

TEST REPORT

Product : Smart Wi-Fi Wall Switch
Trade mark : meross, refoss, rospick
MSS510, MSS550, MSS560,
Model/Type reference : MSS570, RSS510, RSS550,
RSS560, RSS570
Serial Number : N/A
Report Number : EED32L00260001
FCC ID : 2AMUU-MSWWS01
Date of Issue : Oct. 11, 2019
Test Standards : 47 CFR Part 15Subpart C
Test result : PASS

Prepared for:

Chengdu Meross Technology Co.,Ltd.
Room 1312, Floor 13, Building 6-1, Zone E, TianFu
Software Park, GaoXin District, Chengdu, 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

Tested By:

mark.chen.

Mark Chen

Compiled by:

Mina Xu

Mina Xu

Reviewed by:

Ware Xin

Ware Xin

Approved by:

Kevin Yang

Kevin Yang

Date:

Oct. 11, 2019

Check No.: 4038842670



2 Version

Version No.	Date	Description
00	2019-10-11	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

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.

Model No.: MSS510, MSS550, MSS560, MSS570, RSS510, RSS550, RSS560, RSS570

Only the model MSS510 was tested, We the undersigned hereby confirm that any of our production units bearing the following model numbers are identical in circuitry and electrical, mechanical and physical construction; the only differences are the appearance and model no.for trading purpose

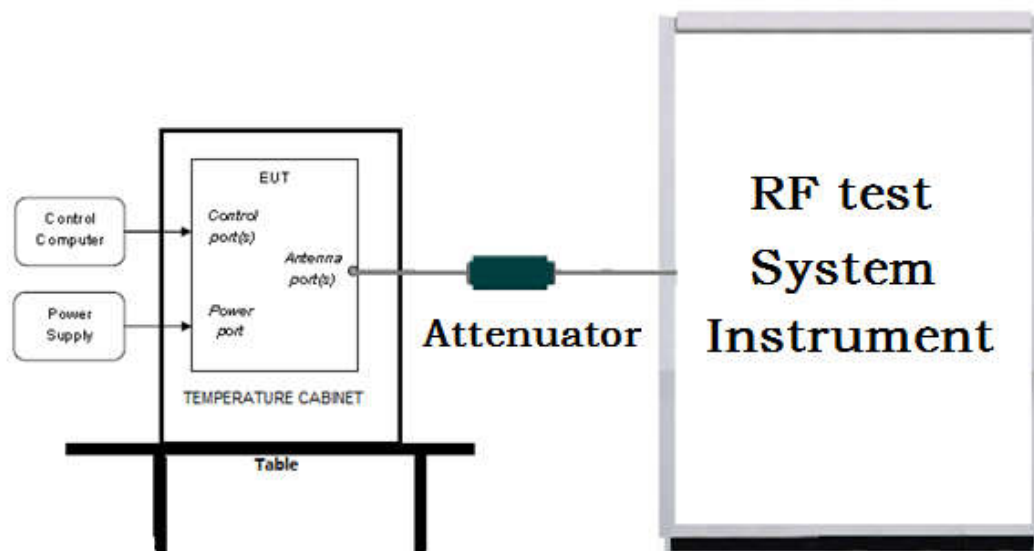
4 Content

1 COVER PAGE	1
2 VERSION	2
3 TEST SUMMARY	3
4 CONTENT	4
5 TEST REQUIREMENT	5
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
6 GENERAL INFORMATION	8
6.1 CLIENT INFORMATION	8
6.2 GENERAL DESCRIPTION OF EUT	8
6.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD	8
6.4 DESCRIPTION OF SUPPORT UNITS	9
6.5 TEST LOCATION	9
6.6 DEVIATION FROM STANDARDS	10
6.7 ABNORMALITIES FROM STANDARD CONDITIONS	10
6.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER	10
6.9 MEASUREMENT UNCERTAINTY (95% CONFIDENCE LEVELS, $k=2$)	10
7 EQUIPMENT LIST	11
8 RADIO TECHNICAL REQUIREMENTS SPECIFICATION	15
Duty Cycle	16
Appendix A): Conducted Peak Output Power	17
Appendix B): 6dB Occupied Bandwidth	23
Appendix C): Band-edge for RF Conducted Emissions	34
Appendix D): RF Conducted Spurious Emissions	39
Appendix E): Power Spectral Density	53
Appendix F): Antenna Requirement	59
Appendix G): AC Power Line Conducted Emission	60
Appendix H): Restricted bands around fundamental frequency (Radiated)	63
Appendix I): Radiated Spurious Emissions	96
PHOTOGRAPHS OF TEST SETUP	110
PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS	113

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:

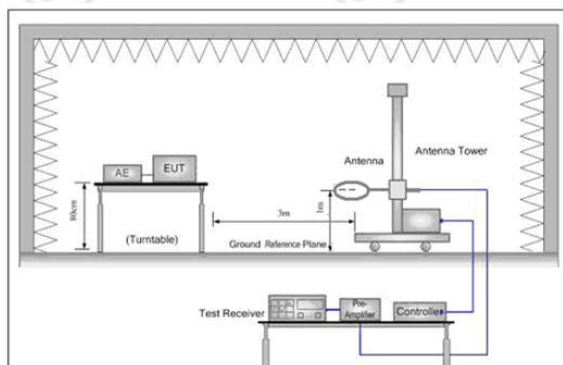


Figure 1. Below 30MHz

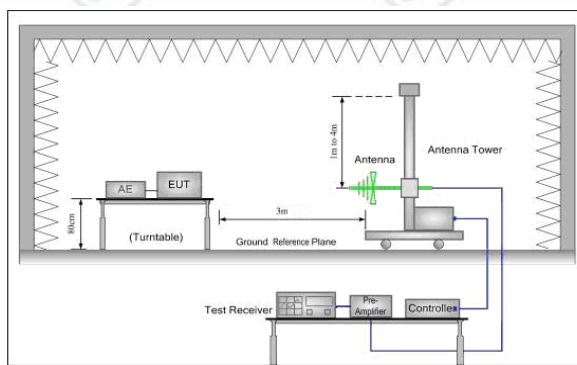


Figure 2. 30MHz to 1GHz

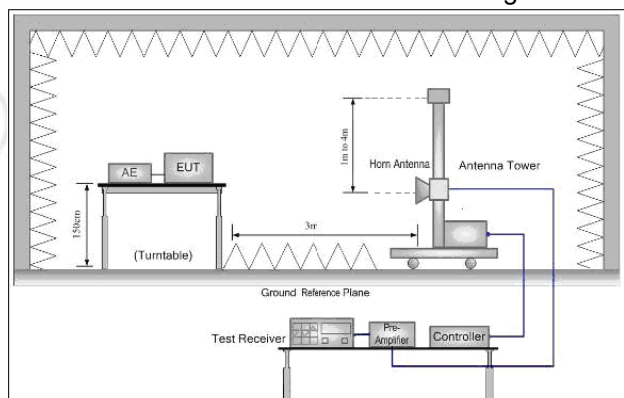
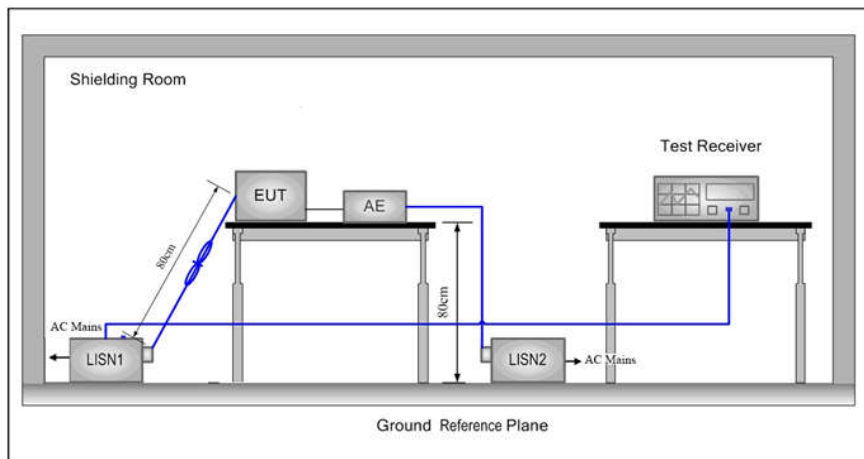


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	25.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010mbar

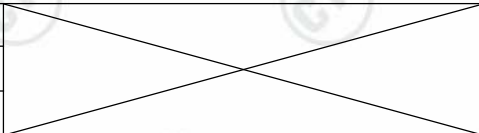
5.3 Test Condition

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
802.11n(HT40)	2422MHz ~2452 MHz	Channel 1	Channel 4	Channel7
		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

Scan under all rate at lowest channel								
Mode	802.11b							
Data Rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
Power(dBm)	17.96	18.14	18.28	18.33				
Mode	802.11g							
Data Rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Power(dBm)	17.45	17.38	17.35	17.29	17.25	17.21	17.16	17.13
Mode	802.11n (HT20)							
Data Rate	6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps
Power(dBm)	16.77	17.72	17.66	17.62	16.59	16.55	16.51	16.49
Mode	802.11n (HT40)							
Data Rate	13.5Mbps	27Mbps	40.5Mbps	54Mbps	81Mbps	108Mbps	121.5Mbps	135Mbps
Power(dBm)	14.99	14.96	14.93	14.91	14.89	14.87	14.86	14.84

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:	Chengdu Meross Technology Co.,Ltd.
Address of Applicant:	Room 1312, Floor 13, Building 6-1, Zone E, TianFu Software Park, GaoXin District, Chengdu, China
Manufacturer:	Chengdu Meross Technology Co.,Ltd.
Address of Manufacturer:	Room 1312, Floor 13, Building 6-1, Zone E, TianFu Software Park, GaoXin District, Chengdu, China
Factory:	CHENGDU XUGUANG TECHNOLOGY CO.,LTD.
Address of Factory:	2 Section of Park Road, Longquanyi, Chengdu, China

6.2 General Description of EUT

Product Name:	Smart Wi-Fi Wall Switch
Model No.(EUT):	MSS510, MSS550, MSS560, MSS570, RSS510, RSS550, RSS560, RSS570
Test Model No.:	MSS510
Trade Mark:	meross, refoss, rospick
EUT Supports Radios application:	WiFi IEEE 802.11 /b/g/n(HT20)(HT40) 2412MHz to 2462MHz
Power Supply:	AC120V, 60Hz
Sample Received Date:	Sep. 12, 2019
Sample tested Date:	Sep. 12, 2019 to Oct. 10, 2019

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:	DSSS, OFDM				
Test Power Grade:	Mode	Channel	Frequency	Data Rate	Power Setting
	802.11b	1	2412	1 Mbps	1B
		6	2437		1A
		11	2462		1A
	802.11g	1	2412	6 Mbps	10
		6	2437		10
		11	2462		10
	802.11n(HT20)	1	2412	MCS 0	11
		6	2437		11
		11	2462		11
	802.11n(HT40)	3	2422	MCS 0	11
		6	2437		11
		9	2452		11
Test Software of EUT:	MT7682 QA 0.3.0.8				

Antenna Type and Gain:	Type: PCB antenna Gain: 1.5 dBi
Test Voltage:	DC 5V

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	Channel	Frequency
1	2422MHz	4	2437MHz	7	2452MHz		
2	2427MHz	5	2442MHz				
3	2432MHz	6	2447MHz				

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	7.9×10^{-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	02-29-2020
Spectrum Analyzer	Keysight	N9010A	MY54510339	03-01-2019	02-29-2020
Signal Generator	Keysight	N5182B	MY53051549	03-01-2019	02-29-2020
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	02-29-2020
PC-1	Lenovo	R4960d	---	03-01-2019	02-29-2020
BT&WI-FI Automatic control	R&S	OSP120	101374	03-01-2019	02-29-2020
RF control unit	JS Tonscend	JS0806-2	15860006	03-01-2019	02-29-2020
RF control unit	JS Tonscend	JS0806-1	15860004	03-01-2019	02-29-2020
RF control unit	JS Tonscend	JS0806-4	158060007	03-01-2019	02-29-2020
BT&WI-FI Automatic test software	JS Tonscend	JS1120-2	---	03-01-2019	02-29-2020

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
Communication test set	Agilent	E5515C	GB47050 534	03-01-2019	02-28-2022
Communication test set	R&S	CMW500	102898	01-18-2019	01-17-2020
LISN	R&S	ENV216	100098	05-08-2019	05-07-2020
LISN	schwarzbeck	NNLK8121	8121-529	05-08-2019	05-07-2020
Voltage Probe	R&S	ESH2-Z3 0299.7810.56	100042	06-13-2017	06-12-2020
Current Probe	R&S	EZ-17 816.2063.03	100106	05-20-2019	05-19-2020
ISN	TESEQ	ISN T800	30297	01-16-2019	01-15-2020
Barometer	changchun	DYM3	1188	06-20-2019	06-19-2020

