

TEST REPORT

Product : Vision Screener
Trade mark : CHAROPS
Model/Type reference : CVS-1
Serial Number : N/A
Report Number : EED32L00297002
FCC ID : 2AT8E-CVS1
Date of Issue : May 22, 2020
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

SHANGHAI HUVITZ Co., Ltd.
Building 1, No. 150, Renjie Road, Fengxian, Shanghai, China

Prepared by:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District,
Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Compiled by:

Sunlight Sun

Sunlight Sun

Reviewed by:

Ware Xin

Ware Xin

Approved by:

Sam Chuang

Sam Chuang

Date:

May 22, 2020

Check No.:3970383225



2 Version

Version No.	Date	Description
00	May 22, 2020	Original

3 Test Summary

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

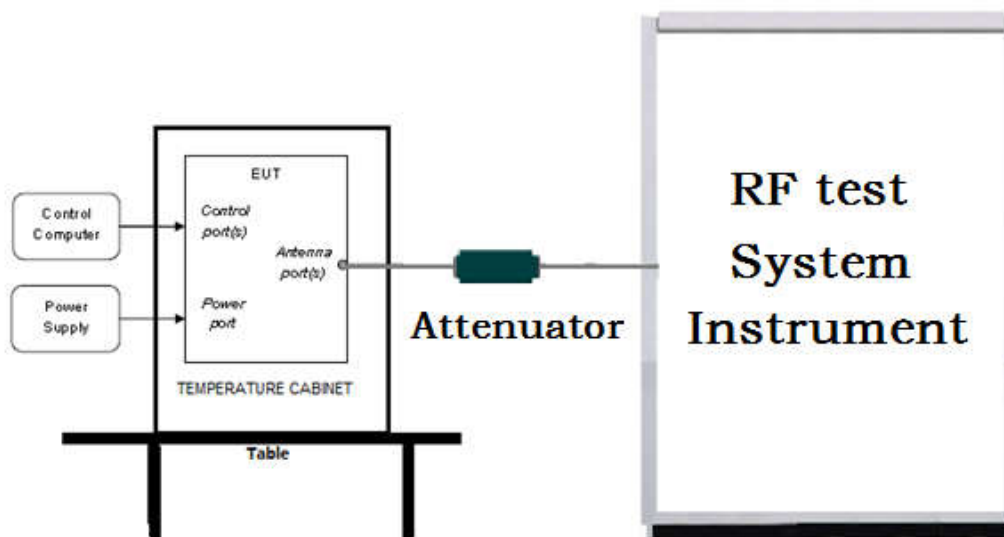
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5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

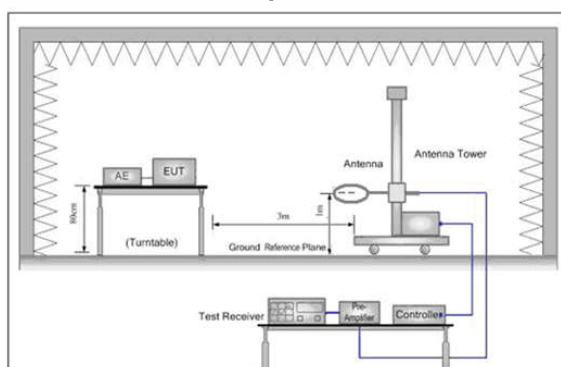


Figure 1. Below 30MHz

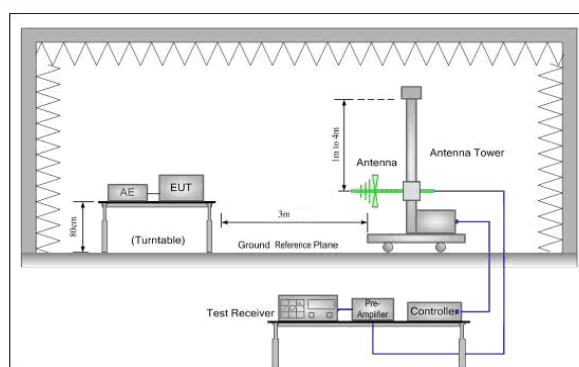


Figure 2. 30MHz to 1GHz

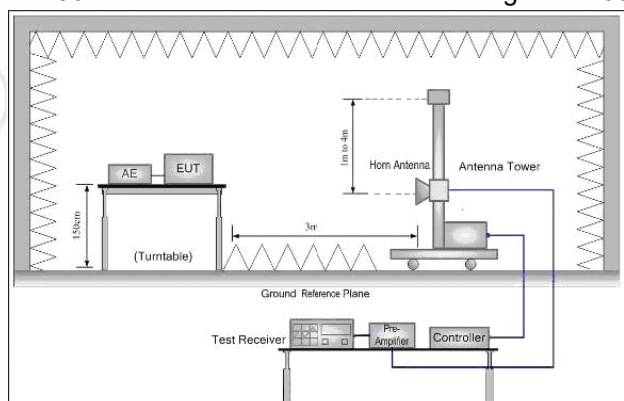
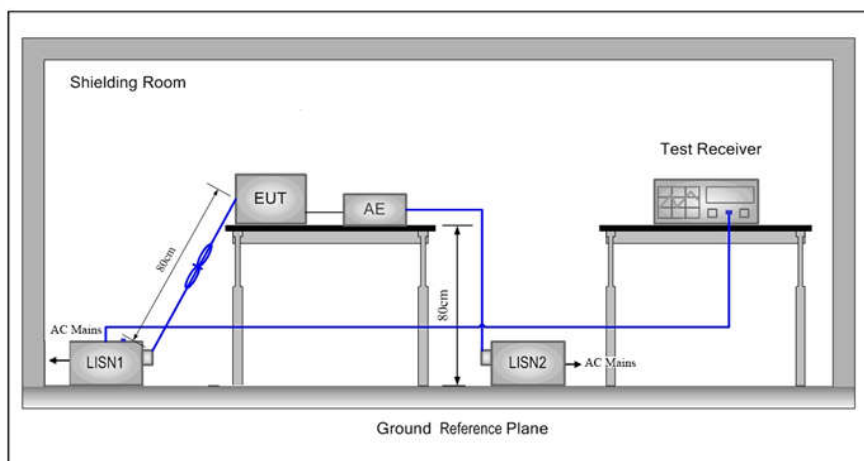


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	24.0 °C
Humidity:	53 % RH
Atmospheric Pressure:	1010 mbar

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	Channel 11
		2412MHz	2437MHz	2462MHz
802.11n(HT40)	2422MHz ~2452 MHz	Channel 3	Channel 6	Channel 9
		2422MHz	2437MHz	2452MHz
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

Mode	802.11b							
Data Rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
Power(dBm)	15.0	15.4	15.7	15.9				
Mode	802.11g							
Data Rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Power(dBm)	15.4	15.39	15.37	15.35	15.33	15.31	15.30	15.29
Mode	802.11n (HT20)							
Data Rate	6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps
Power(dBm)	14.91	14.90	14.88	14.85	14.83	14.81	14.80	14.78
Mode	802.11n (HT40)							
Data Rate	13.5Mbps	27Mbps	40.5Mbps	54Mbps	81Mbps	108Mbps	121.5Mbps	135Mbps
Power(dBm)	13.19	13.17	13.15	13.12	13.10	12.99	12.97	12.95

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); 13.5Mbps of rate is the worst case of 802.11n(HT40).

6 General Information

6.1 Client Information

Applicant:	SHANGHAI HUVITZ Co., Ltd.
Address of Applicant:	Building 1, No. 150, Renjie Road, Fengxian, Shanghai, China
Manufacturer:	SHANGHAI HUVITZ Co., Ltd.
Address of Manufacturer:	Building 1, No. 150, Renjie Road, Fengxian, Shanghai, China
Factory:	SHANGHAI HUVITZ Co., Ltd.
Address of Factory:	Building 1, No. 150, Renjie Road, Fengxian, Shanghai, China

6.2 General Description of EUT

Product Name:	Vision Screener	
Model No.(EUT):	CVS-1	
Trade mark:	CHAROPS	
EUT Supports Radio application:	IEEE 802.11 b/g/n(HT20)(HT40): 2412MHz to 2462MHz	
Power Supply:	AC Adapter	MODEL:MDS-030AAC15 INPUT:100-240V~0.8-0.6V 50-60Hz OUTPUT:15V---2A
Sample Received Date:	Oct. 17, 2019	
Sample tested Date:	Oct. 17, 2019 to Apr.24, 2020	

6.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 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 and HT40) : OFDM (64QAM, 16QAM, QPSK,BPSK)
Test Power Grade:	Reference Tablel
Test Software of EUT:	Default
Antenna Type and Gain:	Type: Omnidirectional Antenna Gain: 2dBi
Test Voltage:	AC220V/50Hz

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		
Operation Frequency each of channel(802.11n HT40)							
Channel	Frequency	Channel	Frequency	Channel	Frequency		
3	2422MHz	6	2437MHz	9	2452MHz		
4	2427MHz	7	2442MHz				
5	2432MHz	8	2447MHz				

Table:

Mode	Channel	Frequency	Data Rate	Power Setting
b	1	2412	11 Mbps	20000
	6	2437		20000
	11	2462		20000
g	1	2412	6 Mbps	11000
	6	2437		11000
	11	2462		11000
n20	1	2412	MCS 0	10000
	6	2437		9000
	11	2462		9000
n40	3	2422	MCS 0	8000
	6	2437		8000
	9	2452		8000

6.4 Description of Support Units

The EUT has been tested with associated equipment below

1) support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Notebook	DELL	DELL	CE&FCC	DELL

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	7.9×10^{-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	Mode No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Spectrum Analyzer	Keysight	N9010A	MY54510339	03-01-2019 02-17-2020	02-29-2020 02-16-2021
Signal Generator	Keysight	N5182B	MY53051549	03-01-2019 02-17-2020	02-29-2020 02-16-2021
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	07-26-2019	07-25-2020
High-pass filter	Sinoscite	FL3CX03WG18N M12-0398-002	---	---	---
High-pass filter	MICRO- TRONICS	SPA-F-63029-4	---	---	---
DC Power	Keysight	E3642A	MY56376072	03-01-2019 02-17-2020	02-29-2020 02-16-2021
PC-1	Lenovo	R4960d	---	---	---
BT&WI-FI Automatic control	R&S	OSP120	101374	03-01-2019 02-17-2020	02-29-2020 02-16-2021
RF control unit	JS Tonscend	JS0806-2	158060006	03-01-2019 02-17-2020	02-29-2020 02-16-2021
BT&WI-FI Automatic test software	JS Tonscend	JS1120-3	---	---	---

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	05-20-2019	05-19-2020
Temperature/ Humidity Indicator	Defu	TH128	/	06-14-2019	06-13-2020
LISN	R&S	ENV216	100098	05-08-2019	05-07-2020
Barometer	changchun	DYM3	1188	06-20-2019	06-19-2020

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
3M Chamber & Accessory	TDK	SAC-3	---	05-24-2019	05-23-2022
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	07-26-2019	07-25-2020
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04-25-2018	04-24-2021
Receiver	R&S	ESCI7	100938-003	10-21-2019	10-20-2020
Multi device Controller	maturo	NCD/070/107 11112	---	---	---
Temperature/ Humidity Indicator	Shanghai	HM10	1804298	07-26-2019	07-25-2020
Cable line	Fulai(7M)	SF106	5219/6A	---	---
Cable line	Fulai(6M)	SF106	5220/6A	---	---
Cable line	Fulai(3M)	SF106	5216/6A	---	---
Cable line	Fulai(3M)	SF106	5217/6A	---	---

3M full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
RSE Automatic test software	JS Tonscend	JS36-RSE	10166	06-19-2019	06-18-2020
Receiver	Keysight	N9038A	MY57290136	03-27-2019	03-26-2020
Spectrum Analyzer	Keysight	N9020B	MY57111112	03-27-2019	03-26-2020
Spectrum Analyzer	Keysight	N9030B	MY57140871	03-27-2019	03-26-2020
TRILOG Broadband	Schwarzbeck	VULB 9163	9163-1148	04-25-2018	04-24-2021
Horn Antenna	Schwarzbeck	BBHA 9170	9170-832	04-25-2018	04-24-2021
Horn Antenna	ETS-	3117	00057407	07-10-2018	07-09-2021
Preamplifier	EMCI	EMC184055SE	980596	05-22-2019	05-21-2020
Preamplifier	EMCI	EMC001330	980563	05-08-2019	05-07-2020
Preamplifier	JS Tonscend	980380	EMC051845 SE	01-16-2019	01-15-2020
Temperature/ Humidity	biaozhi	GM1360	EE1186631	04-30-2019	04-29-2020
Fully Anechoic Chamber	TDK	FAC-3	---	01-17-2018	01-16-2021
Filter bank	JS Tonscend	JS0806-F	188060094	04-10-2018	04-09-2021
Cable line	Times	SFT205-NMSM-2.50M	394812-0001	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0002	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0003	---	---
Cable line	Times	SFT205-NMSM-2.50M	393495-0001	---	---
Cable line	Times	EMC104-NMNM-1000	SN160710	---	---
Cable line	Times	SFT205-NMSM-3.00M	394813-0001	---	---
Cable line	Times	SFT205-NMNM-1.50M	381964-0001	---	---
Cable line	Times	SFT205-NMSM-7.00M	394815-0001	---	---
Cable line	Times	HF160-KMKM-3.00M	393493-0001	---	---

8 Radio Technical Requirements Specification

Reference documents for testing:

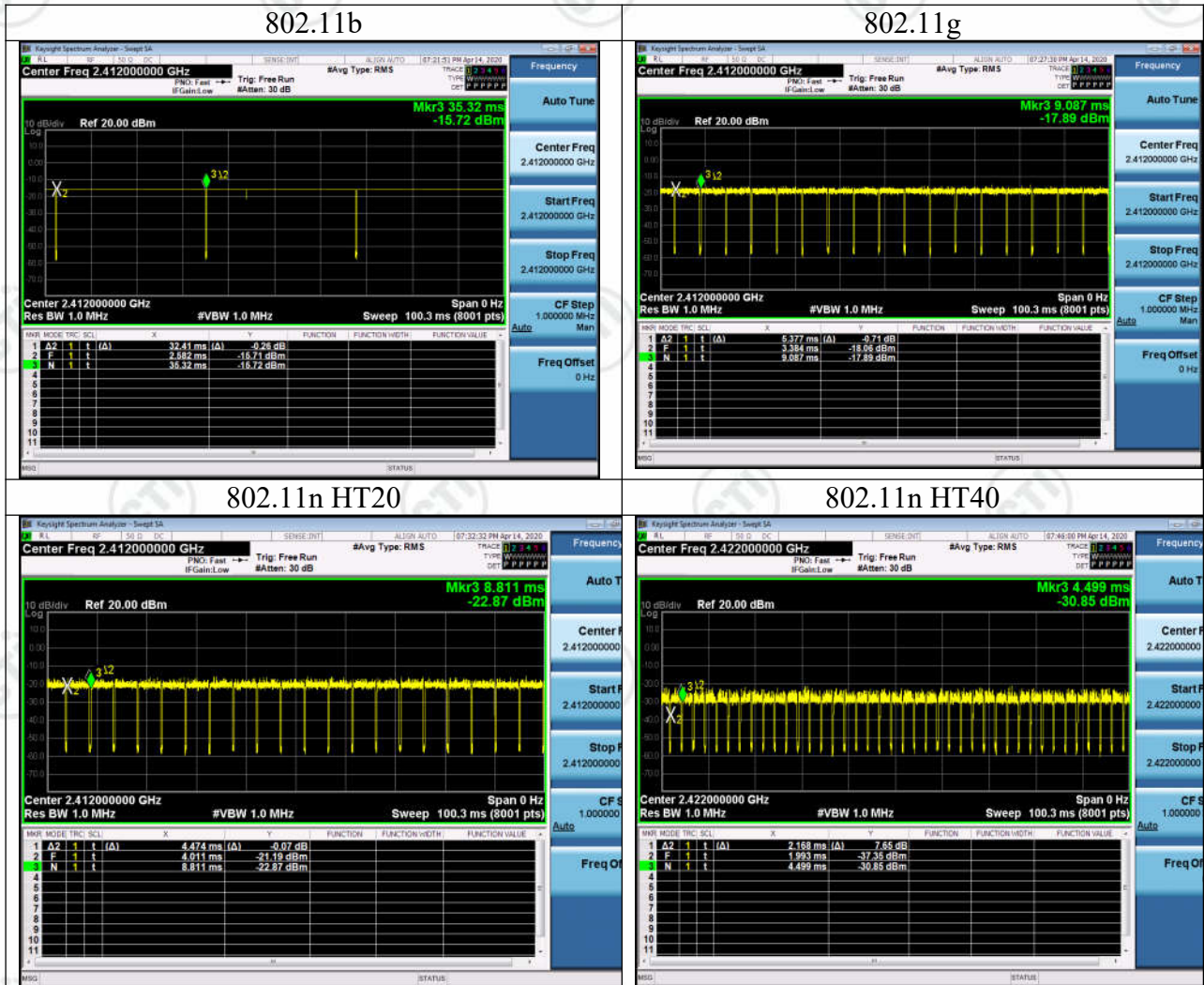
No.	Identity	Document Title
1	FCC Part15C	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

