


Prüfbericht-Nr.: <i>Test Report No.:</i>	15084102 001	Auftrags-Nr.: <i>Order No.:</i>	154110603	Seite 1 von 51 <i>Page 1 of 51</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	626805	Auftragsdatum: <i>Order date:</i>	09.07.2015	
Auftraggeber: <i>Client:</i>	Murata Manufacturing Co., Ltd. 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan			
Prüfgegenstand: <i>Test item:</i>	Wi-Fi module			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	CMWC1ZZABJ FCC ID: VPYCMABJ IC: 772C-CMABJ			
Auftrags-Inhalt: <i>Order content:</i>	Complete test			
Prüfgrundlage: <i>Test specification:</i>	FCC CFR47 Part 15, Subpart C Section 15.247 ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v03r03 RSS-Gen Issue 4, November 2014 RSS-247 Issue 1, May 2015			
Wareneingangsdatum: <i>Date of receipt:</i>	11.06.2015			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000213021-001			
Prüfzeitraum: <i>Testing period:</i>	19.06.2015 - 23.06.2015			
Ort der Prüfung: <i>Place of testing:</i>	MRT Technology (Suzhou) Co., Ltd			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
30.06.2015 Adrian Shi / PE Datum Name / Stellung Unterschrift Date Name / Position Signature		30.06.2015 Shi Li / Reviewer Datum Name / Stellung Unterschrift Date Name / Position Signature		
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

V04

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 PEAK OUTPUT POWER

RESULT: Pass

5.1.3 6dB BANDWIDTH AND 99% BANDWIDTH

RESULT: Pass

5.1.4 CONDUCTED SPURIOUS EMISSIONS

RESULT: Pass

5.1.5 POWER SPECTRAL DENSITY

RESULT: Pass

5.1.6 SPURIOUS EMISSION

RESULT: Pass

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1. General Remarks

1.1 Complementary Materials

None.

2. Test Sites

2.1 Test Facilities

MRT Technology (Suzhou) Co., Ltd.

D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 809388.

The Industry Canada has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance. The description of the test facility is listed under chambers filing number 11384A.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Conducted Emissions

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2015/11/07
Two-Line V-Network	R&S	ENV216	101683	1 year	2015/11/07
Two-Line V-Network	R&S	ENV216	101684	1 year	2015/11/07
Temperature/ Meter Humidity	Anymetre	TH101B	SR2-01	1 year	2015/11/14

Radiated Emission

Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/10/09
Preamplifier	MRT	AP01G18	1310002	1 year	2015/10/06
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	1 year	2015/11/08
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2015/11/08
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2015/11/08
Broadband Horn Antenna	Schwarzbeck	BBHA9170	9170-549	1 year	2016/01/05
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2015/11/15

Conducted Test Equipment

Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2016/04/23
USB Wideband Power Sensor	Boonton	55006	MRTSUE06109	1 year	2015/10/15
Temperature/Humidity Meter	Anymetre	TH101B	TR3-01	1 year	2015/11/14

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

Table 2: Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	±0.39dB
	> 1GHz	±0.68dB
Radiated Emission	30MHz - 1GHz	±5.34dB
	> 1GHz	±5.40dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a Wi-Fi module.

For details refer to the User Manual and Circuit Diagram.

3.2 Ratings and System Details

Kind of Equipment	Wi-Fi module
Type Designation	CMWC1ZZABJ
Wireless Standard	802.11b/g/n(HT20)
Operating Frequency band	2412 – 2462MHz
Channel Separation	5MHz
Modulation	DSSS, OFDM
Antenna Type	PCB antenna
Antenna Gain	1.86dBi
Extreme Temperature Range	+30~+85°C
Operation Voltage	DC 3.3V

Table 3: Carrier Frequency of Wi-Fi

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400 – 2483.5 MHz	1	2412 MHz	8	2447 MHz
	2	2417 MHz	9	2452 MHz
	3	2422 MHz	10	2457 MHz
	4	2427 MHz	11	2462 MHz
	5	2432 MHz		
	6	2437 MHz		
	7	2442 MHz		

3.3 Independent Operation Modes

The basic operation modes are:

- A. On
 - 1. Wi-Fi mode
 - a. Transmitting
 - i. Low Channel
 - ii. Middle Channel
 - iii. High Channel
 - b. Receiving
- B. Standby
- C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- | | |
|--------------------|----------------------|
| - Bill of Material | - Circuit Diagram |
| - PCB Layout | - Instruction Manual |
| - Photo Document | - Rating Label |

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

Software used for testing: wl.exe

This software was running on the laptop computer connected to the EUT. It was used to enable the test operation modes listed in section 3.3 as appropriate for conducted test.

Mode	Data Rate (Mbps)	Worst Case
802.11b	1, 2, 5, 11	1 Mbps
802.11g	6, 9, 12, 18, 24, 36, 48, 54	6 Mbps
802.11n(HT20)	6.5, 13.0, 19.5, 26.0, 39.0, 52.0, 58.5, 65.0 (MCS0 ~ MCS7)	6.5 Mbps

All modes of operation and data rates were investigated, but only worst case data rate was executed for all test requirements.

4.3 Special Accessories and Auxiliary Equipment

The EUT was tested together with the following accessories:

Description	Manufacturer	Part No.	S/N
Laptop	DELL	PP11L	QDS-BRCM1017

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4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Pass**

Test standard	:	FCC Part 15.247(b)(4) and Part 15.203 RSS-Gen Clause 2.3.3
Limit		The use of antennas with directional gains that do not exceed 6dBi

According to the manufacturer declared, the EUT has one PCB antenna, the directional gain of antenna is 1.86dBi and the PCB antenna is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

5.1.2 Peak Output Power

RESULT:
Pass

Test date : 2015-06-19
 Test standard : FCC Part 15.247(b)(3)
 RSS-247 Clause 5.4(4)
 Basic standard : ANSI C63.10: 2013
 Clause 9.1 of KDB 558074 v03r03
 Limit : 1W
 Kind of test site : Shielded room

Test setup

Test Channel : Low/ Middle/ High
 Operation Mode : A.1.a
 Ambient temperature : 25°C
 Relative humidity : 52%
 Atmospheric pressure : 101kPa

Table 4: Test result of Peak Output Power of Wi-Fi (802.11b)

Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
Low Channel	2412	18.03	30
Middle Channel	2437	17.68	30
High Channel	2462	17.63	30

Table 5: Test result of Peak Output Power of Wi-Fi (802.11g)

Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
Low Channel	2412	22.75	30
Middle Channel	2437	22.66	30
High Channel	2462	22.49	30

Table 6: Test result of Peak Output Power of Wi-Fi (802.11n)

Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
Low Channel	2412	22.52	30
Middle Channel	2437	22.24	30
High Channel	2462	22.32	30

5.1.3 6dB Bandwidth and 99% Bandwidth

RESULT:

Pass

Date of testing	:	2015-06-19
Test standard	:	FCC Part 15.247(a)(2) RSS-247 Clause 5.2(1)
Basic standard	:	ANSI C63.10: 2013 Clause 8 of KDB 558074 v03r03
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A.1.a
Ambient temperature	:	25°C
Relative humidity	:	52%
Atmospheric pressure	:	101kPa

Table 7: Test result of 6dB & 99% Bandwidth of Wi-Fi (802.11b)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	10.16	13.73
Mid Channel	2437	10.12	13.74
High Channel	2462	10.12	13.74

Table 8: Test result of 6dB & 99% Bandwidth of Wi-Fi (802.11g)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	16.51	16.46
Mid Channel	2437	16.51	16.46
High Channel	2462	16.53	16.46

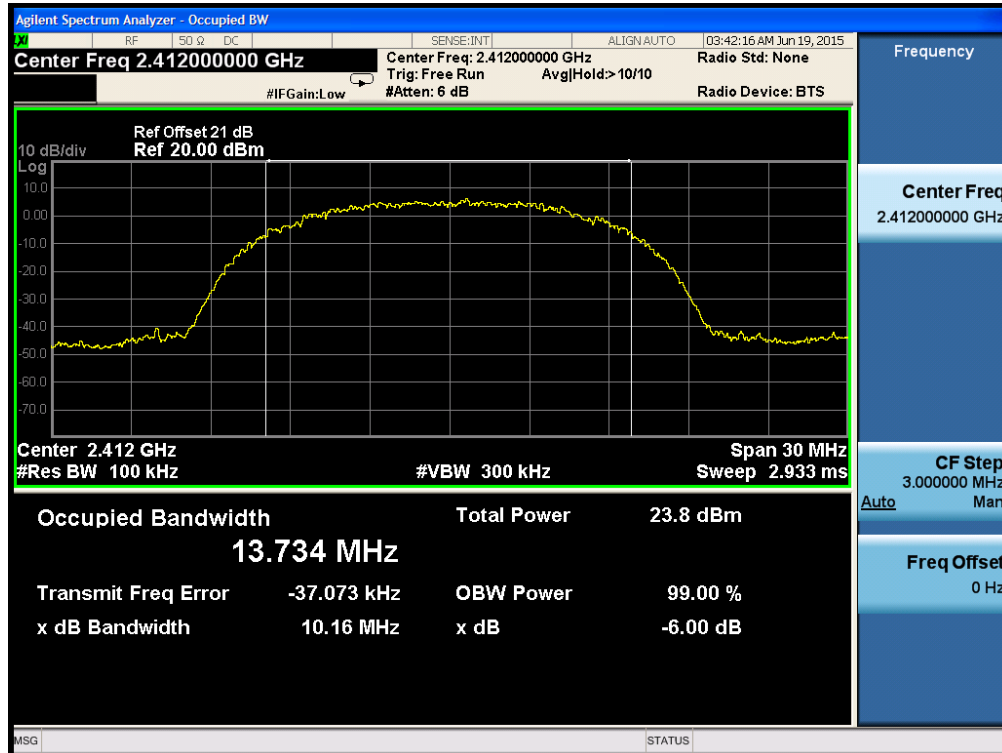
Table 9: Test result of 6dB & 99% Bandwidth of Wi-Fi (802.11n)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low Channel	2412	17.76	17.68
Mid Channel	2437	17.76	17.68
High Channel	2462	17.75	17.69

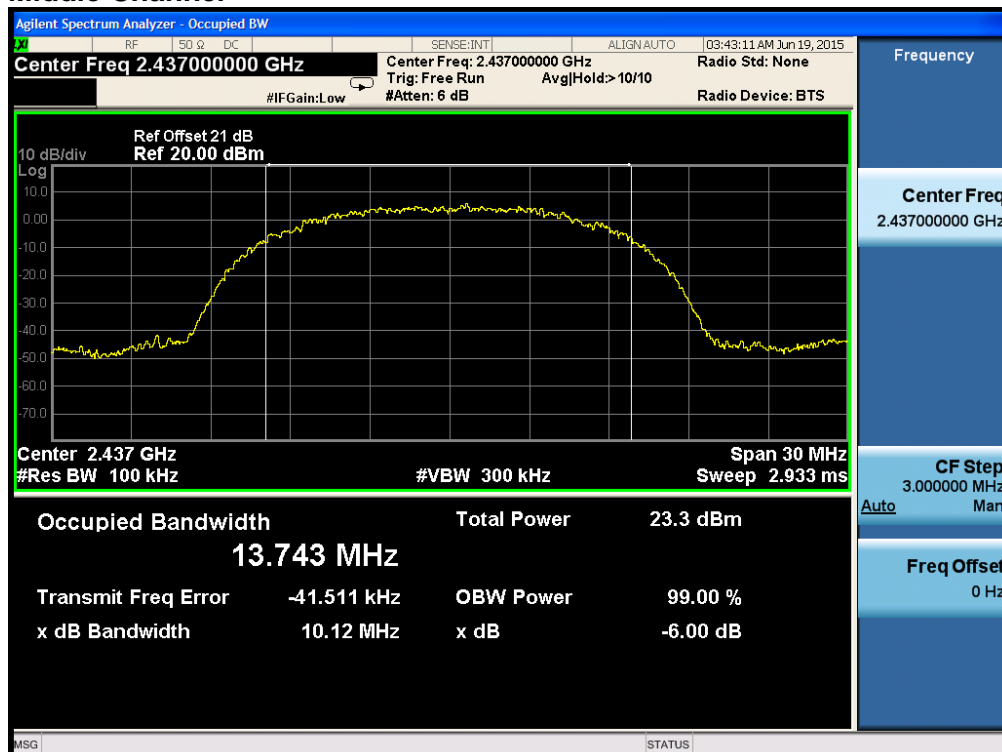
For details refer to following test plot.

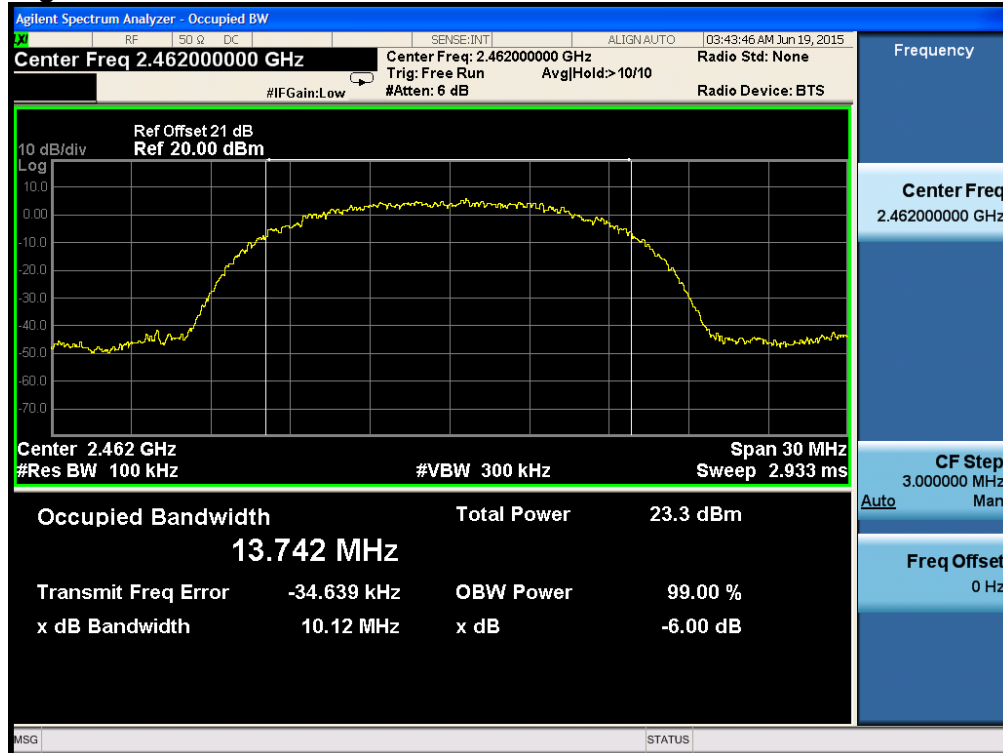
Test Plot of 6dB & 99% Bandwidth measured of 802.11b mode

