TEST REPORT

Report No.	CISRR25121631902
Project No.	CISR251216319
FCC ID	2BTSW-T-HD
Applicant	Shenzhen Monokaro Technology Co., Ltd.
Address	Room 1527, South Tower, Resources-Tech-Building, No.1 Songpingshan Road.Hi-tech Industrial Park (North District), Nanshan District, Shenzhen
Manufacturer	Shenzhen Tiekecheng Electronics Co., Ltd.
Address	505, Sound Box Building, Jiuwei Pioneer Science and Technology Culture Industry Park, Jiuwei Community, Hangcheng Sub-district,ao'an District, Shenzhen City
Product Name	Electronic Display Badge
Trade mark	-
Model/Type reference	T-HD
Listed Model(s)	A-HD、B-HD、U-BG、C-HD、D-HD、E-HD、F-HD、G-HD、I-HD、K-HD、O-HD、P-HD、Q-HD、R-HD、S-HD、M-HD、N-HD、X-HD 、Z-HD、Y-HD
Standard	47 CFR Part 15.247
Date of sample receipt	December 17, 2025
Test date	December 18, 2025 to December 22, 2025
Issue date	December 24, 2025
Test result	**Complied**

Lucas Huang

Reviewed by: Lucas Huang

Hans Hu

Approved by: Hans Hu

The test results relate only to the tested samples.

The test report should not be reproduced except in full without the written approval of Shenzhen Bangce Testing Technology Co., Ltd.

Contents

1. STANDARD AND APPLICABLE TEST METHODS 3

2. REPORT VERSION 3

3. TEST DESCRIPTION 4

4. SUMMARY 5

4.1. Product Description * 5
4.2. Radio Specification Description * 5
4.3. Modification of EUT 6
4.4. Deviation from standards 6
4.5. Testing Site 6

5. TEST CONFIGURATION 7

5.1. Test frequency list 7
5.2. Descriptions of test mode 7
5.3. Test sample information 7
5.4. Environmental conditions 7
5.5. Statement of the measurement uncertainty 7
5.6. Equipment Used during the Test 8

6. TEST RESULTS 10

6.1. Evaluation Results (Evaluation) 10
6.1.1. Antenna Requirement 10
6.2. Radio Spectrum Matter Test Results (RF) 11
6.2.1. Conducted Emission at AC power line 11
6.2.2. 6dB Bandwidth 14
6.2.3. Maximum Conducted Output Power 15
6.2.4. Power Spectral Density 16
6.2.5. Conducted band edge and spurious emission 17
6.2.6. Radiated band edge emission 18
6.2.7. Radiated Spurious Emission (below 1GHz) 24
6.2.8. Radiated Spurious Emission (Above 1GHz) 28

7. APPENDIX REPORT 36

7.1. Conducted Output Power 36
7.2. 6dB Bandwidth 38
7.3. Power Spectral Density 39
7.4. Duty Cycle 41
7.5. Conducted Spurious & Band Edge Emission 42

1. STANDARD AND APPLICABLE TEST METHODS

The tests were performed according to following standards:

47 CFR Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

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

2. REPORT VERSION

Version No.	Issue date	Description
00	December 24, 2025	Original

3. TEST DESCRIPTION

No.	Test Item	Standard Requirement	Result
1	Antenna Requirement	47 CFR 15.203	Pass
2	Conducted Emission at AC power line	47 CFR 15.207(a)	Pass
3	6dB Bandwidth	47 CFR 15.247(a)(2)	Pass
4	Maximum Conducted Output Power	47 CFR 15.247(b)(3)	Pass
5	Power Spectral Density	47 CFR 15.247(e)	Pass
6	Conducted band edge and spurious emission	47 CFR 15.247(d)	Pass
7	Radiated band edge emission	47 CFR 15.247(d), 15.209, 15.205	Pass
8	Radiated Spurious Emission (below 1GHz)	47 CFR 15.247(d), 15.209, 15.205	Pass
9	Radiated Spurious Emission (Above 1GHz)	47 CFR 15.247(d), 15.209, 15.205	Pass

Note:

– The measurement uncertainty is not included in the test result.

4. SUMMARY

4.1. Product Description *

Main unit information:	
Product Name:	Electronic Display Badge
Trade mark:	-
Model No.:	T-HD
Listed Model(s):	A-HD、B-HD、U-BG、C-HD、D-HD、E-HD、F-HD、G-HD、I-HD、K-HD、O-HD、P-HD、Q-HD、R-HD、S-HD、M-HD、N-HD、X-HD 、Z-HD、Y-HD
Model difference:	sales model naming difference
Power supply:	DC 5V
Hardware version:	-
Software version:	-
Accessory unit (AU) information:	
Battery information:	DC 3.7V

4.2. Radio Specification Description *

Modulation type:	GFSK
Operation frequency:	2402MHz to 2480MHz
Channel number:	40
Channel separation:	2MHz
Antenna type:	PCB antenna
Antenna gain:	-7.13dBi

Note:

1) *: As the above information is provided by the applicant, all relevant results and conclusions of this report are based solely on such information. Bangce lab shall not be liable for the authenticity, integrity, and resulting outcomes of the information, and/or the validity of the conclusions herein.
2) Operation frequency list as follow:

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

4.3. Modification of EUT

No modifications are made to the EUT during all test items.

4.4. Deviation from standards

None

4.5. Testing Site

Laboratory Name	Shenzhen Bangce Testing Technology Co., Ltd.
Laboratory Location	101, building 10, Yunli Intelligent Park, Shutianpu community, Matian Street, Guangming District, Shenzhen，Guangdong, China
Contact information	Tel: 86-755-2319 6848, email: service@cis-cn.net Website: http://www.cis-cn.net/
FCC registration number	736346
FCC designation number	CN1372

5. TEST CONFIGURATION

5.1. Test frequency list

Lowest Channel (LCH) (MHz)	Middle Channel (MCH) (MHz)	Highest Channel (HCH) (MHz)
2402	2440	2480

5.2. Descriptions of test mode

No	Test mode	Description
TM1	TX mode	Keep the EUT in continuously transmitting mode with GFSK modulation at lowest, middle and highest channel.
TM2	Link mode	Keep the EUT in Bluetooth linking mode with AE.
TM3	Charging mode	Keep the EUT in charging mode status

5.3. Test sample information

Type	Sample No.
Engineer sample	CISR251216319-S01
Normal sample	CISR251216319-S02

5.4. Environmental conditions

Type	Requirement
Temperature:	15~35°C
Relative Humidity:	25~75%
Air Pressure:	860~1060mbar

5.5. Statement of the measurement uncertainty

No.	Test Items	Measurement Uncertainty
1	Conducted Emission at AC power line (150kHz ~ 30MHz)	3.52dB
2	Bandwidth	0.19%
3	Conducted output power	1.38dB
4	Power spectral density	1.39dB
5	Conducted spurious emission	1.40dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

5.6. Equipment Used during the Test

Conducted Emission at AC power line

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	8*4*3 Shielding room	SKET	8m*4m*3 m	CIS-EE012	2024-09-02	2027-09-01
2	EMI Test Receiver	ROHDE&SCHWARZ	ESPI7	CIS-EE043	2025-01-08	2026-01-07
3	LISN	SCHWARZBECK	NSLK 8127	CIS-EE044	2025-01-08	2026-01-07
4	LISN-AE	ETS	3810/2NM	CIS-EE075	2025-01-08	2026-01-07
5	RF Cable	SKET	-	CIS-EE071	2025-01-08	2026-01-07
6	Power Strip	BULL	GNIN-413	CIS-EE087	2025-01-08	2026-01-07
7	Test software	FARAD	EZ-CON	CIS-EE095	/	/
8	Thermohygrometer	DeLi	8866	CIS-EE069	2025-01-11	2026-01-10

6dB Bandwidth
Maximum Conducted Output Power
Power Spectral Density
Emissions in non-restricted frequency bands

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	Spectrum analyzer	ROHDE&SCHWARZ	FSV-40N	CIS-EE076	2025-01-08	2026-01-07
2	Notch Filter Assembly	WCS	SMU-1003	CIS-EE093	2025-01-08	2026-01-07
3	Vector Signal Generator	Agilent	N5182A	CIS-RE012	2025-01-08	2026-01-07
4	Analog Signal Generator	Agilent	N5181A	CIS-RE013	2025-01-08	2026-01-07
5	Test software	WCS	WCN-Regulatory	CIS-EE103	/	/

Band edge emissions (Radiated)
Emissions in frequency bands (below 1GHz)
Emissions in frequency bands (above 1GHz)

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	9*6*6 anechoic chamber	SKET	9.3*6.3*6	N/A	2024-09-02	2027-09-01
2	Spectrum analyzer	Agilent	N9020A	MY50530263	2025-01-08	2026-01-07
3	Spectrum analyzer	R&S	FSV-40N	102130	2025-01-08	2026-01-07
4	Bilog Antenna	Schwarzbeck	VULB 9163	1463	2023-01-09	2026-01-08

5	Horn Antenna	SCHWARZBECK	BBHA 9120 D	2487	2023-01-09	2026-01-08
6	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	2023-01-09	2026-01-08
7	RF Cable	Tonscend	Cable 1	/	2025-01-08	2026-01-07
8	RF Cable	Tonscend	Cable 2	/	2025-01-08	2026-01-07
9	RF Cable	SKET	Cable 3	/	2025-01-08	2026-01-07
10	L.I.S.N.#1	Schwarzbeck	NSLK812 7	/	2025-01-08	2026-01-07
11	L.I.S.N.#2	ROHDE&SCHWA RZ	ENV216	/	2025-01-08	2026-01-07
12	Horn Antenna	SCHWARZBECK	BBHA917 0	1130	2023-01-09	2026-01-08
13	Preamplifier	Tonscend	TAP1804 0048	AP21C806126	2025-01-08	2026-01-07
14	Variable-frequency power source	Pinhong	PH1110	/	2025-01-08	2026-01-07
15	6dB Attenuator	SKET	DC-6G	/	2025-01-08	2026-01-07
16	Antenna tower	SKT	Bk-4AT-BS	AT202104010 1-V1	2025-01-08	2026-01-07

6. TEST RESULTS

6.1. Evaluation Results (Evaluation)

6.1.1. Antenna Requirement

Test Requirement:	Refer to 47 CFR Part 15.203, 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.

6.1.1.1. Test Result

Pass

6.1.1.2. Conclusion:

The EUT antenna is PCB antenna. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.Antenna structure please refer to the EUT internal photographs antenna photo.

6.2. Radio Spectrum Matter Test Results (RF)

6.2.1. Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).
Test Limit:	

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

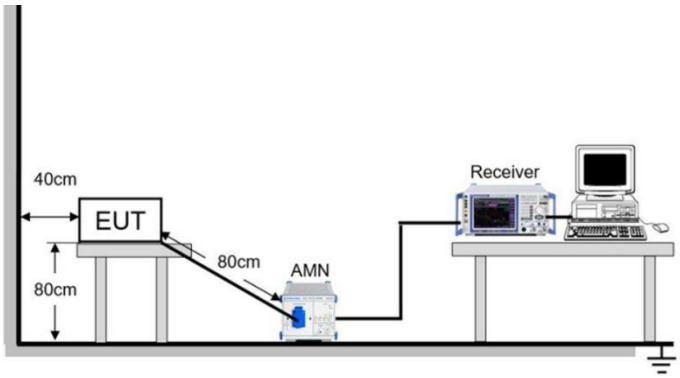
*Decreases with the logarithm of the frequency.

Test Method:	ANSI C63.10-2020 section 6.2
Procedure:	1>. The EUT was setup according to ANSI C63.10 requirements. 2>. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. 3>. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. 4>. The peripheral devices are also connected to the main power through a LISN. (Refer to the block diagram of the test setup and photographs) 5>. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. 6>. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. 7>. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz. 8>. During the above scans, the emissions were maximized by cable manipulation.

