

FCC Test Report

Report No.: AGC07662220201FE02

FCC ID : 2A45M-193MAX

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : R/C DRONE

BRAND NAME : N/A

MODEL NAME : 193MAX, 012, 011, 012S, 016, 186, 007, 660, 480, 870, T07, T60, T70, T80, SG900, SG906MAX, SG906MAX1, SG906MAX2, SG907MAX, SG907ES, SG908, SG908PRO, SG908MAX, SG908MAX1, SG908MAX2, 193, 193MAX1, 193MAX2, 193MAX2S, 011MAX, 011RTS, 193MINI, SG906MINI, 195, 196, 201, 202, 203, 205, 206, 208, 209, 211, 212, 213, 215, 216, 218, 219, 221, 222, 223, 225, 226, 228, 012PRO, 012MAX, 011PRO, 193MINI S, SG906MINI SE

APPLICANT : Shantou City Xin Lin Toys Industrial Co., Ltd.

DATE OF ISSUE : Mar. 05, 2022

STANDARD(S) : FCC Part 15.247

REPORT VERSION : V1.0



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Mar. 05, 2022	Valid	Initial Release

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1. VERIFICATION OF COMPLIANCE

Applicant	Shantou City Xin Lin Toys Industrial Co., Ltd.
Address	No.6 Xinjin Road Zhujin Industrial Zone, Shantou, Guangdong, China
Manufacturer	Shantou City Xin Lin Toys Industrial Co., Ltd.
Address	No.6 Xinjin Road Zhujin Industrial Zone, Shantou, Guangdong, China
Factory	Shantou City Xin Lin Toys Industrial Co., Ltd.
Address	No.6 Xinjin Road Zhujin Industrial Zone, Shantou, Guangdong, China
Product Designation	R/C DRONE
Brand Name	N/A
Test Model	193MAX
Series Model	012, 011, 012S, 016, 186, 007, 660, 480, 870, T07, T60, T70, T80, SG900, SG906MAX, SG906MAX1, SG906MAX2, SG907MAX, SG907ES, SG908, SG908PRO, SG908MAX, SG908MAX1, SG908MAX2, 193, 193MAX1, 193MAX2, 193MAX2S, 011MAX, 011RTS, 193MINI, SG906MINI, 195, 196, 201, 202, 203, 205, 206, 208, 209, 211, 212, 213, 215, 216, 218, 219, 221, 222, 223, 225, 226, 228, 012PRO, 012MAX, 011PRO, 193MINI S, SG906MINI SE
Declaration of Difference	All the series models are the same as the test model except for the model names and the packing.
Date of test	Mar. 05, 2022 to Mar. 05, 2022
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

Bibo Zhang

Bibo Zhang
(Project Engineer)

Mar. 05, 2022

Reviewed By

Calvin Liu

Calvin Liu
(Reviewer)

Mar. 05, 2022

Approved By

Max Zhang

Max Zhang
(Authorized Officer)

Mar. 05, 2022

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as a "R/C DRONE". 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	2.439 GHz to 2.470GHz
RF Output Power	-2.837dBm (Max)
RF Output Power(MIMO)	-0.67dBm (Max)
Modulation	GFSK
Number of channels	25 Channels
Antenna Designation	Internal Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	0dBi
Hardware Version	V1.1
Software Version	044.022.0107
Power Supply	DC 3.8V by battery or DC 5V by adapter

2.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency	Channel Number	Frequency
2400~2483.5MHz	0	2439	13	2455
	1	2440	14	2456
	2	2441	15	2457
	3	2442	16	2458
	4	2443	17	2459
	5	2444	18	2460
	6	2445	19	2461
	7	2446	20	2462
	8	2450	21	2466
	9	2451	22	2467
	10	2452	23	2469
	11	2453	24	2470
	12	2454		

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

This submittal(s) (test report) is intended for **FCC ID: 2A45M-193MAX** 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.

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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	$U_c = \pm 3.1 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 4.0 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.8 \text{ dB}$
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$
Uncertainty of spurious emissions, conducted	$U_c = \pm 2 \%$
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2 \%$

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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.
4. The EUT adjusts the frequency through the button.

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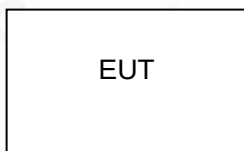
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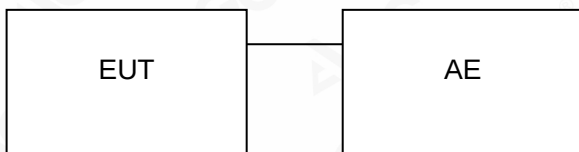
5. SYSTEM TEST CONFIGURATION

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	R/C DRONE	193MAX	2A45M-193MAX	EUT
2	Adapter	ZL-PCB0100020502000	--	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	Compliant

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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 CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 15, 2021	May 14, 2022
LISN	R&S	ESH2-Z5	100086	Jun. 09, 2021	Jun. 08, 2022
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2021	May 14, 2022
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Nov. 17, 2021	Nov. 16, 2022
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	Oct. 31, 2021	Oct. 30, 2023
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, 2022
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 08, 2020	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. $VBW \geq 3 \times RBW$.
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



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7.3. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power- Antenna 1				
Test Mode	Test Channel (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
GFSK	2439	-3.241	≤ 30	Pass
	2454	-3.060	≤ 30	Pass
	2470	-2.837	≤ 30	Pass

Test Data of Conducted Output Power- Antenna 2				
Test Mode	Test Channel (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
GFSK	2439	-4.159	≤ 30	Pass
	2454	-4.599	≤ 30	Pass
	2470	-4.913	≤ 30	Pass

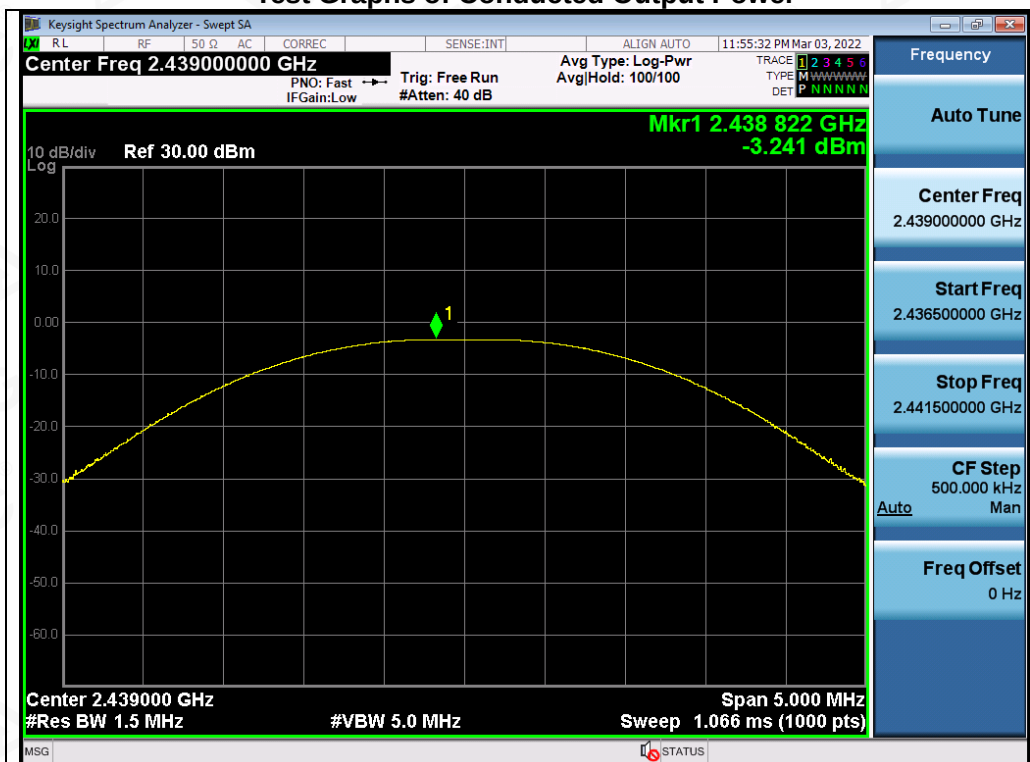
Test Data of Conducted Output Power- Antenna 1+2				
Test Mode	Test Channel (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
GFSK	2439	-0.67	≤ 30	Pass
	2454	-0.75	≤ 30	Pass
	2470	-0.74	≤ 30	Pass