Low Channel



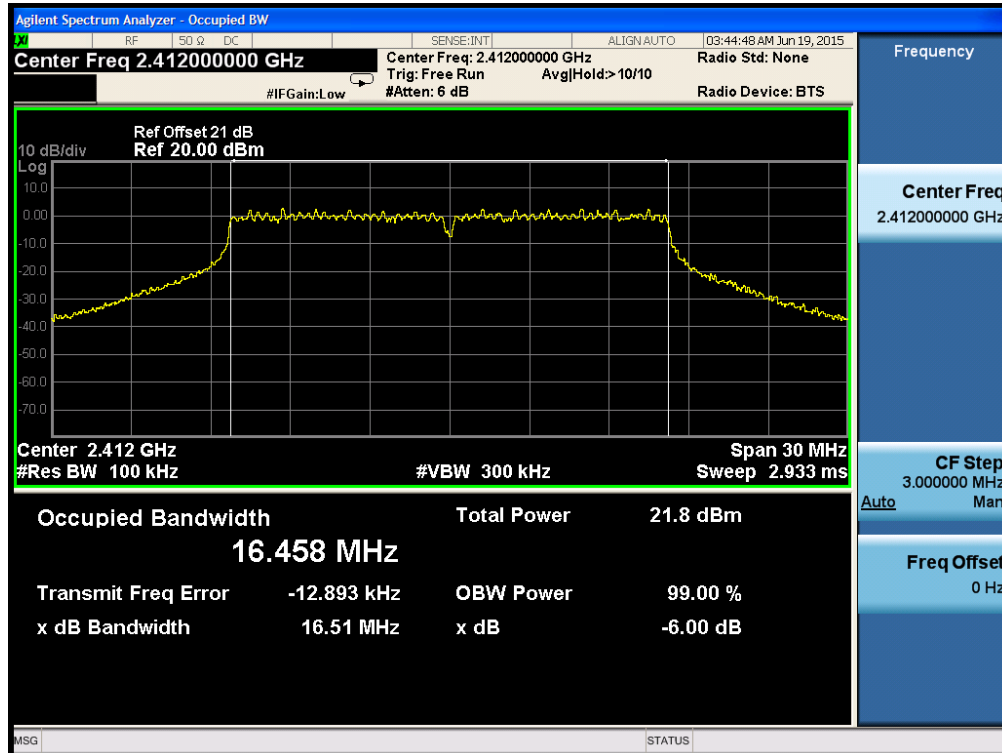
Middle Channel



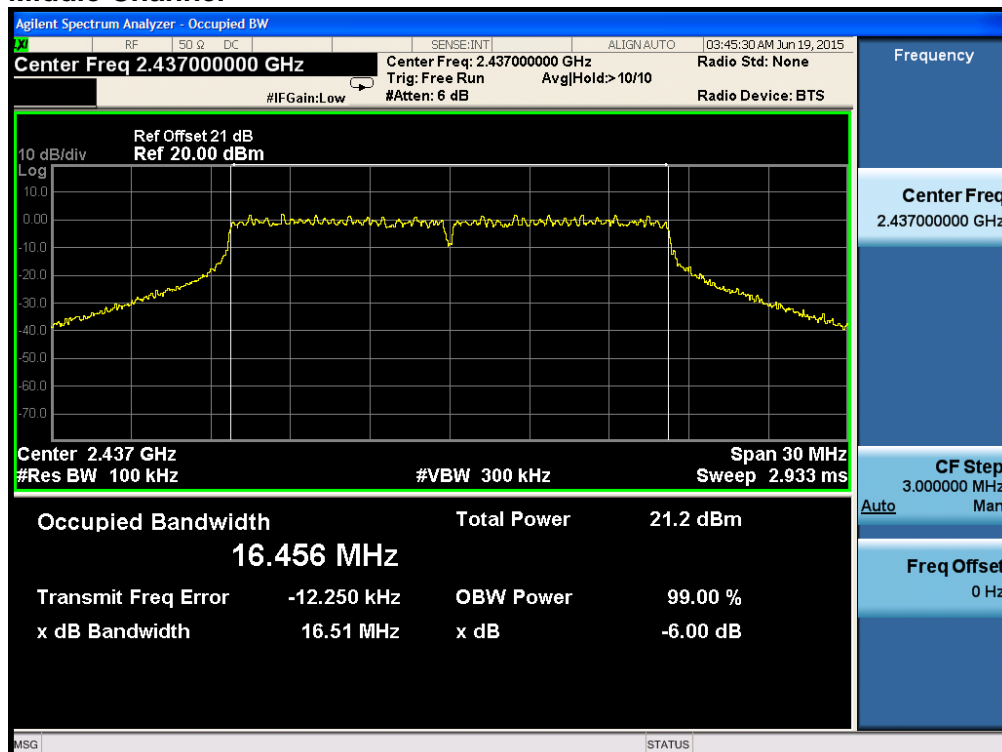
High Channel


Test Plot of 6dB & 99% Bandwidth measured of 802.11g mode

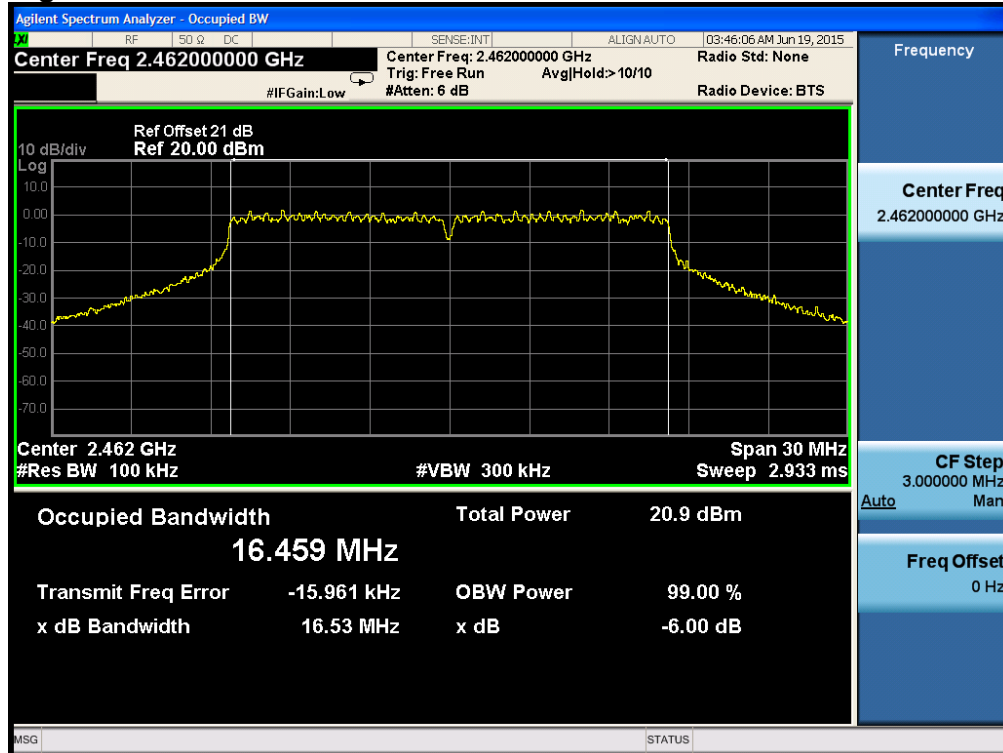
Low Channel



Middle Channel

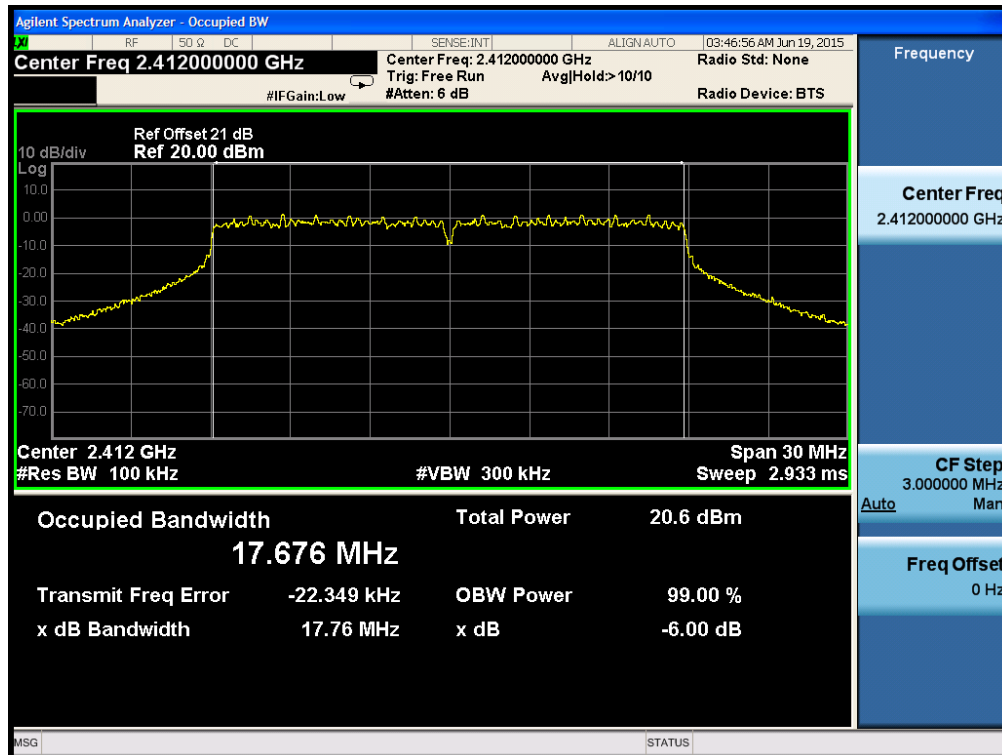


High Channel

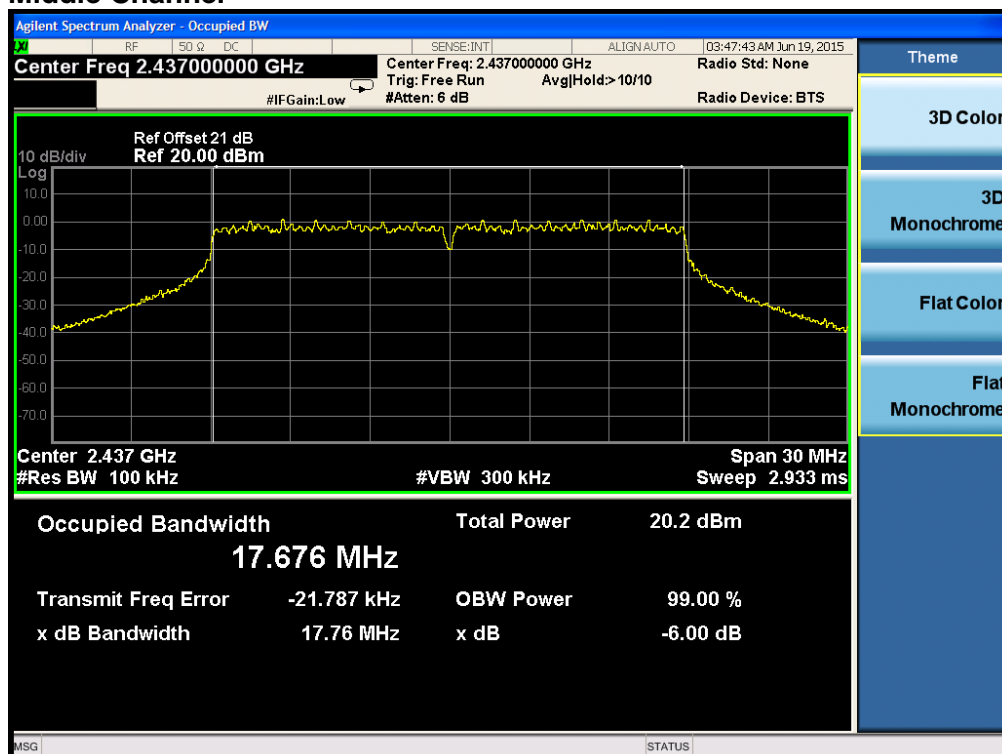


Test Plot of 6dB & 99% Bandwidth measured of 802.11n mode

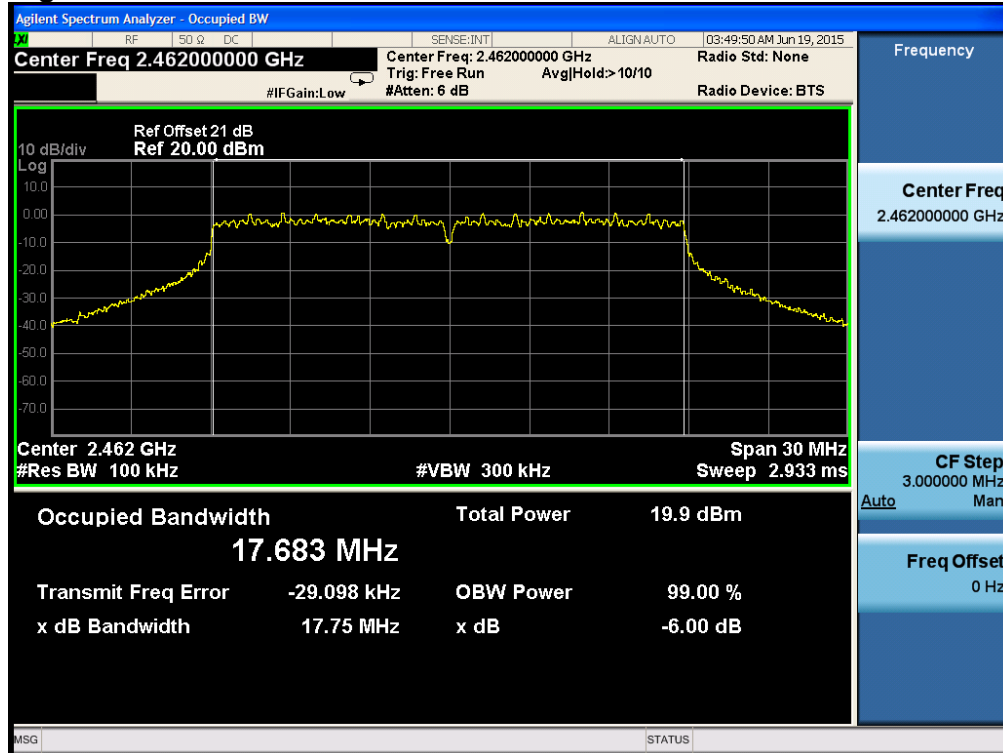
Low Channel



Middle Channel



High Channel



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5.1.4 Conducted Spurious Emissions

RESULT:**Pass**

Date of testing	:	2015-06-19
Test standard	:	FCC part 15.247(d) RSS-247 Clause 5.5
Basic standard	:	ANSI C63.10: 2013
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shield room

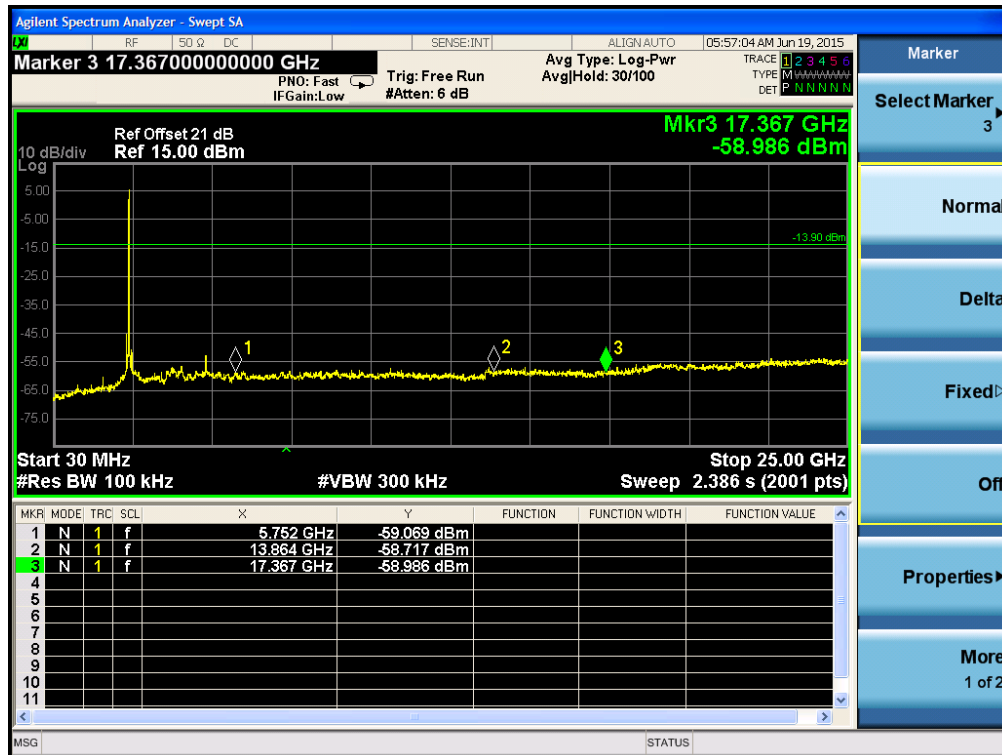
Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A.1.a
Ambient temperature	:	25°C
Relative humidity	:	52%
Atmospheric pressure	:	101kPa

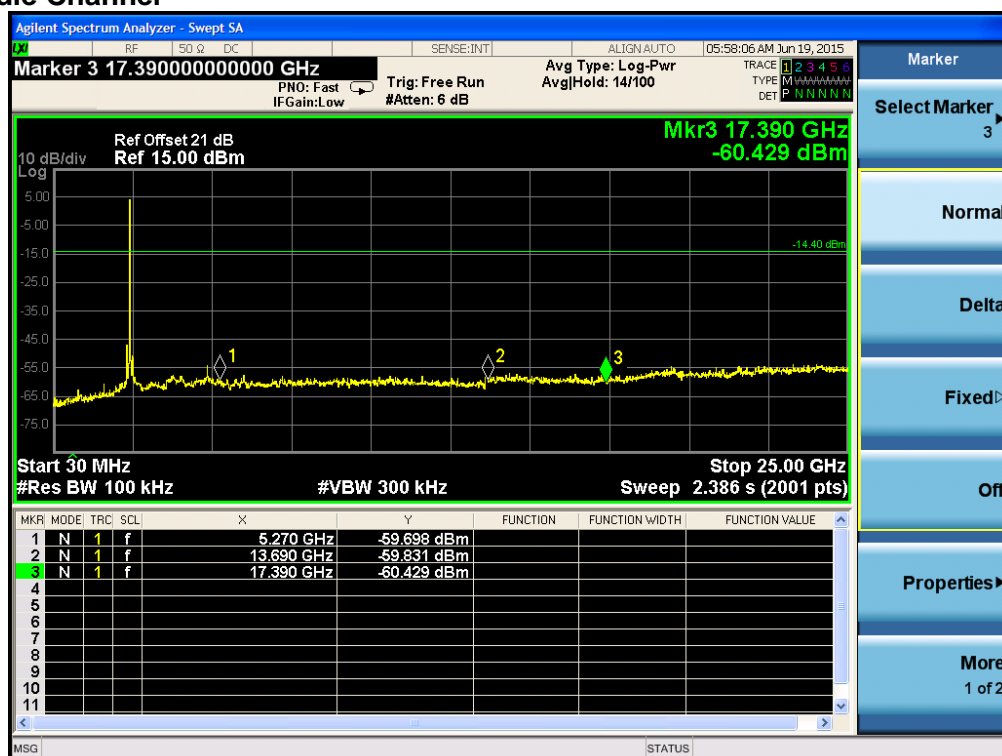
For details refer to following test plot.

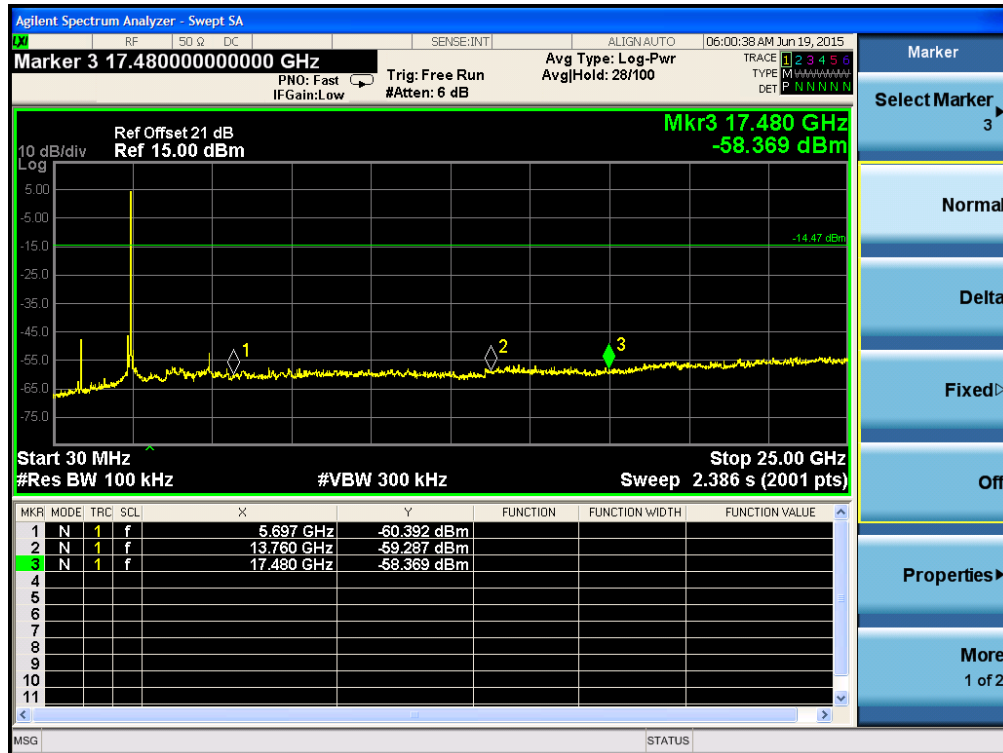
Test Plot of Conducted spurious emissions measured of 802.11b mode

