RF Test Report

For

Applicant Name:	Shenzhen Feyree Technology Co.,Ltd
Address:	2 buildings A seat The second floor 201, Hisense industrial park in,Saxo road no. 2, South bay street, Longgang District, Shenzhen
EUT Name:	Portable EV Charging Station
Brand Name:	菲尔雷® feyree®
Model Number:	F-MBM22-AC-1P32
Series Model Number:	Refer to section 2

Issued By

Company Name:	**BTF Testing Lab (Shenzhen) Co., Ltd.**
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Report Number:	BTF230720R00101
Test Standards:	47 CFR Part 15.247
Test Conclusion:	Pass
FCC ID:	2BALN-F-MBM22
Test Date:	Jun. 23, 2023 -- Jul. 03, 2023
Date of Issue:	Jul. 03, 2023
Prepared By:	elma.yang / Project Engineer
Date:	2023-07-24
Approved By:	Ryan.CJ / EMC Manager
Date:	2023-07-24

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2023-07-24	Original
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1 Introduction

1.1 Identification of Testing Laboratory

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130

1.2 Identification of the Responsible Testing Location

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130
FCC Registration Number:	518915
Designation Number:	CN1330

1.3 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 BTF and all revisions are duly noted in the revisions section.
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2 Product Information

2.1 Application Information

Company Name:	Shenzhen Feyree Technology Co.,Ltd
Address:	2 buildings A seat The second floor 201, Hisense industrial park in,Saxo road no. 2,South bay street，Longgang District, Shenzhen

2.2 Manufacturer Information

Company Name:	Shenzhen Feyree Technology Co.,Ltd
Address:	2 buildings A seat The second floor 201, Hisense industrial park in,Saxo road no. 2,South bay street，Longgang District, Shenzhen

2.3 Factory Information

Company Name:	Shenzhen Feyree Technology Co.,Ltd
Address:	2 buildings A seat The second floor 201, Hisense industrial park in,Saxo road no. 2,South bay street，Longgang District, Shenzhen

2.4 General Description of Equipment under Test (EUT)

EUT Name:	Portable EV Charging Station
Sample SN:	230720-01
Test Model Number:	F-MBM22-AC-1P32
Series Model Number:	F-OBM21-AC-1P16, F-OBM21-AC-1P32, F-GBM21-AC-1P16, F-GBM21-AC-1P32, F-MBM21-AC-1P16, F-MBM21-AC-1P32, F-OBM22-AC-1P16, F-OBM22-AC-1P32, F-OBM22-AC-3P16, F-OBM22-AC-3P32, F-GBM22-AC-1P16, F-GBM22-AC-1P32, F-GBM22-AC-3P16, F-GBM22-AC-3P32, F-MBM22-AC-1P16, F-MBM22-AC-1P32, F-MBM22-AC-1P40, F-OBM23-AC-1P16, F-OBM23-AC-1P32, F-OBM23-AC-3P16, F-OBM23-AC-3P32, F-GBM23-AC-1P16, F-GBM23-AC-1P32, F-GBM23-AC-3P16, F-GBM23-AC-3P32, F-MBM23-AC-1P16, F-MBM23-AC-1P32, F-MBM23-AC-1P40

2.5 Technical Information

Power Supply:	AC120V 50/60Hz
Power Adaptor:	/
Operation Frequency:	2402MHz to 2480MHz
Number of Channels:	40
Modulation Type:	GFSK
Antenna Type:	PCB antenna
Antenna Gain#:	0dBi
Hardware Version:	V1.0
Software Version:	V1.0

Note:

#: The antenna gain provided by the applicant, and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.

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3 Summary of Test Results

3.1 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

3.2 Uncertainty of Test

Item	Measurement Uncertainty
Conducted Emission (150 kHz-30 MHz)	±2.64dB
The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

3.3 Summary of Test Result

Item	Standard	Requirement	Result
Antenna requirement	47 CFR Part 15.247	Part 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15.247	47 CFR 15.207(a)	Pass
6dB Bandwidth	47 CFR Part 15.247	47 CFR 15.247(a)(2)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(3)	Pass
Power Spectral Density	47 CFR Part 15.247	47 CFR 15.247(e)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Band edge emissions (Radiated)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Emissions in restricted frequency bands (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Emissions in restricted frequency bands (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass

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4 Test Configuration

4.1 Test Equipment List

Conducted Emission at AC power line					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Pulse Limiter	Schwarzbeck	VTSD 9561-F	00953	2022-11-24	2023-11-23
Coaxial Switcher	Schwarzbeck	CX210	CX210	2022-11-24	2023-11-23
V-LISN	Schwarzbeck	NSLK 8127	01073	2022-11-24	2023-11-23
LISN	AFJ	LS16/110VAC	16010020076	2023-02-23	2024-02-22
EMI Receiver	R & S	ESCI3	101422	2022-11-24	2023-11-23

Occupied Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RF Test software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	ETM-6050c	20211026123	2022-11-24	2023-11-23
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022-11-24	2023-11-23

Maximum Conducted Output Power					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RF Test software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	ETM-6050c	20211026123	2022-11-24	2023-11-23
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022-11-24	2023-11-23

Power Spectral Density					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co.,	ETM-6050c	20211026123	2022-11-24	2023-11-23

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	LTD				
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022-11-24	2023-11-23

Emissions in non-restricted frequency bands					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	ETM-6050c	20211026123	2022-11-24	2023-11-23
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022-11-24	2023-11-23

Band edge emissions (Radiated)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	2023-03-24	2024-03-23
Preamplifier	Schwarzbeck	BBV9744	00246	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF1-SMASMAM-10m	21101566	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF1-SMASMAM-1m	21101568	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2022-11-24	2023-11-23
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Horn Antenna	Schwarzbeck	BBHA9170	01157	2021-11-28	2023-11-27
EMI TEST RECEIVER	R & S	ESCI7	101032	2022-11-24	2023-11-23
SIGNAL ANALYZER	R & S	FSQ40	100010	2022-11-24	2023-11-23
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Broadband Preamplilifier	Schwarzbeck	BBV9718D	00008	2023-03-24	2024-03-23
Horn Antenna	Schwarzbeck	BBHA9120D	2597	2022-05-22	2024-05-21
EZ_EMC	Frad	FA-03A2 RE+	/	/	/
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Log periodic antenna	Schwarzbeck	VULB 9168	01328	2021-11-28	2023-11-27

Emissions in restricted frequency bands (below 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	2023-03-24	2024-03-23
Preamplifier	Schwarzbeck	BBV9744	00246	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF1-SMASMAM-1	21101566	2022-11-24	2023-11-23

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		0m			
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF1-SMASMAM-1 m	21101568	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2022-11-24	2023-11-23
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Horn Antenna	Schwarzbeck	BBHA9170	01157	2021-11-28	2023-11-27
EMI TEST RECEIVER	R & S	ESCI7	101032	2022-11-24	2023-11-23
SIGNAL ANALYZER	R & S	FSQ40	100010	2022-11-24	2023-11-23
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Broadband Preamplilifier	Schwarzbeck	BBV9718D	00008	2023-03-24	2024-03-23
Horn Antenna	Schwarzbeck	BBHA9120D	2597	2022-05-22	2024-05-21
EZ_EMC	Frad	FA-03A2 RE+	/	/	/
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Log periodic antenna	Schwarzbeck	VULB 9168	01328	2021-11-28	2023-11-27

Emissions in restricted frequency bands (above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	2023-03-24	2024-03-23
Preamplifier	Schwarzbeck	BBV9744	00246	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF1-SMASMAM-1 0m	21101566	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF1-SMASMAM-1 m	21101568	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2022-11-24	2023-11-23
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Horn Antenna	Schwarzbeck	BBHA9170	01157	2021-11-28	2023-11-27
EMI TEST RECEIVER	R & S	ESCI7	101032	2022-11-24	2023-11-23
SIGNAL ANALYZER	R & S	FSQ40	100010	2022-11-24	2023-11-23
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Broadband Preamplilifier	Schwarzbeck	BBV9718D	00008	2023-03-24	2024-03-23
Horn Antenna	Schwarzbeck	BBHA9120D	2597	2022-05-22	2024-05-21
EZ_EMC	Frad	FA-03A2 RE+	/	/	/
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Log periodic antenna	Schwarzbeck	VULB 9168	01328	2021-11-28	2023-11-27

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4.2 Test Auxiliary Equipment

The EUT was tested as an independent device.

4.3 Test Modes

No.	Test Modes	Description
TM1	TX mode	Keep the EUT in continuously transmitting mode with GFSK modulation.

