

## TEST REPORT

**Product** : Mi Smart Plug (Wi-Fi)  
**Trade mark** : MI  
**Model/Type reference** : ZNCZ03CM  
**Serial Number** : N/A  
**Report Number** : EED32K00049901  
**FCC ID** : 2APA9-HMI205A  
**Date of Issue** : Apr. 03, 2018  
**Test Standards** : 47 CFR Part 15 Subpart C  
**Test result** : PASS

Prepared for:

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Prepared by:

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Date:

Apr. 03, 2018

Check No.:3319521119



## 2 Version

Version No.	Date	Description
00	Apr. 03, 2018	Original

### 3 Test Summary

Test Item	Test Requirement	Test method	Result
<b>Antenna Requirement</b>	47 CFR Part 15 Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
<b>AC Power Line Conducted Emission</b>	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
<b>Conducted Peak Output Power</b>	47 CFR Part 15 Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013	PASS
<b>6dB Occupied Bandwidth</b>	47 CFR Part 15 Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013	PASS
<b>Power Spectral Density</b>	47 CFR Part 15 Subpart C Section 15.247 (e)	ANSI C63.10-2013	PASS
<b>Band-edge for RF Conducted Emissions</b>	47 CFR Part 15 Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
<b>RF Conducted Spurious Emissions</b>	47 CFR Part 15 Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
<b>Radiated Spurious Emissions</b>	47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
<b>Restricted bands around fundamental frequency (Radiated Emission)</b>	47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS

Remark:

Test according to ANSI C63.4-2014 & ANSI C63.10-2013.

The tested samples and the sample information are provided by the client.

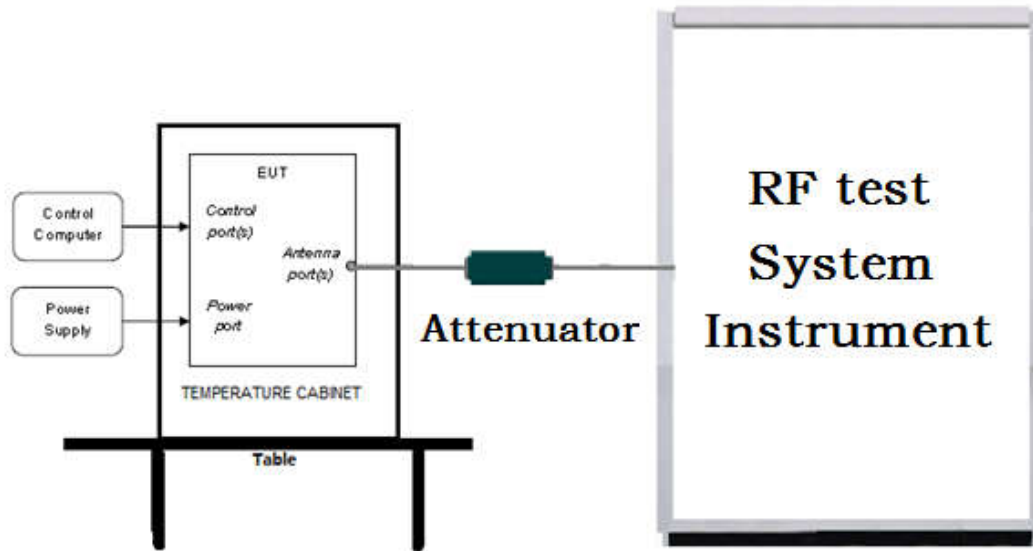
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## 5 Test Requirement

### 5.1 Test setup

#### 5.1.1 For Conducted test setup



#### 5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

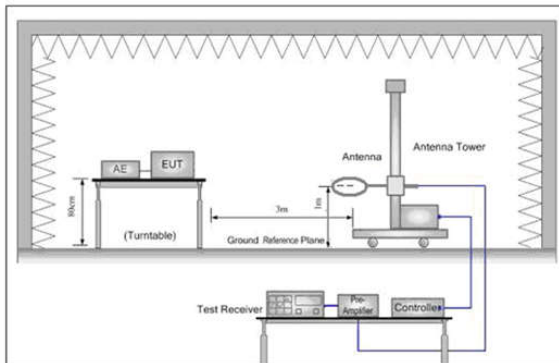


Figure 1. Below 30MHz

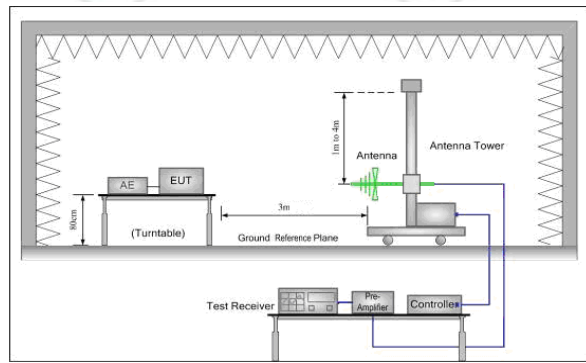


Figure 2. 30MHz to 1GHz

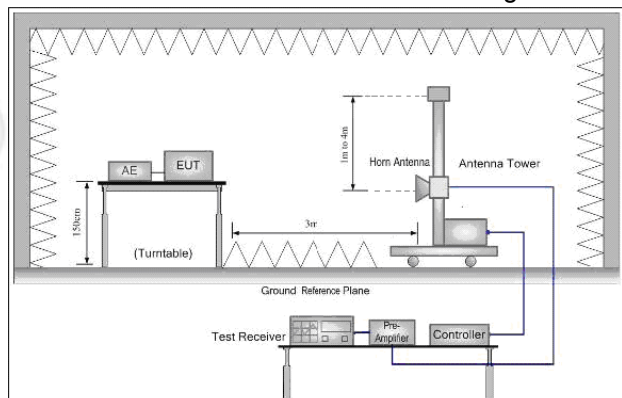
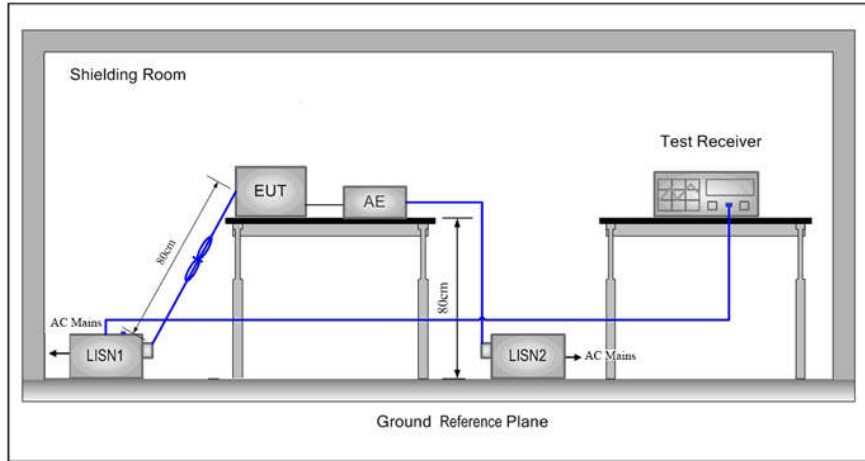


Figure 3. Above 1GHz



**5.1.3 For Conducted Emissions test setup**  
**Conducted Emissions setup**



**5.2 Test Environment**

<b>Operating Environment:</b>	
Temperature:	24.6 °C
Humidity:	47 % RH
Atmospheric Pressure:	1010mbar

**5.3 Test Condition**

**Test channel:**

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
802.11b/g/n(HT20)	2412MHz ~2462 MHz	Channel 1	Channel 6	Channel11
		2412MHz	2437MHz	2462MHz
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.			

Test mode:

Pre-scan under all rate at lowest channel 1

<b>Mode</b>	<b>802.11b</b>				X				
<b>Data Rate</b>	<b>1Mbps</b>	<b>2Mbps</b>	<b>5.5Mbps</b>	<b>11Mbps</b>					
Power(dBm)	20.85	20.11	21.03	21.73					
<b>Mode</b>	<b>802.11g</b>								
<b>Data Rate</b>	<b>6Mbps</b>	<b>9Mbps</b>	<b>12Mbps</b>	<b>18Mbps</b>	<b>24Mbps</b>	<b>36Mbps</b>	<b>48Mbps</b>	<b>54Mbps</b>	
Power(dBm)	25.54	25.18	24.83	24.21	24.99	24.65	25.00	24.85	
<b>Mode</b>	<b>802.11n (HT20)</b>								
<b>Data Rate</b>	<b>6.5Mbps</b>	<b>13Mbps</b>	<b>19.5Mbps</b>	<b>26Mbps</b>	<b>39Mbps</b>	<b>52Mbps</b>	<b>58.5Mbps</b>	<b>65Mbps</b>	
Power(dBm)	25.69	24.96	25.35	25.11	24.87	25.25	24.89	24.76	

Through Pre-scan, 11Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20)

## 6 General Information

### 6.1 Client Information

Applicant:	Shanghai Imilab Technology co., LTD
Address of Applicant:	F5, Building 3, No. 401, Caobao Rd, Xuhui Dist, Shanghai, P.R. China.
Manufacturer:	Shanghai Imilab Technology co., LTD
Address of Manufacturer:	F5, Building 3, No. 401, Caobao Rd, Xuhui Dist, Shanghai, P.R. China.
Factory:	Dongguan Aohai Power Technology Co., Ltd
Address of Factory:	Aohai Technology Park, No.6 Zhenlong Road East, Jiaoyitang, Tangxia, Dongguan, China

### 6.2 General Description of EUT

Product Name:	Mi Smart Plug (Wi-Fi)
Model No.(EUT):	ZNCZ03CM
Trade Mark:	MI
EUT Supports Radios application:	WiFi 802.11b/g/n(20MHz), 2412-2462MHz
Power Supply:	AC 120V, 60Hz
Sample Received Date:	Mar. 14, 2018
Sample tested Date:	Mar. 14, 2018 to Apr. 03, 2018

### 6.3 Product Specification subjective to this standard

Operation Frequency:	WiFi 802.11b/g/n(20MHz), 2412-2462MHz
Channel Separation:	5MHz
Type of Modulation:	DSSS; OFDM
Sample Type:	Fixed production
Test Power Grade:	(manufacturer declare )Backoff:0.00db
Test Software of EUT:	(manufacturer declare ) ESP Series Modules FCC&CE Test Tool V2.2.2.0.exe
Antenna Type and Gain:	Type: PCB Antenna ; Gain: -3dBi
Test Voltage:	AC 120V, 60Hz
Hardware version of the sample:	(manufacturer declare ) B
Firmware version of the sample:	(manufacturer declare )1.3

### 6.4 Description of Support Units

The EUT has been tested independently.



## 6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China 518101

Telephone: +86 (0) 755 3368 3668 Fax: +86 (0) 755 3368 3385

No tests were sub-contracted.

FCC Designation No.: CN1164

## 6.6 Deviation from Standards

None.

## 6.7 Abnormalities from Standard Conditions

None.

## 6.8 Other Information Requested by the Customer

None.

## 6.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	$7.9 \times 10^{-8}$
2	RF power, conducted	0.31dB (30MHz-1GHz)
		0.57dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-12.75GHz)
4	Conduction emission	3.6dB (9kHz to 150kHz)
		3.2dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	2.8%
7	DC power voltages	0.025%

## 7 Equipment List

RF test system					
Equipment	Manufacturer	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Signal Generator	Keysight	E8257D	MY53401106	03-13-2018	03-12-2019
Spectrum Analyzer	Keysight	N9010A	MY54510339	03-13-2018	03-12-2019
Signal Generator	Keysight	N5182B	MY53051549	03-13-2018	03-12-2019
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-10-2018	01-09-2019
DC Power	Keysight	E3642A	MY54426035	03-13-2018	03-12-2019
power meter & power sensor	R&S	OSP120	101374	03-13-2018	03-12-2019
RF control unit	JS Tonscend	JS0806-2	158060006	03-13-2018	03-12-2019
Temperature / Humidity Indicator	Defu	TH128	---	07-08-2017	07-07-2018

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber&Accessory Equipment	TDK	SAC-3	---	06-04-2016	06-03-2019
Spectrum Analyzer	Agilent	E4443A	MY45300910	11-16-2017	11-15-2018
Receiver	R&S	ESCI	100435	06-14-2017	06-13-2018
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	9163-618	08-15-2017	08-14-2018
Horn Antenna	ETS-LINGREN	3117	00057407	07-20-2015	07-18-2018
Spectrum Analyzer	R&S	FSP40	100416	06-13-2017	06-12-2018
Microwave Preamplifier	JS Tonscend	EMC051845S E	980380	01-19-2018	01-18-2019
Loop Antenna	ETS-LINDGREN	6502	00071730	06-22-2017	06-21-2019
Double ridge horn antenna	A.H.SYSTEMS	SAS-574	6042	06-30-2015	06-28-2018
Pre-amplifier	A.H.SYSTEMS	PAP-1840-60	6041	06-30-2015	06-28-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-08-2017	05-07-2018

Conducted disturbance Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESCI	100009	06-14-2017	06-13-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	06-14-2017	06-13-2018
LISN	schwarzbeck	NNLK8121	8121-529	06-13-2017	06-12-2018

## 8 Radio Technical Requirements Specification

### Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15C	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

### Test Results List:

Test Requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (b)(3)	ANSI C63.10	Conducted Peak Output Power	PASS	Appendix A)
Part15C Section 15.247 (a)(2)	ANSI C63.10	6dB Occupied Bandwidth	PASS	Appendix B)
Part15C Section 15.247(d)	ANSI C63.10	Band-edge for RF Conducted Emissions	PASS	Appendix C)
Part15C Section 15.247(d)	ANSI C63.10	RF Conducted Spurious Emissions	PASS	Appendix D)
Part15C Section 15.247 (e)	ANSI C63.10	Power Spectral Density	PASS	Appendix E)
Part15C Section 15.203/15.247 (c)	ANSI C63.10	Antenna Requirement	PASS	Appendix F)
Part15C Section 15.207	ANSI C63.10	AC Power Line Conducted Emission	PASS	Appendix G)
Part15C Section 15.205/15.209	ANSI C63.10	Restricted bands around fundamental frequency (Radiated Emission)	PASS	Appendix H)
Part15C Section 15.205/15.209	ANSI C63.10	Radiated Spurious Emissions	PASS	Appendix I)

**Appendix A): Conducted Peak Output Power**


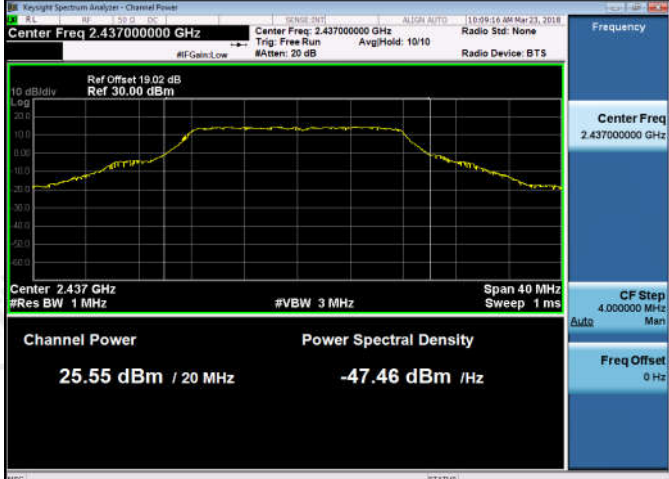
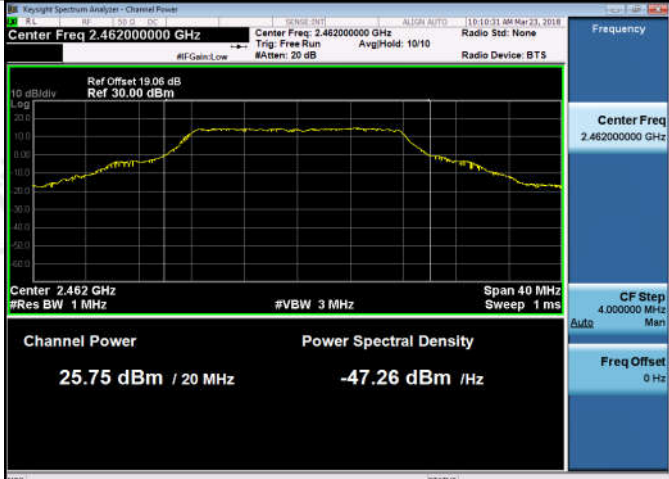
**Result Table**


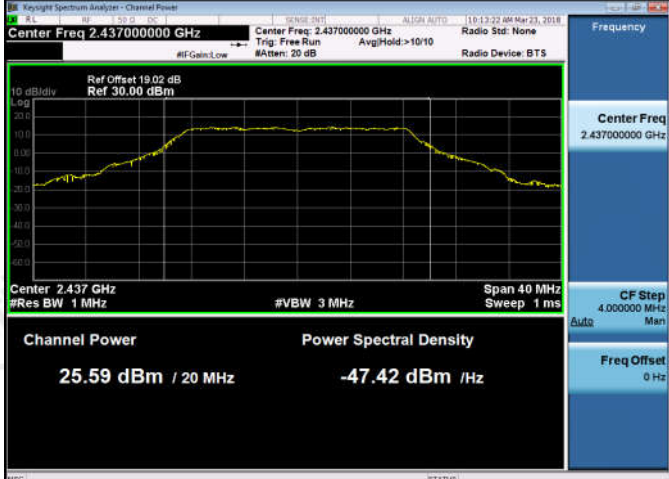
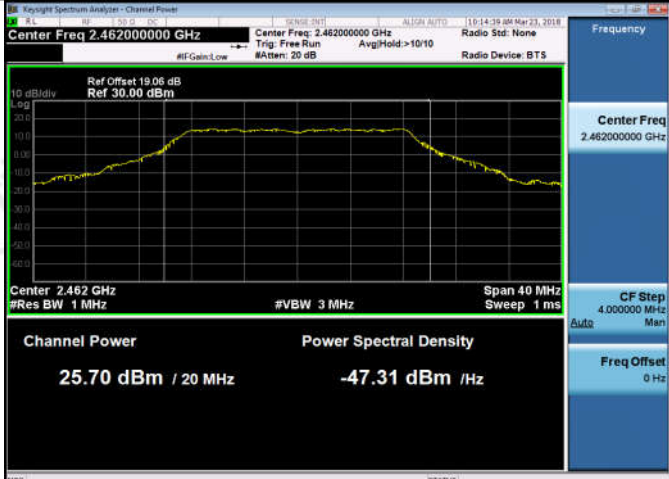
Mode	Channel	Conducted Peak Output Power [dBm]	Verdict
11B	LCH	21.73	PASS
11B	MCH	21.14	PASS
11B	HCH	21.06	PASS
11G	LCH	25.54	PASS
11G	MCH	25.55	PASS
11G	HCH	25.75	PASS
11N20SISO	LCH	25.69	PASS
11N20SISO	MCH	25.59	PASS
11N20SISO	HCH	25.70	PASS



**Test Graph**



<p>11G/LCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.06 dB Ref 30.00 dBm</p> <p>Center Freq 2.412000000 GHz</p> <p>Channel Power: 25.54 dBm / 20 MHz</p> <p>Power Spectral Density: -47.47 dBm / Hz</p>
<p>11G/MCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.02 dB Ref 30.00 dBm</p> <p>Center Freq 2.437000000 GHz</p> <p>Channel Power: 25.55 dBm / 20 MHz</p> <p>Power Spectral Density: -47.46 dBm / Hz</p>
<p>11G/HCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.06 dB Ref 30.00 dBm</p> <p>Center Freq 2.462000000 GHz</p> <p>Channel Power: 25.75 dBm / 20 MHz</p> <p>Power Spectral Density: -47.26 dBm / Hz</p>

