

# TEST REPORT

For

## Microcomputer Board

In conformity with

### FCC CFR 47 Part15 Subpart C / RSS-247 Issue 2

**Model (HVIN/PMN) : RTK5RX23W0C00000BJ**

**FCC ID : 2AEMXRX23WTBQ56**

**ISED ID : 20194-RX23WTBQ56**

**Report No. : WE190516BB2-13**

**Issue Date : November 28, 2019**

**Prepared for**

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## History

| Report No.     | Date              | Revisions   | Issued By |
|----------------|-------------------|---|-----------|
| WE190516BB2-11 | July 19, 2019     | Initial Issue   | K. Onishi |
| WE190516BB2-12 | November 22, 2019 | Correct FCC ID (Page. 1, 3)<br>Correct test data (Page. 13, 17)<br>Add other test data (Clause 2.6) | K. Onishi |
| WE190516BB2-13 | November 28, 2019 | Add extrapolation factor (Clause 2.6)   | K. Onishi |

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## 1 General information

### 1.1 Product description

|                               |  |
|-------------------------------|--|
| Test item                     | : Microcomputer Board                                      |
| Manufacturer                  | : meistier corporation                                     |
| Address                       | : 2081-17 Tabaru, Mashiki-machi, Kamimashiki-gun, Kumamoto |
| Model (HVIN/PMN)              | : RTK5RX23W0C00000BJ                                       |
| FCC ID                        | : 2AEMXRX23WTBQ56  |
| ISED ID                       | : 20194-RX23WTBQ56   |
| Serial number                 | : WS027  |
| Hardware version              | : WS Ver.1   |
| Software version              | : WS Ver.1   |
| Operating frequency           | : 2402 - 2480 MHz  |
| Modulation                    | : GFSK (Bluetooth Ver. 5.0 LE)                             |
| Antenna Gain                  | : +1.6 dBi (manufacturer declaration)                      |
| Receipt date of EUT           | : June 14, 2019  |
| Nominal power source voltages | : DC 5.0 V (USB)   |

### 1.2 Test(s) performed/ Summary of test result

|                       |   |
|-----------------------|---|
| Test specification(s) | : FCC CFR 47 Part 15 Subpart C (01 Oct. 2018)<br>RSS-247 Issue 2, RSS-Gen Issue 5 |
| Test method(s)        | : ANSI C63.10: 2013   |
| Test(s) started       | : June 17, 2019   |
| Test(s) completed     | : July 10, 2019   |

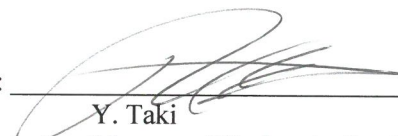
Summary of test result : Complied

Note: The above judgment is only based on the measurement data and it does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.

The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the Laboratory.

Compliance of the EUT is more probable than non-compliance is case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer :   
K. Onishi  
Wireless testing laboratory

Reviewer :   
Y. Taki  
Manager, Wireless testing laboratory

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JP 034811

### 1.3 Test facility

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Registered by Innovation, Science and Economic Development Canada (ISED):  
The registered CAB identifier is JP0009.

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)  
Each registered facility number is as follows;  
Test site A-0045

#### [Kitayamata laboratory]

Address: 3-5-23, Kitayamata, Tsuzuki-ku, Yokohama, 224-0021, Japan  
TEL: +81-45-550-3520  
FAX: +81-45-592-7506

Accredited by National Voluntary Laboratory Accreditation Program (NVLAP) for the emission tests stated in the scope of the certificate under Certificate Number 200780-0

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The registered CAB identifier is JP0009.

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)  
Each registered facility number is as follows;  
Test site A-0212

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## 1.4 Measurement uncertainty

The treatment of uncertainty is based on the general matters on the definition of uncertainty in “Guide to the expression of uncertainty in measurement (GUM)” published by ISO. The Lab’s uncertainty is determined by referring ETSI TR 100 028-1 V1.4.1 (2001-12).

The uncertainty of the measurement result in the level of confidence of approximately 95% (k=2) is as follows;

|  |          |
|--|----------|
| Conducted emission (150 kHz - 30 MHz): | ± 3.3 dB |
| Radiated emission (9 kHz - 30 MHz):    | ± 5.0 dB |
| Radiated emission (30 MHz - 1000 MHz): | ± 5.2 dB |
| Radiated emission (1 GHz - 6 GHz):     | ± 4.9 dB |
| Radiated emission (6 GHz - 18 GHz):    | ± 4.9 dB |
| Radiated emission (18 GHz - 26 GHz):   | ± 5.5 dB |

## 1.5 Summary of test results

| Requirement                                  | Section in FCC        | Section in RSS-247 | Result   | Section in this report |
|--|-----------------------|--------------------|----------|------------------------|
| Occupied Bandwidth (99 %)                    | 2.1049                | 6.7 (RSS-Gen)      | Complied | 2.1                    |
| 6 dB Bandwidth                               | 15.247 (a) (2)        | 5.2 (a)            | Complied | 2.2                    |
| Conducted Output Power                       | 15.247 (b) (3)        | 5.4 (d)            | Complied | 2.3                    |
| Conducted Spurious Emission                  | 15.247 (d)            | 5.5                | Complied | 2.4                    |
| Power Spectral Density                       | 15.247 (e)            | 5.2 (b)            | Complied | 2.5                    |
| Transmitter Radiated Spurious Emissions      | 15.247(d), 15.205 (a) | 8.9/8.10 (RSS-Gen) | Complied | 2.6                    |
| AC power line conducted emissions            | 15.207                | 8.8 (RSS-Gen)      | Complied | 2.7                    |
| Radiated Emissions (Receiver)                | -                     | 7.3 (RSS-Gen)      | Complied | 2.8                    |
| AC power line conducted emissions (Receiver) | -                     | 7.2 (RSS-Gen)      | Complied | 2.9                    |

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## 1.6 Setup of equipment under test (EUT)

### 1.6.1 Test configuration of EUT

#### Equipment(s) under test

| No. | Item                | Model No.          | Manufacture | Serial No. |
|-----|---------------------|--------------------|-------------|------------|
| A   | Microcomputer Board | RTK5RX23W0C00000BJ | meistier    | WS027      |
| -   | -                   | -                  | -           | -          |

#### Support Equipment(s)

| No. | Item       | Model No.    | Manufacture | Serial No. |
|-----|------------|--------------|-------------|------------|
| B   | PC         | PC-VK17HBBCD | NEC         | 26012321A  |
| C   | AC adapter | ADP-65JH E   | NEC         | 2208800DD  |

#### Connected cable(s)

| No. | Item      | From | To       | Length [m] | Shield | Ferrite Core |
|-----|-----------|------|----------|------------|--------|--------------|
| 1   | USB cable | A    | B        | 1.0        | Yes    | No           |
| 2   | DC cable  | B    | C        | 1.8        | No     | Yes          |
| 3   | AC cable  | C    | AC mains | 1.8        | No     | Yes          |

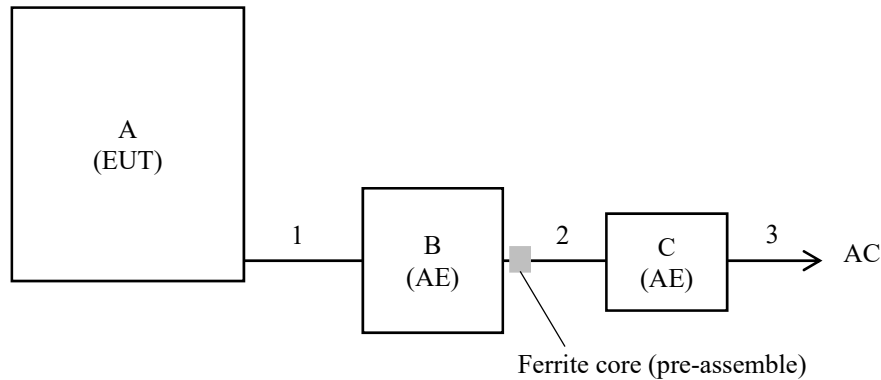
### 1.6.2 Operating condition:

- Tx (2402MHz): The EUT is in normal transmission mode at 2402MHz (2Mbps, 1Mbps, 500kbps, 125kbps)
- Tx (2442MHz): The EUT is in normal transmission mode at 2442MHz (2Mbps, 1Mbps, 500kbps, 125kbps)
- Tx (2480MHz): The EUT is in normal transmission mode at 2480MHz (2Mbps, 1Mbps, 500kbps, 125kbps)
- Rx (2402MHz): The EUT is in normal transmission mode at 2402MHz
- Rx (2442MHz): The EUT is in normal transmission mode at 2442MHz
- Rx (2480MHz): The EUT is in normal transmission mode at 2480MHz

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## 1.6.3 Setup diagram of tested system



## 1.7 Equipment modifications

No modifications have been made to the equipment in order to achieve compliance with the applicable standards described in clause 1.2.

## 1.8 Deviation from the standard

No deviations from the standards described in clause 1.2.

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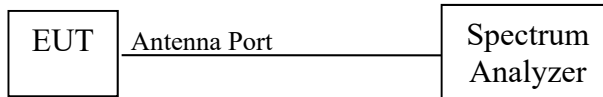
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## 2 Test procedure and test data

### 2.1 Occupied Bandwidth (99%)

#### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



#### Test procedure

Spectrum analyzer is set as below according to ANSI C63.10 clause 6.9

- RBW: 1 to 5 % of OBW
- VBW > 3 x RBW
- Span: OBW x 1.5 to 5
- Trace: Max hold

#### Limitation

There are no limitations.

The measurement value is used for the emission designator.

#### Test equipment used (refer to List of utilized test equipment)

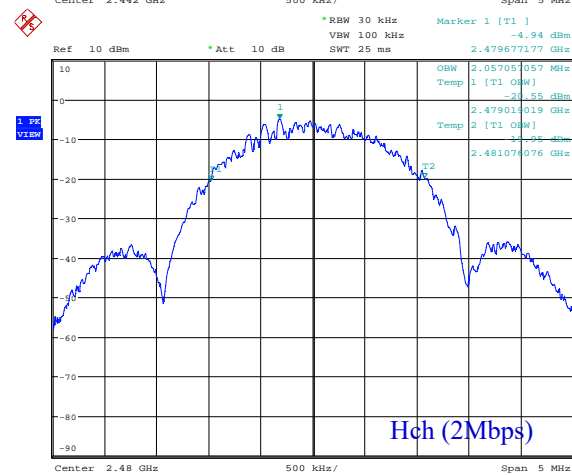
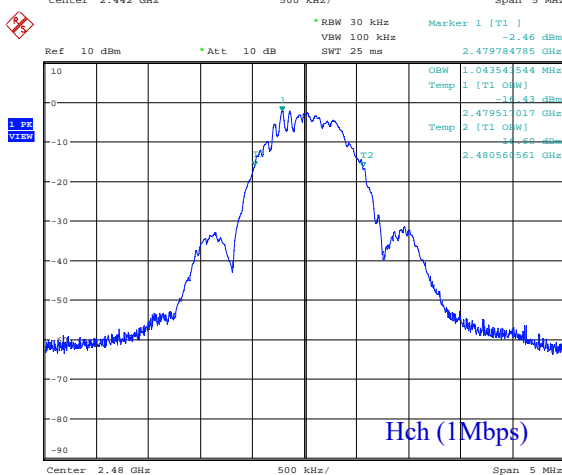
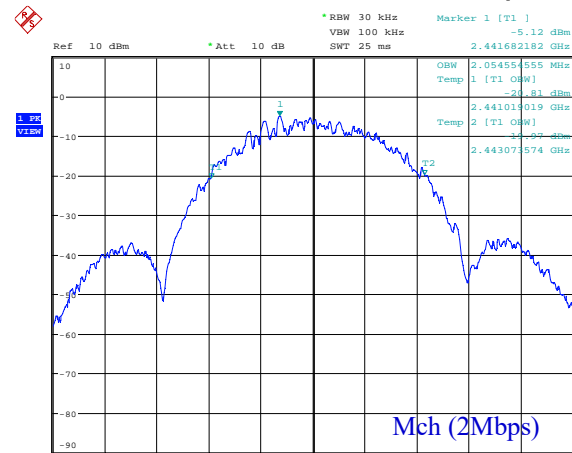
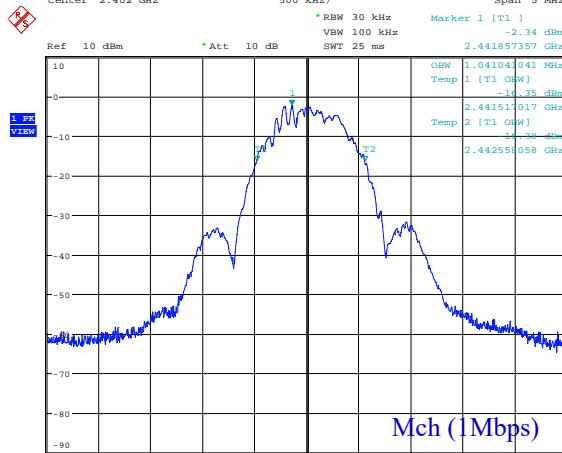
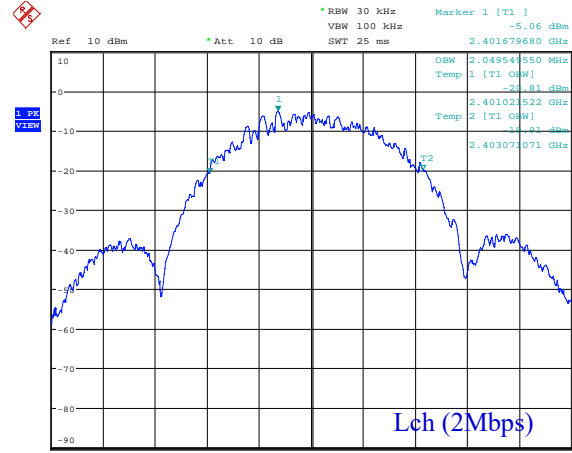
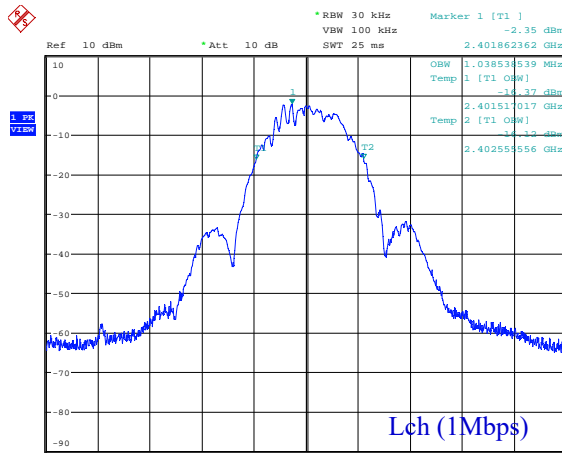
|      |      |   |   |   |   |
|------|------|---|---|---|---|
| TR06 | CL31 | - | - | - | - |
|------|------|---|---|---|---|

#### Test results

| Transmission Frequency<br>[MHz] | Occupied Bandwidth [MHz] |       |
|---------------------------------|--------------------------|-------|
|                                 | 1Mbps                    | 2Mbps |
| 2402                            | 1.038                    | 2.049 |
| 2442                            | 1.041                    | 2.054 |
| 2480                            | 1.043                    | 2.057 |

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Tested Date: June 26, 2019  
Humidity: 54 %

Temperature: 19 degC  
Atmos. Press: 1016 hPa

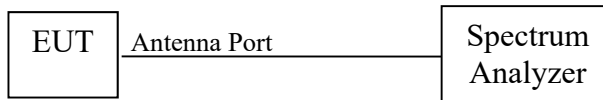
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## 2.2 6dB Bandwidth

### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



### Test procedure

Spectrum analyzer is set as below according to ANSI C63.10 clause 11.8

- RBW: 100 kHz
- VBW: 300 kHz
- Detector: Peak
- Trace: Max hold

### Applicable rule and limitation

15.247 (a) (2) / RSS-247 5.2 (a): Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### Test equipment used (refer to List of utilized test equipment)

|      |      |   |   |   |   |
|------|------|---|---|---|---|
| TR06 | CL31 | - | - | - | - |
|------|------|---|---|---|---|

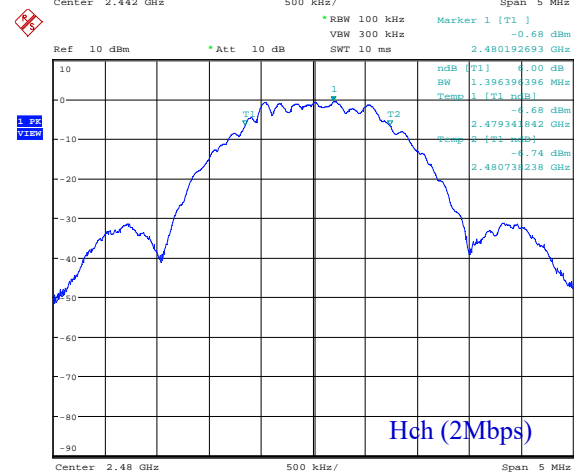
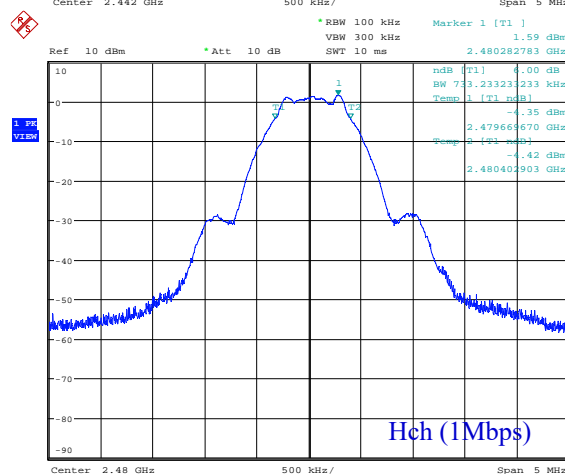
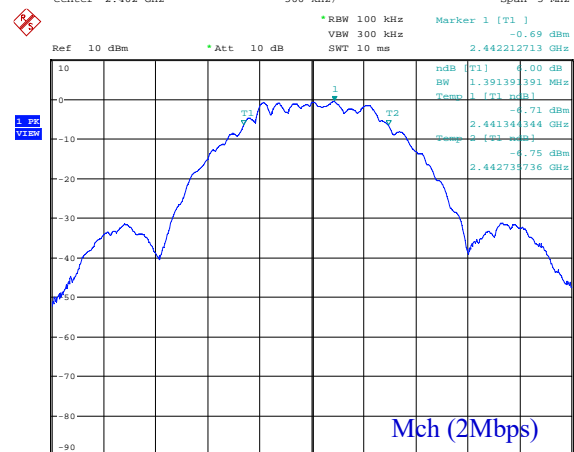
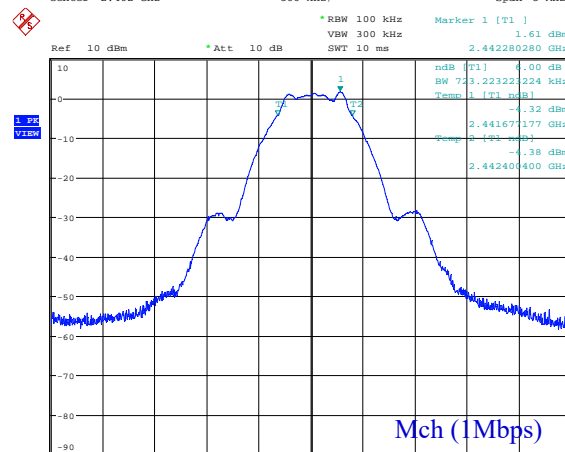
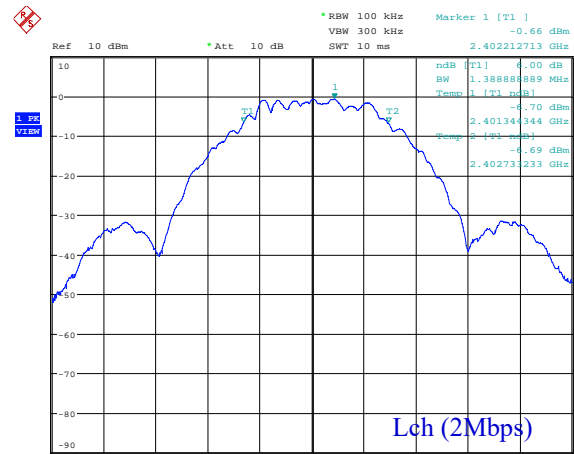
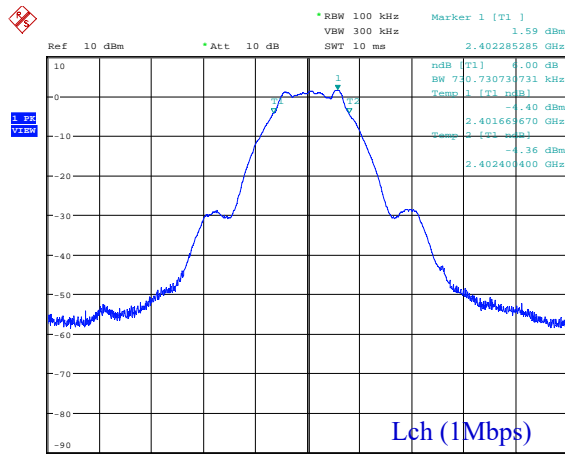
### Test results - Complied with requirement

### Test Data

| Transmission Frequency<br>[MHz] | 6 dB Bandwidth [kHz] |        | Limit<br>[kHz] |
|---------------------------------|----------------------|--------|----------------|
|                                 | 1Mbps                | 2Mbps  |                |
| 2402                            | 730.7                | 1388.8 | 500            |
| 2442                            | 723.2                | 1391.3 | 500            |
| 2480                            | 733.2                | 1396.3 | 500            |

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Tested Date: June 26, 2019  
Humidity: 54 %

Temperature: 19 degC  
Atmos. Press: 1016 hPa

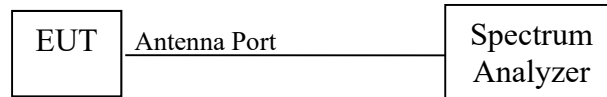
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## 2.3 Peak Output Power

### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



### Test procedure

Spectrum analyzer is set as below according to ANSI C63.10 clause 11.9

- RBW > 6dB BW
- Span > 3 x RBW
- Trace: Max hold
- VBW > 3 x RBW
- Detector: Peak

### Applicable rule and limitation

15.247(b) (3) / RSS-247 5.4 (d): For systems using digital modulation in the 902-928 MHz, 2400-2483.5MHz, and 5725-5850 MHz bands: 1 Watt (30 dBm).

### Test equipment used (refer to List of utilized test equipment)

|      |      |   |   |   |   |
|------|------|---|---|---|---|
| TR06 | CL31 | - | - | - | - |
|------|------|---|---|---|---|

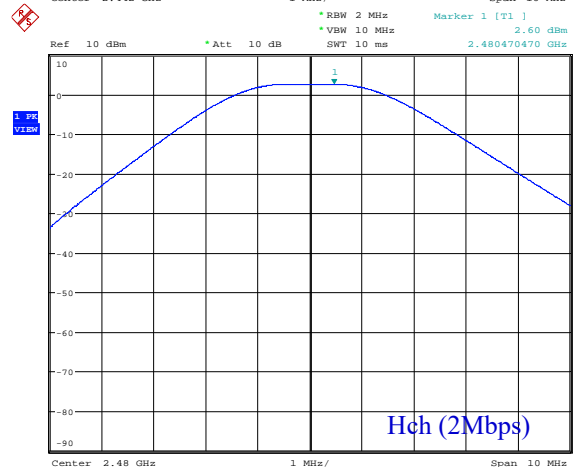
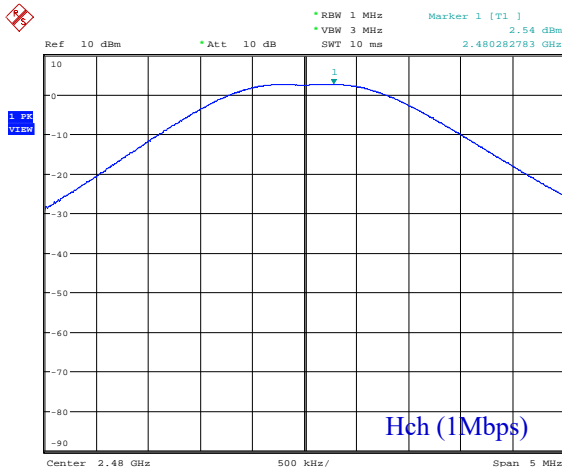
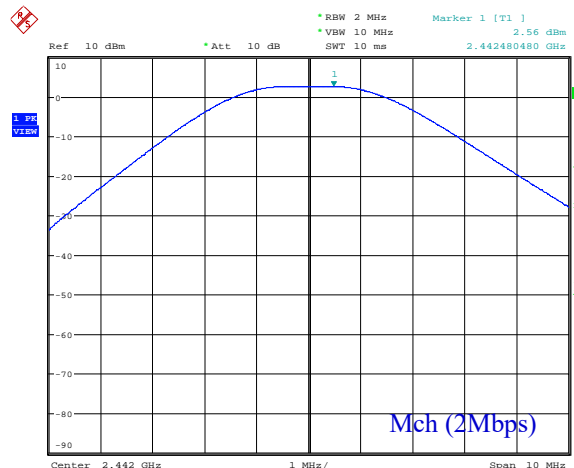
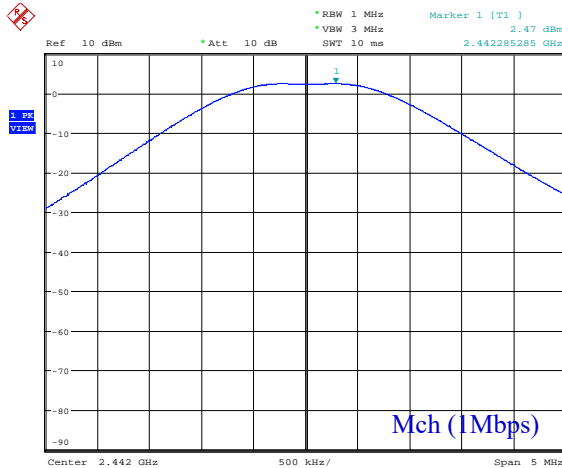
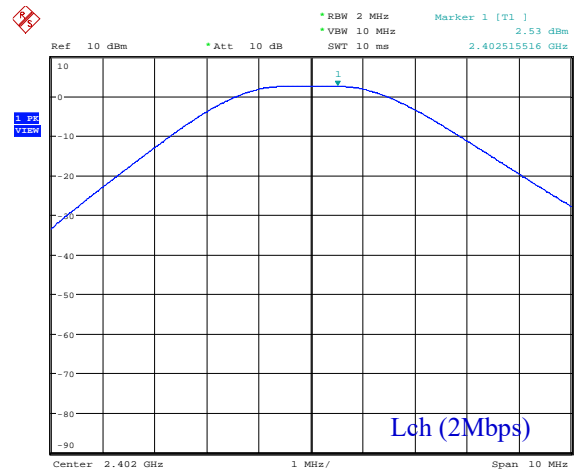
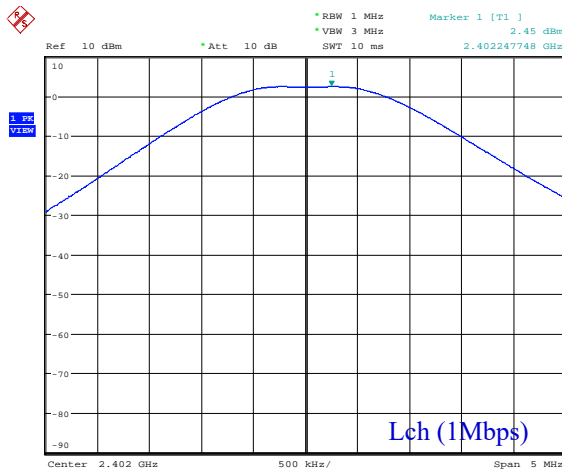
### Test results - Complied with requirement

### Test Data

| Transmission Frequency<br>[MHz] | Output Power [dBm] |       | Limit<br>[dBm] |
|---------------------------------|--------------------|-------|----------------|
|                                 | 1Mbps              | 2Mbps |                |
| 2402                            | 2.45               | 2.53  | 30             |
| 2442                            | 2.47               | 2.56  | 30             |
| 2480                            | 2.54               | 2.60  | 30             |

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Tested Date: June 26, 2019  
Humidity: 54 %

Temperature: 19 degC  
Atmos. Press: 1016 hPa

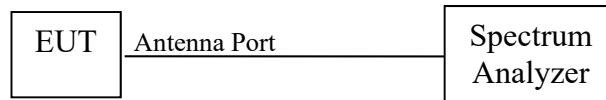
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## 2.4 Conducted Spurious Emissions

### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



### Test procedure

Spectrum analyzer is set as below according to ANSI C63.10 clause 7.8.8

- RBW: 100 kHz
- VBW: 300 kHz
- Detector: Peak
- Trace: Max hold

### Limitation

15.247(d) / RSS-247 5.5: 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.

### Test equipment used (refer to List of utilized test equipment)

|      |      |   |   |   |   |
|------|------|---|---|---|---|
| TR06 | CL31 | - | - | - | - |
|------|------|---|---|---|---|

### Test results - Complied with requirement

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## Test Data

Operating mode: Tx (2402MHz, 1Mbps)

| Frequency<br>[GHz] | Spurious level<br>[dBm] | Carrier level<br>[dBm] | Limit (-20dBc)<br>[dBm] | Result |
|--------------------|-------------------------|------------------------|-------------------------|--------|
| 4.803              | -52.83                  | 1.75                   | -18.25                  | Pass   |
| 9.609              | -36.85                  | 1.75                   | -18.25                  | Pass   |
| 14.413             | -39.99                  | 1.75                   | -18.25                  | Pass   |
| 16.812             | -47.35                  | 1.75                   | -18.25                  | Pass   |

Operating mode: Tx (2442MHz, 1Mbps)

| Frequency<br>[GHz] | Spurious level<br>[dBm] | Carrier level<br>[dBm] | Limit (-20dBc)<br>[dBm] | Result |
|--------------------|-------------------------|------------------------|-------------------------|--------|
| 4.883              | -52.56                  | 1.71                   | -18.29                  | Pass   |
| 9.769              | -37.92                  | 1.71                   | -18.29                  | Pass   |
| 14.650             | -42.20                  | 1.71                   | -18.29                  | Pass   |
| 17.092             | -47.35                  | 1.71                   | -18.29                  | Pass   |

Operating mode: Tx (2480MHz, 1Mbps)

| Frequency<br>[GHz] | Spurious level<br>[dBm] | Carrier level<br>[dBm] | Limit (-20dBc)<br>[dBm] | Result |
|--------------------|-------------------------|------------------------|-------------------------|--------|
| 4.959              | -48.92                  | 1.74                   | -18.26                  | Pass   |
| 7.439              | -55.25                  | 1.74                   | -18.26                  | Pass   |
| 9.921              | -38.64                  | 1.74                   | -18.26                  | Pass   |
| 14.878             | -41.56                  | 1.74                   | -18.26                  | Pass   |
| 17.358             | -45.57                  | 1.74                   | -18.26                  | Pass   |

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Operating mode: Tx (2402MHz, 2Mbps)

| Frequency [GHz] | Spurious level [dBm] | Carrier level [dBm] | Limit (-20dBc) [dBm] | Result      |
|-----------------|----------------------|---------------------|----------------------|-------------|
| 4.803           | -53.84               | -0.38               | -20.38               | Pass        |
| <b>9.606</b>    | <b>-37.61</b>        | <b>-0.38</b>        | <b>-20.38</b>        | <b>Pass</b> |
| 14.409          | -42.24               | -0.38               | -20.38               | Pass        |
| 16.810          | -48.02               | -0.38               | -20.38               | Pass        |

Operating mode: Tx (2442MHz, 2Mbps)

| Frequency [GHz] | Spurious level [dBm] | Carrier level [dBm] | Limit (-20dBc) [dBm] | Result |
|-----------------|----------------------|---------------------|----------------------|--------|
| 4.885           | -52.81               | -0.63               | -20.63               | Pass   |
| 9.770           | -40.26               | -0.63               | -20.63               | Pass   |
| 14.649          | -43.34               | -0.63               | -20.63               | Pass   |
| 17.097          | -49.05               | -0.63               | -20.63               | Pass   |

Operating mode: Tx (2480MHz, 2Mbps)

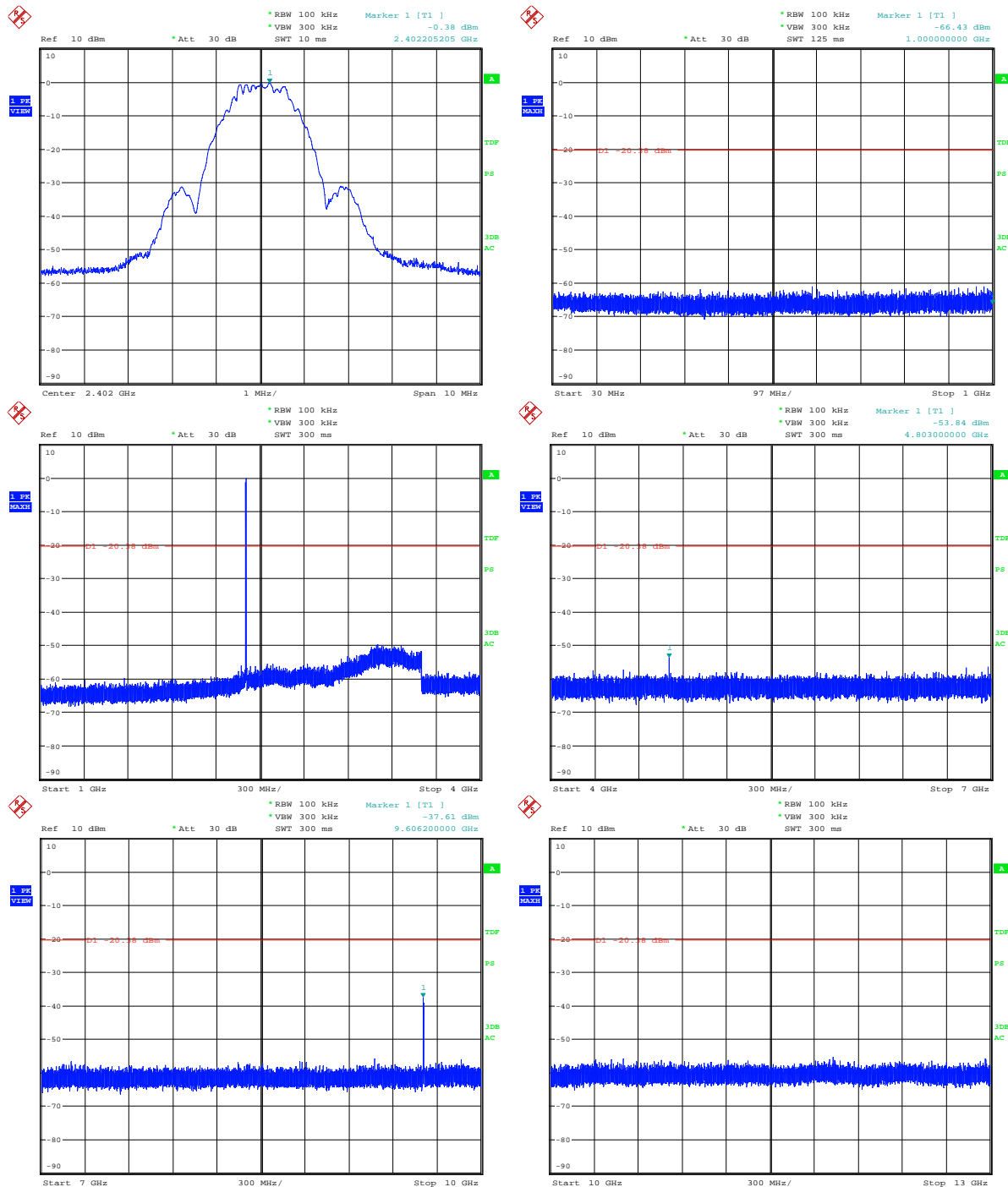
| Frequency [GHz] | Spurious level [dBm] | Carrier level [dBm] | Limit (-20dBc) [dBm] | Result |
|-----------------|----------------------|---------------------|----------------------|--------|
| 4.959           | -50.16               | -0.65               | -20.65               | Pass   |
| 9.918           | -39.87               | -0.65               | -20.65               | Pass   |
| 14.877          | -43.92               | -0.65               | -20.65               | Pass   |
| 17.356          | -49.71               | -0.65               | -20.65               | Pass   |

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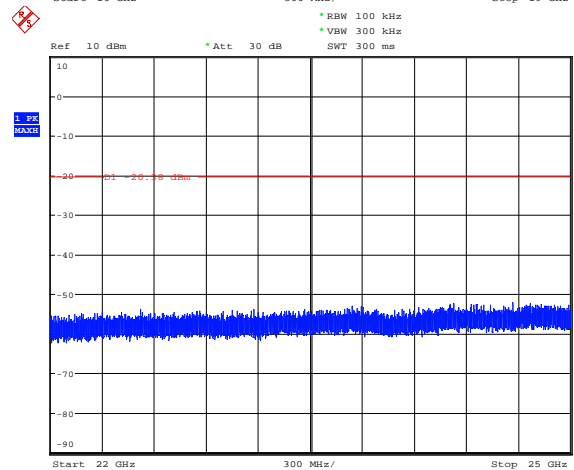
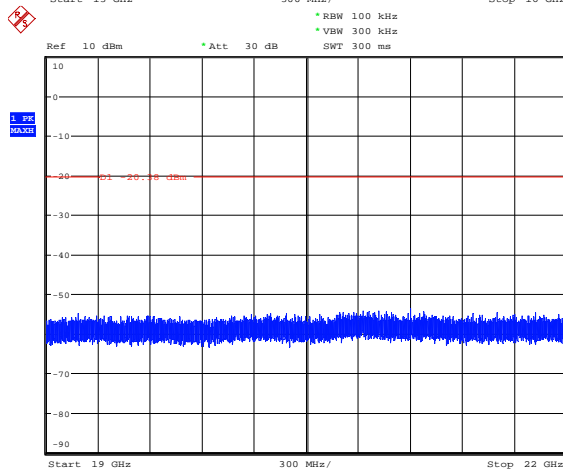
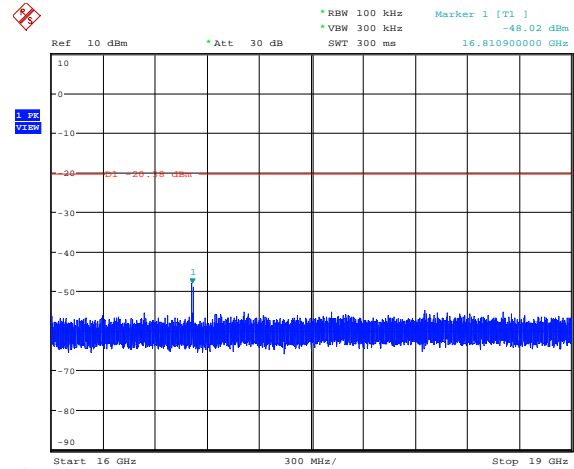
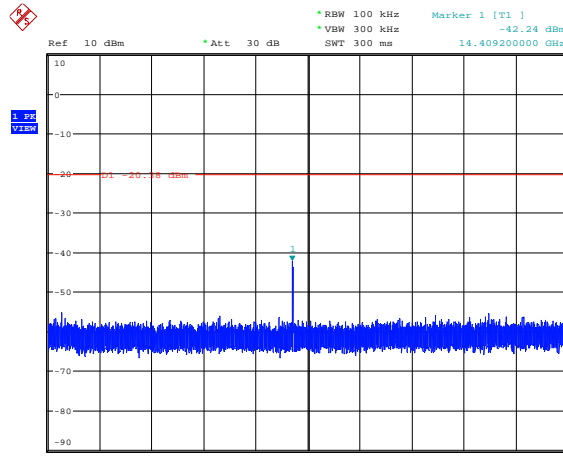
[Chart]

Tx (2402MHz, 2Mbps)



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Tested Date: June 26, 2019  
Humidity: 54 %

Temperature: 19 degC  
Atmos. Press: 1016 hPa

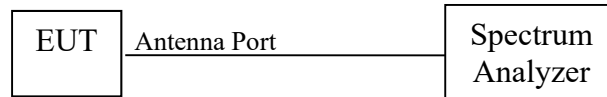
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## 2.5 Power Spectral density

### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



### Test procedure

Spectrum analyzer is set as below according to ANSI C63.10 clause 11.10

- RBW: 3 kHz
- Span > 1.5 x 6dB BW
- Trace: Max hold
- VBW: 10 kHz
- Detector: Peak

### Limitation

15.247(e) / RSS-247 5.2 (b): 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.

