

TEST REPORT

Product : Mini PC
Trade mark : CHUWI
Model/Type reference : HeroBox
Serial Number : N/A
Report Number : EED32M00265503
FCC ID : 2AHLZ-HEROBOX
Date of Issue : Oct. 23, 2020
Test Standards : 47 CFR Part 15Subpart C
Test result : PASS

Prepared for:

CHUWI TECHNOLOGY (ShenZhen) CO., LIMITED
2 Floor Building 3 LiJinCheng Industrial park
the east of Gongye road LongHua, Shenzhen, China

Prepared by:

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Date:

Oct. 23, 2020

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Check No: 4762139776

2 Version

Version No.	Date	Description
00	Oct. 23, 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

Remark:

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

Company Name and Address shown on Report, the sample(s) and sample Information was/ were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.

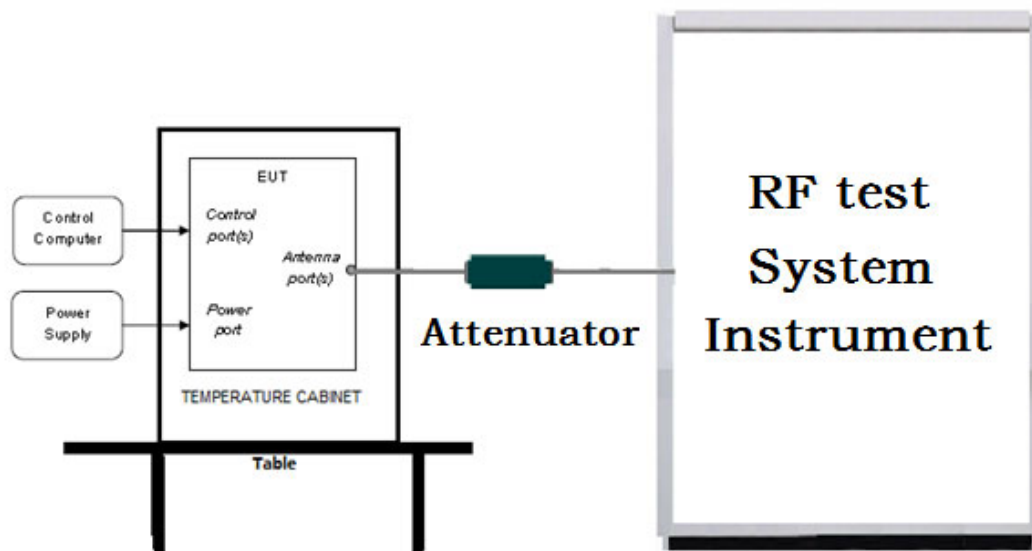
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5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

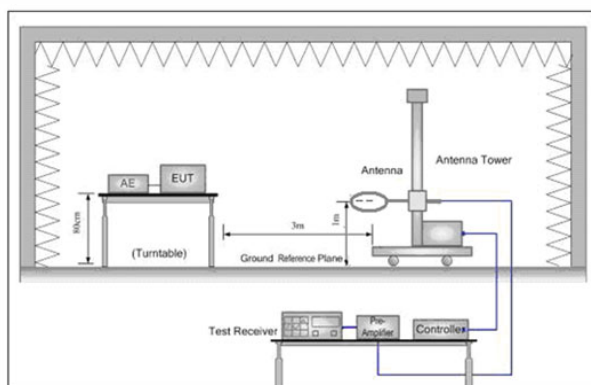


Figure 1. Below 30MHz

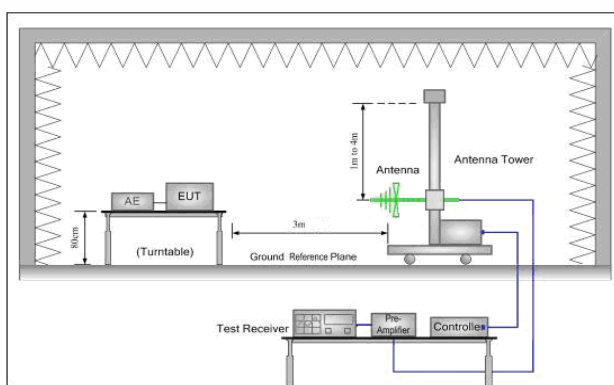


Figure 2. 30MHz to 1GHz

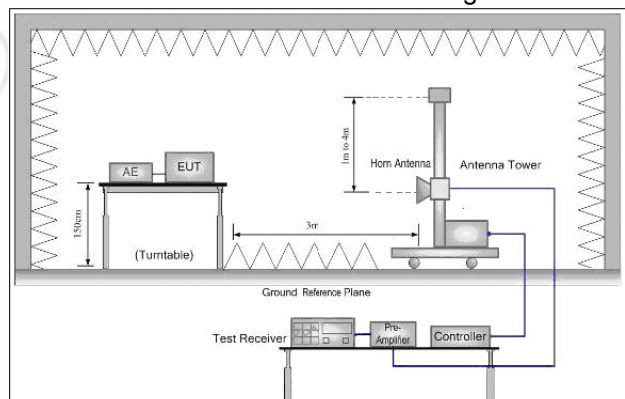
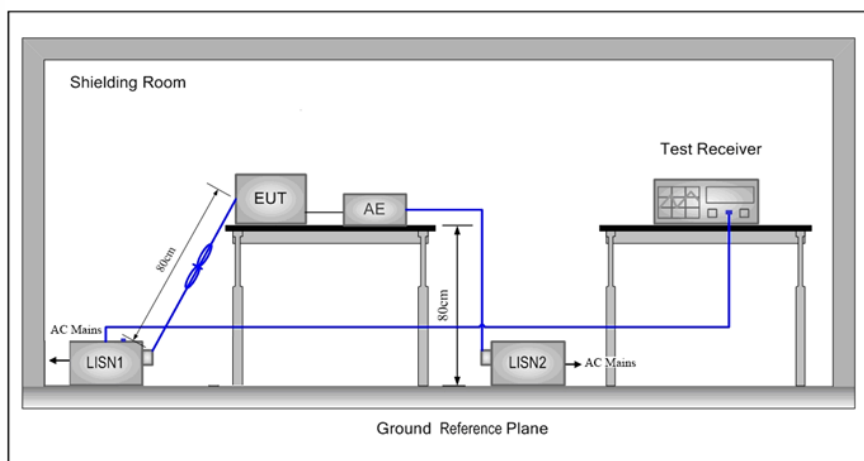


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	24.0 °C
Humidity:	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 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

Mode	802.11b							
Data Rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
Power(dBm)	15.24	15.21	15.18	15.16				
Mode	802.11g							
Data Rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Power(dBm)	14.24	14.22	14.19	14.15	14.12	14.11	14.10	14.08
Mode	802.11n (HT20)							
Data Rate	6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps
Power(dBm)	14.34	14.31	14.28	14.25	14.24	14.22	14.17	14.15
Mode	802.11n (HT40)							
Data Rate	13.5Mbps	27Mbps	40.5Mbps	54Mbps	81Mbps	108Mbps	121.5Mbps	135Mbps
Power(dBm)	13.77	13.75	13.72	13.70	13.68	13.65	13.62	13.60

Through Pre-scan, 1Mbps 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:	CHUWI TECHNOLOGY (ShenZhen) CO., LIMITED
Address of Applicant:	2 Floor Building 3 LiJinCheng Industrial park the east of Gongye road LongHua, Shenzhen, China
Manufacturer:	CHUWI TECHNOLOGY (ShenZhen) CO., LIMITED
Address of Manufacturer:	2 Floor Building 3 LiJinCheng Industrial park the east of Gongye road LongHua, Shenzhen, China
Factory:	ILIFE Technology Co., Ltd
Address of Factory:	3rd Floor, Bld3, 4-5rd, Bld6 , LiJinCheng Industrial Park, The East of Gong Ye Road, LongHua , ShenZhen, Guangdong Province, China

6.2 General Description of EUT

Product Name:	Mini PC
Model No.(EUT):	HeroBox
Trade mark:	CHUWI
EUT Supports Radios application:	IEEE 802.11b/g/n(HT20)(HT40): 2400MHz to 2483.5MHz
Power Supply:	Adapter Model:A241-1202000D Input:100-240V~50/60Hz0.8A Output:12.0V---2.0A 24.0W
Sample Received Date:	Aug. 28, 2020
Sample tested Date:	Aug. 28, 2020 to Oct.14, 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:	Default
Test Software of EUT:	DRTU
Antenna Type and Gain:	Type: FPC antenna Gain:2.14dBi
Test Voltage:	DC 12V

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
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	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Spectrum Analyzer	Keysight	N9010A	MY54510339	02-17-2020	02-16-2021
Signal Generator	Keysight	N5182B	MY53051549	02-17-2020	02-16-2021
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	06-29-2020	06-28-2021
High-pass filter	Sinoscite	FL3CX03WG18N M12-0398-002	---	---	---
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	---	---
DC Power	Keysight	E3642A	MY56376072	02-17-2020	02-16-2021
PC-1	Lenovo	R4960d	---	---	---
BT&WI-FI Automatic control	R&S	OSP120	101374	02-17-2020	02-16-2021
RF control unit	JS Tonscend	JS0806-2	158060006	02-17-2020	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	04-28-2020	04-27-2021
Temperature/ Humidity Indicator	Defu	TH128	/	---	---
LISN	R&S	ENV216	100098	03-05-2020	03-04-2021
Barometer	changchun	DYM3	1188	---	---

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	9163-618	05-16-2020	05-15-2021
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 qixiang	HM10	1804298	06-29-2020	06-28-2021
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 (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
RSE Automatic test software	JS Tonscend	JS36-RSE	10166	---	---
Receiver	Keysight	N9038A	MY57290136	03-05-2020	03-04-2021
Spectrum Analyzer	Keysight	N9020B	MY57111112	03-05-2020	03-04-2021
Spectrum Analyzer	Keysight	N9030B	MY57140871	03-05-2020	03-04-2021
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	ETS-LINDGREN	3117	00057407	07-10-2018	07-09-2021
Preamplifier	EMCI	EMC184055SE	980596	05-20-2020	05-19-2021
Preamplifier	EMCI	EMC001330	980563	04-22-2020	04-21-2021
Preamplifier	JS Tonscend	980380	EMC051845 SE	01-09-2020	01-08-2021
Temperature/Humidity Indicator	biaozhi	GM1360	EE1186631	04-27-2020	04-26-2021
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

