
FCC Test Report

Report No.: AGC01162150501FE04

FCC ID : N8NLS4WF
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Wi-Fi Module
BRAND NAME : N/A
MODEL NAME : LSD4WF-2MD05101
CLIENT : Lierda Science & Technology Group Co., Ltd.
DATE OF ISSUE : Jun.19, 2015
STANDARD(S) : FCC Part 15.247
TEST PROCEDURE(S) : KDB 558074 v03r02
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



CAUTION:

This report shall not be reproduced except in full without the written permission of the test laboratory and shall not be quoted out of context.



Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jun.19, 2015	Valid	Original Report

TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY	5
2. GENERAL INFORMATION	6
2.1. PRODUCT DESCRIPTION	6
2.2. TABLE OF CARRIER FREQUENCYS	6
2.3. IEEE 802.11N MODULATION SCHEME	7
2.4. RELATED SUBMITTAL(S) / GRANT (S)	7
2.5. TEST METHODOLOGY	7
2.6. SPECIAL ACCESSORIES	8
2.7. EQUIPMENT MODIFICATIONS	8
3. MEASUREMENT UNCERTAINTY	9
4. DESCRIPTION OF TEST MODES	9
5. SYSTEM TEST CONFIGURATION	10
5.1. CONFIGURATION OF EUT SYSTEM.....	10
5.2. EQUIPMENT USED IN EUT SYSTEM.....	10
5.3. SUMMARY OF TEST RESULTS.....	10
6. TEST FACILITY	11
7. OUTPUT POWER	12
7.1. MEASUREMENT PROCEDURE	12
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	12
7.3. LIMITS AND MEASUREMENT RESULT.....	13
8. 6 DB BANDWIDTH	15
8.1. MEASUREMENT PROCEDURE	15
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	15
8.3. LIMITS AND MEASUREMENT RESULTS	16
9. CONDUCTED SPURIOUS EMISSION	26
9.1. MEASUREMENT PROCEDURE	26
9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	26
9.3. MEASUREMENT EQUIPMENT USED	26
9.4. LIMITS AND MEASUREMENT RESULT.....	26
10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY	51
10.1 MEASUREMENT PROCEDURE.....	51
10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	51
10.3 MEASUREMENT EQUIPMENT USED	51
10.4 LIMITS AND MEASUREMENT RESULT.....	51

11. RADIATED EMISSION	61
11.1. MEASUREMENT PROCEDURE.....	61
11.2. TEST SETUP	62
11.3. LIMITS AND MEASUREMENT RESULT	63
11.4. TEST RESULT	63
12. BAND EDGE EMISSION	69
12.1. MEASUREMENT PROCEDURE	69
12.2. TEST SET-UP	69
12.3. Test Result	70
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	86
APPENDIX B: PHOTOGRAPHS OF EUT	87

1. VERIFICATION OF CONFORMITY

Applicant	Lierda Science & Technology Group Co., Ltd.
Address	Lierda Building, No.425 Dengyun Road, Hangzhou, Zhejiang, P.R.China
Manufacturer	Lierda Science & Technology Group Co., Ltd.
Address	Lierda Building, No.425 Dengyun Road, Hangzhou, Zhejiang, P.R.China
Product Designation	Wi-Fi Module
Brand Name	N/A
Test Model	LSD4WF-2MD05101
Date of test	Jun.12, 2015 to Jun.18, 2015
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BGN/RF

We hereby certify that:

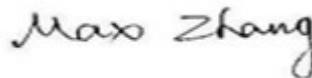
The above equipment was tested by Compliance Certification Services(Shenzhen) Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

Prepared By



Sally Wu Jun.19, 2015

Checked By



Max Zhang Jun.19, 2015

Authorized By



Solger Zhang Jun.19, 2015

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “Wi-Fi Module”. It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.412 GHz~2.462GHz
Output Power	IEEE 802.11b:9.82dBm; IEEE 802.11g:8.27dBm; IEEE 802.11n(20):8.12dBm; IEEE 802.11n(40):6.31dBm
Modulation	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
Number of channels	11
Hardware Version	V1.0
Software Version	V1.0
Antenna Designation	PCB Antenna
Antenna Gain	0dBi
Power Supply	DC5.0V

2.2. TABLE OF CARRIER FREQUENCIES

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

2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPS	NCBPS		NDBPS		Data rate(Mbps)			
					800nsGI		20MHz	40MHz	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
NBPS	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

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

This submittal(s) (test report) is intended for **FCC ID: N8NLS4WF** filing to comply with the FCC Part 15 requirements.

2.5. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2003).

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 15.247 rules KDB 558074 D01 DTS Meas Guidance v03r02.

2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB

Radiated measurement: +/- 3.2dB

4. DESCRIPTION OF TEST MODES

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)

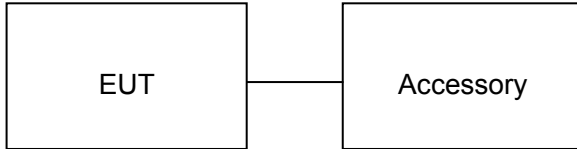
Note:

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.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Wi-Fi Module	N/A	LSD4WF-2MD05101	EUT
2	PC	N/A	Lenovo V2000	Accessory
3	USB Cable	N/A	N/A	Accessory
4	Debug board	N/A	LSD5WF-6042	Accessory

5.3. SUMMARY OF TEST RESULTS

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

6. TEST FACILITY

Site	Compliance Certification Services (Shenzhen) Inc.
Location	No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd.,Guan Lan Town, Baoan District, Shenzhen, China
Description	Test Firm Registration Number: 441872

TEST EQUIPMENT LIST

Radiated Emission Test Site 966(2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/01/2015	03/01/2016
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2015	03/08/2016
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2015	03/17/2016
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2015	03/17/2016
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	07/10/2014	07/09/2015
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/01/2015	03/01/2016
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/01/2015	03/01/2016
Loop Antenna	COM-POWER	AL-130	121044	09/27/2014	09/26/2015
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/28/2015	02/27/2016
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2015	03/08/2016
LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	03/09/2015	03/08/2016
LISN	EMCO	3825/2	8901-1459	03/09/2015	03/08/2016
Temp. / Humidity Meter	VICTOR	HTC-1	N/A	03/04/2015	03/03/2016
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

7. OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

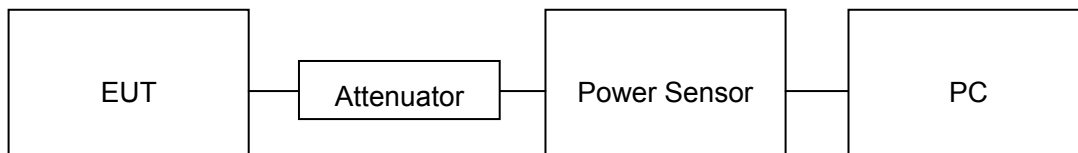
For average power test:

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 558074v03r02 for compliance to FCC 47CFR 15.247 requirements.

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

AVERAGE POWER SETUP



7.3. 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	9.64	30	Pass
2.437	9.82	30	Pass
2.462	9.75	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	8.15	30	Pass
2.437	8.16	30	Pass
2.462	8.27	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	8.05	30	Pass
2.437	8.06	30	Pass
2.462	8.12	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	6.31	30	Pass
2.437	6.28	30	Pass
2.452	6.31	30	Pass

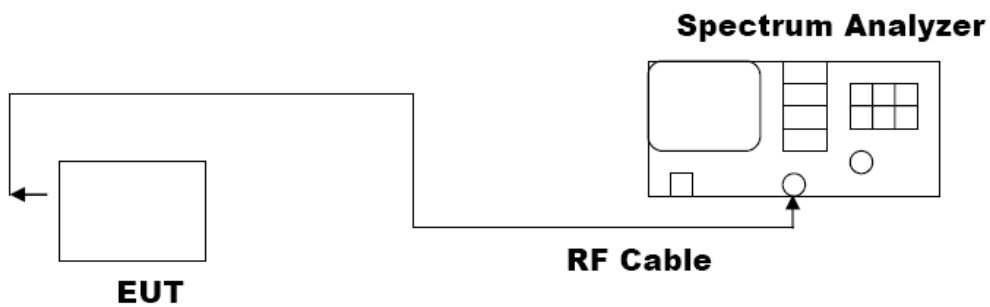
8. 6 DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on 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 KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

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



8.3. 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	10.07	PASS
	Middle Channel	10.08	PASS
	High Channel	10.08	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	16.57	PASS
	Middle Channel	16.57	PASS
	High Channel	16.57	PASS

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

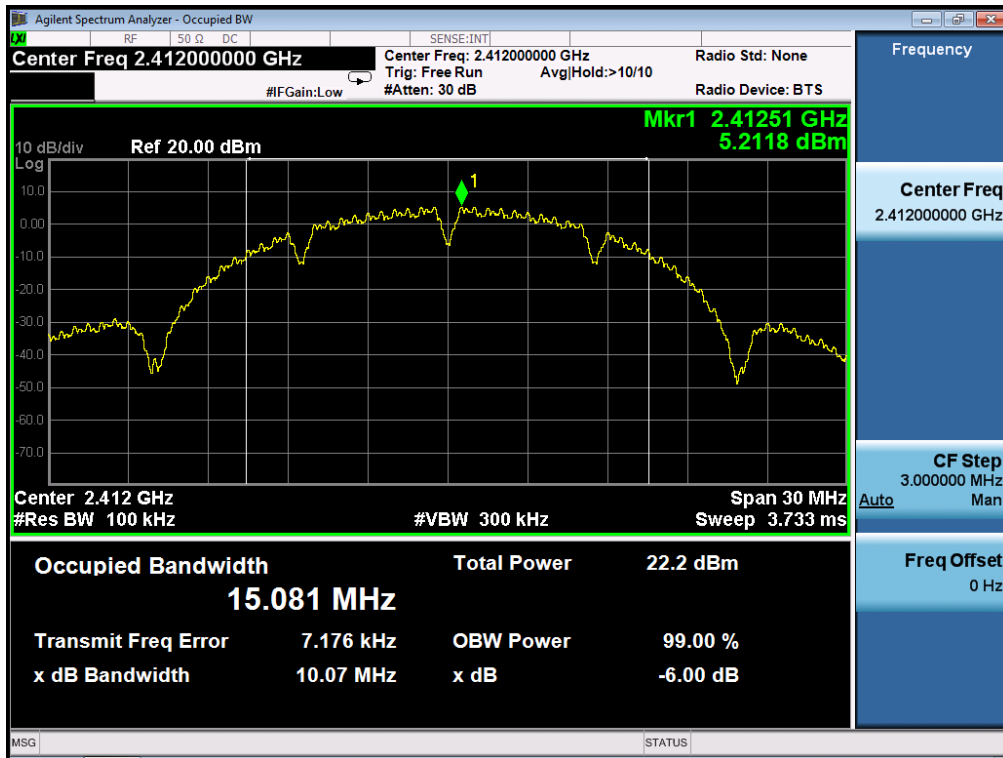
LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	16.57	PASS
	Middle Channel	16.57	PASS
	High Channel	16.57	PASS

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

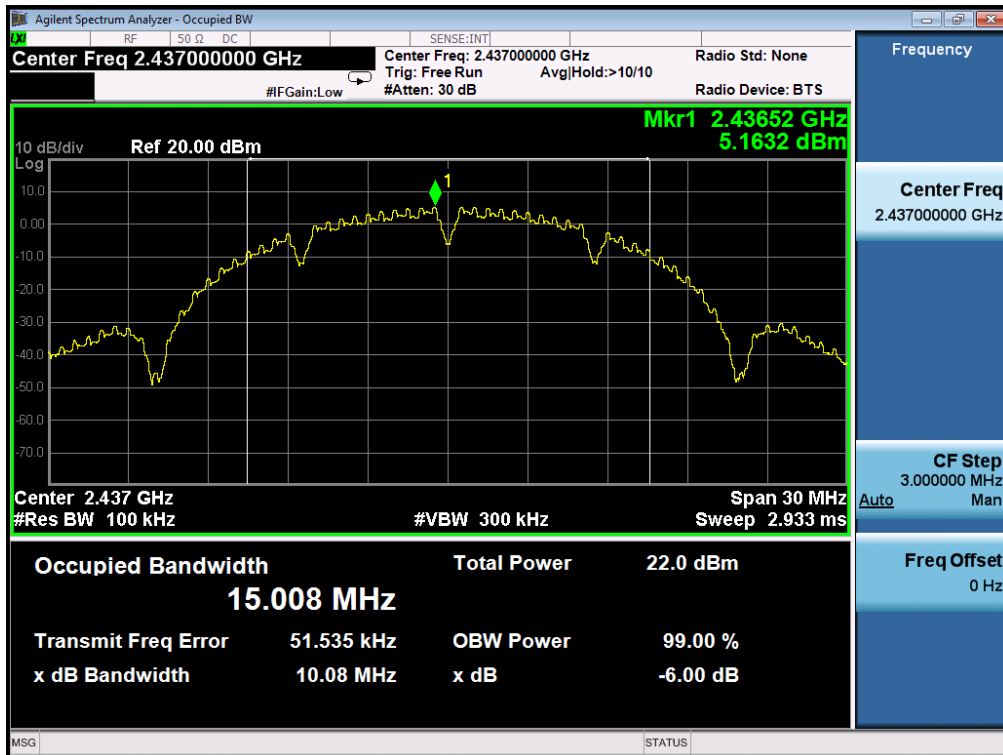
LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Test Data (MHz)		Criteria
>500KHZ	Low Channel	36.51	PASS
	Middle Channel	36.50	PASS
	High Channel	36.47	PASS

802.11b TEST RESULT

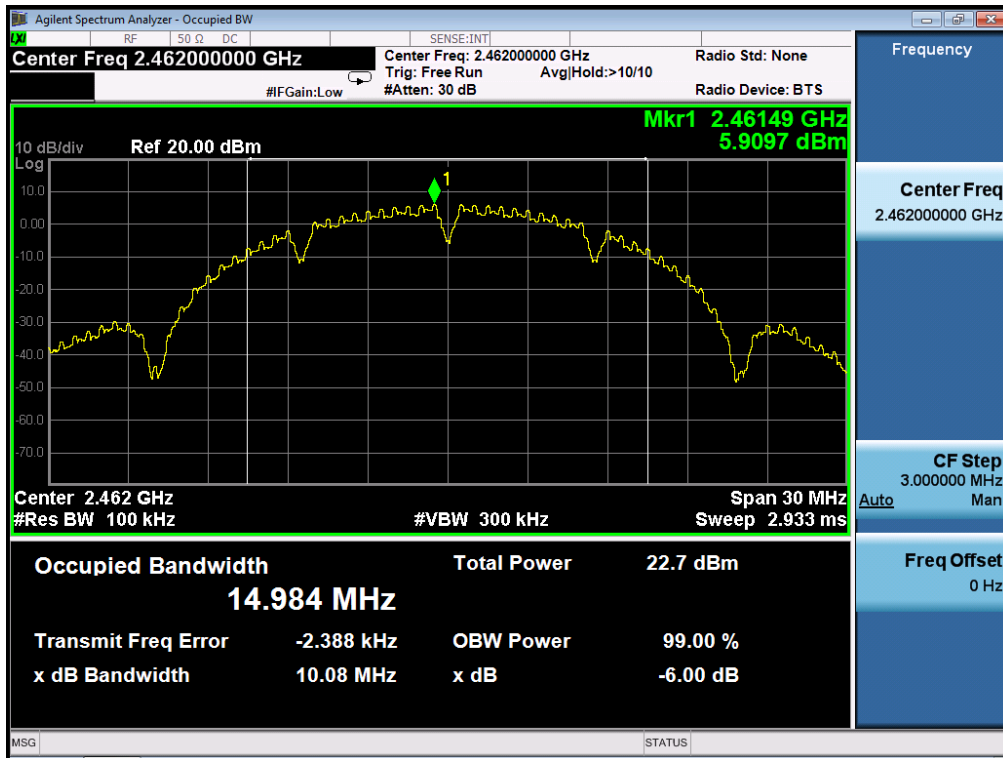
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

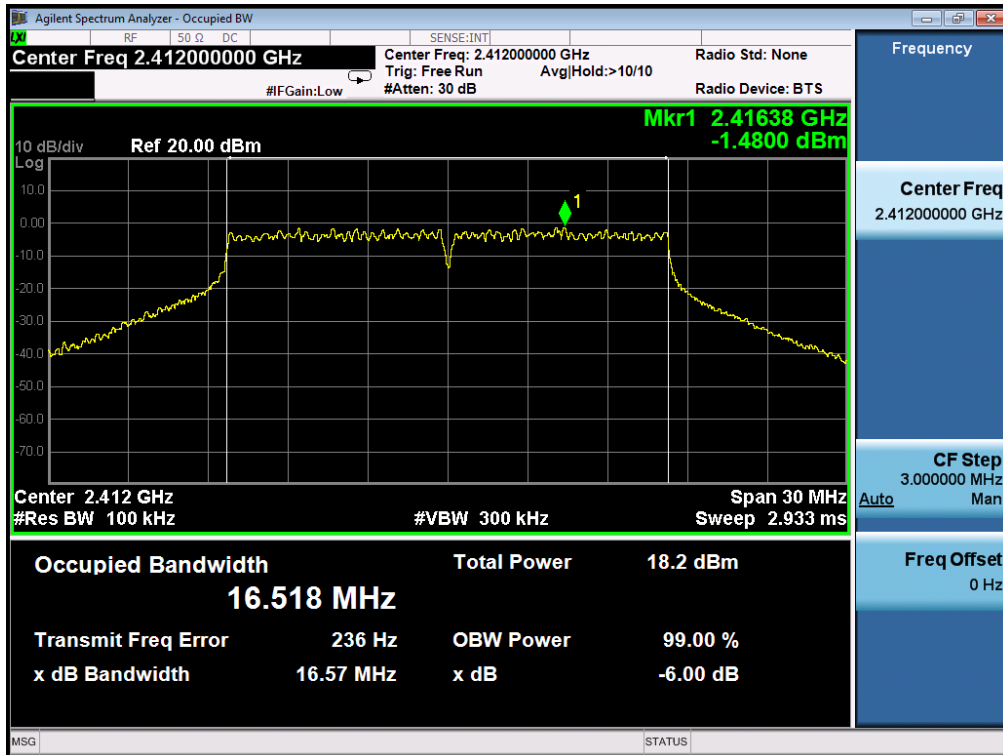


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

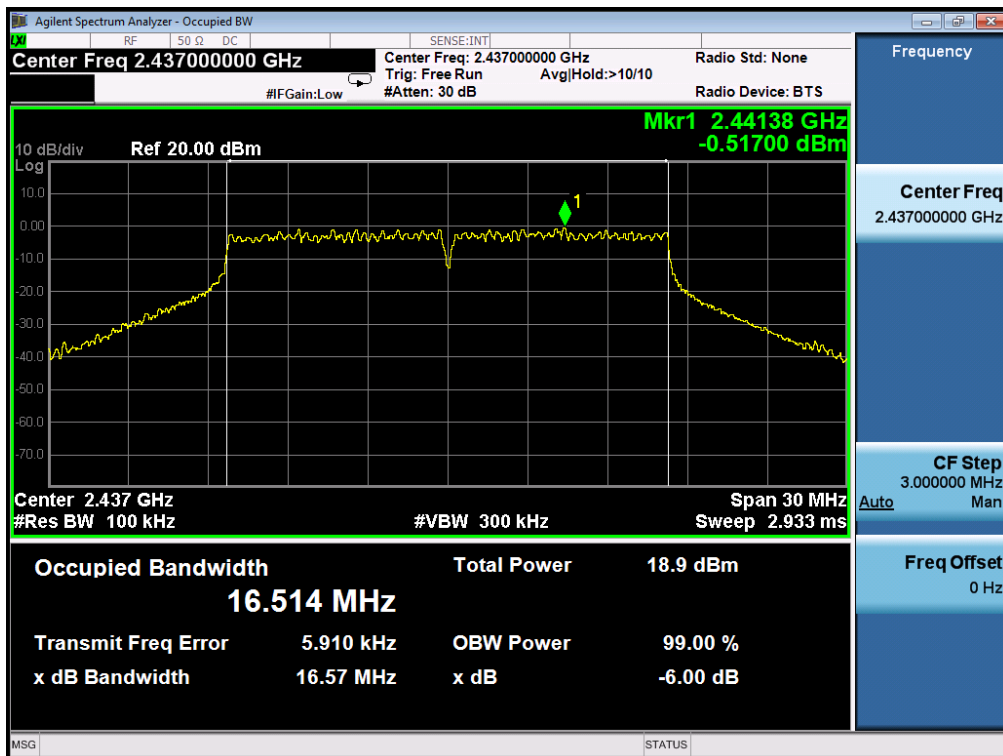


802.11g TEST RESULT

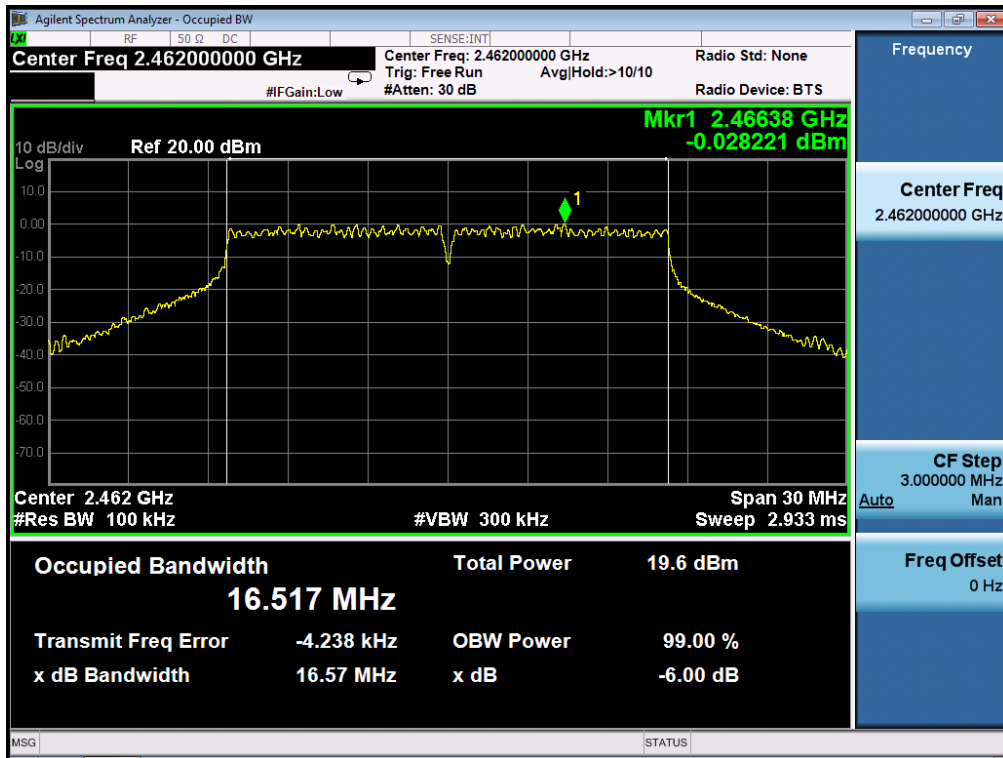
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

