

TEST REPORT

Product Name: WIFI Module
Trade Mark: Prowise
Model No. / HVIN: PW.2.12004.0002
Add. Model No. / HVIN: N/A
Report Number: 210118001RFC-4
Test Standards: FCC 47 CFR Part 15 Subpart E
RSS-247 Issue 2
RSS-Gen Issue 5
FCC ID: 2AQ5RWIFIAP6275P
IC: 24301-WIFIAP6275P
Test Result: PASS
Date of Issue: May 6, 2021

Prepared for:

Shenzhen KTC Commercial Display Technology CO.,LTD.
No.4023, Northern Wuhe Road, Bantian Street, Longgang District,
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Version

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V1.0	May 6, 2021	Original



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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Shenzhen KTC Commercial Display Technology CO.,LTD.
Address of Applicant:	No.4023, Northern Wuhe Road, Bantian Street, Longgang District, Shenzhen City, Guangdong Province, P.R.China
Manufacturer:	Shenzhen KTC Commercial Display Technology CO.,LTD.
Address of Manufacturer:	No.4023, Northern Wuhe Road, Bantian Street, Longgang District, Shenzhen City, Guangdong Province, P.R.China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	WIFI Module		
Model No. / HVIN:	PW.2.12004.0002		
Add. Model No. / HVIN:	N/A		
Trade Mark:	Prowise		
DUT Stage:	Production Unit		
EUT Supports Function:	2.4 GHz ISM Band:	IEEE 802.11b/g/n/ax	
		Bluetooth 5.0	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac/ax
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac/ax
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac/ax
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac/ax
Software Version:	1.0.28		
Hardware Version:	A1		
Sample Received Date:	January 20, 2021		
Sample Tested Date:	March 6, 2021 to March 30, 2021		

1.2.2 Description of Accessories

None.

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Bands:	5150 MHz to 5250 MHz (U-NII-1)
	5250 MHz to 5350 MHz (U-NII-2A)
	5470 MHz to 5725 MHz (U-NII-2C)
	5 725 MHz to 5 850 MHz (U-NII-3)
Frequency Ranges:	5180 MHz to 5240 MHz
	5260 MHz to 5320 MHz
	5500 MHz to 5700 MHz
	5 745 MHz to 5 825 MHz
Support Standards:	IEEE 802.11a/n/ac/ax
TPC Function:	Not Support
DFS Operational mode:	Slave without radar Interference detection function
Type of Modulation:	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11ac: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11ax: OFDM(,1024QAM,256QAM, 64QAM, 16QAM, QPSK, BPSK)
Channel Spacing:	IEEE 802.11a/n-HT20/ac-VHT20/ax20: 20 MHz

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Data Rate:	IEEE 802.11n-HT40/ac-VHT40/ax40: 40 MHz	
	IEEE 802.11ac-VHT80/ax80: 80 MHz	
	IEEE 802.11a: Up to 54 Mbps	
	IEEE 802.11n-HT20: Up to MCS15	
	IEEE 802.11n-HT40: Up to MCS15	
	IEEE 802.11ac-VHT20: Up to MCS8	
	IEEE 802.11ac-VHT40: Up to MCS9	
	IEEE 802.11ac-VHT80: Up to MCS9	
	IEEE 802.11ax20: Up to HE11	
	IEEE 802.11ax40: Up to HE11	
	IEEE 802.11ax80: Up to HE11	
Number of Channels:	5150 MHz to 5250 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20/ax20 2 for IEEE 802.11n-HT40/ac-VHT40/ax40 1 for IEEE 802.11acVHT80/ax80	
	5250 MHz to 5350 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20/ax20 2 for IEEE 802.11n-HT40/ac-VHT40/ax40 1 for IEEE 802.11acVHT80/ax80	
	5470 MHz to 5725 MHz: 11 for IEEE 802.11a/n-HT20/ac-VHT20/ax20 5 for IEEE 802.11n-HT40/ac-VHT40/ax40 2 for IEEE 802.11ac-VHT80/ax80	
	5725 MHz to 5850 MHz: 5 for IEEE 802.11a/n-HT20/ac-VHT20/ax20 2 for IEEE 802.11n-HT40/ac-VHT40/ax40 1 for IEEE 802.11ac-VHT80/ax80	
Antenna Type:	Chain 0	External Antenna
	Chain 1	External Antenna
Antenna Gain:	Chain 0	5150 MHz to 5250 MHz: 1.67 dBi
		5250 MHz to 5350 MHz: 1.75 dBi
		5470 MHz to 5725 MHz: 2.95 dBi
		5725 MHz to 5850 MHz: 1.55 dBi
	Chain 1	5150 MHz to 5250 MHz: 1.67 dBi
		5250 MHz to 5350 MHz: 1.75 dBi
		5470 MHz to 5725 MHz: 2.95 dBi
		5725 MHz to 5850 MHz: 1.55 dBi
Maximum EIRP (dBm):	SISO_Chain 0	U-NII-1
	IEEE 802.11a:	14.10
	SISO_Chain 1	U-NII-1
	IEEE 802.11a:	14.75
	MIMO_Chain 0+1	U-NII-1
	IEEE 802.11n-HT20:	19.37
	IEEE 802.11n-HT40:	16.39
	IEEE 802.11ac-VHT20:	17.56
	IEEE 802.11ac-VHT40:	14.89
	IEEE 802.11ac-VHT80:	14.28

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Maximum conducted output power (dBm):	IEEE 802.11ax20	15.02			
	IEEE 802.11ax40	13.52			
	IEEE 802.11ax8	15.51			
	SISO_Chain 0	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
	IEEE 802.11a:	12.43	12.36	11.97	12.53
	SISO_Chain 1	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
	IEEE 802.11a:	13.08	13.25	12.52	13.03
	MIMO_Chain 0+1	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
	IEEE 802.11n-HT20:	17.70	17.29	15.59	15.73
	IEEE 802.11n-HT40:	14.72	14.52	14.17	14.33
	IEEE 802.11ac-VHT20:	15.89	15.58	15.01	12.30
	IEEE 802.11ac-VHT40:	13.22	13.67	13.12	13.76
	IEEE 802.11ac-VHT80:	12.61	12.34	12.23	11.08
	IEEE 802.11ax20	13.35	12.98	13.44	11.74
	IEEE 802.11ax40	11.85	11.69	12.25	11.46
	IEEE 802.11ax80	13.84	13.45	13.68	11.65
Normal Test Voltage:		3.3 Vdc			

1.4 OTHER INFORMATION

Operation Frequency Each of Channel				
	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
IEEE 802.11a, IEEE 802.11n-HT20, IEEE 802.11ac-VHT20 IEEE 802.11ax20	$f = 5000 + 5k, k = 32 + 4n$			$f = 5000 + 5k, k = 145 + 4n$
	$n = 1, \dots, 4$	$n = 5, \dots, 8$	$n = 17, \dots, 27$	$n = 1, \dots, 5$
IEEE 802.11n-HT40, IEEE 802.11ac-VHT40 IEEE 802.11ax40	$f = 5000 + 5k, k = 30 + 8n$			$f = 5000 + 5k, k = 143 + 8n$
	$n = 1, 2$	$n = 1, \dots, 5$	$n = 9, \dots, 13$	$n = 1, 2$
IEEE 802.11ac-VHT80 IEEE 802.11ax80	$f = 5000 + 5k, k = 26 + 16n$			$f = 5000 + 5k, k = 155$
	$n = 1$	$n = 1, 2$	$n = 5, 6$	
Note: f is the operating frequency (MHz); k is the operating channel.				

