

FCC/ISED - TEST REPORT

Report Number : **68.950.21.0622.01** Date of Issue: **2021-10-09**

Model : **SOUNDBOKS Go**

Product Type : **Wireless Bluetooth Speaker**

Applicant : **Sun Technique Electric Co., Ltd.**

Address : **#35, Songshui Rd, Songmushan Village, Dalang Town, Dongguan, Guangdong, China.**

Manufacturer : **SOUNDBOKS ApS**

Address : **Esromgade 15, 1107, 2200 Copenhagen N, DENMARK**

Test Result : **Positive** **Negative**

Total pages including Appendices : **40**

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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 Designation Number: CA5009

IC Registration No.: 10320A

3 Description of the Equipment Under Test

Product:	Wireless Bluetooth Speaker
Model no.:	SOUNDBOKS Go
FCC ID:	2A29M-SBGO-21-1
IC	27750-SBGO211
HVIN	SOUNDBOKS Go
PMN	Wireless Bluetooth Speaker
Options and accessories:	Adapter: KA4802A-1403300P
Rating:	14.0VDC, 3.3A
Adapter:	Input:100-240Vac, 50/60Hz; 1.2A Output: 14.0VDC, 3.3A 46.2W
Battery	Li-ion Rechargeable Battery 7.8Ah/12.8V 99.84Wh LiFePO4 Input:14.5VDC, 3.0A Output: 12.8Vdc, 7.8A
RF Transmission Frequency:	2402MHz-2480MHz for Bluetooth 2400MHz-2480MHz for 2.4G,
Antenna Type:	Integrated antenna for 2.4G PCB antenna for BT
Antenna Gain:	1.927dBi for BT antenna, 2dBi for 2.4G Hopping antenna
Description of the EUT:	The Equipment Under Test (EUT) is a Wireless Bluetooth Speaker which supports Bluetooth function and 2.4G hopping.

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2020 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-247 Issue 2 February 2017	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices
RSS-Gen Issue 5, Amendment 2, February 2021	General Requirements and Information for the Certification of Radio Apparatus

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

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C & RSS-247 Issue 2					
Test Condition		Test Site	Test Result		
			Pass	Fail	N/A
15.207 RSS-GEN 8.8	Conducted emission AC power port	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.247(b)(1) RSS-247 5.4(b)	Conducted output power	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RSS-247 5.4(b)	Equivalent Isotropic Radiated Power	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
15.247(e) RSS-247 5.2(b)	Power spectral density	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
15.247(a)(2) RSS-247 5.2(a)&RSS- GEN 6.7	6dB bandwidth and 99% Occupied Bandwidth	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
15.247(a)(2) RSS-247 5.1(b)	20dB bandwidth and 99% Occupied Bandwidth	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
15.247(a)(1) RSS-247 5.1(b)	Min. of Hopping Channel Carrier Frequency Separation	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.247(a)(1)(iii) RSS-247 5.1(d)	Min number of hopping frequencies	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.247(a)(1)(iii) RSS-247 5.1(d)	Dwell Time - Average Time of Occupancy	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.247(d) RSS-247 5.5	Spurious RF conducted emissions	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.247(d) RSS-247 5.5	Band edge	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.247(d) & 15.209 & 15.205, RSS-247 5.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	See note 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note 1: N/A=Not Applicable.

Note 2: The EUT uses an Internal antenna, which gain is 1.927dBi for BT antenna, 2dBi for 2.4G Hopping antenna. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2A29M-SBGO-21-1, IC: 27750-SBGO211 complies with RSS-247, RSS-GEN, and 15.207, 15.209, 15.205, 15.247 of the FCC Part 15, Subpart C

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: 2021-07-20

Testing Start Date: 2021-07-21

Testing End Date: 2021-09-10

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

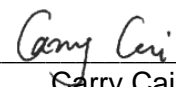
Reviewed by:


John Zhi
Project Manager

Prepared by:

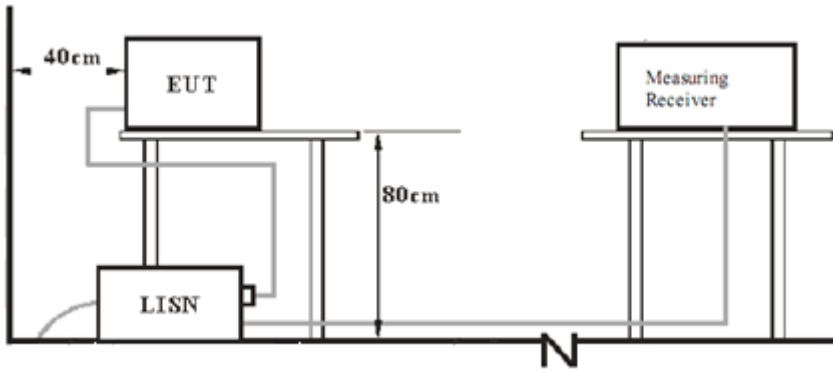

Warlen Song
Project Engineer

Tested by:


Garry Cai
Test Engineer

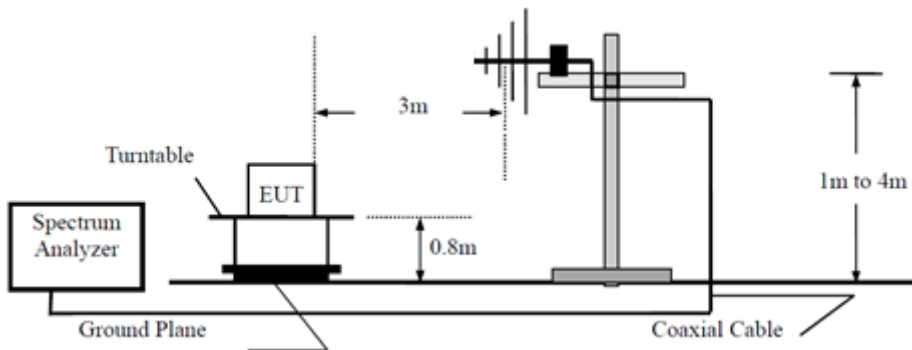
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

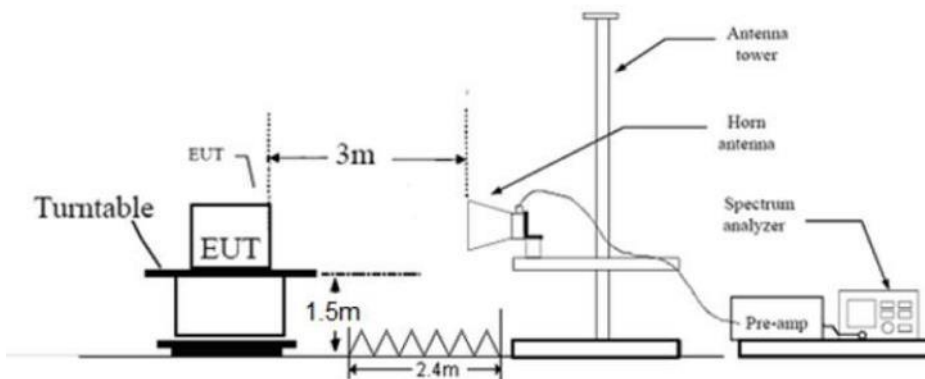


7.2 Radiated test setups

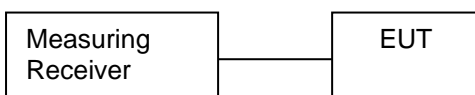
Below 1GHz



Above 1GHz



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.	S/N
Laptop	Thinkpad	X220	---

9 Technical Requirement

9.1 Conducted Emission Test

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

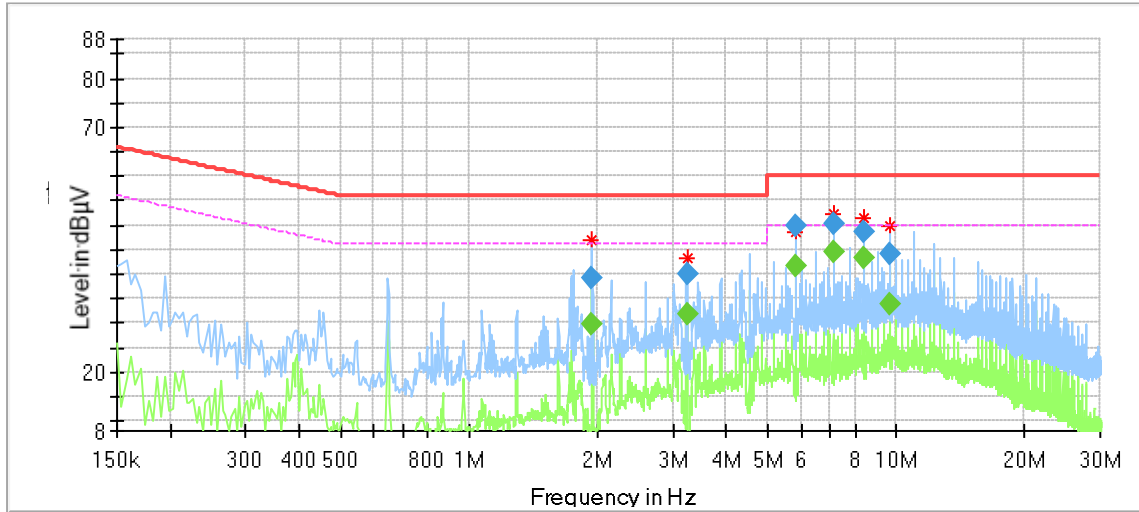
According to §15.207, conducted emissions limit as below:

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

*Decreasing linearly with logarithm of the frequency

Conducted Emission

Product Type : Wireless Bluetooth Speaker
 M/N : SOUNDBOKS Go
 Operating Condition : Normal Working(Aux in + Charing)
 Test Specification : Line
 Comment : AC 120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
1.937500	46.78	---	56.00	9.22	L1	9.22
3.233500	43.33	---	56.00	12.67	L1	9.26
5.821500	48.59	---	60.00	11.41	L1	9.33
7.113500	52.19	---	60.00	7.81	L1	9.36
8.409500	51.55	---	60.00	8.45	L1	9.38
9.701500	49.91	---	60.00	10.09	L1	9.39

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
1.937500	---	29.66	46.00	16.34	L1	9.22
1.937500	39.35	---	56.00	16.65	L1	9.22
3.233500	---	31.62	46.00	14.38	L1	9.26
3.233500	40.09	---	56.00	15.91	L1	9.26
5.821500	---	41.81	50.00	8.19	L1	9.33
5.821500	49.72	---	60.00	10.28	L1	9.33
7.113500	---	44.36	50.00	5.64	L1	9.36
7.113500	50.35	---	60.00	9.65	L1	9.36
8.409500	48.61	---	60.00	11.39	L1	9.38
8.409500	---	43.21	50.00	6.79	L1	9.38
9.701500	43.94	---	60.00	16.06	L1	9.39
9.701500	---	33.70	50.00	16.30	L1	9.39

Remark :

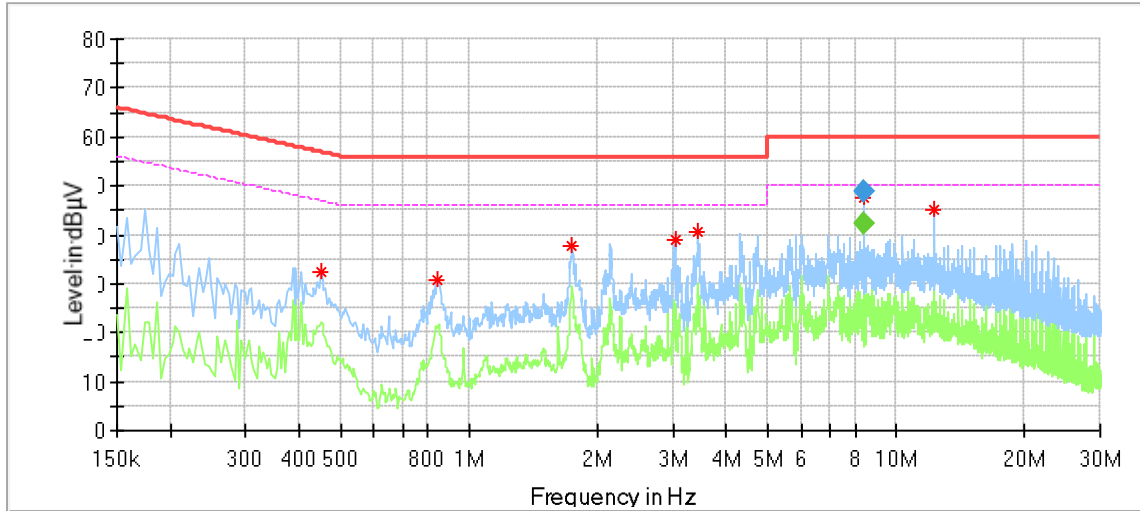
Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

Conducted Emission

Product Type : Wireless Bluetooth Speaker
 M/N : SOUNDBOKS Go
 Operating Condition : Normal Working(Aux in + Charing)
 Test Specification : Neutral
 Comment : AC 120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.450000	32.22	---	56.88	24.65	N	9.39
0.842000	30.75	---	56.00	25.25	N	9.39
1.742000	37.59	---	56.00	18.41	N	9.41
3.038000	38.83	---	56.00	17.17	N	9.44
3.430000	40.66	---	56.00	15.34	N	9.45
8.409500	47.70	---	60.00	12.30	N	9.59
12.286000	45.16	---	60.00	14.84	N	9.62

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
8.409500	---	42.12	50.00	7.88	N	9.59
8.409500	48.83	---	60.00	11.17	N	9.59

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)

9.2 Conducted peak output power

Test Method

1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the power meter by RF cable. The path loss was compensated to the results for each measurement.
2. Use the following spectrum analyzer settings:
RBW > the 6dB bandwidth of the emission being measured, VBW \geq 3RBW, Span \geq 3RBW
Sweep = auto, Detector function = peak, Trace = max hold.
3. 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.

Limits

According to §15.247 (b) (1), conducted peak output power limit as below:

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

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

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

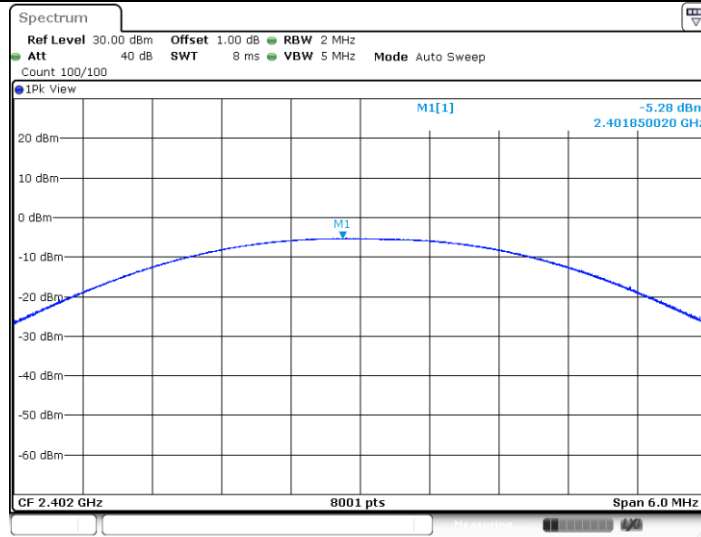
According to & RSS-247 5.4(b), EIRP limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤ 4	≤ 36.02

Test result as below table

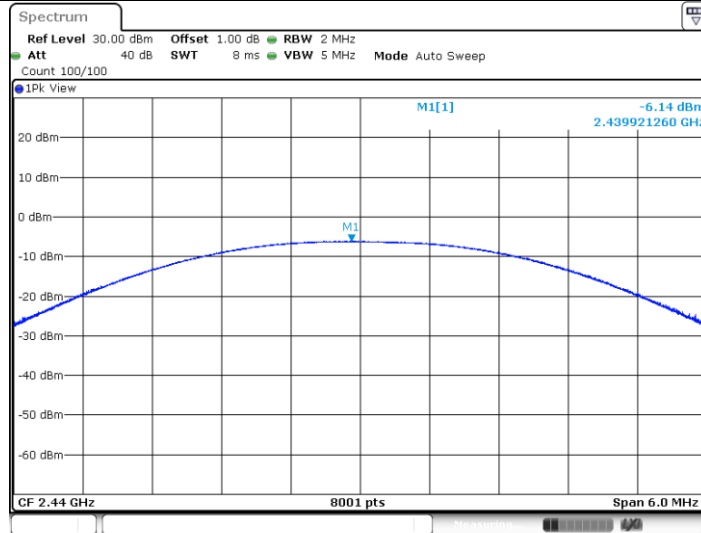
Frequency MHz	Conducted Peak Output Power dBm	EIRP dBm	Result
Bottom channel 2402MHz	-5.28	-3.353	Pass
Middle channel 2440MHz	-6.14	-4.213	Pass
Hight channel 2480MHz	-7.94	-6.013	Pass

BLE_BT4.0_Ant1_2402



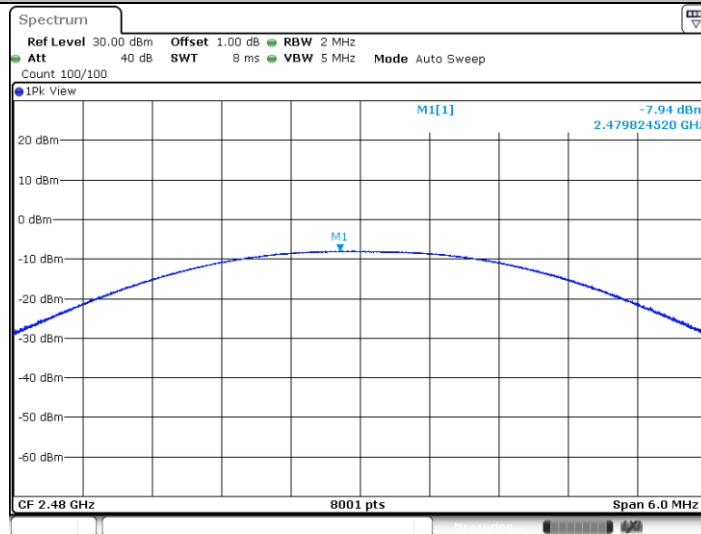
Date: 3.SEP.2021 13:43:22

BLE_BT4.0_Ant1_2440



Date: 3.SEP.2021 13:45:19

BLE_BT4.0_Ant1_2480



Date: 3.SEP.2021 13:47:24

9.3 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 test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set analyzer center frequency to DTS channel center frequency. RBW=10kHz, VBW \geq 3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
3. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
4. Repeat above procedures until other frequencies measured were completed.