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	---	05-24-2019	05-23-2022
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-401	12-21-2018	12-20-2019
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	07-26-2019	07-25-2020
Microwave Preamplifier	Agilent	8449B	3008A02425	07-12-2019	07-11-2020
Microwave Preamplifier	Tonscend	EMC051845 SE	980380	01-16-2019	01-15-2020
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1869	04-25-2018	04-24-2021
Horn Antenna	ETS-LINDGREN	3117	00057410	06-05-2018	06-04-2021
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	07-26-2019	07-25-2020
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04-25-2018	04-24-2021
Spectrum Analyzer	R&S	FSP40	100416	04-28-2019	04-27-2020
Receiver	R&S	ESCI	100435	05-20-2019	05-19-2020
Receiver	R&S	ESCI7	100938-003	11-23-2018	11-22-2019
Multi device Controller	maturo	NCD/070/10711112	---	01-09-2019	01-08-2020
Signal Generator	Agilent	E4438C	MY45095744	03-01-2019	02-29-2020
Signal Generator	Keysight	E8257D	MY53401106	03-01-2019	02-29-2020
Temperature/Humidity Indicator	Shanghai qixiang	HM10	1804298	07-26-2019	07-25-2020
Communication test set	Agilent	E5515C	GB47050534	03-01-2019	02-28-2022
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
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

3M full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
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
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-075	04-25-2018	04-24-2021
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04-25-2018	04-24-2021
TRILOG Broadband Antenna	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	Schwarzbeck	BBHA 9170	9170-829	04-25-2018	04-24-2021
Communication Antenna	Schwarzbeck	CLSA 0110L	1014	02-14-2019	02-13-2020
Biconical antenna	Schwarzbeck	VUBA 9117	9117-381	04-25-2018	04-24-2021
Horn Antenna	ETS-LINDGREN	3117	00057407	07-10-2018	07-09-2021
Preamplifier	EMCI	EMC184055SE	980596	05-22-2019	05-21-2020
Communication test set	R&S	CMW500	102898	01-18-2019	01-17-2020
Preamplifier	EMCI	EMC001330	980563	05-08-2019	05-07-2020
Preamplifier	Agilent	8449B	3008A02425	07-12-2019	07-11-2020
Temperature/ Humidity Indicator	biaozhi	GM1360	EE1186631	04-30-2019	04-29-2020
Signal Generator	KEYSIGHT	E8257D	MY53401106	03-01-2019	02-29-2020
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	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMSM-2.50M	394812-0002	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMSM-2.50M	394812-0003	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMSM-2.50M	393495-0001	01-09-2019	01-08-2020
Cable line	Times	EMC104-NMNM-1000	SN160710	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMSM-3.00M	394813-0001	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMNM-1.50M	381964-0001	01-09-2019	01-08-2020
Cable line	Times	SFT205-NMSM-7.00M	394815-0001	01-09-2019	01-08-2020
Cable line	Times	HF160-KMKM-3.00M	393493-0001	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

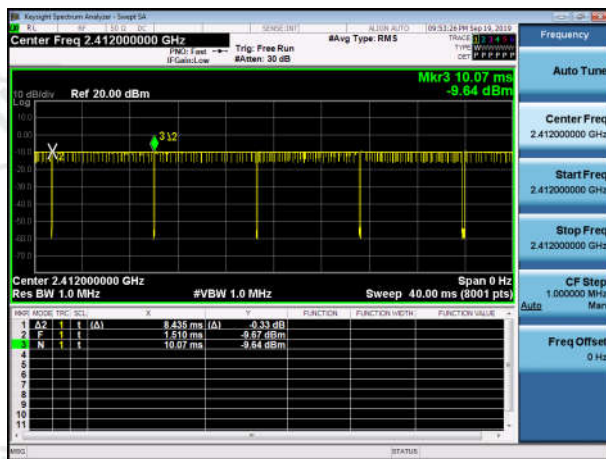
Test Results List:

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)

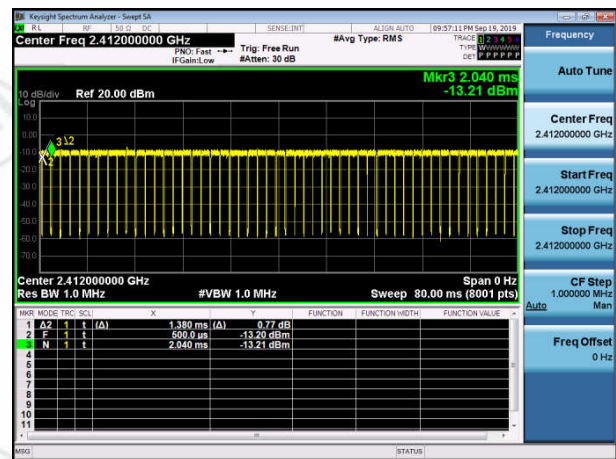
Duty Cycle

Duty Cycle			
Configuration	TX ON(ms)	TX ALL(ms)	Duty Cycle(%)
802.11b	8.435	8.560	98.53%
802.11g	1.380	1.540	89.61%
802.11n HT20	1.300	1.520	85.52%
802.11n HT40	0.630	0.740	85.14%

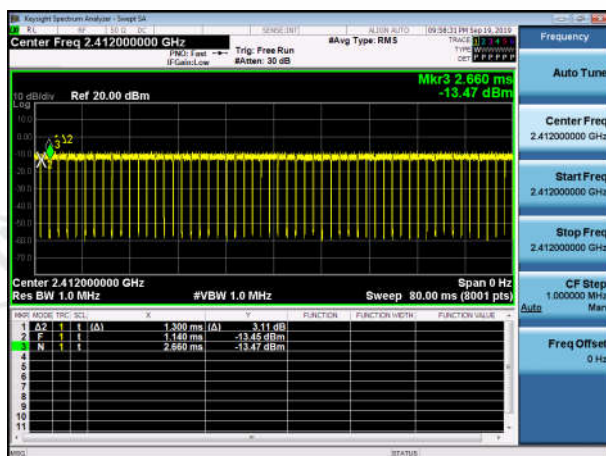
802.11b



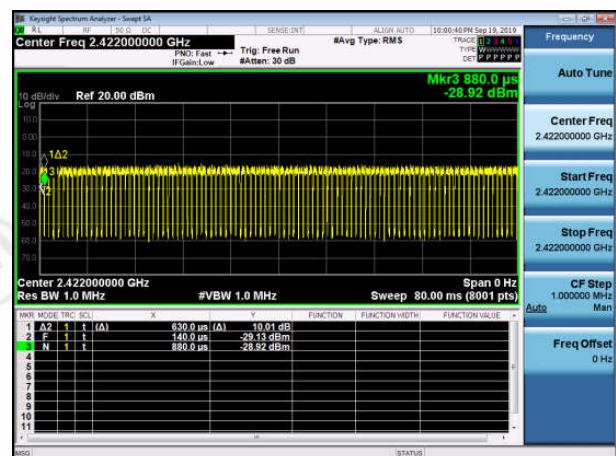
802.11g



802.11n HT20



802.11n HT40



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 :
-------	---

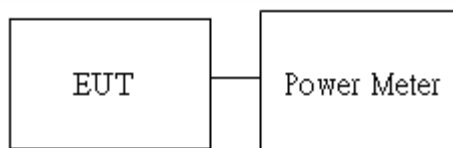
Average output power : For reporting purposes only.

Test Procedure

Test method Refer as KDB 558074 D01.

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Peak output power and Average output power. in the test report.

Test Setup

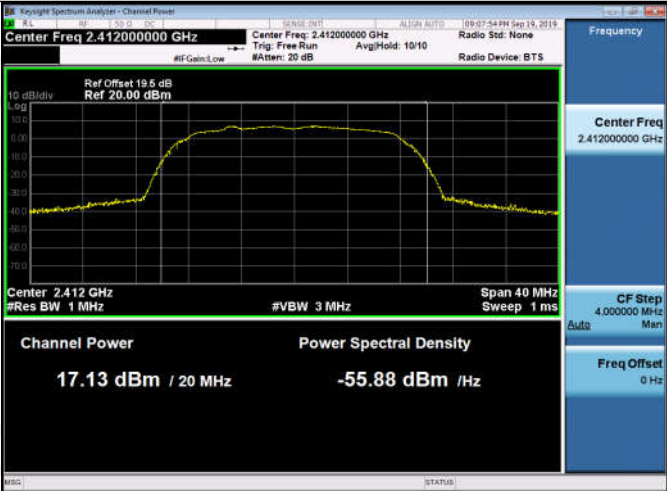
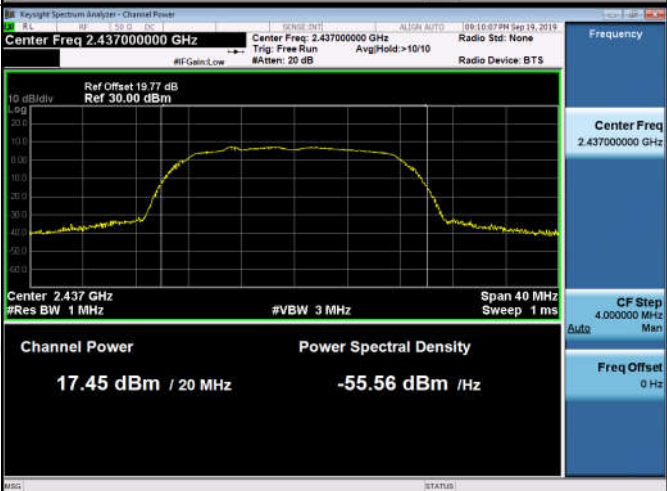


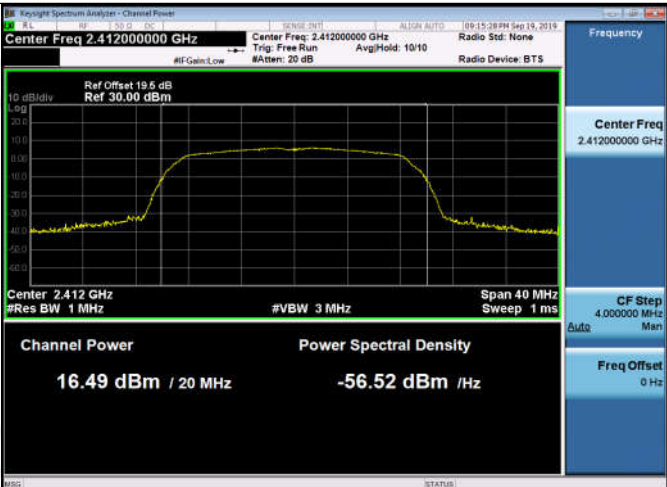
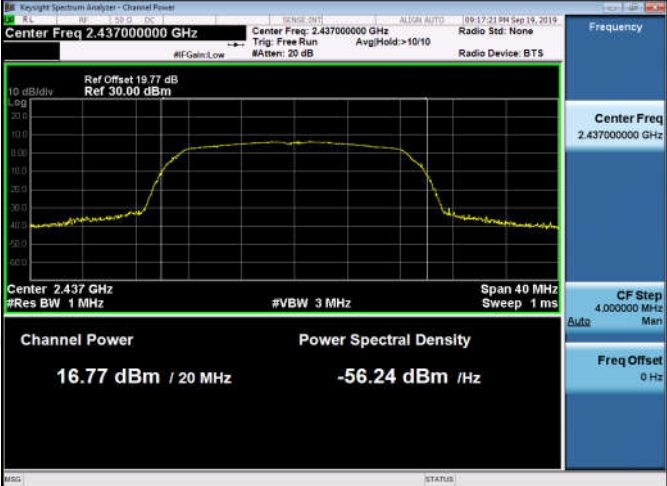
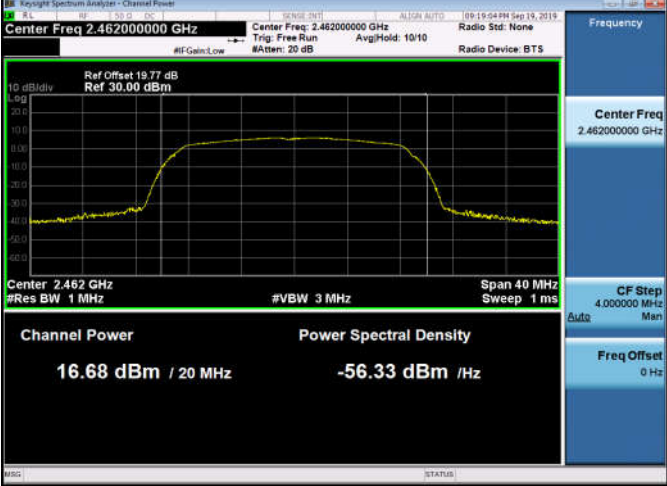
Result Table