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	Thinkpad	PF-0EQBE3 15/11	UnionTrust
Wireless Home Router	SAGEMCOM	FAST5280	N/A	UnionTrust
KTC power mainboard	KTC	PW.1.17055.0001	N/A	Client

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.50 Meter	UnionTrust

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1.6 TEST LOCATION

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1.7 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.2 dB
2	Conducted emission 150KHz-30MHz	±2.7 dB
3	Radiated emission 9KHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.6 dB
5	Radiated emission 1GHz-18GHz	± 4.4 dB
6	Radiated emission 18GHz-26GHz	± 4.6 dB
7	Radiated emission 26GHz-40GHz	± 4.6 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart E Test Cases			
Test Item	Test Requirement	Test Method	Result
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203 FCC 47 CFR Part 15 Subpart E Section 15.407(a)(1) (2) RSS-Gen Issue 5, Section 6.8	N/A	PASS
26 dB emission bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(2)(5) RSS-247 Issue 2 Section 6.2.1.2	KDB 789033 D02 v02r01 Section C.1	PASS
6 dB bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (e) RSS-247 Issue 2 Section 6.2.4.1	KDB 789033 D02 v02r01 Section C.2	PASS
Occupied Bandwidth	RSS-Gen Issue 5, Section 6.7	RSS-Gen Issue 5, section 6.7	PASS
Maximum conducted output power	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3) RSS-247 Issue 2 Section 6.2.1.1/6.2.2.1/6.2.3.1/6.2.4.1	KDB 789033 D02 v02r01 Section E.3.a (Method PM)	PASS
Peak Power Spectral Density	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3) RSS-247 Issue 2 Section 6.2.1.1/6.2.2.1/6.2.3.1/6.2.4.1	KDB 789033 D02 v02r01 Section F	PASS
Radiated Emissions and Band Edge Measurement	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(6) FCC 47 CFR Part 15 Subpart C Section 15.209/205 RSS-247 Issue 2 Section 6.2.1.2/6.2.2.2/6.2.3.2/6.2.4.2	KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6	PASS
Dynamic Frequency Selection	FCC 47 CFR Part 15 Subpart E Section 15.407 (h) RSS-247 Issue 2 Section 6.3	KDB 905462 D03 Client Without DFS New Rules v01r02	PASS
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(6) FCC 47 CFR Part 15 Subpart C Section 15.207 RSS-Gen Issue 5, Section 8.8	ANSI C63.10-2013, Section 6.2.	PASS

For Dynamic Frequency Selection

Test Case	Result
Channel Availability Check Time	N/A ¹
U-NII Detection Bandwidth	N/A ¹
Channel Closing Transmission Time	PASS
Channel Move Time	PASS
DFS Detection Threshold	N/A ¹
Non- Occupancy Period	N/A ¹

Note:

1) The EUT is slave, NA In this whole report not application.

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Jan. 22, 2021	Jan. 21, 2024
☒	Receiver	R&S	ESIB26	100114	Nov. 18, 2020	Nov. 17, 2021
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 10, 2020	Nov. 09, 2021
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 14, 2020	Nov. 13, 2022
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 14, 2020	Nov. 13, 2022
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 10, 2020	Nov. 9, 2021
☒	Preamplifier	HP	8447F	2805A02960	May. 30, 2020	May. 9, 2021
☐	Horn Antenna	ETS-LINDGREN	3117	00164202	May. 30, 2020	May. 29, 2021
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	Dec. 03, 2018	Dec. 03, 2021
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	Jun. 19, 2020	Jun. 18, 2021
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☐	Band Rejection Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50702	G248	Nov. 16, 2020	Nov. 15, 2021
☒	Band Rejection Filter (5150MHz~5880MHz)	Micro-Tronics	BRM50716	G1868	Nov. 16, 2020	Nov. 15, 2021
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Nov. 18, 2020	Nov. 17, 2021
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 18, 2020	Nov. 17, 2021
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 18, 2020	Nov. 17, 2021
☐	LISN	ETS-Lindgren	3816/2SH	00201088	Nov. 18, 2020	Nov. 17, 2021
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted RF test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 10, 2020	Nov. 09, 2021
☒	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Nov. 10, 2020	Nov. 09, 2021
☐	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430023	Nov. 10, 2020	Nov. 09, 2021
☒	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	Nov. 10, 2020	Nov. 09, 2021

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4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage	Relative Humidity (%)
NT/NV	+15 to +35	3.3Vdc	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
26 dB emission bandwidth	24.6	56	100.11	Rocky Li
6 dB bandwidth	24.6	56	100.11	Rocky Li
Occupied Bandwidth	24.6	56	100.11	Rocky Li
Maximum conducted output power	24.6	56	100.11	Rocky Li
Peak Power Spectral Density	24.6	56	100.11	Rocky Li
Radiated Emissions and Band Edge Measurement	23.9	54	100.34	Andy Lin
Dynamic Frequency Selection	24.6	56	100.11	Rocky Li
AC Power Line Conducted Emission	24.7	34	99.97	Tripp Jiang

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11a IEEE 802.11n-HT20 IEEE 802.11ac-VHT20 IEEE 802.11ax20	5150 MHz to 5250 MHz	Channel 36	Channel 44	Channel 48
		5180 MHz	5220 MHz	5240 MHz
	5250 MHz to 5350 MHz	Channel 52	Channel 60	Channel 64
		5260 MHz	5300 MHz	5320 MHz
	5470 MHz to 5725 MHz	Channel 100	Channel 116	Channel 140
		5500 MHz	5580 MHz	5700 MHz
	5725 MHz to 5850 MHz	Channel 149	Channel 157	Channel 165
		5745 MHz	5785 MHz	5825 MHz
IEEE 802.11n-HT40 IEEE 802.11ac-VHT40 IEEE 802.11ax40	5150 MHz to 5250 MHz	Channel 38	--	Channel 46
		5190 MHz	--	5230 MHz
	5250 MHz to 5350 MHz	Channel 54	--	Channel 62
		5270 MHz	--	5310 MHz
	5470 MHz to 5725 MHz	Channel 102	Channel 110	Channel 134
		5510 MHz	5550 MHz	5670 MHz
	5725 MHz to 5850 MHz	Channel 151	--	Channel 159
		5755 MHz	--	5795 MHz
IEEE 802.11ac-VHT80 IEEE 802.11ax80	5150 MHz to 5250 MHz	--	Channel 42	--
		--	5210 MHz	--
	5250 MHz to 5350 MHz	--	Channel 58	--
		--	5290 MHz	--
	5470 MHz to 5725 MHz	Channel 106	--	--
		5530 MHz	--	--
	5725 MHz to 5850 MHz	--	Channel 155	--
		--	5775 MHz	--

4.3 EUT TEST STATUS

Mode	Tx/Rx Function	Description
IEEE 802.11a/n/ac/ax	1Tx/1Rx or 2Tx/2Rx	1. Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

Power Setting								
Mode	U-NII-1		U-NII-2A		U-NII-2C		U-NII-3	
	Chain 0	Chain 1	Chain 0	Chain 1	Chain 0	Chain 1	Chain 0	Chain 1
IEEE 802.11a	50	45	50	45	53	47	60	60
IEEE 802.11n-HT20	50	50	50	50	50	50	60	60
IEEE 802.11n-HT40	50	50	50	50	50	50	60	60
IEEE 802.11ac-VHT20	50	50	50	50	50	50	60	60
IEEE 802.11ac-VHT40	50	50	50	50	50	50	60	60
IEEE 802.11ac-VHT80	46	46	46	46	46	46	50	50
IEEE 802.11ax20	35	35	35	35	40	40	45	45
IEEE 802.11ax40	35	35	35	35	45	45	45	45
IEEE 802.11ax80	40	40	40	40	45	45	45	45

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Test Software

Test software name: adb command ;

4.4 PRE-SCAN

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below

Mode	Worst-case data rates
IEEE 802.11a	6 Mbps
IEEE 802.11n-HT20	MCS0
IEEE 802.11n-HT40	MCS0
IEEE 802.11ac-VHT20	MCS0
IEEE 802.11ac-VHT40	MCS0
IEEE 802.11ac-VHT80	MCS0
IEEE 802.11ax20	HE0
IEEE 802.11ax40	HE0
IEEE 802.11ax80	HE0

