RF TEST REPORT

For

Guangzhou Palemay photoelectric technology Co., LTD
Product Name: Chassis light leather wire light
Test Model(s).: 60x90app

Report Reference No.	:	**DACE240411018RL001**
FCC ID	:	**2BF7X-6090APP**
Applicant's Name	:	Guangzhou Palemay photoelectric technology Co., LTD
Address	:	441 Warehouse, 4th Floor, Liyuan Plaza, 45 Yongfu Road, Yuexiu District, Guangzhou
Testing Laboratory	:	Shenzhen DACE Testing Technology Co., Ltd.
Address	:	101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China
Test Specification Standard	:	**47 CFR Part 15.247** **ANSI C63.10-2013 & KDB 558074 D01 15.247 Meas Guidance v05r02**
Date of Receipt	:	April 11, 2024
Date of Test	:	April 11, 2024 to April 18, 2024
Data of Issue	:	April 18, 2024
Result	:	**Pass**

Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	DACE240411018RL001	April 18, 2024

NOTE1:

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

Compiled by:	Supervised by:	Approved by:
Keren Huang	Stone Yin	Tom Chen
Amy Zhu / Test Engineer	Stone Yin / Project Engineer	Tom Chen / Manager

CONTENTS

1 TEST SUMMARY

1.1 Test Standards

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

1.2 Summary of Test Result

Item	Method	Requirement	Result
Antenna requirement	/	47 CFR 15.203	Pass
Occupied Bandwidth	ANSI C63.10-2013, section 11.8	47 CFR 15.247(a)(2)	Pass
Maximum Conducted Output Power	ANSI C63.10-2013, section 11.9.1	47 CFR 15.247(b)(3)	Pass
Power Spectral Density	ANSI C63.10-2013, section 11.10	47 CFR 15.247(e)	Pass
Emissions in non-restricted frequency bands	ANSI C63.10-2013 section 11.11	47 CFR 15.247(d), 15.209, 15.205	Pass
Band edge emissions (Radiated)	ANSI C63.10-2013 section 6.10	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (below 1GHz)	ANSI C63.10-2013 section 6.6.4	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (above 1GHz)	ANSI C63.10-2013 section 6.6.4	47 CFR 15.247(d), 15.209, 15.205	Pass

Note: 1.N/A -this device(EUT) is not applicable to this testing item
2. RF-conducted test results including cable loss.

2 GENERAL INFORMATION

2.1 Client Information

Applicant's Name : Guangzhou Palemay photoelectric technology Co., LTD
Address : 441 Warehouse, 4th Floor, Liyuan Plaza, 45 Yongfu Road, Yuexiu District, Guangzhou

Manufacturer : Guangzhou Palemay photoelectric technology Co., LTD
Address : 441 Warehouse, 4th Floor, Liyuan Plaza, 45 Yongfu Road, Yuexiu District, Guangzhou

2.2 Description of Device (EUT)

Product Name:	Chassis light leather wire light
Model/Type reference:	60x90app
Series Model:	90x120app, 120x150app
Model Difference:	The power size and length of the product are different, but there is no change in PCB and BOM, it will not affect any EMC/RF performance of the product . Test sample model: 60x90app
Trade Mark:	N/A
Product Description:	Chassis light leather wire light
Power Supply:	DC12V -1A from adapter or others (Test voltage is DC12V from battery)
Operation Frequency:	2402MHz to 2480MHz
Number of Channels:	40
Modulation Type:	GFSK
Antenna Type:	PCB ANTENNA
Antenna Gain:	-0.61dBi
Hardware Version:	BLE-RGB-S
Software Version:	V1.0

Operation Frequency each of channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
3	2406MHz	13	2426MHz	23	2446MHz	33	2466MHz
4	2408MHz	14	2428MHz	24	2448MHz	34	2468MHz
5	2410MHz	15	2430MHz	25	2450MHz	35	2470MHz
6	2412MHz	16	2432MHz	26	2452MHz	36	2472MHz
7	2414MHz	17	2434MHz	27	2454MHz	37	2474MHz
8	2416MHz	18	2436MHz	28	2456MHz	38	2476MHz
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

Note:

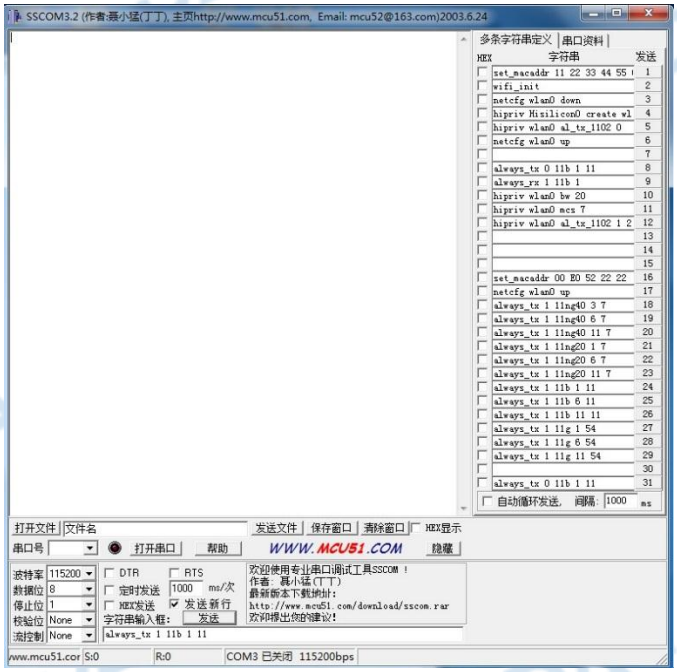
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the

selected channel see below:

Test channel	Frequency (MHz)
	BLE
Lowest channel(L)	2402MHz
Middle channel(M)	2440MHz
Highest channel(H)	2480MHz

2.3 Description of Test Modes

No	Title	Description
TM1	TX-GFSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation.

Title	Description
TX mode	Keep the EUT works in continuously transmitting mode.
	☒Special software is used. ☐Through engineering command into the engineering mode. engineering command: *#*#3646633#*#* ☐Other method:
	Special software: 

2.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Title	Manufacturer	Model No.	Serial No.
BATTERY	CAMEL	DC12V	/
/	/	/	/

2.5 Equipments Used During The Test

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

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RF Test Software	Tachoy Information	RTS-01	V2.0.0.0	/	/
RF Sensor Unit	Tachoy Information	TR1029-2	000001	/	/
Vector signal generator	Keysight	N5181A	MY48180415	2023-11-09	2024-11-08
Signal generator	Keysight	N5182A	MY50143455	2023-11-09	2024-11-08
Spectrum Analyzer	Keysight	N9020A	MY53420323	2023-12-12	2024-12-11

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

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test software	Farad	EZ -EMC	V1.1.42	/	/
Positioning Controller	/	MF-7802	/	/	/
Amplifier(18-40G)	COM-POWER	AH-1840	10100008-1	2022-04-05	2025-04-04
Horn antenna	COM-POWER	AH-1840 (18-40G)	10100008	2023-04-05	2025-04-04
Loop antenna	ZHINAN	ZN30900C	ZN30900C	2021-07-05	2024-07-04
Cable(LF)#2	Schwarzbeck	/	/	2024-02-19	2025-02-18
Cable(LF)#1	Schwarzbeck	/	/	2024-02-19	2025-02-18
Cable(HF)#2	Schwarzbeck	AK9515E	96250	2024-03-20	2025-03-19
Cable(HF)#1	Schwarzbeck	SYV-50-3-1	/	2024-03-20	2025-03-19
Power amplifier(LF)	Schwarzbeck	BBV9743	9743-151	2023-06-13	2024-06-12
Power amplifier(HF)	Schwarzbeck	BBV9718	9718-282	2023-06-13	2024-06-12
Wideband radio communication tester	R&S	CMW500	113410	2023-06-13	2024-06-12
Spectrum Analyzer	R&S	FSP30	1321.3008K40 -101729-jR	2023-06-14	2024-06-13
Horn Antenna	Sunol Sciences	DRH-118	A091114	2023-05-13	2025-05-12
Broadband Antenna	Sunol Sciences	JB6 Antenna	A090414	2023-05-21	2025-05-20
Test Receiver	R&S	ESCI	102109	2023-06-13	2024-06-12

2.6 Statement Of The Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Disturbance (0.15~30MHz)	±3.41dB
Occupied Bandwidth	±3.63%
RF conducted power	±0.733dB
RF power density	±0.234%
Conducted Spurious emissions	±1.98dB
Radiated Emission (Above 1GHz)	±5.46dB
Radiated Emission (Below 1GHz)	±5.79dB
Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

2.7 Identification of Testing Laboratory

Company Name:	Shenzhen DACE Testing Technology Co., Ltd.
Address:	101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China
Phone Number:	+86-13267178997
Fax Number:	86-755-29113252

Identification of the Responsible Testing Location

Company Name:	Shenzhen DACE Testing Technology Co., Ltd.
Address:	101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China
Phone Number:	+86-13267178997
Fax Number:	86-755-29113252
FCC Registration Number:	0032847402
Designation Number:	CN1342
Test Firm Registration No.:	778666
A2LA Certificate Number:	6270.01

2.8 Announcement

(1) The test report reference to the report template version v0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) This document may not be altered or revised in any way unless done so by DACE and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

(6) We hereby declare that the laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant. the laboratory is not responsible for the accuracy of the information provided by the client. When the information provided by the customer may affect the effectiveness of the results, the responsibility lies with the customer, and the laboratory does not assume any responsibility.

3 Evaluation Results (Evaluation)

3.1 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.

3.1.1 Conclusion:

Meets requirements

4 Radio Spectrum Matter Test Results (RF)

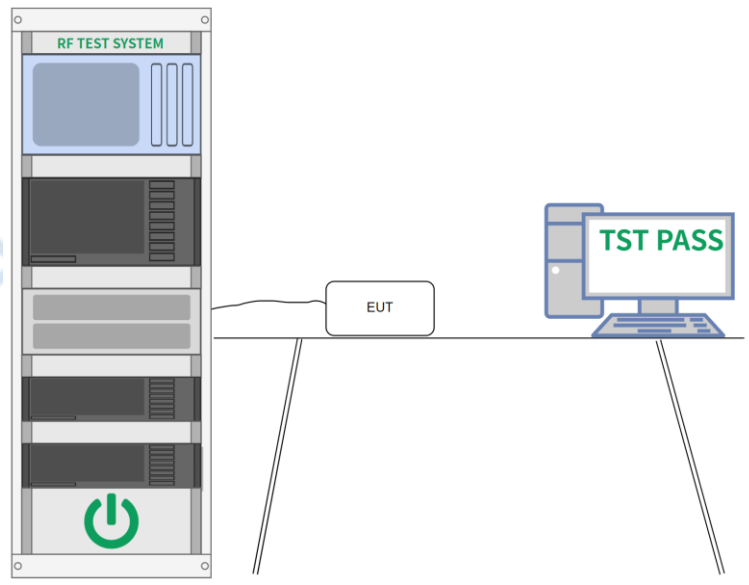
4.1 Occupied Bandwidth

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 C63.10-2013, section 11.8
Procedure:	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.

4.1.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.6 °C	Humidity:	51.2 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.1.2 Test Setup Diagram:



4.1.3 Test Data:

Please Refer to Appendix for Details.

