FCC / ISED- TEST REPORT

Report Number	:	**64.790.21.05634.02-R2**	Date of Issue:	2024-07-23
Model	:	**US-SK108**		
Product Type	:	Smart Kit		
Applicant	:	GD Midea Air-Conditioning Equipment Co., Ltd.		
Address	:	Lingang Road, Beijiao, Shunde 528311 Foshan, Guangdong, China		
Manufacturer	:	GD Midea Air-Conditioning Equipment Co., Ltd.		
Address	:	Lingang Road, Beijiao, Shunde 528311 Foshan, Guangdong, China		
Production Facility	:	GD Midea Air-Conditioning Equipment Co., Ltd.		
Address	:	Lingang Road, Beijiao, Shunde 528311 Foshan, Guangdong, China		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**47**		

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

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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, Guangdong, China
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299
FCC Registration No.:	514049
FCC Designation Number:	CN5009
ISED CAB identifier:	CN0077
IC Registration No.:	10320A

3 Description of the Equipment under Test

Product:	Smart Kit
Model no.:	US-SK108
Product Marketing Name (PMN):	Smart Kit
Hardware Version Identification No. (HVIN):	US-SK108
FCC ID:	2ADQOMDNA22
IC:	12575A-MDNA22
Options and accessories:	NIL
Ratings:	DC 5V (by USB port)
RF Transmission Frequency:	2402MHz - 2480MHz
No. of Operated Channel:	40
Modulation:	GFSK
Antenna Type:	PCB Antenna
Antenna Gain:	3.31dBi max.
Description of the EUT:	Products are smart kits with Wi-Fi and Bluetooth function, they are only can be used in Midea Group's household appliances for controling function. It can not connect to computer for any other function.

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 and Information for the Certification of Radio Apparatus
RSS-247 Issue 2 February 2017	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to KDB558074 D01 v05r02 DTS Measurement Guidance and ANSI C63.10-2020.

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5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C 10-1-2023 Edition / RSS-247 Issue 2, February 2017/ RSS-Gen Issue 5, April 2018 Amendment 1, March 2019 + Amendment 2, February 2021			
Test Condition		Test Result	Test Site
§15.207 RSS-GEN 8.8	Conducted emission AC power port	Pass	Site 1
§15.247 (b) (3) & RSS-247 5.4(d)	Conducted output power	Pass	Site 1
RSS-247 5.4(d)	Equivalent Isotropic Radiated Power	Pass	Site 1
§15.247(e) RSS-247 5.2(b)	Power spectral density	Pass	Site 1
§15.247(a)(2) RSS-247 5.2(a) & RSS-GEN 6.7	6dB bandwidth	Pass	Site 1
§15.247(a)(1) RSS-247 5.1(b)	20dB Occupied bandwidth	N/A	--
RSS-GEN 6.7	99% Occupied Bandwidth	Pass	Site 1
§15.247(a)(1) RSS-247 5.1(b)	Carrier frequency separation	N/A	--
§15.247(a)(1)(iii) RSS-247 5.1(d)	Number of hopping frequencies	N/A	--
§15.247(a)(1)(iii) RSS-247 5.1(d)	Dwell Time	N/A	--
§15.247(d) RSS-247 5.5	Spurious RF conducted emissions	Pass	Site 1
§15.247(d) RSS-247 5.5	Band edge	Pass	Site 1
§15.247(d) & §15.209 & §15.205 RSS-247 5.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	Pass	Site 1
§15.203 RSS-Gen 6.8	Antenna requirement	Pass See note 1	--

Remark 1: N/A – Not Applicable.
Note 1: The EUT uses a PCB Antenna 3.31dBi max. According 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

This report is used to apply C2PC on new model US-SK108, which is based on the previous report 64.790.21.05634.01-R2 for following technical changes:

- Remove the plastic enclosure and USB interface, and change to SMT interface type.
- Add a metal shield covering all components.

So in this application the test data of conducted emission, conducted output power and radiated spurious emissions in this report is new test data to verify the compliance of these changes, other test data were refer from 64.790.21.05634.01-R2 of original application and these test data are still effective and representative of the compliance of this change of the product.
The conducted emissions of US-SK108 were tested with a notebook, and the input voltage is 120VAC/60Hz;
The RF tests of US-SK108 were tested with a power source, and the input power is 5VDC.

This submittal(s) (test report) is intended for FCC ID: 2ADQOMDNA22, complies with Section 15.207, 15.209, 15.205, 15.247 of the FCC Part 15, Subpart C rules.
This submittal(s) (test report) is intended for IC: 12575A-MDNA22, complies with RSS-247 and RSS-Gen.

This report is only for BLE.

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:	2021-11-20	2024-05-30
Testing Start Date:	2021-11-29	2024-06-13
Testing End Date:	2021-12-09	2024-06-19

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

Reviewed by:	Prepared by:	Tested by:
Jessie He	Myron Yu	Carry Cai
EMC Project Manager	EMC Project Engineer	EMC Test Engineer

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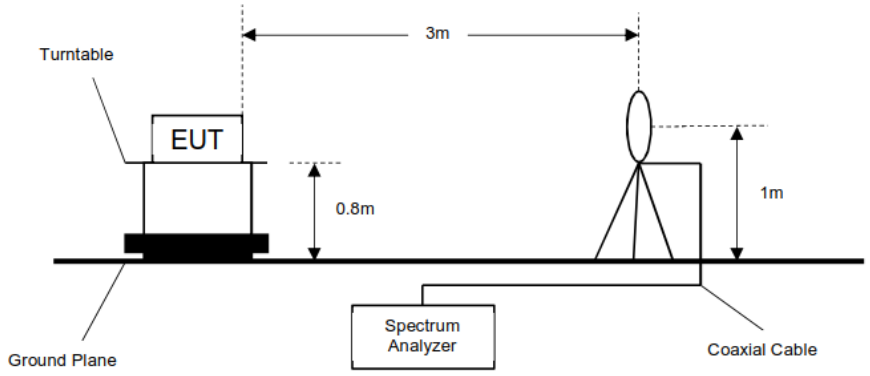
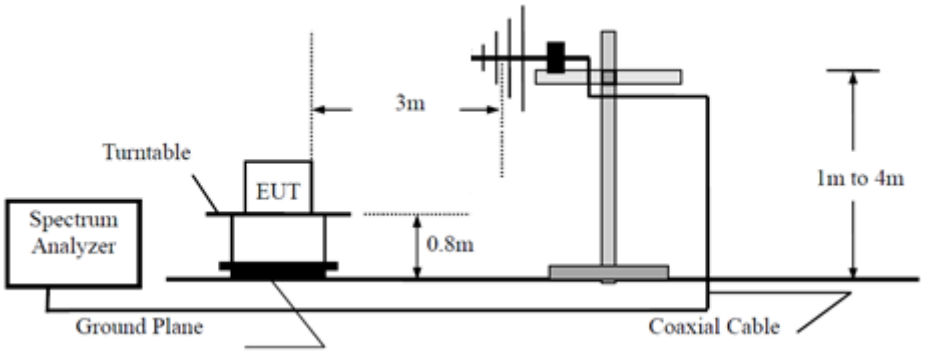
7 Test Setups

7.1 Radiated test setups

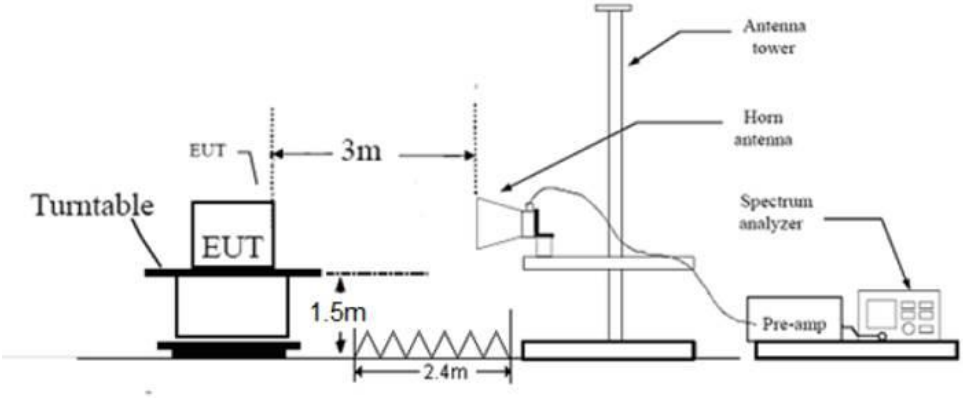
9kHz - 30MHz



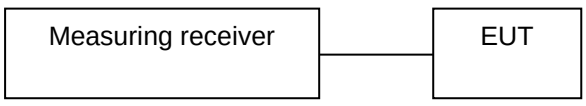
Below 1GHz



Above 1GHz



7.2 Conducted RF test setups



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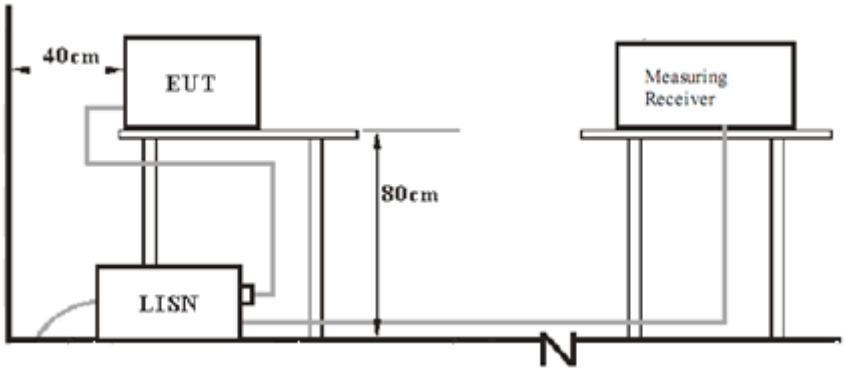
7.3 AC Power Line Conducted Emission test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Mobile Phone	Apple	iPhone 6	---
APP	Midea	MSmartHome	---
Laptop	Lenovo	X240	L34015282
Software	/	DOGO_VP2.0.1	---

Test Software Information:

Test Software Version	DOGO_VP2.0.1	
Mode	Setting TX Power	Data Rate
BLE 2402	Default parameters, <3dBm	1 Mbps
BLE 2440	Default parameters, <4dBm	1 Mbps
BLE 2480	Default parameters, <4dBm	1 Mbps

The system was configured to channel 11, 18, and 26 for the test.