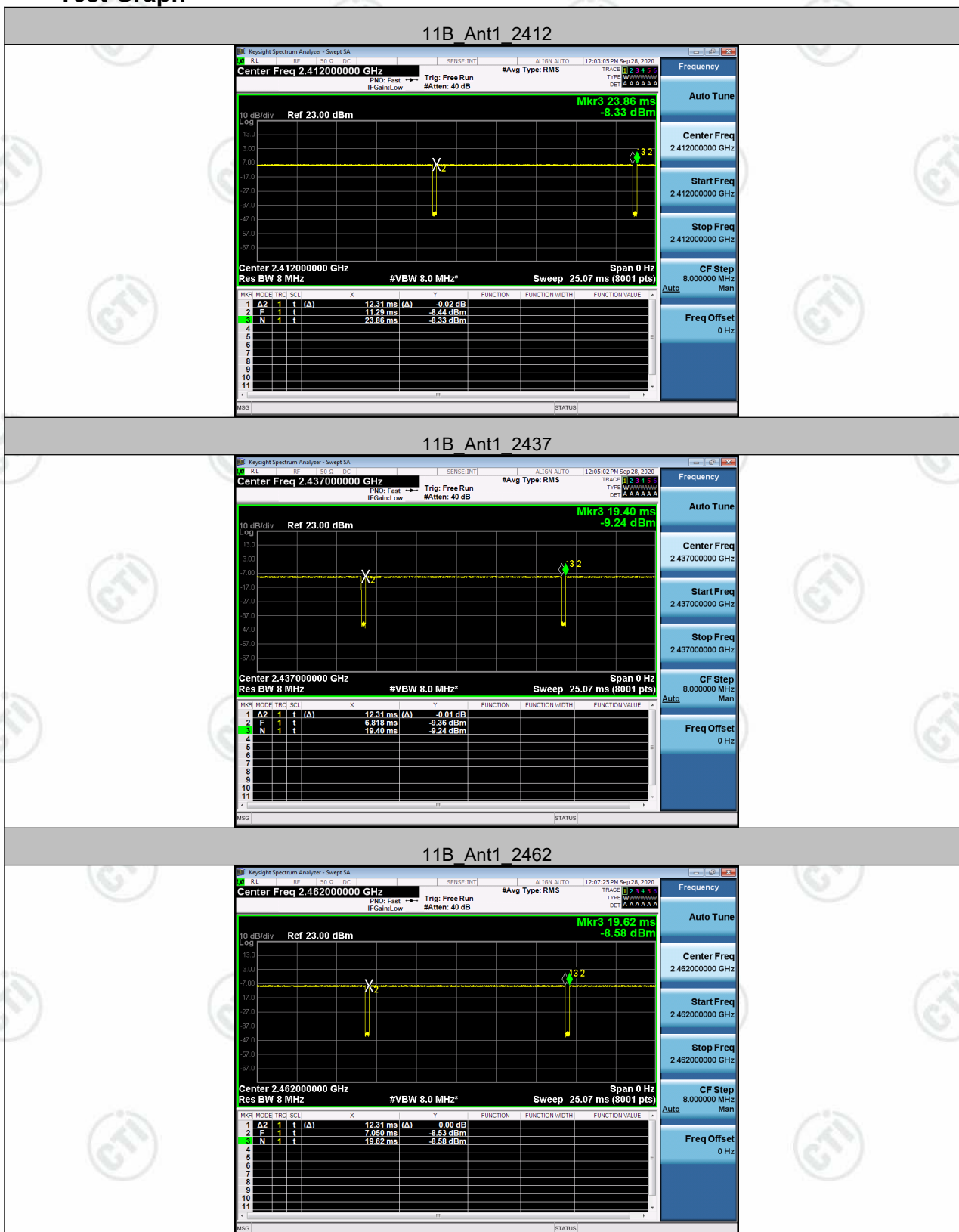
Test Results List:

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)

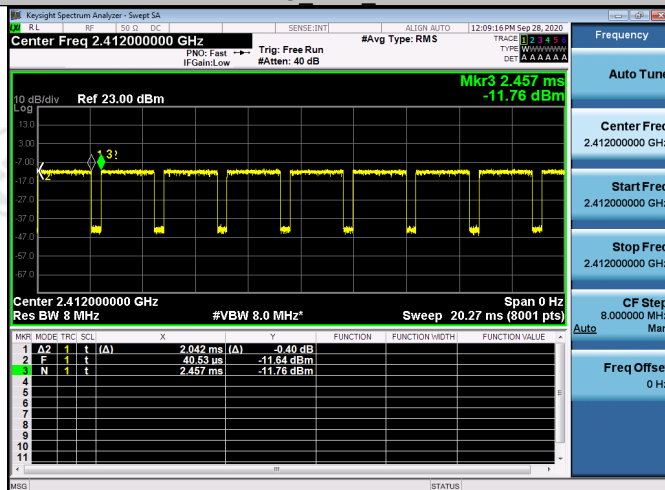
EUT DUTY CYCLE
Result Table

Test Mode	Antenna	Channel	Duty Cycle [%]	Limit	Verdict
11B	Ant1	2412	97.91	---	PASS
	Ant1	2437	97.91	---	PASS
	Ant1	2462	97.93	---	PASS
11G	Ant1	2412	84.49	---	PASS
	Ant1	2437	84.59	---	PASS
	Ant1	2462	84.49	---	PASS
11N20SISO	Ant1	2412	84.48	---	PASS
	Ant1	2437	84.48	---	PASS
	Ant1	2462	84.48	---	PASS
11N40SISO	Ant1	2422	83.79	---	PASS
	Ant1	2437	83.79	---	PASS
	Ant1	2452	83.79	---	PASS

Test Graph



11G Ant1 2412



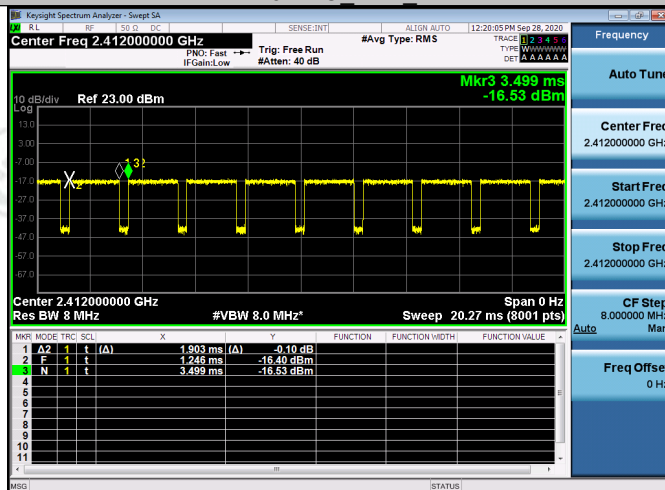
11G Ant1 2437



11G Ant1 2462



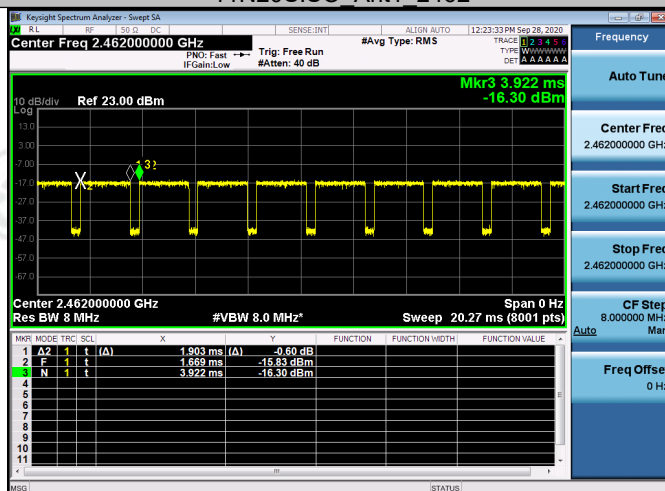
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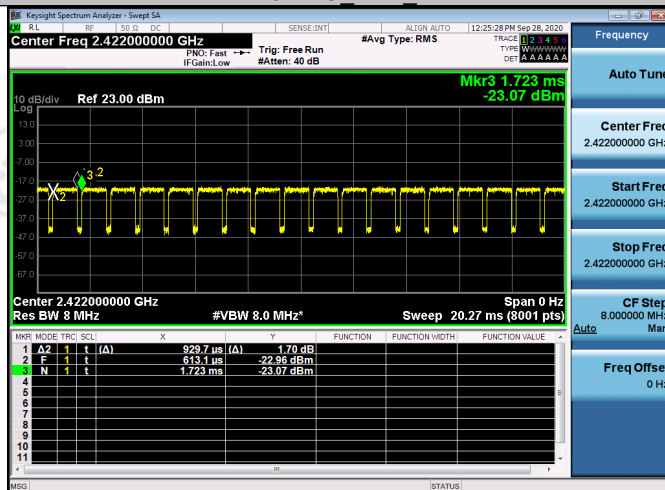
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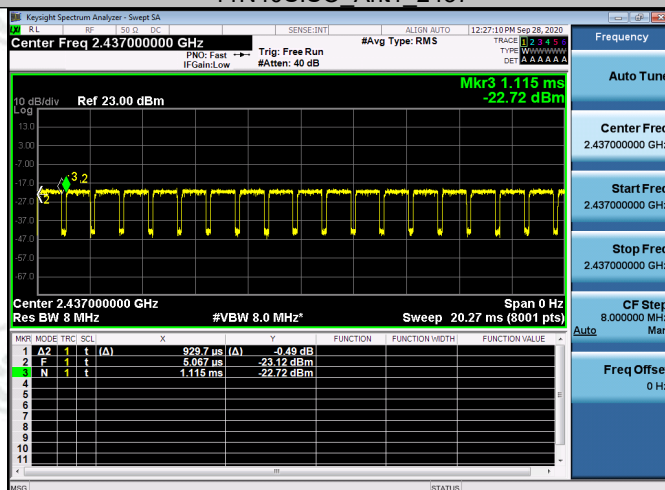
11N20SISO_Ant1_2462



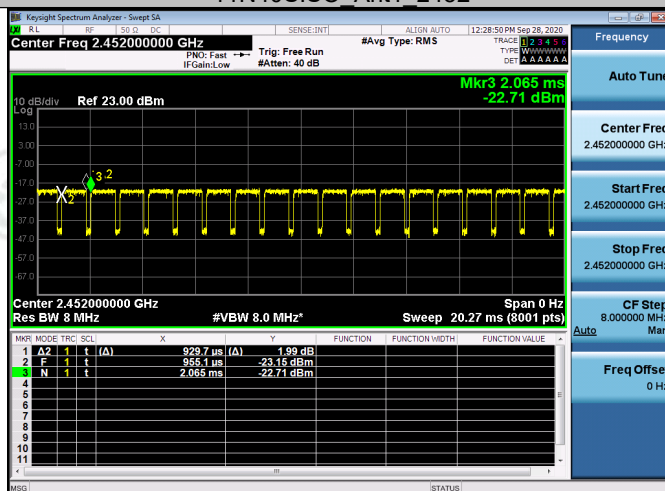
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



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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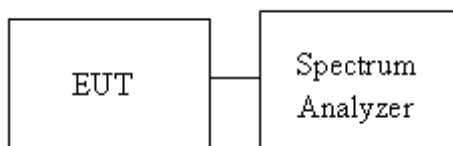
Average output power : For reporting purposes only.

