RF TEST REPORT

Test Equipment	:	PACER
Model Name	:	NP-KDT241
FCC ID	:	2BLHGNPKDT241
IC	:	33139-NPKDT241
Date of receipt	:	2024-09-11
Test Duration	:	2024-10-02 ~ 2024-10-09
Date of issue	:	2024-11-28

Applicant : neumafit Inc.

32-1-306, 1, Gwanak-ro, Gwanak-gu, Seoul, 08826,
Republic of Korea

Test Laboratory : Lab-T, Inc.

2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si
Gyeonggi-do 17036, Korea(Republic of)

Test Specification : FCC Part 15 Subpart C 15.247

RSS-247 Issue 3 (2023-08), RSS-GEN Issue 5 A2(2021-02)

RF Output Power : -7.65 dBm

Test Result : Pass

The above equipment was tested by Lab-T Testing Laboratory for compliance
with the requirements of FCC,IC Rules and Regulations.
The test results presented in this test report are limited only to the sample supplied by applicant
and the use of this test report is inhibited other than its purpose.
This test report shall not be reproduced except in full, without the written approval of Lab-T, Inc
This test report is not related to KOLAS.

Tested by:

Engineer
HyunWoo Lee

Reviewed by:

Technical Manager
SangHoon Yu

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APPENDIX I **33**

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1. Revision History

Test Report No.	Date	Description
TRRFCC24-0018	2024-11-28	Initial Issue

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2. Information

2.1 Applicant Information

Applicant Name	neumafit Inc.
Address	32-1-306, 1, Gwanak-ro, Gwanak-gu, Seoul, 08826, Republic of Korea
Telephone No.	+82-10-2376-8439
Person in charge	Jinmo Kim / jmkim@neumafit.com
Manufacturer	neumafit Inc.
Address	32-1-306, 1, Gwanak-ro, Gwanak-gu, Seoul, 08826, Republic of Korea

2.2 Test Laboratory Information

Corporate name	Lab-T, Inc.
Representative	Duke (Jongyoung) Kim
Address	2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea (Republic of)
Telephone	+82-31-322-6767
Fax	+82-31-322-6768
E-mail	info@lab-t.net
FCC/IC Designation No.	KR0159

2.3 Test Site

Test Site	used	Address
Building L	☒	2182-40 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)
Building T	☒	2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)
Building A	☐	2182-44 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)

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3. Information About Test Equipment

3.1 Equipment Information

Equipment Type	PACER
Model Name	NP-KDT241
Variant model name[Note 2]	-
Frequency Range	2 402 MHz ~ 2 480 MHz
Modulation Type (Symbol rate / Data rate)	GFSK(1 Msps / 1 Mbps)
Modulation Technology	Bluetooth LE
Power Supply	DC 3.7 V
H/W Version	1.0
S/W Version	1.0

Note 1: The above EUT information was declared by the manufacturer.
Note 2: Only the LCD part has been removed.

3.2 Antenna Information

Type	Model No.	Gain	Note.
Chip Antenna	AA055U	2.5 dBi	-

3.3 Test Frequency

Test Mode	Test Frequency (MHz)		
	Lowest Frequency	Middle Frequency	Highest Frequency
Bluetooth LE	2 402	2 440	2 480

3.4 Operation Conditions for the EUT

Firmware State		1.0
Test Software Name(Version)		Teraterm (Version 4.86)
Test Power Setting		5 (-16 dBm)
Serial Number (Setup mode)	EUT #1	#1 (RF conducted measurement)
	EUT #2	#2 (Radiated Emission, Conducted Emission)

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4. Test Report

4.1 Summary

FCC Part 15 & RSS-247 Issue 3 & RSS-GEN Issue 5				
FCC Rule	IC Rule	Parameter	Clause	Status
Transmitter Requirements				
15.203 15.247(b)(4)	RSS-247 5.4(f)	Antenna Requirement	4.3.1	C
15.247(b)(3)	RSS-247 5.4(d)	Maximum Peak Output Power	4.3.2	C
15.247(e)	RSS-247 5.2(b)	Peak Power Spectral Density	4.3.3	C
15.247(a)(2)	RSS-247 5.2(a)	6 dB Channel Bandwidth	4.3.4	C
-	RSS- GEN 6.7	Occupied Bandwidth	4.3.4	C
15.247(d) 15.205(a) 15.209(a)	RSS-247 5.5 RSS- GEN 8.9 RSS- GEN 8.10	Spurious Emission, Band Edge and Restricted bands	4.3.5	C
15.207(a)	RSS- GEN 8.8	Conducted Emissions	4.3.6	C
Note 1: C = Comply N/C = Not Comply N/T = Not Tested N/A = Not Applicable				

* The general test methods used to test this device is ANSI C63.10:2020

4.2 Measurement Uncertainty

Mesurement Items	Expanded Uncertainty	
RF Output Power	0.77 dB	(The confidence level is about 95 %, *k*=2)
Power Spectral Density	0.98 dB	(The confidence level is about 95 %, *k*=2)
Occupied Channel Bandwidth	6.95 kHz	(The confidence level is about 95 %, *k*=2)
Conducted Spurious Emissions	0.47 dB	(The confidence level is about 95 %, *k*=2)
Radiated Spurious Emissions (1 GHz under)	4.78 dB	(The confidence level is about 95 %, *k*=2)
Radiated Spurious Emissions (Above 1 GHz)	5.96 dB	(The confidence level is about 95 %, *k*=2)
Conducted emission	2.36 dB	(The confidence level is about 95 %, *k*=2)

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4.3 Transmitter Requirements

4.3.1 Antenna Requirement

4.3.1.1 Regulation

Accoding to §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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Accoding to §15.247(b)(4) e conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to §RSS-247 5.4(f)(ii) If the transmitter employs an antenna system that emits multiple directional beams, but does not emit multiple directional beams simultaneously, the total output power conducted to the array or arrays that comprise the device (i.e. the sum of the power supplied to all antennas, antenna elements, staves, etc., and summed across all carriers or frequency channels) shall not exceed the applicable output power limit specified in sections 5.4(b) and 5.4(d). However, the total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6 dBi. The directional antenna gain shall be computed as the sum of 10 log (number of array elements or staves) plus the directional gain of the element or stave having the highest gain.

4.3.1.2 Result

Comply
(The transmitter has a Internal Chip Antenna. The directional peak gain of the antenna is 2.5 dBi.)

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4.3.2 Maximum Peak Output Power

4.3.2.1 Regulation

According to §15.247(b)(3) and RSS-247 §5.4(d) 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.

According to §15.247(b)(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.3.2.2 Measurement Procedure

ANSI C63.10 § 11.9.1 Maximum peak condected output power

4.3.2.2.1 PKPM1 Peak power meter method

The maximum peak conducted output power may be measured using a broadband peak RF power meter.
The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

4.3.2.3 Result

Comply (Measurement Data : Refer to the next page)

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4.3.2.4 Measurement Data

Test Mode : Bluetooth LE

Maximum Peak Output Power			
Freq. (MHz)	Result (dBm)	Result (mW)	Limit (dBm)
2 402	-9.35	0.12	30.00
2 440	-7.65	0.17	30.00
2 480	-9.37	0.12	30.00

Note 1 : refer to 4.3.1 for information on limit reduction.
Note 2 : We took the insertion loss of the cable loss into consideration within the measuring instrument

Test Mode : Bluetooth LE

Average Output Power					
Freq. (MHz)	ANT1 (dBm)	ANT1 (mW)	Result (dBm)	Result (mW)	Limit (dBm)
2 402	-12.08	0.06	-11.84	0.07	30.00
2 440	-9.53	0.11	-9.29	0.12	30.00
2 480	-12.09	0.06	-11.85	0.07	30.00

Note 1 : refer to 4.3.1 for information on limit reduction.
Note 2 : We took the insertion loss of the cable loss into consideration within the measuring instrument.
Note 3 : Result : Measured Value + Duty cycle Factor
Note 4 : Average Factor : 10*log(1/(On-time/Period)) refer to 4.3.5.7

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4.3.3 Peak Power Spectral Density

4.3.3.1 Regulation

According to §15.247(e) and RSS-247 §5.2(b) 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.

4.3.3.2 Measurement Procedure

ANSI C63.10 § 11.10 Maximum power spectral density level in the fundamental emission

4.3.3.2.1 Method PKPSD (peak PSD)

The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span > 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 x RBW].
e) Detector= peak.
t) Sweep time = No faster than coupled (auto) time.
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 requirement, then reduce RBW (but no less than 3 kHz) and repeat.

4.3.3.3 Result

Comply

4.3.3.4 Measurement Data

Test Mode : Bluetooth LE

Peak Power Spectral Density		
Freq. (MHz)	Result (dBm)	Limit (dBm)
2 402	-24.63	8.00
2 440	-21.79	8.00
2 480	-25.11	8.00

Note 1 : refer to 4.3.1 for information on limit reduction.
Note 2 : We took the insertion loss of the cable loss into consideration within the measuring instrument.

