# FCC/ISED - TEST REPORT

| | | | | |
|---|---|---|---|---|
| Report Number | : | **68.950.24.0227.01** | Date of Issue: | **2024-04-18** |
| Model/HVIN | : | **CPPB1** | | |
| Product Type | : | Camera | | |
| Applicant | : | GoPro, Inc. | | |
| Address | : | 3025 Clearview Way, San Mateo, CA 94402, USA | | |
| Manufacturer | : | GoPro, Inc. | | |
| Address | : | 3025 Clearview Way, San Mateo, CA 94402, USA | | |
| Test Result | : | ■ **Positive** ☐ **Negative** | | |
| Total pages including Appendices | : | **65** | | |

*Any use for advertising purposes must be granted in writing. This technical report may only be quoted in full. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production. For further details, please see testing and certification regulation, chapter A-3.4.*



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# 1 Table of Contents





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# 2 Details about the Test Laboratory

**Details about the Test Laboratory**

Test Site 1

| | |
|---|---|
| Company name: | TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch<br>Building 12&13, Zhiheng Wisdomland Business Park, Guankou Erlu, Nantou, Nanshan District, Shenzhen City, 518052, P. R. China |
| Telephone: | 86 755 8828 6998 |
| Fax: | 86 755 828 5299 |
| FCC Registration No.: | 514049 |
| FCC Designation No.: | CN5009 |
| IC Registration No.: | 10320A |
| ISED CAB identifier: | CN0077 |

# 3 Description of the Equipment Under Test

| | |
|---|---|
| Product: | Camera |
| Model no.: | CPPB1 |
| FCC ID: | CNFCPPB1 |
| IC: | 10193A-CPPB1 |
| PMN: | CPPB1 |
| HVIN: | CPPB1 |
| Rating: | 3.89VDC |
| RF Transmission Frequency: | 2402MHz-2480MHz |
| No. of Operated Channel: | 79 |
| Modulation: | GFSK, π/4-DQPSK, 8DPSK |
| Antenna Type: | Internal Integrated Metal Antenna |
| Antenna Gain: | 1.5dBi max for 2.4GHz |
| Description of the EUT: | The Equipment Under Test (EUT) is a Camera supports Bluetooth Low Energy / Bluetooth BR+EDR/ Wi-Fi functions |


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# 4 Summary of Test Standards

| Test Standards | |
|---|---|
| FCC Part 15 Subpart C<br>10-1-2023 Edition | PART 15 - RADIO FREQUENCY DEVICES<br>Subpart C - Intentional Radiators |
| RSS-Gen Issue 5, April 2018<br>Amendment 1, March 2019 +<br>Amendment 2, February 2021 | General Requirements for Compliance of Radio Apparatus |
| RSS-247<br>Issue 3 August 2023 | Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices |

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 Measurement Guidance and ANSI C63.10-2013.



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# 5 Summary of Test Results

| Technical Requirements | | | |
|---|---|---|---|
| **FCC Part 15 Subpart C/ RSS-247 Issue 3/RSS-Gen Issue 5** | | | |
| Test Condition | | Test Site | Test Result |
| §15.207& RSS-Gen 8.8 | Conducted emission AC power port | Site 1 | Pass |
| §15.247(b)(1) | Conducted output power | Site 1 | Pass |
| RSS-247 5.4(b) | Conducted output power and Equivalent Isotropic Radiated Power | Site 1 | Pass |
| §15.247(a)(1) & RSS-247 5.1(a) & RSS-Gen 6.7 | 20dB bandwidth and 99% occupied bandwidth | Site 1 | Pass |
| §15.247(a)(1) & RSS-247 5.1(b) | Carrier channel frequency separation | Site 1 | Pass |
| §15.247(a)(1)(iii) & RSS-247 5.1(d) | Number of hopping frequencies | Site 1 | Pass |
| §15.247(a)(1)(iii) & RSS-247 5.1(d) | Dwell Time - Average Time of Occupancy | Site 1 | Pass |
| §15.247(d) & RSS-247 5.5 | Spurious RF conducted emissions | Site 1 | Pass |
| §15.247(d) & RSS-247 5.5 | Band edge | Site 1 | Pass |
| §15.247(d) & §15.209 &§15.205 &RSS-247 5.5 & RSS-Gen 6.13 | Spurious radiated emissions for transmitter | Site 1 | Pass |
| §15.203 & RSS-Gen 6.8 | Antenna requirement | See note 2 | Pass |

Note 1: N/A=Not Applicable.
Note 2: The EUT uses an Internal Integrated Metal Antenna, which gain is 1.5dBi. In accordance to §15.203 & RSS-Gen 6.8, it is considered sufficiently to comply with the provisions of this section.


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# 6 General Remarks

**Remarks**
This submittal(s) (test report) is intended for FCC ID: CNFCPPB1, complies with Section 15.207, 15.209, 15.205, 15.247 of the FCC Part 15, Subpart C.

This submittal(s) (test report) is intended for IC: 10193A-CPPB1, complies with RSS-247, RSS-GEN.

The Model: CPPB1 supports Bluetooth Low Energy/Bluetooth BR+EDR/Wi-Fi functions, power by 3.89VDC, 1960mAh supplied by a rechargeable Lithium Ion Battery or 5VDC supplied by USB type C port.
The TX and RX range is 2402MHz-2480MHz for Bluetooth, 2412MHz – 2462MHz for 2.4GHz Wi-Fi, 5180MHz – 5320MHz, 5500MHz – 5700MHz, 5745MHz – 5825MHz for 5GHz Wi-Fi. (This device shall not be capable of transmitting in the band 5600-5650MHz for Canada. This restriction is for the protection of Terminal Doppler Weather Radar (TDWR) operating in this band.)

Note: The report is for BR+EDR only.

**SUMMARY:**

All tests according to the regulations cited on page 6 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: 2024-02-26

Testing Start Date: 2024-02-26

Testing End Date: 2024-03-18

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

| Reviewed by: | Prepared by: | Tested by: |
|---|---|---|
| John Zhi | Joe Gu | Carry Cai |


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| Project Manager | Project Engineer | Test Engineer |
|---|---|---|



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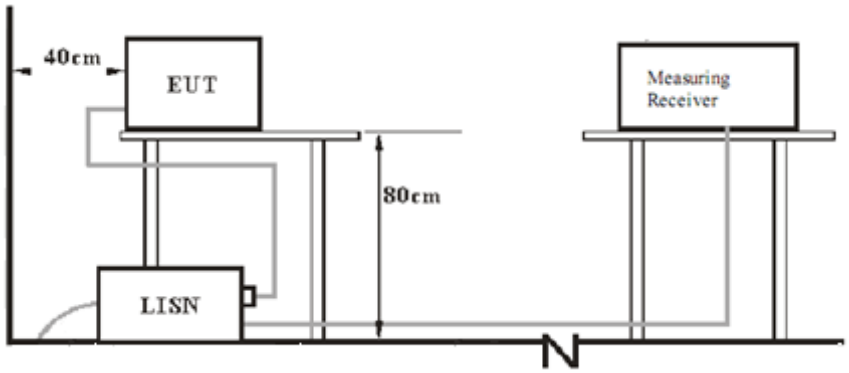
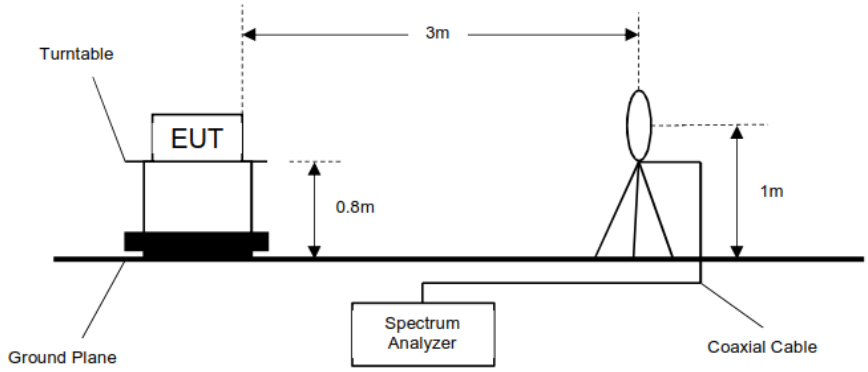
# 7 Test Setups

## 7.1 AC Power Line Conducted Emission test setups

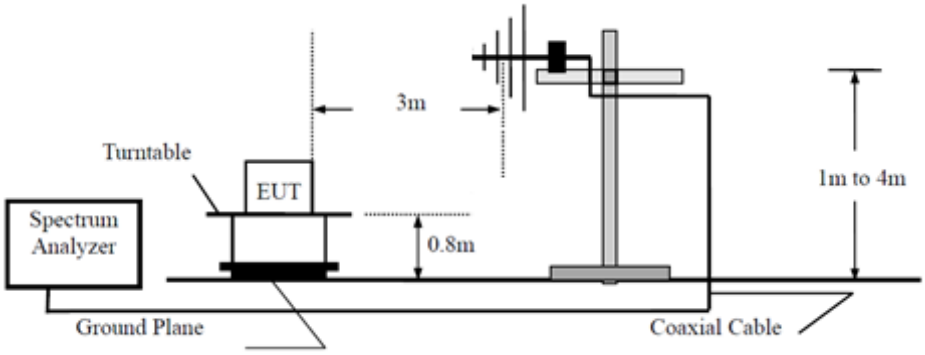



## 7.2 Radiated test setups

9KHz - 30MHz




30MHz - 1GHz



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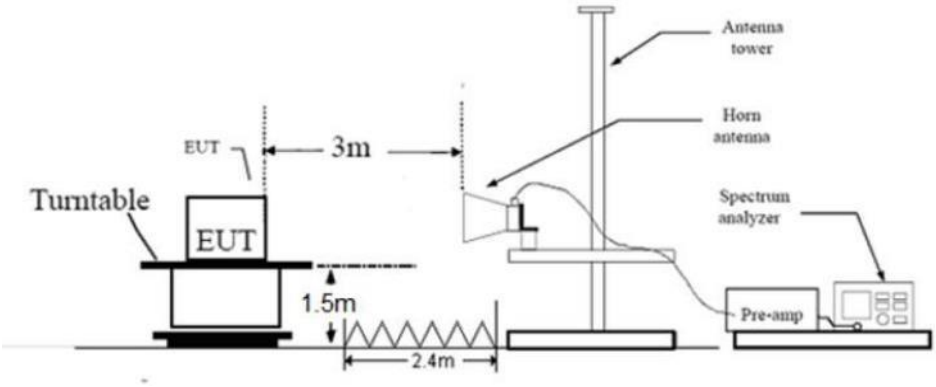
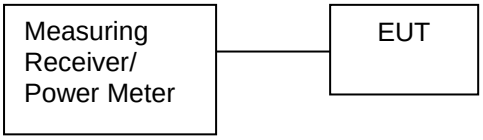
Above 1GHz




7.3 Conducted RF test setups



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# 8 Systems Test Configuration

Auxiliary Equipment Used during Test:

| Description | Manufacturer | Model NO. | S/N |
|---|---|---|---|
| LAPTOP | LENOVO | T460S | --- |
| USB TYPE C CABLE | GOPRO | 0.46M (LENGTH) | --- |
| AC ADAPTER | APPLE | A1401 | |

Test software information:

| Test Software Version | RF TOOL(Ver:0.2.1) |
|---|---|
| Modulation | Setting TX Power |
| GFSK | 0 |
| π/4-DQPSK | 0 |
| 8-DPSK | 0 |

The system was configured to hopping mode and non-hopping mode.

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.


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# 9 Technical Requirement

## 9.1 Conducted Emission

### Test Method

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

### Limit

| Frequency MHz | QP Limit dBµV | AV Limit dBµV |
|---|---|---|
| 0.150-0.500 | 66-56* | 56-46* |
| 0.500-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.


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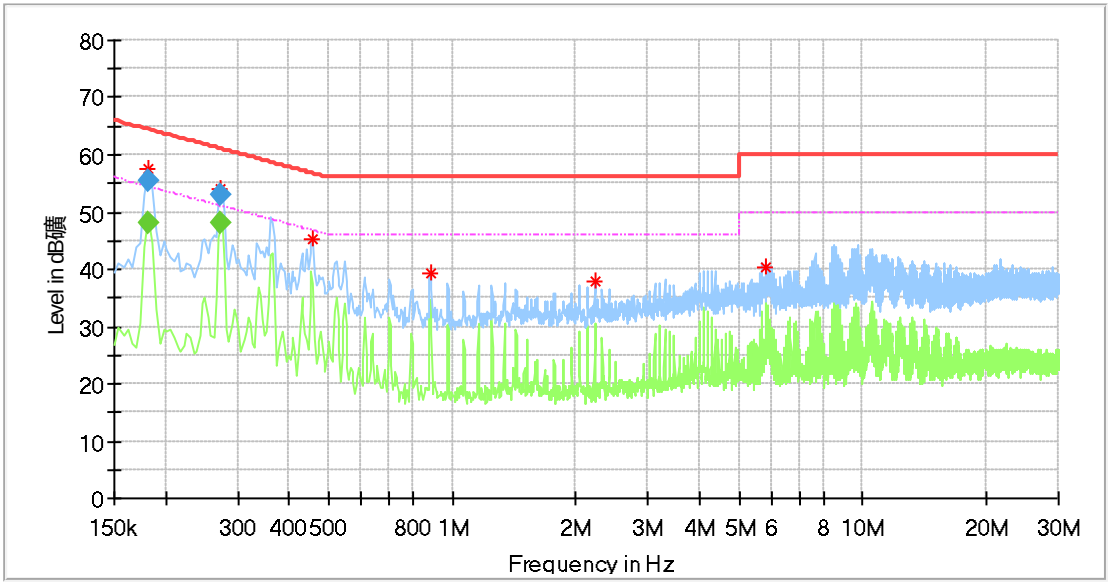
## Conducted Emission

Product Type : Camera
M/N : CPPB1
Operating Condition : Transmit
Test Specification : Line
Comment : AC 120V/60Hz(External adapter)




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Line | Corr. (dB) |
|---|---|---|---|---|---|---|
| 0.181500 | 57.56 | --- | 64.39 | 6.83 | L1 | 10.27 |
| 0.273500 | 54.05 | --- | 61.00 | 6.95 | L1 | 10.28 |
| 0.458000 | 45.18 | --- | 56.73 | 11.55 | L1 | 10.29 |
| 0.886000 | 39.29 | --- | 56.00 | 16.71 | L1 | 10.32 |
| 2.226000 | 38.02 | --- | 56.00 | 17.98 | L1 | 10.38 |
| 5.786000 | 40.44 | --- | 60.00 | 19.56 | L1 | 10.64 |

## Final_Result

| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Line | Corr. (dB) |
|---|---|---|---|---|---|---|
| 0.181500 | --- | 48.24 | 54.42 | 6.18 | L1 | 10.27 |
| 0.181500 | 55.43 | --- | 64.42 | 8.99 | L1 | 10.27 |
| 0.273500 | --- | 47.46 | 51.01 | 3.55 | L1 | 10.28 |
| 0.273500 | 53.14 | --- | 61.01 | 7.87 | L1 | 10.28 |

Remark:
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)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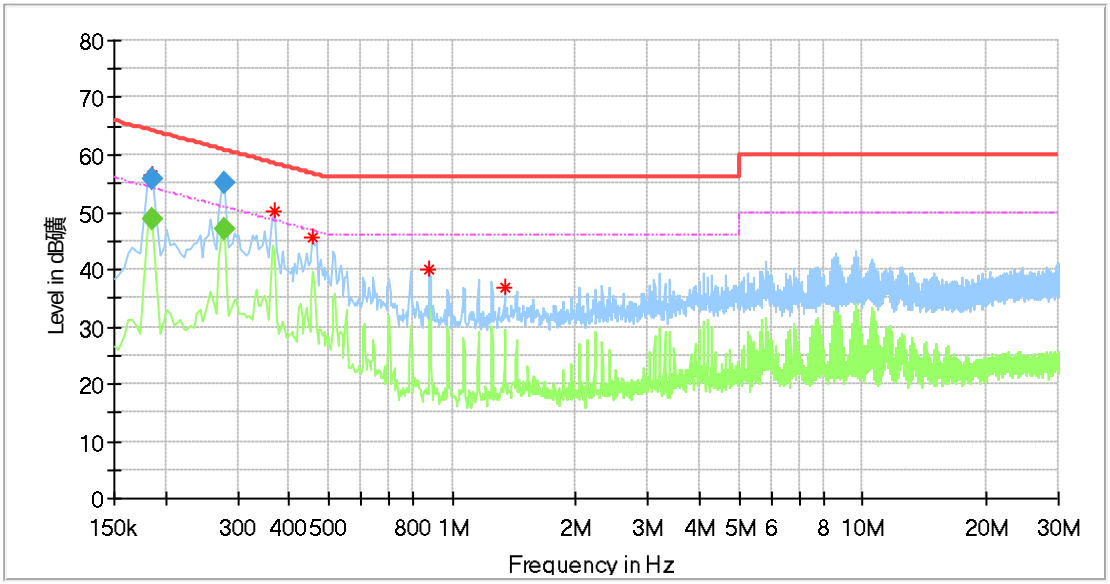
## Conducted Emission

| | | |
|---|---|---|
| Product Type | : | Camera |
| M/N | : | CPPB1 |
| Operating Condition | : | Transmit |
| Test Specification | : | Neutral |
| Comment | : | AC 120V/60Hz(External adapter) |




## Critical_Freqs

| Frequency (MHz) | MaxPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Line | Corr. (dB) |
|---|---|---|---|---|---|---|
| 0.185500 | 56.38 | --- | 64.39 | 8.01 | N | 10.22 |
| 0.277500 | 55.07 | --- | 61.00 | 5.93 | N | 10.23 |
| 0.370000 | 50.12 | --- | 58.50 | 8.38 | N | 10.16 |
| 0.458000 | 45.70 | --- | 56.73 | 11.03 | N | 10.21 |
| 0.882000 | 40.04 | --- | 56.00 | 15.96 | N | 10.19 |
| 1.342000 | 36.92 | --- | 56.00 | 19.08 | N | 10.23 |

## Final_Result

| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Line | Corr. (dB) |
|---|---|---|---|---|---|---|
| 0.185500 | --- | 48.73 | 54.24 | 5.51 | N | 10.22 |
| 0.185500 | 55.68 | --- | 64.24 | 8.56 | N | 10.22 |
| 0.277500 | --- | 47.08 | 50.89 | 3.81 | N | 10.23 |
| 0.277500 | 54.99 | --- | 60.89 | 5.90 | N | 10.23 |

Remark:
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)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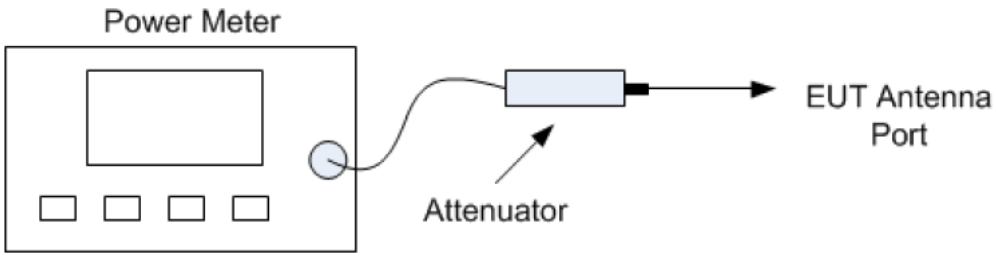
## 9.2 Conducted Output Power & EIRP

**Test Method**

1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
4) Measure the peak power of the transmitter. This measurement is a peak over both the ON and OFF periods of the transmitter.




