



**FCC PART 15 SUBPART C  
CERTIFICATION TEST REPORT**

*For*

**Windows Type Air-condition**

**MODEL NUMBER: TWAC-15CRA1/K8U(ES), TWAC-24CRA2/J3U (ES)**

**FCC ID: 2AJCLTWAC-TYWFS**

**REPORT NUMBER: 4788645763**

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*Prepared for*

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	4/08/2018	Initial Issue	



<b>Summary of Test Results</b>			
<b>Clause</b>	<b>Test Items</b>	<b>FCC Rules</b>	<b>Test Results</b>
1	6dB Bandwidth	FCC 15.247 (a) (2)	Pass
2	Peak Conducted Output Power	FCC 15.247 (b) (3)	Pass
3	Power Spectral Density	FCC 15.247 (e)	Pass
4	Conducted Bandedge and Spurious Emission	FCC 15.247 (d)	Pass
5	Radiated Bandedge and Spurious Emission	FCC 15.247 (d) FCC 15.209 FCC 15.205	Pass
6	Conducted Emission Test For AC Power Port	FCC 15.207	Pass
7	Antenna Requirement	FCC 15.203	Pass



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# 1. ATTESTATION OF TEST RESULTS

## Applicant Information

Company Name: TCL Air conditioner (Zhong Shan) Co.,Ltd.  
Address: N0.59.Nantou Road West, Nantou Town,Zhongshan City, Guangdong P.R. China

## Manufacturer Information

Company Name: TCL Air conditioner (Zhong Shan) Co.,Ltd.  
Address: N0.59.Nantou Road West, Nantou Town,Zhongshan City, Guangdong P.R. China

## EUT Description

EUT Name: Air-condition  
Model: TWAC-15CRA1/K8U(ES), TWAC-24CRA2/J3U(ES)  
Series Model: Please refer to page 9  
Brand Name: N/A  
Sample Status: Normal  
Sample ID: 1102464  
Sample Received Date: 29 Mar. 2018  
Date of Tested: 31 Mar. 2018 ~ 07 Apr. 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC Part 15 Subpart C	PASS

Tested By:

Chris chen  
Engineer Project Associate  
Approved By:

Stephen Guo  
Laboratory Manager

Checked By:

Shawn Wen  
Laboratory Leader



## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with 558074 D01 DTS Meas Guidance v04, 414788 D01 Radiated Test Site v01, FCC CFR 47 Part 2, FCC CFR 47 Part 15 and ANSI C63.10-2013.

## 3. FACILITIES AND ACCREDITATION

Accreditation Certificate	<p><b>A2LA (Certificate No.: 4338.01)</b> Shenzhen STS Test Services Co., Ltd. has been assessed and proved to be in compliance with A2LA.</p> <p><b>CNAS (Registration No.: L7649)</b> Shenzhen STS Test Services Co., Ltd. has been assessed and proved to be in compliance with CNAS.</p> <p><b>FCC (FCC Designation No.: 625569)</b> Shenzhen STS Test Services Co., Ltd. has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules</p> <p><b>IC(Company No.: 12108A)</b> Shenzhen STS Test Services Co., Ltd. has been registered and fully described in a report filed with Industry Canada. The Company Number is 12108A.</p>
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Note 1: All tests measurement facilities use to collect the measurement data are located at 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China

Note 2: The test anechoic chamber in Shenzhen STS Test Services Co., Ltd. had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.



## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognize national standards.

### 4.2. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission (9KHz-150KHz)	$\pm 2.88\text{dB}$
2	Conducted Emission (150KHz-30MHz)	$\pm 2.67\text{dB}$
3	RF power,conducted	$\pm 0.71\text{dB}$
4	Spurious emissions,conducted	$\pm 0.63\text{dB}$
5	All emissions,radiated (9KHz-30MHz)	$\pm 3.02\text{dB}$
6	All emissions,radiated (30MHz-200MHz)	$\pm 3.80\text{dB}$
7	All emissions,radiated (200MHz-1000MHz)	$\pm 3.97\text{dB}$
8	All emissions,radiated(>1G)	$\pm 3.03\text{dB}$





## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

EUT Name	Windows Type Air-condition
EUT Description	The EUT is an Air-condition.
Model	TWAC-15CRA1/K8U(ES), TWAC-24CRA2/J3U(ES)
Remark	All test items had been tested for TWAC-15CRA1/K8U(ES), only the radiation spurious emission from 30MHz to 1GHz was tested for TWAC-24CRA2/J3U(ES).
Series Model	<b>Based on TWAC-15CRA1/K8U(ES) derivation model:</b> TWAC-06CRA1/L1U(ES), TWAC-08CRA1/L0U(ES), TWAC-10CRA1/L0U(ES), TWAC-12CRA1/L0U(ES), TWAC-15CRA1/K8U(ES) <b>Based on TWAC-24CRA2/J3U(ES) derivation model:</b> TWAC-18CRA2/K8U(ES), TWAC-22CRA2/K8U(ES)
Model Difference	According to the description of applicant, all types of electronic circuit of the same, the same WIFI module, the difference are the evaporator, working voltage of compressor, AC motor, linear transformer and used two different control panels.
Radio Technology	IEEE802.11b/g/n HT20
Operation frequency	IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n HT20: 2412MHz—2462MHz
Modulation	IEEE 802.11b: DSSS(CCK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK, BPSK)
Power Supply	Input: AC 115V/60Hz for TWAC-15CRA1/K8U(ES) Input: AC 230V/60Hz for TWAC-24CRA2/J3U(ES)
Hardware Version	N/A
Software Version	N/A

### 5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	IEE Std. 802.11	Frequency (MHz)	Channel Number	Max PK Conducted Power (dBm)
2400-2483.5	1	IEEE 802.11b	2412-2462	1-11[11]	12.02
2400-2483.5	1	IEEE 802.11g	2412-2462	1-11[11]	10.84
2400-2483.5	1	IEEE 802.11nHT20	2412-2462	1-11[11]	10.77



### 5.3. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	4	2427	7	2442	10	2457
2	2417	5	2432	8	2447	11	2462
3	2422	6	2437	9	2452	N/A	N/A

### 5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
WiFi TX(802.11b)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11g)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11n HT20)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz

### 5.5. THE WORSE CASE CONFIGURATIONS

The Worst Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Modulation Mode	Transmit Antenna Number	Test Channel					
		NCB: 20MHz			NCB: 40MHz		
		CH 1	CH 6	CH 11	CH 3	CH 7	CH 11
802.11b	1	12.02	11.48	10.38	N/A		
802.11g	1	10.84	10.63	9.75			
802.11n HT20	1	10.77	10.54	9.63			

### 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2412-2462	PCB Antenna	0

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.
IEEE 802.11g	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT20	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.



## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	N/A	N/A	N/A	N/A

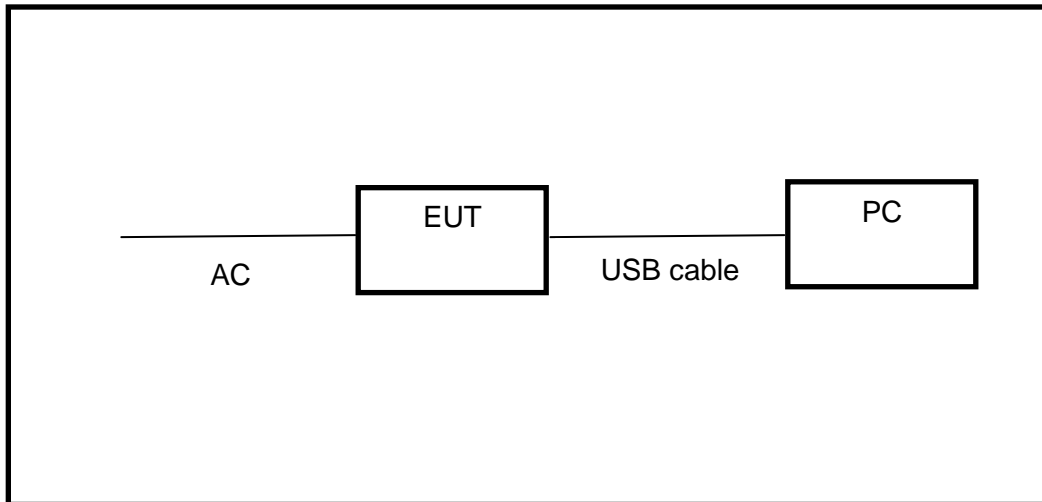
### I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(cm)	Remarks
1	N/A	N/A	N/A	N/A	N/A

### TEST SETUP

The EUT can work in engineering mode with firmware QRCT from QUALCOMM through a Laptop.

### SETUP DIAGRAM FOR TESTS





## 6. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
	Test Receiver	R&S	ESCI	101427	2017.10.15	2018.10.14
	LISN	R&S	ENV216	101242	2017.10.15	2018.10.14
	Conduction Cable	EM	C01	N/A	2018.03.11	2019.03.10
	Temperature & Humidity	Mieo	HH660	N/A	2017.10.15	2018.10.14
Radiated Emissions						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
	EMI Test Receiver	R&S	ESCI	102086	2017.10.15	2018.10.14
	Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2018.11.01
	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1343	2017.10.27	2018.10.26
	SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	N/A	2018.03.11	2019.03.10
	Temperature & Humidity	HH660	Mieo	N/A	2017.10.15	2018.10.14
	Temperature & Humidity	HH660	Mieo	N/A	2017.10.15	2018.10.14
	Pre-mpifier (0.1M-3GHz)	EM	EM330	60538	2018.03.11	2019.03.10
	PreAmplifier (1G-26.5GHz)	Agilent	8449B	60538	2017.10.15	2018.10.14
	Passive Loop (9K--30MHz)	ZHNAN	ZN3090C	16035	2018.03.11	2019.03.10
	Low frequency cable	EM	R01	N/A	2018.03.11	2019.03.10
	Low frequency cable	EM	R06	N/A	2018.03.11	2019.03.10
	High frequency cable	SCHWARZBEC K	R04	N/A	2018.03.11	2019.03.10
	High frequency cable	SCHWARZBEC K	R02	N/A	2018.03.11	2019.03.10
	Semi-anechoic chamber	Changling	966	N/A	2017.10.15	2018.10.14
	trun table	EM	SC100_1	60531	N/A	N/A
	Antnna mast	EM	SC100	N/A	N/A	N/A
	Max-full Antenna Corp	MF	MFA-440H	N/A	N/A	N/A



Other instruments						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
	USB RF power sensor	DARE	RPR3006 W	15I00041SNO0 3	2017.10.15	2018.10.14
	Power Meter	R&S	NRP	100510	2017.10.15	2018.10.14
	Spectrum Analyzer	Agilent	N9020A	MY51110105	2018.03.08	2019.03.07
	Signal Analyzer	Agilent	N9020A	MY49100060	2017.10.15	2018.10.14



## 7. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth	KDB 558074 D01 DTS Meas Guidance v04	8.0
2	Peak Output Power	KDB 558074 D01 DTS Meas Guidance v04	9.1.3
3	Power Spectral Density	KDB 558074 D01 DTS Meas Guidance v04	10.2
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 DTS Meas Guidance v04	11.0
5	Out-of-band emissions in restricted bands	KDB 558074 D01 DTS Meas Guidance v04	12.1
6	Band-edge	KDB 558074 D01 DTS Meas Guidance v04	13.3.2
7	Conducted Emission Test For AC Power Port	ANSI C63.10-2013	7.3



## 8. ANTENNA PORT TEST RESULTS

### 8.1. ON TIME AND DUTY CYCLE

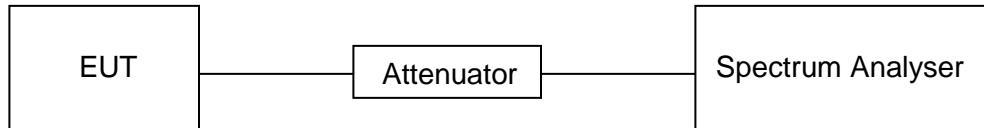
#### LIMITS

None; for reporting purposes only

#### PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

#### TEST SETUP



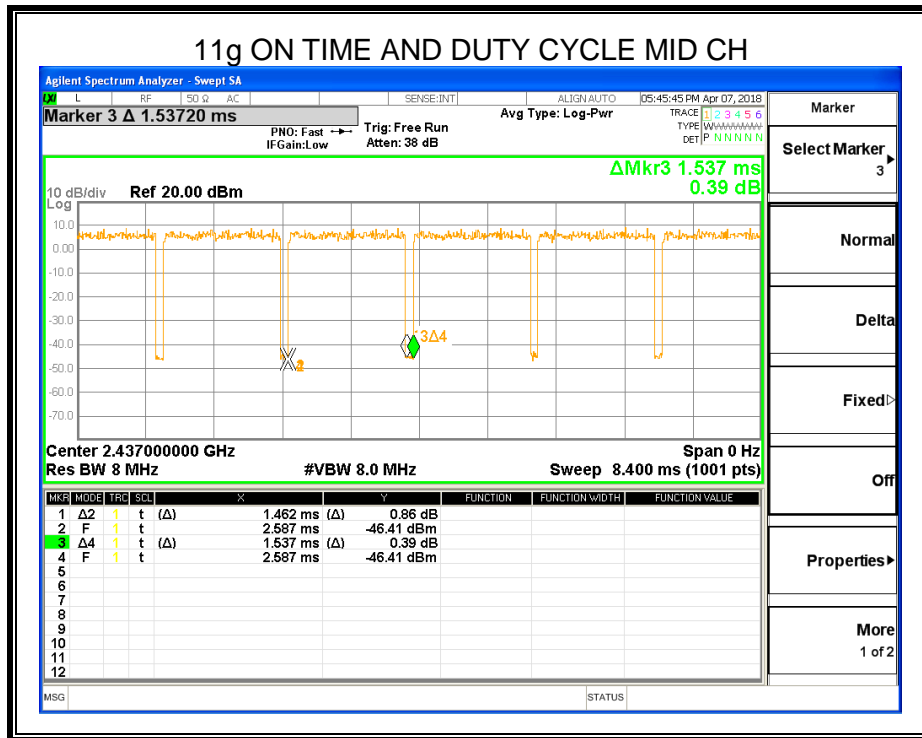
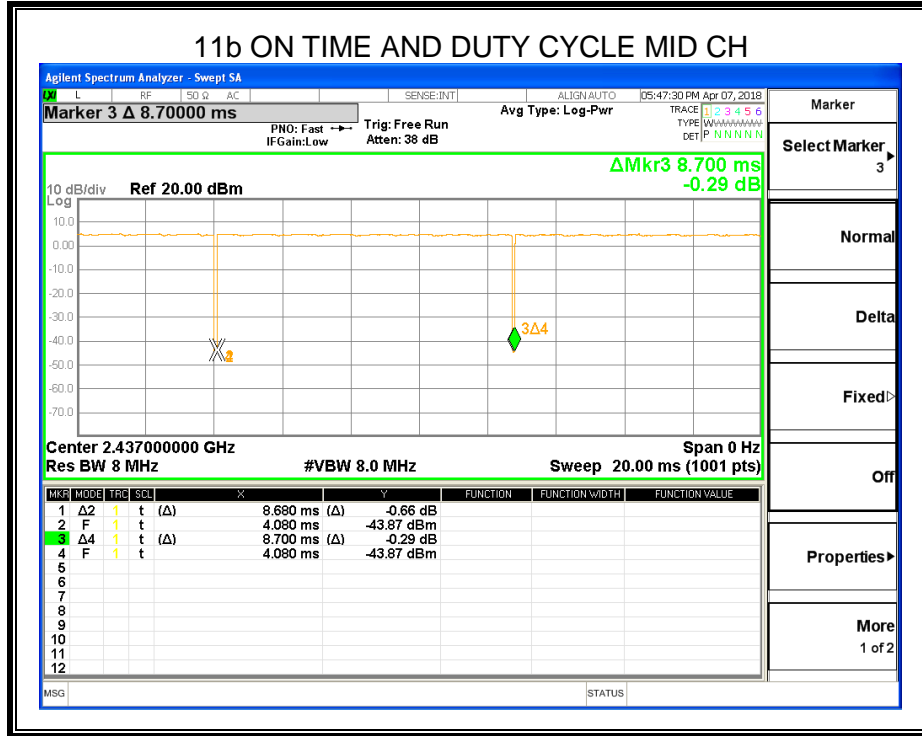
#### TEST ENVIRONMENT

Temperature	25°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V/60Hz

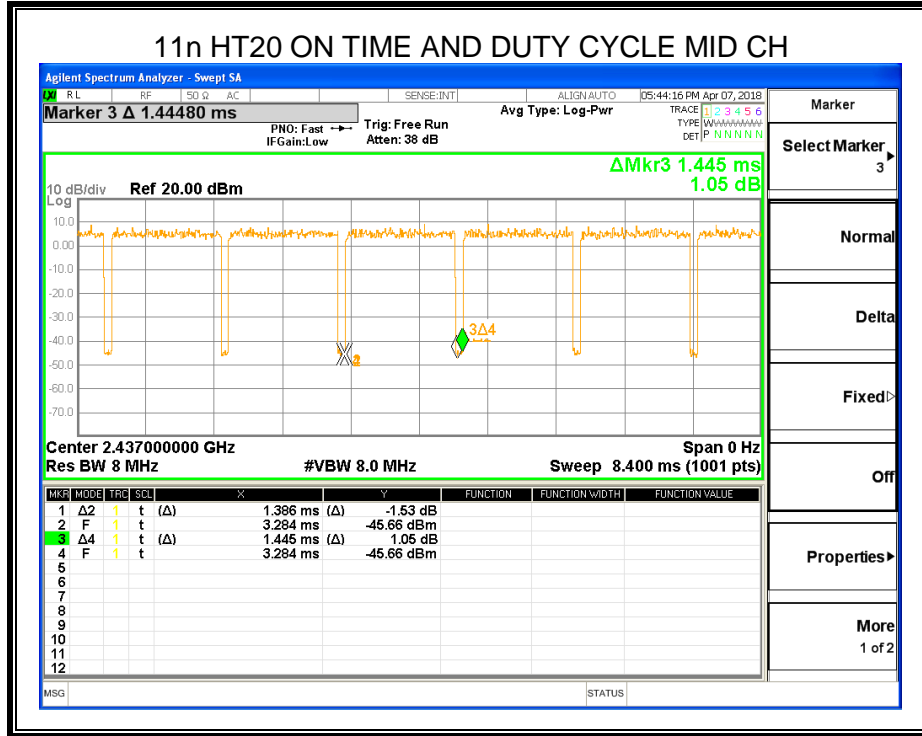
#### RESULTS

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/B Minimum VBW (KHz)
11b	8.680	8.700	0.998	99.77	0.01	0.01
11g	1.462	1.537	0.951	95.12	0.22	1
11n20	1.386	1.445	0.959	95.92	0.18	1

Note: Duty Cycle Correction Factor=10log(1/x).  
Where: x is Duty Cycle(Linear)  
Where: B is On Time







## 8.2. 6 dB DTS BANDWIDTH

### LIMITS

FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(a)(2)	6 dB Bandwidth	$\geq 500\text{KHz}$	2400-2483.5

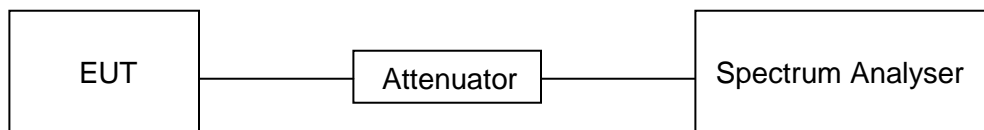
### TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### TEST SETUP





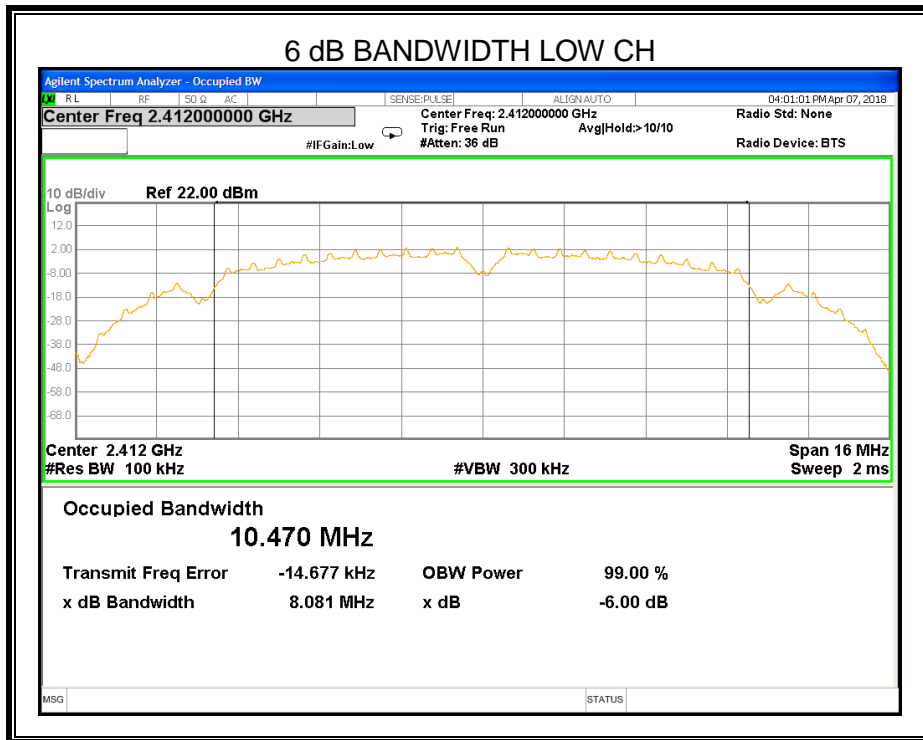
**TEST ENVIRONMENT**

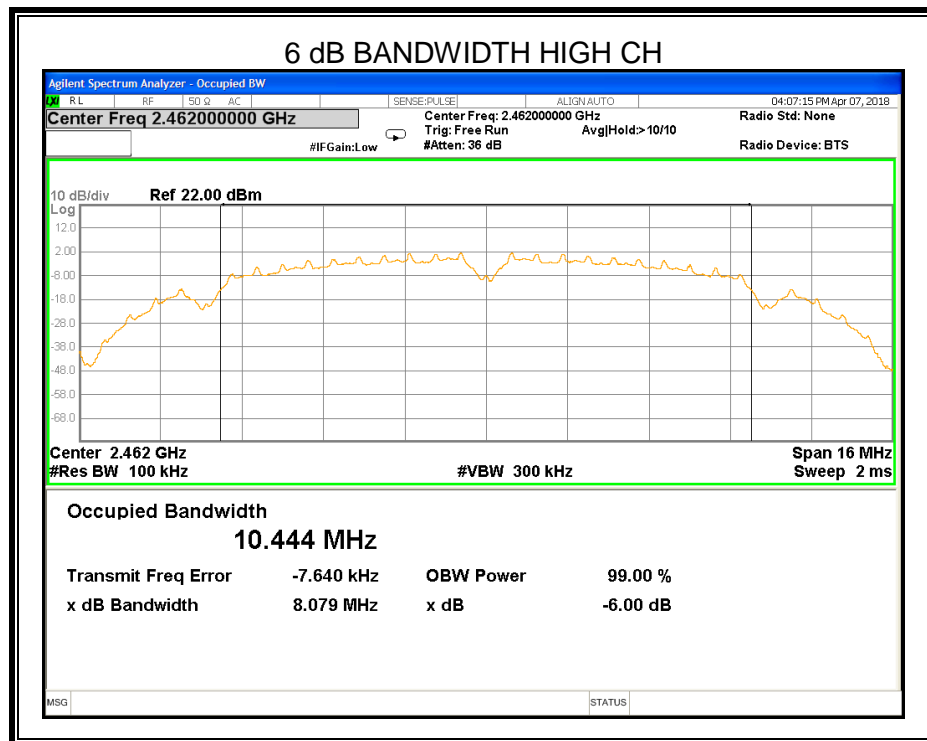
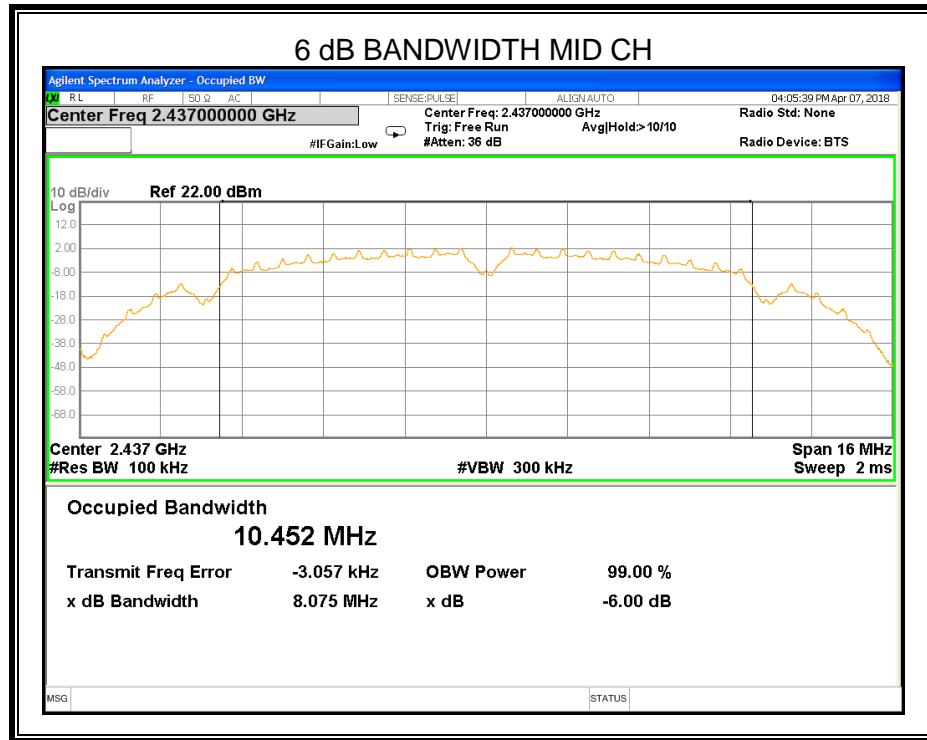
Temperature	25°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V/60Hz