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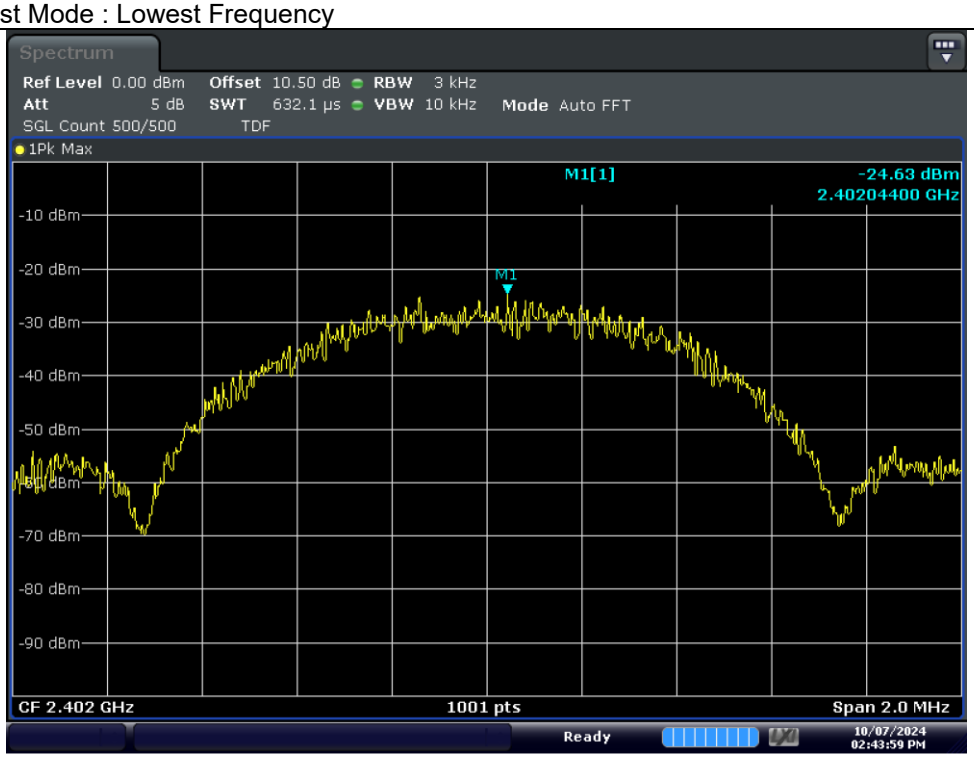
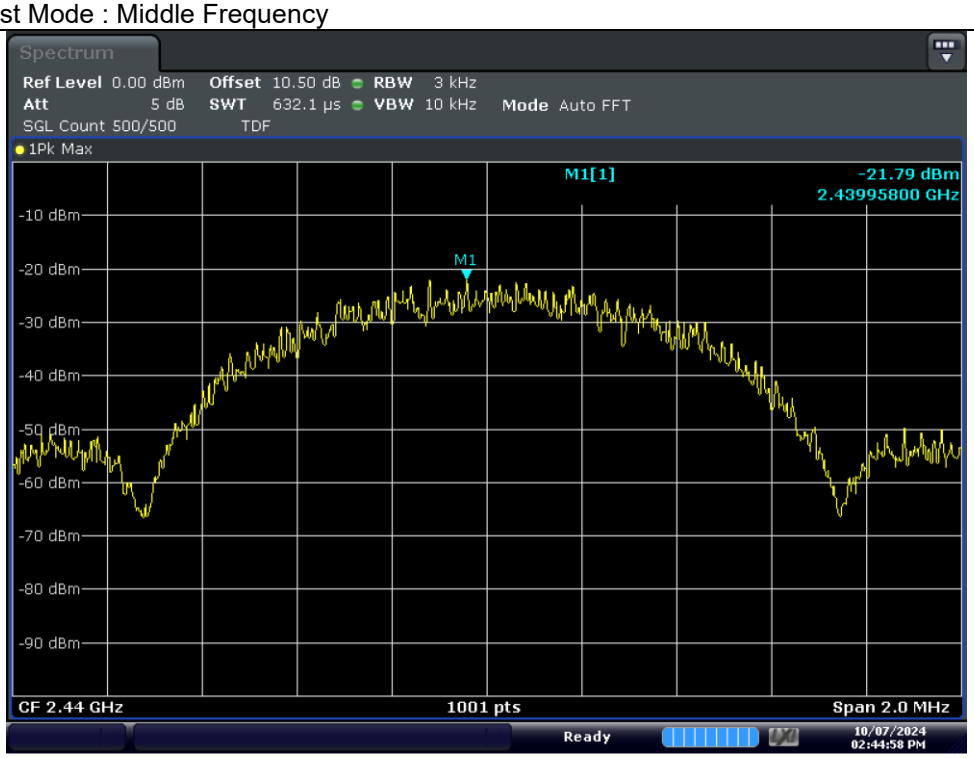
4.3.3.5 Test Plot

Test Mode : Lowest Frequency



Test Mode : Middle Frequency



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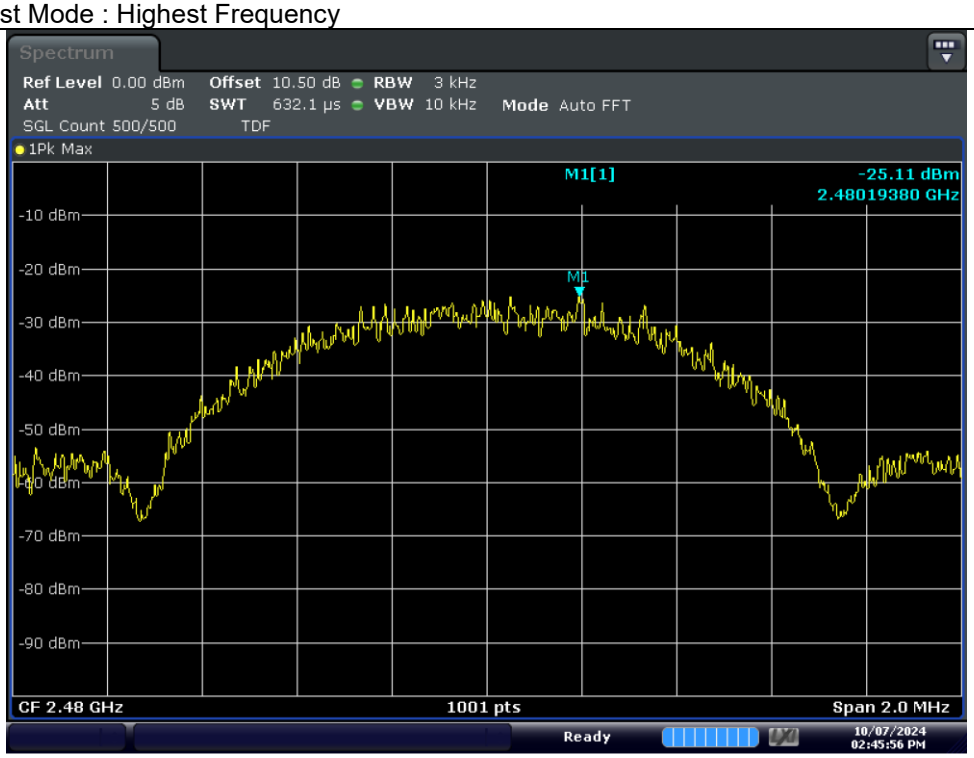
Test Mode : Highest Frequency



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4.3.4 6 dB Bandwidth(DTS Bandwidth)

4.3.4.1 Regulation

According to §15.247(a)(2) and RSS-247 §5.2(a) Systems using digital modulation techniques 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.

4.3.4.2 Measurement Procedure

ANSI C63.10 § 11.8 DTS bandwidth

4.3.4.2.1 Option 1

a) Set RBW = 100 kHz.
b) Set the 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.

4.3.4.2.2 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 above (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.

4.3.4.3 Result

Comply

4.3.4.4 Measurement Data

Test Mode : Bluetooth LE

Frequency (MHz)	6 dB Bandwidth (MHz)	Min. Limit (MHz)	Occupied Bandwidth (MHz)
2 402	0.71	0.50	1.05
2 440	0.71	0.50	1.07
2 480	0.70	0.50	1.06