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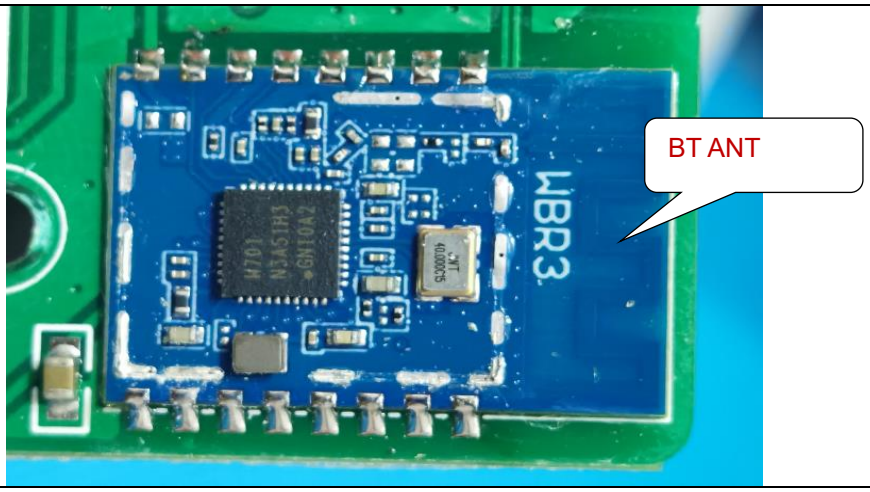
5 Evaluation Results (Evaluation)

5.1 Antenna requirement

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

5.1.1 Conclusion:



6 Radio Spectrum Matter Test Results (RF)

6.1 Conducted Emission at AC power line

Test Requirement:	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 Method:	Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices
Test Limit:	

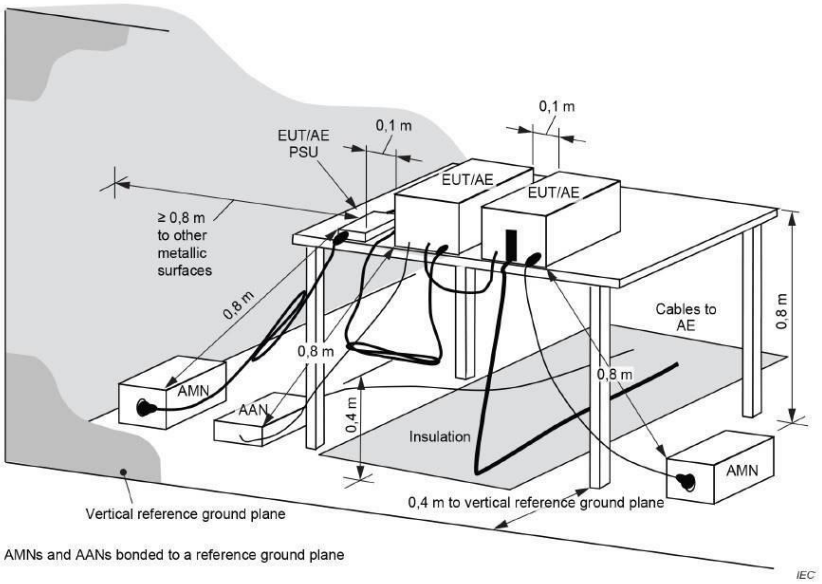
Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

6.1.1 E.U.T. Operation:

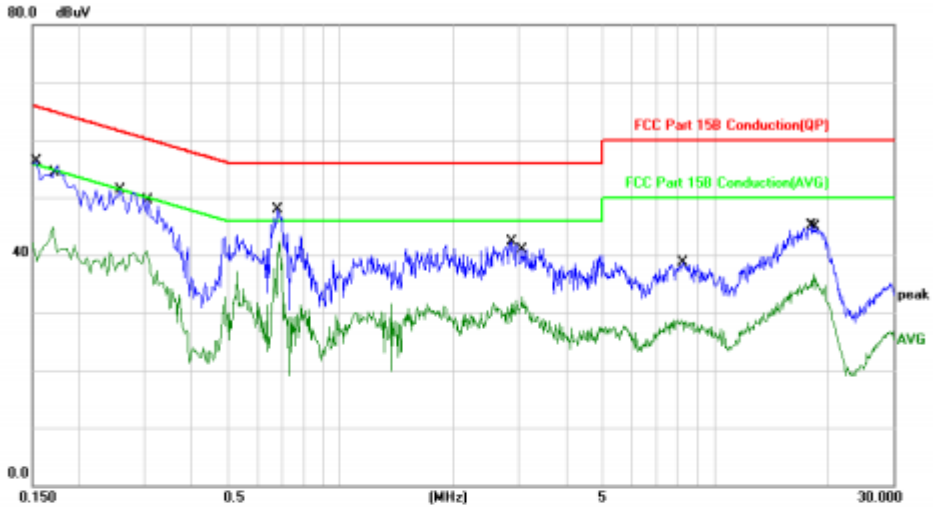
Operating Environment:	
Temperature:	25.2 °C
Humidity:	50.5 %
Atmospheric Pressure:	1010 mbar

6.1.2 Test Setup Diagram:



6.1.3 Test Data:

TM1 / Line: Line / Band: 2.4G / BW: 1 / CH: M



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1539	40.34	15.88	56.22	65.78	-9.56	QP	
2		0.1700	28.95	15.88	44.83	54.96	-10.13	AVG	
3		0.2580	35.40	15.90	51.30	61.49	-10.19	QP	
4		0.3019	24.78	15.90	40.68	50.19	-9.51	AVG	
5		0.6820	31.81	16.00	47.81	56.00	-8.19	QP	
6	*	0.6860	26.24	16.00	42.24	46.00	-3.76	AVG	
7		2.8660	26.15	16.08	42.23	56.00	-13.77	QP	
8		3.0459	16.71	16.09	32.80	46.00	-13.20	AVG	
9		8.1859	11.99	16.78	28.77	50.00	-21.23	AVG	
10		8.2139	21.96	16.78	38.74	60.00	-21.26	QP	
11		18.0458	26.63	18.55	45.18	60.00	-14.82	QP	
12		18.3819	18.09	18.60	36.69	50.00	-13.31	AVG	

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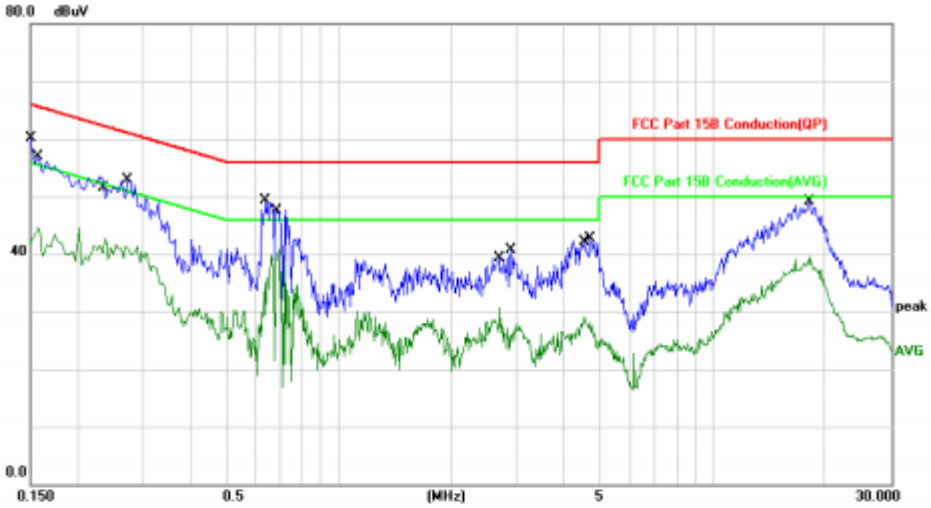
TM1 / Line: Neutral / Band: 2.4G / BW: 1 / CH: M



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1499	44.17	15.88	60.05	66.00	-5.95	QP	
2		0.1580	28.74	15.88	44.62	55.56	-10.94	AVG	
3		0.2379	26.73	15.90	42.63	52.17	-9.54	AVG	
4		0.2740	37.05	15.90	52.95	60.99	-8.04	QP	
5		0.6380	33.29	16.01	49.30	56.00	-6.70	QP	
6	*	0.6897	24.97	15.99	40.96	46.00	-5.04	AVG	
7		2.7058	14.59	16.08	30.67	46.00	-15.33	AVG	
8		2.8860	24.62	16.08	40.70	56.00	-15.30	QP	
9		4.5377	12.93	16.23	29.16	46.00	-16.84	AVG	
10		4.7137	26.44	16.25	42.69	56.00	-13.31	QP	
11		18.0856	30.61	18.55	49.16	60.00	-10.84	QP	
12		18.0856	20.98	18.55	39.53	50.00	-10.47	AVG	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

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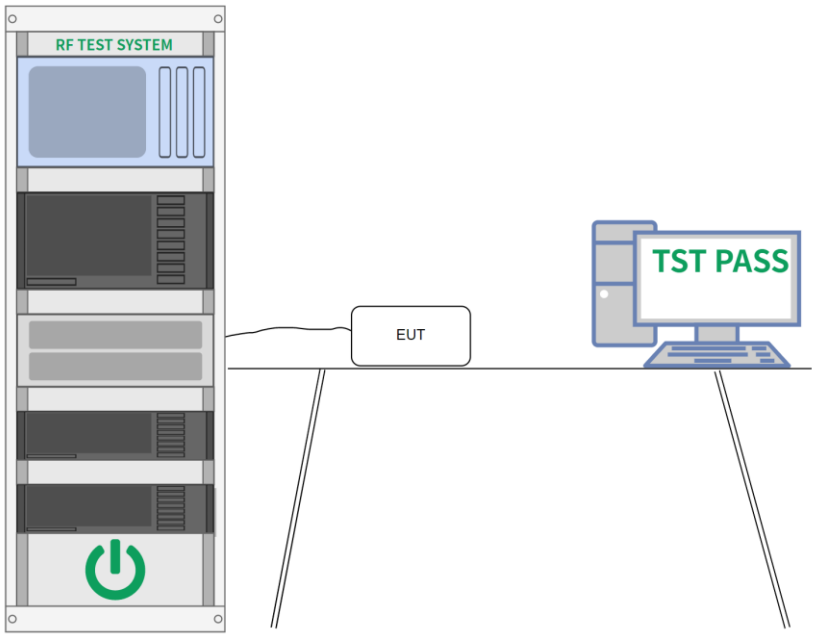
6.2 6dB Bandwidth

Test Requirement:	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 Limit:	Section (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.
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.