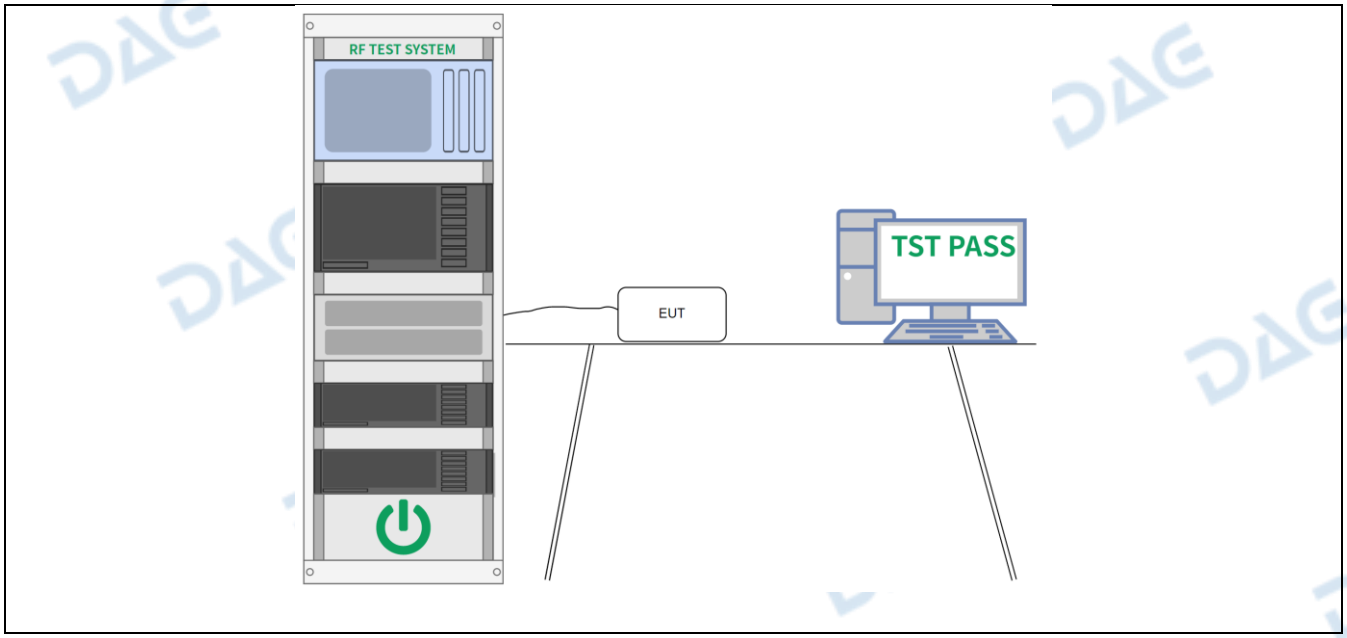
4.2 Maximum Conducted Output Power

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 C63.10-2013, section 11.9.1
Procedure:	ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power Note: Per ANSI C63.10-2013, if there are two or more antnnas, the conducted powers at Core 0, Core 1,…, Core i were first measured separately, as shown in the section above(this product olny have one antenna). The measured values were then summed in linear power units then converted back to dBm. Per ANSI C63.10-2013 Section 14.4.3.2.3, the directional gain is calculated using the following formula, where GN is the gain of the nth antenna and NANT, the total number of antennas used. For correlated unequal antenna gain Directional gain = 10*log[(10G1/20 + 10G2/20 + … + 10GN/20)2 / NANT] dBi For completely uncorrelated unequal antenna gain Directional gain = 10*log[(10G1/10 + 10G2/10 + … + 10GN/10)/ NANT] dBi Sample Multiple antennas Calculation: Core 0 + Core 1 +…Core i. = MIMO/CDD (i is the number of antennas) (#VALUE! mW + mW) = #VALUE! mW = dBm Sample e.i.r.p. Calculation: e.i.r.p. (dBm) = Conducted Power (dBm) + Ant gain (dBi)

4.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.6 °C	Humidity:	51.2 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.2.2 Test Setup Diagram:



4.2.3 Test Data:

Please Refer to Appendix for Details.

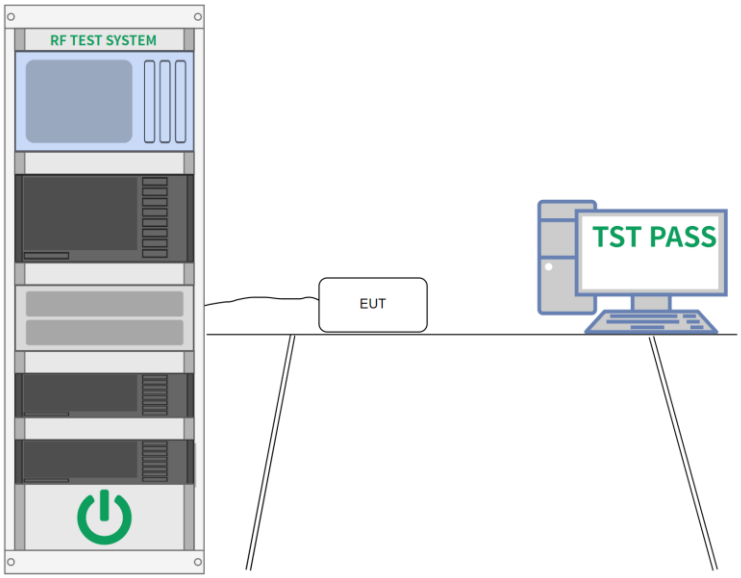
4.3 Power Spectral Density

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 C63.10-2013, section 11.10
Procedure:	ANSI C63.10-2013, section 11.10, Maximum power spectral density level in the fundamental emission

4.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.6 °C	Humidity:	51.2 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.3.2 Test Setup Diagram:



4.3.3 Test Data:

Please Refer to Appendix for Details.

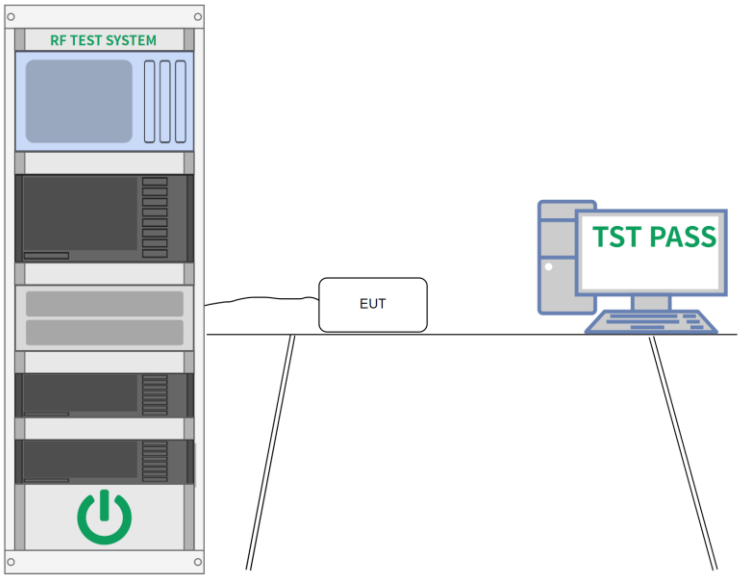
4.4 Emissions in non-restricted frequency bands

Test Requirement:	47 CFR 15.247(d), 15.209, 15.205
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 C63.10-2013 section 11.11
Procedure:	ANSI C63.10-2013 Section 11.11.1, Section 11.11.2, Section 11.11.3

4.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.6 °C	Humidity:	51.2 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.4.2 Test Setup Diagram:



4.4.3 Test Data:

Please Refer to Appendix for Details.

4.5 Band edge emissions (Radiated)

Test Requirement:	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)).`
Test Limit:	

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

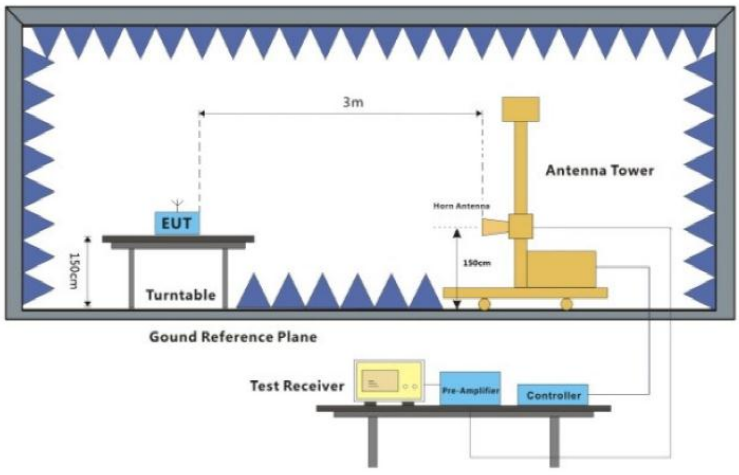
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this 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.

Test Method:	ANSI C63.10-2013 section 6.10
Procedure:	ANSI C63.10-2013 section 6.10.5.2

4.5.1 E.U.T. Operation:

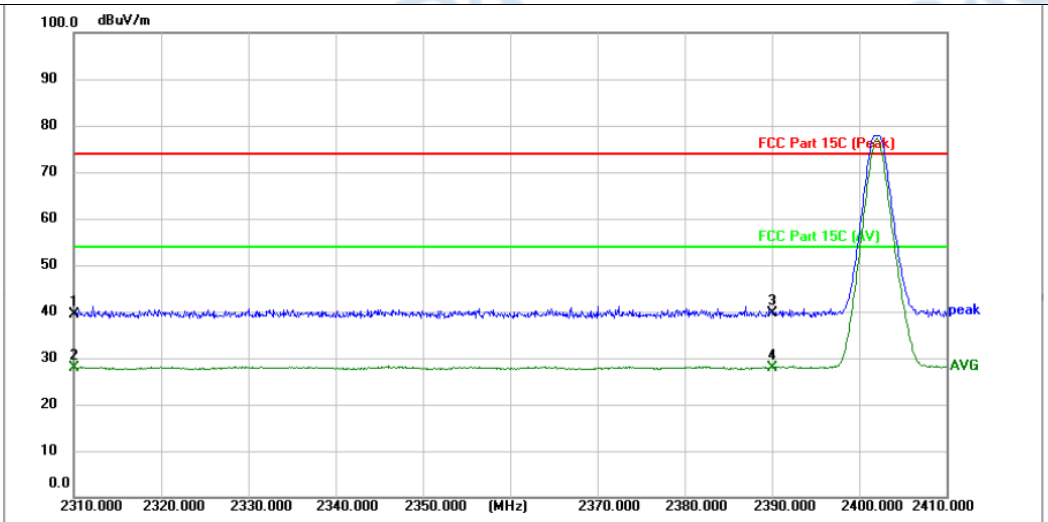
Operating Environment:					
Temperature:	22.6 °C	Humidity:	51.2 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.5.2 Test Setup Diagram:



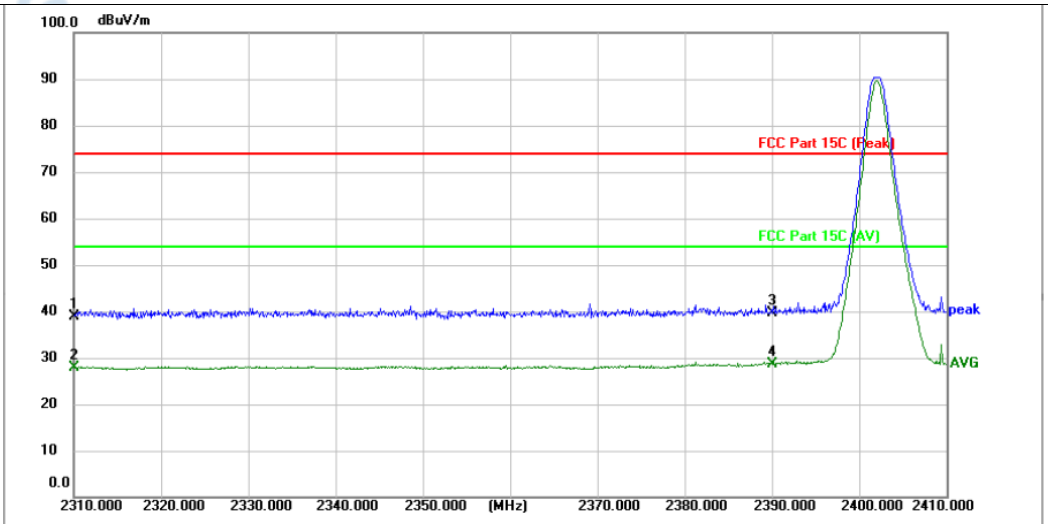
4.5.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



