



TEST REPORT
FCC PART 15 SUBPART C 15.247

Test report
On Behalf of
Dayton Audio division of Parts Express
For
Wireless Wi-Fi & Bluetooth Audio Receiver with IR Remote

Model No.: WBA31

FCC ID: ZXZWBA31

Prepared for : **Dayton Audio division of Parts Express**
725 Pleasant Valley Dr. Springboro, OH 45066, USA

Prepared By : **Shenzhen HUAKE Testing Technology Co., Ltd.**
1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street,
Bao'an District, Shenzhen City, China

Date of Test: **Sep. 20, 2018 ~ Sep. 28, 2018**

Date of Report: **Sep. 28, 2018**

Report Number: **HK1809271170E**

**TEST RESULT CERTIFICATION****Applicant's name**: Dayton Audio division of Parts Express

Address: 725 Pleasant Valley Dr. Springboro, OH 45066, USA

Manufacture's Name: Dayton Audio division of Parts Express

Address: 725 Pleasant Valley Dr. Springboro, OH 45066, USA

Factory's Name: Shenzhen IDER Technology Co., LtdAddress: Block B, WEI PENG DA Industry Park, Dalang, Longhua District,
Shenzhen, China**Product description**

Trade Mark: DAYTON

Product name.....: Wireless Wi-Fi & Bluetooth Audio Receiver with IR Remote

Model and/or type reference ...: WBA31

Standards: **47 CFR FCC Part 15 Subpart C 15.247**

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Date of Test:

Date (s) of performance of tests: Sep. 20, 2018 ~ Sep. 28, 2018

Date of Issue: Sep. 28, 2018

Test Result.....: **Pass**

Testing Engineer :

(Gary Qian)

Technical Manager :

(Eden Hu)

Authorized Signatory :

(Jason Zhou)



TABLE OF CONTENTS

1.SUMMARY.....	5
1.1 TEST STANDARDS	5
1.2 TEST DESCRIPTION	5
1.3 TEST FACILITY	6
1.4 STATEMENT OF THE MEASUREMENT UNCERTAINTY.....	6
2.GENERAL INFORMATION	7
2.1 ENVIRONMENTAL CONDITIONS.....	7
2.2 GENERAL DESCRIPTION OF EUT	7
2.3 DESCRIPTION OF TEST MODES AND TEST FREQUENCY	7
2.4 RELATED SUBMITTAL(S) / GRANT (S)	8
2.5 DESCRIPTION OF TEST SETUP	8
2.6. IEEE 802.11N MODULATION SCHEME.....	9
2.7 EQUIPMENT USED	10
3. OUTPUT POWER	11
3.1. MEASUREMENT PROCEDURE	11
3.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	11
3.3. LIMITS AND MEASUREMENT RESULT	12
4. 6 DB BANDWIDTH	14
4.1. MEASUREMENT PROCEDURE	14
4.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	14
4.3. LIMITS AND MEASUREMENT RESULTS	15
5. CONDUCTED SPURIOUS EMISSION	23
5.1. MEASUREMENT PROCEDURE	23
5.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	23
5.3. LIMITS AND MEASUREMENT RESULT	23
6. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY	42
6.1 MEASUREMENT PROCEDURE	42
6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	42
6.3 LIMITS AND MEASUREMENT RESULT	42
7. RADIATED EMISSION	50



7.1. MEASUREMENT PROCEDURE	50
7.2. TEST SETUP	51
7.3. LIMITS AND MEASUREMENT RESULT	52
7.4. TEST RESULT	52
8. BAND EDGE EMISSION.....	58
8.1. MEASUREMENT PROCEDURE	58
8.2. TEST SET-UP	58
8.3. TEST RESULT	59
9. FCC LINE CONDUCTED EMISSION TEST	75
9.1. LIMITS OF LINE CONDUCTED EMISSION TEST	75
9.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST	75
9.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST	76
9.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST	76
9.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	77
APPENDIX A: PHOTOGRAPHS OF TEST SETUP.....	79
APPENDIX B: PHOTOGRAPHS OF EUT	81



1.SUMMARY

1.1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

[ANSI C63.10:2013](#) : American National Standard for Testing Unlicensed Wireless Devices

[KDB558074 D01 15.247 Meas Guidance v05](#): Guidance for compliance measurements on Digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules.

1.2 TEST DESCRIPTION

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Output Power	Compliant
§15.247	6 dB Bandwidth	Compliant
§15.247	Conducted Spurious Emission	Compliant
§15.247	Maximum Conducted Output Power SPECTRAL Density	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant

NOTE: N/A stands for not applicable.



1.3 TEST FACILITY

1.3.1 Address of the test laboratory

Shenzhen HUAK Testing Technology Co., Ltd.

Add.:1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park,Heping Community, Fuhai Street, Bao'an District, Shenzhen, China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 21210

The 3m alternate test site of Shenzhen HUAK Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 21210 on May 24, 2016.

FCC Registration No.: CN1229

Test Firm Registration Number : 616276

1.4 STATEMENT OF THE MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen HUAK Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for HUAK laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	± 0.57 dB	(1)
Transmitter power Radiated	± 2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	± 2.20 dB	(1)
Occupied Bandwidth	± 0.01 ppm	(1)
Radiated Emission 30~1000MHz	± 4.10 dB	(1)
Radiated Emission Above 1GHz	± 4.32 dB	(1)
Conducted Disturbance0.15~30MHz	± 3.20 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



2. GENERAL INFORMATION

2.1 ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2 GENERAL DESCRIPTION OF EUT

Product Name:	Wireless Wi-Fi & Bluetooth Audio Receiver with IR Remote
Model/Type reference:	WBA31
Power supply:	DC 5V
Modulation	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
Supported modes	802.11 b/g/n20/n40
Operation Frequency	2.412 GHz~2.462GHz
Channel number:	11
Antenna type:	Internal Antenna
Antenna gain:	2dBi
Hardware Version:	V1.1
Software Version:	V1.0

Note: For more details, refer to the user's manual of the EUT.

2.3 DESCRIPTION OF TEST MODES AND TEST FREQUENCY

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	1	2412 MHZ
	2	2417 MHZ
	3	2422 MHZ
	4	2427 MHZ
	5	2432 MHZ
	6	2437 MHZ
	7	2442 MHZ
	8	2447 MHZ
	9	2452 MHZ
	10	2457 MHZ
	11	2462 MHZ

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11, For 40MHZ bandwidth system use Channel 3 to Channel 9



NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Normal operating
Note: Transmit by 802.11b with Data rate (1/2/5.5/11) Transmit by 802.11g with Data rate (6/9/12/18/24/36/48/54) Transmit by 802.11n (20MHz) with Data rate (6.5/13/19.5/26/39/52/58.5/65) Transmit by 802.11n (40MHz) with Data rate (13.5/27/40.5/54/81/108/121.5/135)	

Note:

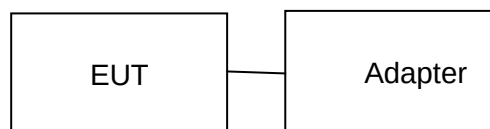
1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the eut is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

2.4 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.5 DESCRIPTION OF TEST SETUP

Operation of EUT during Radiation and Above1GHz Radiation testing:



Item	Equipment	Model No.	ID or Specification	Remark
1	Wireless Wi-Fi & Bluetooth Audio Receiver with IR Remote	WBA31	ZXZWBA31	EUT
2	Adapter	DLN-0501000E1-US	DC5V/1A	Marketed

**2.6. IEEE 802.11N MODULATION SCHEME**

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(Mbps)	
									800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

**2.7 EQUIPMENT USED**

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 28, 2017	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2017	1 Year
4.	Horn Antenna	Schwarzbeck	BBHA 9170	HKE-090	Dec. 28, 2017	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2017	1 Year
10.	Horn Antenna	Schwarzbeck	9120D	HKE-013	Dec. 28, 2017	1 Year
11.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 28, 2017	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2017	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 28, 2017	N/A
14.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 28, 2017	1 Year
15.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
16.	Signal generator	Agilent	N5182A	HKE-029	Dec. 28, 2017	1 Year
17.	Signal Generator	Agilent	83630A	HKE-028	Dec. 28, 2017	1 Year
18.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 28, 2017	3 Year

The calibration interval was one year



3. OUTPUT POWER

3.1. MEASUREMENT PROCEDURE

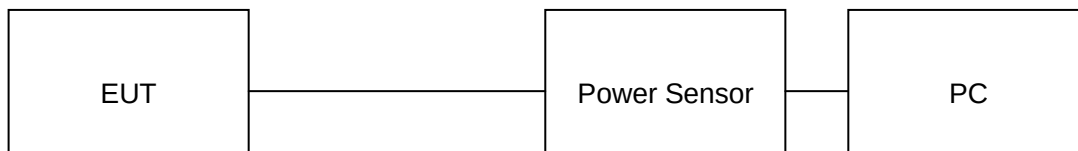
For average power test:

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 ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements.

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

AVERAGE POWER SETUP





3.3. LIMITS AND MEASUREMENT RESULT

TEST ITEM	OUTPUT POWER
TEST MODE	802.11b with data rate 1

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	16.61	30	Pass
2.437	16.47	30	Pass
2.462	16.29	30	Pass

TEST ITEM	OUTPUT POWER
TEST MODE	802.11g with data rate 6

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	14.06	30	Pass
2.437	14.38	30	Pass
2.462	14.25	30	Pass

TEST ITEM	OUTPUT POWER
TEST MODE	802.11n 20 with data rate 6.5

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	13.77	30	Pass
2.437	13.91	30	Pass
2.462	13.48	30	Pass



TEST ITEM	OUTPUT POWER
TEST MODE	802.11n 40 with data rate 13.5

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.422	12.31	30	Pass
2.437	12.59	30	Pass
2.452	12.22	30	Pass



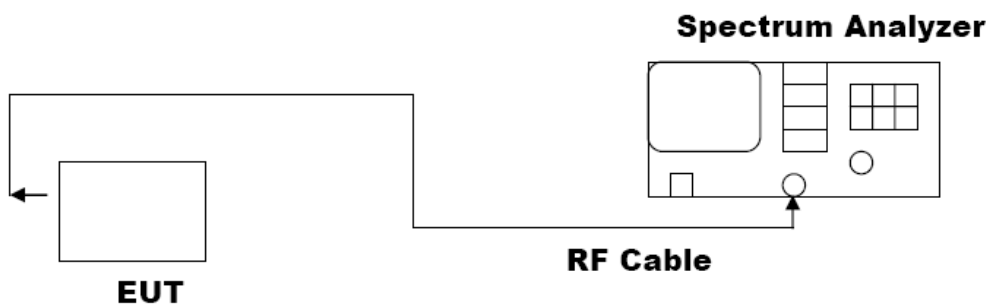
4. 6 DB BANDWIDTH

4.1. 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 Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW $\geq 3 \times$ RBW.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements.

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



**4.3. LIMITS AND MEASUREMENT RESULTS**

TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11b with data rate 11

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	10.03	PASS
	Middle Channel	10.03	PASS
	High Channel	9.769	PASS

TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11g with data rate 54

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	15.10	PASS
	Middle Channel	15.10	PASS
	High Channel	15.08	PASS

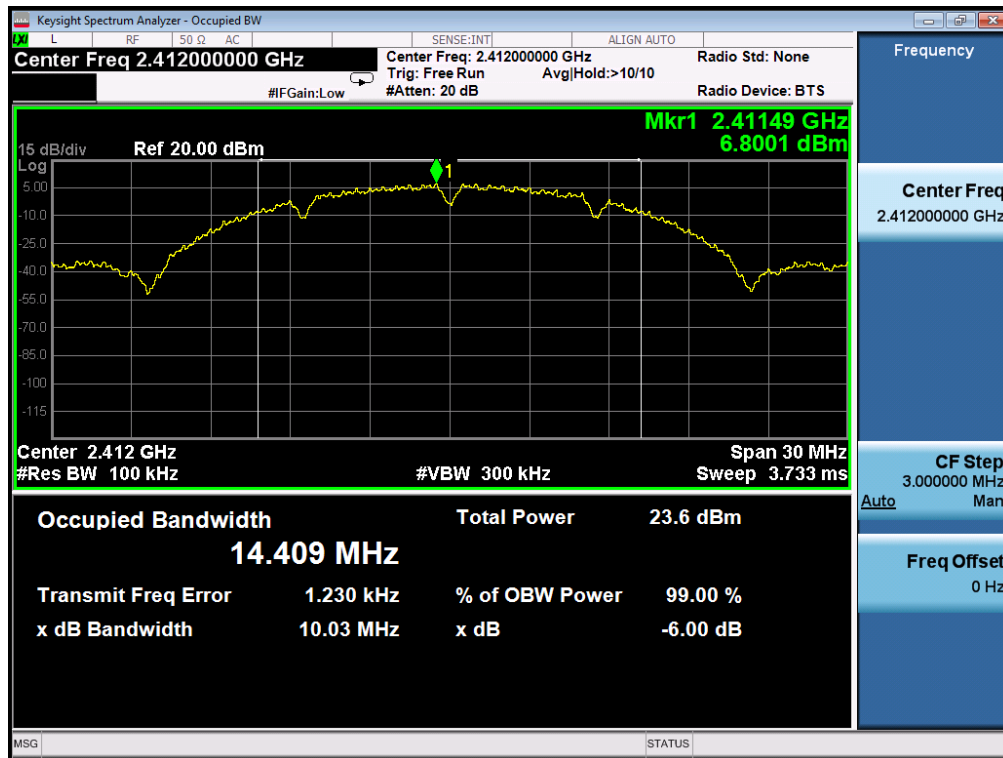
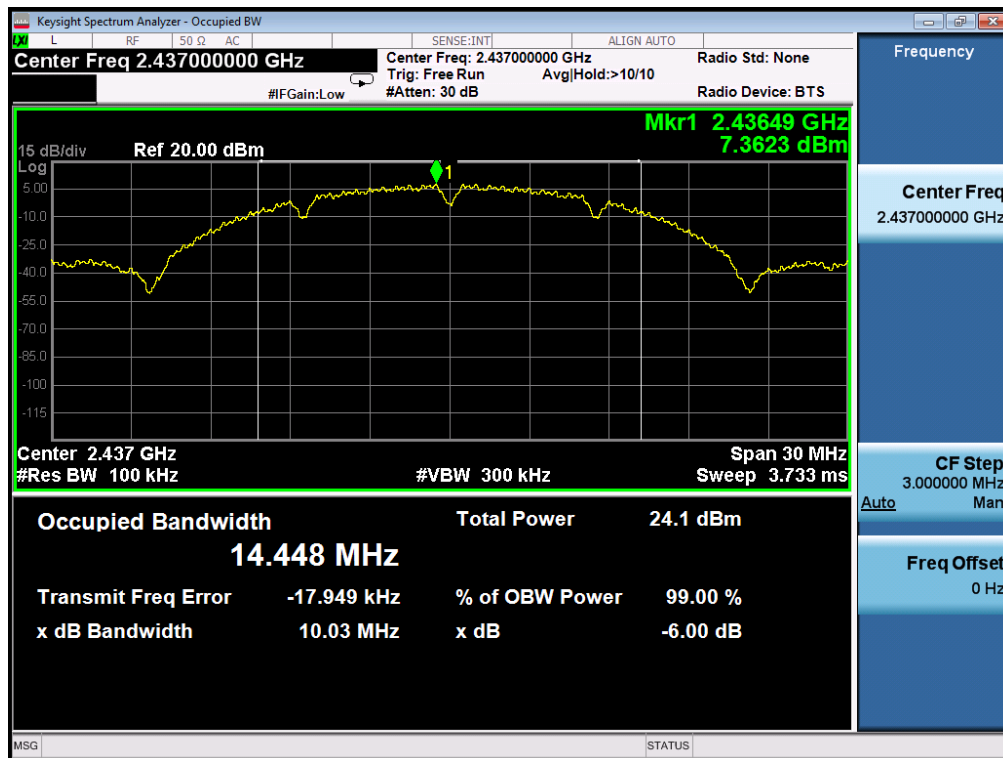
TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11n 20 with data rate 65

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	15.11	PASS
	Middle Channel	15.12	PASS
	High Channel	15.10	PASS



