
FCC Test Report

Report No.: AGC00210210706FE02

FCC ID : 2AVUHVA-SP005

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : VAVA Remote Control

BRAND NAME : VAVA

MODEL NAME : VA-SP005

APPLICANT : Shenzhen NearbyExpress Technology Development
Company Limited

DATE OF ISSUE : Jul. 30, 2021

STANDARD(S) : FCC Part 15.247

REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jul. 30, 2021	Valid	Initial Release

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1. VERIFICATION OF COMPLIANCE


Applicant	Shenzhen NearbyExpress Technology Development Company Limited
Address	Room 701, 702, 703, 705, 706, 708, 709, Building E, Galaxy World Phase II, Minle Community, Minzhi Street, Longhua District, Shenzhen, Guangdong, China 518000
Manufacturer	Shenzhen NearbyExpress Technology Development Company Limited
Address	Room 701, 702, 703, 705, 706, 708, 709, Building E, Galaxy World Phase II, Minle Community, Minzhi Street, Longhua District, Shenzhen, Guangdong, China 518000
Factory	GUANGDONG SENEASY INTELLIGENT TECHNOLOGY CO., LTD.
Address	No. 63, Huitai Industrial Park, Huizhou City, Guangdong Province, P. R. China
Product Designation	VAVA Remote Control
Brand Name	VAVA
Test Model	VA-SP005
Date of test	Jul. 14, 2021 to Jul. 30, 2021
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BLE/RF

We hereby certify that:


The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC part 15.247.

Prepared By 

 Cool Cheng
 (Project Engineer) Jul. 30, 2021

Reviewed By 

 Max Zhang
 (Reviewer) Jul. 30, 2021

Approved By 

 Forrest Lei
 (Authorized Officer) Jul. 30, 2021

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as a “VAVA Remote Control”. It is designed by way of utilizing the GFSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402GHz to 2.480GHz
RF Output Power	1.796dBm(Max)
Bluetooth Version	V4.2
Modulation	BR <input type="checkbox"/> GFSK, EDR <input type="checkbox"/> π/4-DQPSK, <input type="checkbox"/> 8DPSK BLE <input checked="" type="checkbox"/> GFSK 1Mbps <input type="checkbox"/> GFSK 2Mbps
Number of channels	40 Channels
Antenna Designation	PCB Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	3.99dBi
Hardware Version	S1413A3871-B
Software Version	V1.2.2
Power Supply	DC 3.0V by battery

2.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency
2400~2483.5MHz	0	2402 MHz
	1	2404 MHz
	:	:
	38	2478 MHz
	39	2480 MHz

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2.3. RELATED SUBMITTAL(S)/GRANT(S)

This submittal(s) (test report) is intended for **FCC ID: 2AVUHVA-SP005** filing to comply with the FCC Part 15.247 requirements.

2.4. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.7. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 3.1$ dB
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 4.0$ dB
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.8$ dB
Uncertainty of total RF power, conducted	$U_c = \pm 0.8$ dB
Uncertainty of RF power density, conducted	$U_c = \pm 2.6$ dB
Uncertainty of spurious emissions, conducted	$U_c = \pm 2$ %
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2$ %

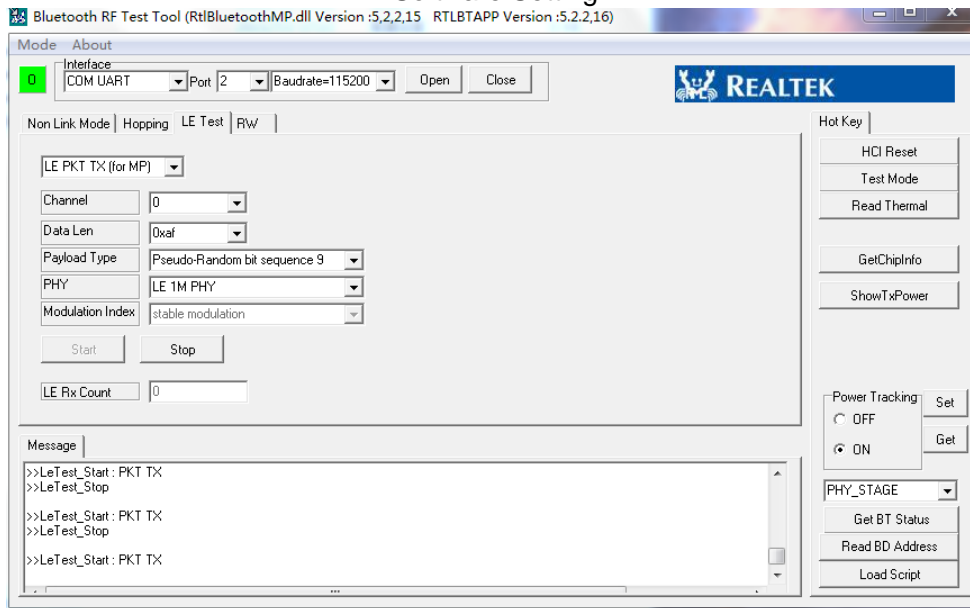
Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX

- Note: 1. Only the result of the worst case was recorded in the report, if no other cases.
 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
 3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

Software Setting



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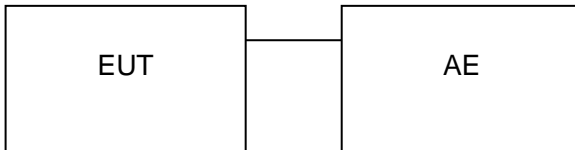
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF TESTED SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:



5.2. EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	VAVA Remote Control	VA-SP005	2AVUHVA-SP005	EUT
2	Control Box	USB-TTL	N/A	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.247 (b)(3)	Peak Output Power	Compliant
15.247 (a)(2)	6 dB Bandwidth	Compliant
15.247 (d)	Conducted Spurious Emission	Compliant
15.247 (e)	Maximum Conducted Output Power Density	Compliant
15.209	Radiated Emission	Compliant
15.207	Conducted Emission	Not applicable

Note: The EUT is battery powered.

6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance (Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	Rohde & Schwarz	ESCI	10096	Apr. 14, 2021	Apr. 13, 2022
EXA Signal Analyzer	Agilent	N9010A	MY53470504	Dec. 07, 2020	Dec. 06, 2021
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2021	Apr. 22, 2023
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 08, 2021	Jan. 07, 2023
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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7. PEAK OUTPUT POWER

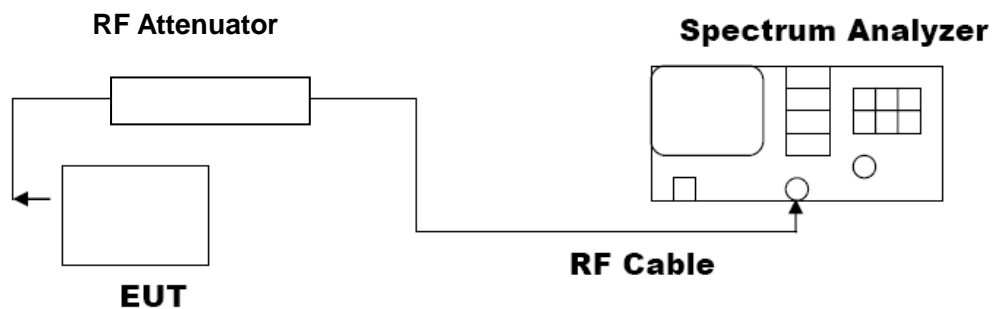
7.1. MEASUREMENT PROCEDURE

For peak power test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. $RBW \geq DTS$ bandwidth
3. $VBW \geq 3 * RBW$.
4. $SPAN \geq VBW$.
5. Sweep: Auto.
6. Detector function: Peak.
7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

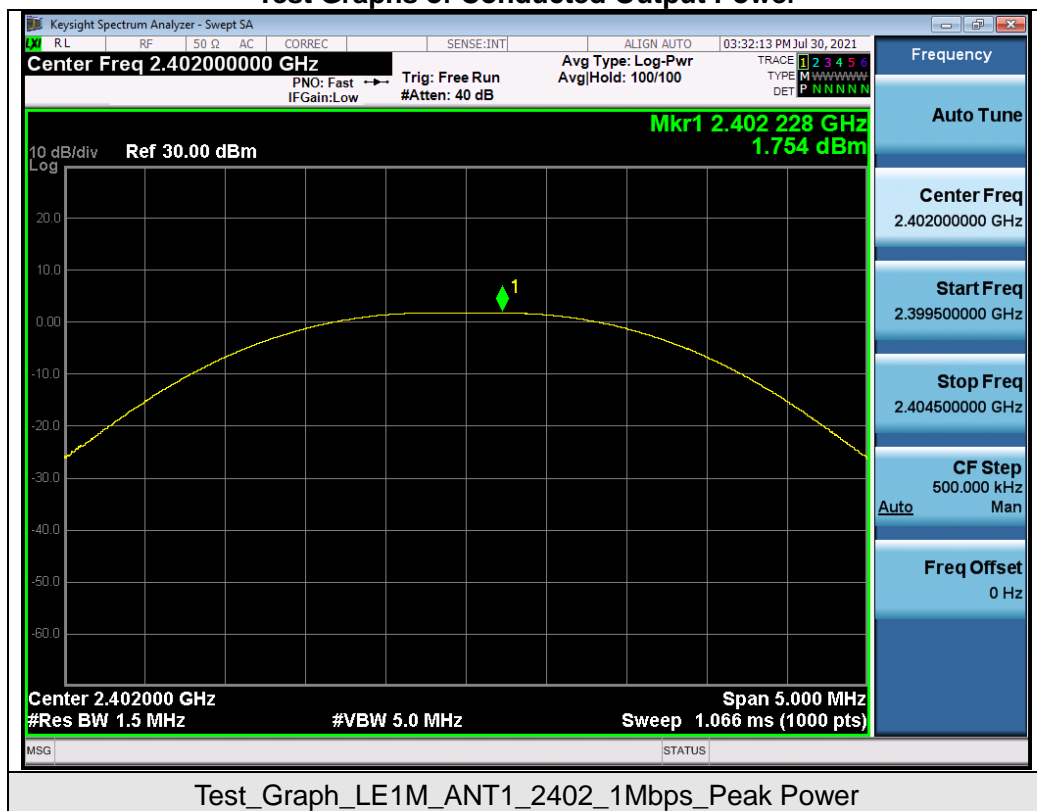
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) PEAK POWER TEST SETUP



