

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant:	Sharp Corporation, Mobile Communication B.U. 2-13-1, Hachihonmatsu-Iida, Higashi-hiroshima-shi, Hiroshima, 739-0192, Japan
Manufacturer:	Sharp Corporation 1 Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan
Product Name:	Smart phone
Report Number:	ER/2019/C0154
FCC ID:	APYHRO00282
FCC Rule Part:	§15.407, Cat: NII
Issue Date:	Jan. 31, 2020
Date of Test:	Dec. 09, 2019 ~ Jan. 17, 2020
Date of EUT Received:	Dec. 09, 2019

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Approved By:

Vito Pei/ Sr. Engineer



Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History				
Report Number	Revision	Description	Issue Date	Remark
ER/2019/C0154	Rev.00	Original.	Jan. 31, 2020	Revised By: Susan Lin

## Note:

Test data is referenced from cross authorization(s)

Measurement results in the original test report ER/2019/C0078 under FCC ID: APYHRO00281 are fully leveraged in this test report with spot check on page 166-181 to demonstrate compliance.

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# 1. GENERAL INFORMATION

# **1.1 Product Description**

Product Name:	Smart phone
Hardware Version:	DVT
Software Version:	N/A
Power Supply:	3.85V from Rechargeable Li-ion Battery

Wi-Fi 802.11	Frequency Range	Channels	Avg. Power (dBm)	Modulation Technology	
	5180~5240	4	14.99		
	5260~5320	4	14.98	OFDM	
а	5500~5720	12	14.93		
	5745~5825	5	14.87		
	5180~5240	4	HT: 14.76 (Worst Case)		
n_HT/	5260~5320	4	HT: 14.74 (Worst Case)	OFDM	
ac_VHT 20M	5500~5720	12	HT: 14.82 (Worst Case)		
20.00	5745~5825	5	HT: 14.57 (Worst Case)		
	5180~5240	4	14.99		
ax HE20M	5260~5320	4	14.94	OFDMA	
ax_nezuwi	5500~5720	12	14.96		
	5745~5825	5	14.99		
	5190~5230	2	HT: 14.84 (Worst Case)		
n_HT/	5270~5310	2	HT: 14.74 (Worst Case)	OFDM	
ac_VHT 40M	5500~5710	6	HT: 14.92 (Worst Case)		
	5745~5825	5	HT: 14.68 (Worst Case)		
	5190~5230	2	14.95		
ax HE40M	5270~5310	2	14.97	OFDMA	
	5500~5710	6	14.94	OFDIMA	
	5745~5825	5	14.85		
	5210	1	HE: 14.92 (Worst Case)		
ac_VHT /	5290	1	HE: 14.96 (Worst Case)	OFDM /	
ax_HE80M	5530~5690	3	HE: 14.84 (Worst Case)	OFDMA	
	5775	1	HE: 14.92 (Worst Case)		

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	64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Type	256QAM for OFDM in 802.11ac only
	1024QAM for OFDMA in 802.11ax only
	802.11 a: 6/9/12/18/24/36/48/54 Mbps
	802.11 n_20MHz: 6.5 – 144.4Mbps
	802.11 n_40MHz: 13.5 - 300.0Mbps
	802.11 ac_20MHz: 6.5 –173.3Mbps
Transition Rate:	802.11 ac_40MHz: 13.5 –400.0Mbps
	802.11 ac_80MHz: 29.3 – 866.7Mbps
	802.11 ax_20MHz: 8 – 286.8Mbps
	802.11 ax_40MHz: 16 – 573.6Mbps
	802.11 ax_80MHz: 34 – 1201Mbps
	Inverted-F Antenna,
	5150~5250MHz Gain: -5.3dBi (ANT0) / -1.7dBi (ANT1)
Antenna Designation:	5250~5350MHz Gain: -5.3dBi (ANT0) / -1.7dBi (ANT1)
	5470~5725MHz Gain: -4.5dBi (ANT0) / -2.2dBi (ANT1)
	5725~5850MHz Gain: -8.6dBi (ANT0) / -2.2dBi (ANT1)

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## **1.2 Test Methodology of Applied Standards**

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

## 1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 (TAF code 0513)

FCC Designation number: TW0001

## 1.4 Special Accessories

There are no special accessories used while test was conducted.

## **1.5 Equipment Modifications**

There was no modification incorporated into the EUT.

## 1.6 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*9m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site. There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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# 2. SYSTEM TEST CONFIGURATION

# 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

# 2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

# 2.3 Test Procedure

# 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

# 2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

# 2.3.3 Radiated Emissions

The EUT is a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

# 2.4 Measurement Results Explanation Example

# For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level. **Note:** The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

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# 2.5 Configuration of Tested System

# Fig. 2-1 Radiated Emission



Fig. 2-2 AC Power Line Conducted Emission

# Fig. 2-3 Conducted (Antenna Port) Emission

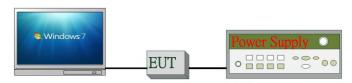


Table 2-1 Equipment Used in Tested Sys	tem
----------------------------------------	-----

ltem	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	DC Power Supply	Agilent	E3640A	MY52410006	N/A	N/A
3.	Notebook	Lenovo	L430	R9-X11BG	N/A	N/A

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# 3. SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB Emission Bandwidth	Compliant
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	Undesirable Radiated Emissions	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.203 §15.407(a)	Antenna Requirement	Compliant

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# 4. DESCRIPTION OF TEST MODES

# 4.1 802.11a/n/ac/ax operated in U-NII Bands

Operated band in			
2	20 M		
СН	Freq		
	(MHz)		U
36	5180		3
40	5200		4
44	5220		
48	5240		

n 5150 MHz ~5 <u>250 MHz:</u>					
4	40 M 80		0 M		
СН	Freq (MHz)		СН	Freq (MHz)	
38	5190		42	5210	
46	5230	-	-		
		•			

2	0 M	4	0 N
СН	Freq (MHz)	СН	Fr
СП	(MHz)	СП	(M
52	5260	54	52
56	5280	62	53
60	5300		
64	5320		

20 M

5805

5825

CH

149

153

157

161

165

Оре	Operated band in 5250 MHz ~5350 MHz:						
2	0 M		40 M			8	0 M
СН	Freq (MHz)		СН	Freq (MHz)		СН	Freq (MHz)
52	5260		54	5270		58	5290

#### 5725 MHz: **Operated band in 5470** 40 M

5710

CH

102

110

118

126

134

142

		Ē			
20 M					
СН	Freq (MHz)				
100	5500				
100	5520				
104	5540				
112	5560				
116	5580				
120	5600				
124	5620				
128	5640				
132	5660				
136	5680				
140	5700				
144	5720				

<u>(0 MHZ ~5/25 MHZ:</u>					
M		8	0 M		
Freq (MHz)		СН	Freq (MHz)		
5510		106	5530		
5550		122	5610		
5590		138	5690		
5630					
5670					

## Operated band in 5745 MHz ~5850 MHz:

0 M		40 M			
Freq		СН	Freq (MHz)		
(MHz)			(MHz)		
5745		151	5755		
5765		159	5795		
5785		_			

80 M			
СН	Freq		
011	(MHz)		
155	5775		

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# 4.2 The Worst Test Modes and Channel Details

- 1. The EUT has been tested under operating condition.
- 2. Test program used to control the EUT for staying in continuous transmitting mode is prorammed.
- 3. Investigation has been done on all the possible configurations for searching the worst case. The given UE is pre-scanned among below modes.

Modulation	Transmission (	Multiple Transmission Spatial	
⊠ 802.11 a	⊠ Ch0 ⊠ Ch1 □ 0	Ch2 🗆 Ch3	🛛 2TX
🛛 802.11 n	⊠ Ch0 ⊠ Ch1 □ 0	Ch2 🗆 Ch3	🛛 MIMO
⊠ 802.11 ac	⊠ Ch0 ⊠ Ch1 □ 0	Ch2 🗆 Ch3	🛛 MIMO
⊠ 802.11 ax	⊠ Ch0 ⊠ Ch1 □ 0	Ch2 🗆 Ch3	🛛 MIMO

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

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## **RADIATED EMISSION TEST:**

	RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE		AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION		ANTENNA PORT
802.11a	BAND (MHz) 5180~5240	36 to 48	44	OFDM	(Mbps) 6	2TX
802.11a	5260~5320	52 to 64	60	OFDM	6	2TX
802.11a	5500~5720	100 to 144	116	OFDM	6	2TX
802.11a	5745~5825	149 to 165	157	OFDM	6	2TX
	RAD	DIATED EMIS	SION TEST (AB	OVE 1 GHz)		
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	26 11 19	OFDM	6	2TX
802.11ax_HE20	5160~5240	30 10 40	36,44,48	OFDMA	MCS0	MIMO
802.11ax_HE40	5190~5230	38 to 46	38,46	OFDMA	MCS0	MIMO
802.11ax_HE80	5210	42	42	OFDMA	MCS0	MIMO
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	2TX
802.11ax_HE20	5200~5520	52 10 04	52,00,04	OFDMA	MCS0	MIMO
802.11ax_HE40	5270~5310	54 to 62	54,62	OFDMA	MCS0	MIMO
802.11ax_HE80	5290	58	58	OFDMA	MCS0	MIMO
802.11a	5500~5720	100 to 144	100,116,140,144	OFDM	6	2TX
802.11ax_HE20	5500~5720	100 10 144	100,110,140,144	OFDMA	MCS0	MIMO
802.11ax_HE40	5510~5710	102 to 142	102,110,134,142	OFDMA	MCS0	MIMO
802.11ax_HE80	5530~5690	106 to 138	106,122,138	OFDMA	MCS0	MIMO
802.11a	5745~5825	149 to 165	140 157 165	OFDM	6	2TX
802.11ax_HE20	5745~5625	149 10 100	149,157,165	OFDMA	MCS0	MIMO
802.11ax_HE40	5755~5795	151 to 159	151,159	OFDMA	MCS0	MIMO
802.11ax_HE80	5775	155	155	OFDMA	MCS0	MIMO

**Note:** The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11a/n/ac Transmitter for channel Low, Mid and High, the worst case E1 position was reported.

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#### ANTENNA PORT CONDUCTED MEASUREMENT:

	CONDUCTED TEST					
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a				OFDM	6	2TX
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS8	MIMO
802.11ax_HE20				OFDMA	MCS0	MIMO
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
802.11ax_HE40	5190~5250	30 10 40	30,40	OFDMA	MCS0	MIMO
802.11ax_HE80	5210	42	42	OFDMA	MCS0	MIMO
802.11a				OFDM	6	2TX
802.11n_HT20	5260~5320	52 to 64	52,60,64	OFDM	MCS8	MIMO
802.11ax_HE20				OFDMA	MCS0	MIMO
802.11n_HT40	5070 5040	E 4 to 60	54.00	OFDM	MCS8	MIMO
802.11ax_HE40	5270~5310	54 to 62	54,62	OFDMA	MCS0	MIMO
802.11ax_HE80	5290	58	58	OFDMA	MCS0	MIMO
802.11a				OFDM	6	2TX
802.11n_HT20	5500~5720	100 to 144	100,116,140,144	OFDM	MCS8	MIMO
802.11ax_HE20				OFDMA	MCS0	MIMO
802.11n_HT40	5510~5710	102 to 142	102,110,134,142	OFDM	MCS8	MIMO
802.11ax_HE40	5510~5710	102 10 142	102,110,134,142	OFDMA	MCS0	MIMO
802.11ax_HE80	5530~5690	106 to 138	106,122,138	OFDMA	MCS0	MIMO
802.11a				OFDM	6	2TX
802.11n_HT20	5745~5825	149 to 165	149,157,165	OFDM	MCS8	MIMO
802.11ax_HE20				OFDMA	MCS0	MIMO
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO
802.11ax_HE40	2122~2195	151 10 159	151,159	OFDMA	MCS0	MIMO
802.11ax_HE80	5775	155	155	OFDMA	MCS0	MIMO

The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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## **Spot Check:**

	RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY AVAILABLE TESTED		TESTED	MODULATION	DATA RATE	ANTENNA	
INIODE	BAND (MHz)	CHANNEL	CHANNEL	WODULATION	(Mbps)	PORT	
802.11a	5180~5240	36 to 48	36	OFDM	6	2TX	
802.11ax_HE20	5160~5240	30 10 40	50	OFDMA	MCS0	MIMO	
802.11a	5260 5220	52 to 64	60, 64	OFDM	6	2TX	
802.11ax_HE20	5260~5320	52 10 64	00, 04	OFDMA	MCS0	MIMO	
802.11a		100 to 111	140	OFDM	6	2TX	
802.11ax_HE20	5500~5720	500~5720 100 to 144	140	OFDMA	MCS0	MIMO	
802.11a	E745 5005	149 to 165	157	OFDM	6	2TX	
802.11ax_HE20	5745~5825 149	149 10 165	157	OFDMA	MCS0	MIMO	

**Note:** The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11a/n/ac Transmitter for channel Low, Mid and High, the worst case E1 position was reported.