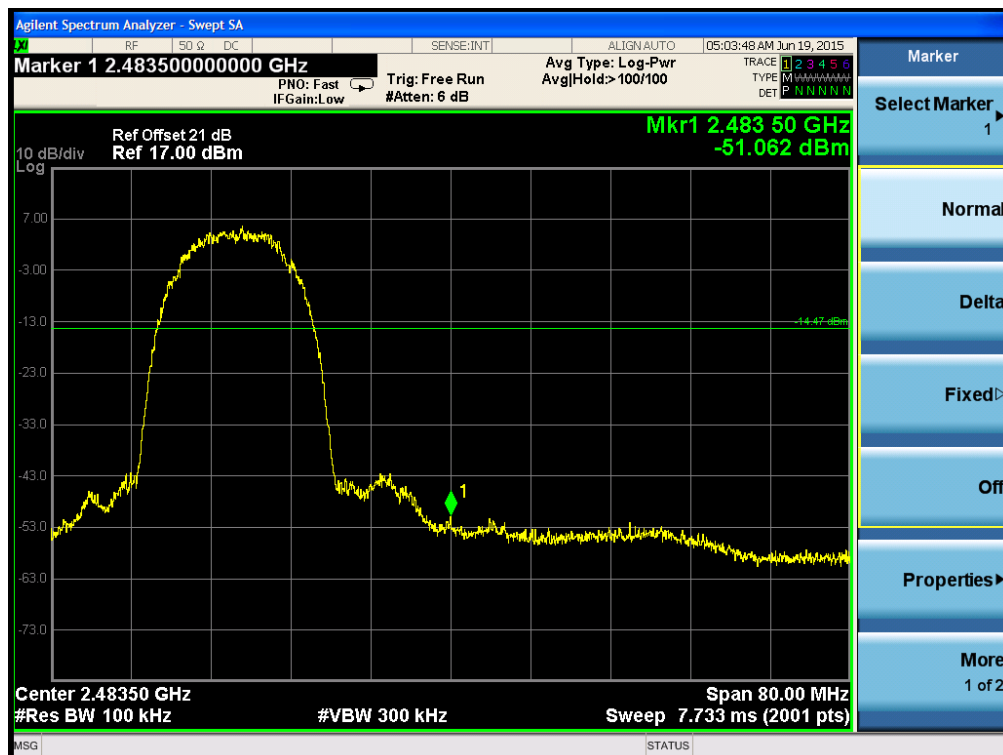
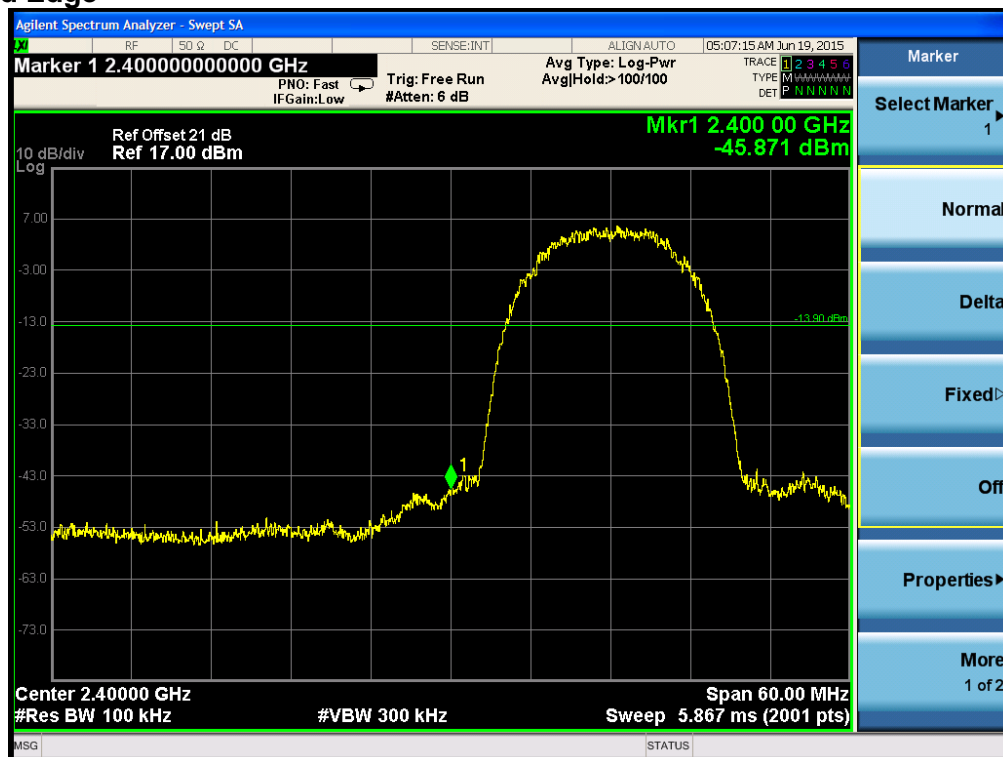
Low Channel



Middle Channel

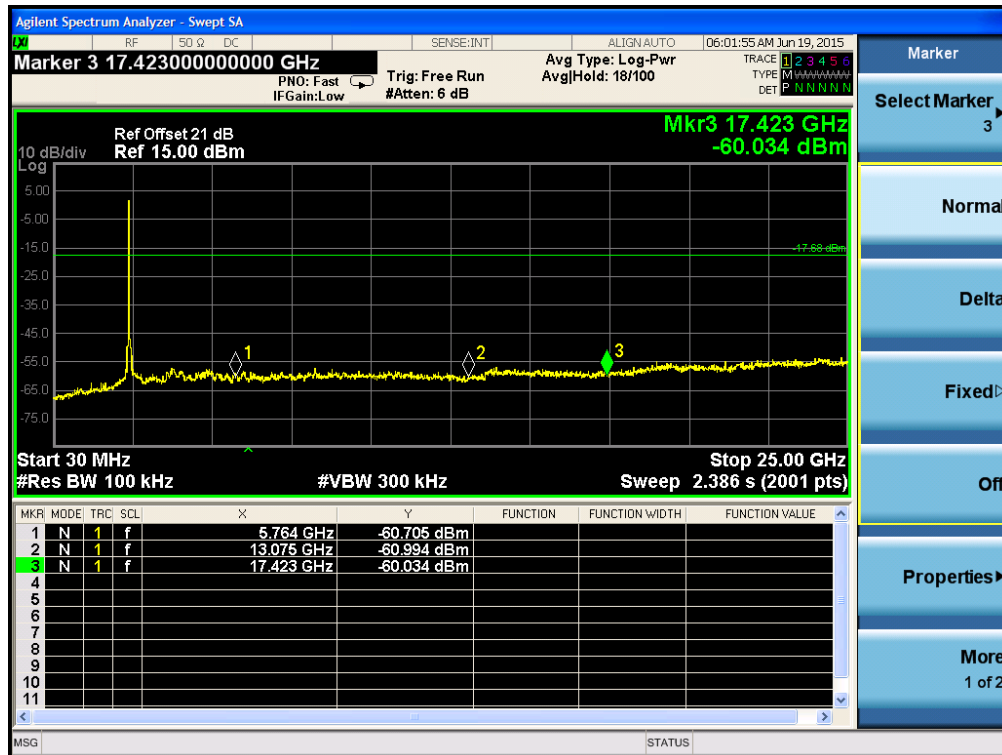




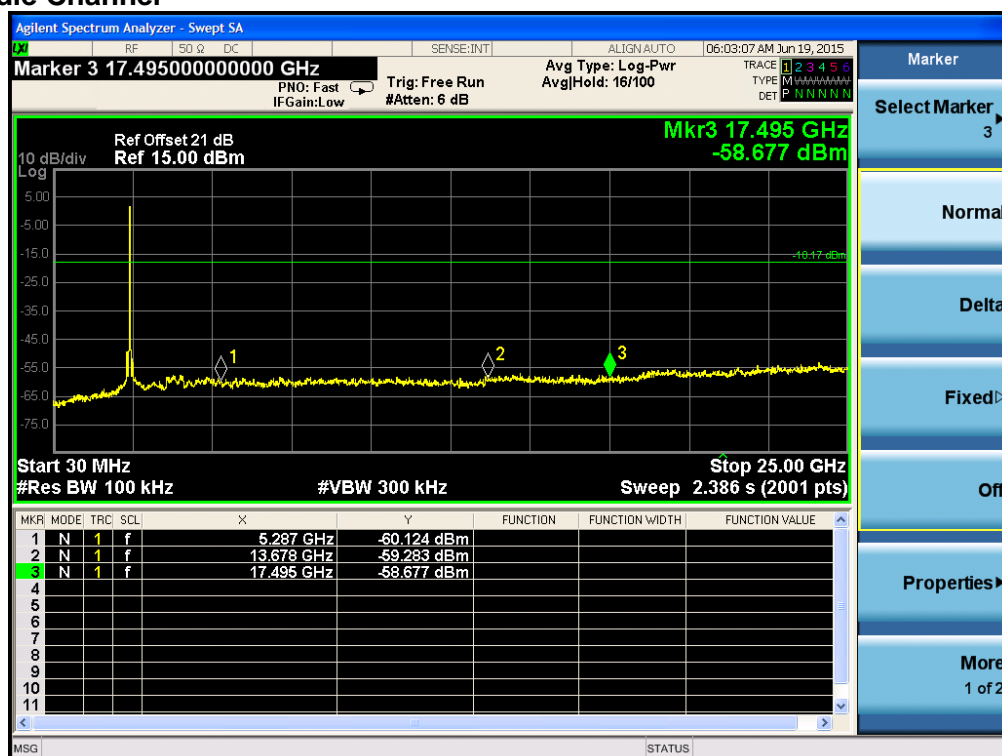
Band Edge


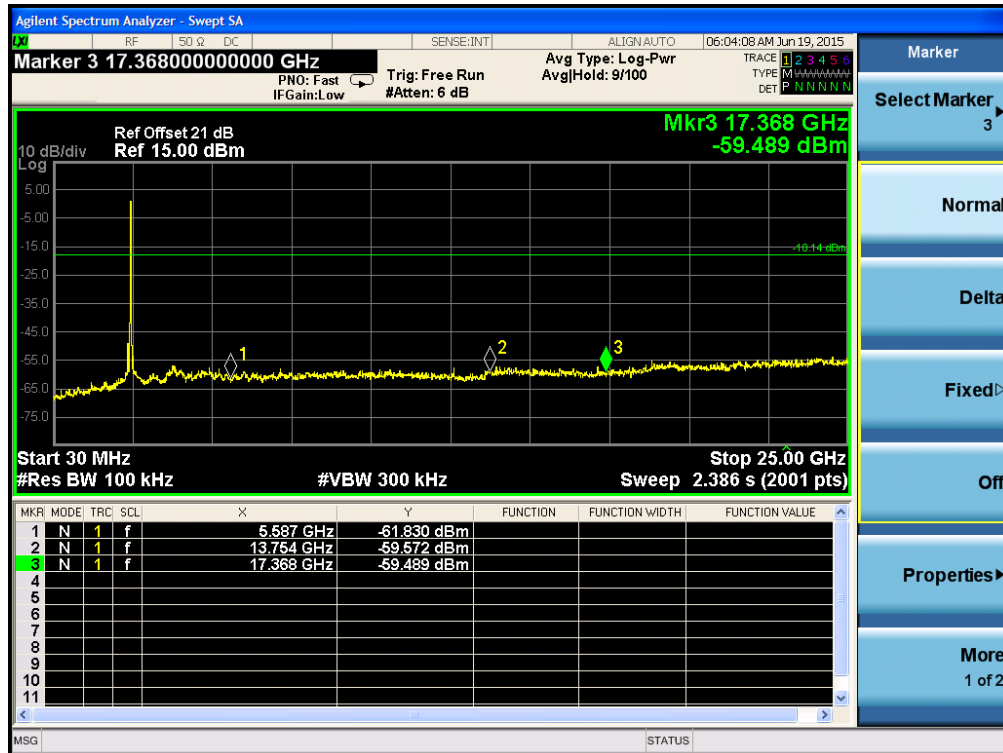
Test Plot of Conducted spurious emissions measured of 802.11g mode

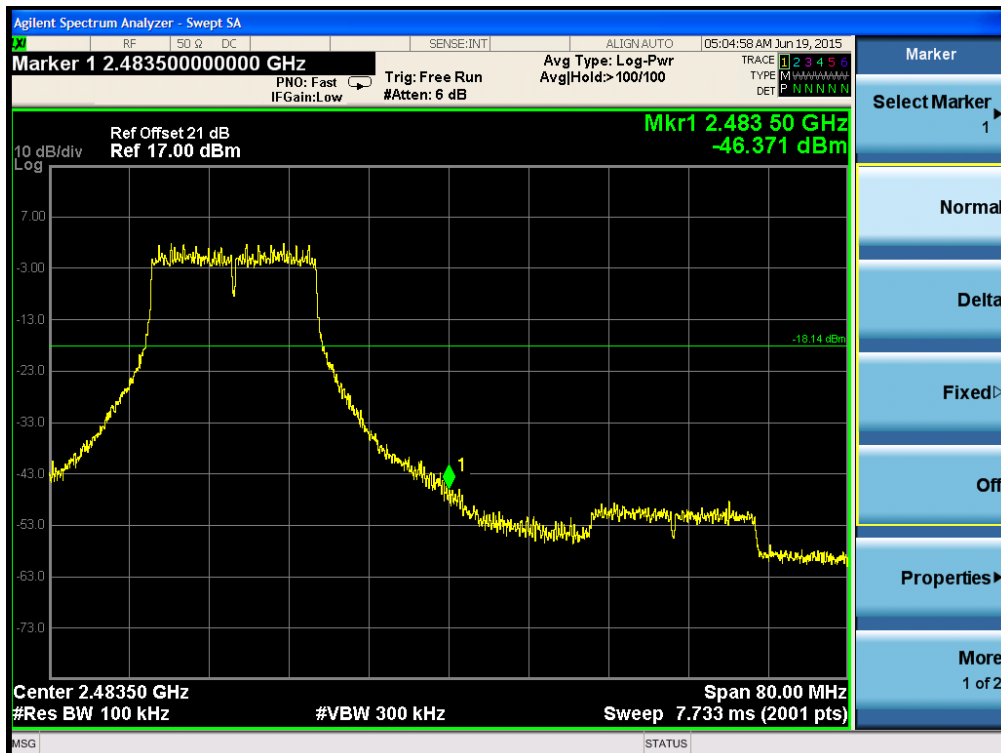
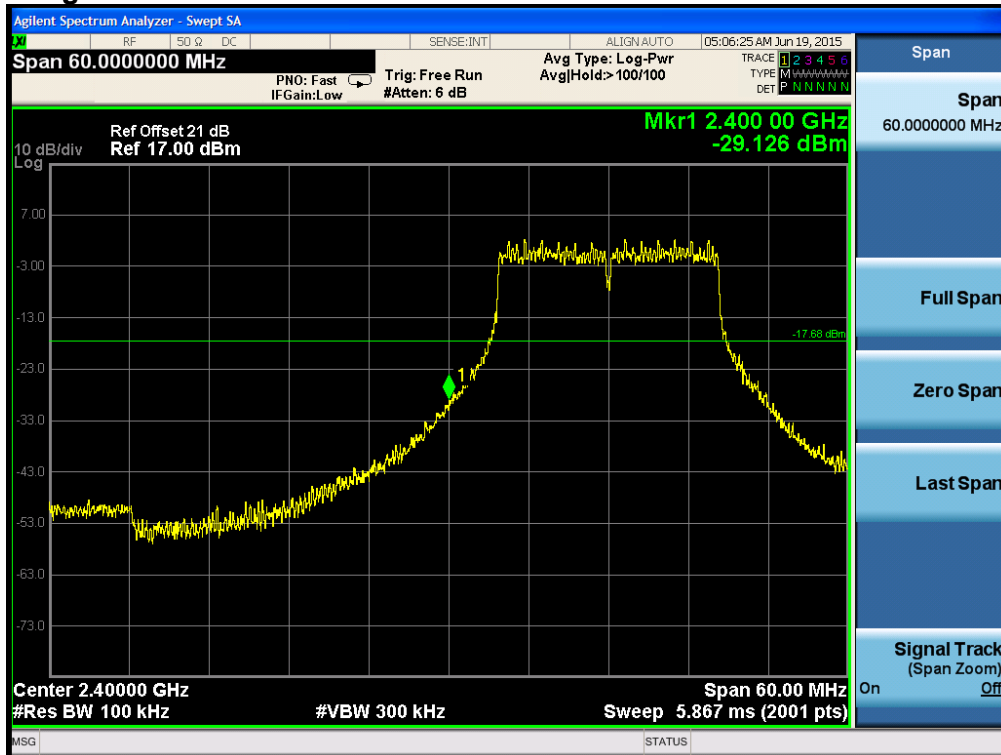
Low Channel



