

FCC Test Report

Report No.: AGC09241191001FE06

FCC ID : 2ADKJ-DWAM83
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : wireless audio module
BRAND NAME : N/A
MODEL NAME : DWAM83
APPLICANT : Dalian Golden Hualu Digital Technology Co., Ltd.
DATE OF ISSUE : Nov. 02, 2019
STANDARD(S) : FCC Part 15.407
TEST PROCEDURE(S) : KDB 789033 D02 v02r01
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	/	Nov. 02, 2019	Valid	Initial Release



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1. VERIFICATION OF CONFORMITY

Applicant	Dalian Golden Hualu Digital Technology Co., Ltd.
Address	No.1, Hua Road, High-Tech Zone Dalian, China
Manufacturer	Shen Zhen HuaYi Electronics Co., Ltd
Address	3F/L, B1, Glory Technology Industrial Park, Baolong 5th road, LongGang, Shenzhen, China
Factory	Dalian Golden Hualu Digital Technology Co., Ltd.
Address	No.1, Hua Road, High-Tech Zone Dalian, China
Product Designation	wireless audio module
Brand Name	N/A
Test Model	DWAM83
Date of test	Oct. 22, 2019 to Oct. 31, 2019
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BGN/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 requirement of FCC Part 15 Rules requirement.

Prepared By



Draven Li
(Project Engineer)

Oct. 31, 2019

Reviewed By



Max Zhang
(Reviewer)

Nov. 02, 2019

Approved By



Forrest Lei
(Authorized Officer)

Nov. 02, 2019

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “wireless audio module”. It is designed by way of utilizing the QPSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	5150 MHz~5250MHz;5725 MHz~5850MHz
Output Power	7.66dBm
Modulation	QPSK
Number of channels	3
Hardware Version	L3
Software Version	V20
Antenna Designation	PCB Antenna
Number of transmit chain	2(Used two antennas,but can not support MIMO)
Directional gain	All transmit signals are completely uncorrelated with each other
Antenna Gain	3dBi
Power Supply	DC 3.3V

2.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency	Frequency Band	Channel Number	Frequency
5150 GHz~ 5250GHz	1	5180	5725 GHz~ 5850GHz	4	5736
	2	5210		5	5762
	3	5240		6	5814

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

This submittal(s) (test report) is intended for **FCC ID: 2ADKJ-DWAM83** filing to comply with the FCC Part 15 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.

Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.407 rules KDB 789033 D02

2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.



3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, $U_c = \pm 3.2$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ dB



4. DESCRIPTION OF TEST MODES

Mode	Available channel	Tested channel
QPSK	1,2,3,4,5,6	1,2,3,4,5,6

Note:

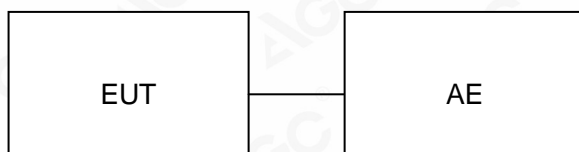
1. The EUT has been set to operate continuously on tested channel individually, and the EUT is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
3. Use engineering instruction set the EUT into the individual test modes.



5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure 1:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	wireless audio module	DWAM83	2ADKJ-DWAM83	EUT
3	PC Adapter	A1534	C02QJ21TGF84	AE
4	PC	Xiaomi	Air 13.3	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.407	6dB Bandwidth	Compliant
§15.407	Emission Bandwidth	Compliant
§15.407	Maximum conducted output power	Compliant
§15.407	Conducted Spurious Emission	Compliant
§15.407	Maximum Conducted Output Power Density	Compliant
§15.209	Radiated Emission	Compliant
§15.407	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant

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	Jun. 12, 2019	Jun. 11, 2020
LISN	R&S	ESH2-Z5	100086	Aug. 26, 2019	Aug. 25, 2020
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	Jun. 12, 2019	Jun. 11, 2020
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 20, 2018	Dec. 19, 2019
2.4GHz Fliter	EM Electronics	2400-2500MHz	N/A	Feb. 27, 2019	Feb. 26, 2020
Attenuator	ZHINAN	E-002	N/A	Sep. 09, 2019	Sep. 08, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Jun. 13, 2018	Jun. 12, 2020
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 17, 2018	May. 16, 2020
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 15, 2019	Oct. 16, 2020
ANTENNA	SCHWARZBECK	VULB9168	494	Sep. 20, 2019	Sep. 19, 2021
Test software	FARA	EZ-EMC (Ver RA-03A)	N/A	N/A	N/A

7. MAXIMUM CONDUCTED OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

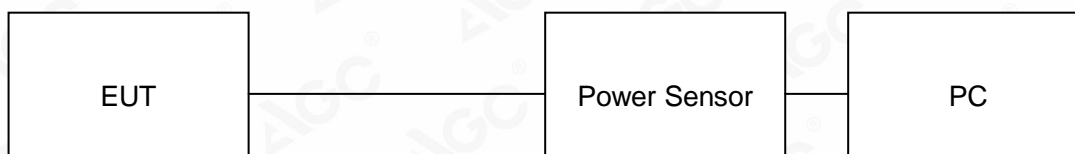
For average power test:

1. Connect EUT RF output port to power sensor through an RF attenuator.
2. Connect the power sensor to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.

Note:The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

7.2. TEST SET-UP

AVERAGE POWER SETUP



7.3. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT FOR QPSK MODULATION					
Frequency (MHz)	Average Power Chain 1(dBm)	Average Power Chain 2(dBm)	Average Power Total(dBm)	Applicable Limits (dBm)	Pass or Fail
5180	7.66	7.42	N/A	30	Pass
5210	7.53	7.50	N/A	30	Pass
5240	7.60	7.58	N/A	30	Pass

LIMITS AND MEASUREMENT RESULT FOR QPSK MODULATION					
Frequency (MHz)	Average Power Chain 1(dBm)	Average Power Chain 2(dBm)	Average Power Total(dBm)	Applicable Limits (dBm)	Pass or Fail
5736	7.41	7.30	N/A	30	Pass
5762	7.33	7.35	N/A	30	Pass
5814	7.37	7.28	N/A	30	Pass



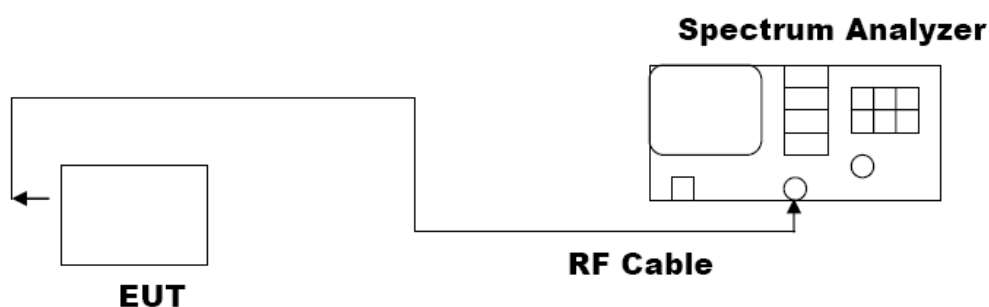
8. 6dB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on operation frequency individually.
3. Set RBW = 100kHz.
4. Set the VBW $\geq 3 \times$ RBW. Detector = Peak. Trace mode = max hold.
5. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.