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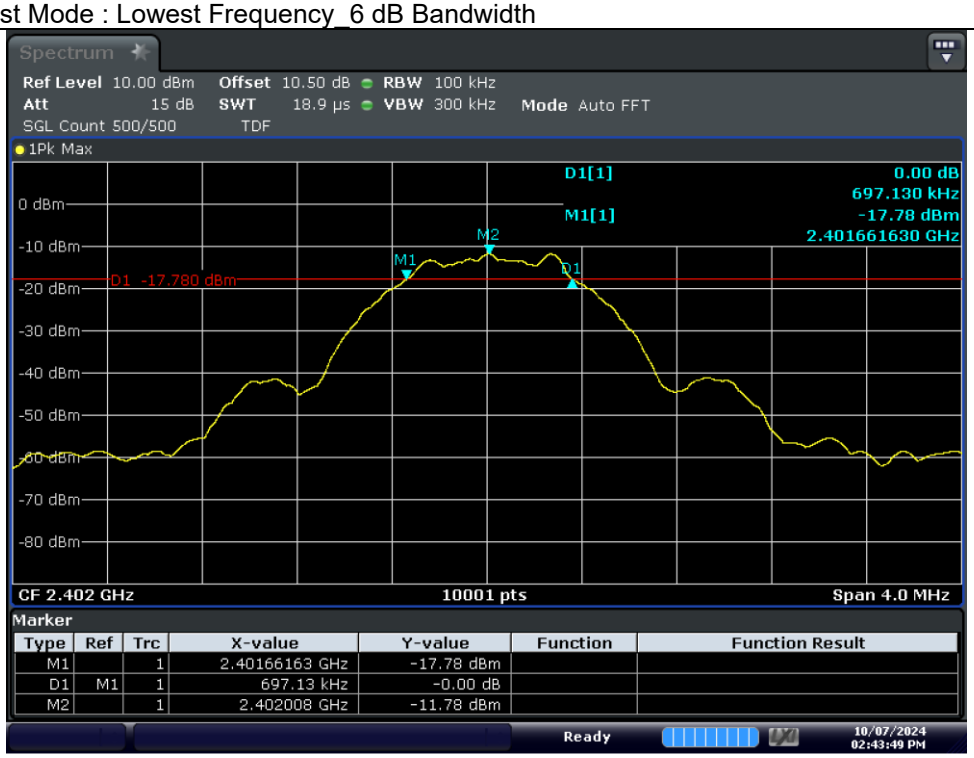
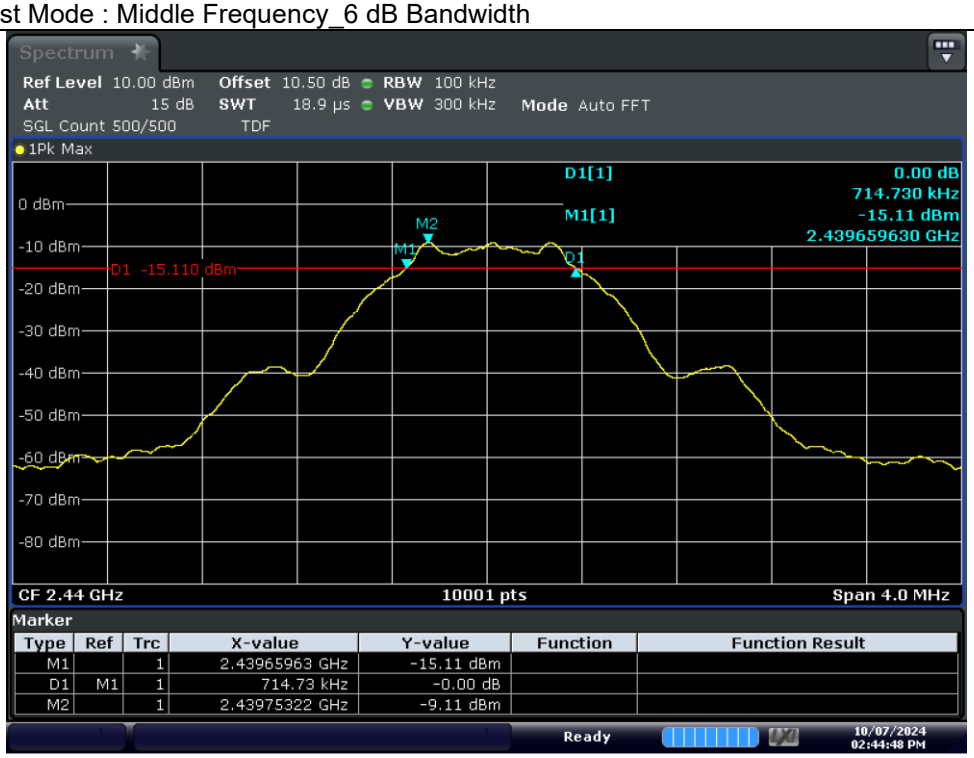
4.3.4.5 Test Plot

Test Mode : Lowest Frequency_6 dB Bandwidth



Test Mode : Middle Frequency_6 dB Bandwidth



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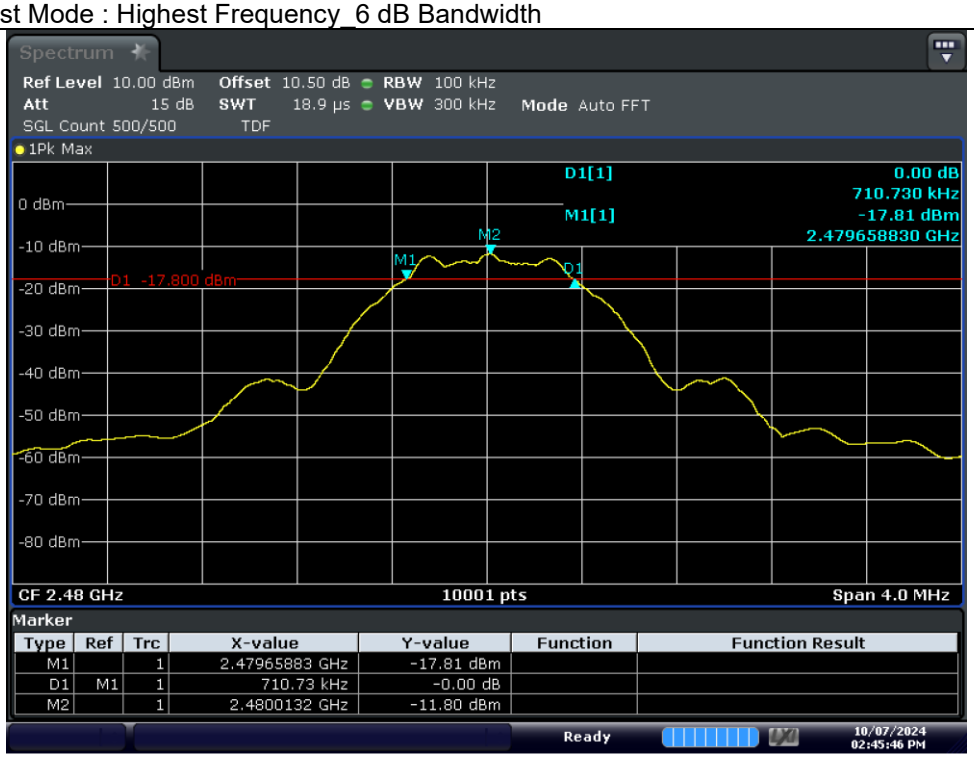
Test Mode : Highest Frequency_6 dB Bandwidth



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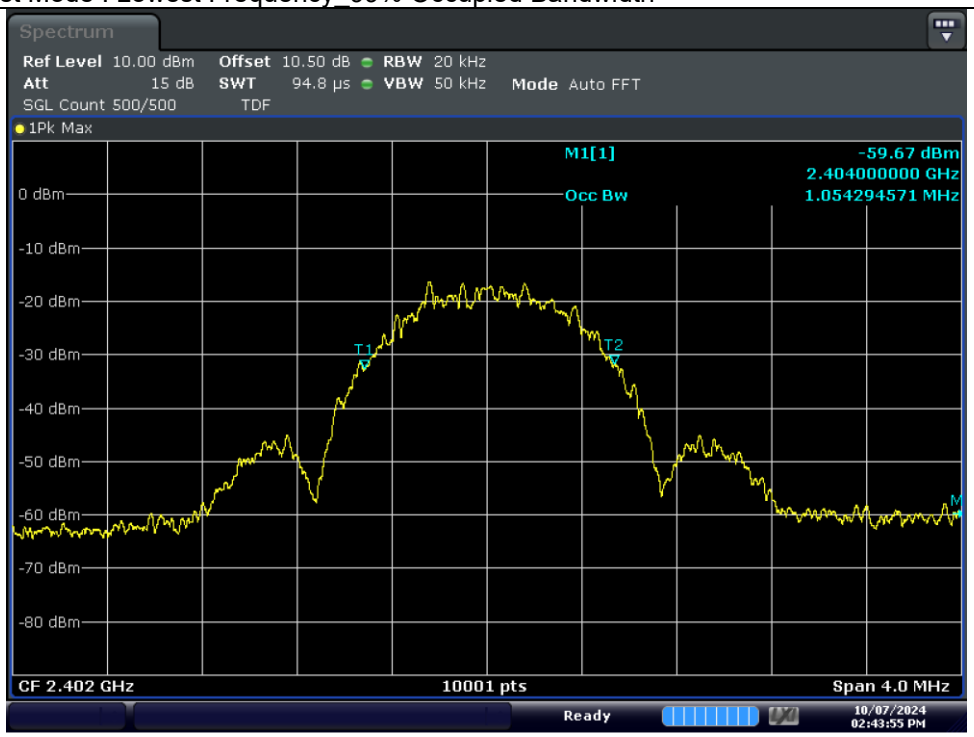
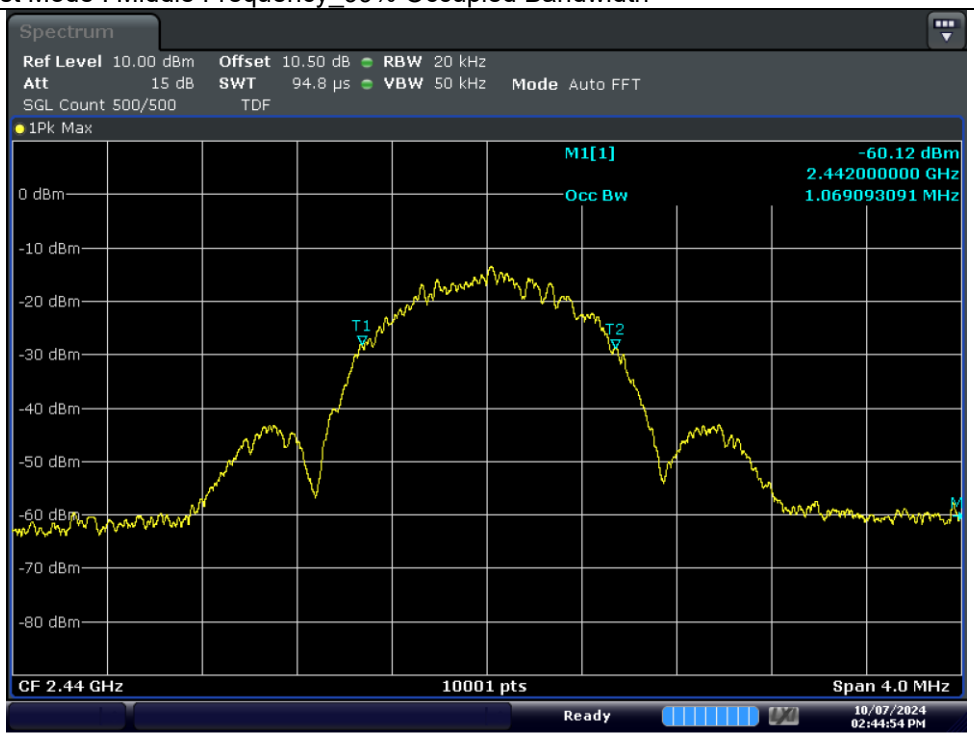
Test Mode : Lowest Frequency_99% Occupied Bandwidth



