

TEST REPORT

Product : PALM Gimbal Camera
Trade mark : 
Model/Type reference : YTXJ03FM
Serial Number : N/A
Report Number : EED32L00396101
FCC ID : 2AG53YTXJ03FM
Date of Issue : Mar. 31, 2020
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

BEIJING FIMI TECHNOLOGY LIMITED

1# Complex Building, Yongtaiyuan Jia, Qinghe, Haidian , Beijing, China

Prepared by:

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Date:

Mar. 31, 2020

Check No.:3096385187



2 Version

Version No.	Date	Description
00	Mar. 31, 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.

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

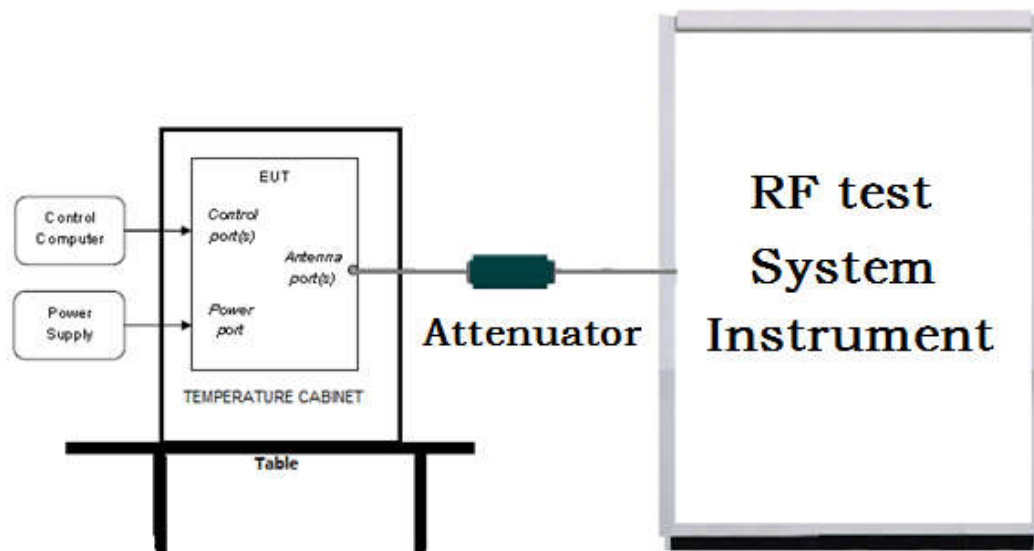
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5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

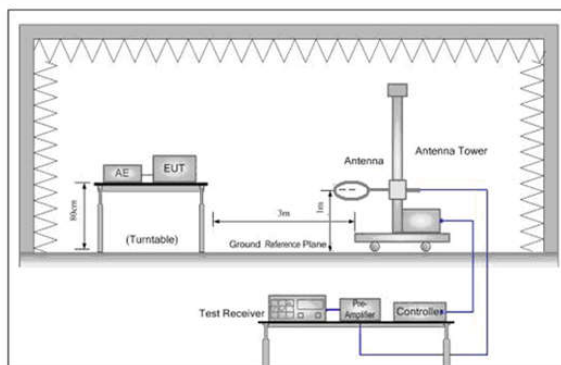


Figure 1. Below 30MHz

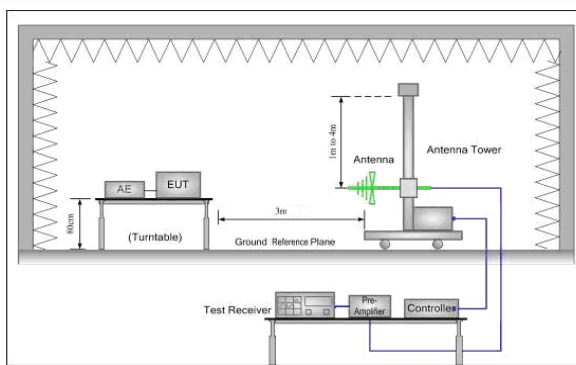


Figure 2. 30MHz to 1GHz

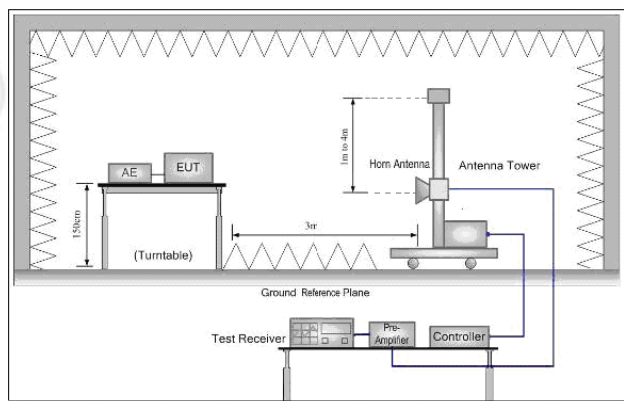
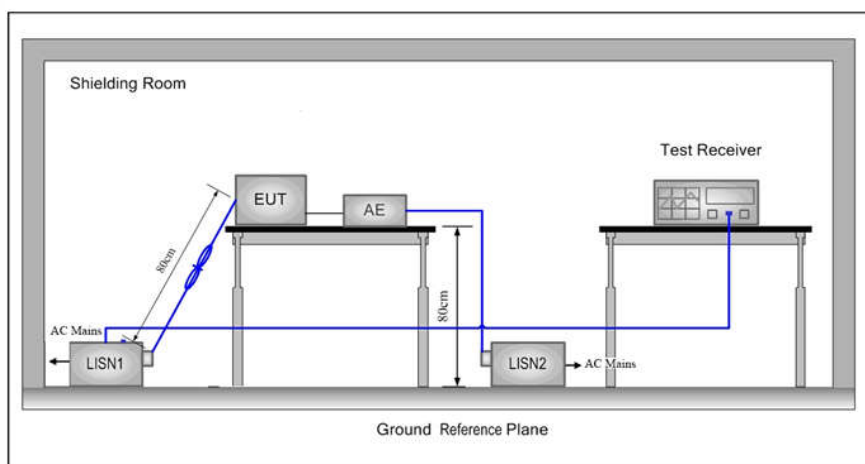


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	24.0 °C
Humidity:	53 % RH
Atmospheric Pressure:	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							
Data Rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
Power(dBm)	8.29	8.31	8.33	8.35				
Mode	802.11g							
Data Rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Power(dBm)	8.13	8.11	8.09	8.07	8.05	8.03	8.01	7.99
Mode	802.11n (HT20)							
Data Rate	6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps
Power(dBm)	7.98	7.97	7.95	7.93	7.91	7.89	7.87	7.85
Mode	802.11n (HT40)							
Data Rate	13.5Mbps	27Mbps	40.5Mbps	54Mbps	81Mbps	108Mbps	121.5Mbps	135Mbps
Power(dBm)	7.7	7.68	7.66	7.64	7.62	7.60	7.58	7.56

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:	BEIJING FIMI TECHNOLOGY LIMITED
Address of Applicant:	1# Complex Building, Yongtaiyuan Jia, Qinghe, Haidian , Beijing, China
Manufacturer:	BEIJING FIMI TECHNOLOGY LIMITED
Address of Manufacturer:	1# Complex Building, Yongtaiyuan Jia, Qinghe, Haidian , Beijing, China

6.2 General Description of EUT

Product Name:	PALM Gimbal Camera
Model No.(EUT):	YTXJ03FM
Trade Mark:	
EUT Supports Radios application:	IEEE 802.11 b/g/n(HT20)(HT40): 2412MHz to 2462MHz
Power Supply:	Lithium-ion Battery :7.4V 1000mAh
Sample Received Date:	Dec. 31, 2019
Sample tested Date:	Dec. 31, 2019 to Mar. 24, 2020

6.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g :OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Test power grade:	B:19/19/20, G:28/28/28, N20:28/27/27, N40:25/25/25
Test Software of EUT:	Putty
Antenna Type and Gain:	Type: Multilayer Chip antenna Gain: 1dBi
Test Voltage:	DC 7.4V

Operation Frequency each of channel(802.11b/g/n HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		
Operation Frequency each of channel(802.11n HT40)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2422MHz	4	2437MHz	7	2452MHz		
2	2427MHz	5	2442MHz				
3	2432MHz	6	2447MHz				

6.4 Description of Support Units

The EUT has been tested with associated equipment below.

1) support equipment

Associated equipment name		Manufacturer	Model No.	Certification	S/N serial number	Supplied by
AE1	Notebook	DELL	DELL 3490	FCC and CE	D245DX2	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	03-01-2019 02-17-2020	02-29-2020 02-16-2021
Signal Generator	Keysight	N5182B	MY53051549	03-01-2019 02-17-2020	02-29-2020 02-16-2021
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	07-26-2019	07-25-2020
High-pass filter	Sinoscite	FL3CX03WG18N M12-0398-002	---	---	---
High-pass filter	MICRO- TRONICS	SPA-F-63029-4	---	---	---
DC Power	Keysight	E3642A	MY56376072	03-01-2019 02-17-2020	02-29-2020 02-16-2021
PC-1	Lenovo	R4960d	---	---	---
BT&WI-FI Automatic control	R&S	OSP120	101374	03-01-2019 02-17-2020	02-29-2020 02-16-2021
RF control unit	JS Tonscend	JS0806-2	158060006	03-01-2019 02-17-2020	02-29-2020 02-16-2021
BT&WI-FI Automatic test software	JS Tonscend	JS1120-3	---	---	---

Conducted disturbance Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESCI	100435	05-20-2019	05-19-2020
Temperature/ Humidity Indicator	Defu	TH128	/	06-14-2019	06-13-2020
LISN	R&S	ENV216	100098	05-08-2019	05-07-2020
Barometer	changchun	DYM3	1188	06-20-2019	06-19-2020

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

3M full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (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
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	05-22-2019	05-21-2020
Preamplifier	EMCI	EMC001330	980563	05-08-2019	05-07-2020
Preamplifier	JS Tonscend	980380	EMC051845 SE	01-09-2020	01-08-2021
Temperature/Humidity Indicator	biaozhi	GM1360	EE1186631	04-30-2019	04-29-2020
Fully Anechoic Chamber	TDK	FAC-3	---	01-17-2018	01-16-2021
Filter bank	JS Tonscend	JS0806-F	188060094	04-10-2018	04-09-2021
Cable line	Times	SFT205-NMSM-2.50M	394812-0001	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0002	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0003	---	---
Cable line	Times	SFT205-NMSM-2.50M	393495-0001	---	---
Cable line	Times	EMC104-NMNM-1000	SN160710	---	---
Cable line	Times	SFT205-NMSM-3.00M	394813-0001	---	---
Cable line	Times	SFT205-NMNM-1.50M	381964-0001	---	---
Cable line	Times	SFT205-NMSM-7.00M	394815-0001	---	---
Cable line	Times	HF160-KMKM-3.00M	393493-0001	---	---

8 Radio Technical Requirements Specification

Reference documents for testing:

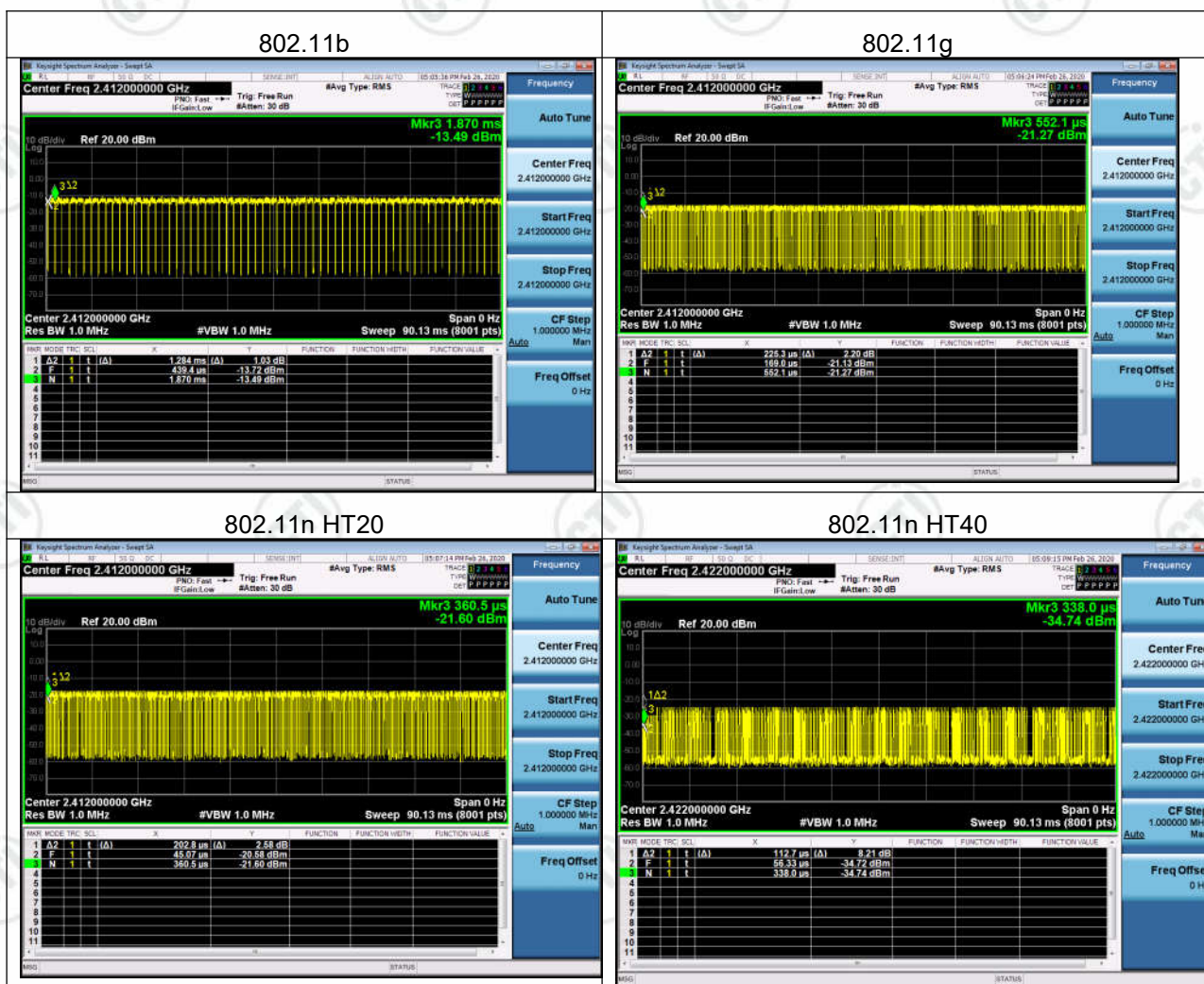
No.	Identity	Document Title
1	FCC Part15C	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Test Results List:

Test Requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (b)(3)	ANSI C63.10	Conducted Peak Output Power	PASS	Appendix A)
Part15C Section 15.247 (a)(2)	ANSI C63.10	6dB Occupied Bandwidth	PASS	Appendix B)
Part15C Section 15.247(d)	ANSI C63.10	Band-edge for RF Conducted Emissions	PASS	Appendix C)
Part15C Section 15.247(d)	ANSI C63.10	RF Conducted Spurious Emissions	PASS	Appendix D)
Part15C Section 15.247 (e)	ANSI C63.10	Power Spectral Density	PASS	Appendix E)
Part15C Section 15.203/15.247 (c)	ANSI C63.10	Antenna Requirement	PASS	Appendix F)
Part15C Section 15.207	ANSI C63.10	AC Power Line Conducted Emission	PASS	Appendix G)
Part15C Section 15.205/15.209	ANSI C63.10	Restricted bands around fundamental frequency (Radiated Emission)	PASS	Appendix H)
Part15C Section 15.205/15.209	ANSI C63.10	Radiated Spurious Emissions	PASS	Appendix I)

EUT DUTY CYCLE

Duty Cycle			
Configuration	TX ON(ms)	TX ALL(ms)	Duty Cycle(%)
802.11b	1.284	1.4306	89.76%
802.11g	0.2253	0.3831	58.8%
802.11n HT20	0.2028	0.31543	64.29%
802.11n HT40	0.1127	0.28167	40.00%



Appendix A): Conducted Peak Output Power

Test Limit

According to §15.247(b)(3),

Peak output power :

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

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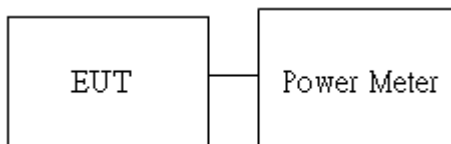
Average output power : For reporting purposes only.