Note: The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

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



8.3. LIMITS AND MEASUREMENT RESULTS

LIMITS AND MEASUREMENT RESULT FOR QPSK MODULATION			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	5736MHz	9.819	PASS
	5762MHz	9.814	PASS
	5814MHz	9.819	PASS



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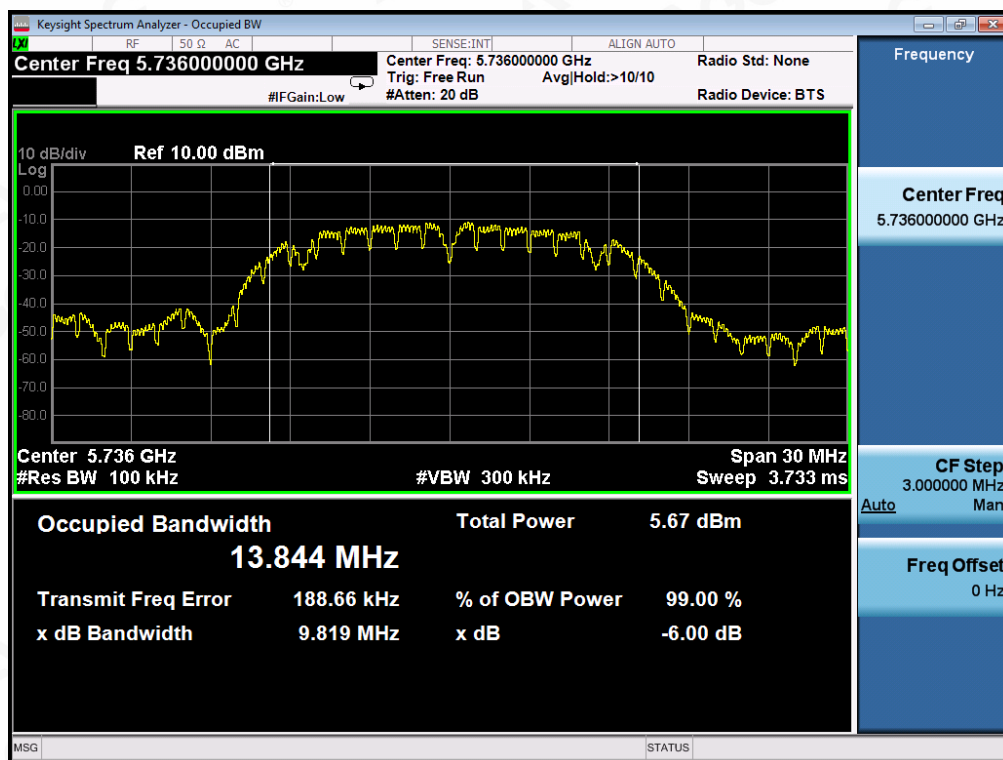
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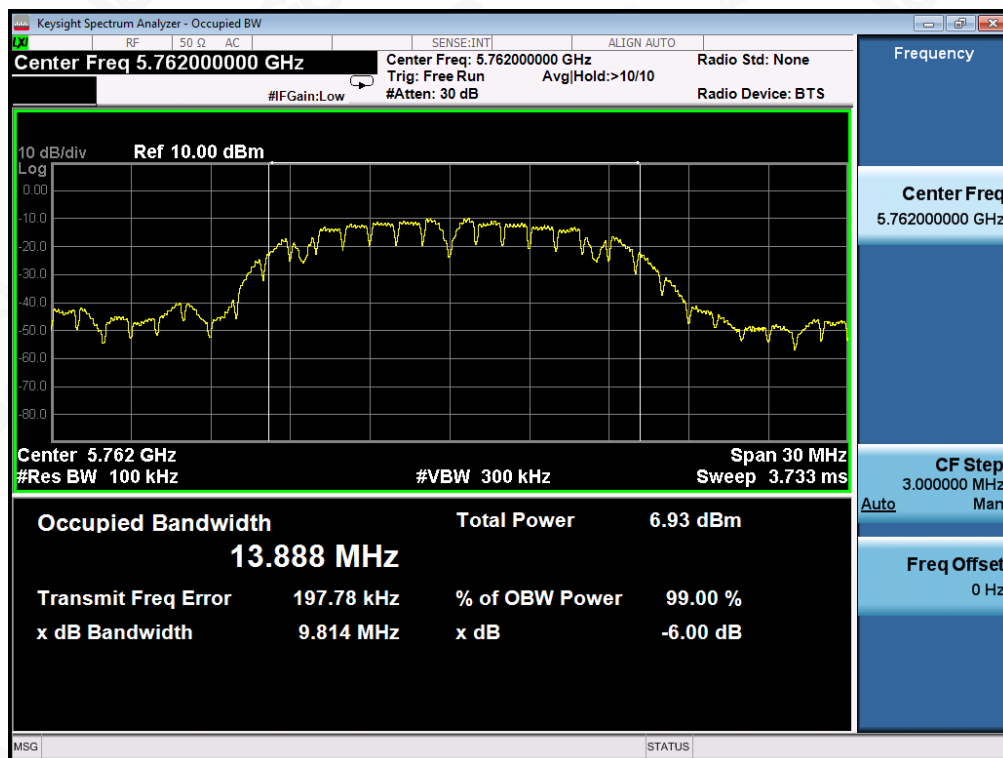
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TEST RESULT

