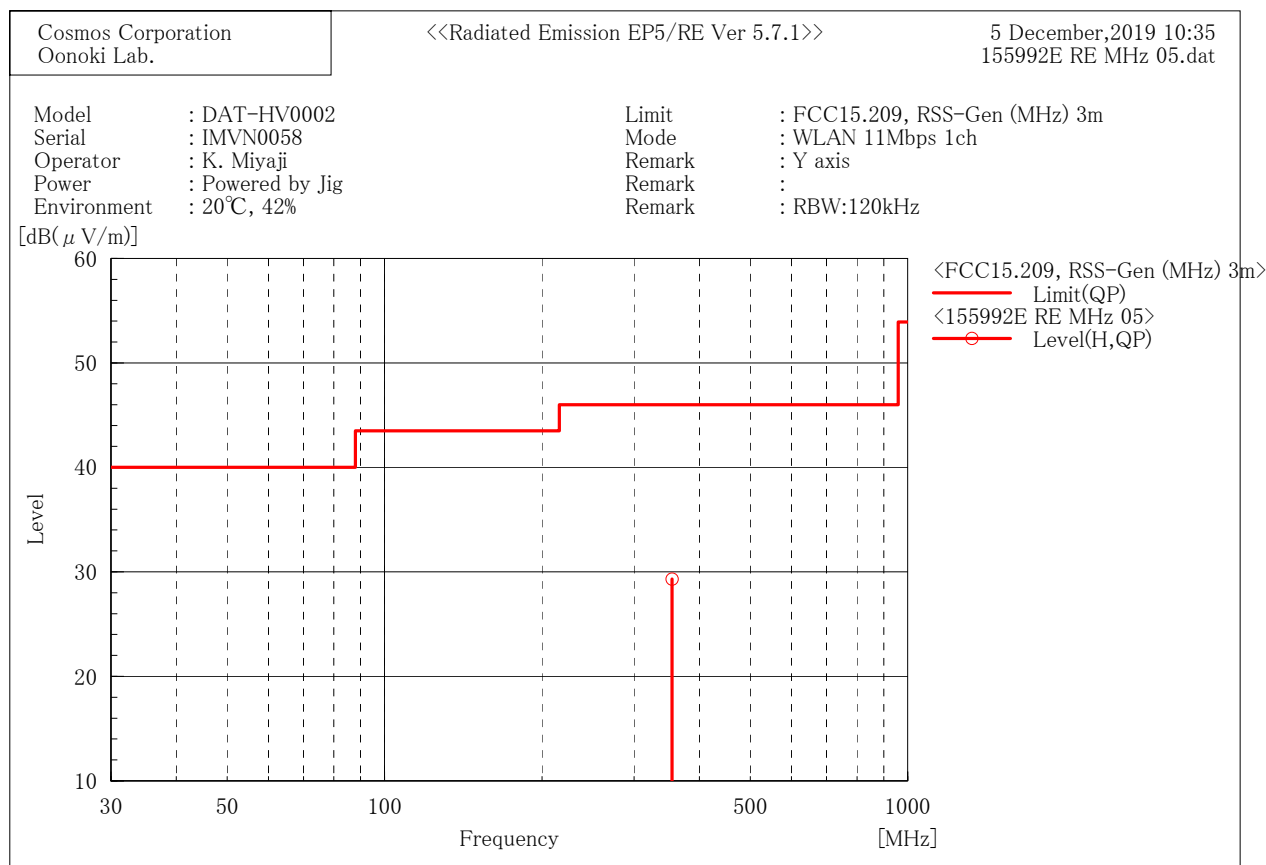
Note:

$$\text{c.f (Correction Factor)} = \text{Cable Attenuation Factor} + \text{Antenna Factor} + \text{Amplifier Gain}$$



### 5.1.3 Test Detail (Continued)

#### <30 MHz to 1 GHz> Test Data (11Mbps 1ch)



#### Final Result

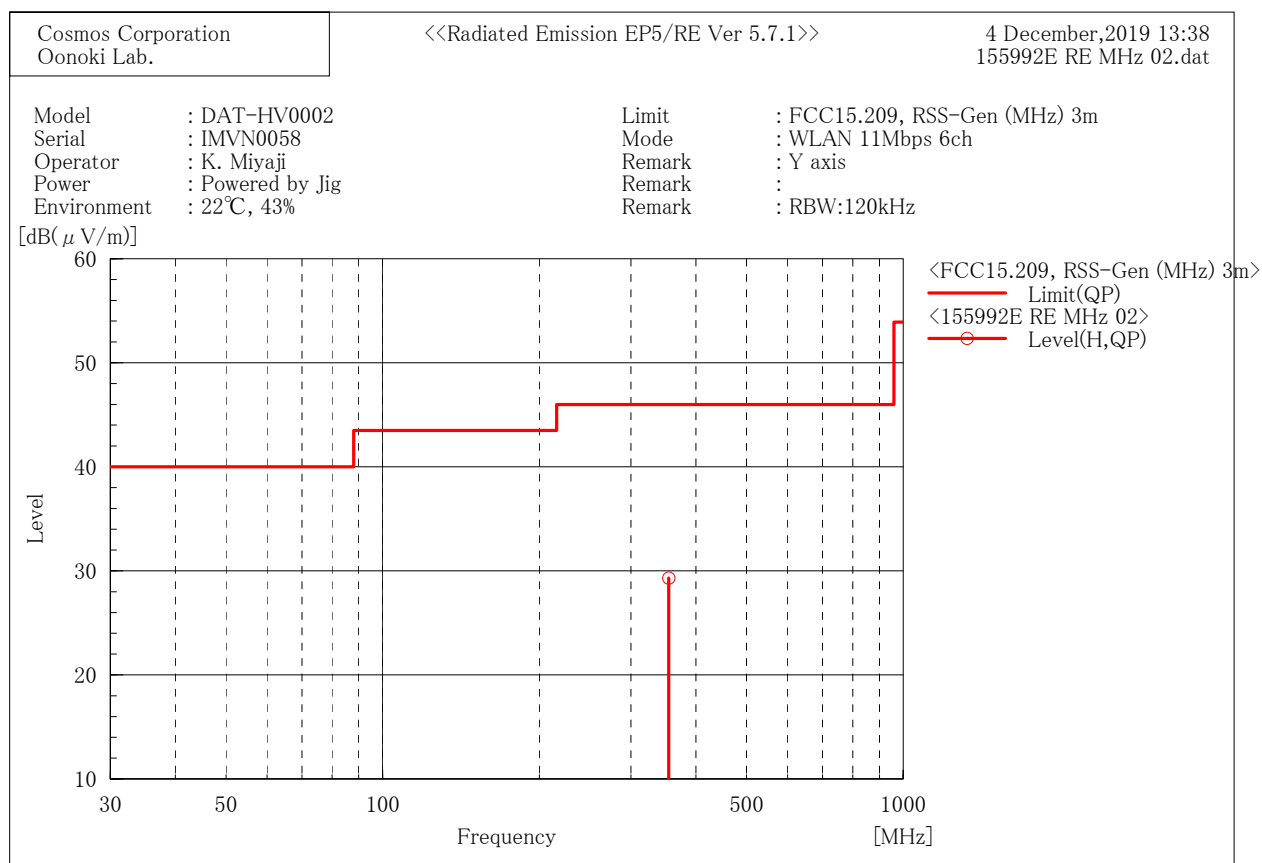
--- Horizontal Polarization (QP)---

| No. | Frequency<br>[MHz] | Reading<br>[dB(μV)] | c.f<br>[dB(1/m)] | Result<br>[dB(μV/m)] | Limit<br>[dB(μV/m)] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] |
|-----|--------------------|---------------------|------------------|----------------------|---------------------|----------------|----------------|--------------|
| 1   | 354.460            | 35.1                | -5.8             | 29.3                 | 46.0                | 16.7           | 100.0          | 272.0        |



### 5.1.3 Test Detail (Continued)

#### <30 MHz to 1 GHz> Test Data (11Mbps 6ch)



#### Final Result

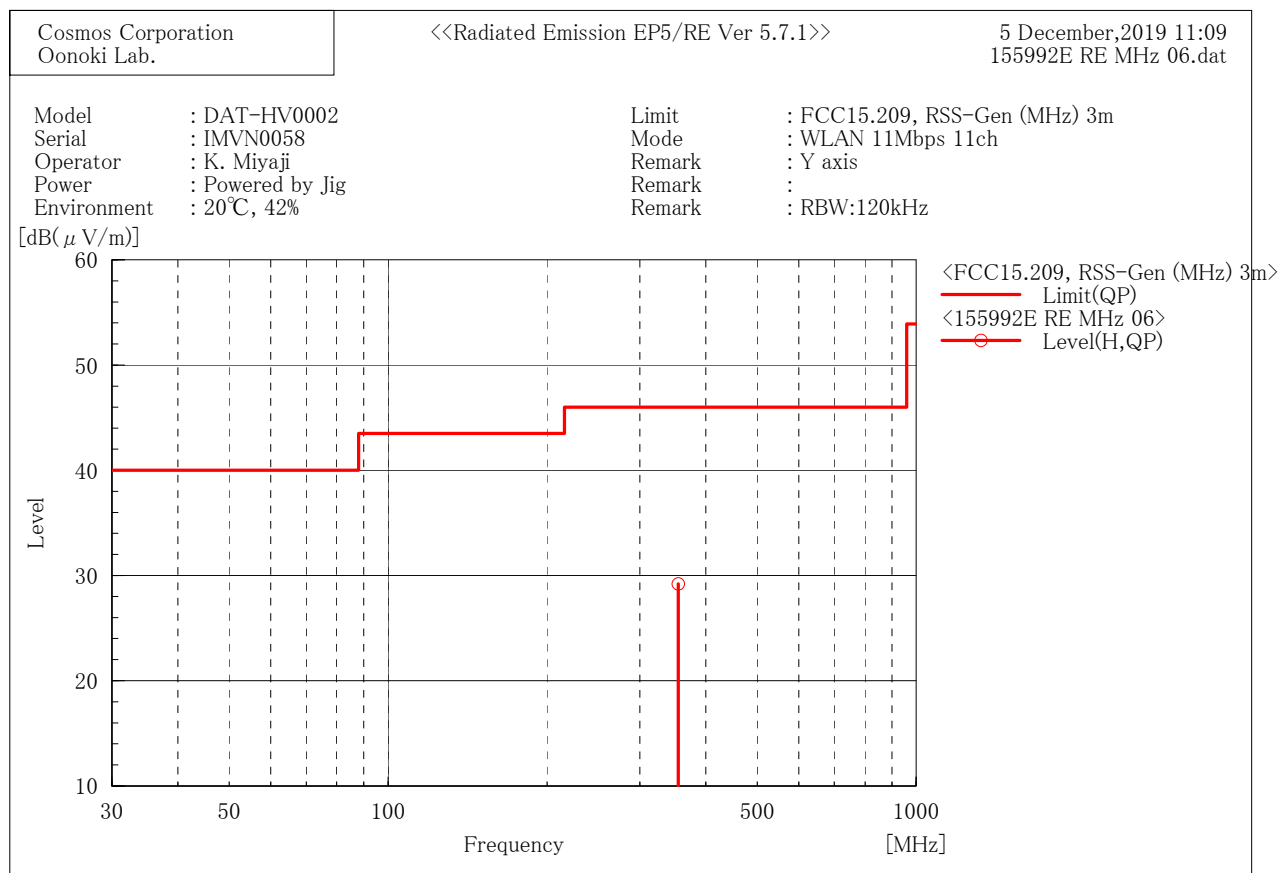
--- Horizontal Polarization (QP)---

| No. | Frequency<br>[MHz] | Reading<br>[dB(μV)] | c.f<br>[dB(1/m)] | Result<br>[dB(μV/m)] | Limit<br>[dB(μV/m)] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] |
|-----|--------------------|---------------------|------------------|----------------------|---------------------|----------------|----------------|--------------|
| 1   | 354.460            | 35.1                | -5.8             | 29.3                 | 46.0                | 16.7           | 100.0          | 269.0        |