Test Procedure

Test method Refer as KDB 558074 D01.

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

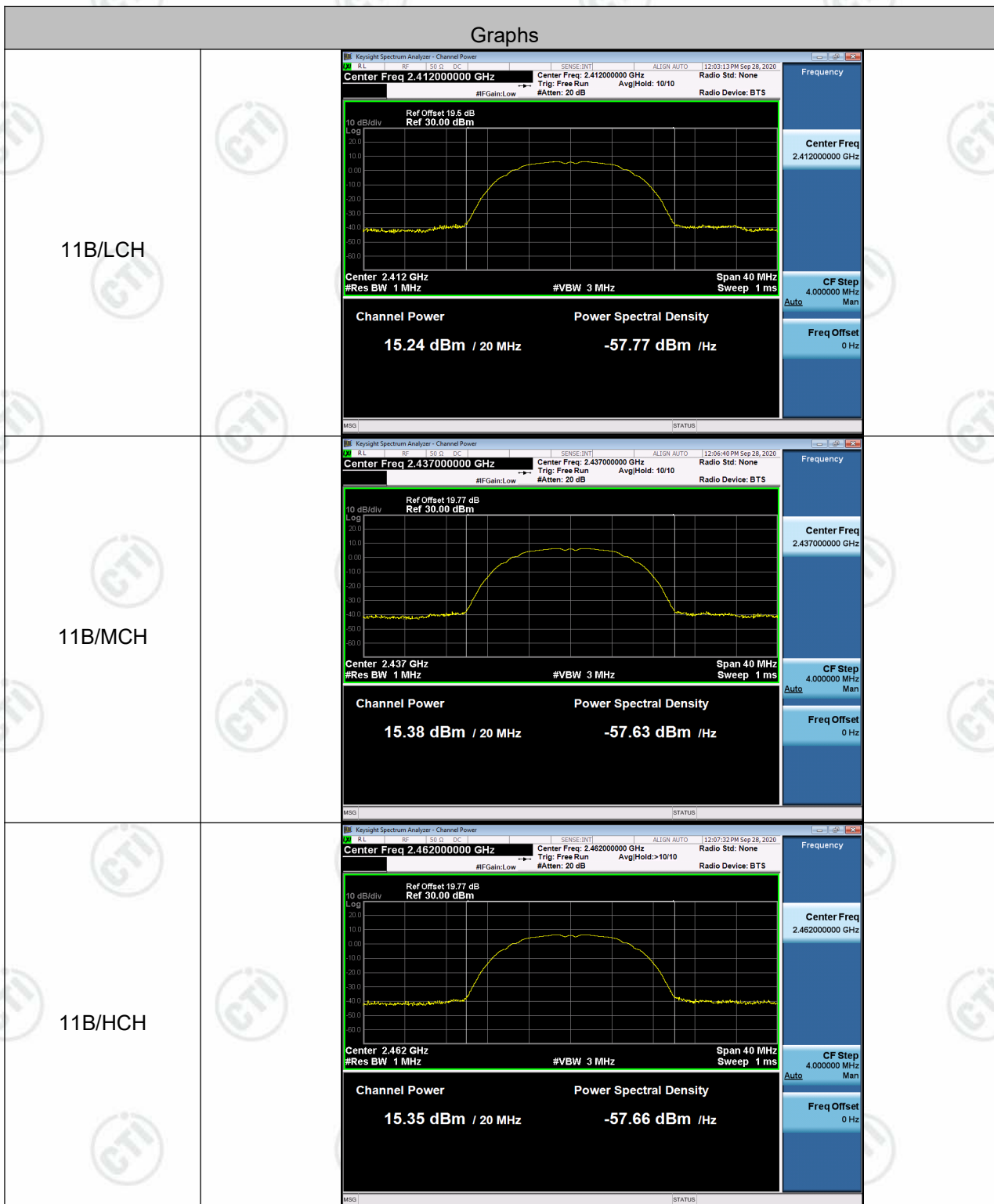
Test Setup

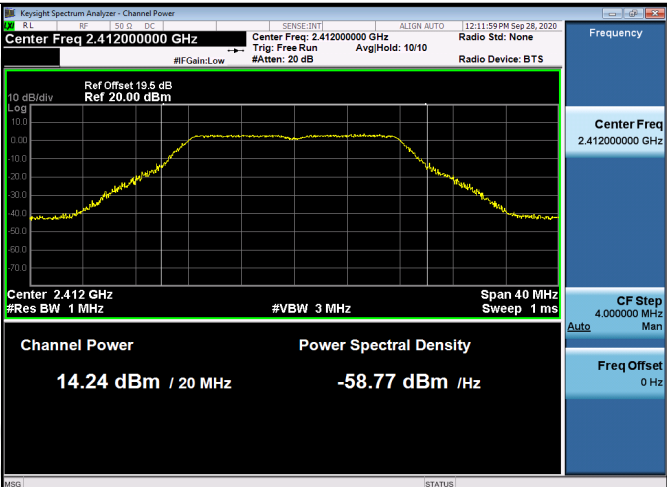
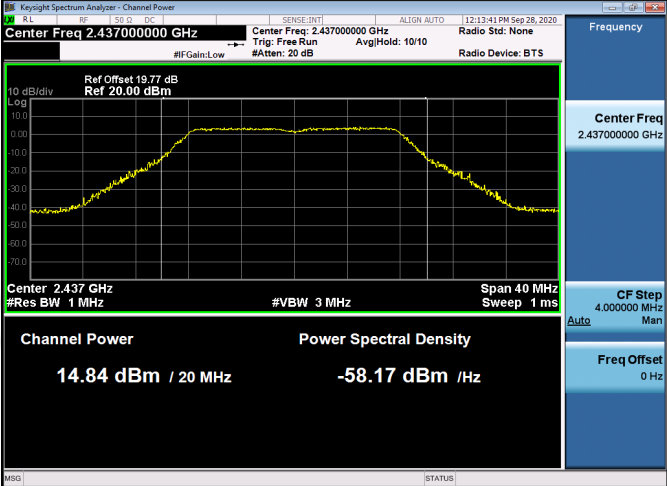
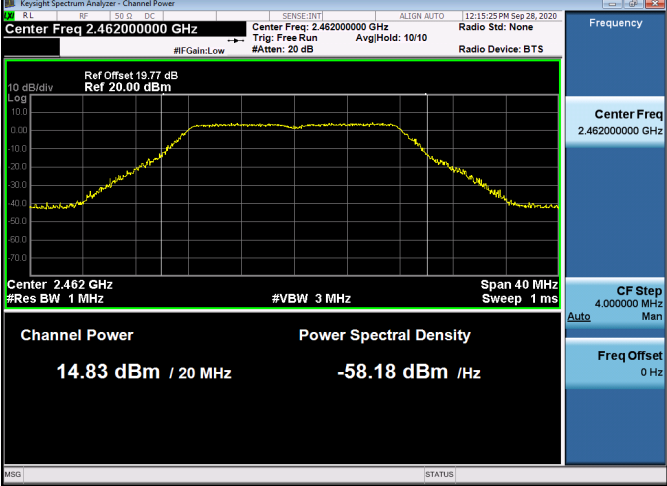


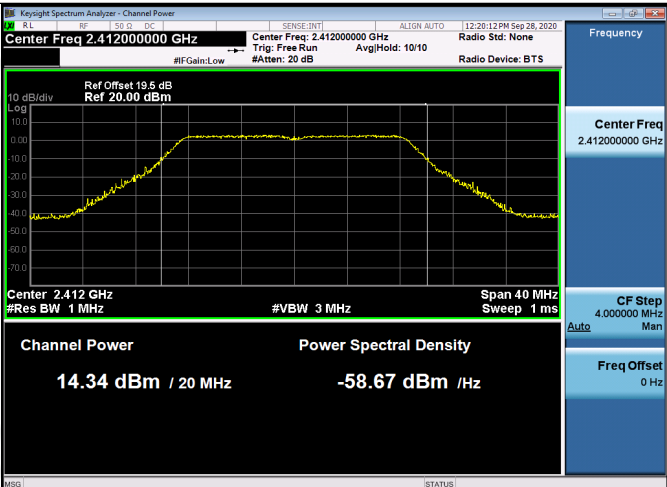
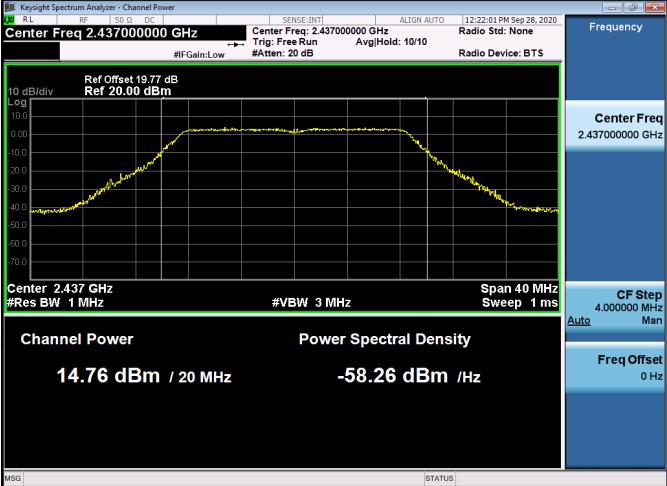
Test Result