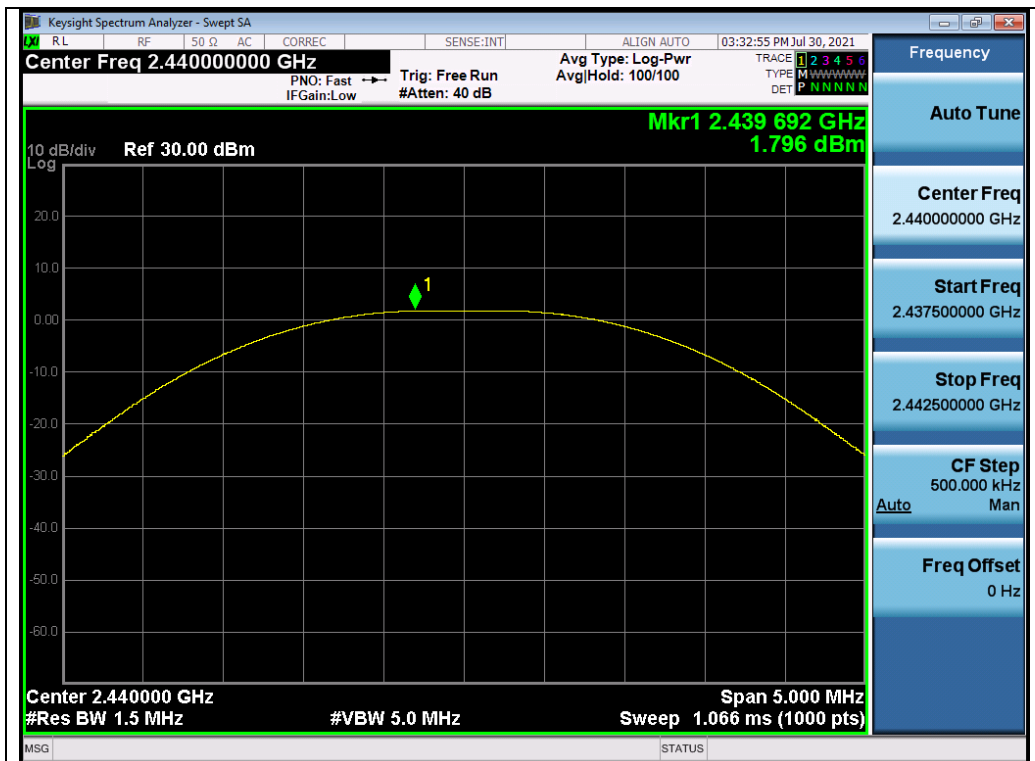
7.3. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power				
Test Mode	Test Channel (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
GFSK 1M	2402	1.754	≤ 30	Pass
	2440	1.796	≤ 30	Pass
	2480	1.340	≤ 30	Pass

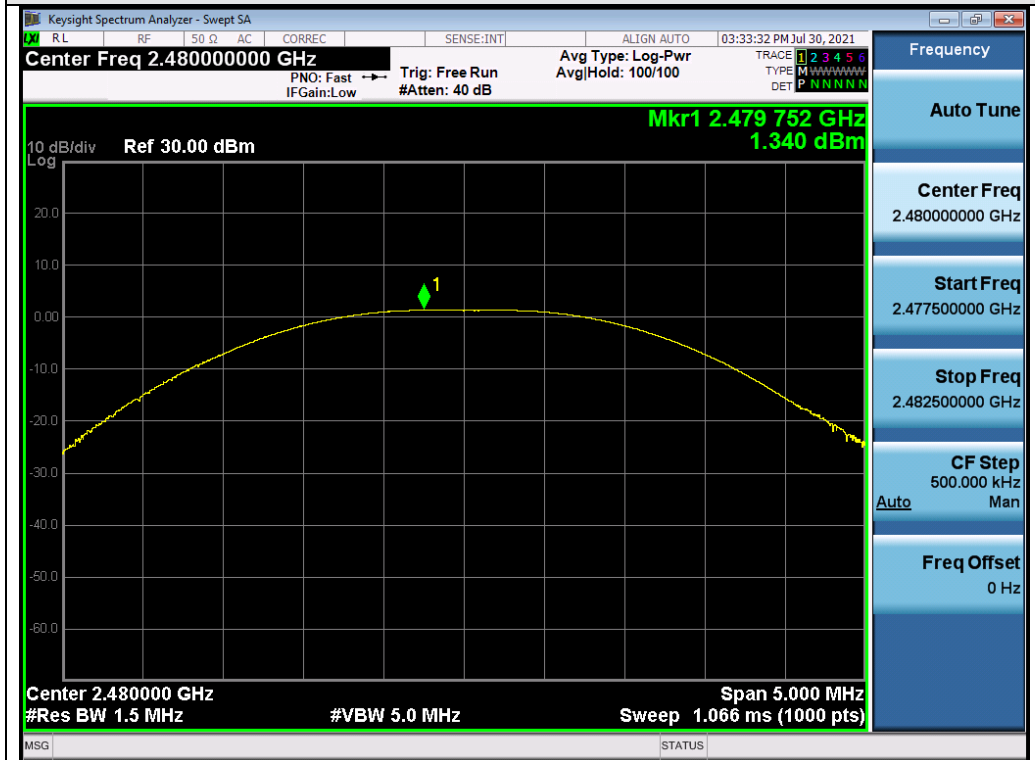
Test Graphs of Conducted Output Power



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Test_Graph_LE1M_ANT1_2440_1Mbps_Peak Power



Test_Graph_LE1M_ANT1_2480_1Mbps_Peak Power

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8. BANDWIDTH

8.1. MEASUREMENT PROCEDURE

6dB bandwidth:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW $\geq 3 \times$ RBW.
4. Set SPA Trace 1 Max hold, then View.

Occupied bandwidth:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel
The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

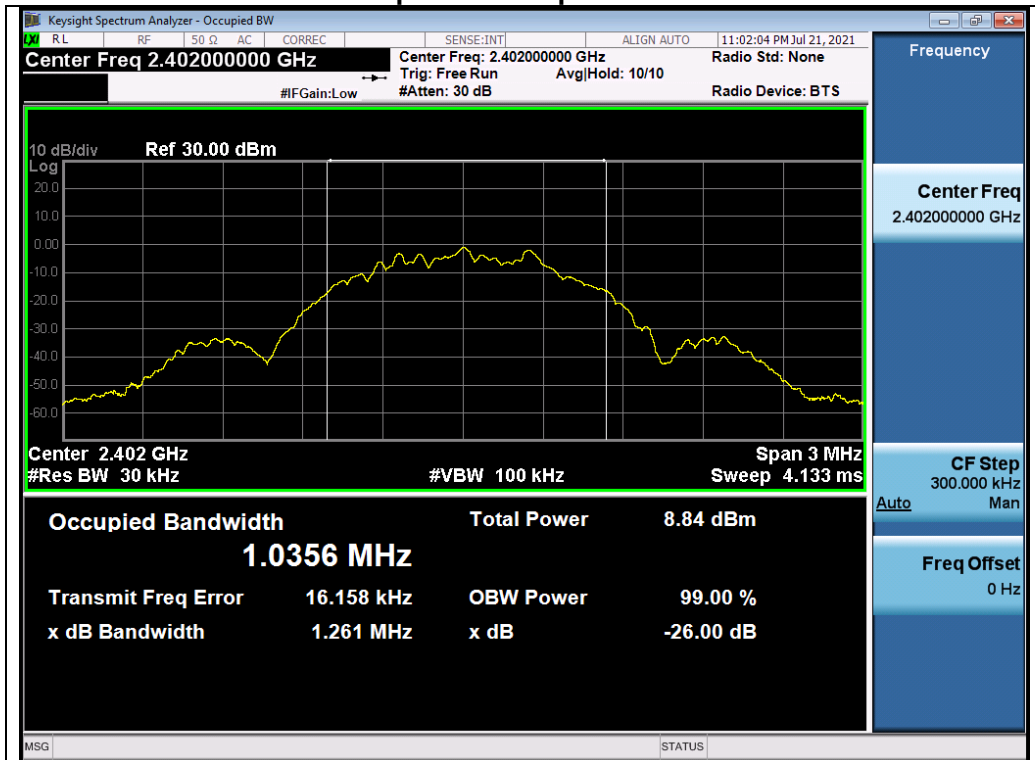
The same as described in section 7.2.

