

Withings

TEST REPORT

Model:
WPA02

REPORT NUMBER
241200289THC-001

ISSUE DATE
Mar. 05, 2025

PAGES
46

DOCUMENT CONTROL NUMBER
GFT-OP-10h (28-Nov-2018)
© 2020 Intertek



Radio Spectrum TEST REPORT

Applicant:	Withings 2 Rue Maurice Hartmann Issy-les-Moulineaux 92130 France
Product:	Withings U-Scan Reader
Model No.:	WPA02
FCC ID:	XNAWPA02
Test Method/ Standard:	47 CFR FCC Part 15.247 & ANSI C63.10 2013 KDB 558074 D01 v05r02
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 17, Ln. 246, Niupu S. Rd., Xiangshan Dist, Hsinchu City 300075, Taiwan



Rich Nien

Rich Nien
Engineer

Rico Deng

Rico Deng
Reviewer

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

TEST REPORT

Revision History

Report No.	Issue Date	Revision Summary
241200289THC-001	Mar. 05, 2025	Original report

Table of Contents

1. General Information	6
1.1 Identification of the EUT	6
1.2 Antenna description	6
1.3 Operation mode	6
1.4 Peripherals equipment	7
2. Minimum 6 dB Bandwidth	8
2.1 Instrument Setting.....	8
2.2 Test Procedure	8
2.3 Test Diagram	8
2.4 Limit	8
2.5 Test Results	9
3. Maximum Peak Conducted Output Power	12
3.1 Instrument Setting.....	12
3.2 Test Procedure	12
3.3 Test Diagram	12
3.4 Limit	12
3.5 Test Results	13
4. Power Spectral Density.....	14
4.1 Instrument Setting.....	14
4.2 Test Procedure	14
4.3 Test Diagram	14
4.4 Limit	14
4.5 Test Results	15
5. Emissions in Non-Restricted Frequency Bands	18
5.1 Instruments Setting	18
5.2 Test Procedure	18
5.3 Test Diagram	18
5.4 Limit	18
5.5 Test Results	19
6. Emissions in Restricted Frequency Bands (Radiated emission measurements)	26
6.1 Instrument Setting.....	26
6.2 Test setup & procedure	26
6.3 Limit	28
6.4 Test Result.....	29
7. Emission on Band Edge.....	34
7.1 Instrument Setting.....	34
7.2 Test Procedure	34
7.2 Test Results	35

8. AC Power Line Conducted Emission	40
8.1 Measuring instrument setting.....	40
8.2 Test Procedure	40
8.3 Test Diagram	40
8.4 Limit	41
8.5 Test Results	42
Appendix A: Test equipment list.....	44
Appendix B: Measurement Uncertainty.....	46

Summary of Test Data

Test Requirement	Applicable Rule (Section 15.247)	Result
Minimum 6 Db Bandwidth	15.247(a)(2)	Pass
Maximum Peak Conducted Output Power	15.247(b)(3)	Pass
Power Spectral Density	15.247€	Pass
Emissions In Non-Restricted Frequency Bands	15.247(d)	Pass
Emissions In Restricted Frequency Bands (Radiated emission measurements)	15.247(d), 15.205, 15.209	Pass
Emission On The Band Edge	15.247(d), 15.205	Pass
AC Power Line Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.

Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information

1.1 Identification of the EUT

Product:	Withings U-Scan Reader
Model No.:	WPA02
Operating Frequency:	2402 MHz ~ 2480 MHz
Frequency of Each Channel:	2402+5 k, k= 0 ~ 39
Rating:	1. DC 5V 2. DC 3.8V
Power Cord:	N/A
Sample receiving date:	2025/01/13
Sample condition:	Workable
Test Date(s):	2025/02/03 ~ 2025/02/07

SOP file name and version
RF_EMI_STM32WB_test_procedure_v7

	Mac
BLE	A47EFA3CCA40

1.2 Antenna description

Antenna Gain : 4.1 dBi
 Antenna Type : FCB moment
 Connector Type : Fixed

1.3 Operation mode

Connected to Notebook, executing “Tera term” to select different frequency.

Mode	Channel	Frequency (MHz)	Signal on time(ms)	Signal on & off time(ms)	Duty cycle	Duty Cycle factor
BLE 1M	19	2440	0.42	0.63	0.667	1.761
BLE 2M	19	2440	0.23	0.63	0.370	4.317

1.4 Peripherals equipment

Peripherals name	Brand	Model No.	Serial No.
Notebook PC	HP	HP ProBook 440 G3	5CD8021S9H
Fixture	Yahorng	PC23H019	N/A

Peripherals name	Length	Shielded(Y/N)	Brand	Model No.
USB Cable	3m	Y	UGREEN	USB Cable

2. Minimum 6 dB Bandwidth

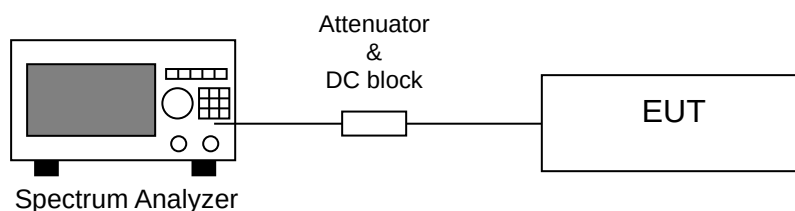
2.1 Instrument Setting

Spectrum Parameter	Setting
Detector	Peak
RBW	100kHz
VBW	$\geq 3 \times \text{RBW}$
Sweep	Auto couple
Trace	Allow the trace to stabilize.
Span	Between two times and five times the occupied bandwidth
Attenuation	Auto

2.2 Test Procedure

Step 1	The transmitter output was connected to the spectrum analyzer.
Step 2	Test was performed accordance with ANSI C63.10.
Step 3	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

2.3 Test Diagram



2.4 Limit

The minimum 6 dB bandwidth shall be at least 500 kHz.

2.5 Test Results

Temperature (°C) :	20
Relative Humidity (%) :	65
Test date :	2025/02/07

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
BLE 1M	0	2402	0.64	>0.5	Pass
	19	2440	0.65	>0.5	Pass
	39	2480	0.62	>0.5	Pass
BLE 2M	0	2402	1.11	>0.5	Pass
	19	2440	1.09	>0.5	Pass
	39	2480	1.10	>0.5	Pass

6dB Bandwidth @ BLE 1M Ch 0



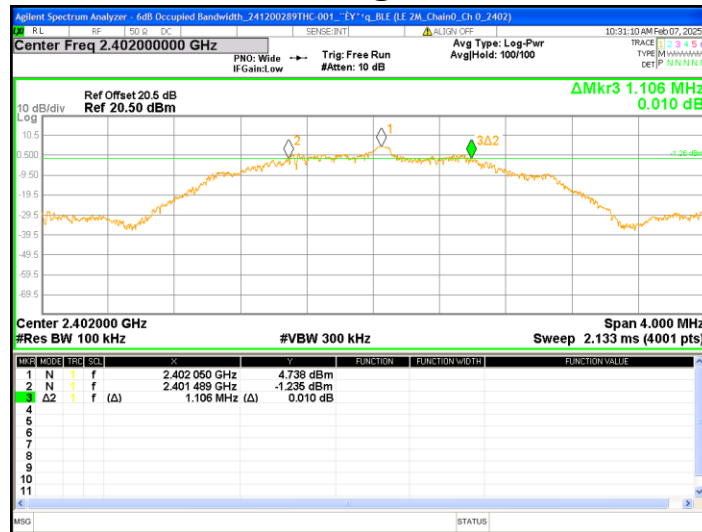
6dB Bandwidth @ BLE 1M Ch 19



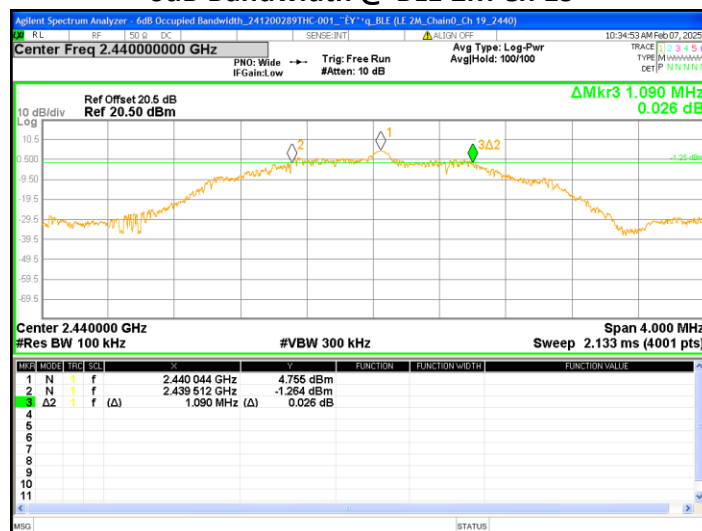
6dB Bandwidth @ BLE 1M Ch 39



6dB Bandwidth @ BLE 2M Ch 0



6dB Bandwidth @ BLE 2M Ch 19



6dB Bandwidth @ BLE 2M Ch 39



3. Maximum Peak Conducted Output Power

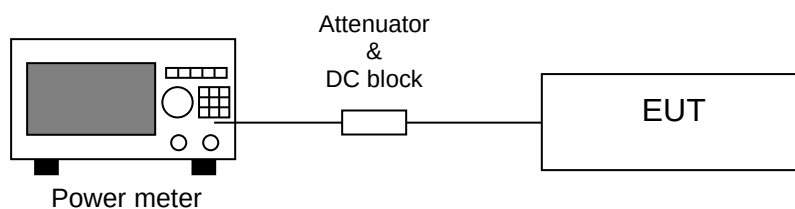
3.1 Instrument Setting

Power Meter Parameter	Setting
Bandwidth	65MHz bandwidth is greater than the EUT emission bandwidth
Detector	Peak & Average

3.2 Test Procedure

The preferred methodology is to use integrated average power measurements, as described in 11.9.2 and 11.13.3 of ANSI C63.10. The peak integrated band power methods of 11.9.1.2 and 11.13.3.2 of ANSI C63.10 are not applicable for FCC compliance testing purposes.

3.3 Test Diagram



3.4 Limit

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt (30dBm)

TEST REPORT

3.5 Test Results

Temperature (°C) :	20
Relative Humidity (%) :	65
Test date :	2025/02/07

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Maximum power (PK) (dBm)	Maximum power (PK) (mW)	Limit (dBm)	Margin (dB)
BLE 1M	0	2402	5.02	3.18	5.49	3.54	30	-24.51
	19	2440	4.86	3.06	5.37	3.44	30	-24.63
	39	2480	4.69	2.94	5.27	3.37	30	-24.73
BLE 2M	0	2402	5.25	3.35	5.75	3.76	30	-24.25
	19	2440	5.06	3.21	5.61	3.64	30	-24.39
	39	2480	4.86	3.06	5.41	3.48	30	-24.59

4. Power Spectral Density

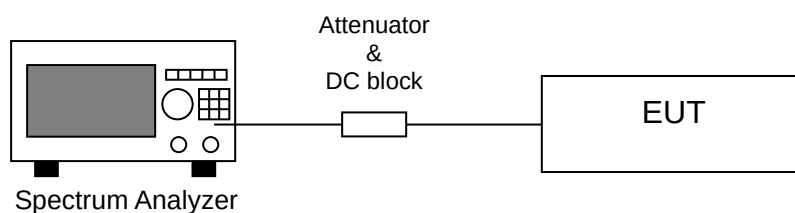
4.1 Instrument Setting

Spectrum Function	Setting
Detector	Peak
RBW	≥ 3 kHz
VBW	$\geq 3 \times$ RBW
Sweep	Auto couple
Trace	Max hold
Span	1.5 times x 6dB bandwidth
Attenuation	Auto

4.2 Test Procedure

Step 1	Test procedure refer to subclause 11.10 of ANSI C63.10.
Step 2	Using the maximum conducted output power in the fundamental emission demonstrates compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
Step 3	Use the peak marker function to determine the maximum amplitude level within the RBW.

