FCC/ISED - TEST REPORT

Report Number	:	**68.950.23.1153.01**	Date of Issue:	**January 10, 2024**
Model / HVIN	:	**CA0905**		
Product Type	:	Wireless Headphones		
Applicant	:	Audio Partnership PLC		
Address	:	Gallery Court, Hankey Place, London, SE1 4BB, United Kingdom		
Manufacturer	:	Audio Partnership PLC		
Address	:	Gallery Court, Hankey Place, London, SE1 4BB, United Kingdom		
Factory	:	Charter Media (Dongguan) Co., Ltd.		
Address	:	Dabandi Industrial Zone, Daning District, Humen Town, 523930 Dongguan City, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**74**		

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2 Details about the Test Laboratory

Details about the Test Laboratory

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

3 Description of the Equipment Under Test

Product Name/PMN	Wireless Headphones
Model no./ Hardware Version Identification No. (HVIN)	CA0905
FCC ID:	YKBCA0905-042
IC:	9095A-CA0905042
Options and accessories:	N/A
Rating:	Input:5V⎓1A Battery Capacity:3.7V, 980mAh
RF Transmission Frequency:	2402MHz-2480MHz
No. of Operated Channel:	79
Modulation:	GFSK, π/4-DQPSK, 8DPSK
Antenna Type:	Monopole antenna
Antenna	Gain: 2.7dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Wireless Headphones which support Bluetooth function. Only Bluetooth (BR+EDR) included in this report.

NOTE 1: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2021 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5, April 2018 Amendment 1, March 2019 + Amendment 2, February 2021	General Requirements for Compliance of Radio Apparatus
RSS-247 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 C63.10-2020.

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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 peak output power	Site 1	Pass
RSS-247 5.4(b)	Conducted peak 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 a monopole antenna and manufacturer will stick it down with glue, which gain is 2.7dBi. 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: YKBCA0905-042, IC: 9095A-CA0905042, complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules and RSS-247, RSS-GEN.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

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

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

Sample Received Date:	December 25, 2023
Testing Start Date:	December 25, 2023
Testing End Date:	January 10, 2024

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

Reviewed by:	Prepared by:	Tested by:
John Zhi	Sanvin Zheng	Carry Cai
Project Manager	Project Engineer	Test Engineer

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
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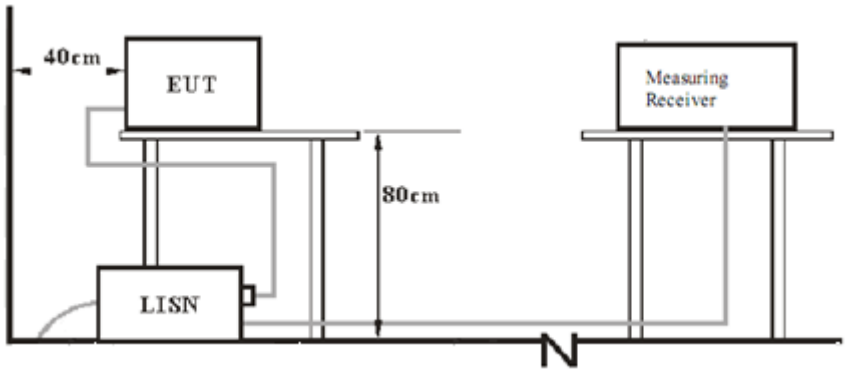
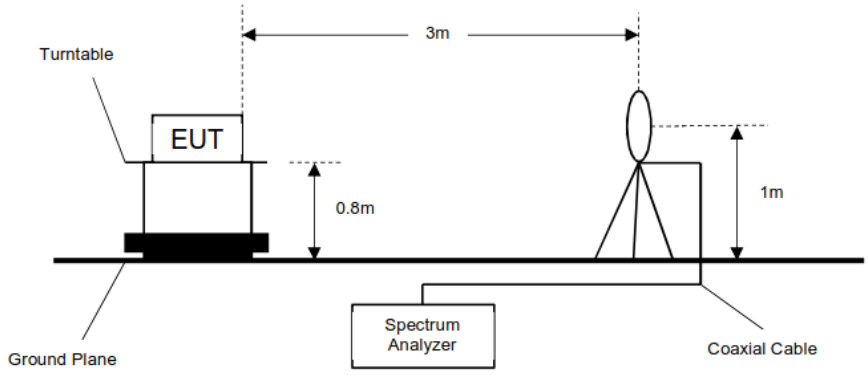
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

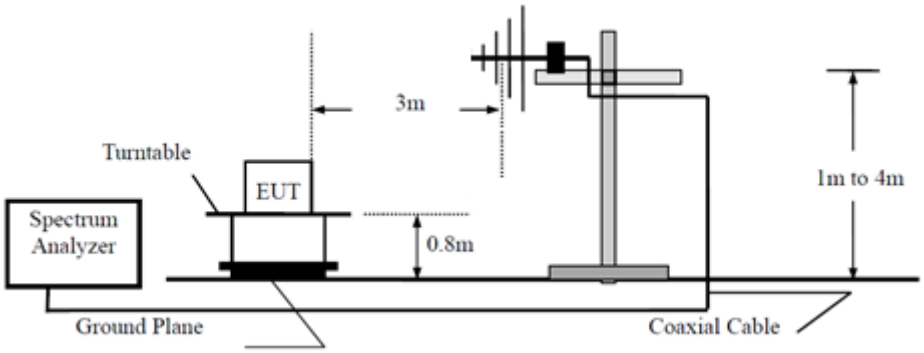


7.2 Radiated test setups

9KHz – 30MHz



30MHz - 1GHz



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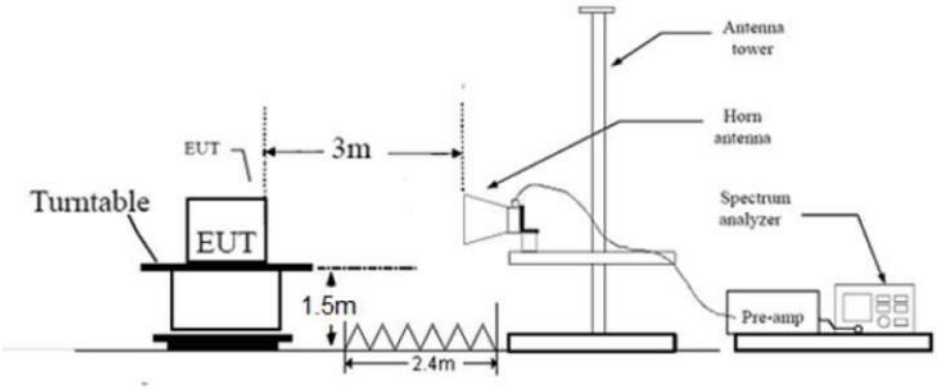
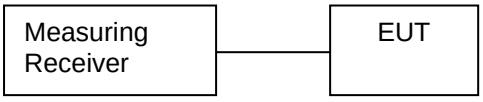
Above 1GHz



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
Adaptor	Apple	A1443	5VDC, 1.0A
Computer	HP	5CD302CY52	---

Cables Used During Test:

Cable	Length	Shielded/unshielded	With / without ferrite
C-to-C Cable	1.25m	Shielded	Without ferrite
3.5mm-to-C Cable	1.25m	Shielded	Without ferrite

Test software information:

Test Software Version	Bluetest3	
Modulation	Setting TX Power	Packet Type
GFSK	Default	PRBS9
π/4-DQPSK	Default	PRBS9
8DPSK	Default	PRBS9

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
0.1502.700	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

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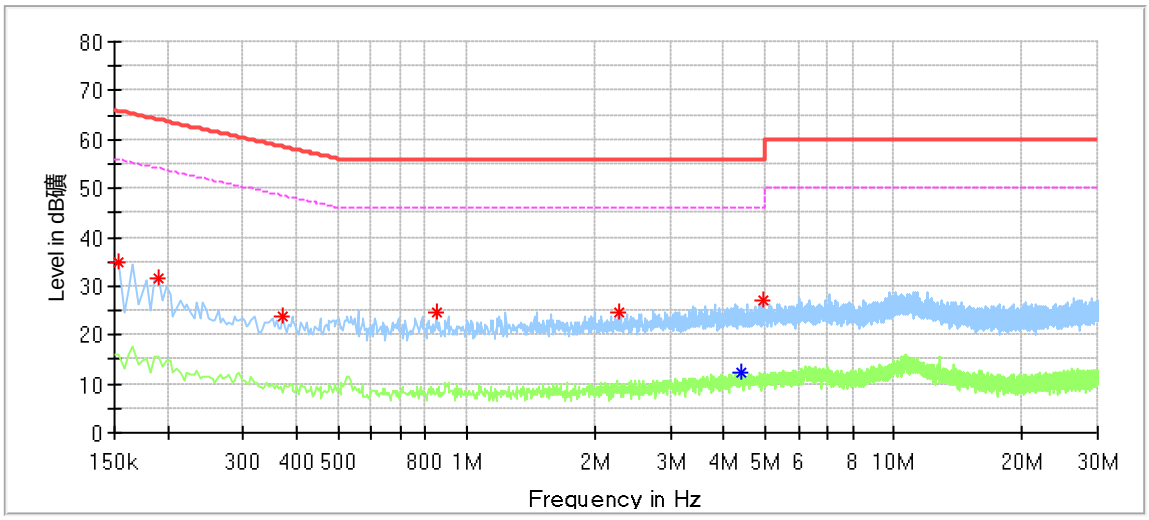
Conducted Emission

Product Type	:	Wireless Headphones
M/N	:	CA0905
Operating Condition	:	Charging+Transmitting
Test Specification	:	Line
Comment	:	AC 120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.154000	35.02	---	65.78	30.77	L1	9.52
0.190000	31.45	---	64.04	32.59	L1	9.54
0.370000	23.85	---	58.50	34.65	L1	9.57
0.850000	24.75	---	56.00	31.25	L1	9.60
2.266000	24.67	---	56.00	31.33	L1	9.63
4.418000	---	12.43	46.00	33.57	L1	9.72
4.926000	27.26	---	56.00	28.74	L1	9.74

Remark:
Max Peak= Read level + Corrector factor
Correct factor=cable loss + LISN factor

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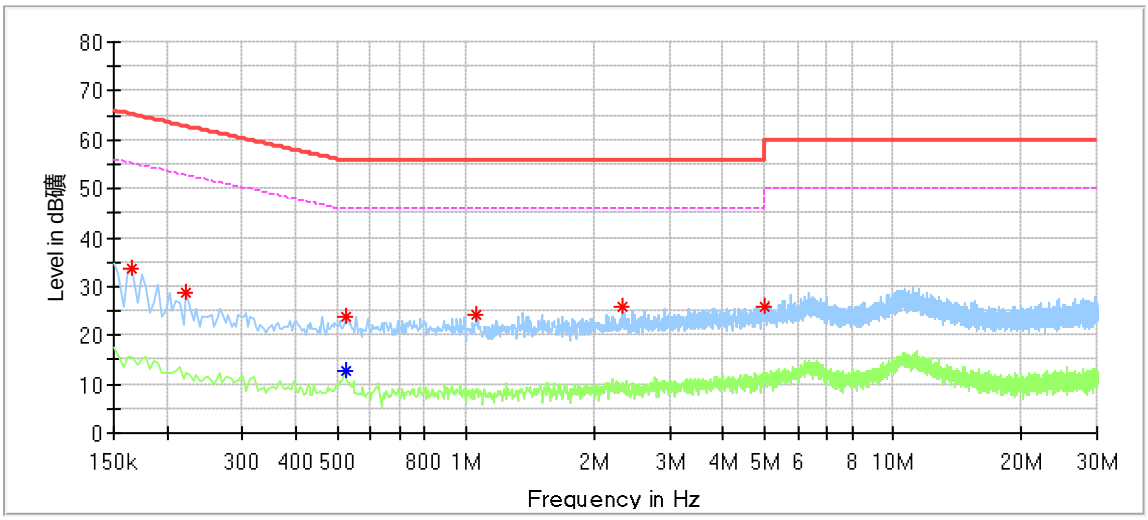
Conducted Emission

Product Type	:	Wireless Headphones
M/N	:	CA0905
Operating Condition	:	Charging+Transmitting
Test Specification	:	Neutral
Comment	:	AC 120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.166000	33.64	---	65.16	31.52	N	9.57
0.222000	28.77	---	62.74	33.98	N	9.58
0.522000	---	12.68	46.00	33.32	N	9.62
0.522000	23.73	---	56.00	32.27	N	9.62
1.062000	24.08	---	56.00	31.92	N	9.63
2.330000	25.94	---	56.00	30.06	N	9.66
4.994000	26.04	---	56.00	29.96	N	9.78

Remark:
Max Peak= Read level + Corrector factor
Correct factor=cable loss + LISN factor

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9.2 Conducted Peak Output Power & EIRP

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
3. Use the following test receiver settings:
   Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
   RBW > the 20dB bandwidth of the emission being measured, VBW≥RBW,
   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. The indicated level is the peak output power and record the results in the test report.
5. Repeat above procedures until all frequencies measured were complete.

Limits

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

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

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

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

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Conducted Peak Output Power & EIRP

Bluetooth Mode GFSK modulation Test Result

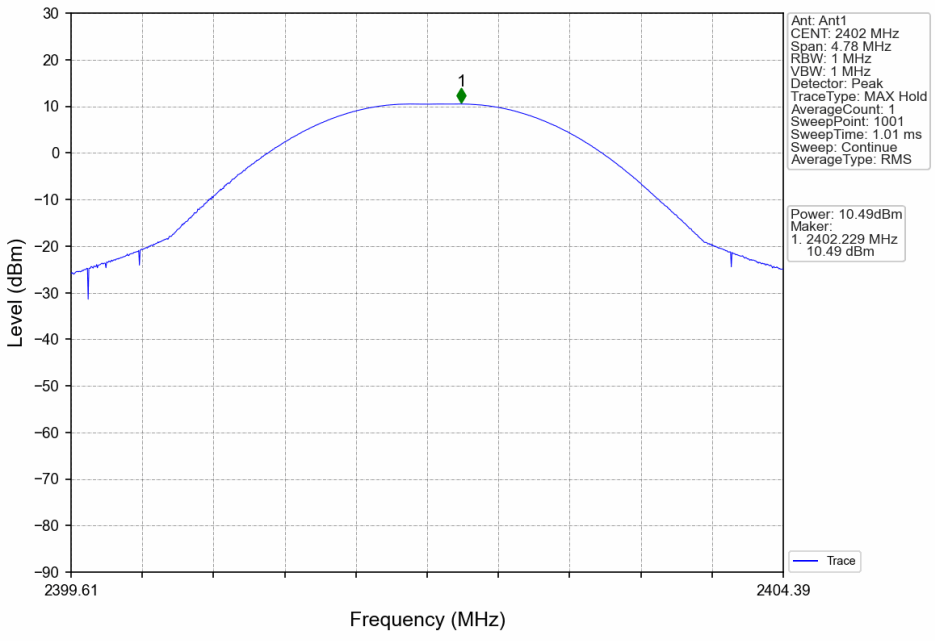
Frequency MHz	Conducted Peak Output Power dBm	Antenna Gain dBi	EIRP dBm	Result
Low channel 2402MHz	10.49	2.7	13.19	Pass
Middle channel 2441MHz	10.29	2.7	12.99	Pass
High channel 2480MHz	10.13	2.7	12.83	Pass

Bluetooth Mode π/4-DQPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Antenna Gain dBi	EIRP dBm	Result
Low channel 2402MHz	9.63	2.7	12.33	Pass
Middle channel 2441MHz	9.68	2.7	12.38	Pass
High channel 2480MHz	9.54	2.7	12.24	Pass

Bluetooth Mode 8DPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Antenna Gain dBi	EIRP dBm	Result
Low channel 2402MHz	10.25	2.7	12.95	Pass
Middle channel 2441MHz	10.28	2.7	12.98	Pass
High channel 2480MHz	10.14	2.7	12.84	Pass



GFSK_DH5_LCH_2402MHz_Ant1_NTNV

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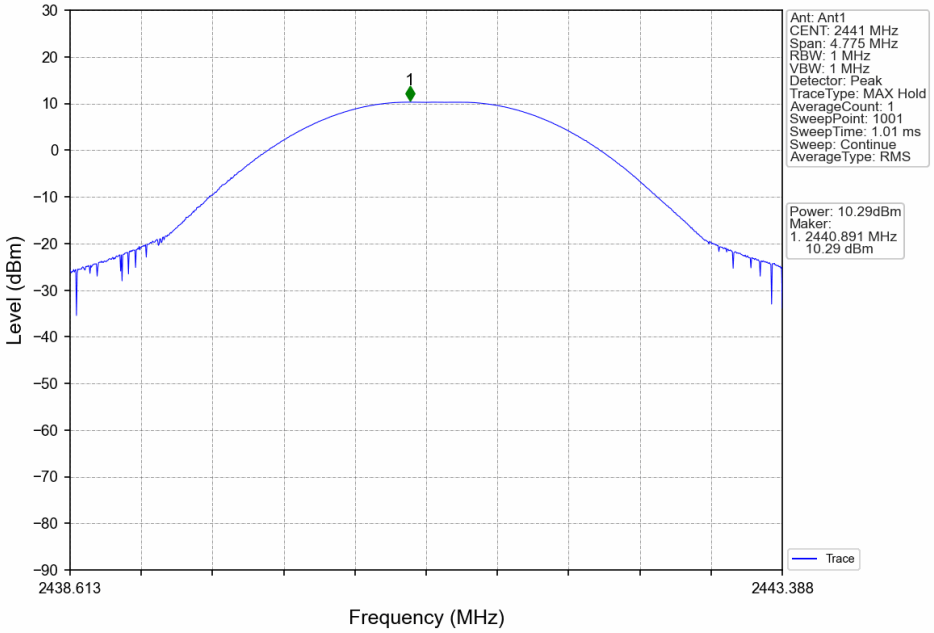

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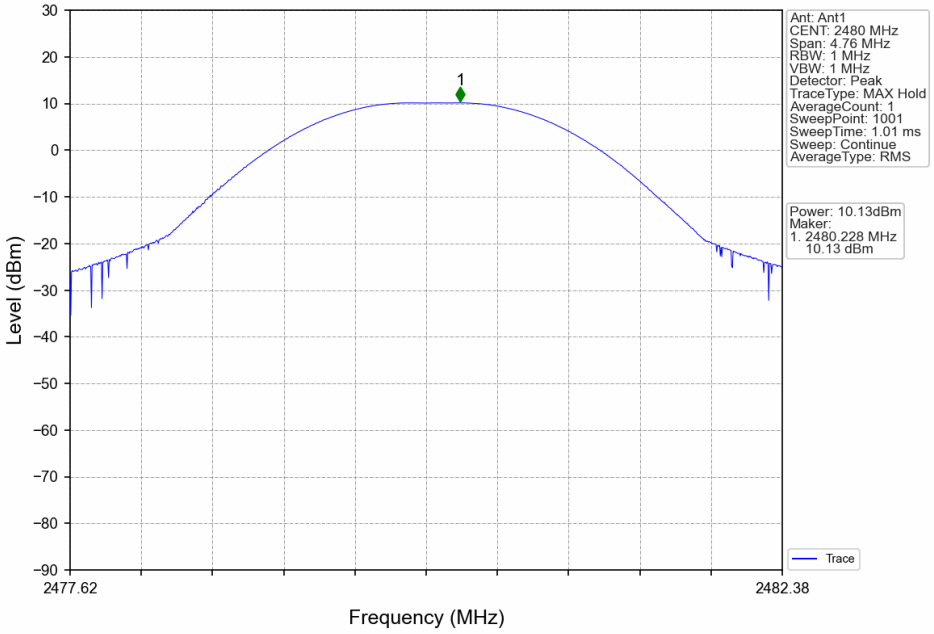

GFSK_DH5_HCH_2480MHz_Ant1_NTNV

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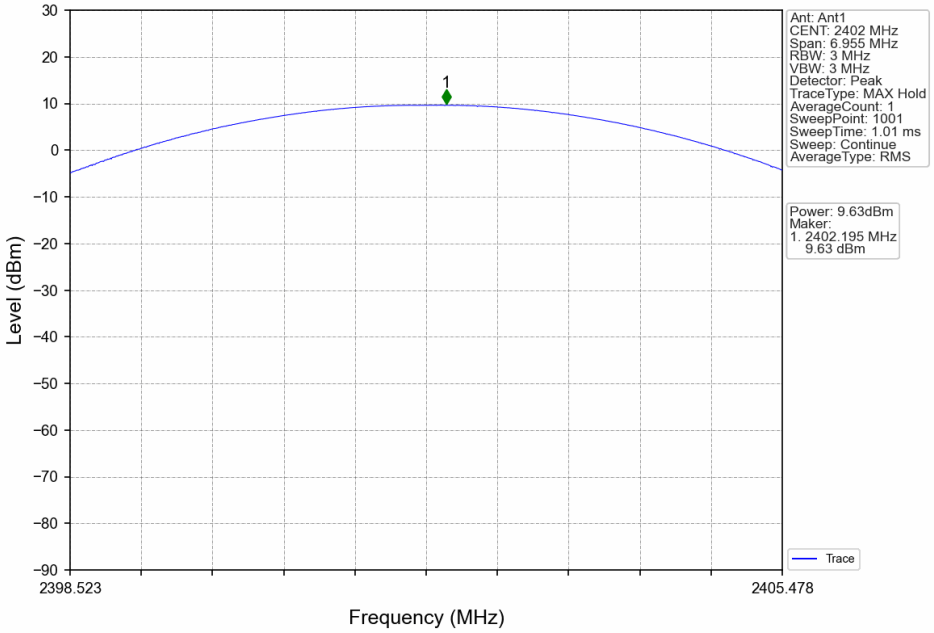
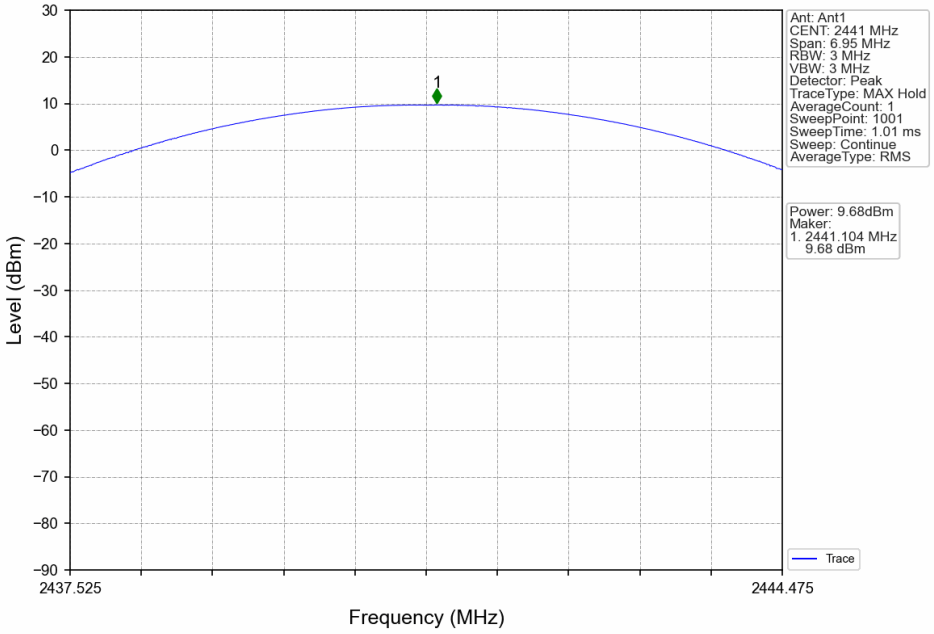