Test Mode : Middle Frequency_99% Occupied Bandwidth



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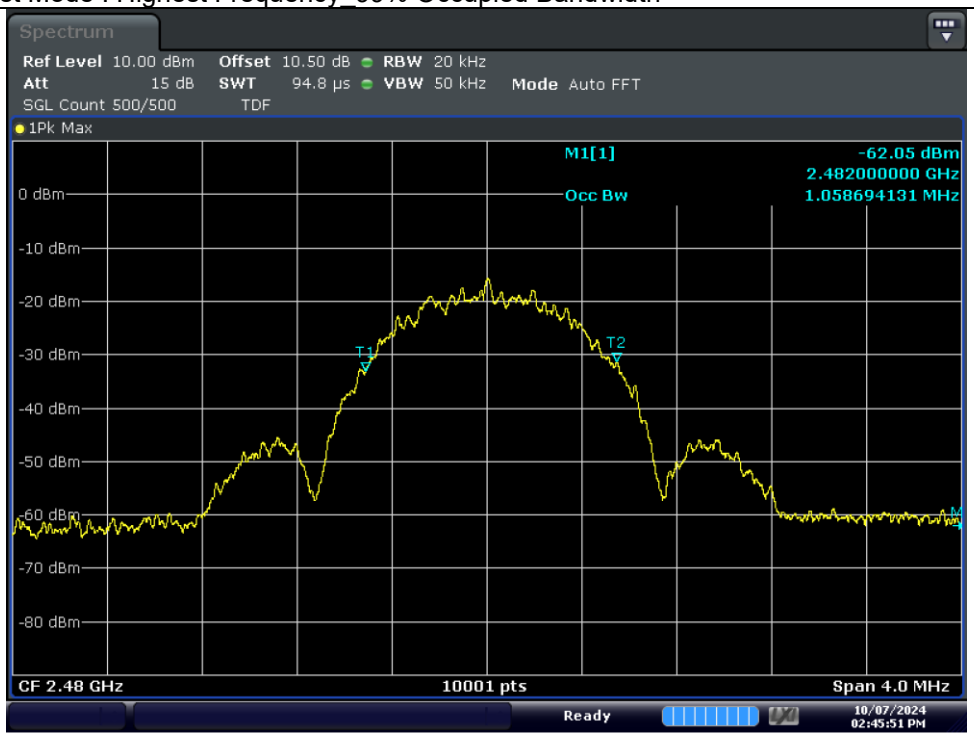
Test Mode : Highest Frequency_99% Occupied Bandwidth



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4.3.5 Spurious Emission, Band Edge, and Restricted bands

4.3.5.1 Regulation

According to §15.247(d) and RSS-247 §5.5 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. 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)).

According to §15.209(a) and RSS-GEN §8.9 Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall notexceed the field strength levels specified in the following table:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shallnot 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 permltted under other sections of this part, e.g., §§15.231 and 15.241.

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According to §15.205(a) and (b), and RSS-GEN §8.10 only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 – 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.386 75	156.7 - 156.9	2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 – 4 400	Above 38.6
13.36 - 13.41			

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurement

According to §RSS-GEN 8.10 Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.

MHz	MHz	MHz	GHz
0.009 - 0.110	13.36 - 13.41	960 – 1 427	9.0 - 9.2
0.495 - 0.505	16.42 - 16.423	1 435 – 1 626.5	9.3 - 9.5
2.173 5 - 2.190 5	16.694 75 - 16.695 25	1 645.5 – 1 646.5	10.6 - 12.7
4.125 - 4.128	16.804 25 - 16.804 75	1 660 – 1 710	13.25 - 13.4
3.020 -3.026	25.5 - 25.67	1 718.8 – 1 722.2	14.47 - 14.5
4.177 25 - 4.177 75	37.5 - 38.25	2 200 – 2 300	15.35 - 16.2
4.207 25 - 4.207 75	73 - 74.6	2 310 – 2 390	17.7 - 21.4
5.677 - 5.683	74.8 - 75.2	2 483.5 – 2 500	22.01 - 23.12
6.215 - 6.218	108 - 138	2 655 – 2 900	23.6 - 24.0
6.267 75 - 6.268 25	149.9 - 150.05	3 260 – 3 267	31.2 - 31.8
6.311 75 - 6.312 25	156.524 75 - 156.525 25	3 332 – 3 339	36.43 - 36.5
8.291 - 8.294	156.7 - 156.9	3 345.8 – 3 358	Above 38.6
8.362 - 8.366	162.012 5 - 167.17	3 500 – 4 400	
8.376 25 - 8.386 75	167.72 - 173.2	4 500 - 5 150	
8.414 25 - 8.414 75	240 - 285	5 350 - 5 460	
12.29 - 12.293	322 - 335.4	7 250 - 7 750	
12.519 75 - 12.520 25	399.9 - 410	8 025 - 8 500	
12.576 75 - 12.577 25	608 - 614		

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4.3.5.2 Measurement Procedure

4.3.5.2.1 Band-edge Compliance of RF Conducted Emissions

4.3.5.2.1.1 Reference Level Measurement

Establish a reference level by using the following procedure:

1) Set instrument center frequency to DTS channel center frequency.
2) Set the span to ≥ 1.5 times the DTS bandwidth.
3) Set the RBW = 100 kHz.
4) Set the VBW ≥ [3 x RBW].
5) Detector = peak.
6) Sweep time = No faster than coupled (auto) time.
7) Trace mode = max-hold.
8) Allow trace to fully stabilize.
9) Use the peak marker function to determine the maximum PSD level.

4.3.5.2.1.2 Emissions Level Measurement

1) Set the center frequency and span to encompass frequency range to be measured. Note that the frequency range might need to be divided into multiple frequency ranges to retain frequency resolution.
2) Set the RBW = 100 kHz.
3) Set the VBW ≥ [3 x RBW].
4) Detector = peak.
5) Sweep time = No faster than coupled (auto) time.
6) Trace mode = max-hold.
7) Allow trace to fully stabilize.
8) 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) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

4.3.5.2.2 Conducted Spurious Emissions

Set the spectrum analyzer as follows:

1) Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
2) RBW = 100 kHz
3) VBW ≥ 3 x RBW
4) Sweep = auto
5) Detector function = peak
6) Trace = max hold
7) Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
8) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

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4.3.5.2.3 Radiated Spurious Emissions

1) The preliminary and final rdiated measurements were performed to determine the frequency producing the maximum emissions in at a 10m anechoic chamber. The EUT was tested at a distance 3 meters.
2) The EUT was placed on the top of the 0.8 m height or 1.5 m height non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.
3) The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, and from 30 to 1 000 MHz using the TRILOG broadband antenna, and from 1 000 MHz to 26 500 MHz using the horn antenna.
4) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

Note 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1 GHz.
Note 2 : The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
Note 3 : The 0.8 m height is for below 1 GHz testing, and 1.5 m is for above 1 GHz testing
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : (Below 1 GHz) Loss : Cable loss – Amp gain, Result : Reading + Ant Factor + Loss
Note 6 : (Above 1 GHz) Factor : Ant Factor + Cable Loss - Amp Gain + Distance Factor
Peak Result : Reading + Factor
Average Reasult : Average Reading + Factor + Average Factor
Average Factor : 10*log(1/Duty Cycle) * Refer to 4.3.5.7
Note 7 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 8 : Not Detected means that peak data does not exceed the average limit.

