FCC / ISED – TEST REPORT

Report Number	:	**607902504901R01**	Date of Issue:	**July 4, 2025**
Model/HVIN	:	**SBC-D12**		
Product Type	:	**MasterMind 4 C4**		
Applicant	:	Dayton Industrial Co., Ltd		
Address	:	2-12 Kwai Fat Road, 11-A Kwai Chung, New Territories, Hong Kong.		
Production Facility	:	KENDY ELECRTONICS (DONGGUAN) CO., LTD.		
Address	:	XIN SI HUANG TANG VILLAGE HENG LI TOWN, DONGGUAN CITY, GUANGDONG, CHINA.		
Test Result	:	■ **Positive** ☐ Negative		
Total pages including Appendices	:	**48**		

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1 Table of Contents

1 Table of Contents 2
2 Details about the Test Laboratory 3
3 Description of the Equipment Under Test 4
4 Summary of Test Standards 5
5 Summary of Test Results 6
6 General Remarks 7
7 Test Setups 8
8 Systems Test Configuration 10
9 Technical Requirement 11
9.1 Conducted Emission 11
9.2 Conducted Peak Output Power & EIRP 12
9.3 Power Spectral Density 15
9.4 6 dB Bandwidth 18
9.5 99% bandwidth 21
9.6 Spurious RF Conducted Emissions 24
9.7 Band Edge 29
9.8 Spurious Radiated Emissions for Transmitter 32
10 Test Equipment List 47
11 System Measurement Uncertainty 48

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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 Building 12 & 13, Zhiheng Wisdomland Business Park, Guankou Erlu, Nantou, Nanshan District Shenzhen 518052 P.R. China
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299
FCC Registration No.:	514049
FCC Deignation No.:	CN5009
IC Registration No.:	10320A
ISED CAB Identifier:	CN0077

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	MasterMind 4 C4
Model no.:	SBC-D12
Hardware Version Identification No. (HVIN)	SBC-D12
Firmware Version Identification No. (FVIN)	Rx7.2.8.3.0
Product Marketing Name (PMN)	MasterMind 4 C4
Brand name:	N/A
FCC ID:	O4GC4
IC:	7666A-C4
Rating:	DC 12V (Powered by Bike Battery) Or DC 5.0V (Back-up Power by USB Port)
RF Transmission Frequency:	BLE: 2402MHz – 2480MHz
No. of Operated Channel:	40
Modulation: Transmitter Rate:	GFSK 1M, 2M bps
Antenna Type:	PCB Antenna
Antenna	Gain: 0 dBi
Description of the EUT:	The EUT is considered as a wireless device which has Bluetooth and ANT+ features, it is to be used in an E-Bike and it is mainly powered by the E-bike's battery during operation. It can also be charged via its USB type-C port for inside 3.7VDC 240mAh rechargeable battery which is for the repairing, data backup and maintenance by Manufacturer only and can't power EUT alone any time. More details of EUT technical specification please refer to the User's Manual Only BLE measurement is 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 10-1-2023 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 + A1 + A2						
Test Condition		Test Site	Test Result			Test Environment
			Pass	Fail	N/A	
§15.207 & RSS-GEN 8.8	Conducted emission AC power port	Site 1	☐	☐	☒	T: 24.8℃ H: 53.7%
§15.247 (b) (3) & RSS-247 5.4(d)	Conducted peak output power	Site 1	☒	☐	☐	T: 24.8℃ H: 53.7%
RSS-247 5.4(d)	Equivalent Isotropic Radiated Power	Site 1	☒	☐	☐	T: 24.8℃ H: 53.7%
§15.247(a)(2) & RSS-247 5.2(a) & RSS-GEN 6.7	6dB bandwidth and 99% Occupied Bandwidth	Site 1	☒	☐	☐	T: 24.8℃ H: 53.7%
§15.247(e) & RSS-247 5.2(b)	Power spectral density	Site 1	☒	☐	☐	T: 24.8℃ H: 53.7%
§15.247(d) & RSS-247 5.5	Spurious RF conducted emissions	Site 1	☒	☐	☐	T: 24.8℃ H: 53.7%
§15.247(d) & RSS-247 5.5	Band edge	Site 1	☒	☐	☐	T: 24.8℃ H: 53.7%
§15.247(d) & §15.209 & §15.205 & RSS-247 5.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	Site 1	☒	☐	☐	T: 24.7℃ H: 49.3%
§15.203 & RSS-Gen 6.8	Antenna requirement	See note 2	☒	☐	☐	--

Note 1: N/A=Not Applicable.
Note 2: The EUT uses a PCB Antenna, which gain is 0 dBi. In accordance to §15.203 & RSS-Gen 6.8, it is considered sufficiently to comply with the provisions of this section.
Note 3: T :Temperature, H: Humidity

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6 General Remarks

Remarks

All the test result of this report is based on the sample of main model: **SBC-D12.**

This submittal(s) (test report) is intended for **FCC ID: O4GC4**, **IC: 7666A-C4**, complies with Section 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:	May 28, 2025
Testing Start Date:	May 28, 2025
Testing End Date:	June 20, 2025

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

Reviewed by:	Prepared by:	Tested by:
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Section Manager	EMC Project Engineer	Test Engineer

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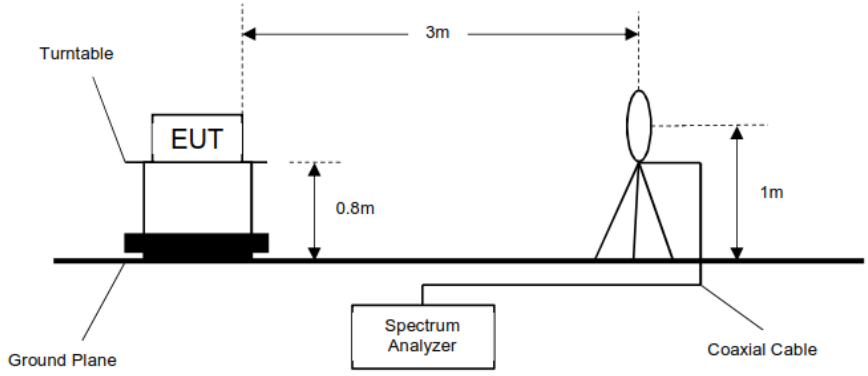
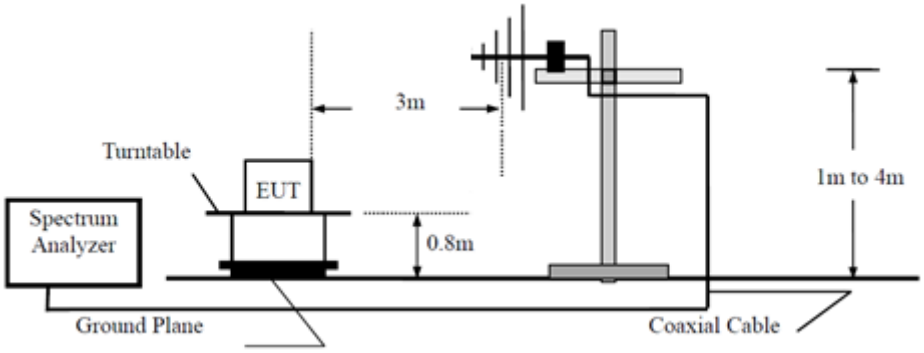
7 Test Setups

7.1 Radiated test setups

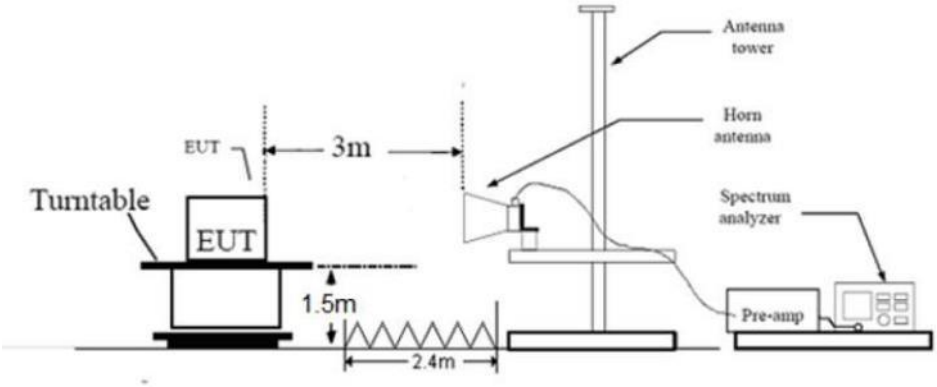
9kHz - 30MHz



30MHz - 1GHz



Above 1GHz



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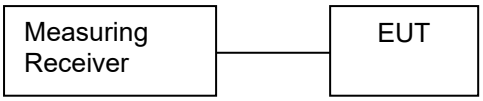
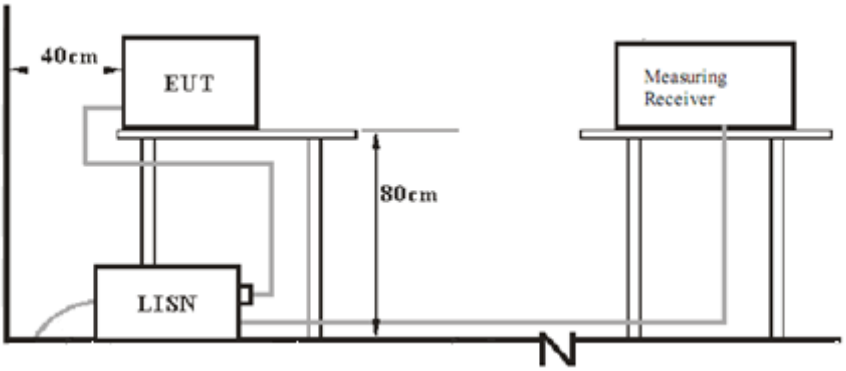
7.2 Conducted RF test setups



7.3 AC Power Line Conducted Emission test setups



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8 Systems Test Configuration

Auxiliary Equipment Used during Test:

Description	Manufacturer	Model NO.	Remark
Laptop	Lenovo	X220	0A72168
Battery 12 VDC	---	---	12V, 90Ah/10HR
RF Test Mode Software	nRFgo	1.21.2	Provided by applicant

Cables Used During Test:

Cable	Length	Shielded/unshielded	With / without ferrite
---	---	---	---

The system was configured to non-hopping mode, testing channel 0, 19, 39.

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.

The transmitter rate 1Mbps and 2Mbps mode are tested, only the worst case transmitter rate data mode is recorded in the report.

The power level set to level 8 of the nRFgo test mode software.

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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

According to §15.207 & RSS-GEN 8.8, conducted emissions limit as below:

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

*Decreasing linearly with logarithm of the frequency

Test result: Test Not Applicable for the Battery-Operated Device.