Limit

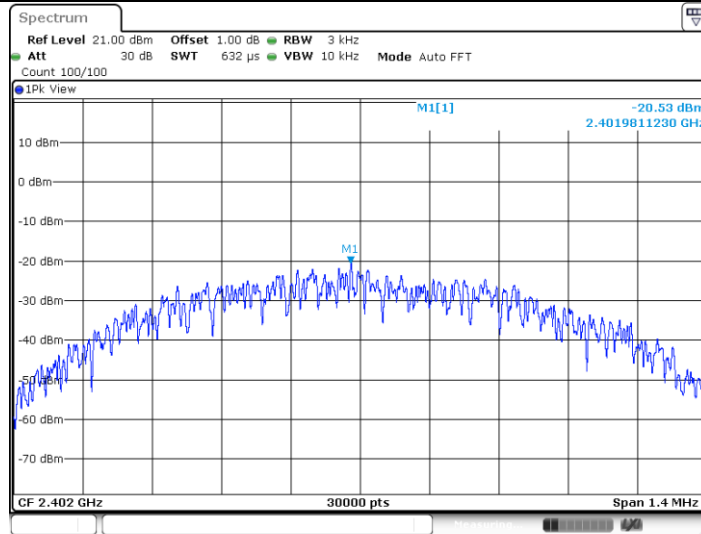
Limit [dBm/3KHz]

≤8

Test result

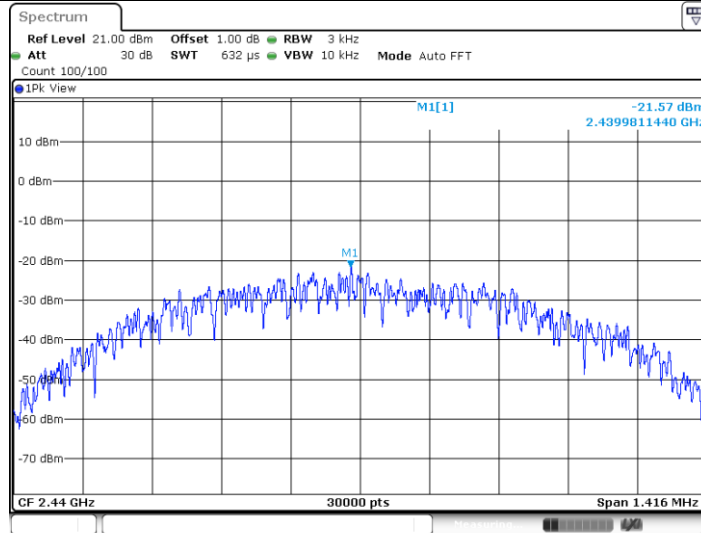
Frequency MHz	Power spectral density dBm/3KHz	Result
Bottom channel 2402MHz	-20.53	Pass
Middle channel 2440MHz	-21.57	Pass
Top channel 2480MHz	-23.4	Pass

BLE_BT4.0_Ant1_2402



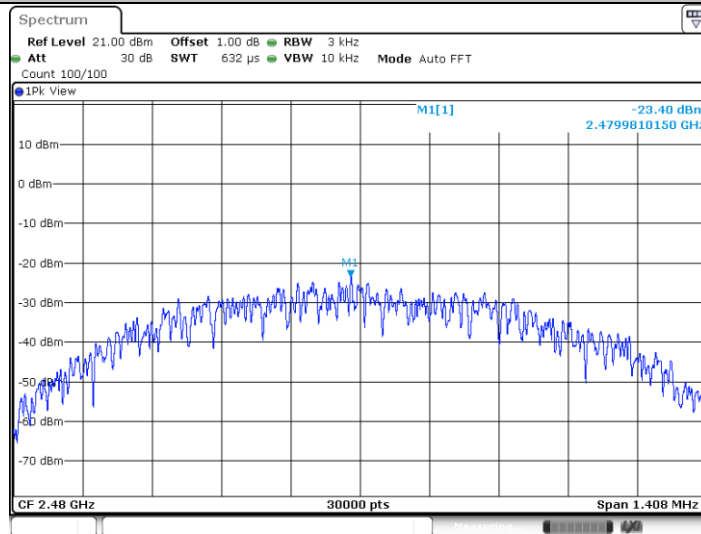
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BLE_BT4.0_Ant1_2440



Date: 3.SEP.2021 13:45:25

BLE_BT4.0_Ant1_2480



Date: 3.SEP.2021 13:47:29

9.4 6 dB Bandwidth and 99% Occupied Bandwidth

Test Method

1. The RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following test receiver settings:
Span = approximately 5 times the 6dB bandwidth, centered on a hopping channel
RBW =100KHz, VBW \geq 3RBW,
Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth. Record the results.
5. Repeat above procedures until all frequencies measured were complete.

Limit

Limit [kHz]

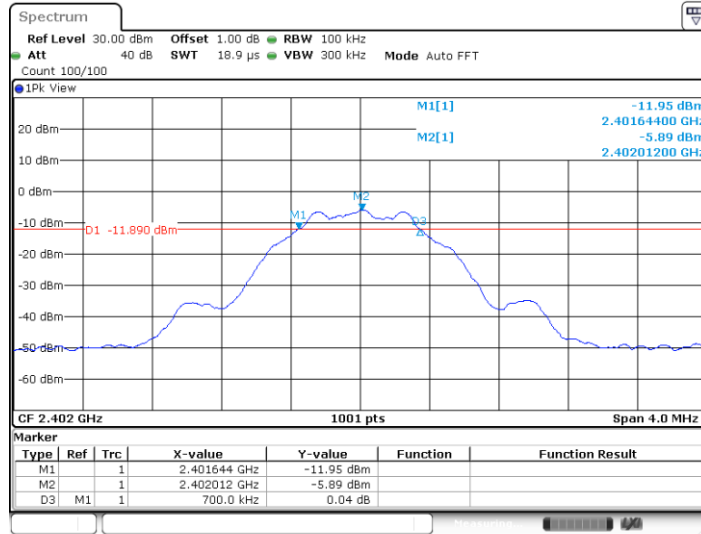
—————
≥500

Test result

Frequency MHz	6dB bandwidth MHz	99% bandwidth MHz	Result
Bottom channel 2402MHz	0.700	1.059	Pass
Middle channel 2440MHz	0.708	1.059	Pass
Top channel 2480MHz	0.704	1.063	Pass