### 5.1.3 Test Detail (Continued)

#### <30 MHz to 1 GHz> Test Data (11Mbps 11ch)



#### Final Result

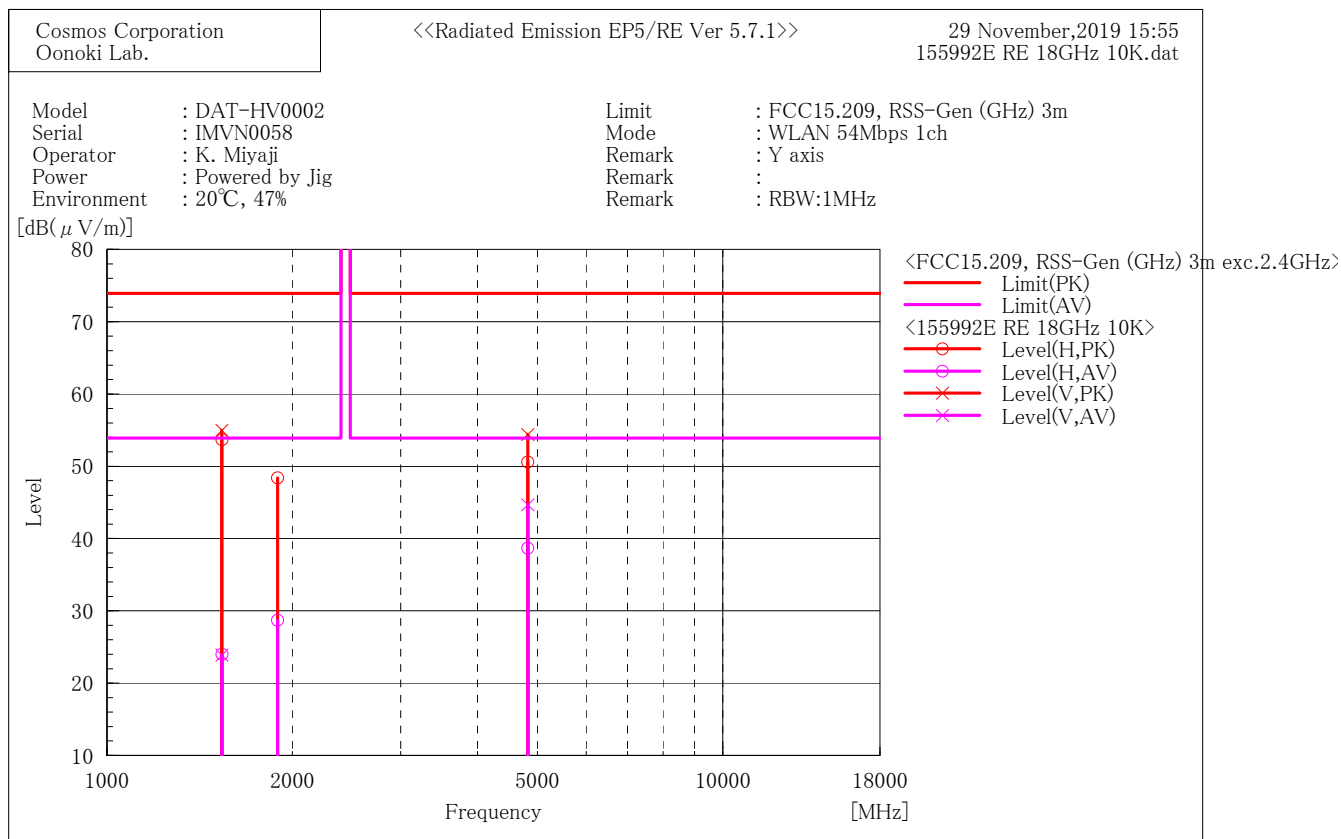
--- Horizontal Polarization (QP)---

| No. | Frequency<br>[MHz] | Reading<br>[dB(μV)] | c.f<br>[dB(1/m)] | Result<br>[dB(μV/m)] | Limit<br>[dB(μV/m)] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] |
|-----|--------------------|---------------------|------------------|----------------------|---------------------|----------------|----------------|--------------|
| 1   | 354.460            | 35.0                | -5.8             | 29.2                 | 46.0                | 16.8           | 100.0          | 278.0        |



### 5.1.3 Test Detail (Continued)

#### <1 GHz to 18 GHz> Test Data (54Mbps 1ch)



#### Final Result

##### --- Horizontal Polarization (PK)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1537.738        | 60.4             | -6.7          | 53.7              | 73.9             | 20.2        | 124.0       | 259.0     |
| 2   | 1892.200        | 53.4             | -5.0          | 48.4              | 73.9             | 25.5        | 197.0       | 231.0     |
| 3   | 4823.940        | 47.2             | 3.4           | 50.6              | 73.9             | 23.3        | 100.0       | 158.0     |

##### --- Horizontal Polarization (AV)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1537.738        | 30.7             | -6.7          | 24.0              | 53.9             | 29.9        | 124.0       | 259.0     |
| 2   | 1892.200        | 33.7             | -5.0          | 28.7              | 53.9             | 25.2        | 197.0       | 231.0     |
| 3   | 4823.940        | 35.3             | 3.4           | 38.7              | 53.9             | 15.2        | 100.0       | 158.0     |

##### --- Vertical Polarization (PK)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1536.725        | 61.7             | -6.7          | 55.0              | 73.9             | 18.9        | 100.0       | 15.0      |
| 2   | 4823.905        | 51.0             | 3.4           | 54.4              | 73.9             | 19.5        | 264.0       | 102.0     |

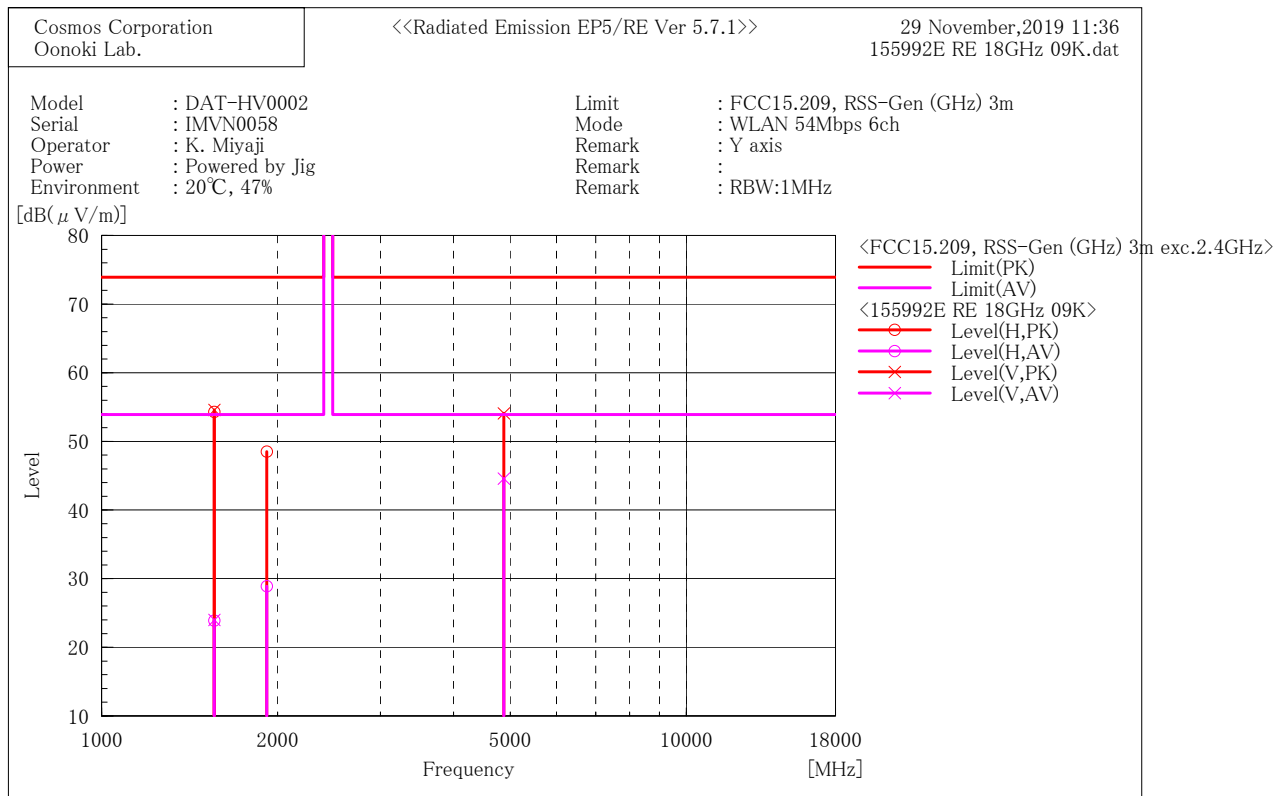
##### --- Vertical Polarization (AV)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1536.725        | 30.6             | -6.7          | 23.9              | 53.9             | 30.0        | 100.0       | 15.0      |
| 2   | 4823.905        | 41.3             | 3.4           | 44.7              | 53.9             | 9.2         | 264.0       | 102.0     |



### 5.1.3 Test Detail (Continued)

#### <1 GHz to 18 GHz> Test Data (54Mbps 6ch)



#### Final Result

##### --- Horizontal Polarization (PK)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c. f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|----------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1558.350        | 61.1             | -6.8           | 54.3              | 73.9             | 19.6        | 115.0       | 267.0     |
| 2   | 1916.960        | 53.3             | -4.8           | 48.5              | 73.9             | 25.4        | 113.0       | 224.0     |

##### --- Horizontal Polarization (AV)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c. f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|----------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1558.350        | 30.7             | -6.8           | 23.9              | 53.9             | 30.0        | 115.0       | 267.0     |
| 2   | 1916.960        | 33.7             | -4.8           | 28.9              | 53.9             | 25.0        | 113.0       | 224.0     |

##### --- Vertical Polarization (PK)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c. f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|----------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1559.080        | 61.4             | -6.8           | 54.6              | 73.9             | 19.3        | 119.0       | 15.0      |
| 2   | 4873.960        | 50.5             | 3.6            | 54.1              | 73.9             | 19.8        | 267.0       | 97.0      |

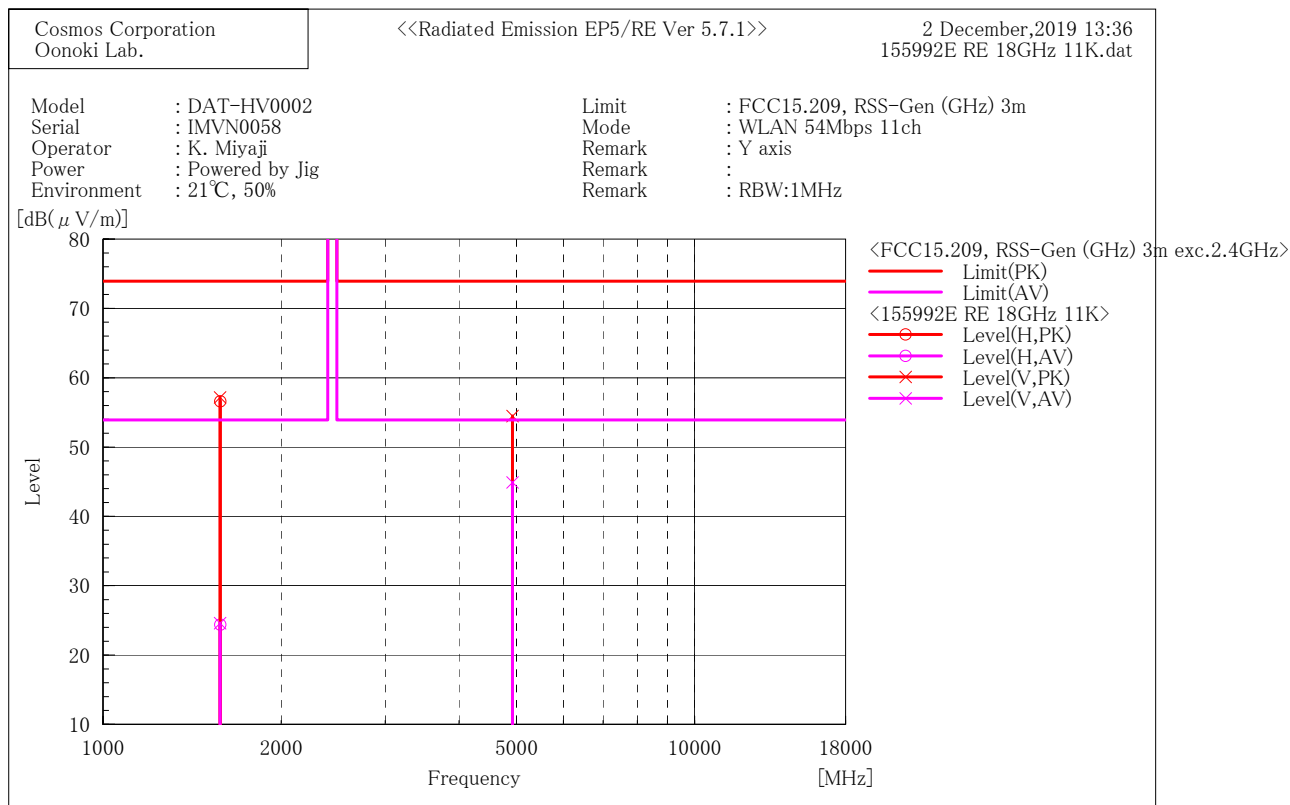
##### --- Vertical Polarization (AV)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c. f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|----------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1559.080        | 30.8             | -6.8           | 24.0              | 53.9             | 29.9        | 119.0       | 15.0      |
| 2   | 4873.960        | 41.0             | 3.6            | 44.6              | 53.9             | 9.3         | 267.0       | 97.0      |



### 5.1.3 Test Detail (Continued)

#### <1 GHz to 18 GHz> Test Data (54Mbps 11ch)



#### Final Result

##### --- Horizontal Polarization (PK)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1578.567        | 63.3             | -6.7          | 56.6              | 73.9             | 17.3        | 121.0       | 263.0     |

##### --- Horizontal Polarization (AV)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1578.567        | 31.1             | -6.7          | 24.4              | 53.9             | 29.5        | 121.0       | 263.0     |

##### --- Vertical Polarization (PK)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1577.400        | 63.9             | -6.7          | 57.2              | 73.9             | 16.7        | 123.0       | 31.0      |
| 2   | 4923.907        | 50.6             | 3.9           | 54.5              | 73.9             | 19.4        | 276.0       | 106.0     |

##### --- Vertical Polarization (AV)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 1577.400        | 31.3             | -6.7          | 24.6              | 53.9             | 29.3        | 123.0       | 31.0      |
| 2   | 4923.907        | 41.0             | 3.9           | 44.9              | 53.9             | 9.0         | 276.0       | 106.0     |



### 5.1.3 Test Detail (Continued)

<18 GHz to 25 GHz>

No spurious emission for RF module was found in 18 GHz to 25 GHz.



## 5.2 6 dB Bandwidth (15.247(a), RSS-247 5.2(1))

### 5.2.1 Setting Remarks

The both side of 6 dB down value from peak power were measured by using 6 dB bandwidth measurement function in accordance with ANSI C63.10 clause 11.8.