Middle Channel

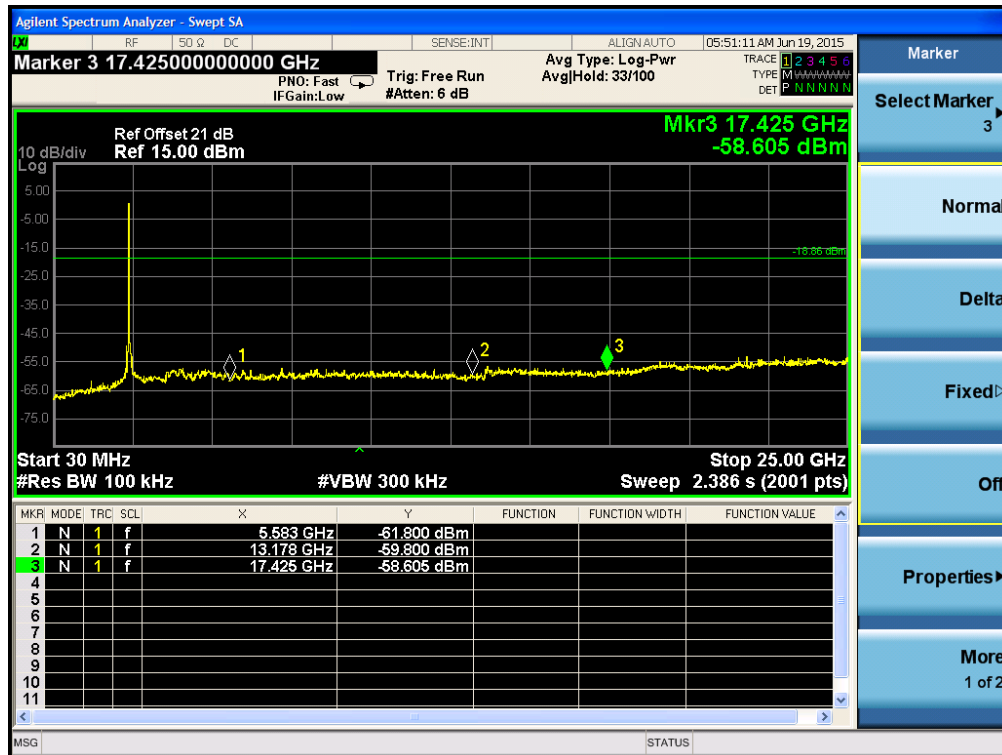




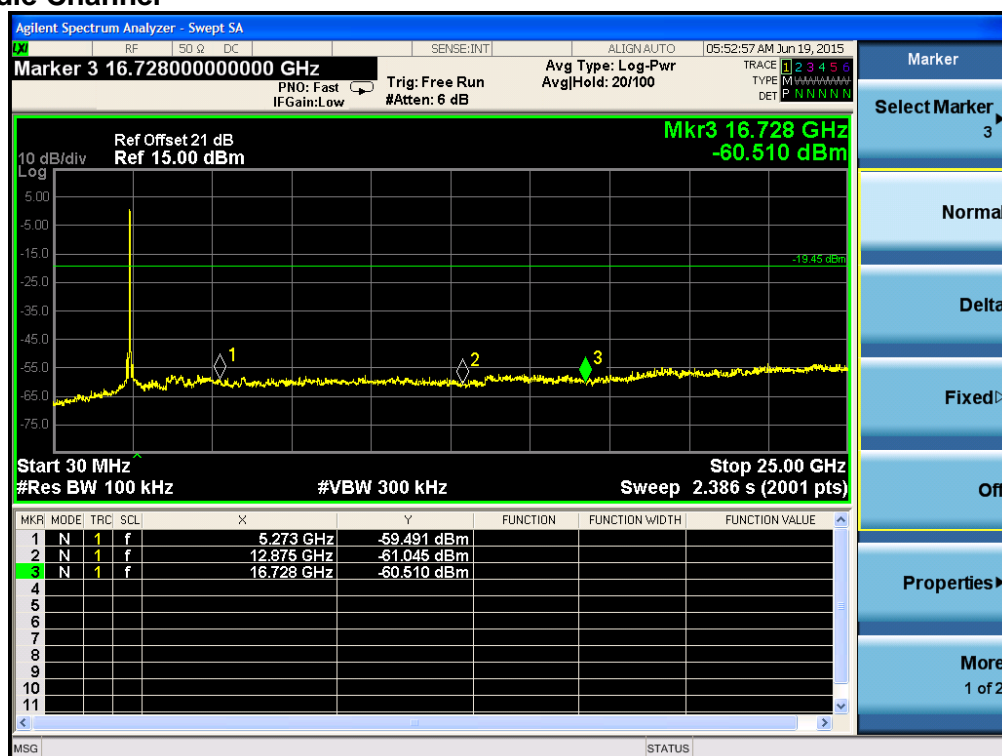
Band Edge


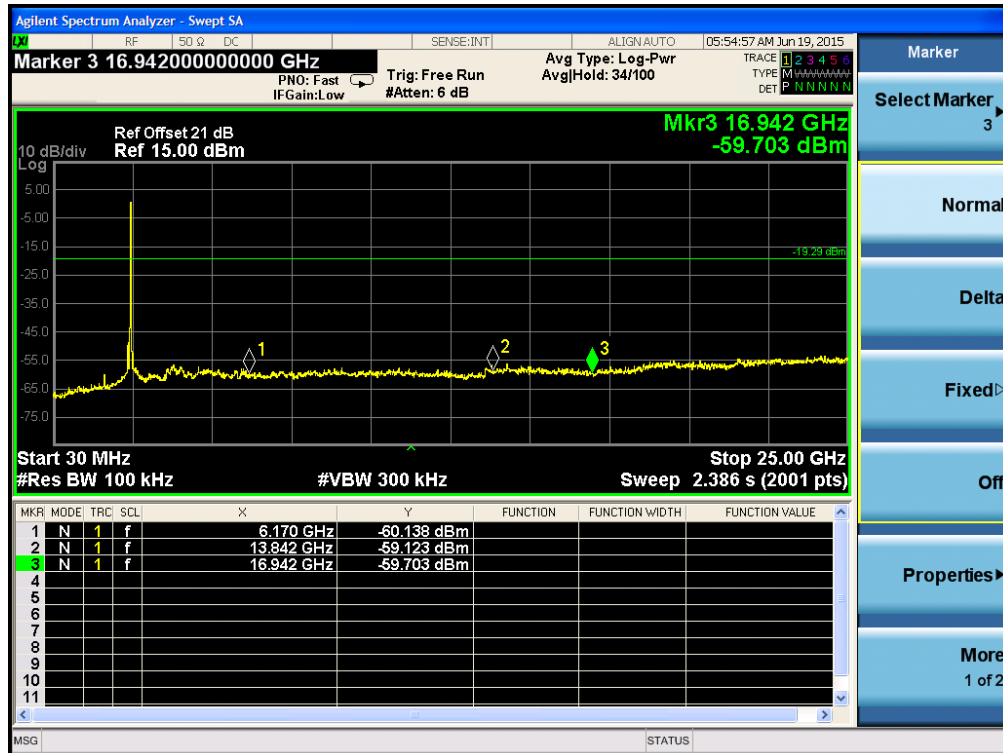
Test Plot of Conducted spurious emissions measured of 802.11n mode

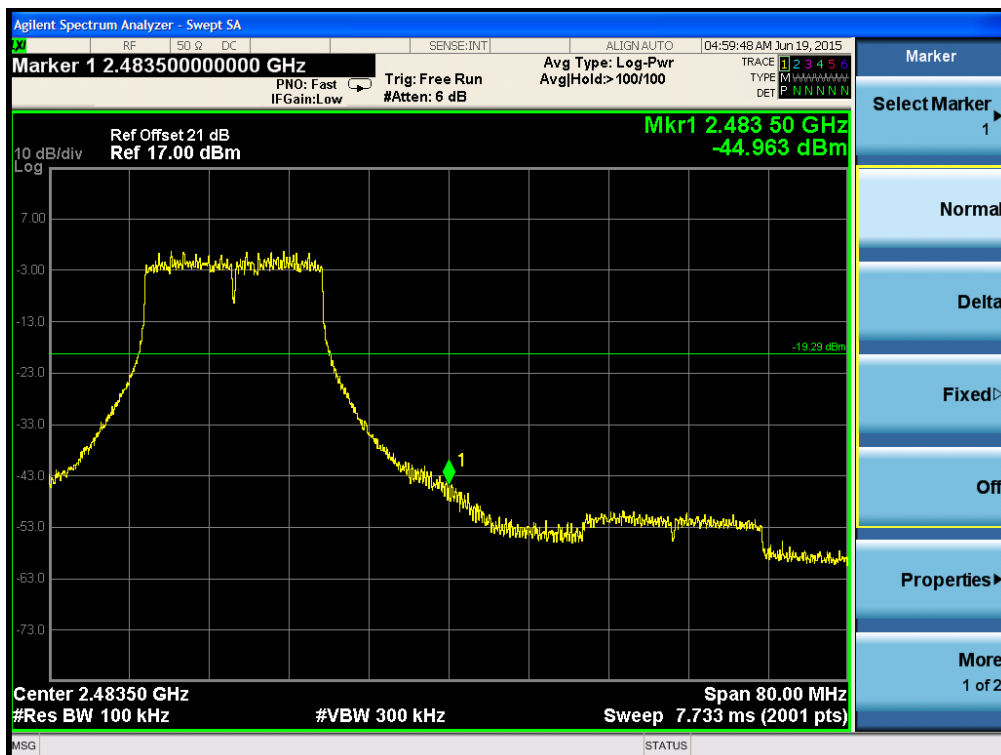
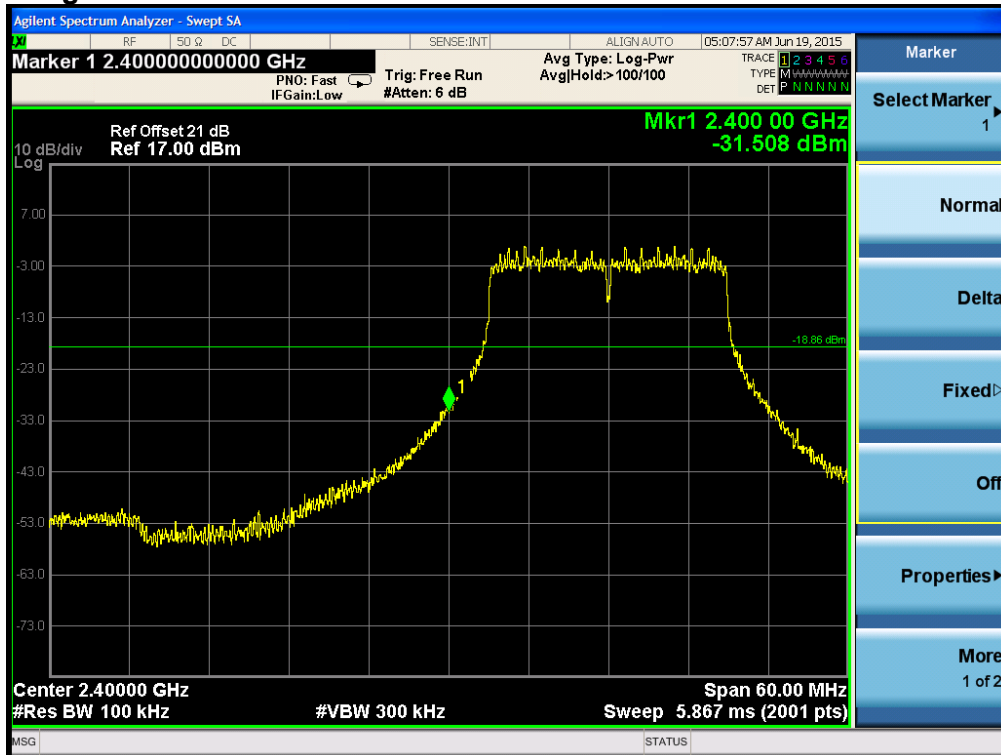
Low Channel



Middle Channel





Band Edge


5.1.5 Power spectral density

RESULT:

Pass

Date of testing	:	2015-06-19
Test standard	:	FCC part 15.247(e)
		RSS-247 Clause 5.2(2)
Basic standard	:	ANSI C63.10: 2013
		Clause 10 of KDB 558074 v03r03
Limit	:	8dBm/3kHz
Kind of test site	:	Shield room

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A.1.a
Ambient temperature	:	25°C
Relative humidity	:	52%
Atmospheric pressure	:	101kPa

Table 10: Test result of power spectral density:

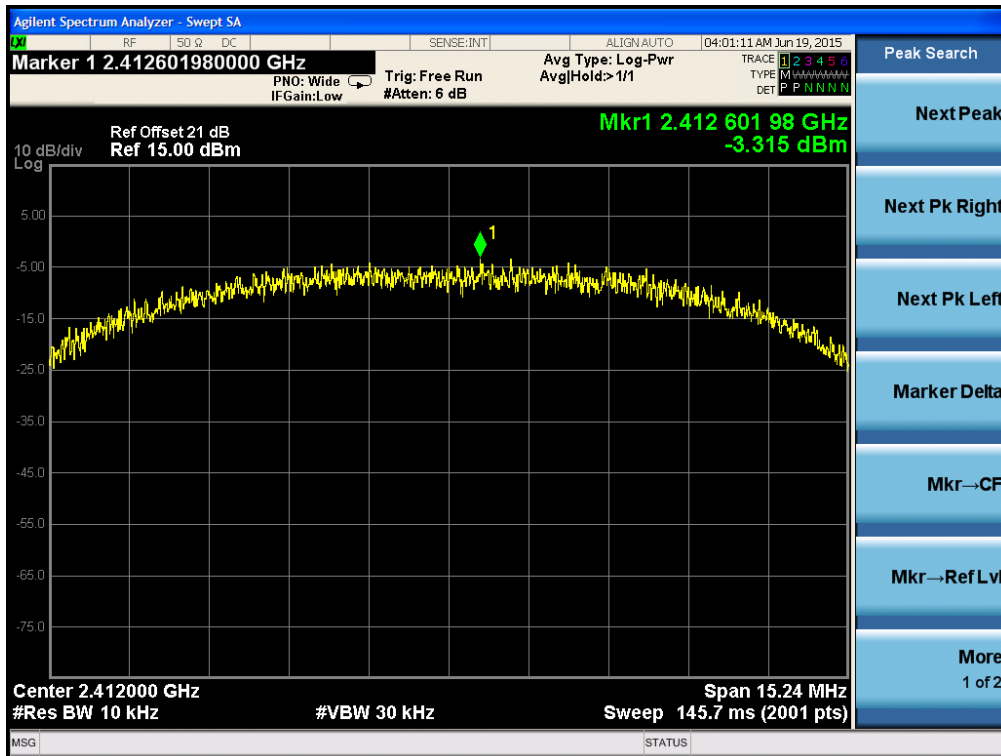
Mode	Channel (MHz)	Reading Level (dBm/10kHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	2412	-3.315	-8.544	8
	2437	-3.722	-8.951	8
	2462	-3.673	-8.902	8
802.11g	2412	-5.510	-10.739	8
	2437	-5.942	-11.171	8
	2462	-5.627	-10.856	8
802.11n	2412	-6.680	-11.909	8
	2437	-7.316	-12.545	8
	2462	-6.114	-11.343	8

Notes:

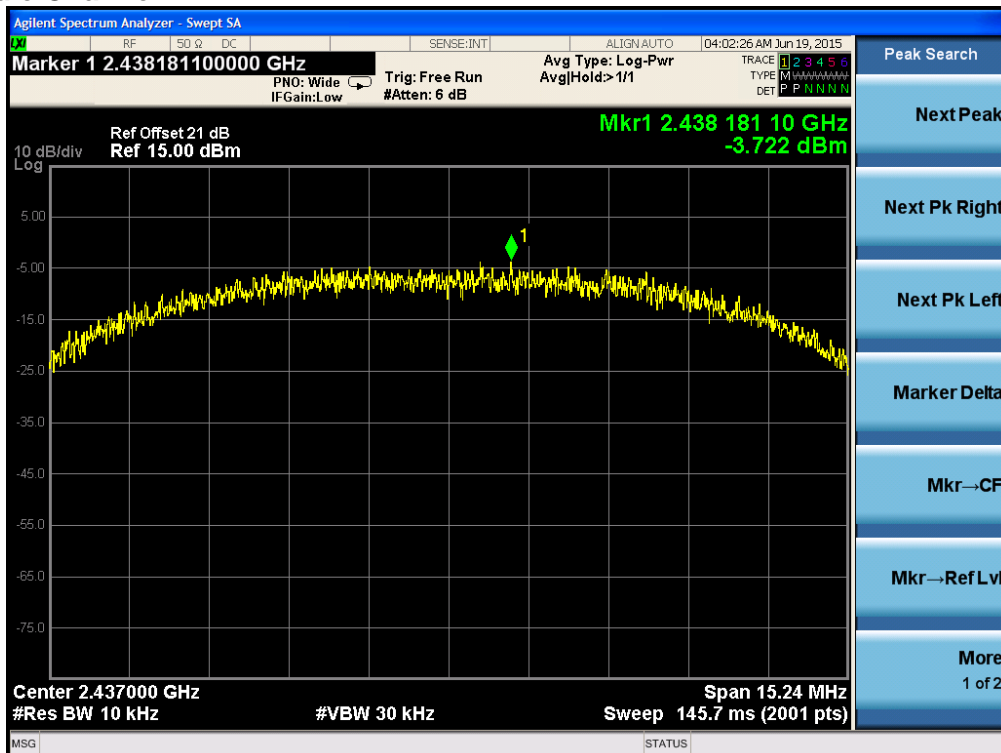
$$dBm/3kHz = dBm/10kHz - 10\log(10/3)$$

For details refer to following test plot.

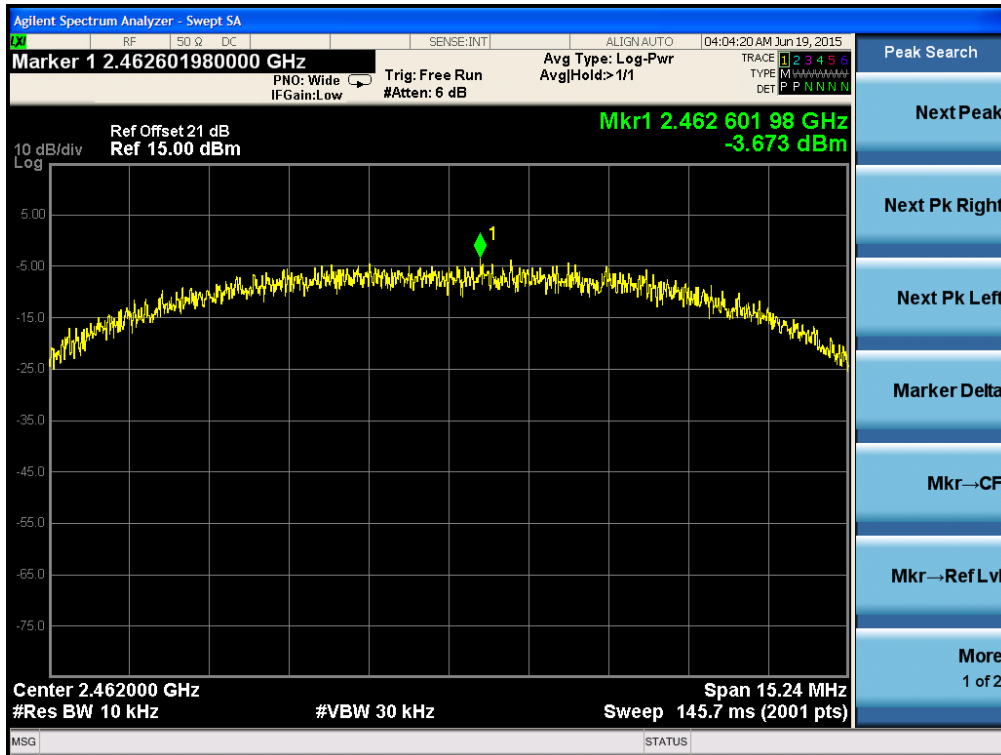
Test Plot of Power spectral density measured of 802.11b mode Low Channel



