

## TEST REPORT

**Product** : WiFi module  
**Trade mark** : wireless-tag  
**Model/Type reference** : WT-01E  
**Serial Number** : N/A  
**Report Number** : EED32L00068701  
**FCC ID** : 2AFOS-WT-01E  
**Date of Issue** : May 14, 2019  
**Test Standards** : 47 CFR Part 15Subpart C  
**Test result** : PASS

Prepared for:

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**Road, Bantian Sub-district, Longgang District, Shenzhen**

Prepared by:

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May 14, 2019

Check No.:3757542804



## 2 Version

Version No.	Date	Description
00	May 14, 2019	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 sample(s) and the sample information are provided by the client.

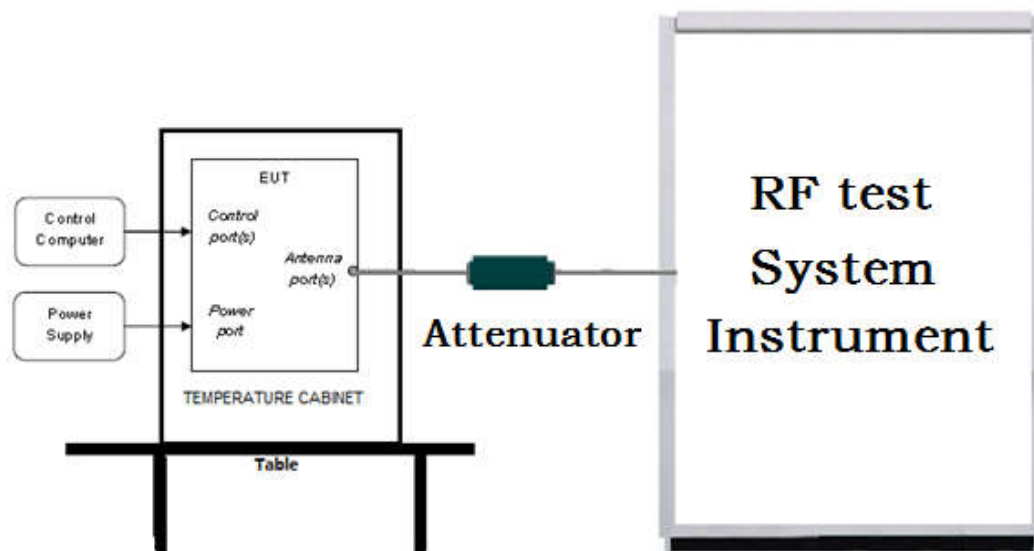
## 4 Content

<b>1 COVER PAGE</b>	<b>1</b>
<b>2 VERSION</b>	<b>2</b>
<b>3 TEST SUMMARY</b>	<b>3</b>
<b>4 CONTENT</b>	<b>4</b>
<b>5 TEST REQUIREMENT</b>	<b>5</b>
5.1 TEST SETUP	5
5.1.1 For Conducted test setup	5
5.1.2 For Radiated Emissions test setup	5
5.1.3 For Conducted Emissions test setup	6
5.2 TEST ENVIRONMENT	6
5.3 TEST CONDITION	6
<b>6 GENERAL INFORMATION</b>	<b>7</b>
6.1 CLIENT INFORMATION	7
6.2 GENERAL DESCRIPTION OF EUT	7
6.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD	7
6.4 DESCRIPTION OF SUPPORT UNITS	7
6.5 TEST LOCATION	8
6.6 DEVIATION FROM STANDARDS	8
6.7 ABNORMALITIES FROM STANDARD CONDITIONS	8
6.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER	8
6.9 MEASUREMENT UNCERTAINTY (95% CONFIDENCE LEVELS, K=2)	8
<b>7 EQUIPMENT LIST</b>	<b>9</b>
<b>8 RADIO TECHNICAL REQUIREMENTS SPECIFICATION</b>	<b>11</b>
Appendix A): Conducted Peak Output Power	12
Appendix B): 6dB Occupied Bandwidth	16
Appendix C): Band-edge for RF Conducted Emissions	20
Appendix D): RF Conducted Spurious Emissions	23
Appendix E): Power Spectral Density	30
Appendix F): Antenna Requirement	34
Appendix G): AC Power Line Conducted Emission	35
Appendix H): Restricted bands around fundamental frequency (Radiated)	38
Appendix I): Radiated Spurious Emissions	52
<b>PHOTOGRAPHS OF TEST SETUP</b>	<b>60</b>
<b>PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS</b>	<b>62</b>

## 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:

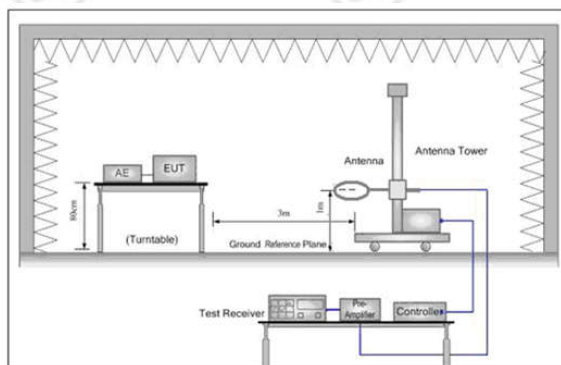


Figure 1. Below 30MHz

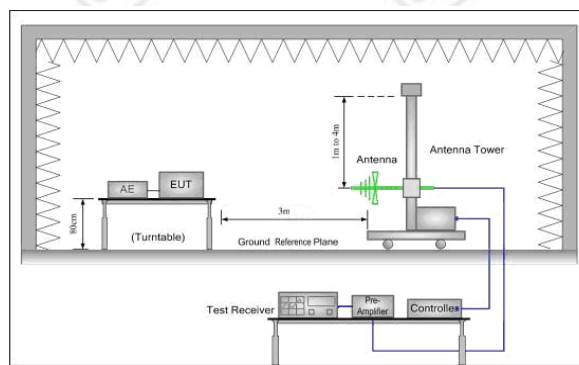


Figure 2. 30MHz to 1GHz

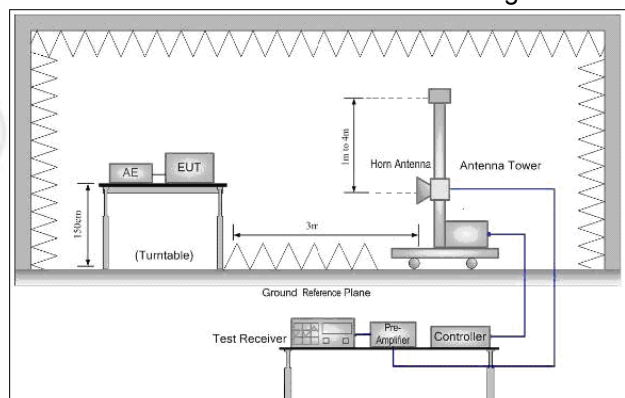
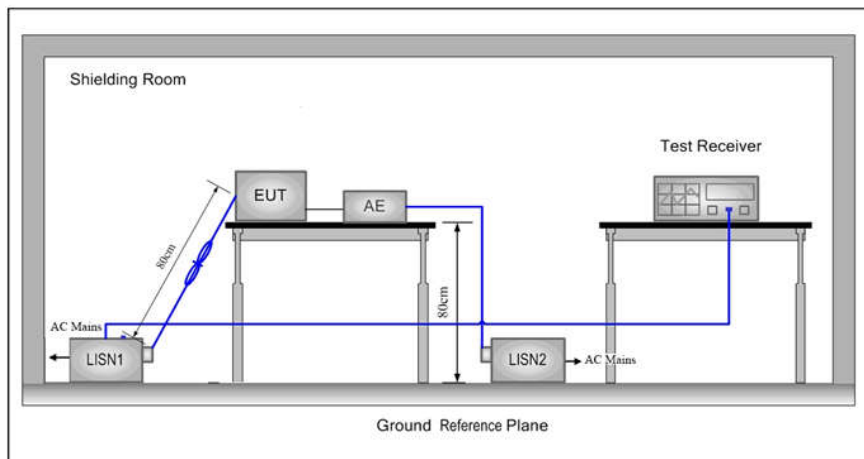


Figure 3. Above 1GHz



### 5.1.3 For Conducted Emissions test setup

#### Conducted Emissions setup



## 5.2 Test Environment

Operating Environment for RF Conducted test:	
Temperature:	25°C
Humidity:	52% RH
Atmospheric Pressure:	101kPa

## 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
TX mode:	The EUT transmitted the continuous signal at the specific channel(s).			

Test mode:

Pre-scan under all rate at lowest channel 1

Mode	802.11b							
Data Rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
Power(dBm)	17.29	17.38	17.50	17.58				
Mode	802.11g							
Data Rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Power(dBm)	16.82	16.81	16.74	16.72	16.70	16.59	16.55	16.37
Mode	802.11n (HT20)							
Data Rate	6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps
Power(dBm)	15.61	15.60	15.51	15.50	15.39	15.33	15.30	15.29

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:	Wireless-tag Technology Co., LTD
Address of Applicant:	Room 115-118, Building A, ChengshishanhaiCenter, No.11, Zhongxing Road, Bantian Sub-district, Longgang District, Shenzhen
Manufacturer:	Wireless-tag Technology Co., LTD
Address of Manufacturer:	Room 115-118, Building A, ChengshishanhaiCenter, No.11, Zhongxing Road, Bantian Sub-district, Longgang District, Shenzhen
Factory:	Wireless-tag Technology Co., LTD
Address of Factory:	Room 115-118, Building A, ChengshishanhaiCenter, No.11, Zhongxing Road, Bantian Sub-district, Longgang District, Shenzhen

### 6.2 General Description of EUT

Product Name:	WiFi module
Model No.(EUT):	WT-01E
Trade Mark:	wireless-tag
EUT Supports Radios application:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz
Power Supply:	DC 3.3V
Sample Received Date:	Mar. 29, 2019
Sample tested Date:	Apr. 04, 2019 to May 06, 2019

### 6.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz						
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels						
Channel Separation:	5MHz						
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK)						
Test Power Grade:	N/A						
Test Software of EUT:	ESP Series Modules FCC & CE Test Tool V2.2.3.exe (manufacturer declare)						
Antenna Type:	Spring Antenna						
Antenna Gain:	3dBi						
Test Voltage:	DC 3.3V						
Operation Frequency each of channel(802.11b/g/n HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

### 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

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

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	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.3dB (30MHz-1GHz)
		4.5dB (1GHz-12.75GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%



## 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	03-01-2019	02-28-2020
Spectrum Analyzer	Keysight	N9010A	MY54510339	03-01-2019	02-28-2020
Signal Generator	Keysight	N5182B	MY53051549	03-01-2019	02-28-2020
High-pass filter	Sinoscite	FL3CX03WG1 8NM12-0398-002	---	01-09-2019	01-08-2020
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-09-2019	01-08-2020
DC Power	Keysight	E3642A	MY54426035	03-01-2019	02-28-2020
PC-1	Lenovo	R4960d	---	03-01-2019	02-28-2020
BT&WI-FI Automatic control	R&S	OSP120	101374	03-01-2019	02-28-2020
RF control unit	JS Tonscend	JS0806-2	15860006	03-01-2019	02-28-2020
RF control unit	JS Tonscend	JS0806-1	15860004	03-01-2019	02-28-2020
RF control unit	JS Tonscend	JS0806-4	158060007	03-01-2019	02-28-2020
BT&WI-FI Automatic test software	JS Tonscend	JS1120-2	---	03-01-2019	02-28-2020
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	10-12-2018	10-11-2019

Conducted disturbance Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESCI	100435	05-25-2018	05-24-2019
Temperature/ Humidity Indicator	Defu	TH128	/	07-02-2018	07-01-2019
Communication test set	Agilent	E5515C	GB47050 534	03-01-2019	02-28-2020
Communication test set	R&S	CMW500	102898	01-18-2019	01-17-2020
LISN	R&S	ENV216	100098	05-10-2018	05-10-2019
LISN	schwarzbeck	NNLK8121	8121-529	05-10-2018	05-10-2019
Voltage Probe	R&S	ESH2-Z3 0299.7810.5 6	100042	06-13-2017	06-11-2020
Current Probe	R&S	EZ-17 816.2063.03	100106	05-30-2018	05-29-2019
ISN	TESEQ	ISN T800	30297	01-06-2019	01-15-2020