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9 Technical Requirement

9.1 Conducted Emission

Test Method

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

Limit

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

*Decreasing line

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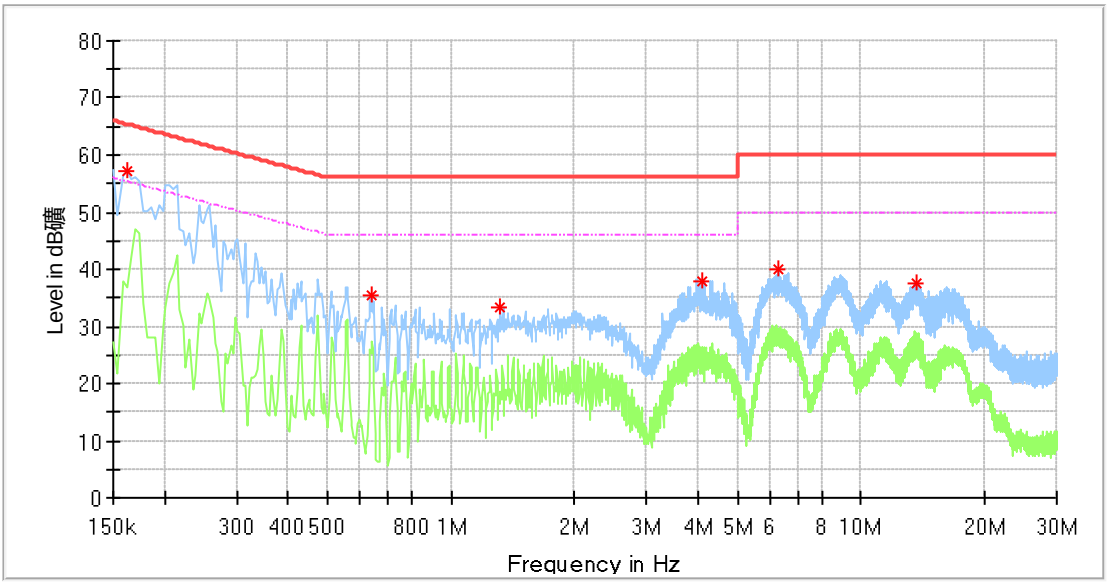
Conducted Emission

Product Type	:	Smart Kit
M/N	:	US-SK108
Operating Condition	:	Transmitting
Test Specification	:	Power Line, Live
Comment	:	AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.162000	57.20	---	65.36	8.16	L1	10.27
0.642000	35.39	---	56.00	20.61	L1	10.31
1.322000	33.37	---	56.00	22.63	L1	10.33
4.110000	37.89	---	56.00	18.11	L1	10.50
6.274000	40.16	---	60.00	19.84	L1	10.68
13.674000	37.60	---	60.00	22.40	L1	11.14

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

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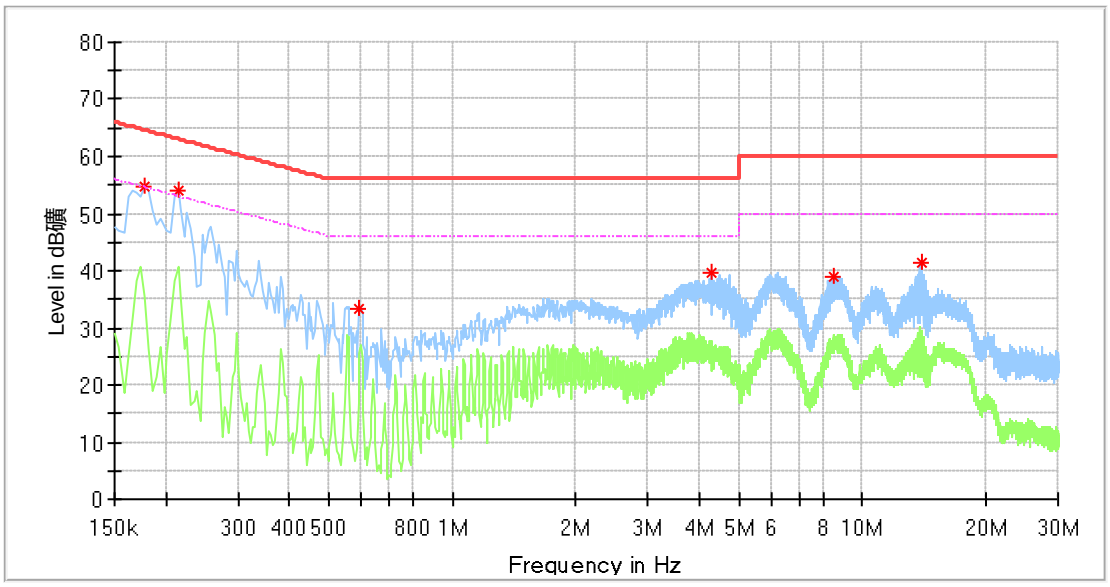
Conducted Emission

Product Type	:	Smart Kit
M/N	:	US-SK108
Operating Condition	:	Transmitting
Test Specification	:	Power Line, Neutral
Comment	:	AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.178000	54.64	---	64.58	9.94	N	10.22
0.214000	53.91	---	63.05	9.14	N	10.23
0.594000	33.42	---	56.00	22.58	N	10.20
4.298000	39.82	---	56.00	16.18	N	10.46
8.550000	39.07	---	60.00	20.93	N	11.03
13.890000	41.50	---	60.00	18.50	N	11.31

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

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9.2 Conducted 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), 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	≤36.2

Test Results

Channel (MHz)	Conducted output power (dBm)	E.I.R.P (dBm)	Limit (dBm)	Verdict
2402	1.81	5.12	≤30	PASS
2440	3.10	6.41	≤30	PASS
2480	3.29	6.60	≤30	PASS

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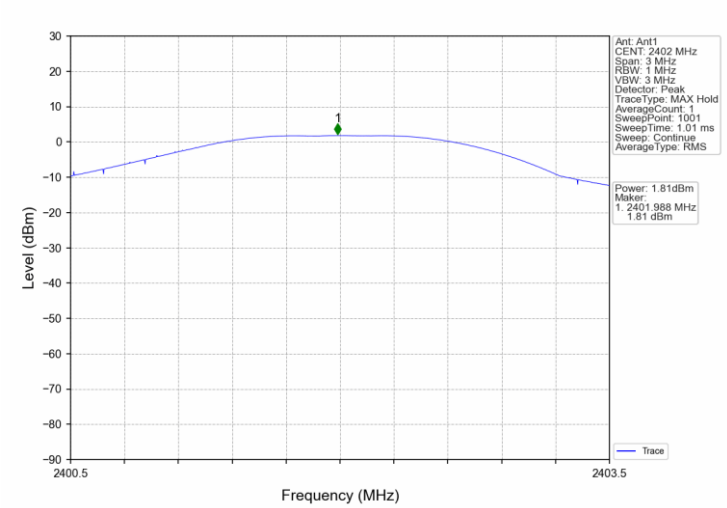
Test Graphs

1M_LCH_2402MHz_Ant1_NTNV

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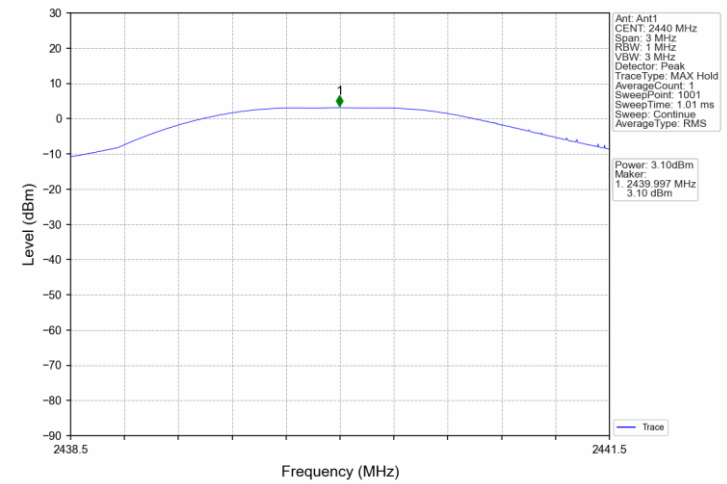
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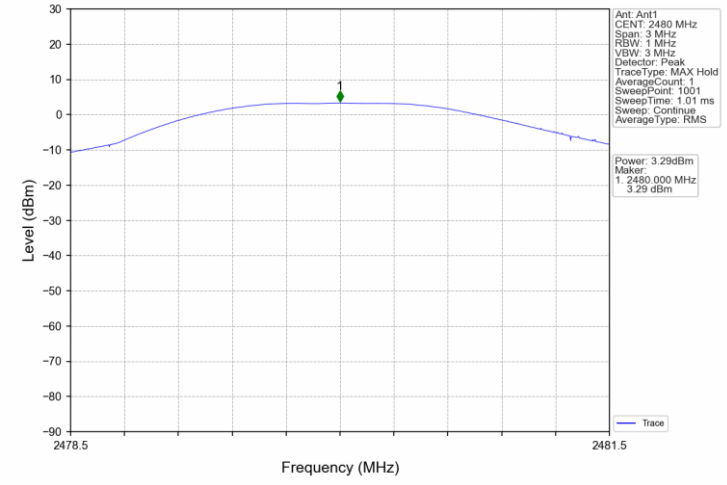

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9.3 6dB bandwidth

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 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:
   RBW=100KHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Use the automatic bandwidth measurement capability of an instrument, use the X dB bandwidth mode with X set to 6 dB.
5. Allow the trace to stabilize, record the 6 dB Bandwidth value.

Limit

Limit [kHz]
≥500

Test Results

Channel(MHz)	6dB BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
2402	0.656	2401.652	2402.308	0.5	PASS
2440	0.660	2439.648	2440.308	0.5	PASS
2480	0.660	2479.648	2480.308	0.5	PASS

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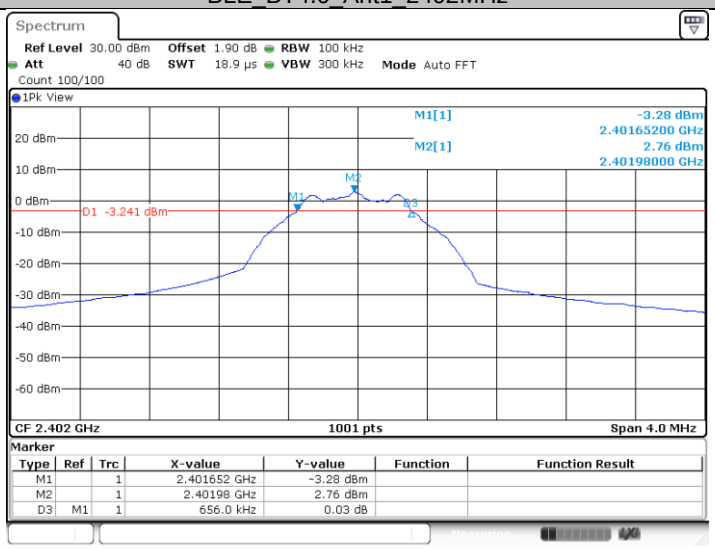
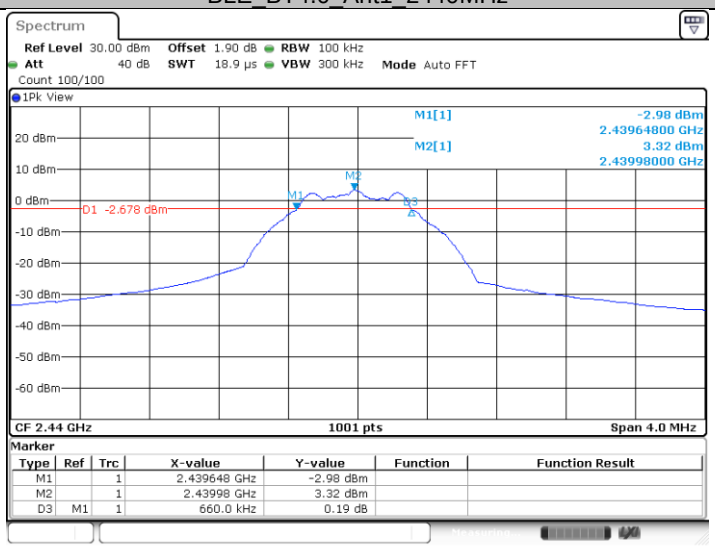
Test Graphs

BLE_BT4.0_Ant1_2402MHz



Date: 29.NOV.2021 10:03:28

BLE_BT4.0_Ant1_2440MHz



Date: 29.NOV.2021 10:05:18

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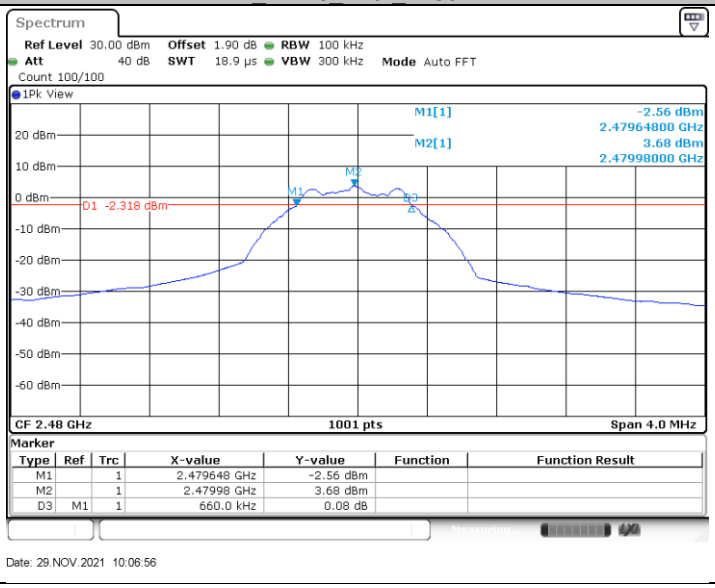
BLE_BT4.0_Ant1_2480MHz



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9.4 99% bandwidth

Test Method

1. Connect EUT test port to spectrum analyzer.
   Use the following spectrum analyzer settings:
   RBW=1% to 5% of the actual occupied, VBW≥3RBW, Sweep = auto,
   Detector function = peak, Trace = max hold
2. Use the occupied bandwidth measurement capability of test receiver.
3. Allow the trace to stabilize, record the occupied bandwidth value.