6.2.1.1. E.U.T. Operation

Operating Environment:					
Temperature:	22.7 °C	Humidity:	57 %	Atmospheric Pressure:	102.8 kPa
Pre test mode:	TM3				
Final test mode:	TM3				

6.2.1.2. Test Setup Diagram

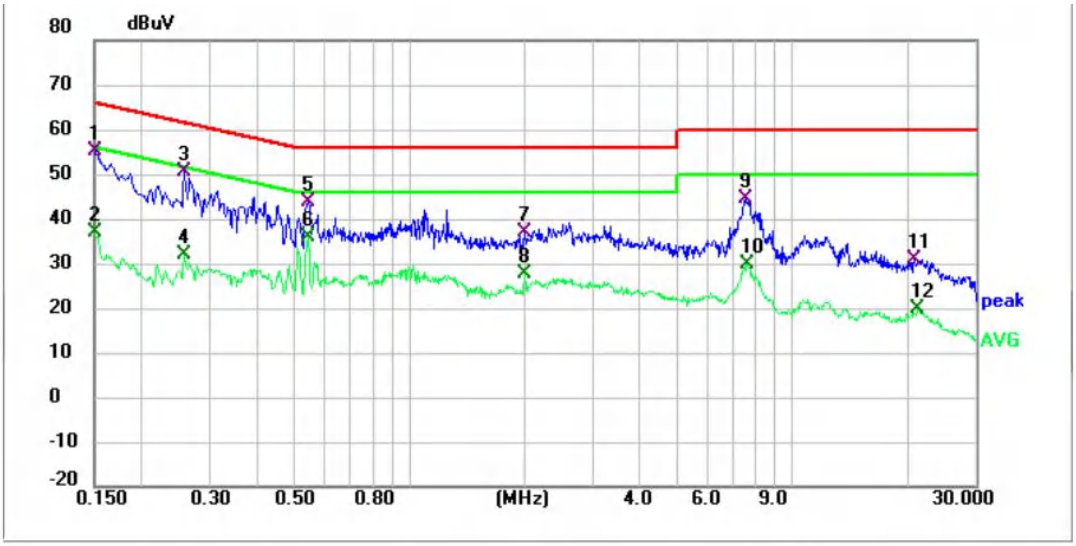


6.2.1.3. Test Result

Pass

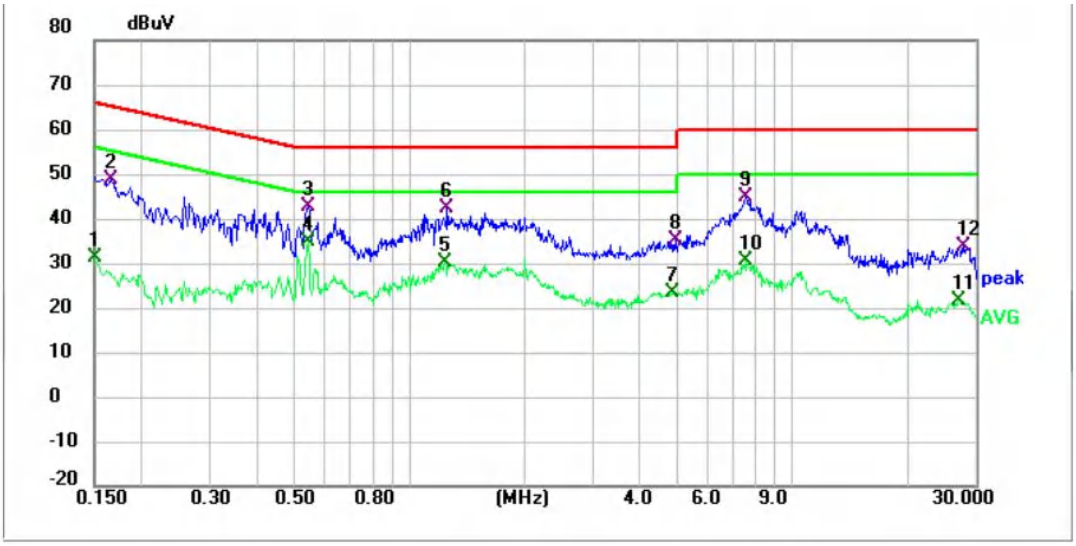
6.2.1.4. Test Data

Mode3 / Line: Line



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	44.82	10.20	55.02	66.00	10.98	QP
2	0.1500	26.69	10.20	36.89	56.00	19.11	AVG
3	0.2580	40.50	10.16	50.66	61.50	10.84	QP
4	0.2580	21.81	10.16	31.97	51.50	19.53	AVG
5	0.5420	33.61	10.16	43.77	56.00	12.23	QP
6 *	0.5420	25.56	10.16	35.72	46.00	10.28	AVG
7	2.0020	26.83	10.26	37.09	56.00	18.91	QP
8	2.0020	17.50	10.26	27.76	46.00	18.24	AVG
9	7.5300	34.20	10.35	44.55	60.00	15.45	QP
10	7.6140	19.52	10.35	29.87	50.00	20.13	AVG
11	20.8460	20.03	10.97	31.00	60.00	29.00	QP
12	21.3540	9.01	10.97	19.98	50.00	30.02	AVG

Mode3 / Line: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	21.19	10.20	31.39	56.00	24.61	AVG
2	0.1660	38.70	10.19	48.89	65.16	16.27	QP
3	0.5420	32.61	10.16	42.77	56.00	13.23	QP
4 *	0.5420	24.56	10.16	34.72	46.00	11.28	AVG
5	1.2380	20.00	10.20	30.20	46.00	15.80	AVG
6	1.2540	32.26	10.21	42.47	56.00	13.53	QP
7	4.8980	13.15	10.38	23.53	46.00	22.47	AVG
8	4.9380	24.64	10.38	35.02	56.00	20.98	QP
9	7.5900	34.43	10.35	44.78	60.00	15.22	QP
10	7.5900	20.26	10.35	30.61	50.00	19.39	AVG
11	27.1620	10.60	10.92	21.52	50.00	28.48	AVG
12	27.9740	22.71	10.90	33.61	60.00	26.39	QP

Note:
1>. Level = Reading +Factor (Voltage Division Coefficient + Cable Loss + Attenuator Factor)
2>. Margin = Limit - Level

6.2.2. 6dB Bandwidth

Test Requirement:	47 CFR 15.247(a)(2)
Test Limit:	Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	ANSI C63.10-2020, section 11.8
Procedure:	**11.8.1 Option 1** The steps for the first option are as follows: a) Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz. b) Set the VBW ≥ [3 × RBW]. c) Detector = peak. d) Trace mode = max-hold. e) Sweep = No faster than coupled (auto) time. f) Allow the trace to stabilize. g) Measure the maximum width of the emission by placing two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−6 dB down amplitude". If a marker is below this "−6 dB down amplitude" value, then it shall be as close as possible to this value. **11.8.2 Option 2** The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

6.2.2.1. E.U.T. Operation

Operating Environment:					
Temperature:	23 °C	Humidity:	56.2 %	Atmospheric Pressure:	102.6 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.2.2.2. Test Setup Diagram

6.2.2.3. Test Result

Pass

6.2.2.4. Test Data

Please Refer to Appendix for Details.

6.2.3. Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(3)
Test Limit:	Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Method:	ANSI C63.10-2020 section 11.9.1
Procedure:	ANSI C63.10-2020, section 11.9.1 Maximum peak conducted output power

6.2.3.1. E.U.T. Operation

Operating Environment:					
Temperature:	23.5 °C	Humidity:	56.4 %	Atmospheric Pressure:	102.6 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.2.3.2. Test Setup Diagram

6.2.3.3. Test Result

Pass

6.2.3.4. Test Data

Please Refer to Appendix for Details.

6.2.4. Power Spectral Density

Test Requirement:	47 CFR 15.247(e)
Test Limit:	Refer to 47 CFR 15.247(e), 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 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Method:	ANSI C63.10-2020, section 11.10
Procedure:	ANSI C63.10-2020, section 11.10, Maximum power spectral density level in the fundamental emission

6.2.4.1. E.U.T. Operation

Operating Environment:					
Temperature:	23.1 °C	Humidity:	57 %	Atmospheric Pressure:	102.6 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.2.4.2. Test Setup Diagram

6.2.4.3. Test Result

Pass

6.2.4.4. Test Data

Please Refer to Appendix for Details.

6.2.5. Conducted band edge and spurious emission

Test Requirement:	47 CFR 15.247(d)
Test Limit:	Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	ANSI C63.10-2020 section 11.11
Procedure:	ANSI C63.10-2020 Section 11.11.1, Section 11.11.2, Section 11.11.3

6.2.5.1. E.U.T. Operation

Operating Environment:					
Temperature:	22.7 °C	Humidity:	56.2 %	Atmospheric Pressure:	102.6 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.2.5.2. Test Setup Diagram

6.2.5.3. Test Result

Pass

6.2.5.4. Test Data

Please Refer to Appendix for Details.

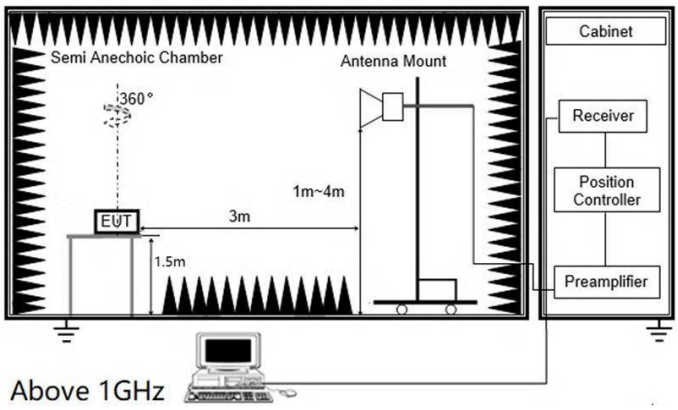
6.2.6. Radiated band edge emission

<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.10</td></tr>
<tr><td>Procedure:</td><td>1>. EUT was setup and tested according to ANSI C63.10 .
2>. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3>. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4>. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.
5>. Use the following spectrum analyzer settings:
a) Span shall wide enough to fully capture the emission being measured
b) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement
For average measurement: use duty cycle correction factor method (DCCF), Average level = Peak level + DCCF</td></tr>
</table>

6.2.6.1. E.U.T. Operation

Operating Environment:					
Temperature:	21.9 °C	Humidity:	58.7 %	Atmospheric Pressure:	102.8 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.2.6.2. Test Setup Diagram