**RESULTS**

**8.2.1. 802.11b MODE**

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	8.081	500	Pass
Middle	2437	8.075	500	Pass
High	2462	8.079	500	Pass

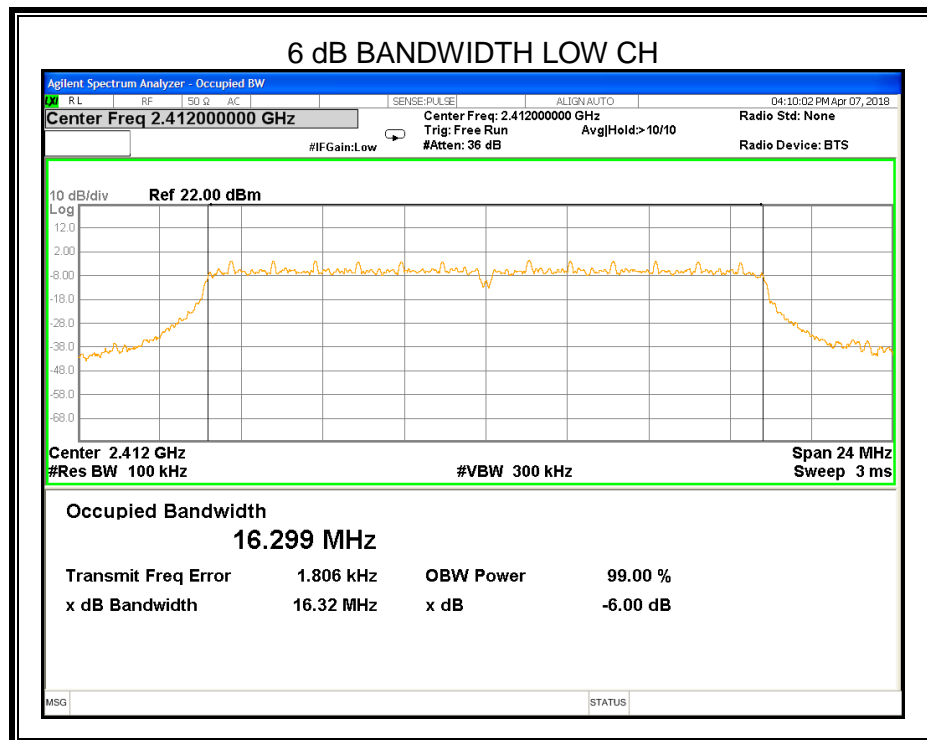


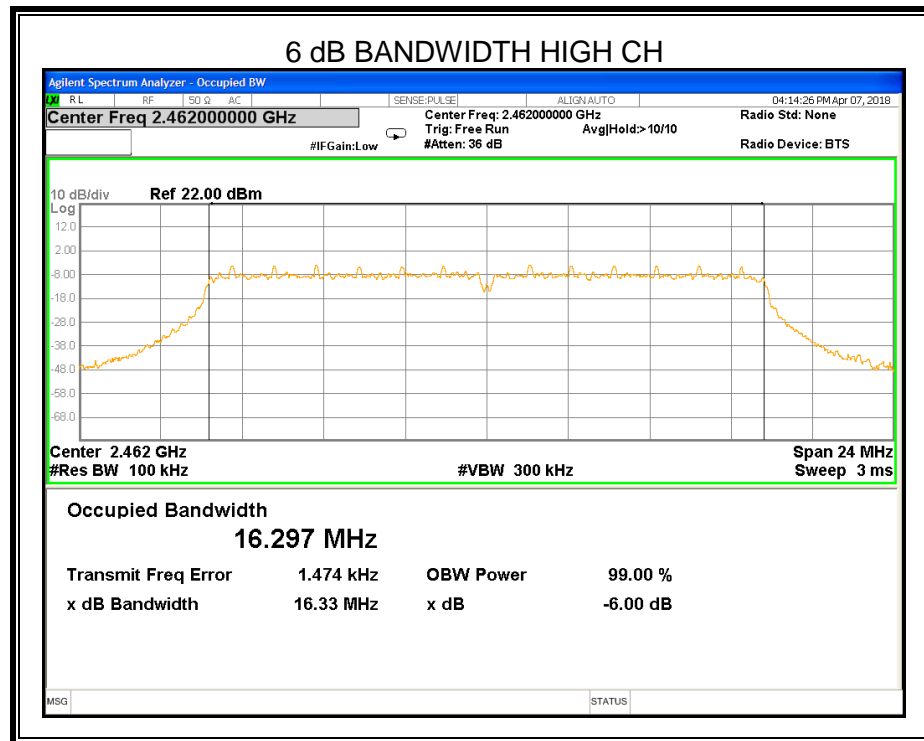
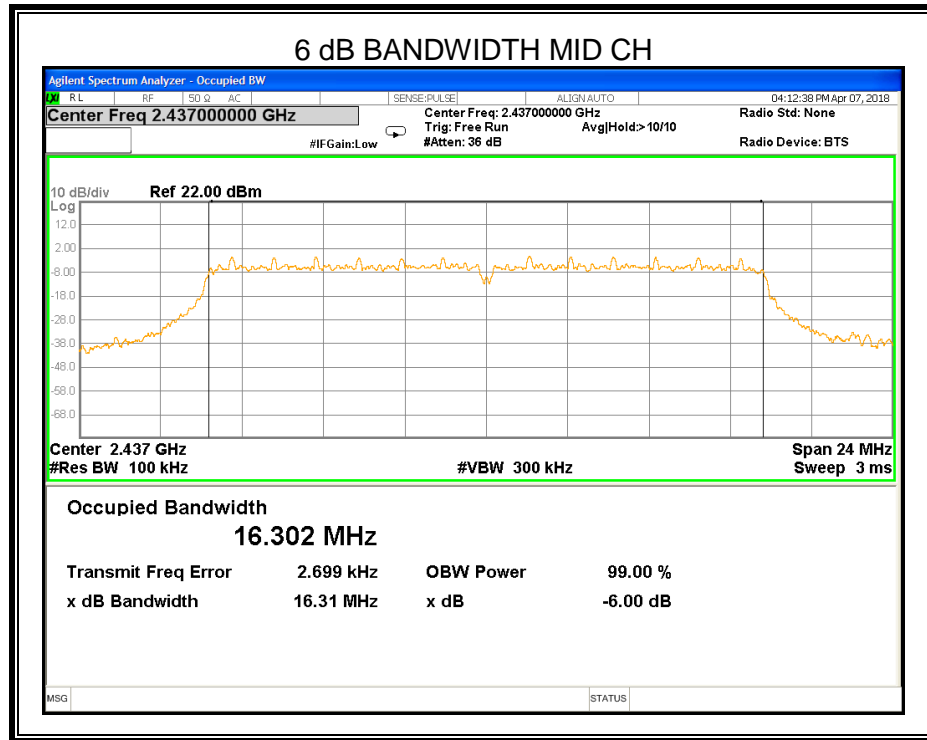




### 8.2.2. 802.11g MODE

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.32	500	Pass
Middle	2437	16.31	500	Pass
High	2462	16.33	500	Pass

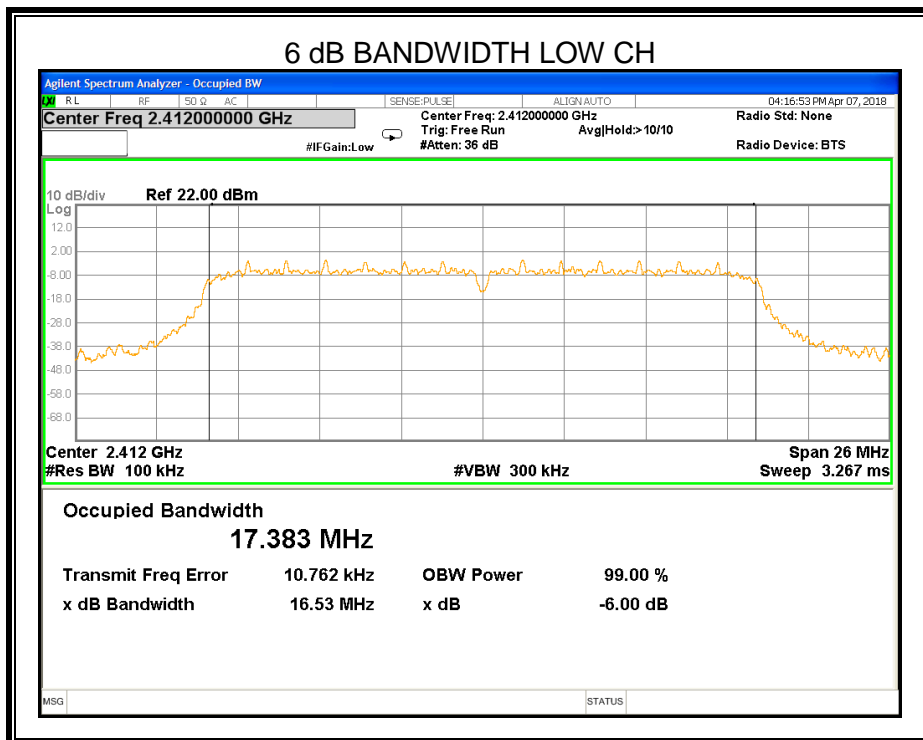


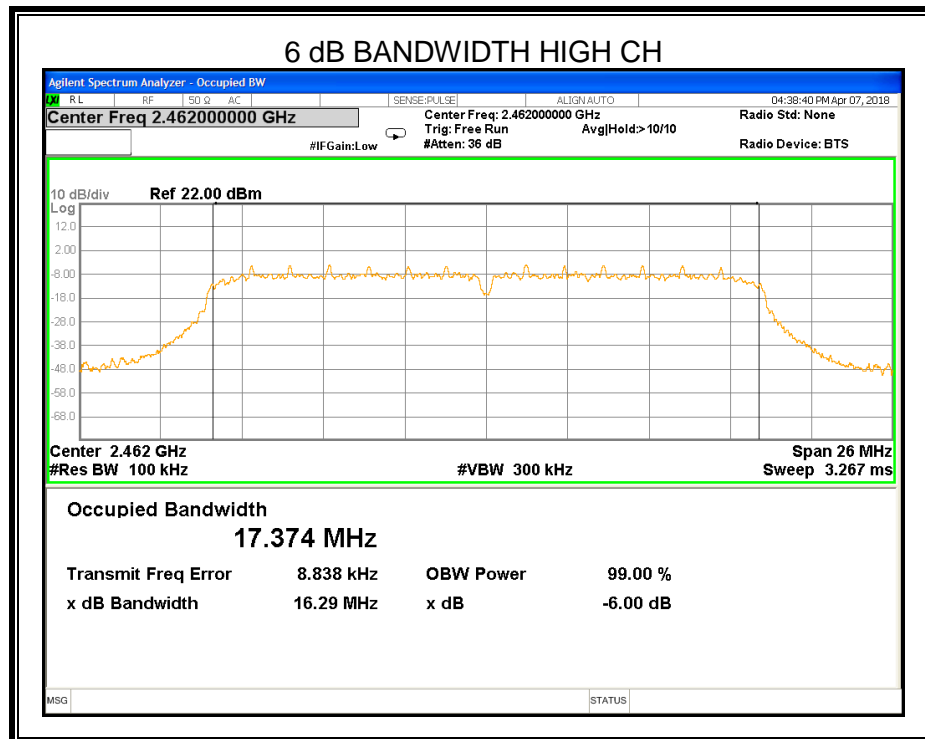
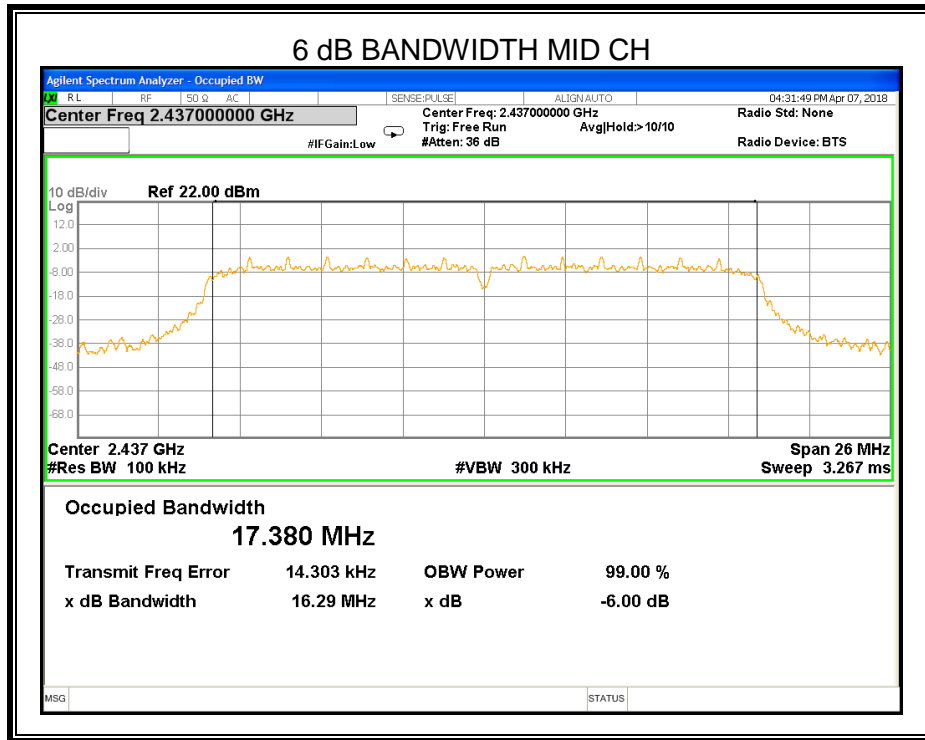




### 8.2.3. 802.11n HT20 MODE

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.53	500	Pass
Middle	2437	16.29	500	Pass
High	2462	16.29	500	Pass









### 8.3. PEAK CONDUCTED OUTPUT POWER

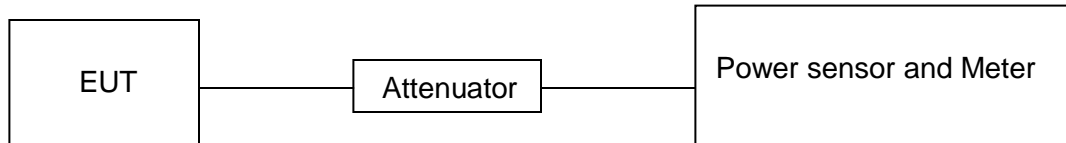
#### LIMITS

FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5

#### TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.  
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.  
Measure peak power each channel.

#### TEST SETUP



#### TEST ENVIRONMENT

Temperature	25°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V/60Hz



## **RESULTS**

### **8.3.1. 802.11b MODE**

Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
Low	2412	12.02	30
Middle	2437	11.48	30
High	2462	10.38	30

### **8.3.2. 802.11g MODE**

Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
Low	2412	10.84	30
Middle	2437	10.63	30
High	2462	9.75	30

### **8.3.3. 802.11n HT20 MODE**

Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
Low	2412	10.77	30
Middle	2437	10.54	30
High	2462	9.63	30



## 8.4. POWER SPECTRAL DENSITY

### LIMITS

FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

### TEST PROCEDURE

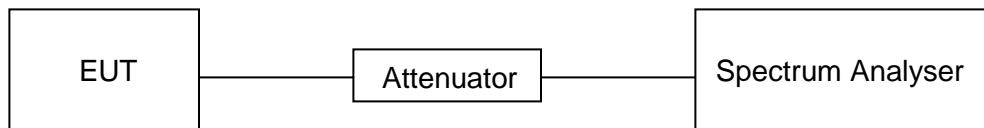
Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW	$\geq 3 \times \text{RBW}$
Span	$1.5 \times \text{DTS bandwidth}$
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### TEST SETUP



### TEST ENVIRONMENT

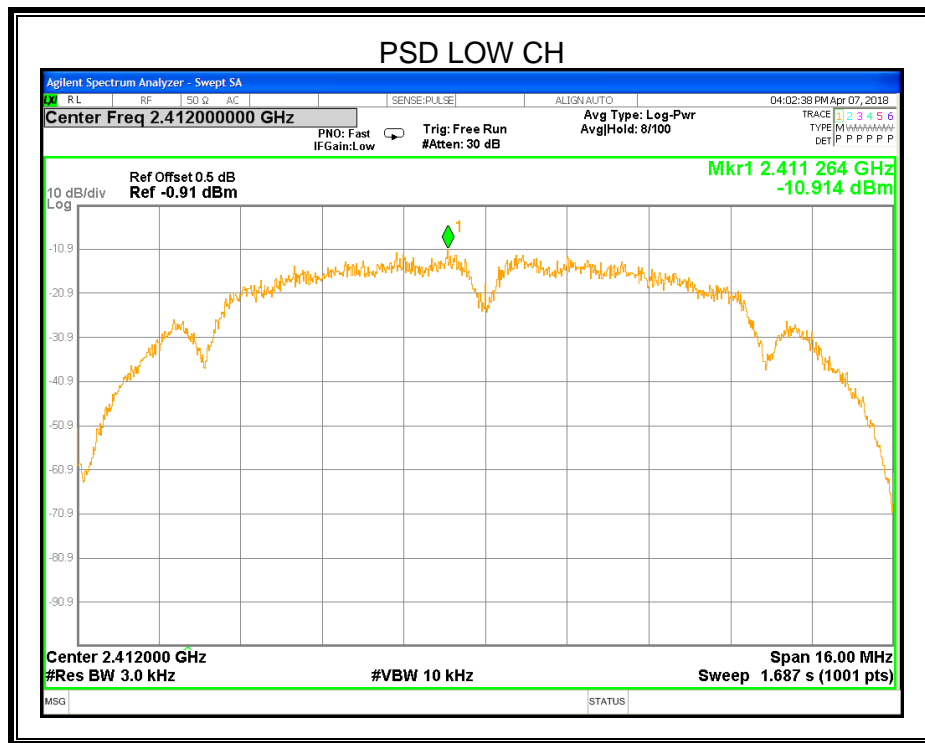
Temperature	25°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V/60Hz

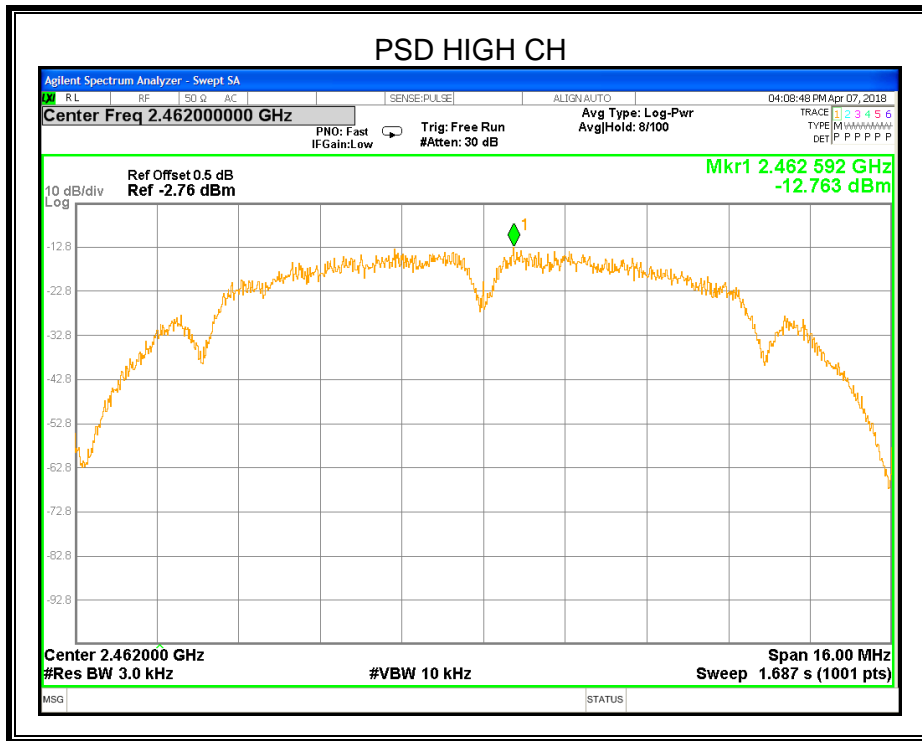
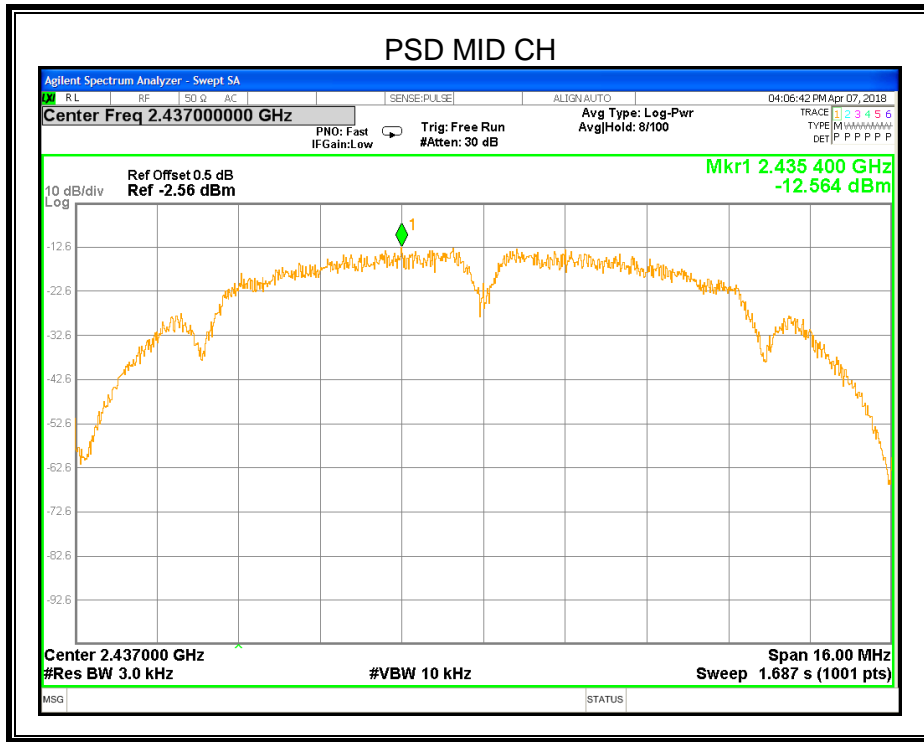