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
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-401	12-21-2018	12-20-2019
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	07-30-2018	07-29-2019
Microwave Preamplifier	Agilent	8449B	3008A02425	08-21-2018	08-20-2019
Microwave Preamplifier	Tonscend	EMC051845 SE	980380	01-16-2019	01-15-2020
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1869	04-25-2018	04-23-2021
Horn Antenna	ETS-LINDGREN	3117	00057410	06-05-2018	06-03-2021
Double ridge horn antenna	A.H.SYSTEMS	SAS-574	374	06-05-2018	06-04-2021
Pre-amplifier	A.H.SYSTEMS	PAP-1840-60	6041.6041	08-08-2018	08-07-2019
Loop Antenna	ETS	6502	00071730	06-22-2017	06-21-2019
Spectrum Analyzer	R&S	FSP40	100416	05-11-2018	05-10-2019
Receiver	R&S	ESCI	100435	05-25-2018	05-24-2019
Receiver	R&S	ESCI7	100938-003	11-23-2018	11-22-2019
Multi device Controller	maturio	NCD/070/10711112	---	01-09-2019	01-08-2020
LISN	schwarzbeck	NNBM8125	81251547	05-11-2018	05-10-2019
LISN	schwarzbeck	NNBM8125	81251548	05-11-2018	05-10-2019
Signal Generator	Agilent	E4438C	MY45095744	03-01-2019	02-28-2020
Signal Generator	Keysight	E8257D	MY53401106	03-01-2019	02-28-2020
Temperature/Humidity Indicator	Shanghai qixiang	HM10	1804298	10-12-2018	10-11-2019
Communication test set	Agilent	E5515C	GB47050534	03-01-2019	02-28-2020
Cable line	Fulai(7M)	SF106	5219/6A	01-09-2019	01-08-2020
Cable line	Fulai(6M)	SF106	5220/6A	01-09-2019	01-08-2020
Cable line	Fulai(3M)	SF106	5216/6A	01-09-2019	01-08-2020
Cable line	Fulai(3M)	SF106	5217/6A	01-09-2019	01-08-2020
Communication test set	R&S	CMW500	104466	01-18-2019	01-17-2020
High-pass filter	Sinoscite	FL3CX03WG18NM12-0398-002	---	01-09-2019	01-08-2020
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX01CA09CL12-0395-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX01CA08CL12-0393-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA04CL12-0396-002	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA03CL12-0394-001	---	01-09-2019	01-08-2020

## 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	17.58	PASS
11B	MCH	18.03	PASS
11B	HCH	17.1	PASS
11G	LCH	16.82	PASS
11G	MCH	17.85	PASS
11G	HCH	16.67	PASS
11N20SISO	LCH	15.61	PASS
11N20SISO	MCH	16.45	PASS
11N20SISO	HCH	15.2	PASS



## Test Graph





11G/LCH	 <p>Keynote Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.5 dB Ref 20.00 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 16.82 dBm / 20 MHz</p> <p>Power Spectral Density -56.19 dBm / Hz</p>
11G/MCH	 <p>Keynote Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.77 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 17.85 dBm / 20 MHz</p> <p>Power Spectral Density -55.16 dBm / Hz</p>
11G/HCH	 <p>Keynote Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.77 dB Ref 20.00 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 16.67 dBm / 20 MHz</p> <p>Power Spectral Density -56.34 dBm / Hz</p>

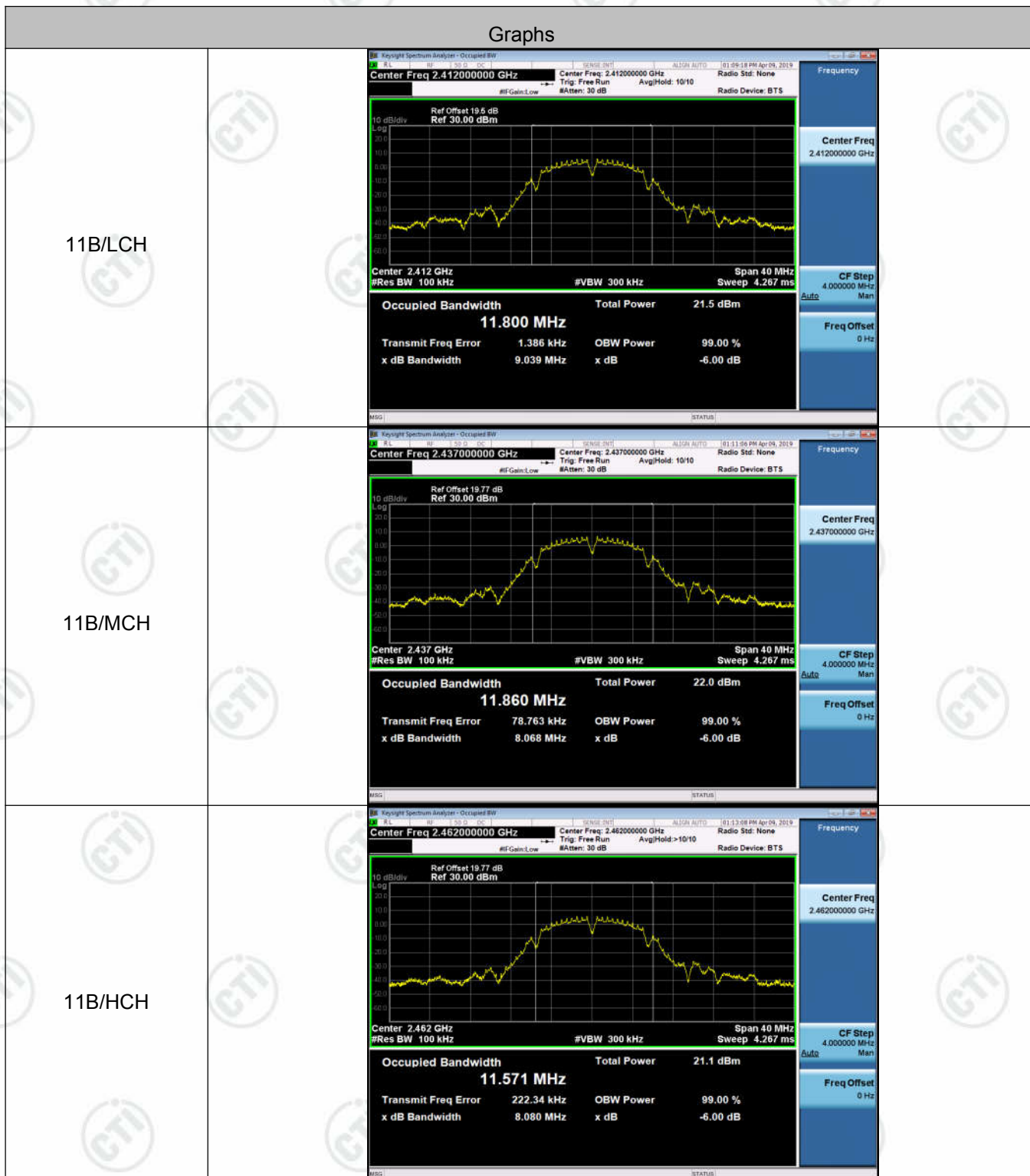
11N20SISO/LCH	 <p>KeySight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.5 dB Ref 20.00 dBm</p> <p>Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms</p> <p>Channel Power 15.61 dBm / 20 MHz</p> <p>Power Spectral Density -57.41 dBm / Hz</p>
11N20SISO/MCH	 <p>KeySight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.77 dB Ref 20.00 dBm</p> <p>Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms</p> <p>Channel Power 16.45 dBm / 20 MHz</p> <p>Power Spectral Density -56.56 dBm / Hz</p>
11N20SISO/HCH	 <p>KeySight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.77 dB Ref 20.00 dBm</p> <p>Center 2.462 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms</p> <p>Channel Power 15.20 dBm / 20 MHz</p> <p>Power Spectral Density -57.81 dBm / Hz</p>

## Appendix B): 6dB Occupied Bandwidth

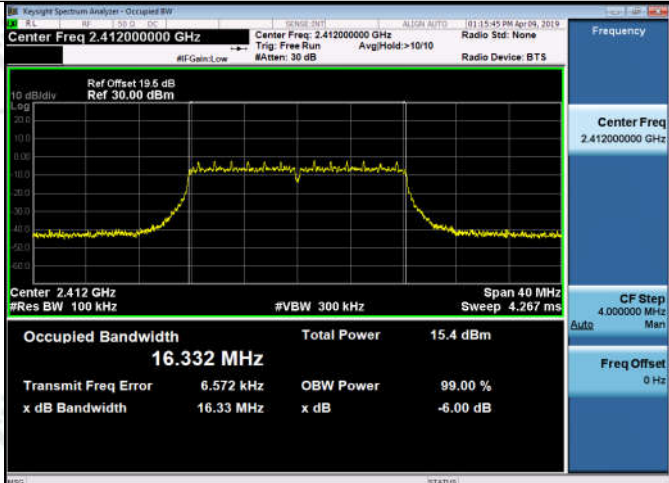
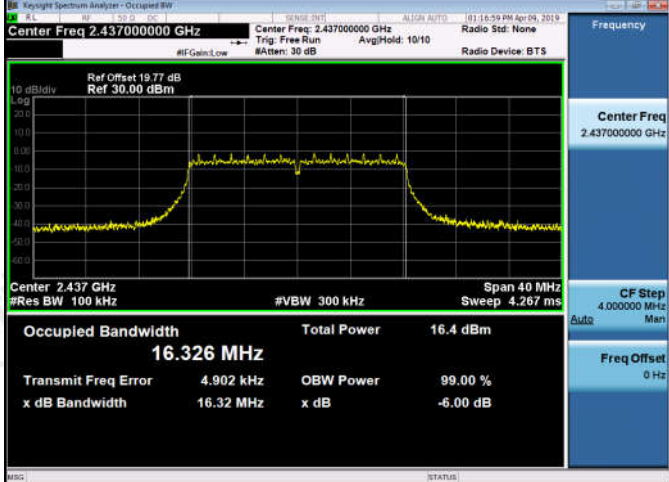
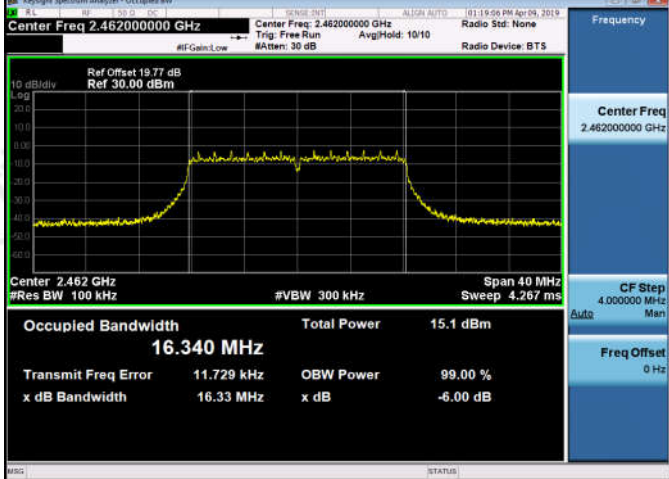
Result Table

Mode	Channel	6dB Bandwidth [MHz]	99% OBW [MHz]	Verdict
11B	LCH	9.039	11.800	PASS
11B	MCH	8.068	11.860	PASS
11B	HCH	8.080	11.571	PASS
11G	LCH	16.33	16.332	PASS
11G	MCH	16.32	16.326	PASS
11G	HCH	16.33	16.340	PASS
11N20SISO	LCH	16.55	17.459	PASS
11N20SISO	MCH	16.54	17.448	PASS
11N20SISO	HCH	16.56	17.472	PASS

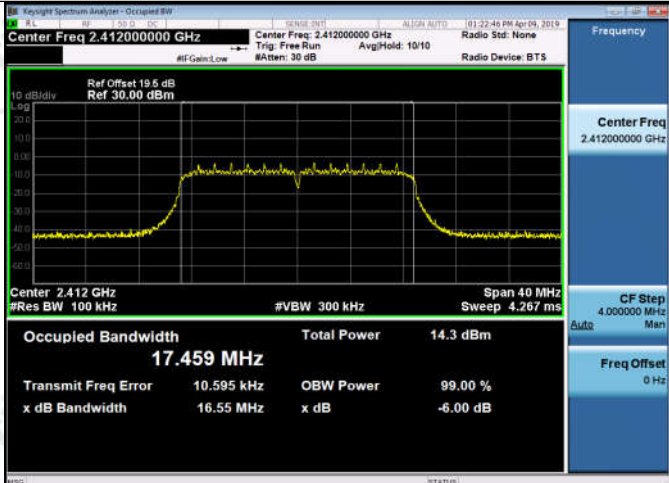
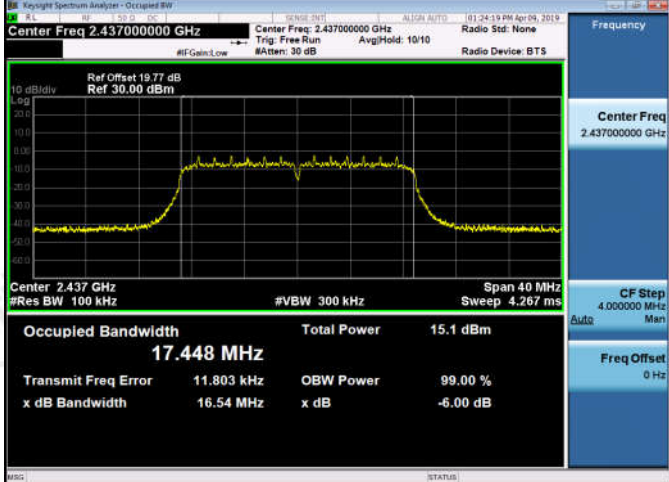
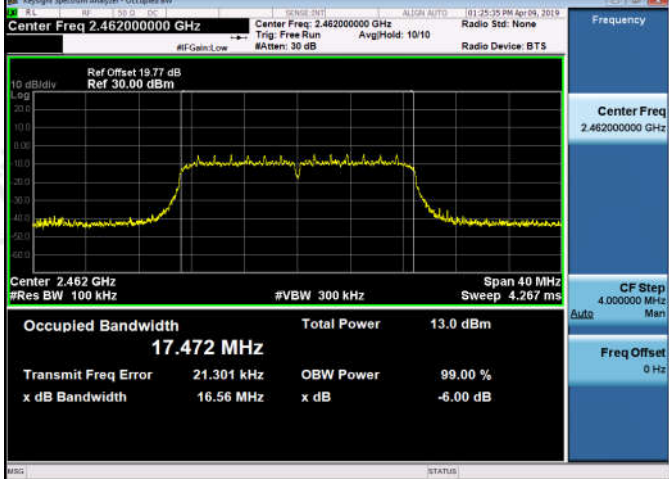
## Test Graph