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9.2 Conducted Peak Output Power & EIRP

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 5 times the 6dB bandwidth, centered on a channel need to test, RBW > the 6dB bandwidth of the emission being measured, 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. 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) (3) & RSS-247 5.4(d), 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(d), EIRP limit as below:

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

Test result

Mode	TX Type	Frequency (MHz)	Conducted Peak Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Verdict
1M	SISO	2402	6.56	0.0	6.56	Pass
		2440	6.83	0.0	6.83	Pass
		2480	6.63	0.0	6.63	Pass
2M	SISO	2402	6.62	0.0	6.62	Pass
		2440	6.89	0.0	6.89	Pass
		2480	6.69	0.0	6.69	Pass

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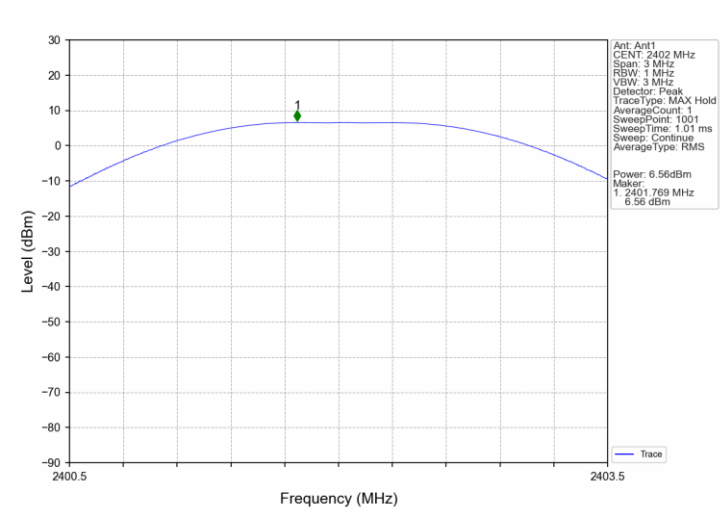
1M_LCH_2402MHz_Ant1_NTNV

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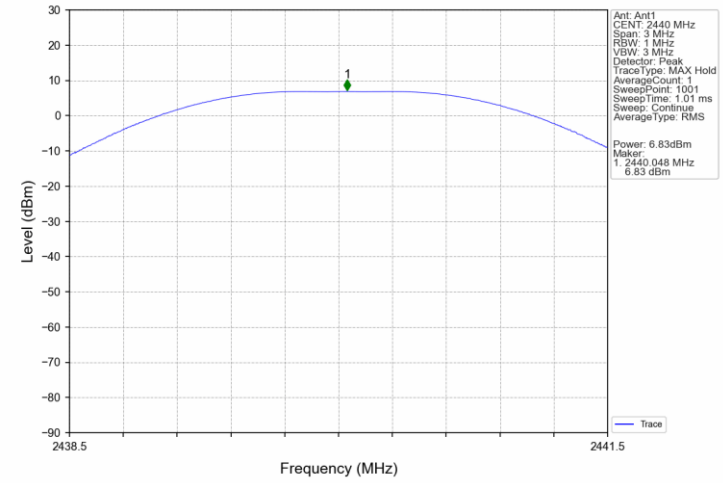
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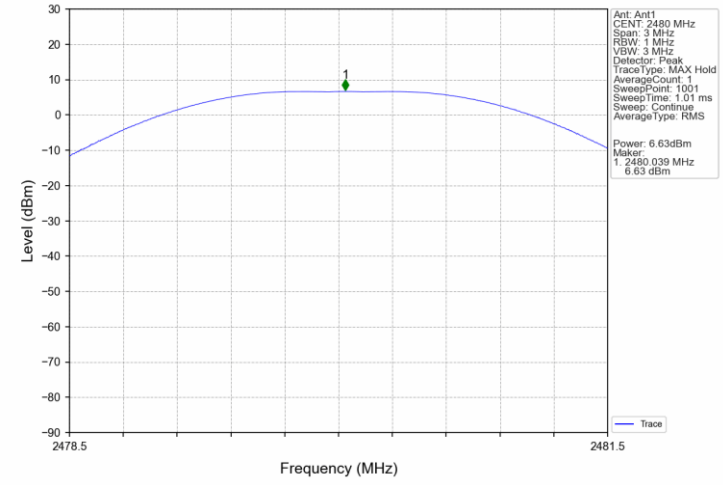
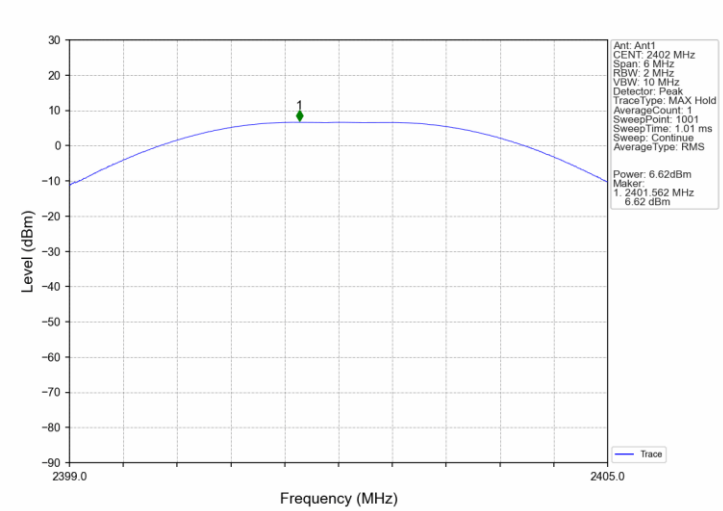


2M_LCH_2402MHz_Ant1_NTNV

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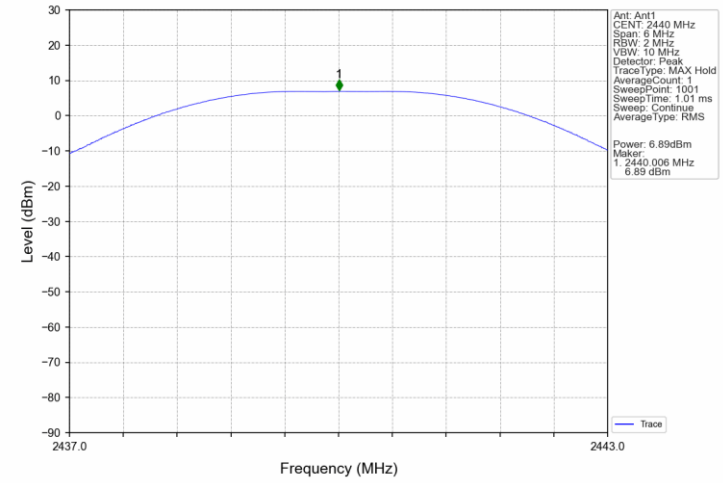
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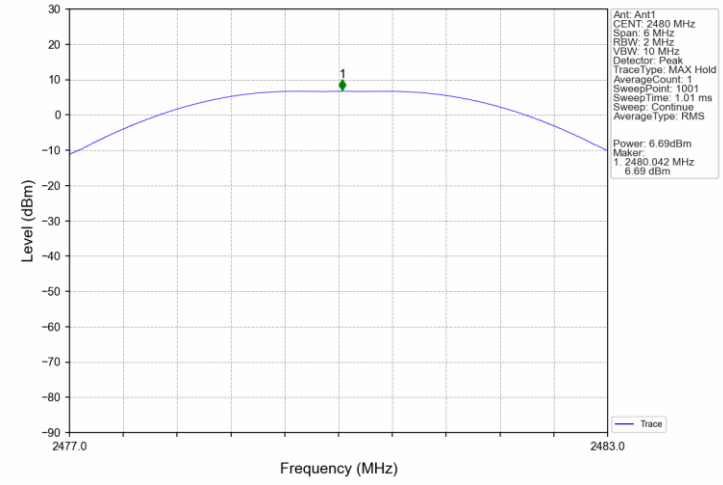

9.3 Power Spectral Density

Test Method

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
4. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW≥3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
5. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
6. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3kHz]
≤8

Test Results

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-8.86	<=8	Pass
		2440	-8.58	<=8	Pass
		2480	-8.81	<=8	Pass
2M	SISO	2402	-11.11	<=8	Pass
		2440	-10.67	<=8	Pass
		2480	-10.94	<=8	Pass

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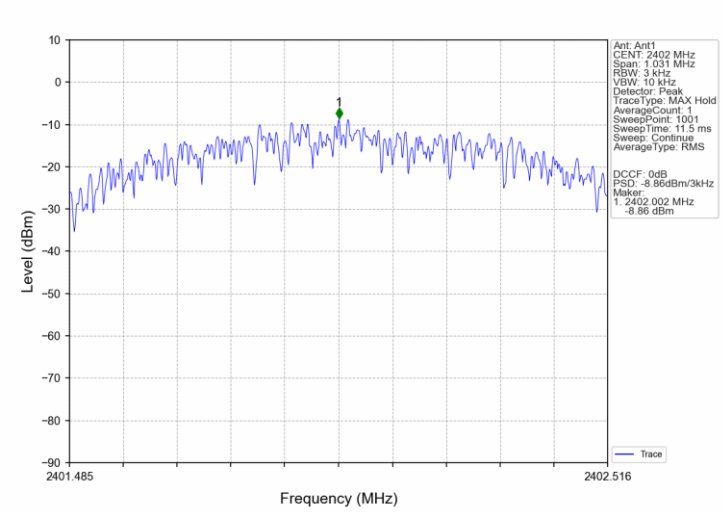
1M_LCH_2402MHz_Ant1_NTNV

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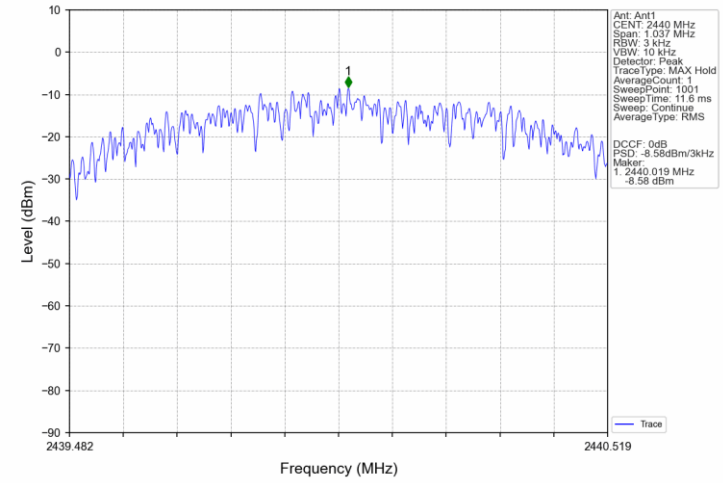
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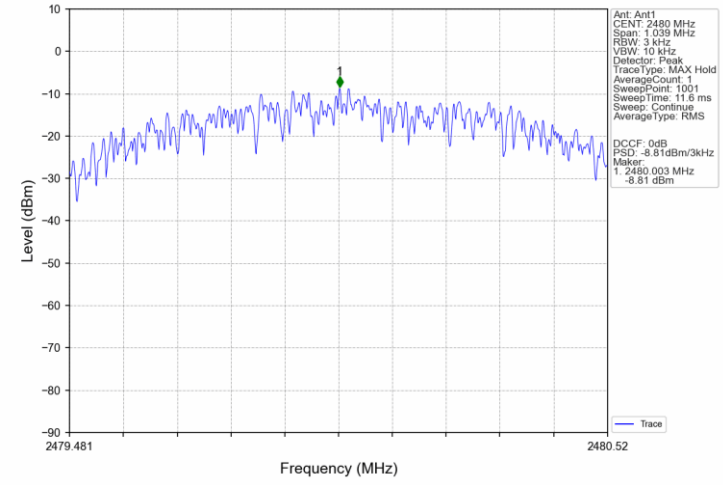

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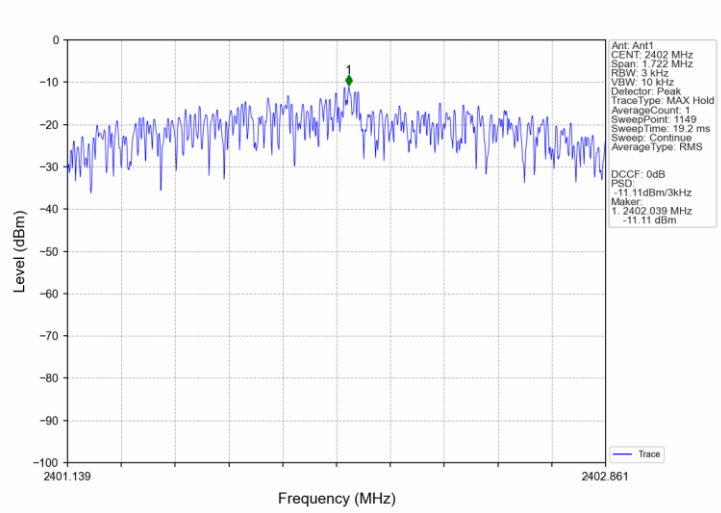
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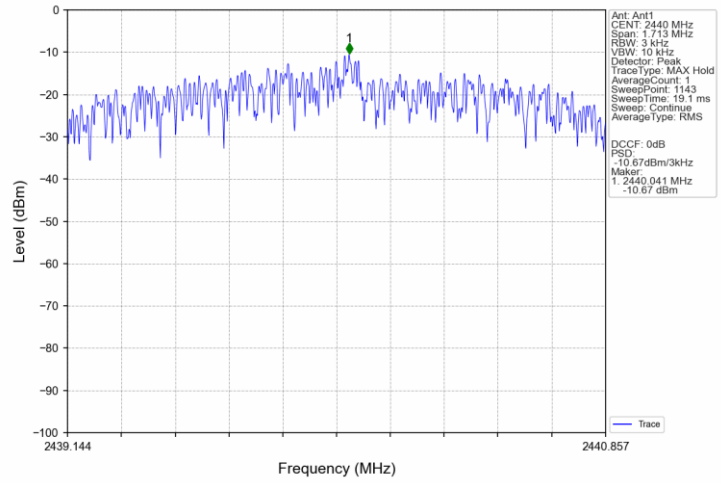
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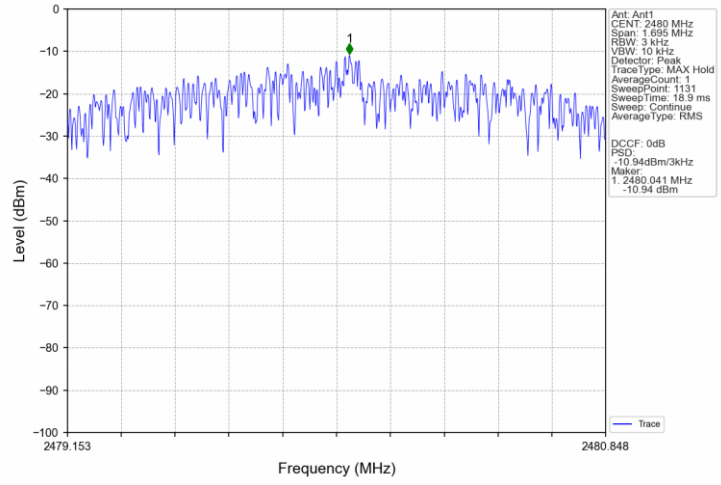

9.4 6 dB Bandwidth

Test Method

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set center frequency to the nominal EUT channel center frequency
3. Set RBW =1% to 5% of the OBW but not less than 100kHz, VBW≥ 3 × RBW Detector = Peak. Trace mode = max hold. Sweep = auto Trace = max hold
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
5. Record the results in the test report.

