

TEST REPORT

Product : CREALITY BOX
Trade mark : CREALITY
Model/Type reference : WB-01
Serial Number : N/A
Report Number : EED32M00275001
FCC ID : 2AXH6CREALITY-BOX
Date of Issue : Sep. 24, 2020
Test Standards : 47 CFR Part 15Subpart C
Test result : PASS

Prepared for:

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Date:

Sep. 24, 2020



Check No.:2447672064

2 Version

Version No.	Date	Description
00	Sep. 24, 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.

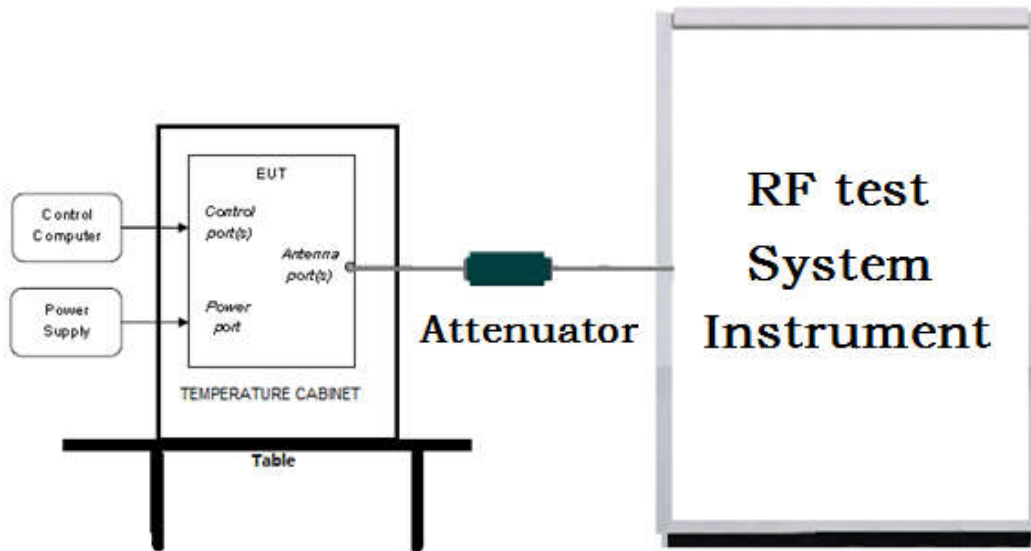
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5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

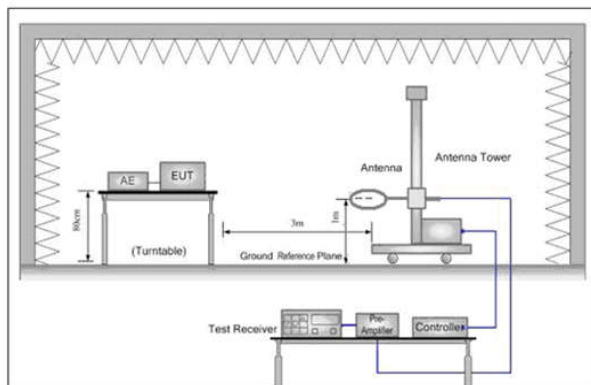


Figure 1. Below 30MHz

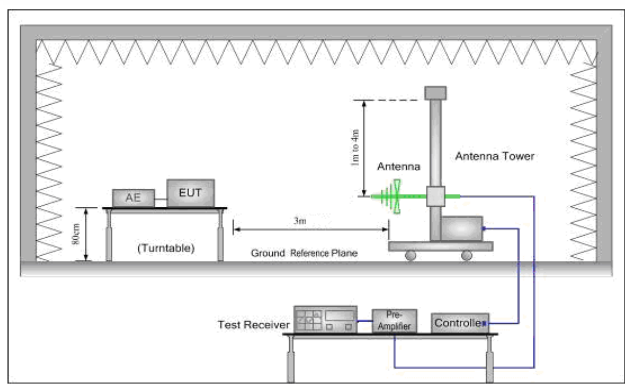


Figure 2. 30MHz to 1GHz

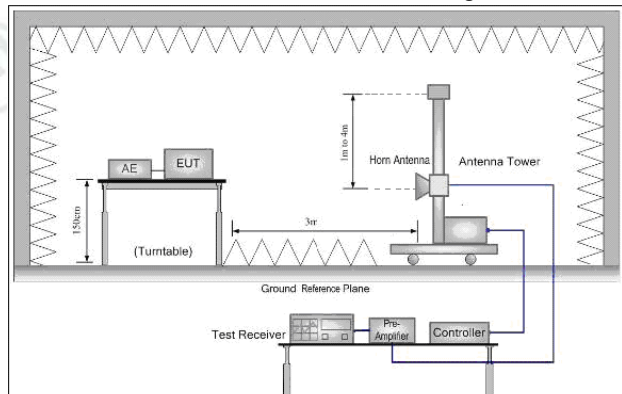
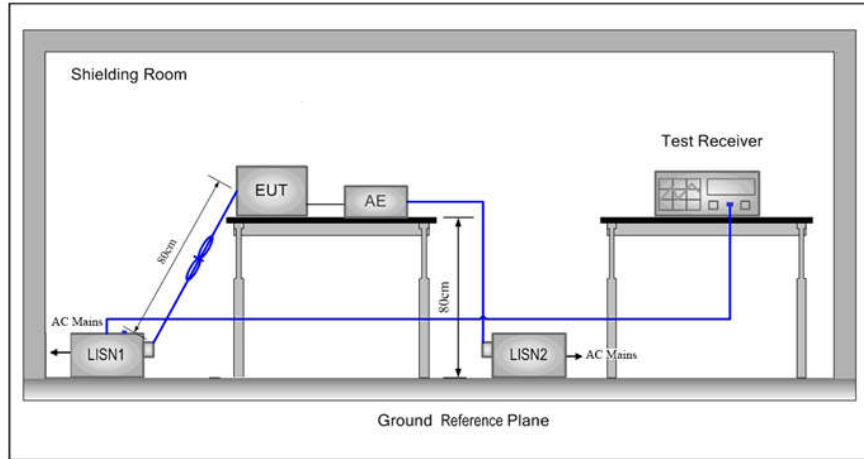


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	24.0 °C
Humidity:	53 % 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

Mode	802.11b				X				
Data Rate	1Mbps	2Mbps	5.5Mbps	11Mbps					
Power(dBm)	12.79	12.77	12.75	12.73					
Mode	802.11g								
Data Rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps	
Power(dBm)	13.13	13.11	13.09	13.07	13.05	13.03	13.01	12.99	
Mode	802.11n (HT20)								
Data Rate	6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps	
Power(dBm)	12.92	12.90	12.88	12.86	12.84	12.82	12.80	12.78	
Mode	802.11n (HT40)								
Data Rate	13.5Mbps	27Mbps	40.5Mbps	54Mbps	81Mbps	108Mbps	121.5Mbps	135Mbps	
Power(dBm)	12.46	12.44	12.42	12.40	12.38	12.36	12.34	12.32	

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:	Shenzhen Creality 3D Technology Co., Ltd.
Address of Applicant:	11F & Room 1201, Block 3, JinChengYuan, Tongsheng Community, Dalang, Longhua District, Shenzhen, China
Manufacturer:	Shenzhen Creality 3D Technology Co., Ltd.
Address of Manufacturer:	11F & Room 1201, Block 3, JinChengYuan, Tongsheng Community, Dalang, Longhua District, Shenzhen, China
Factory:	Shenzhen Creality 3D Technology Co., Ltd.
Address of Factory:	1F & 4F Block F, Yujianfeng Industrial Area, No.289 Huafan Road, Tongsheng Community, Dalang, Longhua District, Shenzhen, China

6.2 General Description of EUT

Product Name:	CREALITY BOX
Model No.(EUT):	WB-01
Trade mark:	CREALITY
EUT Supports Radios application:	IEEE 802.11 b/g/n(HT20)(HT40): 2412MHz to 2462MHz
Power Supply:	DC 5V
Sample Received Date:	Sep. 03, 2020
Sample tested Date:	Sep. 03, 2020 to Sep. 17, 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:	QATool_Dbg.exe
Antenna Type and Gain:	Type: PCB antenna Gain: 2dBi
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		
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 with associated equipment below.

Associated equipment name		Manufacturer	Model	S/N serial number	Certification	Supplied by
AE1	Notebook	DELL	DELL 3490	D245DX2	CE & FCC	DELL

6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd
 Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China
 Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385
 No tests were sub-contracted.
 FCC Designation No.: CN1164

6.6 Deviation from Standards

None.

6.7 Abnormalities from Standard Conditions

None.

6.8 Other Information Requested by the Customer

None.

6.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (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)
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	matturo	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
TRIOLOG 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:

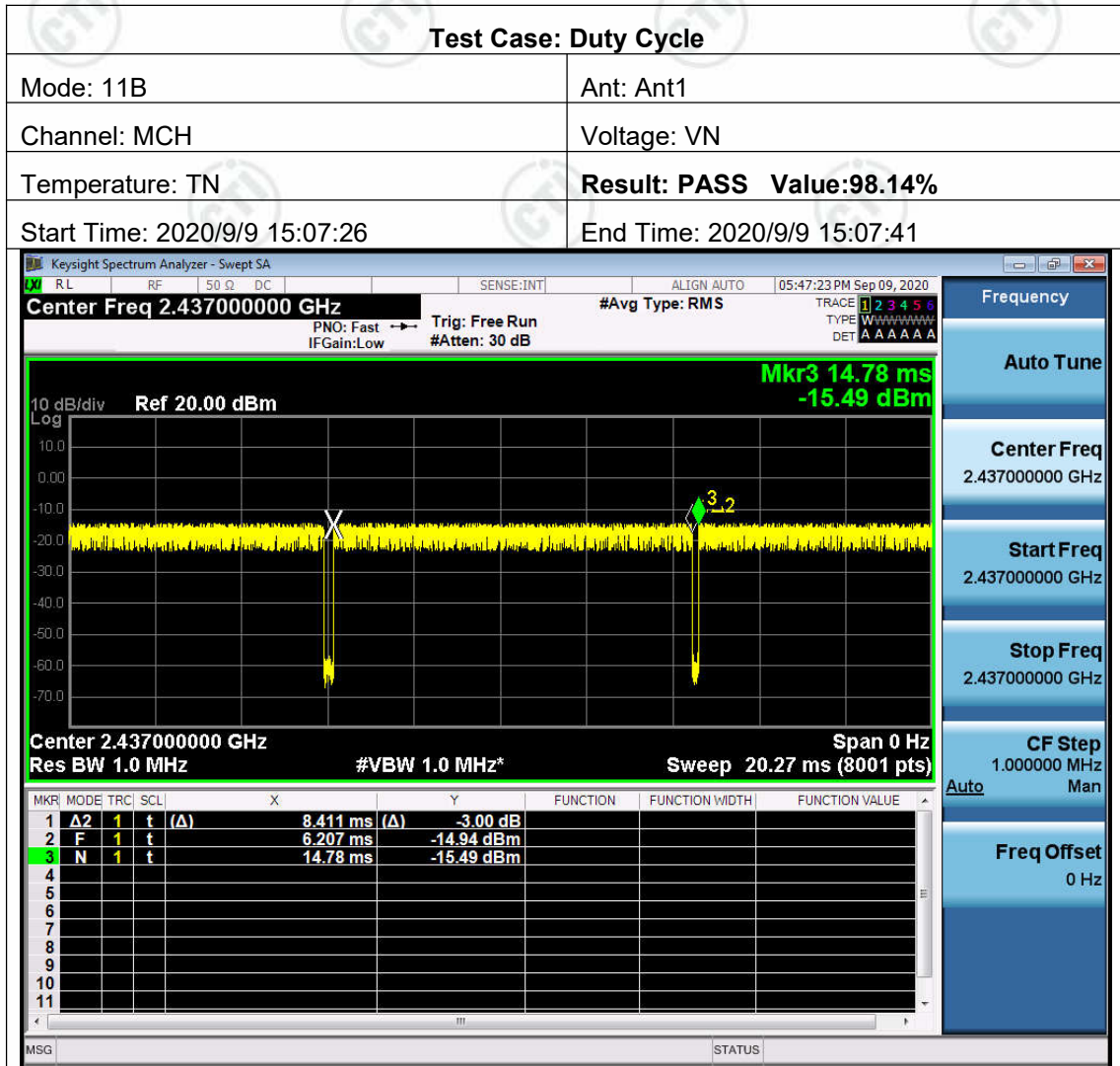
Test Requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (b)(3)	ANSI C63.10	Conducted Peak Output Power	PASS	Appendix A)
Part15C Section 15.247 (a)(2)	ANSI C63.10	6dB Occupied Bandwidth	PASS	Appendix B)
Part15C Section 15.247(d)	ANSI C63.10	Band-edge for RF Conducted Emissions	PASS	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)