4.3 Test Diagram



4.4 Limit

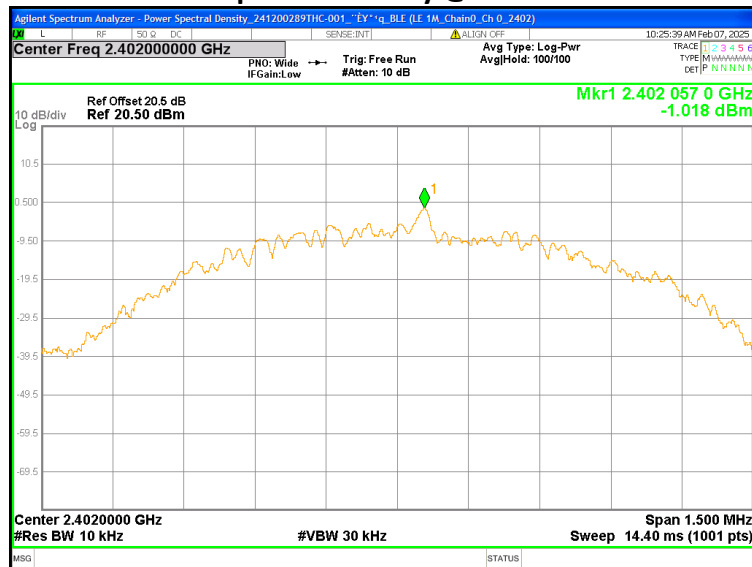
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 10 kHz band during any time interval of continuous transmission

4.5 Test Results

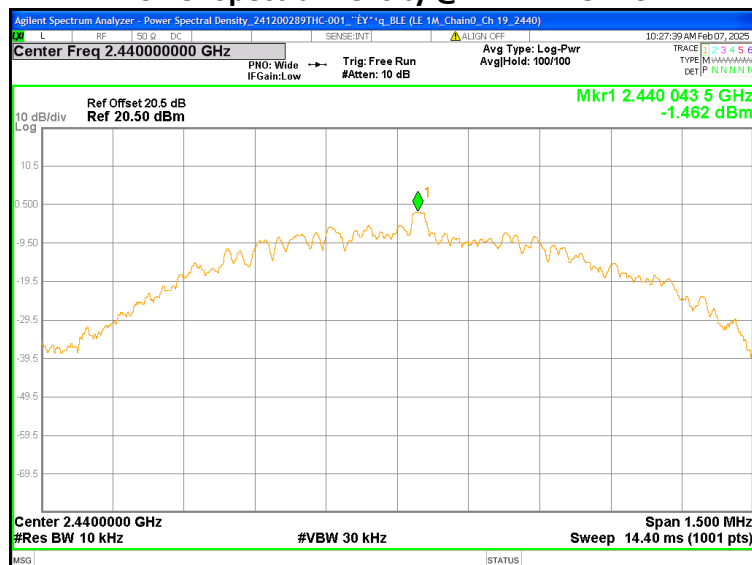
Temperature (°C) :	20
Relative Humidity (%) :	65
Test date :	2025/02/07

Mode	Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
BLE 1M	0	2402	-1.02	8	-9.02
	19	2440	-1.46	8	-9.46
	39	2480	-1.19	8	-9.19
BLE 2M	0	2402	-1.61	8	-9.61
	19	2440	-1.13	8	-9.13
	39	2480	-1.13	8	-9.13

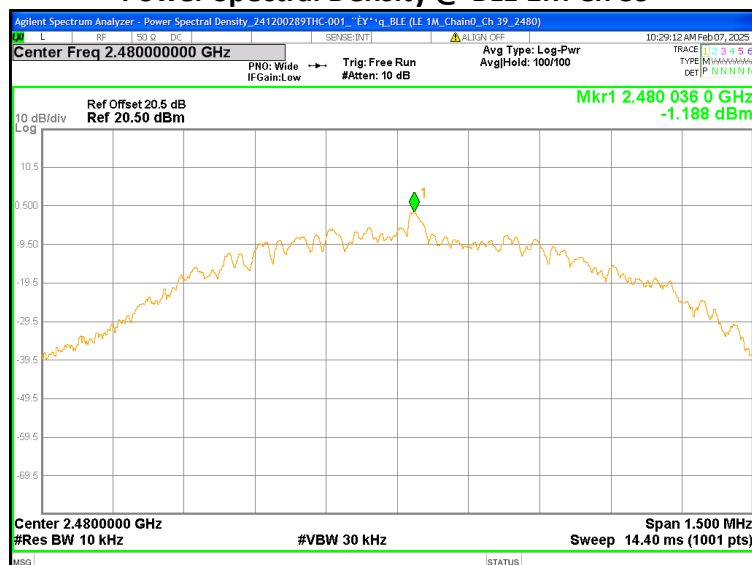
Power Spectral Density @ BLE 1M Ch 0



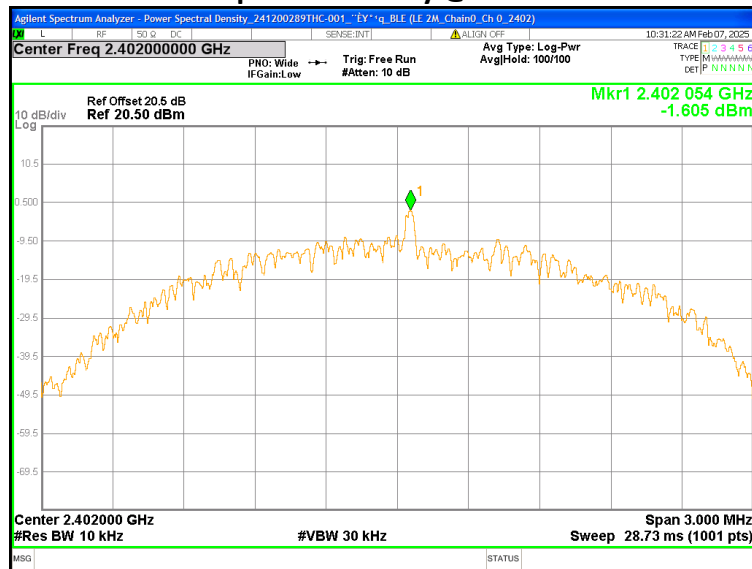
Power Spectral Density @ BLE 1M Ch 19



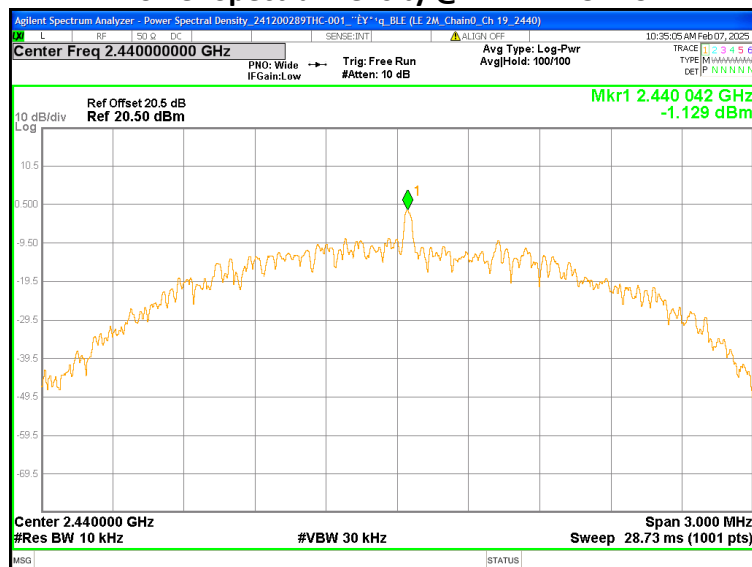
Power Spectral Density @ BLE 1M Ch 39



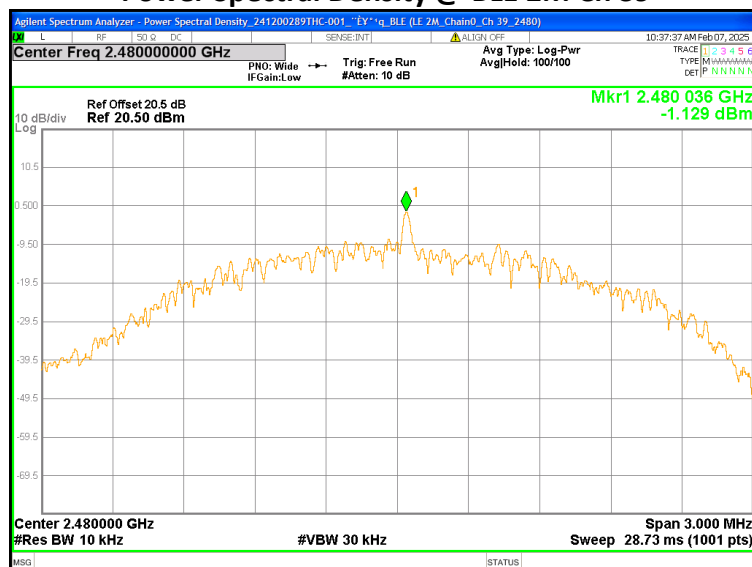
Power Spectral Density @ BLE 2M Ch 0



Power Spectral Density @ BLE 2M Ch 19



Power Spectral Density @ BLE 2M Ch 39



5. Emissions in Non-Restricted Frequency Bands

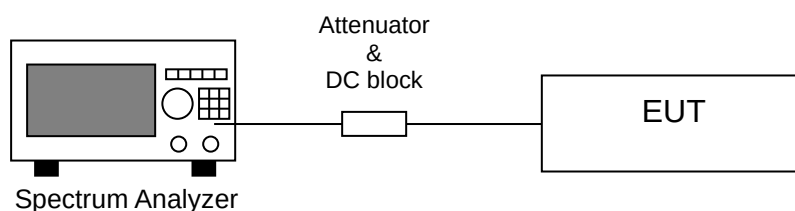
5.1 Instruments Setting

Spectrum Function	Setting (Reference Level)	Setting (Emission Level)
Detector	Peak	Peak
RBW	≥ 100 kHz	≥ 100 kHz
VBW	$\geq 3 \times$ RBW	$\geq 3 \times$ RBW
Sweep	Auto couple	Auto couple
Trace	Max hold	Max hold
Span	≥ 1.5 time 6dB bandwidth	
Attenuation	Auto	Auto

5.2 Test Procedure

- Step 1 The procedure was used in antenna-port conducted and connected to the spectrum analyzer.
- Step 2 Set instrument center frequency to center frequency.
- Step 3 Use the parameter configured in subclause 11.11 of ANSI C63.10 to measure.
- Step 4 Use the peak marker function to determine the maximum amplitude level.