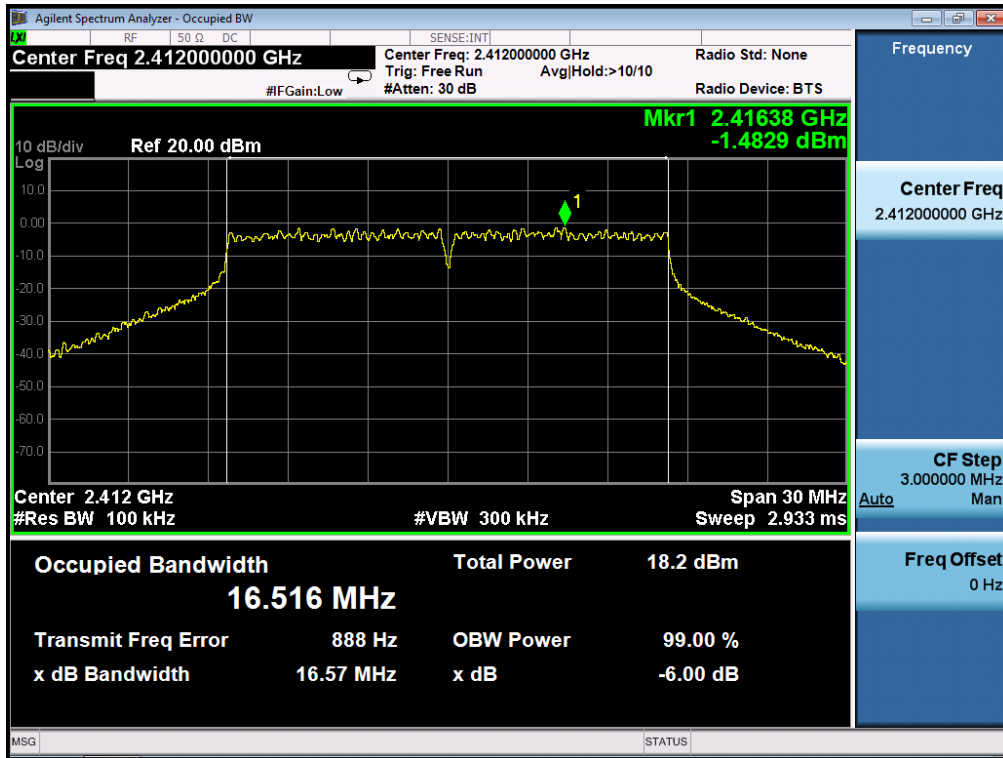


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

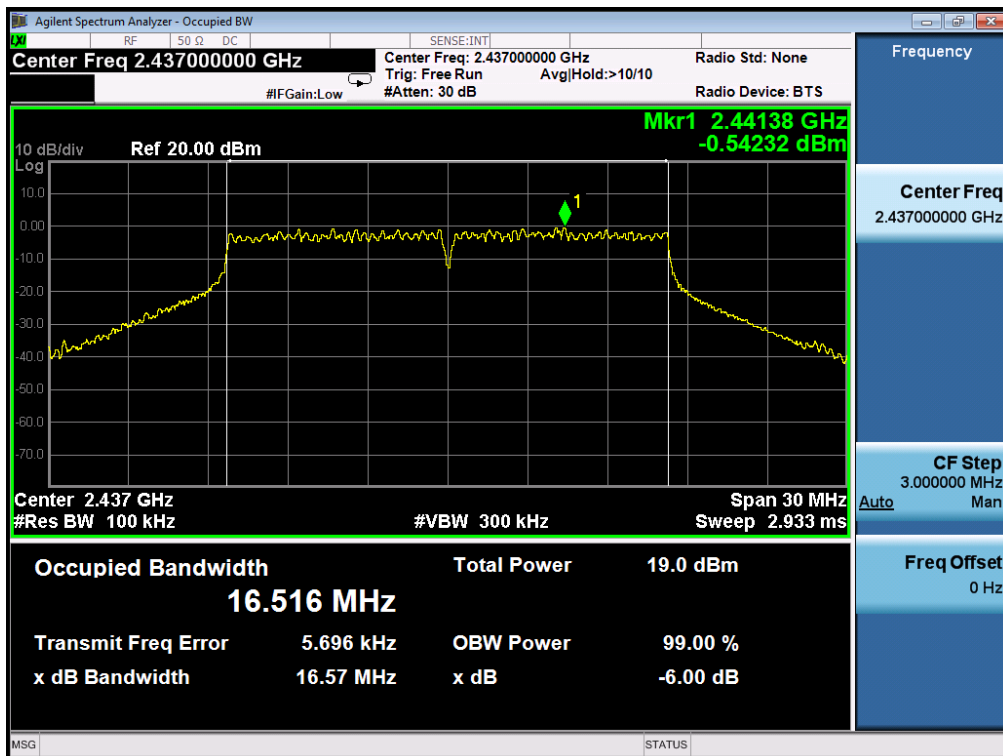


802.11n (20) TEST RESULT

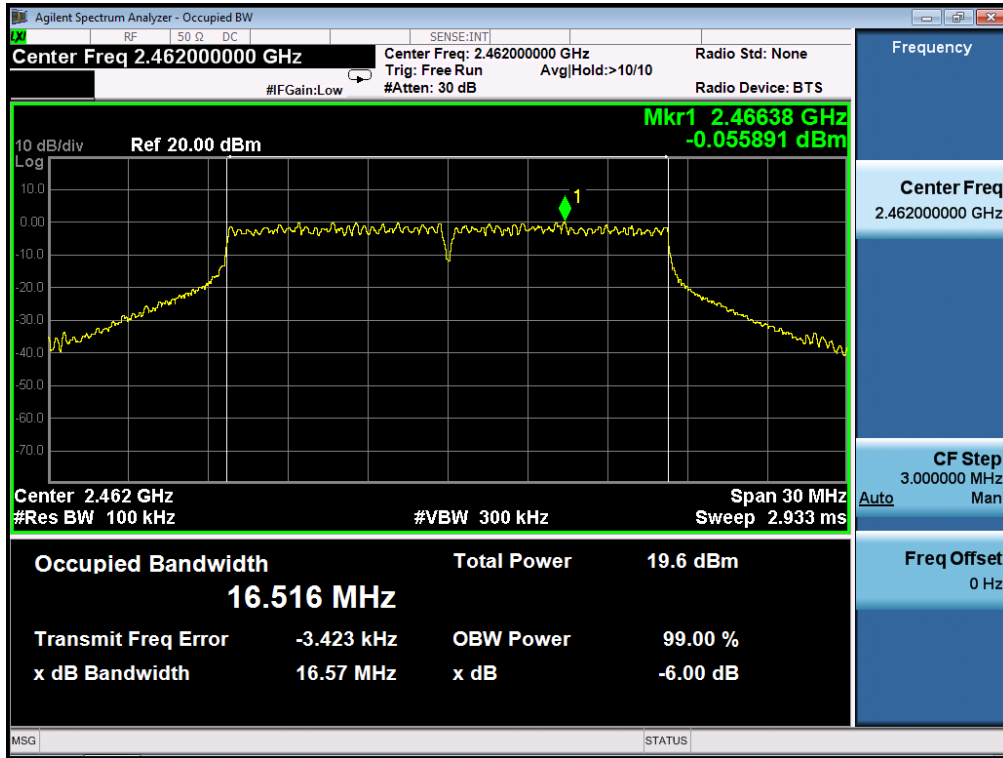
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

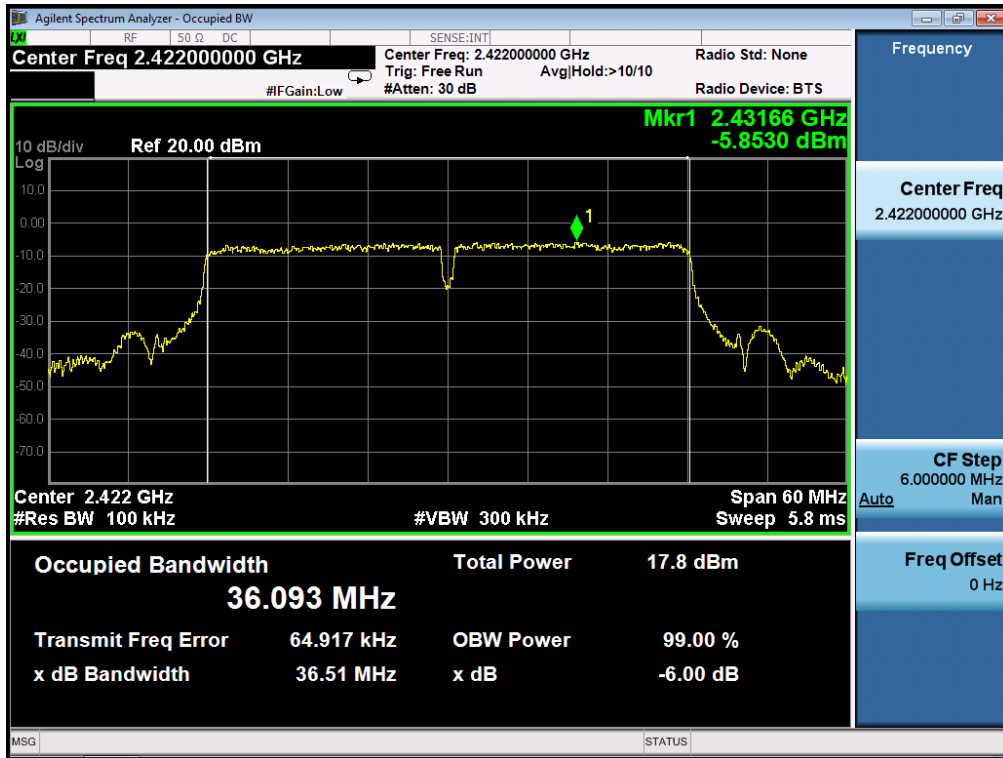


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

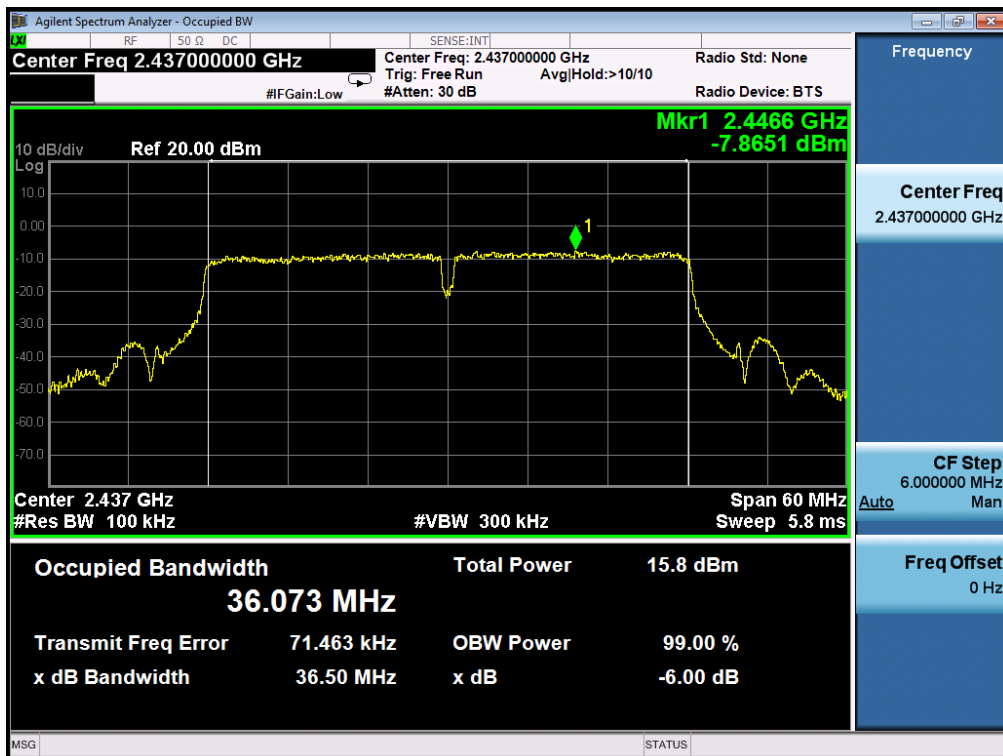


802.11n(40) TEST RESULT

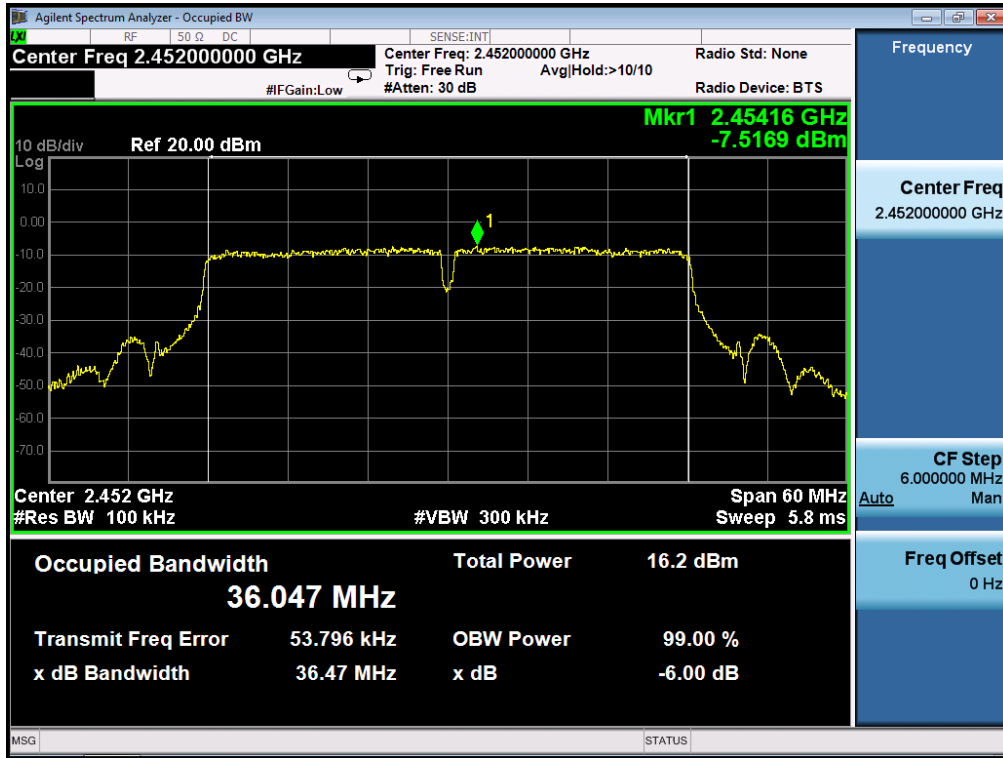
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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 KDB 558074 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.

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

The same as described in section 8.2.

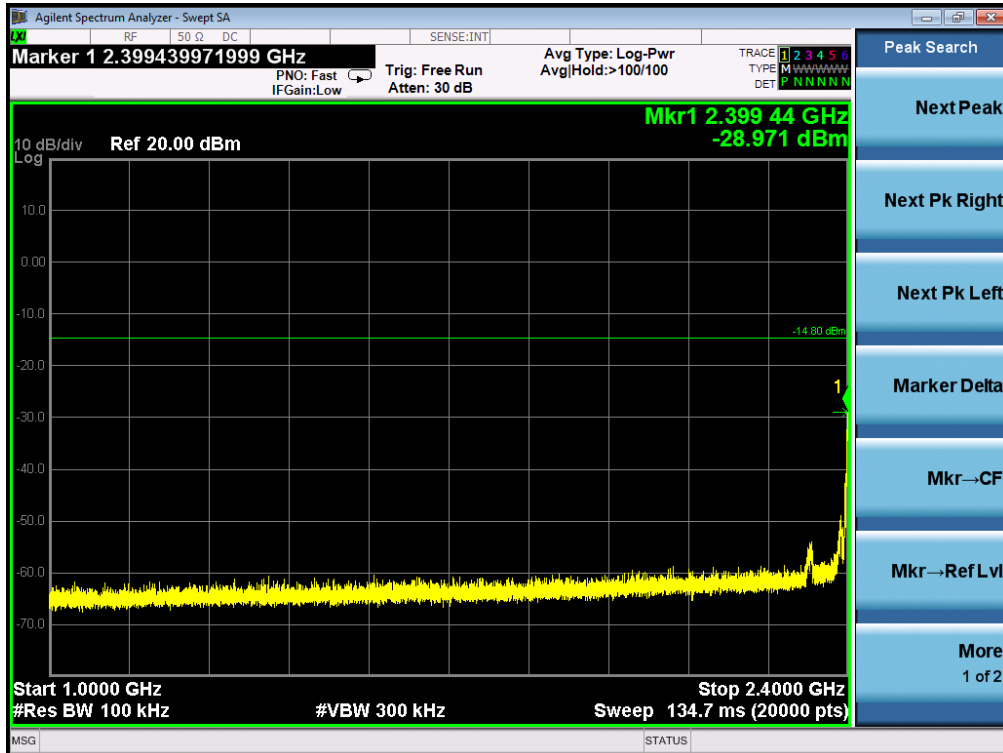
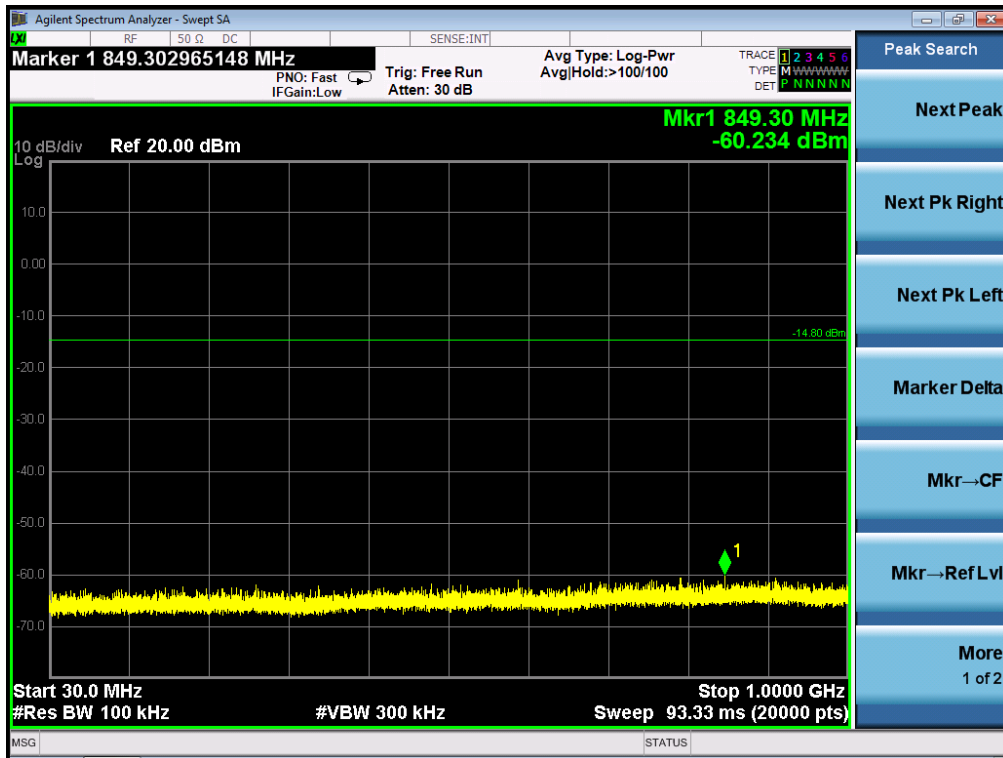
9.3. MEASUREMENT EQUIPMENT USED

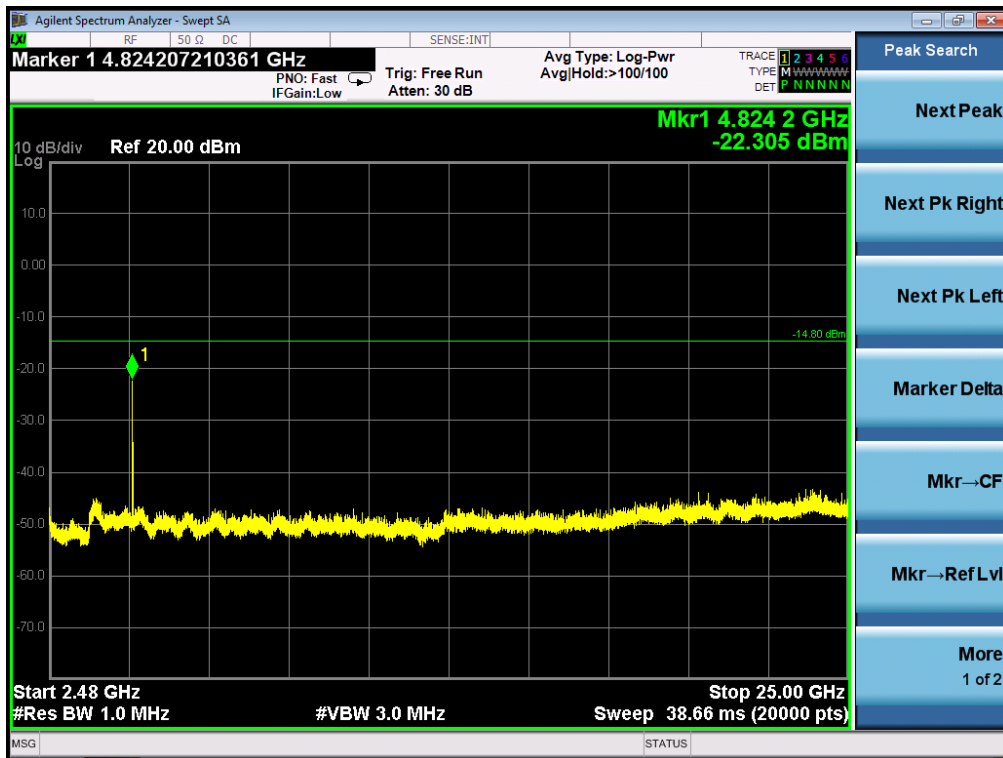
The same as described in section 6.