**Power meter conducted test setup**

**Limits**

According to §15.247 (b) (1) & RSS-247 5.4(b), conducted output power limit as below:

| Frequency Range MHz | Limit W | Limit dBm |
|---|---|---|
| 2400-2483.5 | ≤0.125 | ≤21 |

According to & RSS-247 5.4(b), EIRP limit as below:

| Frequency Range MHz | Limit W | Limit dBm |
|---|---|---|
| 2400-2483.5 | ≤4 | ≤36 |

Remark: EIRP=Conducted output power + Antenna Gain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## Conducted Output Power & EIRP

Bluetooth Mode GFSK modulation Test Result

| Frequency MHz | Conducted Output Power dBm | Antenna Gain dBi | EIRP dBm | Result |
|---|---|---|---|---|
| Low channel 2402MHz | 5.71 | 1.5 | 7.21 | Pass |
| Middle channel 2441MHz | 5.41 | 1.5 | 6.91 | Pass |
| High channel 2480MHz | 5.59 | 1.5 | 7.09 | Pass |

Bluetooth Mode π/4-DQPSK modulation Test Result

| Frequency MHz | Conducted Output Power dBm | Antenna Gain dBi | EIRP dBm | Result |
|---|---|---|---|---|
| Low channel 2402MHz | 5.24 | 1.5 | 6.74 | Pass |
| Middle channel 2441MHz | 4.67 | 1.5 | 6.17 | Pass |
| High channel 2480MHz | 4.70 | 1.5 | 6.20 | Pass |

Bluetooth Mode 8DPSK modulation Test Result

| Frequency MHz | Conducted Output Power dBm | Antenna Gain dBi | EIRP dBm | Result |
|---|---|---|---|---|
| Low channel 2402MHz | 5.18 | 1.5 | 6.68 | Pass |
| Middle channel 2441MHz | 4.78 | 1.5 | 6.28 | Pass |
| High channel 2480MHz | 4.69 | 1.5 | 6.19 | Pass |


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## 9.3 20 dB Bandwidth and 99% Occupied Bandwidth

**Test Method**

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following test receiver settings:
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
   RBW = 1% to 5% of the OBW, VBW≥3RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Measure the frequency difference of two frequencies that were attenuated 20 dB/99% OBW from the reference level. Record the frequency difference as the emission bandwidth. Record the results.
5. Repeat above procedures until all frequencies measured were complete.

**Limit**

| Limit [kHz] |
|---|
| N/A |



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## 20 dB bandwidth and 99% Occupied Bandwidth

Test result

| TestMode | Frequency | 20 dB Bandwidth | 99% Bandwidth | Limit | Result |
|---|---|---|---|---|---|
| | MHz | MHz | MHz | MHz | |
| GFSK | 2402 | 1.116 | 0.869 | -- | Pass |
| GFSK | 2441 | 1.116 | 0.869 | -- | Pass |
| GFSK | 2480 | 1.116 | 0.869 | -- | Pass |
| π/4-DQPSK | 2402 | 1.413 | 1.199 | -- | Pass |
| π/4-DQPSK | 2441 | 1.428 | 1.196 | -- | Pass |
| π/4-DQPSK | 2480 | 1.413 | 1.199 | -- | Pass |
| 8DPSK | 2402 | 1.410 | 1.199 | -- | Pass |
| 8DPSK | 2441 | 1.410 | 1.202 | -- | Pass |
| 8DPSK | 2480 | 1.410 | 1.202 | -- | Pass |


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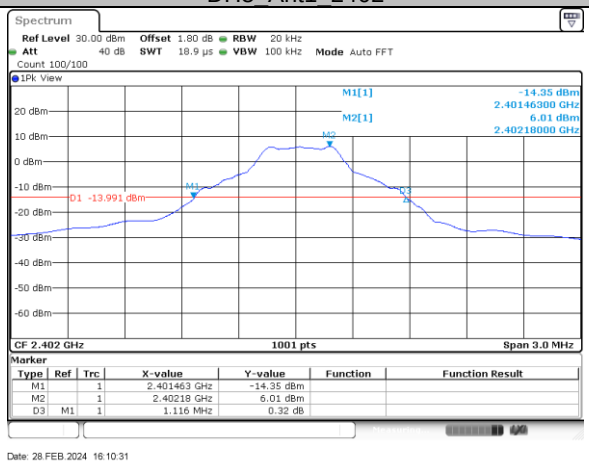
## 20 dB Bandwidth

DH5_Ant1_2402

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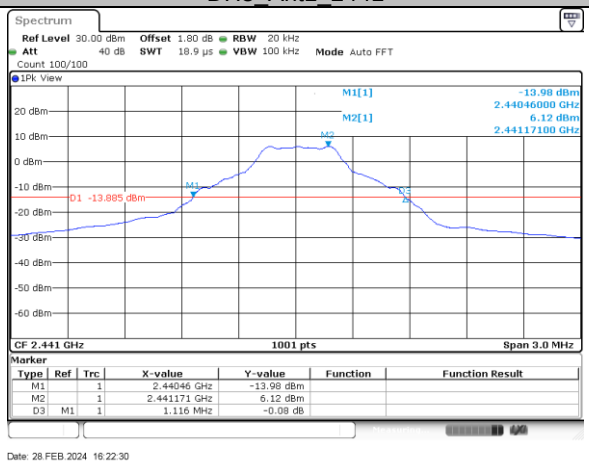
DH5_Ant1_2441

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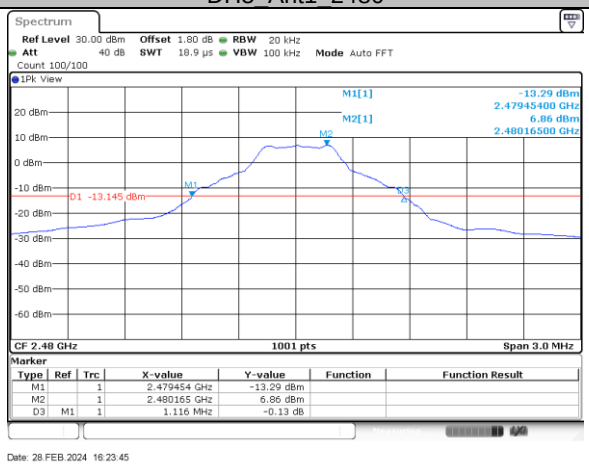
DH5_Ant1_2480

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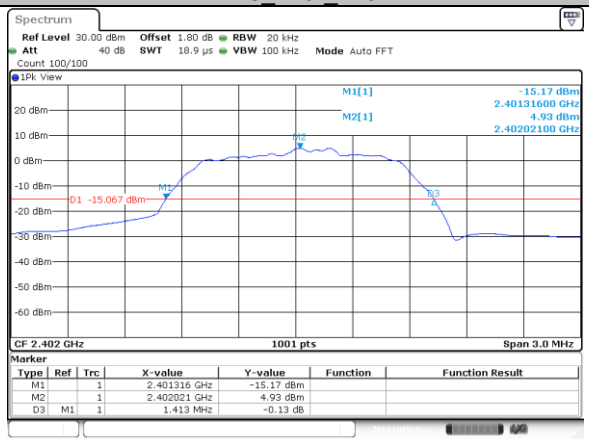
|  |



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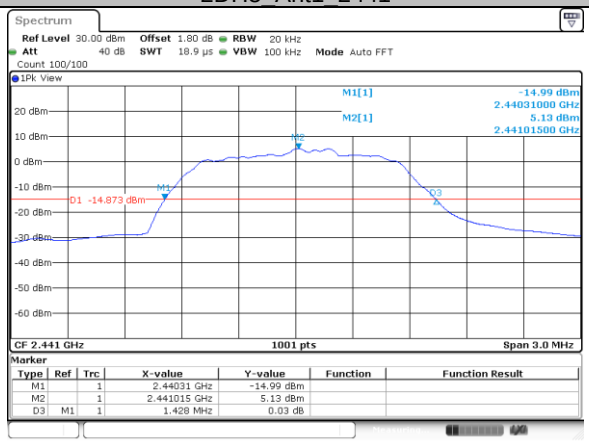
|  |



Date: 28.FEB.2024 16:25:15

| 2DH5_Ant1_2480 |
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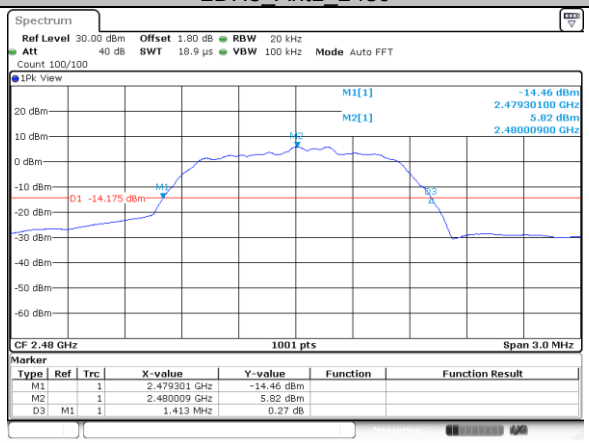
|  |



Date: 28.FEB.2024 16:26:26



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| 3DH5_Ant1_2402 |
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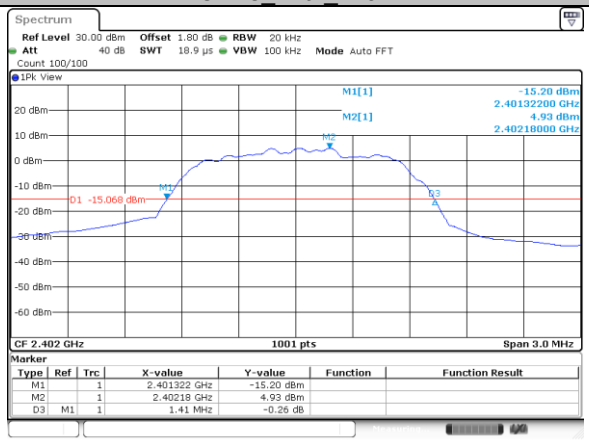
|  |
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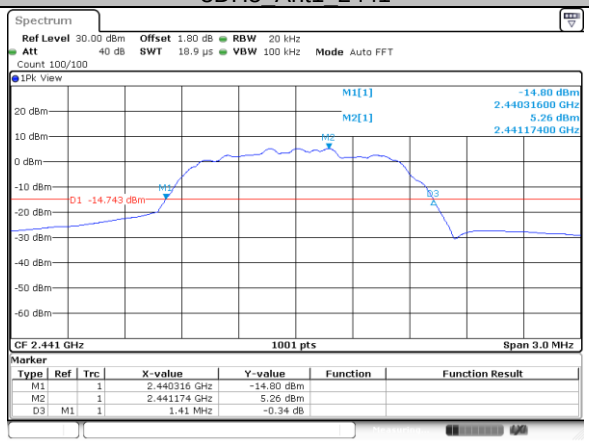
|  |
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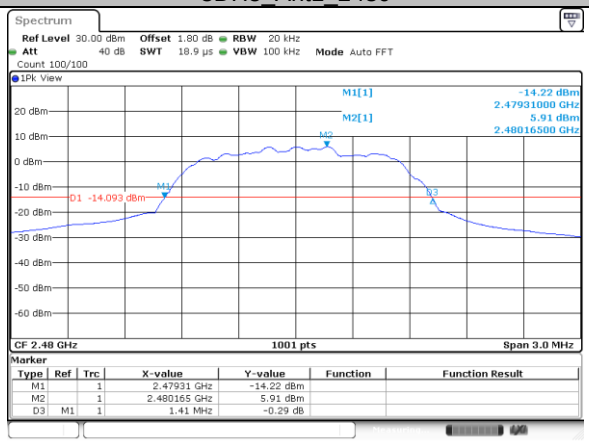
|  |



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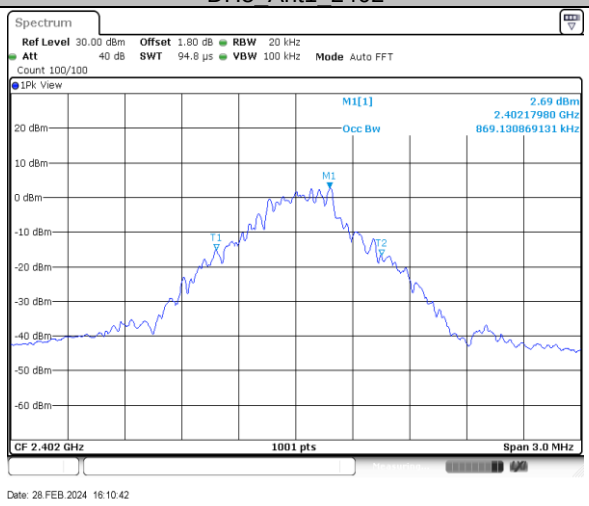
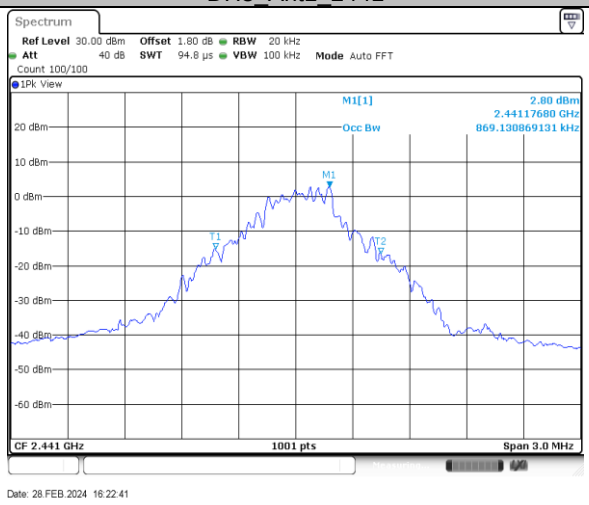
## 99% Occupied Bandwidth

DH5_Ant1_2402




DH5_Ant1_2441

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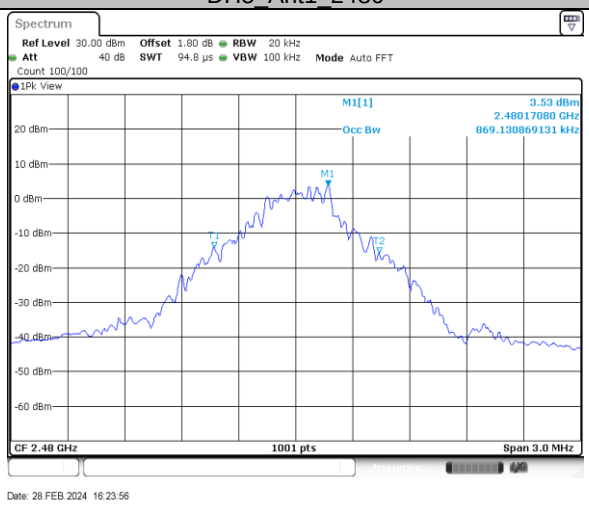

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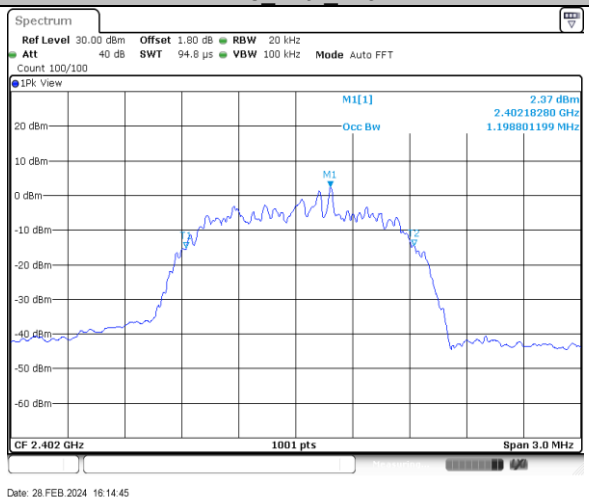
|  |
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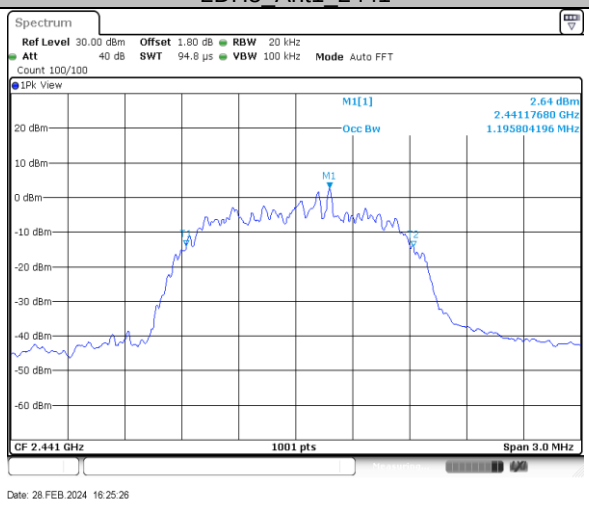
|  |
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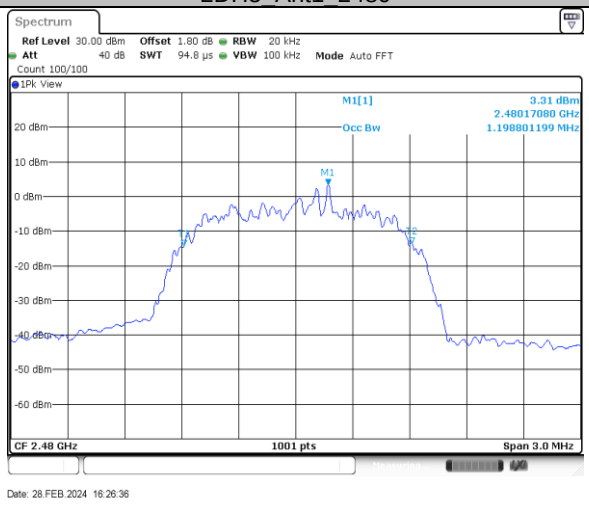
|  |

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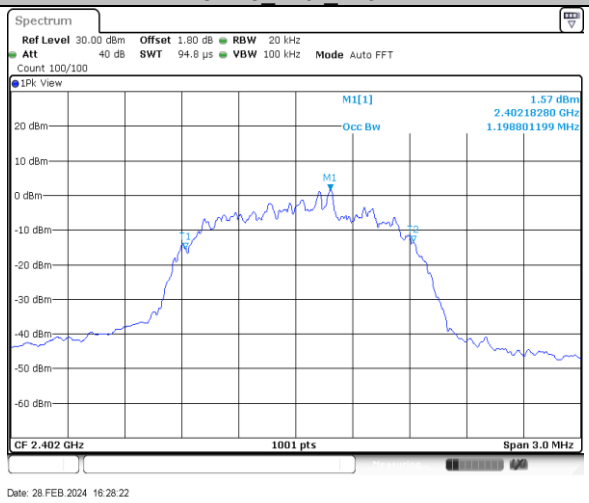
| --- |
|  |
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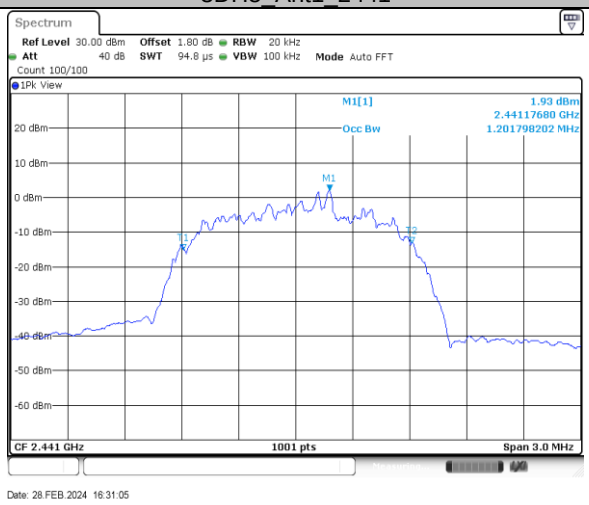
|  |
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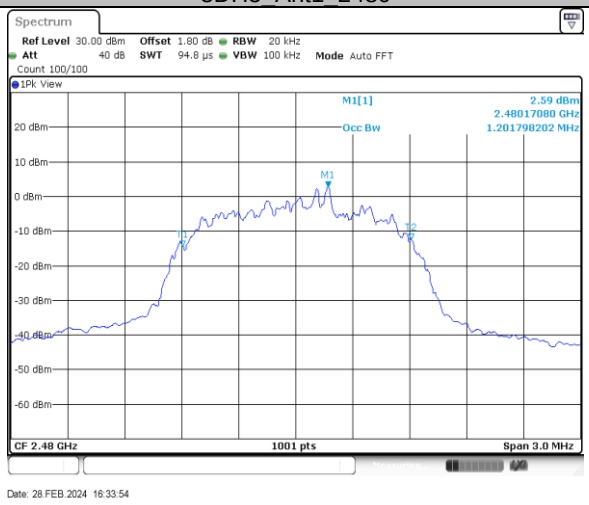
|  |

## 9.4 Carrier Frequency Separation

**Test Method**

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit to hopping mode.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. VBW ≥RBW, Sweep = auto, Detector function = peak.
4. By using the Max-Hold function record the separation of two adjacent channels.
5. Measure the frequency difference of these two adjacent channels by spectrum analyzer marker function. Record the results.
6. Repeat above procedures until all frequencies measured were complete.