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

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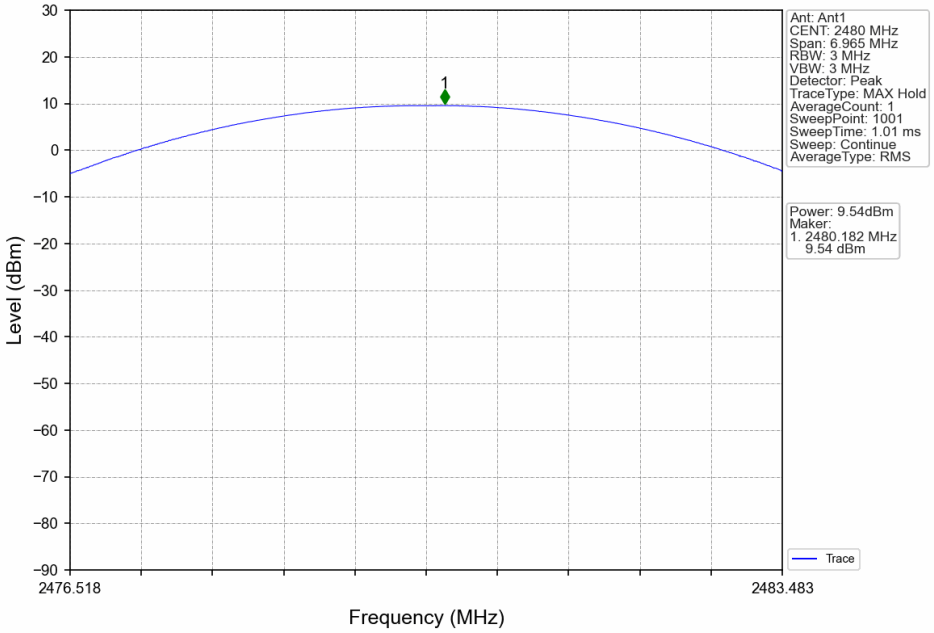
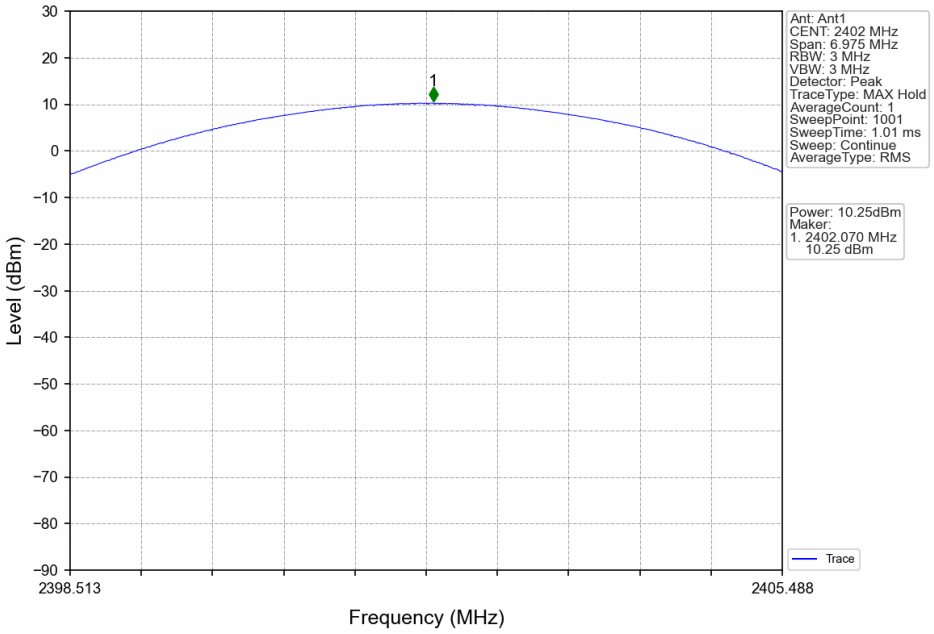


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

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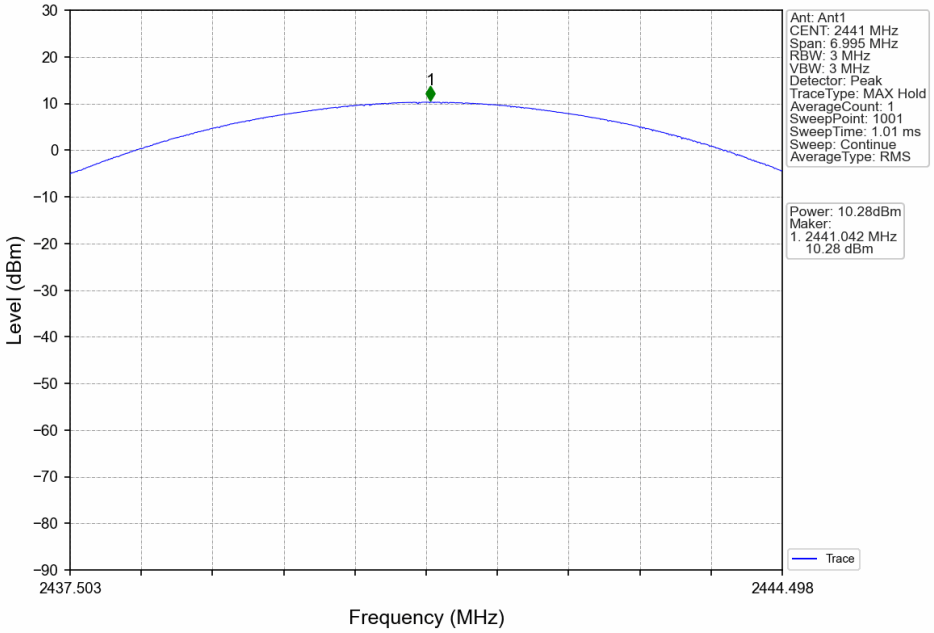
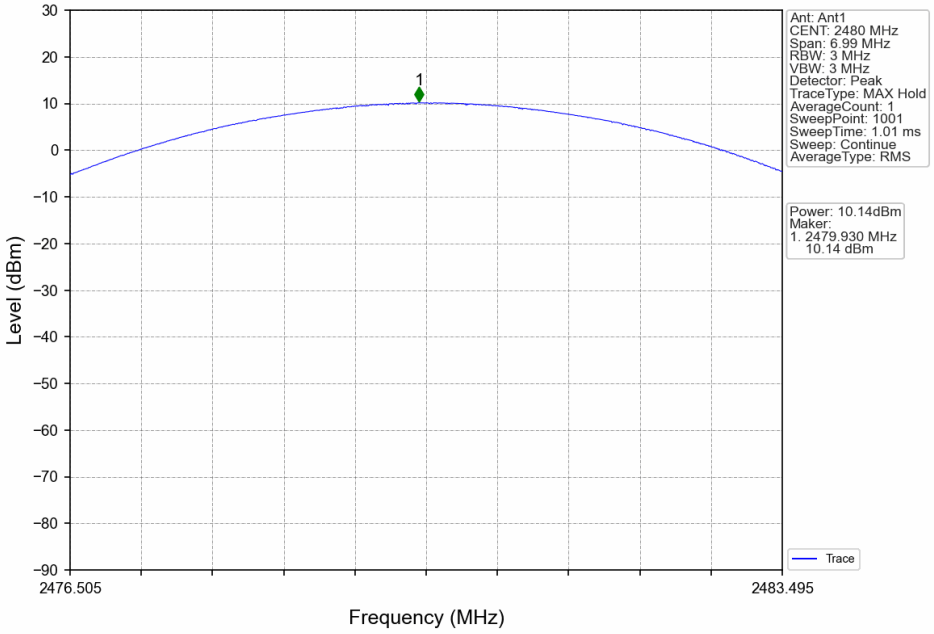


8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

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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 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.
3. Use the following test receiver settings:
   Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
   RBW > the 20dB bandwidth of the emission being measured, VBW≥RBW,
   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 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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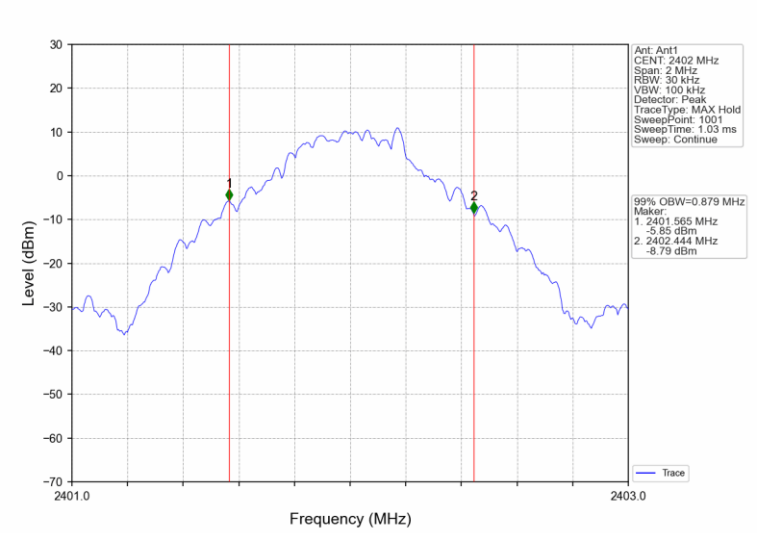
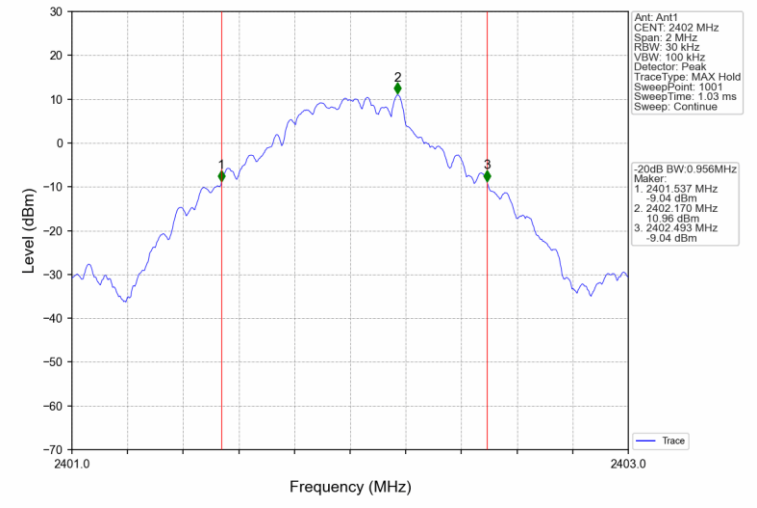
20 dB bandwidth and 99% Occupied Bandwidth

Bluetooth Mode GFSK Modulation test result

Frequency MHz	20 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz	Result
2402	0.956	0.879	--	Pass
2441	0.955	0.882	--	Pass
2480	0.952	0.877	--	Pass

Low channel 2402MHz





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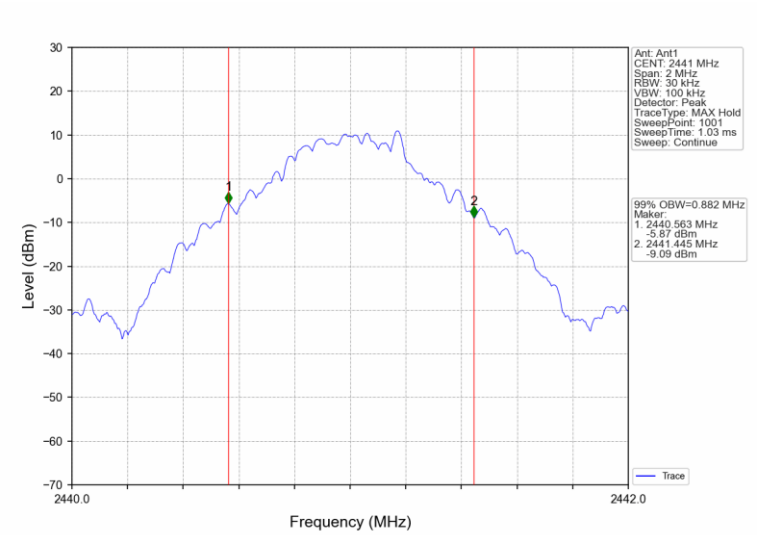
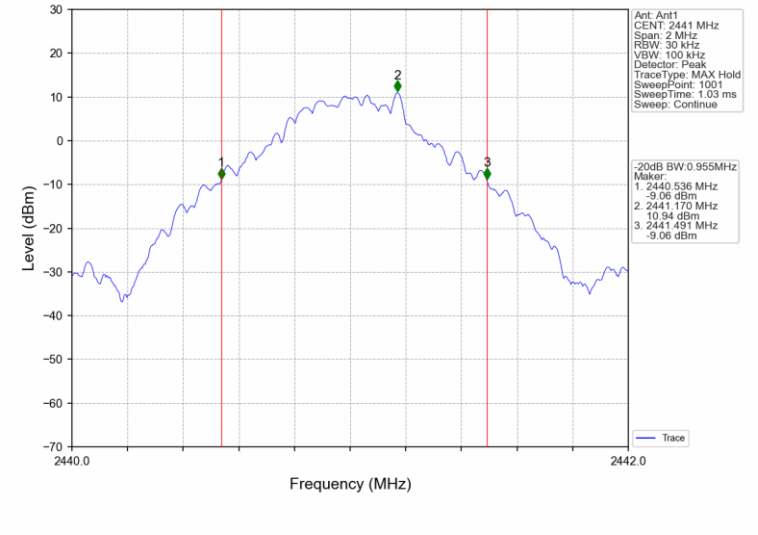
20 dB bandwidth and 99% Occupied Bandwidth

Middle channel 2441MHz





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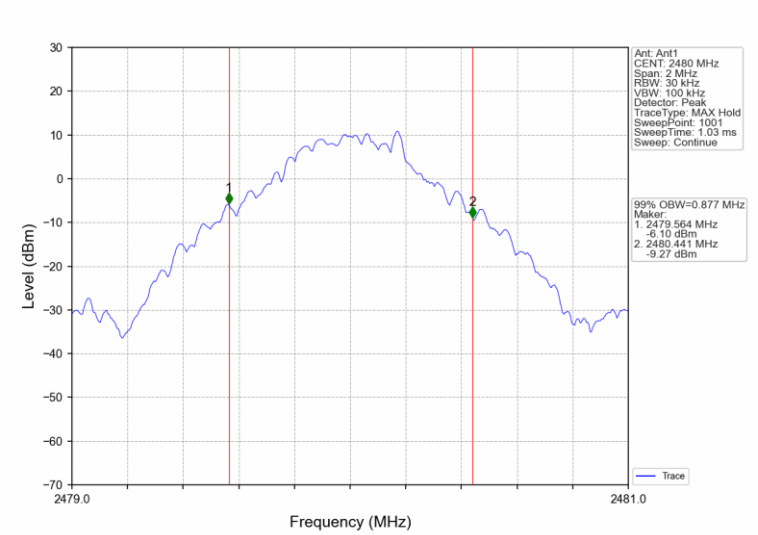
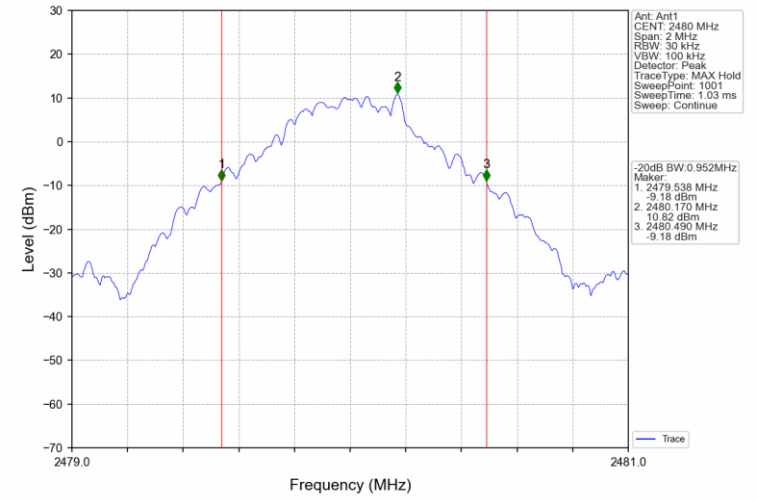
20 dB bandwidth and 99% Occupied Bandwidth

High channel 2480MHz





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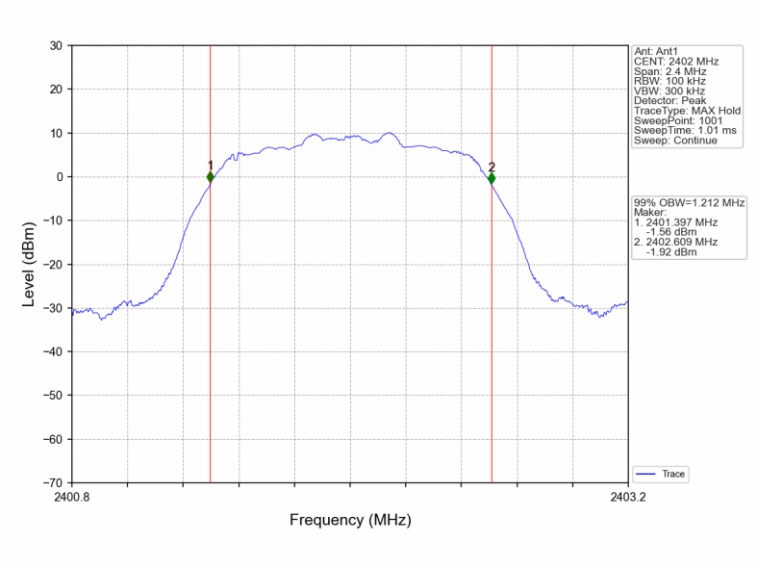
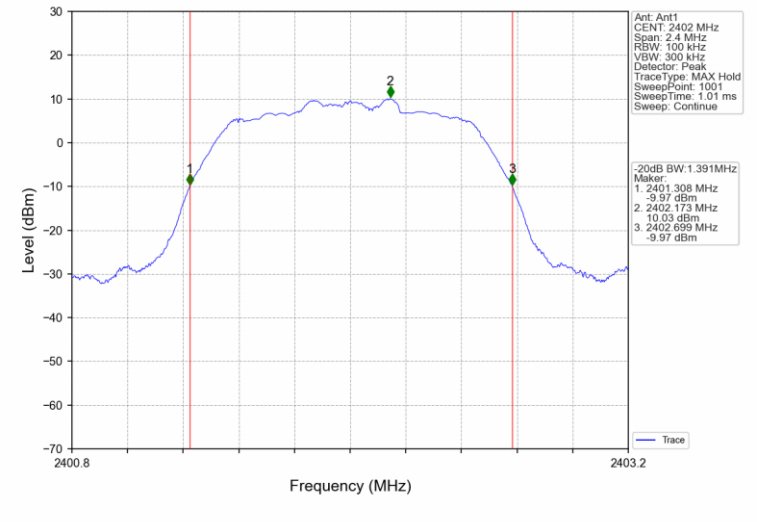
20 dB bandwidth and 99% Occupied Bandwidth

Bluetooth Mode π/4-DQPSK Modulation test result

Frequency	20 dB Bandwidth	99% Bandwidth	Limit	Result
MHz	MHz	MHz	MHz	
2402	1.391	1.212	--	Pass
2441	1.390	1.213	--	Pass
2480	1.393	1.212	--	Pass

Low channel 2402MHz





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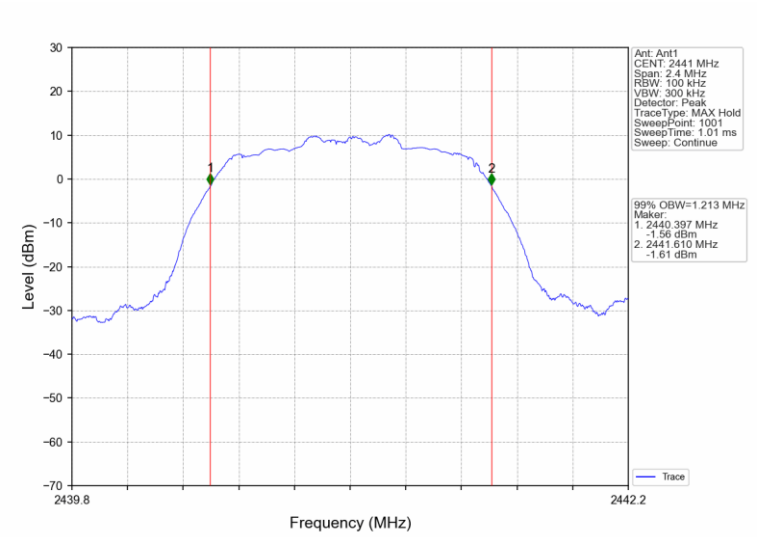
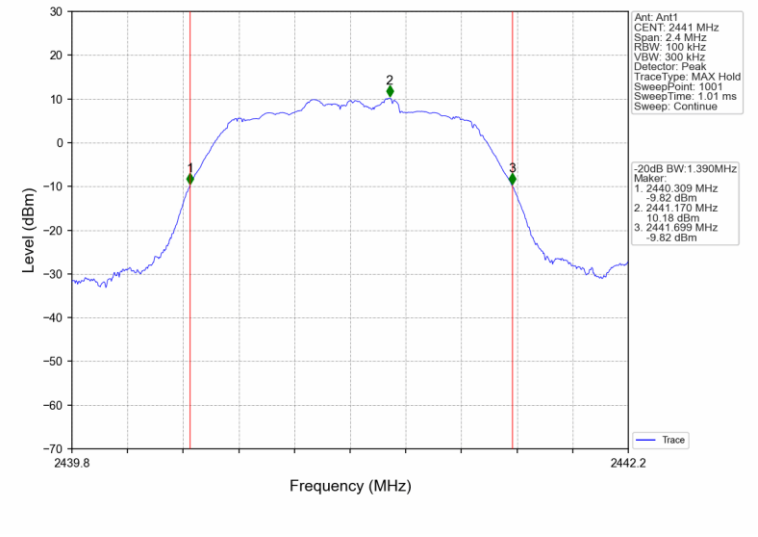
20 dB bandwidth and 99% Occupied Bandwidth