8.3. LIMITS AND MEASUREMENT RESULTS

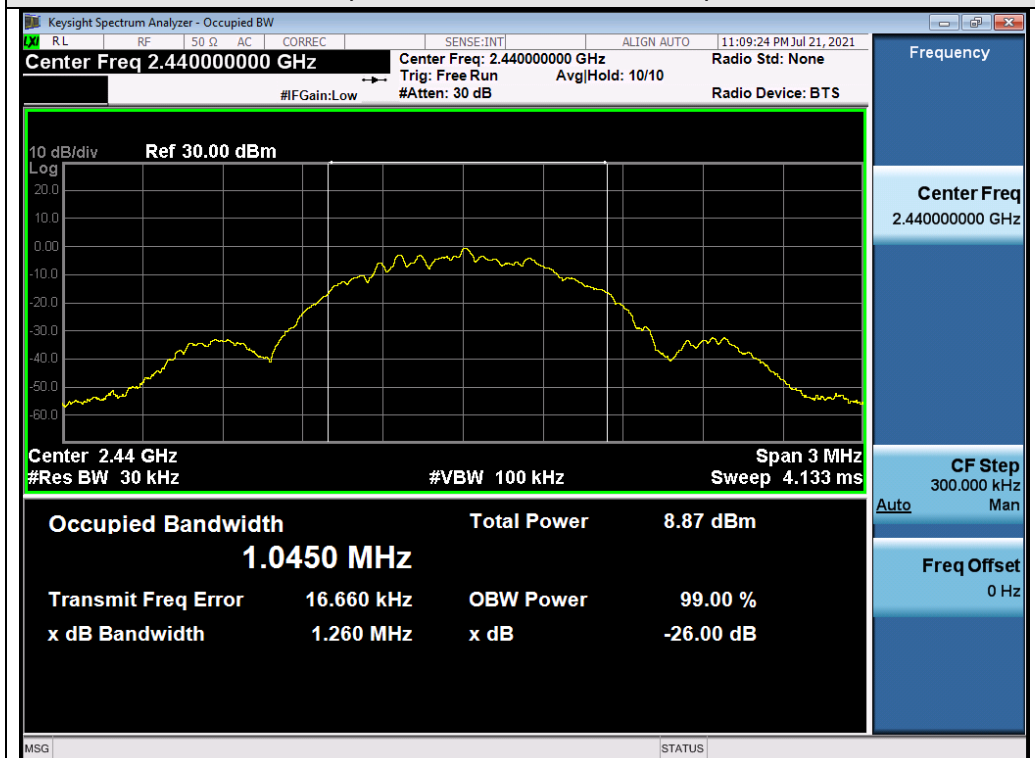
Test Data of Occupied Bandwidth and DTS Bandwidth					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-6dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
GFSK 1M	2402	1.036	0.663	≥ 0.5	Pass
	2440	1.045	0.683	≥ 0.5	Pass
	2480	1.058	0.721	≥ 0.5	Pass

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Test Graphs of Occupied Bandwidth

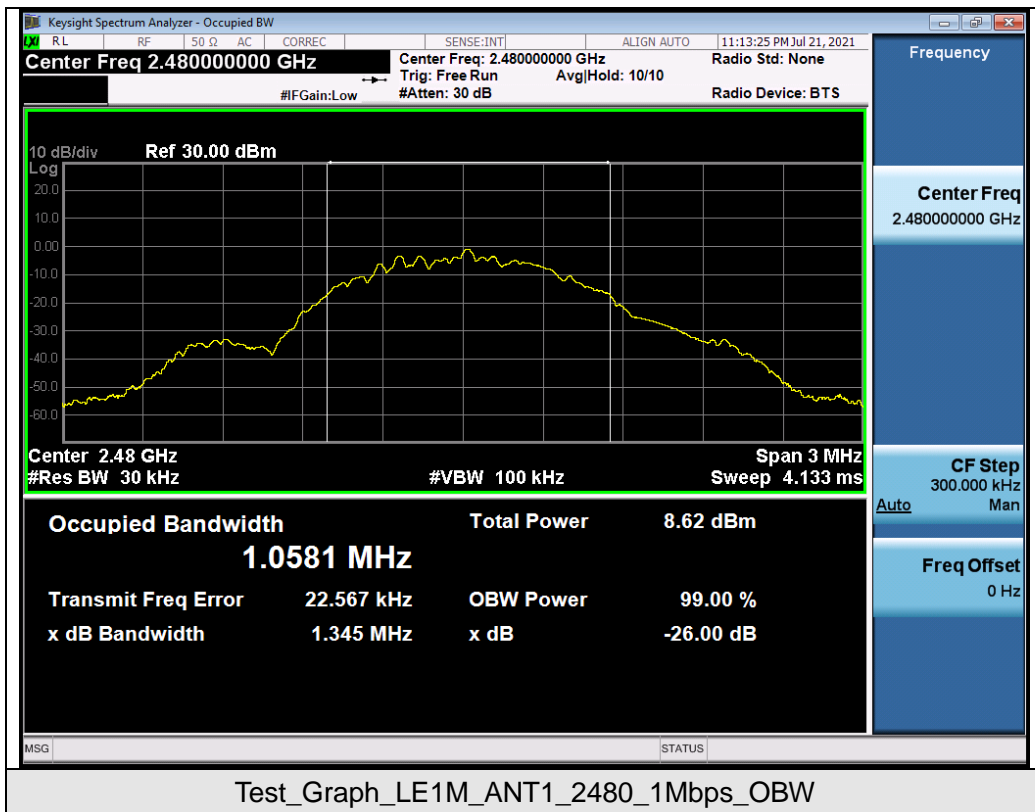


Test_Graph_LE1M_ANT1_2402_1Mbps_OBW



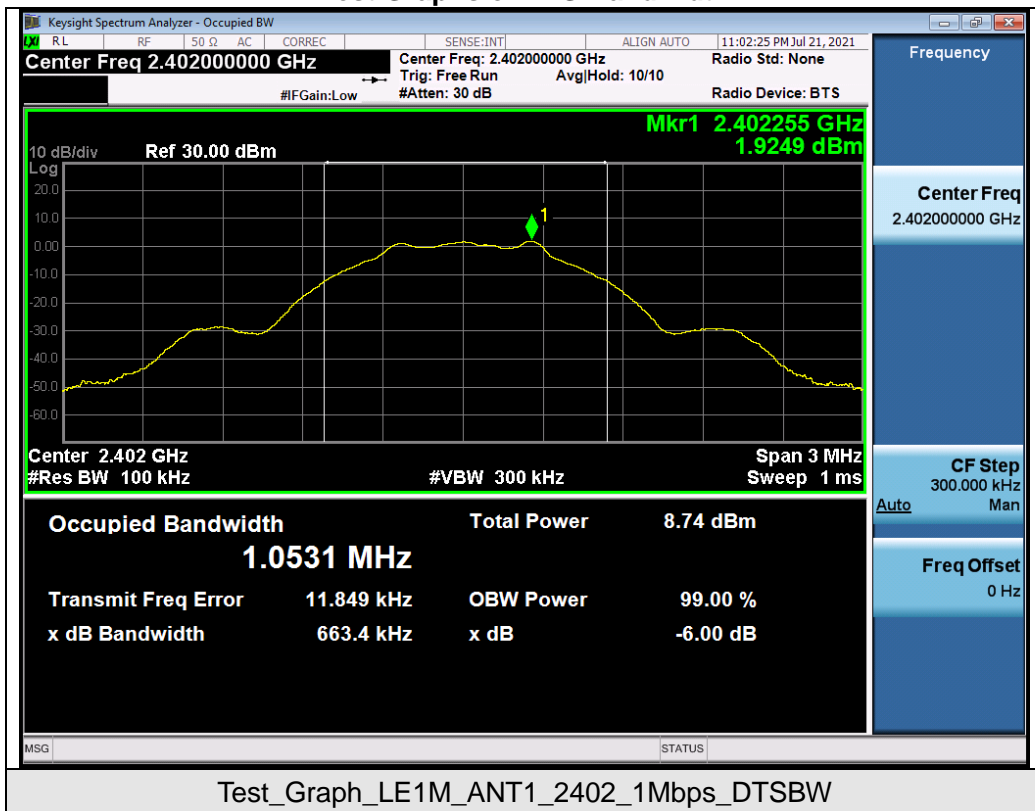
Test_Graph_LE1M_ANT1_2440_1Mbps_OBW

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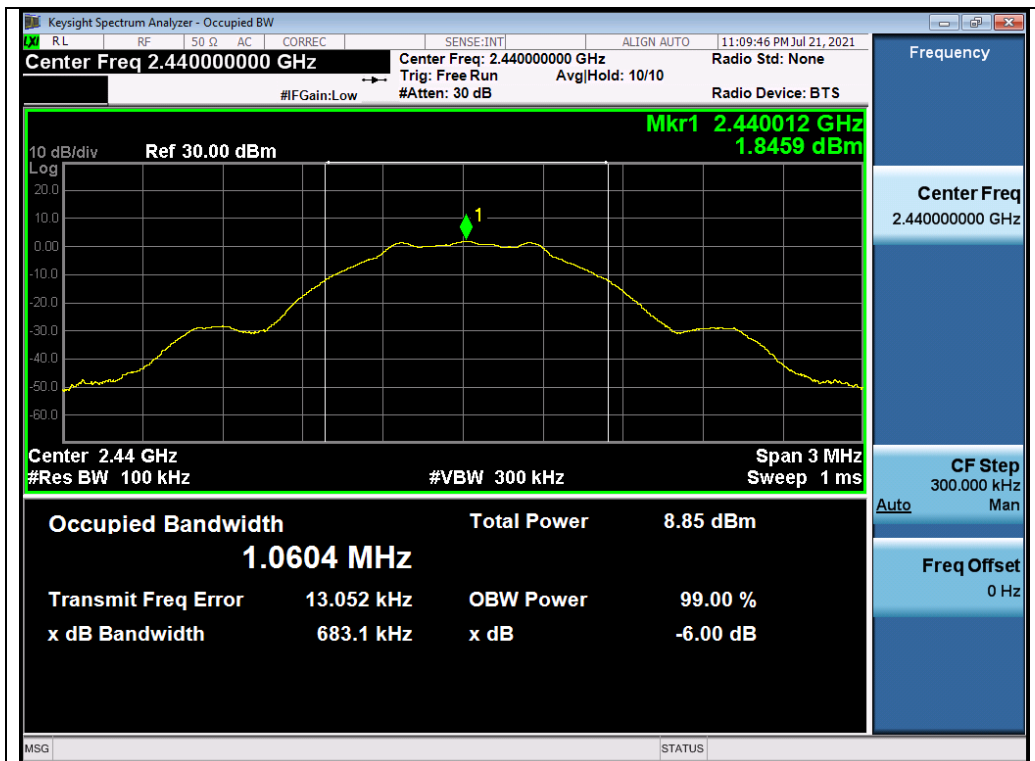
Test_Graph_LE1M_ANT1_2480_1Mbps_OBW