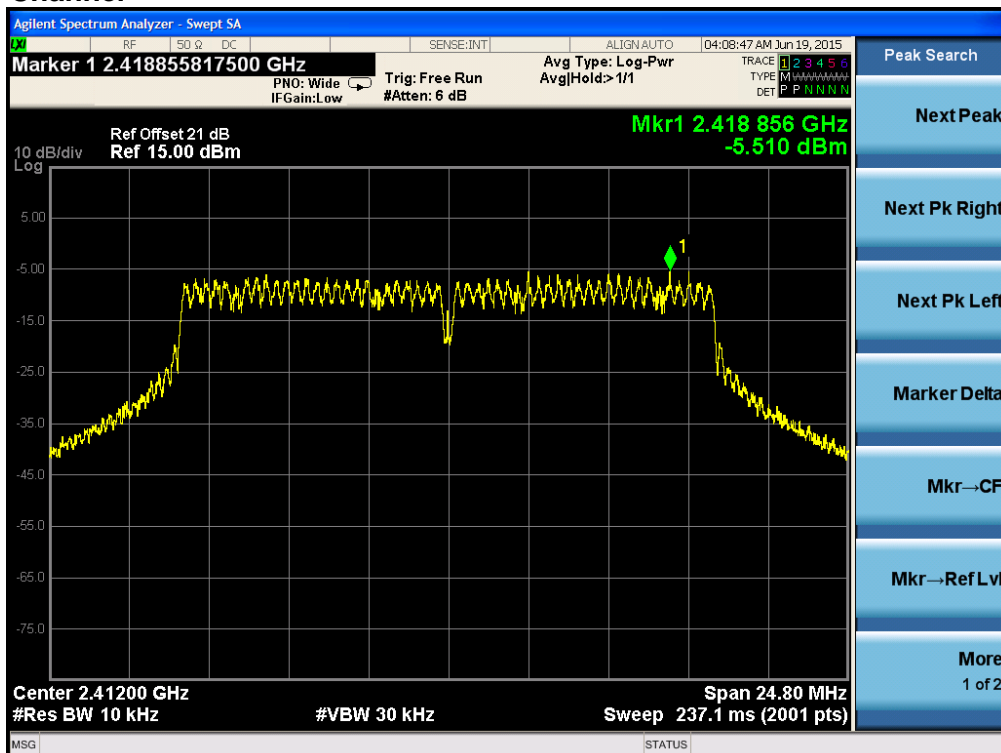
Middle Channel

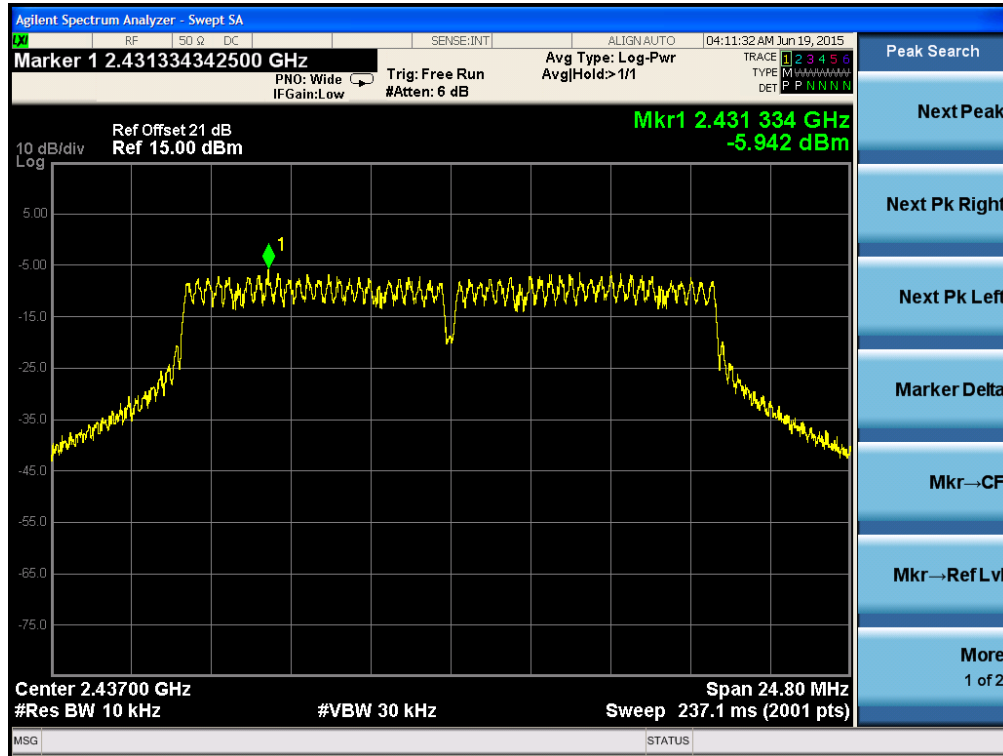
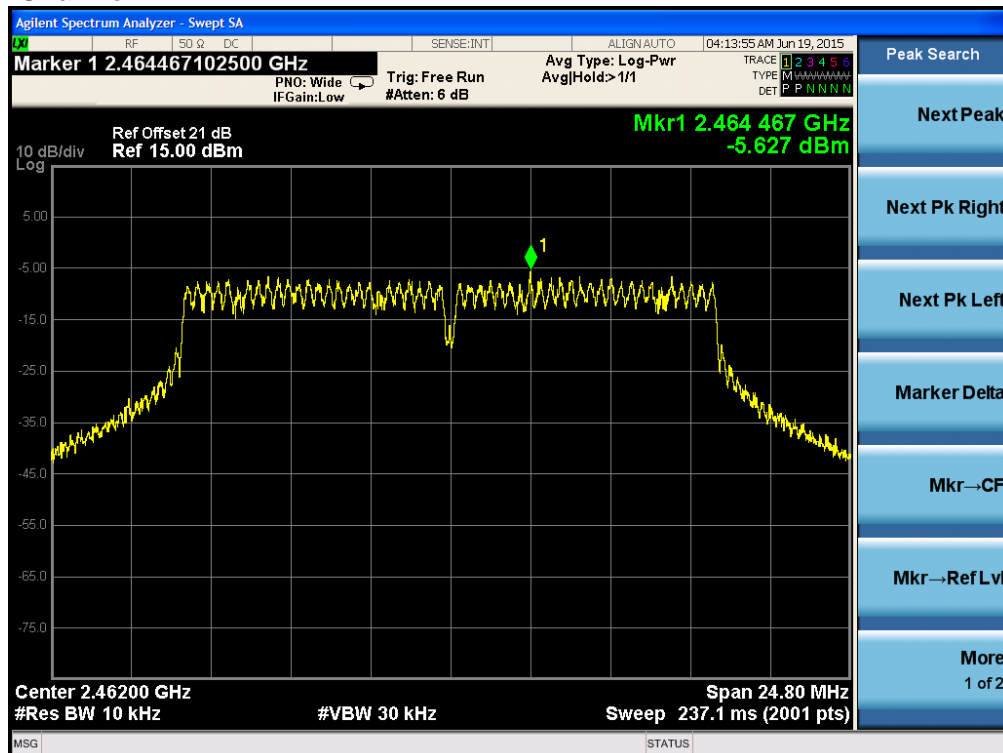


High Channel

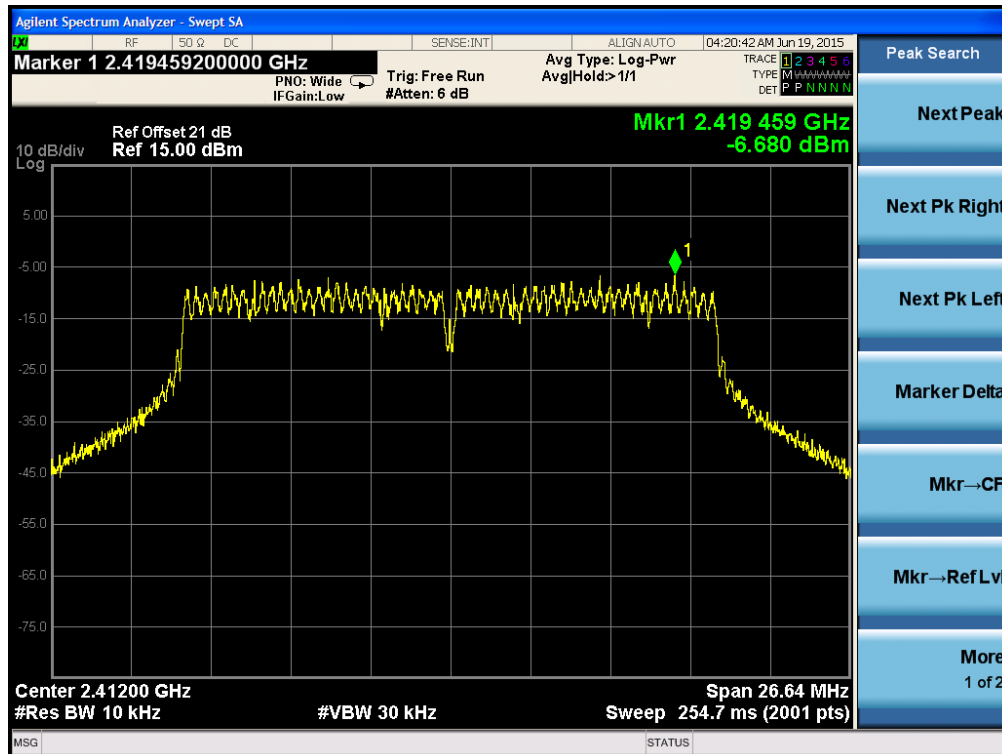


Test Plot of Power spectral density measured of 802.11g mode Low Channel

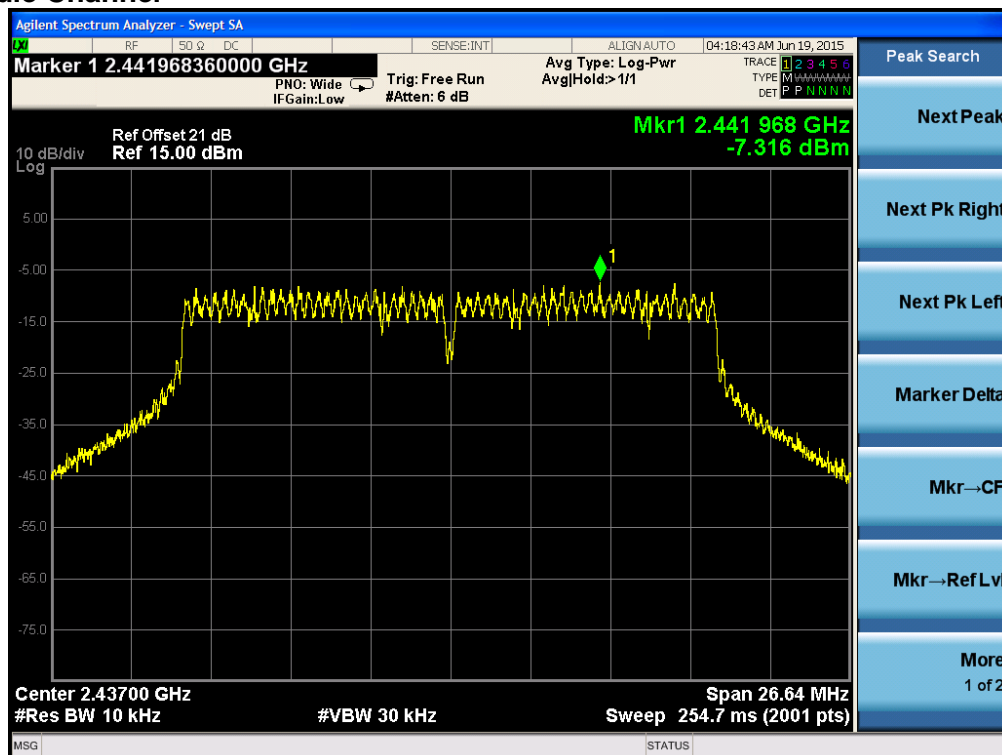


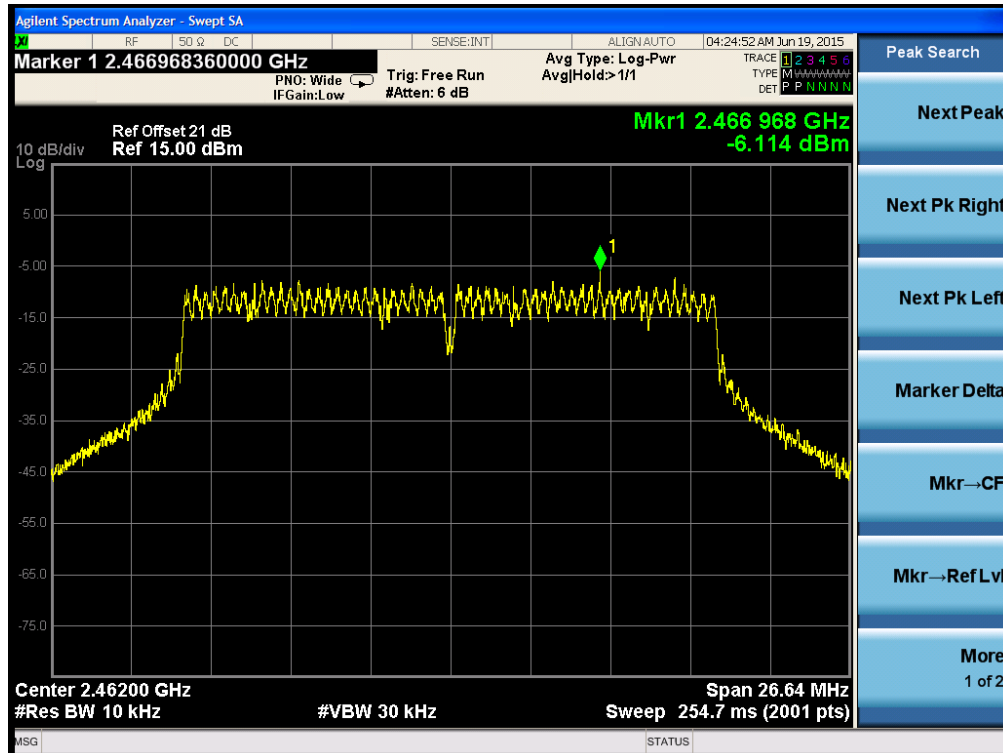
Middle Channel

High Channel


Test Plot of Power spectral density measured of 802.11n mode Low Channel



Middle Channel



High Channel


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5.1.6 Spurious Emission

RESULT:**Pass**

Date of testing : 2015-06-23
Test standard : FCC part 15.247(d)
RSS-Gen Clause 8.10
Basic standard : ANSI C63.10: 2013
Clause 11 of KDB 558074 v03r03
Limits : FCC part 15.209(a)
Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Test Channel : Low/ Middle/ High
Operation mode : A.1
Ambient temperature : 25°C
Relative humidity : 52%
Atmospheric pressure : 101kPa

Table 11: Test result of Spurious Emission of Wi-Fi (802.11b)

Channel	Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
Low	184.958	26.554	15.234	-16.946	43.500	11.320	PEAK	H
	780.052	29.593	7.123	-16.407	46.000	22.470	PEAK	
	4825.000	53.907	51.207	-20.093	74.000	2.700	PEAK	
	114.996	33.898	21.846	-9.602	43.500	12.052	PEAK	V
	434.975	32.561	15.448	-13.439	46.000	17.113	PEAK	
	4824.622	42.180	39.480	-11.820	54.000	2.700	AVG	
	4825.000	55.660	52.960	-18.340	74.000	2.700	PEAK	
Middle	260.011	24.487	10.649	-21.513	46.000	13.837	PEAK	H
	309.966	25.029	10.276	-20.971	46.000	14.753	PEAK	
	4876.000	50.985	48.310	-23.015	74.000	2.675	PEAK	
	114.996	33.996	21.944	-9.504	43.500	12.052	PEAK	V
	434.975	32.847	15.734	-13.153	46.000	17.113	PEAK	
	4876.000	50.826	48.151	-23.174	74.000	2.675	PEAK	
High	300.024	25.313	10.801	-20.687	46.000	14.512	PEAK	H
	349.979	25.320	9.545	-20.680	46.000	15.775	PEAK	
	4927.000	48.104	45.334	-25.896	74.000	2.770	PEAK	
	114.996	34.124	22.072	-9.376	43.500	12.052	PEAK	V
	434.975	32.362	15.249	-13.638	46.000	17.113	PEAK	
	4927.000	46.881	44.111	-27.119	74.000	2.770	PEAK	

Table 12: Test result of Spurious Emission of Wi-Fi (802.11g)

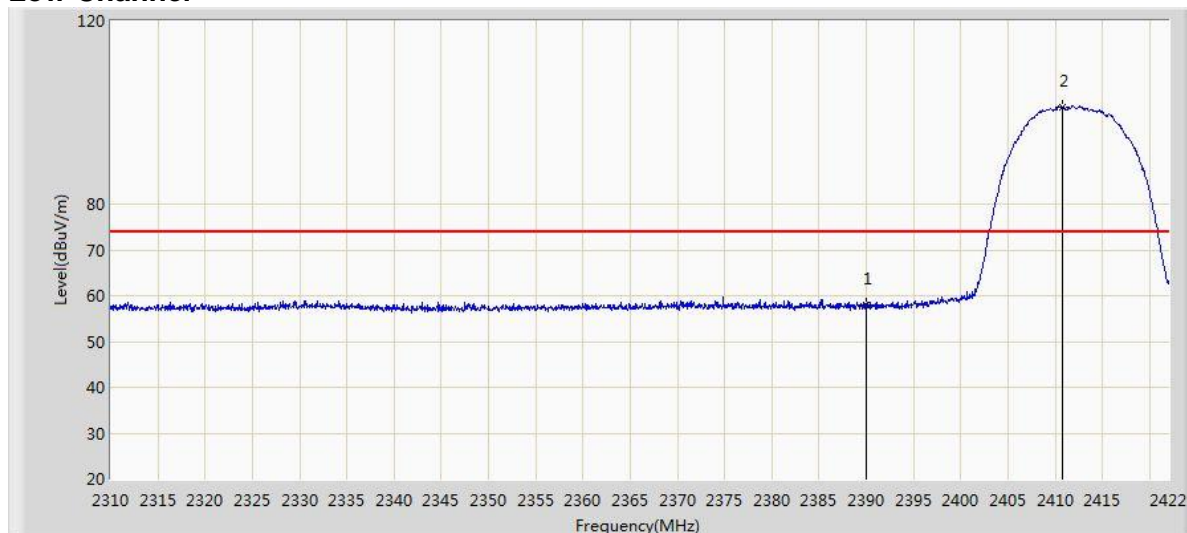
Channel	Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
Low	300.024	25.244	10.732	-20.756	46.000	14.512	PEAK	H
	655.044	25.010	4.346	-20.990	46.000	20.664	PEAK	
	4825.000	49.476	46.776	-24.524	74.000	2.700	PEAK	
	114.996	34.332	22.280	-9.168	43.500	12.052	PEAK	V
	434.975	32.292	15.179	-13.708	46.000	17.113	PEAK	
	4825.000	49.892	47.192	-24.108	74.000	2.700	PEAK	
Middle	300.024	25.117	10.605	-20.883	46.000	14.512	PEAK	H
	349.979	27.292	11.517	-18.708	46.000	15.775	PEAK	
	4876.000	45.870	43.195	-28.130	74.000	2.675	PEAK	
	54.978	29.263	14.595	-10.737	40.000	14.669	PEAK	V
	114.996	32.154	20.102	-11.346	43.500	12.052	PEAK	
	4867.500	46.252	43.584	-27.748	74.000	2.667	PEAK	
High	260.011	24.393	10.555	-21.607	46.000	13.837	PEAK	H
	304.995	25.355	10.732	-20.645	46.000	14.623	PEAK	
	4927.000	44.651	41.881	-29.349	74.000	2.770	PEAK	
	114.875	33.889	21.816	-9.611	43.500	12.073	PEAK	V
	434.975	32.240	15.127	-13.760	46.000	17.113	PEAK	
	4918.500	42.478	39.724	-31.522	74.000	2.753	PEAK	

Table 13: Test result of Spurious Emission of Wi-Fi (802.11n)

