

TEST REPORT

Product : WIFI Module
Trade mark : GSD
Model/Type reference : W5LM2001
Serial Number : N/A
Report Number : EED32L00320701
FCC ID : 2AC23-W5L
Date of Issue : Dec. 06, 2019
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

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Prepared by:

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Date:

Dec. 06, 2019

Check No.: 3096383329



2 Version

Version No.	Date	Description
00	Dec. 06, 2019	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	ANSI C63.10-2013	ANSI C63.10-2013	PASS

Remark:

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

The tested sample(s) and the sample information are provided by the client.

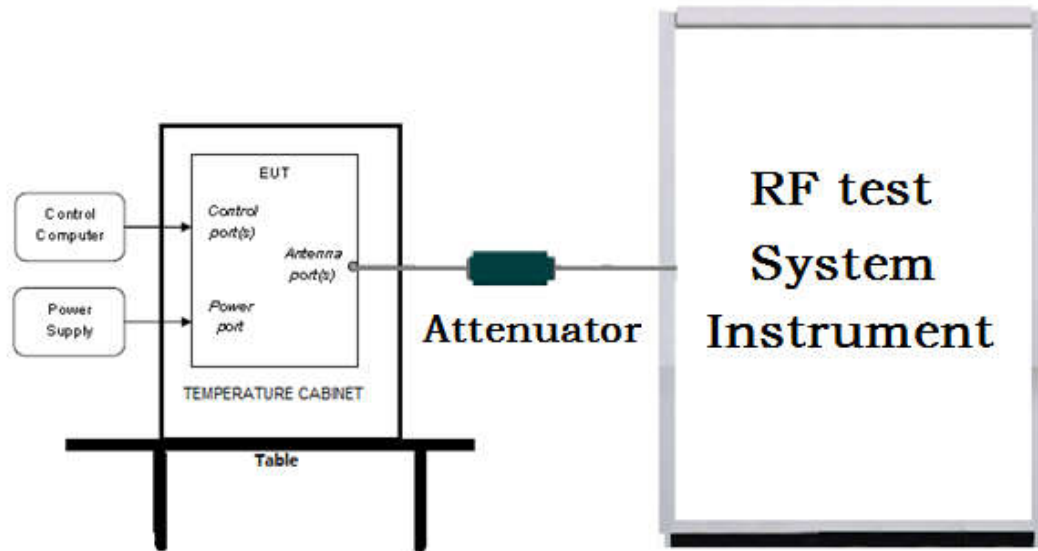
4 Content

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	9
6.4 DESCRIPTION OF SUPPORT UNITS	10
6.5 TEST LOCATION	10
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
EUT DUTY CYCLE	16
Appendix A): Conducted Peak Output Power	18
Appendix B): 6dB Occupied Bandwidth	32
Appendix C): Band-edge for RF Conducted Emissions	50
Appendix D): RF Conducted Spurious Emissions	57
Appendix E): Power Spectral Density	82
Appendix F): Antenna Requirement	95
Appendix G): AC Power Line Conducted Emission	97
Appendix H): Restricted bands around fundamental frequency (Radiated)	100
Appendix I): Radiated Spurious Emissions	181
PHOTOGRAPHS OF TEST SETUP	200
PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS	204

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:

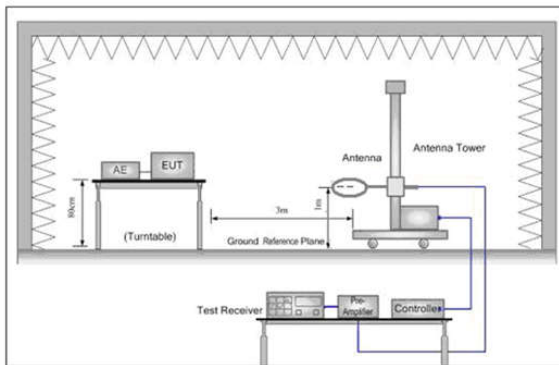


Figure 1. Below 30MHz

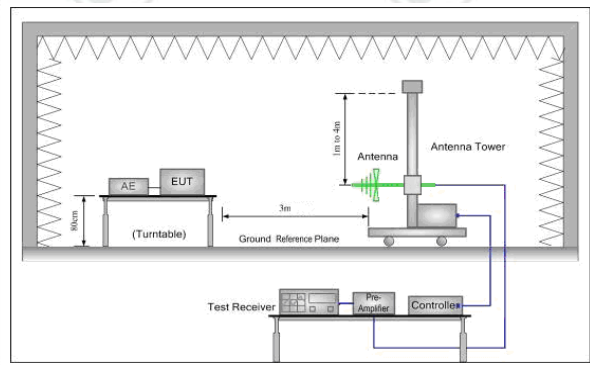


Figure 2. 30MHz to 1GHz

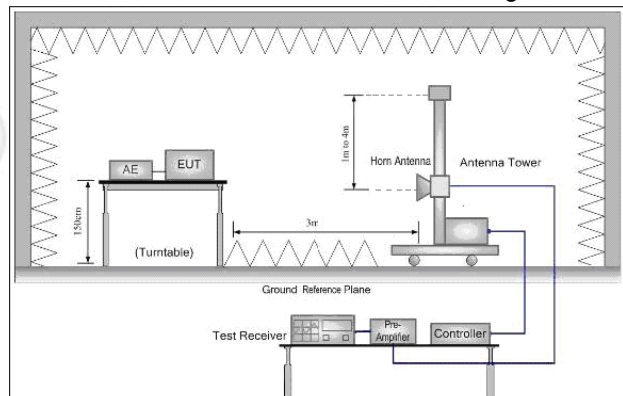
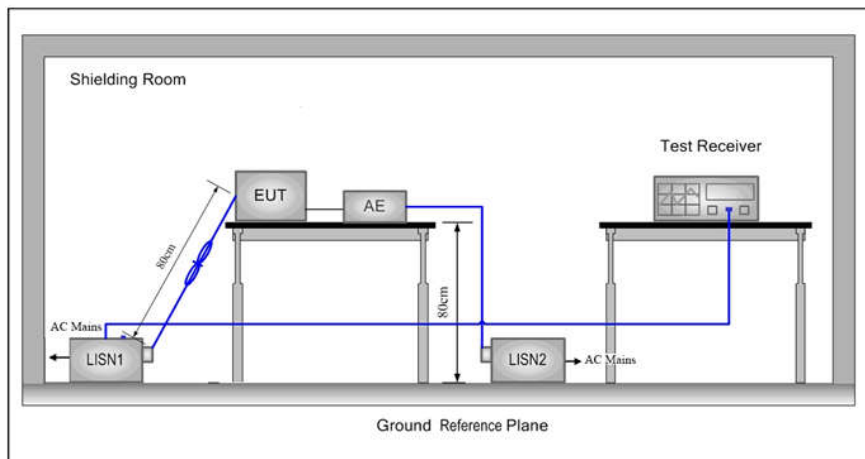


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	24.0 °C
Humidity:	55 % 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 3	Channel 6	Channel9
		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)	19.93	19.96	20.04	21.10				
Mode	802.11g							
Data Rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Power(dBm)	25.63	25.59	25.52	25.48	25.45	25.41	25.37	25.32
Mode	802.11n (HT20)							
Data Rate	6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps
Power(dBm)	23.71	23.68	23.64	23.62	23.58	23.56	23.53	23.47
Mode	802.11n (HT40)							
Data Rate	13.5Mbps	27Mbps	40.5Mbps	54Mbps	81Mbps	108Mbps	121.5Mbps	135Mbps
Power(dBm)	23.95	23.91	23.85	23.81	23.75	23.72	23.68	23.63

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:	Hui Zhou Gaoshengda Technology Co., LTD
Address of Applicant:	NO.75 Zhongkai Development Area, Huizhou, Guangdong, China
Manufacturer:	Hui Zhou Gaoshengda Technology Co., LTD
Address of Manufacturer:	NO.75 Zhongkai Development Area, Huizhou, Guangdong, China
Factory:	Hui Zhou Gaoshengda Technology Co., LTD
Address of Factory:	NO.75 Zhongkai Development Area, Huizhou, Guangdong, China

6.2 General Description of EUT

Product Name:	WIFI Module
Model No.(EUT):	W5LM2001
Trade Mark:	GSD
EUT Supports Radios application:	IEEE 802.11 a/b/g/n(HT20)(HT40): 2412MHz to 2462MHz
Power Supply:	DC 3.3V
Sample Received Date:	Oct. 31, 2019
Sample tested Date:	Oct. 31, 2019 to Nov. 25, 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:	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 Table						
Test Software of EUT:	MT7688 QA 0.0.2.6						
Antenna Type and Gain:	PIFA antenna ; 2.94dBi						
Test Voltage:	DC 3.3V						
Operation Frequency each of channel(802.11b/g/n HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		
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				

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	Mode 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
Attenuator	HuaXiang	SHX370	15040701	03-01-2019	02-29-2020
Signal Generator	Keysight	N5181A	MY46240094	03-01-2019	02-29-2020
Signal Generator	Keysight	N5182B	MY53051549	03-01-2019	02-29-2020
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	07-26-2019	07-25-2020
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	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	FL5CX01CA09 CL12-0395-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX01CA08 CL12-0393-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA04 CL12-0396-002	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA03 CL12-0394-001	---	01-09-2019	01-08-2020
Communication test set	R&S	CMW500	107929	04-28-2019	04-27-2020
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	JSTS1120-2	---	03-01-2019	02-29-2020
high-low temperature test chamber	DongGuangQinZhuo	LK-80GA	QZ20150611879	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 0299.7810.5 6	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	6041.6042	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	10-21-2019	10-20-2020
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	5-21-2020
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