**RESULTS**

**8.4.1. 802.11b MODE**

Test Channel	Frequency	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low	2412MHz	-10.914	8	PASS
Middle	2437MHz	-12.564	8	PASS
High	2462MHz	-12.763	8	PASS

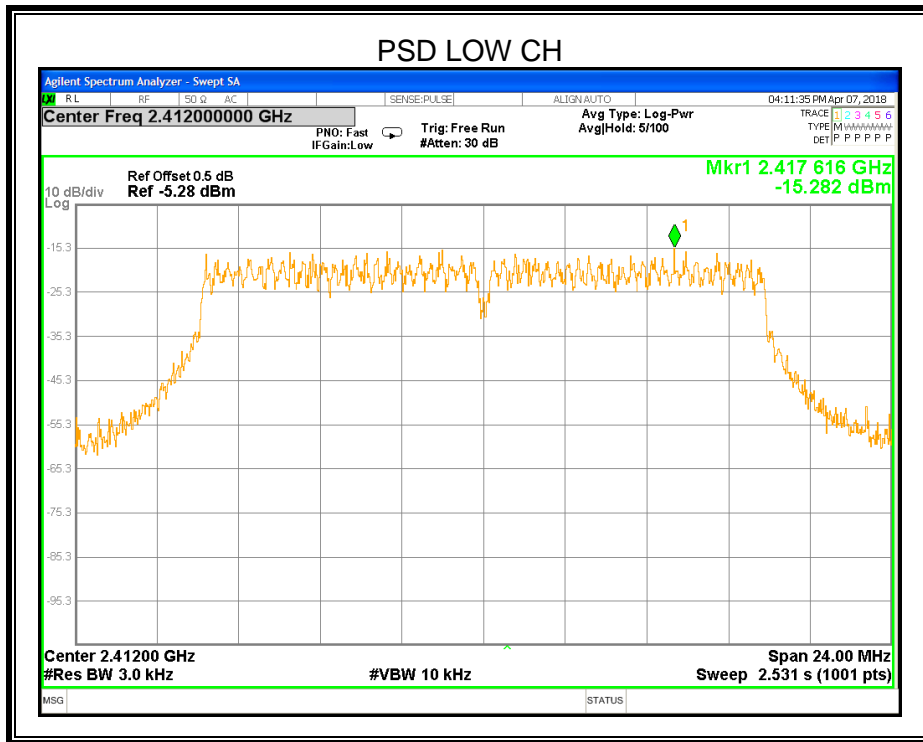


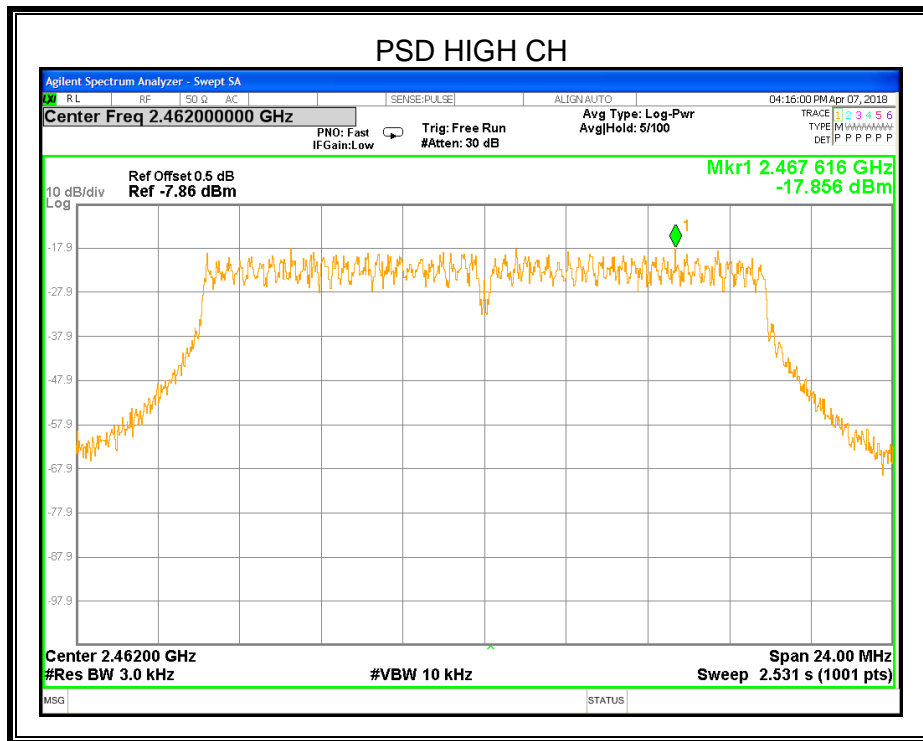
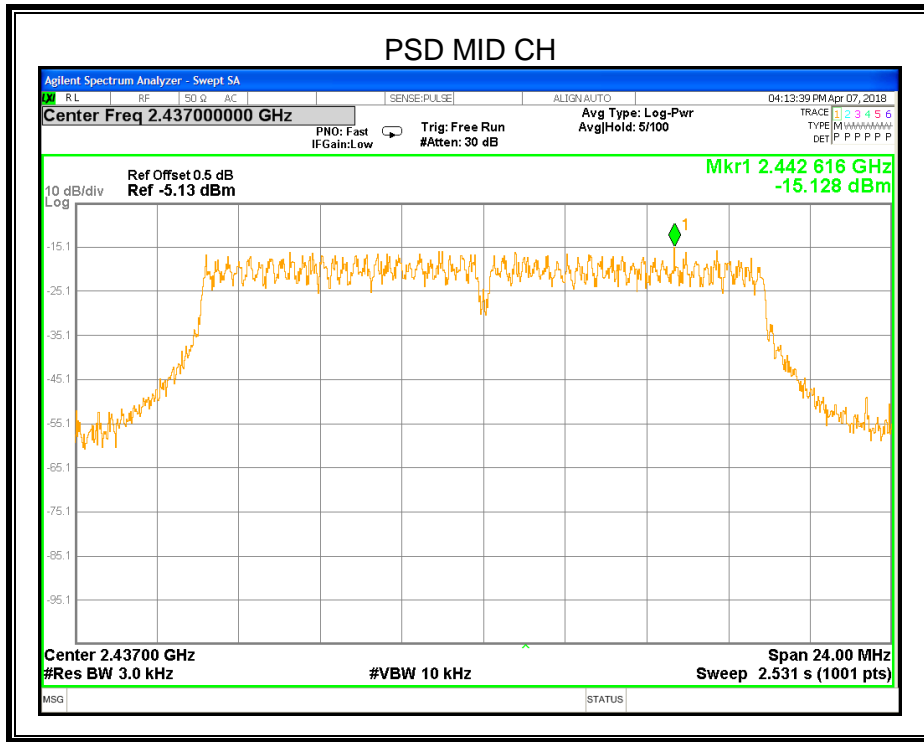




### 8.4.2. 802.11g MODE

Test Channel	Frequency	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low	2412MHz	-15.282	8	PASS
Middle	2437MHz	-15.128	8	PASS
High	2462MHz	-17.856	8	PASS

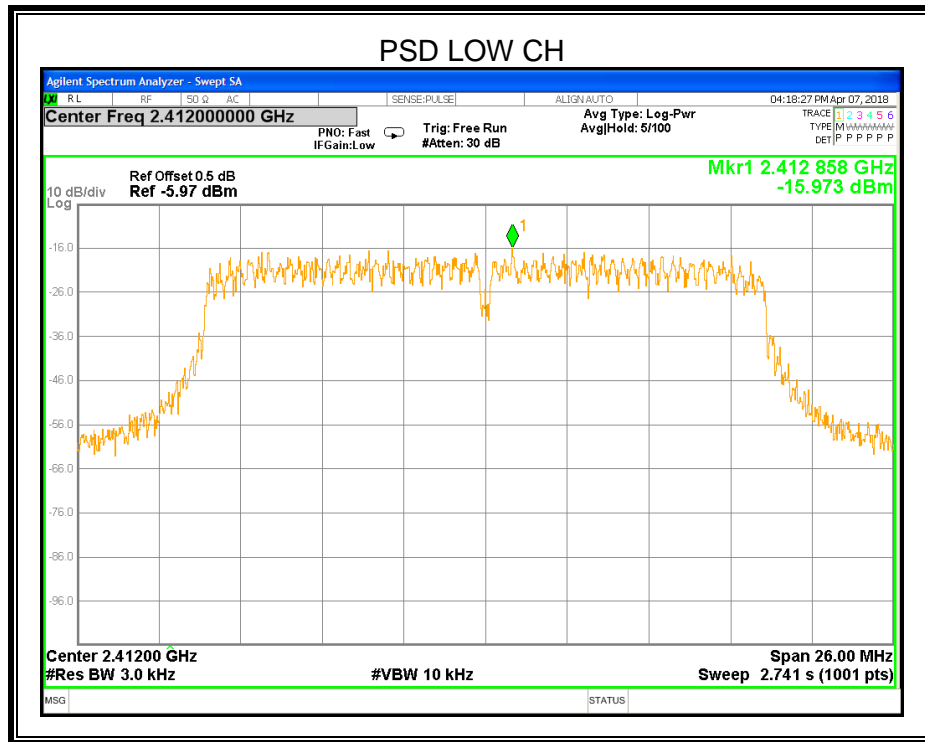




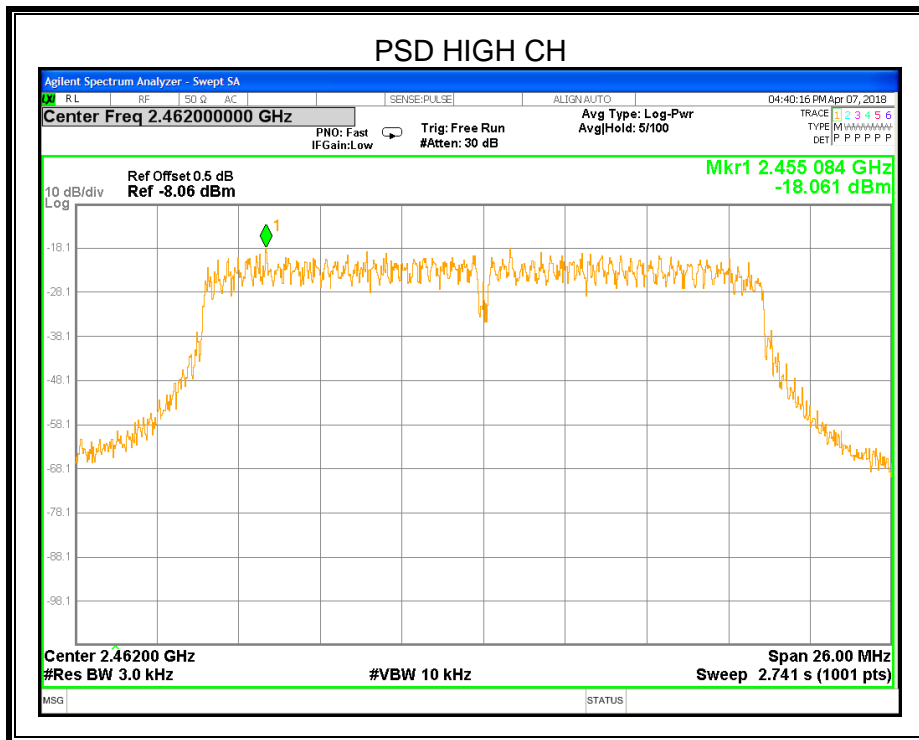
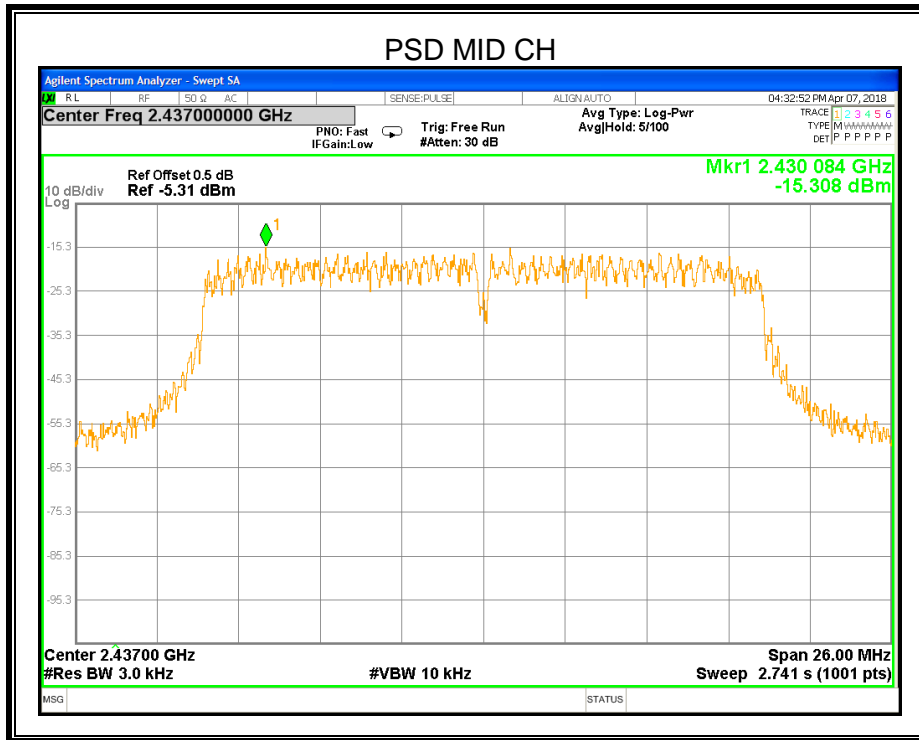


### 8.4.3. 802.11n HT20 MODE

Test Channel	Frequency	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low	2412MHz	-15.973	8	PASS
Middle	2437MHz	-15.308	8	PASS
High	2462MHz	-18.061	8	PASS









## 8.5. CONDUCTED BANDEGE AND SPURIOUS EMISSIONS

### LIMITS

FCC Part15 (15.247) Subpart C		
Section	Test Item	Limit
FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

### TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

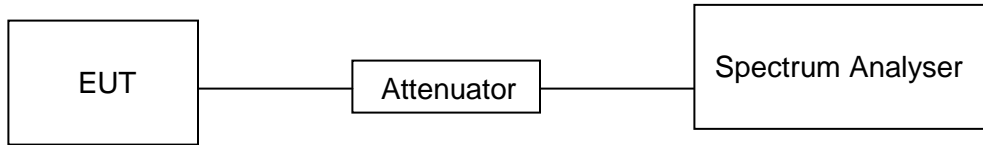
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