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# 5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Meas- urement	+/- 0.96 dB
Peak Power Spectral Density Meas- urement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

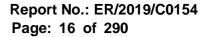
Radiated Spurious Emission Measurement Uncertainty				
	9kHz~30MHz: +-2.3dB			
	30MHz - 180MHz: +/- 3.37dB			
Polarization: Vertical	180MHz -417MHz: +/- 3.19dB			
	0.417GHz-1GHz: +/- 3.19dB			
	1GHz - 18GHz: +/- 4.04dB			
	18GHz - 40GHz: +/- 4.04dB			
	9kHz~30MHz: +-2.3dB			
	30MHz - 167MHz: +/- 4.22dB			
Polarization: Horizontal	167MHz -500MHz: +/- 3.44dB			
Polarization: Horizontai	0.5GHz-1GHz: +/- 3.39dB			
	1GHz - 18GHz: +/- 4.08dB			
	18GHz - 40GHz: +/- 4.08dB			

## Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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# 6. CONDUCTED EMISSION TEST

# 6.1 Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

Frequency range	Lin dB(	
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note		

1. The lower limit shall apply at the transition frequencies

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

## 6.2 Measurement Equipment Used

Conducted Emission Test Site								
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
EMI Test Receiver	R&S	ESCI 7	1166.5950.07	07/04/2019	07/03/2020			
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2019	11/25/2020			
LISN	SCHWARZBECK	NSLK 8127	8127-649	04/02/2019	04/01/2020			
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R	N.C.R			

NOTE: N.C.R refers to Not Calibrated Required.

# 6.3 EUT Setup

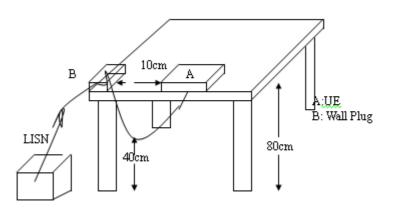
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- The LISN was connected with 120Vac/60Hz power source.

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# 6.4 Test SET-UP



## 6.5 Measurement Procedure

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all phases of power being supplied by given UE are completed.

## 6.6 Measurement Result

Note: Refer to next page for measurement data and plots. Note2: The \* reveals the worst-case results that closet to the limit.

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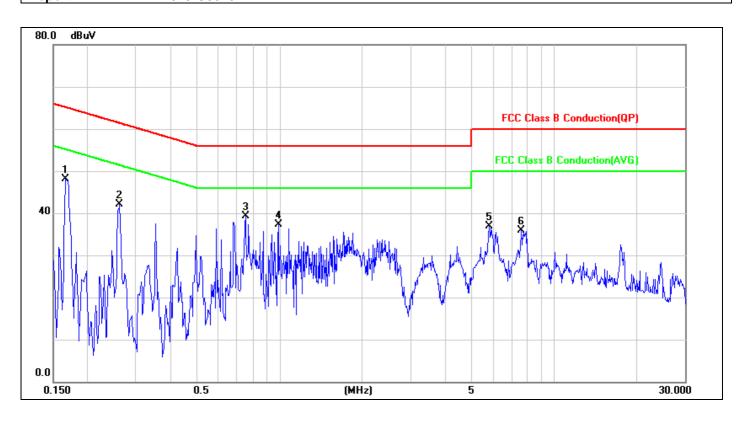
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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Description:	Operation	Date:	2020/01/11
Line:	L1	Temp.(°C)/Hum.(%):	23.6(°C)/62%
Test Voltage: Report:	AC 120V/60Hz ER-2019-C0078	Test By:	Kane



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
NO.	IVIR.	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	Delector	Comment
1		0.1660	48.15	0.00	48.15	65.16	-17.01	peak	
2		0.2620	42.14	0.01	42.15	61.37	-19.22	peak	
3	*	0.7540	39.37	0.02	39.39	56.00	-16.61	peak	
4		0.9900	37.27	0.02	37.29	56.00	-18.71	peak	
5		5.8260	36.77	0.20	36.97	60.00	-23.03	peak	
6		7.6300	35.68	0.24	35.92	60.00	-24.08	peak	

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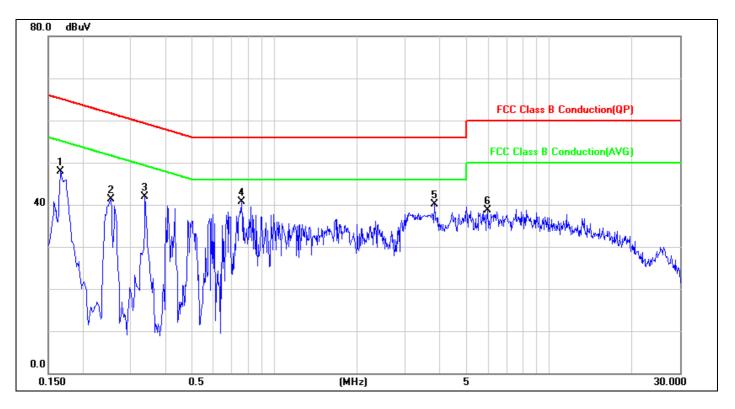
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台灣檢驗科技股份有限公司	t (886-2) 2299-3279	f (886-2) 2298-0488	www.tw.sgs.com	



Description:	Operation	Date:	2020/01/11
Line:	Ν	Temp.(°C)/Hum.(%):	23.6(°C)/62%
Test Voltage: Report:	AC 120V/60Hz ER-2019-C0078	Test By:	Kane



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
NO.	IVIR.	(MHz)	(dBuV)	( dB )	(dBuV)	(dBuV)	(dB)	Delector	Comment
1		0.1660	47.85	0.03	47.88	65.16	-17.28	peak	
2		0.2540	41.18	0.03	41.21	61.63	-20.42	peak	
3		0.3380	41.93	0.03	41.96	59.25	-17.29	peak	
4	*	0.7620	40.61	0.04	40.65	56.00	-15.35	peak	
5		3.8340	39.91	0.14	40.05	56.00	-15.95	peak	
6		5.9780	38.52	0.22	38.74	60.00	-21.26	peak	

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# 7. DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

# 7.1 Measurement Procedure:

- 1. Set span = Zero
- 2. RBW = 8MHz
- 3. VBW = 8MHz,
- 4. Detector = Peak

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# **Duty Cycle:**

## Formula:

Duty Cycle = Ton / (Ton+Toff)

Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log ( 1/Duty Cycle )	1/T (kHz)	VBW setting (kHz)
802.11a	99.15	0.04	0.51	1.00
802.11n_20	98.85	0.05	0.69	1.00
802.11n_40	83.33	0.79	0.63	1.00
802.11ax_20	98.35	0.07	0.99	1.00
802.11ax_40	66.08	1.80	0.81	1.00
802.11ax_80	73.64	1.33	0.96	1.00

Duty Cycle Factor:  $10 * \log(1/0.9915) = 0.04$ Duty Cycle Factor:  $10 * \log(1/0.9885) = 0.05$ Duty Cycle Factor:  $10 * \log(1/0.8333) = 0.79$ Duty Cycle Factor:  $10 * \log(1/0.7884) = 1.03$ Duty Cycle Factor:  $10 * \log(1/0.9835) = 0.07$ Duty Cycle Factor:  $10 * \log(1/0.6608) = 1.8$ Duty Cycle Factor:  $10 * \log(1/0.7364) = 1.33$ 

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## 7.2 Duty Cycle Test Plots

## 802.11a



#### 802.11n HT20



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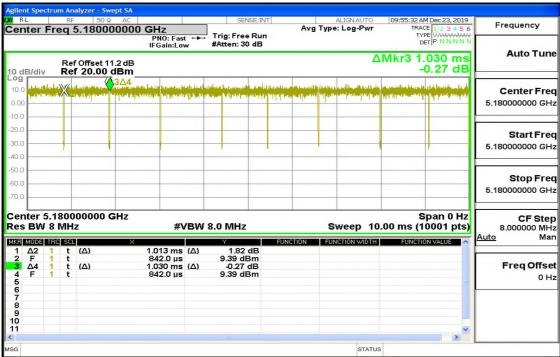
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## 802.11n HT 40



## 802.11ax HE 20



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## 802.11ax HE 40



## 802.11 ax HE 80



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台灣檢驗科技股份有限公司	t (886-2) 2299-3279	f (886-2) 2298-0488	www.tw.sgs.com	



# 8. 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

# 8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

# 8.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
  - 3a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto,

Detector = Peak,

Trace Mode = Max Hold,

Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.

3b. Mark the peak frequency and –26dB (upper and lower) frequency.

- 4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
- 5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.

a. Set the spectrum analyzer as

$$RBW = 100 kHz$$

VBW = 3\*RBW,

Span = 30M/50MHz,

Detector=Peak,

Sweep=auto

b. Mark the peak frequency and -6dB (upper and lower) frequency.

6. Repeat above procedures until all frequency of interest measured was complete.

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## 8.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/02/2019	05/01/2020
DC Power Supply	Agilent	E3640A	MY52410006	12/10/2019	12/09/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021

## 8.4 Test Set-up



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## 8.5 Measurement Result

## 26dB Bandwidth

802.11a_Ch0			802.11a_Ch1		
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	18.66	12.709	5180	18.77	12.735
5220	18.61	12.697	5220	18.84	12.751
5240	18.62	12.700	5240	18.83	12.749
5260	18.66	12.709	5260	18.75	12.730
5300	18.66	12.709	5300	18.62	12.700
5320	18.66	12.709	5320	18.61	12.697
5500	18.72	12.723	5500	18.59	12.693
5580	18.55	12.683	5580	18.55	12.683
5700	18.49	12.669	5700	18.46	12.662
5720	18.71	12.721	5720	18.74	12.728

#### 802.11ax\_20\_Ch0

802.11ax\_20\_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5180	full	20.59	13.137	5180	full	20.69	13.158
5220	full	20.74	13.168	5220	full	20.61	13.141
5240	full	20.84	13.189	5240	full	20.67	13.153
5260	full	20.7	13.160	5260	full	20.65	13.149
5300	full	20.6	13.139	5300	full	20.67	13.153
5320	full	20.73	13.166	5320	full	20.57	13.132
5500	full	20.7	13.160	5500	full	20.52	13.122
5580	full	20.67	13.153	5580	full	20.49	13.115
5700	full	20.53	13.124	5700	full	20.6	13.139
5720	full	20.59	13.137	5720	full	20.66	13.151

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802.11a	x _40_Ch0			802.11ax _40_Ch1				
Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)	
5190	full	40	16.021	5190	full	40.25	16.048	
5230	full	40.23	16.046	5230	full	39.86	16.005	
5270	full	40.18	16.040	5270	full	40.49	16.073	
5310	full	39.94	16.014	5310	full	40.07	16.028	
5510	full	39.88	16.008	5510	full	40	16.021	
5550	full	40.23	16.046	5550	full	39.92	16.012	
5670	full	40.11	16.033	5670	full	40.21	16.043	
5710	full	39.97	16.017	5710	full	40.1	16.031	