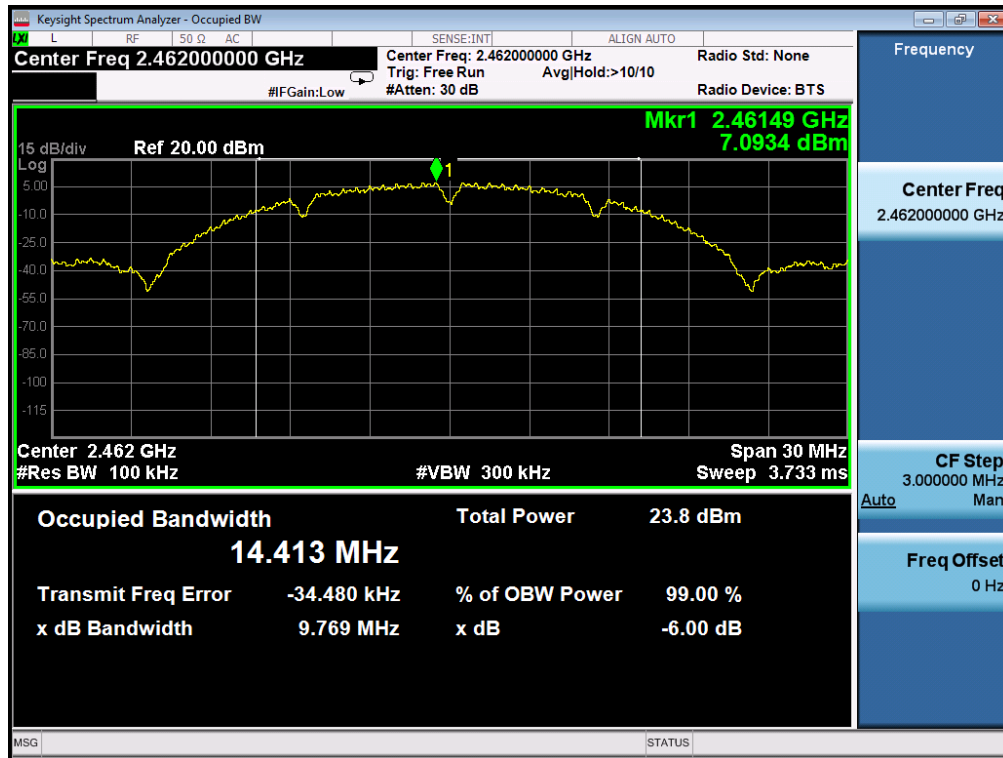
TEST ITEM	6DB BANDWIDTH
TEST MODE	802.11n 40 with data rate 135

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	35.06	PASS
	Middle Channel	35.07	PASS
	High Channel	35.07	PASS

**802.11b TEST RESULT****TEST PLOT OF BANDWIDTH FOR LOW CHANNEL****TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL**

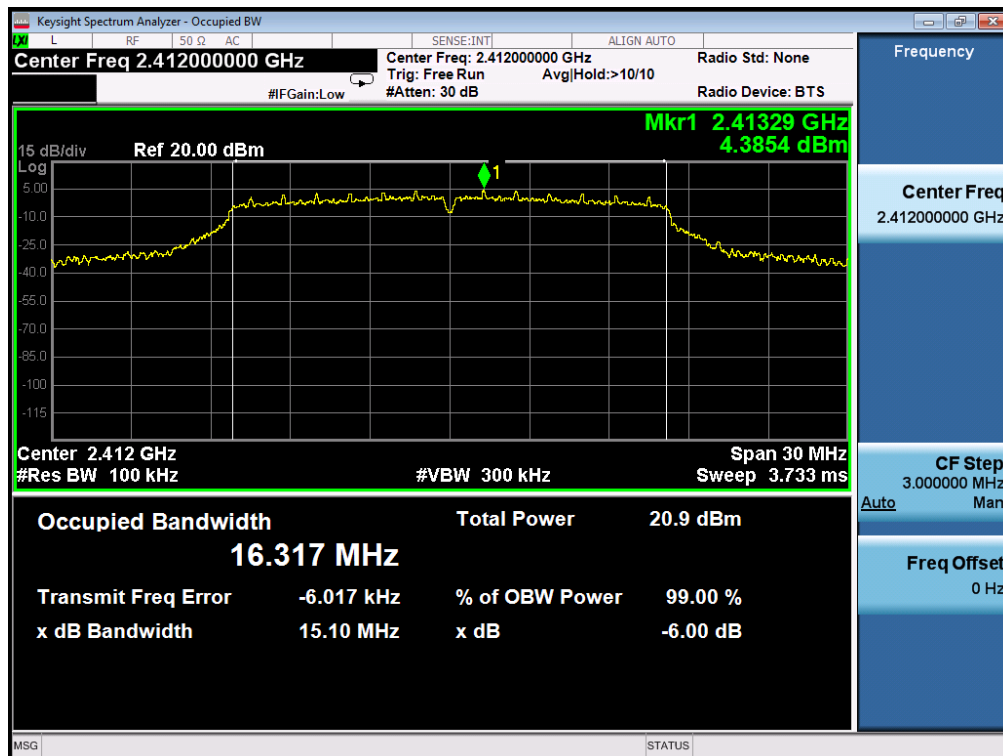


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



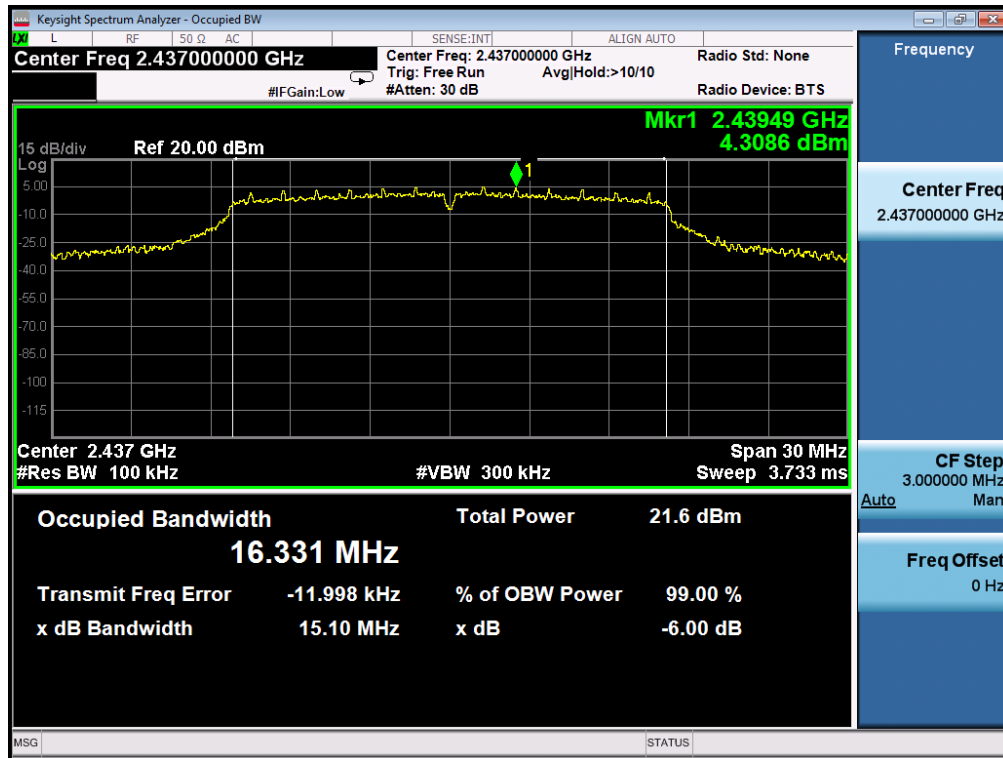
802.11g TEST RESULT

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

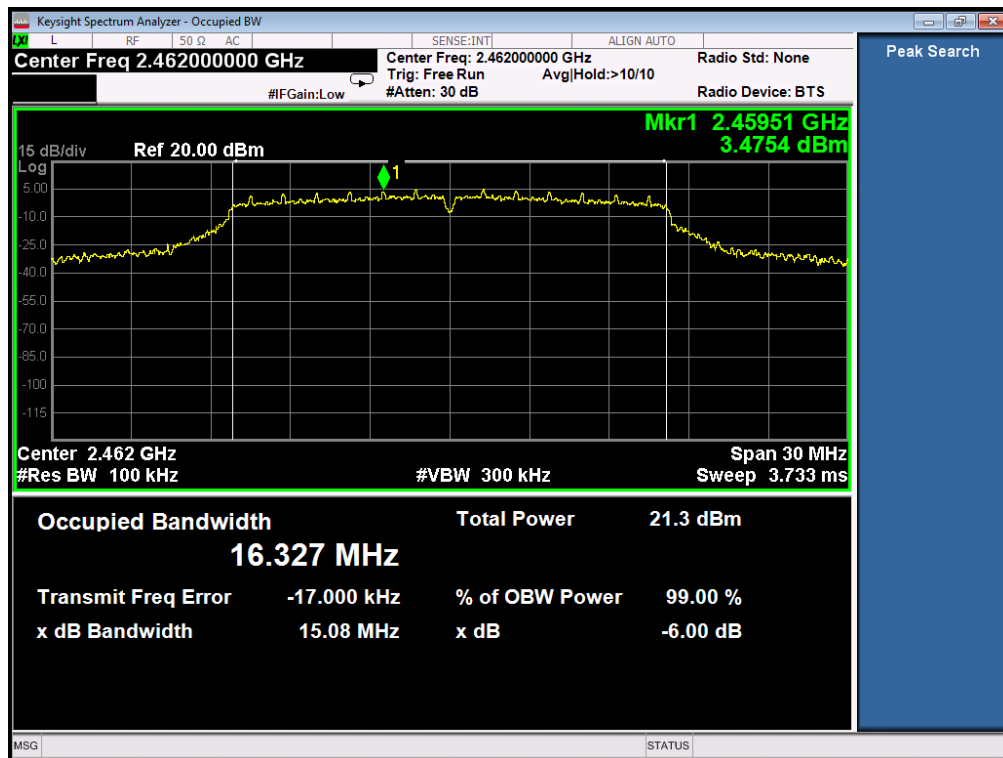


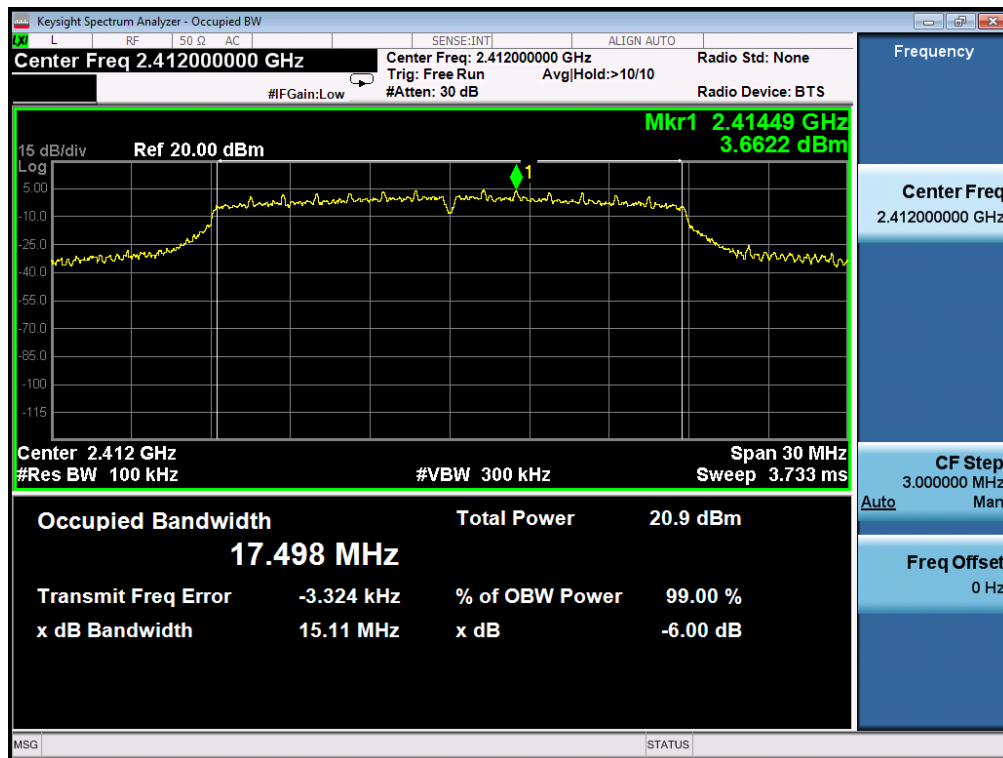
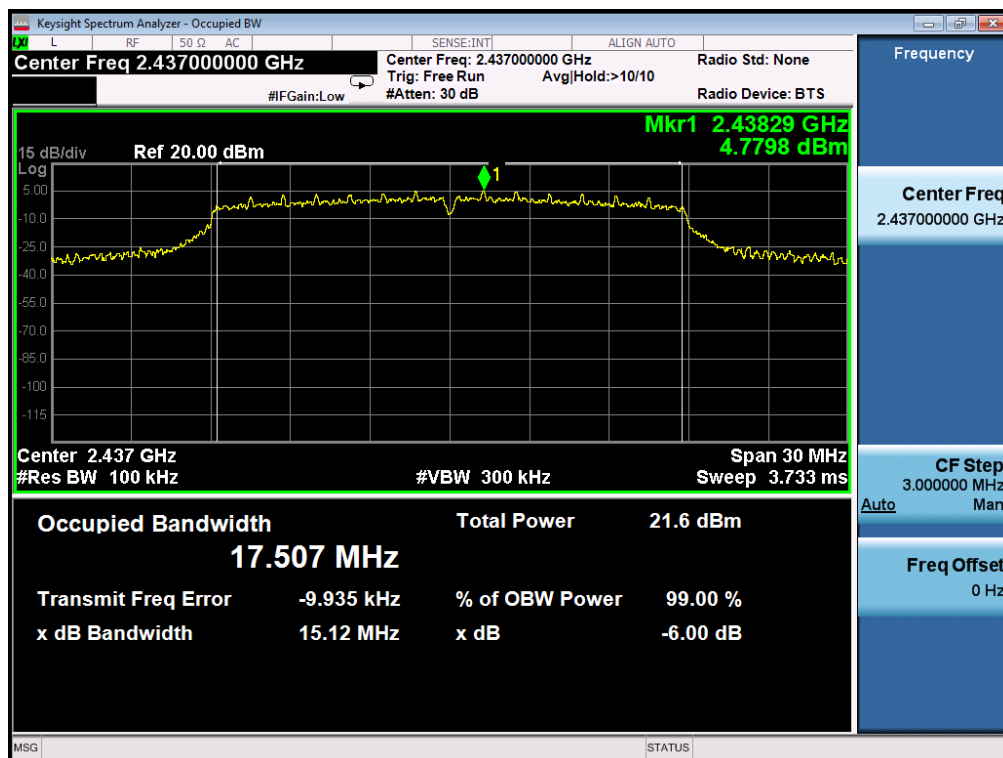


TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



**802.11n (20) TEST RESULT****TEST PLOT OF BANDWIDTH FOR LOW CHANNEL****TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL**