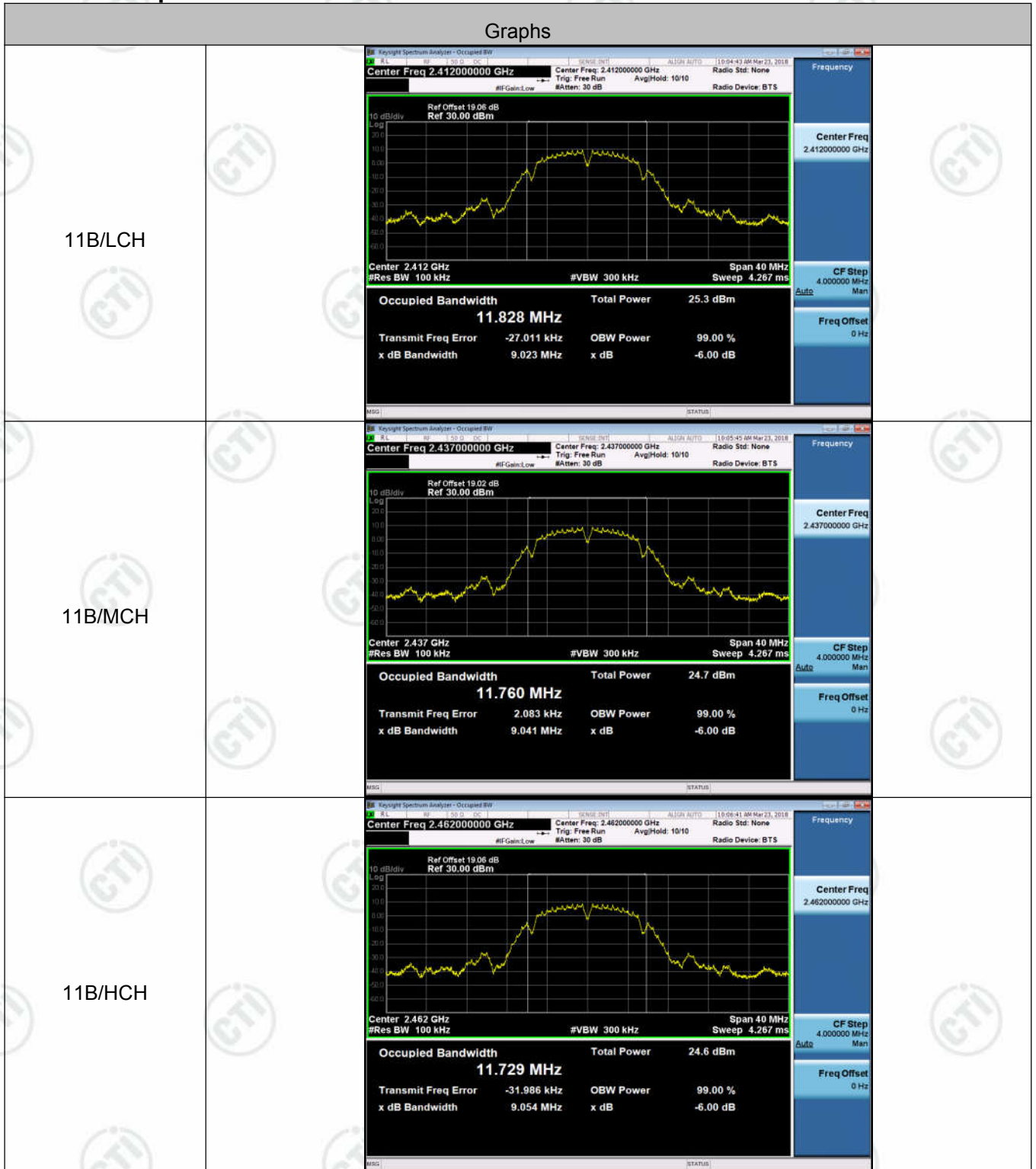
<p>11N20SISO/LCH</p>	 <p>Center Freq 2.412000000 GHz</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.06 dB Ref 30.00 dBm</p> <p>Center 2.412 GHz #Res BW 1 MHz</p> <p>#VBW 3 MHz</p> <p>Span 40 MHz Sweep 1 ms</p> <p>Channel Power 25.69 dBm / 20 MHz</p> <p>Power Spectral Density -47.32 dBm / Hz</p> <p>Center Freq 2.412000000 GHz</p> <p>CF Step 4.000000 MHz</p> <p>Freq Offset 0 Hz</p>
<p>11N20SISO/MCH</p>	 <p>Center Freq 2.437000000 GHz</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.02 dB Ref 30.00 dBm</p> <p>Center 2.437 GHz #Res BW 1 MHz</p> <p>#VBW 3 MHz</p> <p>Span 40 MHz Sweep 1 ms</p> <p>Channel Power 25.59 dBm / 20 MHz</p> <p>Power Spectral Density -47.42 dBm / Hz</p> <p>Center Freq 2.437000000 GHz</p> <p>CF Step 4.000000 MHz</p> <p>Freq Offset 0 Hz</p>
<p>11N20SISO/HCH</p>	 <p>Center Freq 2.462000000 GHz</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.06 dB Ref 30.00 dBm</p> <p>Center 2.462 GHz #Res BW 1 MHz</p> <p>#VBW 3 MHz</p> <p>Span 40 MHz Sweep 1 ms</p> <p>Channel Power 25.70 dBm / 20 MHz</p> <p>Power Spectral Density -47.31 dBm / Hz</p> <p>Center Freq 2.462000000 GHz</p> <p>CF Step 4.000000 MHz</p> <p>Freq Offset 0 Hz</p>

**Appendix B): 6dB Occupied Bandwidth  
Result Table**

Mode	Channel	6dB Bandwidth [MHz]	99% OBW [MHz]	Verdict
11B	LCH	9.023	11.828	PASS
11B	MCH	9.041	11.760	PASS
11B	HCH	9.054	11.729	PASS
11G	LCH	16.35	16.642	PASS
11G	MCH	16.34	16.622	PASS
11G	HCH	16.34	16.833	PASS
11N20SISO	LCH	17.59	17.967	PASS
11N20SISO	MCH	17.58	17.924	PASS
11N20SISO	HCH	17.58	18.119	PASS

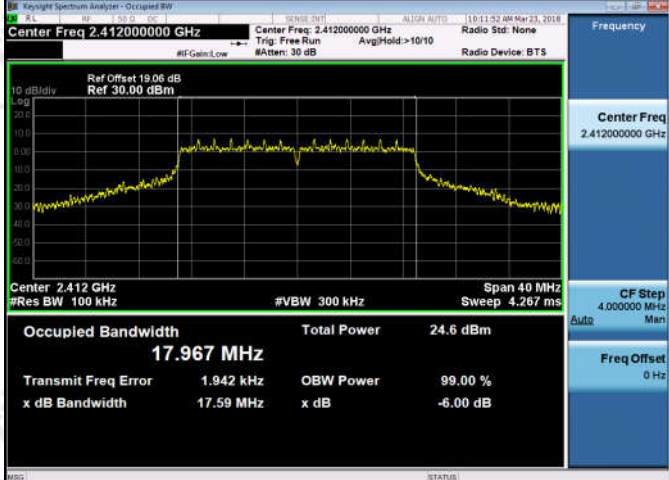
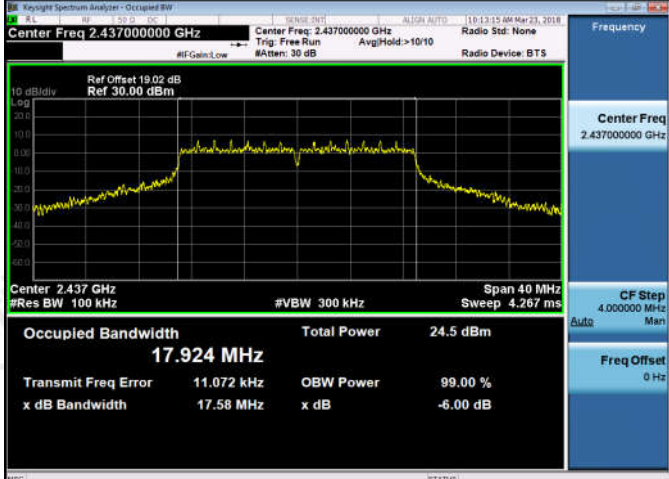
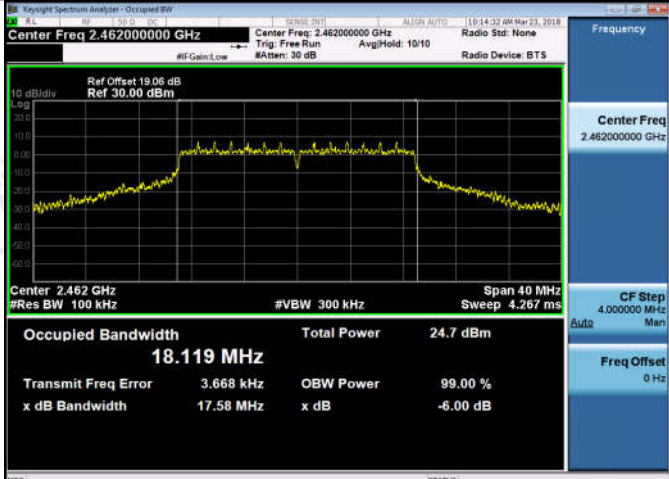


**Test Graph**





<p>11G/LCH</p>	<p>Center Freq 2.412000000 GHz</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.06 dB Ref 30.00 dBm</p> <p>Center 2.412 GHz #Res BW 100 kHz</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth <b>16.642 MHz</b> Total Power 24.3 dBm</p> <p>Transmit Freq Error -45.284 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 16.35 MHz x dB -6.00 dB</p>
<p>11G/MCH</p>	<p>Center Freq 2.437000000 GHz</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.02 dB Ref 30.00 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth <b>16.622 MHz</b> Total Power 24.4 dBm</p> <p>Transmit Freq Error -35.250 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 16.34 MHz x dB -6.00 dB</p>
<p>11G/HCH</p>	<p>Center Freq 2.462000000 GHz</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.06 dB Ref 30.00 dBm</p> <p>Center 2.462 GHz #Res BW 100 kHz</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth <b>16.833 MHz</b> Total Power 24.6 dBm</p> <p>Transmit Freq Error -86.239 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 16.34 MHz x dB -6.00 dB</p>

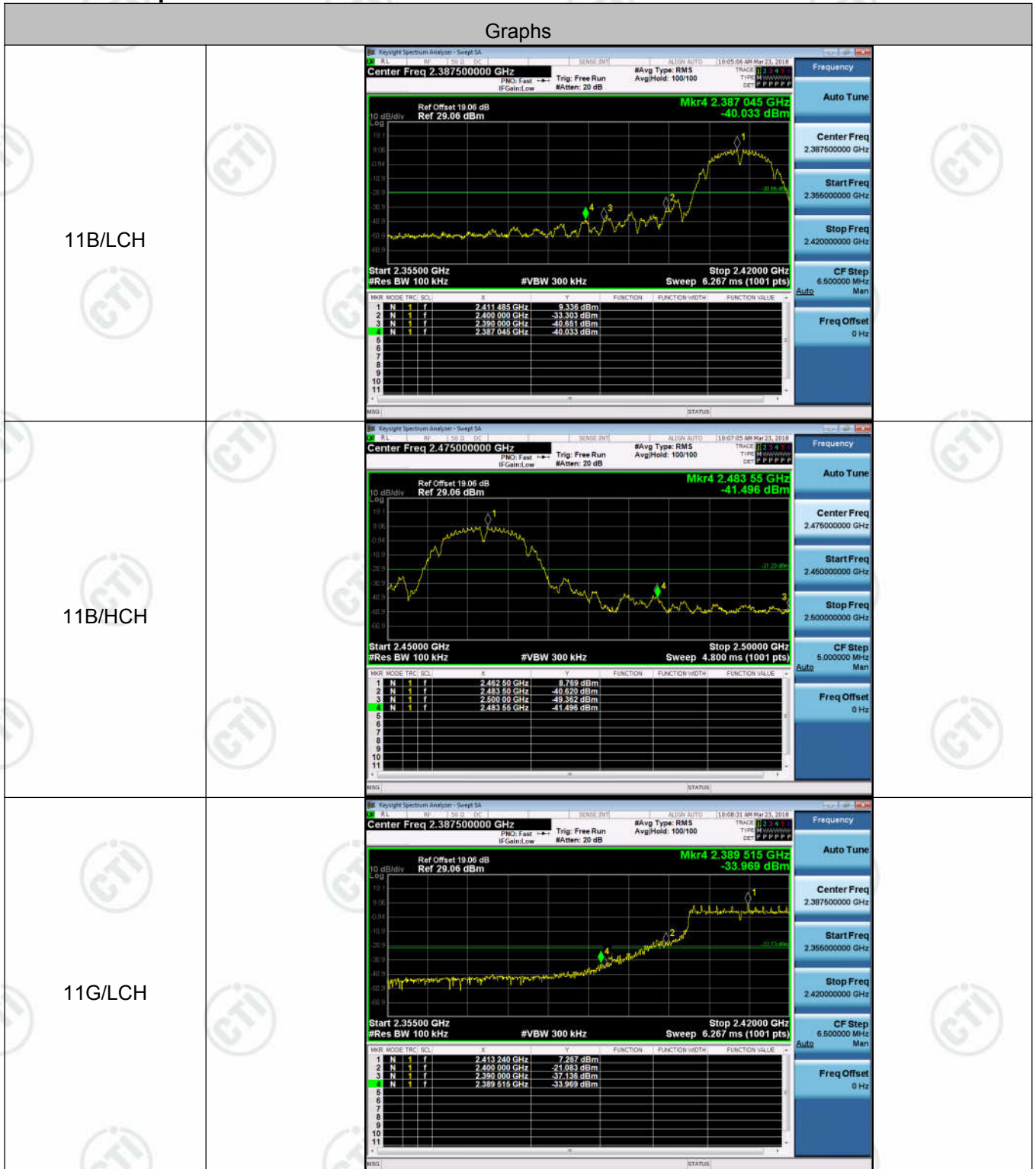
<p>11N20SISO/LCH</p>	 <p>Center Freq 2.412000000 GHz</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.06 dB Ref 30.00 dBm</p> <p>Center 2.412 GHz #Res BW 100 kHz</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>#VBW 300 kHz</p> <p>Occupied Bandwidth <b>17.967 MHz</b></p> <p>Total Power 24.6 dBm</p> <p>Transmit Freq Error 1.942 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 17.59 MHz</p> <p>x dB -6.00 dB</p>
<p>11N20SISO/MCH</p>	 <p>Center Freq 2.437000000 GHz</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.02 dB Ref 30.00 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>#VBW 300 kHz</p> <p>Occupied Bandwidth <b>17.924 MHz</b></p> <p>Total Power 24.5 dBm</p> <p>Transmit Freq Error 11.072 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 17.58 MHz</p> <p>x dB -6.00 dB</p>
<p>11N20SISO/HCH</p>	 <p>Center Freq 2.462000000 GHz</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.06 dB Ref 30.00 dBm</p> <p>Center 2.462 GHz #Res BW 100 kHz</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>#VBW 300 kHz</p> <p>Occupied Bandwidth <b>18.119 MHz</b></p> <p>Total Power 24.7 dBm</p> <p>Transmit Freq Error 3.668 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 17.58 MHz</p> <p>x dB -6.00 dB</p>

**Appendix C): Band-edge for RF Conducted Emissions**

**Result Table**

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	9.336	-40.033	-20.66	PASS
11B	HCH	8.769	-41.496	-21.23	PASS
11G	LCH	7.267	-33.969	-22.73	PASS
11G	HCH	7.255	-32.365	-22.75	PASS
11N20SISO	LCH	7.387	-31.769	-22.61	PASS
11N20SISO	HCH	7.220	-29.448	-22.78	PASS

**Test Graph**





<p>11G/HCH</p>	 <p>Center Freq 2.47500000 GHz</p> <p>Mkr4 2.483 60 GHz -32.365 dBm</p> <p>Start 2.45000 GHz Stop 2.50000 GHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.800 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRIG</th> <th>SCL</th> <th>F</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.457 00 GHz</td> <td></td> <td></td> <td>7.255 dBm</td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.483 60 GHz</td> <td></td> <td></td> <td>-32.151 dBm</td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.500 00 GHz</td> <td></td> <td></td> <td>-40.355 dBm</td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.483 60 GHz</td> <td></td> <td></td> <td>-32.365 dBm</td> </tr> </tbody> </table>	MKR	MODE	TRIG	SCL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.457 00 GHz			7.255 dBm	2	N	1	f	2.483 60 GHz			-32.151 dBm	3	N	1	f	2.500 00 GHz			-40.355 dBm	4	N	1	f	2.483 60 GHz			-32.365 dBm
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<p>11N20SISO/LCH</p>	 <p>Center Freq 2.38750000 GHz</p> <p>Mkr4 2.388 605 GHz -31.769 dBm</p> <p>Start 2.35500 GHz Stop 2.42000 GHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 6.267 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRIG</th> <th>SCL</th> <th>F</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.413 240 GHz</td> <td></td> <td></td> <td>7.387 dBm</td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.400 000 GHz</td> <td></td> <td></td> <td>-19.755 dBm</td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.390 000 GHz</td> <td></td> <td></td> <td>-32.301 dBm</td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.388 605 GHz</td> <td></td> <td></td> <td>-31.769 dBm</td> </tr> </tbody> </table>	MKR	MODE	TRIG	SCL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.413 240 GHz			7.387 dBm	2	N	1	f	2.400 000 GHz			-19.755 dBm	3	N	1	f	2.390 000 GHz			-32.301 dBm	4	N	1	f	2.388 605 GHz			-31.769 dBm
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<p>11N20SISO/HCH</p>	 <p>Center Freq 2.47500000 GHz</p> <p>Mkr4 2.485 10 GHz -29.448 dBm</p> <p>Start 2.45000 GHz Stop 2.50000 GHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.800 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRIG</th> <th>SCL</th> <th>F</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.457 00 GHz</td> <td></td> <td></td> <td>7.220 dBm</td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.483 60 GHz</td> <td></td> <td></td> <td>-30.338 dBm</td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.500 00 GHz</td> <td></td> <td></td> <td>-42.092 dBm</td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.485 10 GHz</td> <td></td> <td></td> <td>-29.448 dBm</td> </tr> </tbody> </table>	MKR	MODE	TRIG	SCL	F	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.457 00 GHz			7.220 dBm	2	N	1	f	2.483 60 GHz			-30.338 dBm	3	N	1	f	2.500 00 GHz			-42.092 dBm	4	N	1	f	2.485 10 GHz			-29.448 dBm
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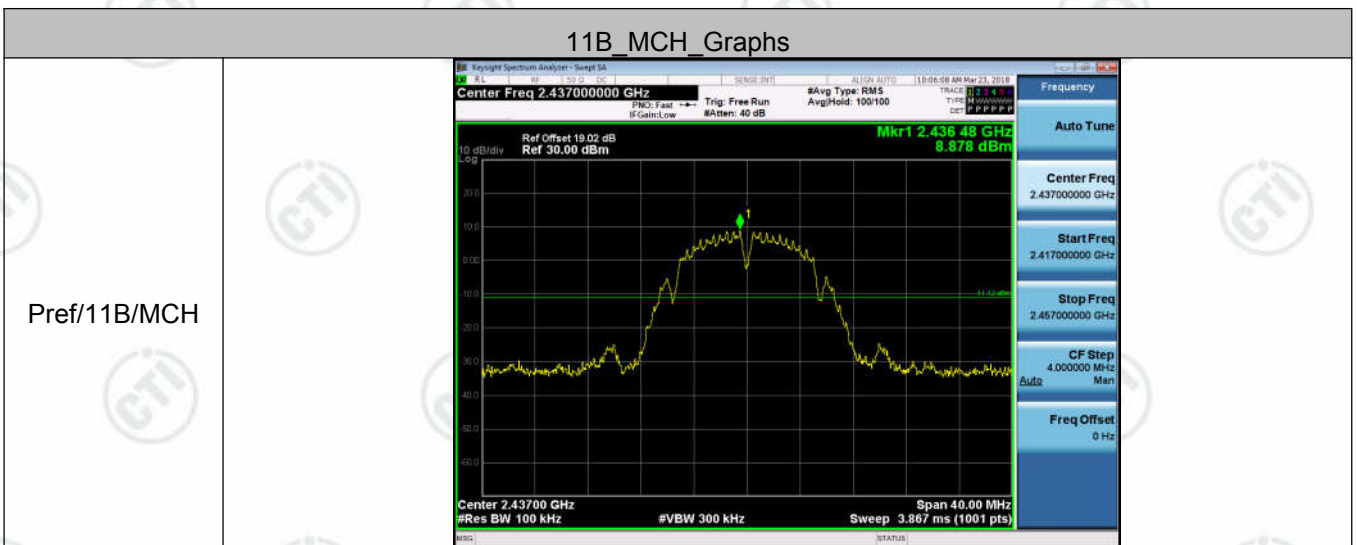