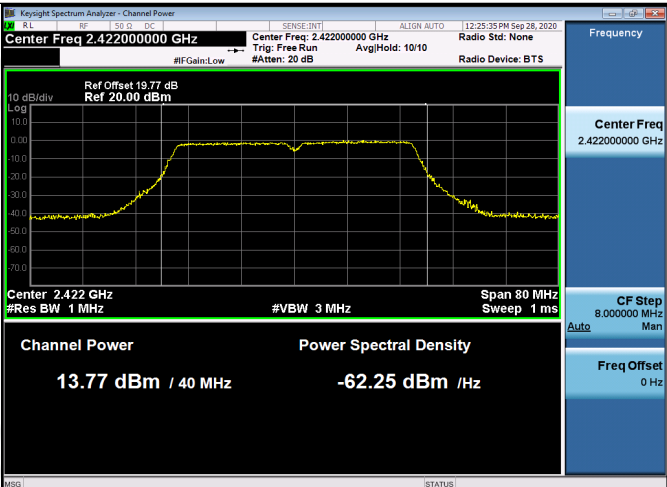
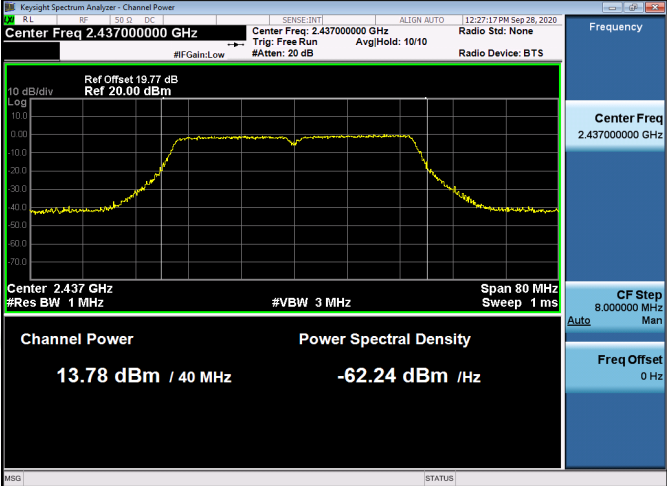
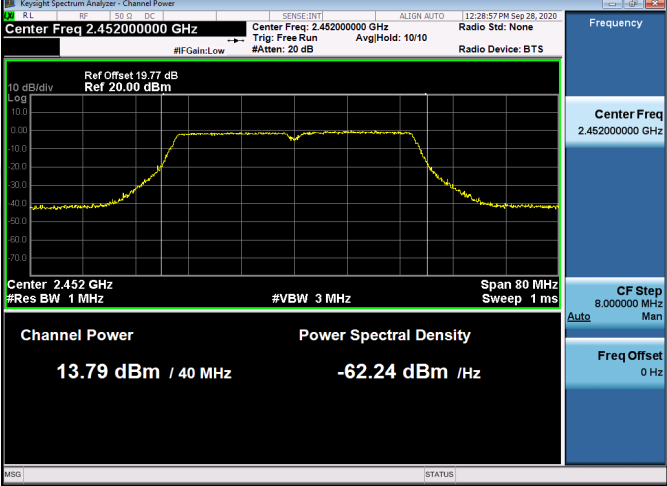
Mode	Channel	Conducted Peak Output Power [dBm]	Verdict
11B	LCH	15.24	PASS
11B	MCH	15.38	PASS
11B	HCH	15.35	PASS
11G	LCH	14.24	PASS
11G	MCH	14.84	PASS
11G	HCH	14.83	PASS
11N20SISO	LCH	14.34	PASS
11N20SISO	MCH	14.76	PASS
11N20SISO	HCH	14.64	PASS
11N40SISO	LCH	13.77	PASS
11N40SISO	MCH	13.78	PASS
11N40SISO	HCH	13.79	PASS

Test Graph



11G/LCH	 KeySight Spectrum Analyzer - Channel Power 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 20.00 dBm 10 dB/div Log Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 14.24 dBm / 20 MHz Power Spectral Density -58.77 dBm /Hz Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11G/MCH	 KeySight Spectrum Analyzer - Channel Power 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 20.00 dBm 10 dB/div Log Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 14.84 dBm / 20 MHz Power Spectral Density -58.17 dBm /Hz Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11G/HCH	 KeySight Spectrum Analyzer - Channel Power 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 20.00 dBm 10 dB/div Log Center 2.462 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power 14.83 dBm / 20 MHz Power Spectral Density -58.18 dBm /Hz Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz

11N20SISO/LCH	 KeySight Spectrum Analyzer - Channel Power 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 20.00 dBm 10 dB/div Log Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power Power Spectral Density 14.34 dBm / 20 MHz -58.67 dBm / Hz Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11N20SISO/MCH	 KeySight Spectrum Analyzer - Channel Power 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 20.00 dBm 10 dB/div Log Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power Power Spectral Density 14.76 dBm / 20 MHz -58.26 dBm / Hz Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11N20SISO/HCH	 KeySight Spectrum Analyzer - Channel Power 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 20.00 dBm 10 dB/div Log Center 2.462 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Channel Power Power Spectral Density 14.64 dBm / 20 MHz -58.37 dBm / Hz Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz

11N40SISO/LCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.42200000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Channel Power: 13.77 dBm / 40 MHz Power Spectral Density: -62.25 dBm / Hz Center 2.422 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Frequency: Center Freq 2.42200000 GHz CF Step 8.000000 MHz Auto Man Freq Offset 0 Hz
11N40SISO/MCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.43700000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Channel Power: 13.78 dBm / 40 MHz Power Spectral Density: -62.24 dBm / Hz Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Frequency: Center Freq 2.43700000 GHz CF Step 8.000000 MHz Auto Man Freq Offset 0 Hz
11N40SISO/HCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.45200000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Channel Power: 13.79 dBm / 40 MHz Power Spectral Density: -62.24 dBm / Hz Center 2.452 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Frequency: Center Freq 2.45200000 GHz CF Step 8.000000 MHz Auto Man Freq Offset 0 Hz

Appendix B): 6dB Occupied Bandwidth

Test Limit

According to §15.247(a)(2),

6 dB Bandwidth :

Limit	Shall be at least 500kHz
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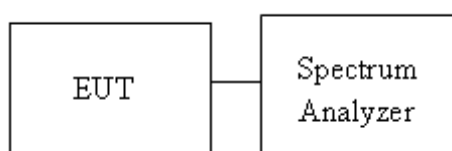
Occupied Bandwidth(99%) : For reporting purposes only.

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.