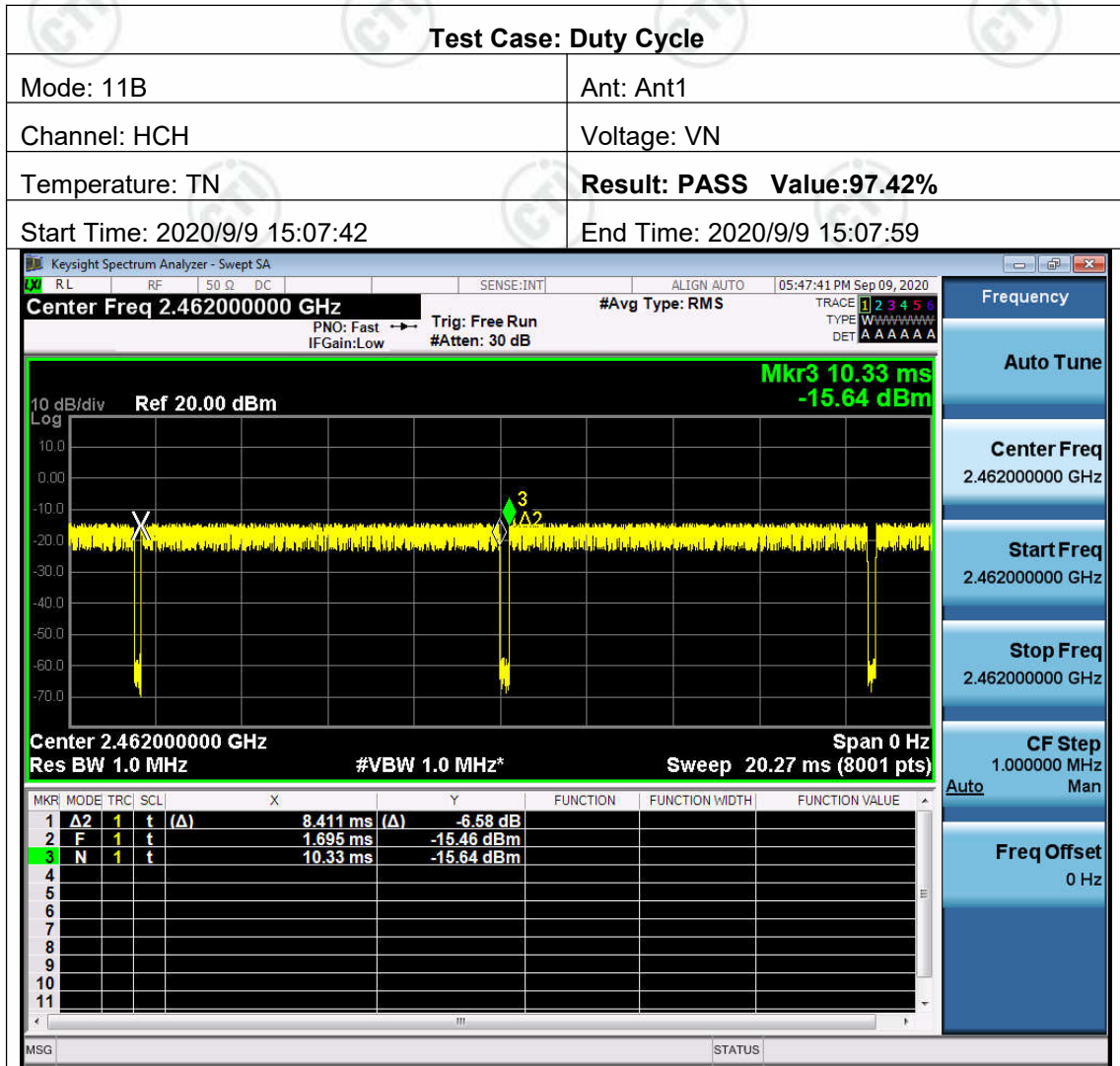
EUT DUTY CYCLE

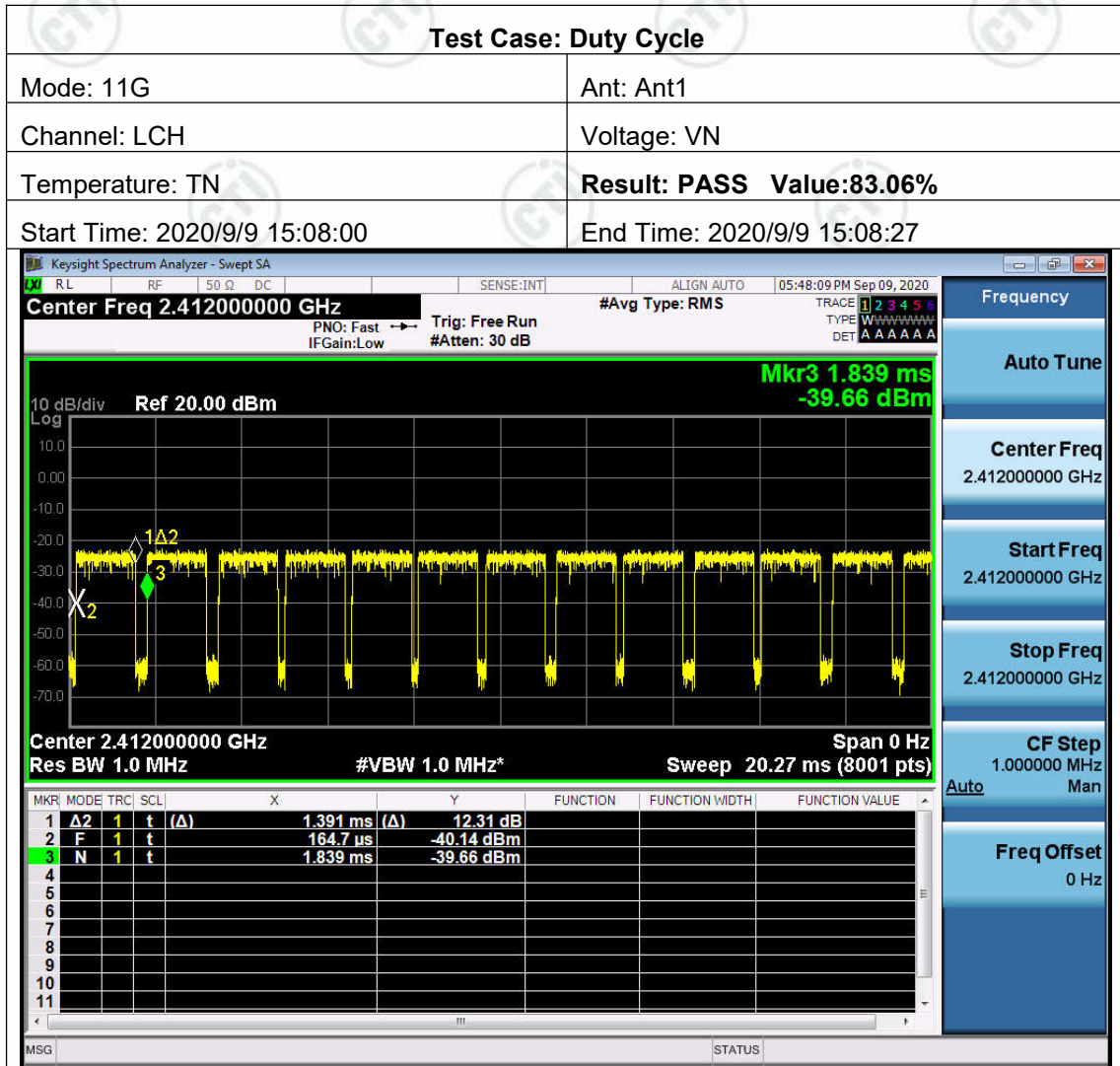
Test Case: Duty Cycle	
Mode: 11B	Ant: Ant1
Channel: LCH	Voltage: VN
Temperature: TN	Result: PASS Value:97.62%
Start Time: 2020/9/9 15:07:18	End Time: 2020/9/9 15:07:26

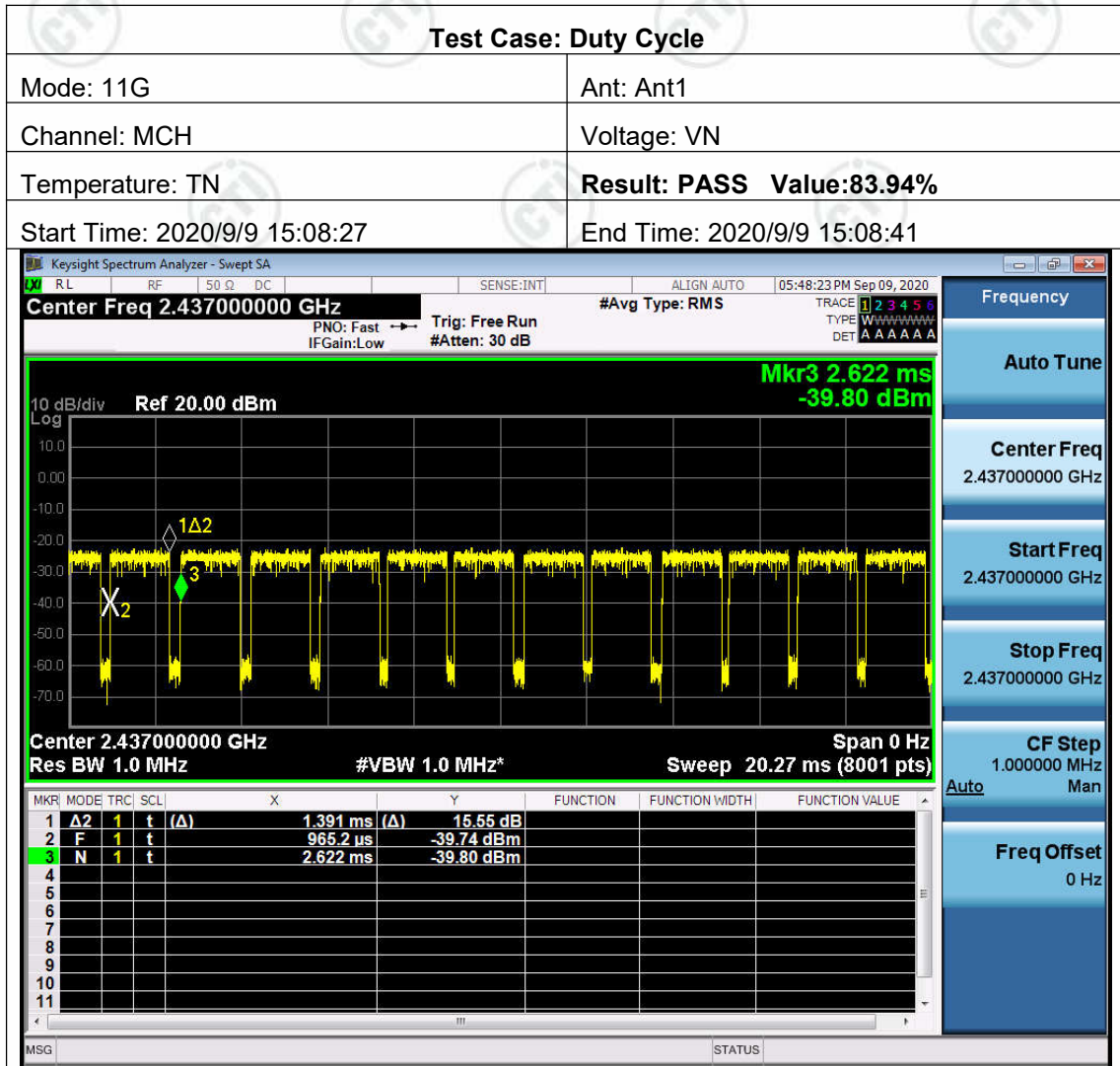
The screenshot shows a Keysight Spectrum Analyzer interface. The main display is a log-log plot of power spectral density (PSD) in dBm/Hz versus frequency in GHz. The center frequency is 2.412 GHz. A signal trace is visible as a yellow horizontal band. Two markers are placed on the trace: a vertical marker at 16.82 ms and a horizontal marker at -15.82 dBm. The plot settings include a resolution bandwidth (Res BW) of 1.0 MHz and a span of 0 Hz. The reference level is 20.00 dBm. The interface also shows various control panels on the right, including 'Auto Tune', 'Center Freq', 'Start Freq', 'Stop Freq', 'CF Step', and 'Freq Offset'.

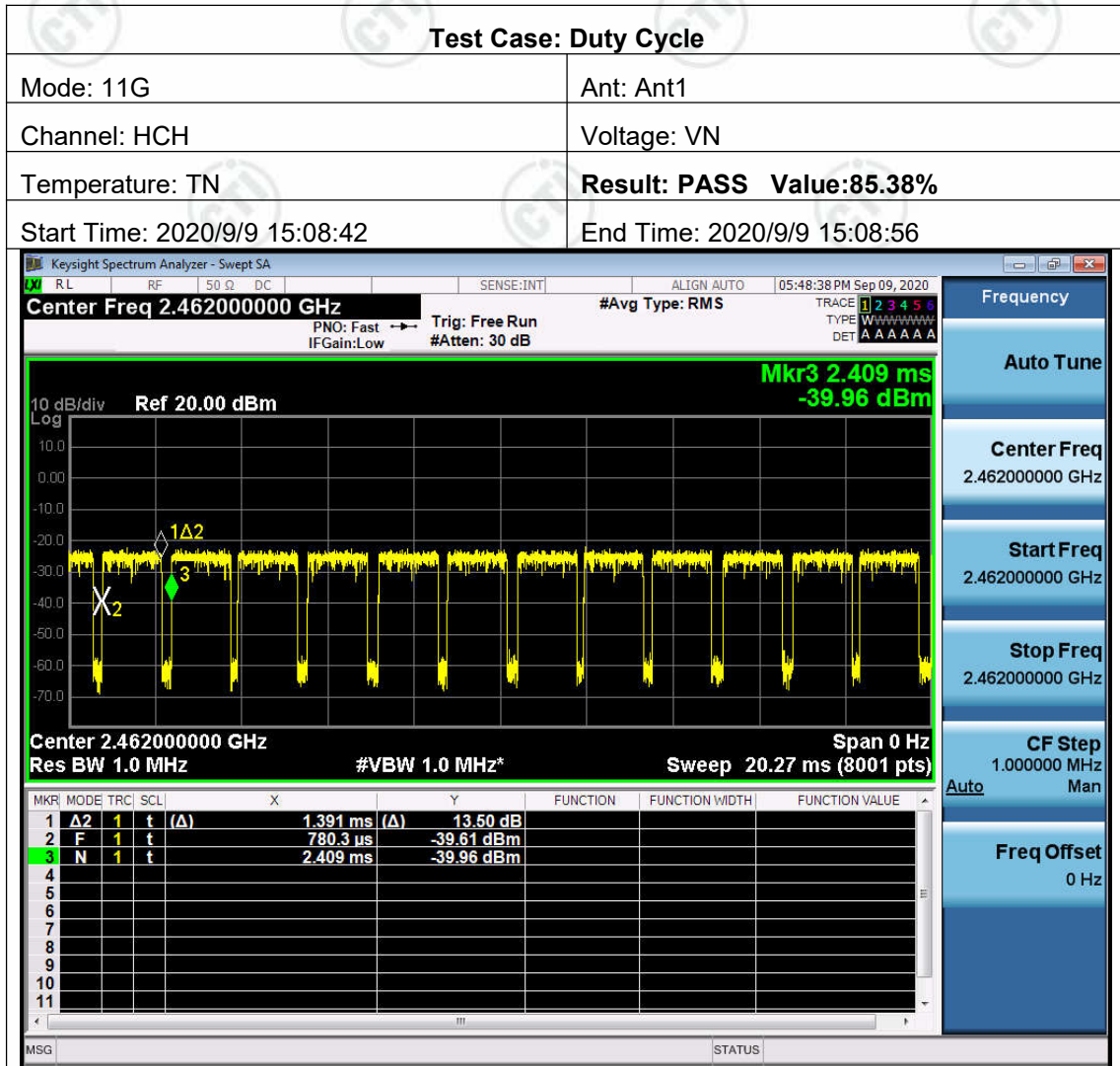
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ	1	t	8.411 ms (Δ)	-3.72 dB			
2	F	1	t	8.203 ms	-14.84 dBm			
3	N	1	t	16.82 ms	-15.82 dBm			
4								
6								
6								
7								
8								
9								
10								
11								