802.11ax \_80\_Ch0

802.11ax \_80\_Ch1

Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU config	26dB BW (MHz)	10 Log (B) (dB)
5210	full	81.21	19.096	5210	full	81.45	19.109
5290	full	81.29	19.100	5290	full	81.75	19.125
5530	full	82.15	19.146	5530	full	81.38	19.105
5610	full	81.29	19.100	5610	full	81.74	19.124
5690	full	81.24	19.098	5690	full	81.95	19.135

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## 6dB Bandwidth (5725 MHz~ 5850 MHz) measure with Peak detector for FCC

802.11a_Ch0			802.11a_Ch1				
Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)		
5745	16.34	12.133	5745	16.02	12.047		
5785	16.16	12.084	5785	15.94	12.025		
5825	16.14	12.079	5825	15.95	12.028		

802.11ax\_20\_Ch0

802.11ax\_20\_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5745	full	17.85	12.516	5745	full	18.37	12.641
5785	full	18.29	12.622	5785	full	18.46	12.662
5825	full	18.46	12.662	5825	full	17.56	12.445

802.11ax\_40\_Ch0

802.11ax\_40\_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5755	full	36.45	15.617	5755	full	37.27	15.714
5795	full	37.11	15.695	5795	full	36.76	15.654

802.11ax \_80\_Ch0

台灣

802.11ax \_80\_Ch1

Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)	Freq. (MHz)	RU config	6dB BW (MHz)	10 Log (B) (dB)
5775	full	76.25	18.822	5775	full	75.6	18.785

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## 99% BW verification for DFS Function

802.11a	_Ch0		802.11a_Ch1			
Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	
5240	5248.15	< 5250	5240	5248.17	< 5250	
5745	5736.84	> 5725	5745	5736.84	> 5725	

#### 802.11ax\_20\_Ch0

802.11ax\_20\_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5249.43	< 5250	5240	5249.44	< 5250
5745	5735.58	> 5725	5745	5735.58	> 5725

#### 802.11ax \_40\_Ch0

802.11ax \_40\_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5230	5248.81	< 5250	5230	5248.85	< 5250
5755	5736.21	> 5725	5755	5736.25	> 5725

802.11ax \_VHT80\_Ch0

802.11ax \_VHT80\_Ch1

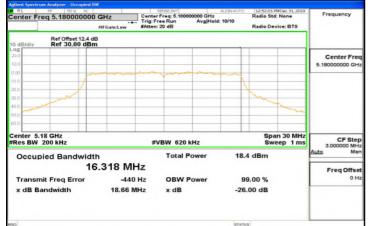
Freq. (MHz)	Measured Freq. (MHz)	Freq. Limit Free		Measured Freq. (MHz)	Limit (MHz)
5210	5248.48	< 5250	5210	5248.52	< 5250
5775	5736.54	> 5725	5775	5736.63	> 5725

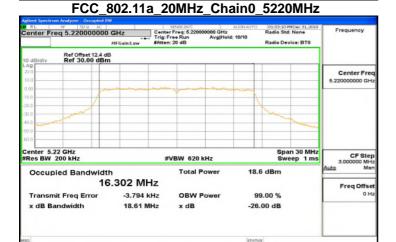
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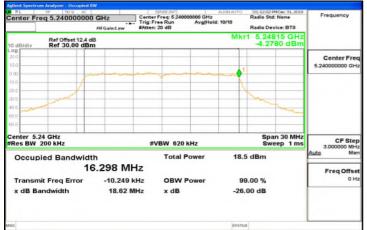


#### FCC 802.11a 20MHz Chain0 5180MHz

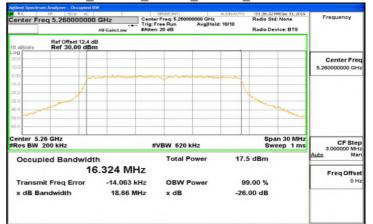




#### FCC\_802.11a\_20MHz\_Chain0\_5240MHz



#### FCC 802.11a 20MHz Chain0 5260MHz



#### FCC 802.11a 20MHz Chain0 5300MHz



#### FCC\_802.11a\_20MHz\_Chain0\_5320MHz

Center Fr	eq 5.32000000	/IFGain:Lnw	Center Freq: 5.3200 Trig: Free Run #Atten: 20 dB	ALION 000000 GHz Avg[Hold: 10/10	Radio St	MDec 31, 2019 d: None wice: BTS	Frequency
10 dB/div	Ref Offset 12.4 d Ref 30.00 dBr						
20.0							Center Free 5.320000000 GH
10.0					V		
40,0	and the second s				~		
50.0 60.0							
Center 5. Res BW			#VBW 620	kHz		an 30 MHz eep 1 ms	CF Ste 3.000000 MH
Occup	ied Bandwidt	h 5.312 MH	Total F	ower	18.1 dBm		Auto Mar
	nit Freq Error andwidth	-16.033 ki 18.66 Mi	Hz OBW F	Power	99.00 % -26.00 dB		Freq Offse 0 H
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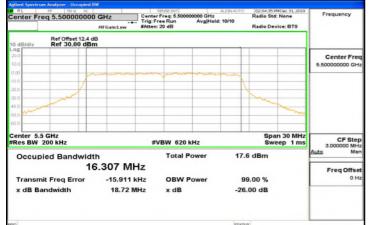
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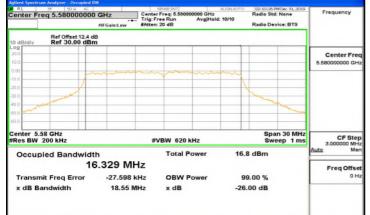
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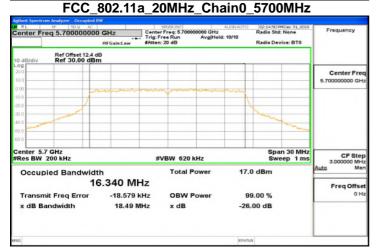


#### FCC 802.11a 20MHz Chain0 5500MHz

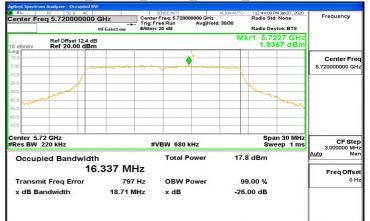




FCC 802.11a 20MHz Chain0 5580MHz



#### FCC 802.11a 20MHz Chain0 5720MHz



## FCC 802.11a 20MHz Chain0 5745MHz



#### FCC\_802.11a\_20MHz\_Chain0\_5785MHz

Center Fr	eq 5.785000000		Server Int Center Freq: 5.785000000 ( Frig: Free Run Avg Naten: 20 dB	ALIGNAUTO 3Hz (Hold: 10/10	Radio Sto	MDec 31, 2019 I: None vice: BTS	Frequency
10 dB/div	Ref Offset 12.4 dE Ref 30,00 dBm						
20 0						-	Center Free 5,78500000 GH
10.0	-	orten hand hard	munguentient	allenter			
0.0	- A				-		
0.0						marca	
0.0							
Res BW			#VBW 300 kHz			2.933 ms	CF Ste 3.000000 MH
Occup	ied Bandwidt		Total Power	- 18.	6 dBm		Auto Ma
		.323 MH					Freq Offse
	nit Freq Error andwidth	-23.765 kH 16.16 MH			9.00 % .00 dB		он
10				STAT	15		

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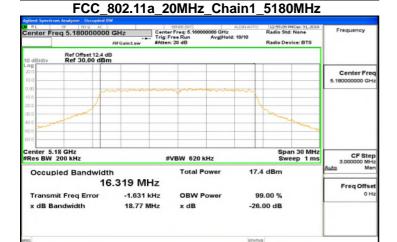
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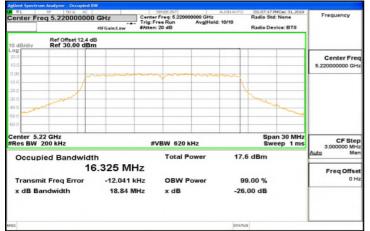


#### FCC 802.11a 20MHz Chain0 5825MHz

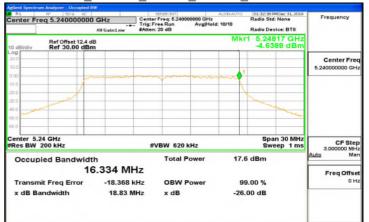




#### FCC\_802.11a\_20MHz\_Chain1\_5220MHz



#### FCC 802.11a 20MHz Chain1 5240MHz



#### D1:40:04 PMDec 31 enter Freq 5.26000000 GHz Center Freq: 5 Radio Device: BTS Ref Offset 12.4 dB Ref 30.00 dBm Center Free er 5.26 GHz Span 30 MHz Sweep 1 ms CF Step #VBW 620 kHz Total Power 17.1 dBm Occupied Bandwidth 16.338 MHz Freq Offse 0 H Transmit Freq Error -14.757 kHz OBW Power 99.00 % x dB Bandwidth 18.75 MHz x dB -26.00 dB

FCC 802.11a 20MHz Chain1 5260MHz

#### FCC\_802.11a\_20MHz\_Chain1\_5300MHz

Center Fre	eq 5.300000000	Trig	ter Freq: 5.300000000 GHz Free Run Avg Hold en: 20 dB	Radi:	7:361/MDac 31, 2019 5 Std: None 5 Device: BTS	Frequency
10 dB/div	Ref Offset 12.4 dl Ref 30.00 dBm					
200 100						Center Fre 5.300000000 GH
-10.0						
30.0 40.0 50.0					and the second	
Center 5.3 #Res BW			#VBW 620 kHz		Span 30 MHz Sweep 1 ms	CF Ster
Occup	ied Bandwidt 16	h 5.336 MHz	Total Power	17.8 dBr	n	Auto Ma
	nit Freq Error andwidth	-15.245 kHz 18.62 MHz	OBW Power x dB	99.00 9 -26.00 di		014

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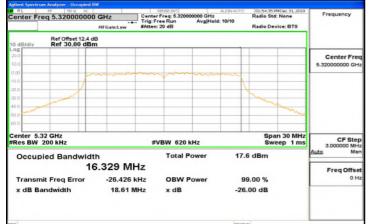
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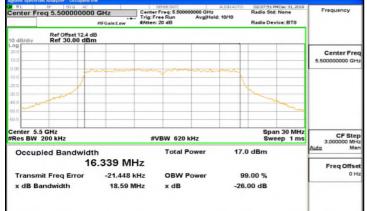
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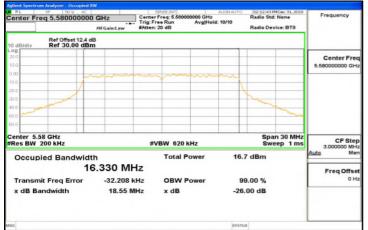
#### FCC 802.11a 20MHz Chain1 5320MHz



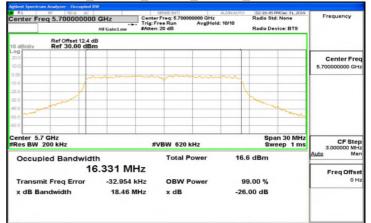


# FCC 802.11a 20MHz Chain1 5500MHz

#### FCC\_802.11a\_20MHz\_Chain1\_5580MHz



#### FCC 802.11a 20MHz Chain1 5700MHz



#### FCC 802.11a 20MHz Chain1 5720MHz



#### FCC\_802.11a\_20MHz\_Chain1\_5745MHz

Center Fr	eq 5.745000000		Center Freq: 5.745000 Trig: Free Run #Atten: 20 dB	C 02:20:57 PMDec 31, 2019 Radio Std: None Radio Device: BTS		Frequency	
10 dB/div	Ref Offset 12.4 dE Ref 30.00 dBm			M	(r1 5.73 -5.54	684 GHz 168 dBm	
20.0							Center Freq 5.745000000 GHz
0.00	- prin	almahan	- have been been been been been been been be	mound			
30.0	-				han		
40.0 min	Comment of the second s				-	- mushangline	
n 0							
Res BW			#VBW 300 k	Hz		an 30 MHz 2.933 ms	CF Step 3.000000 MH
Occup	ied Bandwidt		Total Po	ower 17	.1 dBm		Auto Mar
	16 hit Freg Error	-30.897 kH			99.00 %		Freq Offset
	andwidth	16.02 MH			6.00 dB		
				lavia	n m		