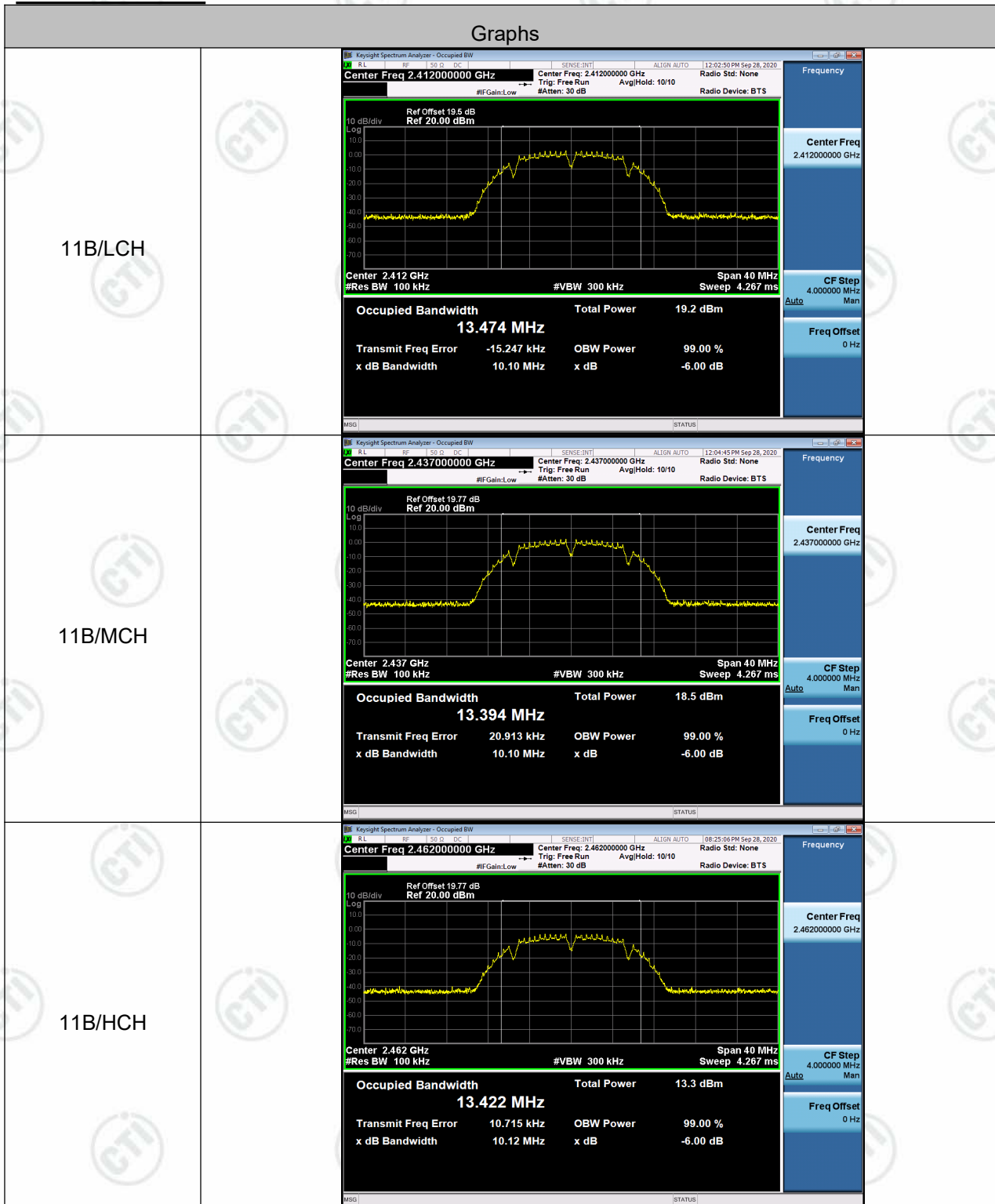
Test Setup

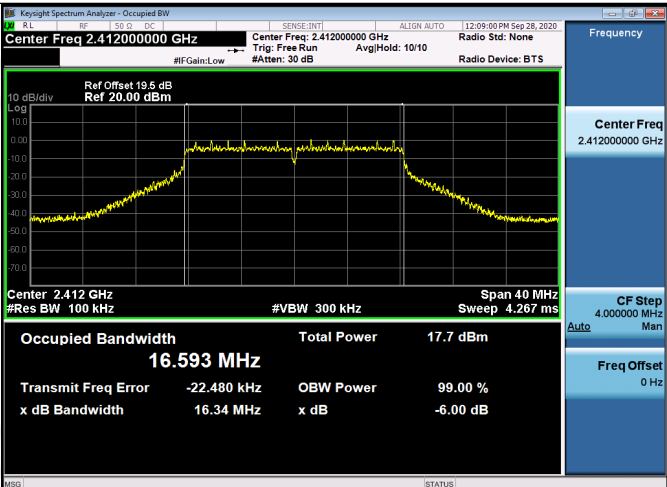
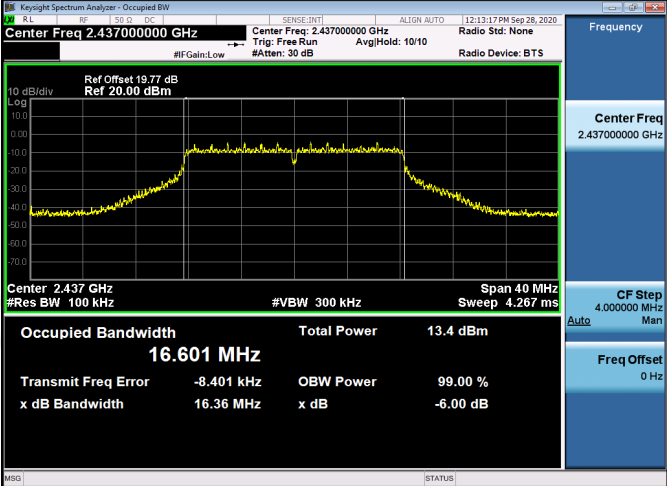
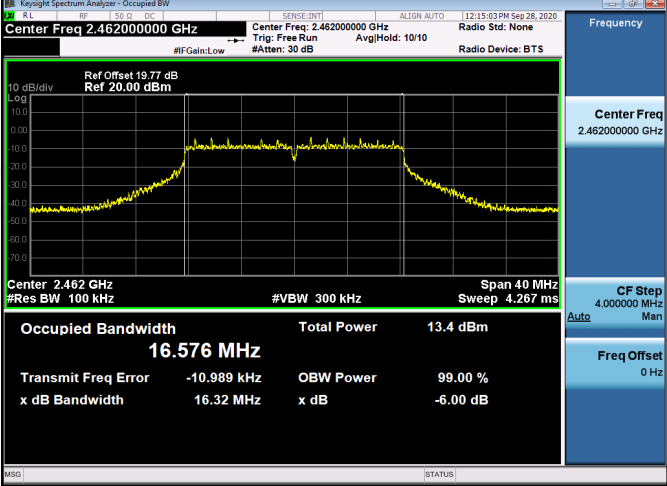


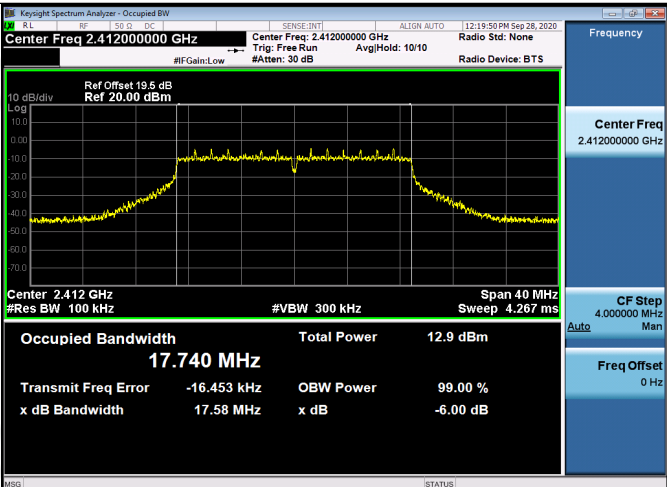
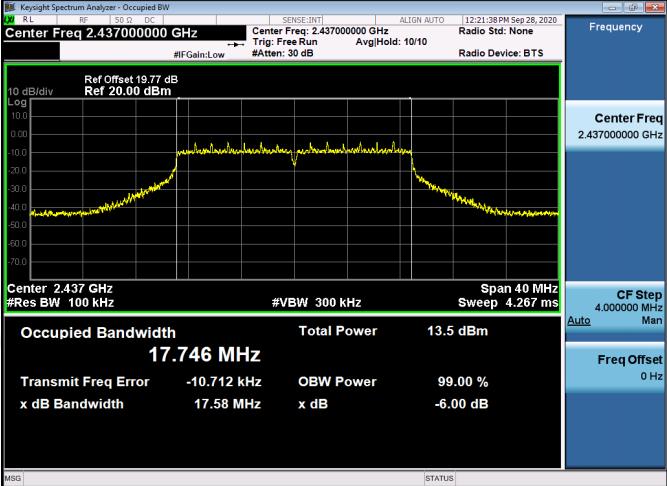
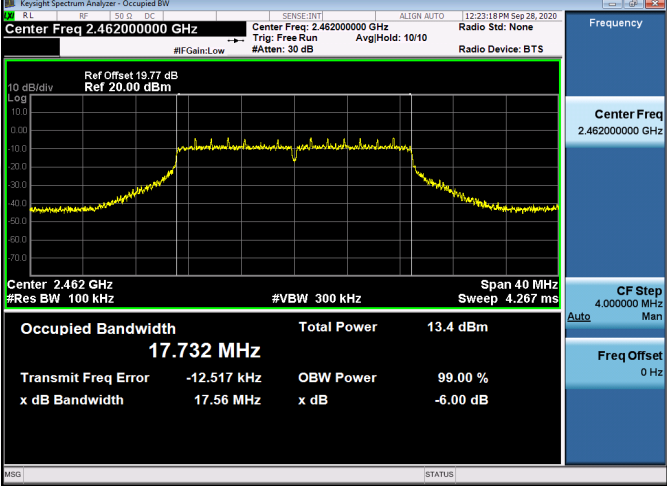
Test Result

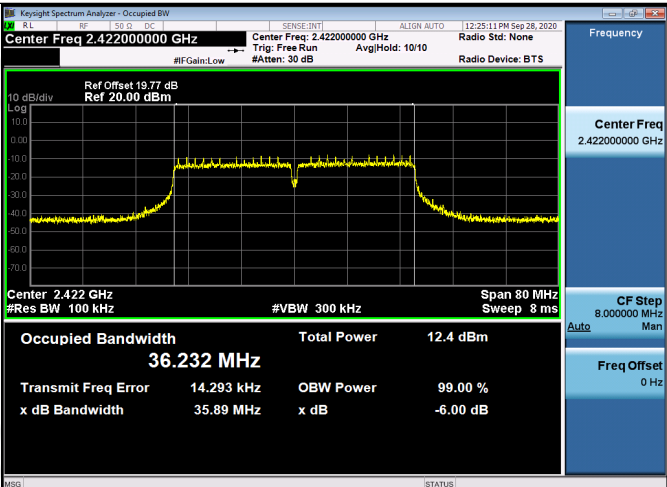
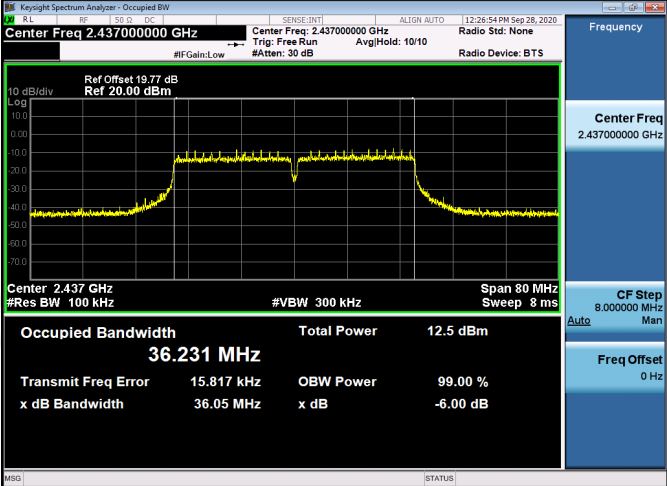
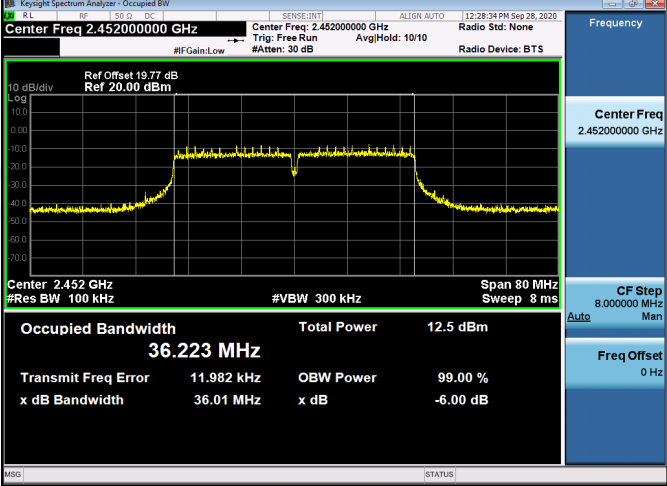
Mode	Channel	6dB Bandwidth [MHz]	99% OBW [MHz]	Verdict
11B	LCH	10.10	13.571	PASS
11B	MCH	10.10	13.575	PASS
11B	HCH	10.12	13.527	PASS
11G	LCH	16.34	17.078	PASS
11G	MCH	16.36	17.058	PASS
11G	HCH	16.32	16.991	PASS
11N20SISO	LCH	17.58	18.154	PASS
11N20SISO	MCH	17.58	18.137	PASS
11N20SISO	HCH	17.56	18.106	PASS
11N40SISO	LCH	35.89	36.452	PASS
11N40SISO	MCH	36.05	36.519	PASS
11N40SISO	HCH	36.01	36.470	PASS