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

Figure 1. Below 30MHz

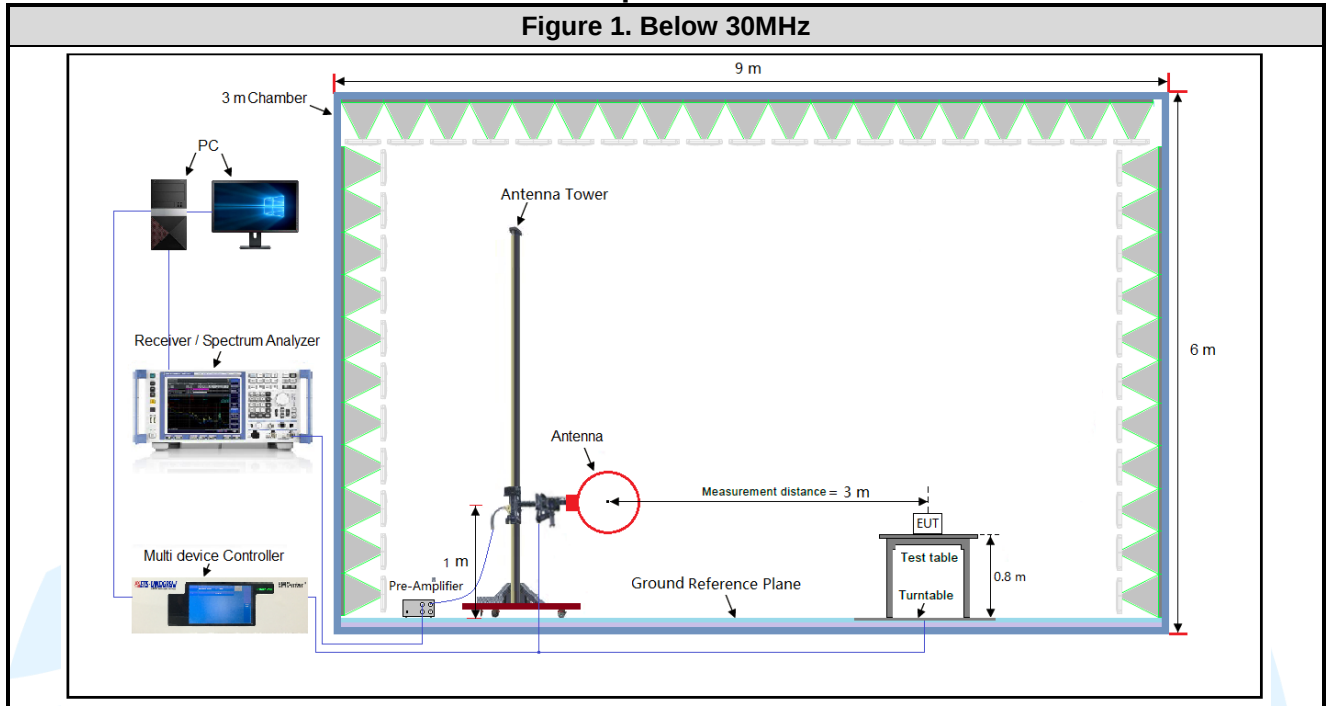
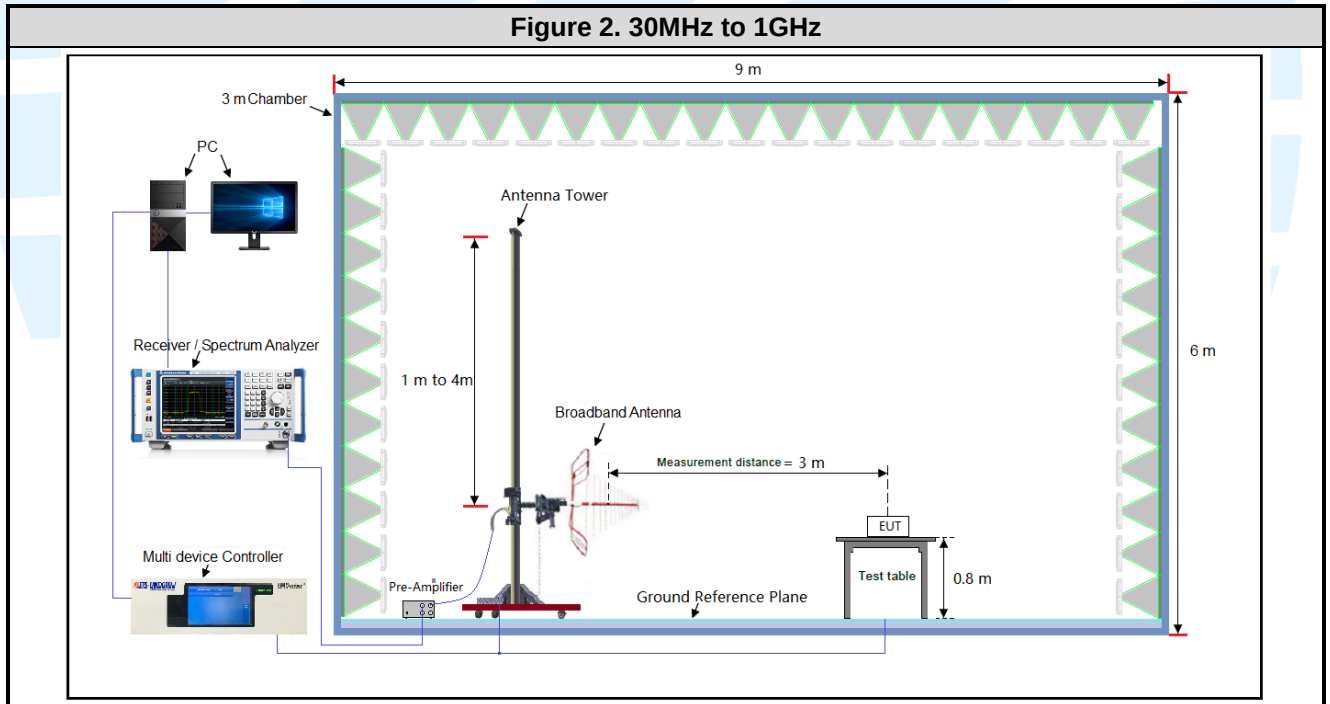
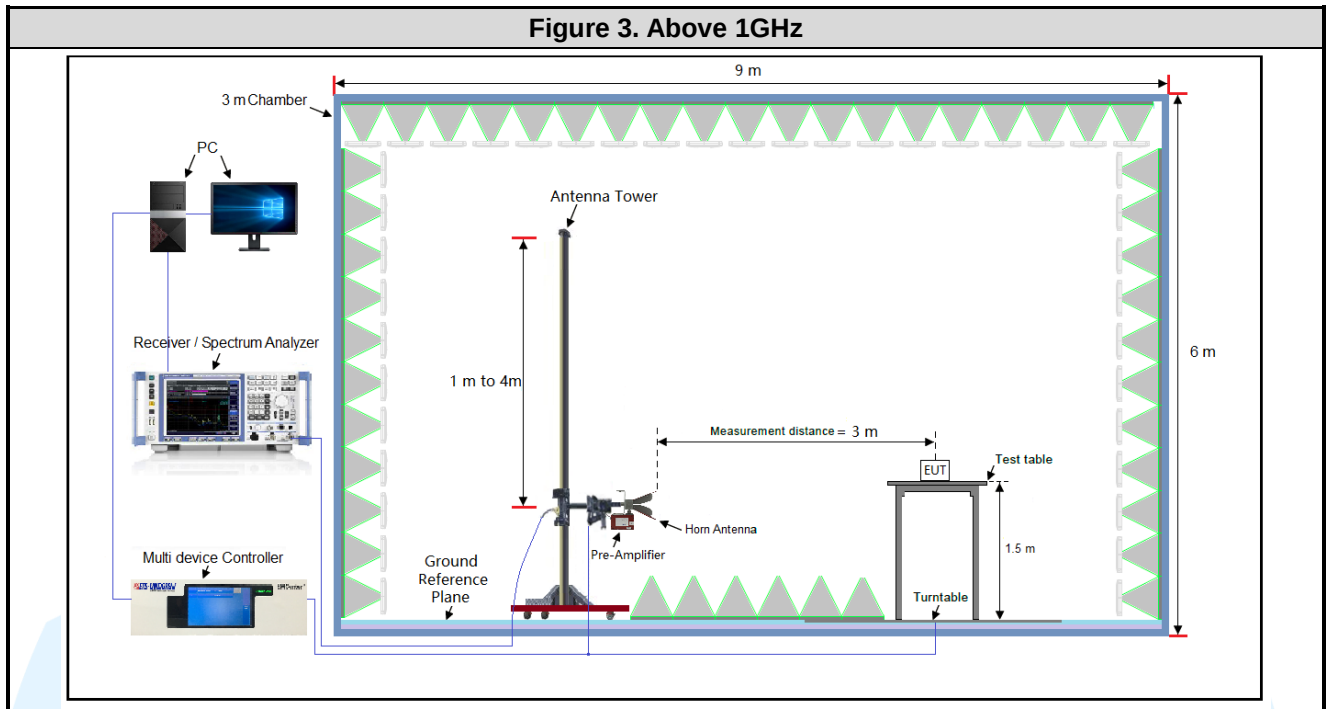
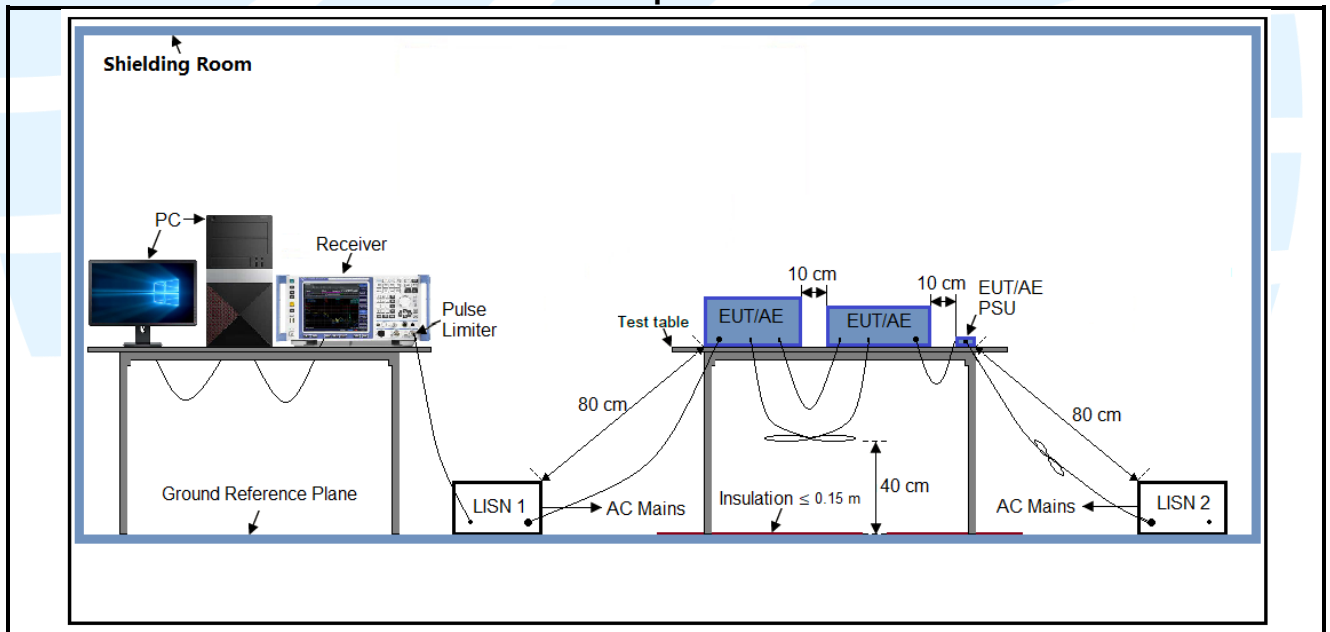


