
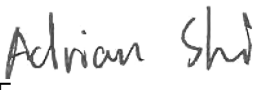



<b>Prüfbericht-Nr.:</b> <i>Test Report No.:</i>	<b>15087416 001</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	<b>154110603</b>	<b>Seite 1 von 28</b> <i>Page 1 of 28</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	<b>626805</b>	<b>Auftragsdatum:</b> <i>Order date:</i>	<b>09.07.2015</b>	
<b>Auftraggeber:</b> <i>Client:</i>	<b>Murata Manufacturing Co., Ltd.</b> 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan			
<b>Prüfgegenstand:</b> <i>Test item:</i>	<b>Wi-Fi module</b>			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	<b>CMWC1ZZABJ</b> FCC ID: VPYCMABJ IC: 772C-CMABJ			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	<b>Partial test</b>			
<b>Prüfgrundlage:</b> <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			
<b>Wareneingangsdatum:</b> <i>Date of receipt:</i>	<b>11.06.2015</b>			
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	<b>A000213021-005</b>			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	<b>20.09.2015 - 22.09.2015</b>			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	<b>MRT Technology (Suzhou) Co., Ltd</b>			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	<b>TÜV Rheinland (Shanghai) Co., Ltd.</b>			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	<b>Pass</b>			
<b>geprüft von / tested by:</b> 		<b>kontrolliert von / reviewed by:</b> 		
<b>23.09.2015</b>	<b>Adrian Shi / PE</b>	<b>23.09.2015</b>	<b>Shi Li / Reviewer</b>	
<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>
<b>Sonstiges / Other:</b>				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		<b>Prüfmuster vollständig und unbeschädigt</b> <i>Test item complete and undamaged</i>		
<p>* 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</p> <p>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</p>				
<p><b>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.</b>  <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></p>				

V04

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*Test Report No.*

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## TEST SUMMARY

### 5.1.1 ANTENNA REQUIREMENT

*RESULT: Pass*

### 5.1.2 SPURIOUS EMISSION

*RESULT: Pass*

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<b>APPENDIX II- PHOTOGRAPHS OF THE TEST SET-UP</b>		

## 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 with swivel external antenna.

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	Swivel external antenna
Antenna Gain	2.2 dBi
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 6.7
Limit	:	The use of antennas with directional gains that do not exceed 6dBi

According to the manufacturer declared, the EUT adopt the external antenna (please see note) via RF receptacle and specifical cable. The directional gain of antenna is 2.2dBi. Therefore the EUT is considered sufficient to comply with the provision.

*Note:*

*Antenna: Titanis 2.4 GHz Swivel reverse thread SMA Antenna - Part No. B4844-R*

## 5.1.2 Spurious Emission

**RESULT:****Pass**

Date of testing : 2015-09-20, 2015-09-22  
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 v03r03  
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°C  
Relative humidity : 52%  
Atmospheric pressure : 101kPa

**Table 4: Test result of Spurious Emission of Wi-Fi (802.11b)**

Channel	Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
Low	59.100	23.493	9.492	-16.507	40.000	14.001	QP	H
	855.955	28.755	5.196	-17.245	46.000	23.559	QP	
	3184.500	42.484	44.063	-31.516	74.000	-1.579	PK	
	3575.000	36.720	37.509	-37.280	74.000	-0.789	PK	
	4825.000	51.879	49.179	-22.121	74.000	2.700	PK	
	7256.000	44.037	36.136	-29.963	74.000	7.901	PK	
	65.890	27.203	14.983	-12.797	40.000	12.220	QP	V
	126.030	30.282	19.903	-13.218	43.500	10.379	QP	
	3184.500	42.484	44.063	-31.516	74.000	-1.579	PK	
	3575.000	36.720	37.509	-37.280	74.000	-0.789	PK	
	4825.000	51.879	49.179	-22.121	74.000	2.700	PK	
	7256.000	44.037	36.136	-29.963	74.000	7.901	PK	
Middle	779.810	29.327	6.860	-16.673	46.000	22.467	QP	H
	897.180	31.778	7.816	-14.222	46.000	23.962	QP	
	3024.000	36.240	38.341	-37.760	74.000	-2.101	PK	
	3497.000	36.168	37.302	-37.832	74.000	-1.134	PK	
	4876.000	45.696	43.021	-28.304	74.000	2.675	PK	
	7311.000	43.360	35.356	-30.640	74.000	8.004	PK	
	65.405	31.324	18.943	-8.676	40.000	12.381	QP	V
	129.910	32.275	22.221	-11.225	43.500	10.054	QP	
	3193.000	41.749	43.346	-32.251	74.000	-1.597	PK	
	3452.000	36.986	38.397	-37.014	74.000	-1.412	PK	
	4876.000	49.096	46.421	-24.904	74.000	2.675	PK	
	7311.000	42.362	34.358	-31.638	74.000	8.004	PK	
High	657.105	26.355	5.652	-19.645	46.000	20.703	QP	H
	800.180	25.263	2.540	-20.737	46.000	22.723	QP	
	3012.000	36.482	38.605	-37.518	74.000	-2.123	PK	
	3549.000	36.707	37.597	-37.293	74.000	-0.890	PK	
	4927.000	46.055	43.285	-27.945	74.000	2.770	PK	
	7386.000	43.596	35.680	-30.404	74.000	7.916	PK	
	68.315	32.853	21.439	-7.147	40.000	11.414	QP	V
	126.515	30.787	20.449	-12.713	43.500	10.338	QP	
	3201.500	40.973	42.583	-33.027	74.000	-1.609	PK	
	3545.000	36.754	37.663	-37.246	74.000	-0.910	PK	
	4927.000	48.648	45.878	-25.352	74.000	2.770	PK	
	7386.000	42.699	34.783	-31.301	74.000	7.916	PK	

**Table 5: Test result of Spurious Emission of Wi-Fi (802.11g)**

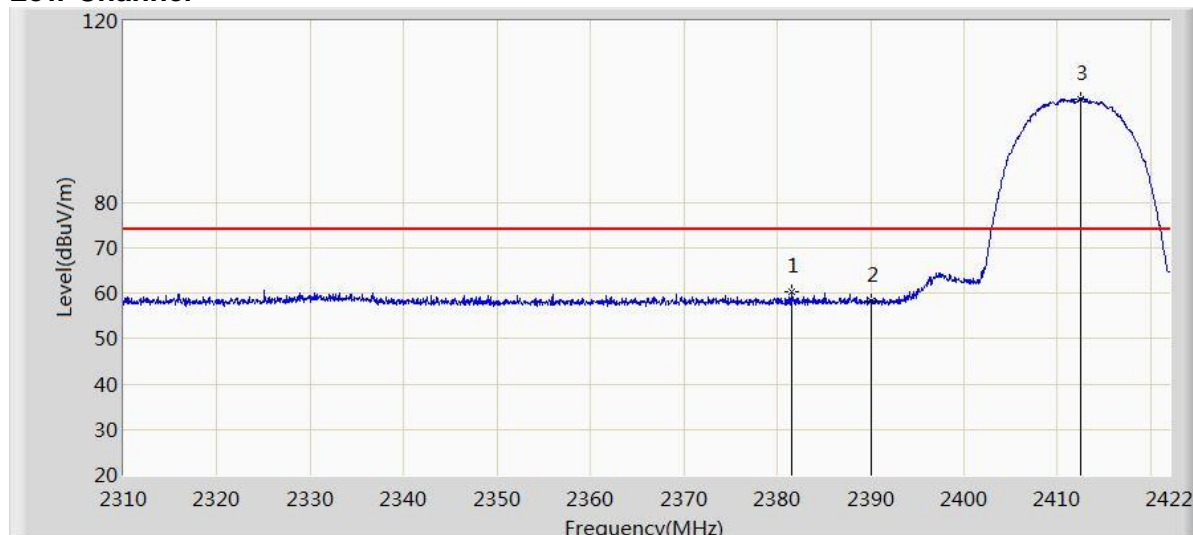
Channel	Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
Low	646.920	26.304	5.777	-19.696	46.000	20.527	QP	H
	805.030	25.259	2.471	-20.741	46.000	22.788	QP	
	3084.000	36.604	38.451	-37.396	74.000	-1.847	PK	
	3586.000	36.682	37.435	-37.318	74.000	-0.752	PK	
	4825.000	43.181	40.481	-30.819	74.000	2.700	PK	
	7256.000	43.135	35.234	-30.865	74.000	7.901	PK	
	131.850	31.570	21.682	-11.930	43.500	9.888	QP	V
	298.690	32.006	17.524	-13.994	46.000	14.482	QP	
	3193.000	42.366	43.963	-31.634	74.000	-1.597	PK	
	3587.000	36.950	37.698	-37.050	74.000	-0.749	PK	
	4825.000	48.478	45.778	-25.522	74.000	2.700	PK	
	7256.000	43.660	35.759	-30.340	74.000	7.901	PK	
Middle	798.240	27.324	4.629	-18.676	46.000	22.695	QP	H
	890.390	26.263	2.354	-19.737	46.000	23.909	QP	
	3013.000	36.324	38.446	-37.676	74.000	-2.122	PK	
	3587.000	37.532	38.280	-36.468	74.000	-0.749	PK	
	4867.500	44.603	41.935	-29.397	74.000	2.667	PK	
	7311.000	43.645	35.641	-30.355	74.000	8.004	PK	
	146.885	27.509	18.087	-15.991	43.500	9.422	QP	V
	239.520	30.069	16.727	-15.931	46.000	13.342	QP	
	3193.000	42.437	44.034	-31.563	74.000	-1.597	PK	
	3574.000	37.569	38.361	-36.431	74.000	-0.792	PK	
	4876.000	47.469	44.794	-26.531	74.000	2.675	PK	
	7311.000	43.261	35.257	-30.739	74.000	8.004	PK	
High	525.185	22.725	4.123	-23.275	46.000	18.602	QP	H
	789.510	24.813	2.229	-21.187	46.000	22.584	QP	
	3047.000	35.612	37.596	-38.388	74.000	-1.984	PK	
	3526.000	37.224	38.231	-36.776	74.000	-1.007	PK	
	4927.000	44.733	41.963	-29.267	74.000	2.770	PK	
	7386.000	42.538	34.622	-31.462	74.000	7.916	PK	
	141.550	27.756	18.345	-15.744	43.500	9.411	QP	V
	180.350	26.405	15.491	-17.095	43.500	10.914	QP	
	3184.000	42.356	43.934	-31.644	74.000	-1.578	PK	
	3598.000	36.526	37.227	-37.474	74.000	-0.700	PK	
	4918.500	45.099	42.345	-28.901	74.000	2.753	PK	
	7386.000	43.404	35.488	-30.596	74.000	7.916	PK	