Test Graph
6 dB Bandwidth

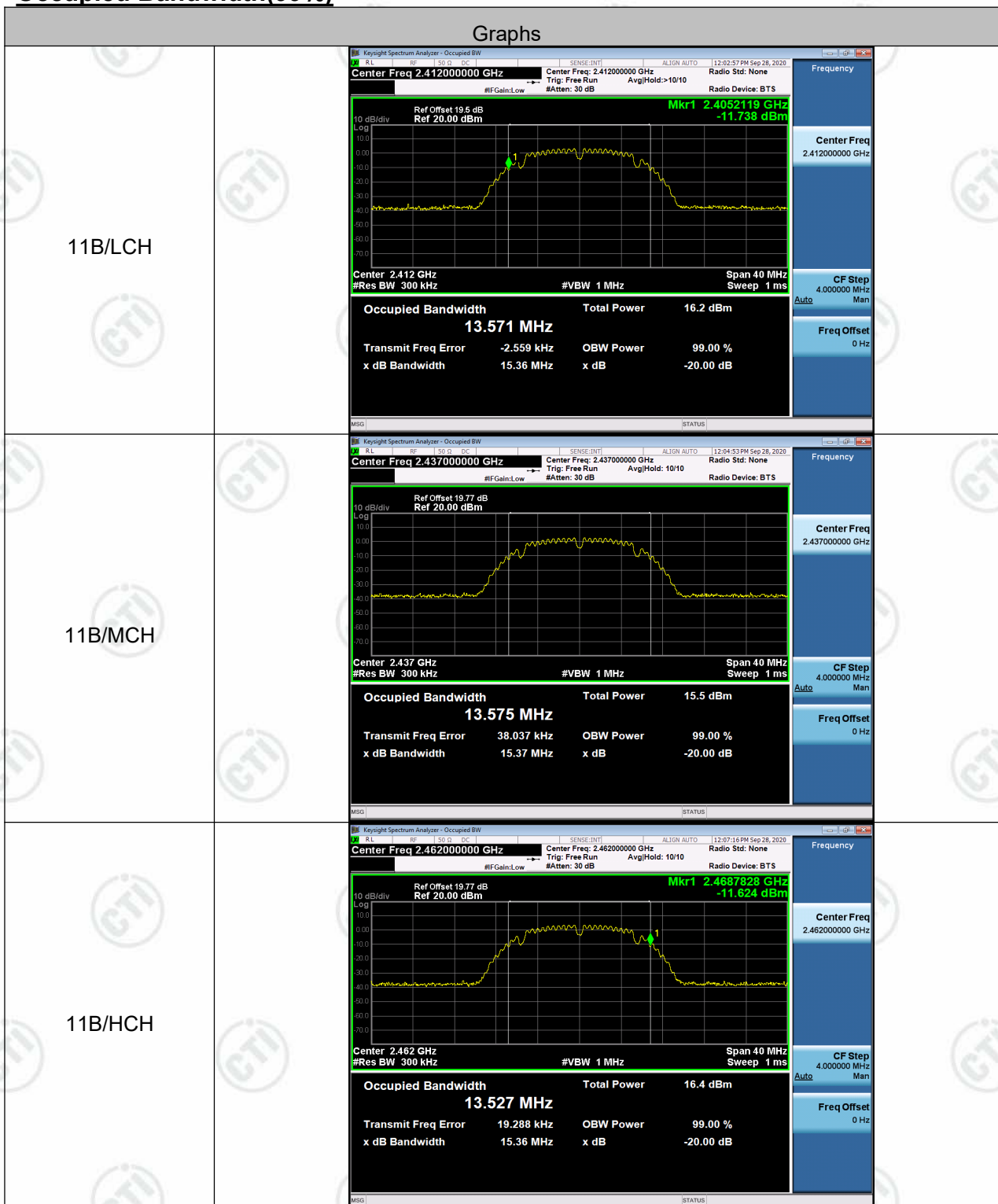


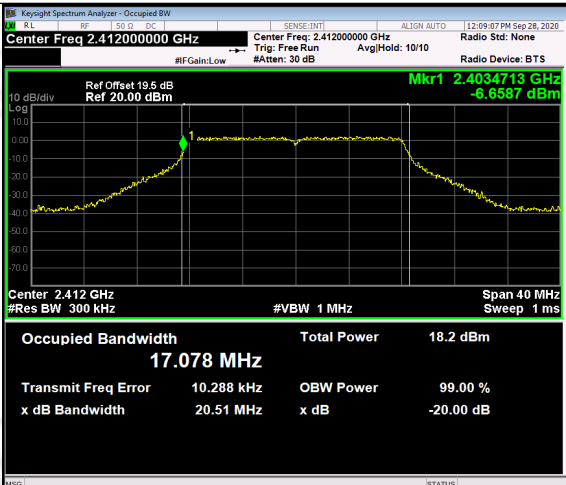
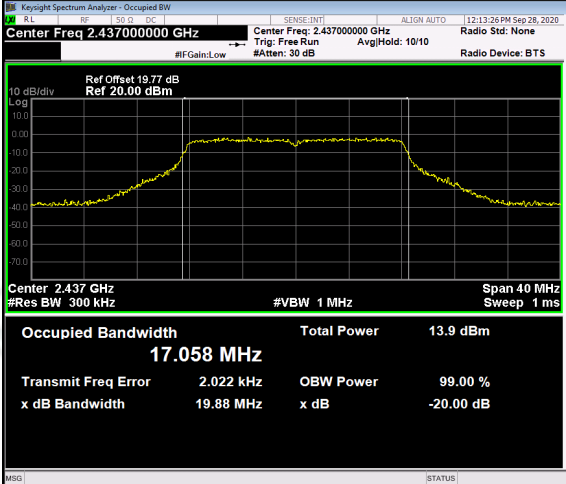
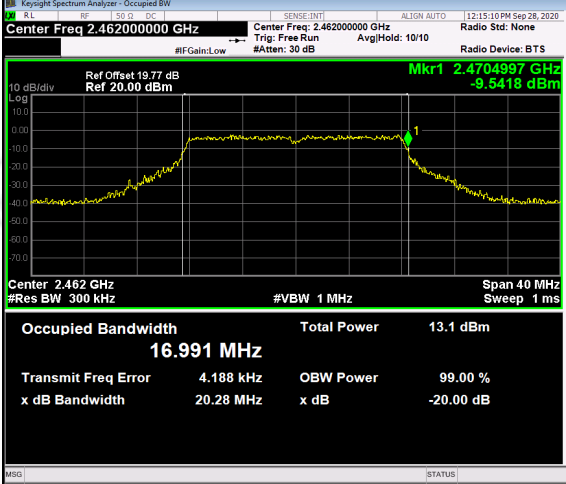
11G/LCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 20.00 dBm Center Freq 2.412000000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS 10 dB/div Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 4.267 ms Occupied Bandwidth 16.593 MHz Total Power 17.7 dBm Transmit Freq Error -22.480 kHz OBW Power 99.00 % x dB Bandwidth 16.34 MHz x dB -6.00 dB Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11G/MCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Center Freq 2.437000000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS 10 dB/div Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 4.267 ms Occupied Bandwidth 16.601 MHz Total Power 13.4 dBm Transmit Freq Error -8.401 kHz OBW Power 99.00 % x dB Bandwidth 16.36 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11G/HCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Center Freq 2.462000000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS 10 dB/div Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 4.267 ms Occupied Bandwidth 16.576 MHz Total Power 13.4 dBm Transmit Freq Error -10.989 kHz OBW Power 99.00 % x dB Bandwidth 16.32 MHz x dB -6.00 dB Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz

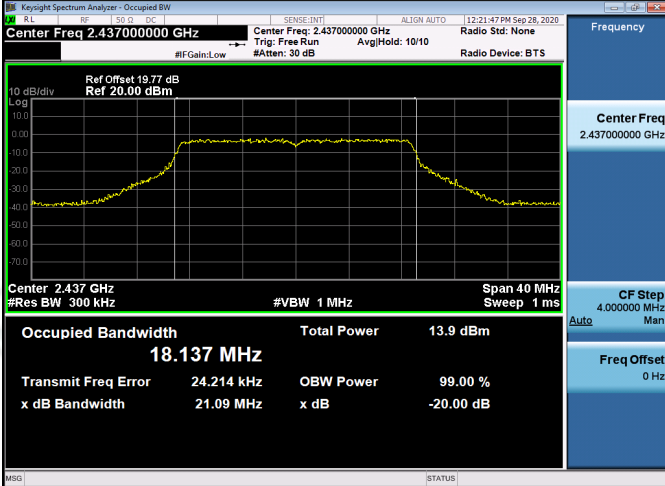
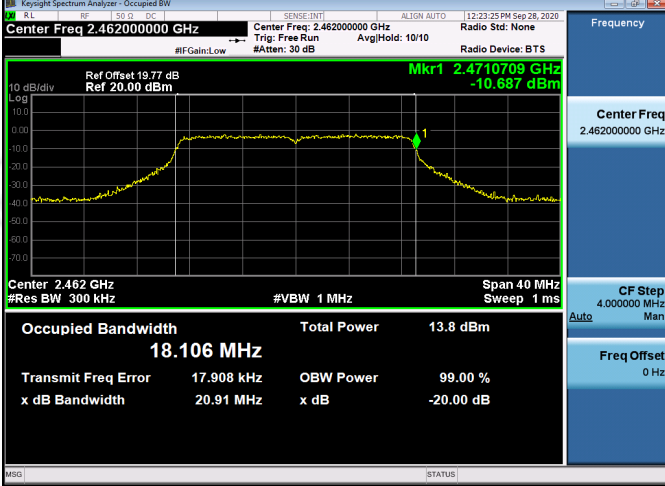
11N20SISO/LCH	
11N20SISO/MCH	
11N20SISO/HCH	