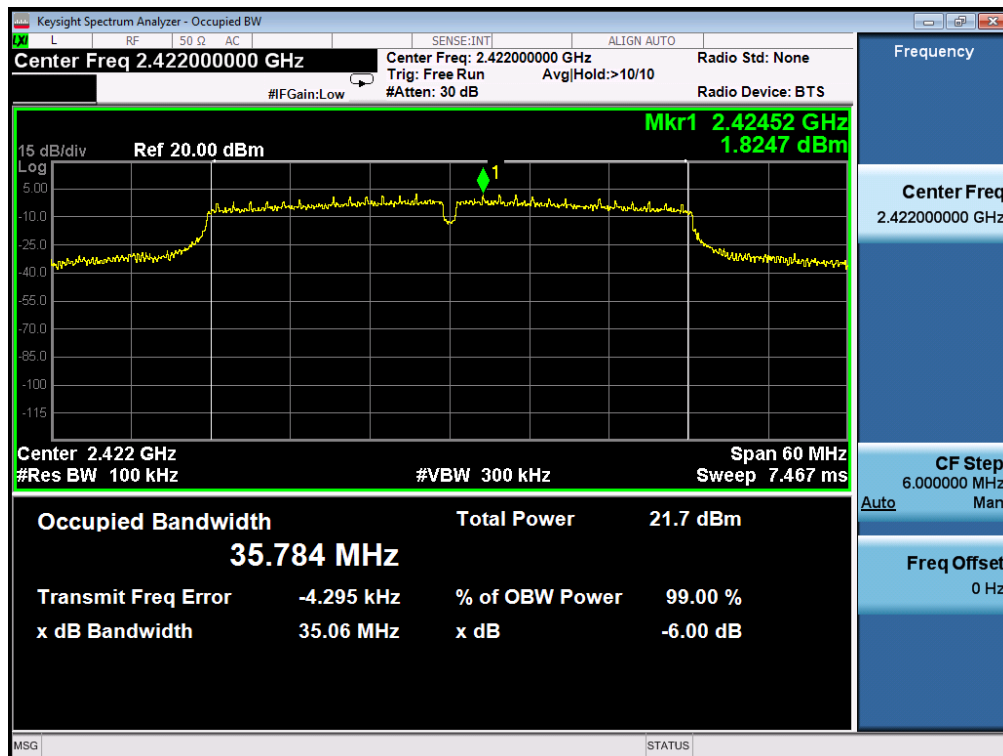


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



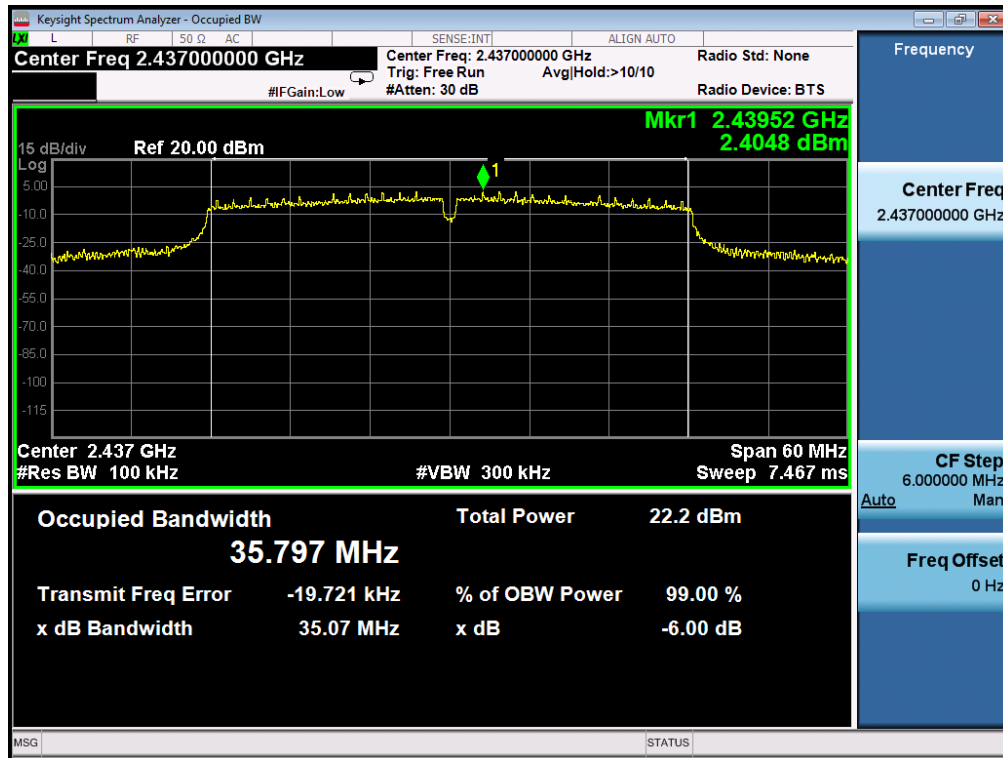
802.11n (40) TEST RESULT

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

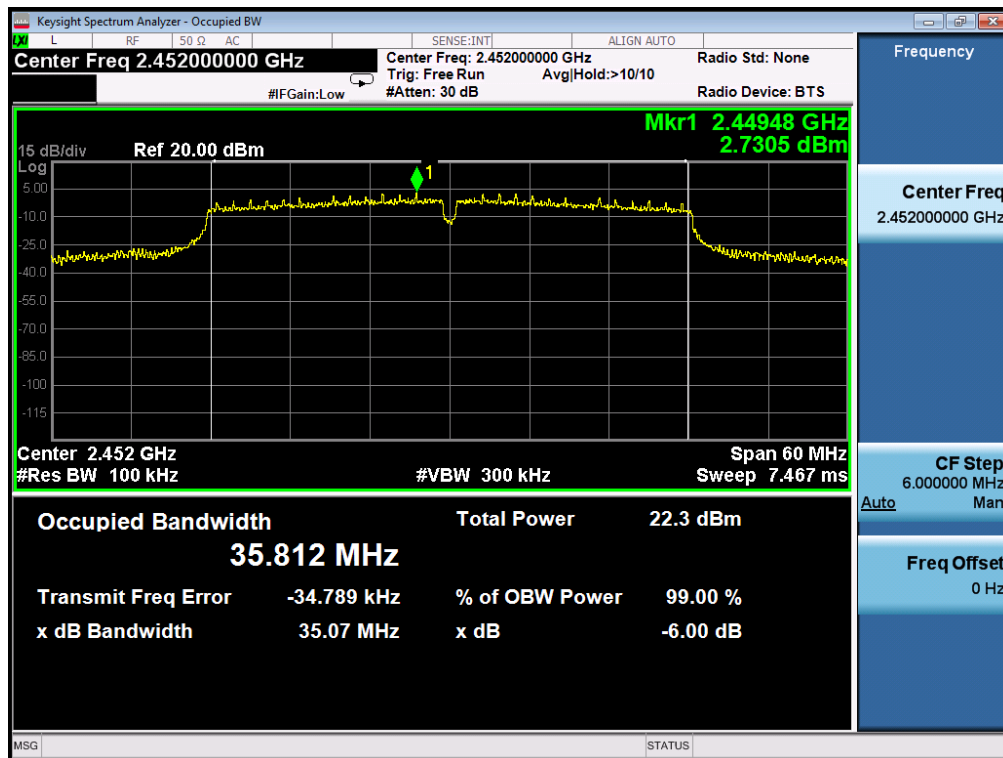




TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL





5. CONDUCTED SPURIOUS EMISSION

5.1. 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 (2013) for compliance to FCC 47CFR 15.247 requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW > RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW > RBW) are conform to the requirement.

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

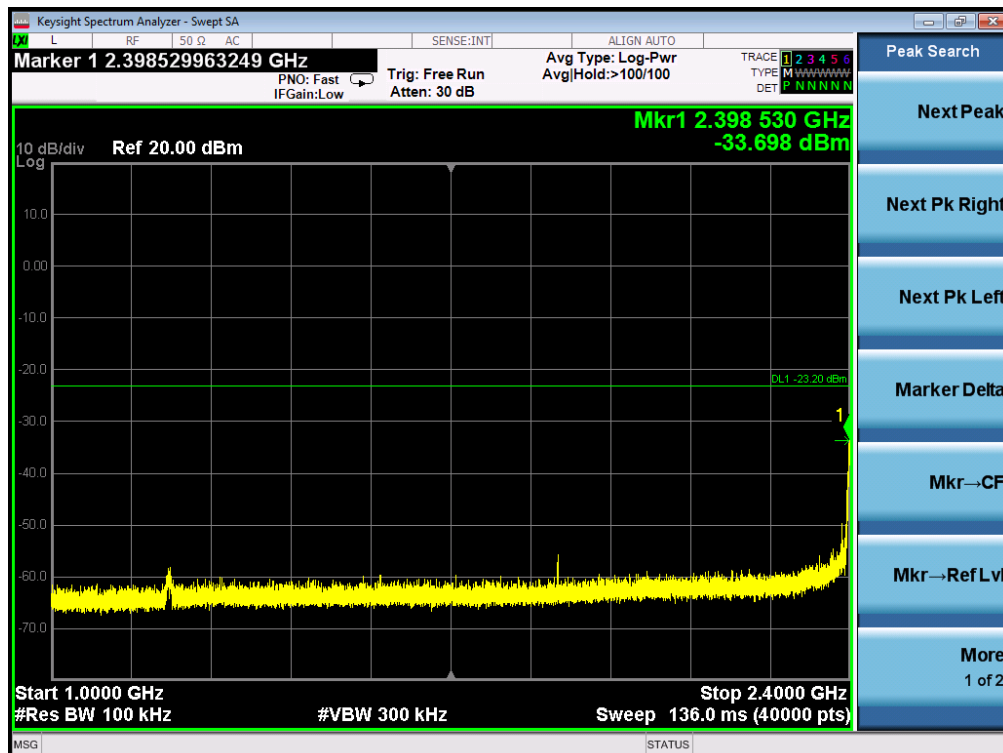
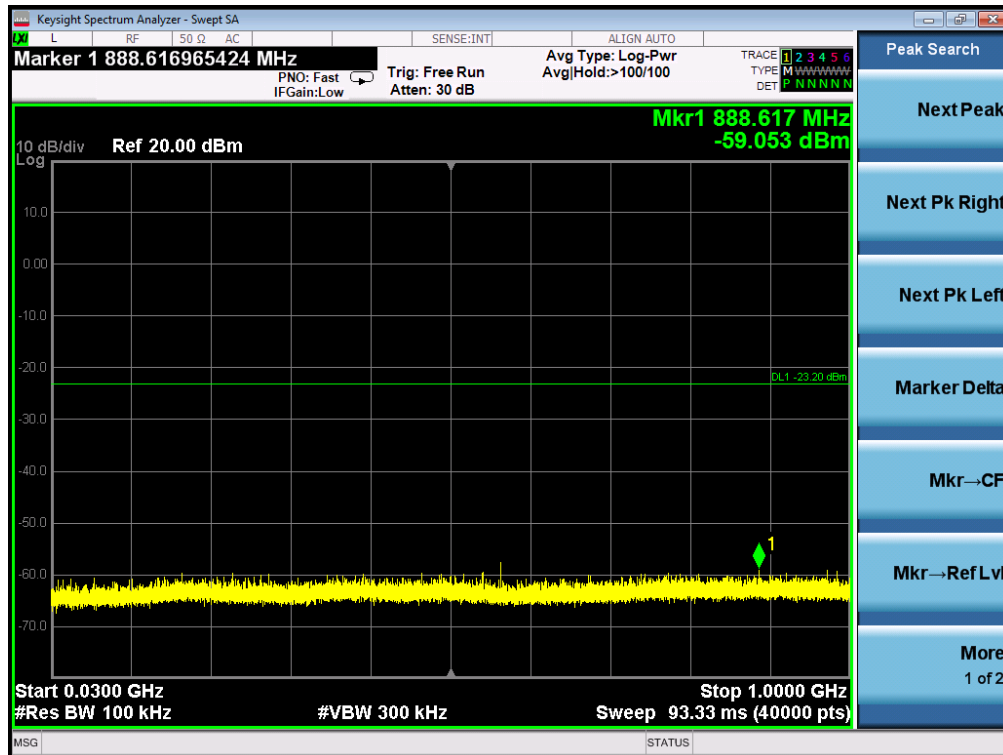
The same as described in section 4.2.

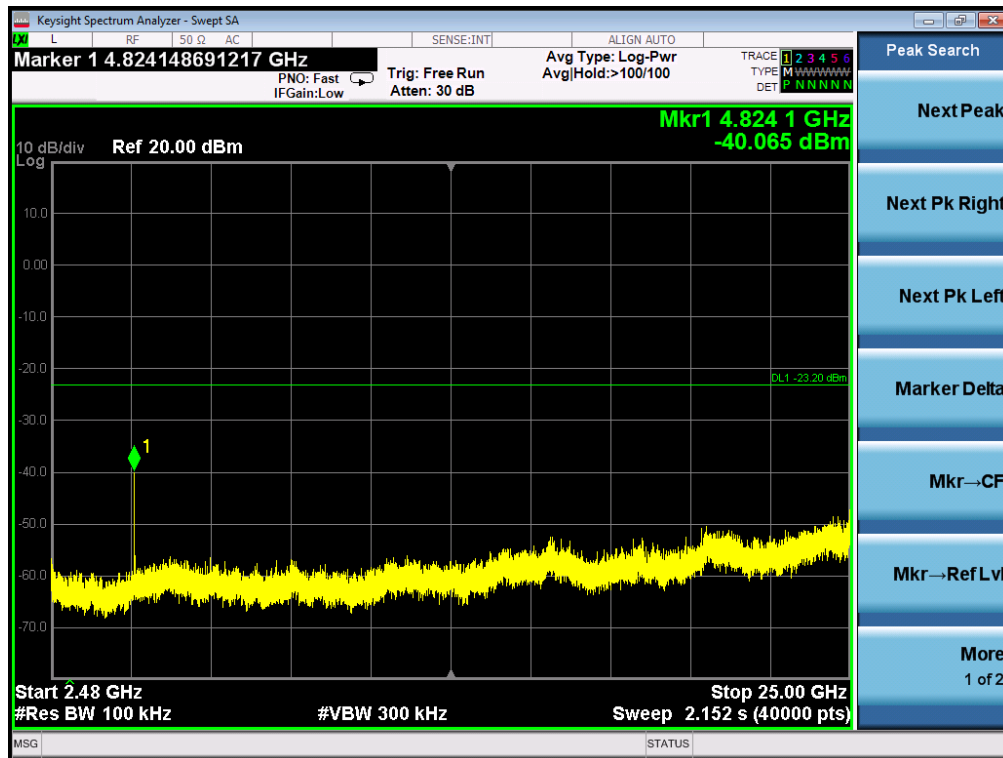
5.3. LIMITS AND MEASUREMENT RESULT

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 30 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation 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))	At least -30dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -30dBc than the limit Specified on the TOP Channel	PASS

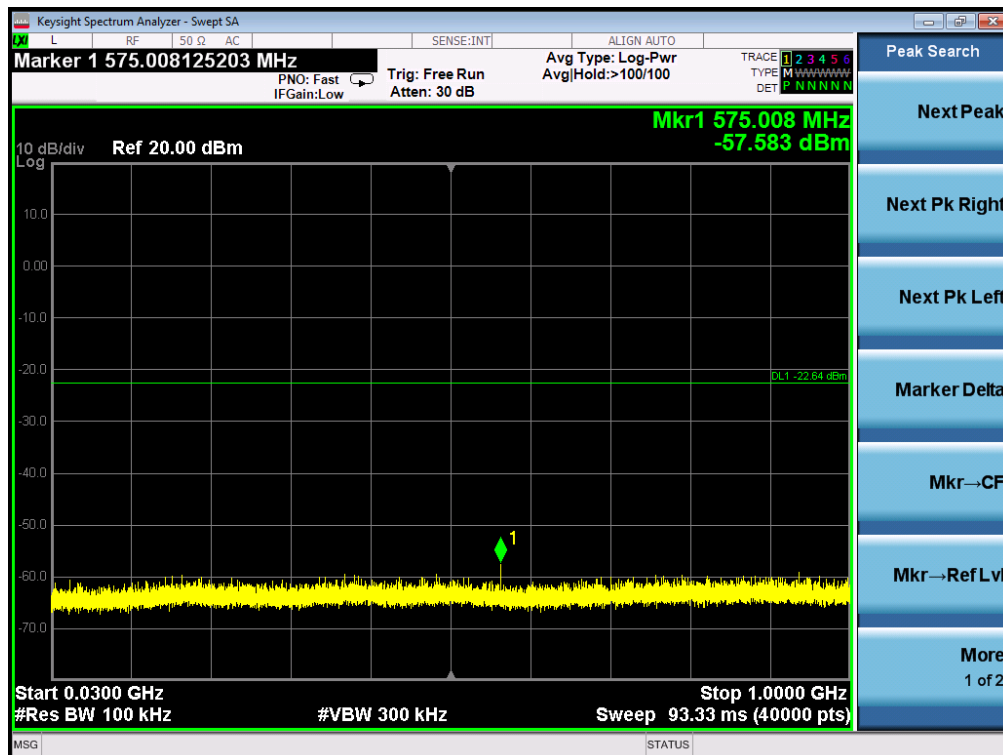


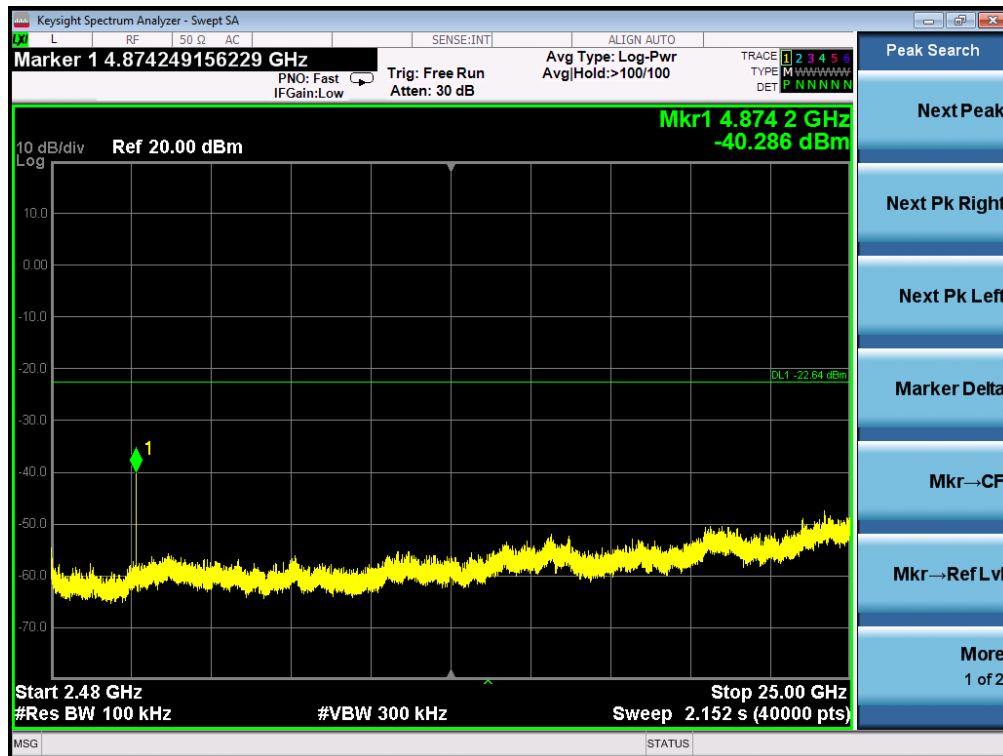
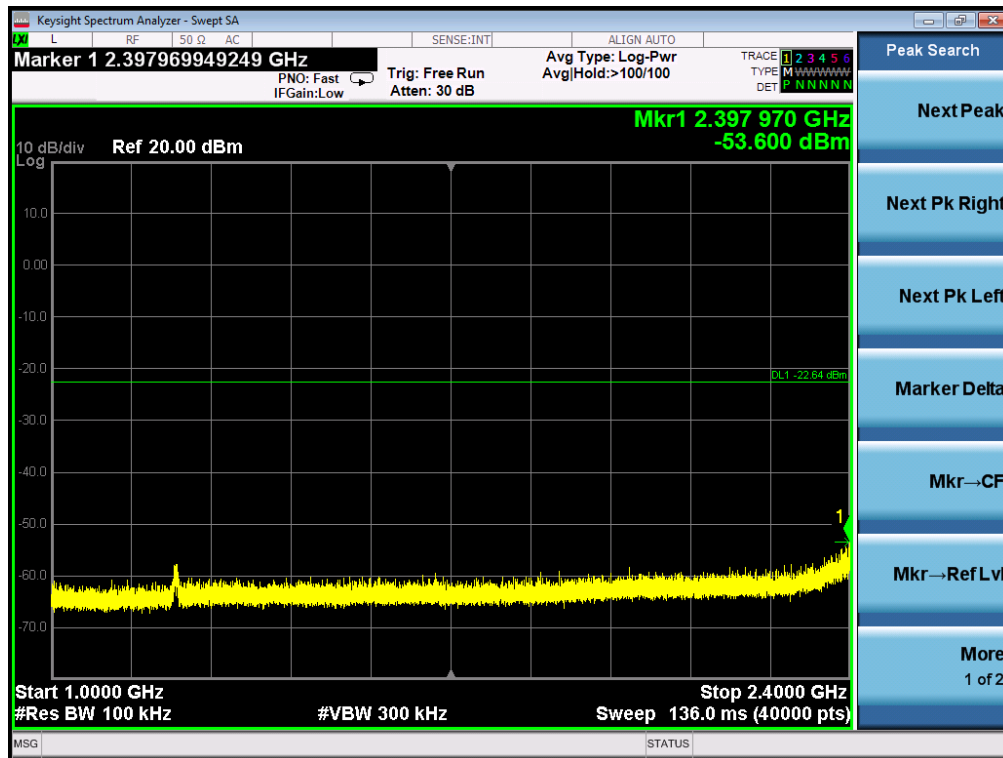
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11b FOR MODULATION IN LOW CHANNEL