Test Procedure

Test method Refer as KDB 558074 D01.

1. The EUT RF output connected to 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.

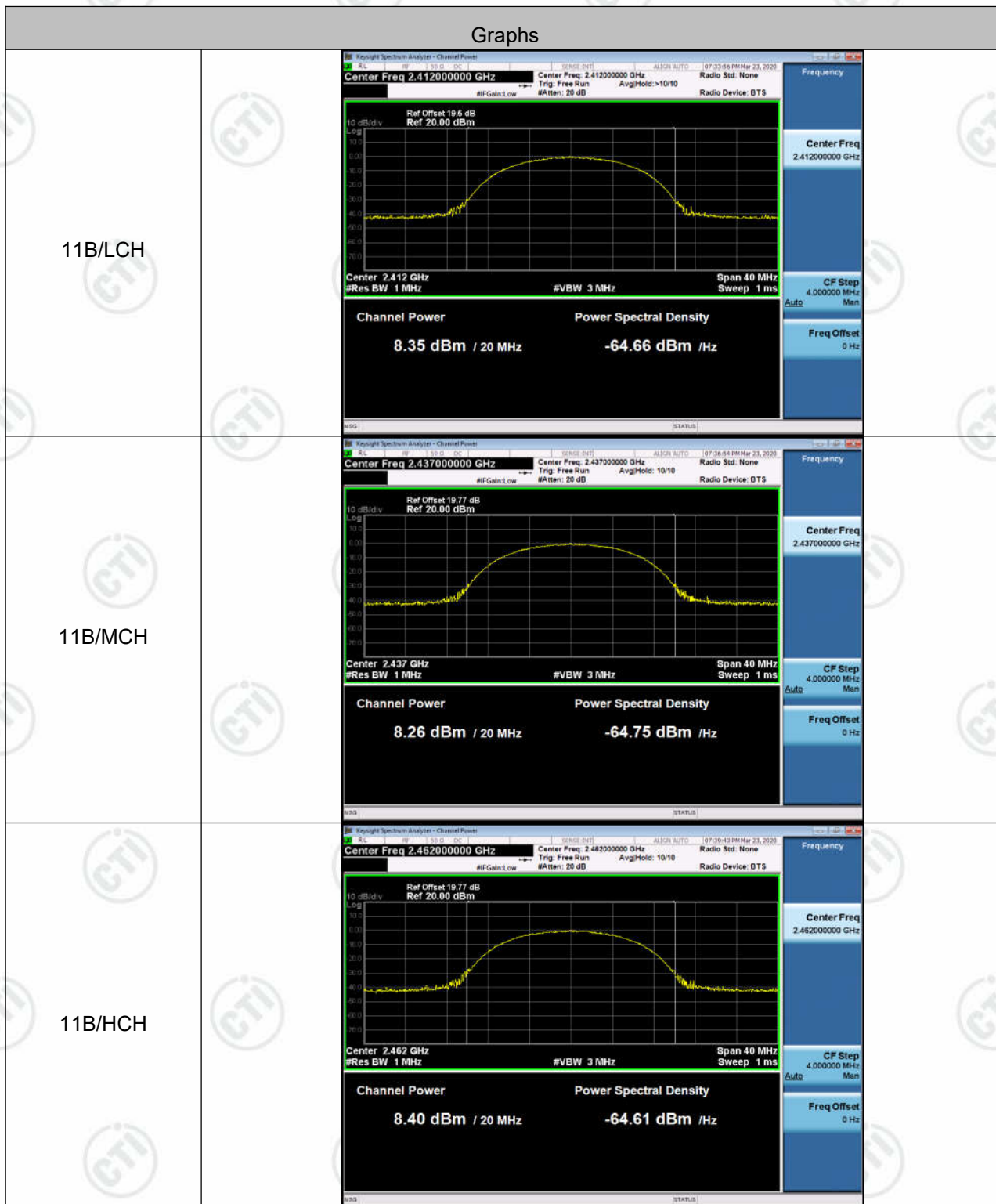
Test Setup

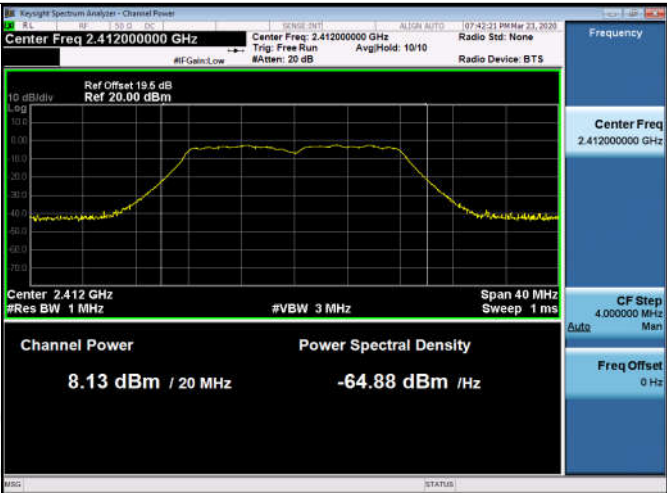
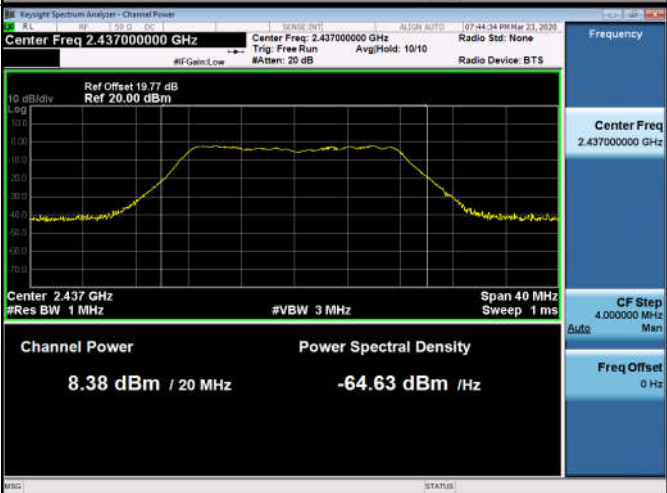
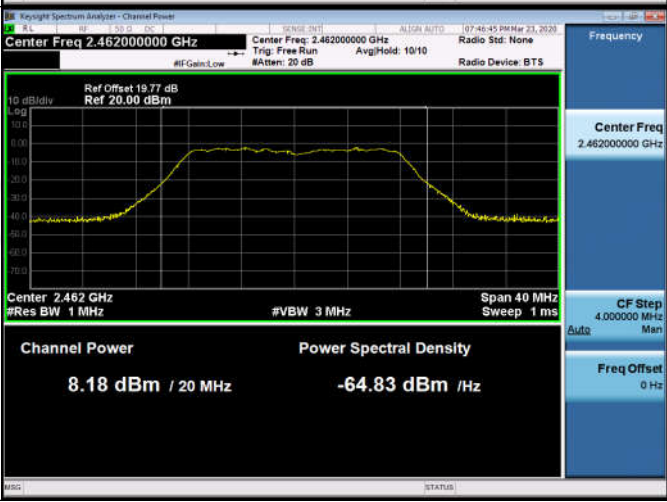


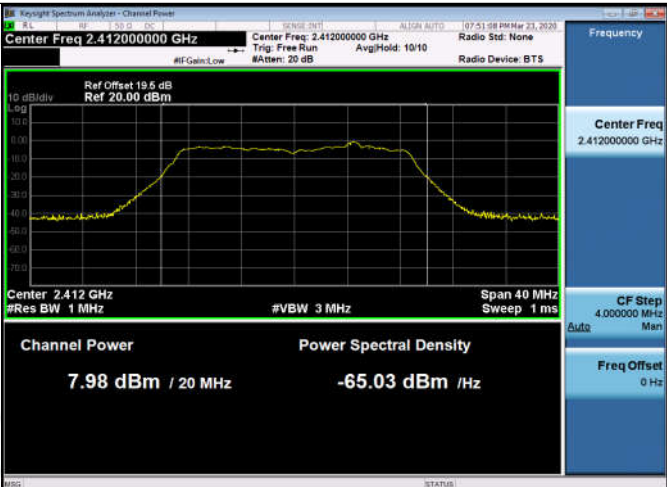
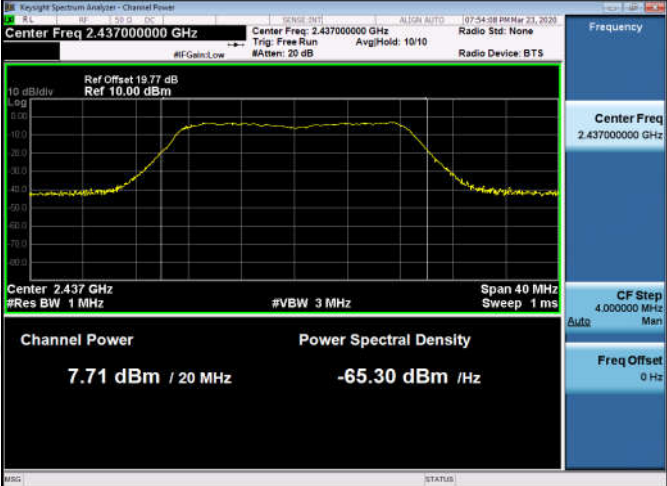
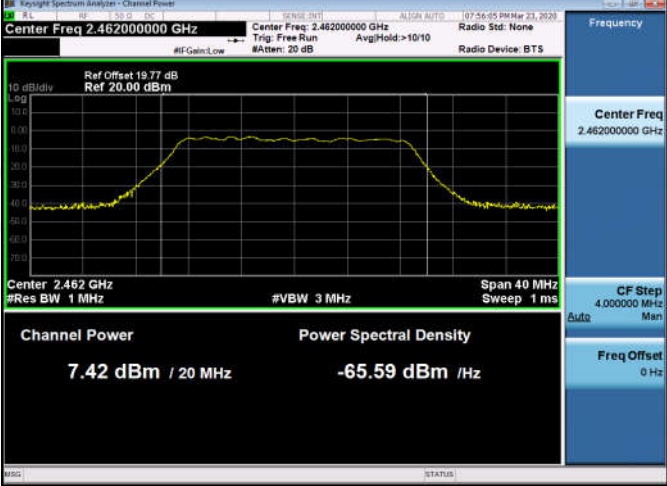
Result Table

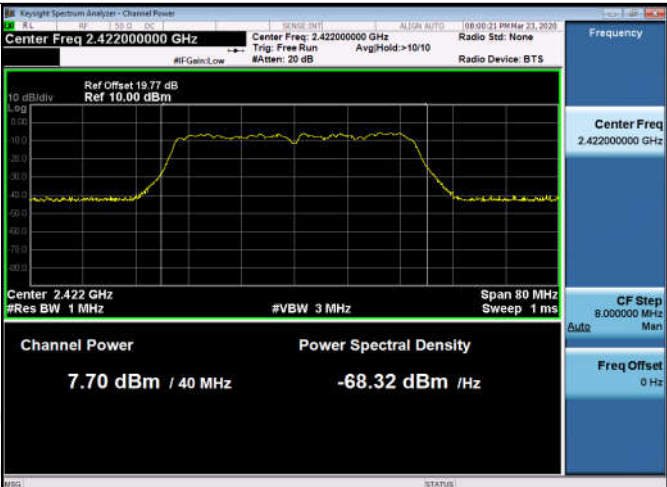
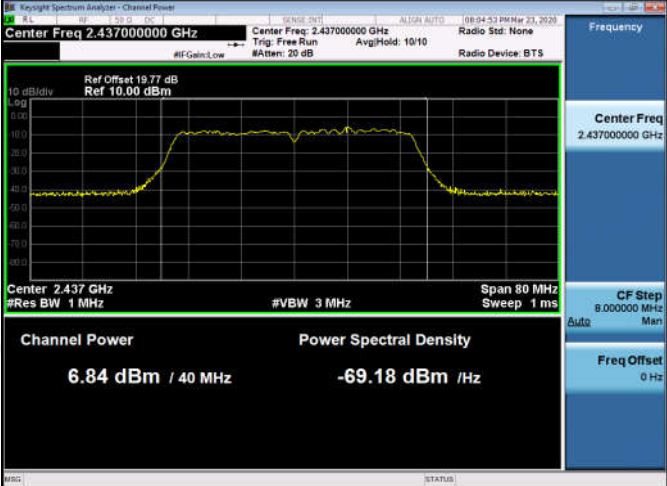
Mode	Channel	Conducted Peak Output Power [dBm]	Verdict
11B	LCH	8.35	PASS
11B	MCH	8.26	PASS
11B	HCH	8.4	PASS
11G	LCH	8.13	PASS
11G	MCH	8.38	PASS
11G	HCH	8.18	PASS
11N20SISO	LCH	7.98	PASS
11N20SISO	MCH	7.71	PASS
11N20SISO	HCH	7.42	PASS
11N40SISO	LCH	7.7	PASS
11N40SISO	MCH	6.84	PASS
11N40SISO	HCH	6.8	PASS

Test Graph



11G/LCH	
11G/MCH	
11G/HCH	

11N20SISO/LCH	 Keyight Spectrum Analyzer - Channel Power Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 20.00 dBm Channel Power: 7.98 dBm / 20 MHz Power Spectral Density: -65.03 dBm / Hz Center 2.412 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Frequency: Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11N20SISO/MCH	 Keyight Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Channel Power: 7.71 dBm / 20 MHz Power Spectral Density: -65.30 dBm / Hz Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms Frequency: Center Freq 2.437000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11N20SISO/HCH	 Keyight Spectrum Analyzer - Channel Power Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 20.00 dBm Channel Power: 7.42 dBm / 20 MHz Power Spectral Density: -65.59 dBm / Hz Center 2.462 GHz #Res BW 1 MHz #VBW 3 MHz Span 40 MHz Sweep 1 ms 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 2.422000000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Center 2.422 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Channel Power 7.70 dBm / 40 MHz Power Spectral Density -68.32 dBm / Hz Frequency Center Freq 2.422000000 GHz CF Step 8.000000 MHz Auto Man Freq Offset 0 Hz
11N40SISO/MCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Center 2.437 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Channel Power 6.84 dBm / 40 MHz Power Spectral Density -68.18 dBm / Hz Frequency Center Freq 2.437000000 GHz CF Step 8.000000 MHz Auto Man Freq Offset 0 Hz
11N40SISO/HCH	 KeySight Spectrum Analyzer - Channel Power Center Freq 2.452000000 GHz Ref Offset 19.77 dB Ref 10.00 dBm Center 2.452 GHz #Res BW 1 MHz #VBW 3 MHz Span 80 MHz Sweep 1 ms Channel Power 6.80 dBm / 40 MHz Power Spectral Density -69.22 dBm / Hz Frequency Center Freq 2.452000000 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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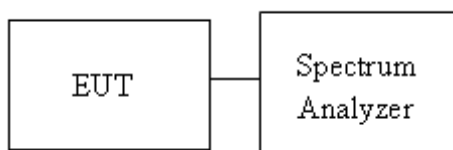
Occupied Bandwidth(99%) : For reporting purposes only.

