Opple Lighting Co.,Ltd

RF TEST REPORT

Report Type:
FCC Part 15.247 RF report

Model:
SWREMOTE-001

REPORT NUMBER:
2412B0403SHA-001

ISSUE DATE:
March 6, 2025

DOCUMENT CONTROL NUMBER:
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TEST REPORT

Report no.: 2412B0403SHA-001

Applicant	:	Opple Lighting Co.,Ltd Room 411, Building 1 No. 6111,Longdong Avenue, Pudong New District, Shanghai City 201201,P. R. China
Manufacturer	:	Opple Lighting Co.,Ltd Room 411, Building 1 No. 6111,Longdong Avenue, Pudong New District, Shanghai City 201201,P. R. China
FCC ID	:	2BMMWMT001XH1CB

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2023): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2020): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

PREPARED BY:	REVIEWED BY:
Project Engineer Erick Liu	Reviewer Wakeyou Wang

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Revision History

Report No.	Version	Description	Issued Date
2412B0403SHA-001	Rev. 01	Initial issue of report	March 6, 2025

Measurement result summary

TEST ITEM	FCC REFERANCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	Pass
Maximum conducted output power and e.i.r.p.	15.247(b)(3)	Pass
Power spectrum density	15.247(e)	Pass
Emission outside the frequency band	15.247(d)	Pass
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	Pass
Power line conducted emission	15.207(a)	Pass
Antenna requirement	15.203	Pass

Notes: 1: NA =Not Applicable
2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.
3: Additions, Deviations and Exclusions from Standards: None.

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	MASTER DIMMING DEVICE
Type/Model:	SWREMOTE-001
Description of EUT:	The EUT is a remote bottom with BLE function, it has only one model.
Rating:	5V DC, 0.1A
EUT type:	☒ Table top ☐ Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	February 10, 2025
Date of test:	February 13, 2025 ~ February 28, 2025

1.2 Technical Specification

Frequency Band:	2400MHz ~ 2483.5MHz
Bluetooth Version:	Bluetooth LE
Type of Modulation:	GFSK
Channel Number:	40
Data Rate:	1 Mbps
Channel Separation:	2 MHz
Antenna Information:	Chip antenna, 1.69dBi max

Note: This information is supplied by the applicant. Any change in this value would result in different test data / conclusion.

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Description of Test Facility

Name:	Intertek Testing Services (Shanghai FTZ) Co., Ltd.
Address:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
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The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L21189
	FCC Accredited Lab Designation Number: CN0175
	IC Registration Lab CAB identifier: CN0014
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2023)
ANSI C63.10 (2020)
KDB 558074(v05r02)

2.2 Mode of operation during the test

The lowest, middle and highest channel were tested as representatives.

Frequency Band (MHz)				2402 ~ 2480			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	**2402**	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	**19**	**2440**	29	2460	**39**	**2480**

Data rate VS Power:
The test setting software is offered by the manufactory. The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

Test software and Power Setting parameter			
Test Software	EMI_Test_Tool		
Working Mode	BLE		
Test Channel	2402MHz	2440MHz	2480MHz
Power Setting	6.1	6.1	6.1

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

Radiated test mode: EUT transmitted signal with BT antenna;

Conducted test mode: EUT transmitted signal from BT RF port connected to SPA directly;

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	e3	Audix	9.160323
Radiated emission	e3	Audix	9.160323

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	DELL 5480	-
2	RF cable	/	0.2m length; 0.5dB loss
3	Adapter	Xiaomi MDY-03-EC	-

2.5 Test environment condition:

Test items	Temperature °C	Humidity % RH
Minimum 6dB Bandwidth	24	46
Maximum conducted output power and e.i.r.p.		
Power spectrum density		
Emission outside the frequency band		
Radiated Emissions in restricted frequency bands	25	52
Power line conducted emission	25	52

2.6 Instrument list

Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Test Receiver	R&S	ESIB 26	EC 3045	2025-09-14
☑	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2025-10-23
☑	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2025-06-10
☑	Horn antenna	R&S	HF 906	EC 3049	2026-01-15
☐	Horn antenna	ETS	3117	EC 4792-1	2025-03-14
☑	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2025-07-07
☐	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2025-03-23
☐	Horn antenna	ETS	3116c	Ec5955	2026-01-15
Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Test Receiver	R&S	ESR7	EC 6194	2025-12-07
☑	Attenuator	Weinschel	68-6-44	EC 3043-9	2026-02-07
☑	A.M.N.	R&S	ESH2-Z5	EC 3119	2025-11-09
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2025-09-08
☑	Power sensor	Agilent	U2021XA	EC 5338-1	2025-03-01
☐	Vector Signal Generator	Agilent	N5182B	EC 5175	2025-03-01
☐	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2025-03-01
☐	Mobile Test System	Litepoint	Iqxel	EC 5176	2026-01-08
☐	Test Receiver	R&S	ESCI 7	EC 4501	2026-01-08
Additional instrument					

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Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3442	2026-01-08

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2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Maximum peak output power	± 0.74dB
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

3 Minimum 6dB bandwidth

Test result: Pass

3.1 Limit

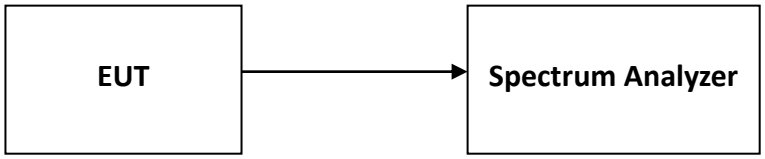
For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2 Measurement Procedure

The minimum 6dB bandwidth is measured using the Spectrum Analyzer according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 8.2) for compliance requirements.

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) 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.

3.3 Test Configuration



3.4 Test Results of Minimum 6dB bandwidth

Please refer to Appendix A

4 Maximum conducted output power and e.i.r.p.

Test result: Pass

4.1 Limit

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 W. (The e.i.r.p. shall not exceed 4 W)

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

4.2 Measurement Procedure

☒ Maximum peak conducted output power

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 8.3.1) for compliance requirements.

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ 3 × RBW.
c) Set span ≥ 3 x RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

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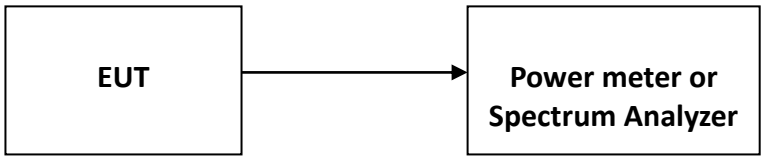
☐ Maximum conducted (average) output power

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 8.3.2) for compliance requirements.

a) Measure the duty cycle, x, of the transmitter output signal as described in Section 6.0.
b) Set span to at least 1.5 x OBW.
c) Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz.
d) Set VBW ≥ 3 x RBW.
e) Number of points in sweep ≥ 2 x span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
f) Sweep time = auto.
g) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
h) Do not use sweep triggering. Allow the sweep to “free run”.
i) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
j) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
k) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on- and off-times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is 25 %.

4.3 Test Configuration



4.4 Test Results of Maximum conducted output power

Please refer to Appendix A

5 Power spectrum density

Test result: **Pass**

5.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 8dBm/MHz and 8+ (6 –antenna gain-beam forming gain).

5.2 Measurement Procedure

☒ Method PKPSD (peak PSD)

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 × RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

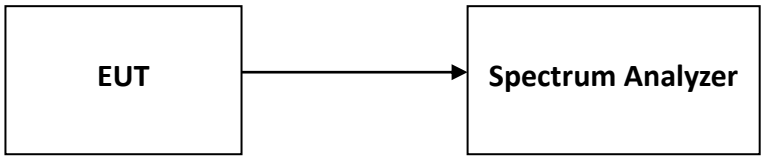
☐ Method AVGPSD

The power output was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 8.4) for compliance requirements.

This procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., duty cycle < 98 %), and when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than ± 2 %):

a) Measure the duty cycle (x) of the transmitter output signal as described in Section 11.6.
b) Set instrument center frequency to DTS channel center frequency.
c) Set span to at least 1.5 x OBW.
d) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
e) Set VBW ≥3 x RBW.
f) Detector = power averaging (RMS) or sample detector (when RMS not available).
g) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h) Sweep time = auto couple.
i) Do not use sweep triggering. Allow sweep to “free run”.
j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
k) Use the peak marker function to determine the maximum amplitude level.
l) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.
m) If resultant value exceeds the limit, then reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

5.3 Test Configuration



5.4 Test Results of Power spectrum density

Please refer to Appendix A

6 Emission outside the frequency band

Test result: **Pass**

6.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

6.2 Measurement Procedure

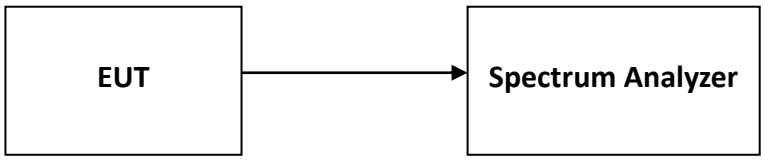
The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 11.0) for compliance requirements.

Reference level measurement
Establish a reference level by using the following procedure:
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.