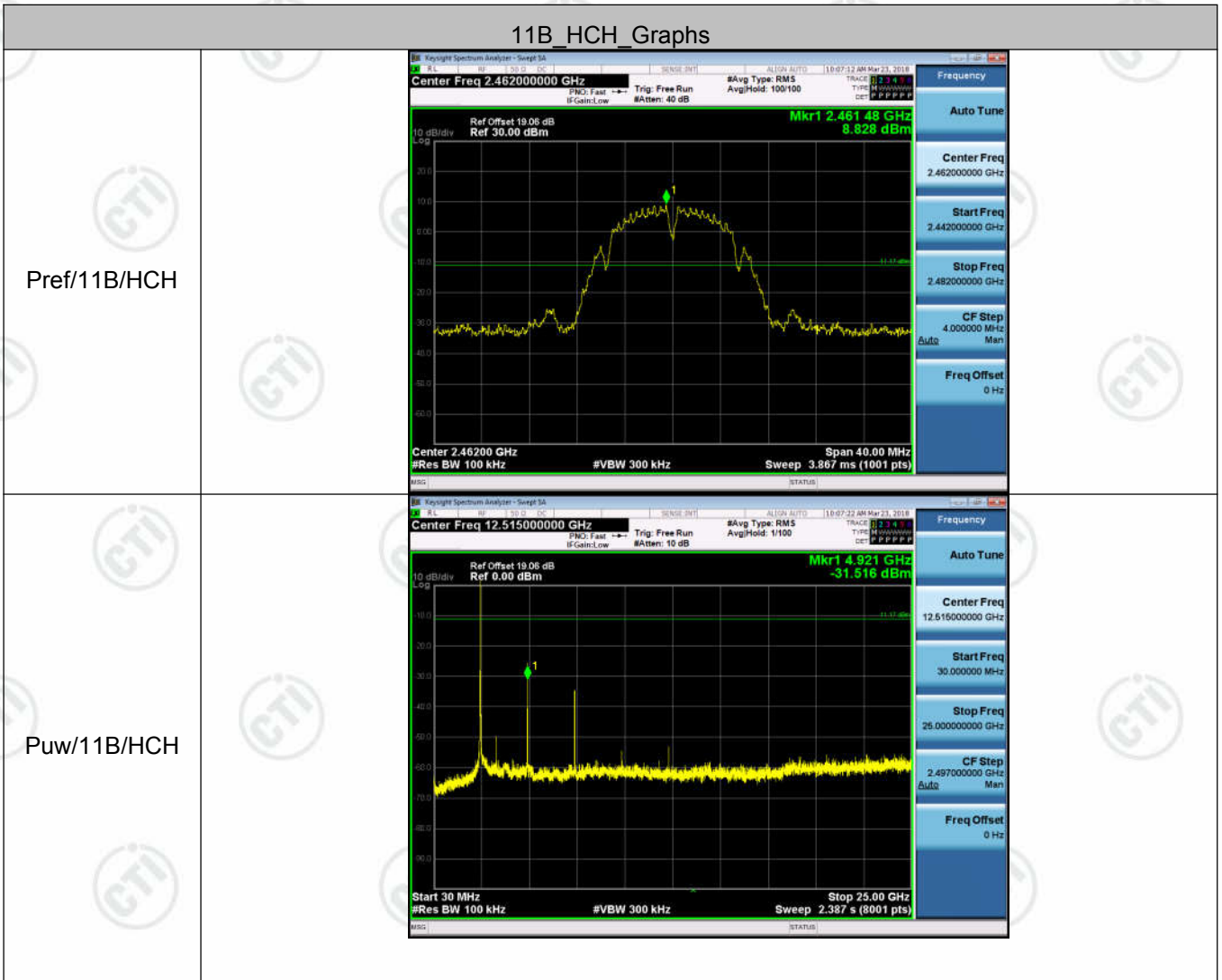
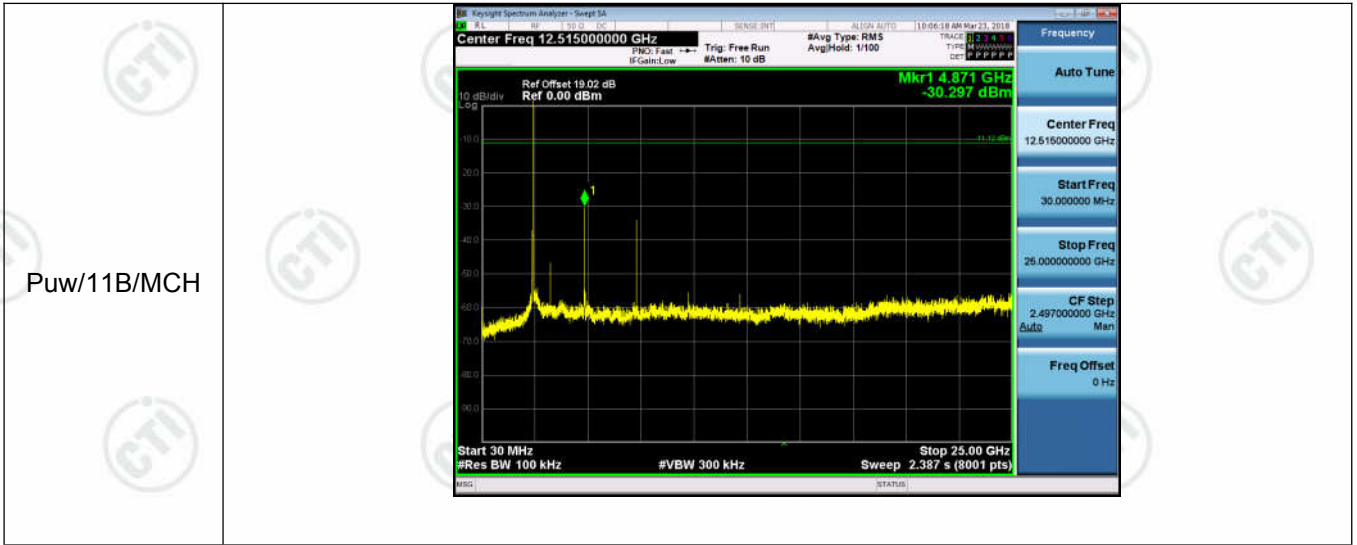
## Appendix D): RF Conducted Spurious Emissions

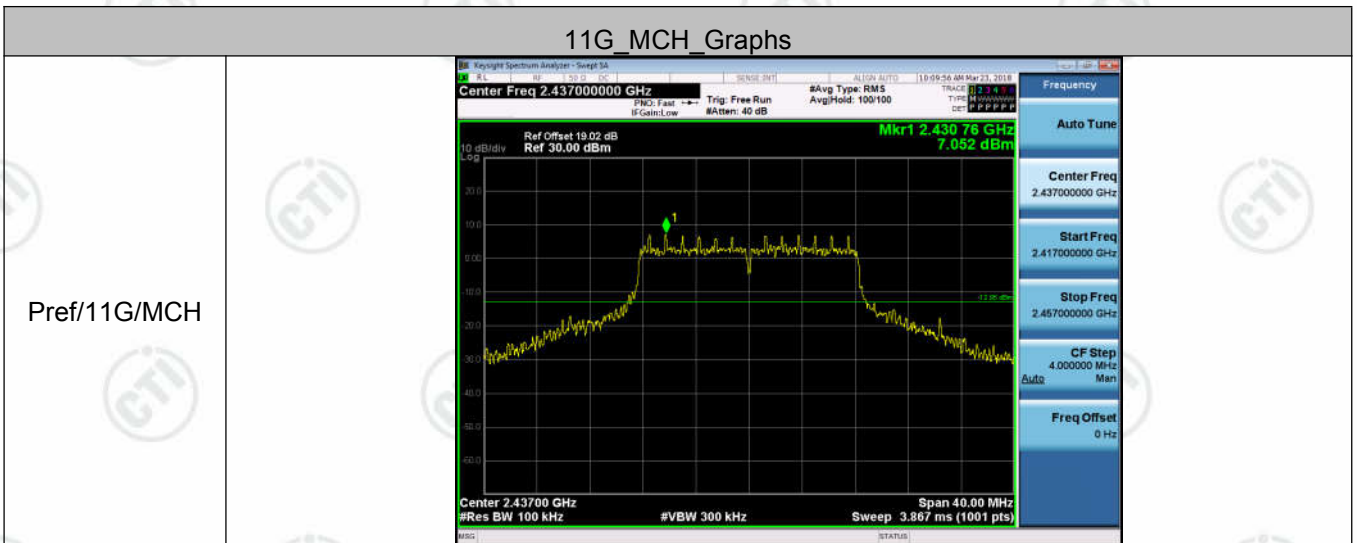
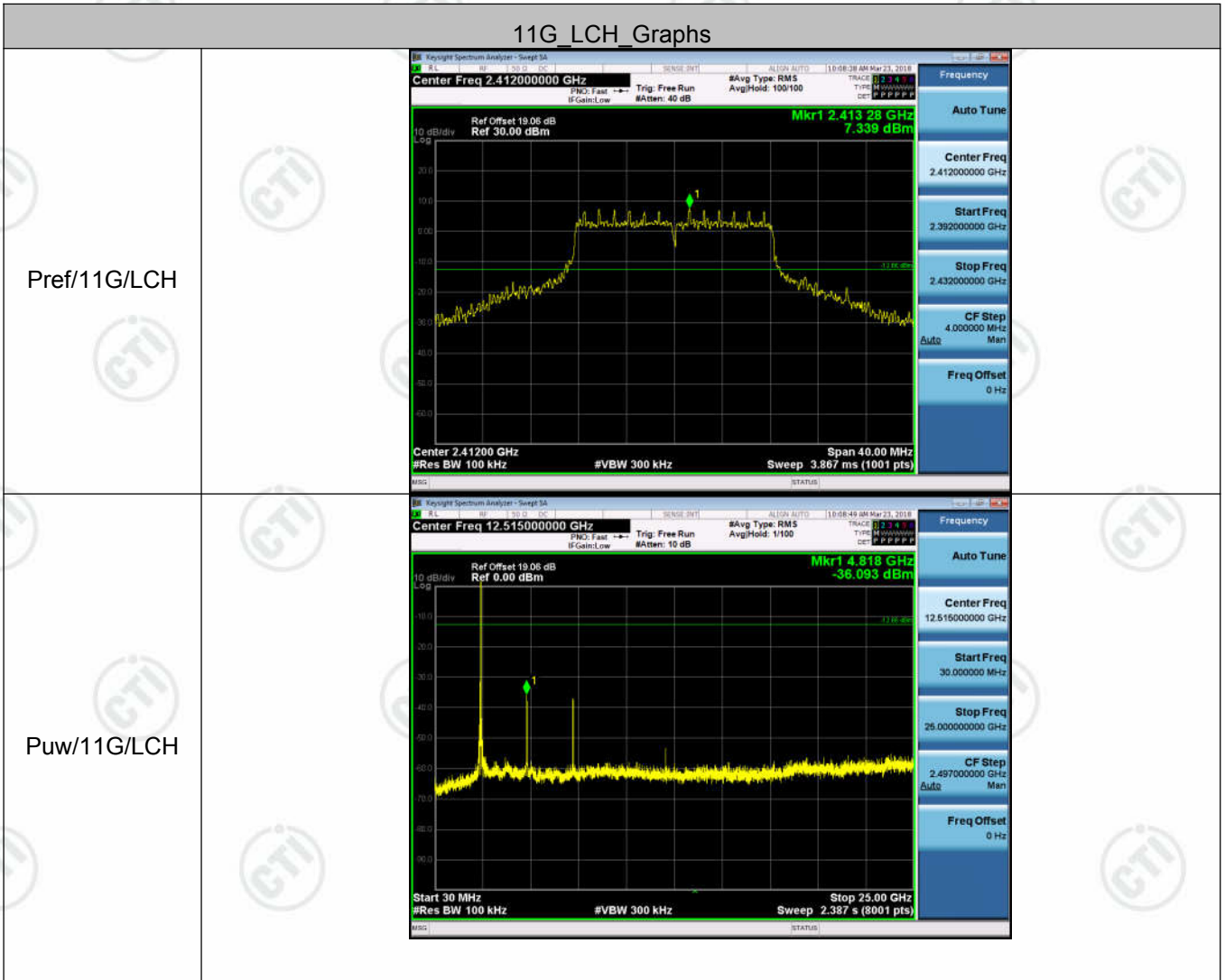
**Result Table**

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
11B	LCH	9.268	<Limit	PASS
11B	MCH	8.878	<Limit	PASS
11B	HCH	8.828	<Limit	PASS
11G	LCH	7.339	<Limit	PASS
11G	MCH	7.052	<Limit	PASS
11G	HCH	7.515	<Limit	PASS
11N20SISO	LCH	7.426	<Limit	PASS
11N20SISO	MCH	7.320	<Limit	PASS
11N20SISO	HCH	7.449	<Limit	PASS

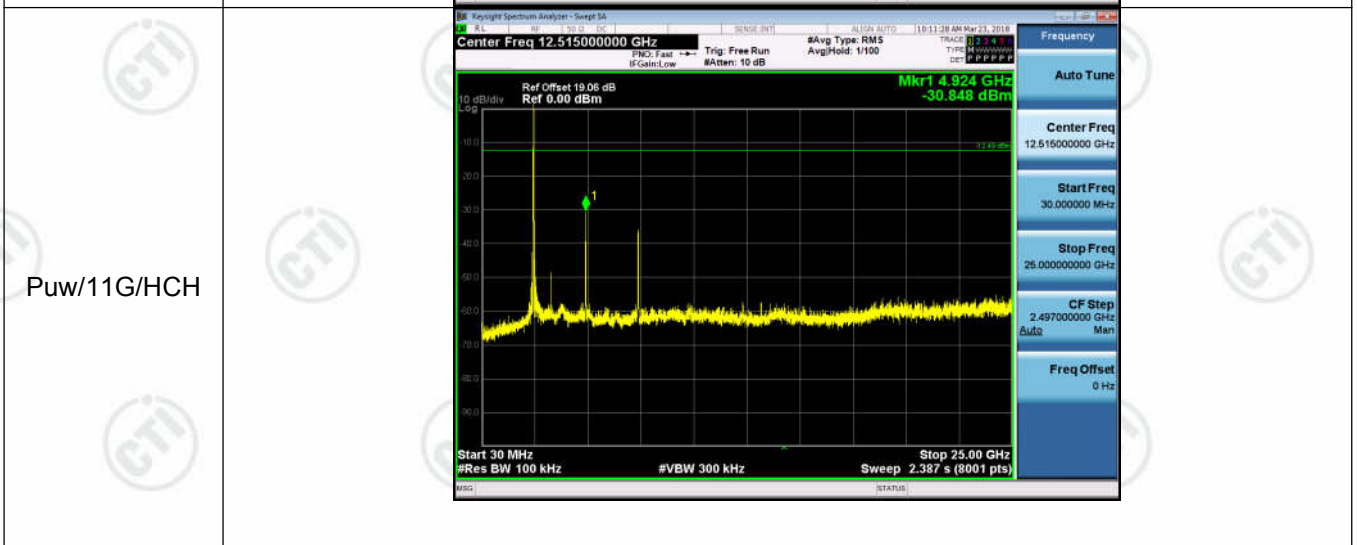
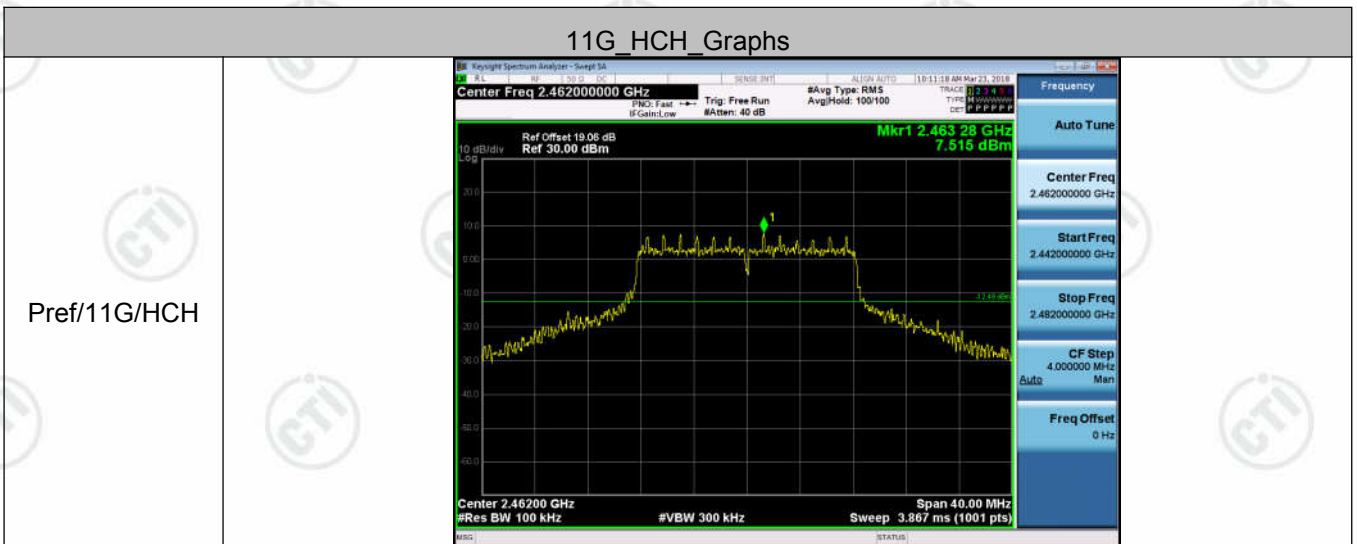
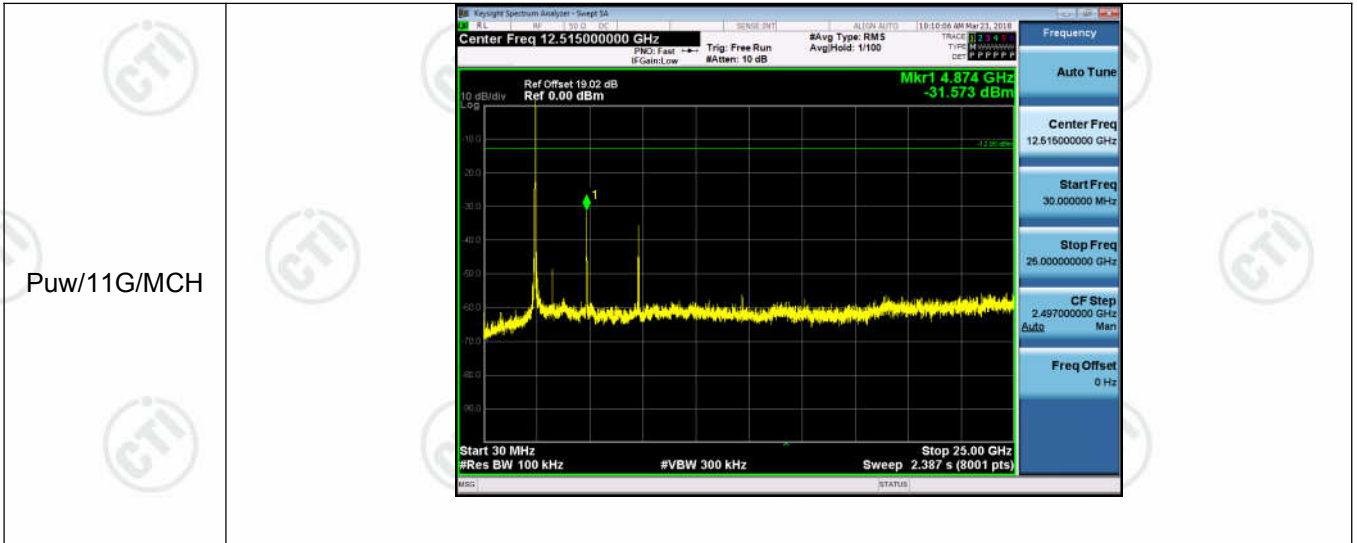
**Test Graph**



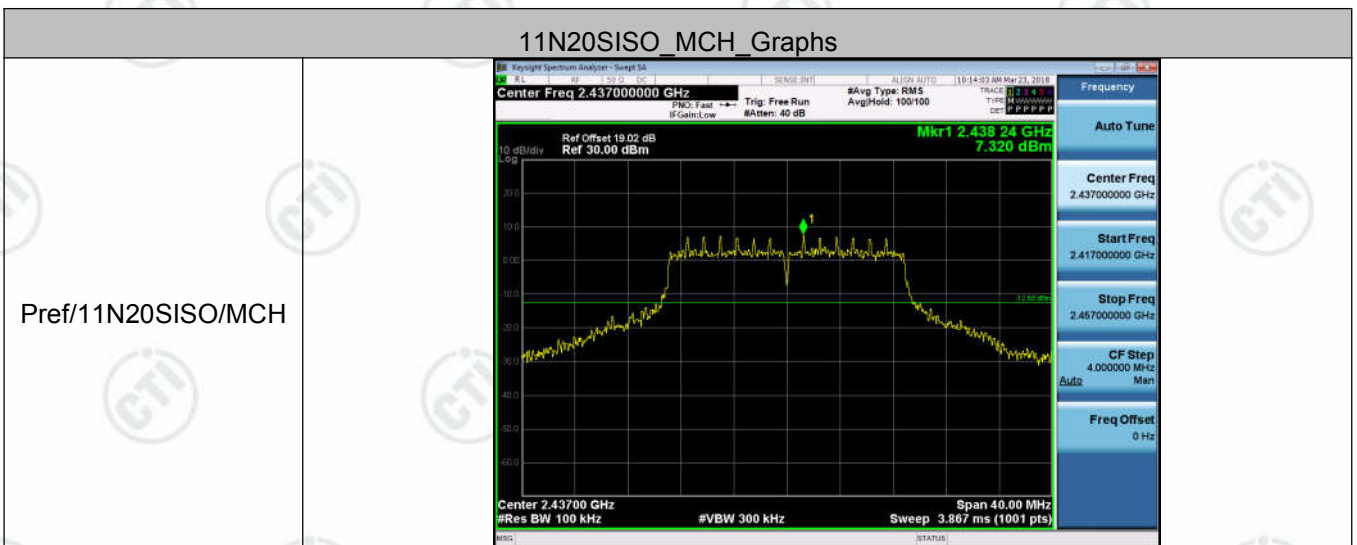
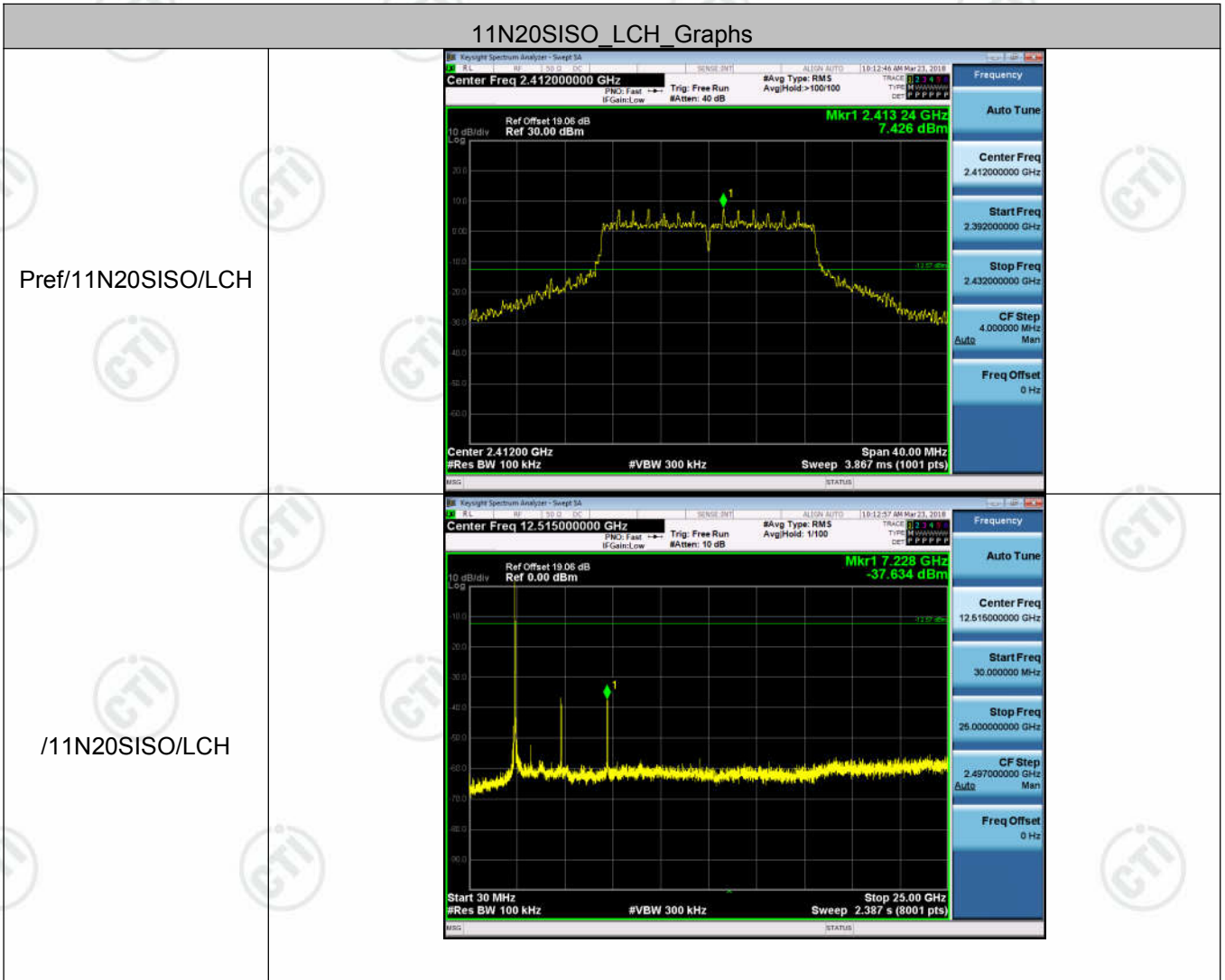