5.3 Test Diagram



5.4 Limit

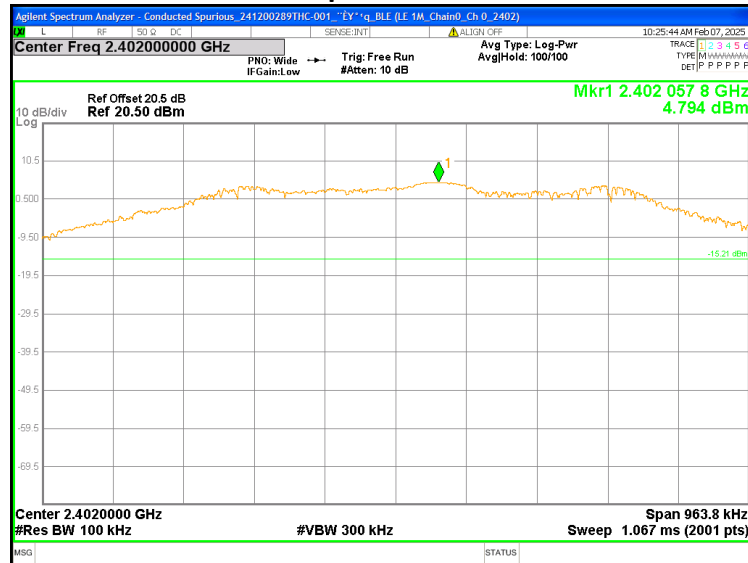
The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz

5.5 Test Results

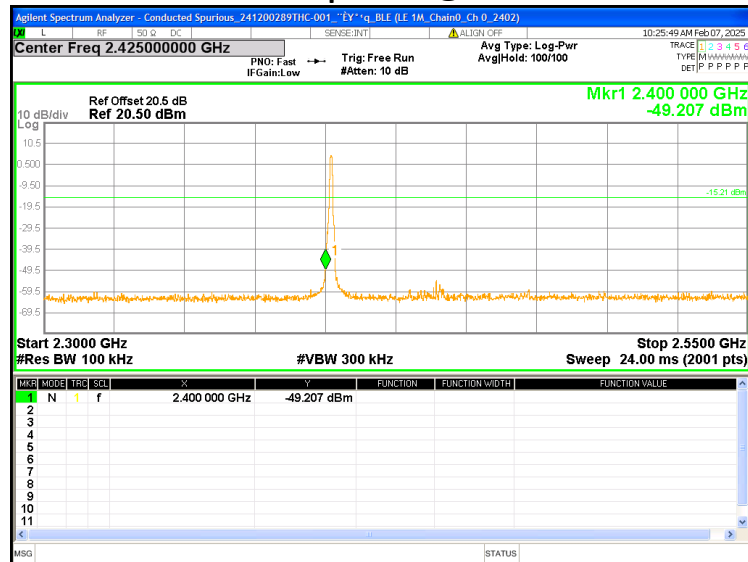
Temperature (°C) :	20
Relative Humidity (%) :	65
Test date :	2025/02/07

Mode	Channel	Frequency (MHz)	Delta (dBc)	Limit (dBc)
BLE 1M	0	2402	54.00	>20
	19	2440	55.47	>20
	39	2480	54.88	>20
BLE 2M	0	2402	32.35	>20
	19	2440	54.82	>20
	39	2480	54.97	>20

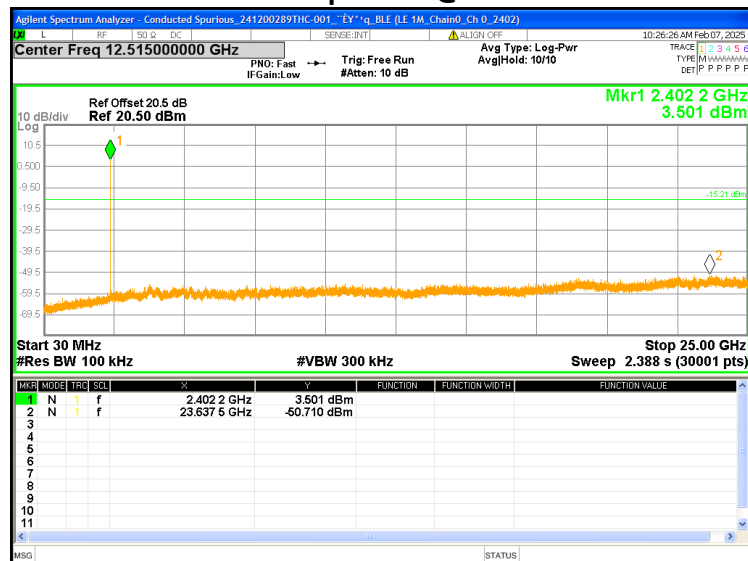
Chain0 : Conducted Spurious @ BLE 1M Mode Ch 0



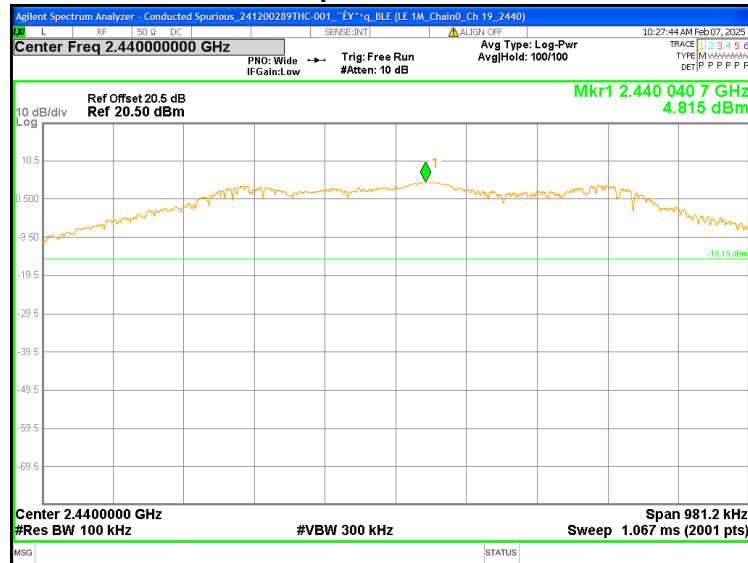
Chain0 : Conducted Spurious @ BLE 1M Mode Ch 0



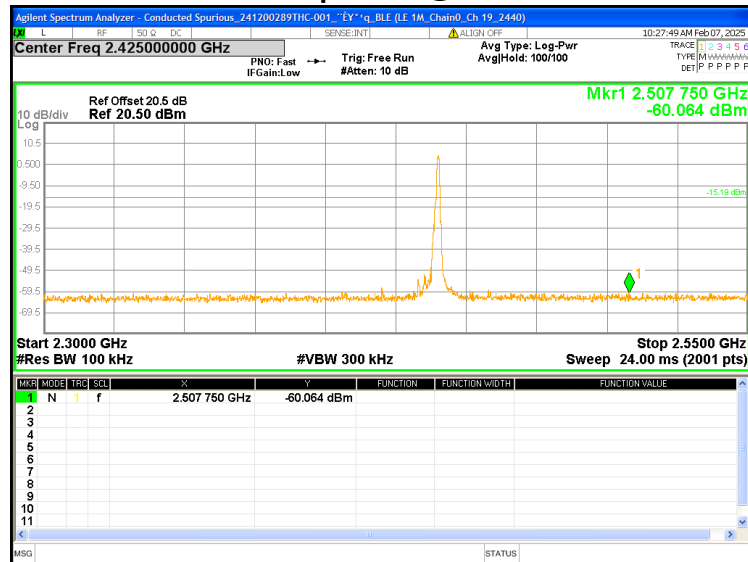
Chain0 : Conducted Spurious @ BLE 1M Mode Ch 0



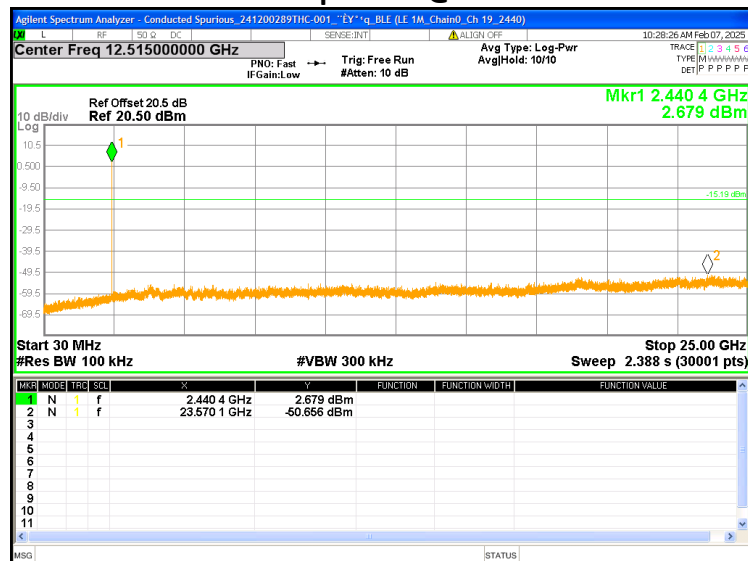
Chain0 : Conducted Spurious @ BLE 1M Mode Ch 19



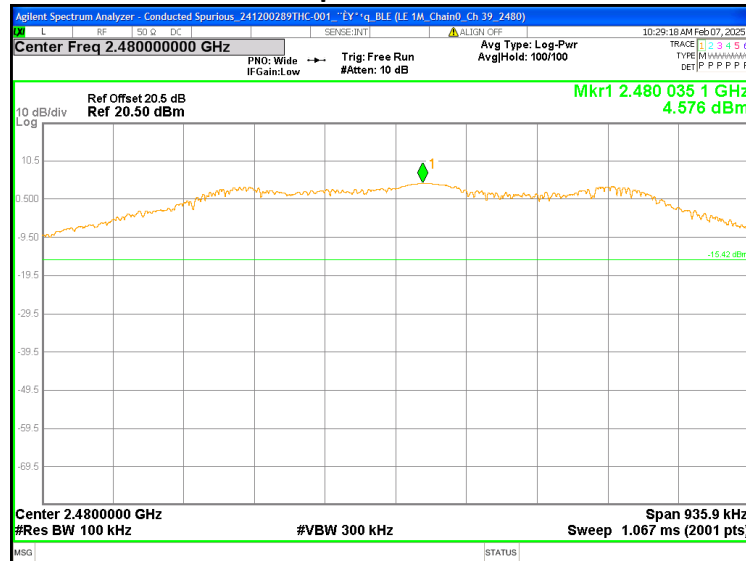
Chain0 : Conducted Spurious @ BLE 1M Mode Ch 19



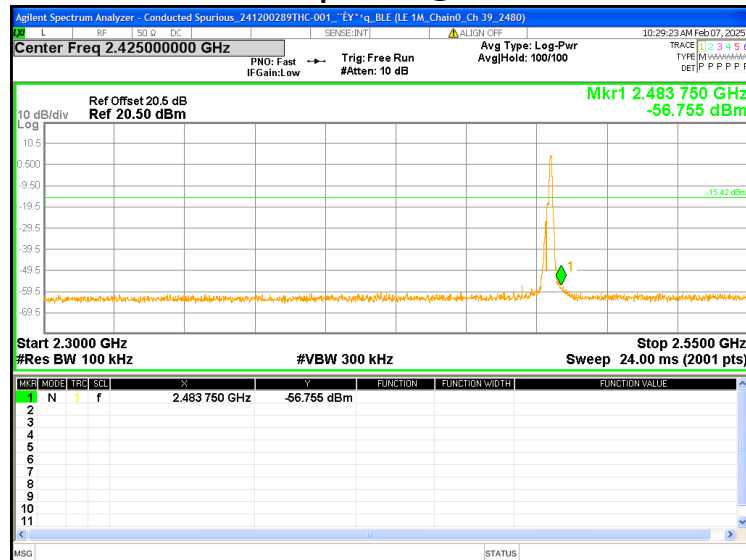
Chain0 : Conducted Spurious @ BLE 1M Mode Ch 19



