Prüfbericht-Nr.: *Test Report No.*:	**15093884 001**	**Auftrags-Nr.:** *Order No.*:	154142438	Seite 1 von 54 *Page 1 of 54*
Kunden-Referenz-Nr.: *Client Reference No.*:	626805	**Auftragsdatum:** *Order date*:	04.01.2016	
Auftraggeber: *Client*:	Murata Manufacturing Co., Ltd. 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan			
Prüfgegenstand: *Test item*:	WLAN module			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	CMWC1ZZABR FCC ID: VPYCMABR IC: 772C-CMABR			
Auftrags-Inhalt: *Order content*:	Complete test			
Prüfgrundlage: *Test specification*:	FCC CFR47 Part 15, Subpart C Section 15.247 ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v03r05 RSS-Gen Issue 4, November 2014 RSS-247 Issue 1, May 2015			

Wareneingangsdatum: *Date of receipt*:	04.01.2016
Prüfmuster-Nr.: *Test sample No.*:	A000316979-001
Prüfzeitraum: *Testing period*:	15.01.2016 - 18.01.2016
Ort der Prüfung: *Place of testing*:	MRT Technology (Suzhou) Co., Ltd
Prüflaboratorium: *Testing laboratory*:	TÜV Rheinland (Shanghai) Co., Ltd.
Prüfergebnis*: *Test result**:	Pass

geprüft von / *tested by*:			**kontrolliert von** / *reviewed by*:		
03.02.2016	Adrian Shi / PE	Adrian Shi	03.02.2016	Shi Li / Reviewer	shi li
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*:

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*:	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* 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*

VD4

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

5. 2 RF EXPOSURE STATEMENT
RESULT: Pass

Contents

1. General Remarks

1.1 Complementary Materials

Null

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	MRTSUE06001	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2016/11/03
Temperature/ Meter Humidity	Ouleinuo	N/A	MRTSUE06114	1 year	2016/11/20
Radiated Emission					
Spectrum Analyzer	Agilent	E4447A	MRTSUE06028	1 year	2016/12/08
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2016/11/03
Preamplifier	Agilent	83017A	MRTSUE06020	1 year	2016/03/29
Preamplifier	Schwarzbeck	BBV9721	MRTSUE06121	1 year	2016/04/16
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2016/11/07
TRILOG Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2016/11/07
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2016/11/07
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2016/01/05
Temperature/Humidity Meter	Ouleinuo	N/A	MRTSUE06115	1 year	2016/11/20
Conducted Test Equipment					
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2016/05/08
USB Wideband Power Sensor	Boonton	55006	MRTSUE06109	1 year	2016/05/08
Temperature/Humidity Meter	Ouleinuo	N/A	MRTSUE06114	1 year	2016/11/20

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 basics using in house standards or comparisons.

2.5 Measurement Uncertainty

Table 2: Measurement Uncertainty

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: ± 3.46dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: ± 4.18dB 1GHz ~ 40GHz: ± 4.76dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a WLAN module.

For details refer to the User Manual and Circuit Diagram.

3.2 Ratings and System Details

Kind of Equipment	WLAN module
Type Designation	CMWC1ZZABR
Wireless Standard	802.11b/g/n(HT20)
Operating Frequency band	2412 – 2462MHz
Channel Separation	5MHz
Modulation	DSSS, OFDM
Antenna Type	PCB antenna
Antenna Gain	3.3 dBi
Extreme Temperature Range	+30~+85℃
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. WLAN 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 rata 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

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 6.7
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 3.3dBi 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.

FCC 15.203 – Antenna Requirement 1		**Pass**
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	Antenna type:	Fixed Integral wire antenna
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2		**Pass**
FCC Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.	
Results:	Only one integral antenna can be used.	
Verdict:	N/A	

RSS-Gen 6.3 – External Control		**Pass**
IC Requirement:	The device shall not have any external controls accessible to the user that enable it to be adjusted, selected or programmed to operate in violation of the limits prescribed in the applicable RSS.	
Results:	The device does not have any transmitter external controls accessible to the user that can be adjusted and operated in violation of the limits of this standard.	
Verdict:	Pass	

RSS-Gen 8.3 – Antenna Requirement		**Pass**
IC Requirement:	When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer.	
Results:	a) Antenna type: b) Manufacturer c) model no d) Gain with reference to an isotropic radiator:	Fixed Integral wire antenna N/A N/A 3.3 dBi
Verdict:	Pass	

5.1.2 Peak Output Power

RESULT: **Pass**

Test date	:	2016-01-15
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 v03r05
Limit	:	1W
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A.1.a
Ambient temperature	:	25℃
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	17.02	30
Middle Channel	2437	17.59	30
High Channel	2462	17.50	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	22.43	30
Middle Channel	2437	**22.71**	30
High Channel	2462	21.29	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	22.01	30
Middle Channel	2437	22.12	30
High Channel	2462	19.57	30

5.1.3 6dB Bandwidth and 99% Bandwidth

RESULT: **Pass**

Date of testing	:	2016-01-15
Test standard	:	FCC Part 15.247(a)(2) RSS-247 Clause 5.2(1) RSS-Gen Clause 6.6
Basic standard	:	ANSI C63.10: 2013 Clause 8 of KDB 558074 v03r05 Clause 6.6 of RSS-Gen
Limit	:	≥500KHz for 6dB Bandwidth
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A.1.a
Ambient temperature	:	25℃
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	10.13	13.787
Mid Channel	2437	10.12	13.763
High Channel	2462	10.12	13.692

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	16.37	16.569
Mid Channel	2437	16.39	16.585
High Channel	2462	16.37	16.554

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	17.61	17.732
Mid Channel	2437	17.65	17.701
High Channel	2462	17.63	17.709

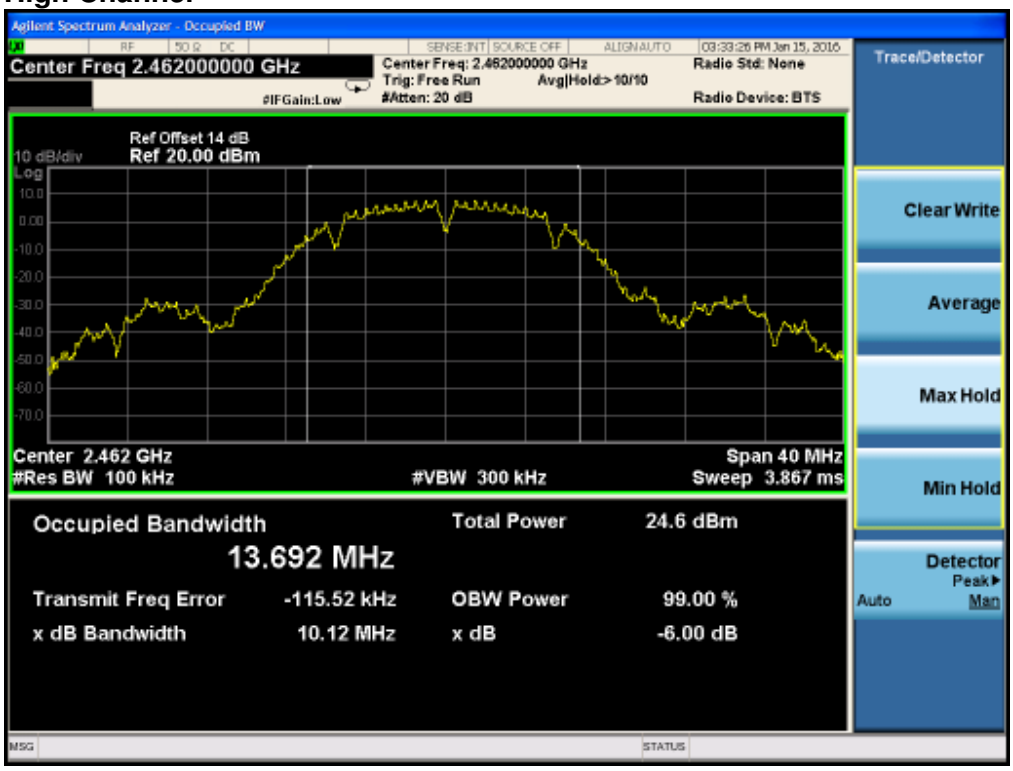
For details refer to following test plot.