### Test equipment used (refer to List of utilized test equipment)

|      |      |   |   |   |   |
|------|------|---|---|---|---|
| TR06 | CL31 | - | - | - | - |
|------|------|---|---|---|---|

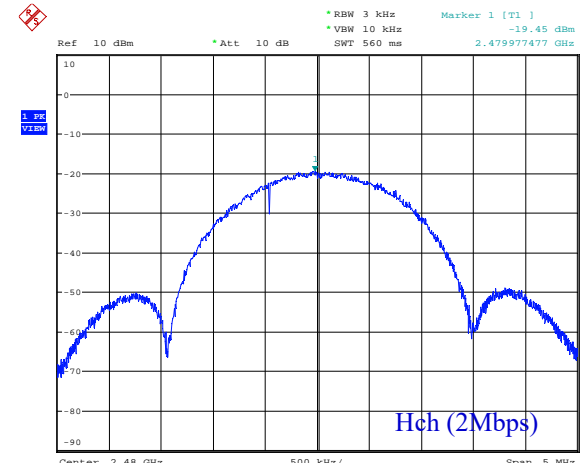
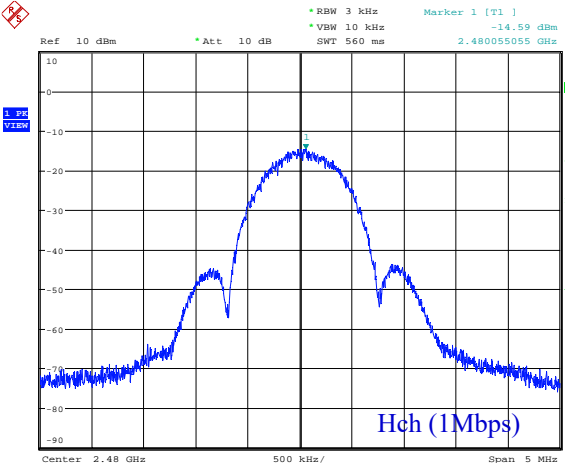
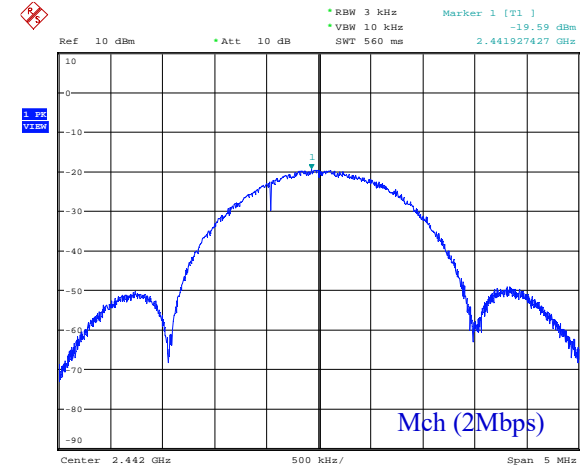
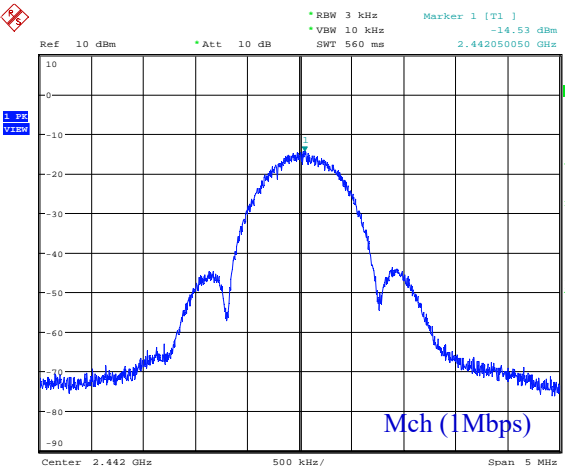
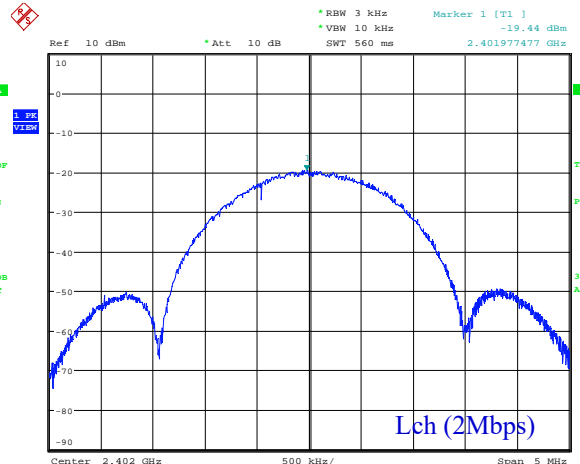
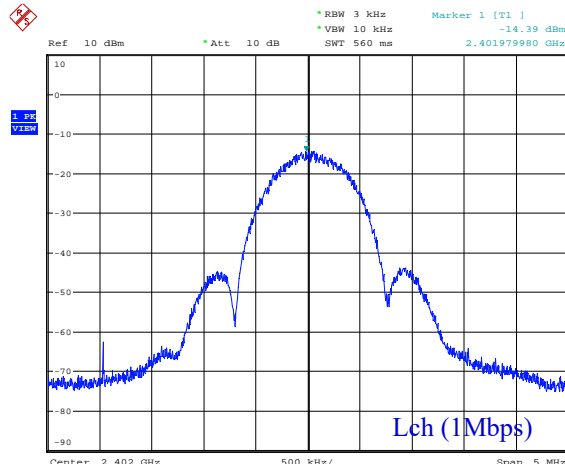
### Test results - Complied with requirement

### Test Data

| Transmission Frequency<br>[MHz] | Spectral Density [dBm] |        | Limit<br>[dBm] |
|---------------------------------|------------------------|--------|----------------|
|                                 | 1Mbps                  | 2Mbps  |                |
| 2402                            | -14.39                 | -19.44 | 8              |
| 2442                            | -14.53                 | -19.59 | 8              |
| 2480                            | -14.59                 | -19.45 | 8              |

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Tested Date: June 26, 2019  
Humidity: 54 %

Temperature: 19 degC  
Atmos. Press: 1016 hPa

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## 2.6 Transmitter Radiated Spurious Emissions

### Test setup

Test setup was implemented according to the method of ANSI C63.10 clause 6.

### Test procedure

Measurement procedures were implemented according to the method of ANSI C63.10 clauses 6.  
The test receiver is set as below

- [9 - 150 kHz]  
RBW: 200 Hz, Detector: QP
- [150 kHz - 30 MHz]  
RBW: 9 kHz, Detector: QP
- [30 - 1000 MHz]  
RBW: 120 kHz, Detector: QP
- [above 1000 MHz]  
RBW: 1 MHz, Detector: Ave/PK

### Applicable rule and limitation

Except as shown in paragraph 15.205 (d) of this section, only spurious emissions are permitted in any of the frequency bands listed (FCC 15.205 / RSS-Gen 8.10)

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in FCC 15.209 / RSS-Gen 8.9. At frequencies equal to or less than 1000 MHz, compliance with the limits in FCC 15.209 / RSS-Gen 8.9 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions.

#### FCC 15.209: Field strength limits below 30 MHz

| Frequency<br>[MHz] | Field Strength<br>[μV/m] | Measurement<br>Distance [m] |
|--------------------|--------------------------|-----------------------------|
| 0.009 – 0.490      | 2400/F(kHz)              | 300                         |
| 0.490 – 1.705      | 24000/F(kHz)             | 30                          |
| 1.705 – 30.0       | 30                       | 30                          |

#### RSS-Gen 8.9: Field strength limits below 30 MHz

| Frequency        | Field Strength<br>[μA/m] | Measurement<br>Distance [m] |
|------------------|--------------------------|-----------------------------|
| 9 – 490 kHz      | 6.37/F(kHz)              | 300                         |
| 490 – 1705 kHz   | 63.7/F(kHz)              | 30                          |
| 1.705 – 30.0 MHz | 0.08                     | 30                          |

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Extrapolation factor of 3m test distance (ANSI C63.10-2013 6.4.4)

| Frequency [MHz] | D ( $\lambda/2\pi$ ) [m] | D (Limit) [m] | Extrapolation Factor |
|-----------------|--------------------------|---------------|----------------------|
| 0.009           | 5305.16                  | 300           | 80.00                |
| 0.159           | 300.29                   | 300           | 80.00                |
| 0.160           | 298.42                   | 300           | 79.95                |
| 0.490           | 97.44                    | 300           | 70.23                |
| 0.490           | 97.44                    | 30            | 40.00                |
| 1.591           | 30.01                    | 30            | 40.00                |
| 1.592           | 29.99                    | 30            | 40.00                |
| 10.000          | 4.77                     | 30            | 24.04                |
| 13.560          | 3.52                     | 30            | 21.39                |
| 15.910          | 3.00                     | 30            | 20.00                |
| 30.000          | 1.59                     | 30            | 20.00                |

FCC 15.209 / RSS-Gen 8.9: Field strength limits above 30 MHz

| Frequency [MHz] | Field Strength [ $\mu\text{V/m}$ ] | Measurement Distance [m] | Field Strength [ $\text{dB}\mu\text{V/m}$ ] |
|-----------------|------------------------------------|--------------------------|---|
| 30 – 88         | 100                                | 3                        | 40.0  |
| 88 – 216        | 150                                | 3                        | 43.5  |
| 216 – 960       | 200                                | 3                        | 46.0  |
| Above 960       | 500                                | 3                        | 53.9  |

In the emission table above, the tighter limit applies at the band edges.

The emission limits shown in the above table are based on measurements employing a quasi-peak detector.

**Test results - Complied with requirement**

**Test equipment used (refer to List of utilized test equipment)**

|      |      |       |      |      |      |      |      |
|------|------|-------|------|------|------|------|------|
| AC01 | BA07 | BRF12 | CL11 | CL30 | CL31 | CL38 | DH06 |
| HPF4 | LP06 | PR12  | PR21 | SH01 | TR06 | -    | -    |

**Test software used**

EMI1 Ver. 5.9

**Calculation method**

The Correction Factor and Result are calculated as followings.

$$\text{Correction Factor [dB/m]} = \text{Ant. Factor [dB/m]} + \text{Loss [dB]} - \text{Gain [dB]}$$

$$\text{Result [dB}\mu\text{V/m]} = \text{Reading [dB}\mu\text{V]} + \text{Correction Factor [dB/m]}$$

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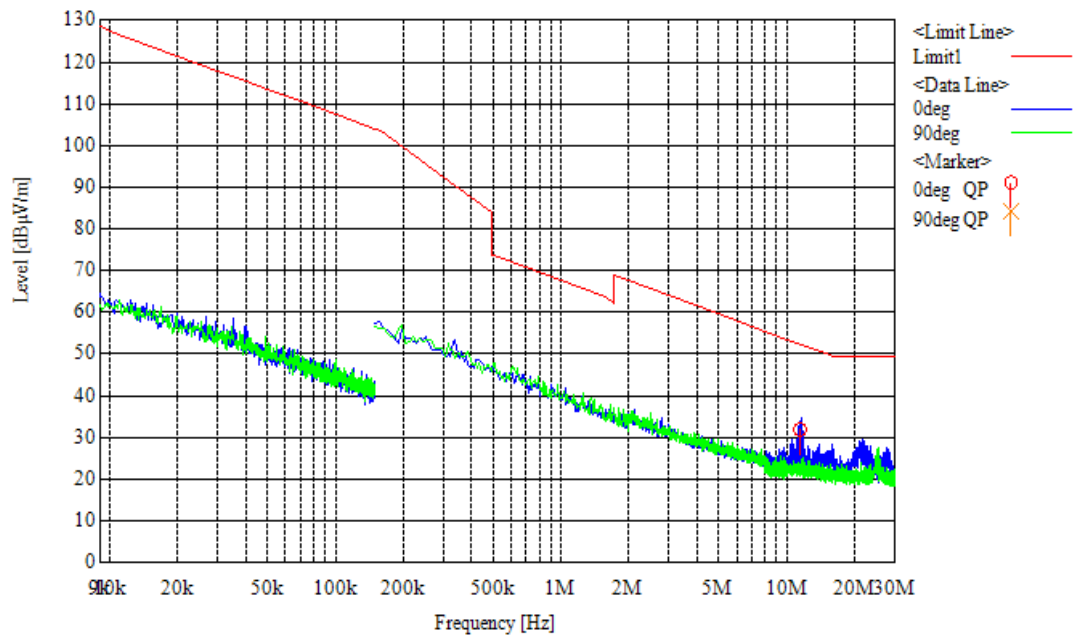
## Test Data (9 kHz - 30MHz)

Operating frequency: 2402MHz  
Worst configuration: 2Mbps, X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

### [Emission level]

| No. | Frequency [MHz] | Reading [dBμV] | Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Ant. |
|-----|-----------------|----------------|---------------|-----------|-----------|-----------------|----------------|-------------|------|
| 1   | 11.43916        | 21.2           | 10.2          | 0.6       | 0.0       | 32.0            | 52.4           | 20.4        | 0deg |

### [Chart]



Tested Date: June 26, 2019  
Humidity: 54 %

Temperature: 19 degC  
Atmos. Press: 1016 hPa

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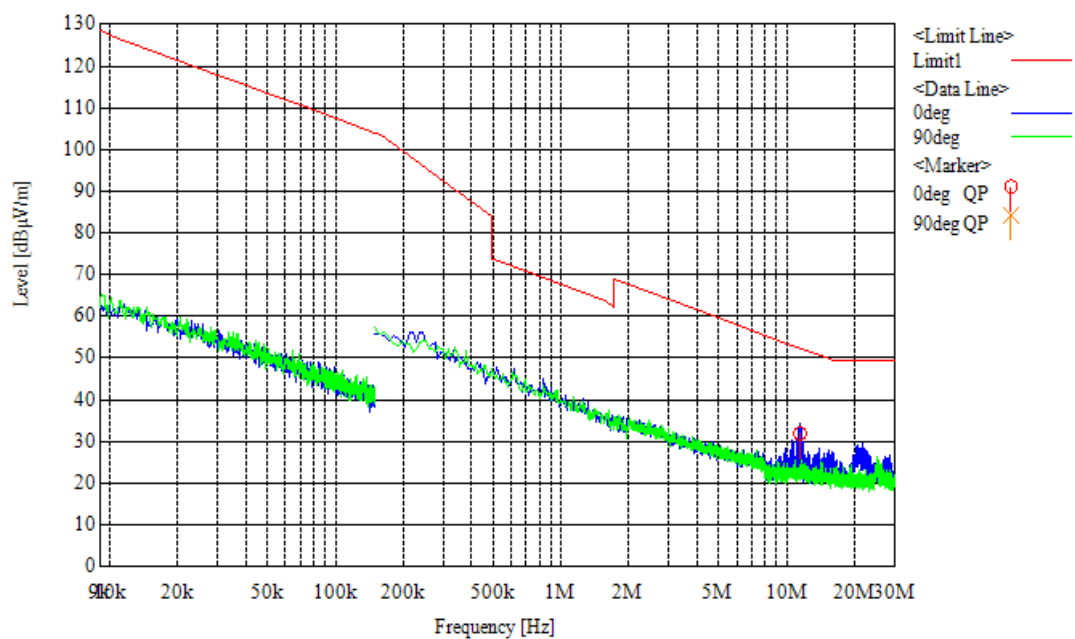
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Operating frequency: 2442MHz  
Worst configuration: 2Mbps, X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

[Emission level]

| No. | Frequency [MHz] | Reading [dBμV] | Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Ant. |
|-----|-----------------|----------------|---------------|-----------|-----------|-----------------|----------------|-------------|------|
| 1   | 11.43972        | 20.9           | 10.2          | 0.6       | 0.0       | 31.7            | 52.4           | 20.7        | 0deg |

[Chart]



Tested Date: June 26, 2019  
Humidity: 54 %

Temperature: 19 degC  
Atmos. Press: 1016 hPa

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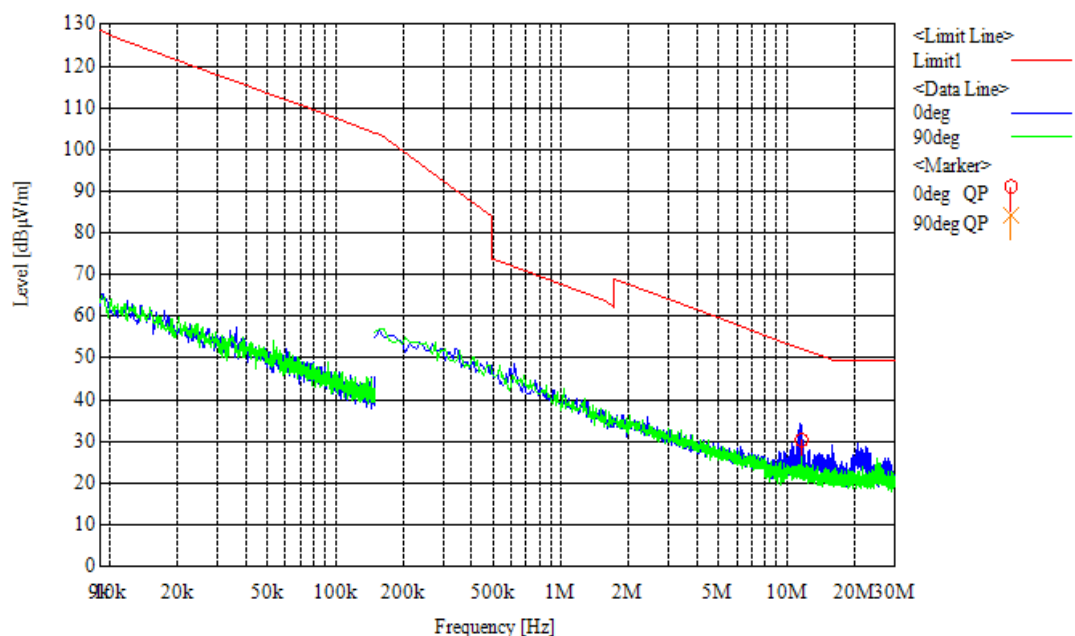
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Operating frequency: 2480MHz  
Worst configuration: 2Mbps, X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

[Emission level]

| No. | Frequency [MHz] | Reading [dBμV] | Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Ant. |
|-----|-----------------|----------------|---------------|-----------|-----------|-----------------|----------------|-------------|------|
| 1   | 11.55829        | 19.3           | 10.2          | 0.6       | 0.0       | 30.1            | 52.3           | 22.2        | 0deg |

[Chart]



Tested Date: June 26, 2019  
Humidity: 54 %

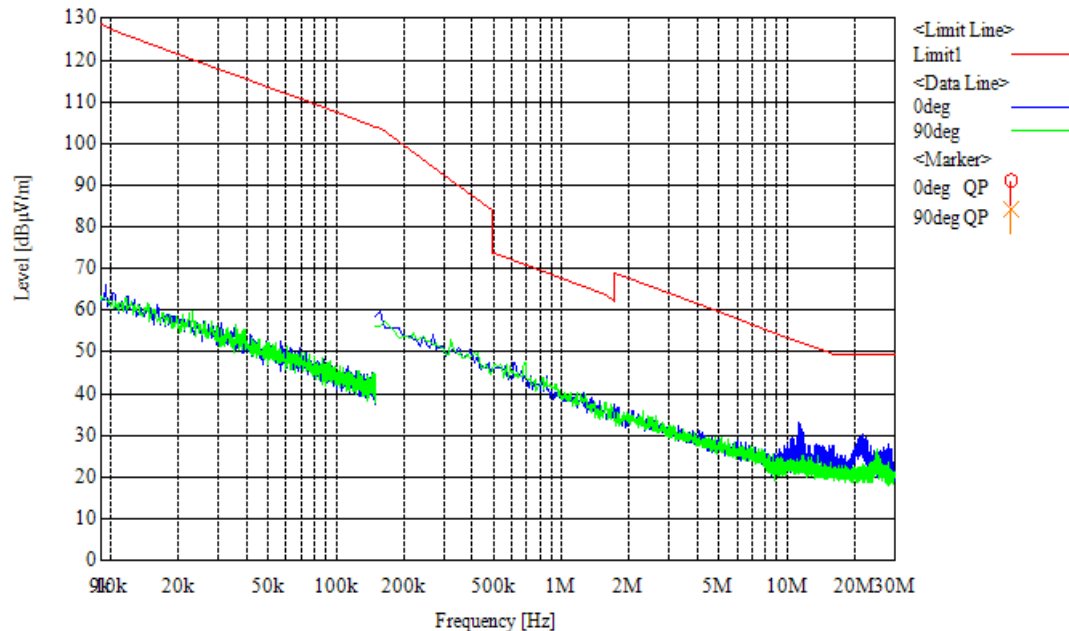
Temperature: 19 degC  
Atmos. Press: 1016 hPa

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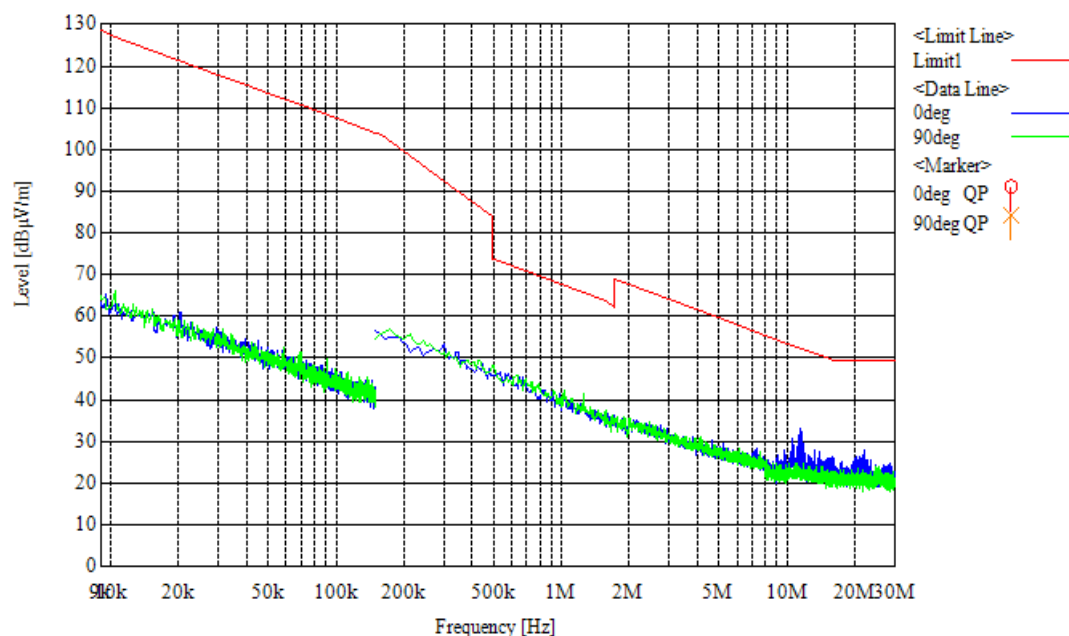
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## Other test Data (9 kHz - 30MHz)

Operating mode: 2402MHz, 1Mbps, X-plane



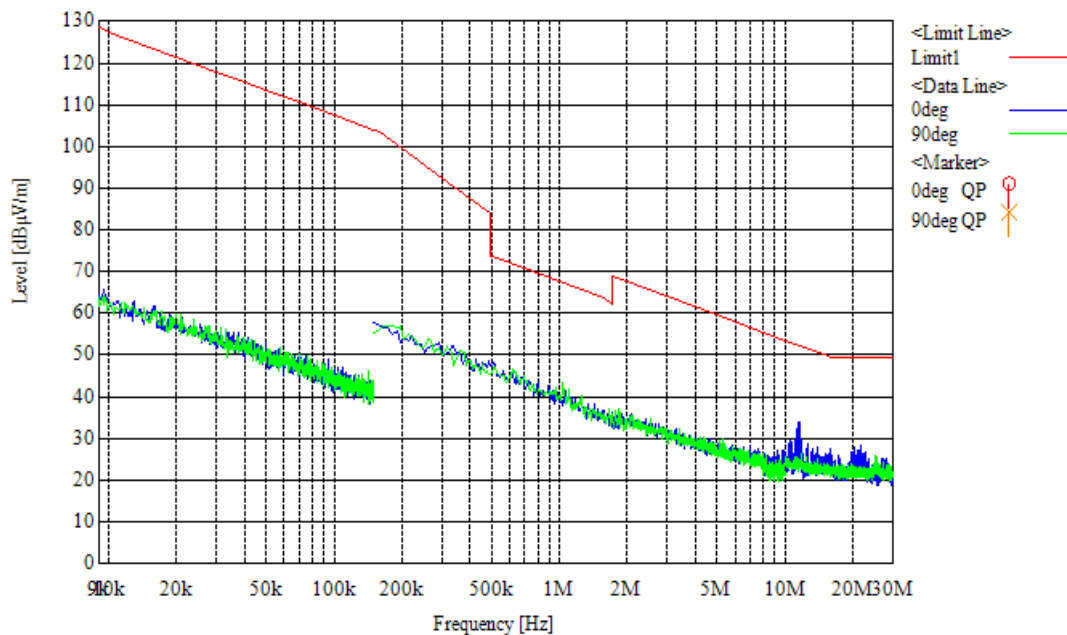
Operating mode: 2402MHz, 1Mbps, Y-plane



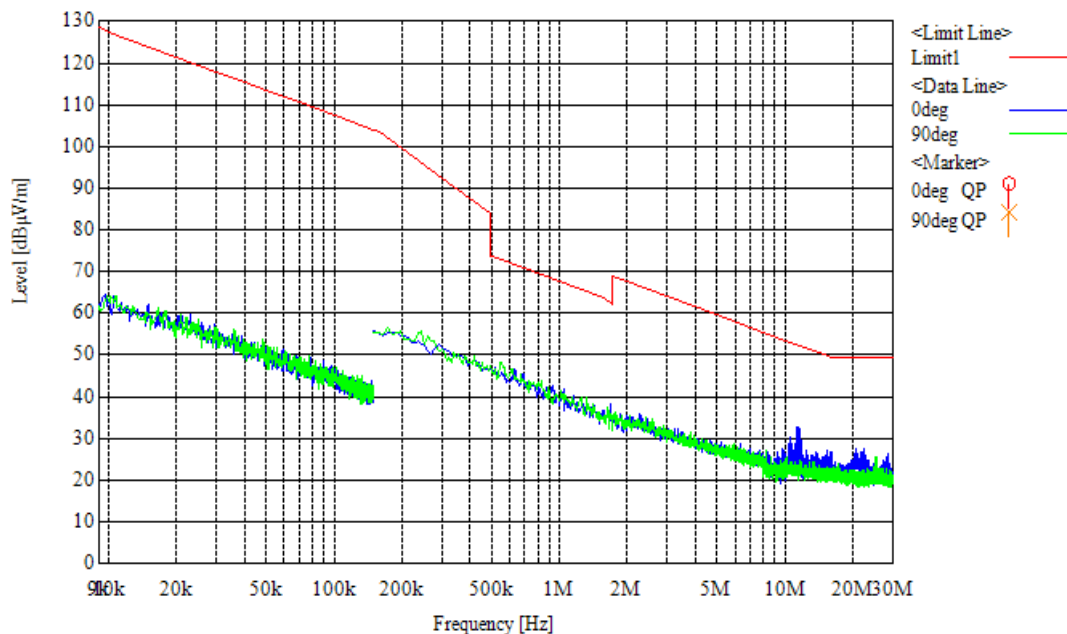
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Operating mode: 2402MHz, 1Mbps, Z-plane



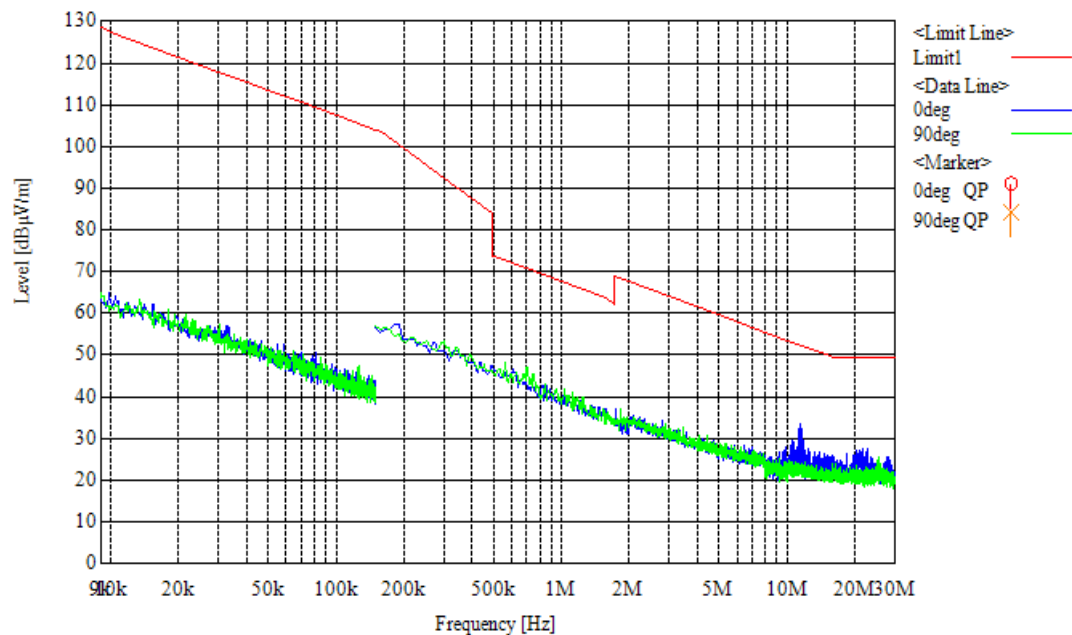
Operating mode: 2402MHz, 2Mbps, Y-plane



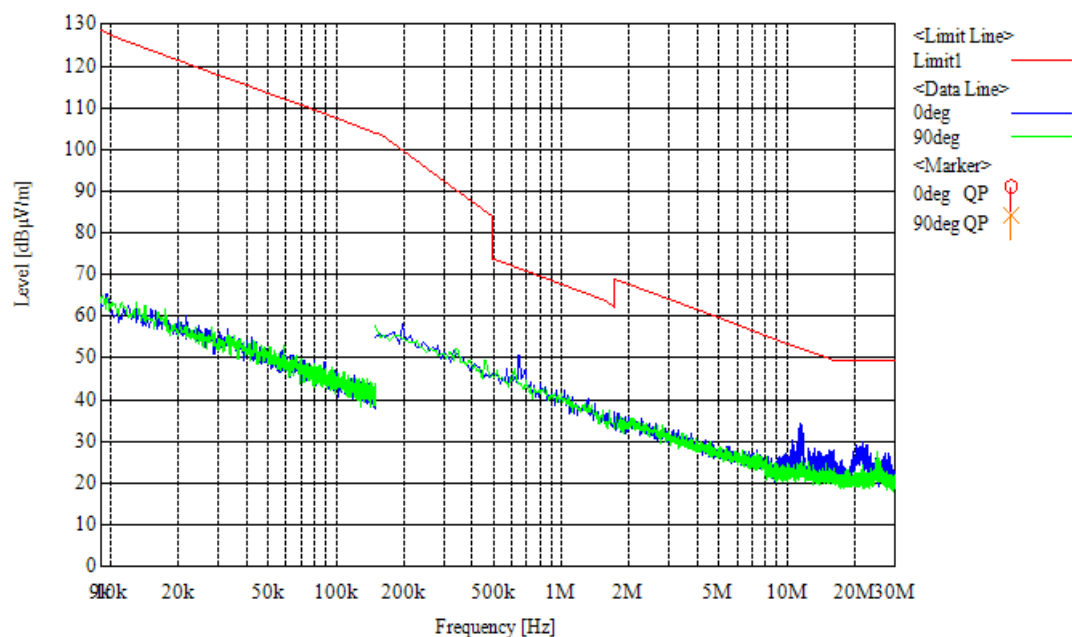
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Operating mode: 2402MHz, 2Mbps, Z-plane