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)

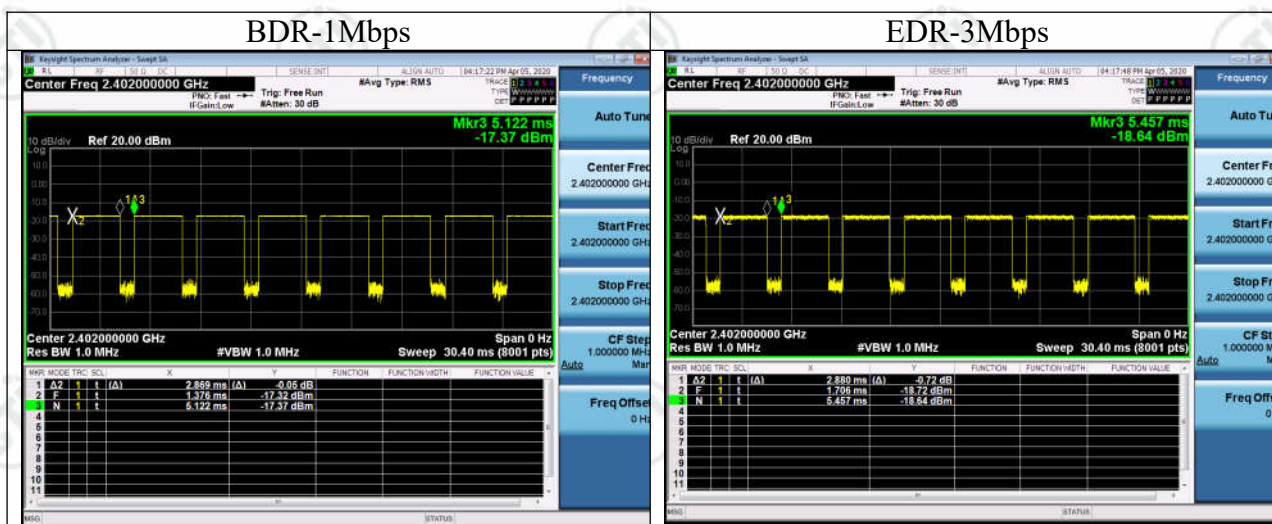
Duty Cycle

Duty Cycle			
Configuration	TX ON(ms)	TX ALL(ms)	Duty Cycle(%)
802.11b	32.41	32.738	99.0%
802.11g	5.377	5.703	94.3%
802.11n HT20	4.474	4.8	93.2%
802.11n HT40	2.168	2.506	86.5%



EUT DUTY CYCLE

Duty Cycle			
Configuration	TX ON(ms)	TX ALL(ms)	Duty Cycle(%)
BDR-1Mbps	2.869	3.746	76.59%
EDR-3Mbps	2.880	3.751	76.78%



Appendix A): Conducted Peak Output Power

Test Limit

According to §15.247(b)(3),

Peak output power :

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt(30 dBm), base on the use of antennas with directional gain not exceed 6 dBi. If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Limit	☒ Antenna not exceed 6 dBi : 30dBm ☐ Antenna with DG greater than 6 dBi : [Limit = 30 – (DG – 6)] ☐ Point-to-point operation :
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Average output power : For reporting purposes only.

Test Procedure

Test method Refer as KDB 558074 D01.

1. The EUT RF output connected to spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT.
3. Spectrum analyzer settings are as follows :
 - a) Set the RBW = 1 MHz.
 - b) Set the VBW $\geq [3 \times \text{RBW}]$.
 - c) Set the span $\geq [1.5 \times \text{DTS bandwidth}]$.
 - d) Detector = peak.
 - e) Sweep time = auto couple.
 - f) Trace mode = max hold.
 - g) Allow trace to fully stabilize.
 - h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges
4. Measure and record the result in the test report.

Test Setup

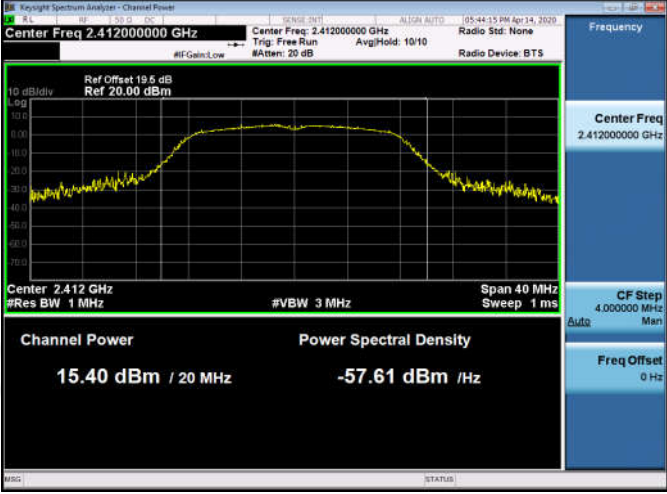
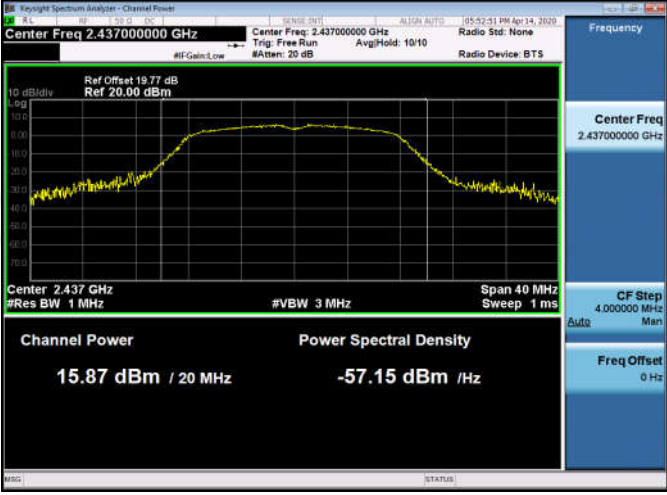
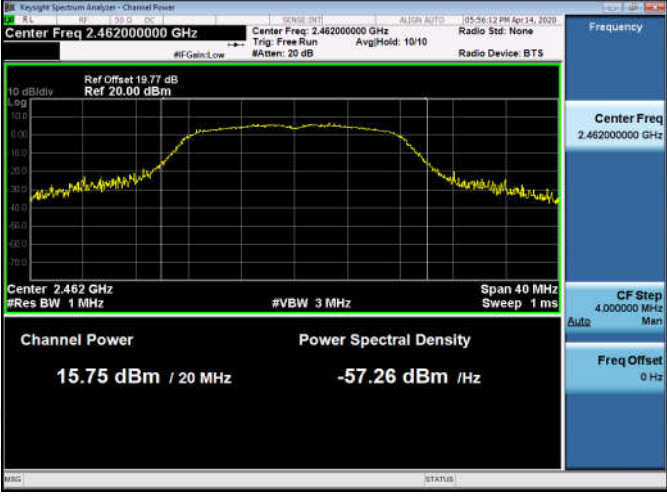


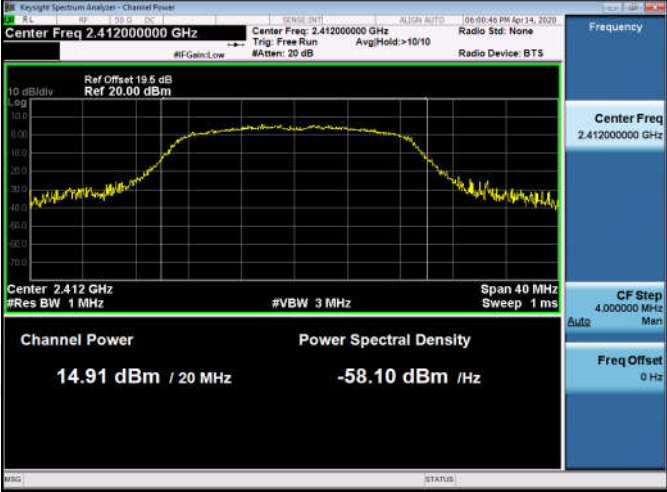
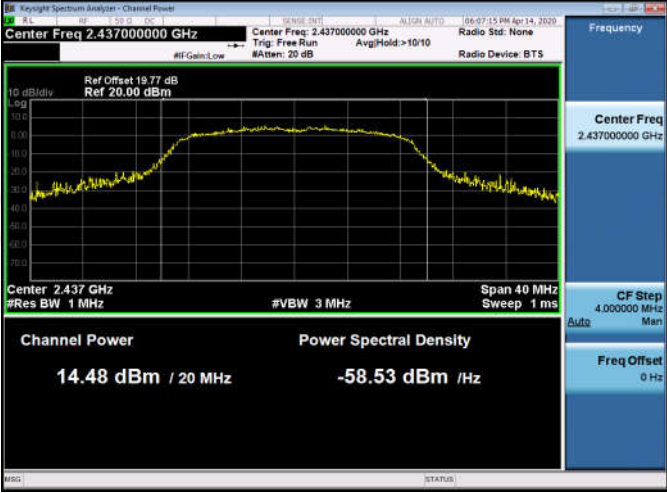
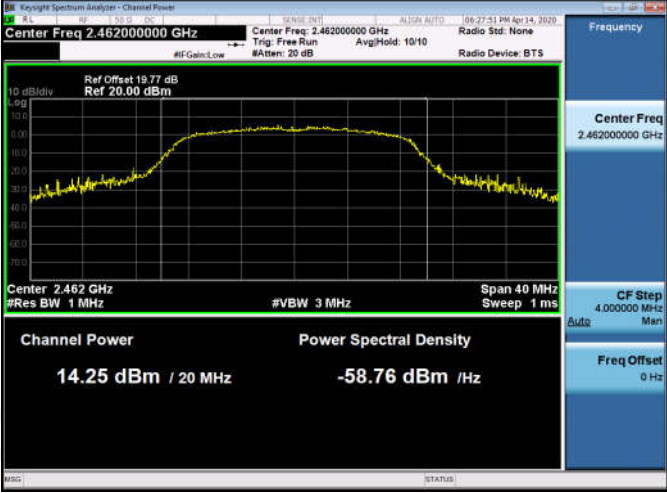
Result Table

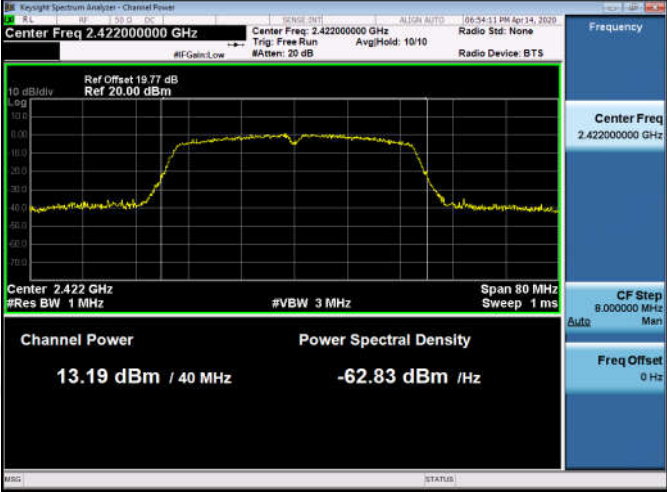
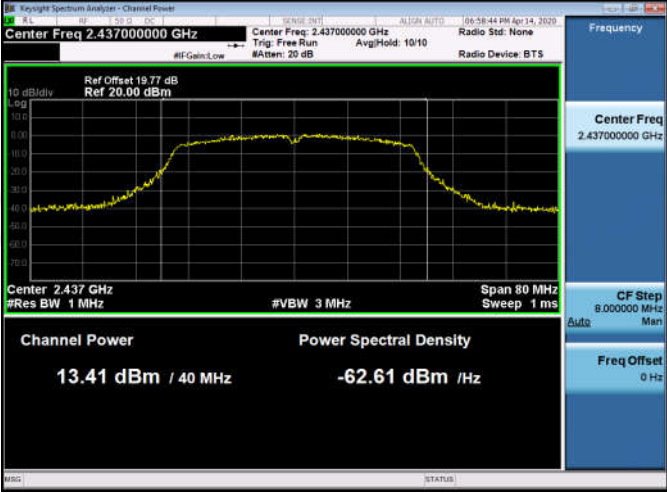
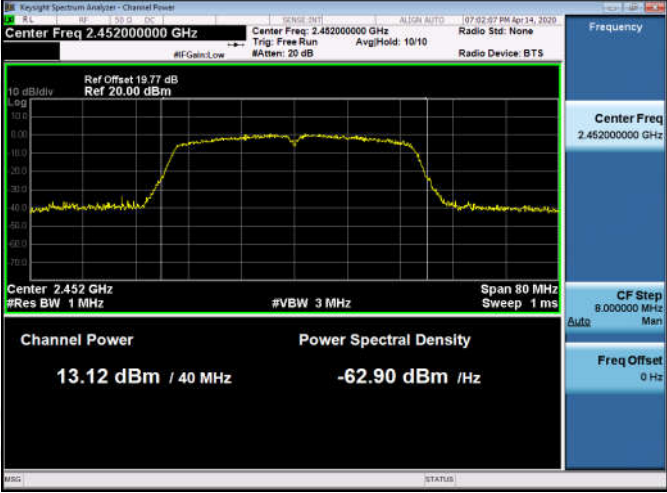
Mode	Channel	Conducted Peak Output Power [dBm]	Verdict
11B	LCH	15.9	PASS
11B	MCH	16.31	PASS
11B	HCH	16.17	PASS
11G	LCH	15.4	PASS
11G	MCH	15.87	PASS
11G	HCH	15.75	PASS
11N20SISO	LCH	14.91	PASS
11N20SISO	MCH	14.48	PASS
11N20SISO	HCH	14.25	PASS
11N40SISO	LCH	13.19	PASS
11N40SISO	MCH	13.41	PASS
11N40SISO	HCH	13.12	PASS

Test Graph

Graphs	
11B/LCH	KeySight Spectrum Analyzer - Channel Power Center Freq: 2.412000000 GHz Ref Offset: 19.5 dB, Ref: 30.00 dBm Channel Power: 15.90 dBm / 20 MHz Power Spectral Density: -57.11 dBm / Hz
11B/MCH	KeySight Spectrum Analyzer - Channel Power Center Freq: 2.437000000 GHz Ref Offset: 19.77 dB, Ref: 30.00 dBm Channel Power: 16.31 dBm / 20 MHz Power Spectral Density: -56.70 dBm / Hz
11B/HCH	KeySight Spectrum Analyzer - Channel Power Center Freq: 2.462000000 GHz Ref Offset: 19.77 dB, Ref: 30.00 dBm Channel Power: 16.17 dBm / 20 MHz Power Spectral Density: -56.84 dBm / Hz

11G/LCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.412000000 GHz Ref Offset 19.6 dB Ref 20.00 dBm Channel Power: 15.40 dBm / 20 MHz Power Spectral Density: -57.61 dBm / Hz
11G/MCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Channel Power: 15.87 dBm / 20 MHz Power Spectral Density: -57.15 dBm / Hz
11G/HCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Channel Power: 15.75 dBm / 20 MHz Power Spectral Density: -57.26 dBm / Hz

11N20SISO/LCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 20.00 dBm Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 14.91 dBm / 20 MHz Power Spectral Density -58.10 dBm / Hz Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11N20SISO/MCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 14.48 dBm / 20 MHz Power Spectral Density -58.53 dBm / Hz Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11N20SISO/HCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Center 2.462 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 14.25 dBm / 20 MHz Power Spectral Density -58.76 dBm / Hz Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz

11N40SISO/LCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.422000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Channel Power: 13.19 dBm / 40 MHz Power Spectral Density: -62.83 dBm / Hz Center 2.422 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Frequency: Center Freq 2.422000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/MCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Channel Power: 13.41 dBm / 40 MHz Power Spectral Density: -62.61 dBm / Hz Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Frequency: Center Freq 2.437000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/HCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.452000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Channel Power: 13.12 dBm / 40 MHz Power Spectral Density: -62.90 dBm / Hz Center 2.452 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Frequency: Center Freq 2.452000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz

Appendix B): 6dB Occupied Bandwidth&99% Bandwidth

Test Limit

According to §15.247(a)(2),

6 dB Bandwidth :

Limit	Shall be at least 500kHz
-------	--------------------------

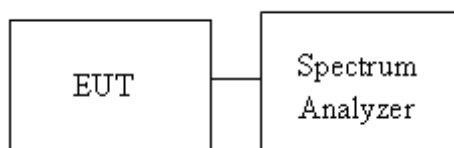
Occupied Bandwidth(99%) : For reporting purposes only.