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

Low Channel

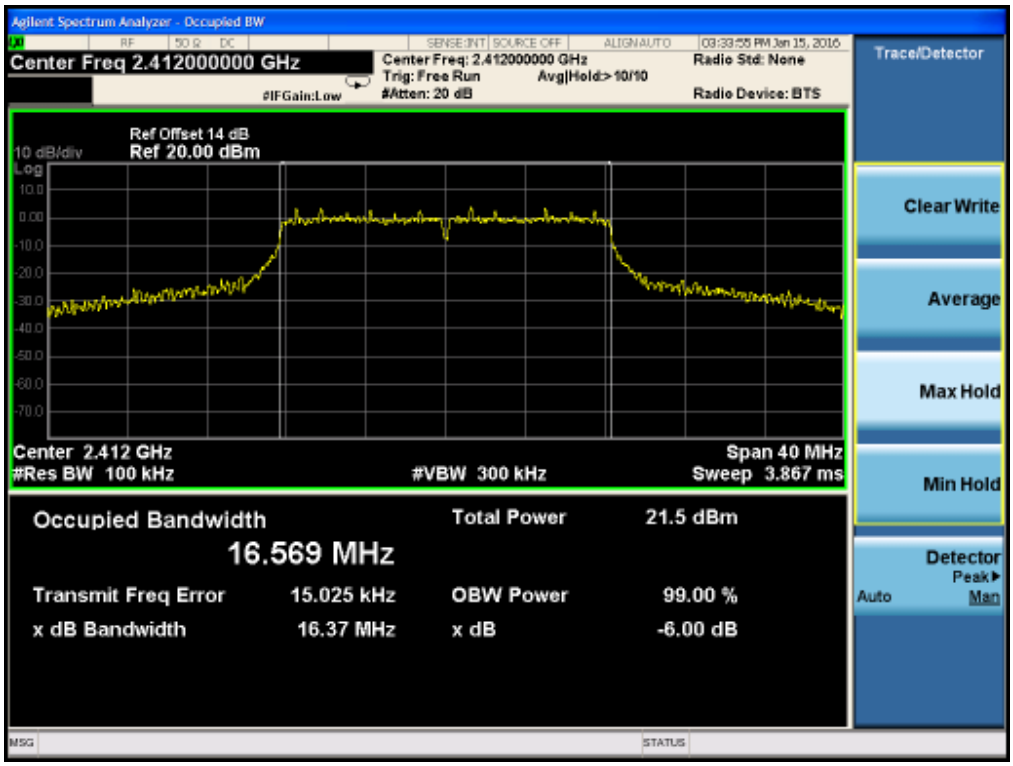
Middle Channel

High Channel

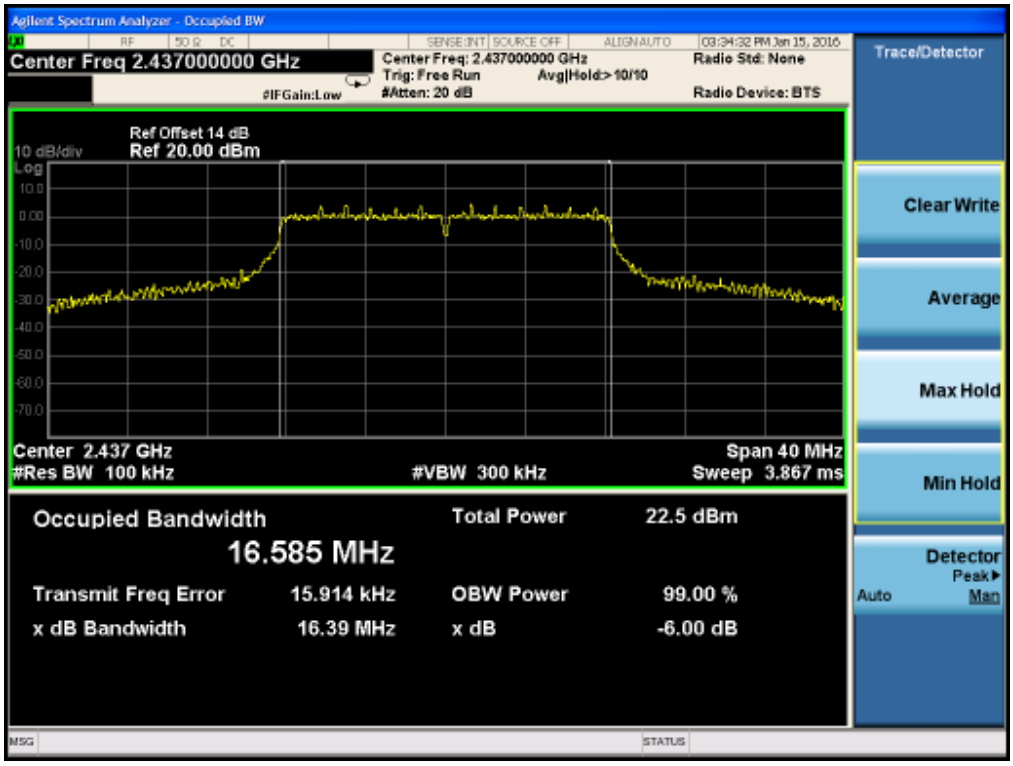


Test Plot of 6dB & 99% Bandwidth measured of 802.11g mode

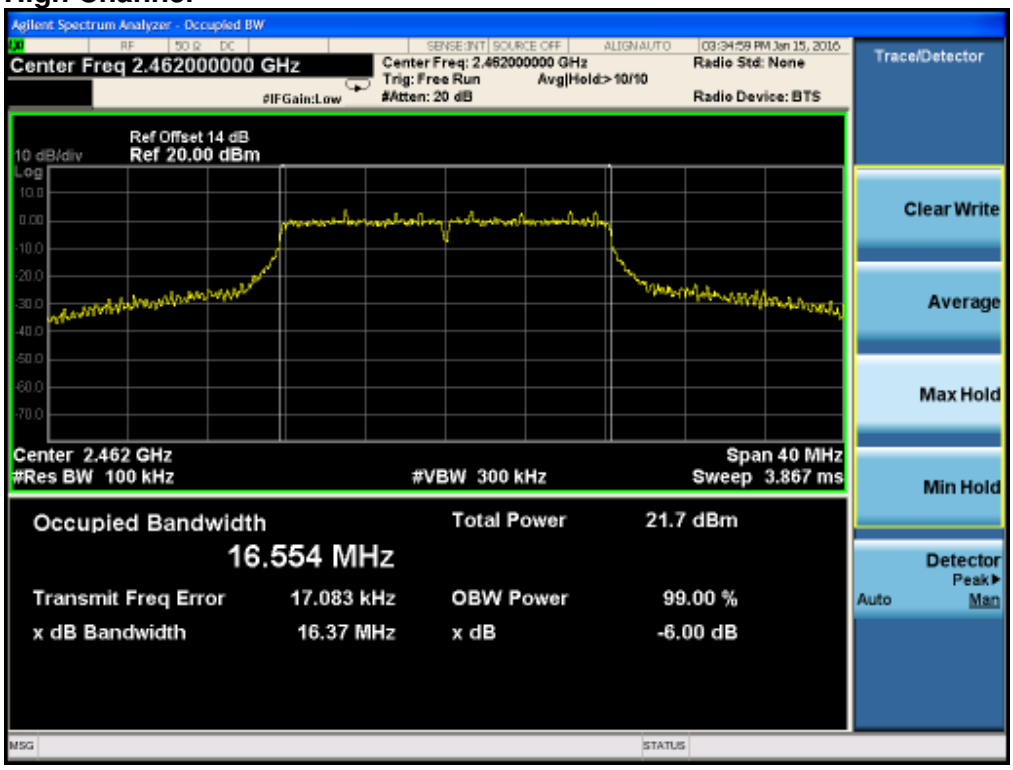
Low Channel



Middle Channel

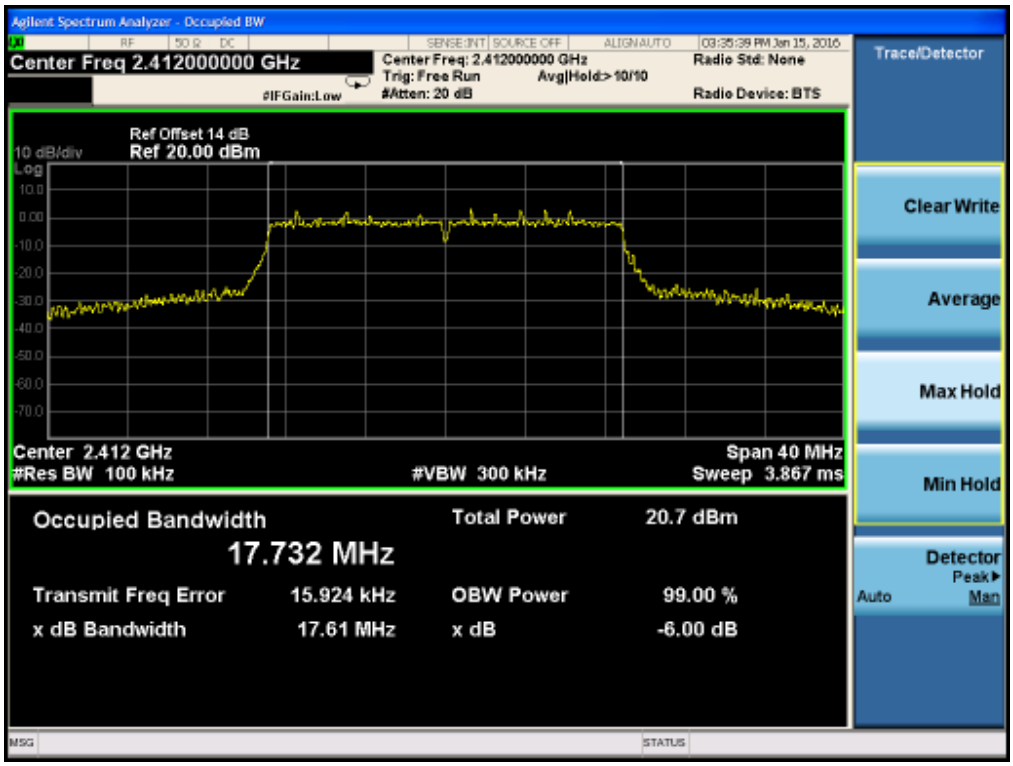


High Channel

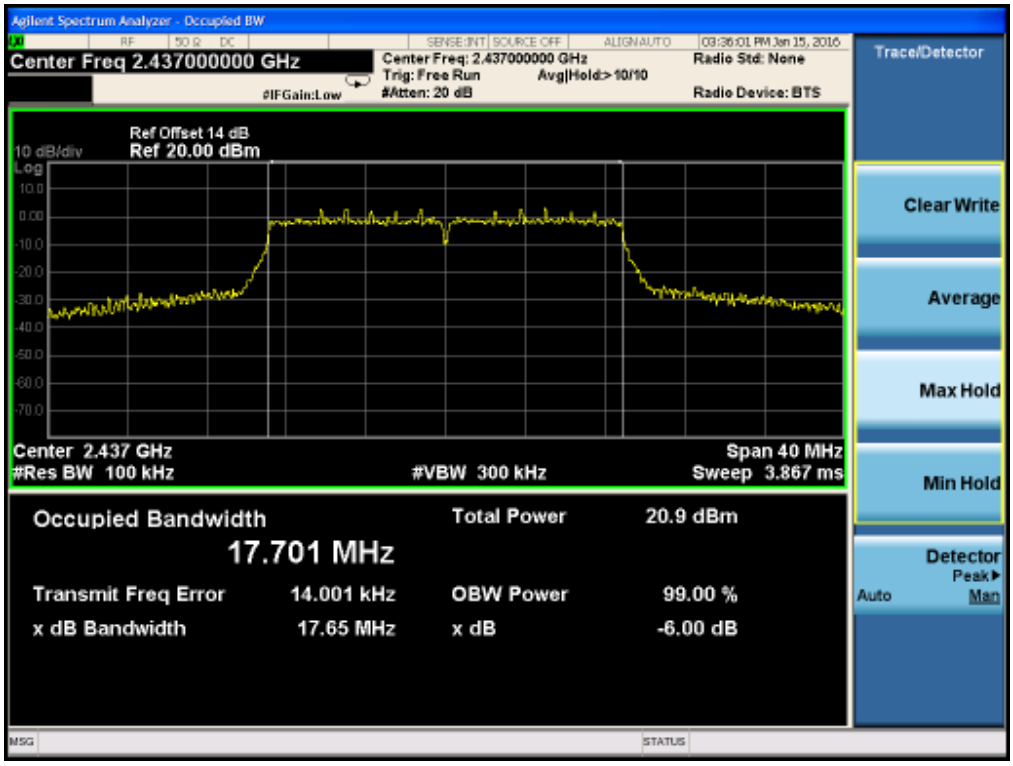


Test Plot of 6dB & 99% Bandwidth measured of 802.11n mode

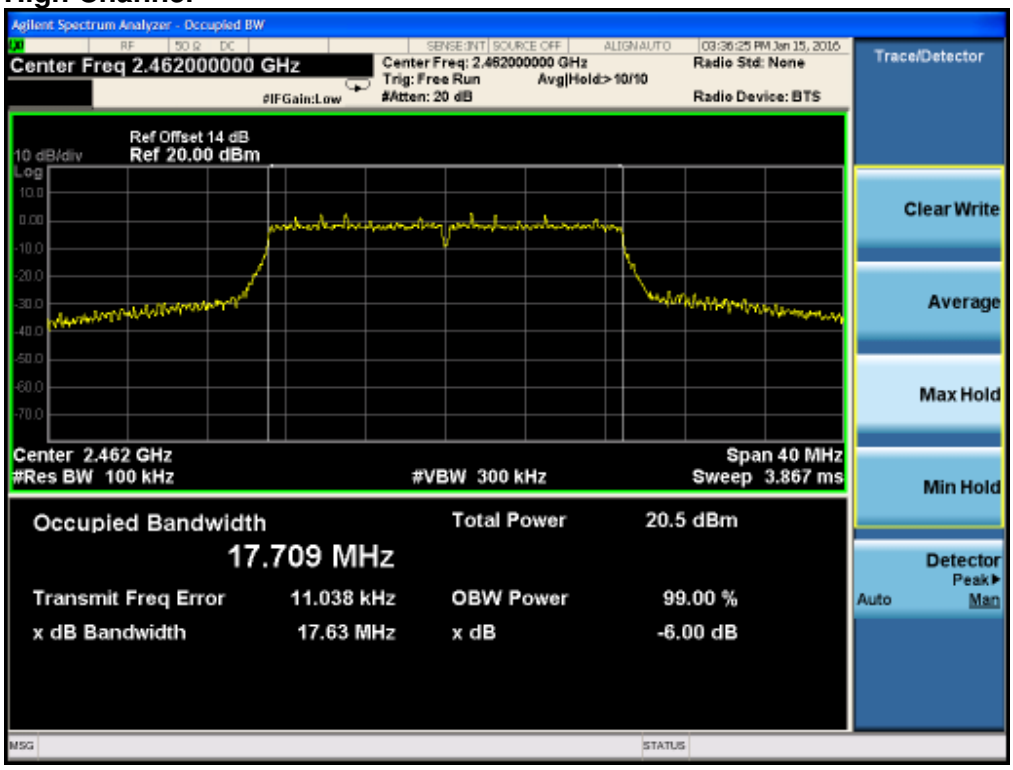
Low Channel



Middle Channel



High Channel



5.1.4 Conducted Spurious Emissions

RESULT: **Pass**

Date of testing	:	2016-01-15
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

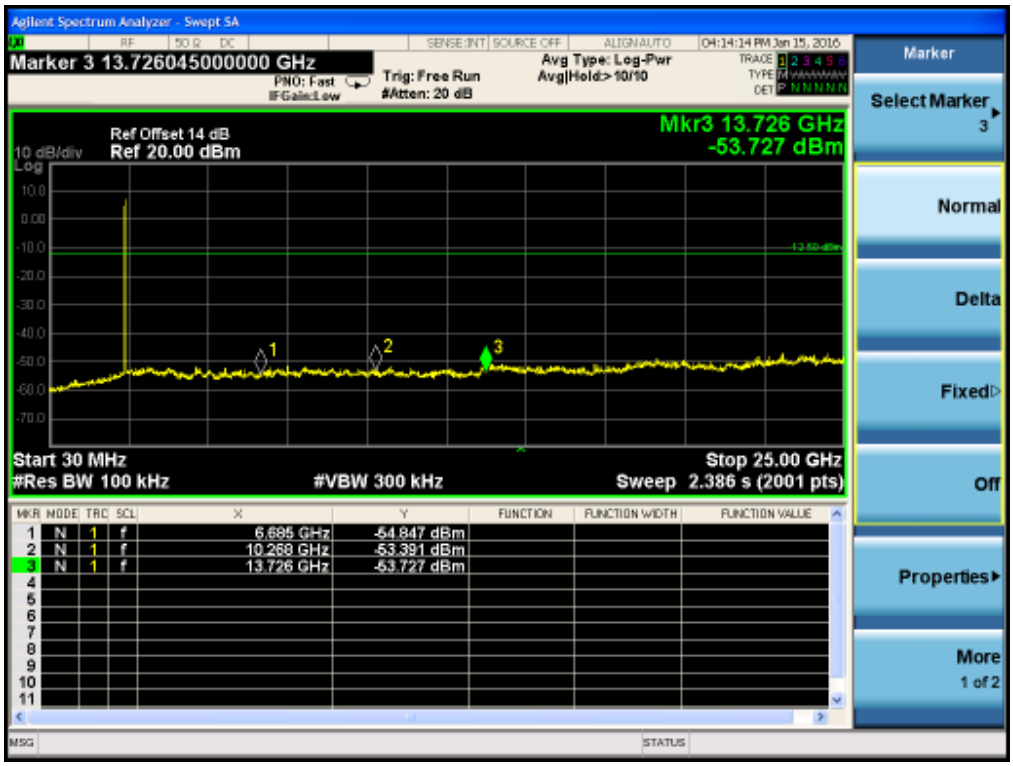
Test setup

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

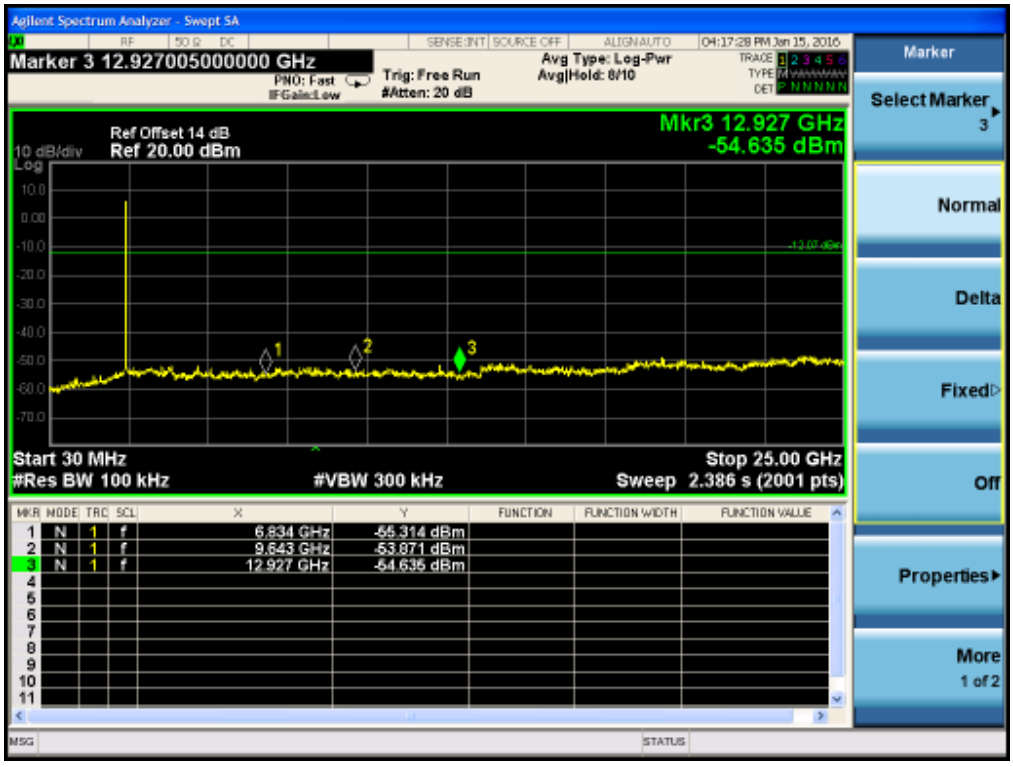
For details refer to following test plot.