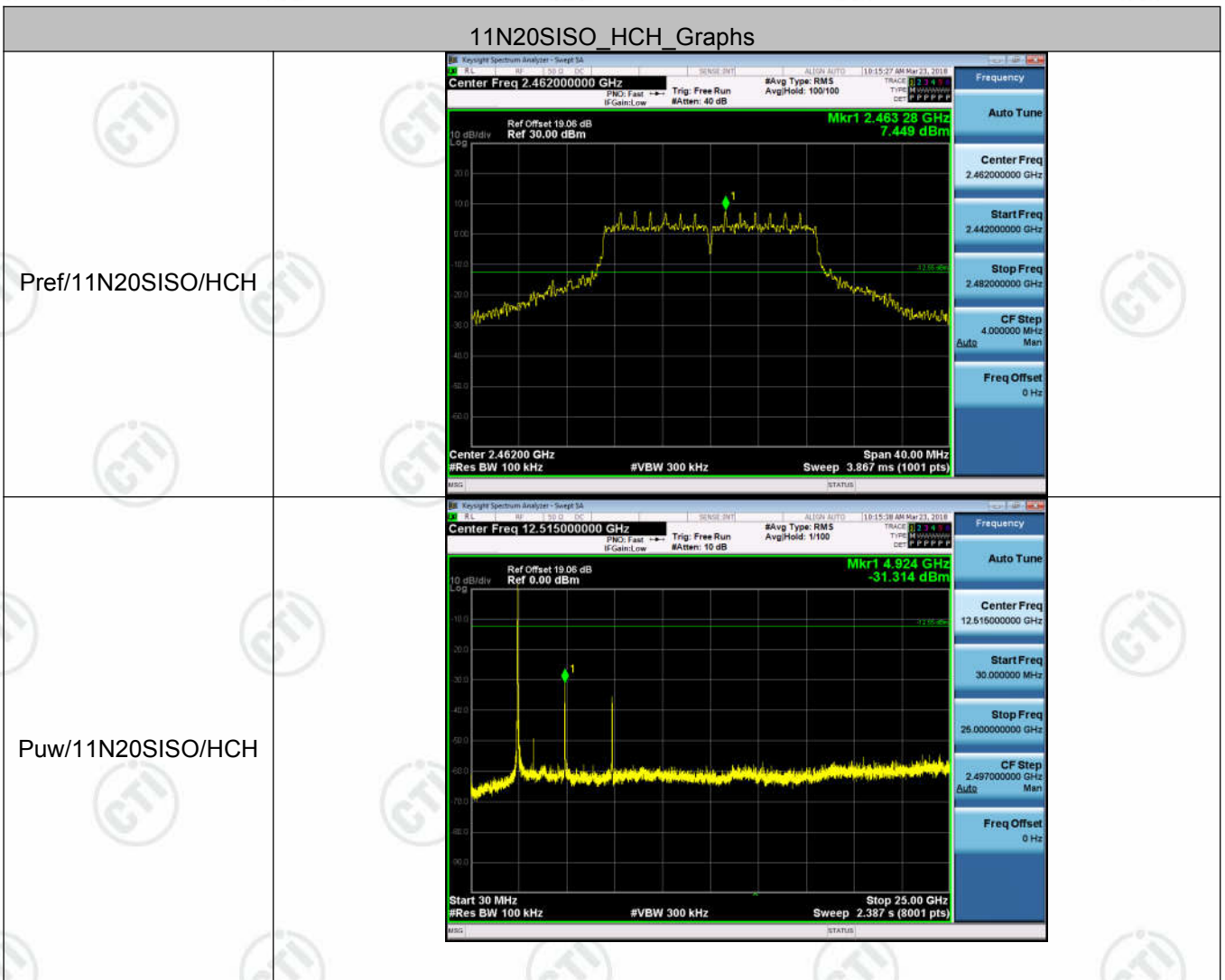
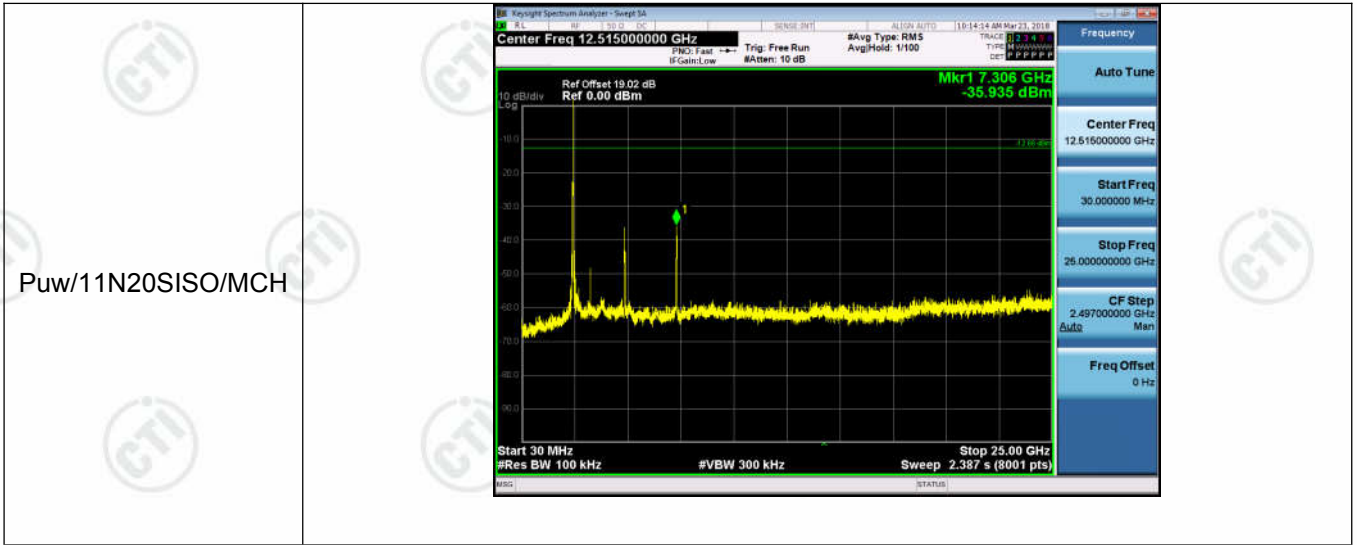










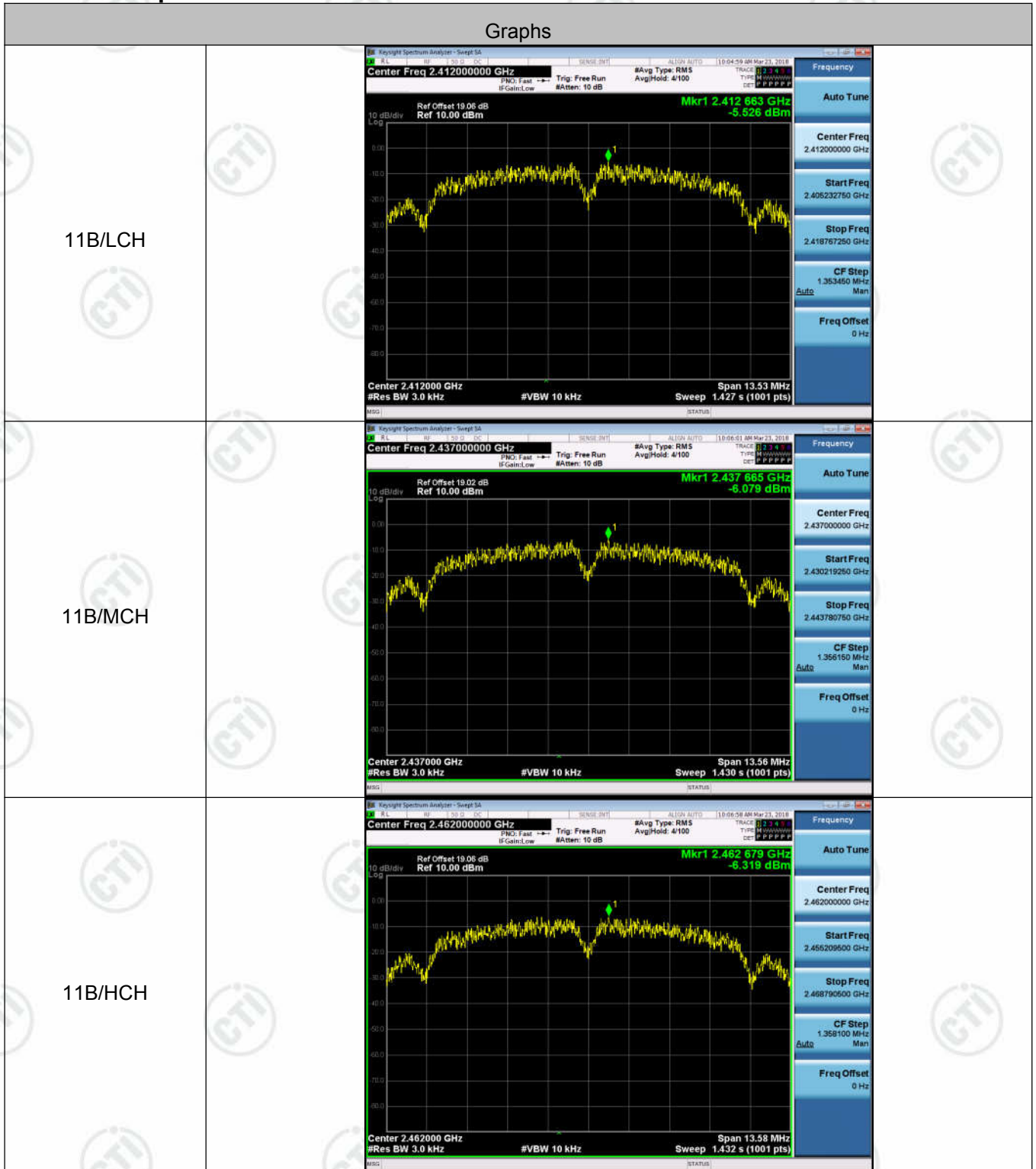


## Appendix E): Power Spectral Density

### Result Table

Mode	Channel	Power Spectral Density [dBm]	Limit [dBm/3kHz]	Verdict
11B	LCH	-5.526	8	PASS
11B	MCH	-6.079	8	PASS
11B	HCH	-6.319	8	PASS
11G	LCH	-6.971	8	PASS
11G	MCH	-6.947	8	PASS
11G	HCH	-6.709	8	PASS
11N20SISO	LCH	-8.312	8	PASS
11N20SISO	MCH	-8.414	8	PASS
11N20SISO	HCH	-8.351	8	PASS

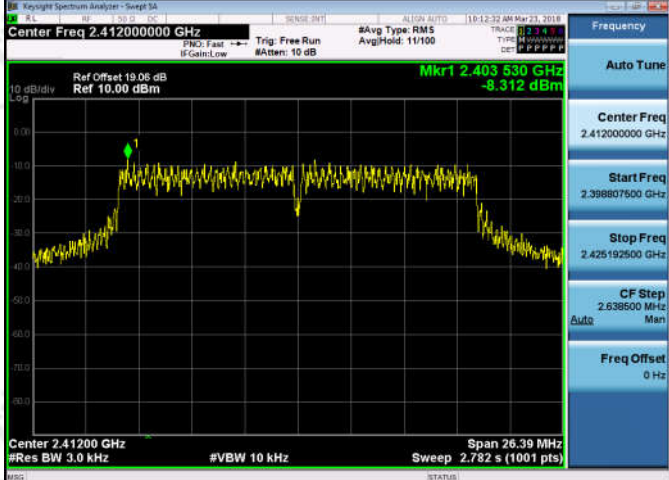
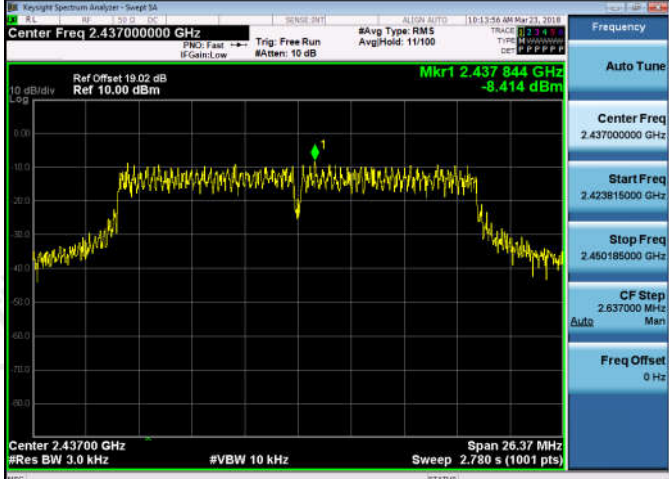
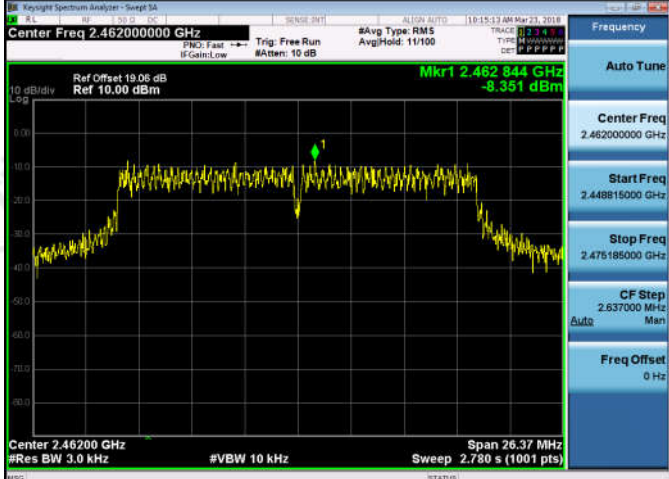
**Test Graph**





<p>11G/LCH</p>	
<p>11G/MCH</p>	
<p>11G/HCH</p>	



<p>11N20SISO/LCH</p>	
<p>11N20SISO/MCH</p>	
<p>11N20SISO/HCH</p>	

## Appendix F): Antenna Requirement

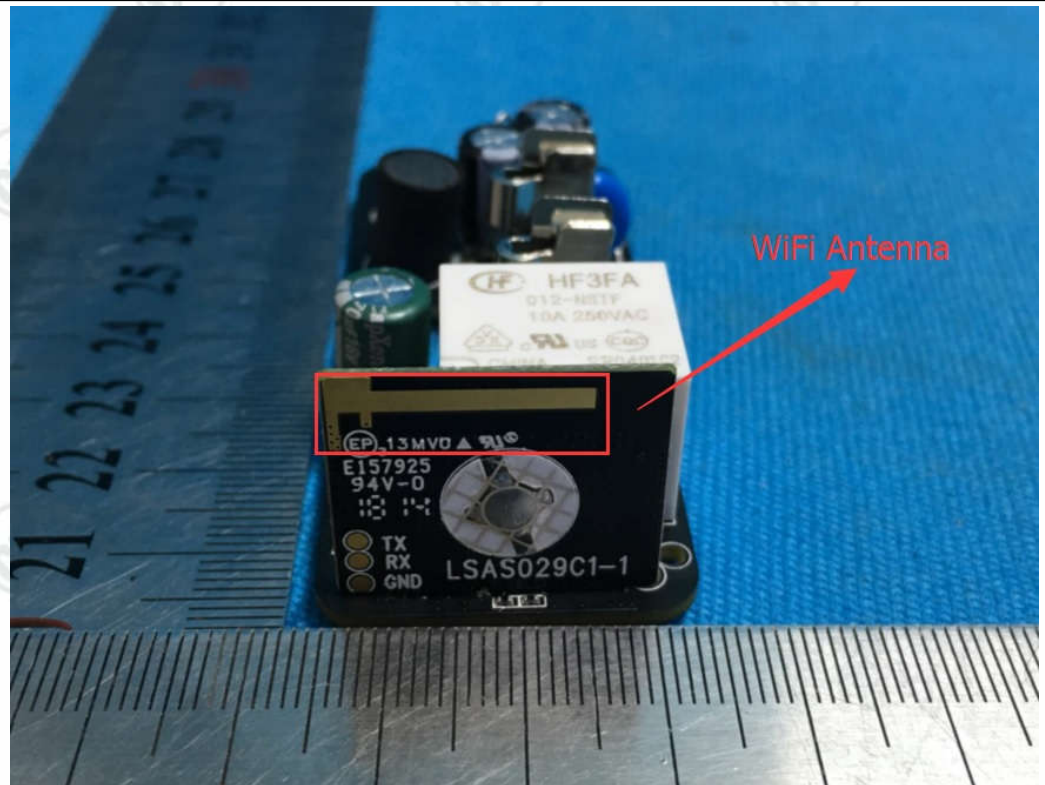
### 15.203 requirement:

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, 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.

### 15.247(b) (4) requirement:

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.

#### EUT Antenna:



The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -3dBi.