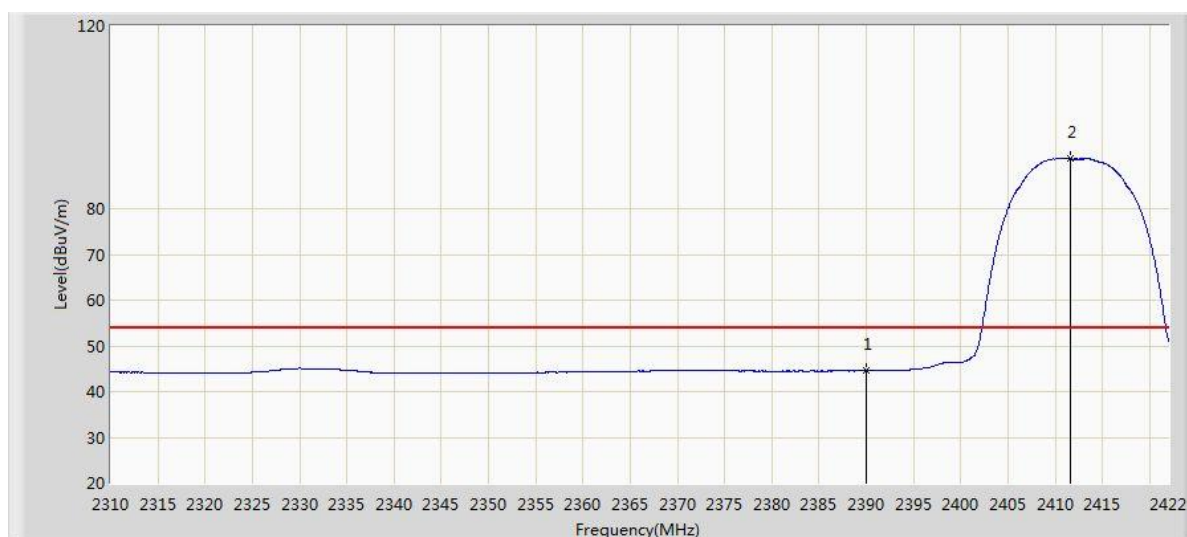
Channel	Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
Low	300.024	24.750	10.238	-21.250	46.000	14.512	PEAK	H
	655.044	24.773	4.109	-21.227	46.000	20.664	PEAK	
	4816.500	46.205	43.508	-27.795	74.000	2.697	PEAK	
	114.875	34.199	22.126	-9.301	43.500	12.073	PEAK	V
	434.975	32.297	15.184	-13.703	46.000	17.113	PEAK	
	4825.000	47.912	45.212	-26.088	74.000	2.700	PEAK	
Middle	299.902	25.022	10.513	-20.978	46.000	14.509	PEAK	H
	349.979	25.229	9.454	-20.771	46.000	15.775	PEAK	
	4876.000	45.118	42.443	-28.882	74.000	2.675	PEAK	
	114.996	34.328	22.276	-9.172	43.500	12.052	PEAK	V
	434.975	32.303	15.190	-13.697	46.000	17.113	PEAK	
	4876.000	44.484	41.809	-29.516	74.000	2.675	PEAK	
High	260.011	23.990	10.152	-22.010	46.000	13.837	PEAK	H
	304.995	25.268	10.645	-20.732	46.000	14.623	PEAK	
	4918.500	43.427	40.673	-30.573	74.000	2.753	PEAK	
	114.996	33.981	21.929	-9.519	43.500	12.052	PEAK	V
	434.975	32.316	15.203	-13.684	46.000	17.113	PEAK	
	4927.000	42.617	39.847	-31.383	74.000	2.770	PEAK	

Notes:

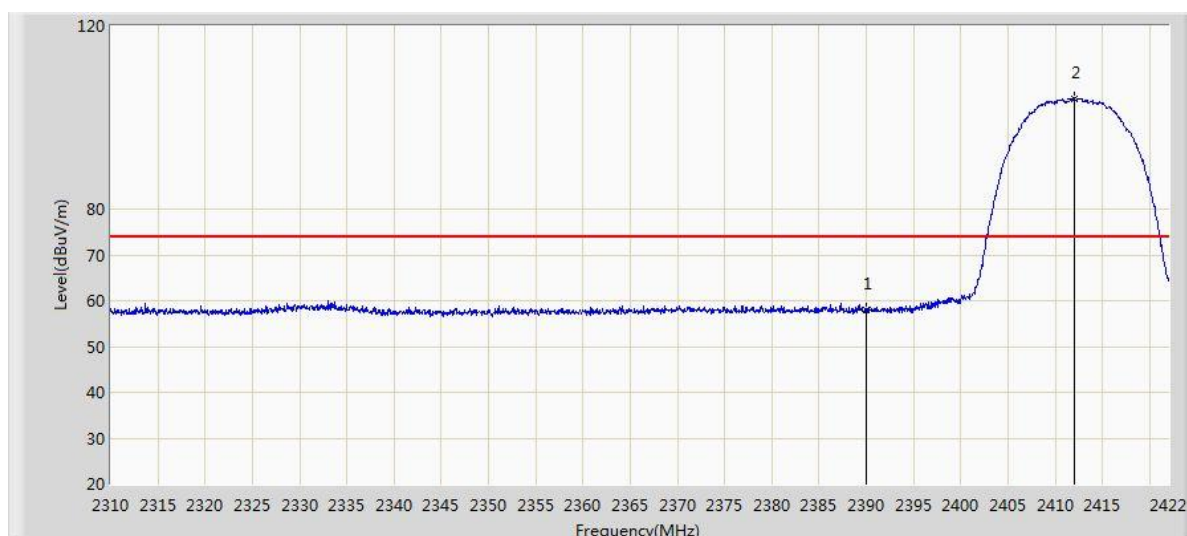
1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. Due to the peak measure values also meet the average limit (54dBm), the average measurement is not tested based on technical judgment.

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Page 39 of 51
Test Plot of Frequency Band Edge of 802.11b mode
Low Channel


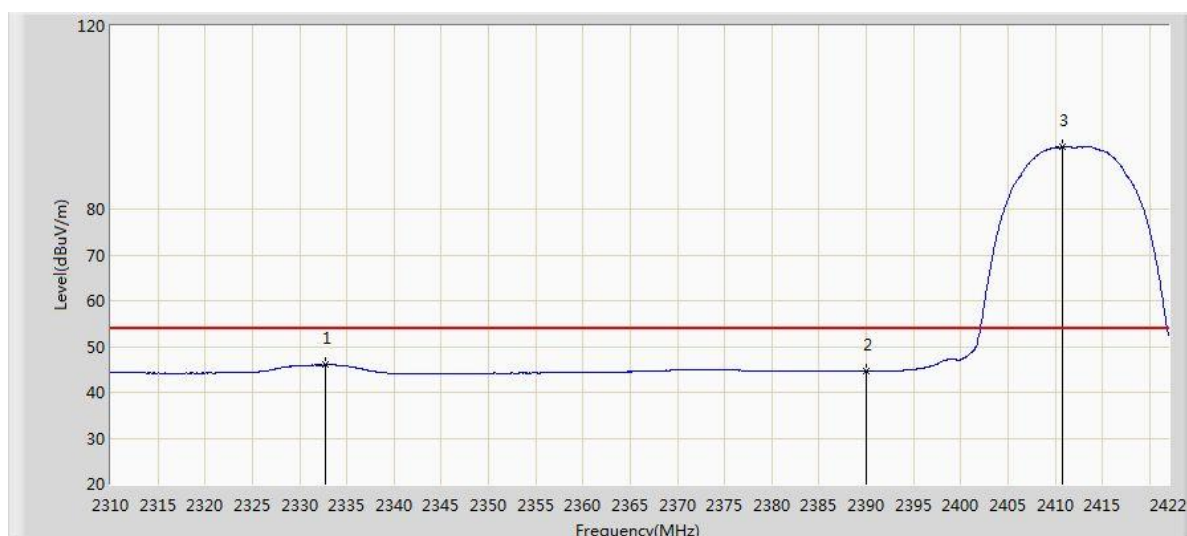
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	57.980	26.777	-16.020	74.000	31.203	PK	H
2410.800	101.262	70.090	27.262	74.000	31.172	PK	



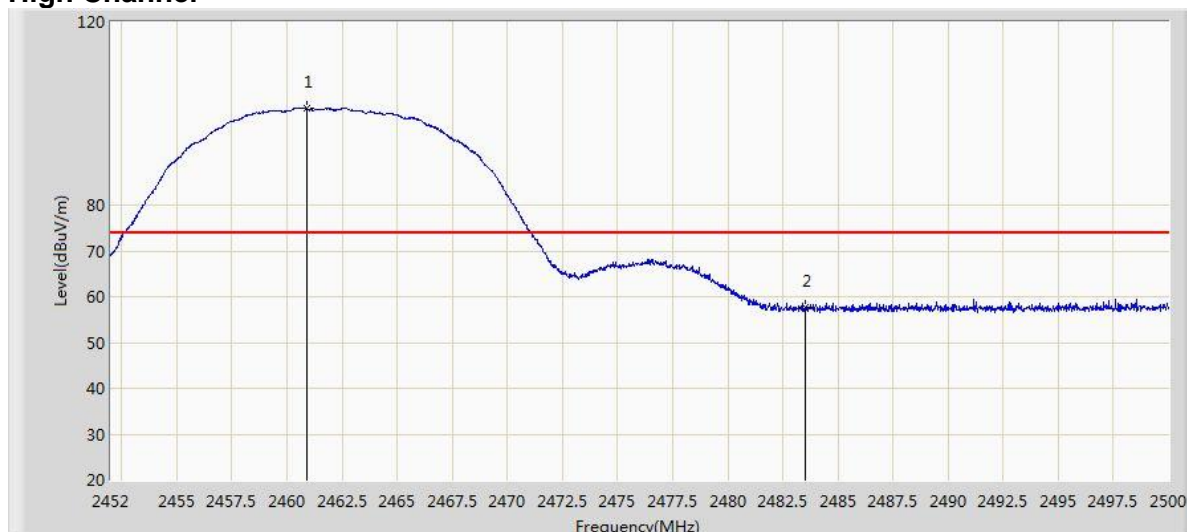
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	44.537	13.334	-9.463	54.000	31.203	AV	H
2411.640	91.044	59.874	37.044	54.000	31.170	AV	



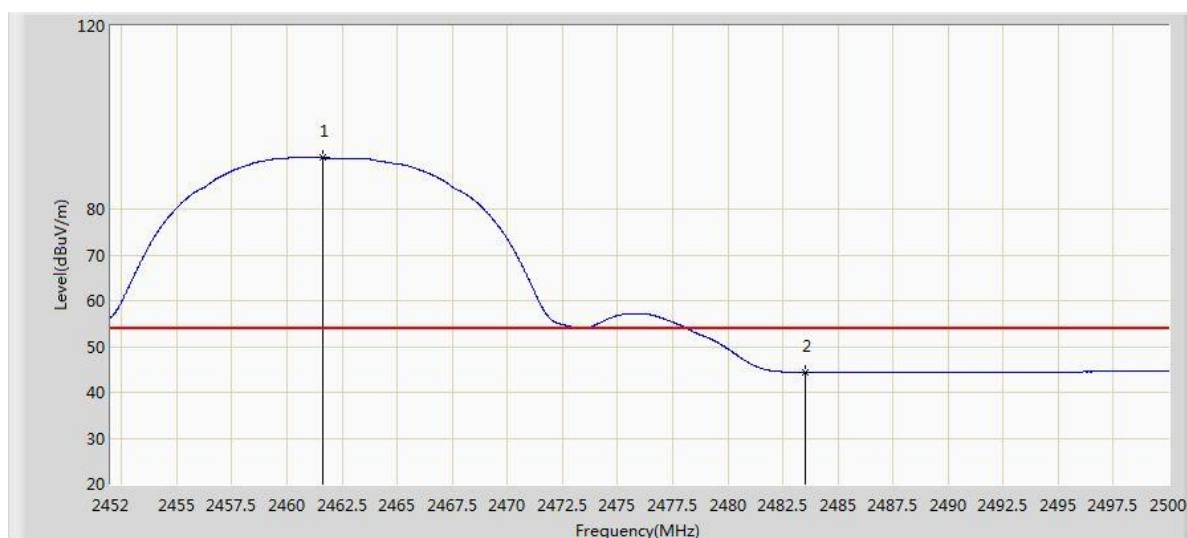
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	57.888	26.685	-16.112	74.000	31.203	PK	V
2412.088	104.039	72.870	30.039	74.000	31.170	PK	



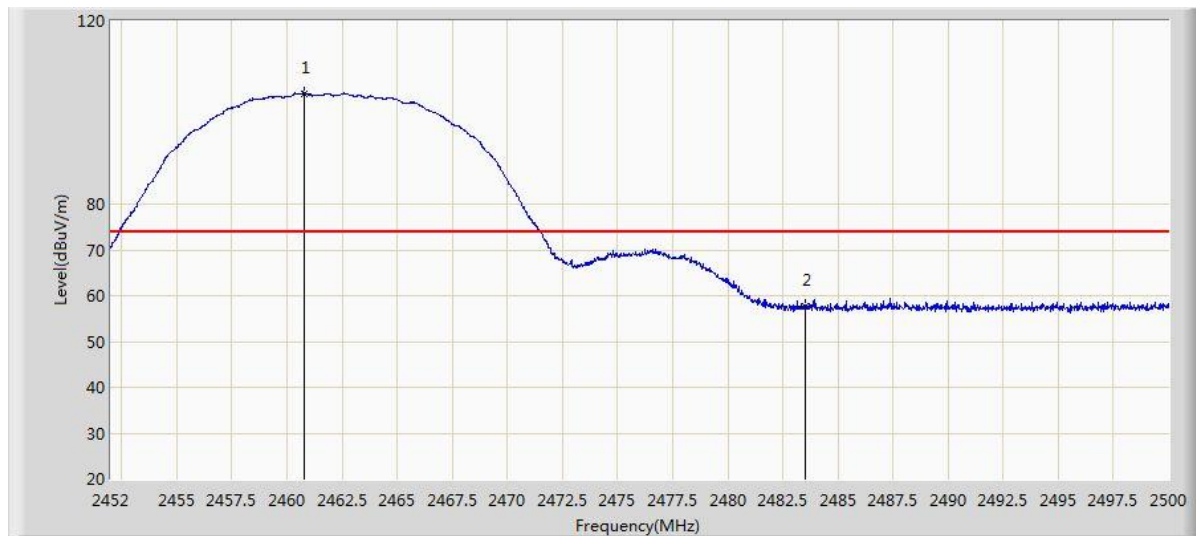
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2332.736	45.953	14.590	-8.047	54.000	31.363	AV	V
2390.000	44.634	13.431	-9.366	54.000	31.203	AV	
2410.800	93.523	62.351	39.523	54.000	31.172	AV	

High Channel


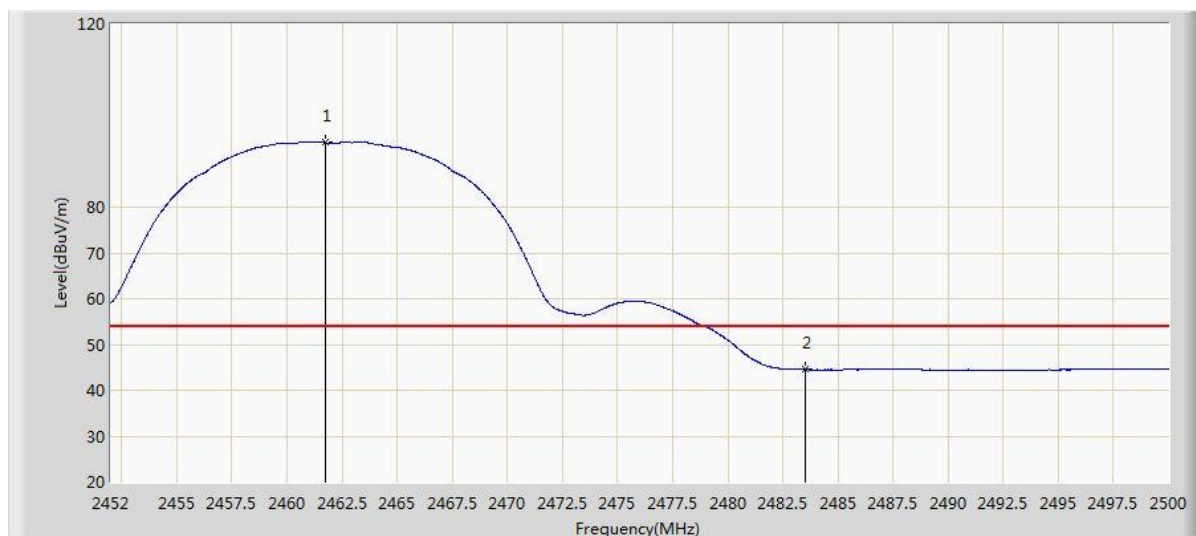
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2460.880	101.231	70.098	27.231	74.000	31.133	PK	H
2483.500	57.586	26.393	-16.414	74.000	31.194	PK	



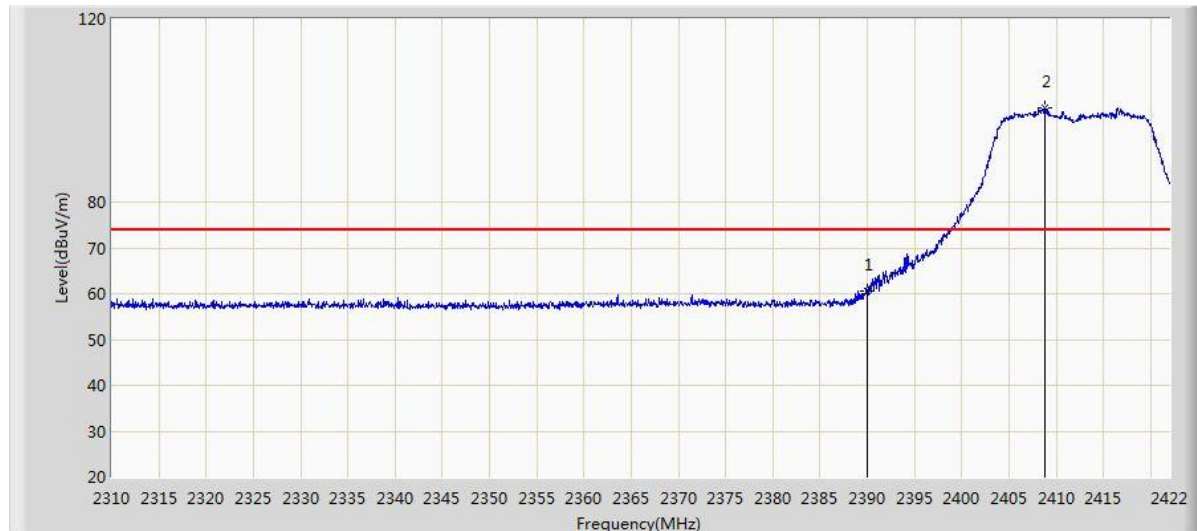
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2461.600	91.339	60.204	37.339	54.000	31.135	AV	H
2483.500	44.404	13.211	-9.596	54.000	31.194	AV	