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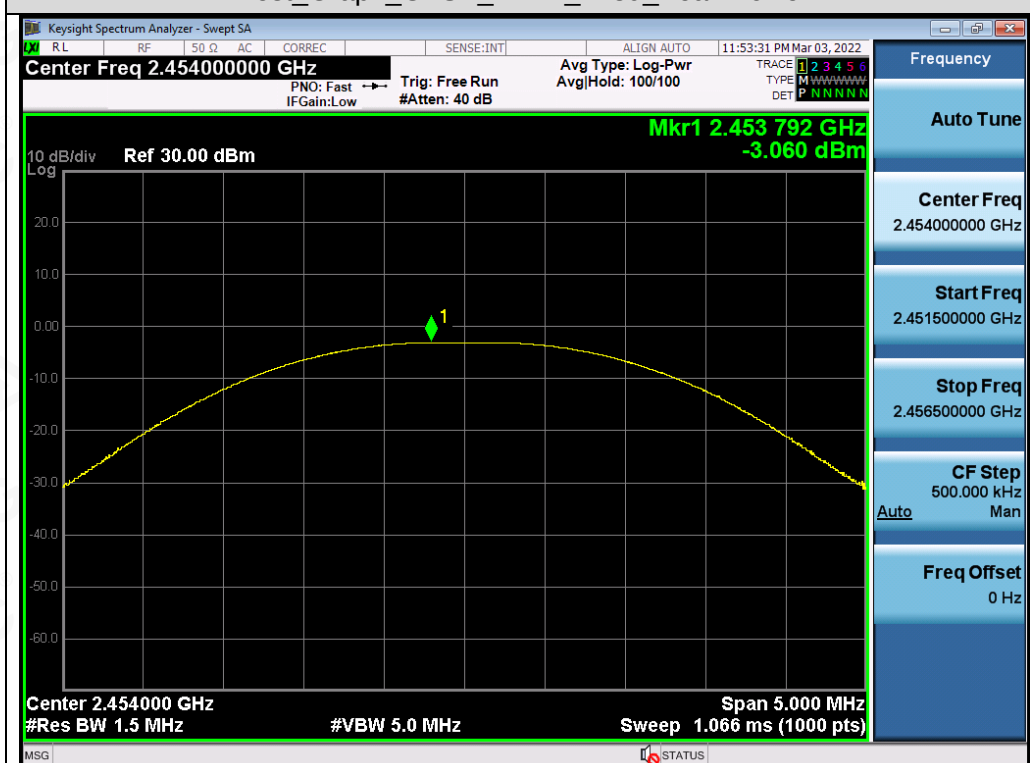
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Test Graphs of Conducted Output Power



Test_Graph_GFSK_ANT1_2439_Peak Power

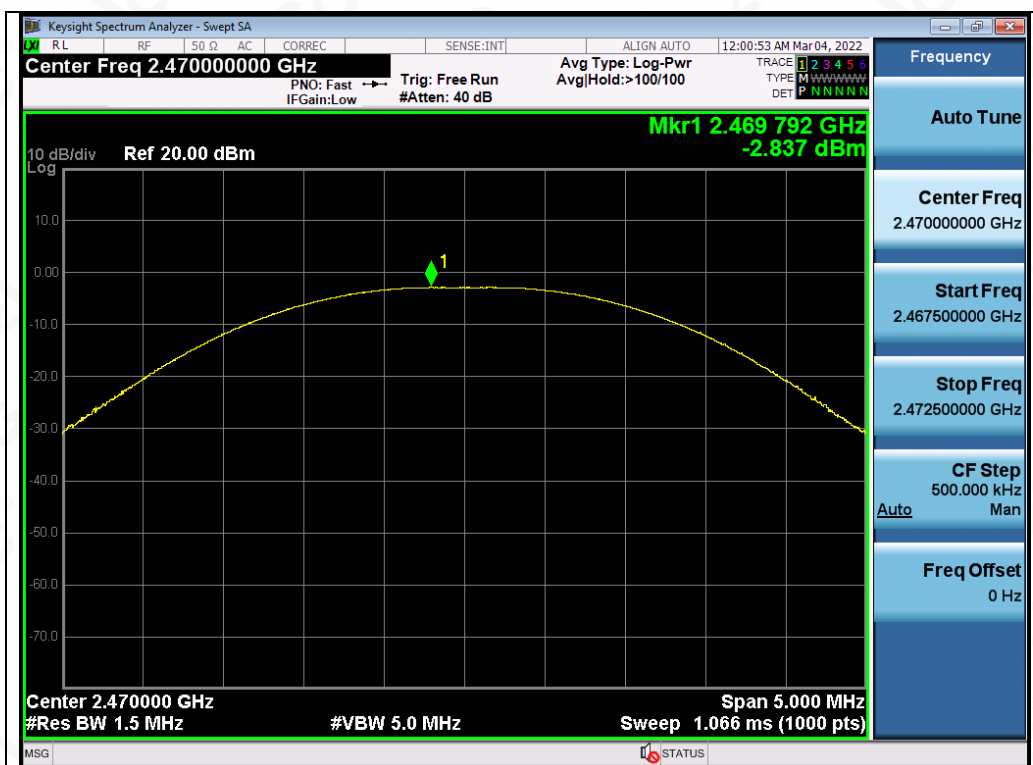


Test_Graph_GFSK_ANT1_2454_Peak Power

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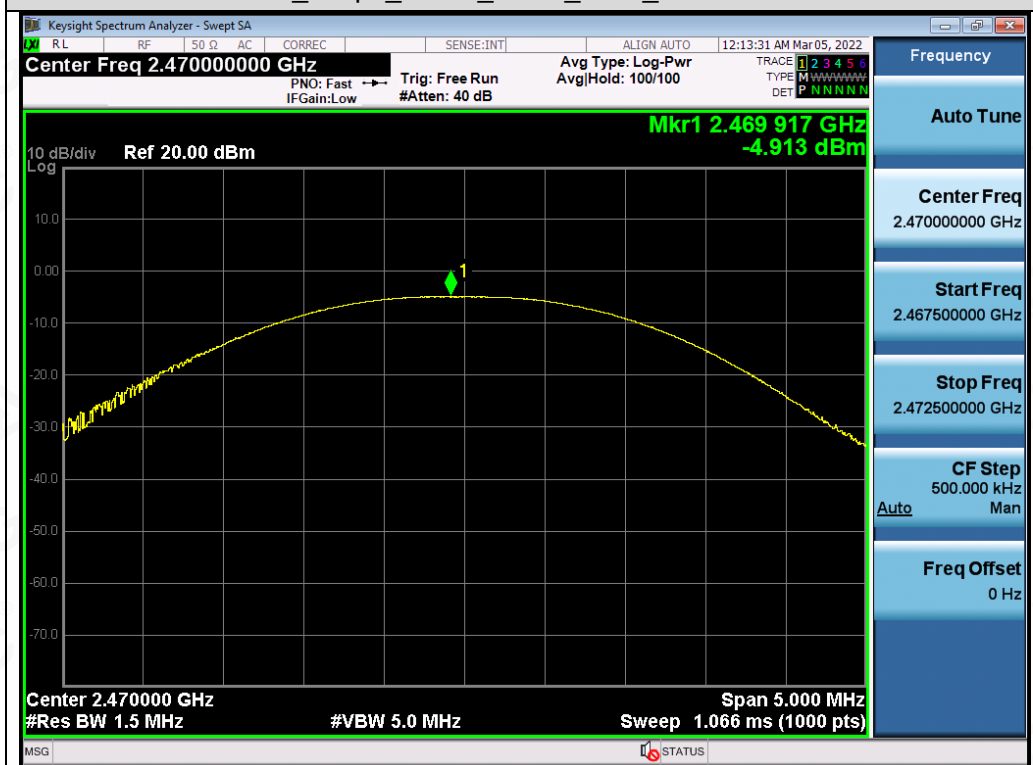
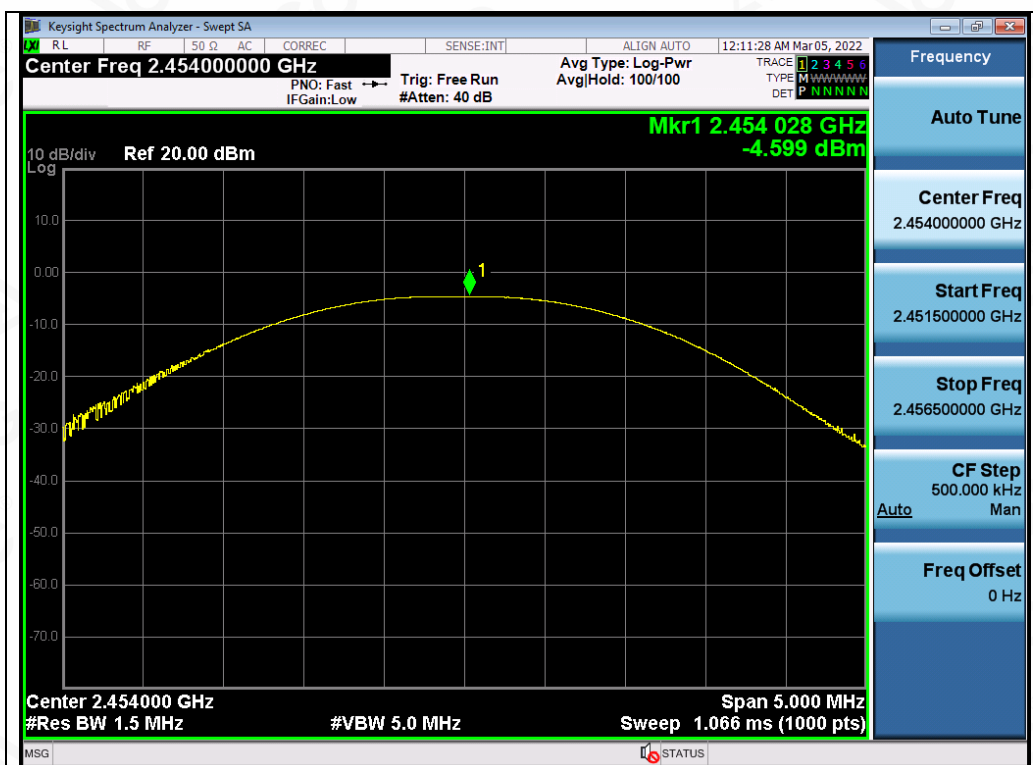




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8. BANDWIDTH

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-antenna 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-6dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
GFSK	2439	0.942	0.523	≥ 0.5	Pass
	2454	0.941	0.523	≥ 0.5	Pass
	2470	0.941	0.523	≥ 0.5	Pass