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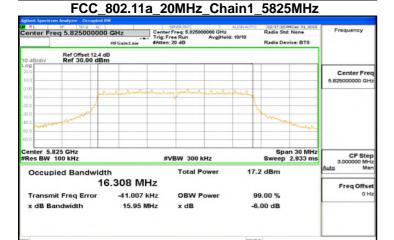
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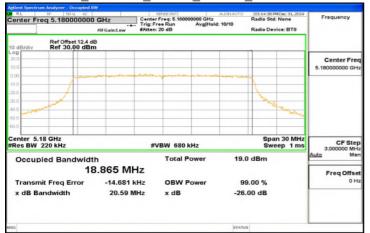


#### FCC 802.11a 20MHz Chain1 5785MHz

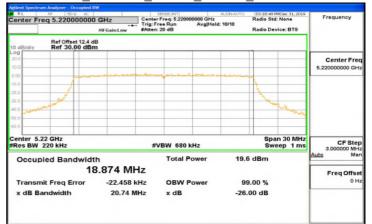




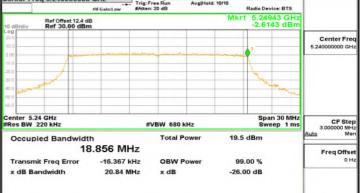
#### FCC\_802.11ax\_20MHz\_Chain0\_5180MHz



#### FCC\_802.11ax\_20MHz Chain0 5220MHz



FCC 802.11ax 20MHz Chain0 5240MHz D3:25:20 PMDec 31 Radio Std: None nter Freq 5.240000000 GHz Center Freq: 5.2 Radio Device: BTS



#### FCC\_802.11ax\_20MHz\_Chain0\_5260MHz

Center Fre	eq 5.260000000		Center Freq: 5.26000000 GHz Trig: Freq: 5.26000000 GHz Trig: Free Run Avg[Hold: 10/10 \$Atten: 20 dB		Radio Std: None	Frequency
10 dB/div	Ref Offset 12.4 dl Ref 30.00 dBn					
20.0			and the first surgery and the surgery states of the surgery states			Center Free 5.260000000 GH
10.0					1	
40.0 50.0	Jonathan 1				- maria	
Center 5.2 #Res BW			#VBW 680	) kHz	Span 30 MH Sweep 1 m	
Occup	ied Bandwidt 18	<sup>ь</sup> 3.892 МН		Power	20.0 dBm	Auto Ma
	nit Freq Error andwidth	-14.869 kH 20.70 MH		Power	99.00 % -26.00 dB	OH
eo.					STATUS	

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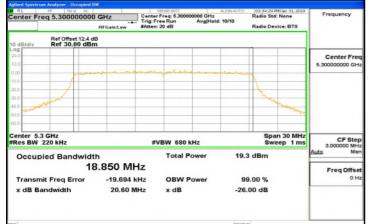
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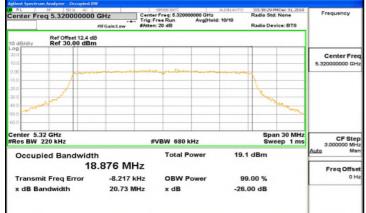
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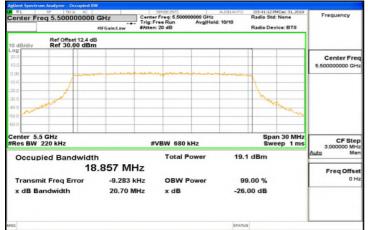
#### FCC 802.11ax 20MHz Chain0 5300MHz



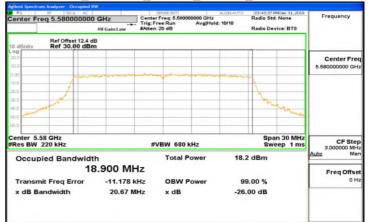


# FCC 802.11ax 20MHz Chain0 5320MHz

#### FCC\_802.11ax\_20MHz\_Chain0\_5500MHz



#### FCC\_802.11ax\_20MHz Chain0 5580MHz



#### D3:45:361MDec 31 nter Freq 5.700000000 GHz Center Freq: 5 Radio Device: BTS Ref Offset 12.4 dB Ref 30.00 dBm Center Free 5,700000000 G BW 220 kHz Span 30 MH CF Step #VBW 680 kHz Total Power 18.8 dBm Occupied Bandwidth 18.895 MHz Freq Offse 0 H Transmit Freq Error -7.705 kHz OBW Power 99.00 % x dB Bandwidth 20.53 MHz x dB -26.00 dB

FCC 802.11ax 20MHz Chain0 5700MHz

#### FCC\_802.11ax\_20MHz\_Chain0\_5720MHz

Center Fre	RF 50 Ω AC eq 5.720000000	GHz Cente	SENSE:INT r Freq: 5.720000000 GHz ree Run Avg Hold : 20 dB	d: 30/30	12:57:32 PM Jan 07, 2020 Radio Std: None Radio Device: BTS	Frequency
10 dB/div	Ref Offset 12.4 di Ref 20.00 dBm			Mkr1	5.71697 GHz 2.6412 dBm	
10.0 0.00			mysaulour and when my			Center Fre 5.720000000 GH
30.0	Marked -				L .	
40.0 50.0	<u>~</u>				Mundon	
0.0 Center 5.7					Span 30 MHz	CF Ste
Res BW 2	ied Bandwidt		VBW 680 kHz Total Power	19.3	Sweep 1 ms dBm	3.000000 Mi Auto Mi
	it Freq Error andwidth	-14.281 kHz 20.59 MHz	OBW Power x dB	99. -26.0	00 % 0 dB	01

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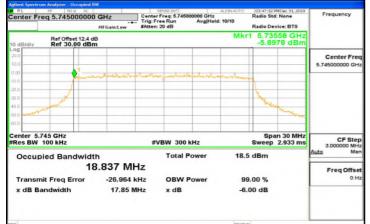
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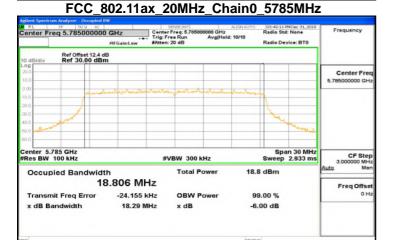
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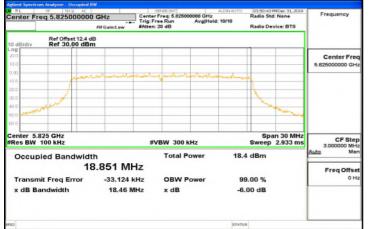


#### FCC 802.11ax 20MHz Chain0 5745MHz

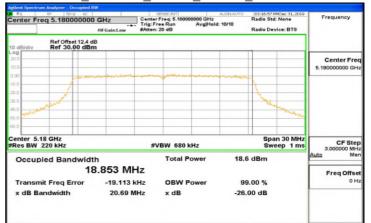




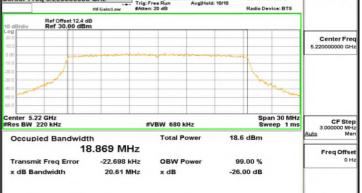
#### FCC\_802.11ax\_20MHz\_Chain0\_5825MHz



#### FCC 802.11ax 20MHz Chain1 5180MHz



#### FCC 802.11ax 20MHz Chain1 5220MHz D3:20:56 PMDec 31 nter Freq 5.220000000 GHz Center Freq: 5



#### FCC\_802.11ax\_20MHz\_Chain1\_5240MHz

Center Fr	eq 5.240000000		Center Free Trig: Free F #Atten: 20 d	tin AvgHold	ALIGRAUTO	Radio Std: Radio Dev		Frequency	
10 dB/div	Ref Offset 12.4 dl Ref 30.00 dBn				Mkr	1 5.249	44 GHz 59 dBm		
200						1		Center Free 5.240000000 GH	
10.0	1				- Sector				
40.0	- Marcard		_			Mary	-		
0.0			_			_			
enter 5. Res BW			#VBV	680 kHz		Spar Swe	n 30 MHz ep 1 ms	CF Ste 3.000000 MH	
Occup	ied Bandwidt	h 8.875 MH		otal Power	18.5	dBm		Auto Ma	
	nit Freq Error andwidth	-23.605 kH	iz C	DBW Power		.00 % 00 dB		Freq Offse 0 H	
					TATU				

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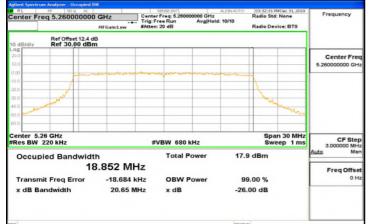
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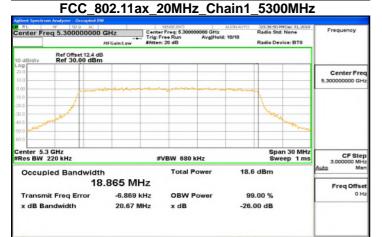
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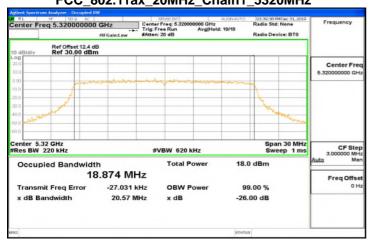


#### FCC 802.11ax 20MHz Chain1 5260MHz

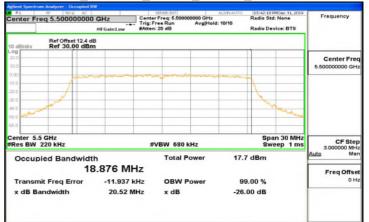




# FCC\_802.11ax\_20MHz\_Chain1\_5320MHz



#### FCC 802.11ax 20MHz Chain1 5500MHz



#### D3:44:34 PMDec 31 nter Freq 5.580000000 GHz Center Freq: 5 Radio Device: BTS Ref Offset 12.4 dB Ref 30.00 dBm Center Free er 5.58 GHz Span 30 MHz Sweep 1 ms CF Step #VBW 680 kHz 220 kHz Total Power 17.7 dBm Occupied Bandwidth 18.857 MHz Freq Offse 0 H Transmit Freq Error -15.043 kHz OBW Power 99.00 % dB Bandwidth 20.49 MHz x dB -26.00 dB

FCC 802.11ax 20MHz Chain1 5580MHz

#### FCC\_802.11ax\_20MHz\_Chain1\_5700MHz

Center Fr	eq 5.700000000	Trig: F	r Freq: 5.700000000 GHz Free Run Avg Hol 20 dB	ALIGRAUTO	Radio Std: No Radio Device	one	Frequency	
10 dB/div	Ref 0ffset 12.4 dB Ref 30.00 dBm							
20.0 10.0 0.00			a and the second			_	Center Fre 5.700000000 GH	
-10.0 -20.0 -30.0					m	_		
40.0 50.0 60.0	W					mahais		
Center 5.7 #Res BW		#	VBW 680 kHz			30 MHz 0 1 ms	CF Ste 3.000000 MH	
Occup	ied Bandwidt 18	h 8.863 MHz	Total Power	18.	.0 dBm		Auto Ma	
	nit Freq Error andwidth	-25.442 kHz 20.60 MHz	OBW Power x dB		99.00 % 5.00 dB		он	
				TAT				

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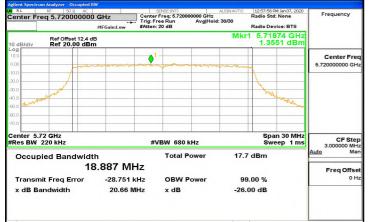
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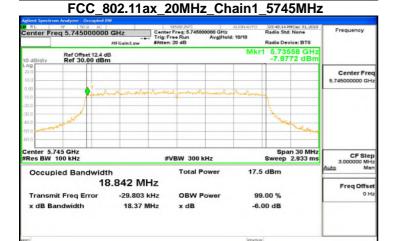
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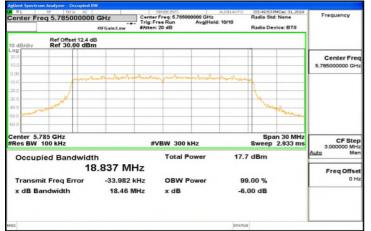