**TEST SETUP**

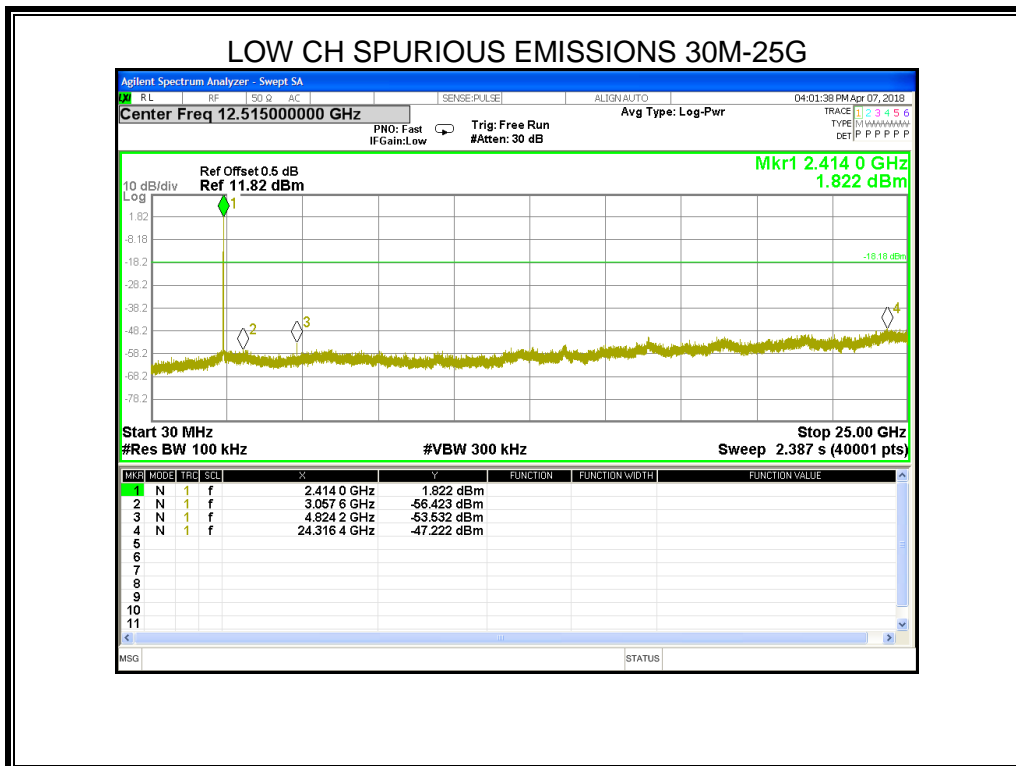


**TEST ENVIRONMENT**

Temperature	25°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V/60Hz

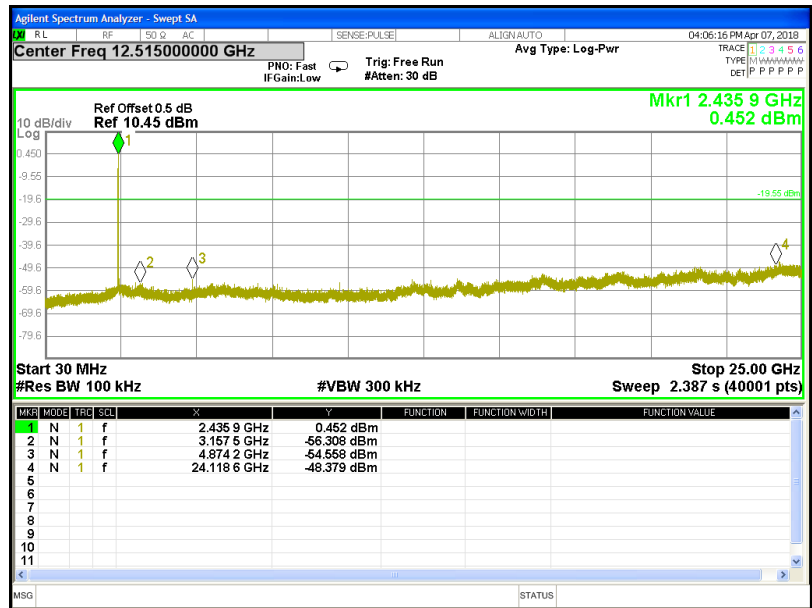
**RESULTS**

**8.5.1. 802.11b MODE**

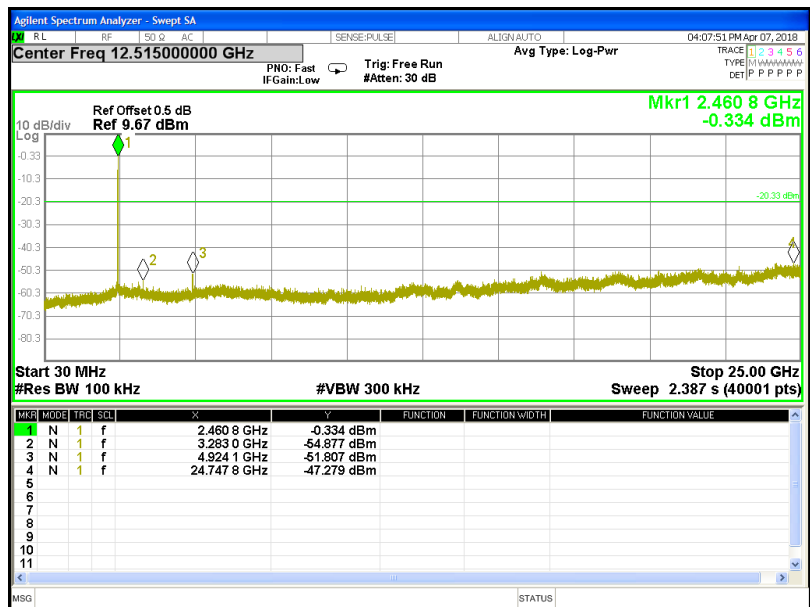




### MID CH SPURIOUS EMISSIONS 30M-25G

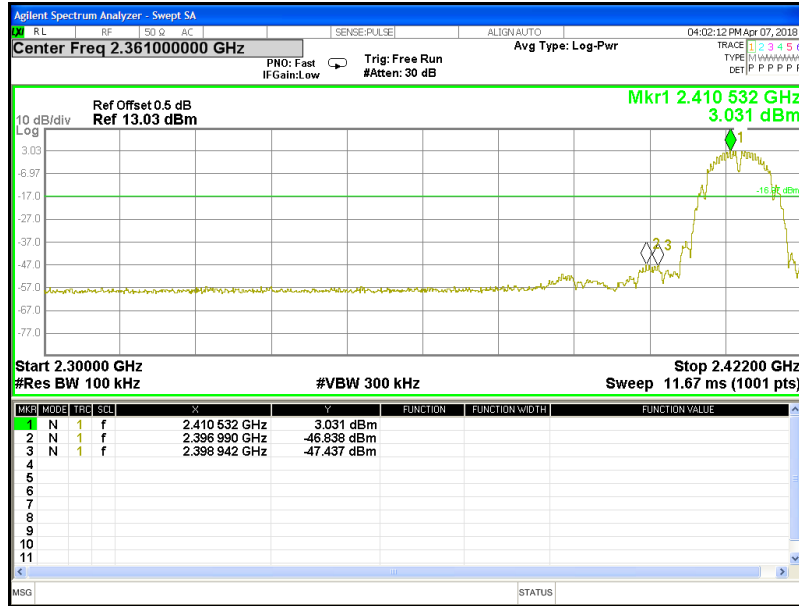


### HIGH CH SPURIOUS EMISSIONS 30M-25G

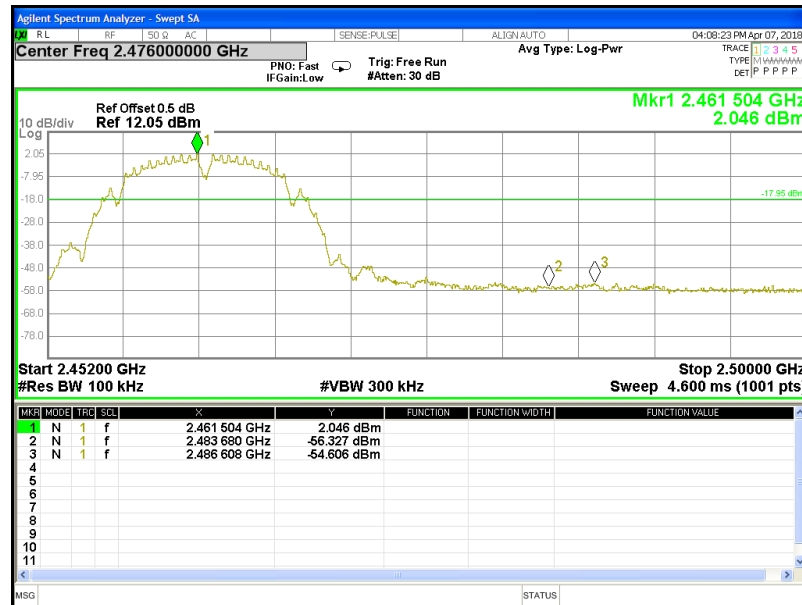




### LOW CH BANDEDAGE

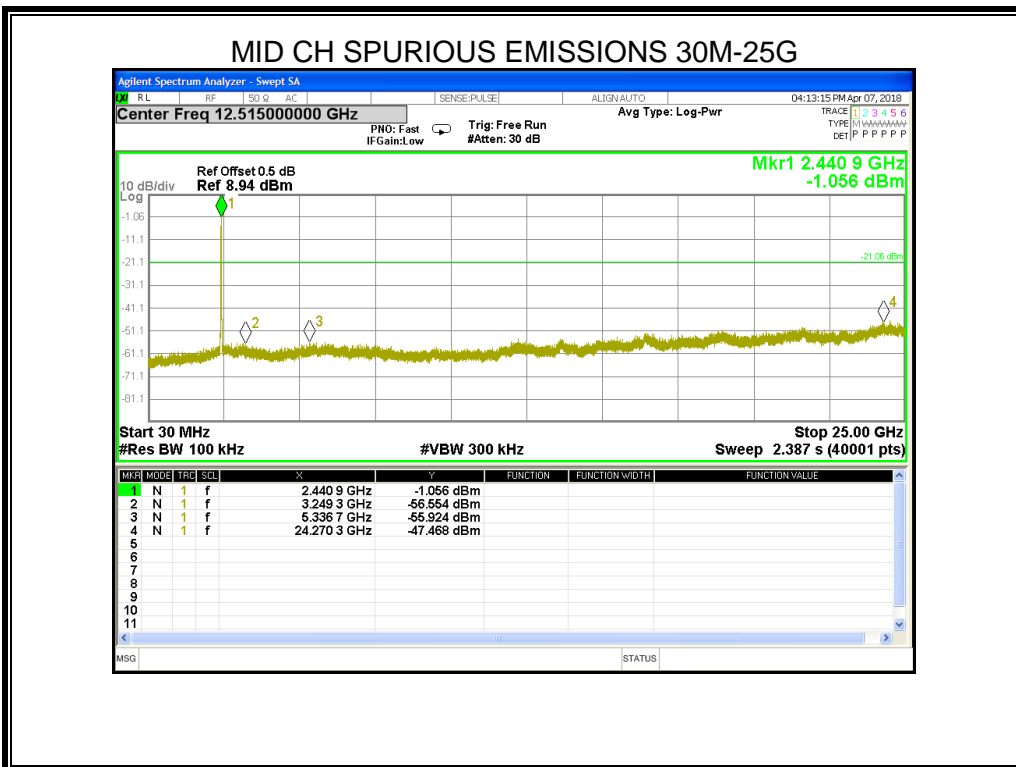
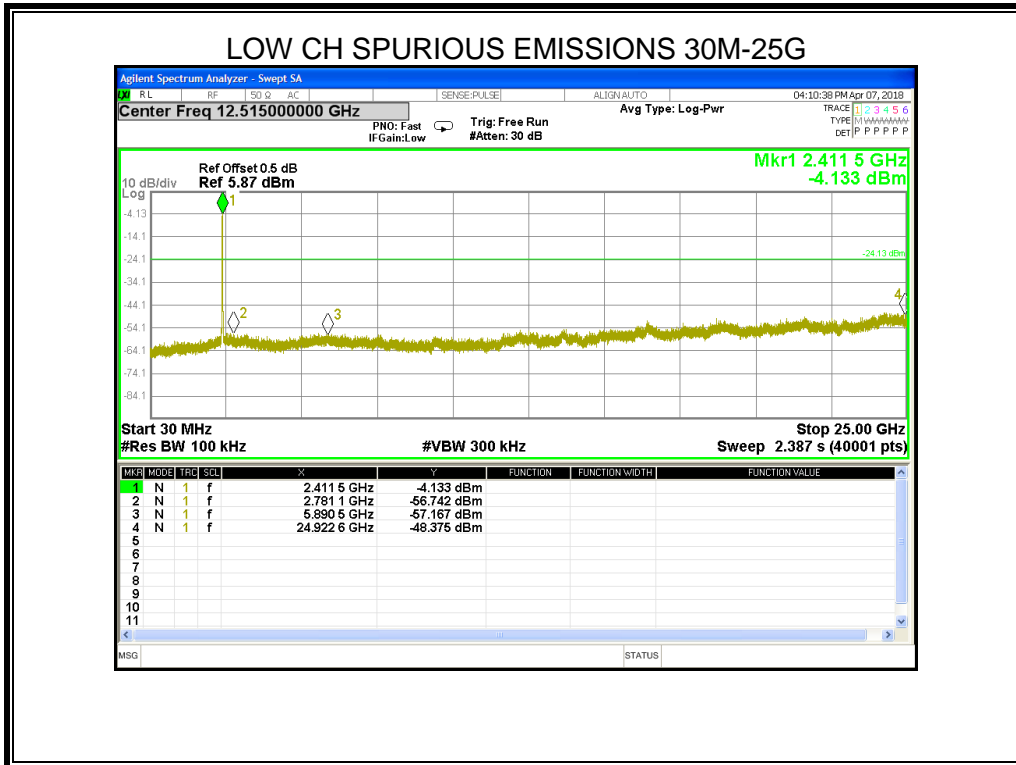


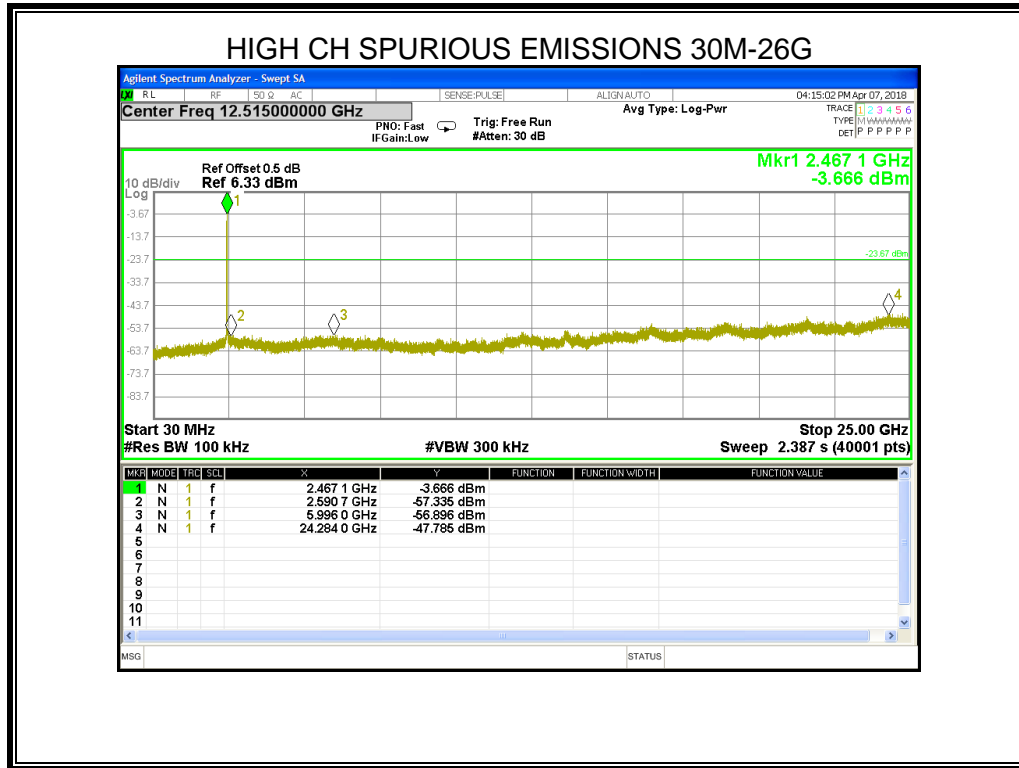
### HIGH CH BANDEDAGE





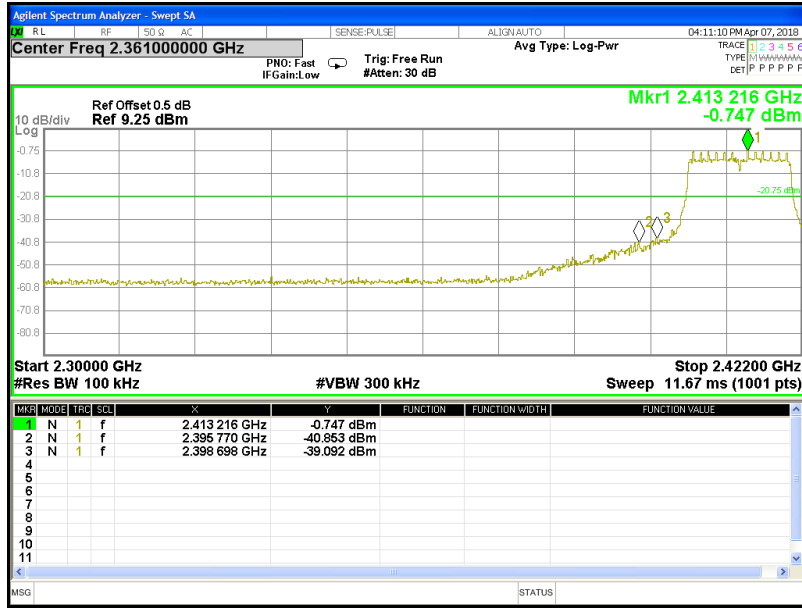
### 8.5.2. 802.11g MODE



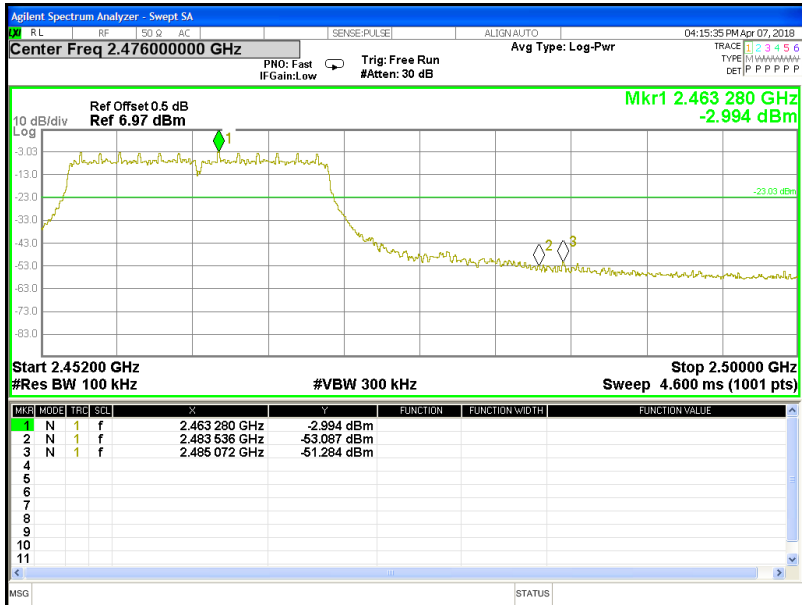




### LOW CH BANDEDAGE

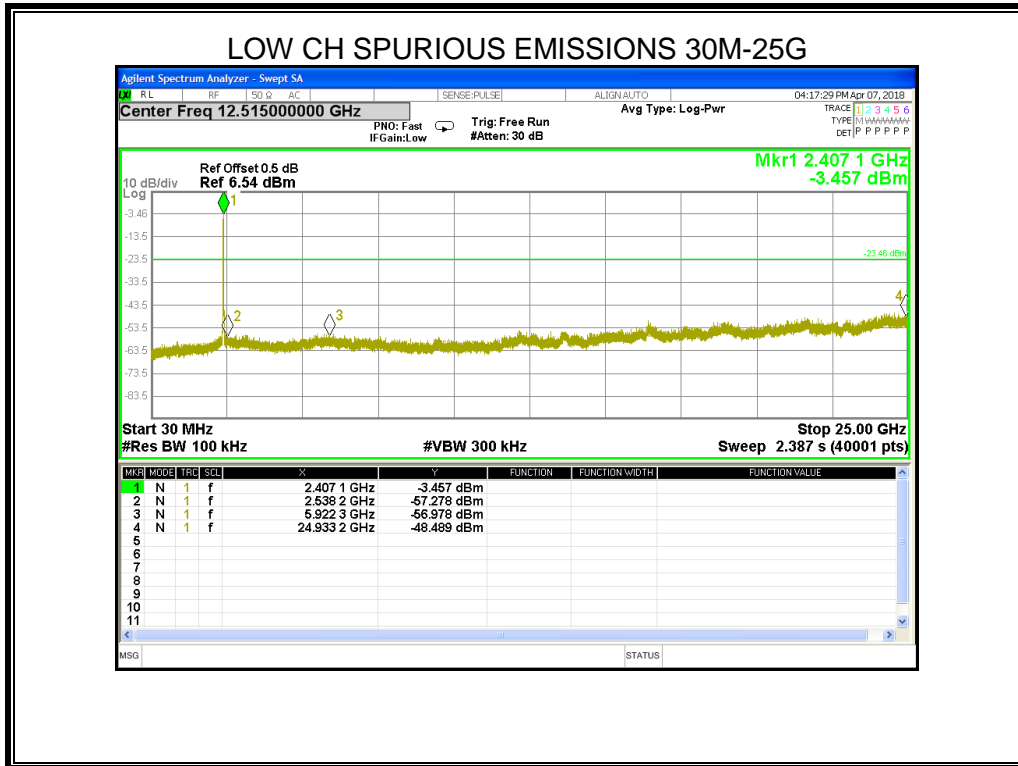


### HIGH CH BANDEDAGE



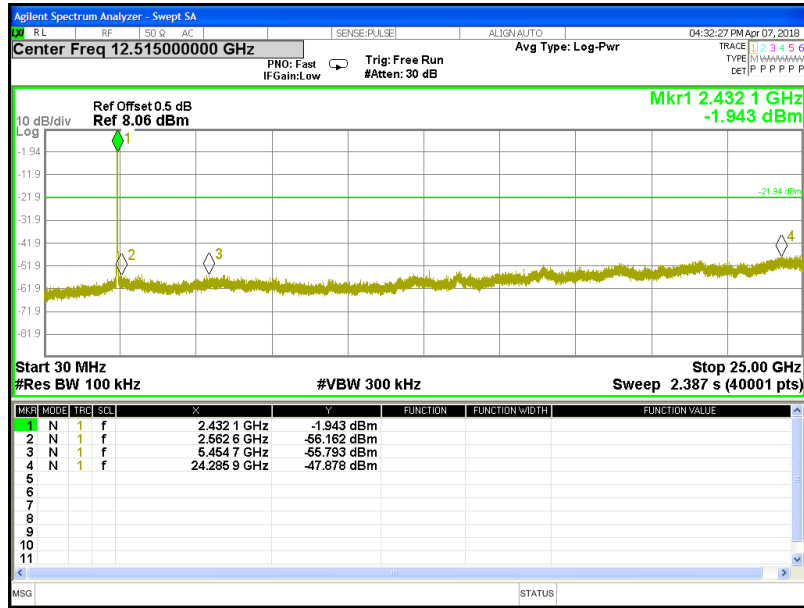


### 8.5.3. 802.11n HT20 MODE

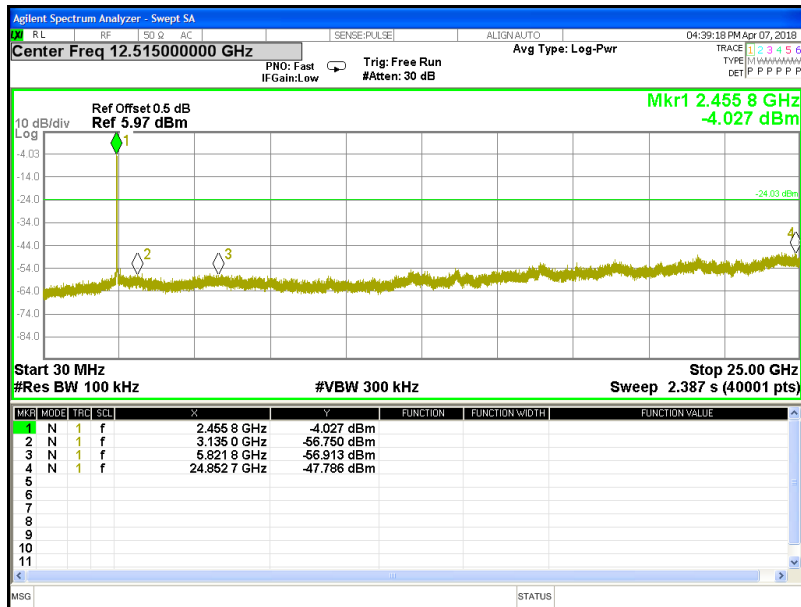




### MID CH SPURIOUS EMISSIONS 30M-25G

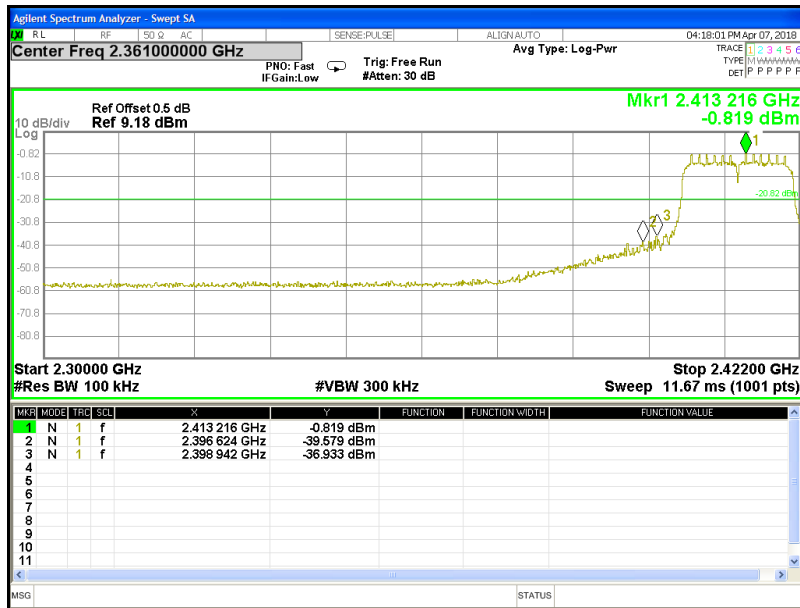


### HIGH CH SPURIOUS EMISSIONS 30M-25G

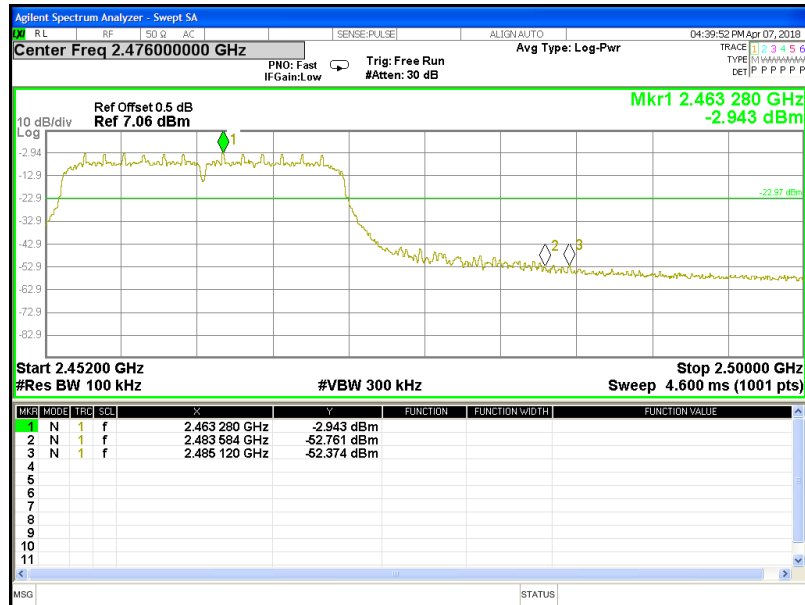




### LOW CH BANDEDAGE



### HIGH CH BANDEDAGE





## 9. RADIATED TEST RESULTS

### LIMITS

Please refer to FCC §15.205 and §15.209

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.



Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

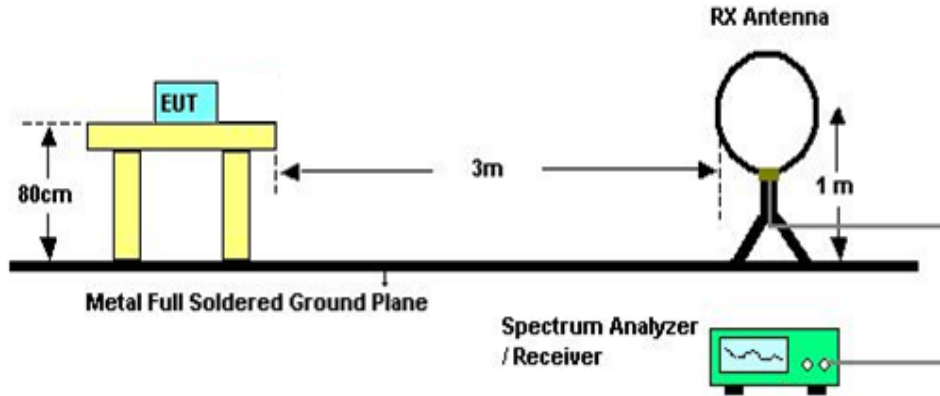
Restricted bands of operation

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
<sup>1</sup> 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	( <sup>2</sup> )
13.36-13.41			

Note: <sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.  
<sup>2</sup>Above 38.6c

**TEST SETUP AND PROCEDURE**

Below 30MHz

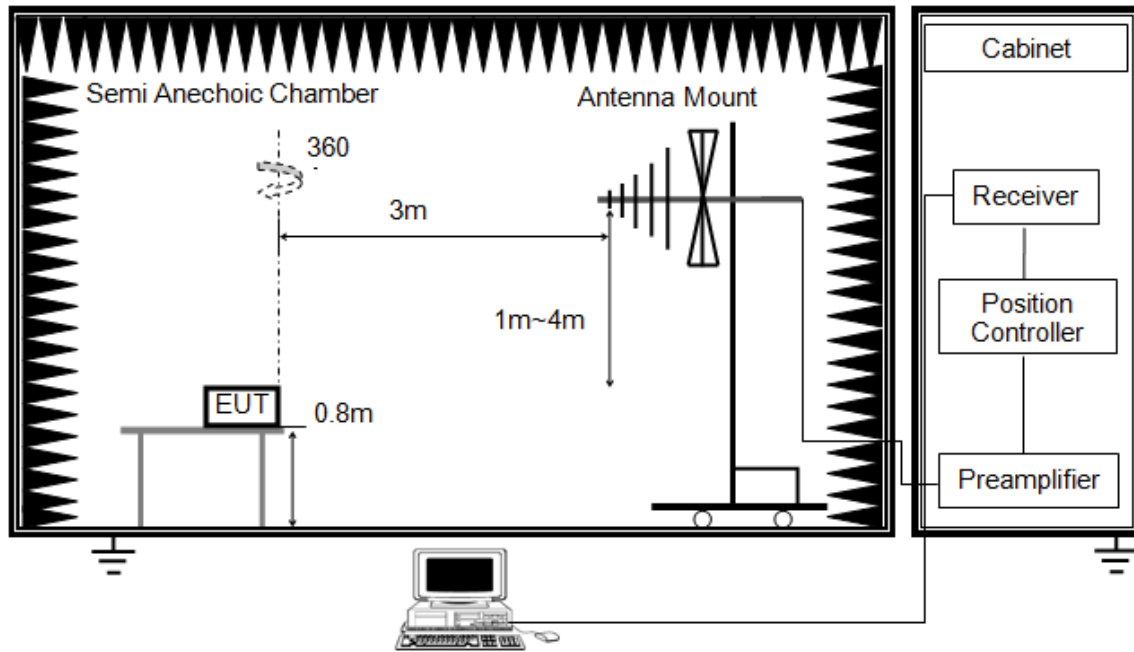


The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
6. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Below 1G

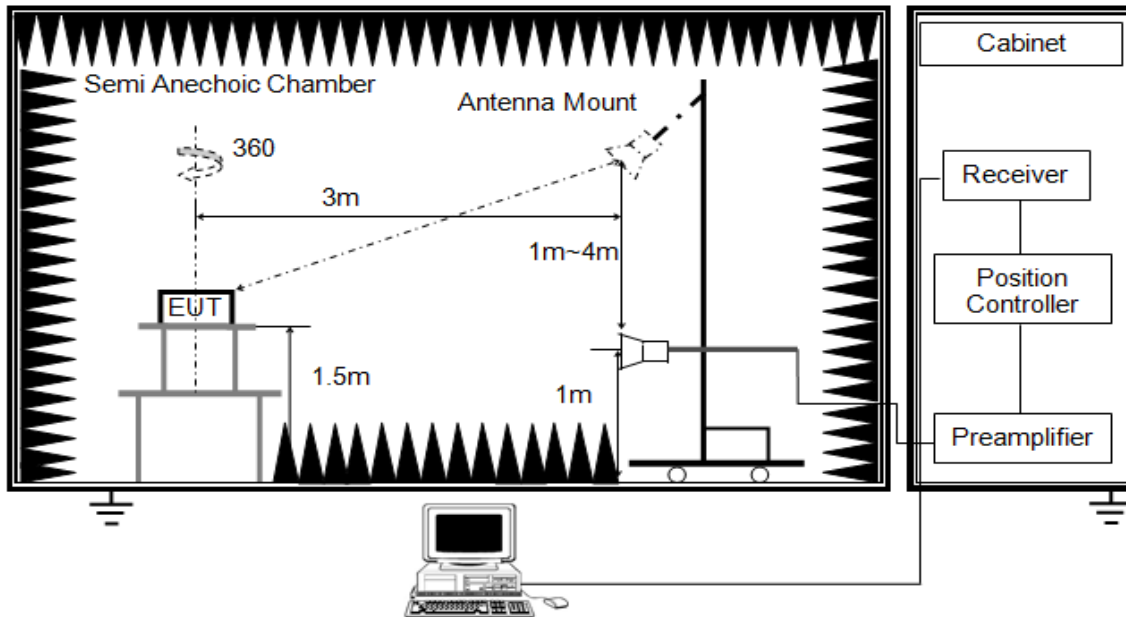


The setting of the spectrum analyser

RBW	120K
VBW	300K
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
6. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

ABOVE 1G



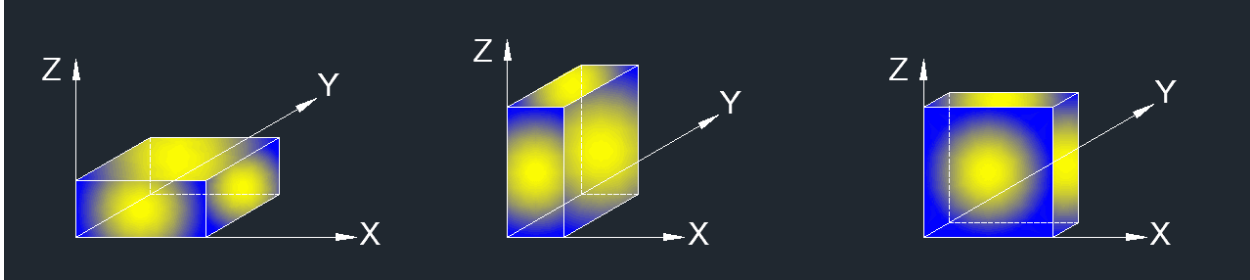
The setting of the spectrum analyser

RBW	1M
VBW	PEAK: 3M AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8m above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with  $1/T_{on}$  video bandwidth with peak detector for average measurements, where  $T_{on}$  is the transmit duration.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)



X axis, Y axis, Z axis positions:



8. Y axis position is the worst mode, the report only shown the worst mode data.

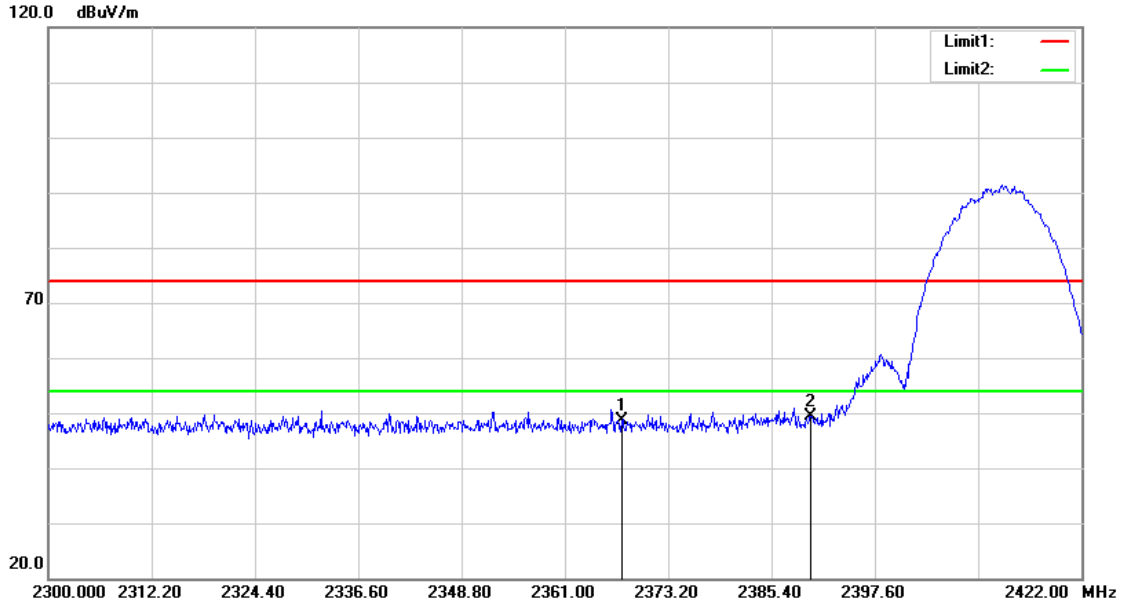
**TEST ENVIRONMENT**

Temperature	25°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V/60Hz



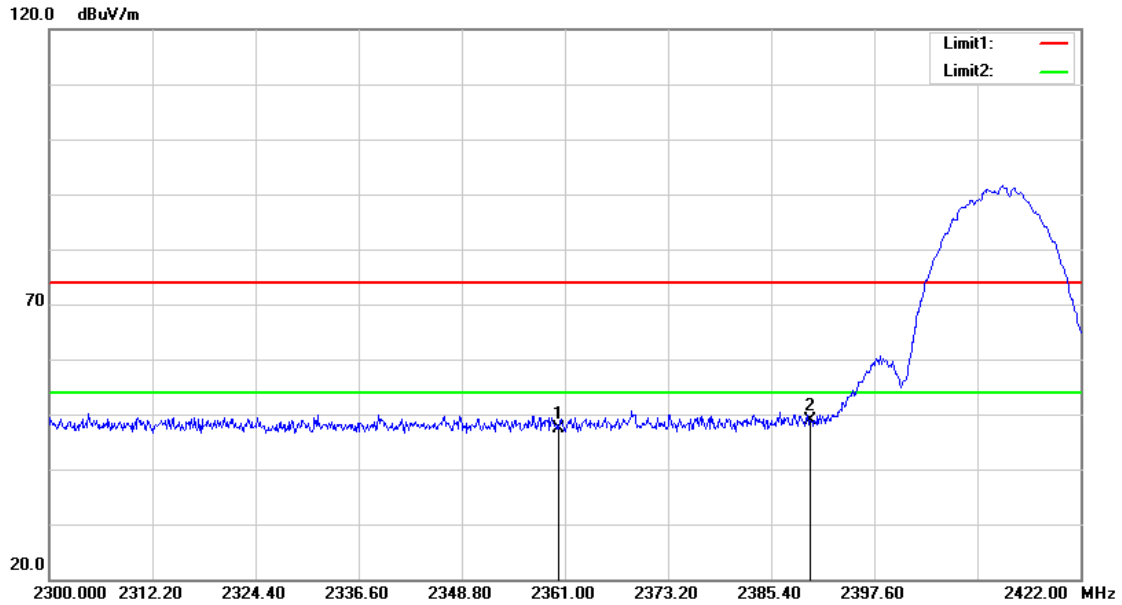
### 9.1. RESTRICTED BANDEDGE

#### 802.11 b-Low Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2367.710	59.36	-10.63	48.73	74.00	-25.27	peak
2	2390.000	59.82	-10.48	49.34	74.00	-24.66	peak

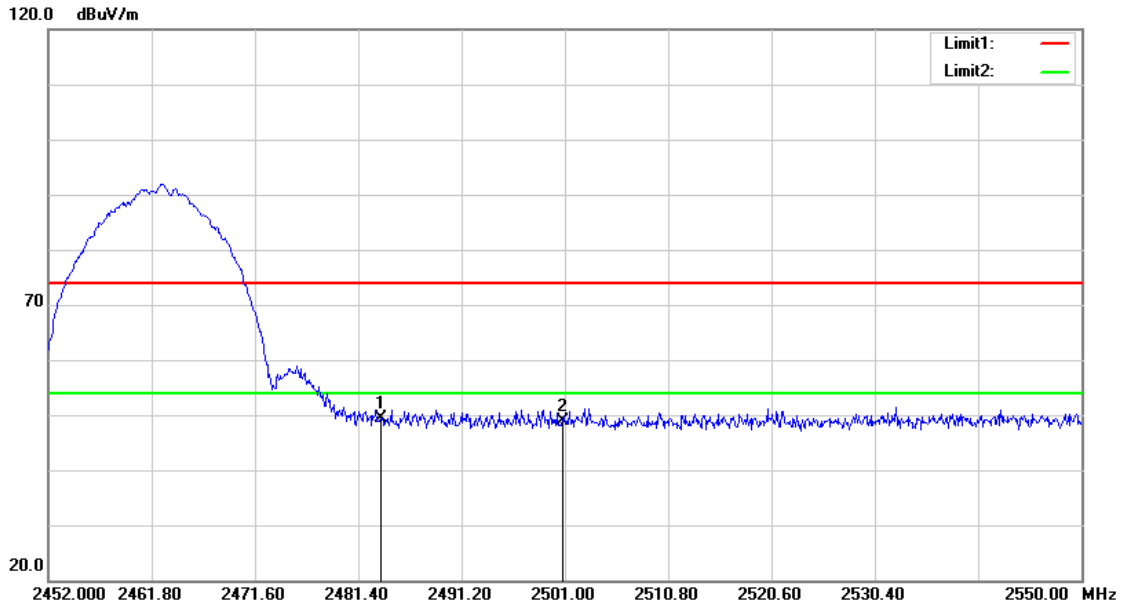
#### Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2360.268	58.10	-10.67	47.43	74.00	-26.57	peak
2	2390.000	59.35	-10.48	48.87	74.00	-25.13	peak

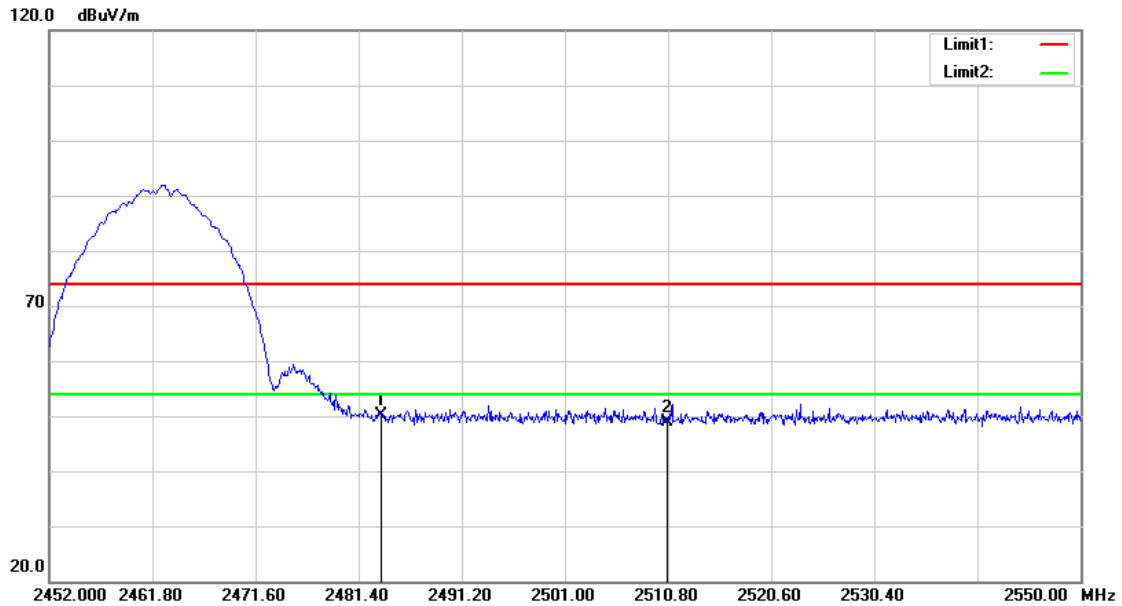


**802.11 b-High**  
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	59.37	-9.99	49.38	74.00	-24.62	peak
2	2500.804	58.84	-9.91	48.93	74.00	-25.07	peak

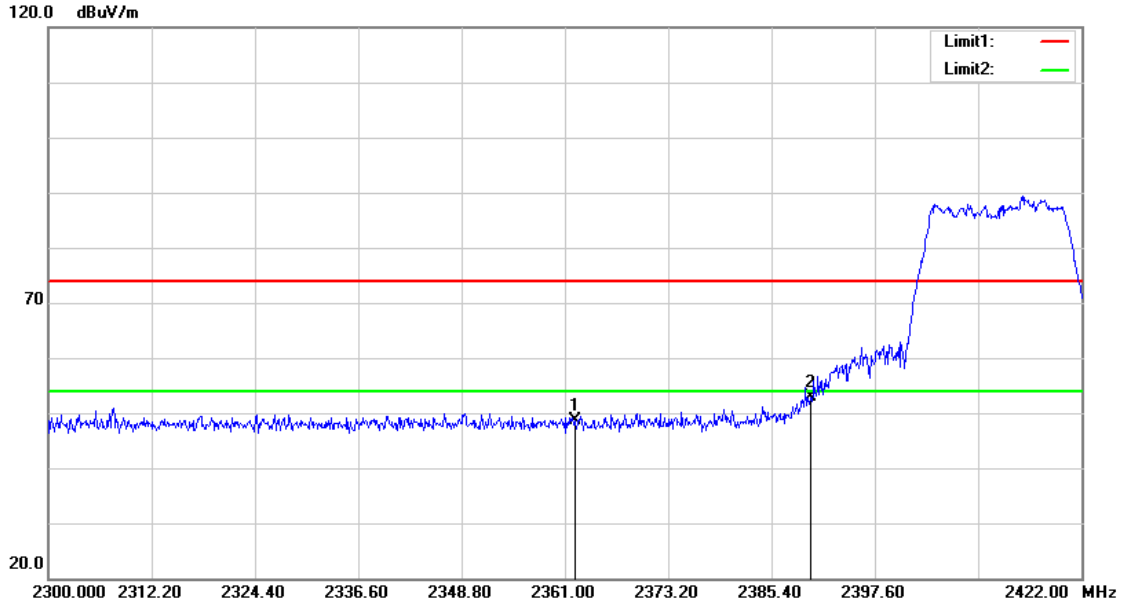
Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	60.17	-9.99	50.18	74.00	-23.82	peak
2	2510.702	58.86	-9.88	48.98	74.00	-25.02	peak

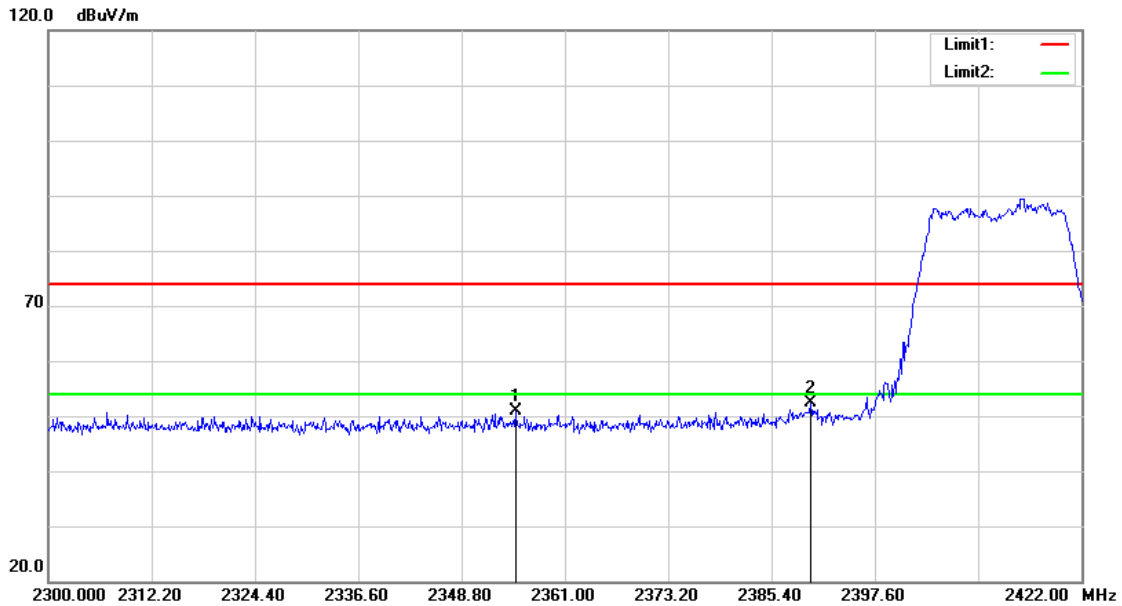


802.11 g-Low  
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2362.220	59.27	-10.67	48.60	74.00	-25.40	peak
2	2390.000	63.37	-10.48	52.89	74.00	-21.11	peak

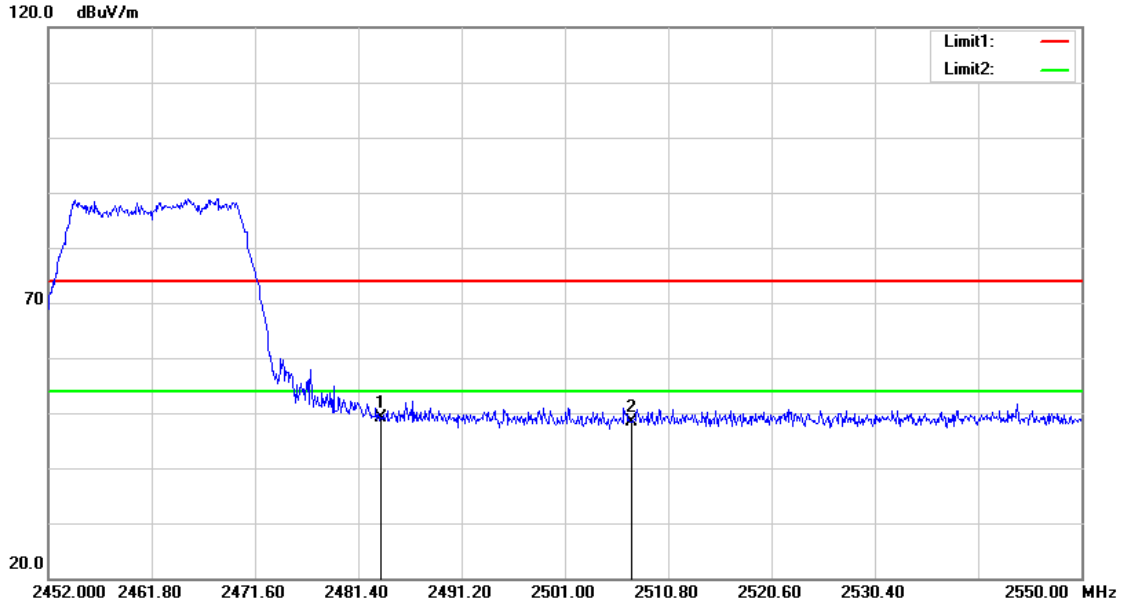
Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2355.144	61.49	-10.71	50.78	74.00	-23.22	peak
2	2390.000	62.80	-10.48	52.32	74.00	-21.68	peak

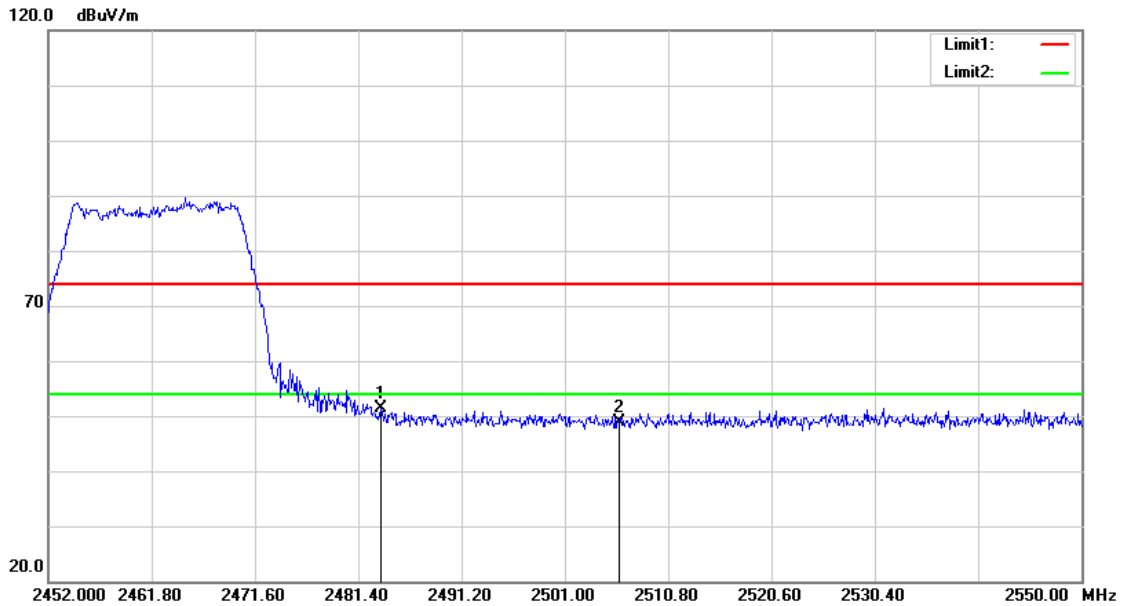


802.11 g-High  
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	59.21	-9.99	49.22	74.00	-24.78	peak
2	2507.370	58.20	-9.89	48.31	74.00	-25.69	peak