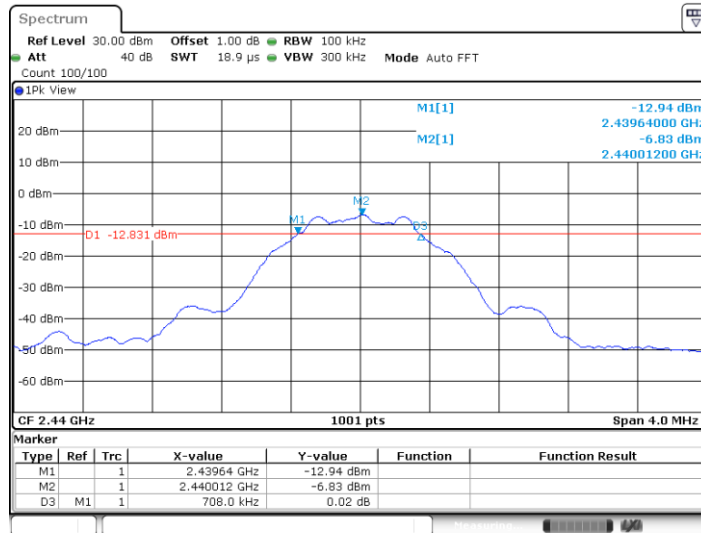
6 dB Bandwidth

Low channel 2402MHz



Date: 3.SEP.2021 13:43:05

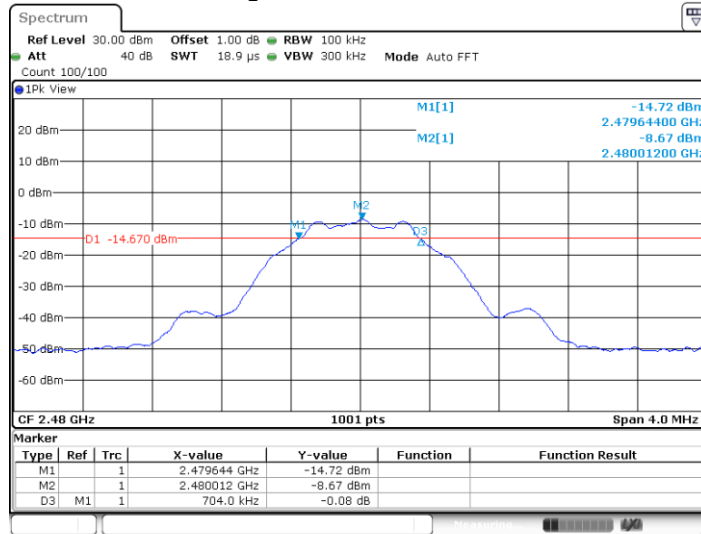
Middle channel 2440MHz



Date: 3.SEP.2021 13:45:02

6 dB Bandwidth

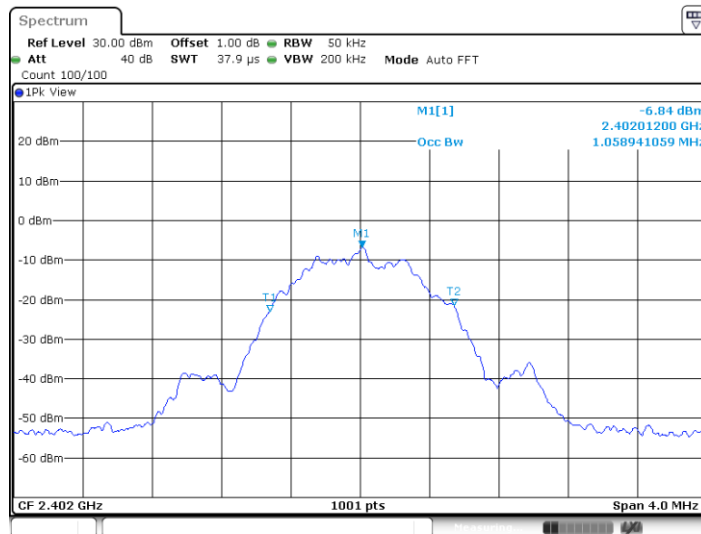
High channel 2480MHz



Date: 3.SEP.2021 13:47:07

99% Bandwidth

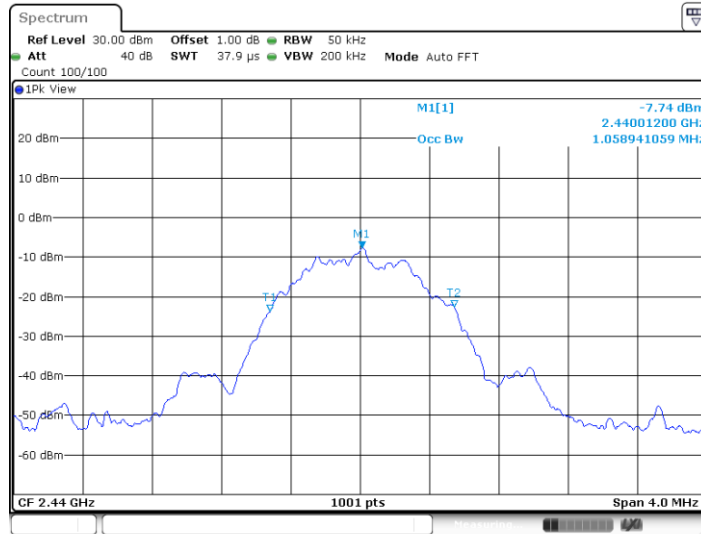
Low channel 2402MHz



Date: 3.SEP.2021 13:43:15

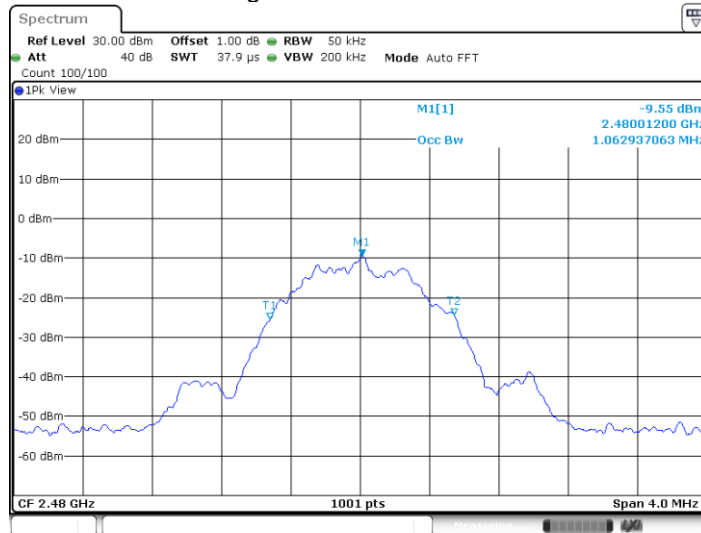
99% Bandwidth

Middle channel 2440MHz



Date: 3.SEP.2021 13:45:13

High channel 2480MHz



Date: 3.SEP.2021 13:47:17

9.5 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. 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 ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
3. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
4. The level displayed must comply with the limit specified in this Section. Submit these plots.
5. Repeat above procedures until all frequencies measured were complete.

Limit

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

Spurious RF conducted emissions

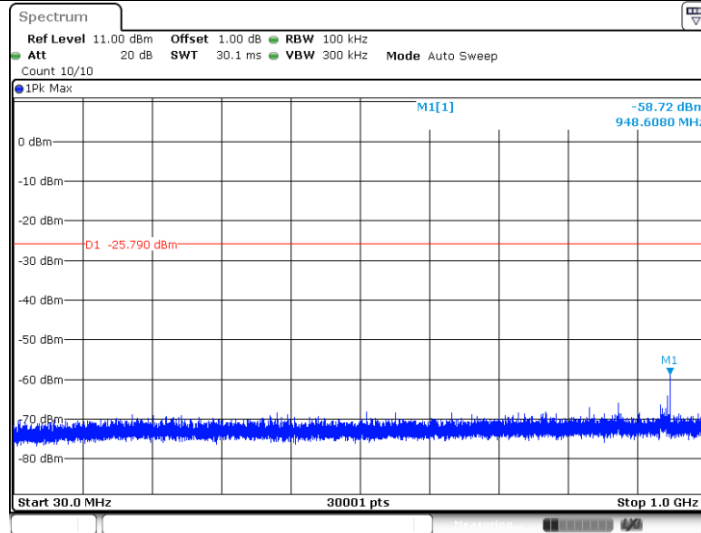
TestMode	Antenna	Channel (MHz)	FreqRange (MHz)	RefLevel	Result (dBm)	Limit (dBm)	Verdict
BLE_BT4.0	Ant0	2402	Reference	-5.79 dBm	-5.79	---	PASS
		2402	30~1000	30~1000 MHz	-58.72	<=-25.79	PASS
		2402	1000~26500	1000~26500 MHz	-52.26	<=-25.79	PASS
		2440	Reference	-6.87 dBm	-6.87	---	PASS
		2440	30~1000	30~1000 MHz	-60.55	<=-26.87	PASS
		2440	1000~26500	1000~26500 MHz	-52.78	<=-26.87	PASS
		2480	Reference	-8.67 dBm	-8.67	---	PASS
		2480	30~1000	30~1000 MHz	-56.71	<=-28.67	PASS
		2480	1000~26500	1000~26500 MHz	-52.27	<=-28.67	PASS

BLE_BT4.0_Ant1_2402_0-Reference



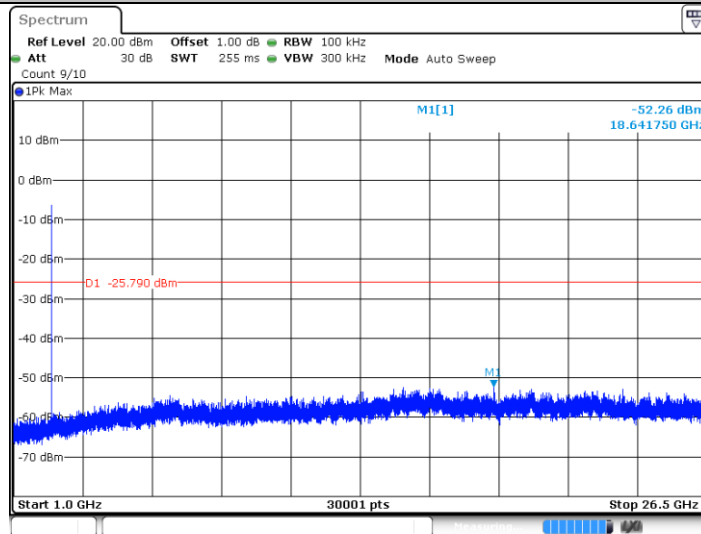
Date: 3.SEP.2021 13:43:44

BLE_BT4.0_Ant1_2402_30-1000



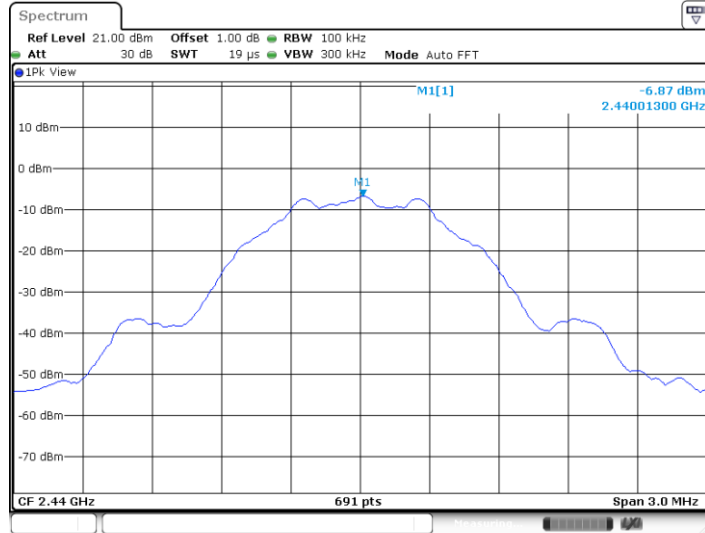
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BLE_BT4.0_Ant1_2402_1000-26500



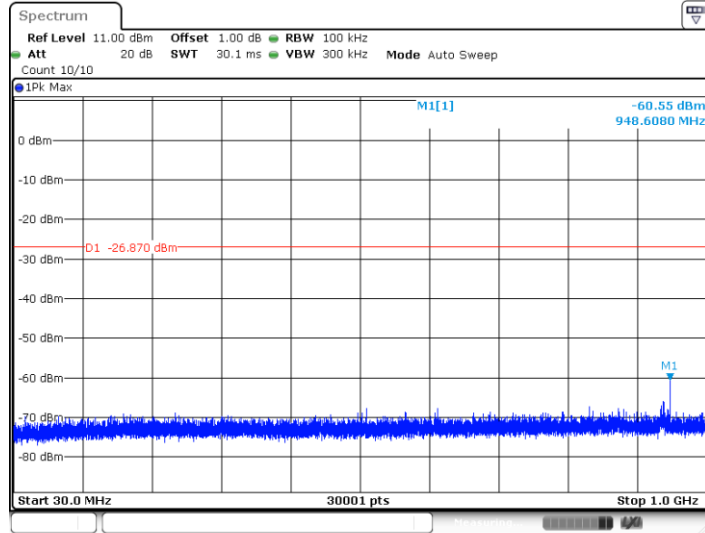
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BLE_BT4.0_Ant1_2440_0-Reference