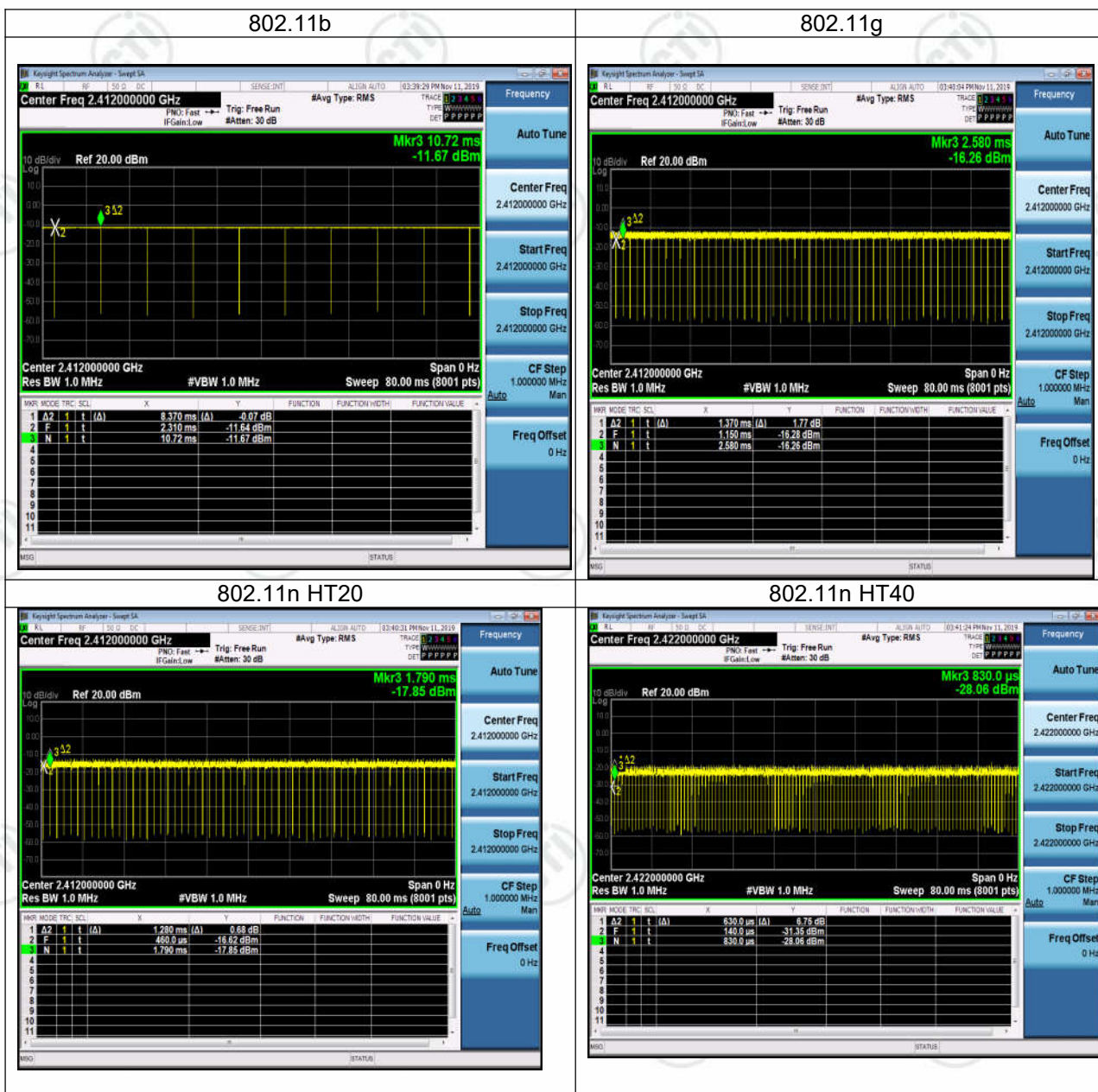
Test Results List:

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)

EUT DUTY CYCLE

ANT1

Duty Cycle			
Configuration	TX ON(ms)	TX ALL(ms)	Duty Cycle(%)
802.11b	8.370	8.41	99.5%
802.11g	1.370	1.43	95.8%
802.11n HT20	1.280	1.33	96.2%
802.11n HT40	0.63	0.69	91.3%

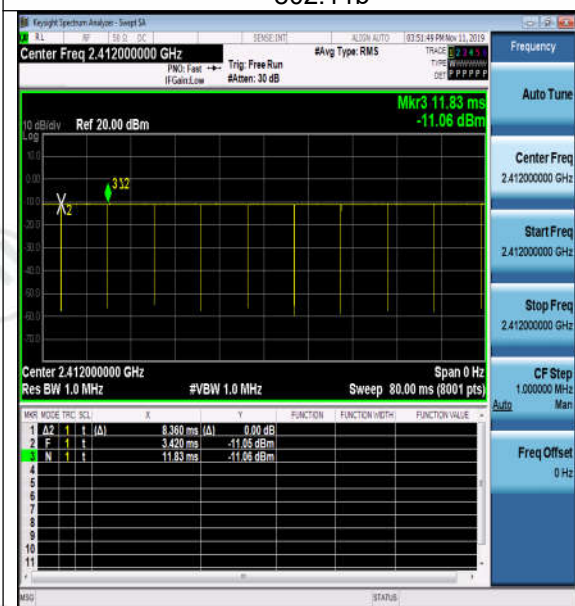


ANT2

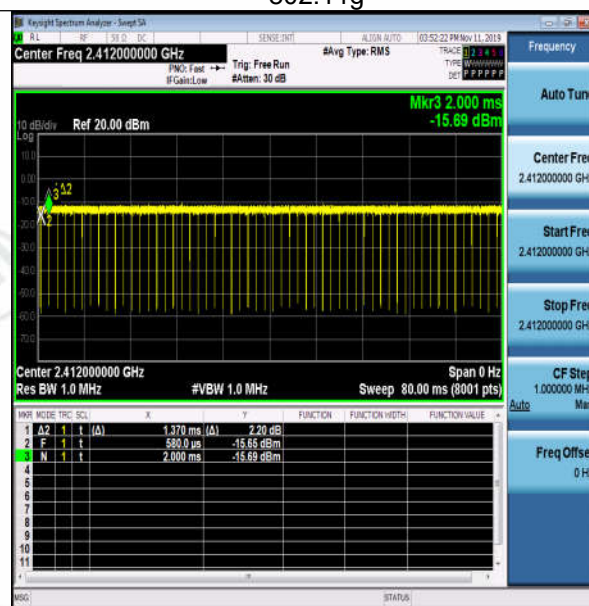
Duty Cycle

Configuration	TX ON(ms)	TX ALL(ms)	Duty Cycle(%)
802.11b	8.360	8.41	99.41%
802.11g	1.370	1.42	96.48%
802.11n HT20	1.280	1.33	96.24%
802.11n HT40	0.630	0.68	92.65%