6.2.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.8 °C
Humidity:	49.9 %
Atmospheric Pressure:	1010 mbar

6.2.2 Test Setup Diagram:



6.2.3 Test Data:

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6.3 Maximum Conducted Output Power

Test Requirement:	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 Limit:	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.
Procedure:	1. Set analyzer center frequency to DTS channel center frequency. 2. Set the span to ⩾ 2 times the DTS bandwidth. 3. Set the RBW to: RBW=3MHz. 4. Set the VBW ⩾ RBW. 5. Detector = peak. 6. Sweep time = auto couple. 7. Trace mode = max hold. 8. Allow trace to fully stabilize. 9. Use the peak marker function to determine the maximum amplitude level within the RBW

6.3.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.8 °C
Humidity:	49.9 %
Atmospheric Pressure:	1010 mbar

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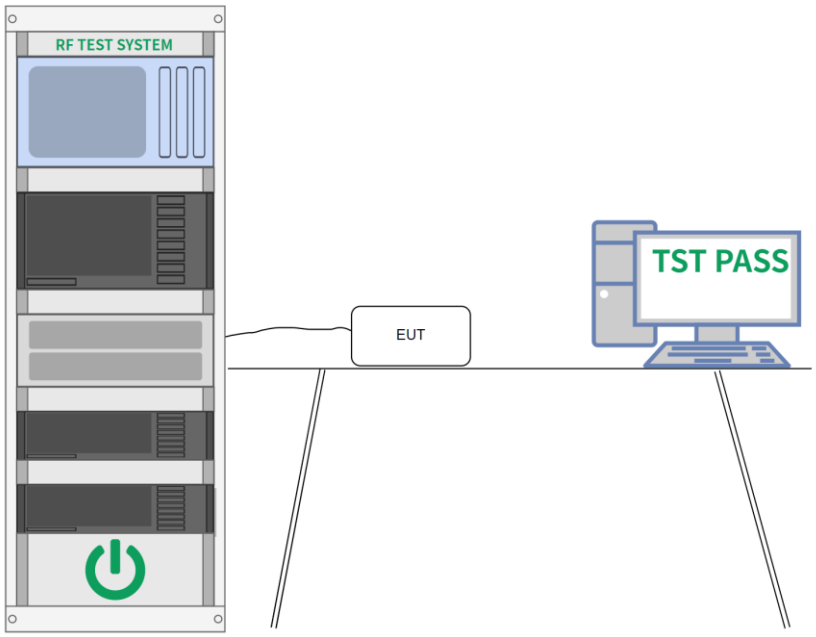
6.3.2 Test Setup Diagram:



6.3.3 Test Data:

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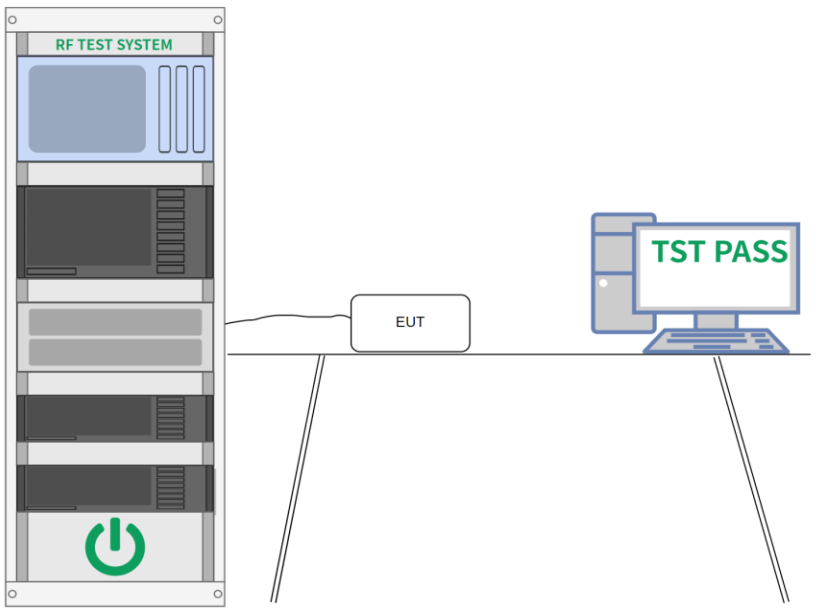
6.4 Power Spectral Density

Test Requirement:	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 Limit:	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 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.
Procedure:	1. Set analyzer center frequency to DTS channel center frequency. 2. Set the span to 1.5 times the DTS bandwidth. 3. Set the RBW to: 3 kHz ⩽ RBW ⩽ 100 kHz. 4. Set the VBW ⩾ 3 x RBW. 5. Detector = peak. 6. Sweep time = auto couple. 7. Trace mode = max hold. 8. Allow trace to fully stabilize. 9. Use the peak marker function to determine the maximum amplitude level within the RBW.

6.4.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.8 °C
Humidity:	49.9 %
Atmospheric Pressure:	1010 mbar

6.4.2 Test Setup Diagram:



6.4.3 Test Data:

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6.5 Emissions in non-restricted frequency bands

Test Requirement:	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 Limit:	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.
Procedure:	ANSI C63.10-2013 Section 11.11.1, Section 11.11.2, Section 11.11.3

6.5.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.8 °C
Humidity:	49.9 %
Atmospheric Pressure:	1010 mbar

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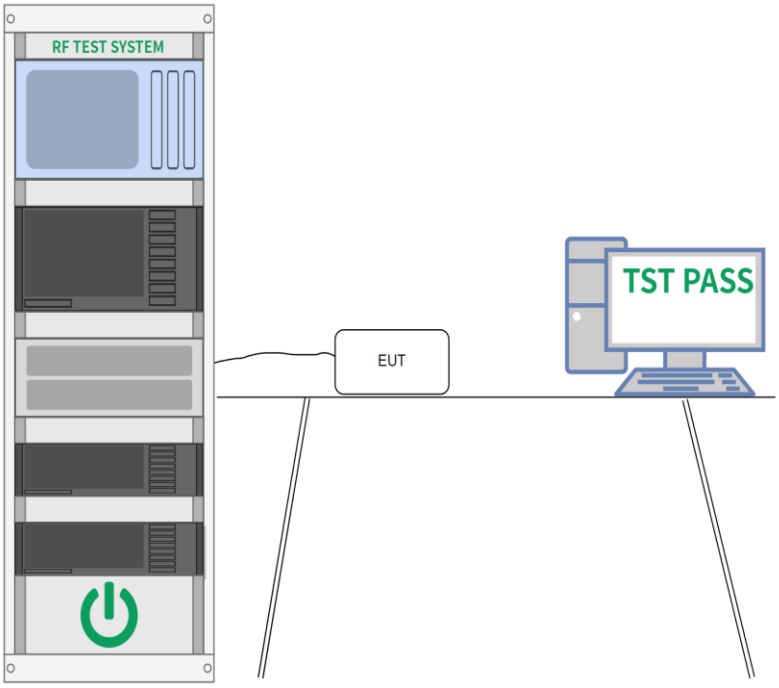
6.5.2 Test Setup Diagram:



6.5.3 Test Data:

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6.6 Band edge emissions (Radiated)

Test Requirement:	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 Method:	Radiated emissions tests
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

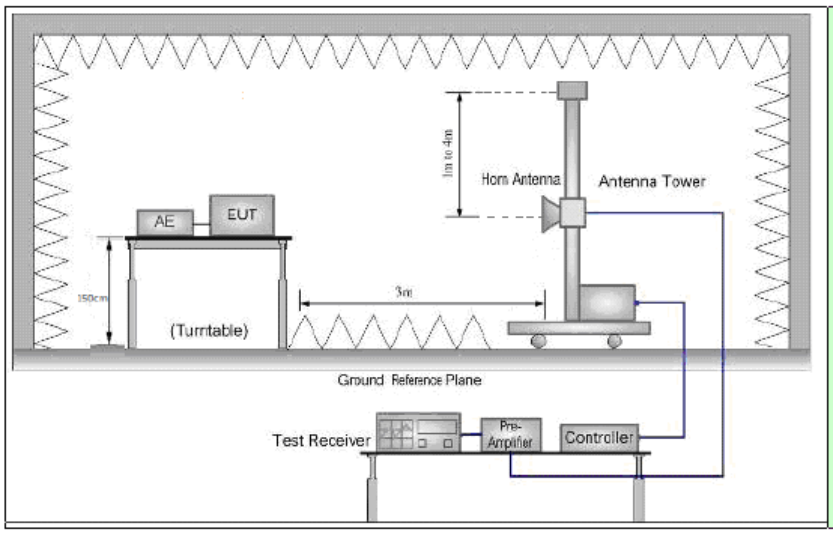
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

Procedure:	ANSI C63.10-2013 section 6.6.4

6.6.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.1 °C
Humidity:	46.3 %
Atmospheric Pressure:	1010 mbar

6.6.2 Test Setup Diagram:



6.6.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	2310.000	65.45	-30.59	34.86	74.00	-39.14	peak	P
2	2390.000	64.67	-30.49	34.18	74.00	-39.82	peak	P
3	2400.000	67.34	-30.48	36.86	74.00	-37.14	peak	P

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	2310.000	64.15	-30.59	33.56	74.00	-40.44	peak	P
2	2390.000	66.83	-30.49	36.34	74.00	-37.66	peak	P
3	2400.000	69.93	-30.48	39.45	74.00	-34.55	peak	P

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TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	2483.500	70.55	-30.39	40.16	74.00	-33.84	peak	P
2	2500.000	64.95	-30.37	34.58	74.00	-39.42	peak	P

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	2483.500	70.12	-30.39	39.73	74.00	-34.27	peak	P
2	2500.000	64.99	-30.37	34.62	74.00	-39.38	peak	P

Remark:
1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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6.7 Emissions in restricted frequency bands (below 1GHz)

Test Requirement:	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 Method:	Radiated emissions tests
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.