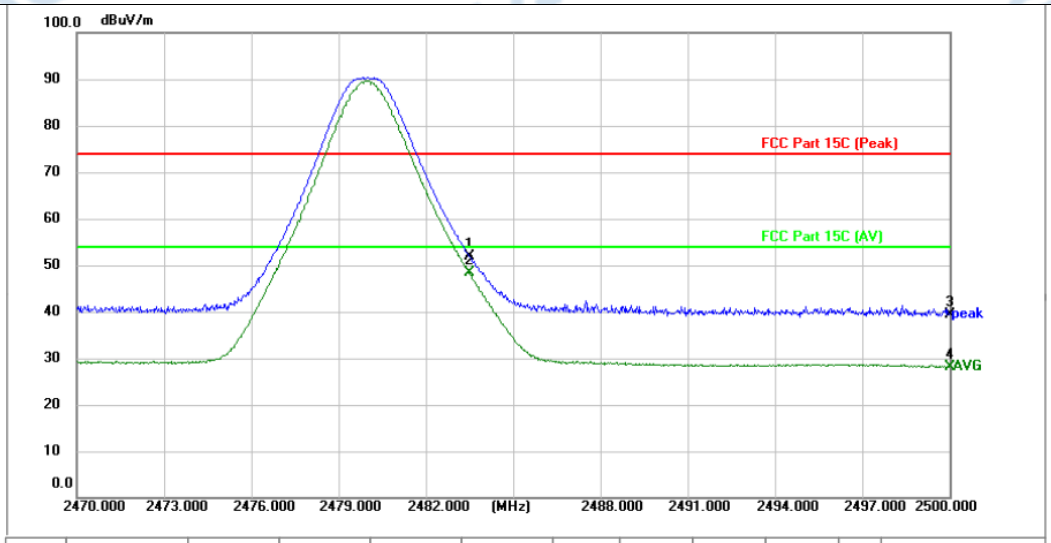
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	40.26	-0.93	39.33	74.00	-34.67	peak	150		P	
2 *	2310.000	28.88	-0.93	27.95	54.00	-26.05	AVG	150		P	
3	2390.000	40.45	-0.73	39.72	74.00	-34.28	peak	150		P	
4	2390.000	28.59	-0.73	27.86	54.00	-26.14	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



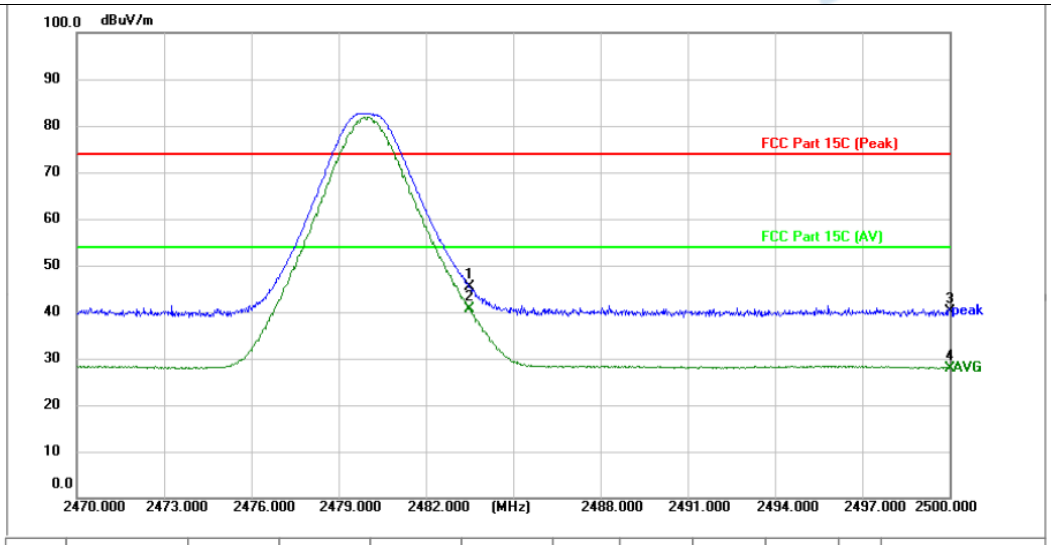
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	41.19	-2.23	38.96	74.00	-35.04	peak	150		P	
2	2310.000	30.18	-2.23	27.95	54.00	-26.05	AVG	150		P	
3	2390.000	41.59	-1.92	39.67	74.00	-34.33	peak	150		P	
4 *	2390.000	30.64	-1.92	28.72	54.00	-25.28	AVG	150		P	

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	53.55	-1.56	51.99	74.00	-22.01	peak			P	
2 *	2483.500	49.84	-1.56	48.28	54.00	-5.72	AVG			P	
3	2500.000	40.79	-1.50	39.29	74.00	-34.71	peak			P	
4	2500.000	29.72	-1.50	28.22	54.00	-25.78	AVG			P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	45.88	-0.49	45.39	74.00	-28.61	peak	150		P	
2 *	2483.500	41.24	-0.49	40.75	54.00	-13.25	AVG	150		P	
3	2500.000	40.65	-0.45	40.20	74.00	-33.80	peak	150		P	
4	2500.000	28.43	-0.45	27.98	54.00	-26.02	AVG	150		P	

Remark:

1.Mesurement Level = Reading level + Correct Factor, Margin= Mesurement Level - Limit
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

4.6 Emissions in frequency bands (below 1GHz)

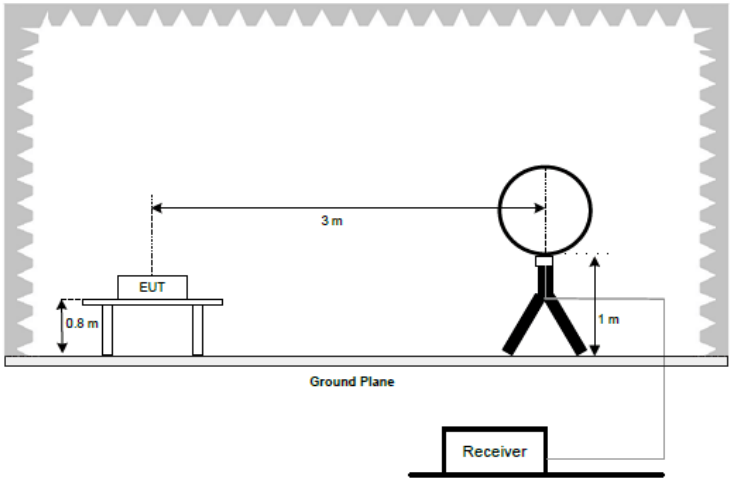
<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<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 C63.10-2013 section 6.6.4</td></tr>
<tr><td>Procedure:</td><td>a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
j. Repeat above procedures until all frequencies measured was complete.
Remark:
1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:</td></tr>
</table>

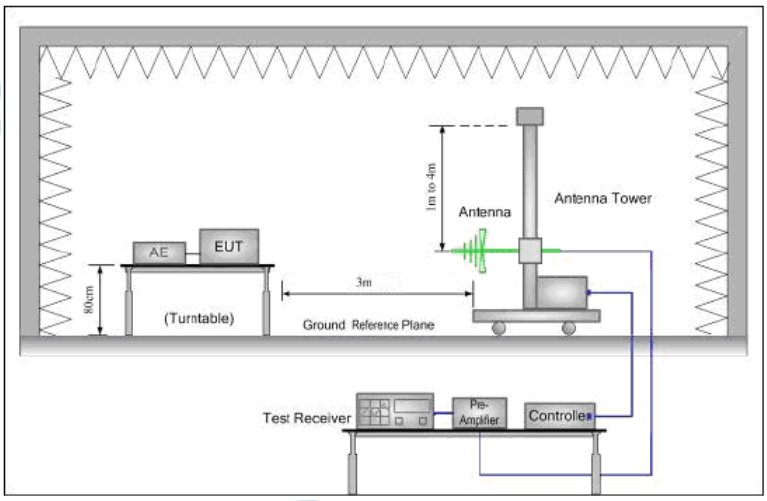
	Final Test Level =Receiver Reading + Antenna Factor + Cable Factor ¨C Preamplifier Factor 3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.

4.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.6 °C	Humidity:	51.2 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.6.2 Test Setup Diagram:





4.6.3 Test Data:

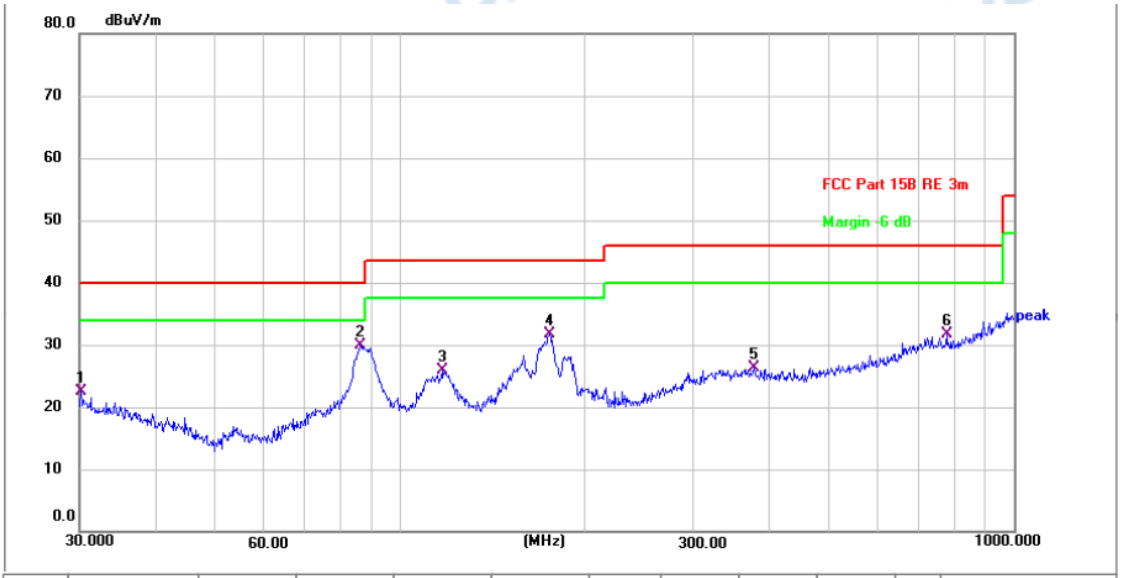
Between 9KHz – 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

Between 30MHz – 1000MHz:

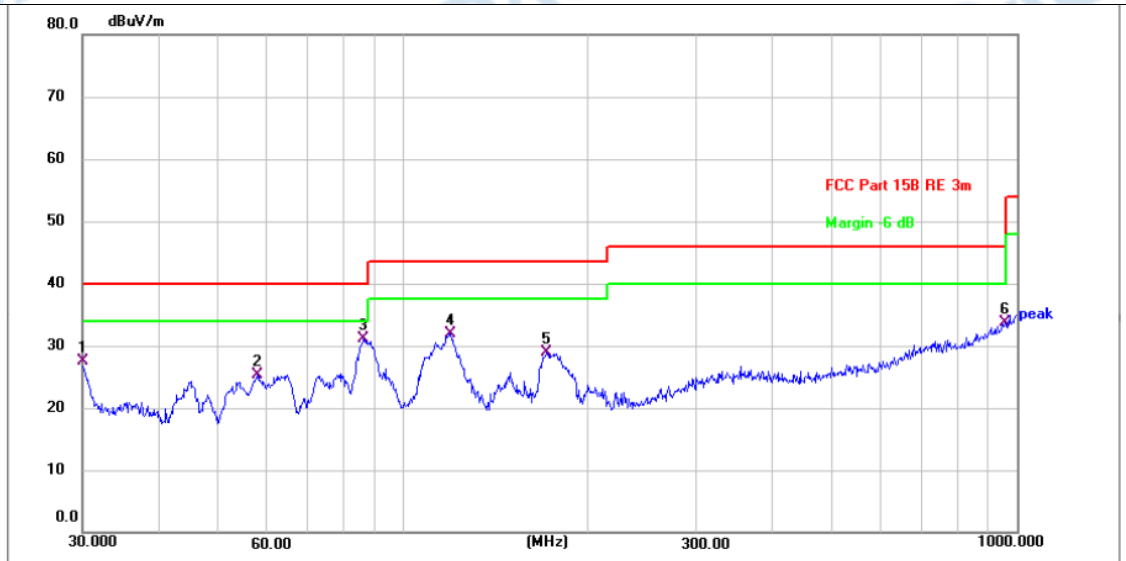
Between 30MHz-1000MHz

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	30.2111	25.50	-2.92	22.58	40.00	-17.42	QP	100		P	
2 *	86.2001	36.58	-6.63	29.95	40.00	-10.05	QP	100		P	
3	116.9495	30.87	-4.97	25.90	43.50	-17.60	QP	100		P	
4	175.0368	34.84	-3.21	31.63	43.50	-11.87	QP	100		P	
5	377.2591	24.81	1.55	26.36	46.00	-19.64	QP	100		P	
6	776.8778	25.77	5.88	31.65	46.00	-14.35	QP	100		P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	30.0000	30.40	-2.86	27.54	40.00	-12.46	QP	100		P	
2	57.7962	34.53	-9.21	25.32	40.00	-14.68	QP	100		P	
3 *	86.2001	37.72	-6.63	31.09	40.00	-8.91	QP	100		P	
4	119.4361	36.88	-4.88	32.00	43.50	-11.50	QP	100		P	
5	171.3926	32.13	-3.29	28.84	43.50	-14.66	QP	100		P	
6	955.4381	24.48	9.21	33.69	46.00	-12.31	QP	100		P	

Remark: Margin= Mesurement Level- Limit
Measurement Level=Test receiver reading + correction factor
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

4.7 Emissions in frequency bands (above 1GHz)

<table>
<tr><td>Test Requirement:</td><td>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.
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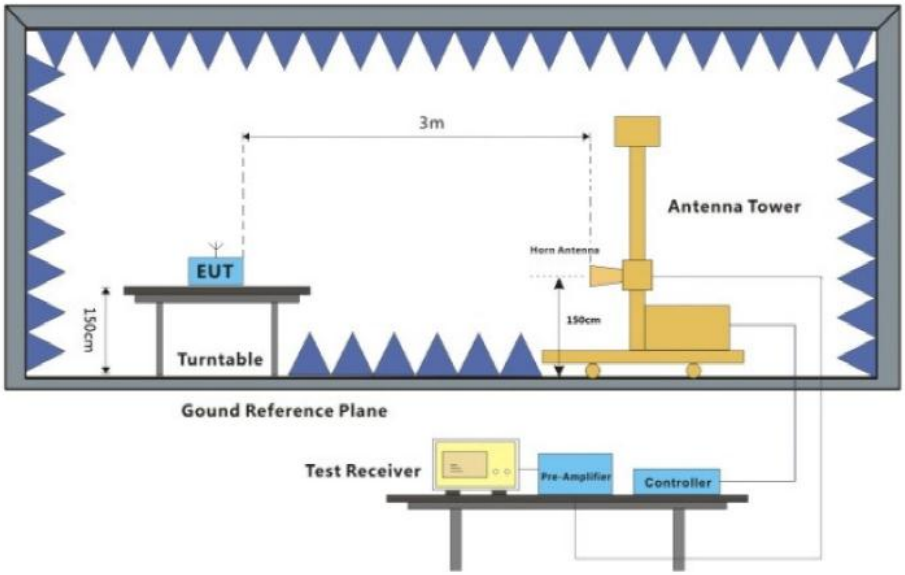
<tr><td>Procedure:</td><td>a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
j. Repeat above procedures until all frequencies measured was complete.
Remark:
1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:</td></tr>
</table>

	Final Test Level =Receiver Reading + Antenna Factor + Cable Factor ¨C Preamplifier Factor 3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.

4.7.1 E.U.T. Operation:

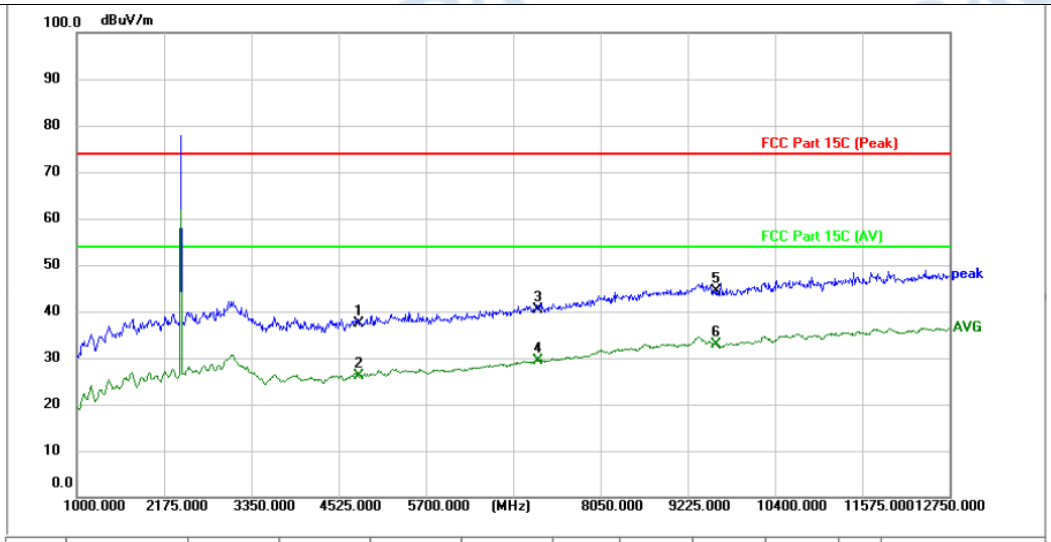
Operating Environment:					
Temperature:	22.6 °C	Humidity:	51.2 %	Atmospheric Pressure:	102 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.7.2 Test Setup Diagram:



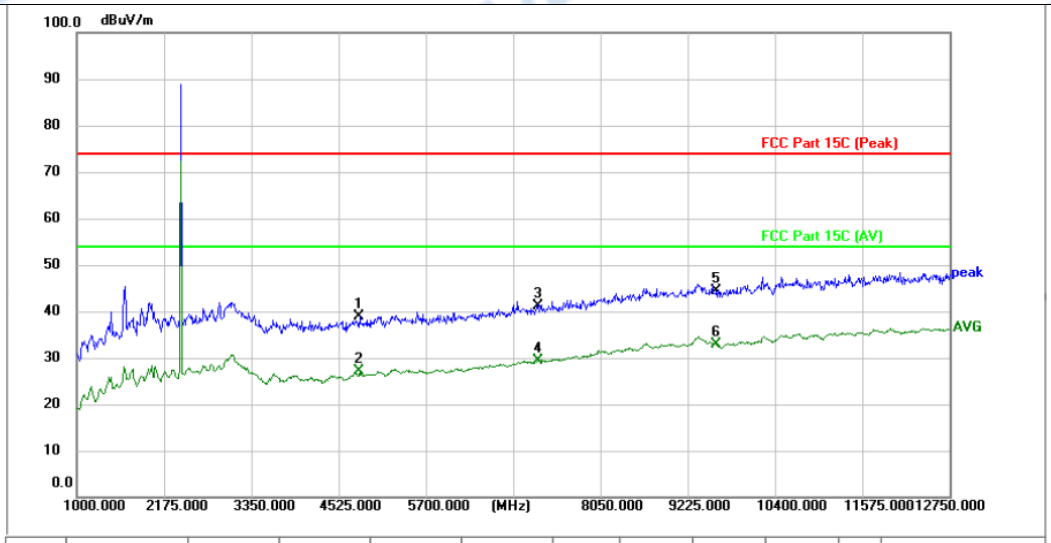
4.7.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



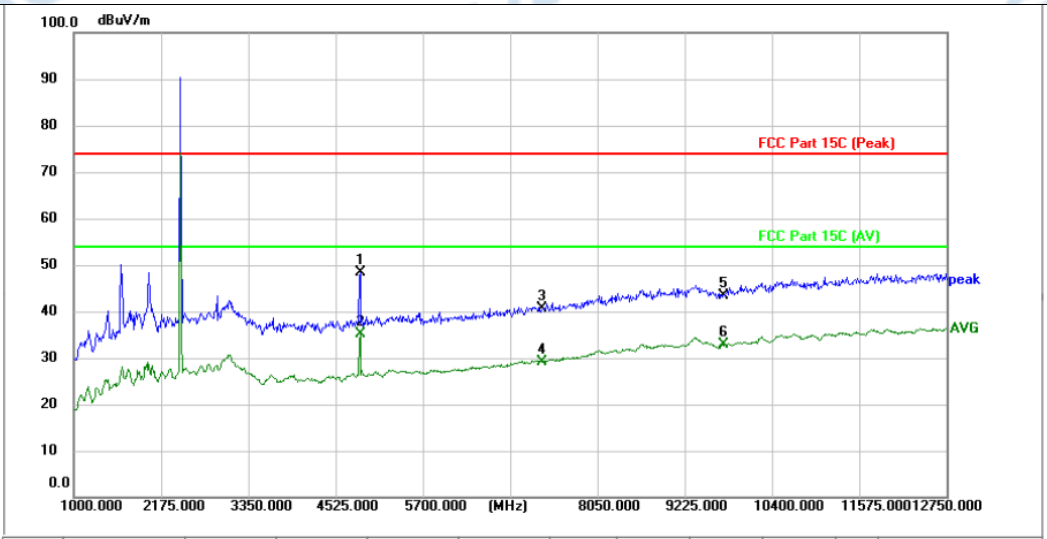
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4804.000	38.28	-0.90	37.38	74.00	-36.62	peak	150		P	
2	4804.000	27.10	-0.90	26.20	54.00	-27.80	AVG	150		P	
3	7206.000	36.33	4.13	40.46	74.00	-33.54	peak	150		P	
4	7206.000	25.35	4.13	29.48	54.00	-24.52	AVG	150		P	
5	9608.000	36.40	8.09	44.49	74.00	-29.51	peak	150		P	
6 *	9608.000	24.79	8.09	32.88	54.00	-21.12	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



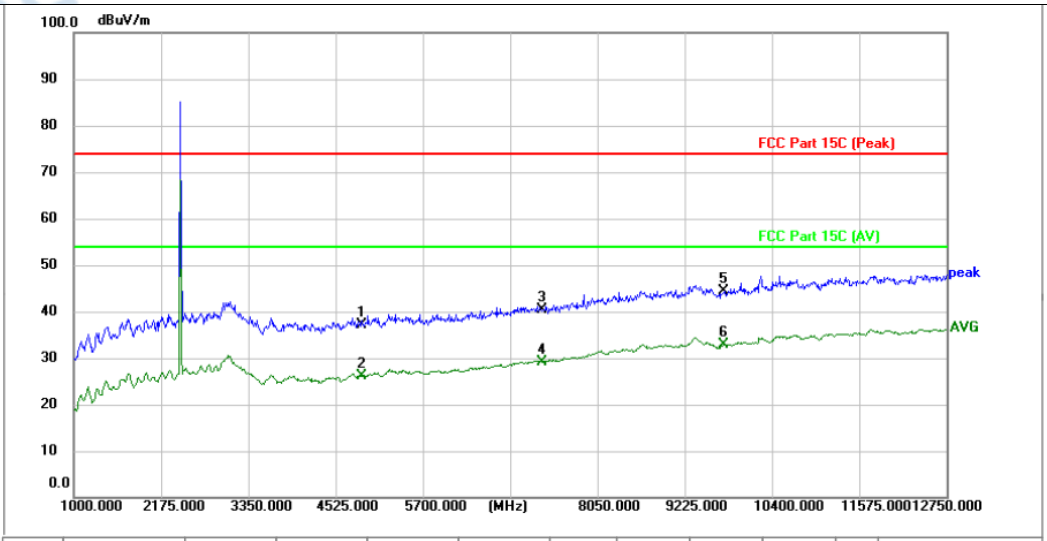
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4804.000	39.20	-0.28	38.92	74.00	-35.08	peak	150		P	
2	4804.000	27.41	-0.28	27.13	54.00	-26.87	AVG	150		P	
3	7206.000	37.11	4.09	41.20	74.00	-32.80	peak	150		P	
4	7206.000	25.35	4.09	29.44	54.00	-24.56	AVG	150		P	
5	9608.000	36.31	8.02	44.33	74.00	-29.67	peak	150		P	
6 *	9608.000	24.78	8.02	32.80	54.00	-21.20	AVG	150		P	