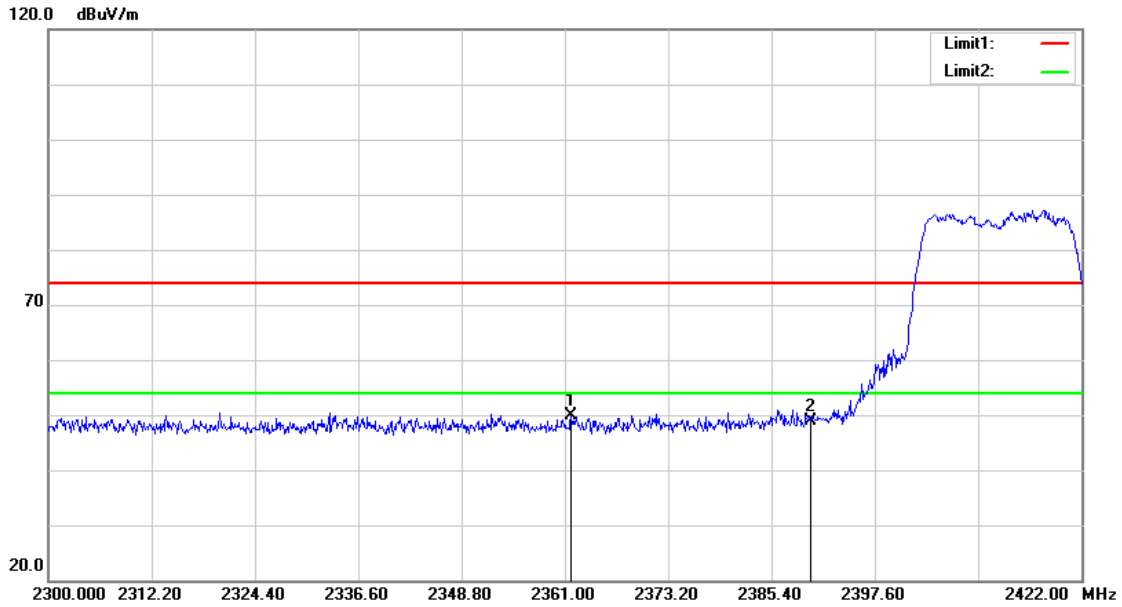
Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	61.32	-9.99	51.33	74.00	-22.67	peak
2	2506.194	58.73	-9.89	48.84	74.00	-25.16	peak

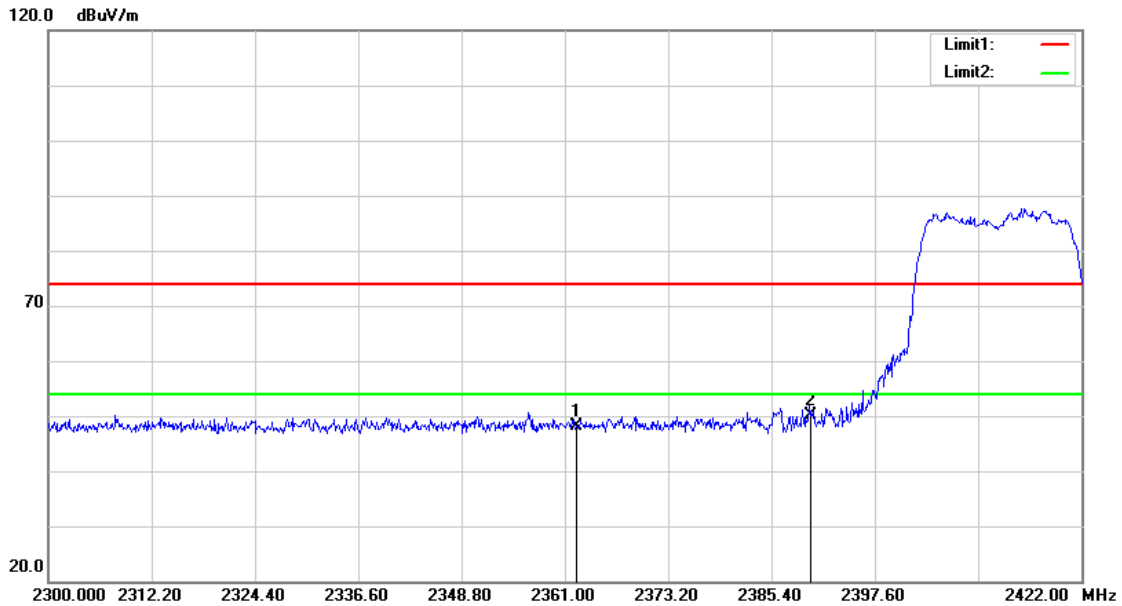


802.11 n20-Low  
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2361.732	60.49	-10.67	49.82	74.00	-24.18	peak
2	2390.000	59.39	-10.48	48.91	74.00	-25.09	peak

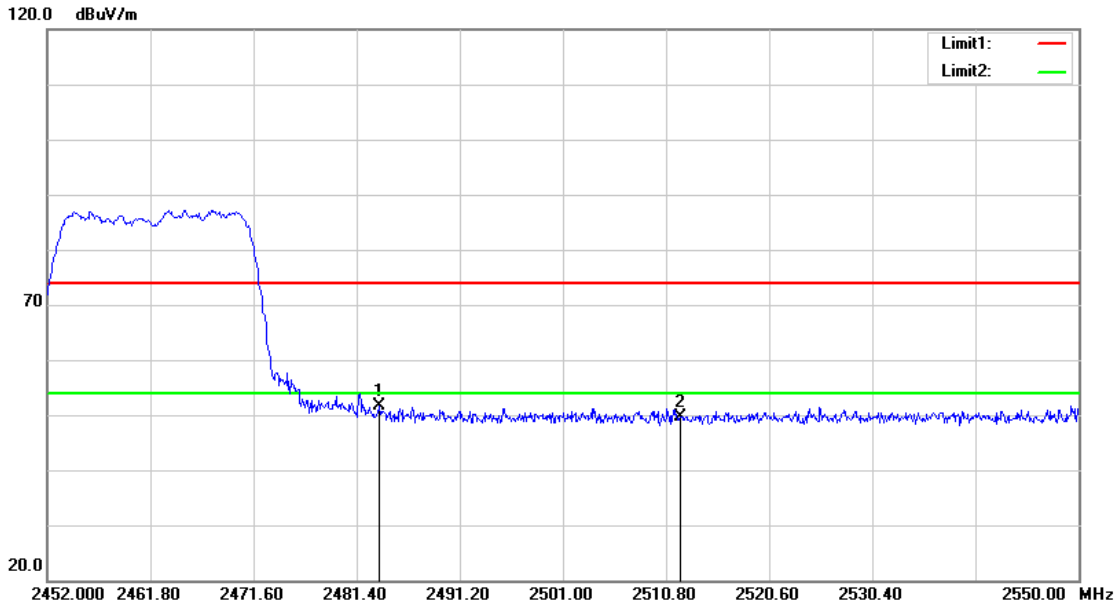
Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2362.342	58.80	-10.67	48.13	74.00	-25.87	peak
2	2390.000	60.59	-10.48	50.11	74.00	-23.89	peak

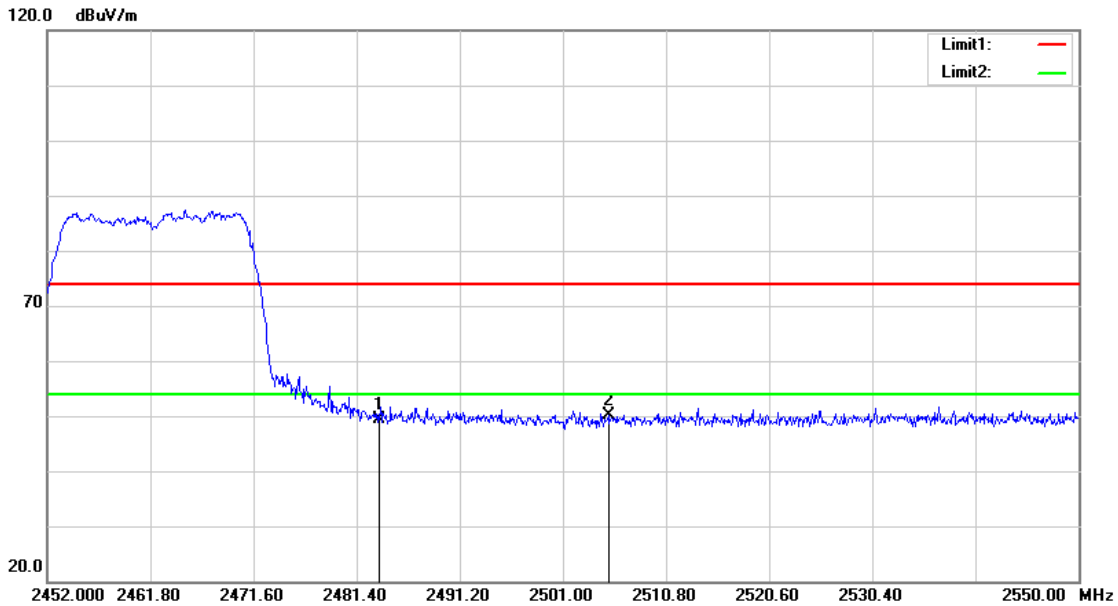


802.11 n20-High  
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	61.64	-9.99	51.65	74.00	-22.35	peak
2	2512.172	59.62	-9.87	49.75	74.00	-24.25	peak

Vertical



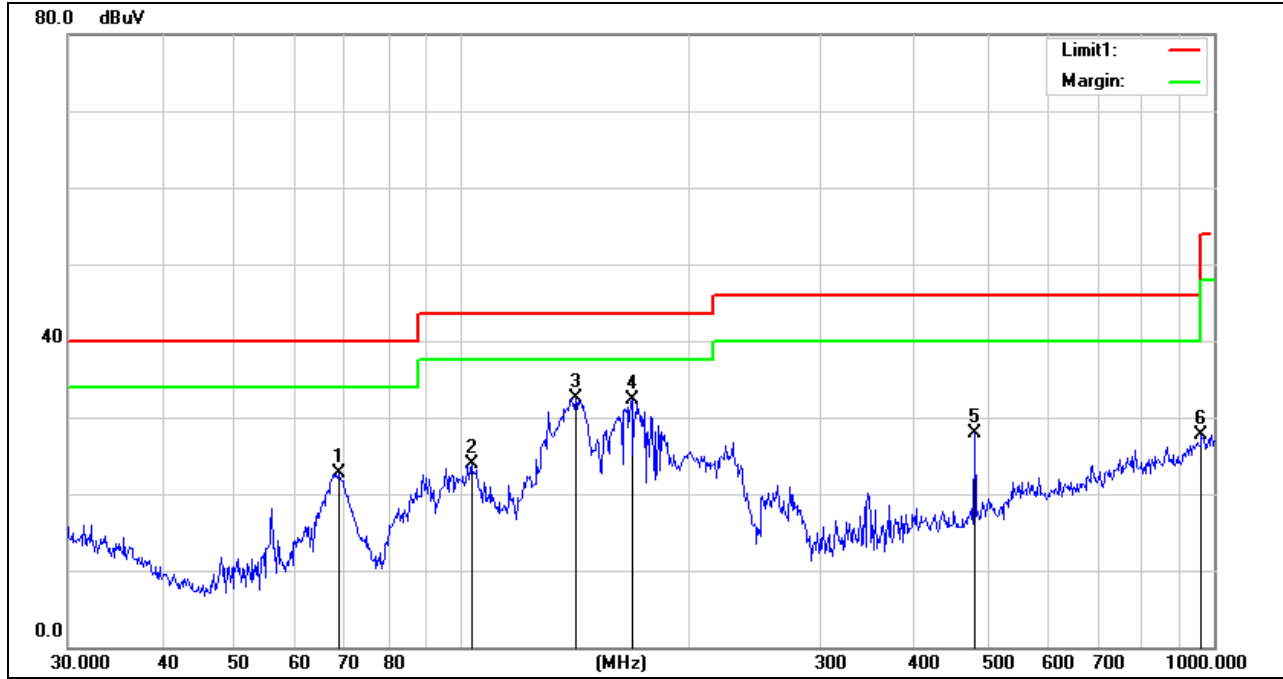
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	59.33	-9.99	49.34	74.00	-24.66	peak
2	2505.312	60.09	-9.89	50.20	74.00	-23.80	peak



## 9.2. SPURIOUS EMISSIONS (30-1GHz)

Note: All the channels had been tested, but only the worst data (802.11b channel 01) recorded in the report.

### Model: TWAC-15CRA1/K8U(ES) HARMONICS AND SPURIOUS EMISSIONS (HORIZONTAL)



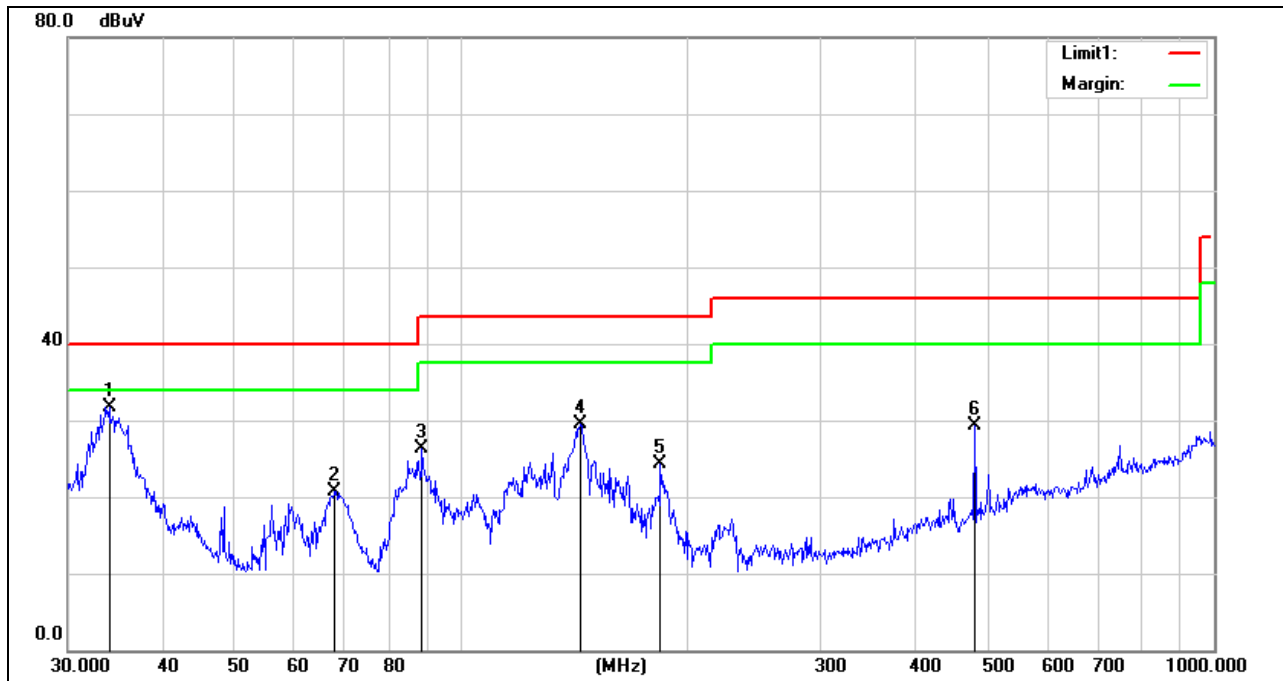
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	68.6310	46.91	-24.14	22.77	40.00	-17.23	QP
2	103.0800	42.79	-18.93	23.86	43.50	-19.64	QP
3	141.8262	50.18	-17.59	32.59	43.50	-10.91	QP
4	168.4138	51.49	-19.20	32.29	43.50	-11.21	QP
5	480.5276	37.36	-9.38	27.98	46.00	-18.02	QP
6	962.1623	27.76	-0.12	27.64	54.00	-26.36	QP

Note: Measurement = Reading Level + Correct Factor.





**Model: TWAC-15CRA1/K8U(ES)**  
**HARMONICS AND SPURIOUS EMISSIONS (VERTICAL)**

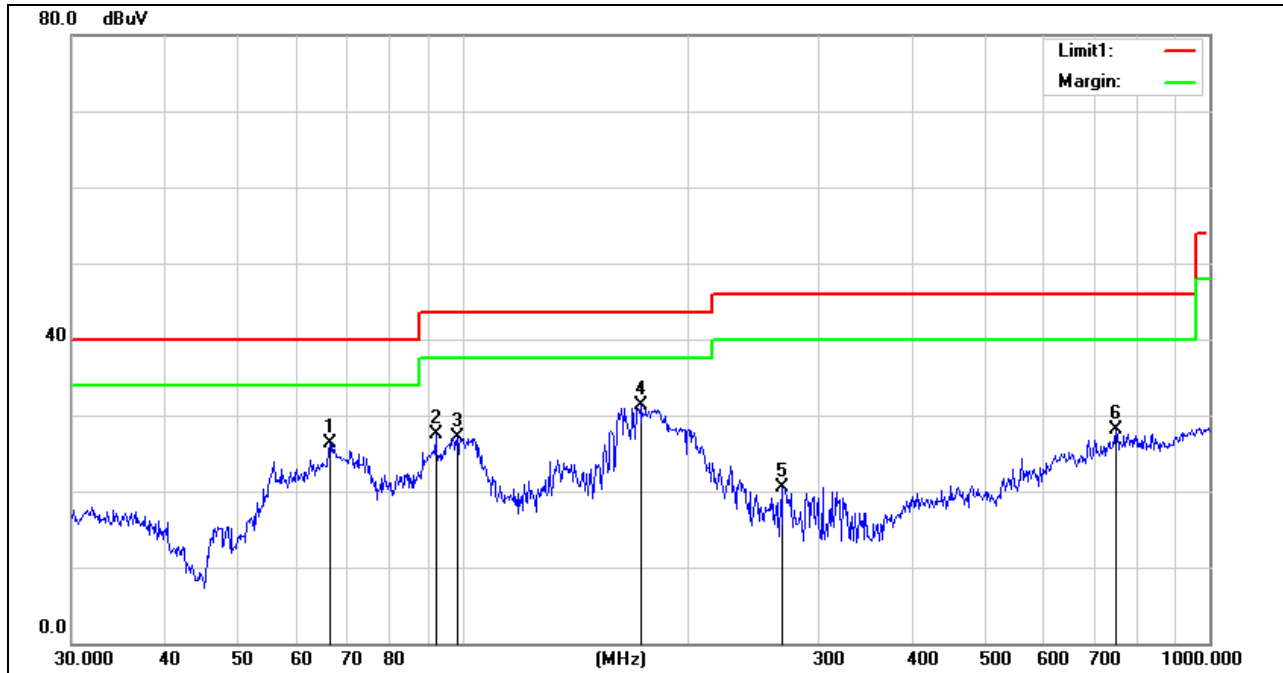


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	34.0365	45.01	-13.26	31.75	40.00	-8.25	QP
2	67.9130	44.80	-24.15	20.65	40.00	-19.35	QP
3	88.6524	46.90	-20.53	26.37	43.50	-17.13	QP
4	143.8295	47.12	-17.69	29.43	43.50	-14.07	QP
5	183.8440	44.14	-19.76	24.38	43.50	-19.12	QP
6	480.5276	38.68	-9.38	29.30	46.00	-16.70	QP

Note: Measurement = Reading Level + Correct Factor.



**Model: TWAC-24CRA2/J3U(ES)**  
**HARMONICS AND SPURIOUS EMISSIONS (HORIZONTAL)**

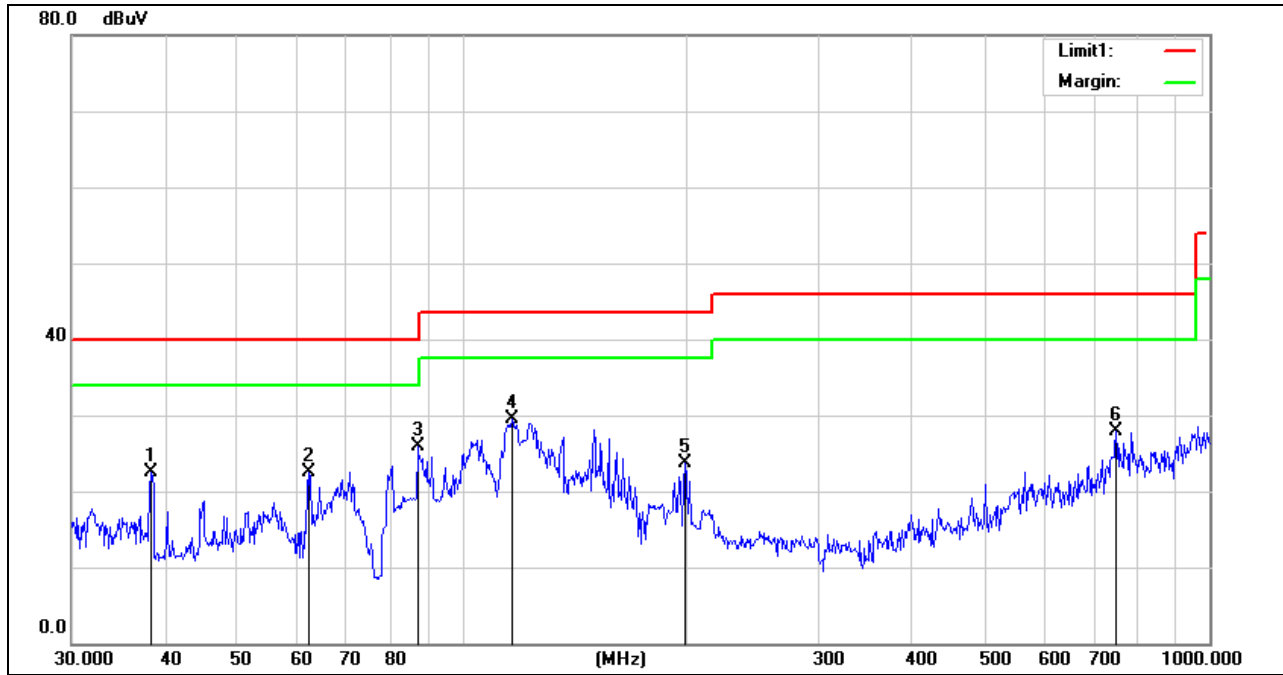


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	66.4990	50.53	-24.19	26.34	40.00	-13.66	QP
2	92.1388	47.39	-19.98	27.41	43.50	-16.09	QP
3	98.4865	46.42	-19.35	27.07	43.50	-16.43	QP
4	173.2050	50.76	-19.36	31.40	43.50	-12.10	QP
5	268.4852	35.94	-15.41	20.53	46.00	-25.47	QP
6	750.1082	31.73	-3.56	28.17	46.00	-17.83	QP

Note: Measurement = Reading Level + Correct Factor.