Limit

Limit [kHz]
--

Test result

Channel	99% OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
2402	1.027	2401.477	2402.503	---	PASS
2440	1.027	2439.477	2440.503	---	PASS
2480	1.031	2479.473	2480.503	---	PASS

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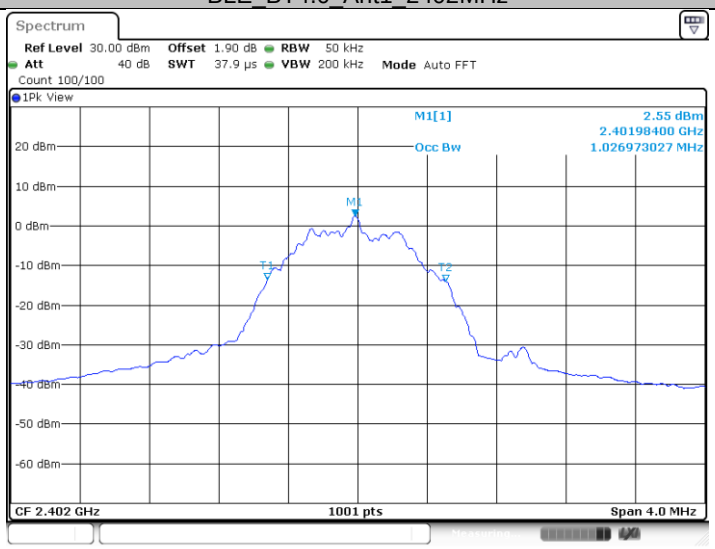
Test Graphs

BLE_BT4.0_Ant1_2402MHz



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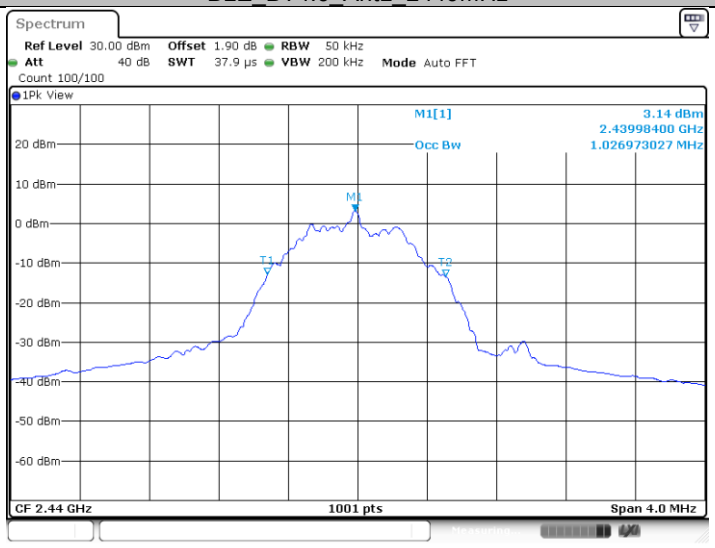
BLE_BT4.0_Ant1_2440MHz



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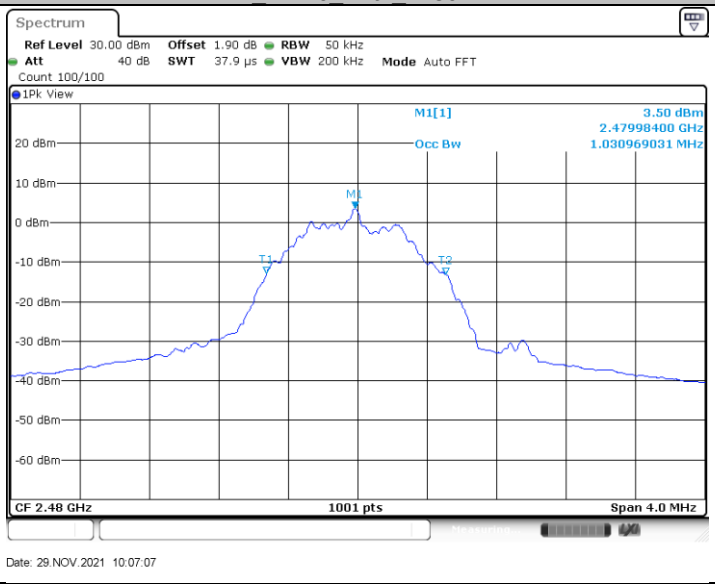
BLE_BT4.0_Ant1_2480MHz



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9.5 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

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

Channel(MHz)	Result(dBm/3KHz)	Limit(dBm/3KHz)	Verdict
2402	-12.82	<=8	PASS
2440	-12.17	<=8	PASS
2480	-11.85	<=8	PASS

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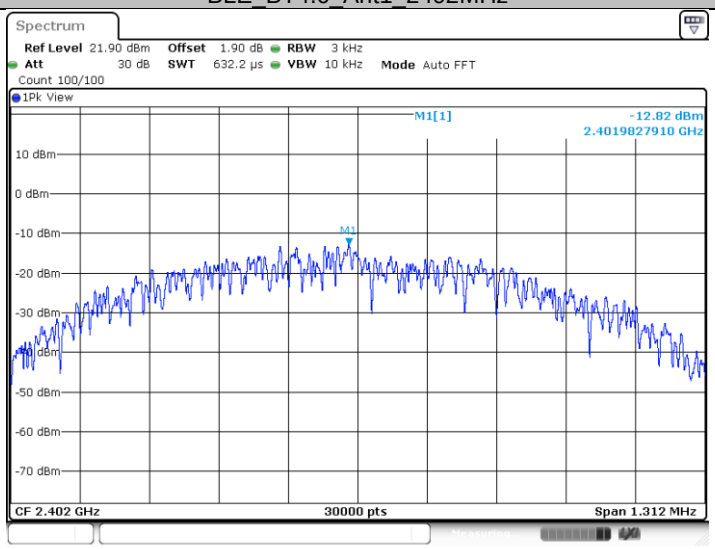
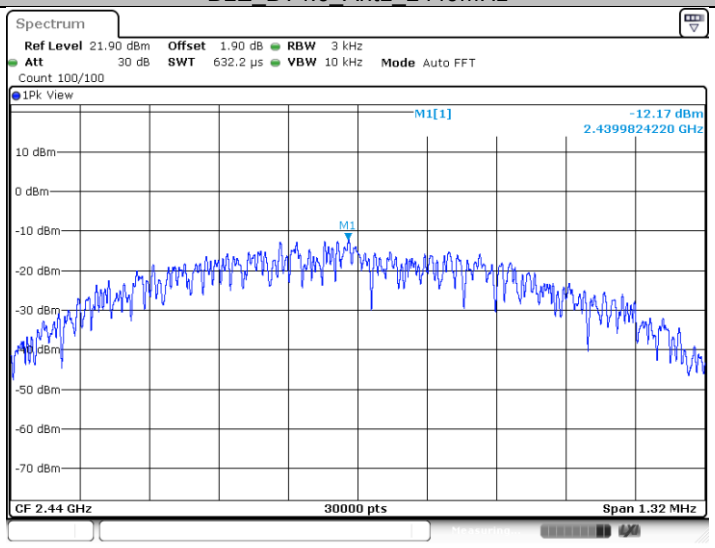
Test Graphs

BLE_BT4.0_Ant1_2402MHz



BLE_BT4.0_Ant1_2440MHz



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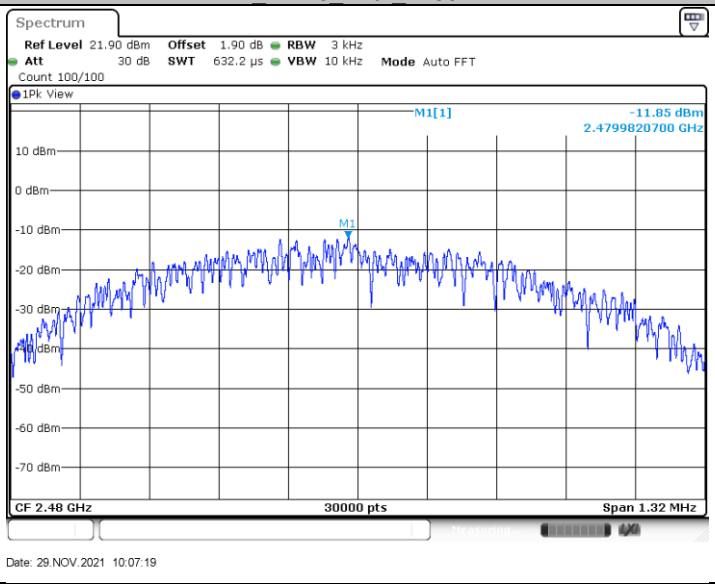
BLE_BT4.0_Ant1_2480MHz



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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 Results

Channel(MHz)	Freq Range (MHz)	RefLevel(dBm)	Result(dBm)	Limit(dBm)	Verdict
2402	Reference	2.71	2.71	---	PASS
	30~1000	30~1000	-66.59	<=-17.29	PASS
	1000~26500	1000~26500	-31.74	<=-17.29	PASS
2440	Reference	3.32	3.32	---	PASS
	30~1000	30~1000	-67.09	<=-16.68	PASS
	1000~26500	1000~26500	-50.5	<=-16.68	PASS
2480	Reference	3.66	3.66	---	PASS
	30~1000	30~1000	-66.57	<=-16.34	PASS
	1000~26500	1000~26500	-44.5	<=-16.34	PASS

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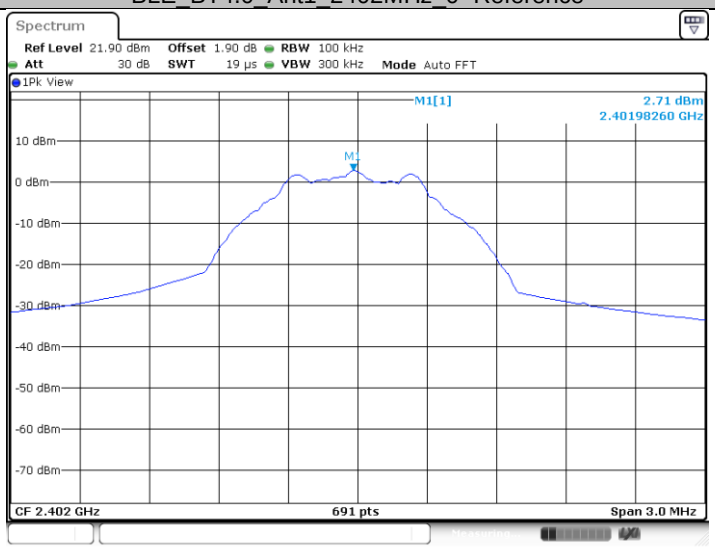
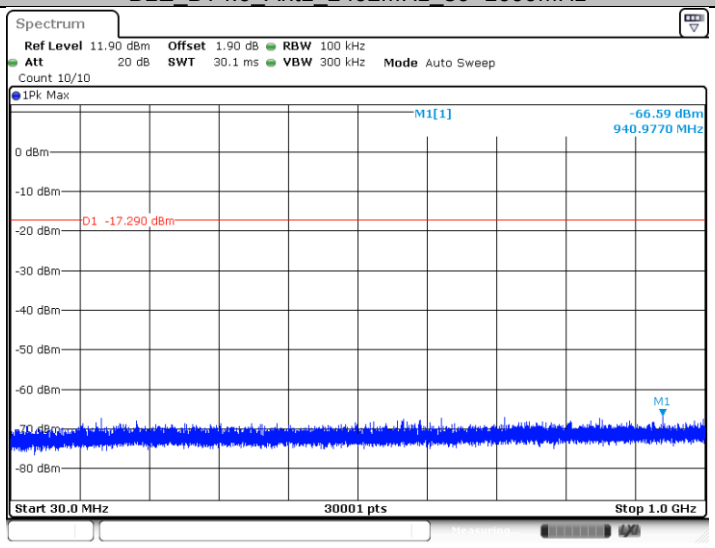
Test Graphs