Test Procedure

Test method Refer as KDB 558074 D01 and ANSI C63.10: 2013 clause 6.9.2,

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW =100KHz , VBW = 300KHz and Detector = Peak, to measurement 6dB Bandwidth
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

Test Setup



Result Table

6dB Bandwidth

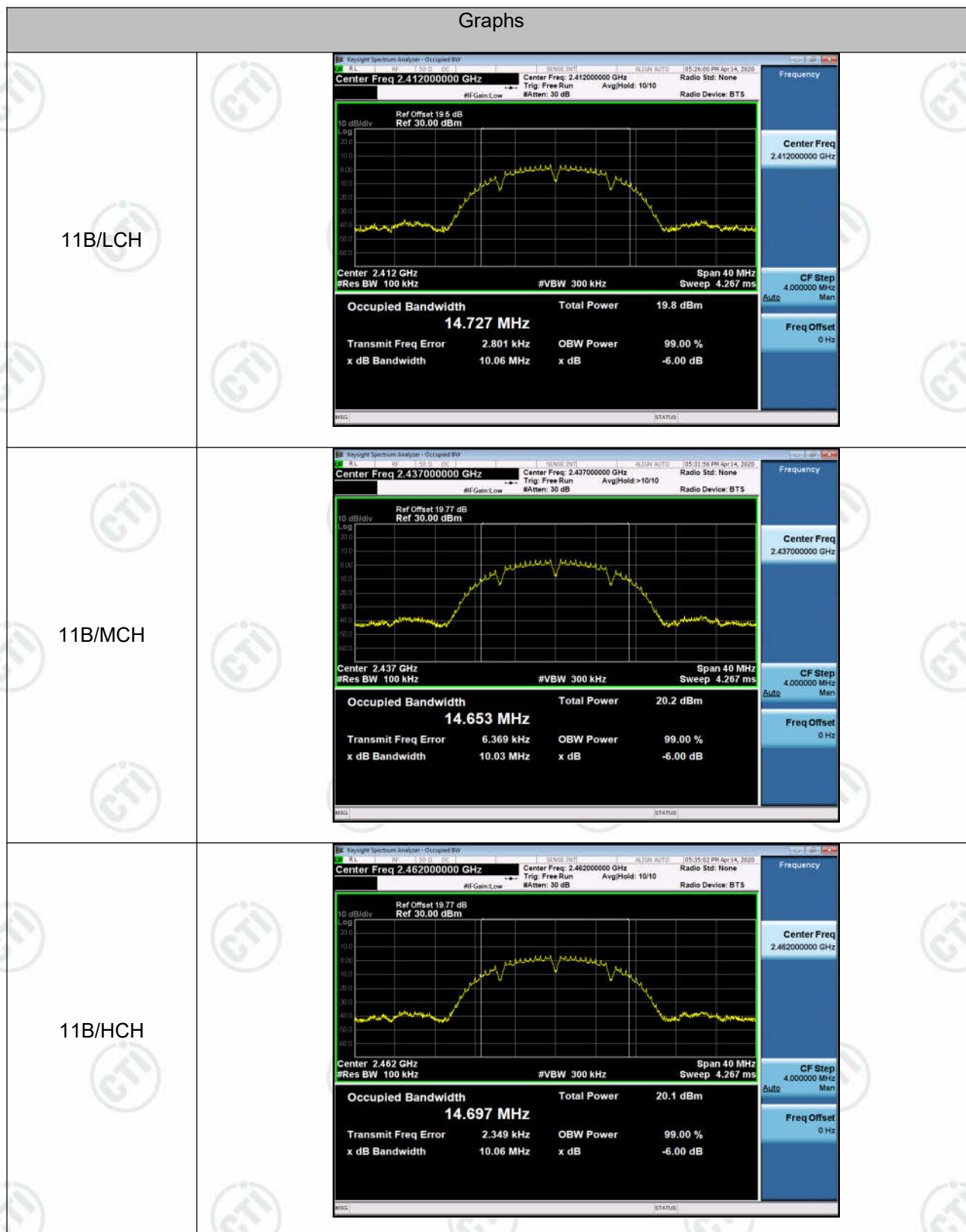
Mode	Channel	6dB Bandwidth [MHz]	Verdict
11B	LCH	10.06	PASS
11B	MCH	10.03	PASS
11B	HCH	10.06	PASS
11G	LCH	15.10	PASS
11G	MCH	15.05	PASS
11G	HCH	15.11	PASS
11N20SISO	LCH	15.08	PASS
11N20SISO	MCH	15.08	PASS
11N20SISO	HCH	15.11	PASS
11N40SISO	LCH	35.04	PASS
11N40SISO	MCH	35.05	PASS
11N40SISO	HCH	35.07	PASS

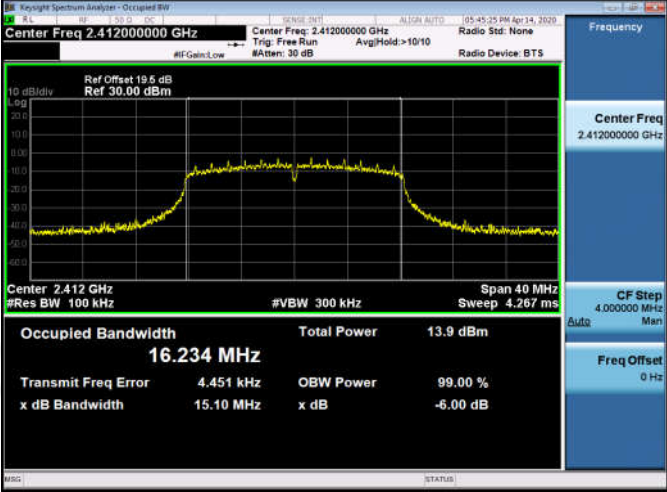
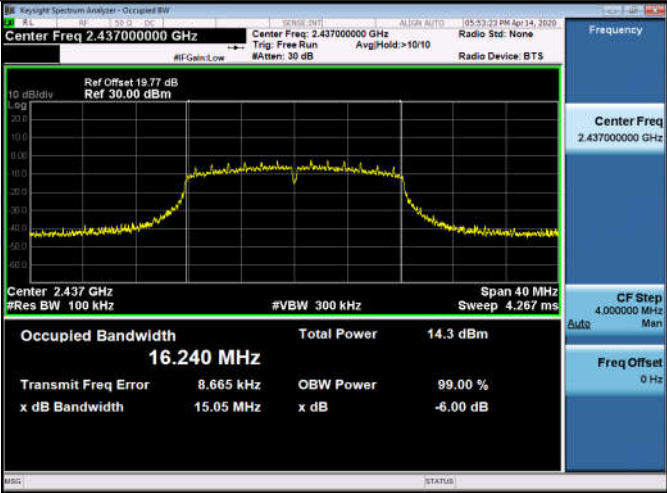
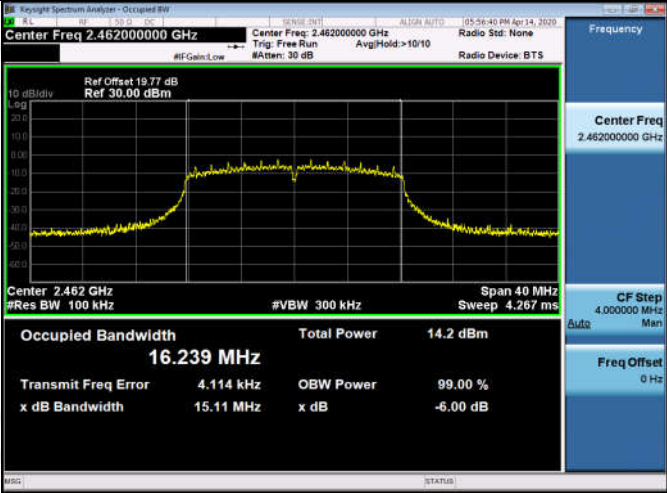
99% Bandwidth

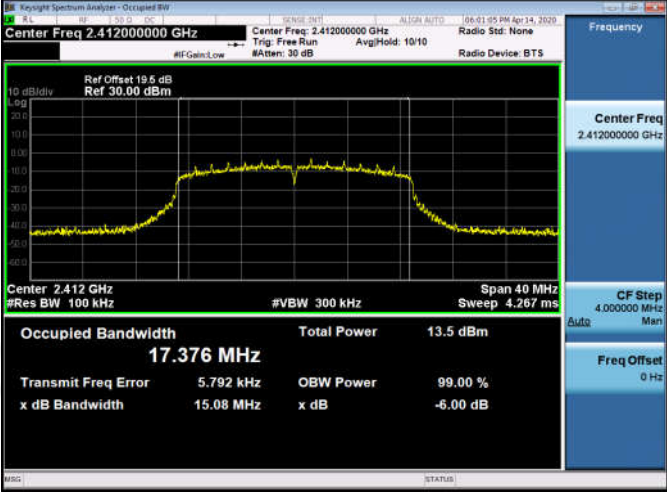
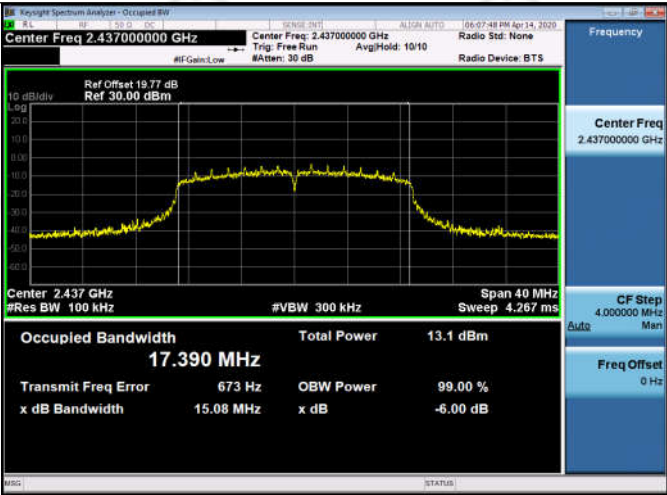
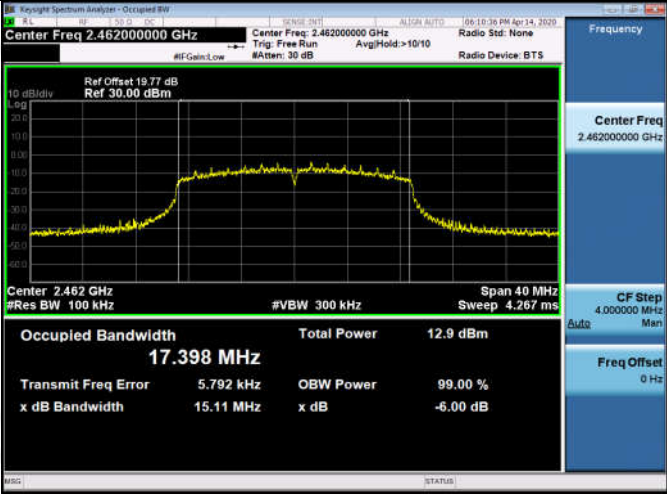
Mode	Channel.	99% OBW [MHz]	Verdict
11B	LCH	14.599	PASS
11B	MCH	14.842	PASS
11B	HCH	14.645	PASS
11G	LCH	16.295	PASS
11G	MCH	16.471	PASS
11G	HCH	16.283	PASS
11N20SISO	LCH	17.455	PASS
11N20SISO	MCH	17.609	PASS
11N20SISO	HCH	17.415	PASS
11N40SISO	LCH	35.910	PASS
11N40SISO	MCH	35.998	PASS
11N40SISO	HCH	35.739	PASS

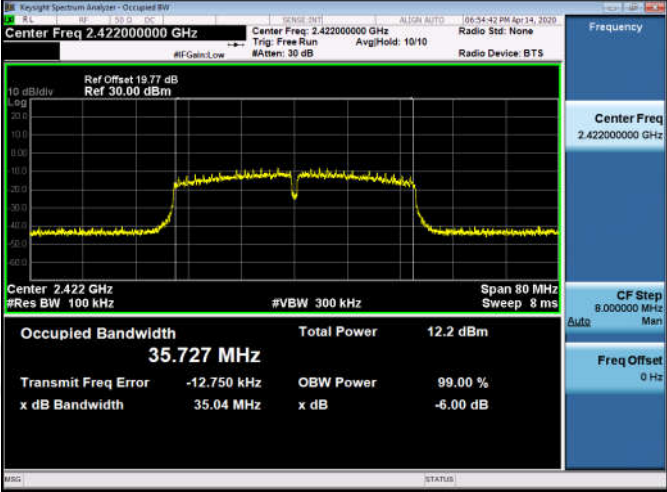
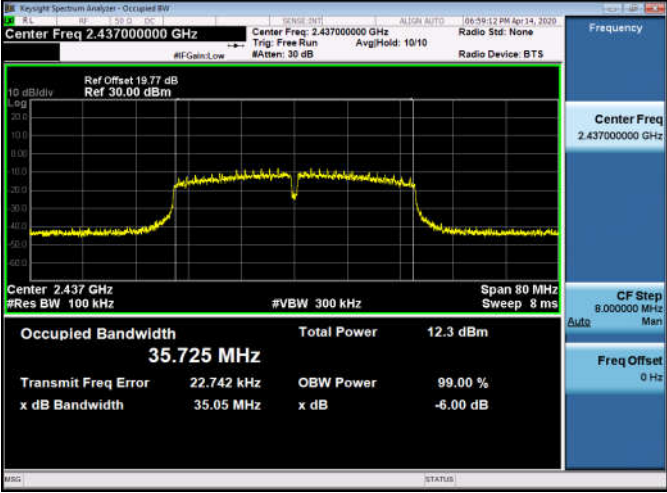
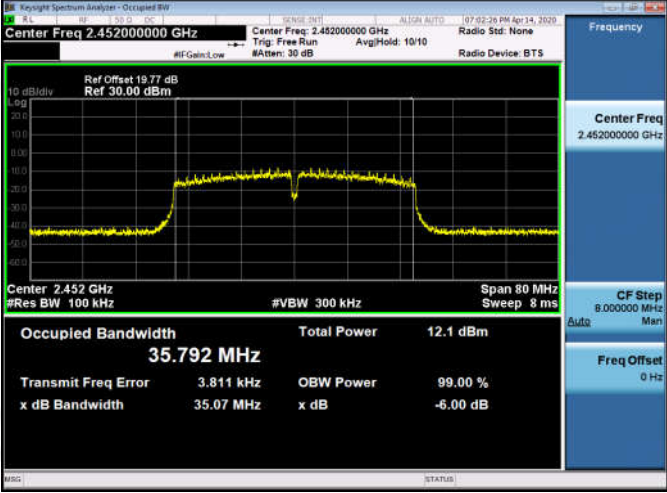
Test Graph

6dB Bandwidth



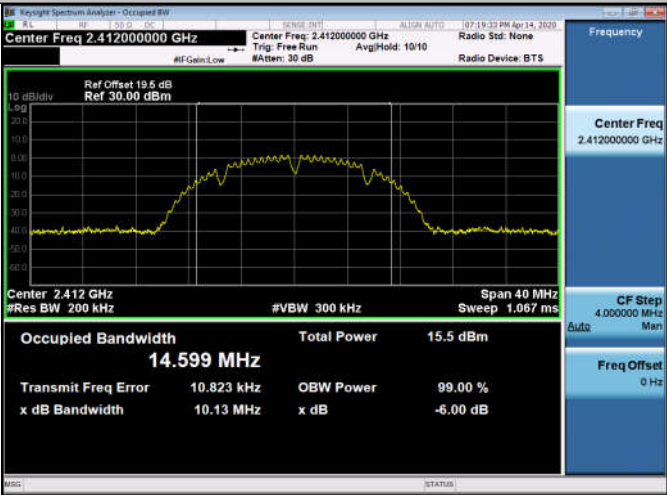
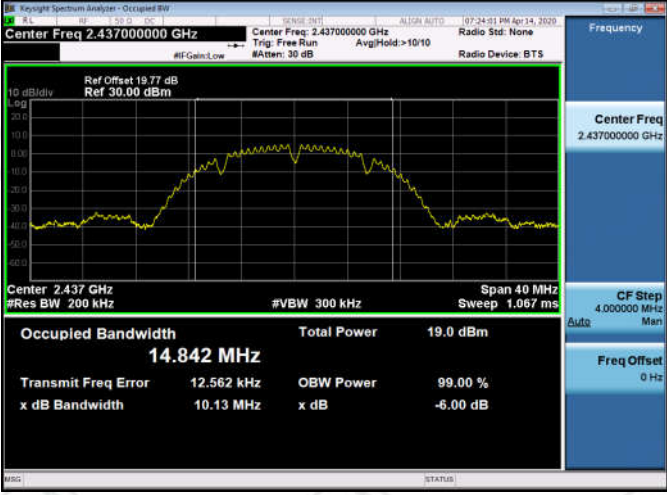
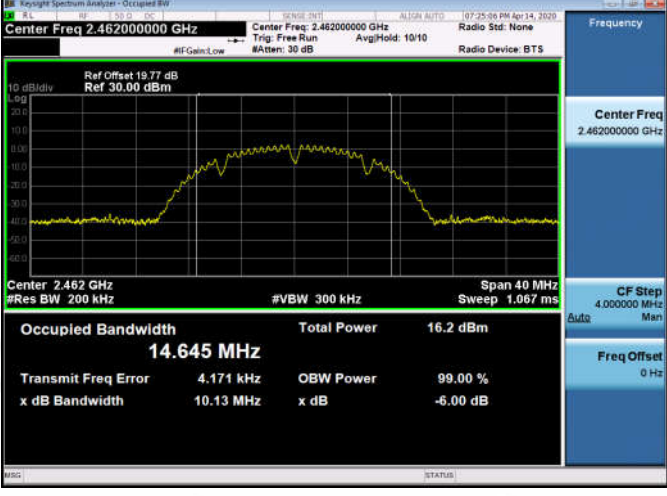
11G/LCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 100 kHz Span 40 MHz #VBW 300 kHz Sweep 4.267 ms Occupied Bandwidth 16.234 MHz Total Power 13.9 dBm Transmit Freq Error 4.451 kHz OBW Power 99.00 % x dB Bandwidth 15.10 MHz x dB -6.00 dB
11G/MCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 100 kHz Span 40 MHz #VBW 300 kHz Sweep 4.267 ms Occupied Bandwidth 16.240 MHz Total Power 14.3 dBm Transmit Freq Error 8.665 kHz OBW Power 99.00 % x dB Bandwidth 15.05 MHz x dB -6.00 dB
11G/HCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.462 GHz #Res BW 100 kHz Span 40 MHz #VBW 300 kHz Sweep 4.267 ms Occupied Bandwidth 16.239 MHz Total Power 14.2 dBm Transmit Freq Error 4.114 kHz OBW Power 99.00 % x dB Bandwidth 15.11 MHz x dB -6.00 dB