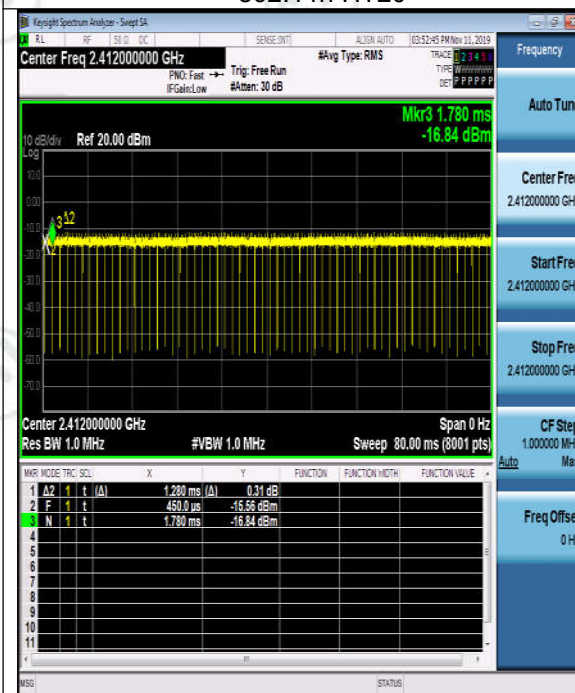
802.11b



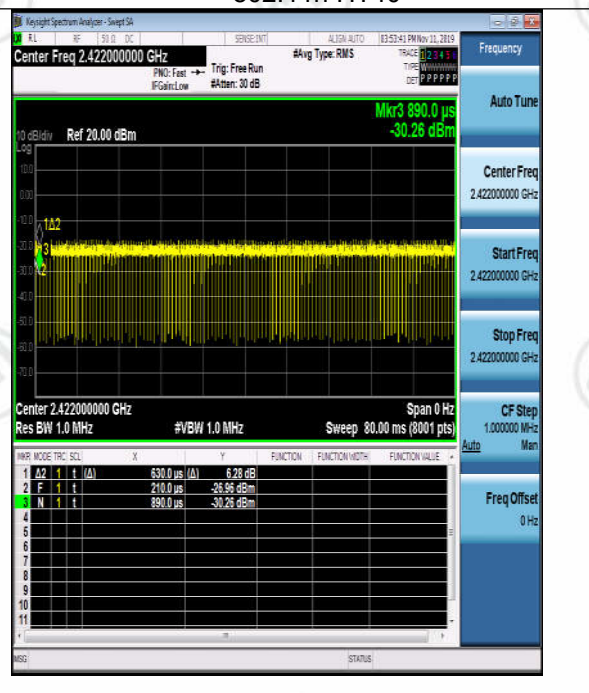
802.11g



802.11n HT20



802.11n HT40



Appendix A): Conducted Peak Output Power

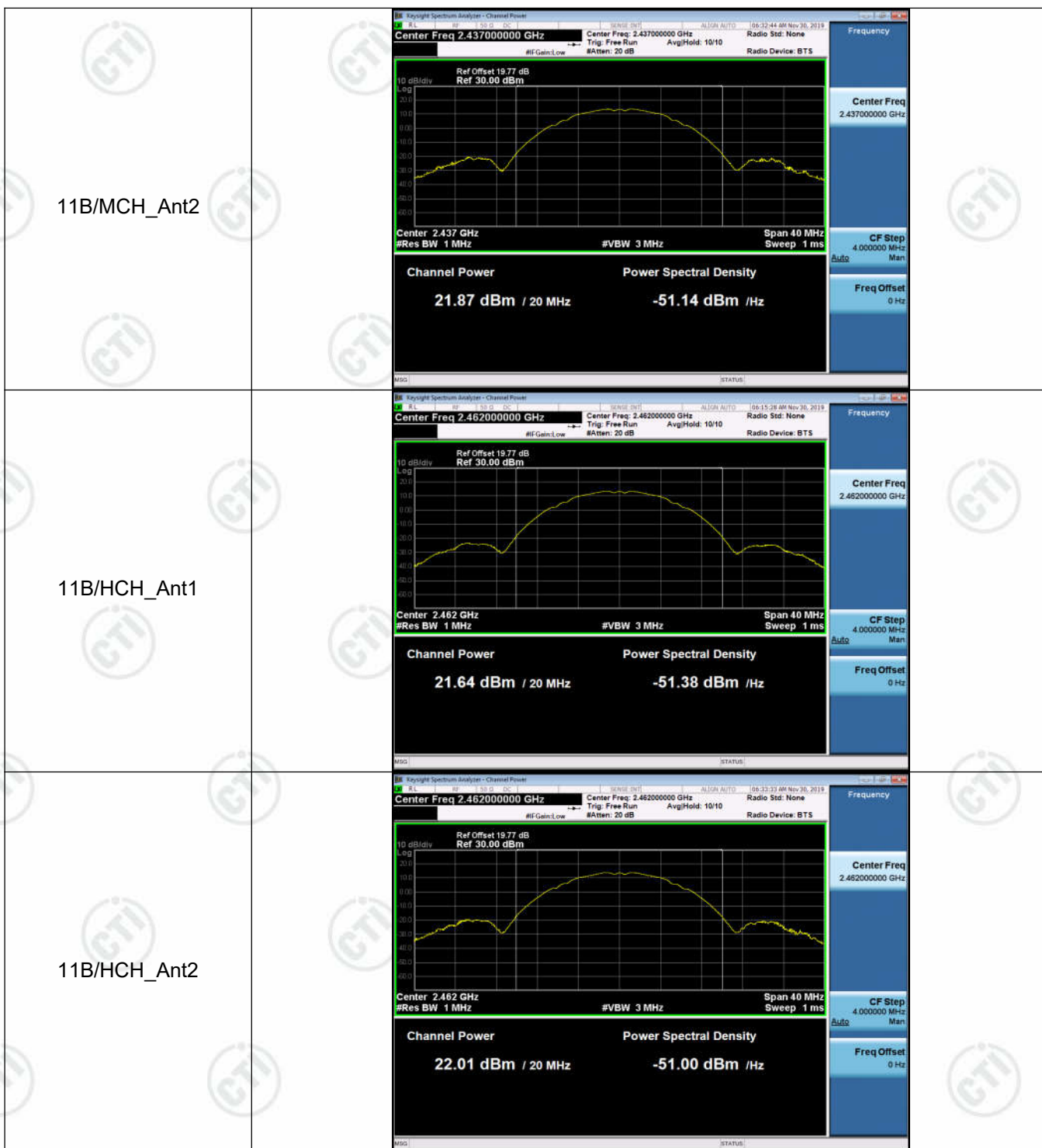
Result Table

Mode	Antenna	Channel	Conducted Peak Output Power [dBm]	Verdict
11B	Ant1	LCH	21.1	PASS
11B	Ant2	LCH	21.44	PASS
11B	Ant1	MCH	22.21	PASS
11B	Ant2	MCH	21.87	PASS
11B	Ant1	HCH	21.64	PASS
11B	Ant2	HCH	22.01	PASS
11G	Ant1	LCH	25.63	PASS
11G	Ant2	LCH	25.75	PASS
11G	Ant1	MCH	26.02	PASS
11G	Ant2	MCH	26.16	PASS
11G	Ant1	HCH	25.52	PASS
11G	Ant2	HCH	26.18	PASS
11N20SISO	Ant1	LCH	23.71	PASS
11N20SISO	Ant2	LCH	24.73	PASS
11N20SISO	Ant1	MCH	24.6	PASS
11N20SISO	Ant2	MCH	25.39	PASS
11N20SISO	Ant1	HCH	24.62	PASS
11N20SISO	Ant2	HCH	25.35	PASS
11N20MIMO	Ant1	LCH	20.02	PASS
11N20MIMO	Ant2	LCH	22.29	PASS
11N20MIMO	Ant1+2	LCH	24.31	PASS
11N20MIMO	Ant1	MCH	21.06	PASS
11N20MIMO	Ant2	MCH	22.95	PASS
11N20MIMO	Ant1+2	MCH	25.12	PASS
11N20MIMO	Ant1	HCH	21.04	PASS
11N20MIMO	Ant2	HCH	22.52	PASS
11N20MIMO	Ant1+2	HCH	24.85	PASS
11N40SISO	Ant1	LCH	23.95	PASS
11N40SISO	Ant2	LCH	24.13	PASS
11N40SISO	Ant1	MCH	23.84	PASS
11N40SISO	Ant2	MCH	24.19	PASS
11N40SISO	Ant1	HCH	24.02	PASS

11N40SISO	Ant2	HCH	24.14	PASS
11N40MIMO	Ant1	LCH	20.5	PASS
11N40MIMO	Ant2	LCH	22.13	PASS
11N40MIMO	Ant1+2	LCH	24.40	PASS
11N40MIMO	Ant1	MCH	20.31	PASS
11N40MIMO	Ant2	MCH	22.11	PASS
11N40MIMO	Ant1+2	MCH	24.31	PASS
11N40MIMO	Ant1	HCH	20.4	PASS
11N40MIMO	Ant2	HCH	22.12	PASS
11N40MIMO	Ant1+2	HCH	24.35	PASS

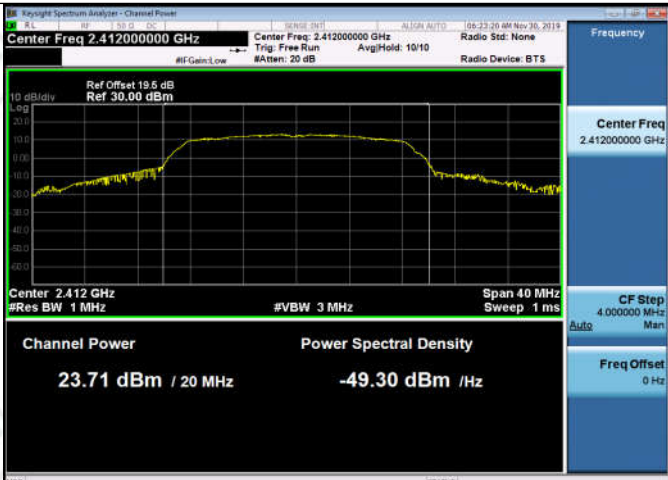
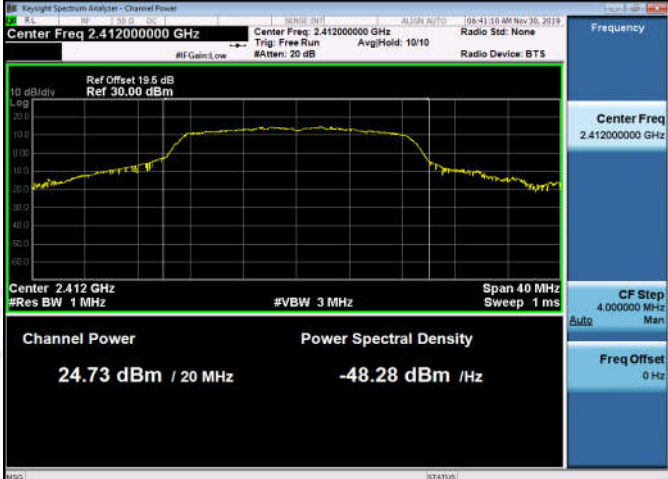
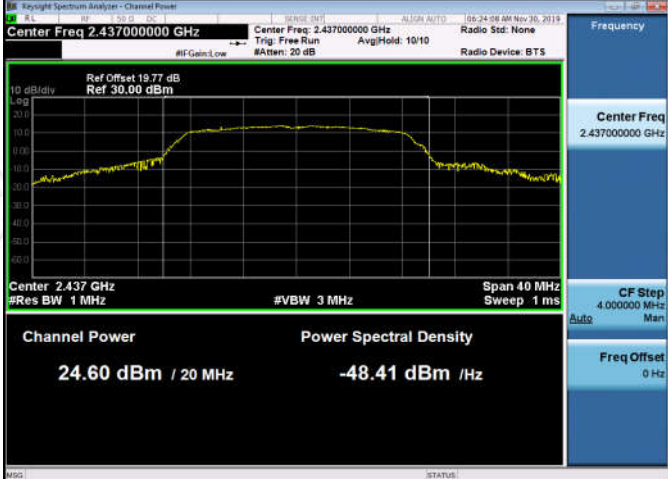
Test Graph