### Appendix G): AC Power Line Conducted Emission

Test Procedure:	<p>Test frequency range :150KHz-30MHz</p> <ol style="list-style-type: none"> <li>1)The mains terminal disturbance voltage test was conducted in a shielded room.</li> <li>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a <math>50\Omega/50\mu\text{H} + 5\Omega</math> linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</li> <li>3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,</li> <li>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.</li> </ol>														
Limit:	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dB<math>\mu</math>V)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table> <p>* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. NOTE : The lower limit is applicable at the transition frequency</p>	Frequency range (MHz)	Limit (dB $\mu$ V)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dB $\mu$ V)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													

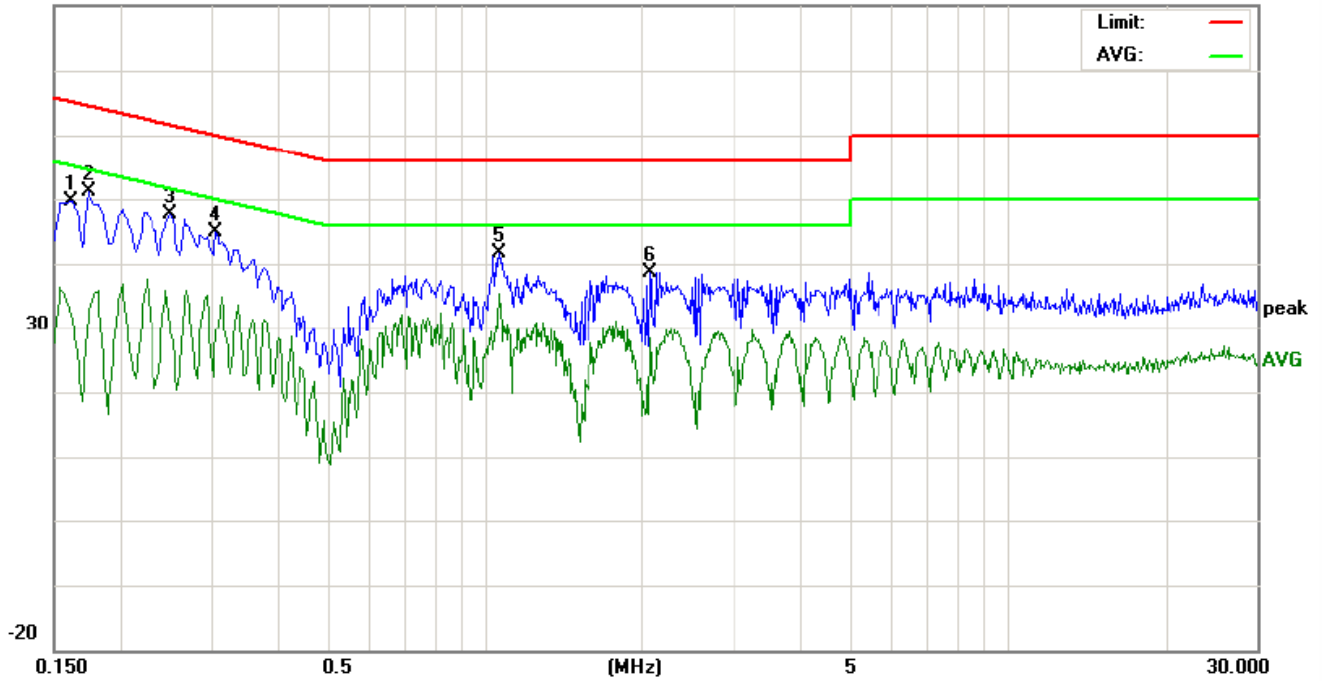
#### Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:

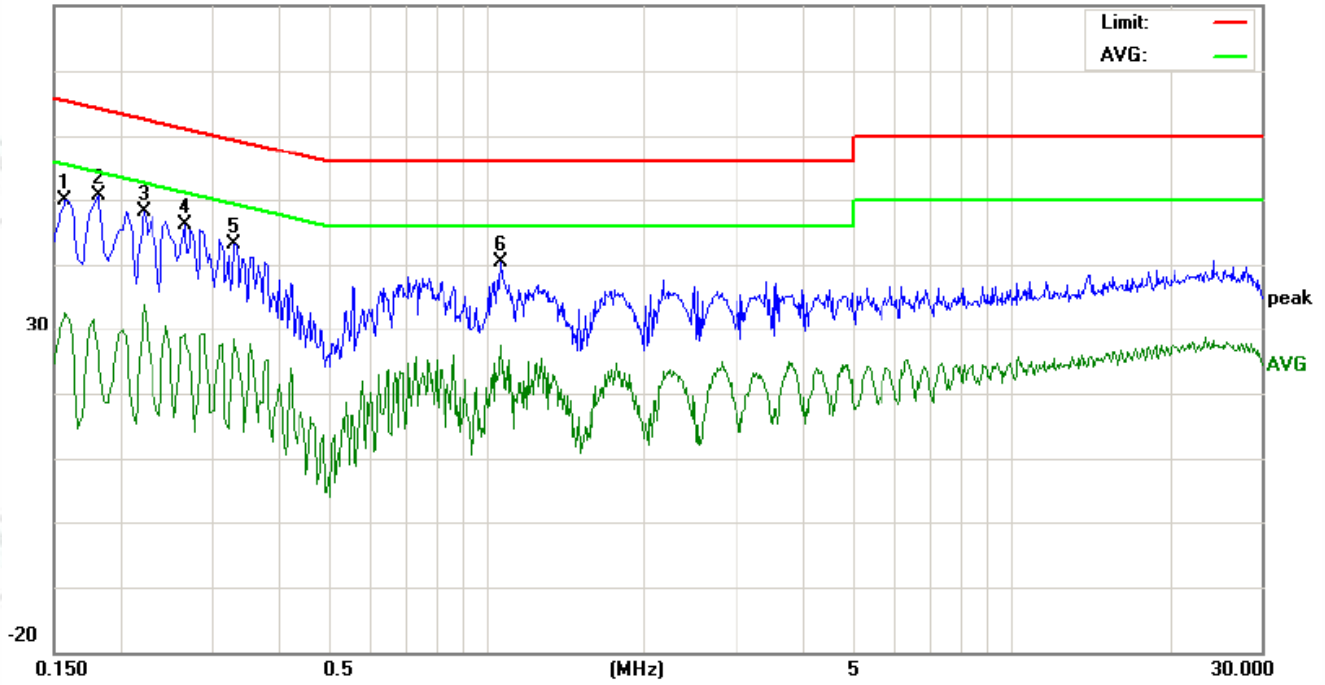
80.0 dBuV



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1620	39.92	35.81	18.55	9.75	49.67	45.56	28.30	65.36	55.36	-19.80	-27.06	P	
2	0.1740	41.28	35.66	21.61	9.74	51.02	45.40	31.35	64.76	54.76	-19.36	-23.41	P	
3	0.2500	37.96	32.78	20.74	9.74	47.70	42.52	30.48	61.75	51.75	-19.23	-21.27	P	
4	0.3067	33.76	29.68	18.83	9.78	43.54	39.46	28.61	60.06	50.06	-20.60	-21.45	P	
5	1.0700	31.94	29.92	24.36	9.72	41.66	39.64	34.08	56.00	46.00	-16.36	-11.92	P	
6	2.0750	29.01	20.01	7.38	9.72	38.73	29.73	17.10	56.00	46.00	-26.27	-28.90	P	



Neutral line:  
80.0 dBuV



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1580	40.21	37.76	21.58	9.76	49.97	47.52	31.34	65.56	55.56	-18.04	-24.22	P	
2	0.1819	40.98	34.94	18.03	9.73	50.71	44.67	27.76	64.39	54.39	-19.72	-26.63	P	
3	0.2220	38.46	36.85	21.67	9.73	48.19	46.58	31.40	62.74	52.74	-16.16	-21.34	P	
4	0.2660	36.33	34.60	19.84	9.76	46.09	44.36	29.60	61.24	51.24	-16.88	-21.64	P	
5	0.3303	33.93	30.60	15.74	9.77	43.70	40.37	25.51	59.44	49.44	-19.07	-23.93	P	
6	1.0660	30.57	27.64	17.11	9.72	40.29	37.36	26.83	56.00	46.00	-18.64	-19.17	P	

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

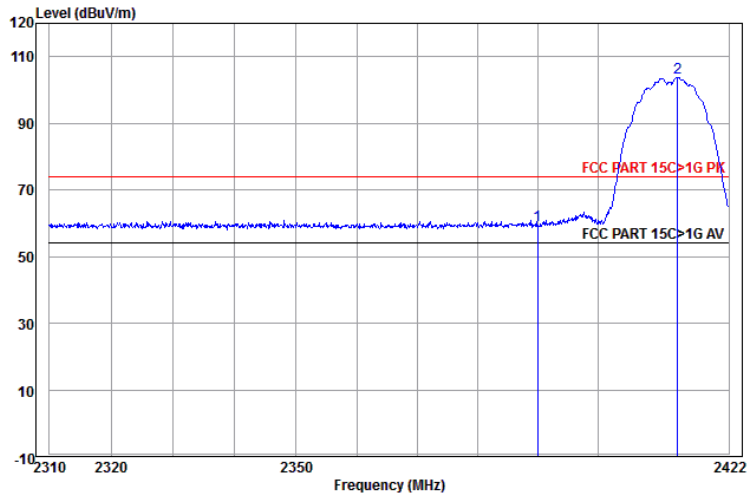


## Appendix H): Restricted bands around fundamental frequency (Radiated)

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Test Procedure:	<p><b>Below 1GHz test procedure as below:</b></p> <ol style="list-style-type: none"> <li>The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel</li> </ol> <p><b>Above 1GHz test procedure as below:</b></p> <ol style="list-style-type: none"> <li>Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber change form table 0.8 meter to 1.5 meter( Above 18GHz the distance is 1 meter and table is 1.5 meter).</li> <li>Test the EUT in the lowest channel , the Highest channel</li> <li>The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.</li> <li>Repeat above procedures until all frequencies measured was complete.</li> </ol>				
Limit:	Frequency	Limit (dB $\mu$ V/m @3m)	Remark		
	30MHz-88MHz	40.0	Quasi-peak Value		
	88MHz-216MHz	43.5	Quasi-peak Value		
	216MHz-960MHz	46.0	Quasi-peak Value		
	960MHz-1GHz	54.0	Quasi-peak Value		
	Above 1GHz	54.0	Average Value		
		74.0	Peak Value		

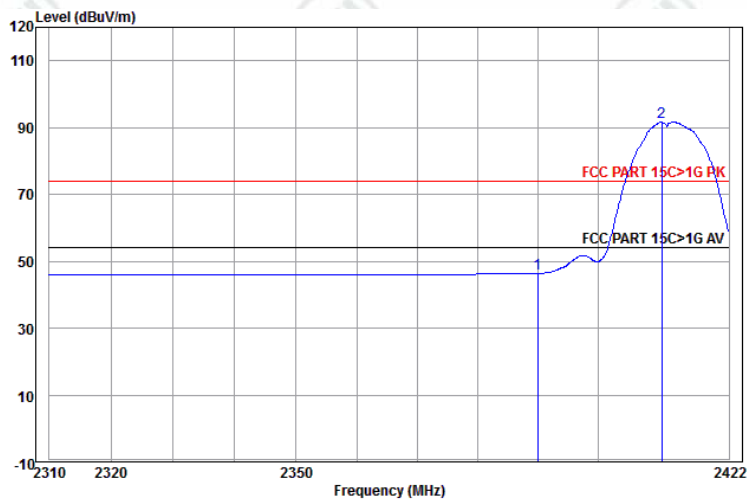
**Test plot as follows:**

Worse case mode:	802.11b (11Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Peak



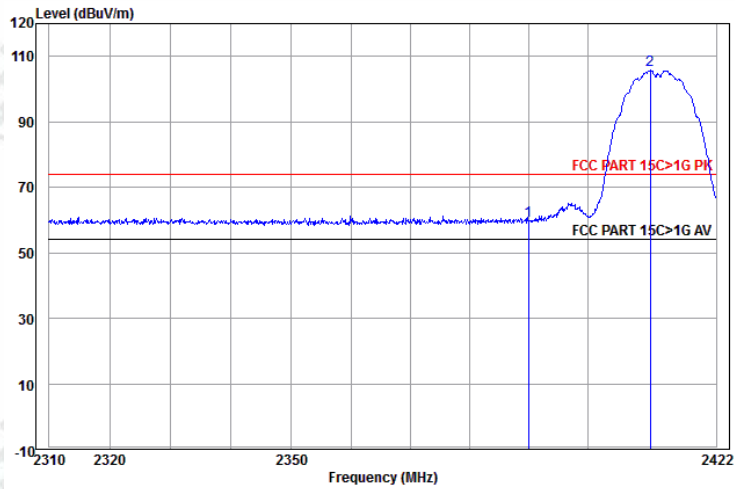
	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	23.78	59.38	74.00	-14.62	Horizontal	
2 pp	2413.415	32.58	3.08	68.05	103.71	74.00	29.71	Horizontal	

Worse case mode:	802.11b (11Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Average



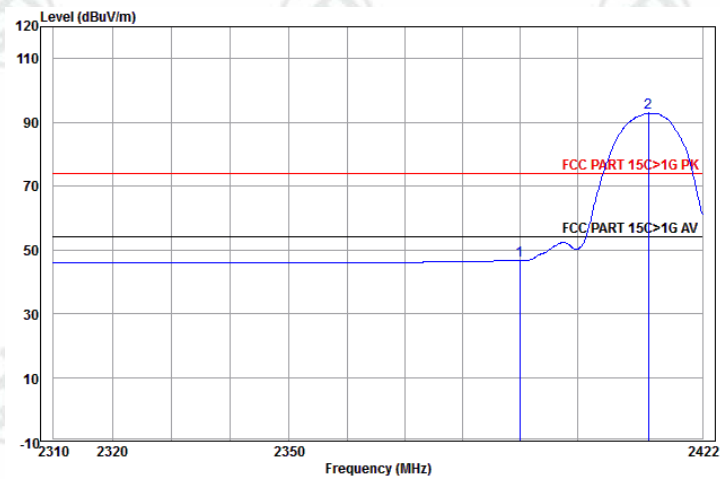
	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	10.83	46.43	54.00	-7.57	Horizontal	Average
2 pp	2410.674	32.58	3.08	55.90	91.56	54.00	37.56	Horizontal	Average

Worse case mode:	802.11b (11Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Vertical	Remark: Peak



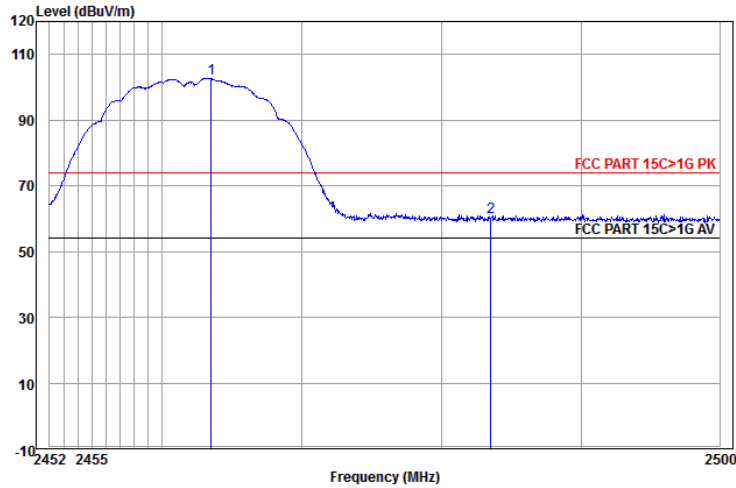
	Ant Freq	Cable Factor	Cable Loss	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2390.000	32.53	3.07	24.25	59.85	74.00	-14.15	Vertical
2 pp	2410.674	32.58	3.08	70.09	105.75	74.00	31.75	Vertical

Worse case mode:	802.11b (11Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Vertical	Remark: Average



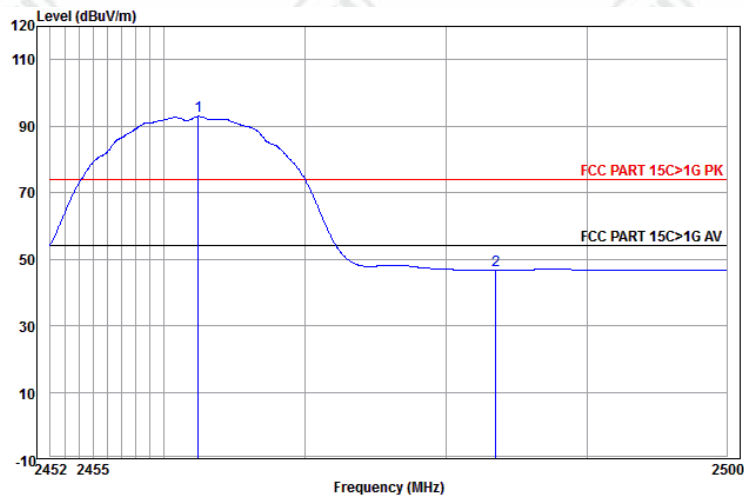
	Ant Freq	Cable Factor	Cable Loss	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2390.000	32.53	3.07	10.99	46.59	54.00	-7.41	Vertical Average
2 pp	2412.501	32.58	3.08	57.25	92.91	54.00	38.91	Vertical Average

Worse case mode:	802.11b (11Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Horizontal	Remark: Peak



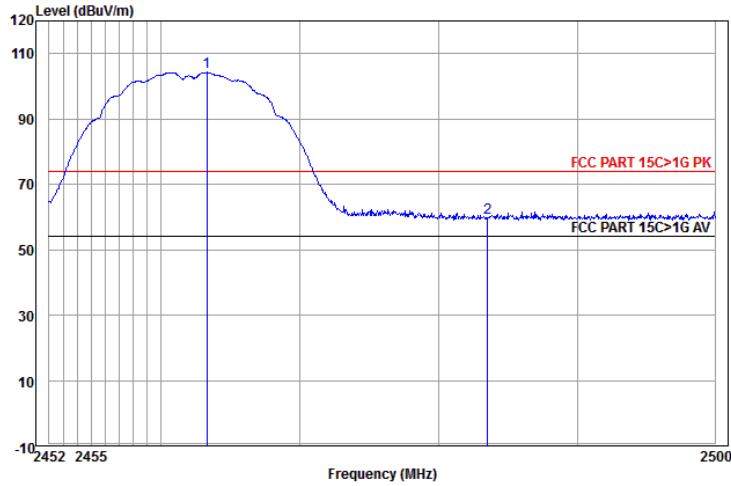
	Ant Freq	Cable Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	2463.483	32.68	3.11	66.95	102.74	74.00	28.74	Horizontal
2	2483.500	32.71	3.12	24.59	60.42	74.00	-13.58	Horizontal

Worse case mode:	802.11b (11Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Horizontal	Remark: Average



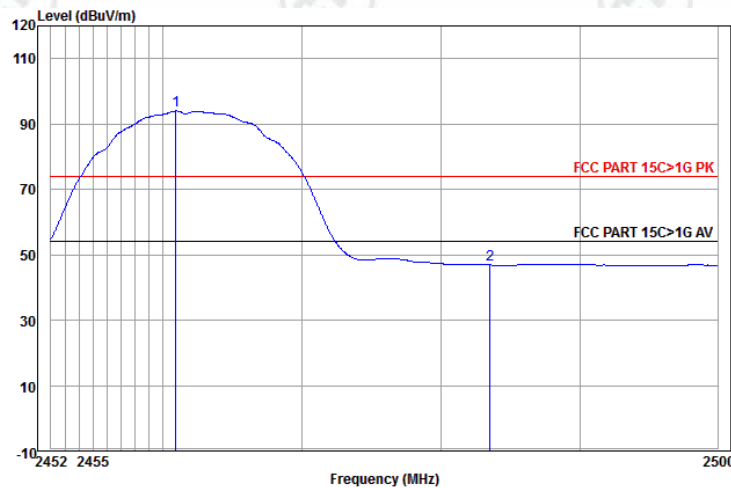
	Ant Freq	Cable Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	2462.433	32.67	3.11	57.13	92.91	54.00	38.91	Horizontal Average
2	2483.500	32.71	3.12	10.91	46.74	54.00	-7.26	Horizontal Average

Worse case mode:	802.11b (11Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Vertical	Remark: Peak



	Ant Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2463.292	32.68	3.11	68.47	104.26	74.00	30.26	Vertical	
2	2483.500	32.71	3.12	23.86	59.69	74.00	-14.31	Vertical	

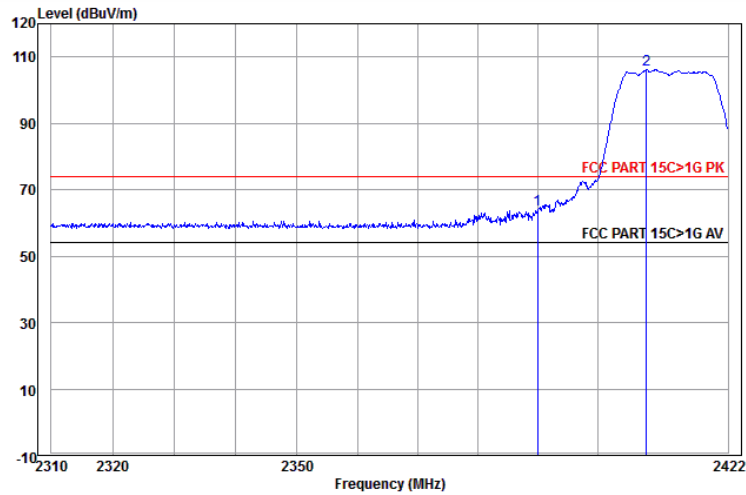
Worse case mode:	802.11b (11Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Vertical	Remark: Average



	Ant Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2460.906	32.67	3.11	58.24	94.02	54.00	40.02	Vertical	Average
2	2483.500	32.71	3.12	11.03	46.86	54.00	-7.14	Vertical	Average

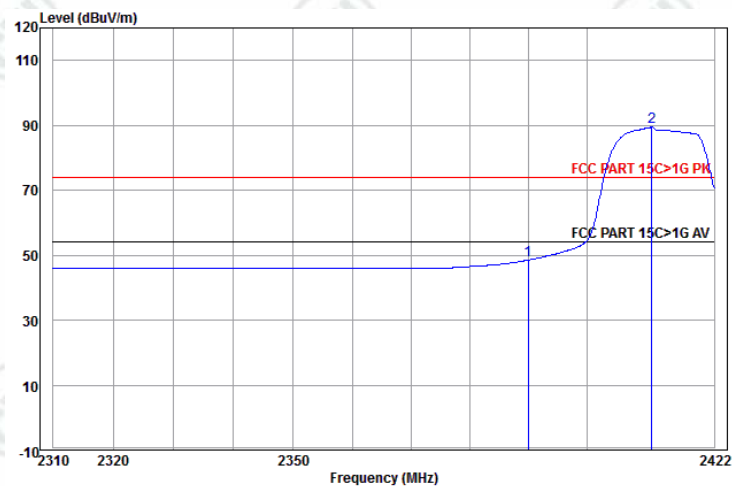


Worse case mode:	802.11g (6Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Peak