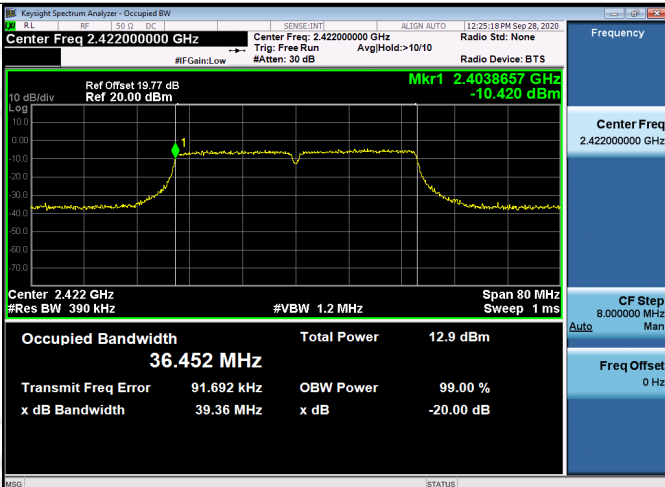
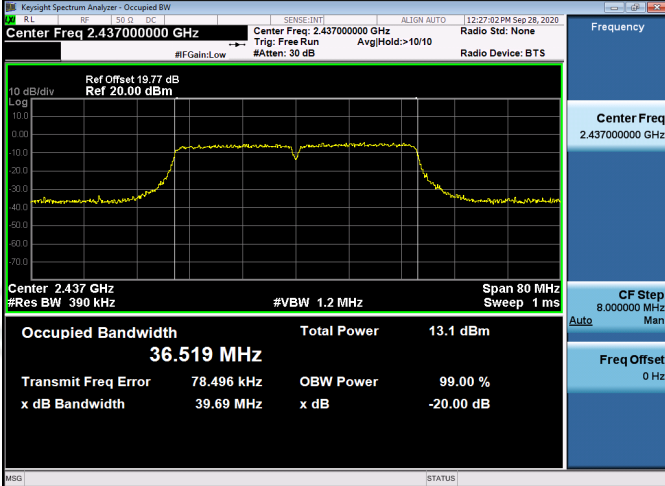
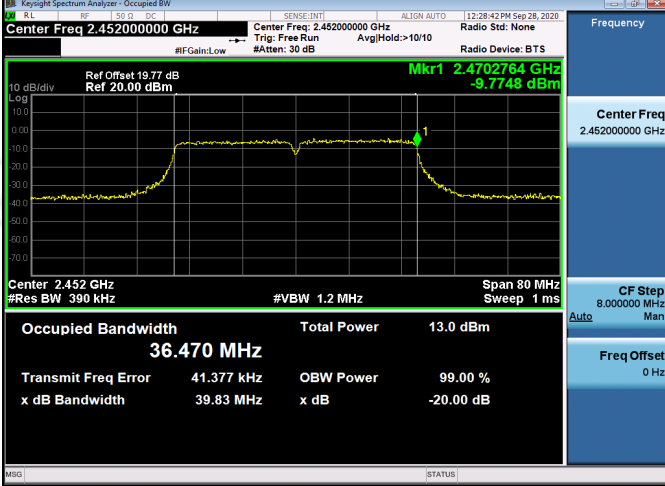
11N40SISO/LCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.422000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Center 2.422 GHz #Res BW 100 kHz Occupied Bandwidth 36.232 MHz Total Power 12.4 dBm Transmit Freq Error 14.293 kHz x dB Bandwidth 35.89 MHz OBW Power 99.00 % x dB -6.00 dB Span 80 MHz Sweep 8 ms Frequency Center Freq 2.422000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/MCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Center 2.437 GHz #Res BW 100 kHz Occupied Bandwidth 36.231 MHz Total Power 12.5 dBm Transmit Freq Error 15.817 kHz x dB Bandwidth 36.05 MHz OBW Power 99.00 % x dB -6.00 dB Span 80 MHz Sweep 8 ms Frequency Center Freq 2.437000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/HCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.452000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Center 2.452 GHz #Res BW 100 kHz Occupied Bandwidth 36.223 MHz Total Power 12.5 dBm Transmit Freq Error 11.982 kHz x dB Bandwidth 36.01 MHz OBW Power 99.00 % x dB -6.00 dB Span 80 MHz Sweep 8 ms Frequency Center Freq 2.452000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz

Occupied Bandwidth(99%)



11G/LCH	 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 19.8 dB Ref 20.00 dBm Mkr1 2.4034713 GHz -6.6587 dBm Center 2.412 GHz #Res BW 300 kHz #VBW 1 MHz Span 40 MHz Sweep 1 ms Occupied Bandwidth 17.078 MHz Total Power 18.2 dBm Transmit Freq Error 10.288 kHz OBW Power 99.00 % x dB Bandwidth 20.51 MHz x dB -20.00 dB
11G/MCH	 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 20.00 dBm Center 2.437 GHz #Res BW 300 kHz #VBW 1 MHz Span 40 MHz Sweep 1 ms Occupied Bandwidth 17.058 MHz Total Power 13.9 dBm Transmit Freq Error 2.022 kHz OBW Power 99.00 % x dB Bandwidth 19.88 MHz x dB -20.00 dB
11G/HCH	 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 20.00 dBm Mkr1 2.4704997 GHz -9.5418 dBm Center 2.462 GHz #Res BW 300 kHz #VBW 1 MHz Span 40 MHz Sweep 1 ms Occupied Bandwidth 16.991 MHz Total Power 13.1 dBm Transmit Freq Error 4.188 kHz OBW Power 99.00 % x dB Bandwidth 20.28 MHz x dB -20.00 dB

11N20SISO/LCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 19.8 dB Ref 20.00 dBm Mkr1 2.4029266 GHz -10.206 dBm Center 2.412 GHz #Res BW 300 kHz #VBW 1 MHz Span 40 MHz Sweep 1 ms Occupied Bandwidth 18.154 MHz Total Power 13.3 dBm Transmit Freq Error 3.613 kHz OBW Power 99.00 % x dB Bandwidth 21.36 MHz x dB -20.00 dB
11N20SISO/MCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Center 2.437 GHz #Res BW 300 kHz #VBW 1 MHz Span 40 MHz Sweep 1 ms Occupied Bandwidth 18.137 MHz Total Power 13.9 dBm Transmit Freq Error 24.214 kHz OBW Power 99.00 % x dB Bandwidth 21.09 MHz x dB -20.00 dB
11N20SISO/HCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Mkr1 2.4710709 GHz -10.687 dBm Center 2.462 GHz #Res BW 300 kHz #VBW 1 MHz Span 40 MHz Sweep 1 ms Occupied Bandwidth 18.106 MHz Total Power 13.8 dBm Transmit Freq Error 17.908 kHz OBW Power 99.00 % x dB Bandwidth 20.91 MHz x dB -20.00 dB

11N40SISO/LCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.422000000 GHz Center Freq: 2.422000000 GHz Trig: Free Run Avg/Hold: >10/10 Radio Device: BTS Ref Offset 19.77 dB Ref 20.00 dBm Mkr1 2.4038657 GHz -10.420 dBm Center 2.422 GHz #Res BW 390 kHz #VBW 1.2 MHz Span 80 MHz Sweep 1 ms Occupied Bandwidth 36.452 MHz Total Power 12.9 dBm Transmit Freq Error 91.692 kHz OBW Power 99.00 % x dB Bandwidth 39.36 MHz x dB -20.00 dB
11N40SISO/MCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Trig: Free Run Avg/Hold: >10/10 Radio Device: BTS Ref Offset 19.77 dB Ref 20.00 dBm Center 2.437 GHz #Res BW 390 kHz #VBW 1.2 MHz Span 80 MHz Sweep 1 ms Occupied Bandwidth 36.519 MHz Total Power 13.1 dBm Transmit Freq Error 78.496 kHz OBW Power 99.00 % x dB Bandwidth 39.69 MHz x dB -20.00 dB
11N40SISO/HCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.452000000 GHz Center Freq: 2.452000000 GHz Trig: Free Run Avg/Hold: >10/10 Radio Device: BTS Ref Offset 19.77 dB Ref 20.00 dBm Mkr1 2.4702764 GHz -9.7748 dBm Center 2.452 GHz #Res BW 390 kHz #VBW 1.2 MHz Span 80 MHz Sweep 1 ms Occupied Bandwidth 36.470 MHz Total Power 13.0 dBm Transmit Freq Error 41.377 kHz OBW Power 99.00 % x dB Bandwidth 39.83 MHz x dB -20.00 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.