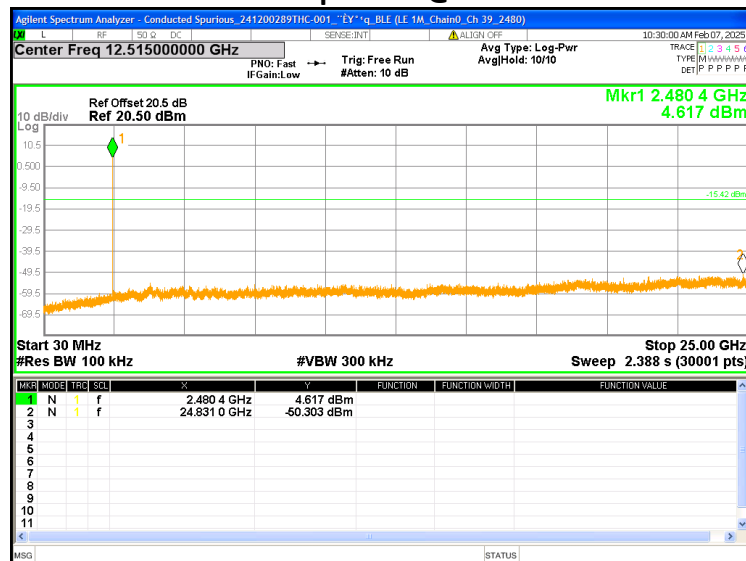
Chain0 : Conducted Spurious @ BLE 1M Mode Ch 39



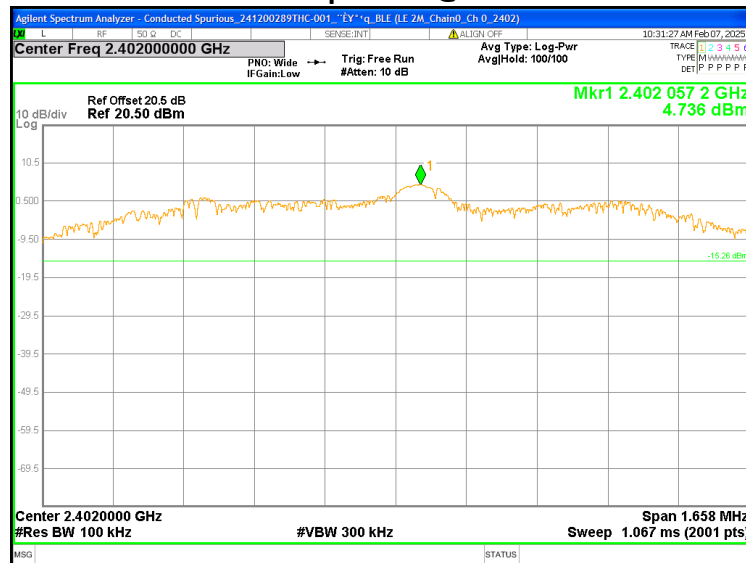
Chain0 : Conducted Spurious @ BLE 1M Mode Ch 39



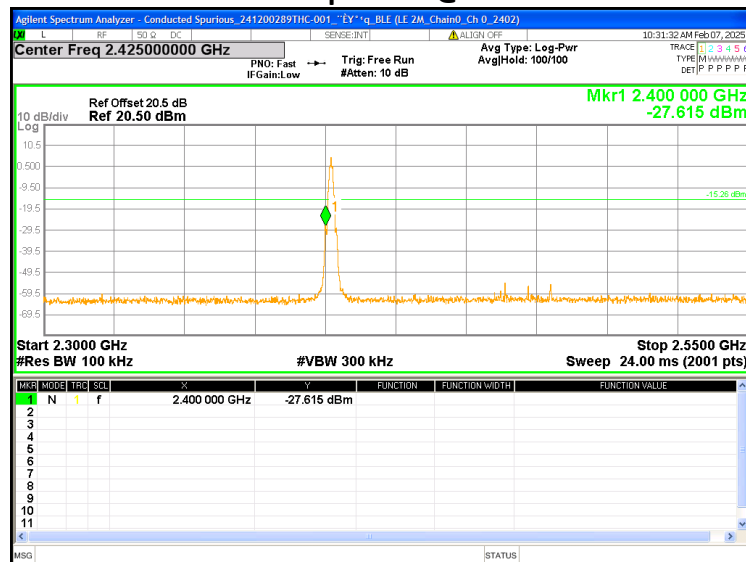
Chain0 : Conducted Spurious @ BLE 1M Mode Ch 39



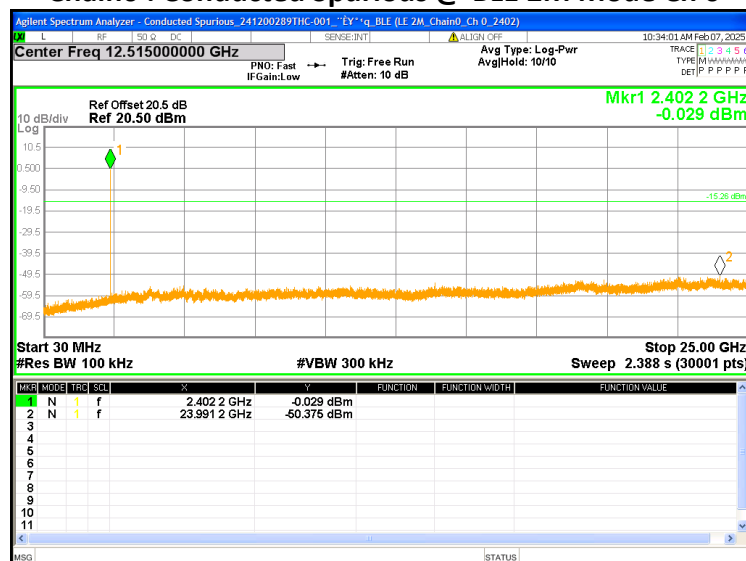
Chain0 : Conducted Spurious @ BLE 2M Mode Ch 0



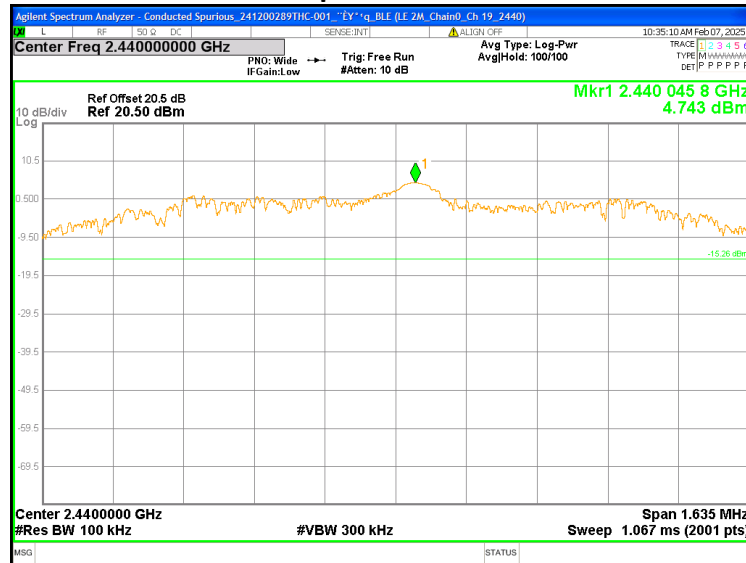
Chain0 : Conducted Spurious @ BLE 2M Mode Ch 0



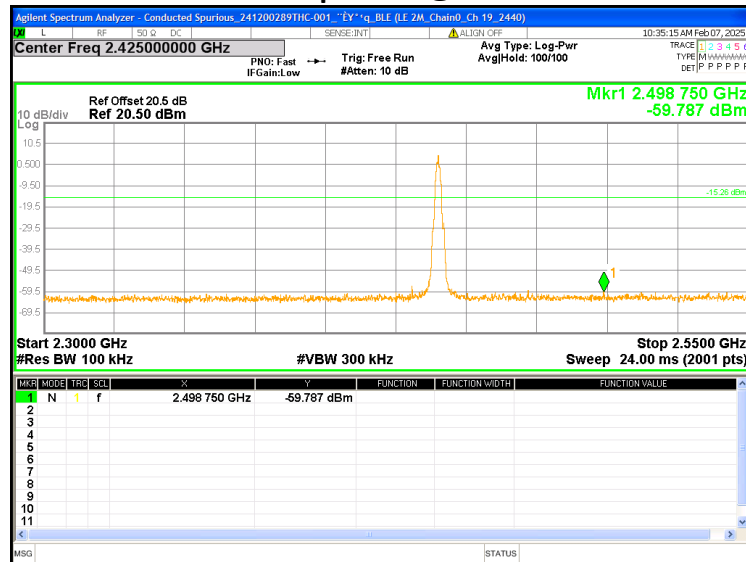
Chain0 : Conducted Spurious @ BLE 2M Mode Ch 0



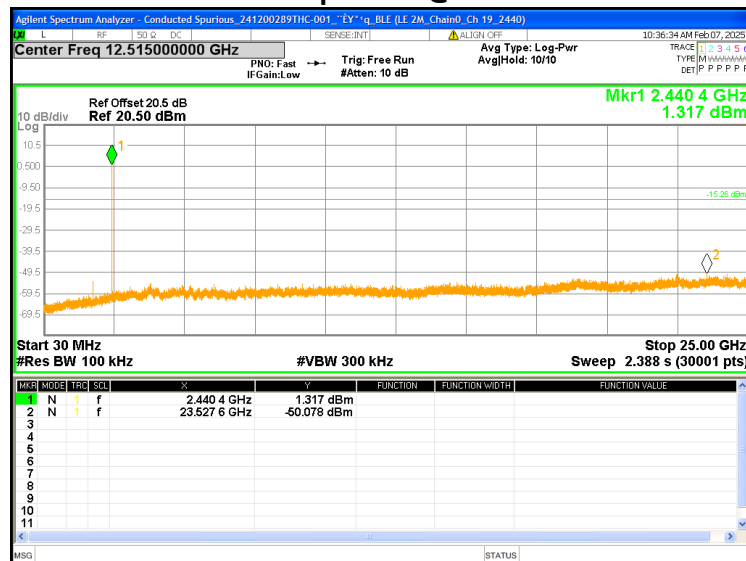
Chain0 : Conducted Spurious @ BLE 2M Mode Ch 19



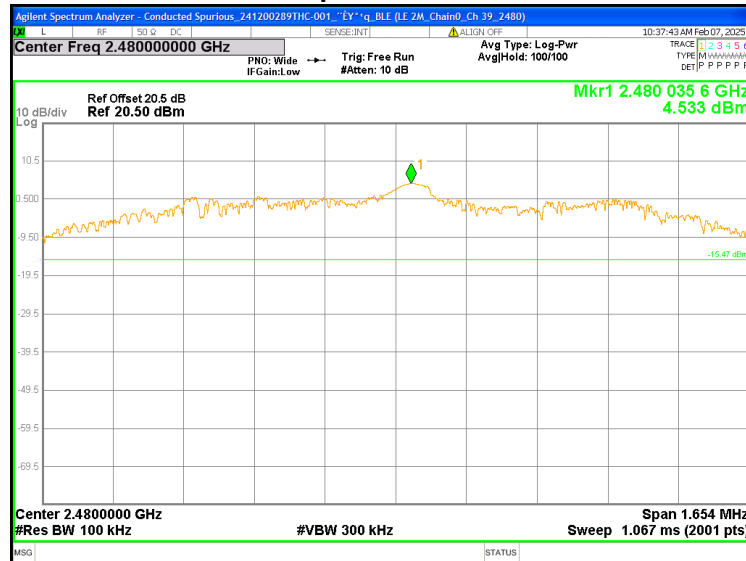
Chain0 : Conducted Spurious @ BLE 2M Mode Ch 19