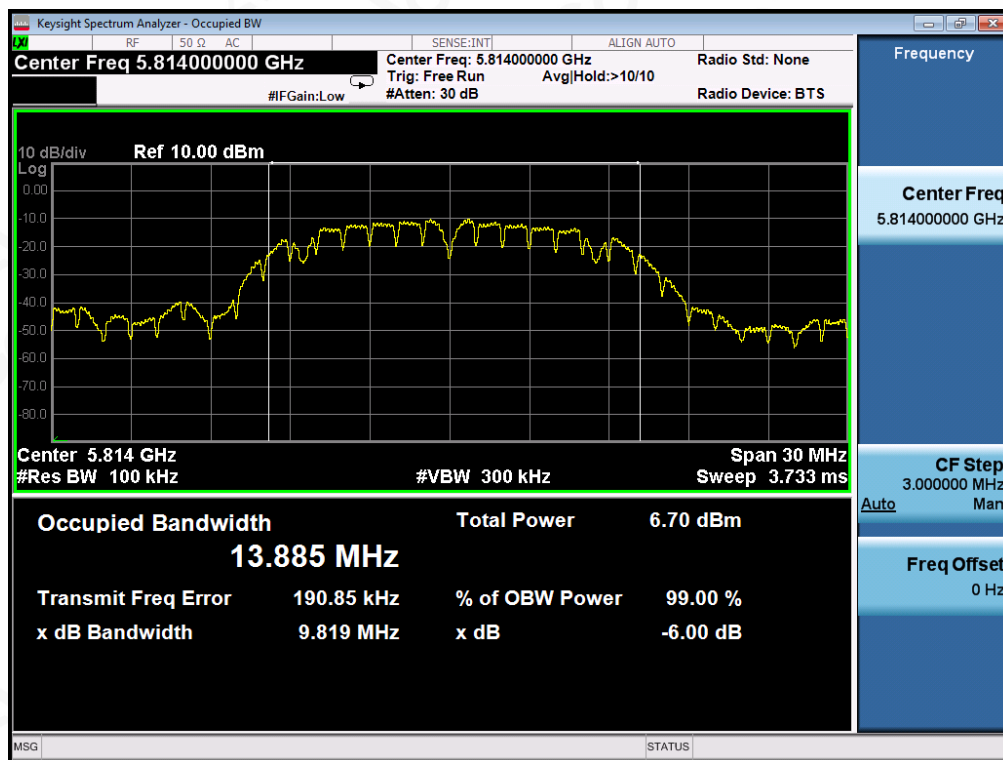
TEST PLOT OF BANDWIDTH FOR 5736MHz



TEST PLOT OF BANDWIDTH FOR 5762MHz



TEST PLOT OF BANDWIDTH FOR 5814MHz



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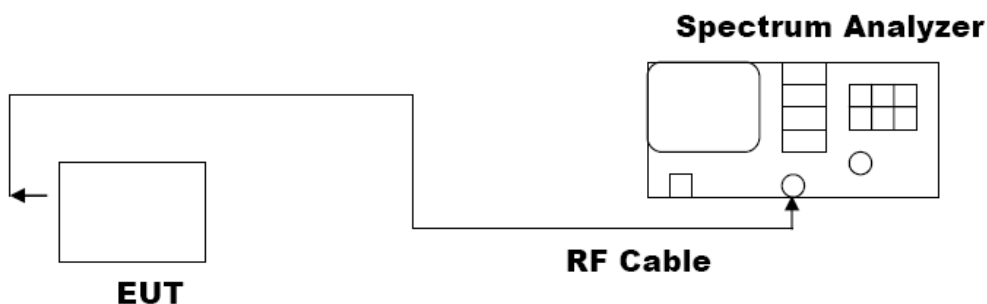
9. EMISSION BANDWIDTH

9.1. MEASUREMENT PROCEDURE

- Set RBW = approximately 1% of the emission bandwidth.
 - Set the VBW > RBW.
 - Detector = Peak.
 - Trace mode = max hold.
 - Measure the maximum width of the emission that is 26 dB down from the maximum of the emission.
- Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Note: The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

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



9.3. LIMITS AND MEASUREMENT RESULTS

LIMITS AND MEASUREMENT RESULT FOR QPSK MODULATION			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
Within the Band	5180MHz	16.12	PASS
	5210MHz	16.12	PASS
	5240MHz	16.14	PASS



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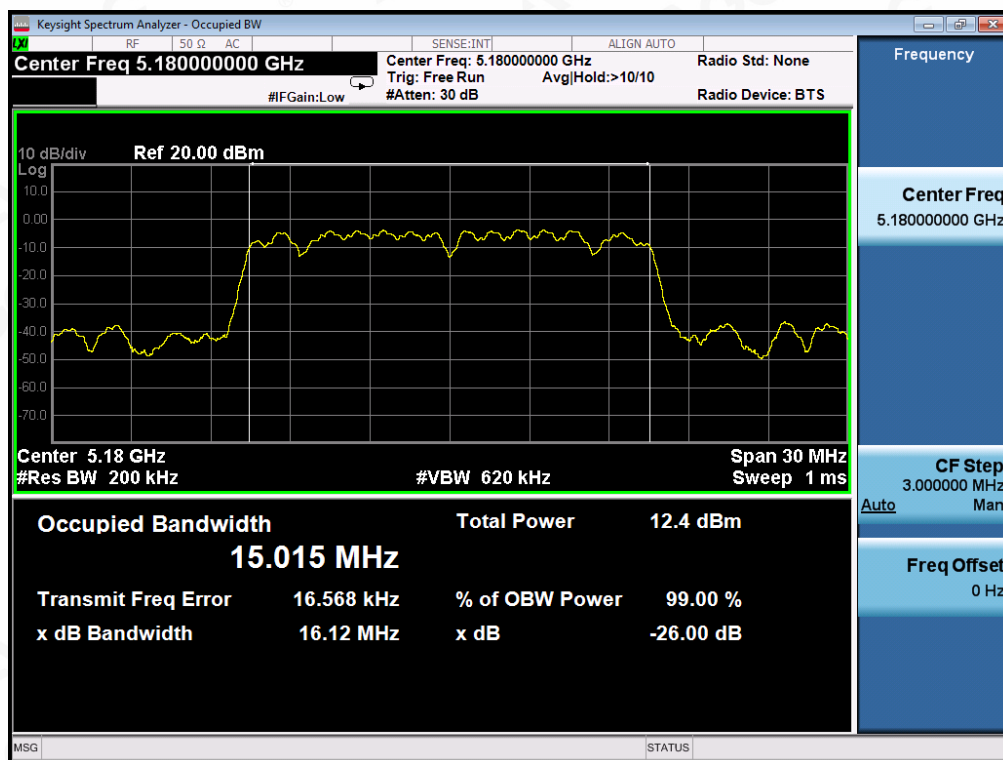
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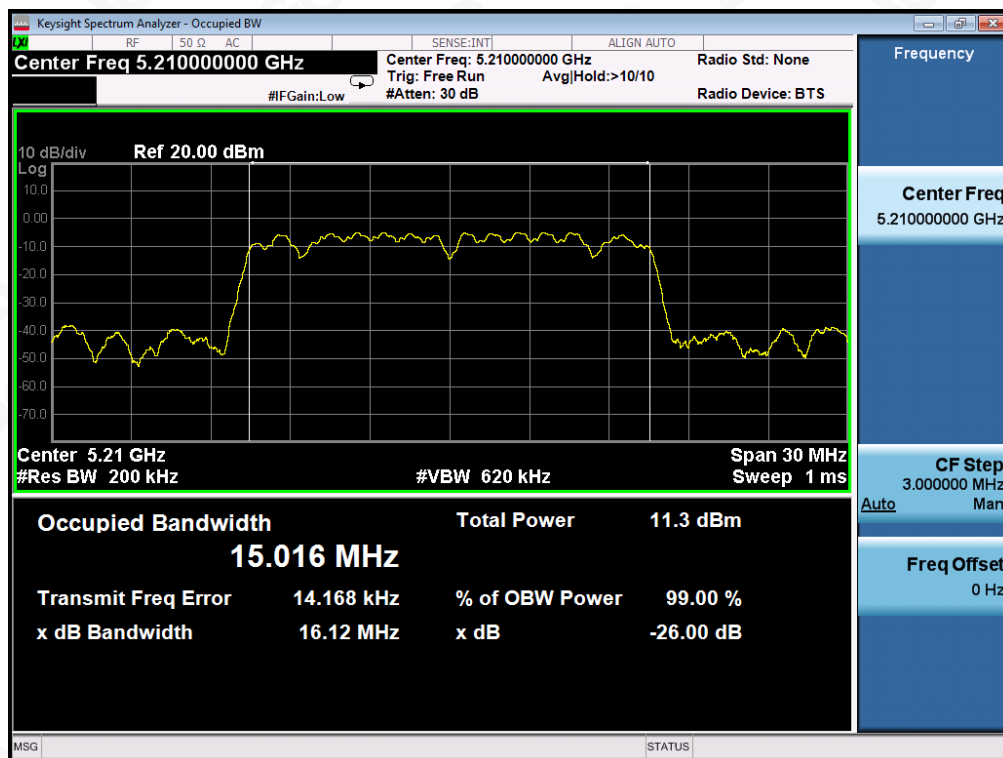
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TEST RESULT