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

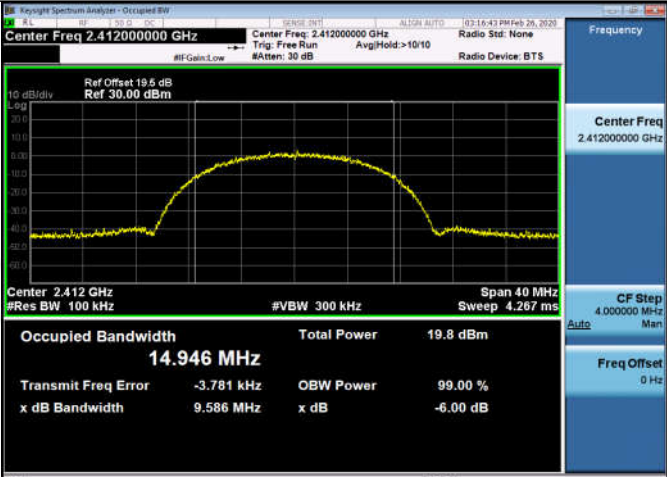
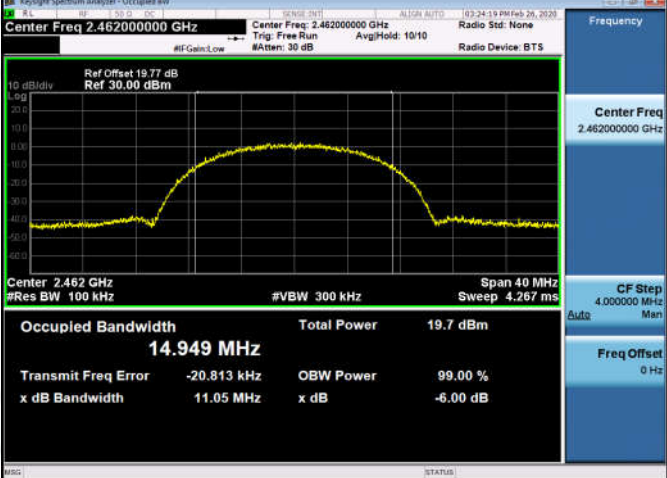


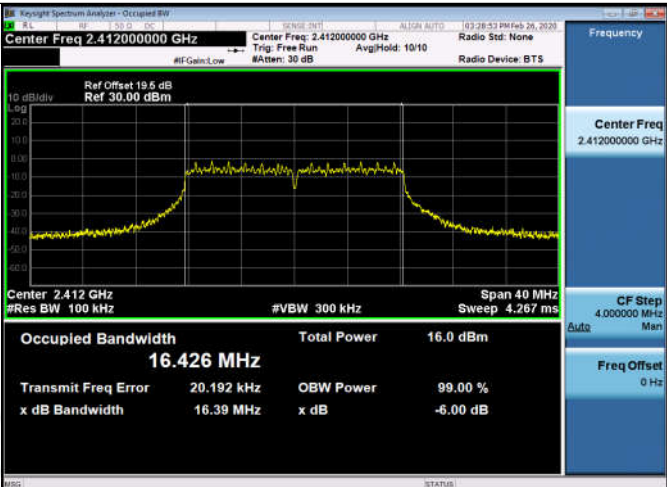
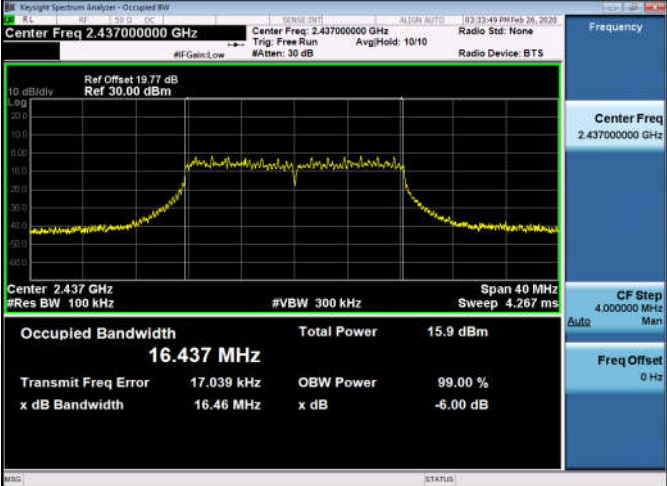
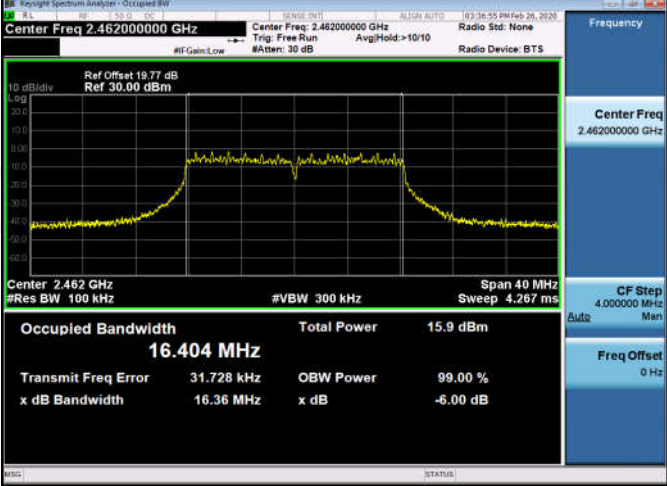
Result Table

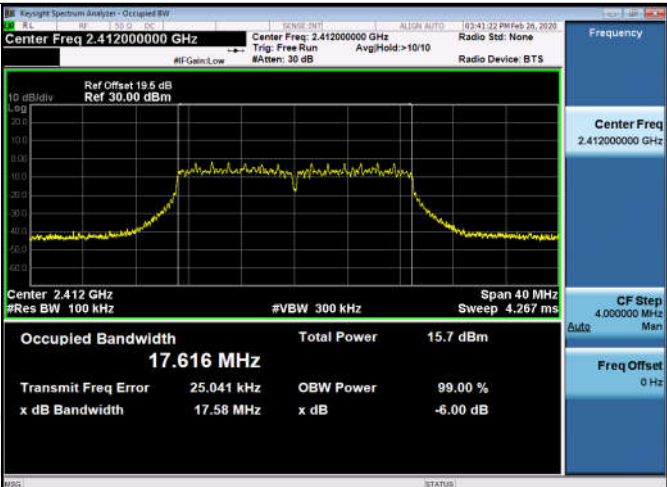
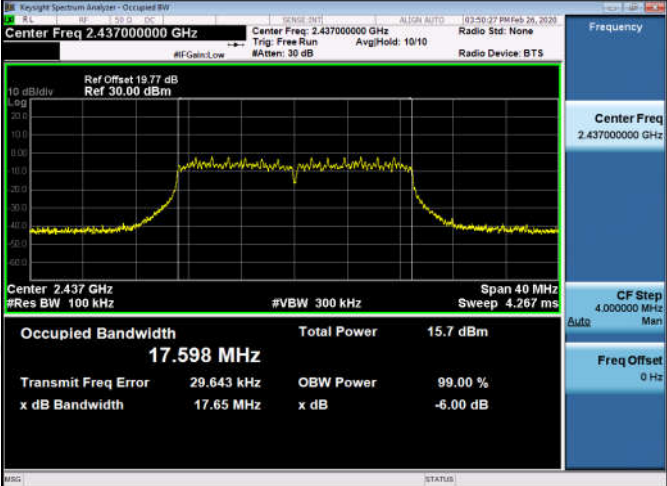
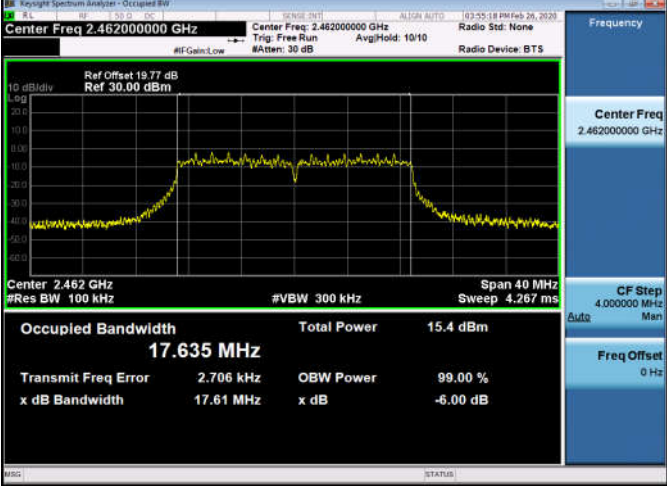
Mode	Channel	6dB Bandwidth [MHz]	Verdict
11B	LCH	9.586	PASS
11B	MCH	10.94	PASS
11B	HCH	11.05	PASS
11G	LCH	16.39	PASS
11G	MCH	16.46	PASS
11G	HCH	16.36	PASS
11N20SISO	LCH	17.58	PASS
11N20SISO	MCH	17.65	PASS
11N20SISO	HCH	17.61	PASS
11N40SISO	LCH	35.66	PASS
11N40SISO	MCH	35.42	PASS
11N40SISO	HCH	35.18	PASS

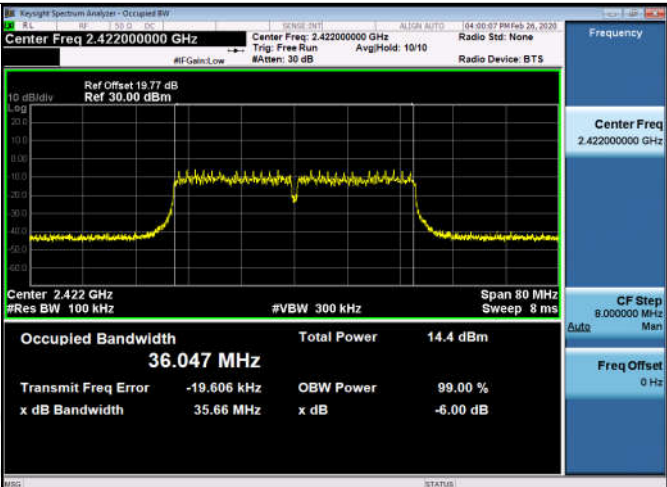
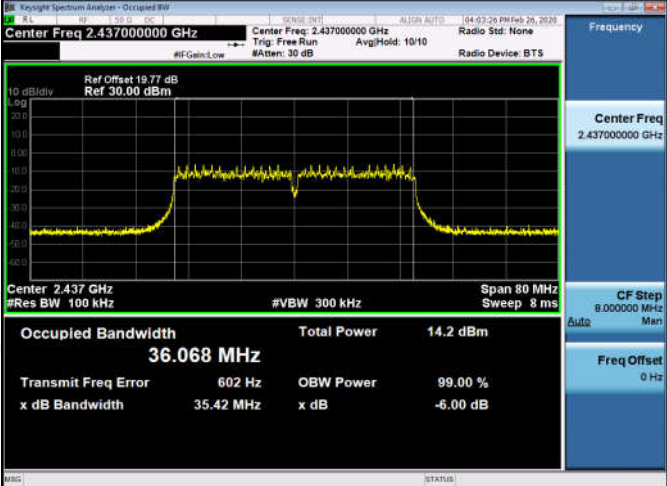
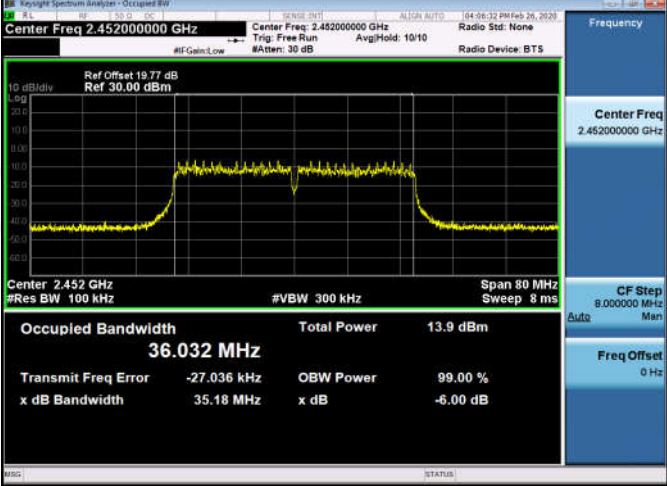
Mode	Channel	99% OBW [MHz]	Verdict
11B	LCH	14.940	PASS
11B	MCH	14.999	PASS
11B	HCH	14.906	PASS
11G	LCH	16.463	PASS
11G	MCH	16.519	PASS
11G	HCH	16.536	PASS
11N20SISO	LCH	17.630	PASS
11N20SISO	MCH	17.669	PASS
11N20SISO	HCH	17.666	PASS
11N40SISO	LCH	36.250	PASS
11N40SISO	MCH	36.196	PASS
11N40SISO	HCH	36.185	PASS

Test Graph 6dB Bandwidth

Graphs	
11B/LCH	 Keygraph Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 19.6 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 4.267 ms Occupied Bandwidth 14.946 MHz Total Power 19.8 dBm Transmit Freq Error -3.781 kHz OBW Power 99.00 % x dB Bandwidth 9.586 MHz x dB -6.00 dB Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11B/MCH	 Keygraph 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 14.963 MHz Total Power 19.4 dBm Transmit Freq Error 48.082 kHz OBW Power 99.00 % x dB Bandwidth 10.94 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11B/HCH	 Keygraph 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 14.949 MHz Total Power 19.7 dBm Transmit Freq Error -20.813 kHz OBW Power 99.00 % x dB Bandwidth 11.05 MHz x dB -6.00 dB Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz