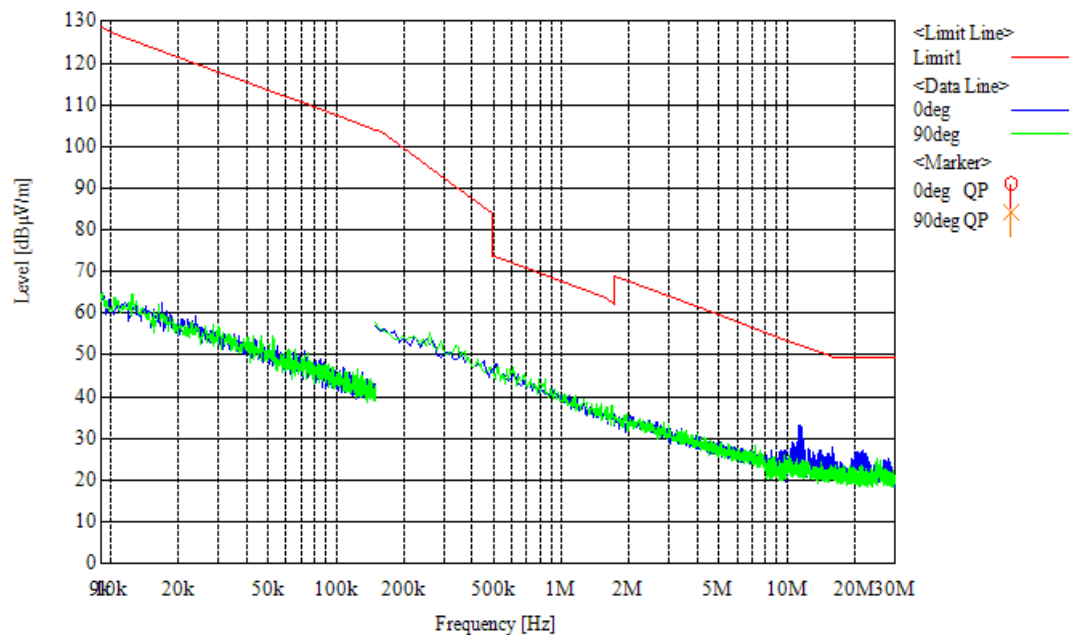
Operating mode: 2442MHz, 1Mbps, X-plane



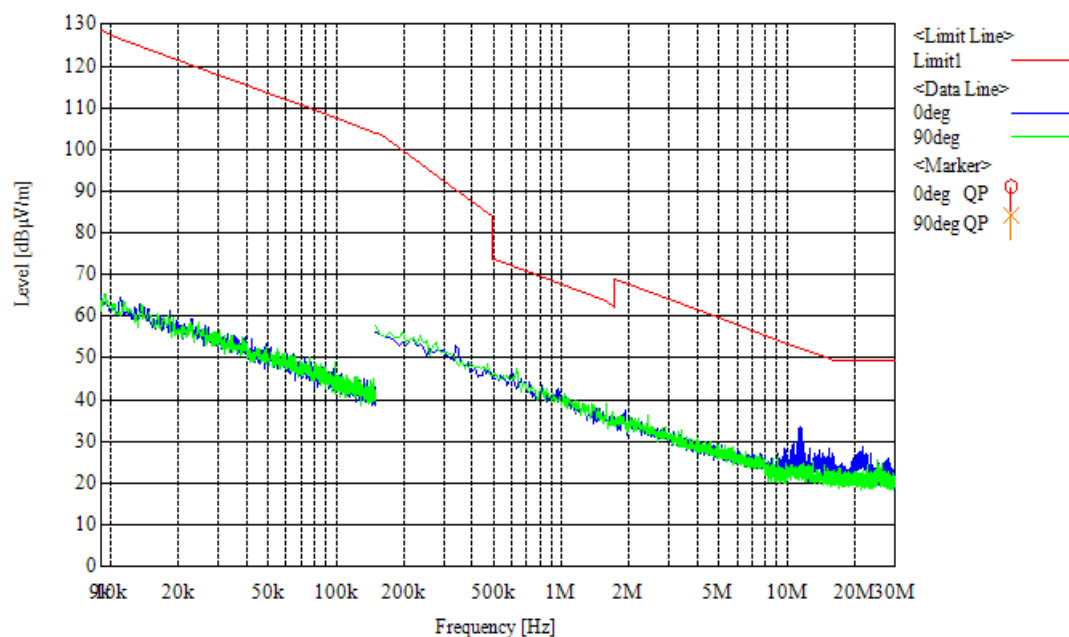
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Operating mode: 2442MHz, 1Mbps, Y-plane



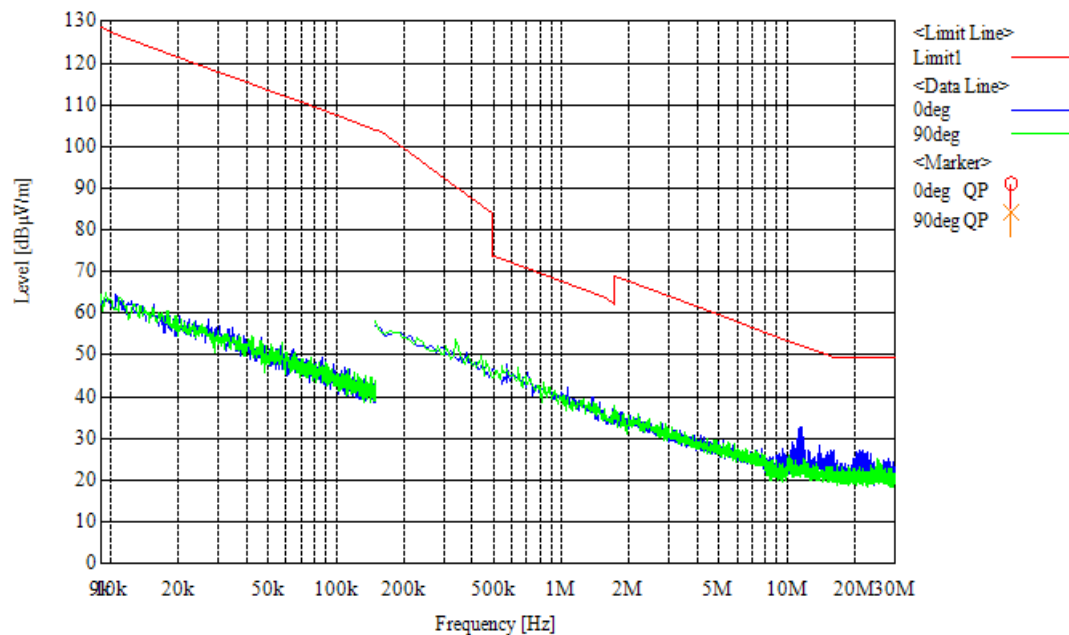
Operating mode: 2442MHz, 1Mbps, Z-plane



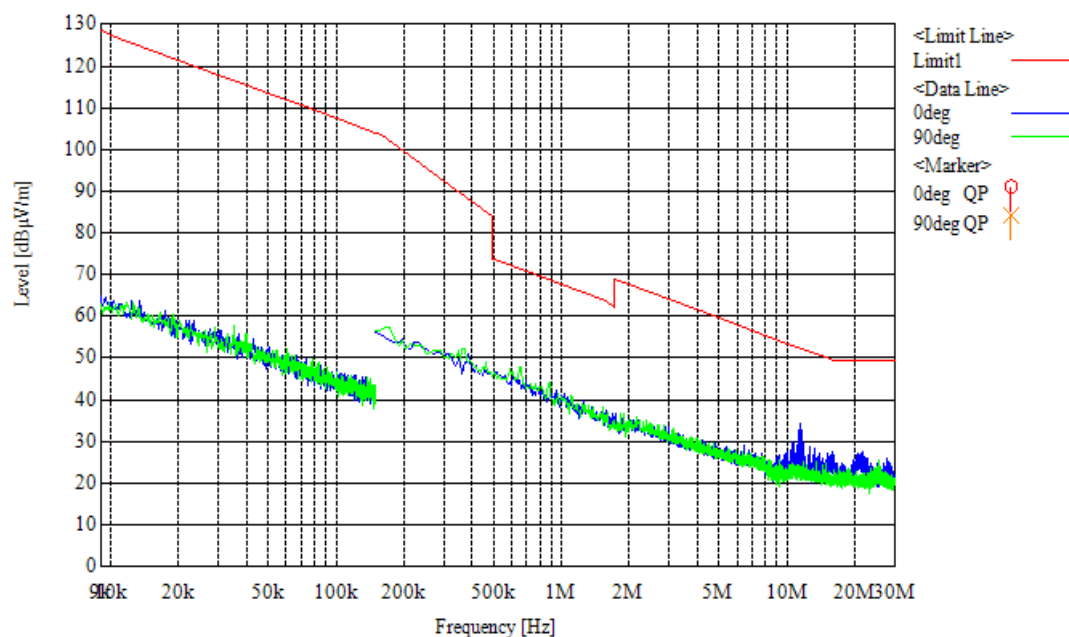
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Operating mode: 2442MHz, 2Mbps, Y-plane



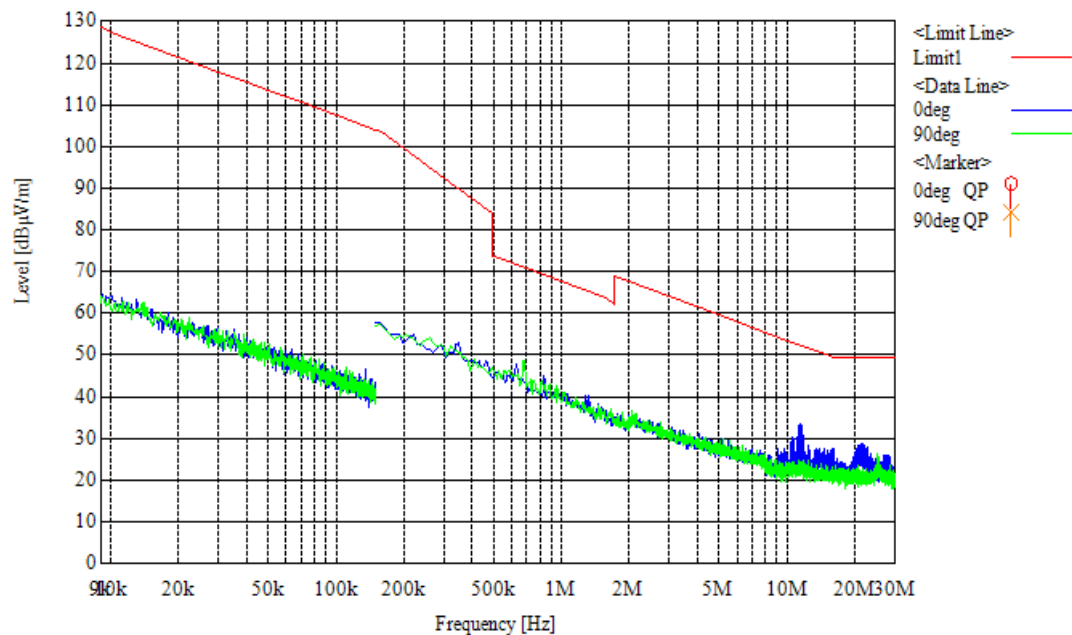
Operating mode: 2442MHz, 2Mbps, Z-plane



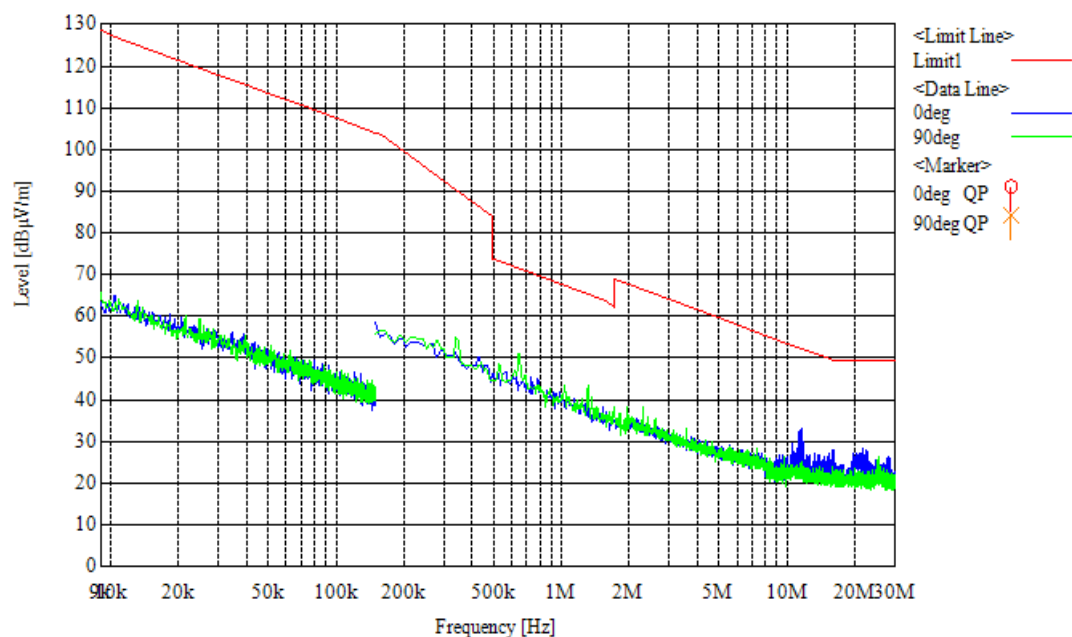
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Operating mode: 2480MHz, 1Mbps, X-plane



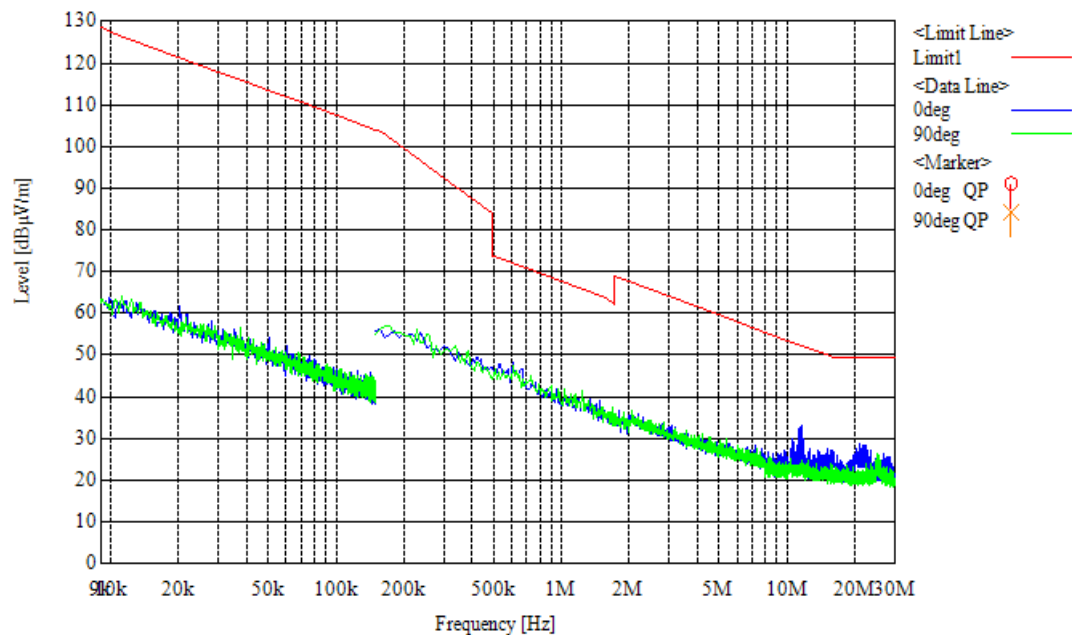
Operating mode: 2480MHz, 1Mbps, Y-plane



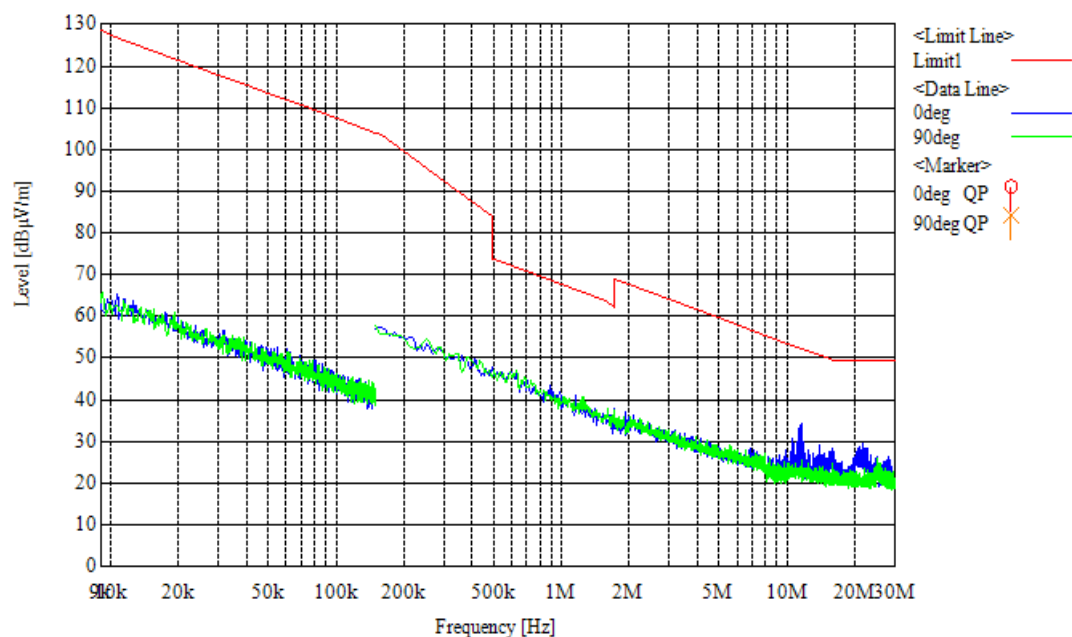
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Operating mode: 2480MHz, 1Mbps, Z-plane



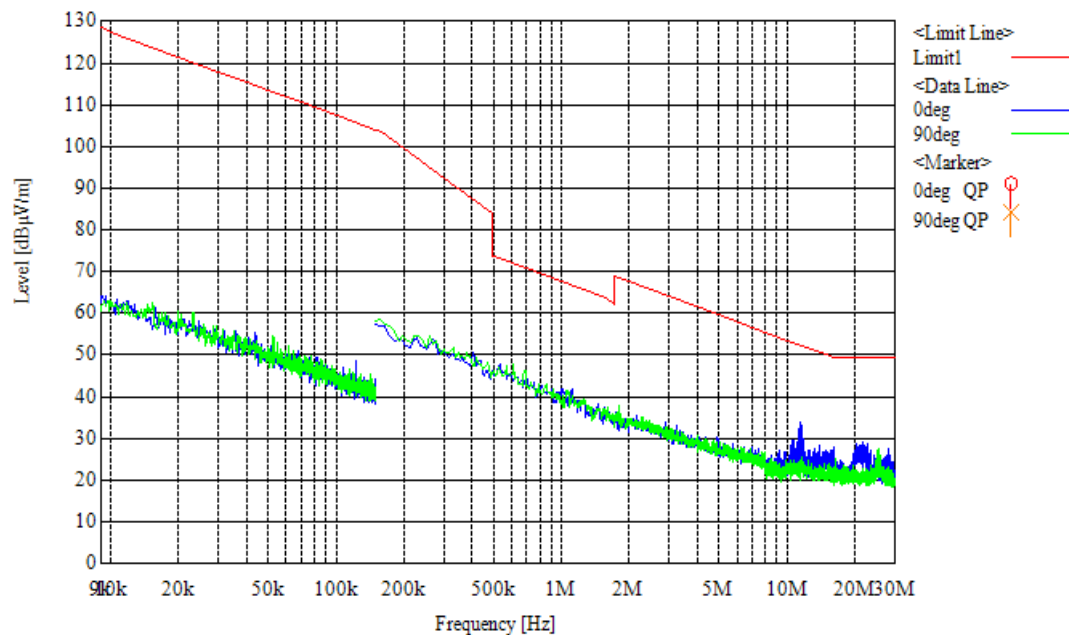
Operating mode: 2480MHz, 2Mbps, Y-plane



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Operating mode: 2480MHz, 2Mbps, Z-plane



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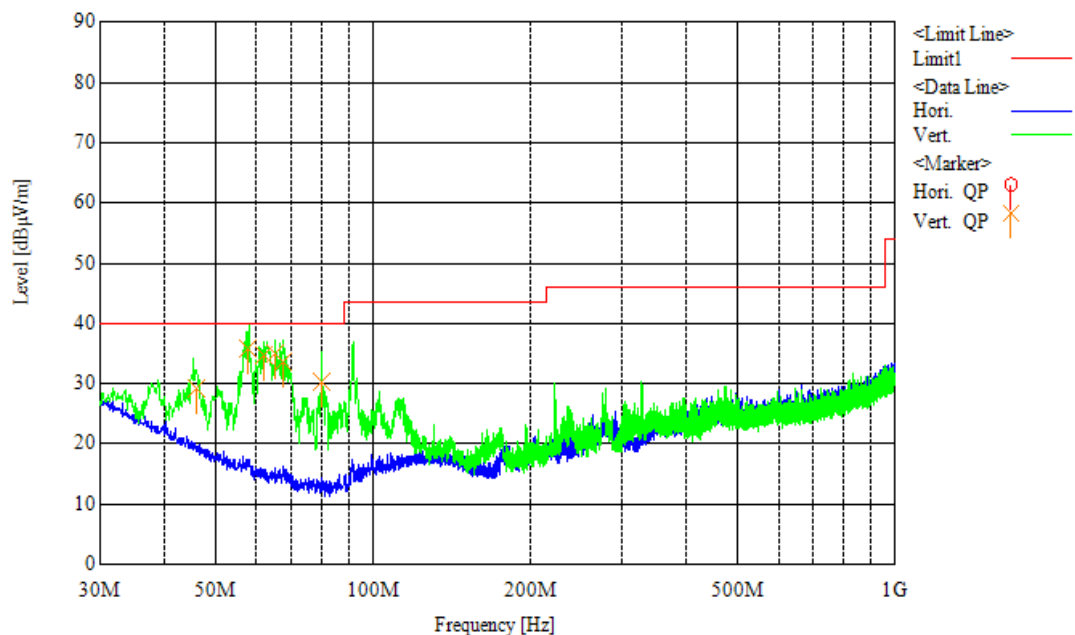
## Test Data (30 - 1000MHz)

Operating frequency: 2402MHz  
Worst configuration: 2Mbps, X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

### [Emission level]

| No. | Frequency [MHz] | Reading [dBμV] | Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Ant.  |
|-----|-----------------|----------------|---------------|-----------|-----------|-----------------|----------------|-------------|-------|
| 1   | 45.968          | 37.7           | 14.8          | 7.1       | 30.3      | 29.3            | 40.0           | 10.7        | Vert. |
| 2   | 57.566          | 47.8           | 11.0          | 7.2       | 30.3      | 35.7            | 40.0           | 4.3         | Vert. |
| 3   | 62.110          | 47.7           | 10.0          | 7.3       | 30.3      | 34.7            | 40.0           | 5.3         | Vert. |
| 4   | 65.260          | 48.3           | 9.5           | 7.4       | 30.3      | 34.9            | 40.0           | 5.1         | Vert. |
| 5   | 67.578          | 47.3           | 9.1           | 7.4       | 30.3      | 33.5            | 40.0           | 6.5         | Vert. |
| 6   | 80.095          | 45.6           | 7.3           | 7.6       | 30.3      | 30.2            | 40.0           | 9.8         | Vert. |

### [Chart]



Tested Date: June 20, 2019  
Humidity: 56 %

Temperature: 19 degC  
Atmos. Press: 1006 hPa

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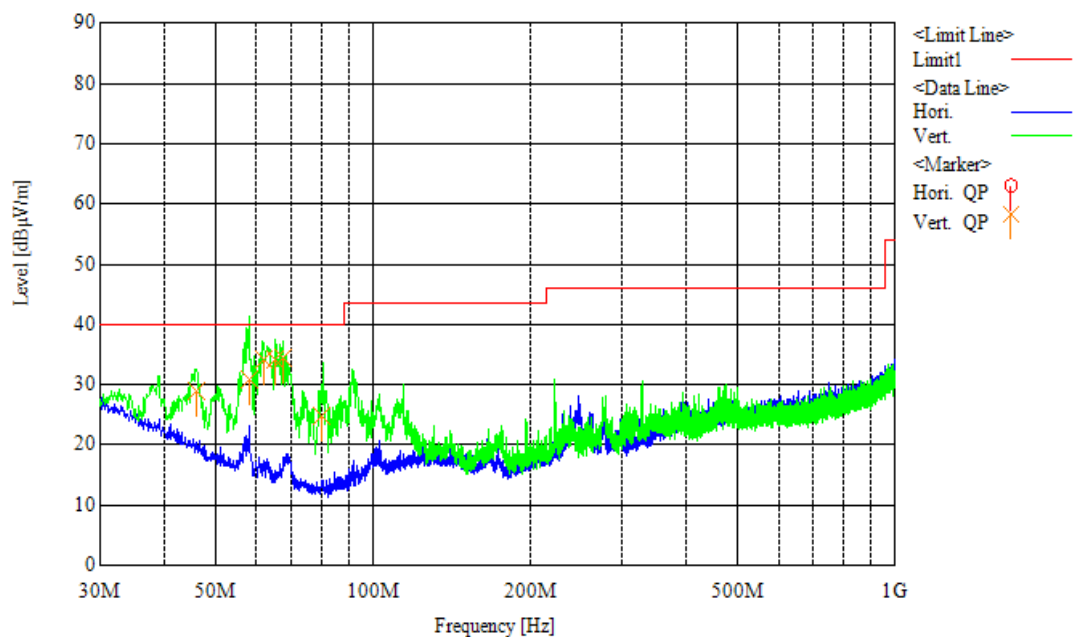
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Operating frequency: 2442MHz  
Worst configuration: 2Mbps, X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

[Emission level]

| No. | Frequency [MHz] | Reading [dBμV] | Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Ant.  |
|-----|-----------------|----------------|---------------|-----------|-----------|-----------------|----------------|-------------|-------|
| 1   | 46.081          | 37.4           | 14.8          | 7.1       | 30.3      | 29.0            | 40.0           | 11.0        | Vert. |
| 2   | 57.957          | 43.1           | 10.9          | 7.3       | 30.3      | 31.0            | 40.0           | 9.0         | Vert. |
| 3   | 62.132          | 47.2           | 10.0          | 7.3       | 30.3      | 34.2            | 40.0           | 5.8         | Vert. |
| 4   | 65.217          | 47.6           | 9.5           | 7.4       | 30.3      | 34.2            | 40.0           | 5.8         | Vert. |
| 5   | 67.516          | 48.2           | 9.1           | 7.4       | 30.3      | 34.4            | 40.0           | 5.6         | Vert. |
| 6   | 80.166          | 40.2           | 7.3           | 7.6       | 30.3      | 24.8            | 40.0           | 15.2        | Vert. |

[Chart]



Tested Date: June 20, 2019  
Humidity: 56 %

Temperature: 19 degC  
Atmos. Press: 1006 hPa

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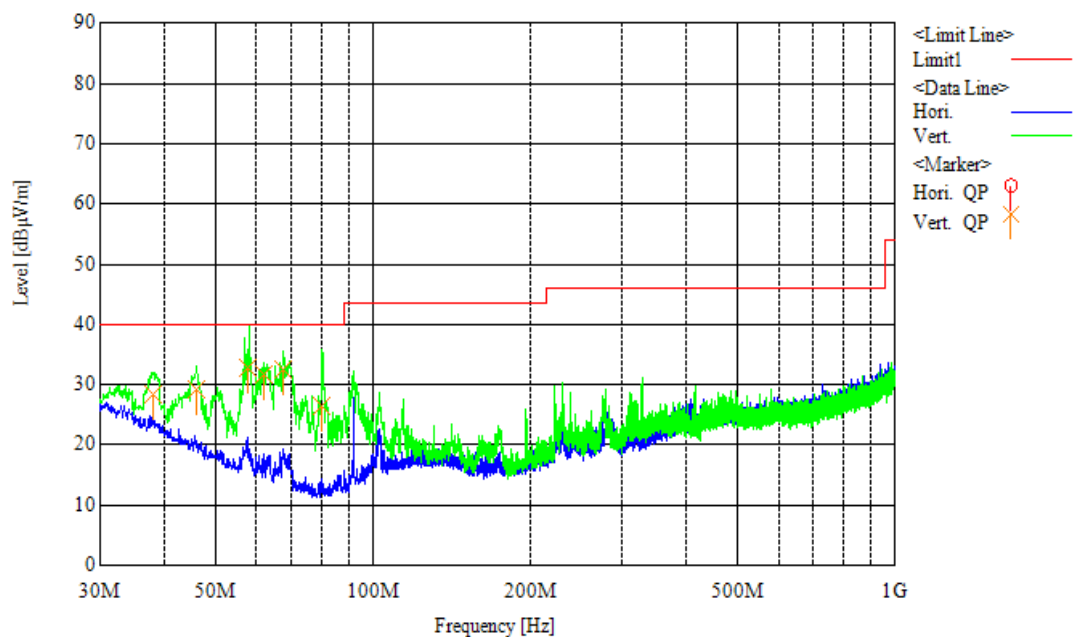
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Operating frequency: 2480MHz  
Worst configuration: 1Mbps, Z-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

[Emission level]

| No. | Frequency [MHz] | Reading [dBμV] | Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Ant.  |
|-----|-----------------|----------------|---------------|-----------|-----------|-----------------|----------------|-------------|-------|
| 1   | 38.070          | 33.5           | 18.5          | 6.9       | 30.4      | 28.5            | 40.0           | 11.5        | Vert. |
| 2   | 46.075          | 37.6           | 14.8          | 7.1       | 30.3      | 29.2            | 40.0           | 10.8        | Vert. |
| 3   | 57.541          | 44.9           | 11.0          | 7.2       | 30.3      | 32.8            | 40.0           | 7.2         | Vert. |
| 4   | 62.140          | 44.6           | 10.0          | 7.3       | 30.3      | 31.6            | 40.0           | 8.4         | Vert. |
| 5   | 67.505          | 46.4           | 9.1           | 7.4       | 30.3      | 32.6            | 40.0           | 7.4         | Vert. |
| 6   | 80.092          | 41.9           | 7.3           | 7.6       | 30.3      | 26.5            | 40.0           | 13.5        | Vert. |

[Chart]



Tested Date: June 20, 2019  
Humidity: 56 %

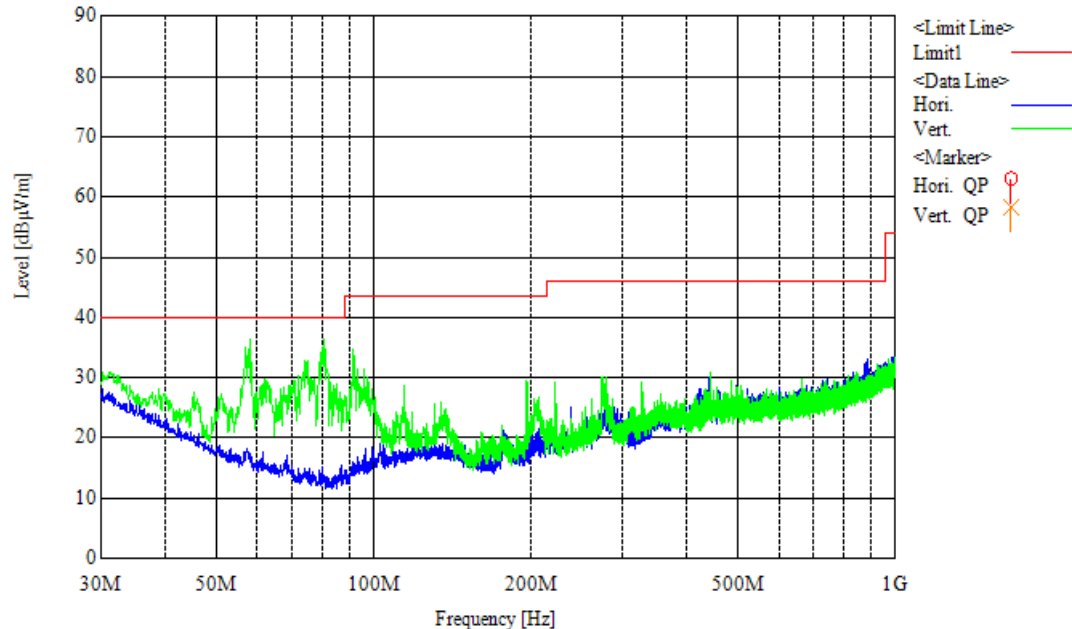
Temperature: 19 degC  
Atmos. Press: 1006 hPa

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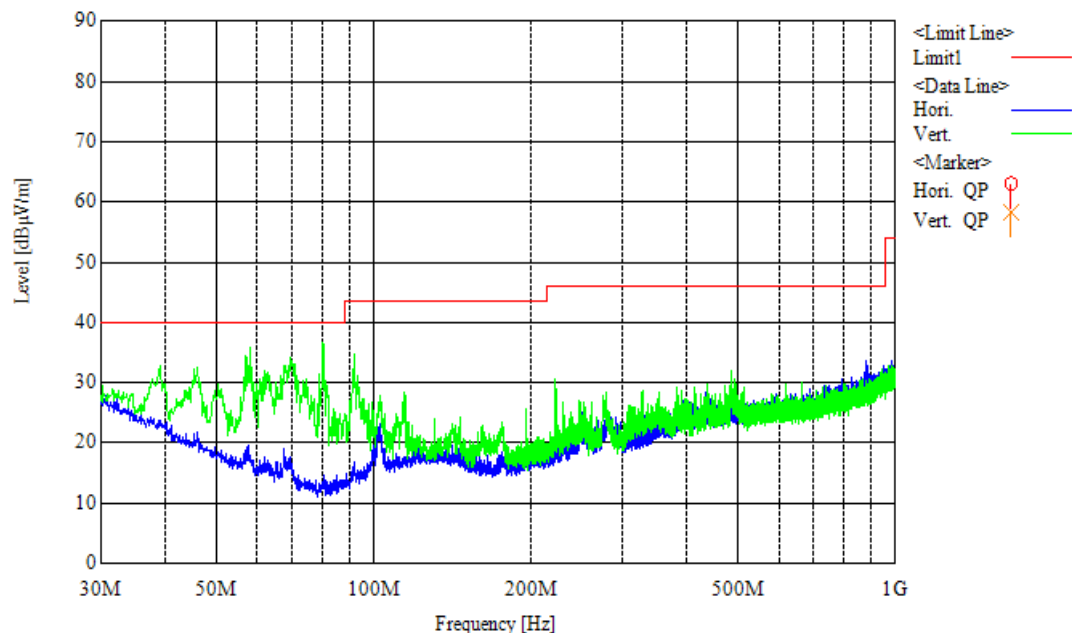
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## Other test Data (30MHz - 1000MHz)