The spectrum analyzer is set as following:

|                       |            |
|-----------------------|------------|
| ·Frequency Span       | : 3 MHz    |
| ·Resolution Bandwidth | : 100 kHz  |
| ·Video Bandwidth      | : 300 kHz  |
| ·Detector Mode        | : Peak     |
| ·Trace Mode           | : Max Hold |

### 5.2.2 Limit

Systems using digital modulation techniques may operate in the 902 MHz to 928 MHz, 2400 MHz to 2483.5 MHz, and 5725 MHz to 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 5.2.3 Test Detail

**Result: PASS**

|                                   |                    |                   |
|-----------------------------------|--------------------|-------------------|
| Uncertainty of measurement result | : $\pm 0.25\%$     |                   |
| Engineer                          | : K. Miyaji        |                   |
| Date of testing                   | : October 17, 2019 | November 28, 2019 |
| Room temperature                  | : 24°C             | 24°C              |
| Relative humidity                 | : 55%              | 55%               |



### 5.2.3 Test Detail (Continued)

**Test Data (11Mbps)**

| Frequency | Measured<br>Bandwidth |
|-----------|-----------------------|
|           | [MHz]                 |
| 2412 MHz  | 10.280                |
| 2437 MHz  | 9.520                 |
| 2462 MHz  | 10.320                |

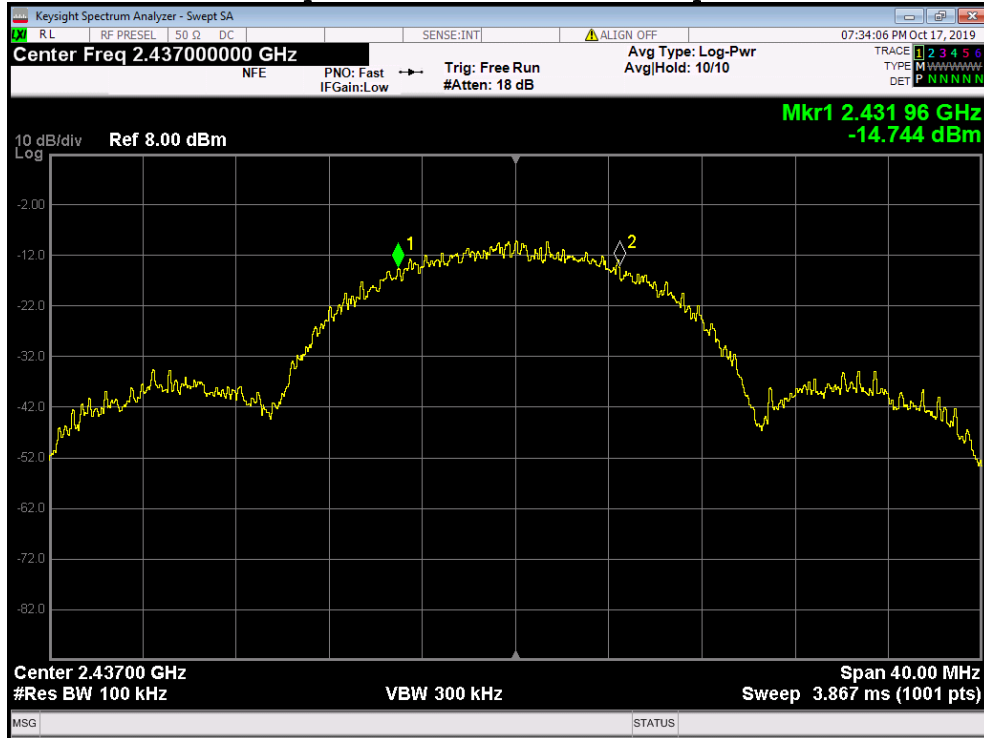
**Test Data (54Mbps)**

| Frequency | Measured<br>Bandwidth |
|-----------|-----------------------|
|           | [MHz]                 |
| 2412 MHz  | 16.400                |
| 2437 MHz  | 16.400                |
| 2462 MHz  | 16.400                |

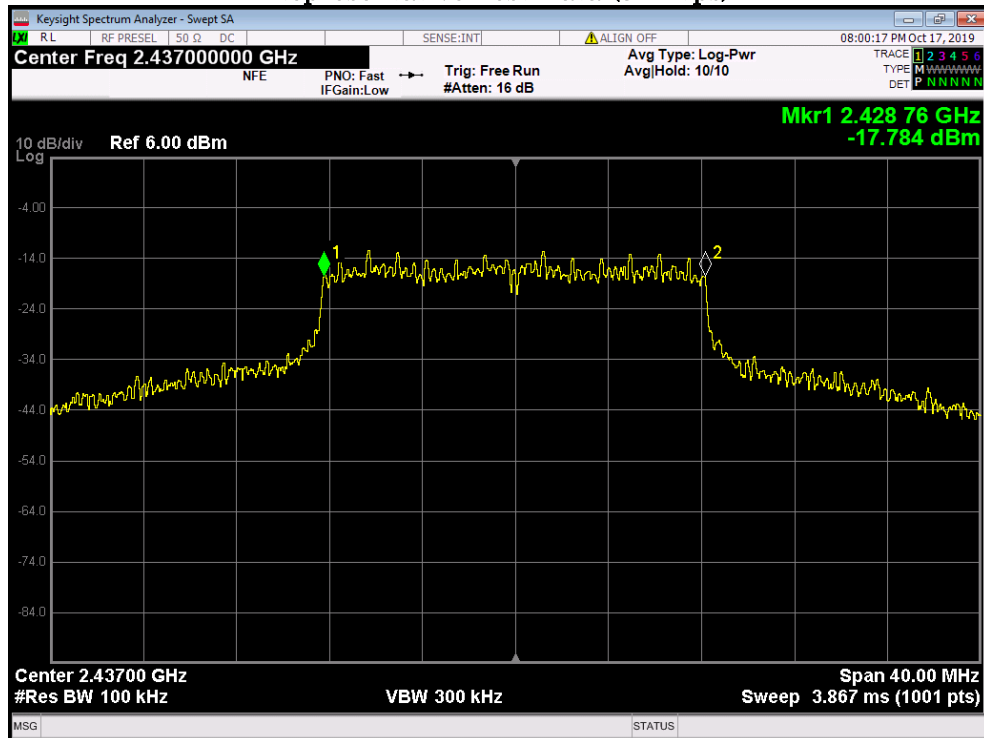


### 5.2.3 Test Detail (Continued)

Representative Test Data (11Mbps)



Representative Test Data (54Mbps)





### 5.3 Maximum Peak Conducted Output Power and E.I.R.P. (15.247(b), RSS-247 5.4)

#### 5.3.1 Setting Remarks

The test was performed in accordance with ANSI C63.10 clause 11.9.1.2.

The spectrum analyzer is set as following:

|                       |                                 |
|-----------------------|---------------------------------|
| ·Frequency Span       | : $1.5 \times \text{Bandwidth}$ |
| ·Resolution Bandwidth | : 1 MHz                         |
| ·Video Bandwidth      | : $3 \times \text{RBW}$         |
| ·Detector Mode        | : Peak                          |
| ·Trace Mode           | : Max Hold                      |

#### 5.3.2 Limit

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands: 1 Watt.

#### 5.3.3 Test Detail

**Result: PASS**

|                                   |                         |                      |
|-----------------------------------|-------------------------|----------------------|
| Uncertainty of measurement result | : $\pm 2.52 \text{ dB}$ |                      |
| Engineer                          | : K. Miyaji             |                      |
| Date of testing                   | : October 17, 2019      | November 28, 2019    |
| Room temperature                  | : $24^{\circ}\text{C}$  | $24^{\circ}\text{C}$ |
| Relative humidity                 | : 55%                   | 55%                  |



### 5.3.3 Test Detail (Continued)

Sample Calculation

$$\begin{aligned}\text{Margin} &= \text{Limit} - \text{Peak Power} \\ &= 30 - 8.61 \\ &= 21.4\end{aligned}$$

**Conducted Output Power (11Mbps)**

| Frequency | Peak Power [dBm] | Limit [dBm] | Margin [dB] |
|-----------|------------------|-------------|-------------|
| 2412 MHz  | 8.61             | 30          | 21.4        |
| 2437 MHz  | 7.93             | 30          | 22.1        |
| 2462 MHz  | 7.49             | 30          | 22.5        |

**Conducted Output Power (54Mbps)**

| Frequency | Peak Power [dBm] | Limit [dBm] | Margin [dB] |
|-----------|------------------|-------------|-------------|
| 2412 MHz  | 9.44             | 30          | 20.6        |
| 2437 MHz  | 9.19             | 30          | 20.8        |
| 2462 MHz  | 8.66             | 30          | 21.3        |

**E.I.R.P. Data (11Mbps)**

| Frequency | E.I.R.P [dBm] | Limit [dBm] | Margin [dB] |
|-----------|---------------|-------------|-------------|
| 2412 MHz  | 9.71          | 36          | 26.29       |
| 2437 MHz  | 9.03          | 36          | 26.97       |
| 2462 MHz  | 8.59          | 36          | 27.41       |

**E.I.R.P. Data (54Mbps)**

| Frequency | E.I.R.P [dBm] | Limit [dBm] | Margin [dB] |
|-----------|---------------|-------------|-------------|
| 2412 MHz  | 10.54         | 36          | 25.46       |
| 2437 MHz  | 10.29         | 36          | 25.71       |
| 2462 MHz  | 9.76          | 36          | 26.24       |



### 5.3.3 Test Detail (Continued)

**Test Data (Worst Data Rate Check)**

| Standard<br>/ Modulation  | Data Rate [Mbps] | Power<br>[dBm] |
|---------------------------|------------------|----------------|
| IEEE<br>802.11b<br>(DSSS) | 1                | 4.53           |
|                           | 2                | 4.96           |
|                           | 5.5              | 6.42           |
|                           | 11               | 7.93           |
| IEEE<br>802.11g<br>(OFDM) | 6                | 8.39           |
|                           | 9                | 8.62           |
|                           | 12               | 8.47           |
|                           | 18               | 8.43           |
|                           | 24               | 8.73           |
|                           | 36               | 8.78           |
|                           | 48               | 8.76           |
|                           | 54               | 9.19           |



## 5.4 Conducted Spurious Emission (15.247(d), RSS-247 5.5)

### 5.4.1 Setting Remarks

The test was performed in accordance with ANSI C63.10 clause 6.7.

The Spectrums are scanned from the lowest generated frequency of EUT up to the 10th harmonics by using the spectrum analyzer.

The spectrum analyzer is set as following:

|                       |            |
|-----------------------|------------|
| ·Resolution Bandwidth | : 100 kHz  |
| ·Video Bandwidth      | : 300 kHz  |
| ·Detector Mode        | : Peak     |
| ·Trace Mode           | : Max Hold |

### 5.4.2 Limit

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

### 5.4.3 Test Detail

**Result: PASS**

|                                   |                     |
|-----------------------------------|---------------------|
| Uncertainty of measurement result | : $\pm 2.52$ dB     |
| Engineer                          | : K. Miyaji         |
| Date of testing                   | : November 28, 2019 |
| Room temperature                  | : 24°C              |
| Relative humidity                 | : 55%               |



#### 5.4.3 Test Detail (Continued)

Test Data (11Mbps)

| Fundamental Frequency | Frequency |     | Relative value [dBc] | Limit [dB] | Margin [dB] |
|-----------------------|-----------|-----|----------------------|------------|-------------|
| 2412 MHz              | 2.3983    | GHz | -26.94               | -20        | 6.9         |
|                       | 2.052     | GHz | -58.60               | -20        | 38.6        |
|                       | 1.8519    | GHz | -59.69               | -20        | 39.7        |

| Fundamental Frequency | Frequency |     | Relative value [dBc] | Limit [dB] | Margin [dB] |
|-----------------------|-----------|-----|----------------------|------------|-------------|
| 2437 MHz              | 2.277437  | GHz | -60.26               | -20        | 40.3        |
|                       | 1.917     | GHz | -60.72               | -20        | 40.7        |
|                       | 2.357717  | GHz | -60.77               | -20        | 40.8        |

| Fundamental Frequency | Frequency |     | Relative value [dBc] | Limit [dB] | Margin [dB] |
|-----------------------|-----------|-----|----------------------|------------|-------------|
| 2462 MHz              | 2.4884    | GHz | -47.47               | -20        | 27.5        |
|                       | 2.542     | GHz | -60.42               | -20        | 40.4        |
|                       | 1.9848    | GHz | -61.03               | -20        | 41.0        |



#### 5.4.3 Test Detail (Continued)

Test Data (54Mbps)

| Fundamental Frequency | Frequency  | Relative value [dBc] | Limit [dB] | Margin [dB] |
|-----------------------|------------|----------------------|------------|-------------|
| 2412 MHz              | 880.9 MHz  | -36.75               | -20        | 16.8        |
|                       | 1530.9 GHz | -25.58               | -20        | 5.6         |
|                       | 3297.3 GHz | -43.55               | -20        | 23.6        |