Middle channel 2441MHz





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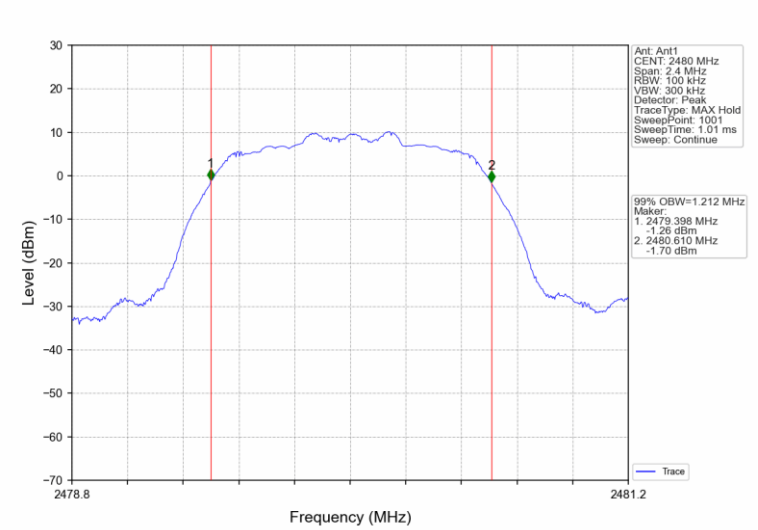
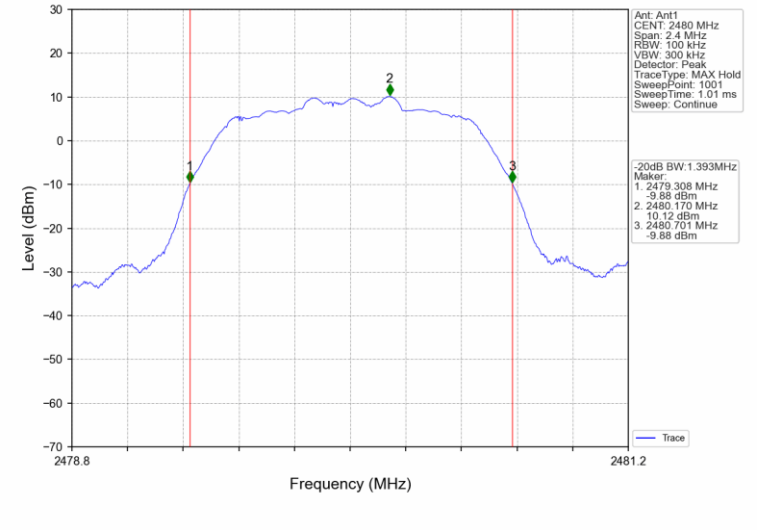
20 dB bandwidth and 99% Occupied Bandwidth

High channel 2480MHz





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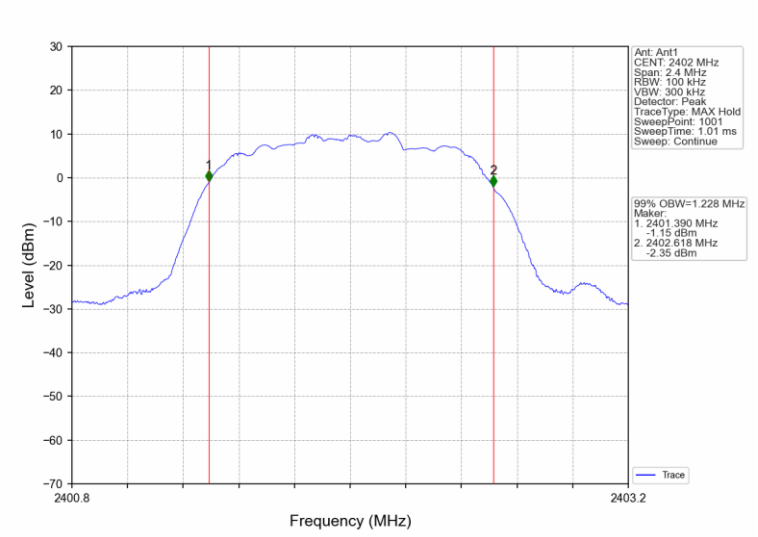
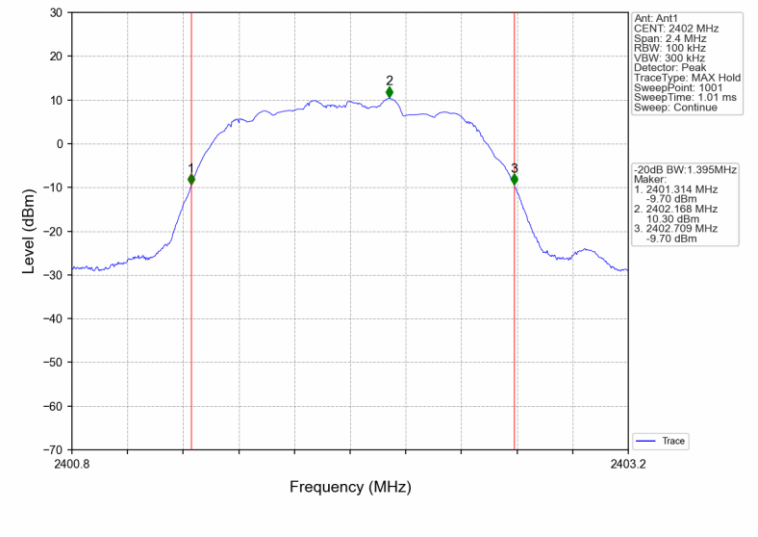
20 dB bandwidth and 99% Occupied Bandwidth

Bluetooth Mode 8DPSK Modulation test result

Frequency MHz	20 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz	Result
2402	1.395	1.228	--	Pass
2441	1.399	1.230	--	Pass
2480	1.398	1.230	--	Pass

Low channel 2402MHz





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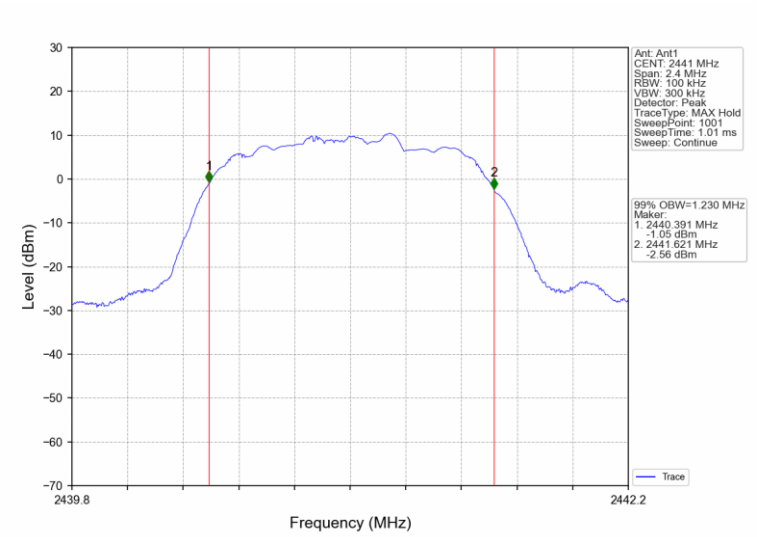
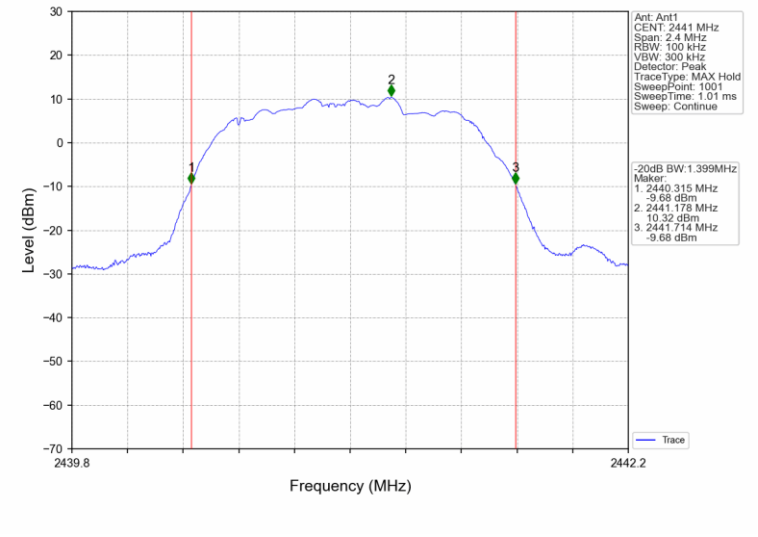
20 dB bandwidth and 99% Occupied Bandwidth

Middle channel 2441MHz





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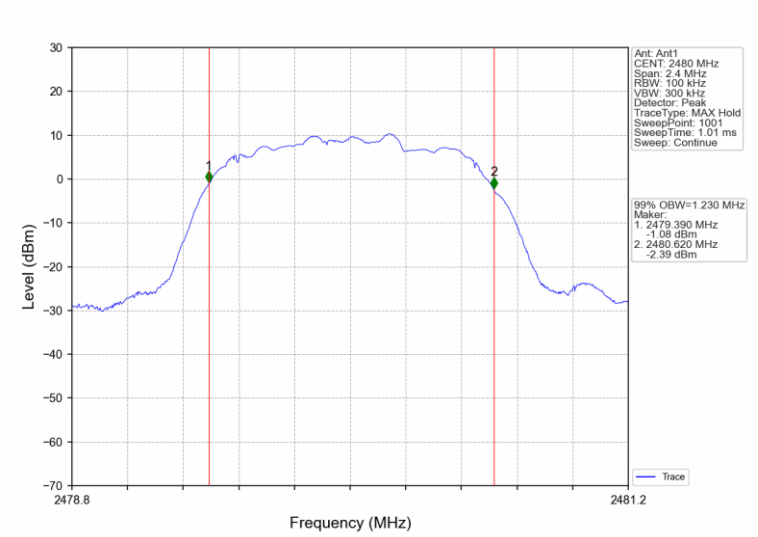
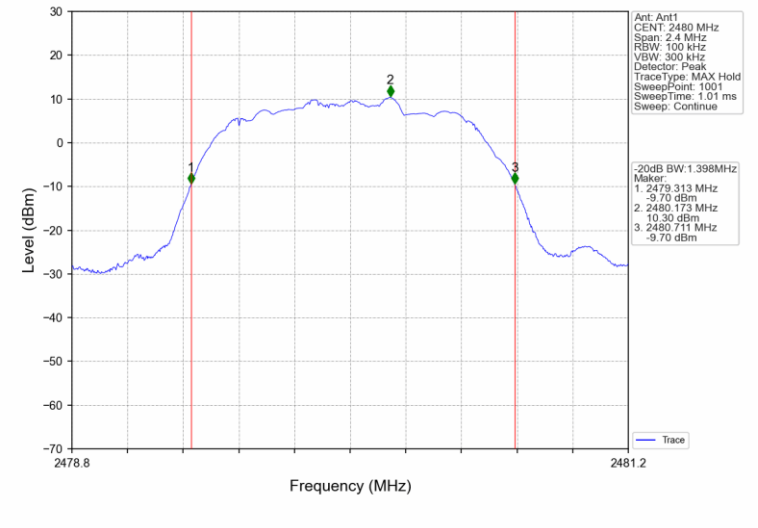
20 dB bandwidth and 99% Occupied Bandwidth

High channel 2480MHz





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9.4 Carrier Frequency Separation

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 to hopping mode.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, 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 kHz
⩾25KHz or 2/3 of the 20 dB bandwidth which is greater

Limit

Packet Type	2/3 of 20 dB Bandwidth kHz
DH5	637
2DH5	929
3DH5	933

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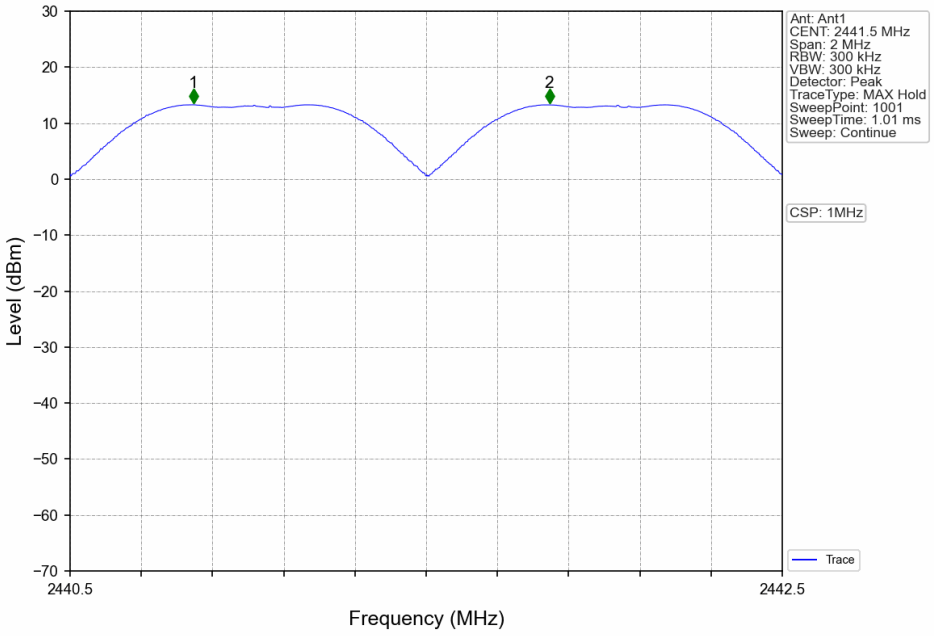
Carrier Frequency Separation

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

GFSK Modulation test result

Modulation	Frequency MHz	Carrier Frequency Separation MHz	Result
GFSK	2441	1.000	Pass
π/4-DQPSK	2441	1.001	Pass
8DPSK	2441	1.001	Pass

GFSK Mode: 2441MHz



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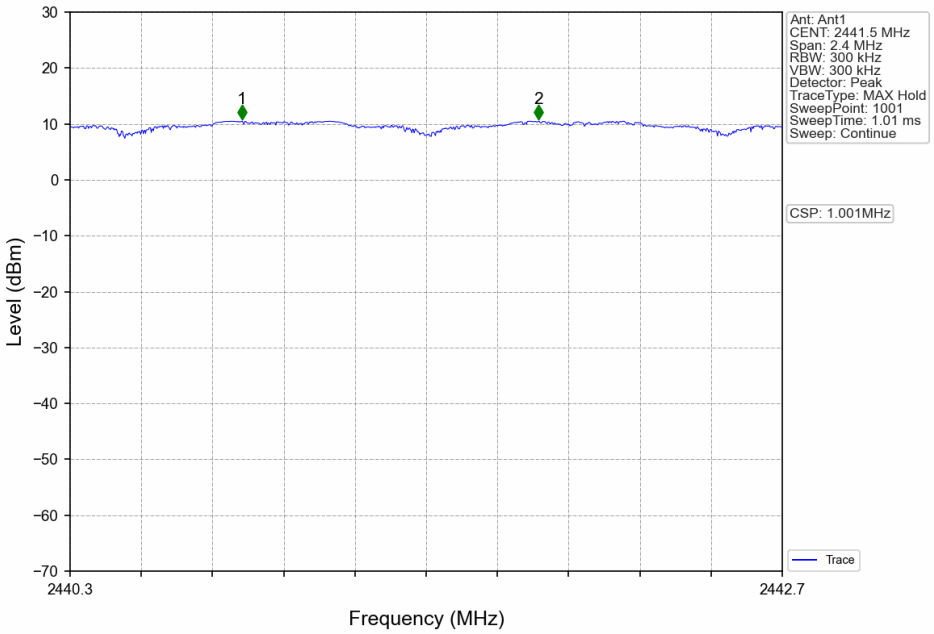
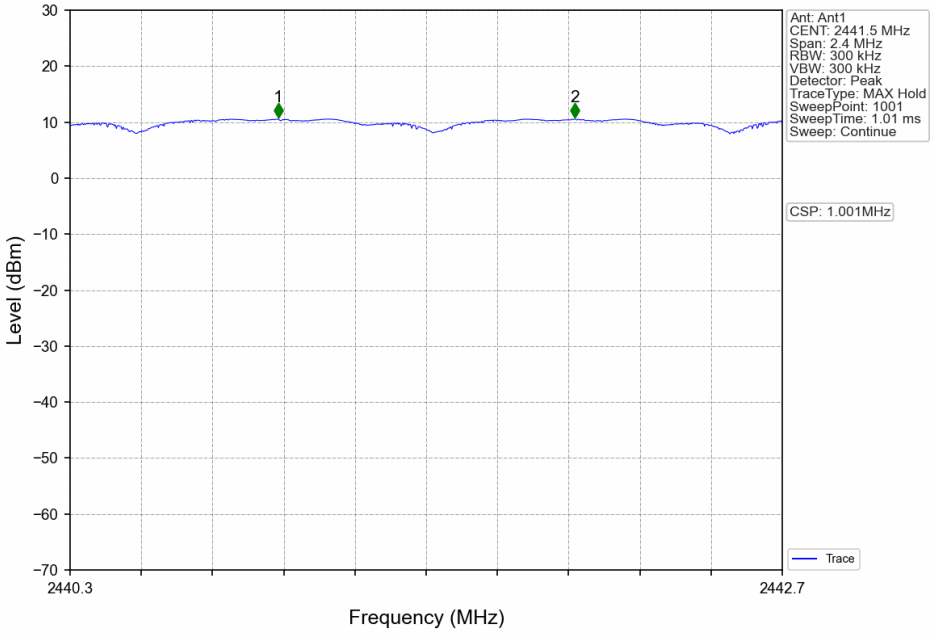
Carrier Frequency Separation

π/4-DQPSK Mode: 2441MHz



8DPSK Mode: 2480MHz



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9.5 Number of Hopping Frequencies

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 to hopping mode.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
4. Set the spectrum analyzer on Max-Hold Mode,
5. Record all the signals from each channel until each one has been recorded.
6. Repeat above procedures until all frequencies measured were complete.

Limit

Limit number
⩾ 15

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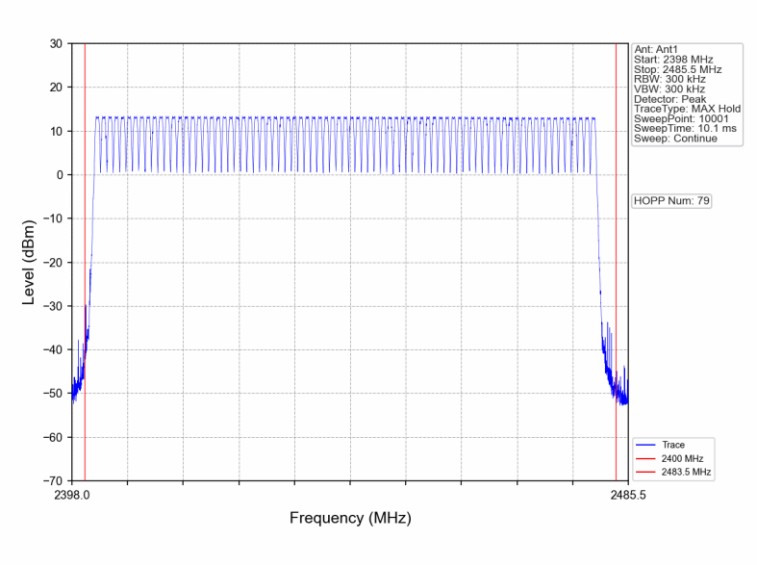
Number of Hopping Frequencies

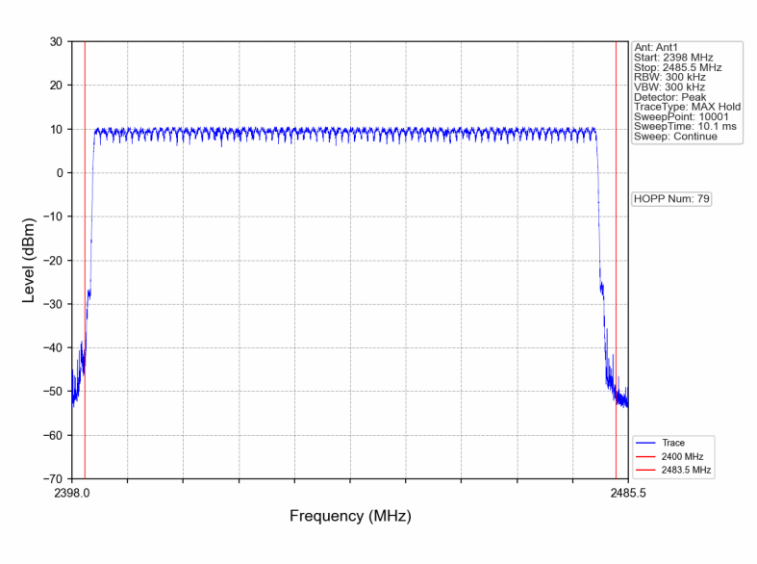
Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification.

Number of hopping frequencies	Result
79	Pass

GFSK Mode



π/4-DQPSK Mode



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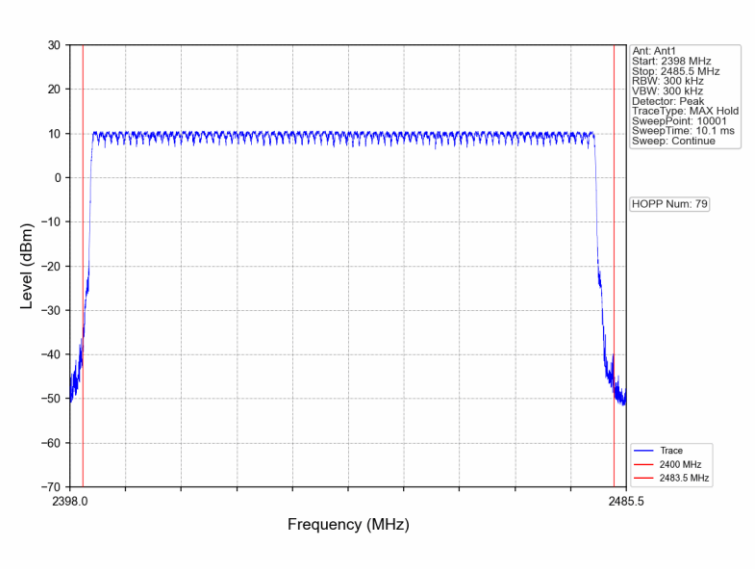
Number of Hopping Frequencies

8DPSK Mode



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9.6 Dwell Time

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 to hopping mode.
3. Use the following spectrum analyzer settings:
   RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
   Set the spectrum analyzer on Max-Hold Mode,
4. Adjust the center frequency of spectrum analyzer on any frequency be measured.
5. Measure the Dwell Time by spectrum analyzer Marker function. Record the results.
   Dwell Time = Burst Width * Total Hops
6. Repeat above procedures until all frequencies measured were complete.