Operating mode: 2402MHz, 1Mbps, X-plane



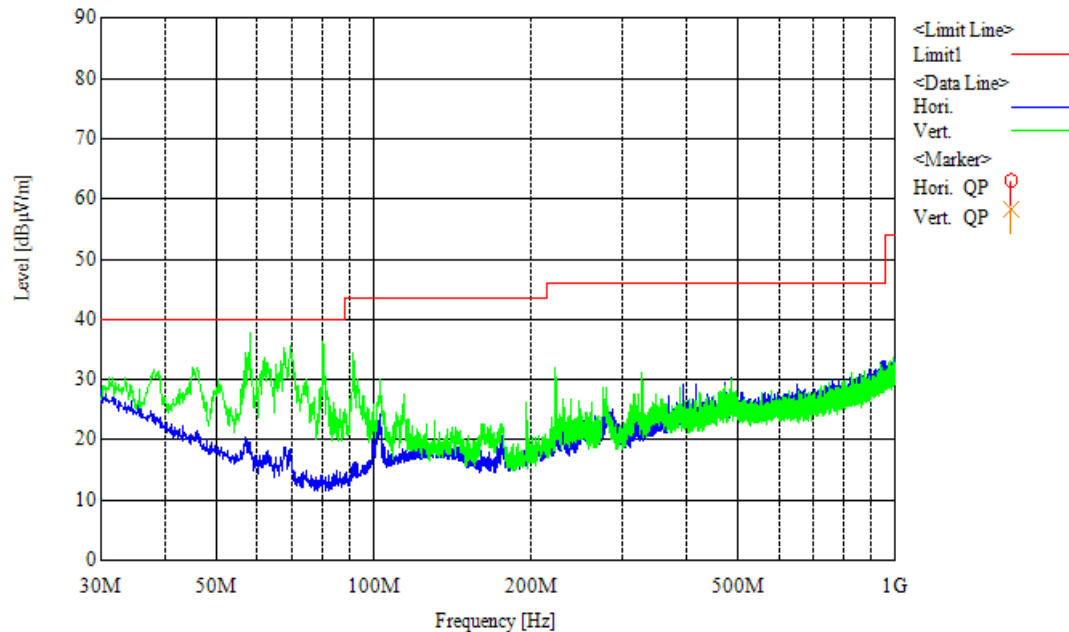
Operating mode: 2402MHz, 1Mbps, Y-plane



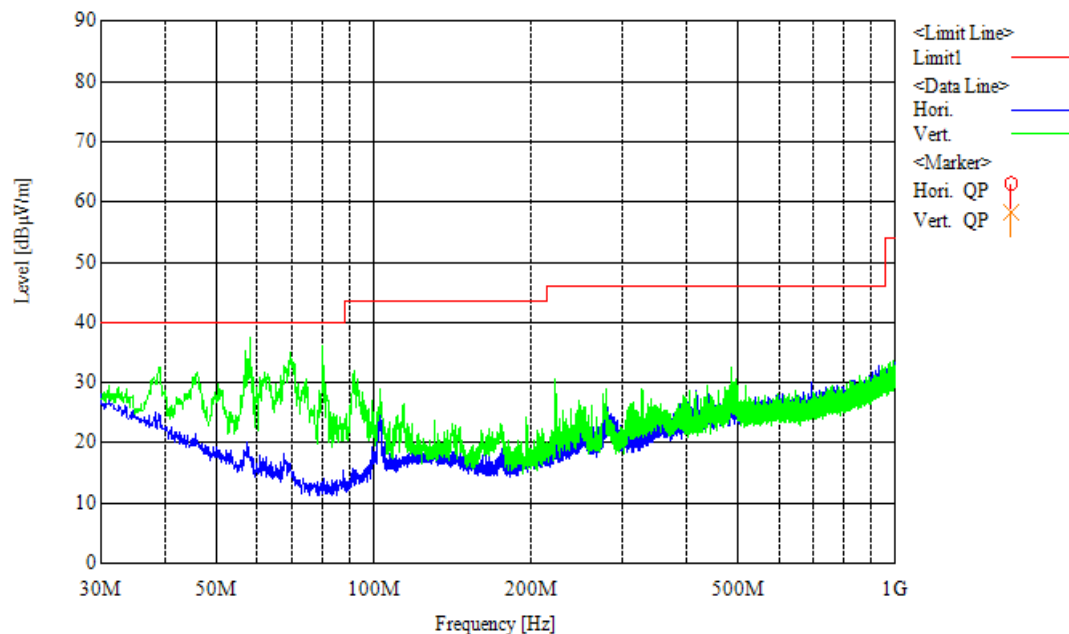
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Operating mode: 2402MHz, 1Mbps, Z-plane



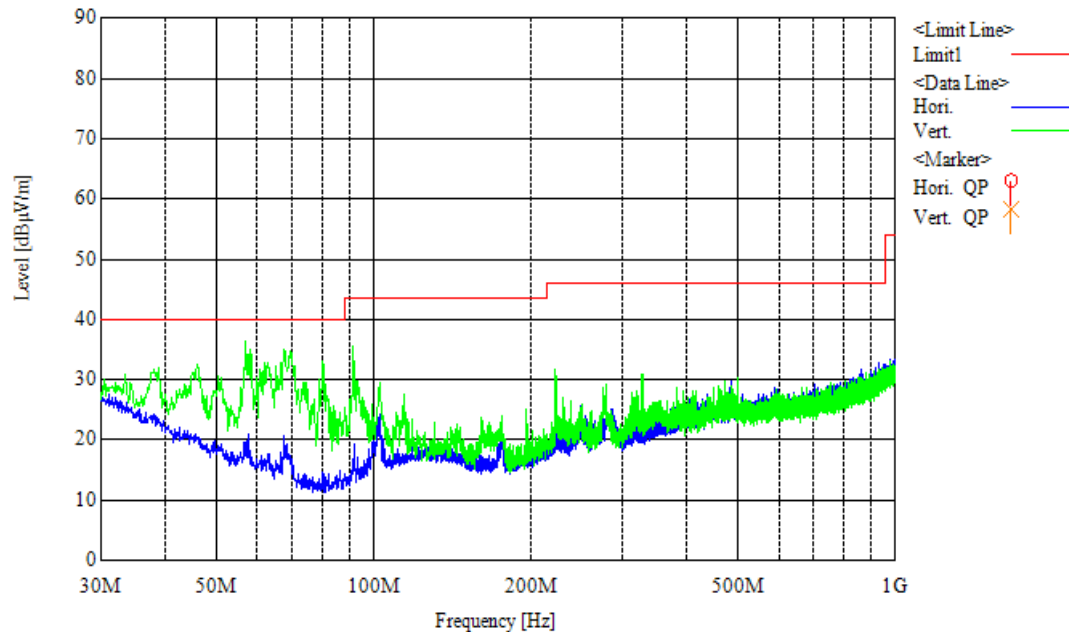
Operating mode: 2402MHz, 2Mbps, Y-plane



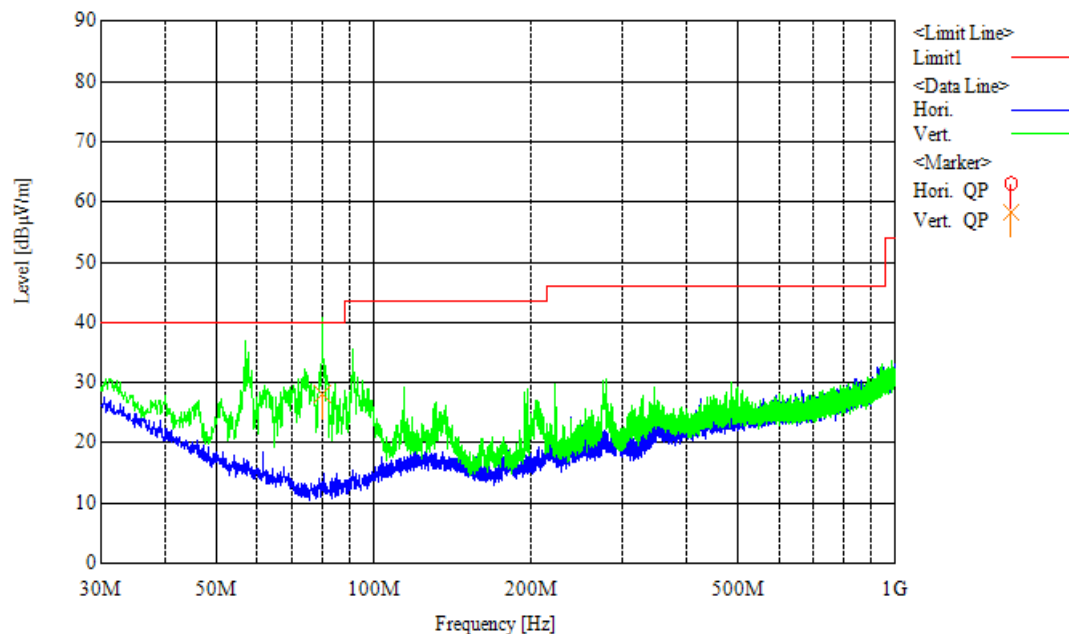
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Operating mode: 2402MHz, 2Mbps, Z-plane



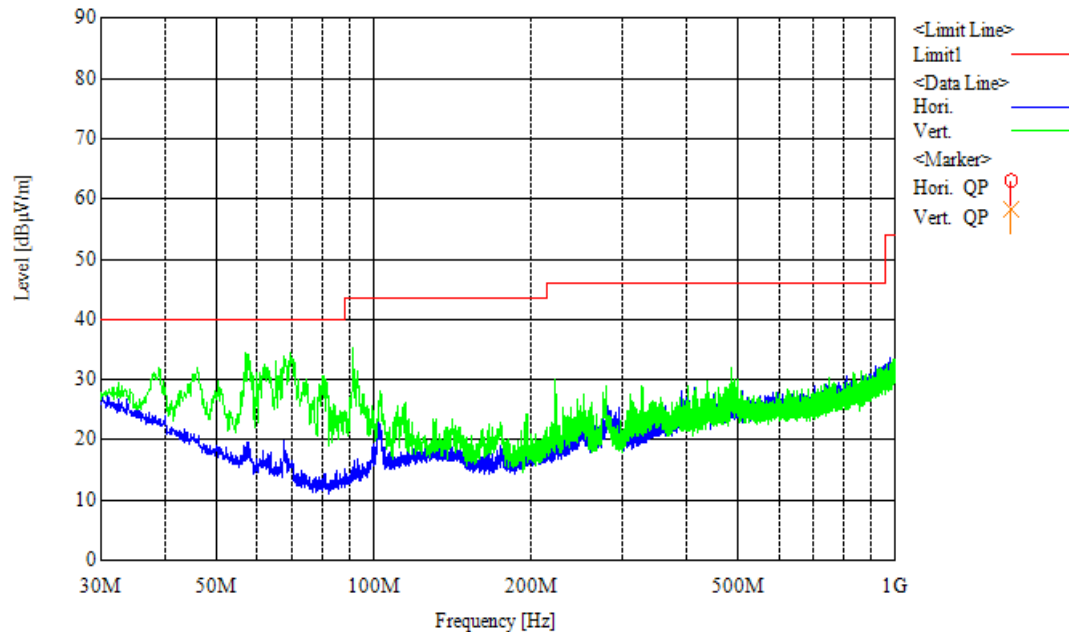
Operating mode: 2442MHz, 1Mbps, X-plane



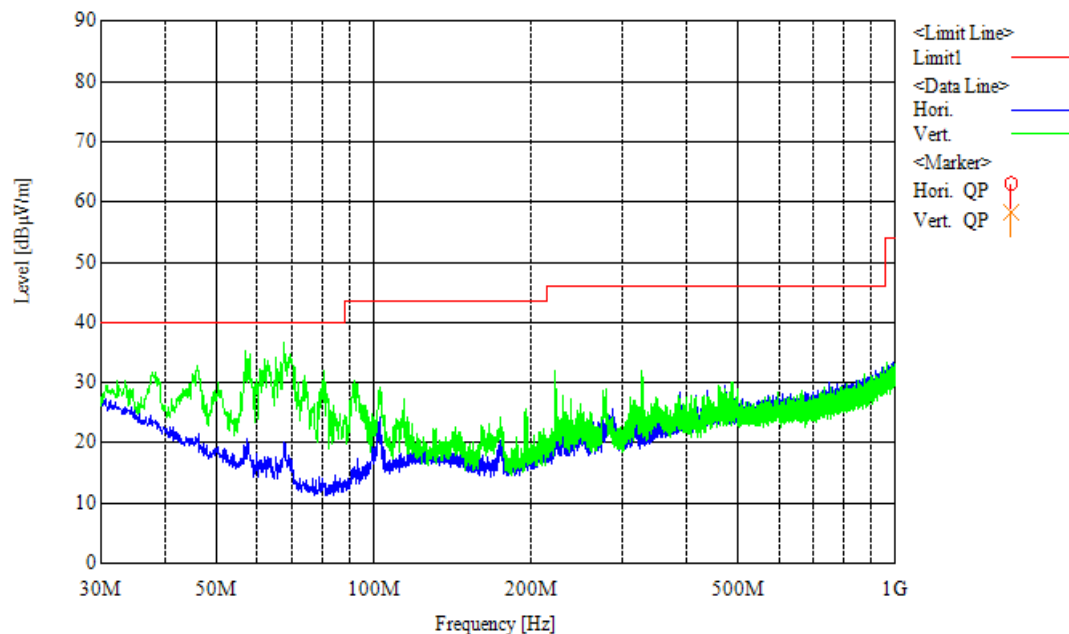
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Operating mode: 2442MHz, 1Mbps, Y-plane



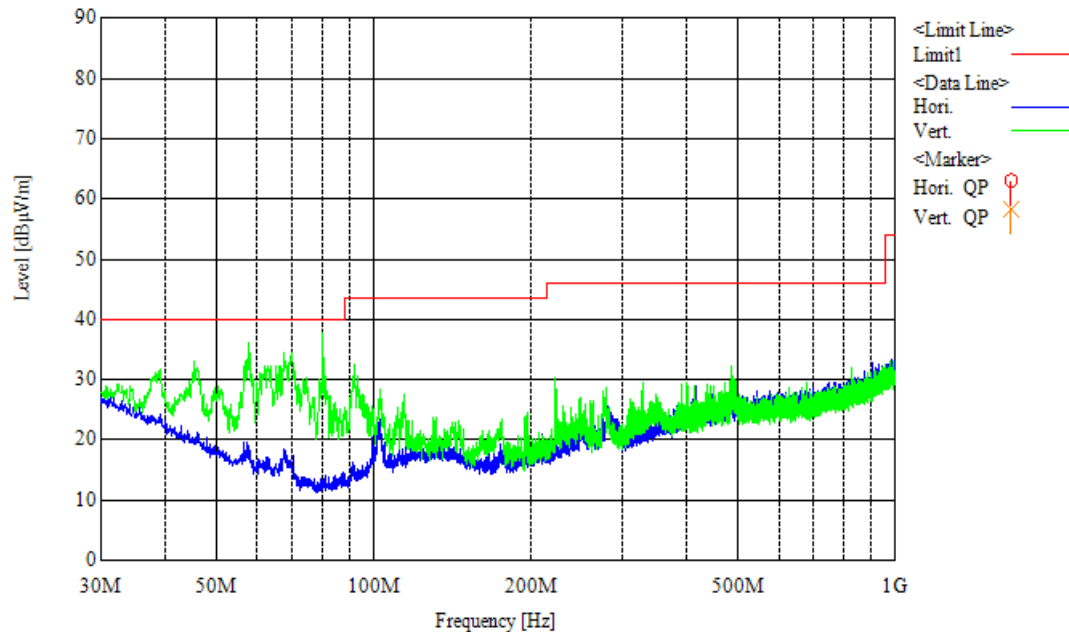
Operating mode: 2442MHz, 1Mbps, Z-plane



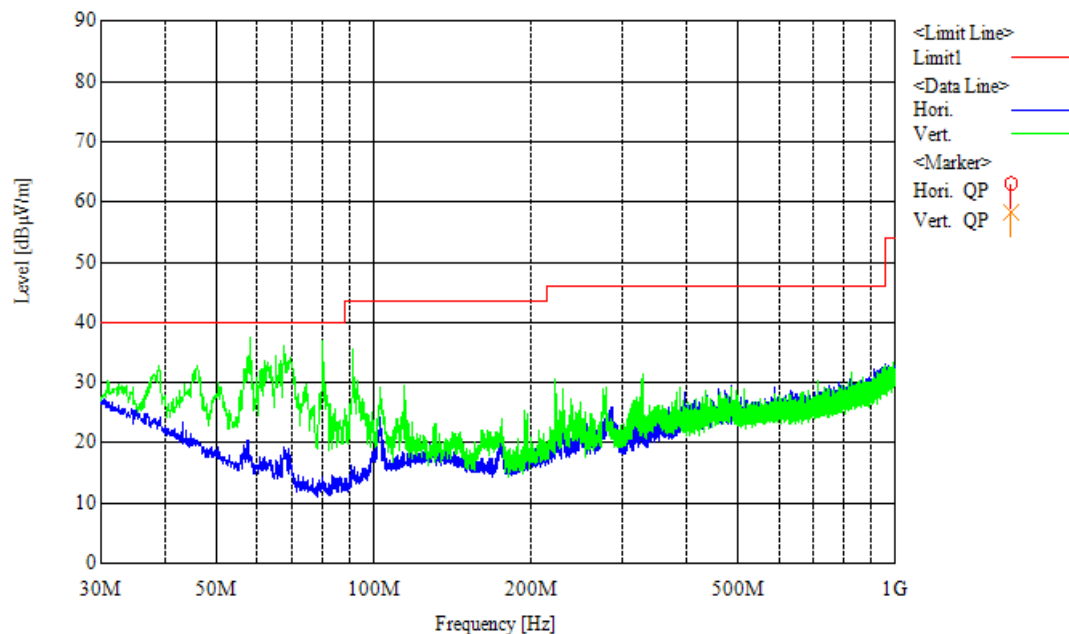
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Operating mode: 2442MHz, 2Mbps, Y-plane



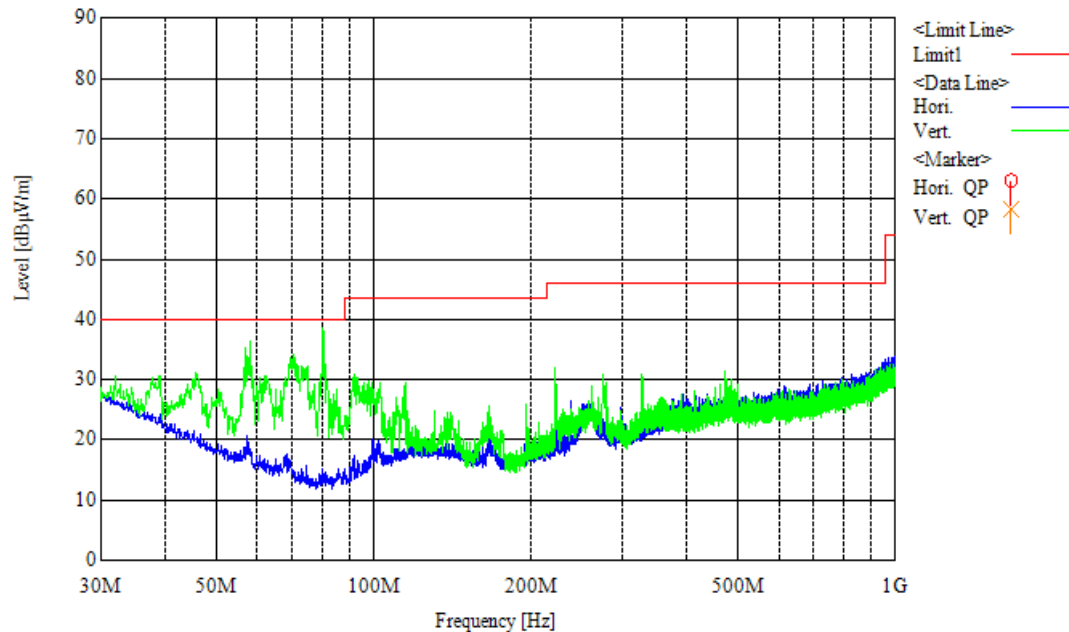
Operating mode: 2442MHz, 2Mbps, Z-plane



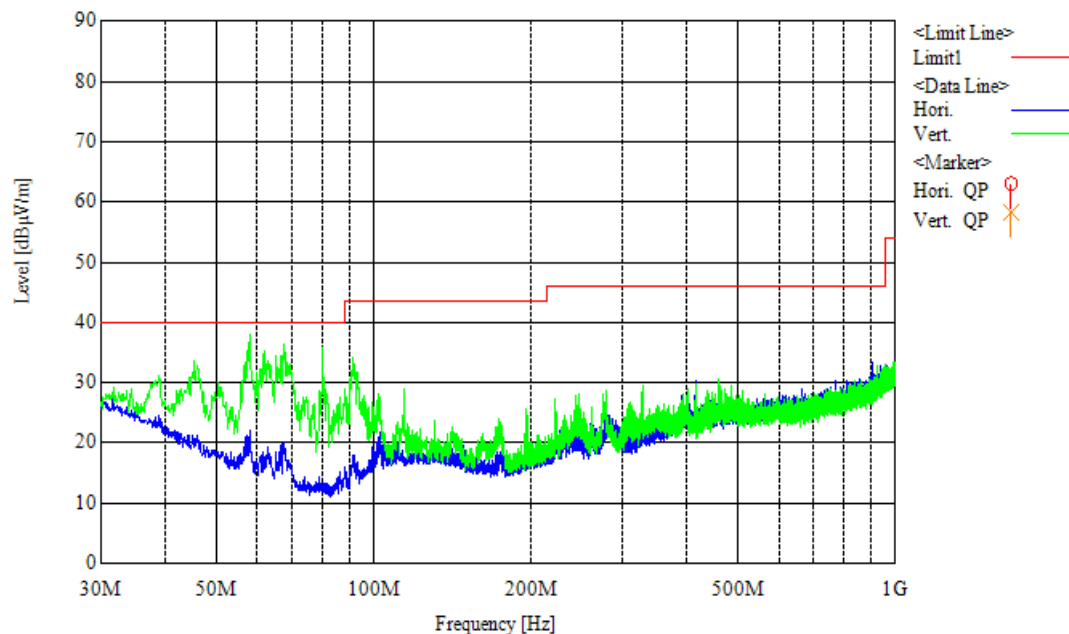
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Operating mode: 2480MHz, 1Mbps, X-plane



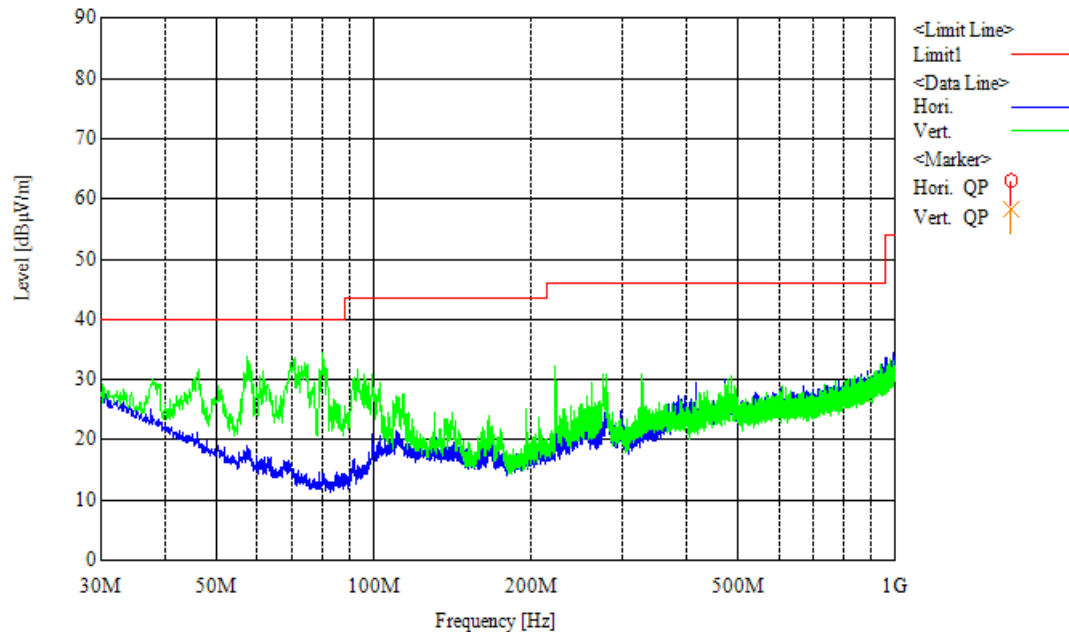
Operating mode: 2480MHz, 1Mbps, Y-plane



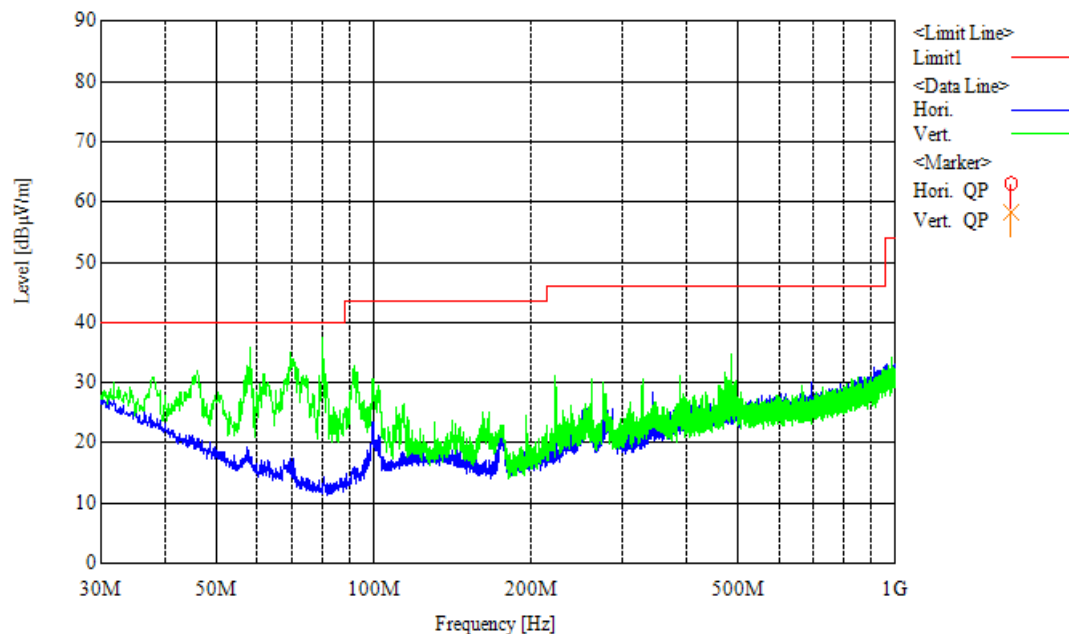
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Operating mode: 2480MHz, 2Mbps, X-plane



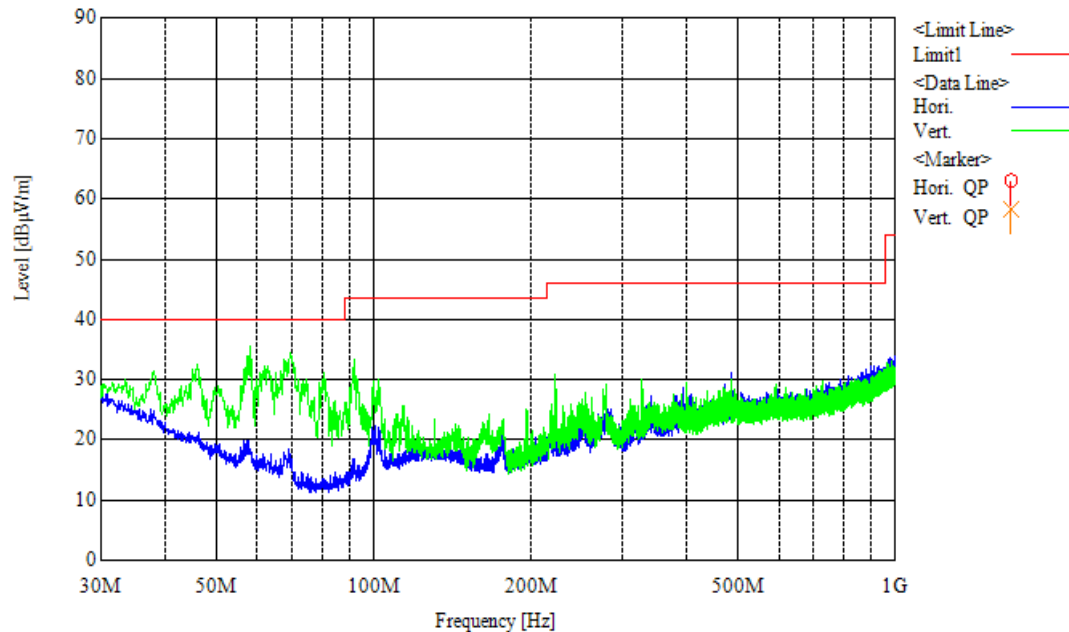
Operating mode: 2480MHz, 2Mbps, Y-plane



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Operating mode: 2480MHz, 2Mbps, Z-plane



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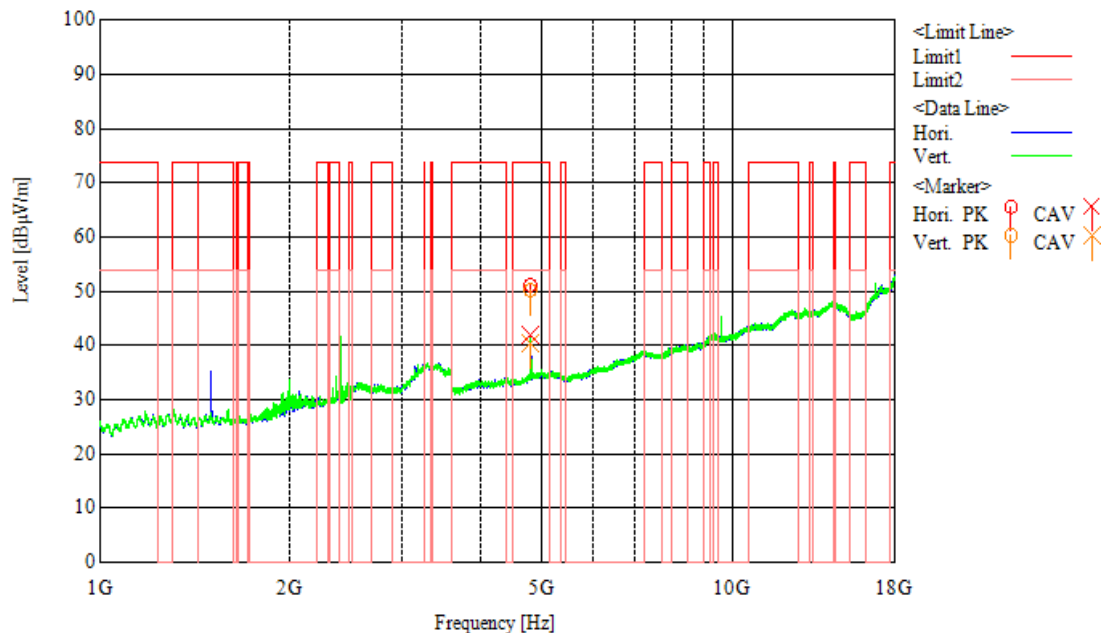
## Test Data (1-18GHz)

Operating frequency: 2402MHz  
Worst configuration: 1Mbps, Y-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

### [Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant.  |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|-------|
| 1   | 4803.944        | 47.9              | 38.7               | 3.2           | 51.1               | 41.9                | 73.9              | 53.9               | 22.8           | 12.0            | Hori. |
| 2   | 4803.976        | 46.9              | 37.1               | 3.2           | 50.1               | 40.3                | 73.9              | 53.9               | 23.8           | 13.6            | Vert. |

### [Chart]



Tested Date: June 17, 2019  
Humidity: 53 %

Temperature: 18 degC  
Atmos. Press: 1009 hPa

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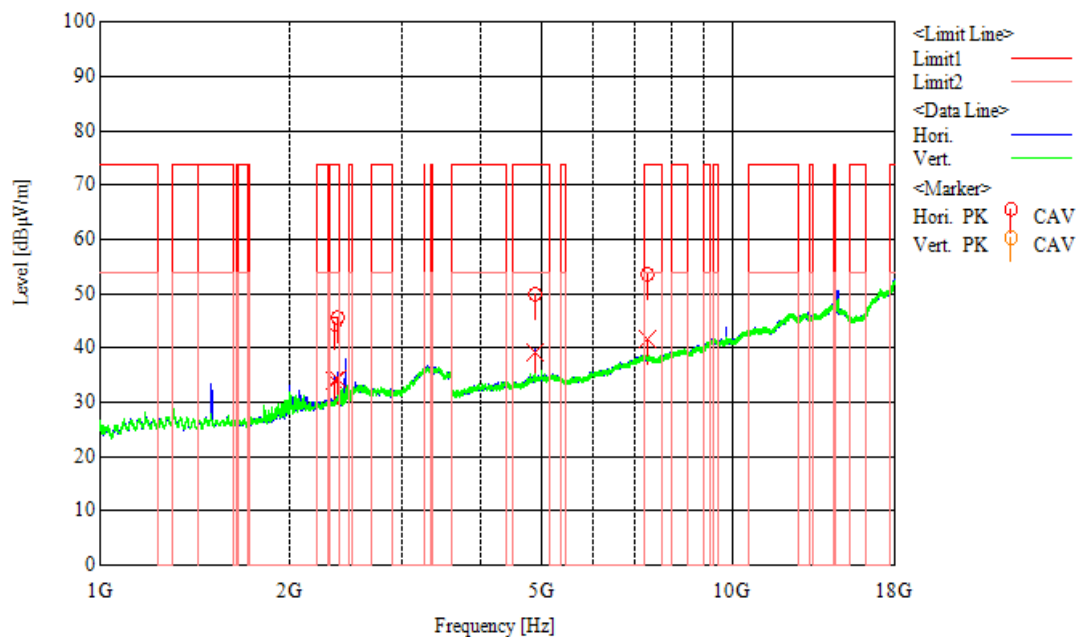
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Operating frequency: 2442MHz  
Worst configuration: 1Mbps, X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

[Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant.  |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|-------|
| 1   | 2346.067        | 47.8              | 37.3               | -3.4          | 44.4               | 33.9                | 73.9              | 53.9               | 29.5           | 20.0            | Hori. |
| 2   | 2378.100        | 48.6              | 37.4               | -3.0          | 45.6               | 34.4                | 73.9              | 53.9               | 28.3           | 19.5            | Hori. |
| 3   | 4884.232        | 46.2              | 35.7               | 3.6           | 49.8               | 39.3                | 73.9              | 53.9               | 24.1           | 14.6            | Hori. |
| 4   | 7325.507        | 45.6              | 33.6               | 7.9           | 53.5               | 41.5                | 73.9              | 53.9               | 20.4           | 12.4            | Hori. |

[Chart]