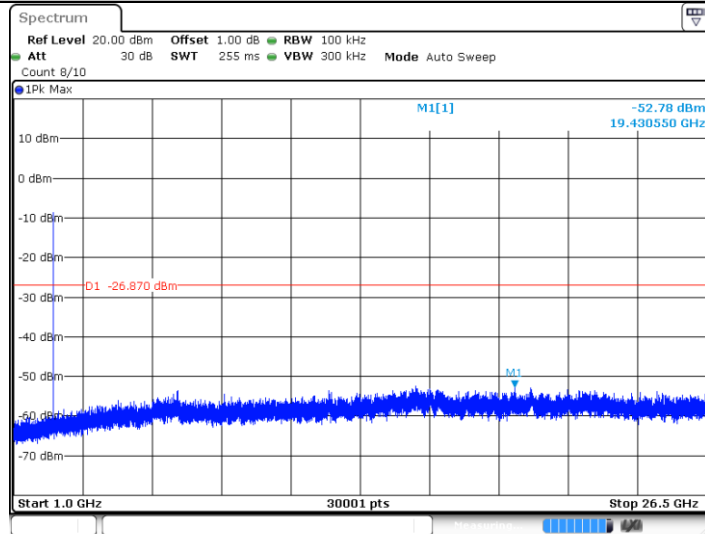
Date: 3.SEP.2021 13:45:31

BLE_BT4.0_Ant1_2440_30~1000



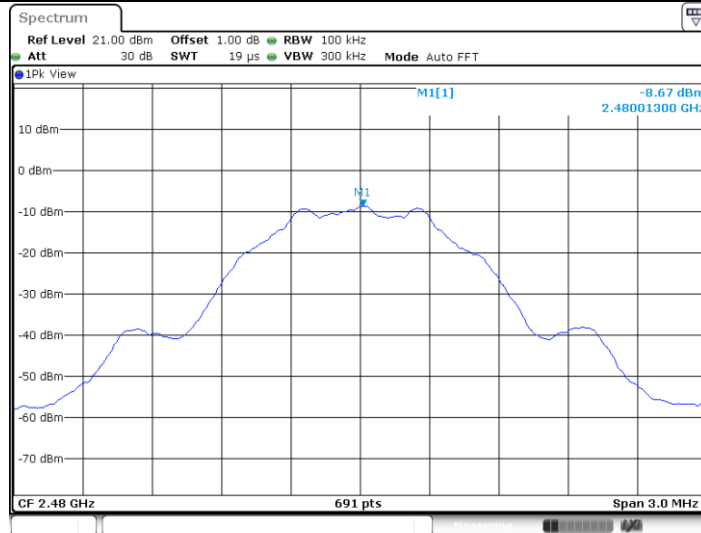
Date: 3.SEP.2021 13:45:37

BLE_BT4.0_Ant1_2440_1000~26500



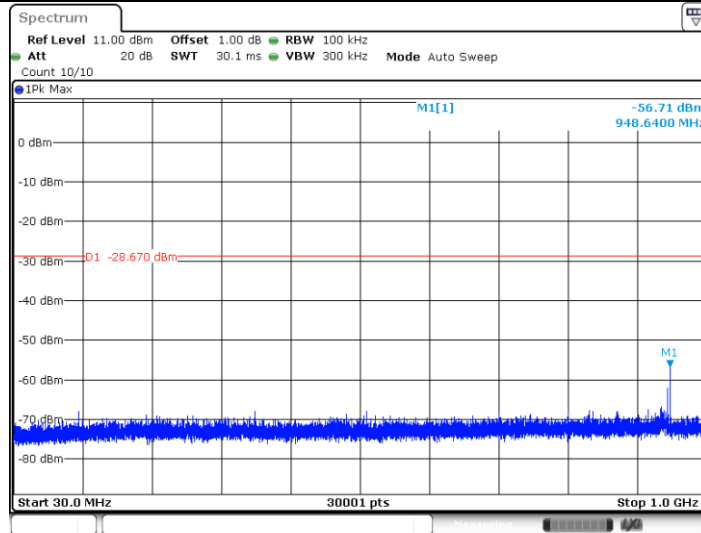
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BLE_BT4.0_Ant1_2480_0-Reference



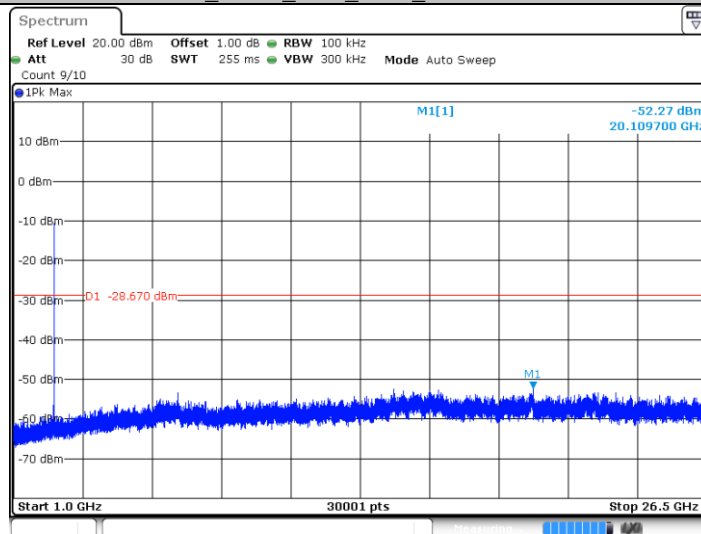
Date: 3.SEP.2021 13:47:44

BLE BT4.0 Ant1 2480_30~1000



Date: 3.SEP.2021 13:47:50

BLE BT4.0 Ant1 2480_1000~26500



Date: 3.SEP.2021 13:47:58

9.6 Band edge

Test Method

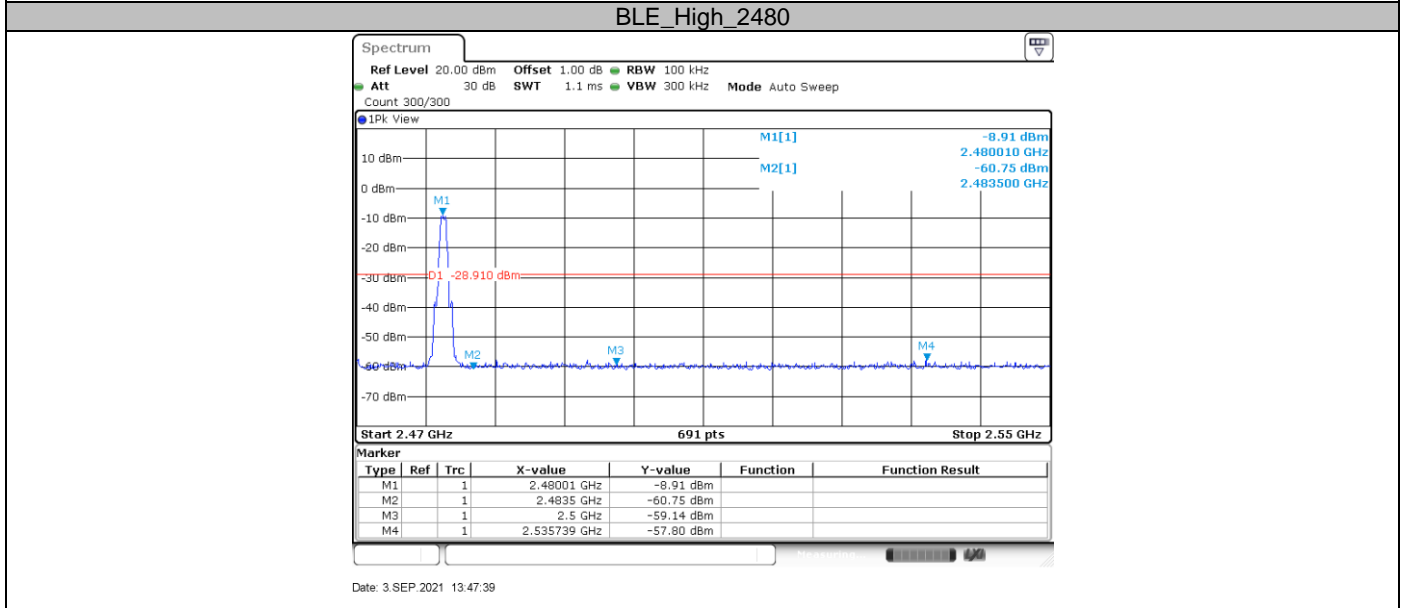
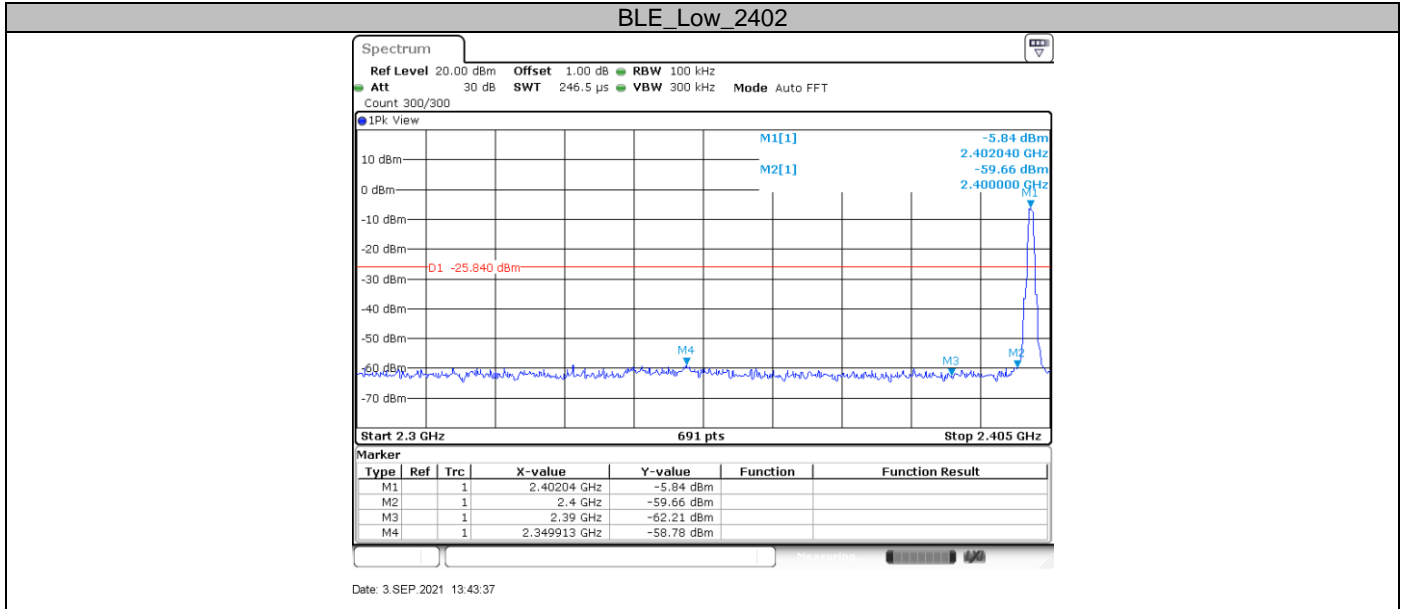
1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
4. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency
6. Set to the maximum power setting and enable the EUT hopping mode, repeat the test.