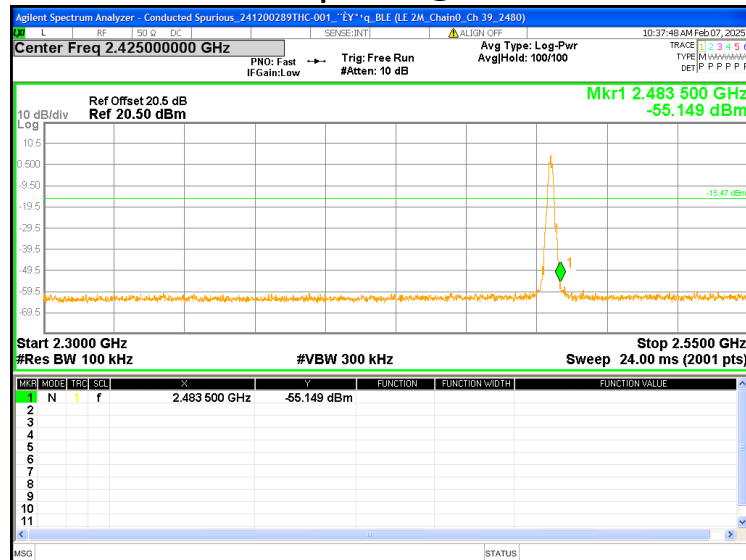
Chain0 : Conducted Spurious @ BLE 2M Mode Ch 19



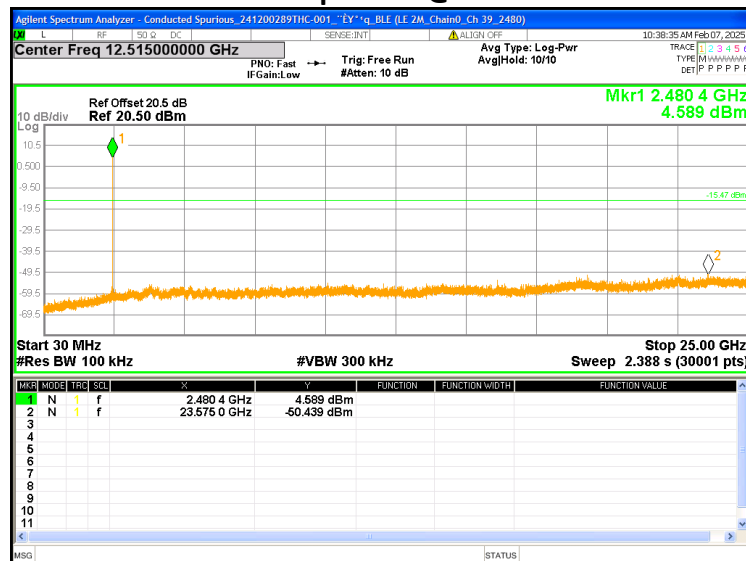
Chain0 : Conducted Spurious @ BLE 2M Mode Ch 39



Chain0 : Conducted Spurious @ BLE 2M Mode Ch 39



Chain0 : Conducted Spurious @ BLE 2M Mode Ch 39



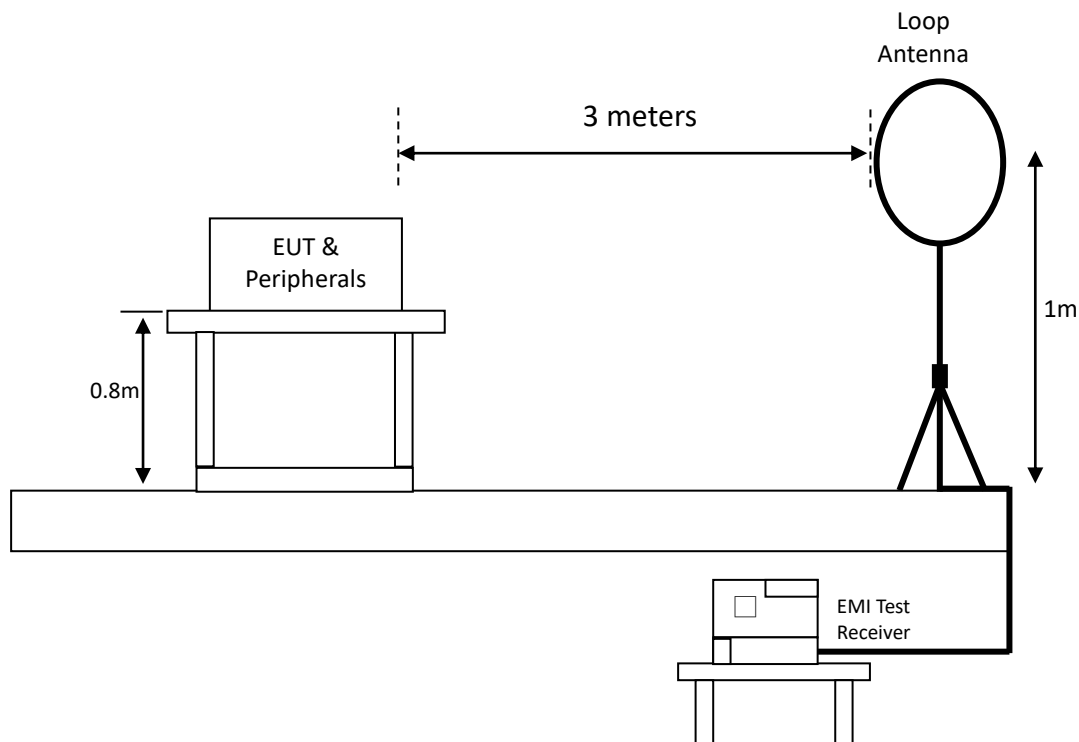
6. Emissions in Restricted Frequency Bands (Radiated emission measurements)

6.1 Instrument Setting

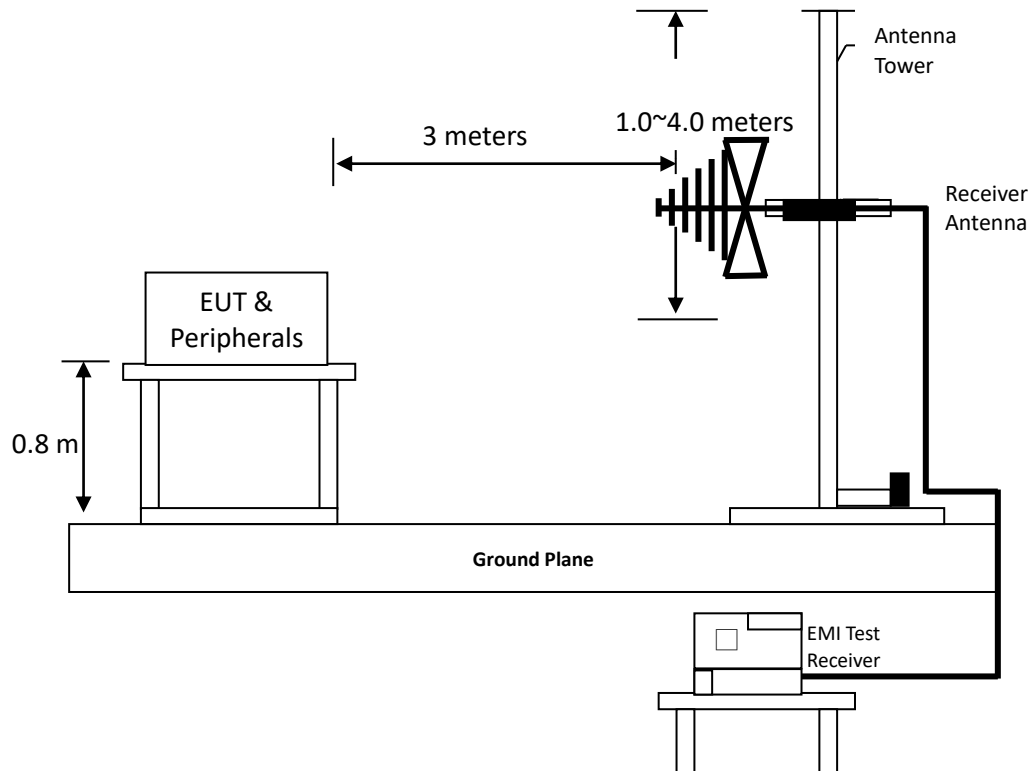
Receiver Function	Setting (Below 1GHz)	Setting (Above 1GHz)
Detector	QP	Peak and Average
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz	1MHz
VBW	$\geq 3 \times \text{RBW}$	3MHz & 1/T minimum kHz
Sweep	Auto couple	Auto couple
Start Frequency	9 kHz	1GHz
Stop Frequency	1 GHz	Tenth harmonic
Attenuation	Auto	Auto

6.2 Test setup & procedure

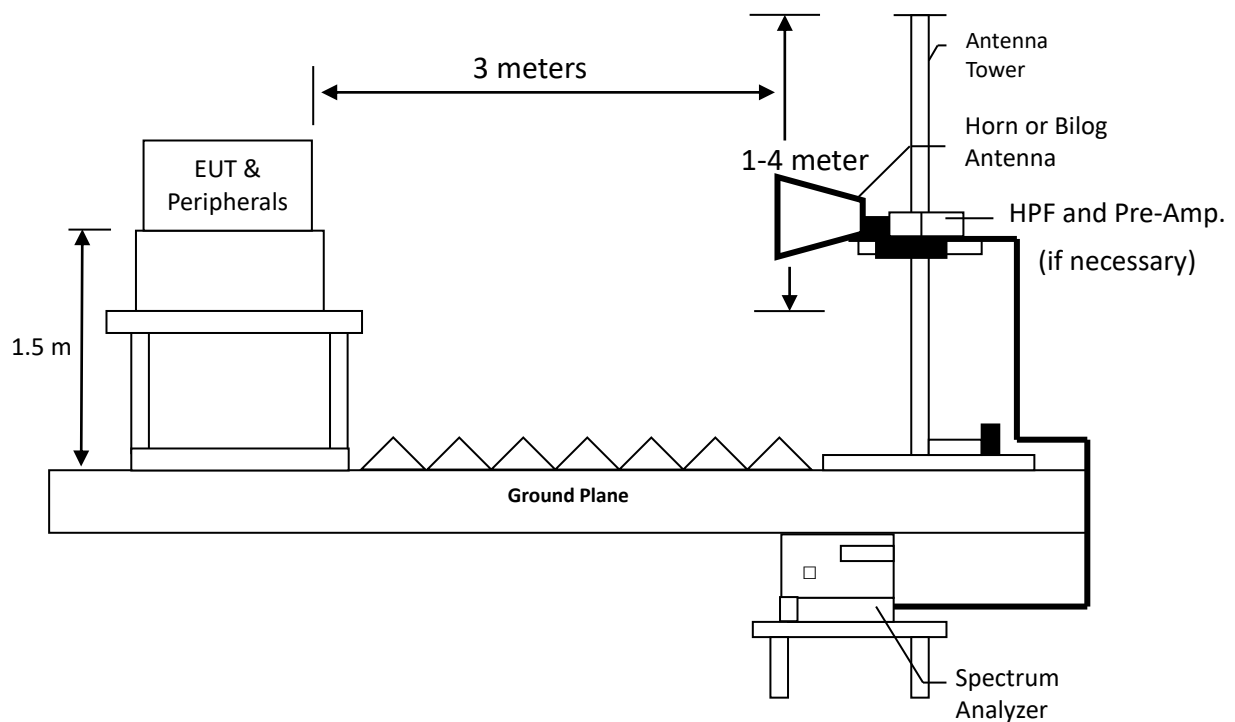
Radiated emission from 9kHz to 30MHz uses Loop Antenna:



Radiated emission below 1GHz using Bilog Antenna



Radiated emission above 1GHz using Horn Antenna



TEST REPORT

Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 1/T minimum kHz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report.