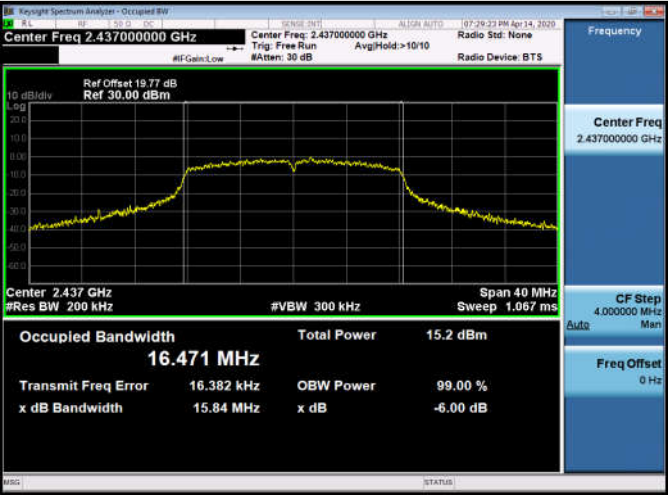
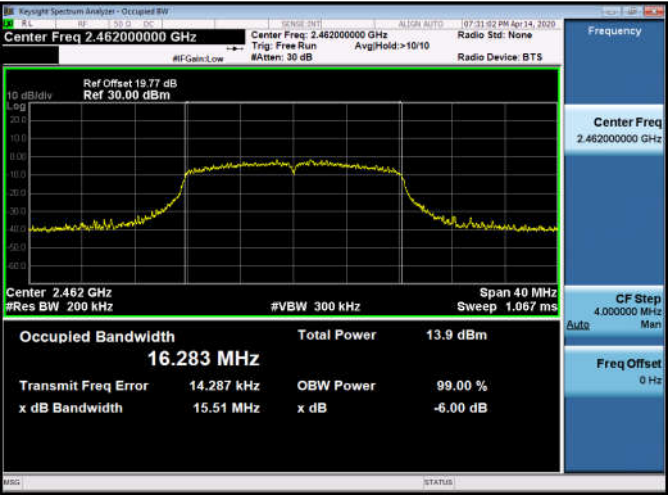
11N20SISO/LCH	 Key parameters from the screenshot: - Center Freq: 2.412000000 GHz - Span: 40 MHz - Res BW: 100 kHz - Occupied Bandwidth: 17.376 MHz - Total Power: 13.5 dBm - Transmit Freq Error: 5.792 kHz - OBW Power: 99.00 % - x dB Bandwidth: 15.08 MHz - x dB: -6.00 dB
11N20SISO/MCH	 Key parameters from the screenshot: - Center Freq: 2.437000000 GHz - Span: 40 MHz - Res BW: 100 kHz - Occupied Bandwidth: 17.390 MHz - Total Power: 13.1 dBm - Transmit Freq Error: 673 Hz - OBW Power: 99.00 % - x dB Bandwidth: 15.08 MHz - x dB: -6.00 dB
11N20SISO/HCH	 Key parameters from the screenshot: - Center Freq: 2.462000000 GHz - Span: 40 MHz - Res BW: 100 kHz - Occupied Bandwidth: 17.398 MHz - Total Power: 12.9 dBm - Transmit Freq Error: 5.792 kHz - OBW Power: 99.00 % - x dB Bandwidth: 15.11 MHz - x dB: -6.00 dB

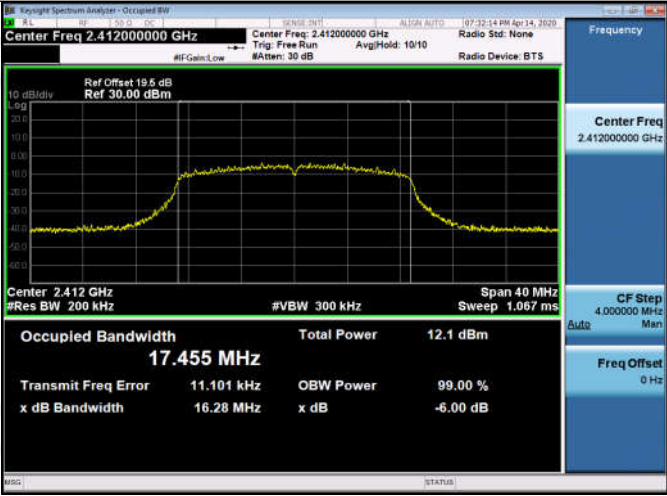
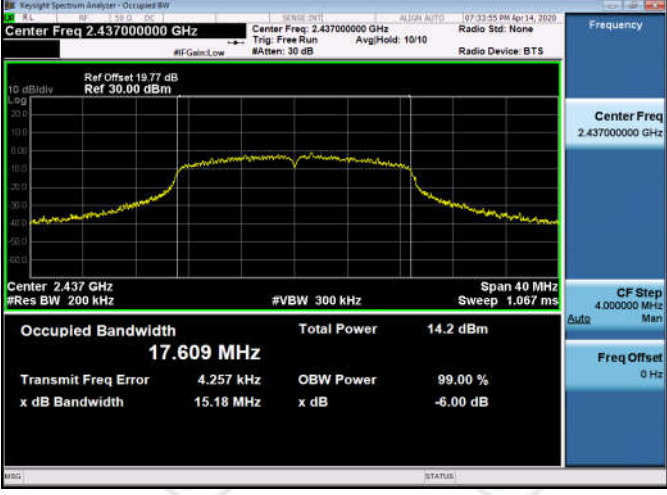
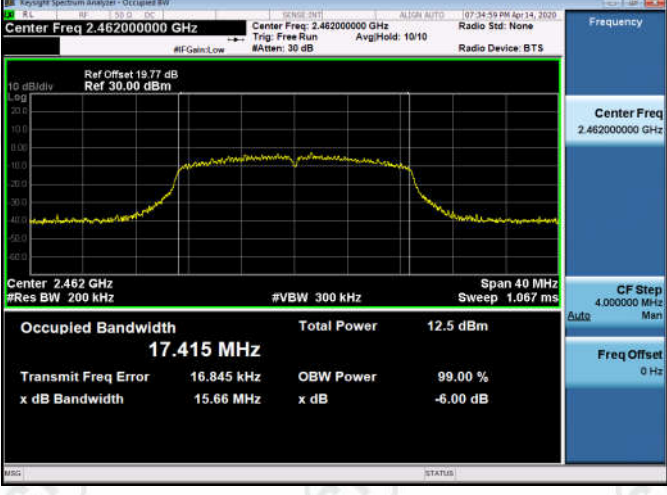
11N40SISO/LCH	 Key Sight Spectrum Analyzer - Occupied BW Center Freq 2.422000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.422 GHz #Res BW 100 kHz #VBW 300 kHz Span 80 MHz Sweep 8 ms Occupied Bandwidth 35.727 MHz Total Power 12.2 dBm Transmit Freq Error -12.750 kHz OBW Power 99.00 % x dB Bandwidth 35.04 MHz x dB -6.00 dB
11N40SISO/MCH	 Key Sight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 80 MHz Sweep 8 ms Occupied Bandwidth 35.725 MHz Total Power 12.3 dBm Transmit Freq Error 22.742 kHz OBW Power 99.00 % x dB Bandwidth 35.05 MHz x dB -6.00 dB
11N40SISO/HCH	 Key Sight Spectrum Analyzer - Occupied BW Center Freq 2.452000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.452 GHz #Res BW 100 kHz #VBW 300 kHz Span 80 MHz Sweep 8 ms Occupied Bandwidth 35.792 MHz Total Power 12.1 dBm Transmit Freq Error 3.811 kHz OBW Power 99.00 % x dB Bandwidth 35.07 MHz x dB -6.00 dB

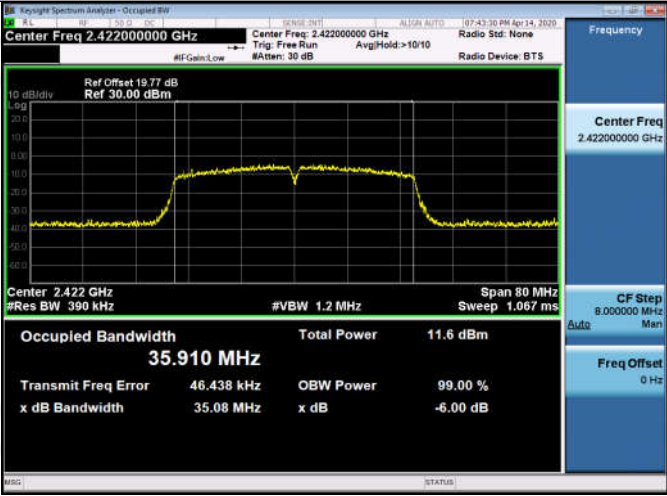
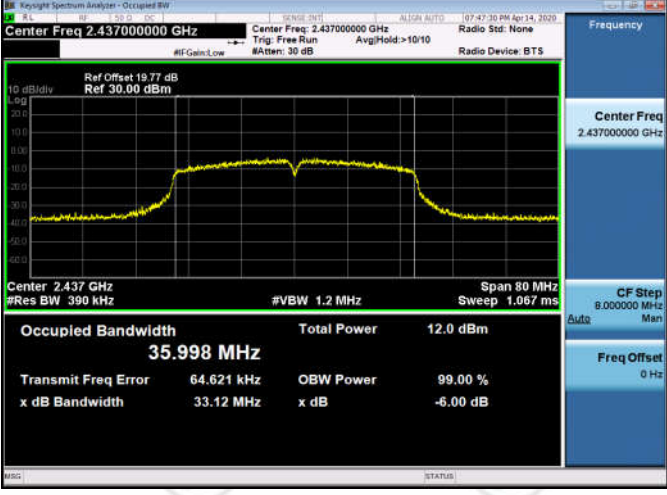
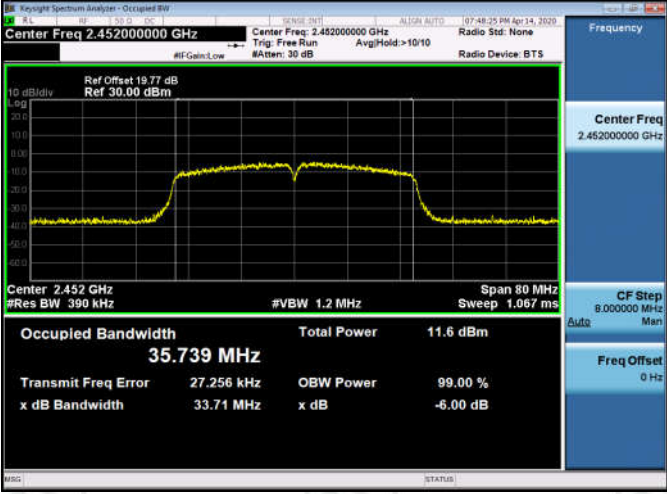
99% Bandwidth

Graphs

11B/LCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 200 kHz #VBW 300 kHz Span 40 MHz Sweep 1.067 ms Occupied Bandwidth 14.599 MHz Total Power 15.5 dBm Transmit Freq Error 10.823 kHz OBW Power 99.00 % x dB Bandwidth 10.13 MHz x dB -6.00 dB Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11B/MCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 200 kHz #VBW 300 kHz Span 40 MHz Sweep 1.067 ms Occupied Bandwidth 14.842 MHz Total Power 19.0 dBm Transmit Freq Error 12.562 kHz OBW Power 99.00 % x dB Bandwidth 10.13 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11B/HCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.462 GHz #Res BW 200 kHz #VBW 300 kHz Span 40 MHz Sweep 1.067 ms Occupied Bandwidth 14.645 MHz Total Power 16.2 dBm Transmit Freq Error 4.171 kHz OBW Power 99.00 % x dB Bandwidth 10.13 MHz x dB -6.00 dB Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz

11G/LCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq: 2.412000000 GHz Ref Offset: 19.5 dB Ref: 30.00 dBm Center 2.412 GHz #Res BW 200 kHz #VBW 300 kHz Span 40 MHz Sweep 1.067 ms Occupied Bandwidth: 16.295 MHz Total Power: 13.7 dBm Transmit Freq Error: 19.580 kHz x dB Bandwidth: 15.73 MHz OBW Power: 99.00 % x dB: -6.00 dB Frequency: Center Freq 2.412000000 GHz CF Step: 4.000000 MHz Freq Offset: 0 Hz
11G/MCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq: 2.437000000 GHz Ref Offset: 19.77 dB Ref: 30.00 dBm Center 2.437 GHz #Res BW 200 kHz #VBW 300 kHz Span 40 MHz Sweep 1.067 ms Occupied Bandwidth: 16.471 MHz Total Power: 15.2 dBm Transmit Freq Error: 16.382 kHz x dB Bandwidth: 15.84 MHz OBW Power: 99.00 % x dB: -6.00 dB Frequency: Center Freq 2.437000000 GHz CF Step: 4.000000 MHz Freq Offset: 0 Hz
11G/HCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq: 2.462000000 GHz Ref Offset: 19.77 dB Ref: 30.00 dBm Center 2.462 GHz #Res BW 200 kHz #VBW 300 kHz Span 40 MHz Sweep 1.067 ms Occupied Bandwidth: 16.283 MHz Total Power: 13.9 dBm Transmit Freq Error: 14.287 kHz x dB Bandwidth: 15.51 MHz OBW Power: 99.00 % x dB: -6.00 dB Frequency: Center Freq 2.462000000 GHz CF Step: 4.000000 MHz Freq Offset: 0 Hz

11N20SISO/LCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Center Freq: 2.412000000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 19.5 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 200 kHz #VBW 300 kHz Span 40 MHz Sweep 1.067 ms Occupied Bandwidth 17.455 MHz Total Power 12.1 dBm Transmit Freq Error 11.101 kHz OBW Power 99.00 % x dB Bandwidth 16.28 MHz x dB -6.00 dB Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11N20SISO/MCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 200 kHz #VBW 300 kHz Span 40 MHz Sweep 1.067 ms Occupied Bandwidth 17.609 MHz Total Power 14.2 dBm Transmit Freq Error 4.257 kHz OBW Power 99.00 % x dB Bandwidth 15.18 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11N20SISO/HCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Center Freq: 2.462000000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 19.77 dB Ref 30.00 dBm Center 2.462 GHz #Res BW 200 kHz #VBW 300 kHz Span 40 MHz Sweep 1.067 ms Occupied Bandwidth 17.415 MHz Total Power 12.5 dBm Transmit Freq Error 16.845 kHz OBW Power 99.00 % x dB Bandwidth 15.66 MHz x dB -6.00 dB Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz

11N40SISO/LCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.422000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.422 GHz #Res BW 390 kHz #VBW 1.2 MHz Span 80 MHz Sweep 1.067 ms Occupied Bandwidth 35.910 MHz Total Power 11.6 dBm Transmit Freq Error 46.438 kHz OBW Power 99.00 % x dB Bandwidth 35.08 MHz x dB -6.00 dB
11N40SISO/MCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 390 kHz #VBW 1.2 MHz Span 80 MHz Sweep 1.067 ms Occupied Bandwidth 35.998 MHz Total Power 12.0 dBm Transmit Freq Error 64.621 kHz OBW Power 99.00 % x dB Bandwidth 33.12 MHz x dB -6.00 dB
11N40SISO/HCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.452000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.452 GHz #Res BW 390 kHz #VBW 1.2 MHz Span 80 MHz Sweep 1.067 ms Occupied Bandwidth 35.739 MHz Total Power 11.6 dBm Transmit Freq Error 27.256 kHz OBW Power 99.00 % x dB Bandwidth 33.71 MHz x dB -6.00 dB

Appendix C): Band-edge for RF Conducted Emissions

Test Limit

According to §15.247(d),

In any 100 kHz bandwidth outside the authorized frequency band,

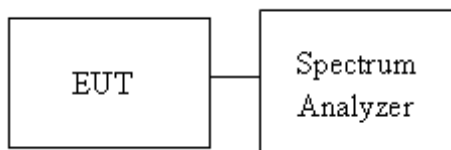
Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Test Procedure

Test method Refer as KDB 558074 D01.