Figure 2. 30MHz to 1GHz

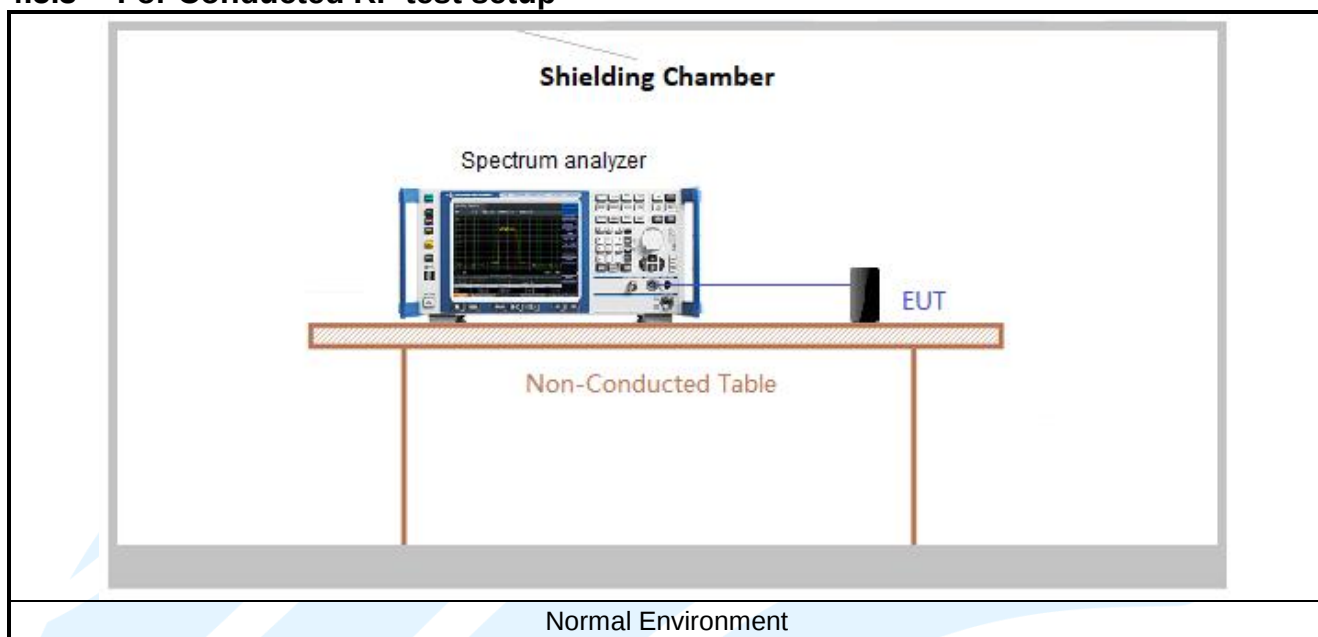




4.5.2 For Conducted Emissions test setup



4.5.3 For Conducted RF test setup



4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

Frequency	Mode	Antenna Port	Worst-case axis positioning
Above 1GHz	1TX	Chain 0	Z axis
	1TX	Chain 1	Z axis
	2TX	Chain 0+1	Z axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.7 DUTY CYCLE

Test Procedure: ANSI C63.10-2013 Clause 12.2.

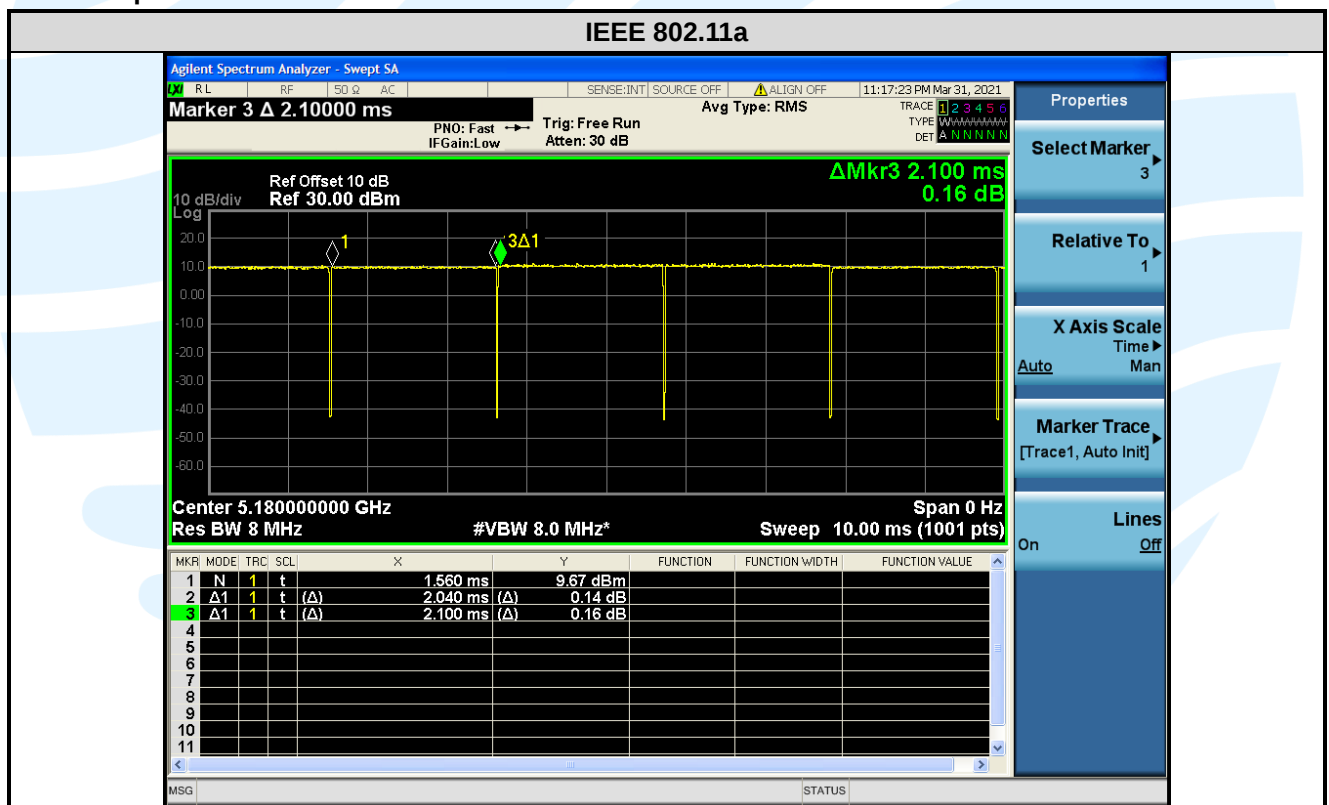
Test Results

Mode	Data rates (Mbps)	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11a	6	2.040	2.100	0.97	97.14	0.13	0.49	-0.25
IEEE 802.11n-HT20	MCS0	1.910	1.955	0.98	97.70	0.10	0.52	-0.20
IEEE 802.11n-HT40	MCS0	0.940	0.975	0.96	96.41	0.16	1.06	-0.32
IEEE 802.11ac-VHT20	MCS0	0.350	0.465	0.75	75.27	1.23	2.86	-2.47
IEEE 802.11ac-VHT40	MCS0	0.650	0.755	0.86	86.09	0.65	1.54	-1.30
IEEE 802.11ac-VHT80	MCS0	0.070	0.103	0.68	67.96	1.68	14.29	-3.35
IEEE 802.11ax20	MCS0	1.480	1.525	0.97	97.05	0.13	0.68	-0.26
IEEE 802.11ax40	MCS0	0.760	0.815	0.93	93.25	0.30	1.32	-0.61
IEEE 802.11ax80	MCS0	0.380	0.545	0.70	69.72	1.57	2.63	-3.13

Remark:

- 1) Duty cycle= On Time/ Period;
- 2) Duty Cycle factor = $10 * \log(1/ \text{Duty cycle})$;
- 3) Average factor = $20 \log_{10} \text{Duty Cycle}$.