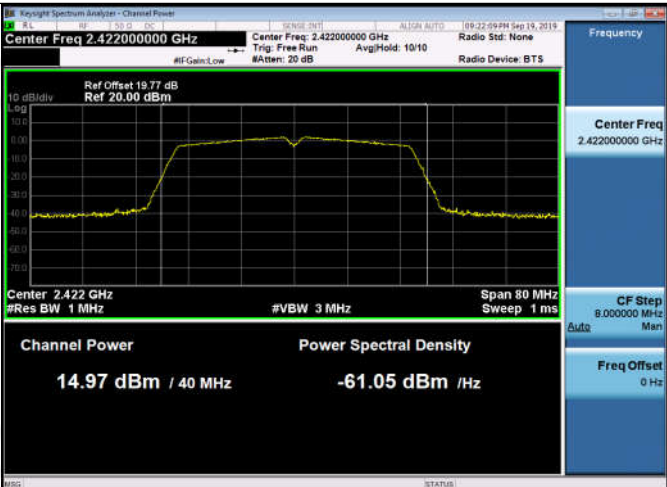
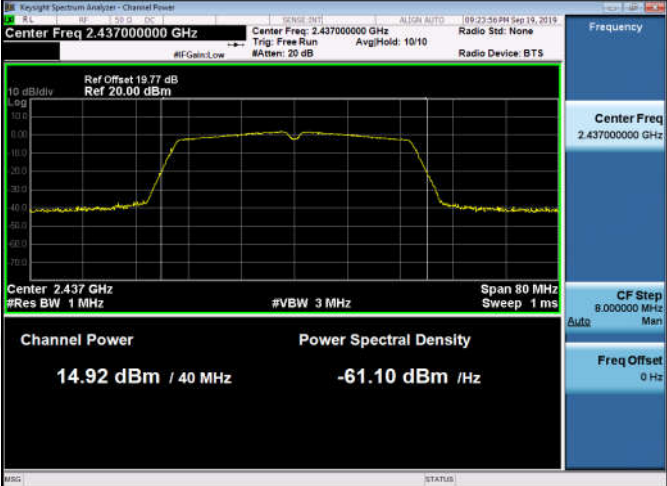
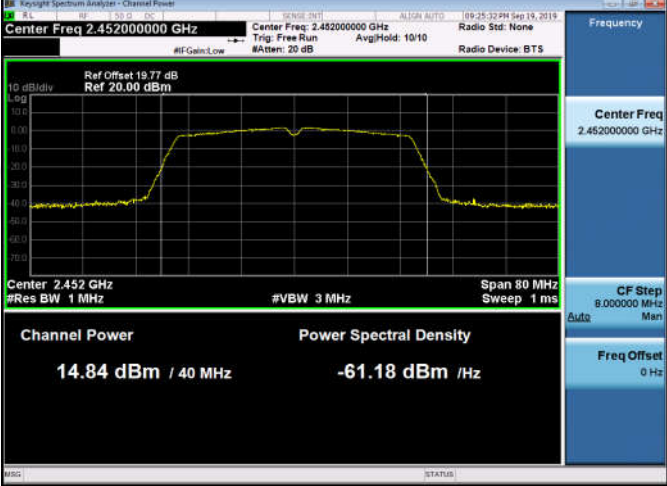
Mode	Channel	Conducted Peak Output Power [dBm]	Verdict
11B	LCH	18.33	PASS
11B	MCH	18.18	PASS
11B	HCH	17.96	PASS
11G	LCH	17.13	PASS
11G	MCH	17.45	PASS
11G	HCH	17.32	PASS
11N20SISO	LCH	16.49	PASS
11N20SISO	MCH	16.77	PASS
11N20SISO	HCH	16.68	PASS
11N40SISO	LCH	14.97	PASS
11N40SISO	MCH	14.92	PASS
11N40SISO	HCH	14.84	PASS

Test Graph



11G/LCH	 Keyight Spectrum Analyzer - Channel Power Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 20.00 dBm Channel Power: 17.13 dBm / 20 MHz Power Spectral Density: -55.88 dBm / Hz Center Freq: 2.412 GHz #Res BW: 1 MHz #VBW: 3 MHz Span: 40 MHz Sweep: 1 ms Frequency: 2.412000000 GHz CF Step: 4.000000 MHz Freq Offset: 0 Hz
11G/MCH	 Keyight Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Channel Power: 17.45 dBm / 20 MHz Power Spectral Density: -55.56 dBm / Hz Center Freq: 2.437 GHz #Res BW: 1 MHz #VBW: 3 MHz Span: 40 MHz Sweep: 1 ms Frequency: 2.437000000 GHz CF Step: 4.000000 MHz Freq Offset: 0 Hz
11G/HCH	 Keyight Spectrum Analyzer - Channel Power Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Channel Power: 17.32 dBm / 20 MHz Power Spectral Density: -55.69 dBm / Hz Center Freq: 2.462 GHz #Res BW: 1 MHz #VBW: 3 MHz Span: 40 MHz Sweep: 1 ms Frequency: 2.462000000 GHz CF Step: 4.000000 MHz Freq Offset: 0 Hz

11N20SISO/LCH	
11N20SISO/MCH	
11N20SISO/HCH	

11N40SISO/LCH	
11N40SISO/MCH	
11N40SISO/HCH	

Appendix B): 6dB Occupied Bandwidth

Test Limit

According to §15.247(a)(2),

6 dB Bandwidth :

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

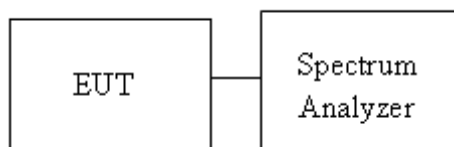
Occupied Bandwidth(99%) : For reporting purposes only.

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

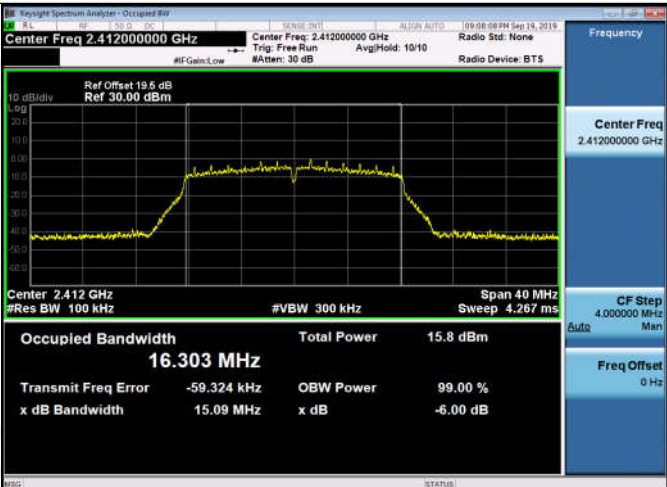
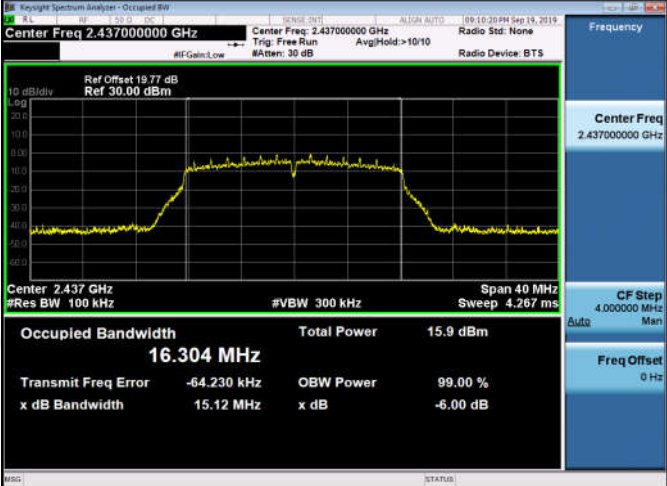
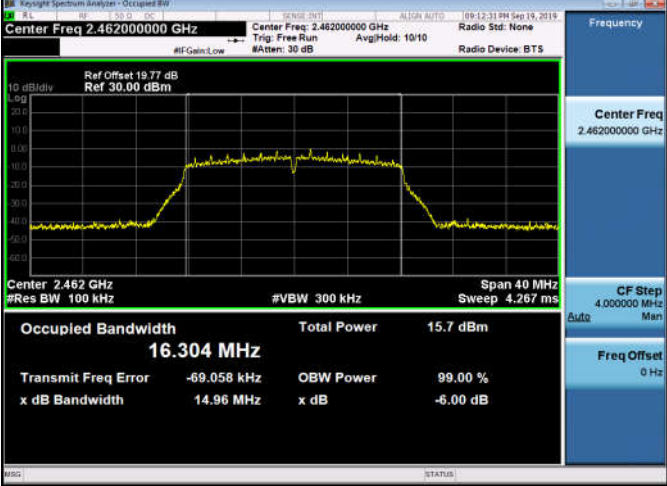


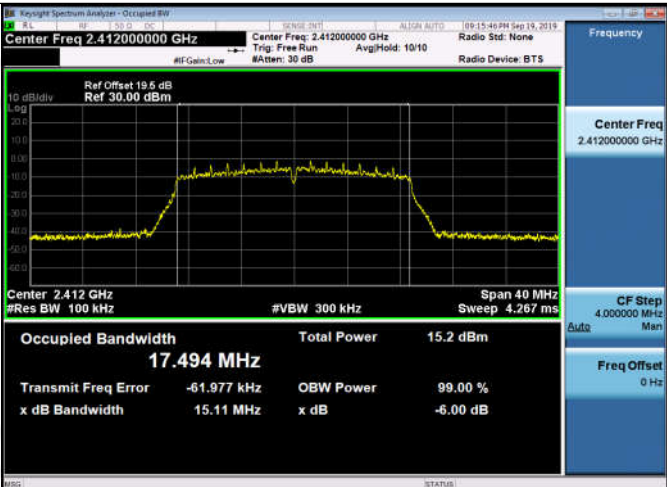
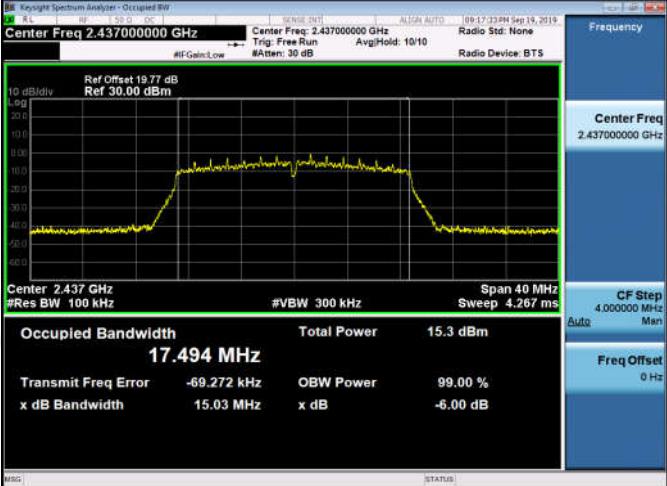
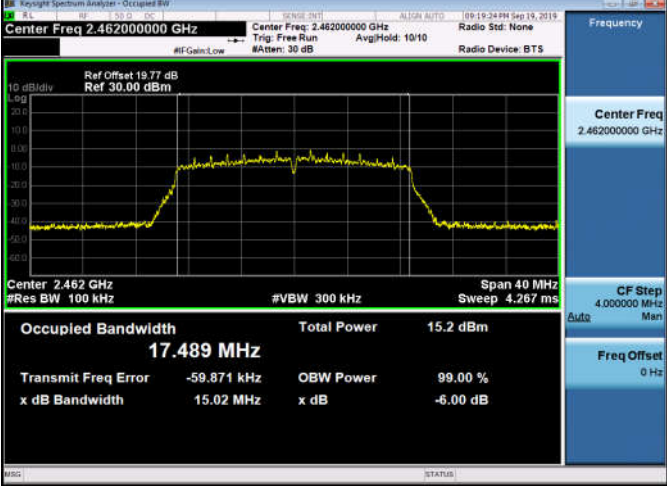
Result Table