Emission level measurement
a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ 3 x RBW.
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

6.3 Test Configuration



6.4 The results of Emission outside the frequency band

Please refer to Appendix A

7 Radiated Emissions in restricted frequency bands

Test result: **Pass**

7.1 Limit

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

7.2 Measurement Procedure

For Radiated emission below 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c) Both X and Y axes of the antenna are set to make the measurement.
d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

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For Radiated emission above 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c) 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.

d) 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.

e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

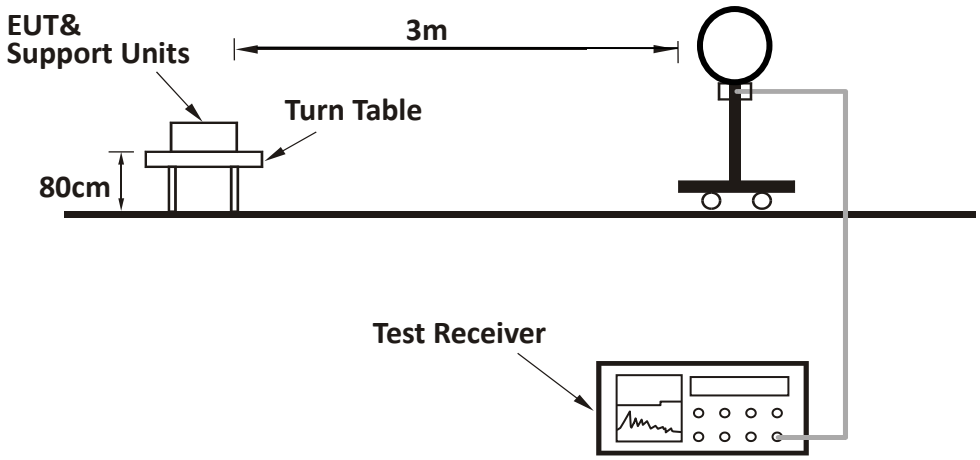
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

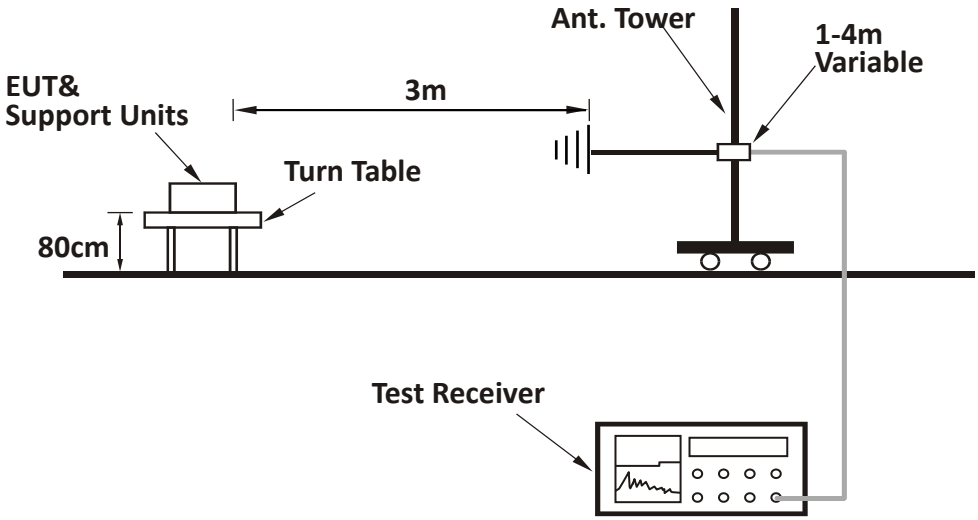
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported

7.3 Test Configuration

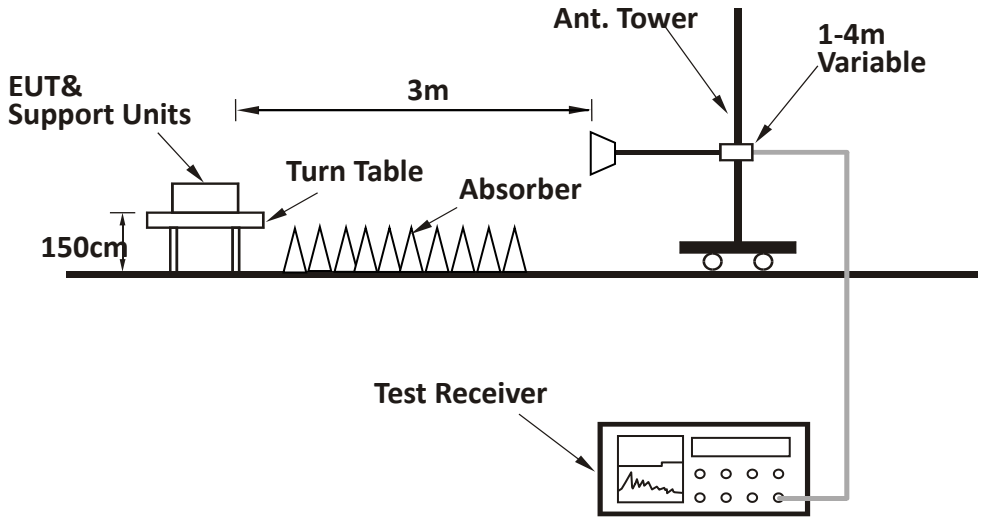
For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



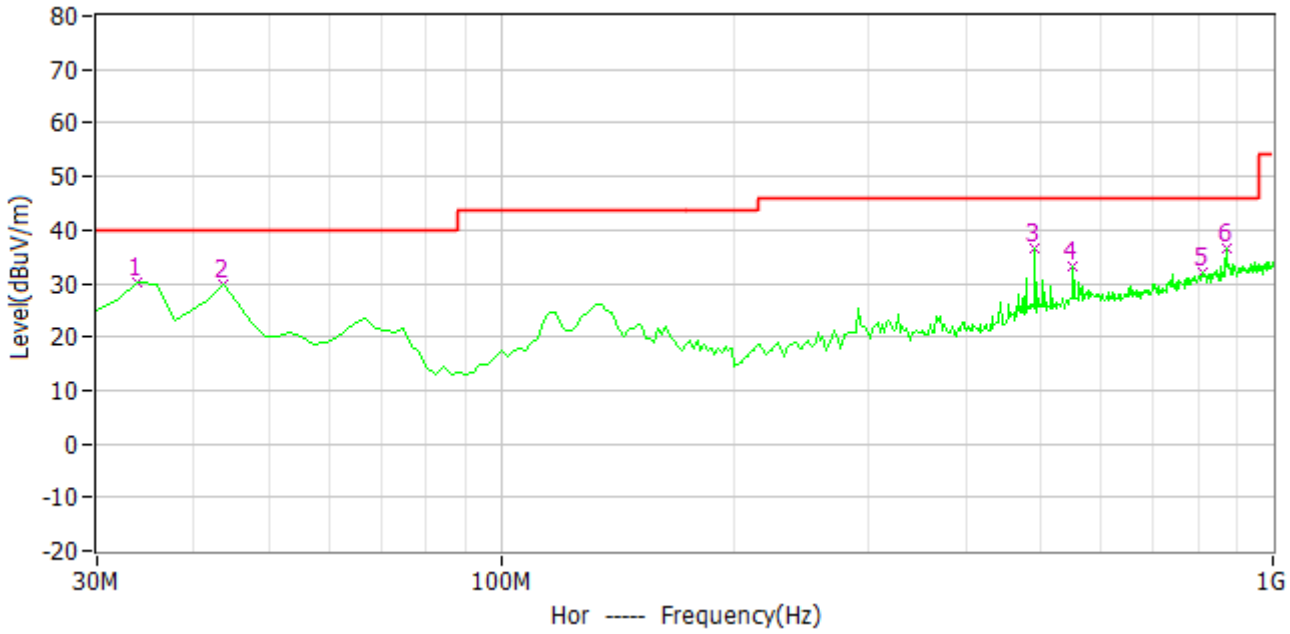
For Radiated emission above 1GHz:

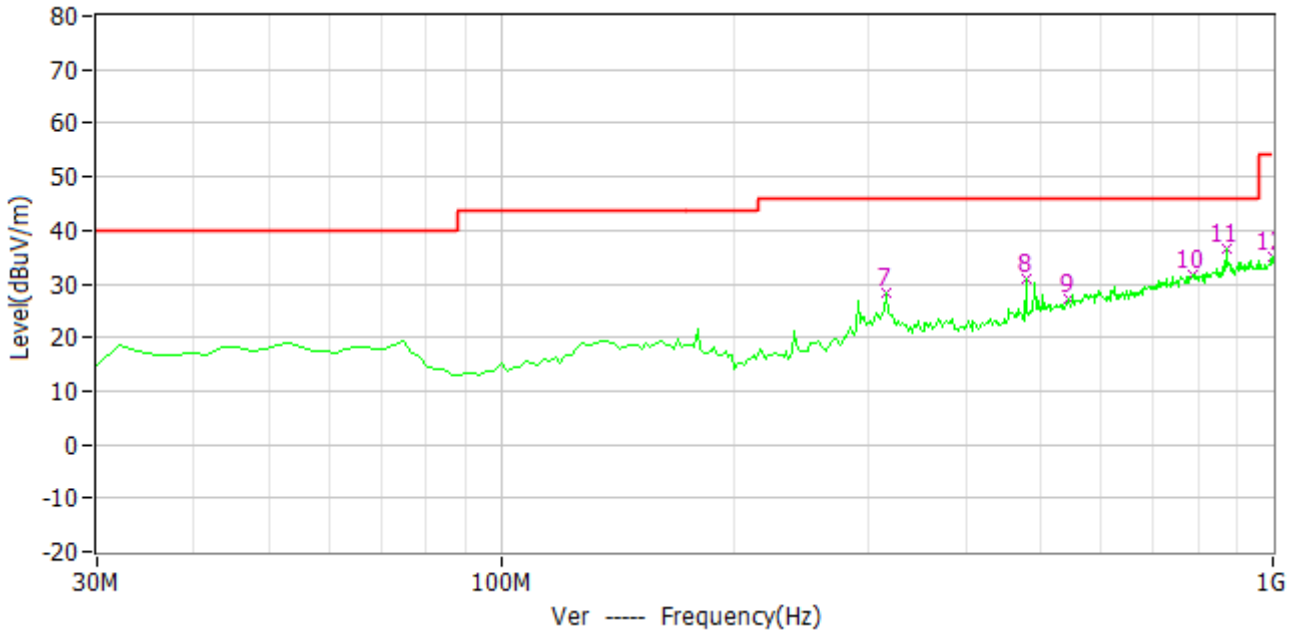


7.4 Test Results of Radiated Emissions

Below 1GHz

Charging mode:





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No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Detector	Polar
1*	33.888MHz	40.00	30.25	-9.75	QP	Hor
2*	43.607MHz	40.00	29.73	-10.27	QP	Hor
3*	492.645MHz	46.00	36.43	-9.57	QP	Hor
4*	550.962MHz	46.00	33.08	-12.92	QP	Hor
5*	809.499MHz	46.00	32.10	-13.90	QP	Hor
6*	869.760MHz	46.00	36.45	-9.55	QP	Hor
7*	315.752MHz	46.00	28.19	-17.81	QP	Ver
8*	479.038MHz	46.00	30.88	-15.12	QP	Ver
9*	543.186MHz	46.00	27.12	-18.88	QP	Ver
10*	788.116MHz	46.00	31.77	-14.23	QP	Ver
11*	869.760MHz	46.00	36.41	-9.59	QP	Ver
12*	998.056MHz	54.00	35.17	-18.83	QP	Ver

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Level = Original Receiver Reading + Correct Factor
3. Delta = Level - Limit
4. If the PK Level is lower than AV limit, the AV test can be elided.