The test plots as follows



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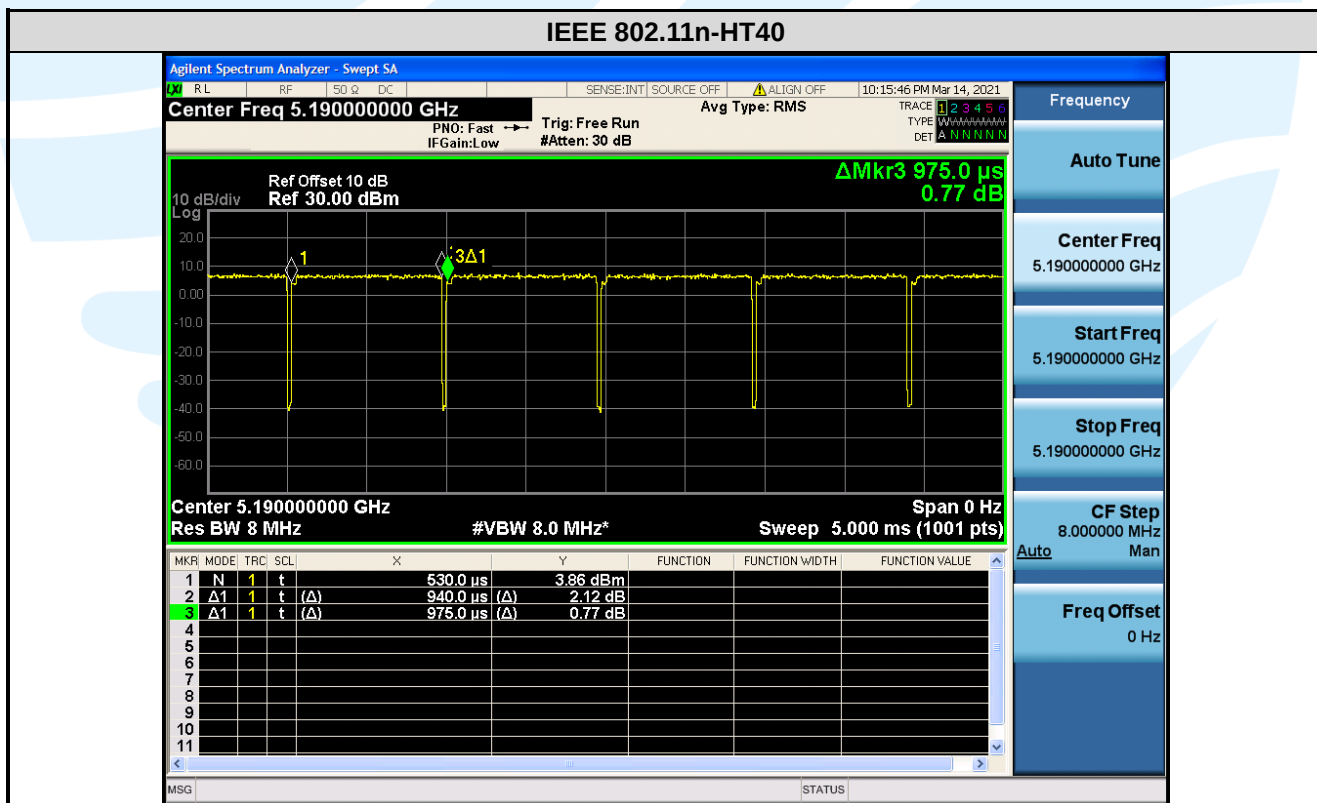
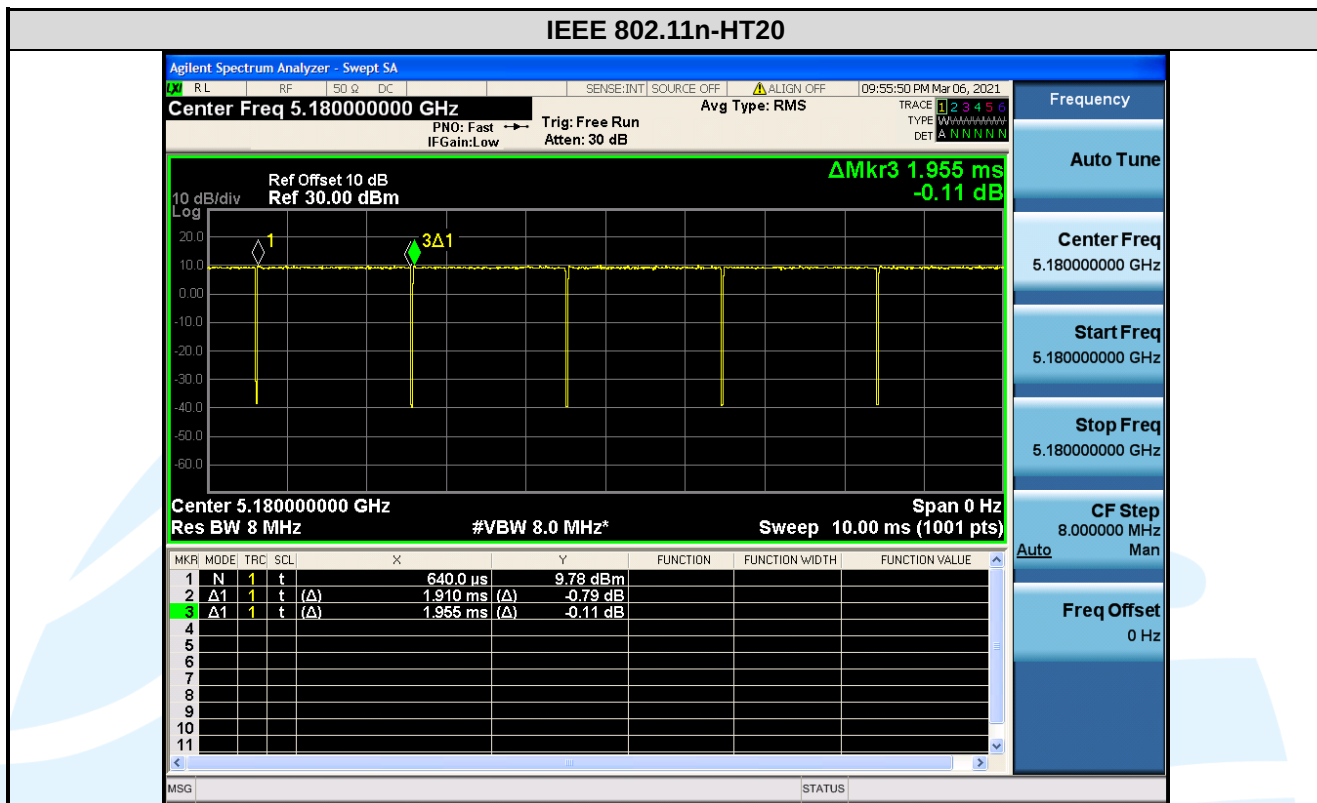
Tel: +86-755-28230888