TEST PLOT OF BANDWIDTH FOR 5180MHz



TEST PLOT OF BANDWIDTH FOR 5210MHz



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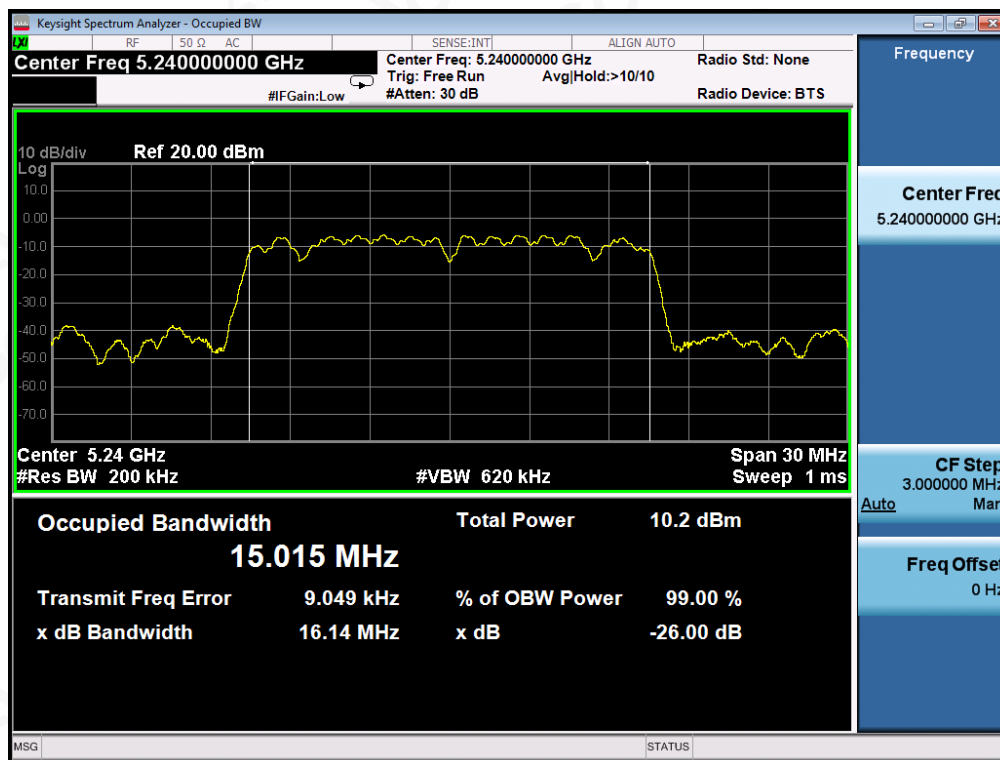
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TEST PLOT OF BANDWIDTH FOR 5240MHz



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10. MAXIMUM CONDUCTED OUTPUT PEAK POWER SPECTRAL DENSITY

10.1 MEASUREMENT PROCEDURE

Refer to KDB 789033 section F

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

10.4 LIMITS AND MEASUREMENT RESULT

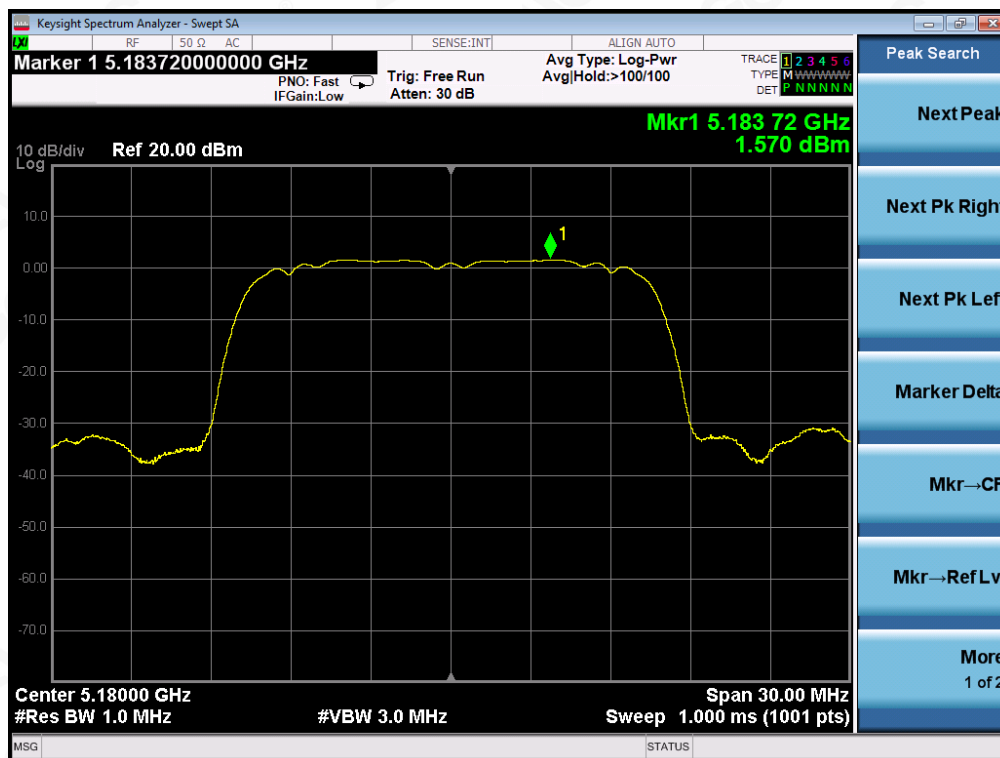
LIMITS AND MEASUREMENT RESULT FOR QPSK MODULATION					
Frequency (MHz)	Power density Chain 1 (dBm/MHz)	Power density Chain 2 (dBm/MHz)	Power density Total (dBm/MHz)	Applicable Limits (dBm/MHz)	Pass or Fail
5180	1.570	1.557	N/A	11	Pass
5210	0.595	0.591	N/A	11	Pass
5240	-0.382	-0.358	N/A	11	Pass

LIMITS AND MEASUREMENT RESULT FOR QPSK MODULATION					
Frequency (MHz)	Power density Chain 1 (dBm/500kHz)	Power density Chain 2 (dBm/500kHz)	Power density Total (dBm/500kHz)	Applicable Limits (dBm/500kHz)	Pass or Fail
5736	-2.549	-2.603	N/A	30	Pass
5762	-3.043	-3.069	N/A	30	Pass
5814	-3.230	-3.262	N/A	30	Pass