Tested Date: June 17, 2019  
Humidity: 53 %

Temperature: 18 degC  
Atmos. Press: 1009 hPa

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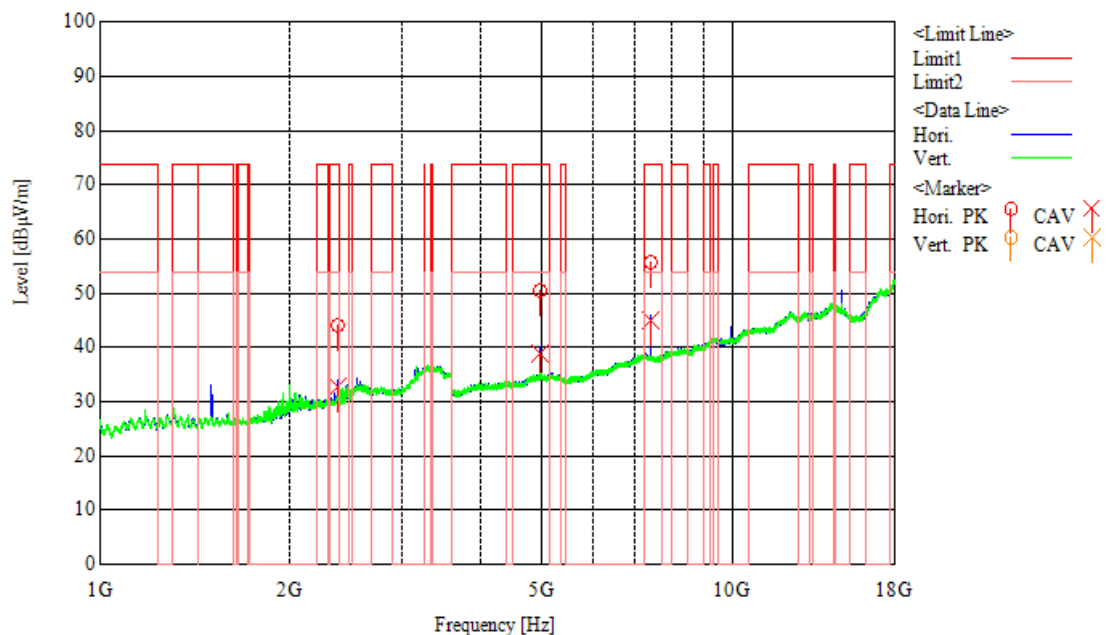
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Operating frequency: 2480MHz  
Worst configuration: 1Mbps, X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

[Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant.  |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|-------|
| 1   | 2383.979        | 47.0              | 35.8               | -2.9          | 44.1               | 32.9                | 73.9              | 53.9               | 29.8           | 21.0            | Hori. |
| 2   | 4959.964        | 46.6              | 35.2               | 3.8           | 50.4               | 39.0                | 73.9              | 53.9               | 23.5           | 14.9            | Hori. |
| 3   | 7439.296        | 47.7              | 37.0               | 8.0           | 55.7               | 45.0                | 73.9              | 53.9               | 18.2           | 8.9             | Hori. |

[Chart]



Tested Date: June 17, 2019  
Humidity: 53 %

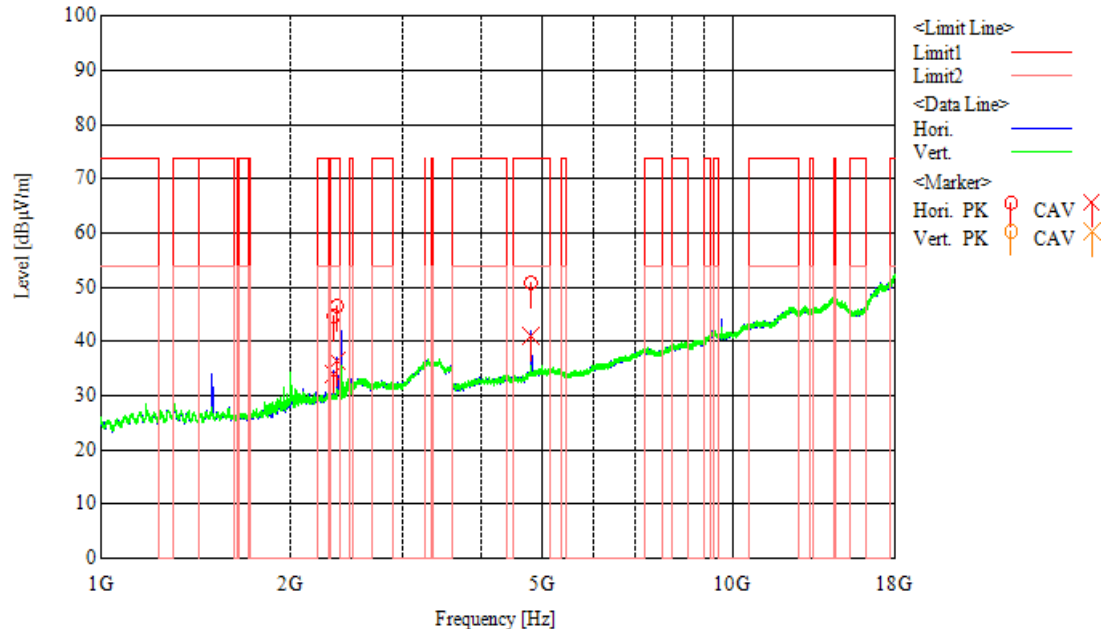
Temperature: 18 degC  
Atmos. Press: 1009 hPa

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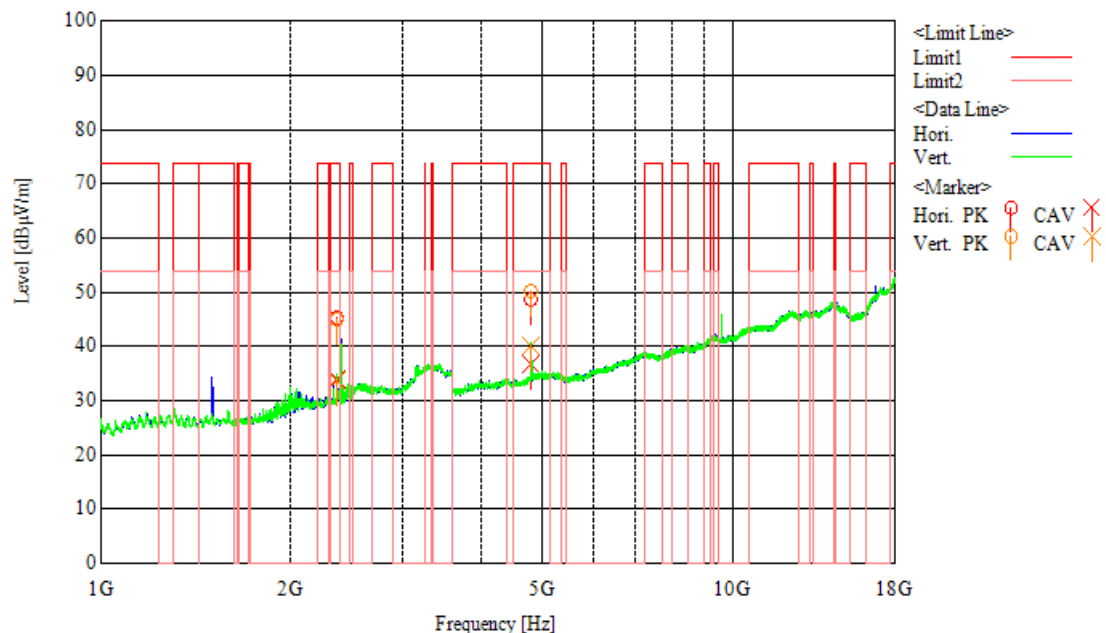
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## Other test Data (1-18GHz)

Operating mode: 2402MHz, 1Mbps, X-plane



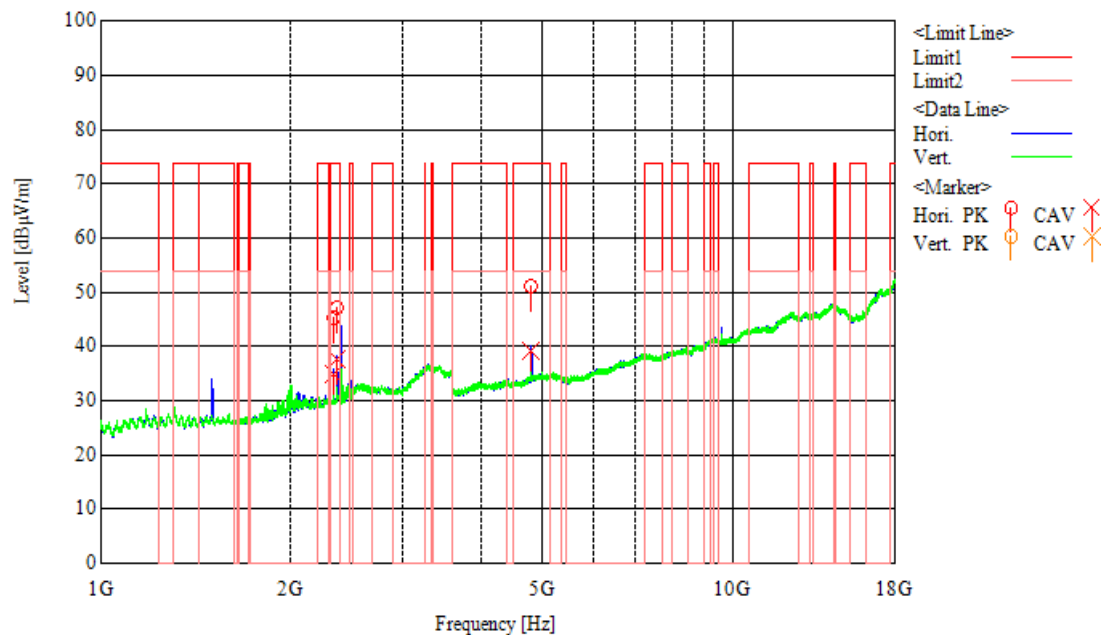
Operating mode: 2402MHz, 1Mbps, Z-plane



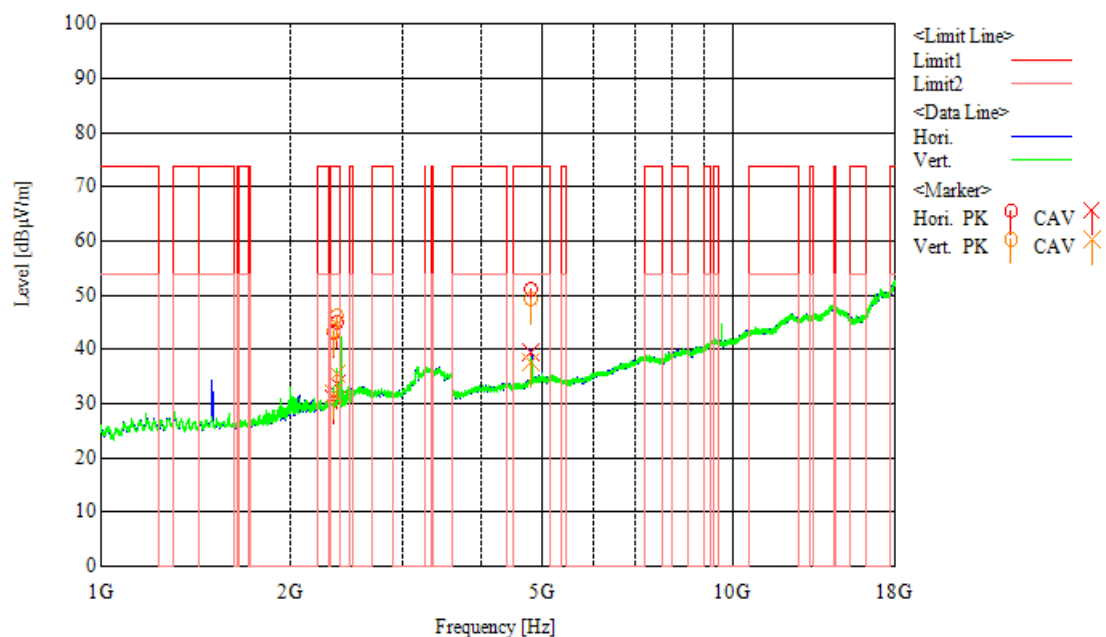
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Operating mode: 2402MHz, 2Mbps, X-plane



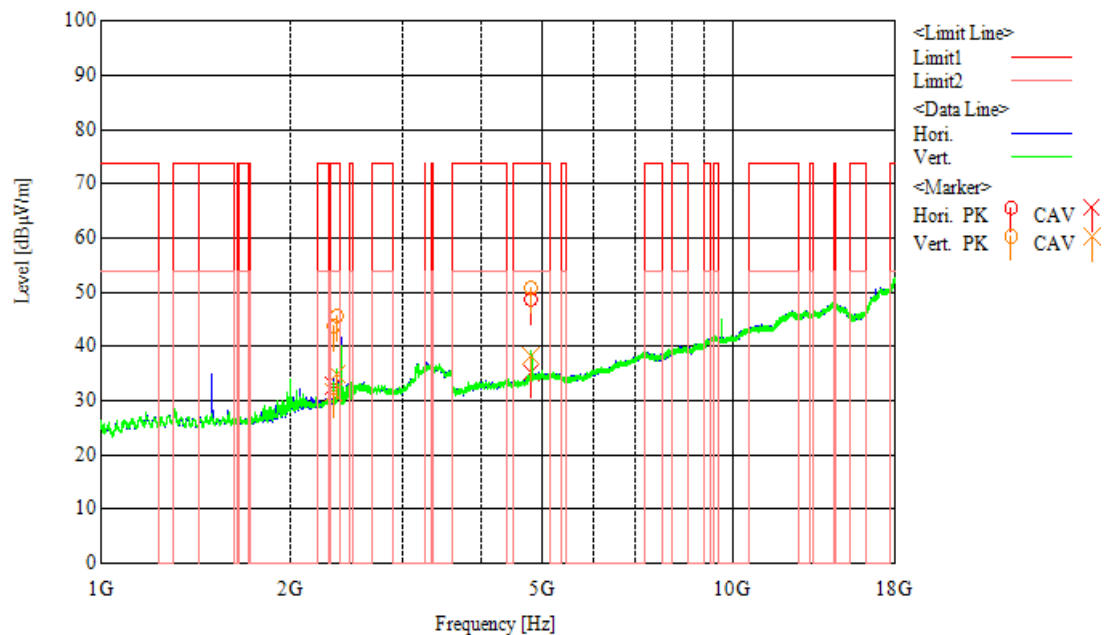
Operating mode: 2402MHz, 2Mbps, Y-plane



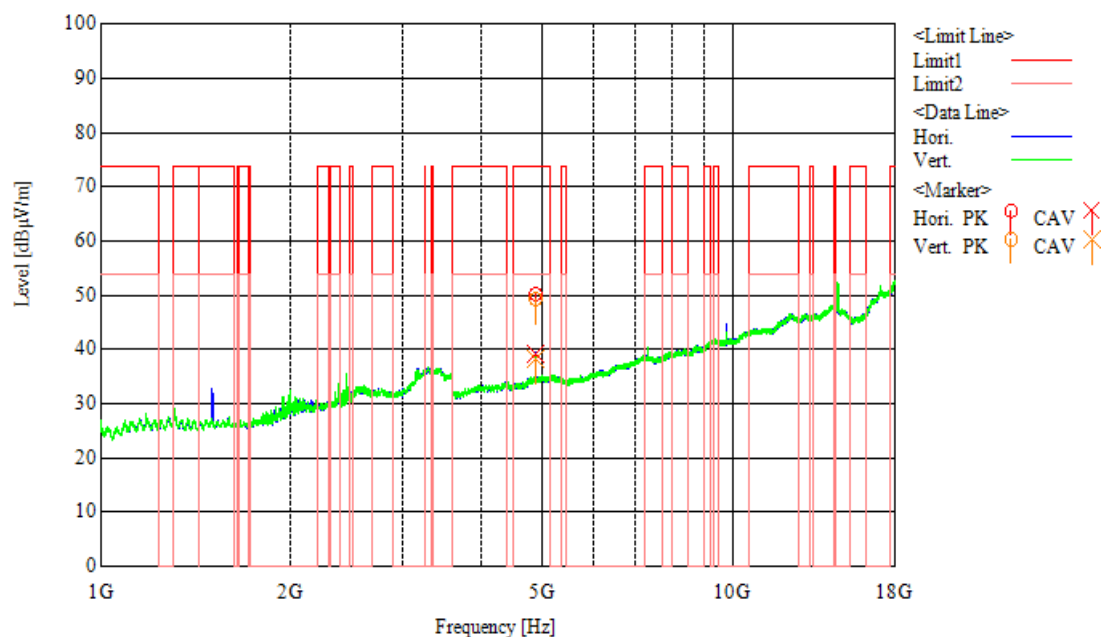
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Operating mode: 2402MHz, 2Mbps, Z-plane



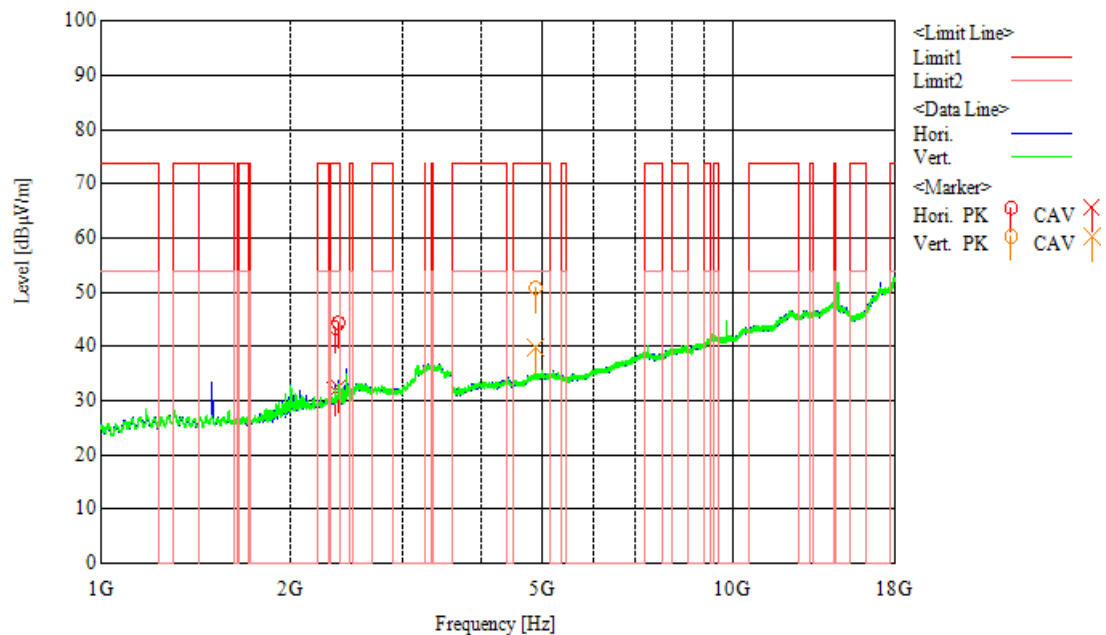
Operating mode: 2442MHz, 1Mbps, Y-plane



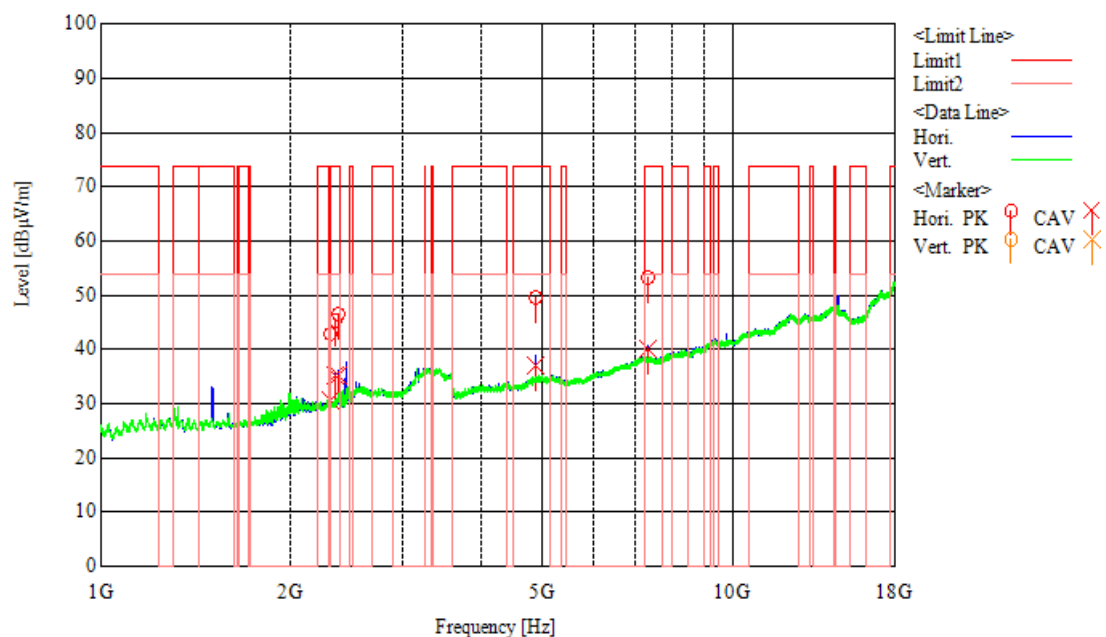
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Operating mode: 2442MHz, 1Mbps, Z-plane



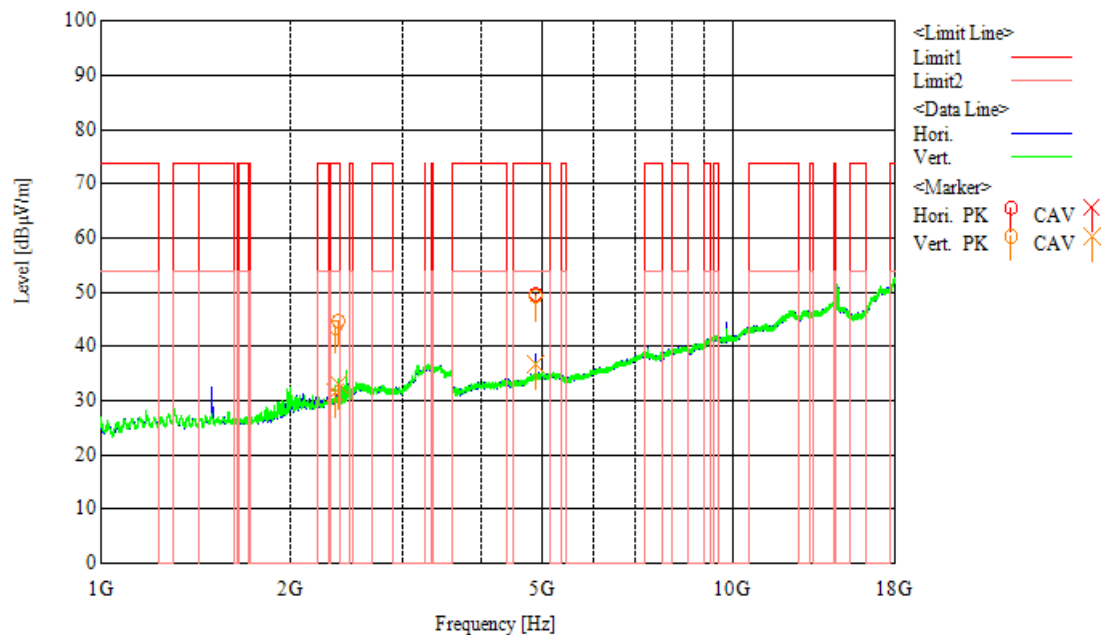
Operating mode: 2442MHz, 2Mbps, X-plane



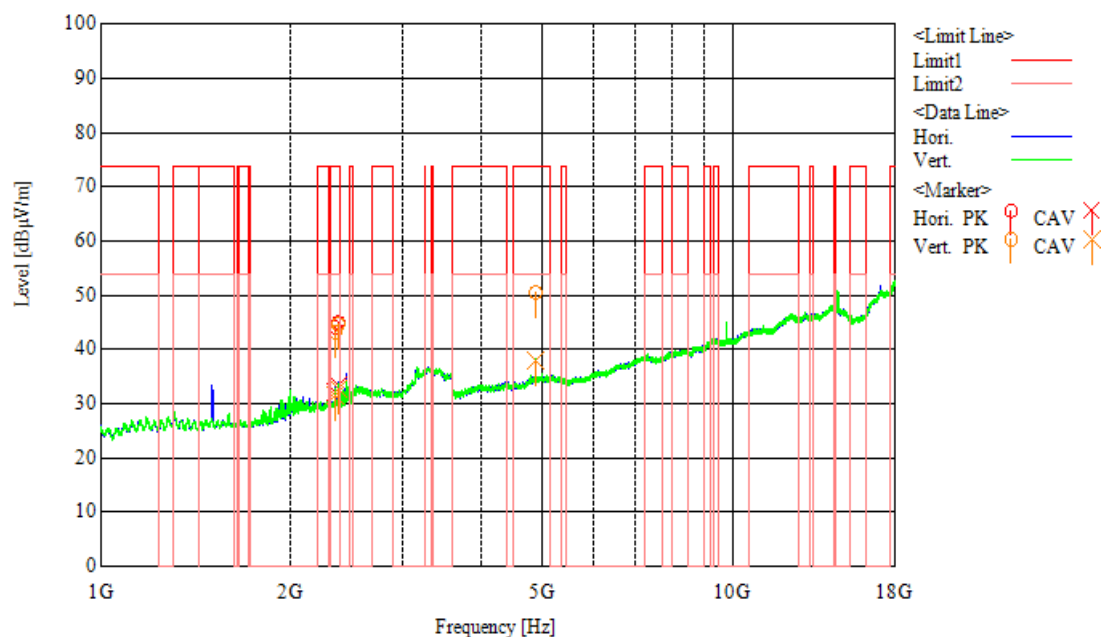
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Operating mode: 2442MHz, 2Mbps, Y-plane



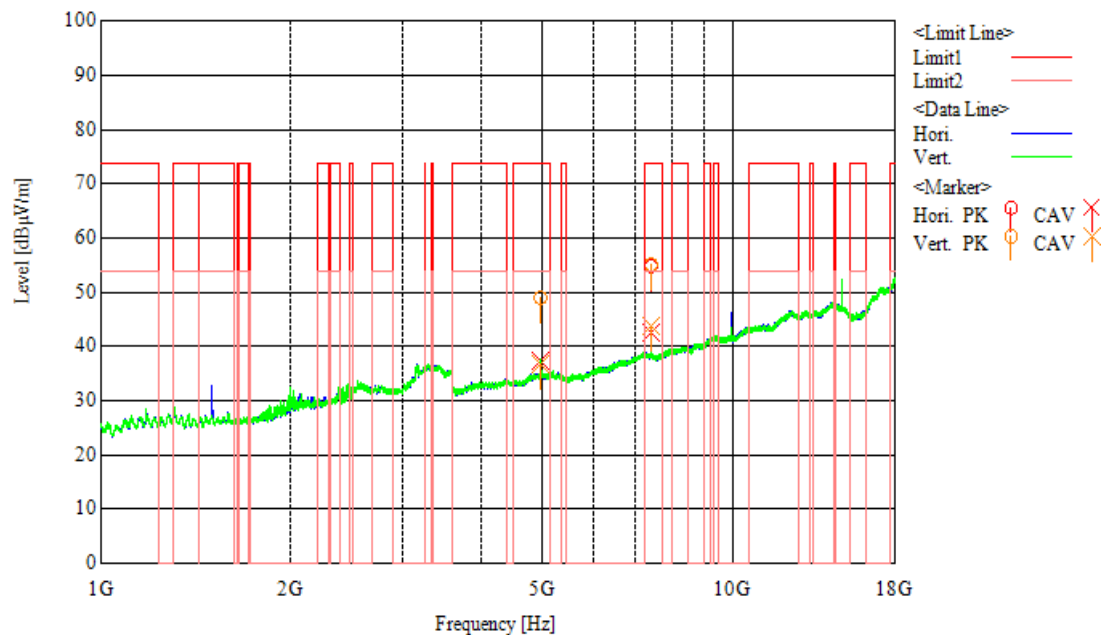
Operating mode: 2442MHz, 2Mbps, Z-plane



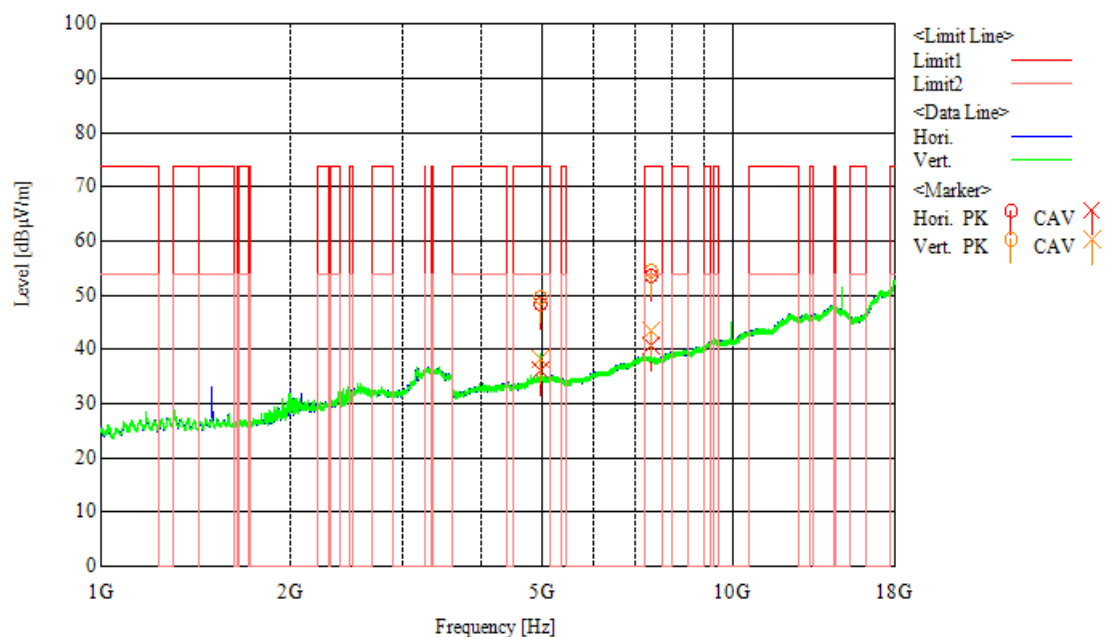
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Operating mode: 2480MHz, 1Mbps, Y-plane



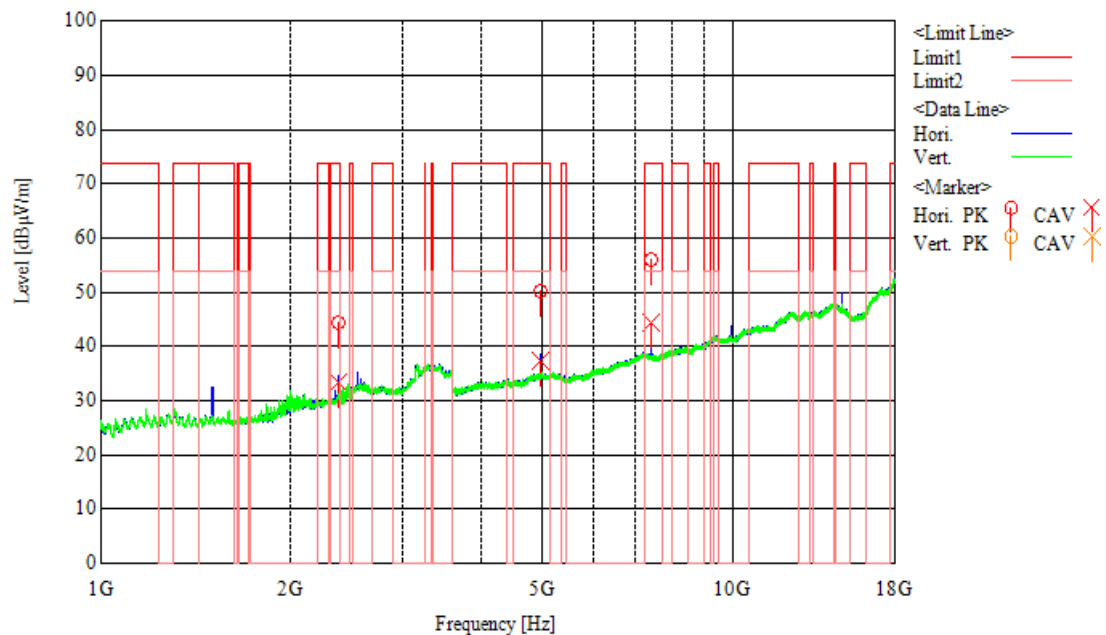
Operating mode: 2480MHz, 1Mbps, Z-plane



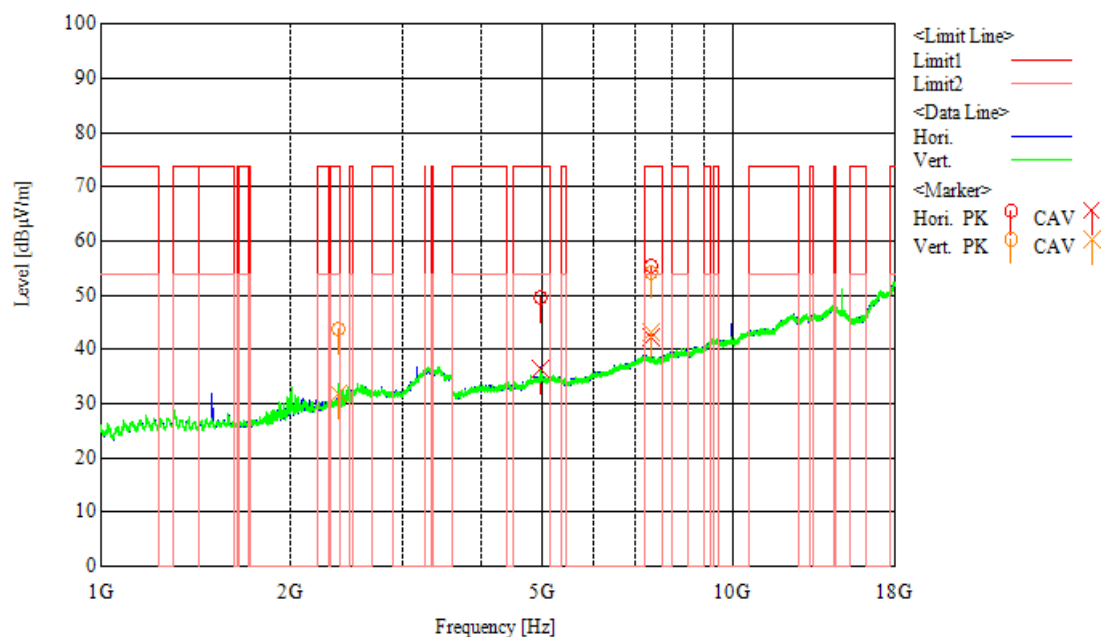
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Operating mode: 2480MHz, 2Mbps, X-plane