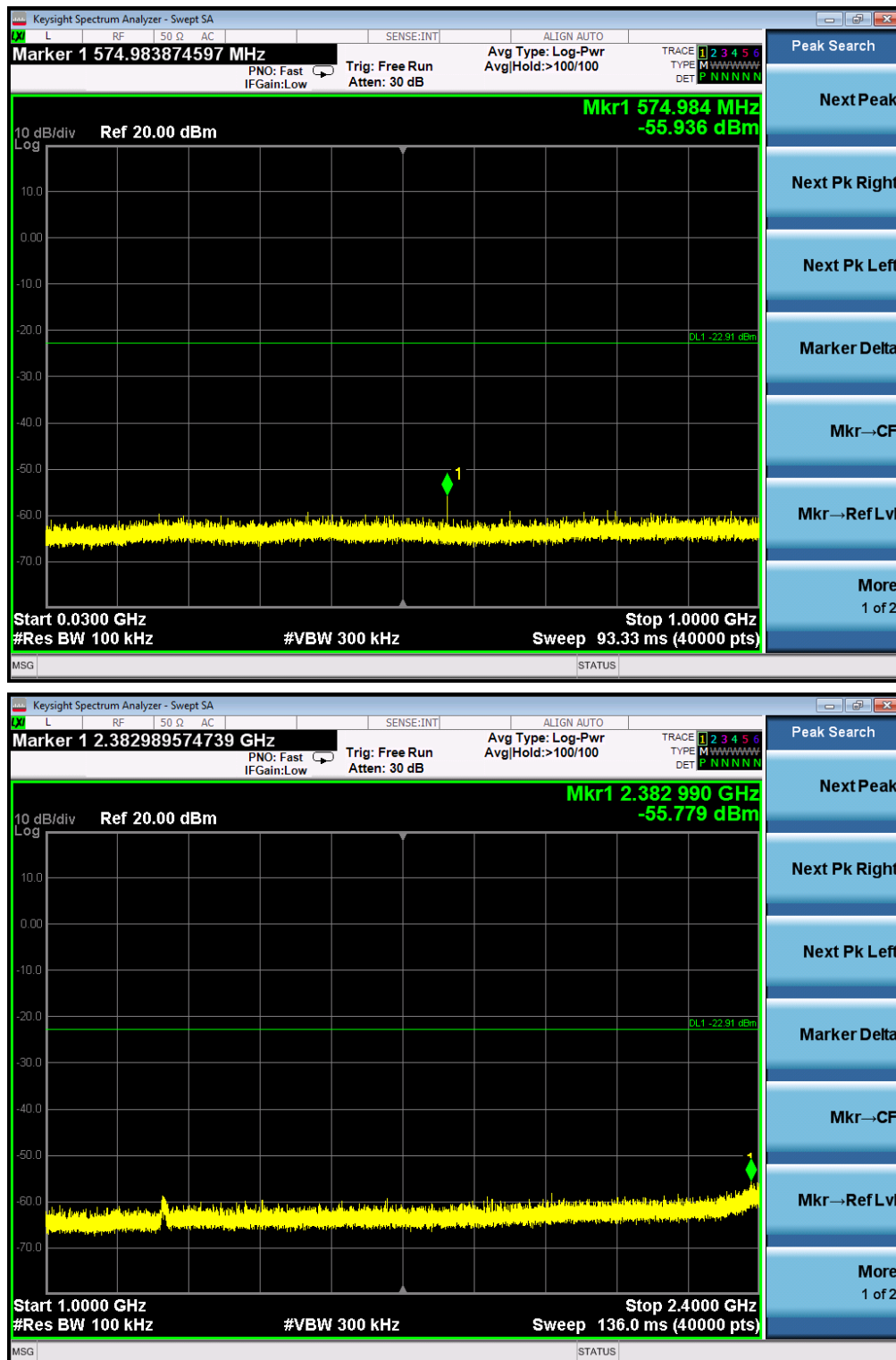
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11b FOR MODULATION IN MIDDLE CHANNEL

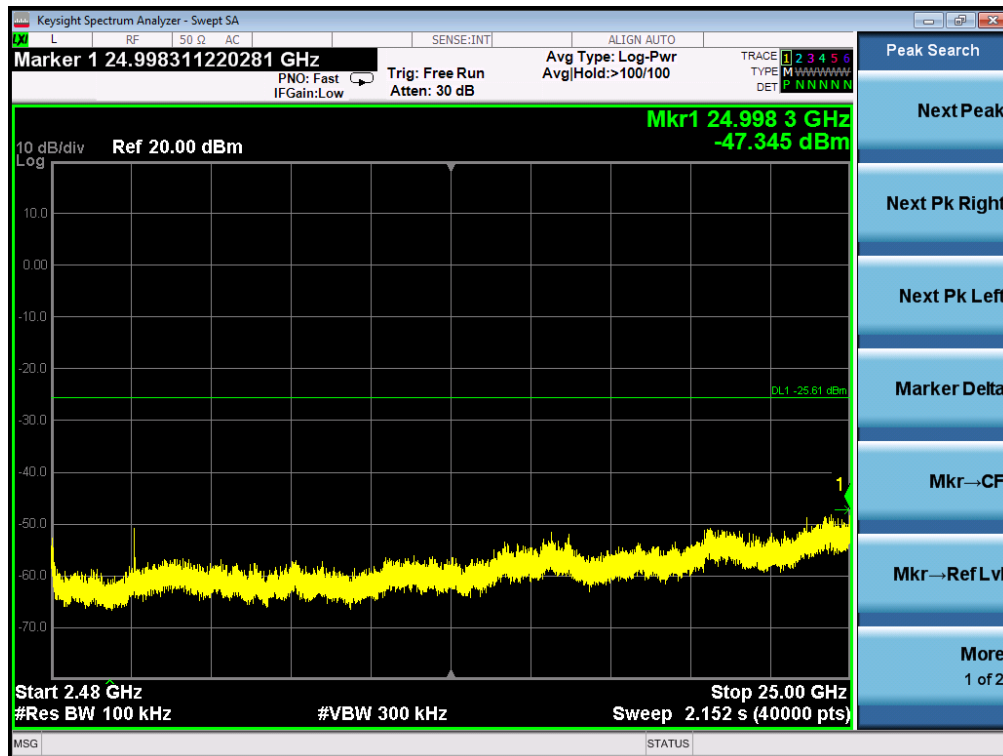
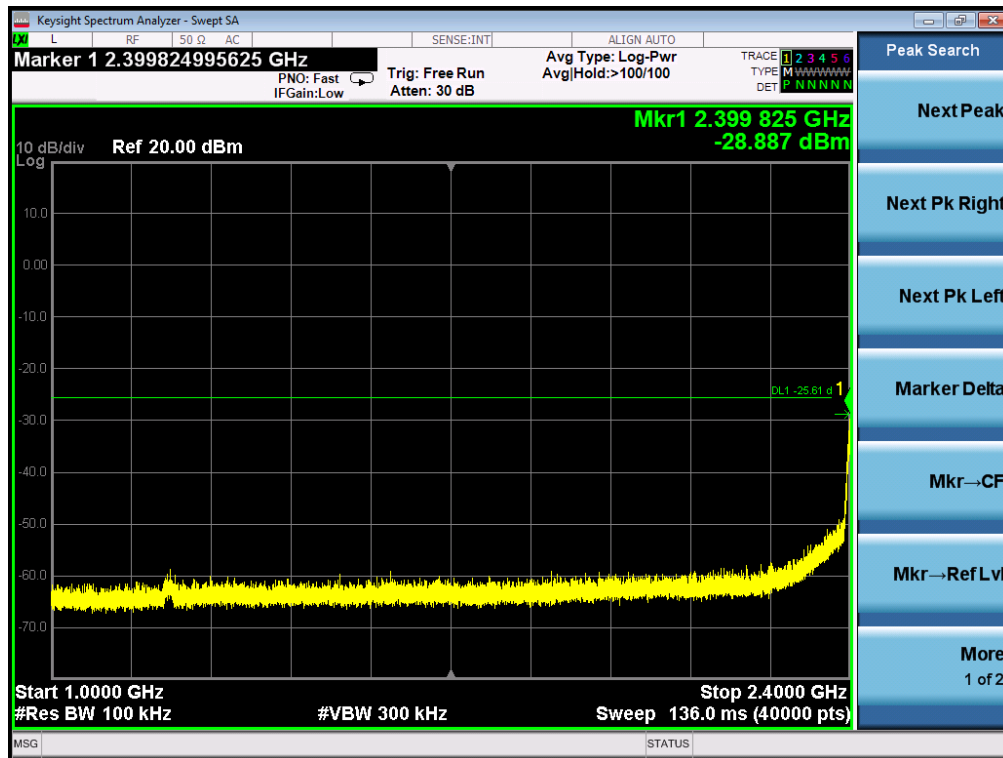






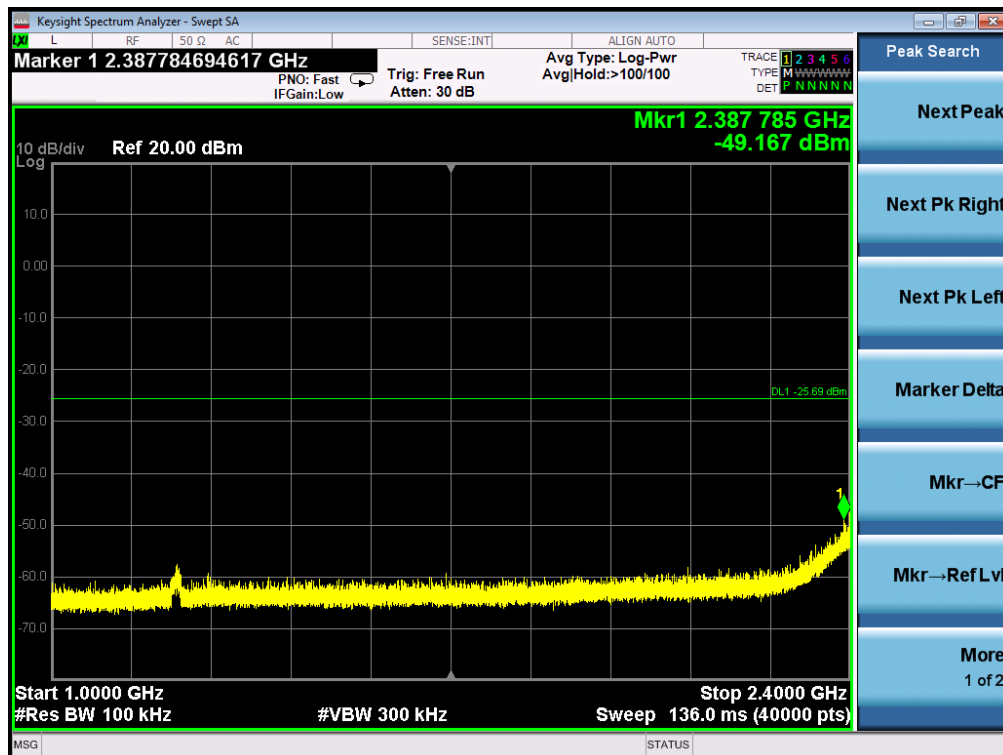
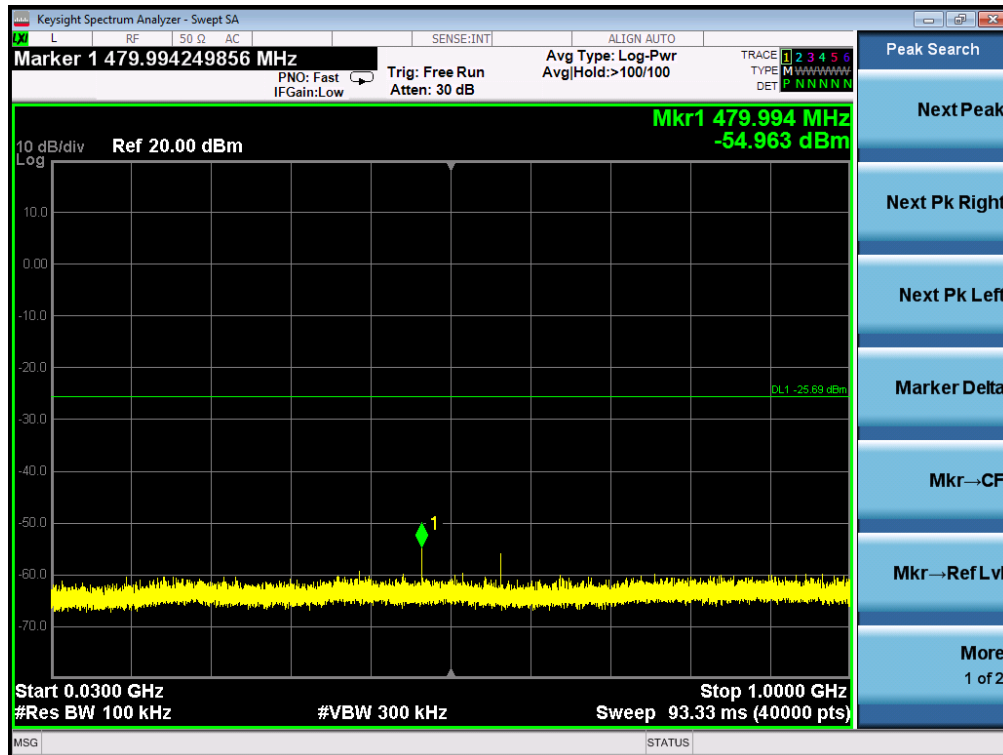
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11b FOR MODULATION IN HIGH CHANNEL