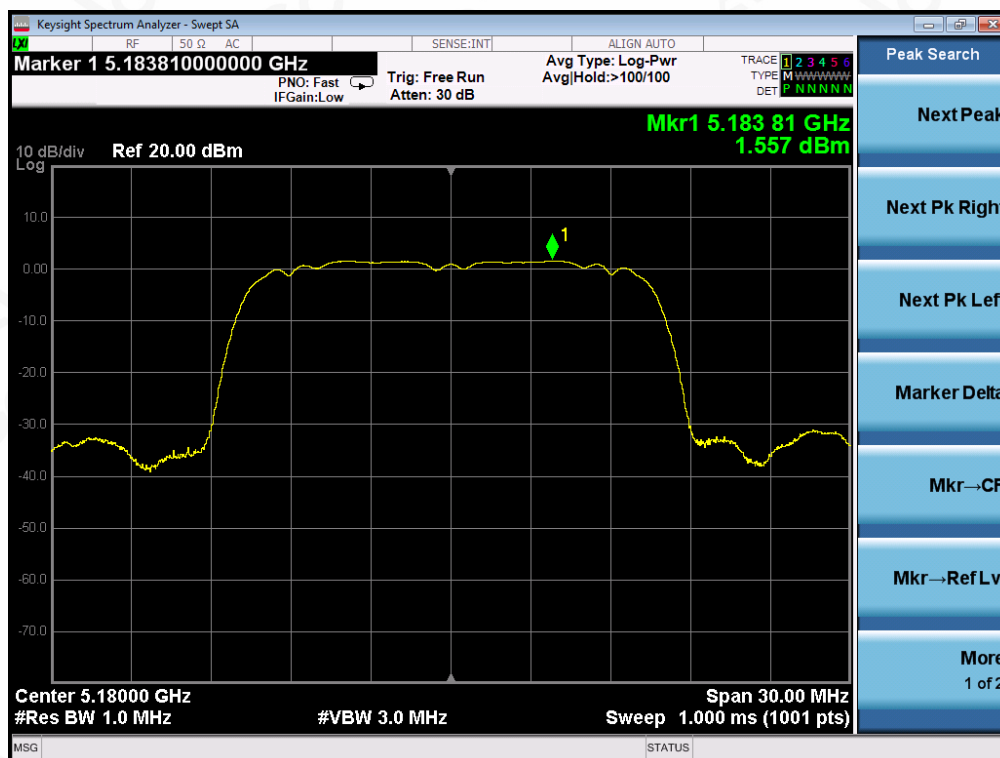


TEST RESULT

TEST PLOT OF SPECTRAL DENSITY FOR 5180MHz AT CHAIN 1



TEST PLOT OF SPECTRAL DENSITY FOR 5180MHz AT CHAIN 2



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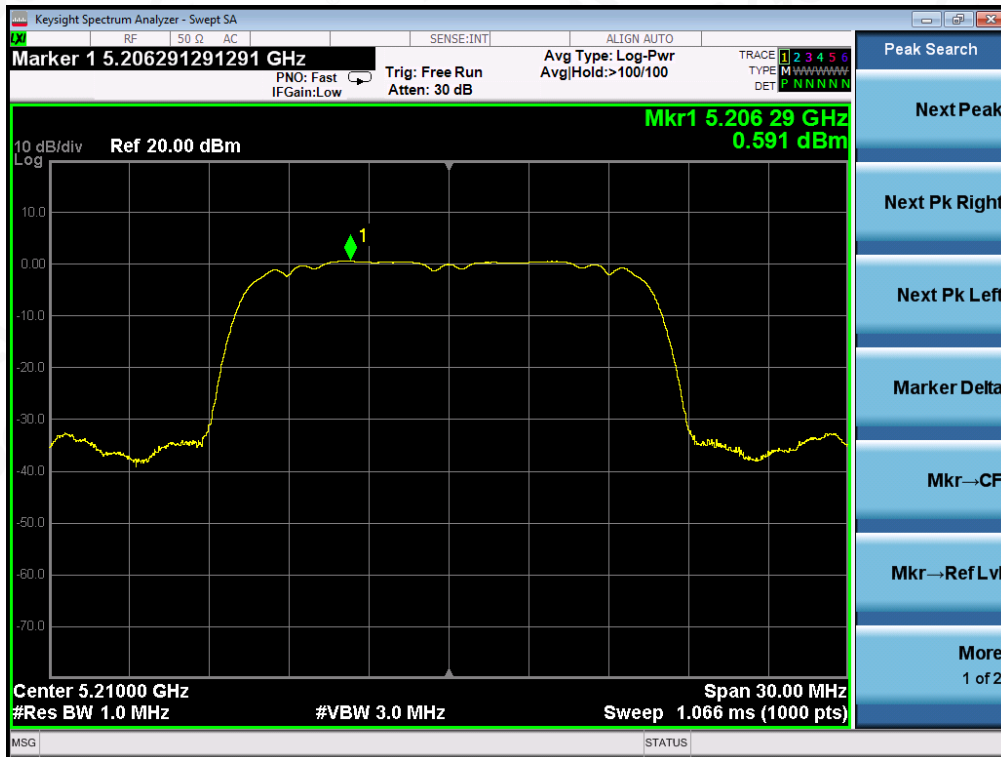
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TEST PLOT OF SPECTRAL DENSITY FOR 5210MHz AT CHAIN 1



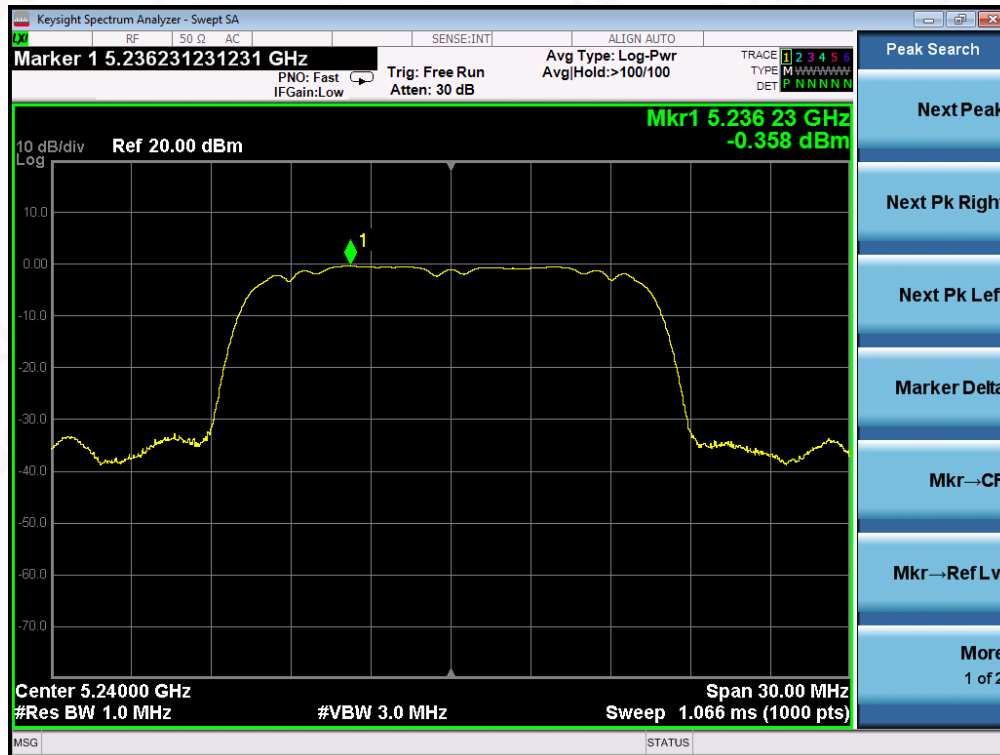
TEST PLOT OF SPECTRAL DENSITY FOR 5210MHz AT CHAIN 2