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.
2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.
3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Setup



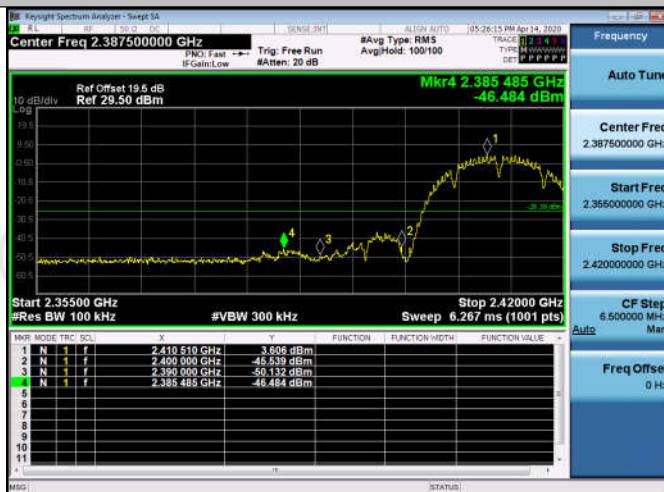
Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	3.606	-46.484	-26.39	PASS
11B	HCH	3.706	-47.791	-26.29	PASS
11G	LCH	-2.998	-49.753	-33	PASS
11G	HCH	-2.100	-48.625	-32.1	PASS
11N20SISO	LCH	-3.350	-50.232	-33.35	PASS
11N20SISO	HCH	-4.245	-48.018	-34.25	PASS
11N40SISO	LCH	-8.198	-48.677	-38.2	PASS
11N40SISO	HCH	-8.196	-49.033	-38.2	PASS

Test Graph

Graphs

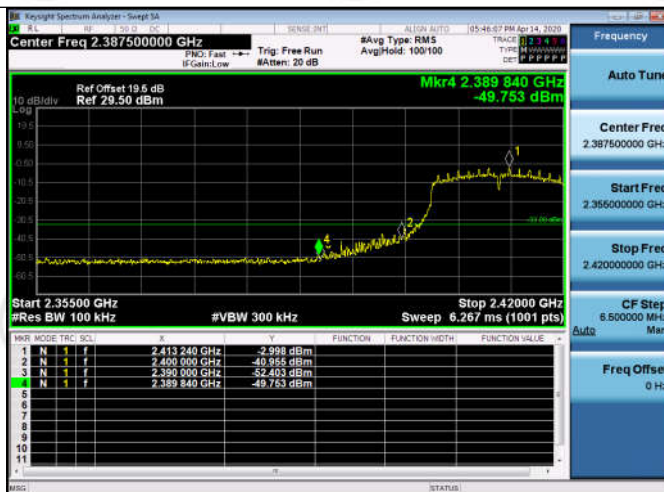
11B/LCH

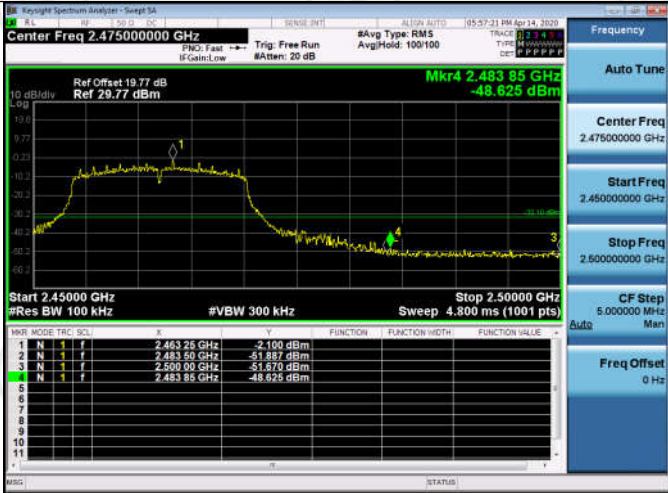
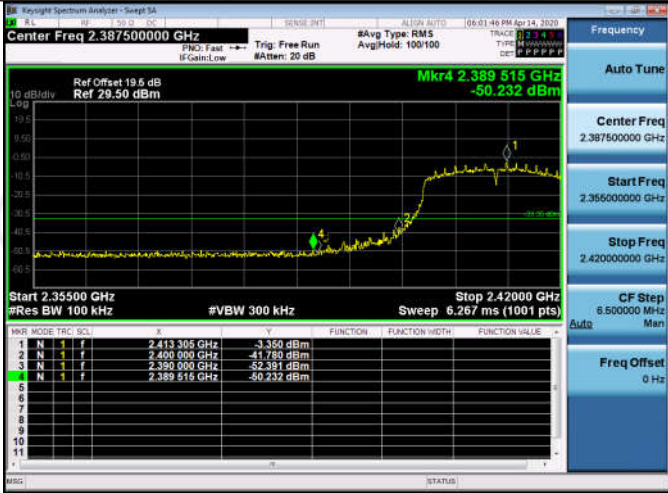
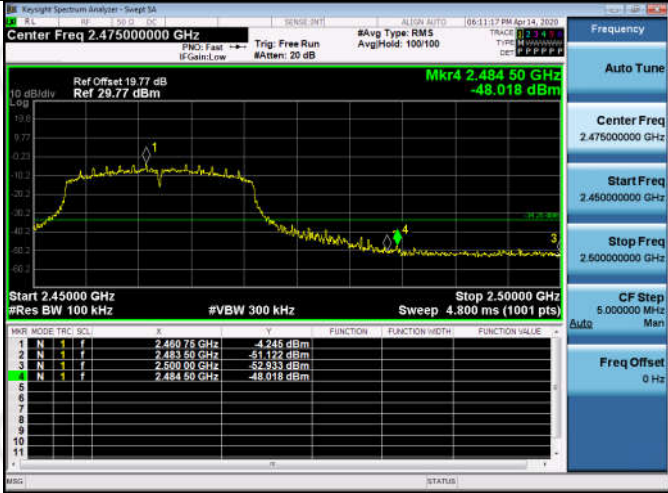


11B/HCH

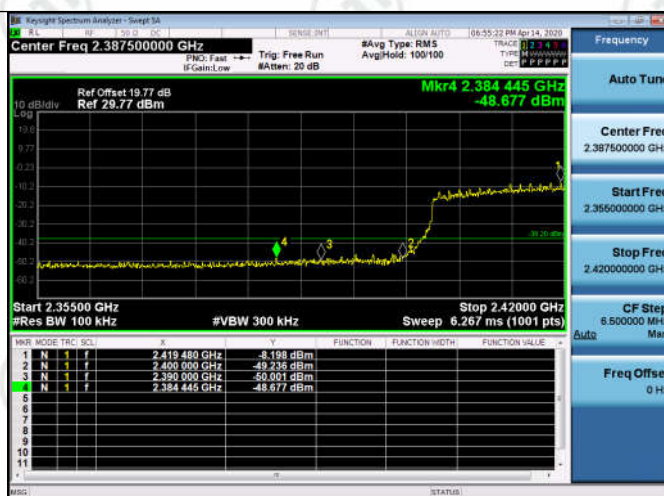


11G/LCH

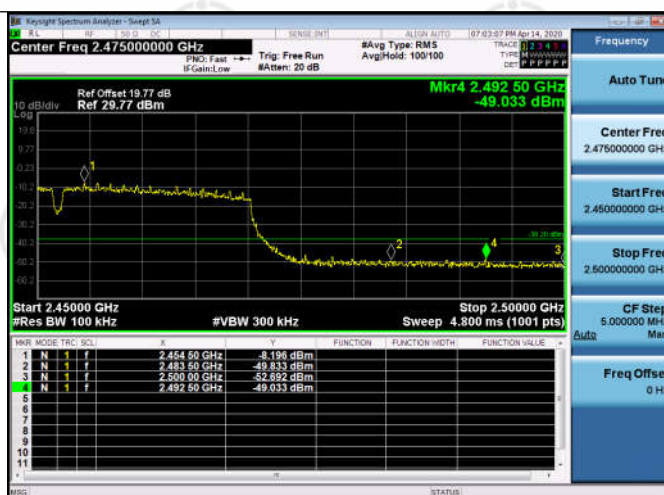


11G/HCH	 <table data-bbox="596 703 1155 871"><thead><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCN</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr></thead><tbody><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.463 25 GHz</td><td>-2.100 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.483 50 GHz</td><td>-51.892 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>2.500 00 GHz</td><td>-51.870 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.483 85 GHz</td><td>-48.625 dBm</td><td></td><td></td><td></td></tr></tbody></table>	MNR	MODE	TRC	SCN	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.463 25 GHz	-2.100 dBm				2	N	1	f	2.483 50 GHz	-51.892 dBm				3	N	1	f	2.500 00 GHz	-51.870 dBm				4	N	1	f	2.483 85 GHz	-48.625 dBm			
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11N20SISO/LCH	 <table data-bbox="596 1225 1155 1391"><thead><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCN</th><th>X</th><th>Y</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>2.413 305 GHz</td><td>-3.350 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.400 000 GHz</td><td>-41.789 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>2.389 000 GHz</td><td>-52.931 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.389 515 GHz</td><td>-50.232 dBm</td><td></td><td></td><td></td></tr></tbody></table>	MNR	MODE	TRC	SCN	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.413 305 GHz	-3.350 dBm				2	N	1	f	2.400 000 GHz	-41.789 dBm				3	N	1	f	2.389 000 GHz	-52.931 dBm				4	N	1	f	2.389 515 GHz	-50.232 dBm			
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3	N	1	f	2.389 000 GHz	-52.931 dBm																																									
4	N	1	f	2.389 515 GHz	-50.232 dBm																																									
11N20SISO/HCH	 <table data-bbox="596 1744 1155 1910"><thead><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCN</th><th>X</th><th>Y</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>2.460 75 GHz</td><td>-4.245 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.483 50 GHz</td><td>-51.122 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>2.500 00 GHz</td><td>-52.933 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.484 50 GHz</td><td>-48.018 dBm</td><td></td><td></td><td></td></tr></tbody></table>	MNR	MODE	TRC	SCN	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.460 75 GHz	-4.245 dBm				2	N	1	f	2.483 50 GHz	-51.122 dBm				3	N	1	f	2.500 00 GHz	-52.933 dBm				4	N	1	f	2.484 50 GHz	-48.018 dBm			
MNR	MODE	TRC	SCN	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
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4	N	1	f	2.484 50 GHz	-48.018 dBm																																									

11N40SISO/LCH



11N40SISO/HCH



Appendix D): RF Conducted Spurious Emissions

Test Limit

According to §15.247(d),

In any 100 kHz bandwidth outside the authorized frequency band,

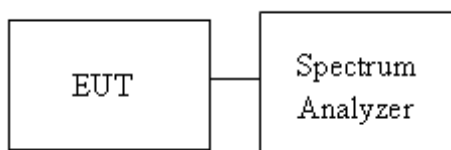
Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Test Procedure

Test method Refer as KDB 558074 D01.

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.
2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.
3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Setup