The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

6.3 Limit

Frequency(MHz)	Field Strength(uV/m)	Measurement distance(m)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

6.4 Test Result

6.4.1 Measurement results: frequencies 9kHz to 30MHz

Temperature (°C) :	21
Relative Humidity (%) :	48
Test date :	2025/02/05

The test was performed on EUT under continuously transmitting mode. The worst case occurred at BLE 2M Ch 0.

Antenna Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Perpendicular	0.04	PK	17.68	38.64	56.32	115.79	-59.47
Perpendicular	0.46	PK	17.32	35.89	53.21	94.37	-41.16
Perpendicular	0.61	PK	17.50	32.74	50.24	71.91	-21.67
Perpendicular	0.91	PK	17.59	30.58	48.17	68.44	-20.27
Perpendicular	1.18	PK	17.48	25.98	43.46	66.17	-22.71
Perpendicular	1.54	PK	17.45	20.59	38.04	63.86	-25.82

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Parallel	0.19	PK	16.94	25.40	42.34	102.08	-59.74
Parallel	0.46	PK	17.32	27.13	44.45	94.37	-49.92
Parallel	0.64	PK	17.50	26.17	43.67	71.50	-27.83
Parallel	0.70	PK	17.50	23.47	40.97	70.72	-29.75
Parallel	0.88	PK	17.60	21.69	39.29	68.73	-29.44
Parallel	1.00	PK	17.50	18.67	36.17	67.62	-31.45

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Ground-parallel	0.07	PK	17.01	34.17	51.18	110.83	-59.65
Ground-parallel	0.19	PK	16.94	22.29	39.23	102.08	-62.85
Ground-parallel	0.43	PK	17.26	19.62	36.88	94.96	-58.08
Ground-parallel	0.52	PK	17.42	20.11	37.53	73.30	-35.77
Ground-parallel	0.58	PK	17.48	24.48	41.96	72.35	-30.39
Ground-parallel	0.70	PK	17.50	14.55	32.05	70.72	-38.67

Remark: Corr. Factor = Antenna Factor + Cable Loss

TEST REPORT

6.5.2 Measurement results: frequencies below 1 GHz

Temperature (°C) :	21
Relative Humidity (%) :	48
Test date :	2025/02/05

The test was performed on EUT under continuously transmitting mode. The worst case occurred at BLE 2M Ch 0.

Antenna Polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Horizontal	132.82	PK	19.04	14.27	33.31	43.50	-10.19
Horizontal	141.55	PK	20.12	8.56	28.68	43.50	-14.82
Horizontal	151.25	PK	20.67	11.01	31.68	43.50	-11.82
Horizontal	197.81	PK	18.02	8.13	26.15	43.50	-17.35
Horizontal	288.02	PK	21.41	7.71	29.12	46.00	-16.88
Horizontal	345.25	PK	22.76	5.93	28.69	46.00	-17.31

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Vertical	40.67	PK	19.68	16.61	36.29	40.00	-3.71
Vertical	101.78	PK	16.06	14.99	31.05	43.50	-12.45
Vertical	120.21	PK	17.87	13.55	31.42	43.50	-12.08
Vertical	141.55	PK	20.12	12.27	32.39	43.50	-11.11
Vertical	150.28	PK	20.66	11.00	31.66	43.50	-11.84
Vertical	345.25	PK	22.76	7.74	30.50	46.00	-15.50

Remark: Corr. Factor = Antenna Factor + Cable Loss

TEST REPORT

6.5.3 Measurement results: frequency above 1GHz to 25GHz

Temperature (°C) :	20
Relative Humidity (%) :	65
Test date :	2025/02/03

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
BLE 1M Ch 0	4804	PK	H	-6.03	56.18	50.15	74	-23.85
	7206	PK	H	2.98	55.61	58.59	74	-15.41
	7206	AV	H	2.98	50.10	53.08	54	-0.92
	3990	PK	V	-9.92	59.67	49.75	74	-24.25
	4260	PK	V	-8.74	59.34	50.60	74	-23.40
	4804	PK	V	-6.03	56.26	50.23	74	-23.77
	7206	PK	V	2.98	51.10	54.08	74	-19.92
	7206	AV	V	2.98	42.00	44.98	54	-9.02
BLE 1M Ch 19	4880	PK	H	-6.04	57.56	51.52	74	-22.48
	7320	PK	H	2.82	55.37	58.19	74	-15.81
	7320	AV	H	2.82	50.20	53.02	54	-0.98
	3990	PK	V	-9.92	58.94	49.02	74	-24.98
	4260	PK	V	-8.74	60.02	51.28	74	-22.72
	4880	PK	V	-6.04	55.89	49.85	74	-24.15
	7320	PK	V	2.82	51.38	54.20	74	-19.80
	7320	AV	V	2.82	45.20	48.02	54	-5.98
BLE 1M Ch 39	4960	PK	H	-5.59	58.24	52.65	74	-21.35
	7440	PK	H	2.75	54.63	57.38	74	-16.62
	7440	AV	H	2.75	50.78	53.53	54	-0.47
	3990	PK	V	-9.92	58.77	48.85	74	-25.15
	4960	PK	V	-5.59	54.95	49.36	74	-24.64
	7440	PK	V	2.75	52.54	55.29	74	-18.71
	7440	AV	V	2.75	46.91	49.66	54	-4.34

Remark: 1. Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain
2. The emissions were very low against the limit above 18 GHz.

TEST REPORT

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
BLE 2M Ch 0	4804	PK	H	-6.03	55.82	49.79	74	-24.21
	7206	PK	H	2.98	55.69	58.67	74	-15.33
	7206	AV	H	2.98	50.20	53.18	54	-0.82
	7206	AV	V	2.98	42.00	44.98	54	-9.02
	3990	PK	V	-9.92	59.71	49.79	74	-24.21
	4260	PK	V	-8.74	60.43	51.69	74	-22.31
	4804	PK	V	-6.03	54.91	48.88	74	-25.12
	7206	PK	V	2.98	52.03	55.01	74	-18.99
	7206	AV	V	2.98	45.93	48.91	54	-5.09
BLE 2M Ch 19	4880	PK	H	-6.04	57.85	51.81	74	-22.19
	7320	PK	H	2.82	54.97	57.79	74	-16.21
	7320	AV	H	2.82	50.38	53.20	54	-0.80
	3990	PK	V	-9.92	59.17	49.25	74	-24.75
	4260	PK	V	-8.74	60.21	51.47	74	-22.53
	4880	PK	V	-6.04	56.40	50.36	74	-23.64
	7320	PK	V	2.82	51.88	54.70	74	-19.30
	7320	AV	V	2.82	45.18	48.00	54	-6.00
BLE 2M Ch 39	4960	PK	H	-5.59	57.89	52.30	74	-21.70
	7440	PK	H	2.75	54.52	57.27	74	-16.73
	7440	AV	H	2.75	49.50	52.25	54	-1.75
	4260	PK	V	-8.74	61.70	52.96	74	-21.04
	4960	PK	V	-5.59	55.60	50.01	74	-23.99
	7440	PK	V	2.75	51.05	53.80	74	-20.20
	7440	AV	V	2.75	47.18	49.93	54	-4.07

Remark: 1. Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain
2. The emissions were very low against the limit above 18 GHz.

7. Emission on Band Edge

7.1 Instrument Setting

Spectrum Function	Setting
Detector	Peak and Average
RBW	1MHz
VBW	3MHz & 1/T minimum kHz
Sweep	Auto couple
Restrict bands	2310 MHz ~ 2390 MHz 2483.5 MHz ~ 2500 MHz
Attenuation	Auto

7.2 Test Procedure

The test procedure is the same as Emissions in Restricted Frequency Bands (Radiated emission measurements).

TEST REPORT

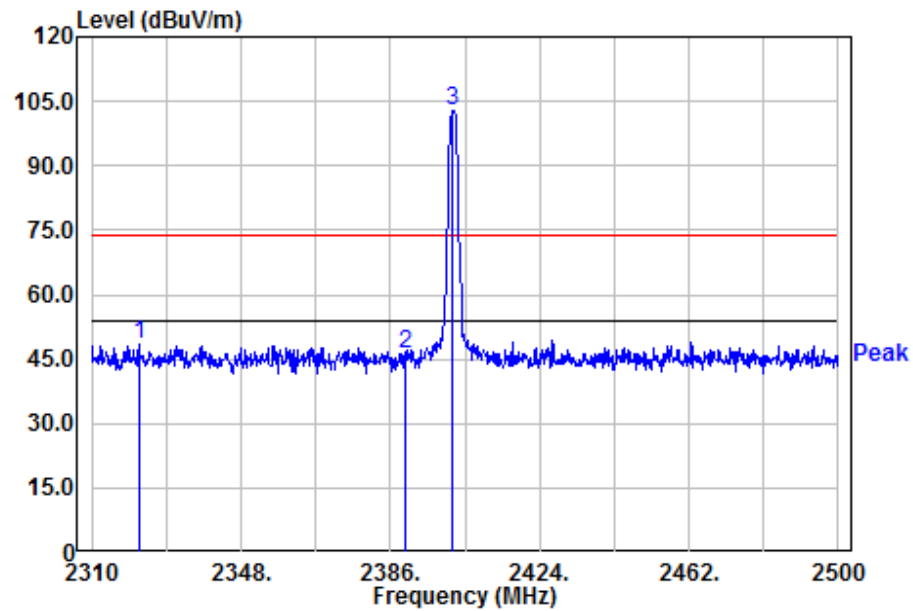
7.2 Test Results

Temperature (°C) :	20
Relative Humidity (%) :	65
Test date :	2025/02/03

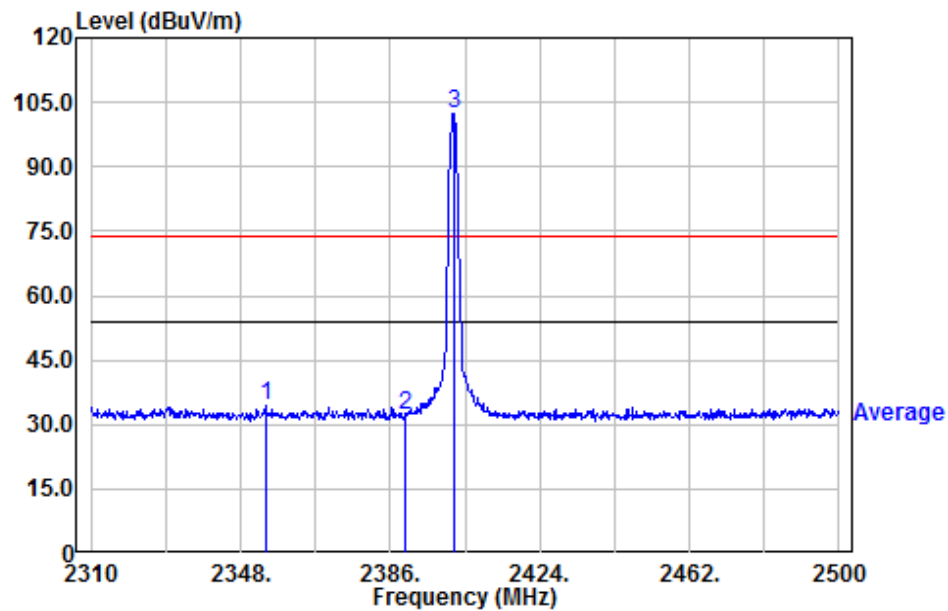
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
BLE 1M	2322.16	PK	H	34.73	13.65	48.38	74	-25.62	2310~2390
	2354.27	AV	H	34.37	0.09	34.46	54	-19.54	
	2483.50	PK	H	34.53	14.26	48.79	74	-25.21	2483.5~2500
	2484.04	AV	H	34.53	3.98	38.51	54	-15.49	
BLE 2M	2344.96	PK	H	34.44	15.11	49.55	74	-24.45	2310~2390
	2321.59	AV	H	34.74	0.30	35.04	54	-18.96	
	2483.50	PK	H	34.53	14.24	48.77	74	-25.23	2483.5~2500
	2483.50	AV	H	34.53	7.73	42.26	54	-11.74	