BLE_BT4.0_Ant1_2402MHz_0~Reference



Date: 29.NOV.2021 10:04:06

BLE_BT4.0_Ant1_2402MHz_30~1000MHz



Date: 29.NOV.2021 10:04:12

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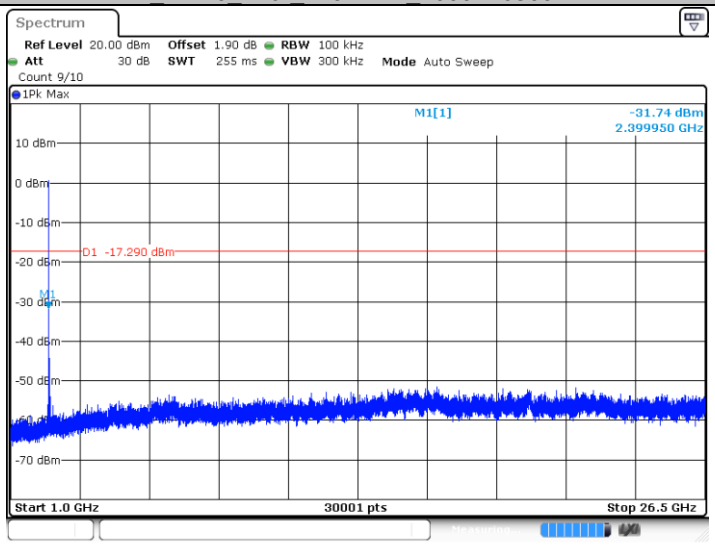
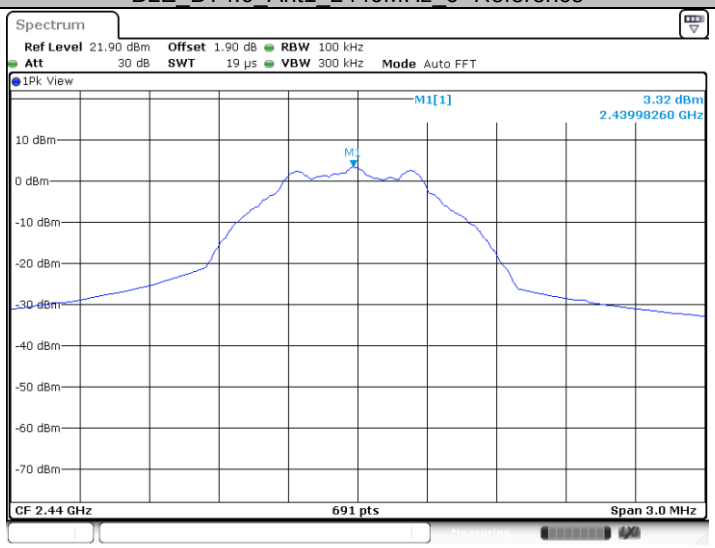
BLE_BT4.0_Ant1_2402MHz_1000~26500 MHz



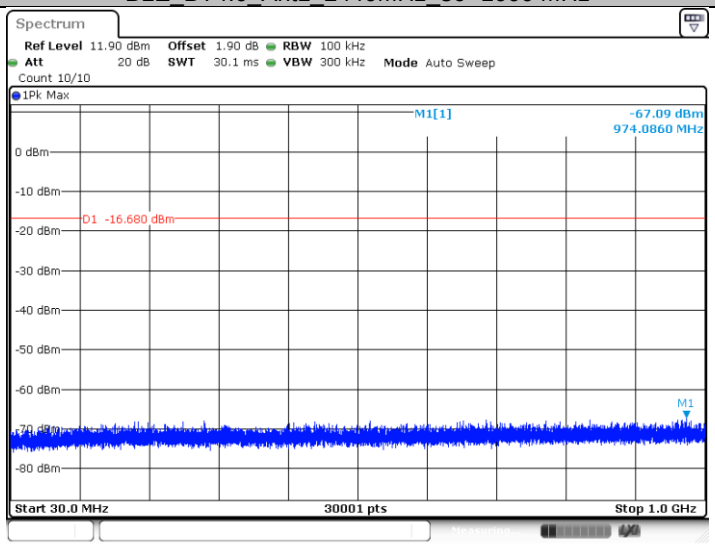
Date: 29.NOV.2021 10:04:20

BLE_BT4.0_Ant1_2440MHz_0~Reference



Date: 29.NOV.2021 10:05:47

BLE_BT4.0_Ant1_2440MHz_30~1000 MHz



Date: 29.NOV.2021 10:05:53

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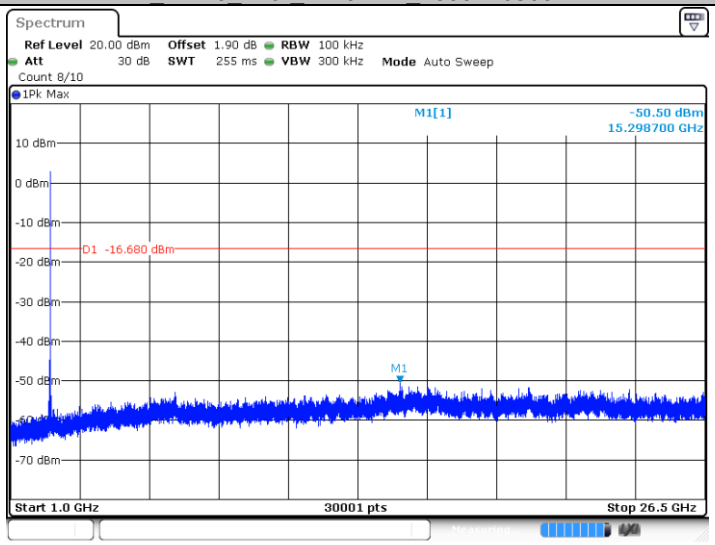
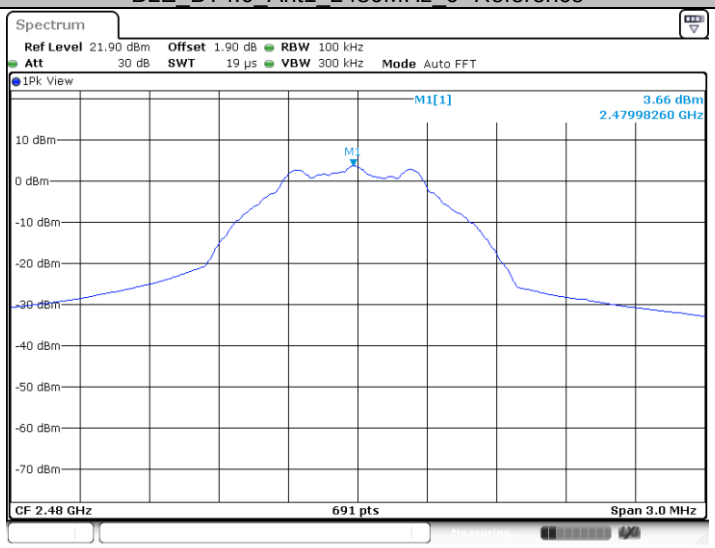
BLE_BT4.0_Ant1_2440MHz_1000~26500 MHz



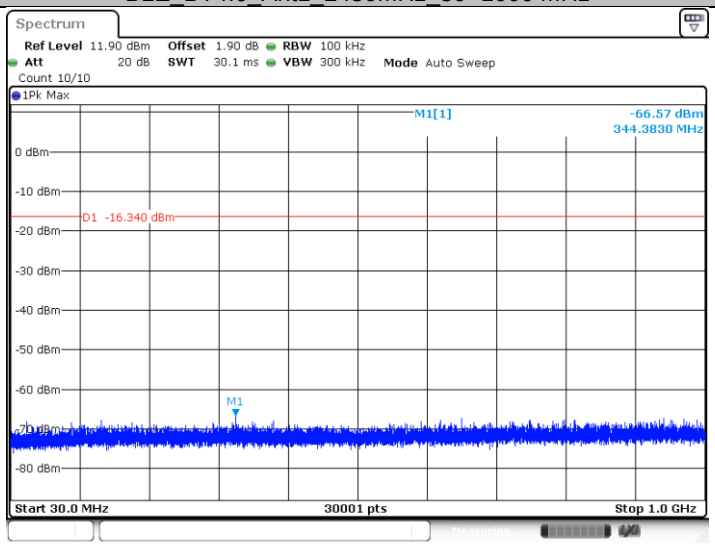
Date: 29.NOV.2021 10:06:01

BLE_BT4.0_Ant1_2480MHz_0~Reference



Date: 29.NOV.2021 10:07:34

BLE_BT4.0_Ant1_2480MHz_30~1000 MHz



Date: 29.NOV.2021 10:07:40

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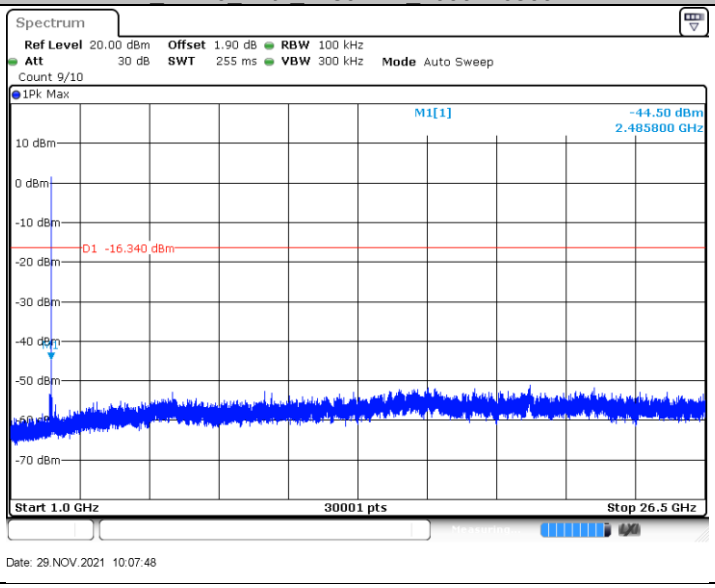
BLE_BT4.0_Ant1_2480MHz_1000~26500 MHz



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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
   RBW = 100 kHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize, use the peak and delta measurement to record the result.
5. The level displayed must comply with the limit specified in this Section.
6. Repeat above procedures until all frequencies measured were complete and submit all the plots.

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 Results

Refer to test graphs.