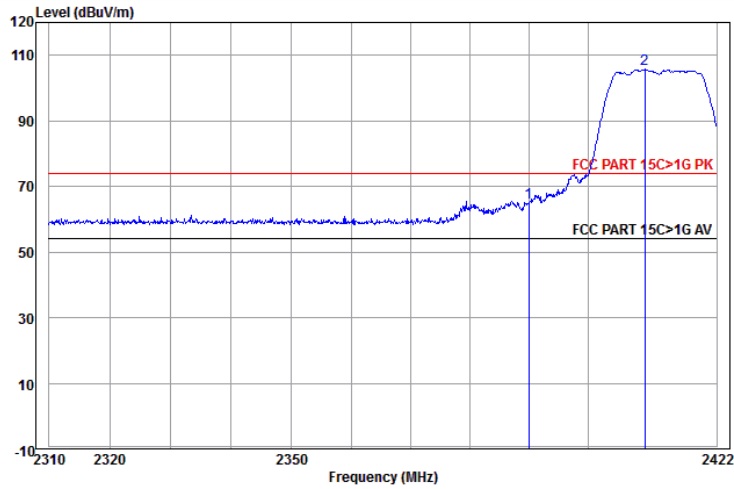
	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	28.41	64.01	74.00	-9.99	Horizontal	
2 pp	2408.278	32.57	3.08	70.43	106.08	74.00	32.08	Horizontal	

Worse case mode:	802.11g (6Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Average



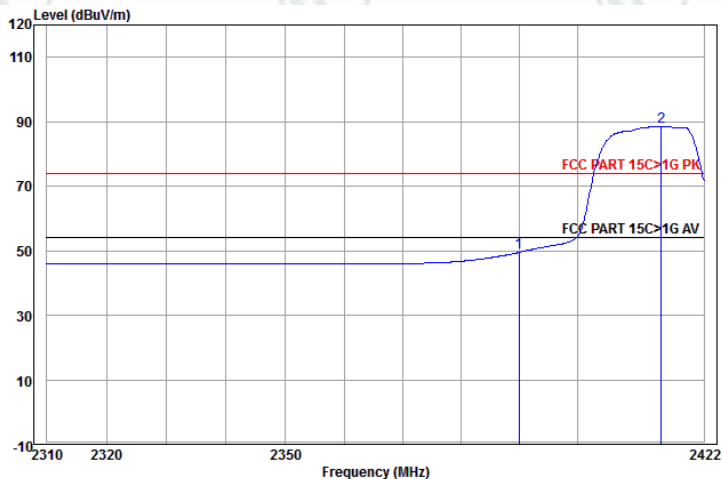
	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	12.97	48.57	54.00	-5.43	Horizontal	Average
2 pp	2411.245	32.58	3.08	53.80	89.46	54.00	35.46	Horizontal	Average

Worse case mode:	802.11g (6Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Vertical	Remark: Peak



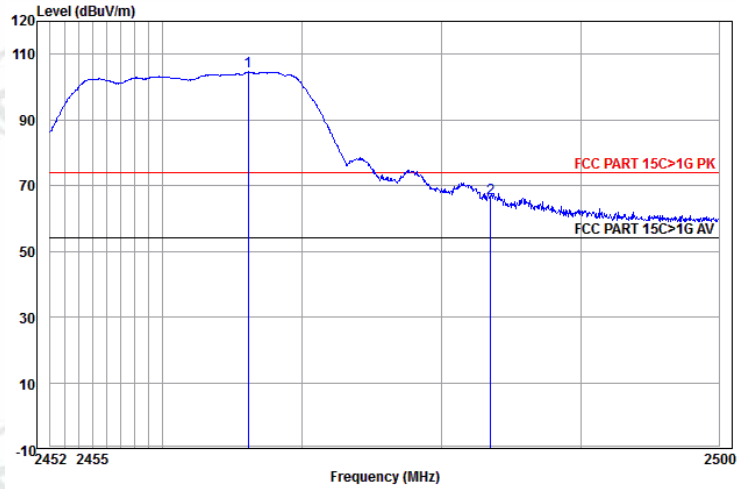
	Ant Freq	Cable Factor	Loss	Read Level	Level	Limit	Over	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	29.66	65.26	74.00	-8.74	Vertical	
2 pp	2409.761	32.57	3.08	70.01	105.66	74.00	31.66	Vertical	

Worse case mode:	802.11g (6Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Vertical	Remark: Average



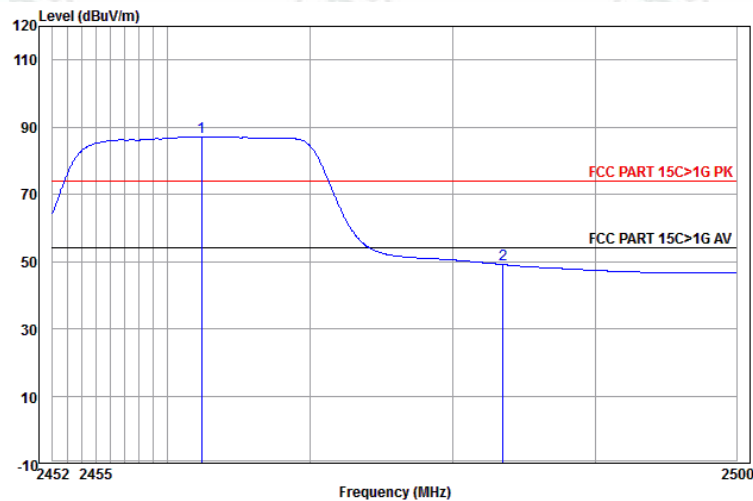
	Ant Freq	Cable Factor	Loss	Read Level	Level	Limit	Over	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	13.97	49.57	54.00	-4.43	Vertical	Average
2 pp	2414.558	32.58	3.08	52.82	88.48	54.00	34.48	Vertical	Average

Worse case mode:	802.11g (6Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Horizontal	Remark: Peak



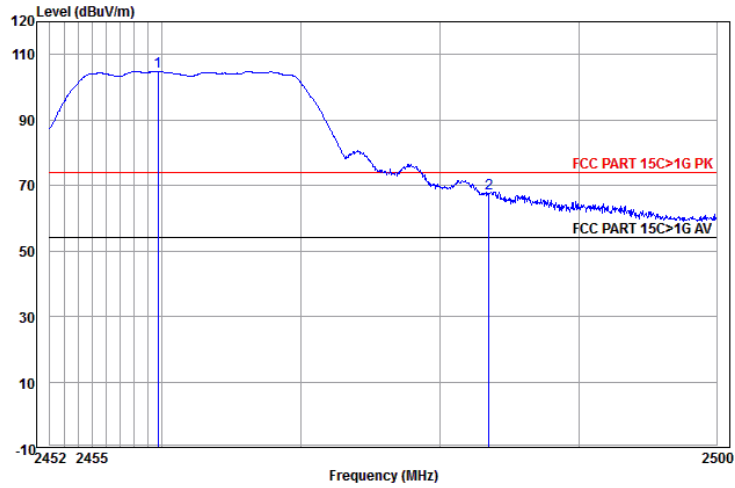
	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	pp 2466.111	32.68	3.11	68.81	104.60	74.00	30.60	Horizontal	
2	2483.500	32.71	3.12	30.31	66.14	74.00	-7.86	Horizontal	

Worse case mode:	802.11g (6Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Horizontal	Remark: Average



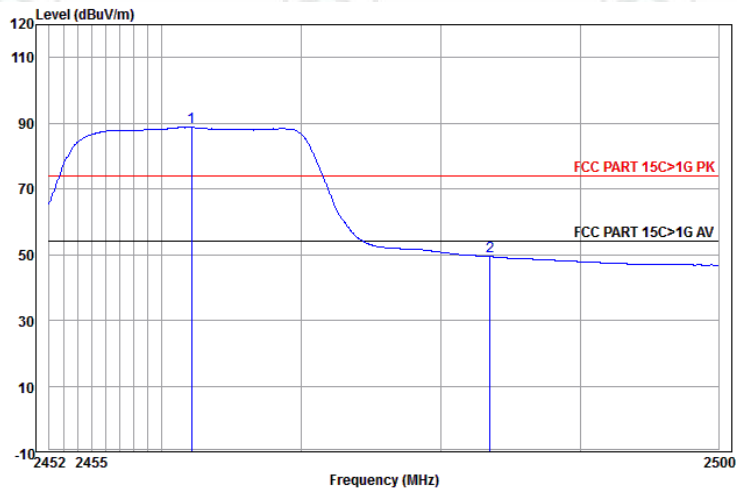
	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	pp 2462.385	32.67	3.11	51.40	87.18	54.00	33.18	Horizontal	Average
2	2483.500	32.71	3.12	13.30	49.13	54.00	-4.87	Horizontal	Average

Worse case mode:	802.11g (6Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Vertical	Remark: Peak



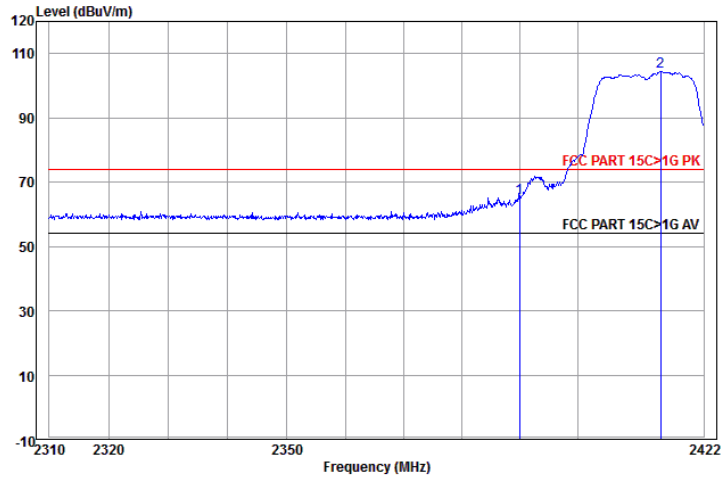
	Ant Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2459.713	32.67	3.11	69.10	104.88	74.00	30.88	Vertical	
2	2483.500	32.71	3.12	31.89	67.72	74.00	-6.28	Vertical	

Worse case mode:	802.11g (6Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Vertical	Remark: Average



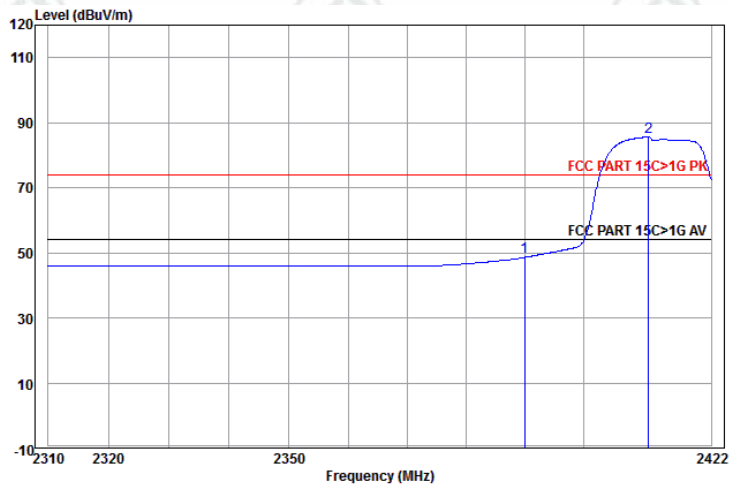
	Ant Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2462.146	32.67	3.11	52.99	88.77	54.00	34.77	Vertical	Average
2	2483.500	32.71	3.12	13.60	49.43	54.00	-4.57	Vertical	Average

Worse case mode:	802.11n(HT20) (6.5Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Peak



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	29.42	65.02	74.00	-8.98	Horizontal	
2 pp	2414.443	32.58	3.08	68.67	104.33	74.00	30.33	Horizontal	

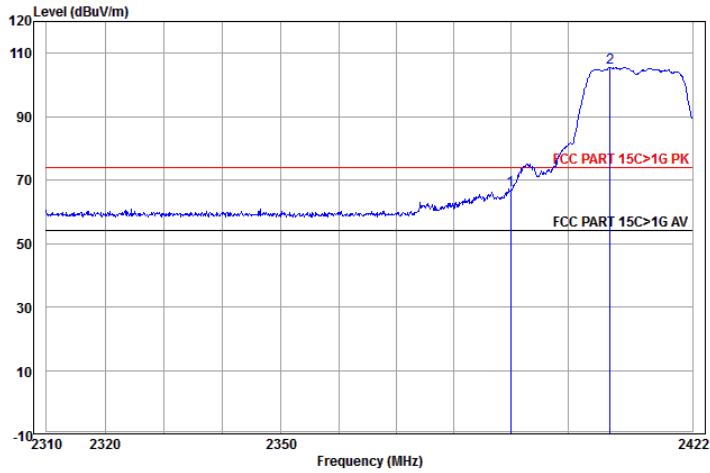
Worse case mode:	802.11n(HT20) (6.5Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Average



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	13.06	48.66	54.00	-5.34	Horizontal	Average
2 pp	2411.245	32.58	3.08	50.02	85.68	54.00	31.68	Horizontal	Average

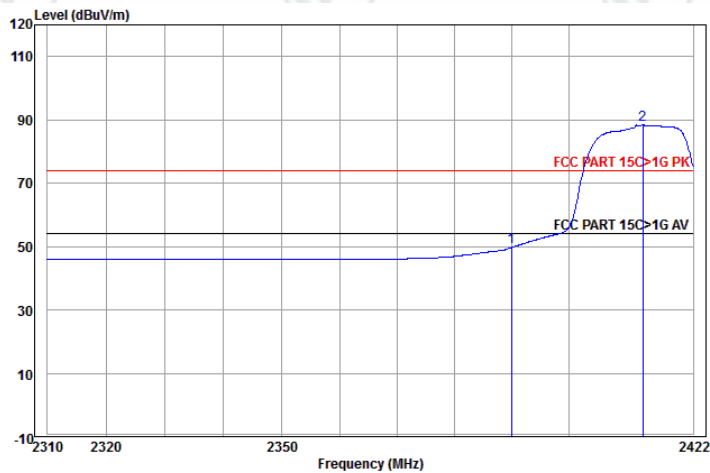


Worse case mode:	802.11n(HT20) (6.5Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Vertical	Remark: Peak



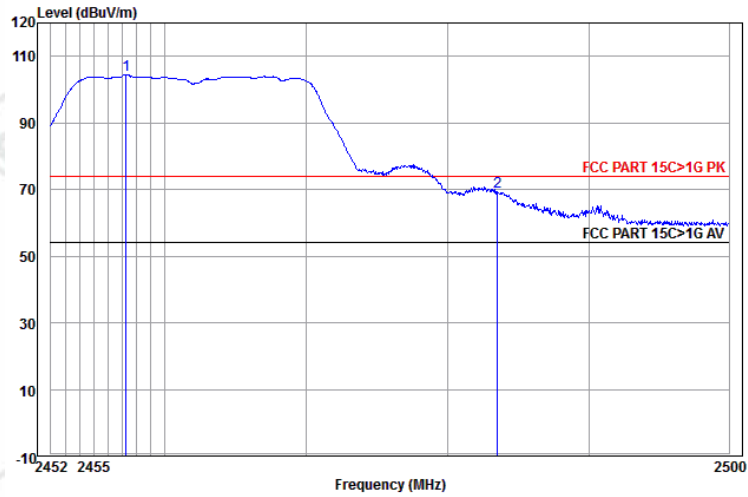
	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	31.26	66.86	74.00	-7.14	Vertical	
2 pp	2407.480	32.57	3.08	69.98	105.63	74.00	31.63	Vertical	

Worse case mode:	802.11n(HT20) (6.5Mbps)		
Frequency: 2412MHz	Test channel: Lowest	Polarization: Vertical	Remark: Average



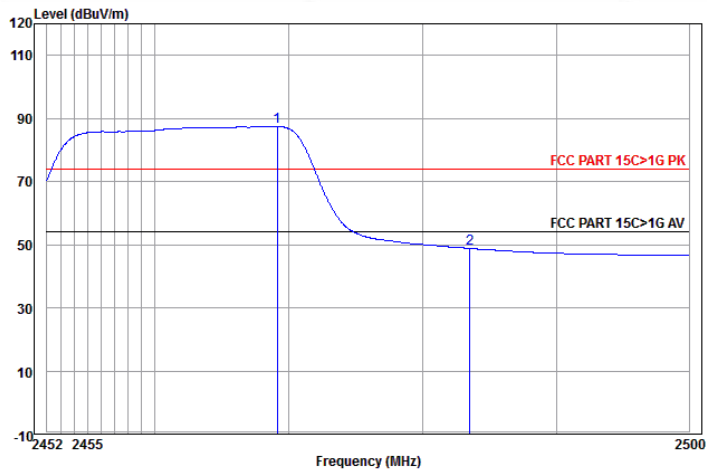
	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	14.19	49.79	54.00	-4.21	Vertical	Average
2 pp	2413.072	32.58	3.08	52.68	88.34	54.00	34.34	Vertical	Average

Worse case mode:	802.11n(HT20) (6.5Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Horizontal	Remark: Peak



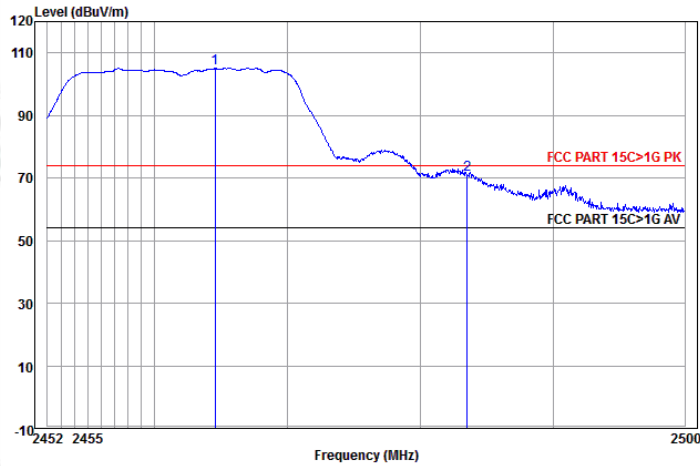
	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz		dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2457.282	32.66	3.10	68.72	104.48	74.00	30.48	Horizontal	
2	2483.500	32.71	3.12	33.42	69.25	74.00	-4.75	Horizontal	

Worse case mode:	802.11n(HT20) (6.5Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Horizontal	Remark: Average



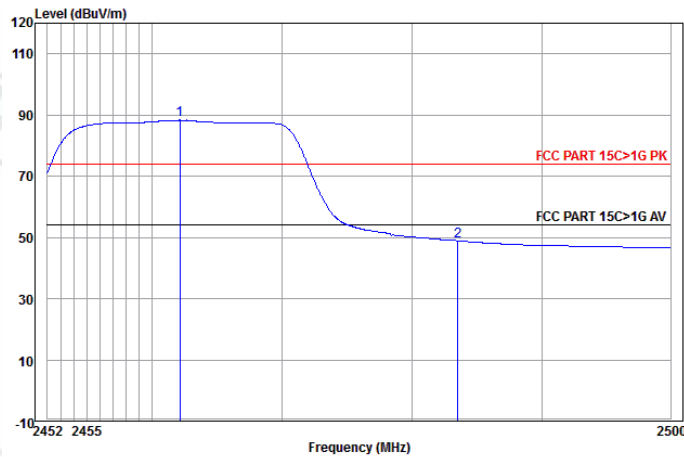
	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz		dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2469.125	32.69	3.11	51.61	87.41	54.00	33.41	Horizontal	Average
2	2483.500	32.71	3.12	13.01	48.84	54.00	-5.16	Horizontal	Average

Worse case mode:	802.11n(HT20) (6.5Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Vertical	Remark: Peak



	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2464.534	32.68	3.11	69.24	105.03	74.00	31.03	Vertical	
2	2483.500	32.71	3.12	35.12	70.95	74.00	-3.05	Vertical	

Worse case mode:	802.11n(HT20) (6.5Mbps)		
Frequency: 2462MHz	Test channel: Highest	Polarization: Vertical	Remark: Average



	Ant Freq	Cable Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2462.146	32.67	3.11	52.53	88.31	54.00	34.31	Vertical	Average
2	2483.500	32.71	3.12	13.08	48.91	54.00	-5.09	Vertical	Average

**Note:**

1) Through Pre-scan transmitting mode with all kind of modulation and data rate, find the 11Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; and then Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading - Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

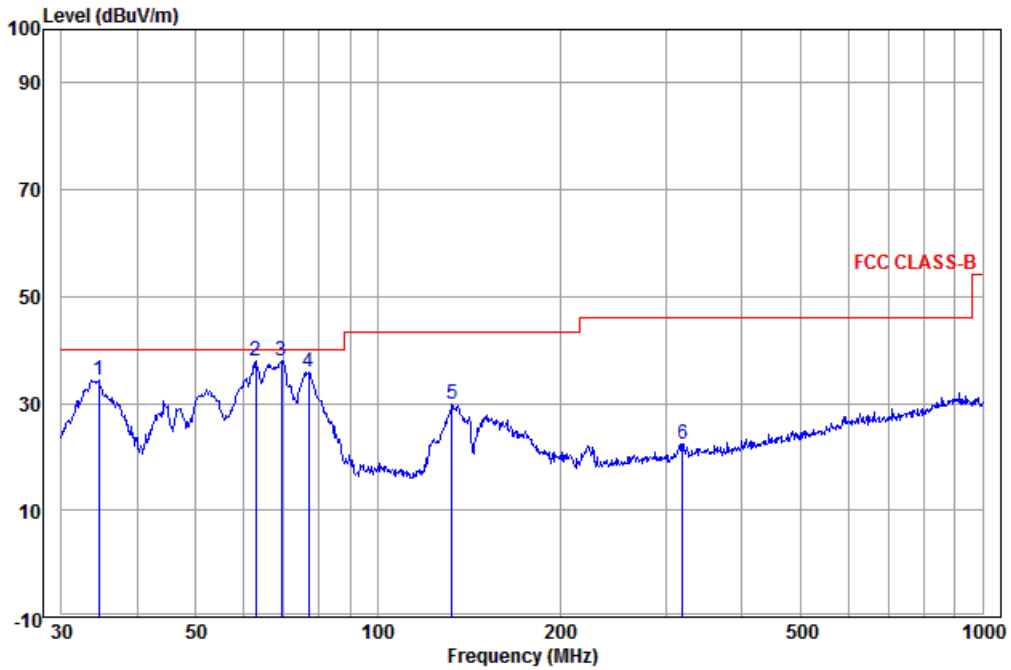
## Appendix I): Radiated Spurious Emissions