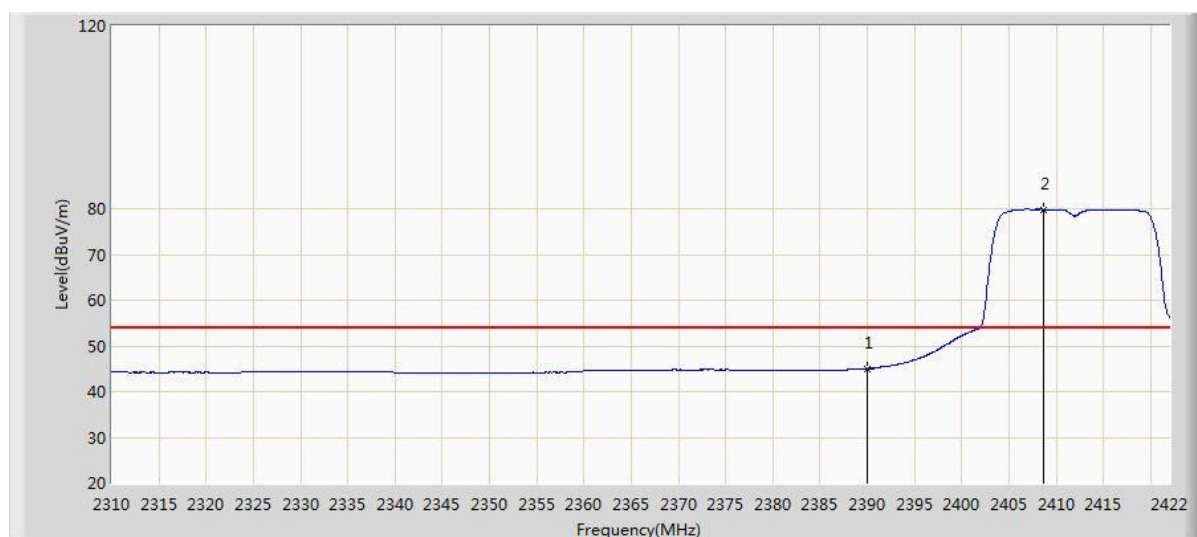
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2460.784	104.189	73.056	30.189	74.000	31.133	PK	V
2483.500	57.592	26.399	-16.408	74.000	31.194	PK	



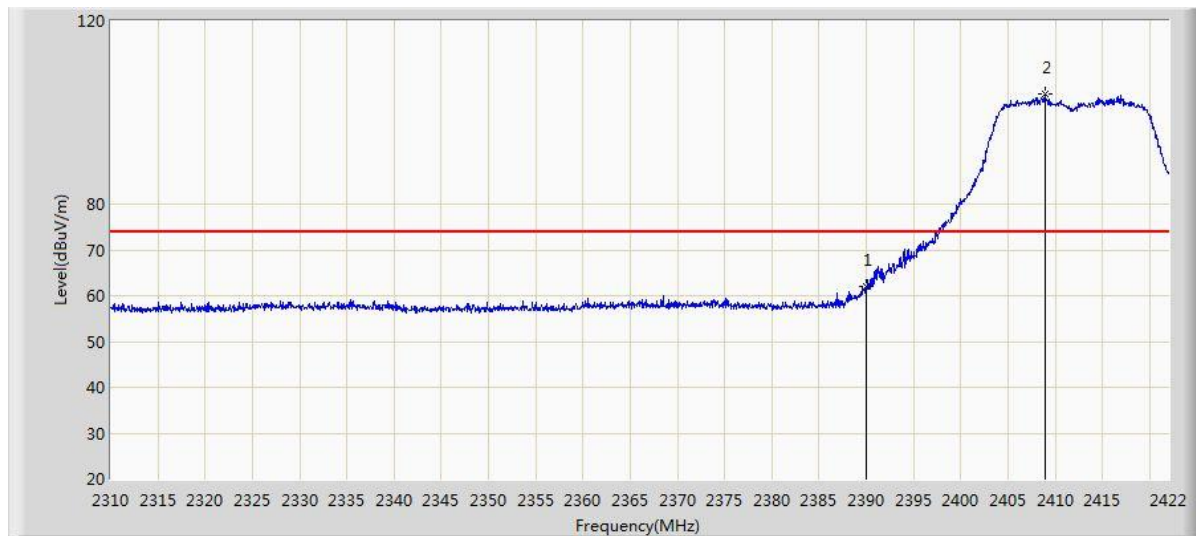
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2461.744	94.090	62.955	40.090	54.000	31.135	AV	V
2483.500	44.512	13.319	-9.488	54.000	31.194	AV	

Test Plot of Frequency Band Edge of 802.11g mode
Low Channel


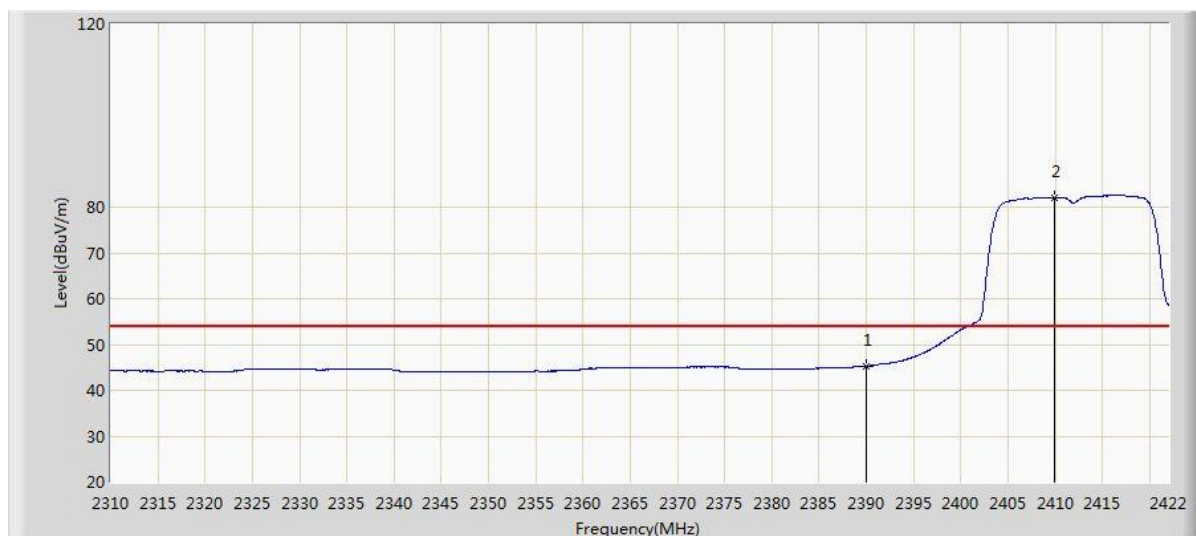
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	60.631	29.428	-13.369	74.000	31.203	PK	H
2408.840	100.640	69.466	26.640	74.000	31.175	PK	



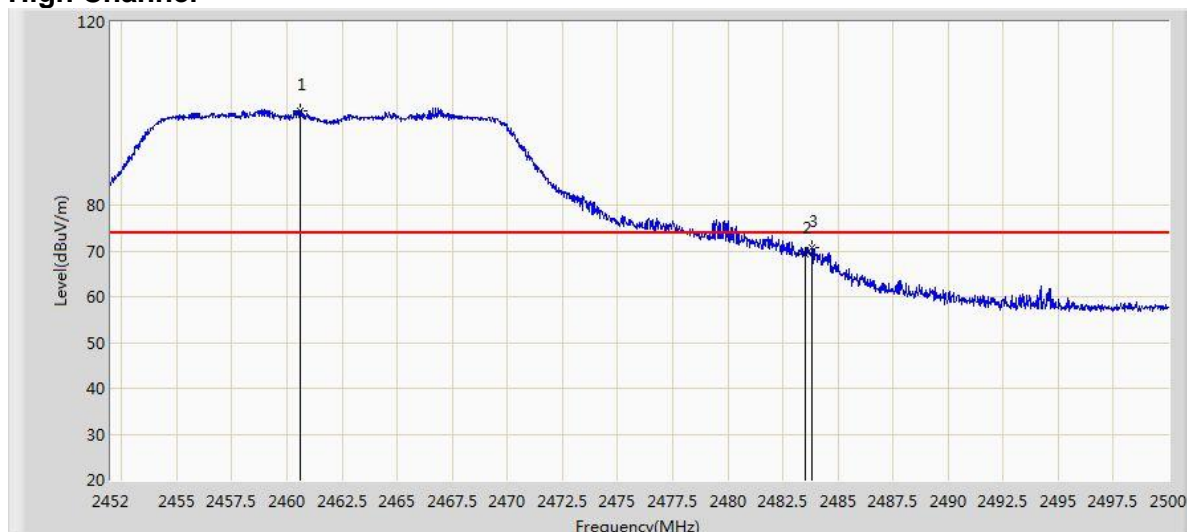
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	45.028	13.825	-8.972	54.000	31.203	AV	H
2408.728	79.787	48.613	25.787	54.000	31.175	AV	



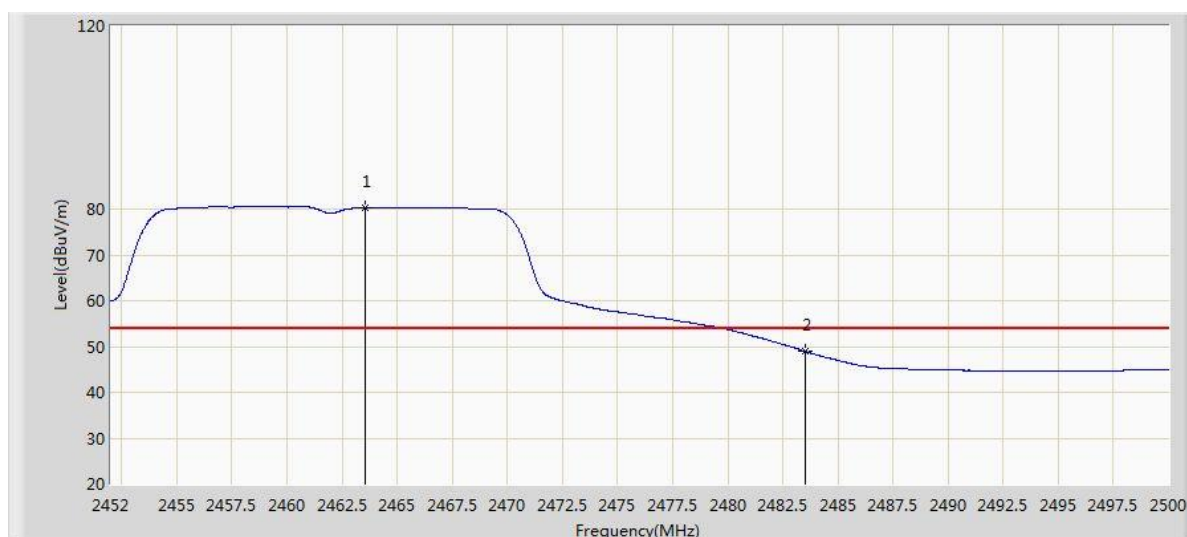
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	61.937	30.734	-12.063	74.000	31.203	PK	V
2408.952	103.926	72.752	29.926	74.000	31.174	PK	



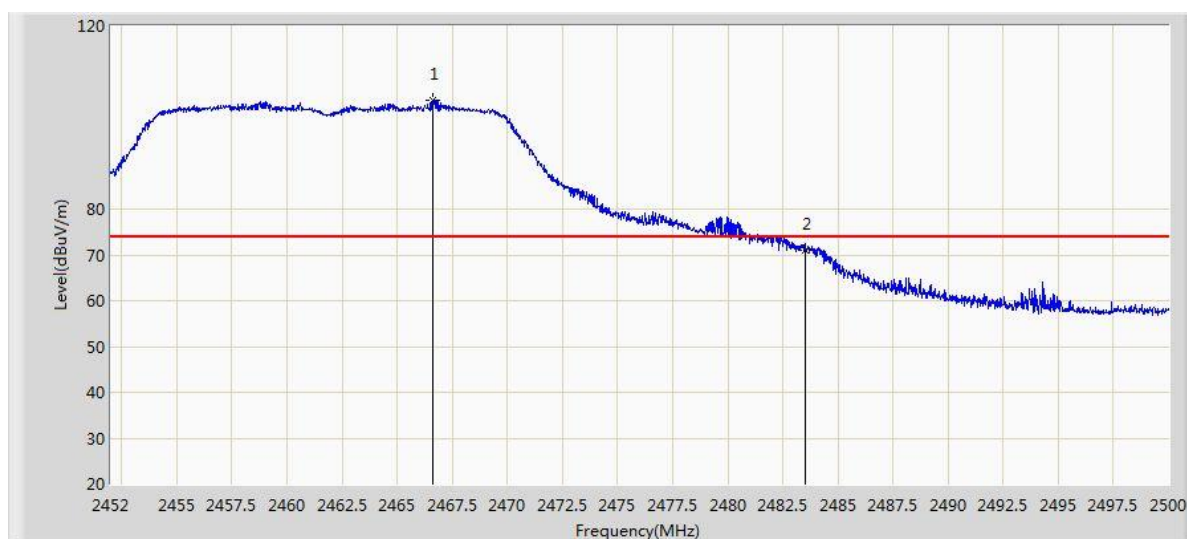
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	45.305	14.102	-8.695	54.000	31.203	AV	V
2409.904	82.053	50.880	28.053	54.000	31.173	AV	

High Channel


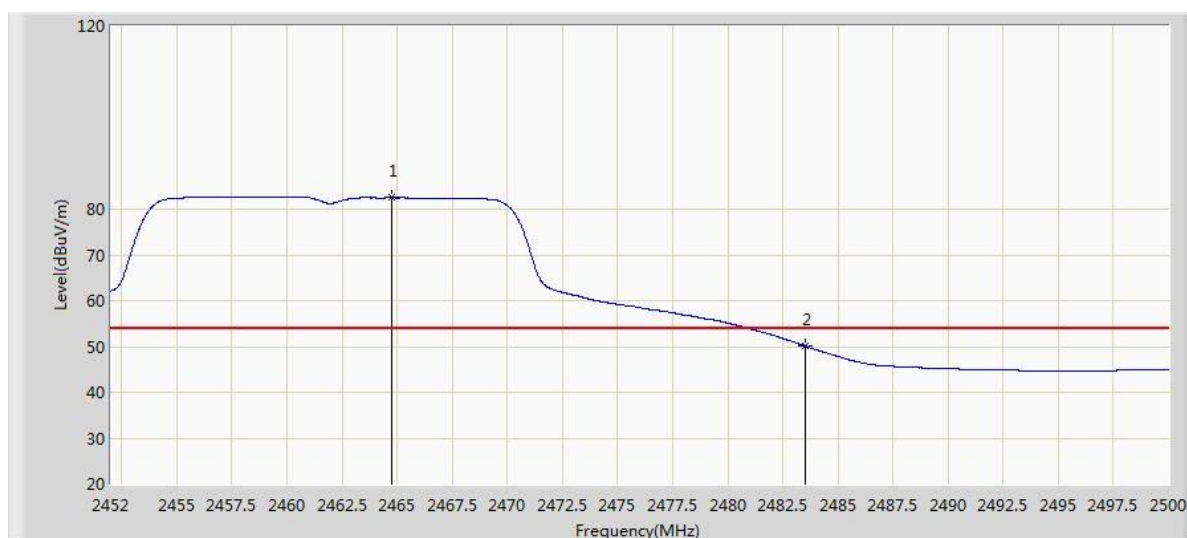
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2460.616	100.605	69.472	26.605	74.000	31.133	PK	H
2483.500	69.376	38.183	-4.624	74.000	31.194	PK	
2483.848	70.651	39.457	-3.349	74.000	31.194	PK	



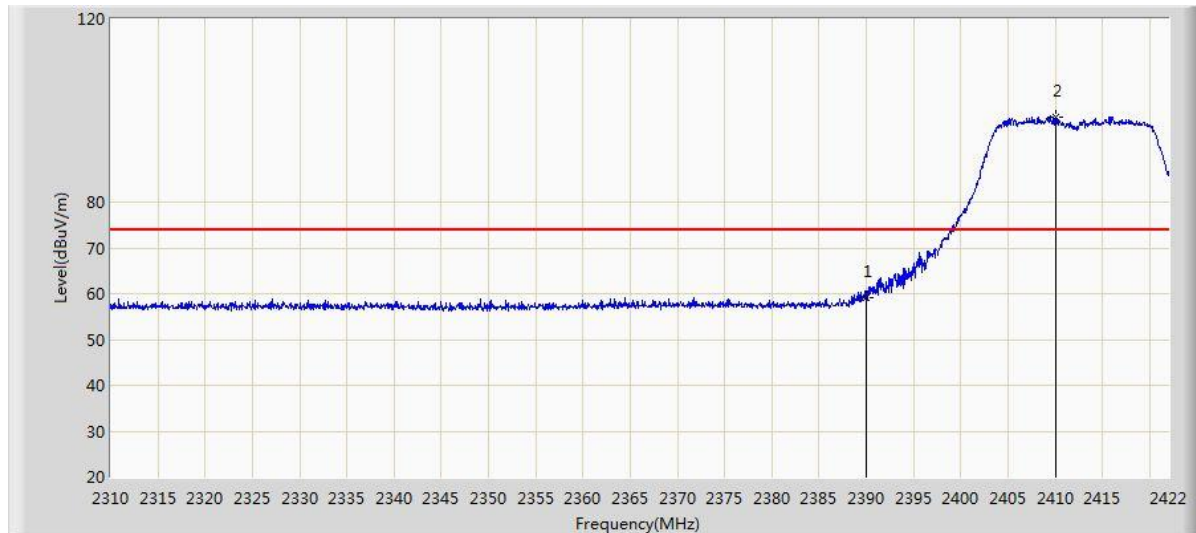
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2463.544	80.304	49.166	26.304	54.000	31.139	AV	H
2483.500	48.943	17.750	-5.057	54.000	31.194	AV	



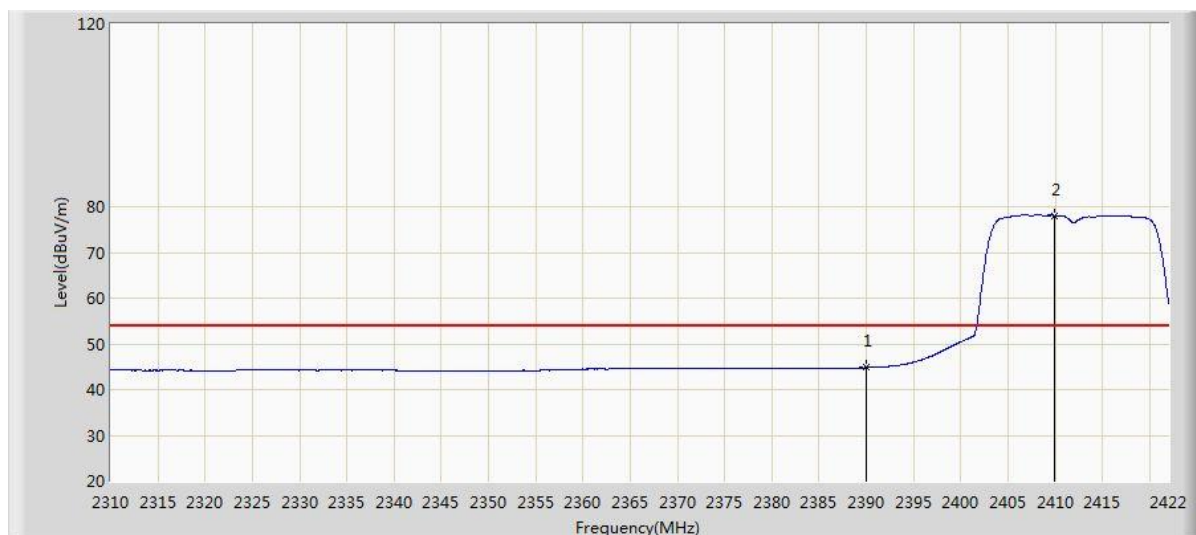
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2466.592	103.709	72.562	29.709	74.000	31.147	PK	V
2483.500	71.072	39.879	-2.928	74.000	31.194	PK	