Test Plot of Conducted spurious emissions measured of 802.11b mode

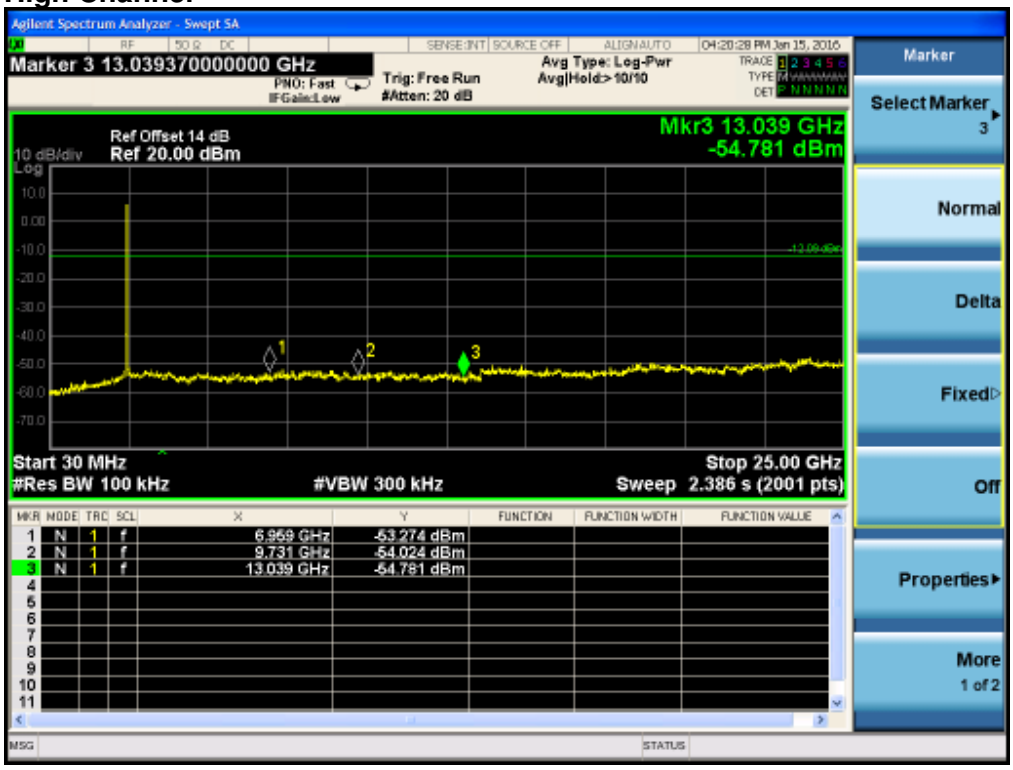
Low Channel



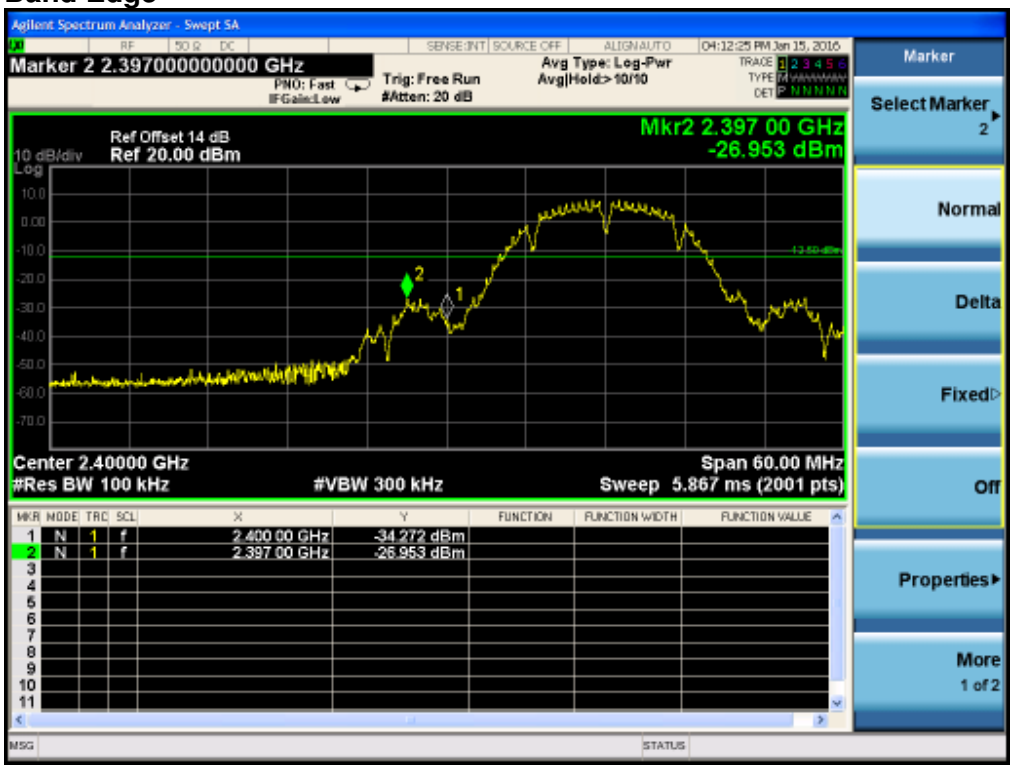
Middle Channel



High Channel



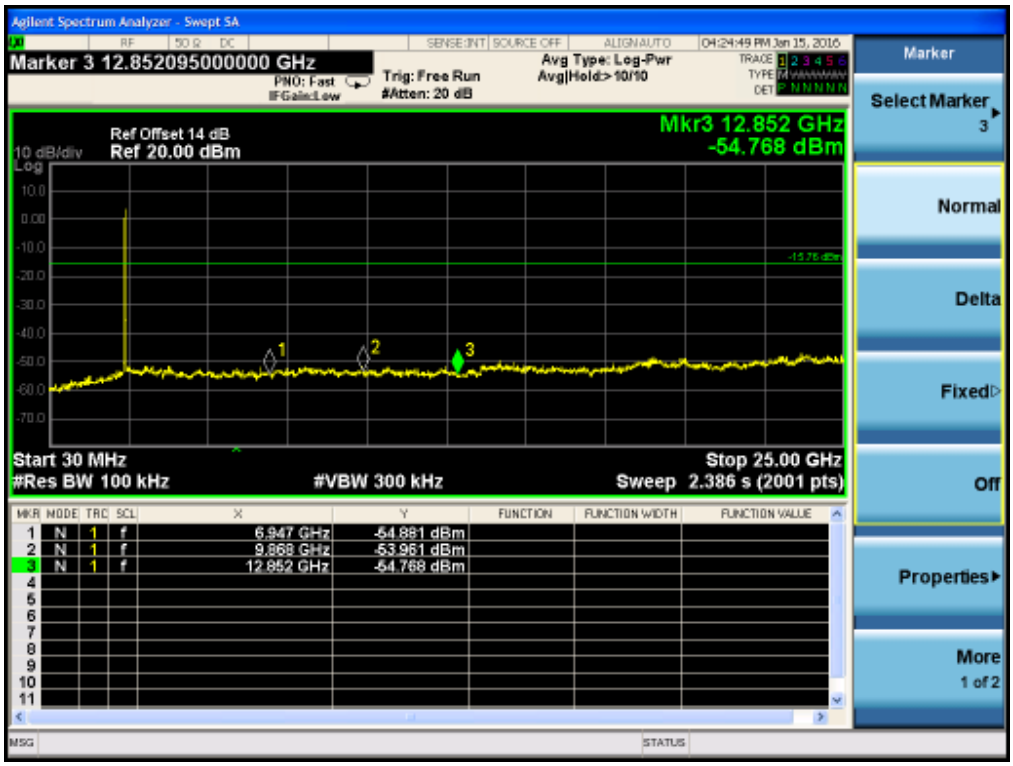
Band Edge


Agilent Spectrum Analyzer - Swept SA
Marker 2 2.397000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
04:12:25 PM Jan 15, 2016
Ref Offset 14 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr2 2.397 00 GHz
-26.953 dBm
Center 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 60.00 MHz
Sweep 5.867 ms (2001 pts)
1 N 1 f 2.400 00 GHz -34.272 dBm
2 N 1 f 2.397 00 GHz -26.953 dBm
Marker
Select Marker 2
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

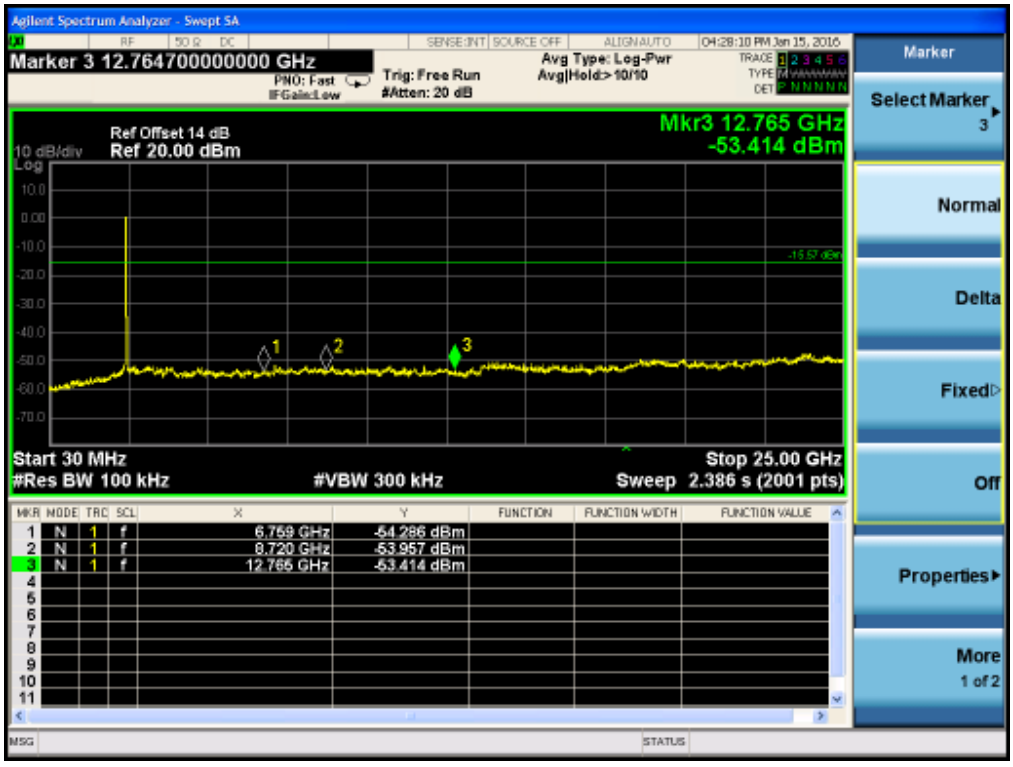

Agilent Spectrum Analyzer - Swept SA
Marker 2 2.485060000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
04:19:39 PM Jan 15, 2016
Ref Offset 14 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr2 2.485 06 GHz
-47.160 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 80.00 MHz
Sweep 7.733 ms (2001 pts)
1 N 1 f 2.483 50 GHz -49.786 dBm
2 N 1 f 2.485 06 GHz -47.160 dBm
Marker
Select Marker 2
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

Test Plot of Conducted spurious emissions measured of 802.11g mode

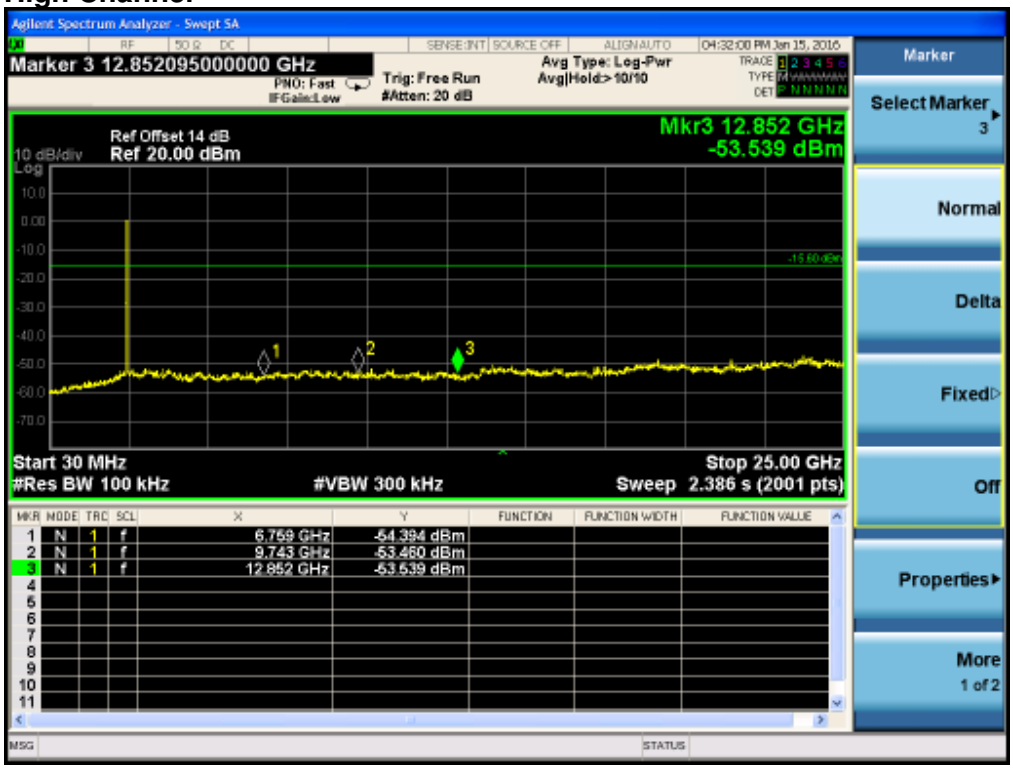
Low Channel



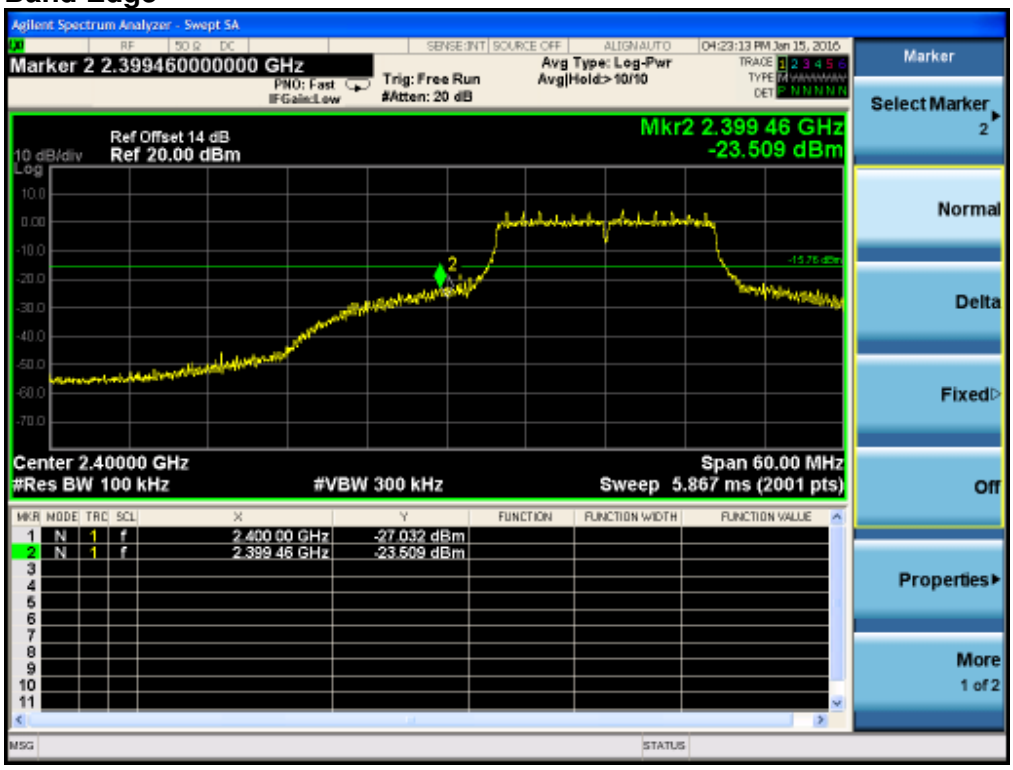
Middle Channel



High Channel



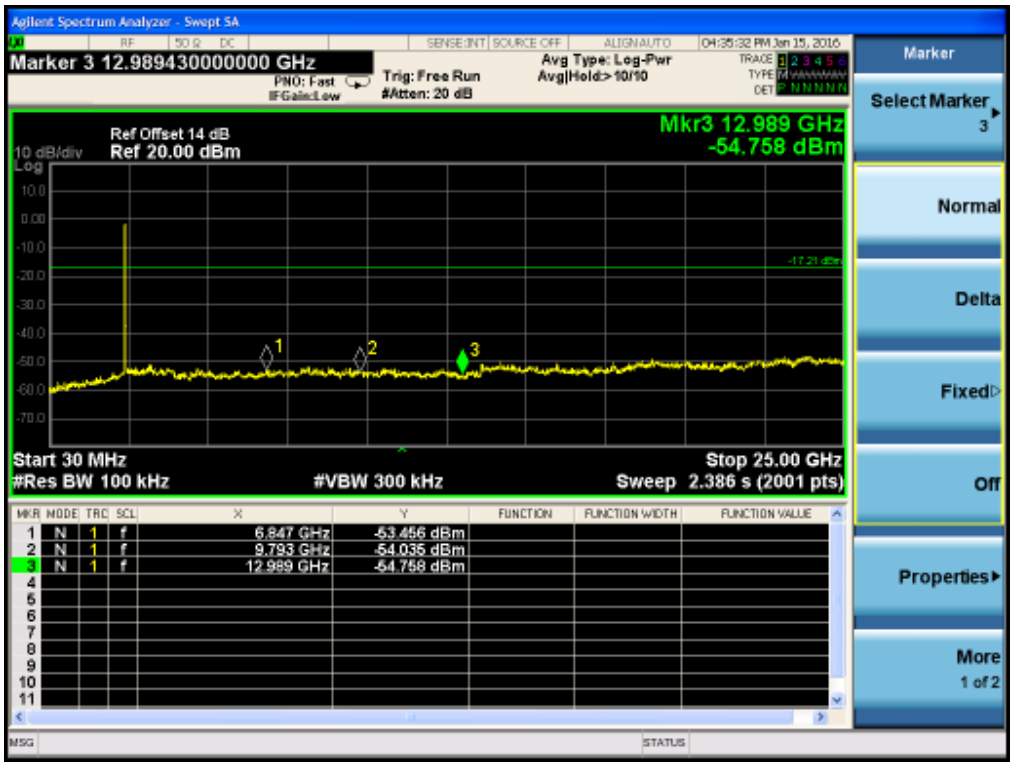
Band Edge


Agilent Spectrum Analyzer - Swept SA
Marker 2 2.399460000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
04:23:13 PM Jan 15, 2016
Ref Offset 14 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr2 2.399 46 GHz
-23.509 dBm
-15.76 dBm
Center 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 60.00 MHz
Sweep 5.867 ms (2001 pts)
1 N 1 f 2.400 00 GHz -27.032 dBm
2 N 1 f 2.399 46 GHz -23.509 dBm
Marker
Select Marker
2
Normal
Delta
Fixed
Off
Properties
More
1 of 2
MSG
STATUS

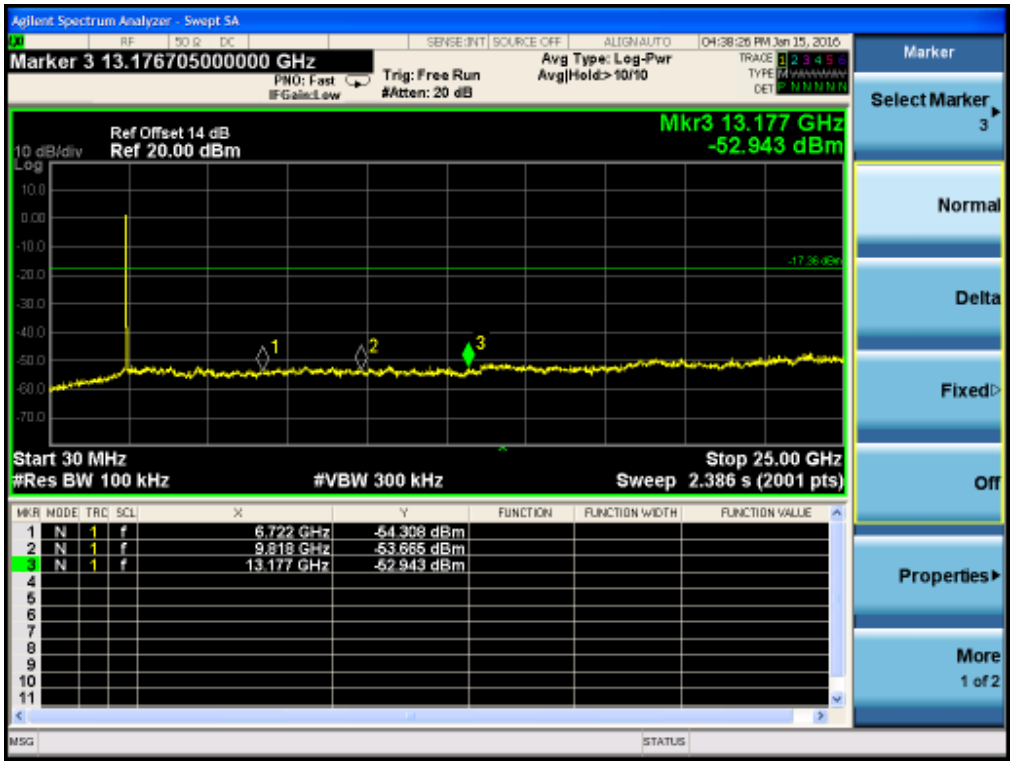

Agilent Spectrum Analyzer - Swept SA
Marker 1 2.483500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
04:30:28 PM Jan 15, 2016
Ref Offset 14 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.483 50 GHz
-34.003 dBm
-15.60 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 80.00 MHz
Sweep 7.733 ms (2001 pts)
1 N 1 f 2.483 50 GHz -34.003 dBm
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2
MSG
STATUS