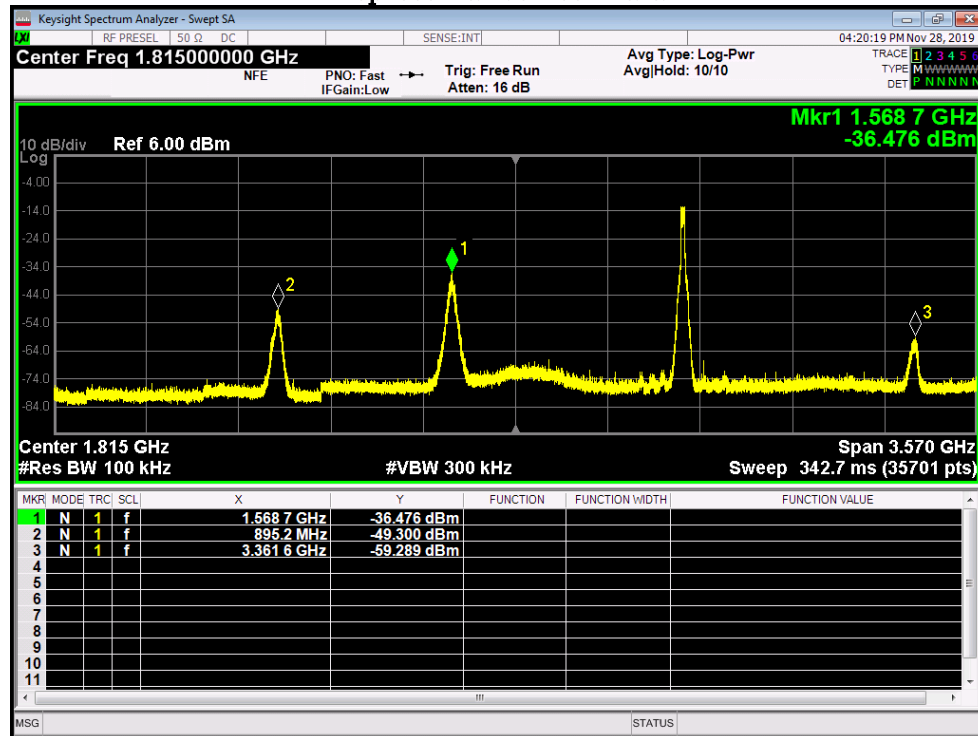
| Fundamental Frequency | Frequency  | Relative value [dBc] | Limit [dB] | Margin [dB] |
|-----------------------|------------|----------------------|------------|-------------|
| 2437 MHz              | 890.9 MHz  | -38.53               | -20        | 18.5        |
|                       | 1549.1 GHz | -27.10               | -20        | 7.1         |
|                       | 3327.4 GHz | -44.08               | -20        | 24.1        |

| Fundamental Frequency | Frequency  | Relative value [dBc] | Limit [dB] | Margin [dB] |
|-----------------------|------------|----------------------|------------|-------------|
| 2462 MHz              | 895.2 MHz  | -38.00               | -20        | 18.0        |
|                       | 1568.7 GHz | -24.71               | -20        | 4.7         |
|                       | 3361.6 GHz | -46.46               | -20        | 26.5        |

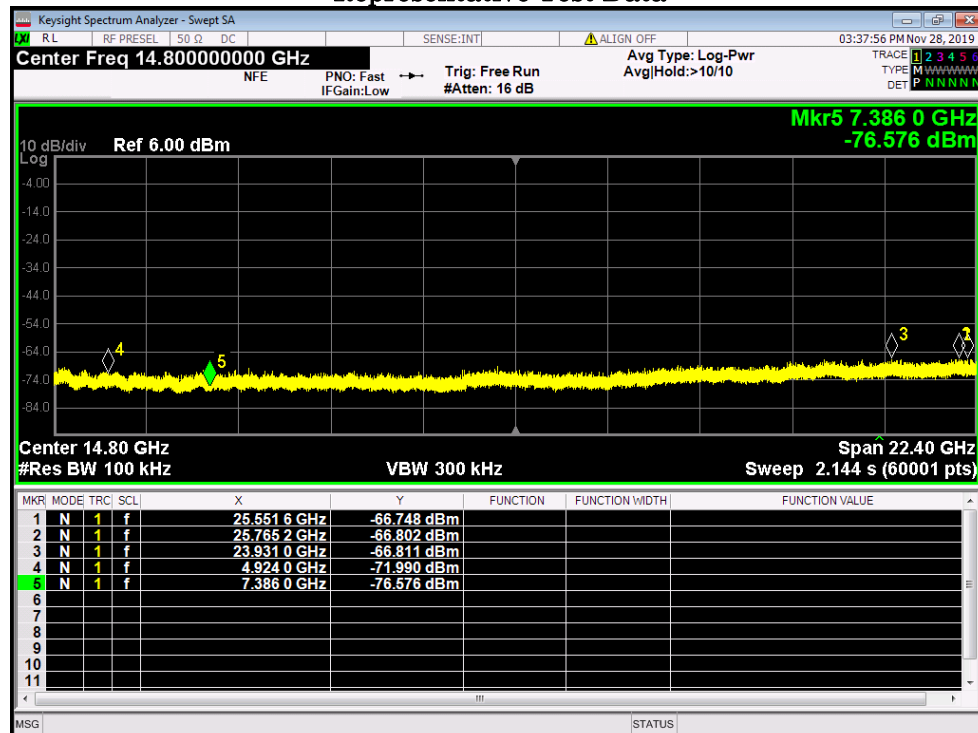


### 5.4.3 Test Detail (Continued)

#### Representative Test Data



#### Representative Test Data





## 5.5 Band Edge Measurement (15.247(d))

### 5.5.1 Setting Remarks

The test was performed in accordance with ANSI C63.10 clause 6.10.

The test setup was made in accordance with ANSI C63.10-2013 on the table installed in a semi-anechoic chamber. The non-conductive table, 0.8 m high, was placed on the turntable, and the EUT was put on the non-conductive table. The EUT was measured at 1 m to 4 m height of the antenna. The turntable was fully rotated. The highest radiation from the equipment was recorded. The measurement was carried out with both horizontal and vertical antenna polarization. This measurement is repeated in both side of the spectrum. The test receiver with Peak, Quasi Peak and Average detector is in accordance with CISPR 16-1-1. The measurement was carried out with the measuring distance of 3 m.

Setting Condition of Analyzer

| Detector | RBW   |
|----------|-------|
| Peak     | 1 MHz |
| Average  | 1 MHz |

### 5.5.2 Test Detail

**Result: PASS**

#### Conducted Measurement

Uncertainty of measurement result :  $\pm 2.52$  dB  
Engineer : K. Miyaji  
Date of testing : December 3, 2019  
Room temperature : 23°C  
Relative humidity : 46%

#### Radiated Measurement

Uncertainty of measurement result :  $\pm 4.30$  dB  
Engineer : K. Miyaji  
Date of testing : November 29, 2019      December 2, 2019  
Room temperature : 20°C      21°C  
Relative humidity : 47%      50%



## 5.5.2 Test Detail (Continued)

[Conducted Measurement]

Sample Calculation

$$\begin{aligned}\text{Relative value} &= \text{Band Edge (Reading)} - \text{Fundamental (Reading)} \\ &= -33.405 - (-8.879) \\ &= -24.526\end{aligned}$$

$$\begin{aligned}\text{Margin} &= \text{Limit} - \text{Relative value} \\ &= -20 - (-24.526) \\ &= 4.526\end{aligned}$$

### Test Data

IEEE802.11b

| Operating Frequency [MHz] | Measurement Frequency [MHz] | Fundamental (Reading) [dBm] | Band Edge (Reading) [dBm] | Relative value [dBc] | Limit [dB] | Margin [dB] |
|---------------------------|-----------------------------|-----------------------------|---------------------------|----------------------|------------|-------------|
| 2412                      | 2396.46                     | -8.879                      | -33.405                   | -24.526              | -20        | 4.526       |
| 2462                      | 2488.4                      | -9.532                      | -57.008                   | -47.476              | -20        | 27.476      |

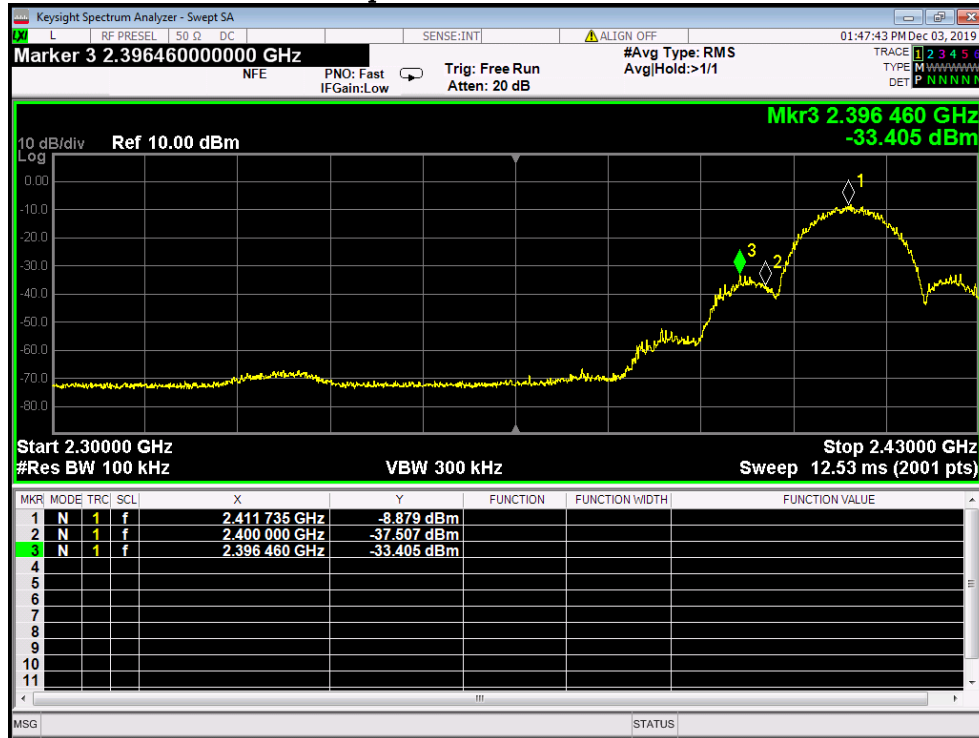
IEEE802.11g

| Operating Frequency [MHz] | Measurement Frequency [MHz] | Fundamental (Reading) [dBm] | Band Edge (Reading) [dBm] | Relative value [dBc] | Limit [dB] | Margin [dB] |
|---------------------------|-----------------------------|-----------------------------|---------------------------|----------------------|------------|-------------|
| 2412                      | 2399.45                     | -11.988                     | -33.882                   | -21.894              | -20        | 1.894       |
| 2462                      | 2483.5                      | -12.536                     | -45.842                   | -33.306              | -20        | 13.306      |

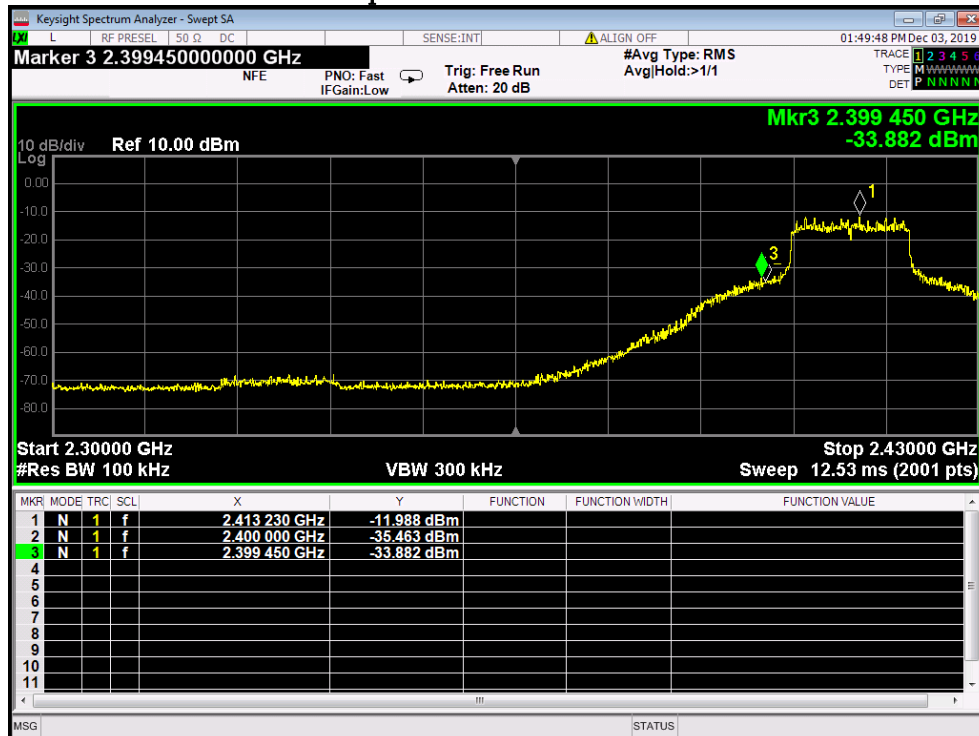


## 5.5.2 Test Detail (Continued)

### Representative Test Data



### Representative Test Data





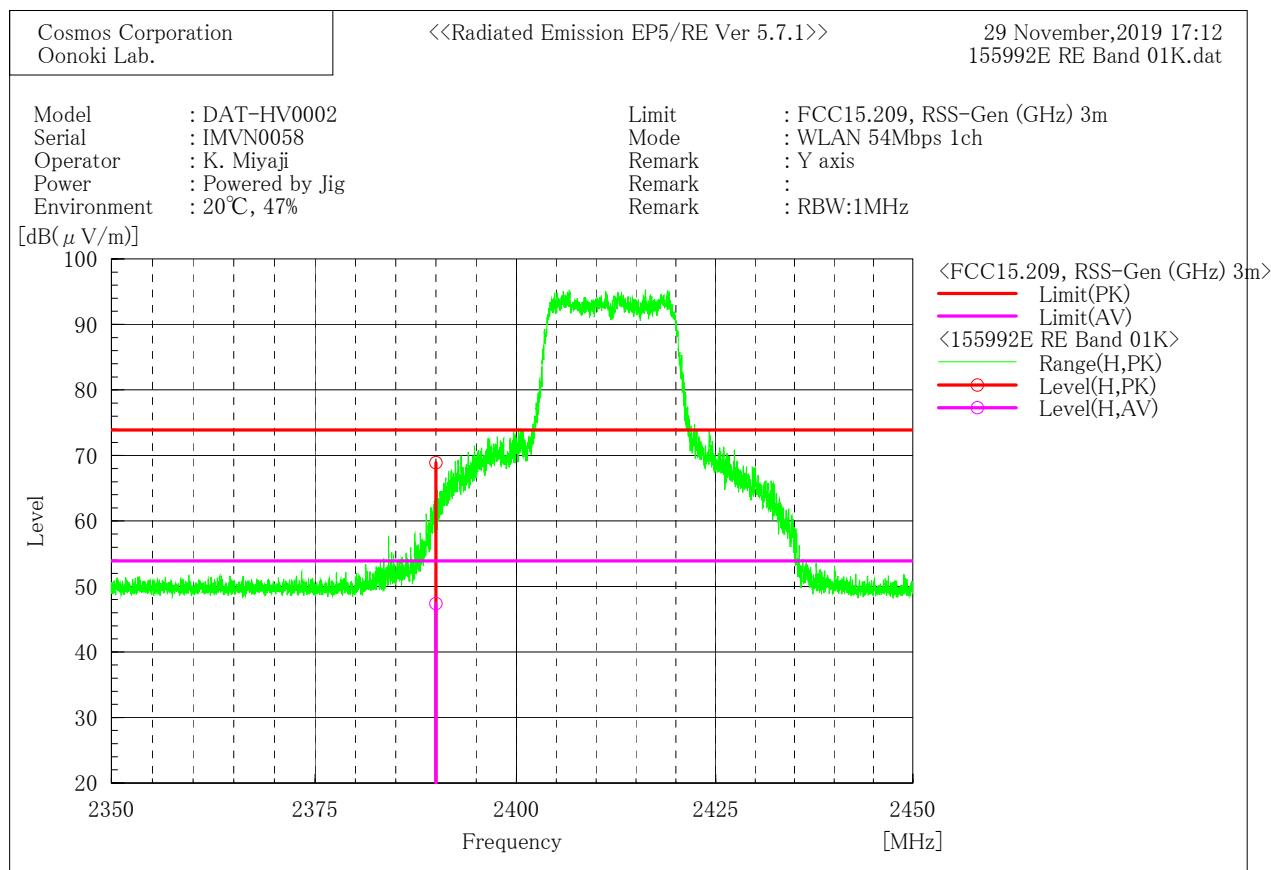
## 5.5.2 Test Detail (Continued)