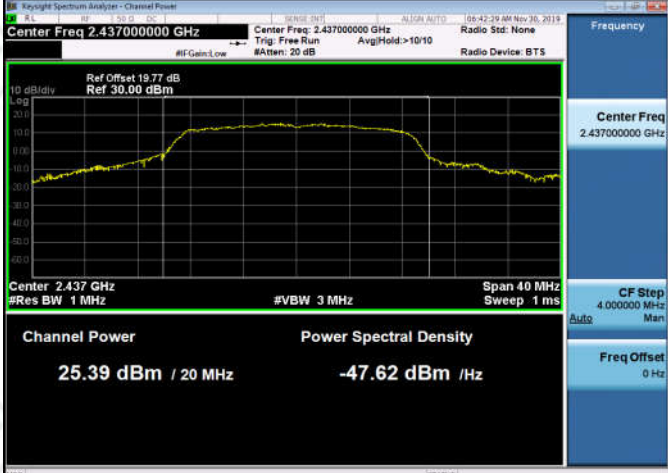
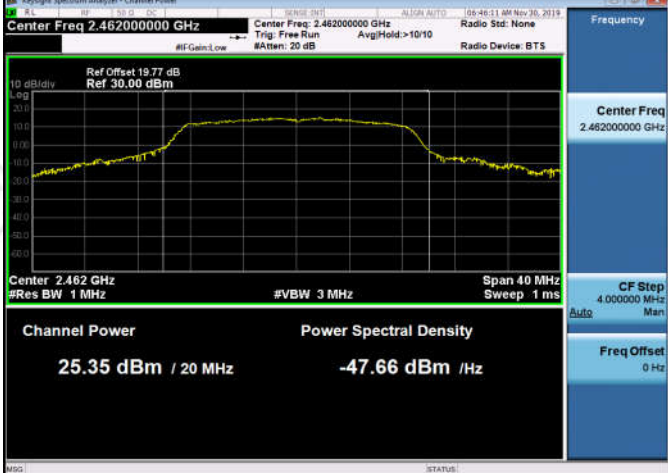


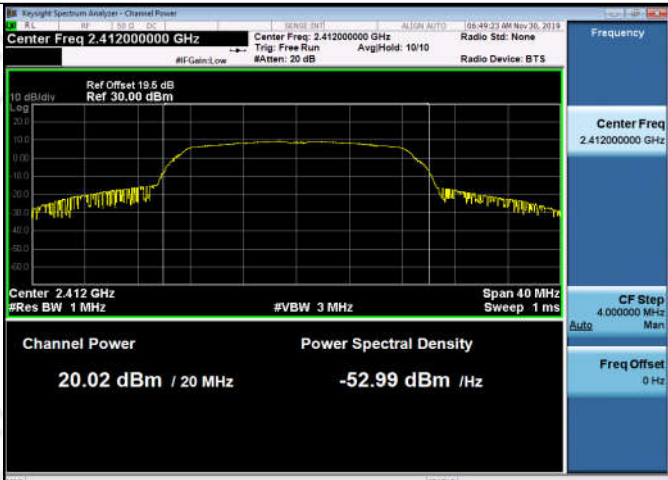
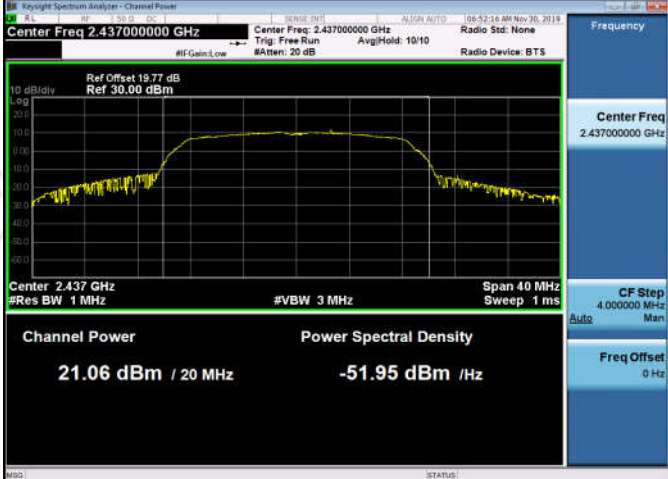


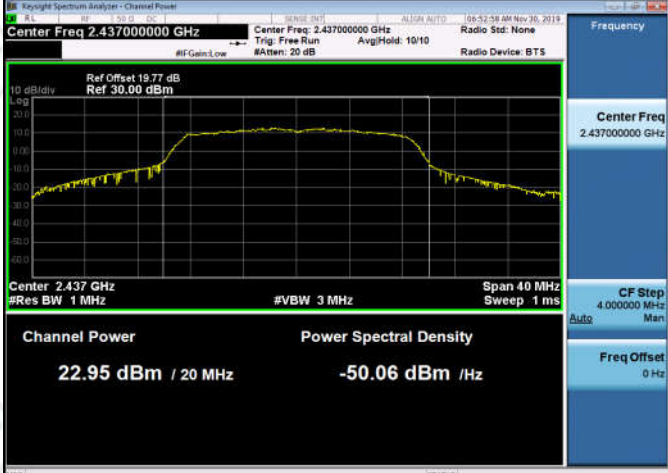
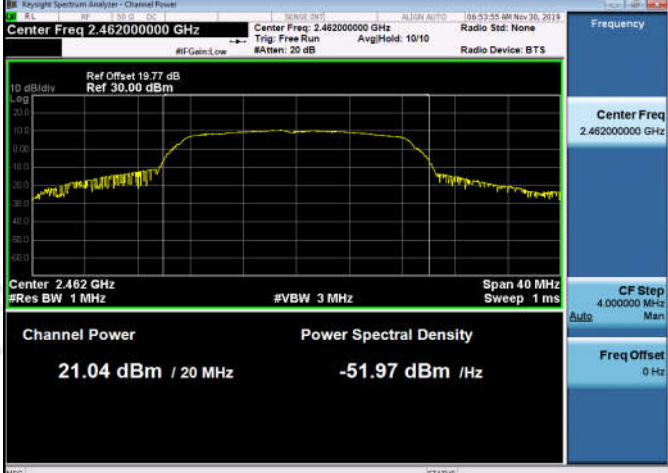
11G/LCH_Ant1	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.412000000 GHz Ref Offset 19.6 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 25.63 dBm / 20 MHz Power Spectral Density -47.38 dBm / Hz Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11G/LCH_Ant2	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.412000000 GHz Ref Offset 19.6 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 25.75 dBm / 20 MHz Power Spectral Density -47.26 dBm / Hz Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11G/MCH_Ant1	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 26.02 dBm / 20 MHz Power Spectral Density -46.99 dBm / Hz Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz

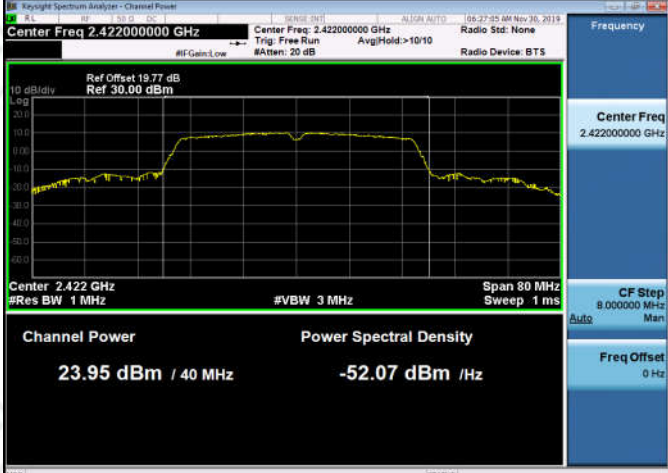
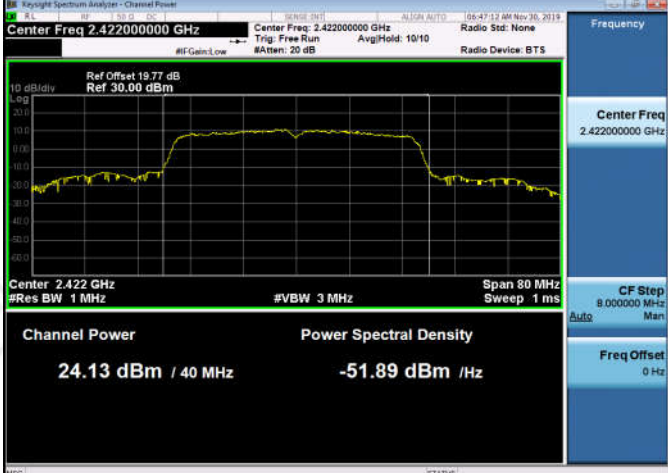
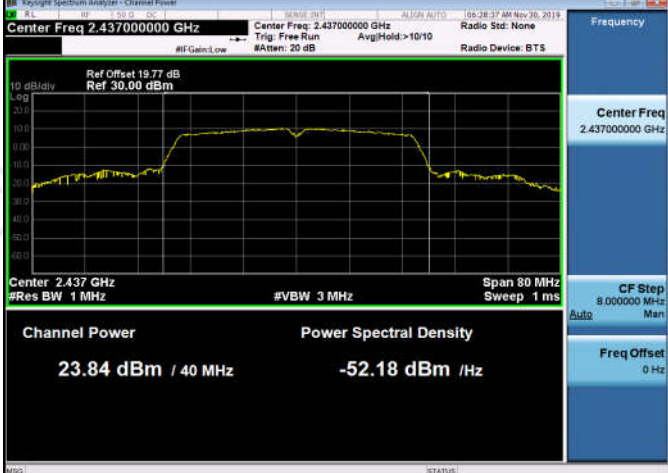
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11G/HCH_Ant1	
11G/HCH_Ant2	