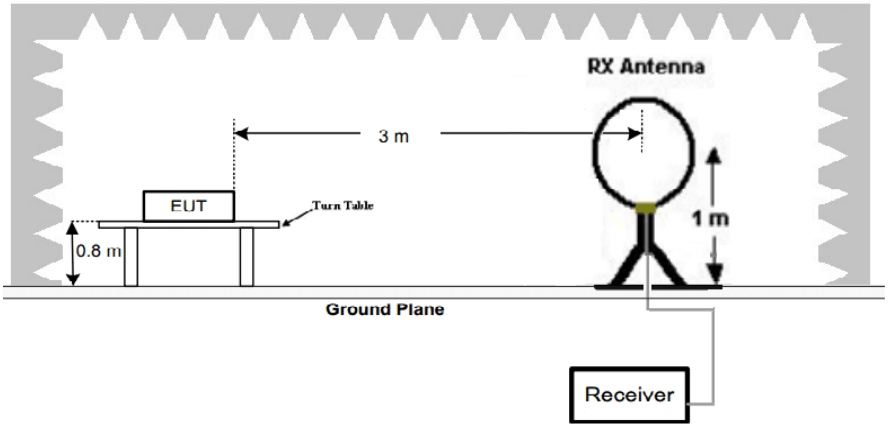
Procedure:	ANSI C63.10-2013 section 6.6.4

6.7.1 E.U.T. Operation:

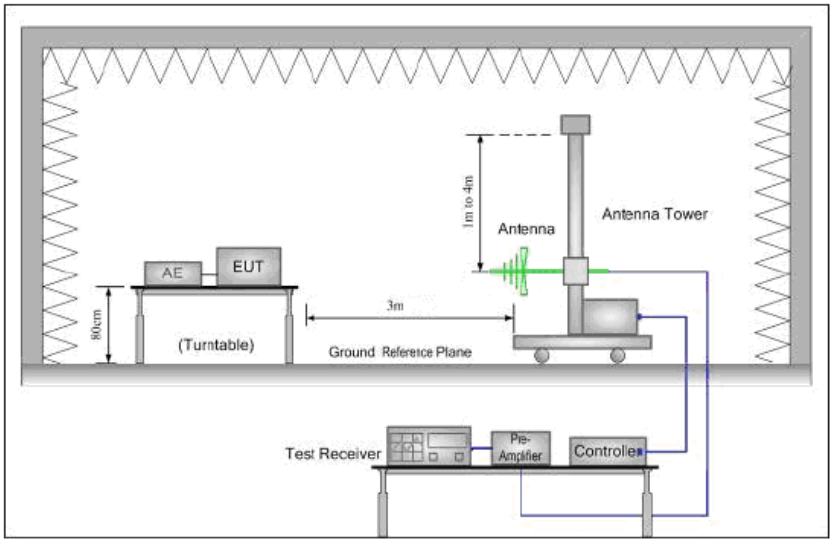
Operating Environment:	
Temperature:	22.1 °C
Humidity:	46.3 %
Atmospheric Pressure:	1010 mbar

6.7.2 Test Setup Diagram:

For radiated emissions below 30MHz



30MHz to 1GHz



6.7.3 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.

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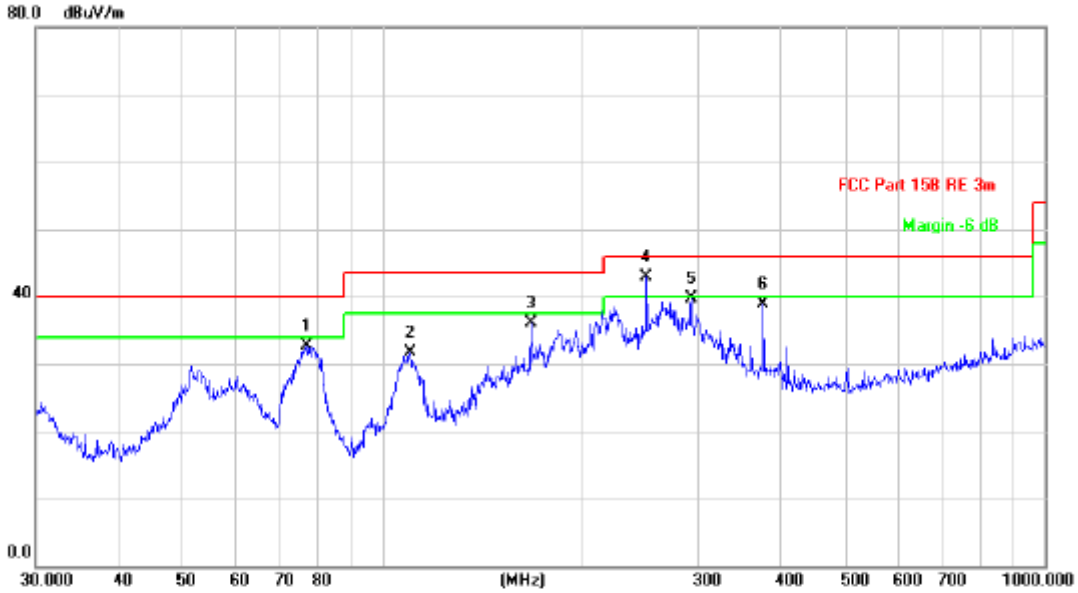
Between 30MHz – 1000MHz.

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		77.0505	49.15	-16.38	32.77	40.00	-7.23	QP	100	324	
2		110.1816	43.02	-11.22	31.80	43.50	-11.70	QP	100	55	
3		167.8243	47.45	-11.26	36.19	43.50	-7.31	QP	100	117	
4	*	250.3012	53.60	-10.75	42.85	46.00	-3.15	QP	100	151	
5		293.0842	48.08	-8.47	39.61	46.00	-6.39	QP	100	342	
6		375.9385	46.41	-7.57	38.84	46.00	-7.16	QP	100	279	

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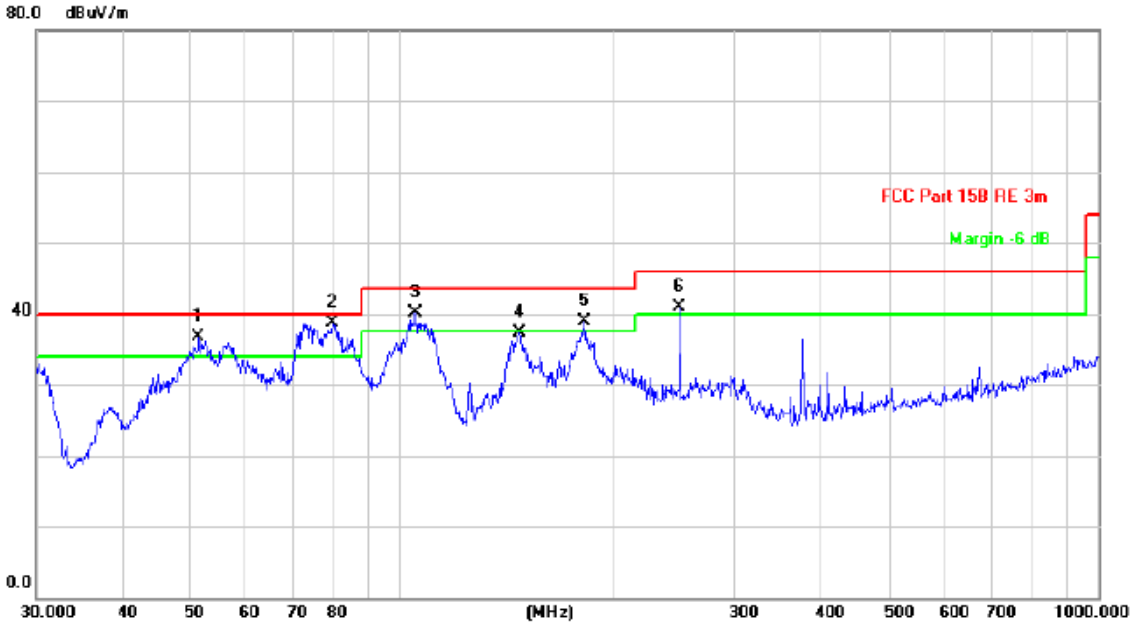
TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	!	51.3004	52.30	-15.62	36.68	40.00	-3.32	QP	100	113	
2	*	79.8002	54.83	-16.37	38.46	40.00	-1.54	QP	100	272	
3	!	104.9033	52.52	-12.49	40.03	43.50	-3.47	QP	100	311	
4		147.4036	47.95	-10.61	37.34	43.50	-6.16	QP	100	46	
5	!	182.5592	50.64	-11.77	38.87	43.50	-4.63	QP	100	189	
6	!	250.3011	51.61	-10.75	40.86	46.00	-5.14	QP	100	287	

Note:
1.Final Over = Receiver Read level + Factor - Limit
2.The emission levels of other frequencies are very lower than the limit and not show in test report.