11G/LCH	 <p>Keyight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.5 dB Ref 30.00 dBm</p> <p>Center 2.412 GHz #Res BW 100 kHz</p> <p>Occupied Bandwidth <b>16.332 MHz</b></p> <p>Total Power 15.4 dBm</p> <p>Transmit Freq Error 6.572 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 16.33 MHz</p> <p>x dB -6.00 dB</p>
11G/MCH	 <p>Keyight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz</p> <p>Occupied Bandwidth <b>16.326 MHz</b></p> <p>Total Power 16.4 dBm</p> <p>Transmit Freq Error 4.902 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 16.32 MHz</p> <p>x dB -6.00 dB</p>
11G/HCH	 <p>Keyight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.462 GHz #Res BW 100 kHz</p> <p>Occupied Bandwidth <b>16.340 MHz</b></p> <p>Total Power 15.1 dBm</p> <p>Transmit Freq Error 11.729 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 16.33 MHz</p> <p>x dB -6.00 dB</p>



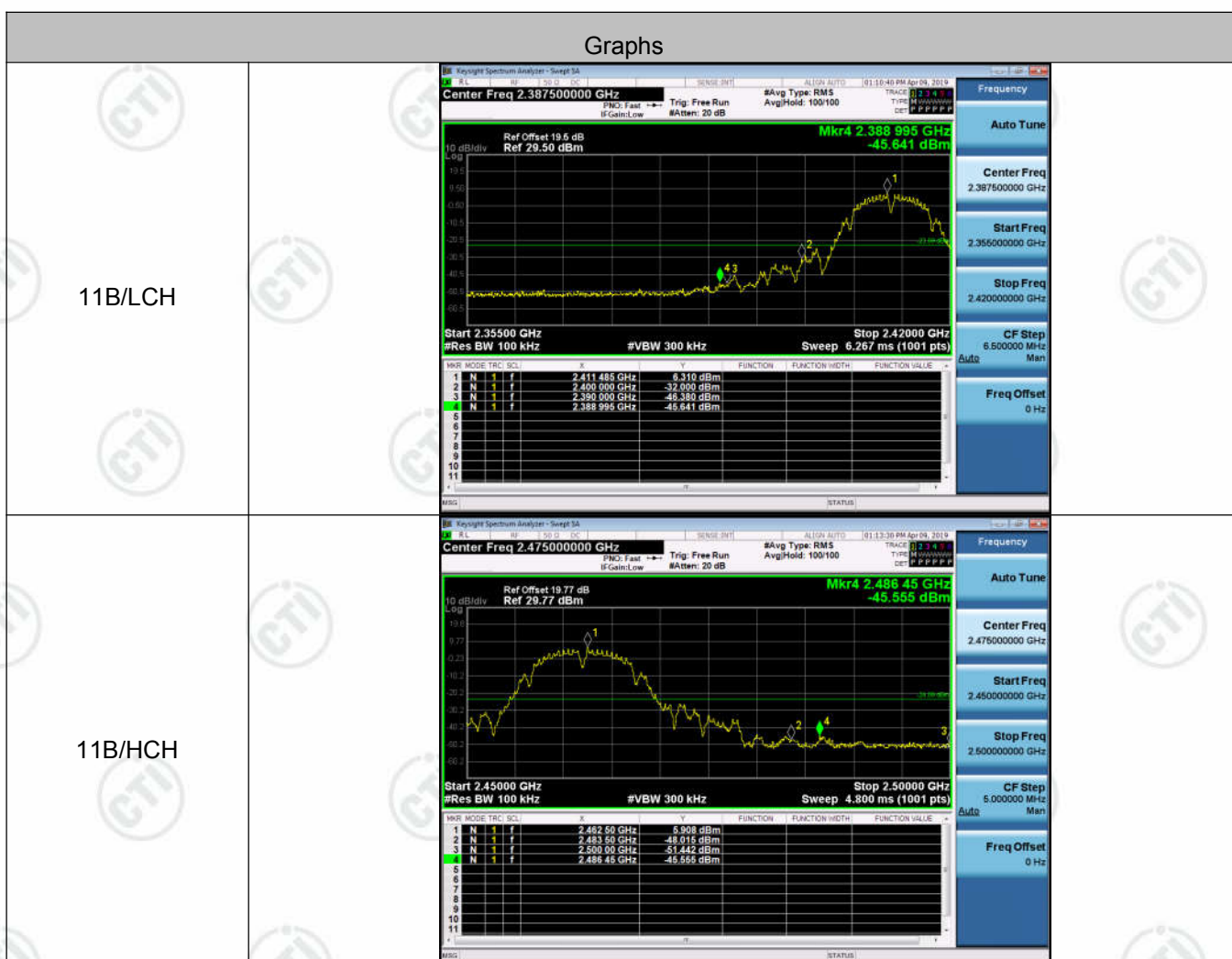
11N20SISO/LCH	 <p>Center Freq 2.41200000 GHz</p> <p>Ref Offset 19.5 dB Ref 30.00 dBm</p> <p>Center Freq 2.41200000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS</p> <p>Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth 17.459 MHz Total Power 14.3 dBm</p> <p>Transmit Freq Error 10.595 kHz OBW Power 99.00 % x dB Bandwidth 16.55 MHz x dB -6.00 dB</p>
11N20SISO/MCH	 <p>Center Freq 2.43700000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center Freq 2.43700000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS</p> <p>Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth 17.448 MHz Total Power 15.1 dBm</p> <p>Transmit Freq Error 11.803 kHz OBW Power 99.00 % x dB Bandwidth 16.54 MHz x dB -6.00 dB</p>
11N20SISO/HCH	 <p>Center Freq 2.46200000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center Freq 2.46200000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS</p> <p>Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth 17.472 MHz Total Power 13.0 dBm</p> <p>Transmit Freq Error 21.301 kHz OBW Power 99.00 % x dB Bandwidth 16.56 MHz x dB -6.00 dB</p>

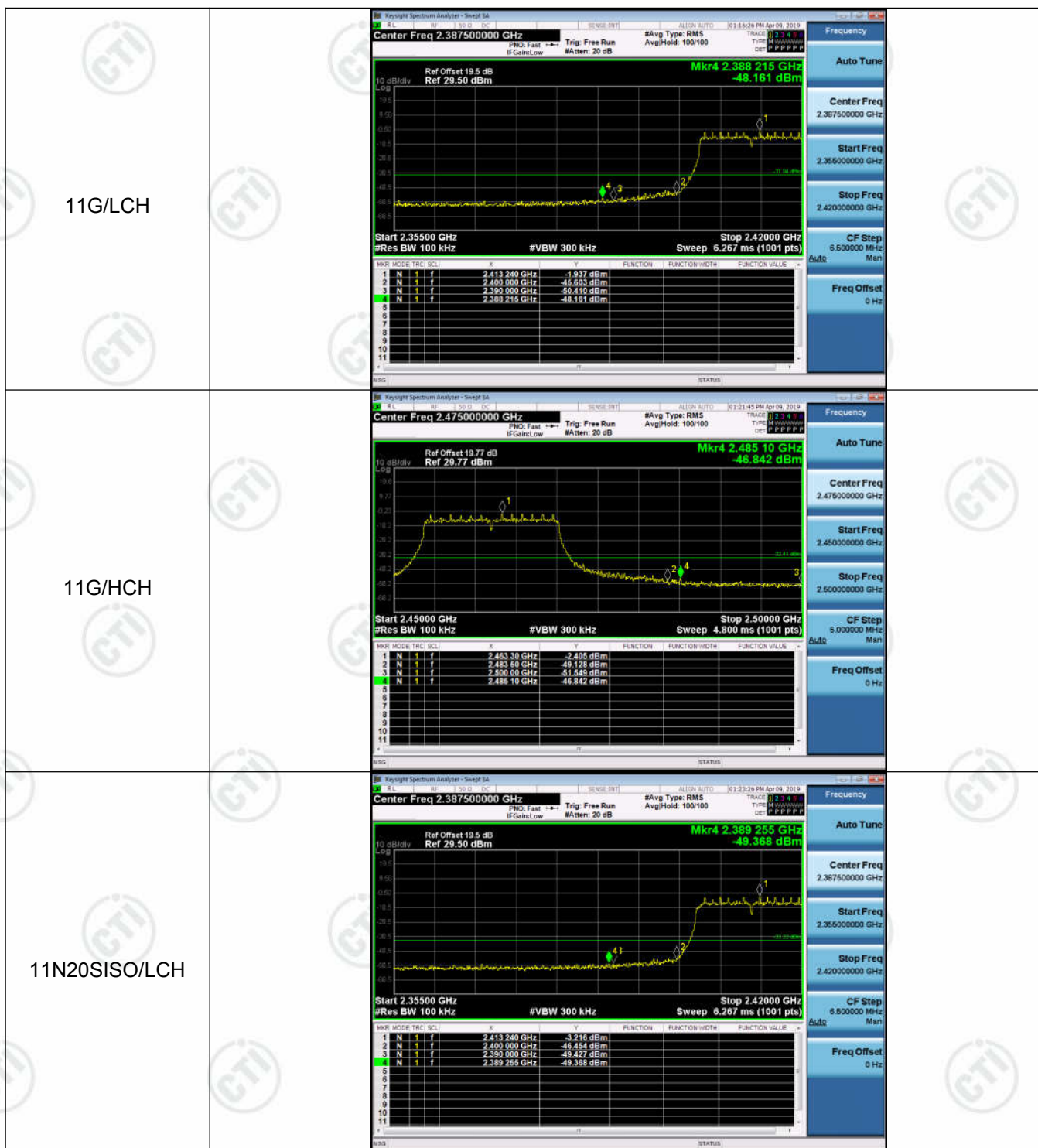
## Appendix C): Band-edge for RF Conducted Emissions

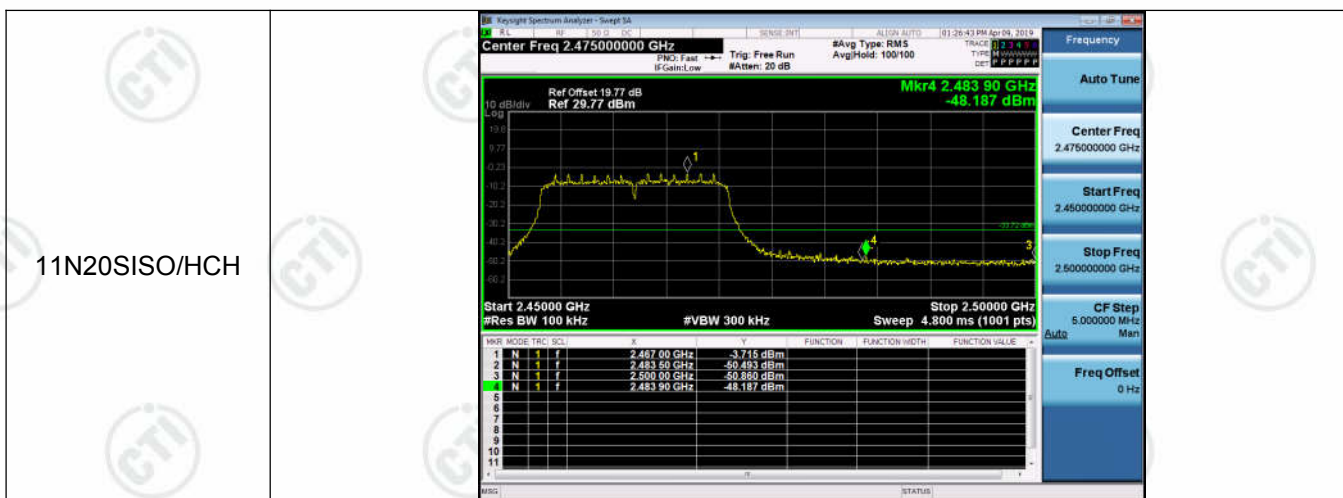
Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	6.310	-45.641	-23.69	PASS
11B	HCH	5.908	-45.555	-24.09	PASS
11G	LCH	-1.937	-48.161	-31.94	PASS
11G	HCH	-2.405	-46.842	-32.41	PASS
11N20SISO	LCH	-3.216	-49.368	-33.22	PASS
11N20SISO	HCH	-3.715	-48.187	-33.72	PASS