Test Graphs of DTS Bandwidth

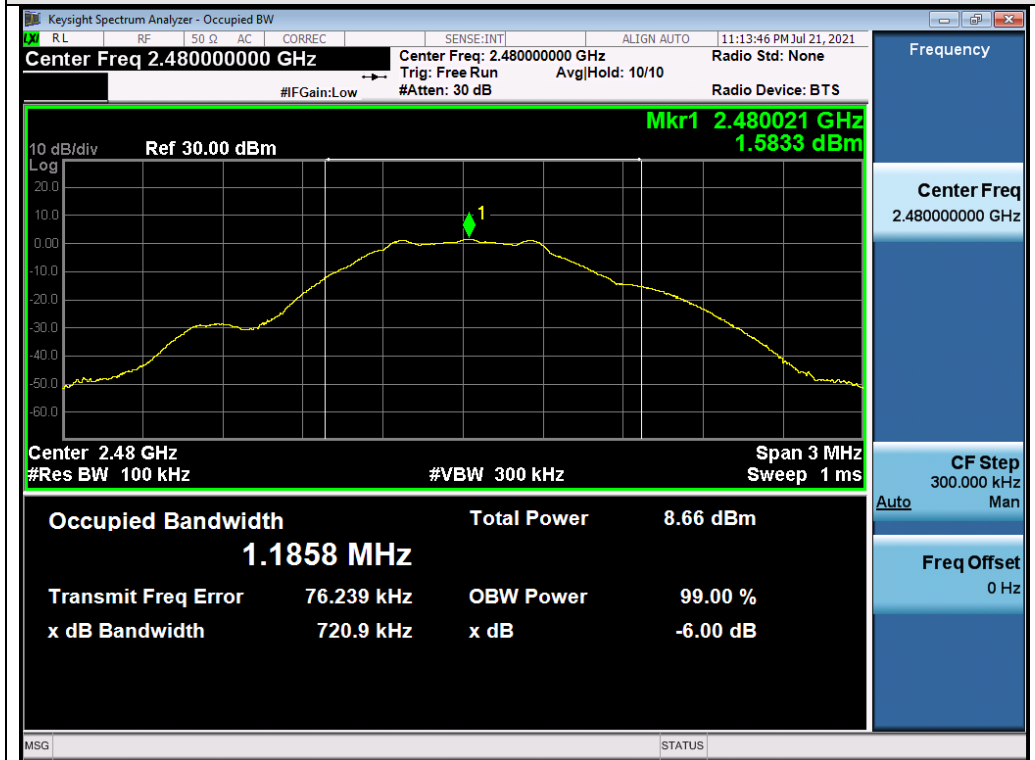


Test_Graph_LE1M_ANT1_2402_1Mbps_DTSBW

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Test_Graph_LE1M_ANT1_2440_1Mbps_DTSBW



Test_Graph_LE1M_ANT1_2480_1Mbps_DTSBW

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9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

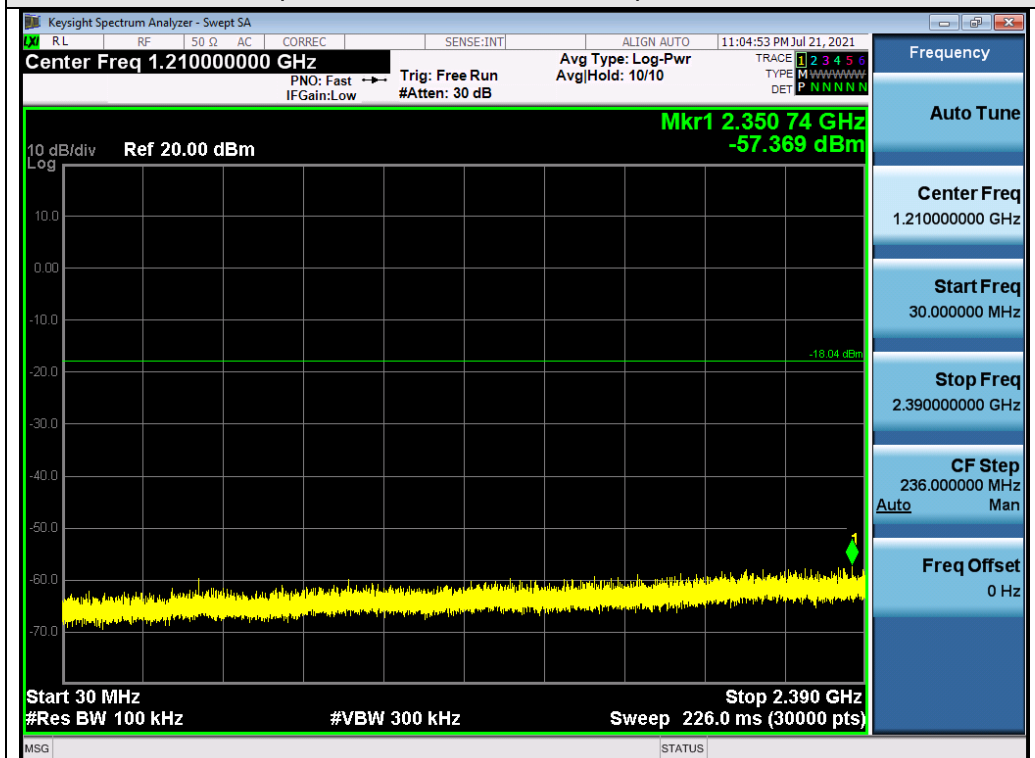
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	At least -20dBc than the reference level	PASS

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Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands

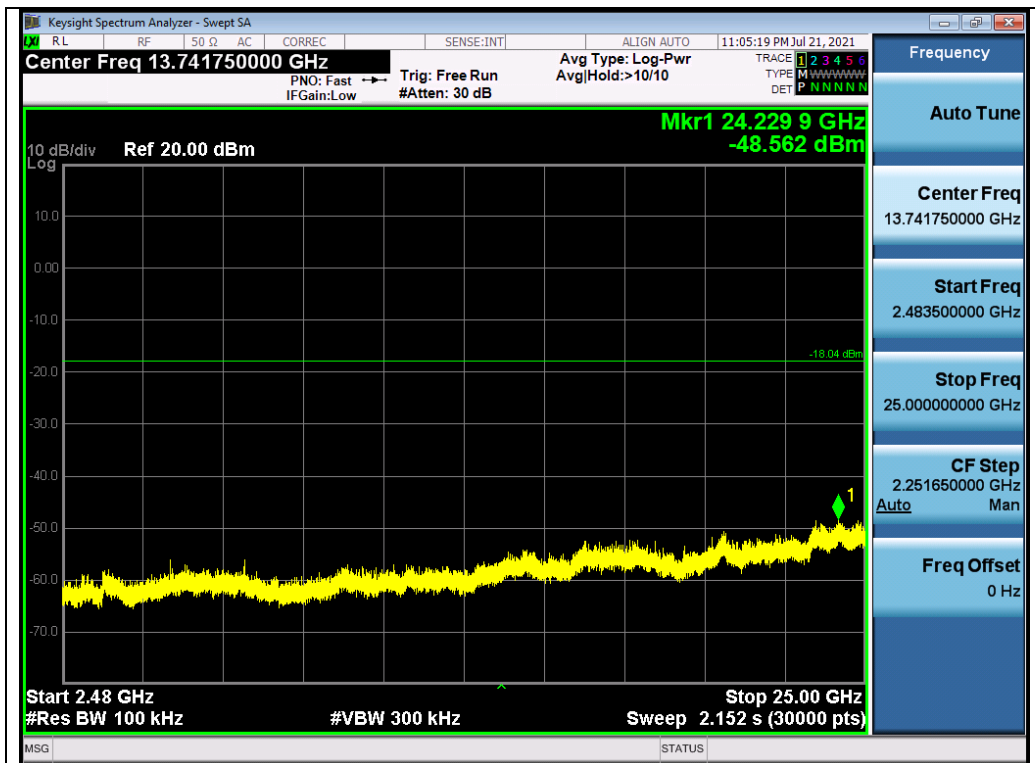


Test_Graph_LE1M_ANT1_2402_1Mbps_Reference Level

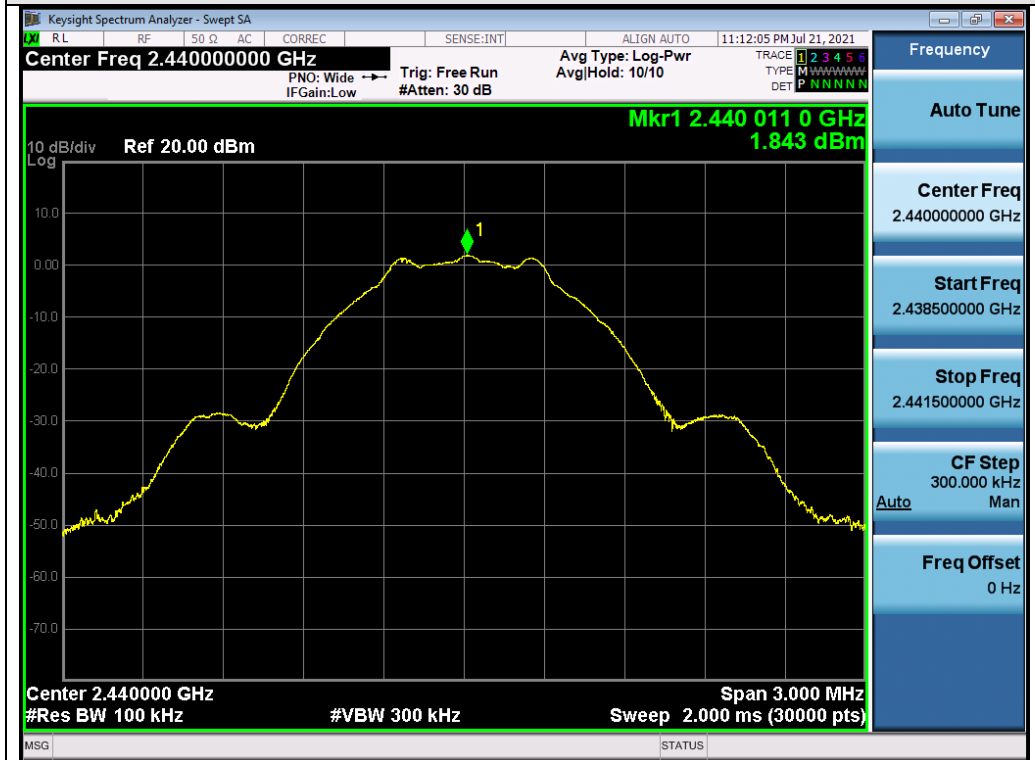


Test_Graph_LE1M_ANT1_2402_1Mbps_Lower Band Emissions

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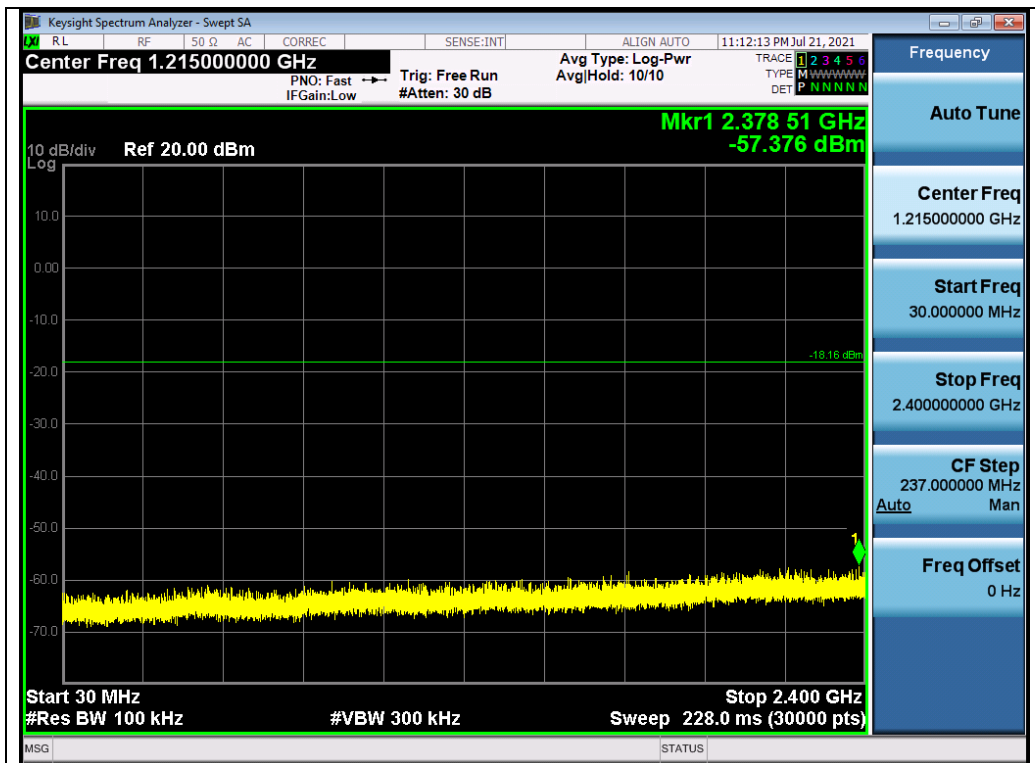


Test_Graph_LE1M_ANT1_2402_1Mbps_Higher Band Emissions

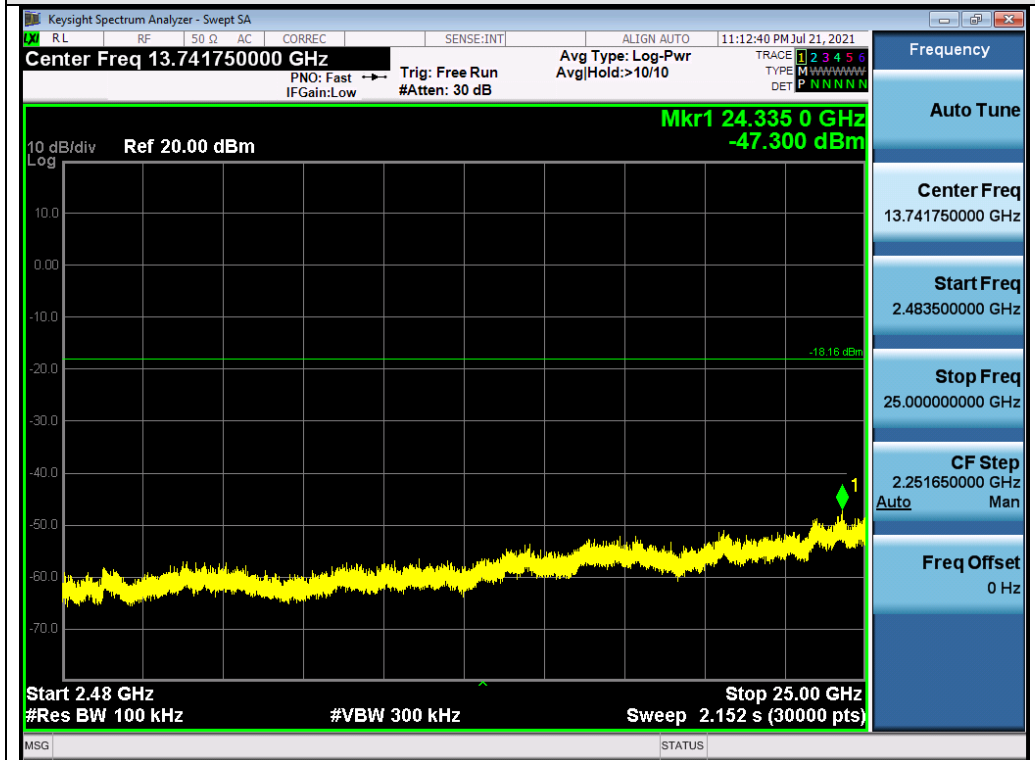


Test_Graph_LE1M_ANT1_2440_1Mbps_Reference Level

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Test_Graph_LE1M_ANT1_2440_1Mbps_Lower Band Emissions