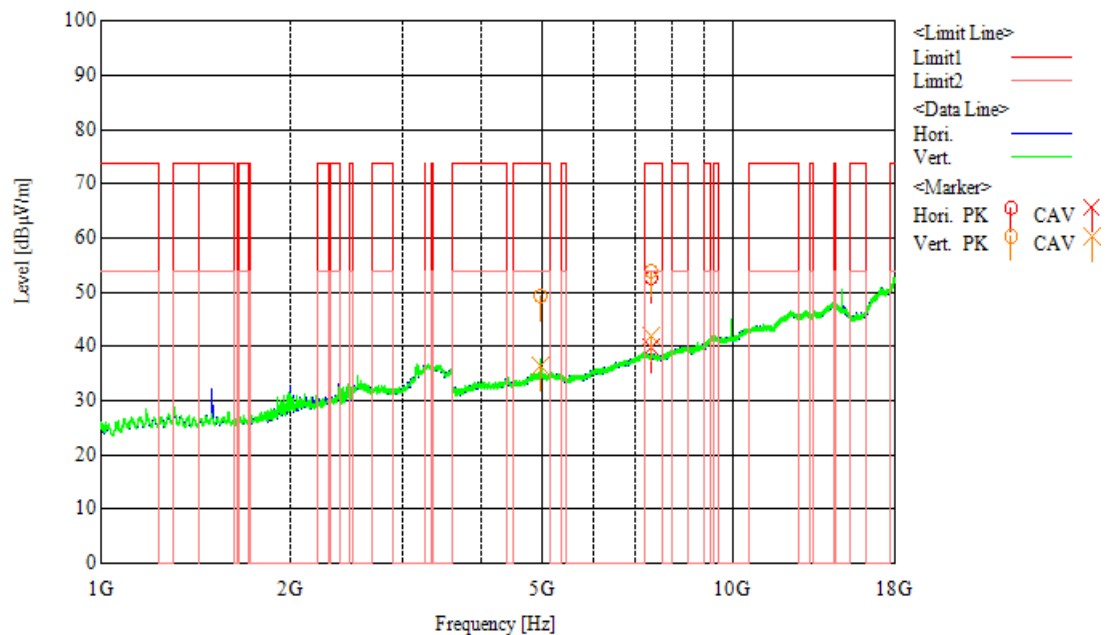
Operating mode: 2480MHz, 2Mbps, Y-plane



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Operating mode: 2480MHz, 2Mbps, Z-plane



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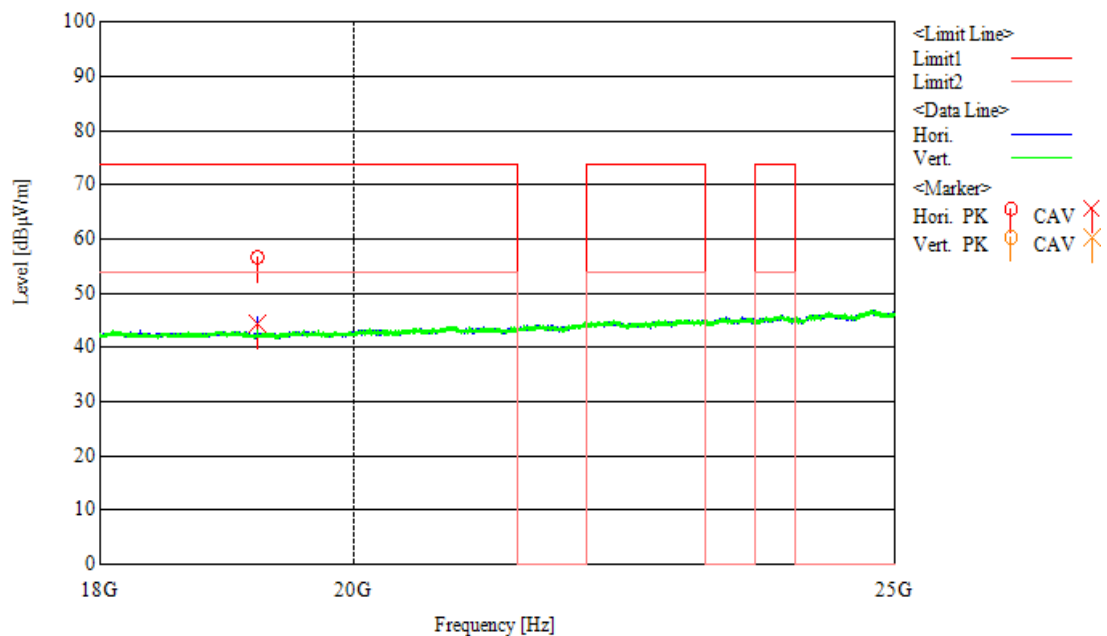
## Test Data (18-25GHz)

Operating frequency: 2402MHz  
Worst configuration: 1Mbps, Z-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

### [Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant.  |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|-------|
| 1   | 19214.439       | 42.4              | 30.2               | 14.2          | 56.6               | 44.4                | 73.9              | 53.9               | 17.3           | 9.5             | Hori. |

### [Chart]



Tested Date: June 19, 2019  
Humidity: 52 %

Temperature: 20 degC  
Atmos. Press: 1010 hPa

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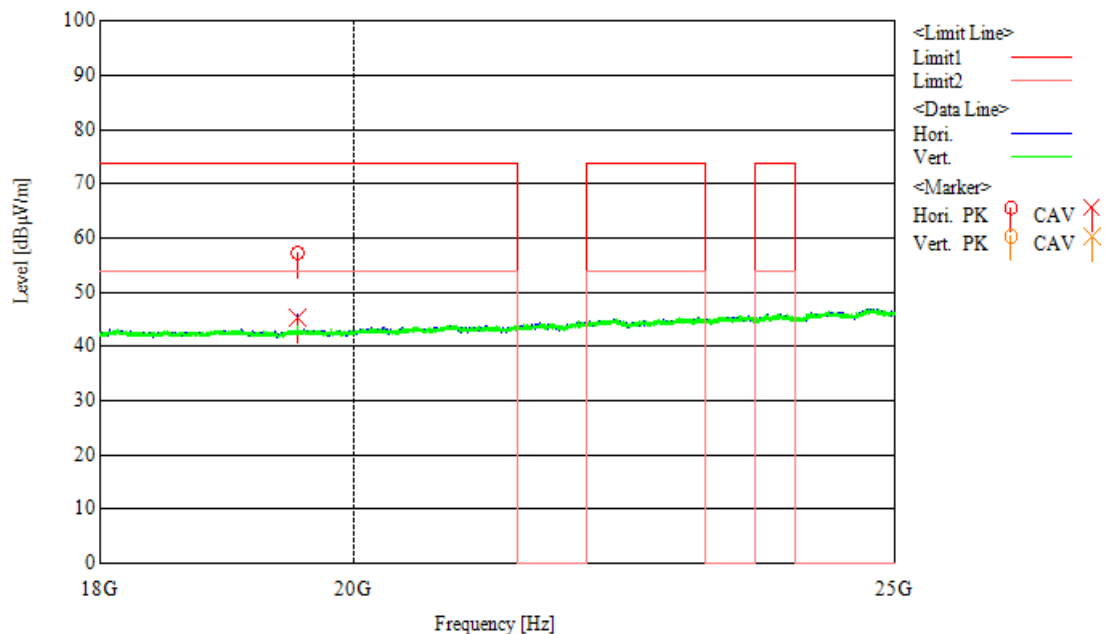
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Operating frequency: 2442MHz  
Worst configuration: 1Mbps, Z-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

[Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant.  |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|-------|
| 1   | 19534.330       | 43.5              | 31.6               | 13.8          | 57.3               | 45.4                | 73.9              | 53.9               | 16.6           | 8.5             | Hori. |

[Chart]



Tested Date: June 19, 2019  
Humidity: 52 %

Temperature: 20 degC  
Atmos. Press: 1010 hPa

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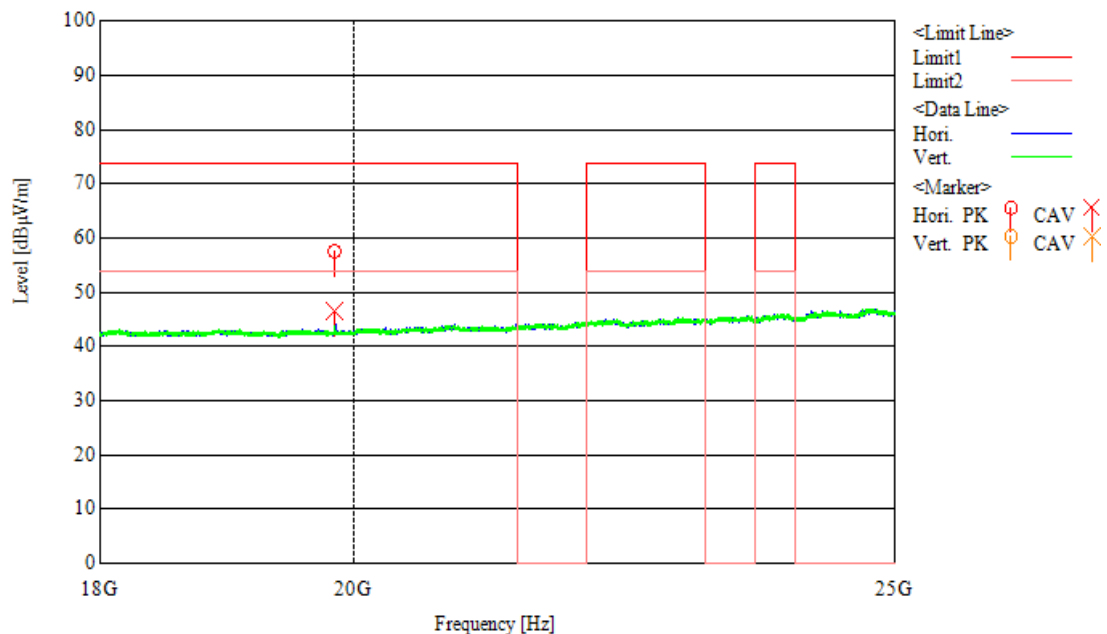
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Operating frequency: 2480MHz  
Worst configuration: 1Mbps, Z-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

[Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant.  |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|-------|
| 1   | 19838.340       | 44.1              | 32.8               | 13.6          | 57.7               | 46.4                | 73.9              | 53.9               | 16.2           | 7.5             | Hori. |

[Chart]



Tested Date: June 19, 2019  
Humidity: 52 %

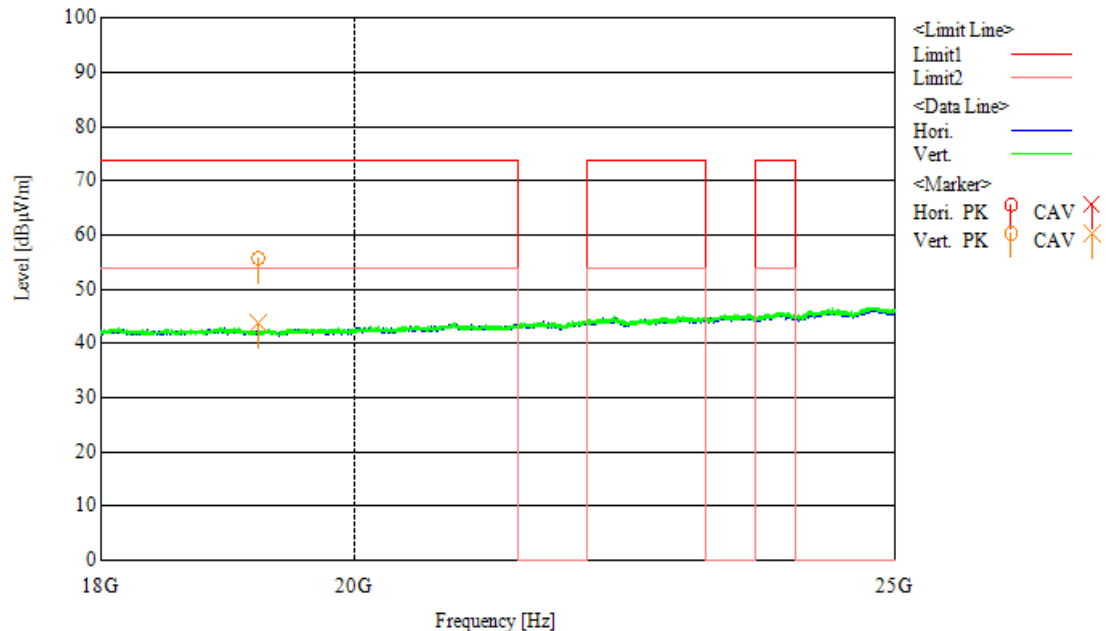
Temperature: 20 degC  
Atmos. Press: 1010 hPa

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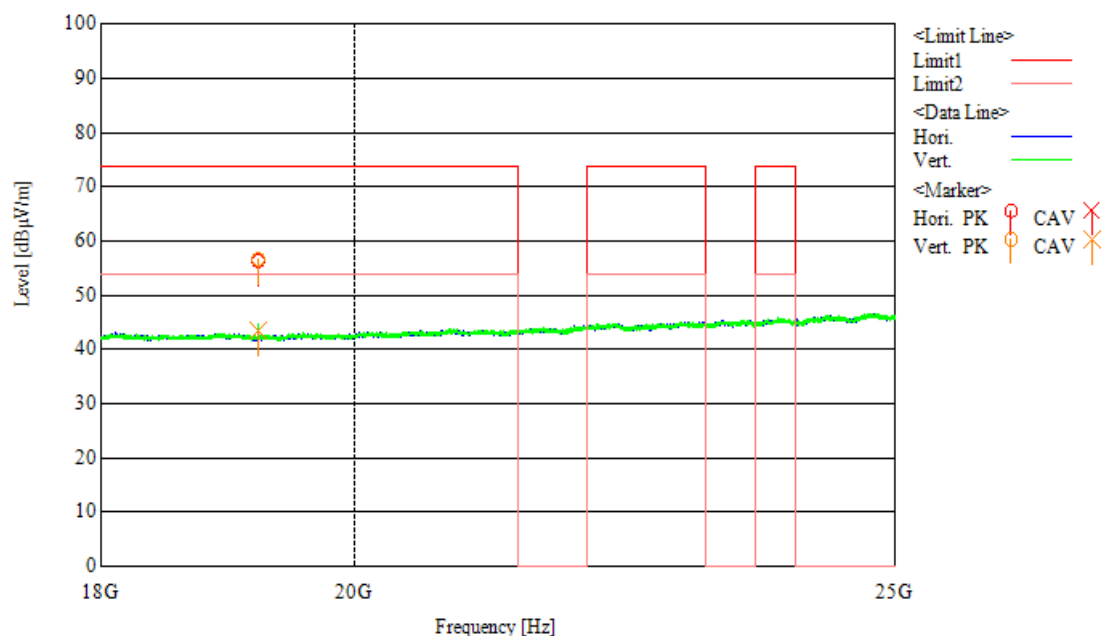
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## Other test Data (18-25GHz)

Operating mode: 2402MHz, 1Mbps, X-plane



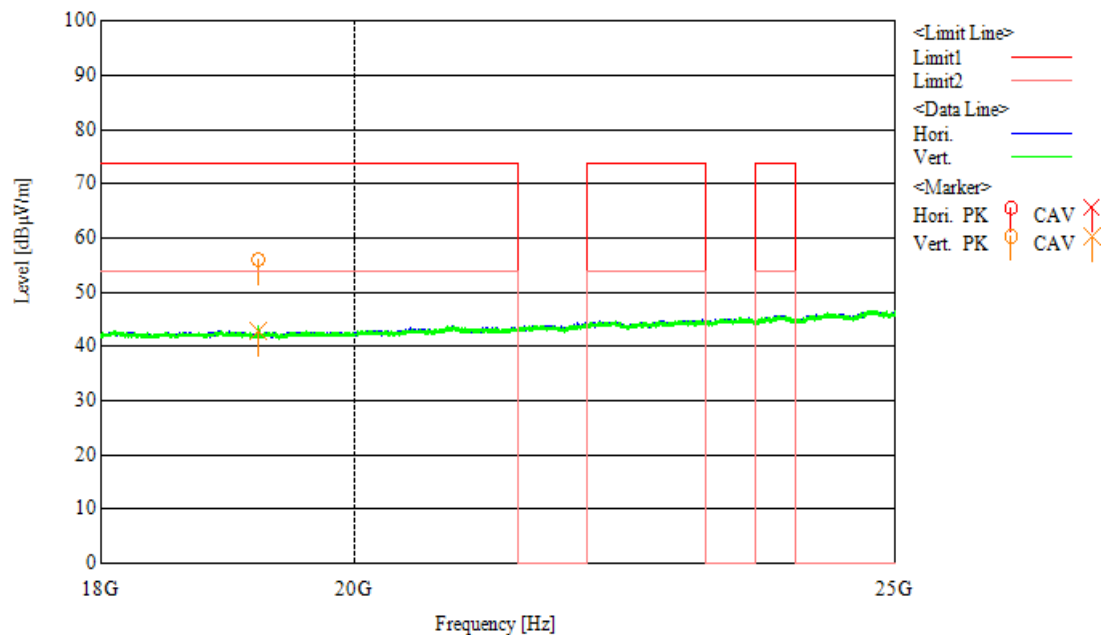
Operating mode: 2402MHz, 1Mbps, Y-plane



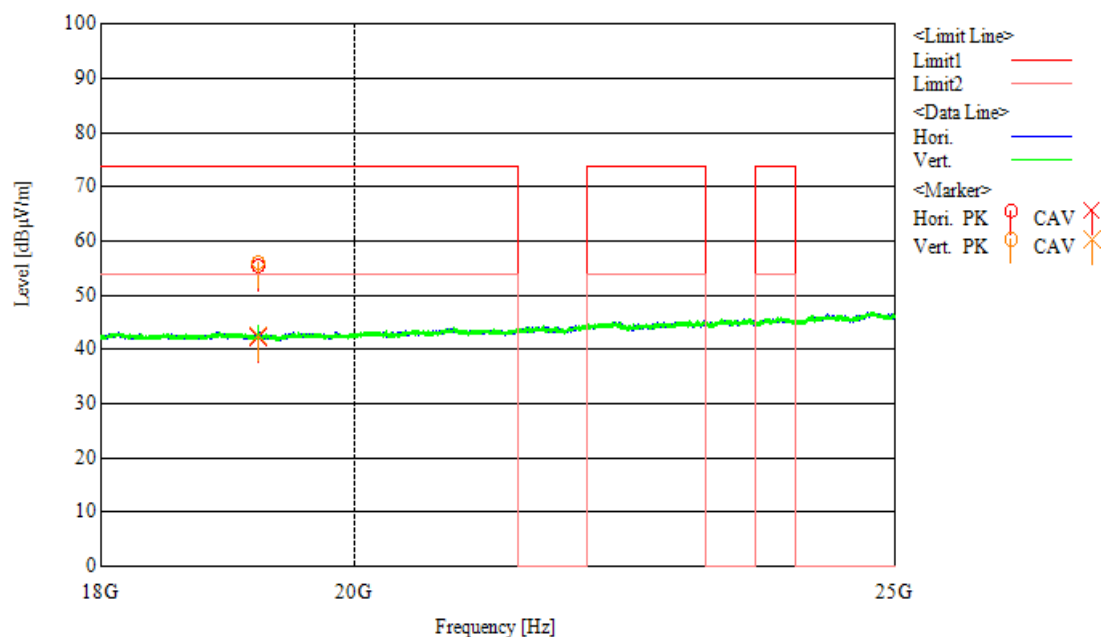
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Operating mode: 2402MHz, 2Mbps, X-plane



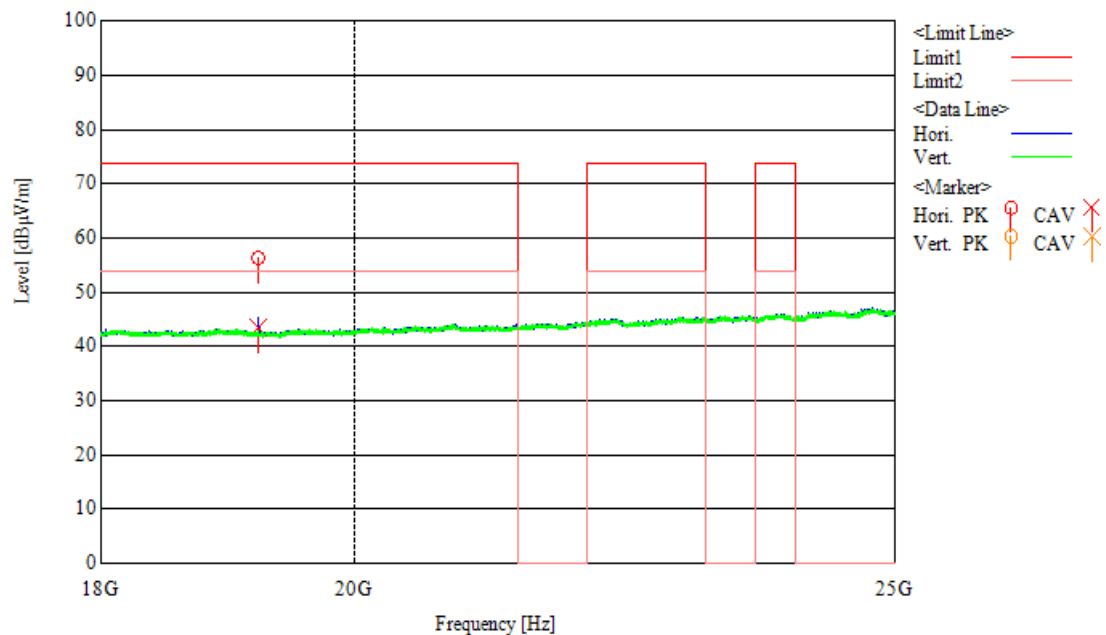
Operating mode: 2402MHz, 2Mbps, Y-plane



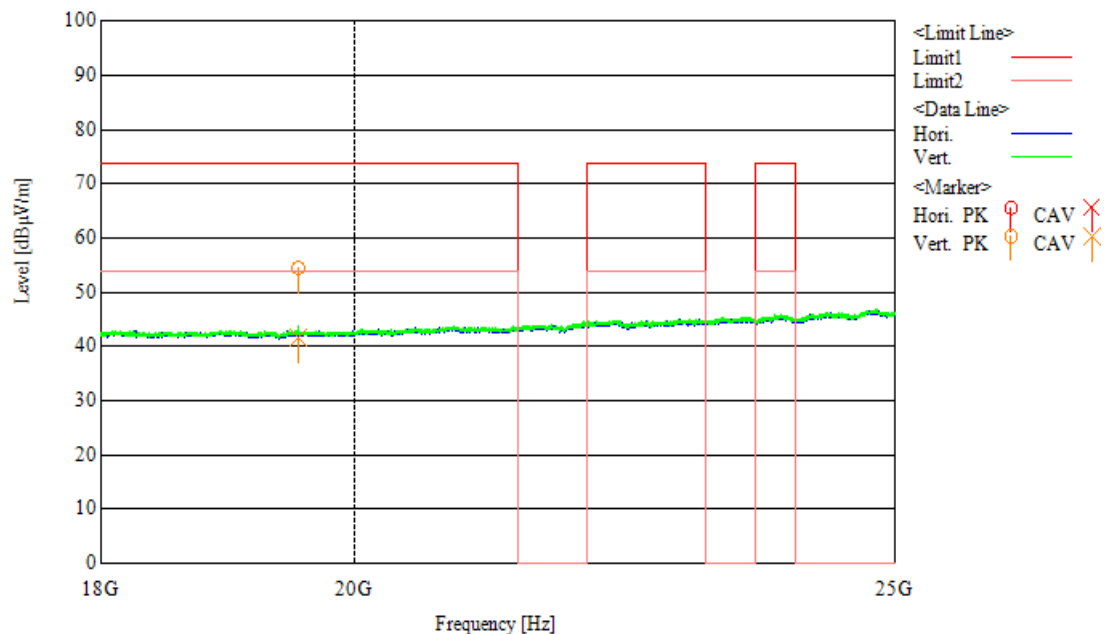
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Operating mode: 2402MHz, 2Mbps, Z-plane



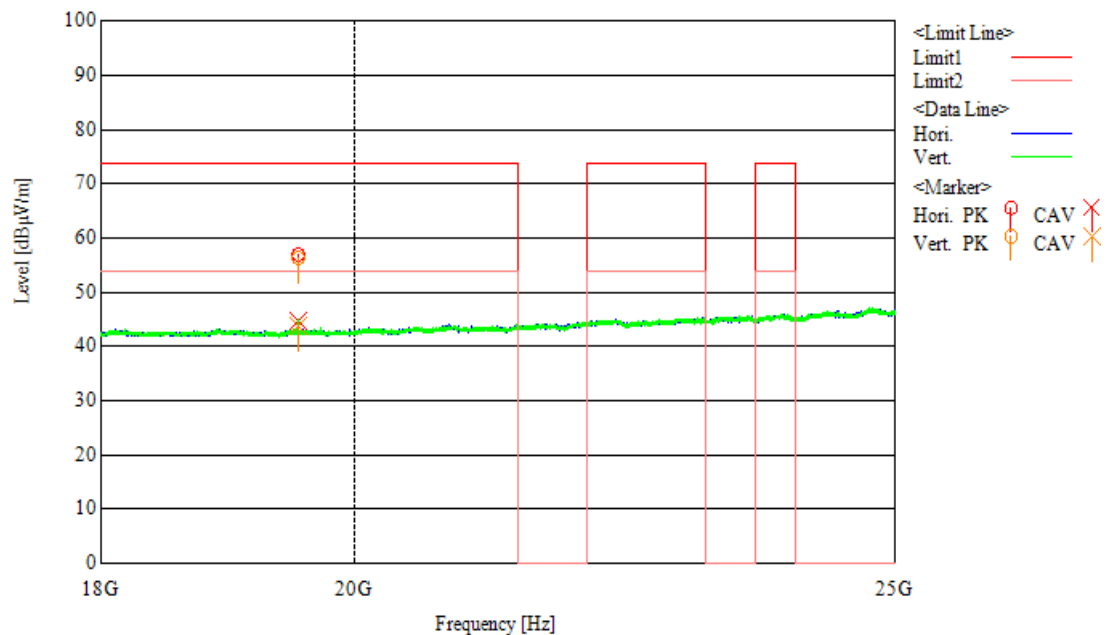
Operating mode: 2442MHz, 1Mbps, X-plane



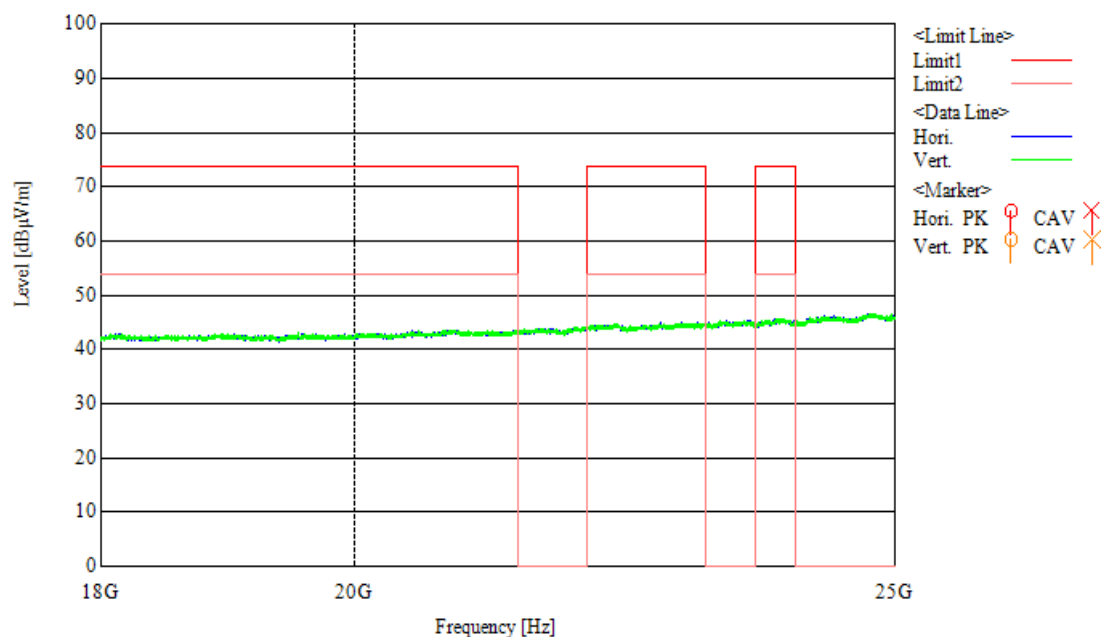
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Operating mode: 2442MHz, 1Mbps, Y-plane



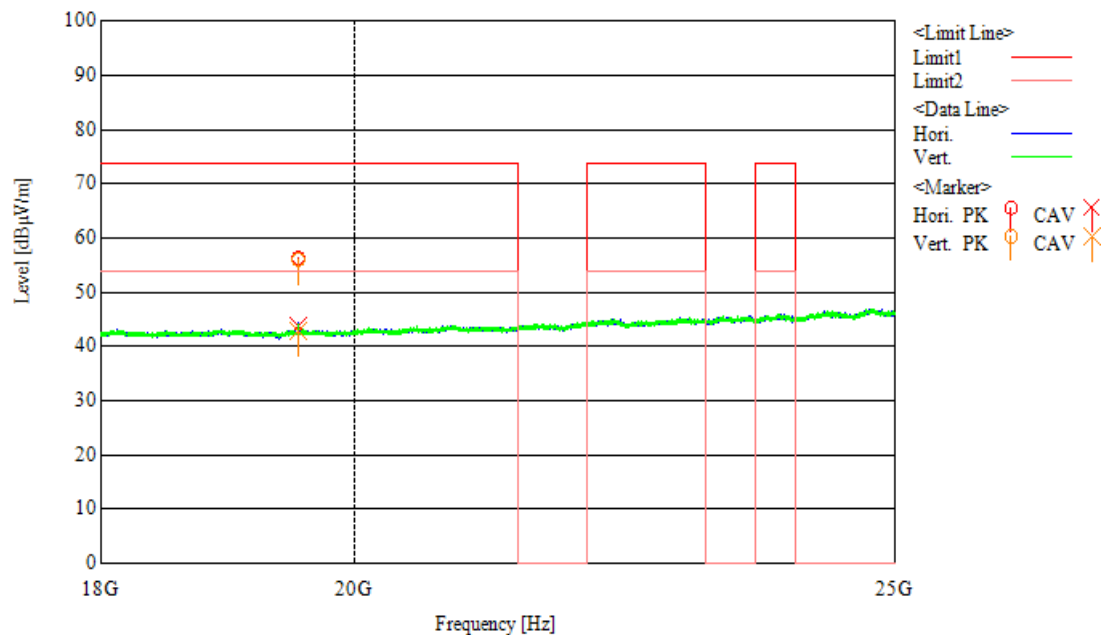
Operating mode: 2442MHz, 2Mbps, X-plane



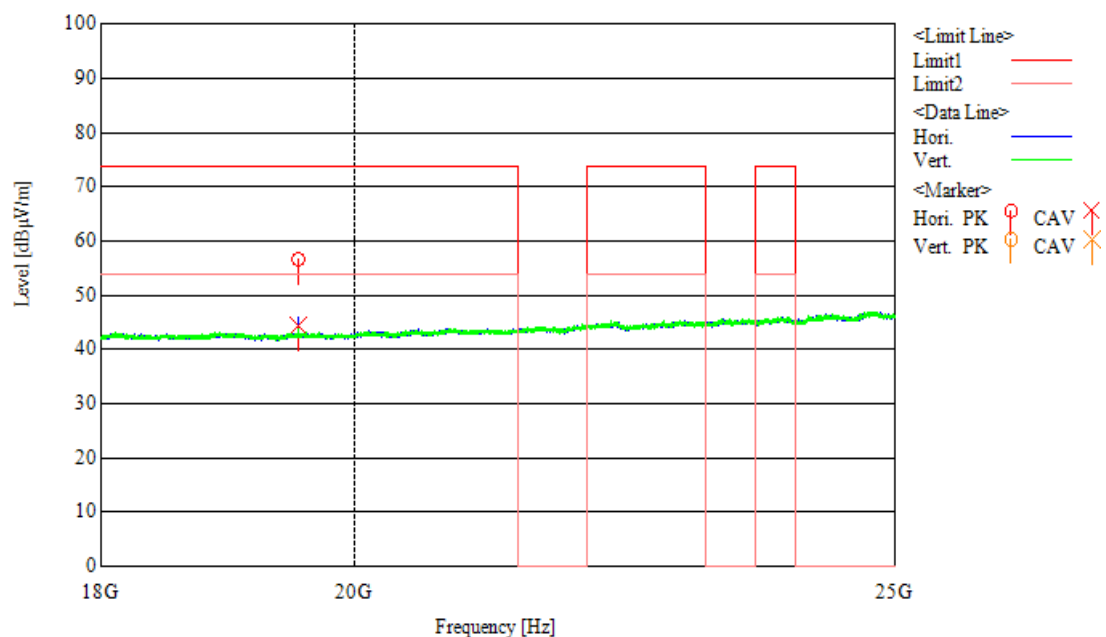
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Operating mode: 2442MHz, 2Mbps, Y-plane



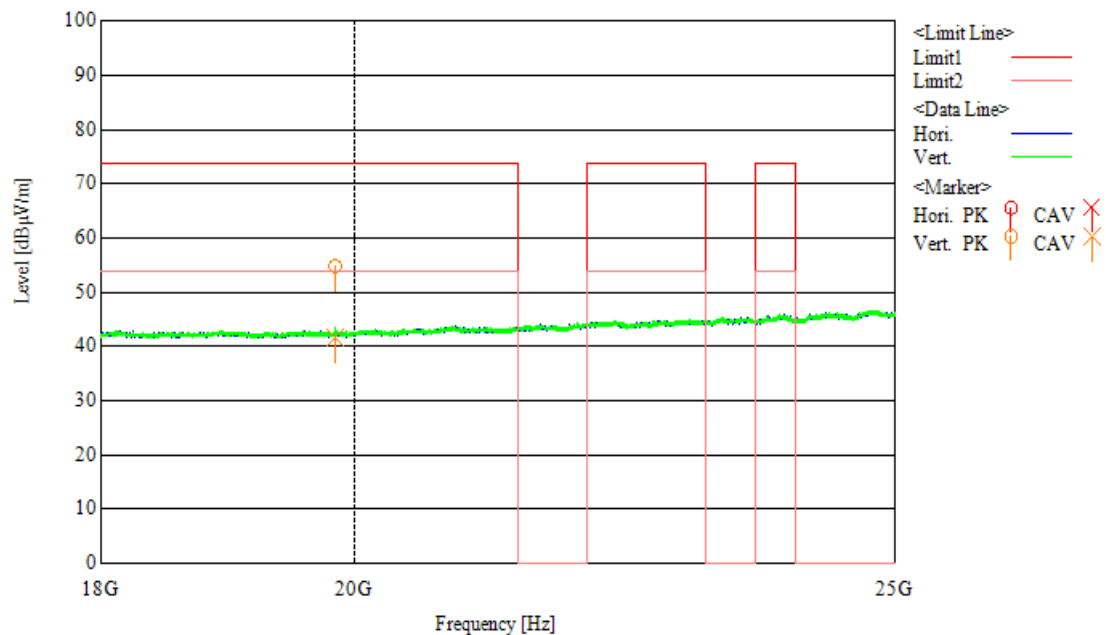
Operating mode: 2442MHz, 2Mbps, Z-plane



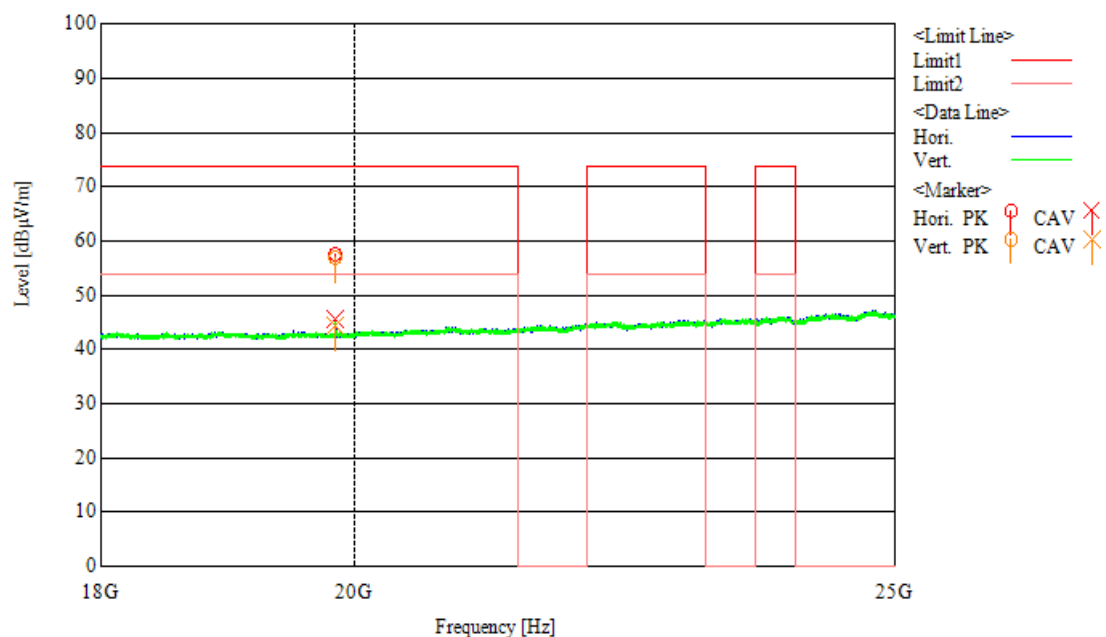
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Operating mode: 2480MHz, 1Mbps, X-plane