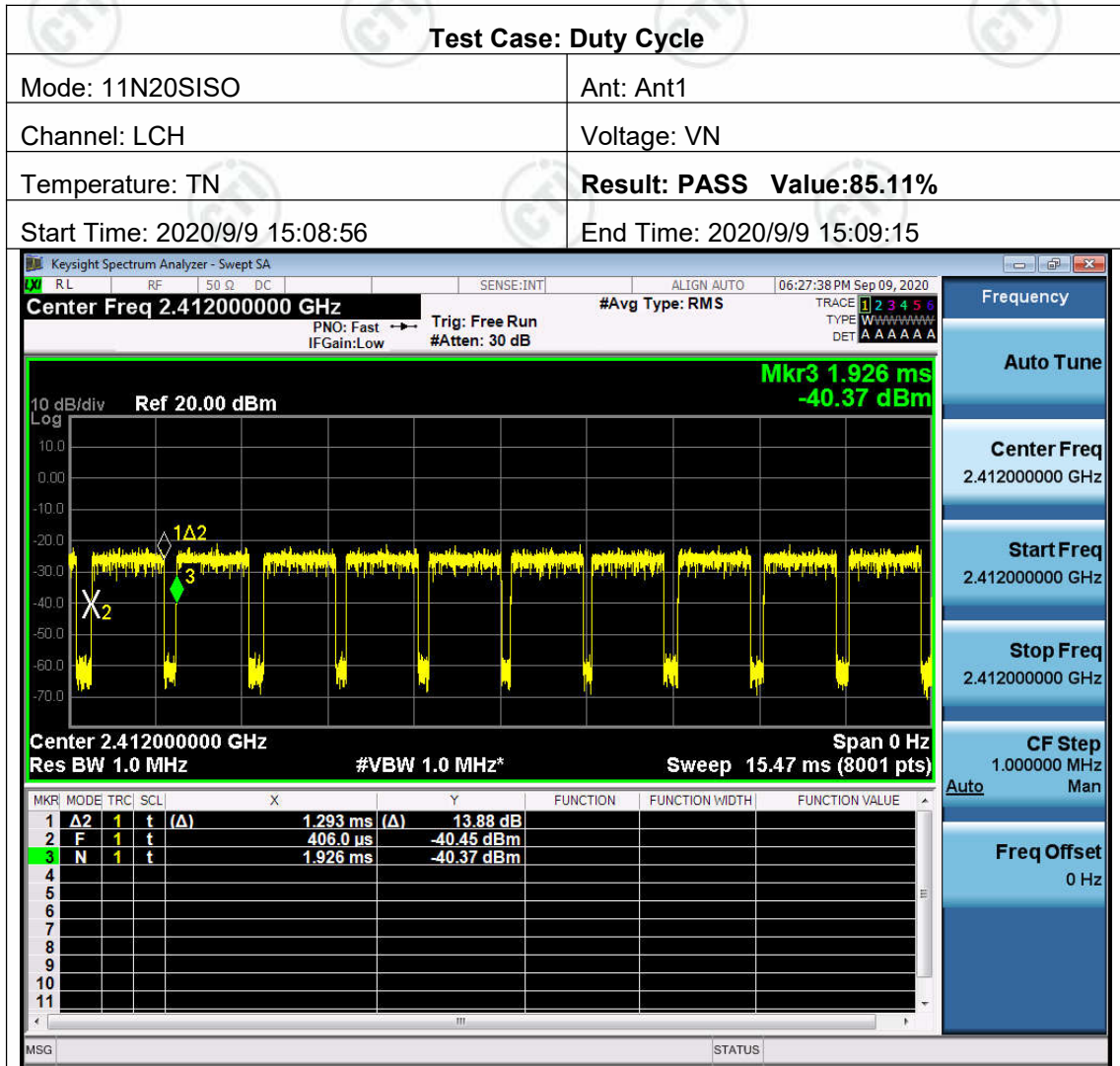


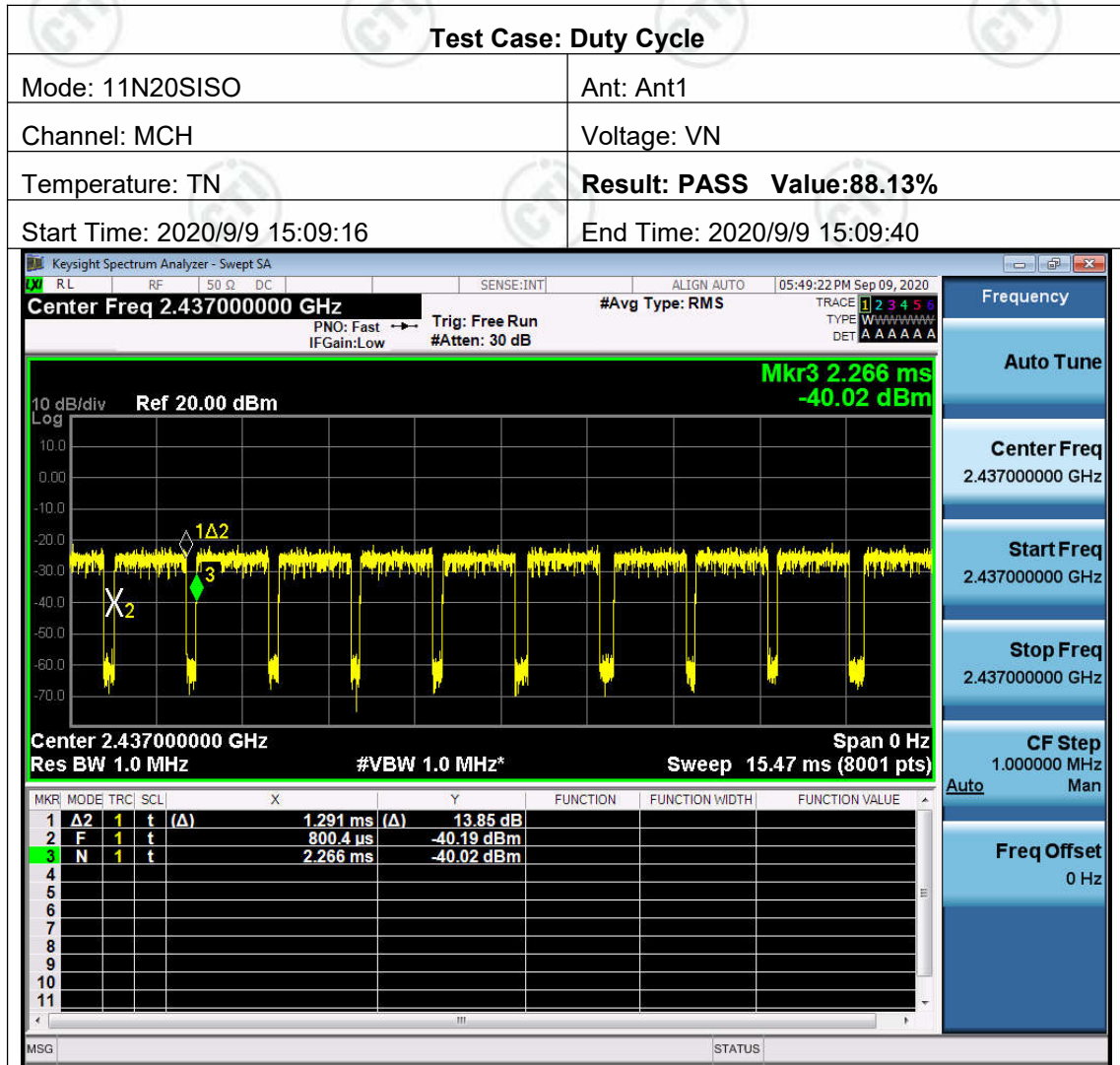


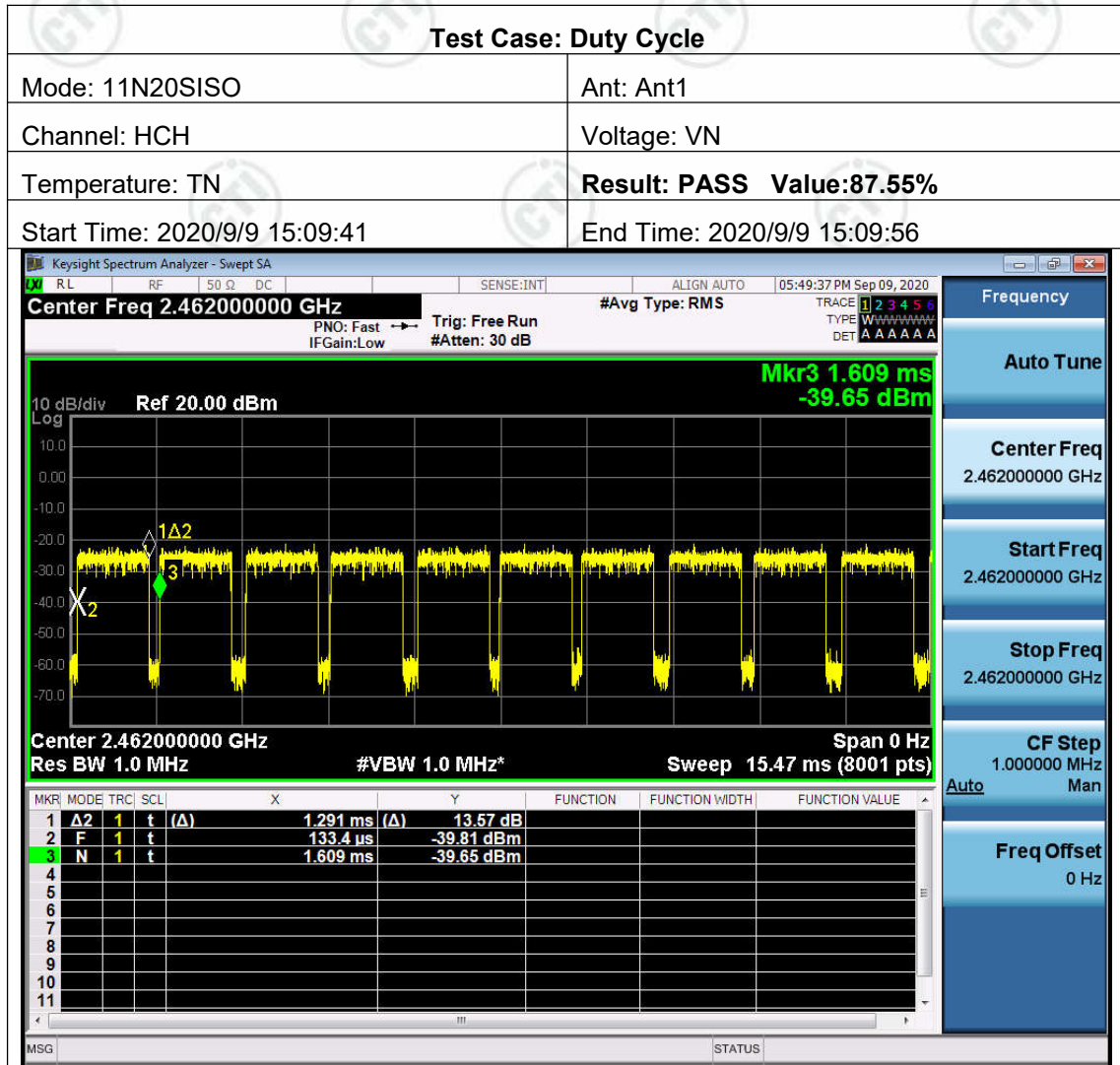


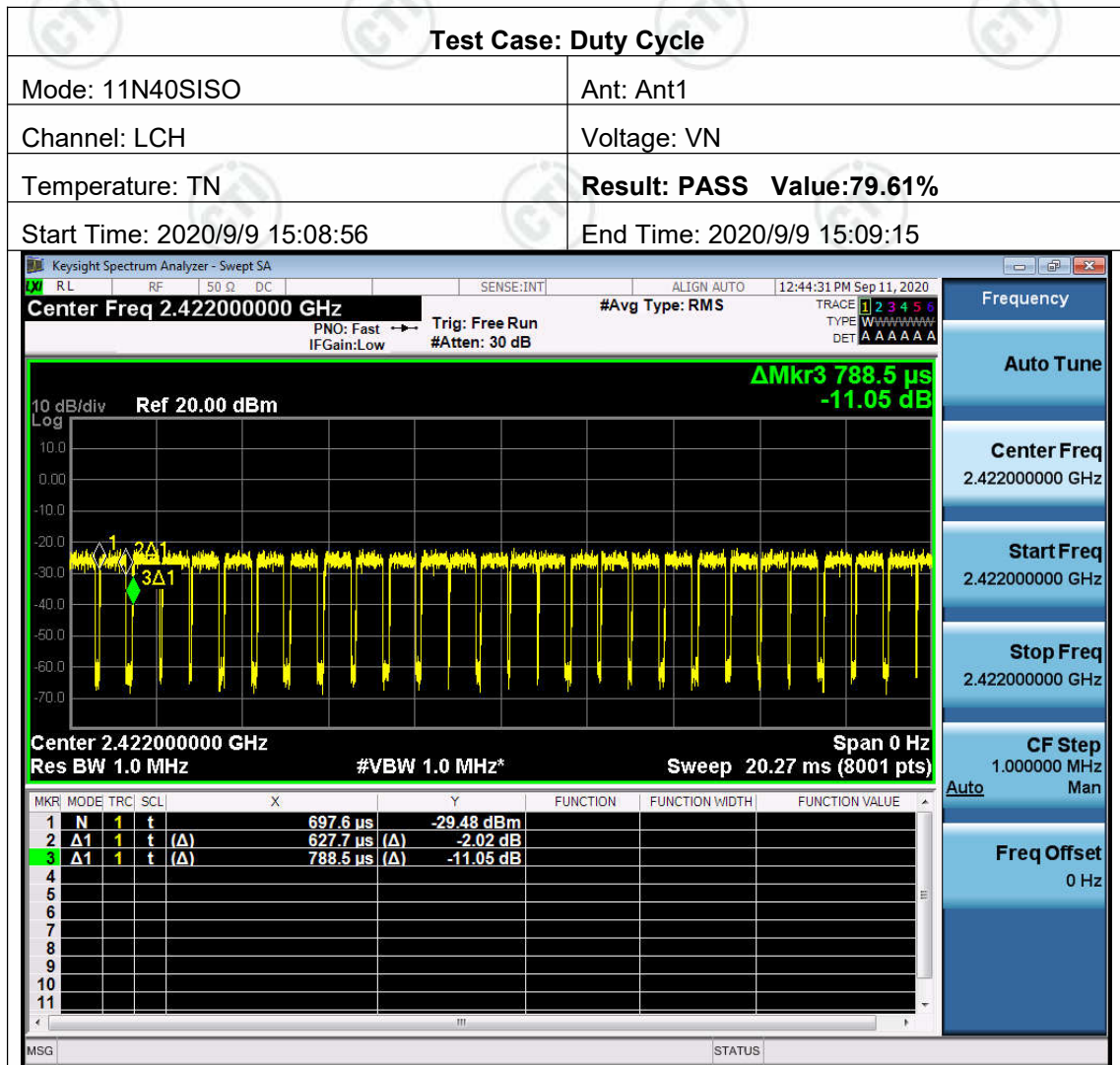


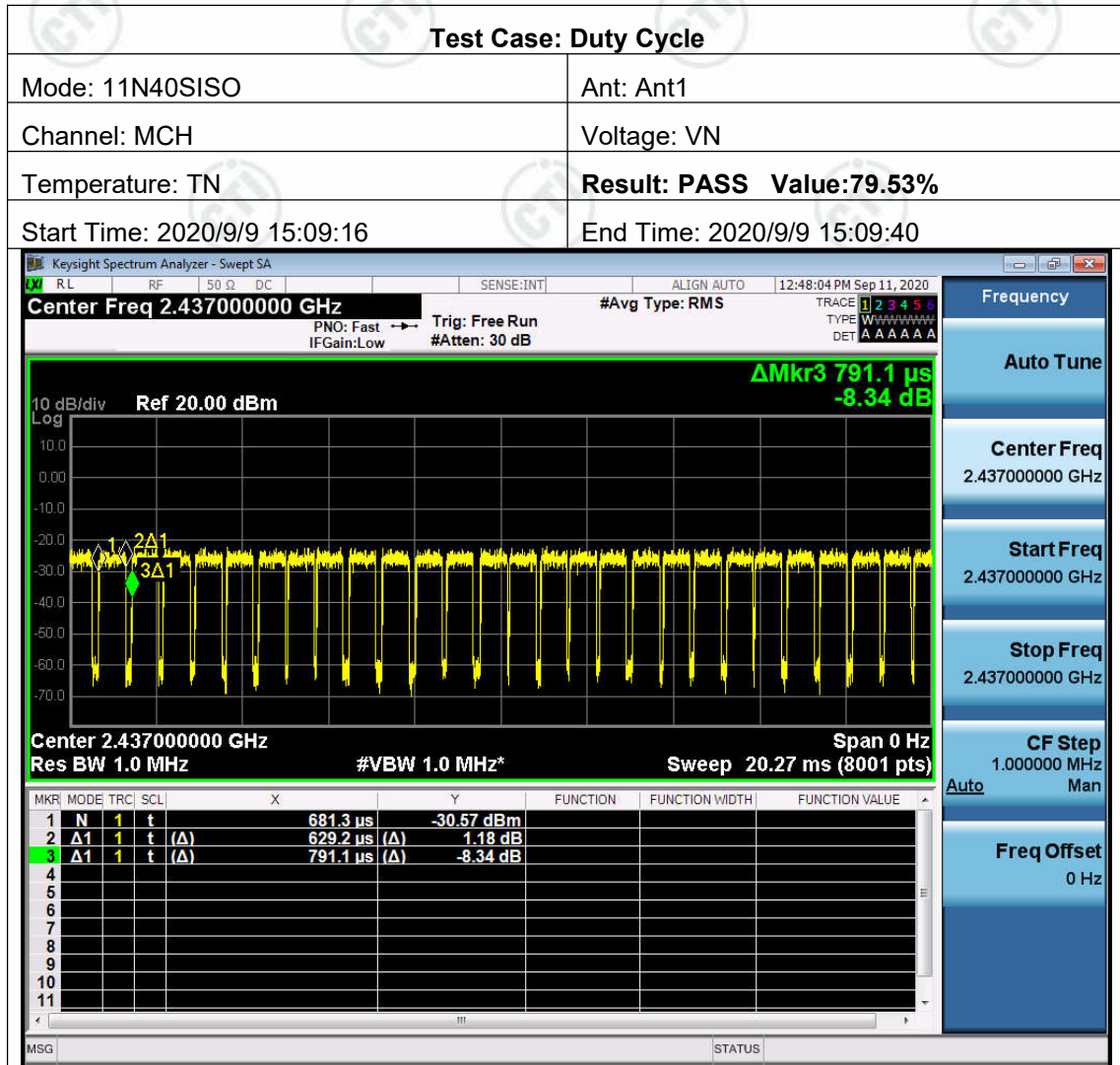


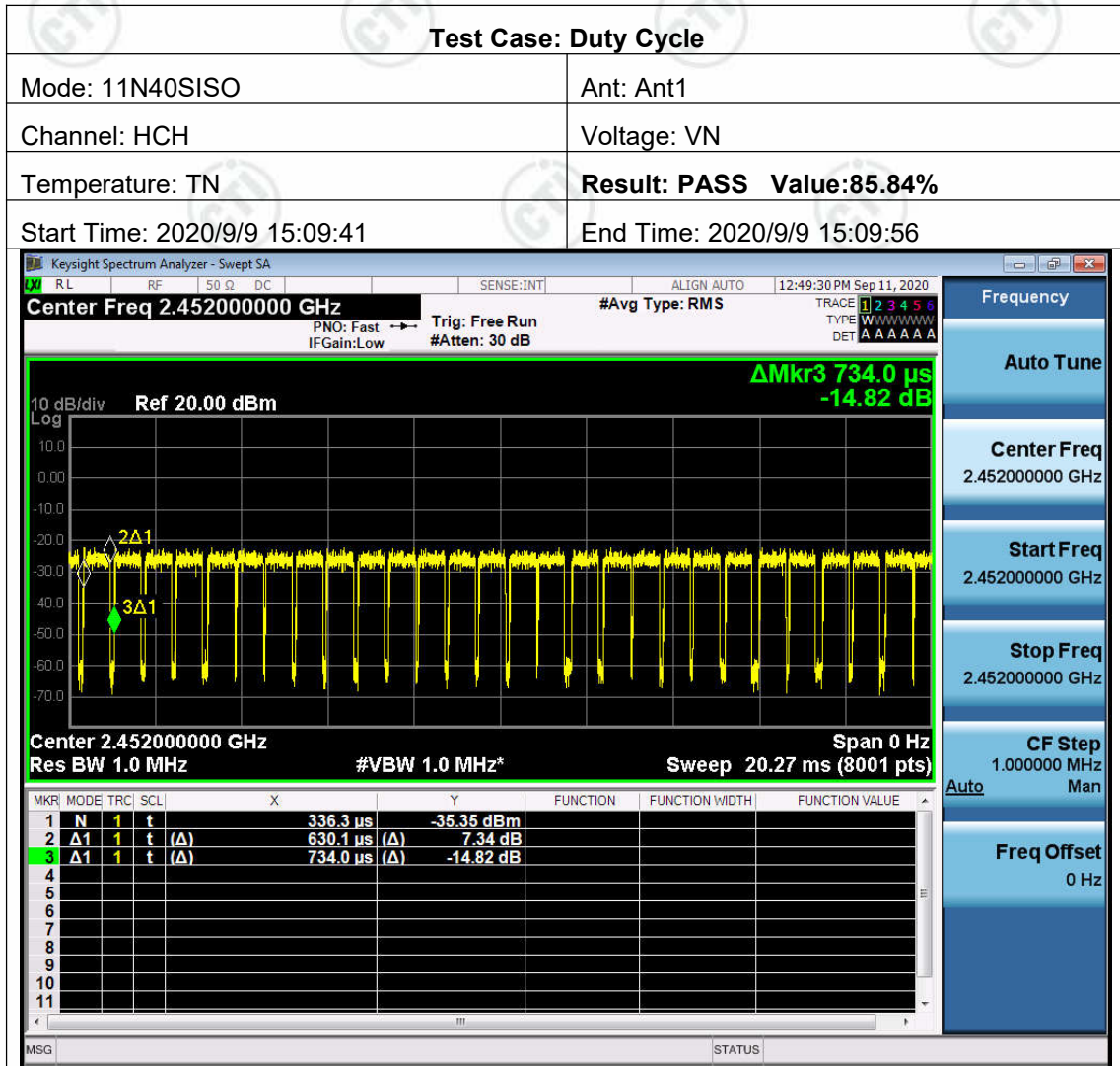












Appendix A): Conducted Peak Output Power

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	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 30dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [Limit = 30 – (DG – 6)] <input type="checkbox"/> Point-to-point operation :
-------	---

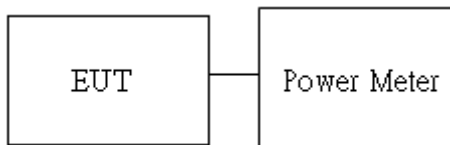
Average output power : For reporting purposes only.

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

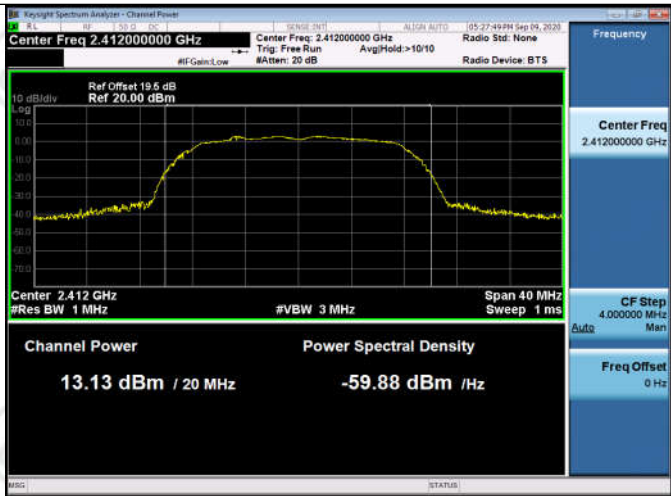


Result Table

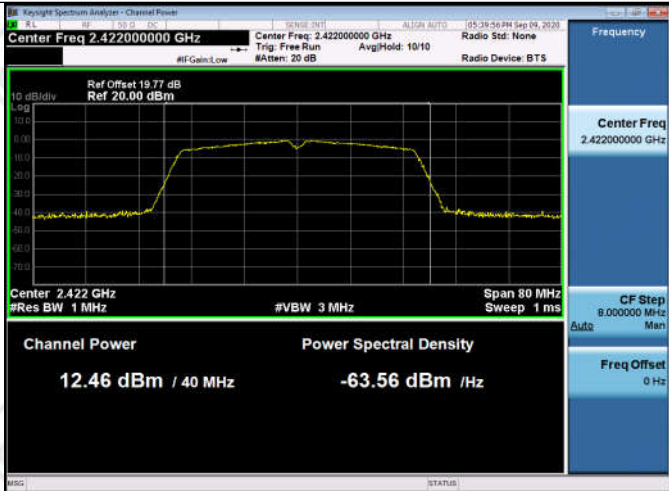
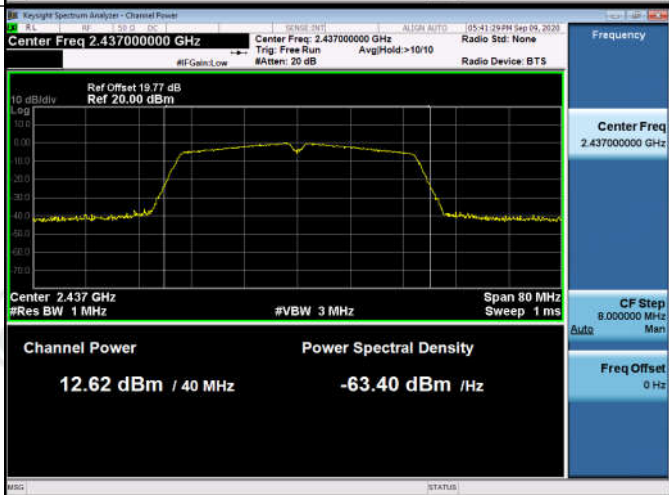

Mode	Channel	Conducted Peak Output Power [dBm]	Verdict
11B	LCH	12.79	PASS
11B	MCH	13.39	PASS
11B	HCH	13.26	PASS
11G	LCH	13.13	PASS
11G	MCH	13.49	PASS
11G	HCH	13.59	PASS
11N20SISO	LCH	12.92	PASS
11N20SISO	MCH	13.32	PASS
11N20SISO	HCH	13.38	PASS
11N40SISO	LCH	12.46	PASS
11N40SISO	MCH	12.62	PASS
11N40SISO	HCH	12.67	PASS

Test Graph



<p>11G/LCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.6 dB Ref 20.00 dBm</p> <p>Channel Power: 13.13 dBm / 20 MHz</p> <p>Power Spectral Density: -59.88 dBm / Hz</p> <p>Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms</p>
<p>11G/MCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.77 dB Ref 20.00 dBm</p> <p>Channel Power: 13.49 dBm / 20 MHz</p> <p>Power Spectral Density: -59.52 dBm / Hz</p> <p>Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms</p>
<p>11G/HCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.77 dB Ref 20.00 dBm</p> <p>Channel Power: 13.59 dBm / 20 MHz</p> <p>Power Spectral Density: -59.42 dBm / Hz</p> <p>Center 2.462 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms</p>