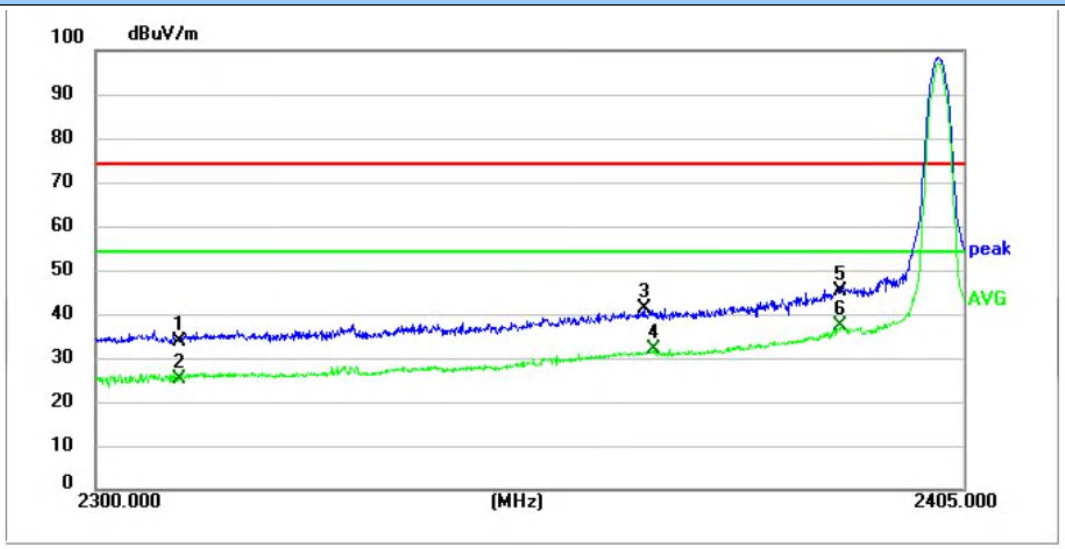


6.2.6.3. Test Result

Pass

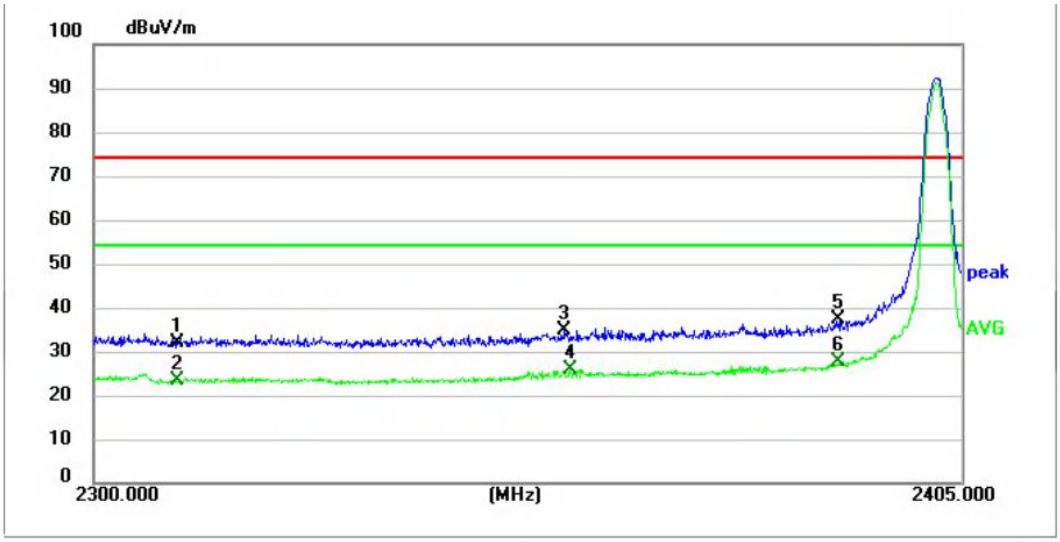
6.2.6.4. Test Data

Mode1 / Polarization: Horizontal / CH: L



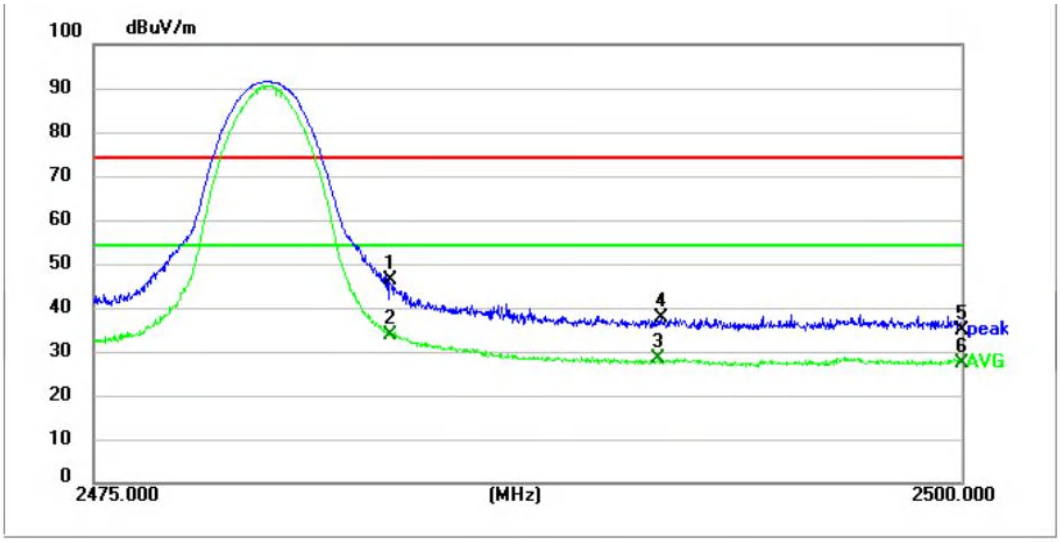
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2310.0000	51.25	-17.52	33.73	74.00	40.27	peak
2	2310.0000	42.57	-17.52	25.05	54.00	28.95	AVG
3	2365.8770	58.54	-17.41	41.13	74.00	32.87	peak
4	2367.1264	49.27	-17.40	31.87	54.00	22.13	AVG
5	2390.0000	62.56	-17.32	45.24	74.00	28.76	peak
6 *	2390.0000	54.71	-17.32	37.39	54.00	16.61	AVG

Mode1 / Polarization: Vertical / CH: L



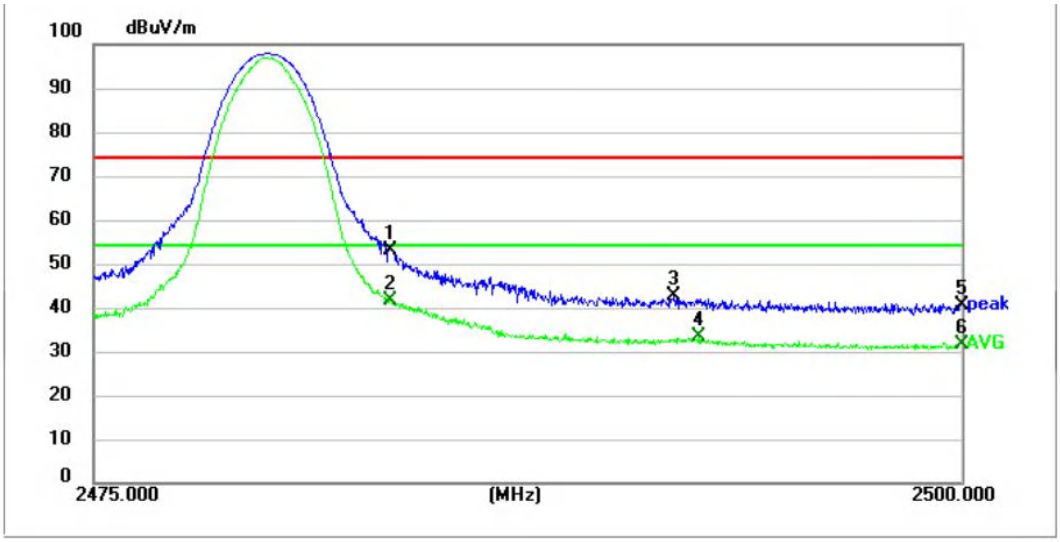
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2310.0000	49.63	-17.52	32.11	74.00	41.89	peak
2	2310.0000	40.75	-17.52	23.23	54.00	30.77	AVG
3	2356.5109	52.21	-17.44	34.77	74.00	39.23	peak
4	2357.1620	43.24	-17.44	25.80	54.00	28.20	AVG
5	2390.0000	54.71	-17.32	37.39	74.00	36.61	peak
6 *	2390.0000	44.95	-17.32	27.63	54.00	26.37	AVG

Mode1 / Polarization: Horizontal / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.5000	63.24	-17.03	46.21	74.00	27.79	peak
2 *	2483.5000	50.61	-17.03	33.58	54.00	20.42	AVG
3	2491.2600	45.48	-16.99	28.49	54.00	25.51	AVG
4	2491.3300	54.75	-16.98	37.77	74.00	36.23	peak
5	2500.0000	51.65	-16.94	34.71	74.00	39.29	peak
6	2500.0000	44.42	-16.94	27.48	54.00	26.52	AVG

Mode1 / Polarization: Vertical / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.5000	70.19	-17.03	53.16	74.00	20.84	peak
2 *	2483.5000	58.63	-17.03	41.60	54.00	12.40	AVG
3	2491.7175	59.62	-16.98	42.64	74.00	31.36	peak
4	2492.4350	50.25	-16.98	33.27	54.00	20.73	AVG
5	2500.0000	57.64	-16.94	40.70	74.00	33.30	peak
6	2500.0000	48.54	-16.94	31.60	54.00	22.40	AVG

6.2.7. Radiated Spurious Emission (below 1GHz)

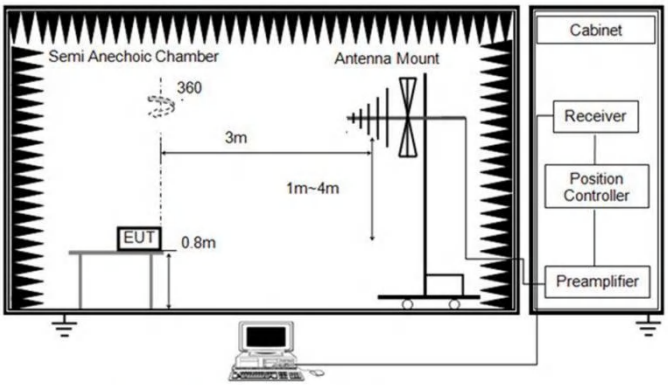
<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.6.4</td></tr>
<tr><td>Procedure:</td><td>1>. The EUT was setup and tested according to ANSI C63.10.
2>. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3>. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4>. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5>. Set to the maximum power setting and enable the EUT transmit continuously.
6>. Use the following spectrum analyzer settings
a) Span shall wide enough to fully capture the emission being measured;
b) RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.</td></tr>
</table>

6.2.7.1. E.U.T. Operation

Operating Environment:					
Temperature:	21.9 °C	Humidity:	58.7 %	Atmospheric Pressure:	102.8 kPa
Pre test mode:	TM1, TM2, TM3				
Final test mode:	All of the listed pre-test mode were tested, only the data of the worst mode (TM1) is recorded in the report				