[Radiated Measurement]

Result = Reading + c.f  
= 58.6 + 10.3  
= 68.9

Margin = Limit – Result  
= 73.9 – 68.9  
= 5.0

### Test Data (54Mbps 1ch)



### Final Result

--- Horizontal Polarization (PK)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 2390.000        | 58.6             | 10.3          | 68.9              | 73.9             | 5.0         | 181.0       | 168.0     |

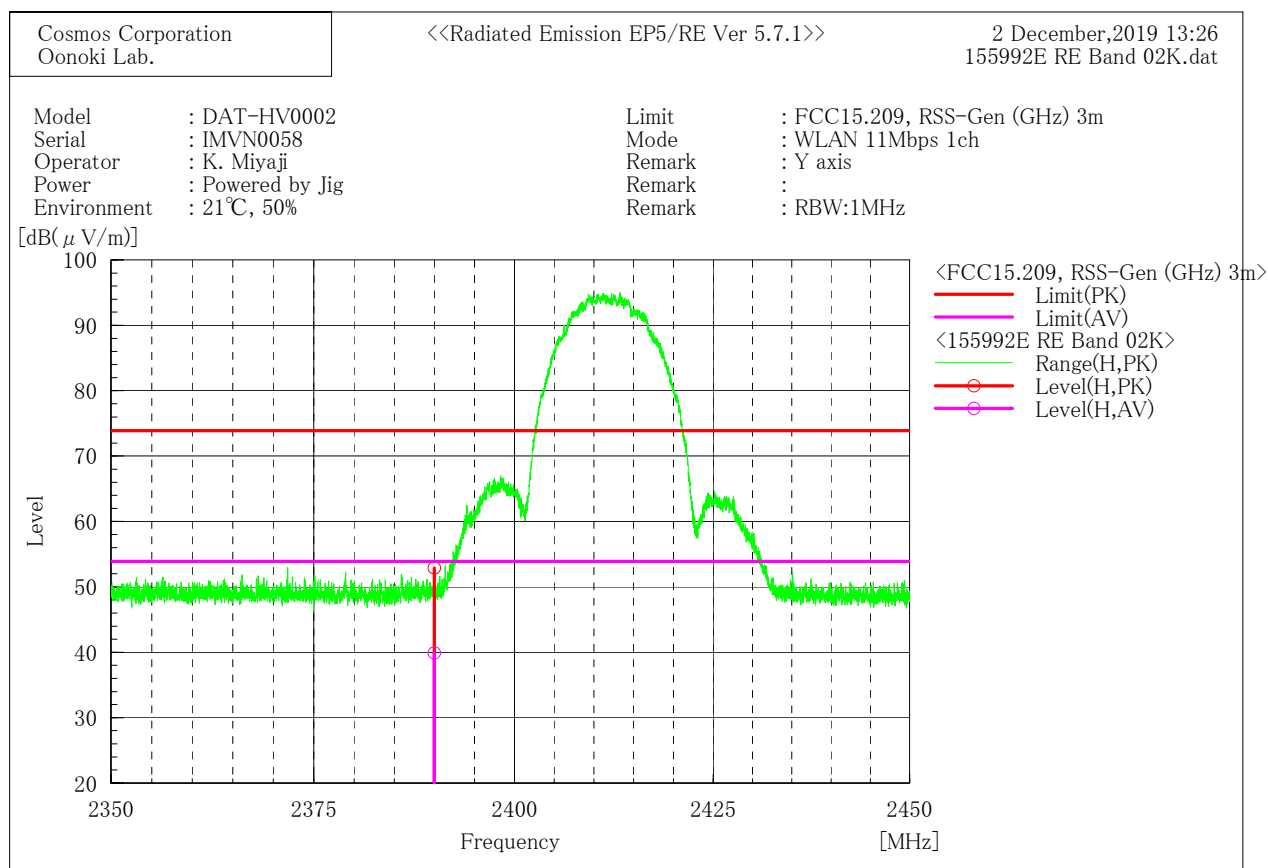
--- Horizontal Polarization (AV)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 2390.000        | 37.1             | 10.3          | 47.4              | 53.9             | 6.5         | 181.0       | 168.0     |



## 5.5.2 Test Detail (Continued)

### Test Data (11Mbps 1ch)



### Final Result

#### --- Horizontal Polarization (PK)---

| No. | Frequency<br>[MHz] | Reading<br>[dB( $\mu$ V)] | c. f<br>[dB(1/m)] | Result<br>[dB( $\mu$ V/m)] | Limit<br>[dB( $\mu$ V/m)] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] |
|-----|--------------------|---------------------------|-------------------|----------------------------|---------------------------|----------------|----------------|--------------|
| 1   | 2390.000           | 42.6                      | 10.3              | 52.9                       | 73.9                      | 21.0           | 181.0          | 168.0        |

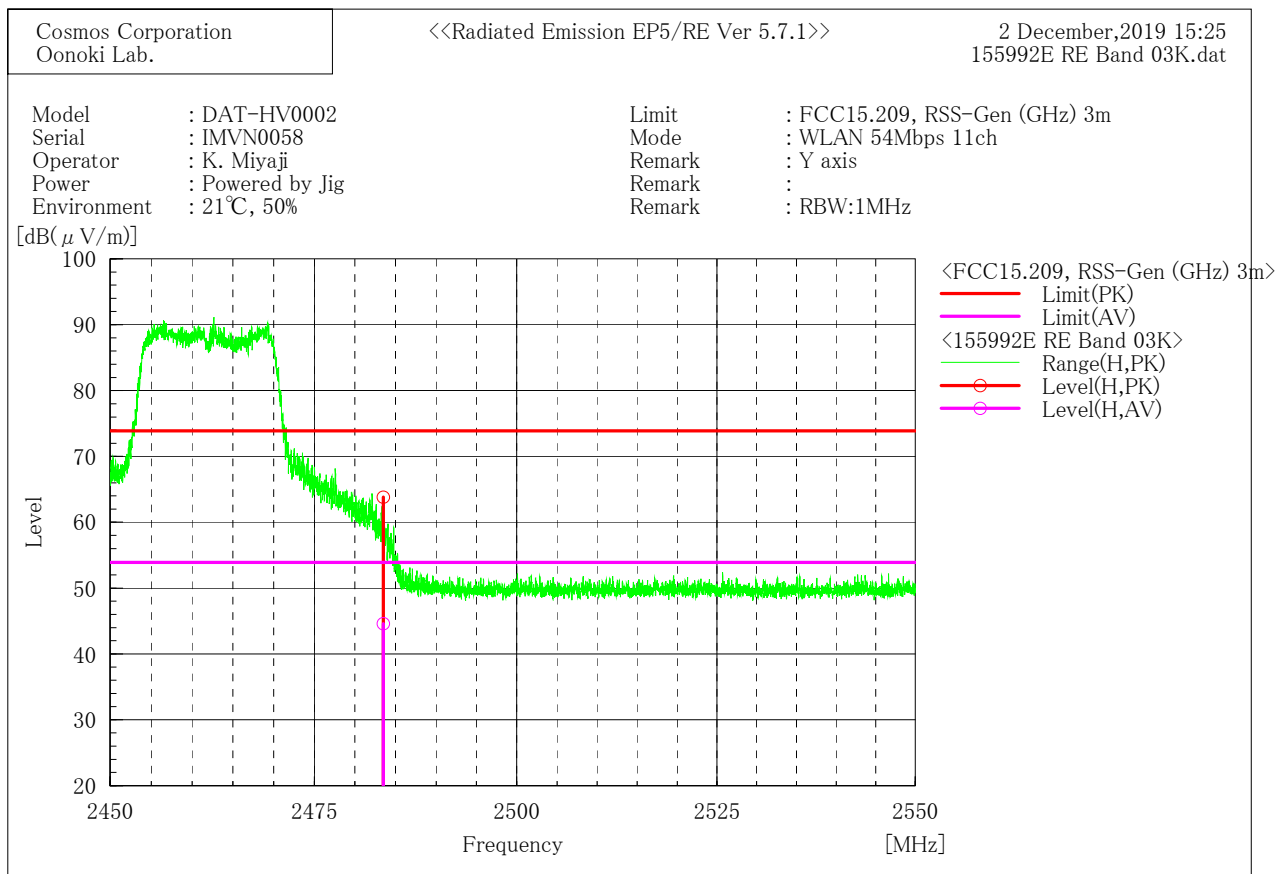
#### --- Horizontal Polarization (AV)---

| No. | Frequency<br>[MHz] | Reading<br>[dB( $\mu$ V)] | c. f<br>[dB(1/m)] | Result<br>[dB( $\mu$ V/m)] | Limit<br>[dB( $\mu$ V/m)] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] |
|-----|--------------------|---------------------------|-------------------|----------------------------|---------------------------|----------------|----------------|--------------|
| 1   | 2390.000           | 29.6                      | 10.3              | 39.9                       | 53.9                      | 14.0           | 181.0          | 168.0        |



## 5.5.2 Test Detail (Continued)

### Test Data (54Mbps 11ch)



#### Final Result

##### --- Horizontal Polarization (PK)---

| No. | Frequency [MHz] | Reading [dB( $\mu$ V)] | c. f [dB(1/m)] | Result [dB( $\mu$ V/m)] | Limit [dB( $\mu$ V/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------------|----------------|-------------------------|------------------------|-------------|-------------|-----------|
| 1   | 2483.500        | 53.7                   | 10.1           | 63.8                    | 73.9                   | 10.1        | 214.0       | 163.0     |

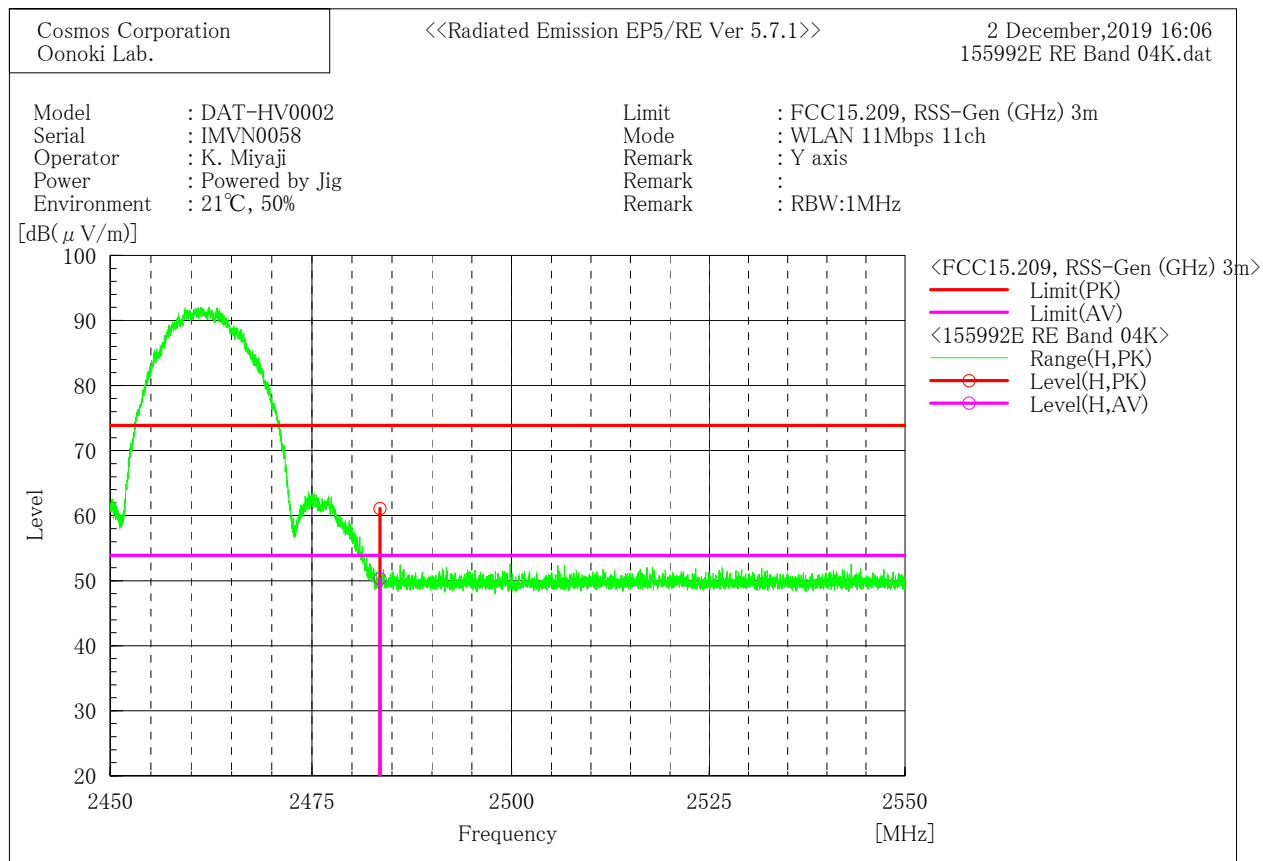
##### --- Horizontal Polarization (AV)---

| No. | Frequency [MHz] | Reading [dB( $\mu$ V)] | c. f [dB(1/m)] | Result [dB( $\mu$ V/m)] | Limit [dB( $\mu$ V/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------------|----------------|-------------------------|------------------------|-------------|-------------|-----------|
| 1   | 2483.500        | 34.5                   | 10.1           | 44.6                    | 53.9                   | 9.3         | 214.0       | 163.0     |