**Limit**

| Limit<br>kHz |
|---|
| ⩾25KHz or 2/3 of the 20 dB bandwidth which is greater |

Limit

| Modulation | Frequency<br>MHz | 2/3 of 20 dB Bandwidth<br>kHz |
|---|---|---|
| GFSK | 2441 | 744 |
| π/4-DQPSK | 2441 | 952 |
| 8DPSK | 2441 | 940 |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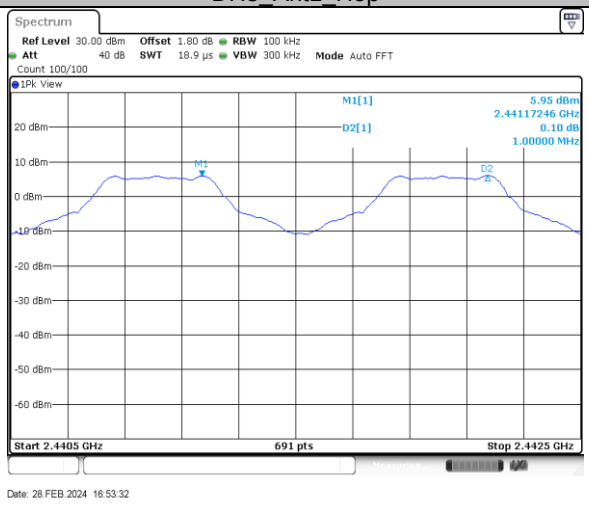
## Carrier Frequency Separation

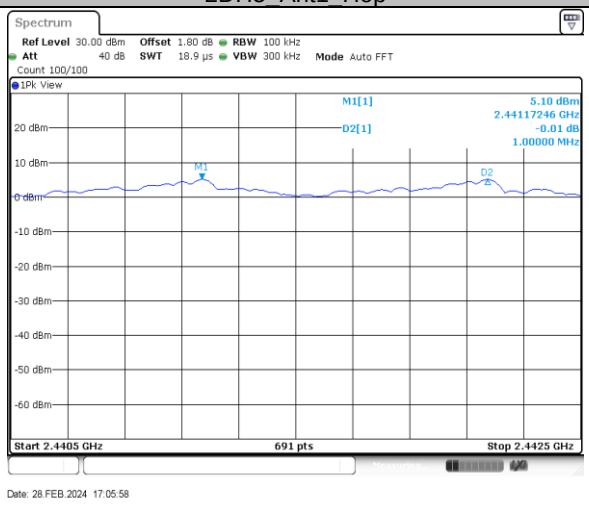
Test result: The measurement was performed with the typical configuration (normal hopping status).

| Modulation | Frequency MHz | Carrier Frequency Separation MHz | Result |
|---|---|---|---|
| GFSK | 2441 | 1 | Pass |
| π/4-DQPSK | 2441 | 1 | Pass |
| 8DPSK | 2441 | 1.003 | Pass |

DH5_Ant1_Hop




2DH5_Ant1_Hop



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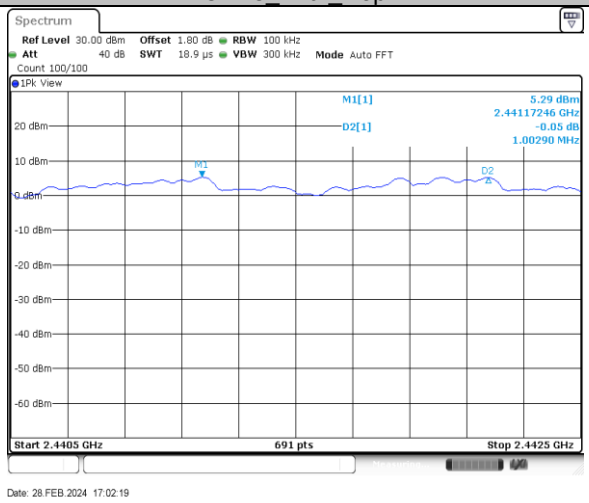
| 3DH5_Ant1_Hop |
| --- |
|  |





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## 9.5 Number of Hopping Frequencies

**Test Method**

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit to hopping mode.
3. Use the following spectrum analyzer settings:
   Span = the frequency band of operation, RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller, VBW ≥RBW, Sweep = auto, Detector function = peak, Trace=Max hold.
4. Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

**Limit**

| Limit number |
|---|
| ⩾ 15 |



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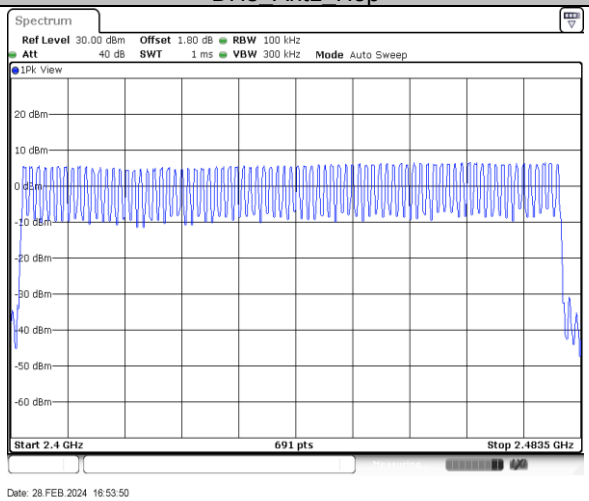
## Number of Hopping Frequencies

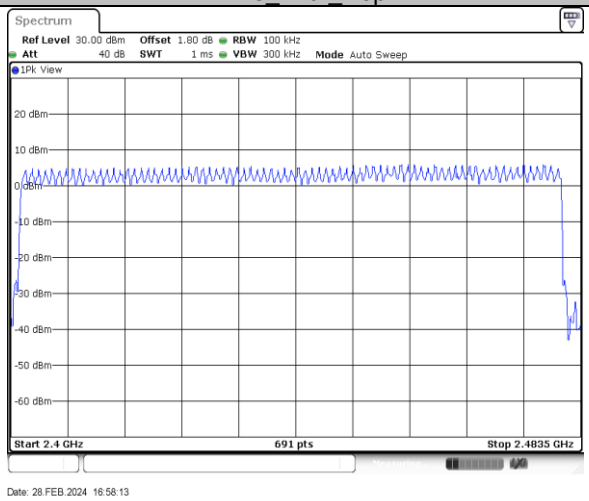
Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification. Here GFSK modulation mode was used to show compliance.

| Number of hopping frequencies | Result |
|---|---|
| 79 | Pass |

DH5_Ant1_Hop




2DH5_Ant1_Hop



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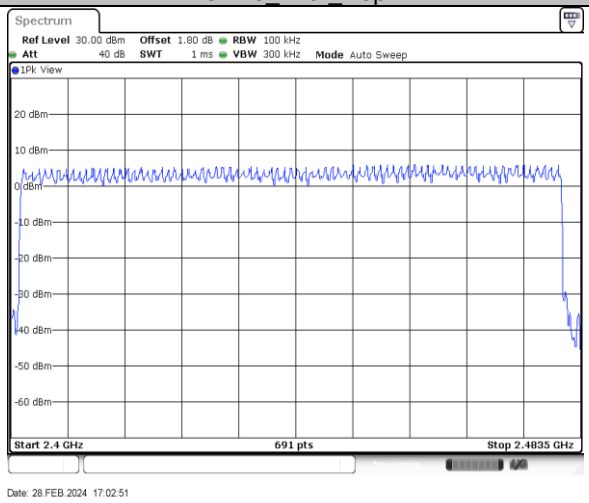
| 3DH5_Ant1_Hop |
| --- |
|  |





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## 9.6 Dwell Time

**Test Method**

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit to hopping mode.
3. Span: Zero span, centered on a hopping channel.
4. RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
5. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
6. Detector function: Peak.
7. Trace: Max hold. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

**Limit**

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.


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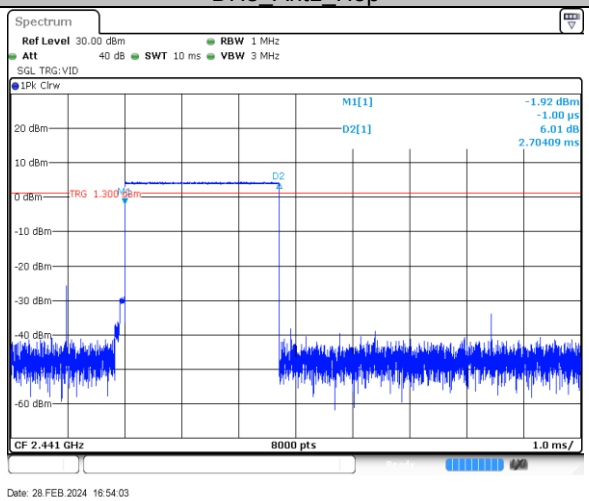
## Dwell Time

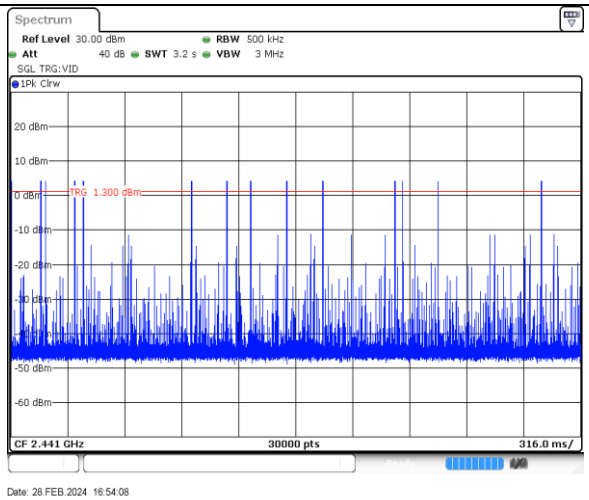
### Dwell time

The maximum dwell time shall be 0.4 s.
According to the Bluetooth Core Specification, the worse result (DH5, 2DH5, 3DH5 mode) was reported to show compliance.
The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 79 [ch] = 31.6 [s]
The Dwell Time = Burst Width * Total Hops.

| Test Mode | Channel | Burst Width (ms) | Total Hops | Result (s) | Limit (s) | Verdict |
|---|---|---|---|---|---|---|
| DH5 | Hop | 2.70 | 140 | 0.379 | <=0.4 | PASS |
| 2DH5 | Hop | 2.70 | 90 | 0.243 | <=0.4 | PASS |
| 3DH5 | Hop | 2.80 | 100 | 0.28 | <=0.4 | PASS |

DH5_Ant1_Hop





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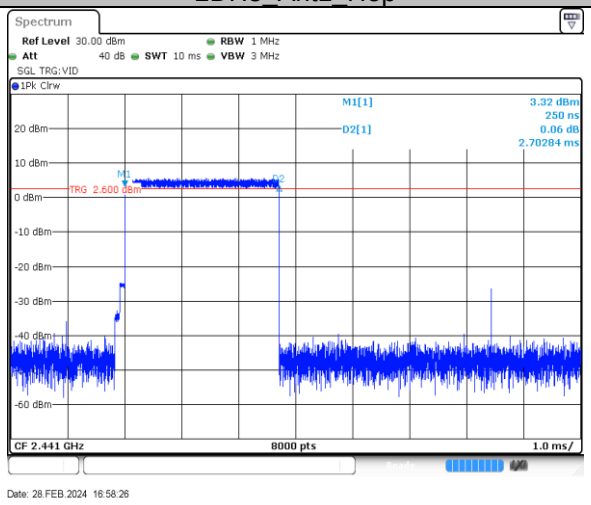
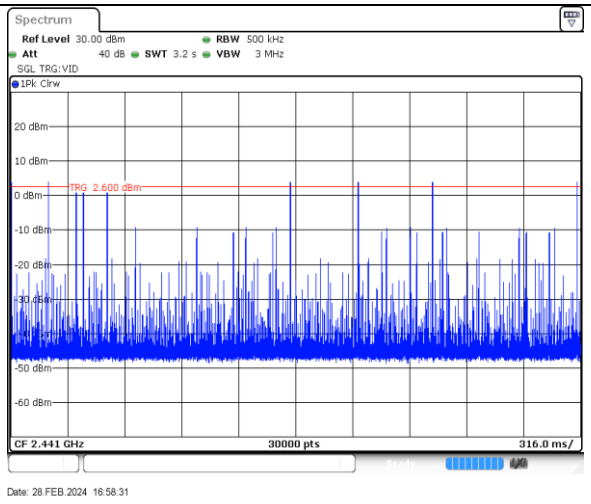
| 2DH5_Ant1_Hop |
| --- |
|  |
|  |
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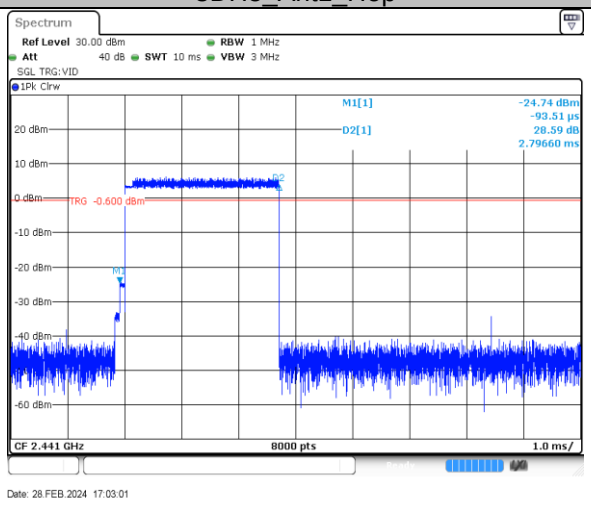
|  |



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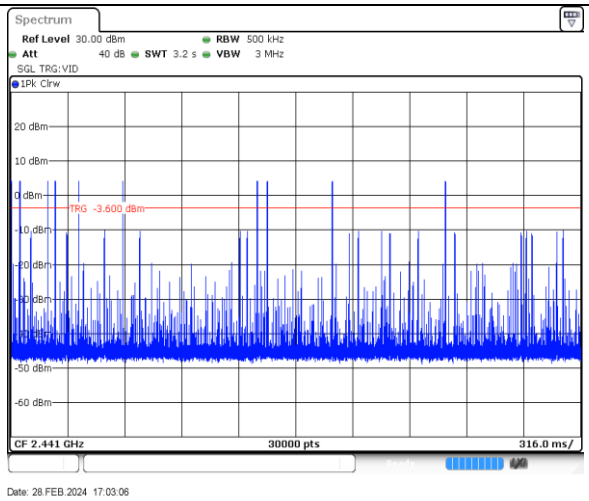




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## 9.7 Spurious RF Conducted Emissions

**Test Method**

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector, Sweep = auto, Span = wide enough to capture the peak level of the in-band emission and all spurious emissions, Trace = max hold. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.
4. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency

**Limit**

| Frequency Range MHz | Limit (dBc) |
|---|---|
| 30-25000 | -20 |



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## Spurious RF Conducted Emissions

| TestMode | Channel (MHz) | Frequency Range (MHz) | Reference Level | Result (dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|
| DH5 | 2402 | Reference | 5.93 dBm | 5.93 | --- | PASS |
| | | 30~1000 | 30~1000 MHz | -63.79 | <=-14.07 | PASS |
| | | 1000~26500 | 1000~26500 MHz | -42.26 | <=-14.07 | PASS |
| | 2480 | Reference | 6.87 dBm | 6.87 | --- | PASS |
| | | 30~1000 | 30~1000 MHz | -60.58 | <=-13.13 | PASS |
| | | 1000~26500 | 1000~26500 MHz | -45.31 | <=-13.13 | PASS |
| 2DH5 | 2402 | Reference | 4.78 dBm | 4.78 | --- | PASS |
| | | 30~1000 | 30~1000 MHz | -66.27 | <=-15.22 | PASS |
| | | 1000~26500 | 1000~26500 MHz | -40.23 | <=-15.1 | PASS |
| | 2441 | Reference | 5.19 dBm | 5.19 | --- | PASS |
| | | 30~1000 | 30~1000 MHz | -65.27 | <=-14.81 | PASS |
| | | 1000~26500 | 1000~26500 MHz | -42.26 | <=-14.81 | PASS |
| | 2480 | Reference | 5.85 dBm | 5.85 | --- | PASS |
| | | 30~1000 | 30~1000 MHz | -63.39 | <=-14.15 | PASS |
| | | 1000~26500 | 1000~26500 MHz | -42.37 | <=-14.15 | PASS |
| 3DH5 | 2402 | Reference | 4.84 dBm | 4.84 | --- | PASS |
| | | 30~1000 | 30~1000 MHz | -66.29 | <=-15.16 | PASS |
| | | 1000~26500 | 1000~26500 MHz | -40.34 | <=-15.16 | PASS |
| | 2441 | Reference | 5.30 dBm | 5.30 | --- | PASS |
| | | 30~1000 | 30~1000 MHz | -66.37 | <=-14.7 | PASS |
| | | 1000~26500 | 1000~26500 MHz | -42.11 | <=-14.7 | PASS |
| | 2480 | Reference | 5.90 dBm | 5.90 | --- | PASS |
| | | 30~1000 | 30~1000 MHz | -66 | <=-14.1 | PASS |
| | | 1000~26500 | 1000~26500 MHz | -42.18 | <=-14.1 | PASS |