TEST PLOT OF SPECTRAL DENSITY FOR 5240MHz AT CHAIN 1



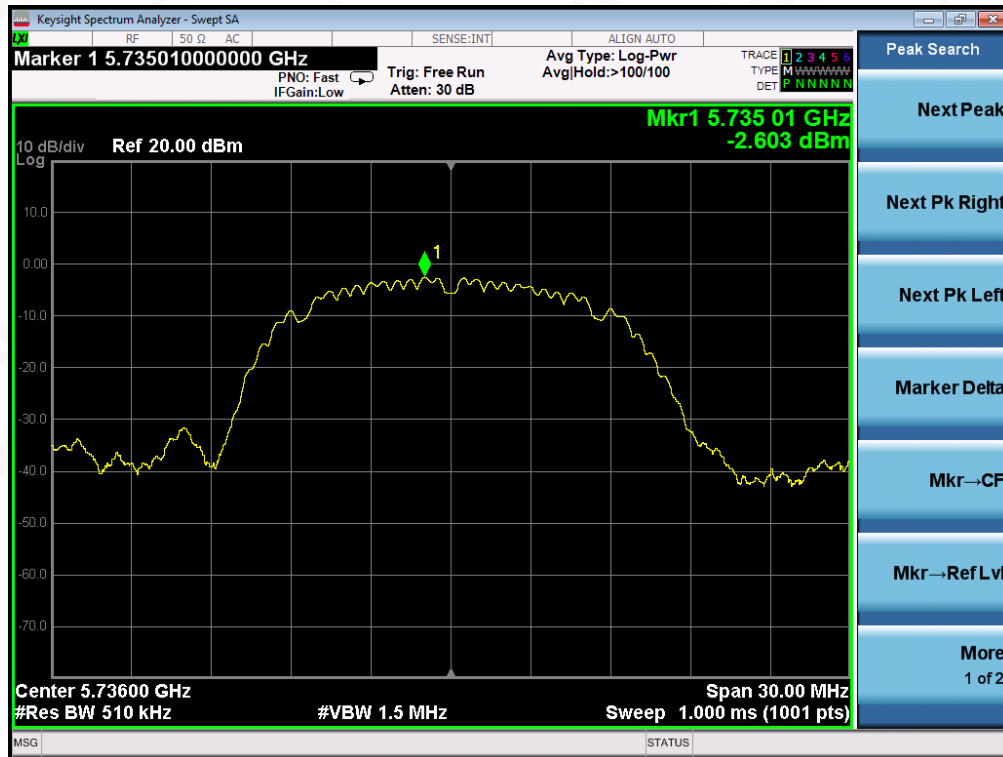
TEST PLOT OF SPECTRAL DENSITY FOR 5240MHz AT CHAIN 2



TEST PLOT OF SPECTRAL DENSITY FOR 5736MHz AT CHAIN 1



TEST PLOT OF SPECTRAL DENSITY FOR 5736MHz AT CHAIN 2



TEST PLOT OF SPECTRAL DENSITY FOR 5762MHz AT CHAIN 1



TEST PLOT OF SPECTRAL DENSITY FOR 5762MHz AT CHAIN 2



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TEST PLOT OF SPECTRAL DENSITY FOR 5814MHz AT CHAIN 1



TEST PLOT OF SPECTRAL DENSITY FOR 5814MHz AT CHAIN 2



11. CONDUCTED SPURIOUS EMISSION

11.1. 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 KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

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

The same as described in section 8.2.

11.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

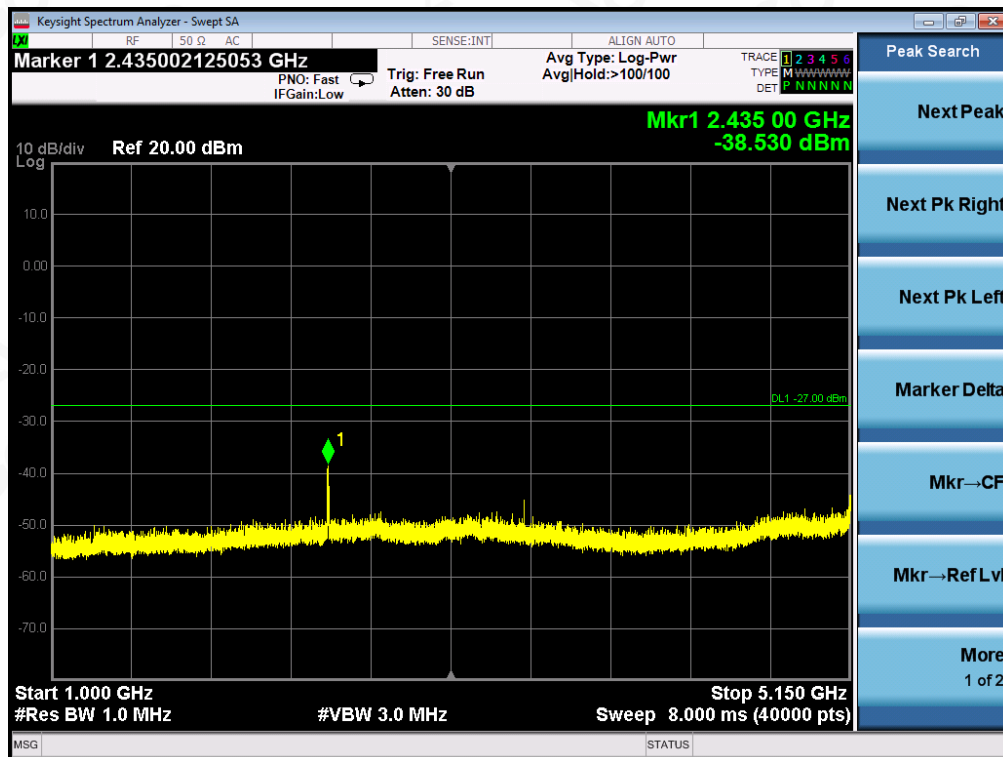
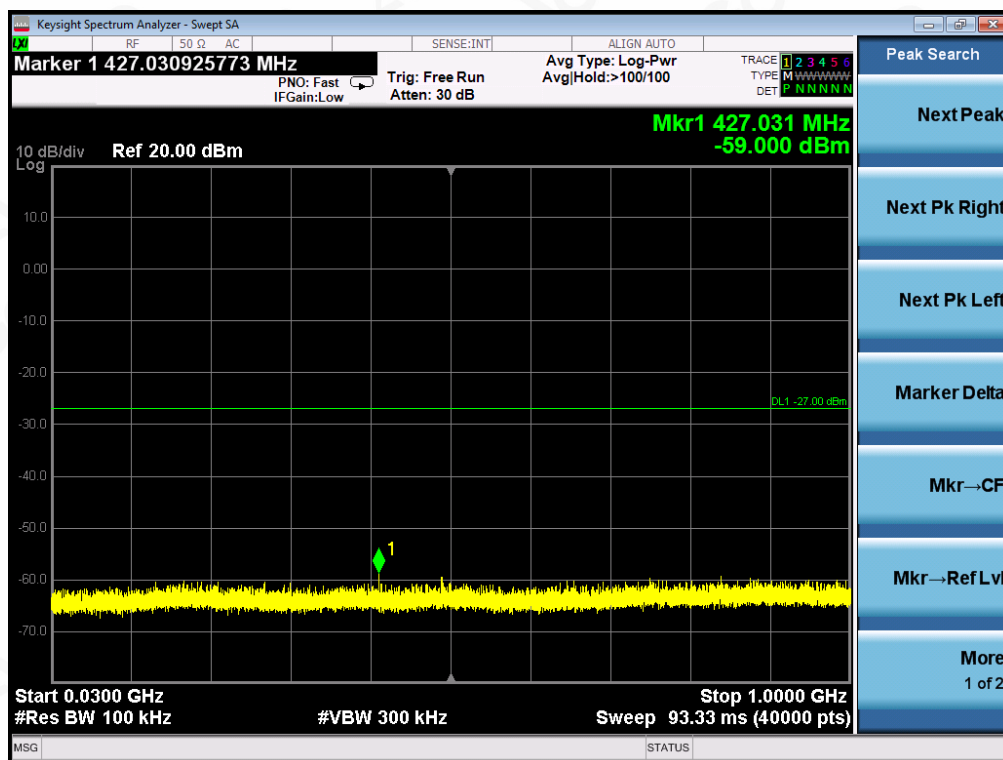
11.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test channel	Criteria
-27dBm/MHz	5150MHz-5250MHz	PASS
All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	5725MHz-5850MHz	PASS