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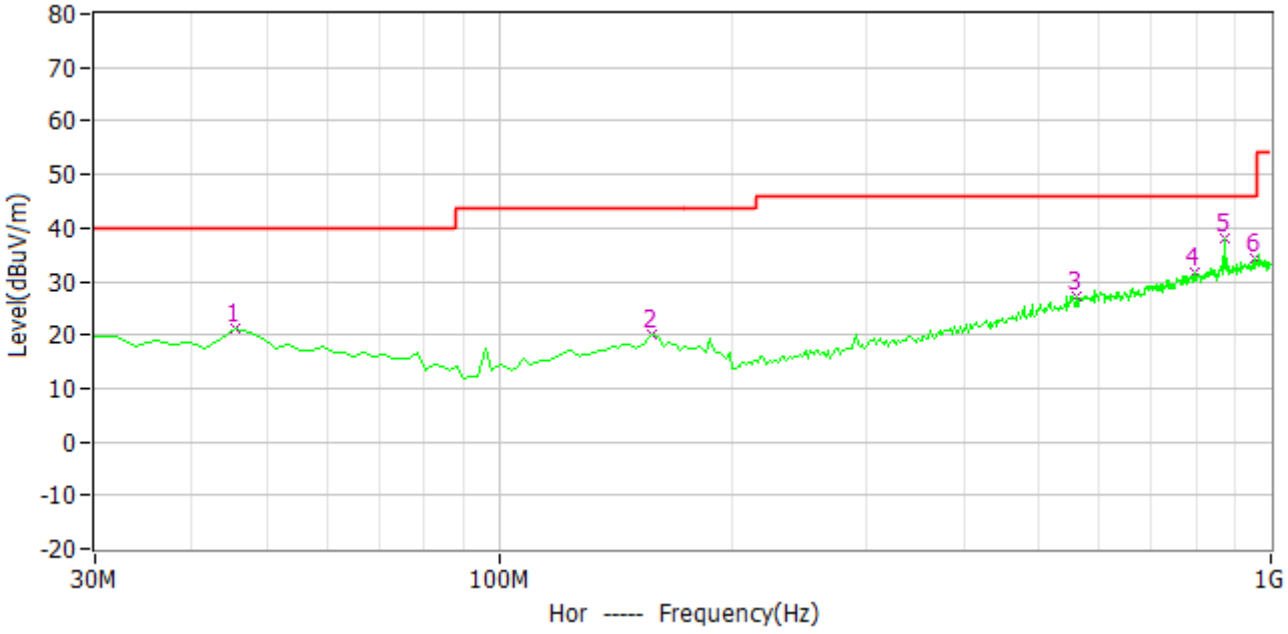
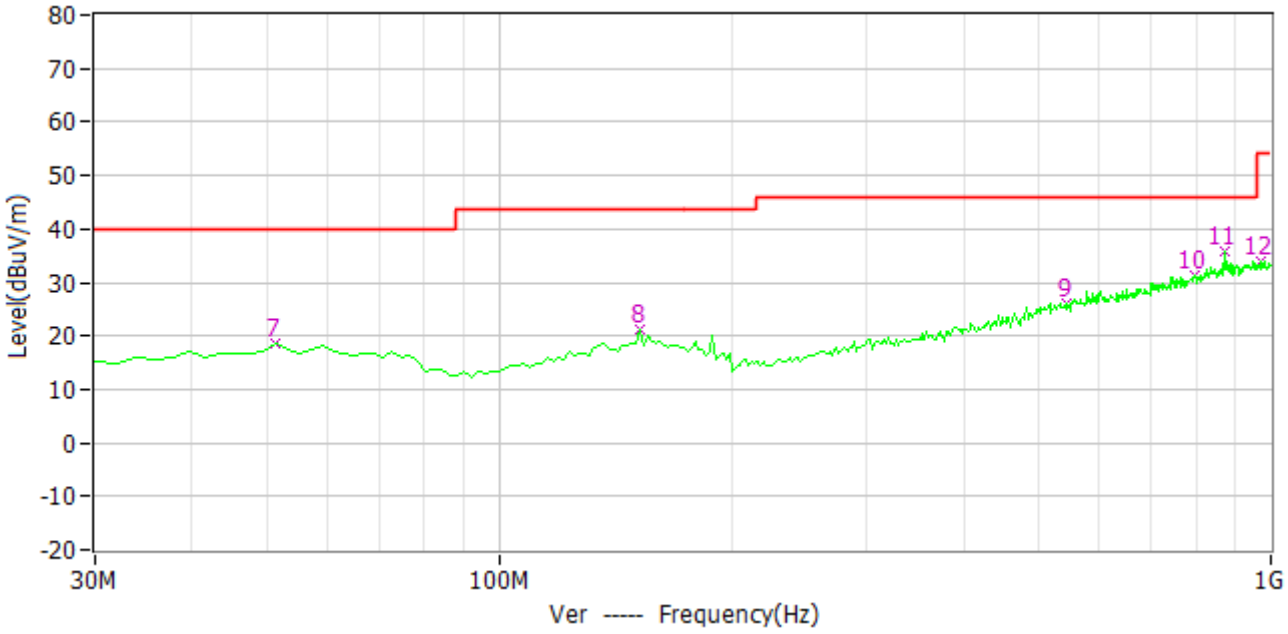
Working mode:





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No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Detector	Polar
1*	45.551MHz	40.00	21.17	-18.83	QP	Hor
2*	158.297MHz	43.50	20.17	-23.33	QP	Hor
3*	558.738MHz	46.00	27.24	-18.76	QP	Hor
4*	797.836MHz	46.00	31.79	-14.21	QP	Hor
5*	869.760MHz	46.00	38.12	-7.88	QP	Hor
6*	953.347MHz	46.00	34.26	-11.74	QP	Hor
7*	51.383MHz	40.00	18.46	-21.54	QP	Ver
8*	152.465MHz	43.50	21.23	-22.27	QP	Ver
9*	543.186MHz	46.00	26.22	-19.78	QP	Ver
10*	795.892MHz	46.00	31.49	-14.51	QP	Ver
11*	869.760MHz	46.00	35.79	-10.21	QP	Ver
12*	970.842MHz	54.00	34.11	-19.89	QP	Ver

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Level = Original Receiver Reading + Correct Factor
3. Delta = Level - Limit
4. If the PK Level is lower than AV limit, the AV test can be elided.

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Above 1GHz
The emission was conducted from 1GHz to 25GHz

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2390	48.60	74.00	25.40	PK
	V	2390	48.90	74.00	25.10	PK
	H	4804	47.10	74.00	26.90	PK
	V	4804	47.70	74.00	26.30	PK
M	H	4880	47.30	74.00	26.70	PK
	V	4880	48.10	74.00	25.90	PK
H	H	2483.5	49.90	74.00	24.10	PK
	V	2483.5	51.40	74.00	22.60	PK
	H	4960	48.60	74.00	25.40	PK
	V	4960	48.80	74.00	25.20	PK