6.2.7.2. Test Setup Diagram



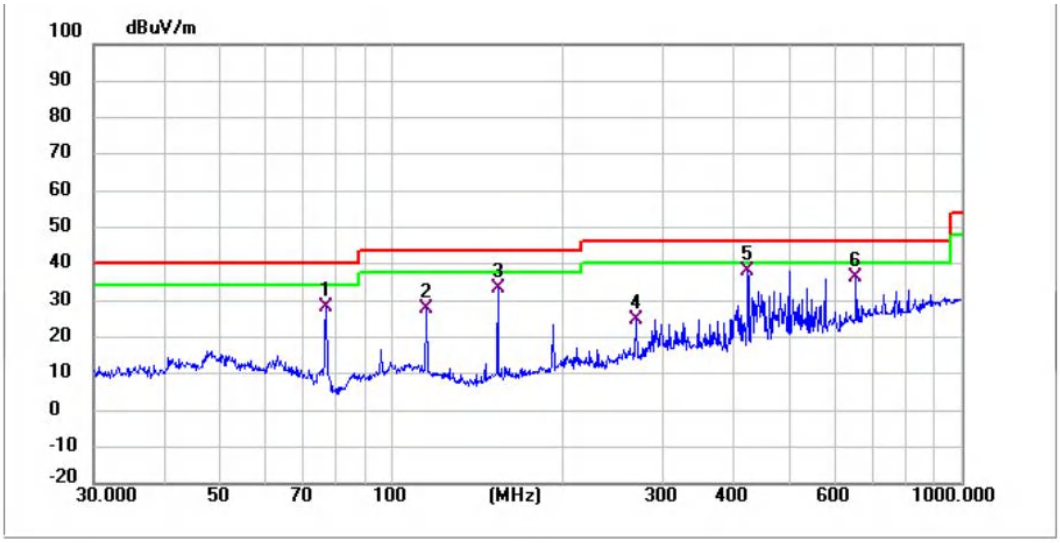
Below 1 GHz and above 30 MHz

6.2.7.3. Test Result

Pass

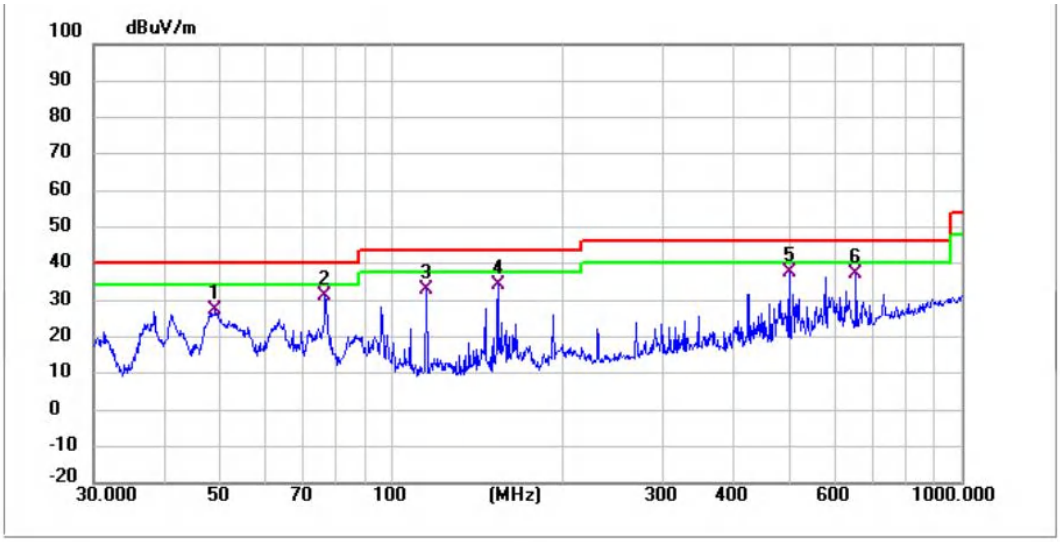
6.2.7.4. Test Data

Mode1 / Polarization: Horizontal / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	76.7806	62.55	-34.27	28.28	40.00	11.72	QP
2	115.3204	59.31	-31.57	27.74	43.50	15.76	QP
3	153.7384	66.53	-33.25	33.28	43.50	10.22	QP
4	268.4852	53.18	-28.31	24.87	46.00	21.13	QP
5 *	422.0577	62.09	-24.23	37.86	46.00	8.14	QP
6	654.2318	54.43	-18.08	36.35	46.00	9.65	QP

Mode1 / Polarization: Vertical / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	49.0144	56.35	-29.17	27.18	40.00	12.82	QP
2	76.5119	65.23	-34.22	31.01	40.00	8.99	QP
3	115.3204	64.36	-31.57	32.79	43.50	10.71	QP
4	153.7384	67.38	-33.25	34.13	43.50	9.37	QP
5 *	499.4245	59.76	-21.99	37.77	46.00	8.23	QP
6	654.2318	55.11	-18.08	37.03	46.00	8.97	QP

Note:
1>. For 9 kHz ~ 30 MHz Measurement
The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.
2>. Level= Reading + Factor (Antenna Factor+ Cable Loss- Preamp Factor)
3>. Margin = Limit – Level

6.2.8. Radiated Spurious Emission (Above 1GHz)

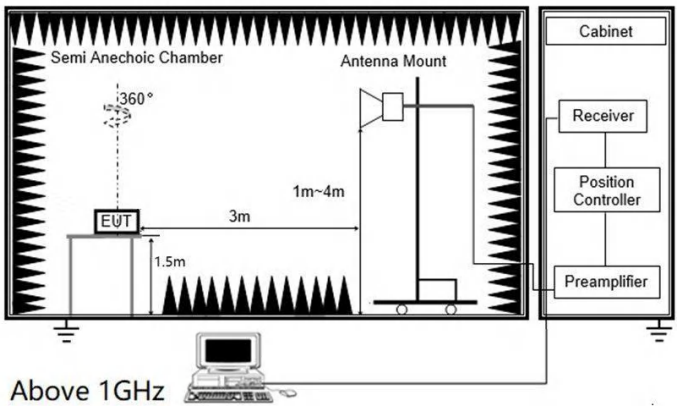
<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), in addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.6.4</td></tr>
<tr><td>Procedure:</td><td>1>. The EUT was setup and tested according to ANSI C63.10.
2>. The EUT is placed on a turn table which is 0.8 meter above ground for 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3>. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4>. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5>. Set to the maximum power setting and enable the EUT transmit continuously.
6>. Use the following spectrum analyzer settings
a) Span shall wide enough to fully capture the emission being measured;
b) Set RBW=1MHz, VBW=3MHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement: use duty cycle correction factor method (DCCF)
Average level = Peak level + DCCF</td></tr>
</table>

6.2.8.1. E.U.T. Operation

<table>
<tr><td colspan="6">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>21.9 °C</td><td>Humidity:</td><td>58.7 %</td><td>Atmospheric Pressure:</td><td>102.8 kPa</td></tr>
<tr><td colspan="2">Pre test mode:</td><td colspan="4">TM1, TM2, TM3</td></tr>
<tr><td colspan="2">Final test mode:</td><td colspan="4">All of the listed pre-test mode were tested, only the data of the worst mode (TM1) is recorded in the report</td></tr>
</table>

6.2.8.2. Test Setup Diagram

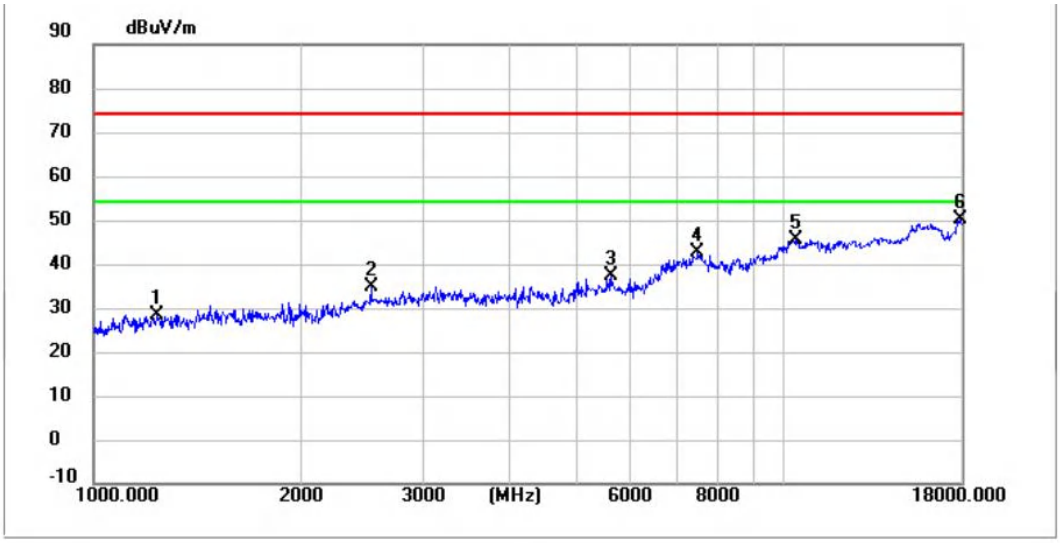


6.2.8.3. Test Result

Pass

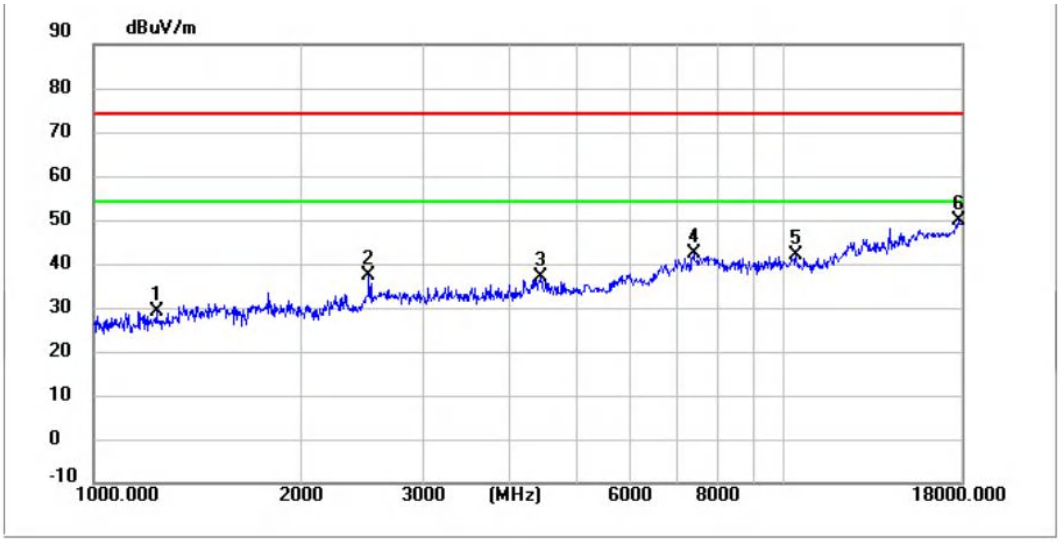
6.2.8.4. Test Data

Mode1 / Polarization: Horizontal / CH: L



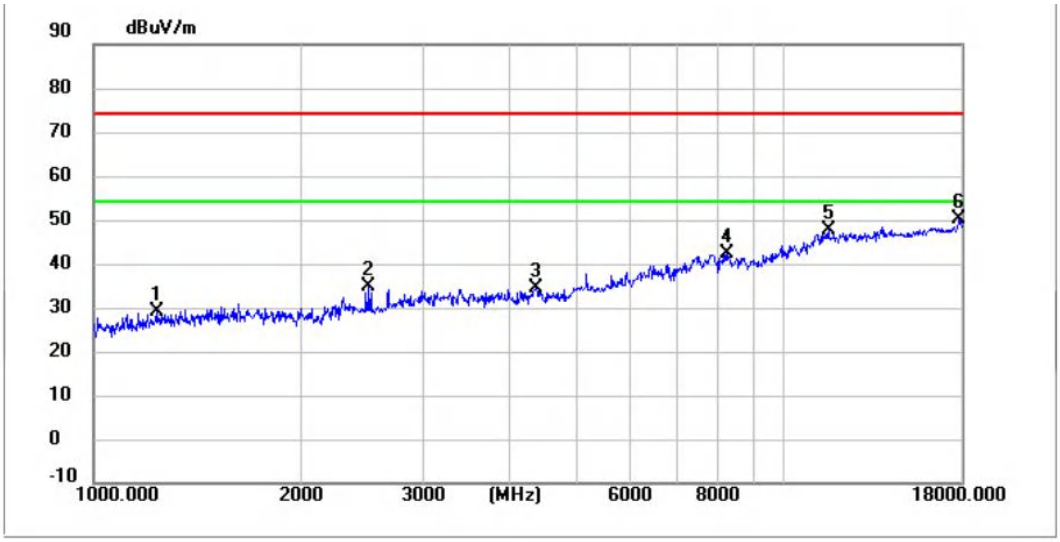
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1241.4000	49.95	-21.39	28.56	74.00	45.44	peak
2	2528.3000	51.49	-16.72	34.77	74.00	39.23	peak
3	5607.0000	43.85	-6.63	37.22	74.00	36.78	peak
4	7490.6000	37.35	5.18	42.53	74.00	31.47	peak
5	10382.3000	33.87	11.73	45.60	74.00	28.40	peak
6 *	17971.1000	26.31	23.92	50.23	74.00	23.77	peak