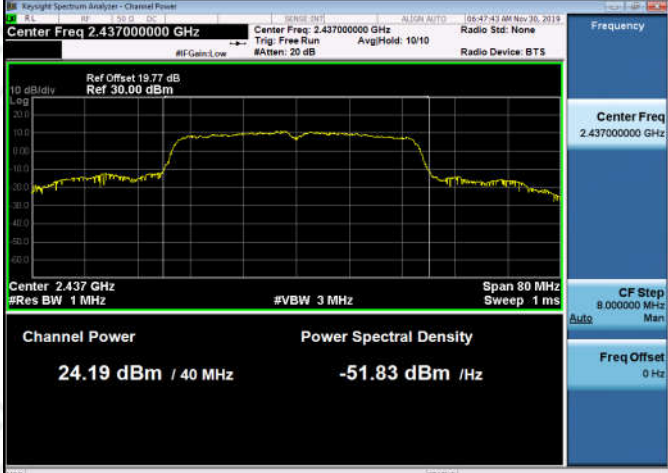
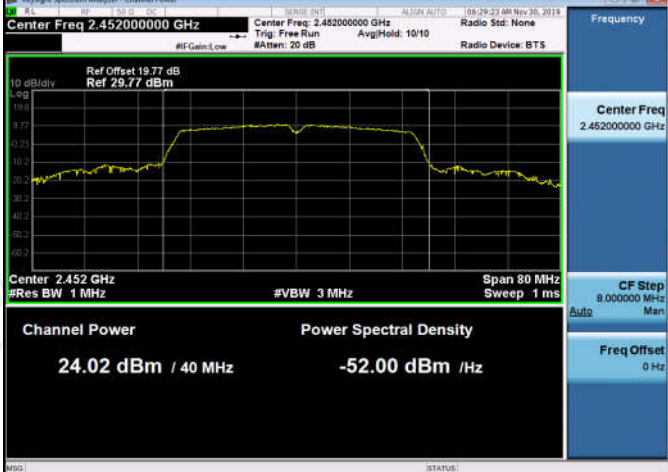
11N20SISO/LCH_Ant1	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.412000000 GHz Ref Offset 19.6 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 23.71 dBm / 20 MHz Power Spectral Density -49.30 dBm / Hz Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11N20SISO/LCH_Ant2	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.412000000 GHz Ref Offset 19.6 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 24.73 dBm / 20 MHz Power Spectral Density -48.28 dBm / Hz Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11N20SISO/MCH_Ant1	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 24.60 dBm / 20 MHz Power Spectral Density -48.41 dBm / Hz Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz

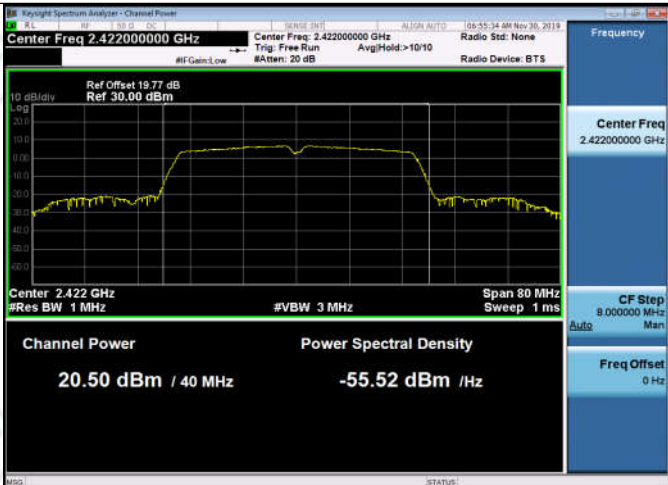
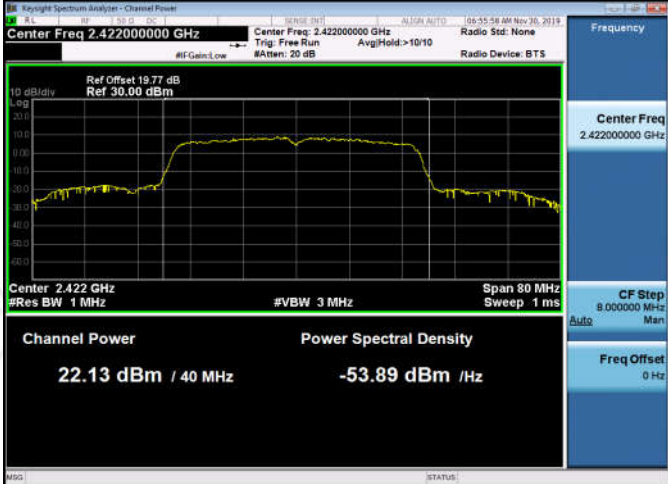
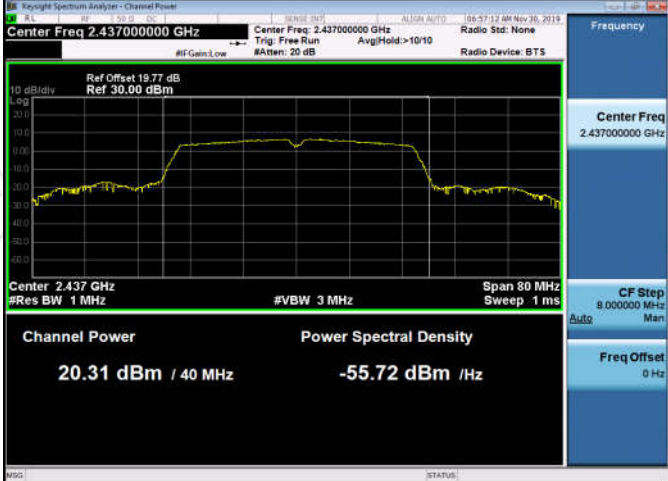
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11N20SISO/HCH_Ant1	
11N20SISO/HCH_Ant2	

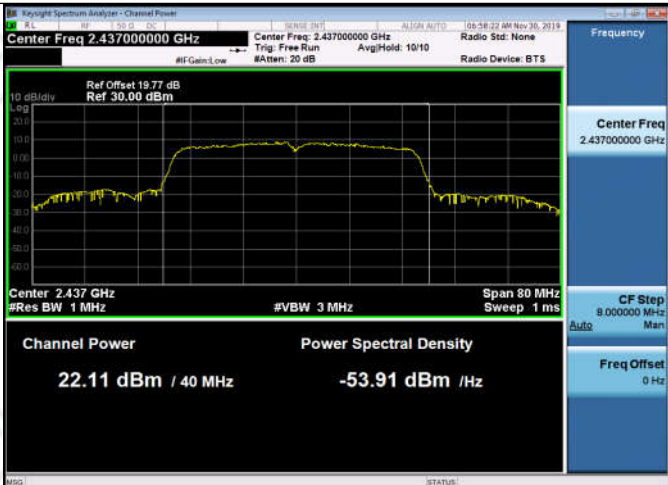
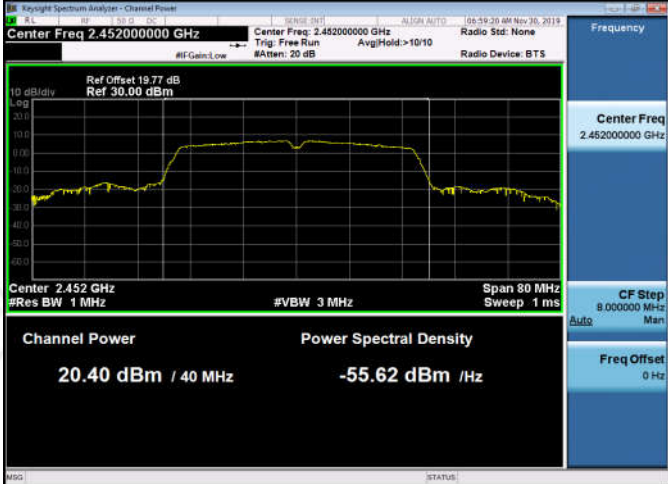
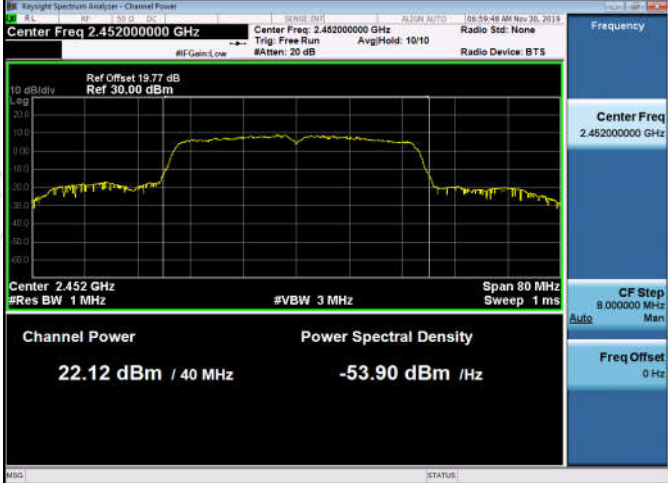
11N20MIMO/LCH_Ant1	 Keyight Spectrum Analyzer - Channel Power Center Freq 2.412000000 GHz Ref Offset 19.6 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 20.02 dBm / 20 MHz Power Spectral Density -52.99 dBm /Hz Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11N20MIMO/LCH_Ant2	 Keyight Spectrum Analyzer - Channel Power Center Freq 2.412000000 GHz Ref Offset 19.6 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 22.29 dBm / 20 MHz Power Spectral Density -50.72 dBm /Hz Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11N20MIMO/MCH_Ant1	 Keyight Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 21.06 dBm / 20 MHz Power Spectral Density -51.95 dBm /Hz Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz

11N20MIMO/MCH_Ant2	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 22.95 dBm / 20 MHz Power Spectral Density -50.06 dBm / Hz
11N20MIMO/HCH_Ant1	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.462 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 21.04 dBm / 20 MHz Power Spectral Density -51.97 dBm / Hz
11N20MIMO/HCH_Ant2	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.462 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 22.52 dBm / 20 MHz Power Spectral Density -50.49 dBm / Hz