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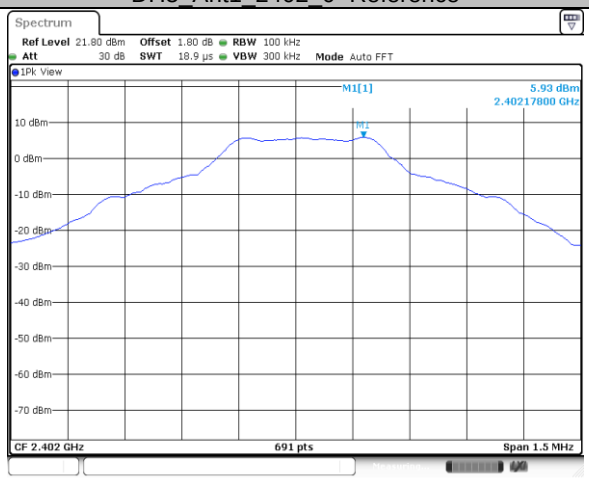
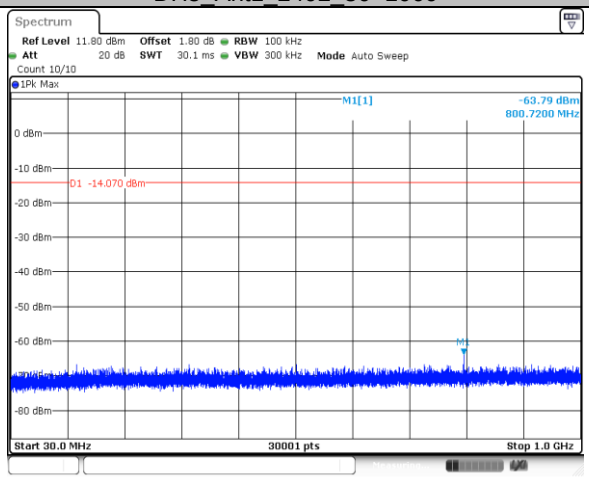
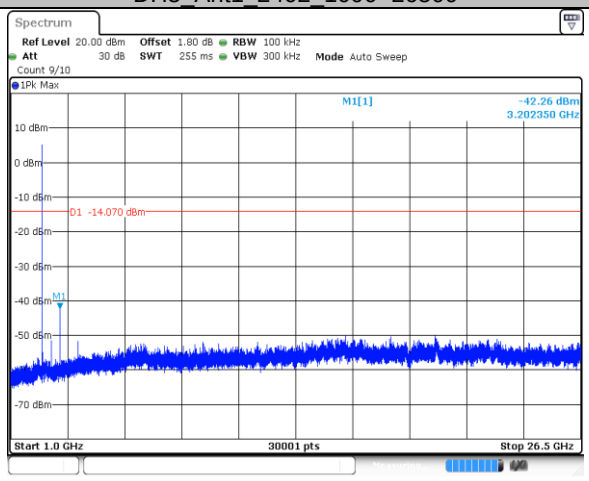
DH5_Ant1_2402_0~Reference




DH5_Ant1_2402_30~1000




DH5_Ant1_2402_1000~26500



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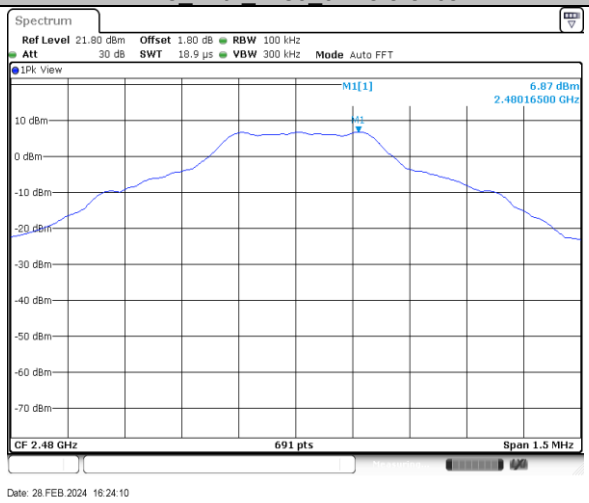
| DH5_Ant1_2480_0~Reference |
| --- |
|  |
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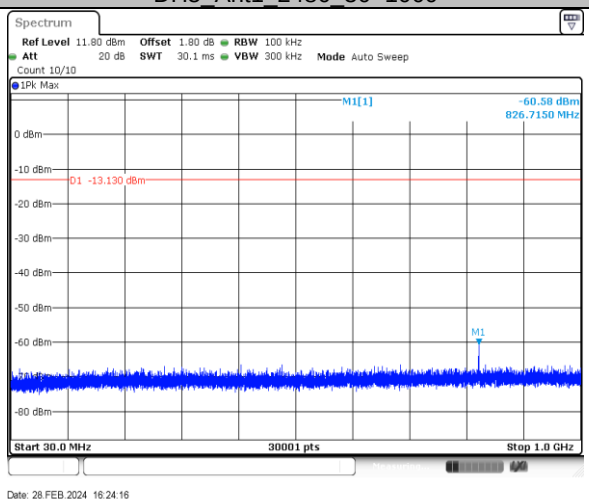
|  |
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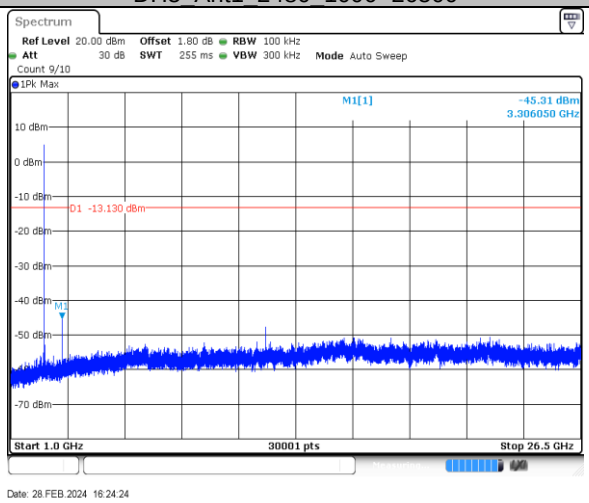
|  |









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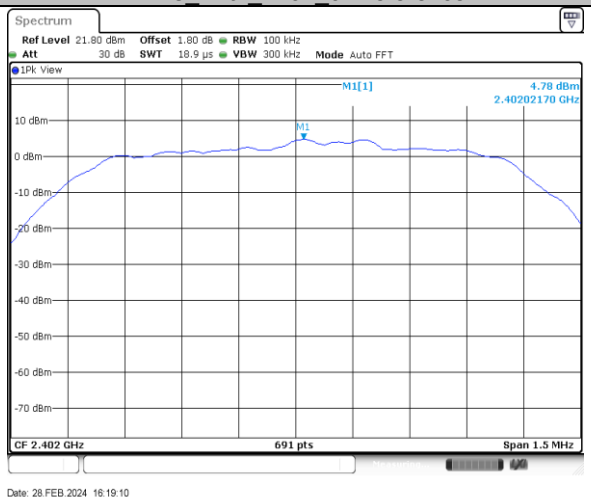
| 2DH5_Ant1_2402_0~Reference |
|---|
|  |
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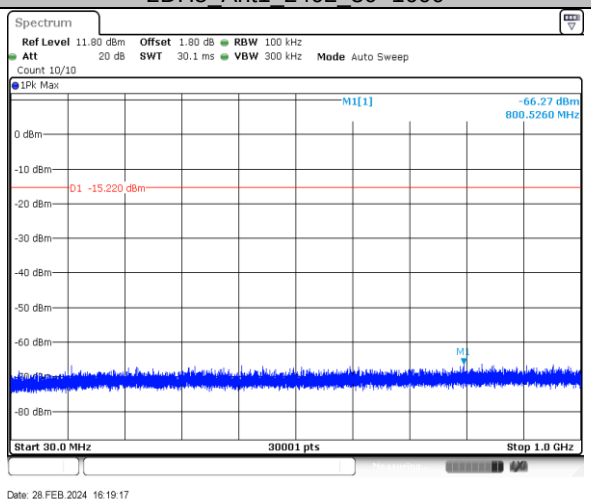
|  |
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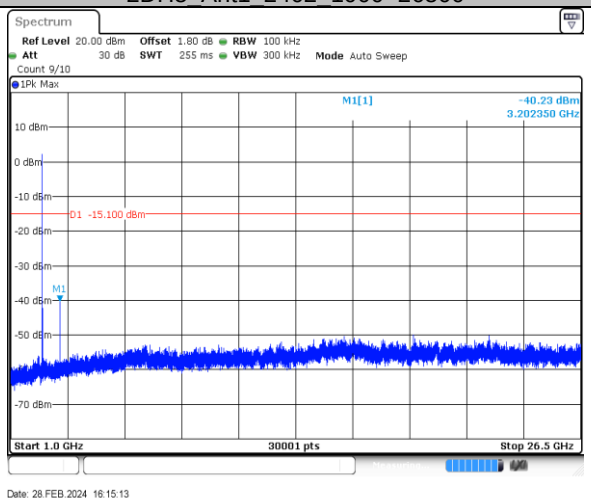
|  |









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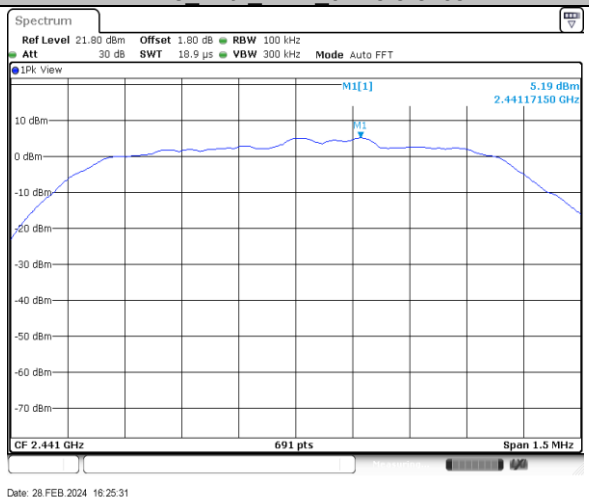
|  |
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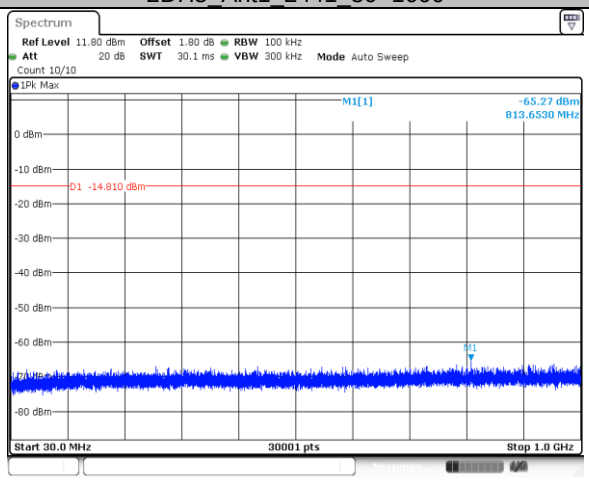
|  |
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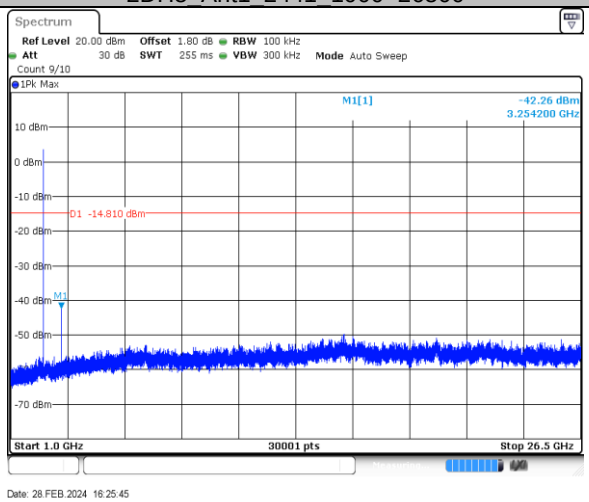
|  |









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| 2DH5_Ant1_2480_0~Reference |
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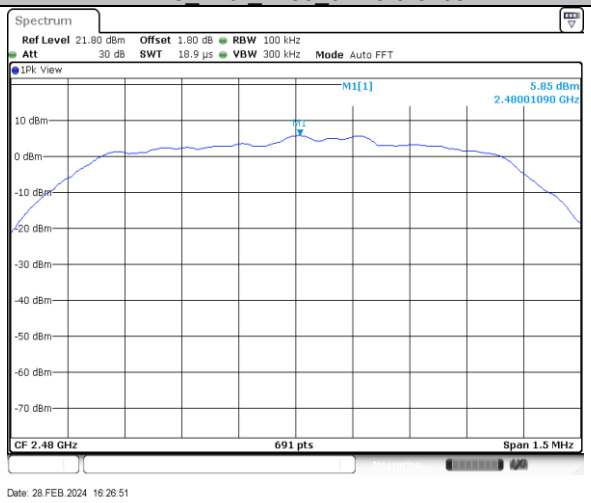
|  |
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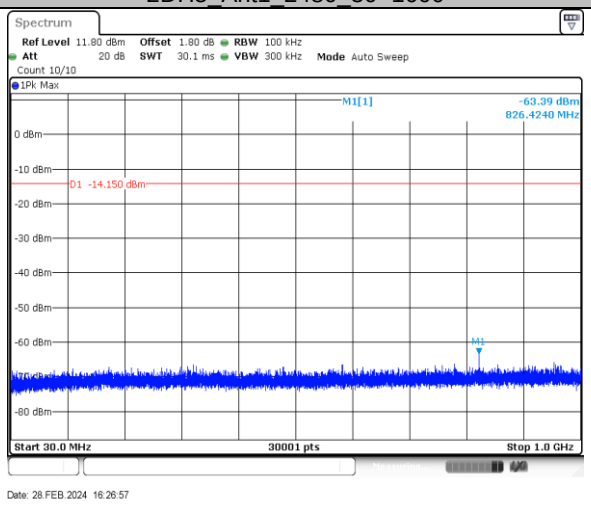
|  |
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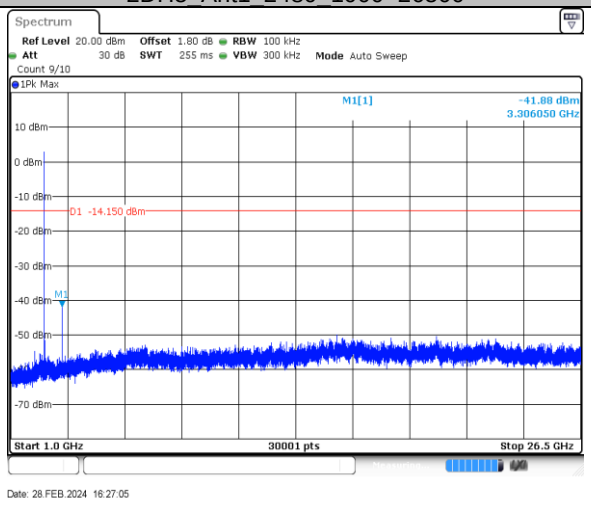
|  |



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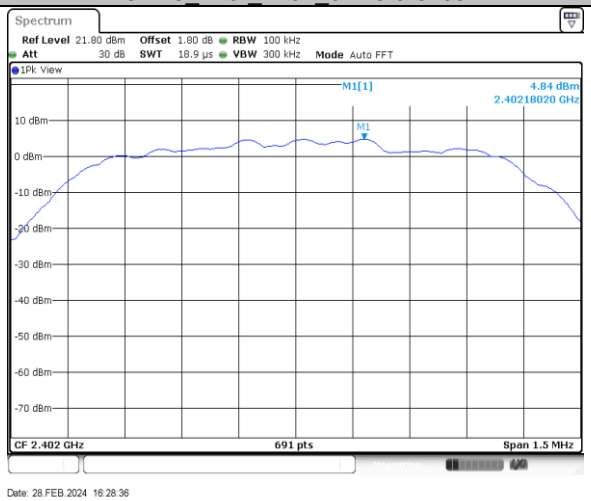
|  |
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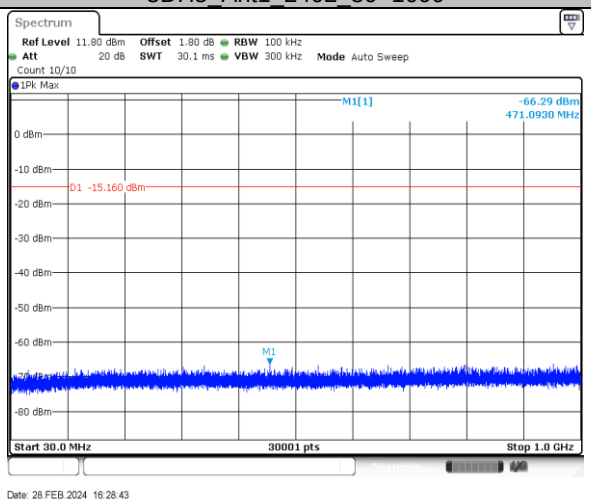
|  |
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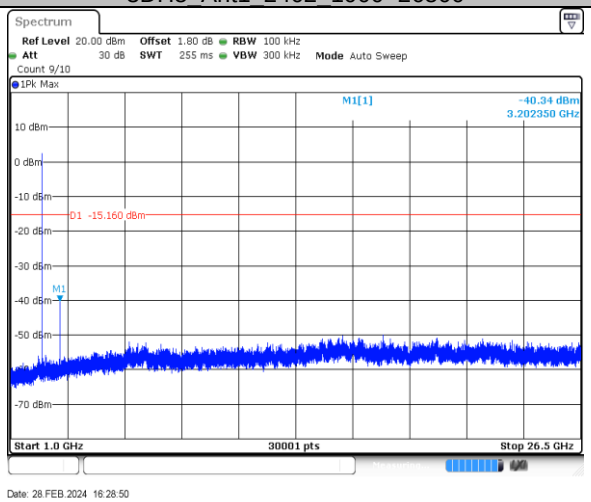
|  |



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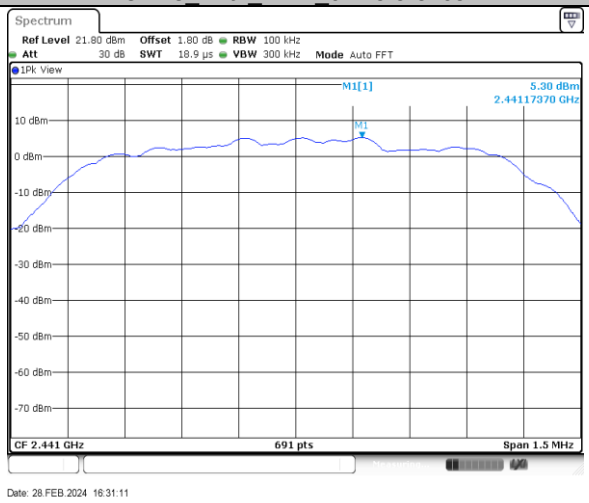
|  |
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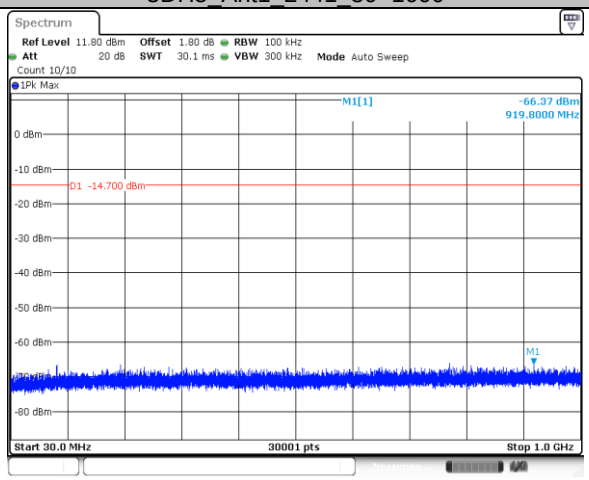
|  |
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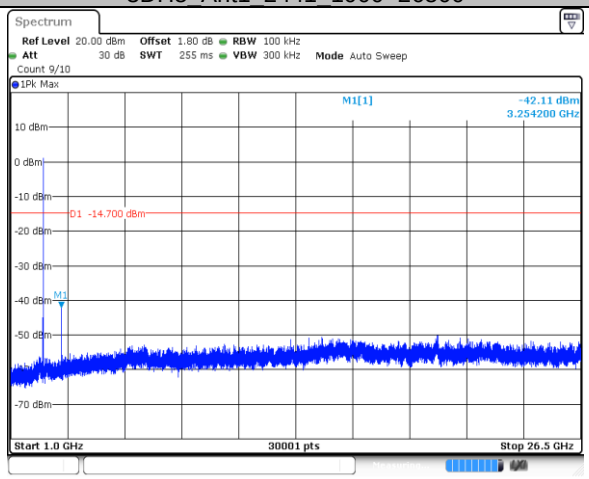
|  |