Mode1 / Polarization: Vertical / CH: L



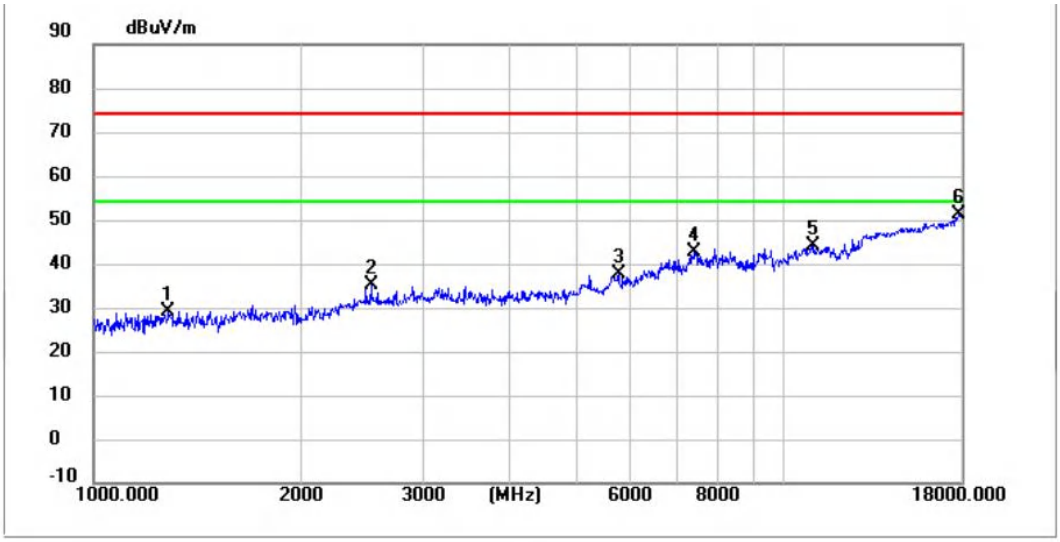
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1238.0000	50.44	-21.40	29.04	74.00	44.96	peak
2	2504.5000	54.14	-16.90	37.24	74.00	36.76	peak
3	4454.4000	47.98	-11.02	36.96	74.00	37.04	peak
4	7395.4000	37.48	4.90	42.38	74.00	31.62	peak
5	10387.4000	30.15	11.73	41.88	74.00	32.12	peak
6 *	17926.9000	26.42	23.58	50.00	74.00	24.00	peak

Mode1 / Polarization: Horizontal / CH: M



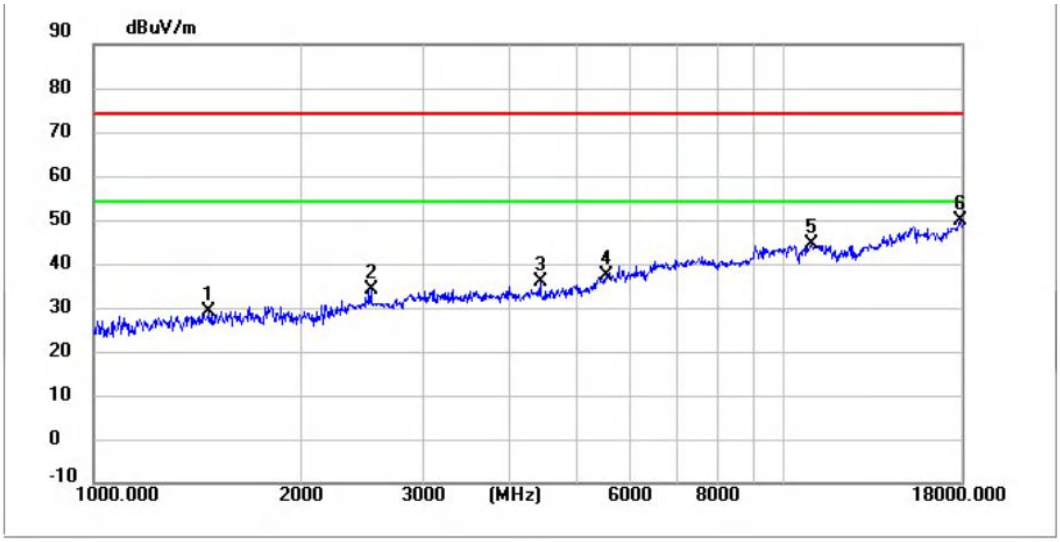
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1238.0000	50.42	-21.40	29.02	74.00	44.98	peak
2	2504.5000	51.79	-16.90	34.89	74.00	39.11	peak
3	4374.5000	45.98	-11.41	34.57	74.00	39.43	peak
4	8282.8000	35.24	6.97	42.21	74.00	31.79	peak
5	11592.7000	33.60	14.02	47.62	74.00	26.38	peak
6 *	17920.1000	26.74	23.54	50.28	74.00	23.72	peak

Mode1 / Polarization: Vertical / CH: M



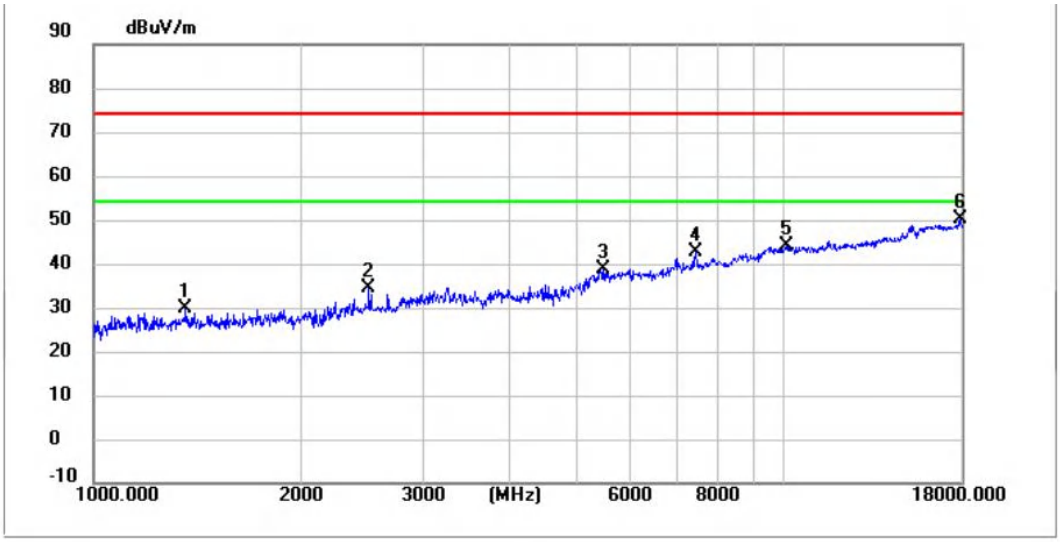
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1282.2000	50.27	-21.32	28.95	74.00	45.05	peak
2	2528.3000	52.02	-16.72	35.30	74.00	38.70	peak
3	5761.7000	43.90	-6.18	37.72	74.00	36.28	peak
4	7432.8000	37.71	5.04	42.75	74.00	31.25	peak
5	10999.4000	30.76	13.38	44.14	74.00	29.86	peak
6 *	17921.8000	27.68	23.55	51.23	74.00	22.77	peak

Mode1 / Polarization: Horizontal / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1472.6000	49.93	-20.78	29.15	74.00	44.85	peak
2	2528.3000	50.84	-16.72	34.12	74.00	39.88	peak
3	4442.5000	46.97	-11.07	35.90	74.00	38.10	peak
4	5549.2000	44.04	-6.65	37.39	74.00	36.61	peak
5	10945.0000	31.22	13.13	44.35	74.00	29.65	peak
6 *	17971.1000	25.83	23.92	49.75	74.00	24.25	peak

Mode1 / Polarization: Vertical / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1362.1000	51.12	-21.17	29.95	74.00	44.05	peak
2	2504.5000	51.20	-16.90	34.30	74.00	39.70	peak
3	5479.5000	45.64	-6.89	38.75	74.00	35.25	peak
4	7441.3000	37.62	5.07	42.69	74.00	31.31	peak
5	10049.1000	33.19	11.06	44.25	74.00	29.75	peak
6 *	17952.4000	26.23	23.78	50.01	74.00	23.99	peak

Note:
1>. Level= Reading + Factor (Antenna Factor+ Cable Loss- Preamp Factor)
2>. Margin = Limit – Level
3>. Average measurement was not performed if peak level is lower than average limit (54dBuV/m) above 1GHz.

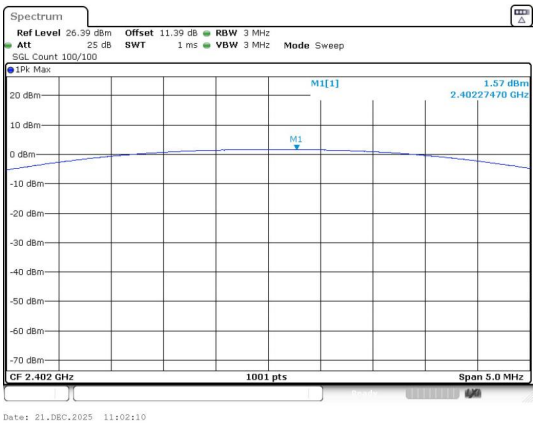
7. APPENDIX REPORT

7.1. Conducted Output Power

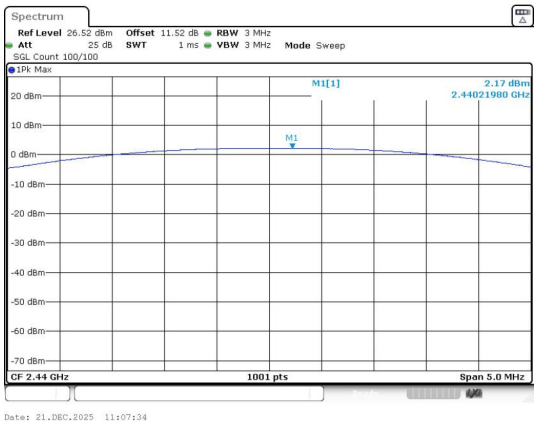
Test Result

Mode	Channel	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (dBm)	Result
BLE 1M	0	1.57	1.44	≤30	PASS
	19	2.17	1.65	≤30	PASS
	39	2.64	1.84	≤30	PASS
BLE 2M	0	1.68	1.47	≤30	PASS
	19	2.35	1.72	≤30	PASS
	39	2.83	1.92	≤30	PASS