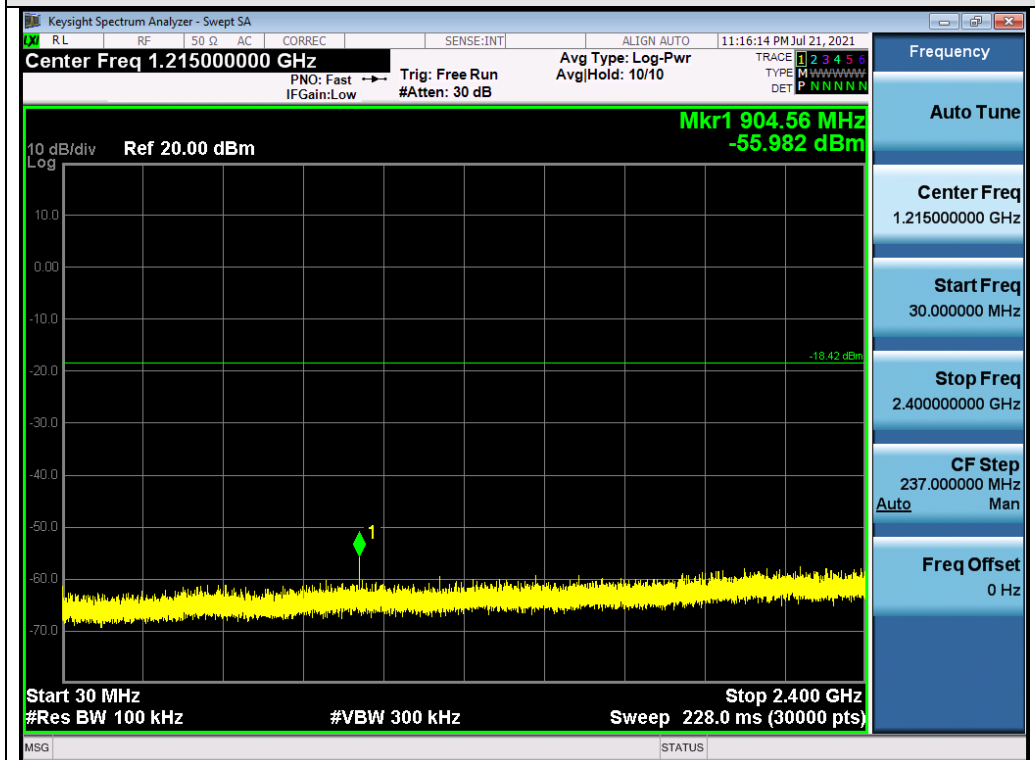


Test_Graph_LE1M_ANT1_2440_1Mbps_Higher Band Emissions

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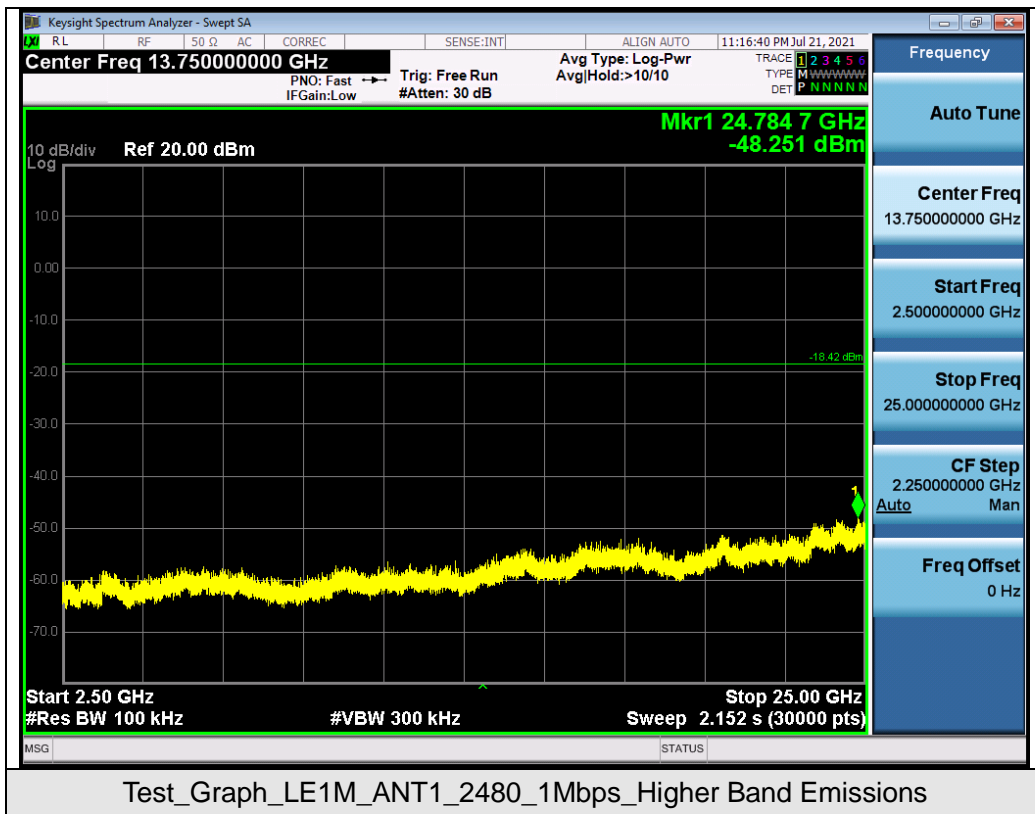


Test_Graph_LE1M_ANT1_2480_1Mbps_Reference Level



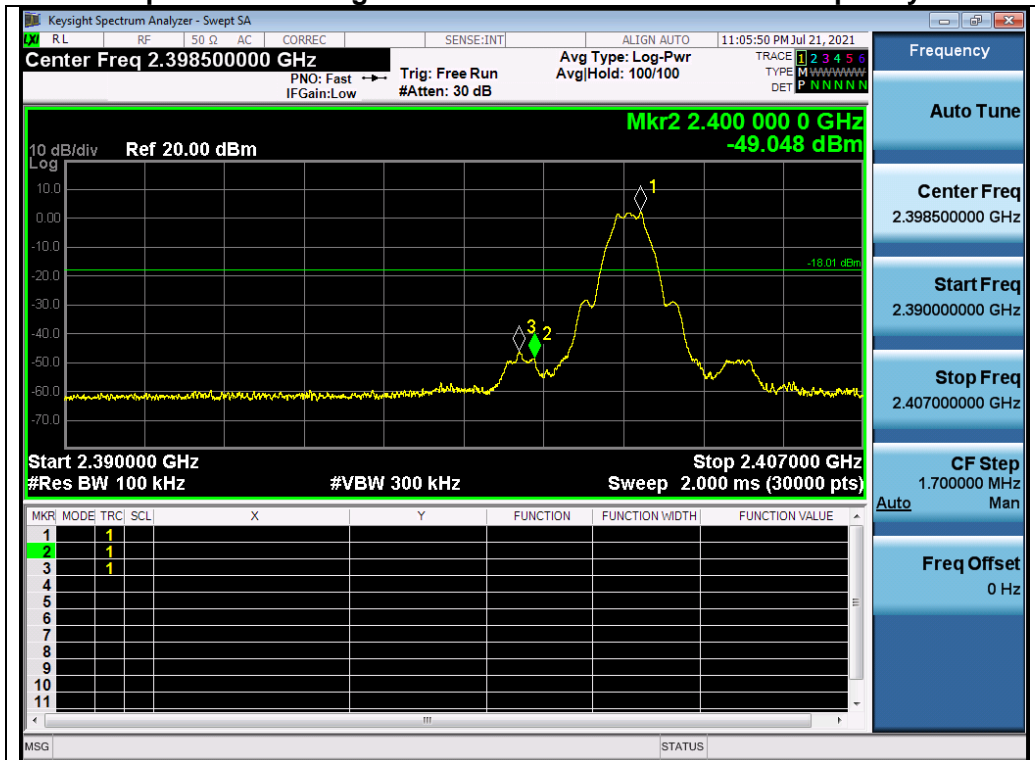
Test_Graph_LE1M_ANT1_2480_1Mbps_Lower Band Emissions

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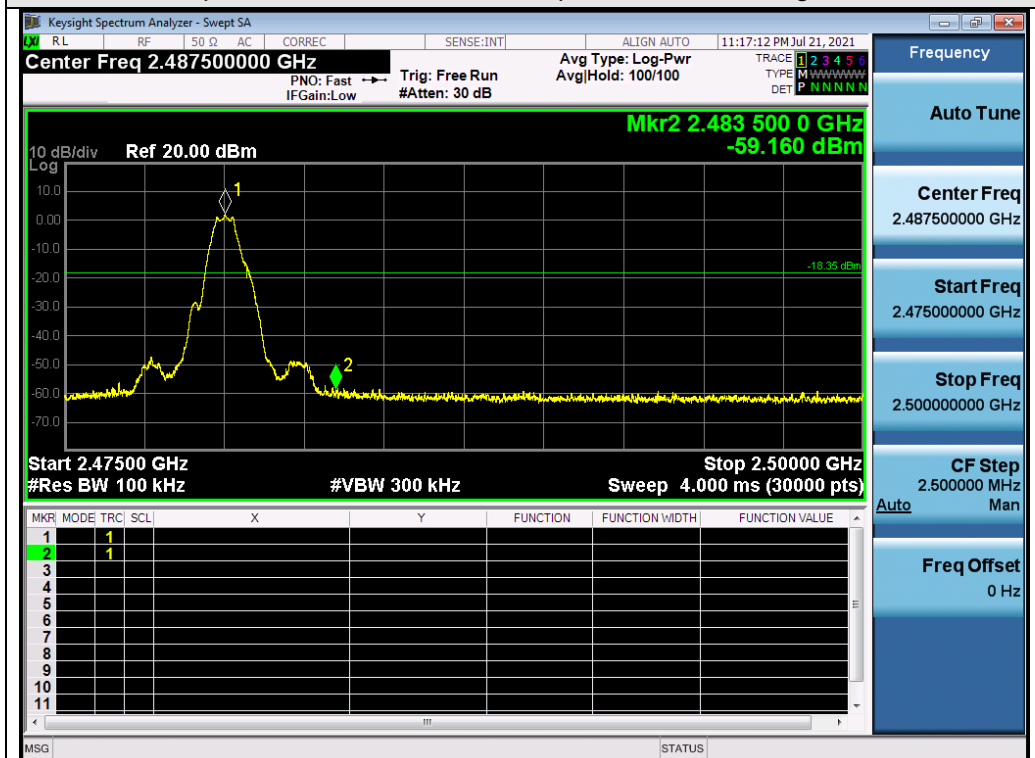


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Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



Test_Graph_LE1M_ANT1_2402_1Mbps_Lower Band Edge Emissions



Test_Graph_LE1M_ANT1_2480_1Mbps_Higher Band Edge Emissions

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10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1. MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set the SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the KDB 558074 item 8.4 was used in this testing.

10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer to Section 7.2.