## 5.5.2 Test Detail (Continued)

### Test Data (11Mbps 11ch)



#### Final Result

##### --- Horizontal Polarization (PK)---

| No. | Frequency<br>[MHz] | Reading<br>[dB( $\mu$ V)] | c. f<br>[dB(1/m)] | Result<br>[dB( $\mu$ V/m)] | Limit<br>[dB( $\mu$ V/m)] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] |
|-----|--------------------|---------------------------|-------------------|----------------------------|---------------------------|----------------|----------------|--------------|
| 1   | 2483.500           | 51.0                      | 10.1              | 61.1                       | 73.9                      | 12.8           | 214.0          | 163.0        |

##### --- Horizontal Polarization (AV)---

| No. | Frequency<br>[MHz] | Reading<br>[dB( $\mu$ V)] | c. f<br>[dB(1/m)] | Result<br>[dB( $\mu$ V/m)] | Limit<br>[dB( $\mu$ V/m)] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] |
|-----|--------------------|---------------------------|-------------------|----------------------------|---------------------------|----------------|----------------|--------------|
| 1   | 2483.500           | 40.2                      | 10.1              | 50.3                       | 53.9                      | 3.6            | 214.0          | 163.0        |



## 5.6 Power Spectral Density (15.247(e), RSS-247 5.2(2))

### 5.6.1 Setting Remarks

The test was performed in accordance with ANSI C63.10 clause 11.10.2.

The spectrum analyzer is set as following:

|                       |                                |
|-----------------------|--------------------------------|
| ·Frequency Span       | : Approx. 1.5 × 6 dB Bandwidth |
| ·Resolution Bandwidth | : 3 kHz                        |
| ·Video Bandwidth      | : 10 kHz                       |
| ·Detector Mode        | : Peak                         |
| ·Trace Mode           | : Max Hold                     |

### 5.6.2 Limit

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

### 5.6.3 Test Detail

**Result: PASS**

|                                   |                     |
|-----------------------------------|---------------------|
| Uncertainty of measurement result | : ±2.52 dB          |
| Engineer                          | : K. Miyaji         |
| Date of testing                   | : November 28, 2019 |
| Room temperature                  | : 24°C              |
| Relative humidity                 | : 55%               |

Sample Calculation

$$\begin{aligned}\text{Power Spectral Density} &= \text{Reading} + \text{Correction Factor} \\ &= -10.147 + 2.7437 \\ &= -7.4\end{aligned}$$

$$\begin{aligned}\text{Margin} &= \text{Limit} - \text{Power Spectral Density} \\ &= 8.0 - (-7.4) \\ &= 15.4\end{aligned}$$



### 5.6.3 Test Detail (Continued)

**Test Data (11Mbps)**

| Frequency | Reading [dBm] | Correction Factor [dB] | Power Spectral Density [dBm] | Limit [dBm] | Margin [dB] |
|-----------|---------------|------------------------|------------------------------|-------------|-------------|
| 2412 MHz  | -10.147       | 2.7437                 | -7.4                         | 8.0         | 15.4        |
| 2437 MHz  | -10.508       | 2.7185                 | -7.79                        | 8.0         | 15.8        |
| 2462 MHz  | -11.038       | 2.6617                 | -8.38                        | 8.0         | 16.4        |

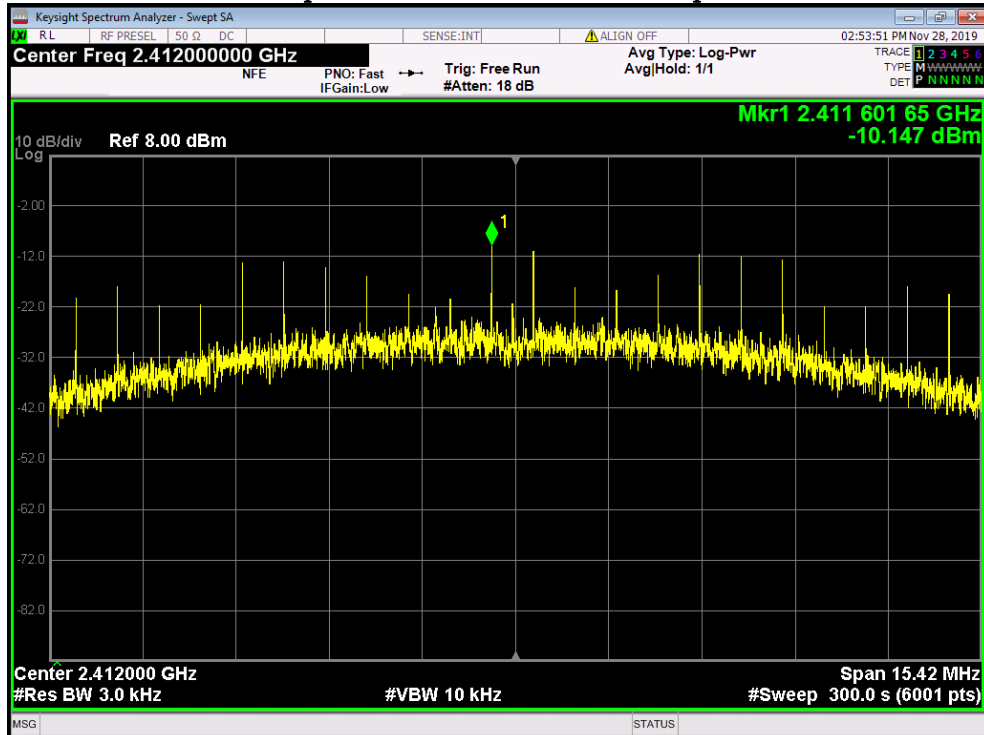
**Test Data (54Mbps)**

| Frequency | Reading [dBm] | Correction Factor [dB] | Power Spectral Density [dBm] | Limit [dBm] | Margin [dB] |
|-----------|---------------|------------------------|------------------------------|-------------|-------------|
| 2412 MHz  | -23.392       | 2.7437                 | -20.65                       | 8.0         | 28.7        |
| 2437 MHz  | -23.684       | 2.7185                 | -20.97                       | 8.0         | 29.0        |
| 2462 MHz  | -23.418       | 2.6617                 | -20.76                       | 8.0         | 28.8        |

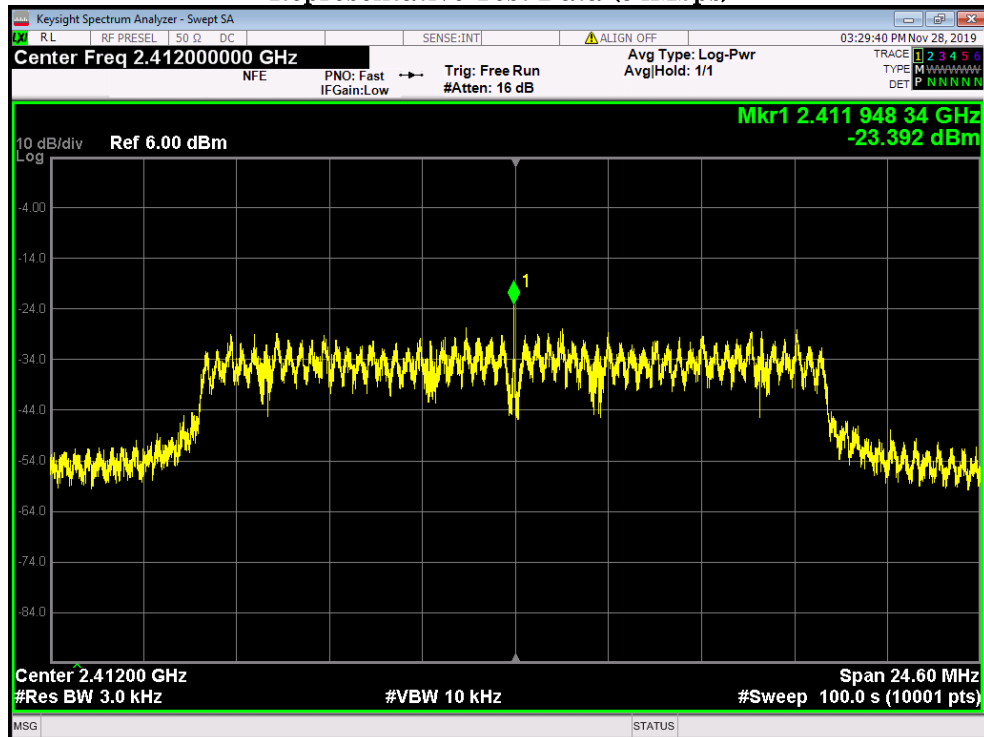


### 5.6.3 Test Detail (Continued)

Representative Test Data (11Mbps)



Representative Test Data (54Mbps)





## 5.7 Occupied Bandwidth (RSS-Gen Annex A)

### 5.7.1 Setting Remarks

The test was performed in accordance with ANSI C63.10 clause 6.9.3.

Occupied Bandwidth is measured by using 99% Bandwidth measurement function.

The spectrum analyzer is set as following:

- Resolution Bandwidth : 1% to 5% of the OBW (not less than 1 kHz)
- Video Bandwidth : Approx.  $3 \times$  RBW or greater
- Detector Mode : Peak
- Trace Mode : Max Hold

### 5.7.2 Test Detail

**Result: PASS**

- Uncertainty of measurement result :  $\pm 0.25\%$
- Engineer : K. Miyaji
- Date of testing : November 28, 2019
- Room temperature :  $24^{\circ}\text{C}$
- Relative humidity : 55%

**Test Data (11Mbps)**

| Frequency | Measured Bandwidth |
|-----------|--------------------|
|           | [MHz]              |
| 2412 MHz  | 16.32              |
| 2437 MHz  | 16.08              |
| 2462 MHz  | 16.16              |

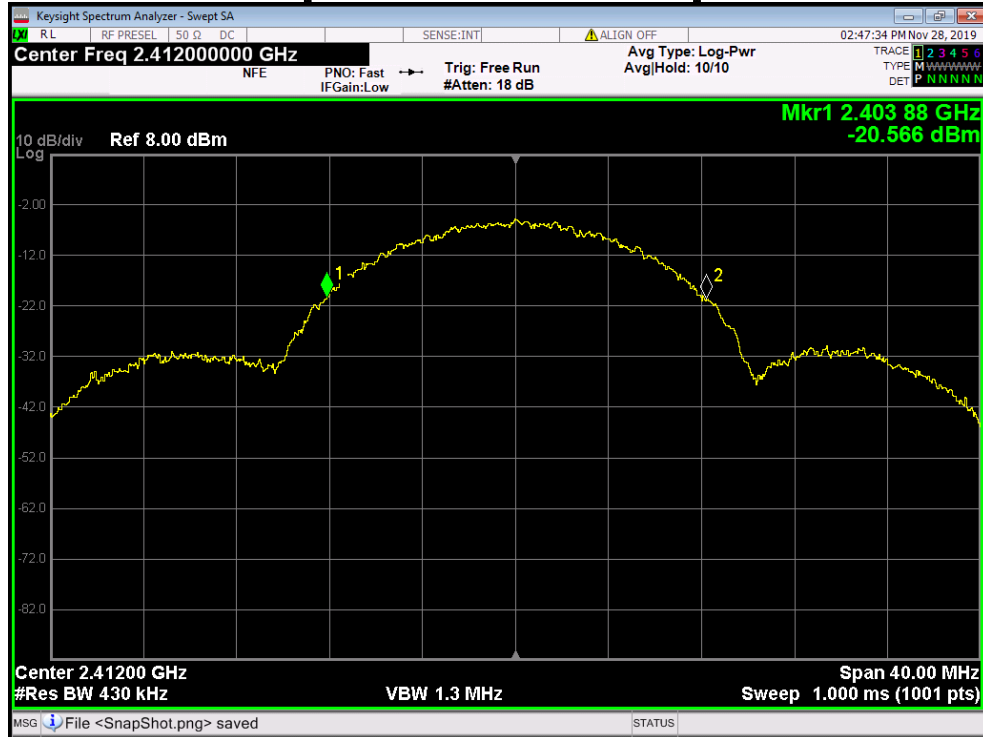
**Test Data (54Mbps)**

| Frequency | Measured Bandwidth |
|-----------|--------------------|
|           | [MHz]              |
| 2412 MHz  | 19.52              |
| 2437 MHz  | 20.44              |
| 2462 MHz  | 19.6               |