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 mode) was reported to show compliance.

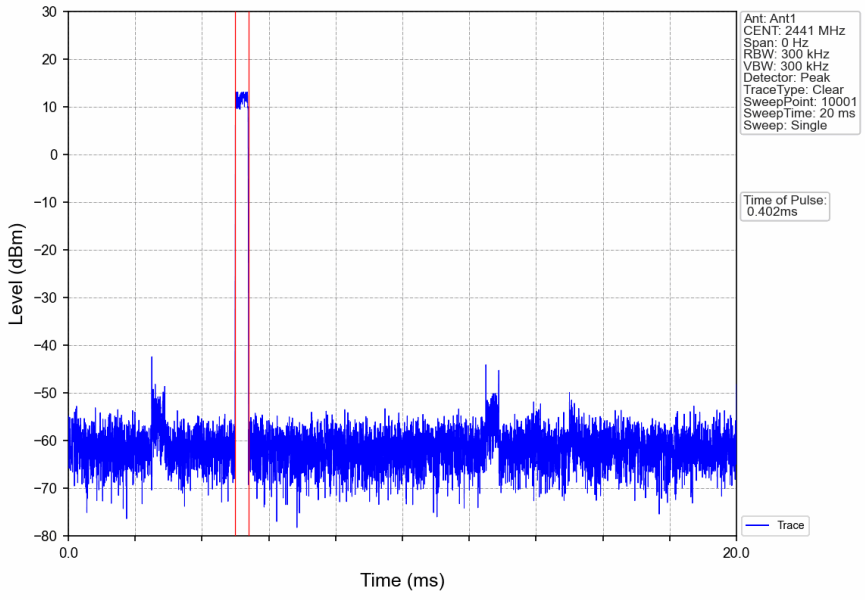
The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:
The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 79 [ch] = 31.6 [s*ch];

The burst width, which is directly measured, refers to the duration on one channel hop.

Test Result

Test Mode	Channel	Burst Width (ms)	Total Hops	Result (ms)	Limit (ms)	Verdict
DH1	Hop	0.402	320	128.640	<=400	PASS
DH3	Hop	1.656	156	258.336	<=400	PASS
DH5	Hop	2.906	107	310.942	<=400	PASS
2DH1	Hop	0.390	320	124.800	<=400	PASS
2DH3	Hop	1.642	160	262.720	<=400	PASS
2DH5	Hop	2.906	115	334.190	<=400	PASS
3DH1	Hop	0.392	320	125.440	<=400	PASS
3DH3	Hop	1.642	154	252.868	<=400	PASS
3DH5	Hop	2.894	116	335.704	<=400	PASS

DH1_Ant0_Hop



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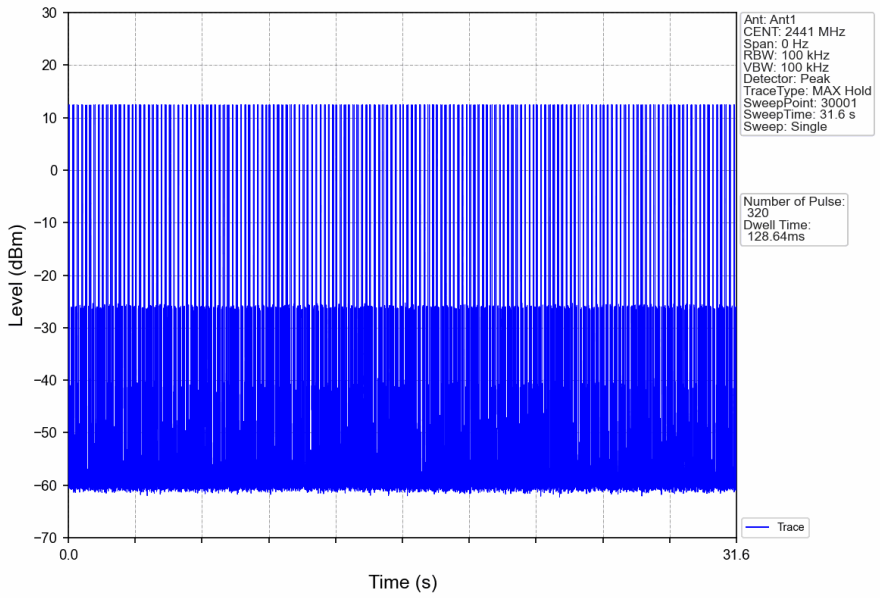
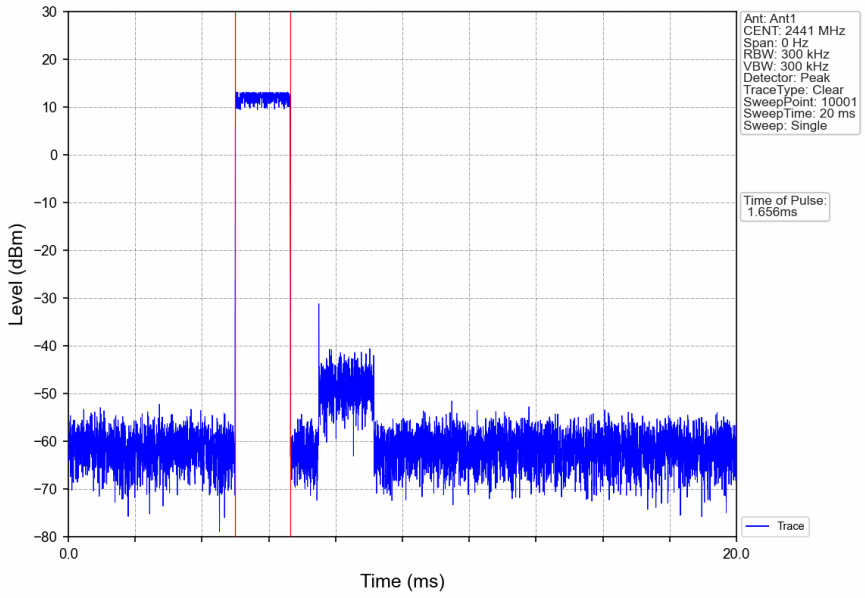


DH3_Ant0_Hop



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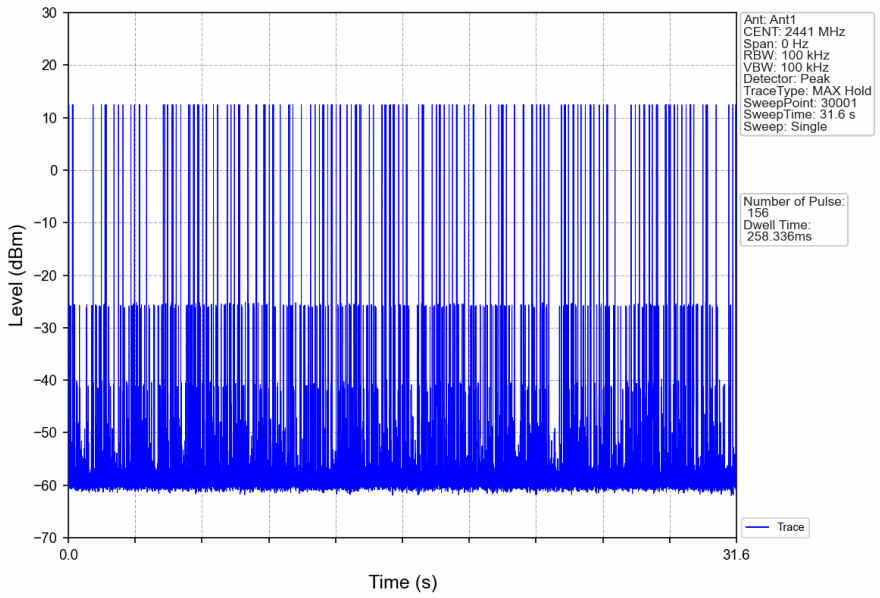
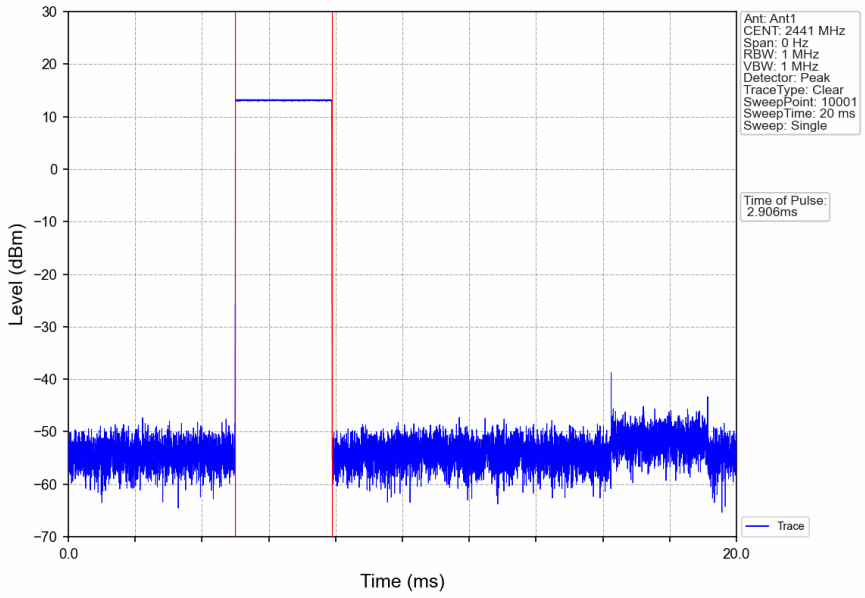


DH5_Ant0_Hop



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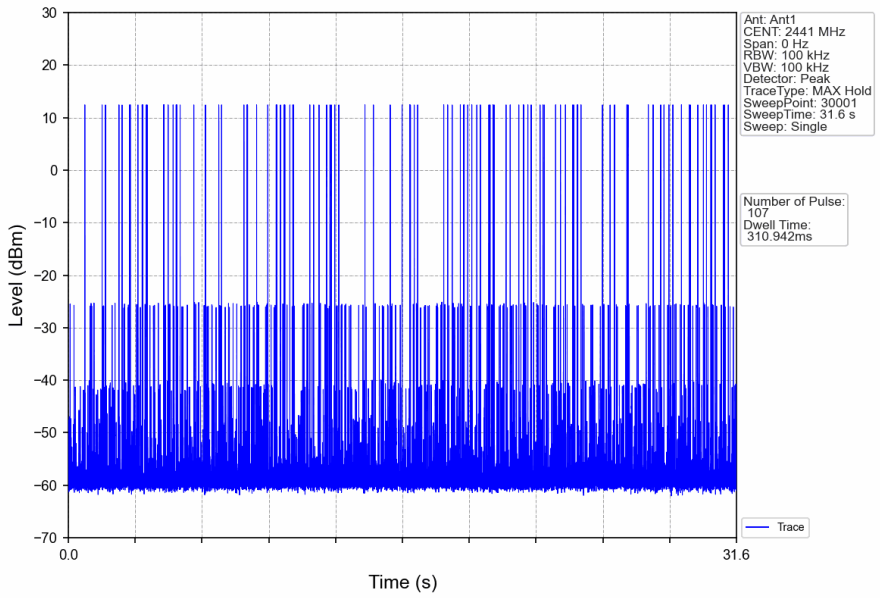
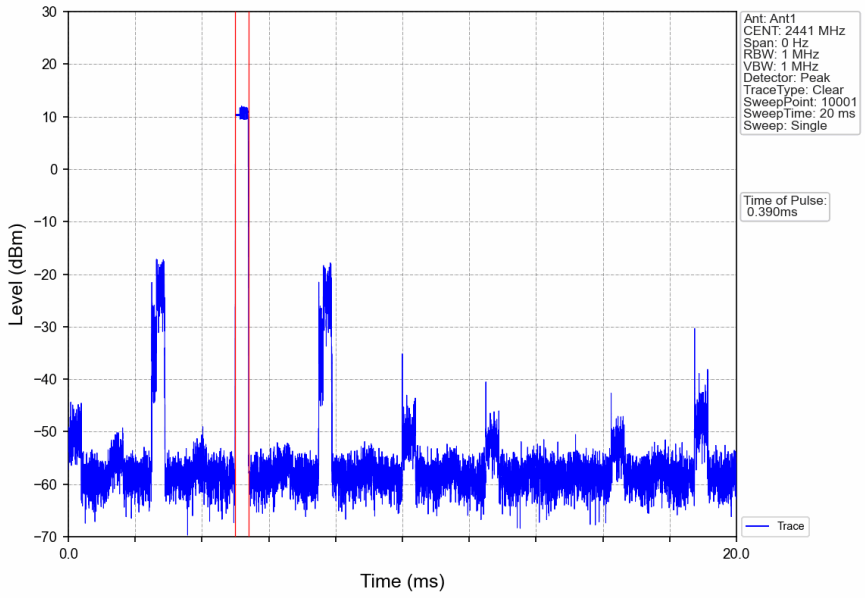


2DH1_Ant0_Hop



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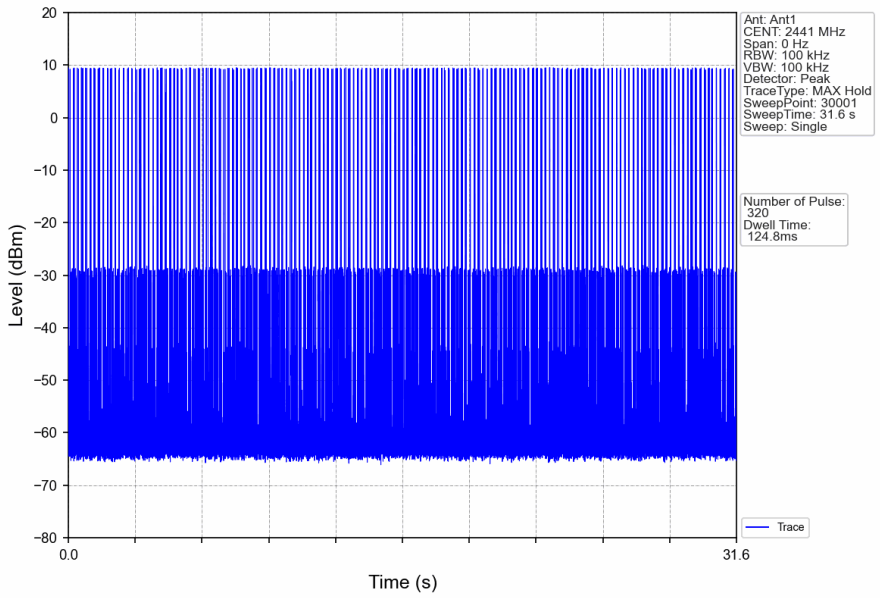
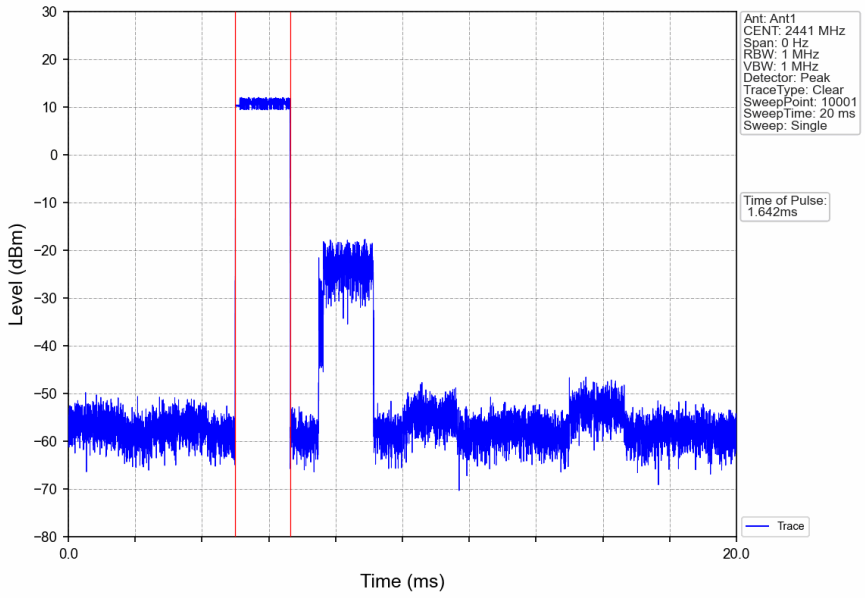


2DH3_Ant0_Hop



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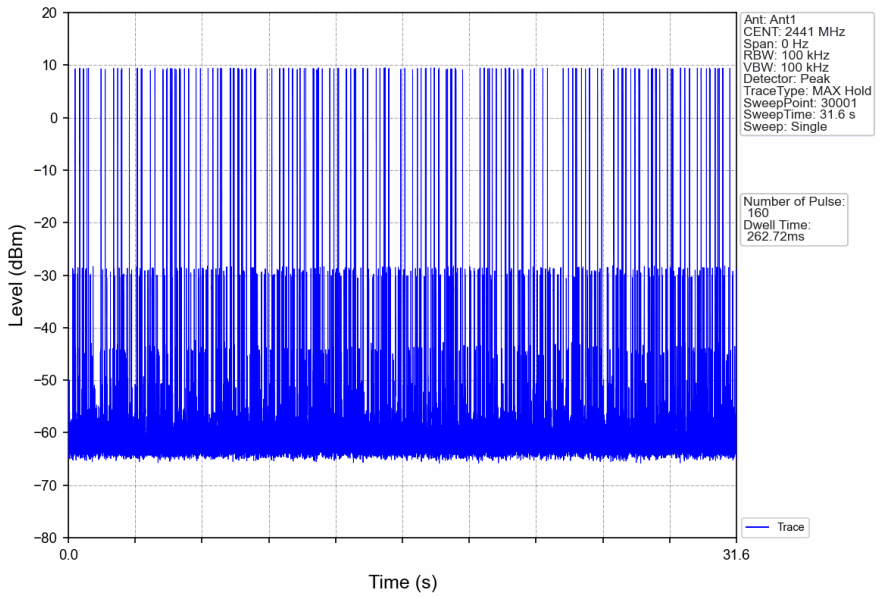
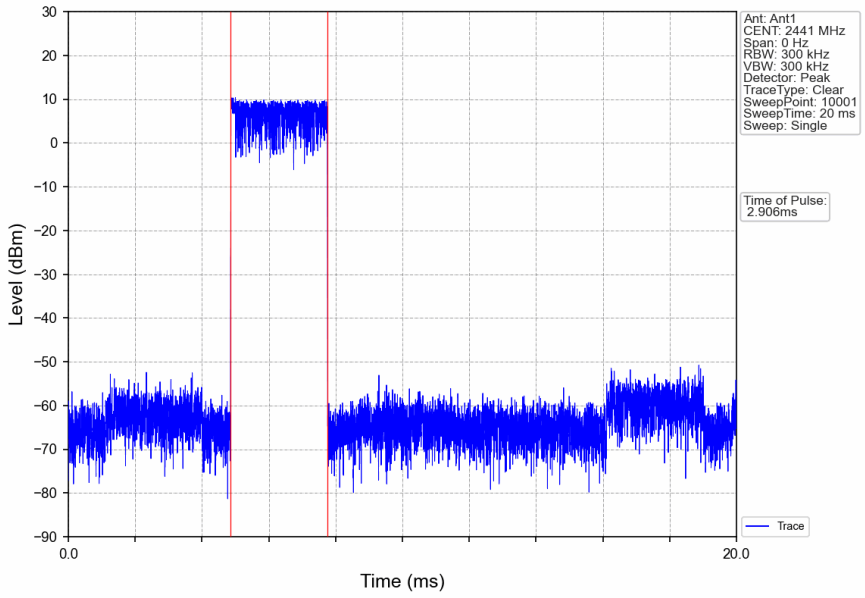


2DH5_Ant0_Hop



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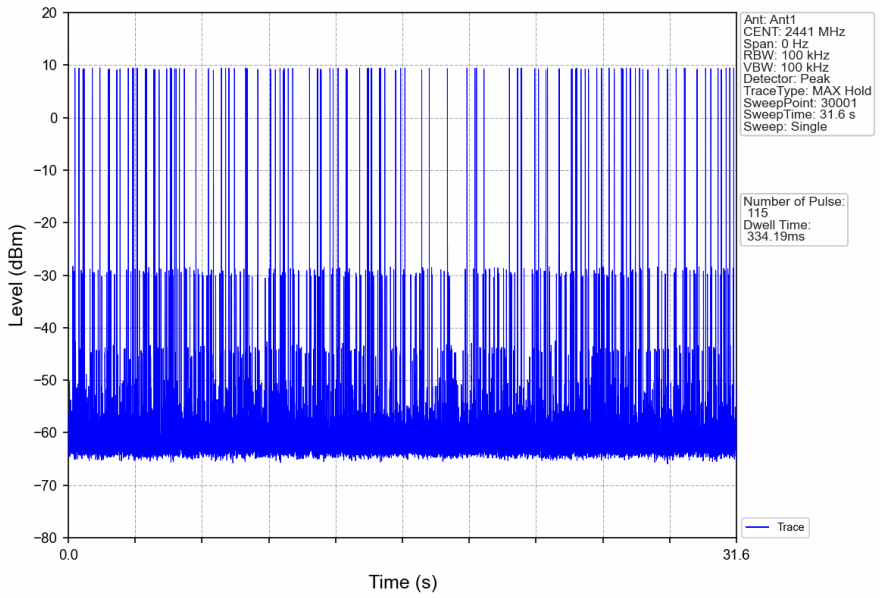
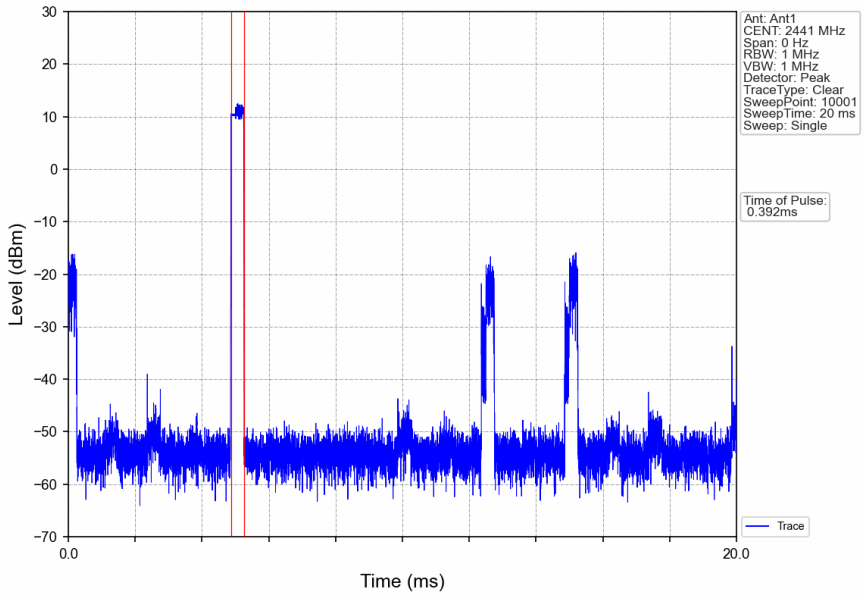