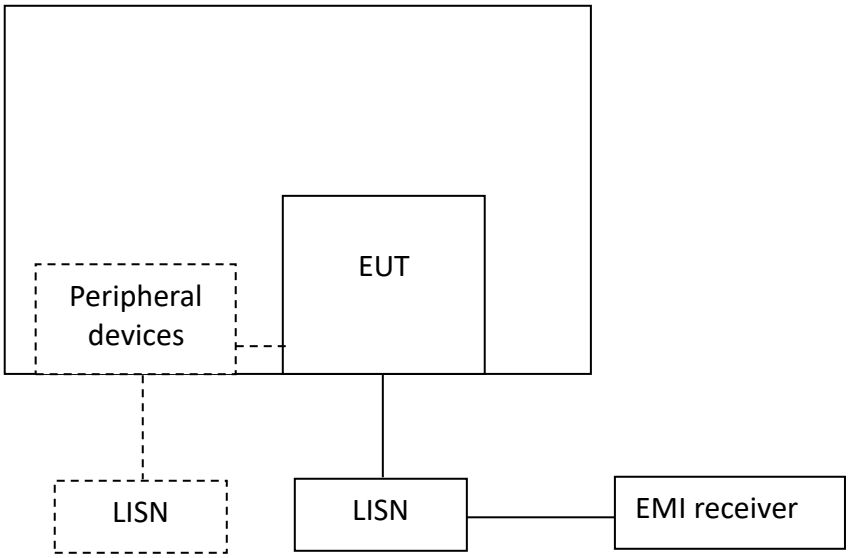
8 Power line conducted emission

Test result: **Pass**

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

8.2 Test Configuration



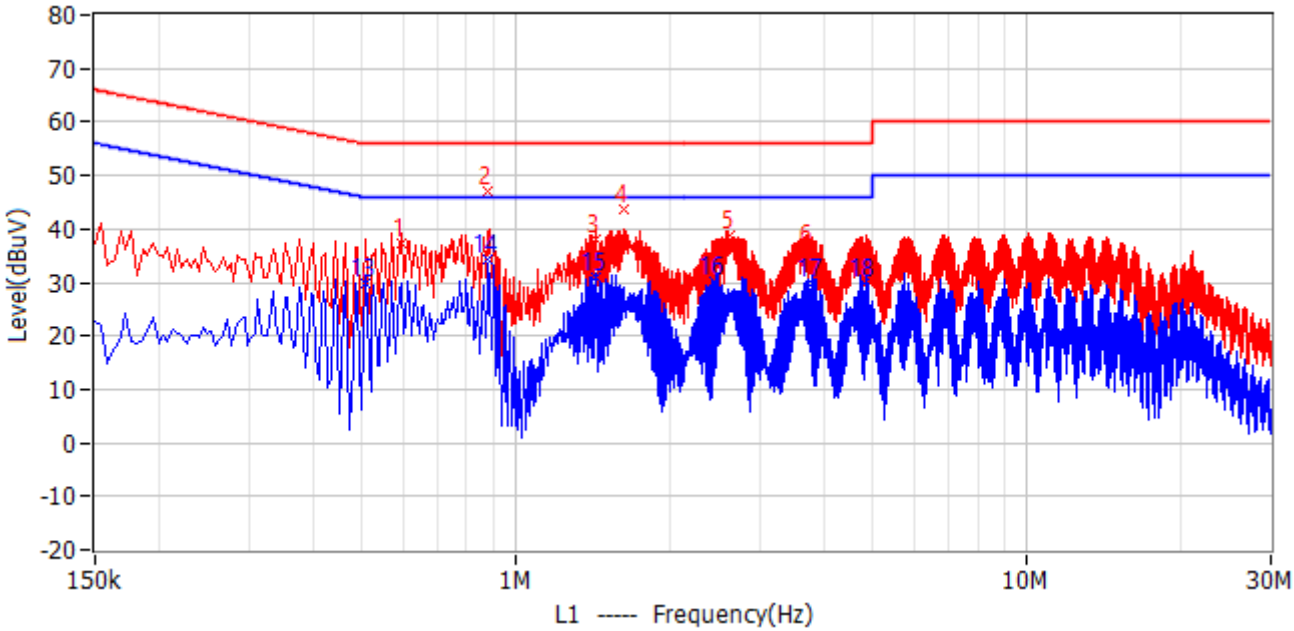
8.3 Measurement Procedure

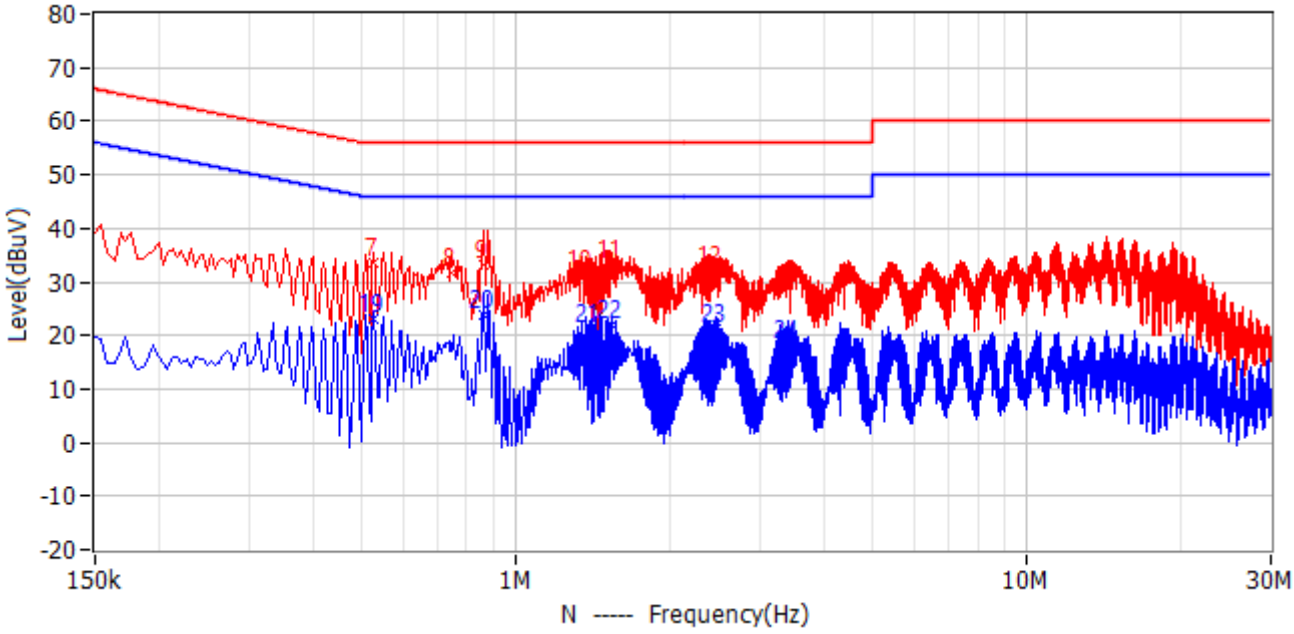
Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

8.4 Test Results of Power line conducted emission





No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	595.500kHz	56.00	37.39	-18.61	31.19	6.20	QP	L1
2	883.500kHz	56.00	47.10	-8.90	40.90	6.20	QP	L1
3	1.433MHz	56.00	38.00	-18.00	31.80	6.20	QP	L1
4	1.631MHz	56.00	43.80	-12.20	37.60	6.20	QP	L1
5	2.621MHz	56.00	38.97	-17.03	32.77	6.20	QP	L1
6	3.723MHz	56.00	36.36	-19.64	30.06	6.30	QP	L1

TEST REPORT

No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
7	528.000kHz	56.00	33.71	-22.29	27.51	6.20	QP	N
8	748.500kHz	56.00	31.53	-24.47	25.33	6.20	QP	N
9	861.000kHz	56.00	33.05	-22.95	26.85	6.20	QP	N
10	1.347MHz	56.00	31.14	-24.86	24.94	6.20	QP	N
11	1.541MHz	56.00	33.14	-22.86	26.94	6.20	QP	N
12	2.423MHz	56.00	32.10	-23.90	25.90	6.20	QP	N
13	505.500kHz	46.00	29.85	-16.15	23.65	6.20	CAV	L1
14	883.500kHz	46.00	34.12	-11.88	27.92	6.20	CAV	L1
15	1.433MHz	46.00	31.03	-14.97	24.83	6.20	CAV	L1
16	2.445MHz	46.00	30.26	-15.74	24.06	6.20	CAV	L1
17	3.791MHz	46.00	29.76	-16.24	23.46	6.30	CAV	L1
18	4.803MHz	46.00	29.82	-16.18	23.42	6.40	CAV	L1
19	528.000kHz	46.00	23.10	-22.90	16.90	6.20	CAV	N
20	861.000kHz	46.00	23.95	-22.05	17.75	6.20	CAV	N
21	1.388MHz	46.00	21.14	-24.86	14.94	6.20	CAV	N
22	1.541MHz	46.00	22.07	-23.93	15.87	6.20	CAV	N
23	2.468MHz	46.00	21.36	-24.64	15.16	6.20	CAV	N
24	3.413MHz	46.00	18.21	-27.79	11.91	6.30	CAV	N

Remark: 1. Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.
2. Level = Original Receiver Reading + Factor
3. Delta= Level - Limit
4. If the PK Level is lower than AV limit, the AV test can be elided.

Example: Assuming LISN Factor = 10.00dB, Cable Loss = 2.00dB,
Original Receiver Reading = 10.00dBuV, Limit = 66.00dBuV.
Then Factor = 10.00 + 2.00 = 12.00dB;
Level = 10dBuV + 12.00dB = 22.00dBuV;
Delta = 22.00dBuV - 66.00dBuV = –44.00dB.

9 Antenna requirement

Requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Result:
EUT uses permanently attached antenna to the intentional radiator, so it can comply with the provisions of this section.

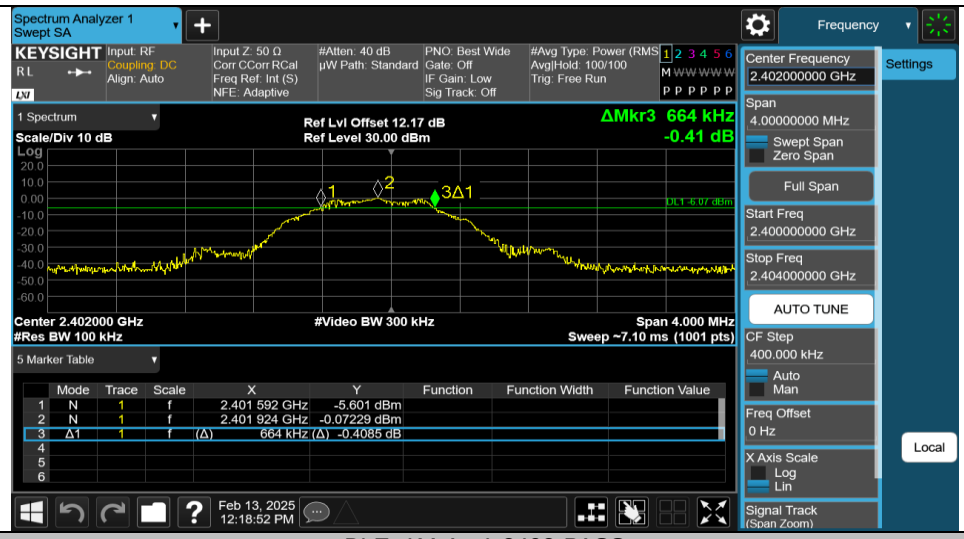
Appendix A: Test results

DTS Bandwidth

Test Result

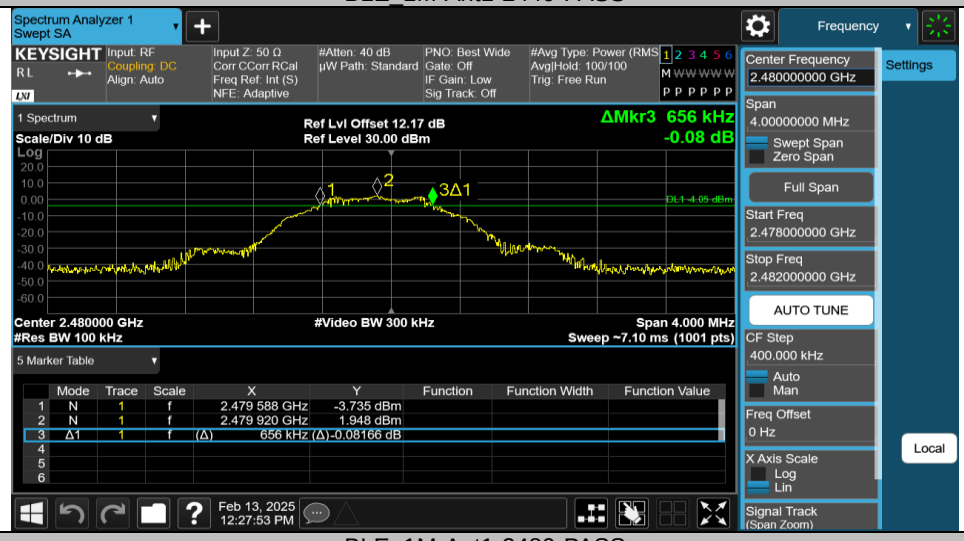
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.664	2401.592	2402.256	0.5	PASS
BLE_1M	Ant1	2440	0.660	2439.588	2440.248	0.5	PASS
BLE_1M	Ant1	2480	0.656	2479.588	2480.244	0.5	PASS