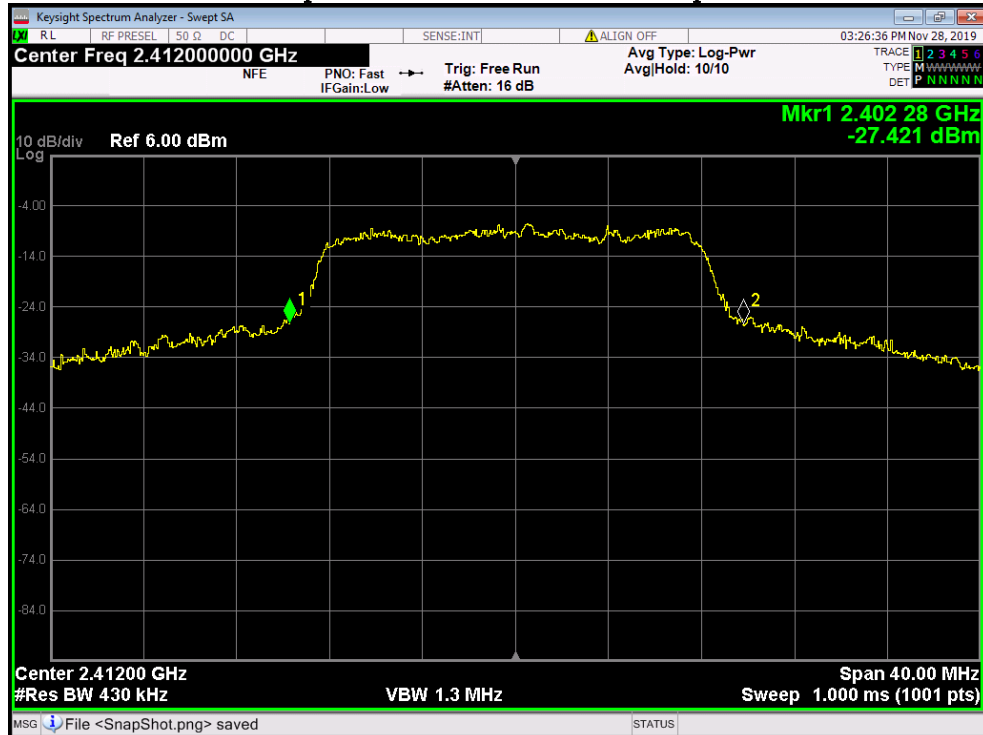


## 5.7.2 Test Detail (Continued)

### Representative Test Data (11Mbps)



### Representative Test Data (54Mbps)





## 5.8 Receiver Spurious Emissions (Radiated) (RSS-Gen 7.3)

### 5.8.1 Setting Remarks

The test was performed in accordance with ANSI C63.4-2014 clause 8.

In the frequency range from 30 MHz to 12.5 GHz (as 5th harmonics), the electric field strength was measured in accordance with ANSI C63.4-2014.

The test setup was made in accordance with ANSI C63.4-2014 on the table installed in a semi-anechoic chamber. The non-conductive table was placed on the turntable, and the EUT was put on the non-conductive table. The EUT was measured at 1 m to 4 m height of the antenna.

The turntable was fully rotated. The highest radiation from the equipment was recorded.

The measurement was carried out with both horizontal and vertical antenna polarization.

The test receiver with Peak, Quasi Peak and Average detector is in accordance with CISPR 16-1-1.

The measurement was carried out with the measuring distance of 3 m.

Setting Condition of Test receiver

| Frequency range   | Detector   | RBW     |
|-------------------|------------|---------|
| 30 MHz to 1 GHz   | Quasi peak | 120 kHz |
| 1 GHz to 12.5 GHz | Peak       | 1 MHz   |
|                   | Average    | 1 MHz   |

### 5.8.2 Limit

| Frequency range    | Field Strength (Distance) |       |          |       |
|--------------------|---------------------------|-------|----------|-------|
|                    | [μV/m]                    |       | [dBμV/m] |       |
| 30 MHz to 88 MHz   | 100                       | (3 m) | 40.0     | (3 m) |
| 88 MHz to 216 MHz  | 150                       | (3 m) | 43.5     | (3 m) |
| 216 MHz to 960 MHz | 200                       | (3 m) | 46.0     | (3 m) |
| Above 960 MHz      | 500                       | (3 m) | 53.9     | (3 m) |



### 5.8.3 Test Detail

**Result: PASS**

|                                   |   |                  |                  |
|-----------------------------------|---|------------------|------------------|
| Uncertainty of measurement result | : | $\pm 4.30$ dB    |                  |
| Engineer                          | : | K. Miyaji        |                  |
| Date of testing                   | : | December 2, 2019 | December 5, 2019 |
| Room temperature                  | : | 22°C             | 20°C             |
| Relative humidity                 | : | 51%              | 42%              |

#### Sample Calculation

Result = Reading + c.f  
=  $35.2 + (-5.8)$   
= 29.4

Margin = Limit – Result  
=  $46.0 - 29.4$   
= 16.6

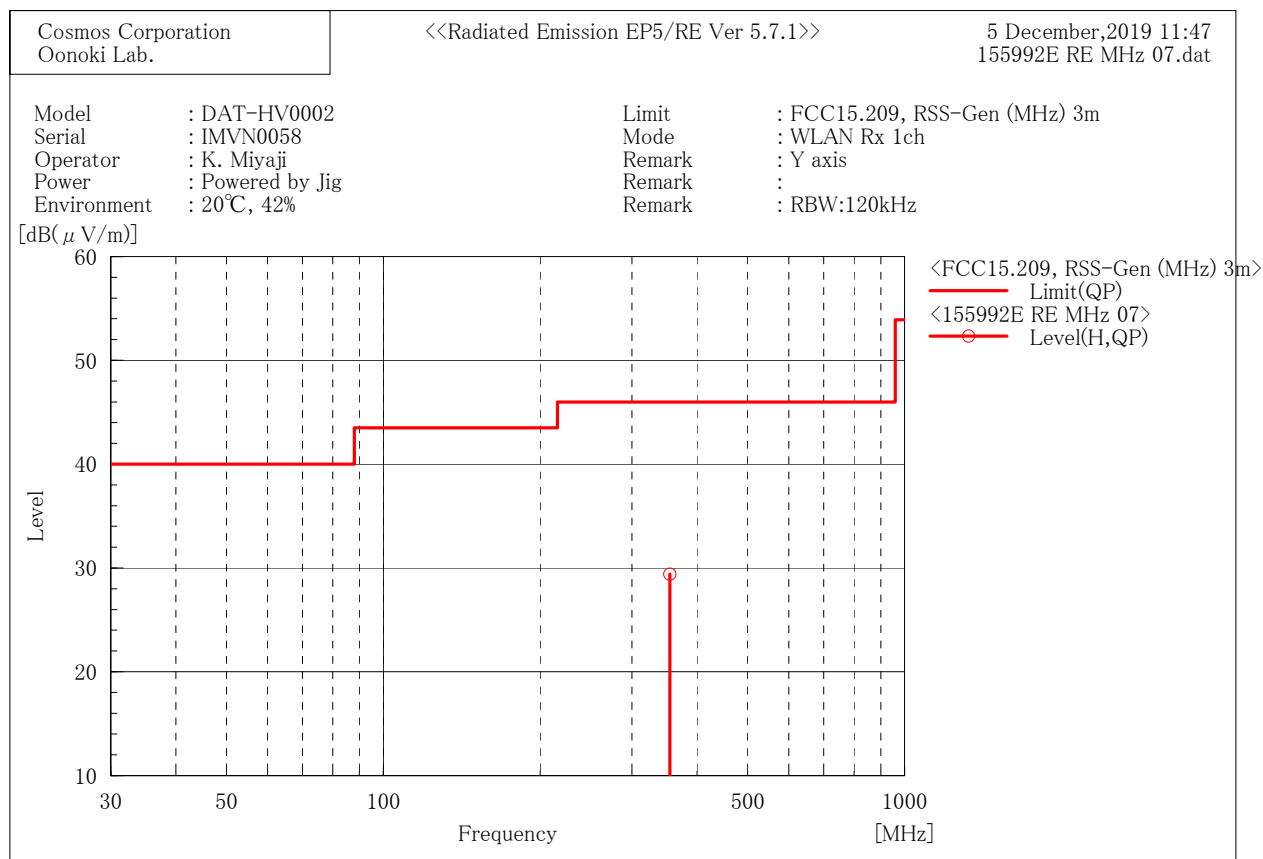
Note:

c.f (Correction Factor) = Cable Attenuation Factor + Antenna Factor + Amplifier Gain



### 5.8.3 Test Detail (Continued)

#### <30 MHz to 1 GHz> Test Data (Rx 1ch)



#### Final Result

--- Horizontal Polarization (QP)---

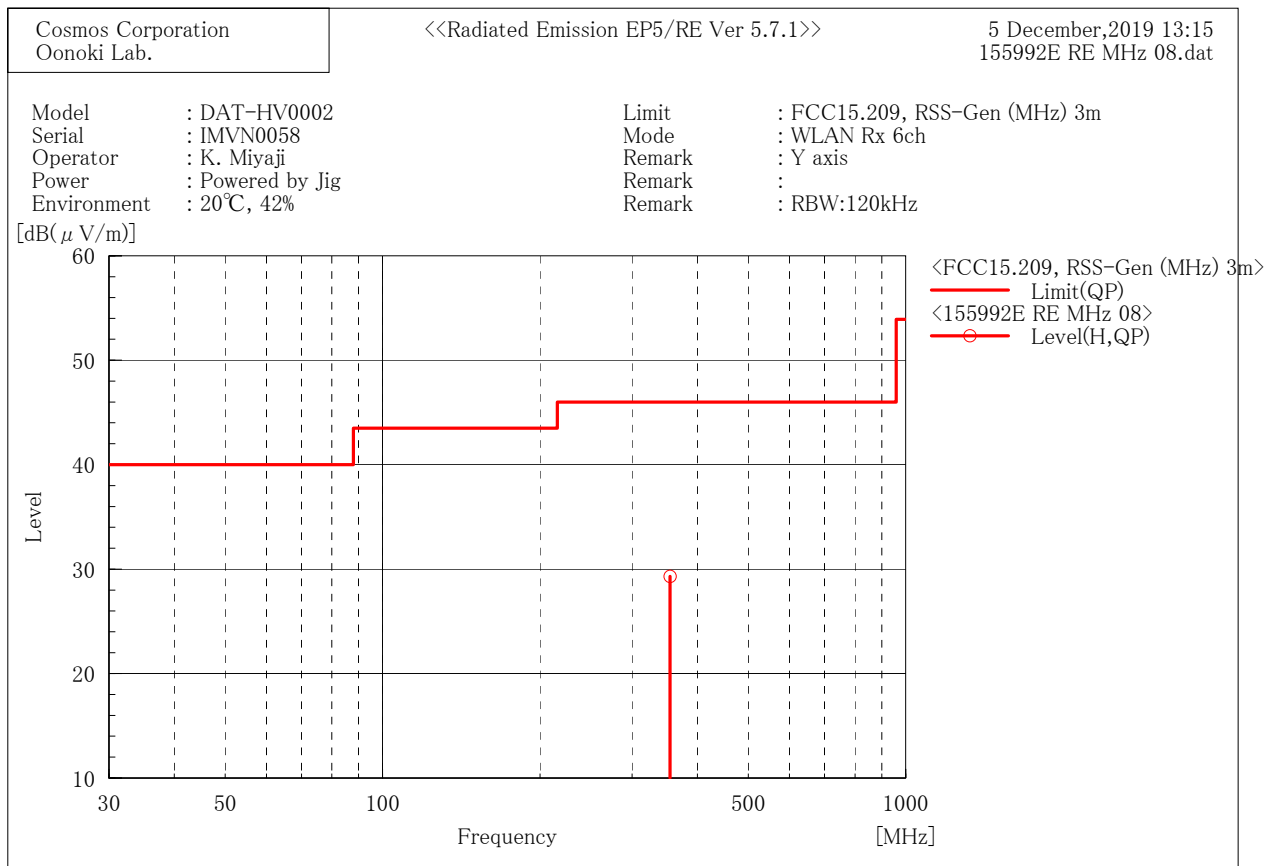
| No. | Frequency<br>[MHz] | Reading<br>[dB( $\mu$ V)] | c.f<br>[dB(1/m)] | Result<br>[dB( $\mu$ V/m)] | Limit<br>[dB( $\mu$ V/m)] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] |
|-----|--------------------|---------------------------|------------------|----------------------------|---------------------------|----------------|----------------|--------------|
| 1   | 354.463            | 35.2                      | -5.8             | 29.4                       | 46.0                      | 16.6           | 100.0          | 274.0        |