<p>11N20SISO/LCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.412000000 GHz Center Freq: 2.412000000 GHz Radio Std: None</p> <p>Ref Offset 19.6 dB Ref 20.00 dBm</p> <p>Channel Power: 12.92 dBm / 20 MHz</p> <p>Power Spectral Density: -60.09 dBm / Hz</p> <p>Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms</p>
<p>11N20SISO/MCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Radio Std: None</p> <p>Ref Offset 19.77 dB Ref 20.00 dBm</p> <p>Channel Power: 13.32 dBm / 20 MHz</p> <p>Power Spectral Density: -59.69 dBm / Hz</p> <p>Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms</p>
<p>11N20SISO/HCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.462000000 GHz Center Freq: 2.462000000 GHz Radio Std: None</p> <p>Ref Offset 19.77 dB Ref 20.00 dBm</p> <p>Channel Power: 13.38 dBm / 20 MHz</p> <p>Power Spectral Density: -59.63 dBm / Hz</p> <p>Center 2.462 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms</p>

<p>11N40SISO/LCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.422000000 GHz Center Freq: 2.422000000 GHz Radio Std: None</p> <p>Ref Offset 19.77 dB Ref 20.00 dBm</p> <p>Channel Power: 12.46 dBm / 40 MHz Power Spectral Density: -63.56 dBm / Hz</p> <p>Center 2.422 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms</p>
<p>11N40SISO/MCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Radio Std: None</p> <p>Ref Offset 19.77 dB Ref 20.00 dBm</p> <p>Channel Power: 12.62 dBm / 40 MHz Power Spectral Density: -63.40 dBm / Hz</p> <p>Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms</p>
<p>11N40SISO/HCH</p>	 <p>Keysight Spectrum Analyzer - Channel Power</p> <p>Center Freq 2.452000000 GHz Center Freq: 2.452000000 GHz Radio Std: None</p> <p>Ref Offset 19.77 dB Ref 10.00 dBm</p> <p>Channel Power: 12.67 dBm / 40 MHz Power Spectral Density: -63.36 dBm / Hz</p> <p>Center 2.452 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms</p>

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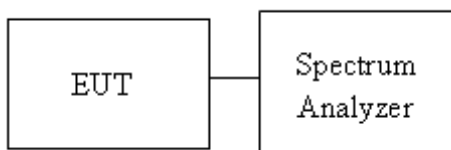
Occupied Bandwidth(99%) : For reporting purposes only.