Test Plot of Conducted spurious emissions measured of 802.11n mode

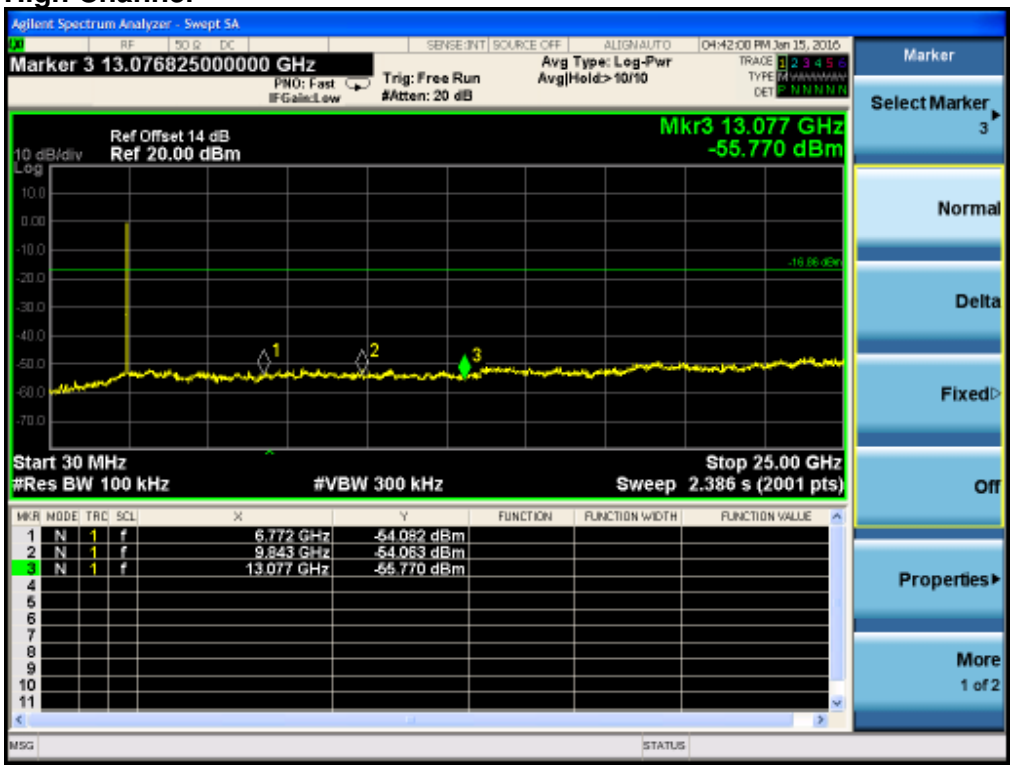
Low Channel



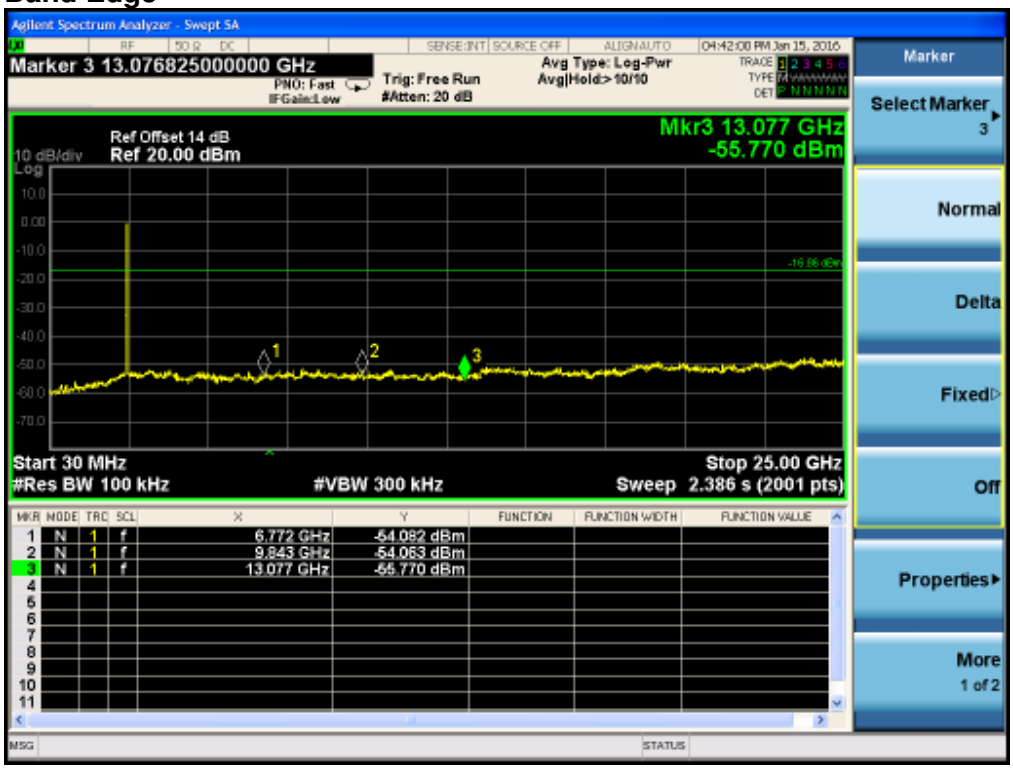
Middle Channel



High Channel



Band Edge


Agilent Spectrum Analyzer - Swept SA
Marker 3 13.076825000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
04:42:00 PM Jan 15, 2016
Ref Offset 14 dB
10 dB/div
Ref 20.00 dBm
Mkr3 13.077 GHz
-55.770 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (2001 pts)
1 N 1 f 6.772 GHz -54.082 dBm
2 N 1 f 9.843 GHz -54.063 dBm
3 N 1 f 13.077 GHz -55.770 dBm
Marker
Select Marker
3
Normal
Delta
Fixed
Off
Properties
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Marker 1 2.483500000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
04:40:22 PM Jan 15, 2016
Ref Offset 14 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.483 50 GHz
-36.006 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 80.00 MHz
Sweep 7.733 ms (2001 pts)
1 N 1 f 2.483 50 GHz -36.006 dBm
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

5.1.5 Power spectral density

RESULT: **Pass**

Date of testing	:	2016-01-15
Test standard	:	FCC part 15.247(e) RSS-247 Clause 5.2(2)
Basic standard	:	ANSI C63.10: 2013 Clause 10 of KDB 558074 v03r05
Limit	:	8dBm/3kHz
Kind of test site	:	Shielded room

Test setup

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

Table 10: Test result of Power Spectral Density of Wi-Fi (802.11b)

Channel (MHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)
2412	-6.694	8
2437	-5.885	8
2462	-5.894	8

Table 11: Test result of Power Spectral Density of Wi-Fi (802.11g)

Channel (MHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)
2412	-11.289	8
2437	-11.049	8
2462	-11.099	8

Table 12: Test result of Power Spectral Density of Wi-Fi (802.11n)

Channel (MHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)
2412	-12.679	8
2437	-11.639	8
2462	-11.063	8

For details refer to following test plot.