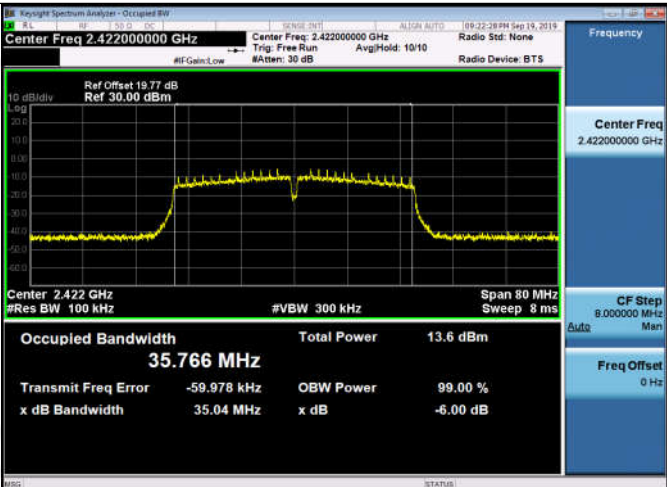
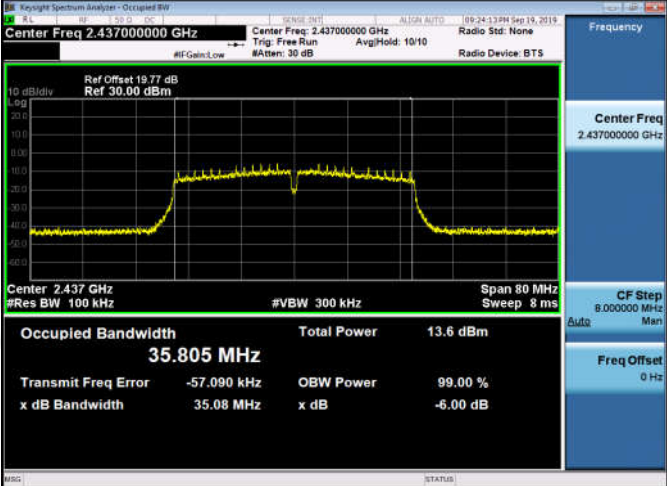
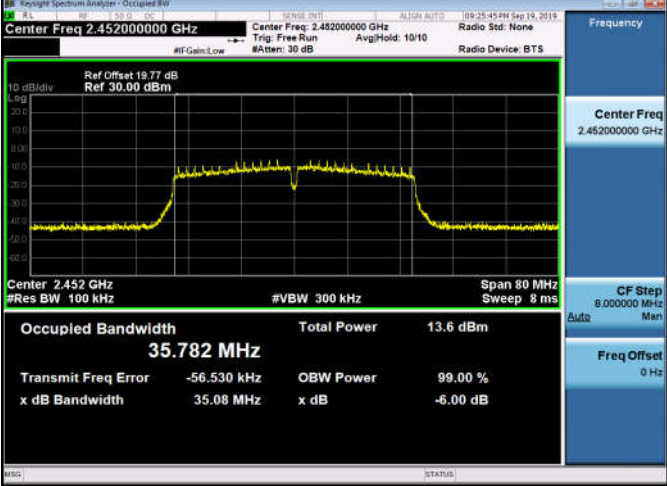
Mode	Channel	6dB Bandwidth [MHz]	Verdict
11B	LCH	10.00	PASS
11B	MCH	10.02	PASS
11B	HCH	9.549	PASS
11G	LCH	15.09	PASS
11G	MCH	15.12	PASS
11G	HCH	14.96	PASS
11N20SISO	LCH	15.11	PASS
11N20SISO	MCH	15.03	PASS
11N20SISO	HCH	15.02	PASS
11N40SISO	LCH	35.04	PASS
11N40SISO	MCH	35.08	PASS
11N40SISO	HCH	35.08	PASS

Test Graph



11G/LCH	 Keyight 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 Occupied Bandwidth 16.303 MHz Total Power 15.8 dBm Transmit Freq Error -59.324 kHz OBW Power 99.00 % x dB Bandwidth 15.09 MHz x dB -6.00 dB
11G/MCH	 Keyight 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 Occupied Bandwidth 16.304 MHz Total Power 15.9 dBm Transmit Freq Error -64.230 kHz OBW Power 99.00 % x dB Bandwidth 15.12 MHz x dB -6.00 dB
11G/HCH	 Keyight 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 Occupied Bandwidth 16.304 MHz Total Power 15.7 dBm Transmit Freq Error -69.058 kHz OBW Power 99.00 % x dB Bandwidth 14.96 MHz x dB -6.00 dB

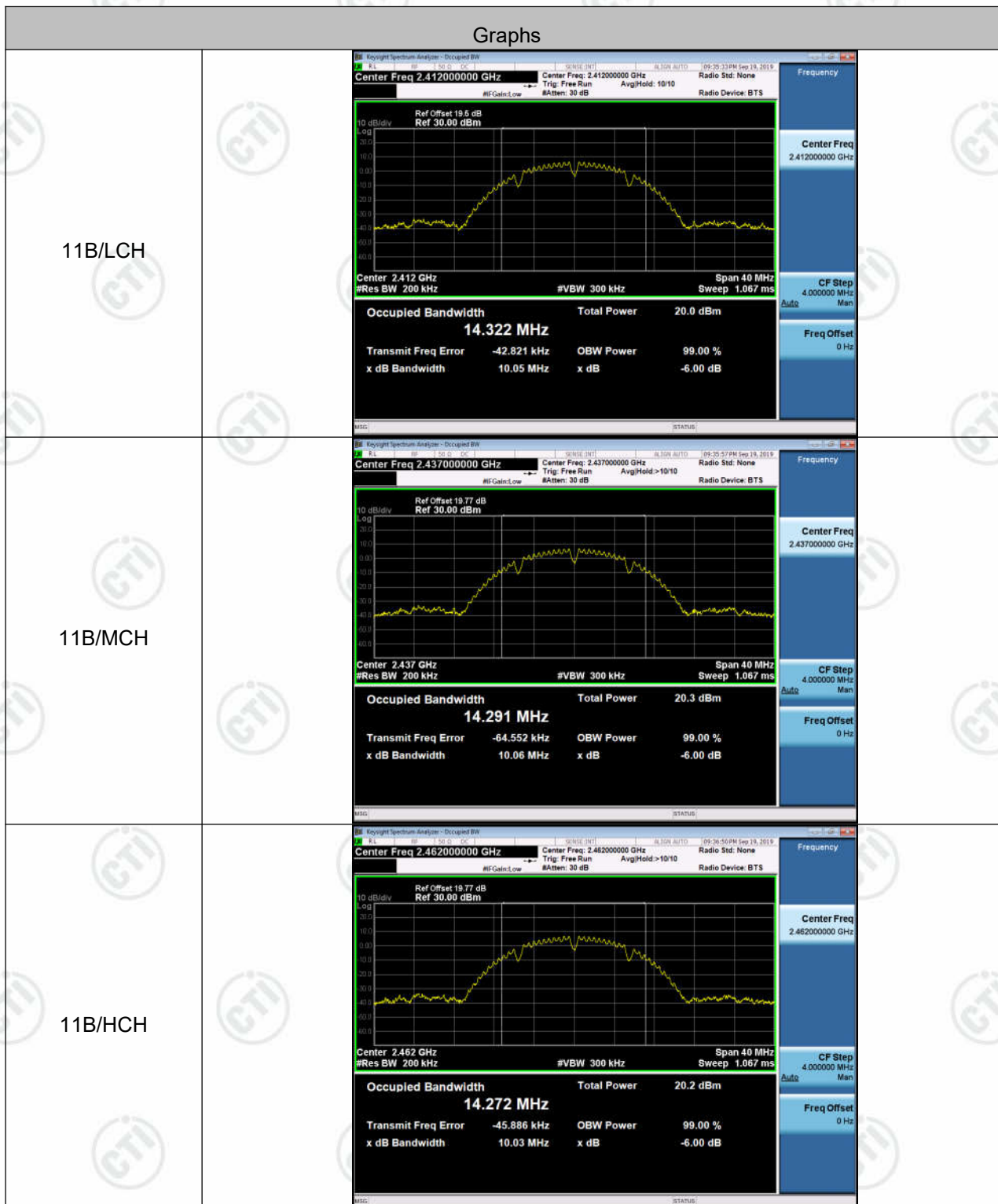
11N20SISO/LCH	 Key: Keysight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 100 kHz Occupied Bandwidth 17.494 MHz Total Power 15.2 dBm Transmit Freq Error -61.977 kHz OBW Power 99.00 % x dB Bandwidth 15.11 MHz x dB -6.00 dB Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11N20SISO/MCH	 Key: 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 Occupied Bandwidth 17.494 MHz Total Power 15.3 dBm Transmit Freq Error -69.272 kHz OBW Power 99.00 % x dB Bandwidth 15.03 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11N20SISO/HCH	 Key: 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 Occupied Bandwidth 17.489 MHz Total Power 15.2 dBm Transmit Freq Error -59.871 kHz OBW Power 99.00 % x dB Bandwidth 15.02 MHz x dB -6.00 dB Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz

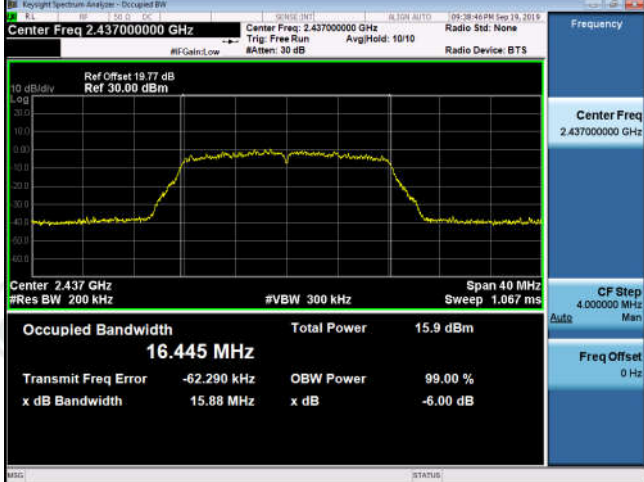
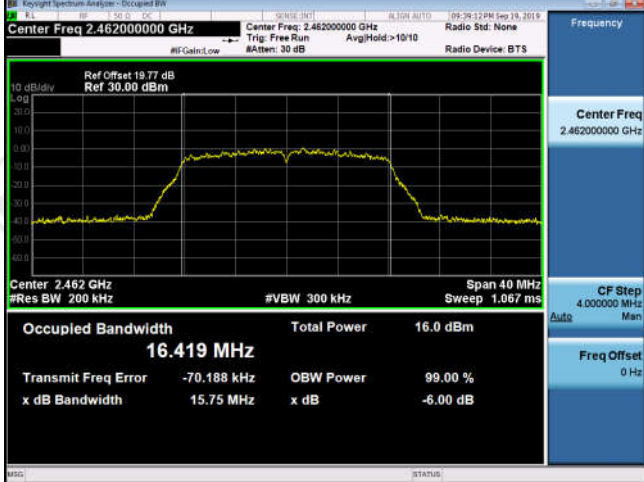
11N40SISO/LCH	 Key: Keysight Spectrum Analyzer - Occupied BW Center Freq 2.422000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.422 GHz #Res BW 100 kHz Span 80 MHz Sweep 8 ms Occupied Bandwidth 35.766 MHz Total Power 13.6 dBm Transmit Freq Error -59.978 kHz OBW Power 99.00 % x dB Bandwidth 35.04 MHz x dB -6.00 dB Frequency Center Freq 2.422000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/MCH	 Key: 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 80 MHz Sweep 8 ms Occupied Bandwidth 35.805 MHz Total Power 13.6 dBm Transmit Freq Error -57.090 kHz OBW Power 99.00 % x dB Bandwidth 35.08 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/HCH	 Key: Keysight 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 Span 80 MHz Sweep 8 ms Occupied Bandwidth 35.782 MHz Total Power 13.6 dBm Transmit Freq Error -56.530 kHz OBW Power 99.00 % x dB Bandwidth 35.08 MHz x dB -6.00 dB Frequency Center Freq 2.452000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz

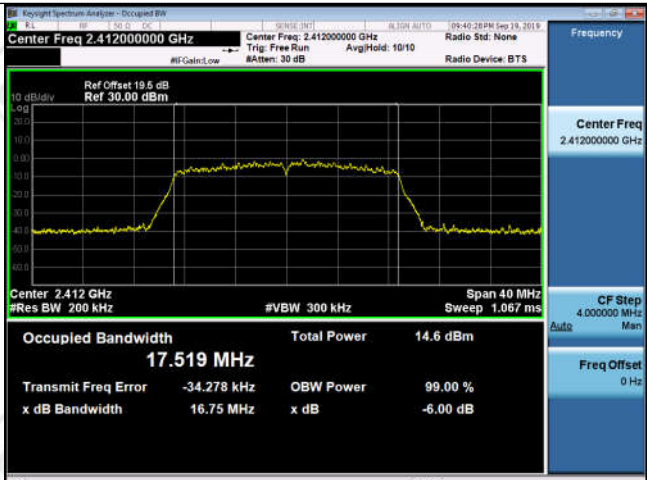
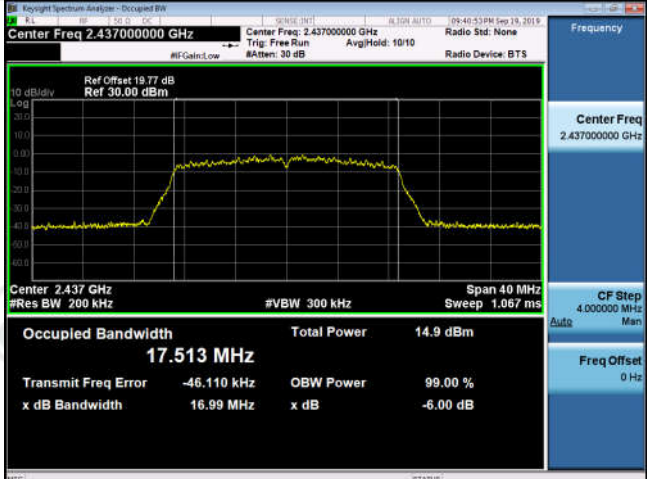
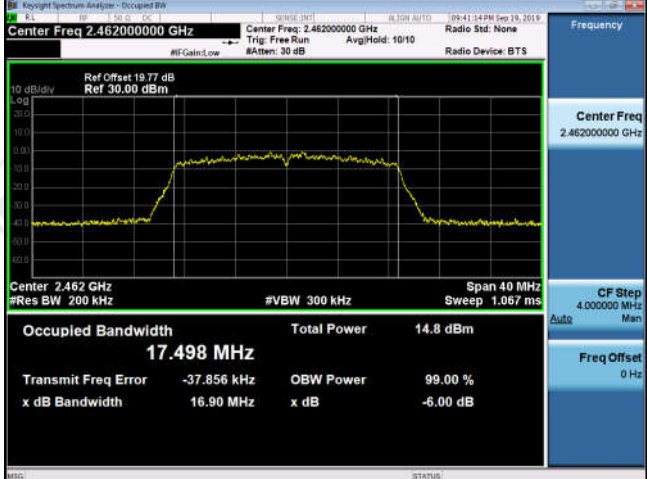
Occupied Bandwidth(99%)

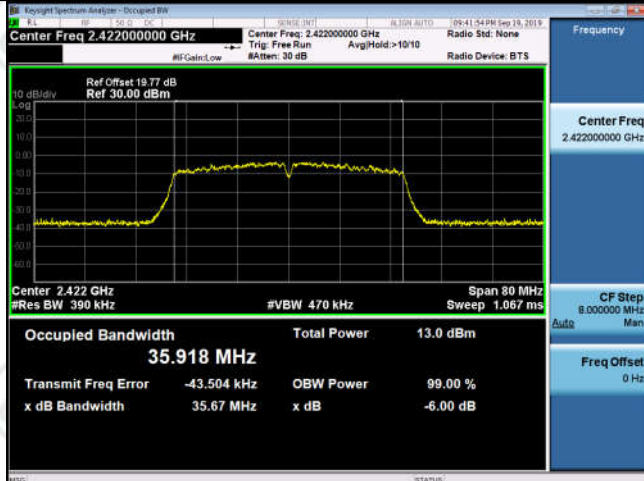
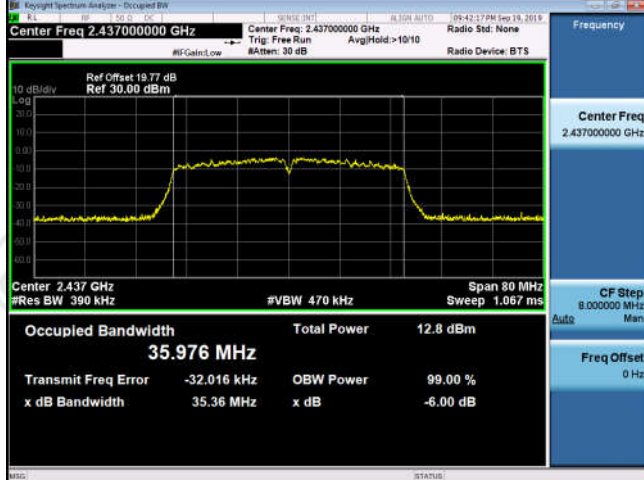
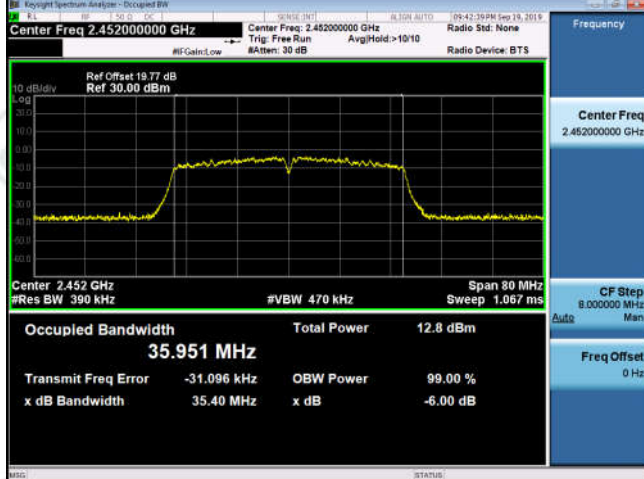
Mode	Channel	99% OBW [MHz]	Verdict
11B	LCH	14.322	PASS
11B	MCH	14.291	PASS
11B	HCH	14.272	PASS
11G	LCH	16.407	PASS
11G	MCH	16.445	PASS
11G	HCH	16.419	PASS
11N20SISO	LCH	17.519	PASS
11N20SISO	MCH	17.513	PASS
11N20SISO	HCH	17.498	PASS
11N40SISO	LCH	35.918	PASS
11N40SISO	MCH	35.976	PASS
11N40SISO	HCH	35.951	PASS

Test Graph



11G/LCH	 Keyight 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: 16.407 MHz Total Power: 15.7 dBm Transmit Freq Error: -48.334 kHz OBW Power: 99.00 % x dB Bandwidth: 15.93 MHz x dB: -6.00 dB
11G/MCH	 Keyight 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: 16.445 MHz Total Power: 15.9 dBm Transmit Freq Error: -62.290 kHz OBW Power: 99.00 % x dB Bandwidth: 15.88 MHz x dB: -6.00 dB
11G/HCH	 Keyight 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: 16.419 MHz Total Power: 16.0 dBm Transmit Freq Error: -70.188 kHz OBW Power: 99.00 % x dB Bandwidth: 15.75 MHz x dB: -6.00 dB

11N20SISO/LCH	 Keyight 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 17.519 MHz Total Power 14.6 dBm Transmit Freq Error -34.278 kHz OBW Power 99.00 % x dB Bandwidth 16.75 MHz x dB -6.00 dB Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11N20SISO/MCH	 Keyight 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 17.513 MHz Total Power 14.9 dBm Transmit Freq Error -46.110 kHz OBW Power 99.00 % x dB Bandwidth 16.99 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11N20SISO/HCH	 Keyight 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 17.498 MHz Total Power 14.8 dBm Transmit Freq Error -37.856 kHz OBW Power 99.00 % x dB Bandwidth 16.90 MHz x dB -6.00 dB Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz

11N40SISO/LCH	 Center Freq 2.422000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.422 GHz #Res BW 390 kHz #VBW 470 kHz Sweep 1.067 ms Occupied Bandwidth 35.918 MHz Total Power 13.0 dBm Transmit Freq Error -43.504 kHz OBW Power 99.00 % x dB Bandwidth 35.67 MHz x dB -6.00 dB
11N40SISO/MCH	 Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 390 kHz #VBW 470 kHz Sweep 1.067 ms Occupied Bandwidth 35.976 MHz Total Power 12.8 dBm Transmit Freq Error -32.016 kHz OBW Power 99.00 % x dB Bandwidth 35.36 MHz x dB -6.00 dB
11N40SISO/HCH	 Center Freq 2.452000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.452 GHz #Res BW 390 kHz #VBW 470 kHz Sweep 1.067 ms Occupied Bandwidth 35.951 MHz Total Power 12.8 dBm Transmit Freq Error -31.096 kHz OBW Power 99.00 % x dB Bandwidth 35.40 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,

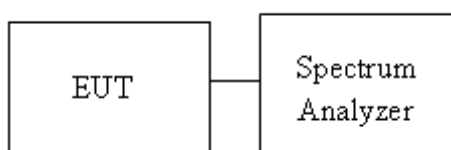
Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

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.