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: M



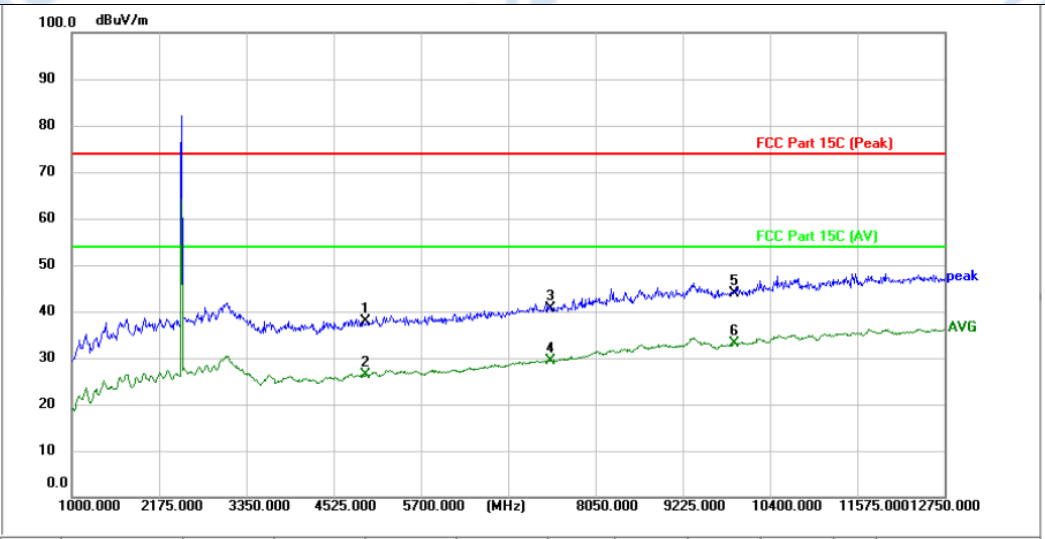
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4854.000	48.51	-0.12	48.39	74.00	-25.61	peak	150		P	
2 *	4854.000	35.33	-0.12	35.21	54.00	-18.79	AVG	150		P	
3	7320.000	36.28	4.36	40.64	74.00	-33.36	peak	150		P	
4	7320.000	24.83	4.36	29.19	54.00	-24.81	AVG	150		P	
5	9760.000	35.14	8.12	43.26	74.00	-30.74	peak	150		P	
6	9760.000	24.68	8.12	32.80	54.00	-21.20	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: M



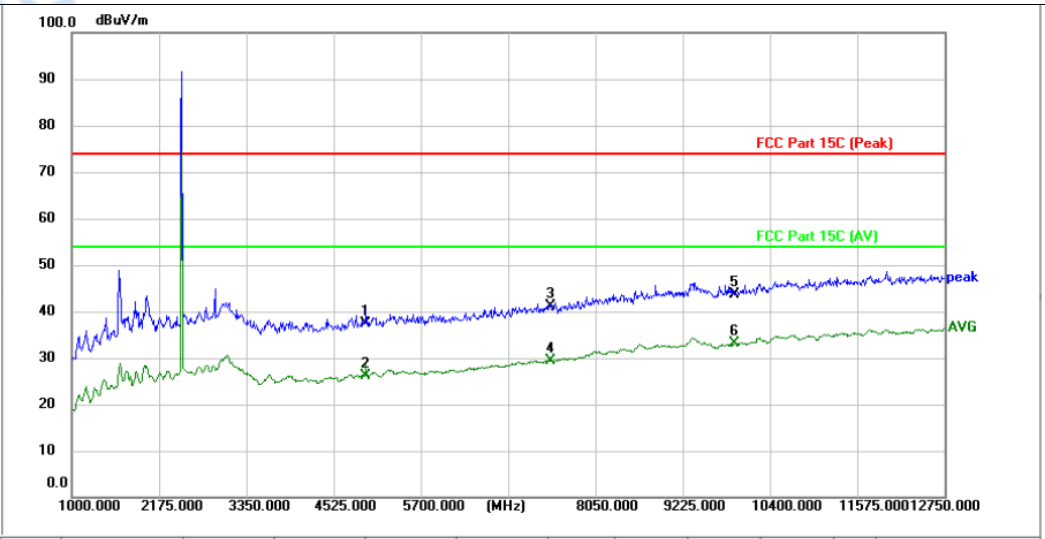
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4880.000	37.89	-0.65	37.24	74.00	-36.76	peak	150		P	
2	4880.000	26.77	-0.65	26.12	54.00	-27.88	AVG	150		P	
3	7320.000	36.13	4.31	40.44	74.00	-33.56	peak	150		P	
4	7320.000	24.82	4.31	29.13	54.00	-24.87	AVG	150		P	
5	9760.000	36.19	8.09	44.28	74.00	-29.72	peak	150		P	
6 *	9760.000	24.72	8.09	32.81	54.00	-21.19	AVG	150		P	

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4960.000	38.13	-0.37	37.76	74.00	-36.24	peak	150		P	
2	4960.000	26.68	-0.37	26.31	54.00	-27.69	AVG	150		P	
3	7440.000	36.11	4.49	40.60	74.00	-33.40	peak	150		P	
4	7440.000	24.93	4.49	29.42	54.00	-24.58	AVG	150		P	
5	9920.000	35.73	8.08	43.81	74.00	-30.19	peak	150		P	
6 *	9920.000	24.96	8.08	33.04	54.00	-20.96	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4960.000	37.08	0.23	37.31	74.00	-36.69	peak	150		P	
2	4960.000	26.01	0.23	26.24	54.00	-27.76	AVG	150		P	
3	7440.000	36.45	4.64	41.09	74.00	-32.91	peak	150		P	
4	7440.000	24.70	4.64	29.34	54.00	-24.66	AVG	150		P	
5	9920.000	35.37	8.23	43.60	74.00	-30.40	peak	150		P	
6 *	9920.000	25.01	8.23	33.24	54.00	-20.76	AVG	150		P	

Remark: Margin= Level – Limit; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
Level=Test receiver reading + correction factor

5 TEST SETUP PHOTOS

Please Refer to test setup file for Details.

6 PHOTOS OF THE EUT

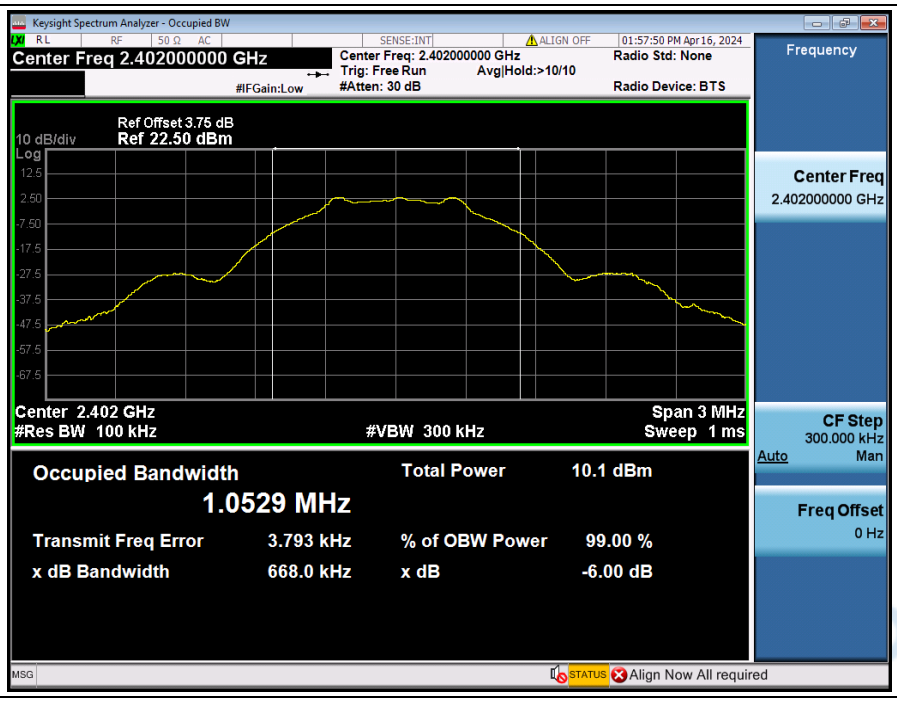
Please Refer to external photos file and internal photos file for Details.

Appendix

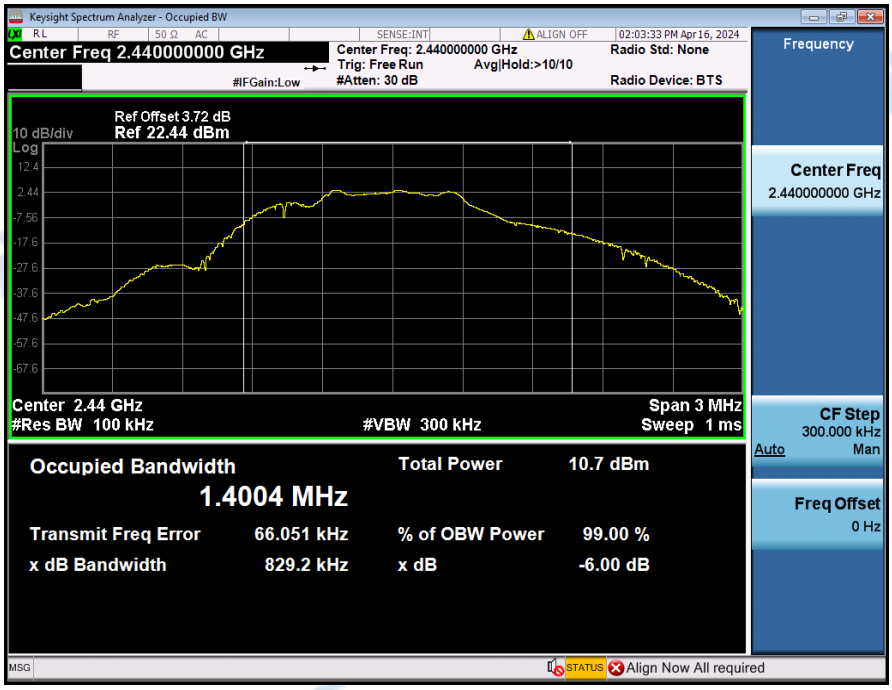
1. -6dB Bandwidth

Condition	Antenna	Rate	Frequency (MHz)	-6dB BW(kHz)	limit(kHz)	Result
NVNT	ANT1	1Mbps	2402.00	668.04	500	Pass
NVNT	ANT1	1Mbps	2440.00	829.23	500	Pass
NVNT	ANT1	1Mbps	2480.00	916.17	500	Pass