Test Graphs



BLE_1M-Ant1-2402-PASS

BLE_1M-Ant1-2440-PASS



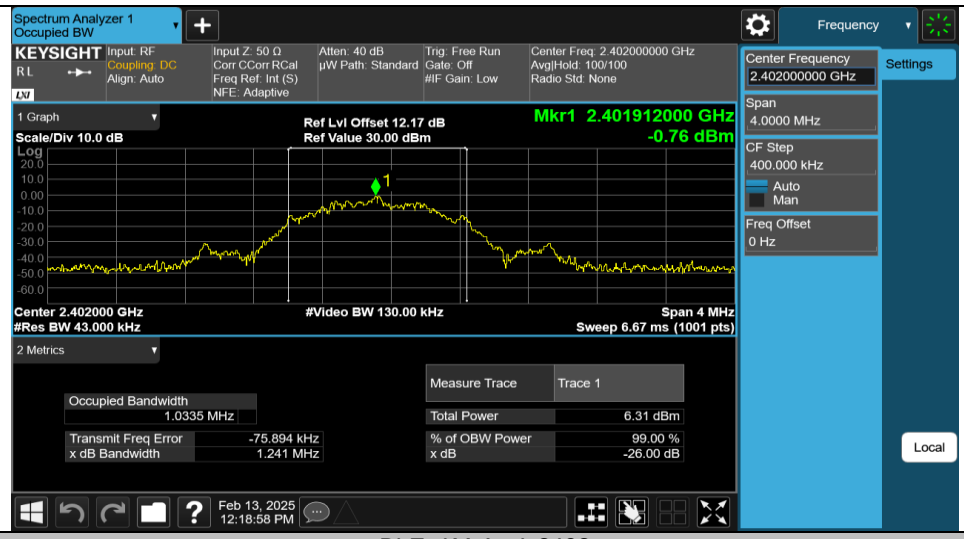
BLE_1M-Ant1-2480-PASS

Occupied Channel Bandwidth

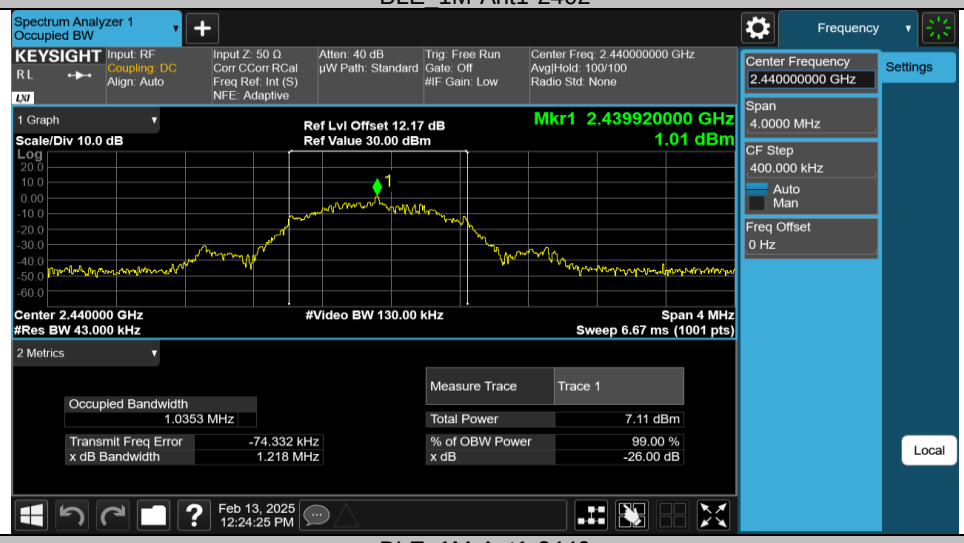
Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0335	2401.4074	2402.4409	---	---
BLE_1M	Ant1	2440	1.0353	2439.4080	2440.4433	---	---
BLE_1M	Ant1	2480	1.0257	2479.4013	2480.4270	---	---

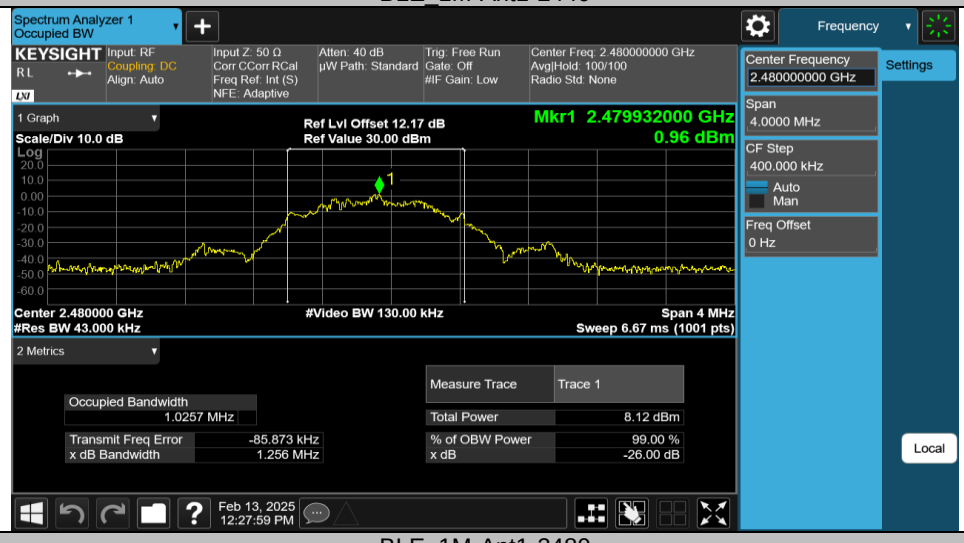
Test Graphs



BLE_1M-Ant1-2402



BLE_1M-Ant1-2440



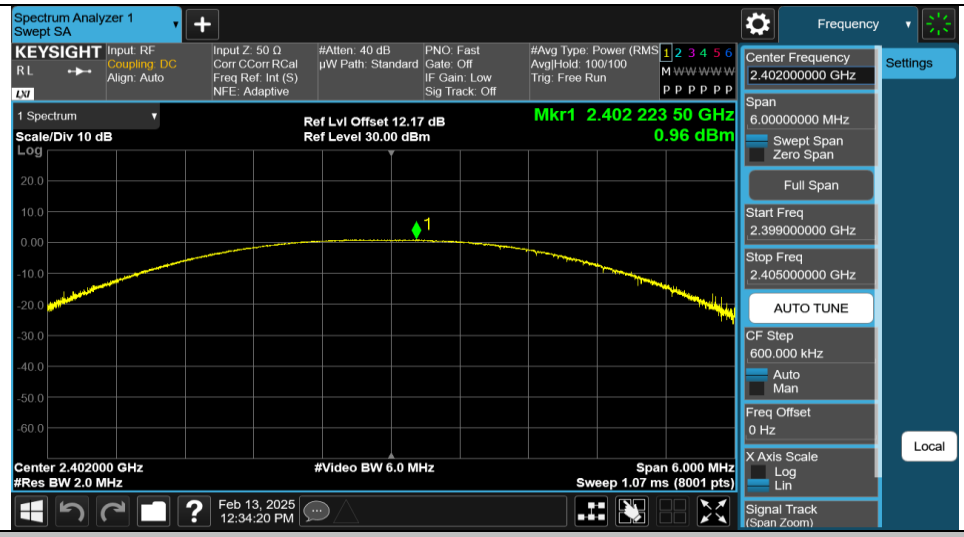
BLE_1M-Ant1-2480

Maximum conducted output power

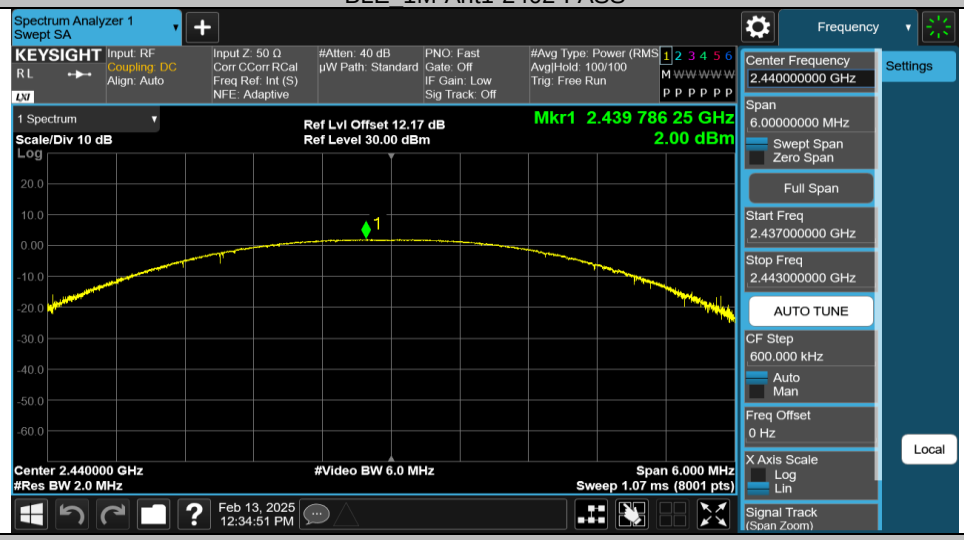
Test Result Peak

TestMode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0.96	≤30	2.65	≤36	PASS
BLE_1M	Ant1	2440	2.00	≤30	3.69	≤36	PASS
BLE_1M	Ant1	2480	2.54	≤30	4.23	≤36	PASS