Limit

Limit [kHz]
≥500

Test Result

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.687	>=0.5	Pass
		2440	1	0.691	>=0.5	Pass
		2480	1	0.693	>=0.5	Pass
2M	SISO	2402	1	1.148	>=0.5	Pass
		2440	1	1.142	>=0.5	Pass
		2480	1	1.130	>=0.5	Pass

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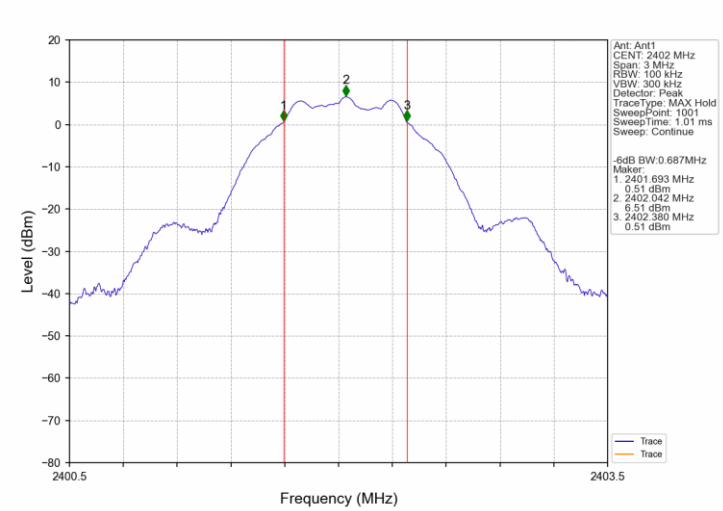
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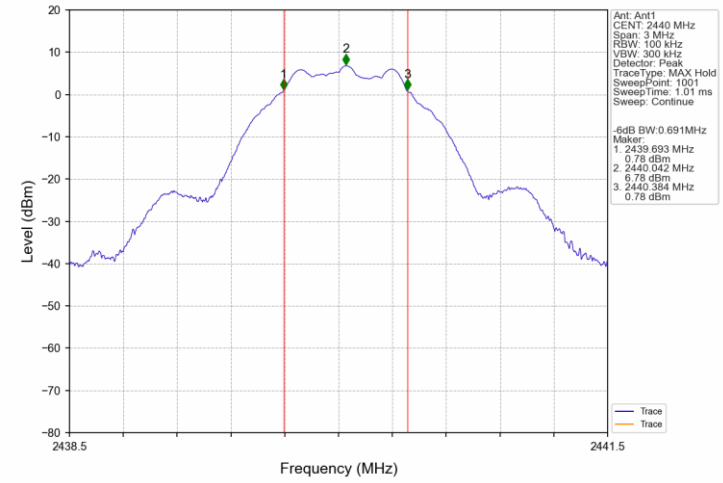
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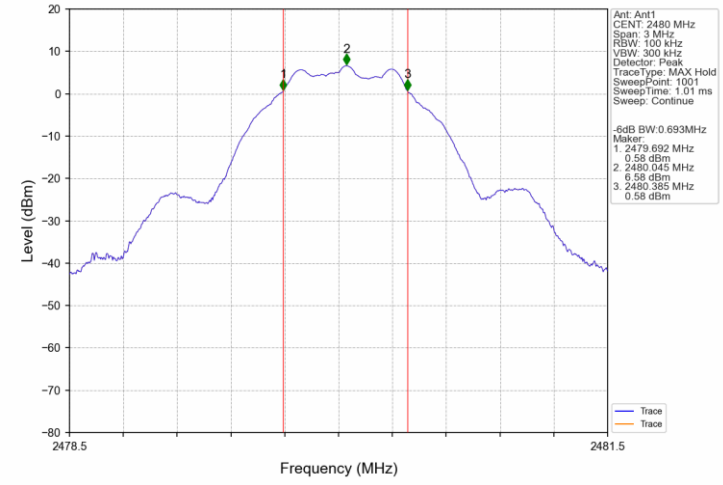

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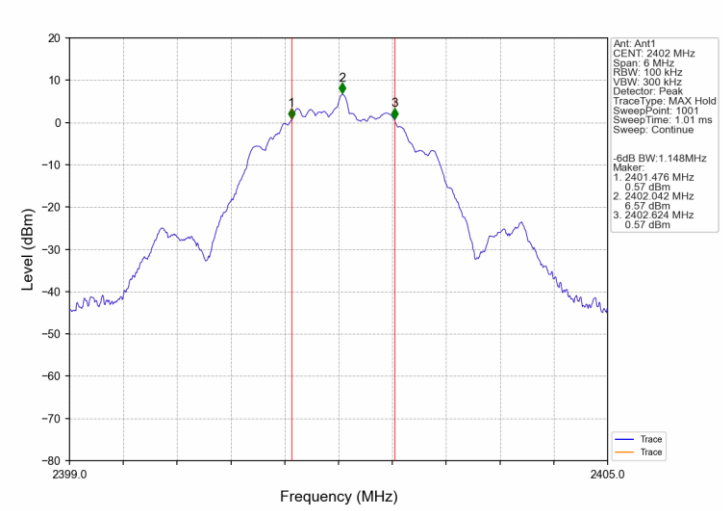
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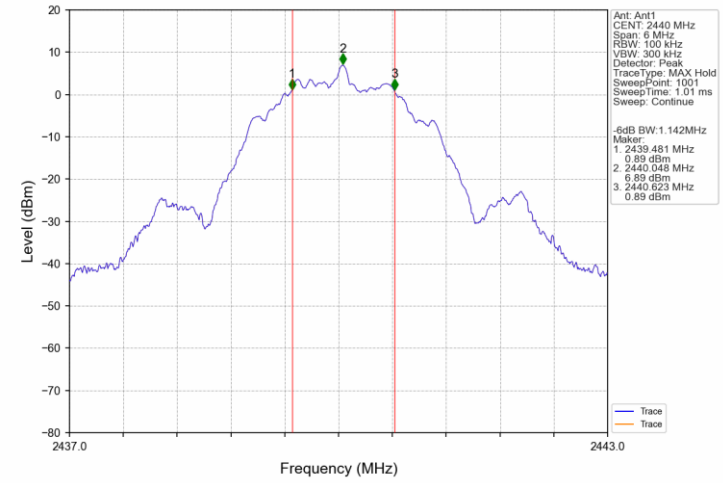
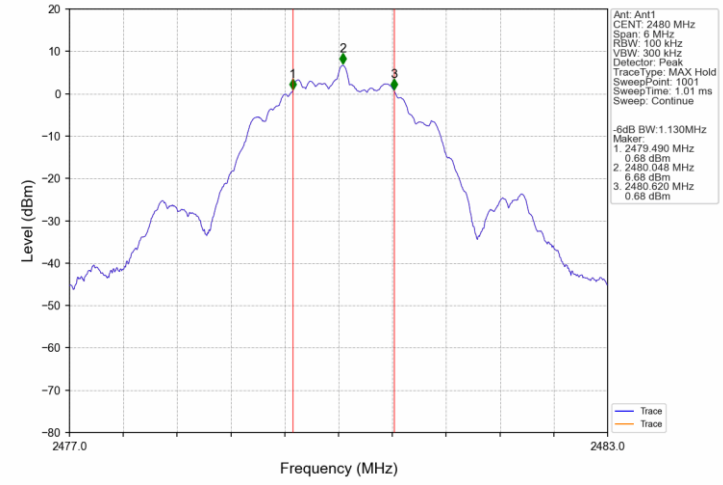

2M_HCH_2480MHz_Ant1_NTNV


9.5 99% bandwidth

Test Method

1. Set center frequency to the nominal EUT channel center frequency
2. Set span = 1.5 times to 5.0 times the OBW. Set RBW = 1 % to 5 % of the OBW
   Set VBW ≥ 3 RBW Trace mode = max hold. Sweep = auto couple.
   Allow the trace to stabilize.
3. Use the 99 % power bandwidth function of the instrument.
4. Record the results in the test report.

Limit

Limit [kHz]
--

Test Result

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	1.051	/	Pass
		2440	1	1.054	/	Pass
		2480	1	1.049	/	Pass
2M	SISO	2402	1	2.086	/	Pass
		2440	1	2.096	/	Pass
		2480	1	2.080	/	Pass