11N40SISO/LCH_Ant1	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.422000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.422 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Channel Power 23.95 dBm / 40 MHz Power Spectral Density -52.07 dBm / Hz Frequency Center Freq 2.422000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/LCH_Ant2	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.422000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.422 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Channel Power 24.13 dBm / 40 MHz Power Spectral Density -51.89 dBm / Hz Frequency Center Freq 2.422000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/MCH_Ant1	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Channel Power 23.84 dBm / 40 MHz Power Spectral Density -52.18 dBm / Hz Frequency Center Freq 2.437000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz

11N40SISO/MCH_Ant2	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Channel Power 24.19 dBm / 40 MHz Power Spectral Density -51.83 dBm / Hz Frequency Center Freq 2.437000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/HCH_Ant1	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.452000000 GHz Ref Offset 19.77 dB Ref 29.77 dBm Center 2.452 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Channel Power 24.02 dBm / 40 MHz Power Spectral Density -52.00 dBm / Hz Frequency Center Freq 2.452000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/HCH_Ant2	 Keynote Spectrum Analyzer - Channel Power Center Freq 2.452000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.452 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Channel Power 24.14 dBm / 40 MHz Power Spectral Density -51.88 dBm / Hz Frequency Center Freq 2.452000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz

11N40MIMO/LCH_Ant1	
11N40MIMO/LCH_Ant2	
11N40MIMO/MCH_Ant1	

11N40MIMO/MCH_Ant2	
11N40MIMO/HCH_Ant1	
11N40MIMO/HCH_Ant2	

Appendix B): 6dB Occupied Bandwidth

Result Table For 6dB Occupied Bandwidth

Mode	Antenna	Channel	6dB Bandwidth [MHz]	Verdict
11B	Ant1	LCH	9.077	PASS
11B	Ant2	LCH	9.079	PASS
11B	Ant1	MCH	9.076	PASS
11B	Ant2	MCH	9.076	PASS
11B	Ant1	HCH	9.084	PASS
11B	Ant2	HCH	9.083	PASS
11G	Ant1	LCH	15.12	PASS
11G	Ant2	LCH	15.07	PASS
11G	Ant1	MCH	15.09	PASS
11G	Ant2	MCH	15.12	PASS
11G	Ant1	HCH	15.08	PASS
11G	Ant2	HCH	15.10	PASS
11N20SISO	Ant1	LCH	15.12	PASS
11N20SISO	Ant2	LCH	15.13	PASS
11N20SISO	Ant1	MCH	15.12	PASS
11N20SISO	Ant2	MCH	15.12	PASS
11N20SISO	Ant1	HCH	15.06	PASS
11N20SISO	Ant2	HCH	15.13	PASS
11N40SISO	Ant1	LCH	35.13	PASS
11N40SISO	Ant2	LCH	35.13	PASS
11N40SISO	Ant1	MCH	35.09	PASS
11N40SISO	Ant2	MCH	35.12	PASS
11N40SISO	Ant1	HCH	35.13	PASS
11N40SISO	Ant2	HCH	35.11	PASS

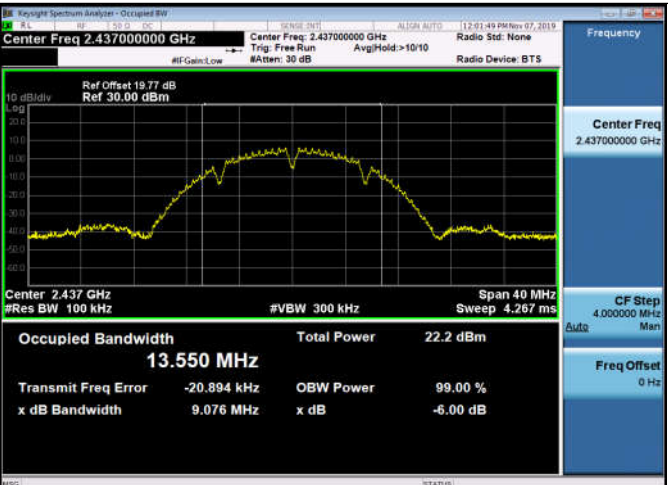
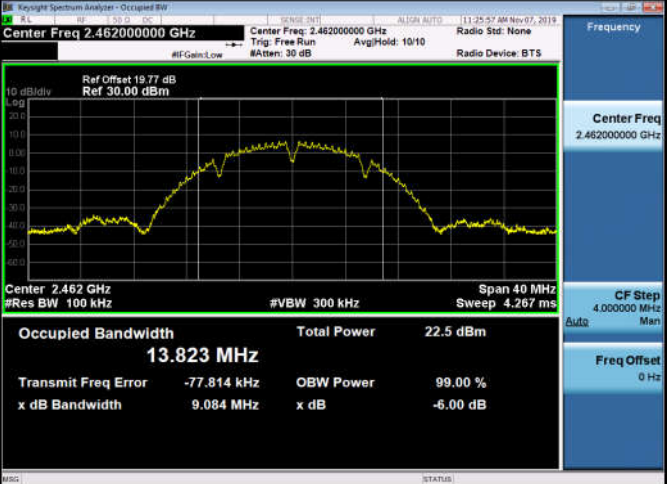
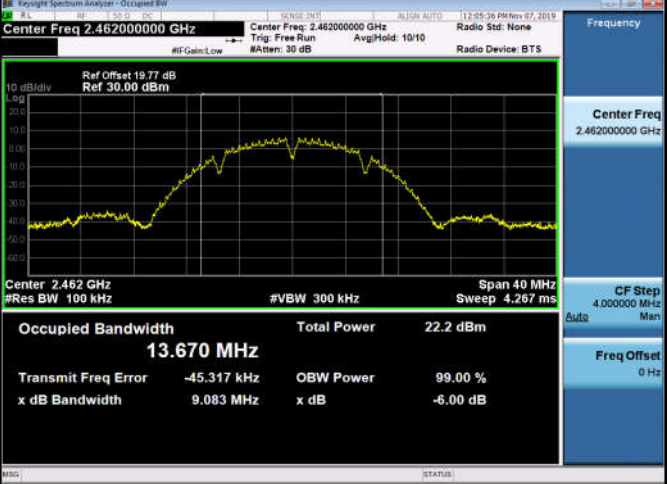
Result Table For 99% Occupied Bandwidth

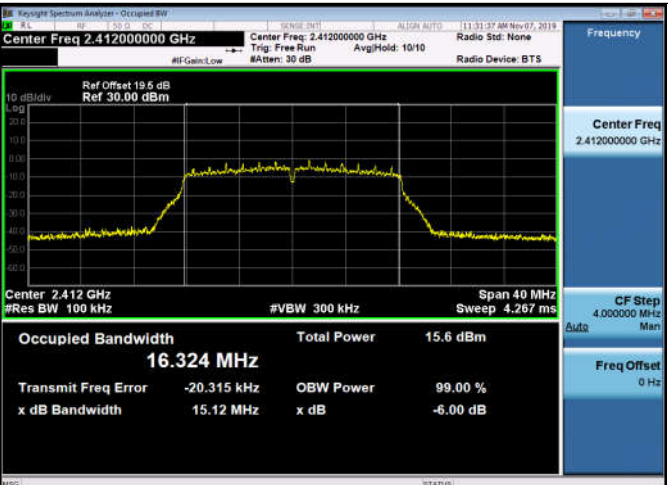
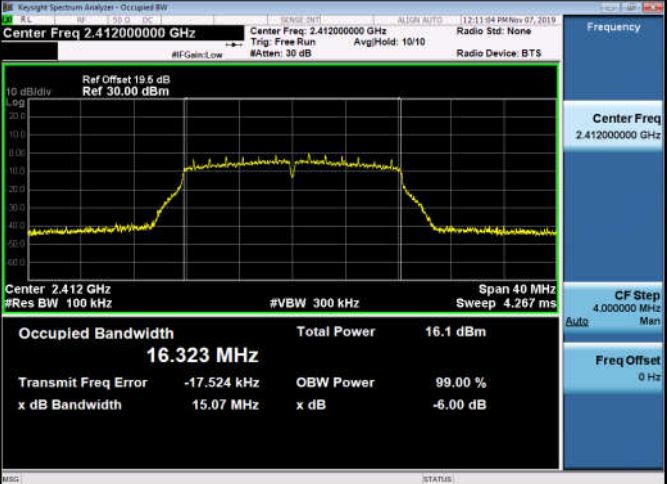
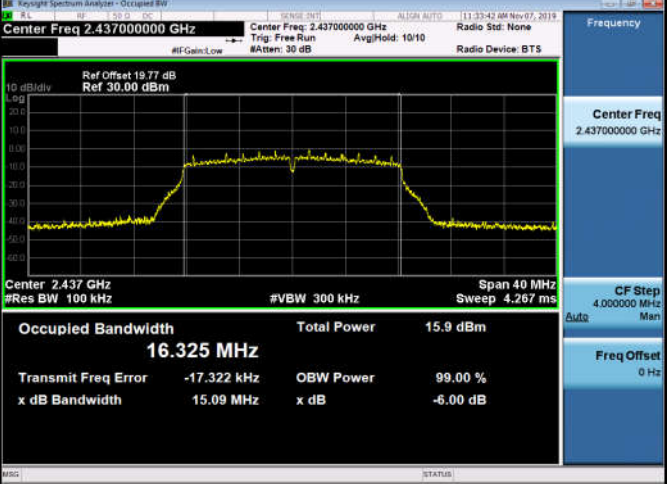
Mode	Antenna	Channel	99%OBW[MHz]	Verdict
11B	Ant1	LCH	13.622	PASS
11B	Ant2	LCH	13.606	PASS
11B	Ant1	MCH	13.640	PASS
11B	Ant2	MCH	13.717	PASS
11B	Ant1	HCH	13.823	PASS
11B	Ant2	HCH	13.775	PASS
11G	Ant1	LCH	16.433	PASS
11G	Ant2	LCH	16.475	PASS
11G	Ant1	MCH	16.455	PASS
11G	Ant2	MCH	16.475	PASS
11G	Ant1	HCH	16.514	PASS
11G	Ant2	HCH	16.461	PASS
11N20SISO	Ant1	LCH	17.549	PASS
11N20SISO	Ant2	LCH	17.566	PASS
11N20SISO	Ant1	MCH	17.556	PASS
11N20SISO	Ant2	MCH	17.577	PASS
11N20SISO	Ant1	HCH	17.604	PASS
11N20SISO	Ant2	HCH	17.570	PASS
11N40SISO	Ant1	LCH	36.153	PASS