Test Data of Occupied Bandwidth and DTS Bandwidth-antenna 2					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-6dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
GFSK	2439	1.0572	0.531	≥ 0.5	Pass
	2454	1.1192	0.559	≥ 0.5	Pass
	2470	1.1294	0.519	≥ 0.5	Pass

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Test Graphs of Occupied Bandwidth



Test_Graph_GFSK_ANT1_2439_OBW



Test_Graph_GFSK_ANT1_2454_OBW

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Test_Graph_GFSK_ANT1_2470_OBW



Test_Graph_GFSK_ANT2_2439_OBW

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Test_Graph_GFSK_ANT2_2454_OBW



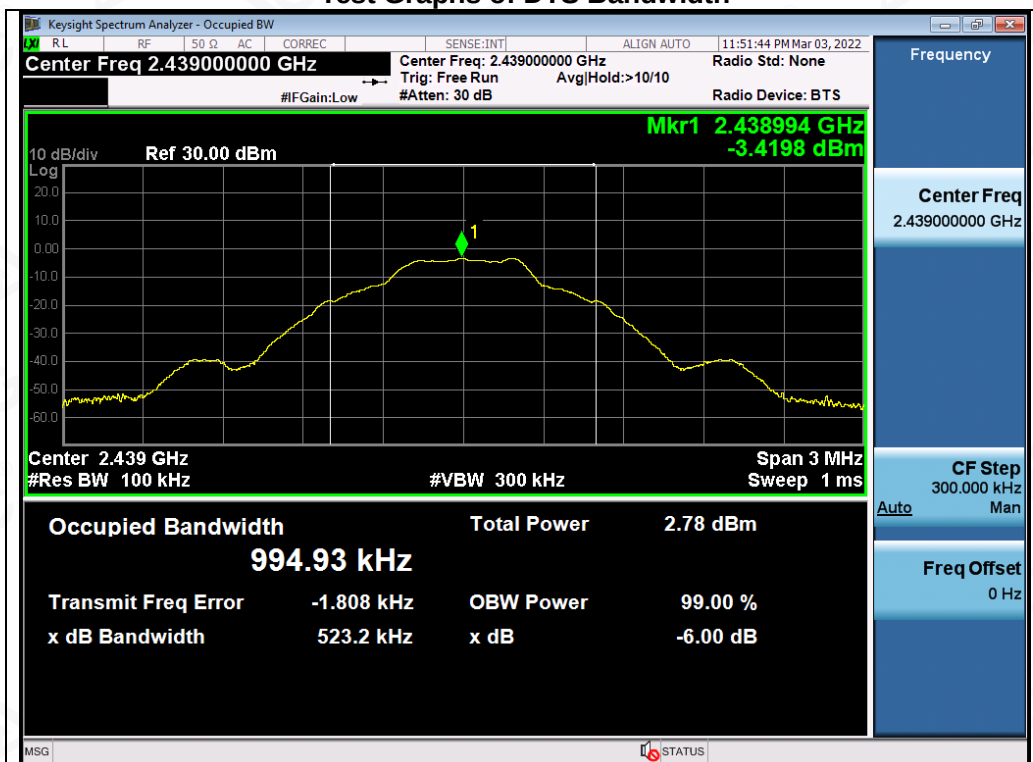
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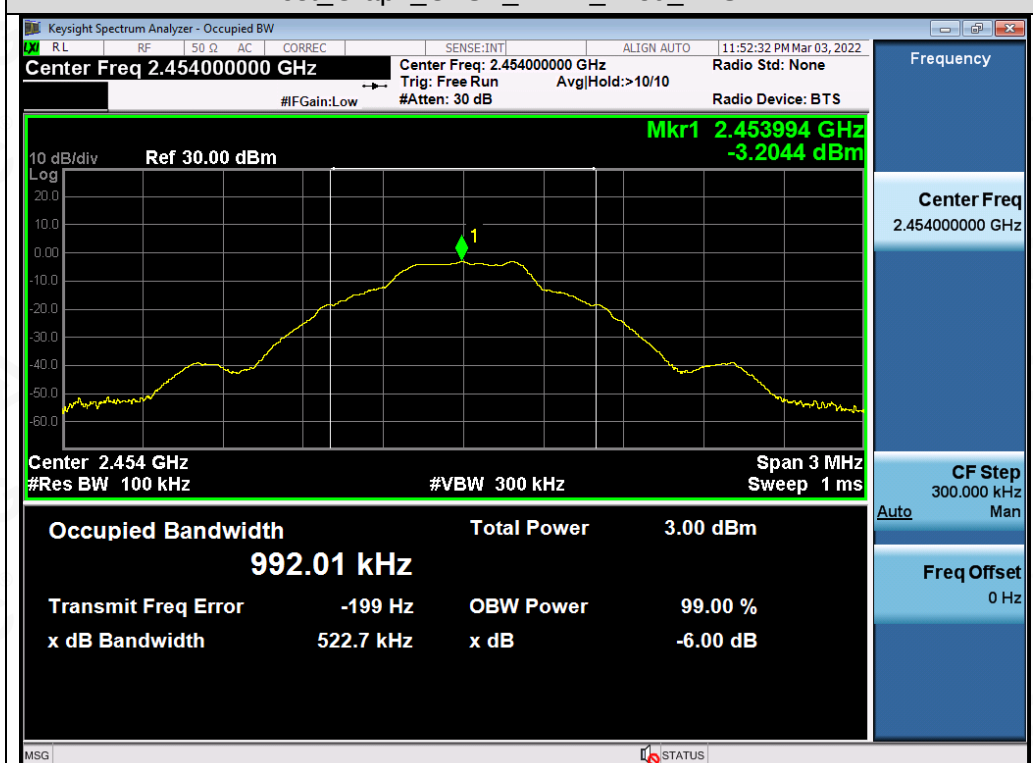
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Test Graphs of DTS Bandwidth



Test_Graph_GFSK_ANT1_2439_DTSBW

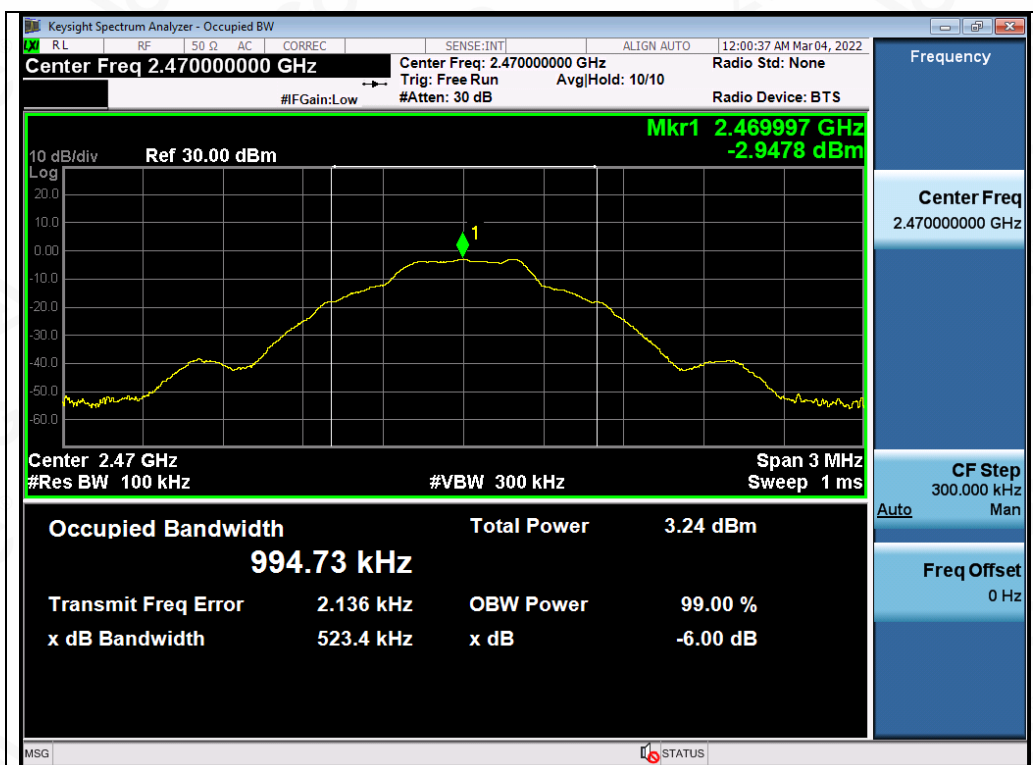


Test_Graph_GFSK_ANT1_2454_DTSBW

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Test_Graph_GFSK_ANT1_2470_DTSBW