### 5.8.3 Test Detail (Continued)

<30 MHz to 1 GHz>

#### Test Data (Rx 6ch)



#### Final Result

--- Horizontal Polarization (QP)---

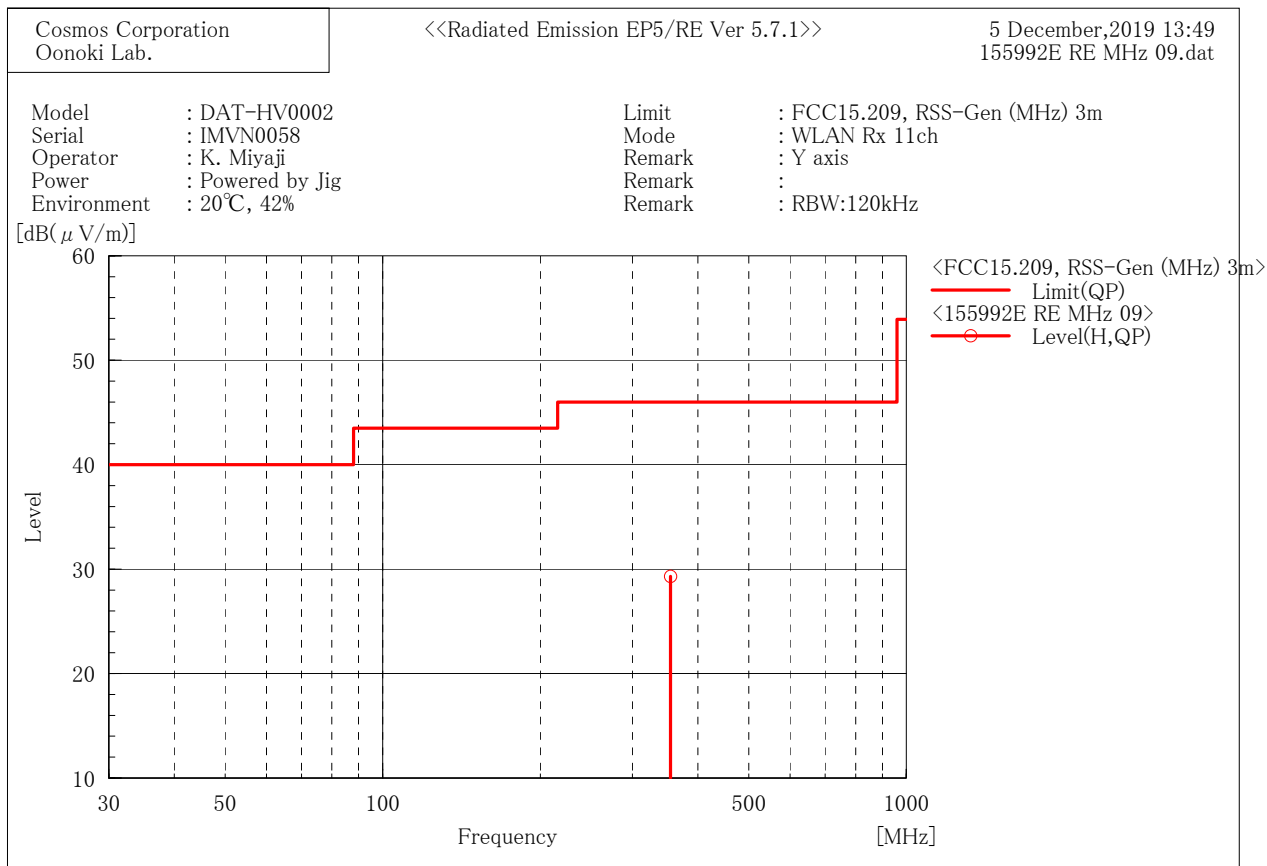
| No. | Frequency<br>[MHz] | Reading<br>[dB( $\mu$ V)] | c.f<br>[dB(1/m)] | Result<br>[dB( $\mu$ V/m)] | Limit<br>[dB( $\mu$ V/m)] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] |
|-----|--------------------|---------------------------|------------------|----------------------------|---------------------------|----------------|----------------|--------------|
| 1   | 354.460            | 35.1                      | -5.8             | 29.3                       | 46.0                      | 16.7           | 100.0          | 275.0        |



### 5.8.3 Test Detail (Continued)

<30 MHz to 1 GHz>

Test Data (Rx 11ch)



#### Final Result

--- Horizontal Polarization (QP)---

| No. | Frequency<br>[MHz] | Reading<br>[dB( $\mu$ V)] | c.f<br>[dB(1/m)] | Result<br>[dB( $\mu$ V/m)] | Limit<br>[dB( $\mu$ V/m)] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] |
|-----|--------------------|---------------------------|------------------|----------------------------|---------------------------|----------------|----------------|--------------|
| 1   | 354.460            | 35.1                      | -5.8             | 29.3                       | 46.0                      | 16.7           | 100.0          | 273.0        |



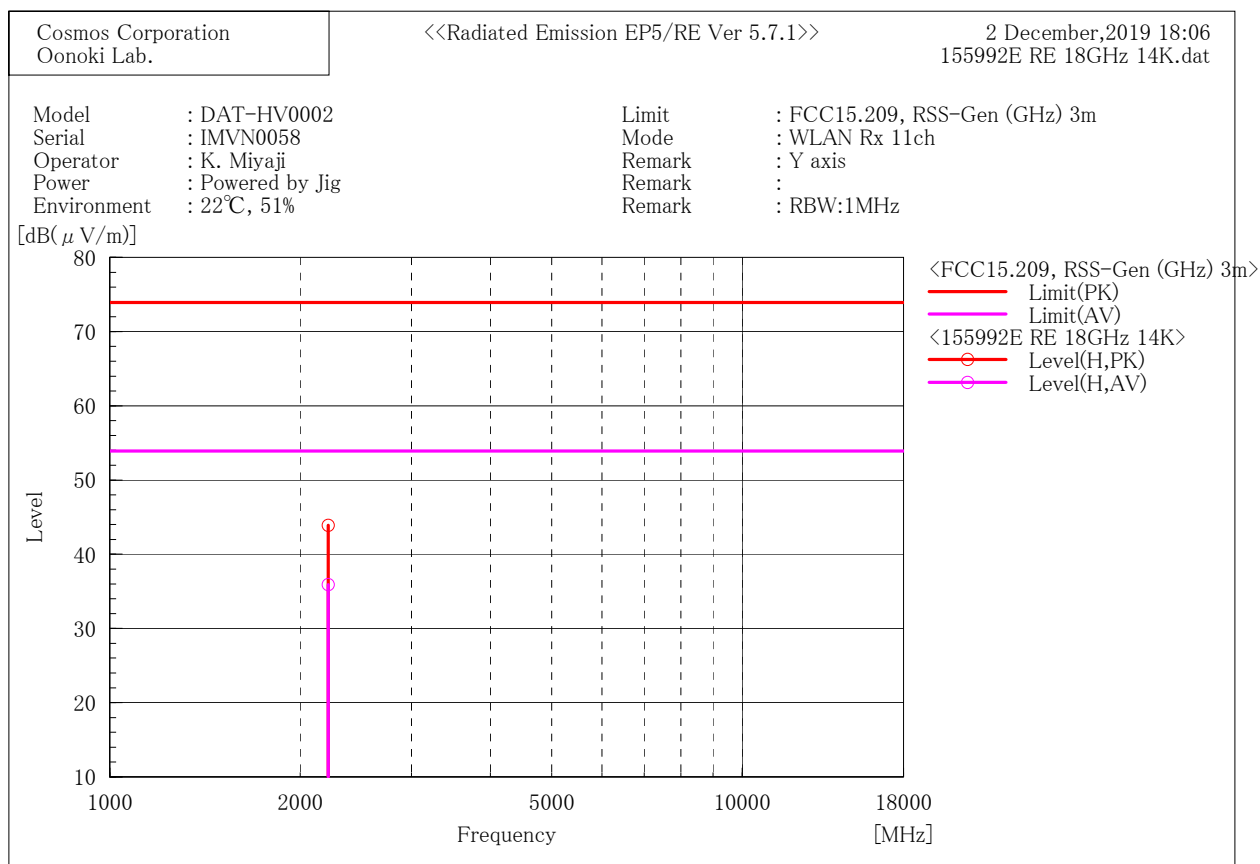
### 5.8.3 Test Detail (Continued)

<1 GHz to 12.5 GHz>

No spurious emission for RF module was found in middle channel and lowest channel.

<1 GHz to 12.5 GHz>

#### Test Data (Rx 11ch)



#### Final Result

##### --- Horizontal Polarization (PK)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 2215.373        | 48.1             | -4.2          | 43.9              | 73.9             | 30.0        | 260.0       | 179.0     |

##### --- Horizontal Polarization (AV)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Height [cm] | Angle [°] |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|-------------|-----------|
| 1   | 2215.373        | 40.1             | -4.2          | 35.9              | 53.9             | 18.0        | 260.0       | 179.0     |



## 6. List of Test and Measurement Instruments

### Transmitter Spurious Emissions (Radiated) (Below 1 GHz)

### Receiver Spurious Emissions (Radiated) (Below 1 GHz)

| Instruments                                  | Manufacturer                 | Model                 | Serial No.   | Calibrated Date/Until    |
|----------------------------------------------|------------------------------|-----------------------|--------------|--------------------------|
| EMI Test Receiver                            | Agilent Technologies         | N9038A                | MY54130015   | 2019/06/10<br>2020/06/09 |
| Pre-Amplifier<br>(30 MHz to 1 GHz)           | HEWLETT<br>PACKARD           | 8447D OPT<br>010      | 2944A07891   | 2019/04/08<br>2020/04/07 |
| Biconical Antenna<br>(30 MHz to 300 MHz)     | SCHWARZBECK                  | VHBB9124<br>/ BBA9106 | 9124-311     | 2019/11/05<br>2020/11/04 |
| Log-Periodic Antenna<br>(300 MHz to 1 GHz)   | SCHWARZBECK                  | UHALP9108-A           | 0645         | 2019/11/05<br>2020/11/04 |
| Anechoic Chamber 3 m                         | JSE                          | COAC3M-01             | ---          | 2019/04/09<br>2020/04/08 |
| Attenuator 3 dB                              | JFW                          | 50FP-003-H2           | ---          | 2019/04/09<br>2020/04/08 |
| RF Cable<br>RF Selector<br>(30 MHz to 1 GHz) | Fujikura                     | 8D-2W                 | OC14         | 2019/04/03<br>2020/04/02 |
|                                              | SUHNER                       | RG223/U               | OC11         |                          |
|                                              |                              | RG214/U               | OC15<br>OC16 |                          |
|                                              |                              | RG400/U               | OC17         |                          |
|                                              | TSJ                          | RFM-E121              | 03149        |                          |
| Digital midi<br>Thermometer/Hygrometer       | EMPEX<br>INSTRUMENTS,<br>INC | TD-8316               | ME00836S     | 2019/10/22<br>2020/10/21 |
| Software                                     | TOYO                         | EP5/RE<br>(ver 5.7.1) | ---          | ---                      |



## 6. List of Test and Measurement Instruments (Continued)

Transmitter Spurious Emission (Radiated) (Above 1 GHz)

Receiver Spurious Emissions (Radiated) (Above 1 GHz)

Band Edge Measurement (Radiated)

| Instruments                                               | Manufacturer           | Model                 | Serial No.  | Calibrated Date/Until    |
|-----------------------------------------------------------|------------------------|-----------------------|-------------|--------------------------|
| EMI Test Receiver                                         | Agilent Technologies   | N9038A                | MY54130015  | 2019/06/10<br>2020/06/09 |
| Pre-Amplifier                                             | TSJ                    | MLA-0120AML<br>-34    | ---         | 2019/02/06<br>2020/02/05 |
| Double Ridged Broadband Horn Antenna<br>(1 GHz to 18 GHz) | SCHWARZBECK            | BBHA9120D             | 443         | 2019/11/03<br>2020/11/02 |
| Standard Gain Horn Antenna<br>(8.2 GHz to 12.4 GHz)       | MI Technologies        | 12-8.2 093290         | 22856NL     | 2019/11/27<br>2020/11/26 |
| Standard Gain Horn Antenna<br>(12.4 GHz to 18 GHz)        | MI Technologies        | 12-12 093275          | 22857NL     | 2019/11/27<br>2020/11/26 |
| Standard Gain Horn Antenna<br>(18 GHz to 26.5 GHz)        | TOYO                   | HAP18-26N             | 00000013    | 2018/11/26<br>2019/11/25 |
| Anechoic Chamber 3 m                                      | JSE                    | COAC3M-01             | ---         | 2019/04/09<br>2020/04/08 |
| Attenuator 10 dB                                          | WEINSCHEL ASSOCIATES   | WA2-10                | A278        | 2019/08/07<br>2020/08/06 |
| Attenuator 3 dB                                           | JFW INDUSTRIES         | 50HF-003N             | 1401        | 2019/03/04<br>2020/03/03 |
| RF Cable<br>(1 GHz to 18 GHz)                             | HUBER+SUHNER           | SUCOFLEX 104A         | MY1044/4A   | 2019/04/04<br>2020/04/03 |
|                                                           | STORM                  | TRUE BLUE 290         | OC20 / OC49 |                          |
| RF Cable<br>(18 GHz to 40 GHz)                            | SUHNER                 | SUCOFLEX 102A         | MY025/2A    | 2019/11/14<br>2020/11/13 |
| Notch Filter                                              | MICRO-TRONICS          | BRM50702              | 027         | 2019/06/14<br>2020/06/30 |
| Digital midi Thermometer/Hygrometer                       | EMPEX INSTRUMENTS, INC | TD-8316               | ME00836S    | 2019/10/22<br>2020/10/21 |
| Software                                                  | TOYO                   | EP5/RE<br>(ver 5.7.1) | ---         | ---                      |



## 6. List of Test and Measurement Instruments (Continued)

Maximum Peak Conducted Output Power and E.I.R.P.

6 dB Bandwidth / Conducted Spurious Emission / Power Spectral Density

Band Edge Measurement (Conducted)

| Instruments                          | Manufacturer                                   | Model                        | Serial No.         | Calibrated Date/Until    |
|--------------------------------------|------------------------------------------------|------------------------------|--------------------|--------------------------|
| EMI Test Receiver                    | Agilent Technologies                           | N9038A                       | MY54130015         | 2019/06/10<br>2020/06/09 |
| RF TEST SET                          | Agilent Technologies<br>(MORITA TECH Co.,Ltd ) | MT-747                       | 13326              | 2019/11/07<br>2020/11/06 |
| RF Cable                             | HUBER + SUHNER                                 | SUCOFLEX<br>102              | MY094/2<br>MY098/2 | 2019/11/07<br>2020/11/06 |
| Electronic Thermometer<br>Hygrometer | A&D                                            | AD-5682                      | 0311 / 1012020     | 2019/07/20<br>2020/07/19 |
| Software                             | KEYSIGHT TECHNOLOGIES                          | JPJ5A1NN141<br>00 (Ver 1.63) | ---                | ---                      |

## 7. Appendix

Refer to separated files for the following appendixes.

Appendix 1: Photographs of the Test Setup

Appendix 2: External Photographs

----- End of Report -----