MODULATION

TEST PLOT OF OUT OF BAND EMISSIONS FOR MODULATION IN 5180MHz



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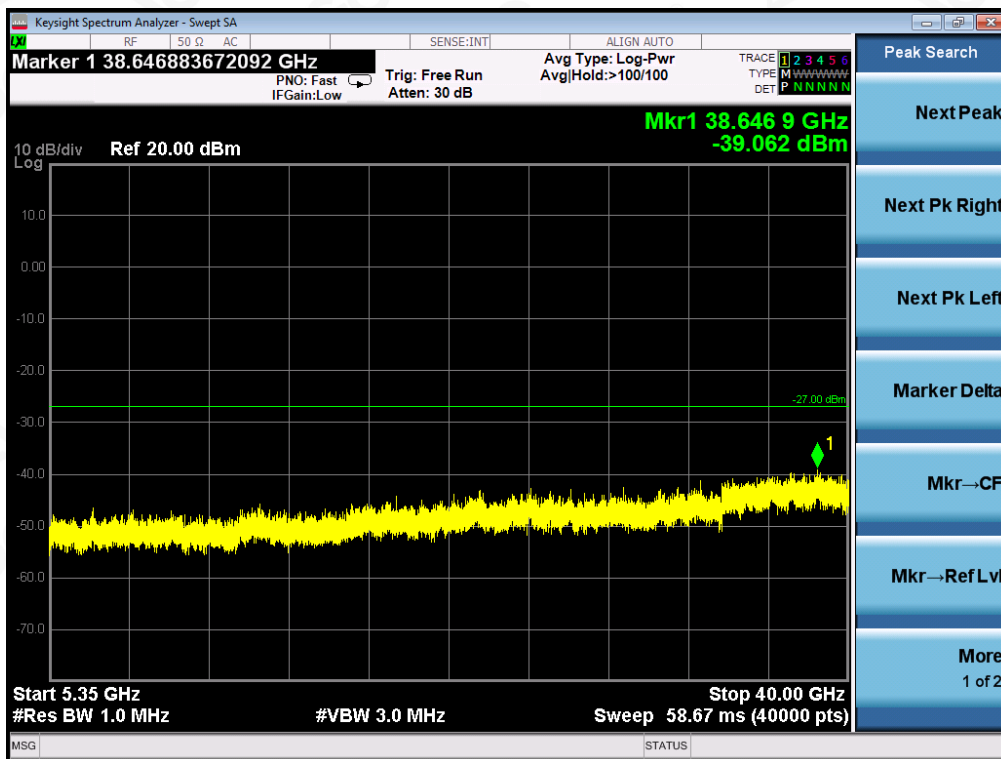
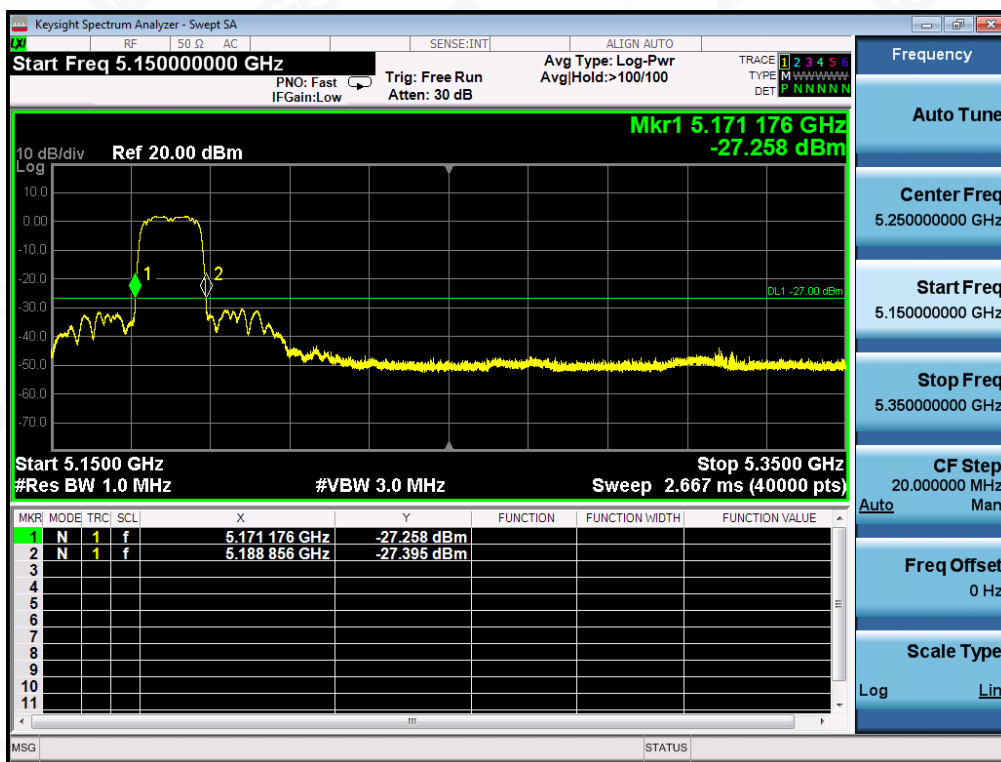
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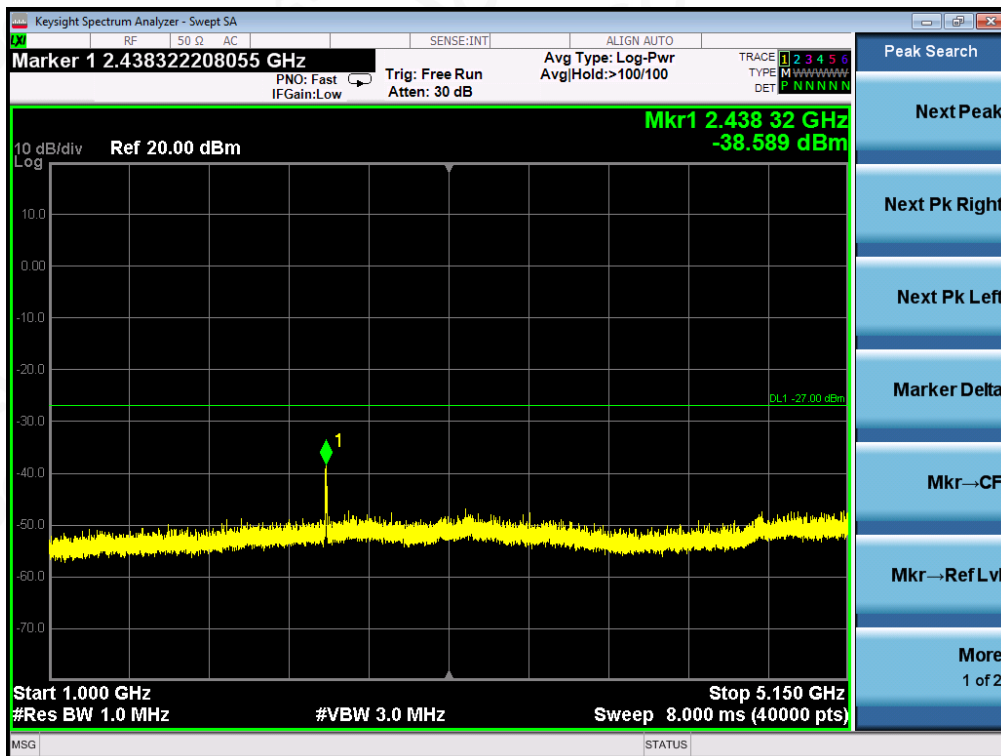