Test Plot of Power spectral density measured of 802.11b mode

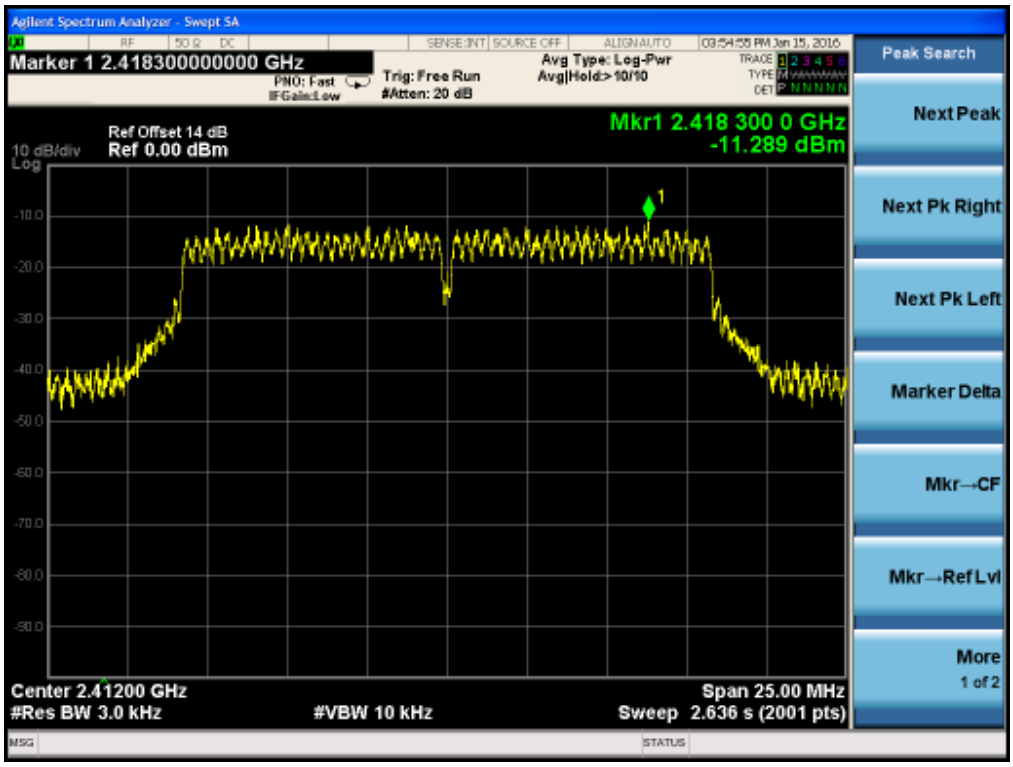
Low Channel

Middle Channel

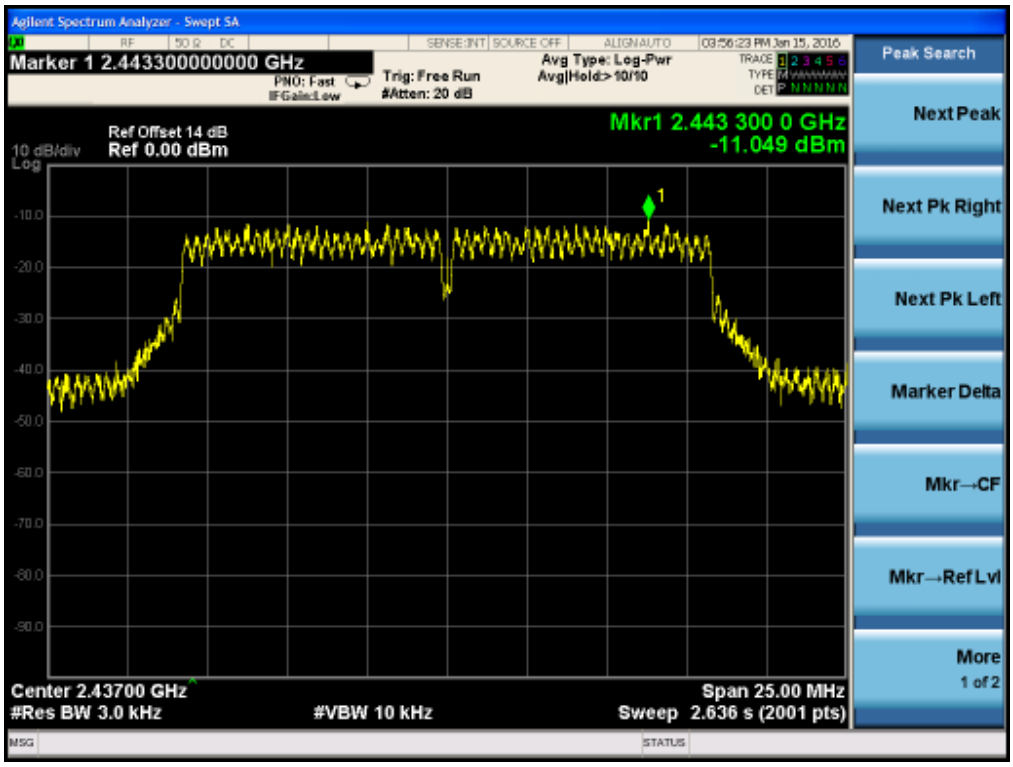
High Channel

Test Plot of Power spectral density measured of 802.11g mode

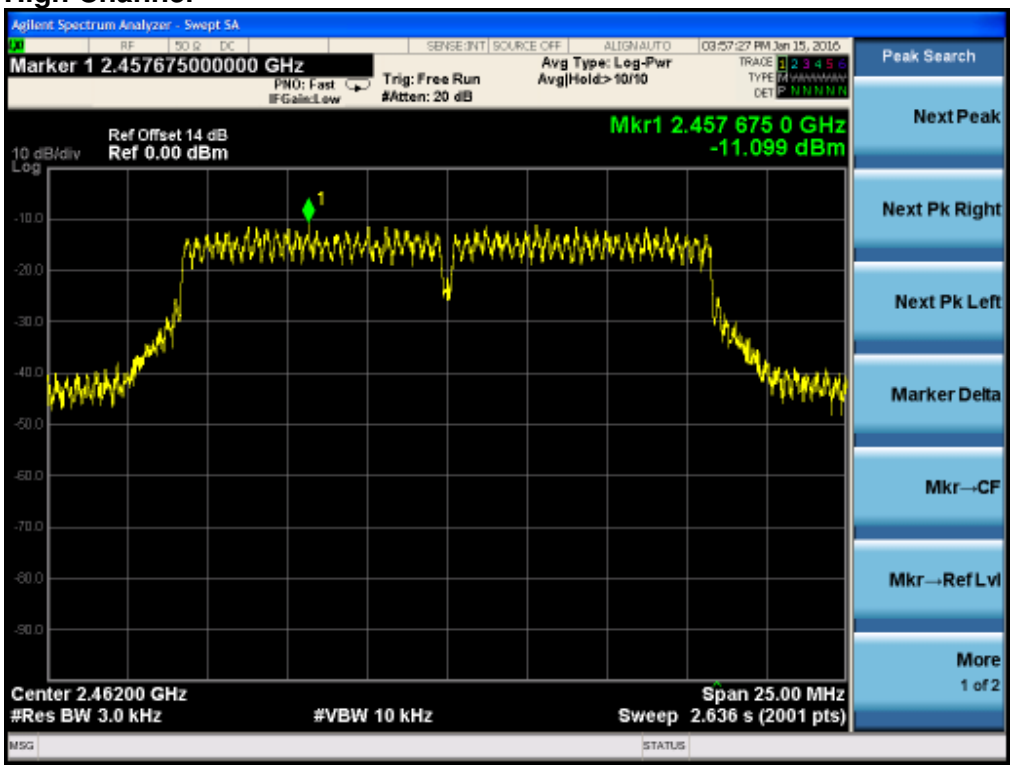
Low Channel



Middle Channel

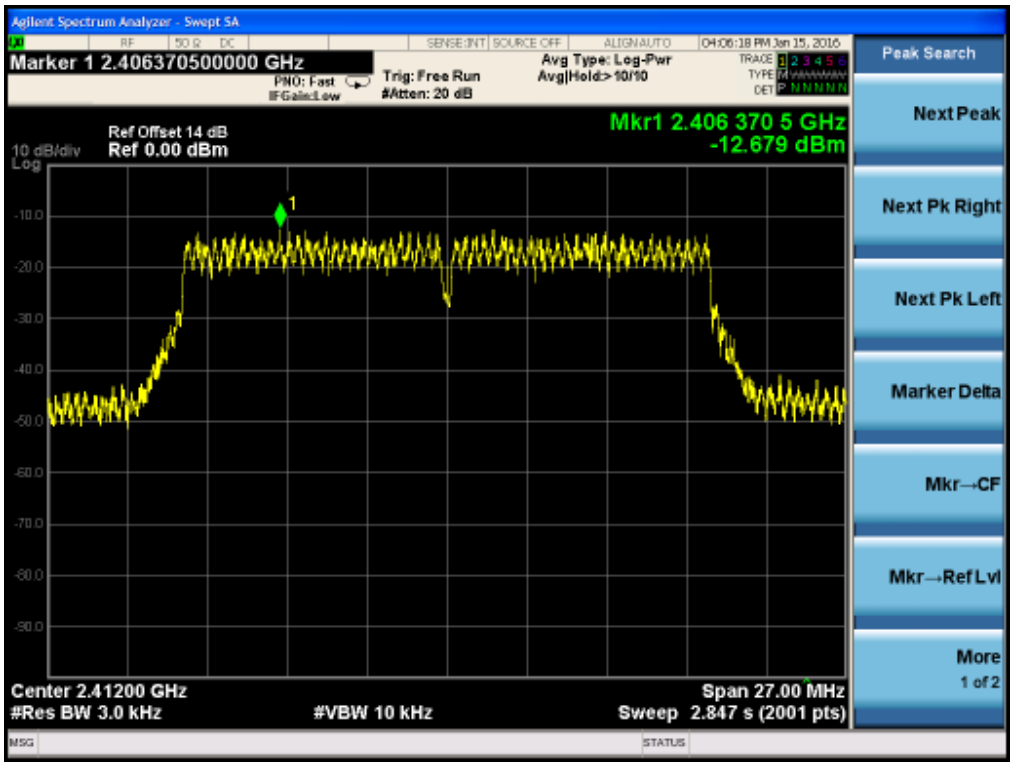


High Channel

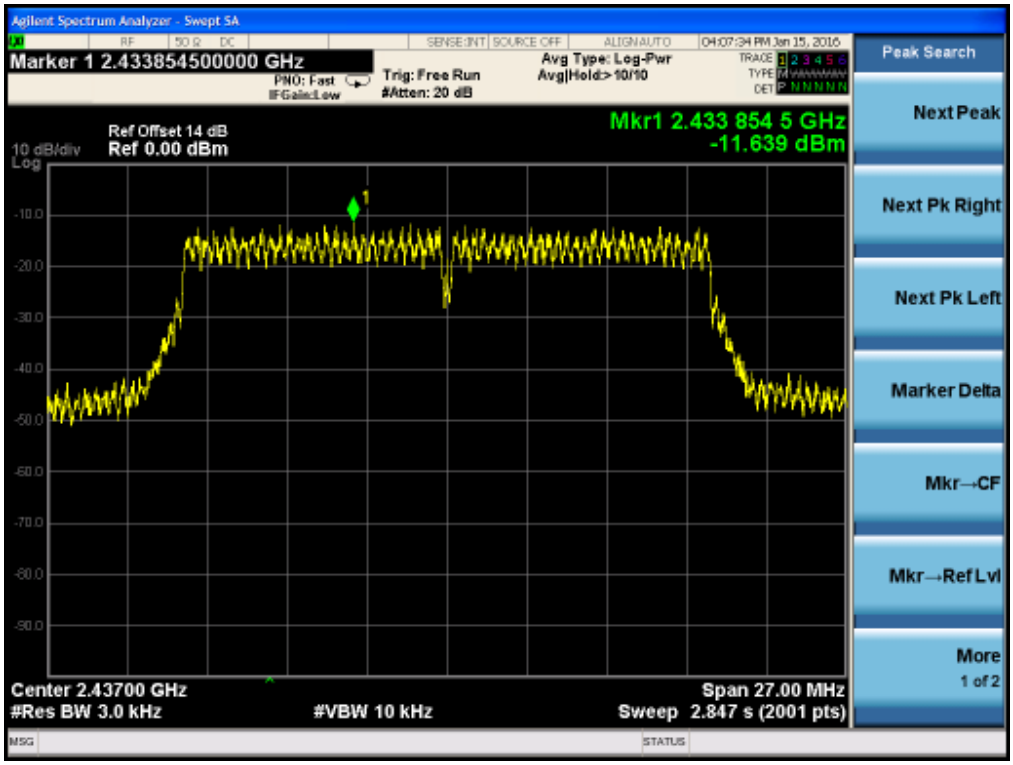


Test Plot of Power spectral density measured of 802.11n mode

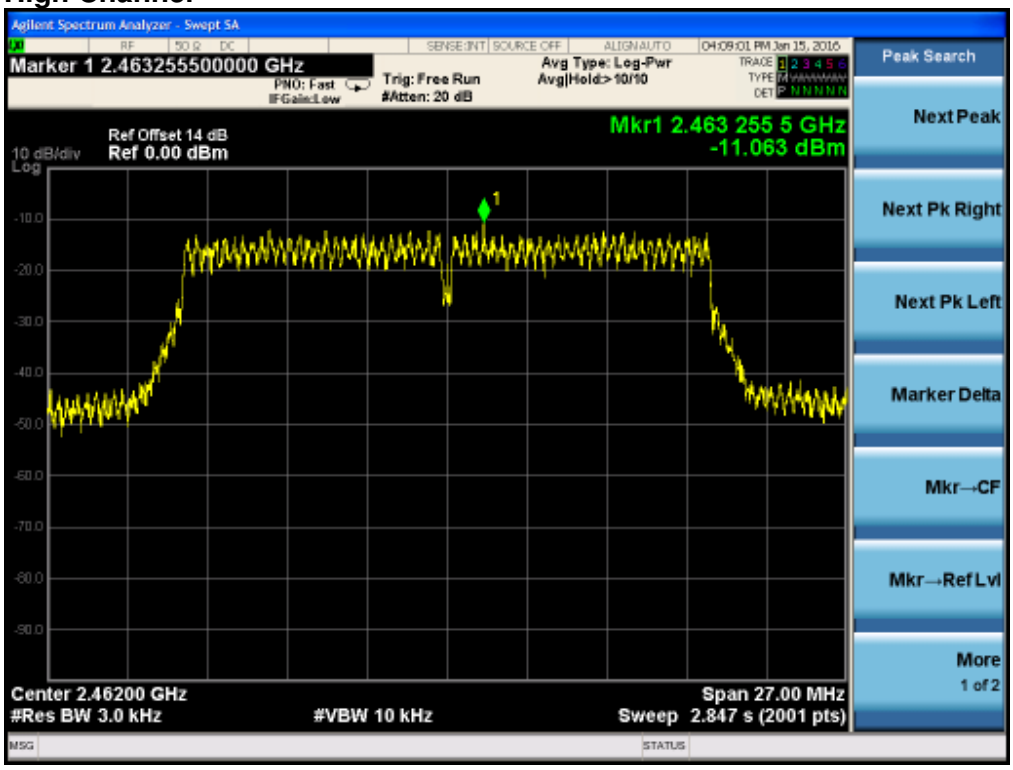
Low Channel



Middle Channel



High Channel



5.1.6 Spurious Emission

RESULT: **Pass**

Date of testing	:	2016-01-18
Test standard	:	FCC part 15.247(d) RSS-Gen Clause 8.9 & 8.10
Basic standard	:	ANSI C63.10: 2013 Clause 11 & 12 of KDB 558074 v03r05
Limits	:	FCC part 15.209(a) RSS-Gen Clause 8.9
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

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

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

Channel	Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
Low	557.680	-1.030	19.324	18.294	46.000	-27.706	QP	H
	682.325	-1.050	21.304	20.254	46.000	-25.746	QP	
	4111.000	38.144	-0.152	37.992	74.000	-36.008	PK	
	4825.000	47.591	1.992	49.583	74.000	-24.417	PK	
	7239.000	35.621	9.637	45.257	74.000	-28.743	PK	
	10273.500	34.390	12.961	47.351	74.000	-26.649	PK	
	582.900	-1.470	19.823	18.353	46.000	-27.647	QP	V
	744.890	-0.260	22.214	21.953	46.000	-24.047	QP	
	3958.000	39.046	-0.914	38.132	74.000	-35.868	PK	
	4825.000	47.932	1.992	49.924	74.000	-24.076	PK	
	7230.500	35.849	9.700	45.548	74.000	-28.452	PK	
	9755.000	35.469	11.368	46.837	74.000	-27.163	PK	
Middle	513.545	-0.320	18.528	18.209	46.000	-27.791	QP	H
	719.185	-0.260	21.879	21.620	46.000	-24.380	QP	
	4884.500	46.614	2.020	48.634	74.000	-25.366	PK	
	7324.000	37.306	9.649	46.955	74.000	-27.045	PK	
	8896.500	34.043	10.532	44.575	74.000	-29.425	PK	
	10137.500	34.905	12.342	47.247	74.000	-26.753	PK	
	500.935	-1.470	18.347	16.877	46.000	-29.123	QP	V
	648.375	-1.310	20.703	19.393	46.000	-26.607	QP	
	4884.500	47.584	2.020	49.604	74.000	-24.396	PK	
	7324.000	37.844	9.649	47.493	74.000	-26.507	PK	
	8973.000	34.464	10.481	44.946	74.000	-29.054	PK	
	9882.500	35.086	11.748	46.834	74.000	-27.166	PK	
High	606.180	-0.640	20.173	19.533	46.000	-26.467	QP	H
	743.920	-0.410	22.206	21.796	46.000	-24.204	QP	
	4927.000	48.686	1.891	50.577	74.000	-23.423	PK	
	7383.500	39.484	9.794	49.278	74.000	-24.722	PK	
	8845.500	34.896	10.644	45.540	74.000	-28.460	PK	
	10384.000	33.963	13.510	47.472	74.000	-26.528	PK	
	513.545	-1.320	18.528	17.209	46.000	-28.791	QP	V
	756.045	-0.940	22.319	21.380	46.000	-24.620	QP	
	4927.000	49.034	1.891	50.925	74.000	-23.075	PK	
	7383.500	40.157	9.794	49.951	74.000	-24.049	PK	
	8539.500	34.965	9.706	44.672	74.000	-29.328	PK	
	10469.000	34.350	13.610	47.960	74.000	-26.040	PK	

Table 14: Test result of Spurious Emission of Wi-Fi (802.11g)

Channel	Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
Low	651.285	-1.240	20.749	19.509	46.000	-26.491	QP	H
	766.230	-0.240	22.460	22.220	46.000	-23.780	QP	
	4102.500	39.356	-0.203	39.153	74.000	-34.847	PK	
	4825.000	42.716	1.992	44.708	74.000	-29.292	PK	
	7222.000	35.497	9.763	45.260	74.000	-28.740	PK	
	10231.000	34.611	12.866	47.477	74.000	-26.523	PK	
	502.875	-0.640	18.375	17.735	46.000	-28.265	QP	V
	739.070	-1.470	22.129	20.659	46.000	-25.341	QP	
	4060.000	39.011	-0.582	38.429	74.000	-35.571	PK	
	4825.000	42.242	1.992	44.234	74.000	-29.766	PK	
	7239.000	35.610	9.637	45.246	74.000	-28.754	PK	
	10248.000	34.463	12.898	47.361	74.000	-26.639	PK	
Middle	573.200	-1.480	19.636	18.157	46.000	-27.843	QP	H
	721.125	-0.560	21.899	21.339	46.000	-24.661	QP	
	4876.000	42.795	1.918	44.713	74.000	-29.287	PK	
	7332.500	37.135	9.679	46.813	74.000	-27.187	PK	
	8981.500	34.582	10.392	44.975	74.000	-29.025	PK	
	10367.000	32.998	13.483	46.481	74.000	-27.519	PK	
	640.615	-1.840	20.570	18.730	46.000	-27.270	QP	V
	903.000	0.140	24.166	24.306	46.000	-21.694	QP	
	4876.000	43.471	1.918	45.389	74.000	-28.611	PK	
	7324.000	37.210	9.649	46.859	74.000	-27.141	PK	
	8701.000	34.142	10.236	44.377	74.000	-29.623	PK	
	10248.000	34.780	12.898	47.678	74.000	-26.322	PK	
High	552.345	-1.420	19.205	17.784	46.000	-28.216	QP	H
	776.415	-1.560	22.576	21.016	46.000	-24.984	QP	
	4935.500	44.721	1.942	46.663	74.000	-27.337	PK	
	7400.500	40.641	9.831	50.471	74.000	-23.529	PK	
	9525.500	34.990	11.129	46.118	74.000	-27.882	PK	
	10384.000	34.565	13.510	48.074	74.000	-25.926	PK	
	572.715	-2.150	19.628	17.478	46.000	-28.522	QP	V
	673.595	-0.540	21.133	20.593	46.000	-25.407	QP	
	4927.000	44.116	1.891	46.007	74.000	-27.993	PK	
	7383.500	39.436	9.794	49.230	74.000	-24.770	PK	
	8981.500	34.508	10.392	44.901	74.000	-29.099	PK	
	10112.000	35.721	12.259	47.980	74.000	-26.020	PK	

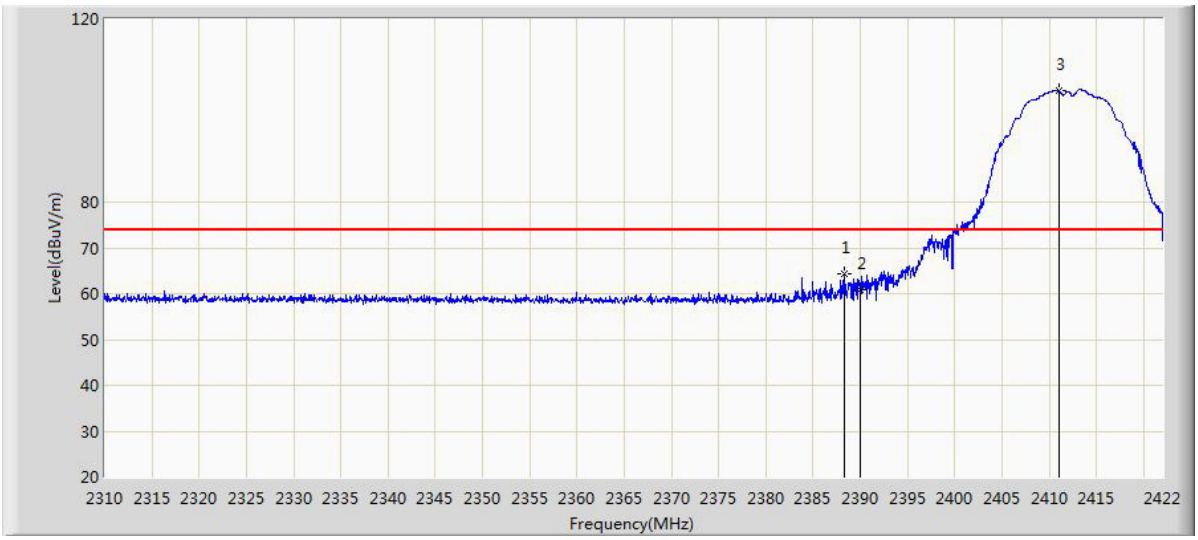
Table 15: Test result of Spurious Emission of Wi-Fi (802.11n)

Channel	Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
Low	697.360	-1.540	21.550	20.010	46.000	-25.990	QP	H
	826.370	-0.840	23.300	22.460	46.000	-23.540	QP	
	4111.000	38.686	-0.152	38.534	74.000	-35.466	PK	
	4825.000	40.366	1.992	42.358	74.000	-31.642	PK	
	7171.000	34.858	9.559	44.417	74.000	-29.583	PK	
	9636.000	34.801	11.353	46.154	74.000	-27.846	PK	
	440.310	-0.250	17.292	17.042	46.000	-28.958	QP	V
	718.215	-2.010	21.870	19.859	46.000	-26.141	QP	
	4825.000	41.869	1.992	43.861	74.000	-30.139	PK	
	7477.000	35.681	9.893	45.575	74.000	-28.425	PK	
	8675.500	34.210	10.162	44.372	74.000	-29.628	PK	
	9636.000	35.635	11.353	46.988	74.000	-27.012	PK	
Middle	623.640	-1.420	20.364	18.944	46.000	-27.056	QP	H
	836.070	-2.480	23.399	20.919	46.000	-25.081	QP	
	4876.000	38.993	1.918	40.911	74.000	-33.089	PK	
	7324.000	35.394	9.649	45.043	74.000	-28.957	PK	
	8531.000	34.793	9.724	44.516	74.000	-29.484	PK	
	10231.000	34.638	12.866	47.504	74.000	-26.496	PK	
	604.725	-0.470	20.158	19.688	46.000	-26.312	QP	V
	821.520	-2.030	23.231	21.202	46.000	-24.798	QP	
	4884.500	40.753	2.020	42.773	74.000	-31.227	PK	
	7315.500	36.016	9.666	45.683	74.000	-28.317	PK	
	8854.000	33.596	10.625	44.220	74.000	-29.780	PK	
	10537.000	33.569	13.941	47.510	74.000	-26.490	PK	
High	652.740	-1.040	20.776	19.736	46.000	-26.264	QP	H
	808.910	-0.840	23.024	22.184	46.000	-23.816	QP	
	4935.500	41.999	1.942	43.941	74.000	-30.059	PK	
	7400.500	36.349	9.831	46.179	74.000	-27.821	PK	
	8854.000	33.182	10.625	43.806	74.000	-30.194	PK	
	9755.000	35.705	11.368	47.073	74.000	-26.927	PK	
	572.230	-0.470	19.619	19.149	46.000	-26.851	QP	V
	762.350	-1.030	22.409	21.379	46.000	-24.621	QP	
	4927.000	42.732	1.891	44.623	74.000	-29.377	PK	
	7392.000	38.061	9.873	47.934	74.000	-26.066	PK	
	8735.000	34.111	10.472	44.583	74.000	-29.417	PK	
	10256.500	34.167	12.900	47.067	74.000	-26.933	PK	