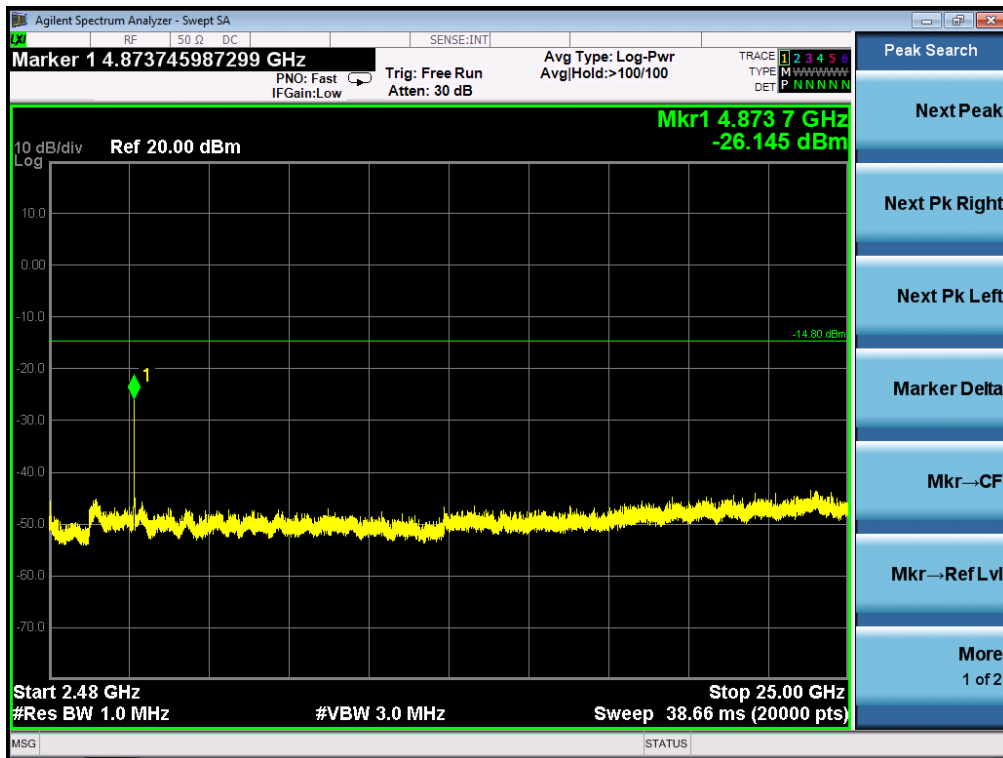
9.4. LIMITS AND MEASUREMENT RESULT

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. 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 -20dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -20dBc than the limit Specified on the TOP Channel	PASS

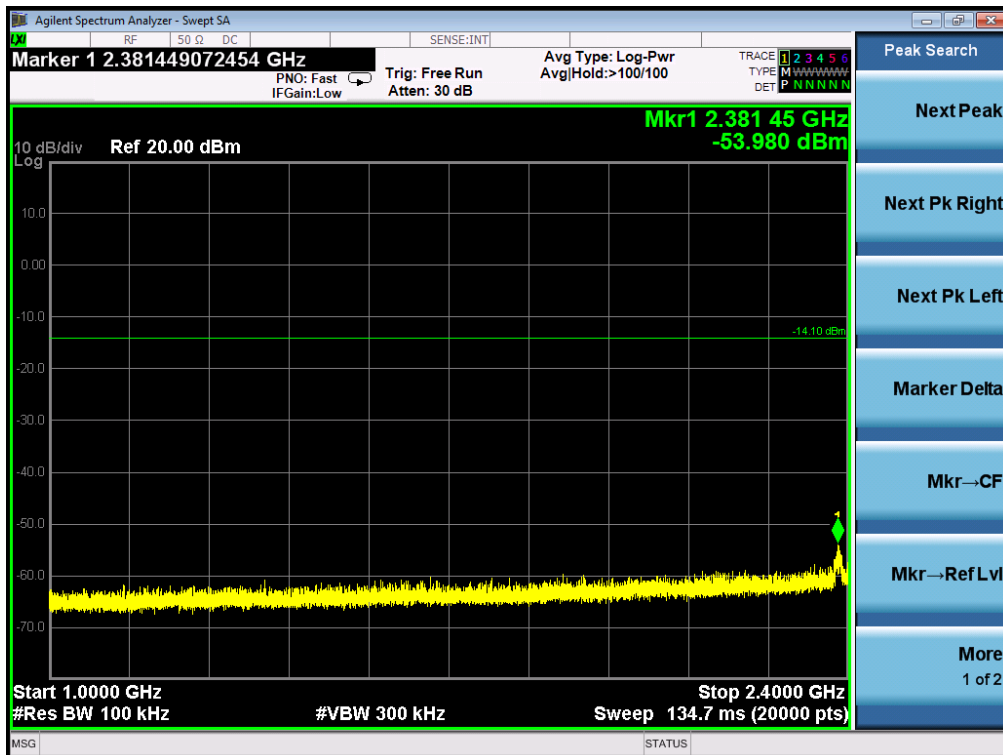
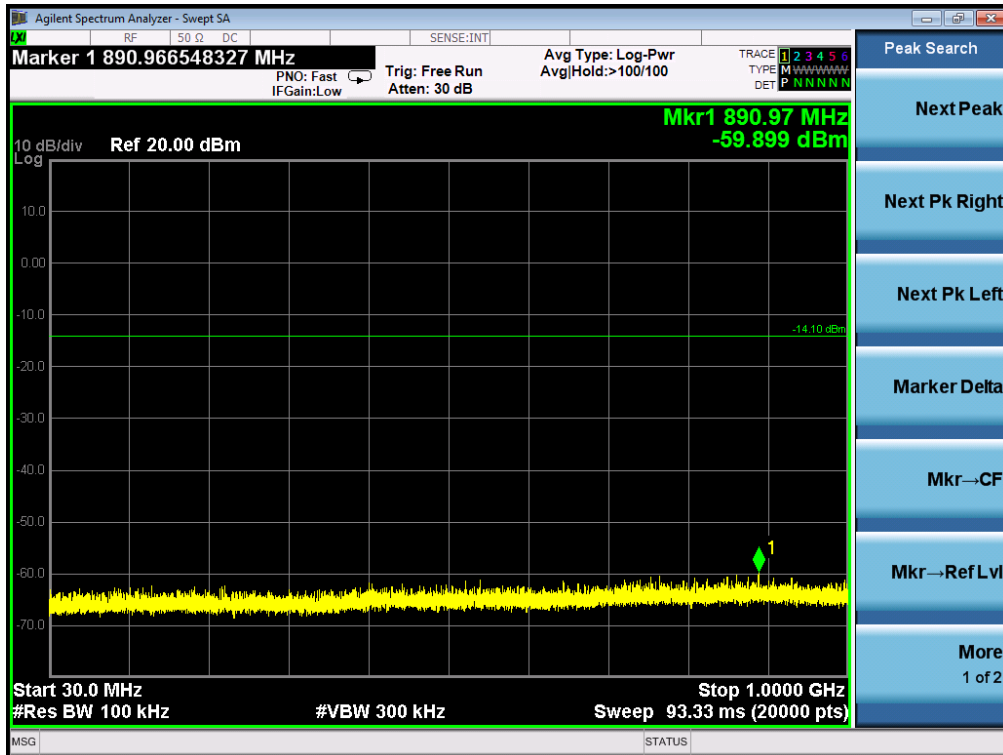
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11b FOR MODULATION IN LOW CHANNEL

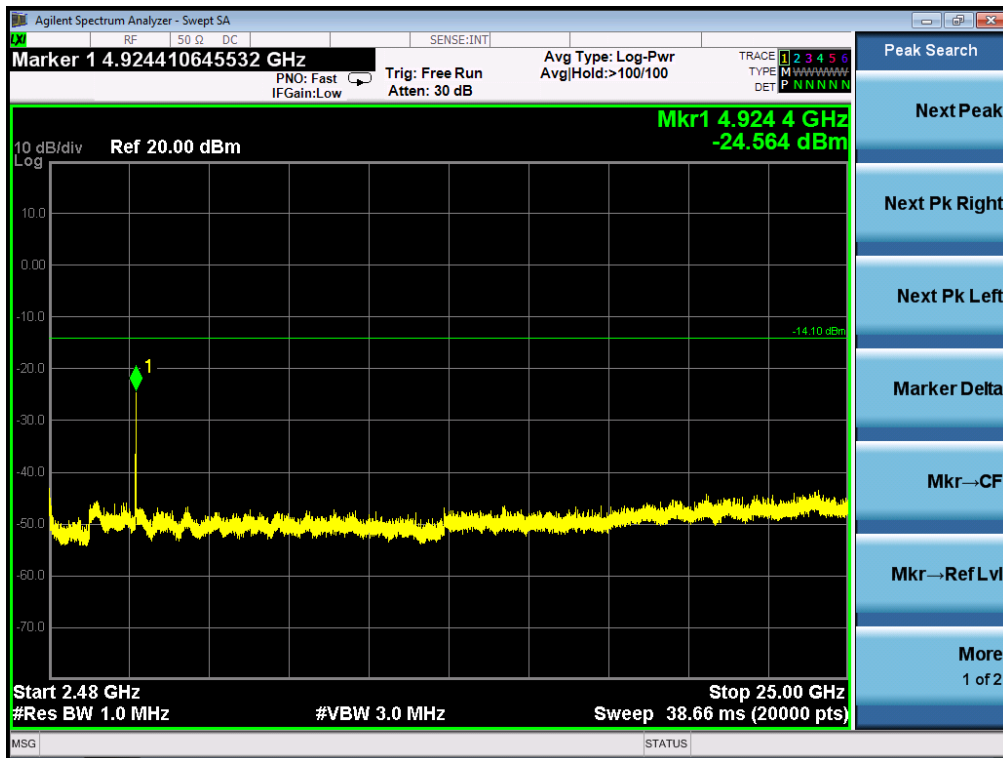




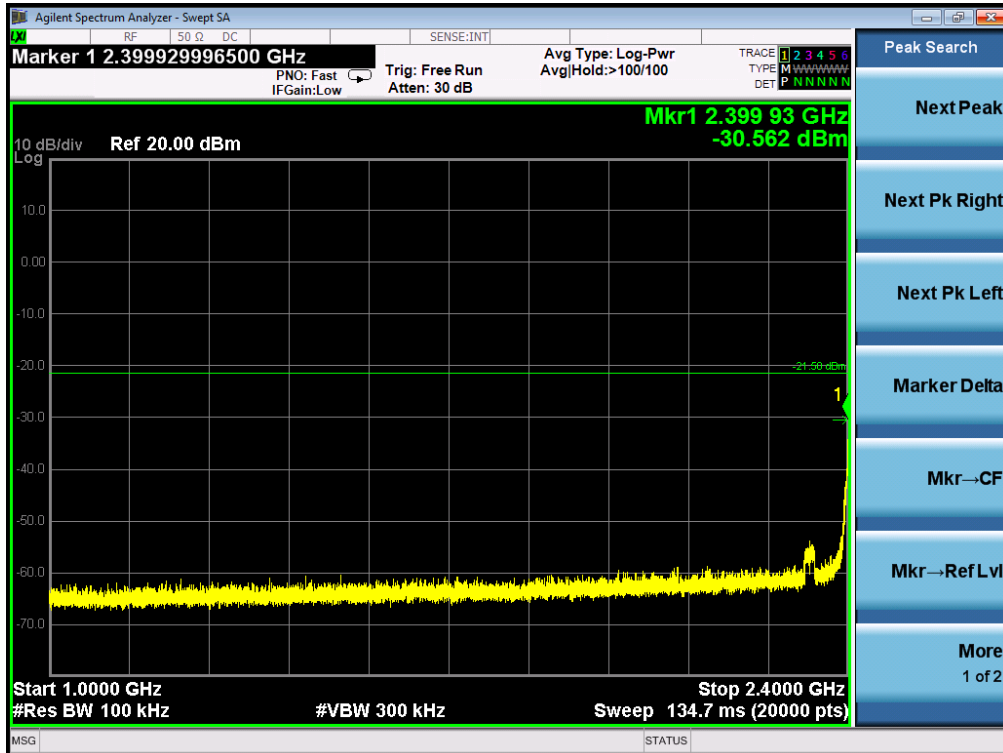
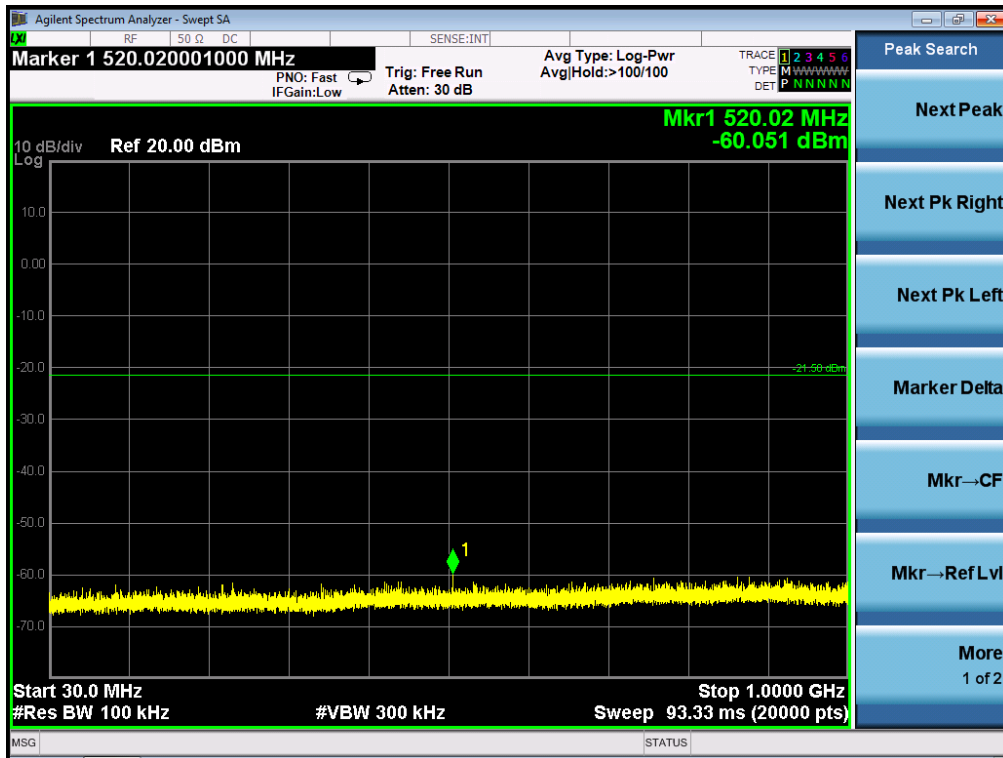


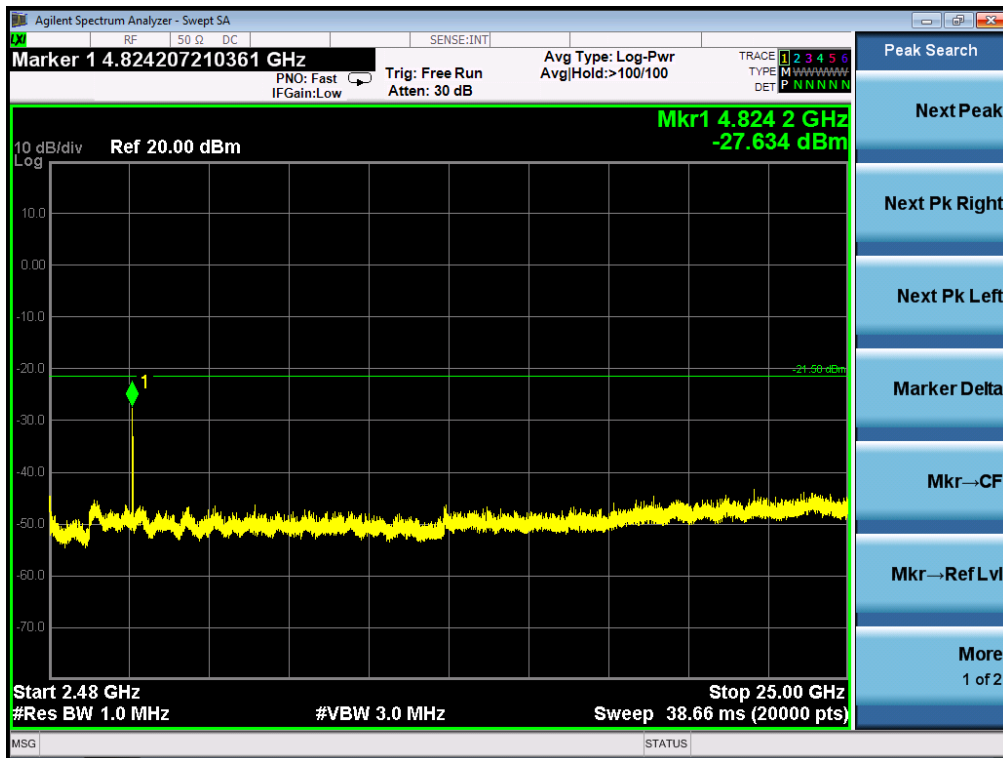
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11b FOR MODULATION IN HIGH CHANNEL



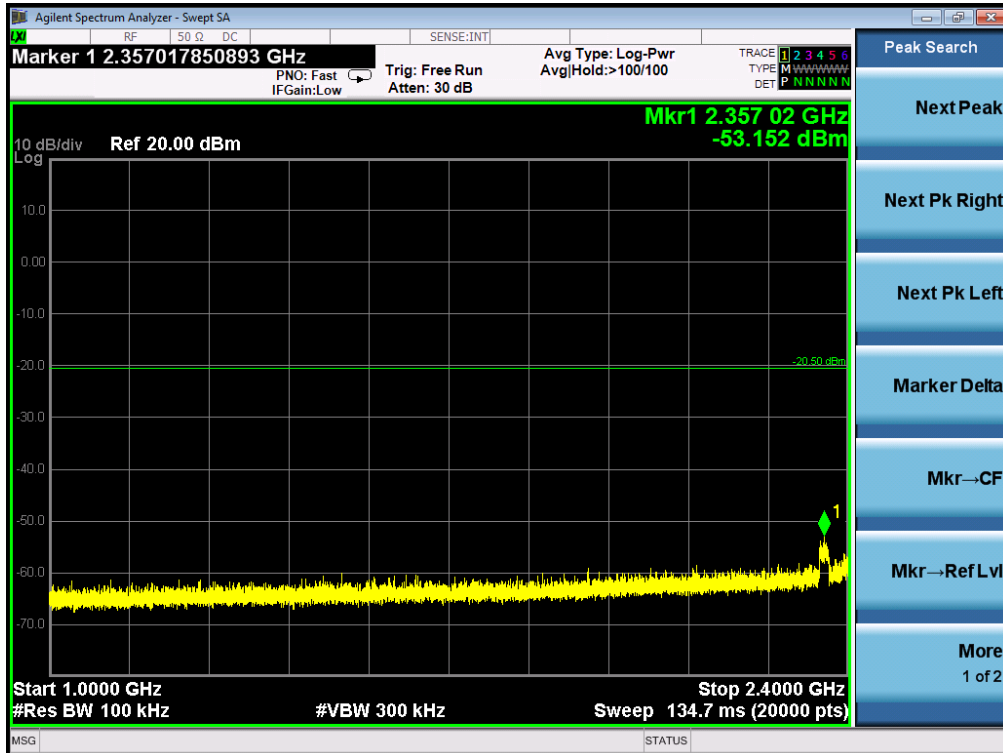
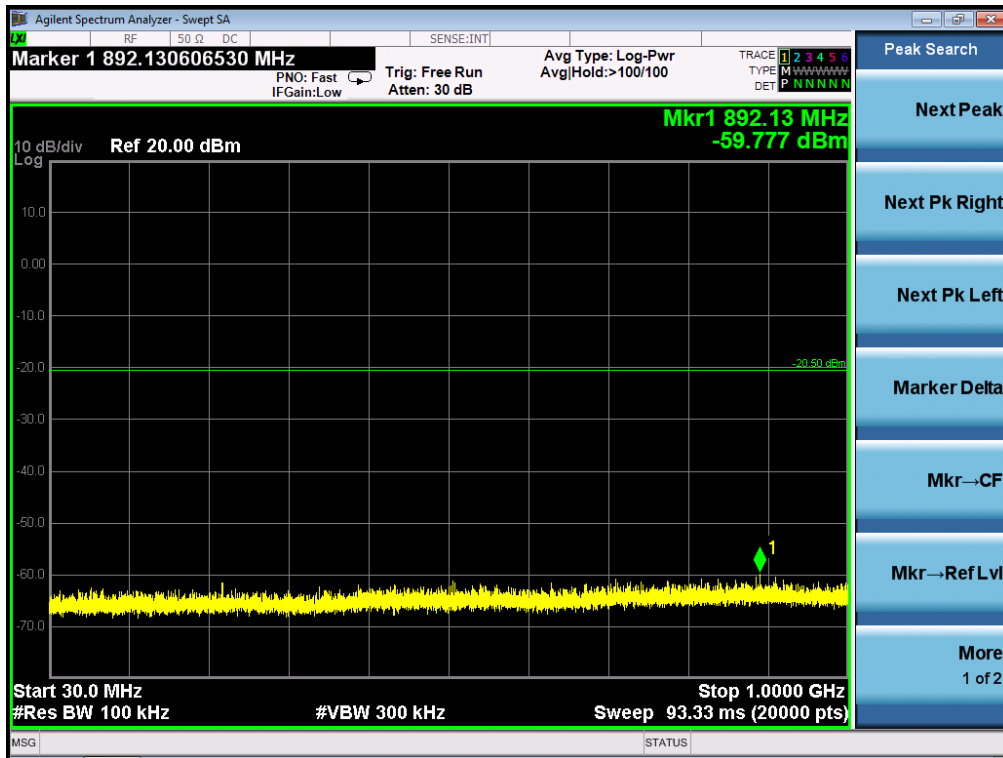


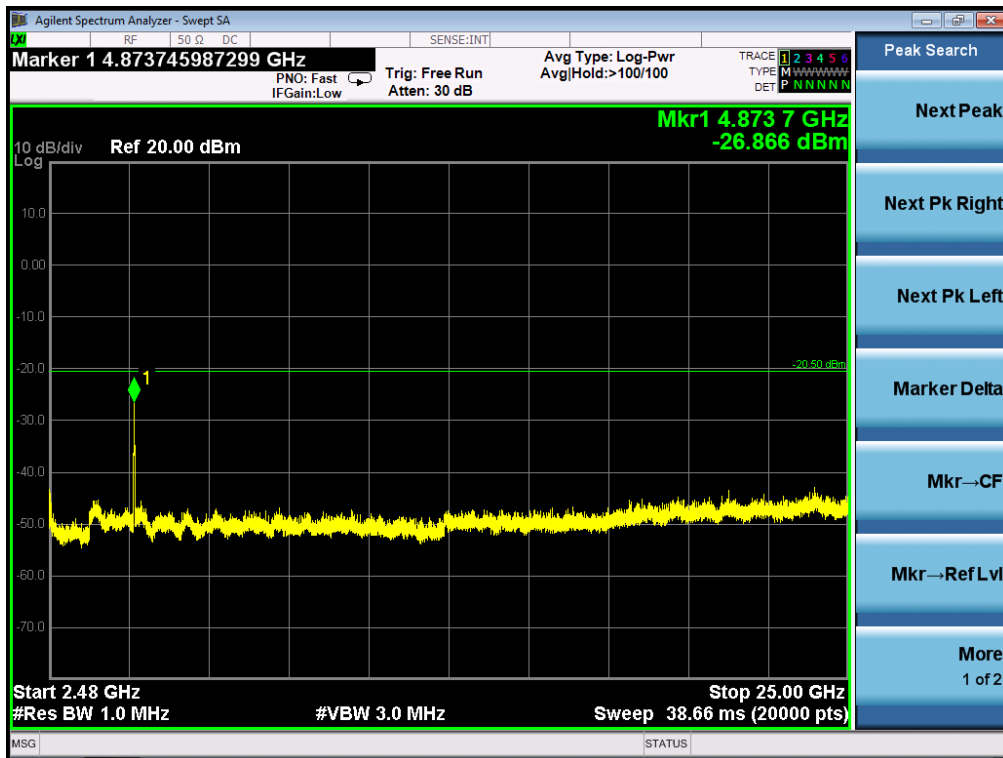
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11g FOR MODULATION IN LOW CHANNEL