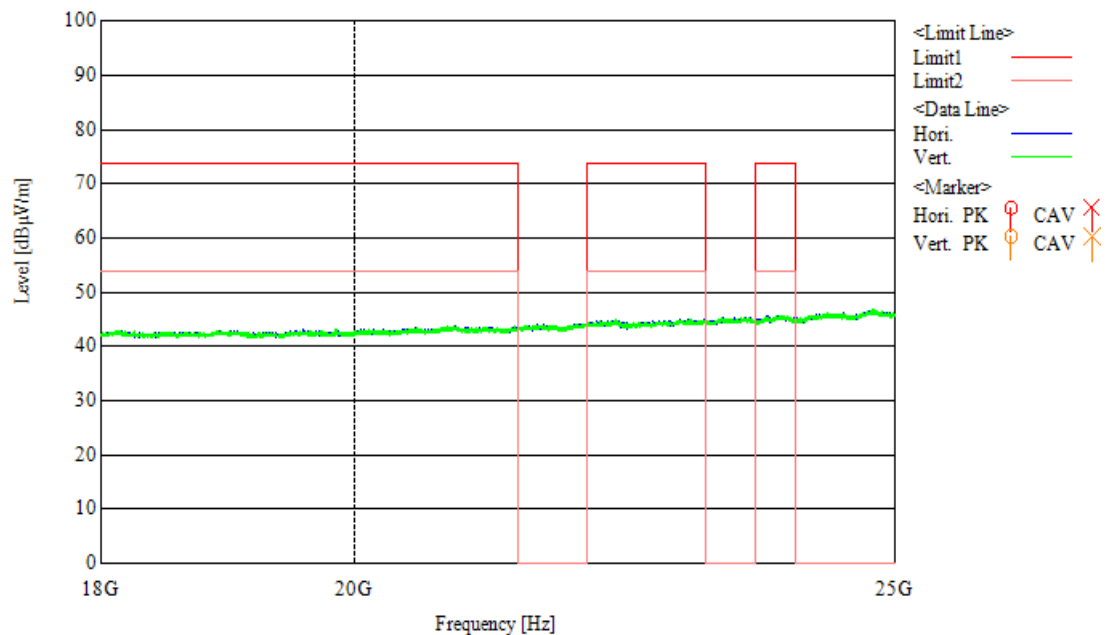
Operating mode: 2480MHz, 1Mbps, Y-plane



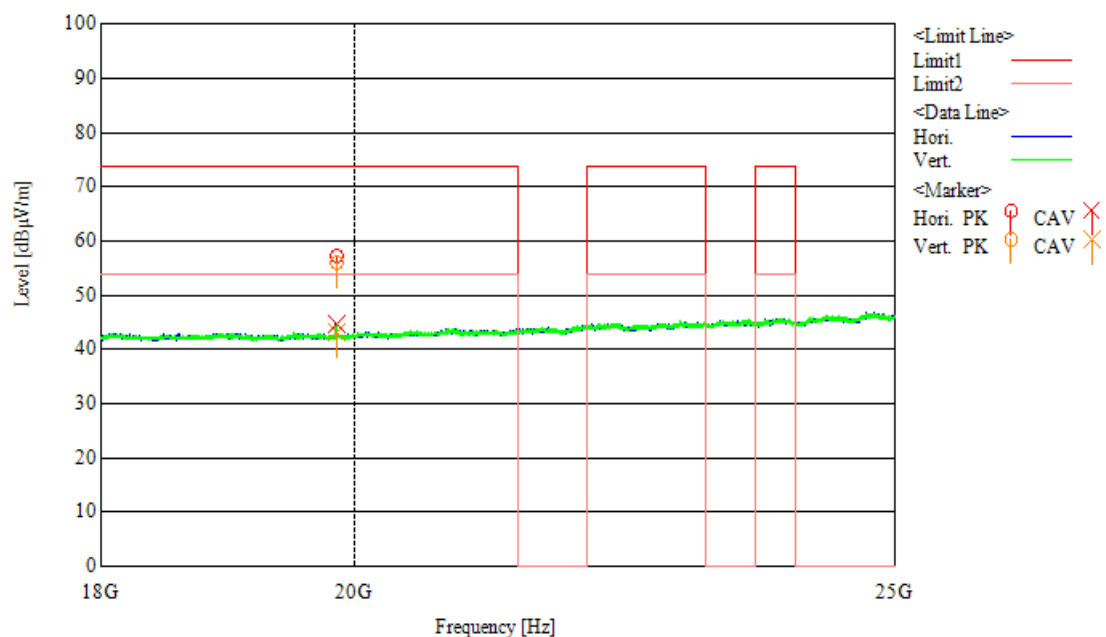
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Operating mode: 2480MHz, 2Mbps, X-plane



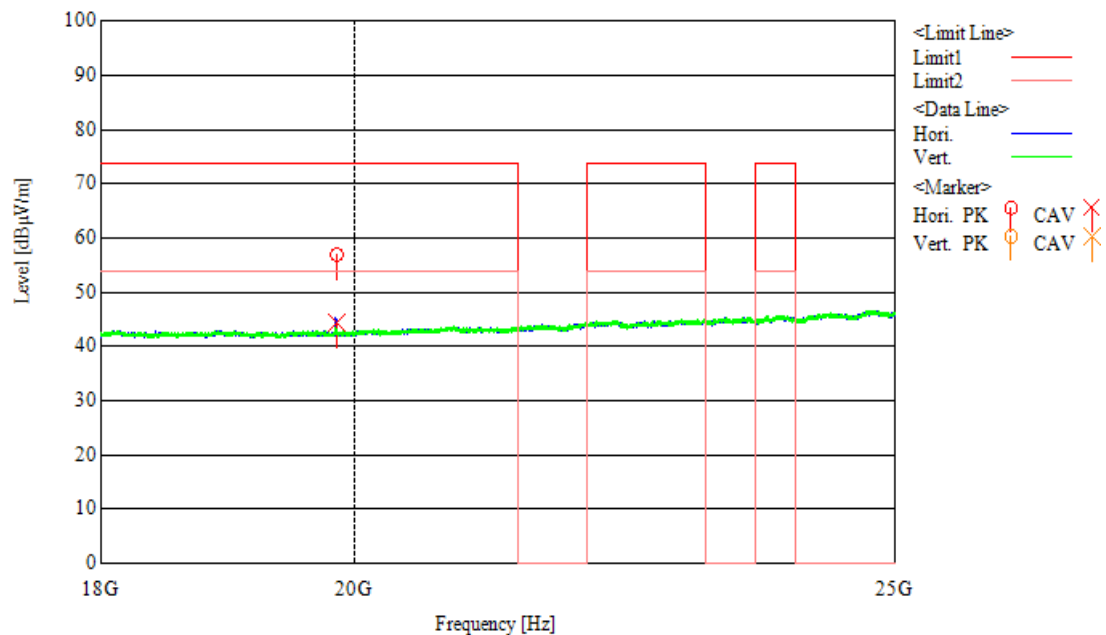
Operating mode: 2480MHz, 2Mbps, Y-plane



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Operating mode: 2480MHz, 2Mbps, Z-plane



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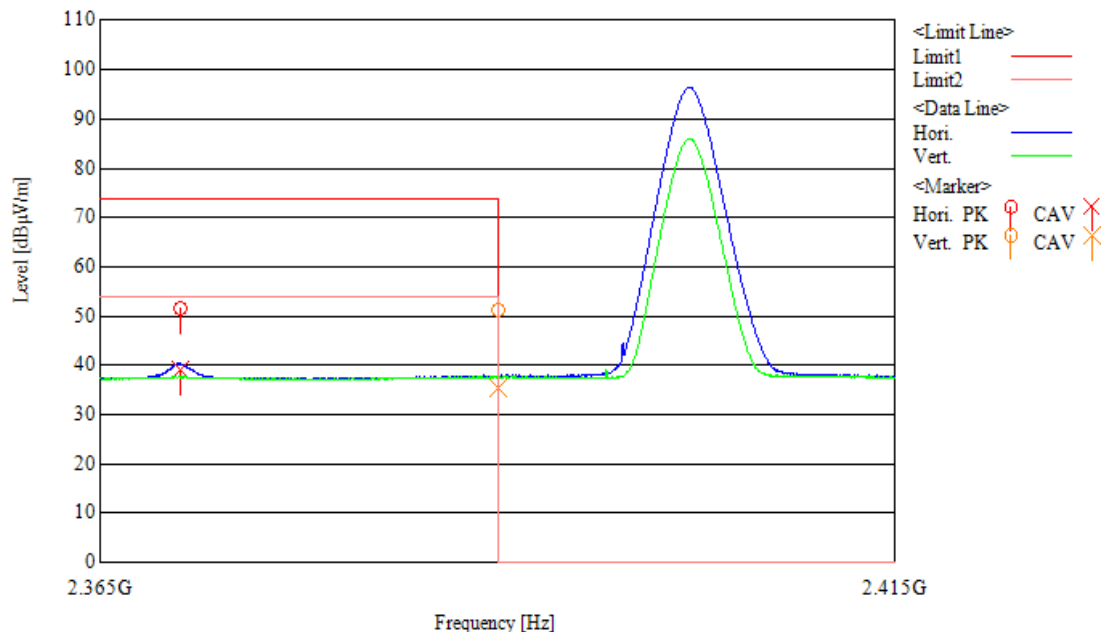
## Restricted bandedge measurement

Operating frequency: 2402MHz  
Worst configuration: 2Mbps, X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

### [Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant.  |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|-------|
| 1   | 2369.996        | 46.3              | 34.0               | 5.1           | 51.4               | 39.1                | 73.9              | 53.9               | 22.5           | 14.8            | Hori. |
| 2   | 2390.000        | 45.8              | 30.1               | 5.3           | 51.1               | 35.4                | 73.9              | 53.9               | 22.8           | 18.5            | Vert. |

### [Chart]



Tested Date: June 17, 2019  
Humidity: 53 %

Temperature: 18 degC  
Atmos. Press: 1009 hPa

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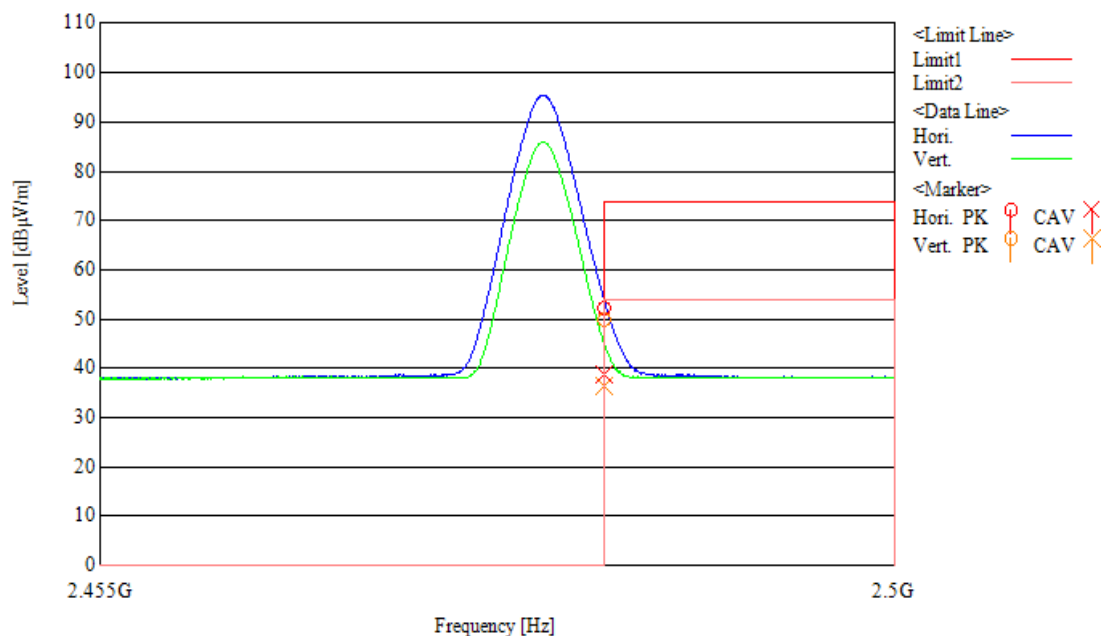
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Operating frequency: 2480MHz  
Worst configuration: 2Mbps, X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

[Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant.  |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|-------|
| 1   | 2483.500        | 46.3              | 32.9               | 6.0           | 52.3               | 38.9                | 73.9              | 53.9               | 21.6           | 15.0            | Hori. |
| 2   | 2483.500        | 44.0              | 30.4               | 6.0           | 50.0               | 36.4                | 73.9              | 53.9               | 23.9           | 17.5            | Vert. |

[Chart]



Tested Date: June 17, 2019  
Humidity: 53 %

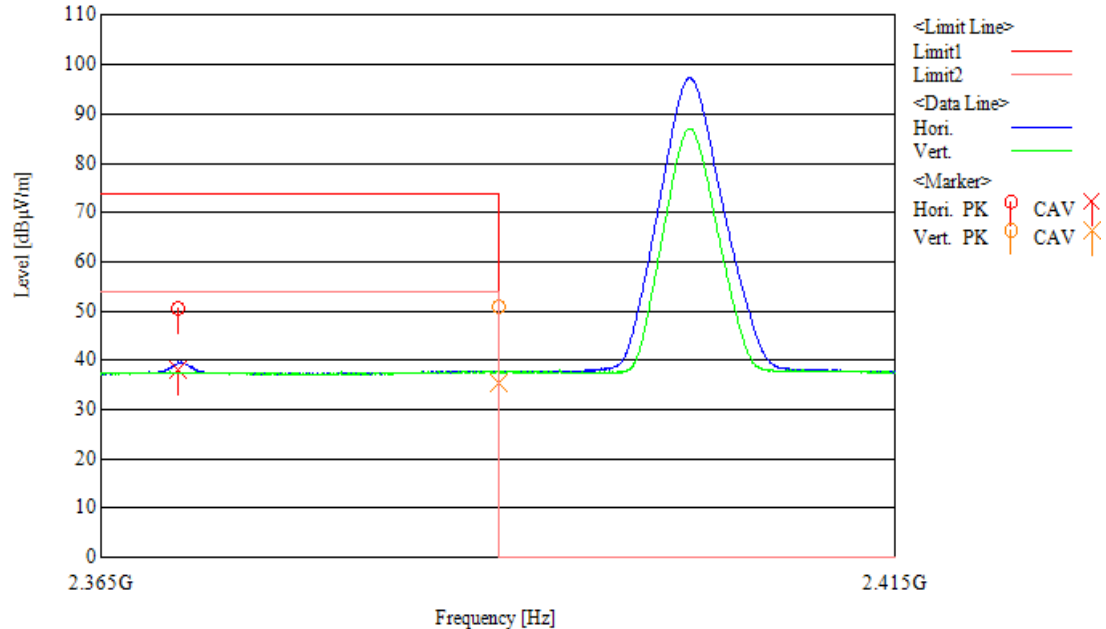
Temperature: 18 degC  
Atmos. Press: 1009 hPa

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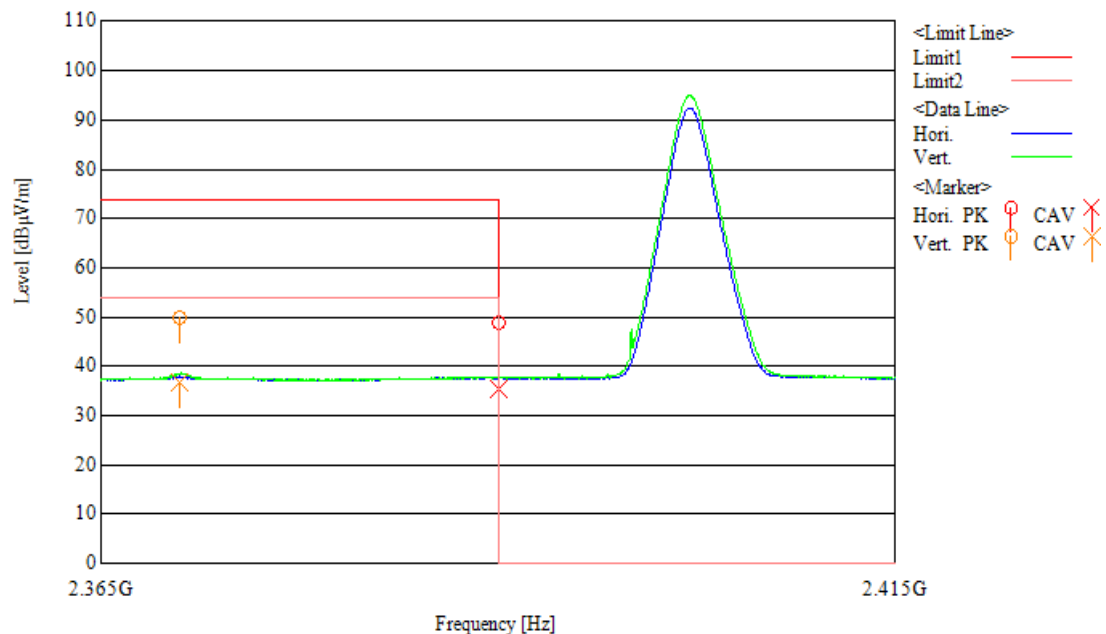
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## Restricted bandedge measurement (other test data)

Operating mode: 2402MHz, 1Mbps, X-plane



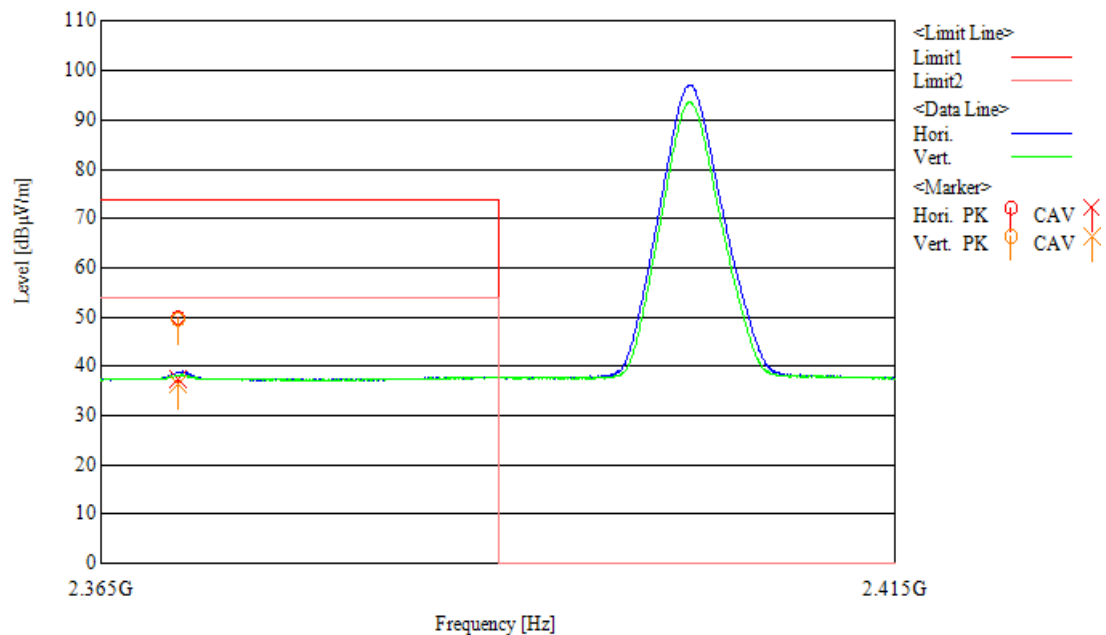
Operating mode: 2402MHz, 1Mbps, Y-plane



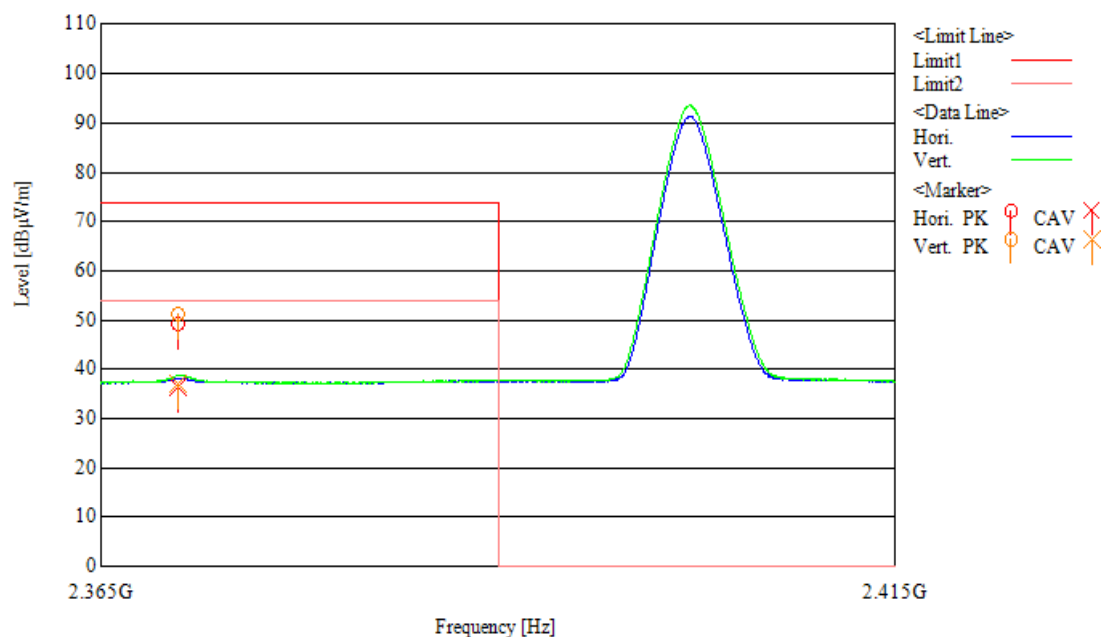
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Operating mode: 2402MHz, 1Mbps, Z-plane



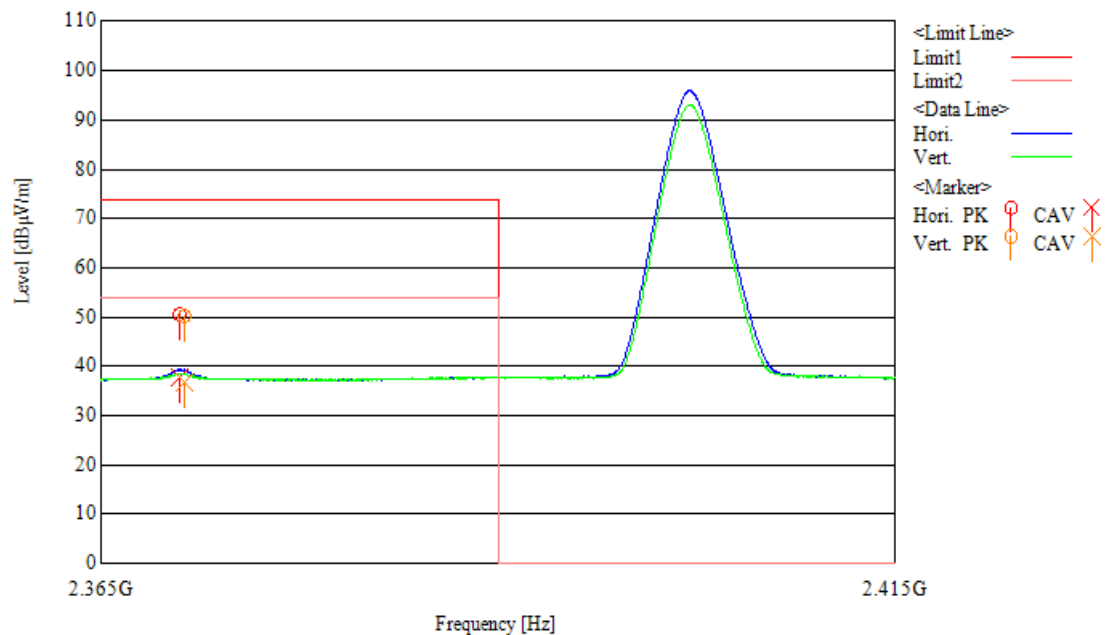
Operating mode: 2402MHz, 2Mbps, Y-plane



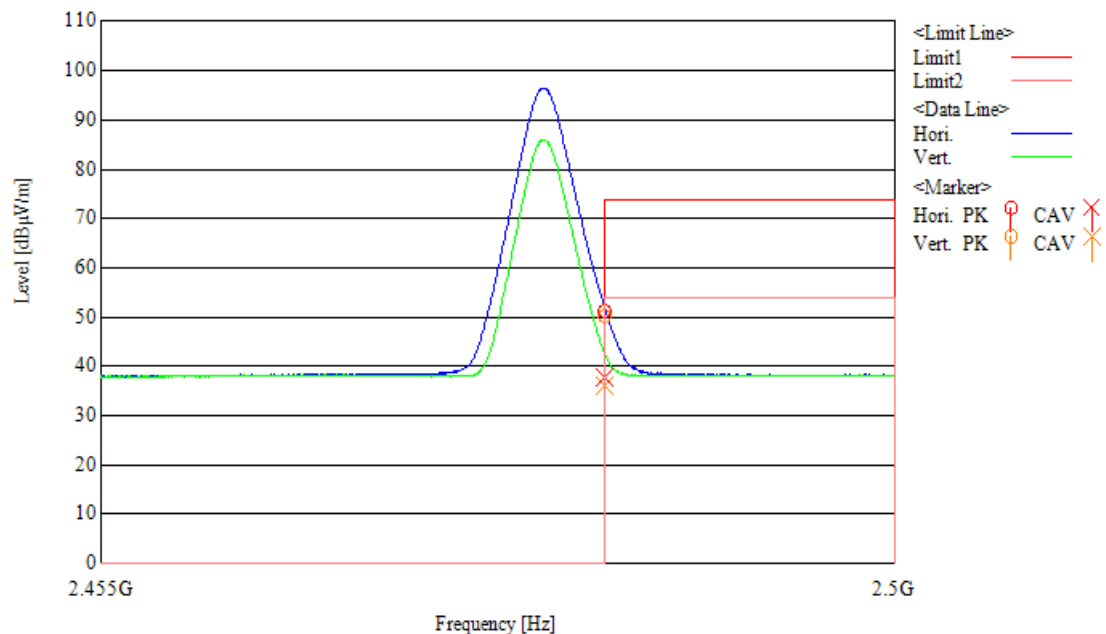
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Operating mode: 2402MHz, 2Mbps, Z-plane



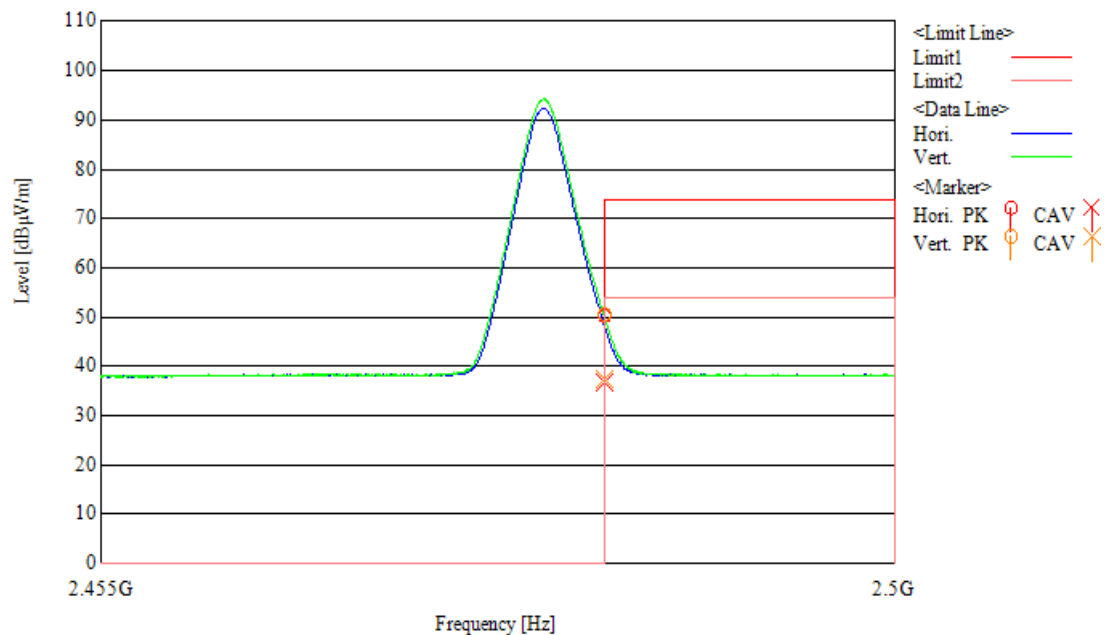
Operating mode: 2480MHz, 1Mbps, X-plane



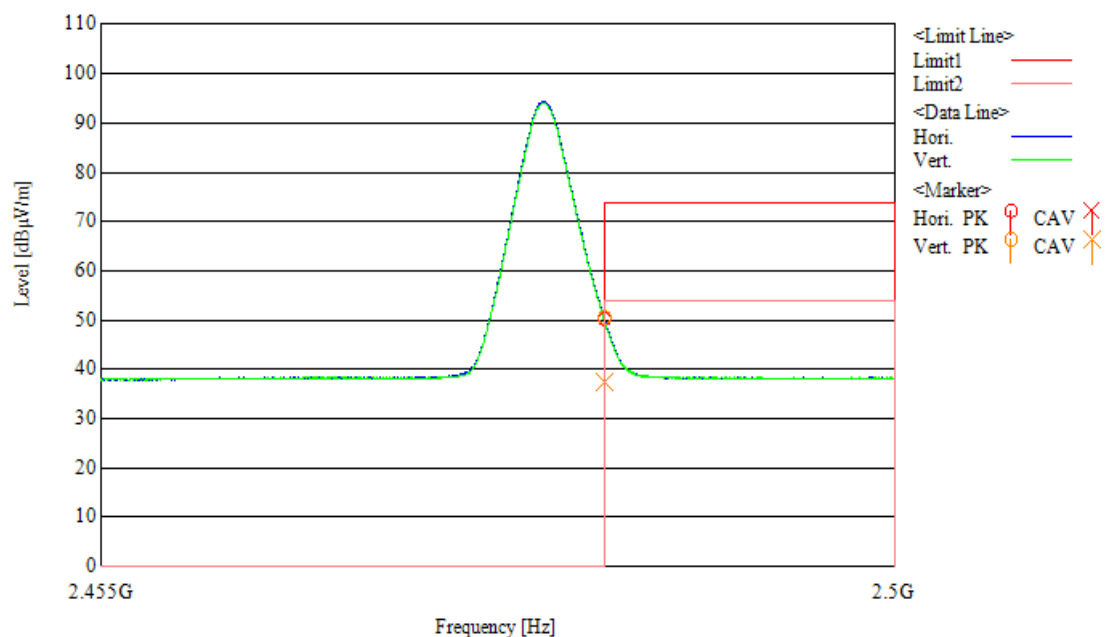
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Operating mode: 2480MHz, 1Mbps, Y-plane



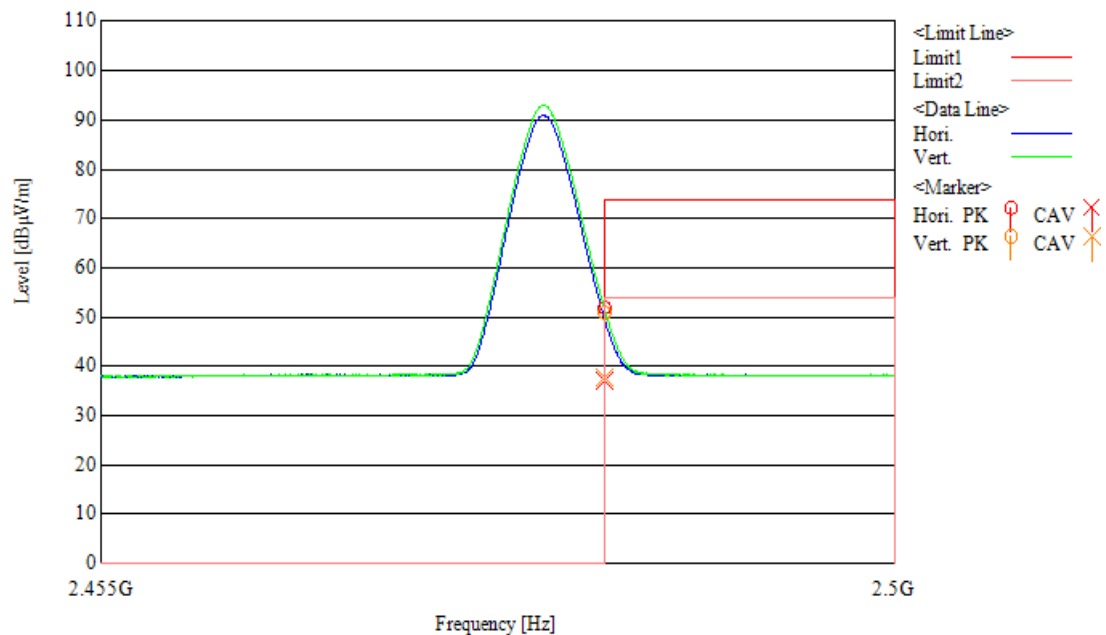
Operating mode: 2480MHz, 1Mbps, Z-plane



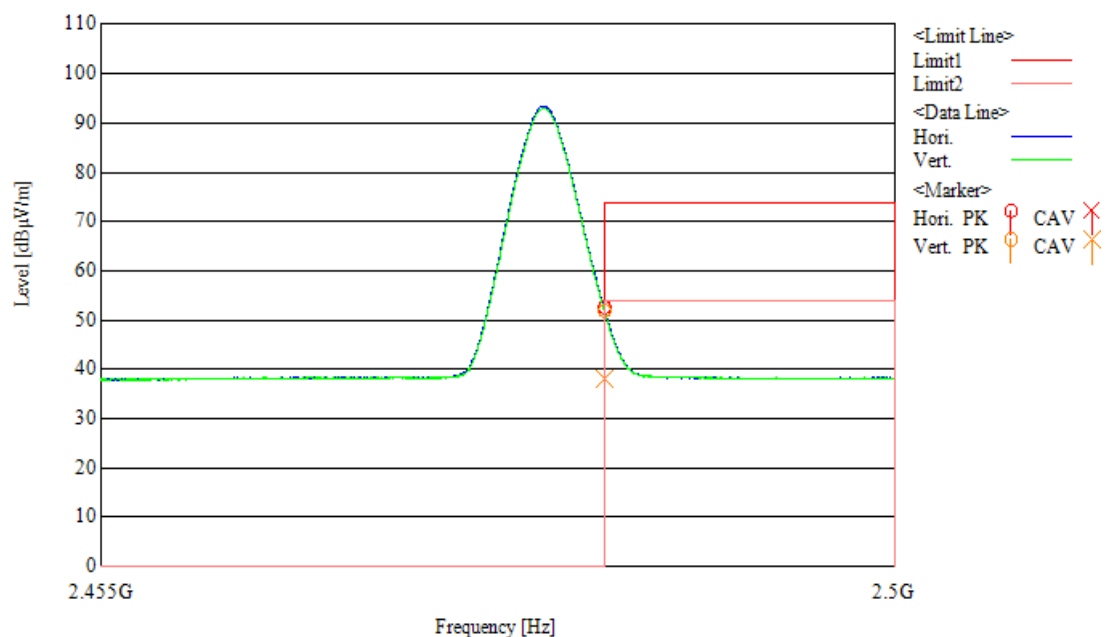
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Operating mode: 2480MHz, 2Mbps, Y-plane



Operating mode: 2442MHz, 2Mbps, Z-plane



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## 2.7 AC power line conducted emissions

### Test setup

Test setup was implemented according to the method of ANSI C63.10 clause 6.2.