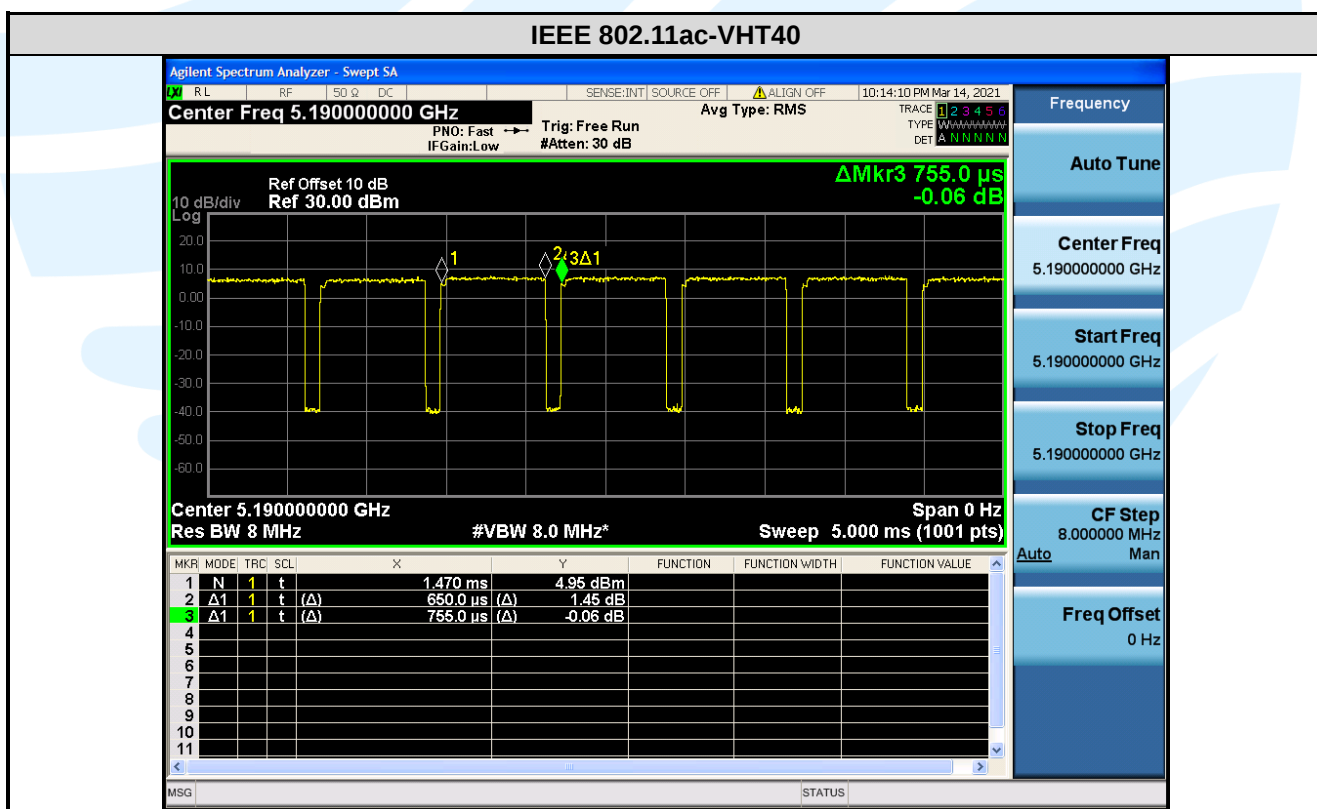
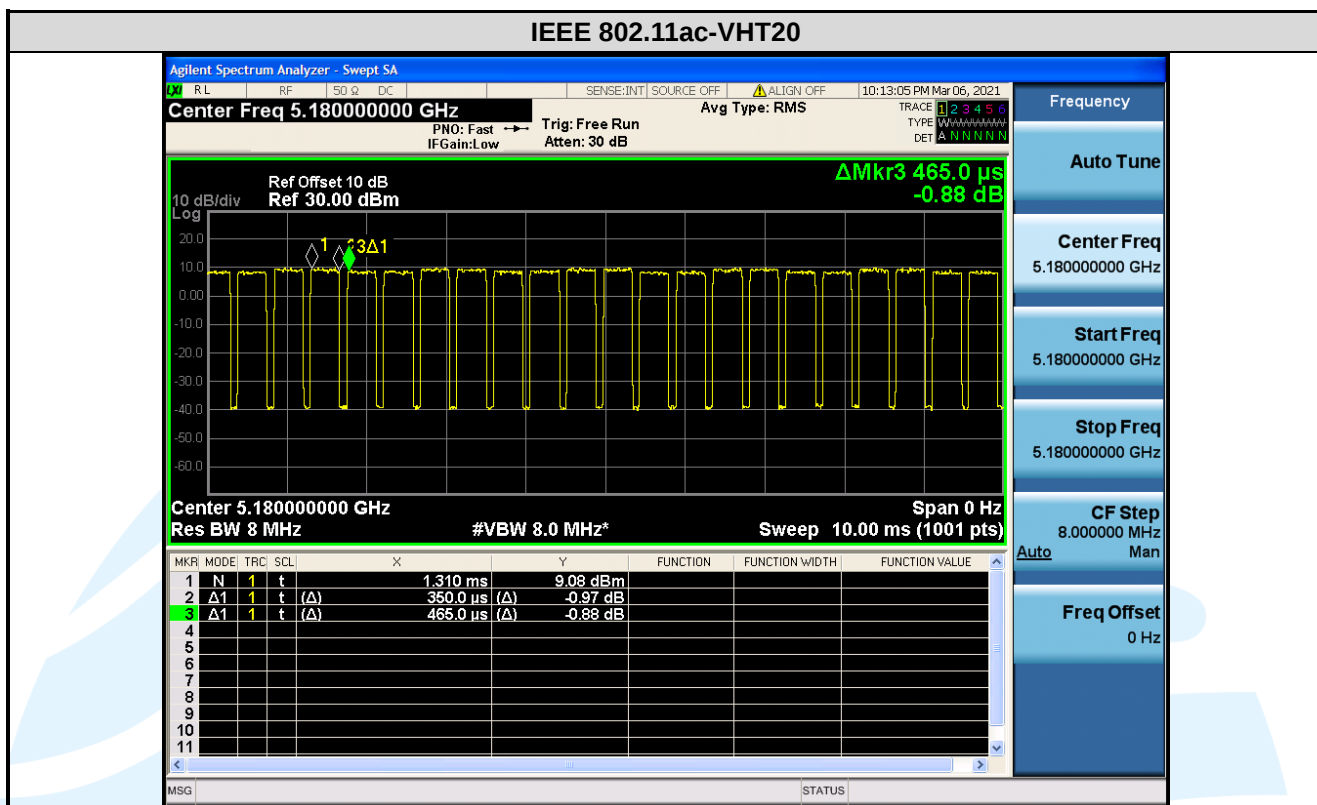
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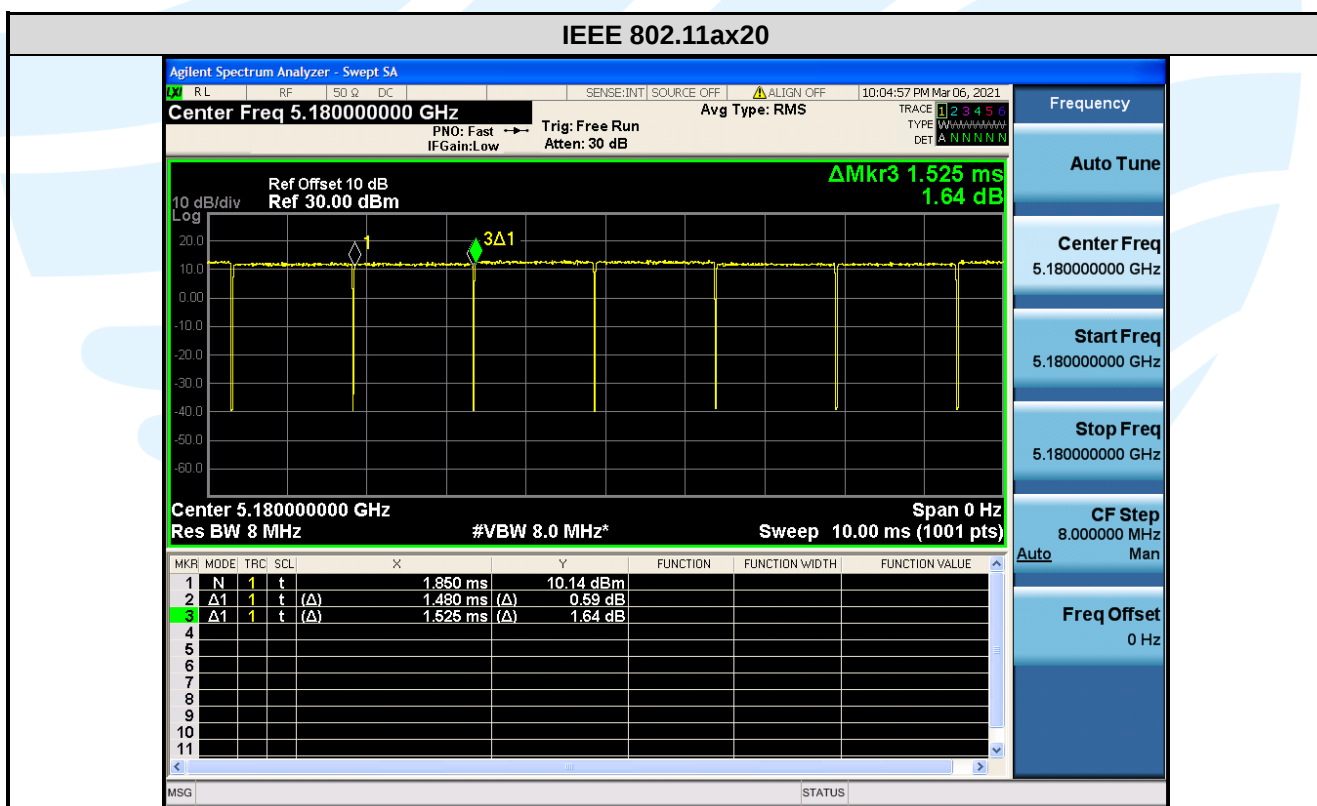
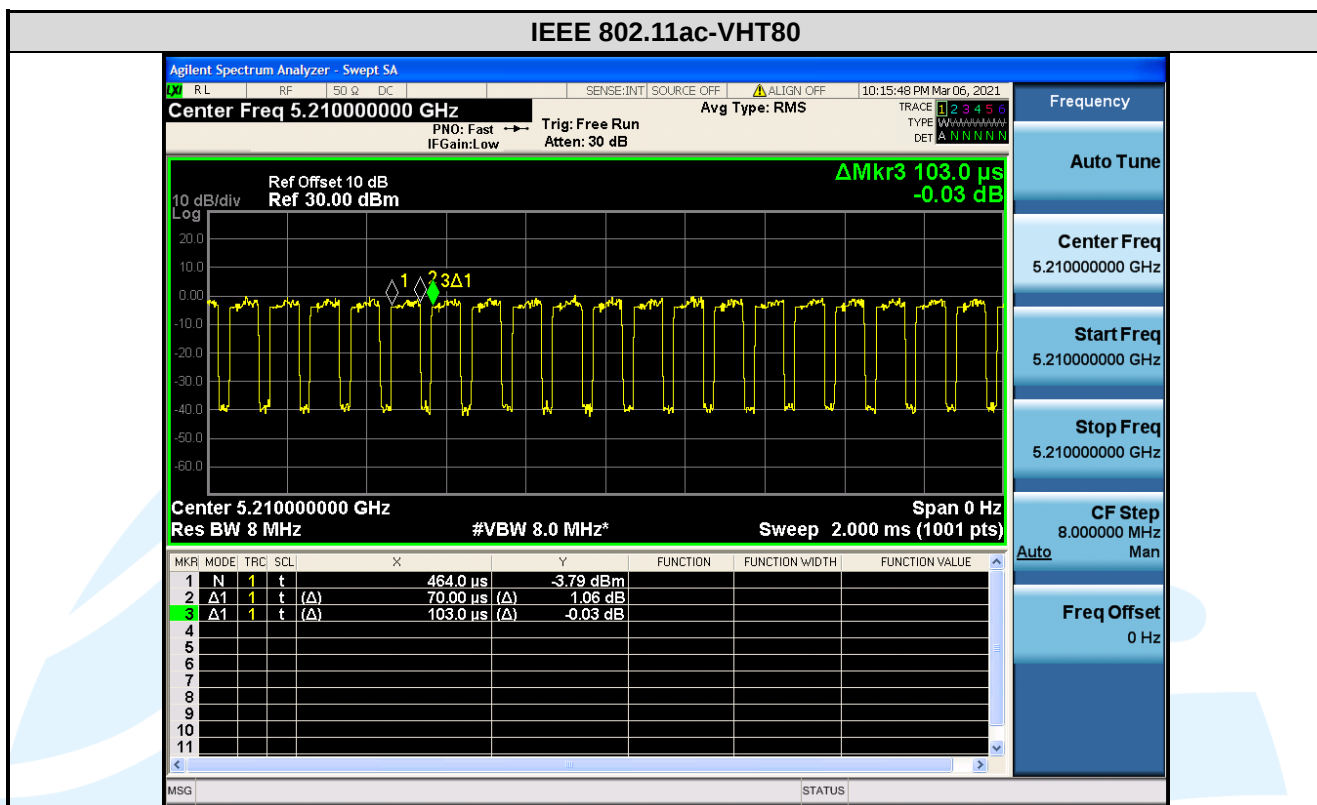
E-mail: info@uttlab.com