**Model: TWAC-24CRA2/J3U(ES)**  
**HARMONICS AND SPURIOUS EMISSIONS (VERTICAL)**



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	38.3462	37.92	-15.47	22.45	40.00	-17.55	QP
2	62.2128	46.73	-24.30	22.43	40.00	-17.57	QP
3	87.1115	46.73	-20.91	25.82	40.00	-14.18	QP
4	116.5400	47.45	-17.91	29.54	43.50	-13.96	QP
5	198.5880	43.88	-20.19	23.69	43.50	-19.81	QP
6	750.1082	31.54	-3.56	27.98	46.00	-18.02	QP

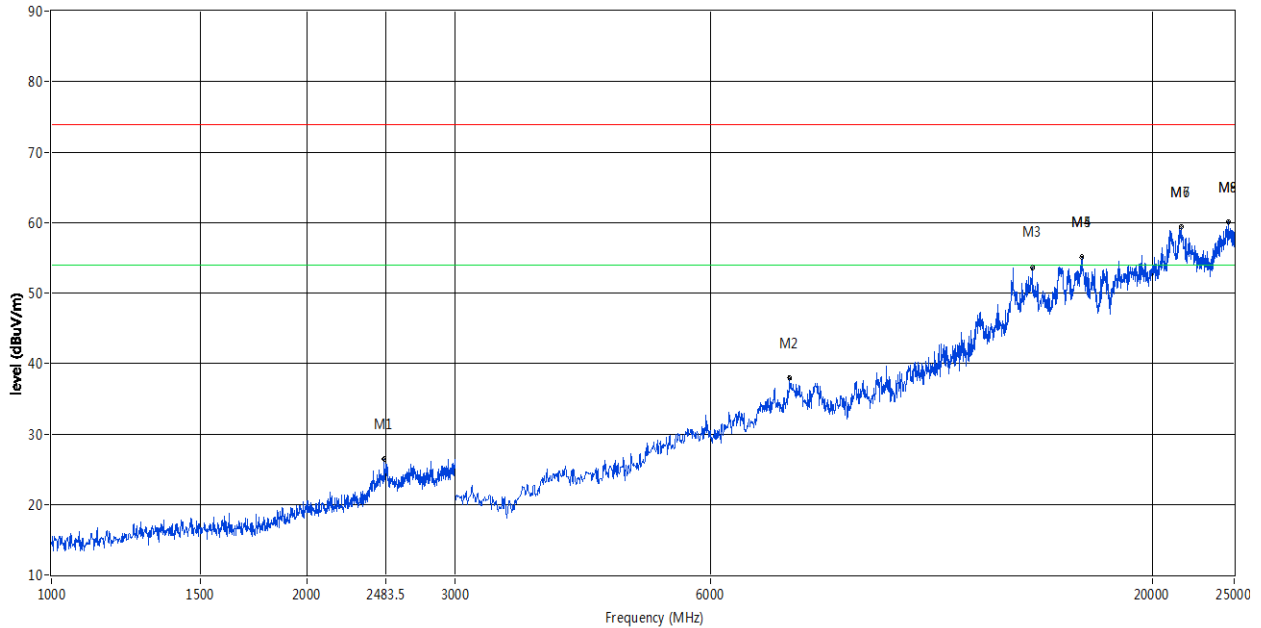
Note: Measurement = Reading Level + Correct Factor.



### 9.3. SPURIOUS EMISSIONS (Above 1GHz)

#### 802.11b Low Channel Horizontal

RE\_FCC Test Case\_FCC 15B 1GHz-25GHz

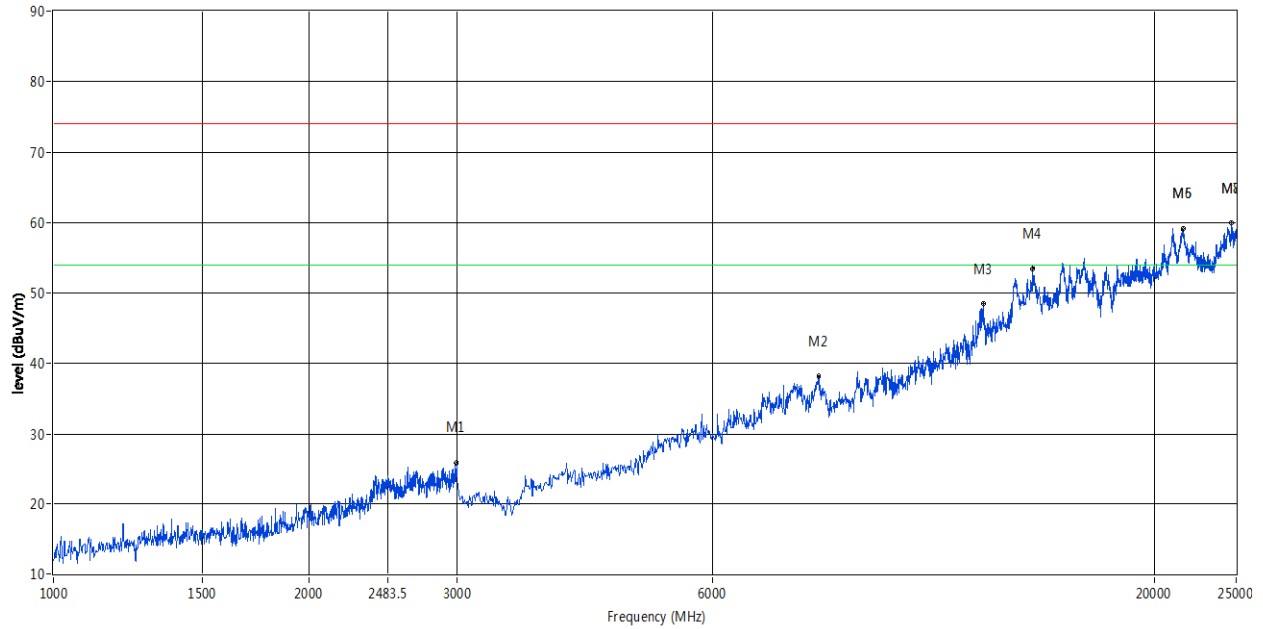


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2470.000	26.42	1.31	74.0	-47.58	Peak	15.00	100	H	Pass
2	7450.000	37.90	9.51	74.0	-36.10	+Peak	11.00	100	H	Pass
3	14428.000	53.67	25.10	74.0	-20.33	Peak	11.00	100	H	Pass
4**	16516.000	45.09	21.83	54.0	-8.91	Av	13.00	100	H	Pass
4	16516.000	55.21	21.83	74.0	-18.79	Peak	13.00	100	H	Pass
5**	21616.001	47.61	23.98	54.0	-6.39	Av	11.00	100	H	Pass
5	21616.001	59.40	23.98	74.0	-14.60	Peak	11.00	100	H	Pass
6**	24580.000	49.88	23.12	54.0	-4.12	Av	9.00	100	H	Pass
6	24580.000	60.09	23.12	74.0	-13.91	Peak	9.00	100	H	Pass



Vertical

RE\_FCC Test Case\_FCC 15B 1GHz-25GHz



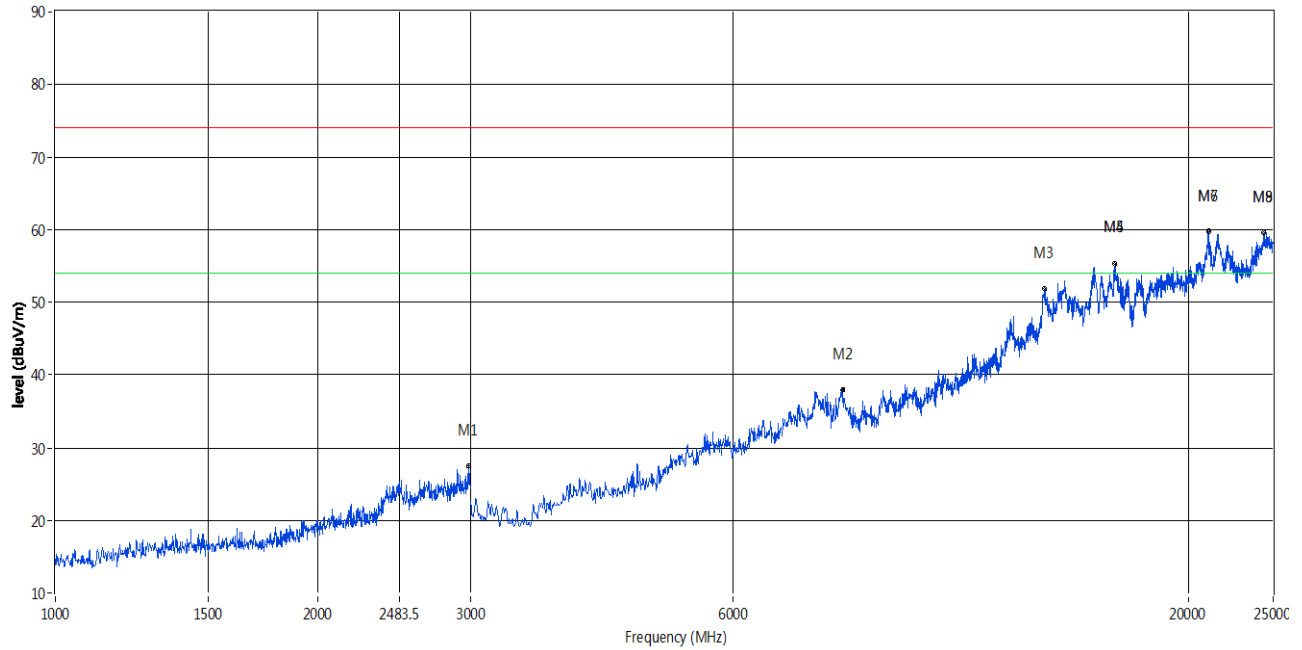
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2994.000	25.86	2.06	74.0	-48.14	Peak	2.00	100	V	Pass
2	8020.000	38.20	9.90	74.0	-35.80	Peak	9.00	100	V	Pass
3	12560.000	48.50	19.50	74.0	-25.50	Peak	3.00	100	V	Pass
4	14356.000	53.45	25.12	74.0	-20.55	Peak	12.00	100	V	Pass
5**	21604.000	47.85	23.98	54.0	-6.15	Av	13.00	100	V	Pass
5	21604.000	59.18	23.98	74.0	-14.82	Peak	13.00	100	V	Pass
6**	24688.001	48.83	23.08	54.0	-5.17	Av	15.00	100	V	Pass
6	24688.001	59.96	23.08	74.0	-14.04	Peak	15.00	100	V	Pass



## 802.11b Mid Channel

Horizontal

RE\_FCC Test Case\_FCC 15B 1GHz-25GHz

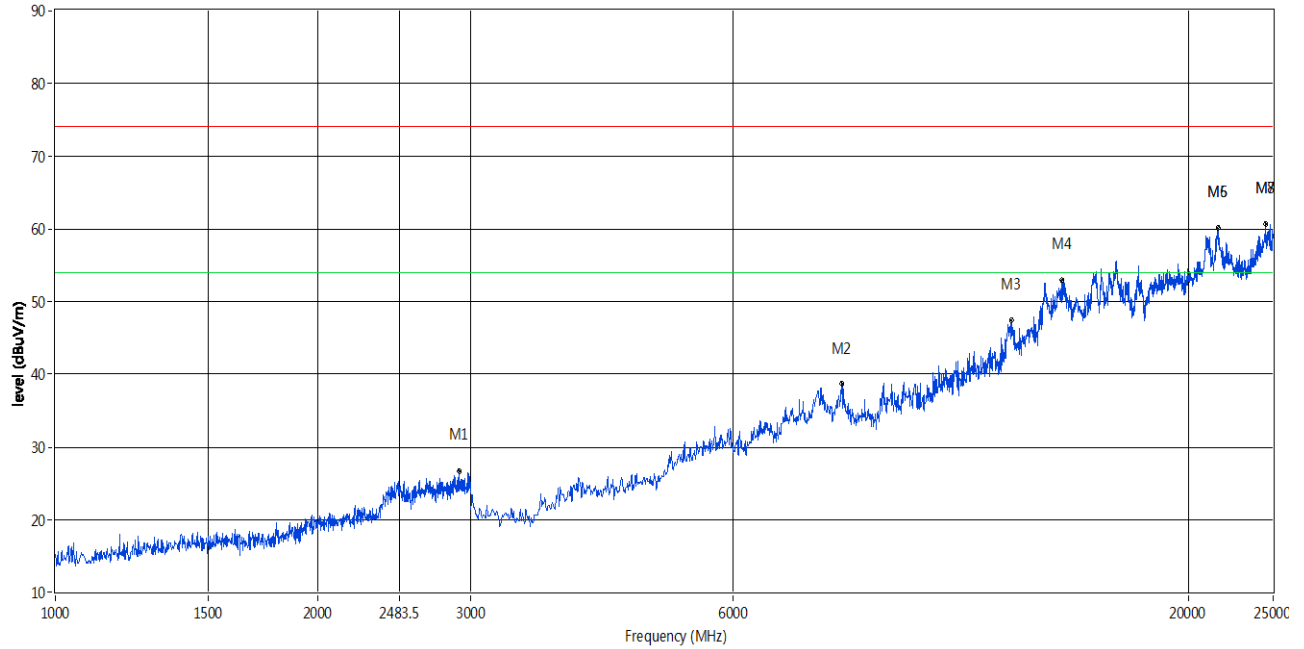


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2984.000	27.53	2.14	74.0	-46.47	Peak	2.00	100	H	Pass
2	8020.000	37.94	9.90	74.0	-36.06	Peak	15.00	100	H	Pass
3	13671.999	51.83	22.89	74.0	-22.17	Peak	14.00	100	H	Pass
4**	16480.000	44.30	22.81	54.0	-18.61	Av	13.00	100	H	Pass
4	16480.000	55.39	22.81	74.0	-18.61	Peak	13.00	100	H	Pass
5**	21076.001	46.95	24.12	54.0	-7.05	Av	10.00	100	H	Pass
5	21076.001	59.83	24.12	74.0	-14.17	Peak	10.00	100	H	Pass
6**	24423.999	48.13	23.17	54.0	-5.87	Av	15.00	100	H	Pass
6	24423.999	59.65	23.17	74.0	-14.35	Peak	15.00	100	H	Pass



Vertical

RE\_FCC Test Case\_FCC 15B 1GHz-25GHz

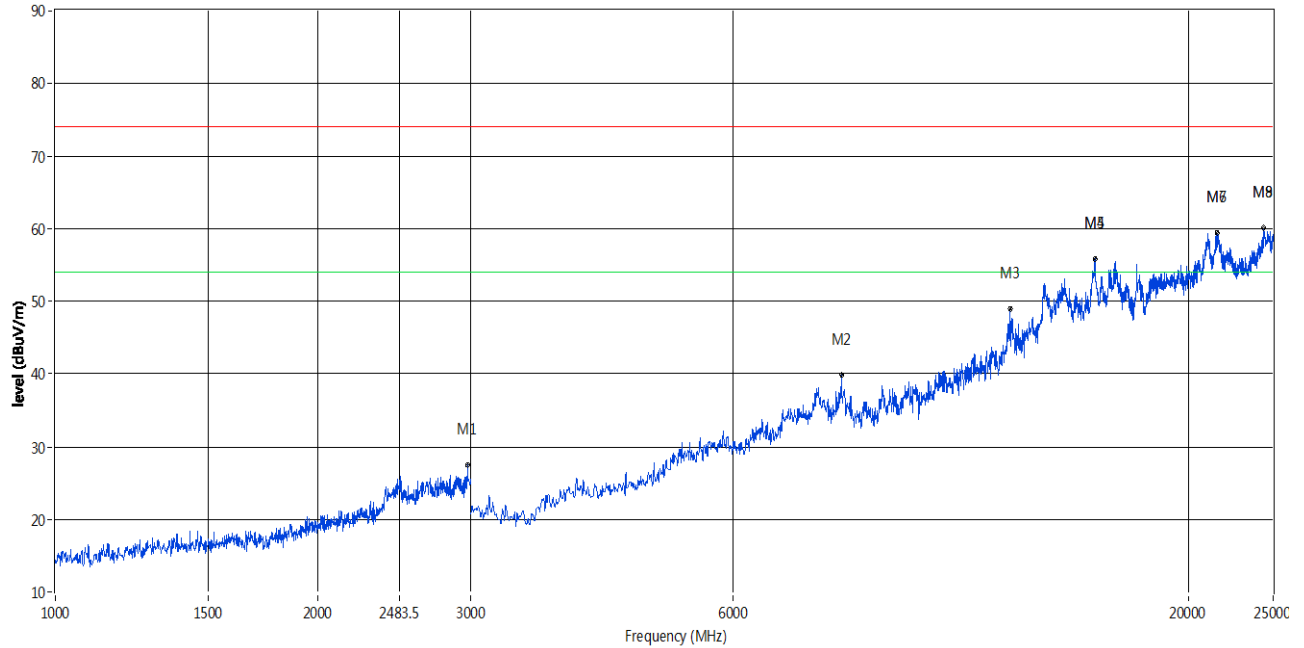


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2908.000	26.72	1.71	74.0	-47.28	Peak	5.00	100	V	Pass
2	8010.000	38.59	10.42	74.0	-35.41	Peak	13.00	100	V	Pass
3	12519.999	47.42	19.89	74.0	-26.58	Peak	10.00	100	V	Pass
4	14320.000	53.00	24.92	74.0	-21.00	Peak	3.00	100	V	Pass
5**	21616.001	47.99	23.98	54.0	-6.01	Av	10.00	100	V	Pass
5	21616.001	60.09	23.98	74.0	-13.91	Peak	10.00	100	V	Pass
6**	24532.001	48.67	23.13	54.0	-5.33	Av	11.00	100	V	Pass
6	24532.001	60.65	23.13	74.0	-13.35	Peak	11.00	100	V	Pass



## 802.11b High Channel Horizontal

RE\_FCC Test Case\_FCC 15B 1GHz-25GHz



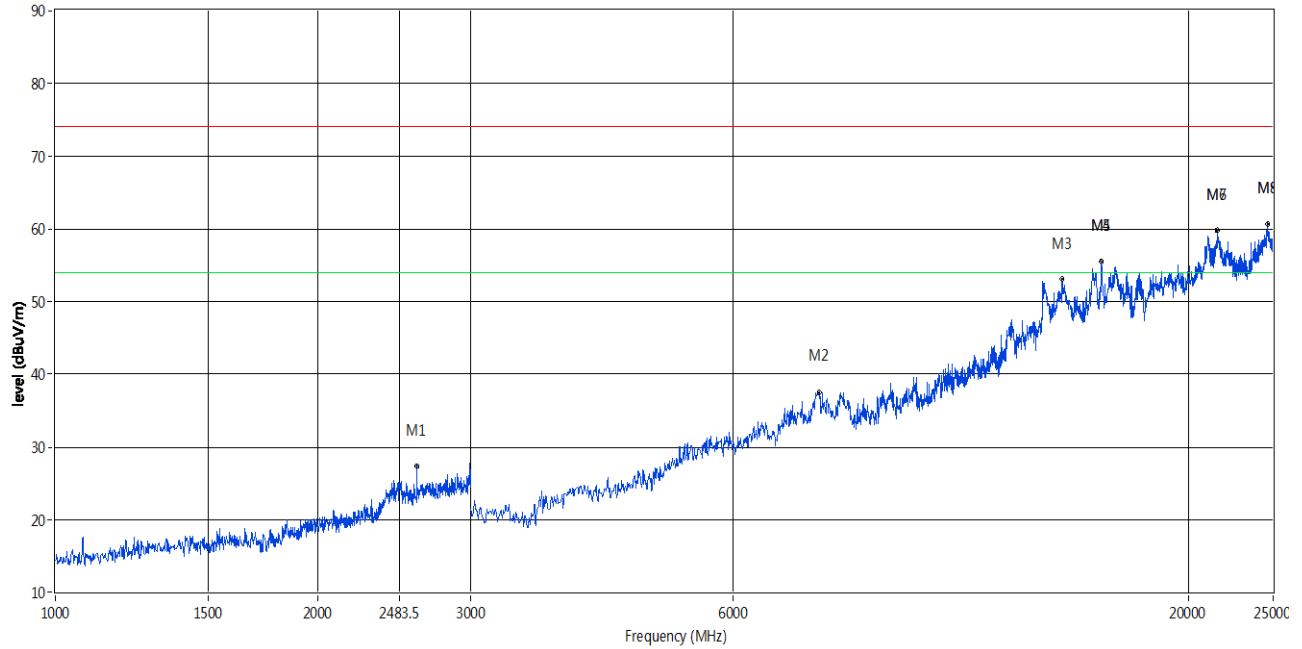
No.	Frequency (MHz)	Results (dBUV/m)	Factor (dB)	Limit (dBUV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2978.000	27.53	2.17	74.0	-46.47	Peak	14.00	100	H	Pass
2	7990.000	39.86	10.65	74.0	-34.14	Peak	9.00	100	H	Pass
3	12480.000	48.96	19.51	74.0	-25.04	Peak	6.00	100	H	Pass
4**	15616.000	44.36	23.40	54.0	-9.64	Av	4.00	100	H	Pass
4	15616.000	55.88	23.40	74.0	-18.12	Peak	4.00	100	H	Pass
5**	21556.001	47.69	24.00	54.0	-6.31	Av	11.00	100	H	Pass
5	21556.001	59.47	24.00	74.0	-14.53	Peak	11.00	100	H	Pass
6**	24412.000	49.82	23.17	54.0	-4.18	Av	8.00	100	H	Pass
6	24412.000	60.05	23.17	74.0	-13.95	Peak	8.00	100	H	Pass





Vertical

RE\_FCC Test Case\_FCC 15B 1GHz-25GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2600.000	27.35	0.04	74.0	-46.65	Peak	15.00	100	V	Pass
2	7530.000	37.55	10.47	74.0	-36.45	Peak	11.00	100	V	Pass
3	14320.000	53.09	24.92	74.0	-20.91	Peak	9.00	100	V	Pass
4**	15892.000	43.89	22.94	54.0	-10.11	Av	7.00	100	V	Pass
4	15892.000	55.44	22.94	74.0	-18.56	Peak	7.00	100	V	Pass
5**	21579.999	48.66	23.99	54.0	-5.34	Av	3.00	100	V	Pass
5	21579.999	59.77	23.99	74.0	-14.23	Peak	3.00	100	V	Pass
6**	24651.999	48.97	23.09	54.0	-5.03	Av	6.00	100	V	Pass
6	24651.999	60.62	23.09	74.0	-13.38	Peak	6.00	100	V	Pass

Remark:

1. Scan with 802.11b, 802.11g, 802.11n (HT-20) the worst case is 802.11b, only show the worst case in the report.
2. The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

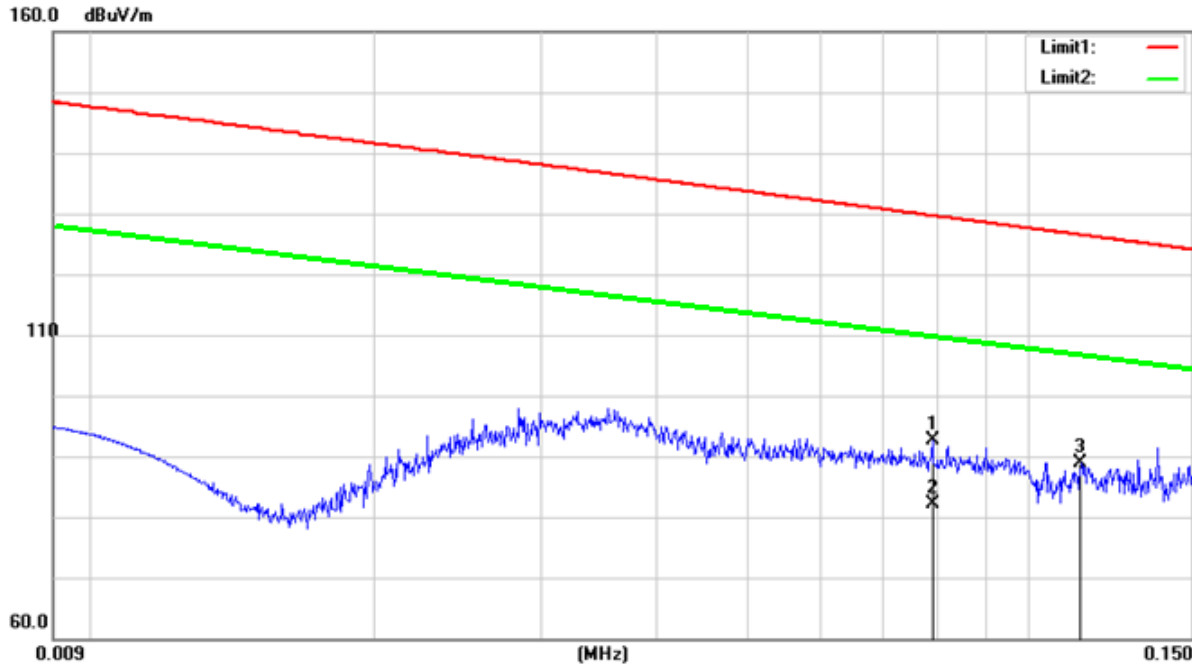


### 9.4. SPURIOUS EMISSIONS BELOW 30M

Note: All the channels had been tested, but only the worst data(802.11b channel 01) recorded in the report.