**Table 6: Test result of Spurious Emission of Wi-Fi (802.11n)**

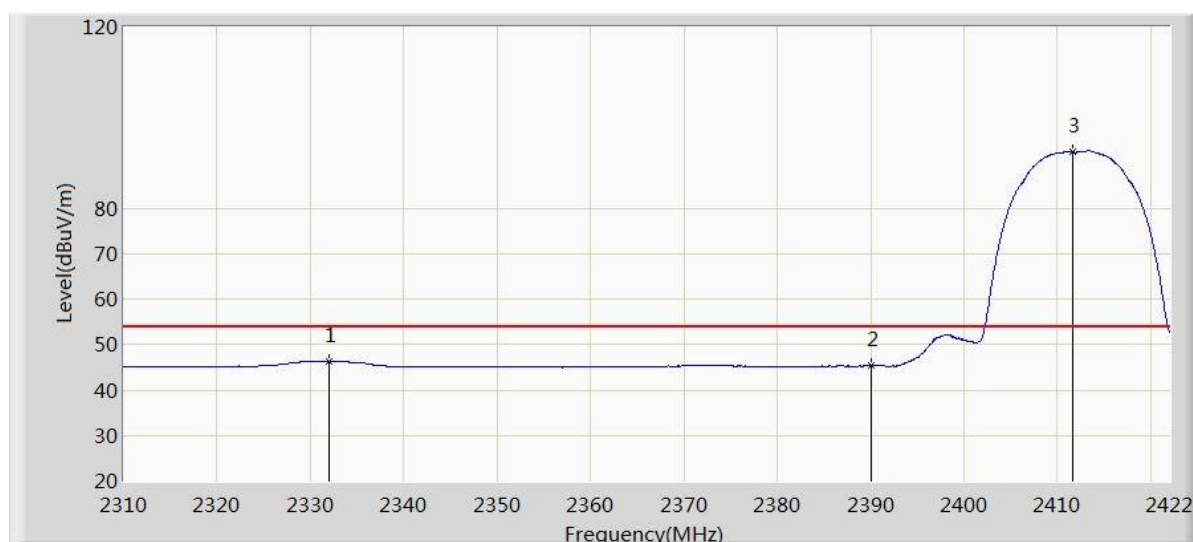
Channel	Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
Low	625.580	22.143	1.876	-23.857	46.000	20.267	QP	H
	784.175	25.649	3.129	-20.351	46.000	22.520	QP	
	3014.000	36.030	38.150	-37.970	74.000	-2.120	PK	
	3585.000	36.945	37.702	-37.055	74.000	-0.757	PK	
	4816.500	42.108	39.411	-31.892	74.000	2.697	PK	
	7256.000	42.608	34.707	-31.392	74.000	7.901	PK	
	174.045	28.016	17.584	-15.484	43.500	10.432	QP	V
	231.760	26.023	12.938	-19.977	46.000	13.085	QP	
	3193.000	42.366	43.963	-31.634	74.000	-1.597	PK	
	3587.000	36.685	37.433	-37.315	74.000	-0.749	PK	
	4816.500	46.435	43.738	-27.565	74.000	2.697	PK	
	7256.000	43.087	35.186	-30.913	74.000	7.901	PK	
Middle	511.120	20.681	2.301	-25.319	46.000	18.380	QP	H
	789.995	24.163	1.573	-21.837	46.000	22.590	QP	
	3017.000	36.616	38.731	-37.384	74.000	-2.115	PK	
	3567.000	36.768	37.581	-37.232	74.000	-0.813	PK	
	4876.000	42.631	39.956	-31.369	74.000	2.675	PK	
	7311.000	42.649	34.645	-31.351	74.000	8.004	PK	
	138.640	26.393	16.862	-17.107	43.500	9.531	QP	V
	172.105	25.179	14.854	-18.321	43.500	10.325	QP	
	3193.000	43.396	44.993	-30.604	74.000	-1.597	PK	
	3567.000	37.635	38.448	-36.365	74.000	-0.813	PK	
	4876.000	46.695	44.020	-27.305	74.000	2.675	PK	
	7311.000	42.534	34.530	-31.466	74.000	8.004	PK	
High	527.125	19.732	1.102	-26.268	46.000	18.630	QP	H
	800.180	24.601	1.878	-21.399	46.000	22.723	QP	
	3018.000	36.048	38.161	-37.952	74.000	-2.114	PK	
	3592.000	37.680	38.406	-36.320	74.000	-0.727	PK	
	4927.000	42.331	39.561	-31.669	74.000	2.770	PK	
	7386.000	43.077	35.161	-30.923	74.000	7.916	PK	
	141.550	30.839	21.428	-12.661	43.500	9.411	QP	V
	170.650	27.056	16.799	-16.444	43.500	10.257	QP	
	3193.000	42.050	43.647	-31.950	74.000	-1.597	PK	
	3597.000	36.277	36.982	-37.723	74.000	-0.705	PK	
	4927.000	42.524	39.754	-31.476	74.000	2.770	PK	
	7386.000	42.818	34.902	-31.182	74.000	7.916	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.

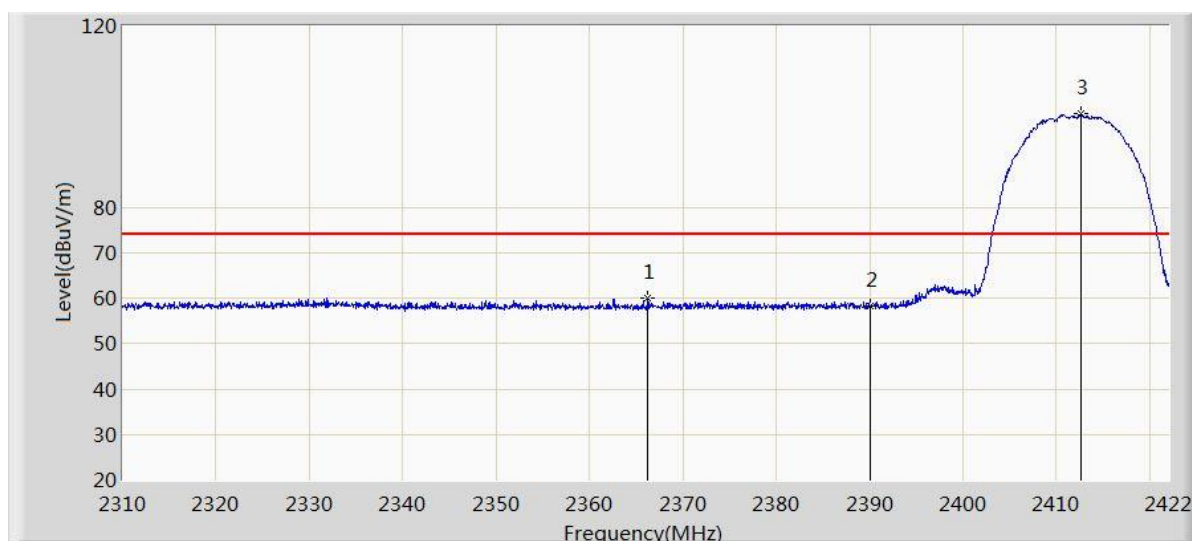
**Test Plot of Frequency Band Edge of 802.11b mode**
**Low Channel**


Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2381.568	60.333	29.115	-13.667	74.000	31.218	PK	H
2390.000	58.300	27.097	-15.700	74.000	31.203	PK	
2412.480	102.864	71.695	28.864	74.000	31.169	PK	

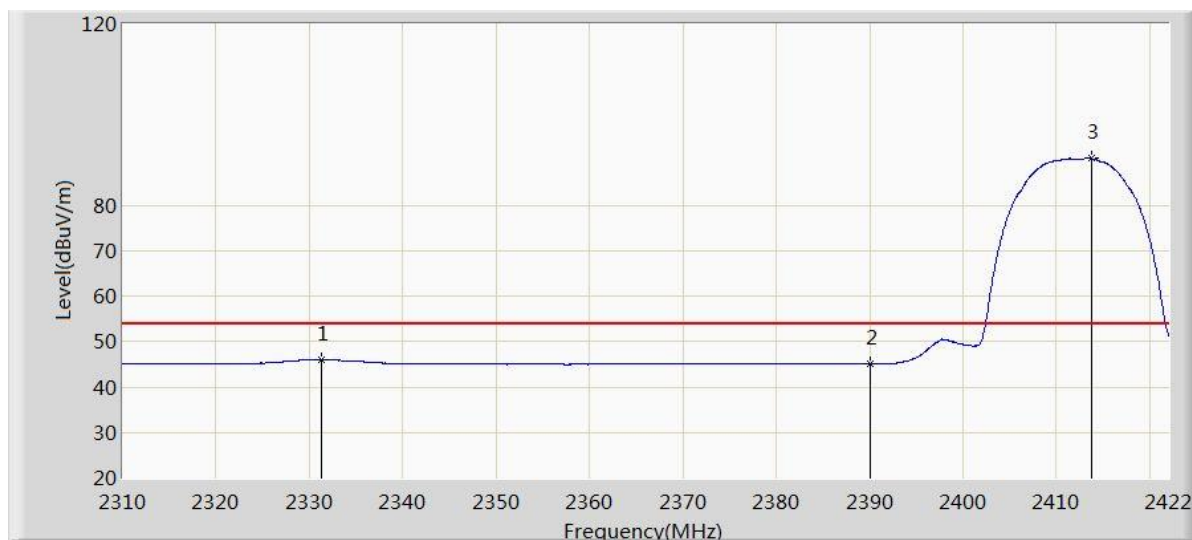


Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2332.064	46.355	14.989	-7.645	54.000	31.366	AV	H
2390.000	45.331	14.128	-8.669	54.000	31.203	AV	
2411.640	92.525	61.355	38.525	54.000	31.170	AV	

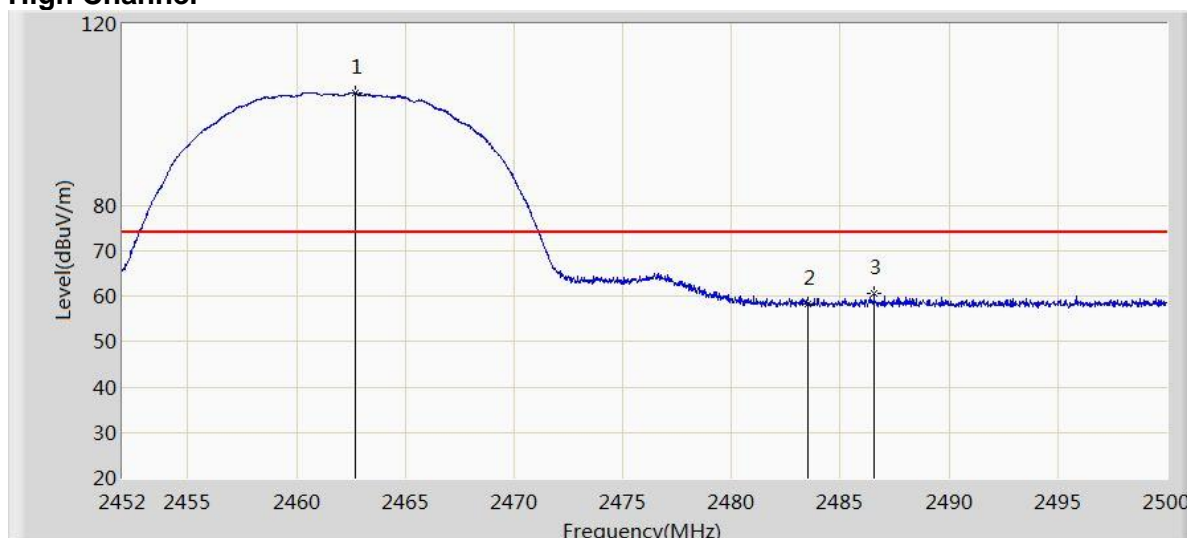




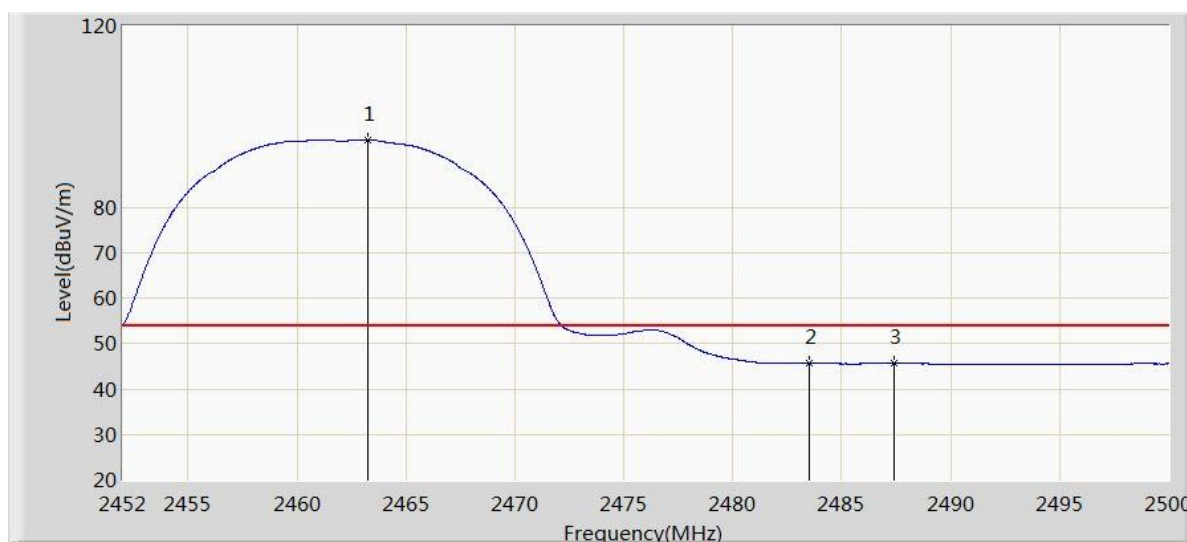
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2366.280	60.023	28.776	-13.977	74.000	31.246	PK	V
2390.000	58.287	27.084	-15.713	74.000	31.203	PK	
2412.592	100.685	69.516	26.685	74.000	31.169	PK	