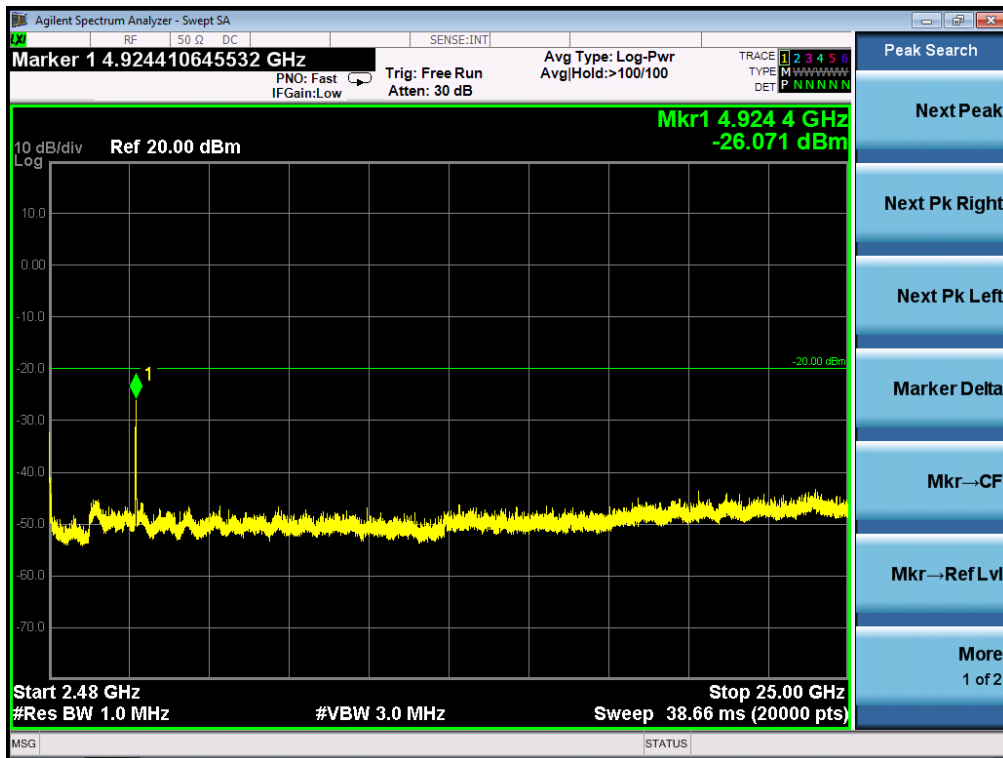




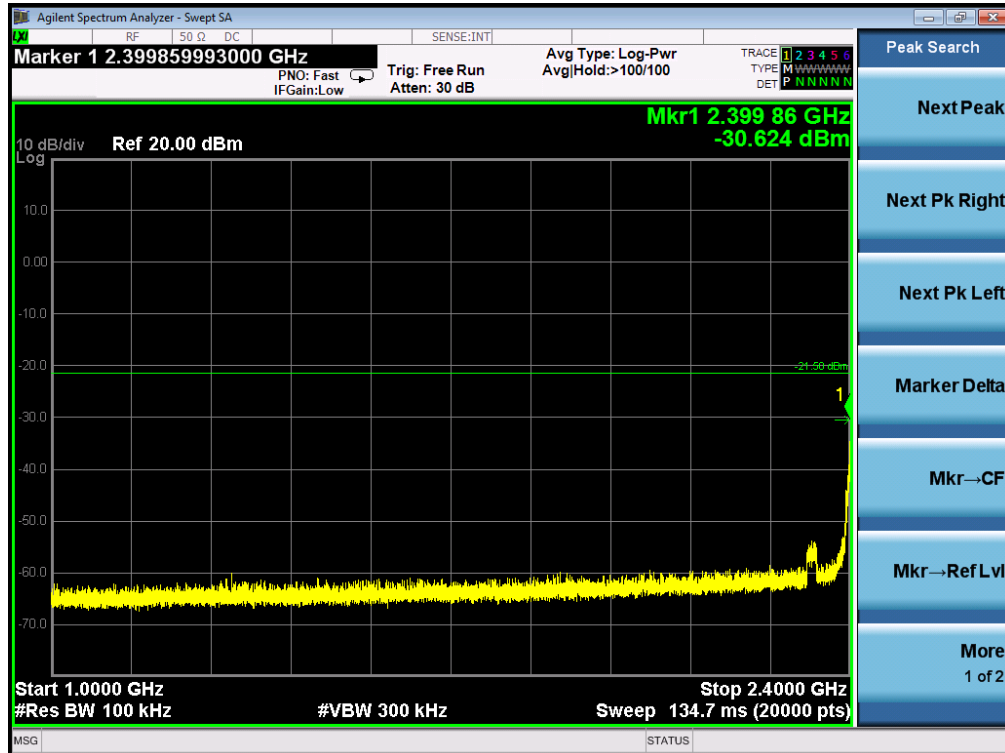
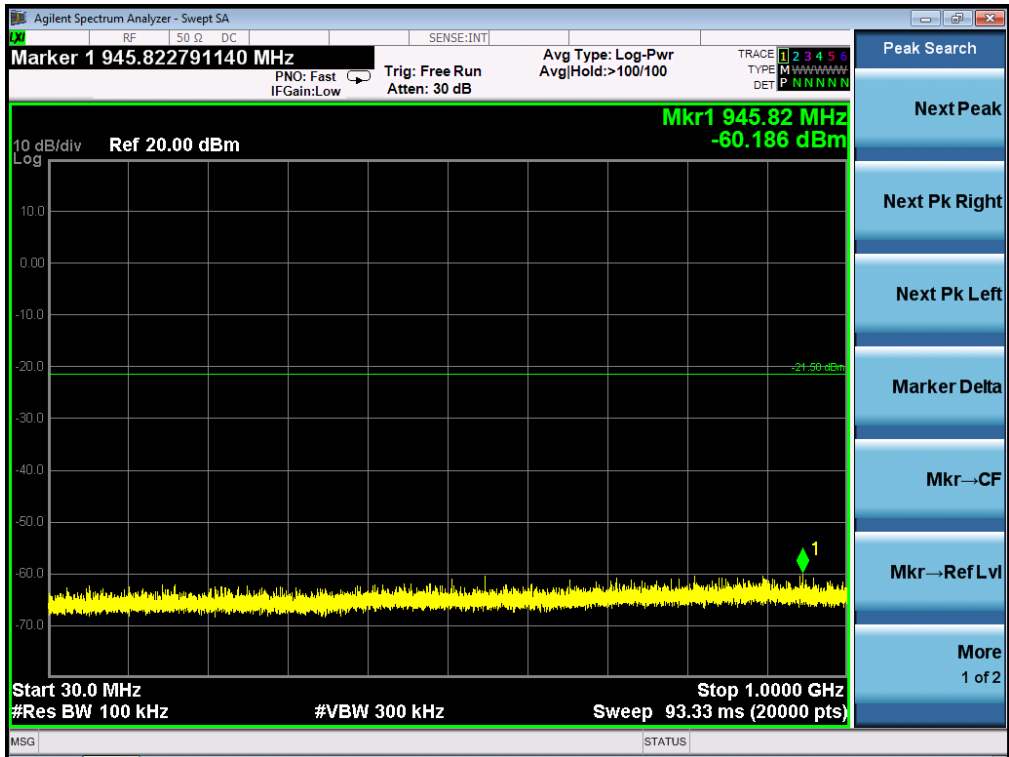
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11g FOR MODULATION IN MIDDLE CHANNEL

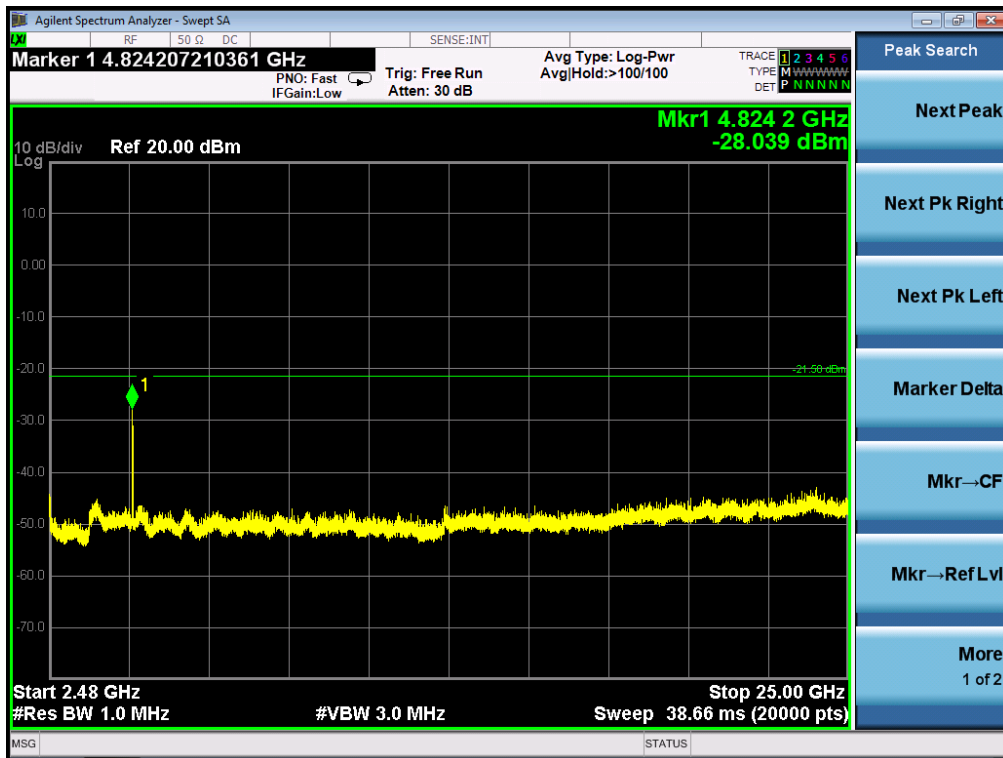


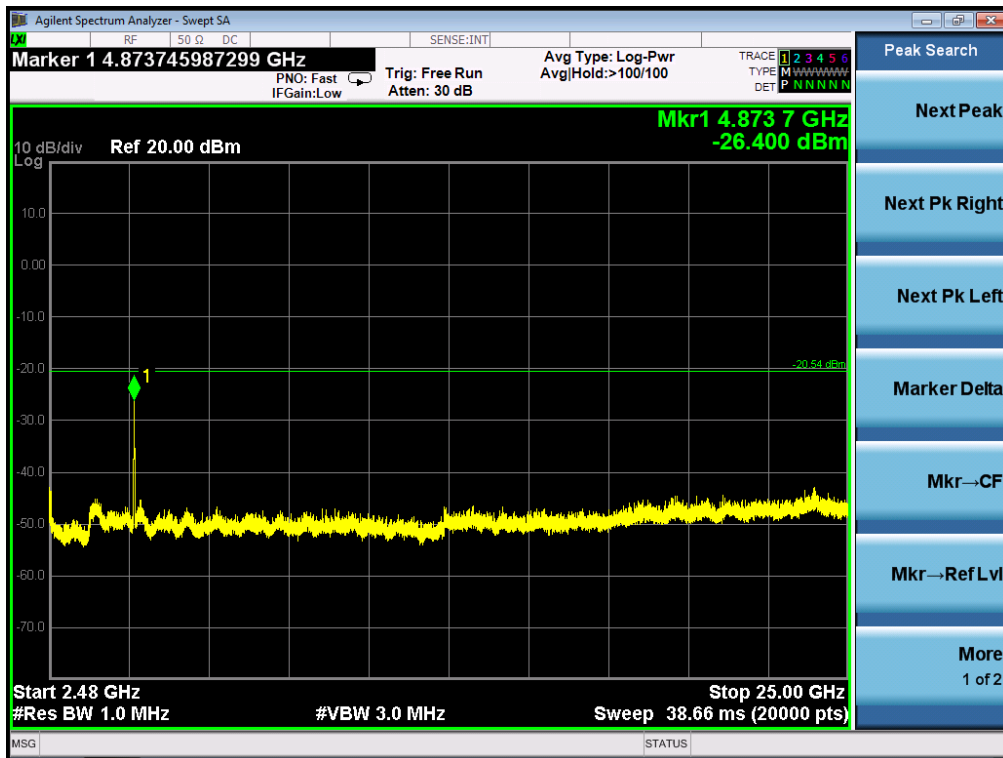




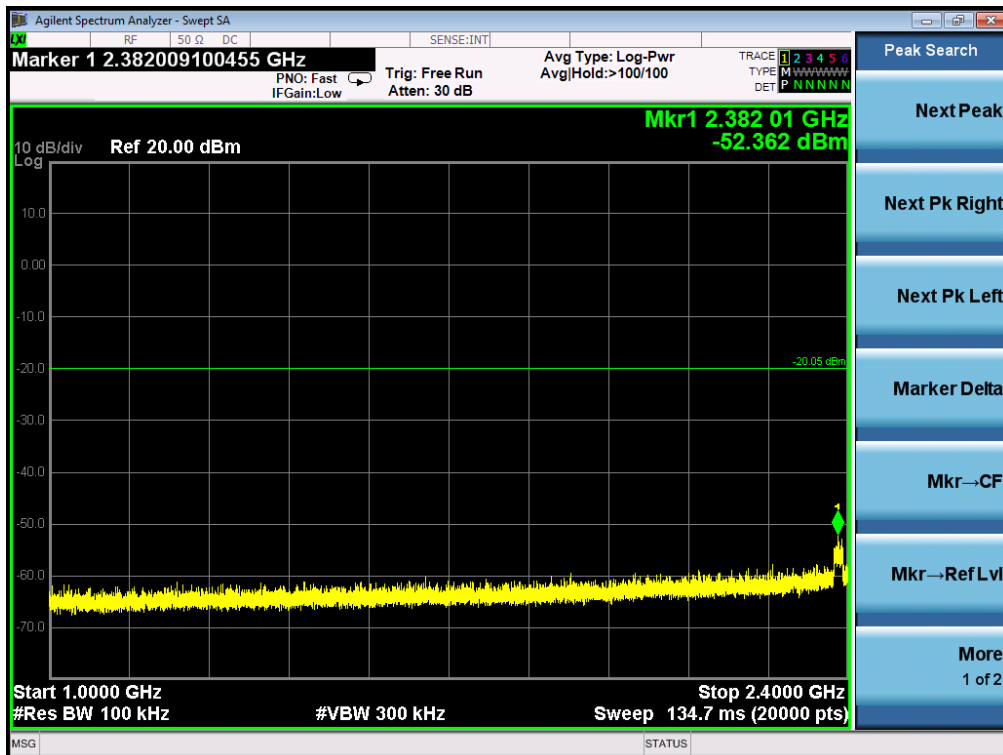
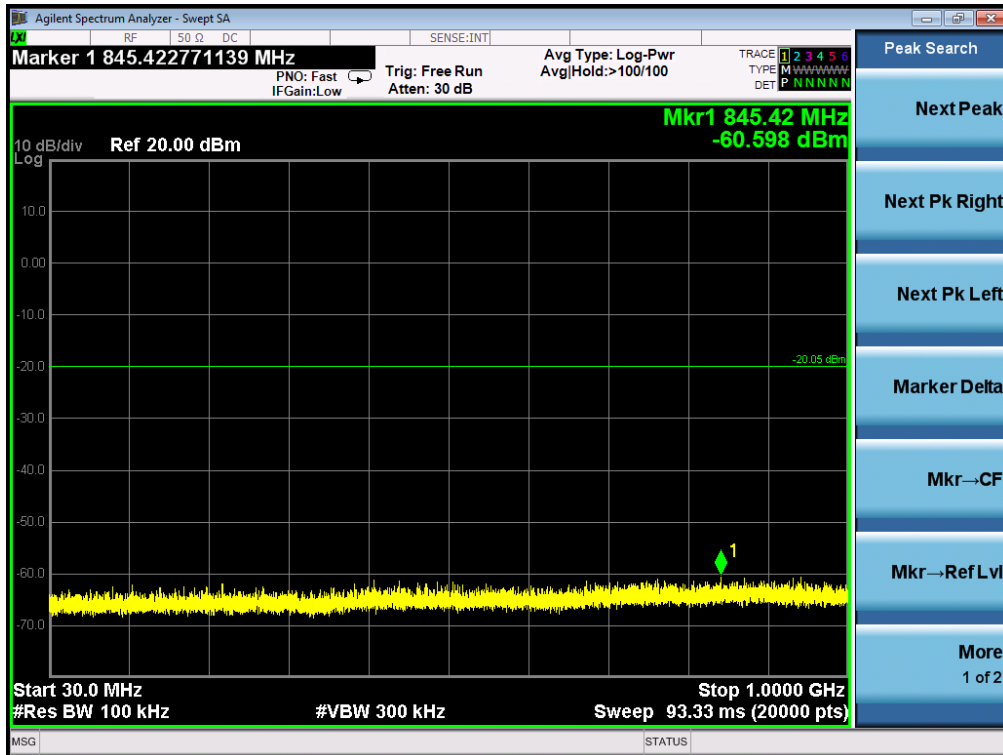
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11n20 FOR MODULATION IN LOW CHANNEL

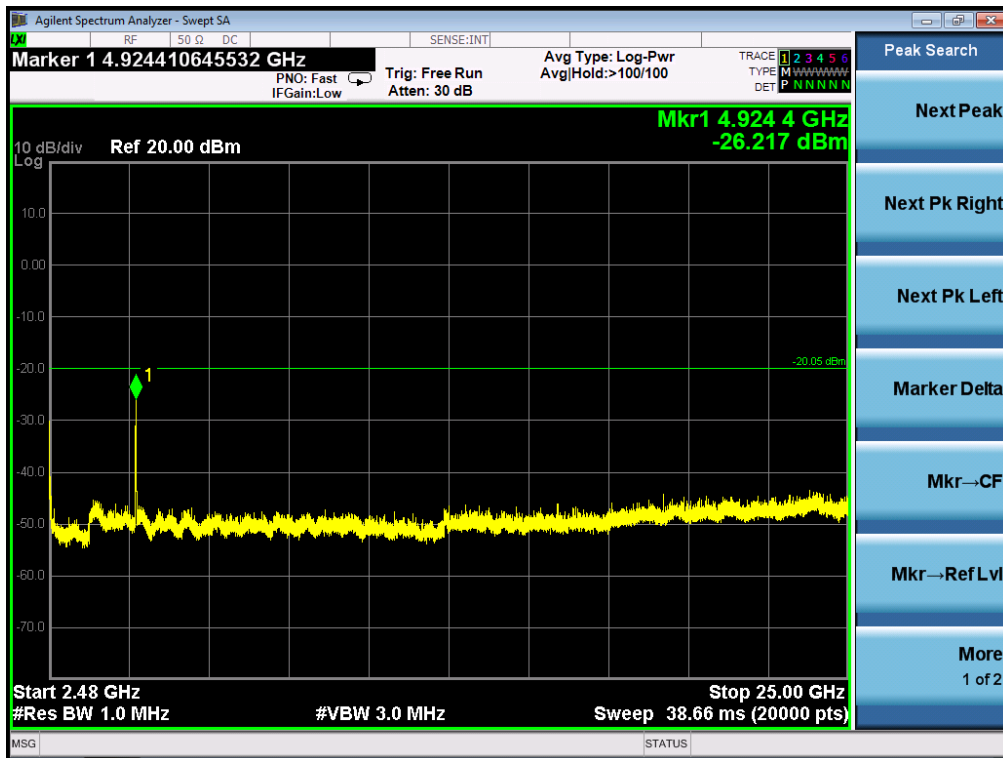




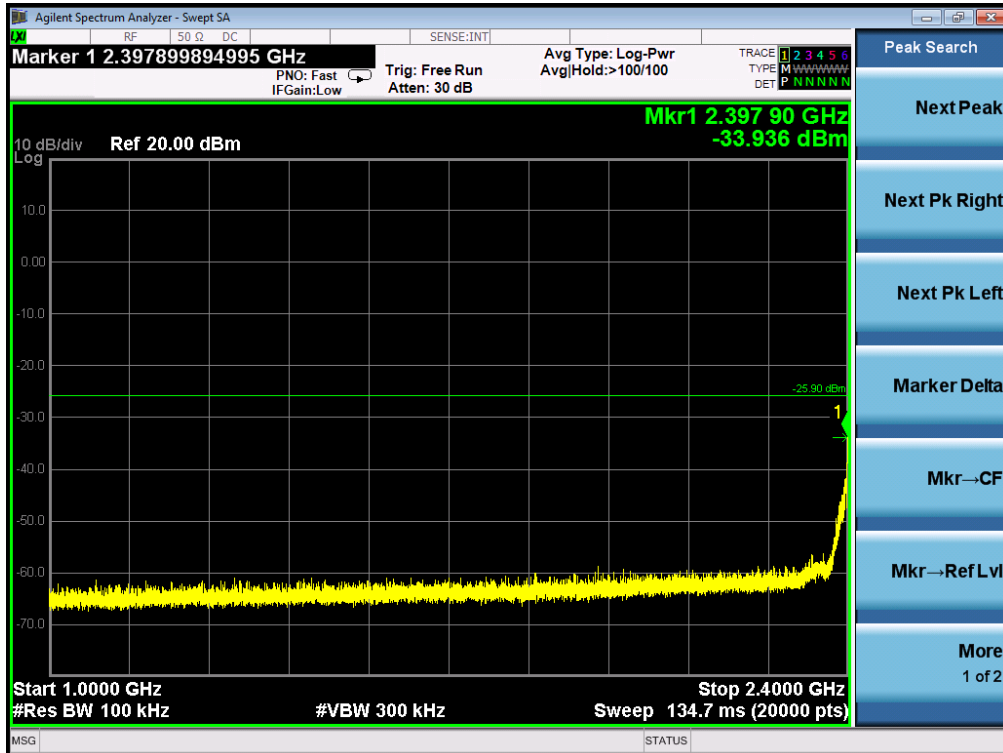
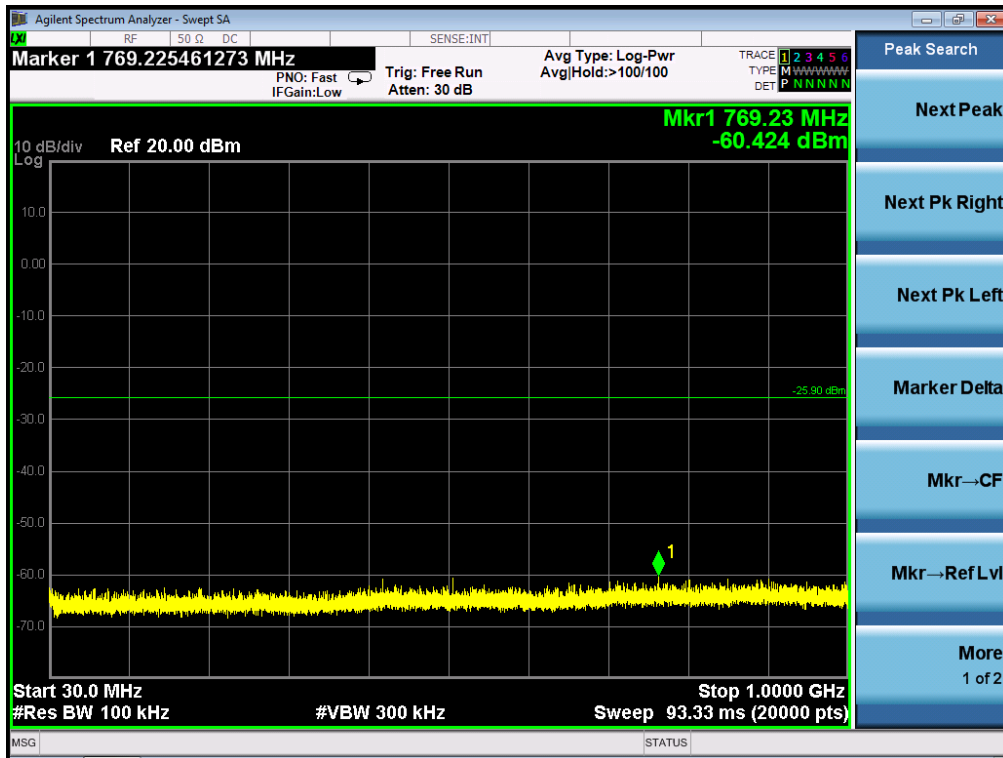