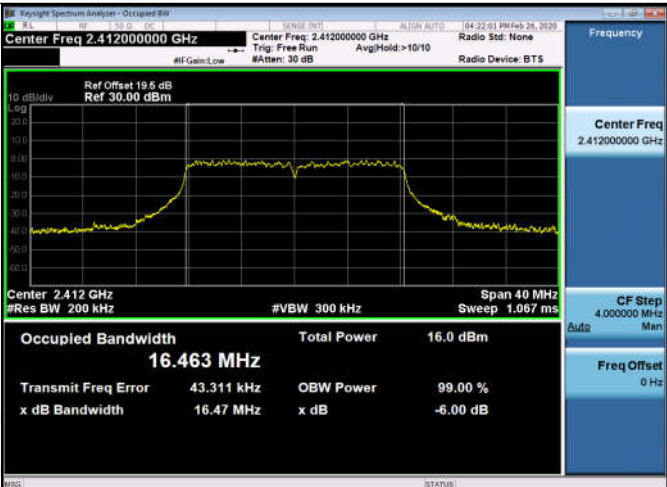
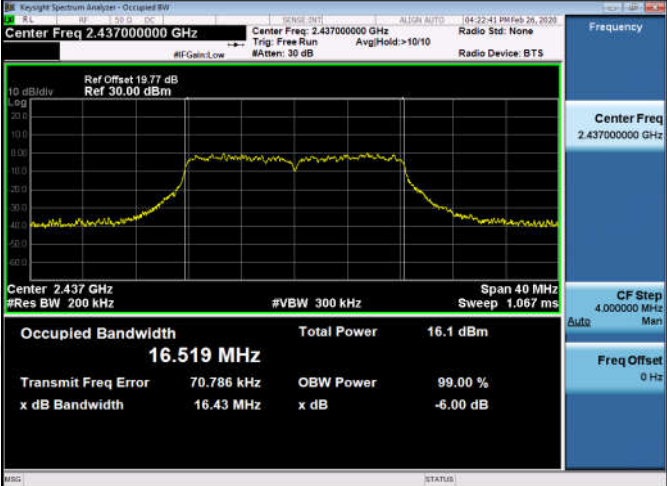
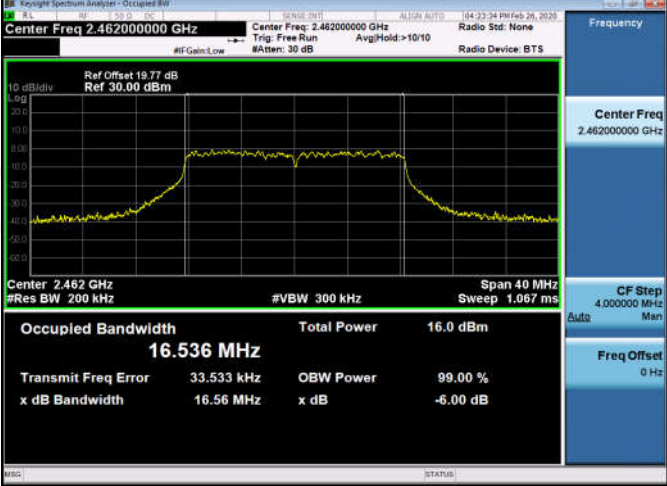
11G/LCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 100 kHz Span 40 MHz Sweep 4.267 ms #VBW 300 kHz Occupied Bandwidth 16.426 MHz Total Power 16.0 dBm Transmit Freq Error 20.192 kHz OBW Power 99.00 % x dB Bandwidth 16.39 MHz x dB -6.00 dB Freq Offset 0 Hz
11G/MCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 100 kHz Span 40 MHz Sweep 4.267 ms #VBW 300 kHz Occupied Bandwidth 16.437 MHz Total Power 15.9 dBm Transmit Freq Error 17.039 kHz OBW Power 99.00 % x dB Bandwidth 16.46 MHz x dB -6.00 dB Freq Offset 0 Hz
11G/HCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.462 GHz #Res BW 100 kHz Span 40 MHz Sweep 4.267 ms #VBW 300 kHz Occupied Bandwidth 16.404 MHz Total Power 15.9 dBm Transmit Freq Error 31.728 kHz OBW Power 99.00 % x dB Bandwidth 16.36 MHz x dB -6.00 dB Freq Offset 0 Hz

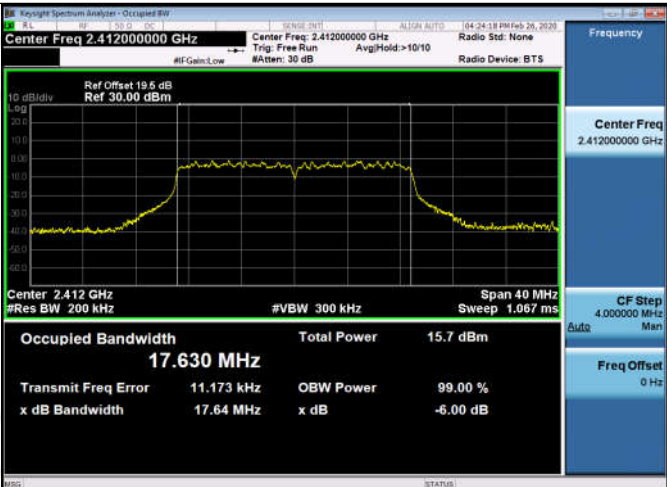
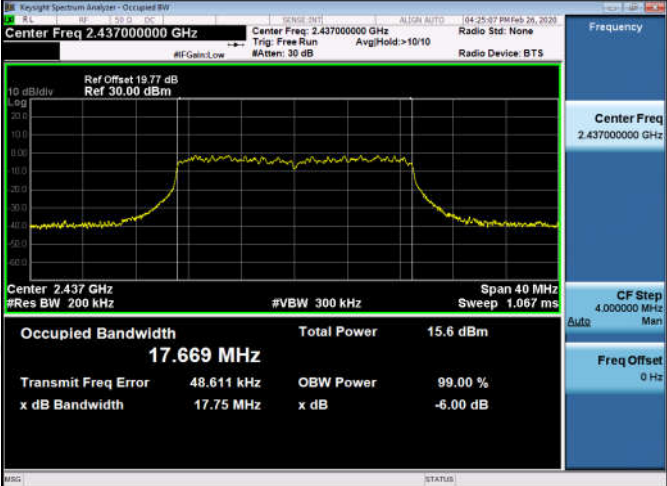
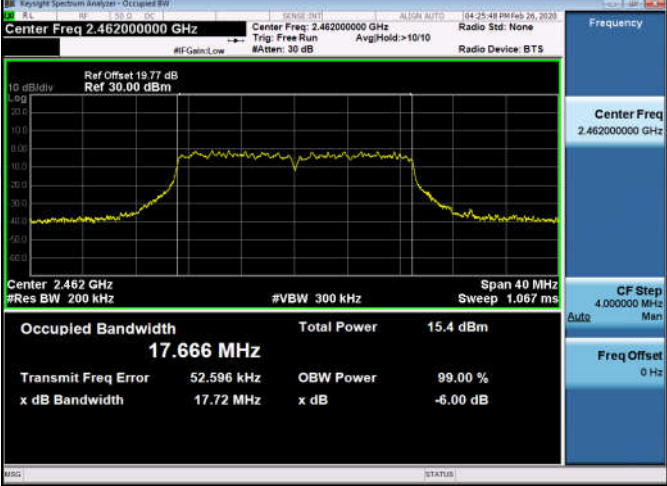
11N20SISO/LCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 100 kHz Occupied Bandwidth 17.616 MHz Total Power 15.7 dBm Transmit Freq Error 25.041 kHz OBW Power 99.00 % x dB Bandwidth 17.58 MHz x dB -6.00 dB
11N20SISO/MCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 100 kHz Occupied Bandwidth 17.598 MHz Total Power 15.7 dBm Transmit Freq Error 29.643 kHz OBW Power 99.00 % x dB Bandwidth 17.65 MHz x dB -6.00 dB
11N20SISO/HCH	 Keylight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.462 GHz #Res BW 100 kHz Occupied Bandwidth 17.635 MHz Total Power 15.4 dBm Transmit Freq Error 2.706 kHz OBW Power 99.00 % x dB Bandwidth 17.61 MHz x dB -6.00 dB

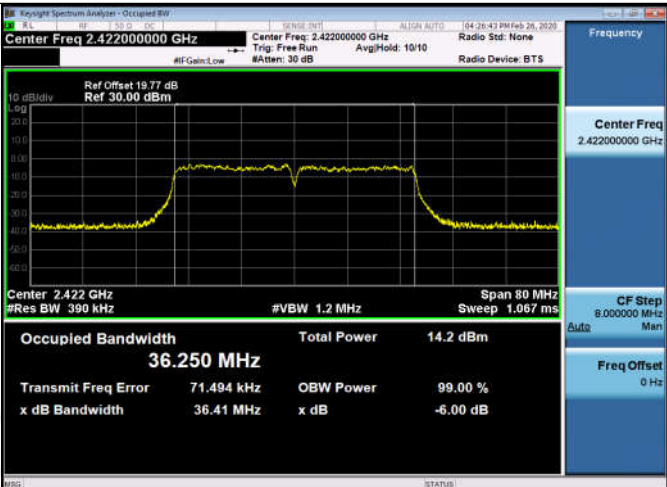
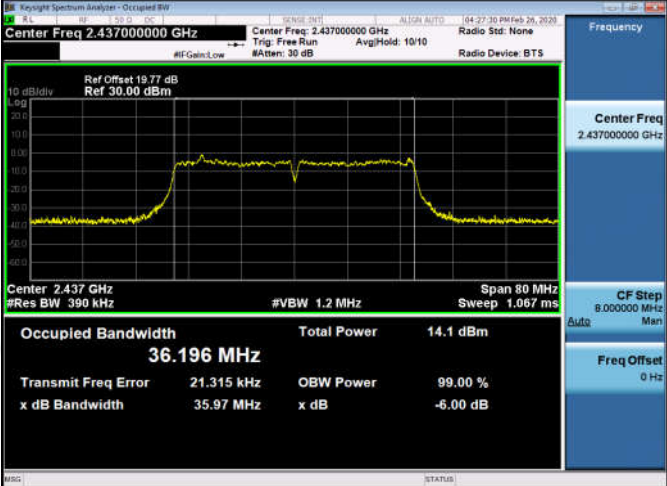
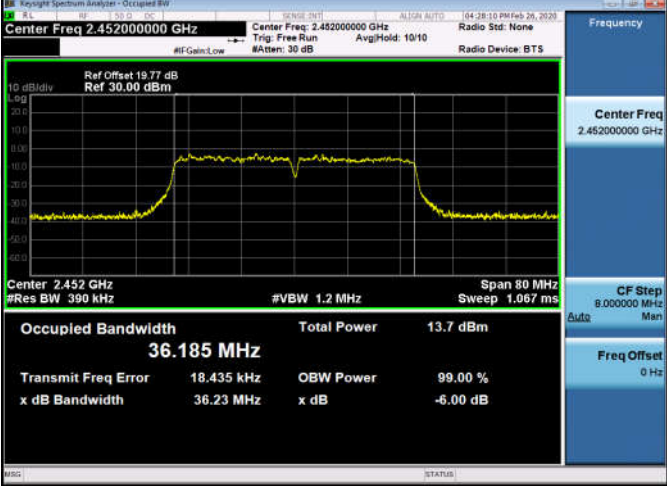
11N40SISO/LCH	 Keyight Spectrum Analyzer - Occupied BW Center Freq 2.422000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.422 GHz #Res BW 100 kHz Span 80 MHz Sweep 8 ms Occupied Bandwidth 36.047 MHz Total Power 14.4 dBm Transmit Freq Error -19.606 kHz OBW Power 99.00 % x dB Bandwidth 35.66 MHz x dB -6.00 dB Frequency Center Freq 2.422000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/MCH	 Keyight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 100 kHz Span 80 MHz Sweep 8 ms Occupied Bandwidth 36.068 MHz Total Power 14.2 dBm Transmit Freq Error 602 Hz OBW Power 99.00 % x dB Bandwidth 35.42 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/HCH	 Keyight Spectrum Analyzer - Occupied BW Center Freq 2.452000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.452 GHz #Res BW 100 kHz Span 80 MHz Sweep 8 ms Occupied Bandwidth 36.032 MHz Total Power 13.9 dBm Transmit Freq Error -27.036 kHz OBW Power 99.00 % x dB Bandwidth 35.18 MHz x dB -6.00 dB Frequency Center Freq 2.452000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz

99% OBW



11G/LCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 200 kHz Occupied Bandwidth 16.463 MHz Total Power 16.0 dBm Transmit Freq Error 43.311 kHz OBW Power 99.00 % x dB Bandwidth 16.47 MHz x dB -6.00 dB Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11G/MCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 200 kHz Occupied Bandwidth 16.519 MHz Total Power 16.1 dBm Transmit Freq Error 70.786 kHz OBW Power 99.00 % x dB Bandwidth 16.43 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11G/HCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.462 GHz #Res BW 200 kHz Occupied Bandwidth 16.536 MHz Total Power 16.0 dBm Transmit Freq Error 33.533 kHz OBW Power 99.00 % x dB Bandwidth 16.56 MHz x dB -6.00 dB Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz

11N20SISO/LCH	 Key: Keysight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 19.5 dB Ref 30.00 dBm Center 2.412 GHz #Res BW 200 kHz Occupied Bandwidth 17.630 MHz Total Power 15.7 dBm Transmit Freq Error 11.173 kHz OBW Power 99.00 % x dB Bandwidth 17.64 MHz x dB -6.00 dB Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11N20SISO/MCH	 Key: Keysight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 200 kHz Occupied Bandwidth 17.669 MHz Total Power 15.6 dBm Transmit Freq Error 48.611 kHz OBW Power 99.00 % x dB Bandwidth 17.75 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz
11N20SISO/HCH	 Key: Keysight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.462 GHz #Res BW 200 kHz Occupied Bandwidth 17.666 MHz Total Power 15.4 dBm Transmit Freq Error 52.596 kHz OBW Power 99.00 % x dB Bandwidth 17.72 MHz x dB -6.00 dB Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Freq Offset 0 Hz

11N40SISO/LCH	 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 390 kHz Span 80 MHz Sweep 1.067 ms #VBW 1.2 MHz Occupied Bandwidth 36.250 MHz Total Power 14.2 dBm Transmit Freq Error 71.494 kHz OBW Power 99.00 % x dB Bandwidth 36.41 MHz x dB -6.00 dB Frequency Center Freq 2.422000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/MCH	 Keyight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.437 GHz #Res BW 390 kHz Span 80 MHz Sweep 1.067 ms #VBW 1.2 MHz Occupied Bandwidth 36.196 MHz Total Power 14.1 dBm Transmit Freq Error 21.315 kHz OBW Power 99.00 % x dB Bandwidth 35.97 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz
11N40SISO/HCH	 Keyight Spectrum Analyzer - Occupied BW Center Freq 2.452000000 GHz Ref Offset 19.77 dB Ref 30.00 dBm Center 2.452 GHz #Res BW 390 kHz Span 80 MHz Sweep 1.067 ms #VBW 1.2 MHz Occupied Bandwidth 36.185 MHz Total Power 13.7 dBm Transmit Freq Error 18.435 kHz OBW Power 99.00 % x dB Bandwidth 36.23 MHz x dB -6.00 dB Frequency Center Freq 2.452000000 GHz CF Step 8.000000 MHz Freq Offset 0 Hz

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,

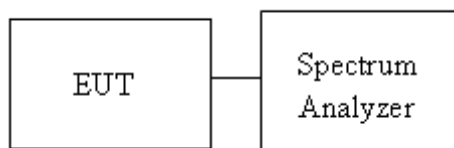
Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

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.