3DH1_Ant0_Hop



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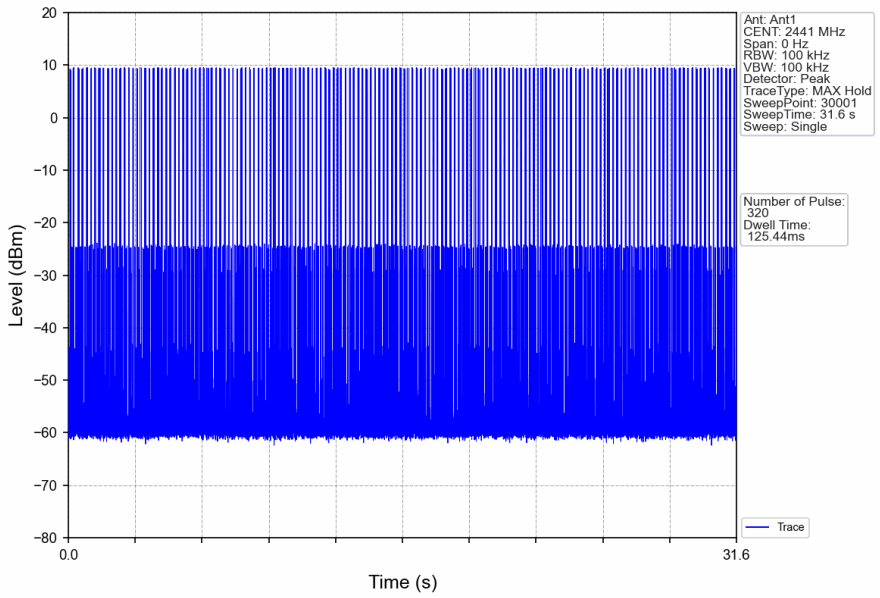
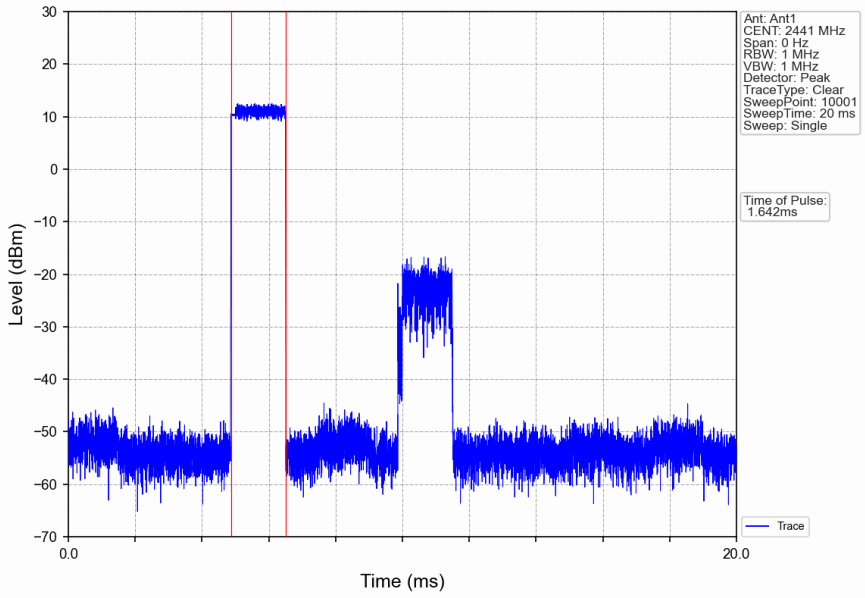


3DH3_Ant0_Hop



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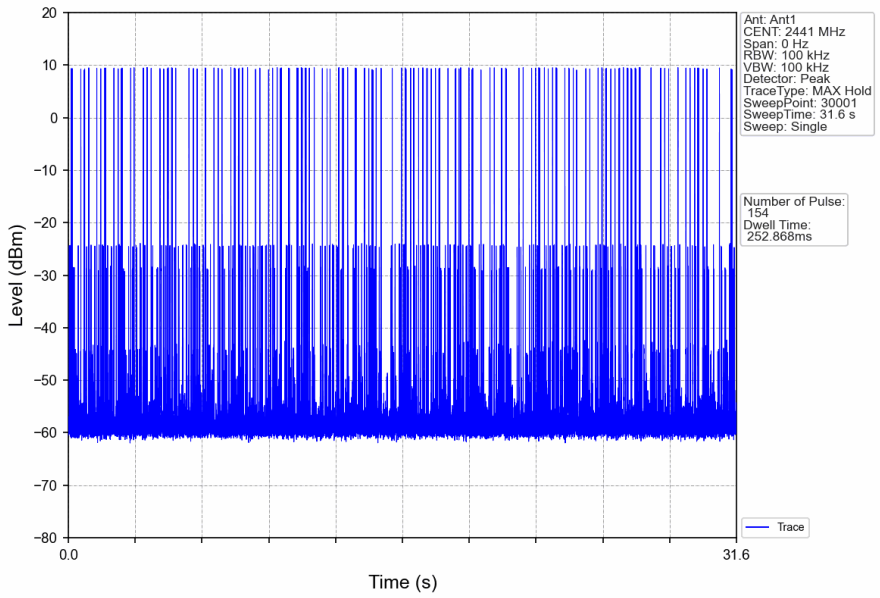
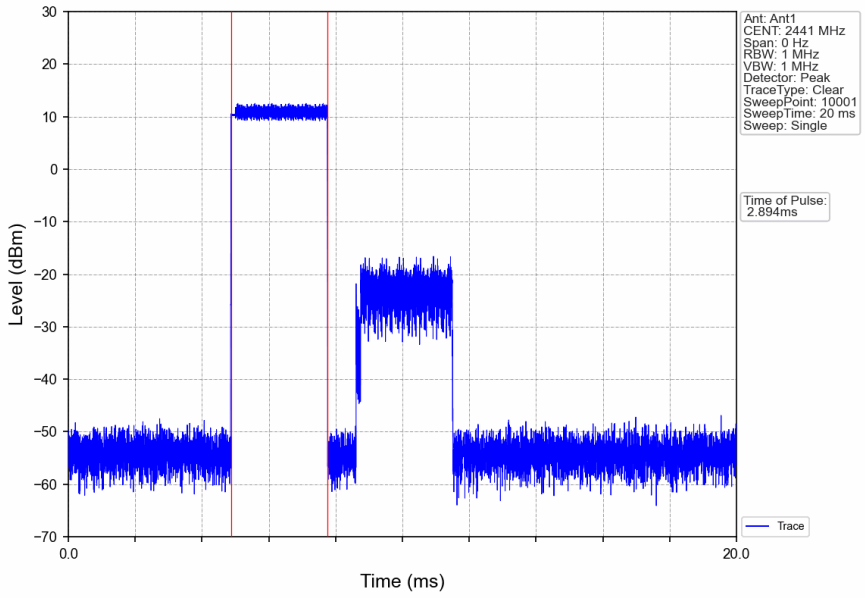


3DH5_Ant0_Hop



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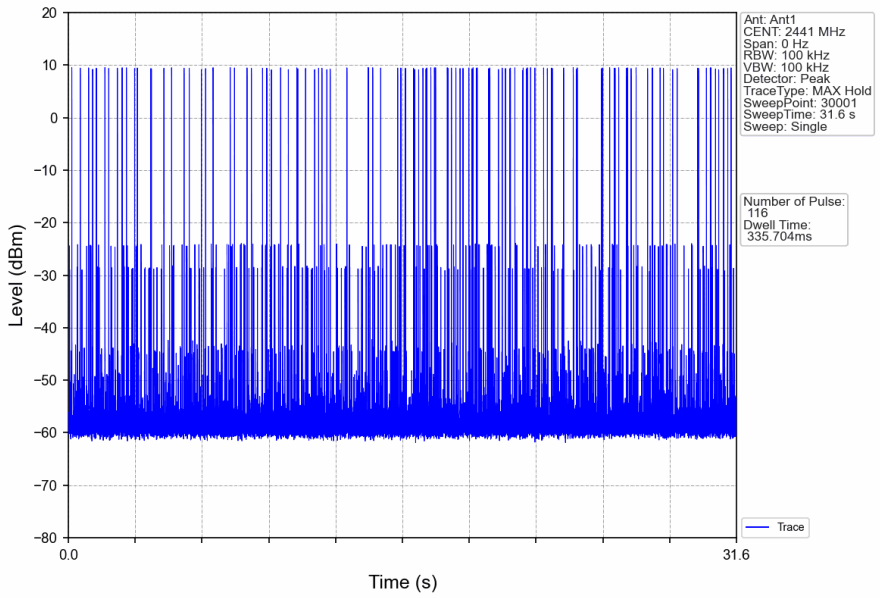

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9.7 Spurious RF Conducted Emissions

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. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
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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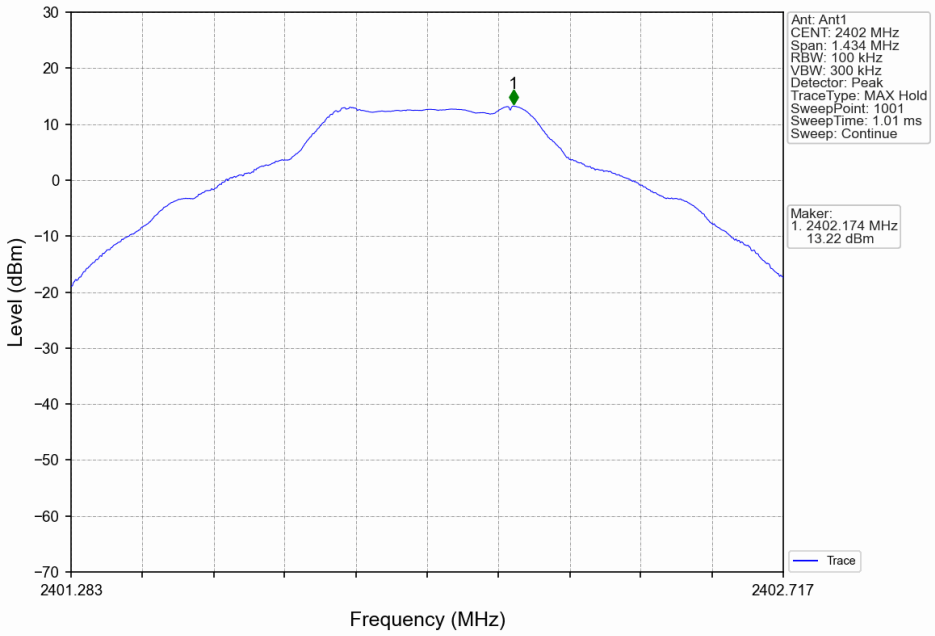
Spurious RF Conducted Emissions

Test Mode	Antenna	Channel (MHz)	Frequency Range (MHz)	Reference Level	Result (dBm)	Limit (dBm)	Verdict
DH5	Ant0	2402	Reference	13.22	13.22	---	PASS
			30~25000	30~25000	-43.09	-6.78	PASS
		2441	Reference	13.19	13.19	---	PASS
			30~25000	30~25000	-42.99	-6.78	PASS
		2480	Reference	13.08	13.08	---	PASS
			30~25000	30~25000	-43.12	-6.78	PASS
2DH5	Ant0	2402	Reference	10.04	10.04	---	PASS
			30~25000	30~25000	-49.41	-9.83	PASS
		2441	Reference	10.17	10.17	---	PASS
			30~25000	30~25000	-48.61	-9.83	PASS
		2480	Reference	10.04	10.04	---	PASS
			30~25000	30~25000	-49.37	-9.83	PASS
3DH5	Ant0	2402	Reference	10.31	10.31	---	PASS
			30~25000	30~25000	-42.30	-9.61	PASS
		2441	Reference	10.39	10.39	---	PASS
			30~25000	30~25000	-43.08	-9.61	PASS
		2480	Reference	10.29	10.29	---	PASS
			30~25000	30~25000	-43.04	-9.61	PASS

DH5_Ant0_2402_0~Reference



DH5_Ant0_2402_30~25000

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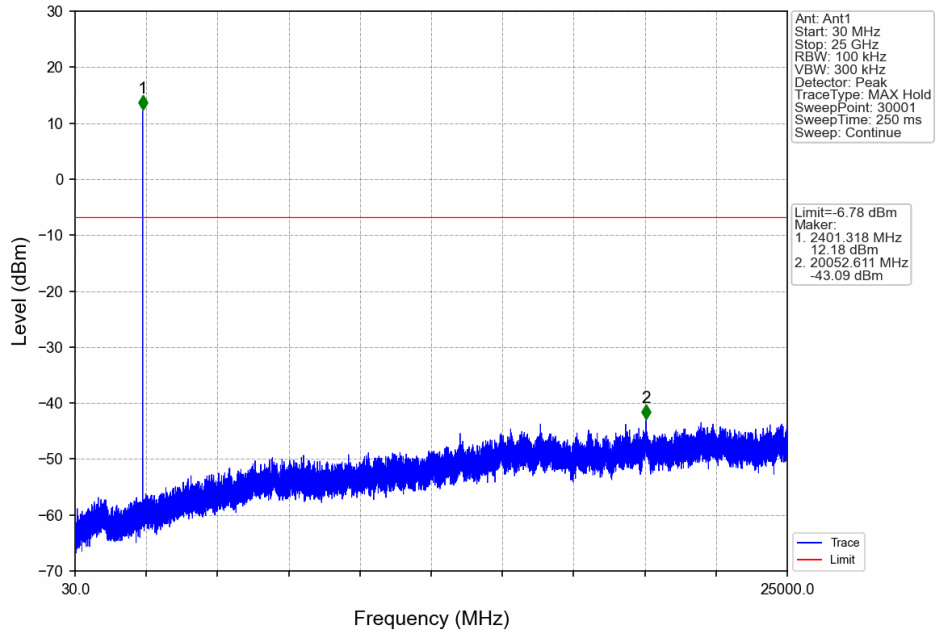
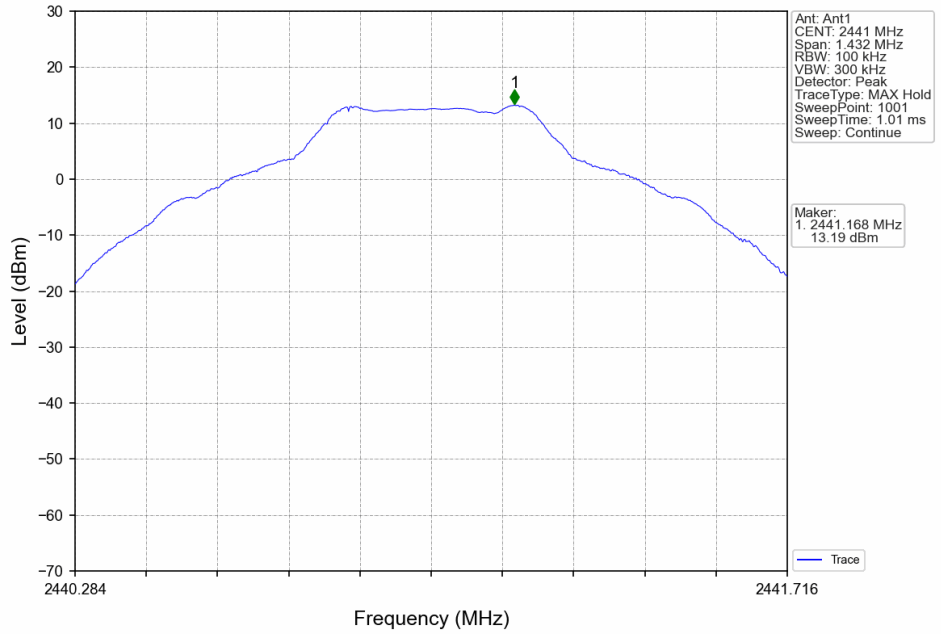


DH5_Ant0_2441_0~Reference



DH5_Ant0_2441_30~25000

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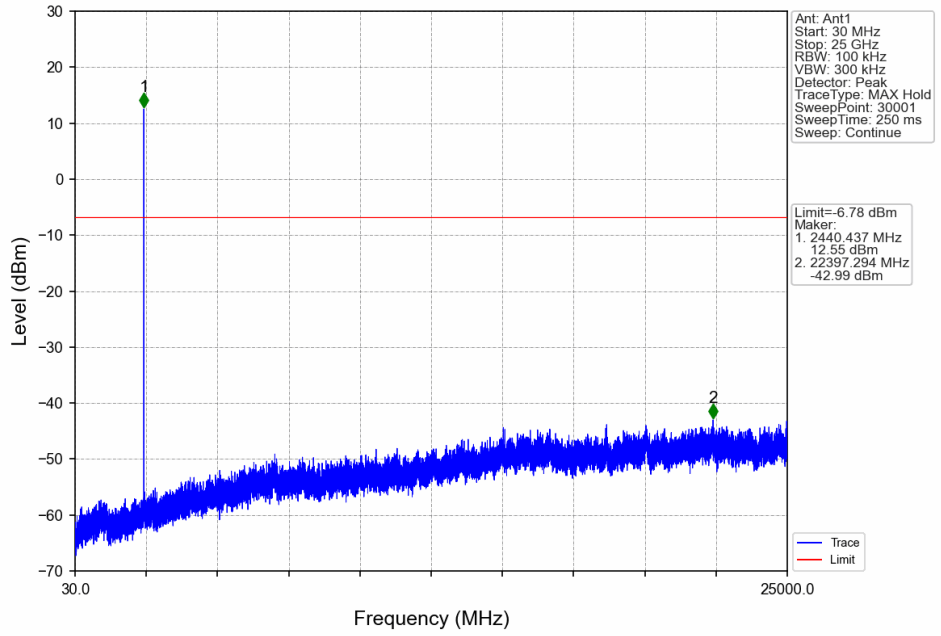
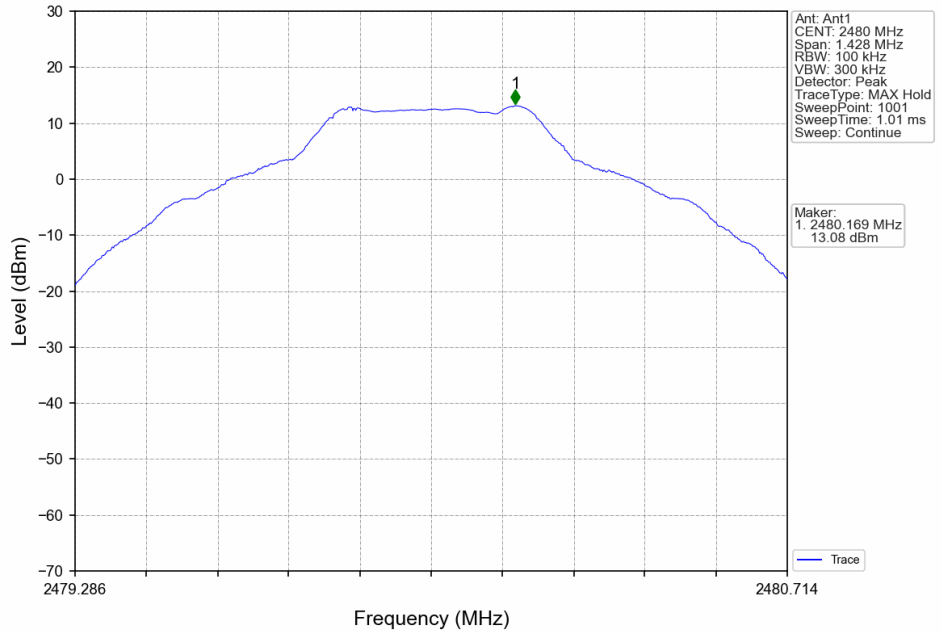