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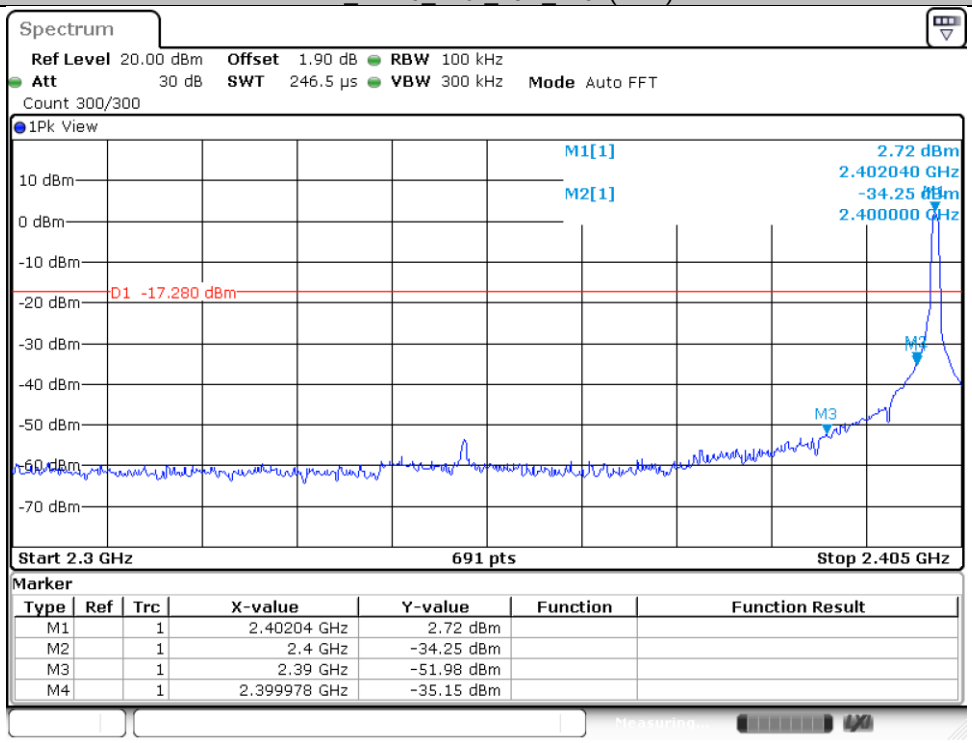
Test Graphs

BLE_BT4.0_Ant1_Low_2402(MHz)

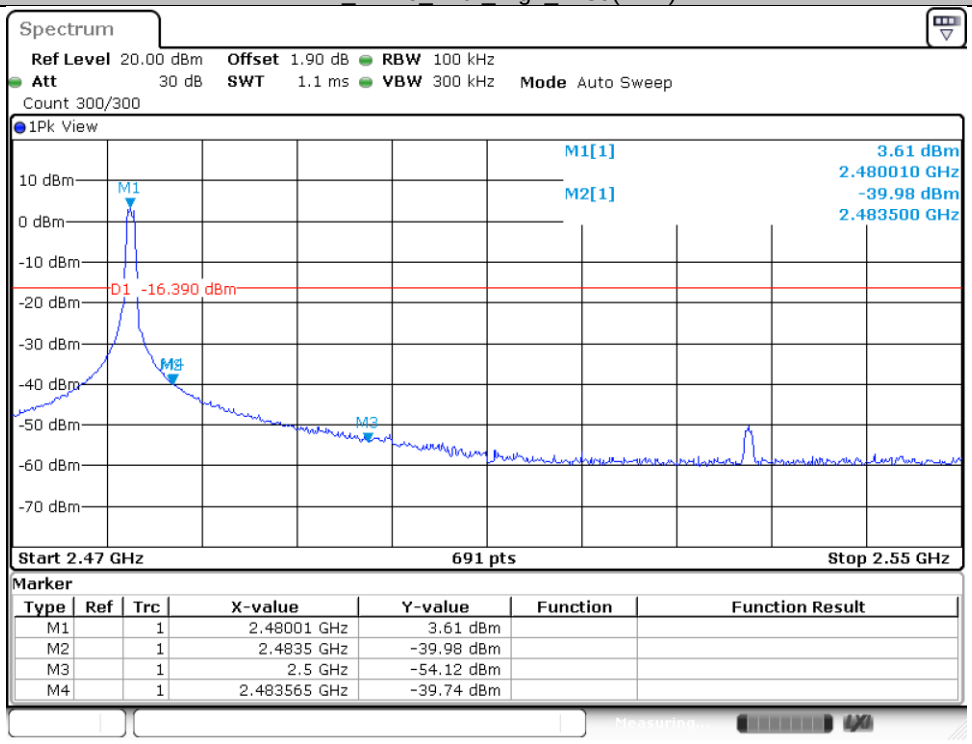


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40204 GHz	2.72 dBm		
M2		1	2.4 GHz	-34.25 dBm		
M3		1	2.39 GHz	-51.98 dBm		
M4		1	2.399978 GHz	-35.15 dBm		

Date: 29.NOV.2021 10:04:00

BLE_BT4.0_Ant1_High_2480(MHz)



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.48001 GHz	3.61 dBm		
M2		1	2.4835 GHz	-39.98 dBm		
M3		1	2.5 GHz	-54.12 dBm		
M4		1	2.483565 GHz	-39.74 dBm		

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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:

1) Procedure for Unwanted Emissions Measurements Below 1000 MHz
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.

2) 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.

3) Procedures 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—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

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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.

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

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

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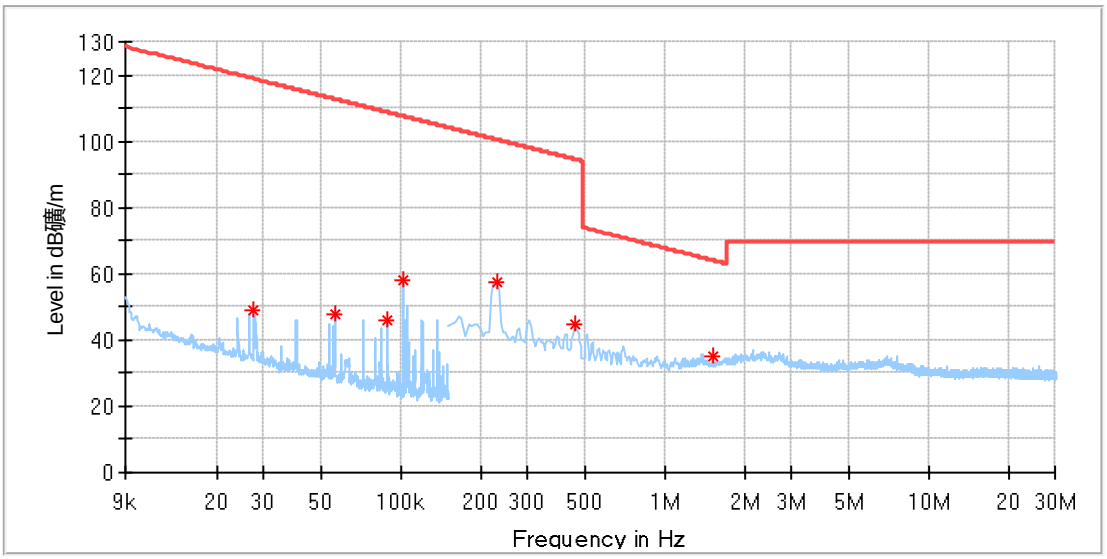
Spurious radiated emissions for transmitter

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

Transmitting spurious emission test result as below:

Spurious radiated emissions for BLE 2402MHz (9kHz – 30MHz)(worst case)



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB/m)
0.027706	49.16	118.74	69.58	H	285.0	19.93
0.056141	47.68	112.61	64.93	H	0.0	19.96
0.087960	45.82	108.71	62.89	H	0.0	19.95
0.101637*	57.96	107.46	49.49	H	77.0	19.95
0.229600	57.27	100.38	43.11	H	122.0	19.91
0.453475	45.01	94.47	49.46	H	359.0	19.95
1.513150	35.37	64.01	28.64	H	359.0	20.02

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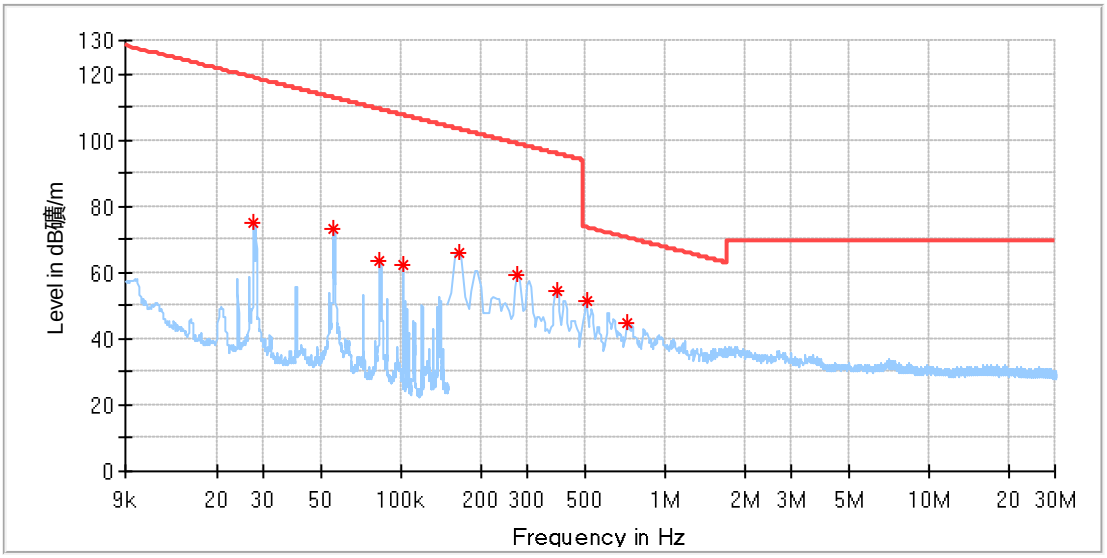

Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB/m)
0.027659	75.22	118.75	43.53	V	277.0	19.93
0.055342	72.97	112.73	39.77	V	0.0	19.96
0.083072	63.22	109.21	45.99	V	0.0	19.95
0.101637*	62.20	107.46	45.25	V	0.0	19.95
0.164925	66.12	103.25	37.14	V	162.0	19.92
0.274375	59.27	98.83	39.56	V	120.0	19.93
0.388800	54.53	95.81	41.28	V	5.0	19.94
0.503225*	51.48	73.57	22.08	V	120.0	19.95
0.717150	44.78	70.49	25.71	V	25.0	20.00

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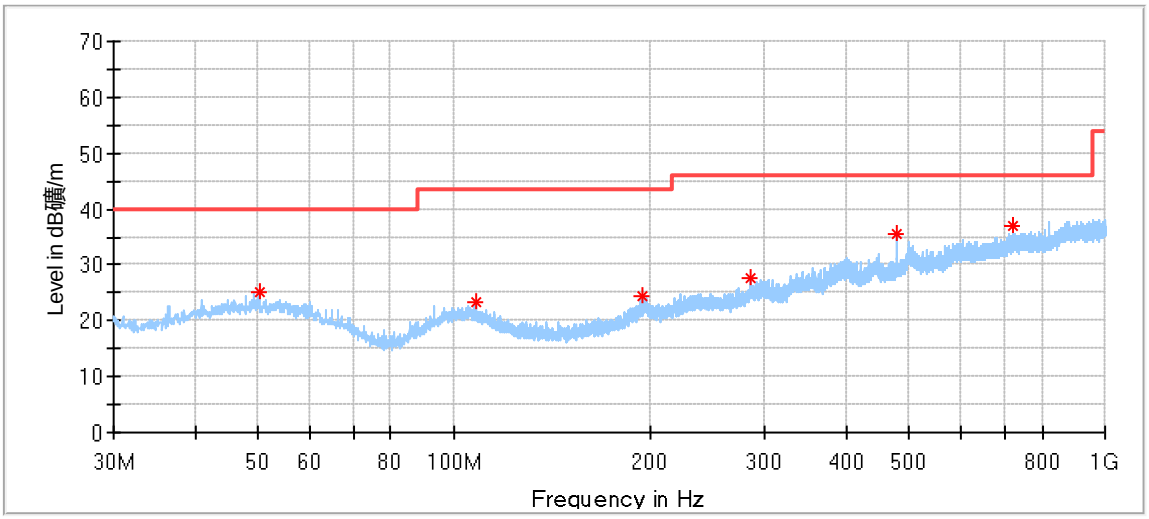
Spurious radiated emissions for BLE 2402MHz (30MHz – 1GHz)(worst case)