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| 3DH5_Ant1_2480_0~Reference |
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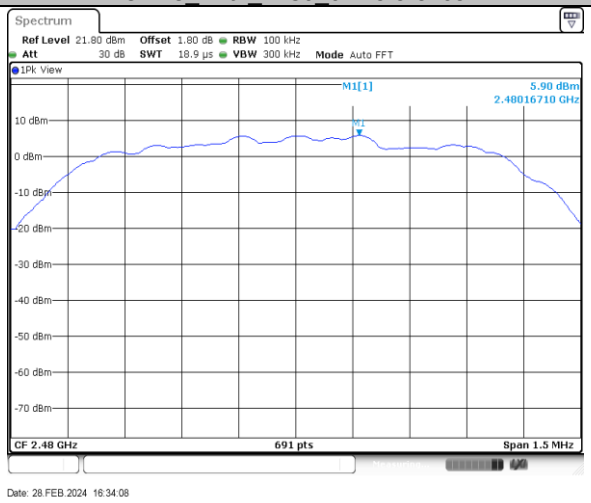
|  |
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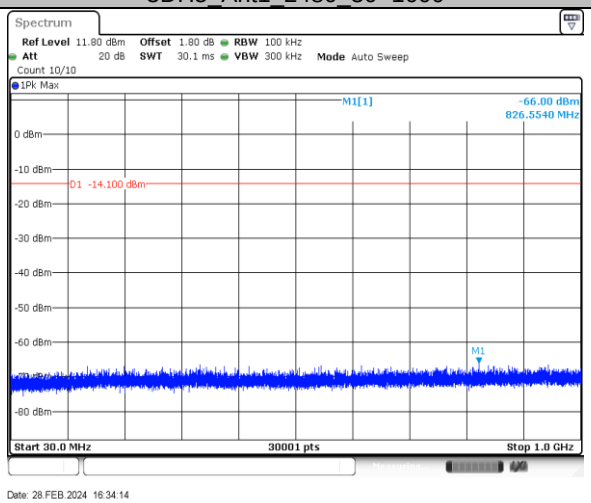
|  |
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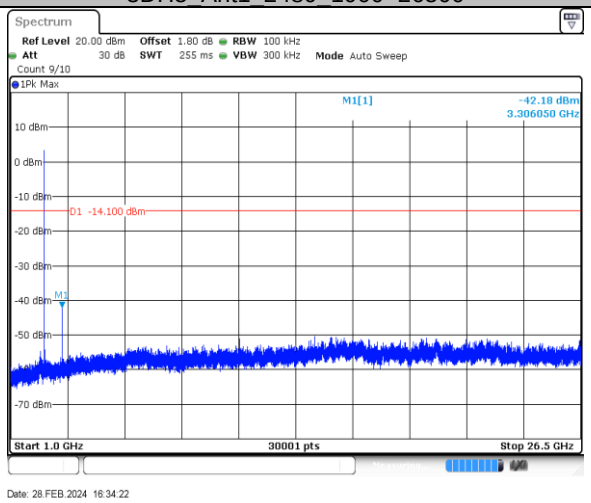
|  |



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## 9.8 Band Edge Testing

**Test Method**

1. The RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously. Set the EUT to the lowest frequency channel.
3. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector, Trace: Max hold, Sweep time: Coupled, Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation. Allow the trace to stabilize.
4. Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, and then use the marker-to-peak function to move the marker to the peak of the in-band emission.
5. Set the EUT to the highest frequency channel and repeat step 2) to 4)
6. Enable the EUT hopping mode, repeat the test.

**Limit:**

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the100 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 that the transmitter demonstrates compliance with the peak conducted power limits.


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## Band Edge

| TestMode | ChName | Channel (MHz) | Reference Level (dBm) | Result (dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|
| DH5 | Low | 2402 | 5.43 | -36.42 | <=-14.57 | PASS |
| | High | 2480 | 6.89 | -36.63 | <=-13.11 | PASS |
| | Low | Hop_2402 | 5.05 | -55.23 | -14.95 | PASS |
| | High | Hop_2480 | 6.79 | -49.97 | -13.21 | PASS |
| 2DH5 | Low | 2402 | 4.78 | -51.62 | <=-15.22 | PASS |
| | High | 2480 | 5.76 | -35.32 | <=-14.24 | PASS |
| | Low | Hop_2402 | 1.45 | -55.35 | -18.55 | PASS |
| | High | Hop_2480 | 5.61 | -52.11 | -14.39 | PASS |
| 3DH5 | Low | 2402 | 4.04 | -31.35 | <=-15.96 | PASS |
| | High | 2480 | 5.97 | -35.99 | <=-14.03 | PASS |
| | Low | Hop_2402 | 1.51 | -54.8 | -18.49 | PASS |
| | High | Hop_2480 | 5.86 | -50.28 | -14.14 | PASS |


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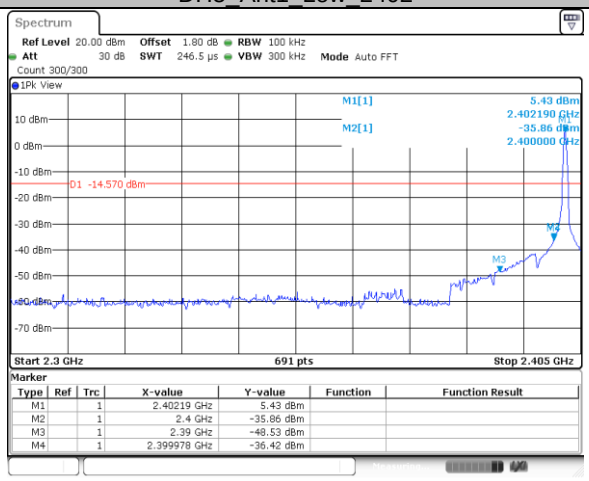
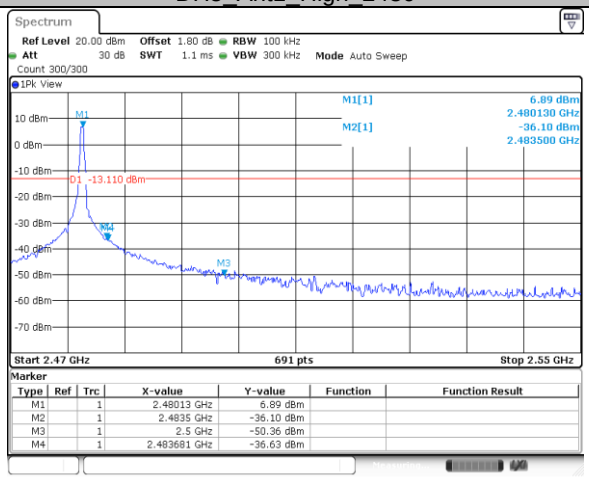
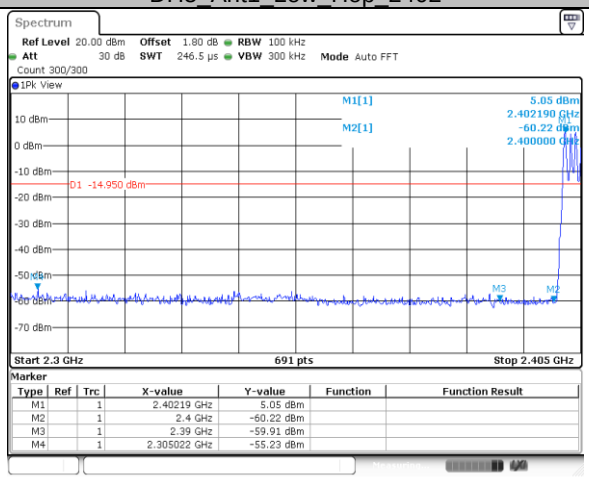
DH5_Ant1_Low_2402



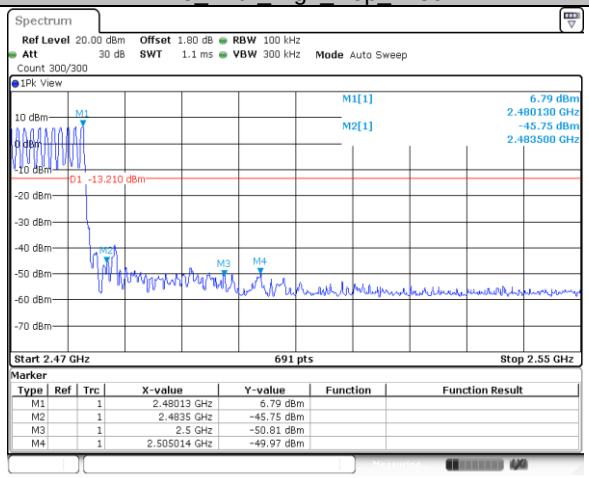

DH5_Ant1_High_2480




DH5_Ant1_Low_Hop_2402



DH5_Ant1_High_Hop_2480

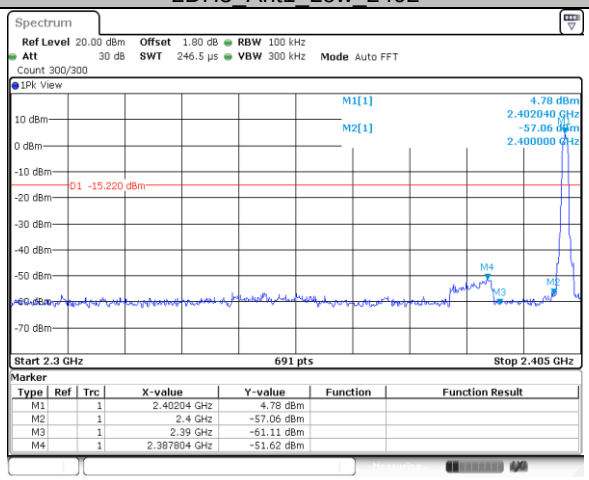



Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.48013 GHz | 6.79 dBm | | |
| M2 | | 1 | 2.4835 GHz | -45.75 dBm | | |
| M3 | | 1 | 2.5 GHz | -50.81 dBm | | |
| M4 | | 1 | 2.505014 GHz | -49.97 dBm | | |

Date: 28.FEB.2024 16:56:04

2DH5_Ant1_Low_2402

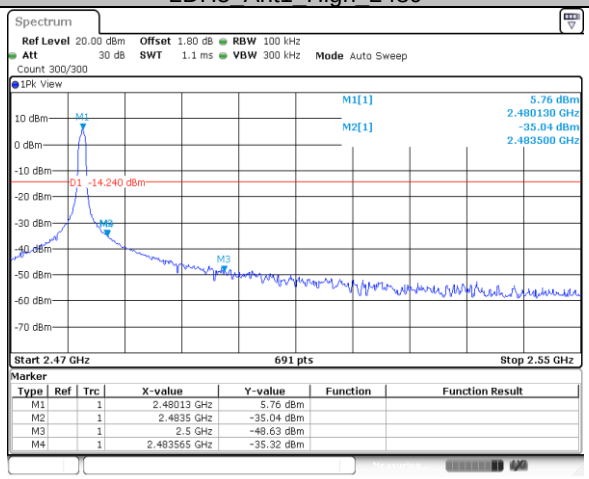



Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.40204 GHz | 4.78 dBm | | |
| M2 | | 1 | 2.4 GHz | -57.06 dBm | | |
| M3 | | 1 | 2.39 GHz | -61.11 dBm | | |
| M4 | | 1 | 2.387804 GHz | -51.62 dBm | | |

Date: 28.FEB.2024 16:49:05

2DH5_Ant1_High_2480




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.48013 GHz | 5.76 dBm | | |
| M2 | | 1 | 2.4835 GHz | -35.04 dBm | | |
| M3 | | 1 | 2.5 GHz | -48.63 dBm | | |
| M4 | | 1 | 2.483565 GHz | -35.32 dBm | | |

Date: 28.FEB.2024 16:50:01



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| 2DH5_Ant1_Low_Hop_2402 |
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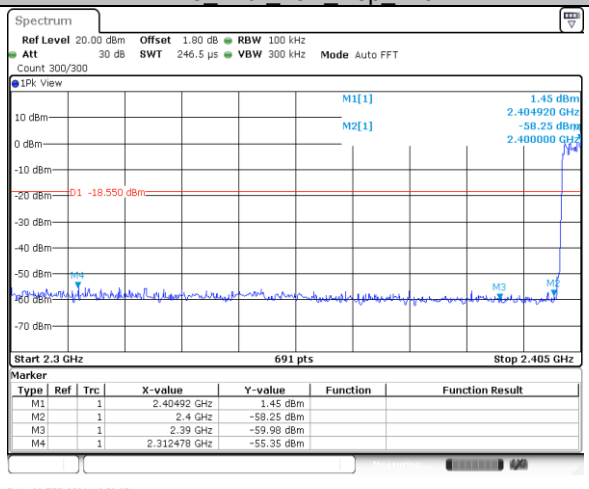
|  |
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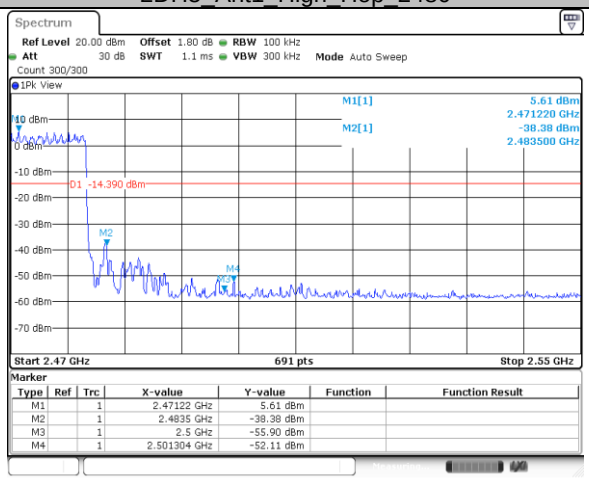
|  |
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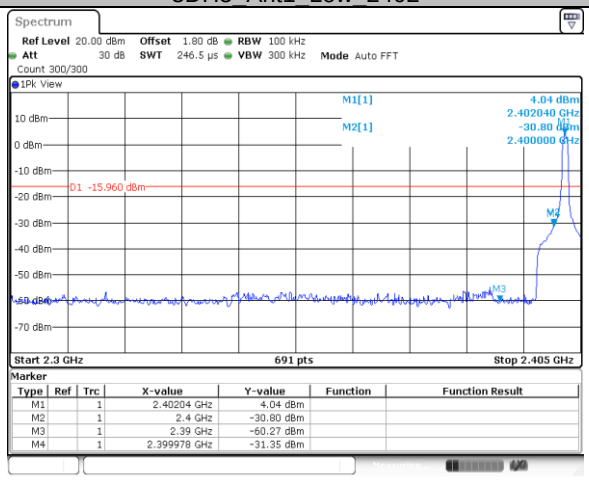
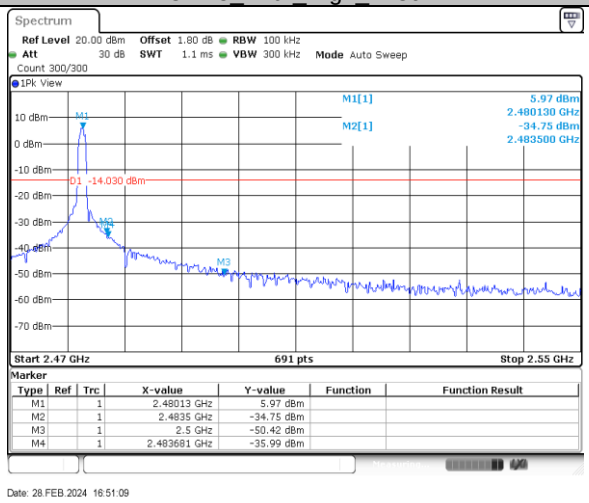
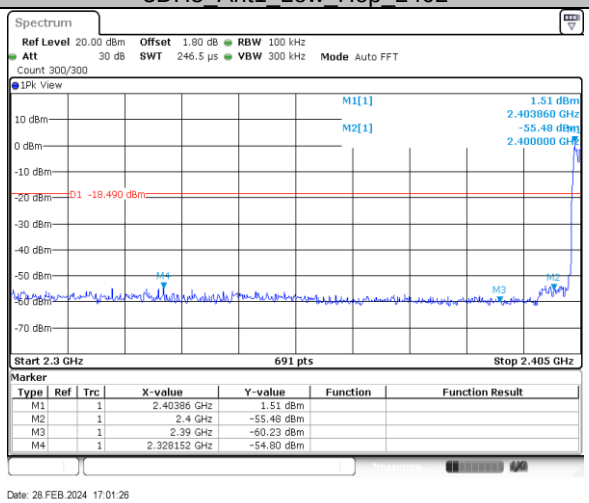
|  |

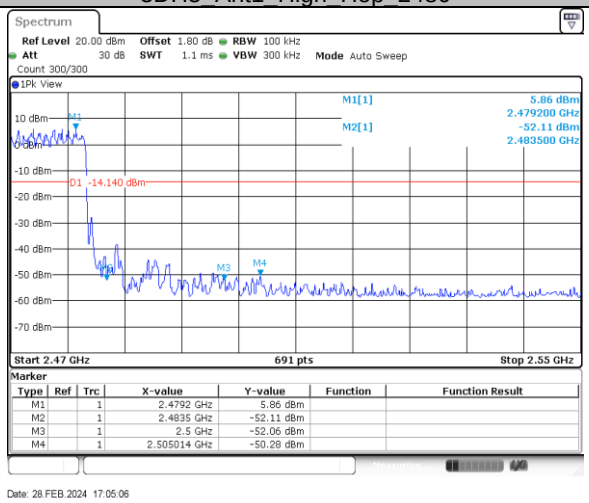
3DH5_Ant1_High_2480




3DH5_Ant1_Low_Hop_2402




3DH5_Ant1_High_Hop_2480



## 9.9 Spurious Radiated Emissions for Transmitter

**Test Method**

1. The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
4. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
5. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
6. Use the following test receiver settings According to C63.10:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz to 120KHz for f < 1 GHz; VBW≥ RBW; Sweep = auto; Detector function = QP; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥1 GHz for peak measurement.
   For average measurement:
   The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle)).
   The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
7. Repeat above procedures until all frequencies measured were complete.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## Spurious Radiated Emissions for Transmitter

### Limit

The radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section15.205 & RSS-GEN 8.10, must comply with the radiated emission limits specified in section 15.209 & RSS-Gen 6.13.

| Frequency MHz | Field Strength μV/m | Field Strength dBμV/m | Detector | Measurement distance meters |
|---|---|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 48.5-13.8 | AV | 300 |
| 0.490-1.705 | 24000/F(kHz) | 33.8-23.0 | QP | 30 |
| 1.705-30 | 30 | 29.5 | QP | 30 |
| 30-88 | 100 | 40 | QP | 3 |
| 88-216 | 150 | 43.5 | QP | 3 |
| 216-960 | 200 | 46 | QP | 3 |
| 960-1000 | 500 | 54 | QP | 3 |
| Above 1000 | 500 | 54 | AV | 3 |
| Above 1000 | 5000 | 74 | PK | 3 |

Note 1: Limit 3m(dBμV/m)=Limit 300m(dBμV/m)+40Log(300m/3m) (Below 30MHz)
Note 2: Limit 3m(dBμV/m)=Limit 30m(dBμV/m)+40Log(30m/3m) (Below 30MHz)