Test_Graph_GFSK_ANT2_2439_DTSBW

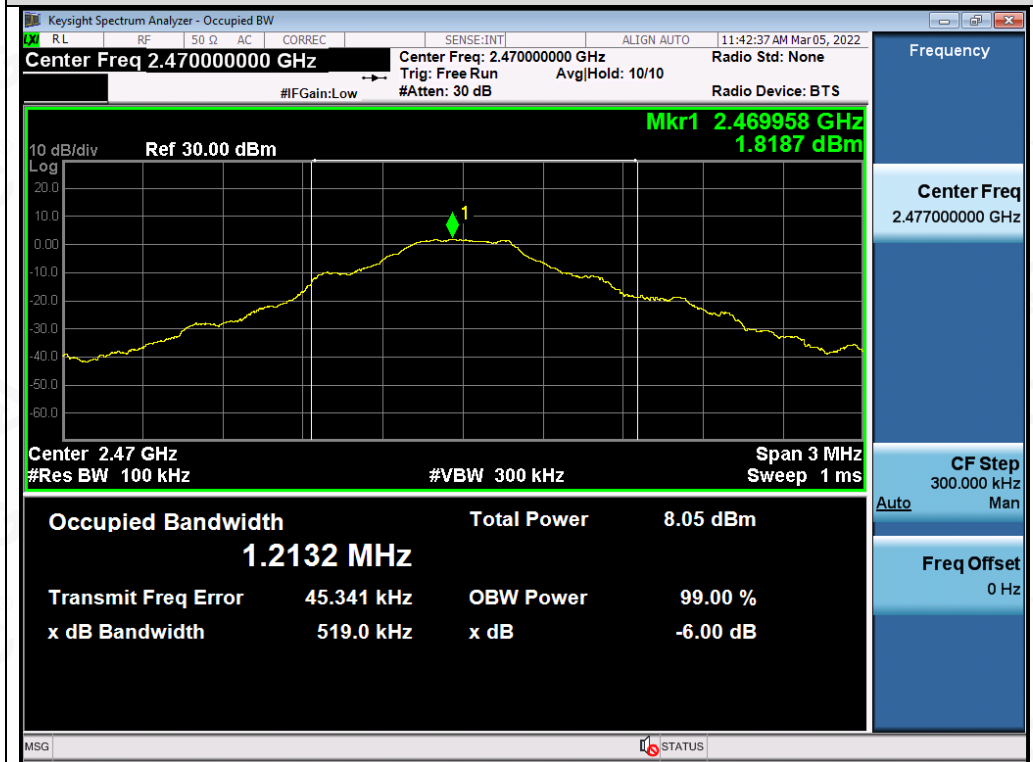
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Test_Graph_GFSK_ANT2_2454_DTSBW



Test_Graph_GFSK_ANT2_2470_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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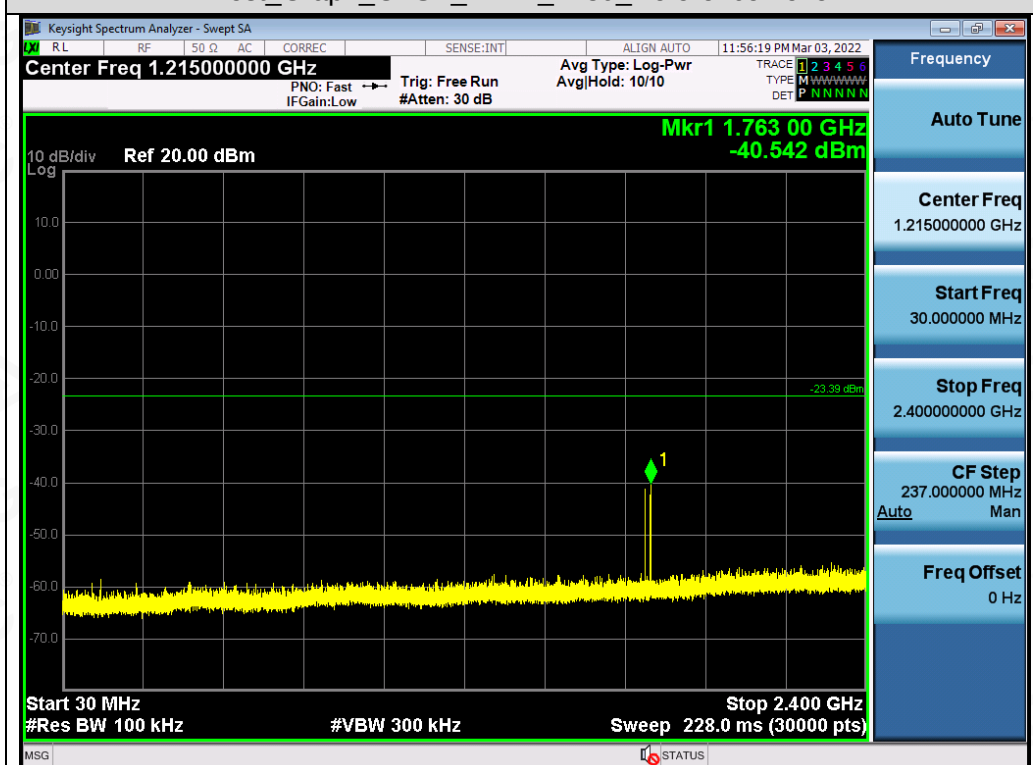
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Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



Test_Graph_GFSK_ANT1_2439_Reference Level

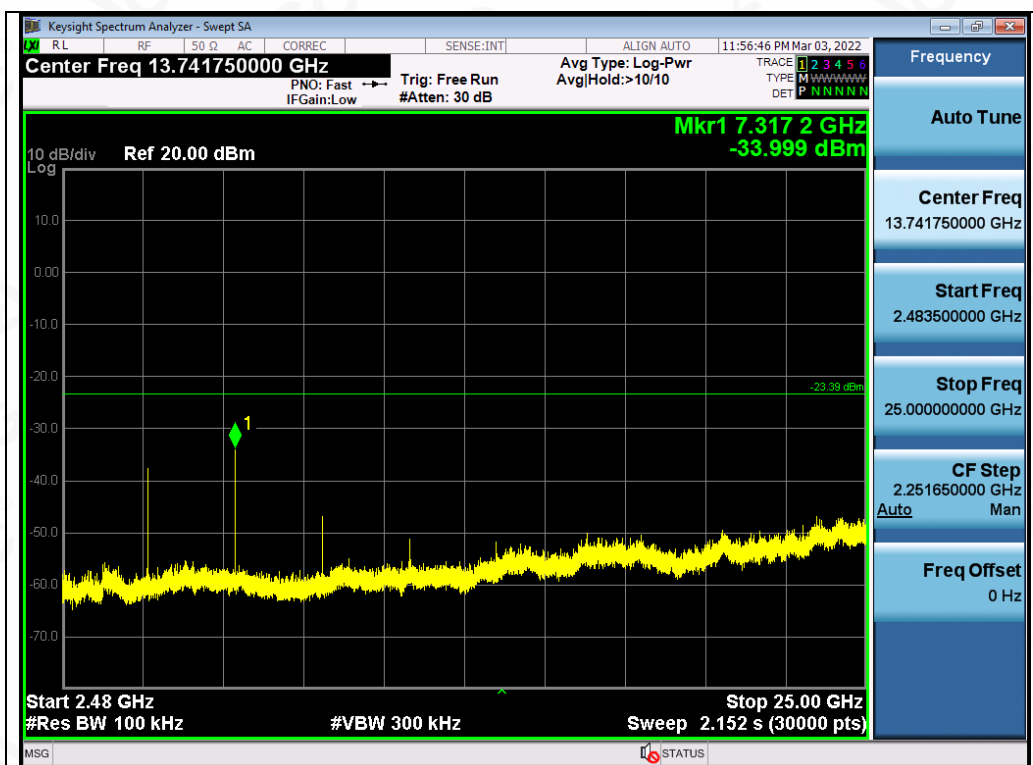


Test_Graph_GFSK_ANT1_2439_Lower Band Emissions

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Test_Graph_GFSK_ANT1_2439_Higher Band Emissions