Limit

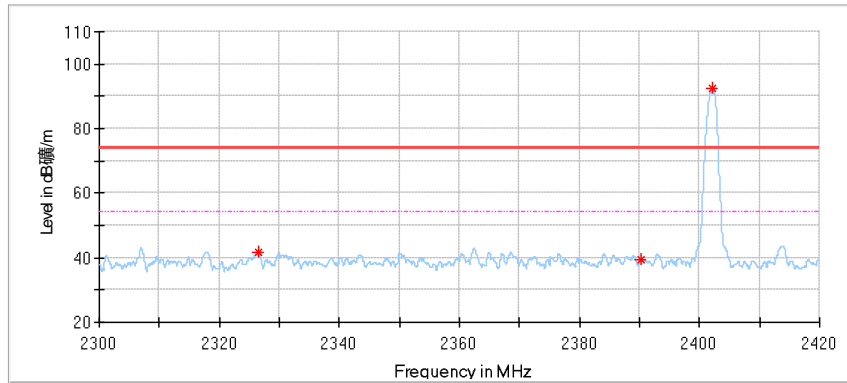
Frequency Range MHz	Limit (dBc)
30-25000	-20

Band edge testing

TestMode	Antenna	ChName	Channel (MHz)	RefLevel (dBm)	Result (dBm)	Limit (dBm)	Verdict
BLE_BT4.0	Ant0	Low	2402	-5.84	-58.78	<=-25.84	PASS
		High	2480	-8.91	-57.8	<=-28.91	PASS

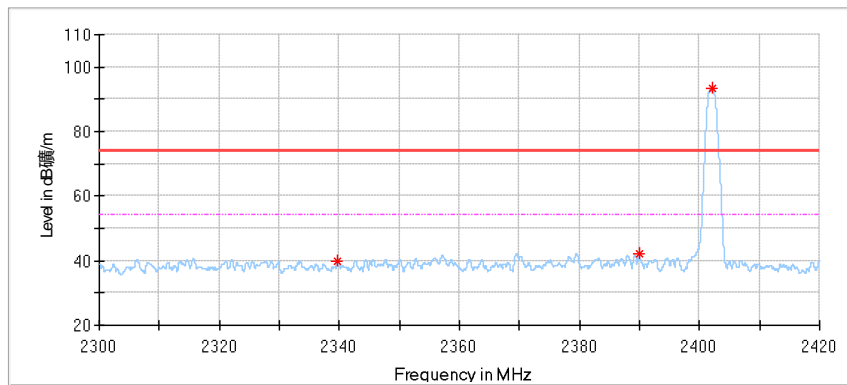


2402MHz
Horizontal:



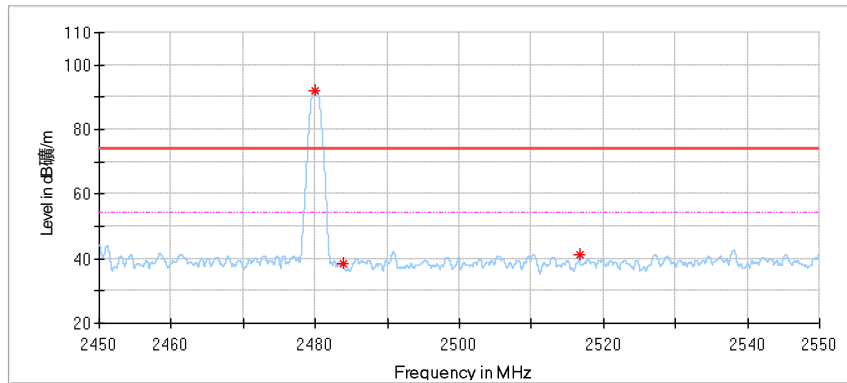
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2326.485714	41.77	74.00	32.23	150.0	H	220.0	-3.19
2390.285714	39.23	74.00	34.78	150.0	H	168.0	-3.06
2402.257143	92.28	74.00	-18.28	150.0	H	15.0	-3.08

Vertical



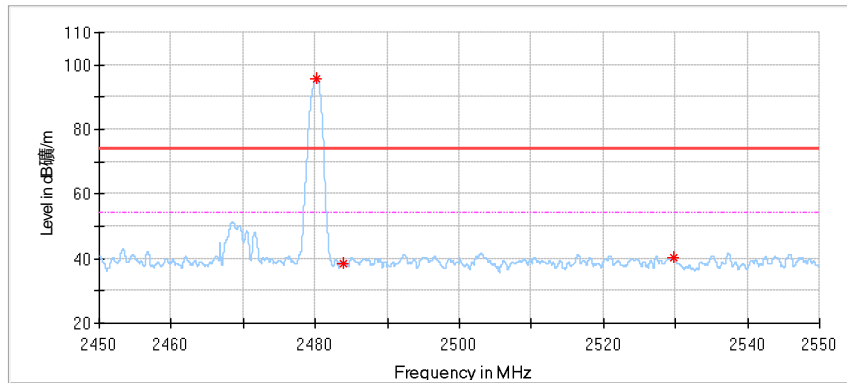
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2339.685714	39.94	74.00	34.06	150.0	V	312.0	-3.15
2389.885714	42.19	74.00	31.81	150.0	V	356.0	-3.06
2402.142857	93.61	74.00	-19.61	150.0	V	54.0	-3.08

2480MHz
Horizontal:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2480.000000	92.05	74.00	-18.05	150.0	H	9.0	-2.70
2483.833333	38.28	74.00	35.72	150.0	H	46.0	-2.70
2516.666667	41.01	74.00	32.99	150.0	H	18.0	-2.62

Vertical



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2480.238095	95.58	74.00	-21.58	150.0	V	73.0	-2.70
2483.833333	38.64	74.00	35.36	150.0	V	338.0	-2.70
2529.833333	40.24	74.00	33.76	150.0	V	79.0	-2.58

9.7 Spurious radiated emissions for transmitter

Test Method

- 1: The EUT was placed 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 spectrum analyzer settings:

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.

Procedures for average unwanted emissions measurements above 1000 MHz

- a) RBW = 1 MHz.
- b) $VBW \geq [3 \times RBW]$.
- c) Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \leq RBW / 2$. 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 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.

Limit

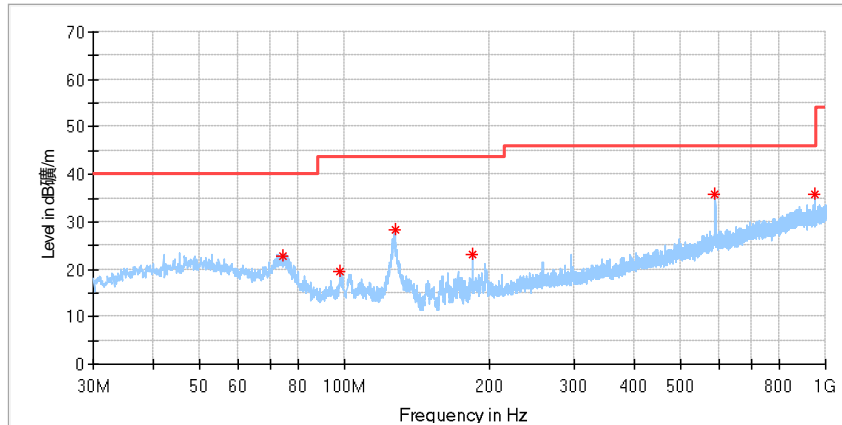
The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB μ V/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

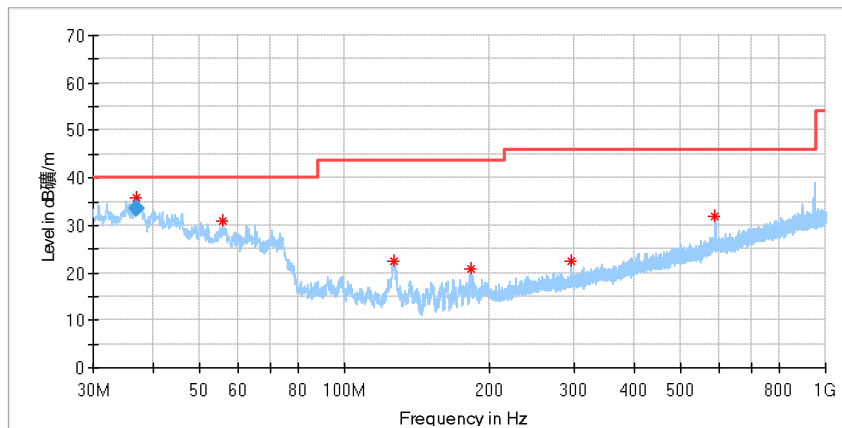
Spurious radiated emissions for transmitter

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.