Test Graph







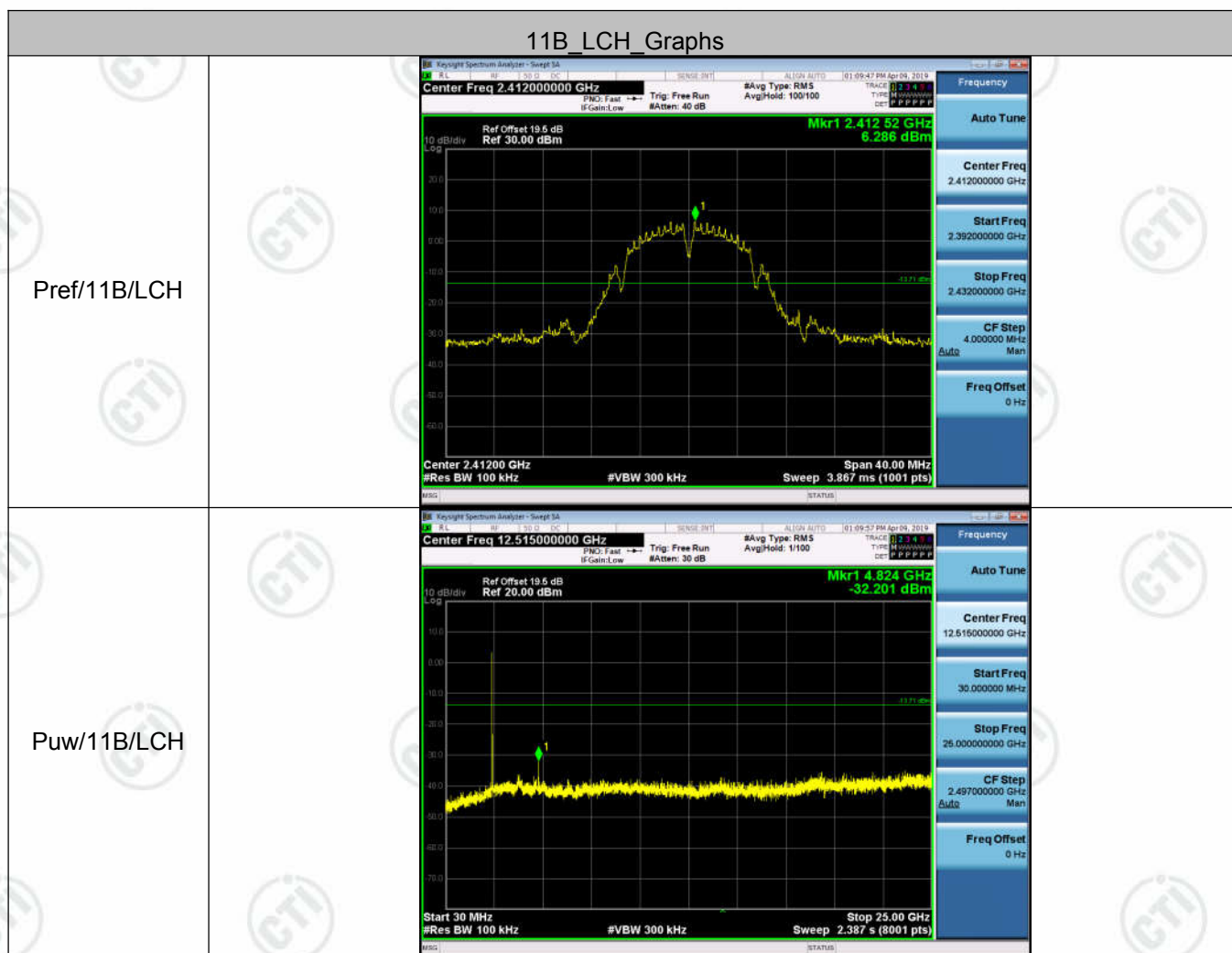


## Appendix D): RF Conducted Spurious Emissions

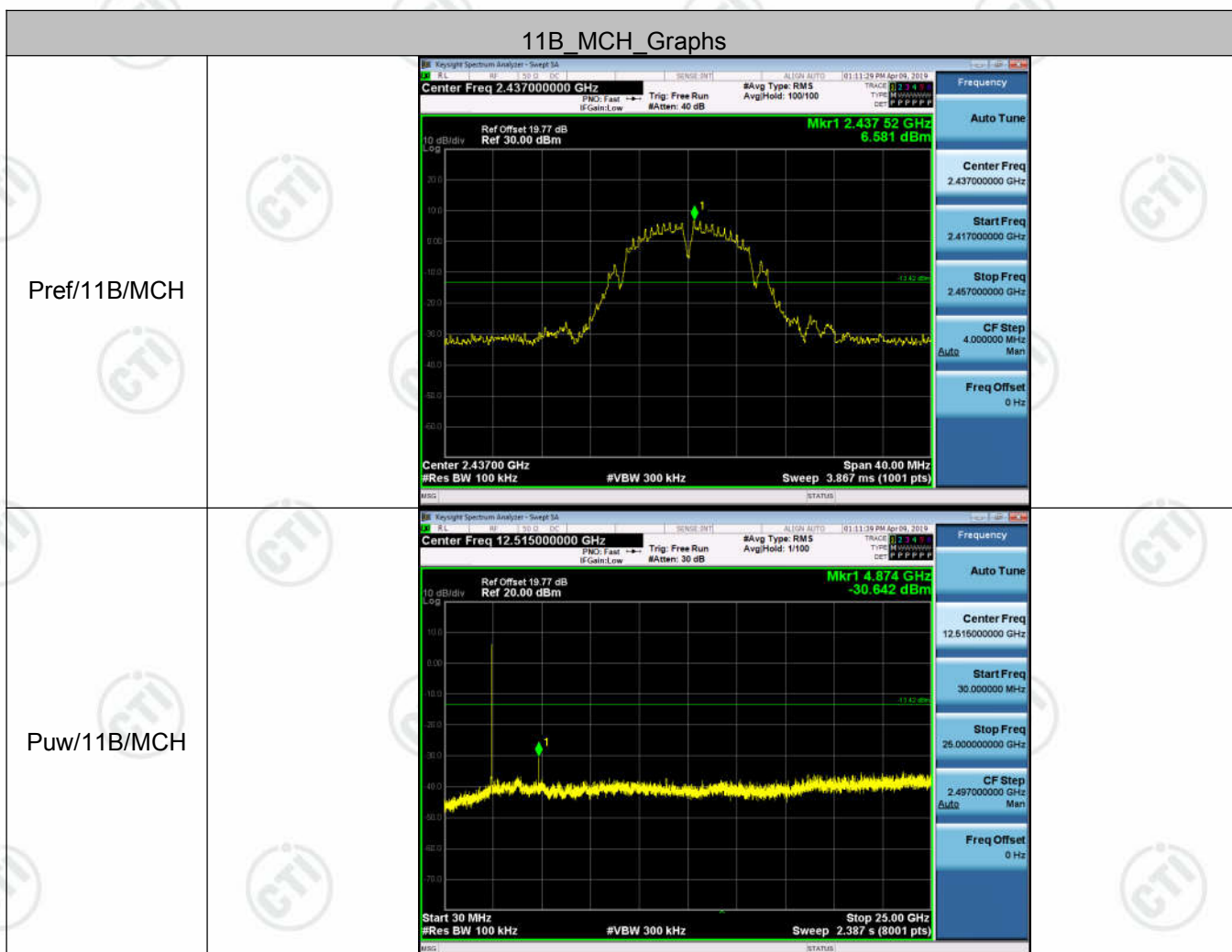
Result Table

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
11B	LCH	6.286	<Limit	PASS
11B	MCH	6.581	<Limit	PASS
11B	HCH	5.477	<Limit	PASS
11G	LCH	-1.92	<Limit	PASS
11G	MCH	-1.293	<Limit	PASS
11G	HCH	-2.312	<Limit	PASS
11N20SISO	LCH	-3.228	<Limit	PASS
11N20SISO	MCH	-2.33	<Limit	PASS
11N20SISO	HCH	-3.622	<Limit	PASS