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6.8 Emissions in restricted frequency bands (above 1GHz)

Test Requirement:	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 Method:	Radiated emissions tests
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

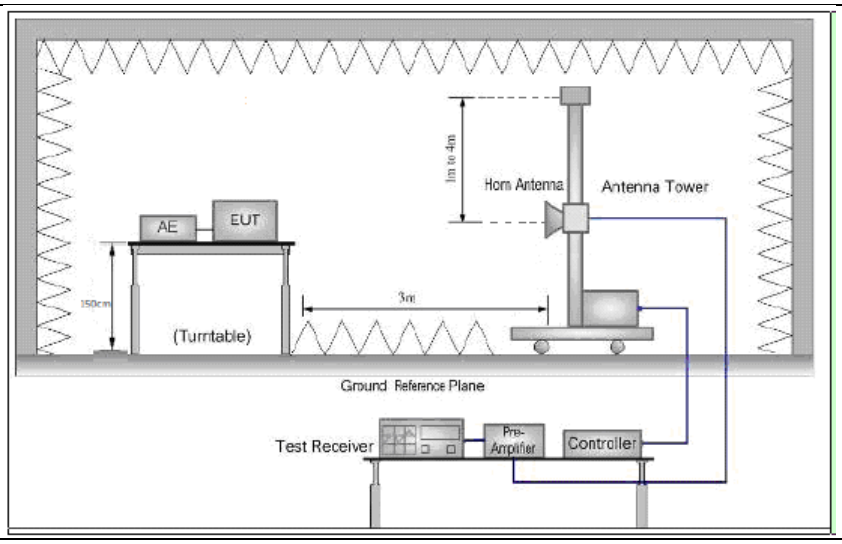
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

Procedure:	ANSI C63.10-2013 section 6.6.4

6.8.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.1 °C
Humidity:	46.3 %
Atmospheric Pressure:	1010 mbar

6.8.2 Test Setup Diagram:



6.8.3 Test Data:

1GHz~25GHz (Record only the worstchannel test results)

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4804.38	68.64	-27.96	40.68	74.00	-33.32	peak	P
2	7206.45	63.38	-24.95	38.43	74.00	-35.57	peak	P
3	9608.55	64.30	-23.34	40.96	74.00	-33.04	peak	P
4	12010.20	63.96	-21.76	42.20	74.00	-31.80	peak	P

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4804.10	69.54	-27.96	41.58	74.00	-32.42	peak	P
2	7207.30	63.56	-24.95	38.61	74.00	-35.39	peak	P
3	9608.51	64.10	-23.34	40.76	74.00	-33.24	peak	P
4	12012.75	63.77	-21.76	42.01	74.00	-31.99	peak	P

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TM1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4962.67	69.91	-27.42	42.49	74.00	-31.51	peak	P
2	7441.49	63.24	-24.82	38.42	74.00	-35.58	peak	P
3	9922.23	65.03	-23.82	41.21	74.00	-32.79	peak	P
4	12400.40	64.20	-21.68	42.52	74.00	-31.48	peak	P

TM1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4961.25	69.41	-27.42	41.99	74.00	-32.01	peak	P
2	7440.62	65.88	-24.82	41.06	74.00	-32.94	peak	P
3	9920.85	63.00	-23.82	39.18	74.00	-34.82	peak	P
4	12402.62	64.86	-21.68	43.18	74.00	-30.82	peak	P

Remark:
1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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7 TEST SETUP PHOTOS

Radiated Emission below 1GHz

Radiated Emission above 1GHz

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Conducted Emission

8 EUT Constructional Details (EUT Photos)

External

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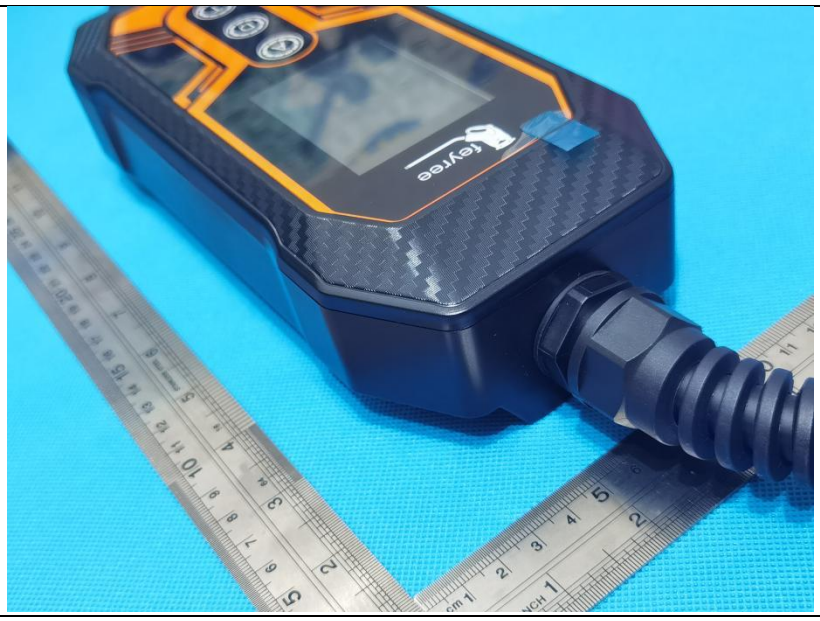

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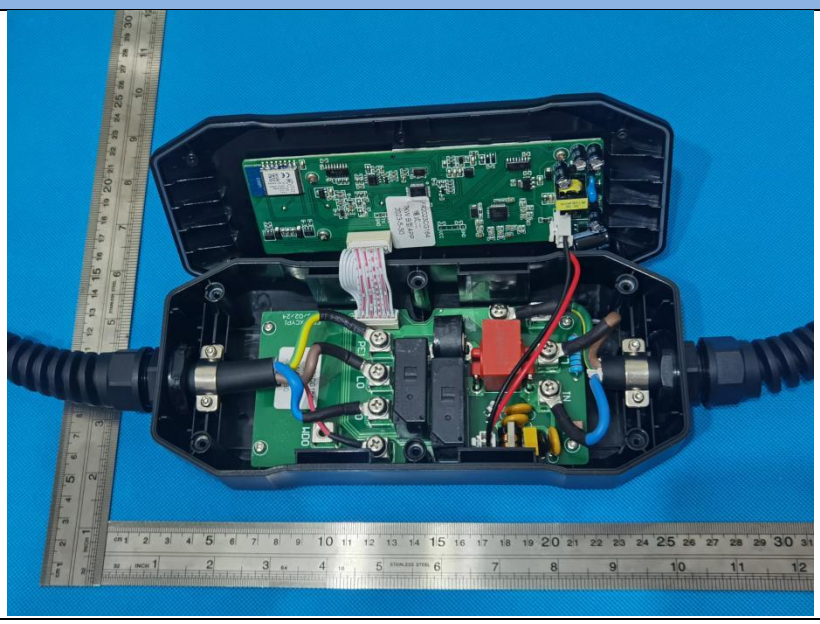
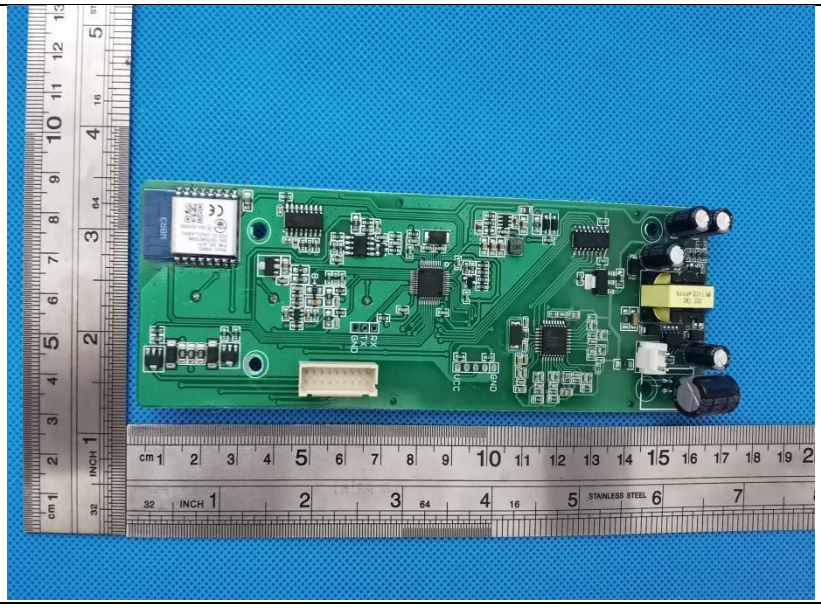
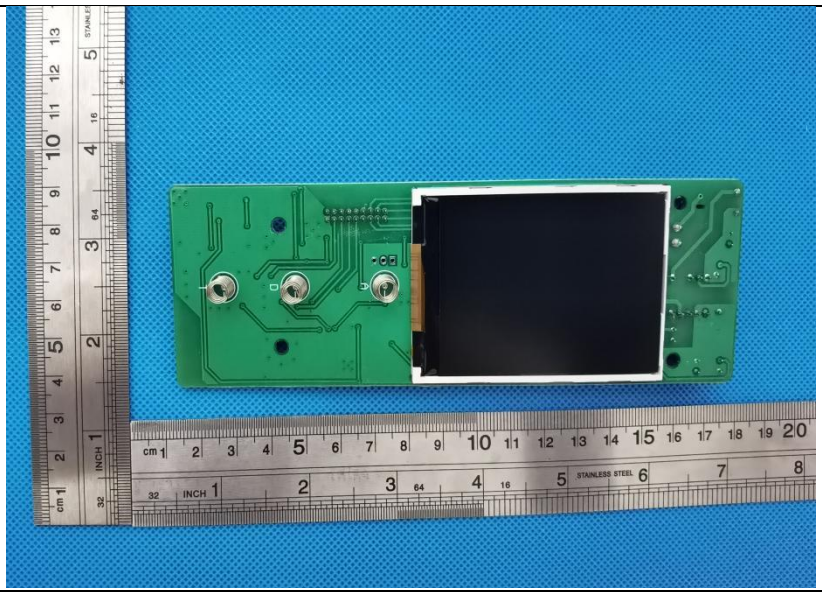
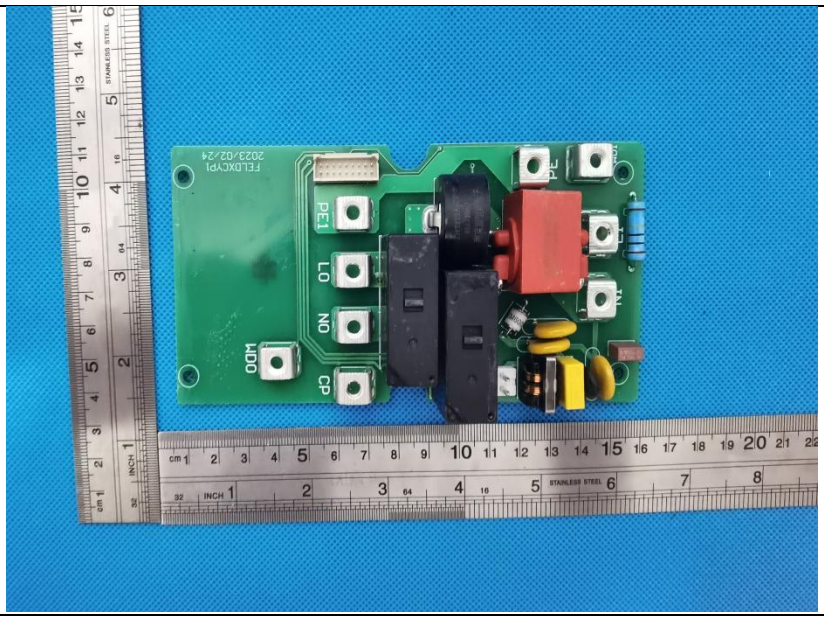
Internal