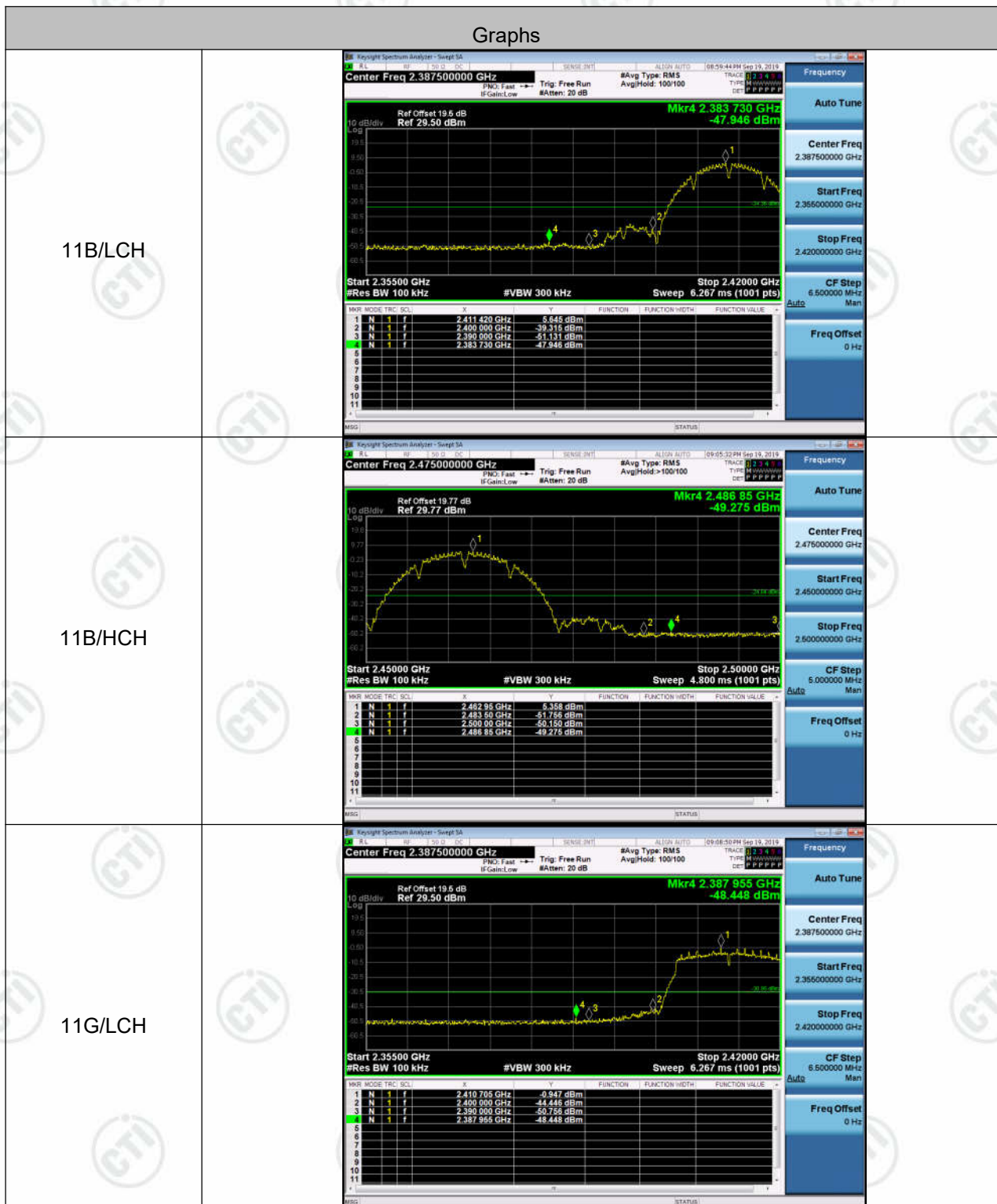
Test Setup



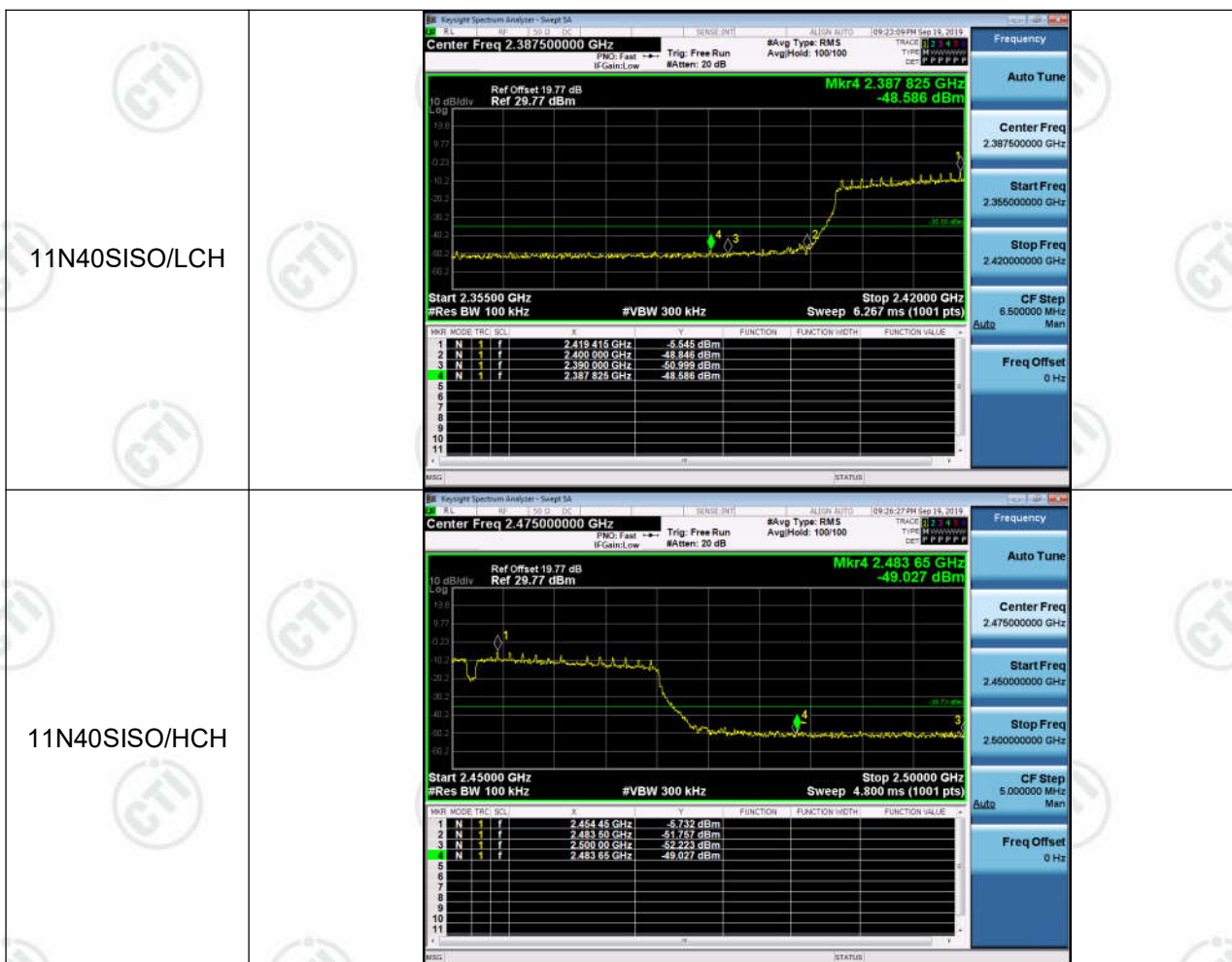
Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	5.645	-47.946	-24.36	PASS
11B	HCH	5.358	-49.275	-24.64	PASS
11G	LCH	-0.947	-48.448	-30.95	PASS
11G	HCH	-0.546	-48.972	-30.55	PASS
11N20SISO	LCH	-1.022	-48.686	-31.02	PASS
11N20SISO	HCH	-1.830	-48.952	-31.83	PASS
11N40SISO	LCH	-5.545	-48.586	-35.55	PASS
11N40SISO	HCH	-5.732	-49.027	-35.73	PASS

Test Graph



11G/HCH	Keyight Spectrum Analyzer - Sweep SA Center Freq 2.475000000 GHz Ref Offset 19.77 dB Ref 29.77 dBm Mkr4 2.488 05 GHz -48.972 dBm Start 2.45000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 4.800 ms (1001 pts) <table><thead><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCL</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 20 GHz</td><td>-0.546 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>-50.477 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>-52.073 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.488 05 GHz</td><td>-48.972 dBm</td><td></td><td></td><td></td></tr></tbody></table>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.463 20 GHz	-0.546 dBm				2	N	1	f	2.483 50 GHz	-50.477 dBm				3	N	1	f	2.500 00 GHz	-52.073 dBm				4	N	1	f	2.488 05 GHz	-48.972 dBm			
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
1	N	1	f	2.463 20 GHz	-0.546 dBm																																									
2	N	1	f	2.483 50 GHz	-50.477 dBm																																									
3	N	1	f	2.500 00 GHz	-52.073 dBm																																									
4	N	1	f	2.488 05 GHz	-48.972 dBm																																									
11N20SISO/LCH	Keyight Spectrum Analyzer - Sweep SA Center Freq 2.387500000 GHz Ref Offset 19.5 dB Ref 29.50 dBm Mkr4 2.382 755 GHz -48.686 dBm Start 2.35500 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 6.267 ms (1001 pts) <table><thead><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCL</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>2.413 240 GHz</td><td>-1.022 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>-44.785 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>2.390 000 GHz</td><td>-51.130 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.382 755 GHz</td><td>-48.686 dBm</td><td></td><td></td><td></td></tr></tbody></table>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.413 240 GHz	-1.022 dBm				2	N	1	f	2.400 000 GHz	-44.785 dBm				3	N	1	f	2.390 000 GHz	-51.130 dBm				4	N	1	f	2.382 755 GHz	-48.686 dBm			
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
1	N	1	f	2.413 240 GHz	-1.022 dBm																																									
2	N	1	f	2.400 000 GHz	-44.785 dBm																																									
3	N	1	f	2.390 000 GHz	-51.130 dBm																																									
4	N	1	f	2.382 755 GHz	-48.686 dBm																																									
11N20SISO/HCH	Keyight Spectrum Analyzer - Sweep SA Center Freq 2.475000000 GHz Ref Offset 19.77 dB Ref 29.77 dBm Mkr4 2.483 85 GHz -48.952 dBm Start 2.45000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 4.800 ms (1001 pts) <table><thead><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCL</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>2.484 45 GHz</td><td>-1.530 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 80 GHz</td><td>-50.206 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>-51.481 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>-48.952 dBm</td><td></td><td></td><td></td></tr></tbody></table>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.484 45 GHz	-1.530 dBm				2	N	1	f	2.483 80 GHz	-50.206 dBm				3	N	1	f	2.500 00 GHz	-51.481 dBm				4	N	1	f	2.483 85 GHz	-48.952 dBm			
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
1	N	1	f	2.484 45 GHz	-1.530 dBm																																									
2	N	1	f	2.483 80 GHz	-50.206 dBm																																									
3	N	1	f	2.500 00 GHz	-51.481 dBm																																									
4	N	1	f	2.483 85 GHz	-48.952 dBm																																									



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

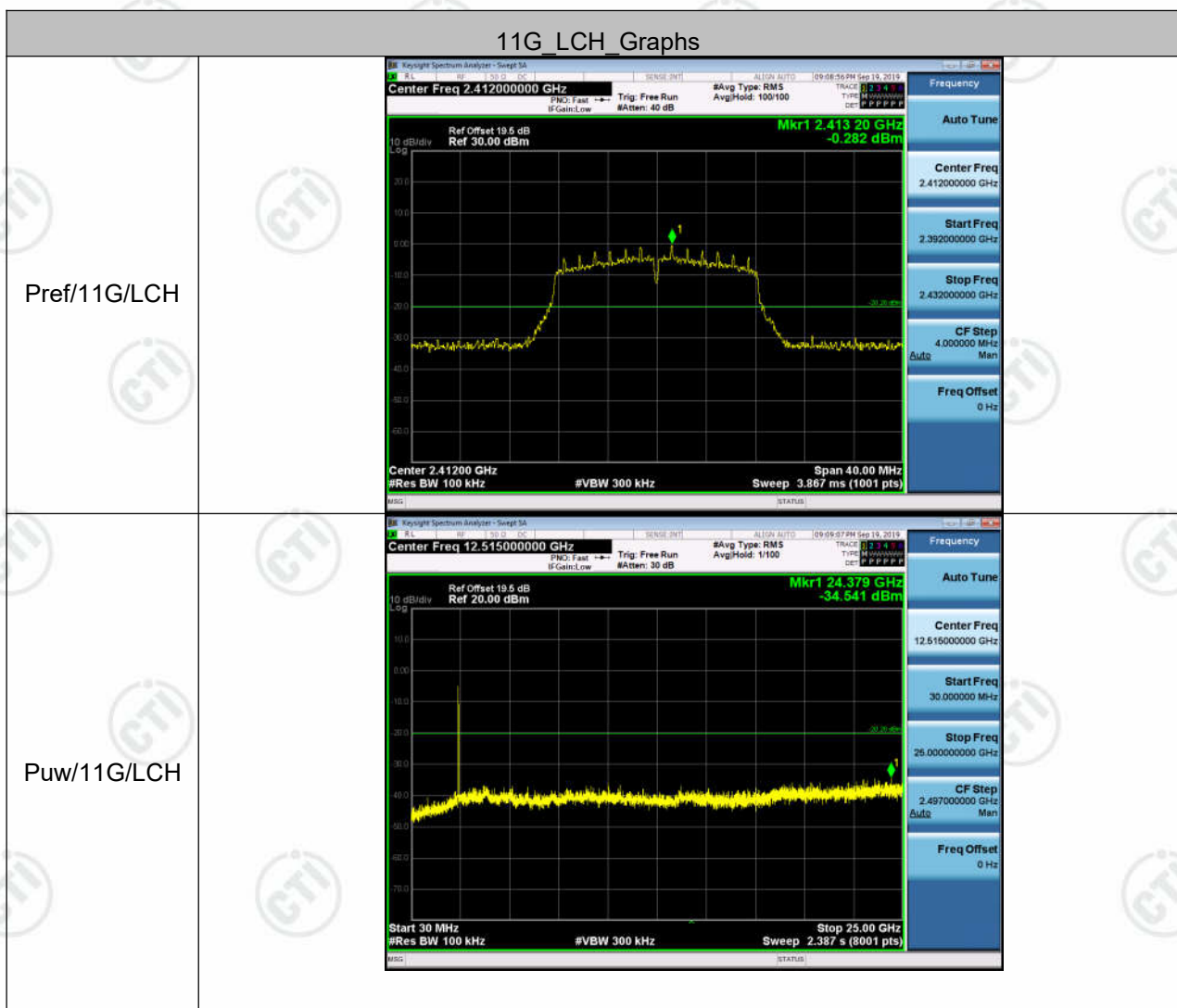
Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
11B	LCH	5.701	<Limit	PASS
11B	MCH	5.519	<Limit	PASS
11B	HCH	5.312	<Limit	PASS
11G	LCH	-0.282	<Limit	PASS
11G	MCH	-0.65	<Limit	PASS
11G	HCH	-0.114	<Limit	PASS
11N20SISO	LCH	-1.341	<Limit	PASS
11N20SISO	MCH	-0.69	<Limit	PASS
11N20SISO	HCH	-0.873	<Limit	PASS
11N40SISO	LCH	-5.876	<Limit	PASS
11N40SISO	MCH	-5.705	<Limit	PASS
11N40SISO	HCH	-5.528	<Limit	PASS