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
50.154444	25.09	40.00	14.91	100.0	H	11.0	18.04
108.138889*	23.18	43.50	20.32	100.0	H	242.0	16.04
194.307222	24.49	43.50	19.01	100.0	H	115.0	16.15
284.786667*	27.47	46.00	18.53	100.0	H	307.0	18.23
479.972222	35.37	46.00	10.63	100.0	H	155.0	22.39
719.993333	36.95	46.00	9.05	100.0	H	68.0	26.18

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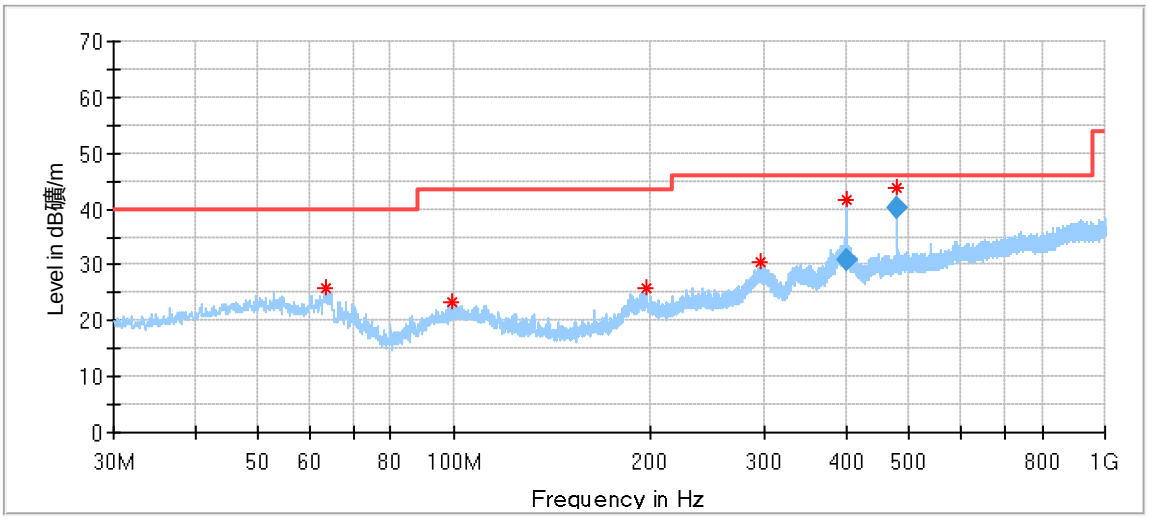

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
63.518889	25.83	40.00	14.17	100.0	V	94.0	15.98
99.031667	23.45	43.50	20.05	100.0	V	0.0	16.02
197.217222	25.67	43.50	17.83	100.0	V	321.0	16.52
296.157222	30.47	46.00	15.53	200.0	V	276.0	18.38

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
399.897000	30.85	46.00	15.15	166.0	V	119.0	21.06
479.997622	40.04	46.00	5.96	167.0	V	36.0	22.39

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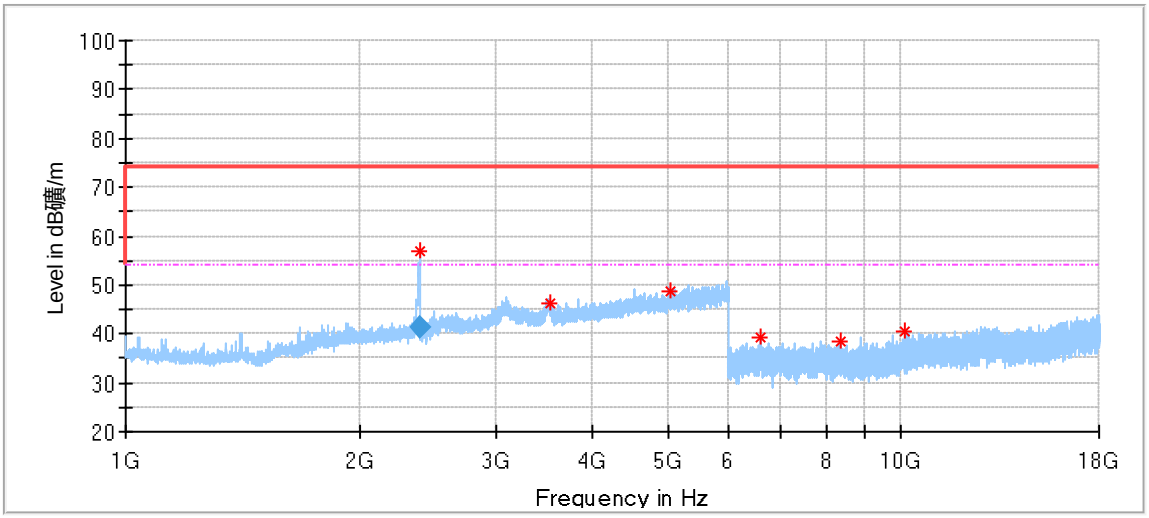
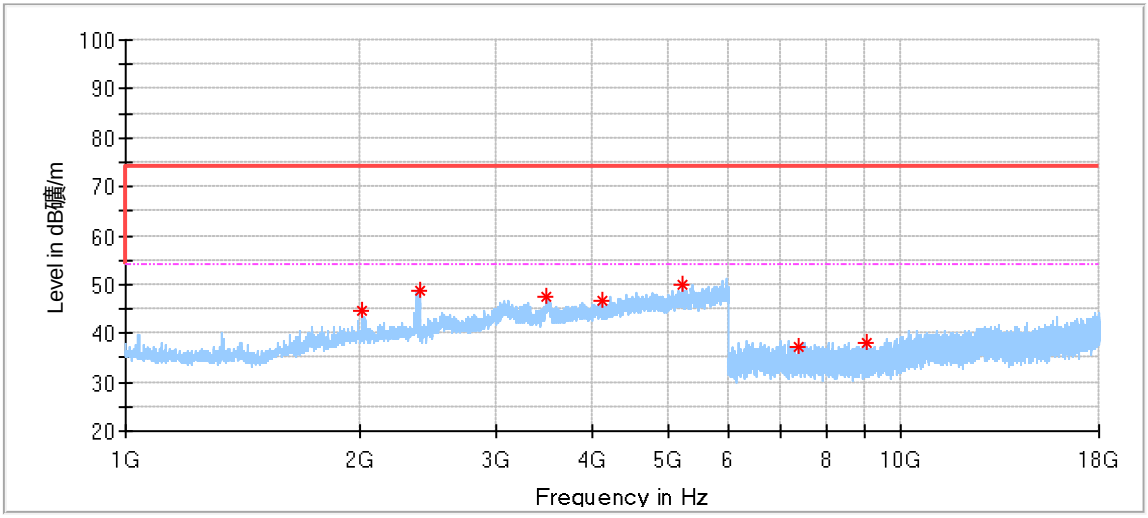
Spurious radiated emissions for BLE 2402MHz (Above 1GHz)



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3531.000000	46.20	74.00	27.80	150.0	H	312.0	1.98
5031.000000*	48.64	74.00	25.36	150.0	H	300.0	4.39
6576.500000	39.46	74.00	34.54	150.0	H	306.0	5.49
8379.500000*	38.66	74.00	35.34	150.0	H	306.0	6.61
10136.500000	40.66	74.00	33.34	150.0	H	282.0	8.71

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2394.500000	41.21	54.00	12.79	150.0	H	168.0	-2.76



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2020.500000	44.47	74.00	29.53	150.0	V	228.0	-4.40
2395.500000	48.91	74.00	25.09	150.0	V	11.0	-2.75
3490.000000	47.67	74.00	26.33	150.0	V	324.0	3.04
4129.000000*	46.82	74.00	27.18	150.0	V	156.0	1.97
5218.500000	50.05	74.00	23.95	150.0	V	58.0	5.00
7380.000000*	37.41	74.00	36.59	150.0	V	302.0	5.89
9019.500000*	38.24	74.00	35.76	150.0	V	350.0	7.08

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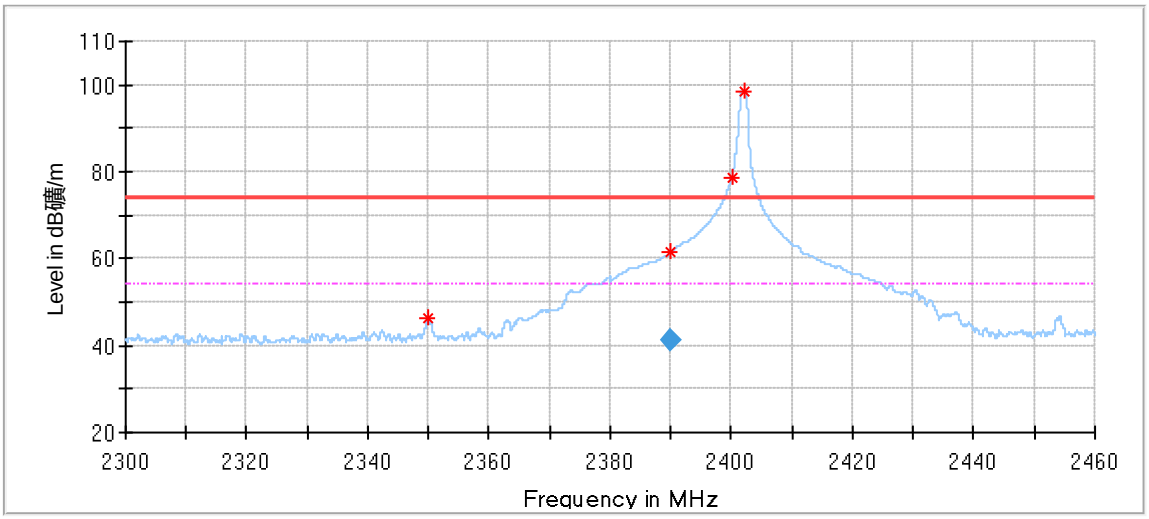
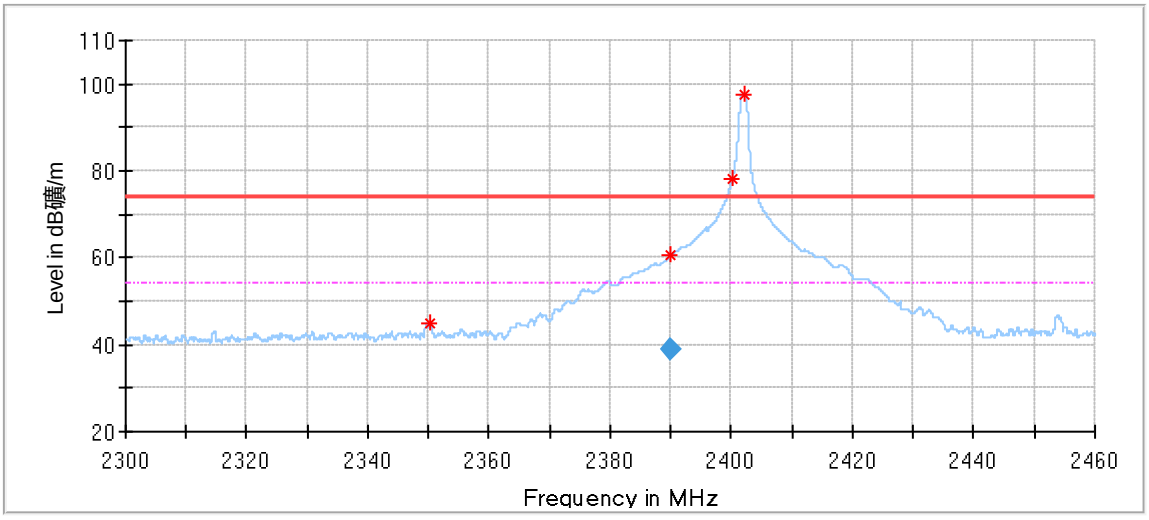
Band edge for BLE 2402MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2349.904000*	46.18	74.00	27.82	150.0	H	171.0	-3.81
2400.048000	78.82	74.00	-4.82	150.0	H	267.0	-3.32
2402.000000	98.56	74.00	-24.56	150.0	H	256.0	-3.30