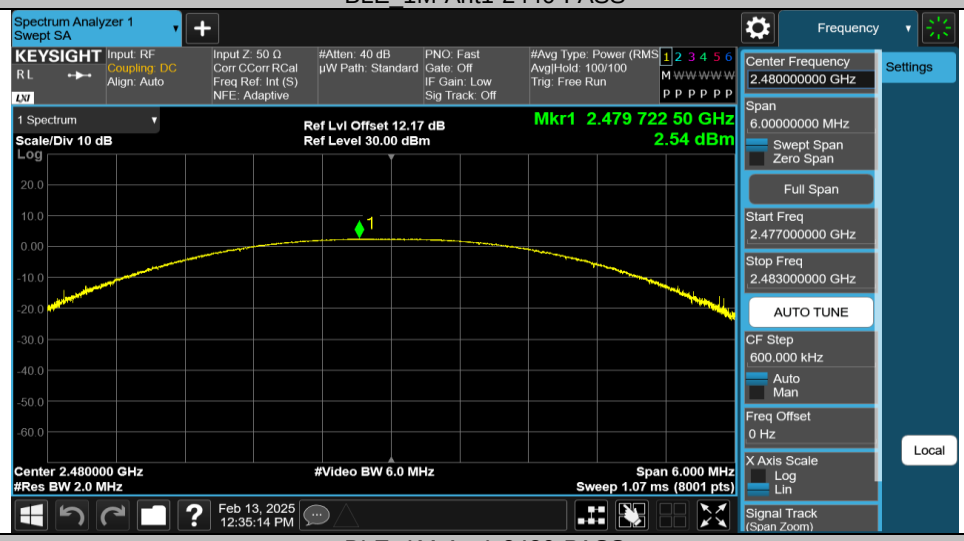
Test Graphs Peak



BLE_1M-Ant1-2402-PASS



BLE_1M-Ant1-2440-PASS



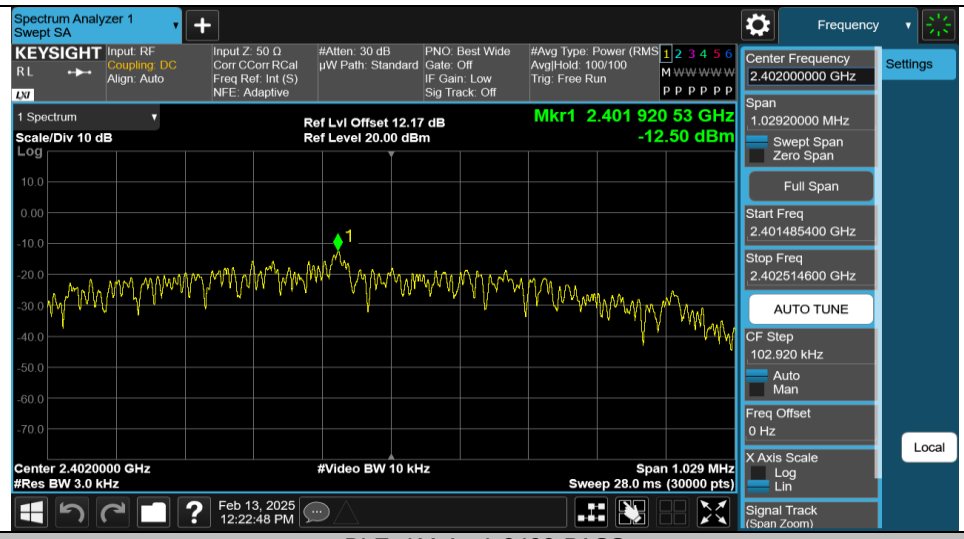
BLE_1M-Ant1-2480-PASS

Maximum power spectral density

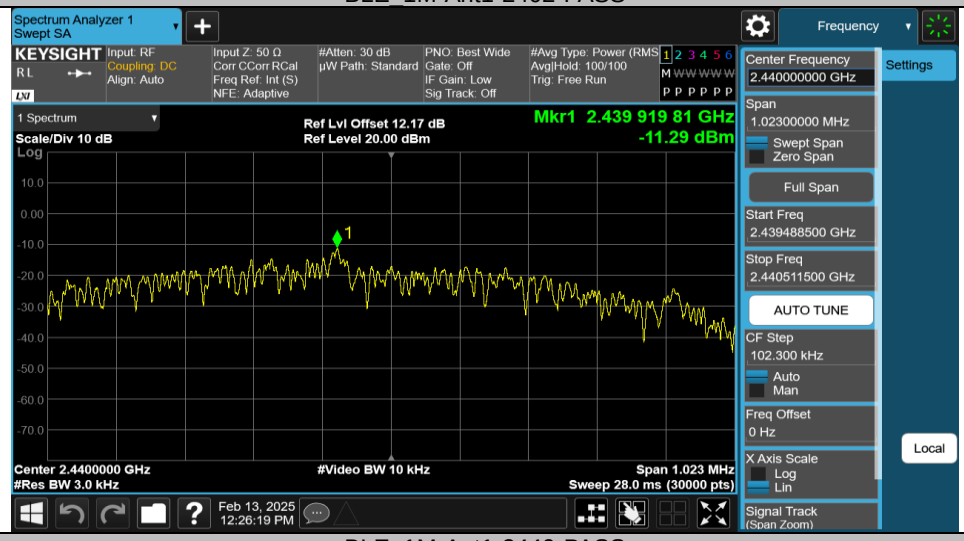
Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-12.50	≤8.00	PASS
BLE_1M	Ant1	2440	-11.29	≤8.00	PASS
BLE_1M	Ant1	2480	-10.42	≤8.00	PASS