4.3.5.3 Result

Comply (Measurement Data : Refer to the next page)

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4.3.5.4 Measurement Data

Test Mode : Below 1 GHz (Worst case : Highest Frequency)

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBμV)	Ant Factor (dB)	Loss (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
70.26	QP	H	34.20	17.20	-29.00	22.40	40.00	17.60
70.26	QP	V	30.40	17.20	-29.00	18.60	40.00	21.40

Test Mode : Above 1 GHz / Lowest Frequency

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBμV)	Factor (dB)	Averge Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2 336.53	PK	H	45.00	-3.74	-	41.26	74.00	32.74
2 349.60	PK	V	40.70	-3.64	-	37.06	74.00	36.94

Test Mode : Above 1 GHz / Middle Frequency

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBμV)	Factor (dB)	Averge Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 878.21	PK	H	45.50	1.76	-	47.26	74.00	26.74
4 878.21	PK	V	43.40	1.76	-	45.16	74.00	28.84

Test Mode : Above 1 GHz / Highest Frequency

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBμV)	Factor (dB)	Averge Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2 487.55	PK	H	41.80	-2.94	-	38.86	74.00	35.14
2 489.82	PK	V	38.80	-2.94	-	35.86	74.00	38.14
4 958.95	PK	H	47.10	1.86	-	48.96	74.00	25.04
4 958.95	PK	V	45.10	1.86	-	46.96	74.00	27.04

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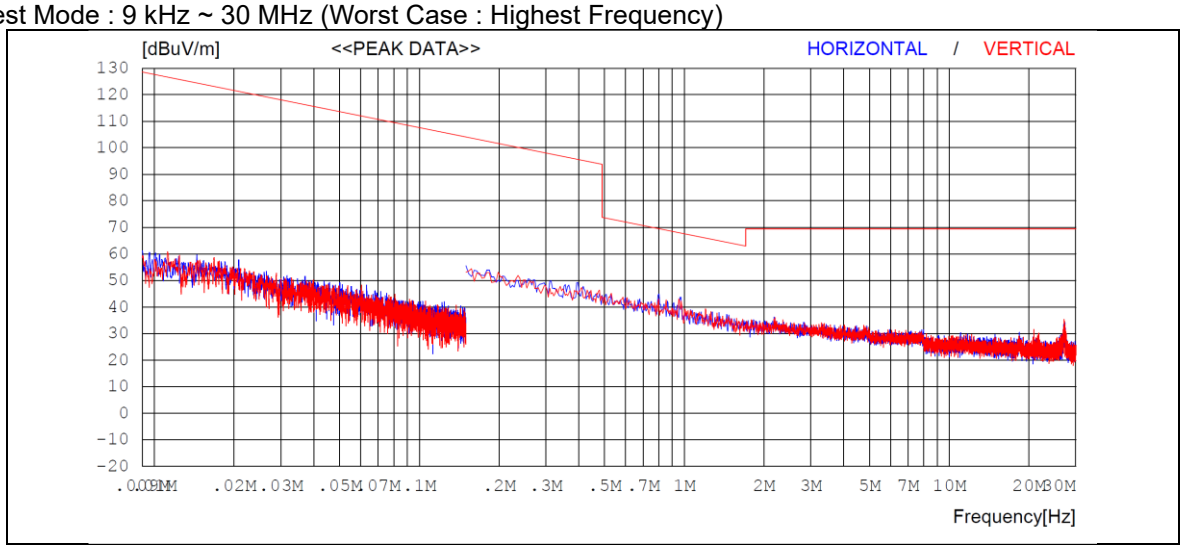
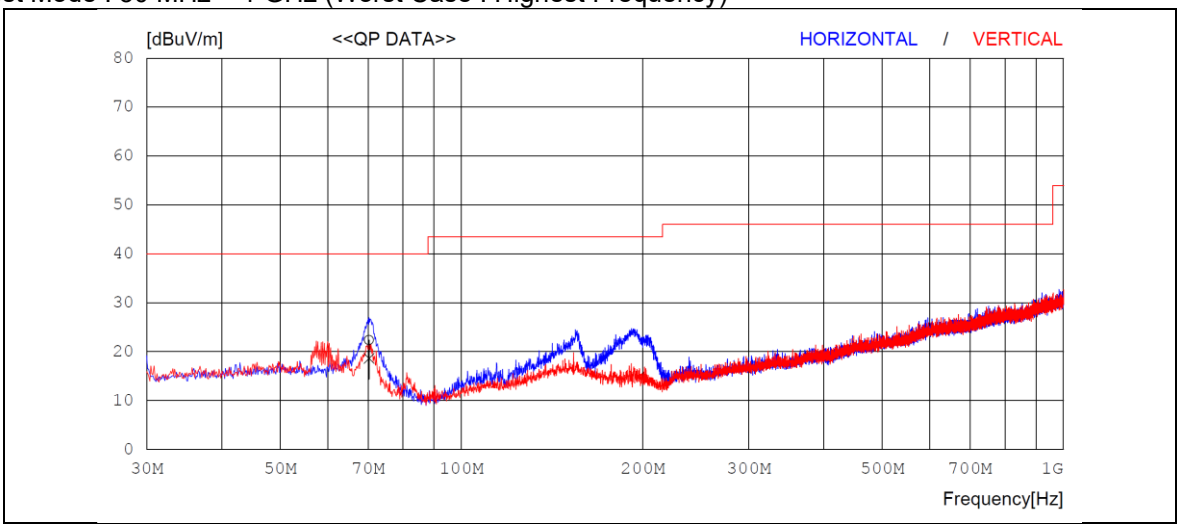
4.3.5.5 Measurement Plot_Radiated Spurious Emissions

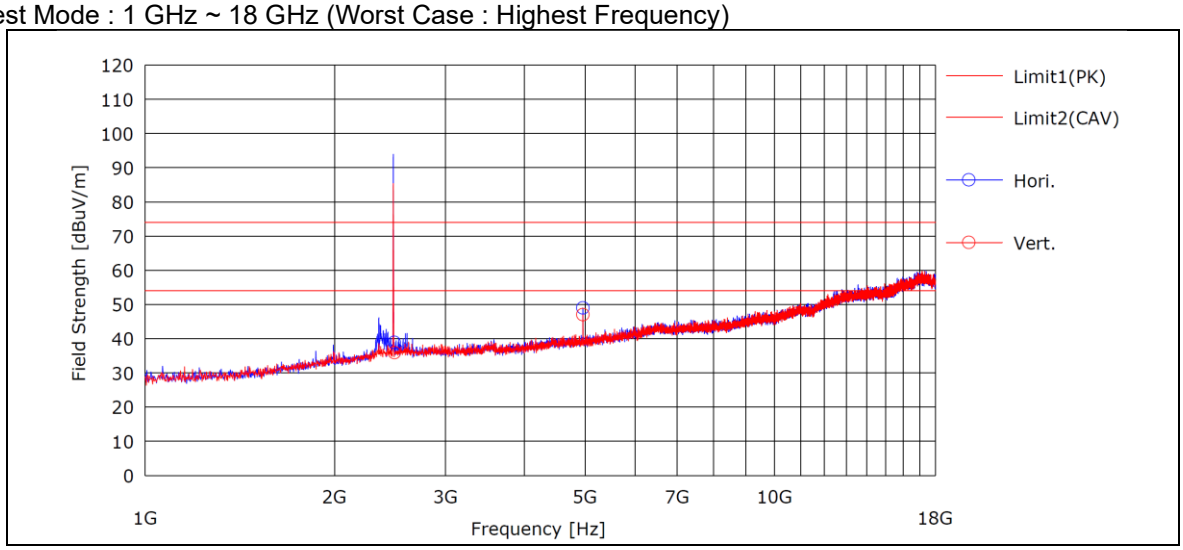
Test Mode : 9 kHz ~ 30 MHz (Worst Case : Highest Frequency)



Test Mode : 30 MHz ~ 1 GHz (Worst Case : Highest Frequency)



Test Mode : 1 GHz ~ 18 GHz (Worst Case : Highest Frequency)