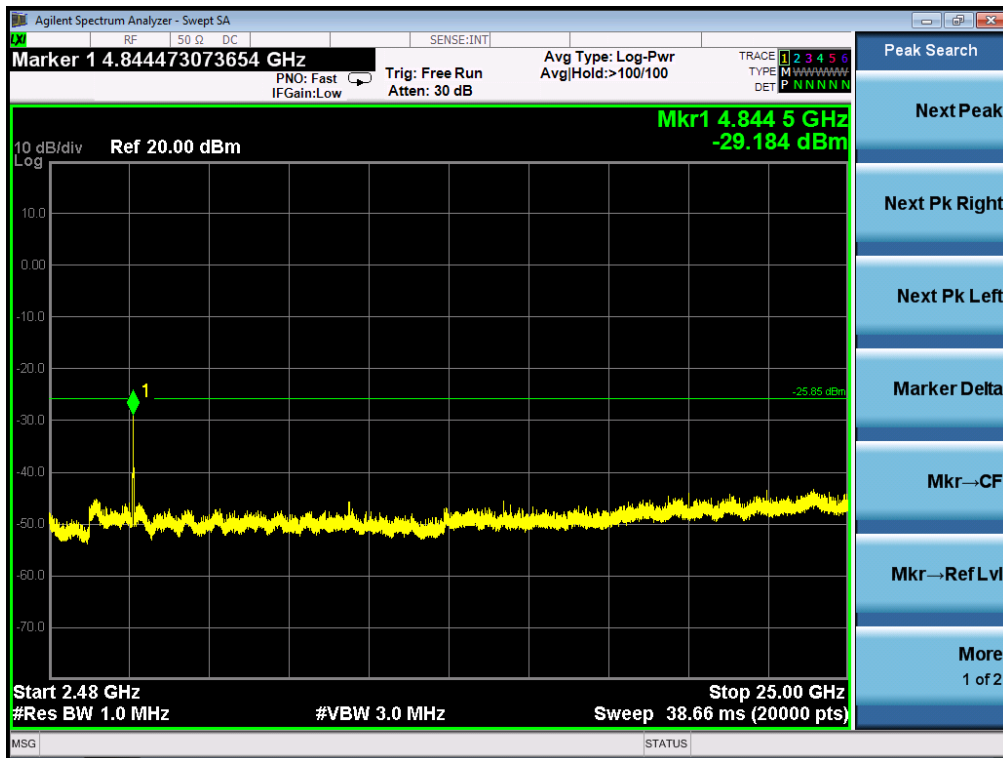
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11n20 FOR MODULATION IN HIGH CHANNEL

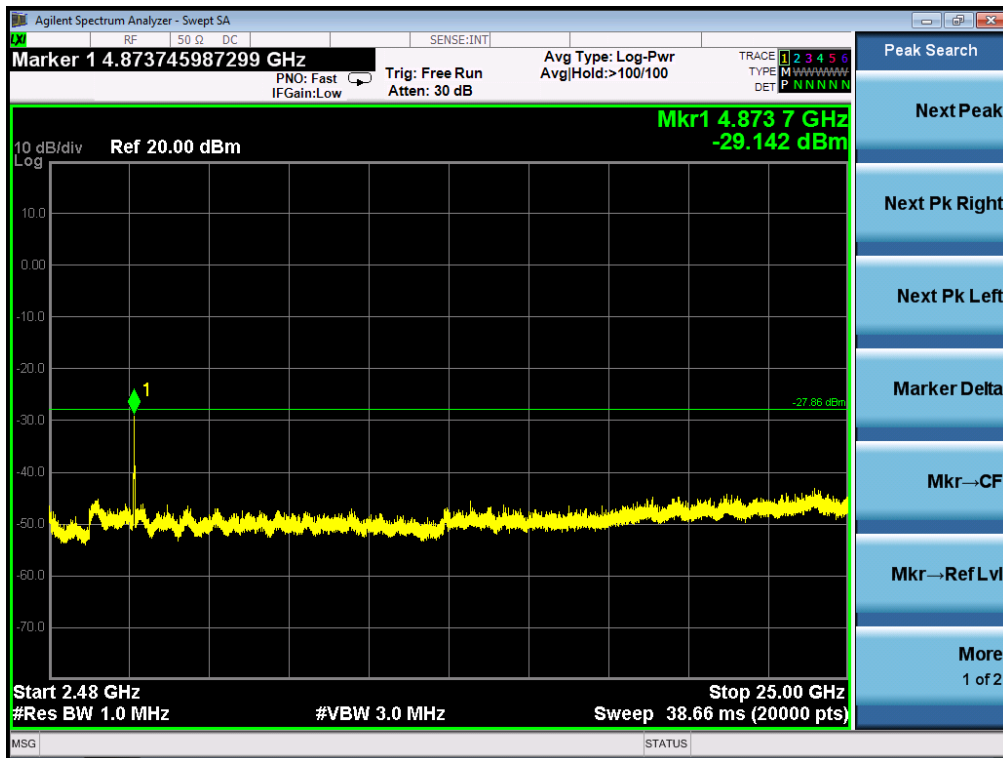


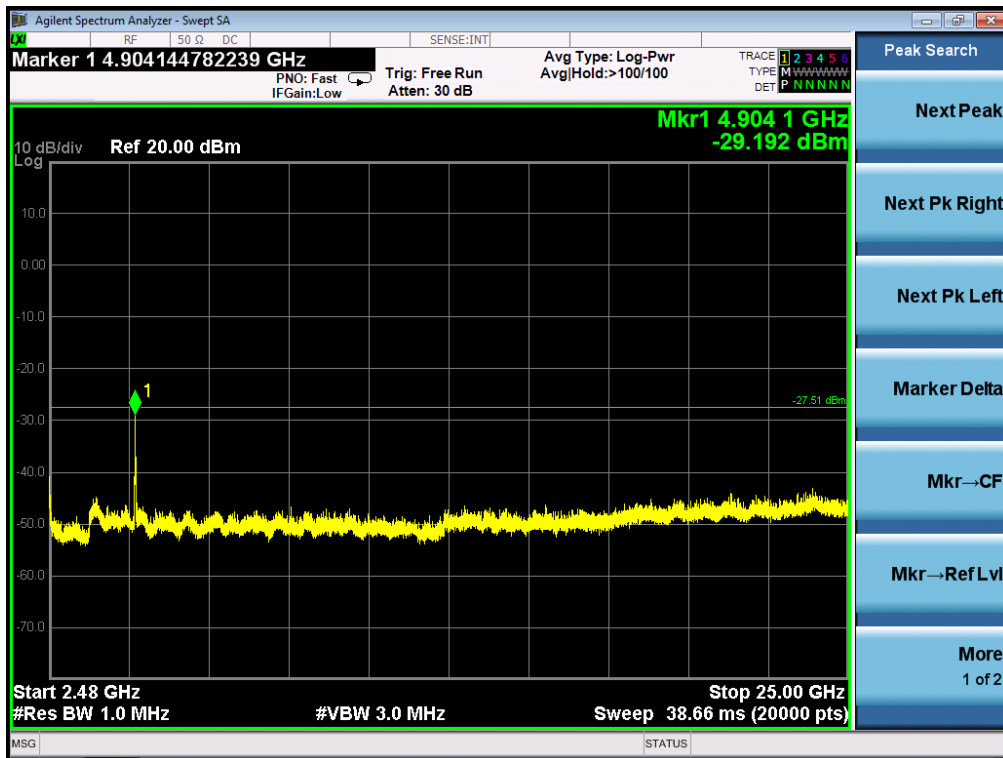


TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11n40 FOR MODULATION IN LOW CHANNEL









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 SPA Trace 1 Max hold, then View.

Note: The method of AVGPS-1 in the KDB 558074 item 10.3 was used in this testing.

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

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

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-14.296	8	Pass
Middle Channel	-16.297	8	Pass
High Channel	-15.604	8	Pass

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

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-16.584	8	Pass
Middle Channel	-15.821	8	Pass
High Channel	-15.384	8	Pass

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

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-16.701	8	Pass
Middle Channel	-15.766	8	Pass
High Channel	-15.178	8	Pass

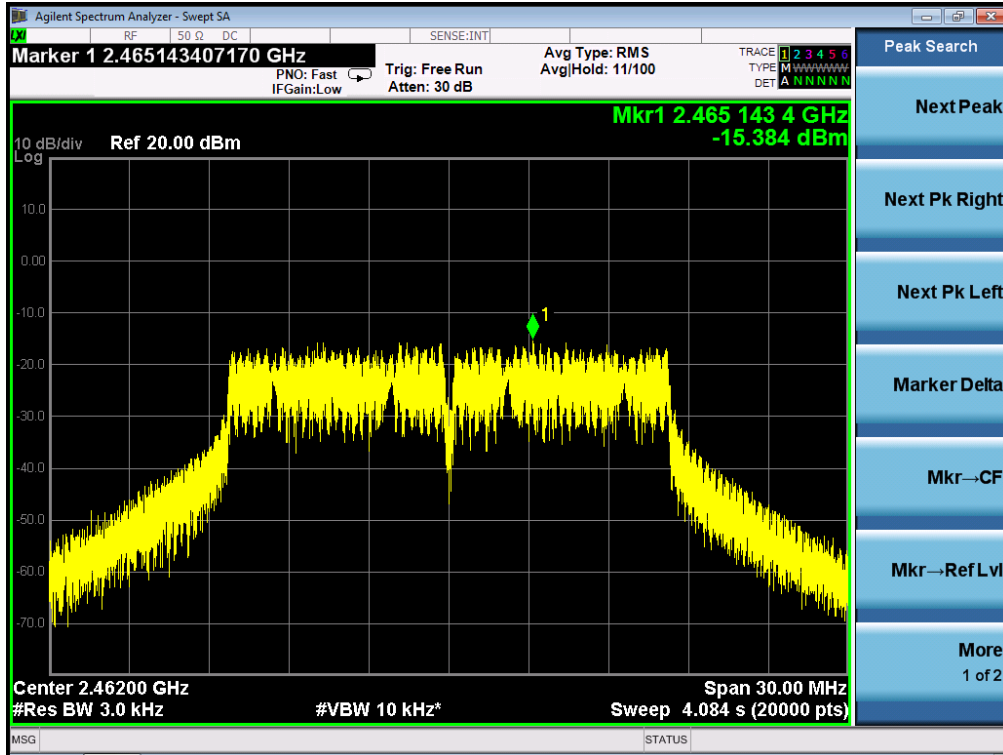
TEST ITEM	POWER PECTRAL DENSITY
TEST MODE	802.11n40 with data rate 13.5

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-19.171	8	Pass
Middle Channel	-20.619	8	Pass
High Channel	-19.793	8	Pass

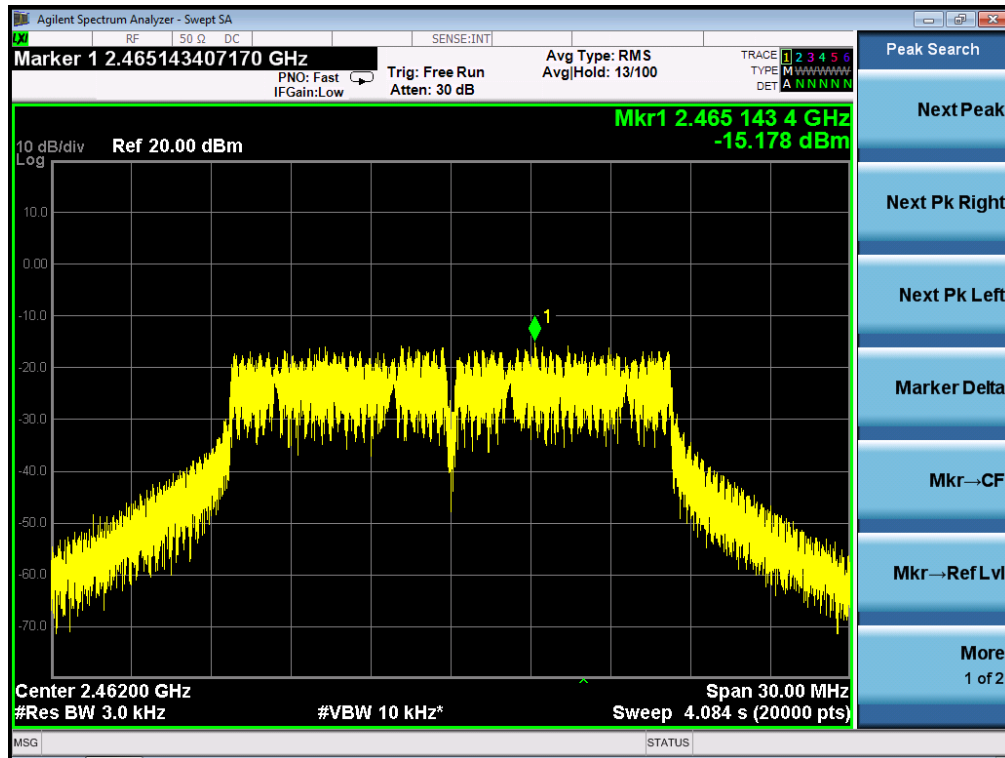
TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



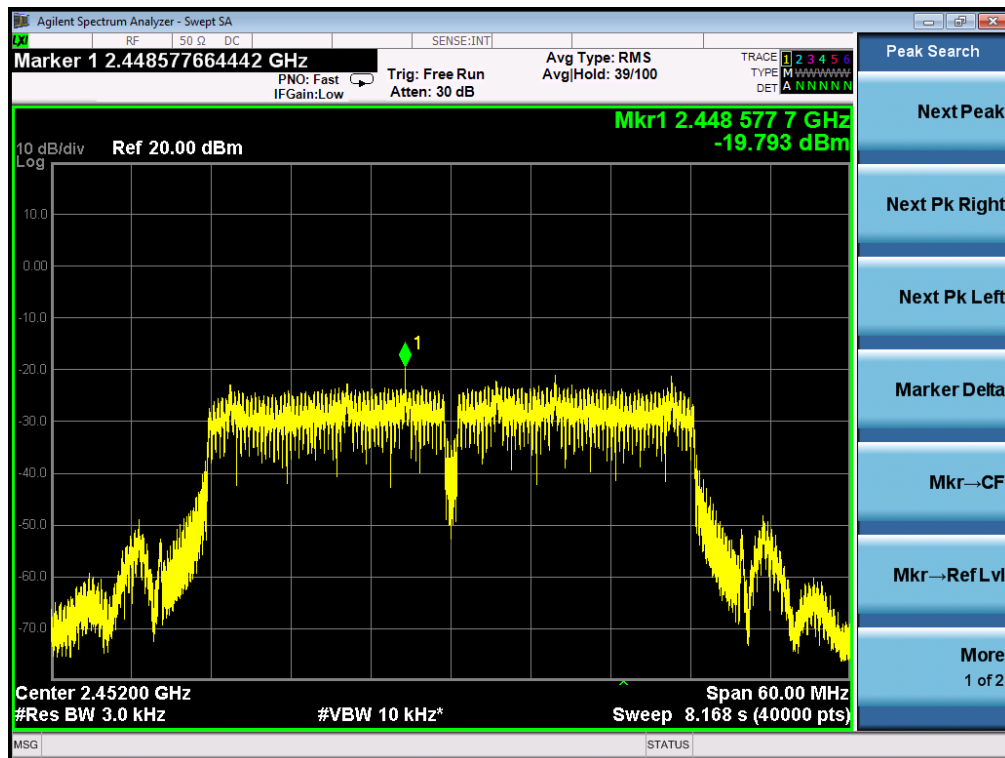
TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



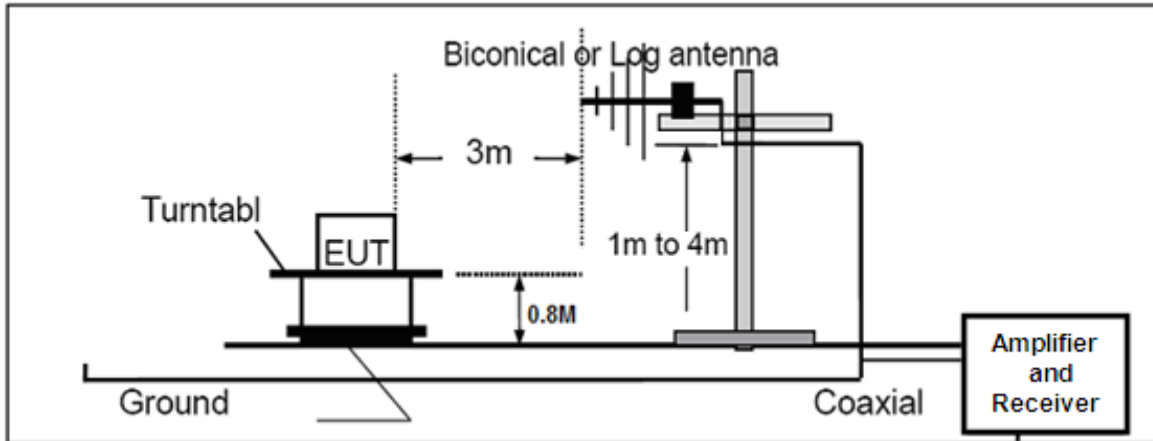
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

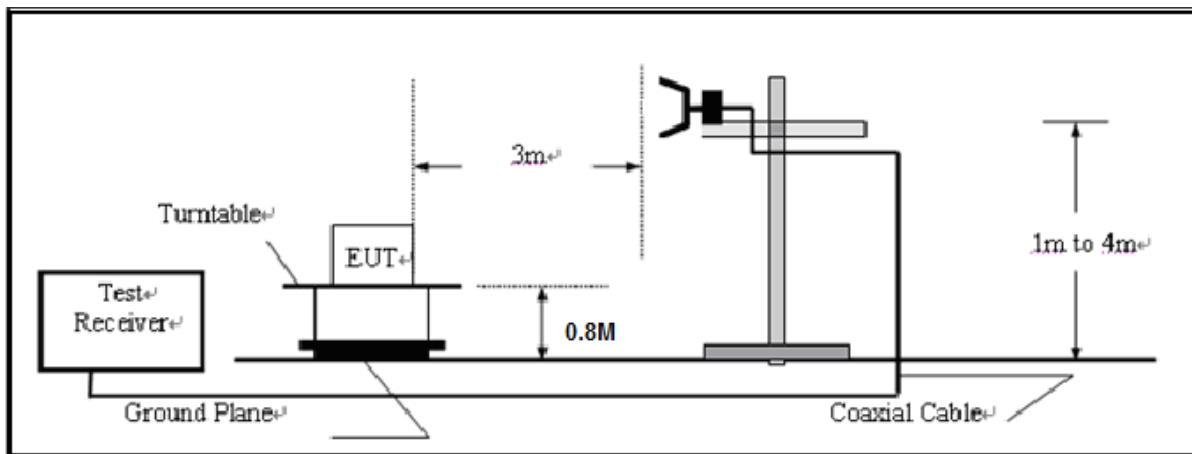
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 emissions, 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 VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
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 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/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.

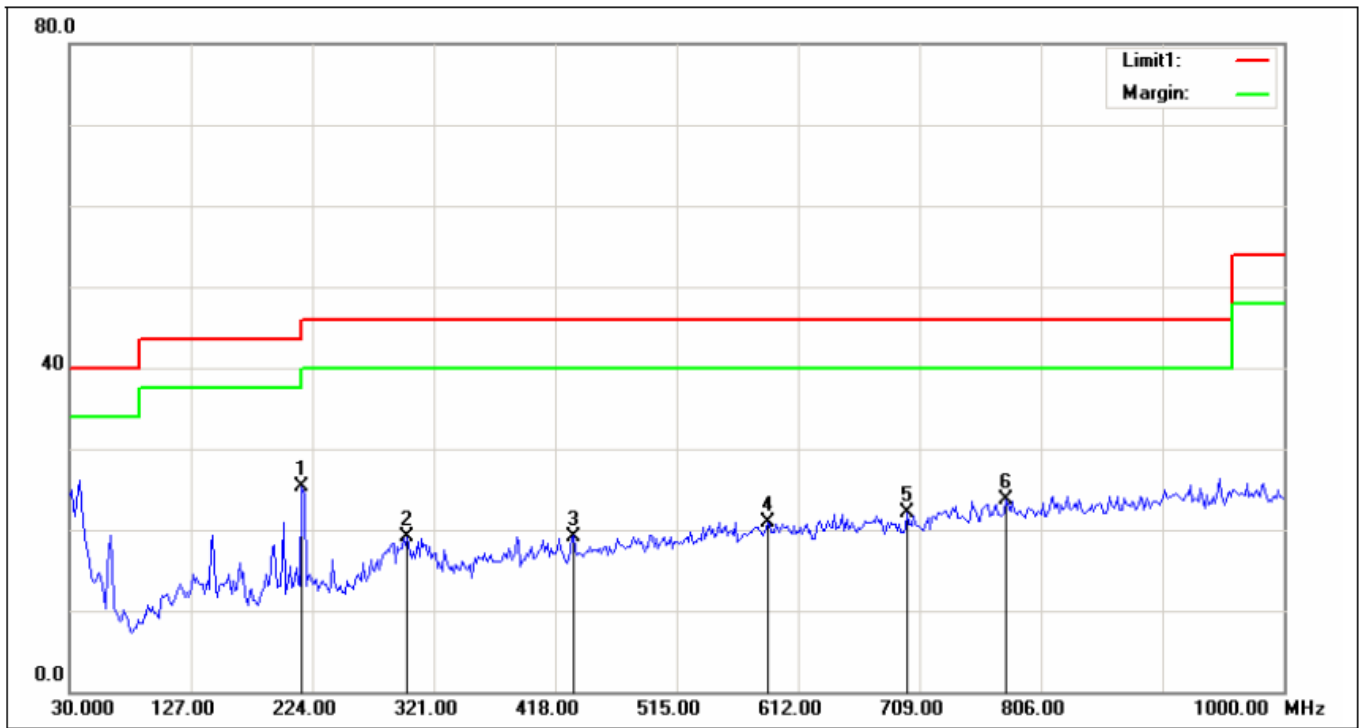
11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