Test Graph

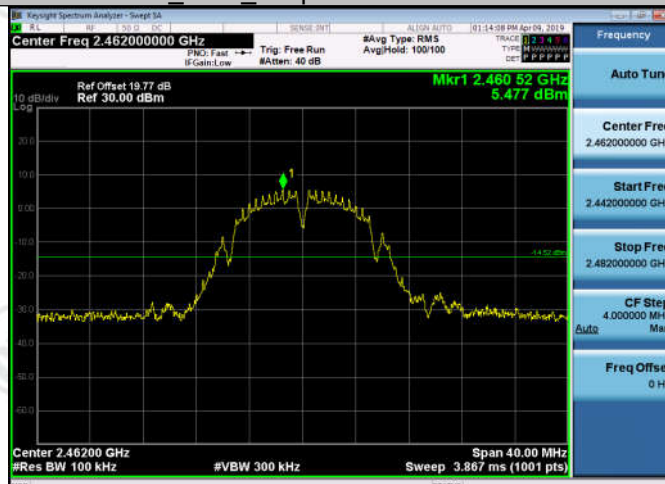




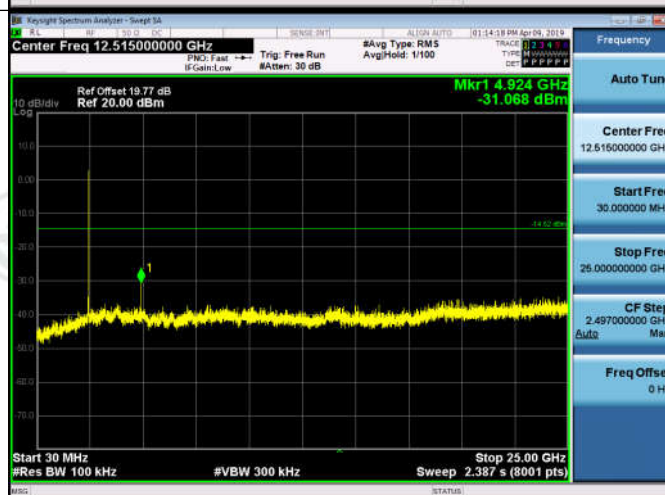


### 11B\_HCH\_Graphs

Pref/11B/HCH

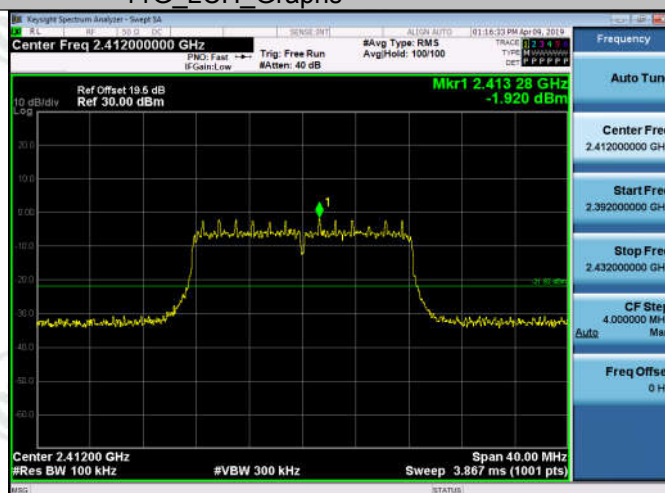


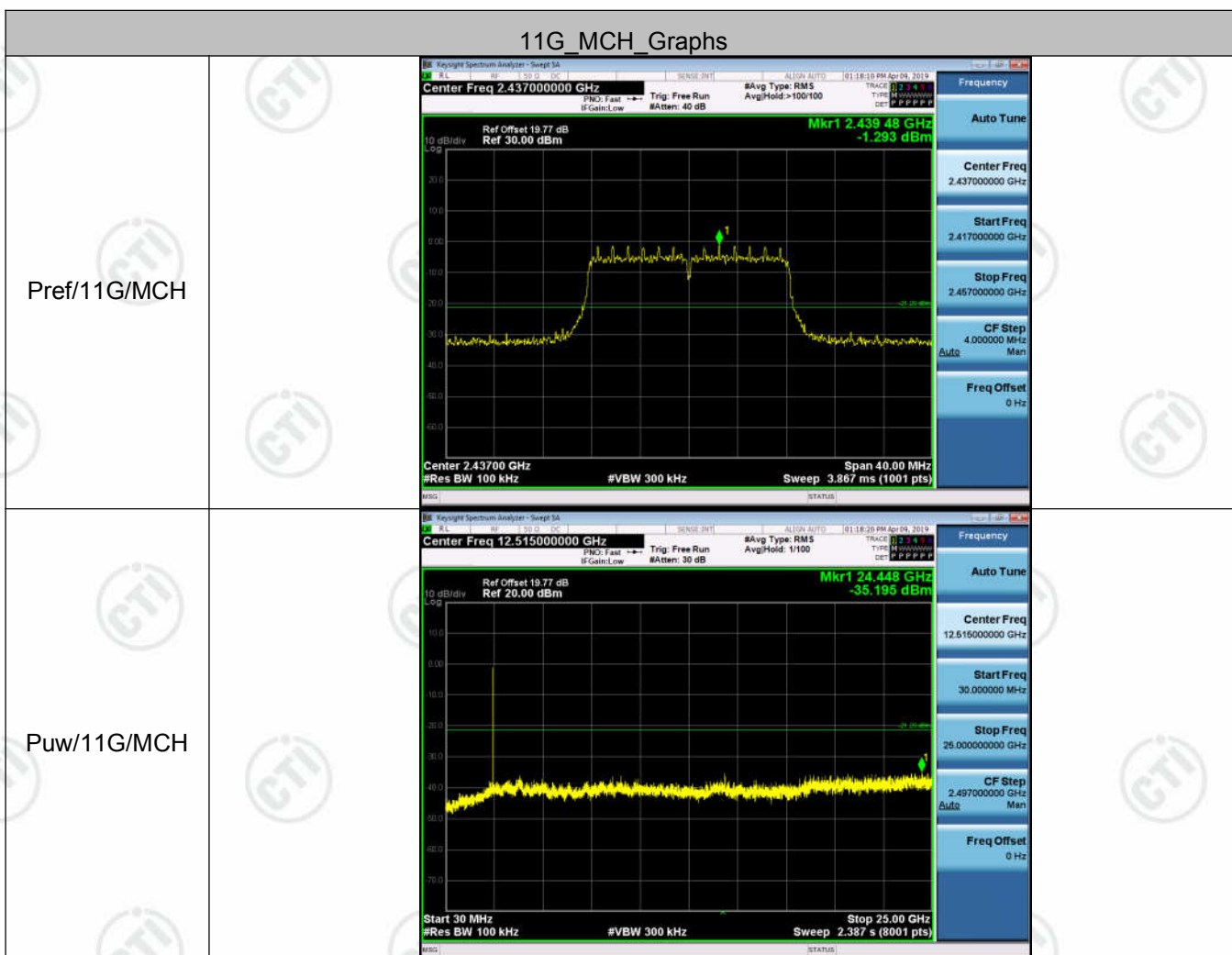
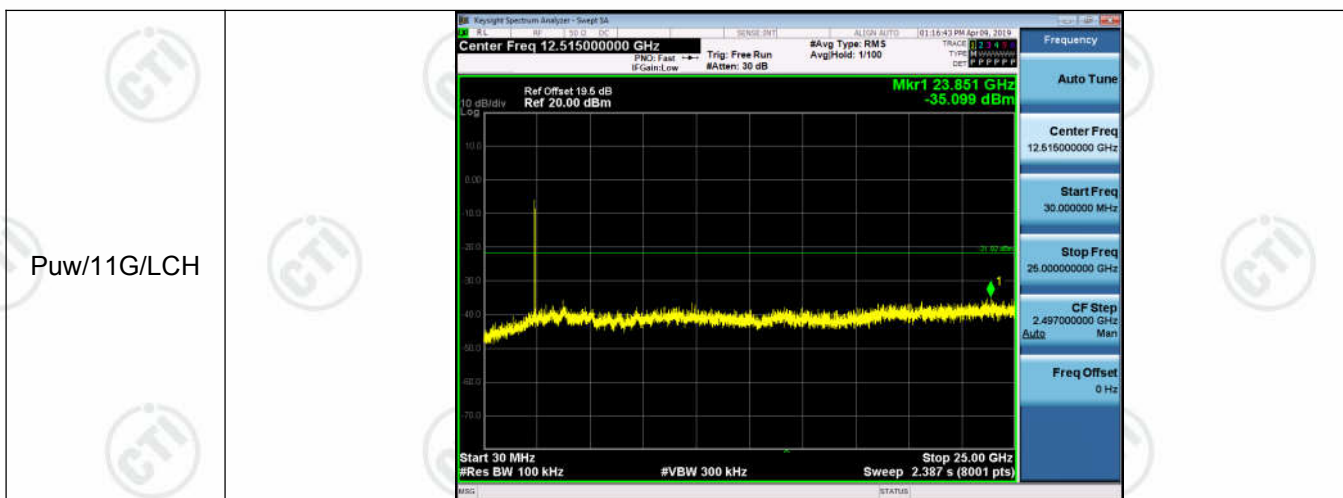
Puw/11B/HCH

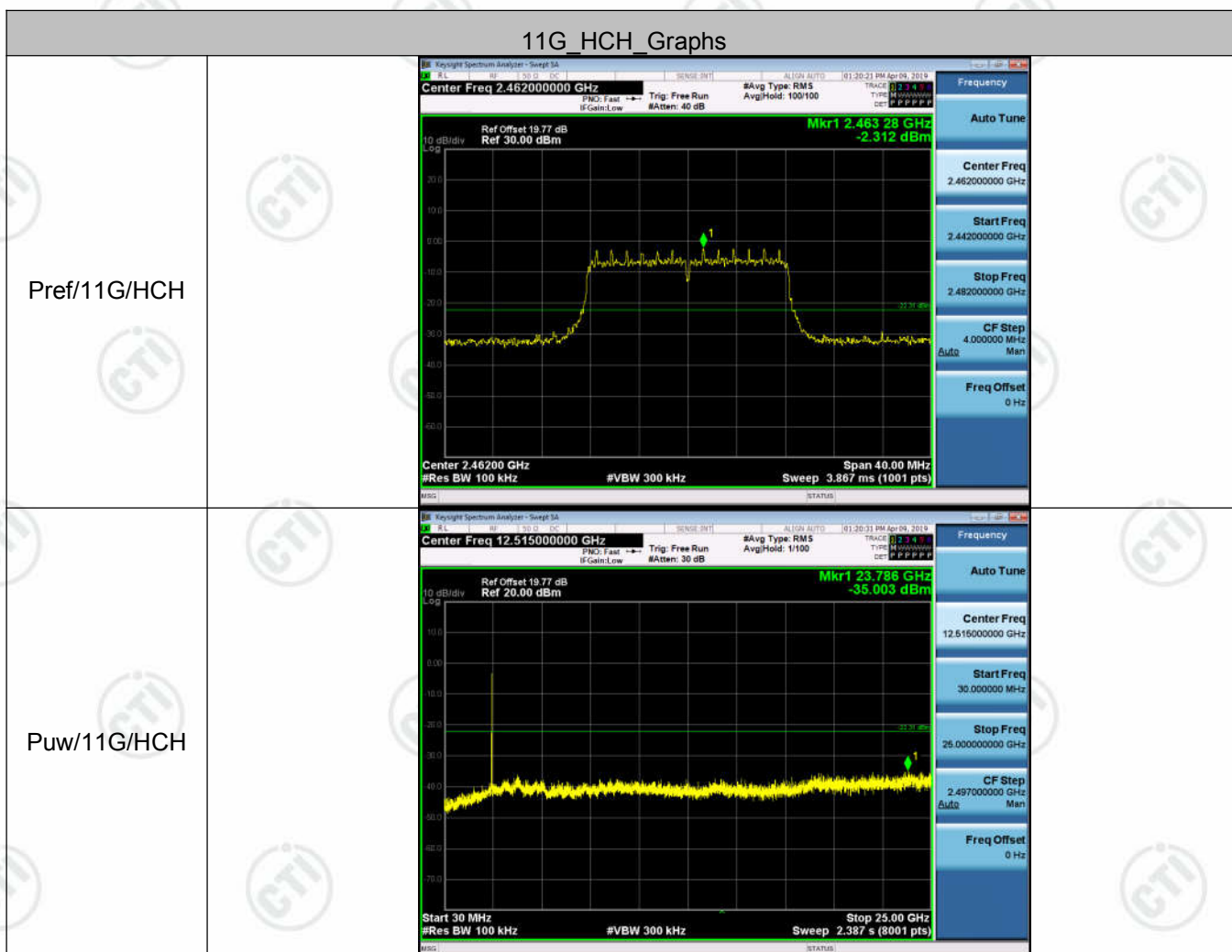


### 11G\_LCH\_Graphs

Pref/11G/LCH

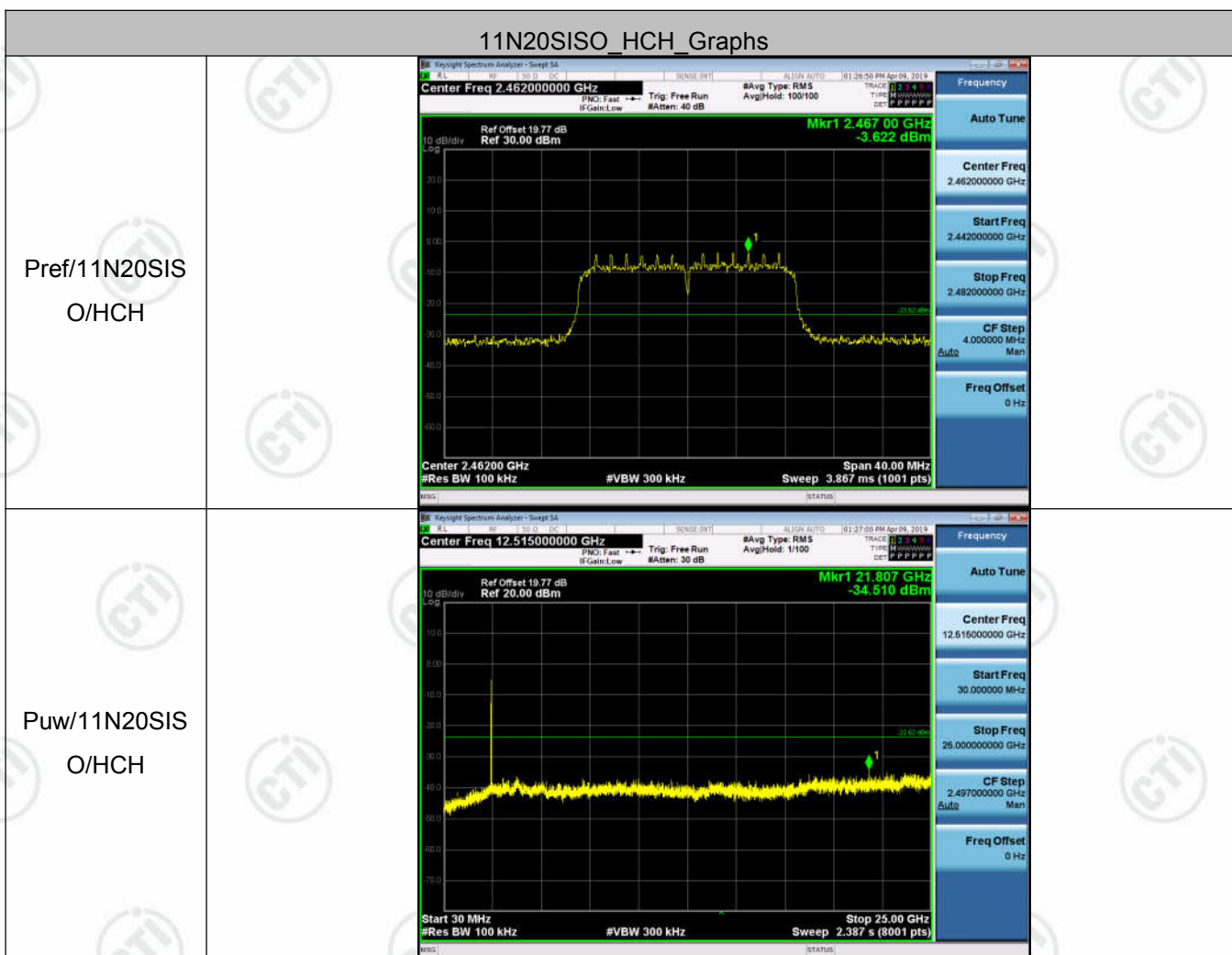
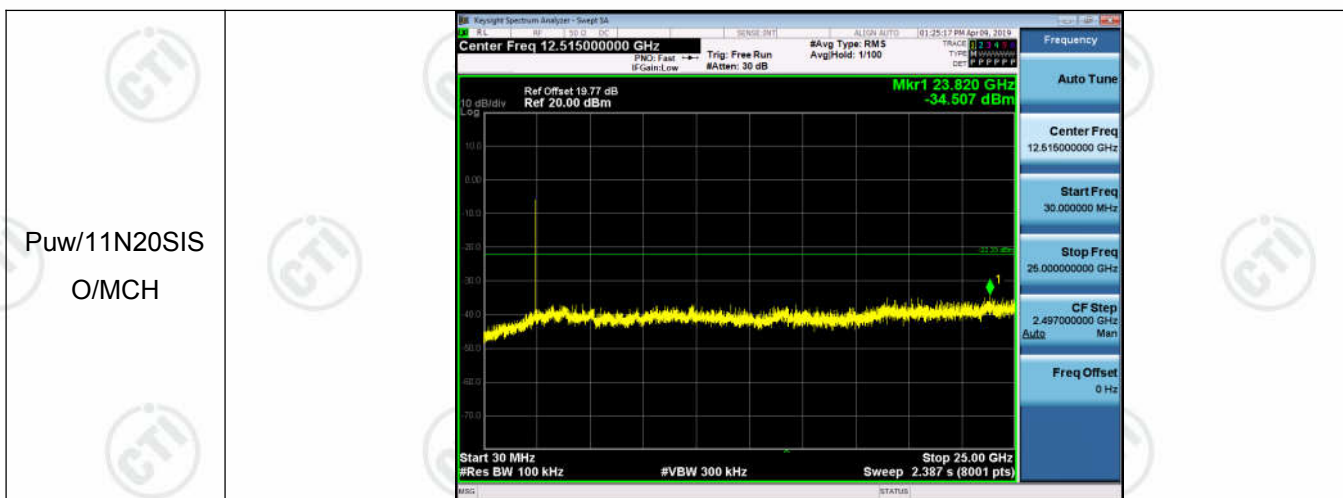