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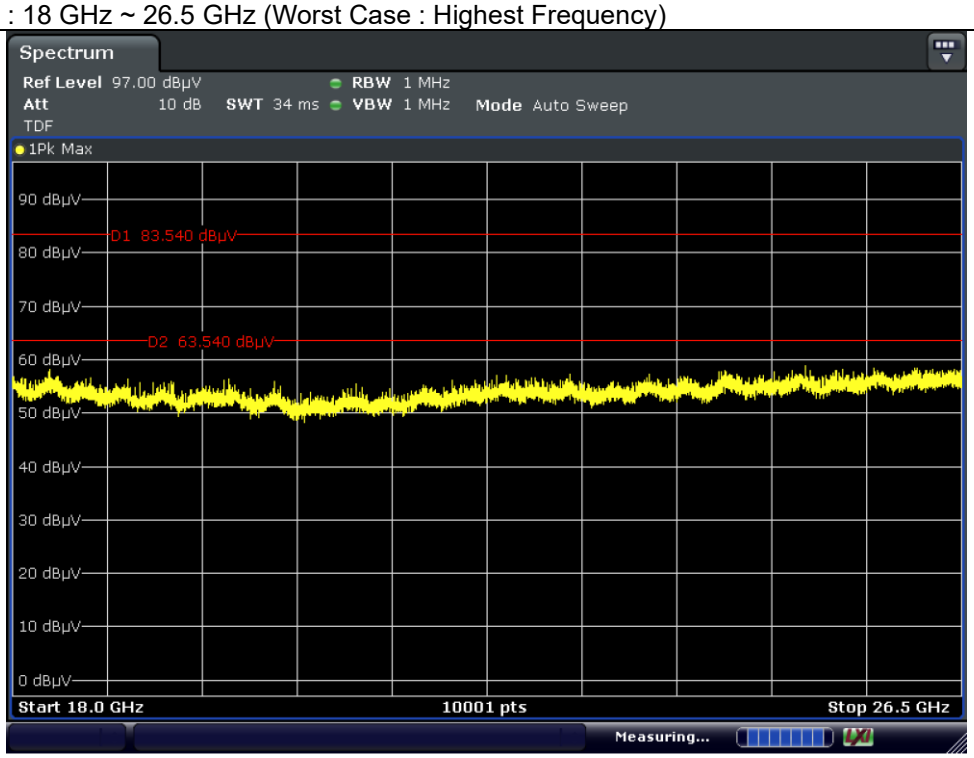
Test Mode : 18 GHz ~ 26.5 GHz (Worst Case : Highest Frequency)



Note 1: Limit : Peak : 83.54 dBµV/m, Average : 63.54 dBµV/m

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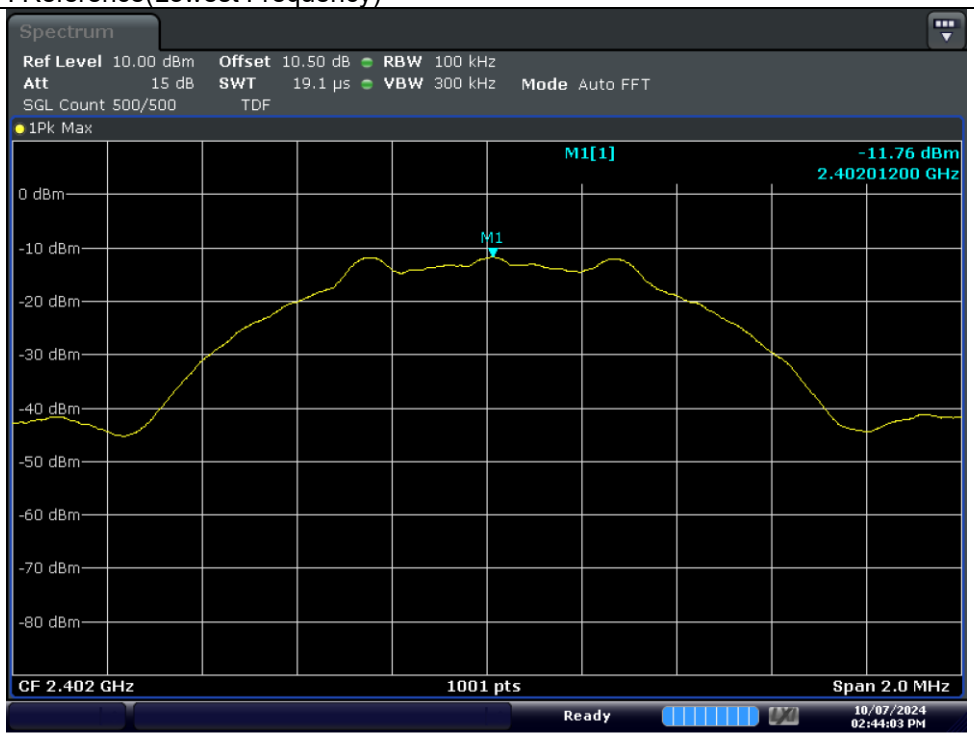
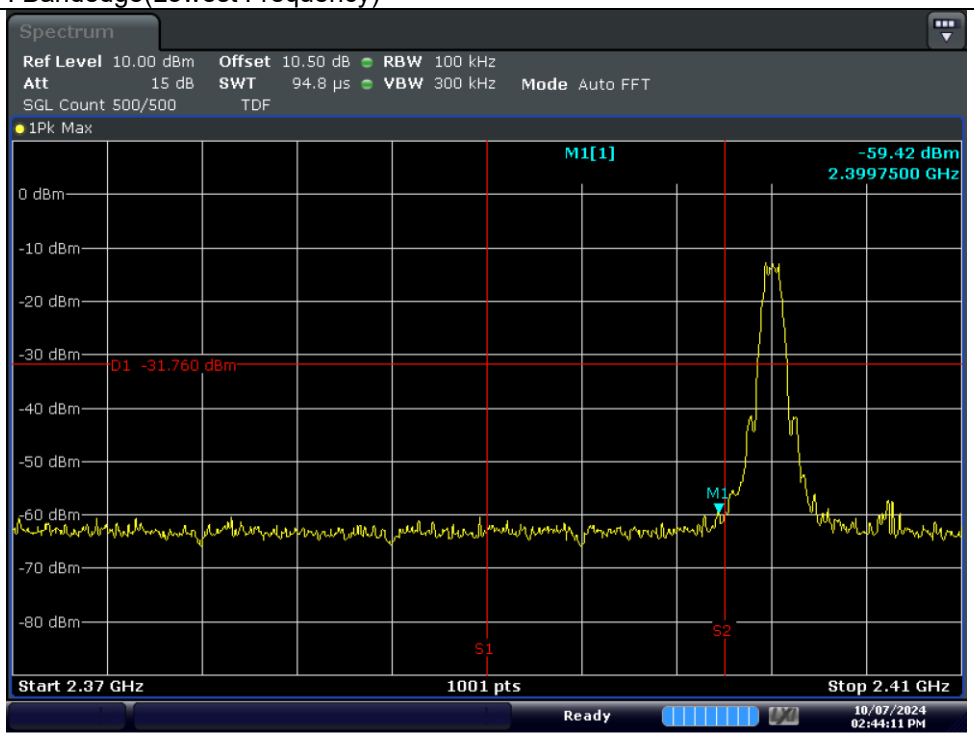
4.3.5.6 Measurement Data_Conducted Spurious Emissions

Test Mode : Reference(Lowest Frequency)



Test Mode : Bandedge(Lowest Frequency)



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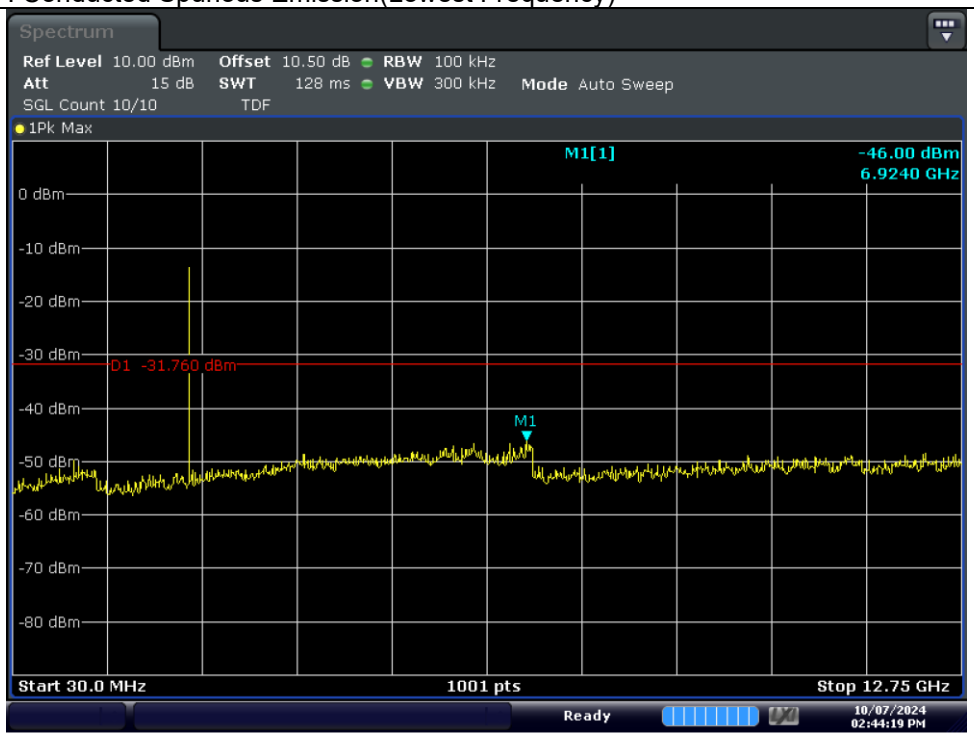
Test Mode : Conducted Spurious Emission(Lowest Frequency)