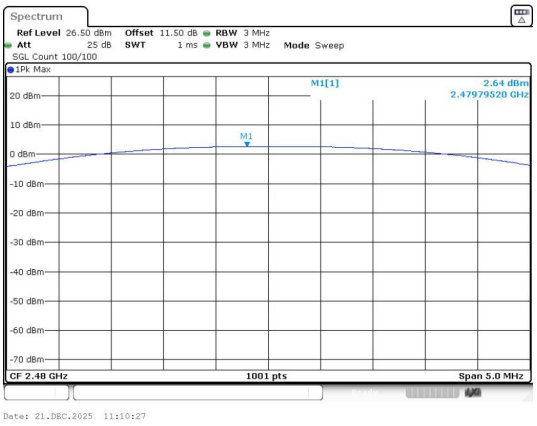
Test Graphs



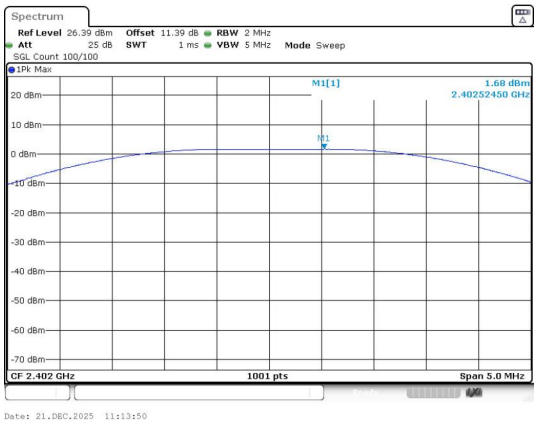
Peak Output Power
BLE 1M_Channel 0



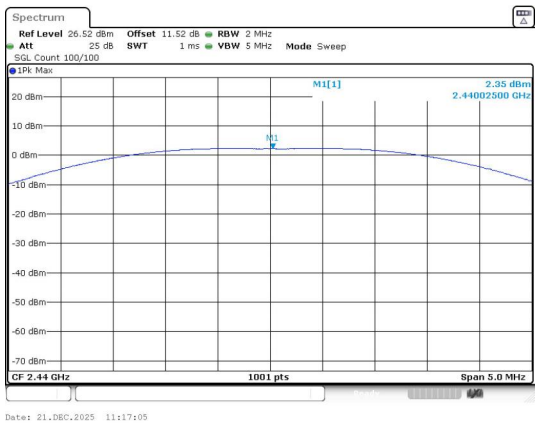
Peak Output Power
BLE 1M_Channel 19



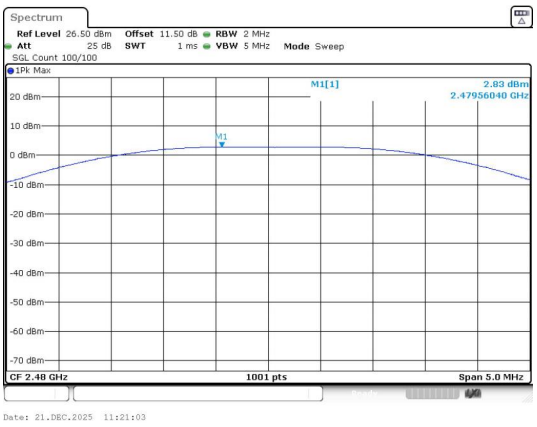
Peak Output Power
BLE 1M_Channel 39



Peak Output Power
BLE 2M_Channel 0



Peak Output Power
BLE 2M_Channel 19



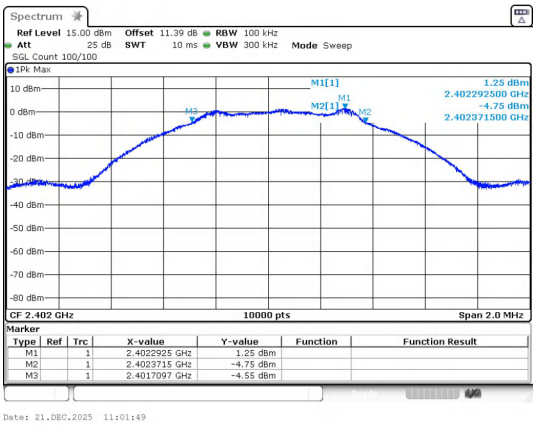
Peak Output Power
BLE 2M_Channel 39

7.2. 6dB Bandwidth

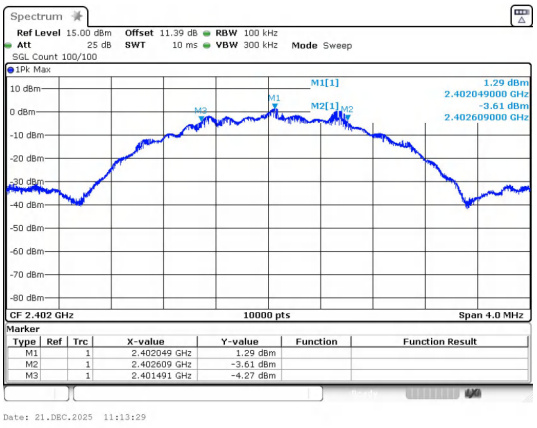
Test Result

Mode	Channel	Center Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
BLE 1M	0	2402	0.6600	≥0.5	PASS
	19	2440	0.6700		PASS
	39	2480	0.6700		PASS
BLE 2M	0	2402	1.120		PASS
	19	2440	1.130		PASS
	39	2480	1.130		PASS

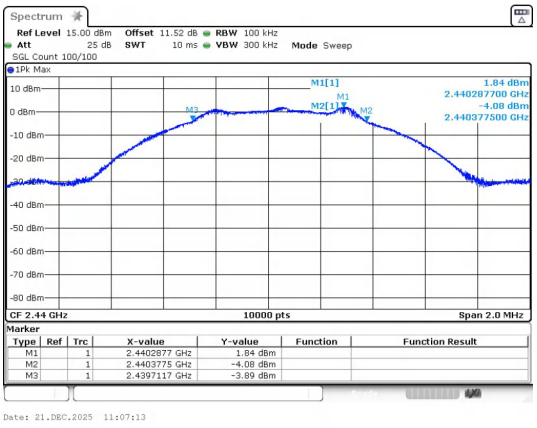
Test Graphs



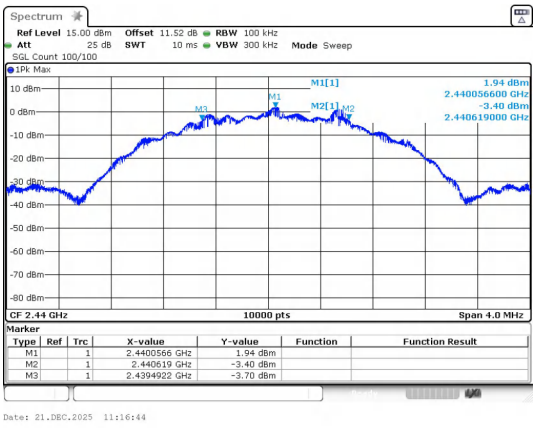
BLE 1M_Channel 0



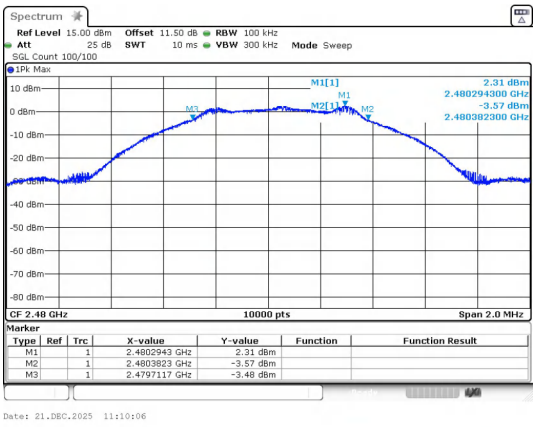
BLE 2M_Channel 0



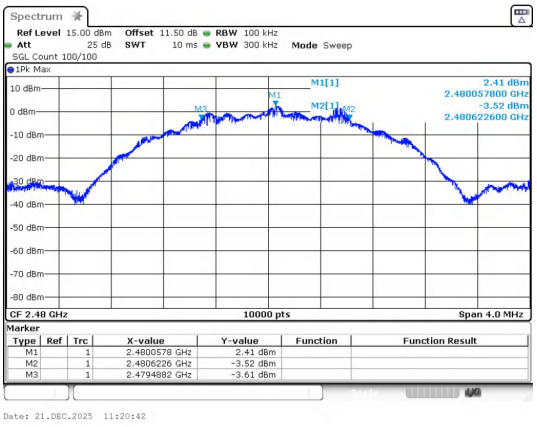
BLE 1M_Channel 19



BLE 2M_Channel 19



BLE 1M_Channel 39



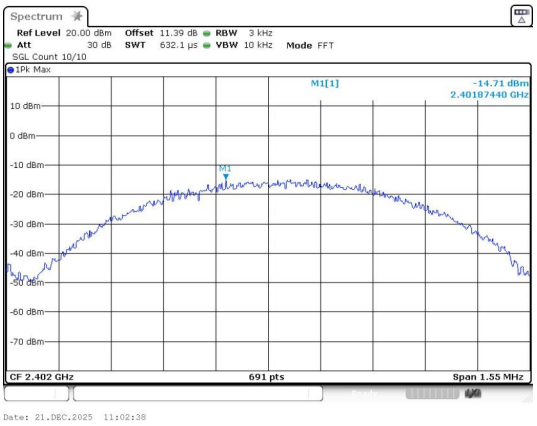
BLE 2M_Channel 39

7.3. Power Spectral Density

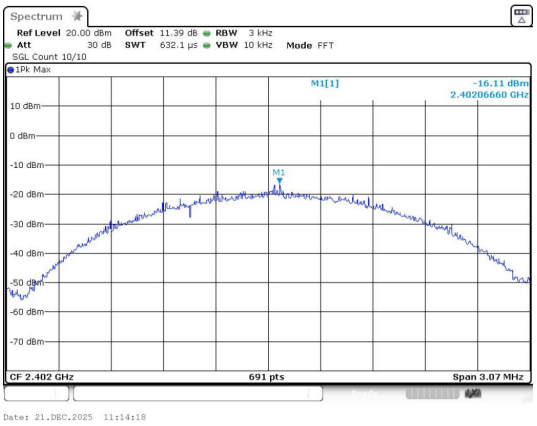
Test Result

Mode	Channel	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
BLE 1M	0	-14.710	≤8	PASS
BLE 1M	19	-13.930	≤8	PASS
BLE 1M	39	-13.720	≤8	PASS
BLE 2M	0	-16.110	≤8	PASS
BLE 2M	19	-15.490	≤8	PASS
BLE 2M	39	-15.150	≤8	PASS