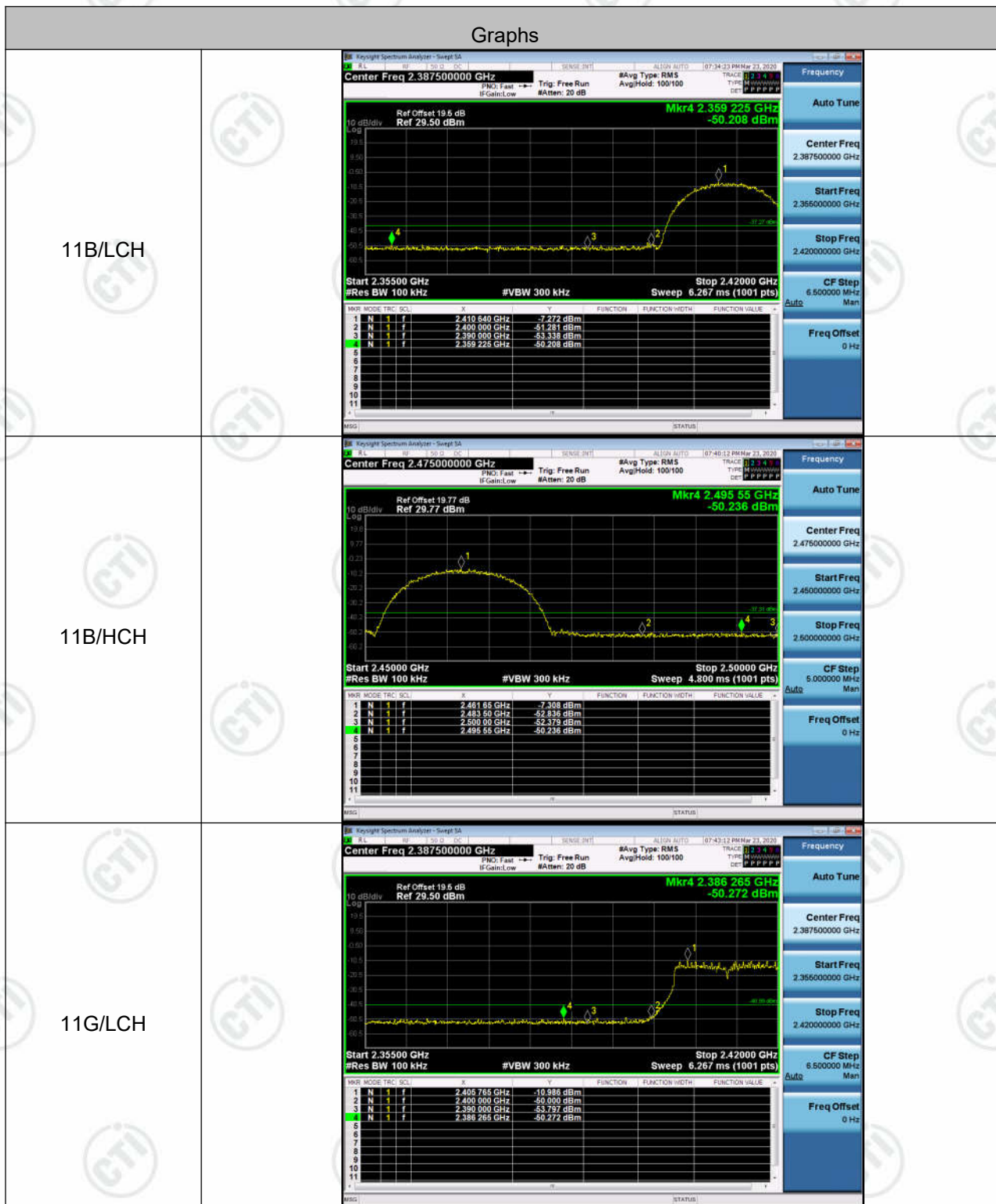
Test Setup



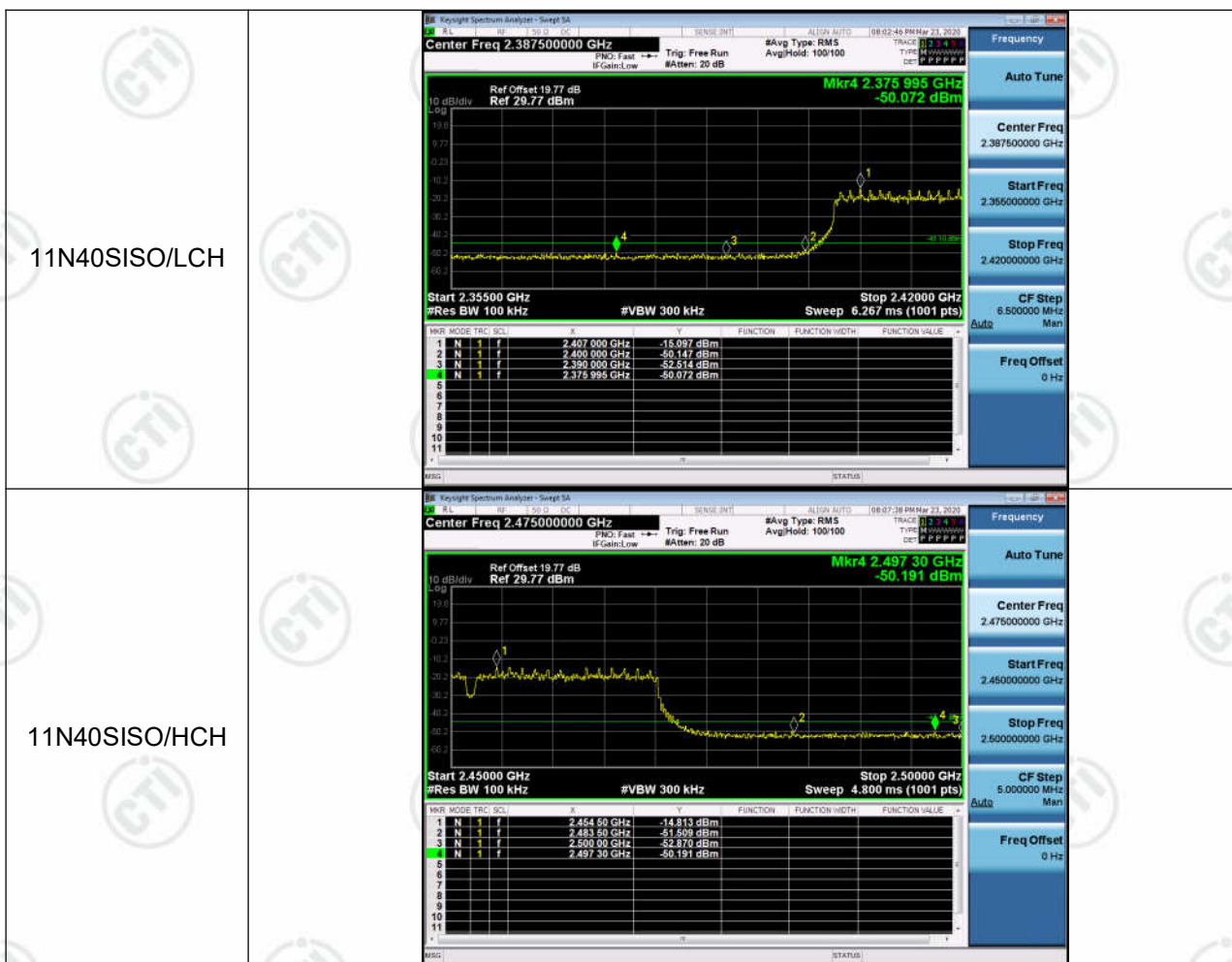
Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	-7.272	-50.208	-37.27	PASS
11B	HCH	-7.308	-50.236	-37.31	PASS
11G	LCH	-10.986	-50.272	-40.99	PASS
11G	HCH	-10.322	-49.896	-40.32	PASS
11N20SISO	LCH	-11.039	-49.761	-41.04	PASS
11N20SISO	HCH	-11.103	-50.333	-41.1	PASS
11N40SISO	LCH	-15.097	-50.072	-45.1	PASS
11N40SISO	HCH	-14.813	-50.191	-44.81	PASS

Test Graph



11G/HCH	Keylight Spectrum Analyzer - Swept SA Center Freq 2.47500000 GHz Ref Offset 19.77 dB Ref 29.77 dBm Start 2.450000 GHz #Res BW 100 kHz Stop 2.500000 GHz #VBW 300 kHz Sweep 4.800 ms (1001 pts) <table><thead><tr><th>MKR</th><th>MODE</th><th>TRC</th><th>SCN</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr></thead><tbody><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.455 75 GHz</td><td>-10.322 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>-52.057 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>-52.965 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.499 40 GHz</td><td>-49.896 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	SCN	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.455 75 GHz	-10.322 dBm				2	N	1	f	2.483 50 GHz	-52.057 dBm				3	N	1	f	2.500 00 GHz	-52.965 dBm				4	N	1	f	2.499 40 GHz	-49.896 dBm			
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11N20SISO/LCH	Keylight Spectrum Analyzer - Swept SA Center Freq 2.387500000 GHz Ref Offset 19.5 dB Ref 29.50 dBm Start 2.355000 GHz #Res BW 100 kHz Stop 2.420000 GHz #VBW 300 kHz Sweep 6.267 ms (1001 pts) <table><thead><tr><th>MKR</th><th>MODE</th><th>TRC</th><th>SCN</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr></thead><tbody><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.417 010 GHz</td><td>-11.039 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>-48.978 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>-52.972 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.379 115 GHz</td><td>-49.761 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	SCN	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.417 010 GHz	-11.039 dBm				2	N	1	f	2.400 000 GHz	-48.978 dBm				3	N	1	f	2.390 000 GHz	-52.972 dBm				4	N	1	f	2.379 115 GHz	-49.761 dBm			
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4	N	1	f	2.494 35 GHz	-50.333 dBm																																									



Appendix D): RF Conducted Spurious Emissions

Test Limit

According to §15.247(d),

In any 100 kHz bandwidth outside the authorized frequency band,

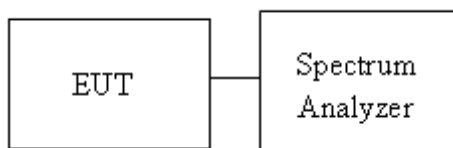
Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

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

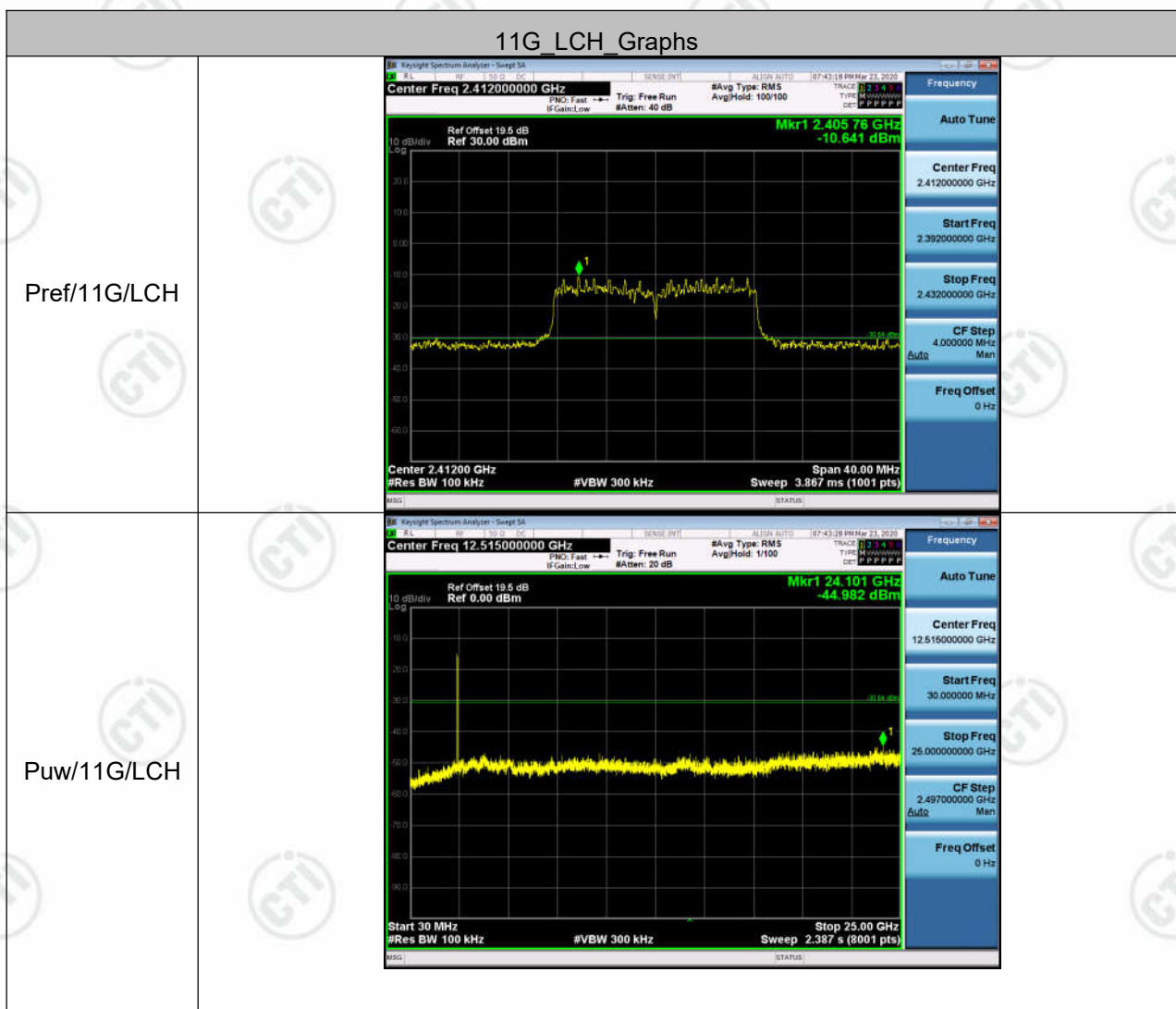
Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
11B	LCH	-7.88	<Limit	PASS
11B	MCH	-7.761	<Limit	PASS
11B	HCH	-6.9	<Limit	PASS
11G	LCH	-10.641	<Limit	PASS
11G	MCH	-10.401	<Limit	PASS
11G	HCH	-10.083	<Limit	PASS
11N20SISO	LCH	-10.811	<Limit	PASS
11N20SISO	MCH	-10.783	<Limit	PASS
11N20SISO	HCH	-11.012	<Limit	PASS
11N40SISO	LCH	-14.501	<Limit	PASS
11N40SISO	MCH	-14.429	<Limit	PASS
11N40SISO	HCH	-13.974	<Limit	PASS