-6dB_Bandwidth_NVNT_ANT1_1Mbps_2402



-6dB_Bandwidth_NVNT_ANT1_1Mbps_2440



-6dB_Bandwidth_NVNT_ANT1_1Mbps_2480

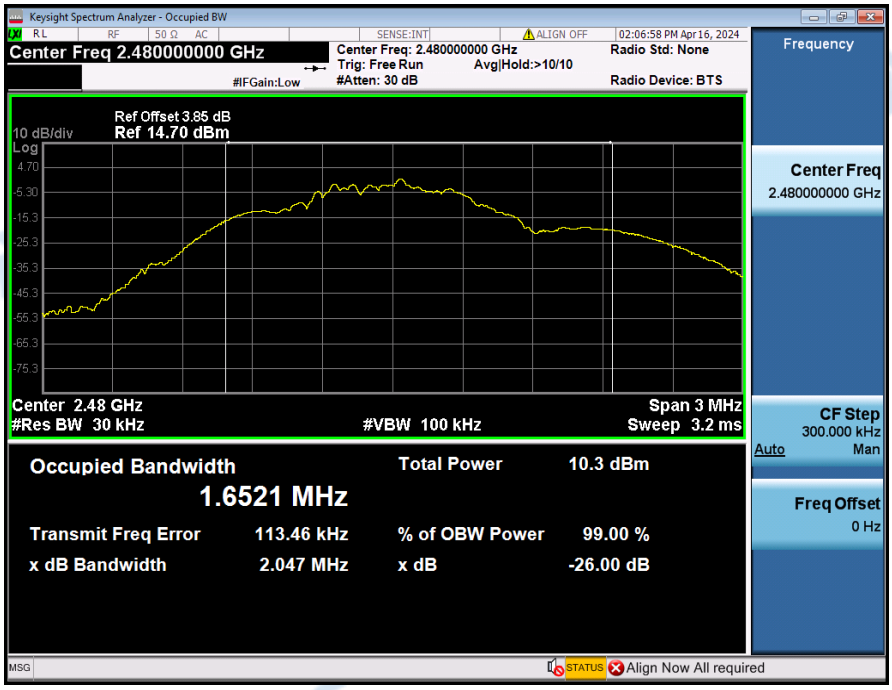
2. 99% Occupied Bandwidth

Condition	Antenna	Rate	Frequency (MHz)	99%%BW(MHz)
NVNT	ANT1	1Mbps	2402.00	1.040
NVNT	ANT1	1Mbps	2440.00	1.154
NVNT	ANT1	1Mbps	2480.00	1.652

99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2402

99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2440

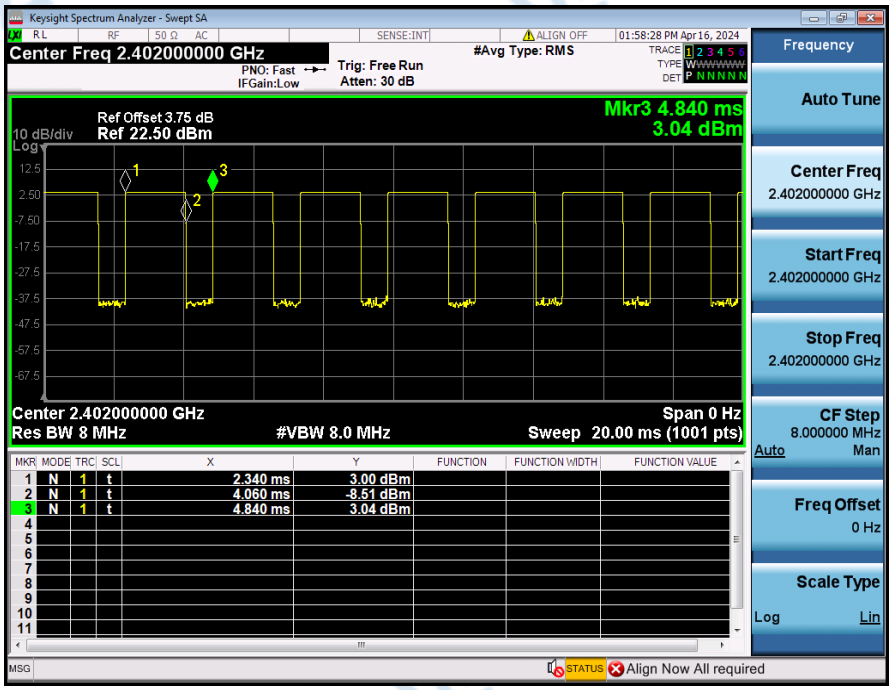
99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2480


Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:INT
ALIGN OFF
02:06:58 PM Apr 16, 2024
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 3.85 dB
10 dB/div
Ref 14.70 dBm
Log
4.70
-5.30
-15.3
-25.3
-35.3
-45.3
-55.3
-65.3
-75.3
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
Occupied Bandwidth
1.6521 MHz
Total Power 10.3 dBm
Transmit Freq Error 113.46 kHz
% of OBW Power 99.00 %
x dB Bandwidth 2.047 MHz
x dB -26.00 dB
Center Freq
2.480000000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS
Align Now All required

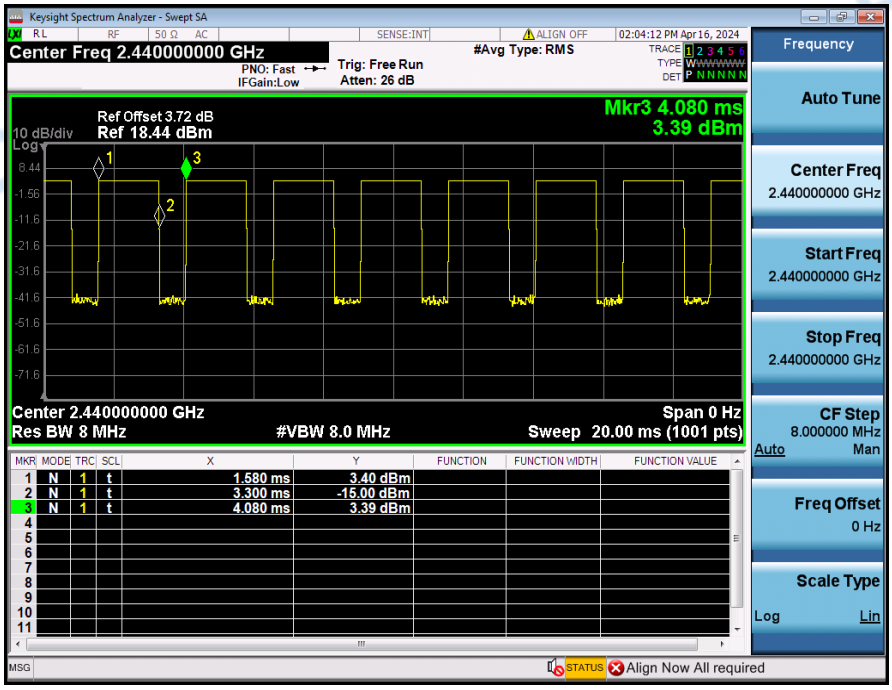
3. Duty Cycle

Condition	Antenna	Rate	Frequency (MHz)	Dutycycle(%)	Duty_factor
NVNT	ANT1	1Mbps	2402.00	69.60	1.57
NVNT	ANT1	1Mbps	2440.00	69.60	1.57
NVNT	ANT1	1Mbps	2480.00	69.60	1.57

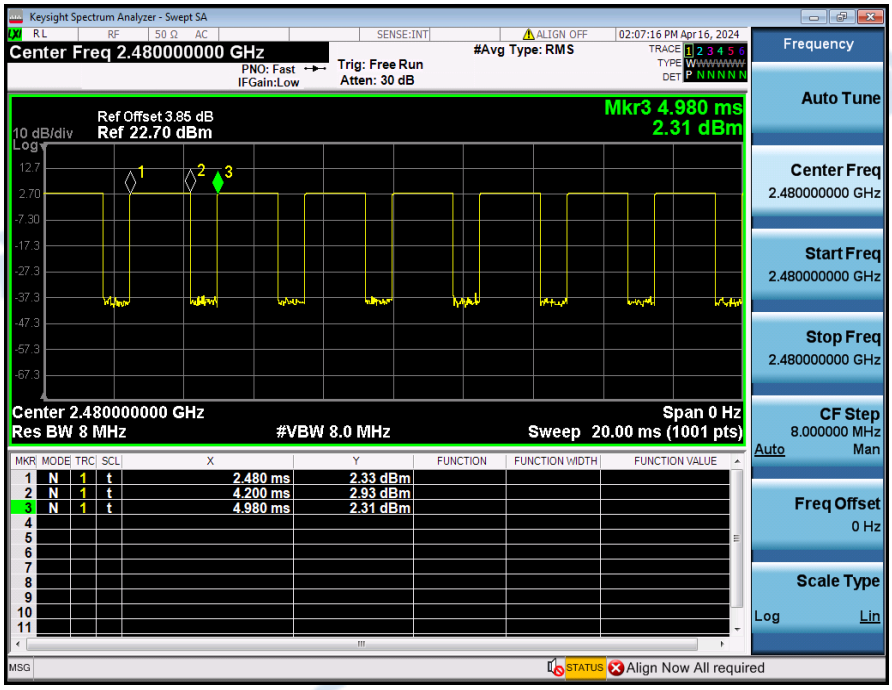
Duty_Cycle_NVNT_ANT1_1Mbps_2402



Duty_Cycle_NVNT_ANT1_1Mbps_2440



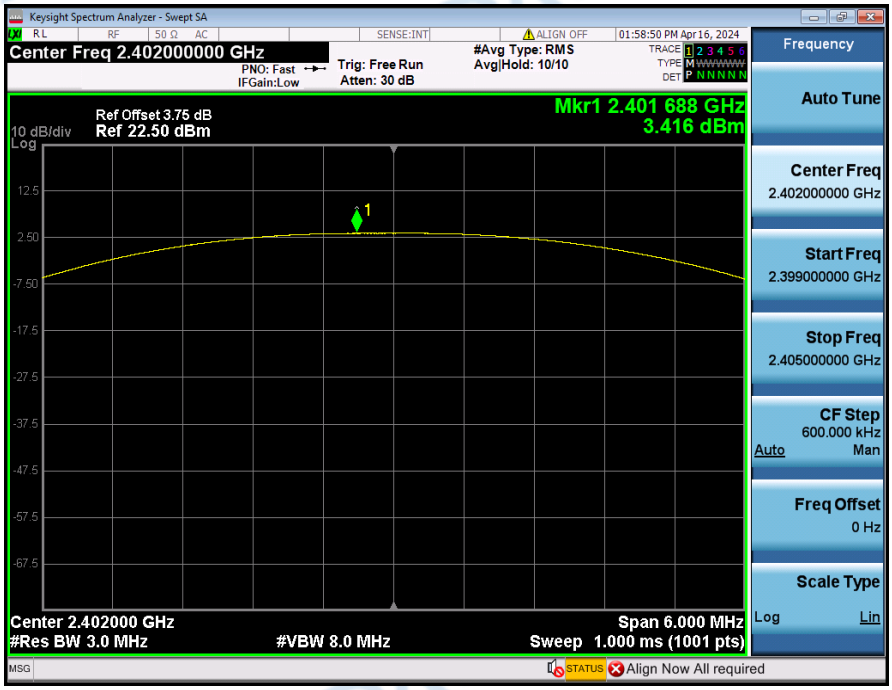
Duty_Cycle_NVNT_ANT1_1Mbps_2480


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
#Avg Type: RMS
02:07:16 PM Apr 16, 2024
Ref Offset 3.85 dB
10 dB/div
Ref 22.70 dBm
Log
Mkr3 4.980 ms
2.31 dBm
Center 2.480000000 GHz
Res BW 8 MHz
#VBW 8.0 MHz
Span 0 Hz
Sweep 20.00 ms (1001 pts)
1 N 1 t 2.480 ms 2.33 dBm
2 N 1 t 4.200 ms 2.93 dBm
3 N 1 t 4.980 ms 2.31 dBm
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.480000000 GHz
Stop Freq
2.480000000 GHz
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
Align Now All required