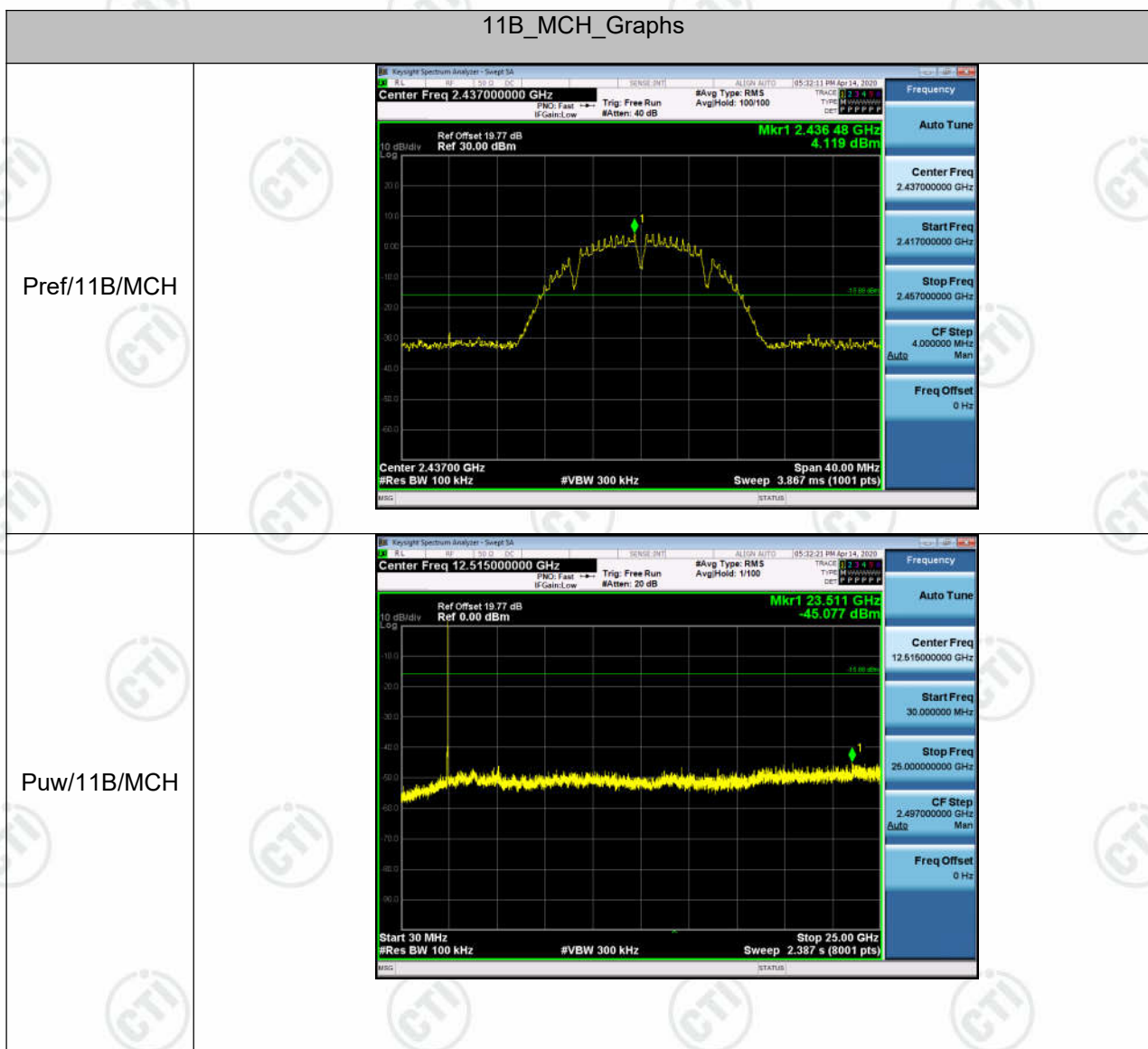


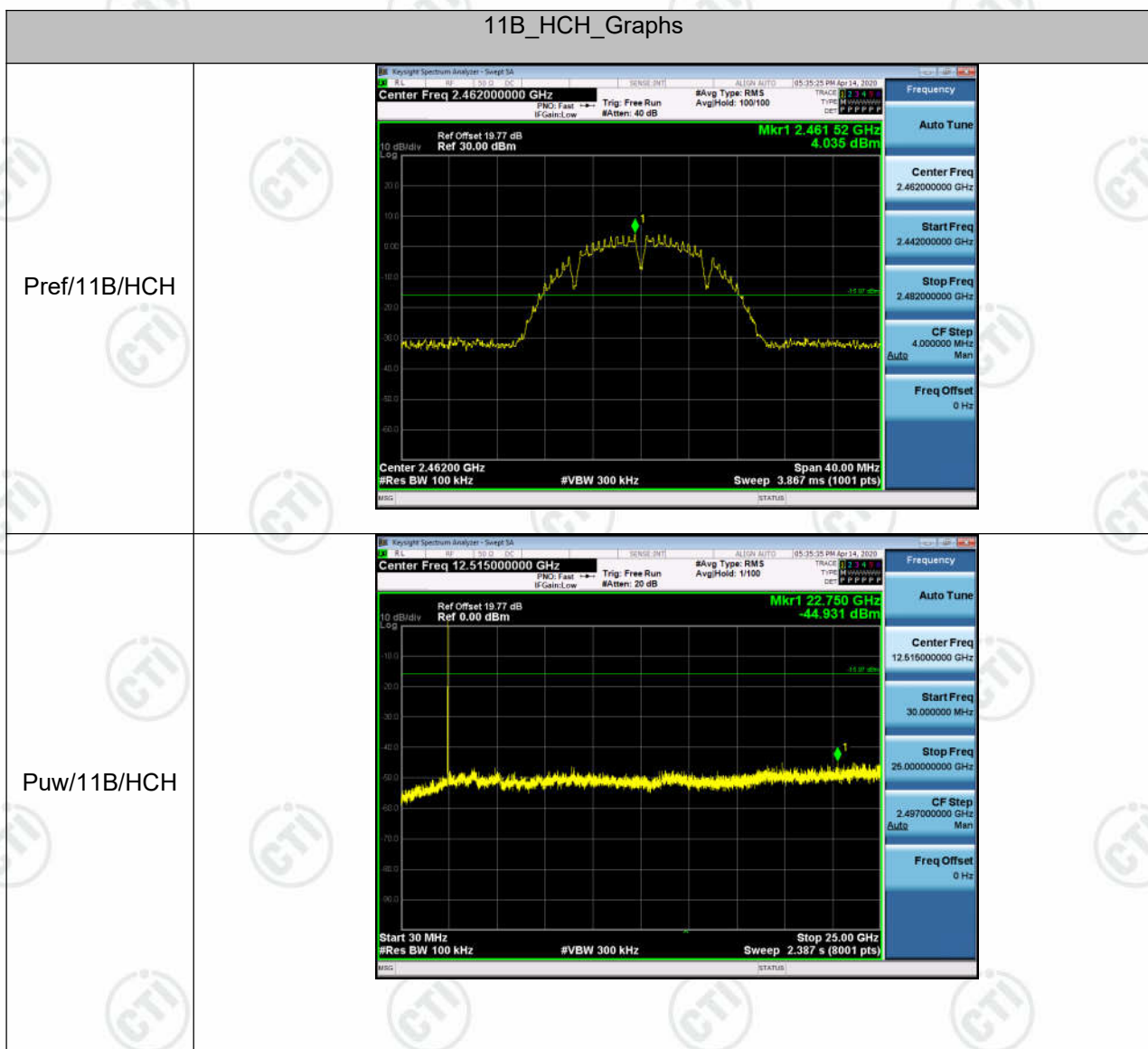
Result Table

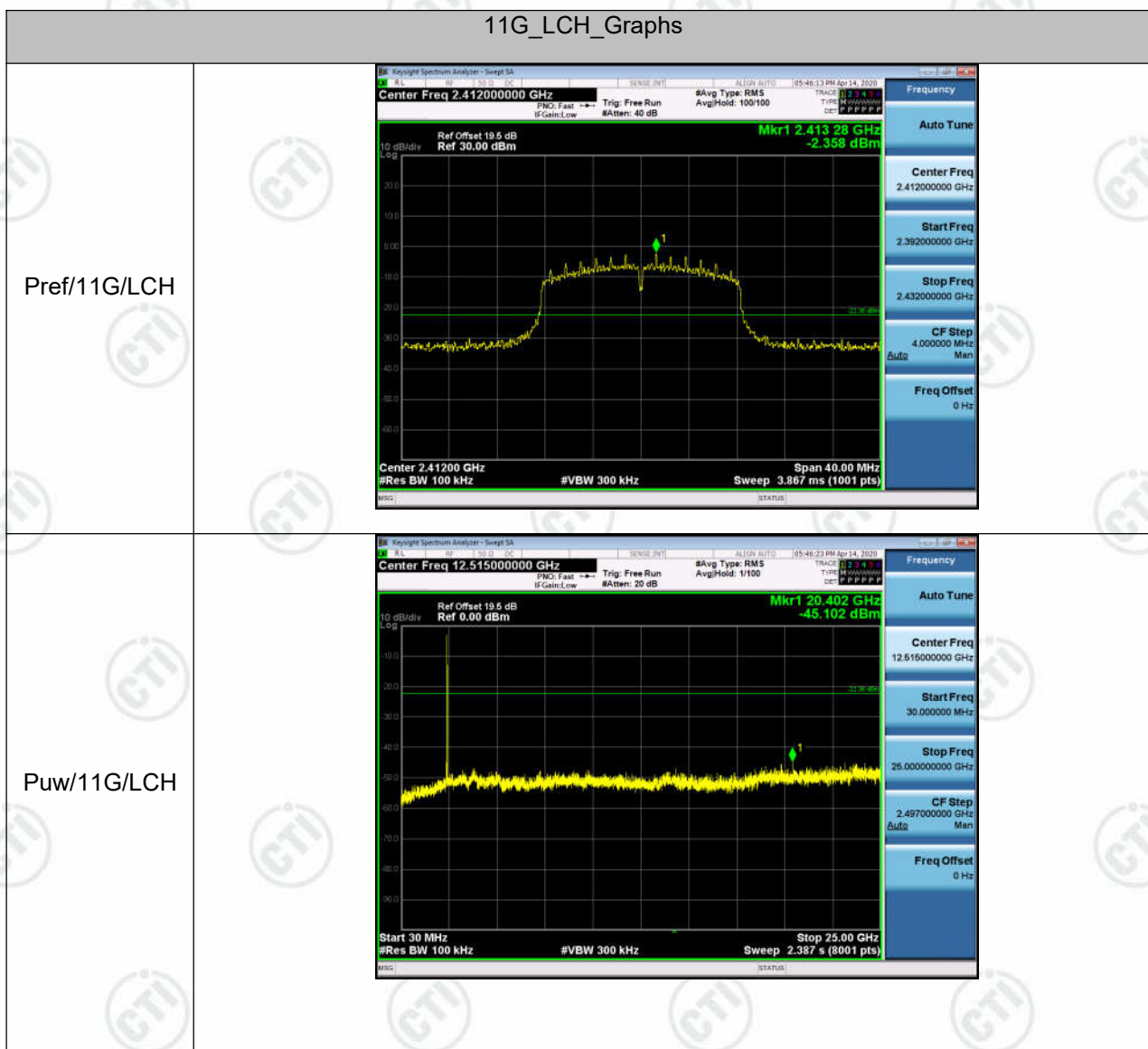
Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
11B	LCH	3.697	<Limit	PASS
11B	MCH	4.119	<Limit	PASS
11B	HCH	4.035	<Limit	PASS
11G	LCH	-2.358	<Limit	PASS
11G	MCH	-1.939	<Limit	PASS
11G	HCH	-1.96	<Limit	PASS
11N20SISO	LCH	-3.014	<Limit	PASS
11N20SISO	MCH	-3.312	<Limit	PASS
11N20SISO	HCH	-3.44	<Limit	PASS
11N40SISO	LCH	-7.85	<Limit	PASS
11N40SISO	MCH	-7.871	<Limit	PASS
11N40SISO	HCH	-8.162	<Limit	PASS