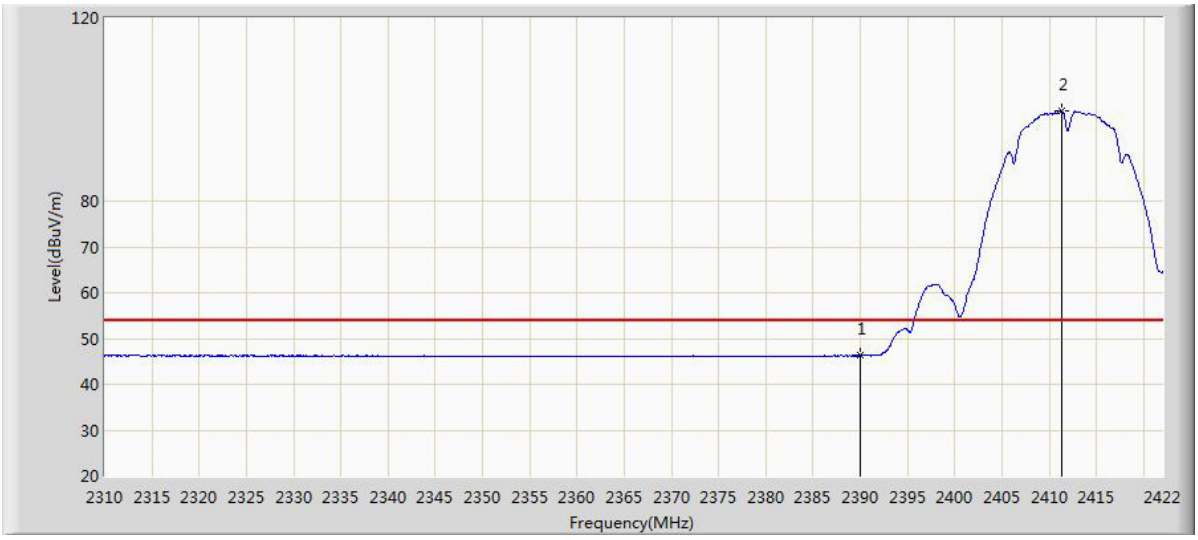
Notes:
1. Transmit mode comply with the field strength within the restricted bands. There is no spurious found below 30MHz.
2. Due to the peak measure values also meet the average limit (54dBm), the average measurement is not tested based on technical judgment.

Test Plot of Frequency Band Edge of 802.11b mode

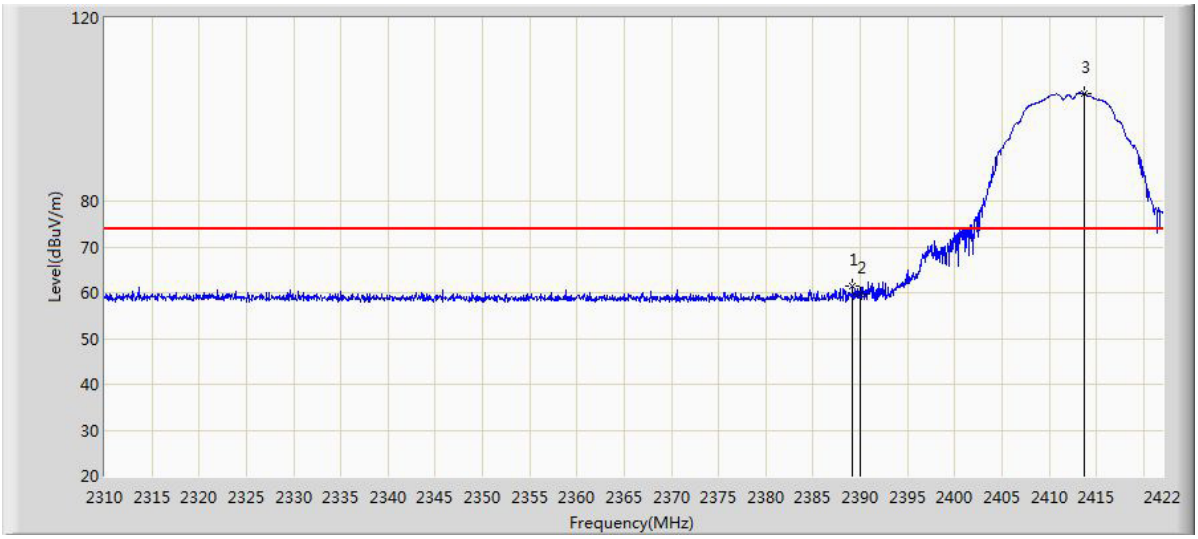
Low Channel



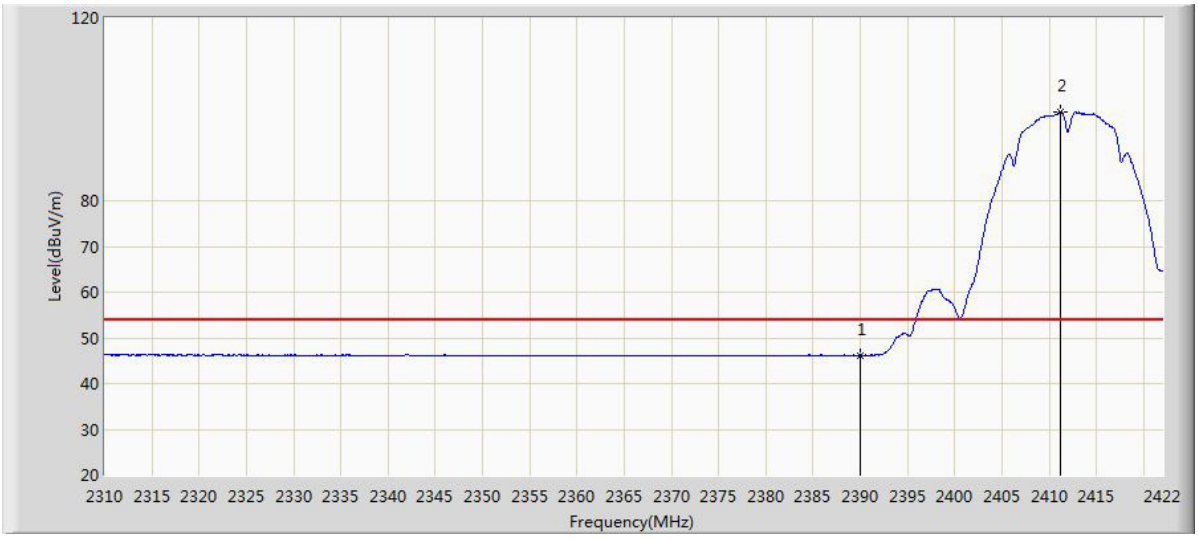
Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2388.288	31.844	32.366	64.210	74.000	-9.790	PK	H
2390.000	28.415	32.368	60.783	74.000	-13.217	PK	
2411.080	72.011	32.319	104.330	N/A	N/A	PK	



Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2390.000	13.893	32.368	46.261	54.000	-7.739	AV	H
2411.304	67.483	32.319	99.802	N/A	N/A	AV	

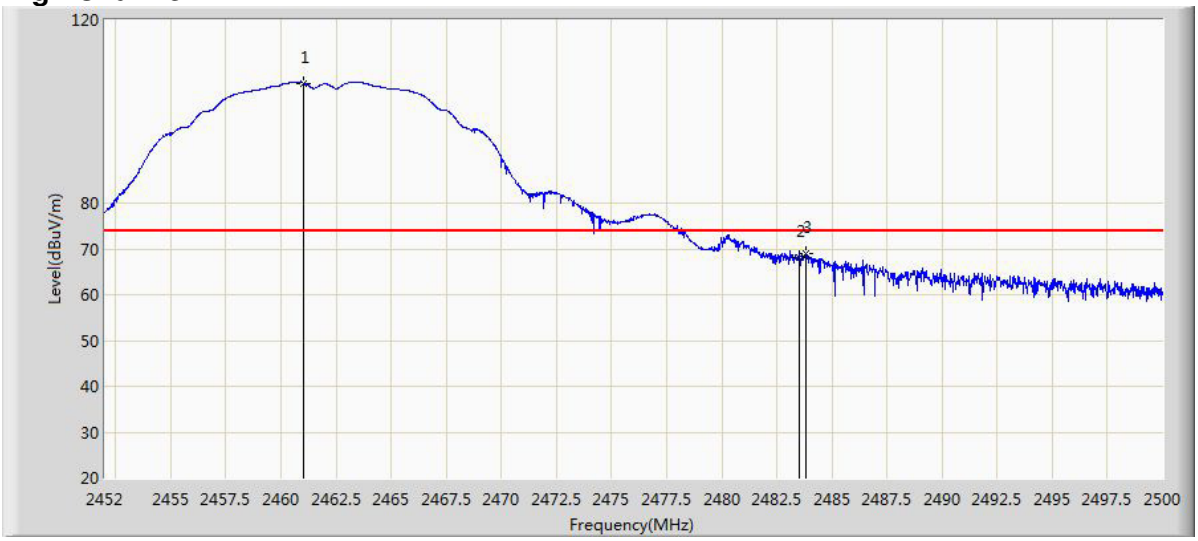


Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2389.184	28.971	32.367	61.338	74.000	-12.662	PK	V
2390.000	27.265	32.368	59.633	74.000	-14.367	PK	
2413.768	71.084	32.316	103.400	N/A	N/A	PK	



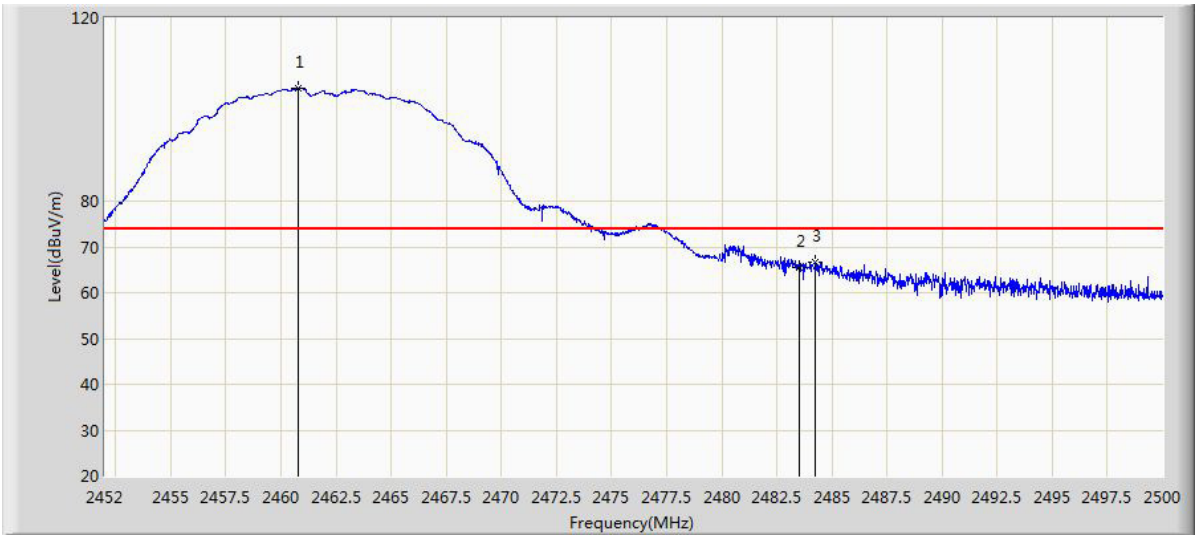
Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2390.000	13.853	32.368	46.221	54.000	-7.779	AV	V
2411.136	67.073	32.319	99.392	N/A	N/A	AV	

High Channel



Freq. (MHz)	Reading (dB µ V)	Correct Factor (dB)	Measure Level (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Detector	Polar
2461.000	73.931	32.271	106.202	N/A	N/A	PK	H
2483.500	35.892	32.349	68.241	74.000	-5.759	PK	
2483.824	36.582	32.349	68.931	74.000	-5.069	PK	

Freq. (MHz)	Reading (dB µ V)	Correct Factor (dB)	Measure Level (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Detector	Polar
2461.288	70.496	32.272	102.768	N/A	N/A	AV	H
2483.500	18.292	32.349	50.641	54.000	-3.359	AV	

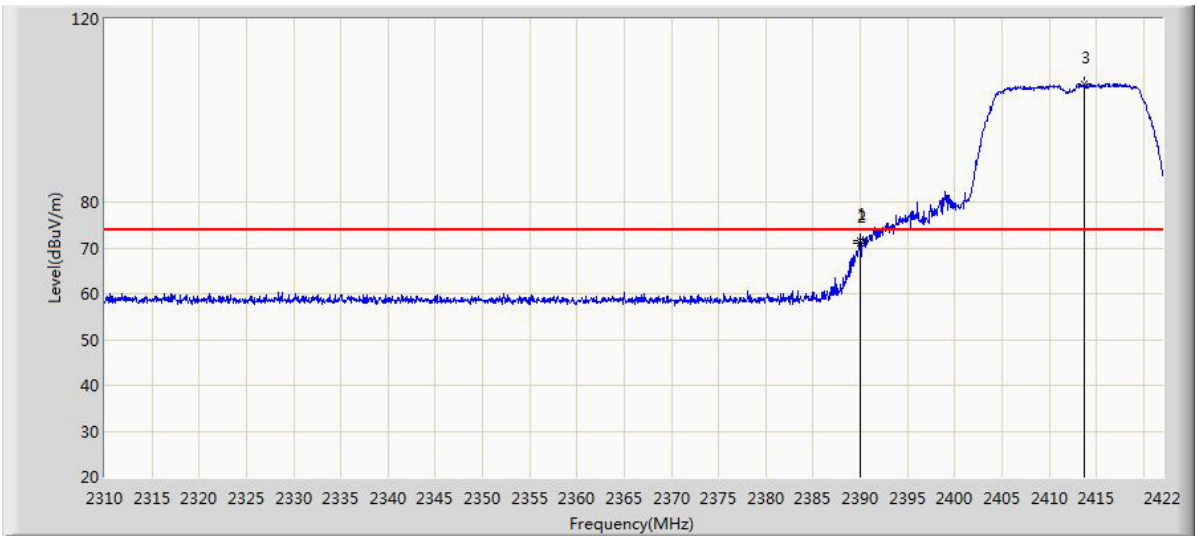


Freq. (MHz)	Reading (dB µ V)	Correct Factor (dB)	Measure Level (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Detector	Polar
2460.784	72.369	32.271	104.640	N/A	N/A	PK	V
2483.500	33.233	32.349	65.582	74.000	-8.418	PK	
2484.256	34.294	32.350	66.644	74.000	-7.356	PK	

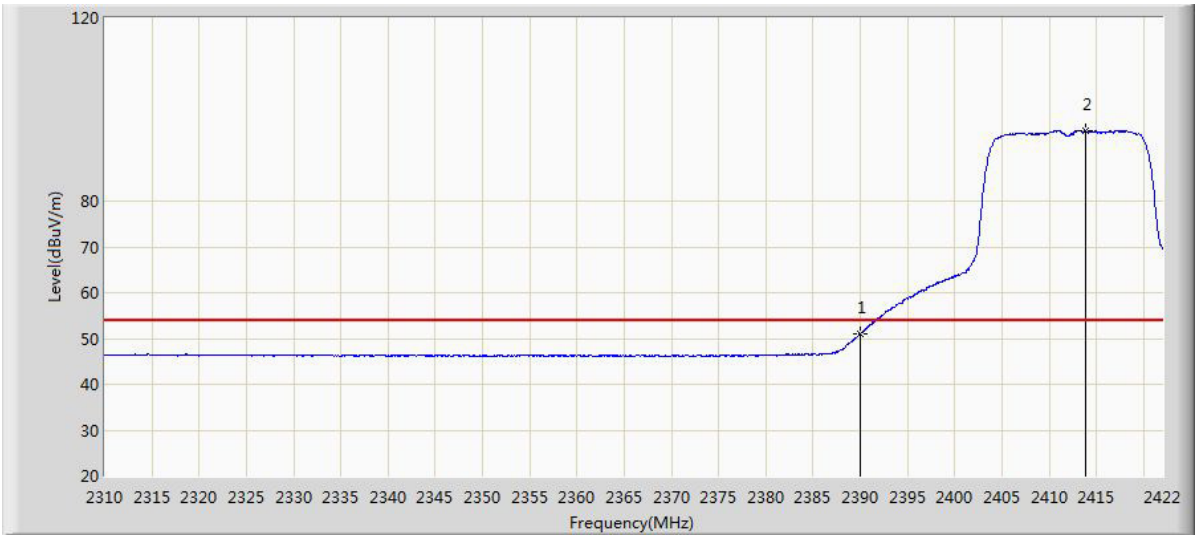
Freq. (MHz)	Reading (dB µ V)	Correct Factor (dB)	Measure Level (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Detector	Polar
2461.240	68.142	32.272	100.414	N/A	N/A	AV	V
2483.500	16.822	32.349	49.171	54.000	-4.829	AV	