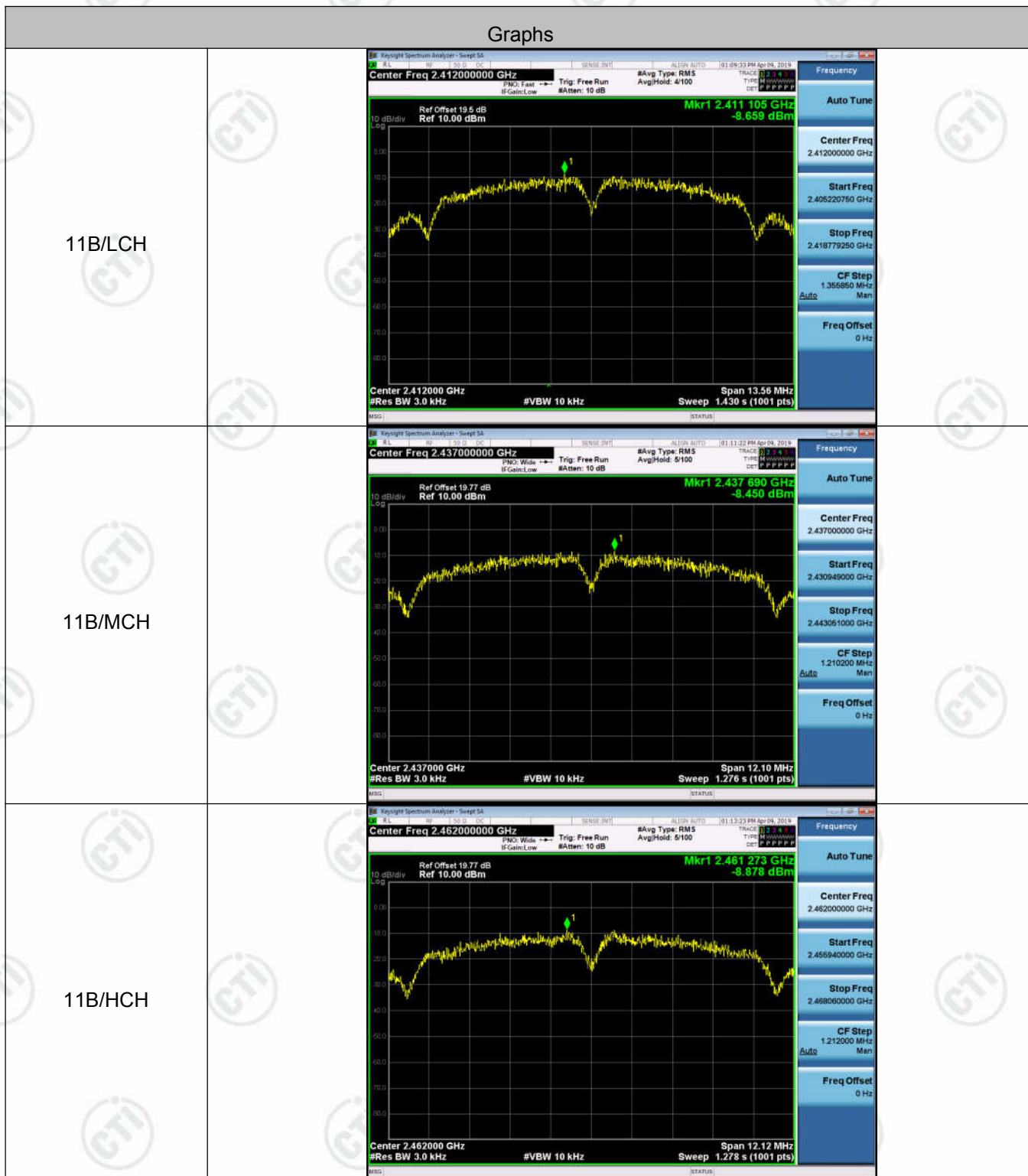


## Appendix E): Power Spectral Density

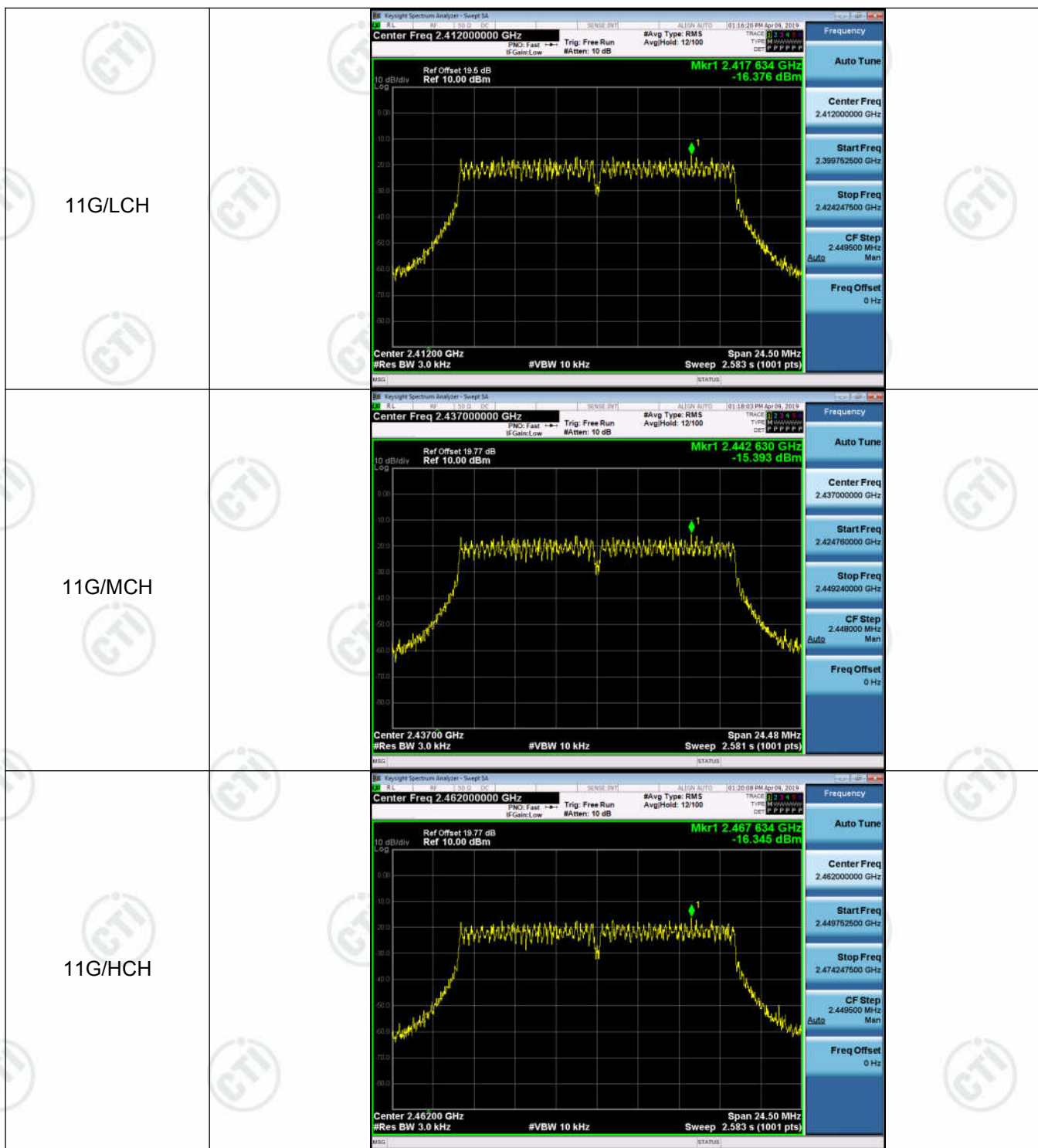
Result Table

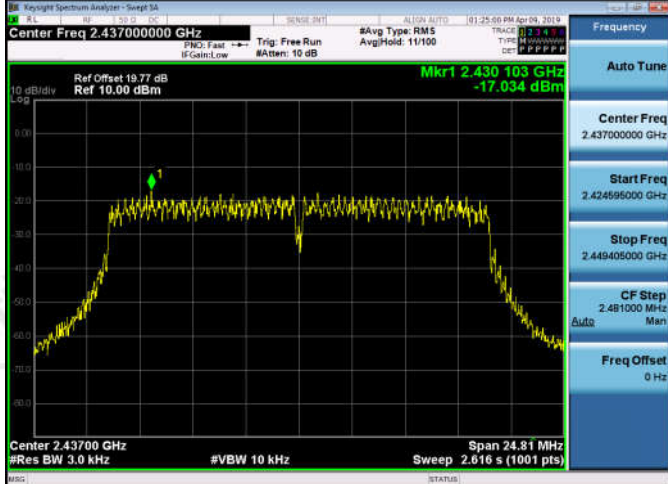
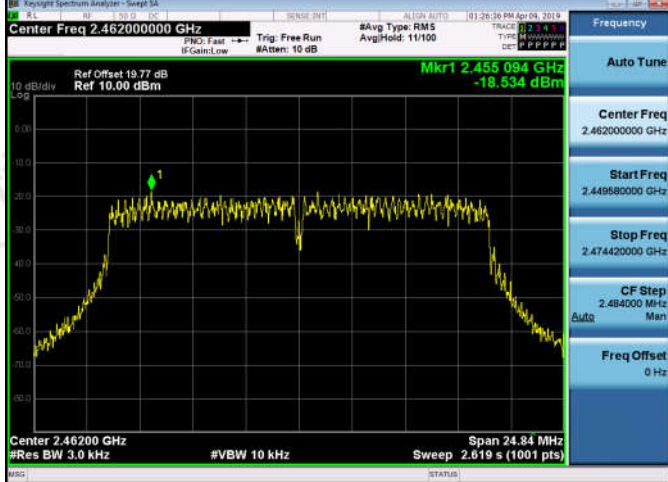
Mode	Channel	Power Spectral Density [dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	LCH	-8.659	8	PASS
11B	MCH	-8.450	8	PASS
11B	HCH	-8.878	8	PASS
11G	LCH	-16.376	8	PASS
11G	MCH	-15.393	8	PASS
11G	HCH	-16.345	8	PASS
11N20SISO	LCH	-17.818	8	PASS
11N20SISO	MCH	-17.034	8	PASS
11N20SISO	HCH	-18.534	8	PASS

## Test Graph







11N20SISO/LCH	 <p>Key: Keysight Spectrum Analyzer - Sweep SA Center Freq 2.41200000 GHz Ref Offset 19.5 dB Ref 10.00 dBm Mkr1 2.405 099 GHz -17.818 dBm Center 2.41200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 24.83 MHz Sweep 2.618 s (1001 pts)</p>
11N20SISO/MCH	 <p>Key: Keysight Spectrum Analyzer - Sweep SA Center Freq 2.43700000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.430 103 GHz -17.034 dBm Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 24.81 MHz Sweep 2.616 s (1001 pts)</p>
11N20SISO/HCH	 <p>Key: Keysight Spectrum Analyzer - Sweep SA Center Freq 2.46200000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.455 094 GHz -18.534 dBm Center 2.46200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 24.84 MHz Sweep 2.619 s (1001 pts)</p>

## Appendix F): Antenna Requirement

### 15.203 requirement:

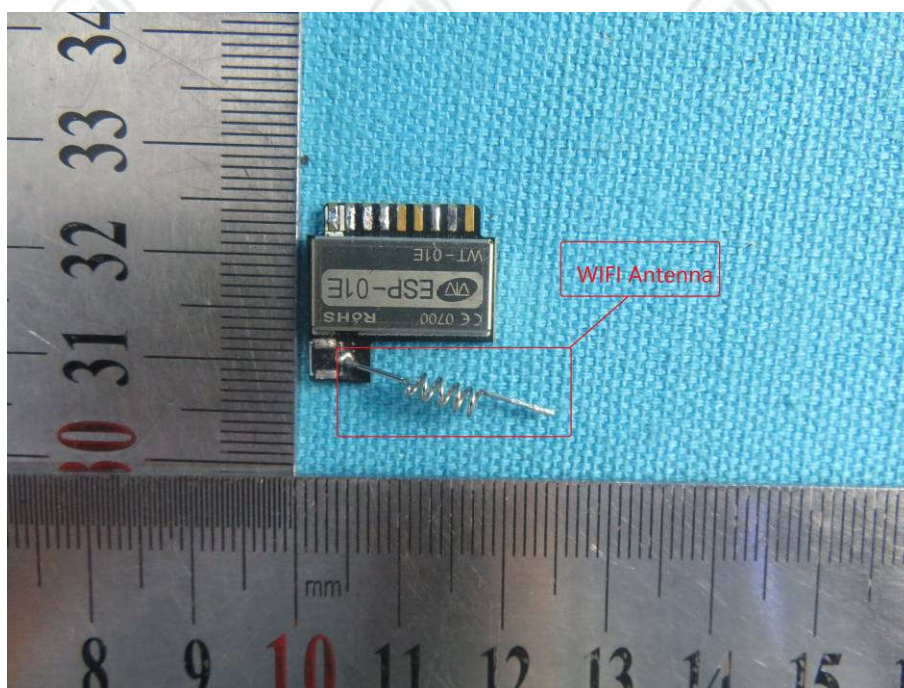
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 Spring Antenna 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> <p>1)The mains terminal disturbance voltage test was conducted in a shielded room.</p> <p>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω 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.</p> <p>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,</p> <p>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.</p> <p>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.</p>																
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><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></table> <p>* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.</p> <p>NOTE : The lower limit is applicable at the transition frequency</p>			Frequency range (MHz)	Limit (dBμV)		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 (dBμV)																
	Quasi-peak	Average															
0.15-0.5	66 to 56*	56 to 46*															
0.5-5	56	46															
5-30	60	50															
Test Ambient:	Temp.: 25°C	Humid.: 52%	Press.: 101kPa														