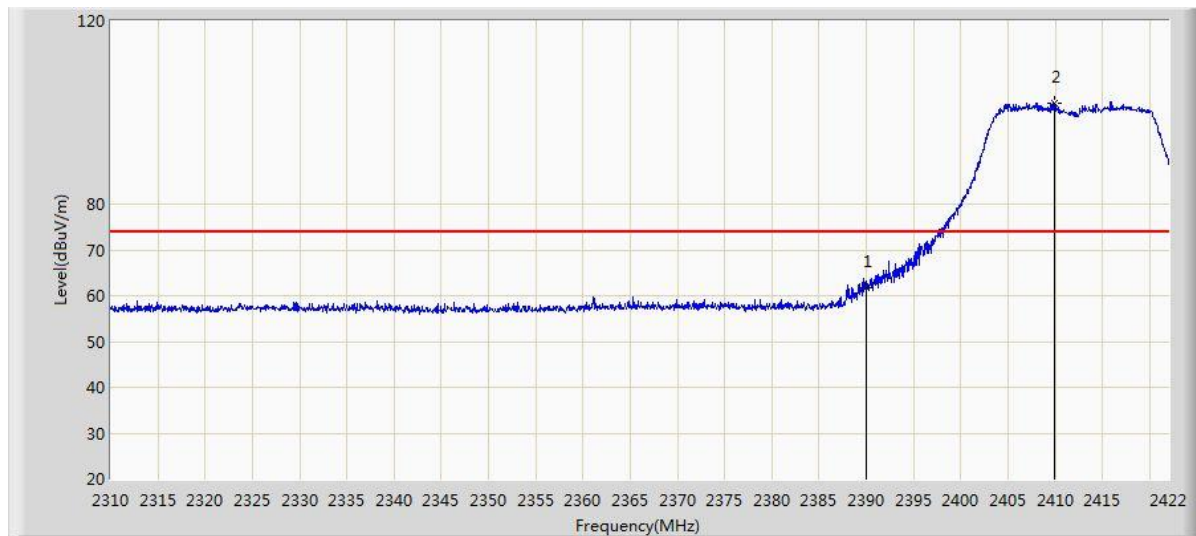
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2464.744	82.497	51.356	28.497	54.000	31.142	AV	V
2483.500	50.107	18.914	-3.893	54.000	31.194	AV	

Test Plot of Frequency Band Edge of 802.11n mode
Low Channel


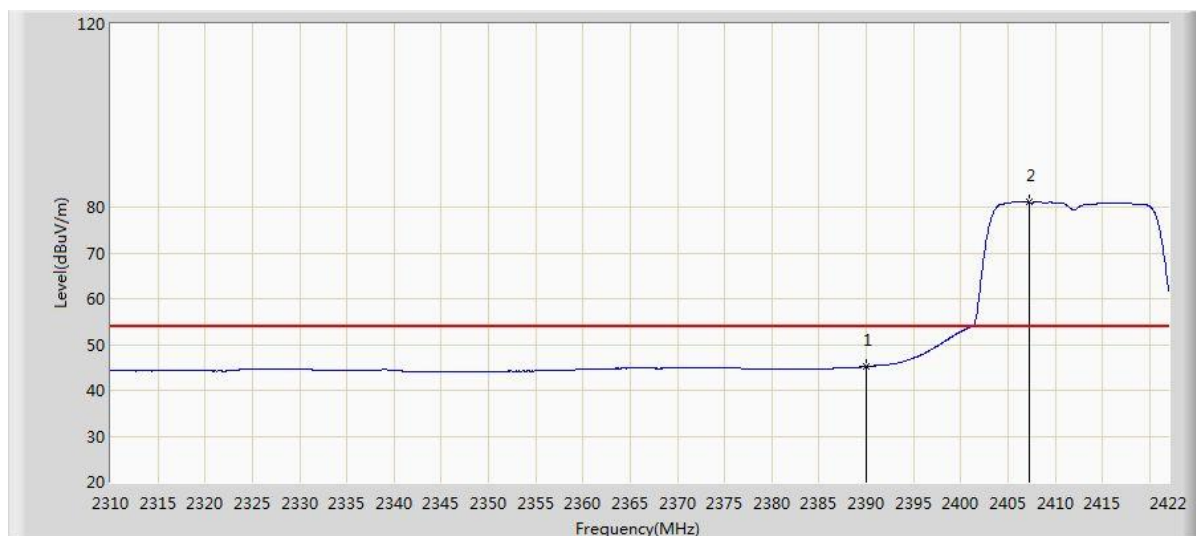
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	59.235	28.032	-14.765	74.000	31.203	PK	H
2410.016	98.454	67.281	24.454	74.000	31.173	PK	



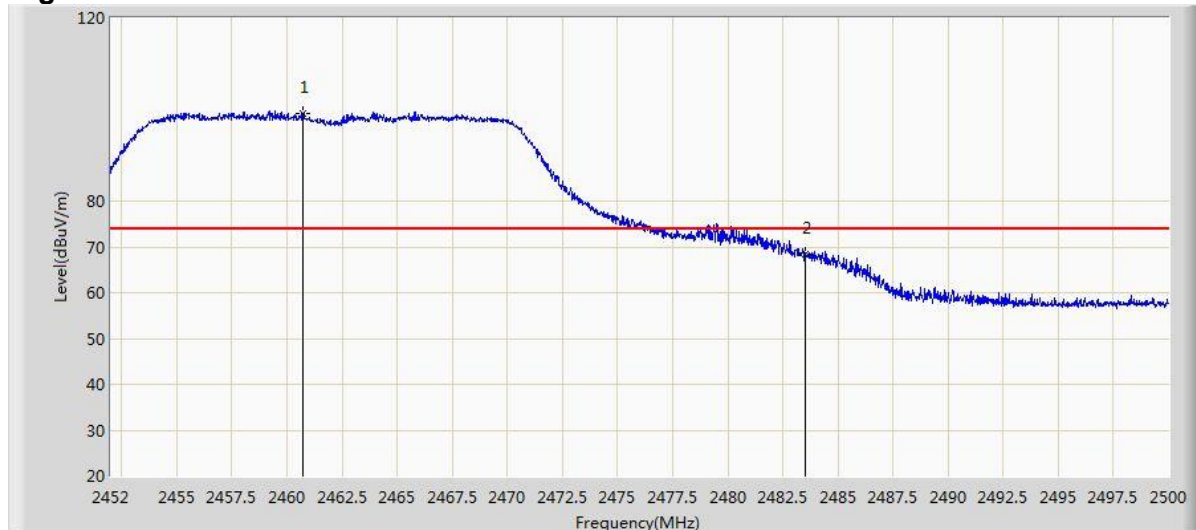
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	44.818	13.615	-9.182	54.000	31.203	AV	H
2409.904	78.044	46.871	24.044	54.000	31.173	AV	



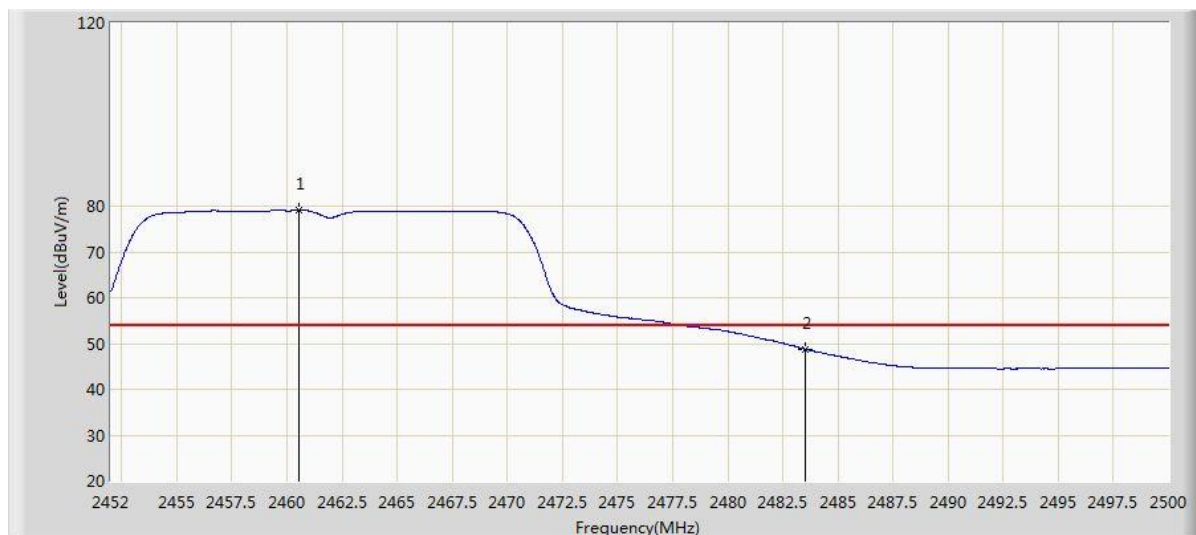
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	61.685	30.482	-12.315	74.000	31.203	PK	V
2409.960	101.937	70.764	27.937	74.000	31.173	PK	



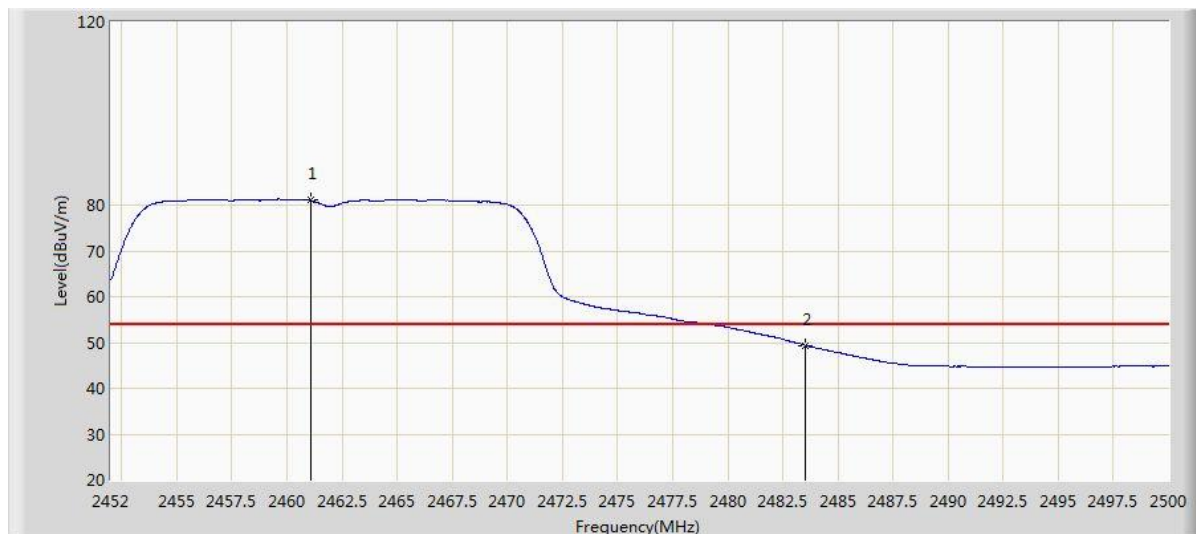
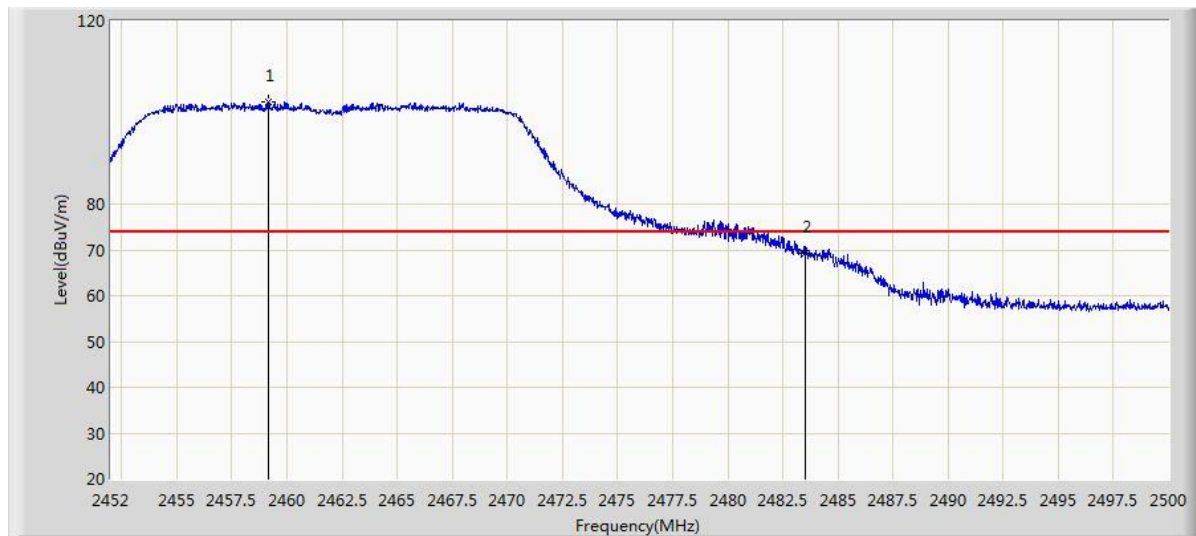
Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	45.135	13.932	-8.865	54.000	31.203	AV	V
2407.328	81.029	49.853	27.029	54.000	31.176	AV	

High Channel


Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2460.712	99.084	67.951	25.084	74.000	31.133	PK	H
2483.500	68.371	37.178	-5.629	74.000	31.194	PK	



Freq. (MHz)	Measure Level (dB μ V/m)	Reading (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Correct Factor (dB)	Detector	Polar
2460.568	79.114	47.981	25.114	54.000	31.133	AV	H
2483.500	48.782	17.589	-5.218	54.000	31.194	AV	



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Appendix I- RF Exposure statement

FCC Requirement

According to FCC 2.1091, mobile equipment must comply with the following applicable limit for maximum permissible exposure (MPE) specified in FCC 1.1310:

Equipment Use	Frequency Range	Power Density [mW/cm ²]	Average Time [min]
General Population / Uncontrolled Exposure	1.5 – 100GHz	1	30

IC Requirement

According to RSS-102 (Issue 5), clause 2.5.2, no routine RF exposure evaluation is required if the transmitter power (e.i.r.p.) is below the following threshold:

Frequency Range	SAR Limitation [W]
Above 1.5GHz	5

Measurement Result

The maximum measured transmitter power is the following:

Conducted Output Power P _{out} [dBm]	Conducted Output Power P _{out} [mW]	Maximum Antenna Gain [dBi]	P _{out} EIRP [mW]	Power Density at 20cm [mW/cm ²]
22.75	188.36	1.86	289.07	0.058

Note:

The power density S in mW/cm² is calculated according to the Friis formula:

$$S = (P_{out} \cdot G) / (4\pi \cdot D^2),$$

where

S = power density in mW/cm²

P_{out} = antenna conducted output power in mW

G = antenna gain in linear scale (here: 1.86dBi=10log(G))

D = distance between observation point and radiating structure in cm (here: 20cm)

Conclusion

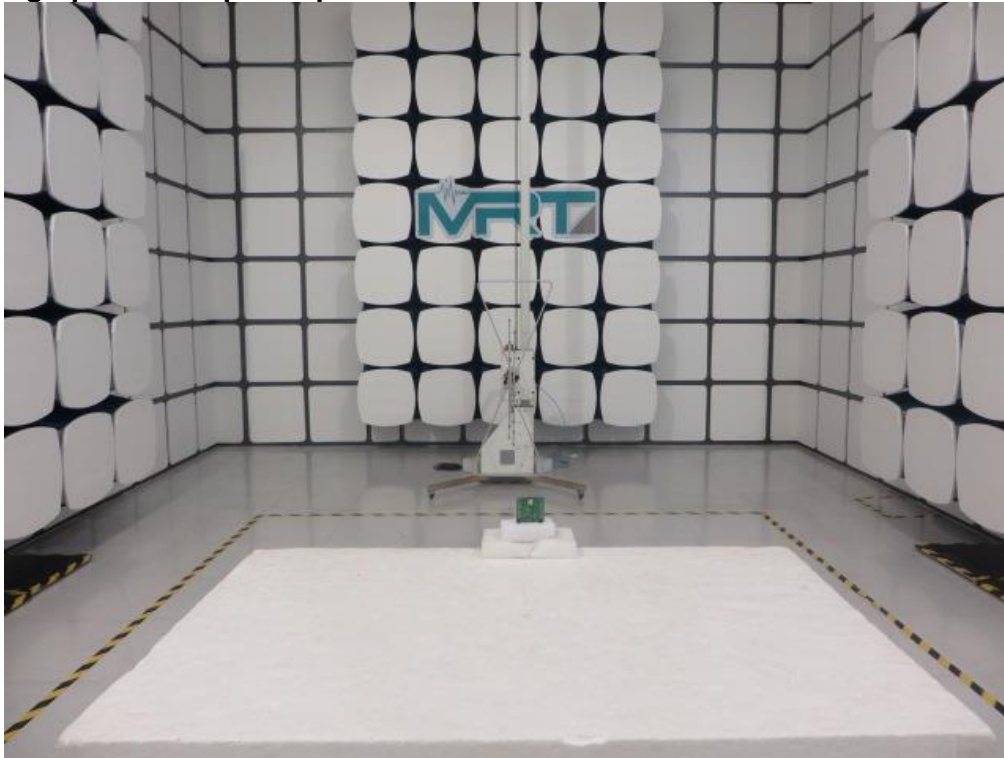
The device complies with the FCC and IC RF exposure requirements since the maximum transmitter power density is below the FCC limit and the e.i.r.p. power is below the IC RF exposure evaluation exemption threshold.

Appendix II- Photographs of the Test Set-Up

Photograph 1: Set-up for Conducted RF test at Antenna Port



Photograph 2: Set-up for Spurious Emissions below 1GHz



Photograph 3: Set-up for Spurious Emissions above 1GHz