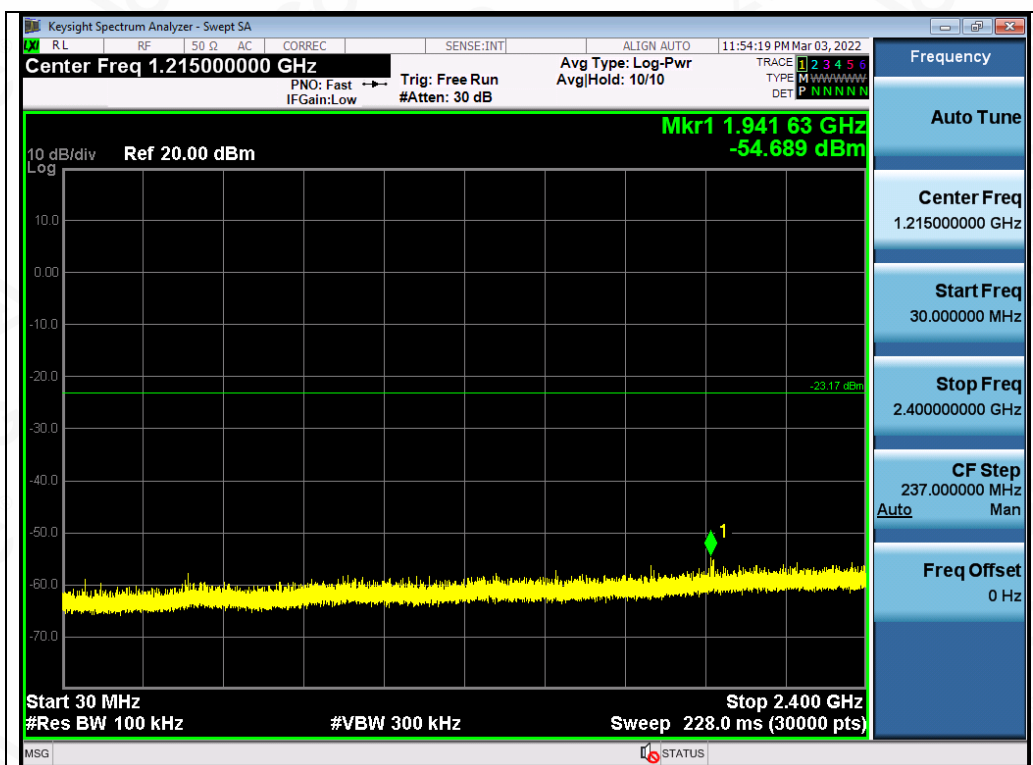


Test_Graph_GFSK_ANT1_2454_Reference Level

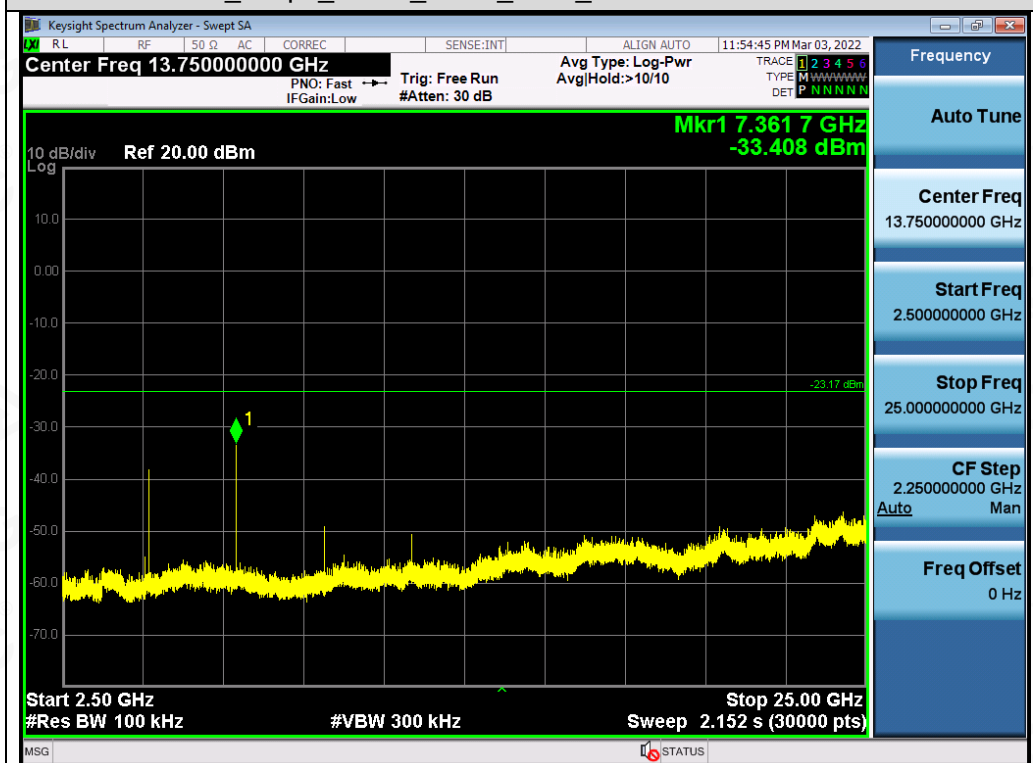
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Test_Graph_GFSK_ANT1_2454_Lower Band Emissions

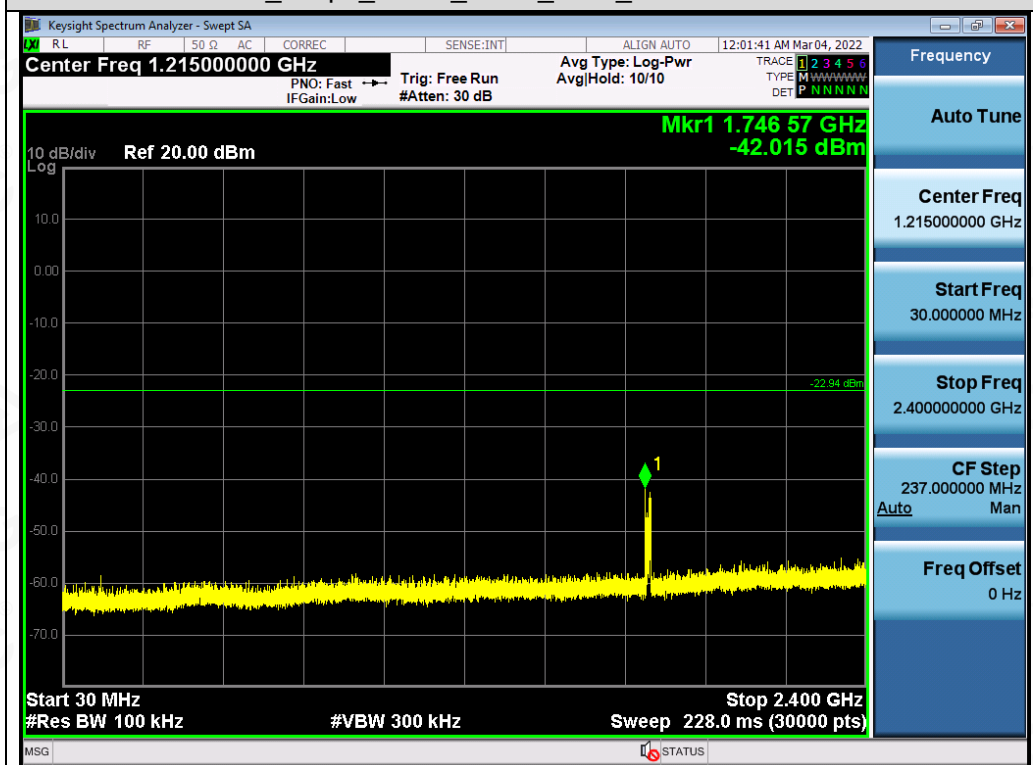


Test_Graph_GFSK_ANT1_2454_Higher Band Emissions

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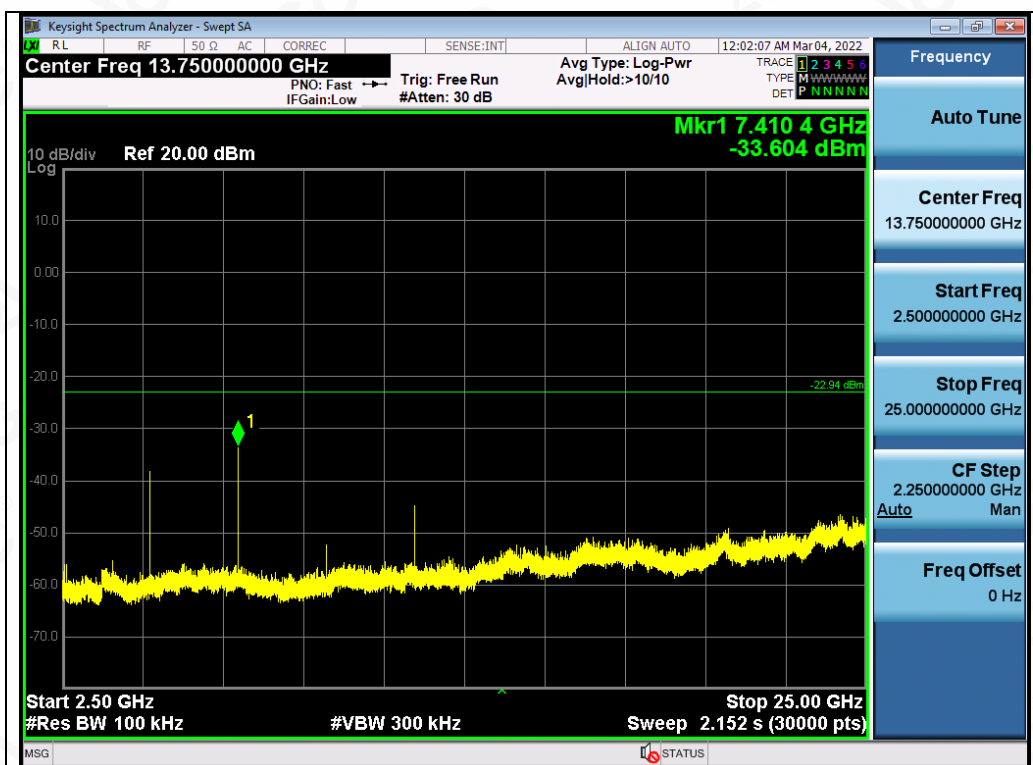