Test Plot of Frequency Band Edge of 802.11g mode

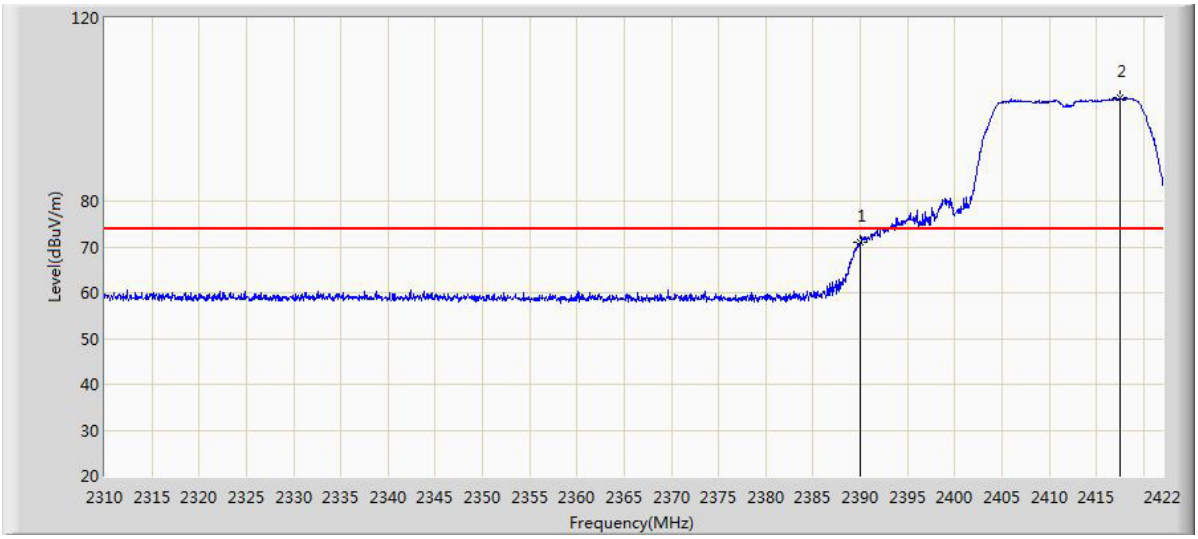
Low Channel



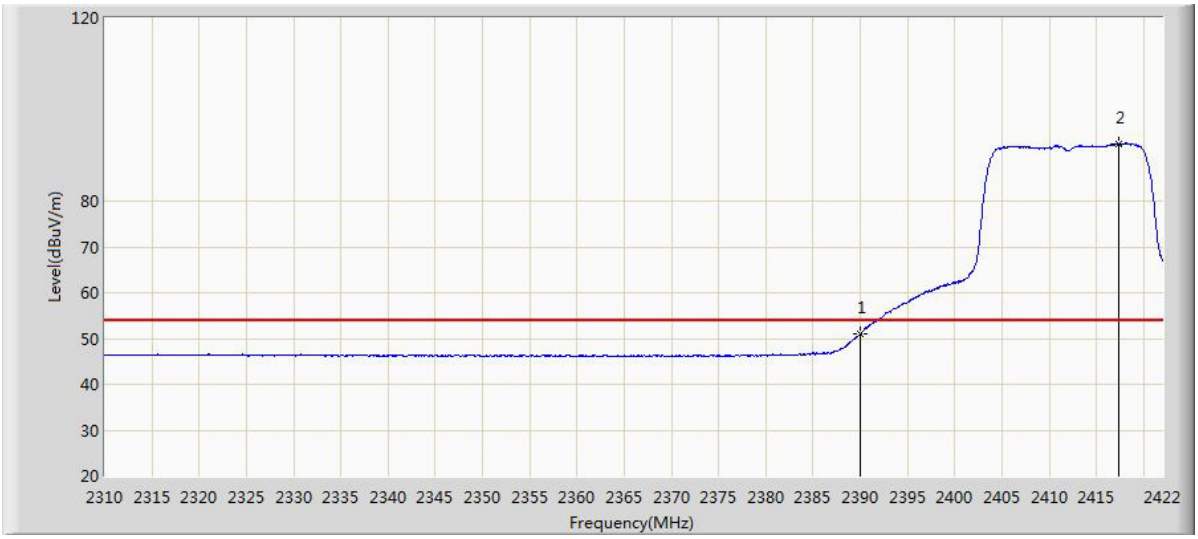
Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2389.968	39.359	32.368	71.727	74.000	-2.273	PK	H
2390.000	38.682	32.368	71.050	74.000	-2.950	PK	
2413.712	73.410	32.316	105.726	N/A	N/A	PK	



Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2390.000	18.629	32.368	50.997	54.000	-3.003	AV	H
2413.824	63.017	32.316	95.333	N/A	N/A	AV	

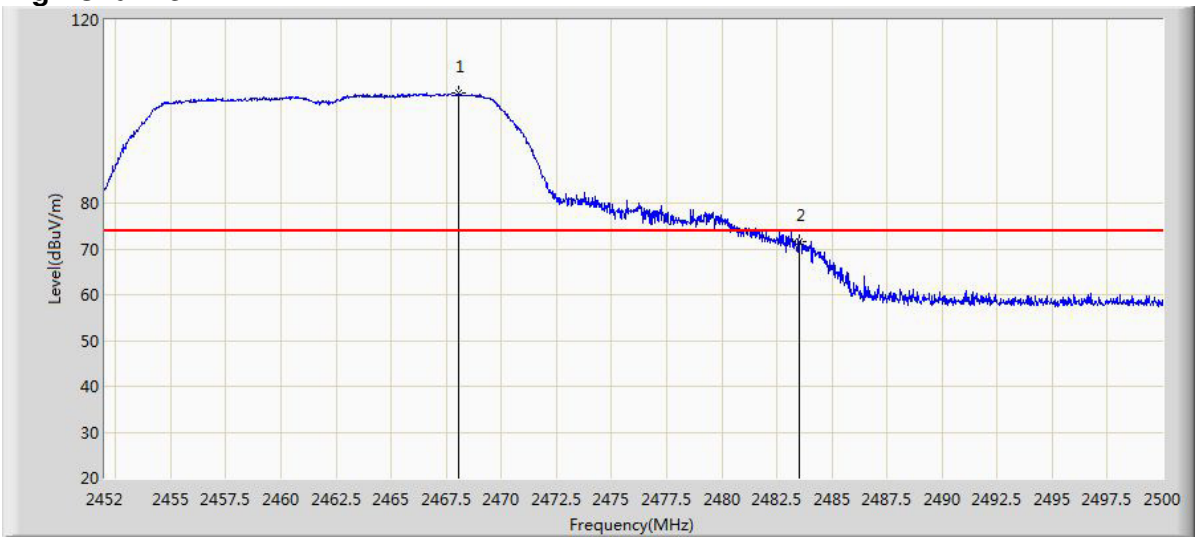


Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2390.000	38.529	32.368	70.897	74.000	-3.103	PK	V
2417.464	70.228	32.312	102.540	N/A	N/A	PK	

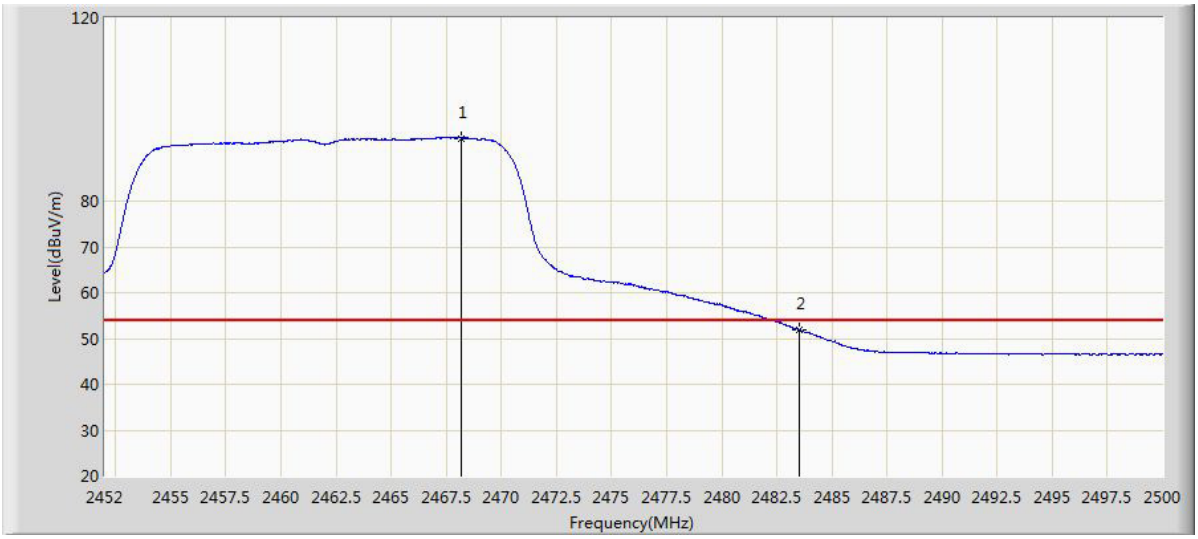


Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2390.000	18.616	32.368	50.984	54.000	-3.016	AV	V
2417.408	60.255	32.312	92.567	N/A	N/A	AV	

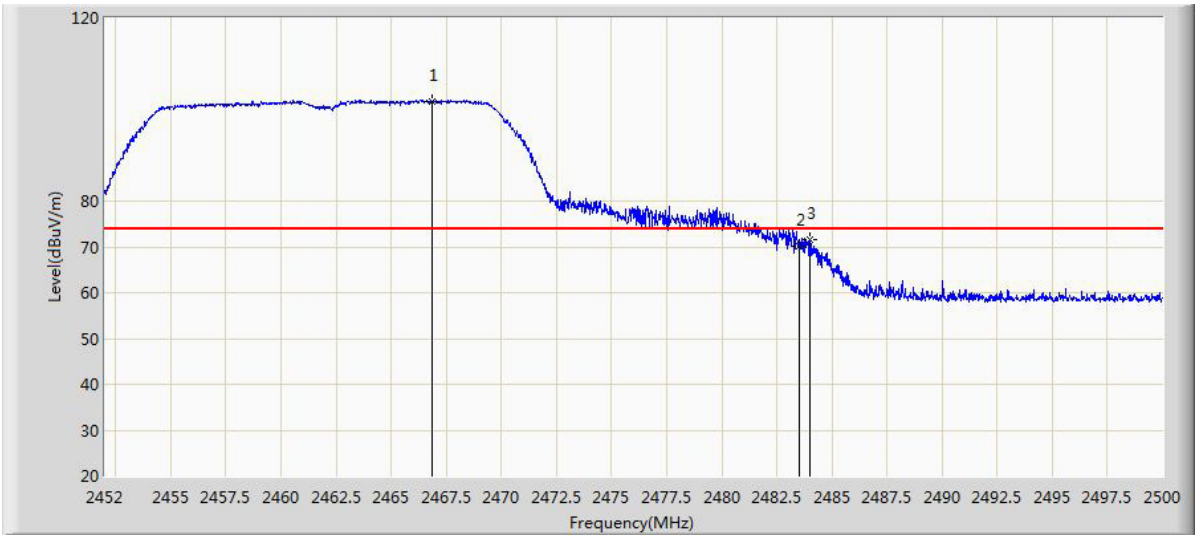
High Channel



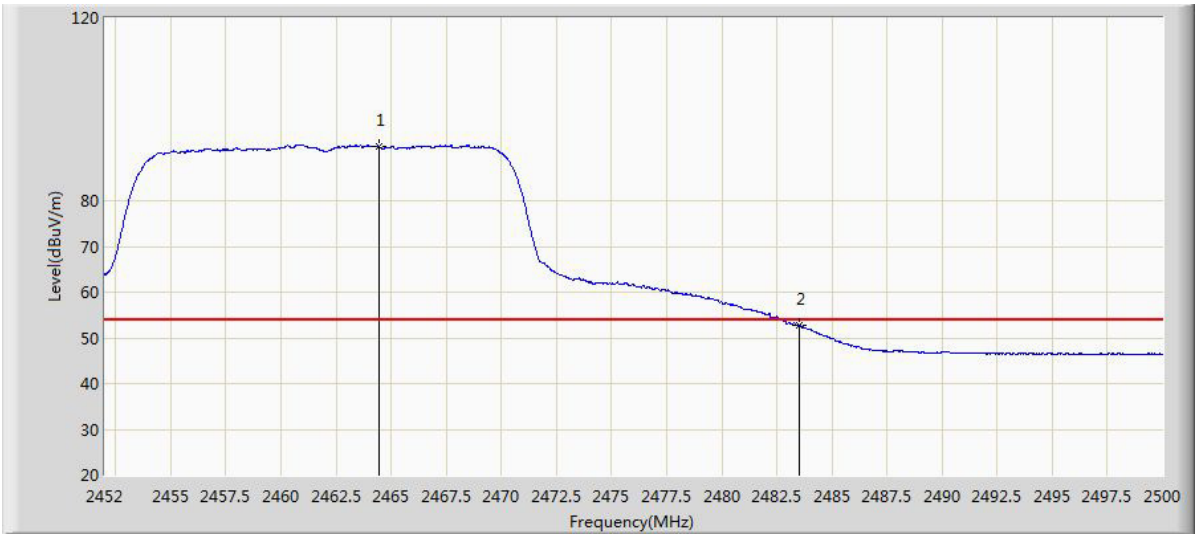
Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2468.032	71.620	32.296	103.916	N/A	N/A	AV	H
2483.500	39.327	32.349	71.676	74.000	-2.324	AV	



Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2468.176	61.466	32.297	93.762	N/A	N/A	AV	H
2483.500	19.591	32.349	51.940	54.000	-2.060	AV	



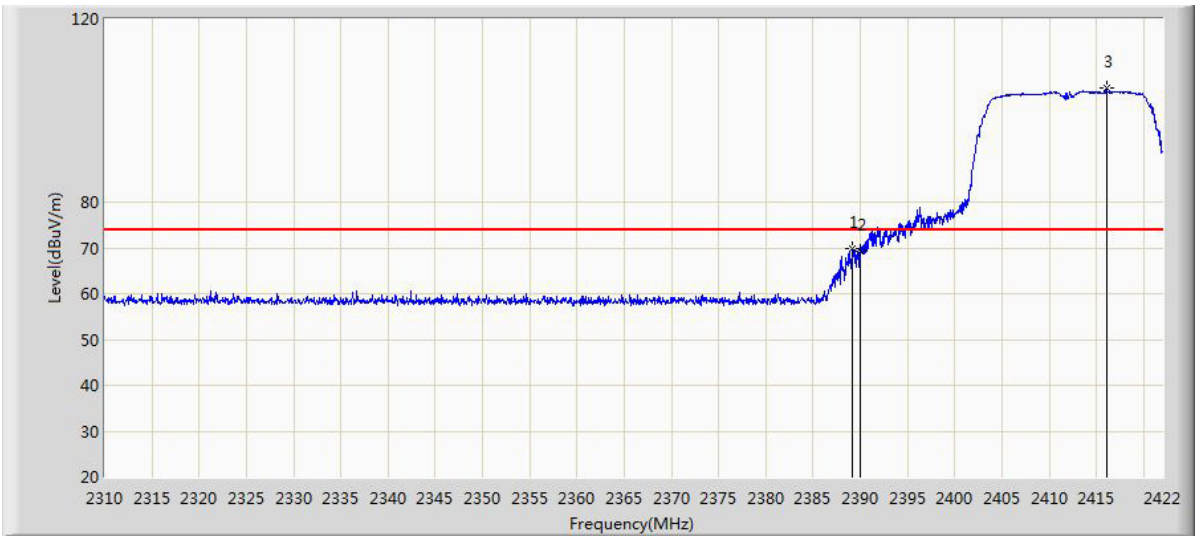
Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2466.832	69.580	32.290	101.871	N/A	N/A	PK	V
2483.500	37.664	32.349	70.013	74.000	-3.987	PK	
2483.992	39.310	32.350	71.660	74.000	-2.340	PK	