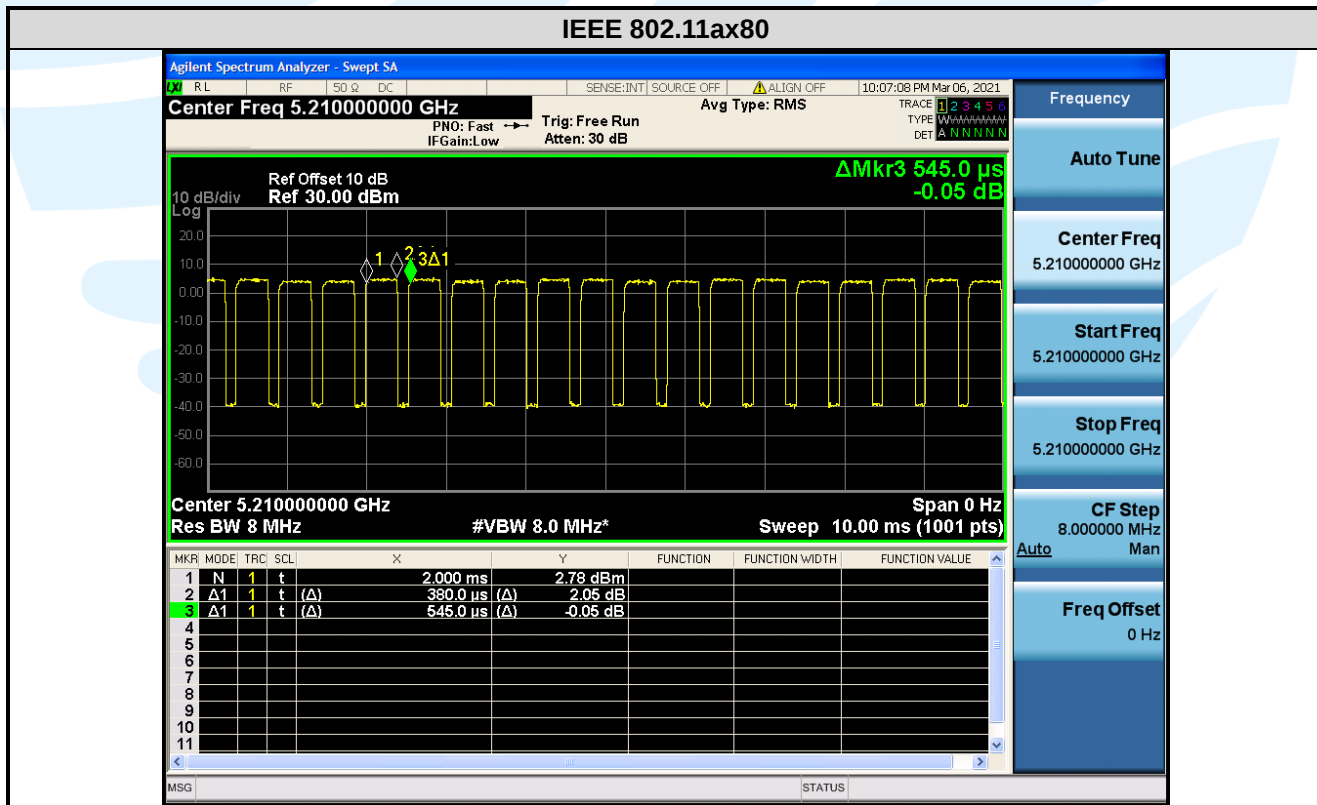
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5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	RSS-247 Issue 2	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
4	RSS-Gen Issue 5	General Requirements for Compliance of Radio Apparatus
5	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
6	KDB 789033 D02 General UNII Test Procedures New Rules v02r01	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15, subpart E
7	KDB 905462 D06 802.11 Channel Plans New Rules v02	Operation in U-NII bands -802.11 channel PLAN(\$15.407)
8	KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02	Compliance measurement procedures for Unlicensed –National Information Infrastructure devices operates in the frequency bands 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz bands incorporating dynamic frequency selection
9	KDB 905462 D03 Client Without DFS New Rules v01r02	U-NII client devices without radar detection capability
10	KDB 662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

5.2 ANTENNA REQUIREMENT

Standard 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. 15.407(a)(1) (2) requirement: The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power and the peak power spectral density shall be reduced by the by the amount in dB that the directional gain of the antenna exceeds 6 dBi. RSS-Gen Issue 5, Section 6.8 requirement: According to RSS-Gen Issue 5, Section 6.8, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. EUT Antenna: The antenna has a special interface and no consideration of replacement. The transmit signals are correlated with each other and the antenna gain of both chains is completely consistent, the best case directional gain of the antenna is 5.96 dBi ((See section 5.5).