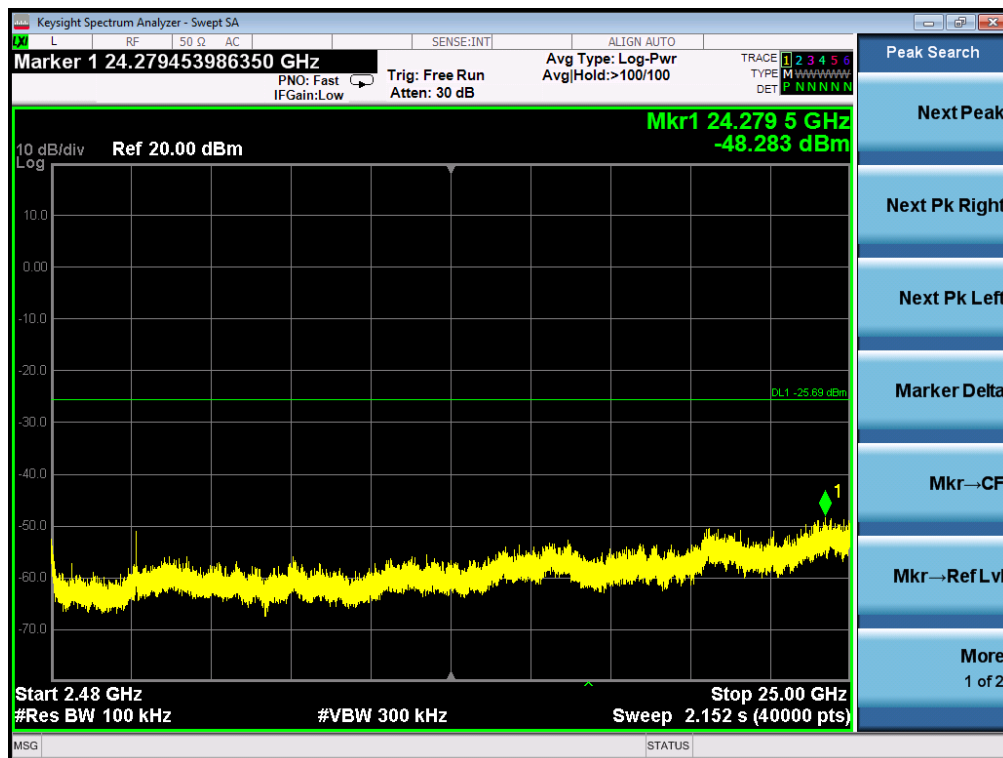




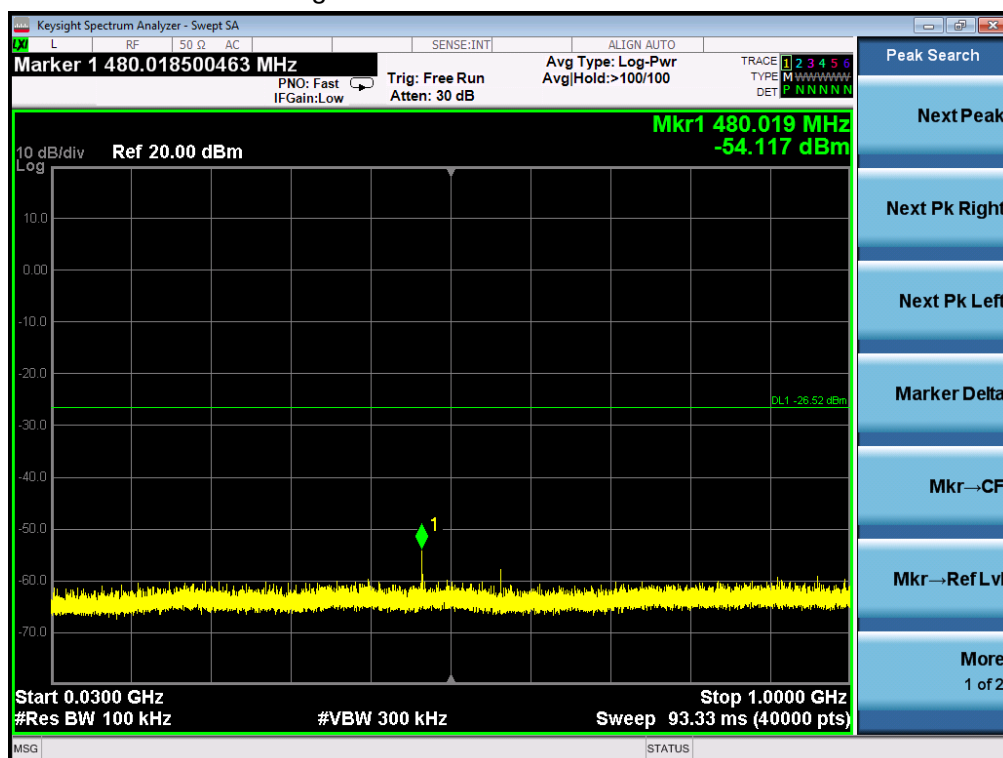


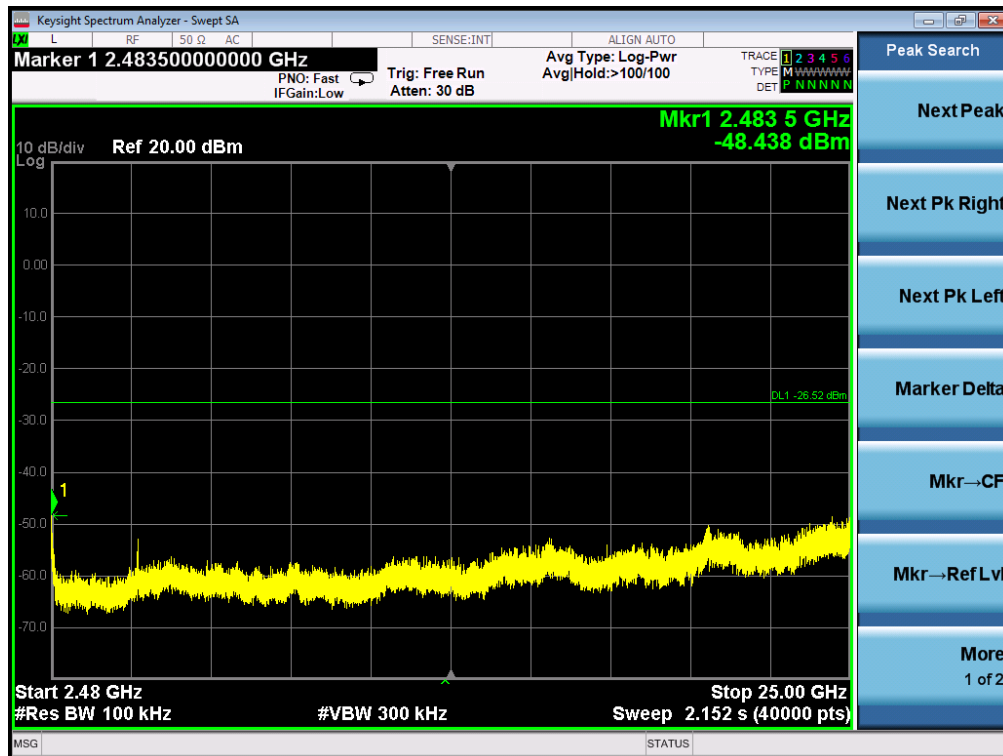
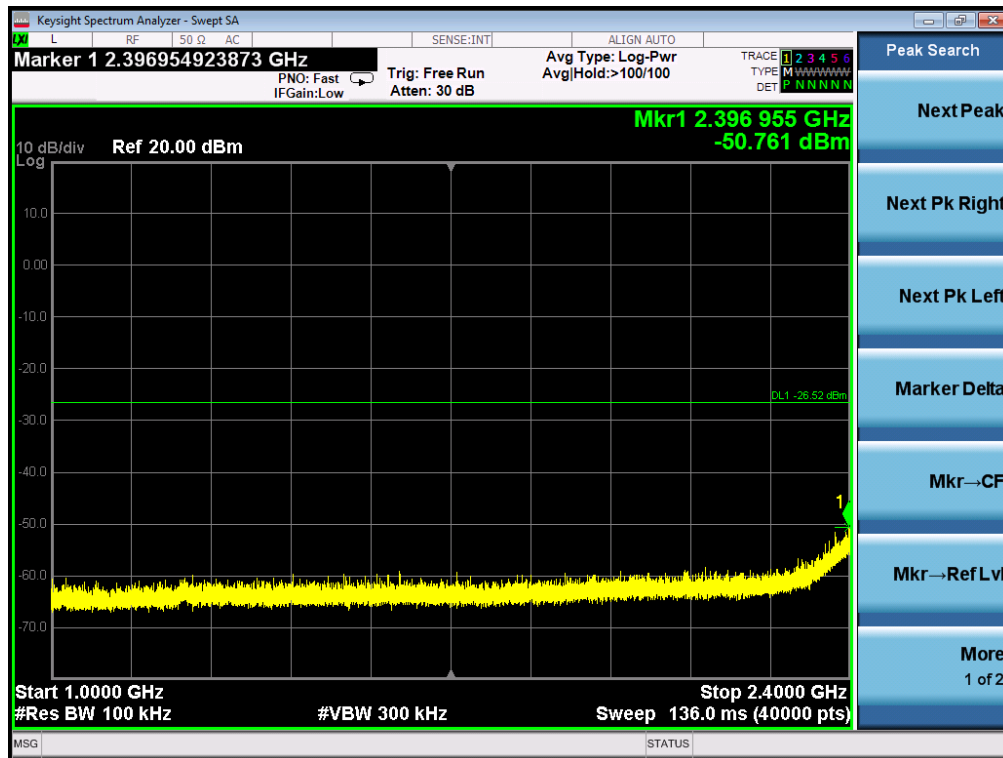
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11g FOR MODULATION IN MIDDLE CHANNEL





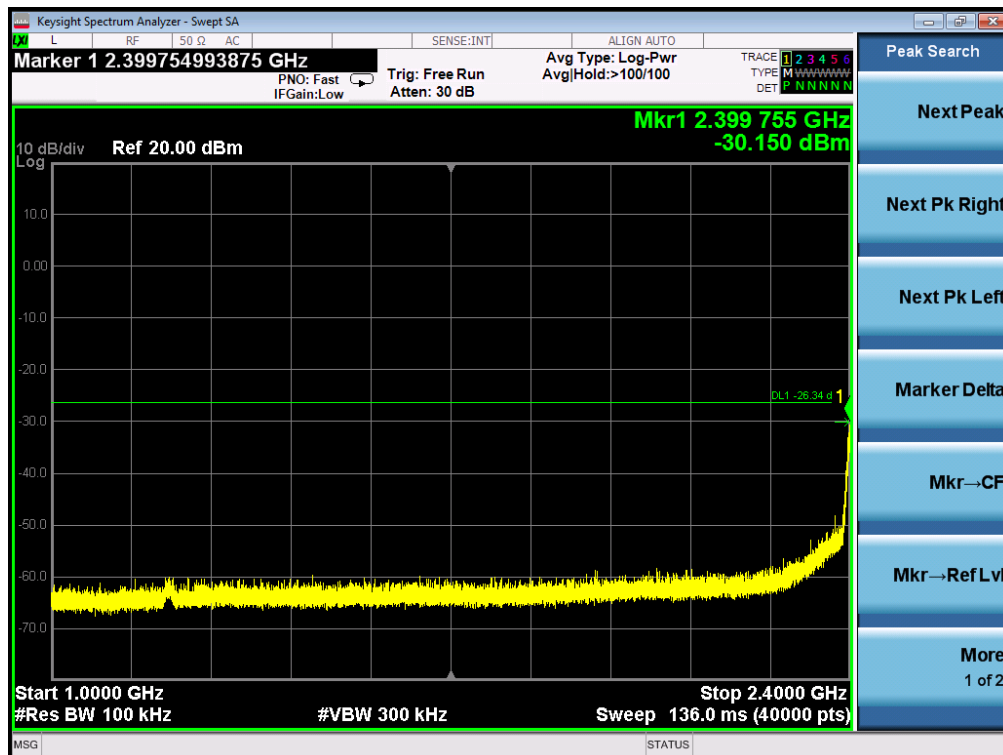
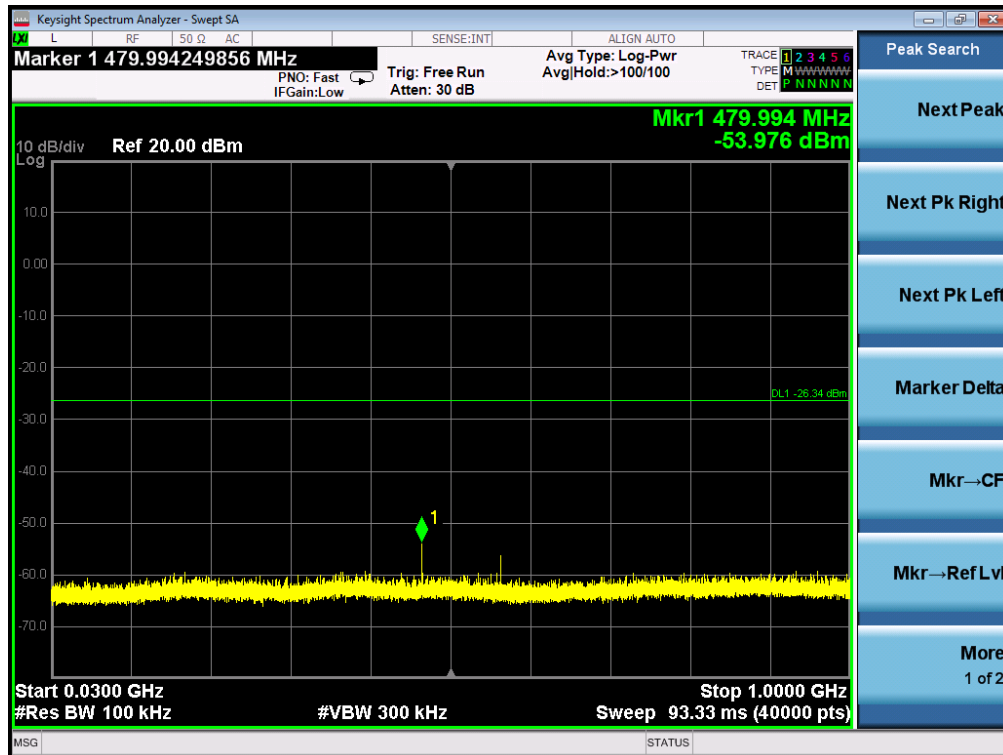
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11g FOR MODULATION IN HIGH CHANNEL