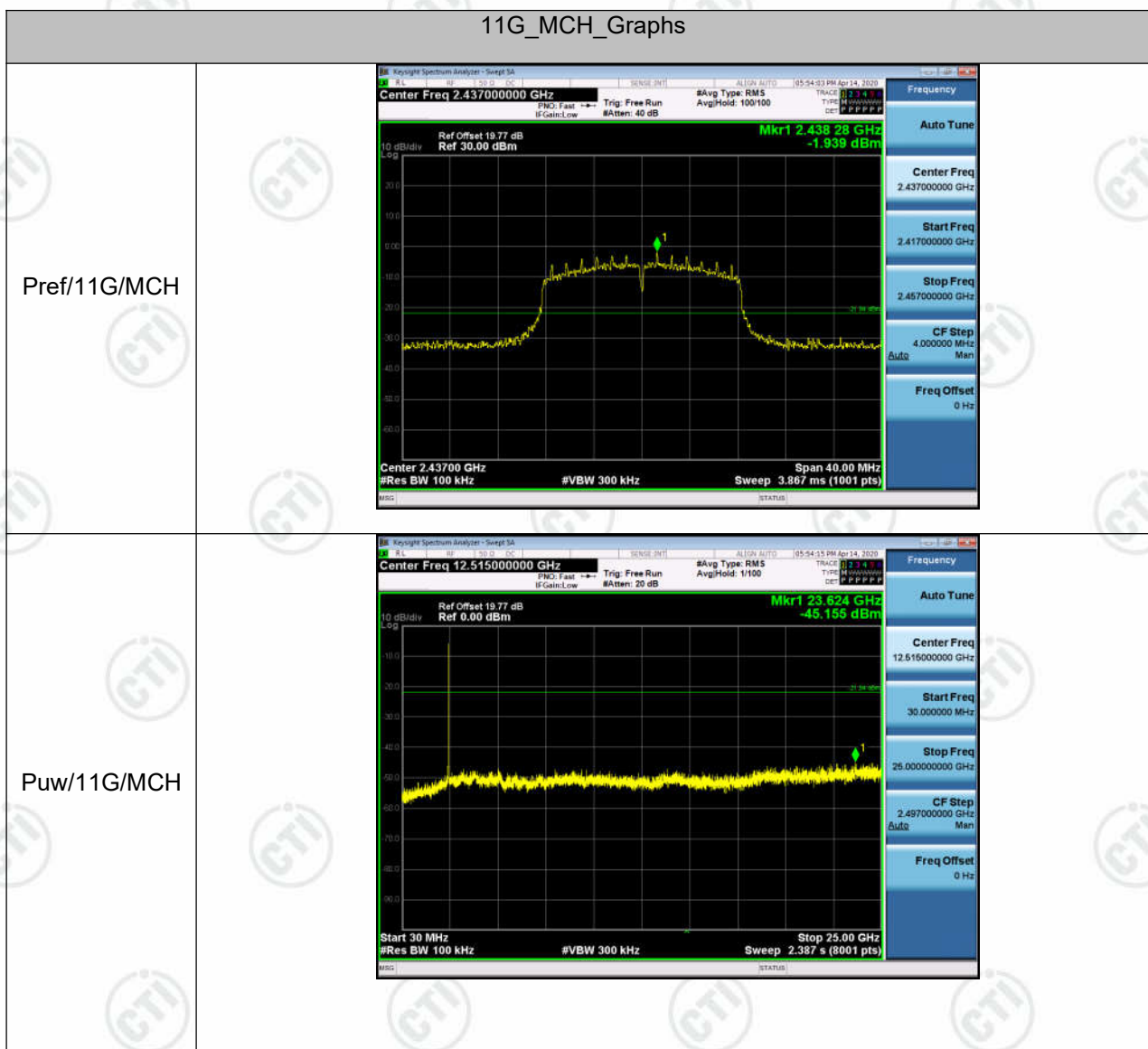
Test Graph

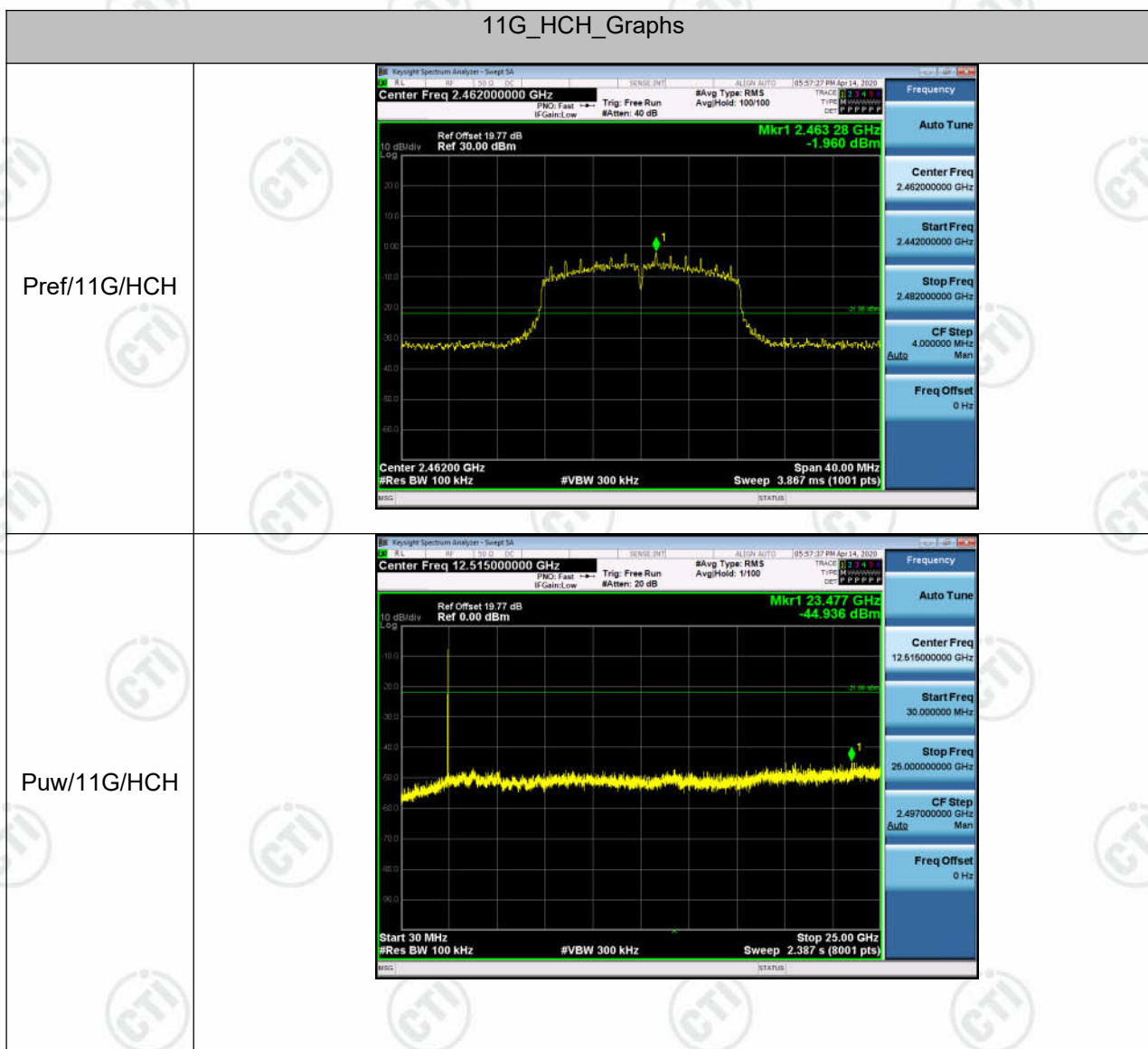






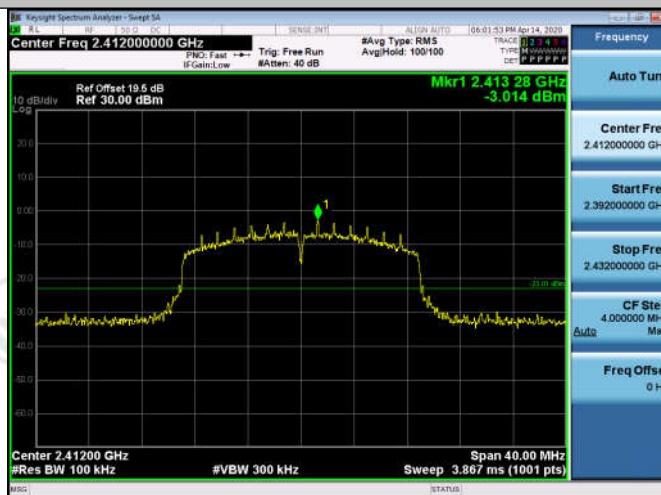




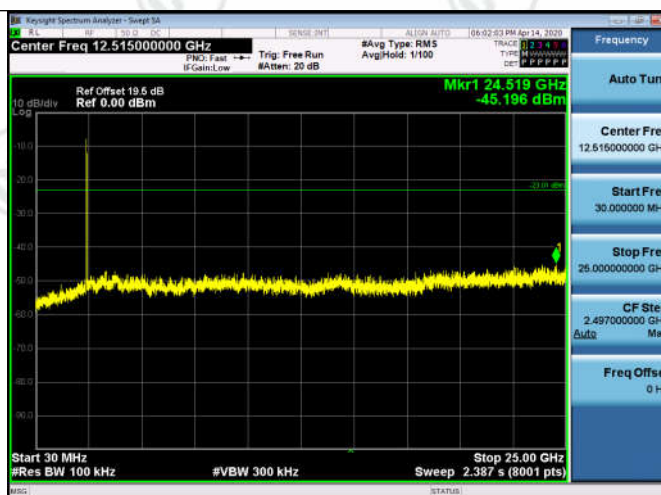


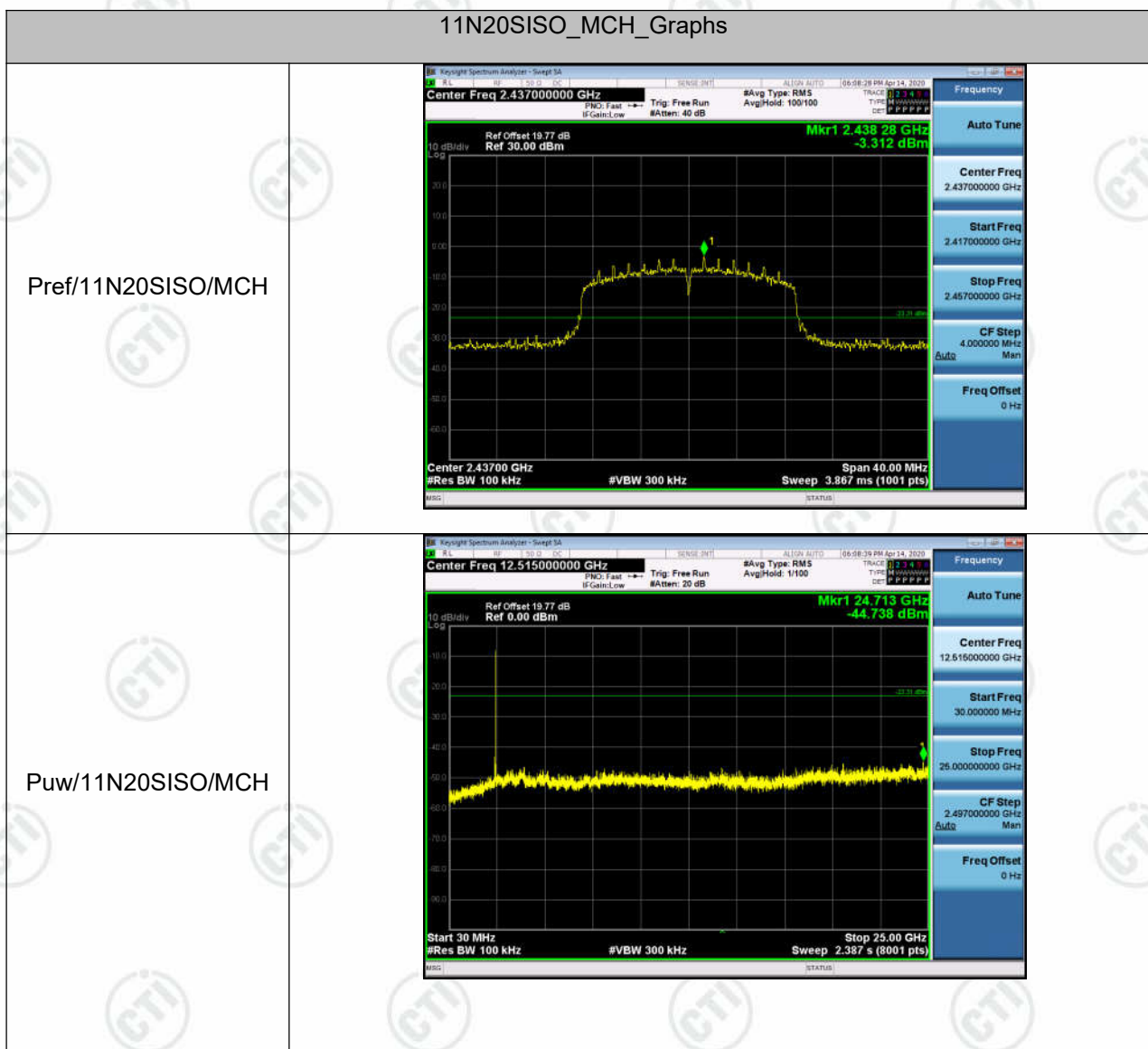
11N20SISO_LCH_Graphs

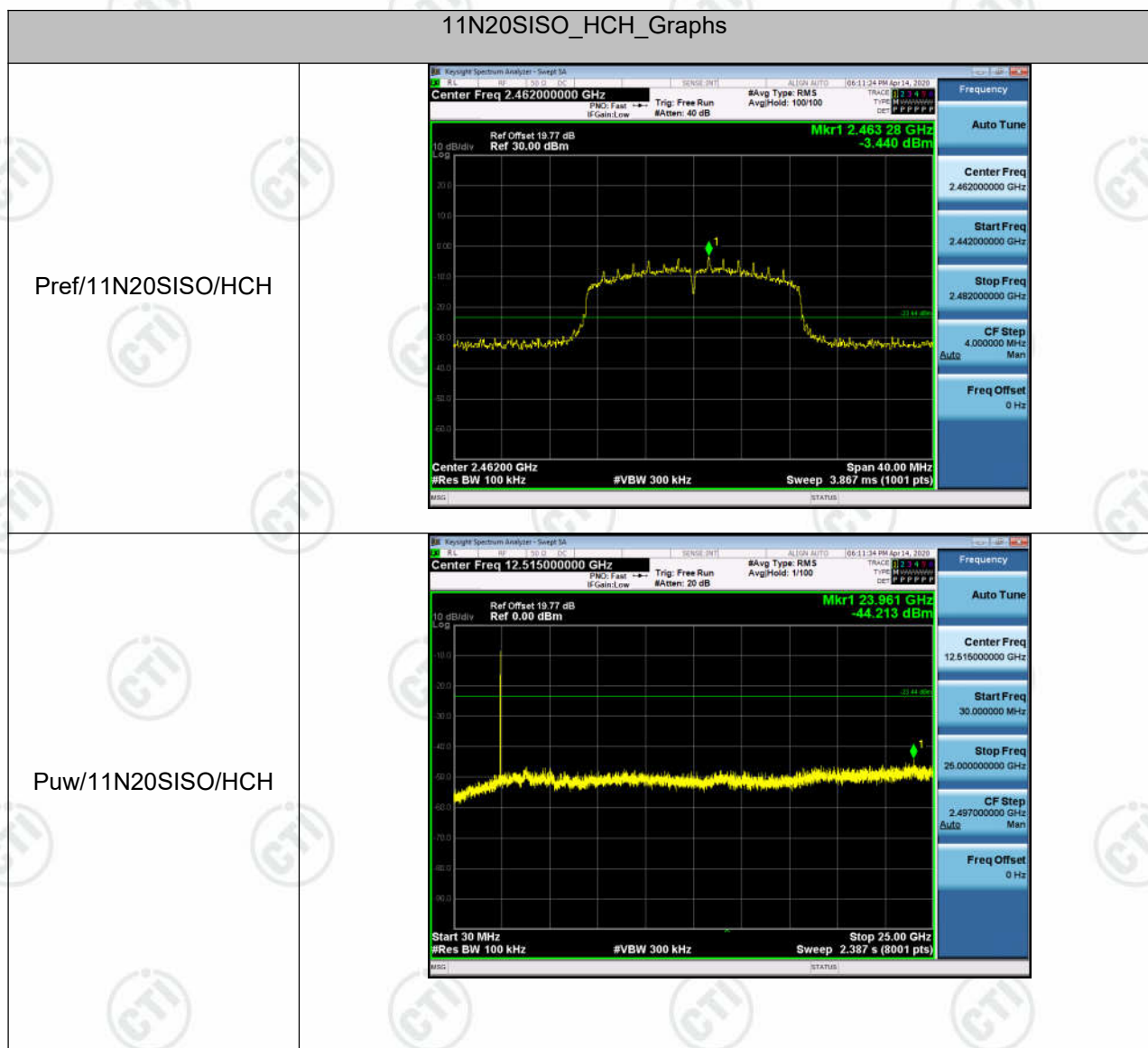
Pref/11N20SISO/LCH

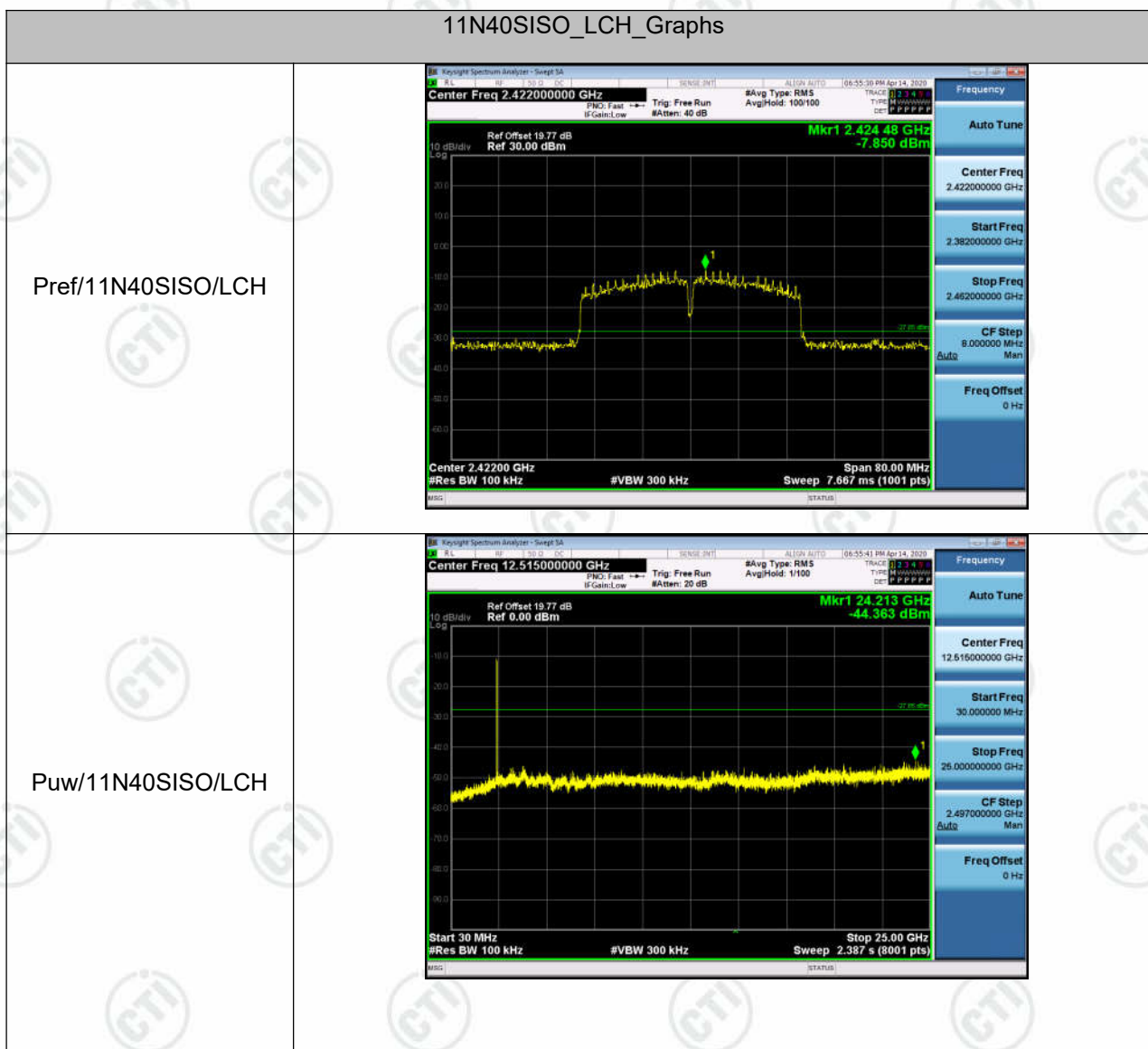


/11N20SISO/LCH



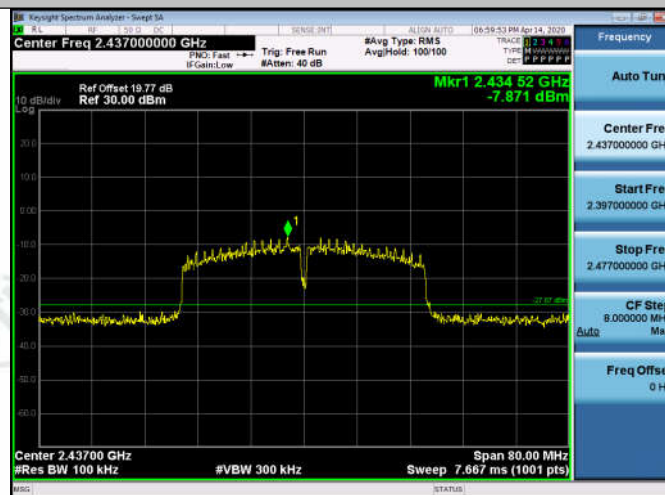




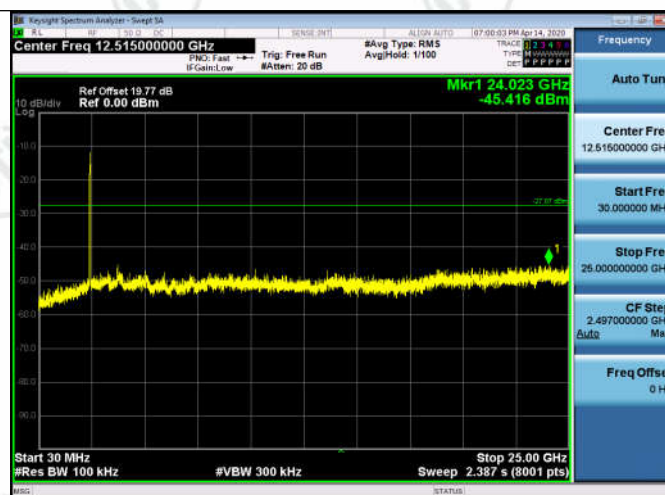


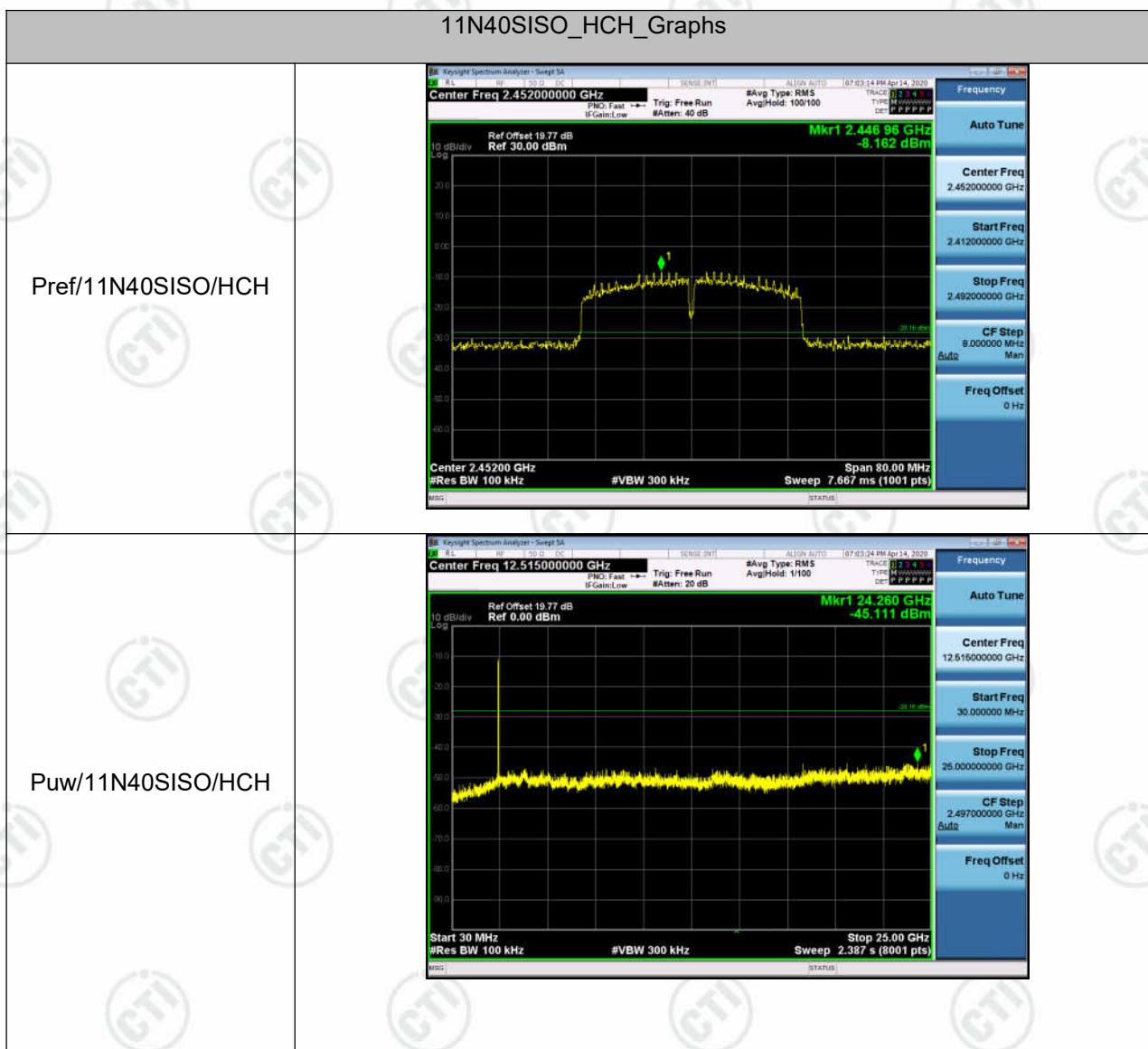
11N40SISO_MCH_Graphs

Pref/11N40SISO/MCH



Puw/11N40SISO/MCH





Appendix E): Power Spectral Density

Test Limit

According to §15.247(e),

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

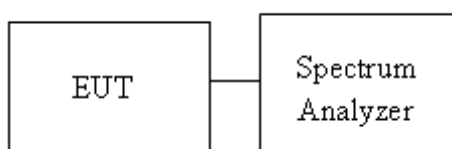
Limit	☒ Antenna not exceed 6 dBi : 8dBm ☐ Antenna with DG greater than 6 dBi : [Limit = 8 – (DG – 6)] ☐ Point-to-point operation :
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Test Procedure

Test method Refer as KDB 558074 D01.

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 3kHz, VBW = 30kHz, Span = 1.5 times DTS Bandwidth (6 dB BW), Detector = Peak, Sweep Time = Auto and Trace = Max hold.
4. The path loss was compensated to the results for each measurement by SA.
5. Mark the maximum level.
6. Measure and record the result of power spectral density. in the test report.