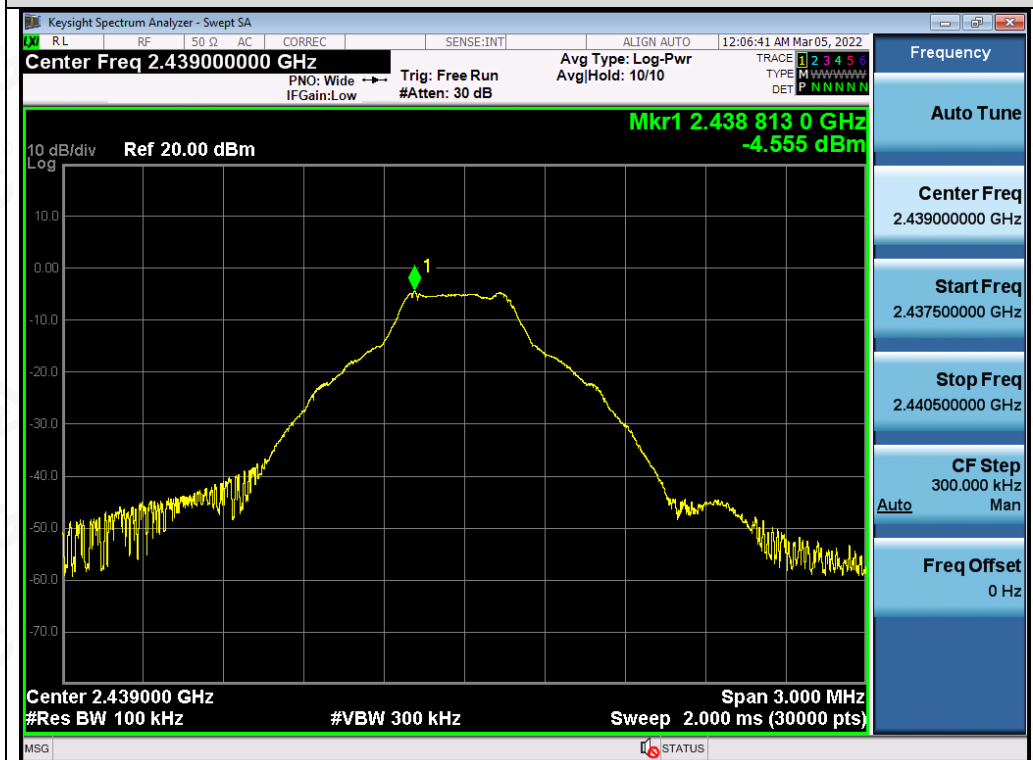
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Test_Graph_GFSK_ANT1_2470_Higher Band Emissions

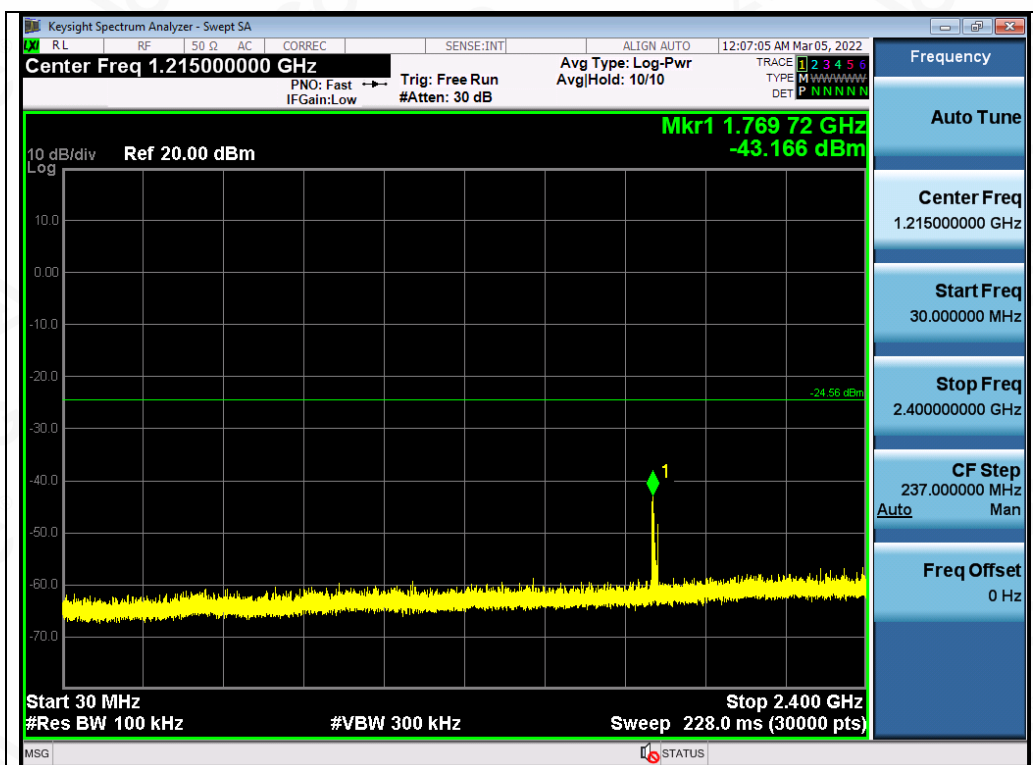


Test_Graph_GFSK_ANT2_2439_Reference Level

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Test_Graph_GFSK_ANT2_2439_Lower Band Emissions

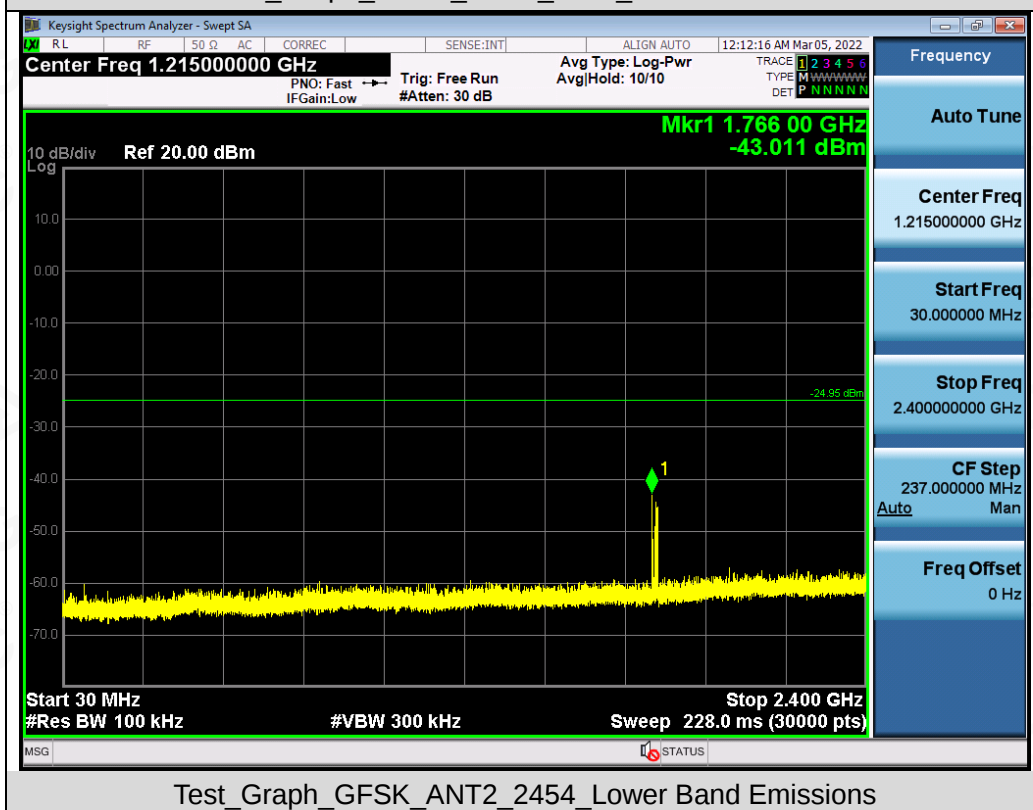
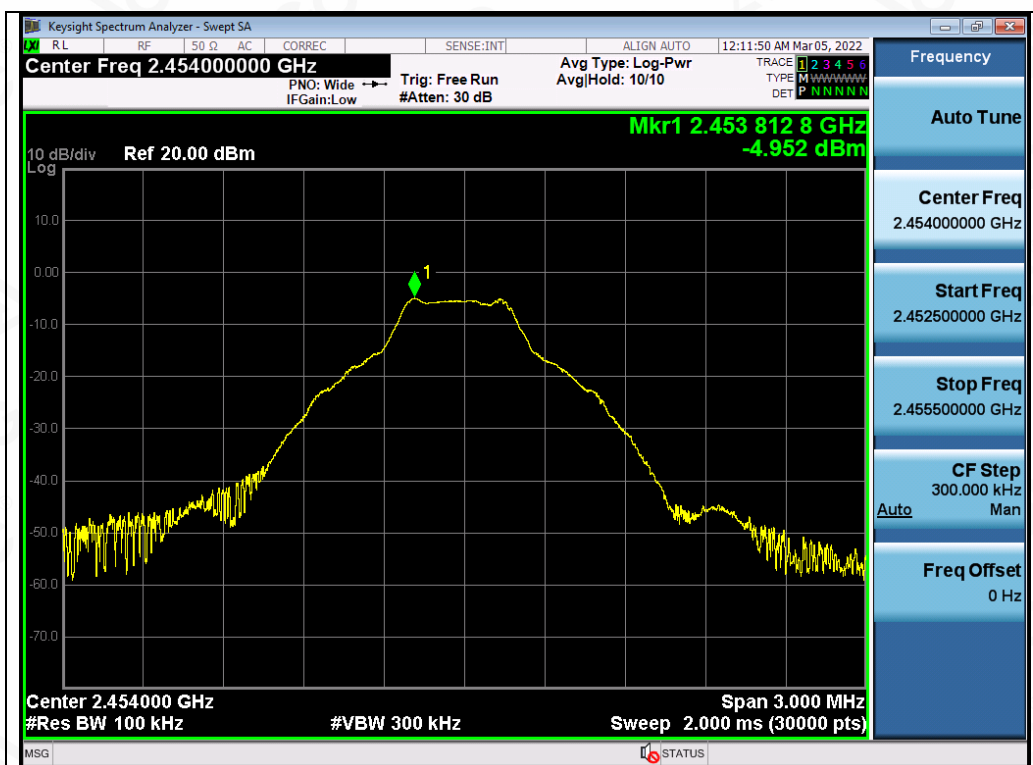