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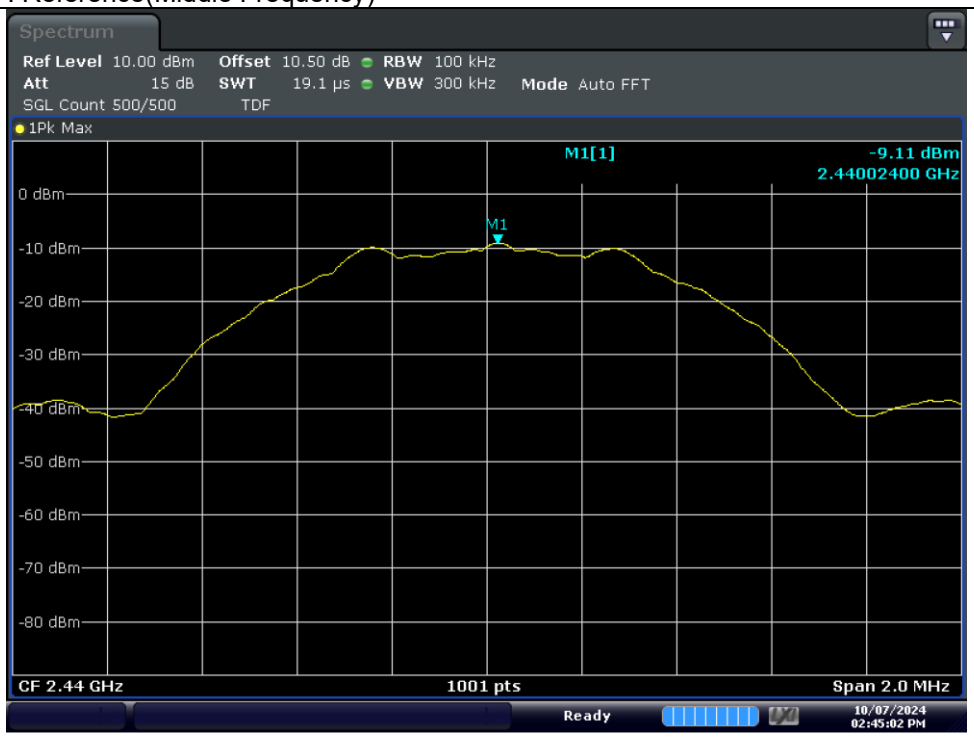
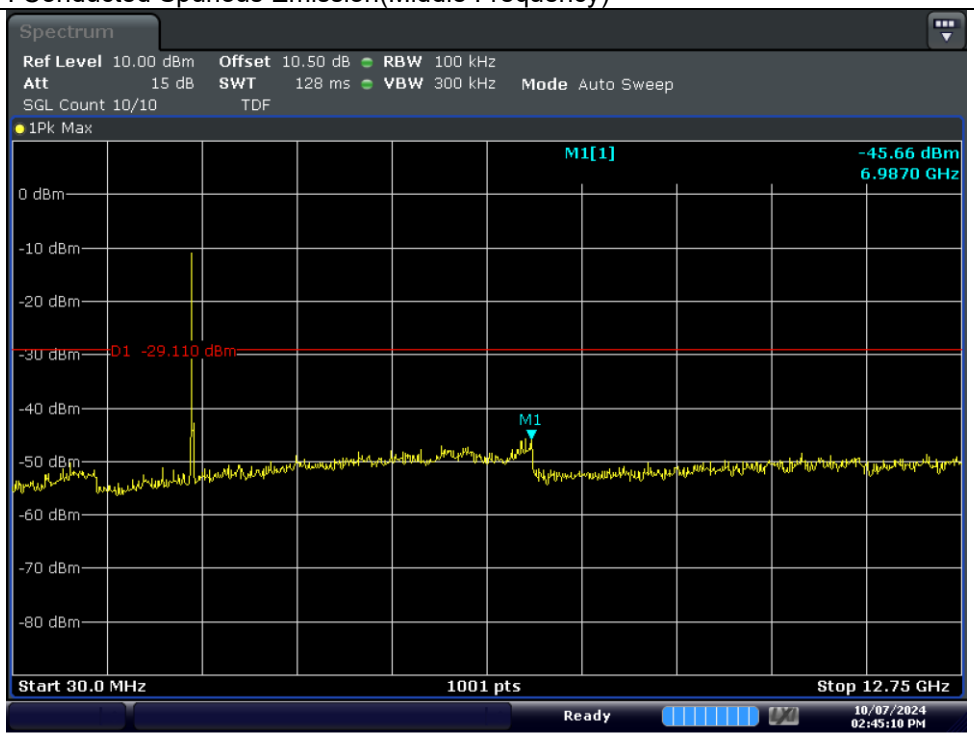
Test Mode : Reference(Middle Frequency)



Test Mode : Conducted Spurious Emission(Middle Frequency)



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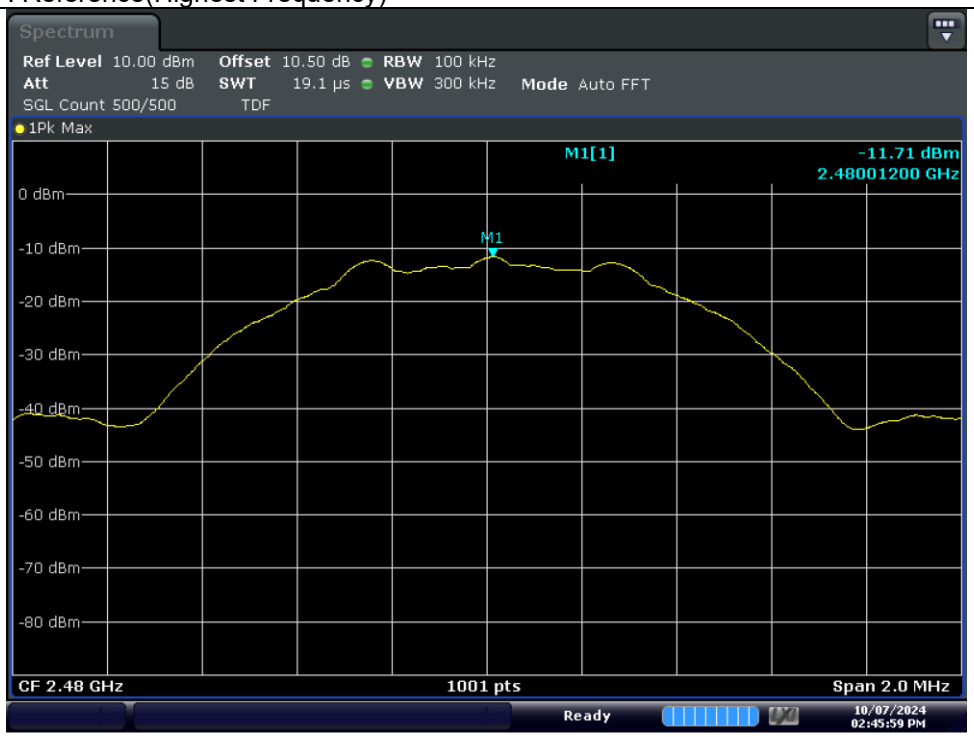
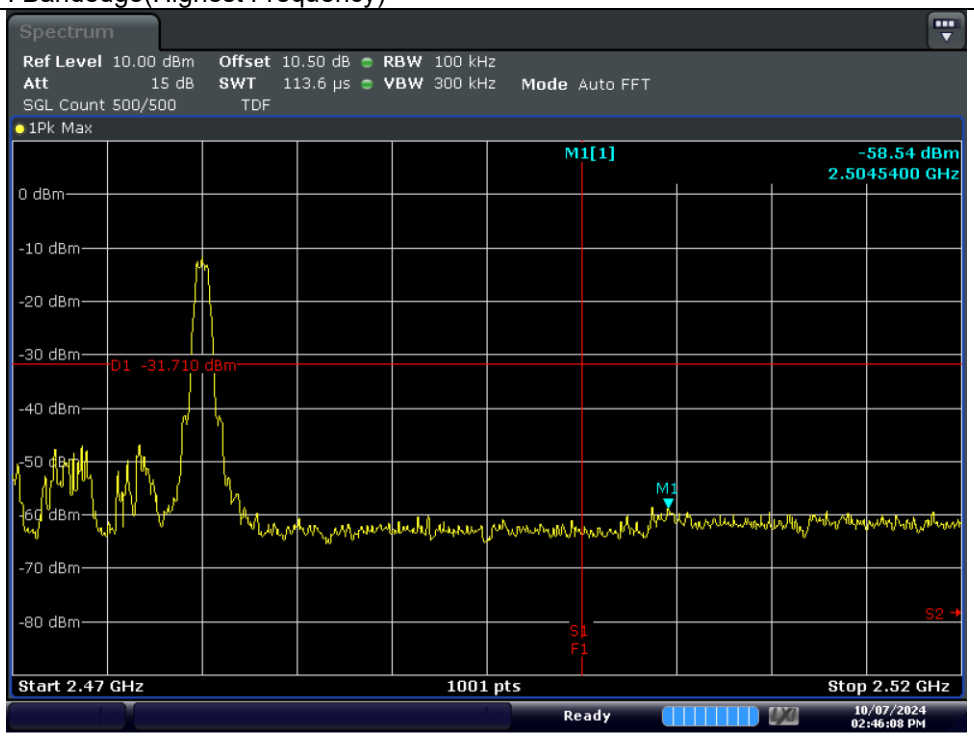
Test Mode : Reference(Highest Frequency)



Test Mode : Bandedge(Highest Frequency)