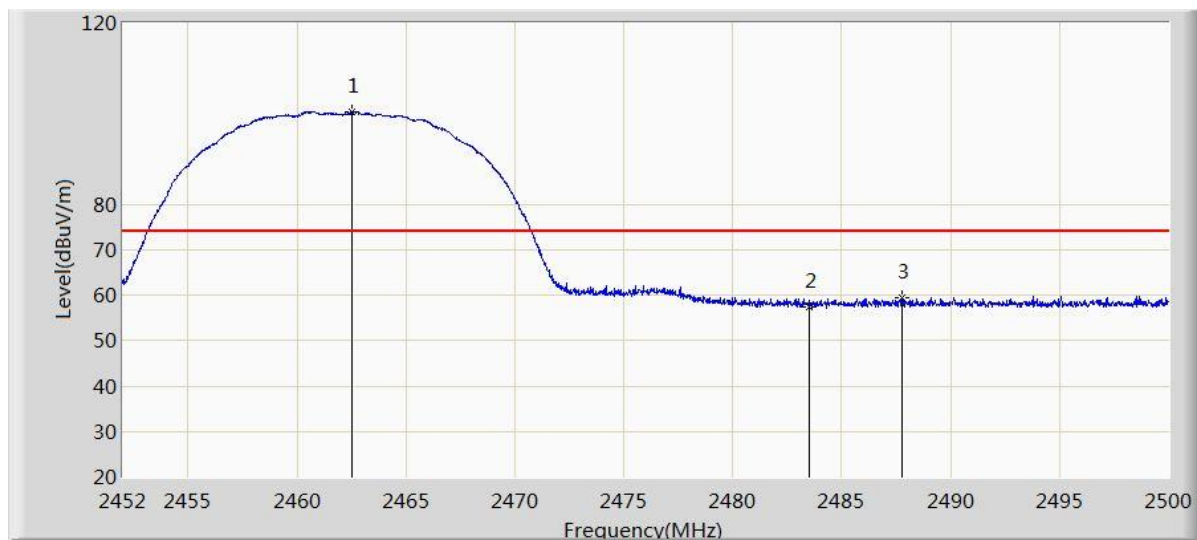
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2331.280	45.973	14.603	-8.027	54.000	31.370	AV	V
2390.000	45.206	14.003	-8.794	54.000	31.203	AV	
2413.768	90.389	59.222	36.389	54.000	31.167	AV	

**High Channel**


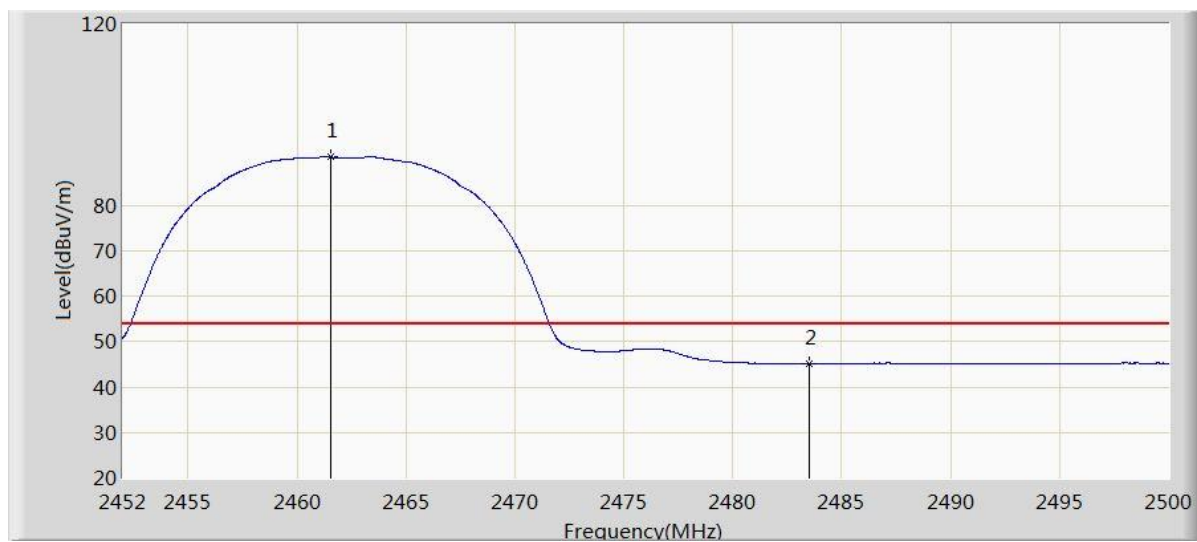
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2462.728	104.818	73.681	30.818	74.000	31.137	PK	H
2483.500	58.346	27.153	-15.654	74.000	31.194	PK	
2486.560	60.586	29.385	-13.414	74.000	31.201	PK	



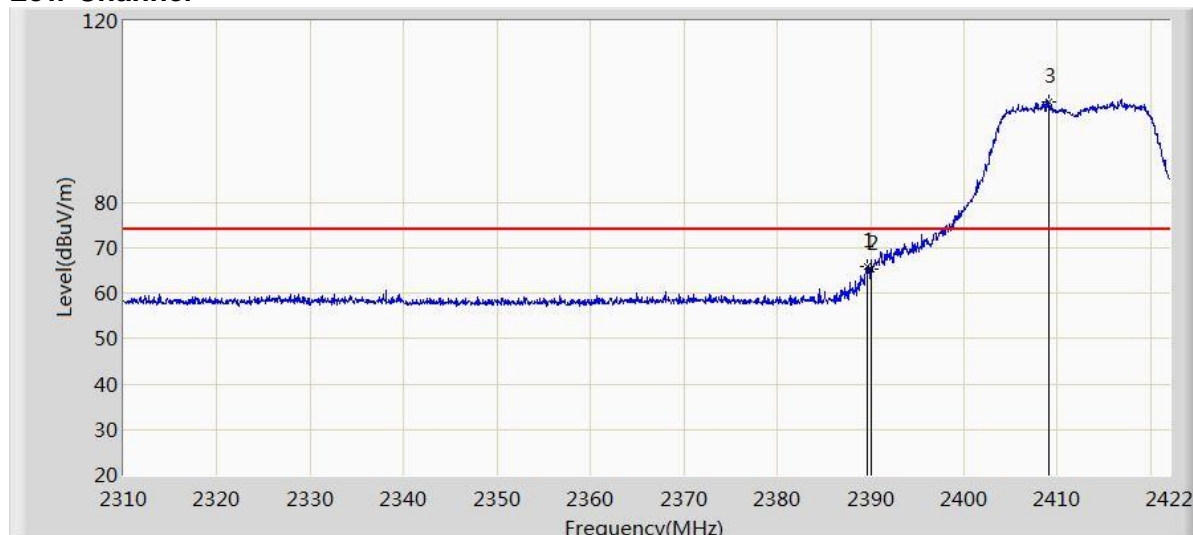
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2463.256	94.828	63.690	40.828	54.000	31.138	AV	H
2483.500	45.701	14.508	-8.299	54.000	31.194	AV	
2487.424	45.749	14.545	-8.251	54.000	31.204	AV	



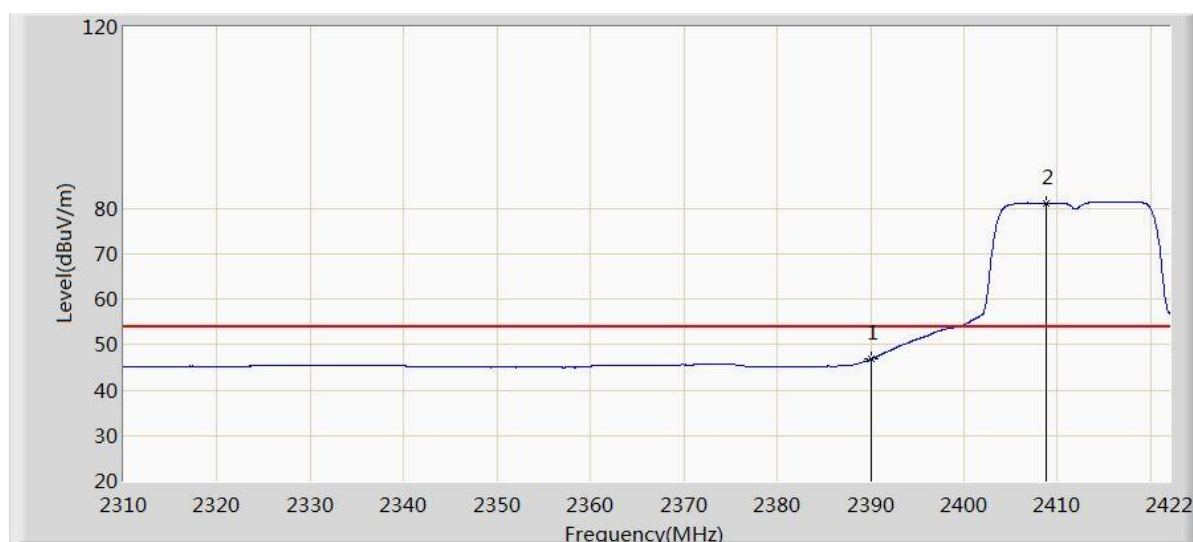
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2462.512	100.328	69.192	26.328	74.000	31.137	PK	V
2483.500	57.365	26.172	-16.635	74.000	31.194	PK	
2487.784	59.565	28.360	-14.435	74.000	31.204	PK	