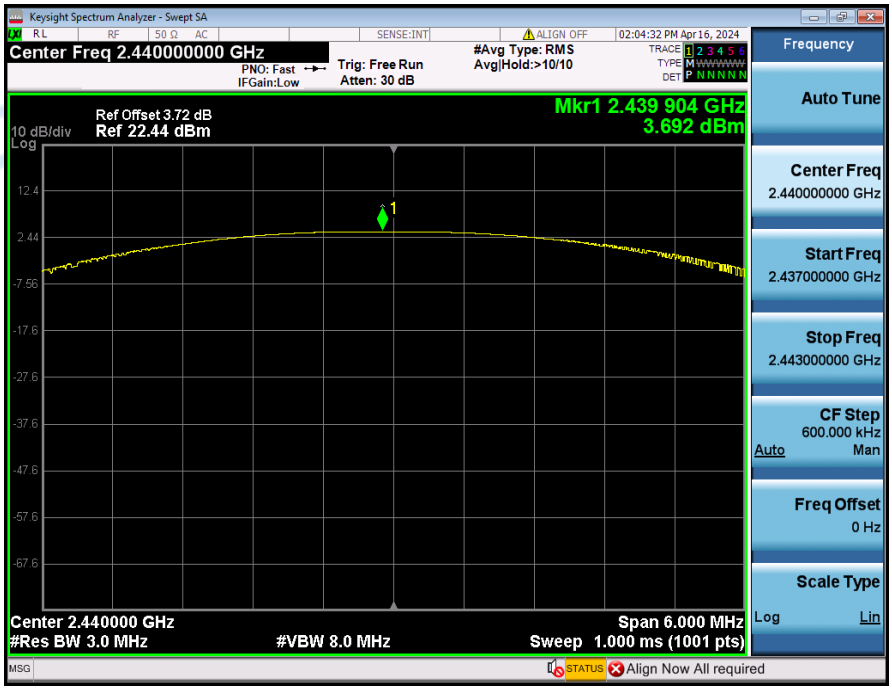
4. Peak Output Power

Condition	Antenna	Rate	Frequency (MHz)	Max. Conducted Power(dBm)	Max. Conducted Power(mW)	Limit(mW)	Result
NVNT	ANT1	1Mbps	2402.00	3.42	2.20	1000	Pass
NVNT	ANT1	1Mbps	2440.00	3.69	2.34	1000	Pass
NVNT	ANT1	1Mbps	2480.00	2.96	1.98	1000	Pass

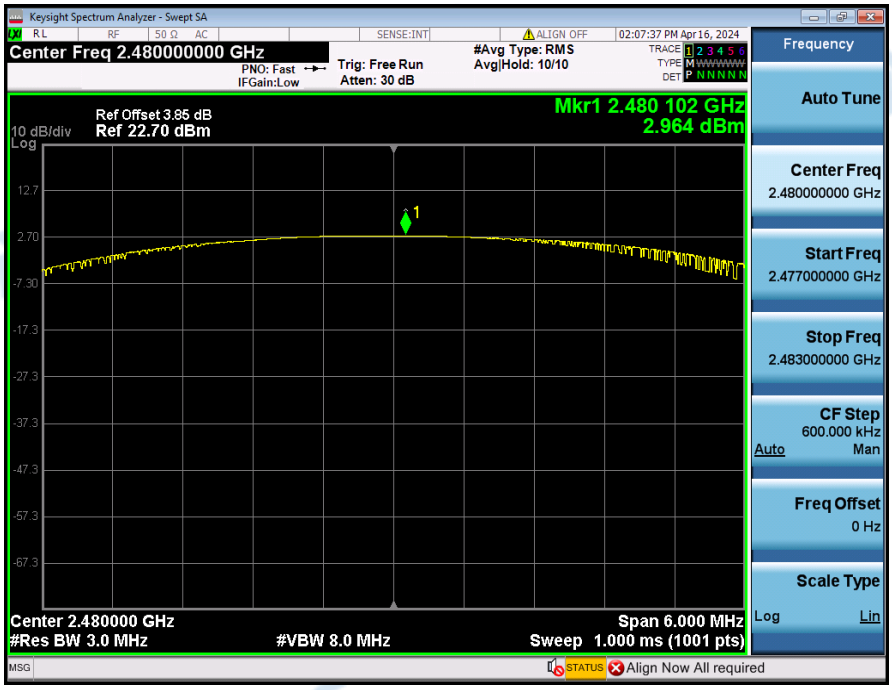
Peak_Output_Power_NVNT_ANT1_1Mbps_2402



Peak_Output_Power_NVNT_ANT1_1Mbps_2440



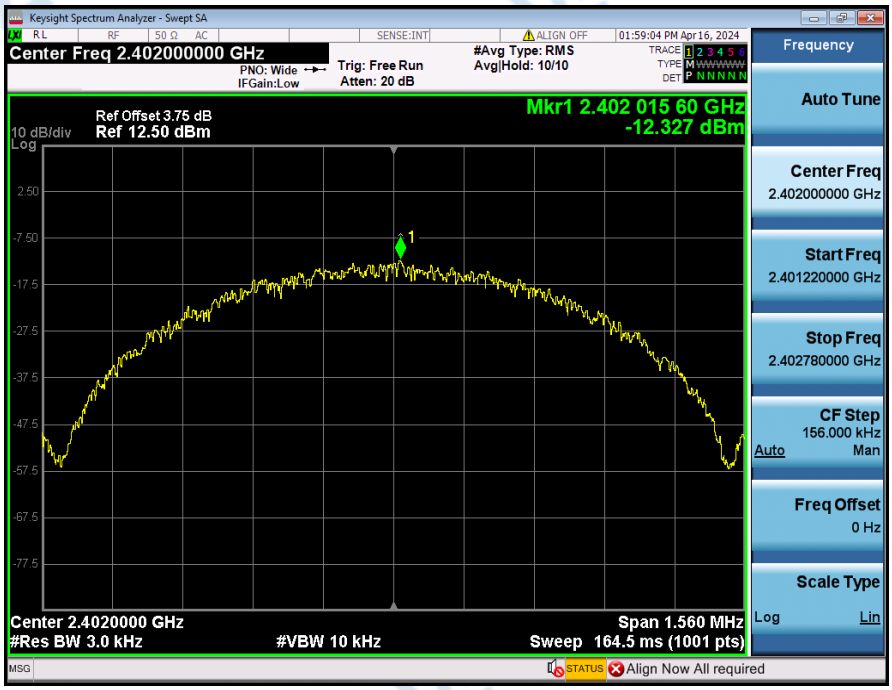
Peak_Output_Power_NVNT_ANT1_1Mbps_2480


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
02:07:37 PM Apr 16, 2024
Ref Offset 3.85 dB
10 dB/div
Log
Ref 22.70 dBm
Mkr1 2.480 102 GHz
2.964 dBm
12.7
2.70
-7.30
-17.3
-27.3
-37.3
-47.3
-57.3
-67.3
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
Span 6.000 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477000000 GHz
Stop Freq
2.483000000 GHz
CF Step
600.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
Align Now All required

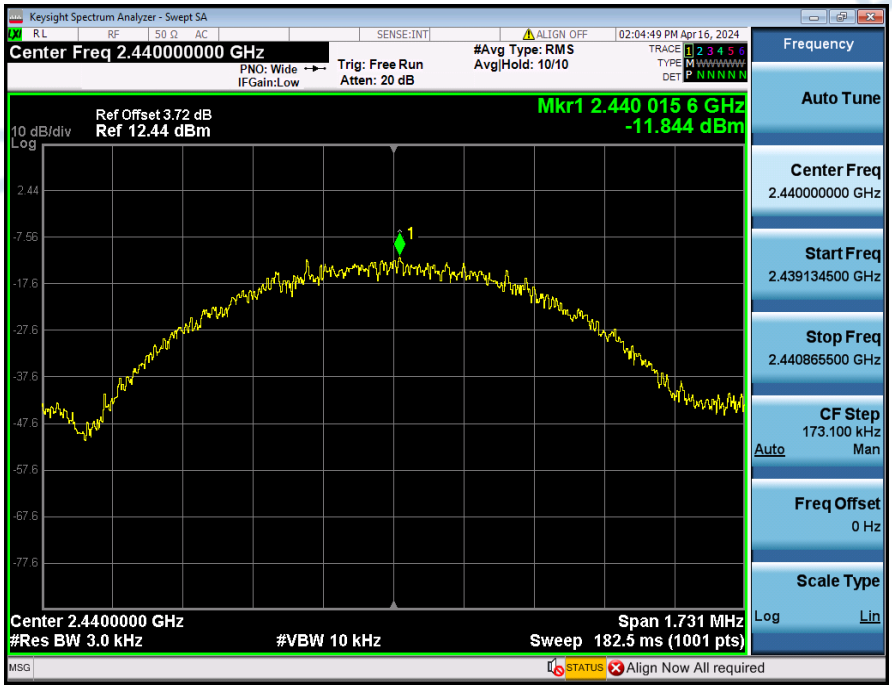
5. Power Spectral Density

Condition	Antenna	Rate	Frequency (MHz)	Power Spectral Density(dBm)	Limit(dBm/3kHz)	Result
NVNT	ANT1	1Mbps	2402.00	-12.33	8	Pass
NVNT	ANT1	1Mbps	2440.00	-11.84	8	Pass
NVNT	ANT1	1Mbps	2480.00	-11.82	8	Pass

Power_Spectral_Density_NVNT_ANT1_1Mbps_2402



Power_Spectral_Density_NVNT_ANT1_1Mbps_2440



Power_Spectral_Density_NVNT_ANT1_1Mbps_2480

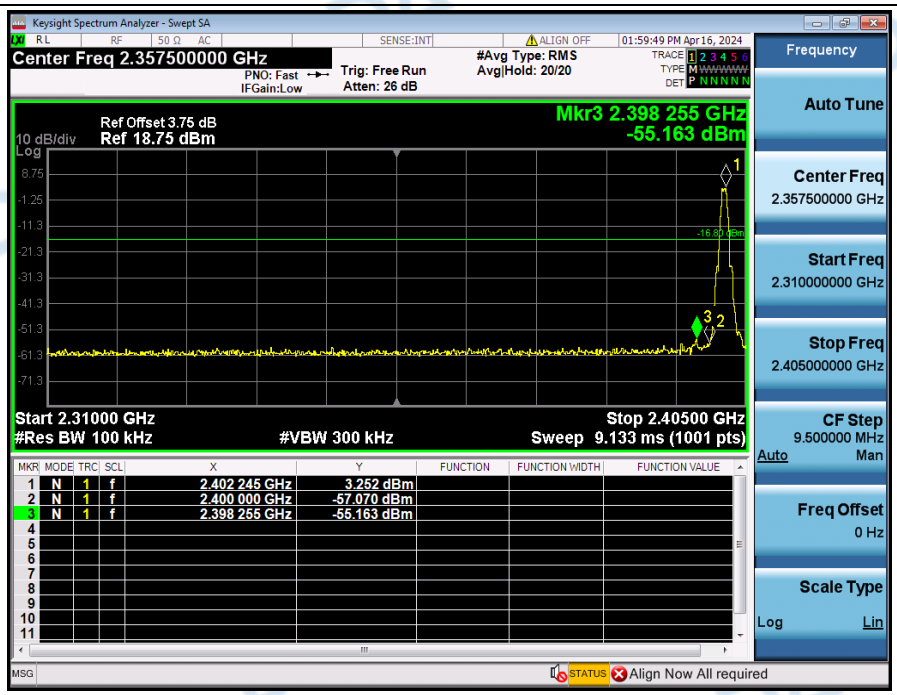

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 24 dB
#Avg Type: RMS
Avg|Hold:>10/10
02:07:53 PM Apr 16, 2024
Ref Offset 3.85 dB
10 dB/div
Log
Ref 16.70 dBm
Mkr1 2.480 032 2 GHz
-11.822 dBm
Center 2.480000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 2.478 MHz
Sweep 261.3 ms (1001 pts)
Align Now All required
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478761000 GHz
Stop Freq
2.481239000 GHz
CF Step
247.800 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