5.326 DB BANDWIDTH & OCCUPIED BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(2)(5)
RSS-247 Issue 2 Section 6.2.1.2

Test Method: KDB 789033 D02 v02r01 Section C.1

Limit: None; for reporting purposes only.

Test Procedure:

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum analyzer.

Spectrum analyzer according to the following Settings:

a) Set RBW = approximately 1 % of the emission bandwidth.

b) Set the VBW > RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Results: Pass

Mode	Channel	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
		Chain 0	Chain 1	Chain 0	Chain 1
IEEE 802.11a	36 (5180)	20.93	20.89	16.574	16.633
	44 (5220)	20.51	20.92	16.598	16.570
	48 (5240)	20.90	21.05	16.663	16.637
	52 (5260)	20.95	20.82	16.605	16.548
	60 (5300)	21.02	21.09	16.572	16.597
	64 (5320)	20.68	20.68	16.545	16.575
	100 (5500)	20.78	20.89	16.520	16.549
	116 (5580)	20.83	21.07	16.535	16.645
	140 (5700)	21.09	20.79	16.542	16.573
IEEE 802.11n-HT20	36 (5180)	20.96	20.82	17.709	17.629
	44 (5220)	21.20	20.89	17.713	17.605
	48 (5240)	21.26	20.67	17.686	17.633
	52 (5260)	21.08	20.87	17.683	17.644
	60 (5300)	20.90	21.81	17.747	17.631
	64 (5320)	20.94	21.61	17.688	17.669
	100 (5500)	20.75	21.17	17.679	17.634
	116 (5580)	21.00	21.01	17.656	17.597
	140 (5700)	21.16	20.96	17.709	17.608
IEEE 802.11n-HT40	38 (5190)	38.98	38.83	36.024	35.981
	46 (5230)	39.49	38.96	36.107	35.965
	54 (5270)	39.83	38.75	36.391	35.989
	62 (5310)	39.06	38.48	35.978	35.992
	102 (5510)	39.38	38.90	35.992	36.002
	110 (5550)	39.29	38.73	36.038	35.925
	134 (5670)	39.36	38.87	36.023	35.964

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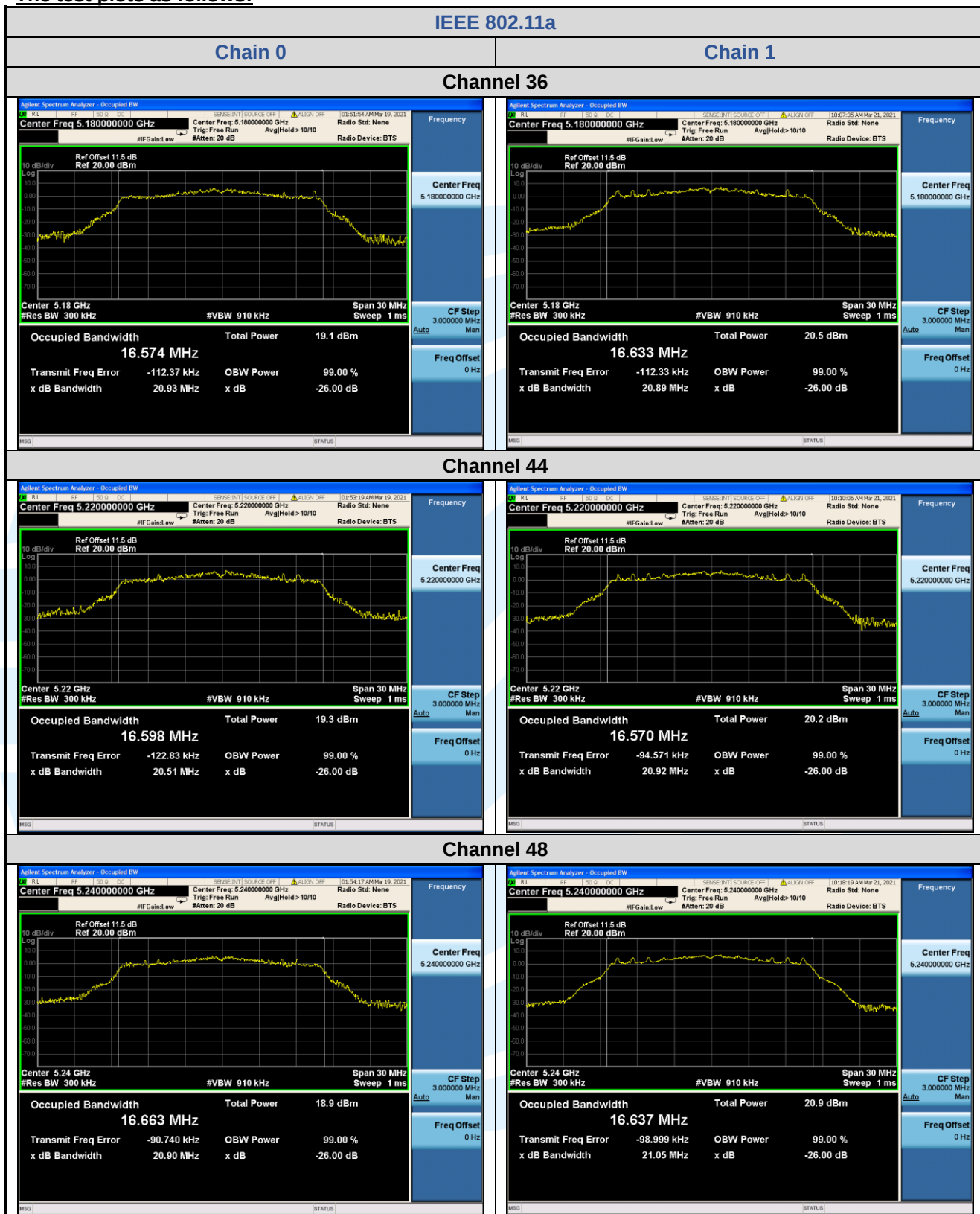
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IEEE 802.11ac-VHT20	36 (5180)	21.19	21.90	17.697	18.027
	44 (5220)	21.08	21.54	17.631	17.980
	48 (5240)	21.13	21.57	17.637	17.980
	52 (5260)	20.97	21.73	17.676	17.972
	60 (5300)	21.30	21.82	17.655	17.971
	64 (5320)	21.68	21.43	17.646	17.978
	100 (5500)	21.19	21.92	17.691	18.002
	116 (5580)	20.98	21.63	17.680	17.958
	140 (5700)	21.13	21.64	17.573	18.034
IEEE 802.11ac-VHT40	38 (5190)	39.38	39.06	35.919	35.938
	46 (5230)	39.75	38.85	35.993	35.937
	54 (5270)	39.51	39.12	35.983	35.935
	62 (5310)	39.52	39.10	35.944	35.963
	102 (5510)	39.65	38.81	35.919	35.877
	110 (5550)	39.50	38.94	35.982	35.967
	134 (5670)	39.53	38.95	35.939	36.027
IEEE 802.11ac-VHT80	42 (5230)	81.21	80.10	75.302	75.017
	58 (5290)	81.34	80.56	75.215	75.026
	106 (5530)	81.02	80.35	75.167	75.016
IEEE 802.11ax20	36 (5180)	21.33	21.72	18.942	18.975
	44 (5220)	21.26	21.24	18.899	18.968
	48 (5240)	21.04	21.35	18.852	18.940
	52 (5260)	20.90	21.32	18.882	18.951
	60 (5300)	21.01	21.43	18.886	18.960
	64 (5320)	21.07	21.30	18.892	18.921
	100 (5500)	21.16	21.30	18.891	18.955
	116 (5580)	21.49	21.43	18.882	18.951
	140 (5700)	21.00	21.28	18.878	18.920
IEEE 802.11ax40	38 (5190)	39.93	40.18	37.645	37.618
	46 (5230)	40.14	40.20	37.610	37.595
	54 (5270)	39.85	40.01	37.594	37.599
	62 (5310)	40.29	40.11	37.541	37.565
	102 (5510)	39.96	40.67	37.581	37.628
	110 (5550)	40.26	40.00	37.616	37.542
	134 (5670)	40.15	40.14	37.628	37.634
IEEE 802.11ax80	42 (5210)	82.62	82.45	77.269	77.279
	58 (5290)	81.81	82.62	77.222	77.261
	106 (5530)	82.26	82.17	77.091	77.243

The test plots as follows:



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