Test_Graph_GFSK_ANT2_2439_Higher Band Emissions

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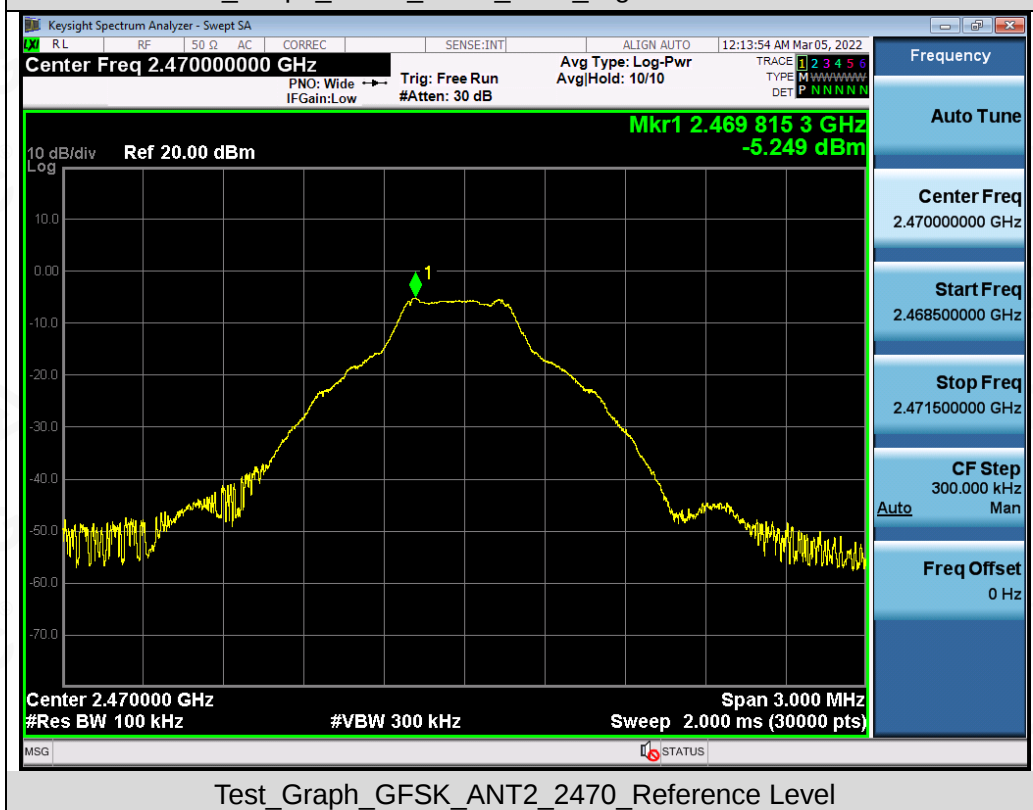




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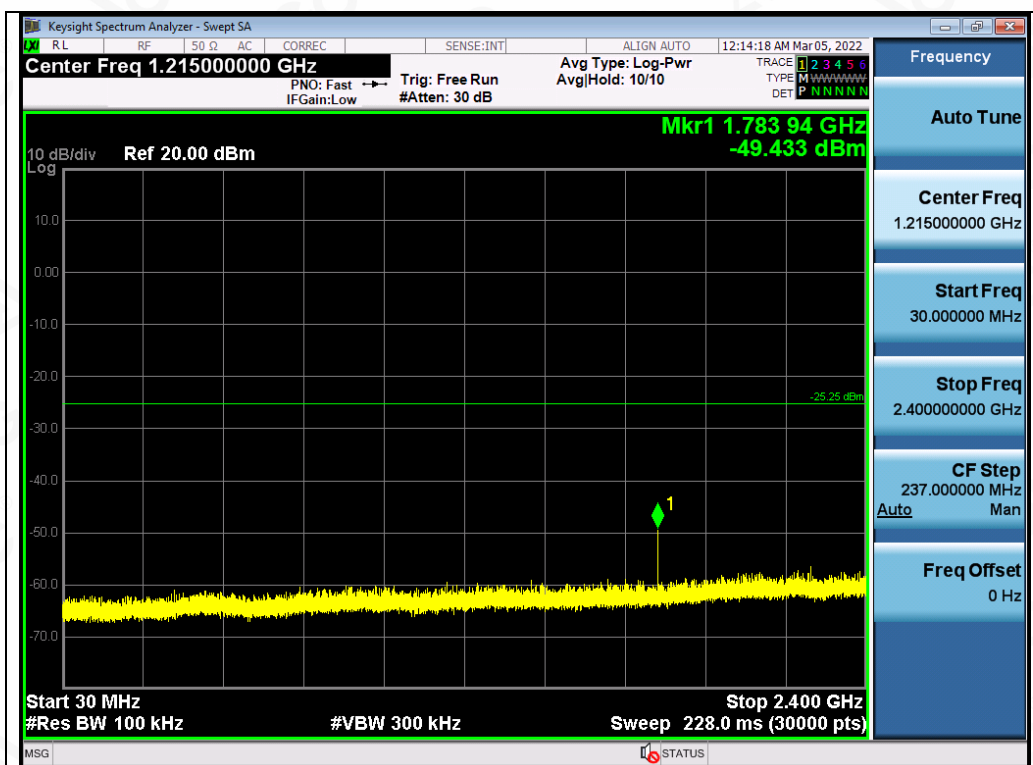




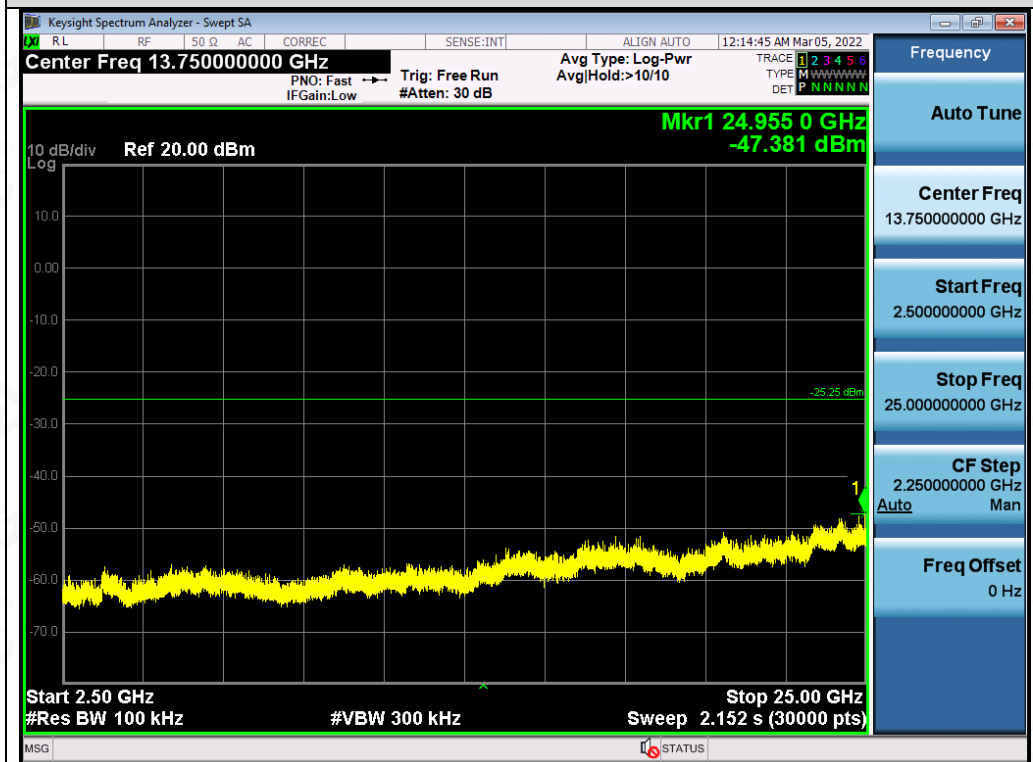
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Test_Graph_GFSK_ANT2_2470_Lower Band Emissions