30MHz to 1000MHz:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
74.620000	22.94	40.00	17.06	200.0	H	346.0	8.99
98.081875	19.47	43.50	24.03	200.0	H	0.0	12.91
127.121250	28.29	43.50	15.21	200.0	H	196.0	10.48
184.290625	23.04	43.50	20.46	100.0	H	0.0	11.62
589.811250	35.71	46.00	10.29	100.0	H	29.0	22.33
948.590000	35.82	46.00	10.18	100.0	H	0.0	27.11

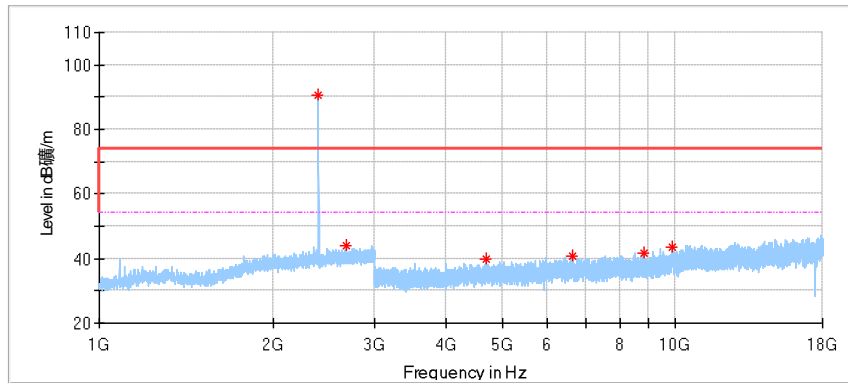


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
36.971875	35.68	40.00	4.32	100.0	V	172.0	12.88
55.826250	30.85	40.00	9.15	100.0	V	0.0	14.74
126.818125	22.32	43.50	21.18	100.0	V	0.0	10.49
182.653750	20.78	43.50	22.72	100.0	V	135.0	11.43
294.870625	22.55	46.00	23.45	200.0	V	0.0	15.33
589.871875	32.02	46.00	13.98	100.0	V	78.0	22.33
Frequency	QuasiPeak	Limit	Margin	Height	Pol	Azimuth	Corr.
36.971875	33.42	40.00	6.58	100.0	V	172.0	12.88

1GHz -18GHz:

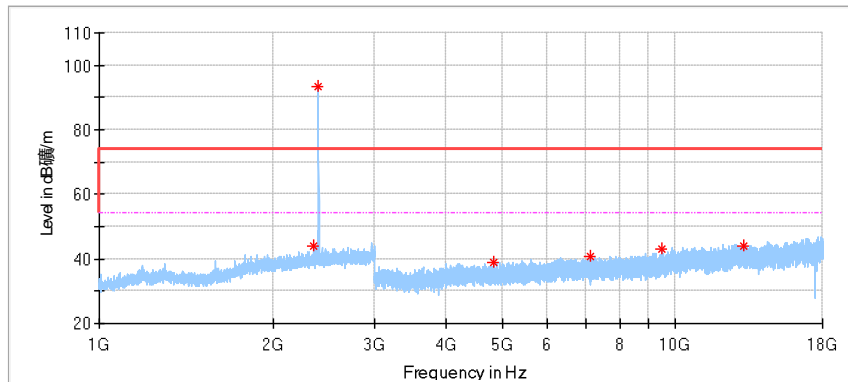
2402MHz

Horizontal:



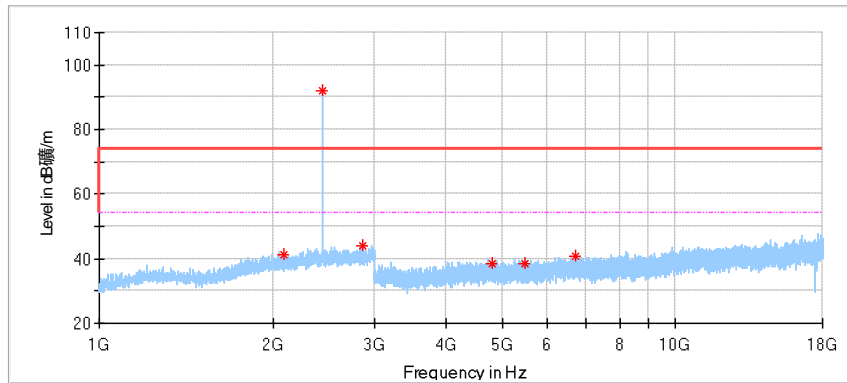
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2402.380952	90.61	74.00	-16.61	150.0	H	8.0	-3.08
2684.285714	43.82	74.00	30.18	150.0	H	319.0	-2.33
4685.500000	39.80	74.00	34.20	150.0	H	236.0	3.31
6627.000000	40.69	74.00	33.31	150.0	H	327.0	6.62
8830.500000	41.58	74.00	32.42	150.0	H	0.0	8.83
9876.000000	43.65	74.00	30.35	150.0	H	9.0	11.01

Vertical



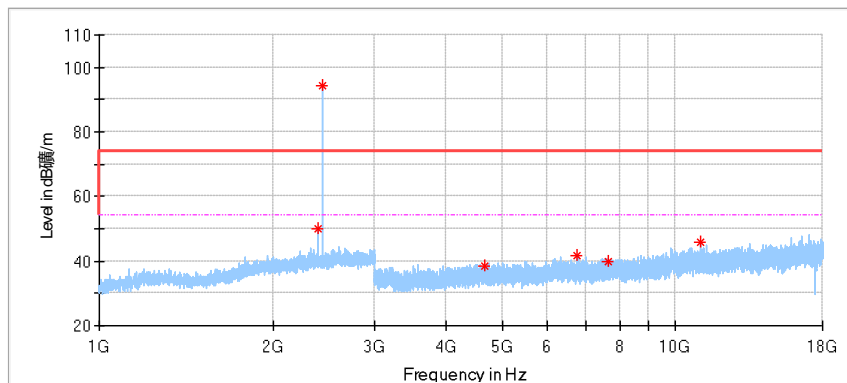
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2352.857143	44.04	74.00	29.96	150.0	V	4.0	-3.12
2402.380952	93.34	74.00	-19.34	150.0	V	47.0	-3.08
4827.500000	38.83	74.00	35.17	150.0	V	177.0	3.52
7111.000000	40.90	74.00	33.10	150.0	V	356.0	6.98
9473.000000	43.04	74.00	30.96	150.0	V	11.0	9.85
13126.500000	43.91	74.00	30.09	150.0	V	11.0	12.32

2440MHz
Horizontal:



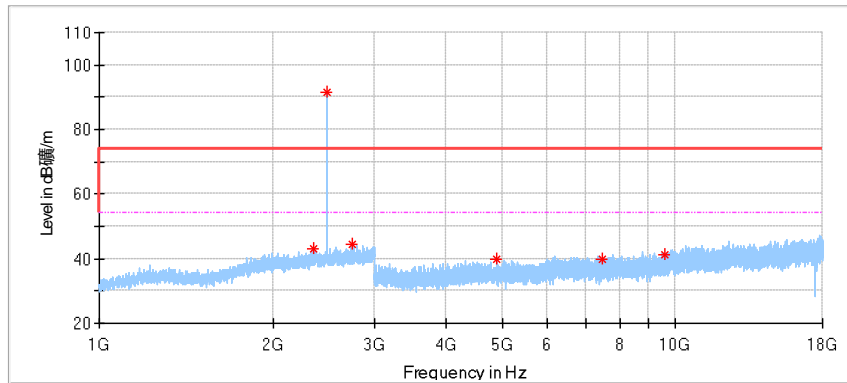
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2084.761905	41.45	74.00	32.55	150.0	H	85.0	-4.47
2440.000000	92.17	74.00	-18.17	150.0	H	13.0	-2.96
2871.428571	44.19	74.00	29.81	150.0	H	232.0	-1.98
4819.000000	38.33	74.00	35.67	150.0	H	37.0	3.47
5488.500000	38.52	74.00	35.48	150.0	H	186.0	4.55
6701.000000	40.94	74.00	33.06	150.0	H	97.0	6.61

Vertical



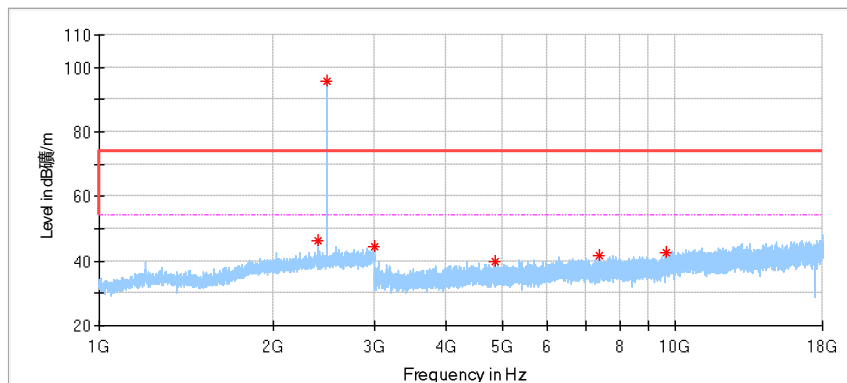
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2400.000000	50.13	74.00	23.87	150.0	V	3.0	-3.08
2440.000000	94.34	74.00	-20.34	150.0	V	56.0	-2.96
4659.500000	38.24	74.00	35.76	150.0	V	350.0	3.25
6738.000000	41.58	74.00	32.42	150.0	V	212.0	6.56
7652.000000	39.95	74.00	34.05	150.0	V	0.0	7.82
11071.500000	45.83	74.00	28.17	150.0	V	65.0	10.92

2480MHz
Horizontal:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2356.666667	43.12	74.00	30.88	150.0	H	342.0	-3.11
2480.476191	91.61	74.00	-17.61	150.0	H	356.0	-2.70
2749.523810	44.39	74.00	29.61	150.0	H	210.0	-2.23
4881.000000	39.63	74.00	34.37	150.0	H	37.0	3.61
7453.000000	40.04	74.00	33.96	150.0	H	350.0	7.39
9561.500000	41.20	74.00	32.80	150.0	H	37.0	9.32