DH5_Ant0_2480_0~Reference



DH5_Ant0_2480_30~25000

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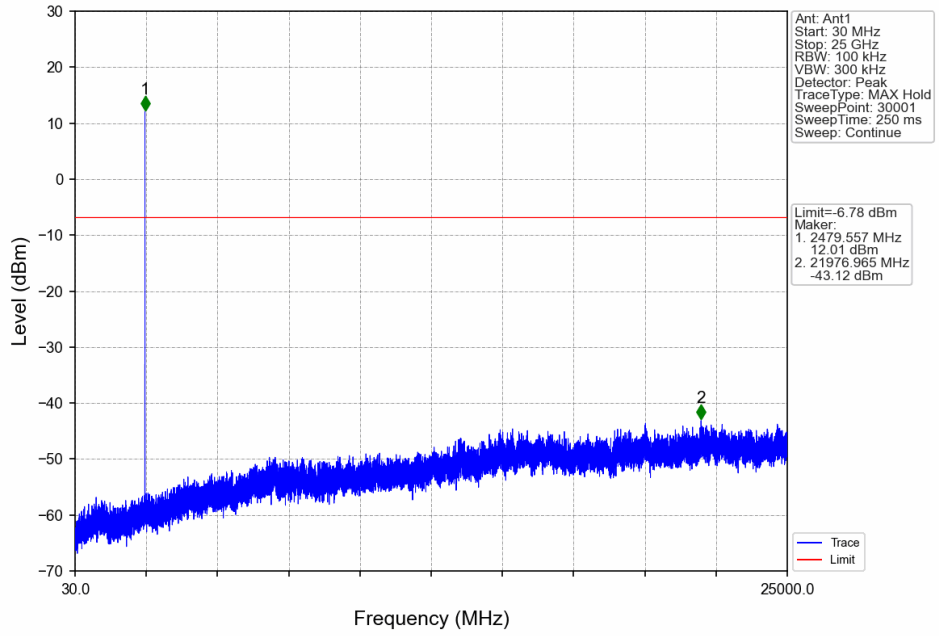
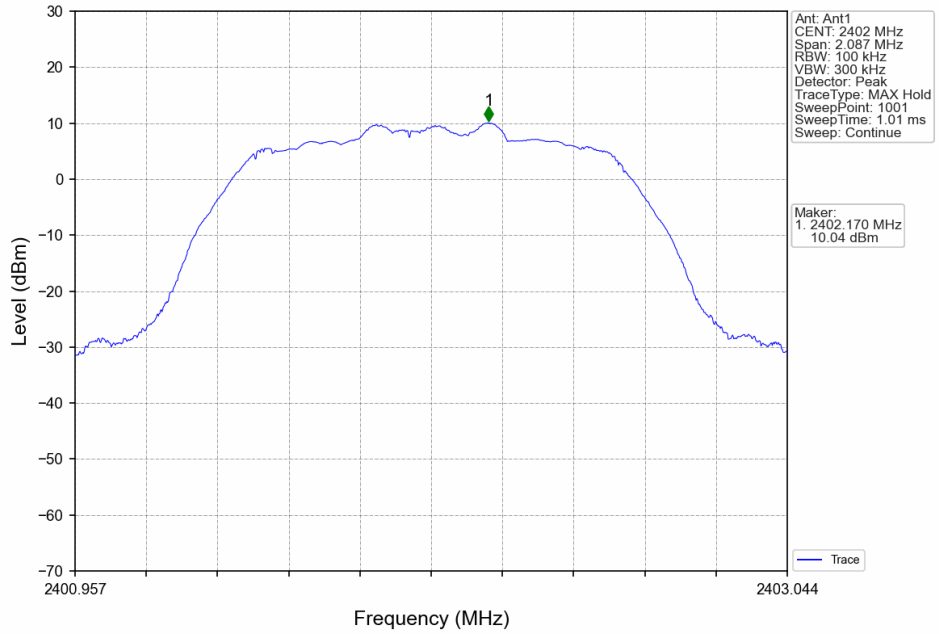


2DH5_Ant0_2402_0~Reference



2DH5_Ant0_2402_30~25000

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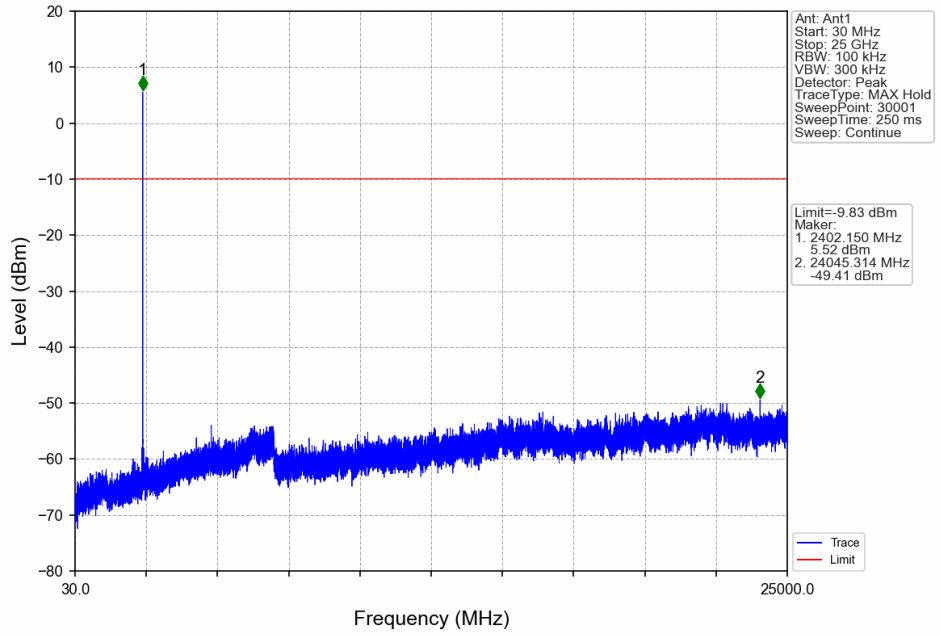
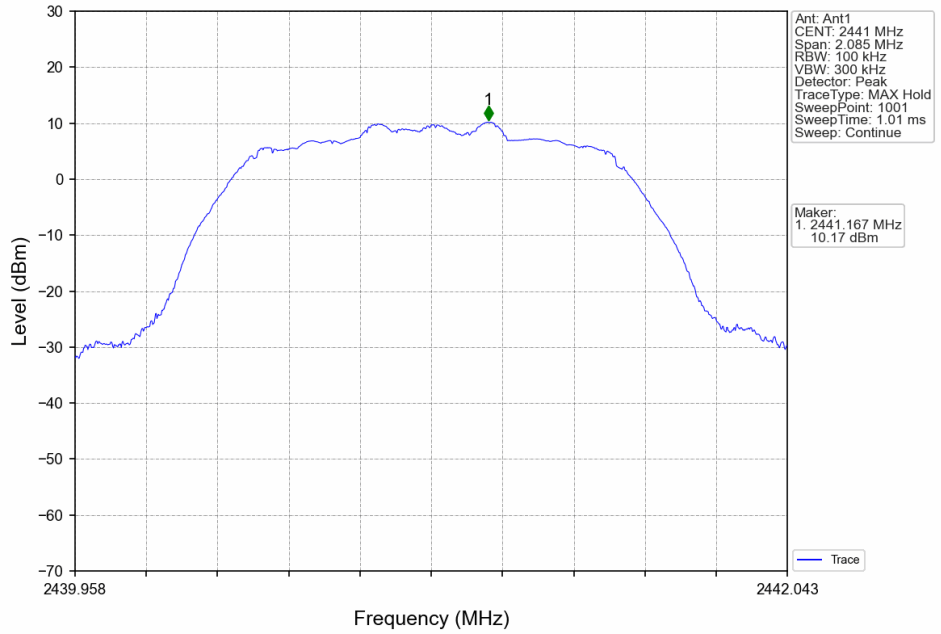


2DH5_Ant0_2441_0~Reference



2DH5_Ant0_2441_30~25000

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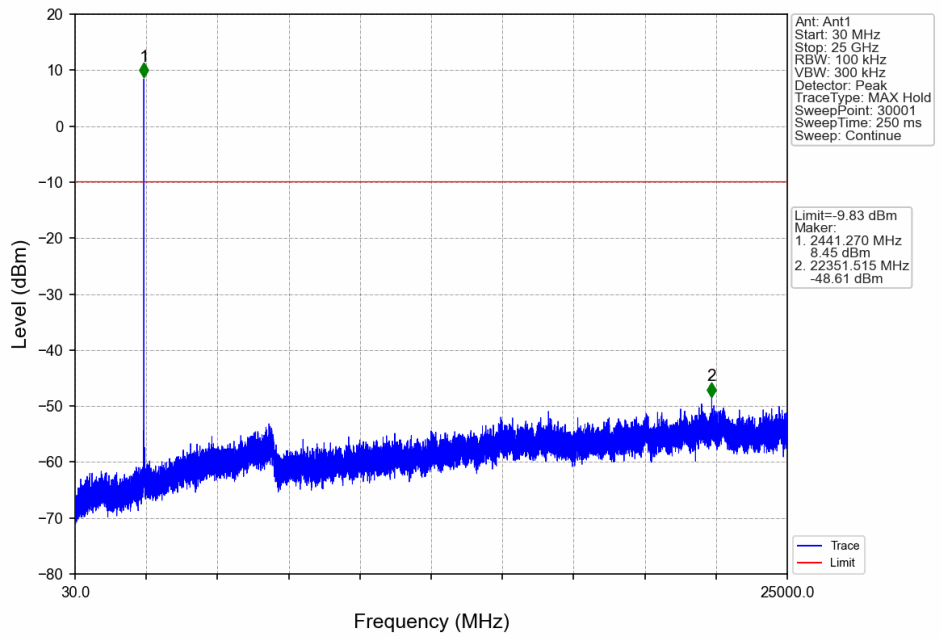
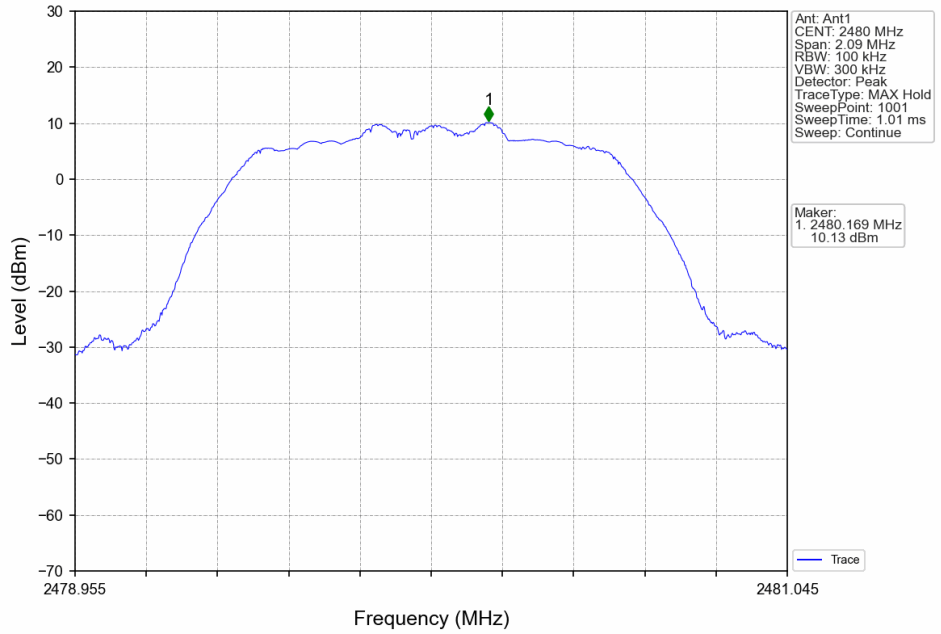


2DH5_Ant0_2480_0~Reference



2DH5_Ant0_2480_30~25000

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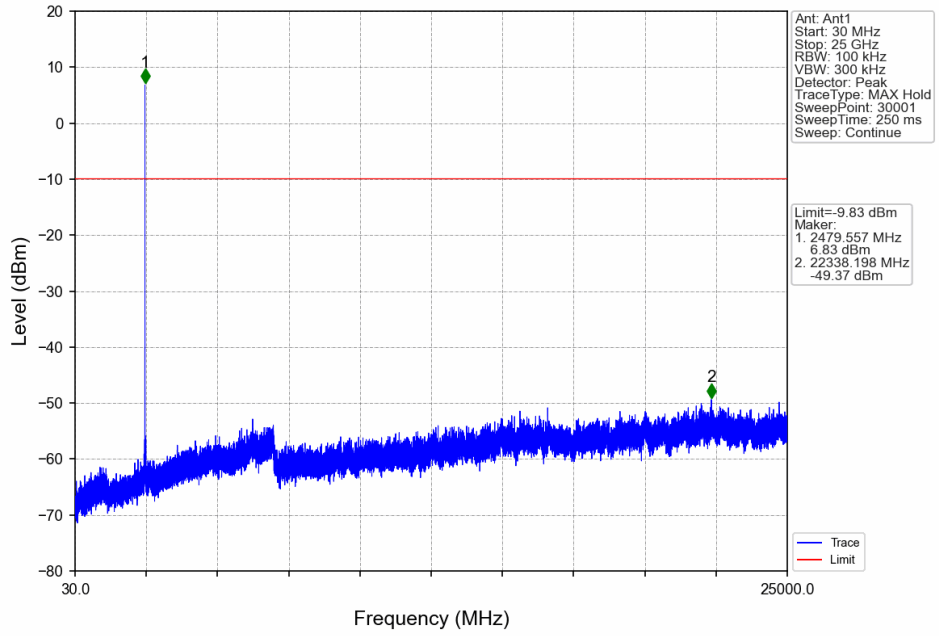

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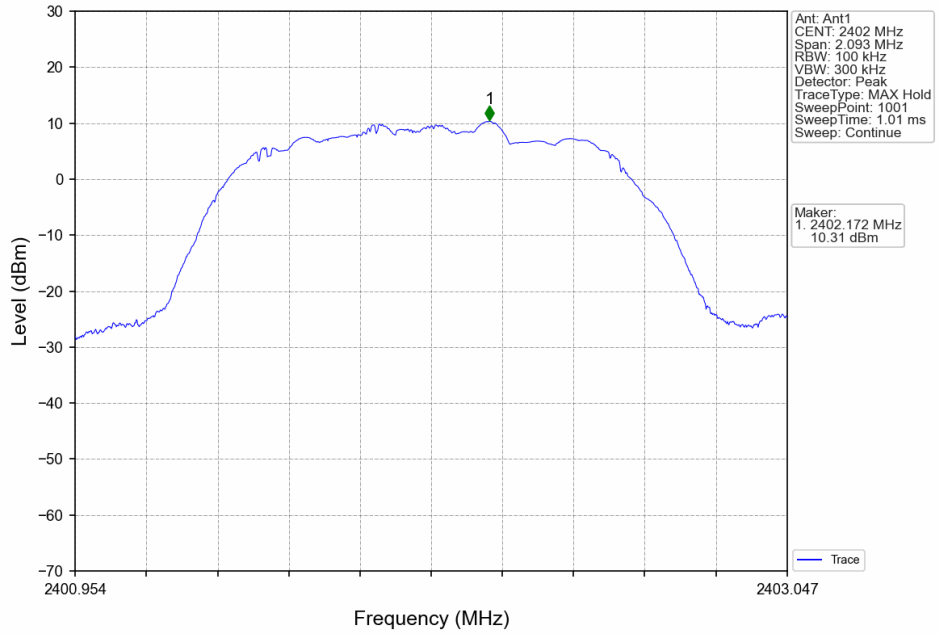

3DH5_Ant0_2402_30~25000

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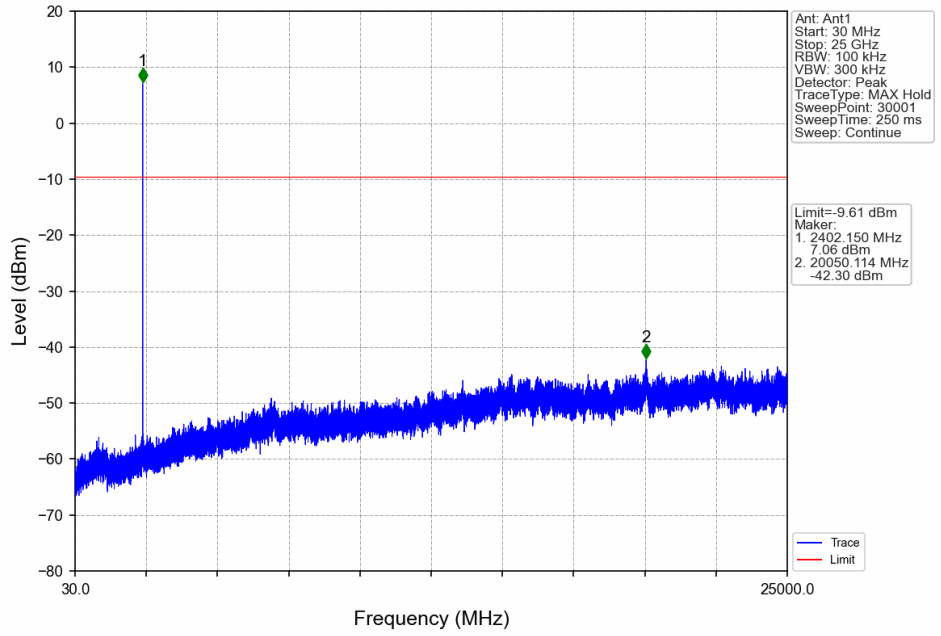

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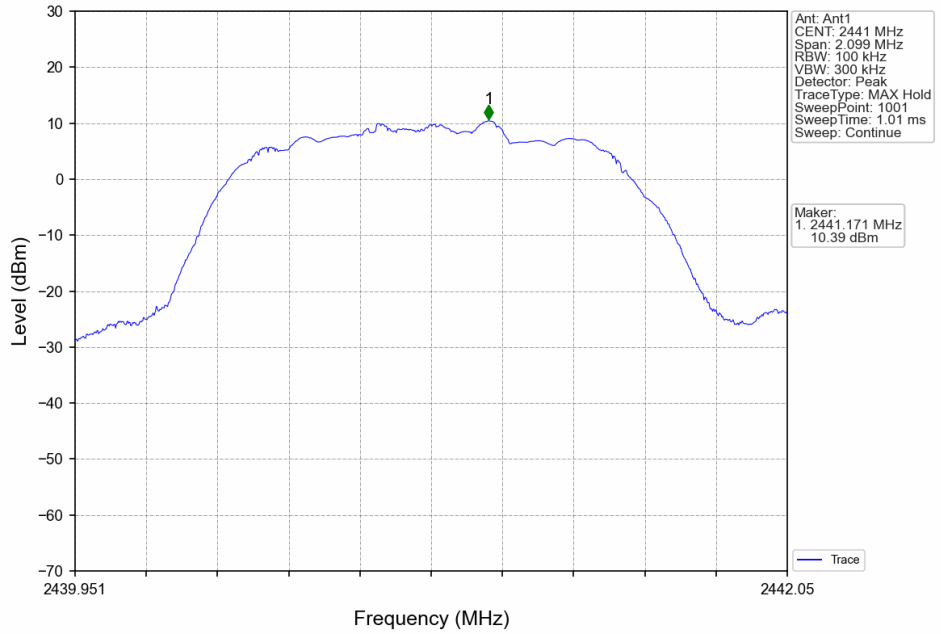

3DH5_Ant0_2441_30~25000

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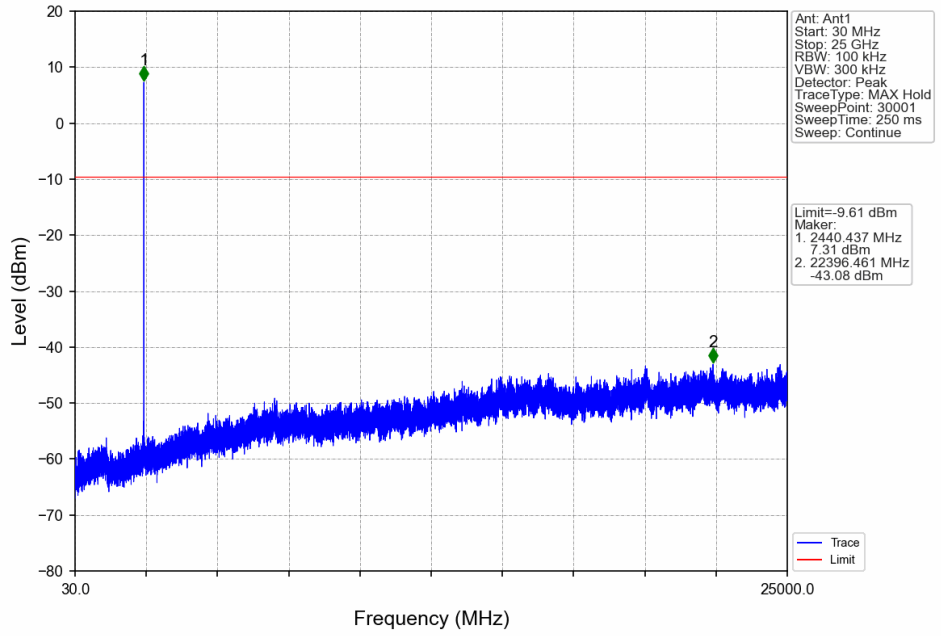

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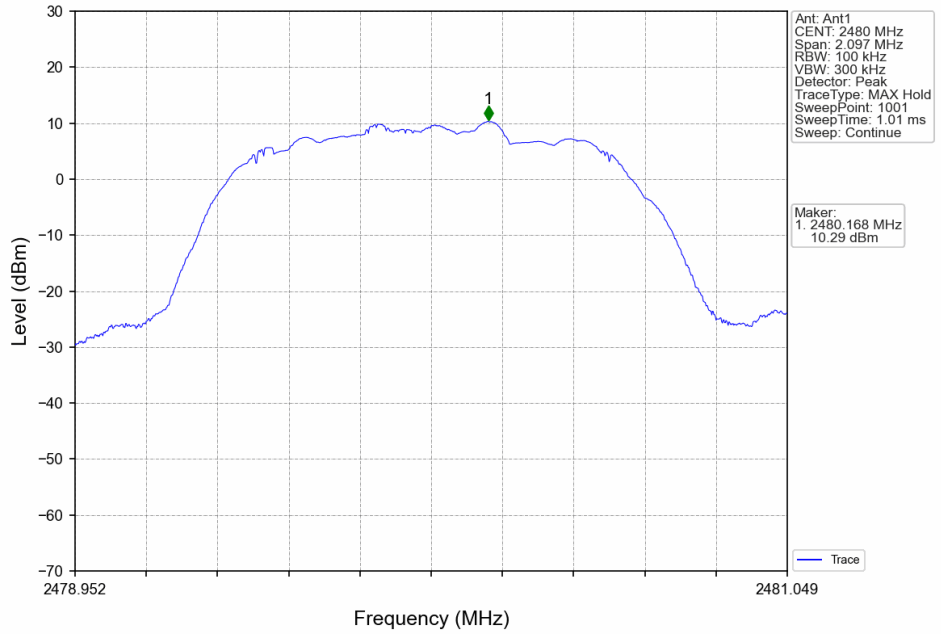