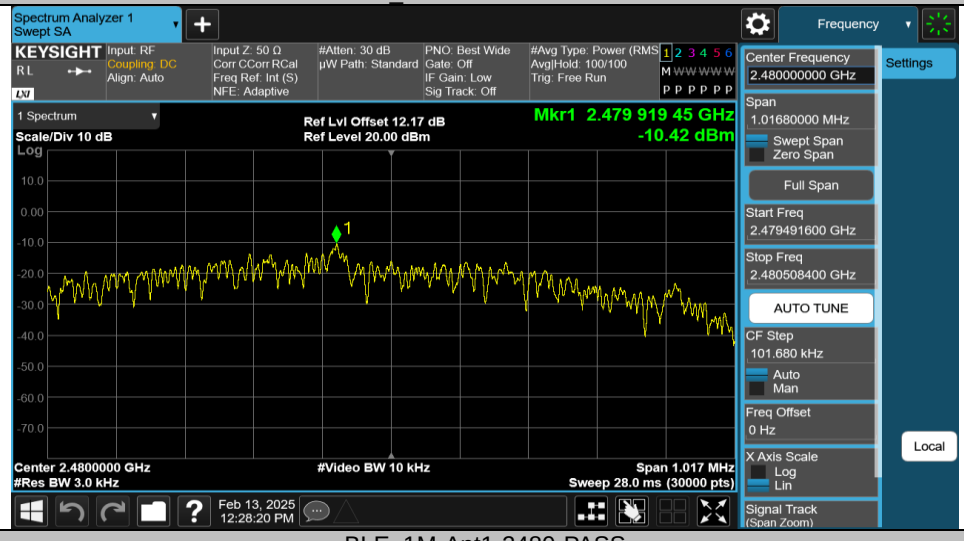
Test Graphs



BLE_1M-Ant1-2402-PASS



BLE_1M-Ant1-2440-PASS



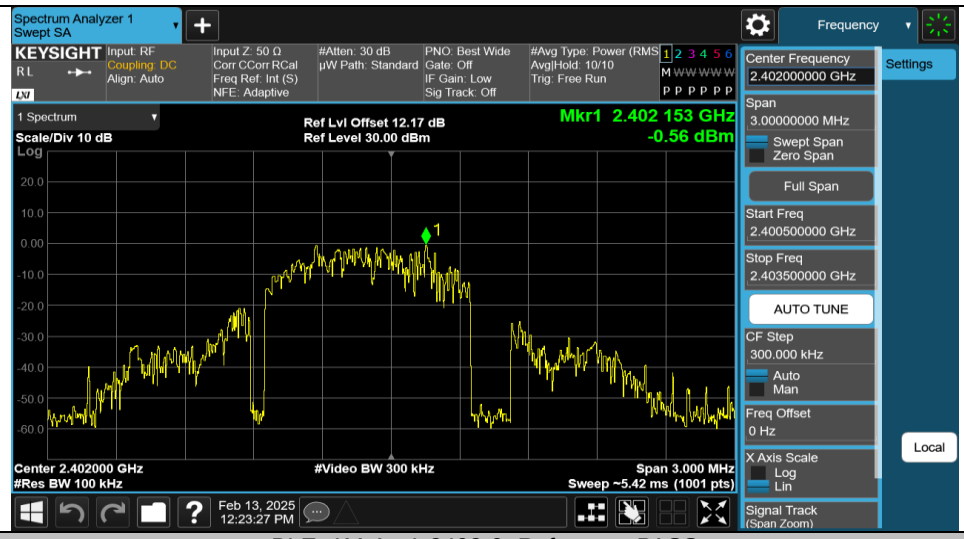
BLE_1M-Ant1-2480-PASS

Conducted Spurious Emission

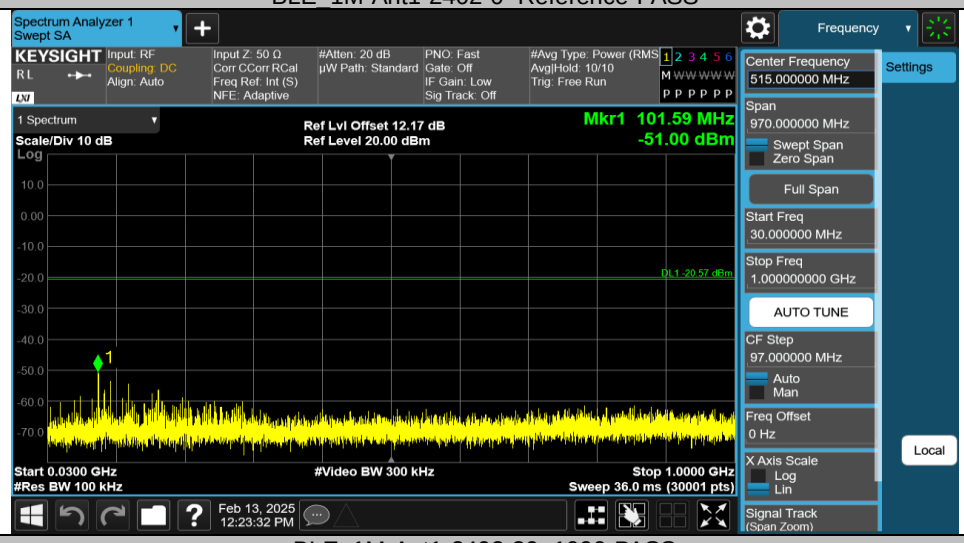
Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0~Reference	-0.57	-0.57	---	PASS
BLE_1M	Ant1	2402	30~1000	-0.57	-51	≤-20.57	PASS
BLE_1M	Ant1	2402	1000~26500	-0.57	-50.31	≤-20.57	PASS
BLE_1M	Ant1	2440	0~Reference	0.60	0.60	---	PASS
BLE_1M	Ant1	2440	30~1000	0.60	-51.24	≤-19.4	PASS
BLE_1M	Ant1	2440	1000~26500	0.60	-48.95	≤-19.4	PASS
BLE_1M	Ant1	2480	0~Reference	1.26	1.26	---	PASS
BLE_1M	Ant1	2480	30~1000	1.26	-49.14	≤-18.74	PASS
BLE_1M	Ant1	2480	1000~26500	1.26	-48.75	≤-18.74	PASS