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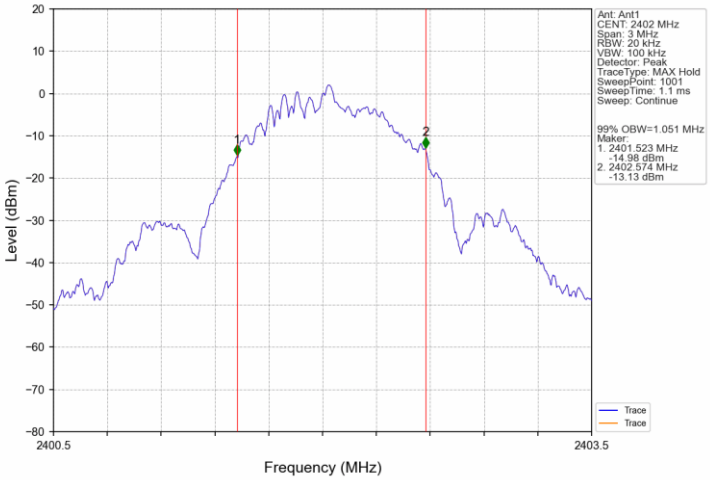
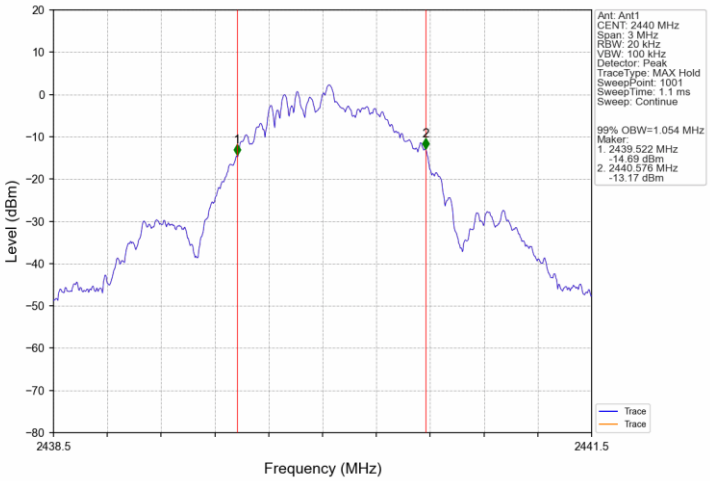
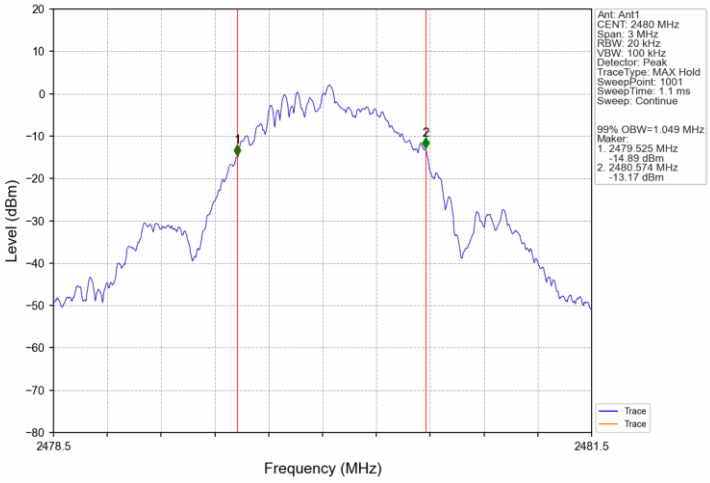
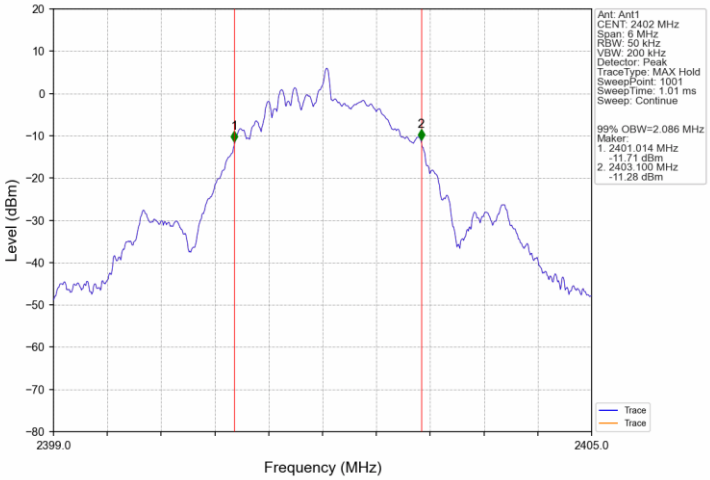
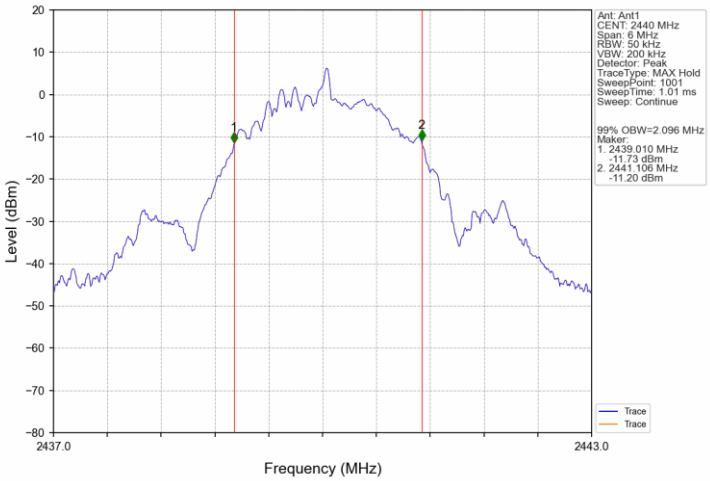
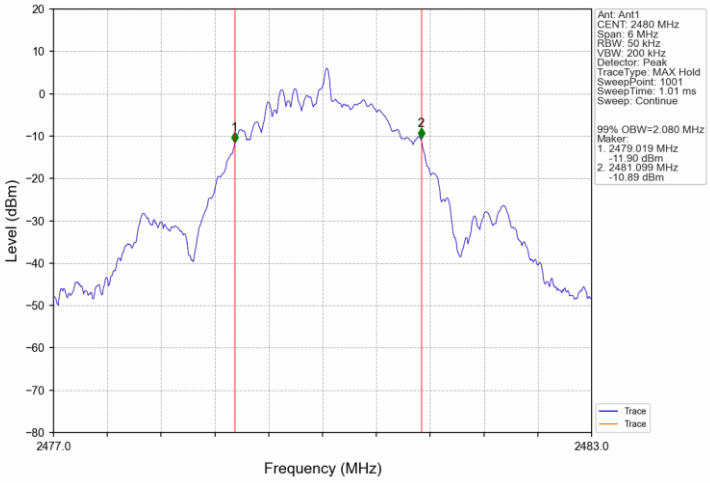
1M_LCH_2402MHz_Ant1_NTNV

1M_MCH_2440MHz_Ant1_NTNV

1M_HCH_2480MHz_Ant1_NTNV


2M_LCH_2402MHz_Ant1_NTNV

2M_MCH_2440MHz_Ant1_NTNV

2M_HCH_2480MHz_Ant1_NTNV


9.6 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, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
5. The level displayed must comply with the limit specified in this Section. Submit these plots.
6. Repeat above procedures until all frequencies measured were complete.

Limit

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

Test Result

Reference level:

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	6.51
		2440	1	6.77
		2480	1	6.57
2M	SISO	2402	1	6.54
		2440	1	6.81
		2480	1	6.60
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.				

Conducted spurious emissions:

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	6.51	-13.49	Pass
		2440	1	6.77	-13.23	Pass
		2480	1	6.57	-13.43	Pass
2M	SISO	2402	1	6.54	-13.46	Pass
		2440	1	6.81	-13.19	Pass
		2480	1	6.60	-13.40	Pass
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.						

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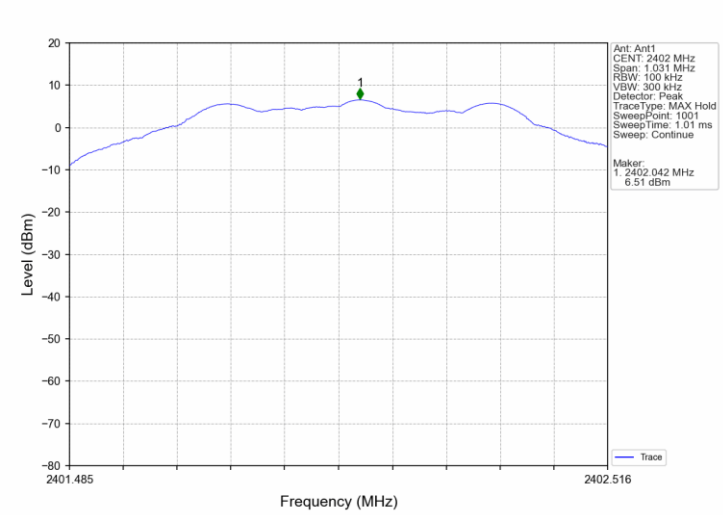
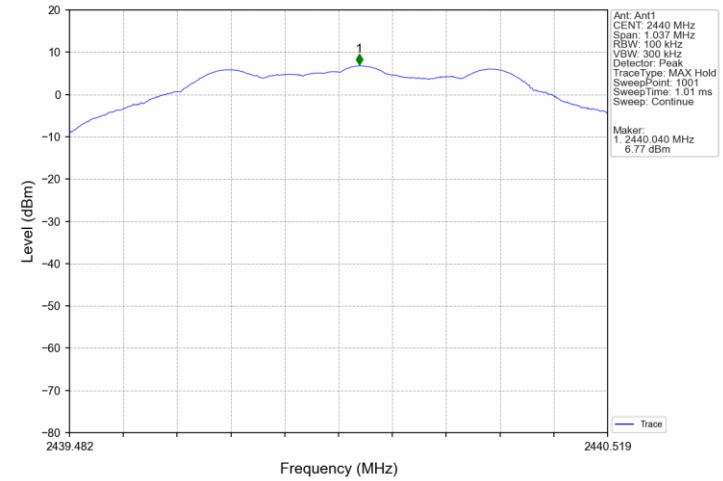
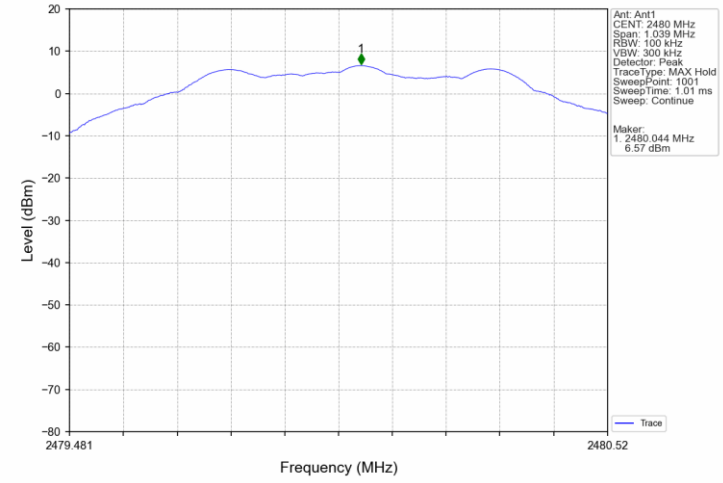
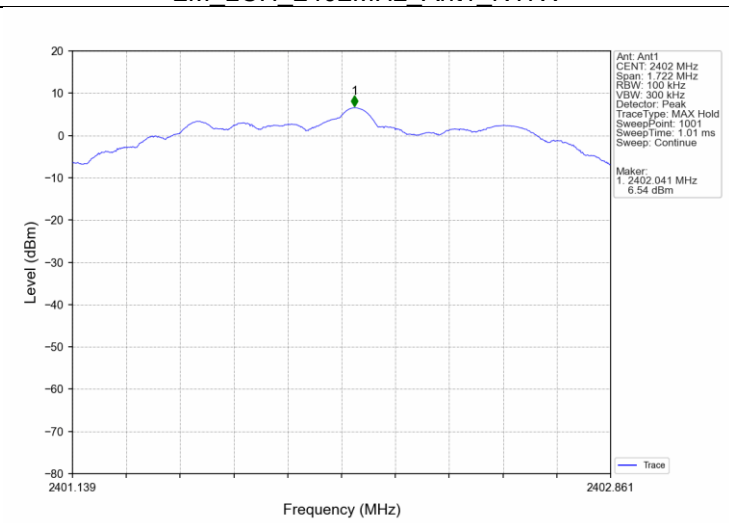
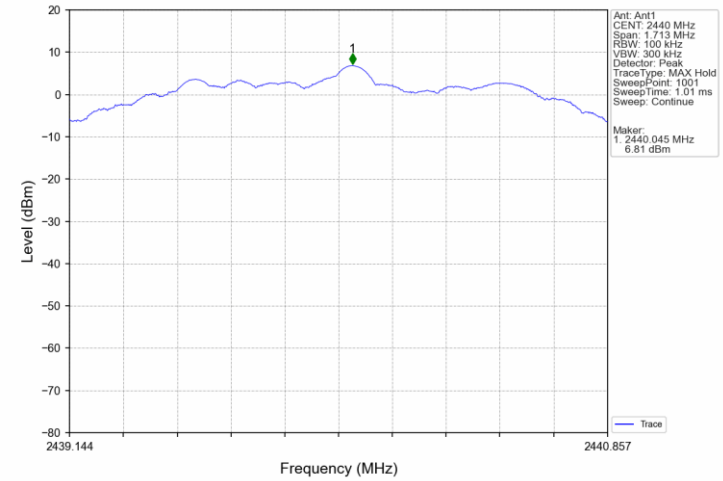
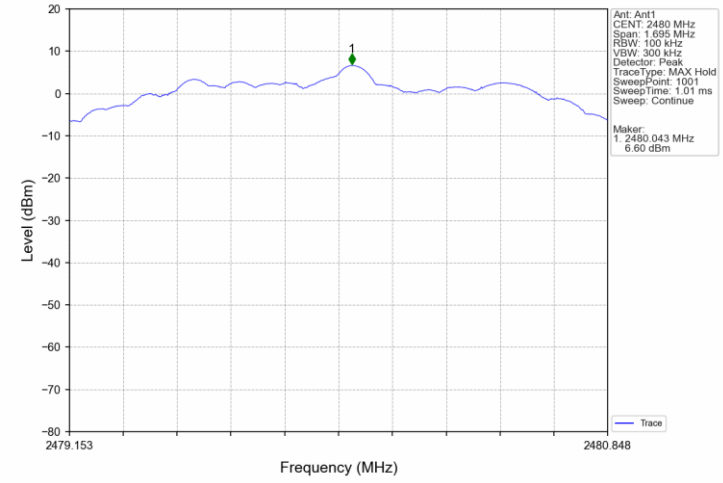
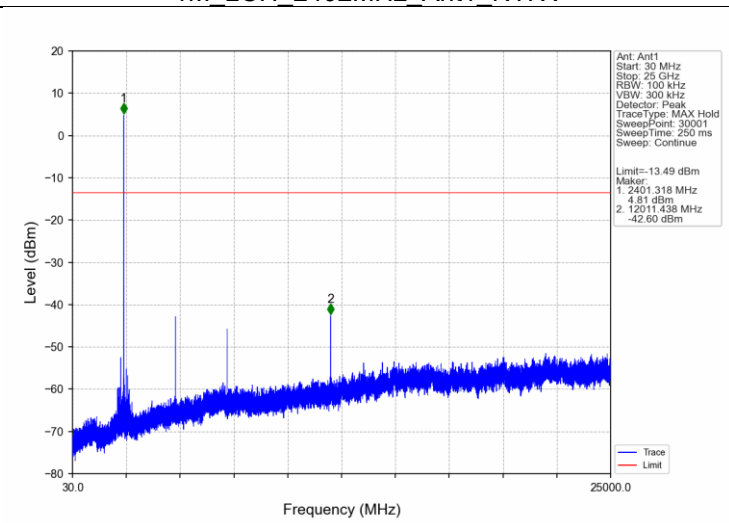
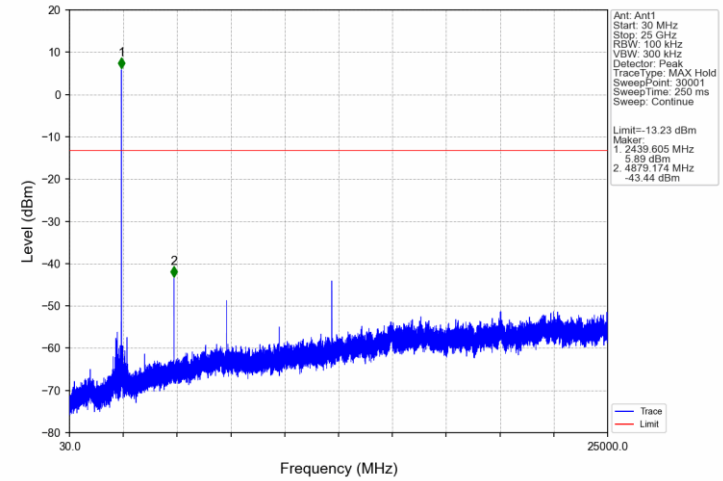
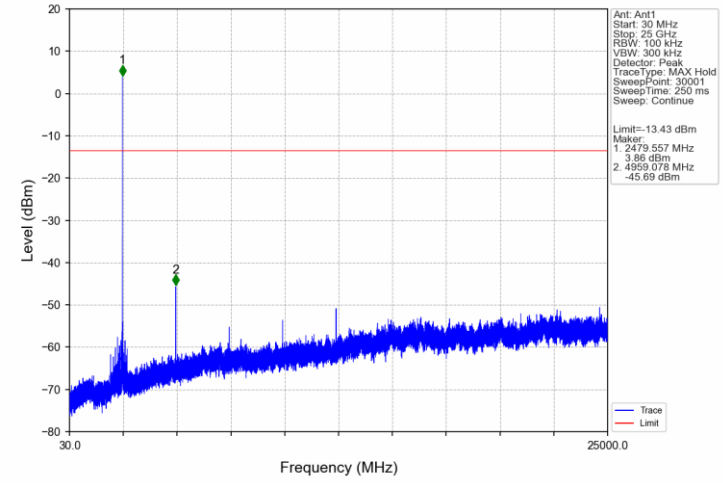
Reference level:

1M_LCH_2402MHz_Ant1_NTNV

1M_MCH_2440MHz_Ant1_NTNV

1M_HCH_2480MHz_Ant1_NTNV


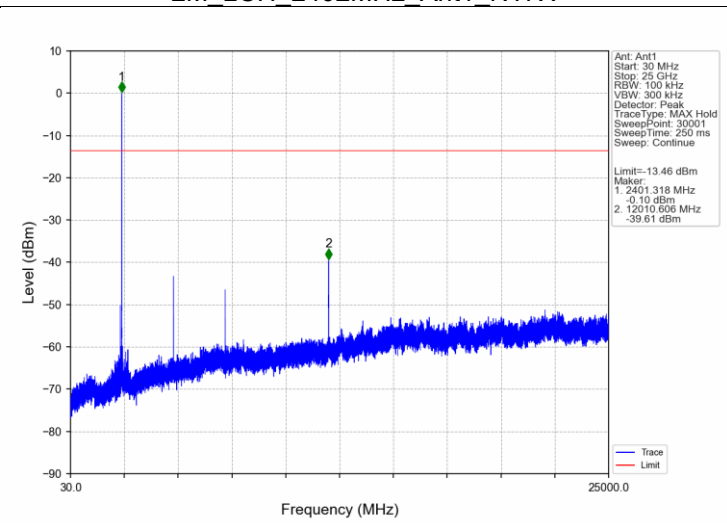
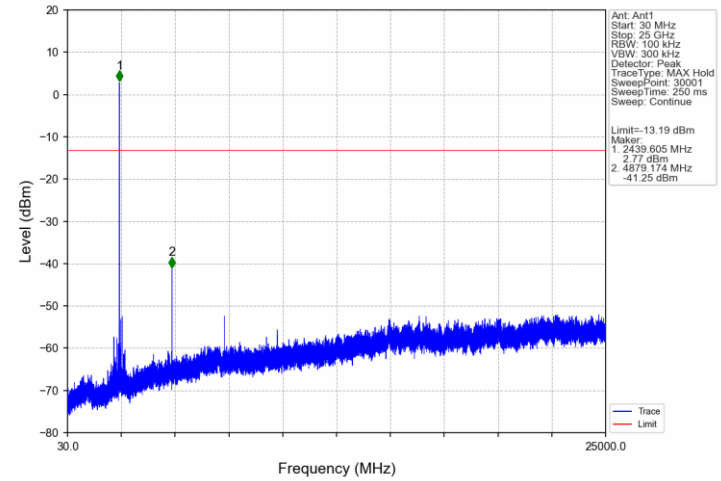
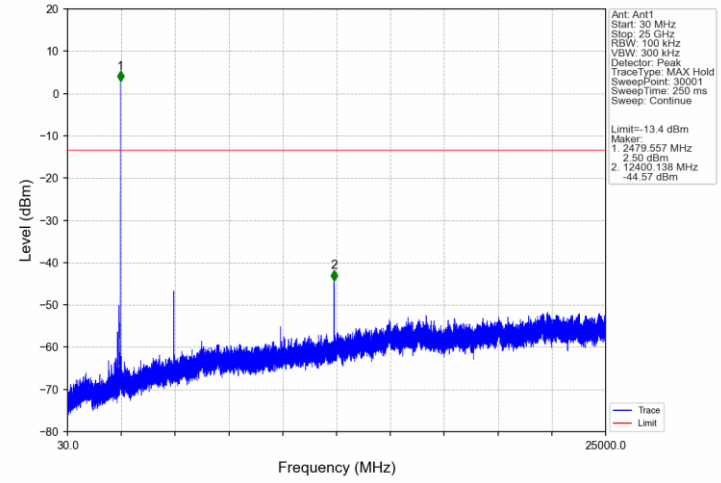
Reference level:

2M_LCH_2402MHz_Ant1_NTNV

2M_MCH_2440MHz_Ant1_NTNV

2M_HCH_2480MHz_Ant1_NTNV


Conducted spurious emissions:

1M_LCH_2402MHz_Ant1_NTNV

1M_MCH_2440MHz_Ant1_NTNV

1M_HCH_2480MHz_Ant1_NTNV


Conducted spurious emissions:

2M_LCH_2402MHz_Ant1_NTNV

2M_MCH_2440MHz_Ant1_NTNV

2M_HCH_2480MHz_Ant1_NTNV


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9.7 Band Edge

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, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
5. The level displayed must comply with the limit specified in this Section. Submit these plots.
6. Repeat above procedures until all frequencies measured were complete.

Limit:

In any 100 kHz 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 the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under § 15.247(b)(3) and RSS-247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB.

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

Test result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	6.51	-13.49	Pass
		2440	1	6.77	-13.23	Pass
		2480	1	6.57	-13.43	Pass
2M	SISO	2402	1	6.54	-13.46	Pass
		2440	1	6.81	-13.19	Pass
		2480	1	6.60	-13.40	Pass
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.						

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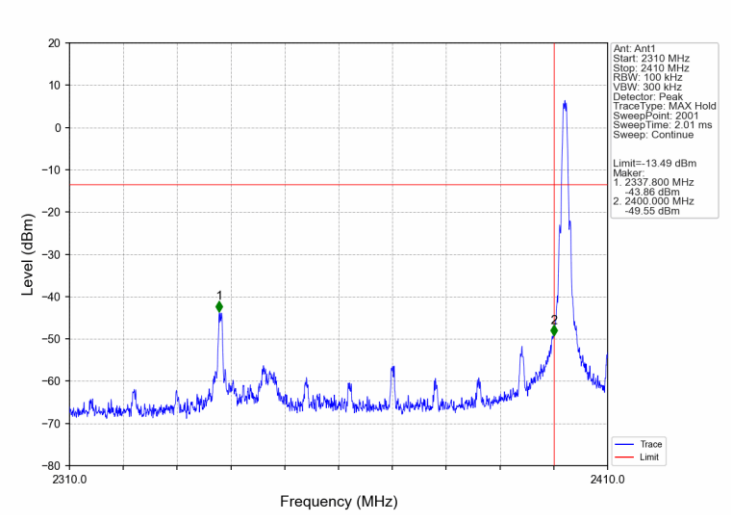
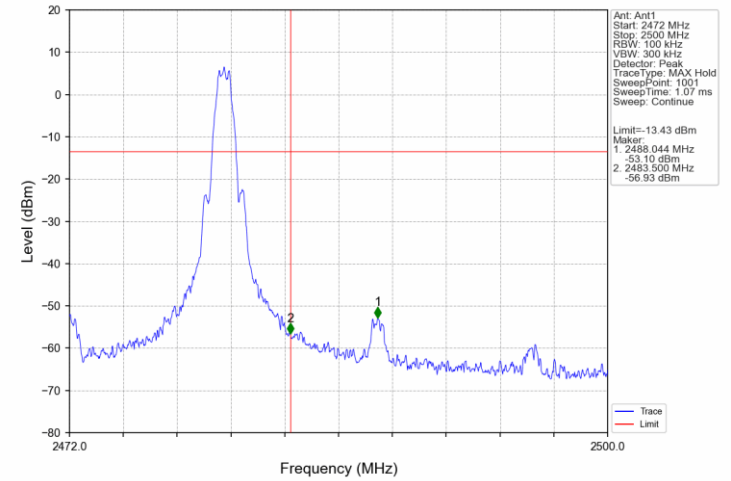
1M_LCH_2402MHz_Ant1_NTNV