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



Result Table
6 dB Bandwidth

Mode	Channel	6 dB Bandwidth [MHz]	Verdict
11B	LCH	10.01	PASS
11B	MCH	10.00	PASS
11B	HCH	9.577	PASS
11G	LCH	15.02	PASS
11G	MCH	13.86	PASS
11G	HCH	15.09	PASS
11N20SISO	LCH	15.09	PASS
11N20SISO	MCH	15.11	PASS
11N20SISO	HCH	15.10	PASS
11N40SISO	LCH	35.09	PASS
11N40SISO	MCH	35.10	PASS
11N40SISO	HCH	35.05	PASS

Occupied Bandwidth(99%)

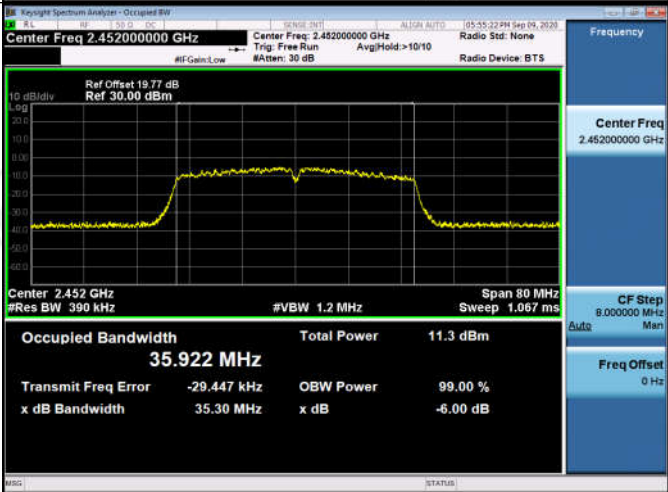
Mode	Channel	99% OBW [MHz]	Verdict
11B	LCH	14.379	PASS
11B	MCH	14.461	PASS
11B	HCH	14.537	PASS
11G	LCH	16.639	PASS
11G	MCH	16.640	PASS
11G	HCH	16.630	PASS
11N20SISO	LCH	17.615	PASS
11N20SISO	MCH	17.596	PASS
11N20SISO	HCH	17.608	PASS
11N40SISO	LCH	35.926	PASS
11N40SISO	MCH	35.923	PASS
11N40SISO	HCH	35.922	PASS

Test Graph
Occupied Bandwidth(99%)



<p>11G/LCH</p>	 <p>Center Freq 2.412000000 GHz</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.6 dB Ref 30.00 dBm</p> <p>Center 2.412 GHz #Res BW 300 kHz</p> <p>Span 40 MHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 16.639 MHz</p> <p>Total Power 11.7 dBm</p> <p>Transmit Freq Error 19.918 kHz</p> <p>x dB Bandwidth 15.97 MHz</p> <p>OBW Power 99.00 %</p> <p>x dB -6.00 dB</p>
<p>11G/MCH</p>	 <p>Center Freq 2.437000000 GHz</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.437 GHz #Res BW 300 kHz</p> <p>Span 40 MHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 16.640 MHz</p> <p>Total Power 12.1 dBm</p> <p>Transmit Freq Error -25.019 kHz</p> <p>x dB Bandwidth 15.90 MHz</p> <p>OBW Power 99.00 %</p> <p>x dB -6.00 dB</p>
<p>11G/HCH</p>	 <p>Center Freq 2.462000000 GHz</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.462 GHz #Res BW 300 kHz</p> <p>Span 40 MHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 16.630 MHz</p> <p>Total Power 12.1 dBm</p> <p>Transmit Freq Error -53.275 kHz</p> <p>x dB Bandwidth 15.85 MHz</p> <p>OBW Power 99.00 %</p> <p>x dB -6.00 dB</p>

<p>11N20SISO/LCH</p>	 <p>Center Freq 2.412000000 GHz</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.6 dB Ref 30.00 dBm</p> <p>Center 2.412 GHz #Res BW 300 kHz</p> <p>Span 40 MHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 17.615 MHz</p> <p>Total Power 11.7 dBm</p> <p>Transmit Freq Error 42.479 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 17.13 MHz</p> <p>x dB -6.00 dB</p>
<p>11N20SISO/MCH</p>	 <p>Center Freq 2.437000000 GHz</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.437 GHz #Res BW 300 kHz</p> <p>Span 40 MHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 17.596 MHz</p> <p>Total Power 12.1 dBm</p> <p>Transmit Freq Error 16.637 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 17.19 MHz</p> <p>x dB -6.00 dB</p>
<p>11N20SISO/HCH</p>	 <p>Center Freq 2.462000000 GHz</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.462 GHz #Res BW 300 kHz</p> <p>Span 40 MHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 17.608 MHz</p> <p>Total Power 12.0 dBm</p> <p>Transmit Freq Error -8.300 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 17.20 MHz</p> <p>x dB -6.00 dB</p>

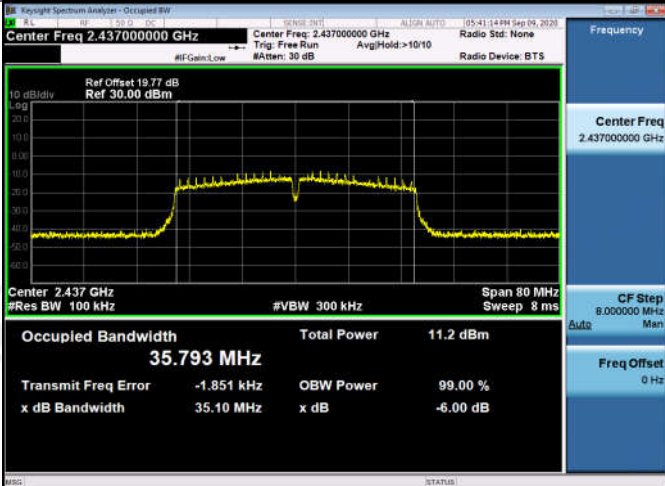
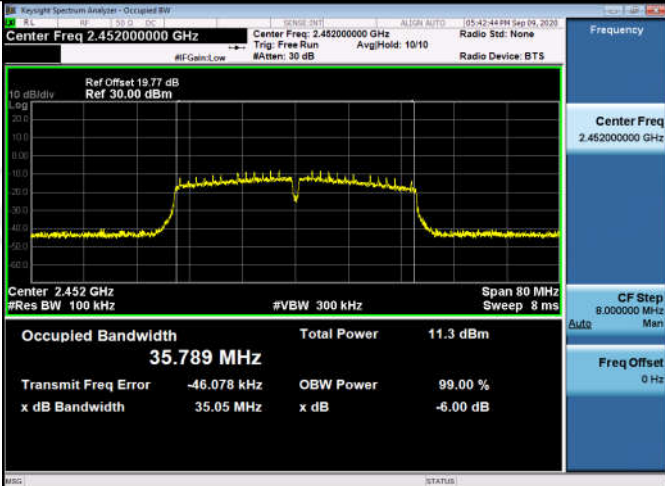
<p>11N40SISO/LCH</p>	 <p>Center Freq 2.422000000 GHz</p> <p>Center Freq 2.422000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.422 GHz #Res BW 390 kHz</p> <p>Span 80 MHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 35.926 MHz Total Power 11.1 dBm</p> <p>Transmit Freq Error 55.857 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 34.52 MHz x dB -6.00 dB</p>
<p>11N40SISO/MCH</p>	 <p>Center Freq 2.437000000 GHz</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.437 GHz #Res BW 390 kHz</p> <p>Span 80 MHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 35.923 MHz Total Power 11.3 dBm</p> <p>Transmit Freq Error 19.118 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 35.11 MHz x dB -6.00 dB</p>
<p>11N40SISO/HCH</p>	 <p>Center Freq 2.452000000 GHz</p> <p>Center Freq 2.452000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.452 GHz #Res BW 390 kHz</p> <p>Span 80 MHz Sweep 1.067 ms</p> <p>Occupied Bandwidth 35.922 MHz Total Power 11.3 dBm</p> <p>Transmit Freq Error -29.447 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 35.30 MHz x dB -6.00 dB</p>

6 dB Bandwidth

Graphs	
11B/LCH	<p>Keyight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.412000000 GHz Center Freq: 2.412000000 GHz Radio Std: None</p> <p>Ref Offset 19.5 dB Ref 30.00 dBm</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth: 14.196 MHz Total Power: 15.7 dBm</p> <p>Transmit Freq Error: 60.443 kHz OBW Power: 99.00 %</p> <p>x dB Bandwidth: 10.01 MHz x dB: -6.00 dB</p>
11B/MCH	<p>Keyight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.437000000 GHz Center Freq: 2.437000000 GHz Radio Std: None</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth: 14.407 MHz Total Power: 19.8 dBm</p> <p>Transmit Freq Error: -8.755 kHz OBW Power: 99.00 %</p> <p>x dB Bandwidth: 10.00 MHz x dB: -6.00 dB</p>
11B/HCH	<p>Keyight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.462000000 GHz Center Freq: 2.462000000 GHz Radio Std: None</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth: 14.415 MHz Total Power: 19.7 dBm</p> <p>Transmit Freq Error: -67.933 kHz OBW Power: 99.00 %</p> <p>x dB Bandwidth: 9.577 MHz x dB: -6.00 dB</p>

<p>11G/LCH</p>	 <p>Center Freq 2.412000000 GHz</p> <p>Center Freq 2.412000000 GHz</p> <p>Ref Offset 19.6 dB Ref 30.00 dBm</p> <p>Center 2.412 GHz #Res BW 100 kHz</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth 16.338 MHz</p> <p>Total Power 18.0 dBm</p> <p>Transmit Freq Error 18.019 kHz</p> <p>x dB Bandwidth 15.02 MHz</p> <p>OBW Power 99.00 %</p> <p>x dB -6.00 dB</p>
<p>11G/MCH</p>	 <p>Center Freq 2.437000000 GHz</p> <p>Center Freq 2.437000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth 16.305 MHz</p> <p>Total Power 12.0 dBm</p> <p>Transmit Freq Error 9.483 kHz</p> <p>x dB Bandwidth 13.86 MHz</p> <p>OBW Power 99.00 %</p> <p>x dB -6.00 dB</p>
<p>11G/HCH</p>	 <p>Center Freq 2.462000000 GHz</p> <p>Center Freq 2.462000000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.462 GHz #Res BW 100 kHz</p> <p>Span 40 MHz Sweep 4.267 ms</p> <p>Occupied Bandwidth 16.311 MHz</p> <p>Total Power 12.0 dBm</p> <p>Transmit Freq Error -4.991 kHz</p> <p>x dB Bandwidth 15.09 MHz</p> <p>OBW Power 99.00 %</p> <p>x dB -6.00 dB</p>

<p>11N20SISO/LCH</p>	<p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.412000000 GHz Center Freq: 2.412000000 GHz Radio Std: None</p> <p>Ref Offset 19.6 dB Ref 30.00 dBm</p> <p>Center 2.412 GHz Span 40 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.267 ms</p> <p>Occupied Bandwidth 17.484 MHz Total Power 11.6 dBm</p> <p>Transmit Freq Error 23.567 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 15.09 MHz x dB -6.00 dB</p>
<p>11N20SISO/MCH</p>	<p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Radio Std: None</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.437 GHz Span 40 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.267 ms</p> <p>Occupied Bandwidth 17.481 MHz Total Power 12.0 dBm</p> <p>Transmit Freq Error 6.881 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 15.11 MHz x dB -6.00 dB</p>
<p>11N20SISO/HCH</p>	<p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.462000000 GHz Center Freq: 2.462000000 GHz Radio Std: None</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.462 GHz Span 40 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 4.267 ms</p> <p>Occupied Bandwidth 17.488 MHz Total Power 12.0 dBm</p> <p>Transmit Freq Error -5.923 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 15.10 MHz x dB -6.00 dB</p>

<p>11N40SISO/LCH</p>	 <p>Center Freq 2.42200000 GHz</p> <p>Center Freq 2.42200000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.422 GHz #Res BW 100 kHz</p> <p>Span 80 MHz Sweep 8 ms</p> <p>Occupied Bandwidth 35.820 MHz Total Power 11.0 dBm</p> <p>Transmit Freq Error 41.669 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 35.09 MHz x dB -6.00 dB</p>
<p>11N40SISO/MCH</p>	 <p>Center Freq 2.43700000 GHz</p> <p>Center Freq 2.43700000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.437 GHz #Res BW 100 kHz</p> <p>Span 80 MHz Sweep 8 ms</p> <p>Occupied Bandwidth 35.793 MHz Total Power 11.2 dBm</p> <p>Transmit Freq Error -1.851 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 35.10 MHz x dB -6.00 dB</p>
<p>11N40SISO/HCH</p>	 <p>Center Freq 2.45200000 GHz</p> <p>Center Freq 2.45200000 GHz</p> <p>Ref Offset 19.77 dB Ref 30.00 dBm</p> <p>Center 2.452 GHz #Res BW 100 kHz</p> <p>Span 80 MHz Sweep 8 ms</p> <p>Occupied Bandwidth 35.789 MHz Total Power 11.3 dBm</p> <p>Transmit Freq Error -46.078 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 35.05 MHz x dB -6.00 dB</p>

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,

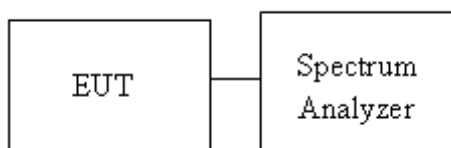
Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

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.