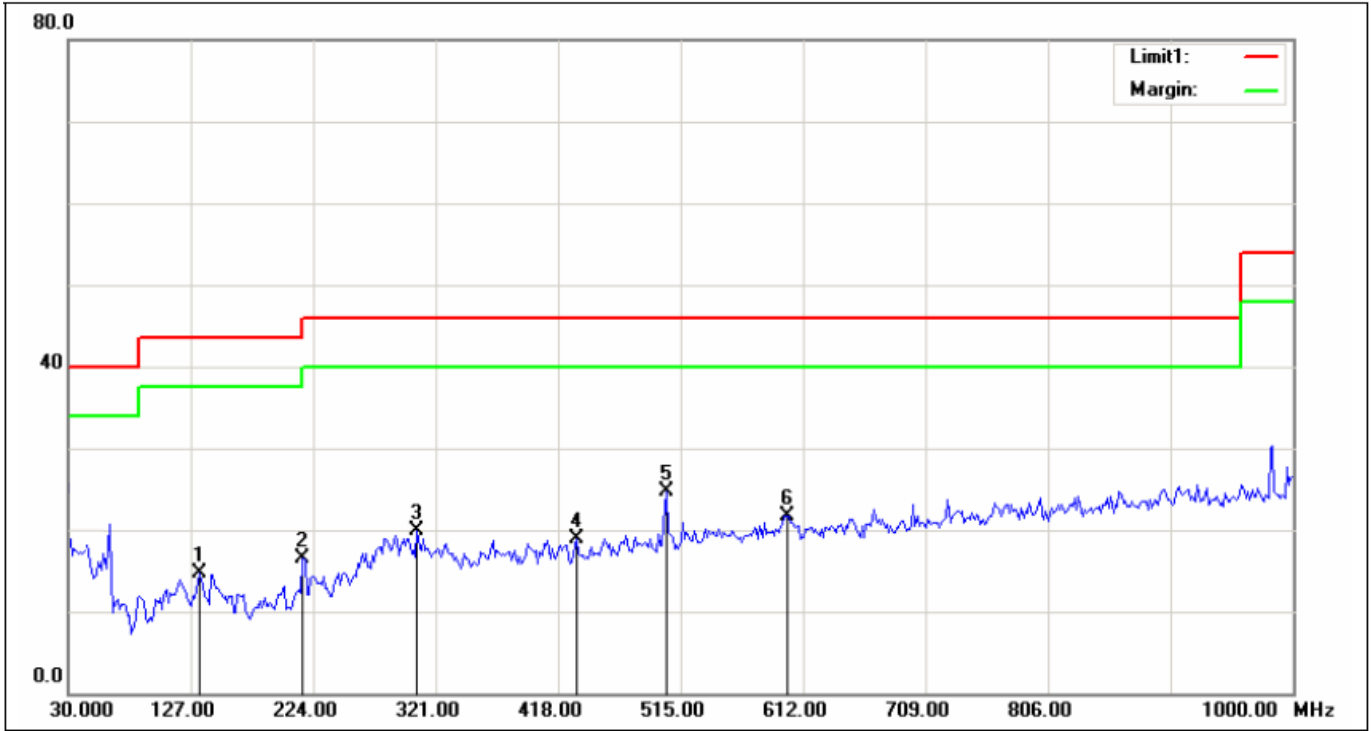
EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1*	215.9167	46.18	-20.82	25.36	43.50	-18.14			peak
2	299.9833	38.75	-19.57	19.18	46.00	-26.82			peak
3	432.5500	34.81	-15.61	19.20	46.00	-26.80			peak
4	587.7500	34.02	-13.06	20.96	46.00	-25.04			peak
5	699.3000	34.14	-11.96	22.18	46.00	-23.82			peak
6	778.5167	34.99	-11.21	23.78	46.00	-22.22			peak

RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ	Antenna	Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	133.4667	35.64	-20.92	14.72	43.50	-28.78			peak
2	215.9167	37.42	-20.82	16.60	43.50	-26.90			peak
3	306.4500	39.28	-19.32	19.96	46.00	-26.04			peak
4	432.5500	34.54	-15.61	18.93	46.00	-27.07			peak
5*	503.6833	39.04	-14.32	24.72	46.00	-21.28			peak
6	599.0667	34.60	-12.89	21.71	46.00	-24.29			peak

RESULT: PASS

Note:

1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
2. The “Factor” value can be calculated automatically by software of measurement system.
3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.

RADIATED EMISSION ABOVE 1GHZ

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Value Type
4824.112	44.89	3.72	48.61	74	-25.39	peak
4824.069	40.37	3.72	44.09	54	-9.91	AVG
7236.112	40.27	8.15	48.42	74	-25.58	peak
7236.120	36.14	8.15	44.29	54	-9.71	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Value Type
4824.034	44.21	3.72	47.93	74	-26.07	peak
4824.080	39.48	3.72	43.2	54	-10.8	AVG
7236.103	40.57	8.15	48.72	74	-25.28	peak
7236.028	36.51	8.15	44.66	54	-9.34	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHZ	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4874.115	44.28	3.75	48.03	74	-25.97	peak
4874.077	39.15	3.75	42.9	54	-11.1	AVG
7311.042	40.36	8.16	48.52	74	-25.48	peak
7311.063	36.32	8.16	44.48	54	-9.52	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHZ	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4874.120	44.58	3.75	48.33	74	-25.67	peak
4874.075	39.21	3.75	42.96	54	-11.04	AVG
7311.118	40.42	8.16	48.58	74	-25.42	peak
7311.057	36.51	8.16	44.67	54	-9.33	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHZ	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Value Type
4924.056	44.86	3.81	48.67	74	-25.33	peak
4924.091	40.28	3.81	44.09	54	-9.91	AVG
7386.040	40.24	8.19	48.43	74	-25.57	peak
7386.110	36.72	8.19	44.91	54	-9.09	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHZ	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Value Type
4924.071	44.39	3.81	48.2	74	-25.8	peak
4924.044	40.08	3.81	43.89	54	-10.11	AVG
7386.048	40.25	8.19	48.44	74	-25.56	peak
7386.111	36.23	8.19	44.42	54	-9.58	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RESULT: PASS

Note:

Other emission from 1G to 25 GHz are considered as ambient noise. No recording in the test report.
 Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.
 The "Factor" value can be calculated automatically by software of measurement system.
 All test modes had been pre-tested. The 802.11b mode is the worst case and recorded in the report.

12. BAND EDGE EMISSION

12.1. MEASUREMENT PROCEDURE

Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

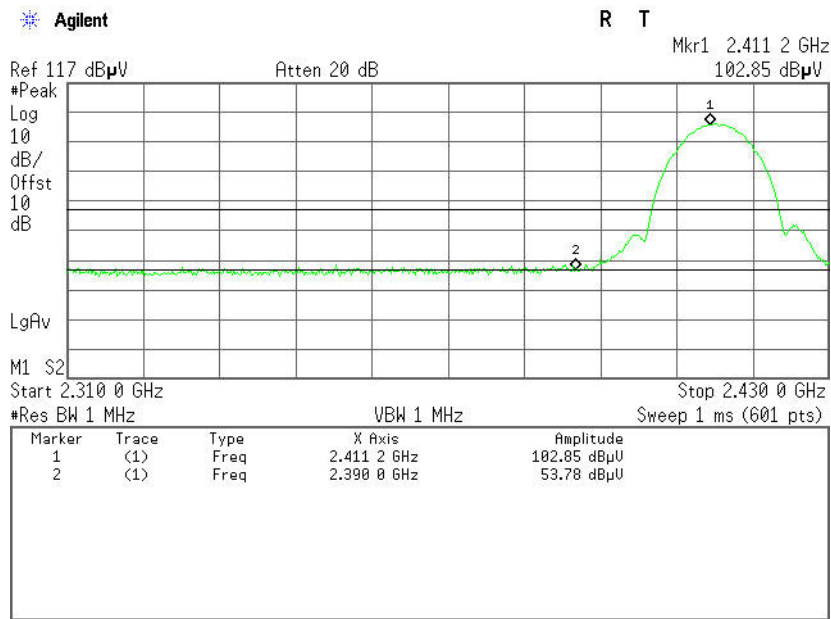
12.2. TEST SET-UP

same as 11.2

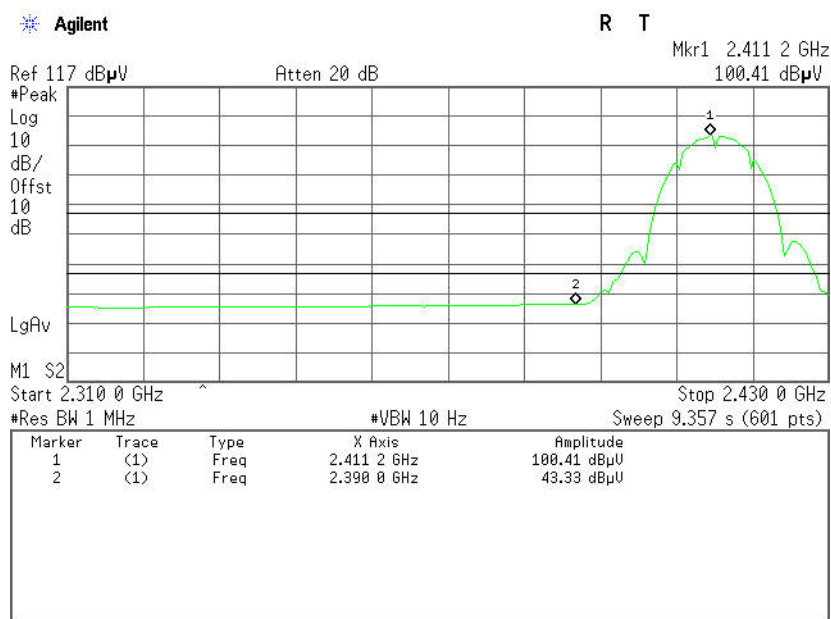
12.3. Test Result

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Horizontal

PK



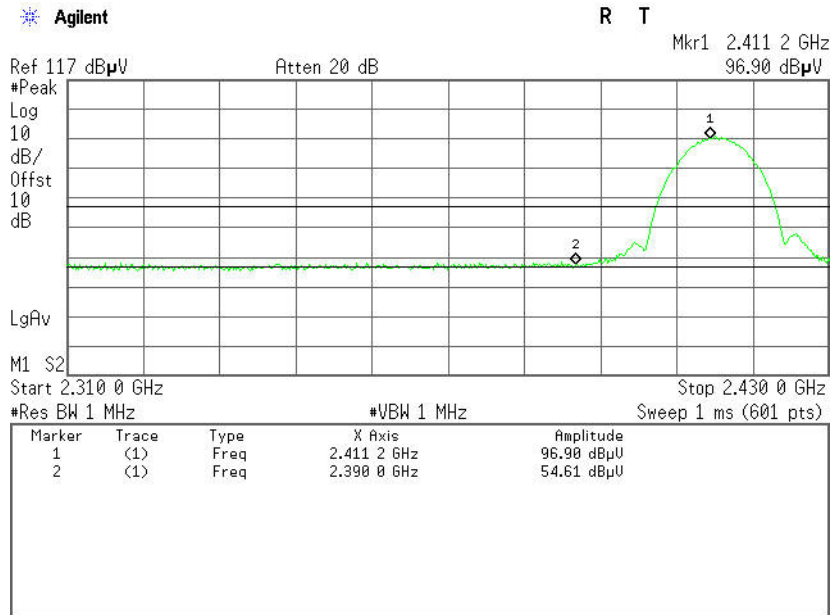
AV



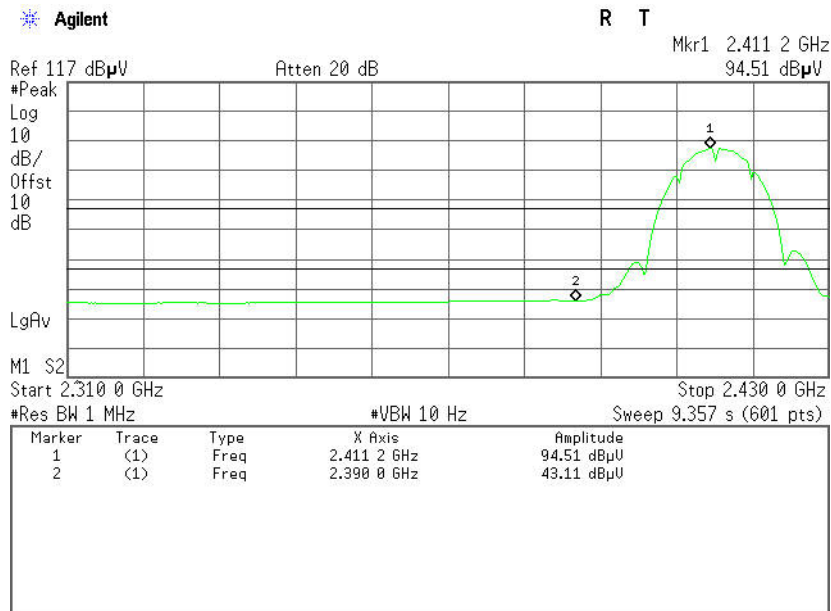
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Vertical

PK



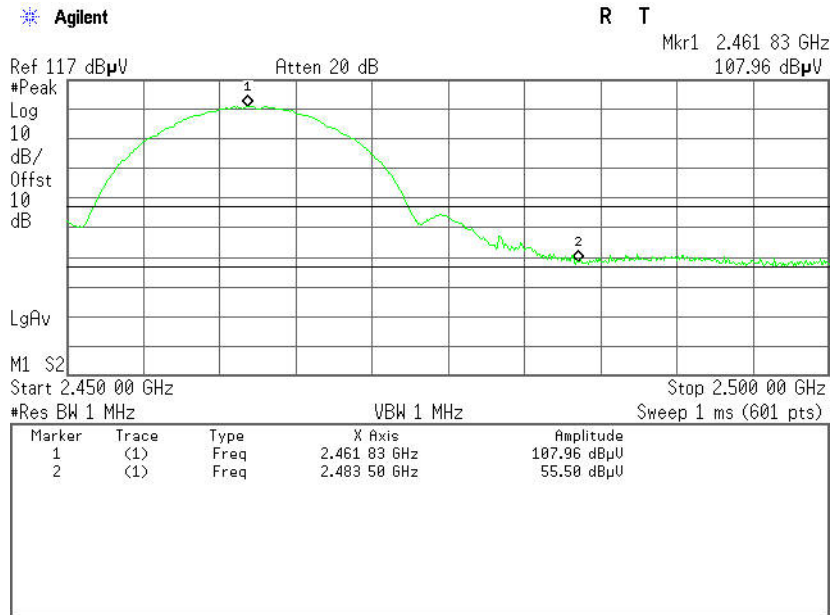
AV



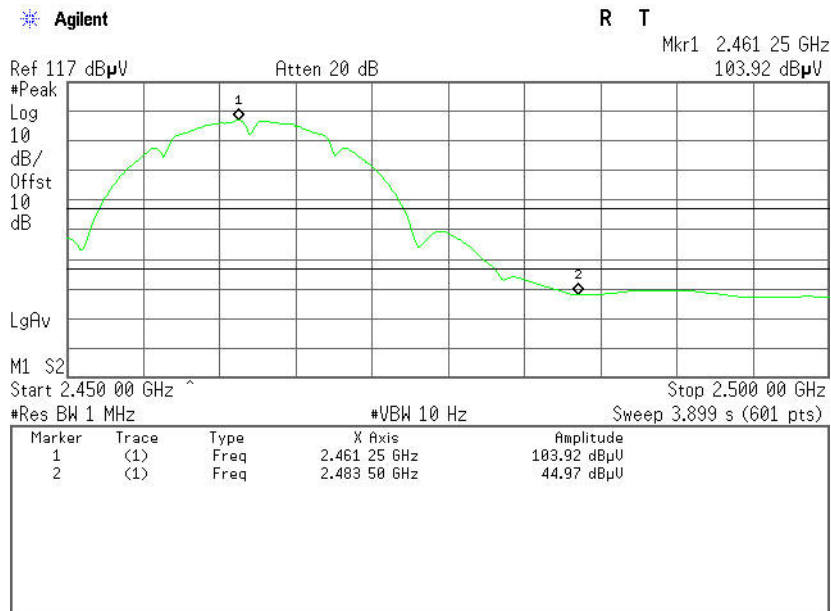
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Horizontal

PK



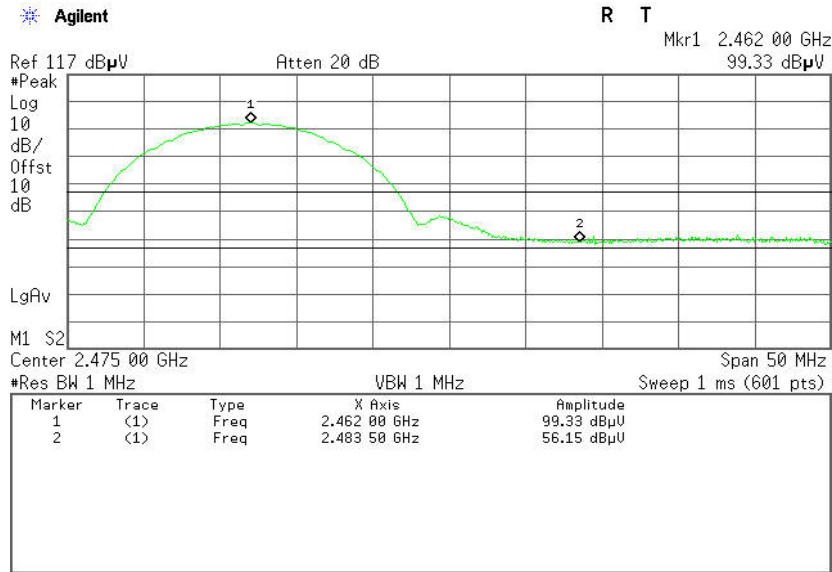
AV



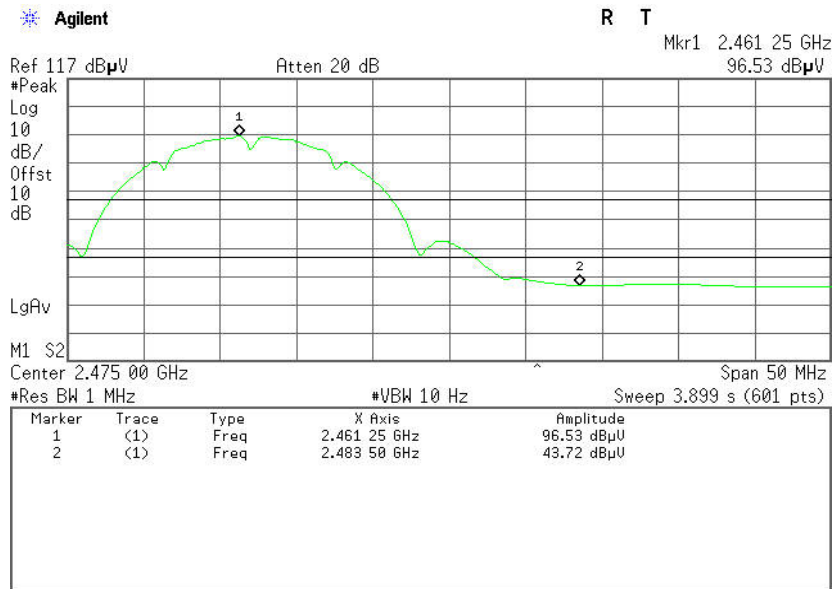
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Vertical

PK



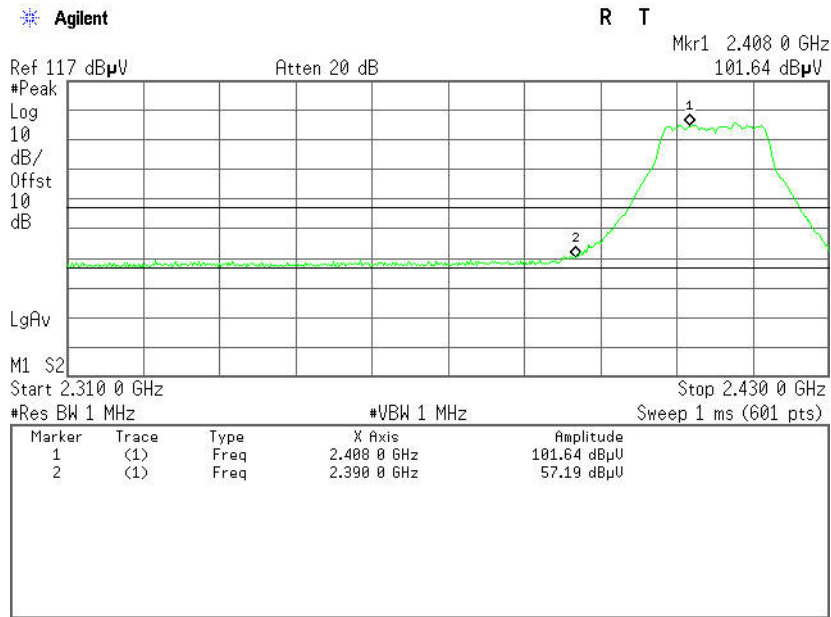
AV



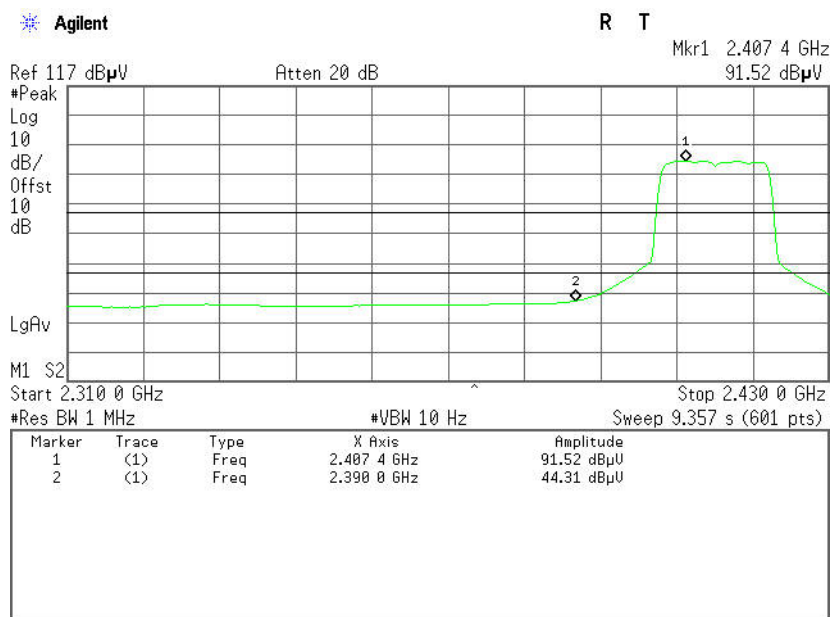
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHZ	Antenna	Horizontal