## FCC 802.11ax 20MHz Chain1 5720MHz

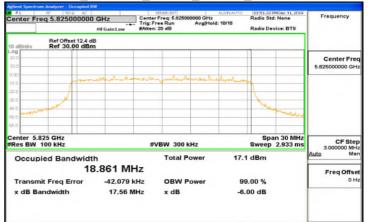




#### FCC\_802.11ax\_20MHz\_Chain1\_5785MHz



#### FCC 802.11ax 20MHz Chain1 5825MHz



#### D8:56:45 AMJan 07 nter Freq 5.190000000 GHz Center Freq: 5 Radio Device: BTS Ref Offset 12.4 dB Ref 30.00 dBm Center Free 190000000 G er 5.19 GH Span 50 MHz Sweep 1 ms CF Step #VBW 1.2 MHz Total Power 19.8 dBm Occupied Bandwidth 37.647 MHz Freq Offse 0 H Transmit Freq Error 55.782 kHz OBW Power 99.00 % dB Bandwidth 40.00 MHz x dB -26.00 dB

FCC 802.11ax 40MHz Chain0 5190MHz

#### FCC\_802.11ax\_40MHz\_Chain0\_5230MHz

Center Fre	eq 5.230000000	Trip	ter Freq: 5.230000000 G SFree Run Avg ten: 20 dB	ALIGNAUTO 09:01:06 AMOla Hz Radio Std: No Hold: 10/10 Radio Device	Frequency				
0 dB/div	Ref 0ffset 12.4 dB Mkr1 5.24881 GHz Ref 30.00 dBm -2.2255 dBm								
20 0 10 0 10 0					Center Free 5.230000000 GH				
0.0									
0.0	1				No.				
0.0									
enter 5.2 Res BW			#VBW 1.3 MHz	Span 5 Sweep	5.000000 MH				
Occup	ied Bandwidth 37	614 MHz	Total Power	19.9 dBm	Auto Ma				
	it Freq Error	-3,579 kHz	OBW Power		OH				
x dB Ba	andwidth	40.23 MHz	x dB	-26,00 dB					
				(artistica)					

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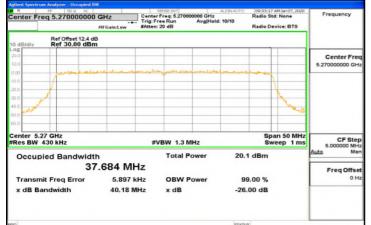
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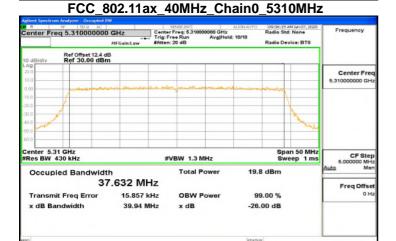
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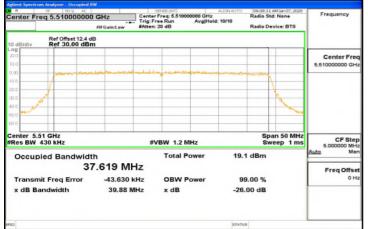


#### FCC 802.11ax 40MHz Chain0 5270MHz

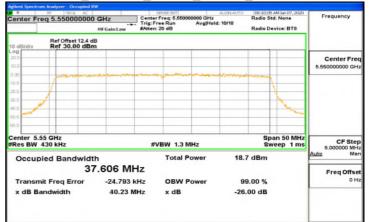




#### FCC\_802.11ax\_40MHz\_Chain0\_5510MHz

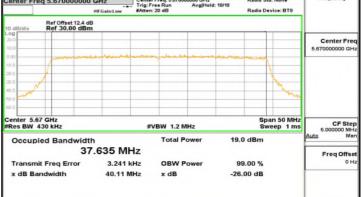


#### FCC\_802.11ax\_40MHz Chain0 5550MHz



09:12:50 AMJan 07 Radio Std: None ter Freq 5.67000000 GHz Center Freq: 5 Radio Device: BTS MEGaind

FCC 802.11ax 40MHz Chain0 5670MHz



#### FCC\_802.11ax\_40MHz\_Chain0\_5710MHz

Center Fre	RF 50 Ω AC eq 5.710000000	Trig	sense:INT ter Freq: 5.710000000 GH : Free Run Avg H en: 20 dB	z Ra old: 30/30	1:00:44 PM Jan 07, 2020 dio Std: None dio Device: BTS	Frequency					
0 dB/div	Ref Offset 12.4 dB Mkr1 5.70865 GHz   Ref 20.00 dBm 3.2752 dBm										
		with more than the	an meren as	ut the and the second	www	Center Fre 5.710000000 GH					
0.0					1 mg						
					~~~~						
enter 5.7 Res BW 4			#VBW 1.3 MHz		Span 50 MHz Sweep 1 ms	CF Ste 5.000000 MH					
Occupi	ied Bandwidth 37	668 MHz	Total Power	19.0 di	3m	Auto Ma Freg Offse					
Transmi x dB Ba	it Freq Error ndwidth	9.000 kHz 39.97 MHz	OBW Power x dB	99.00 -26.00		он					
-				STATUS							

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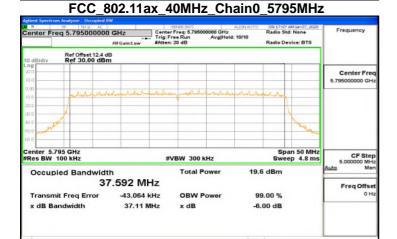
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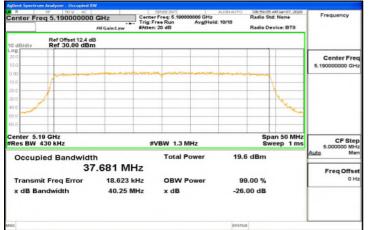


#### FCC 802.11ax 40MHz Chain0 5755MHz

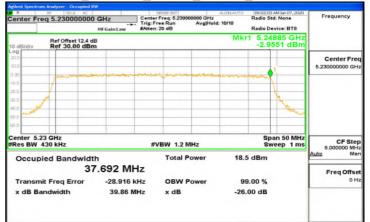




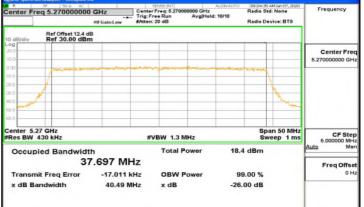
#### FCC\_802.11ax\_40MHz\_Chain1\_5190MHz



#### FCC\_802.11ax\_40MHz Chain1 5230MHz



#### FCC 802.11ax 40MHz Chain1 5270MHz



#### FCC\_802.11ax\_40MHz\_Chain1\_5310MHz

Center Fre	eq 5.310000000	GHz #IFGain:Lnw	Center Freq Trig: Free Ri #Atten: 20 di	5.310000000 GHz	ALIONAUTO 14: 10/10	Radio Std. Radio Dev		Frequency	
0 dB/div	Ref Offset 12.4 dB Ref 30.00 dBm								
20 0 10 0 1 00								Center Free 5.310000000 GH	
0.0	1 martin				han an a	manag			
0.0	1 -						1		
0.0							- the		
enter 5.3 Res BW 4			#VBW	1.2 MHz			n 50 MHz ep 1 ms	CF Ster 5.000000 MH	
Occupi	ied Bandwidtl	631 MH		otal Power	18.	9 dBm		Auto Mar	
Transmi	it Freq Error	-6.110 kd	-	BW Power	9	9.00 %		Freq Offse 0 H	
x dB Ba	ndwidth	40.07 M	Hz x	dB	-26	.00 dB			
						15			

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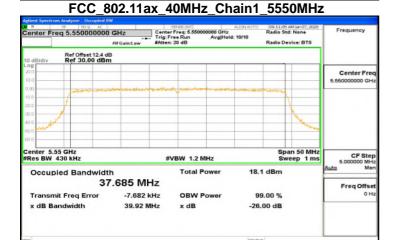
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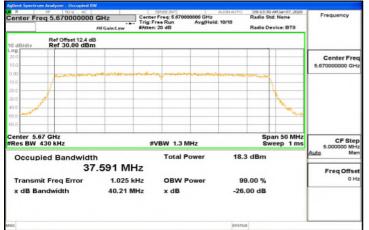


#### FCC 802.11ax 40MHz Chain1 5510MHz

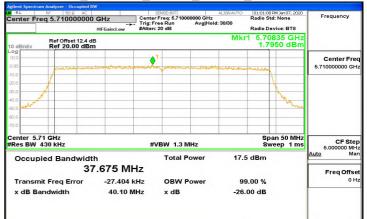




#### FCC\_802.11ax\_40MHz\_Chain1\_5670MHz



#### FCC 802.11ax 40MHz Chain1 5710MHz



#### FCC 802.11ax 40MHz Chain1 5755MHz



#### FCC\_802.11ax\_40MHz\_Chain1\_5795MHz

enter Fre	eq 5.795000000		Center Fre Trig: Free F	q: 5.79500 Run	AvgHold	ALIGNAUTO	Radio St		Frequency
		#IFGain:Low	#Atten: 20 a	#B			Radio De	evice: BTS	
0 dB/div	Ref Offset 12.4 dB Ref 30.00 dBm								
00									Center Free 5.795000000 GH
0.0	proper	mound	hally	miller	and a harder	milada	- Ander		
0.0	*		_						
0.0			_					man	
enter 5.7 Res BW			#VBV	V 300 k	Hz			an 50 MHz ep 4.8 ms	CF Ste 5.000000 MH
Occupi	ied Bandwidt 37	л .575 МН		Total Po	ower	18.4	dBm		Auto Ma
Transmi	it Freq Error	-36.008 kł		DBW P	ower	99	9.00 %		Freq Offse 0 H
x dB Ba	Indwidth	36.76 MH	-lz >	dB		-6.	00 dB		
						are you			

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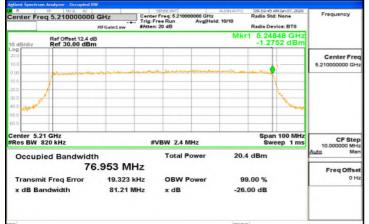
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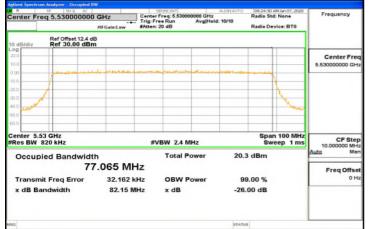
#### FCC 802.11ax 80MHz Chain0 5210MHz



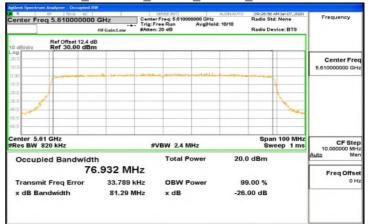
#### 09:21:57 AMJan 07 ter Freq 5.290000000 GHz Center Freq: 5 Radio Device: BTS MEGaind. Ref Offset 12.4 dB Ref 30.00 dBm Center Fre 5 2900 enter 5.29 GH Res BW 820 Span 100 MH Sweep 1 ms CF Ste #VBW 2.4 MHz 10.0 Total Powe 20.6 dBm Occupied Bandwidth 77.082 MHz Freq Offs OBW Power 0 H Transmit Freq Error 101.42 kHz 99.00 % x dB Bandwidth 81.29 MHz x dB -26.00 dB

FCC 802.11ax 80MHz Chain0 5290MHz

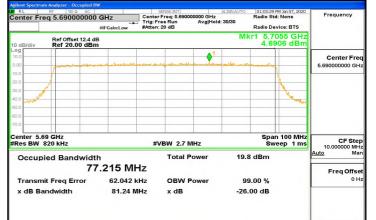
#### FCC\_802.11ax\_80MHz\_Chain0\_5530MHz