<b>Receiver Setup:</b>	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Peak		1MHz	10Hz	Average	
<b>Test Procedure:</b>					
<b>Below 1GHz test procedure as below:</b>					
<p>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</p> <p>d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p>					
<b>Above 1GHz test procedure as below:</b>					
<p>g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter( Above 18GHz the distance is 1 meter and table is 1.5 meter)..</p> <p>h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel</p> <p>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p>					
<b>Limit:</b>	Frequency	Field strength (microvolt/meter)	Limit (dB $\mu$ V/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
<p>Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.</p>					



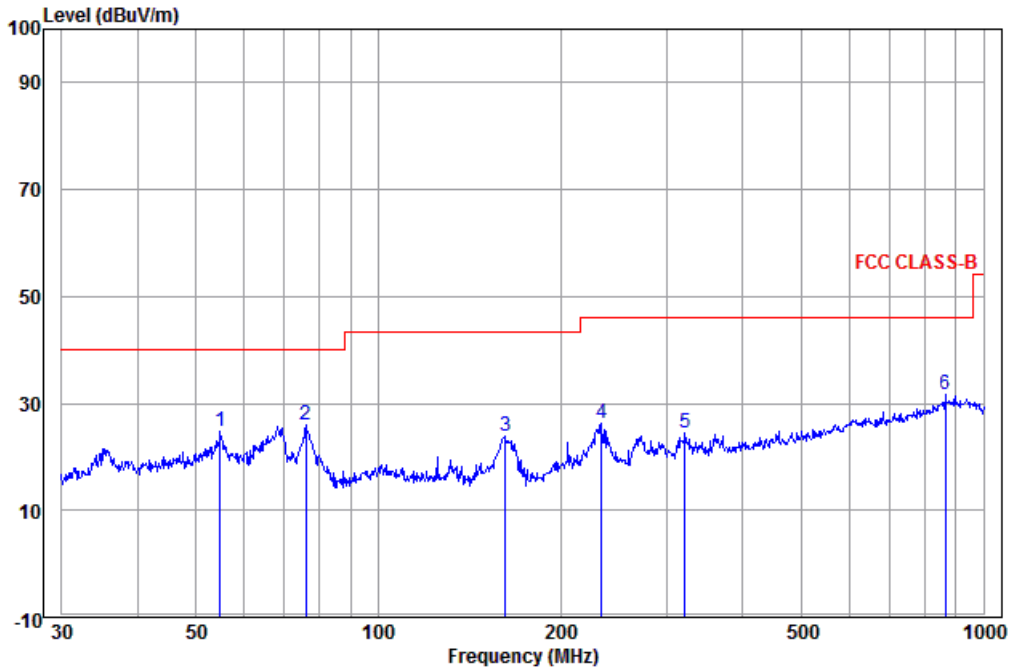
**Radiated Spurious Emissions test Data:  
Radiated Emission below 1GHz**

30MHz~1GHz (QP)		
Test mode:	Transmitting	Vertical



	Ant Freq	Cable Factor	Cable Loss	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	34.517	12.83	0.07	21.35	34.25	40.00	-5.75	Vertical QP
2 pp	62.871	12.28	0.22	25.34	37.84	40.00	-2.16	Vertical QP
3	69.357	10.56	0.25	27.00	37.81	40.00	-2.19	Vertical QP
4	76.781	9.15	0.37	26.33	35.85	40.00	-4.15	Vertical QP
5	132.685	9.92	0.60	19.20	29.72	43.50	-13.78	Vertical QP
6	318.817	13.79	1.17	7.56	22.52	46.00	-23.48	Vertical QP

Test mode:	Transmitting	Horizontal
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	Ant Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	54.835	13.84	0.16	10.79	24.79	40.00	-15.21	Horizontal	QP
2	75.977	9.30	0.35	16.35	26.00	40.00	-14.00	Horizontal	QP
3	162.041	9.52	0.74	13.56	23.82	43.50	-19.68	Horizontal	QP
4	234.168	12.28	1.27	12.61	26.16	46.00	-19.84	Horizontal	QP
5	321.061	13.84	1.18	9.34	24.36	46.00	-21.64	Horizontal	QP
6	866.088	21.56	2.46	7.72	31.74	46.00	-14.26	Horizontal	QP

**Transmitter Emission above 1GHz**

Test mode: 802.11b(11Mbps)			Test Frequency: 2412MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Final test level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1273.572	30.40	2.46	44.28	48.25	36.83	74.00	-37.17	Pass	Horizontal
1557.252	30.98	2.64	43.93	48.35	38.04	74.00	-35.96	Pass	Horizontal
4824.000	34.73	6.72	44.60	52.51	49.36	74.00	-24.64	Pass	Horizontal
6001.768	35.90	5.97	44.50	48.48	45.85	74.00	-28.15	Pass	Horizontal
7236.000	36.42	8.38	44.80	50.67	50.67	74.00	-23.33	Pass	Horizontal
9648.000	37.93	7.63	45.57	44.27	44.26	74.00	-29.74	Pass	Horizontal
1182.943	30.18	2.39	44.41	48.19	36.35	74.00	-37.65	Pass	Vertical
1569.189	31.00	2.64	43.92	48.54	38.26	74.00	-35.74	Pass	Vertical
4824.000	34.73	6.72	44.60	52.31	49.16	74.00	-24.84	Pass	Vertical
6156.505	35.98	6.34	44.52	48.18	45.98	74.00	-28.02	Pass	Vertical
7236.000	36.42	8.38	44.80	50.00	50.00	74.00	-24.00	Pass	Vertical
9648.000	37.93	7.63	45.57	42.68	42.67	74.00	-31.33	Pass	Vertical

Test mode: 802.11b(11Mbps)			Test Frequency: 2437MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Final test level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1270.334	30.39	2.45	44.29	49.09	37.64	74.00	-36.36	Pass	Horizontal
1557.252	30.98	2.64	43.93	48.98	38.67	74.00	-35.33	Pass	Horizontal
4874.000	34.84	6.73	44.60	53.34	50.31	74.00	-23.69	Pass	Horizontal
6764.538	36.29	7.68	44.58	47.67	47.06	74.00	-26.94	Pass	Horizontal
7311.000	36.43	8.44	44.86	50.45	50.46	74.00	-23.54	Pass	Horizontal
9748.000	38.03	7.55	45.55	41.41	41.44	74.00	-32.56	Pass	Horizontal
1225.860	30.29	2.42	44.35	48.17	36.53	74.00	-37.47	Pass	Vertical
1609.646	31.07	2.67	43.88	47.90	37.76	74.00	-36.24	Pass	Vertical
4874.000	34.84	6.73	44.60	53.76	50.73	74.00	-23.27	Pass	Vertical
6172.197	35.99	6.37	44.52	48.20	46.04	74.00	-27.96	Pass	Vertical
7311.000	36.43	8.44	44.86	50.62	50.63	74.00	-23.37	Pass	Vertical
9748.000	38.03	7.55	45.55	41.75	41.78	74.00	-32.22	Pass	Vertical

Test mode: 802.11b(11Mbps)			Test Frequency: 2462MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Final test level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1176.935	30.17	2.39	44.42	48.67	36.81	74.00	-37.19	Pass	Horizontal
1518.111	30.90	2.61	43.98	48.32	37.85	74.00	-36.15	Pass	Horizontal
4924.000	34.94	6.74	44.60	51.04	48.12	74.00	-25.88	Pass	Horizontal
6078.644	35.94	6.16	44.51	48.08	45.67	74.00	-28.33	Pass	Horizontal
7386.000	36.44	8.50	44.92	50.10	50.12	74.00	-23.88	Pass	Horizontal
9848.000	38.14	7.47	45.53	42.73	42.81	74.00	-31.19	Pass	Horizontal
1232.117	30.30	2.43	44.34	49.08	37.47	74.00	-36.53	Pass	Vertical
1589.289	31.04	2.65	43.90	48.08	37.87	74.00	-36.13	Pass	Vertical
4924.000	34.94	6.74	44.60	52.03	49.11	74.00	-24.89	Pass	Vertical
6172.197	35.99	6.37	44.52	48.82	46.66	74.00	-27.34	Pass	Vertical
7386.000	36.44	8.50	44.92	50.20	50.22	74.00	-23.78	Pass	Vertical
9848.000	38.14	7.47	45.53	41.98	42.06	74.00	-31.94	Pass	Vertical

Test mode: 802.11g(6Mbps)			Test Frequency: 2412MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Final test level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1176.935	30.17	2.39	44.42	49.21	37.35	74.00	-36.65	Pass	Horizontal
1549.344	30.96	2.63	43.94	48.11	37.76	74.00	-36.24	Pass	Horizontal
4824.000	34.73	6.72	44.60	52.51	49.36	74.00	-24.64	Pass	Horizontal
5986.509	35.89	5.98	44.50	48.16	45.53	74.00	-28.47	Pass	Horizontal
7236.000	36.42	8.38	44.80	50.50	50.50	74.00	-23.50	Pass	Horizontal
9648.000	37.93	7.63	45.57	42.12	42.11	74.00	-31.89	Pass	Horizontal
1340.089	30.54	2.50	44.19	47.80	36.65	74.00	-37.35	Pass	Vertical
3933.367	32.85	6.36	44.61	49.09	43.69	74.00	-30.31	Pass	Vertical
4824.000	34.73	6.72	44.60	52.68	49.53	74.00	-24.47	Pass	Vertical
6001.768	35.90	5.97	44.50	49.30	46.67	74.00	-27.33	Pass	Vertical
7236.000	36.42	8.38	44.80	50.20	50.20	74.00	-23.80	Pass	Vertical
9648.000	37.93	7.63	45.57	41.93	41.92	74.00	-32.08	Pass	Vertical

Test mode: 802.11g(6Mbps)			Test Frequency: 2437MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Final test level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1228.984	30.29	2.42	44.34	48.96	37.33	74.00	-36.67	Pass	Horizontal
1545.405	30.96	2.63	43.95	49.28	38.92	74.00	-35.08	Pass	Horizontal
4874.000	34.84	6.73	44.6	52.07	49.04	74.00	-24.96	Pass	Horizontal
6156.505	35.98	6.34	44.52	47.74	45.54	74.00	-28.46	Pass	Horizontal
7311.000	36.43	8.44	44.86	50.07	50.08	74.00	-23.92	Pass	Horizontal
9748.000	38.03	7.55	45.55	42.82	42.85	74.00	-31.15	Pass	Horizontal
1182.943	30.18	2.39	44.41	48.77	36.93	74.00	-37.07	Pass	Vertical
1502.732	30.88	2.60	43.99	48.25	37.74	74.00	-36.26	Pass	Vertical
4874.000	34.84	6.73	44.60	53.01	49.98	74.00	-24.02	Pass	Vertical
6594.518	36.21	7.32	44.56	47.44	46.41	74.00	-27.59	Pass	Vertical
7311.000	36.43	8.44	44.86	50.40	50.41	74.00	-23.59	Pass	Vertical
9748.000	38.03	7.55	45.55	41.94	41.97	74.00	-32.03	Pass	Vertical

Test mode: 802.11g(6Mbps)			Test Frequency: 2462MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Final test level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1170.959	30.16	2.38	44.43	48.28	36.39	74.00	-37.61	Pass	Horizontal
1553.293	30.97	2.63	43.94	47.89	37.55	74.00	-36.45	Pass	Horizontal
4924.000	34.94	6.74	44.60	50.21	47.29	74.00	-26.71	Pass	Horizontal
5821.207	35.77	6.10	44.52	48.15	45.50	74.00	-28.50	Pass	Horizontal
7386.000	36.44	8.50	44.92	50.23	50.25	74.00	-23.75	Pass	Horizontal
9848.000	38.14	7.47	45.53	43.09	43.17	74.00	-30.83	Pass	Horizontal
1273.572	30.40	2.46	44.28	47.87	36.45	74.00	-37.55	Pass	Vertical
1541.476	30.95	2.63	43.95	48.82	38.45	74.00	-35.55	Pass	Vertical
4924.000	34.94	6.74	44.60	51.68	48.76	74.00	-25.24	Pass	Vertical
5986.509	35.89	5.98	44.50	48.55	45.92	74.00	-28.08	Pass	Vertical
7386.000	36.44	8.50	44.92	50.56	50.58	74.00	-23.42	Pass	Vertical
9848.000	38.14	7.47	45.53	42.50	42.58	74.00	-31.42	Pass	Vertical



Test mode: 802.11n(HT20)(6.5Mbps)			Test Frequency: 2412MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Final test level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1296.469	30.45	2.47	44.25	47.99	36.66	74.00	-37.34	Pass	Horizontal
1865.735	31.50	2.80	43.62	47.64	38.32	74.00	-35.68	Pass	Horizontal
4824.000	34.73	6.72	44.60	51.88	48.73	74.00	-25.27	Pass	Horizontal
5420.742	35.45	6.41	44.56	48.81	46.11	74.00	-27.89	Pass	Horizontal
7236.000	36.42	8.38	44.80	50.44	50.44	74.00	-23.56	Pass	Horizontal
9648.000	37.93	7.63	45.57	42.25	42.24	74.00	-31.76	Pass	Horizontal
1270.334	30.39	2.45	44.29	48.31	36.86	74.00	-37.14	Pass	Vertical
1573.189	31.01	2.65	43.92	48.27	38.01	74.00	-35.99	Pass	Vertical
4824.000	34.73	6.72	44.60	51.97	48.82	74.00	-25.18	Pass	Vertical
5603.126	35.60	6.27	44.54	48.52	45.85	74.00	-28.15	Pass	Vertical
7236.000	36.42	8.38	44.80	50.30	50.30	74.00	-23.70	Pass	Vertical
9648.000	37.93	7.63	45.57	45.41	45.40	74.00	-28.60	Pass	Vertical

Test mode: 802.11n(HT20)(6.5Mbps)			Test Frequency: 2437MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Final test level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1167.982	30.15	2.38	44.43	48.92	37.02	74.00	-36.98	Pass	Horizontal
1529.749	30.93	2.62	43.96	48.90	38.49	74.00	-35.51	Pass	Horizontal
4874.000	34.84	6.73	44.60	51.57	48.54	74.00	-25.46	Pass	Horizontal
5406.961	35.44	6.42	44.56	48.24	45.54	74.00	-28.46	Pass	Horizontal
7311.000	36.43	8.44	44.86	50.40	50.41	74.00	-23.59	Pass	Horizontal
9748.000	38.03	7.55	45.55	41.66	41.69	74.00	-32.31	Pass	Horizontal
1257.465	30.36	2.44	44.30	48.82	37.32	74.00	-36.68	Pass	Vertical
1545.405	30.96	2.63	43.95	48.36	38.00	74.00	-36.00	Pass	Vertical
4874.000	34.84	6.73	44.60	53.39	50.36	74.00	-23.64	Pass	Vertical
5806.408	35.76	6.11	44.52	48.83	46.18	74.00	-27.82	Pass	Vertical
7311.000	36.43	8.44	44.86	50.50	50.51	74.00	-23.49	Pass	Vertical
9748.000	38.03	7.55	45.55	41.88	41.91	74.00	-32.09	Pass	Vertical

Test mode: 802.11n(HT20)(6.5Mbps)			Test Frequency: 2462MHz			Remark: Peak			
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dB $\mu$ V)	Final test level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)	Result	Antenna Polaxis
1280.072	30.41	2.46	44.27	48.87	37.47	74.00	-36.53	Pass	Horizontal
1549.344	30.96	2.63	43.94	48.35	38.00	74.00	-36.00	Pass	Horizontal
4924.000	34.94	6.74	44.60	50.07	47.15	74.00	-26.85	Pass	Horizontal
6577.752	36.20	7.28	44.56	48.36	47.28	74.00	-26.72	Pass	Horizontal
7386.000	36.44	8.50	44.92	50.40	50.42	74.00	-23.58	Pass	Horizontal
9848.000	38.14	7.47	45.53	41.06	41.14	74.00	-32.86	Pass	Horizontal
1132.844	30.06	2.35	44.48	48.84	36.77	74.00	-37.23	Pass	Vertical
1498.912	30.87	2.60	44.00	48.64	38.11	74.00	-35.89	Pass	Vertical
4924.000	34.94	6.74	44.60	51.38	48.46	74.00	-25.54	Pass	Vertical
6017.064	35.91	6.01	44.50	48.10	45.52	74.00	-28.48	Pass	Vertical
7386.000	36.44	8.50	44.92	50.40	50.42	74.00	-23.58	Pass	Vertical
9848.000	38.14	7.47	45.53	42.01	42.09	74.00	-31.91	Pass	Vertical

**Note:**

1) Through Pre-scan transmitting mode with all kind of modulation and data rate, find the 11Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; and then Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Pre-amplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading - Correct Factor

Correct Factor = Pre-amplifier Factor– Antenna Factor–Cable Factor

3) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

## PHOTOGRAPHS OF TEST SETUP

Test Model No.: ZNCZ03CM

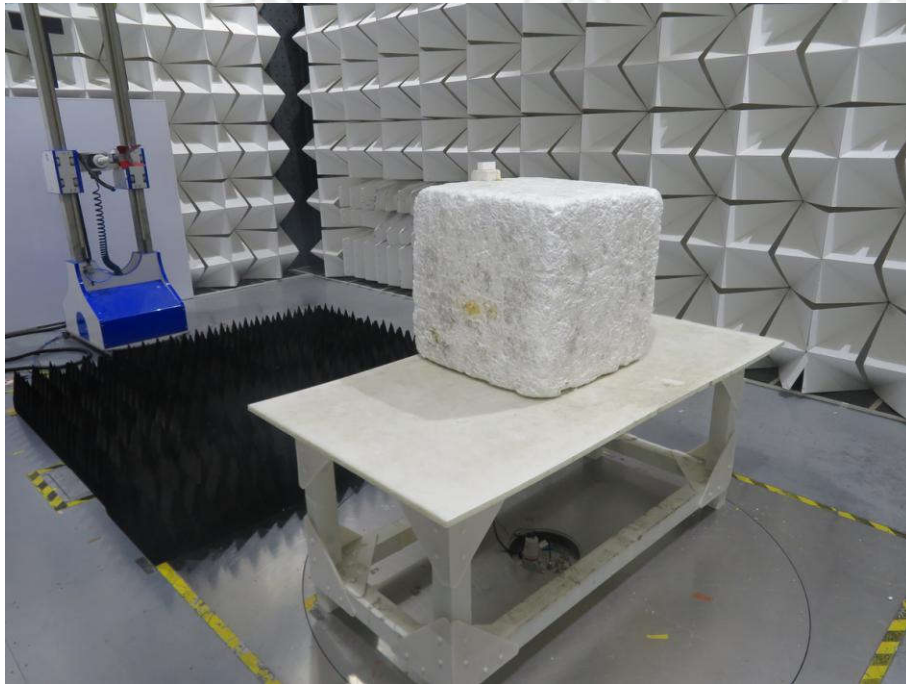


**Radiated spurious emission Test Setup-1(Below 30MHz)**



**Radiated spurious emission Test Setup-2(30MHz-1GHz)**





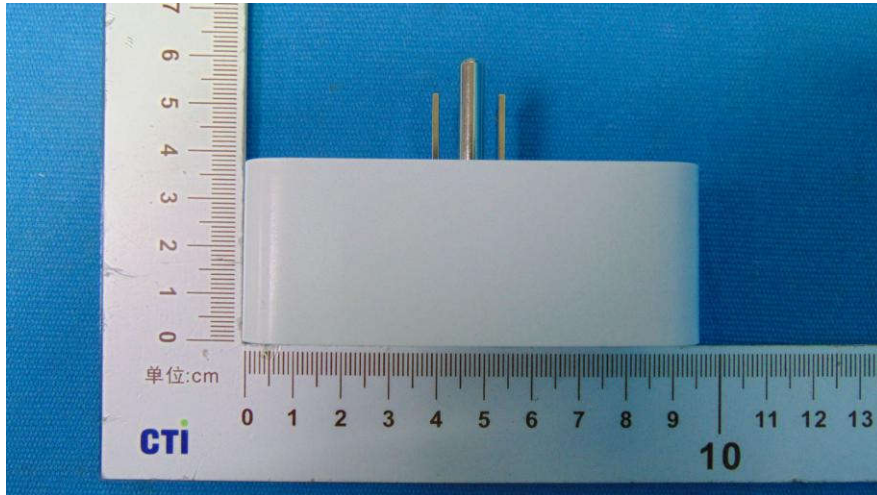
**Radiated spurious emission Test Setup-3(Above 1GHz)**