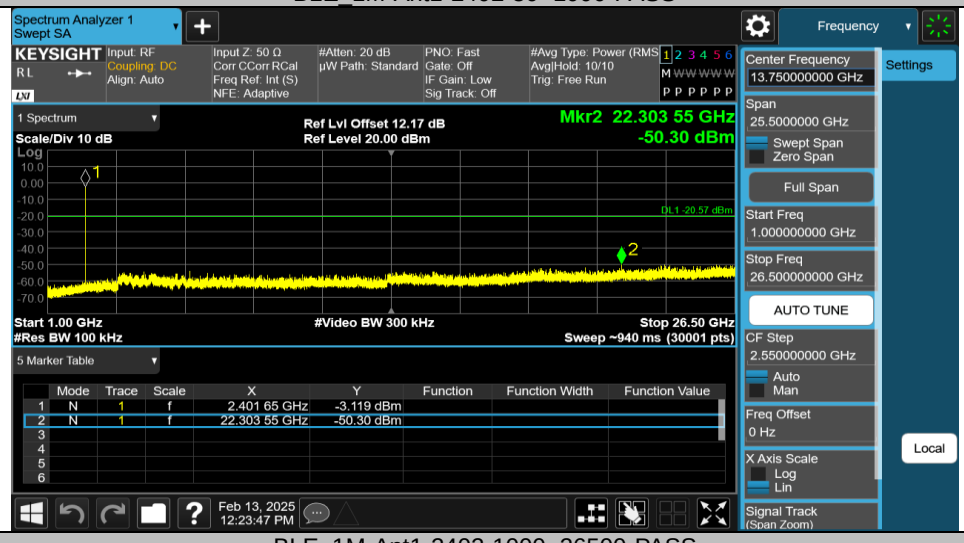
Test Graphs



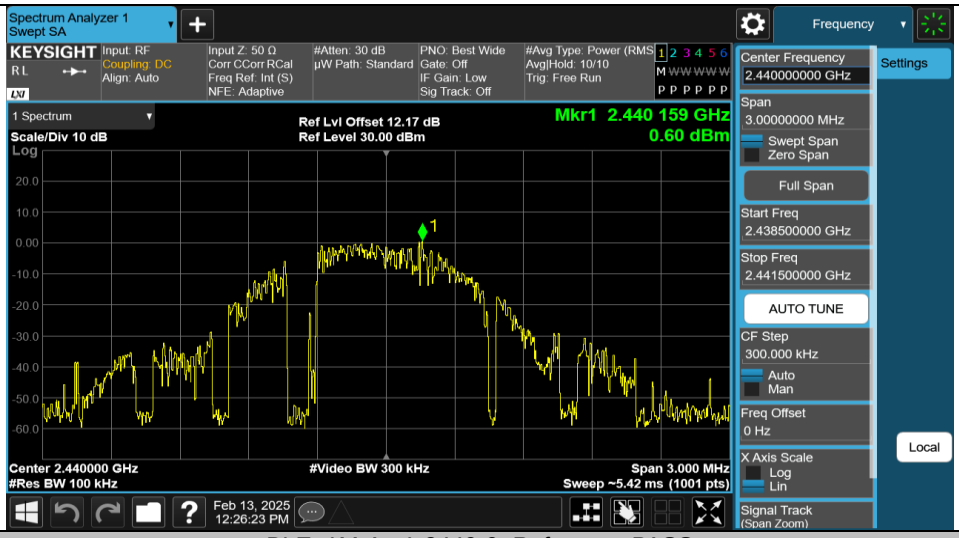
BLE_1M-Ant1-2402-0~Reference-PASS



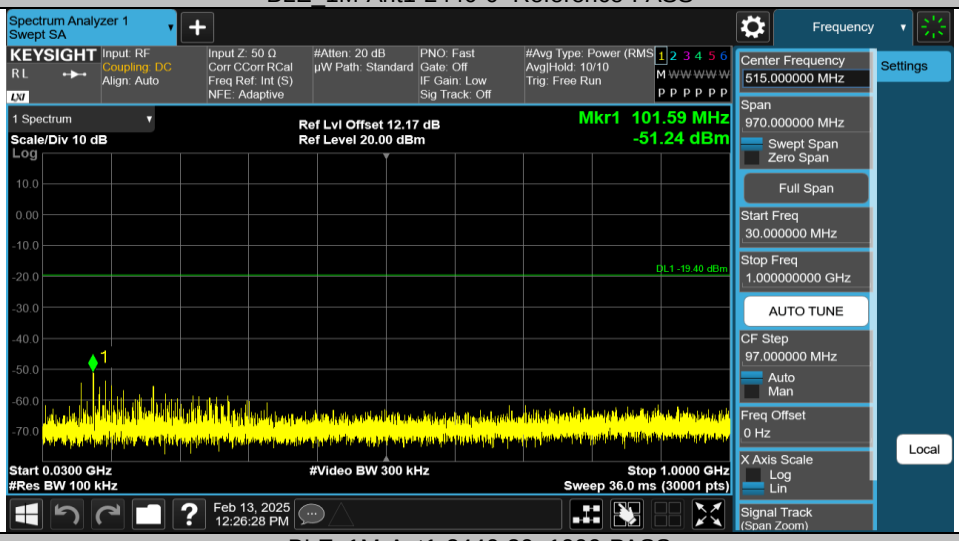
BLE_1M-Ant1-2402-30~1000-PASS



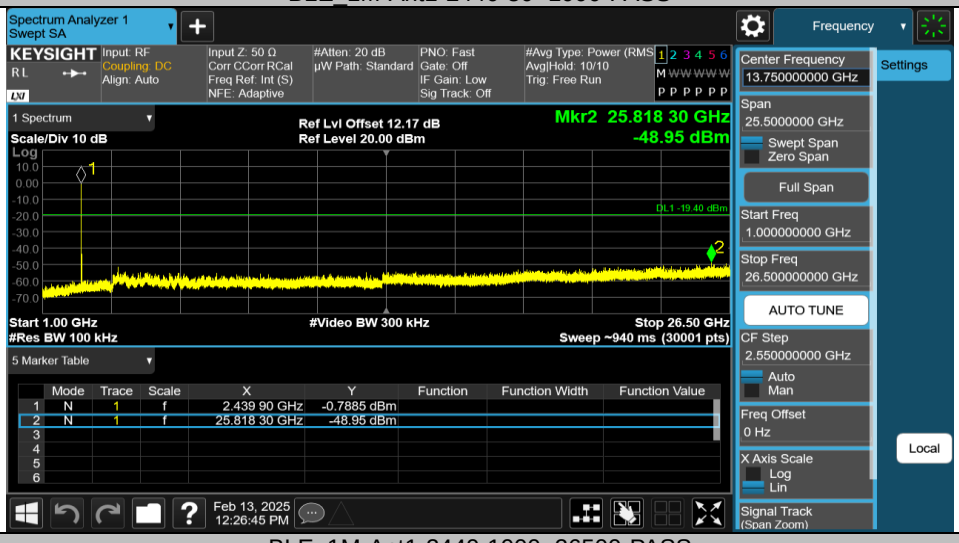
BLE_1M-Ant1-2402-1000~26500-PASS



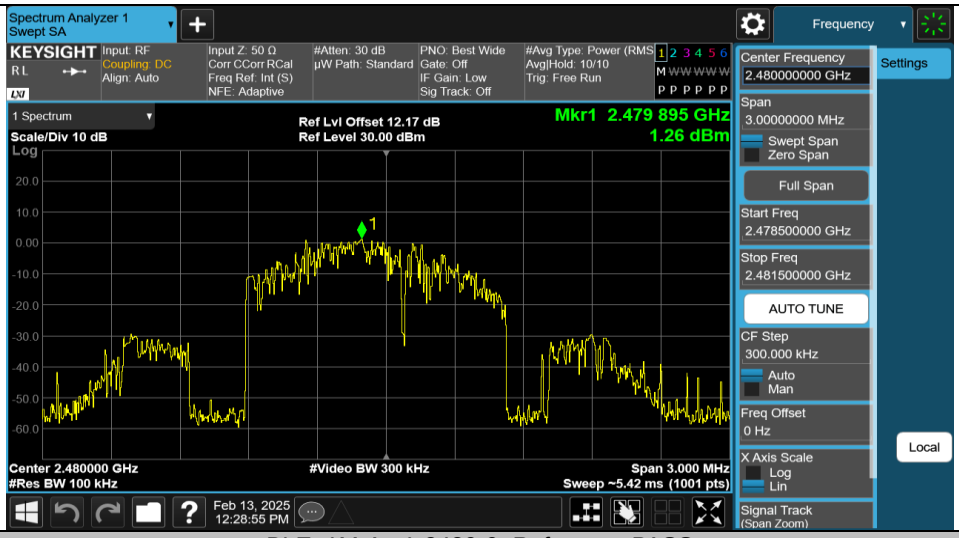
BLE_1M-Ant1-2440-0~Reference-PASS



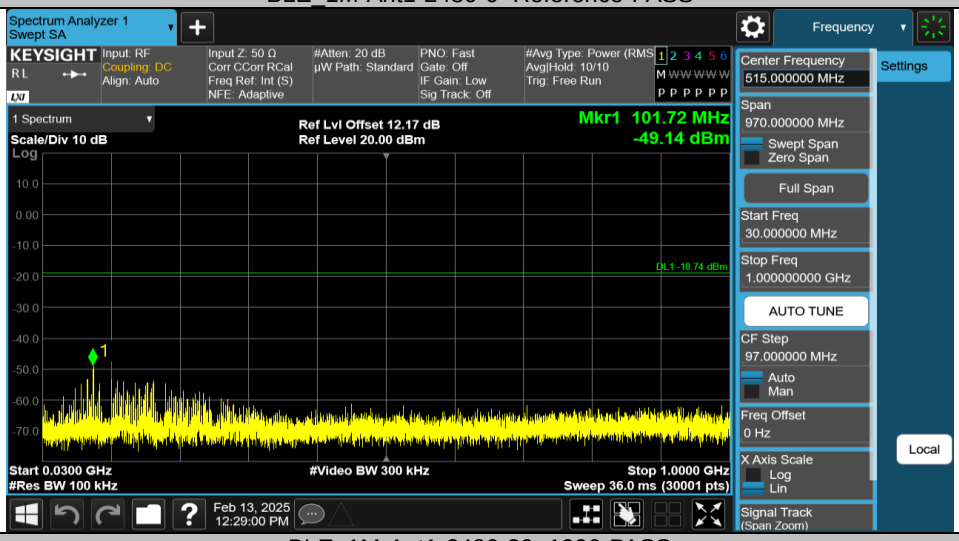
BLE_1M-Ant1-2440-30~1000-PASS



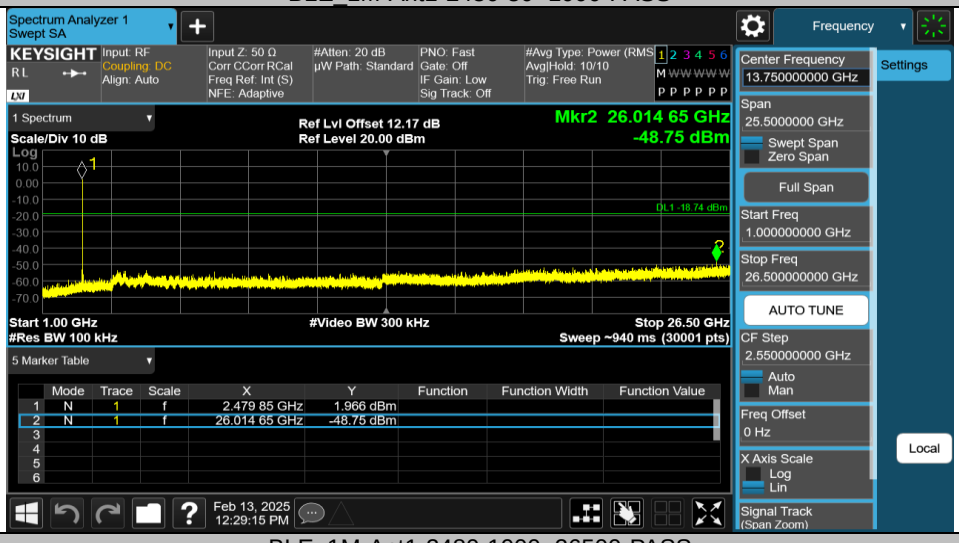
BLE_1M-Ant1-2440-1000~26500-PASS



BLE_1M-Ant1-2480-0~Reference-PASS



BLE_1M-Ant1-2480-30~1000-PASS



BLE_1M-Ant1-2480-1000~26500-PASS

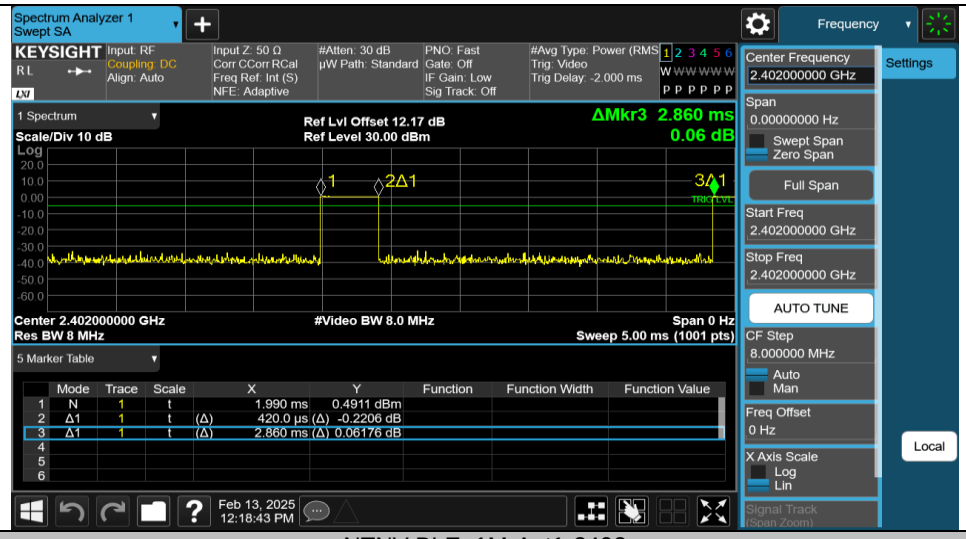
Duty Cycle

Test Result

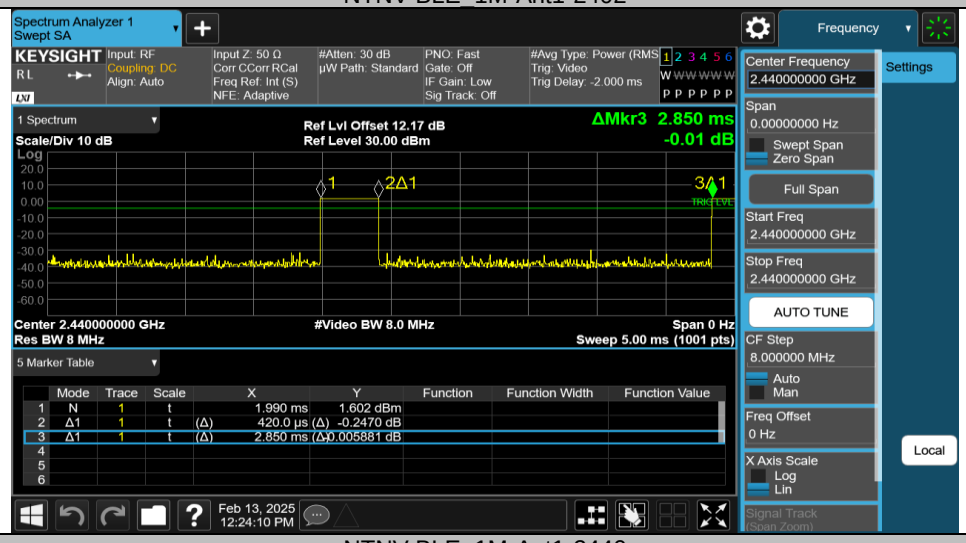
TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	0.42	2.86	14.69	8.33
BLE_1M	Ant1	2440	0.42	2.85	14.74	8.32
BLE_1M	Ant1	2480	0.42	2.86	14.69	8.33

TEST REPORT

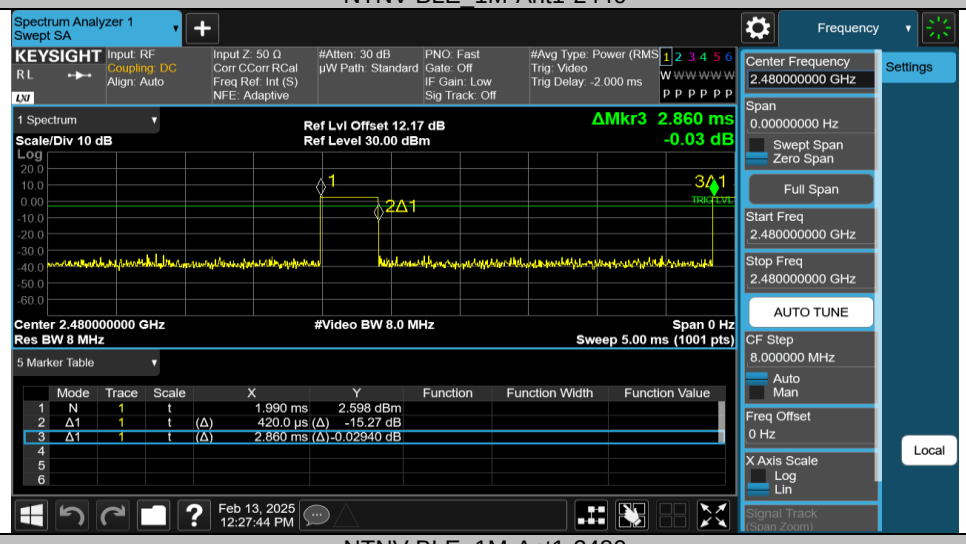
Test Graphs



NTNV-BLE_1M-Ant1-2402



NTNV-BLE_1M-Ant1-2440



NTNV-BLE_1M-Ant1-2480

********** END **********