#### FCC 802.11ax 80MHz Chain0 5610MHz



#### FCC 802.11ax 80MHz Chain0 5690MHz



#### FCC 802.11ax 80MHz Chain0 5775MHz

Center Fre	eq 5.775000	0000 GH	Z ain:Low	CenterF			10/10	Radio Sto	AMDan 07, 2020 f: None vice: BTS	Frequency
10 dB/div	Ref 0ffset 12.4 dB Mkr1 5.73654 GHz Ref 30.00 dBm -10.914 dBm									
10.0										Center Free 5.775000000 GH;
0.00	anne.	unuli.	J.Lenne	A LANCE	men	Millin	Aller	in the		
40.0									L.	
50.0							-		- Marca	
Res BW				#V	BW 300 k	Hz			n 100 MHz 2p 9.6 ms	CF Step 10.000000 MH
Occup	ied Bandv		25 MH	łz	Total P	ower	20.5	i dBm		Auto Mar
	it Freq Erro	or -	22.887 k		OBW P	ower	99	.00 %		0 HJ
x dB Ba	andwidth		76.25 M	Hz	x dB		-6,	00 dB		

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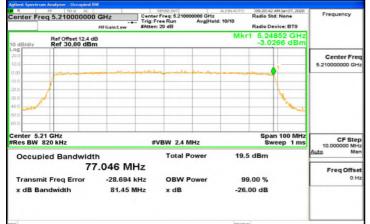
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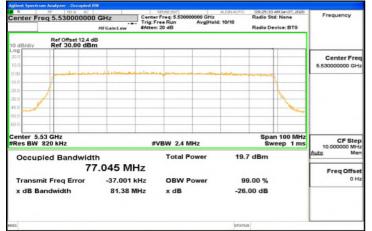
#### FCC 802.11ax 80MHz Chain1 5210MHz



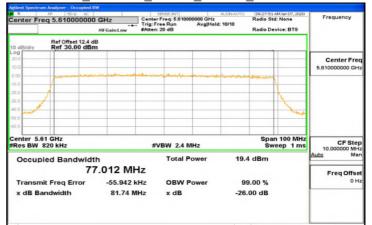
#### 09:23:04 AMJan 07 Radio Std: None ter Freq 5.290000000 GHz Center Freq: 5 Radio Device: BTS MEGaind Ref Offset 12.4 dB Ref 30.00 dBm Center Fre 5 2900 enter 5.29 GH Res BW 820 Span 100 MH Sweep 1 ms CF Ste #VBW 2.4 MHz Total Powe 19.5 dBm Occupied Bandwidth 77.117 MHz Freq Offs OBW Power 0 H Transmit Freq Error -12.160 kHz 99.00 % x dB Bandwidth 81.75 MHz x dB -26.00 dB

FCC 802.11ax 80MHz Chain1 5290MHz

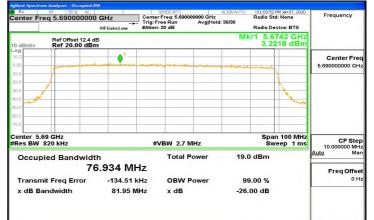
#### FCC\_802.11ax\_80MHz\_Chain1\_5530MHz



#### FCC 802.11ax 80MHz Chain1 5610MHz



FCC 802.11ax 80MHz Chain1 5690MHz



## FCC\_802.11ax\_80MHz\_Chain1\_5775MHz

Center Fre	eq 5.775000	000 GHz			eq: 5.77500 Run 0 dB		10/10	Radio Sto		Frequency
10 dB/div	Pier Oriset 12.4 db								663 GHz 122 dBm	
200		_								Center Free 5.775000000 GH
0.00	pine	un ser	- minerel	ull	Antes	- John Line	برار ارد ارام. ا	ALLAN L		
30 0 40 0									L.	
Center 5.7	775 GHz							Spar	100 MHz	
#Res BW	100 kHz	_		#VE	300 k	Hz			ep 9.6 ms	CF Step 10.000000 MH
Occup	ied Bandw		32 MH	,	Total Po	ower	19.2	dBm		Auto Mar
	it Freq Erro		34.739 kH		OBW P	ower	99	.00 %		Freq Offse
x dB Ba	andwidth		75.60 MH	z	x dB		-6,	00 dB		

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# 9. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

# 9.1 Standard Applicable

OPERZTION Band	EUT CATEGORY	LIMIT
	Access Point (Master device)	1 Watt(30dBm)
U-NII-1	Fixed point-to-point Access Point	1 Watt(30dBm)
	 Mobile and portable client device	250mW(23.98dBm)
U-NII-2A		250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C		250mW(23.98dBm) or 11dBm+10 log B
U-NII-3		1 Watt(30dBm)
•	<b>U</b>	6 dBi are used, the Maximum transmit

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6 dBi.

# Note:

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, ..., GN dBi.

(i) If transmit signals are correlated, then Directional gain

=  $10 \log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/N_{ANT}] dBi$ 

[Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

The antenna gain is not granter than 6 dBi. Therefore, reduction of power is not required.

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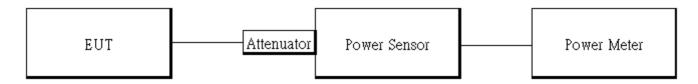
# 9.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
- Power Meter is used as the auxiliary test equipment to conduct the output power 4. measurement.
- 5. Record the max. reading and add 10 log(1/duty cycle).
- Repeat above procedures until all frequency (low, middle, and high channel) measured were 6. complete.

# 9.3 Measurement Equipment Used

EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
Power Meter	Anritsu	ML2496A	1804001	02/13/2019	02/12/2020
Power Sensor	Anritsu	MA2411B	1726104	02/13/2019	02/12/2020
Power Sensor	Anritsu	MA2411B	1726107	02/13/2019	02/12/2020
DC Power Supply	Agilent	E3640A	MY52410006	12/10/2019	12/09/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021

# 9.4 Test Set-up



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## 9.5 Measurement Result

#### 802.11a\_2Tx

СН	Frequency	Data	Avg. POV	VER (dBm)	TOTAL	TOTAL POWER	REQUIRED	
СН	(MHz)	Rate	CH 0	CH 1	(dBm)	(mW)	LIMIT (dBm)	RESULT
36	5180	6	12.02	11.71	14.92	31.011	23.98	PASS
44	5220	6	12.26	11.61	14.99	31.583	23.98	PASS
48	5240	6	12.20	11.6	14.96	31.355	23.98	PASS
52	5260	6	12.33	11.5	14.98	31.493	23.98	PASS
60	5300	6	12.30	11.47	14.96	31.316	23.98	PASS
64	5320	6	12.06	11.13	14.67	29.290	23.98	PASS
100	5500	6	12.00	11.74	14.93	31.152	23.98	PASS
116	5580	6	11.85	11.28	14.62	28.985	23.98	PASS
140	5700	6	12.09	10.97	14.61	28.929	23.98	PASS
144	5720(U-NII 2C)	6	10.91	9.64	13.37	21.717	23.98	PASS
144	5720 (U-NII 3)	6	5.73	4.47	8.19	6.588	30	PASS
149	5745	6	12.05	10.78	14.51	28.240	30	PASS
143	5785	6	12.39	11.16	14.87	30.660	30	PASS
165	5825	6	12.00	11.03	14.83	30.393	30	PASS
02.11n_HT20		0	12.42	11.00	14.00	00.000		17.00
JZ.1111_11120					TOTAL	TOTAL	REQUIRED	
СН	Frequency	Data	Avg. POV	VER (dBm)	POWER	POWER	LIMIT	RESULT
	(MHz)	Rate	CH 0	CH 1	(dBm)	(mW)	(dBm)	
36	5180	MCS0	11.82	11.37	14.66	29.251	23.98	PASS
44	5220	MCS0	12.1	11.25	14.76	29.897	23.98	PASS
48	5240	MCS0	12.01	11.13	14.65	29.193	23.98	PASS
52	5260	MCS0	12.24	11.04	14.74	29.798	23.98	PASS
60	5300	MCS0	12.31	10.95	14.74	29.810	23.98	PASS
64	5320	MCS0	12.29	10.94	14.73	29.701	23.98	PASS
100	5500	MCS0	11.96	11.37	14.74	29.755	23.98	PASS
116	5580	MCS0	12.11	11.38	14.82	30.345	23.98	PASS
140	5700	MCS0	12.13	11.17	14.74	29.765	23.98	PASS
144	5720(U-NII 2C)	MCS0	10.83	9.74	13.37	21.728	23.98	PASS
144	5720 (U-NII 3)	MCS0	6.02	4.85	8.56	7.185	30	PASS
149	5745	MCS0	12.02	10.93	14.57	28.639	30	PASS
157	5785	MCS0	11.96	10.95	14.54	28.476	30	PASS
165	5825	MCS0	11.95	10.9	14.52	28.296	30	PASS
02.11n_HT40								
	Frequency	Data	Avg. POV	VER (dBm)	TOTAL	TOTAL	REQUIRED	
СН	(MHz)	Rate	СН 0	CH 1	POWER	POWER		RESULT
	5400	MCCO			(dBm)	(mW)	(dBm)	
38	5190	MCS0	11.22	10.84	14.84	30.454	23.98	PASS
46	5230	MCS0	11.24	10.66	14.76	29.936	23.98	PASS
54	5270	MCS0	11.41	10.41	14.74	29.792	23.98	PASS
62	5310	MCS0	11.47	10.31	14.73	29.723	23.98	PASS
102	5510	MCS0	11.24	10.75	14.80	30.229	23.98	PASS
110	5550	MCS0	11.37	10.84	14.92	31.012	23.98	PASS
134	5670	MCS0	11.13	10.48	14.62	28.970	23.98	PASS
142	5710(U-NII 2C)	MCS0	10.98	10.07	14.36	27.302	23.98	PASS
142	5720 (U-NII 3)	MCS0	2.22	1.52	5.60	3.633	30	PASS
151	5755	MCS0	11.47	10.18	14.68	29.343	30	PASS
159	5795	MCS0	11.27	10.28	14.61	28.876	30	PASS

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f (886-2) 2298-0488

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#### 802.11ax\_20\_MIMO

СН	Frequency	Data	RU config.	Avg. POV	VER (dBm)	TOTAL POWER	TOTAL POWER	REQUIRED LIMIT	RESULT
on	(MHz)	Rate	litto comig.	CH 0	CH 1	(dBm)	(mW)	(dBm)	NEODE I
		MCS0	full	11.86	11.82	14.92	31.080	23.98	PASS
26	5400	MCS0	26/0	11.23	10.13	13.80	23.986	23.98	PASS
36	5180	MCS0	52/37	11.83	11.54	14.77	30.007	23.98	PASS
		MCS0	106/53	11.86	11.53	14.78	30.081	23.98	PASS
44	5220	MCS0	full	12.08	11.73	14.99	31.574	23.98	PASS
48	5240	MCS0	full	12.01	11.52	14.86	30.596	23.98	PASS
52	5260	MCS0	full	12.16	11.41	14.89	30.803	23.98	PASS
60	5300	MCS0	full	12.22	11.31	14.87	30.715	23.98	PASS
		MCS0	full	12.27	11.4	14.94	31.200	23.98	PASS
		MCS0	26/8	11.38	10.24	13.93	24.729	23.98	PASS
64	5320	MCS0	52/40	12.33	11.05	14.82	30.351	23.98	PASS
		MCS0	106/54	12.29	11.15	14.84	30.493	23.98	PASS
		MCS0	full	12.02	11.73	14.96	31.349	23.98	PASS
100		MCS0	26/0	11.06	10.75	13.99	25.076	23.98	PASS
100	5500	MCS0	52/37	12.04	11.27	14.76	29.901	23.98	PASS
		MCS0	106/53	12.11	11.42	14.86	30.644	23.98	PASS
116	5580	MCS0	full	12.01	11.66	14.92	31.069	23.98	PASS
		MCS0	full	12.21	11.47	14.94	31.193	23.98	PASS
		MCS0	26/8	11.33	10.39	13.97	24.947	23.98	PASS
140	5700	MCS0	52/40	12.28	11.17	14.85	30.515	23.98	PASS
		MCS0	106/54	12.27	11.25	14.87	30.723	23.98	PASS
144	5720(U-NII 2C)	MCS0	full	10.83	10.01	13.53	22.530	23.98	PASS
144	5720 (U-NII 3)	MCS0	full	6.22	2.31	8.92	7.800	23.98	PASS
		MCS0	full	12.22	11.35	14.89	30.843	30	PASS
110	5745	MCS0	26/0	11.15	10.29	13.83	24.132	30	PASS
149	5745	MCS0	52/37	12.22	11.13	14.79	30.157	30	PASS
		MCS0	106/53	12.31	11.13	14.84	30.512	30	PASS
157	5785	MCS0	full	12.1	11.27	14.79	30.127	30	PASS
		MCS0	full	12.11	11.15	14.74	29.794	30	PASS
		MCS0	26/8	12.39	11.35	14.99	31.520	30	PASS
165	5825	MCS0	52/40	12.32	11.31	14.93	31.110	30	PASS
		MCS0	106/54	12.31	11.25	14.90	30.882	30	PASS
02.11ax_40_	МІМО							•	
	Frequency	Data		Avg. POV	VER (dBm)	TOTAL	TOTAL	REQUIRED	DECU
СН	(MHz)	Rate	RU config.	CH 0	CH 1	POWER (dBm)	POWER (mW)	LIMIT (dBm)	RESUL
		11000			40.00		00.004	00.00	B4.00