### Test procedure

Measurement procedures were implemented according to the method of ANSI C63.10 clause 6.2.

### Applicable rule and limitation

FCC 15.207 / RSS-Gen 8.8: AC power line conducted emissions limits

| Frequency of Emission<br>[MHz] | Conducted emissions Limit [dBμV] |            |
|--------------------------------|----------------------------------|------------|
|                                | Quasi-peak                       | Average    |
| 0.15 - 0.5                     | 66 to 56 *                       | 56 to 46 * |
| 0.5 - 5                        | 56                               | 46         |
| 5 - 30                         | 60                               | 50         |

\* Decreases with the logarithm of the frequency. The lower limit applies at the band edges.

### Test equipment used (refer to List of utilized test equipment)

|      |      |      |
|------|------|------|
| TR06 | CL18 | LN05 |
|------|------|------|

### Test software used

EMI1 Ver. 5.9

### Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB] = ISN Factor [dB] + Loss [dB]

Result [dBμV] = Reading [dBμV] + Correction Factor [dB]

### Test results - Complied with requirement

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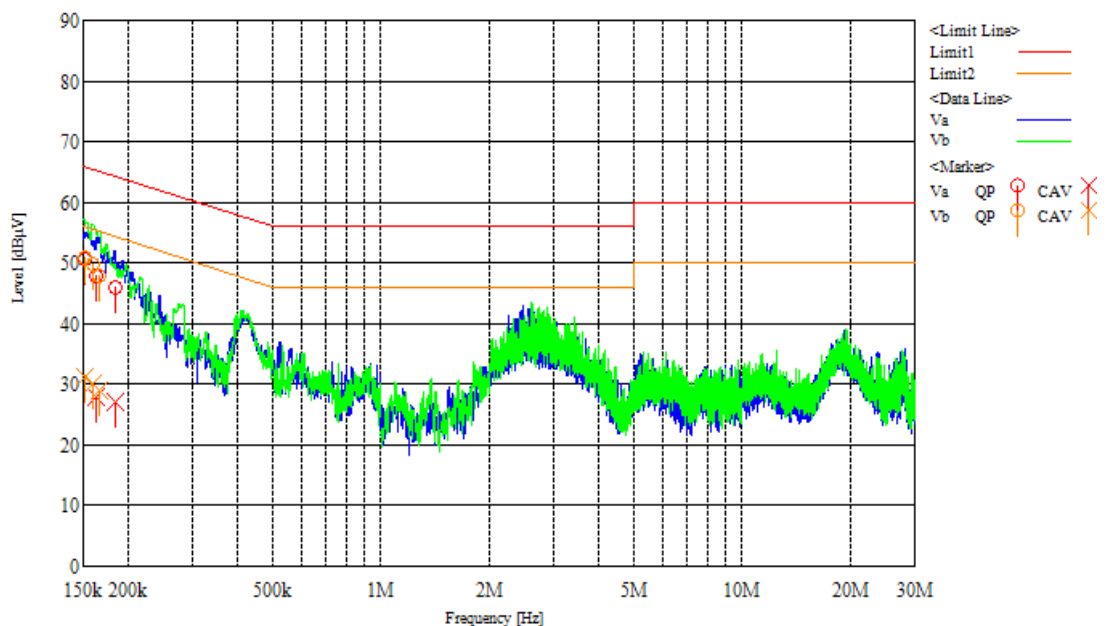
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## Test Data

Operating mode: 2402MHz, 1Mbps (worst)  
Test site: Yokohama Laboratory

| No. | Frequency [MHz] | Reading     |           | C.F. [dB]   | Result      |           | Limit       |           | Margin      |         | PHASE     |
|-----|-----------------|-------------|-----------|-------------|-------------|-----------|-------------|-----------|-------------|---------|-----------|
|     |                 | QP [dBuV]   | AV [dBuV] |             | QP [dBuV]   | AV [dBuV] | QP [dBuV]   | AV [dBuV] | QP [dB]     | AV [dB] |           |
| 1   | 0.15119         | 40.3        | 21.0      | 10.3        | 50.6        | 31.3      | 65.9        | 55.9      | 15.3        | 24.6    | Va        |
| 2   | 0.16292         | 37.5        | 17.5      | 10.3        | 47.8        | 27.8      | 65.3        | 55.3      | 17.5        | 27.5    | Va        |
| 3   | 0.18331         | 35.8        | 16.9      | 10.2        | 46.0        | 27.1      | 64.3        | 54.3      | 18.3        | 27.2    | Va        |
| 4   | <b>0.15085</b>  | <b>40.6</b> | 21.0      | <b>10.3</b> | <b>50.9</b> | 31.3      | <b>66.0</b> | 56.0      | <b>15.1</b> | 24.7    | <b>Vb</b> |
| 5   | 0.15884         | 39.5        | 19.7      | 10.3        | 49.8        | 30.0      | 65.5        | 55.5      | 15.7        | 25.5    | Vb        |
| 6   | 0.16632         | 37.6        | 18.7      | 10.3        | 47.9        | 29.0      | 65.1        | 55.1      | 17.2        | 26.1    | Vb        |

## [Chart]



Tested Date: July 10, 2019  
Humidity: 52 %

Temperature: 24 degC  
Atmos. Press: 1013 hPa

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## 2.8 Radiated emissions (Receiver)

### Test setup

Test setup was implemented according to the method of ANSI C63.4 clause 6 “General requirements for EUT equipment arrangements and operation”, clause 8.2 and Annex H.3 “Radiated emission measurements setup”.

### Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4 clauses 8.2.

The EUT is placed on a non-conducted table which is 0.8 m height from a ground plane and the measurement antenna to EUT distance is 3 meters. The turn table is rotated for 360 degrees to determine the maximum emission level.

The antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

The spectrum analyzer and receiver are set to the followings;

RBW=100 kHz (up to 1000 MHz) or 1 MHz (above 1000 MHz)

VBW= 300 kHz (up to 1000 MHz) or 3 MHz (above 1000 MHz)

Final measurement is carried out with a receiver RBW of 120 kHz (up to 1000 MHz), or 1 MHz (above 1000 MHz).

### Applicable rule and limitation

RSS-Gen 7.3: Radiated emissions limits

| Frequency<br>[MHz] | Field Strength<br>[μV/m] | Measurement<br>Distance [m] | Field Strength<br>[dBμV/m] |
|--------------------|--------------------------|-----------------------------|----------------------------|
| 30 – 88            | 100                      | 3                           | 40.0                       |
| 88 – 216           | 150                      | 3                           | 43.5                       |
| 216 – 960          | 200                      | 3                           | 46.0                       |
| Above 960          | 500                      | 3                           | 53.9                       |

In the emission table above, the tighter limit applies at the band edges.

The emission limits shown in the above table are based on measurements employing a QP detector (up to 1000 MHz) or AVE/PEAK detector (above 1000 MHz).

### Test results - Complied with requirement

### Test equipment used (refer to List of utilized test equipment)

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| AC01 | BA07 | CL11 | CL30 | CL38 | DH06 | PR12 | PR21 |
| TR06 | -    | -    | -    | -    | -    | -    | -    |

### Test software used

EMI1 Ver. 5.9

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## Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB/m] = Ant. Factor [dB/m] + Loss [dB] – Gain [dB]

Result [dBμV/m] = Reading [dBμV] + Correction Factor [dB/m]

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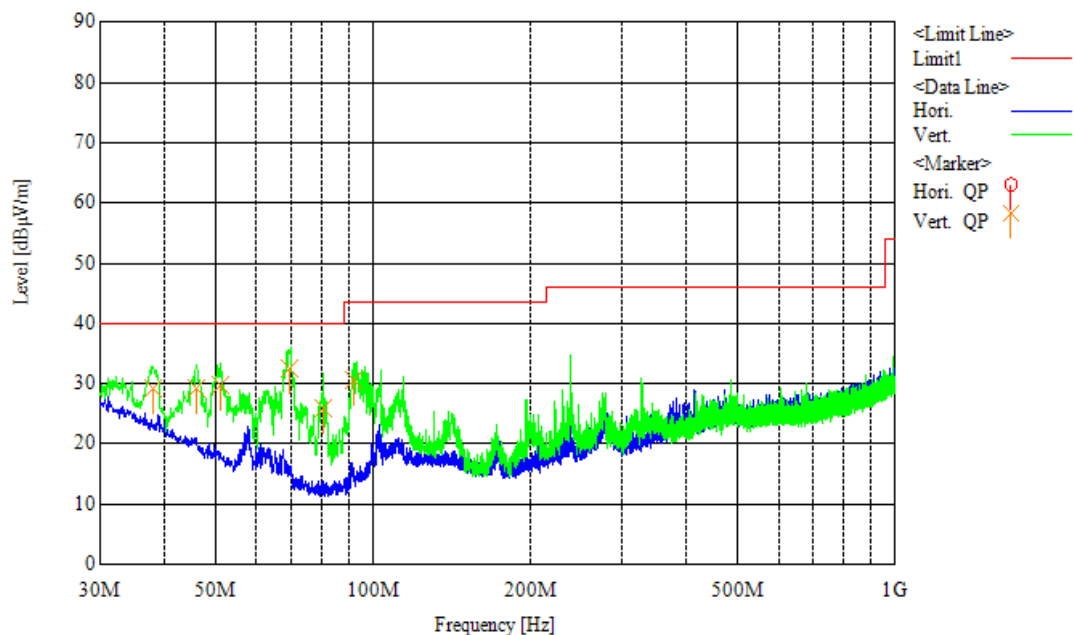
## Test Data (below 1GHz)

Operating frequency: 2402MHz  
Worst configuration: X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

### [Emission level]

| No. | Frequency [MHz] | Reading [dBμV] | Factor [dB/m] | Loss [dB]  | Gain [dB]   | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Ant.         |
|-----|-----------------|----------------|---------------|------------|-------------|-----------------|----------------|-------------|--------------|
| 1   | 37.938          | 34.1           | 18.6          | 6.9        | 30.4        | 29.2            | 40.0           | 10.8        | Vert.        |
| 2   | 46.114          | 37.7           | 14.8          | 7.1        | 30.3        | 29.3            | 40.0           | 10.7        | Vert.        |
| 3   | 51.083          | 40.0           | 12.9          | 7.1        | 30.3        | 29.7            | 40.0           | 10.3        | Vert.        |
| 4   | <b>69.261</b>   | <b>46.5</b>    | <b>8.8</b>    | <b>7.4</b> | <b>30.3</b> | <b>32.4</b>     | <b>40.0</b>    | <b>7.6</b>  | <b>Vert.</b> |
| 5   | 80.685          | 41.4           | 7.4           | 7.5        | 30.3        | 26.0            | 40.0           | 14.0        | Vert.        |
| 6   | 92.354          | 44.5           | 8.8           | 7.6        | 30.3        | 30.6            | 43.5           | 12.9        | Vert.        |

### [Chart]



Tested Date: June 20, 2019  
Humidity: 56 %

Temperature: 19 degC  
Atmos. Press: 1006 hPa

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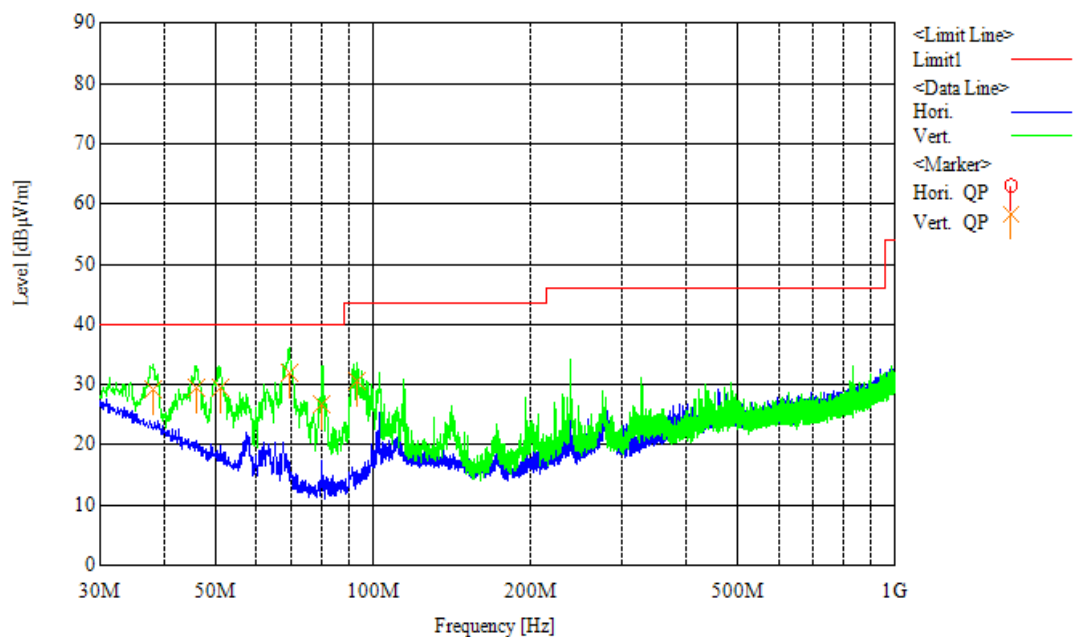
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Operating frequency: 2442MHz  
Worst configuration: X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

## [Emission level]

| No. | Frequency [MHz] | Reading [dBμV] | Factor [dB/m] | Loss [dB]  | Gain [dB]   | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Ant.         |
|-----|-----------------|----------------|---------------|------------|-------------|-----------------|----------------|-------------|--------------|
| 1   | 38.058          | 34.1           | 18.6          | 6.9        | 30.4        | 29.2            | 40.0           | 10.8        | Vert.        |
| 2   | 46.150          | 37.9           | 14.8          | 7.1        | 30.3        | 29.5            | 40.0           | 10.5        | Vert.        |
| 3   | 51.066          | 39.9           | 12.9          | 7.1        | 30.3        | 29.6            | 40.0           | 10.4        | Vert.        |
| 4   | <b>69.493</b>   | <b>46.1</b>    | <b>8.8</b>    | <b>7.4</b> | <b>30.3</b> | <b>32.0</b>     | <b>40.0</b>    | <b>8.0</b>  | <b>Vert.</b> |
| 5   | 79.863          | 42.1           | 7.3           | 7.5        | 30.3        | 26.6            | 40.0           | 13.4        | Vert.        |
| 6   | 93.533          | 44.3           | 9.0           | 7.6        | 30.3        | 30.6            | 43.5           | 12.9        | Vert.        |

## [Chart]



Tested Date: June 20, 2019  
Humidity: 56 %

Temperature: 19 degC  
Atmos. Press: 1006 hPa

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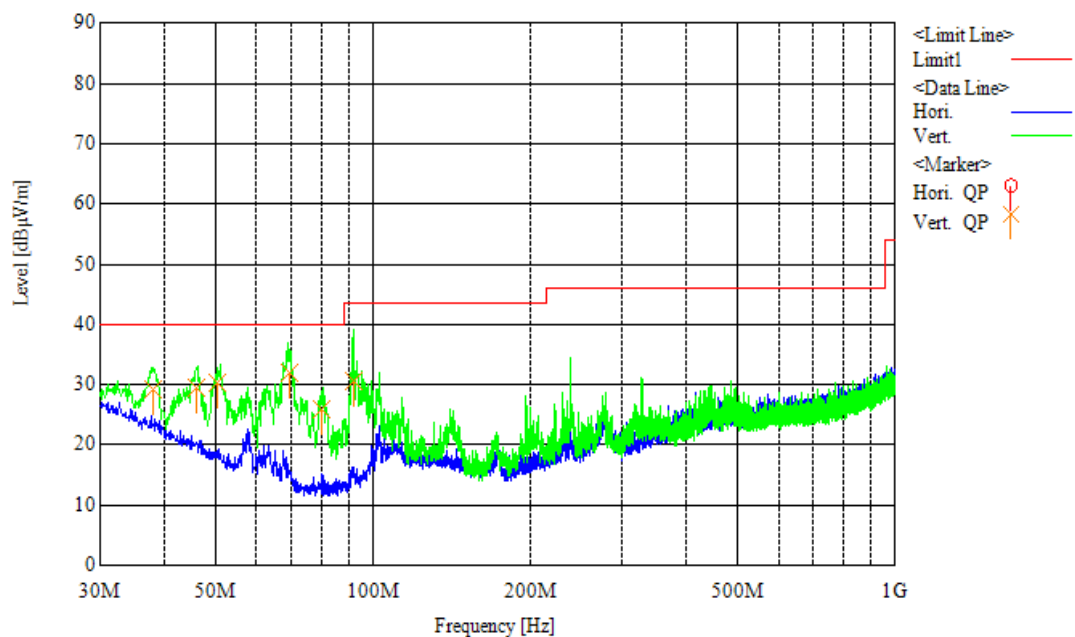
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Operating frequency: 2480MHz  
Worst configuration: X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

[Emission level]

| No. | Frequency [MHz] | Reading [dBμV] | Factor [dB/m] | Loss [dB]  | Gain [dB]   | Result [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Ant.         |
|-----|-----------------|----------------|---------------|------------|-------------|-----------------|----------------|-------------|--------------|
| 1   | 38.040          | 34.1           | 18.6          | 6.9        | 30.4        | 29.2            | 40.0           | 10.8        | Vert.        |
| 2   | 46.005          | 38.0           | 14.8          | 7.1        | 30.3        | 29.6            | 40.0           | 10.4        | Vert.        |
| 3   | 50.606          | 40.6           | 13.0          | 7.1        | 30.3        | 30.4            | 40.0           | 9.6         | Vert.        |
| 4   | <b>69.181</b>   | <b>46.0</b>    | <b>8.9</b>    | <b>7.4</b> | <b>30.3</b> | <b>32.0</b>     | <b>40.0</b>    | <b>8.0</b>  | <b>Vert.</b> |
| 5   | 79.811          | 41.5           | 7.3           | 7.5        | 30.3        | 26.0            | 40.0           | 14.0        | Vert.        |
| 6   | 92.276          | 44.6           | 8.7           | 7.6        | 30.3        | 30.6            | 43.5           | 12.9        | Vert.        |

[Chart]



Tested Date: June 20, 2019  
Humidity: 56 %

Temperature: 19 degC  
Atmos. Press: 1006 hPa

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## Test Data (Above 1000MHz)

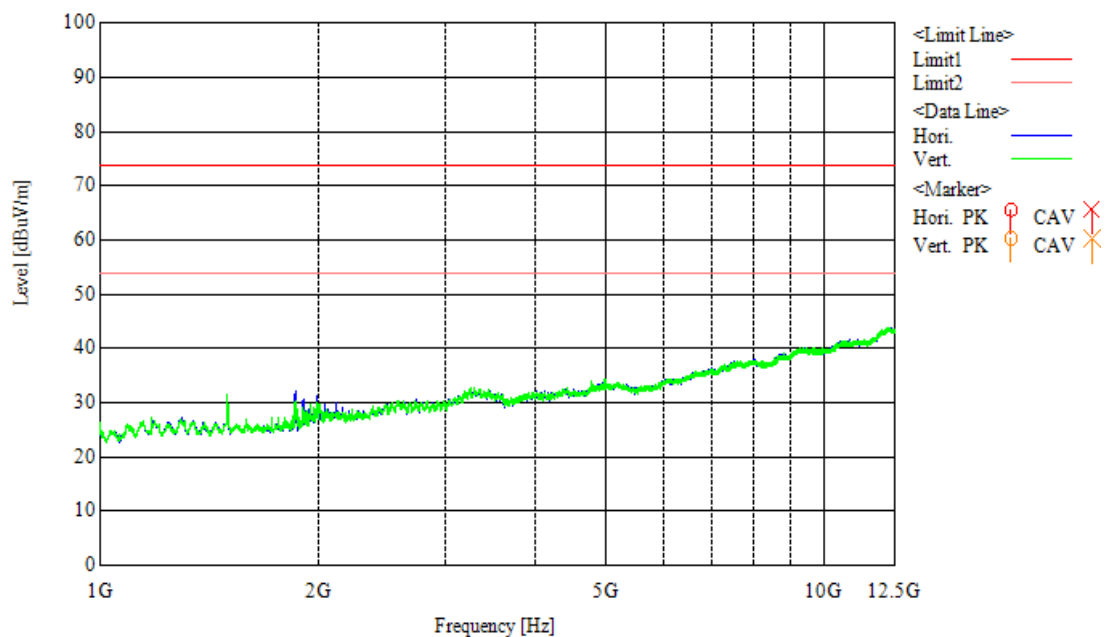
Operating frequency: 2402MHz  
Worst configuration: X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

There is no spurious emission greater than noise floor or 20dB below the limit.

### [Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant. |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|------|
| -   | -               | -                 | -                  | -             | -                  | -                   | -                 | -                  | -              | -               | -    |
| -   | -               | -                 | -                  | -             | -                  | -                   | -                 | -                  | -              | -               | -    |

### [Chart]



Tested Date: June 18, 2019  
Humidity: 48 %

Temperature: 20 degC  
Atmos. Press: 1013 hPa

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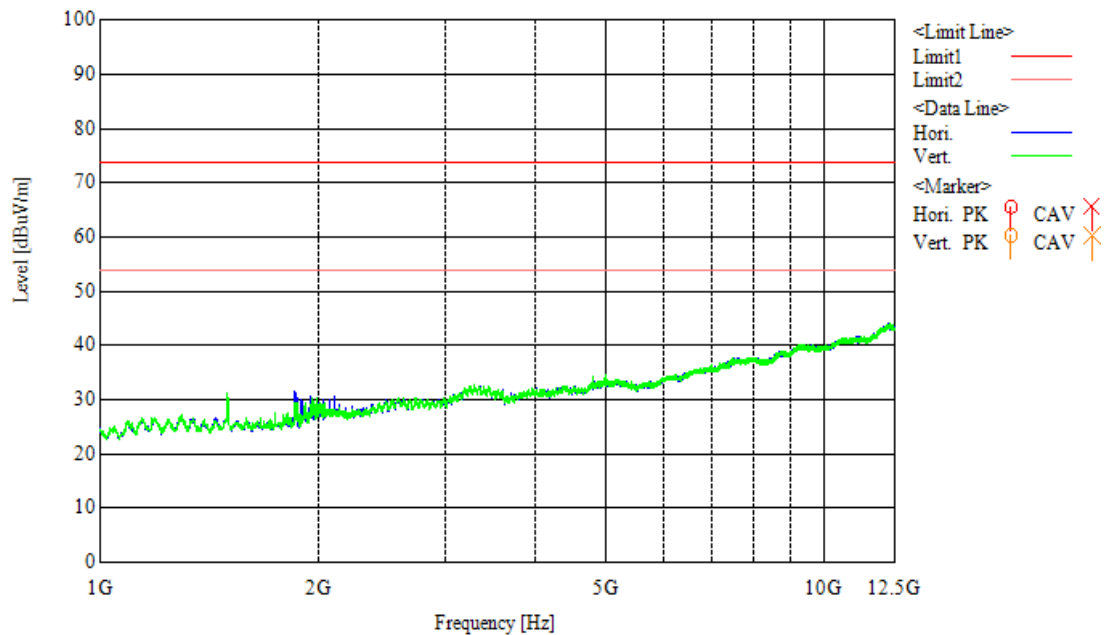
Operating frequency: 2442MHz  
Worst configuration: X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

There is no spurious emission greater than noise floor or 20dB below the limit.

[Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant. |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|------|
| -   | -               | -                 | -                  | -             | -                  | -                   | -                 | -                  | -              | -               | -    |
| -   | -               | -                 | -                  | -             | -                  | -                   | -                 | -                  | -              | -               | -    |

[Chart]



Tested Date: June 18, 2019  
Humidity: 48 %

Temperature: 20 degC  
Atmos. Press: 1013 hPa

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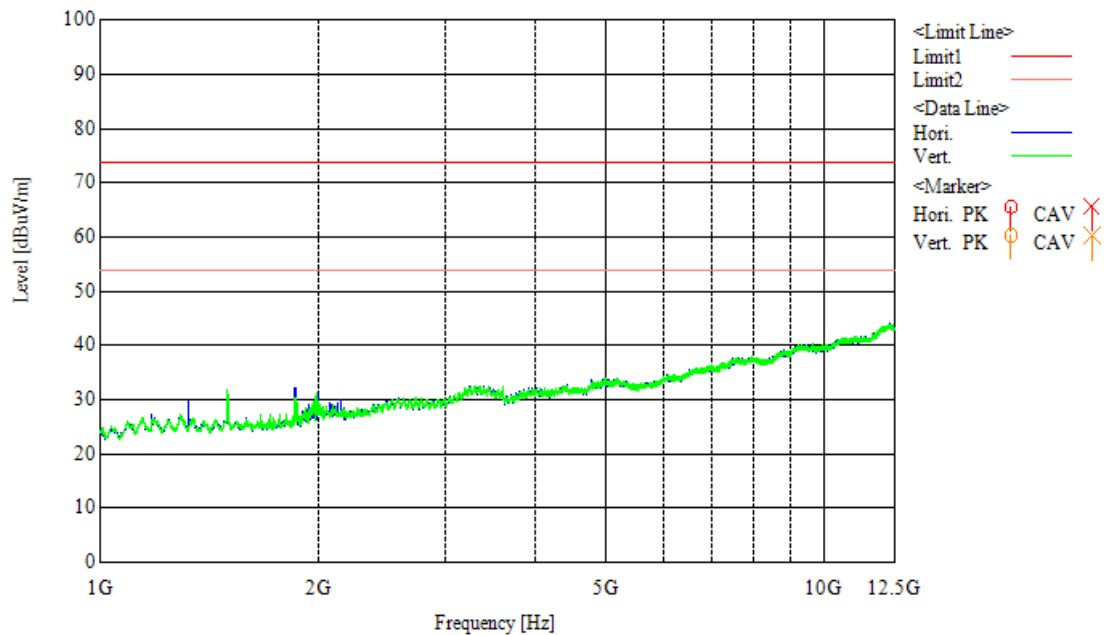
Operating frequency: 2480MHz  
Worst configuration: X-plane  
Test site: Yokohama Laboratory  
Measurement distance: 3 m

There is no spurious emission greater than noise floor or 20dB below the limit.

[Emission level]

| No. | Frequency [MHz] | Reading PK [dBμV] | Reading Ave [dBμV] | C.Factor [dB] | Result PK [dBμV/m] | Result Ave [dBμV/m] | Limit PK [dBμV/m] | Limit Ave [dBμV/m] | Margin PK [dB] | Margin Ave [dB] | Ant. |
|-----|-----------------|-------------------|--------------------|---------------|--------------------|---------------------|-------------------|--------------------|----------------|-----------------|------|
| -   | -               | -                 | -                  | -             | -                  | -                   | -                 | -                  | -              | -               | -    |
| -   | -               | -                 | -                  | -             | -                  | -                   | -                 | -                  | -              | -               | -    |

[Chart]



Tested Date: June 18, 2019  
Humidity: 48 %

Temperature: 20 degC  
Atmos. Press: 1013 hPa

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## 2.9 AC power line conducted emissions (Receiver)

### Test setup

Test setup was implemented according to the method of ANSI C63.4 clause 6 “General requirements for EUT equipment arrangements and operation” and Annex H.1 “AC power line conducted emission measurements setup”.

### Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4 clauses 7, clause 13.1.3 and Annex H.2 “AC power line conducted emission measurements”.

Exploratory measurements were used the spectrum analyzer to identify the frequency of the emission that has the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable positions, and with a typical system equipment configuration and arrangement.

Final ac power line conducted emission measurements were performed based on the exploratory tests.

The EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit are selected for the final measurement.

When the measurement value is greater than average limitation the average detection measurements were performed.

### Applicable rule and limitation

RSS-Gen 7.2: AC power line conducted emissions limits

| Frequency of Emission<br>[MHz] | Conducted emissions Limit [dBμV] |            |
|--------------------------------|----------------------------------|------------|
|                                | Quasi-peak                       | Average    |
| 0.15 - 0.5                     | 66 to 56 *                       | 56 to 46 * |
| 0.5 - 5                        | 56                               | 46         |
| 5 - 30                         | 60                               | 50         |

\* Decreases with the logarithm of the frequency. The lower limit applies at the band edges.

### Test equipment used (refer to List of utilized test equipment)

|      |      |      |
|------|------|------|
| TR06 | CL18 | LN05 |
|------|------|------|

### Test software used

EMI1 Ver. 5.9

### Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB] = ISN Factor [dB] + Loss [dB]

Result [dBμV] = Reading [dBμV] + Correction Factor [dB]

### Test results - Complied with requirement

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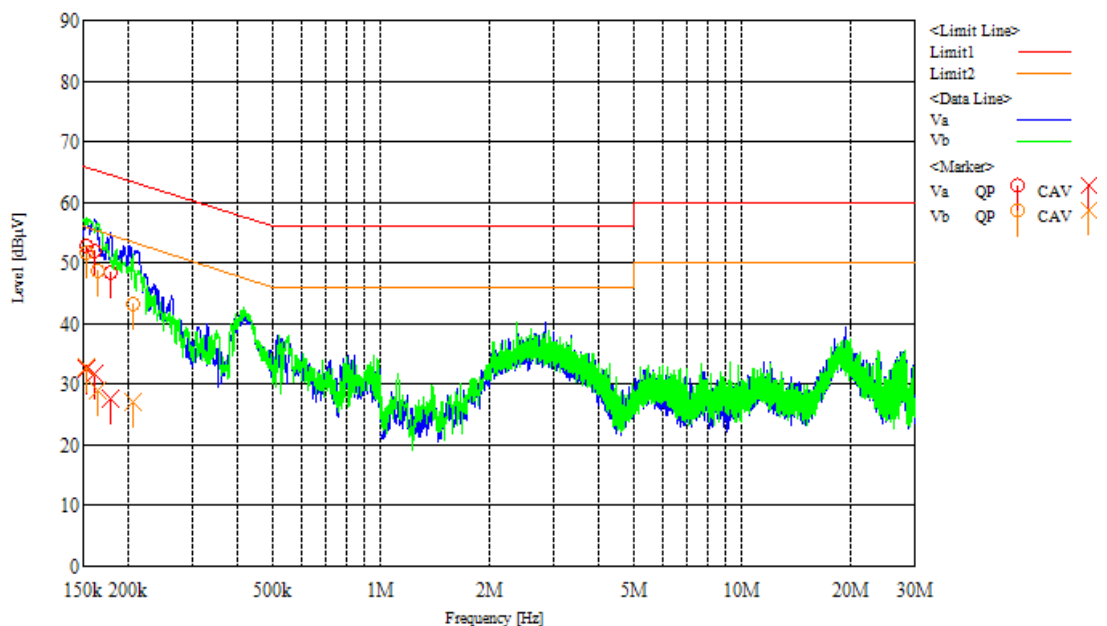
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## Test Data

Operating mode: 2402MHz, 1Mbps (worst)  
Test site: Yokohama Laboratory

| No. | Frequency [MHz] | Reading   |           | C.F. [dB] | Result    |           | Limit     |           | Margin  |         | PHASE |
|-----|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|---------|-------|
|     |                 | QP [dBuV] | AV [dBuV] |           | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] |       |
| 1   | 0.15323         | 42.5      | 22.3      | 10.3      | 52.8      | 32.6      | 65.8      | 55.8      | 13.0    | 23.2    | Va    |
| 2   | 0.16088         | 41.7      | 21.4      | 10.3      | 52.0      | 31.7      | 65.4      | 55.4      | 13.4    | 23.7    | Va    |
| 3   | 0.17855         | 38.4      | 17.5      | 10.2      | 48.6      | 27.7      | 64.6      | 54.6      | 16.0    | 26.9    | Va    |
| 4   | 0.15323         | 41.5      | 22.6      | 10.3      | 51.8      | 32.9      | 65.8      | 55.8      | 14.0    | 22.9    | Vb    |
| 5   | 0.16513         | 38.5      | 18.8      | 10.3      | 48.8      | 29.1      | 65.2      | 55.2      | 16.4    | 26.1    | Vb    |
| 6   | 0.20541         | 33.0      | 17.0      | 10.2      | 43.2      | 27.2      | 63.4      | 53.4      | 20.2    | 26.2    | Vb    |

## [Chart]



Tested Date: July 10, 2019  
Humidity: 52 %

Temperature: 24 degC  
Atmos. Press: 1013 hPa

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## 4 List of utilized test equipment / calibration

| RFT ID No. | Kind of Equipment and Precision  | Manufacturer         | Model No.     | Serial Number | Calibration Date | Calibrated until |
|------------|----------------------------------|----------------------|---------------|---------------|------------------|------------------|
| AC01(EM)   | Anechoic Chamber (1st test room) | JSE                  | 203397C       | -             | 2019/04/20       | 2020/04/30       |
| AC01(EG)   | Anechoic Chamber (1st test room) | JSE                  | 203397C       | -             | 2019/03/30       | 2020/03/31       |
| BA07       | Biological Antenna               | TESEQ                | CBL6143A      | 26670         | 2018/12/07       | 2019/12/31       |
| BRF12      | Band Reject Filter (2400MHz)     | M-City               | BRF2440-01    | RF0012-02     | 2019/03/20       | 2020/03/31       |
| CL11       | RF Cable for RE                  | RFT                  | -             | -             | 2019/03/19       | 2020/03/31       |
| CL18       | RF Cable for CE                  | RFT                  | -             | -             | 2019/03/20       | 2020/03/31       |
| CL30       | RF Cable 5 m                     | SUHNER               | SUCOFLEX104PE | MY3599        | 2019/01/23       | 2020/01/31       |
| CL31       | RF Cable 1 m                     | Junkosha             | MWX221        | 1303S118      | 2019/01/23       | 2020/01/31       |
| CL38       | RF Cable 2 m                     | Junkosha             | MWX221        | 1603S626      | 2019/01/23       | 2020/01/31       |
| DH06       | DRG Horn Antenna                 | A.H. Systems         | SAS-571       | 1339          | 2018/06/19       | 2020/06/30       |
| HPF4       | High Pass Filter (3000MHz)       | Tokyo KEIKI          | TF23LCCZGA    | 9001          | 2018/12/04       | 2019/12/31       |
| LN05       | LISN                             | Kyoritsu             | KNW-407F      | 8-1773-2      | 2019/05/13       | 2020/05/31       |
| LP06       | Loop Antenna                     | ETS-Lindgren         | 6502          | 00164299      | 2019/04/13       | 2020/04/30       |
| PR12       | Pre. Amplifier (1-26G)           | Agilent Technologies | 8449B         | 3008A02513    | 2019/01/23       | 2020/01/31       |
| PR21       | Pre. Amplifier                   | Anritsu              | MH648A        | 6200467119    | 2018/12/04       | 2019/12/31       |
| SH01       | Standard Horn Antenna (18-26G)   | A.H. Systems         | SAS-572       | 208           | 2018/07/12       | 2020/07/31       |
| TR06       | Test Receiver (F/W : 4.73 SP4)   | Rohde & Schwarz      | ESU26         | 100002        | 2018/10/11       | 2019/10/31       |

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

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