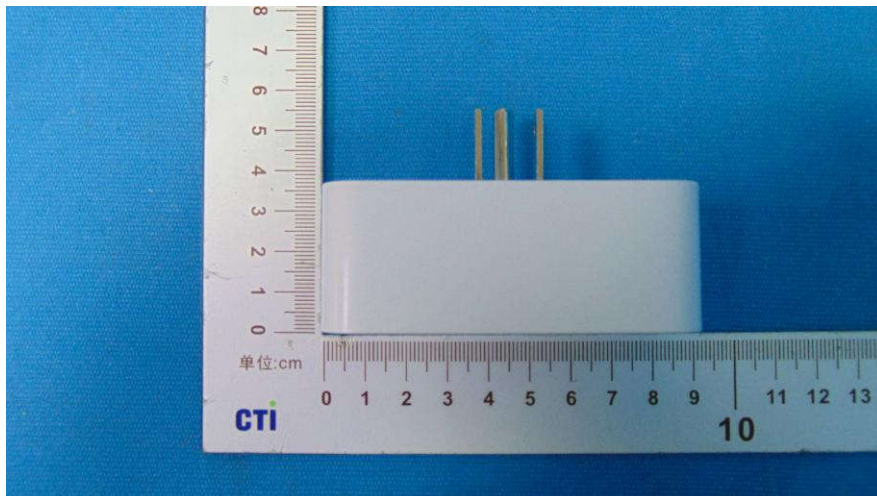
**Conducted Emissions Test Setup**

## PHOTOGRAPHS OF EUT Constructional Details

Test model No.: ZNCZ03CM

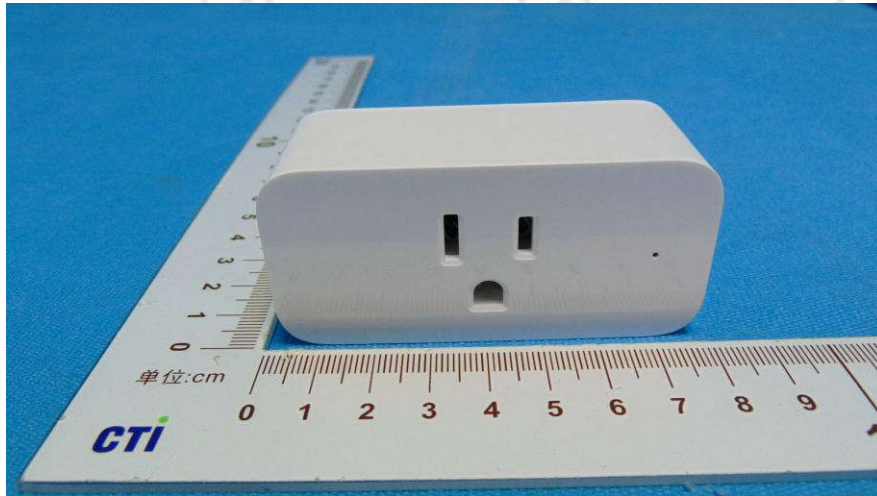


View of Product-1

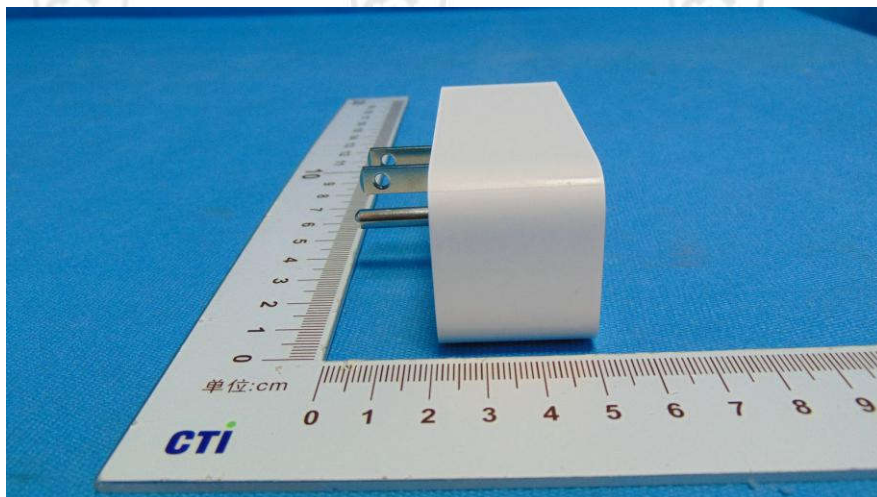


View of Product-2

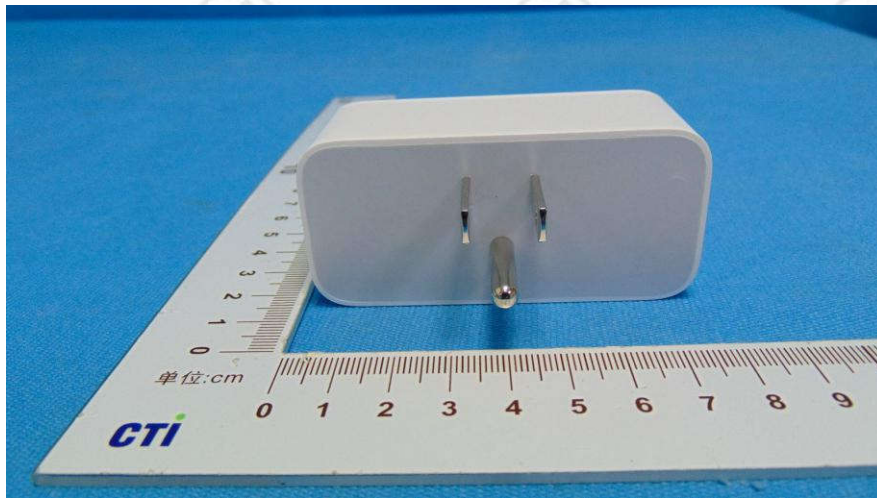




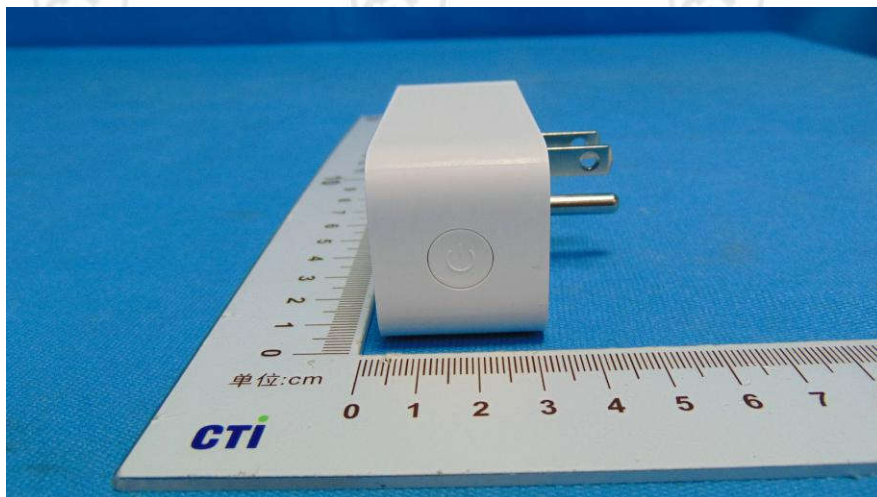
View of Product-3



View of Product-4



View of Product-5



View of Product-6

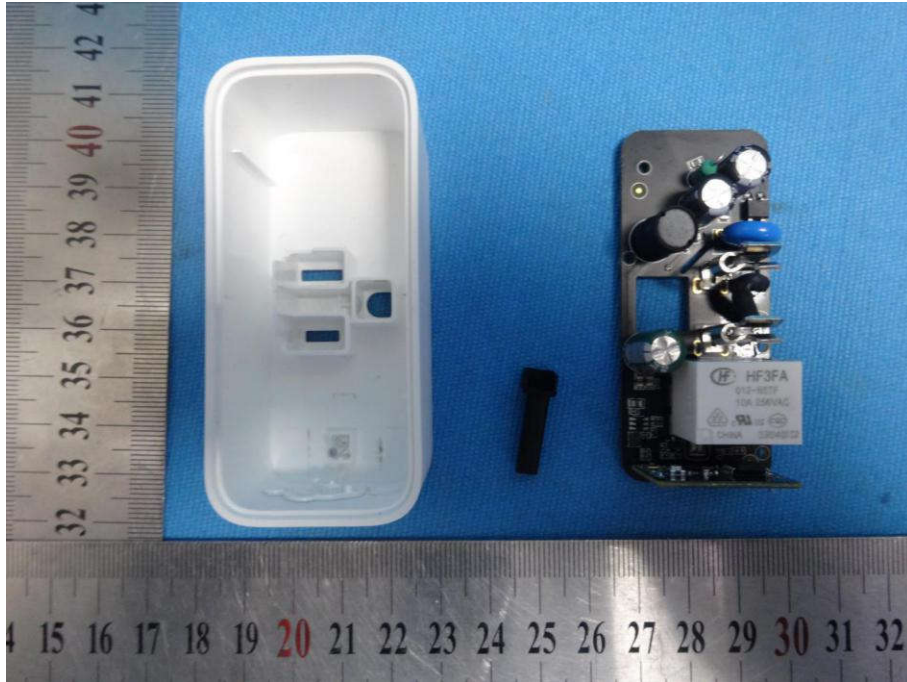




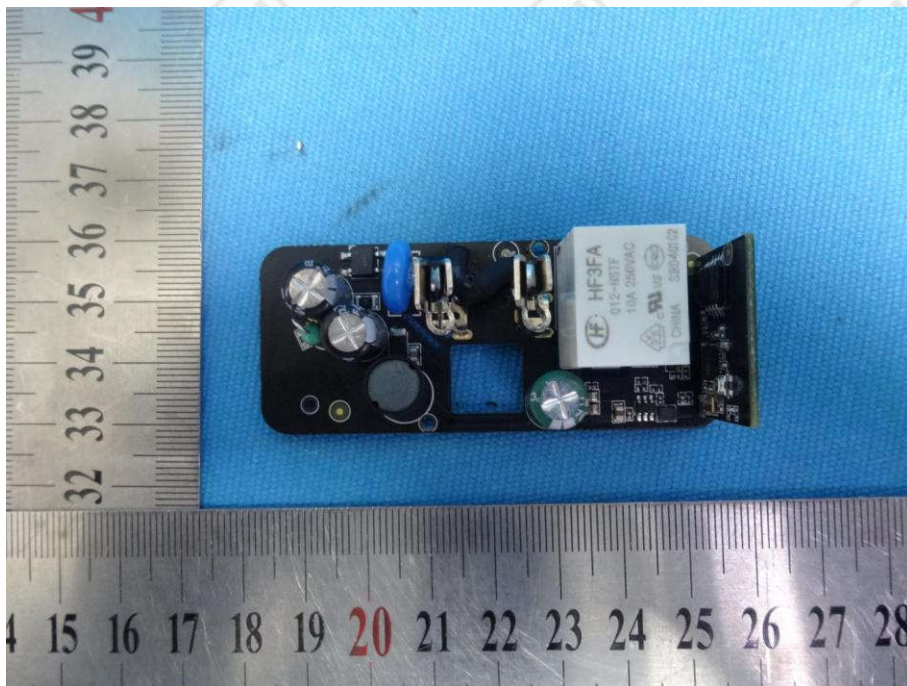
View of Product-7



View of Product-8

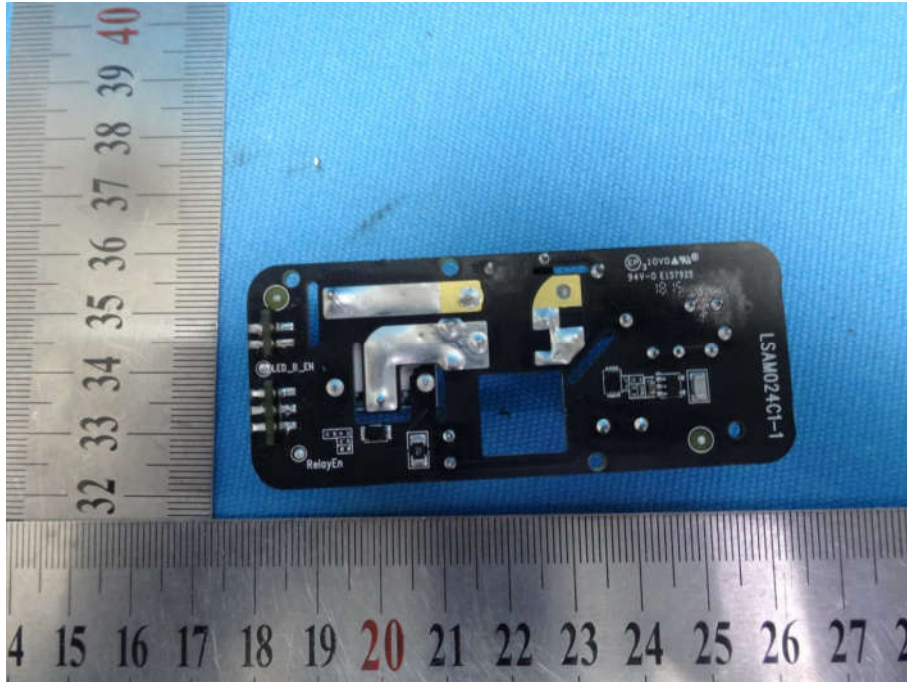


View of Product-9

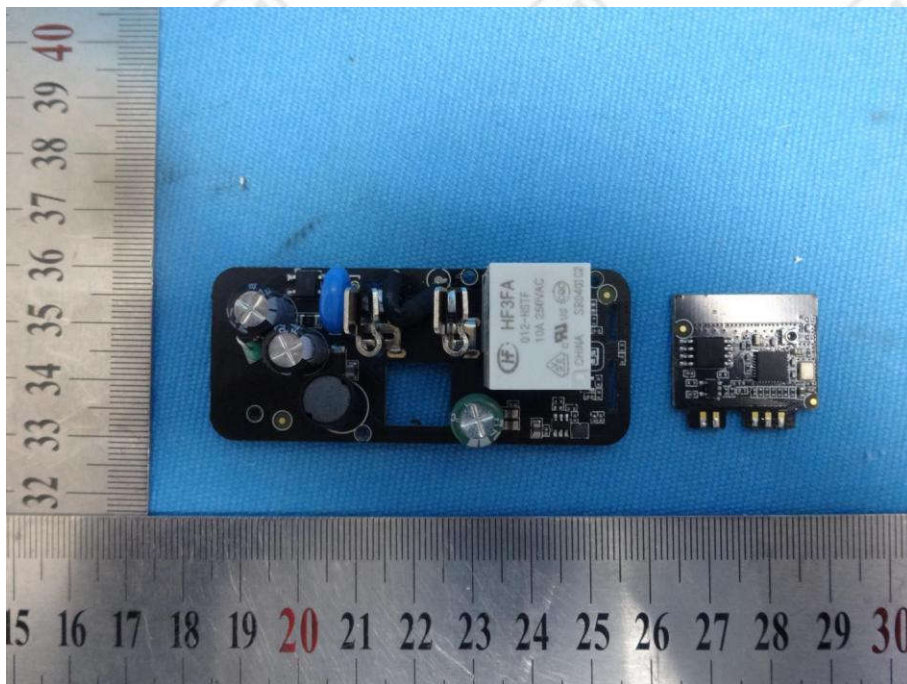


View of Product-10



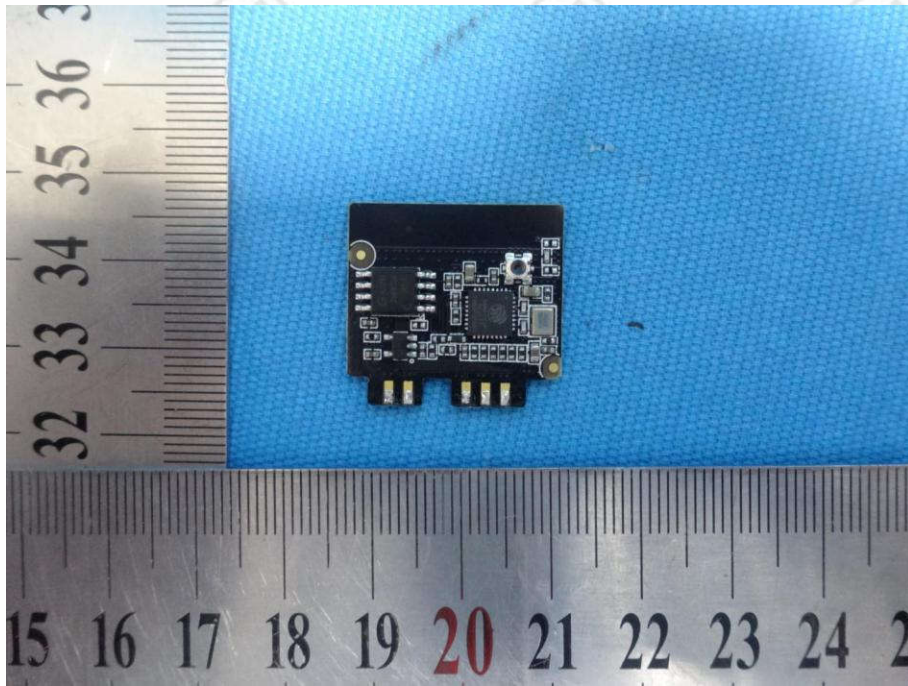


View of Product-11

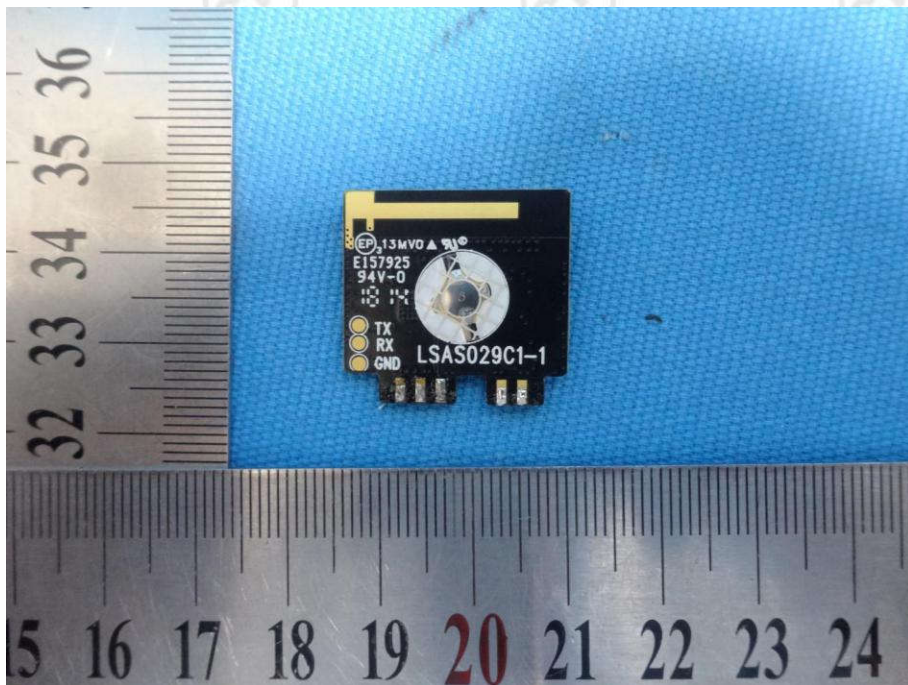


View of Product-12

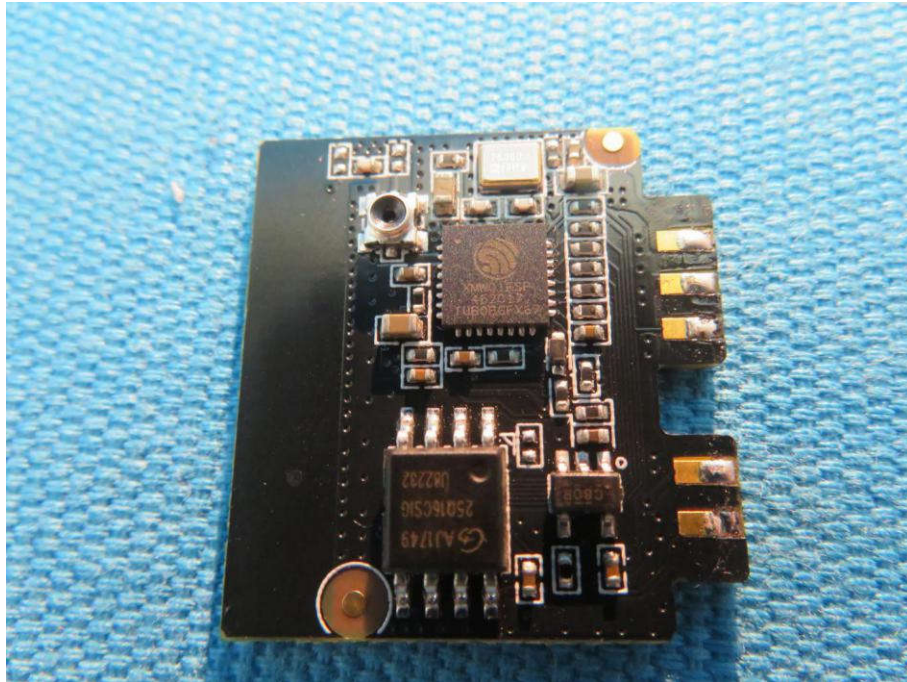




View of Product-13



View of Product-14



View of Product-15

\*\*\* End of Report \*\*\*

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