Test Setup



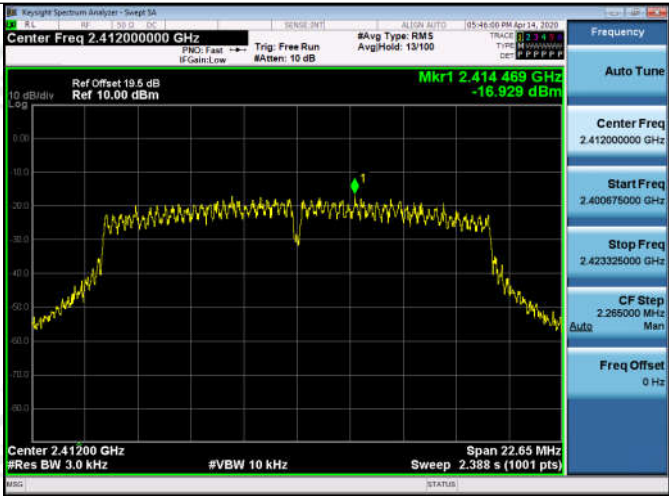
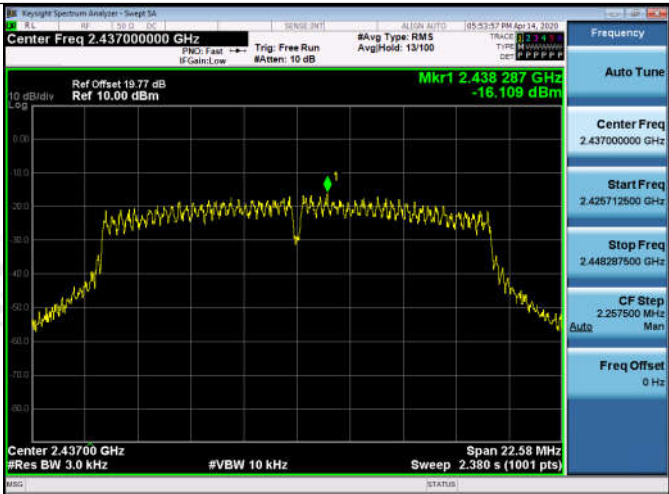
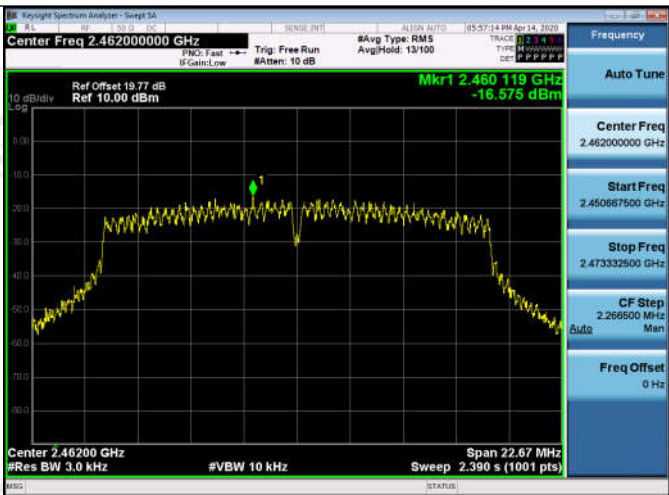
Result Table

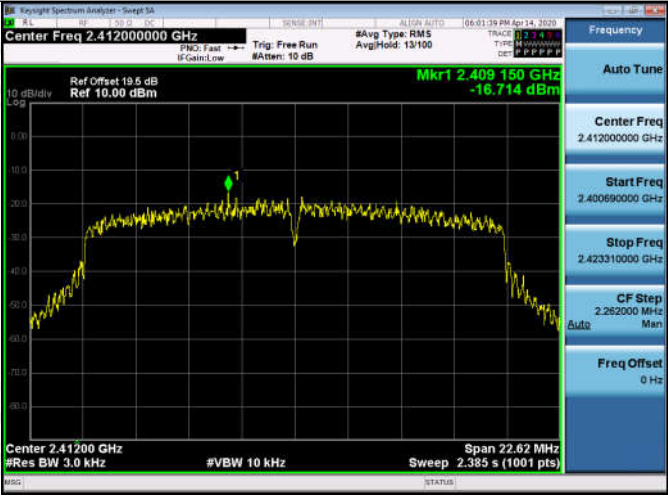
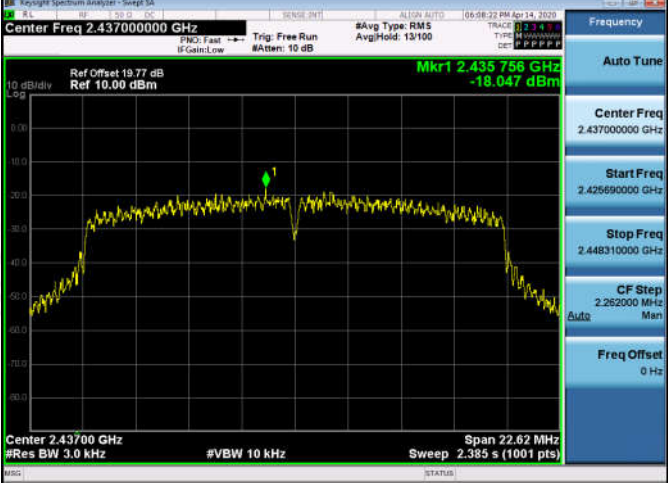
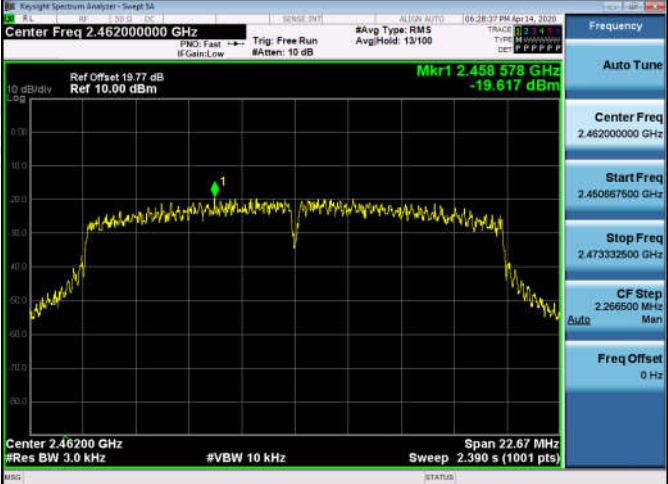
Mode	Channel	Power Spectral Density [dBm]	Verdict
11B	LCH	-9.746	PASS
11B	MCH	-9.781	PASS
11B	HCH	-10.080	PASS
11G	LCH	-16.929	PASS
11G	MCH	-16.109	PASS
11G	HCH	-16.575	PASS
11N20SISO	LCH	-16.714	PASS
11N20SISO	MCH	-18.047	PASS
11N20SISO	HCH	-19.617	PASS
11N40SISO	LCH	-24.156	PASS
11N40SISO	MCH	-22.974	PASS
11N40SISO	HCH	-23.090	PASS

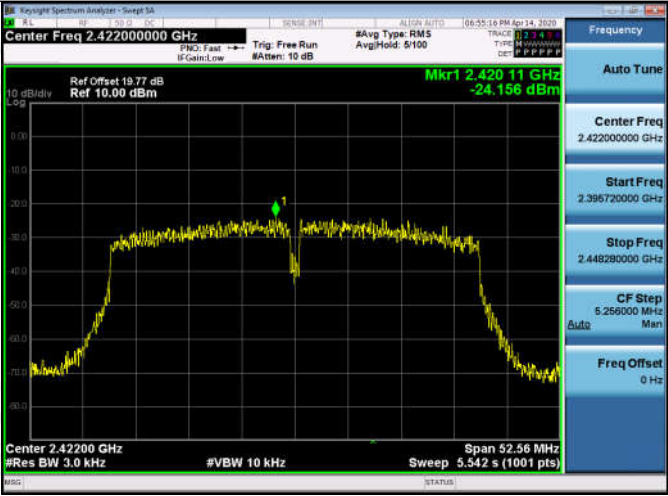
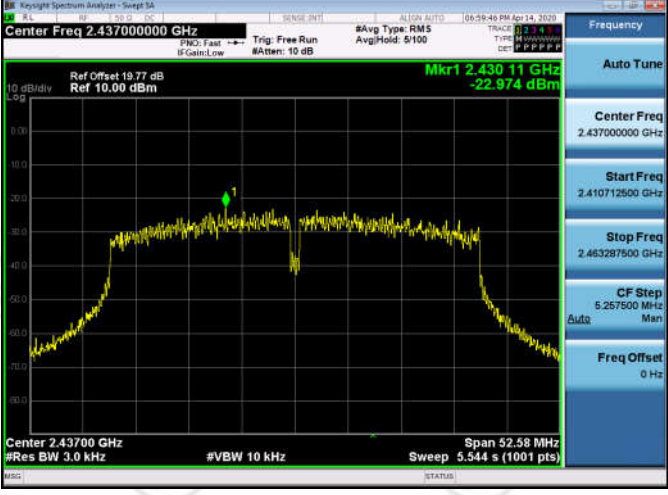
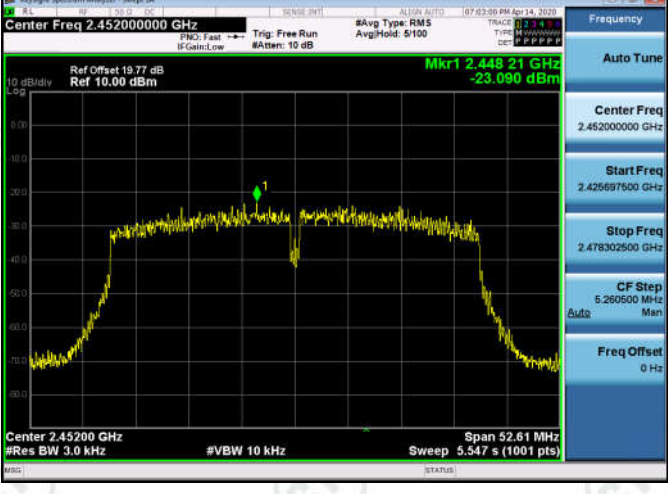
Test Graph

Graphs

11B/LCH	 Keyight Spectrum Analyzer - Sweep SA Center Freq 2.412000000 GHz Ref Offset 19.6 dB Ref 10.00 dBm Mkr1 2.411 246 GHz -9.746 dBm Center 2.412000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 15.09 MHz Sweep 1.591 s (1001 pts)
11B/MCH	 Keyight Spectrum Analyzer - Sweep SA Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.437 707 GHz -9.781 dBm Center 2.437000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 15.05 MHz Sweep 1.586 s (1001 pts)
11B/HCH	 Keyight Spectrum Analyzer - Sweep SA Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.462 815 GHz -10.080 dBm Center 2.462000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 15.09 MHz Sweep 1.591 s (1001 pts)

11G/LCH	 Key: Keyight Spectrum Analyzer - Sweep SA Center Freq 2.41200000 GHz Ref Offset 19.6 dB Ref 10.00 dBm Mkr1 2.414 469 GHz -16.929 dBm Center 2.41200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 22.65 MHz Sweep 2.388 s (1001 pts) Frequency Auto Tune Center Freq 2.41200000 GHz Start Freq 2.400675000 GHz Stop Freq 2.423325000 GHz CF Step 2.285000 MHz Auto Man Freq Offset 0 Hz
11G/MCH	 Key: Keyight Spectrum Analyzer - Sweep SA Center Freq 2.43700000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.438 287 GHz -16.109 dBm Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 22.58 MHz Sweep 2.380 s (1001 pts) Frequency Auto Tune Center Freq 2.437000000 GHz Start Freq 2.426712500 GHz Stop Freq 2.448287500 GHz CF Step 2.287500 MHz Auto Man Freq Offset 0 Hz
11G/HCH	 Key: Keyight Spectrum Analyzer - Sweep SA Center Freq 2.46200000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.460 119 GHz -16.575 dBm Center 2.46200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 22.67 MHz Sweep 2.390 s (1001 pts) Frequency Auto Tune Center Freq 2.462000000 GHz Start Freq 2.450667500 GHz Stop Freq 2.473332500 GHz CF Step 2.286500 MHz Auto Man Freq Offset 0 Hz

11N20SISO/LCH	 Keyight Spectrum Analyzer - Sweep SA Center Freq 2.41200000 GHz Ref Offset 19.6 dB Ref 10.00 dBm Mkr1 2.409150 GHz -16.714 dBm Center 2.41200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 22.62 MHz Sweep 2.385 s (1001 pts) Frequency Auto Tune Center Freq 2.41200000 GHz Start Freq 2.400690000 GHz Stop Freq 2.423310000 GHz CF Step 2.282000 MHz Freq Offset 0 Hz
11N20SISO/MCH	 Keyight Spectrum Analyzer - Sweep SA Center Freq 2.43700000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.435758 GHz -18.047 dBm Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 22.62 MHz Sweep 2.385 s (1001 pts) Frequency Auto Tune Center Freq 2.437000000 GHz Start Freq 2.425690000 GHz Stop Freq 2.448310000 GHz CF Step 2.282000 MHz Freq Offset 0 Hz
11N20SISO/HCH	 Keyight Spectrum Analyzer - Sweep SA Center Freq 2.46200000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.458578 GHz -19.617 dBm Center 2.46200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 22.67 MHz Sweep 2.390 s (1001 pts) Frequency Auto Tune Center Freq 2.462000000 GHz Start Freq 2.450667500 GHz Stop Freq 2.473332500 GHz CF Step 2.268500 MHz Freq Offset 0 Hz

11N40SISO/LCH	 Keyight Spectrum Analyzer - Sweep SA Center Freq 2.42200000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.420 11 GHz -24.156 dBm Center 2.42200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 52.56 MHz Sweep 5.542 s (1001 pts) Frequency Auto Tune Center Freq 2.42200000 GHz Start Freq 2.395720000 GHz Stop Freq 2.448280000 GHz CF Step 5.259000 MHz Freq Offset 0 Hz
11N40SISO/MCH	 Keyight Spectrum Analyzer - Sweep SA Center Freq 2.43700000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.430 11 GHz -22.974 dBm Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 52.58 MHz Sweep 5.544 s (1001 pts) Frequency Auto Tune Center Freq 2.43700000 GHz Start Freq 2.410712500 GHz Stop Freq 2.463287500 GHz CF Step 5.257500 MHz Freq Offset 0 Hz
11N40SISO/HCH	 Keyight Spectrum Analyzer - Sweep SA Center Freq 2.45200000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.448 21 GHz -23.090 dBm Center 2.45200 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 52.61 MHz Sweep 5.547 s (1001 pts) Frequency Auto Tune Center Freq 2.45200000 GHz Start Freq 2.425697500 GHz Stop Freq 2.478302500 GHz CF Step 5.260500 MHz Freq Offset 0 Hz

Appendix F): Antenna Requirement

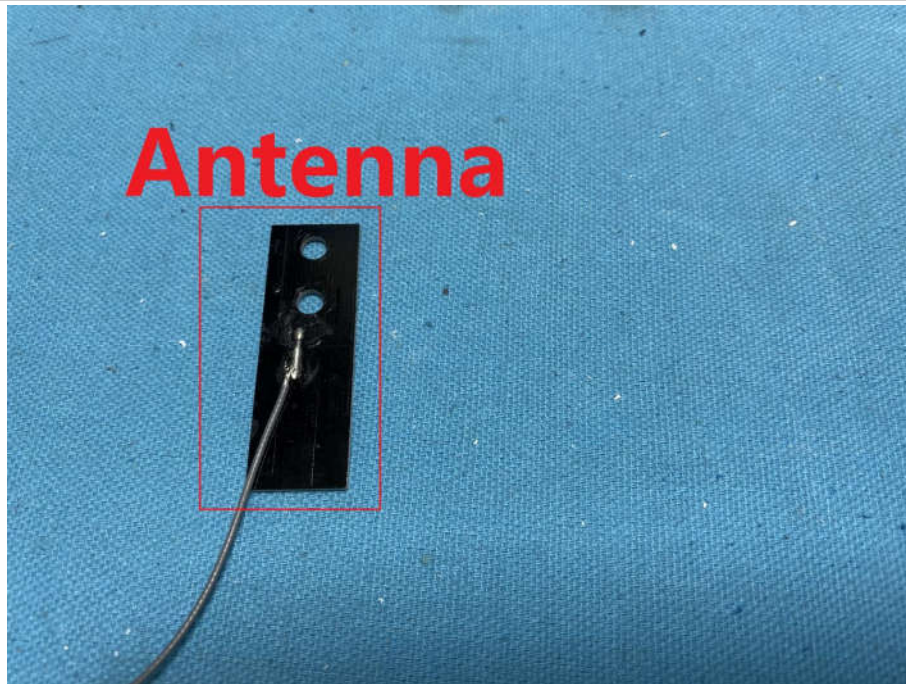
15.203 requirement:

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 2 dBi.

Appendix G): AC Power Line Conducted Emission

Test Procedure:	Test frequency range :150KHz-30MHz 1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ 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. 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, 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. 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.															
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</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> * 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		Frequency range (MHz)	Limit (dB μ 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 μ 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.