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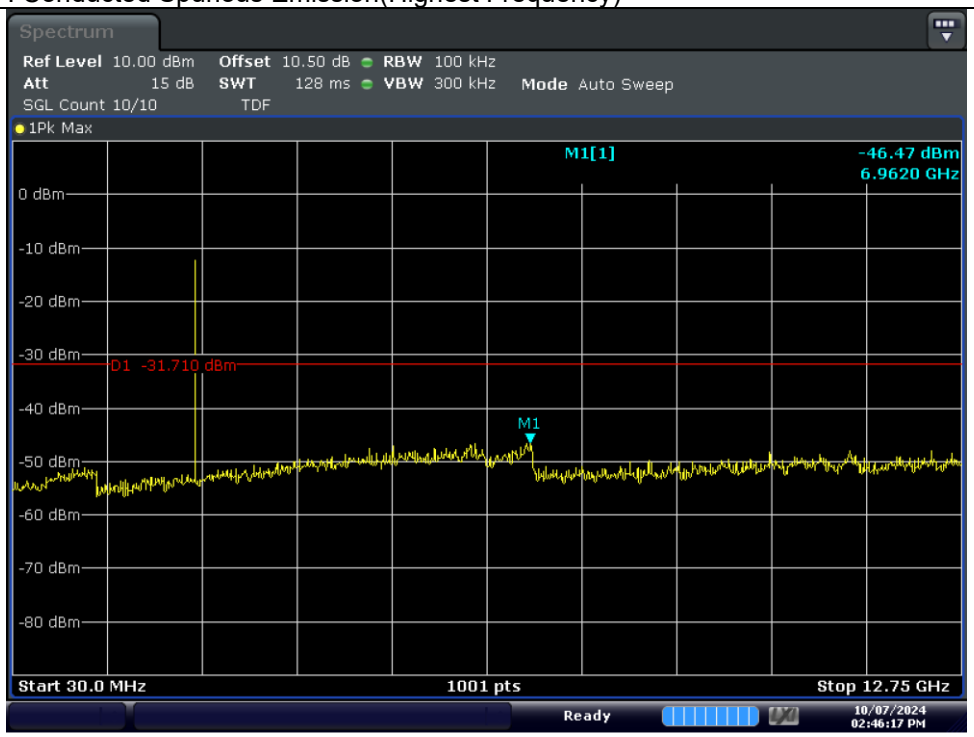
Test Mode : Conducted Spurious Emission(Highest Frequency)



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4.3.5.7 Measurement Data_Duty Cycle

Test Mode : Bluetooth LE

Average Factor(dB) : 10*log(1/(Ontime/Period)) = 0.24 dB

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4.3.6 Conducted Emission

4.3.6.1 Regulation

According to §15.207(a), and RSS-GEN §8.8 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 Ω line impedance stabilization network (LISN).
Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Qausi-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.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

4.3.6.2 Measurement Procedure

1) The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5 m away from the side wall of the shielded room.

2) Each current-carrying conductor of the EUT power cord was individually connected through a 50 Ω/50 μH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.

3) Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.

4) The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.

5) The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASIPEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

4.3.6.3 Result

Comply (Measurement Data : Refer to the next page)

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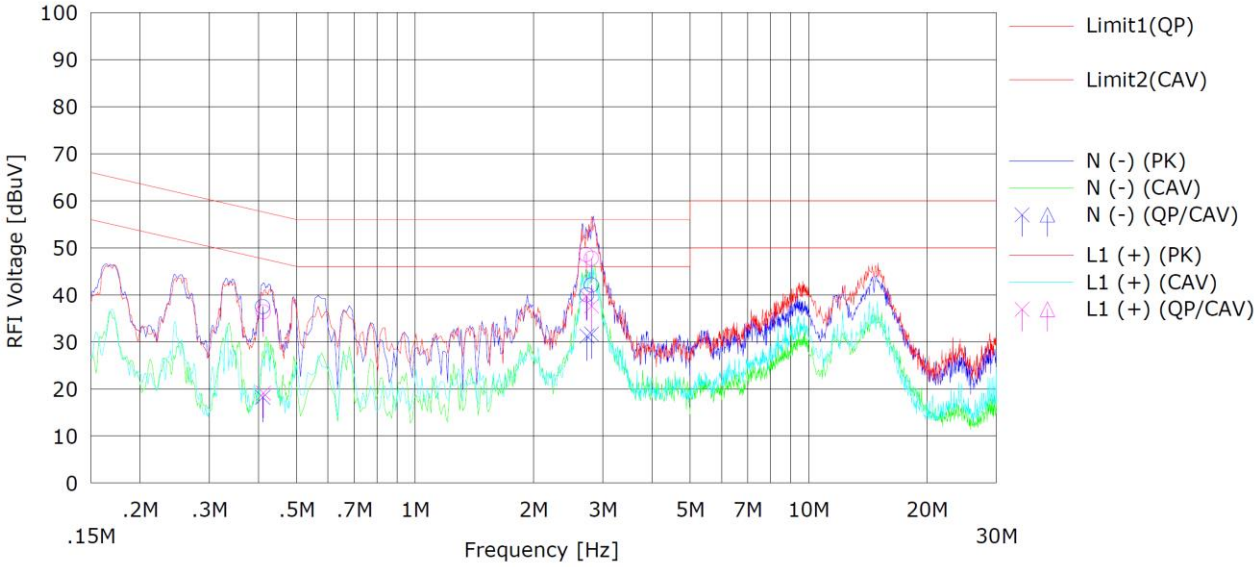
4.4.6.4 Measurement Data

Test Mode : Bluetooth LE (Worst Case : Highest Frequency)



NO	FREQ [MHz]	READING QP [dBuV]	READING CAV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT CAV [dBuV]	LIMIT QP [dBuV]	LIMIT CAV [dBuV]	MARGIN QP [dBuV]	MARGIN CAV [dBuV]	PHASE
1	0.40969	17.3	-2.0	20.2	37.4	18.2	57.7	47.7	20.3	29.5	N (-)
2	2.73132	19.9	11.2	20.1	40.0	31.2	56.0	46.0	16.0	14.8	N (-)
3	2.80559	22.0	11.6	20.1	42.0	31.6	56.0	46.0	14.0	14.4	N (-)
4	0.41122	16.1	-1.1	20.2	36.3	19.1	57.6	47.6	21.3	28.5	L1 (+)
5	2.72182	28.5	19.6	20.1	48.5	39.6	56.0	46.0	7.5	6.4	L1 (+)
6	2.80861	27.6	17.5	20.1	47.7	37.6	56.0	46.0	8.3	8.4	L1 (+)

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APPENDIX I

TEST EQUIPMENT USED FOR TESTS

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To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

Equipment	Manufacturer	Model	Serial No.	Cal. Date (yy.mm.dd)	Next Cal.Date (yy.mm.dd)
FSV Signal Analyzer	ROHDE&SCHWARZ	FSV40	101010	2024-04-01	2025-04-01
Power Sensor	KEYSIGHT	U2022XA	MY55320008	2024-08-12	2025-08-12
ATTENUATOR	WEINSCHEL	54A-10	69672	2023-10-11	2024-10-11
				2024-10-10	2025-10-10
Digital MultiMeter	HP	34401A	US36025428	2024-01-04	2025-01-04
Power Supply	KIKUSUI	PWX1500L	SM002050	2024-08-12	2025-08-12
Signal Generator	ROHDE&SCHWARZ	SMB100A	178384	2023-10-11	2024-10-11
				2024-10-10	2025-10-10
EMI Test Receiver	ROHDE&SCHWARZ	ESU40	100445	2024-09-04	2025-09-04
BiLog Antenna	Schwarzbeck	VULB9168	00821	2023-03-29	2025-03-29
Attenuator	JFW	50F-006	6 dB-3	2024-04-01	2025-04-01
Preamplifier	TSJ	MLA-10k01-b01-27	1870367	2024-04-01	2025-04-01
Antenna Mast(10 m)	TOKIN	5977	-	-	-
Antenna Mast(10 m)	Innco	MA4640-XPET-0800	578	-	-
Controller(10 m)	TOKIN	5909L	141909L-1	-	-
Controller(10 m)	Innco	CO3000	40040217	-	-
Turn Table(10 m)	TOKIN	5983-1.5	-	-	-
Active Loop H-Field	ETS	6502	150598	2024-06-03	2026-06-03
Double Ridege Horn Antenna	ETS	3117	168719	2024-08-05	2025-08-05
Double Ridege Horn Antenna	A.H Systems, Inc	SAS-574	465	2023-04-18	2025-04-18
PREAMPLIFIER	Agilent	8449B	3008A02110	2024-01-08	2025-01-08
PREAMPLIFIER	A.H Systems, Inc	PAM-1840VH	166	2024-01-08	2025-01-08
EMI Test Receiver	ROHDE&SCHWARZ	ESR7	101440	2024-09-04	2025-09-04
LISN	ROHDE&SCHWARZ	ENV216	101883	2024-04-01	2025-04-01
Pulse Limiter	Schwarzbeck	VTSD 9561-F	189	2024-04-02	2025-04-02
RF Cable	Radiall	1800920922000KE	CON-R007	2024-07-26	2025-01-26

-End-

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