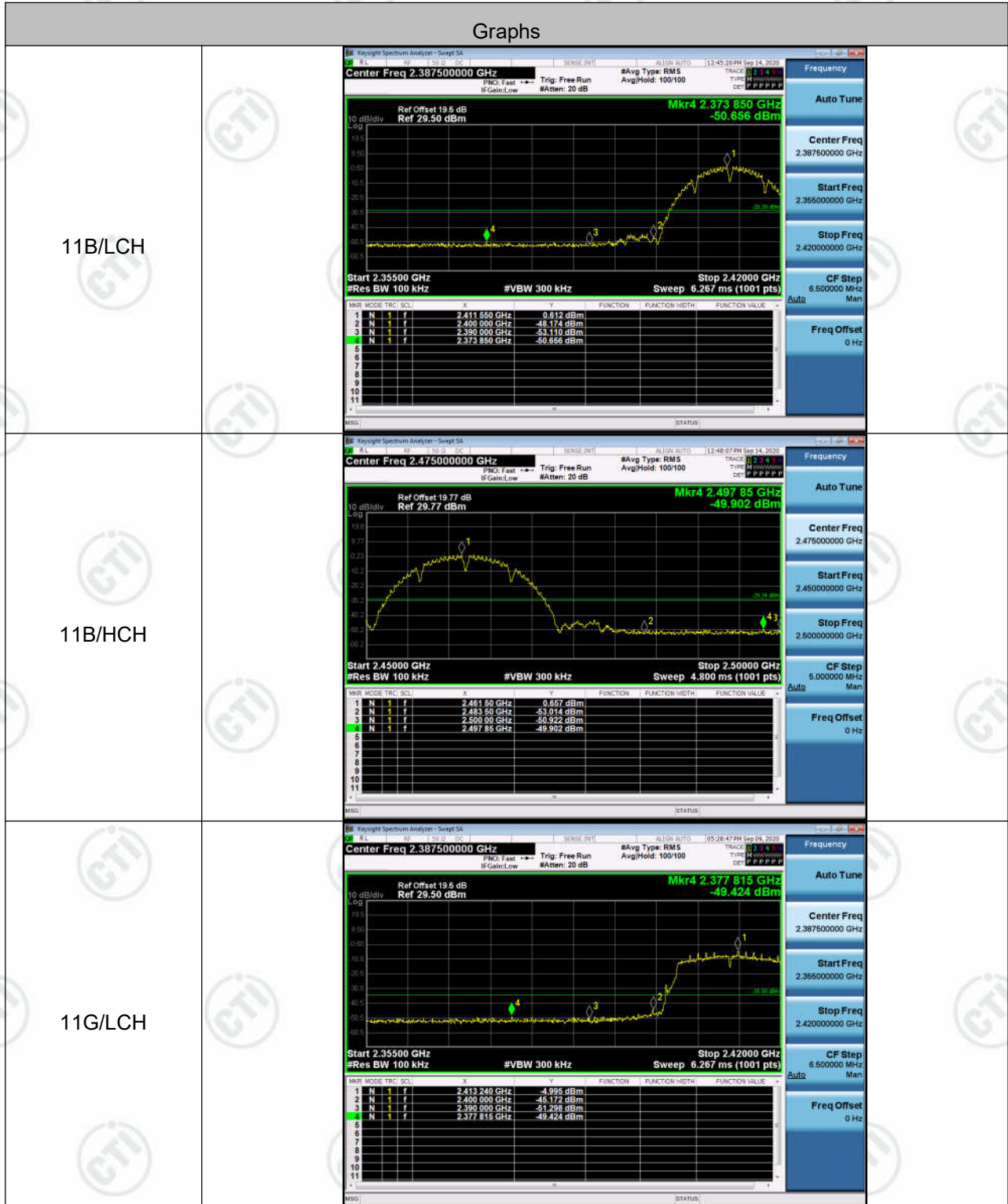
Test Setup



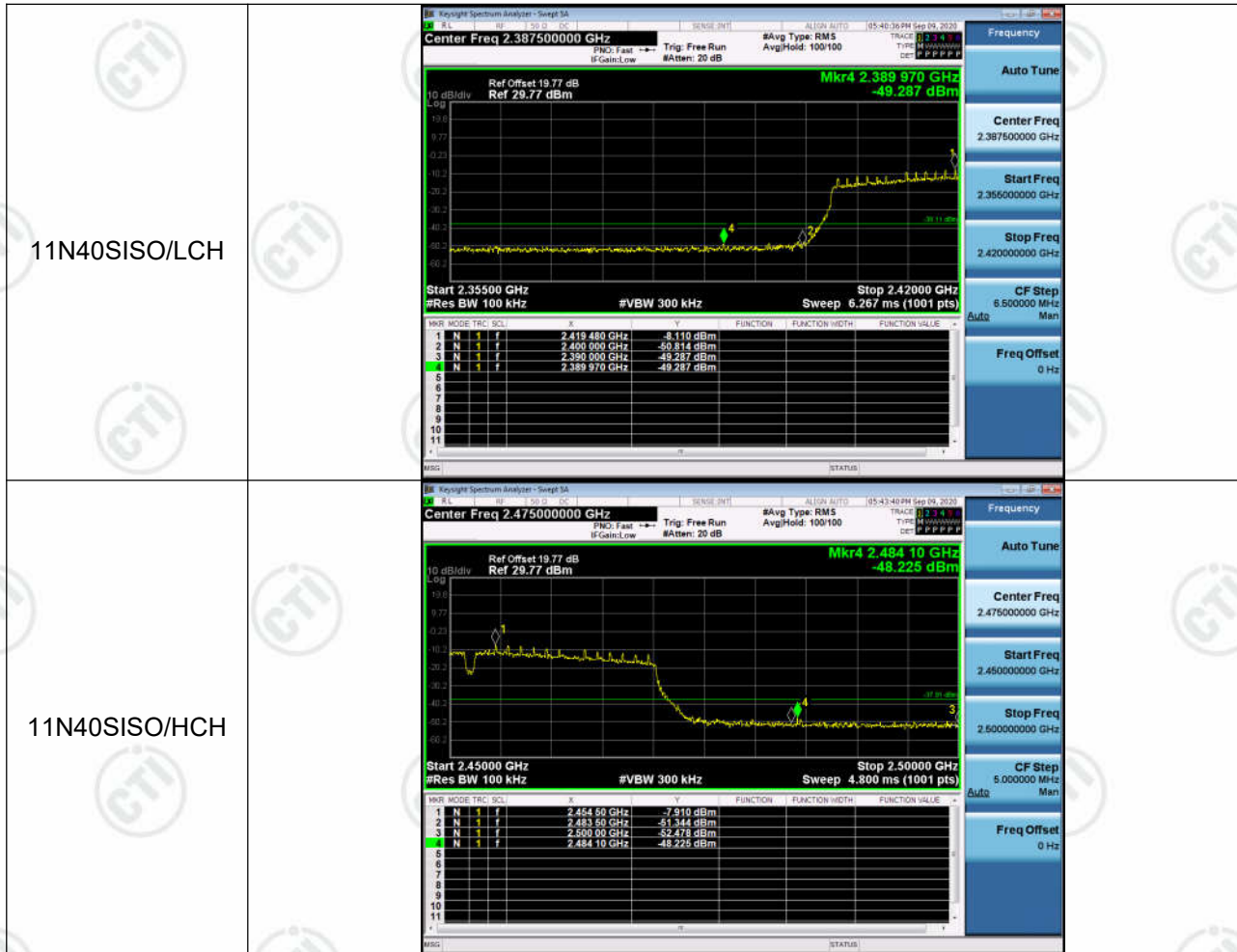
Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	0.612	-50.656	-29.39	PASS
11B	HCH	0.657	-49.902	-29.34	PASS
11G	LCH	-4.995	-49.424	-35	PASS
11G	HCH	-4.819	-49.816	-34.82	PASS
11N20SISO	LCH	-5.268	-49.554	-35.27	PASS
11N20SISO	HCH	-4.983	-49.133	-34.98	PASS
11N40SISO	LCH	-8.110	-49.287	-38.11	PASS
11N40SISO	HCH	-7.910	-48.225	-37.91	PASS

Test Graph



<p>11G/HCH</p>	<p>Key parameters from screenshot:</p> <ul style="list-style-type: none"> Center Freq: 2.47500000 GHz Mkr4: 2.483 90 GHz, -49.816 dBm Start Freq: 2.45000000 GHz Stop Freq: 2.50000000 GHz Res BW: 100 kHz #VBW: 300 kHz Sweep: 4.800 ms (1001 pts)
<p>11N20SISO/LCH</p>	<p>Key parameters from screenshot:</p> <ul style="list-style-type: none"> Center Freq: 2.38750000 GHz Mkr4: 2.365 335 GHz, -49.554 dBm Start Freq: 2.35500000 GHz Stop Freq: 2.42000000 GHz Res BW: 100 kHz #VBW: 300 kHz Sweep: 6.267 ms (1001 pts)
<p>11N20SISO/HCH</p>	<p>Key parameters from screenshot:</p> <ul style="list-style-type: none"> Center Freq: 2.47500000 GHz Mkr4: 2.484 15 GHz, -49.133 dBm Start Freq: 2.45000000 GHz Stop Freq: 2.50000000 GHz Res BW: 100 kHz #VBW: 300 kHz Sweep: 4.800 ms (1001 pts)



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



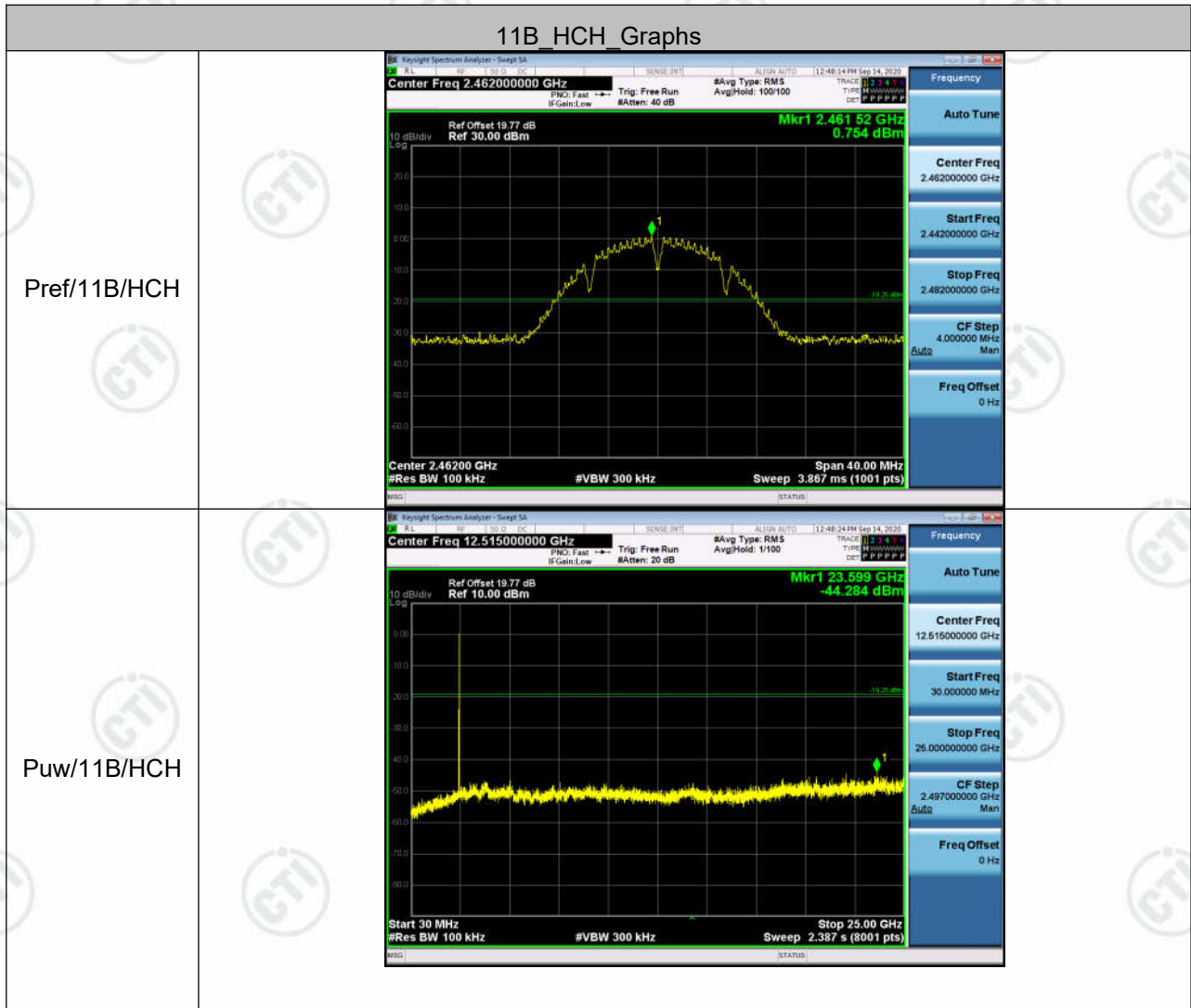
Result Table

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
11B	LCH	0.715	<Limit	PASS
11B	MCH	0.873	<Limit	PASS
11B	HCH	0.754	<Limit	PASS
11G	LCH	-4.702	<Limit	PASS
11G	MCH	-3.931	<Limit	PASS
11G	HCH	-4.392	<Limit	PASS
11N20SISO	LCH	-4.463	<Limit	PASS
11N20SISO	MCH	-4.407	<Limit	PASS
11N20SISO	HCH	-4.35	<Limit	PASS
11N40SISO	LCH	-7.947	<Limit	PASS
11N40SISO	MCH	-7.61	<Limit	PASS
11N40SISO	HCH	-7.775	<Limit	PASS