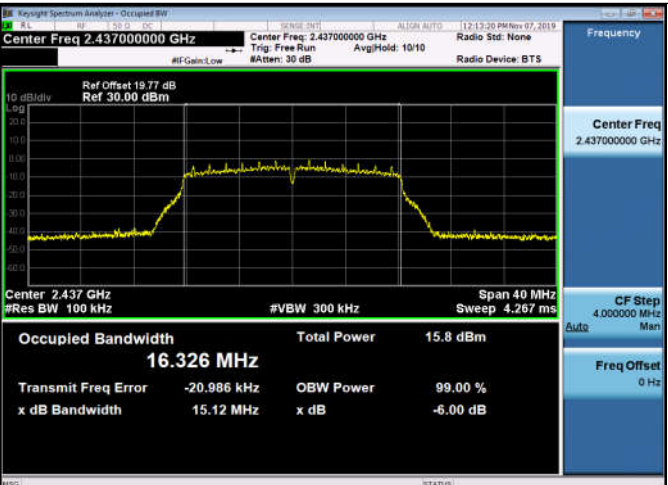
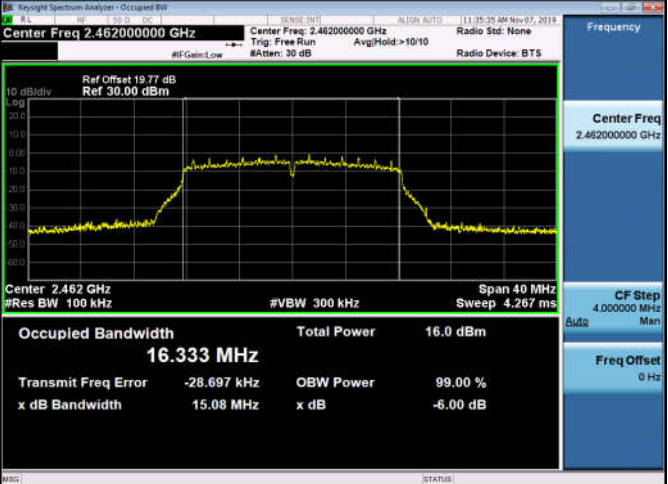
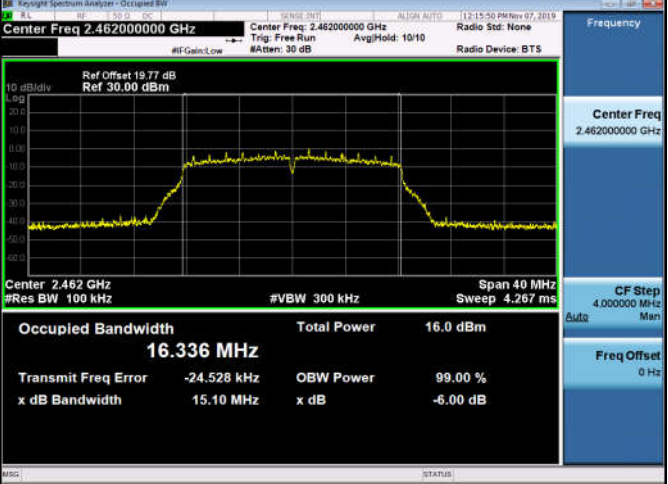
11N40SISO	Ant2	LCH	36.124	PASS
11N40SISO	Ant1	MCH	36.106	PASS
11N40SISO	Ant2	MCH	36.151	PASS
11N40SISO	Ant1	HCH	36.120	PASS
11N40SISO	Ant2	HCH	36.143	PASS

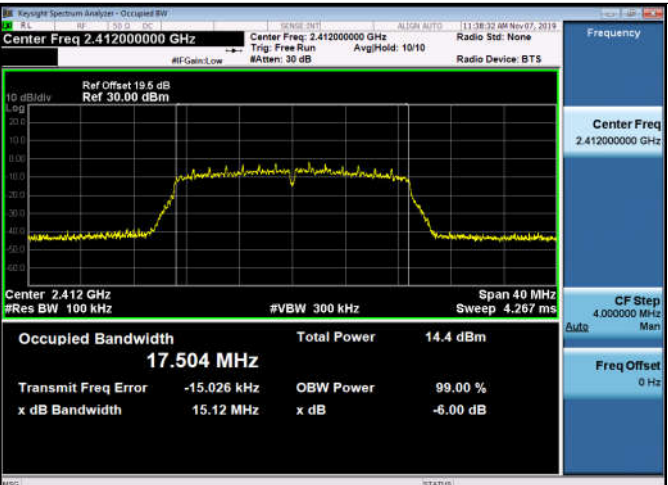
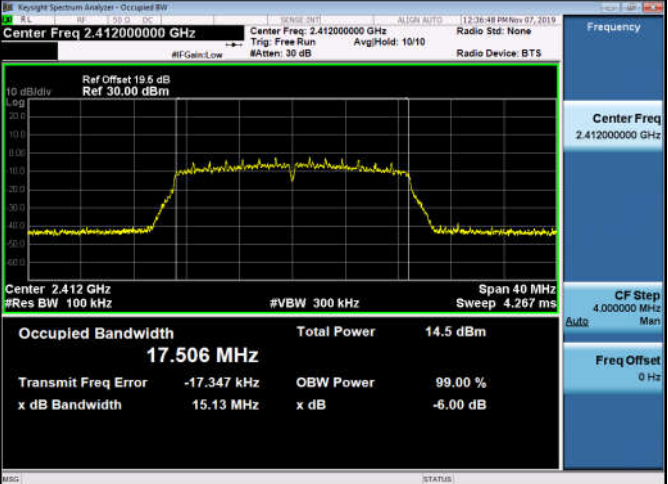
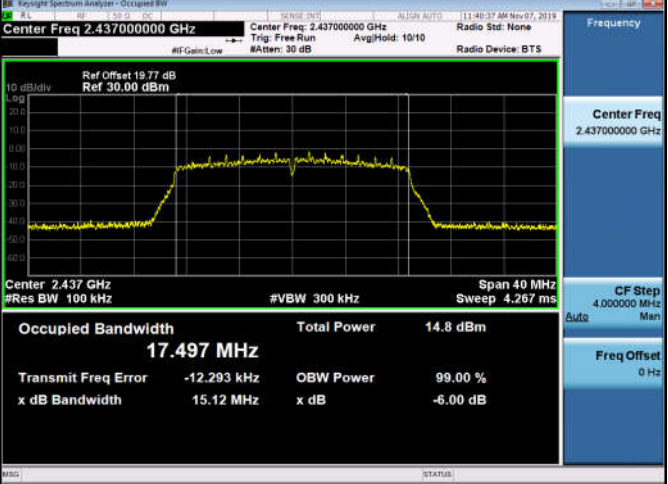
Test Graph For 6dB Occupied Bandwidth

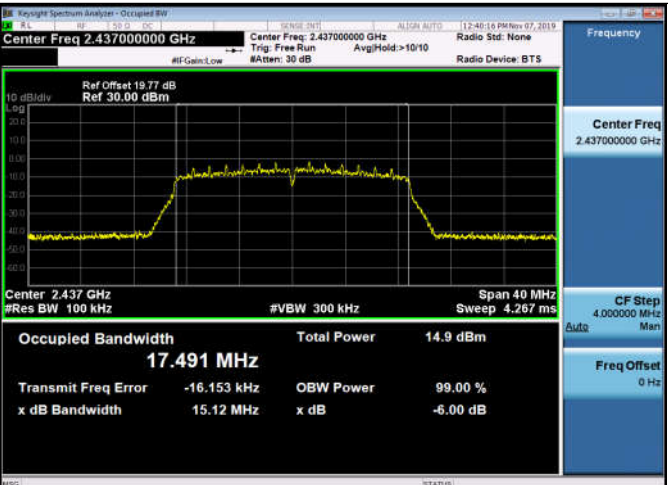
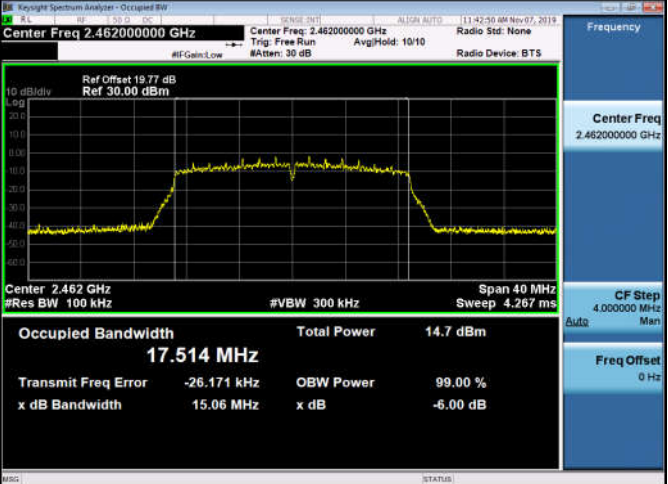
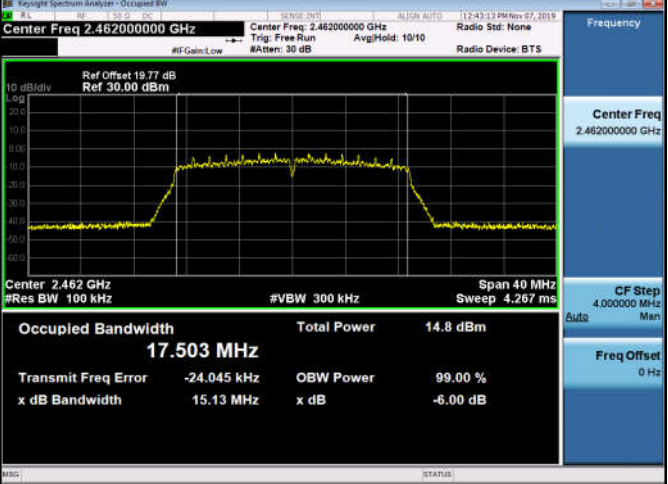