PK



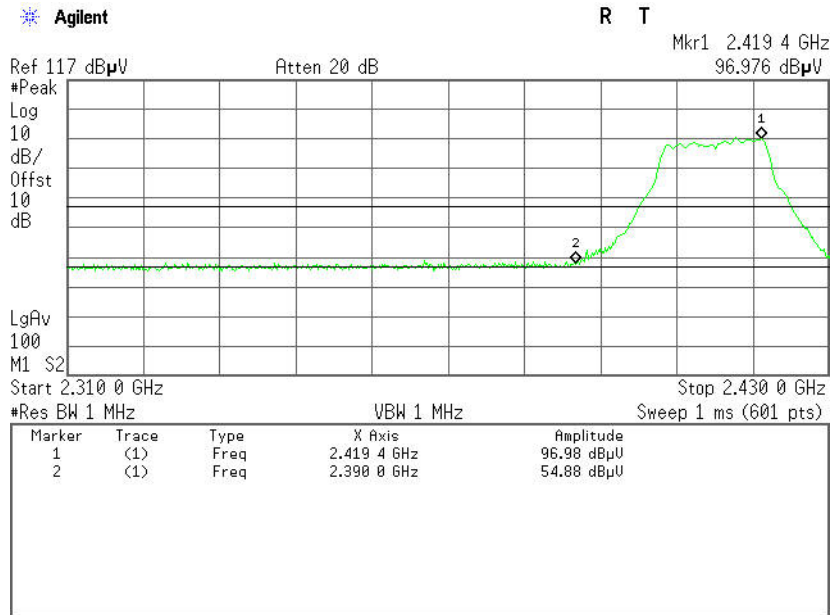
AV



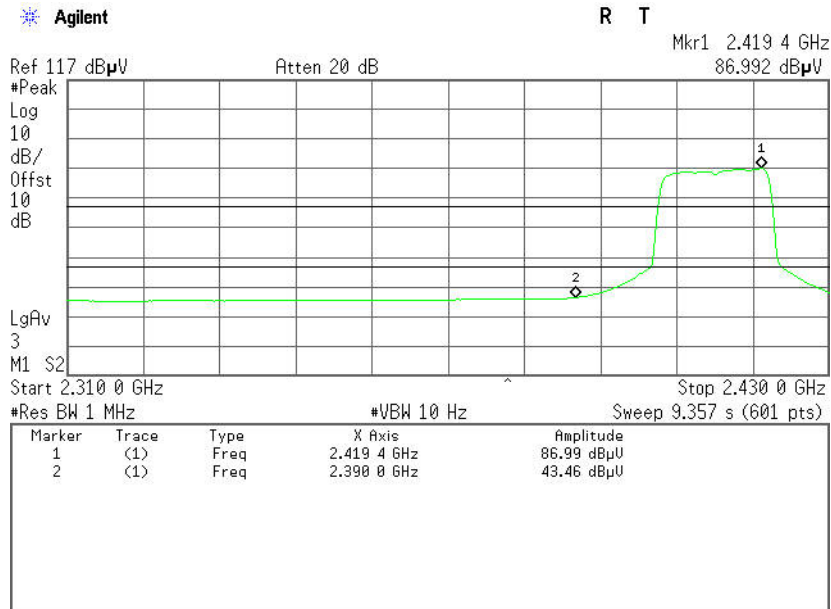
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHZ	Antenna	Vertical

PK



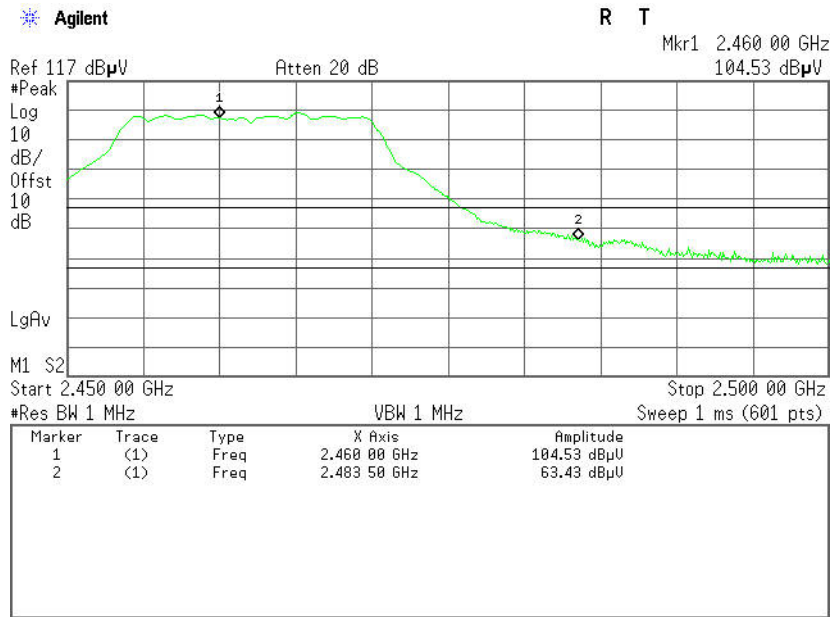
AV



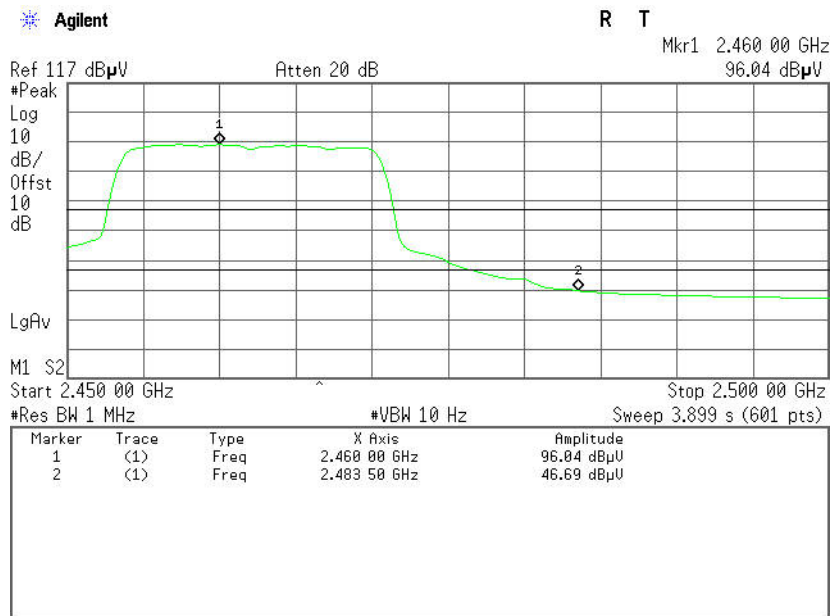
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHZ	Antenna	Horizontal

PK



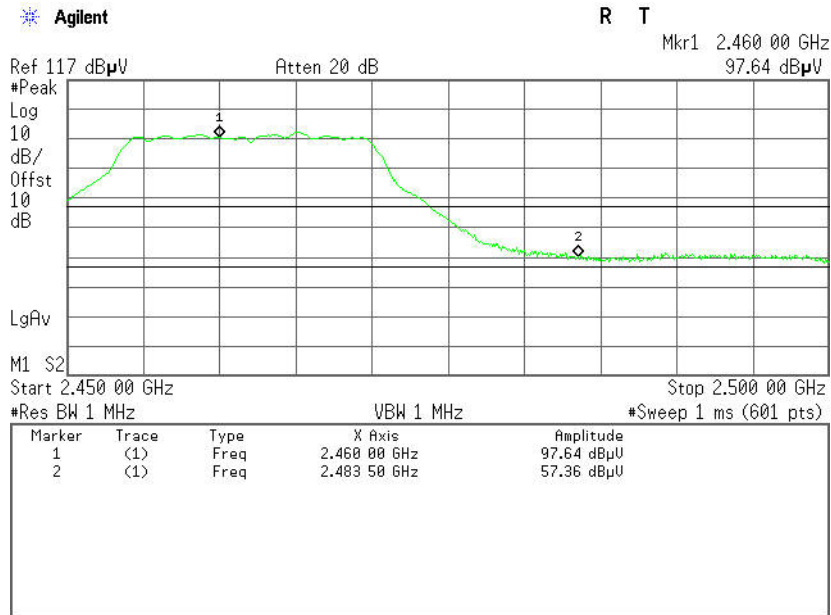
AV



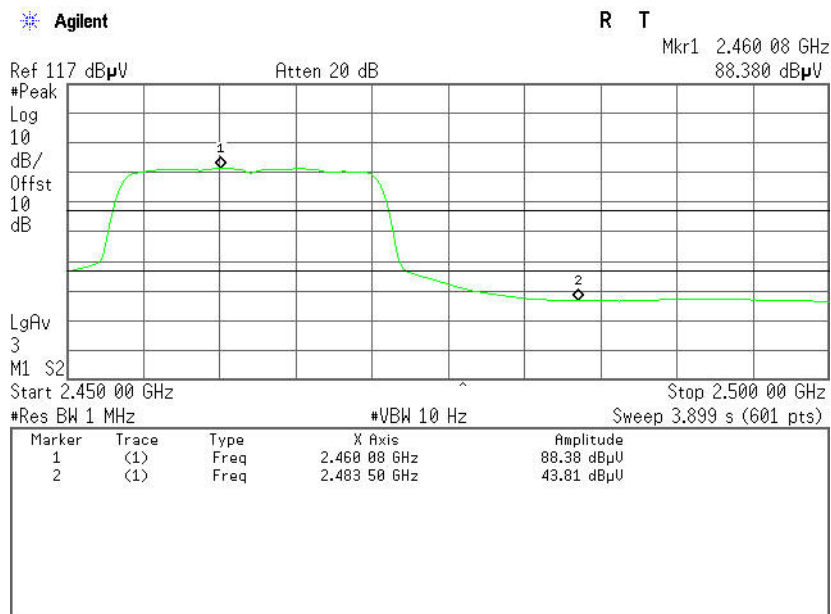
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHZ	Antenna	Vertical

PK



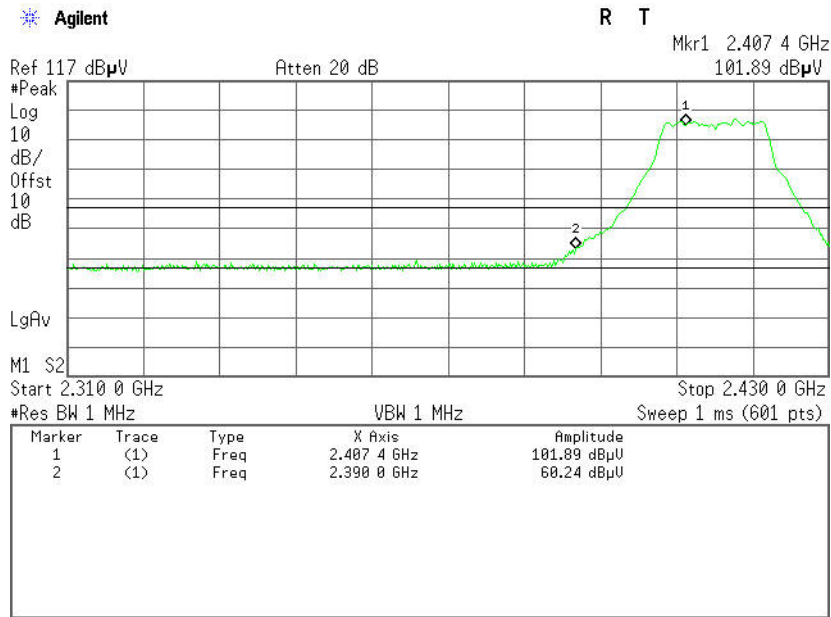
AV



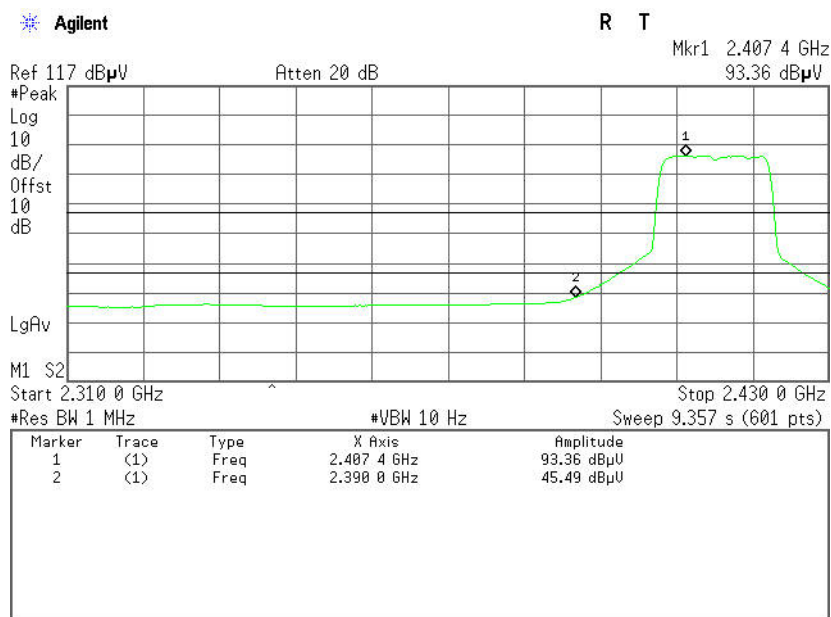
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2412MHZ	Antenna	Horizontal

PK



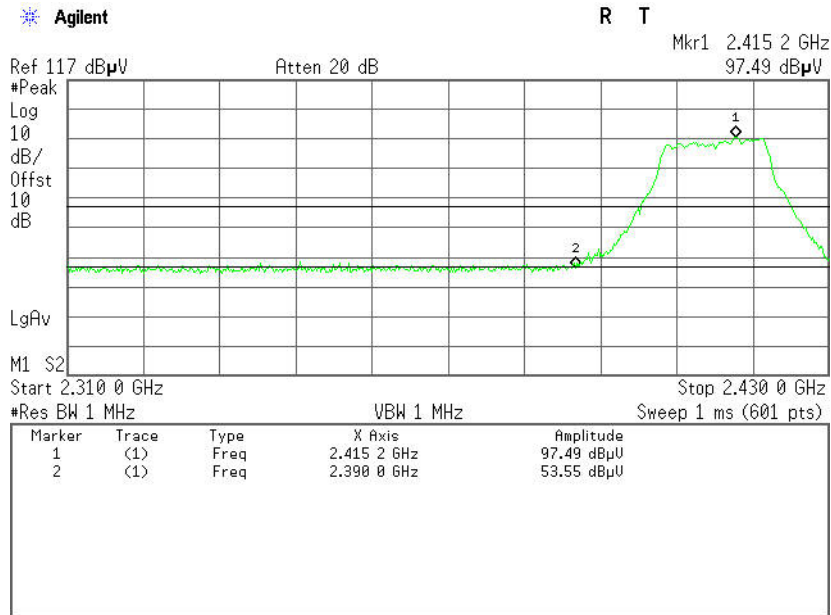
AV



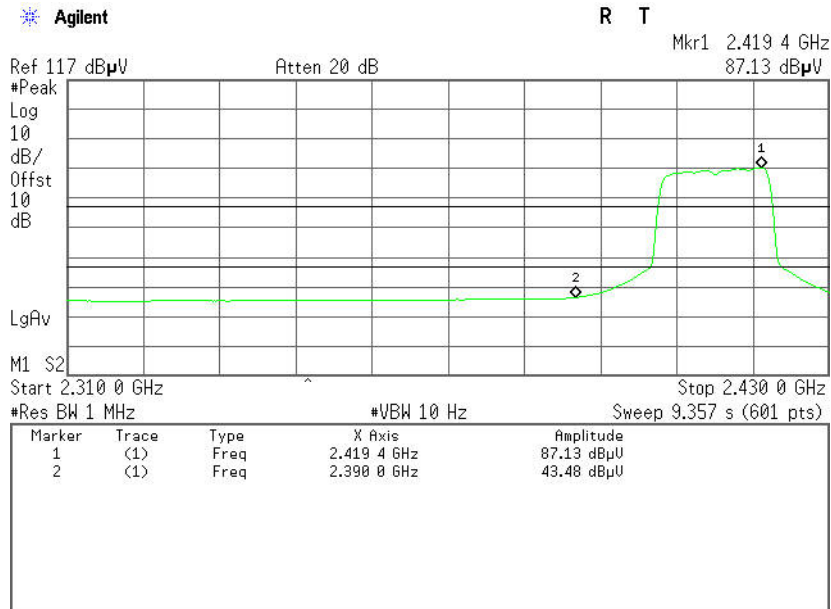
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2412MHZ	Antenna	Vertical

PK



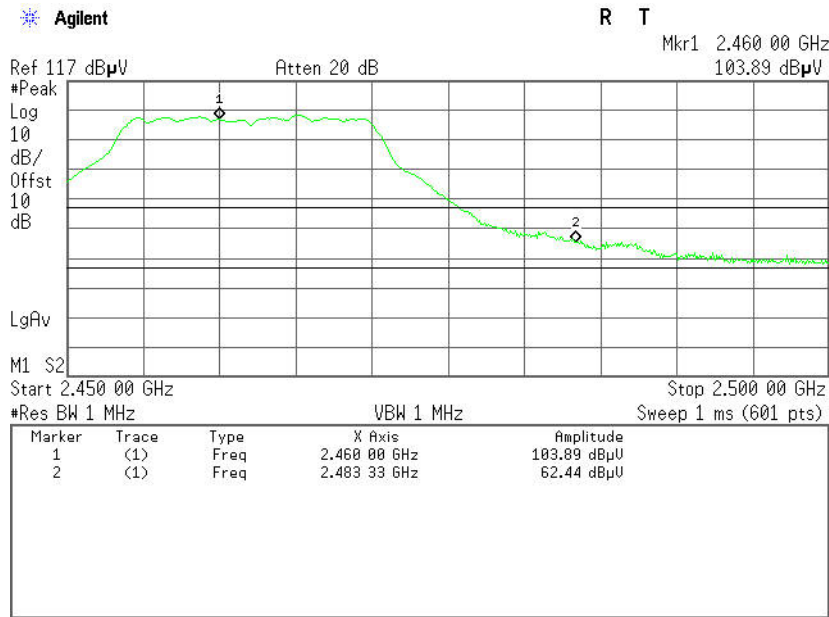
AV



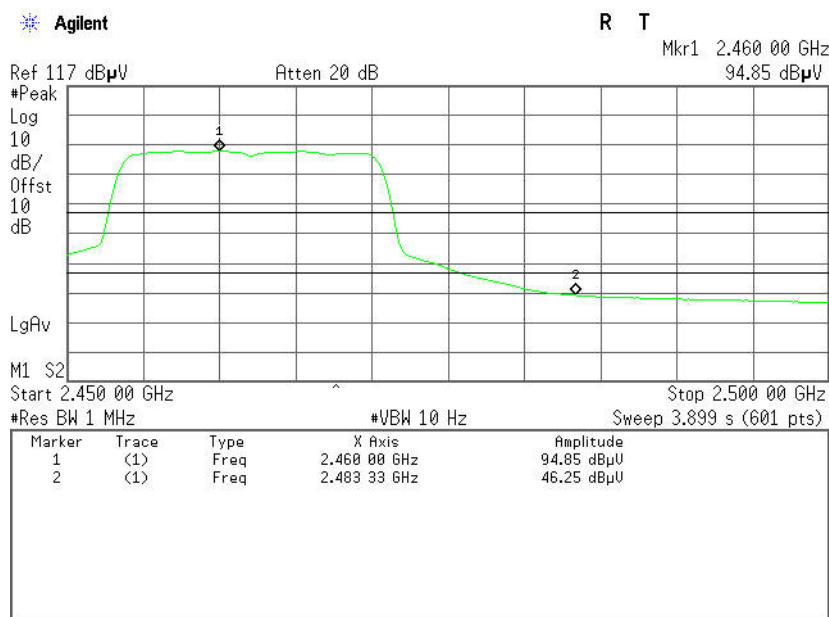
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2462MHZ	Antenna	Horizontal

PK



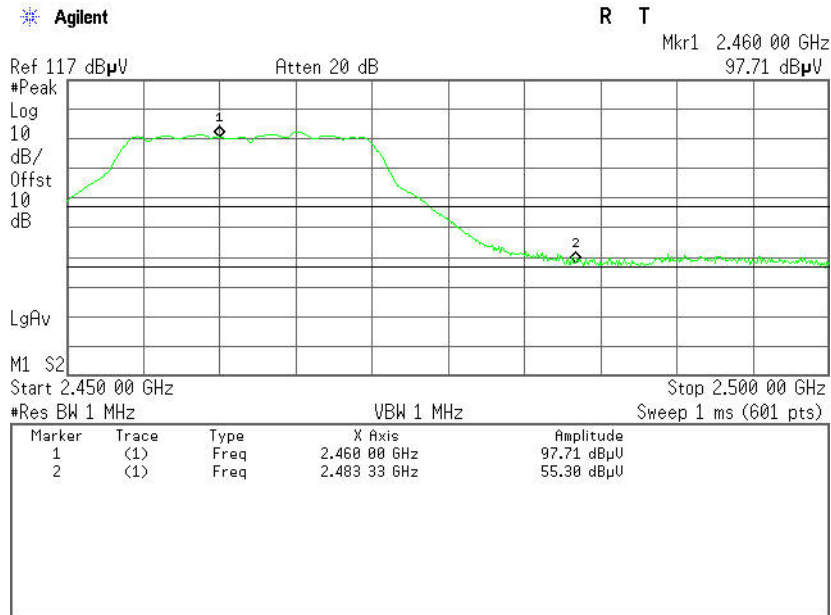
AV



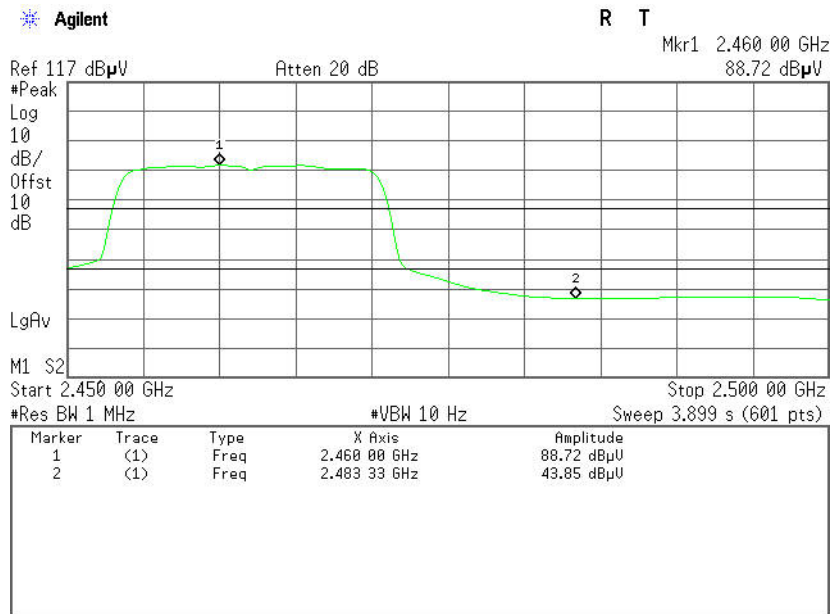
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2462MHZ	Antenna	Vertical