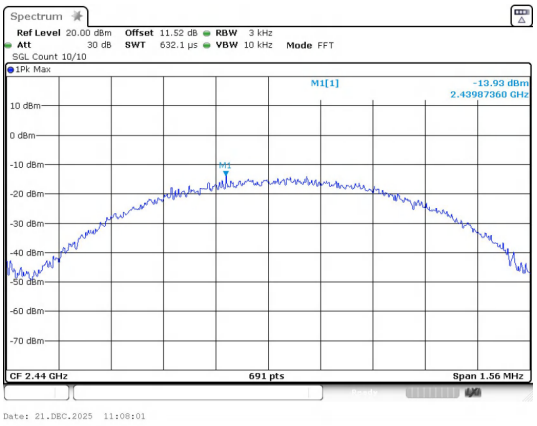
Test Graphs



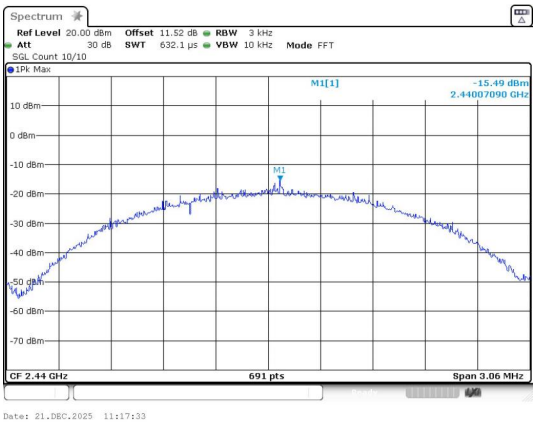
BLE 1M_Channel 0



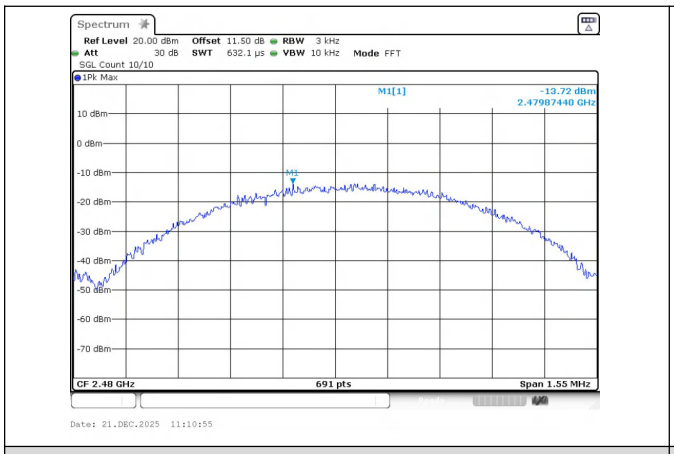
BLE 2M_Channel 0



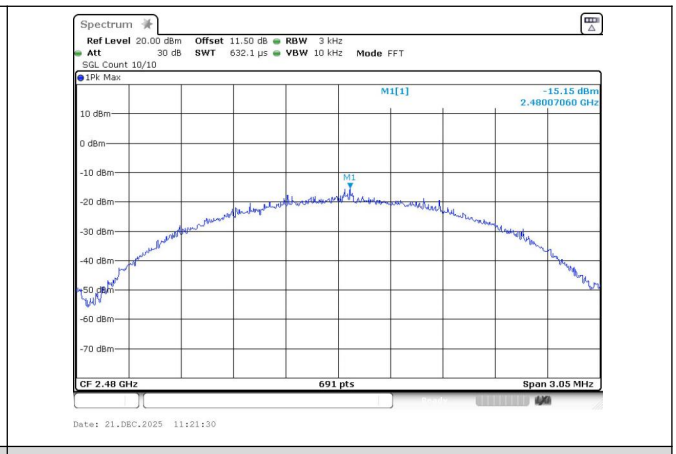
BLE 1M_Channel 19



BLE 2M_Channel 19



BLE 1M_Channel 39



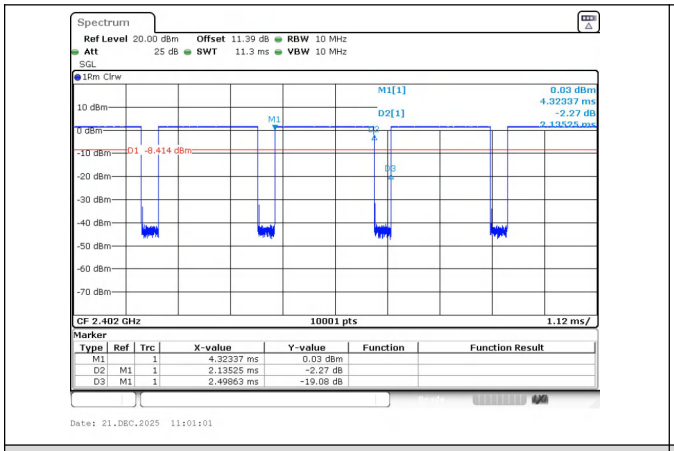
BLE 2M_Channel 39

7.4. Duty Cycle

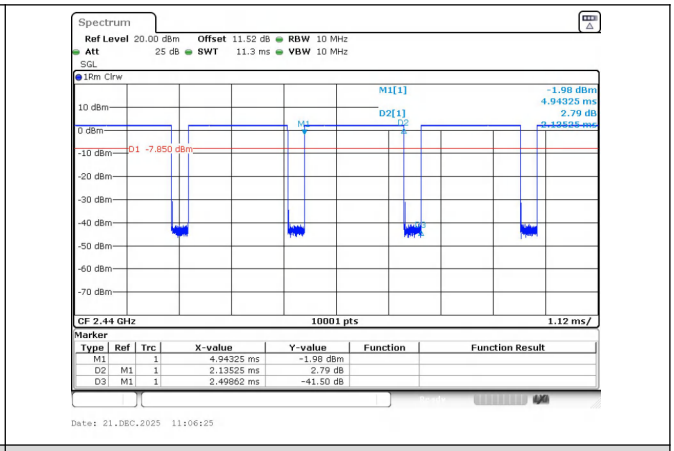
Test Result

Mode	Channel	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
BLE 1M	0	2.135	2.499	85.46	0.8546	0.6824	0.4684
	19	2.135	2.499	85.46	0.8546	0.6824	0.4684
	39	2.135	2.499	85.46	0.8546	0.6824	0.4684
BLE 2M	0	1.080	2.500	43.20	0.4320	3.6452	0.9259
	19	1.079	2.499	43.18	0.4318	3.6472	0.9268
	39	1.079	2.499	43.18	0.4318	3.6472	0.9268

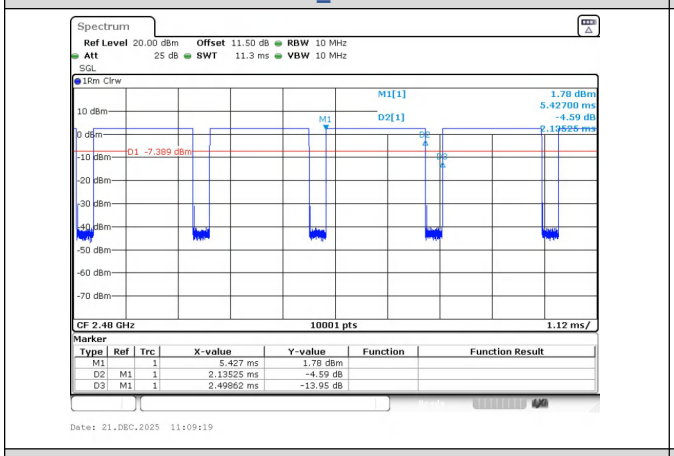
Test Graphs



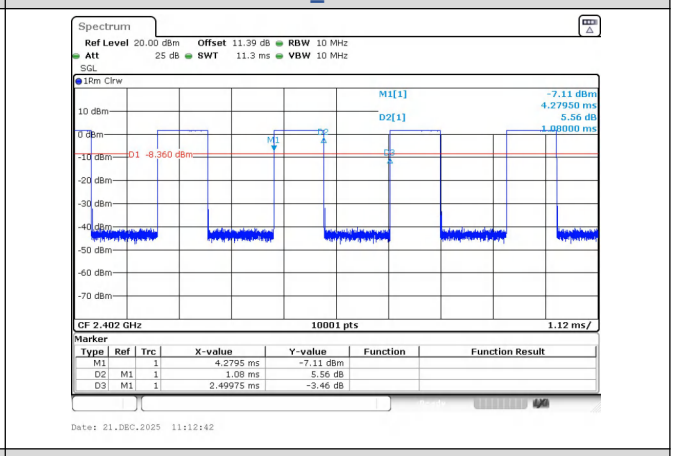
BLE 1M_Channel 0



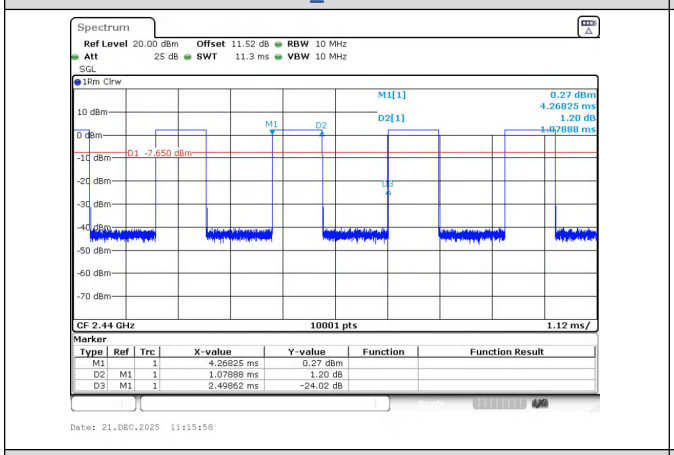
BLE 1M_Channel 19



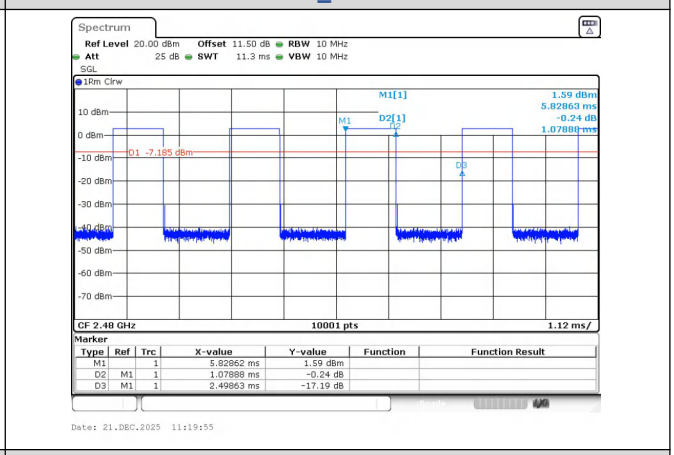
BLE 1M_Channel 39



BLE 2M_Channel 0



BLE 2M_Channel 19



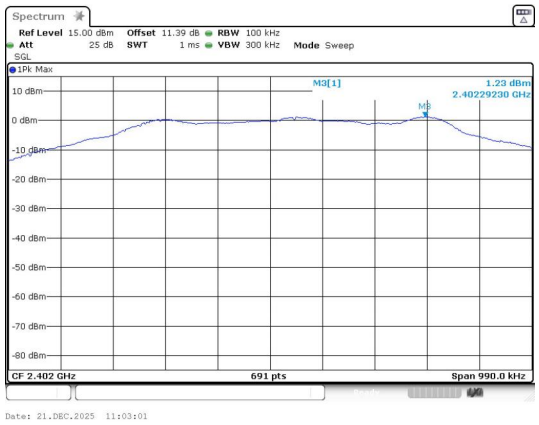
BLE 2M_Channel 39

7.5. Conducted Spurious & Band Edge Emission

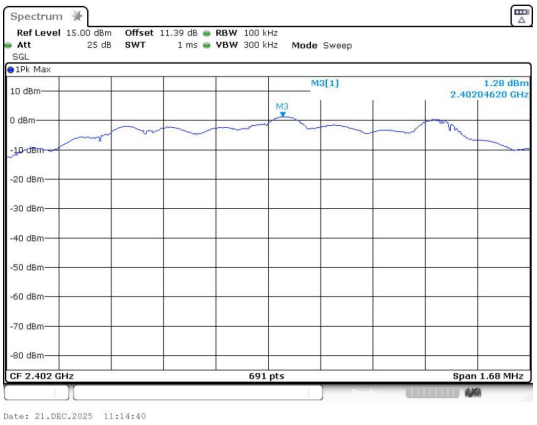
Test Result

Mode	Channel	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
BLE 1M	0	2400.00	-44.830	-18.77	-26.060	PASS
		7205.96	-43.723	-18.77	-24.953	PASS
	19	7319.16	-41.865	-18.15	-23.715	PASS
	39	2483.50	-48.150	-17.68	-30.470	PASS
		7439.85	-42.746	-17.68	-25.066	PASS
BLE 2M	0	2400.00	-32.980	-18.72	-14.260	PASS
		7205.96	-44.527	-18.72	-25.807	PASS
	19	7319.99	-41.406	-18.04	-23.366	PASS
	39	2483.50	-49.080	-17.59	-31.490	PASS
		7441.51	-44.164	-17.59	-26.574	PASS
Note: input compensation coeffcient (dB)= Cable Loss (dB)						