1M_HCH_2480MHz_Ant1_NTNV


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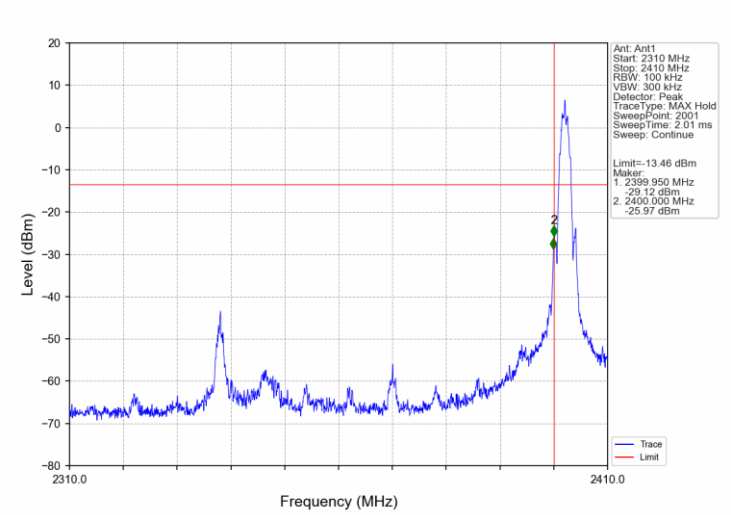
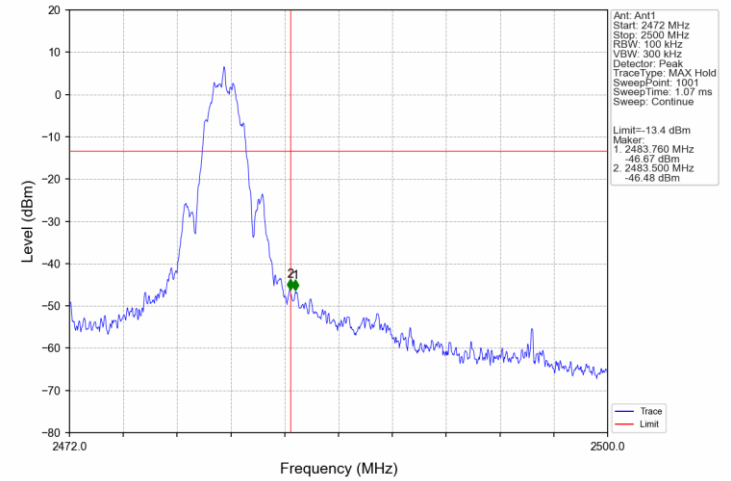
2M_LCH_2402MHz_Ant1_NTNV

2M_HCH_2480MHz_Ant1_NTNV


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9.8 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 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. 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.
4. 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.
5. Use the following spectrum analyzer settings According to C63.10:

For Below 1GHz, use the following test receiver settings:

9kHz -150kHz:
RBW = 200Hz, VBW = 500Hz for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.
150kHz - 30MHz:
RBW = 10 kHz, VBW = 30 kHz for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.
30MHz-1GHz:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz to 120KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For average unwanted emissions measurements above 1000 MHz

a) RBW = 1MHz.
b) VBW \ [3 × RBW].
c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
e) Sweep time = auto.
f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—

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i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)

g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
   1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.
   2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
   3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission(AV) at frequency above 1GHz.

Limit

In any 100 kHz 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 the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under § 15.247(b)(3) and RSS 247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in § 15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§ 15.205(a) and RSS-Gen scetion8.9, must also comply with the radiated emission limits specified in § 15.209(a) and RSS-Gen section 8.10.

RSS-Gen section 8.9 General field strength limits at frequencies below 30 MHz：

Frequency MHz	Magnetic field strength (H-Field) (μA/m) μV/m	Measurement distance meters
0.009-0.490	6.37/F (F in kHz)	300
0.490-1.705	63.7/F (F in kHz)	30
1.705-30	0.08	30

When the limit is in terms of magnetic field, the following equation applies:
H[dB(μA/m)] = V[dB(μV)]+ Lc [dB] - GPA [dB]+ AFE [dB(m-1)]-51.5 [dBΩ]

When the limit is in terms of electric field, the following equation applies:
E[dB(μV/m)]= V[dB(μV)]+ Lc[dB] - GPA[dB] + AFE [dB(m-1)]

The magnetic field limit is converted to the electric field limit by the equation:
Elimit[dB(μV/m)]= Hlimit [dB(μA/m)] +51.5 [dBΩ]

where
H is the magnetic field strength (to be compared with the limit),
V is the voltage level measured by the receiver or spectrum analyzer.

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Lc is the cable loss.
GPA is the gain of the preamplifier (if used), and AFH is the magnetic antenna factor.

FCC&ISED Limit：

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)

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.

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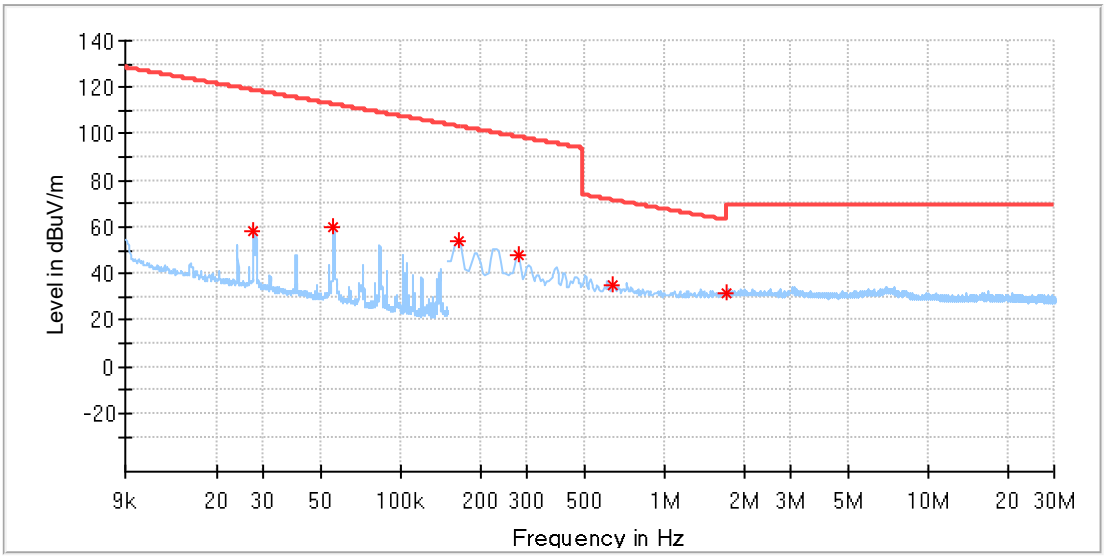
Spurious radiated emissions for transmitter

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 test result is listed in the report.

Transmitting spurious emission test result as below:

Test data_9kHz to 30MHz
BLE 1M _Low Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB/m)
0.027659	58.55	118.75	60.20	H	351.0	19.88
0.055436	60.08	112.72	52.64	H	142.0	19.92
0.164925	54.05	103.25	49.20	H	214.0	19.89
0.279350	48.12	98.68	50.56	H	165.0	19.90
0.632575	35.22	71.59	36.37	H	283.0	19.91
1.702200	31.47	63.01	31.55	H	303.0	20.02

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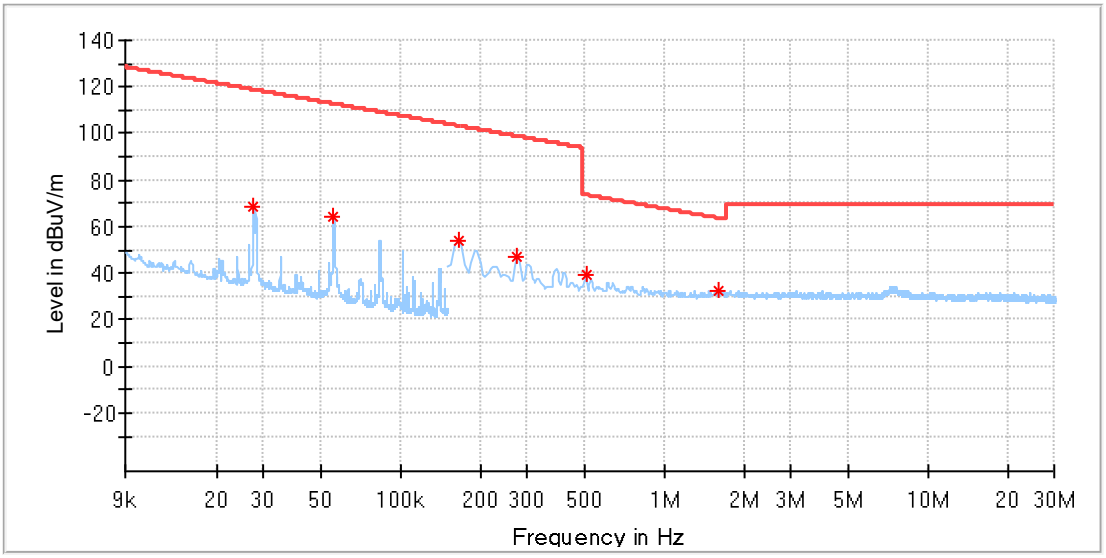
Test data_9kHz to 30MHz
BLE 1M _Low Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB/m)
0.027659	68.15	118.75	50.60	V	196.0	19.88
0.055389	64.42	112.73	48.31	V	123.0	19.92
0.164925	54.24	103.25	49.01	V	354.0	19.89
0.274375	47.26	98.83	51.58	V	63.0	19.90
0.503225	39.36	73.57	34.21	V	34.0	19.89
1.602700	32.67	63.54	30.86	V	299.0	20.00

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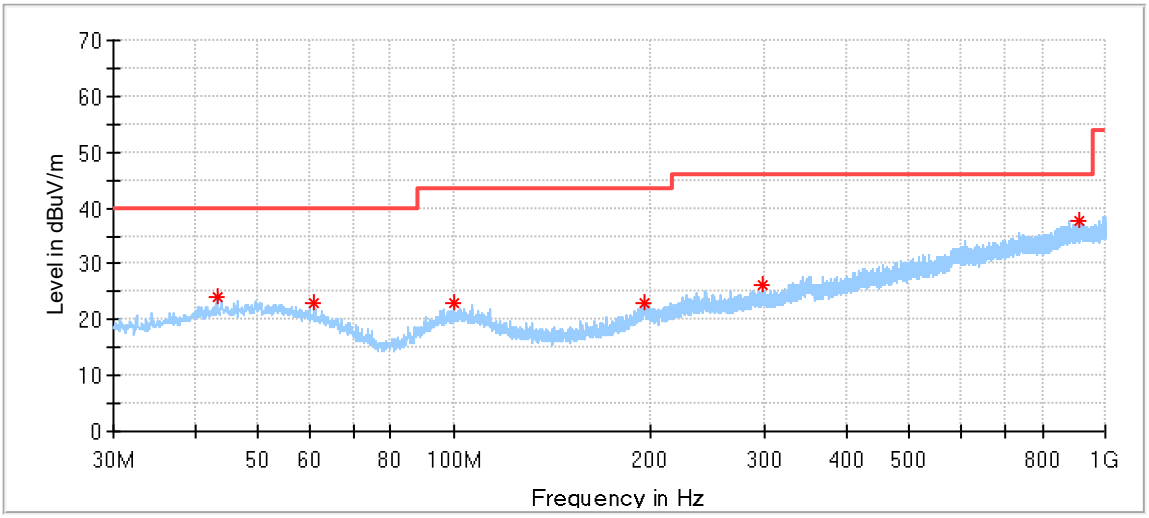
Test data_30MHz to 1000MHz
BLE 1M _Low Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
43.256667	24.10	40.00	15.90	100.0	H	308.0	17.42
60.824444	22.97	40.00	17.04	100.0	H	308.0	16.75
100.325000	22.86	43.50	20.64	100.0	H	37.0	16.27
195.762222	22.95	43.50	20.55	200.0	H	245.0	16.47
297.881667	26.15	46.00	19.85	100.0	H	79.0	18.49
911.622222	37.69	46.00	8.31	100.0	H	7.0	29.12

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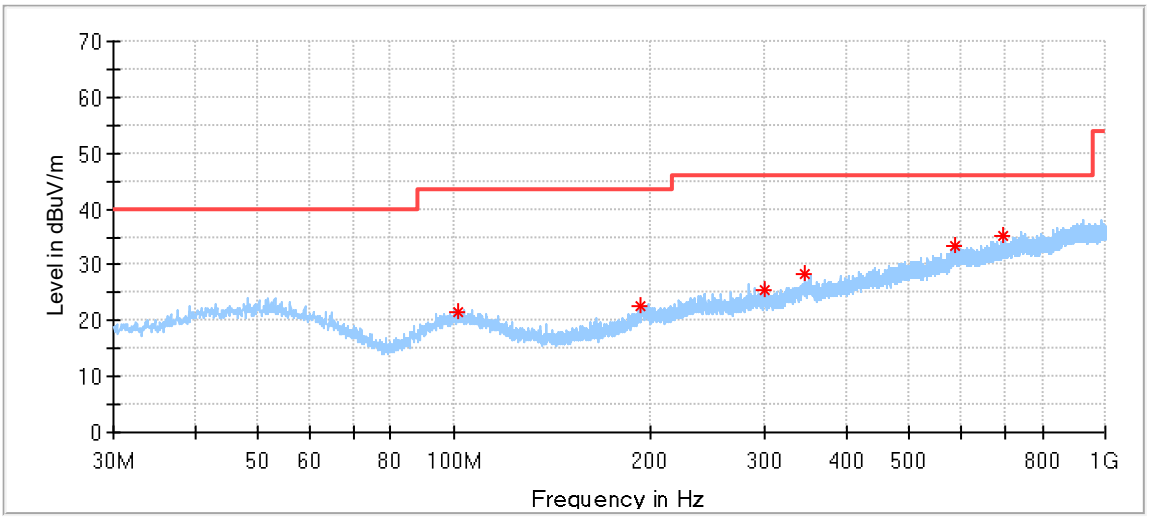
Test data_30MHz to 1000MHz
BLE 1M _Low Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
101.456667	21.63	43.50	21.87	200.0	V	0.0	16.32
192.906111	22.45	43.50	21.05	100.0	V	158.0	15.94
299.713889	25.40	46.00	20.60	100.0	V	356.0	18.48
346.112222	28.43	46.00	17.57	200.0	V	283.0	20.36
589.258889	33.32	46.00	12.68	100.0	V	213.0	25.00
696.228333	35.12	46.00	10.88	100.0	V	29.0	25.83