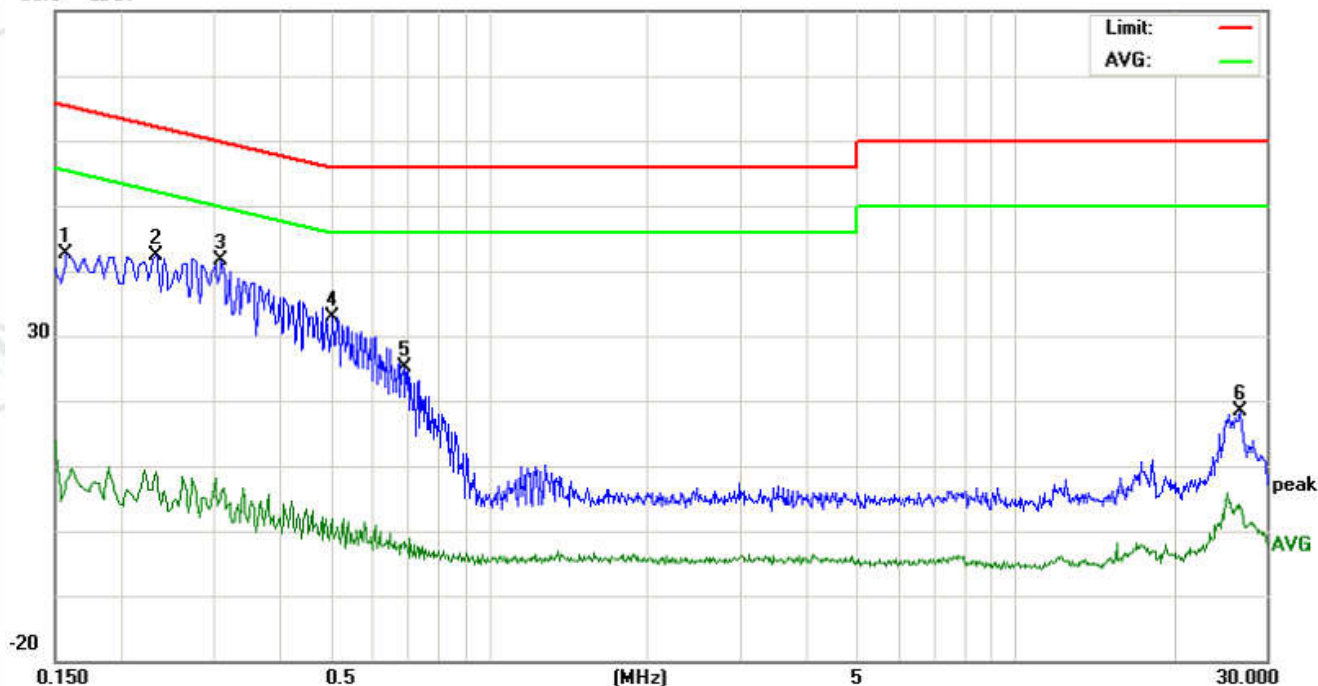
### Measurement Data

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:

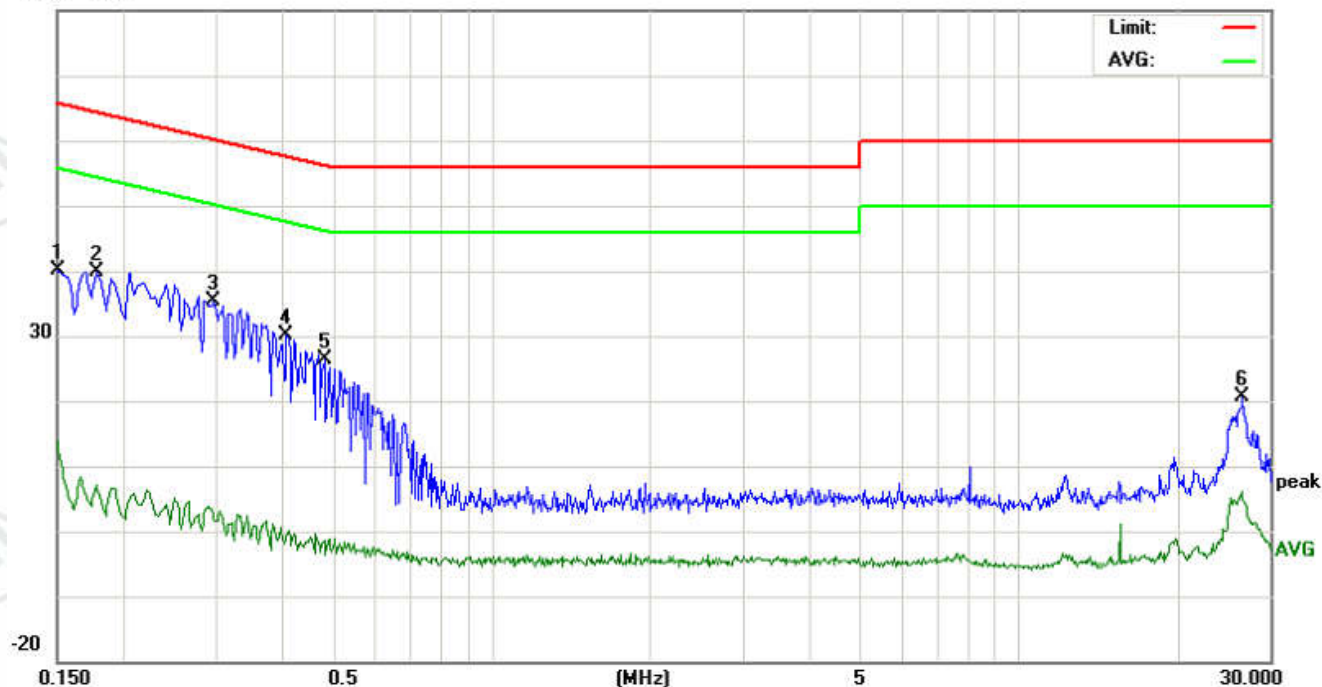
80.0 dBuV



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	0.1582	30.42	26.70	3.93	9.91	40.33	36.61	13.84	65.55	55.55	-28.94	-41.71	P	
2	0.2340	32.52	29.64	-0.91	9.94	42.46	39.58	9.03	62.30	52.30	-22.72	-43.27	P	
3	0.3100	31.55	28.10	-4.35	9.99	41.54	38.09	5.64	59.97	49.97	-21.88	-44.33	P	
4	0.5060	30.43	27.36	3.94	9.90	40.33	37.26	13.84	56.00	46.00	-18.74	-32.16	P	
5	0.6900	15.21	12.12	-11.4	9.84	25.05	21.96	-1.63	56.00	46.00	-34.04	-47.63	P	
6	26.7100	8.34	4.19	-6.05	9.94	18.28	14.13	3.89	60.00	50.00	-45.87	-46.11	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	0.1500	30.14	26.32	3.94	9.91	40.05	36.23	13.85	65.99	55.99	-29.76	-42.14	P	
2	0.1780	30.01	26.41	-2.69	9.91	39.92	36.32	7.22	64.57	54.57	-28.25	-47.35	P	
3	0.2987	30.05	26.79	3.85	10.00	40.05	36.79	13.85	60.28	50.28	-23.49	-36.43	P	
4	0.4100	20.30	16.20	-10.4	9.89	30.19	26.09	-0.59	57.65	47.65	-31.56	-48.24	P	
5	0.4820	16.49	13.76	-11.3	9.89	26.38	23.65	-1.42	56.30	46.30	-32.65	-47.72	P	
6	26.6380	10.64	6.77	-4.88	9.94	20.58	16.71	5.06	60.00	50.00	-43.29	-44.94	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.

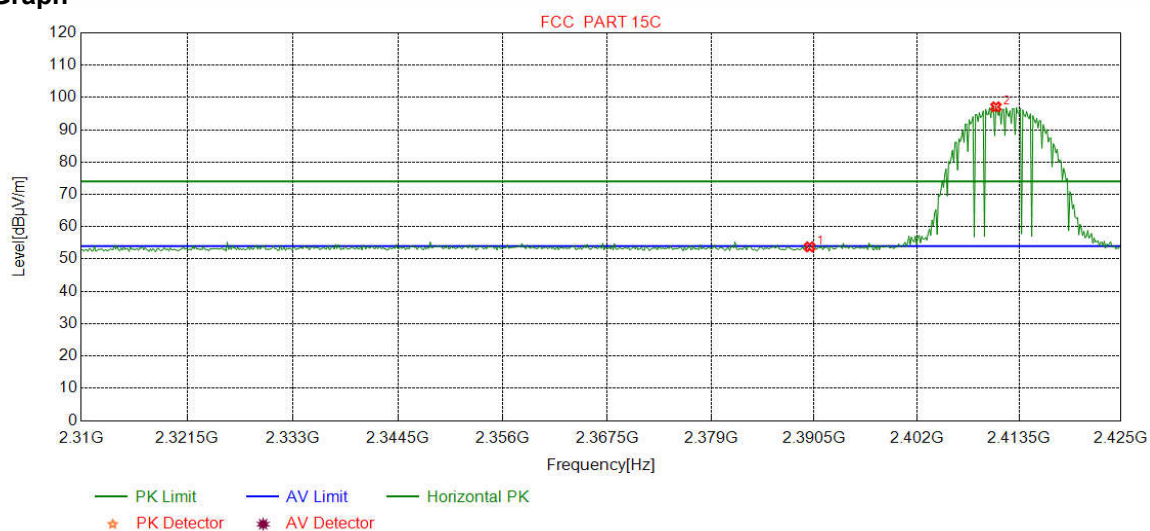
## Appendix H): Restricted bands around fundamental frequency (Radiated)

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 (dBμV/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 Ambient:	Temp.: 25°C	Humid.: 52%		Press.: 101kPa	

**Test plot as follows:**

Mode:	802.11 b(11Mbps) Transmitting	Channel:	2412
Remark:	PK		

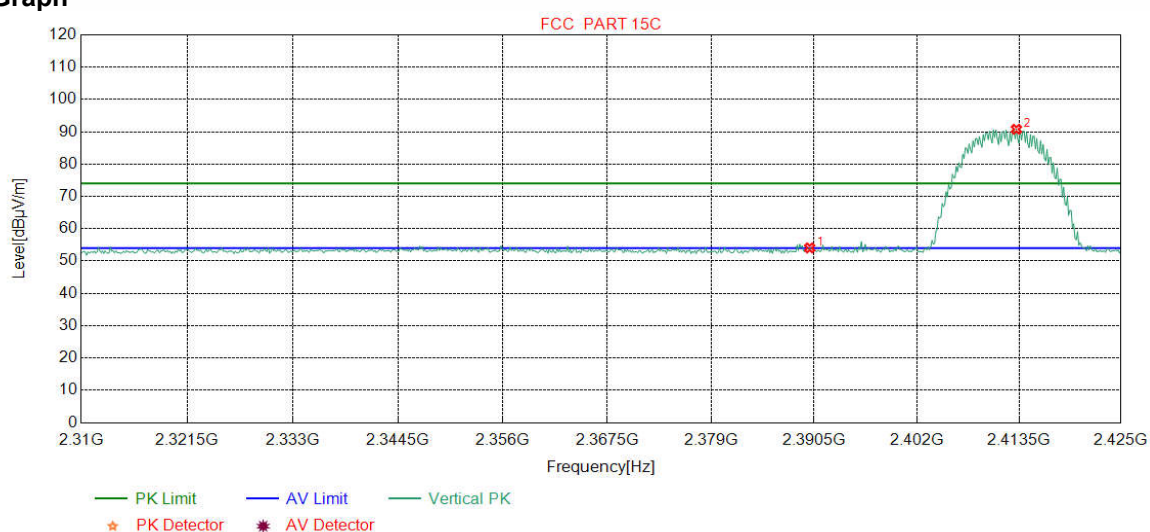
**Test Graph**



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-42.44	50.58	53.76	74.00	20.24	Pass	Horizontal
2	2410.8949	32.28	13.35	-42.43	93.89	97.09	74.00	-23.09	Pass	Horizontal