Remark: Correction Factor = Antenna Factor + Cable Loss

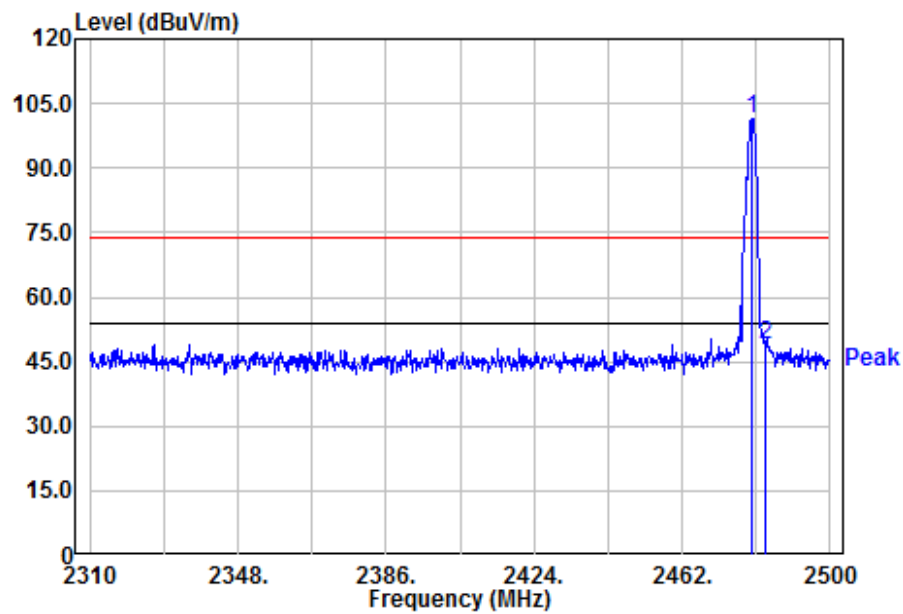
Restricted Band Bandedge @ BLE 1M Mode Ch0 PK



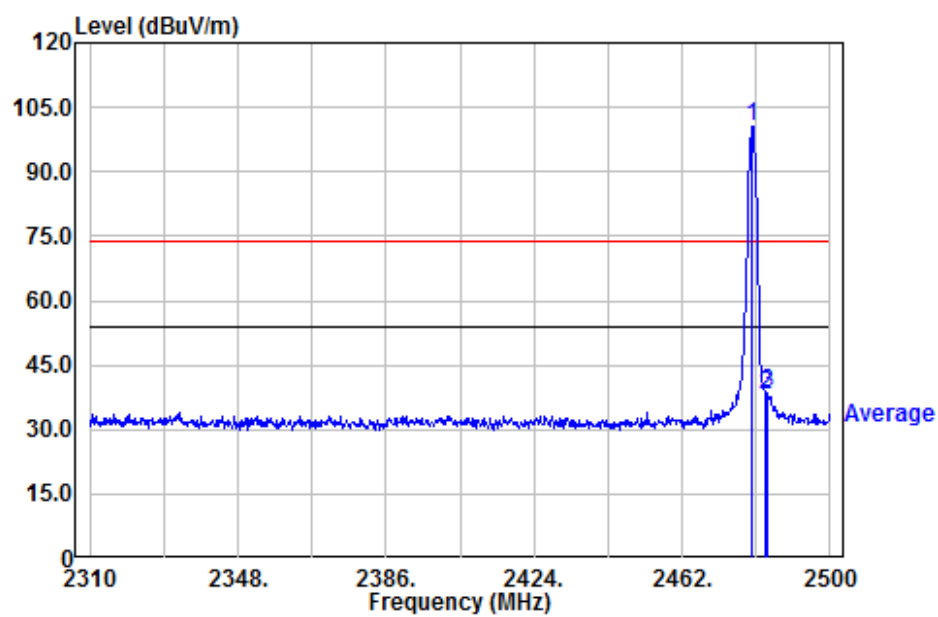
Restricted Band Bandedge @ BLE 1M Mode Ch0 AV



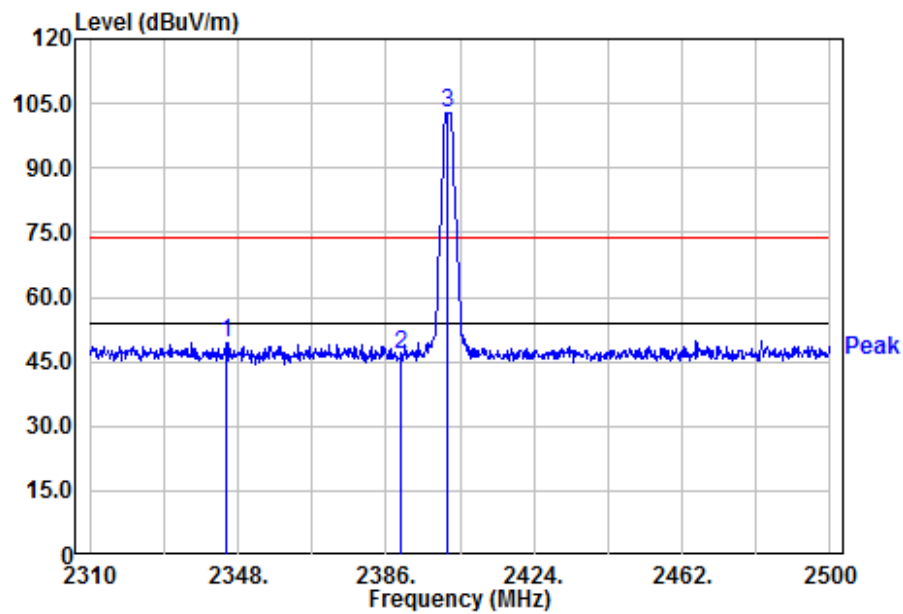
Restricted Band Bandedge @ BLE 1M Mode Ch39 PK



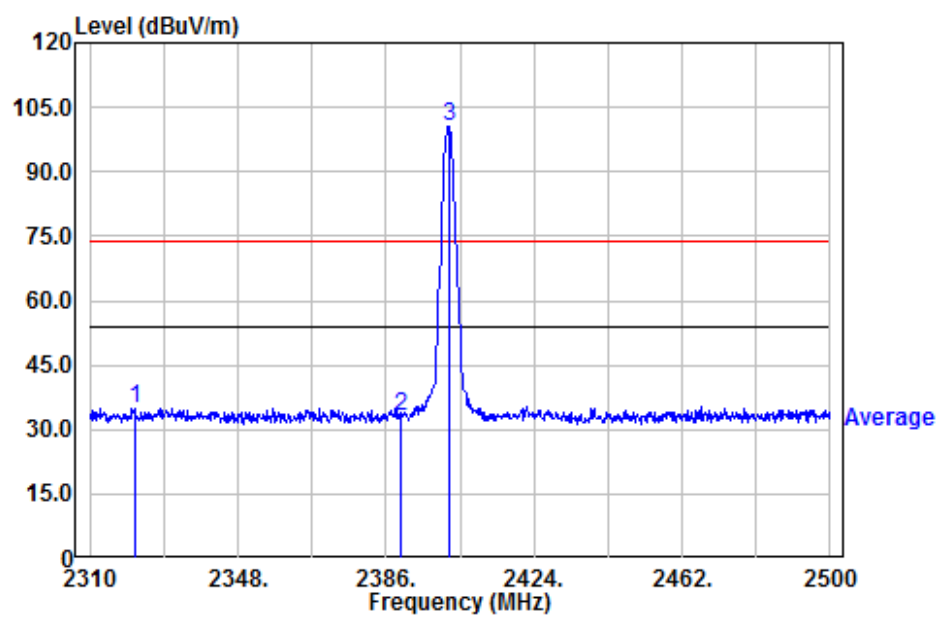
Restricted Band Bandedge @ BLE 1M Mode Ch39 AV



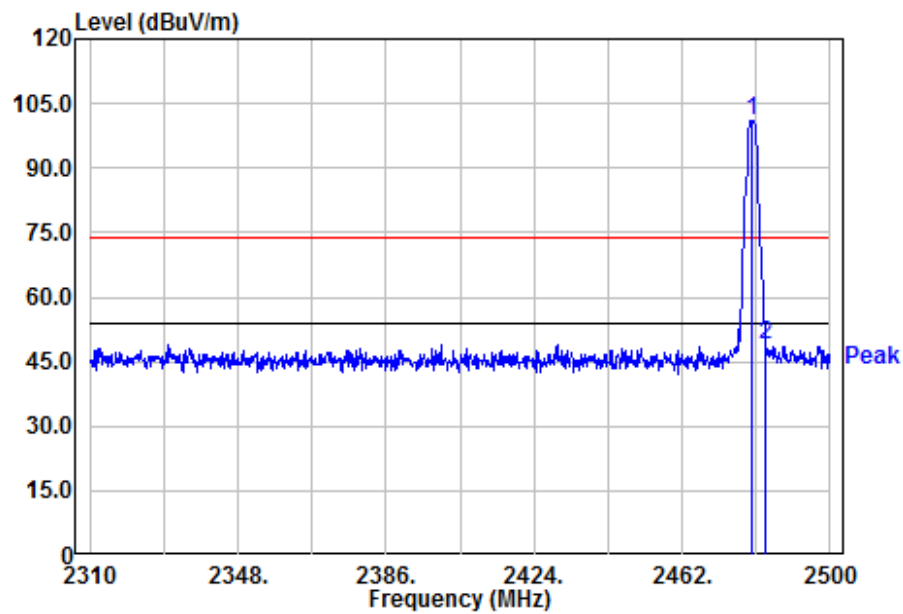
Restricted Band Bandedge @ BLE 2M Mode Ch0 PK



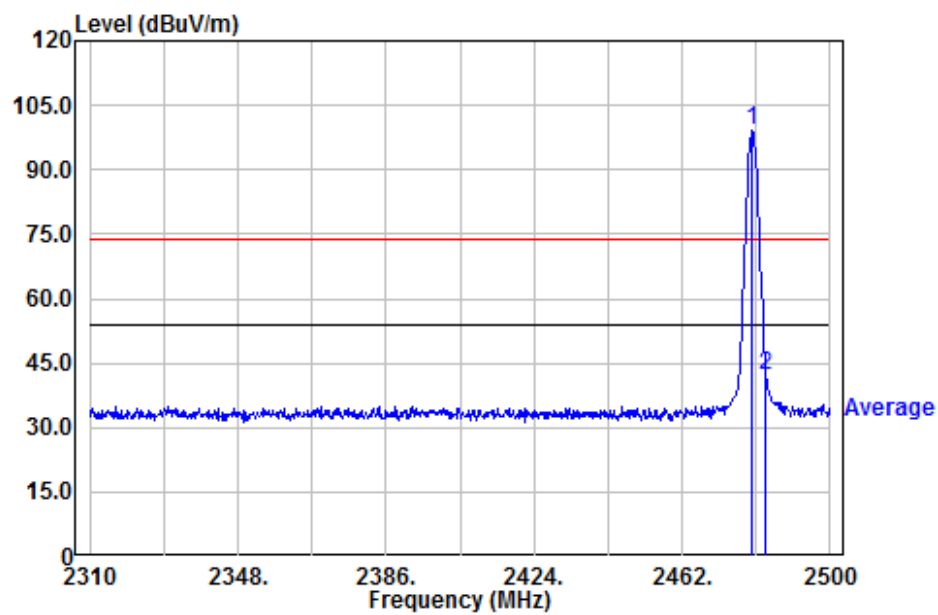
Restricted Band Bandedge @ BLE 2M Mode Ch0 AV