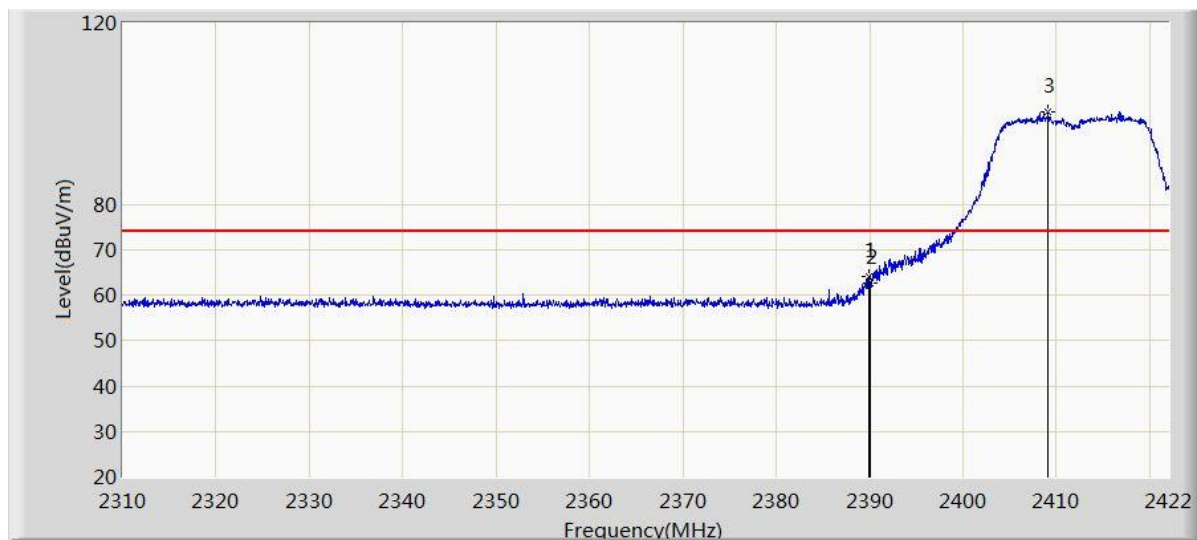
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2461.528	90.674	59.539	36.674	54.000	31.135	AV	V
2483.500	45.247	14.054	-8.753	54.000	31.194	AV	

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


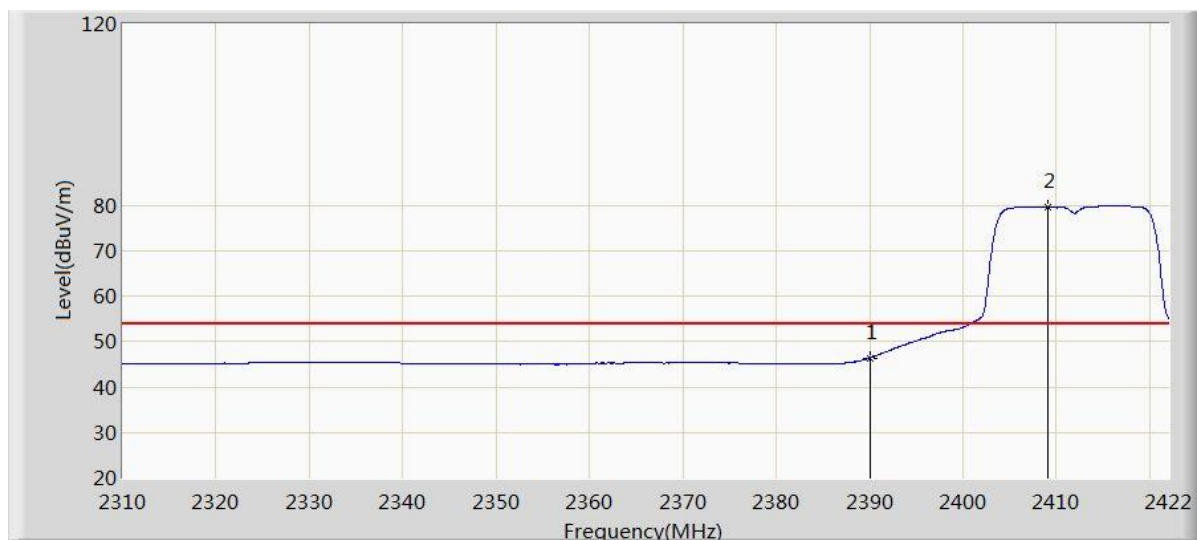
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2389.576	65.980	34.776	-8.020	74.000	31.204	PK	H
2390.000	65.200	33.997	-8.800	74.000	31.203	PK	
2409.064	102.293	71.119	28.293	74.000	31.174	PK	



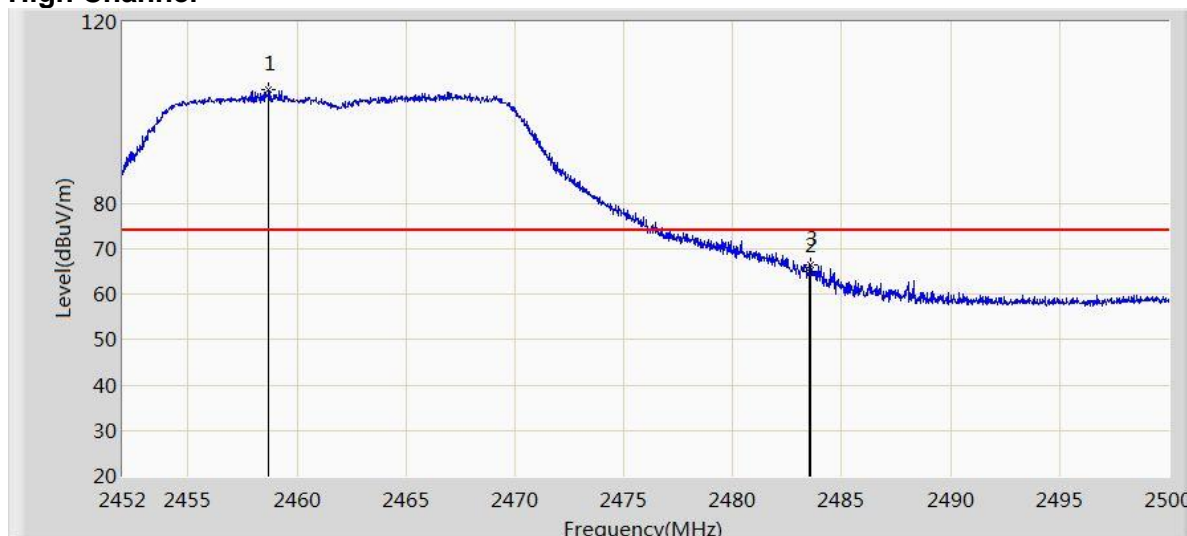
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	46.804	15.601	-7.196	54.000	31.203	AV	H
2408.728	81.113	49.939	27.113	54.000	31.175	AV	



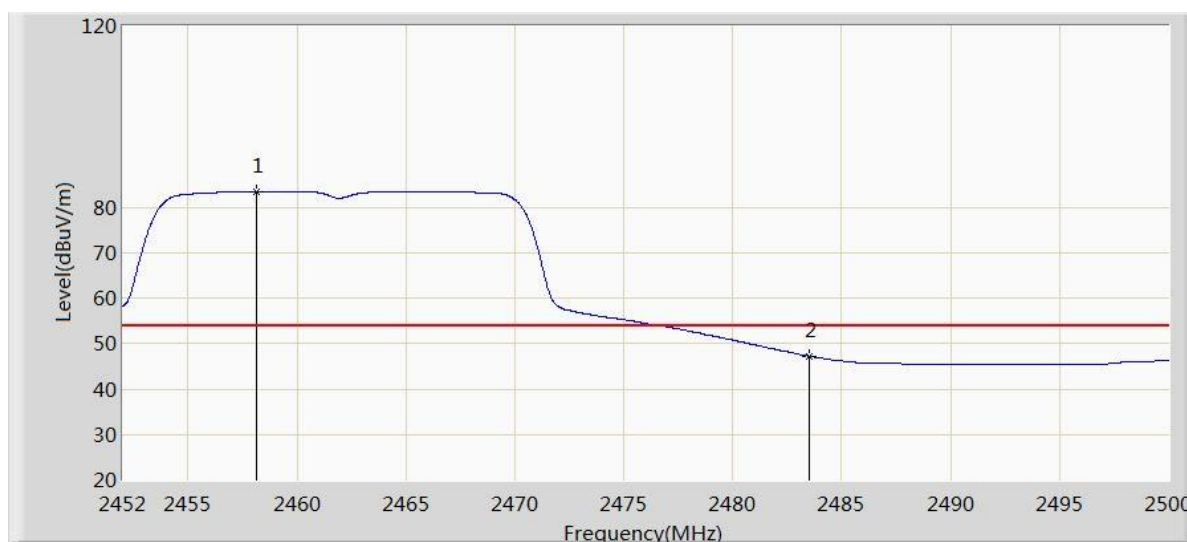
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2389.912	64.178	32.975	-9.822	74.000	31.203	PK	V
2390.000	62.731	31.528	-11.269	74.000	31.203	PK	
2409.120	100.354	69.180	26.354	74.000	31.174	PK	



Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	46.410	15.207	-7.590	54.000	31.203	AV	V
2409.064	79.559	48.385	25.559	54.000	31.174	AV	

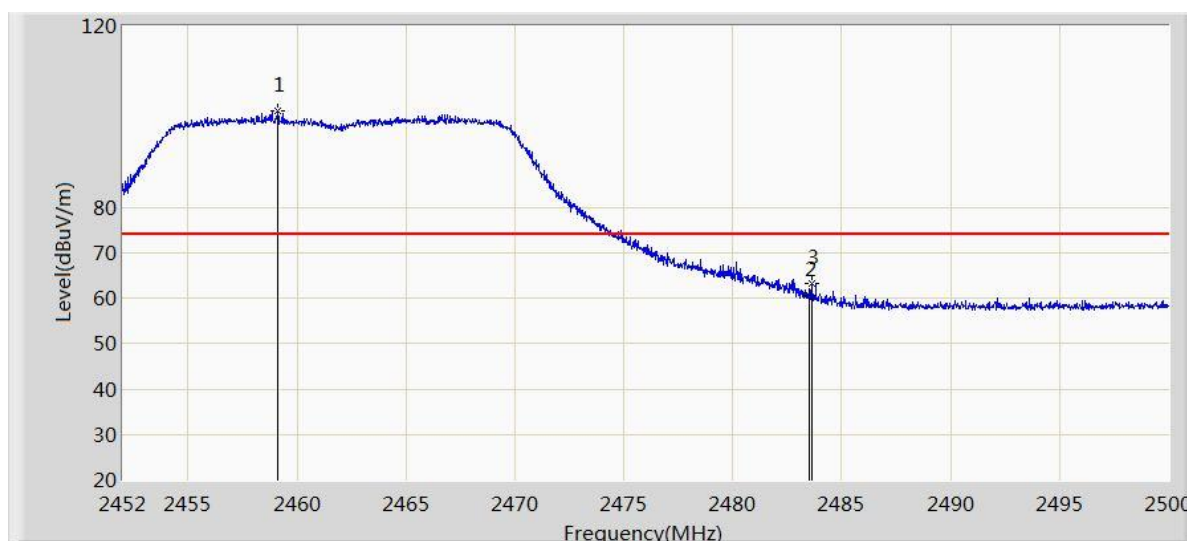
**High Channel**


Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2458.696	104.948	73.819	30.948	74.000	31.129	PK	H
2483.500	64.911	33.718	-9.089	74.000	31.194	PK	
2483.560	66.571	35.378	-7.429	74.000	31.194	PK	

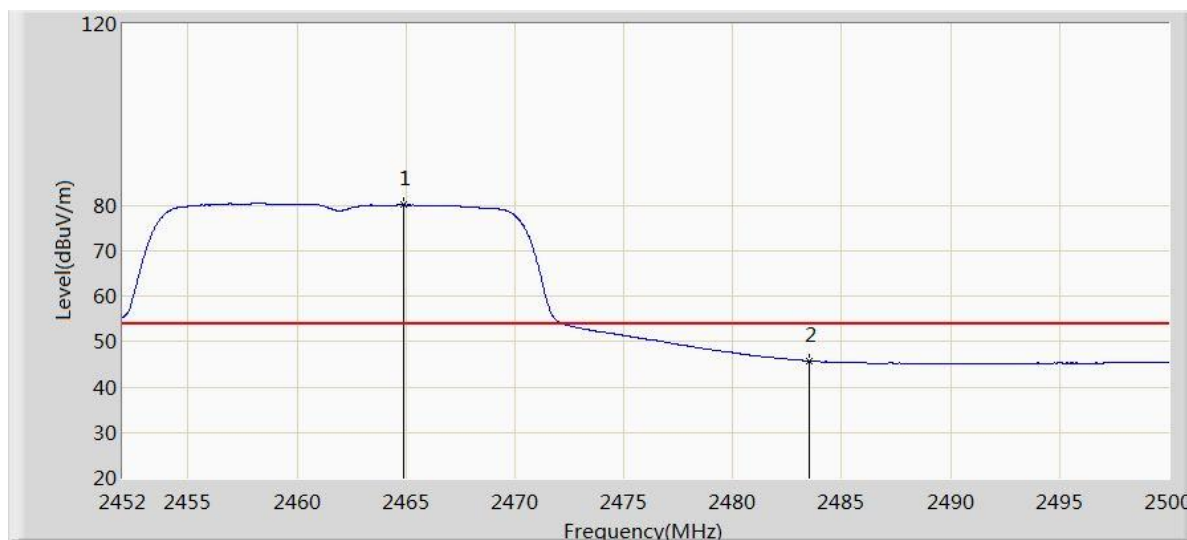


Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2458.168	83.518	52.389	29.518	54.000	31.129	AV	H
2483.500	47.268	16.075	-6.732	54.000	31.194	AV	