**Model: TWAC-15CRA1/K8U(ES)**  
**SPURIOUS EMISSIONS (WORST-CASE CONFIGURATION, VERTICAL)**

**9KHz~ 150KHz**

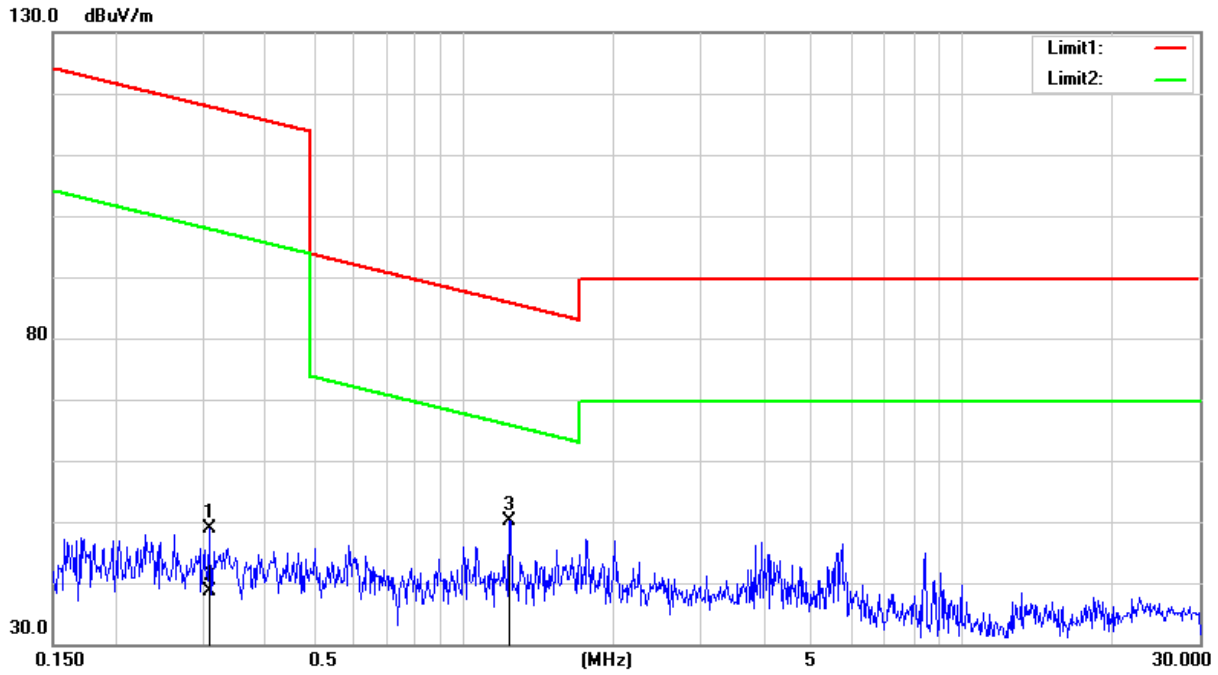


No.	Frequency (MHz)	Reading level (dBuV)	Correction Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0790	70.33	22.26	92.59	129.65	-37.06	peak
2	0.0790	59.82	22.26	82.08	109.65	-27.57	AVG
3	0.1140	66.96	21.80	88.76	126.46	-37.70	QP

Note: Measurement = Reading Level + Correction Factor.



**150KHz ~ 30MHz**



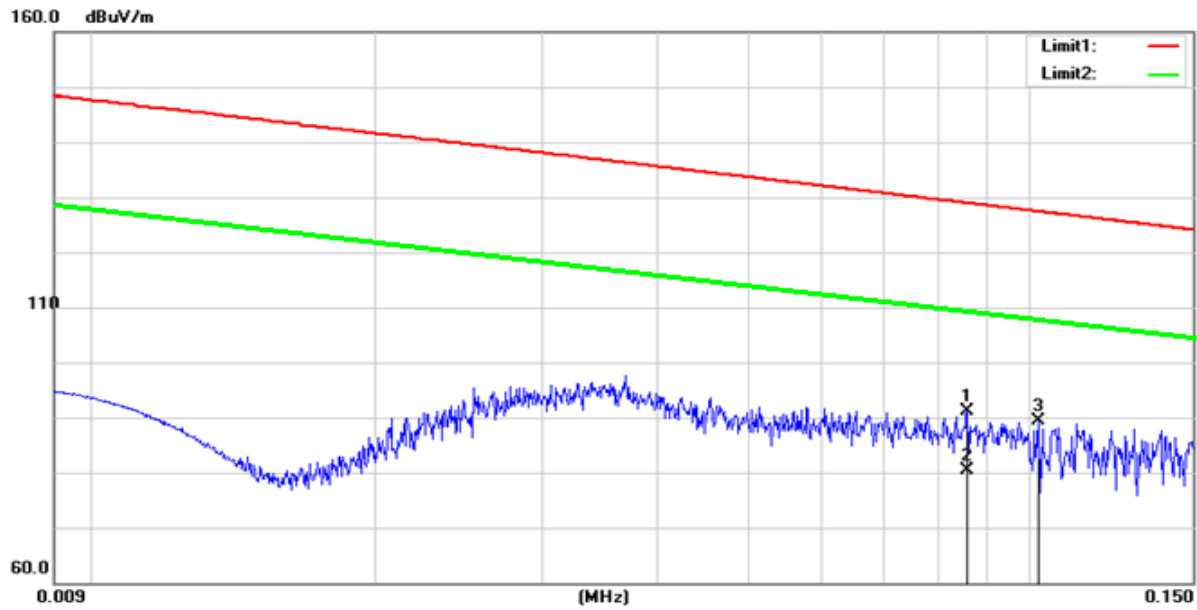
No.	Frequency (MHz)	Reading level (dBuV)	Correction Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.3082	26.02	22.88	48.90	117.83	-68.93	peak
2	0.3082	15.84	22.88	38.72	97.83	-59.11	AVG
3	1.2357	28.25	21.91	50.16	85.77	-35.61	QP

Note: Measurement = Reading Level + Correction Factor.



**Model: TWAC-15CRA1/K8U(ES)**  
**SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)**

**9KHz~ 150KHz**

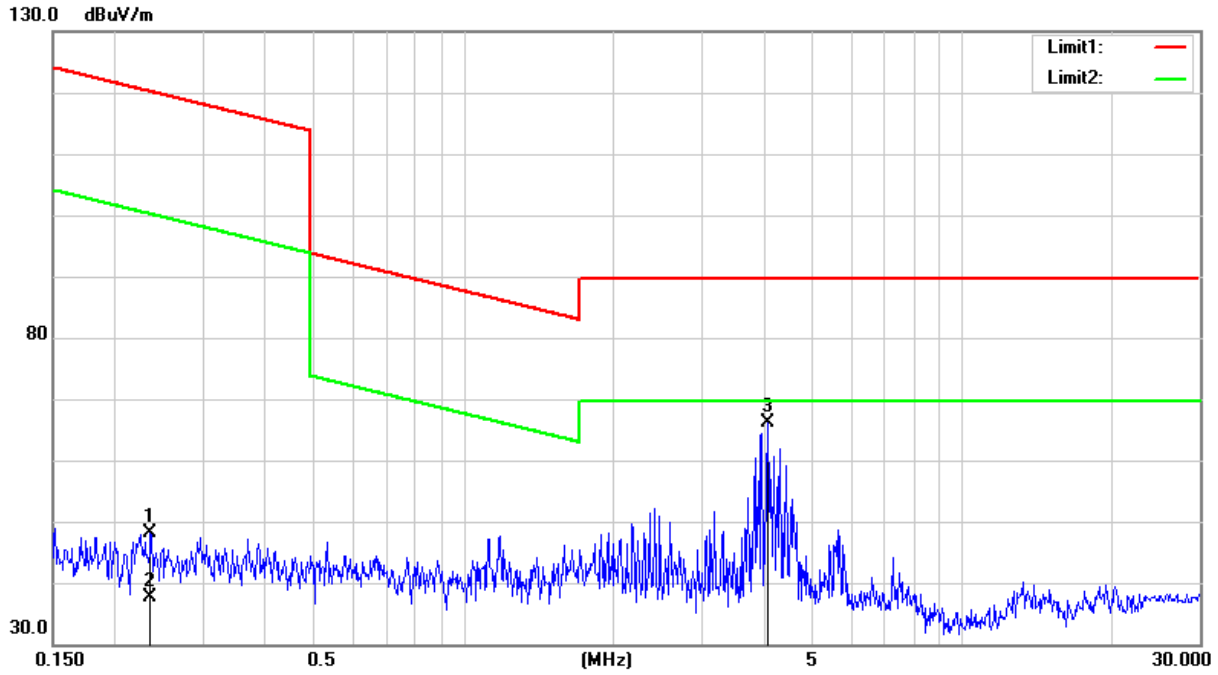


No.	Frequency (MHz)	Reading level (dBuV)	Correction Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0860	69.10	22.07	91.17	128.91	-37.74	peak
2	0.0860	58.39	22.07	80.46	108.91	-28.45	AVG
3	0.1023	67.69	21.73	89.42	127.40	-37.98	QP

Note: Measurement = Reading Level + Correction Factor.



**150KHz ~ 30MHz**



No.	Frequency (MHz)	Reading level (dBuV)	Correction Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.2353	25.64	22.54	48.18	120.17	-71.99	peak
2	0.2353	15.09	22.54	37.63	100.17	-62.54	AVG
3	4.0704	45.67	20.52	66.19	89.54	-23.35	QP

Note: Measurement = Reading Level + Correction Factor.

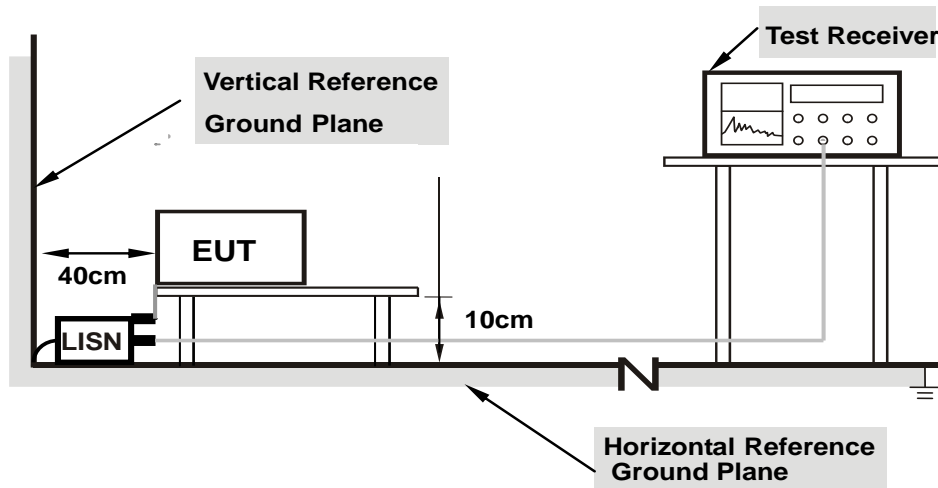
## 10. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

Please refer to FCC §15.207 (a)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

### TEST SETUP AND PROCEDURE



- Note: 1.Support units were connected to second LISN.**  
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

The EUT is put on a table of non-conducting material that is 10cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

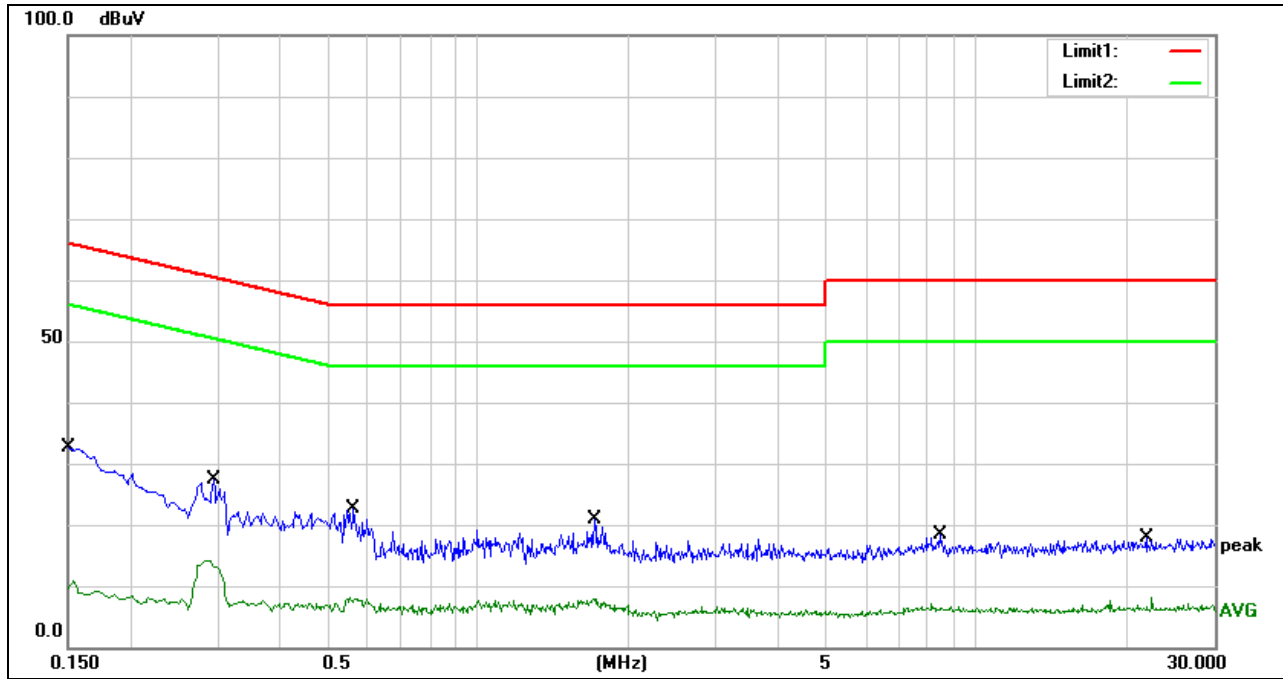
### TEST ENVIRONMENT

Temperature	23.5°C	Relative Humidity	59%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V/60Hz
Test mode	802.11b channel 01(worst mode)		



**TEST RESULTS**

**LINE N RESULTS**

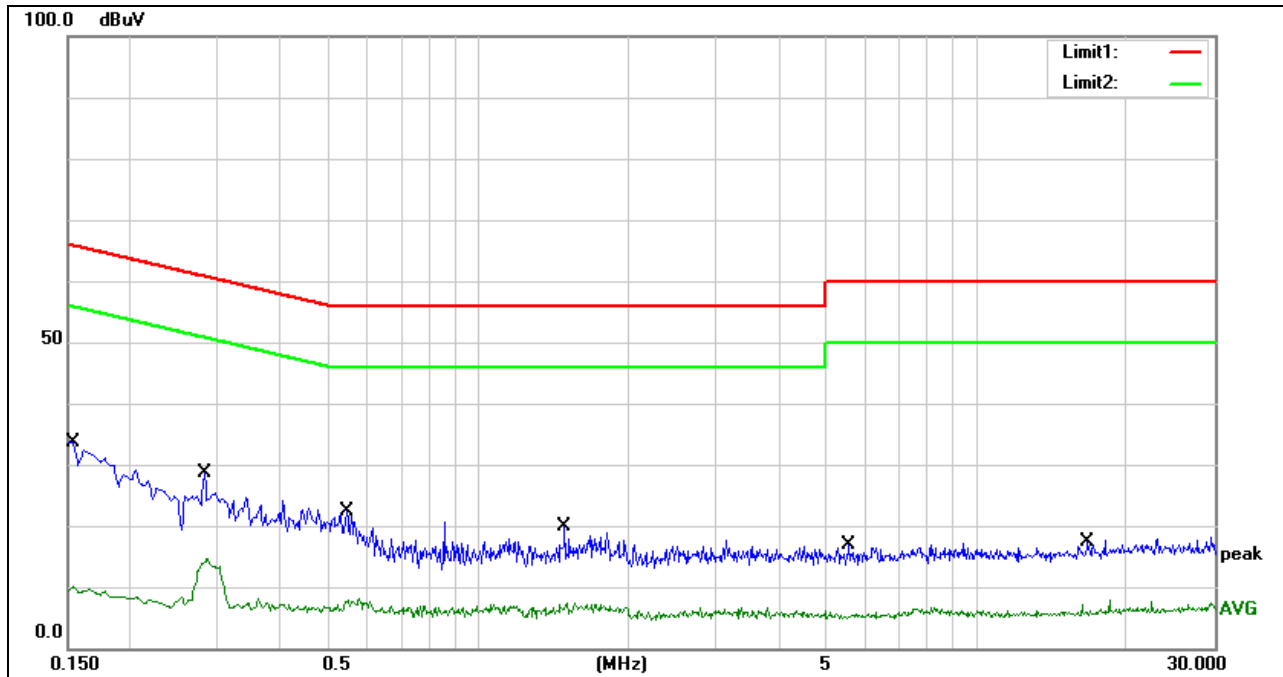


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1500	22.84	9.79	32.63	66.00	-33.37	QP
2	0.1500	-0.17	9.79	9.62	56.00	-46.38	AVG
3	0.2940	17.20	10.20	27.40	60.41	-33.01	QP
4	0.2940	2.90	10.20	13.10	50.41	-37.31	AVG
5	0.5620	12.67	9.97	22.64	56.00	-33.36	QP
6	0.5620	-2.48	9.97	7.49	46.00	-38.51	AVG
7	1.7100	11.09	9.79	20.88	56.00	-35.12	QP
8	1.7100	-1.97	9.79	7.82	46.00	-38.18	AVG
9	8.4220	8.23	10.04	18.27	60.00	-41.73	QP
10	8.4220	-3.68	10.04	6.36	50.00	-43.64	AVG
11	21.8900	7.63	10.35	17.98	60.00	-42.02	QP
12	21.8900	-4.15	10.35	6.20	50.00	-43.80	AVG

- Note: 1. Result = Reading +Correct Factor.  
 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).  
 4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.



**LINE L RESULTS**



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1540	23.82	9.79	33.61	65.78	-32.17	QP
2	0.1540	0.13	9.79	9.92	55.78	-45.86	AVG
3	0.2820	18.42	10.15	28.57	60.76	-32.19	QP
4	0.2820	4.44	10.15	14.59	50.76	-36.17	AVG
5	0.5460	12.47	9.99	22.46	56.00	-33.54	QP
6	0.5460	-2.44	9.99	7.55	46.00	-38.45	AVG
7	1.4900	10.10	9.79	19.89	56.00	-36.11	QP
8	1.4900	-2.83	9.79	6.96	46.00	-39.04	AVG
9	5.5380	7.02	9.86	16.88	60.00	-43.12	QP
10	5.5380	-4.75	9.86	5.11	50.00	-44.89	AVG
11	16.6820	6.99	10.31	17.30	60.00	-42.70	QP
12	16.6820	-4.87	10.31	5.44	50.00	-44.56	AVG

- Note: 1. Result = Reading +Correct Factor.  
 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).  
 4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.





## 11. ANTENNA REQUIREMENTS

### APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### ANTENNA CONNECTOR

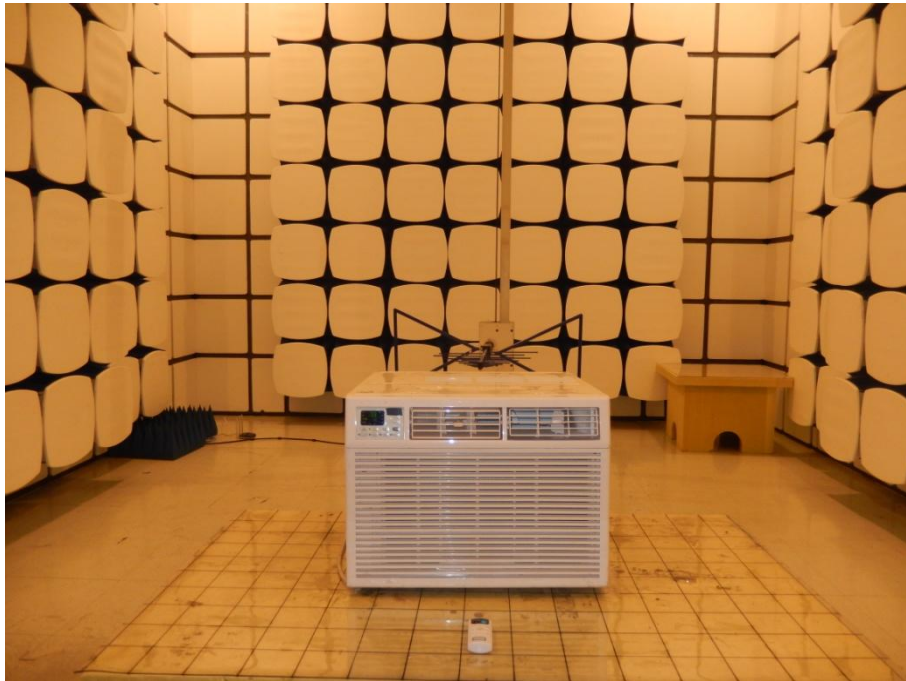
EUT has a PCB Antenna without antenna connector.

### ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi.

## Test photos

### Radiation



## Conduction



**END OF REPORT**