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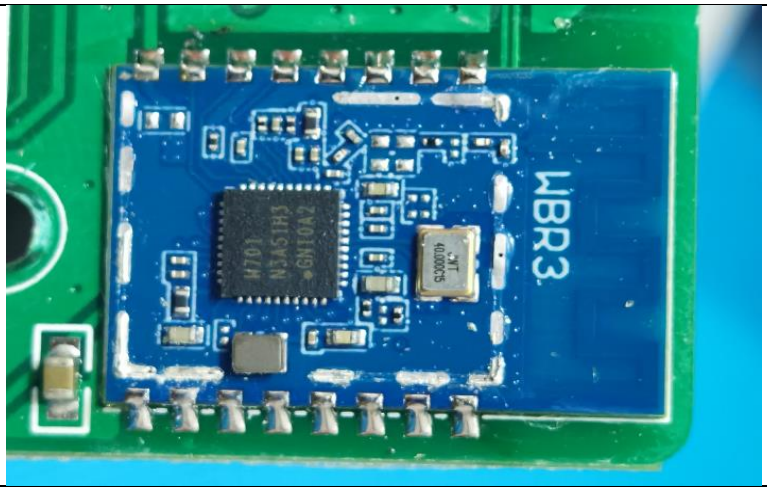

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Appendix

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1. Bandwidth

1.1 OBW

1.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz) Result	Verdict
1M	SISO	2402	1	1.037	Pass
		2440	1	1.038	Pass
		2480	1	1.036	Pass

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1.1.2 Test Graph

99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2402

99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2440

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99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2480

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2.2 6dB BW

2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	699.69	>=0.5	Pass
		2440	1	684.65	>=0.5	Pass
		2480	1	691.63	>=0.5	Pass

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2.2.2 Test Graph

-6dB_Bandwidth_NVNT_ANT1_1Mbps_2402

-6dB_Bandwidth_NVNT_ANT1_1Mbps_2440

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-6dB_Bandwidth_NVNT_ANT1_1Mbps_2480

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3.1 Peak Output Power

3.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	4.79	<=30	Pass
		2440	5.08	<=30	Pass
		2480	4.39	<=30	Pass
Note1: Antenna Gain: Ant1: 0dBi;					

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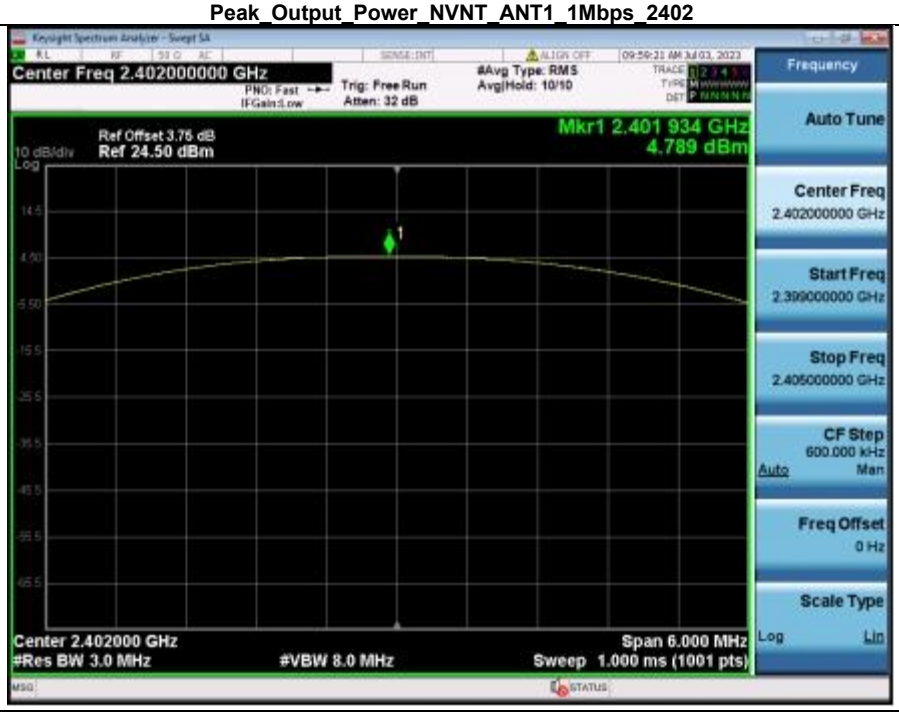
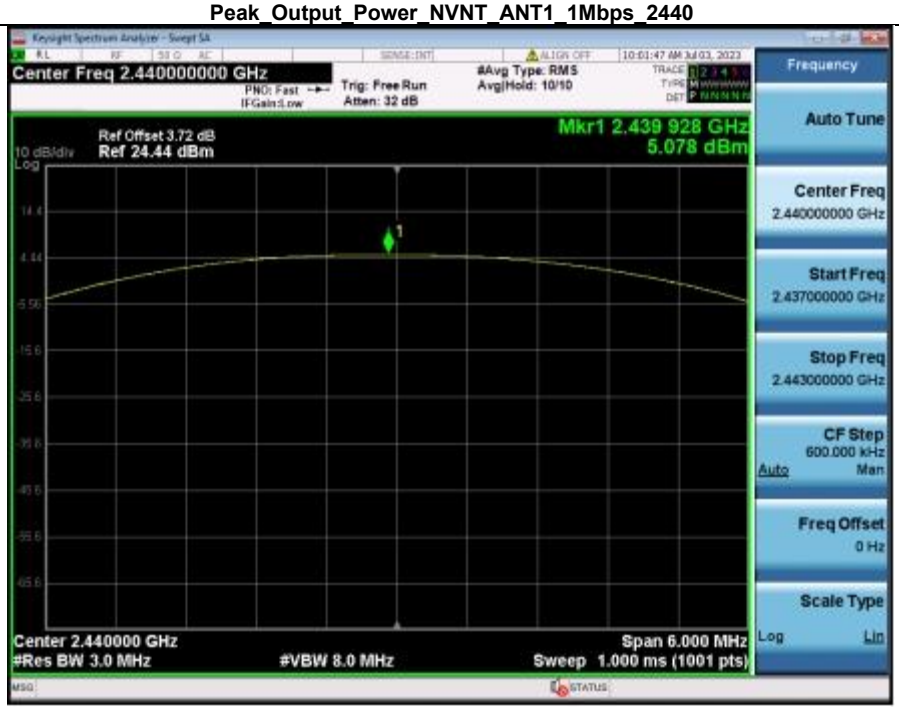
3.1.2 Test Graph