PK



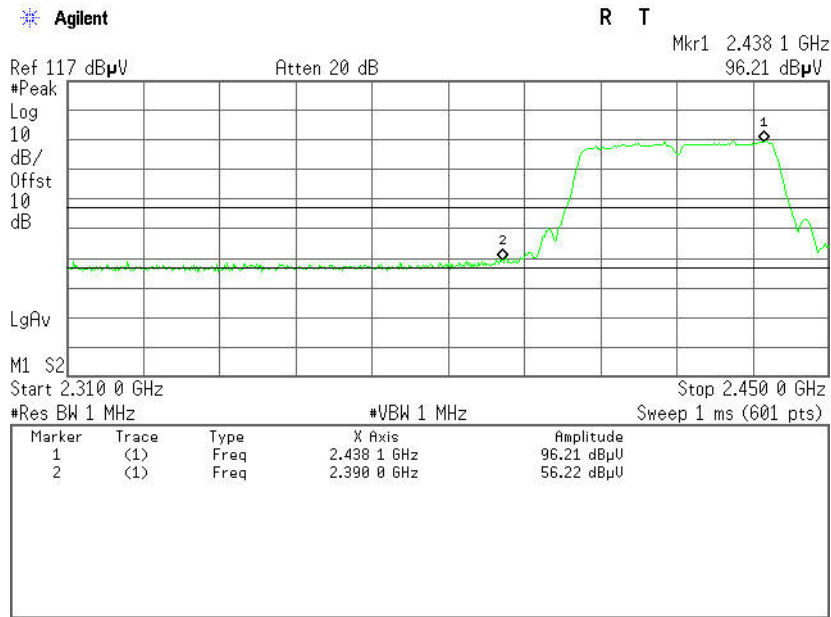
AV



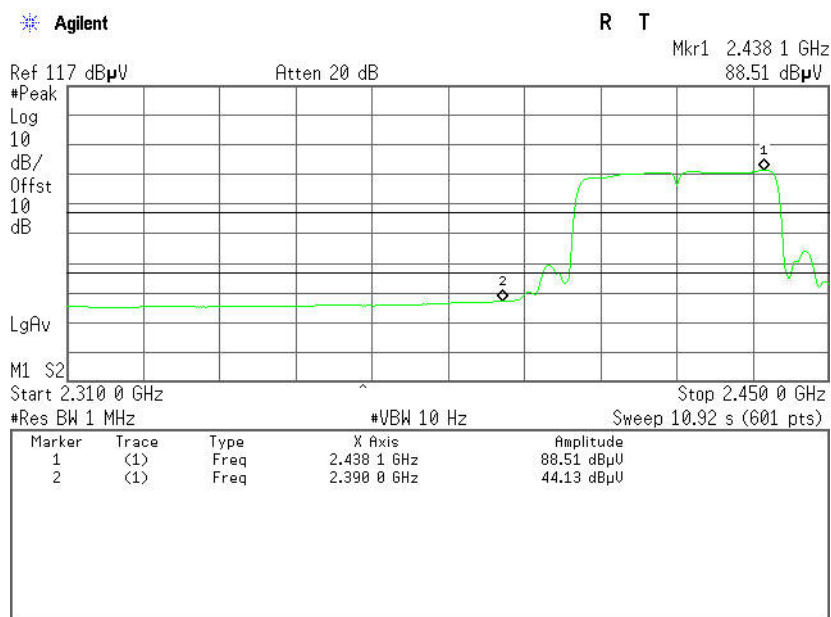
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n40 with data rate 6.5 2422MHZ	Antenna	Horizontal

PK



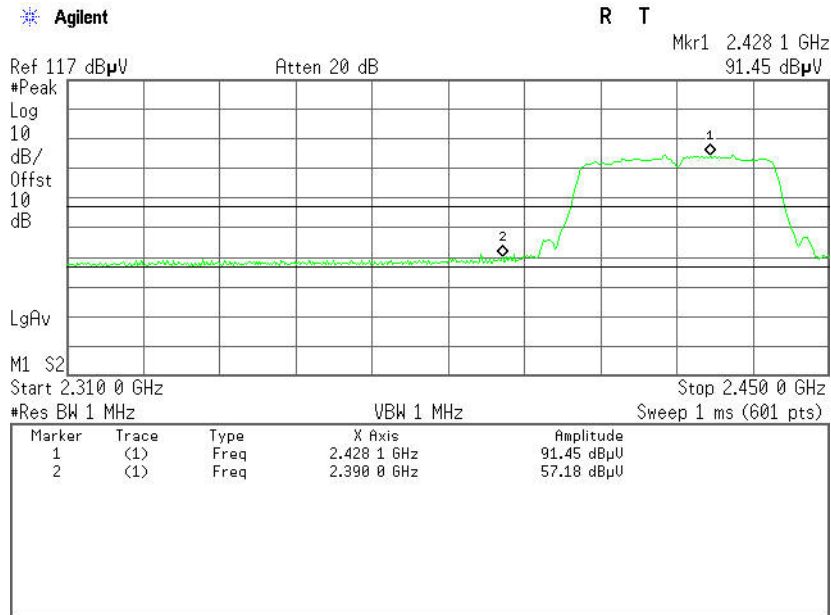
AV



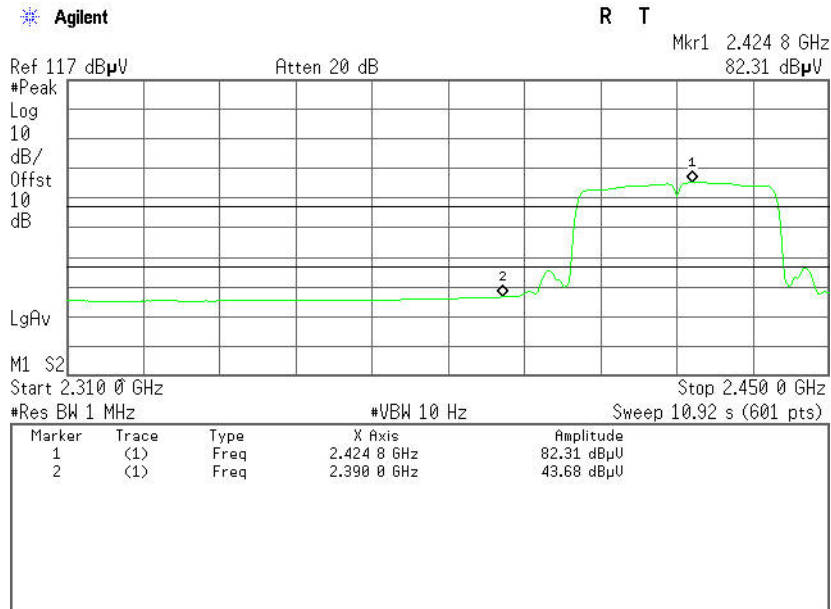
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n40 with data rate 6.5 2422MHZ	Antenna	Vertical

PK



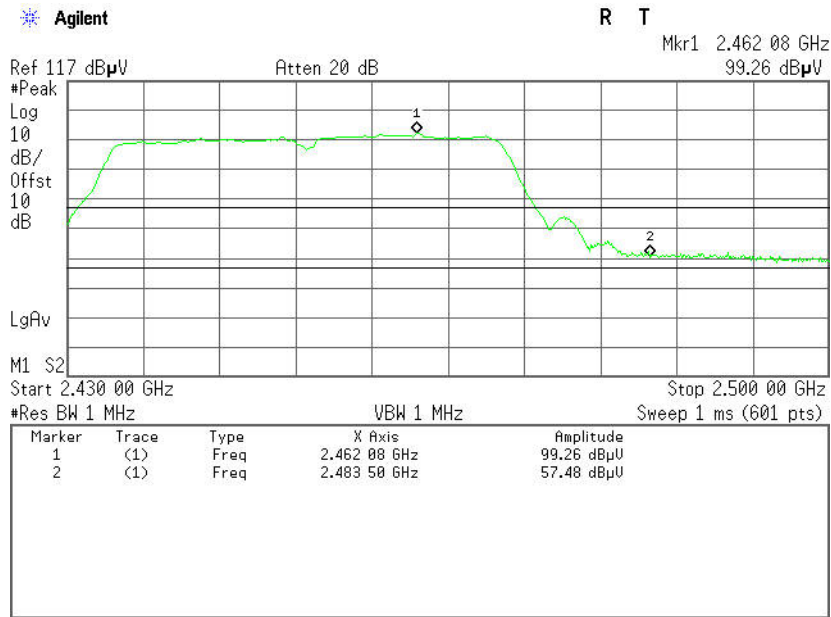
AV



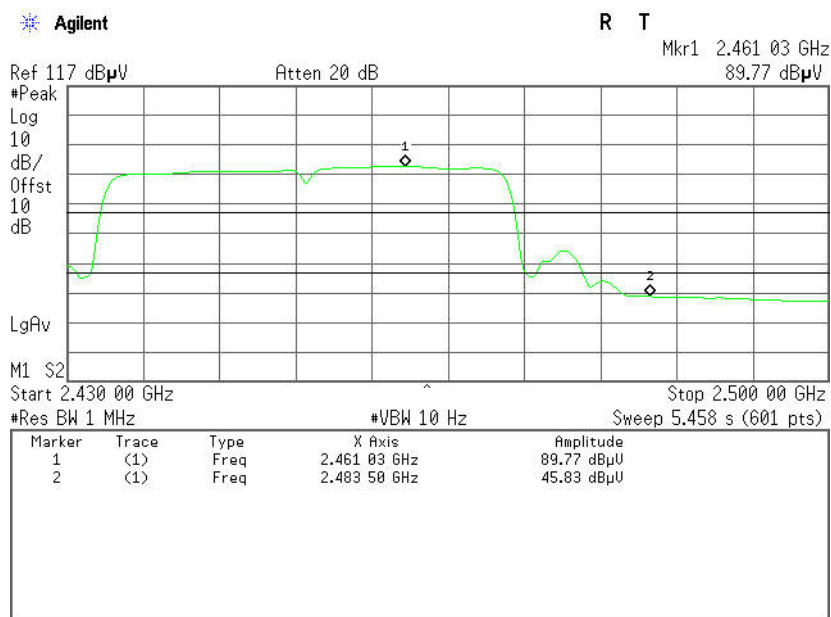
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n40 with data rate 6.5 2452MHZ	Antenna	Horizontal

PK



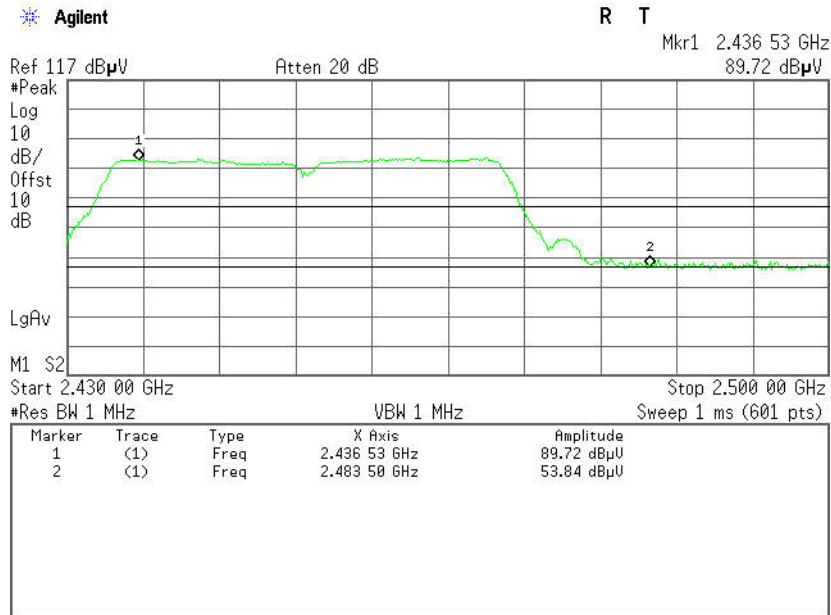
AV



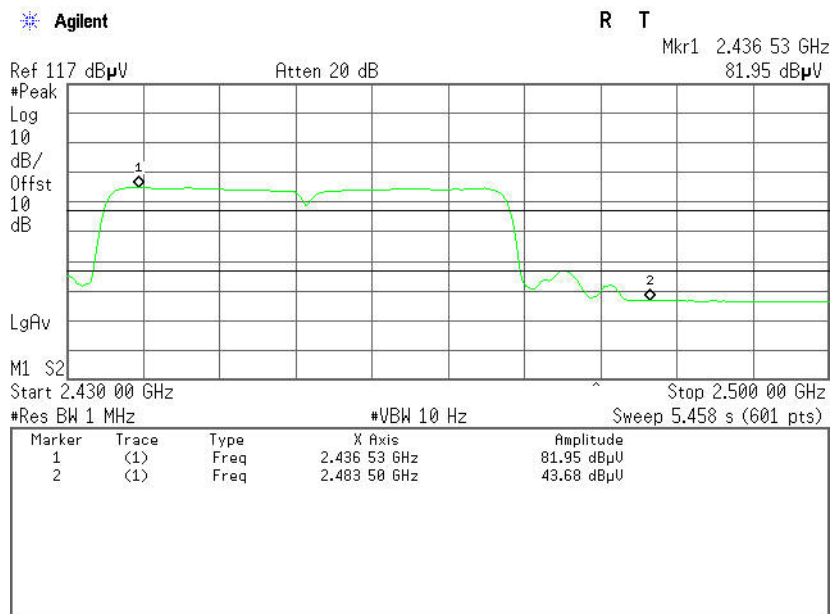
RESULT: PASS

EUT	Wi-Fi Module	Model Name	LSD4WF-2MD05101
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n40 with data rate 6.5 2452MHZ	Antenna	Vertical

PK

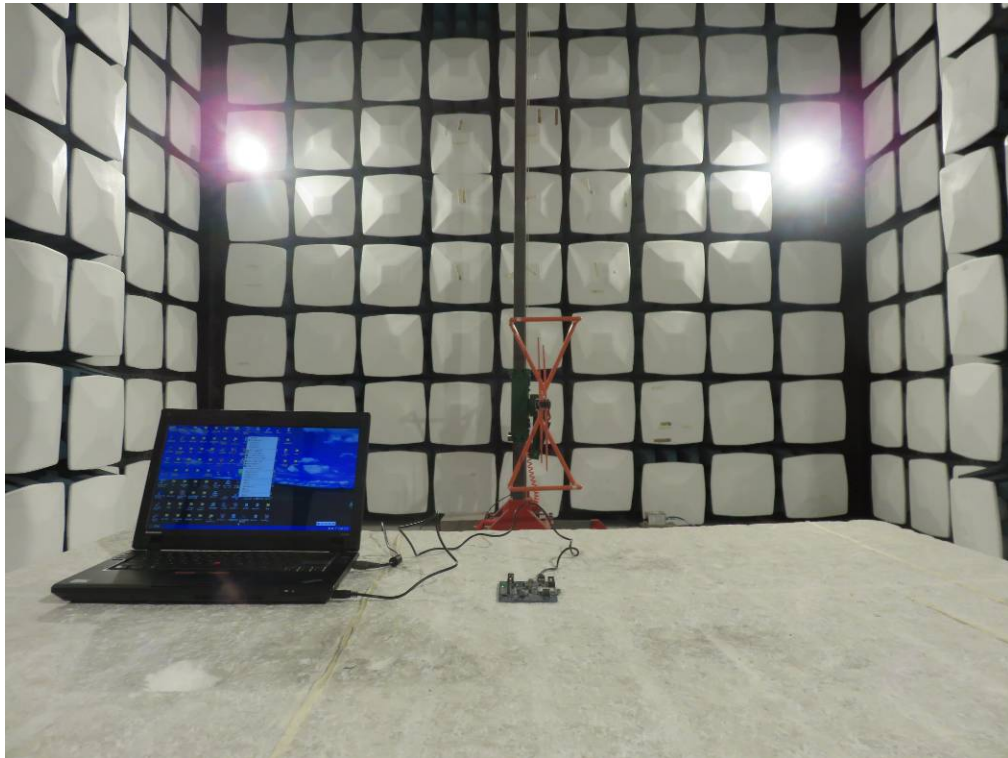


AV

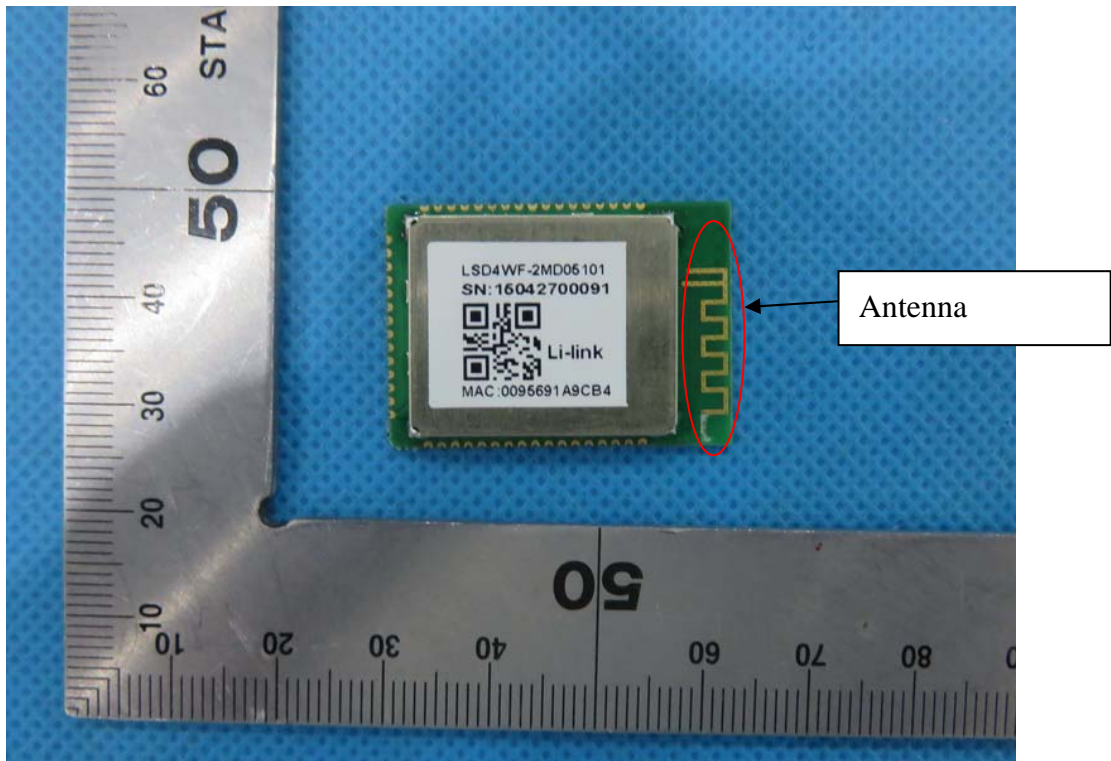


RESULT: PASS

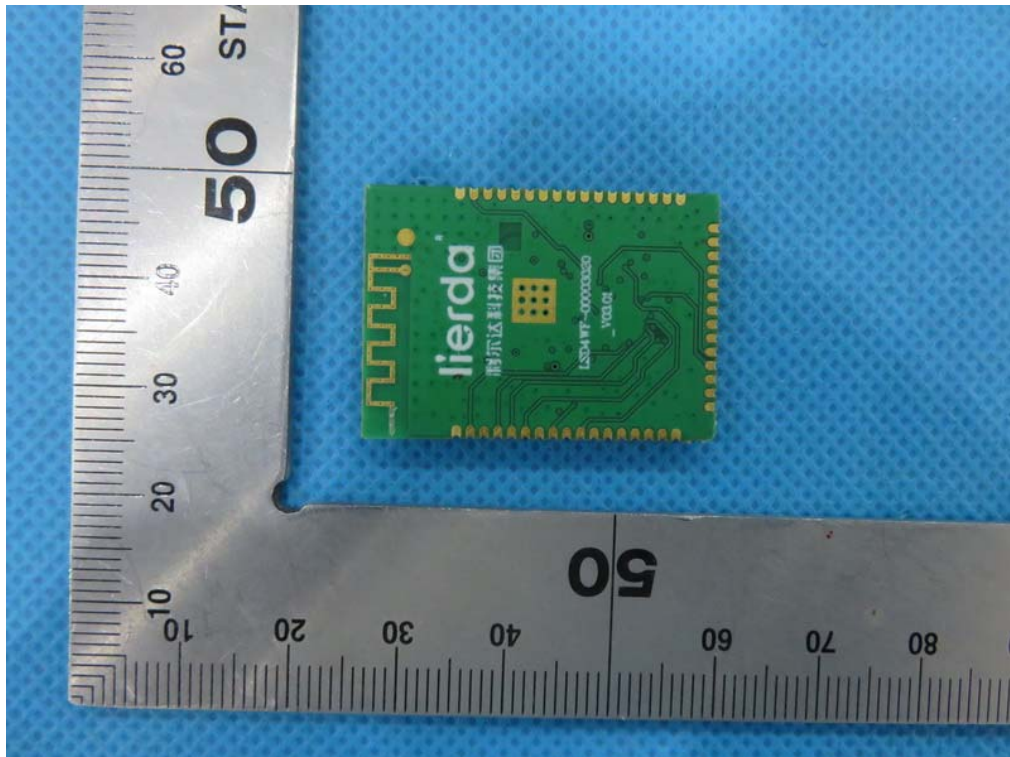
APPENDIX A: PHOTOGRAPHS OF TEST SETUP
FCC RADIATED EMISSION TEST SETUP



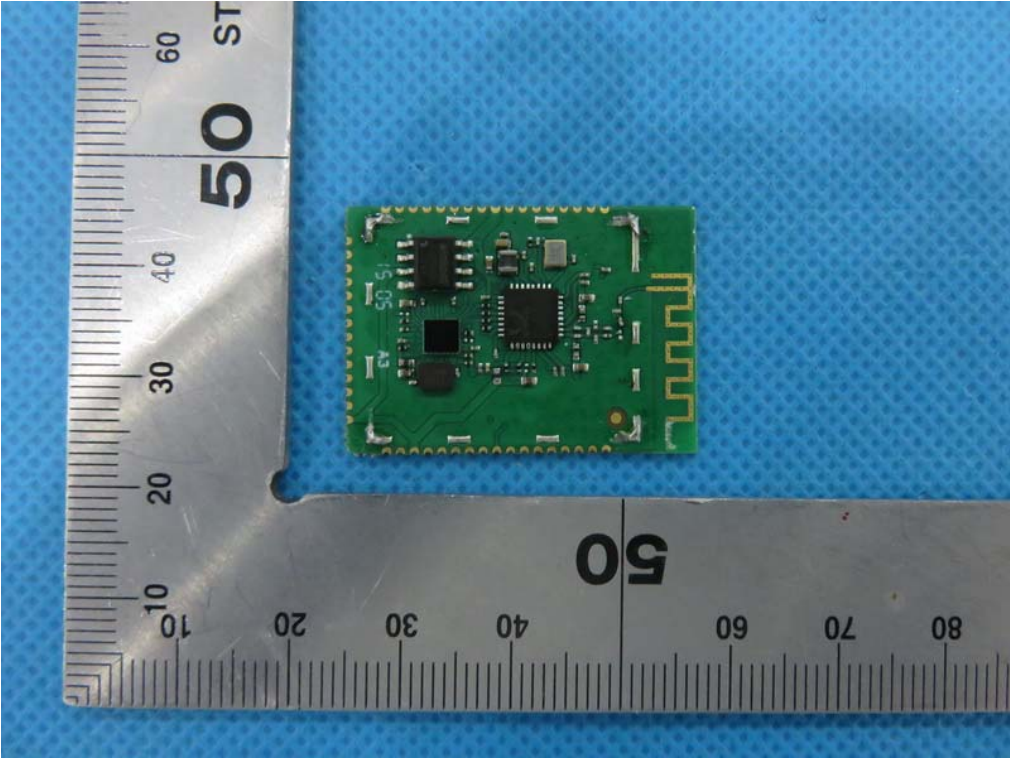
APPENDIX B: PHOTOGRAPHS OF EUT
TOP VIEW OF EUT



BOTTOM VIEW OF EUT



INTERNAL VIEW OF EUT



----END OF REPORT----