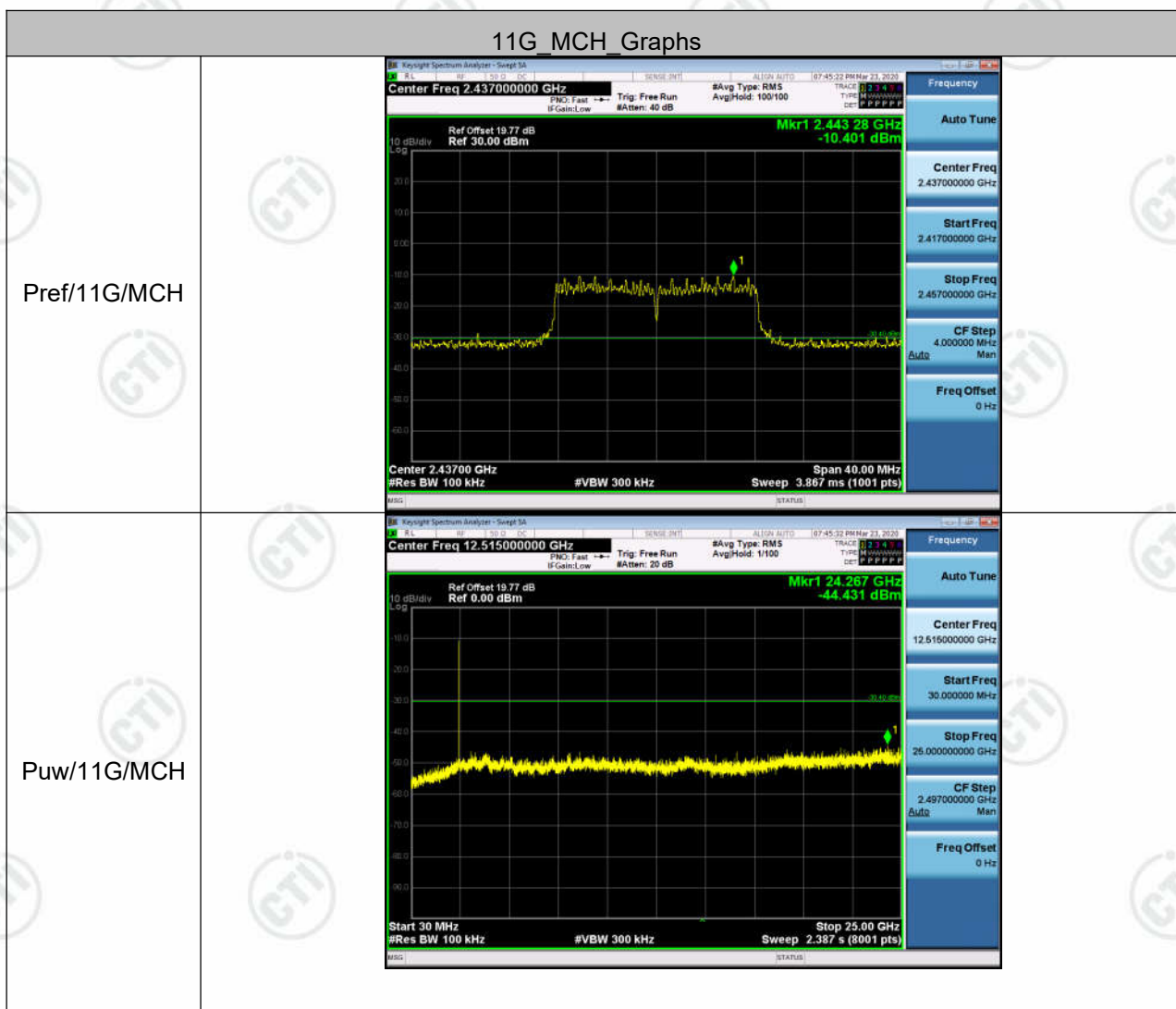
Test Graph

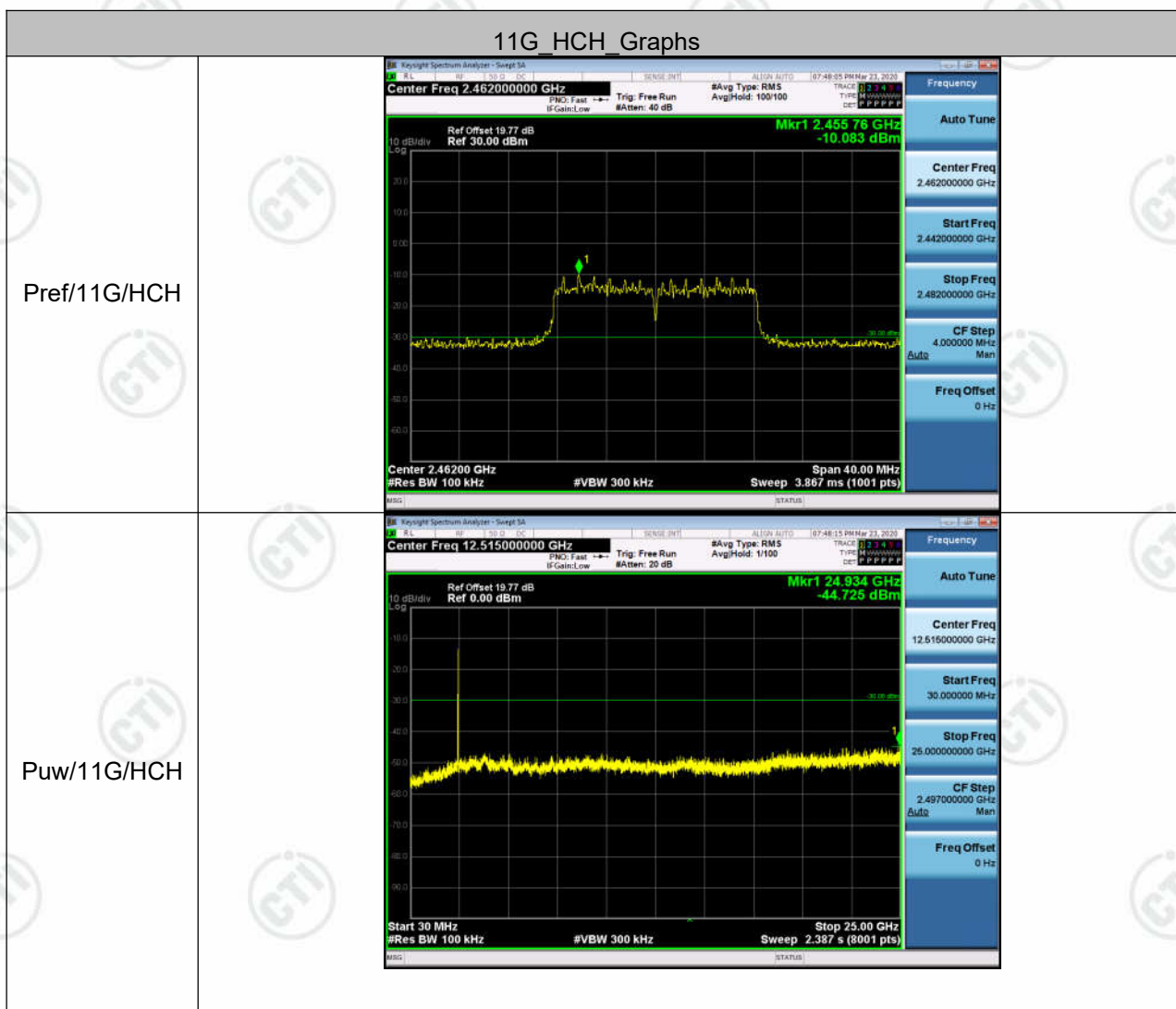


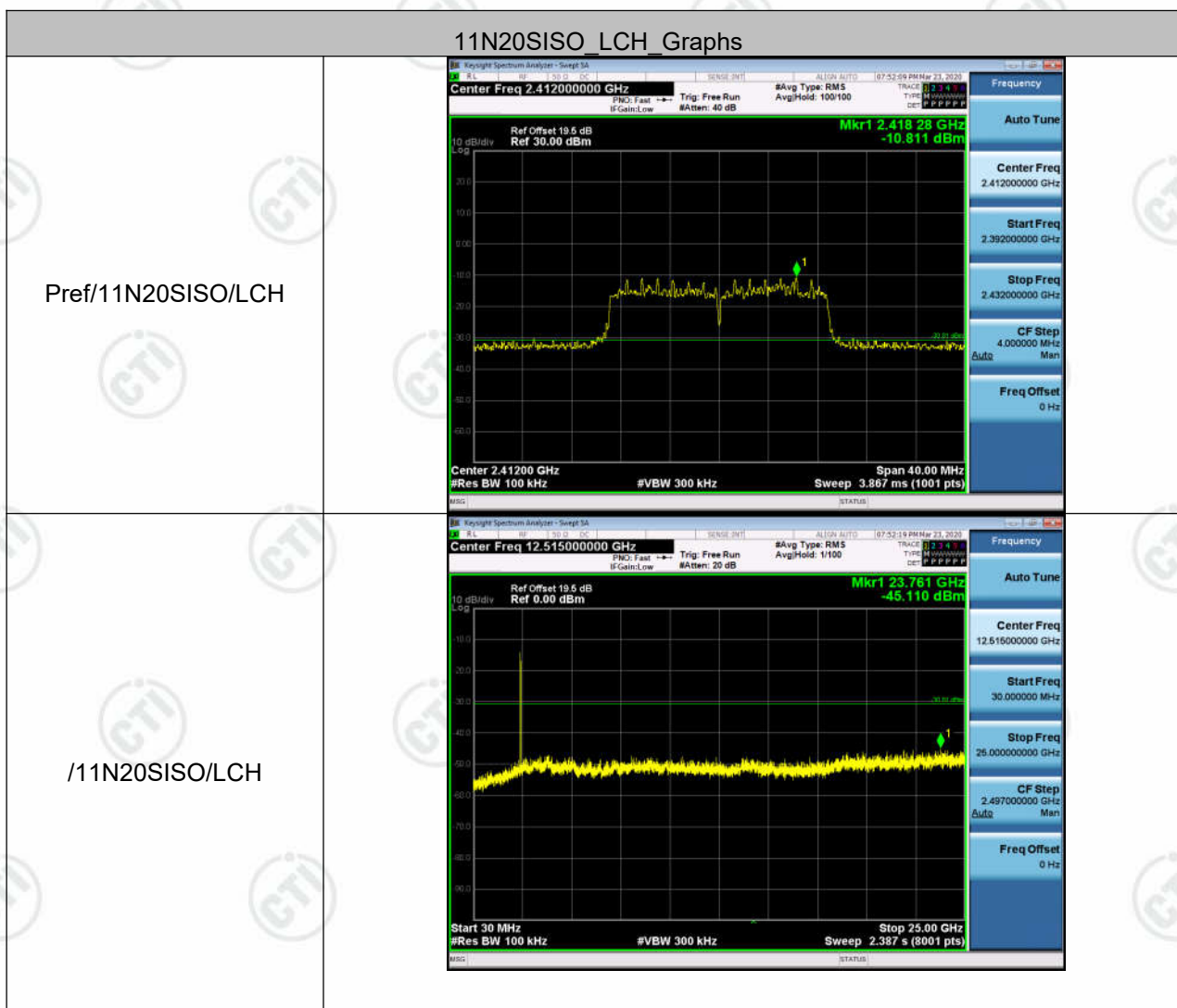


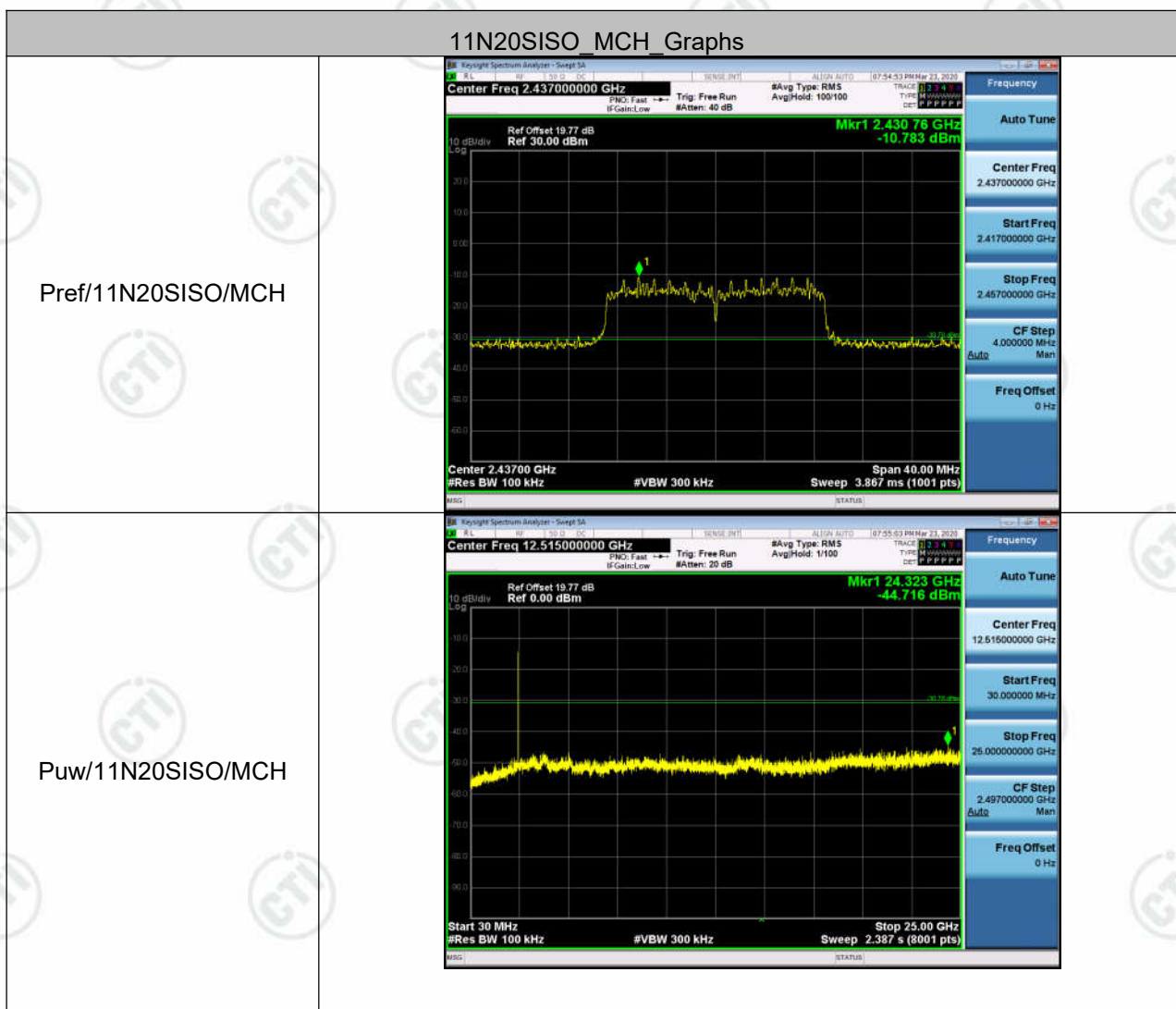


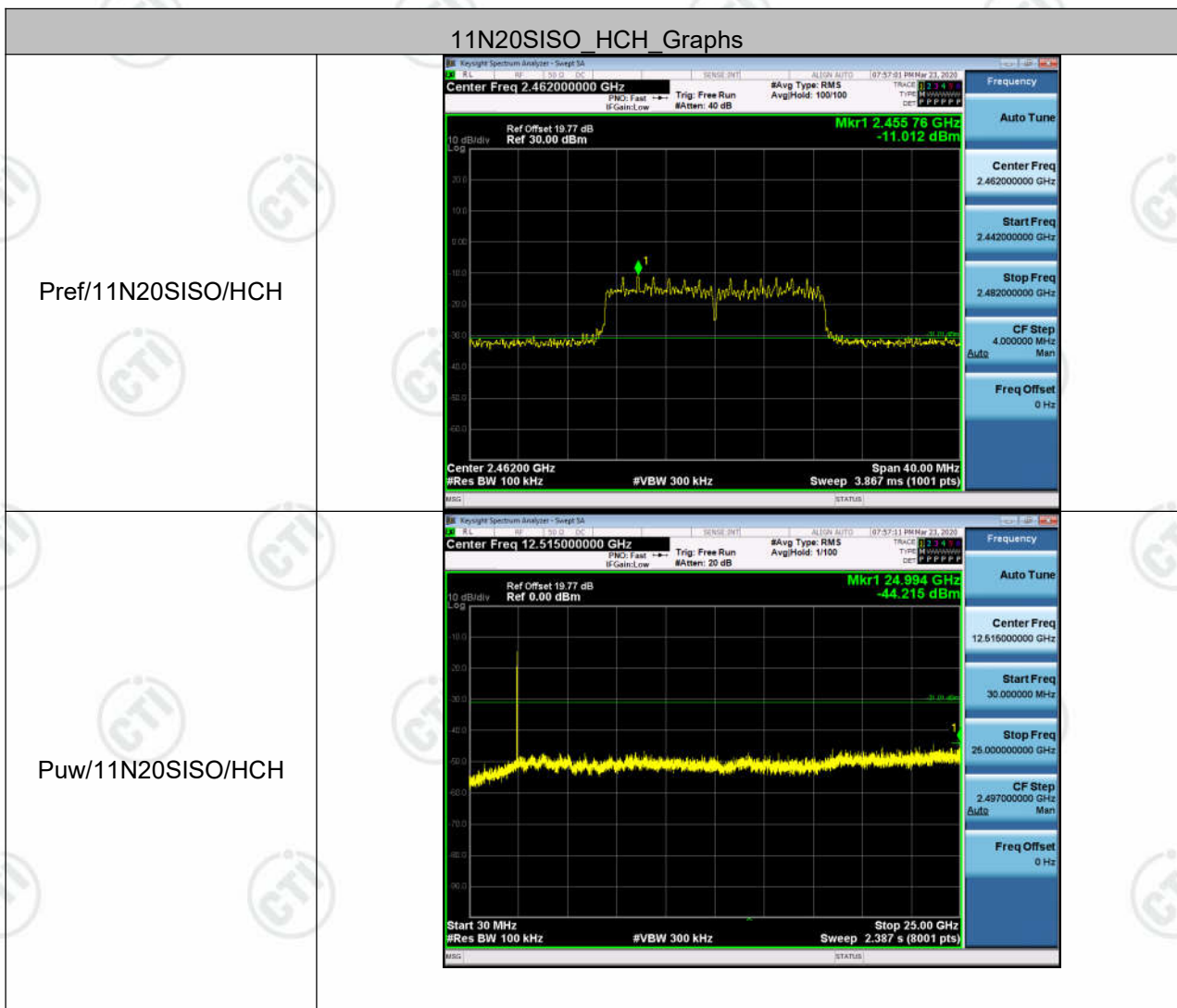


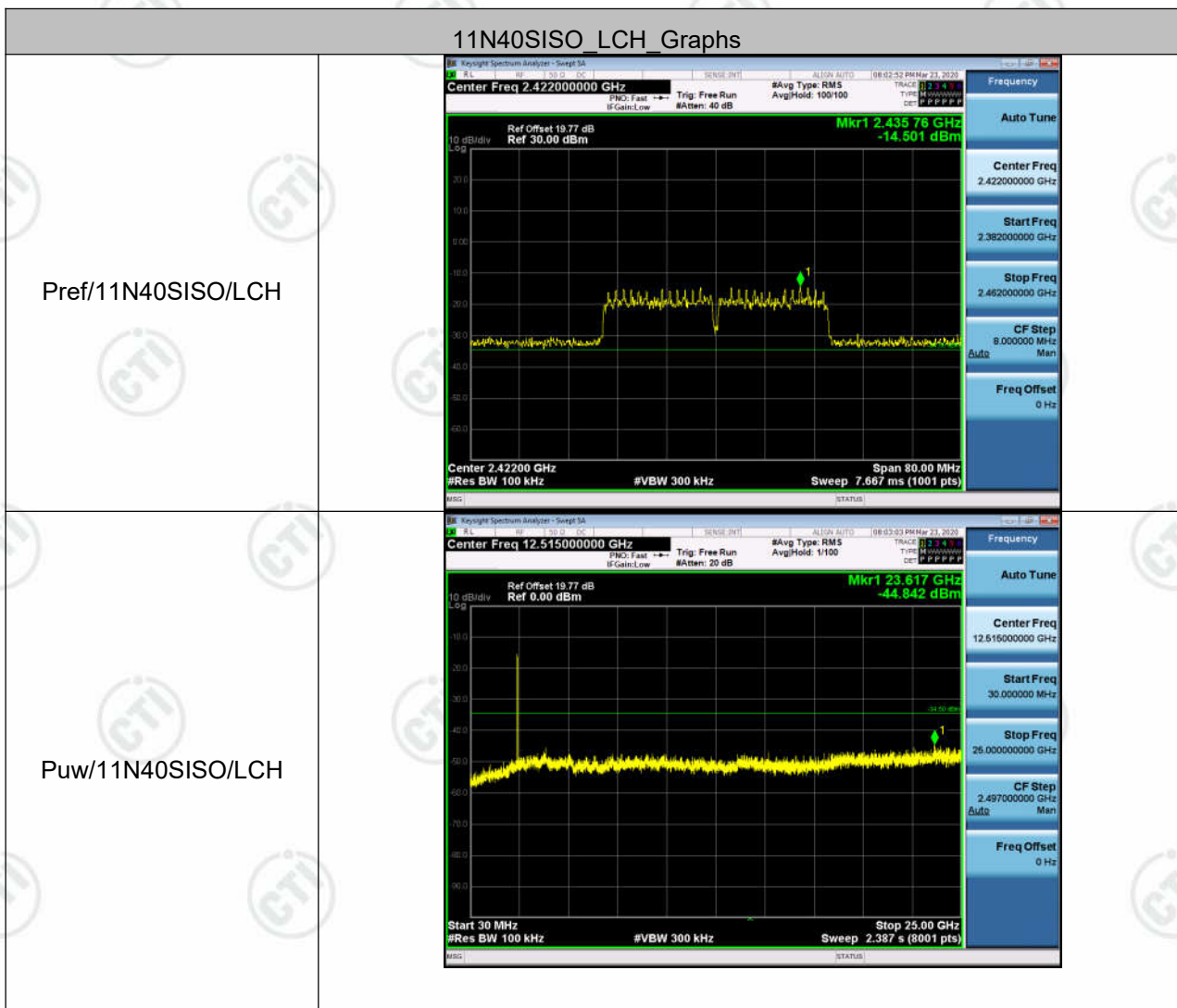


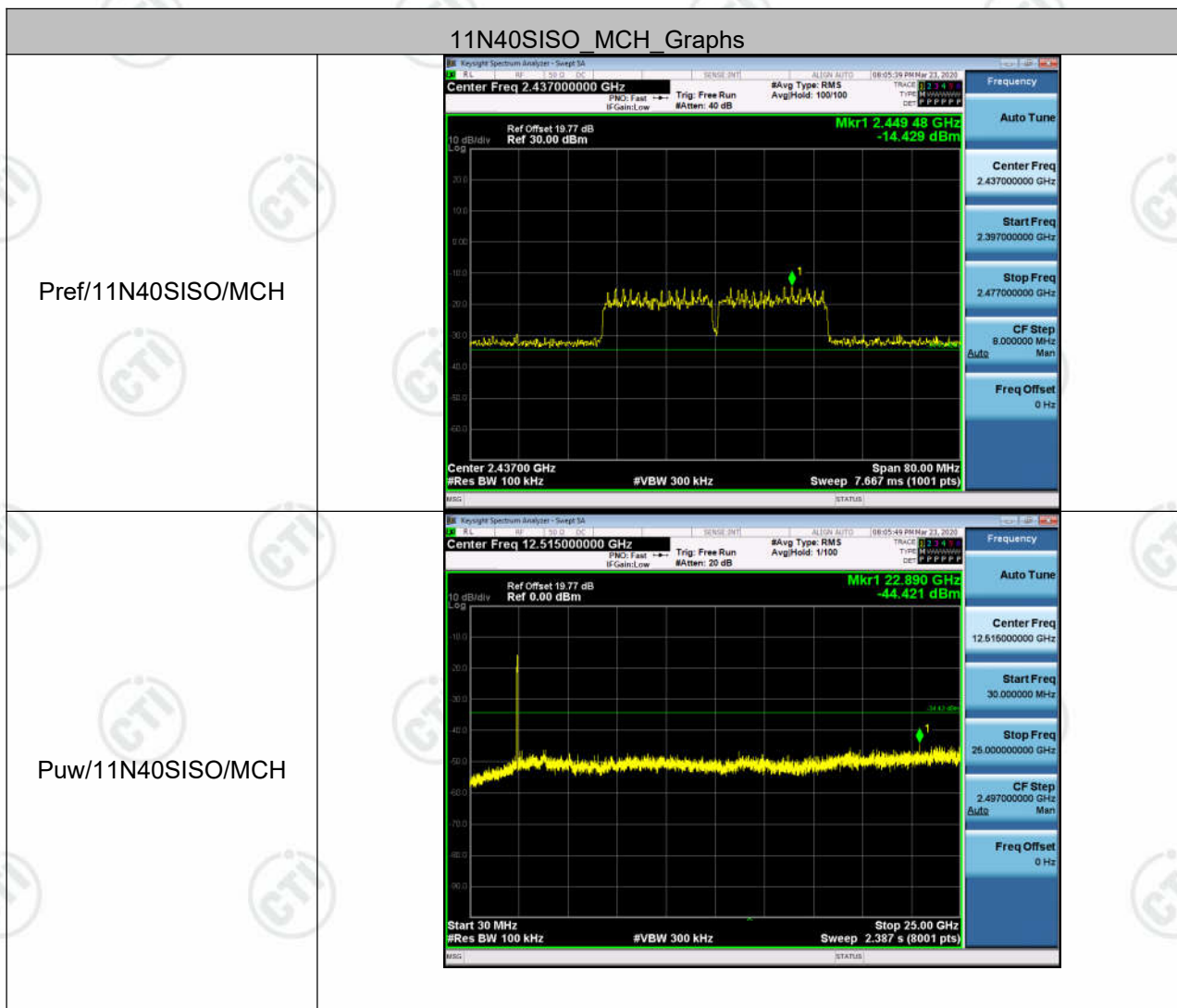


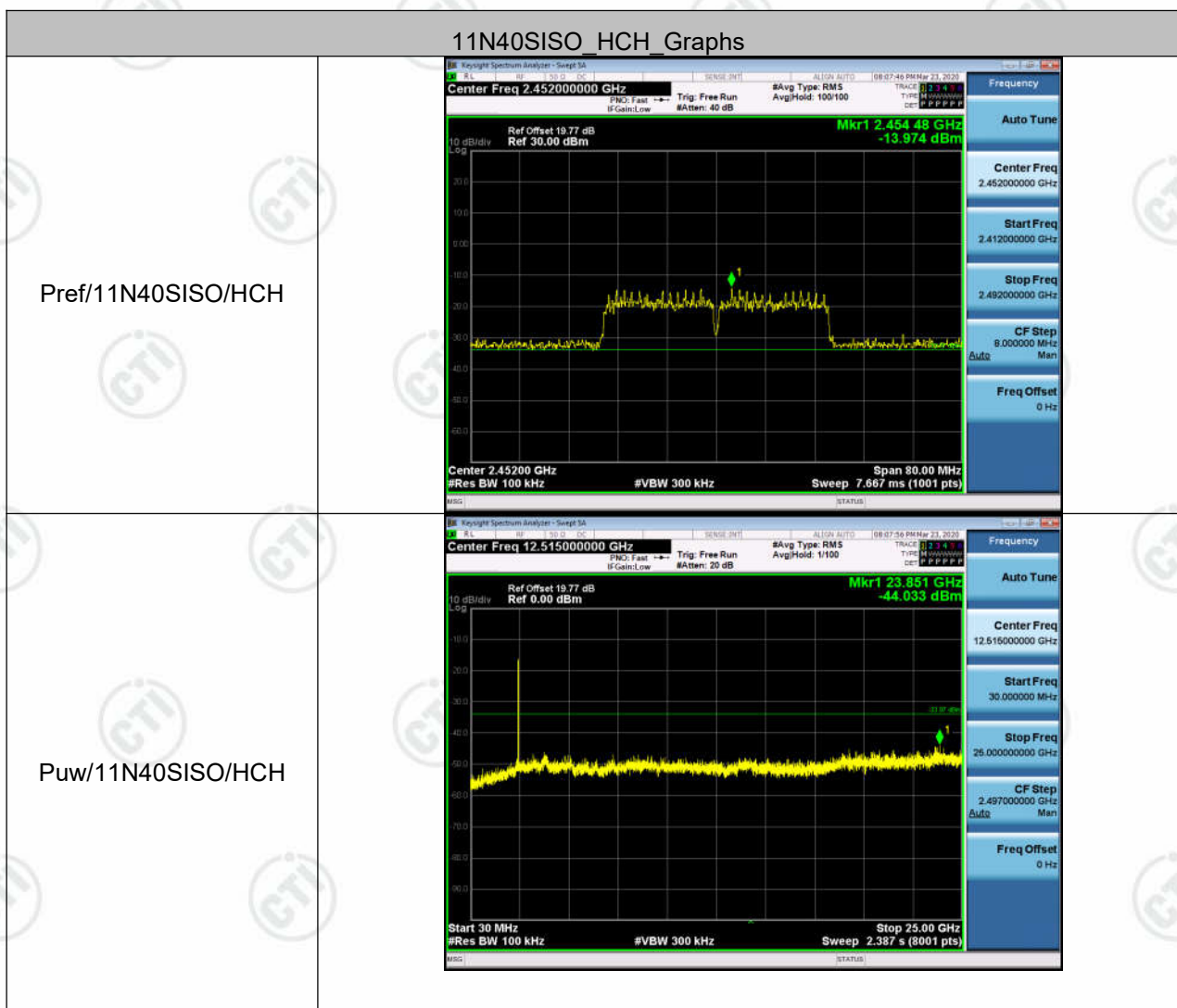












Appendix E): Power Spectral Density

Test Limit

According to §15.247(e),

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

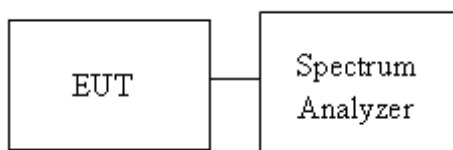
Limit	☒ Antenna not exceed 6 dBi : 8dBm ☐ Antenna with DG greater than 6 dBi : [Limit = 8 – (DG – 6)] ☐ Point-to-point operation :
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Test Procedure

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.