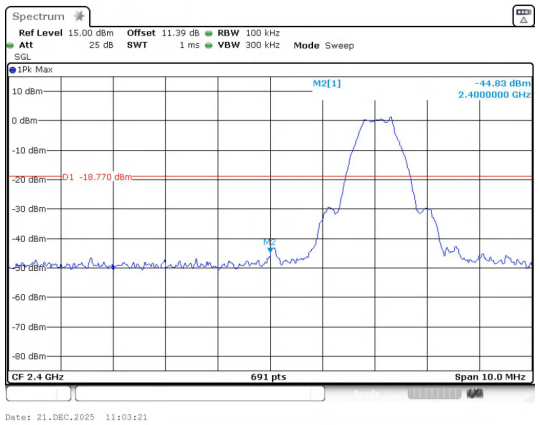
Test Graphs



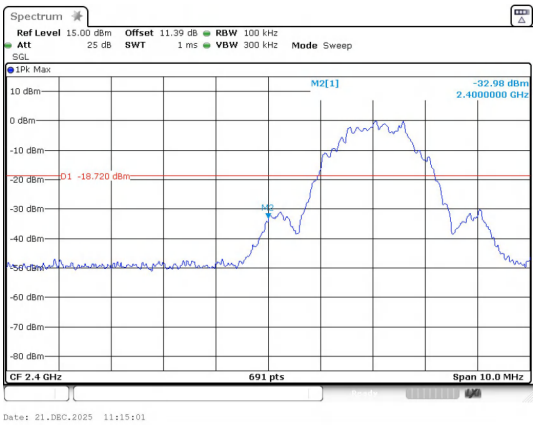
In-Band Reference Level
BLE 1M_Channel 0



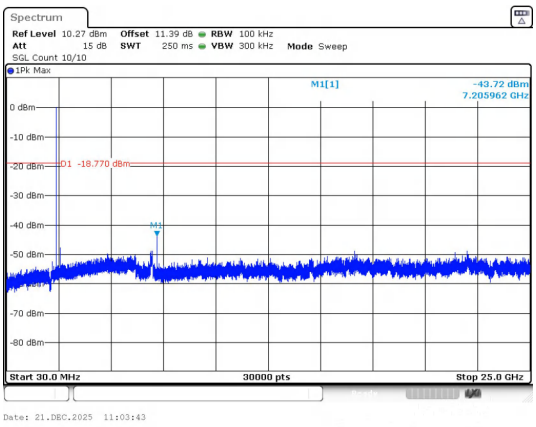
In-Band Reference Level
BLE 2M_Channel 0



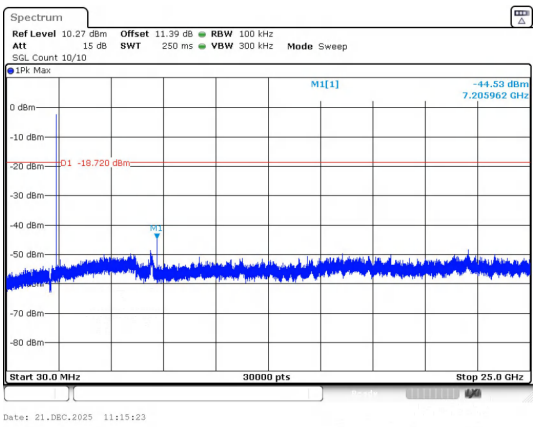
Out Of Band Emission
BLE 1M_Channel 0



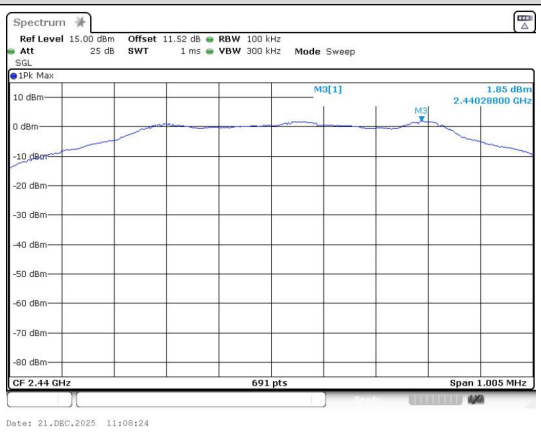
Out Of Band Emission
BLE 2M_Channel 0



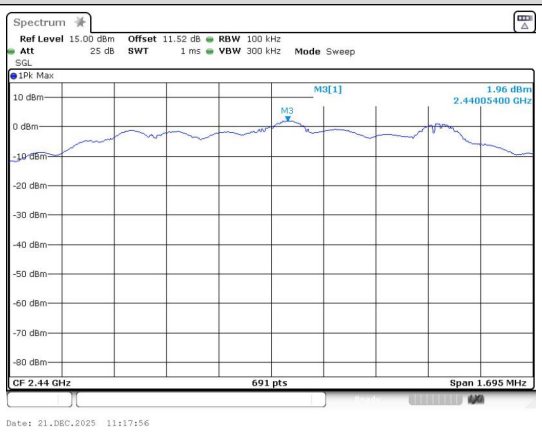
30.0 MHz - 25000.0 MHz
BLE 1M_Channel 0



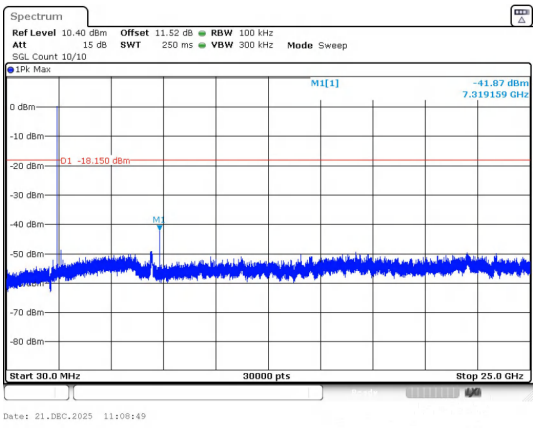
30.0 MHz - 25000.0 MHz
BLE 2M_Channel 0



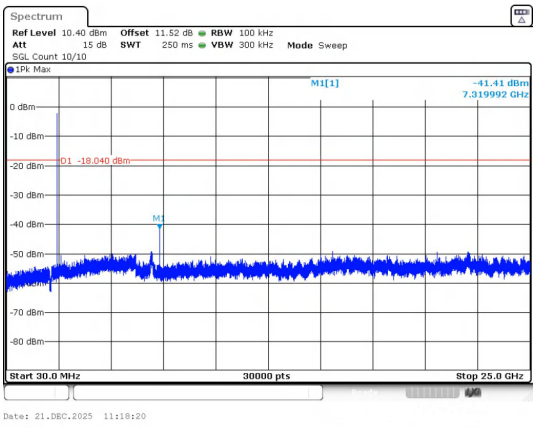
In-Band Reference Level
BLE 1M_Channel 19



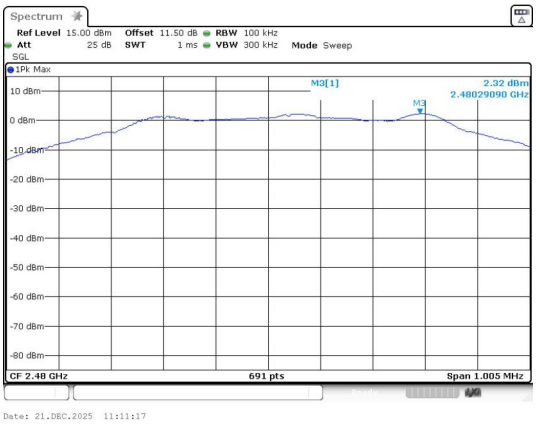
In-Band Reference Level
BLE 2M_Channel 19



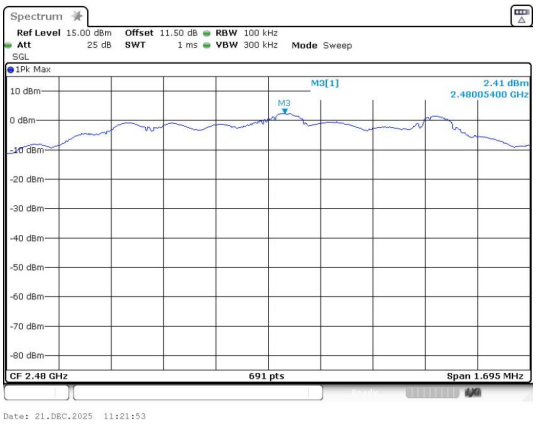
30.0 MHz - 25000.0 MHz
BLE 1M_Channel 19



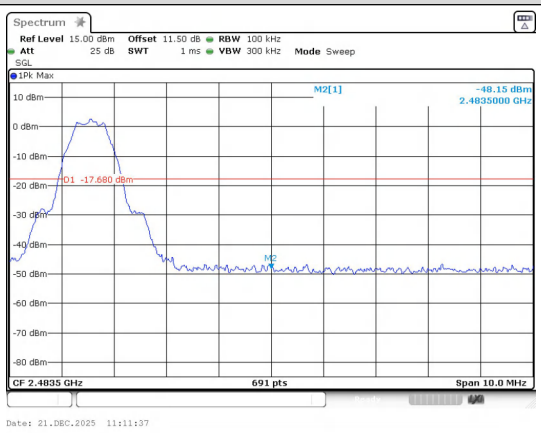
30.0 MHz - 25000.0 MHz
BLE 2M_Channel 19



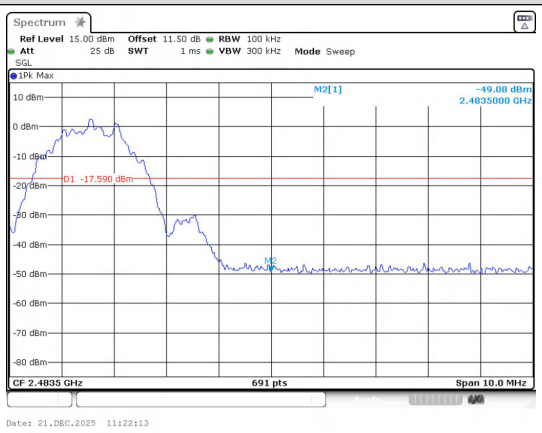
In-Band Reference Level
BLE 1M_Channel 39



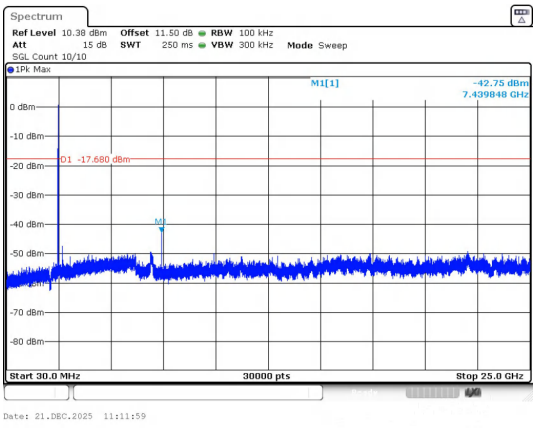
In-Band Reference Level
BLE 2M_Channel 39



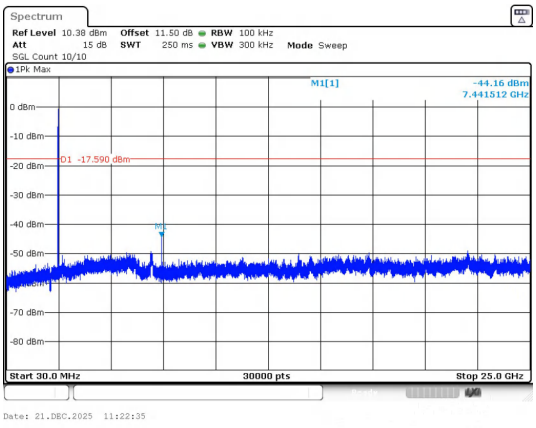
Out Of Band Emission
BLE 1M_Channel 39



Out Of Band Emission
BLE 2M_Channel 39



30.0 MHz - 25000.0 MHz
BLE 1M_Channel 39



30.0 MHz - 25000.0 MHz
BLE 2M_Channel 39