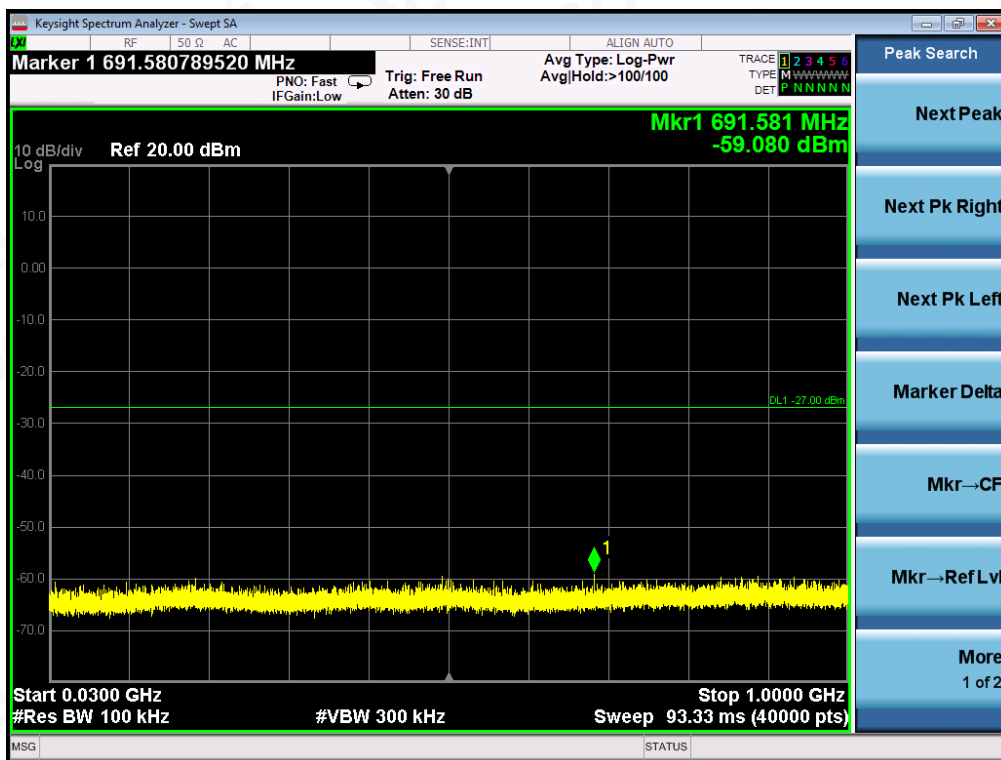
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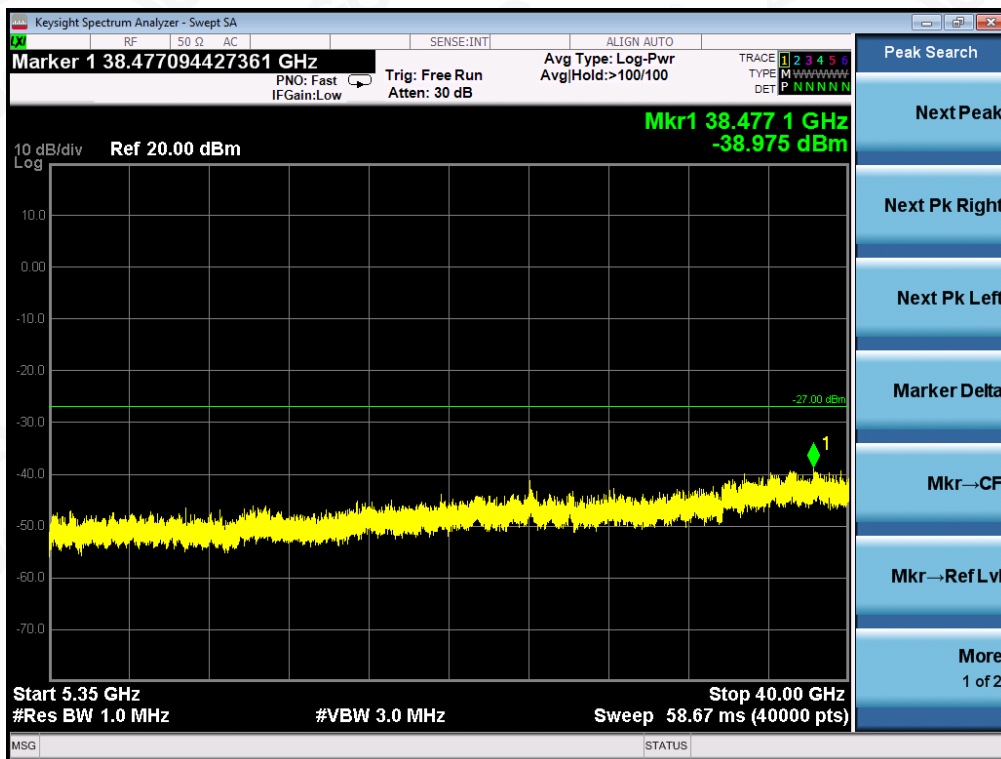
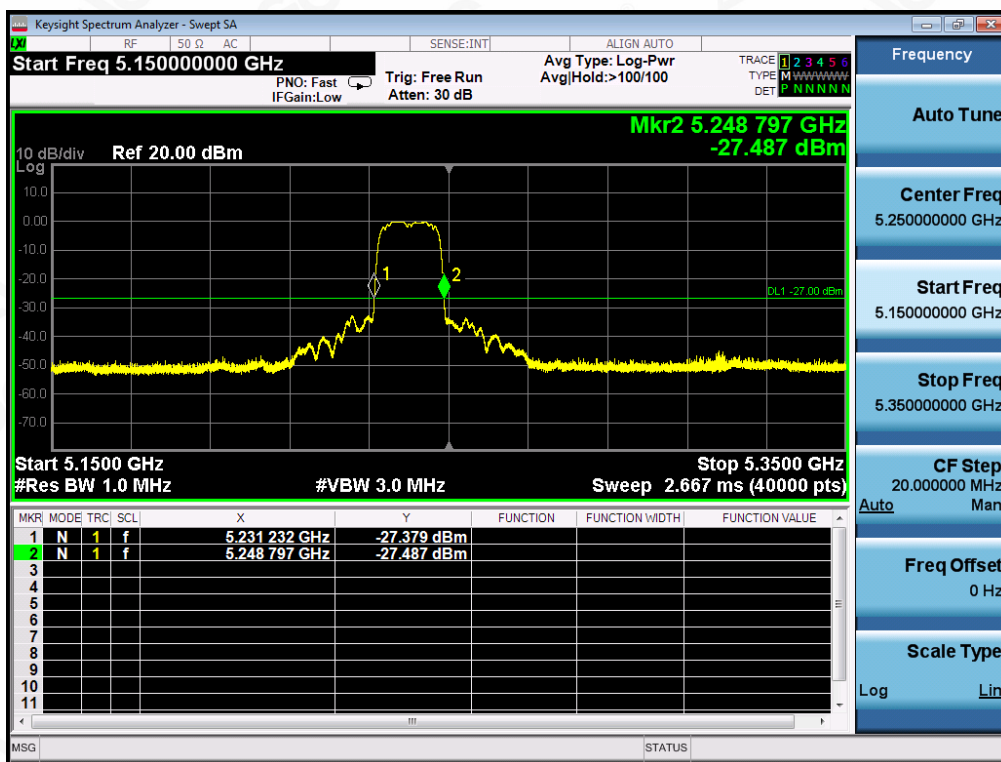
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