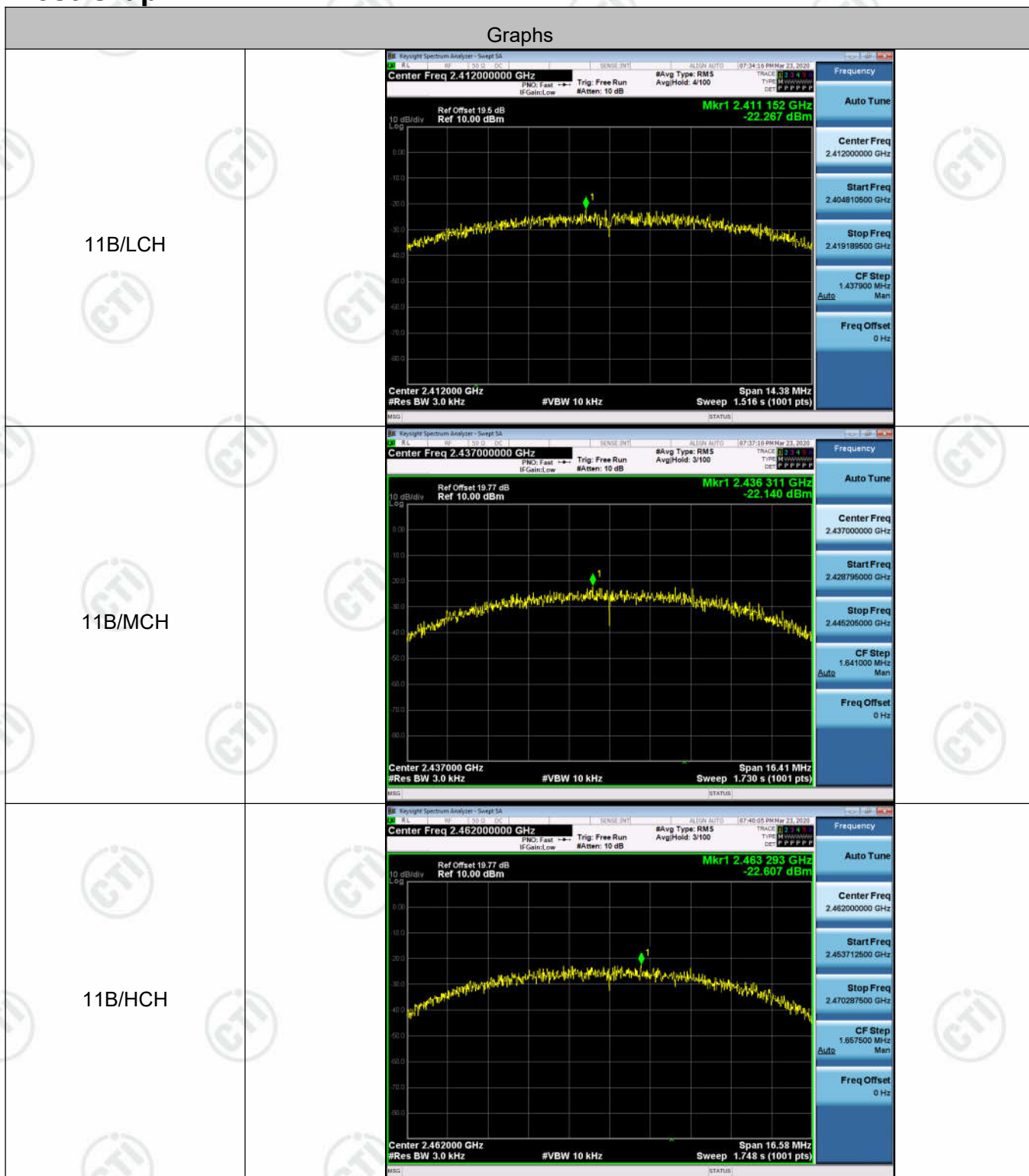
Test Setup



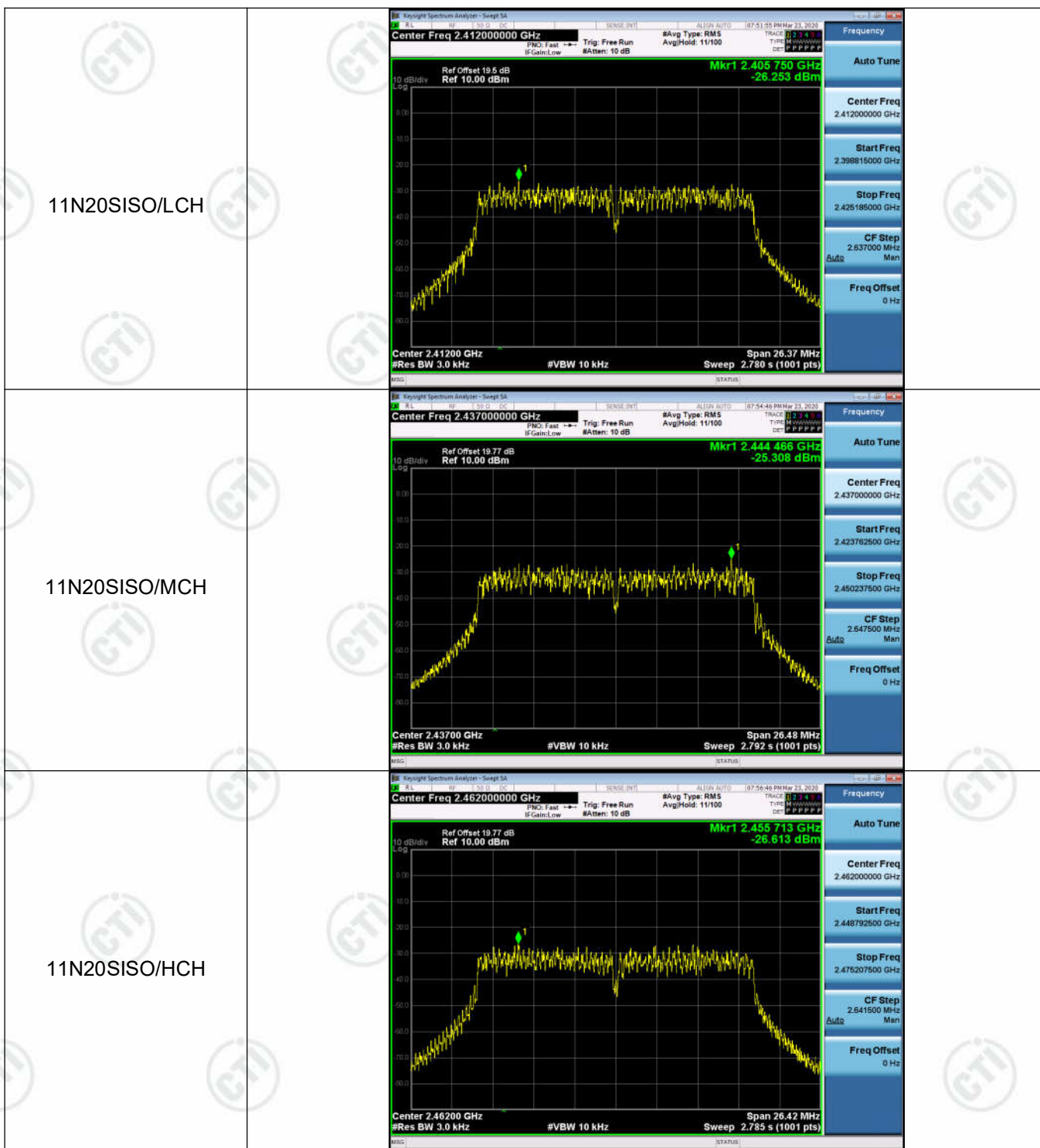
Result Table

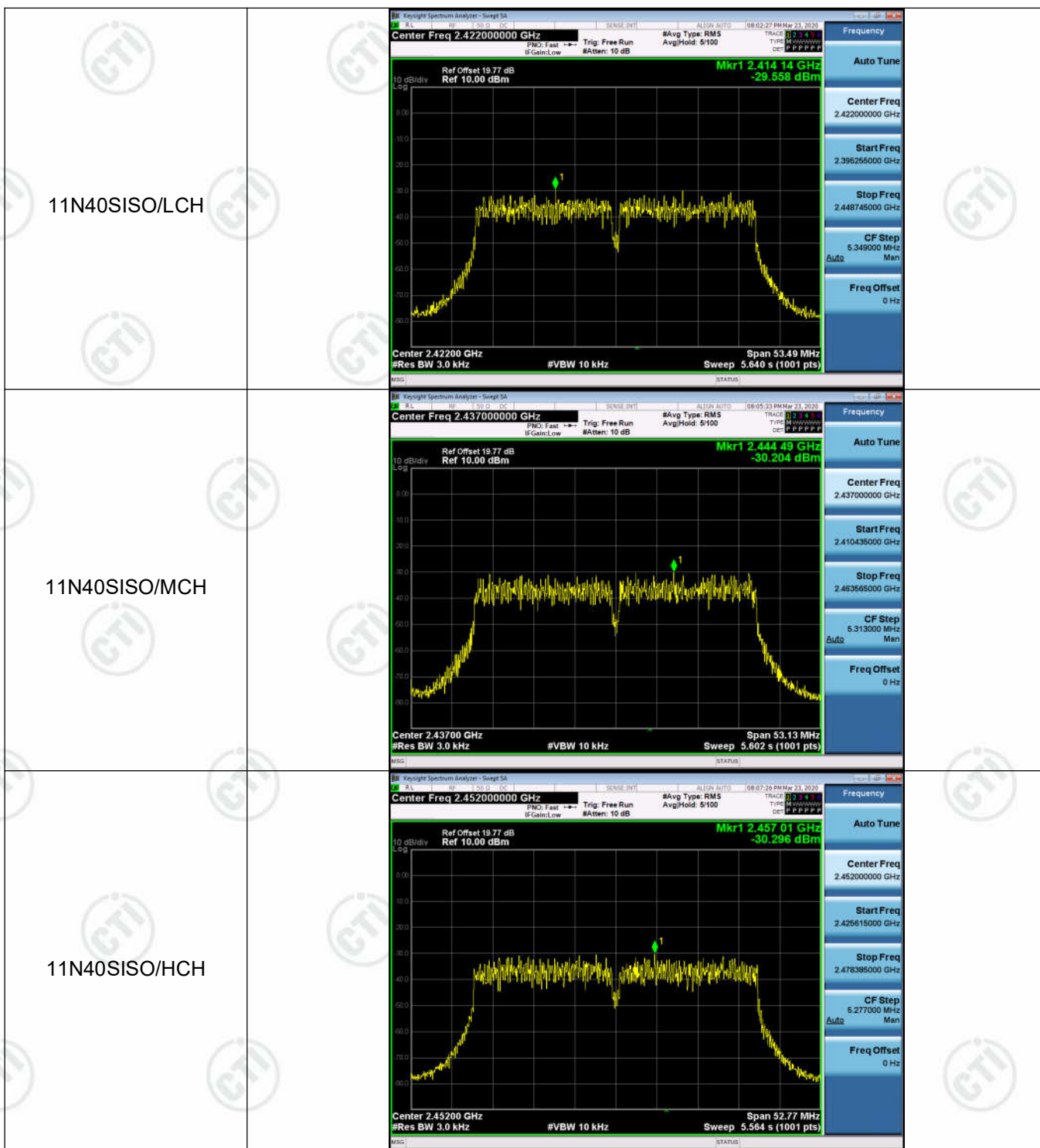
Mode	Channel	Power Spectral Density [dBm]	Verdict
11B	LCH	-22.267	PASS
11B	MCH	-22.140	PASS
11B	HCH	-22.607	PASS
11G	LCH	-26.390	PASS
11G	MCH	-25.669	PASS
11G	HCH	-25.084	PASS
11N20SISO	LCH	-26.253	PASS
11N20SISO	MCH	-25.308	PASS
11N20SISO	HCH	-26.613	PASS
11N40SISO	LCH	-29.558	PASS
11N40SISO	MCH	-30.204	PASS
11N40SISO	HCH	-30.296	PASS

Test Graph









Appendix F): Antenna Requirement

15.203 requirement:

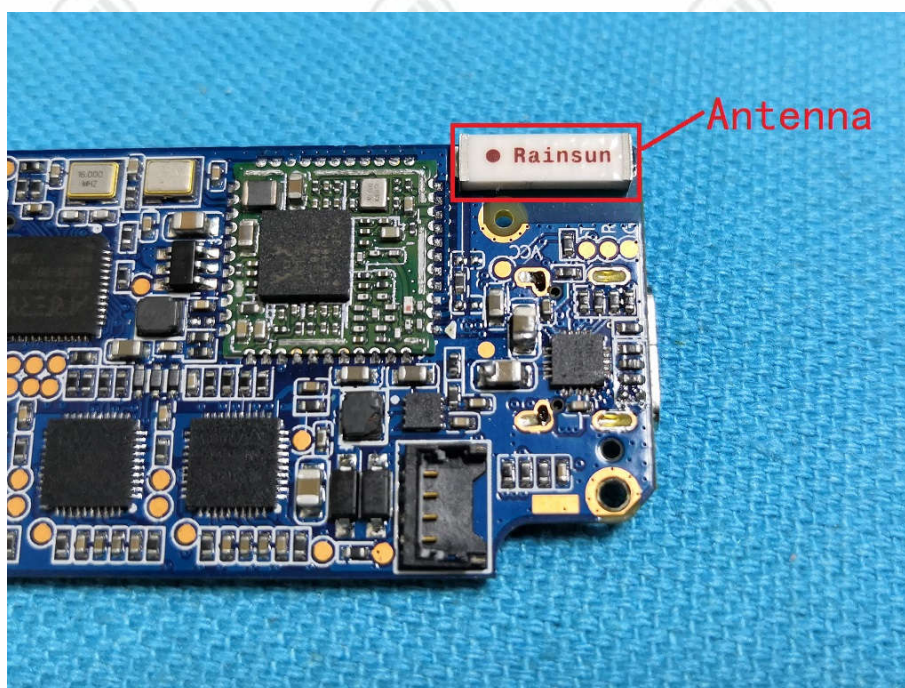
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is Internal Antenna and no consideration of replacement. The best case gain of the antenna is 1dBi.



Appendix G): AC Power Line Conducted Emission

Test Procedure:	Test frequency range :150KHz-30MHz 1)The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.															
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr> <tr> <th>Quasi-peak</th><th>Average</th></tr> </thead> <tbody> <tr> <td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr> <tr> <td>0.5-5</td><td>56</td><td>46</td></tr> <tr> <td>5-30</td><td>60</td><td>50</td></tr> </tbody> </table> * The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. NOTE : The lower limit is applicable at the transition frequency		Frequency range (MHz)	Limit (dB μ V)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dB μ V)															
	Quasi-peak	Average														
0.15-0.5	66 to 56*	56 to 46*														
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5-30	60	50														