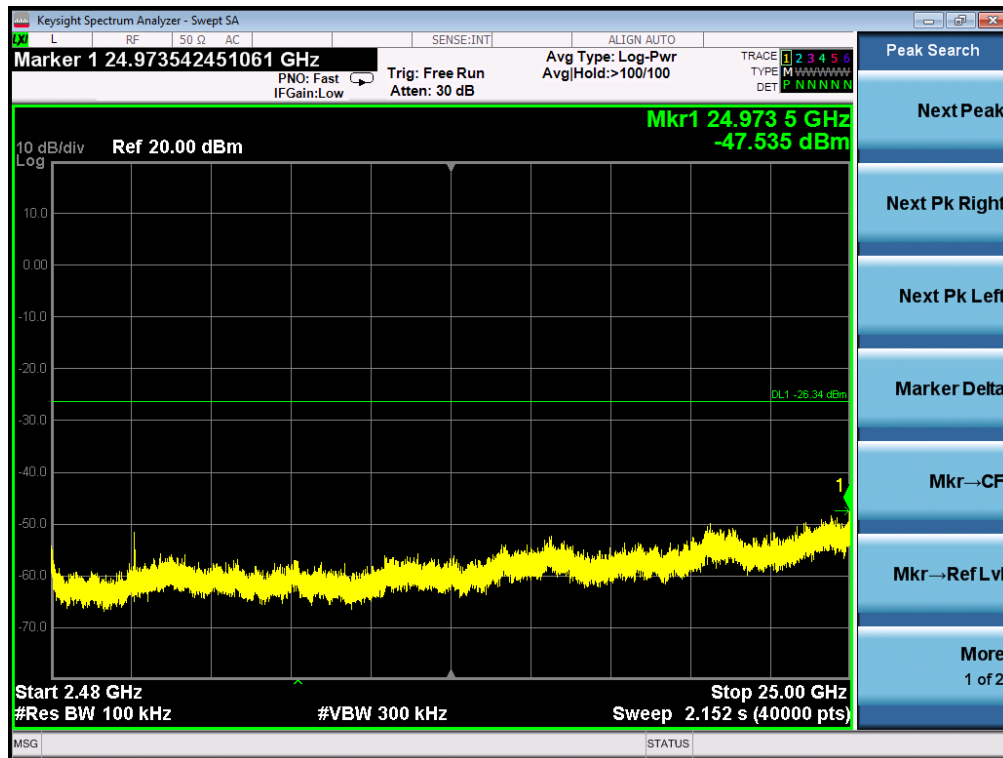




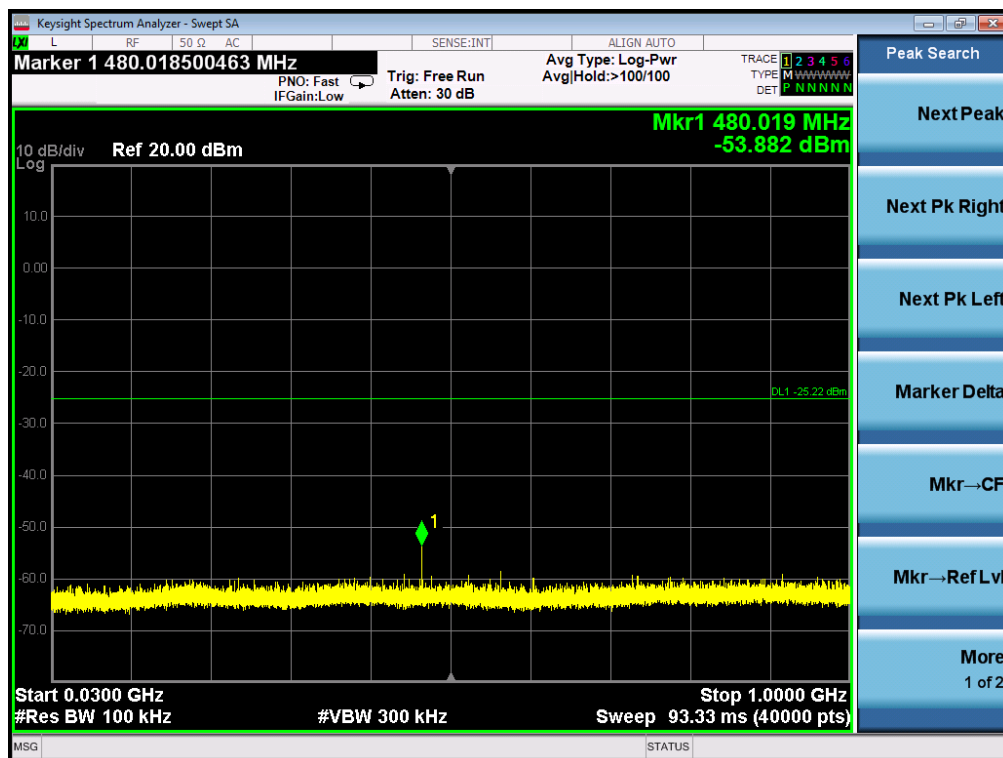


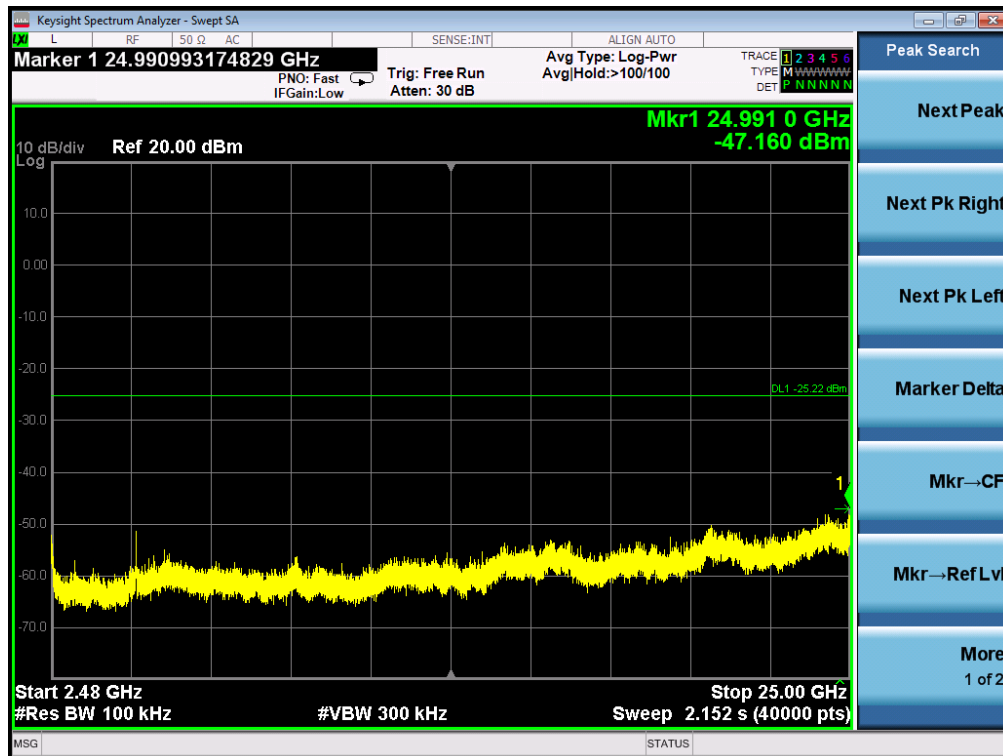
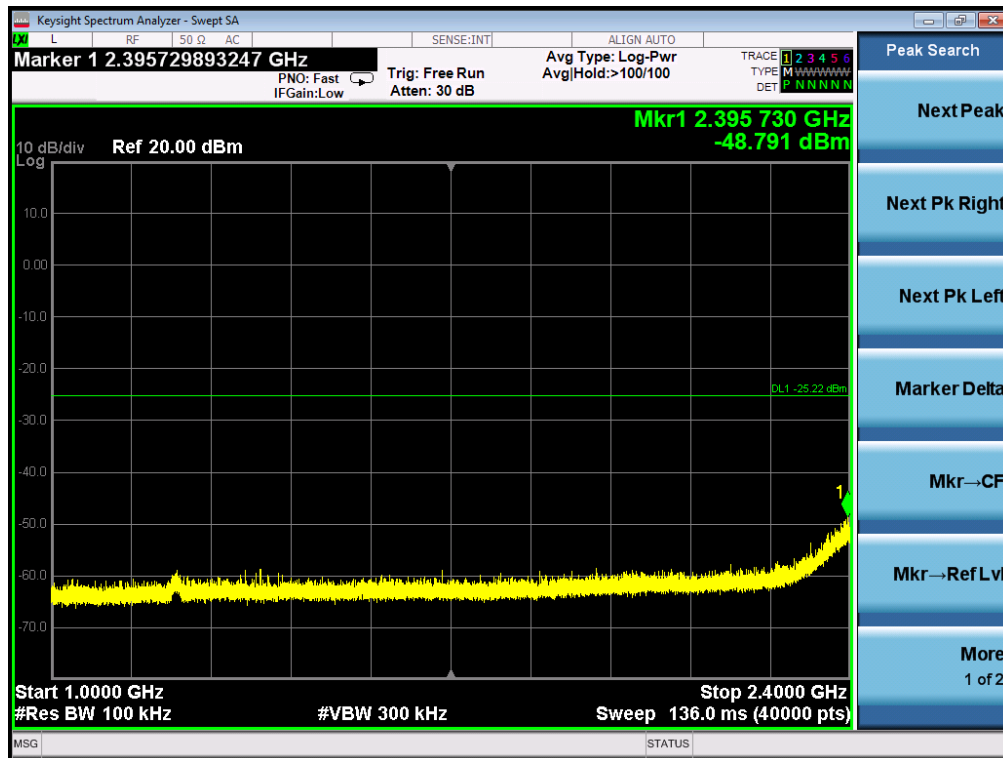
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11n20 FOR MODULATION IN LOW CHANNEL





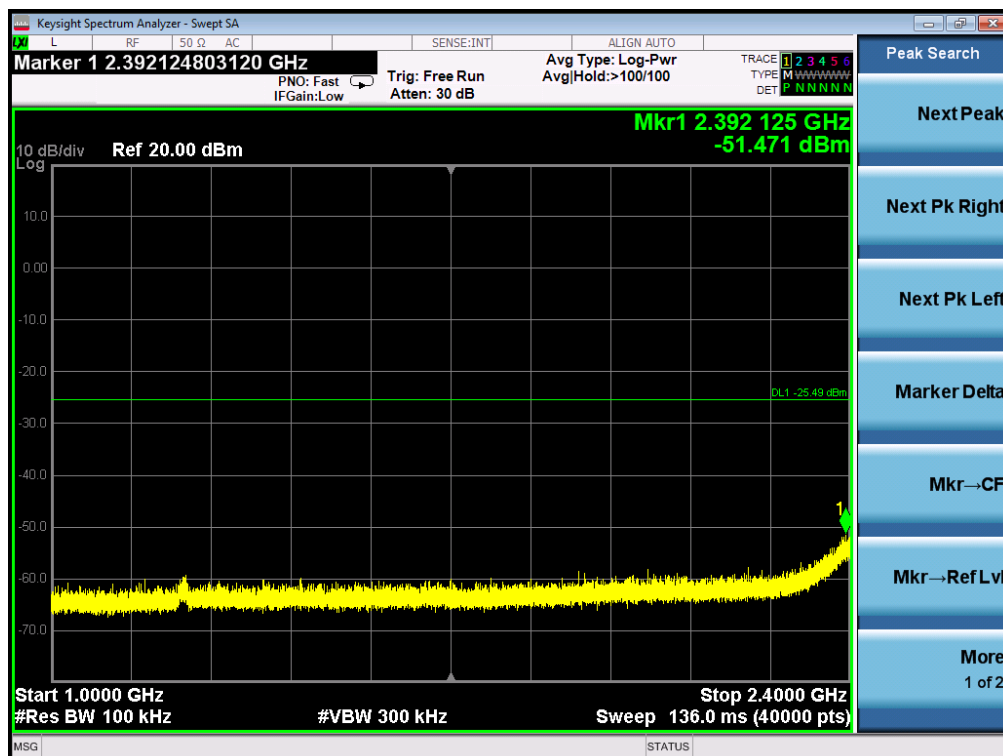
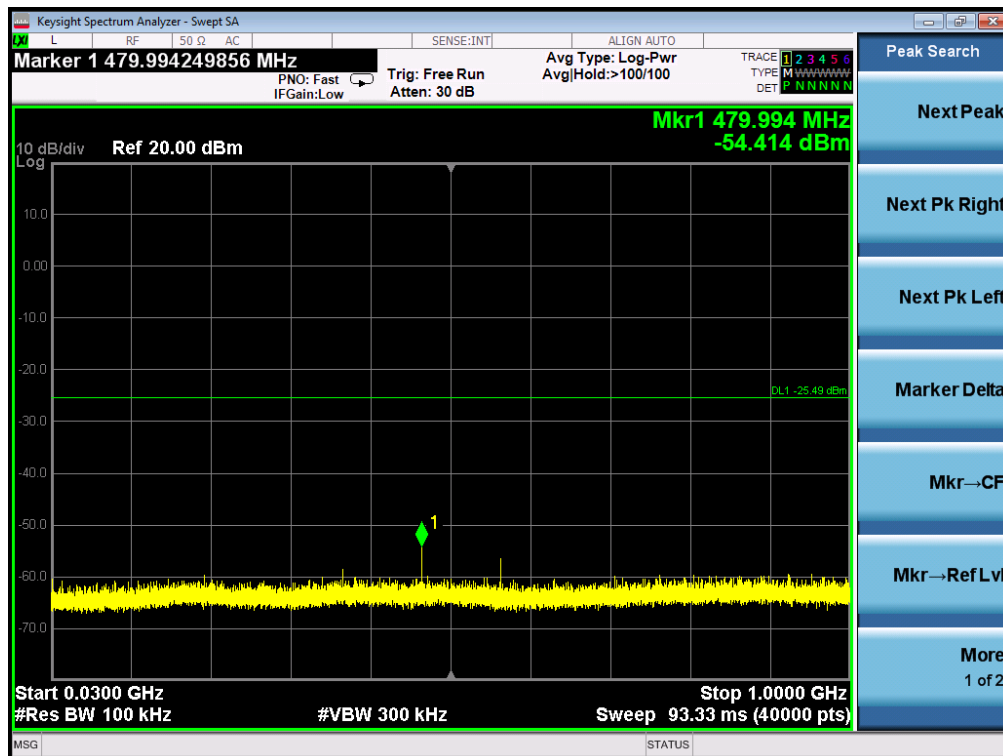
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11n20 FOR MODULATION IN MIDDLE CHANNEL