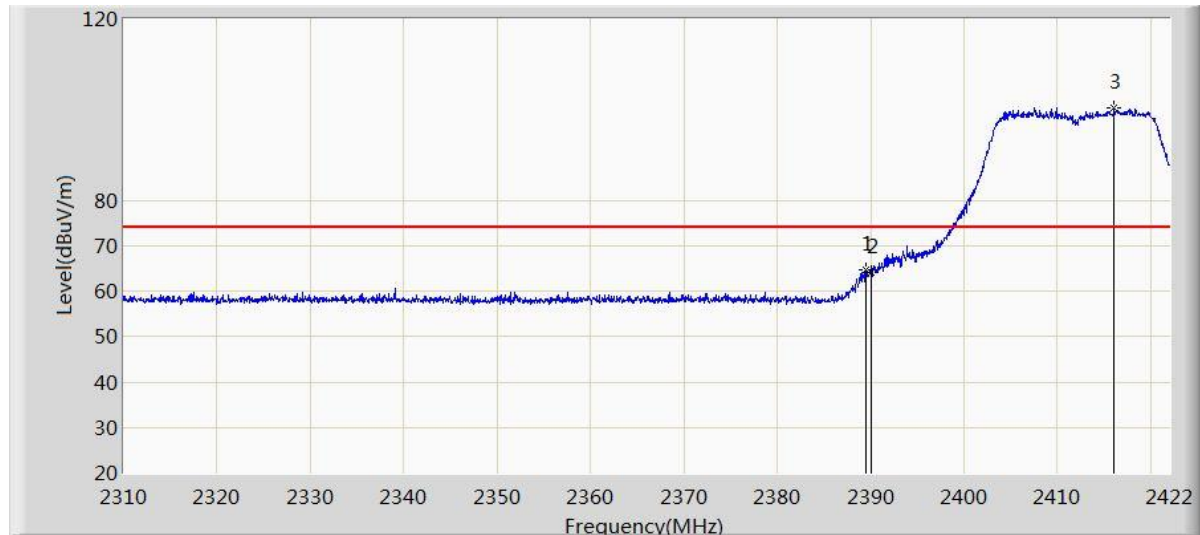




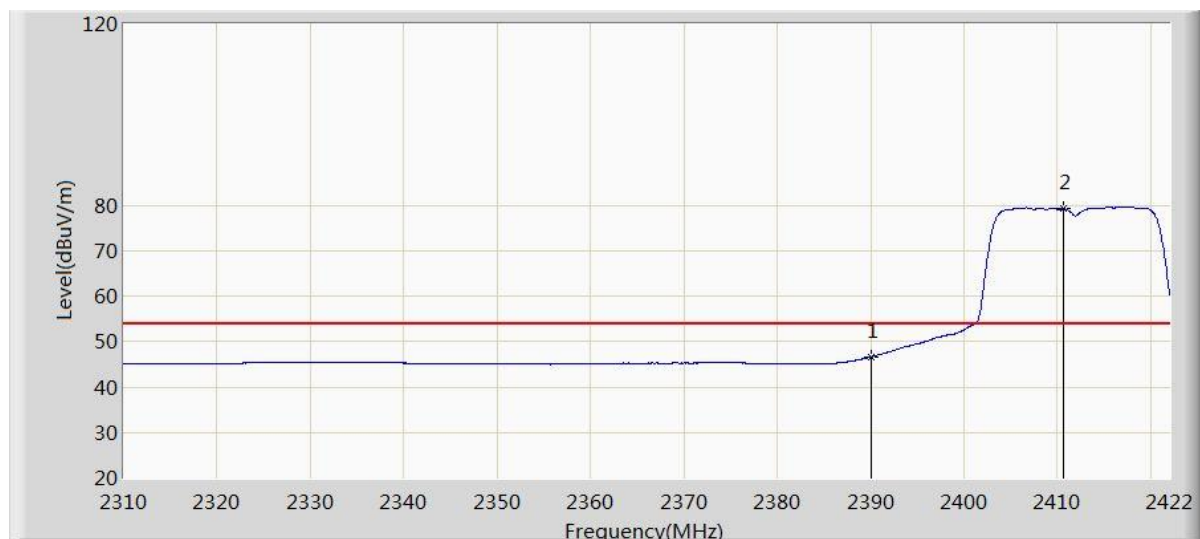
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2459.128	101.261	70.131	27.261	74.000	31.130	PK	V
2483.500	60.758	29.565	-13.242	74.000	31.194	PK	
2483.632	63.223	32.029	-10.777	74.000	31.194	PK	



Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2464.888	80.127	48.985	26.127	54.000	31.142	AV	V
2483.500	45.791	14.598	-8.209	54.000	31.194	AV	

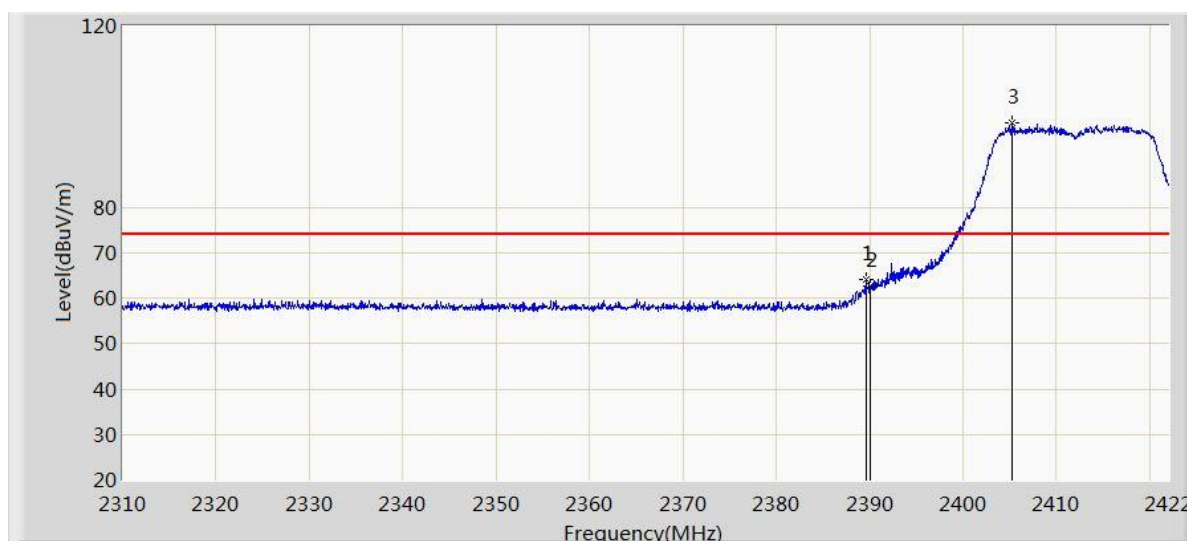
**Test Plot of Frequency Band Edge of 802.11n mode**  
**Low Channel**


Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2389.520	64.642	33.438	-9.358	74.000	31.204	PK	H
2390.000	64.179	32.976	-9.821	74.000	31.203	PK	
2416.064	100.369	69.206	26.369	74.000	31.162	PK	

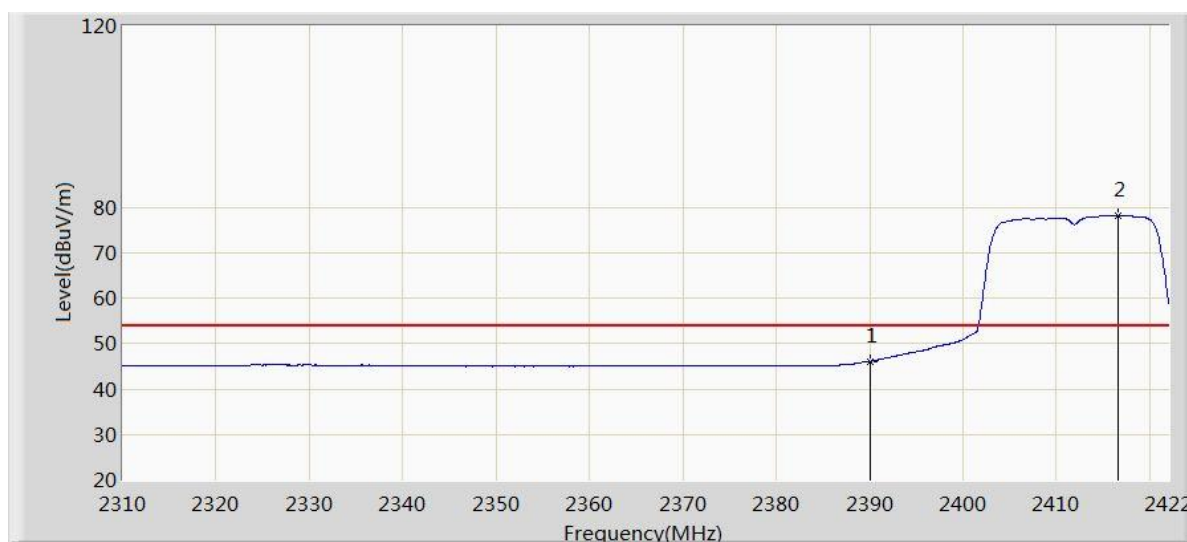


Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	46.642	15.439	-7.358	54.000	31.203	AV	H
2410.632	79.277	48.105	25.277	54.000	31.172	AV	