Vertical

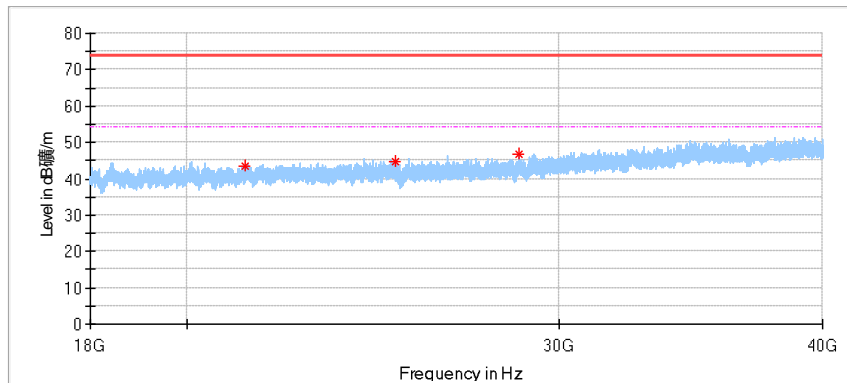


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2397.619048	46.44	74.00	27.56	150.0	V	335.0	-3.08
2480.000000	95.62	74.00	-21.62	150.0	V	74.0	-2.70
2999.523810	44.35	74.00	29.65	150.0	V	185.0	-1.20
4872.500000	39.78	74.00	34.22	150.0	V	181.0	3.67
7397.500000	41.59	74.00	32.41	150.0	V	359.0	7.28
9622.500000	42.42	74.00	31.58	150.0	V	293.0	9.31

Above 18GHz:

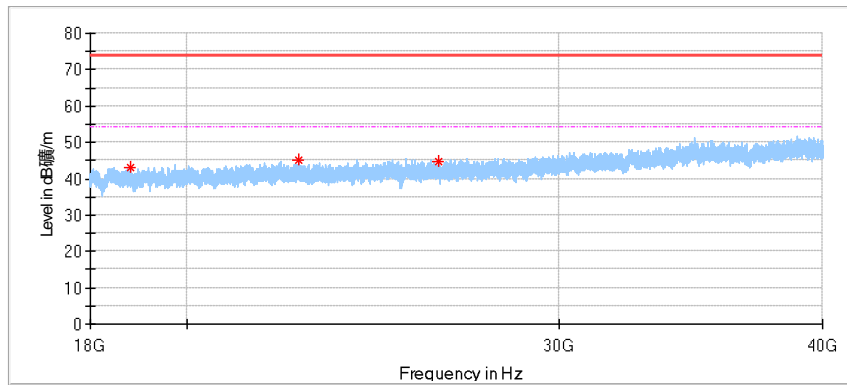
2402MHz

Horizontal:



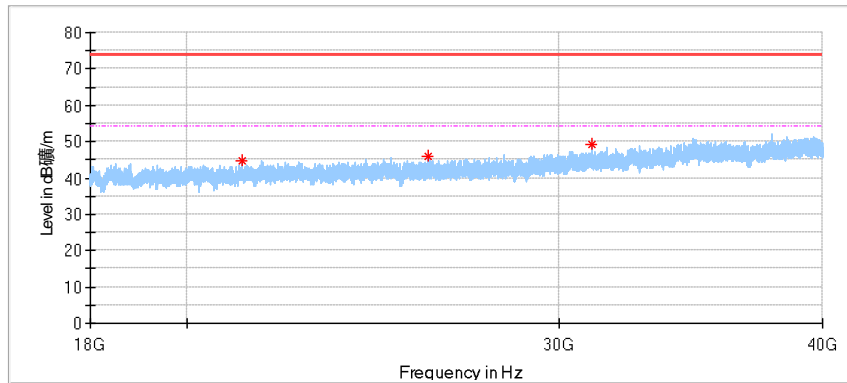
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
21316.500000	43.46	74.00	30.54	150.0	H	0.0	1.4
25117.687500	44.67	74.00	29.33	150.0	H	0.0	3.5
28717.437500	46.66	74.00	27.34	150.0	H	231.0	3.8

Vertical



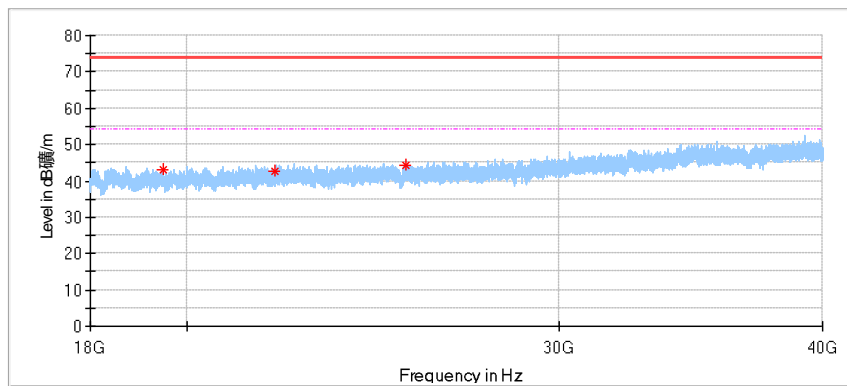
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18800.250000	43.14	74.00	30.86	150.0	V	197.0	-1.0
22595.250000	45.21	74.00	28.79	150.0	V	273.0	2.3
26331.812500	44.73	74.00	29.27	150.0	V	242.0	3.4

2441MHz
Horizontal:



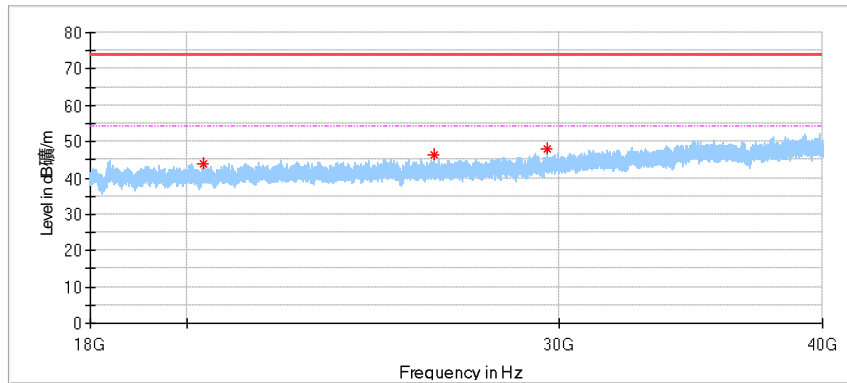
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
21253.250000	44.88	74.00	29.12	150.0	H	345.0	1.3
26023.812500	46.14	74.00	27.86	150.0	H	329.0	3.5
31116.812500	49.13	74.00	24.87	150.0	H	356.0	4.0

Vertical



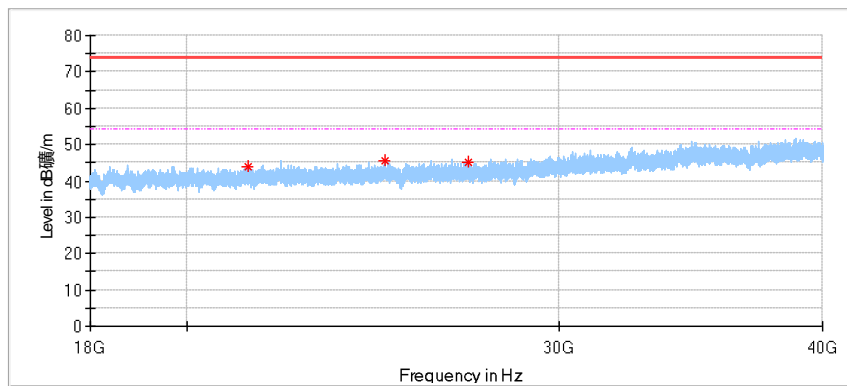
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19479.500000	43.00	74.00	31.00	150.0	V	0.0	-0.7
22021.875000	42.58	74.00	31.42	150.0	V	158.0	1.8
25391.312500	44.13	74.00	29.87	150.0	V	15.0	3.4

2480MHz
Horizontal:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20349.875000	43.91	74.00	30.09	150.0	H	263.0	0.0
26173.000000	46.45	74.00	27.55	150.0	H	6.0	3.4
29637.312500	48.11	74.00	25.89	150.0	H	65.0	3.7

Vertical



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
21385.250000	43.75	74.00	30.25	150.0	V	219.0	1.3
24825.500000	45.40	74.00	28.60	150.0	V	204.0	3.4
27191.187500	45.27	74.00	28.73	150.0	V	0.0	3.9

Remark:

- (1) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) We test Low channel, Middle channel and High channel, only the worse case recorded in this report.
- (3) Corrected Amplitude = Read level + Corrector factor
 Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
 Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

10 Test Equipment List

List of Test Instruments

Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2022-6-4
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2022-2-2
Wave Guide Antenna	ETS	3117	68-4-80-19-001	2022-5-24
Sideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	2021-8-5
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-001	2021-10-25
Pre-amplifier	Rohde & Schwarz	SCU 08F2	68-4-29-19-004	2021-10-25
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	2022-7-27
3m Semi-anechoic chamber	TDK	9X6X6	----	2022-12-29

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2022-6-4
LISN	Rohde & Schwarz	ENV4200	100249	2022-6-5
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2022-6-5
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A

Conducted RF Test System

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2022-6-3
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2022-6-3
Power Splitter	Weinschel	1580	SC319	2022-6-3
Test software	Tonscend	System for BT/WIFI	Version 2.5.77.0418	N/A

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)	3.21dB
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.70dB; Vertical: 4.67dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.65dB; Vertical: 4.63dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 5.05dB; Vertical: 5.04dB;
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.16dB Frequency test involved: 0.6×10^{-7} or 1%
Uncertainty Evaluation for Humidity	0.936%
Uncertainty Evaluation for Temperature	0.195 °C