Mode:	802.11 b(11Mbps) Transmitting	Channel:	2412
Remark:	PK		

**Test Graph**

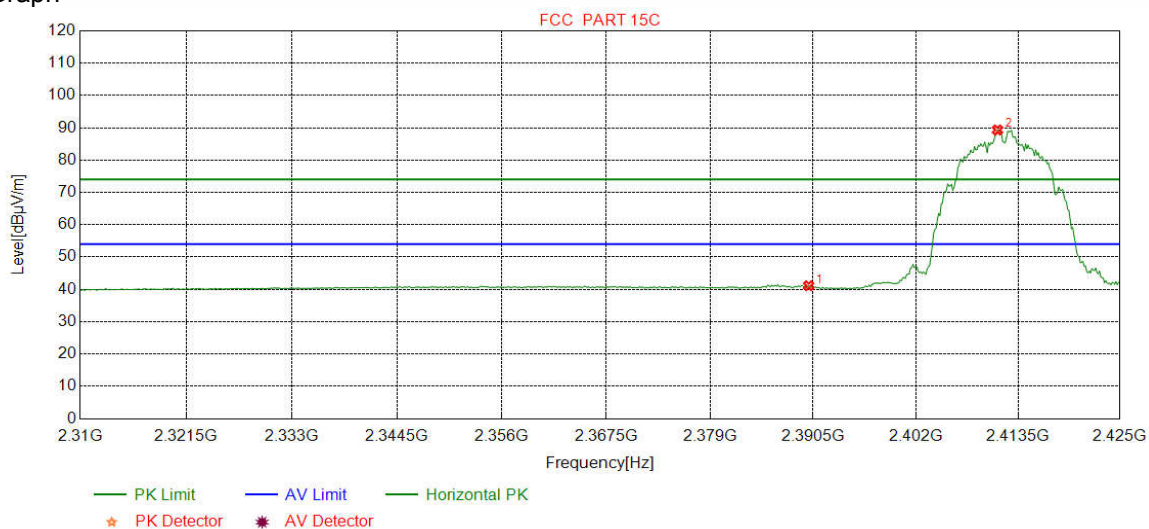


NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-42.44	50.89	54.07	74.00	19.93	Pass	Vertical
2	2413.1977	32.28	13.36	-42.43	87.56	90.77	74.00	-16.77	Pass	Vertical



Mode:	802.11 b(11Mbps) Transmitting	Channel:	2412
Remark:	AV		

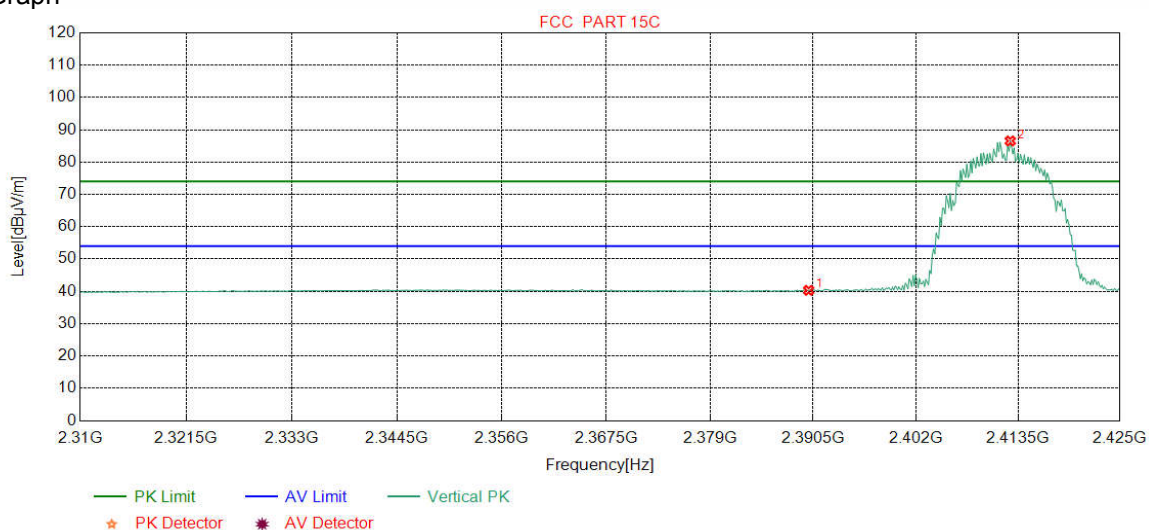
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-42.44	37.95	41.13	54.00	12.87	Pass	Horizontal
2	2411.1827	32.28	13.35	-42.43	86.13	89.33	54.00	-35.33	Pass	Horizontal

Mode:	802.11 b(11Mbps) Transmitting	Channel:	2412
Remark:	AV		

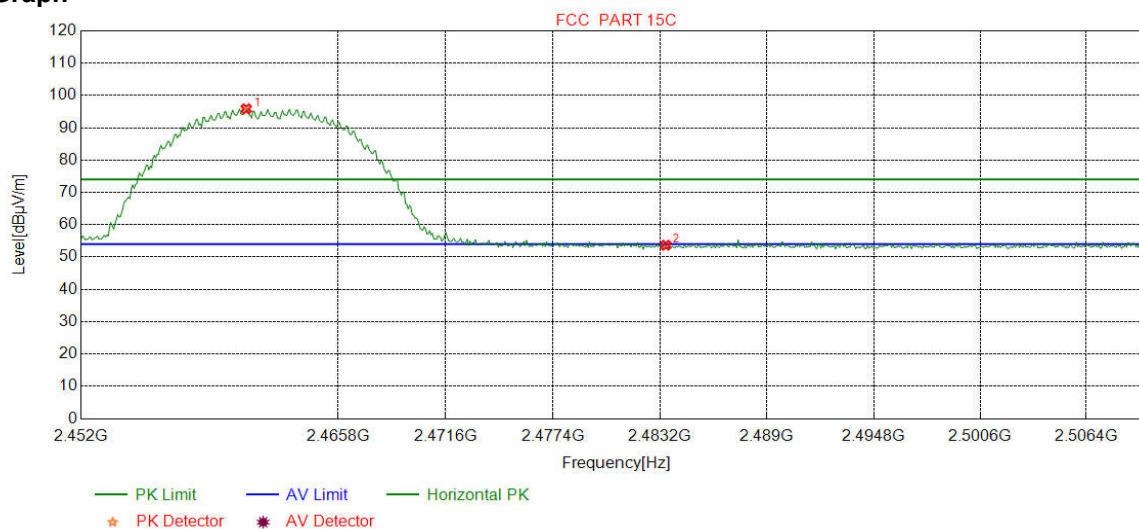
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2390.0000	32.25	13.37	-42.44	37.14	40.32	54.00	13.68	Pass	Vertical
2	2412.6220	32.28	13.36	-42.43	83.34	86.55	54.00	-32.55	Pass	Vertical

Mode:	802.11 b(11Mbps) Transmitting	Channel:	2462
Remark:	PK		

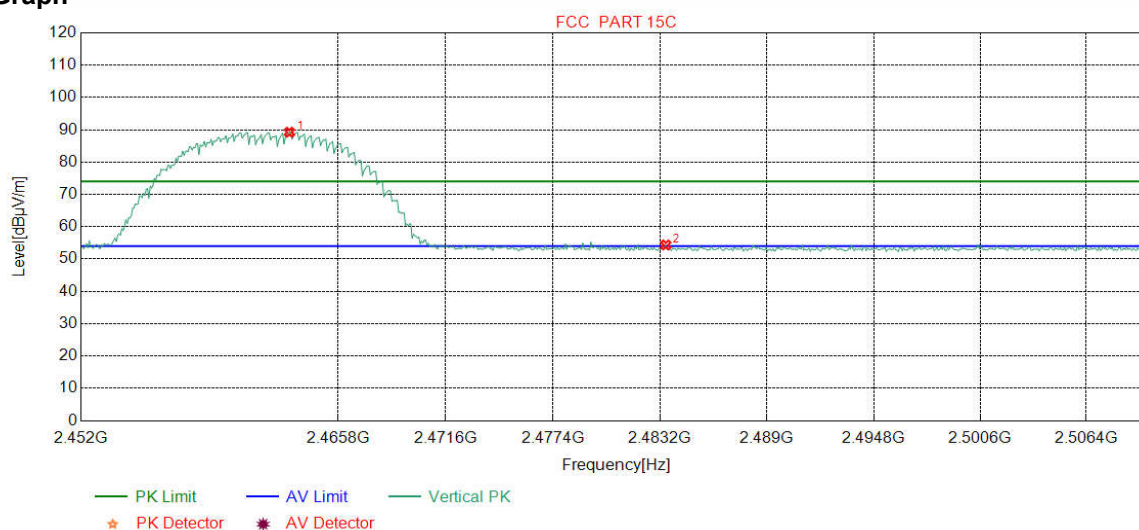
### Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2460.8561	32.35	13.48	-42.41	92.44	95.86	74.00	-21.86	Pass	Horizontal
2	2483.5000	32.38	13.38	-42.40	50.30	53.66	74.00	20.34	Pass	Horizontal

Mode:	802.11 b(11Mbps) Transmitting	Channel:	2462
Remark:	PK		

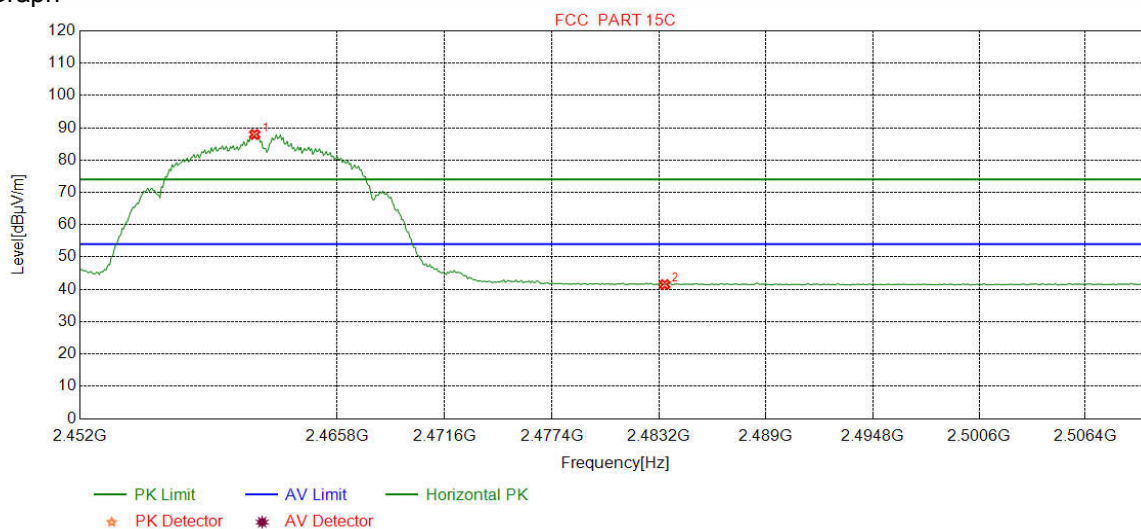
### Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2463.1790	32.35	13.47	-42.41	85.83	89.24	74.00	-15.24	Pass	Vertical
2	2483.5000	32.38	13.38	-42.40	51.00	54.36	74.00	19.64	Pass	Vertical

Mode:	802.11 b(11Mbps) Transmitting	Channel:	2462
Remark:	AV		

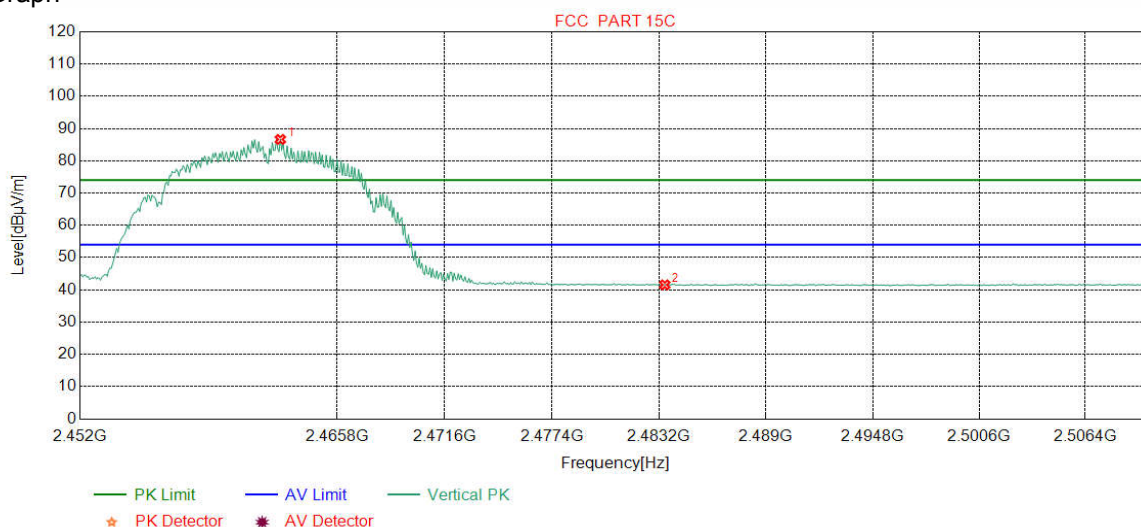
Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2461.3642	32.35	13.48	-42.41	84.51	87.93	54.00	-33.93	Pass	Horizontal
2	2483.5000	32.38	13.38	-42.40	38.13	41.49	54.00	12.51	Pass	Horizontal

Mode:	802.11 b(11Mbps) Transmitting	Channel:	2462
Remark:	AV		

Test Graph



NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity
1	2462.7434	32.35	13.47	-42.41	83.22	86.63	54.00	-32.63	Pass	Vertical
2	2483.5000	32.38	13.38	-42.40	38.19	41.55	54.00	12.45	Pass	Vertical