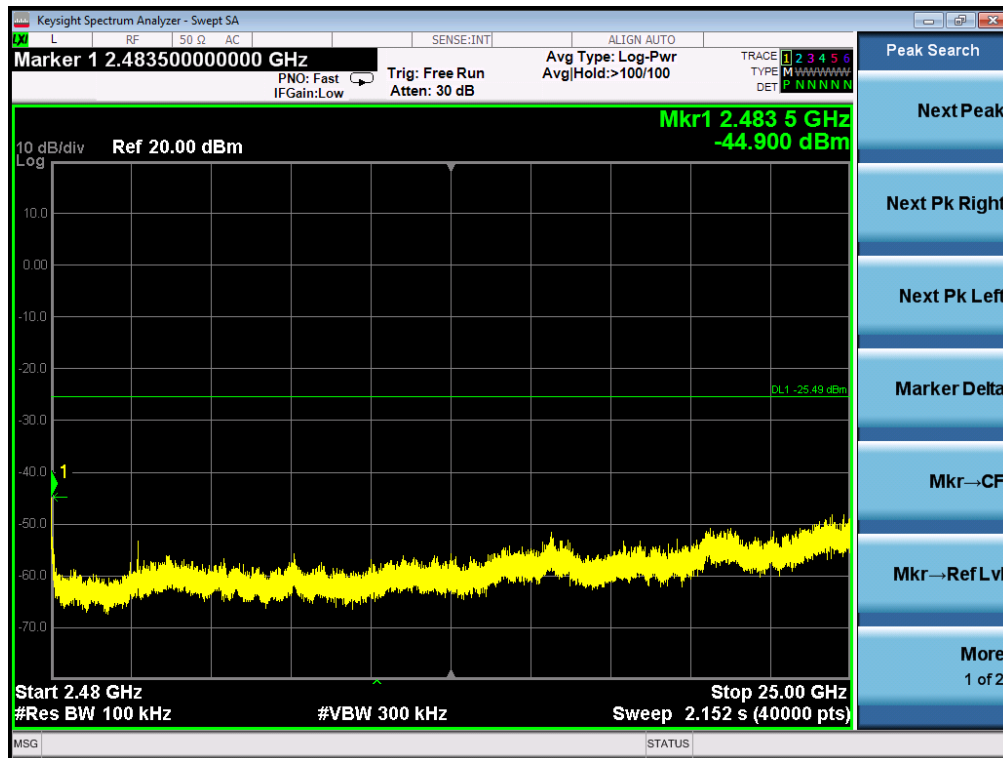




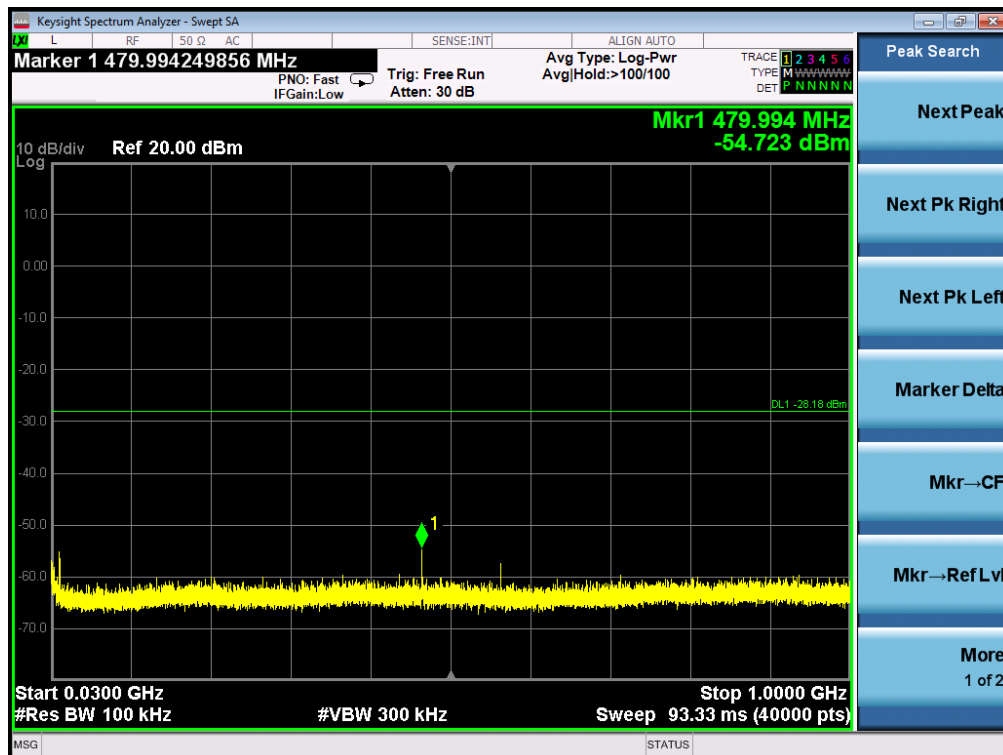


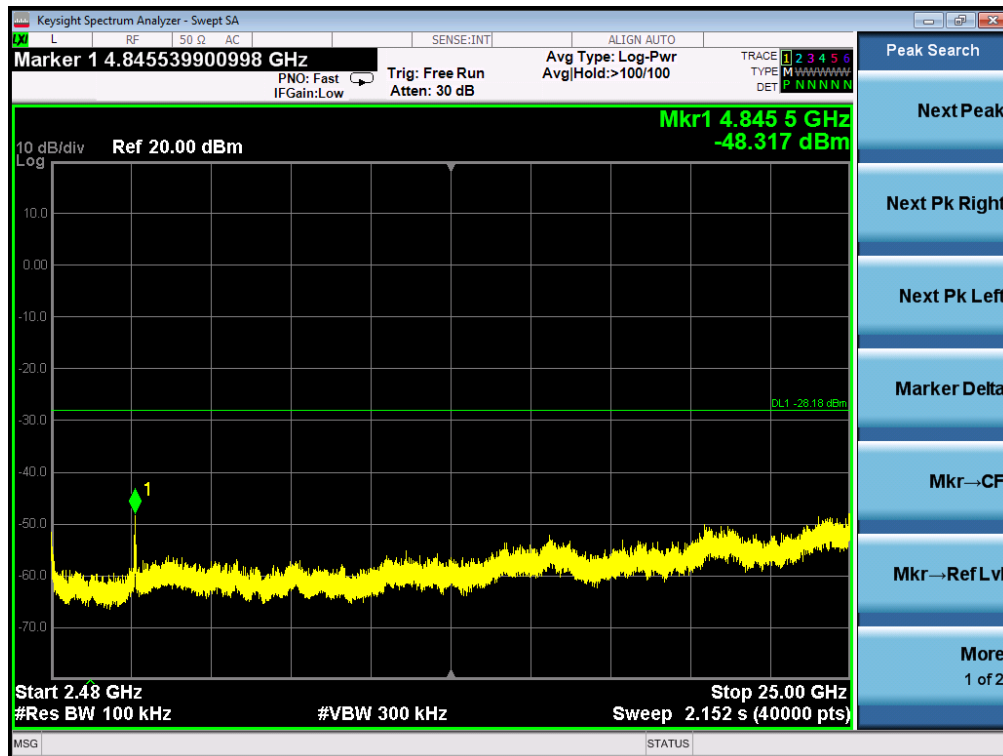
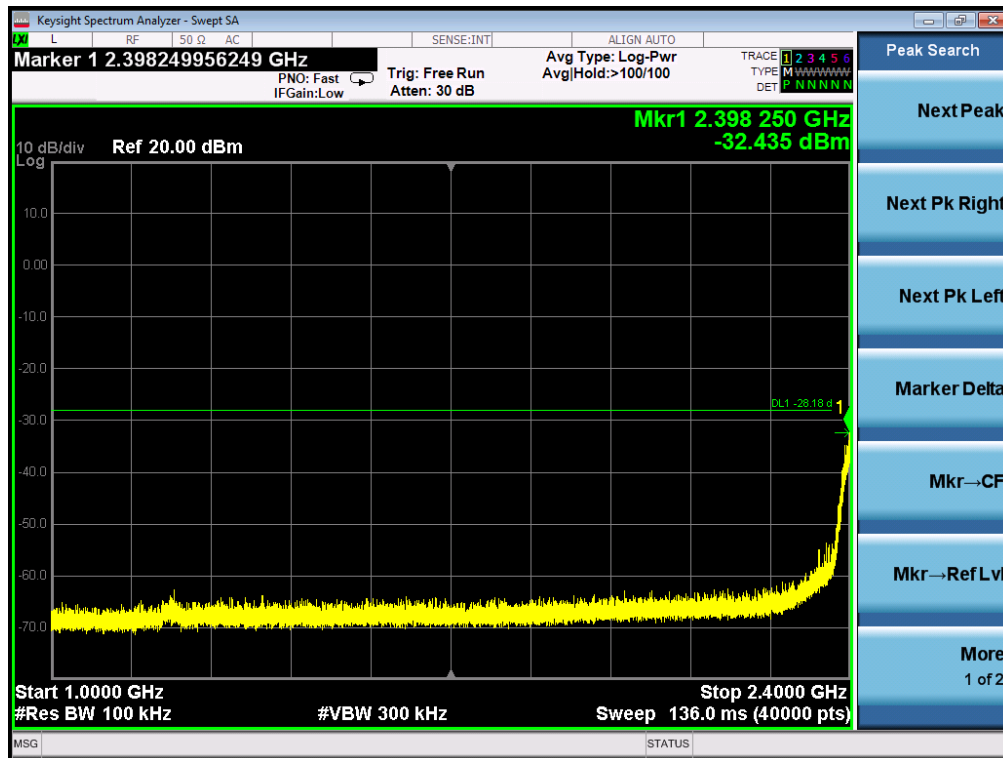
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11n20 FOR MODULATION IN HIGH CHANNEL





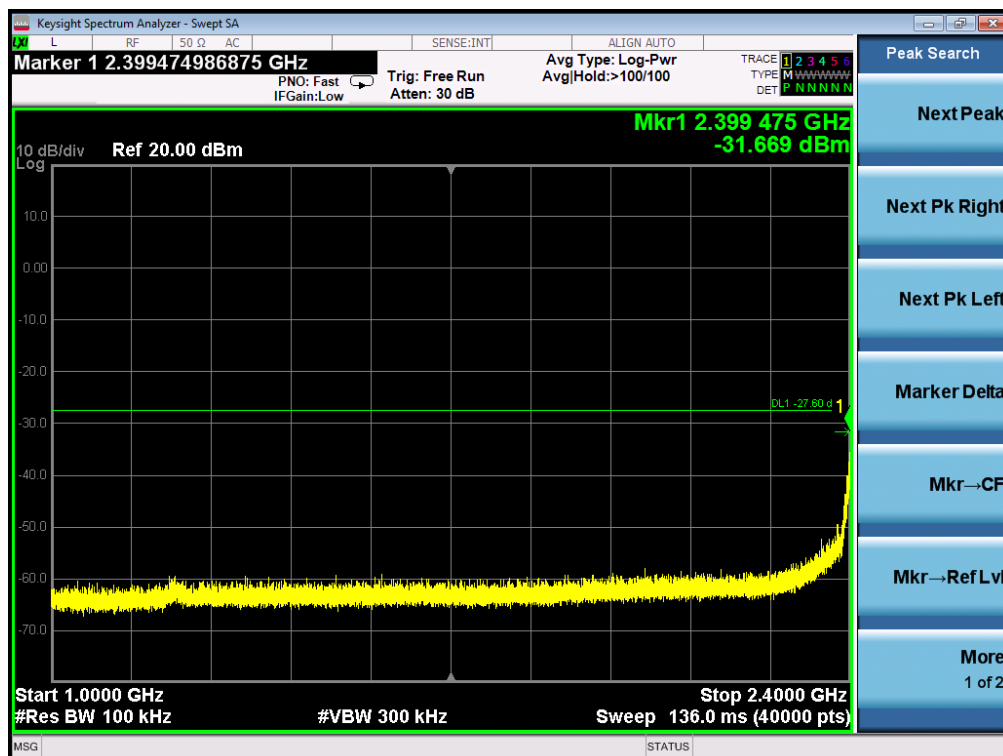
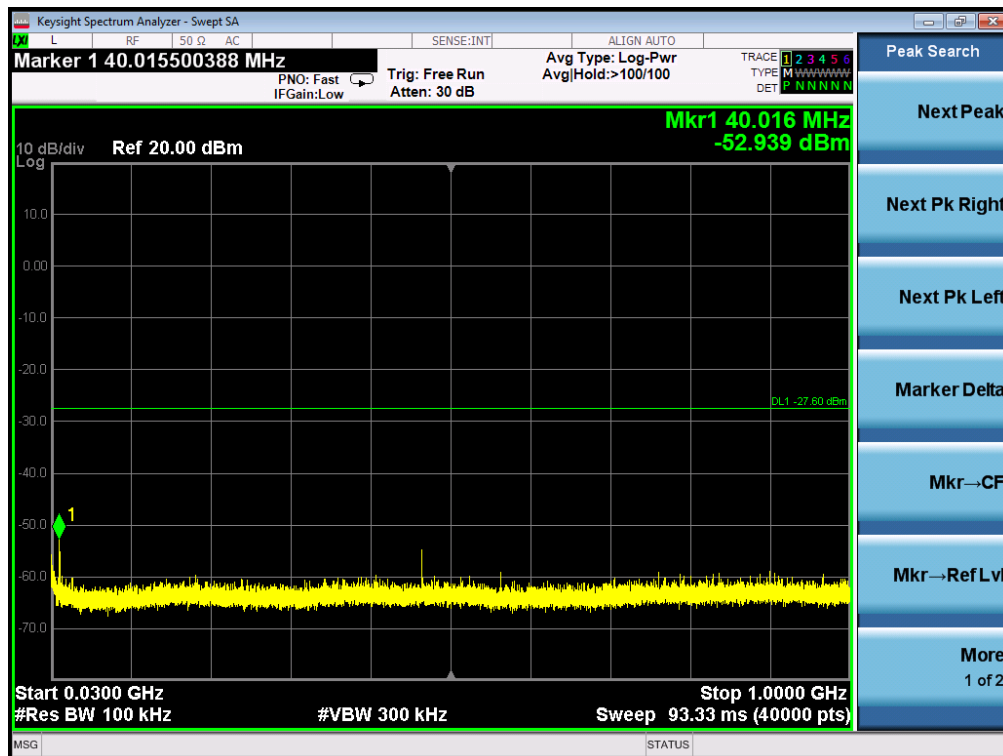
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11n40 FOR MODULATION IN LOW CHANNEL

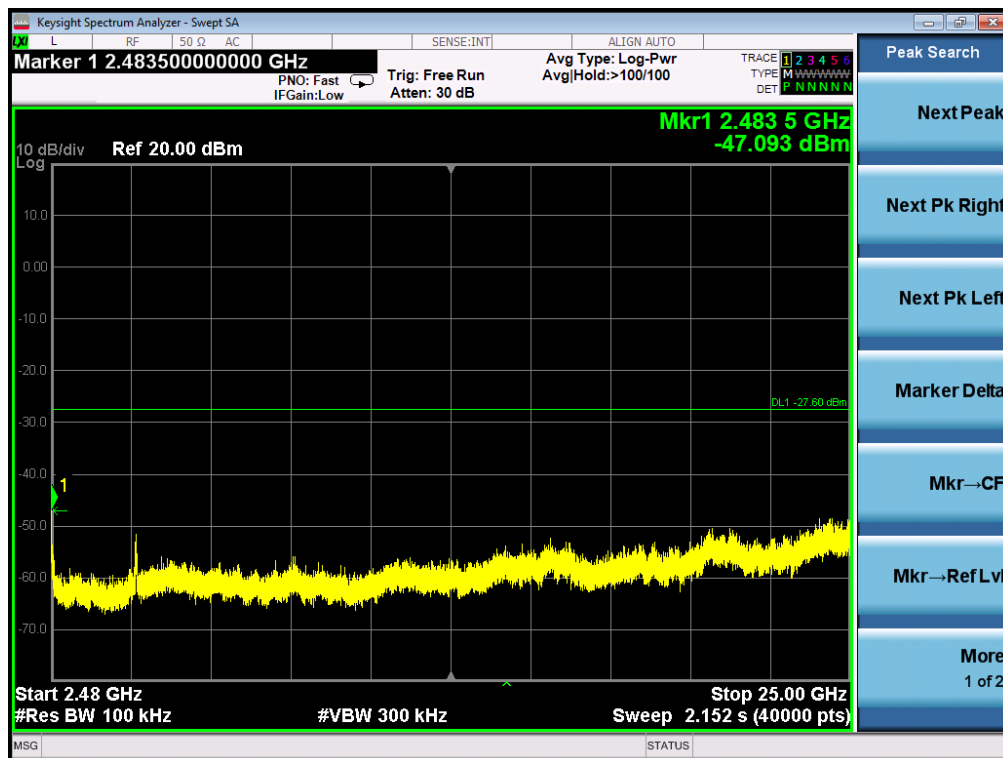




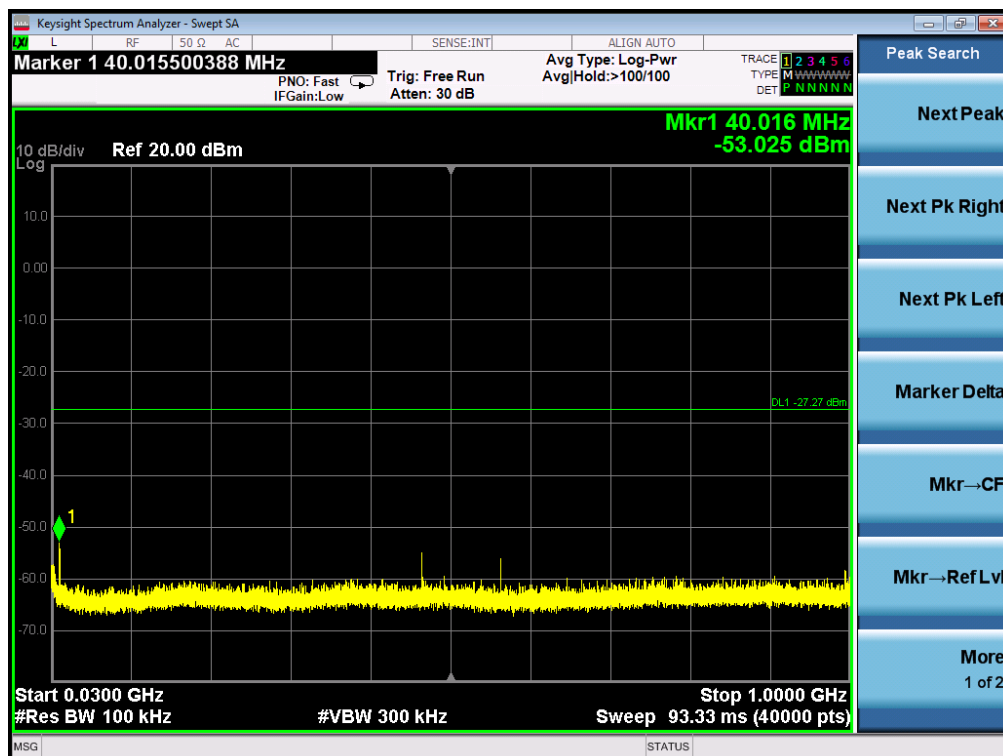


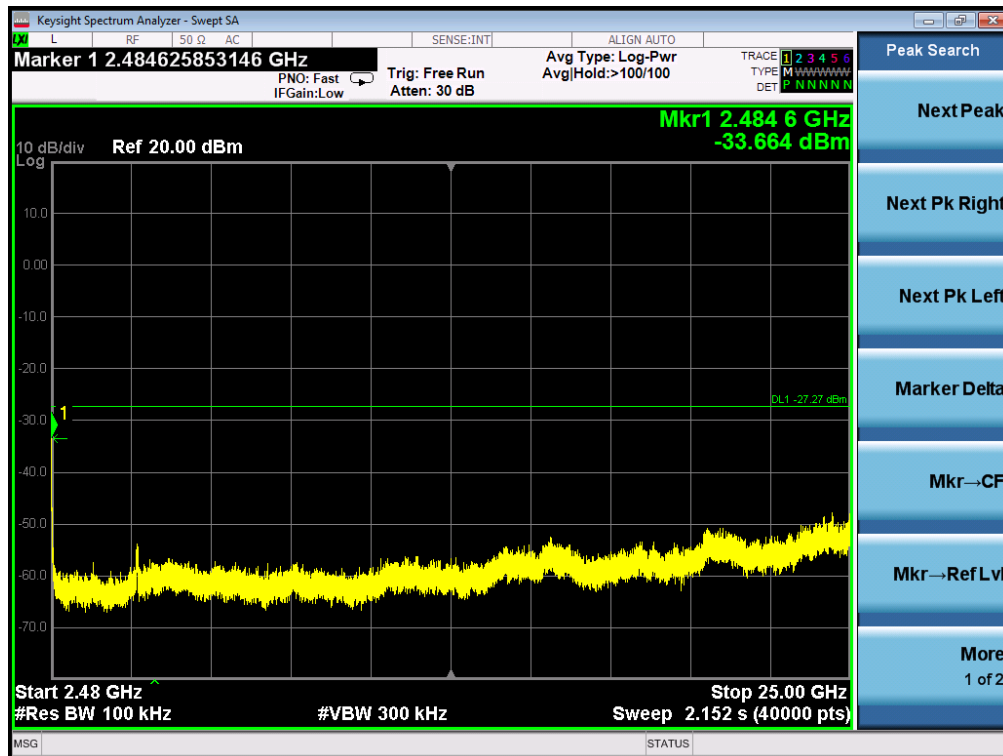
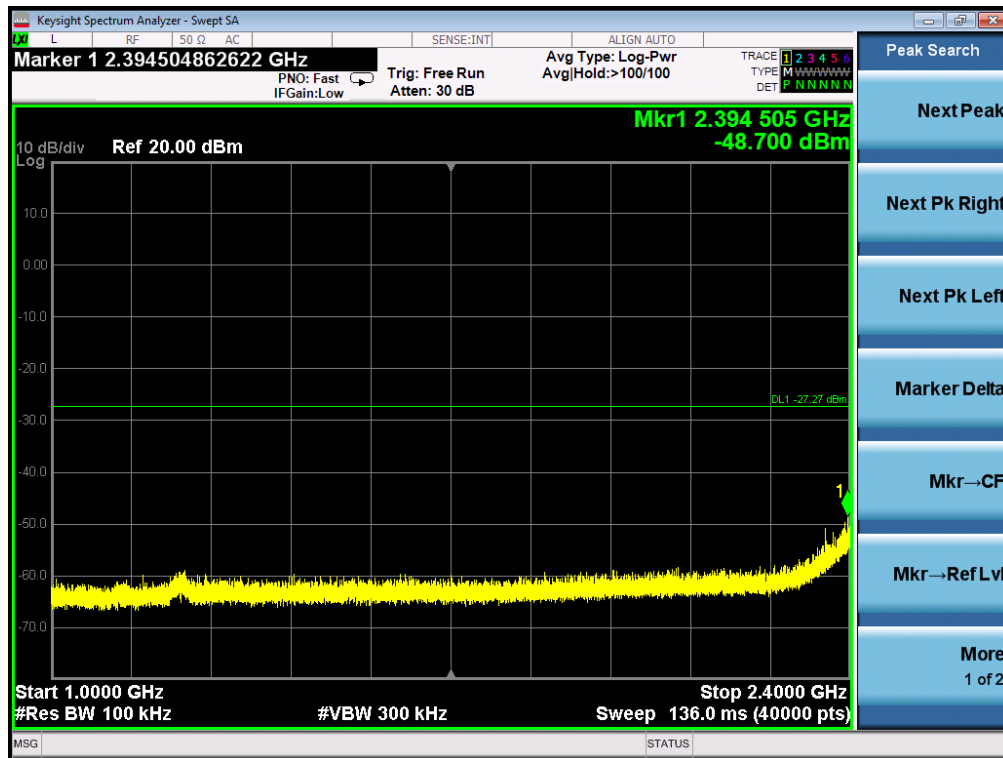
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11n40 FOR MODULATION IN MIDDLE CHANNEL





TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11n40 FOR MODULATION IN HIGH CHANNEL







6. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

6.1 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 method of AVGPS-1 in the ANSI C63.10 (2013) item 11.10 was used in this testing.