3DH5_Ant0_2480_30~25000

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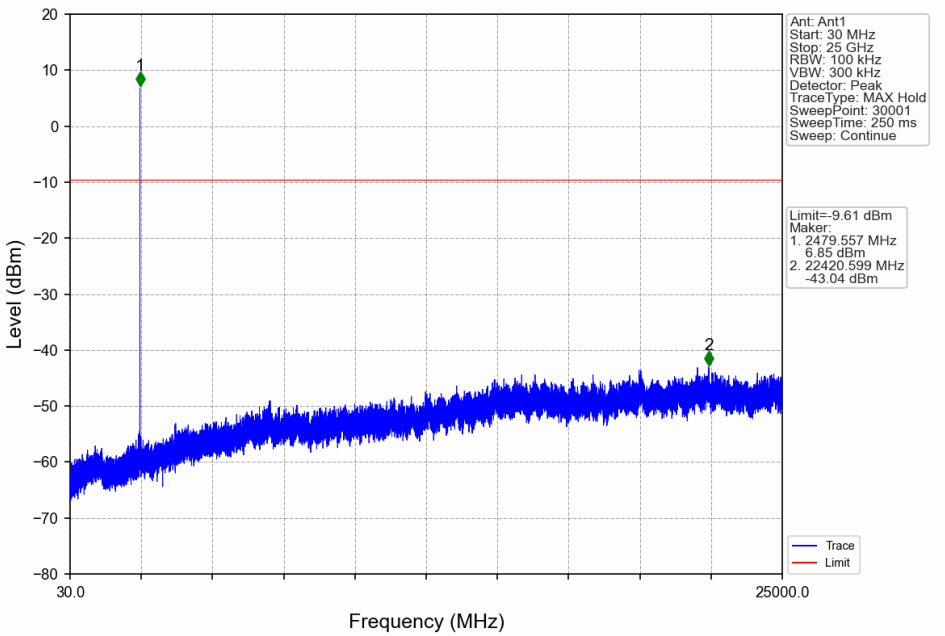

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9.8 Band Edge Testing

Test Method

1. The RF output of EUT was connected to the 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. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
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
6. Set to the maximum power setting and 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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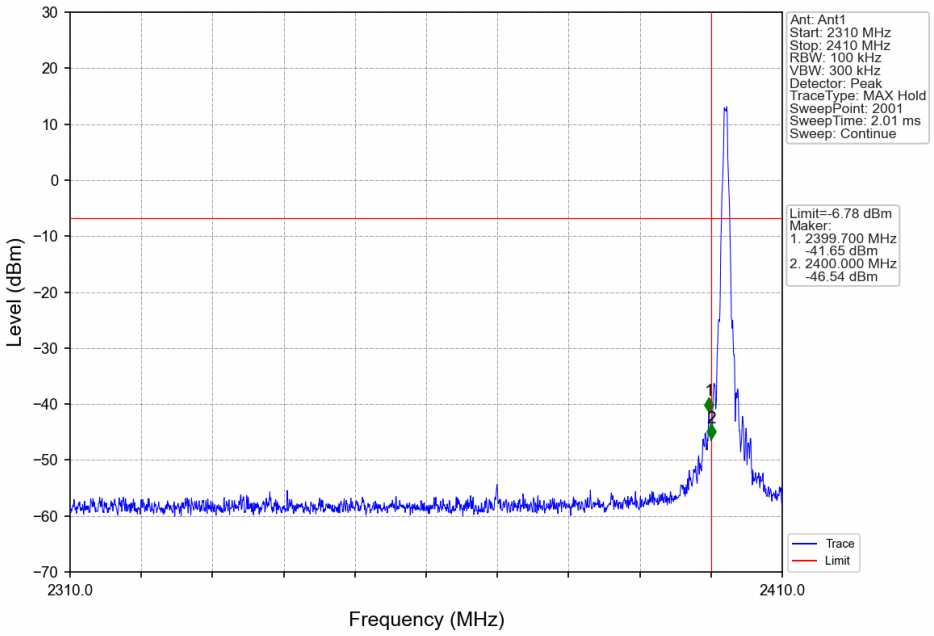
Band Edge

Test Mode	Antenna	Channel	Channel (MHz)	Reference Level (dBm)	Result (dBm)	Limit (dBm)	Verdict
DH5	Ant0	Low	2402	13.22	-41.65	<=-6.78	PASS
		High	2480	13.22	-50.25	<=-6.78	PASS
		Low	Hop_2402	13.22	-43.09	<=-6.78	PASS
		High	Hop_2480	13.22	-52.64	<=-6.78	PASS
2DH5	Ant0	Low	2402	10.17	-41.39	<=-9.83	PASS
		High	2480	10.17	-56.05	<=-9.83	PASS
		Low	Hop_2402	10.17	-45.25	<=-9.83	PASS
		High	Hop_2480	10.17	-53.44	<=-9.83	PASS
3DH5	Ant0	Low	2402	10.39	-43.19	<=--9.61	PASS
		High	2480	10.39	-49.63	<=--9.61	PASS
		Low	Hop_2402	10.39	-45.40	<=--9.61	PASS
		High	Hop_2480	10.39	-51.29	<=--9.61	PASS

DH5_Ant0_Low_2402



DH5_Ant0_High_2480

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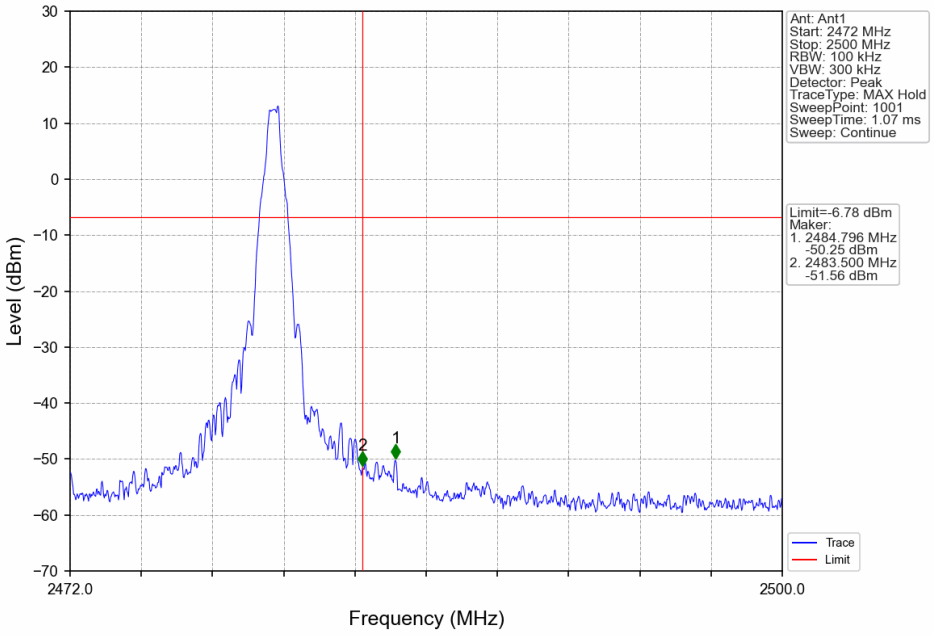
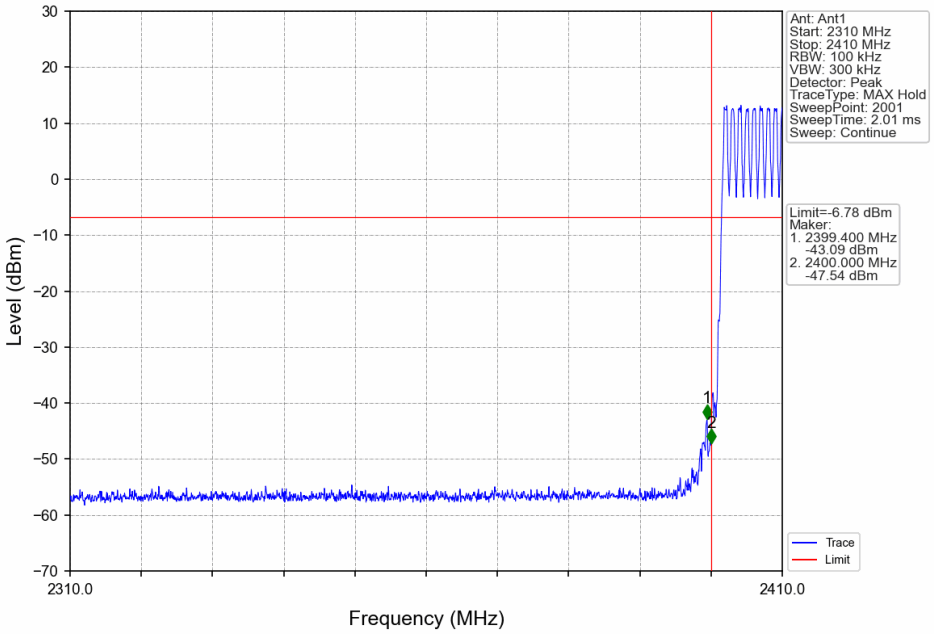


DH5_Ant0_Low_Hop_2402



DH5_Ant0_High_Hop_2480

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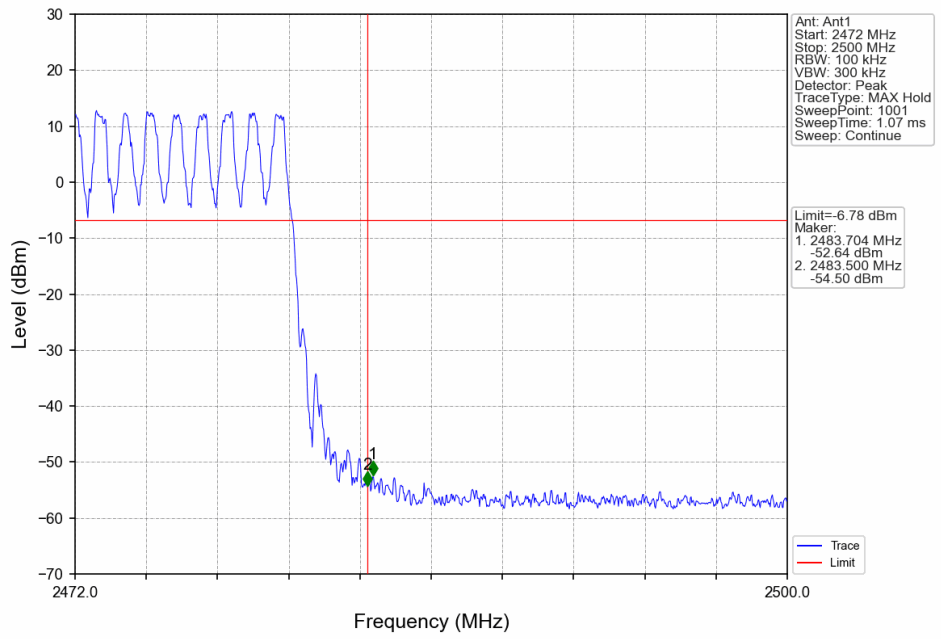
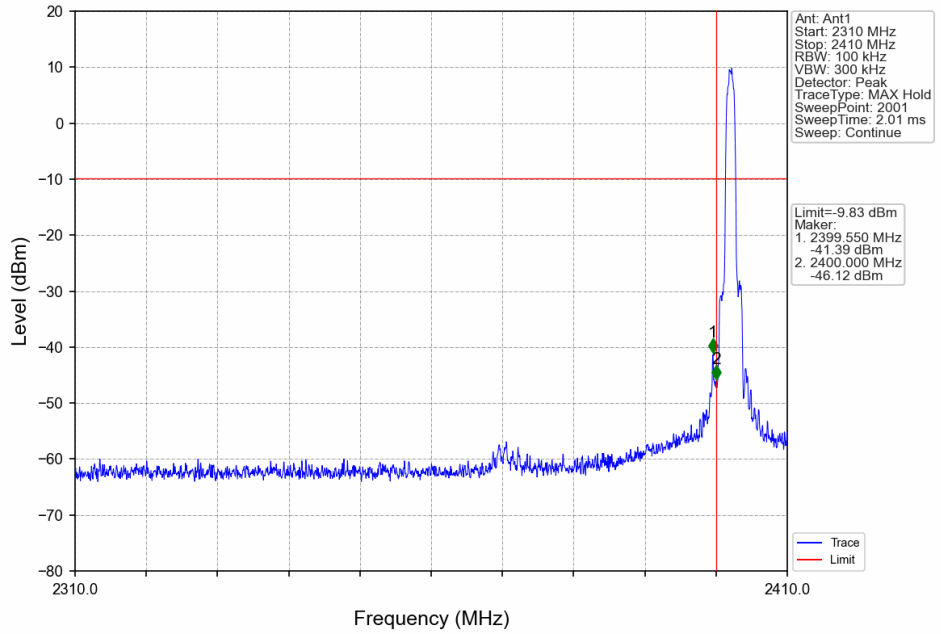


2DH5_Ant0_Low_2402



2DH5_Ant0_High_2480

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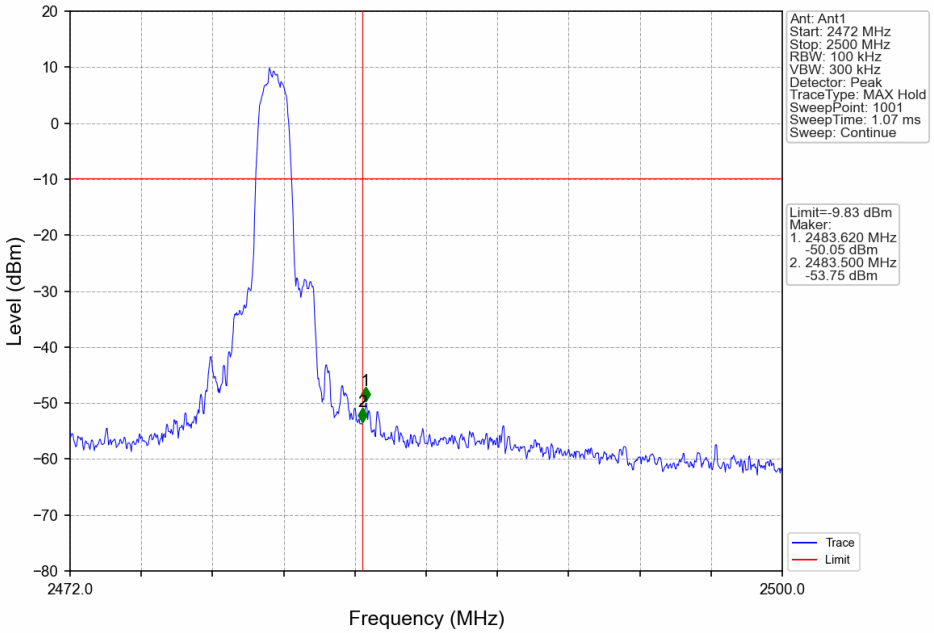
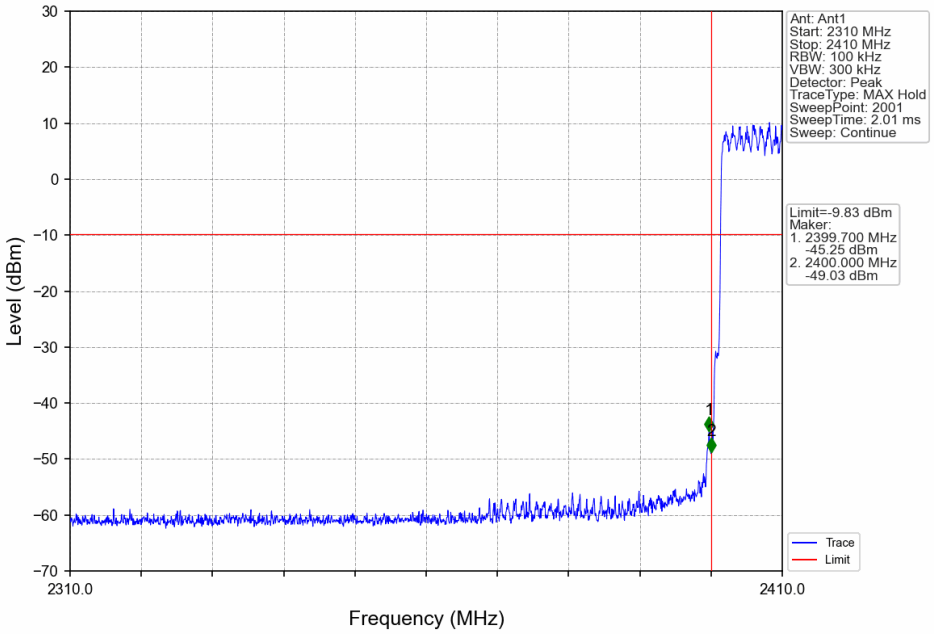


2DH5_Ant0_Low_Hop_2402



2DH5_Ant0_High_Hop_2480

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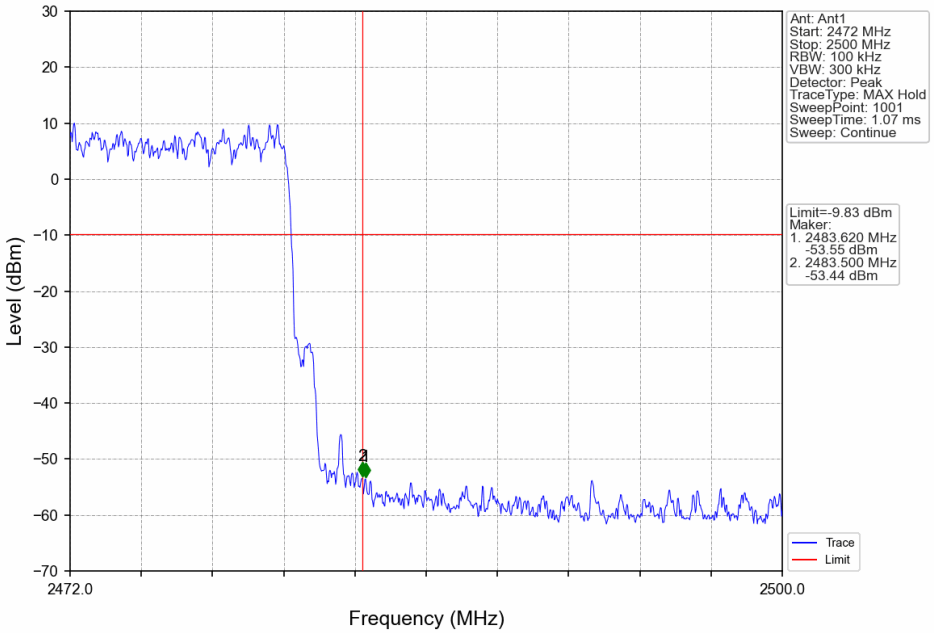
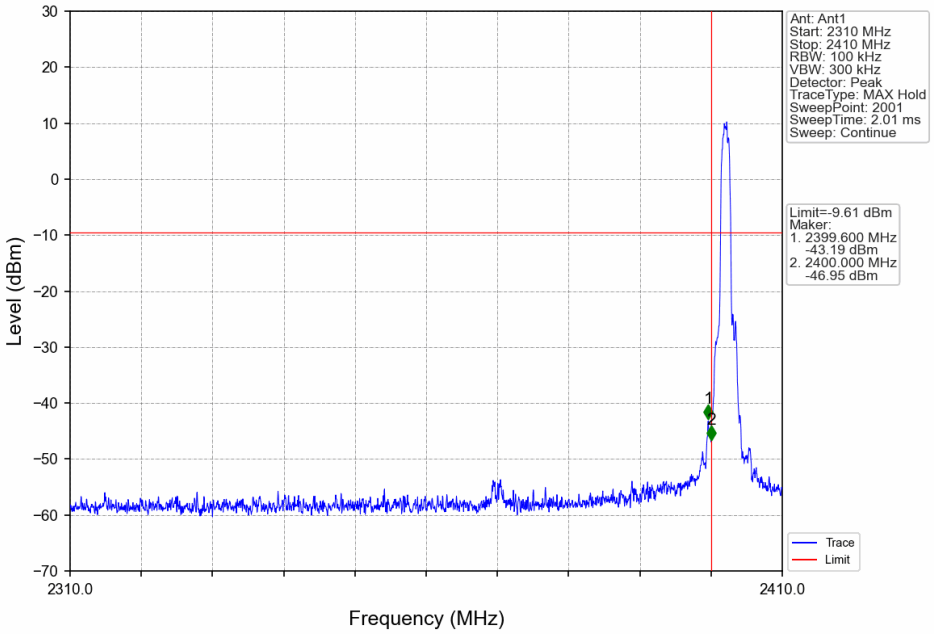


3DH5_Ant0_Low_2402



3DH5_Ant0_High_2480

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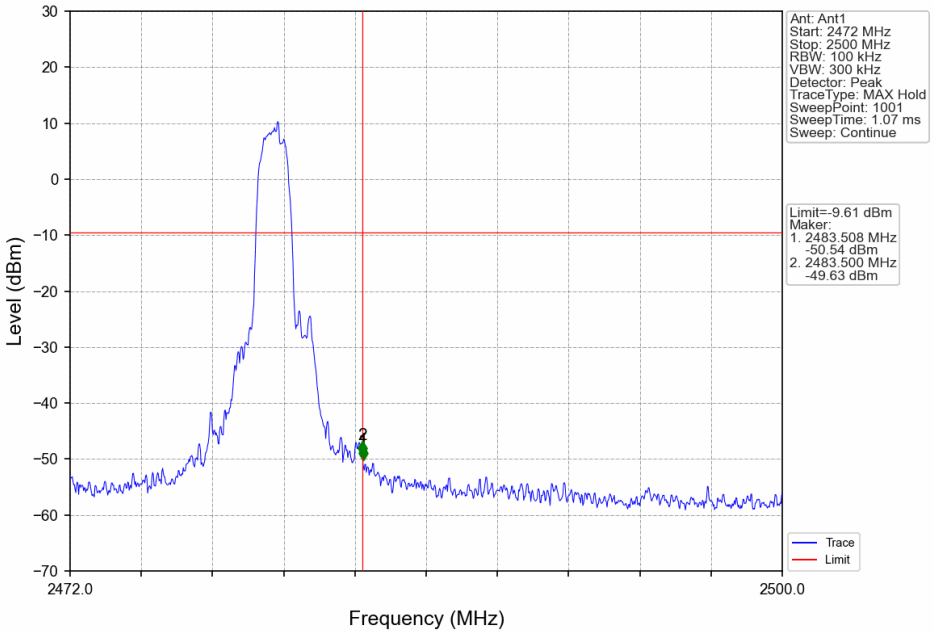
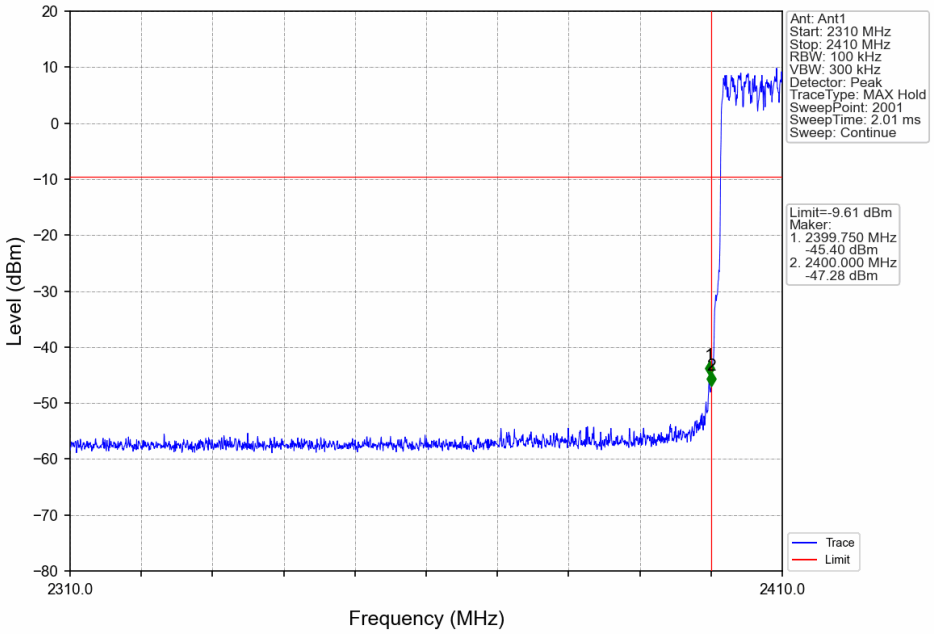


3DH5_Ant0_Low_Hop_2402



3DH5_Ant0_High_Hop_2480

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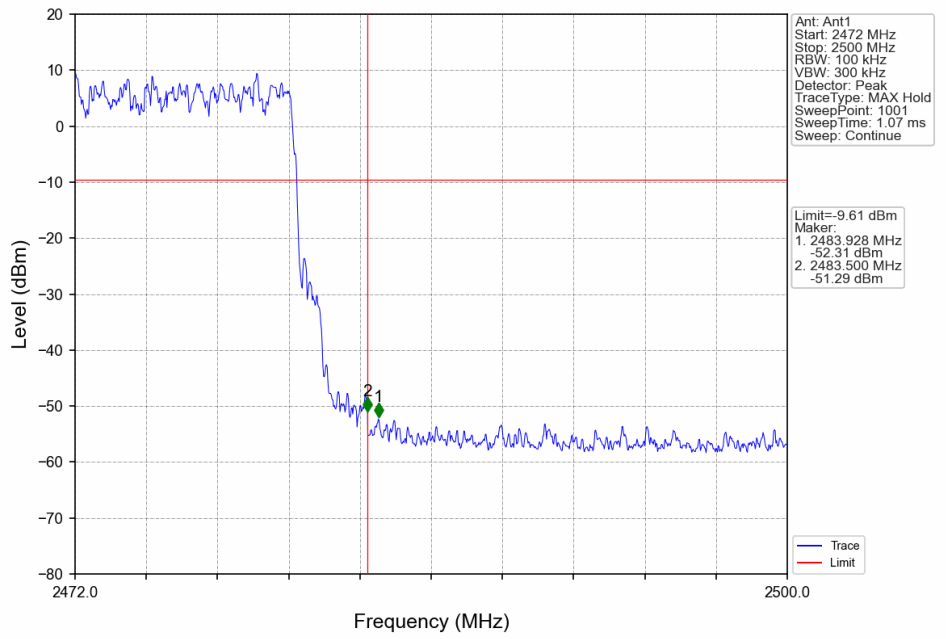

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9.9 Spurious Radiated Emissions for Transmitter

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 spectrum analyzer settings According to C63.10:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥1 GHz for peak measurement.
   For average measurement:
   VBW = 10 Hz, when duty cycle is no less than 98 percent.
   VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum
   power control level for the tested mode of operation.
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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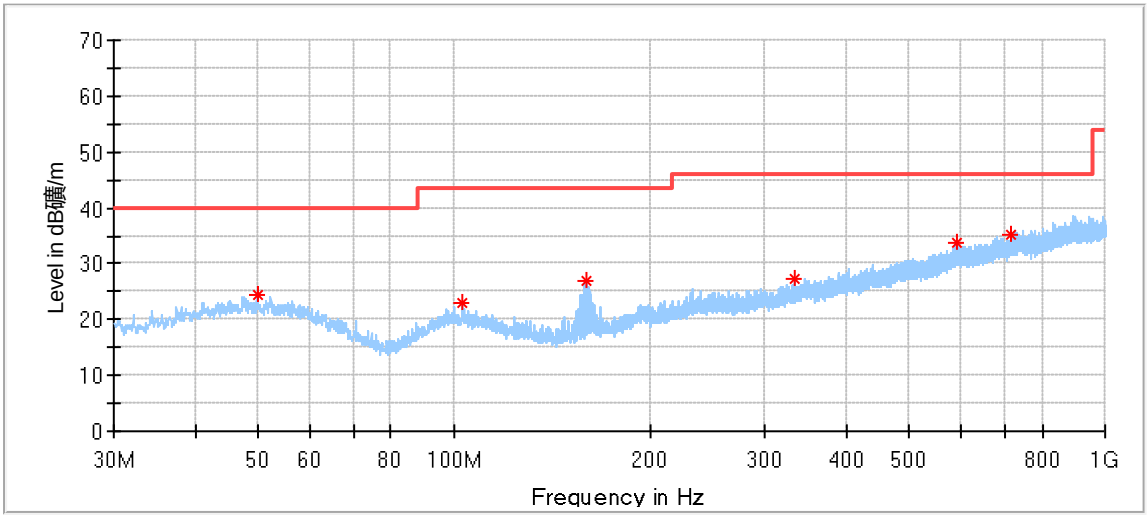
Spurious radiated emissions for transmitter

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.

The only worse case (which is subject to the maximum EIRP, GFSK mode) test result is listed in the report.

Transmitting spurious emission test result as below:

Test data_30MHz to 1000MHz



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.831111	24.38	40.00	15.62	200.0	H	331.0	18.30
102.750000	22.91	43.50	20.59	200.0	H	286.0	16.01
159.225556	26.76	43.50	16.74	200.0	H	170.0	13.12
332.586111*	27.26	46.00	18.74	100.0	H	11.0	19.48
592.384444	33.64	46.00	12.36	200.0	H	202.0	24.98
716.544444	35.12	46.00	10.89	100.0	H	241.0	26.52

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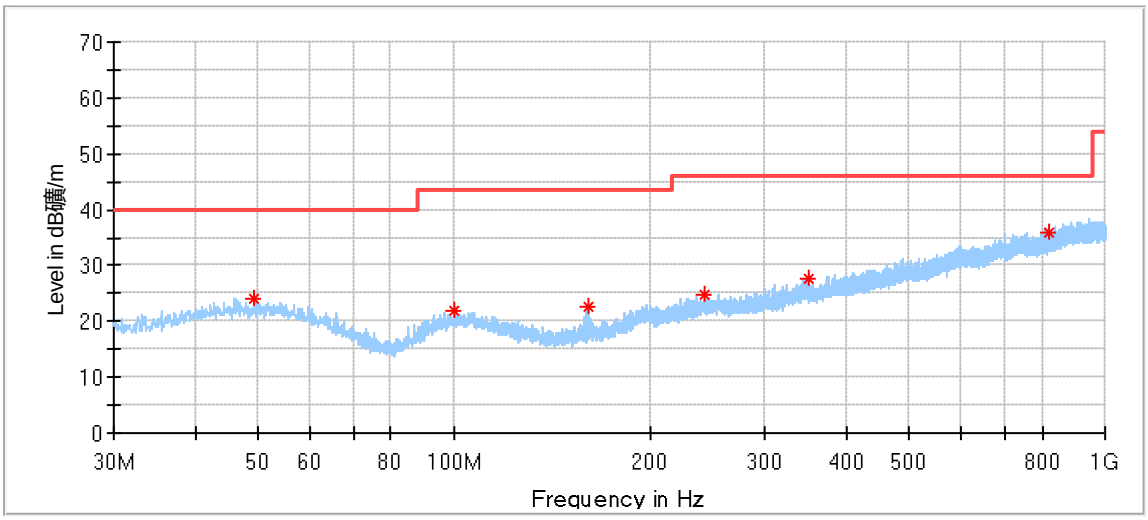

Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.184444	24.20	40.00	15.80	100.0	V	175.0	18.29
100.001667	21.76	43.50	21.74	100.0	V	93.0	15.97
160.249444	22.57	43.50	20.93	200.0	V	277.0	13.13
242.915000*	24.63	46.00	21.37	100.0	V	212.0	17.38
350.692778	27.57	46.00	18.43	200.0	V	52.0	20.08
819.633889	36.06	46.00	9.94	200.0	V	166.0	27.93

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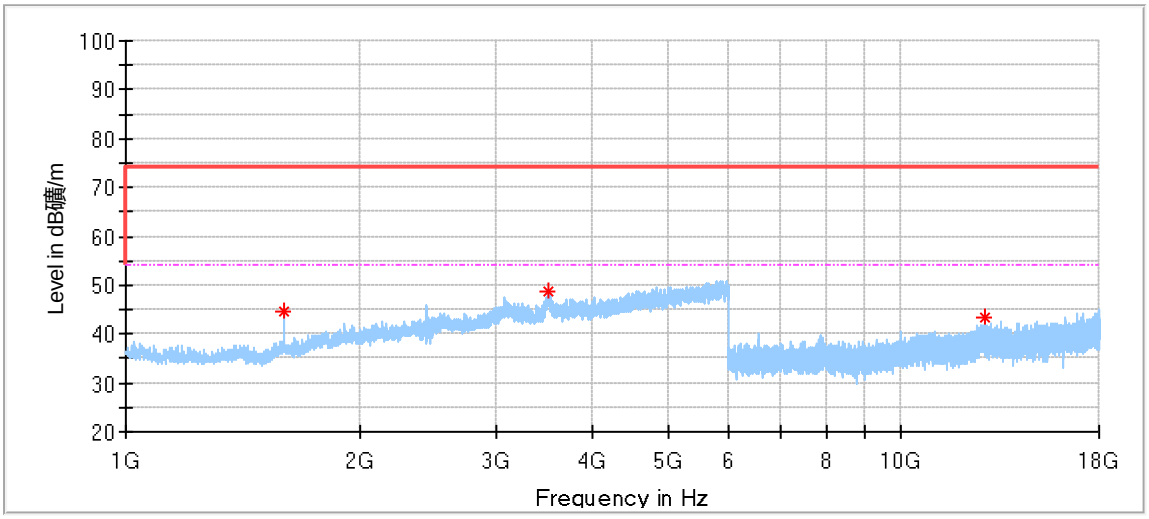
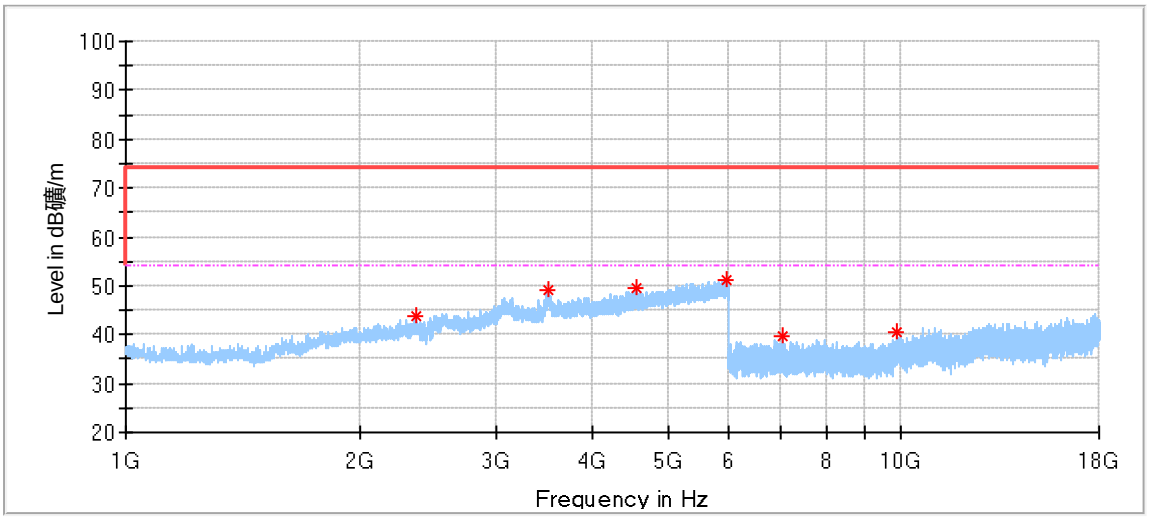
Test data_1000MHz to 18000MHz
DH5_Low Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1597.500000	44.76	74.00	29.24	150.0	H	337.0	-6.88
3505.000000	48.72	74.00	25.28	150.0	H	173.0	4.24
12837.500000	43.29	74.00	30.71	150.0	H	152.0	12.95



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2374.000000*	43.76	74.00	30.24	150.0	V	347.0	-2.59
3511.500000	48.93	74.00	25.07	150.0	V	182.0	3.91
4554.500000*	49.58	74.00	24.42	150.0	V	141.0	4.31
5962.500000	51.21	74.00	22.79	150.0	V	193.0	7.97
7034.500000	39.77	74.00	34.23	150.0	V	180.0	6.40
9873.500000	40.42	74.00	33.58	150.0	V	140.0	9.37

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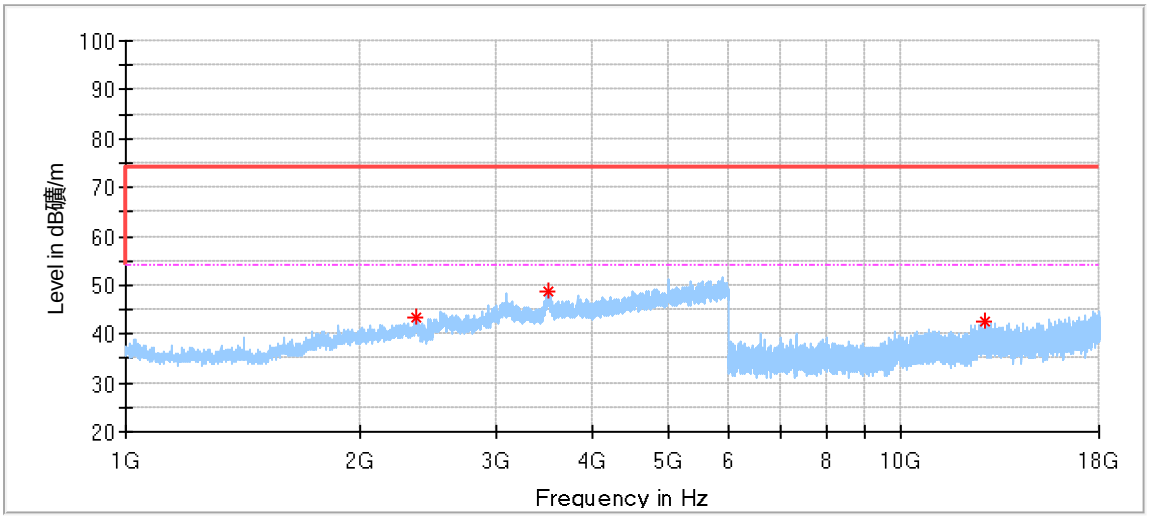
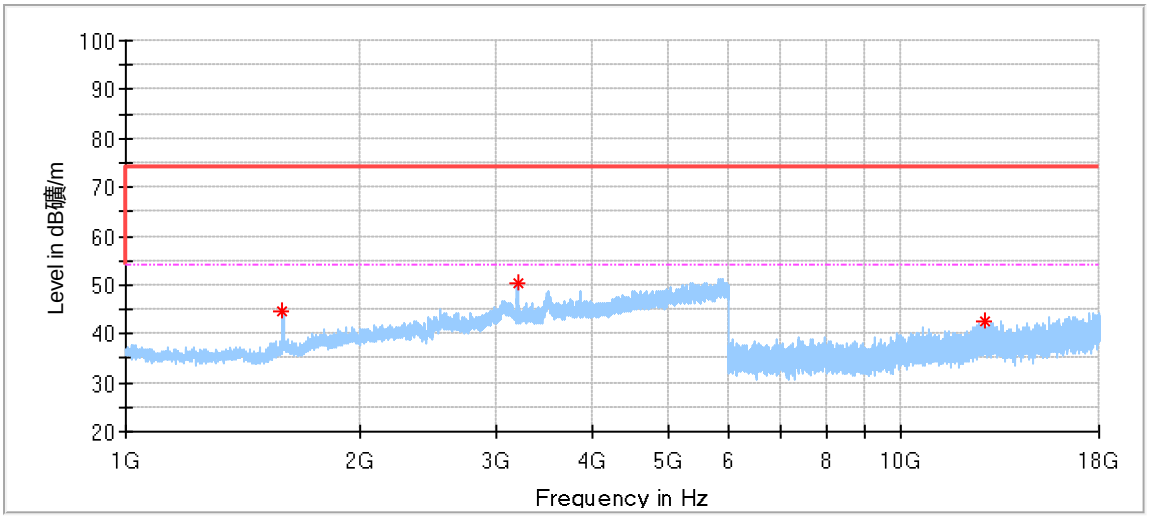
DH5_Middle Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2370.500000*	43.39	74.00	30.61	150.0	H	129.0	-2.62
3509.000000	48.64	74.00	25.36	150.0	H	222.0	4.03
12862.000000	42.40	74.00	31.60	150.0	H	0.0	12.94



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1594.500000*	44.63	74.00	29.37	150.0	V	306.0	-6.92
3199.000000	50.50	74.00	23.50	150.0	V	347.0	0.58
12787.500000	42.57	74.00	31.43	150.0	V	271.0	12.96

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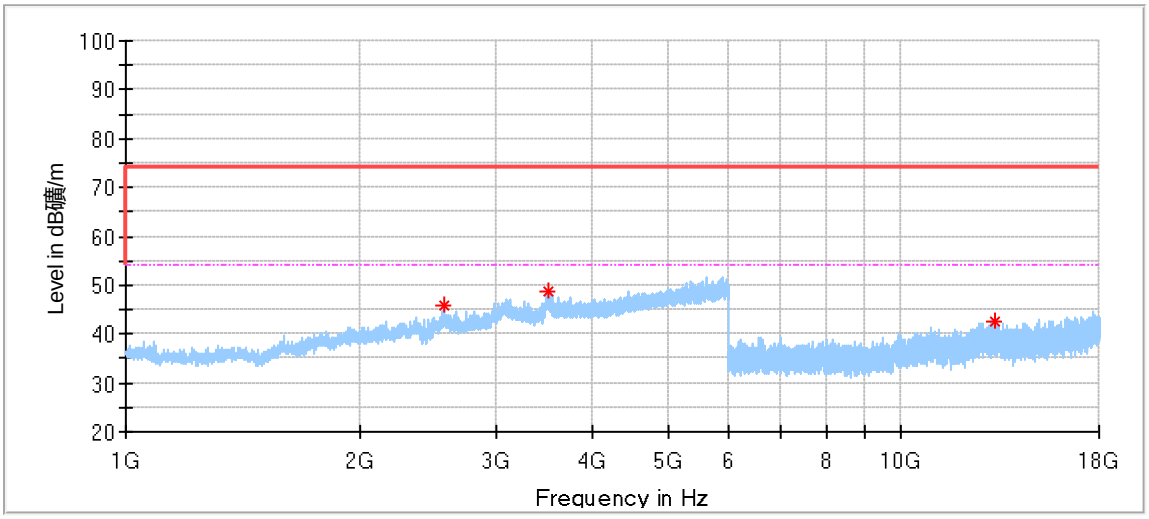
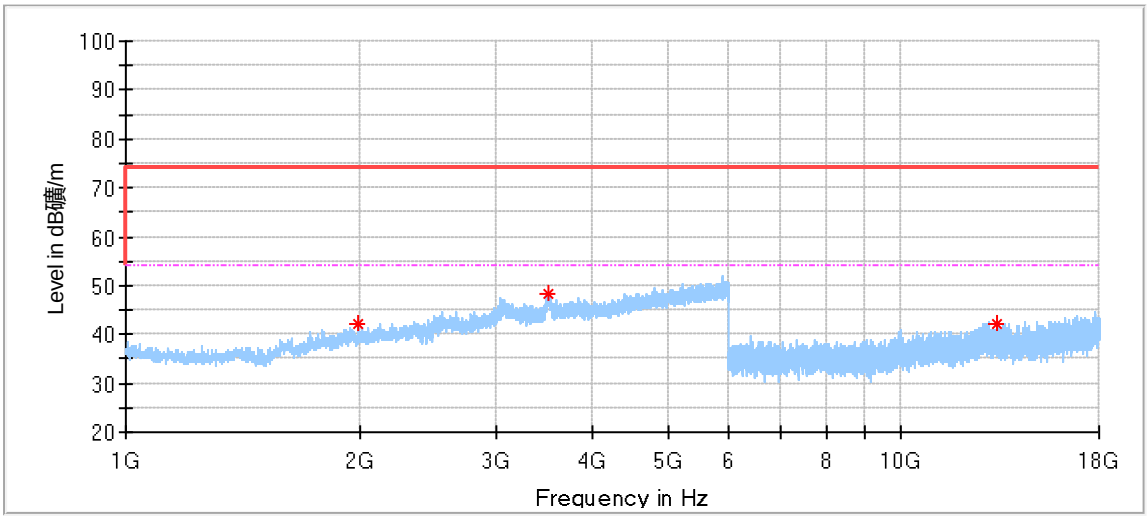
DH5_Hight Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2569.000000	45.73	74.00	28.27	150.0	H	2.0	-1.23
3499.000000	48.68	74.00	25.32	150.0	H	244.0	4.41
13183.000000	42.73	74.00	31.27	150.0	H	49.0	12.95



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1998.000000	42.23	74.00	31.77	150.0	V	326.0	-4.01
3512.500000	48.15	74.00	25.85	150.0	V	29.0	3.85
13267.500000*	42.06	74.00	31.94	150.0	V	332.0	12.84

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) Corrected Amplitude = Read level + Corrector factor
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 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	Version 10.35.02	N/A	N/A
Shielding Room	TDK	CSR #2	68-4-90-19-005	----	3	2025-10-15

Radiated Emission Test, SAC-3 #2

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	2024-3-5
Horn Antenna	Rohde & Schwarz	HF907	68-4-80-14-005	102294	1	2024-5-28
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	1	2024-8-7
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	Version 10.35.02	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

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) 150kHz-30MHz (for test using AMN ENV216)	3.33dB
Uncertainty for Radiated Emission in 3m chamber (68-4-90-14-001) 9kHz-30MHz	4.70dB
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) 30MHz-1000MHz	Horizontal: 4.59dB; Vertical: 4.75dB;
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) 1000MHz-18000MHz	Horizontal: 5.08dB; Vertical: 5.09dB;
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) above 18000MHz	Horizontal: 3.14dB; Vertical: 3.12dB
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.31dB Frequency test involved: 0.6×10-8 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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