СН	Frequency	Data	RU config.			POWER	POWER	LIMIT	RESULT
СП	(MHz)	Rate	KU coning.	CH 0	CH 1	(dBm)	(mW)	(dBm)	RESULT
38	5190	MCS0	full	10.12	10.06	14.90	30.891	23.98	PASS
50	5190	MCS0	242/61	10.02	9.84	14.74	29.780	23.98	PASS
46	5230	MCS0	full	10.21	10.08	14.95	31.288	23.98	PASS
54	5270	MCS0	full	10.3	10.01	14.97	31.374	23.98	PASS
62	5310	MCS0	full	10.43	9.75	14.91	30.985	23.98	PASS
02	5510	MCS0	242/62	10.49	9.66	14.90	30.925	23.98	PASS
102	5510	MCS0	full	10.19	10.04	14.92	31.074	23.98	PASS
102	5510	MCS0	242/61	10.01	9.97	14.80	30.188	23.98	PASS
110	5550	MCS0	full	10.24	10.02	14.94	31.187	23.98	PASS
134	5670	MCS0	full	10.41	9.64	14.85	30.552	23.98	PASS
154	5070	MCS0	242/62	10.07	9.64	14.67	29.300	23.98	PASS
142	5710(U-NII 2C)	MCS0	full	9.99	9.00	14.33	27.120	23.98	PASS
142	5710 (U-NII 3)	MCS0	full	1.53	0.58	5.87	3.864	23.98	PASS
151	5755	MCS0	full	10.51	9.52	14.85	30.559	30	PASS
121	5755	MCS0	242/61	10.19	9.83	14.82	30.353	30	PASS
150	5.705	MCCO	full	10.65	9.26	14.82	30.330	30	PASS
159	5795	MCS0	242/62	10.35	9.44	14.73	29.697	30	PASS

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#### 802.11ax 80 MIMO

СН	Frequency	Data	RU config.	Avg. POW	/ER (dBm)	TOTAL POWER	TOTAL POWER	REQUIRED LIMIT	RESULT
G	(MHz)	Rate	KU COIIIIg.	CH 0	CH 1	(dBm)	(mW)	(dBm)	RESOLT
42	5210	MCS0	full	10.79	10.36	14.92	31.059	23.98	PASS
42	5210	MCS0	484/65	6.87	6.37	10.97	12.499	23.98	PASS
58	5290	MCS0	full	10.85	10.38	14.96	31.354	23.98	PASS
50	5290	MCS0	484/66	7.08	6.02	10.92	12.370	23.98	PASS
106	5530	MCS0	full	10.66	10.33	14.84	30.477	23.98	PASS
100	2220	MCS0	484/65	6.47	6.31	10.73	11.837	23.98	PASS
122	5610	MCS0	full	10.6	10.04	14.67	29.313	23.98	PASS
138	5690(U-NII 2C)	MCS0	full	10.37	9.80	14.44	27.822	23.98	PASS
138	5690 (U-NII 3)	MCS0	full	-0.92	-1.24	3.15	2.068	23.98	PASS
		MCS0	full	10.85	10.28	14.92	31.016	30	PASS
155	5775	MCS0	484/65	6.72	6.48	10.94	12.426	30	PASS
		MCS0	484/66	7.33	5.68	10.92	12.372	30	PASS

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# **10. POWER SPECTRAL DENSITY**

# 10.1 Standard Applicable

OPERZTION Band		EUT CATEGORY	LIMIT	
		Access Point (Master device)	17dBm/ MHz	
U-NII-1		Fixed point-to-point Access Point		
		Mobile and portable client device	11dBm/ MHz	
U-NII-2A			11dBm/ MHz	
U-NII-2C			11dBm/ MHz	
U-NII-3			30dBm/ 500kHz	
	•	0 0	an 6 dBi are used, the Maximum power	

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

# Note:

As per FCC KDB 662911 D01

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, ..., GN dBi.

(i) If transmit signals are correlated, then Directional gain

=  $10 \log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/N_{ANT}] dBi$ 

[Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

The antenna gain is not grater than 6 dBi. Therefore, reduction of power is not required.

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# **10.2Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
- 4. For U-NII1, U-NII-2A, U-NII-2C Band:

Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth) **For U-NII-3 Band**:

Set RBW=500 kHz, VBW $\ge$  3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

- 5. User the cursor on spectrum to peak search the highest level of trace
- 6. Record the max. reading and add 10 log(1/duty cycle).
- 7. Repeat above procedures until all default test channel (low, middle, and high) was complete.
- 802.11n MIMO mode: offset is set following "measure and add 10 Log (N)" on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=2 for this given application.

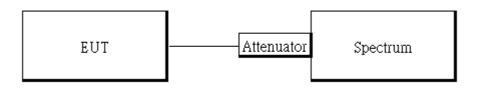
# Note:

For the test of PSD at MIMO mode, the highest emission of worst case employing Measure and add 10 log (N) technical is reported on this report after the comparison between Main Antenna at single transmitting mode and Aux that yields the higher value. The MIMO transmitting mode produces higher value of outcome

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/02/2019	05/01/2020
DC Power Supply	Agilent	E3640A	MY52410006	12/10/2019	12/09/2020
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021

# **10.3Measurement Equipment Used**

# 10.4Test Set-up



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## **10.5Measurement Result**

POV	VER DENSITY 8	02.11a MO	DE_2TX		
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5180.00	3.69	-	3.69	11.00	-7.31
5220.00	4.12	-	4.12	11.00	-6.88
5240.00	3.91	-	3.91	11.00	-7.09
5260.00	4.03	-	4.03	11.00	-6.97
5300.00	3.71	-	3.71	11.00	-7.29
5320.00	3.25	-	3.25	11.00	-7.75
5500.00	3.04	-	3.04	11.00	-7.96
5580.00	2.94	-	2.94	11.00	-8.06
5700.00	3.10	-	3.10	11.00	-7.90
5720 (U-NII 2C)	3.43	-	3.43	11.00	-7.57
5720 (U-NII 3)	-0.56	-	-0.56	30.00	-30.56
5745.00	0.51	-	0.51	30.00	-29.49
5785.00	0.90	-	0.90	30.00	-29.10
5825.00	0.97	-	0.97	30.00	-29.03

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	POW	/ER DENSITY 8	02.11ax 20			
Frequency (MHz)	RU config.	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
	full	2.13	-	2.13	11	-8.87
5180	26/0	10.47	-	10.47	11	-0.53
0100	52/37	8.32	-	8.32	11	-2.68
	106/53	5.39	-	5.39	11	-5.61
5220	full	2.71	-	2.71	11	-8.29
5240	full	2.67	-	2.67	11	-8.33
5260	full	2.97	-	2.97	11	-8.03
5300	full	2.64	-	2.64	11	-8.36
	full	2.17	-	2.17	11	-8.83
5320	26/8	10.52	-	10.52	11	-0.48
5520	52/40	9.13	-	9.13	11	-1.87
	106/54	6.31	-	6.31	11	-4.69
	full	2.25	-	2.25	11	-8.75
5500	26/0	10.62	-	10.62	11	-0.38
5500	52/37	8.93	-	8.93	11	-2.07
	106/53	6.04	-	6.04	11	-4.96
5580	full	2.01	-	2.01	11	-8.99
	full	2.71	-	2.71	11	-8.29
5700	26/8	10.69	-	10.69	11	-0.31
5700	52/40	9.29	-	9.29	11	-1.71
	106/54	6.26	-	6.26	11	-4.74
5720 (U-NII 2C)	full	3.09	-	3.09	11	-7.91
5720 (U-NII 3)	full	-0.39	-	-0.39	30	-30.39
	full	-0.09	-	-0.09	30	-30.09
5745	26/0	8.03	-	8.03	30	-21.97
	52/37	6.19	-	6.19	30	-23.81
5705	106/53	3.57	-	3.57	30	-26.43
5785	full	-0.51	-	-0.51	30	-30.51
	full	-0.41	-	-0.41	30	-30.41
5825	26/8	8.71	-	8.71	30	-21.29
	52/40	5.96	-	5.96	30	-24.04
	106/54	2.89	-	2.89	30	-27.11

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	POW	<b>/ER DENSITY 8</b>	02.11ax 40	) MODE		
Frequency (MHz)	RU config.	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5190	full	-1.56	1.80	0.24	11	-10.76
5150	242/61	0.43	1.80	2.23	11	-8.77
5230	full	-1.02	1.80	0.78	11	-10.22
5270	full	0.01	1.80	1.81	11	-9.19
5310	full	-0.32	1.80	1.48	11	-9.52
5510	242/62	1.13	1.80	2.93	11	-8.07
5510	full	-0.91	1.80	0.89	11	-10.11
3310	242/61	0.32	1.80	2.12	11	-8.88
5550	full	-2.29	1.80	-0.49	11	-11.49
5670	full	-1.65	1.80	0.15	11	-10.85
5070	242/62	0.40	1.80	2.20	11	-8.80
5710 (U-NII 2C)	full	-1.63	1.80	0.17	11	-10.83
5710 (U-NII 3)	full	-5.73	1.80	-3.93	30	-33.93
5755	full	-3.86	1.80	-2.06	30	-32.06
5755	242/61	-2.62	1.80	-0.82	30	-30.82
5795	full	-4.26	1.80	-2.46	30	-32.46
5795	242/62	-2.36	1.80	-0.56	30	-30.56

	POW	/ER DENSITY 8	02.11ax 80	) MODE		
Frequency (MHz)	RU config.	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5210	full	-2.93	1.33	-1.60	11	-12.60
5210	484/65	-7.32	1.33	-5.99	11	-16.99
5290	full	-2.95	1.33	-1.62	11	-12.62
3230	484/66	-6.49	1.33	-5.16	11	-16.16
5530	full	-4.21	1.33	-2.88	11	-13.88
5550	484/65	-6.39	1.33	-5.06	11	-16.06
5610	full	-3.84	1.33	-2.51	11	-13.51
5690 (U-NII 2C)	full	-4.33	1.33	-3.00	11	-14.00
5690 (U-NII 3)	full	-8.58	1.33	-7.25	30	-37.25
	full	-6.40	1.33	-5.07	30	-35.07
5775	484/65	-9.75	1.33	-8.42	30	-38.42
	484/66	-8.84	1.33	-7.51	30	-37.51

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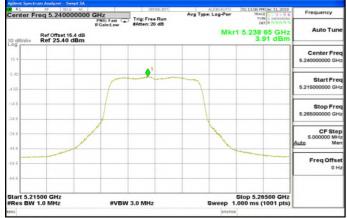
#### 802.11a\_20MHz\_5180MHz