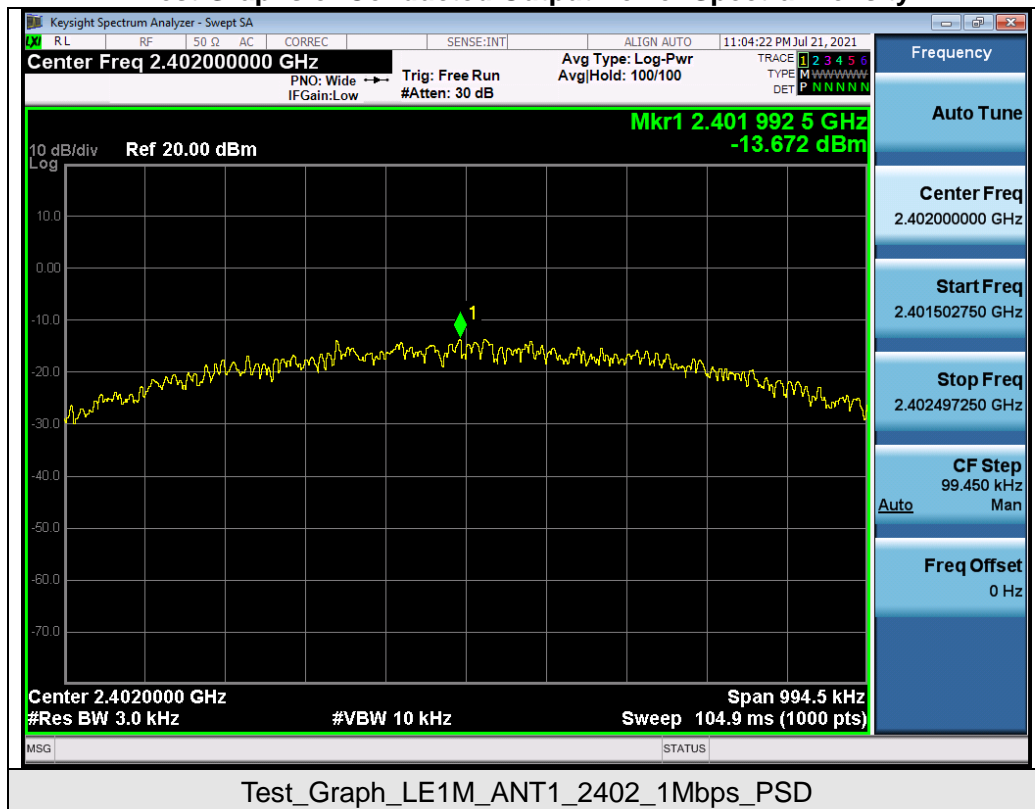
10.3. MEASUREMENT EQUIPMENT USED

Refer to Section 6.

10.4. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power Spectral Density				
Test Mode	Test Channel (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
GFSK 1M	2402	-13.672	≤ 8	Pass
	2440	-13.240	≤ 8	Pass
	2480	-13.511	≤ 8	Pass

Test Graphs of Conducted Output Power Spectral Density



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Test_Graph_LE1M_ANT1_2440_1Mbps_PSD



Test_Graph_LE1M_ANT1_2480_1Mbps_PSD

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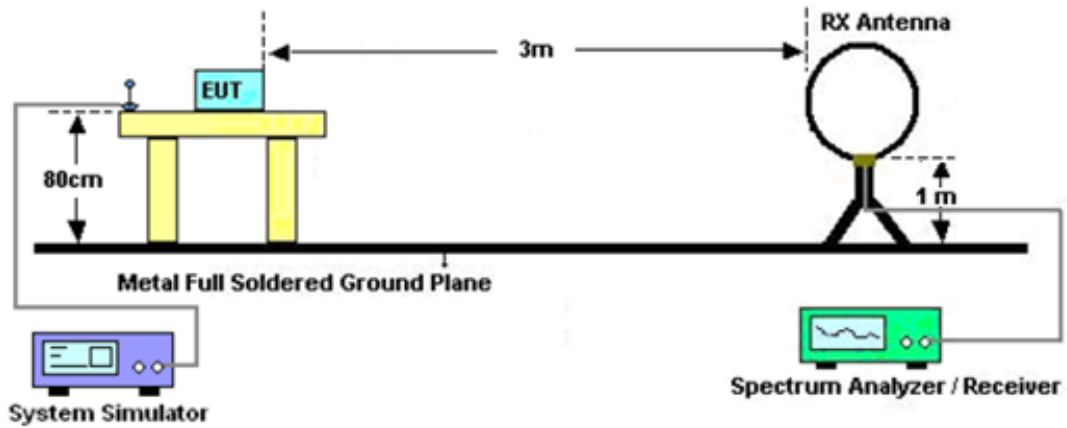
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

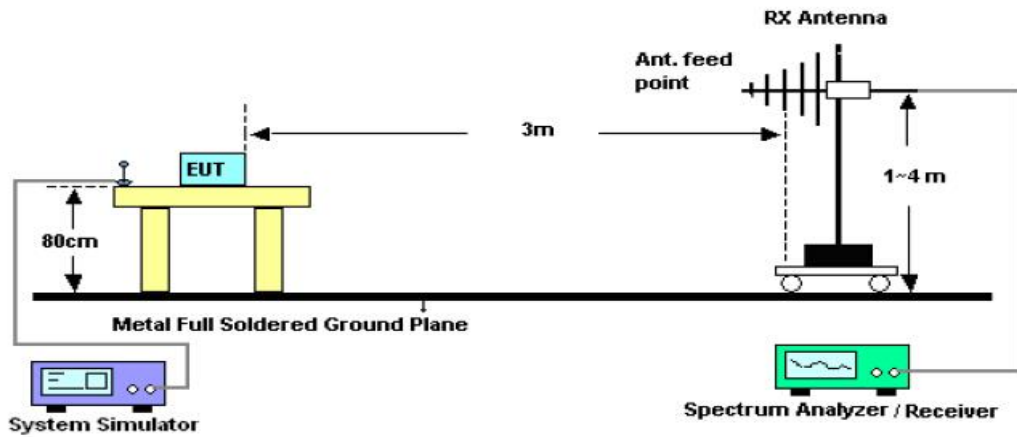
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11.2. TEST SETUP

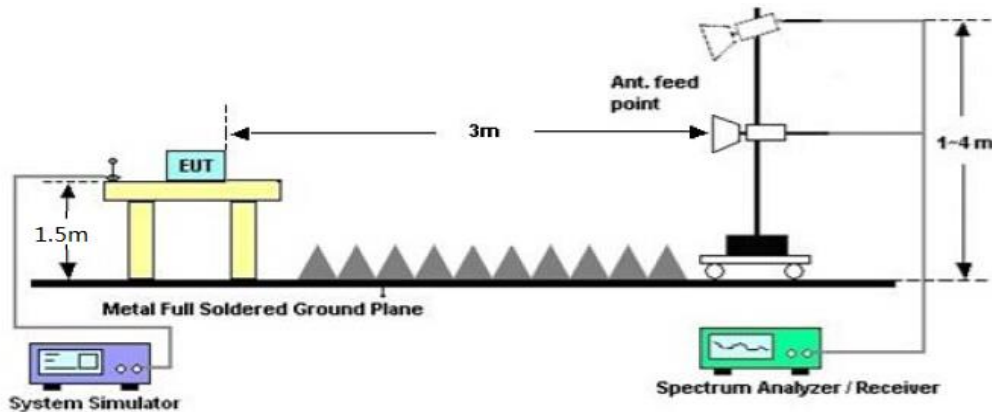
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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11.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (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

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

11.4. TEST RESULT

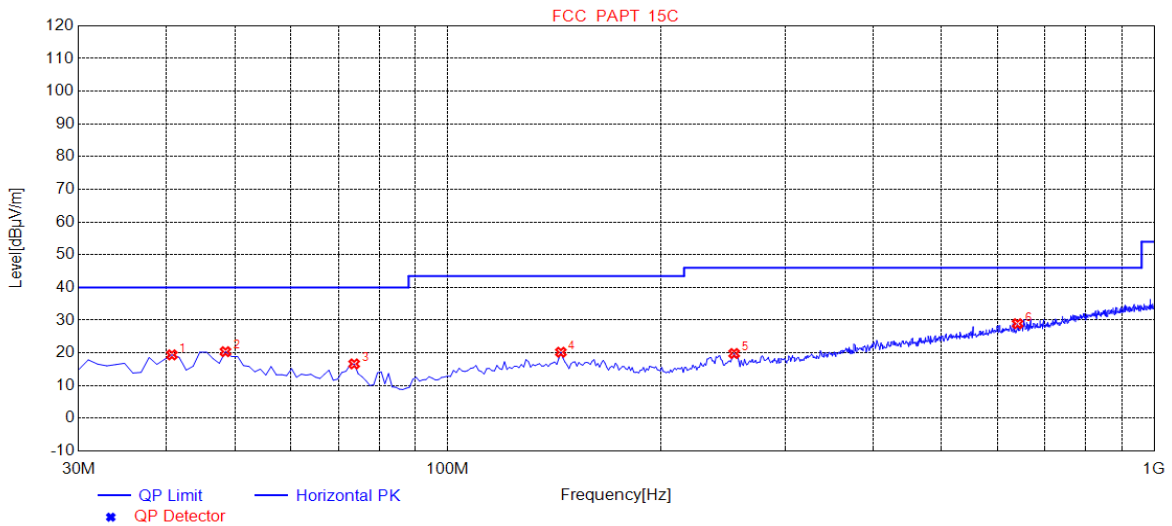
Radiated emission below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported

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Radiated emission from 30MHz to 1000MHz

EUT	VAVA Remote Control	Model Name	VA-SP005
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