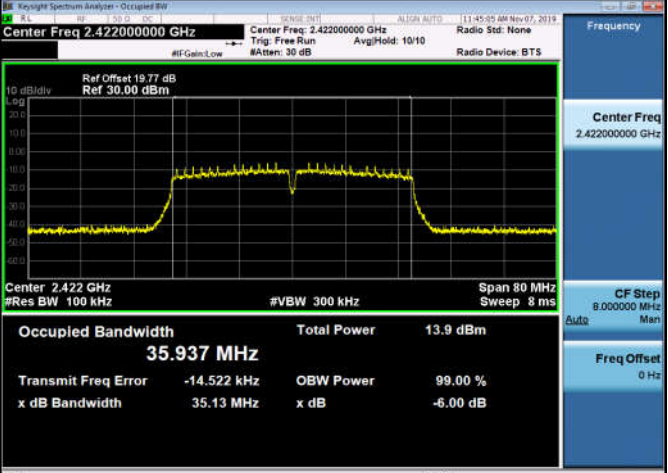
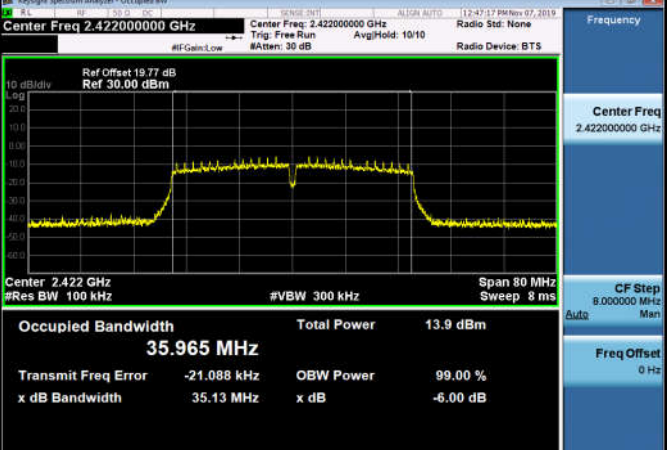
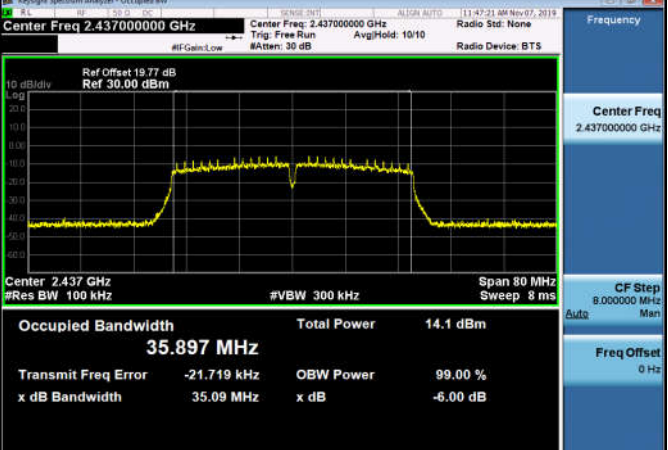
11B/MCH_Ant2	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 100 kHz Occupied Bandwidth 13.550 MHz Total Power 22.2 dBm Transmit Freq Error -20.894 kHz OBW Power 99.00 % x dB Bandwidth 9.076 MHz x dB -6.00 dB
11B/HCH_Ant1	 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 13.823 MHz Total Power 22.5 dBm Transmit Freq Error -77.814 kHz OBW Power 99.00 % x dB Bandwidth 9.084 MHz x dB -6.00 dB
11B/HCH_Ant2	 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 13.670 MHz Total Power 22.2 dBm Transmit Freq Error -45.317 kHz OBW Power 99.00 % x dB Bandwidth 9.083 MHz x dB -6.00 dB

11G/LCH_Ant1	 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 Sweep 4.267 ms Occupied Bandwidth 16.324 MHz Total Power 15.6 dBm Transmit Freq Error -20.315 kHz OBW Power 99.00 % x dB Bandwidth 15.12 MHz x dB -6.00 dB
11G/LCH_Ant2	 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 Sweep 4.267 ms Occupied Bandwidth 16.323 MHz Total Power 16.1 dBm Transmit Freq Error -17.524 kHz OBW Power 99.00 % x dB Bandwidth 15.07 MHz x dB -6.00 dB
11G/MCH_Ant1	 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 Sweep 4.267 ms Occupied Bandwidth 16.325 MHz Total Power 15.9 dBm Transmit Freq Error -17.322 kHz OBW Power 99.00 % x dB Bandwidth 15.09 MHz x dB -6.00 dB

11G/MCH_Ant2	 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 #VBW 300 kHz Span 40 MHz Sweep 4.267 ms Occupied Bandwidth 16.326 MHz Total Power 15.8 dBm Transmit Freq Error -20.986 kHz OBW Power 99.00 % x dB Bandwidth 15.12 MHz x dB -6.00 dB Frequency: Center Freq 2.437000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11G/HCH_Ant1	 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 #VBW 300 kHz Span 40 MHz Sweep 4.267 ms Occupied Bandwidth 16.333 MHz Total Power 16.0 dBm Transmit Freq Error -28.697 kHz OBW Power 99.00 % x dB Bandwidth 15.08 MHz x dB -6.00 dB Frequency: Center Freq 2.462000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11G/HCH_Ant2	 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 #VBW 300 kHz Span 40 MHz Sweep 4.267 ms Occupied Bandwidth 16.336 MHz Total Power 16.0 dBm Transmit Freq Error -24.528 kHz OBW Power 99.00 % x dB Bandwidth 15.10 MHz x dB -6.00 dB Frequency: Center Freq 2.462000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz

11N20SISO/LCH_Ant1	 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 Sweep 4.267 ms Occupied Bandwidth 17.504 MHz Total Power 14.4 dBm Transmit Freq Error -15.026 kHz OBW Power 99.00 % x dB Bandwidth 15.12 MHz x dB -6.00 dB
11N20SISO/LCH_Ant2	 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 Sweep 4.267 ms Occupied Bandwidth 17.506 MHz Total Power 14.5 dBm Transmit Freq Error -17.347 kHz OBW Power 99.00 % x dB Bandwidth 15.13 MHz x dB -6.00 dB
11N20SISO/MCH_Ant1	 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 Sweep 4.267 ms Occupied Bandwidth 17.497 MHz Total Power 14.8 dBm Transmit Freq Error -12.293 kHz OBW Power 99.00 % x dB Bandwidth 15.12 MHz x dB -6.00 dB

11N20SISO/MCH_Ant2	 Key Screenshot Data for 11N20SISO/MCH_Ant2: - 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: 40 MHz, Sweep: 4.267 ms - Occupied Bandwidth: 17.491 MHz - Total Power: 14.9 dBm - Transmit Freq Error: -16.153 kHz - OBW Power: 99.00 % - x dB Bandwidth: 15.12 MHz, x dB: -6.00 dB
11N20SISO/HCH_Ant1	 Key Screenshot Data for 11N20SISO/HCH_Ant1: - Center Freq: 2.462000000 GHz - Ref Offset: 19.77 dB, Ref: 30.00 dBm - Center: 2.462 GHz, #Res BW: 100 kHz, #VBW: 300 kHz, Span: 40 MHz, Sweep: 4.267 ms - Occupied Bandwidth: 17.514 MHz - Total Power: 14.7 dBm - Transmit Freq Error: -26.171 kHz - OBW Power: 99.00 % - x dB Bandwidth: 15.06 MHz, x dB: -6.00 dB
11N20SISO/HCH_Ant2	 Key Screenshot Data for 11N20SISO/HCH_Ant2: - Center Freq: 2.462000000 GHz - Ref Offset: 19.77 dB, Ref: 30.00 dBm - Center: 2.462 GHz, #Res BW: 100 kHz, #VBW: 300 kHz, Span: 40 MHz, Sweep: 4.267 ms - Occupied Bandwidth: 17.503 MHz - Total Power: 14.8 dBm - Transmit Freq Error: -24.045 kHz - OBW Power: 99.00 % - x dB Bandwidth: 15.13 MHz, x dB: -6.00 dB

11N40SISO/LCH_Ant1	 Keyight 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 Occupied Bandwidth 35.937 MHz Total Power 13.9 dBm Transmit Freq Error -14.522 kHz x dB Bandwidth 35.13 MHz OBW Power 99.00 % x dB -6.00 dB
11N40SISO/LCH_Ant2	 Keyight 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 Occupied Bandwidth 35.965 MHz Total Power 13.9 dBm Transmit Freq Error -21.088 kHz x dB Bandwidth 35.13 MHz OBW Power 99.00 % x dB -6.00 dB
11N40SISO/MCH_Ant1	 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 35.897 MHz Total Power 14.1 dBm Transmit Freq Error -21.719 kHz x dB Bandwidth 35.09 MHz OBW Power 99.00 % x dB -6.00 dB