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2389.936000*	41.21	54.00	12.79	150.0	H	267.0	-3.36



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2350.288000*	44.80	74.00	29.20	150.0	V	151.0	-3.81
2400.000000	77.31	74.00	-3.31	150.0	V	266.0	-3.32
2402.000000	97.73	74.00	-23.73	150.0	V	266.0	-3.30

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2390.064000	38.96	54.00	15.04	150.0	V	255.0	-3.36

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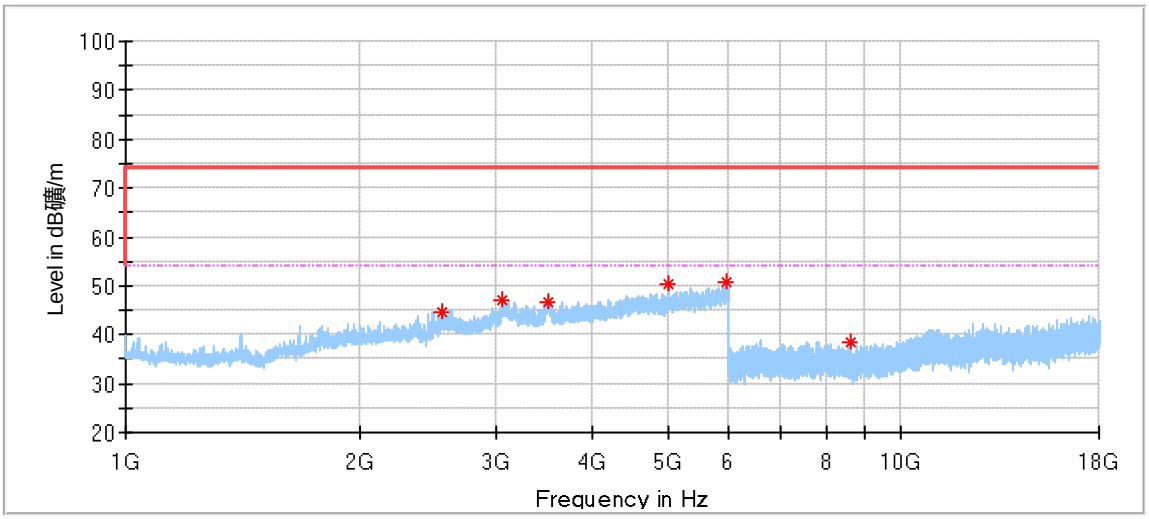
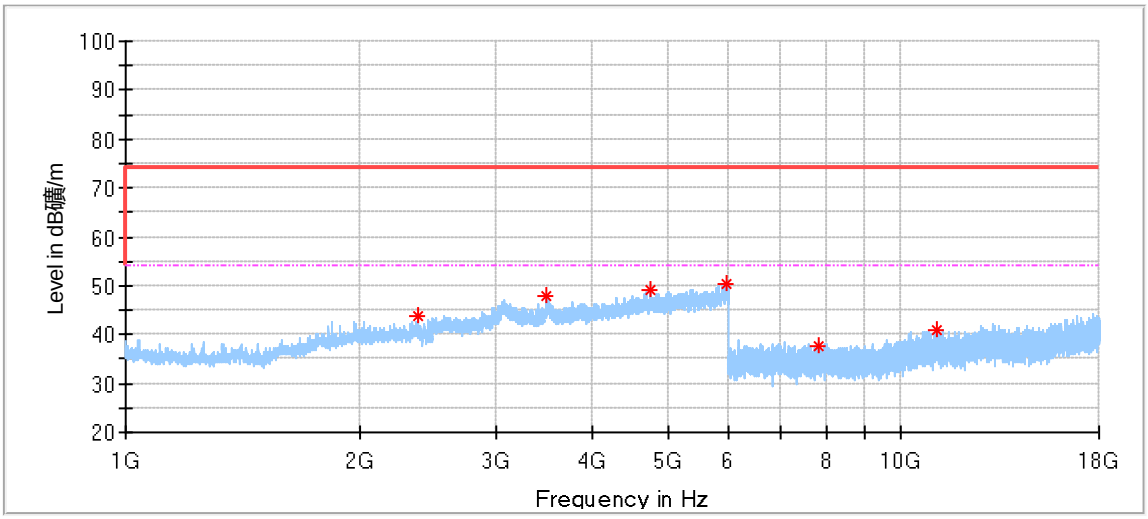
Spurious radiated emissions for BLE 2440MHz (Above 1GHz)



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2553.000000	44.69	74.00	29.31	150.0	H	22.0	-1.61
3051.500000	47.09	74.00	26.91	150.0	H	180.0	1.35
3508.000000	46.83	74.00	27.17	150.0	H	144.0	3.31
5020.000000*	50.24	74.00	23.76	150.0	H	192.0	4.39
5971.500000	50.58	74.00	23.42	150.0	H	70.0	6.89
8594.000000	38.56	74.00	35.44	150.0	H	131.0	6.74



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2387.500000*	43.69	74.00	30.31	150.0	V	264.0	-2.83
3491.500000	47.85	74.00	26.15	150.0	V	22.0	3.15
4748.000000*	49.27	74.00	24.73	150.0	V	70.0	3.83
5948.000000	50.22	74.00	23.78	150.0	V	324.0	6.86
7817.000000	37.77	74.00	36.23	150.0	V	302.0	6.35
11105.000000*	41.12	74.00	32.88	150.0	V	204.0	10.34

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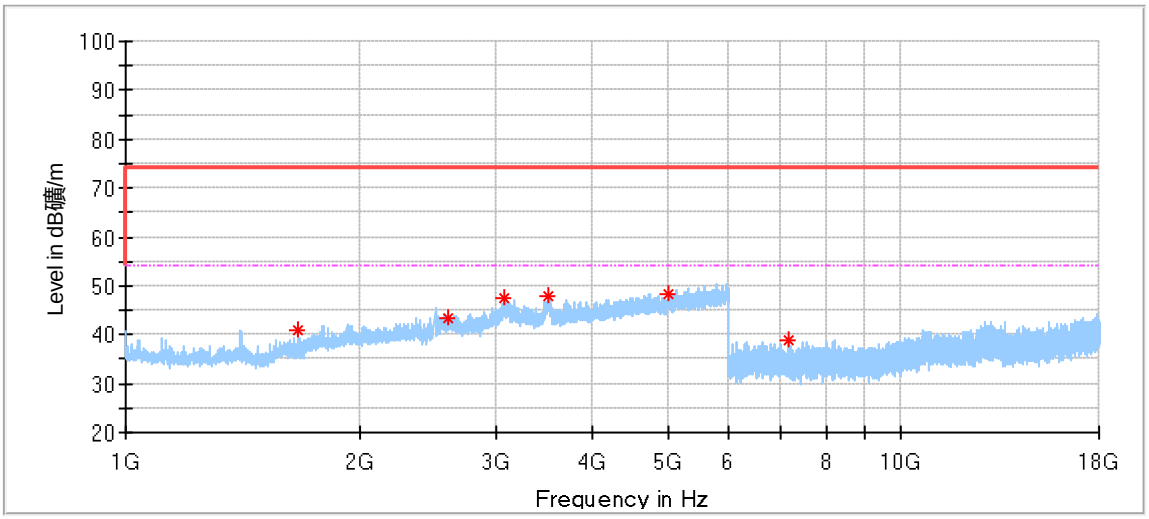
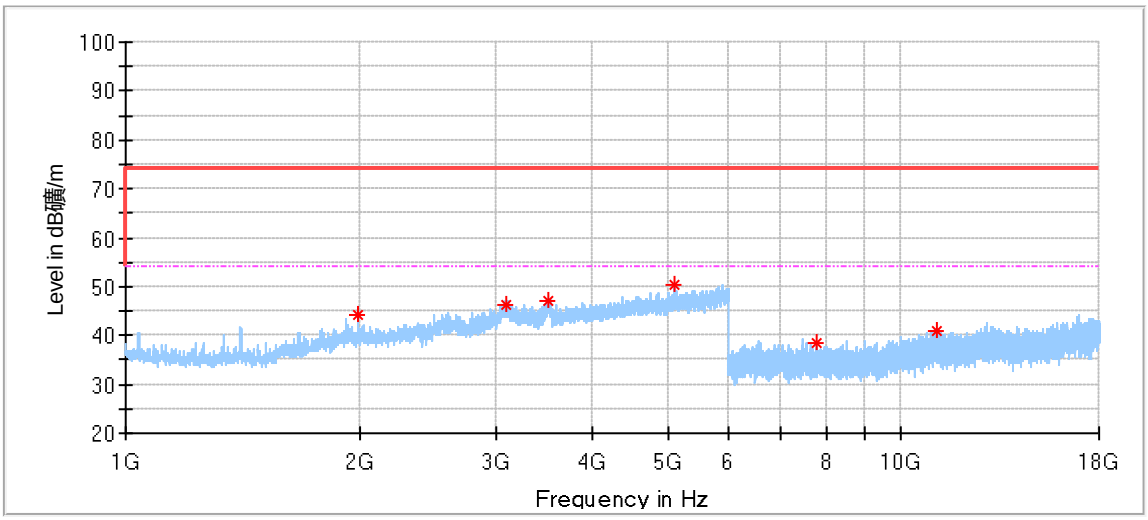
Spurious radiated emissions for BLE 2480MHz (Above 1GHz)



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1664.000000*	41.02	74.00	32.98	150.0	H	108.0	-7.26
2610.000000	43.46	74.00	30.54	150.0	H	24.0	-1.38
3078.000000	47.65	74.00	26.35	150.0	H	72.0	1.35
3510.000000	47.84	74.00	26.16	150.0	H	13.0	3.20
5000.500000*	48.50	74.00	25.50	150.0	H	180.0	4.30
7146.000000	38.98	74.00	35.02	150.0	H	229.0	5.69



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1995.000000	44.13	74.00	29.87	150.0	V	240.0	-4.40
3103.500000	46.44	74.00	27.56	150.0	V	276.0	1.46
3500.000000	47.06	74.00	26.94	150.0	V	81.0	3.76
5113.000000*	50.18	74.00	23.82	150.0	V	288.0	4.72
7769.500000	38.39	74.00	35.61	150.0	V	204.0	6.32
11151.500000*	40.90	74.00	33.10	150.0	V	155.0	10.34