Restricted Band Bandedge @ BLE 2M Mode Ch39 PK



Restricted Band Bandedge @ BLE 2M Mode Ch39 AV



8. AC Power Line Conducted Emission

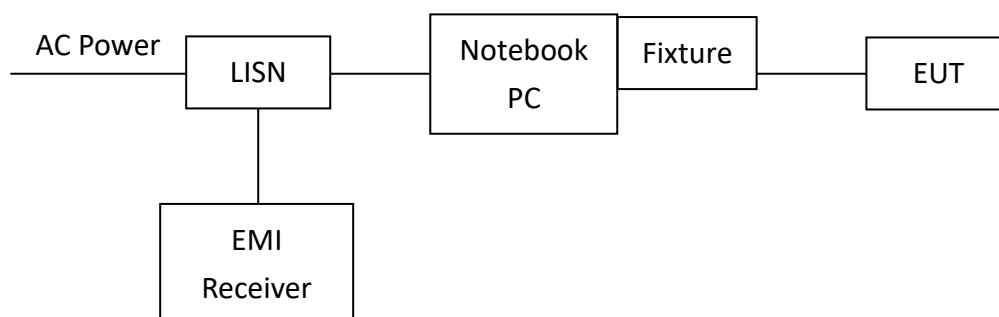
8.1 Measuring instrument setting

Receiver Function	Setting
Detector	QP
Start frequency	0.15MHz
Stop frequency	30MHz
IF bandwidth	9 kHz
Attenuation	10dB

8.2 Test Procedure

Step 1	Configure the EUT according to ANSI C63.10:2013. The EUT or host of EHT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
Step 2	Connect EUT or host of EUT to the power mains through a line impedance stabilization network.
Step 3	All the companion devices are connected to the other LISN. The LISN should provide 50Uh/50ohms coupling impedance.
Step 4	The frequency range from 150 kHz to 30MHz was searched.
Step 5	Set the test-receiver system to peak detector and specified bandwidth with maximum hold mode.
Step 6	The measurement has to be done between each power line and ground at the power terminal.

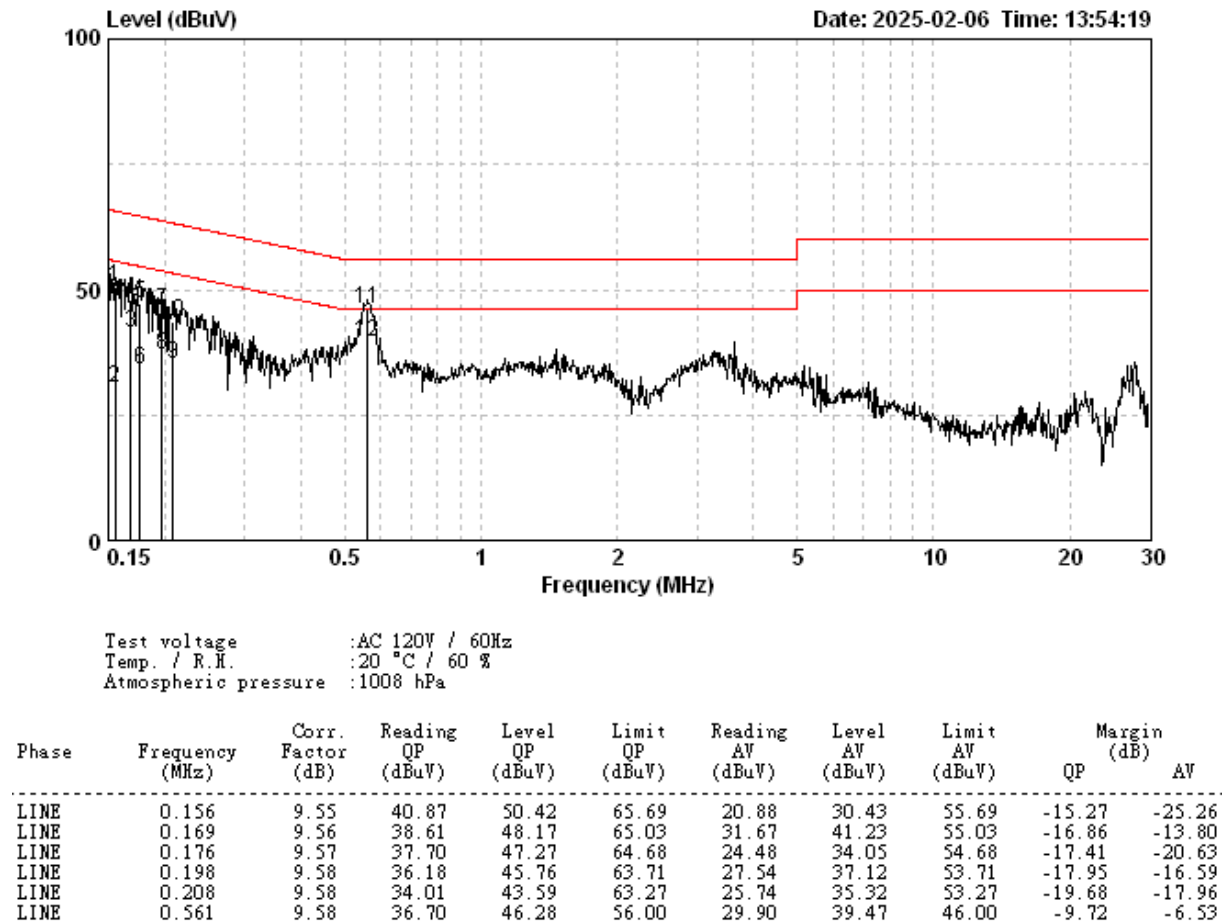
8.3 Test Diagram



8.4 Limit

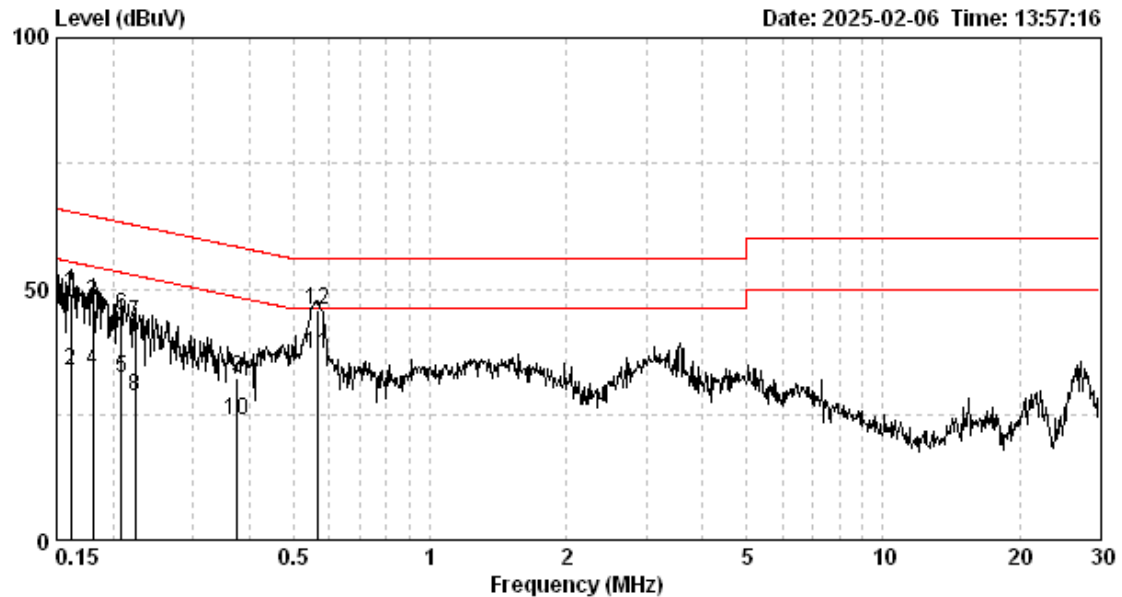
Frequency (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56	56 – 46
0.50~5.00	56	46
5.00~30.0	60	50

8.5 Test Results



Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)



Test voltage : AC 120V / 60Hz
 Temp. / R.H. : 20 °C / 60 %
 Atmospheric pressure : 1008 hPa

Phase	Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB)	
									QP	AV
NEUTRAL	0.162	9.57	39.43	49.01	65.38	24.14	33.71	55.38	-16.38	-21.68
NEUTRAL	0.181	9.58	37.68	47.26	64.46	24.17	33.74	54.46	-17.20	-20.71
NEUTRAL	0.208	9.58	35.22	44.80	63.27	22.61	32.19	53.27	-18.47	-21.08
NEUTRAL	0.223	9.58	33.59	43.17	62.70	19.15	28.73	52.70	-19.53	-23.97
NEUTRAL	0.376	9.59	22.69	32.28	58.37	14.27	23.86	48.37	-26.10	-24.51
NEUTRAL	0.567	9.59	36.26	45.85	56.00	27.47	37.07	46.00	-10.15	-8.93

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)

Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Spectrum Analyzer	R&S	FSP30	100245	2025/01/14	2026/01/13
Signal Analyzer	Agilent	N9030A	MY51380492	2024/07/09	2025/07/08
Signal Analyzer	R&S	FSV40	101532	2024/07/12	2025/07/11
Bi_log Hybrid Antenna	ETC	MCTD 2786B	BLB17J04019 & JB-5-019	2024/07/17	2025/07/16
Horn Antenna	EMCO	3115	00040729	2024/05/15	2025/05/14
Pre-Amplifier	SGH	SGH0301(40dB)	20230109-1	2024/12/18	2025/12/17
Pre-Amplifier	SGH	SGH118(45dB)	20220105-1	2025/01/14	2026/01/13
Cable	SUHNER	SUCOFLEX 104	295105/4	2024/03/02	2025/03/02
Cable	SUHNER	SUCOFLEX 104P	CB0005	2024/06/14	2025/06/13
Hight Pass Filter	Reactel	7HS-3G/18G-S11	N/A	2024/05/23	2025/05/23
Power Meter	Anritsu	ML2495A	0844001	2024/12/07	2025/12/06
Power Sensor	Anritsu	MA2491A	031543	2024/12/07	2025/12/06
20dB Attenuator	PE	PE7001-20	N/A	2024/05/23	2025/05/22
Signal Generator	R&S	SMB100A	115728	2024/07/09	2025/07/08
Wireless Connectivity Tester	R&S	CMW270	100996	2024/06/12	2025/06/11
Temperature&Hu midity Test Chamber	TERCHY	MHU-225LRU(SA)	950838	2024/06/28	2025/06/27
966-2_3m Semi-Anechoic Chamber	CHANCE MOST	CEM-966_2	N/A	2024/07/30	2025/07/29
Test software	Audix	e3	V9	NCR	NCR

Note: No Calibration Required (NCR).

Test Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	R&S	ESCI	100018	2024/07/23	2025/07/22
LISN	R&S	ENV216	101160	2024/06/26	2025/06/25
Cable	SUHNER	EMCCFD300-BM -NM-6000	170502	2024/06/25	2025/06/24
Test software	Audix	e3	V4.20040112L	NCR	NCR
Test site	Intertek	Con-2	N/A	NCR	NCR

Note: No Calibration Required (NCR).

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2.0$.

Item	Uncertainty
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	2.73 dB
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	3.91 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	3.49 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.71 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.71 dB
Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	3.26 dB
Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	3.26 dB
Conducted Measurement	0.69 dB
AC Power Line Conducted Emission	1.31 dB