6. Bandedge

Condition	Antenna	Rate	TX_Frequency (MHz)	Max. Mark Frequency (MHz)	Spurious level(dBm)	limit(dBm)	Result
NVNT	ANT1	1Mbps	2402	2398.255	-55.163	-16.797	Pass
NVNT	ANT1	1Mbps	2480	2485.225	-59.370	-17.162	Pass

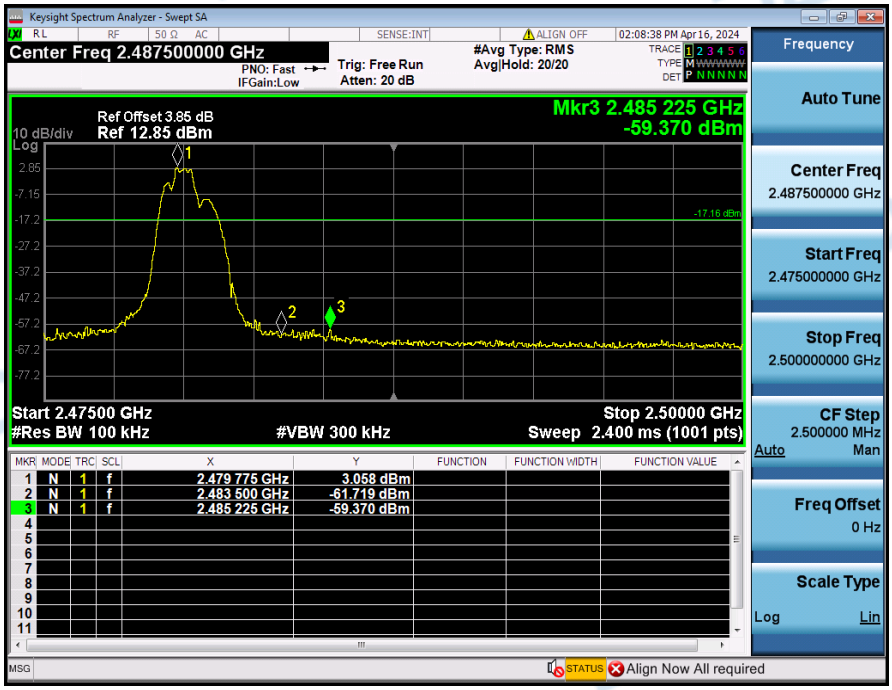
1_Reference_Level_NVNT_ANT1_1Mbps_2402

2_Bandedge_NVNT_ANT1_1Mbps_2402



1_Reference_Level_NVNT_ANT1_1Mbps_2480

2_Bandedge_NVNT_ANT1_1Mbps_2480

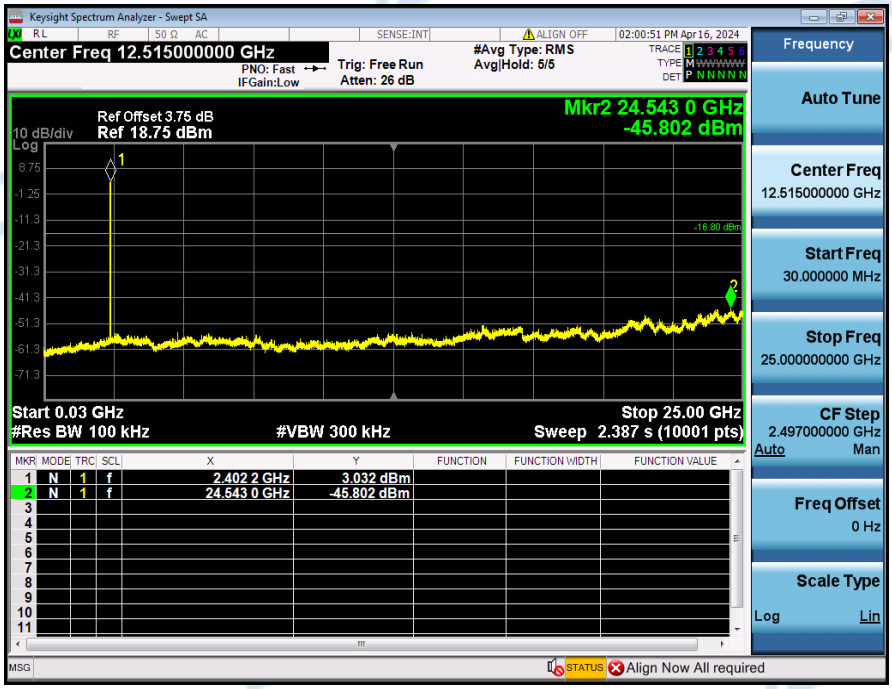


7. Spurious Emission

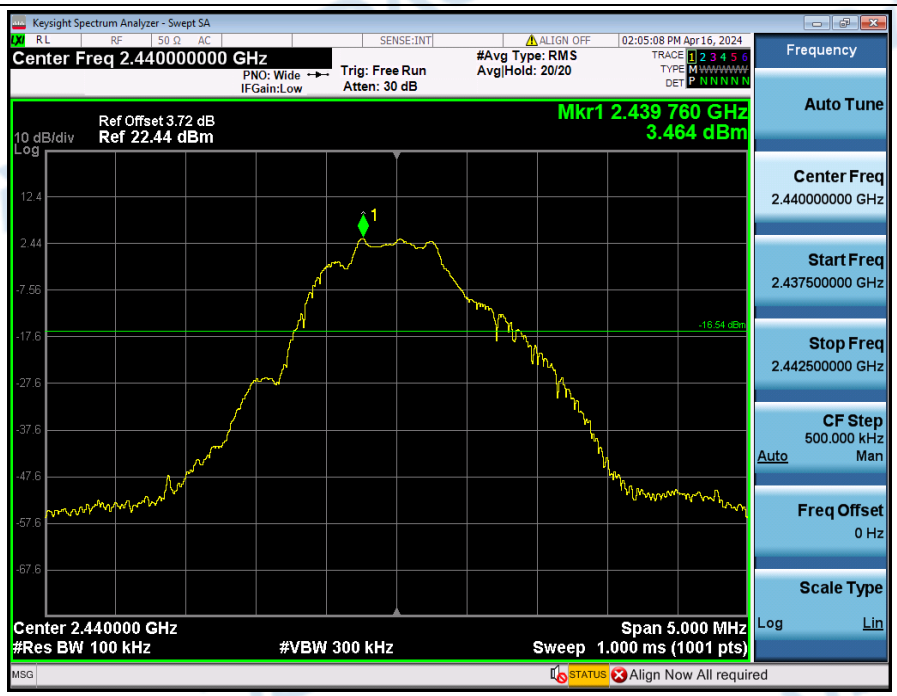
Condition	Antenna	Rate	TX_Frequency(MHz)	Spurious MAX.Value(dBm)	Limit	Result
NVNT	ANT1	1Mbps	2402.00	-45.802	-16.797	Pass
NVNT	ANT1	1Mbps	2440.00	-44.757	-16.536	Pass
NVNT	ANT1	1Mbps	2480.00	-51.221	-17.162	Pass

1_Reference_Level_NVNT_ANT1_1Mbps_2402

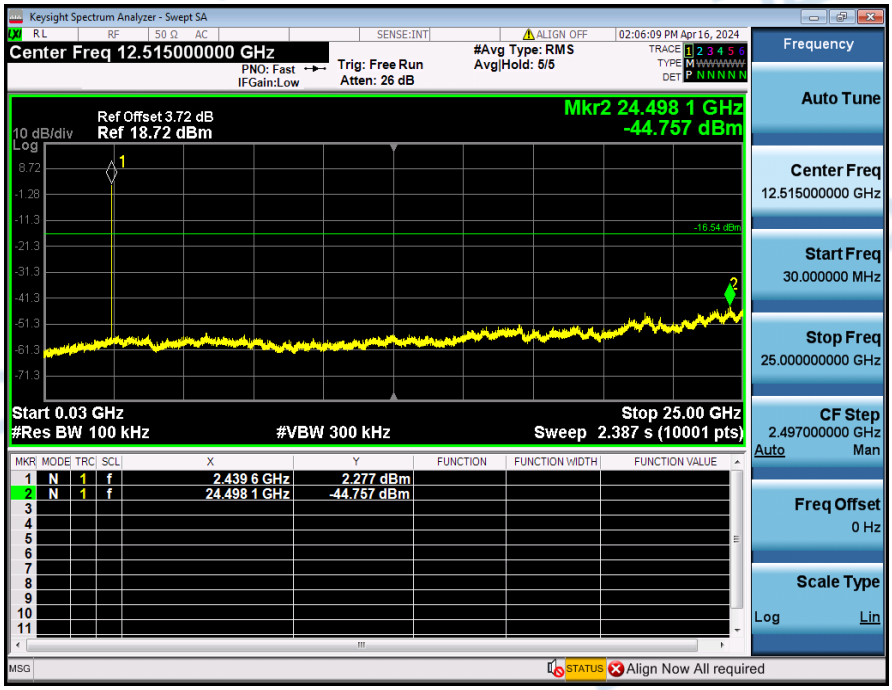
2_Spurious_Emission_NVNT_ANT1_1Mbps_2402



1_Reference_Level_NVNT_ANT1_1Mbps_2440

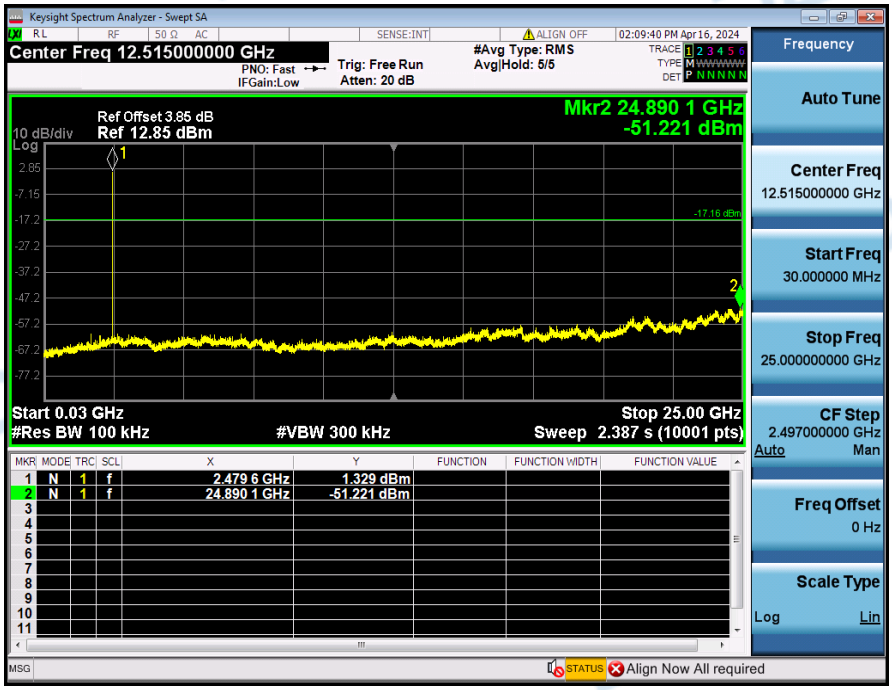


2_Spurious_Emission_NVNT_ANT1_1Mbps_2440



1_Reference_Level_NVNT_ANT1_1Mbps_2480

2_Spurious_Emission_NVNT_ANT1_1Mbps_2480



********** End of Report **********