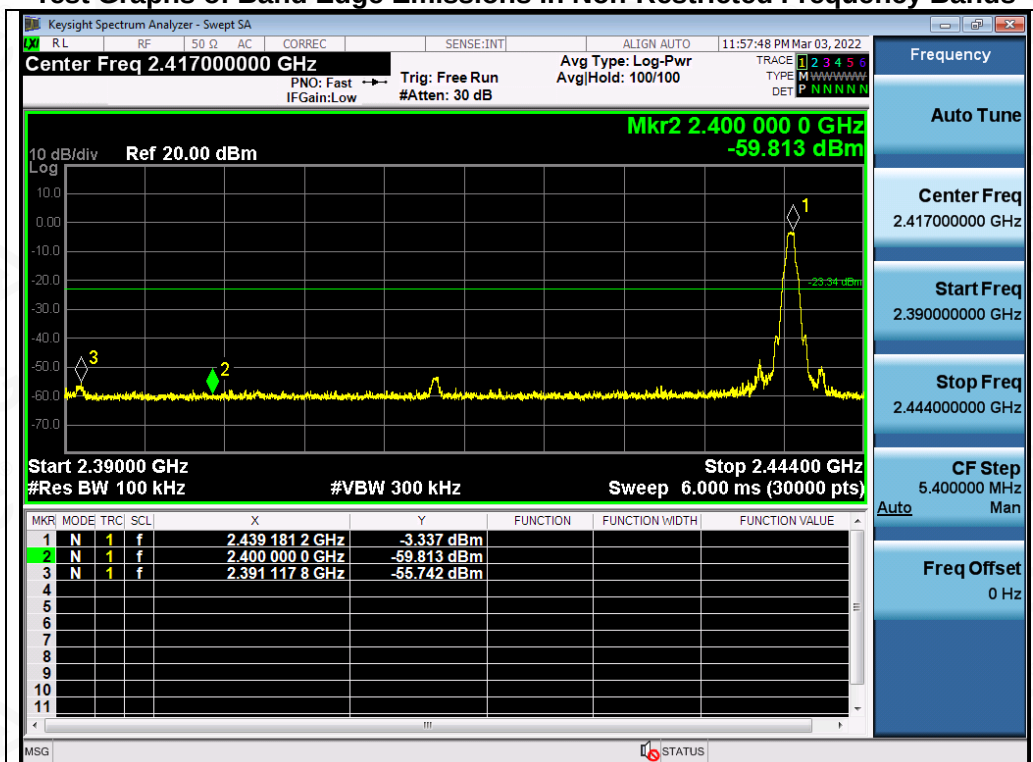
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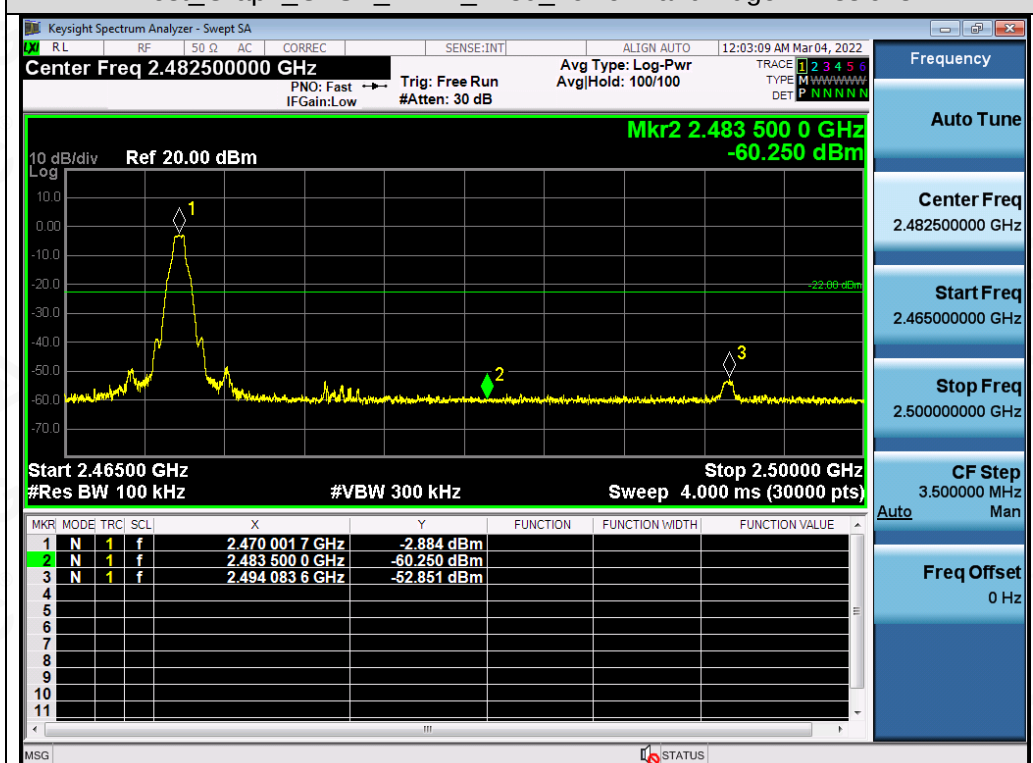
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Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



Test_Graph_GFSK_ANT1_2439_Lower Band Edge Emissions

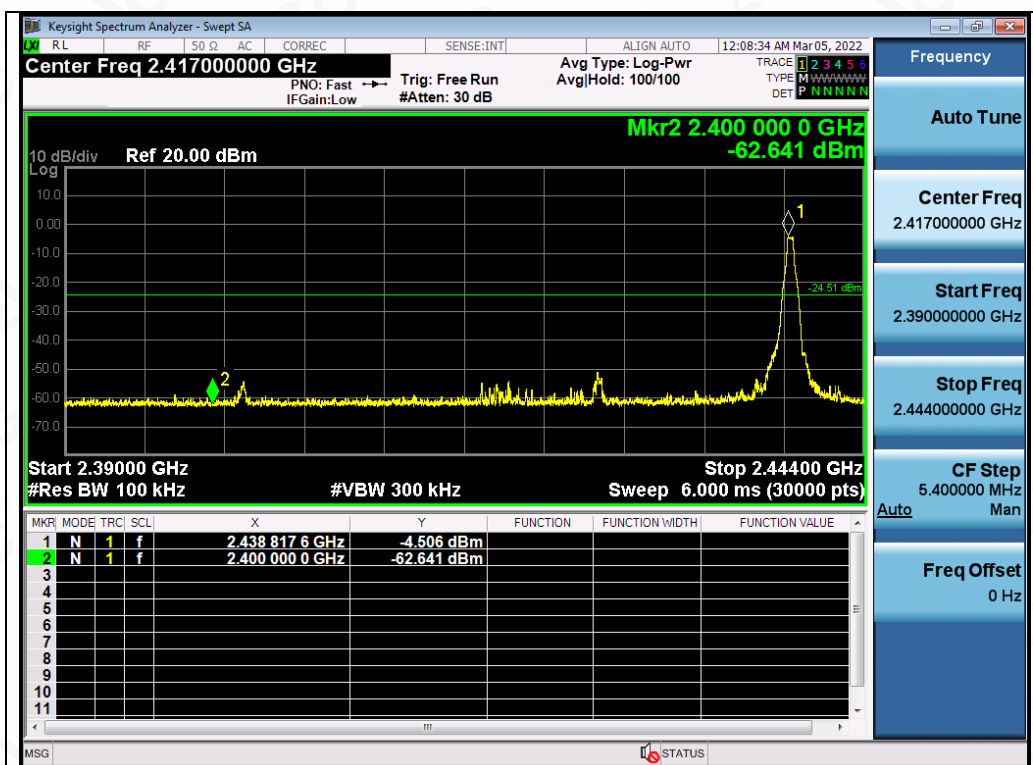


Test_Graph_GFSK_ANT1_2470_Higher Band Edge Emissions

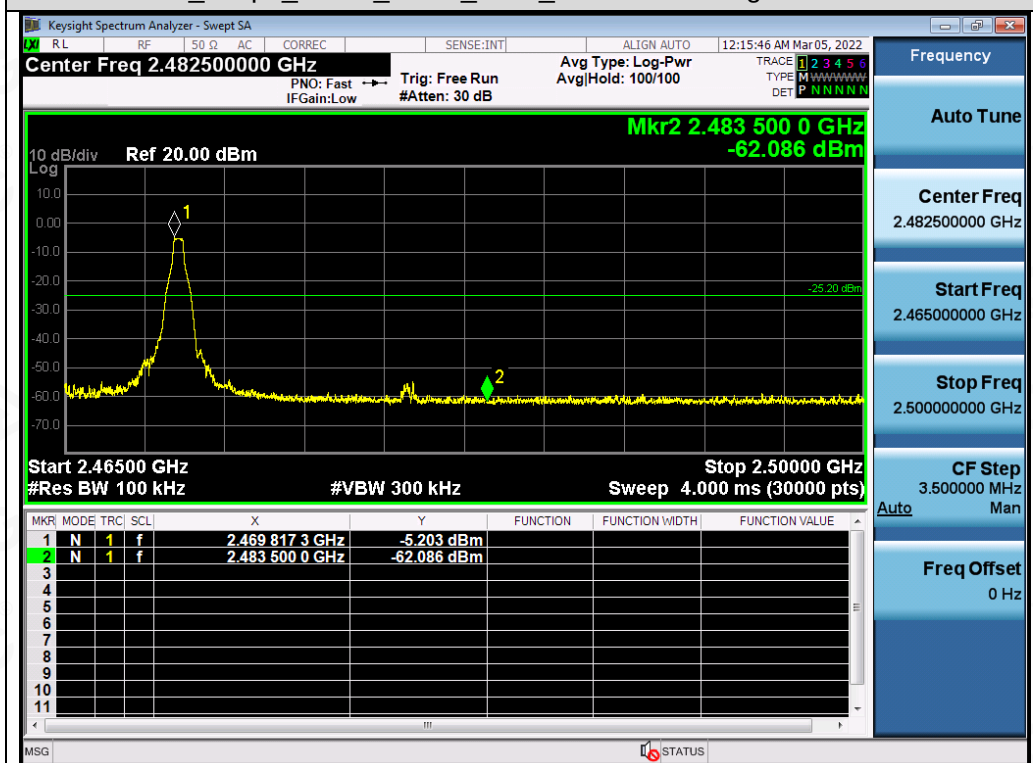
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Test_Graph_GFSK_ANT2_2439_Lower Band Edge Emissions



Test_Graph_GFSK_ANT2_2470_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-antenna 1				
Test Mode	Test Channel (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
GFSK	2439	-14.904	≤ 8	Pass
	2454	-14.687	≤ 8	Pass
	2470	-14.384	≤ 8	Pass

Test Data of Conducted Output Power Spectral Density-antenna 2				
Test Mode	Test Channel (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
GFSK	2439	-16.087	≤ 8	Pass
	2454	-16.444	≤ 8	Pass
	2470	-16.684	≤ 8	Pass

Test Data of Conducted Output Power Spectral Density-antenna 1+2				
Test Mode	Test Channel (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
GFSK	2439	-12.45	≤ 8	Pass
	2454	-12.47	≤ 8	Pass
	2470	-12.37	≤ 8	Pass

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