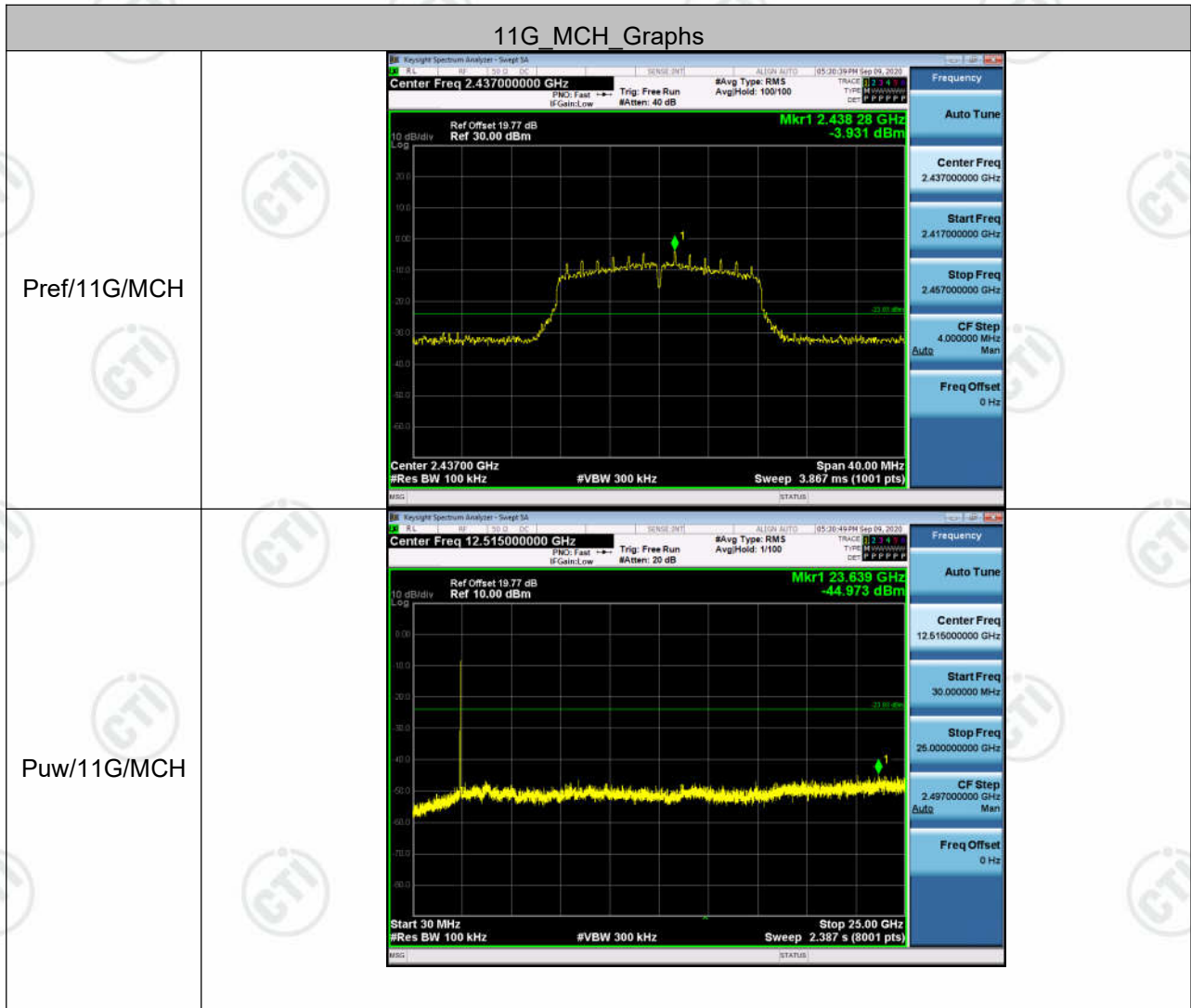
Test Graph

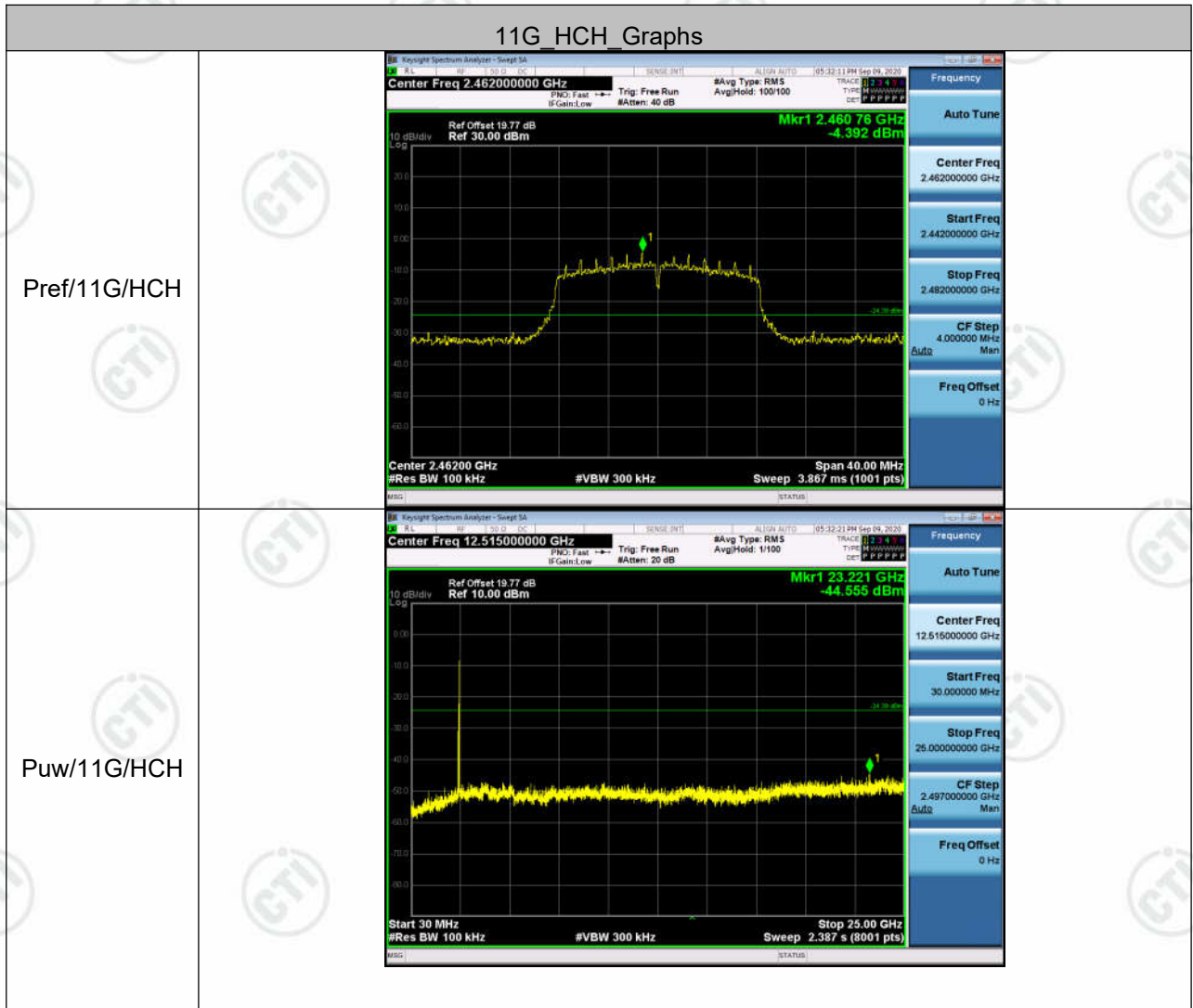


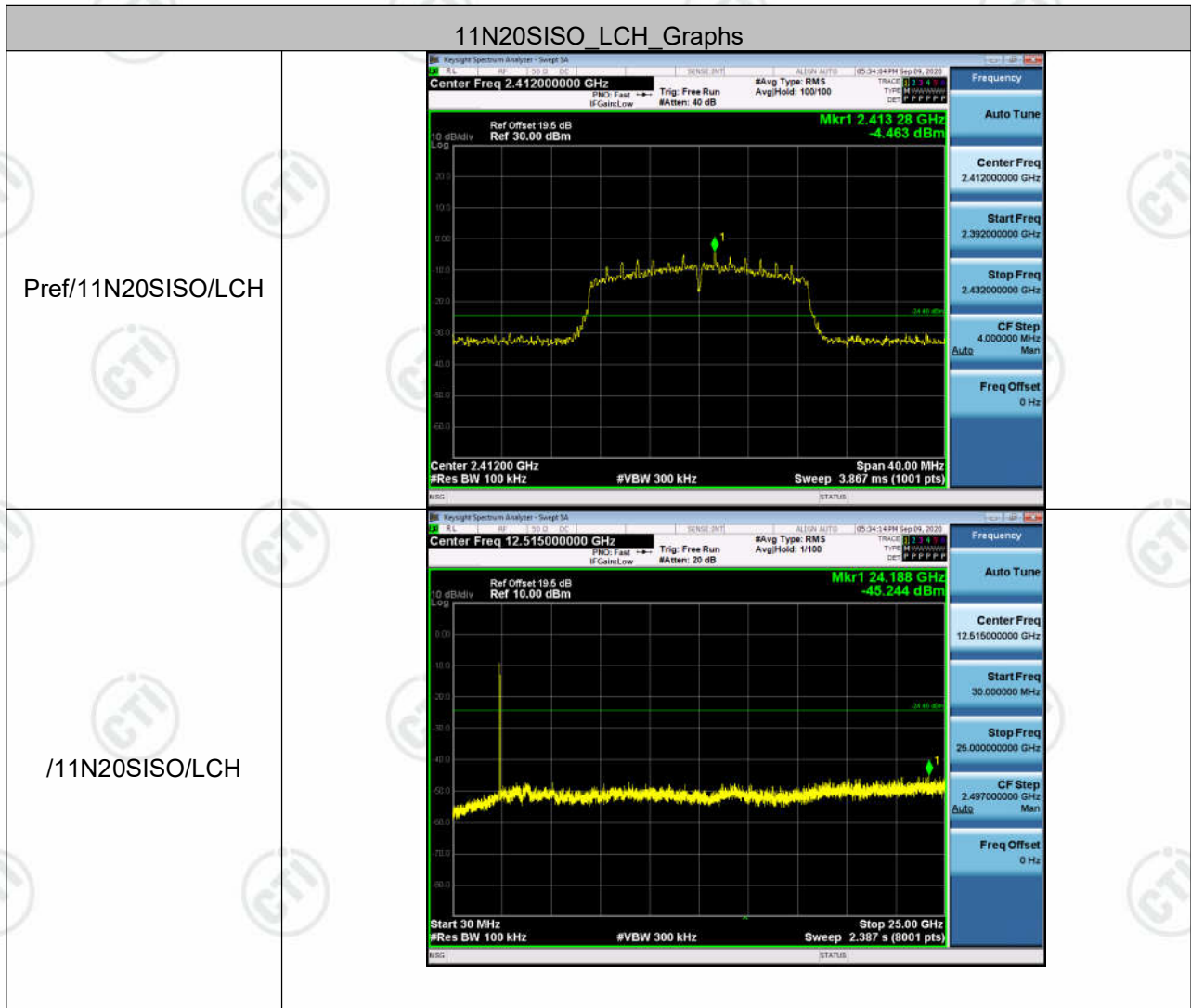


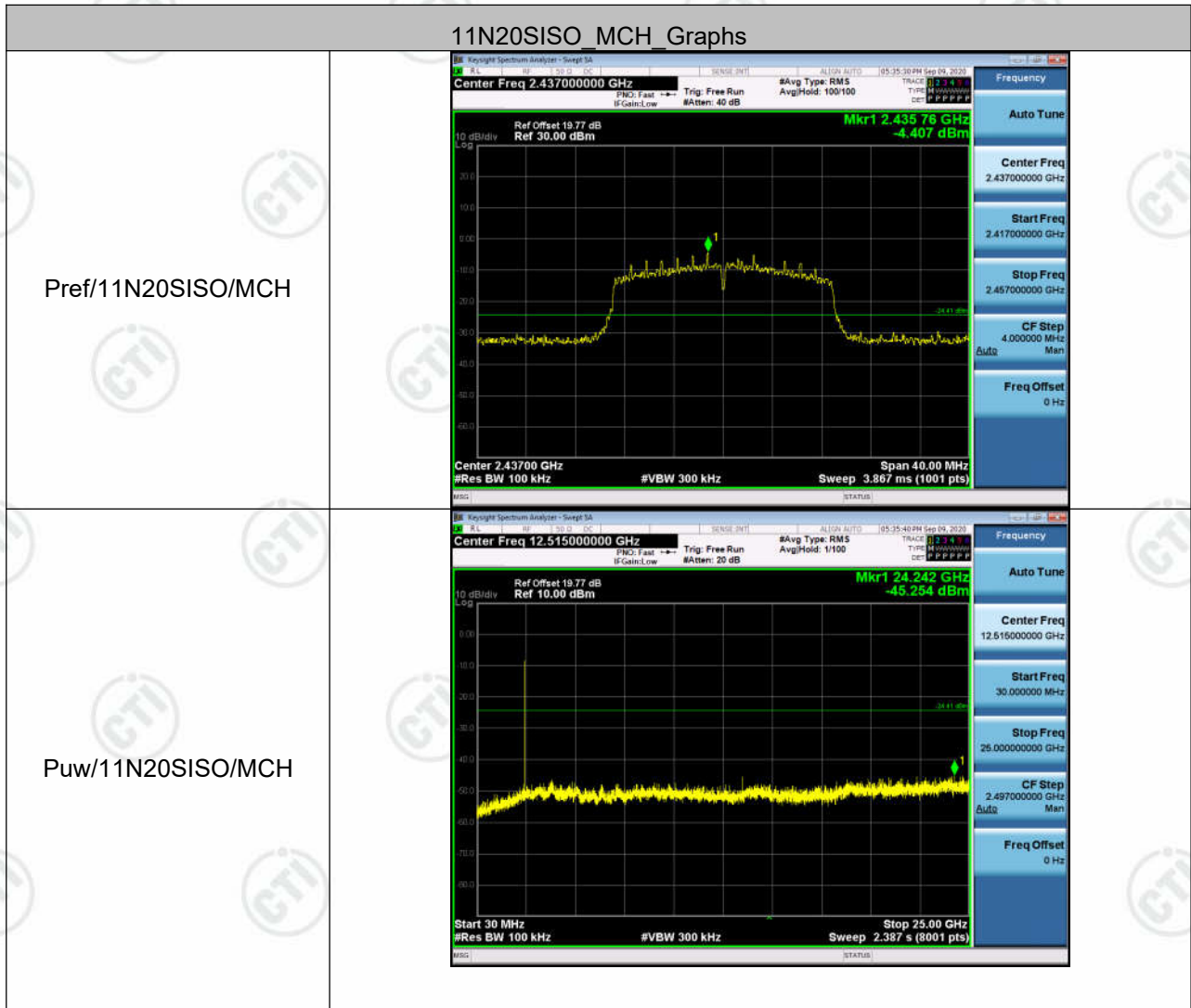


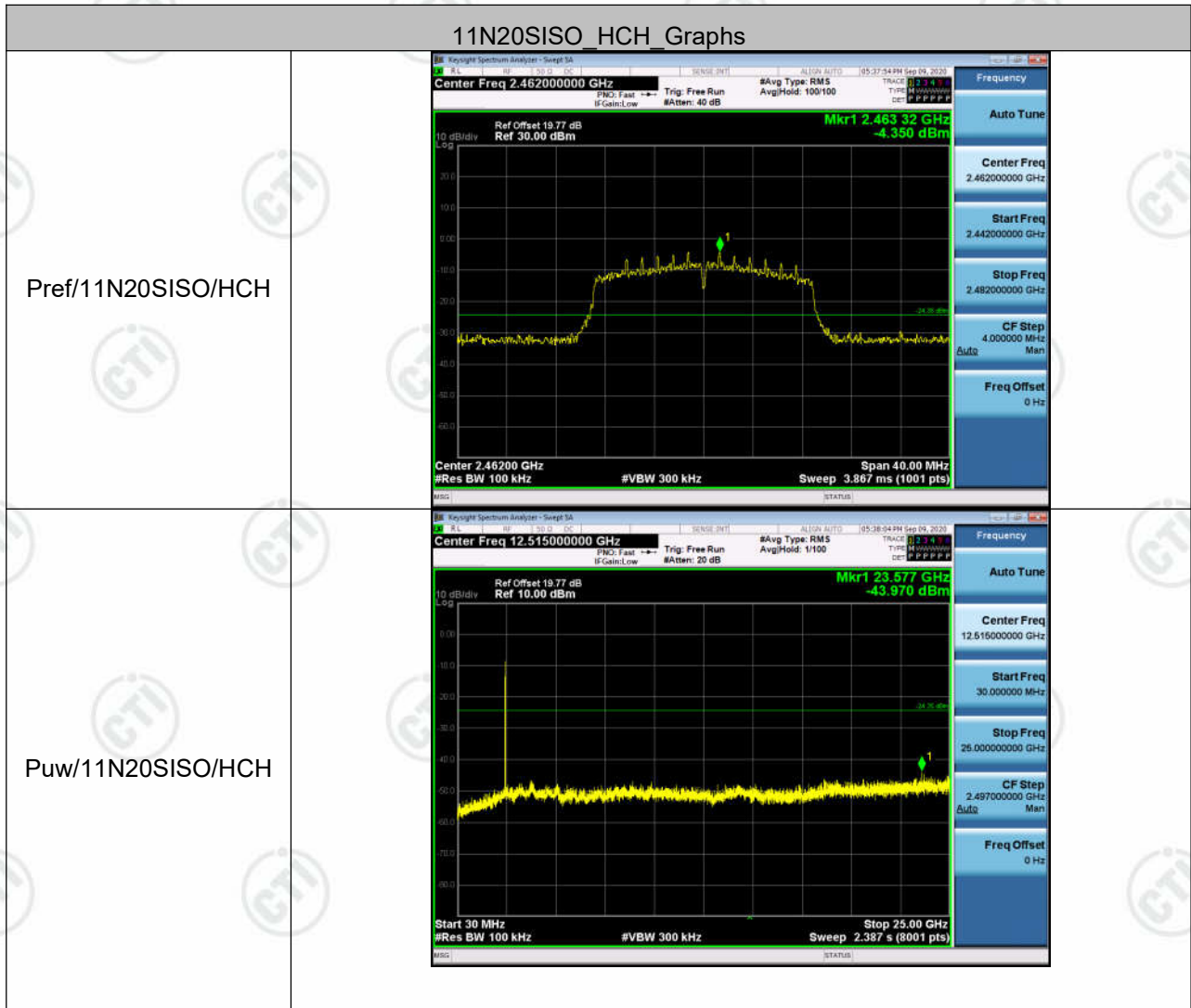


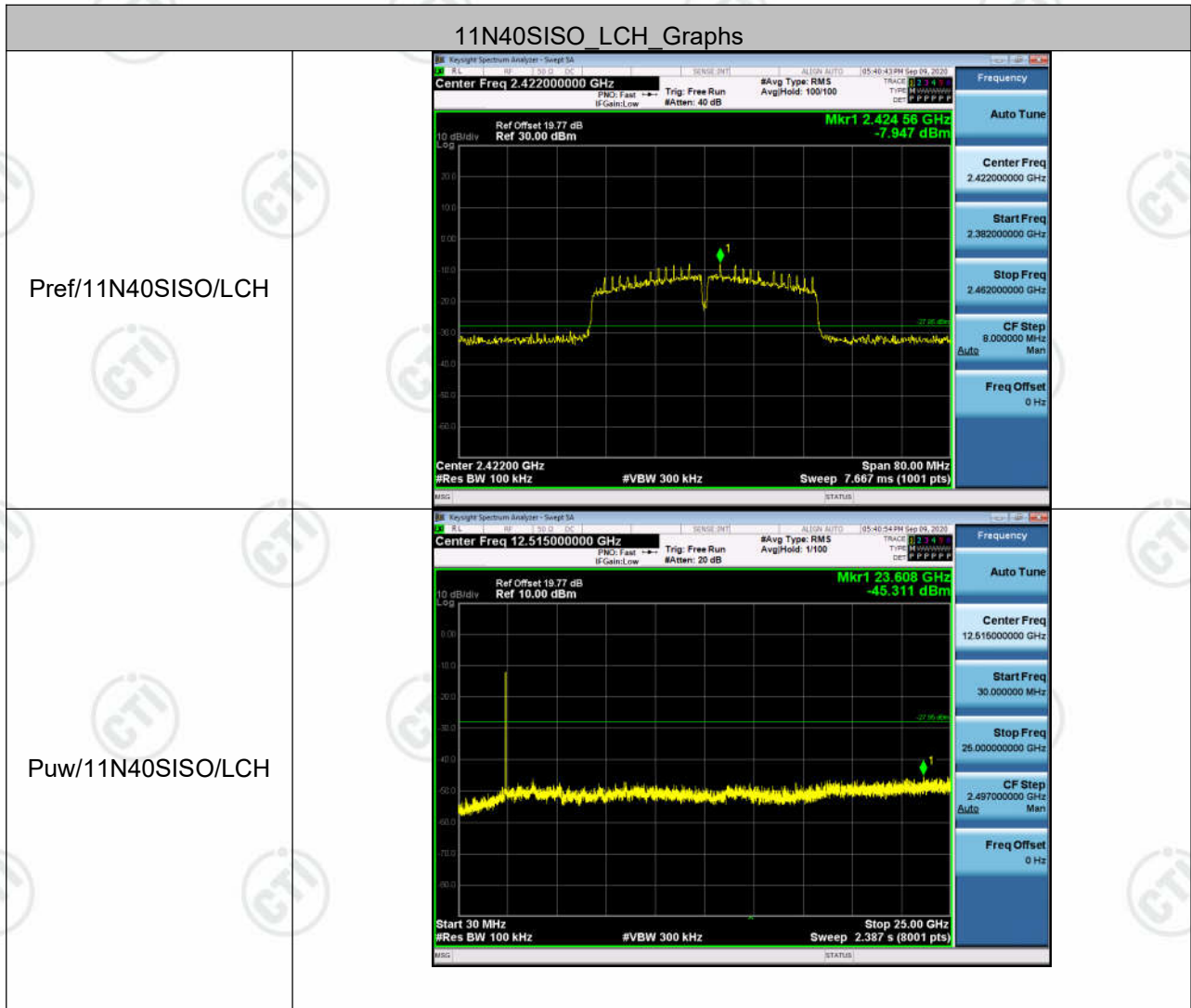


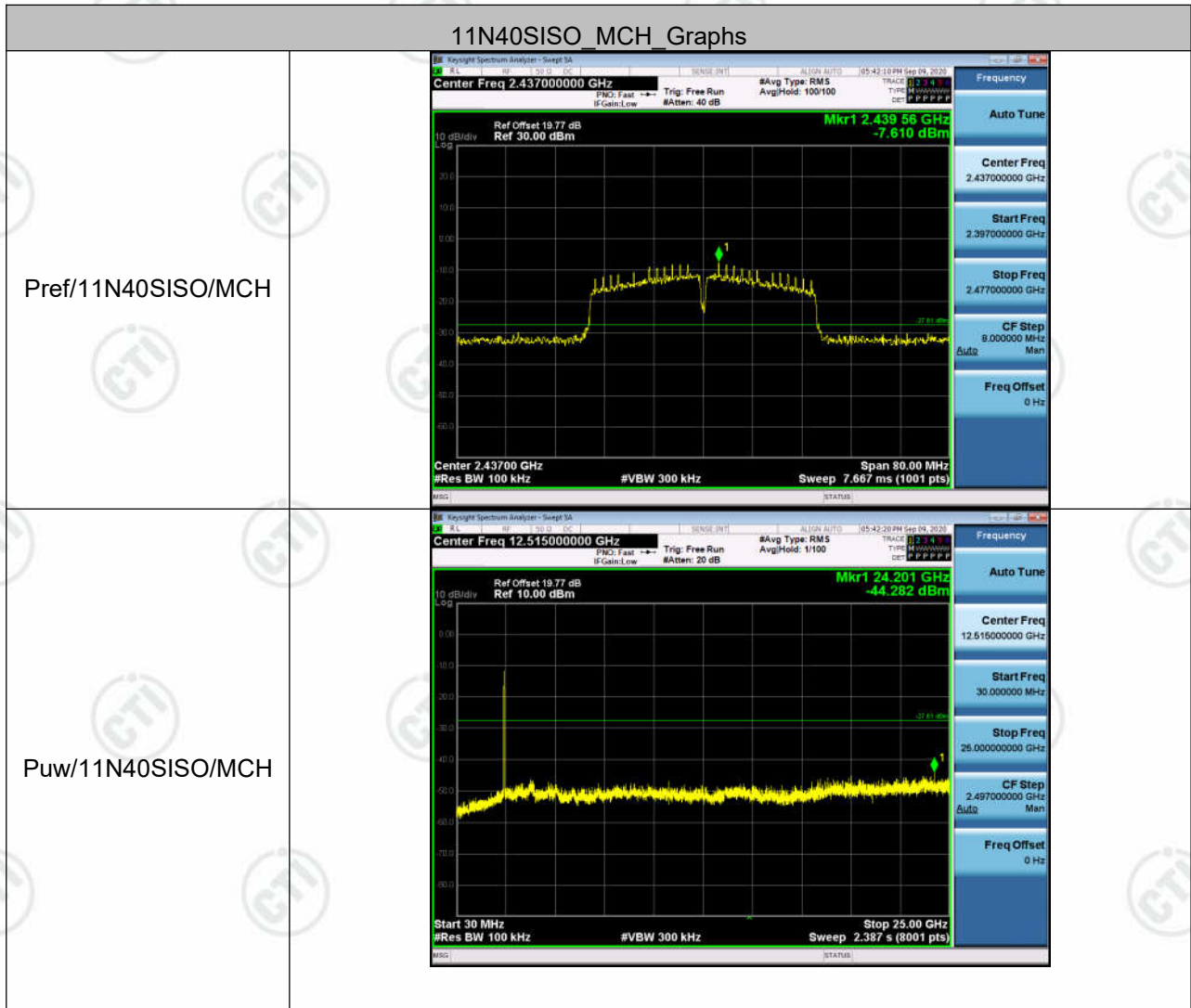


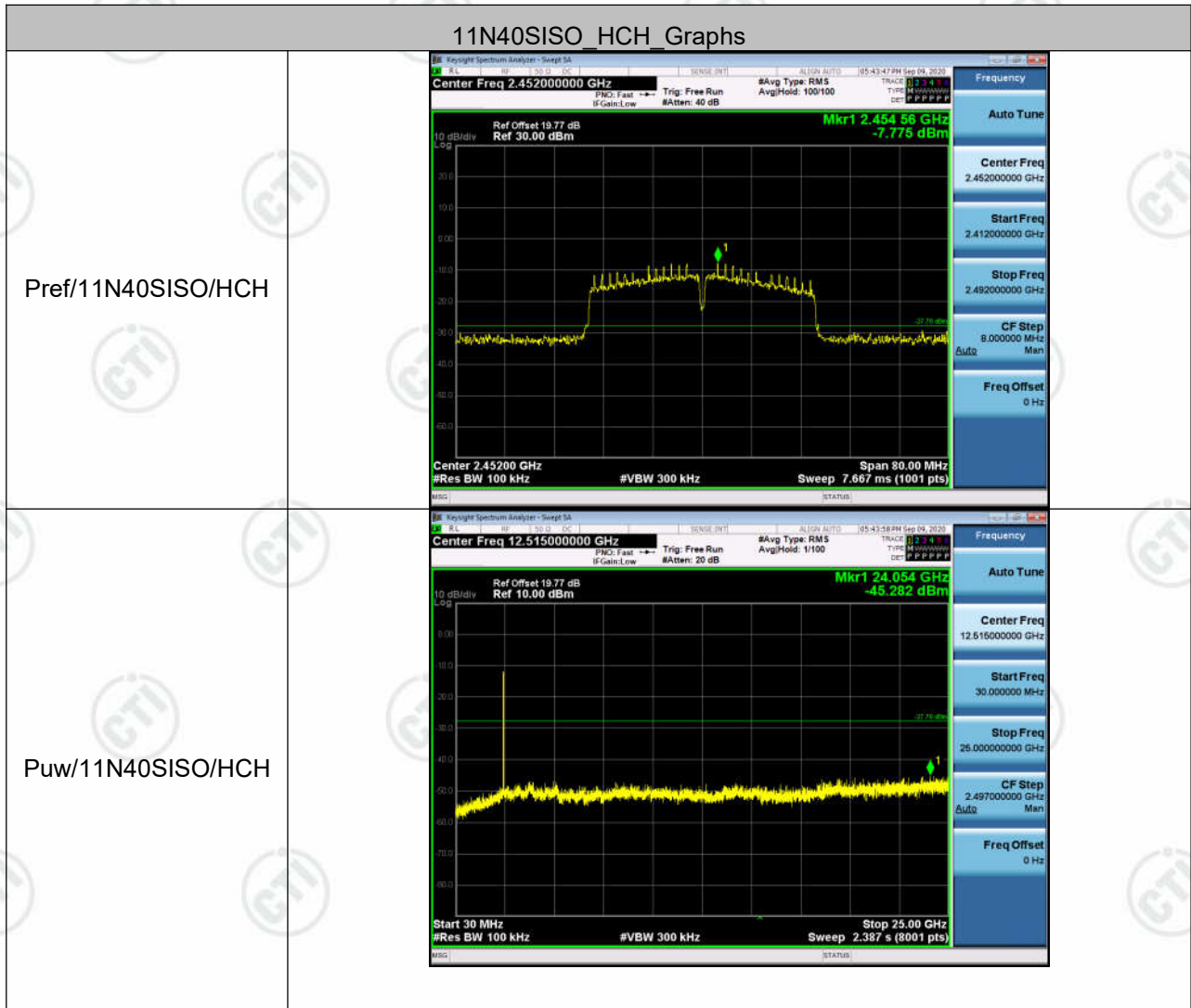












Appendix E): Power Spectral Density

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.

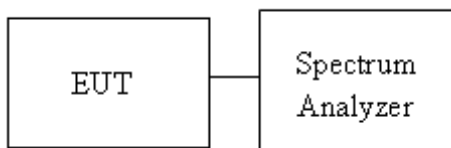
Limit	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 8dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [Limit = 8 – (DG – 6)] <input type="checkbox"/> Point-to-point operation :
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Test Procedure

Test method Refer as KDB 558074 D01.

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

Test Setup



Result Table

Mode	Channel	Power Spectral Density [dBm]	Verdict
11B	LCH	-15.693	PASS
11B	MCH	-15.191	PASS
11B	HCH	-13.886	PASS
11G	LCH	-20.435	PASS
11G	MCH	-20.538	PASS
11G	HCH	-20.071	PASS
11N20SISO	LCH	-21.374	PASS
11N20SISO	MCH	-20.189	PASS
11N20SISO	HCH	-20.190	PASS
11N40SISO	LCH	-24.813	PASS
11N40SISO	MCH	-23.686	PASS
11N40SISO	HCH	-24.157	PASS