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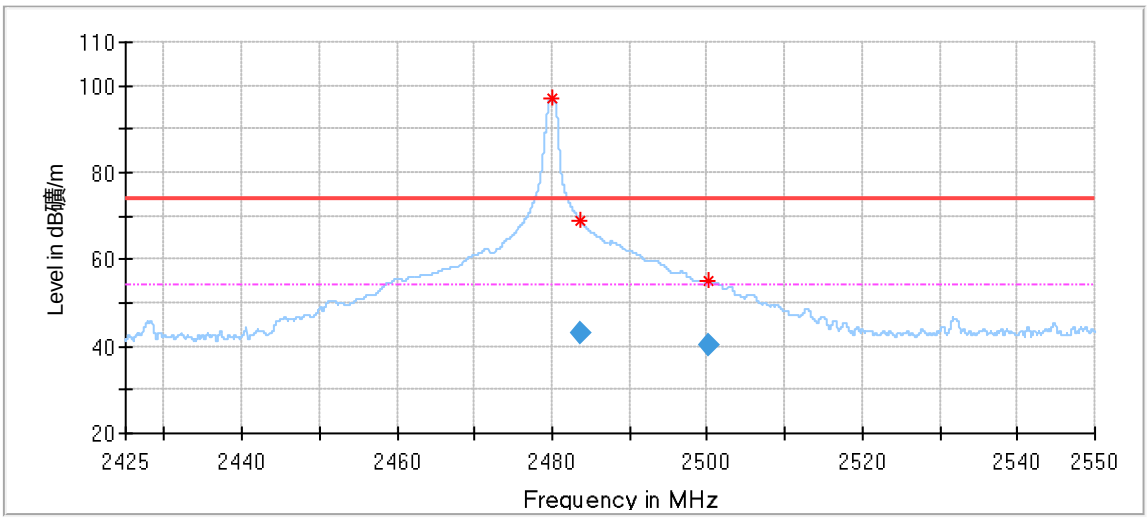
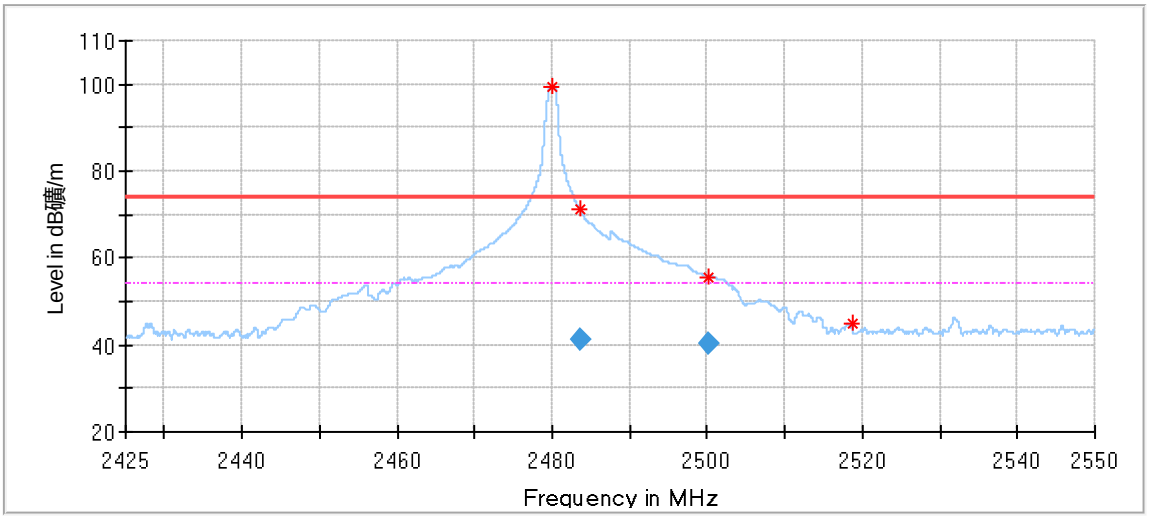
Band edge for BLE 2480MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2479.987500	96.97	74.00	-22.97	150.0	H	125.0	-2.69

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.575000*	43.21	54.00	11.79	150.0	H	264.0	-2.68
2500.237500	40.17	54.00	13.83	150.0	H	264.0	-2.64



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2480.000000	99.46	74.00	-25.46	150.0	V	259.0	-2.69
2518.725000	44.74	74.00	29.26	150.0	V	75.0	-2.51

Final_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.550000*	41.19	54.00	12.81	150.0	V	259.0	-2.68
2500.137500	40.14	54.00	13.86	150.0	V	259.0	-2.64

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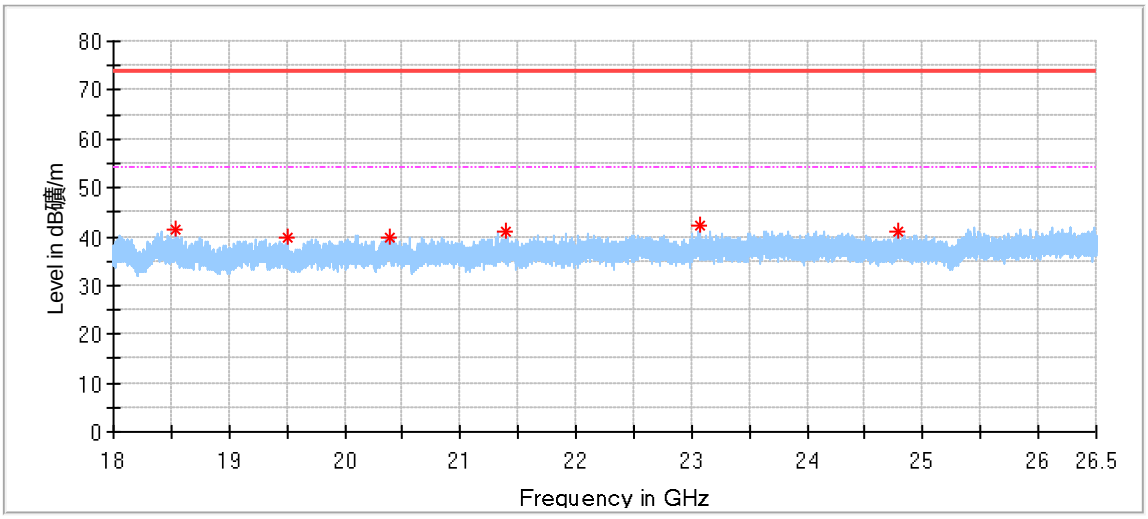
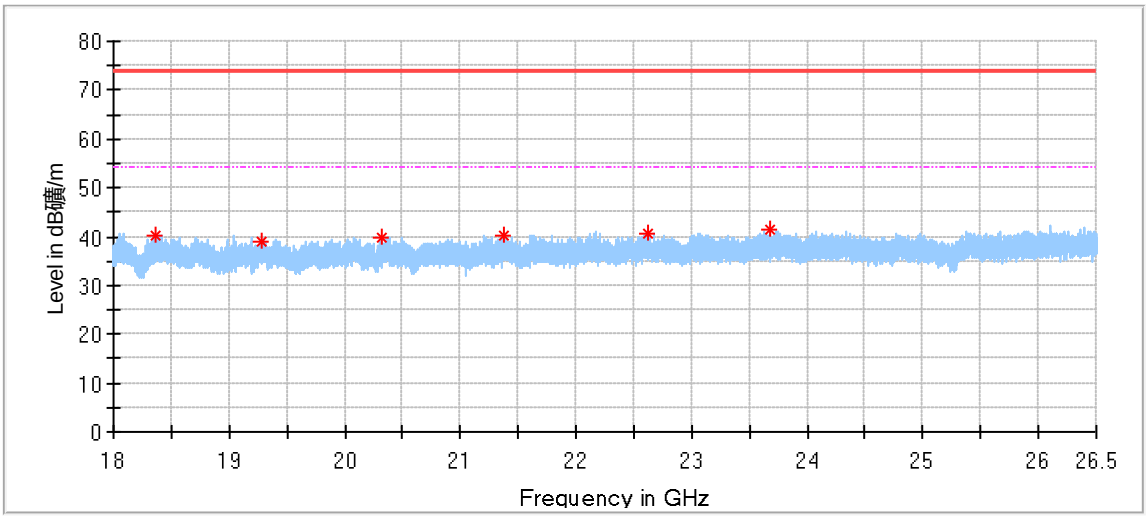
Spurious radiated emissions for BLE 2402MHz (18GHz – 26.5GHz)(worst case)



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18529.390625*	41.39	74.00	32.61	150.0	H	143.0	-4.40
19498.390625*	39.68	74.00	34.32	150.0	H	50.0	-4.09
20389.562500*	39.96	74.00	34.04	150.0	H	96.0	-3.19
21395.218750*	40.92	74.00	33.08	150.0	H	154.0	-2.08
23075.296875*	42.17	74.00	31.83	150.0	H	202.0	-0.63
24779.812500	41.14	74.00	32.86	150.0	H	347.0	-0.27



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18362.312500*	40.23	74.00	33.77	150.0	V	297.0	-4.54
19281.109375*	38.98	74.00	35.02	150.0	V	13.0	-4.25
20317.046875*	39.96	74.00	34.04	150.0	V	205.0	-3.27
21376.359375*	40.38	74.00	33.62	150.0	V	37.0	-2.10
22621.875000*	40.70	74.00	33.30	150.0	V	321.0	-0.80
23673.750000*	41.26	74.00	32.74	150.0	V	158.0	-0.28

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Remark:
(1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of § 15.205 and RSS-Gen section 8.10.
(2) Level=Reading Level + Correction 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

Conducted Emission 2# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-19-002	102590	1	2025-5-13
LISN	Rohde & Schwarz	ENV216	68-4-87-19-001	102472	1	2025-5-12
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	1	2025-5-11
Cable	OUQIAO	RG142	68-4-90-19-005-A20	----	----	----
Test software	Rohde & Schwarz	EMC32	68-4-90-19-005-A01	Version10.35.02	N/A	N/A
Shielding Room	TDK	CSR #2	68-4-90-19-005	----	3	2025-10-15

Radiated Emission, SAC-3 #1

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 7	68-4-74-19-001	102176	1	2025-5-13
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	1	2024-8-7
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-001	15542	1	2025-5-11
Cable	HUBER-SUHNER	RG214	68-4-90-14-001-A20	----	----	----
Cable	HUBER-SUHNER	RG214	68-4-90-14-001-A21	----	----	----
Cable	JUNFLON	MWX221	68-4-90-14-001-A22	----	----	----
3m Semi-anechoic chamber	TDK	SAC-3 #1	68-4-90-14-001	----	3	2026-10-25
Test software	Rohde & Schwarz	EMC32	68-4-90-14-001-A10	Version10.35.02	N/A	N/A

Radiated Emission, 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	2025-5-13
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9162	68-4-80-19-003	284	1	2025-2-22
Wave Guide Antenna	ETS	3117	68-4-80-19-001	00218954	1	2025-4-10
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-001	100745	1	2025-5-11
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-002	100746	1	2025-5-11
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	2025-5-11
Cable	JUNFLON	MWX221	68-4-90-19-006-A20	----	----	----
Cable	JUNFLON	MWX241	68-4-90-19-006-A21	----	----	----
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	3	2026-10-25
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	1	2025-5-13

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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	2025-5-11
RF Meas. and Switch Matrix Unit	TST PASS	TSCB3023R2	68-4-93-23-001	2811685c	1	2025-5-11
Frequency Extender	TST PASS	TSTCMWEXT7	68-4-93-23-001-A01	WEX230017C	1	2025-5-12
Frequency Extender	TST PASS	TSTSGEXT7	68-4-93-23-001-A02	EX2300BA	1	2025-5-12
Cable	JUNFLON	J12J103539	68-4-90-19-003-A20	----	----	----
Cable	JUNFLON	J12J103539	68-4-90-19-003-A21	----	----	----
Cable	JUNFLON	J12J103539	68-4-90-19-003-A22	----	----	----
Cable	JUNFLON	J12J103539	68-4-90-19-003-A23	----	----	----
Test software	TST PASS	System for BT/Wi-Fi	68-4-93-23-001-A03	Version 2.0	N/A	N/A
Shielding Room	TDK	TS8997	68-4-90-19-003	----	3	2025-10-15

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11 System Measurement Uncertainty

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

System Measurement Uncertainty	
Items	**Extended Uncertainty**
Uncertainty for Conducted Emission in new shielding room (68-4-90-19-005) 150kHz-30MHz (for test using AMN ENV216)	3.14dB
Uncertainty for Radiated Emission in 3m chamber (68-4-90-14-001) 9kHz-30MHz	4.69dB
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) 30MHz-1000MHz	Horizontal: 4.96dB; Vertical: 6.10dB
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) 1000MHz-18000MHz	Horizontal: 5.40dB; Vertical: 5.40dB
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) 18GHz-40GHz	5.29dB
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.31dB

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.

---END OF TEST REPORT---

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