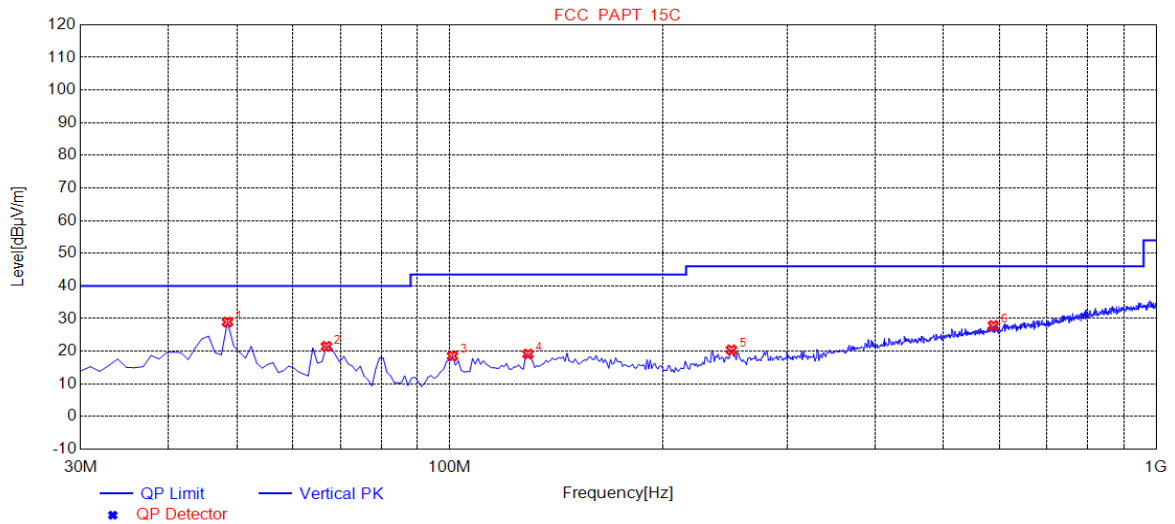


NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	40.6807	19.40	11.91	40.00	20.60	100	150	Horizontal
2	48.4484	20.38	11.71	40.00	19.62	100	240	Horizontal
3	73.6937	16.63	8.46	40.00	23.37	100	190	Horizontal
4	144.5746	20.21	14.88	43.50	23.29	100	190	Horizontal
5	254.2943	19.82	14.63	46.00	26.18	100	90	Horizontal
6	640.7407	28.93	24.96	46.00	17.07	100	320	Horizontal

RESULT: PASS

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EUT	VAVA Remote Control	Model Name	VA-SP005
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

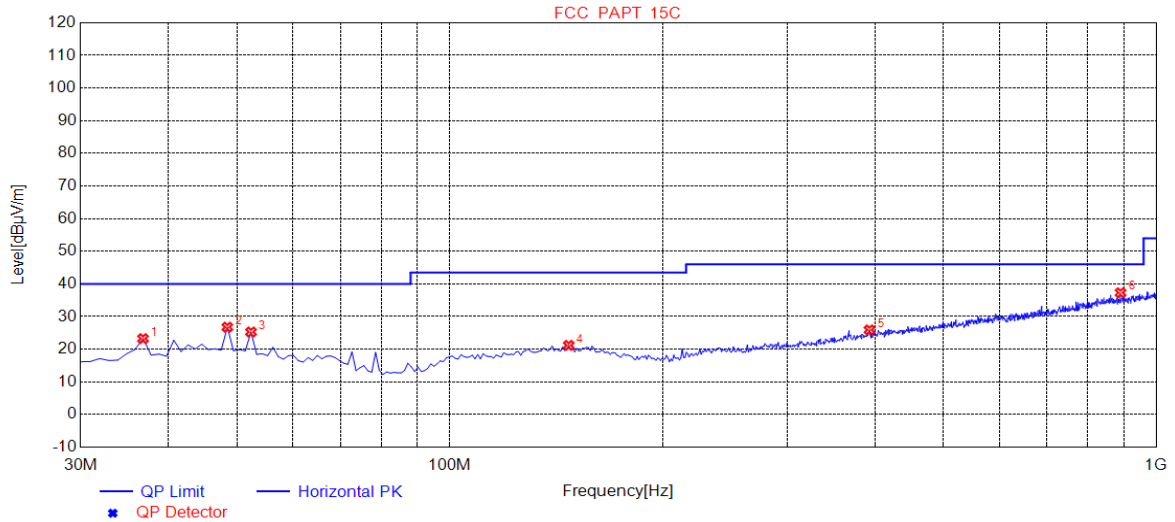


NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	48.4484	28.94	11.71	40.00	11.06	100	100	Vertical
2	66.8969	21.50	9.75	40.00	18.50	100	150	Vertical
3	100.8809	18.55	11.46	43.50	24.95	100	330	Vertical
4	129.0390	19.14	14.08	43.50	24.36	100	290	Vertical
5	250.4104	20.42	14.68	46.00	25.58	100	180	Vertical
6	588.3083	27.90	24.09	46.00	18.10	100	250	Vertical

RESULT: PASS

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EUT	VAVA Remote Control	Model Name	VA-SP005
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Horizontal

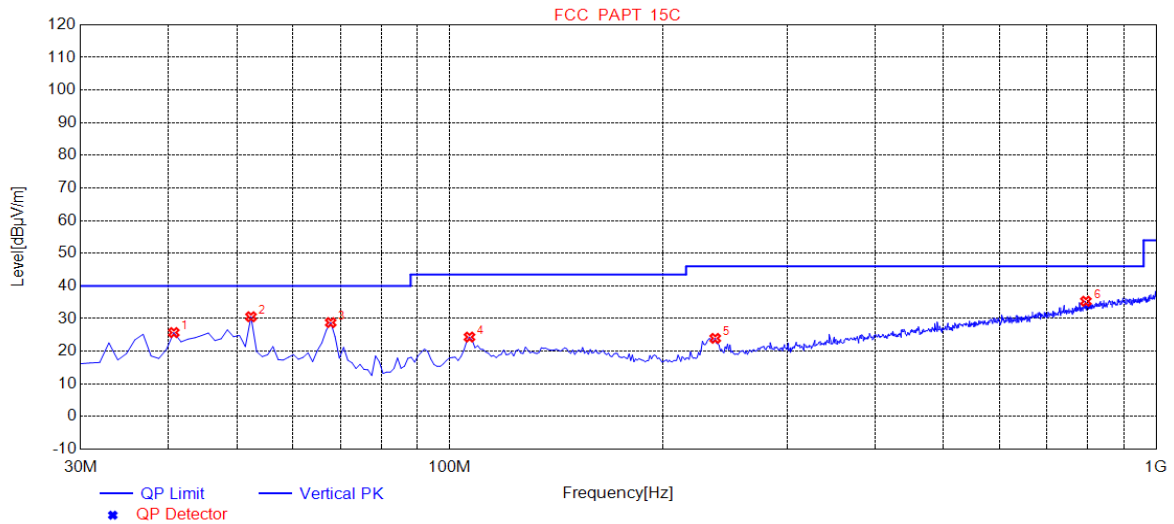


NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.7900	23.25	11.16	40.00	16.75	100	64	Horizontal
2	48.4300	26.77	11.71	40.00	13.23	100	259	Horizontal
3	52.3100	25.29	11.49	40.00	14.71	100	219	Horizontal
4	147.3700	21.20	14.88	43.50	22.30	100	3	Horizontal
5	392.7800	25.94	19.51	46.00	20.06	100	106	Horizontal
6	890.3900	37.31	29.98	46.00	8.69	100	291	Horizontal

RESULT: PASS

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EUT	VAVA Remote Control	Model Name	VA-SP005
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

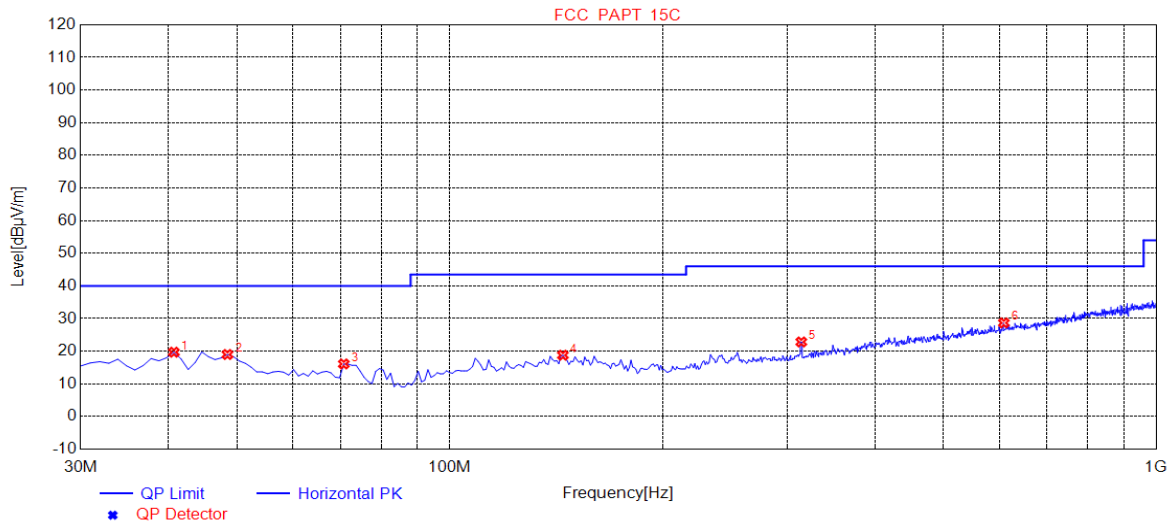


NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	40.6700	25.72	11.91	40.00	14.28	100	24	Vertical
2	52.3100	30.57	11.49	40.00	9.43	100	354	Vertical
3	67.8300	28.77	9.59	40.00	11.23	100	182	Vertical
4	106.6300	24.35	12.07	43.50	19.15	100	229	Vertical
5	237.5800	23.95	14.65	46.00	22.05	100	240	Vertical
6	795.3300	35.31	28.40	46.00	10.69	100	2	Vertical

RESULT: PASS

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EUT	VAVA Remote Control	Model Name	VA-SP005
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	40.6807	19.72	11.91	40.00	20.28	100	290	Horizontal
2	48.4484	19.01	11.71	40.00	20.99	100	40	Horizontal
3	70.7808	16.11	9.06	40.00	23.89	100	200	Horizontal
4	144.5746	18.80	14.88	43.50	24.70	100	200	Horizontal
5	314.4945	22.85	16.46	46.00	23.15	100	30	Horizontal
6	608.6987	28.68	24.45	46.00	17.32	100	300	Horizontal

RESULT: PASS

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