Peak_Output_Power_NVNT_ANT1_1Mbps_2402



Peak_Output_Power_NVNT_ANT1_1Mbps_2440



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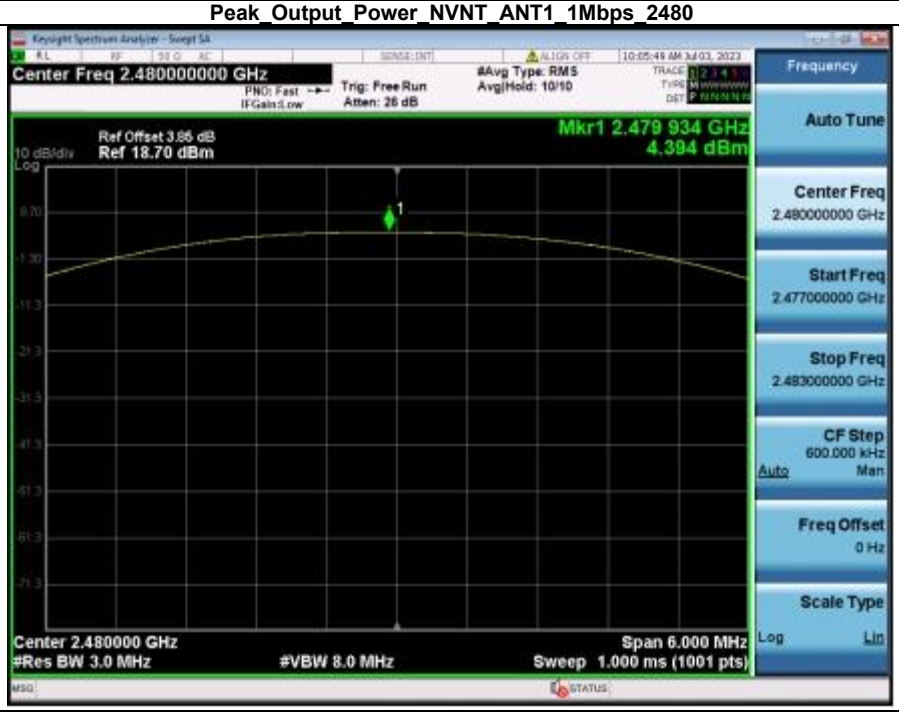
Peak_Output_Power_NVNT_ANT1_1Mbps_2480


4. Maximum Power Spectral Density

4.1 PSD

4.1.1 Test Result

Condition	Antenna	Rate	Frequency (MHz)	Power Spectral Density(dBm)	Limit(dBm/3kHz)	Result
NVNT	ANT1	1Mbps	2402	-10.80	8	Pass
NVNT	ANT1	1Mbps	2440	-10.42	8	Pass
NVNT	ANT1	1Mbps	2480	-11.22	8	Pass
Note1: Antenna Gain: Ant1: 0dBi;						

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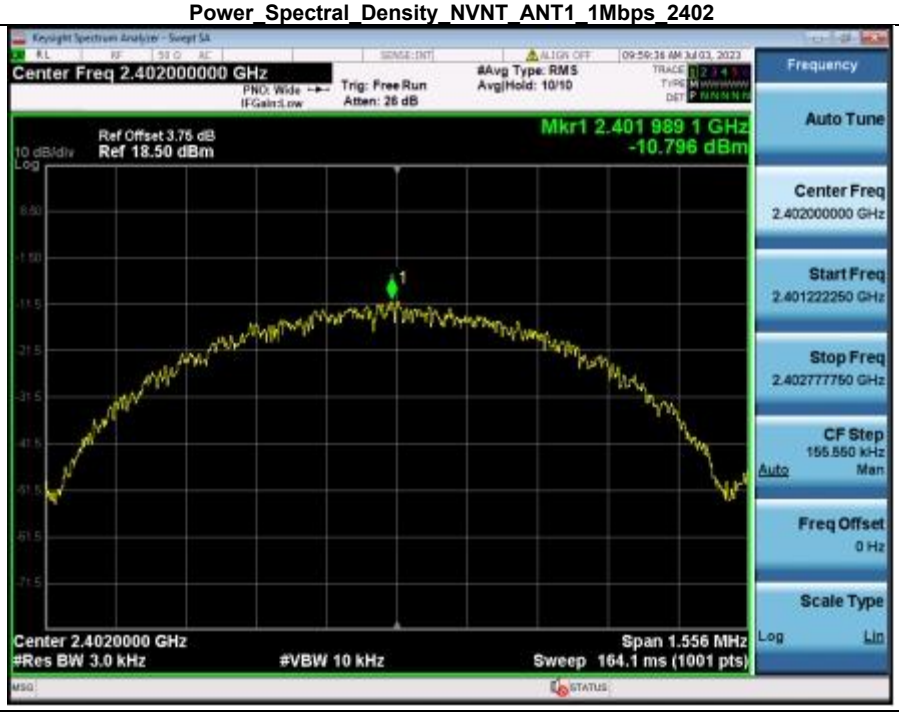
4.1.2 Test Graph

Power_Spectral_Density_NVNT_ANT1_1Mbps_2402



Power_Spectral_Density_NVNT_ANT1_1Mbps_2440

Power_Spectral_Density_NVNT_ANT1_1Mbps_2480

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Center Freq 2.480000000 GHz
Trig: Free Run
Atten: 26 dB
#Avg Type: RMS
Avg|Hold: 10/10
Ref Offset 3.86 dB
10 dB/div
Ref 18.70 dBm
Mkr1 2.480 001 6 GHz
-11.222 dBm
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.554 MHz
Sweep 163.9 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479223000 GHz
Stop Freq
2.480777000 GHz
CF Step
155.400 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

5. Unwanted Emissions and Bandedge

5.1.1 Test Result

Condition	Antenna	Rate	TX_Frequency(MHz)	Spurious MAX.Value(dBm)	Limit	Result
NVNT	ANT1	1Mbps	2402	-44.298	-16.351	Pass
NVNT	ANT1	1Mbps	2440	-49.298	-16.065	Pass
NVNT	ANT1	1Mbps	2480	-44.993	-16.759	Pass

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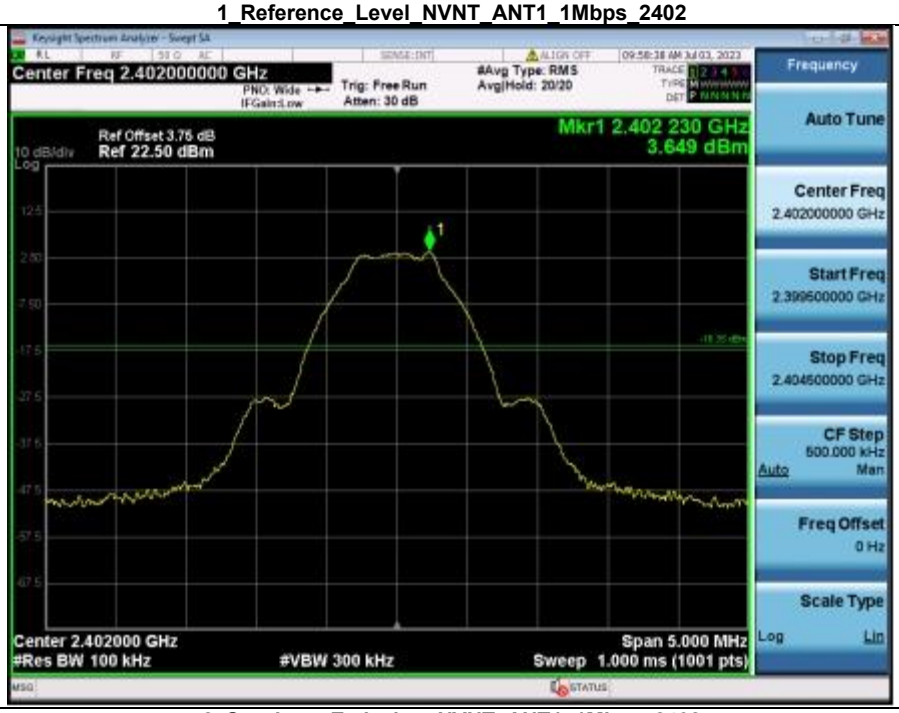
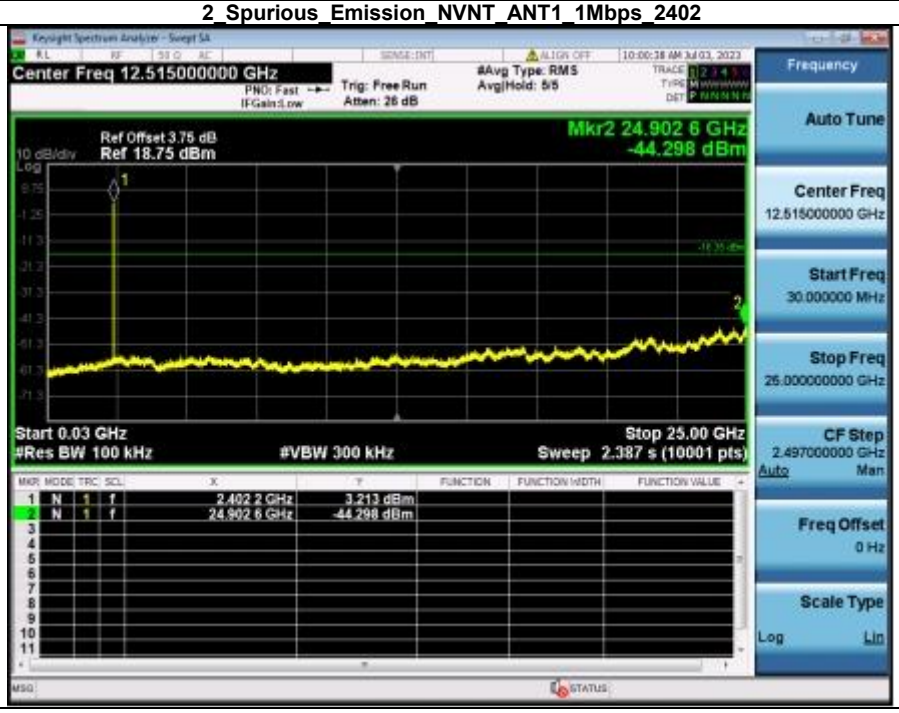
5.1.2 Test Graph