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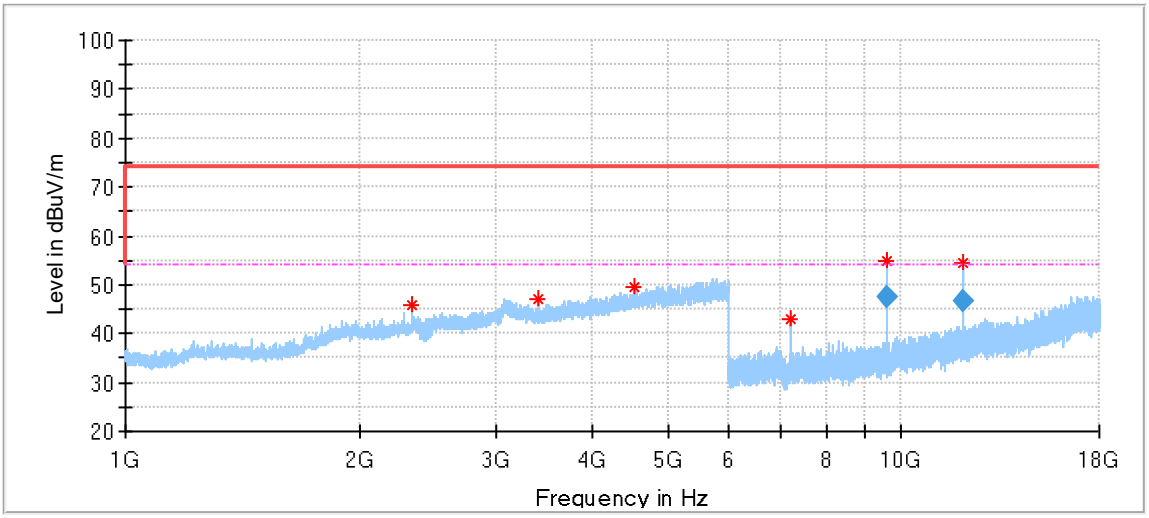
Test data 1GHz to 18GHz:
BLE 1M _Low Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2338.000000	46.01	74.00	27.99	150.0	H	78.0	-1.90
3401.000000	46.94	74.00	27.06	150.0	H	198.0	1.12
4521.500000	49.66	74.00	24.34	150.0	H	15.0	4.92
7206.500000	42.88	74.00	31.12	150.0	H	105.0	8.95
9609.500000	54.71	74.00	19.29	150.0	H	0.0	12.59
12009.000000	54.39	74.00	19.61	150.0	H	0.0	16.32

Final_Result

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9609.500000	47.63	54.00	6.36	150.0	H	0.0	12.59
12009.000000	46.83	54.00	7.17	150.0	H	0.0	16.32

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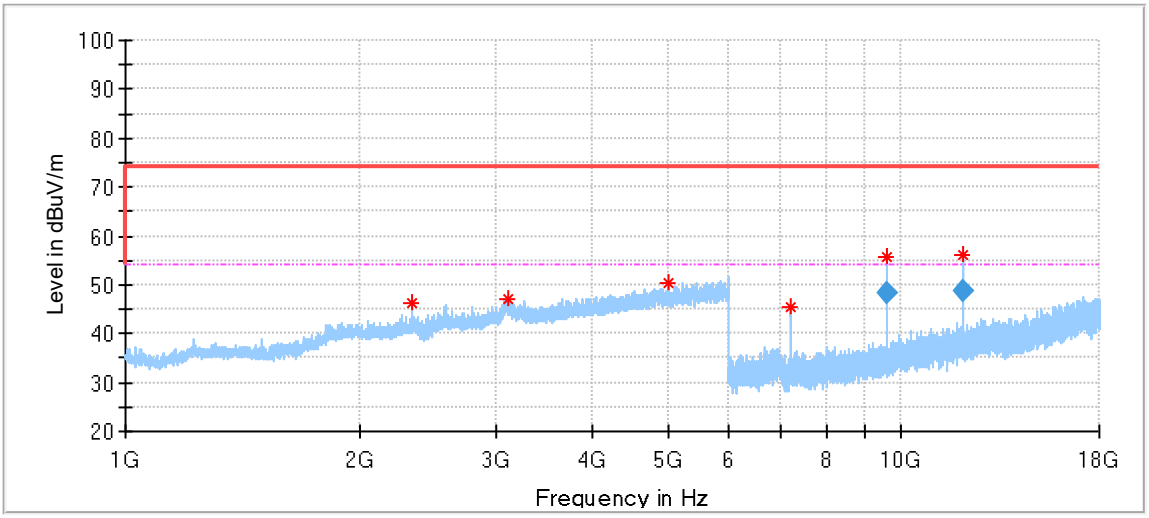
Test data 1GHz to 18GHz:
BLE 1M _Low Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2337.500000	46.34	74.00	27.66	150.0	V	50.0	-1.90
3107.000000	47.25	74.00	26.75	150.0	V	313.0	2.53
5024.000000	50.18	74.00	23.82	150.0	V	205.0	5.82
7205.500000	45.30	74.00	28.70	150.0	V	0.0	8.94
9609.000000	55.80	74.00	18.20	150.0	V	356.0	12.59
12011.500000	55.90	74.00	18.10	150.0	V	183.0	16.30

Final_Result

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9609.000000	48.29	54.00	5.71	150.0	V	356.0	12.59
12011.500000	48.53	54.00	5.47	150.0	V	183.0	16.30

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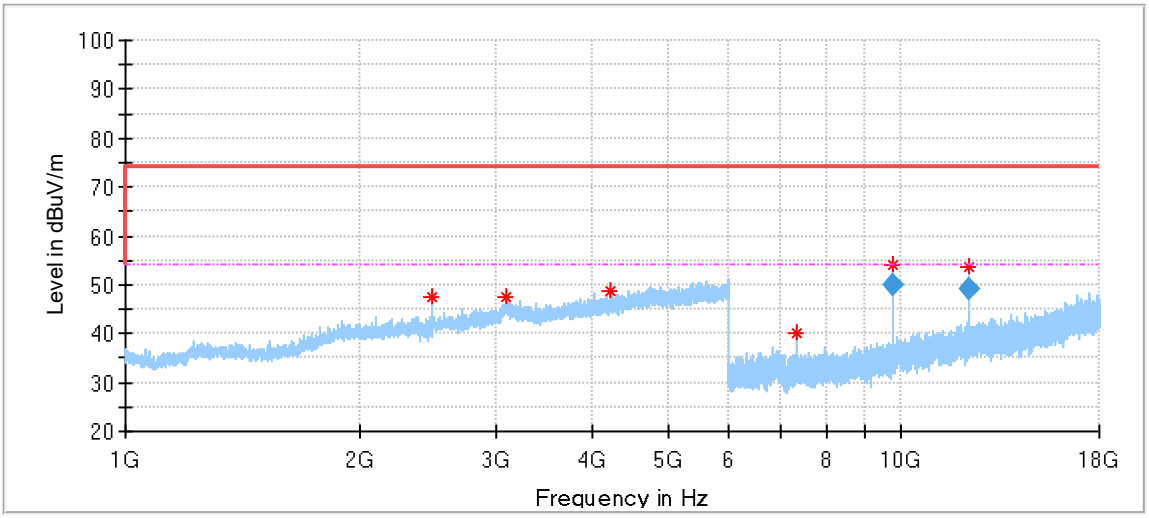
Test data 1GHz to 18GHz:
BLE 1M _Middle Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2479.500000	47.54	74.00	26.47	150.0	H	4.0	-1.01
3098.000000	47.47	74.00	26.53	150.0	H	180.0	2.72
4218.000000	48.69	74.00	25.31	150.0	H	264.0	3.52
7319.500000	40.19	74.00	33.81	150.0	H	32.0	9.62
9759.500000	53.87	74.00	20.13	150.0	H	279.0	12.83
12200.000000	53.67	74.00	20.33	150.0	H	105.0	16.31

Final_Result

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9759.500000	49.75	54.00	4.25	150.0	H	279.0	12.83
12200.000000	49.28	54.00	4.72	150.0	H	105.0	16.31

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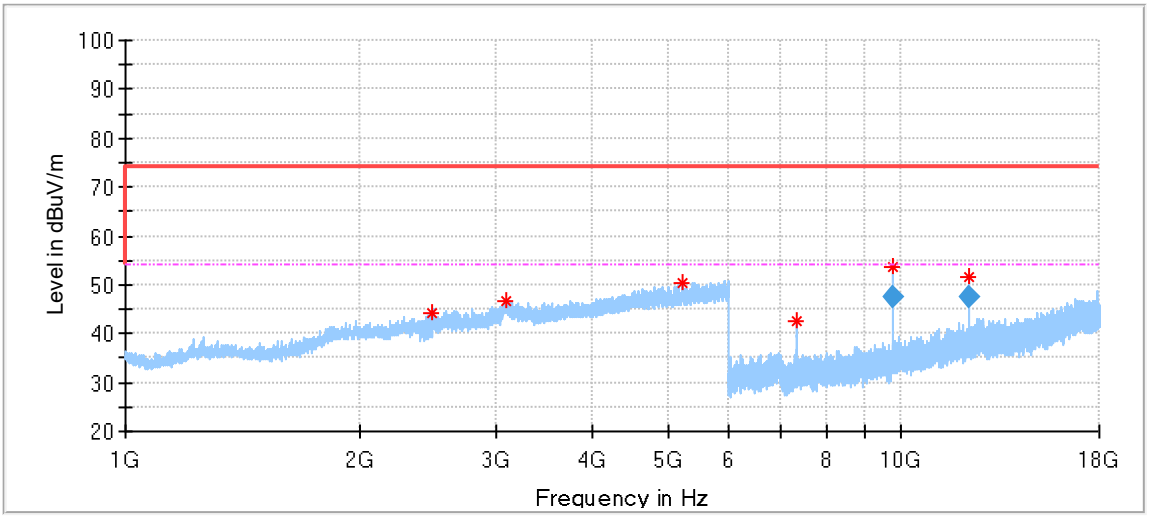
Test data 1GHz to 18GHz:
BLE 1M _Middle Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2488.500000	44.00	74.00	30.00	150.0	V	347.0	-0.95
3090.000000	46.72	74.00	27.28	150.0	V	297.0	2.51
5230.500000	50.54	74.00	23.46	150.0	V	101.0	6.43
7321.000000	42.76	74.00	31.24	150.0	V	325.0	9.62
9761.000000	53.47	74.00	20.53	150.0	V	276.0	12.83
12201.000000	51.59	74.00	22.41	150.0	V	325.0	16.31

Final_Result

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9761.000000	47.55	54.00	6.45	150.0	V	276.0	12.83
12201.000000	47.68	54.00	6.32	150.0	V	325.0	16.31