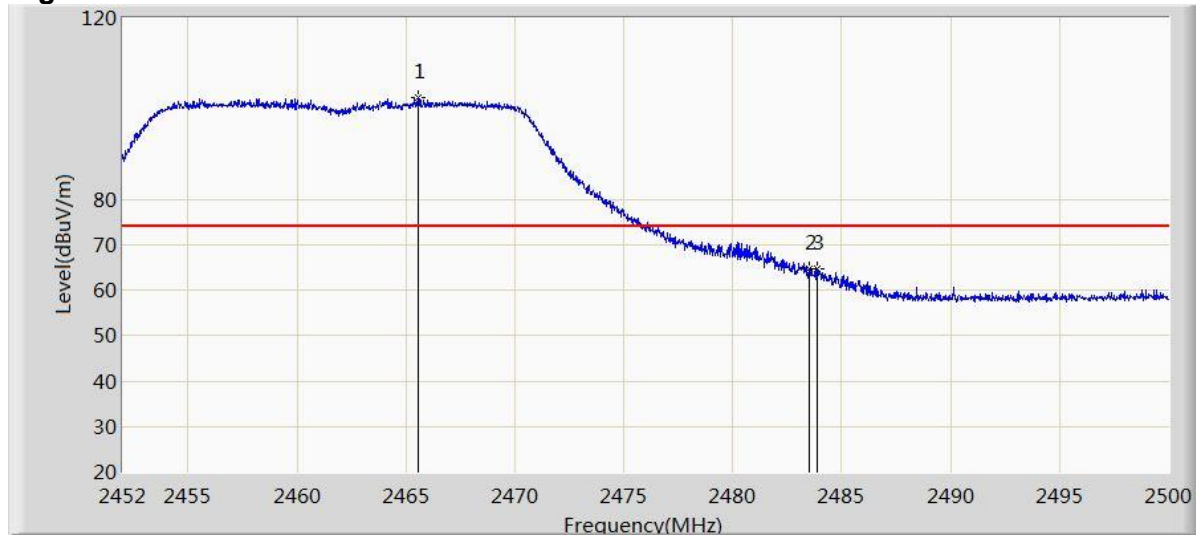




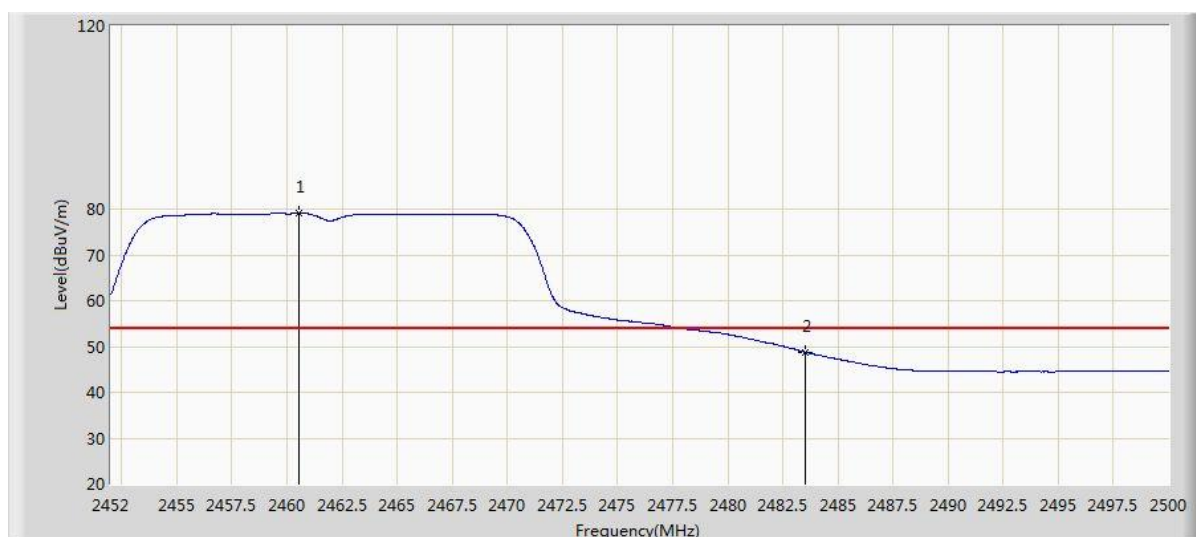
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2389.576	64.052	32.848	-9.948	74.000	31.204	PK	V
2390.000	62.664	31.461	-11.336	74.000	31.203	PK	
2405.312	98.514	67.335	24.514	74.000	31.179	PK	



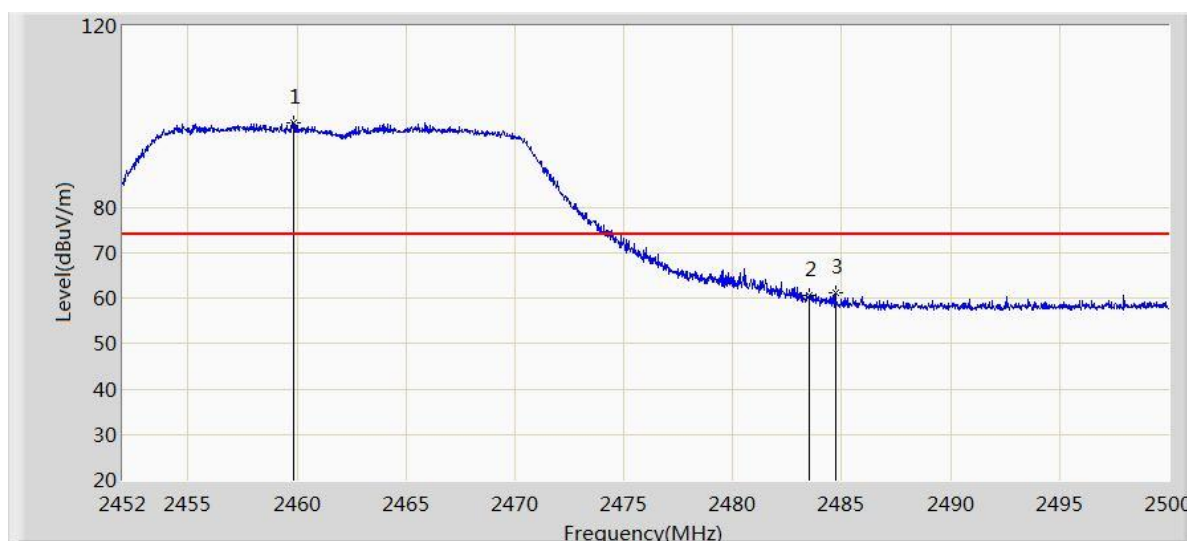
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2390.000	46.134	14.931	-7.866	54.000	31.203	AV	V
2416.624	78.233	47.071	24.233	54.000	31.162	AV	

**High Channel**


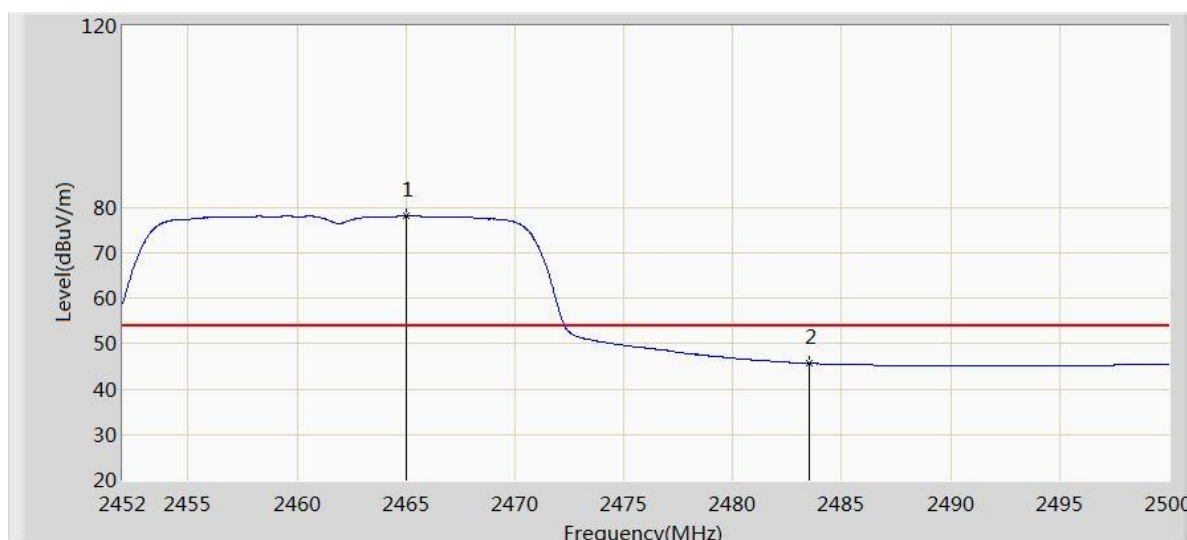
Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2465.560	102.588	71.444	28.588	74.000	31.144	PK	H
2483.500	64.696	33.503	-9.304	74.000	31.194	PK	
2483.872	64.841	33.647	-9.159	74.000	31.194	PK	



Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2465.152	80.722	49.579	26.722	54.000	31.142	AV	H
2483.500	47.271	16.078	-6.729	54.000	31.194	AV	



Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2459.824	98.525	67.394	24.525	74.000	31.131	PK	V
2483.500	60.588	29.395	-13.412	74.000	31.194	PK	
2484.736	61.305	30.108	-12.695	74.000	31.197	PK	



Freq. (MHz)	Measure Level (dB $\mu$ V/m)	Reading (dB $\mu$ V)	Margin (dB)	Limit (dB $\mu$ V/m)	Correct Factor (dB)	Detector	Polar
2465.032	78.068	46.926	24.068	54.000	31.142	AV	V
2483.500	45.664	14.471	-8.336	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 <sup>2</sup> ]	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:

‘at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz; ’

Here  $f = 2450\text{MHz}$ , so Max EIRP should  $\leq 2.7129 \text{ W} = 2712.9 \text{ mW}$

### Measurement Result

The maximum measured transmitter power is the following:

Conducted Output Power P <sub>out</sub> [dBm]	Conducted Output Power P <sub>out</sub> [mW]	Maximum Antenna Gain [dBi]	P <sub>out</sub> EIRP [mW]	Power Density at 20cm [mW/cm <sup>2</sup> ]
22.75	188.36	2.2	312.61	0.062

Note:

The power density  $S$  in mW/cm<sup>2</sup> is calculated according to the Friis formula:

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

where

$S$  = power density in mW/cm<sup>2</sup>

$P_{\text{out}}$  = antenna conducted output power in mW

$G$  = antenna gain in linear scale (here:  $2.2\text{dBi} = 10\log(G)$ )

$D$  = 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 Spurious Emissions below 1GHz**



**Photograph 2: Set-up for Spurious Emissions above 1GHz**