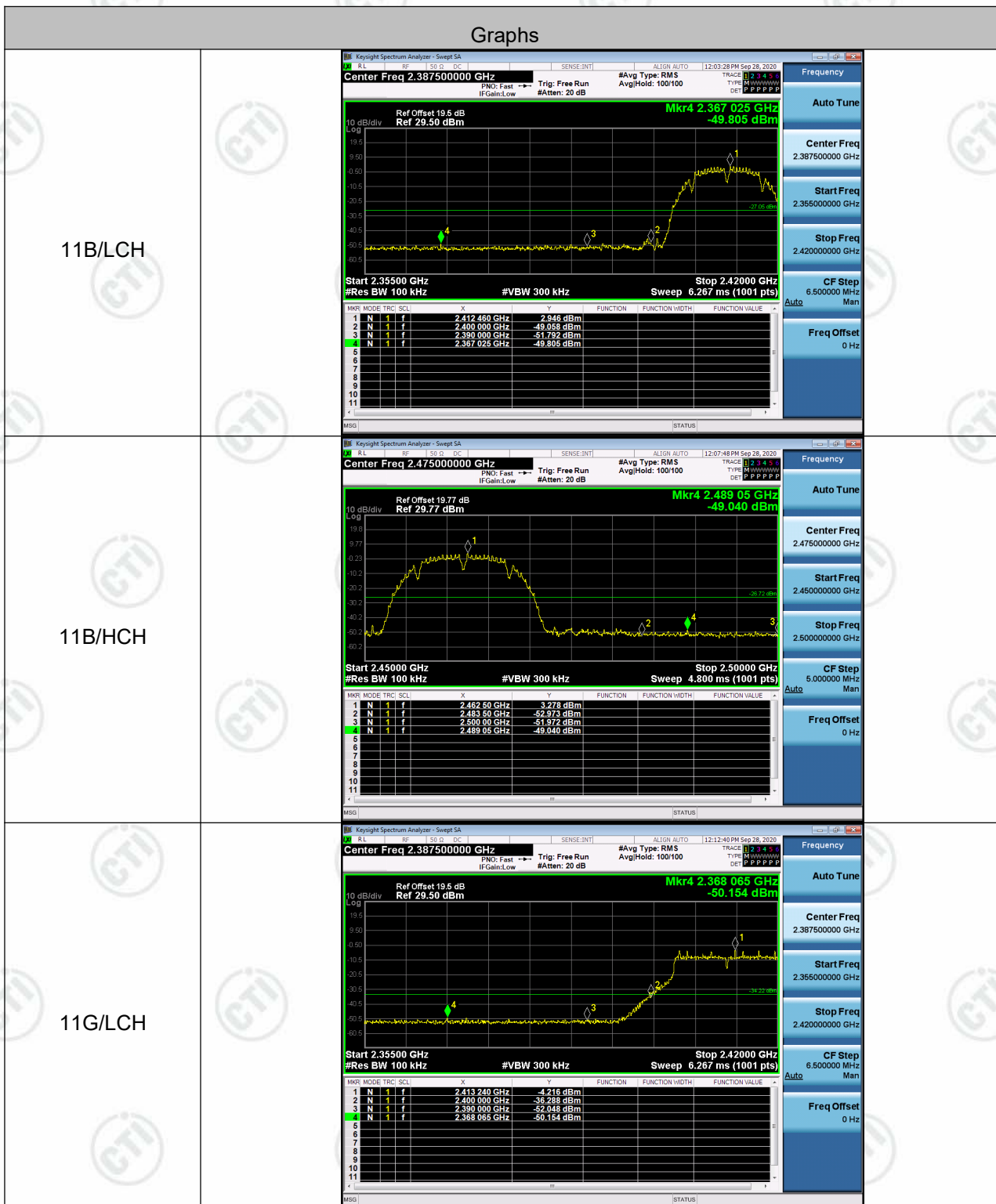
Test Setup



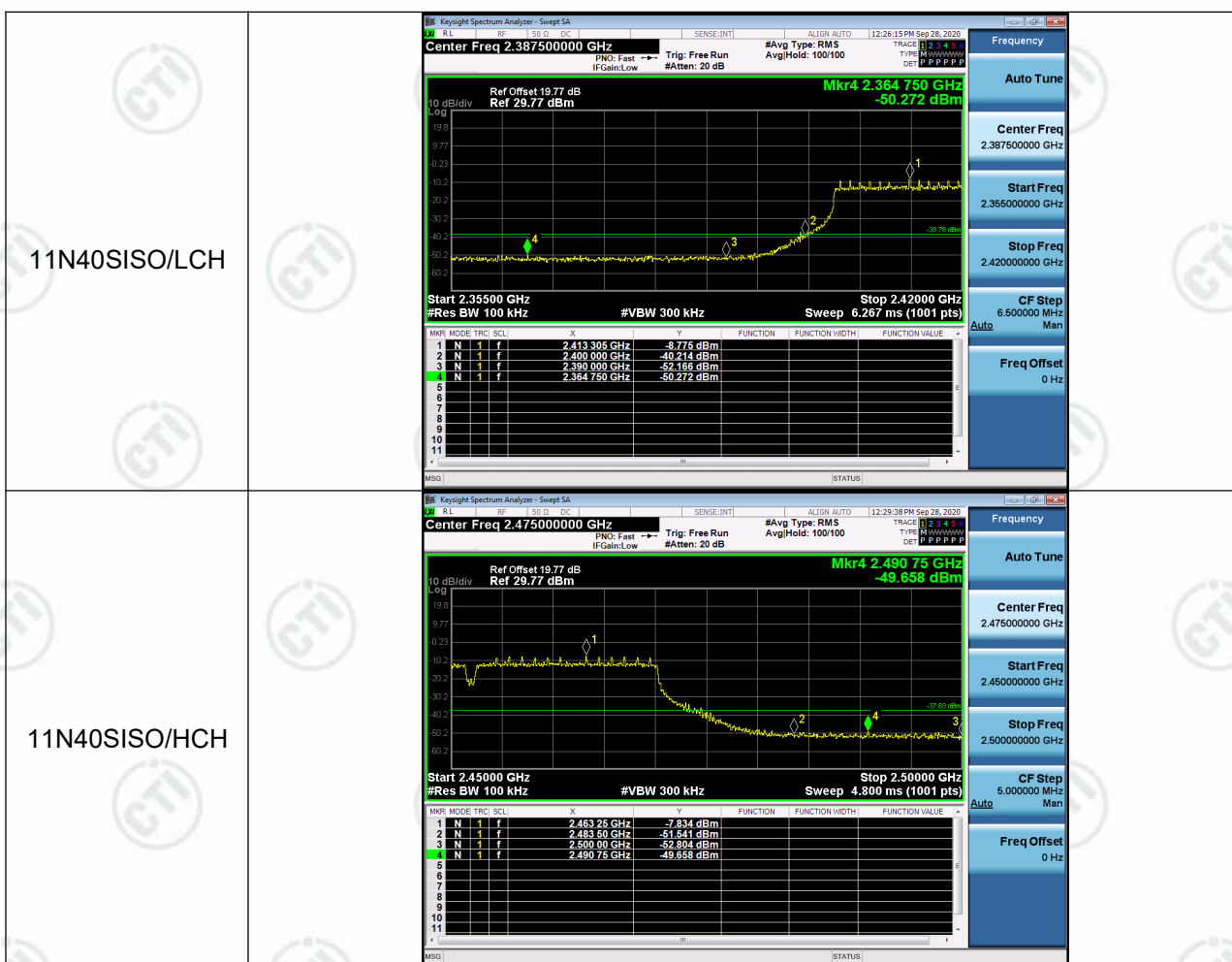
Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	2.946	-49.805	-27.05	PASS
11B	HCH	3.278	-49.040	-26.72	PASS
11G	LCH	-4.216	-50.154	-34.22	PASS
11G	HCH	-3.685	-49.808	-33.69	PASS
11N20SISO	LCH	-4.408	-50.287	-34.41	PASS
11N20SISO	HCH	-3.813	-50.143	-33.81	PASS
11N40SISO	LCH	-8.775	-50.272	-38.78	PASS
11N40SISO	HCH	-7.834	-49.658	-37.83	PASS

Test Graph



11G/HCH	Keylight Spectrum Analyzer - Sweep SA Center Freq 2.47500000 GHz Ref Offset 19.77 dB Ref 29.77 dBm Mkr4 2.488 55 GHz -49.808 dBm Start 2.45000 GHz #Res BW 100 kHz Stop 2.50000 GHz #VBW 300 kHz Sweep 4.800 ms (1001 pts) <table><thead><tr><th>MKR</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 25 GHz</td><td>-3.685 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>-52.317 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>-51.960 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 55 GHz</td><td>-49.808 dBm</td><td></td><td></td><td></td></tr></tbody></table> Frequency Auto Tune Center Freq 2.475000000 GHz Start Freq 2.450000000 GHz Stop Freq 2.500000000 GHz CF Step 5.000000 MHz Man Freq Offset 0 Hz	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.463 25 GHz	-3.685 dBm				2	N	1	f	2.483 50 GHz	-52.317 dBm				3	N	1	f	2.500 00 GHz	-51.960 dBm				4	N	1	f	2.488 55 GHz	-49.808 dBm			
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
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4	N	1	f	2.488 55 GHz	-49.808 dBm																																									
11N20SISO/LCH	Keylight Spectrum Analyzer - Sweep SA Center Freq 2.387500000 GHz Ref Offset 19.5 dB Ref 29.50 dBm Mkr4 2.377 490 GHz -50.287 dBm Start 2.35500 GHz #Res BW 100 kHz Stop 2.42000 GHz #VBW 300 kHz Sweep 6.267 ms (1001 pts) <table><thead><tr><th>MKR</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>-4.408 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>-34.031 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>-52.239 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.377 490 GHz</td><td>-50.287 dBm</td><td></td><td></td><td></td></tr></tbody></table> Frequency Auto Tune Center Freq 2.387500000 GHz Start Freq 2.355000000 GHz Stop Freq 2.420000000 GHz CF Step 6.500000 MHz Man Freq Offset 0 Hz	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.413 240 GHz	-4.408 dBm				2	N	1	f	2.400 000 GHz	-34.031 dBm				3	N	1	f	2.390 000 GHz	-52.239 dBm				4	N	1	f	2.377 490 GHz	-50.287 dBm			
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
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11N20SISO/HCH	Keylight Spectrum Analyzer - Sweep SA Center Freq 2.475000000 GHz Ref Offset 19.77 dB Ref 29.77 dBm Mkr4 2.496 85 GHz -50.143 dBm Start 2.45000 GHz #Res BW 100 kHz Stop 2.50000 GHz #VBW 300 kHz Sweep 4.800 ms (1001 pts) <table><thead><tr><th>MKR</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 25 GHz</td><td>-3.813 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>-51.681 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>-52.657 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.496 85 GHz</td><td>-50.143 dBm</td><td></td><td></td><td></td></tr></tbody></table> Frequency Auto Tune Center Freq 2.475000000 GHz Start Freq 2.450000000 GHz Stop Freq 2.500000000 GHz CF Step 5.000000 MHz Man Freq Offset 0 Hz	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.463 25 GHz	-3.813 dBm				2	N	1	f	2.483 50 GHz	-51.681 dBm				3	N	1	f	2.500 00 GHz	-52.657 dBm				4	N	1	f	2.496 85 GHz	-50.143 dBm			
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
1	N	1	f	2.463 25 GHz	-3.813 dBm																																									
2	N	1	f	2.483 50 GHz	-51.681 dBm																																									
3	N	1	f	2.500 00 GHz	-52.657 dBm																																									
4	N	1	f	2.496 85 GHz	-50.143 dBm																																									



Appendix D): RF Conducted Spurious Emissions

Test Limit

According to §15.247(d),

In any 100 kHz bandwidth outside the authorized frequency band,

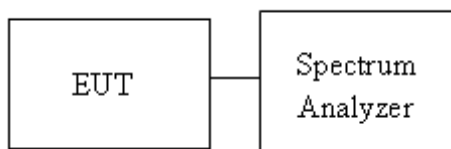
Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

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	2.857	<Limit	PASS
11B	MCH	2.572	<Limit	PASS
11B	HCH	3.196	<Limit	PASS
11G	LCH	-4.502	<Limit	PASS
11G	MCH	-3.77	<Limit	PASS
11G	HCH	-3.625	<Limit	PASS
11N20SISO	LCH	-4.285	<Limit	PASS
11N20SISO	MCH	-3.944	<Limit	PASS
11N20SISO	HCH	-3.764	<Limit	PASS
11N40SISO	LCH	-7.738	<Limit	PASS
11N40SISO	MCH	-7.568	<Limit	PASS
11N40SISO	HCH	-7.644	<Limit	PASS

Test Graph