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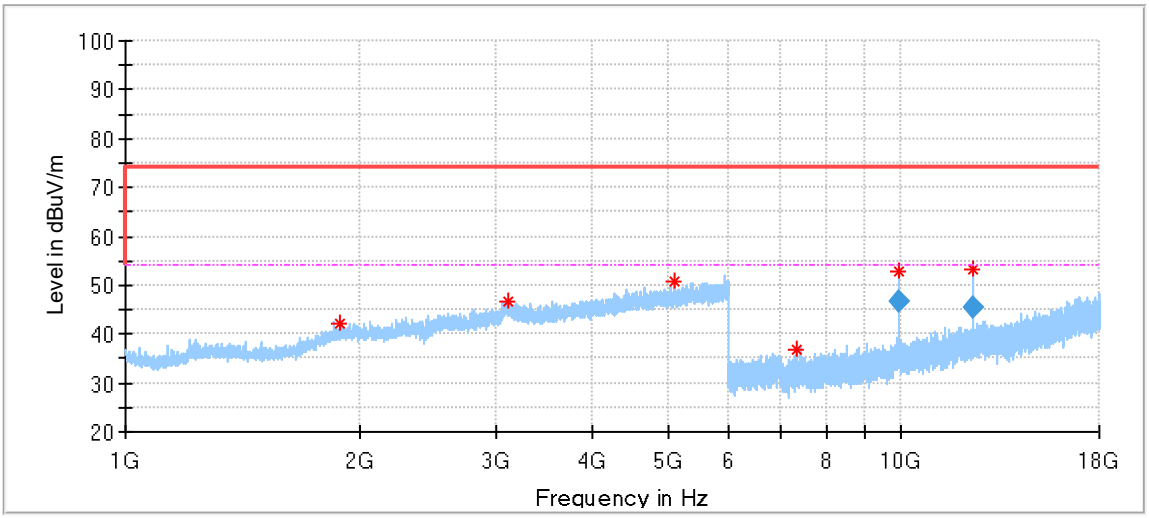
Test data 1GHz to 18GHz:
BLE 1M _High Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1890.000000	42.30	74.00	31.70	150.0	H	213.0	-3.11
3106.500000	46.70	74.00	27.30	150.0	H	0.0	2.55
5098.000000	50.71	74.00	23.29	150.0	H	81.0	6.31
7327.500000	36.83	74.00	37.17	150.0	H	0.0	9.63
9921.000000	52.65	74.00	21.35	150.0	H	350.0	13.03
12399.500000	53.22	74.00	20.78	150.0	H	107.0	16.34

Final_Result

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9921.000000	46.58	54.00	7.42	150.0	H	350.0	13.03
12399.500000	45.25	54.00	8.75	150.0	H	107.0	16.34

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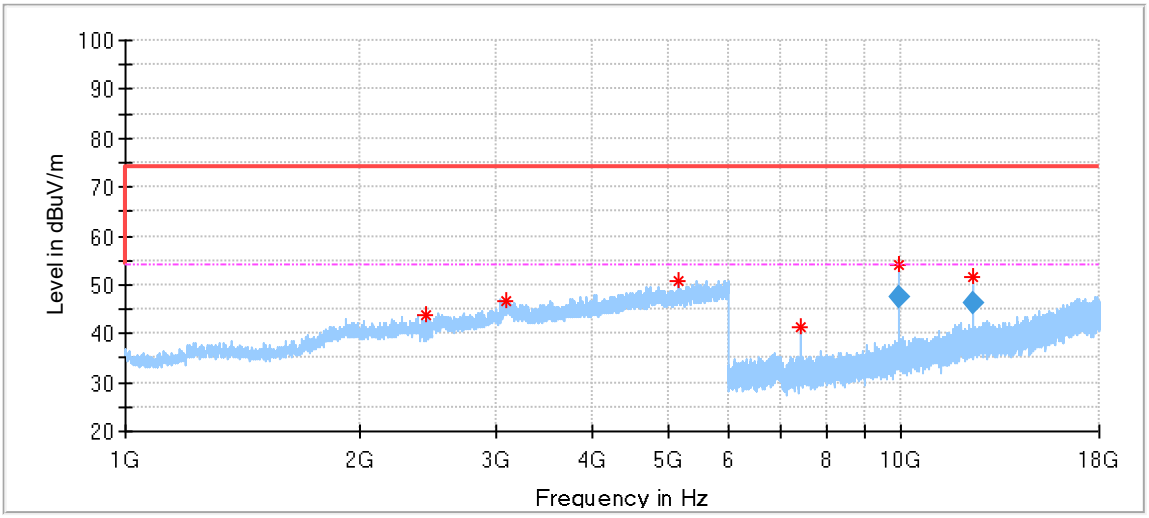
Test data 1GHz to 18GHz:
BLE 1M _High Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2446.500000	43.94	74.00	30.06	150.0	V	213.0	-0.96
3101.500000	46.87	74.00	27.13	150.0	V	153.0	2.72
5160.000000	50.63	74.00	23.37	150.0	V	249.0	6.34
7439.500000	41.30	74.00	32.70	150.0	V	348.0	9.58
9919.000000	54.08	74.00	19.92	150.0	V	324.0	13.02
12399.000000	51.50	74.00	22.50	150.0	V	324.0	16.34

Final_Result

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
9919.000000	47.38	54.00	6.62	150.0	V	324.0	13.02
12399.000000	46.19	54.00	7.81	150.0	V	324.0	16.34

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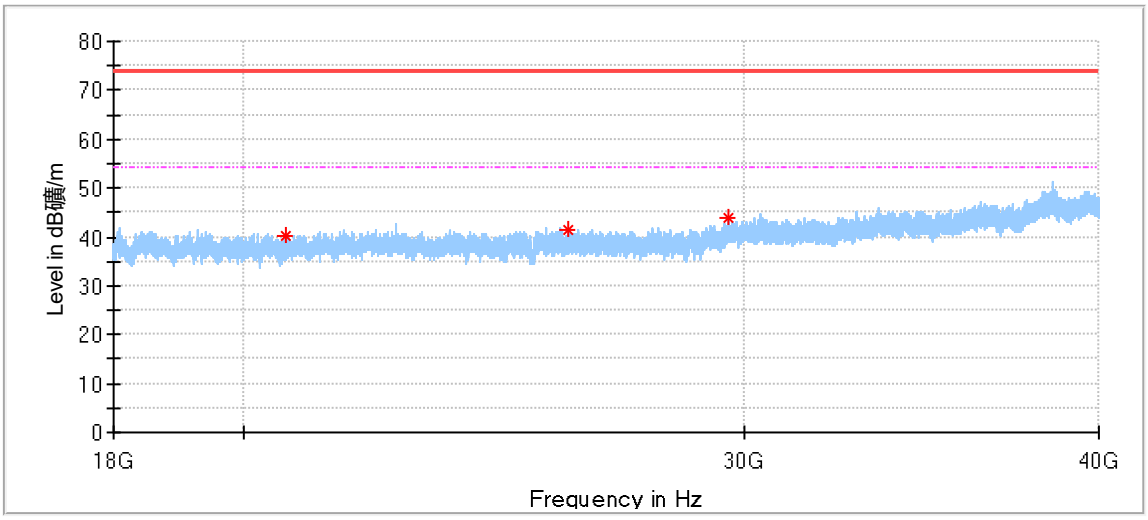
Test data 18GHz to 40GHz:
BLE 1M _Low Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20690.875000	40.12	74.00	33.88	150.0	H	315.0	-1.38
26024.500000	41.33	74.00	32.67	150.0	H	43.0	1.55
29617.375000	44.09	74.00	29.91	150.0	H	216.0	1.92

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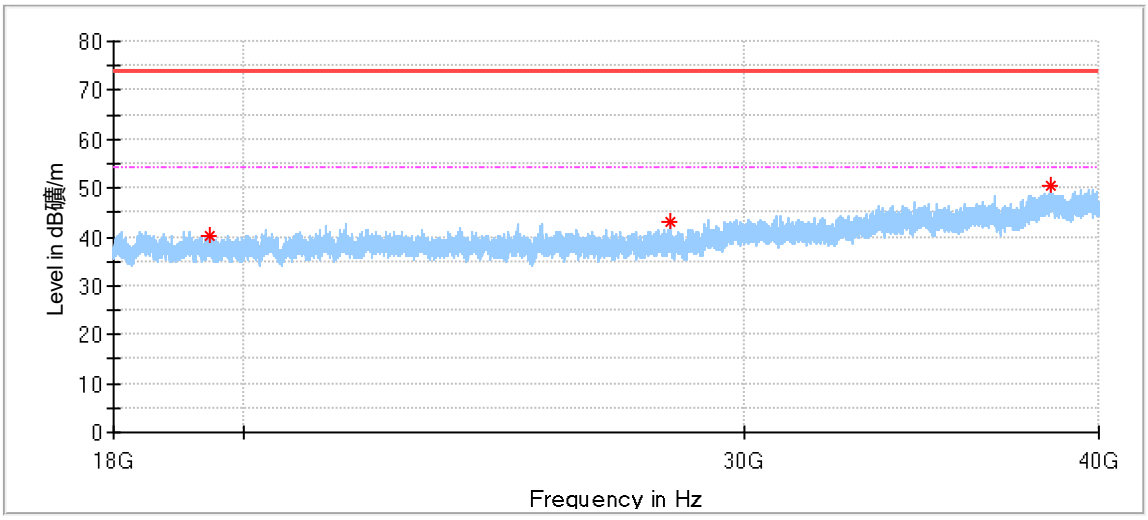
Test data 18GHz to 40GHz:
BLE 1M _Low Channel:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19460.937500	40.28	74.00	33.72	150.0	V	166.0	-2.39
28250.625000	42.91	74.00	31.09	150.0	V	140.0	1.09
38469.625000	50.42	74.00	23.58	150.0	V	0.0	6.57

Remark:
(1) We test both rates for Low channel, Middle channel and High channel separately, only the worst case recorded in this report.
(2) 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

Radiated Emission Test 1# (9kHz – 1GHz)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	2026-4-25
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9162	68-4-80-19-003	284	2026-2-11
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	2025-7-24
Horn Antenna	Rohde & Schwarz	HF907	68-4-80-14-005	102294	2026-4-26
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-001	100745	2026-4-19
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-002	15542	2026-4-19
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	2026-10-25
Test software	Rohde & Schwarz	EMC32	68-4-90-19-006-A01	Version10.35.02	N/A

Radiated Emission 2# Test (1GHz – 40GHz)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	2026-4-25
Wave Guide Antenna	ETS	3117	68-4-80-19-001	00218954	2026-3-10
Sideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	12827	2025-7-2
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	2025-7-17
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-002	15542	2026-4-19
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	2026-10-25
Test software	Rohde & Schwarz	EMC32	68-4-90-19-006-A01	Version10.35.02	N/A

Conducted RF Test System

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
Signal Generator	Rohde & Schwarz	SMB100A	68-4-48-14-001	108272	2026-4-18
Vector Signal Generator	Rohde & Schwarz	SMBV100A	68-4-48-18-001	262825	2026-4-18
Communication Synthetical Test Instrument	Rohde & Schwarz	CMW 270	68-4-48-18-003	101251	2026-4-18
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	2026-4-18
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157W	68-4-93-14-003	101226/100929	2026-4-18
Power Splitter	Weinschel	1580	68-4-85-14-001	SC319	2026-4-18
10dB Attenuator	R&S	DNF	68-4-81-14-004	DNF-001	2026-4-19
10dB Attenuator	R&S	DNF	68-4-81-14-005	DNF-002	2026-4-19
RF Meas. and Switch Matrix Unit	TST PASS	TSCB3023R2	68-4-93-23-001	2811685c	2026-4-18
Test software	Tonscend	System for BT/WIFI	68-4-74-14-006-A13	Version 2.6.77.0518	N/A
Shielding Room	TDK	TS8997	68-4-90-19-003	----	2025-10-15

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-14-001	101782	2026-4-25
LISN	Rohde & Schwarz	ENV432	68-4-87-16-001	101318	2026-4-25
Test software	Rohde & Schwarz	EMC32	68-4-90-14-003-A10	Version9.15.00	N/A
Shielding Room	TDK	CSR #1	68-4-90-19-004	----	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 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3.57dB
Uncertainty for Radiated Emission in 3m chamber 9kHz-30MHz	4.70dB
Uncertainty for Radiated Emission in new 3m chamber 30MHz-1000MHz	Horizontal: 4.59dB; Vertical: 4.75dB
Uncertainty for Radiated Emission in new 3m 1000MHz-18000MHz	Horizontal: 5.08dB; Vertical: 5.09dB;
Uncertainty for Radiated Emission 18000MHz-40000MHz	Horizontal: 4.52dB; Vertical: 4.51dB
Uncertainty for Conducted RF test	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: 2023, clause 4.3.3 and 4.3.4.

---THE END OF REPORT---

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