6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 4.2.

6.3 LIMITS AND MEASUREMENT RESULT

TEST ITEM	POWER SPECTRAL DENSITY
TEST MODE	802.11b with data rate 1

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	5.894	8	Pass
Middle Channel	7.492	8	Pass
High Channel	7.120	8	Pass

TEST ITEM	POWER SPECTRAL DENSITY
TEST MODE	802.11g with data rate 6

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-1.893	8	Pass
Middle Channel	-0.904	8	Pass
High Channel	-1.989	8	Pass



TEST ITEM	POWER SPECTRAL DENSITY
TEST MODE	802.11n 20 with data rate 6.5

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-1.342	8	Pass
Middle Channel	-0.326	8	Pass
High Channel	-1.144	8	Pass

TEST ITEM	POWER SPECTRAL DENSITY
TEST MODE	802.11n 40 with data rate 13.5

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-4.781	8	Pass
Middle Channel	-4.097	8	Pass
High Channel	-4.085	8	Pass

**802.11b TEST RESULT****TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL****TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL**

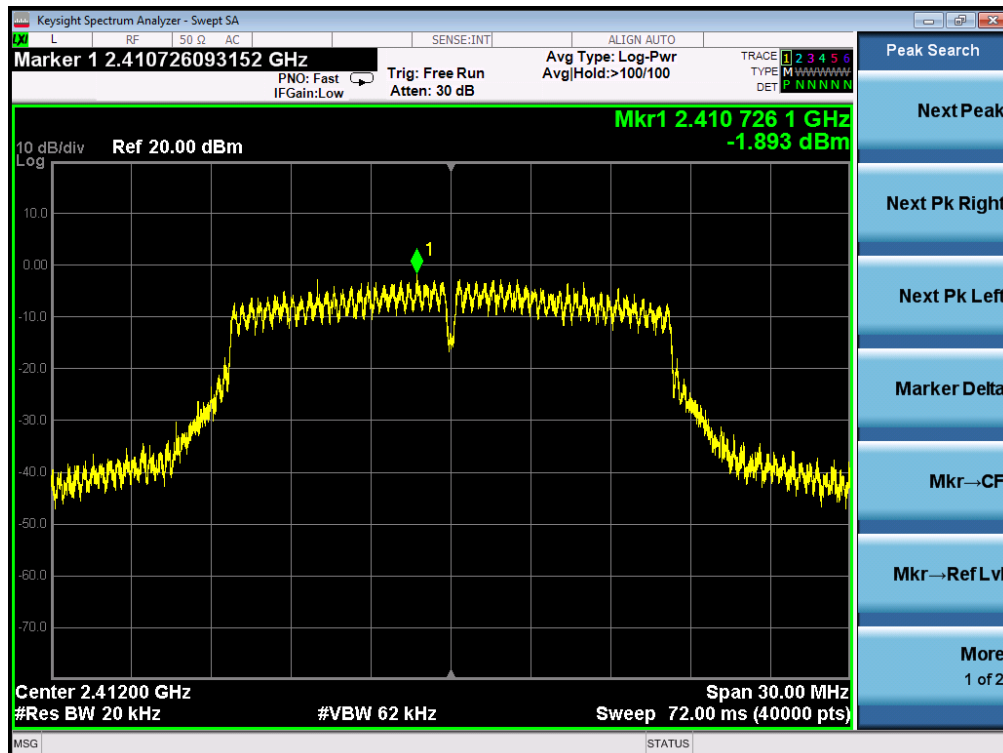


TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



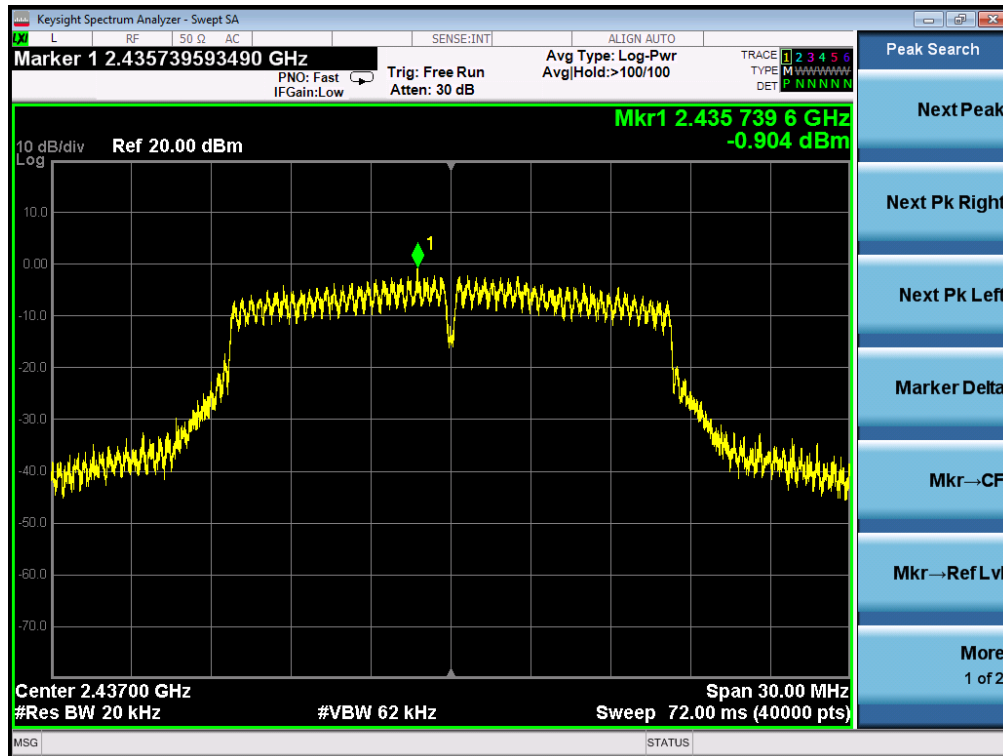
802.11g TEST RESULT

TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL

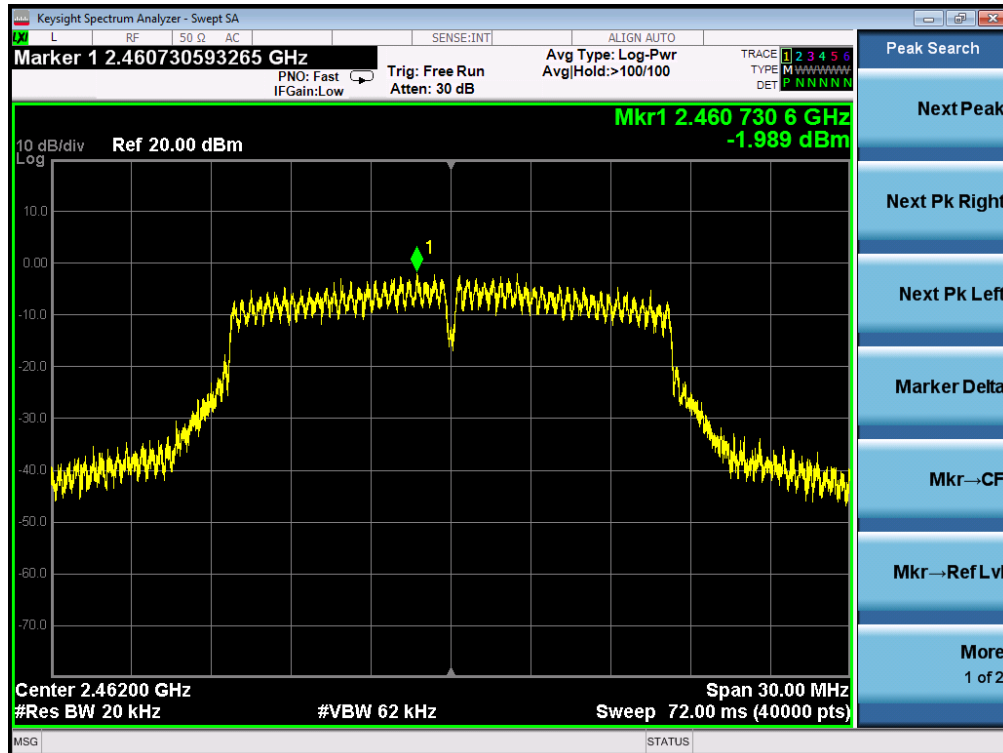




TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



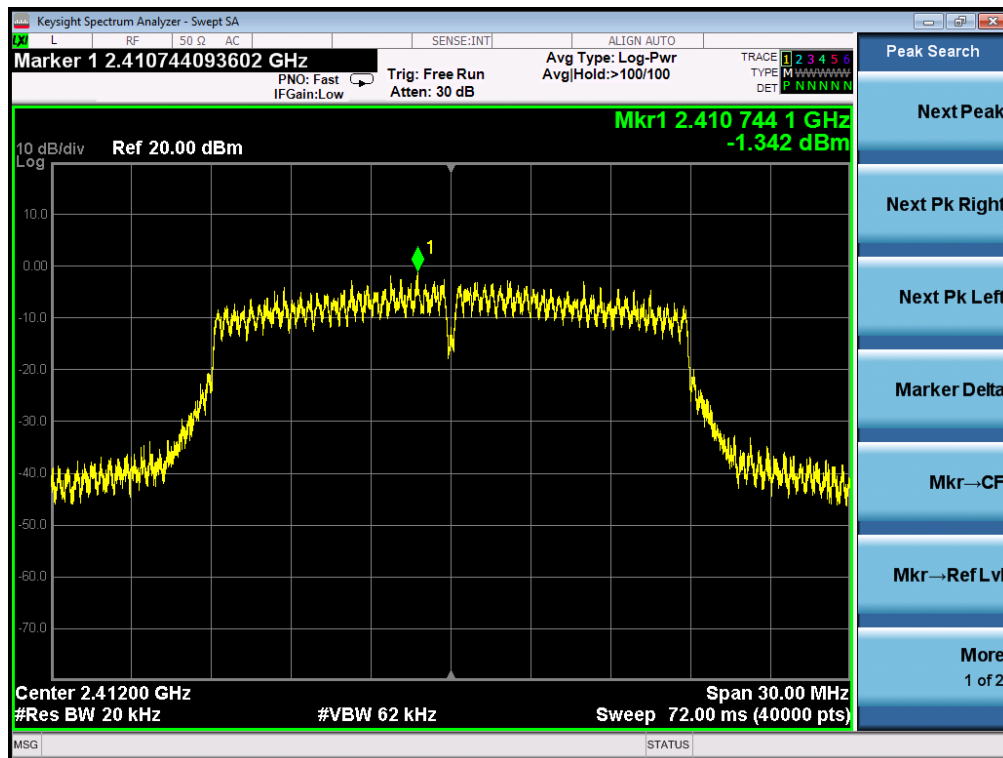
TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



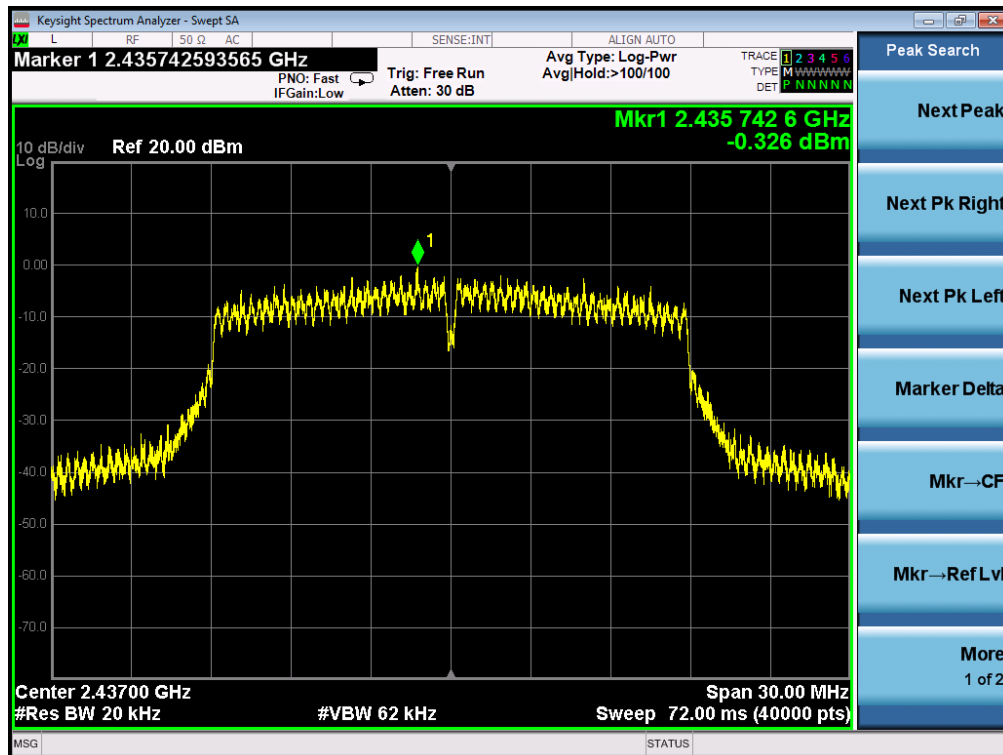


802.11n 20 TEST RESULT

TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL

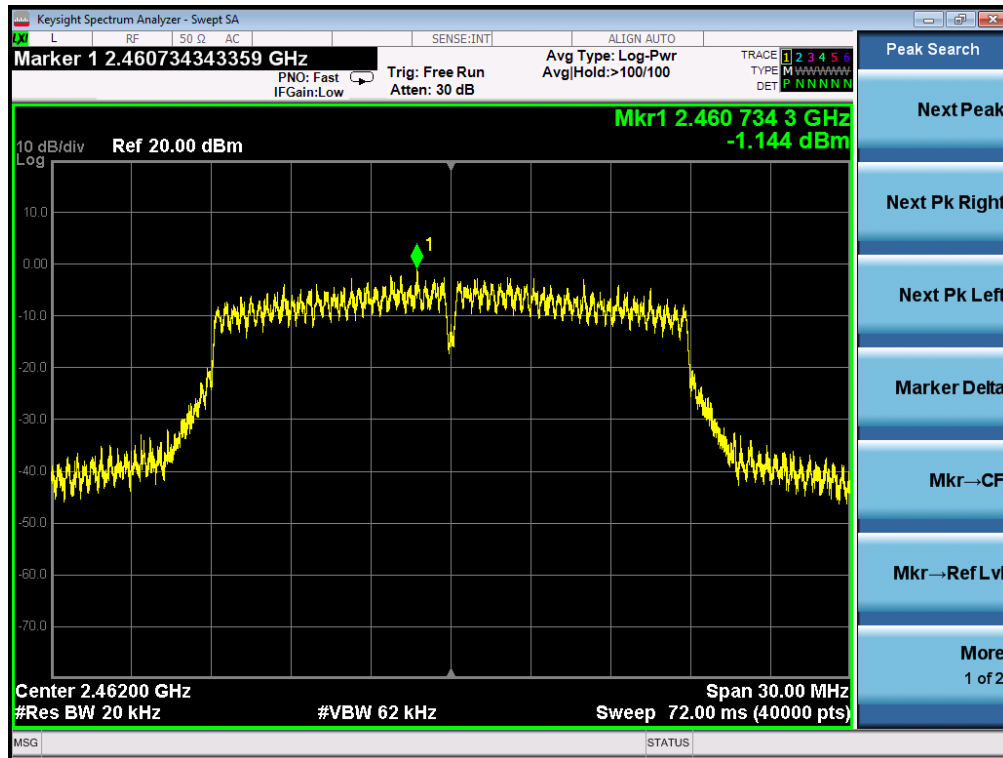


TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL





TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



802.11n 40 TEST RESULT

TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL