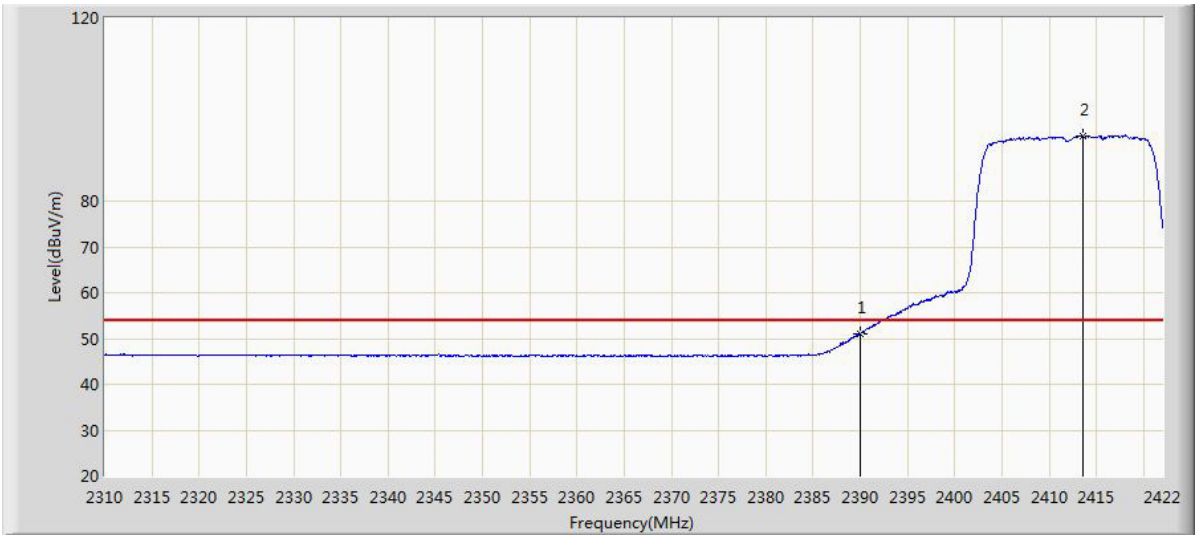
Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2464.432	59.617	32.281	91.898	N/A	N/A	AV	V
2483.500	20.521	32.349	52.870	54.000	-1.130	AV	

Test Plot of Frequency Band Edge of 802.11n mode

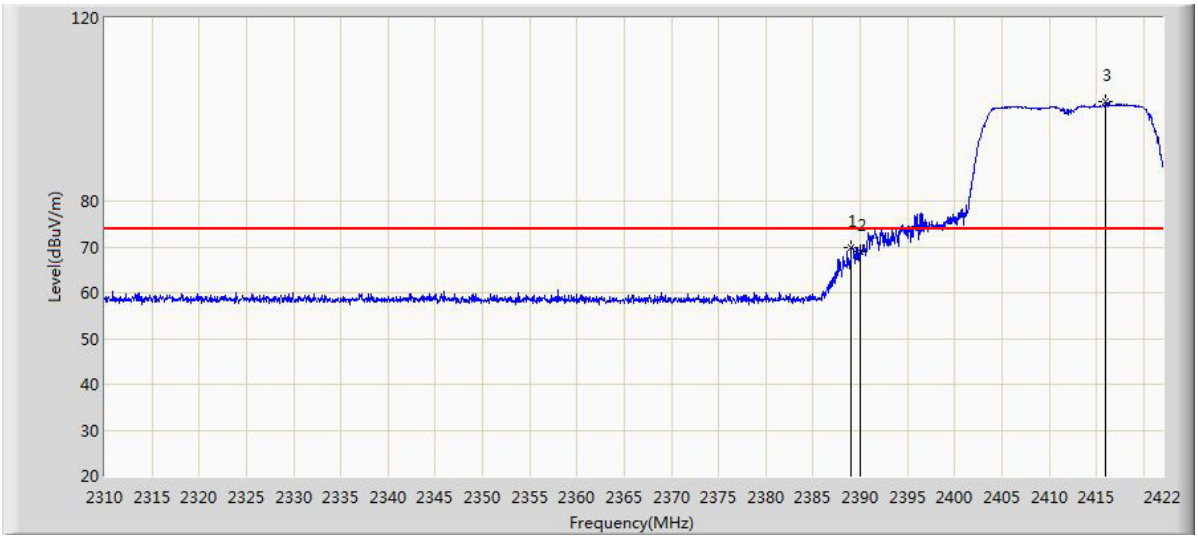
Low Channel



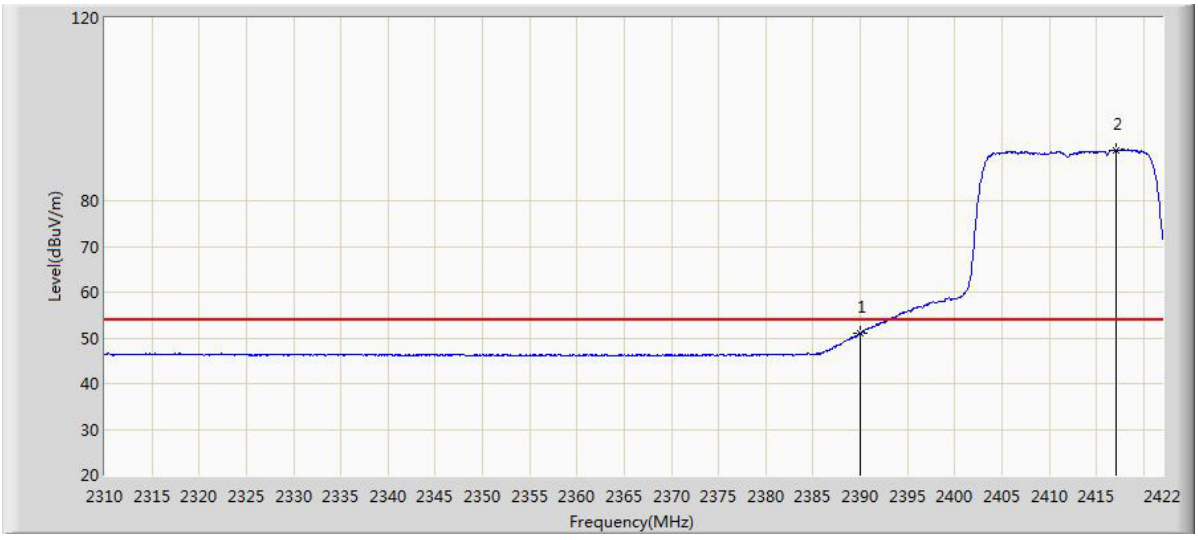
Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2389.184	37.386	32.367	69.753	74.000	-4.247	PK	H
2390.000	37.026	32.368	69.394	74.000	-4.606	PK	
2416.064	72.668	32.313	104.981	N/A	N/A	PK	



Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2390.000	18.700	32.368	51.068	54.000	-2.932	AV	H
2413.600	61.755	32.316	94.071	N/A	N/A	AV	

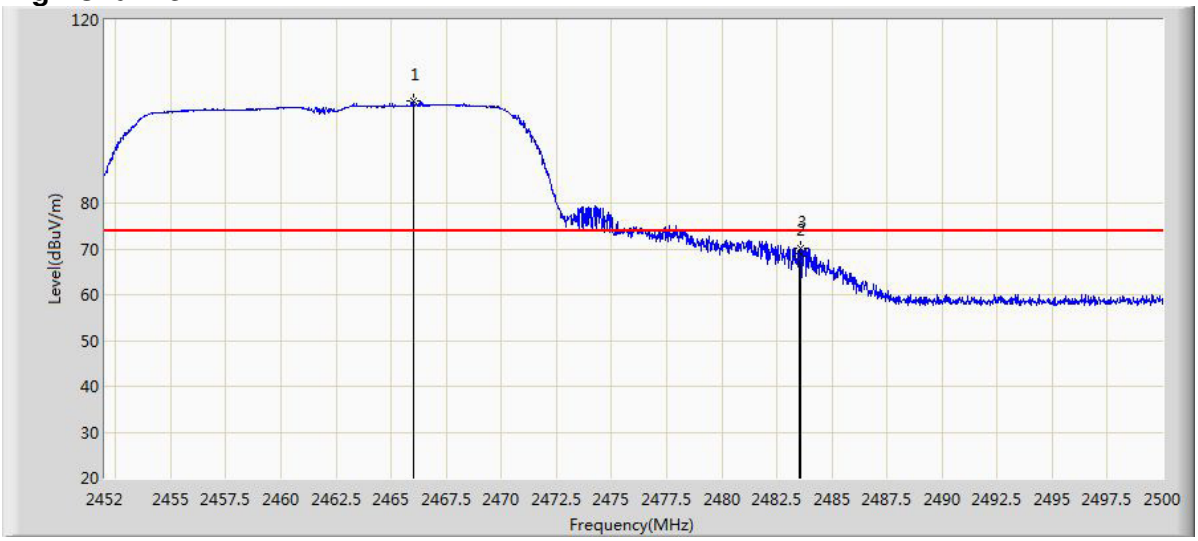


Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2389.072	37.461	32.367	69.828	74.000	-4.172	PK	V
2390.000	36.551	32.368	68.919	74.000	-5.081	PK	
2416.008	69.412	32.313	101.725	N/A	N/A	PK	

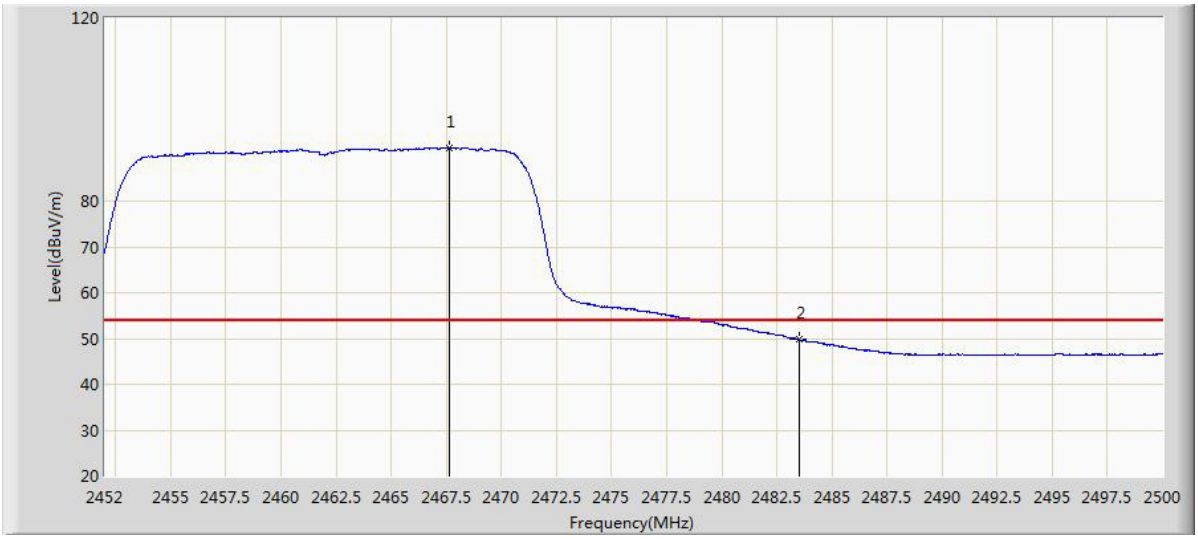


Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2390.000	18.581	32.368	50.949	54.000	-3.051	AV	V
2417.072	58.793	32.312	91.105	N/A	N/A	AV	

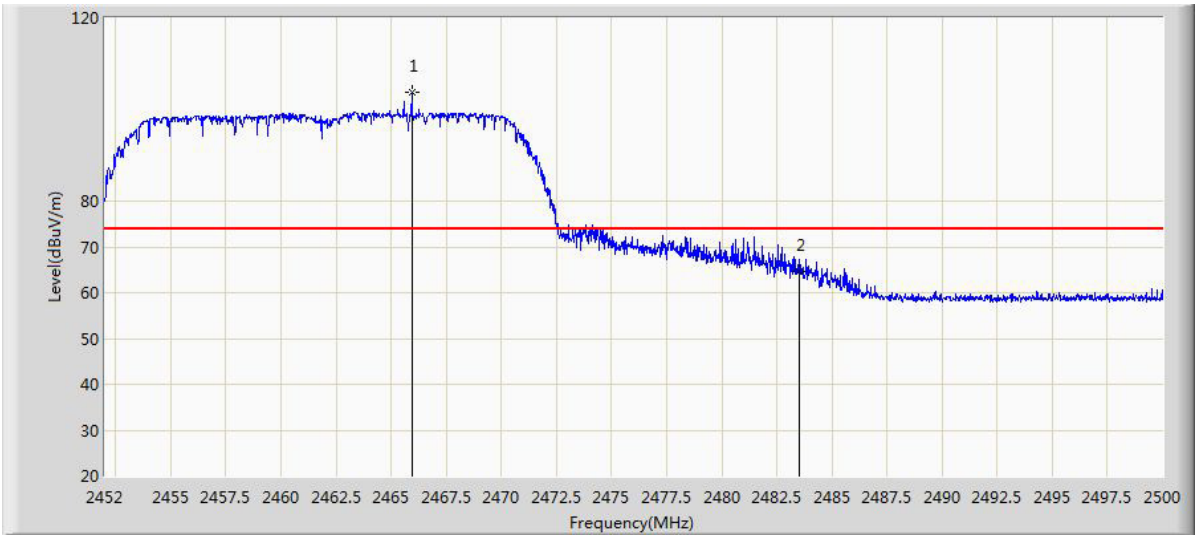
High Channel



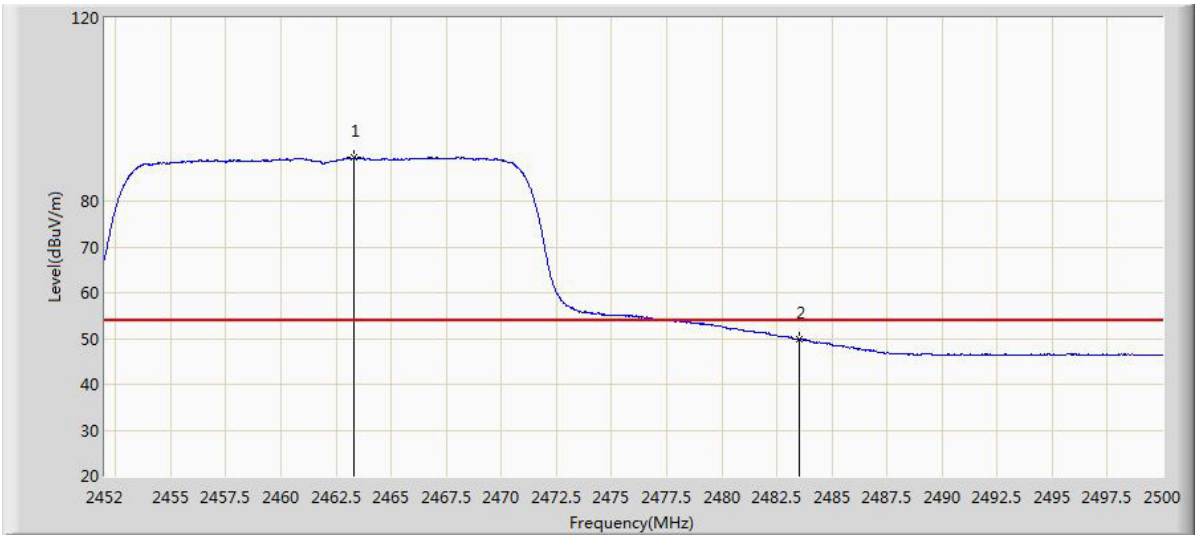
Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2465.992	69.945	32.287	102.232	N/A	N/A	PK	H
2483.500	36.036	32.349	68.385	74.000	-5.615	PK	
2483.560	37.937	32.349	70.286	74.000	-3.714	PK	



Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2467.648	59.393	32.294	91.687	N/A	N/A	AV	H
2483.500	17.545	32.349	49.894	54.000	-4.106	AV	



Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2465.944	71.535	32.287	103.822	N/A	N/A	PK	V
2483.500	32.223	32.349	64.572	74.000	-9.428	PK	



Freq. (MHz)	Reading (dB μ V)	Correct Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polar
2463.304	57.151	32.277	89.428	N/A	N/A	AV	V
2483.500	17.423	32.349	49.772	54.000	-4.228	AV	

5.2 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] $1.31x10^{-2}\ f^{0.6834}$
0.3-6GHz	2.7

Measurement Result

The maximum measured transmitter power is the following:

Conducted Output Power Pout [dBm]	Conducted Output Power Pout [mW]	Maximum Antenna Gain [dBi]	Pout EIRP [mW]	Power Density at 20cm [mW/cm2]
22.71	186.64	3.3	399.02	0.079

Note:

The power density S in mW/cm^2 is calculated according to the Friis formula:

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

where
S = power density in mW/cm^2
P_{out} = antenna conducted output power in mW
G = antenna gain in linear scale (here: 0.5dBi=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.

6. List of Tables