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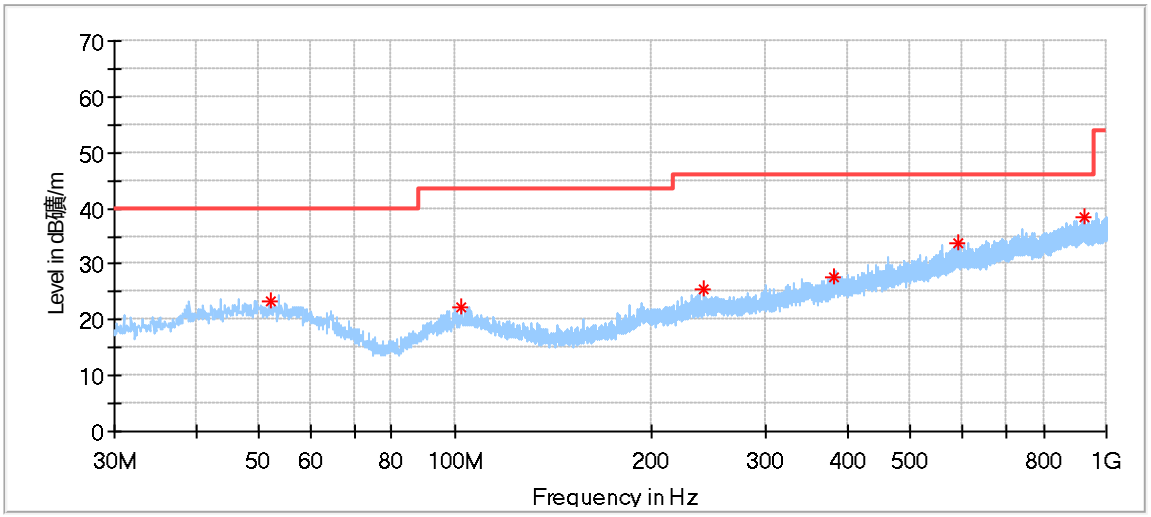
## Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

### Transmitting spurious emission test result as below:

Test data_30MHz to 1000MHz




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 52.148333 | 23.46 | 40.00 | 16.54 | 100.0 | H | 6.0 | 18.21 |
| 102.480556 | 22.38 | 43.50 | 21.12 | 100.0 | H | 263.0 | 16.04 |
| 240.921111 | 25.61 | 46.00 | 20.39 | 100.0 | H | 106.0 | 17.29 |
| 381.894444 | 27.73 | 46.00 | 18.27 | 100.0 | H | 271.0 | 20.78 |
| 592.330556 | 33.92 | 46.00 | 12.08 | 100.0 | H | 177.0 | 24.98 |
| 923.908889 | 38.42 | 46.00 | 7.58 | 100.0 | H | 0.0 | 29.48 |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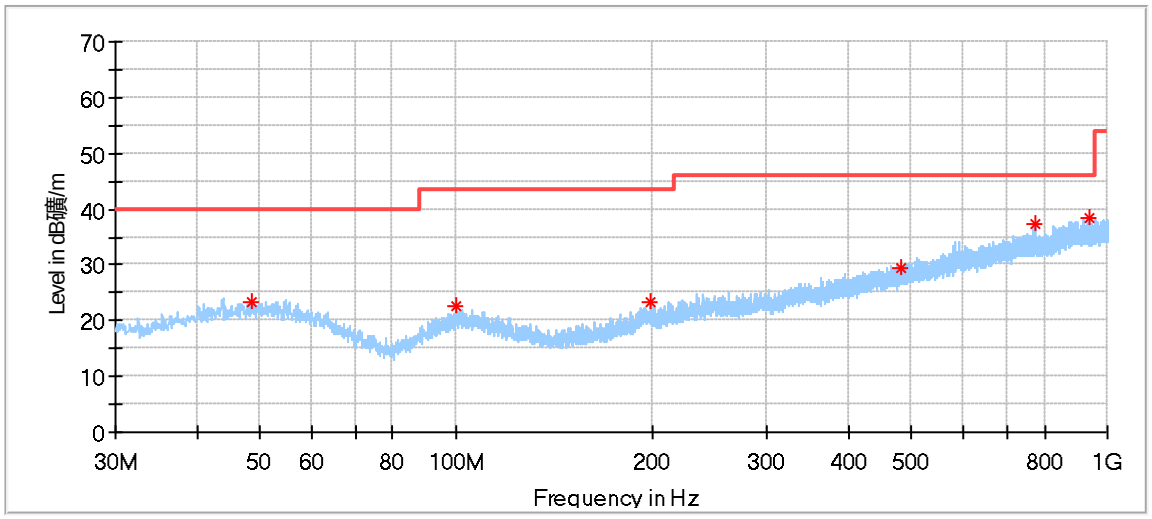


| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 48.591667 | 23.45 | 40.00 | 16.55 | 100.0 | V | 302.0 | 18.29 |
| 100.001667 | 22.45 | 43.50 | 21.05 | 100.0 | V | 232.0 | 15.97 |
| 199.211111 | 23.18 | 43.50 | 20.32 | 100.0 | V | 155.0 | 15.93 |
| 482.235556 | 29.48 | 46.00 | 16.52 | 100.0 | V | 147.0 | 22.73 |
| 772.427222 | 37.40 | 46.00 | 8.60 | 100.0 | V | 42.0 | 27.31 |
| 937.111667 | 38.33 | 46.00 | 7.67 | 100.0 | V | 354.0 | 29.43 |


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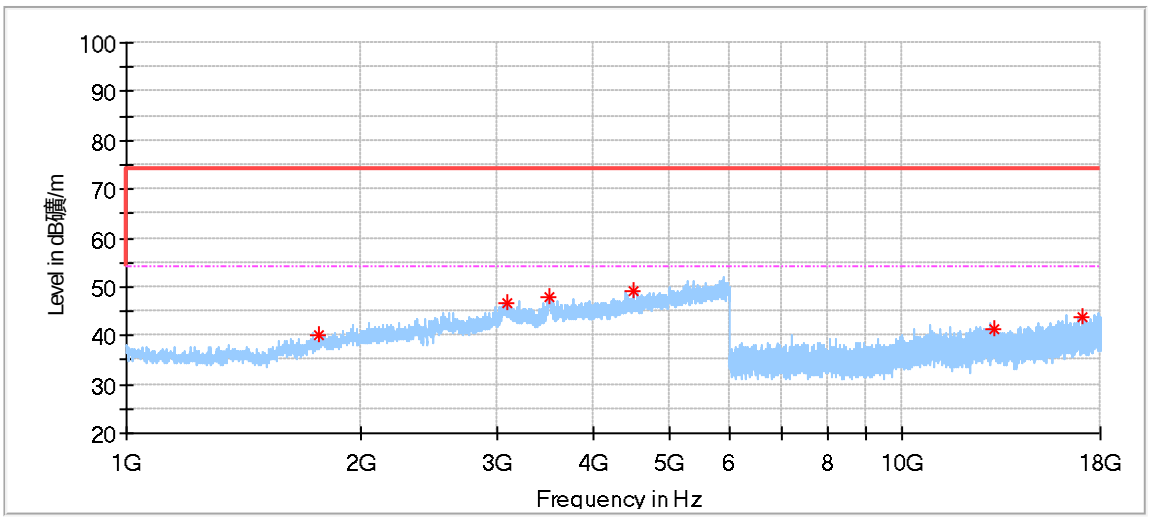
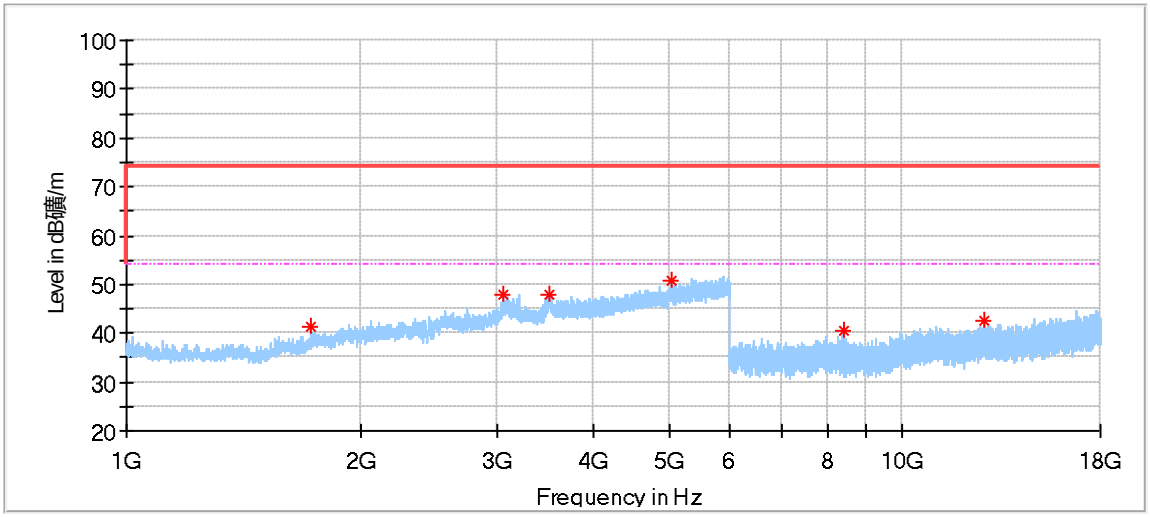
Test data 1GHz to 18GHz:
DH5_Low Channel:

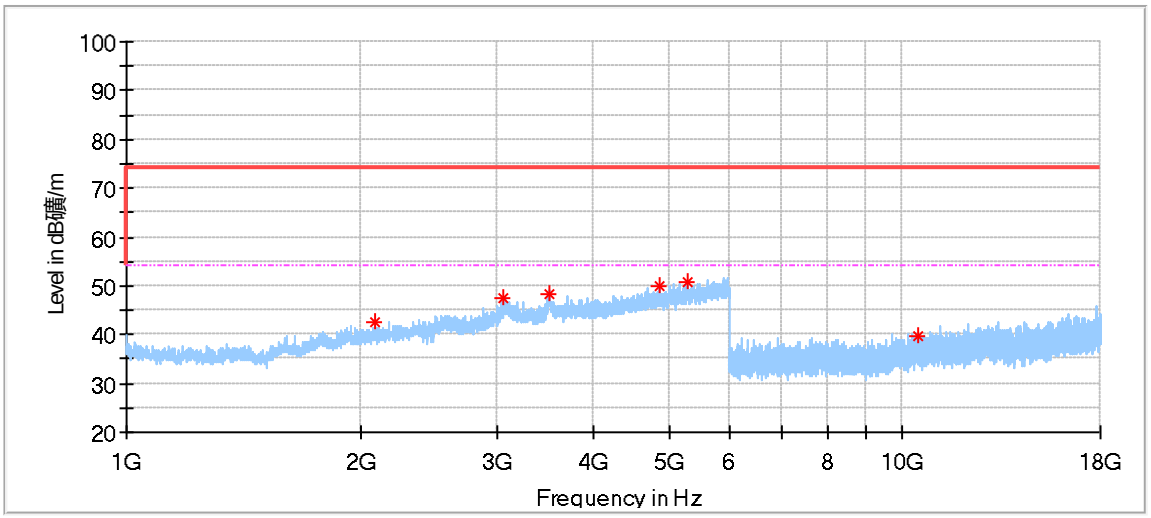



| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 1769.000000 | 40.04 | 74.00 | 33.96 | 150.0 | H | 171.0 | -5.51 |
| 3098.000000 | 46.85 | 74.00 | 27.15 | 150.0 | H | 239.0 | 1.63 |
| 3515.000000 | 48.08 | 74.00 | 25.92 | 150.0 | H | 34.0 | 3.73 |
| 4503.000000* | 49.08 | 74.00 | 24.92 | 150.0 | H | 10.0 | 3.95 |
| 13147.500000 | 41.13 | 74.00 | 32.87 | 150.0 | H | 0.0 | 13.01 |
| 17050.500000 | 43.94 | 74.00 | 30.06 | 150.0 | H | 60.0 | 18.65 |

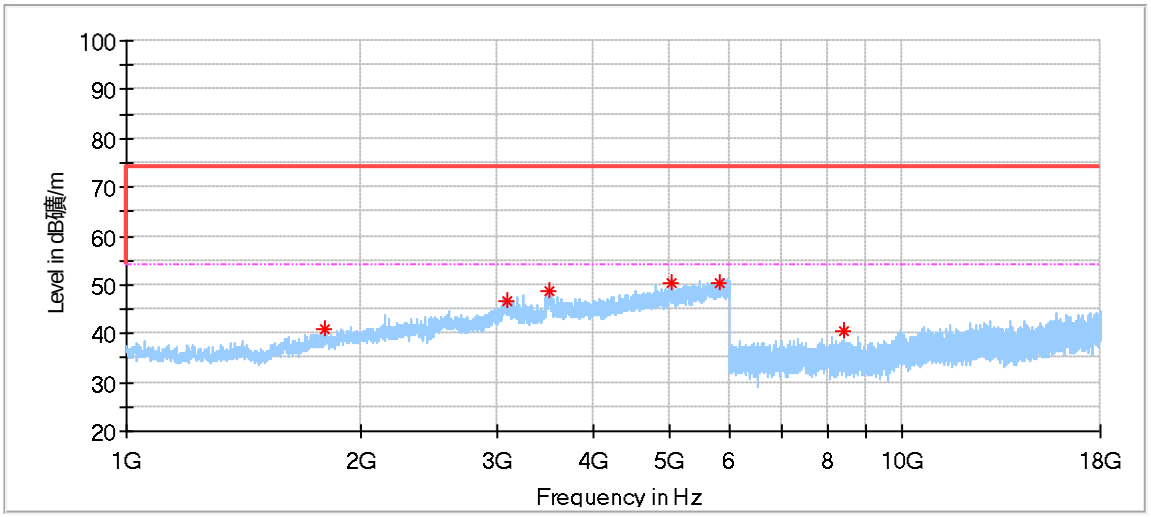



| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 1731.000000 | 41.32 | 74.00 | 32.68 | 150.0 | V | 151.0 | -6.15 |
| 3060.000000 | 47.78 | 74.00 | 26.22 | 150.0 | V | 250.0 | 1.61 |
| 3509.000000 | 48.06 | 74.00 | 25.94 | 150.0 | V | 96.0 | 4.03 |
| 5033.000000* | 50.58 | 74.00 | 23.42 | 150.0 | V | 83.0 | 5.69 |
| 8395.500000* | 40.63 | 74.00 | 33.37 | 150.0 | V | 167.0 | 7.49 |
| 12757.500000 | 42.48 | 74.00 | 31.52 | 150.0 | V | 167.0 | 12.92 |

DH5_Middle Channel:




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 2091.000000 | 42.49 | 74.00 | 31.51 | 150.0 | H | 18.0 | -4.10 |
| 3056.500000 | 47.36 | 74.00 | 26.64 | 150.0 | H | 321.0 | 1.62 |
| 3501.000000 | 48.49 | 74.00 | 25.51 | 150.0 | H | 321.0 | 4.43 |
| 4864.500000* | 50.11 | 74.00 | 23.89 | 150.0 | H | 127.0 | 5.10 |
| 5294.000000 | 50.86 | 74.00 | 23.14 | 150.0 | H | 127.0 | 6.45 |
| 10461.500000 | 39.61 | 74.00 | 34.39 | 150.0 | H | 60.0 | 10.12 |




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 1805.500000 | 40.85 | 74.00 | 33.15 | 150.0 | V | 222.0 | -5.02 |
| 3104.000000 | 46.67 | 74.00 | 27.33 | 150.0 | V | 31.0 | 1.59 |
| 3497.000000 | 48.65 | 74.00 | 25.35 | 150.0 | V | 31.0 | 4.25 |
| 5043.000000* | 50.48 | 74.00 | 23.52 | 150.0 | V | 127.0 | 5.76 |
| 5799.500000 | 50.46 | 74.00 | 23.54 | 150.0 | V | 291.0 | 7.47 |
| 8388.000000* | 40.58 | 74.00 | 33.42 | 150.0 | V | 195.0 | 7.48 |



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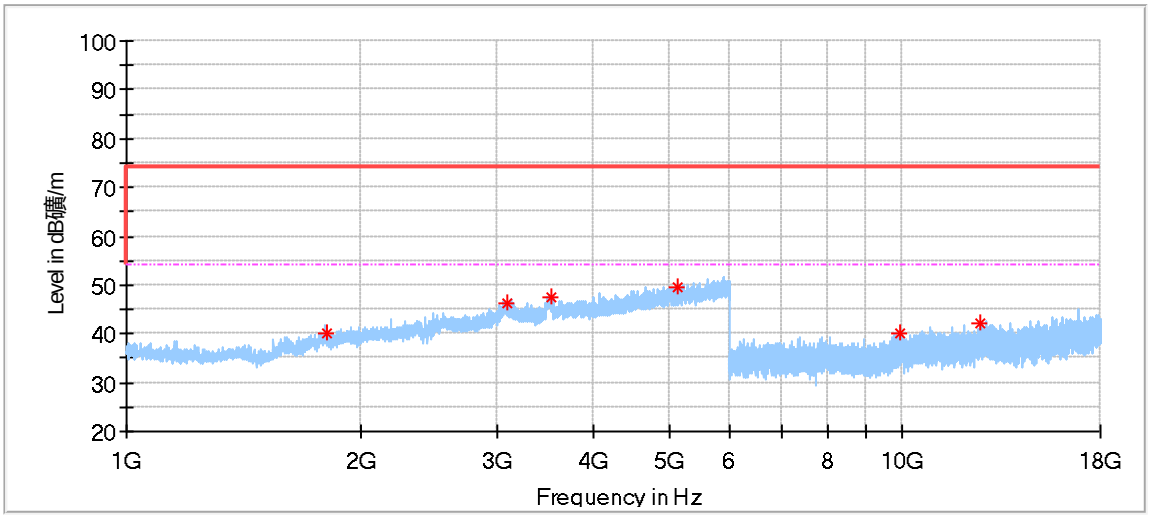
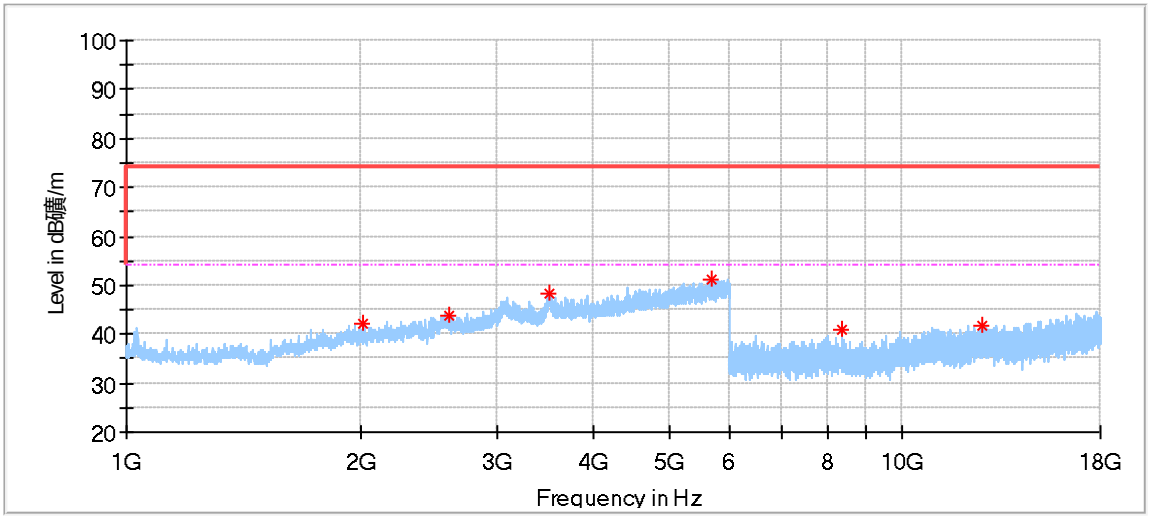
DH5_High Channel:




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 1808.000000 | 40.08 | 74.00 | 33.92 | 150.0 | H | 263.0 | -5.05 |
| 3090.500000 | 46.29 | 74.00 | 27.71 | 150.0 | H | 347.0 | 1.59 |
| 3530.000000 | 47.63 | 74.00 | 26.37 | 150.0 | H | 0.0 | 2.97 |
| 5142.000000* | 49.55 | 74.00 | 24.45 | 150.0 | H | 277.0 | 6.05 |
| 9954.000000 | 40.05 | 74.00 | 33.95 | 150.0 | H | 30.0 | 9.41 |
| 12629.500000* | 42.18 | 74.00 | 31.82 | 150.0 | H | 249.0 | 12.71 |




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 2018.000000 | 42.06 | 74.00 | 31.94 | 150.0 | V | 198.0 | -4.04 |
| 2603.500000 | 43.87 | 74.00 | 30.13 | 150.0 | V | 116.0 | -1.08 |
| 3509.500000 | 48.31 | 74.00 | 25.69 | 150.0 | V | 212.0 | 4.01 |
| 5665.500000 | 51.07 | 74.00 | 22.93 | 150.0 | V | 212.0 | 7.26 |
| 8368.500000* | 40.78 | 74.00 | 33.22 | 150.0 | V | 196.0 | 7.45 |
| 12655.000000* | 41.65 | 74.00 | 32.35 | 150.0 | V | 249.0 | 12.75 |



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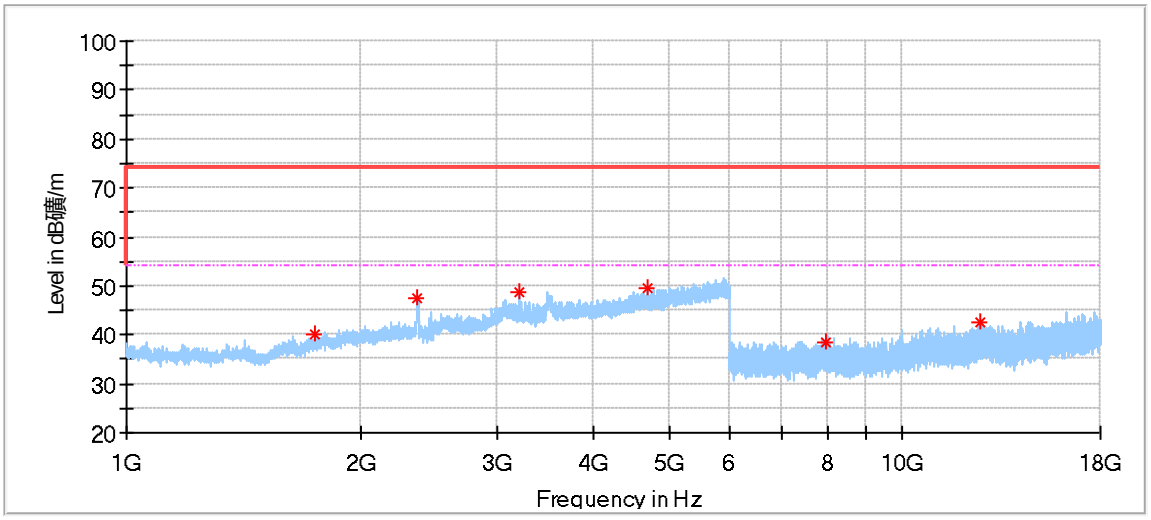
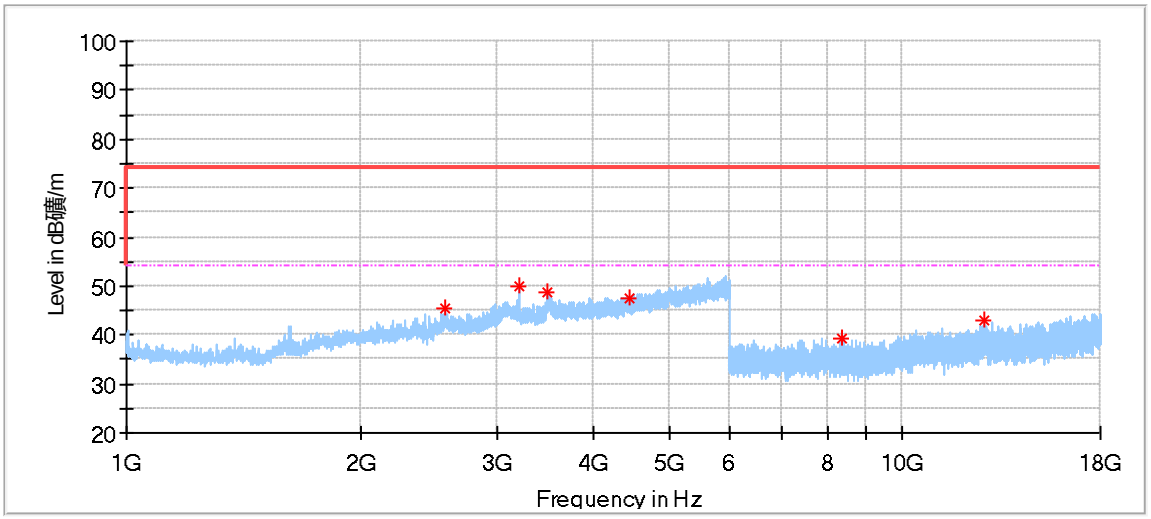
2DH5_Low Channel:




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 1752.000000 | 40.25 | 74.00 | 33.75 | 150.0 | H | 75.0 | -5.80 |
| 2373.500000* | 47.64 | 74.00 | 26.36 | 150.0 | H | 21.0 | -2.59 |
| 3202.500000 | 48.85 | 74.00 | 25.15 | 150.0 | H | 0.0 | 0.56 |
| 4703.000000* | 49.71 | 74.00 | 24.29 | 150.0 | H | 130.0 | 4.52 |
| 7949.500000 | 38.66 | 74.00 | 35.34 | 150.0 | H | 88.0 | 7.31 |
| 12629.500000* | 42.36 | 74.00 | 31.64 | 150.0 | H | 351.0 | 12.71 |




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 2573.500000 | 45.46 | 74.00 | 28.54 | 150.0 | V | 8.0 | -1.20 |
| 3202.500000 | 49.90 | 74.00 | 24.10 | 150.0 | V | 181.0 | 0.56 |
| 3486.000000 | 48.65 | 74.00 | 25.35 | 150.0 | V | 198.0 | 3.42 |
| 4439.500000 | 47.43 | 74.00 | 26.57 | 150.0 | V | 58.0 | 3.63 |
| 8375.500000* | 39.27 | 74.00 | 34.73 | 150.0 | V | 198.0 | 7.46 |
| 12780.000000 | 43.11 | 74.00 | 30.89 | 150.0 | V | 61.0 | 12.96 |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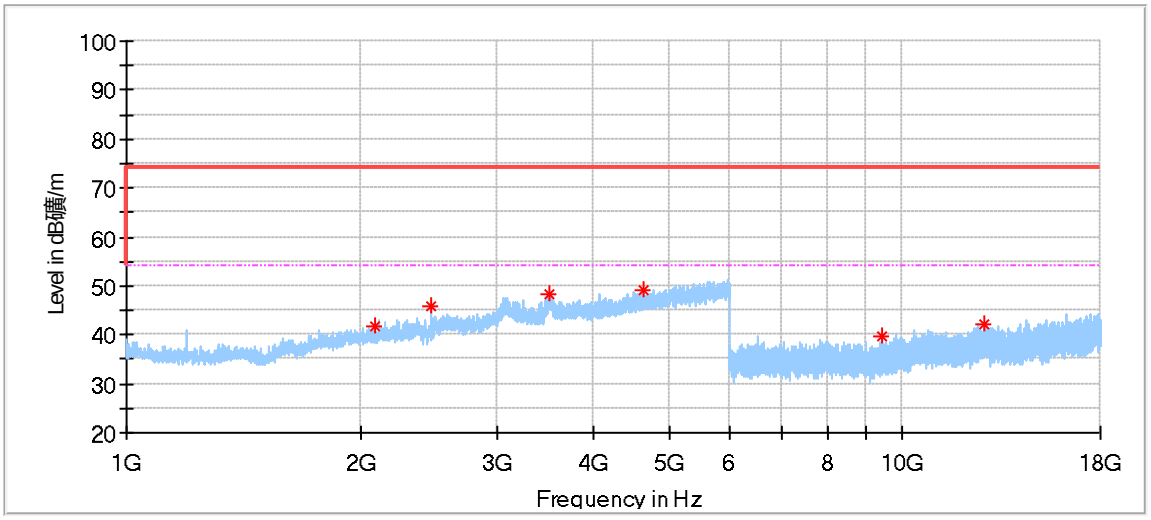
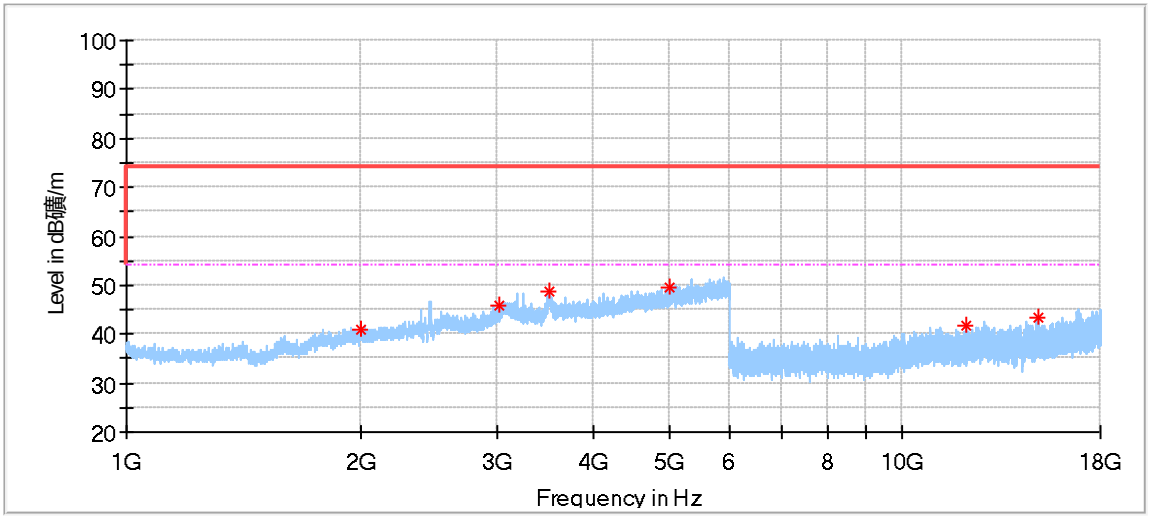
2DH5_Middle Channel:




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 2086.000000 | 41.81 | 74.00 | 32.19 | 150.0 | H | 198.0 | -4.11 |
| 2466.000000 | 46.01 | 74.00 | 27.99 | 150.0 | H | 0.0 | -1.80 |
| 3511.000000 | 48.26 | 74.00 | 25.74 | 150.0 | H | 0.0 | 3.93 |
| 4625.500000* | 49.12 | 74.00 | 24.88 | 150.0 | H | 226.0 | 4.42 |
| 9394.500000* | 39.65 | 74.00 | 34.35 | 150.0 | H | 61.0 | 8.43 |
| 12741.000000 | 42.01 | 74.00 | 31.99 | 150.0 | H | 117.0 | 12.89 |




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 2002.000000 | 40.87 | 74.00 | 33.13 | 150.0 | V | 207.0 | -3.95 |
| 3021.500000 | 45.68 | 74.00 | 28.32 | 150.0 | V | 248.0 | 0.71 |
| 3507.000000 | 48.52 | 74.00 | 25.48 | 150.0 | V | 139.0 | 4.13 |
| 5020.500000* | 49.72 | 74.00 | 24.28 | 150.0 | V | 125.0 | 5.61 |
| 12109.500000* | 41.66 | 74.00 | 32.34 | 150.0 | V | 260.0 | 11.86 |
| 14974.000000 | 43.33 | 74.00 | 30.67 | 150.0 | V | 91.0 | 14.03 |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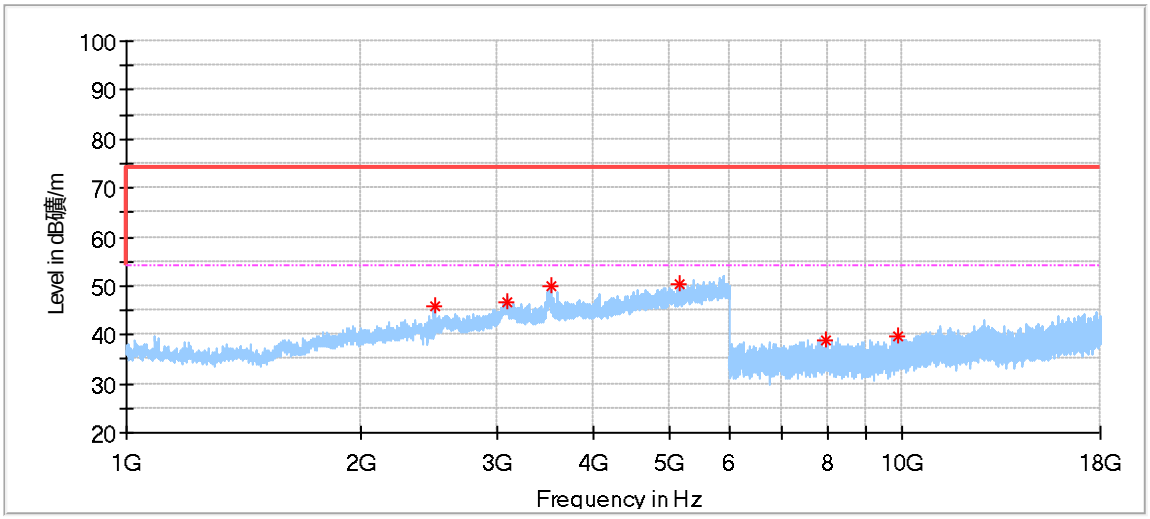
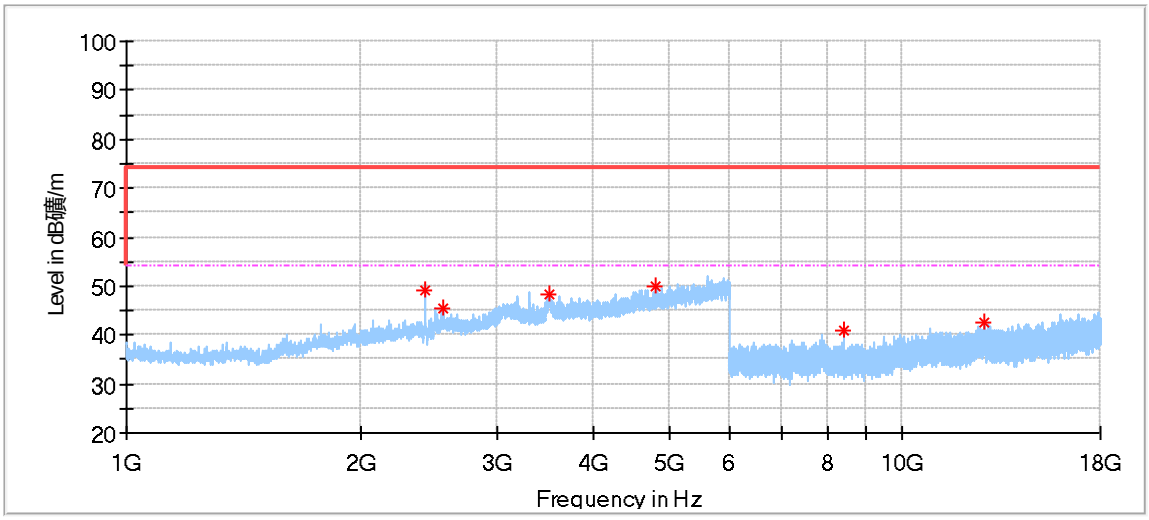
2DH5_High Channel:




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 2493.000000* | 45.92 | 74.00 | 28.08 | 150.0 | H | 185.0 | -1.84 |
| 3103.000000 | 46.51 | 74.00 | 27.49 | 150.0 | H | 62.0 | 1.60 |
| 3522.000000 | 49.75 | 74.00 | 24.25 | 150.0 | H | 347.0 | 3.37 |
| 5159.000000 | 50.25 | 74.00 | 23.75 | 150.0 | H | 75.0 | 6.11 |
| 7986.000000 | 38.89 | 74.00 | 35.11 | 150.0 | H | 333.0 | 7.42 |
| 9874.000000 | 39.52 | 74.00 | 34.48 | 150.0 | H | 306.0 | 9.37 |




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 2429.000000 | 49.03 | 74.00 | 24.97 | 150.0 | V | 294.0 | -2.02 |
| 2561.500000 | 45.45 | 74.00 | 28.55 | 150.0 | V | 239.0 | -1.28 |
| 3499.000000 | 48.46 | 74.00 | 25.54 | 150.0 | V | 280.0 | 4.41 |
| 4821.000000* | 50.07 | 74.00 | 23.93 | 150.0 | V | 18.0 | 5.02 |
| 8390.500000* | 41.08 | 74.00 | 32.92 | 150.0 | V | 170.0 | 7.48 |
| 12760.000000 | 42.36 | 74.00 | 31.64 | 150.0 | V | 30.0 | 12.93 |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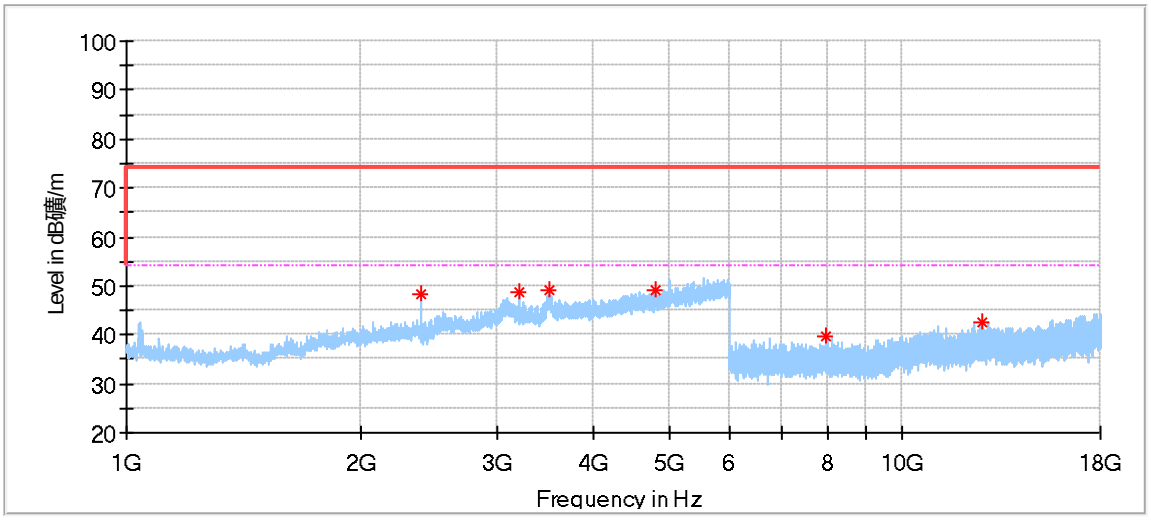
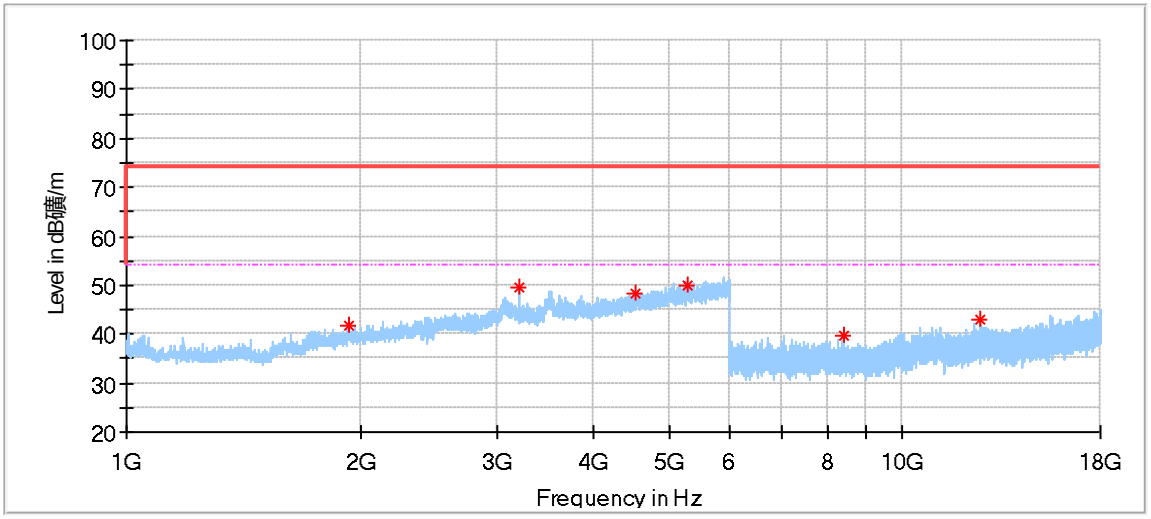
3DH5_Low Channel:

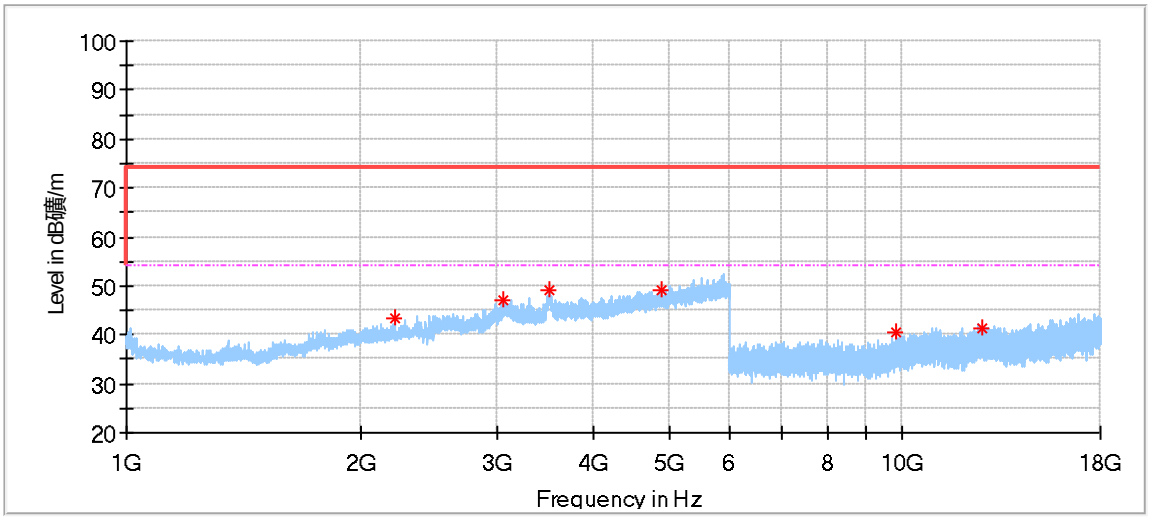



| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 2394.500000 | 48.15 | 74.00 | 25.85 | 150.0 | H | 250.0 | -2.41 |
| 3202.500000 | 48.74 | 74.00 | 25.26 | 150.0 | H | 18.0 | 0.56 |
| 3500.000000 | 49.07 | 74.00 | 24.93 | 150.0 | H | 140.0 | 4.48 |
| 4800.000000* | 49.07 | 74.00 | 24.93 | 150.0 | H | 277.0 | 4.91 |
| 7990.000000 | 39.78 | 74.00 | 34.22 | 150.0 | H | 88.0 | 7.43 |
| 12672.500000* | 42.57 | 74.00 | 31.43 | 150.0 | H | 60.0 | 12.77 |

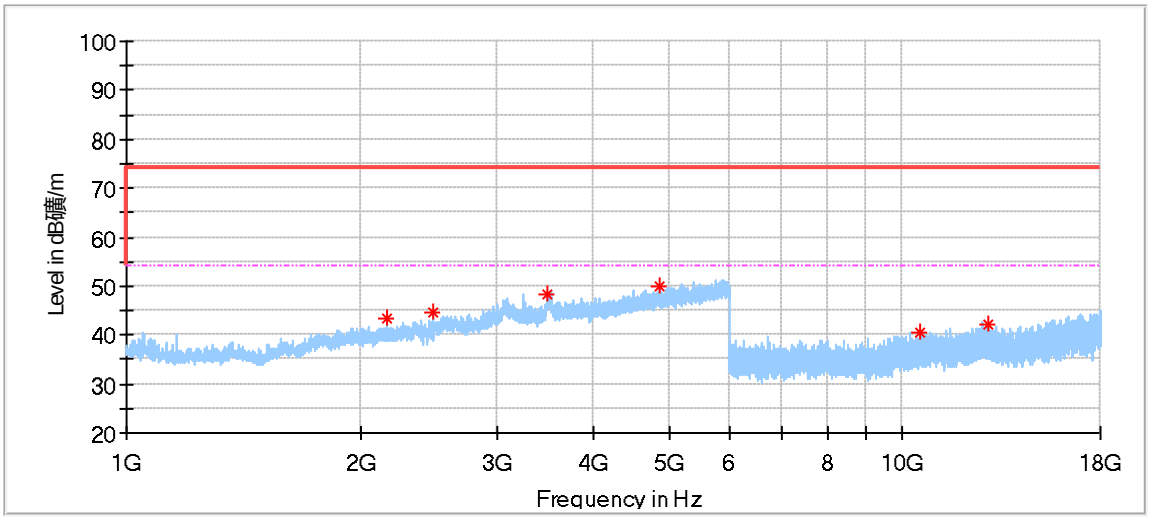



| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 1935.500000 | 41.87 | 74.00 | 32.13 | 150.0 | V | 280.0 | -4.51 |
| 3203.000000 | 49.66 | 74.00 | 24.34 | 150.0 | V | 144.0 | 0.56 |
| 4528.000000 | 48.47 | 74.00 | 25.53 | 150.0 | V | 308.0 | 4.13 |
| 5302.000000 | 49.95 | 74.00 | 24.05 | 150.0 | V | 116.0 | 6.48 |
| 8386.500000* | 39.63 | 74.00 | 34.37 | 150.0 | V | 170.0 | 7.47 |
| 12613.000000* | 42.96 | 74.00 | 31.04 | 150.0 | V | 302.0 | 12.69 |

3DH5_Middle Channel:




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 2215.000000* | 43.20 | 74.00 | 30.80 | 150.0 | H | 358.0 | -3.55 |
| 3063.500000 | 46.89 | 74.00 | 27.11 | 150.0 | H | 257.0 | 1.59 |
| 3501.000000 | 48.96 | 74.00 | 25.04 | 150.0 | H | 329.0 | 4.43 |
| 4899.000000* | 49.02 | 74.00 | 24.98 | 150.0 | H | 107.0 | 5.06 |
| 9821.500000 | 40.32 | 74.00 | 33.68 | 150.0 | H | 58.0 | 9.28 |
| 12653.000000* | 41.23 | 74.00 | 32.77 | 150.0 | H | 111.0 | 12.75 |




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 2162.500000 | 43.30 | 74.00 | 30.70 | 150.0 | V | 121.0 | -3.53 |
| 2491.000000* | 44.51 | 74.00 | 29.49 | 150.0 | V | 0.0 | -1.83 |
| 3489.500000 | 48.36 | 74.00 | 25.64 | 150.0 | V | 257.0 | 3.68 |
| 4863.500000* | 50.14 | 74.00 | 23.86 | 150.0 | V | 216.0 | 5.10 |
| 10528.500000* | 40.58 | 74.00 | 33.42 | 150.0 | V | 82.0 | 10.10 |
| 12894.000000 | 42.20 | 74.00 | 31.80 | 150.0 | V | 7.0 | 12.93 |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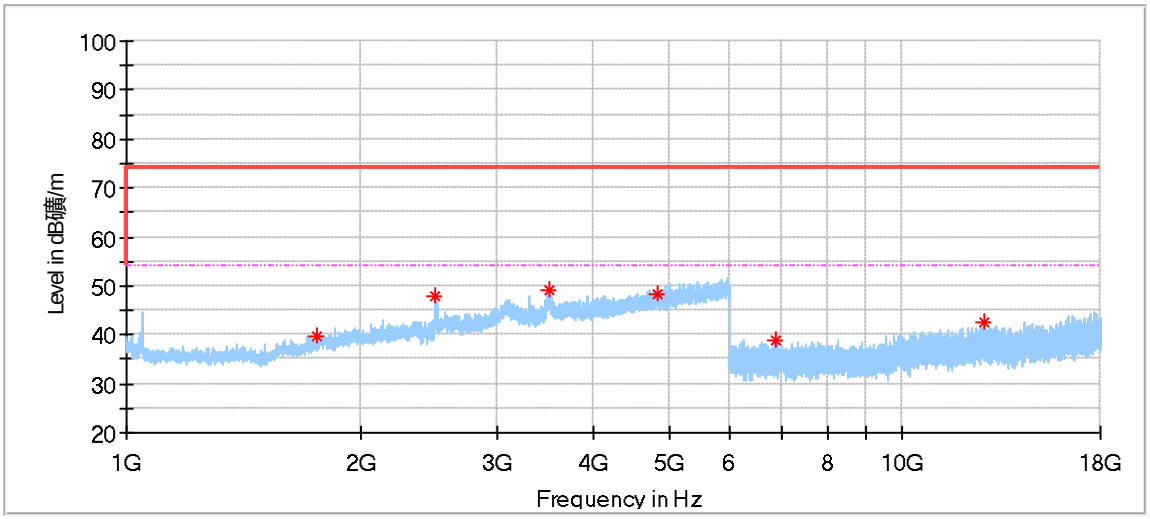
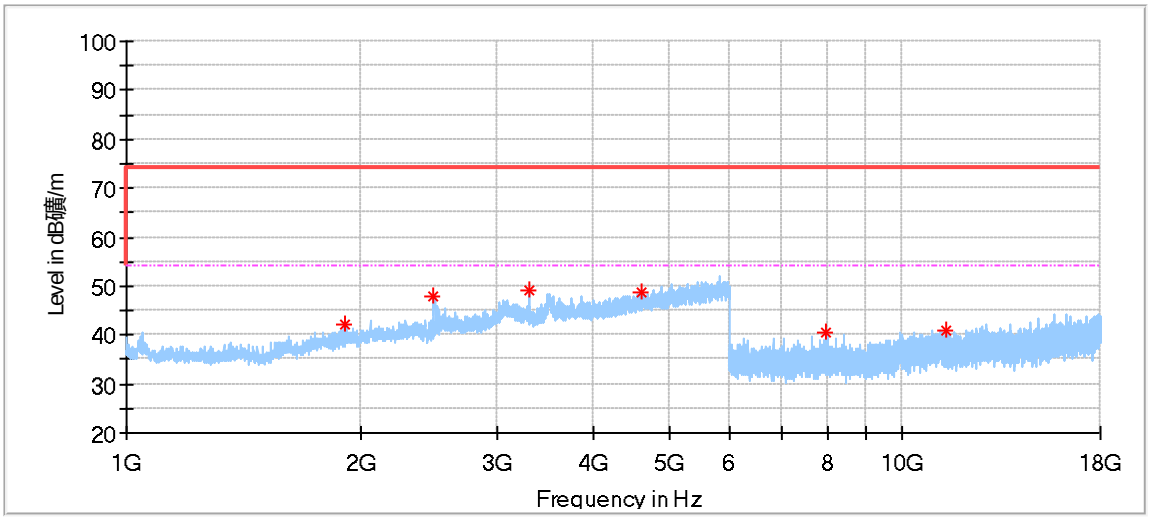
3DH5_High Channel:




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 1759.000000 | 39.52 | 74.00 | 34.48 | 150.0 | H | 206.0 | -5.68 |
| 2497.000000* | 47.82 | 74.00 | 26.18 | 150.0 | H | 220.0 | -1.85 |
| 3498.500000 | 49.05 | 74.00 | 24.95 | 150.0 | H | 39.0 | 4.37 |
| 4836.500000* | 48.46 | 74.00 | 25.54 | 150.0 | H | 80.0 | 5.06 |
| 6866.500000 | 38.72 | 74.00 | 35.28 | 150.0 | H | 7.0 | 6.13 |
| 12779.500000 | 42.43 | 74.00 | 31.57 | 150.0 | H | 330.0 | 12.96 |




| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|
| 1907.000000 | 41.99 | 74.00 | 32.01 | 150.0 | V | 175.0 | -4.69 |
| 2491.500000* | 48.07 | 74.00 | 25.93 | 150.0 | V | 148.0 | -1.83 |
| 3306.500000 | 49.15 | 74.00 | 24.85 | 150.0 | V | 148.0 | 0.50 |
| 4599.000000* | 48.60 | 74.00 | 25.40 | 150.0 | V | 25.0 | 4.37 |
| 7988.500000 | 40.67 | 74.00 | 33.33 | 150.0 | V | 157.0 | 7.43 |
| 11386.500000* | 41.10 | 74.00 | 32.90 | 150.0 | V | 215.0 | 11.19 |

Remark:

(1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205 & RSS-GEN 8.10.

(2) Data of measurement within frequency range 9kHz-30MHz, 18-26GHz are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so test data does not present in this report.

(3) Level= Reading Level + Correction Factor
(4) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)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# 10 Test Equipment List

## List of Test Instruments

### Conducted Emission 2# Test

| DESCRIPTION | MANUFACTURER | MODEL NO. | EQUIPMENT ID | SERIAL NO. | CAL INTERVAL (YEAR) | CAL. DUE DATE |
|---|---|---|---|---|---|---|
| EMI Test Receiver | Rohde & Schwarz | ESR 3 | 68-4-74-19-002 | 102590 | 1 | 2024-5-19 |
| LISN | Rohde & Schwarz | ENV216 | 68-4-87-19-001 | 102472 | 1 | 2024-5-20 |
| Attenuator | Shanghai Huaxiang | TS2-26-3 | 68-4-81-16-003 | 080928189 | 1 | 2024-5-19 |
| Test software | Rohde & Schwarz | EMC32 | 68-4-90-19-005-A01 | Version10.35.02 | N/A | N/A |
| Shielding Room | TDK | CSR #2 | 68-4-90-19-005 | ---- | 3 | 2025-10-15 |

### Radiated Emission 1# Test

| DESCRIPTION | MANUFACTURER | MODEL NO. | EQUIPMENT ID | SERIAL NO. | CAL INTERVAL (YEAR) | CAL. DUE DATE |
|---|---|---|---|---|---|---|
| EMI Test Receiver | Rohde & Schwarz | ESR 7 | 68-4-74-19-001 | 102176 | 1 | 2024-5-20 |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 68-4-80-14-006 | 100398 | 1 | 2024-8-17 |
| 3m Semi-anechoic chamber | TDK | SAC-3 #1 | 68-4-90-14-001 | ---- | 3 | 2024-5-28 |
| Test software | Rohde & Schwarz | EMC32 | 68-4-90-14-001-A10 | Version10.35.02 | N/A | N/A |

### Radiated Emission 2# Test

| DESCRIPTION | MANUFACTURER | MODEL NO. | EQUIPMENT ID | SERIAL NO. | CAL INTERVAL (YEAR) | CAL. DUE DATE |
|---|---|---|---|---|---|---|
| EMI Test Receiver | Rohde & Schwarz | ESR 26 | 68-4-74-14-002 | 101269 | 1 | 2024-5-20 |
| Trilog Super Broadband Test Antenna | Schwarzbeck | VULB 9162 | 68-4-80-19-003 | 284 | 1 | 2025-2-22 |
| Wave Guide Antenna | ETS | 3117 | 68-4-80-19-001 | 00218954 | 1 | 2024-4-26 |
| Pre-amplifier | Rohde & Schwarz | SCU 18F | 68-4-29-19-001 | 100745 | 1 | 2024-5-19 |
| Pre-amplifier | Rohde & Schwarz | SCU 18F | 68-4-29-19-002 | 100746 | 1 | 2024-5-19 |
| Sideband Horn Antenna | Q-PAR | QWH-SL-18-40-K-SG | 68-4-80-14-008 | 12827 | 1 | 2024-7-11 |
| Pre-amplifier | Rohde & Schwarz | SCU 40A | 68-4-29-14-002 | 100432 | 1 | 2024-8-1 |
| Attenuator | Mini-circuits | UNAT-6+ | 68-4-81-21-002 | 15542 | 1 | 2024-5-19 |
| 3m Semi-anechoic chamber | TDK | SAC-3 #2 | 68-4-90-19-006 | ---- | 2 | 2024-5-28 |
| Test software | Rohde & Schwarz | EMC32 | 68-4-90-19-006-A01 | Version10.35.02 | N/A | N/A |

### RF conducted test

| DESCRIPTION | MANUFACTURER | MODEL NO. | EQUIPMENT ID | SERIAL NO. | CAL INTERVAL (YEAR) | CAL. DUE DATE |
|---|---|---|---|---|---|---|
| Signal Analyzer | Rohde & Schwarz | FSV40 | 68-4-74-14-004 | 101030 | 1 | 2024-5-19 |
| RF Switch Module | Rohde & Schwarz | OSP120/OSP-B157W | 68-4-93-14-003 | 101226/100929 | 1 | 2024-5-20 |
| Test software | Tonscend | System for BT/WI-FI | 68-4-74-14-006-A13 | Version 2.6.77.0518 | N/A | N/A |
| Shielding Room | TDK | TS8997 | 68-4-90-19-003 | ---- | 3 | 2025-10-15 |



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# 11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

| System Measurement Uncertainty | |
|---|---|
| Test Items | Extended Uncertainty |
| Uncertainty for Conducted Emission in new shielding room (68-4-90-19-005)<br>150kHz-30MHz (for test using AMN ENV216) | 3.15dB |
| Uncertainty for Radiated Emission in 3m chamber (68-4-90-14-001)<br>9kHz-30MHz | 4.70dB |
| Uncertainty for Radiated Emission in 3m chamber (68-4-90-14-001)<br>30MHz-1000MHz | Horizontal: 4.63dB;<br>Vertical: 4.78dB; |
| Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006)<br>1000MHz-18000MHz | Horizontal: 5.38dB;<br>Vertical: 5.38dB; |
| Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) 18GHz-40GHz | Horizontal: 5.29dB;<br>Vertical: 5.29dB; |
| Uncertainty for Conducted RF test with TS 8997 | RF Power Conducted: 1.31dB<br>Frequency test involved:<br>$0.6\times10^{-8}$ or 1% |

Measurement Uncertainty Decision Rule:
Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2021, clause 4.4.3 and 4.5.1.

---THE END OF REPORT---


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