1_Reference_Level_NVNT_ANT1_1Mbps_2402



2_Spurious_Emission_NVNT_ANT1_1Mbps_2402



3_Bandedge_NVNT_ANT1_1Mbps_2402

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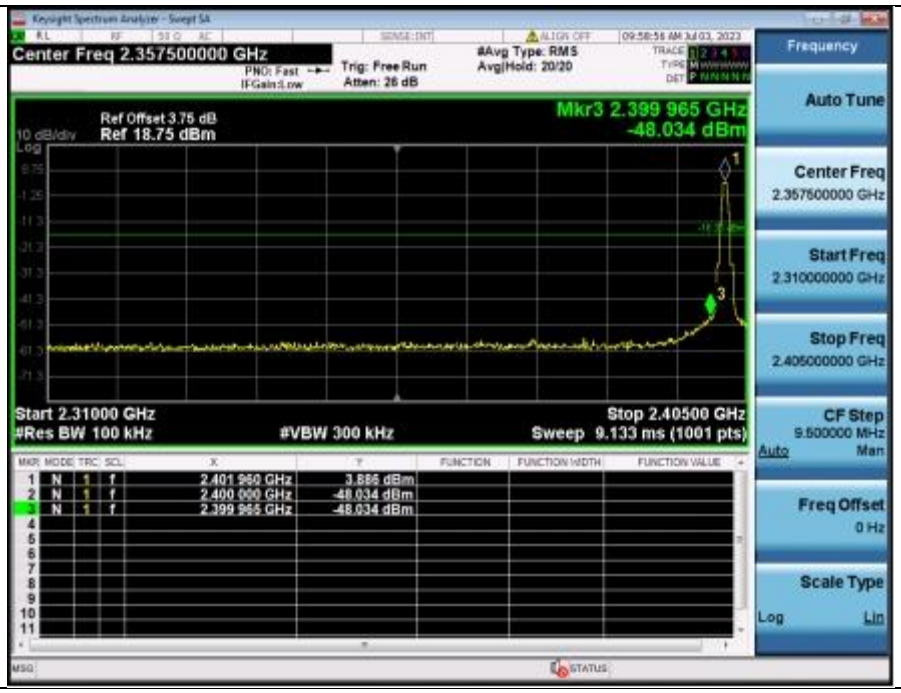

1_Reference_Level_NVNT_ANT1_1Mbps_2440

2_Spurious_Emission_NVNT_ANT1_1Mbps_2440

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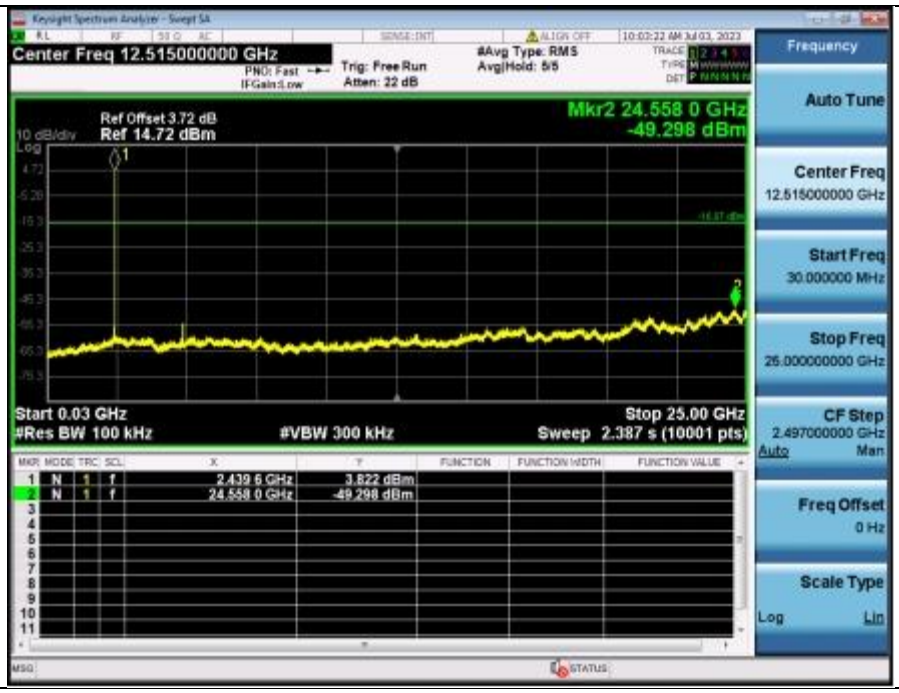
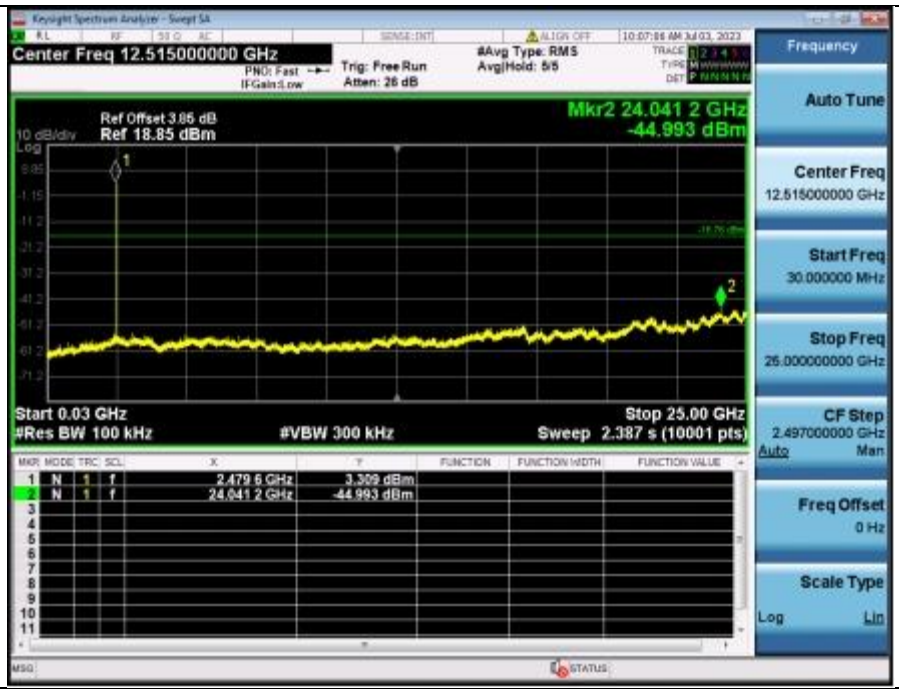
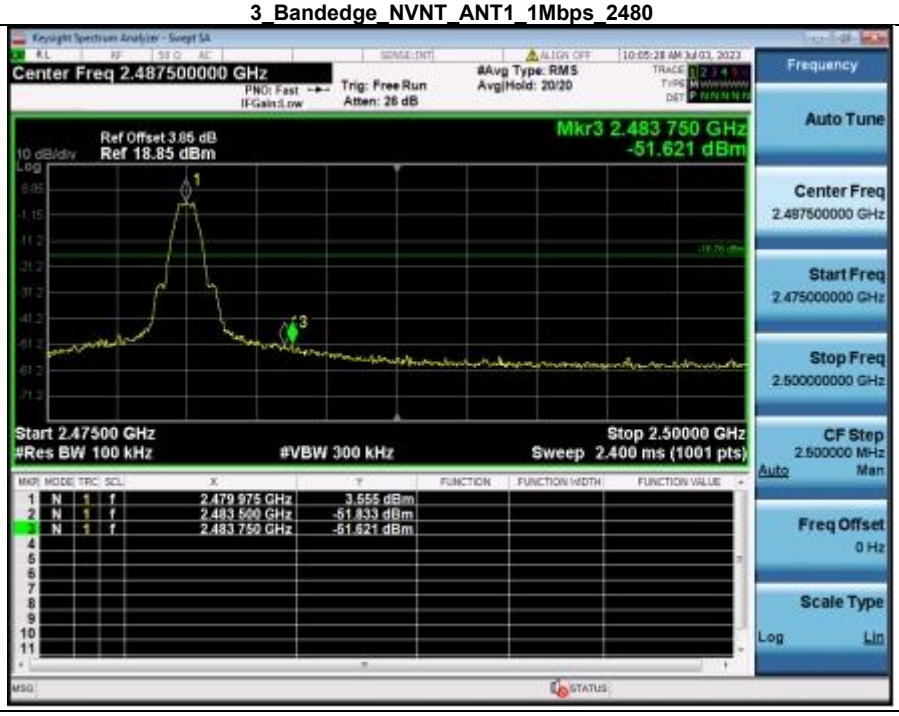


1_Reference_Level_NVNT_ANT1_1Mbps_2480
2_Spurious_Emission_NVNT_ANT1_1Mbps_2480



3_Bandedge_NVNT_ANT1_1Mbps_2480



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1. Form731

7.1 Form731

7.1.1 Test Result

Lower Freq (MHz)	High Freq (MHz)	MAX Power (W)	MAX Power (dBm)
2402	2480	0.00322	5.08

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