Test Graph

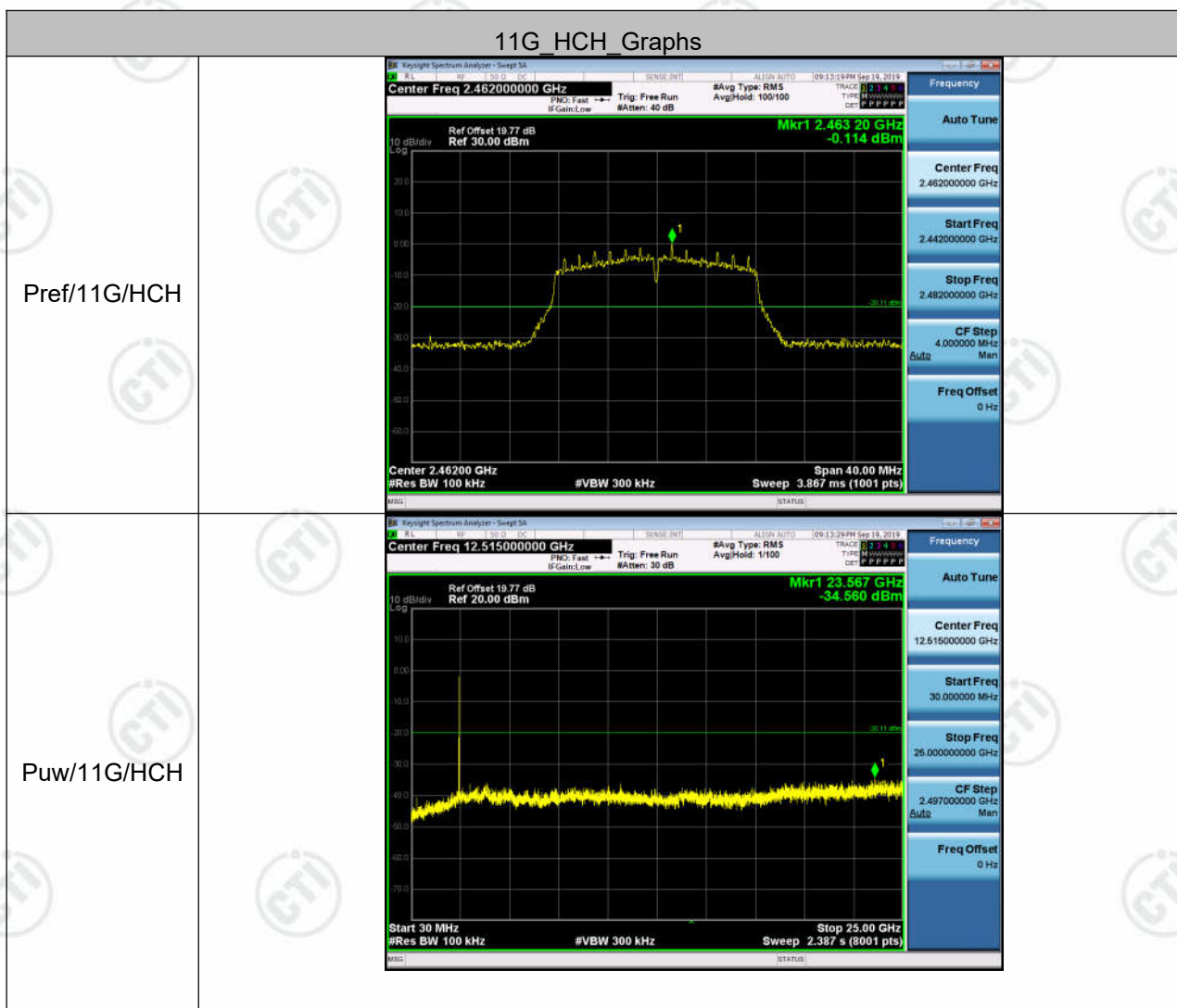


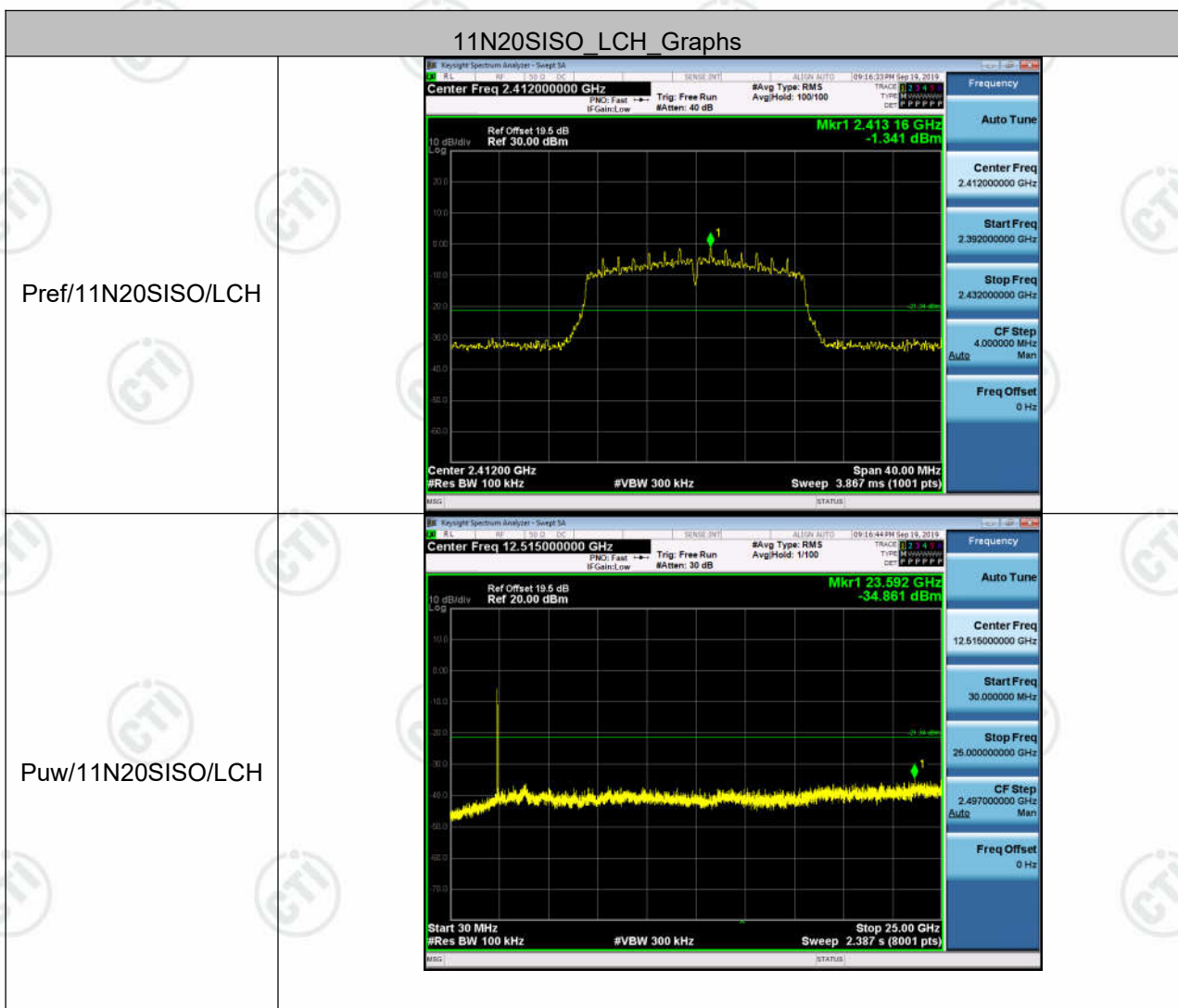


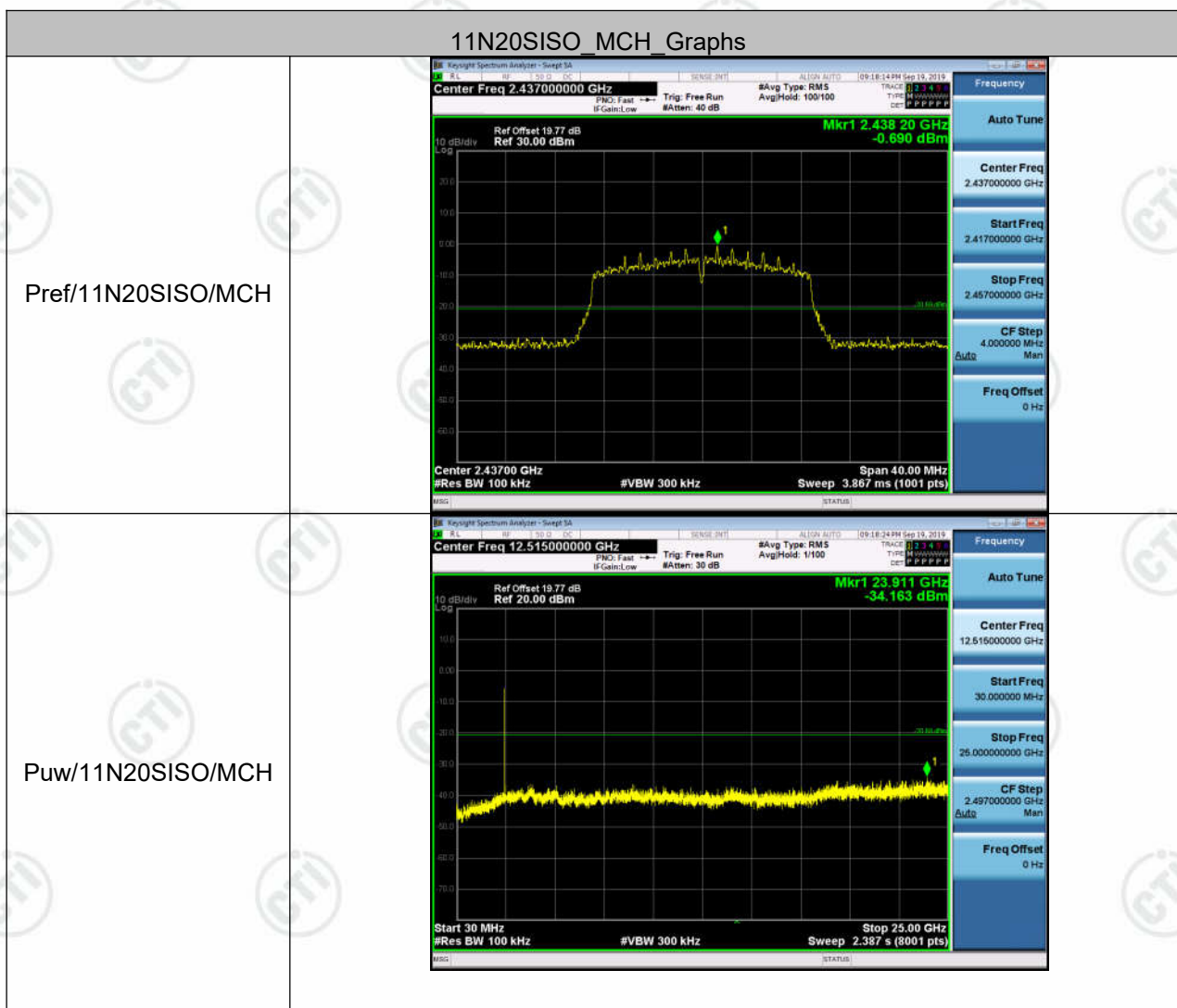


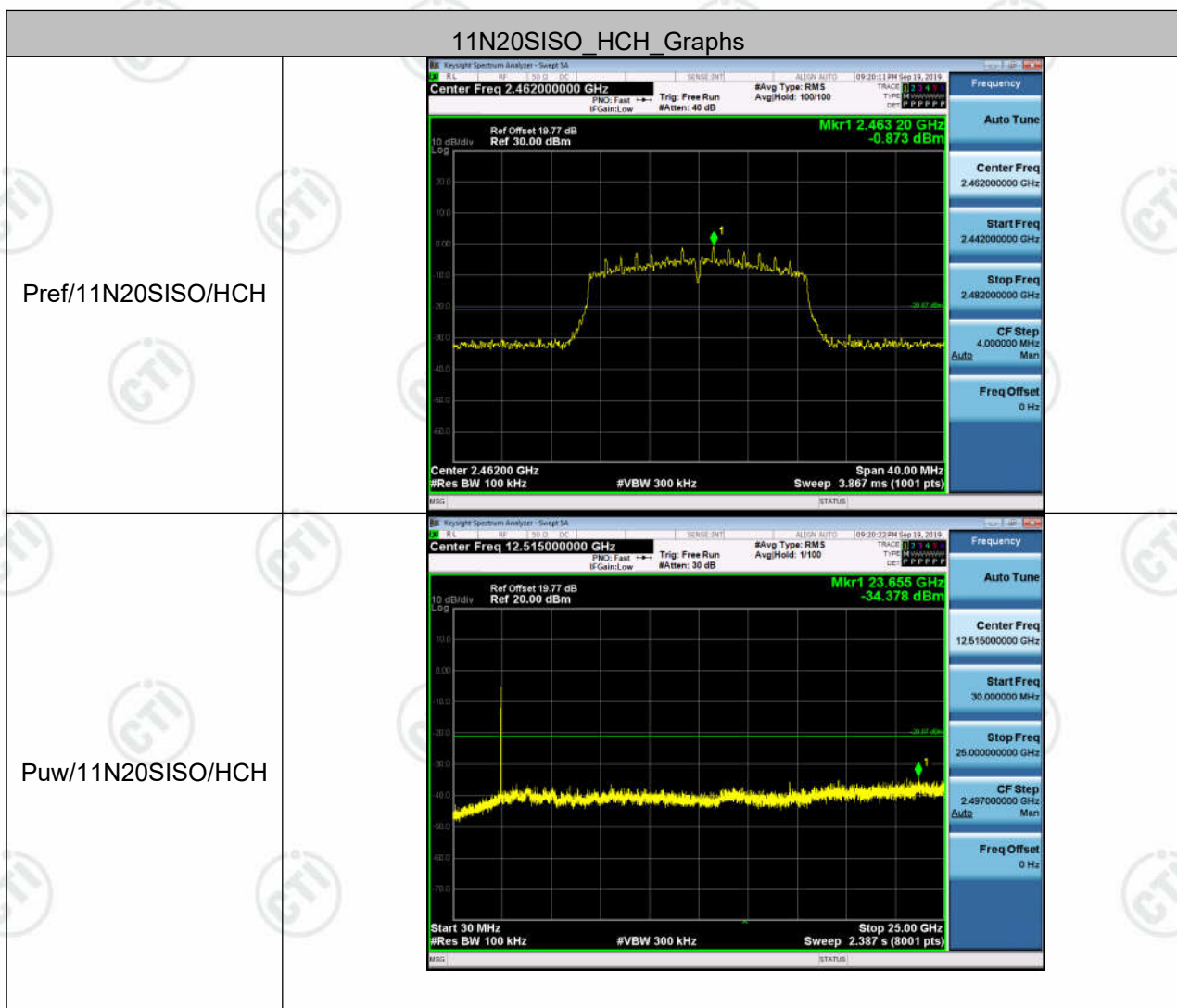


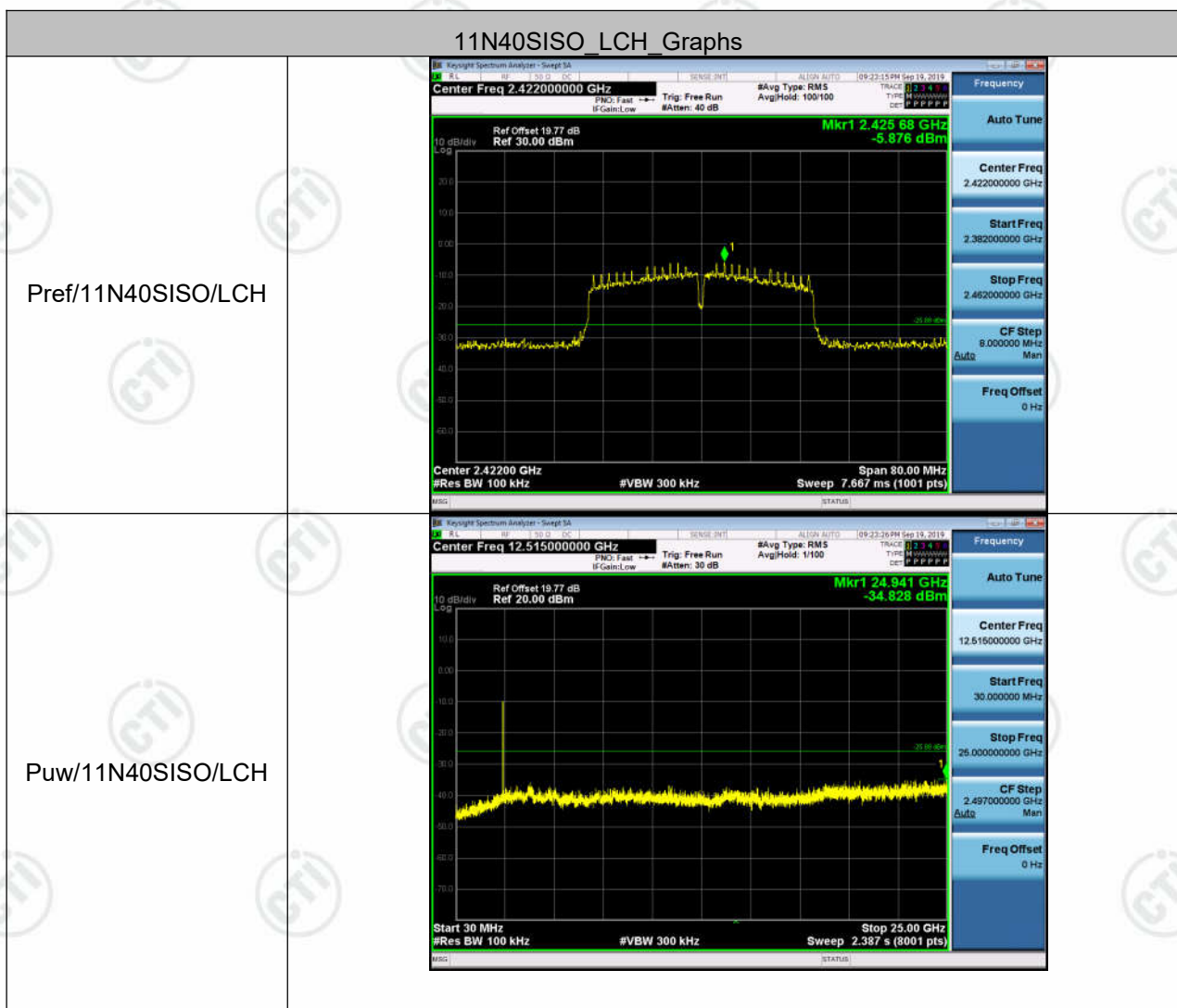


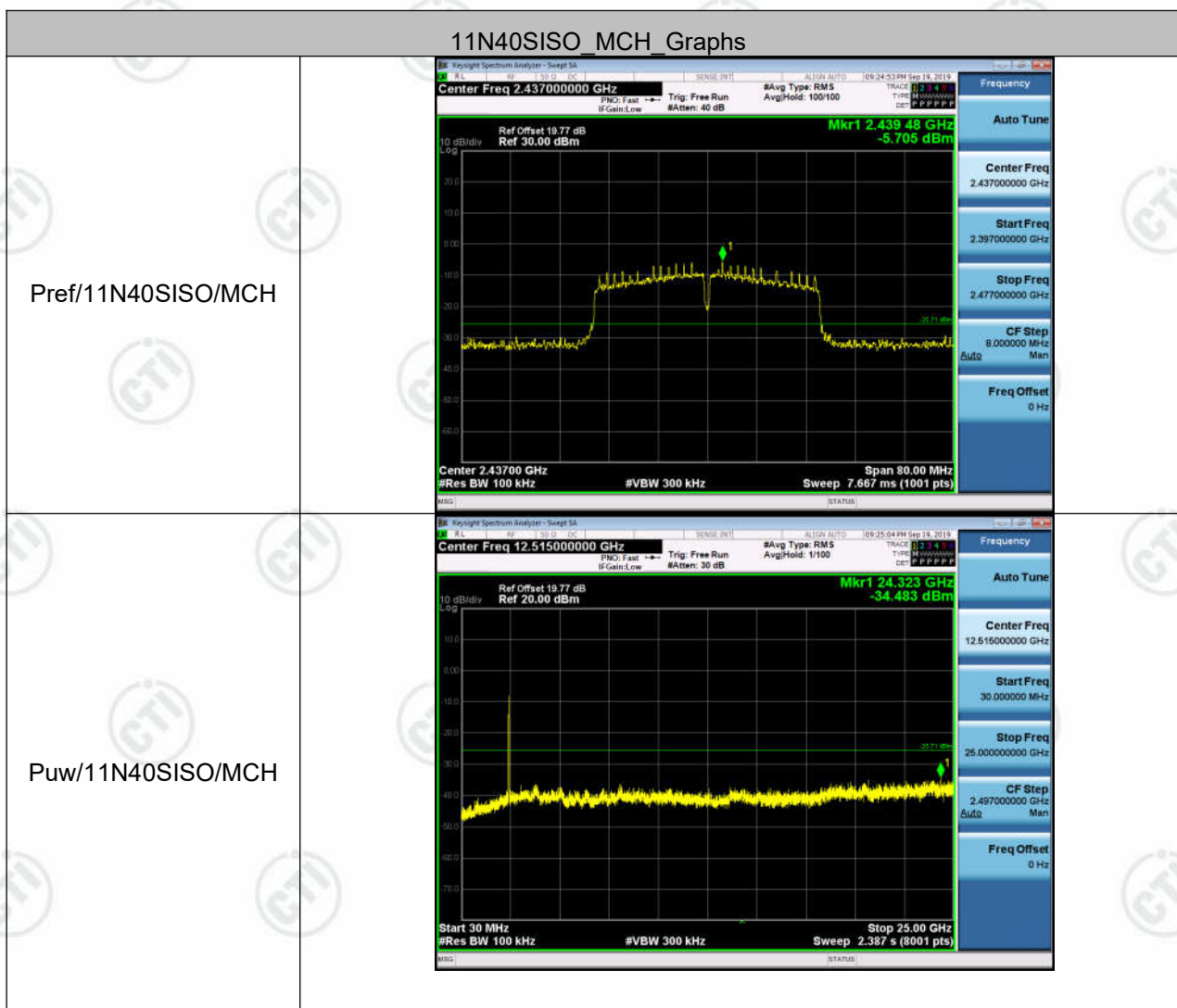


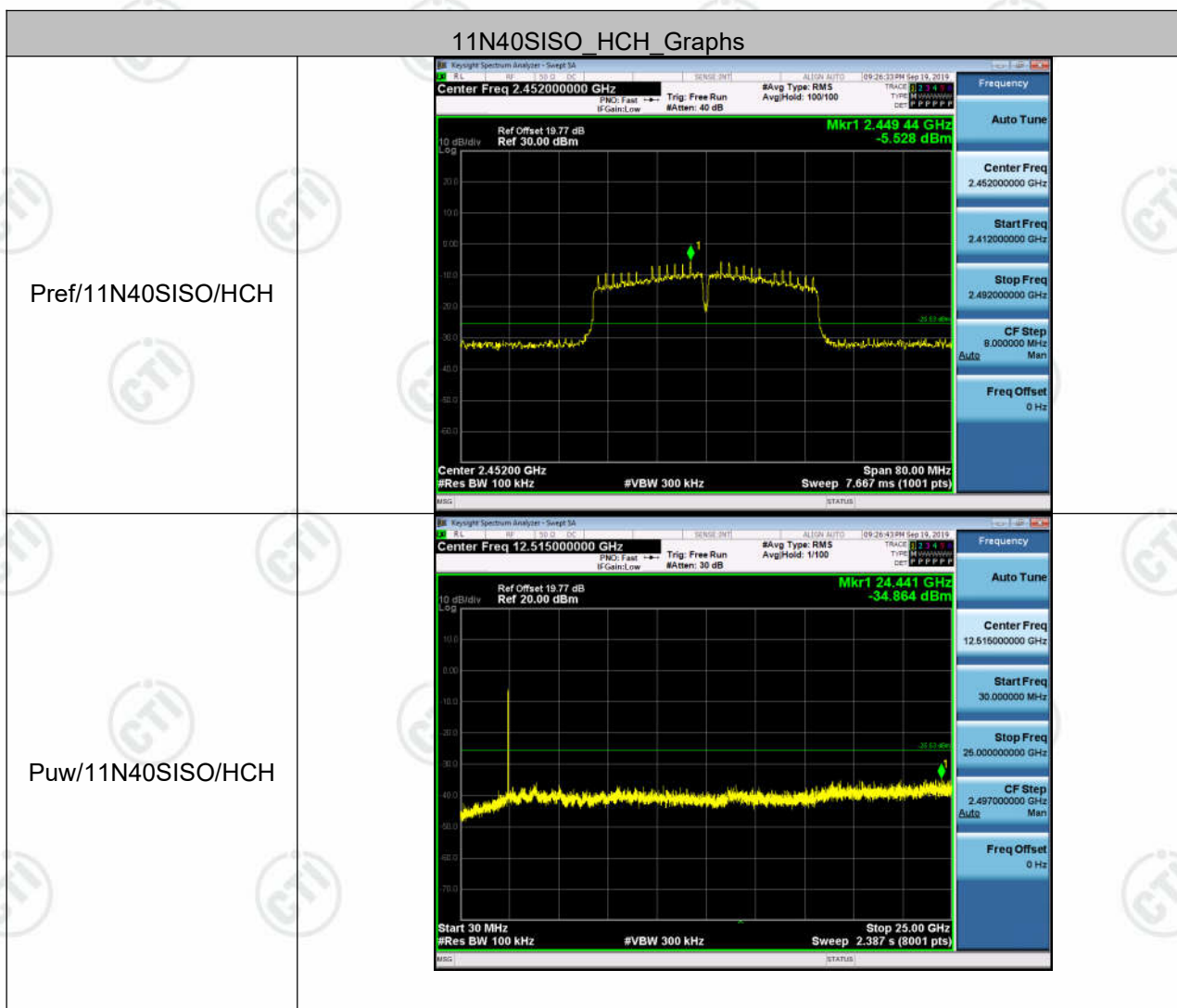












Appendix E): Power Spectral Density

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.

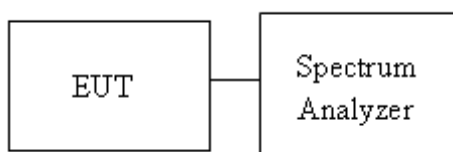
Limit	☒ Antenna not exceed 6 dBi : 8dBm ☐ Antenna with DG greater than 6 dBi : [Limit = 8 – (DG – 6)] ☐ Point-to-point operation :
-------	---

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/3KHz]	Verdict
11B	LCH	-8.568	PASS
11B	MCH	-11.017	PASS
11B	HCH	-11.135	PASS
11G	LCH	-16.719	PASS
11G	MCH	-16.072	PASS
11G	HCH	-16.361	PASS
11N20SISO	LCH	-16.523	PASS
11N20SISO	MCH	-16.833	PASS
11N20SISO	HCH	-17.002	PASS
11N40SISO	LCH	-21.391	PASS
11N40SISO	MCH	-21.744	PASS
11N40SISO	HCH	-22.294	PASS

Test Graph