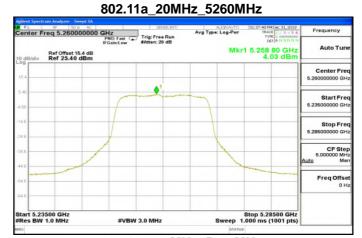


802.11a\_20MHz\_5220MHz



#### 802.11a\_20MHz\_5240MHz





802.11a\_20MHz\_5300MHz



#### 802.11a\_20MHz\_5320MHz



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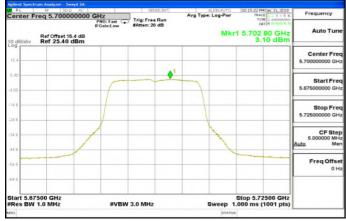


#### 802.11a 20MHz 5500MHz

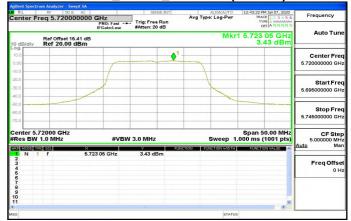


enter Freq 5.580000000 GHz PN0: Fost Cp Trig: Free Run #Atten: 20 dB Auto Tu Mkr1 5.577 50 GH: 2.94 dBm Ref Offset 16.4 dB Center Fr ٠ Start Fre St **p**Fr CF Ste Freq Off tart 5.55500 GHz Res BW 1.0 MHz Stop 5.60500 GHz Sweep 1.000 ms (1001 pts #VBW 3.0 MHz

#### 802.11a 20MHz 5700MHz



#### 802.11a\_20MHz\_5720MHz (UNII 2C)



#### 802.11a\_20MHz\_5720MHz (UNII 3)



#### 802.11a 20MHz 5745MHz



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#### 802.11a 20MHz 5785MHz



enter Freq 5.825000000 GHz Trig: Free Run #Atten: 20 dB Auto Tu Mkr1 5.823 80 GHz Ref Offset 16.4 dB Center Fr Start Fre St DD Fr 5 8. CF Ste Freq Off Start 5.80500 GHz Stop 5.84500 GHz Sweep 1.000 ms (1001 pts #VBW 1.5 MHz

### Full RU 802.11ax 20MHz 5180MHz



#### Full RU 802.11ax 20MHz 5220MHz



#### Full RU 802.11ax 20MHz 5240MHz



#### Full RU 802.11ax 20MHz 5260MHz



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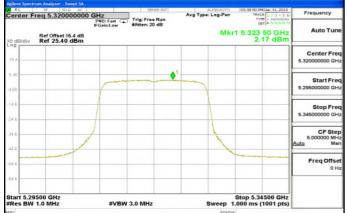
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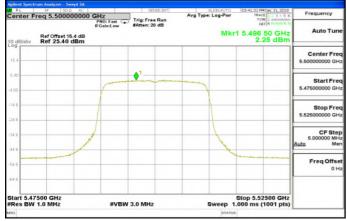
#### Full RU\_802.11ax\_20MHz\_5300MHz



#### Full RU 802.11ax 20MHz 5320MHz



#### Full RU 802.11ax 20MHz 5500MHz



### Full RU 802.11ax 20MHz 5580MHz



#### Full RU 802.11ax 20MHz 5700MHz



#### Full RU 802.11ax 20MHz 5720MHz (UNII 2C)

000 AC 000000 GHz PRO: Fast PRO: Fast PGaint or 15.41 dB 0 dBm	SERSENT		12:59:47 PM and7, 2020 TRACE 12:3 4:5 6 TRACE 12:3 4:5 7 TRACE	5.720000000 GH: Start Free
15.41 dB	#Atten: 20 dB	Mkr	1 5.721 95 GHz	Center Free 5.720000000 GH Start Free
	● <sup>1</sup>			Center Freq 5.72000000 GHz Start Freq
				5.69500000 GH
				Stop Fre 5.745000000 GH
: #VB	W 3.0 MHz	Sweep 1.	Span 50.00 MHz 000 ms (1001 pts)	5.000000 MH
× 5.721 95 GHz	7 80 3.09 dBm	NCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Ma
			~	
	#VB	#VBW 3.0 MHz	#VBW 3.0 MHz Sweep 1.   5 20050000000000000000000000000000000000	#VBW 3.0 MHz Sweep 1.000 ms (1001 pts)

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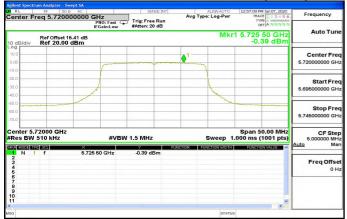
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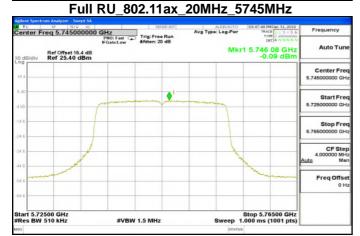
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#### Full RU 802.11ax 20MHz 5720MHz (UNII 3)





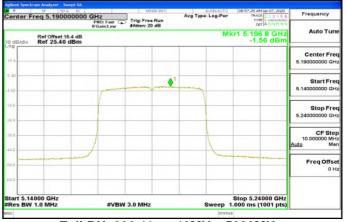
#### Full RU 802.11ax 20MHz 5785MHz



#### Full RU 802.11ax 20MHz 5825MHz



Full RU 802.11ax 40MHz 5190MHz



Full RU 802.11ax 40MHz 5230MHz



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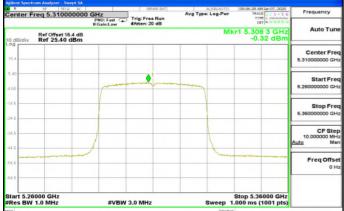
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#### Full RU 802.11ax 40MHz 5270MHz



### Full RU 802.11ax 40MHz 5310MHz



#### Full RU 802.11ax 40MHz 5510MHz



#### Full RU 802.11ax 40MHz 5550MHz



#### Full RU 802.11ax 40MHz 5670MHz



#### Full RU 802.11ax 40MHz 5710MHz (UNII 2C

Frequency	12:59:57 PM Jan 07, 2020 TRACE 1 2 3 4 5 6	ALIGNAUTO	1T	SENSE		AC		RL
	TYPE A WANNAMA	ype. Log-Pwr	n	Trig: Free R	10: Fast	PN	req 5.7100	enter Fi
Auto True				#Atten: 20 di	Sain:Low	IFG		
	r1 5.717 3 GHz -1.63 dBm	МК					Ref Offset 1 Ref 20.00	0 dB/div
Center Free								10.0
5.710000000 GH								0.00
					(			10.0
Start Free								20.0
5.66000000 GH						1		30.0
		1				1		40.0
Stop Fre 5.76000000 GH								50.0
								70.0
	Span 100.0 MHz 000 ms (1001 pts)	Current d		3.0 MHz	40/014/		71000 GHz	Center 5.3
10.000000 MH Auto Ma	annonnanna A		FUNCT		#VBW			
	EDVCHON WALDE	FUNCTION WIDTH	FUNC	-1.63 dBm	3 GHz	5.717 3	f	IKR MODE TE
Freq Offse								234
-								4 5 7 8 9
								8
								10
	× 1							11
-		STATUS						30

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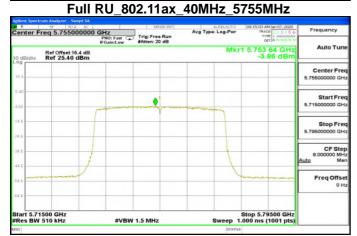
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#### Full RU 802.11ax 40MHz 5710MHz (UNII 3)





#### Full RU 802.11ax 40MHz 5795MHz



#### Full RU 802.11ax 80MHz 5210MHz



#### Full RU 802.11ax 80MHz 5290MHz



#### Full RU 802.11ax 80MHz 5530MHz



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# SG

#### Full RU 802.11ax 80MHz 5610MHz



#### Full RU 802.11ax 80MHz 5690MHz (UNII 2C)



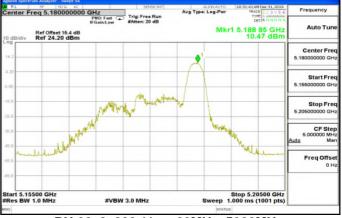
# Full RU 802.11ax 80MHz 5690MHz (UNII 3)

	01:03:05 PM Jan 07, 2020	ALIGNAUTO		SENSE:		50 Q AC	R/F	RL
Frequency	TYPE & UNAULAL	Type: Log-Pwr	P			690000000	r Freq 5.6	enter
100000	DET A N N N N N			Trig: Free Ri #Atten: 20 di	PNO: Fast 😱 IFGain:Low			
Auto Tu	5.725 16 GHz -8.58 dBm	Mkr1				fset 15.41 dB 0.00 dBm	Ref Of	dB/di
						0.00 0.011	iv iter z	pg
Center Fr								0.0
5.69000000 G								.00
								0.0
Start Fr								0.0
5.630000000 G								0.0
						1		0.0
Stop Fre 5.75000000 GH								0.0
								0.0
								0.0
CF St	Span 120.0 MHz 000 ms (1001 pts)	Susan 1			#VBW		5.69000 GW 510 kH	
12.000000 M Auto M		-			#VBVV			
	FUNCTION VALUE	FUNCTION WIDTH	FUNCTION	-8.58 dBm	5 16 GHz	5.72		1 N
Freq Offs								23
0								4
								6
								7
								5 6 7 8 9
	× 1							1
L	(8)			19 19				
		STATUS						٥

#### Full RU 802.11ax 80MHz 5775MHz



#### RU 26 0 802.11ax 20MHz 5180MHz



#### RU 26 8 802.11ax 20MHz 5320MHz



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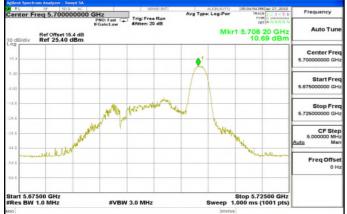
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#### RU 26\_0\_802.11ax\_20MHz\_5500MHz



RU 26 8 802.11ax 20MHz 5700MHz



RU 26 0 802.11ax 20MHz 5745MHz



#### RU 26 8 802.11ax 20MHz 5825MHz



RU 52 37 802.11ax 20MHz 5180MHz



RU 52 40 802.11ax 20MHz 5320MHz



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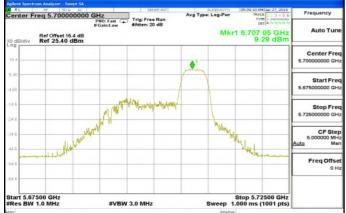
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#### RU 52\_37\_802.11ax\_20MHz\_5500MHz



RU 52 40 802.11ax 20MHz 5700MHz



#### RU 52 37 802.11ax 20MHz 5745MHz



#### RU 52 37 802.11ax 20MHz 5825MHz



#### RU 106 53 802.11ax 20MHz 5180MHz



RU 106 54 802.11ax 20MHz 5320MHz



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#### RU 106\_53\_802.11ax\_20MHz\_5500MHz



RU 106 54 802.11ax 20MHz 5700MHz



#### RU 106 53 802.11ax 20MHz 5745MHz



#### RU 106 54 802.11ax 20MHz 5825MHz



#### RU 242 61 802.11ax 40MHz 5190MHz



RU 242 62 802.11ax 40MHz 5310MHz



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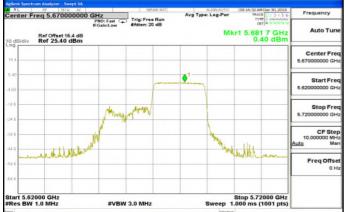
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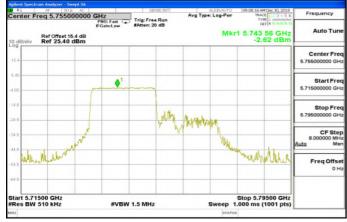
#### RU 242 61 802.11ax 40MHz 5510MHz



RU 242 62 802.11ax 40MHz 5670MHz



#### RU 242 61 802.11ax 40MHz 5755MHz



#### RU 242 62 802.11ax 40MHz 5795MHz



#### RU 484 65 802.11ax 80MHz 5210MHz



#### RU 484 66 802.11ax 80MHz 5290MHz



Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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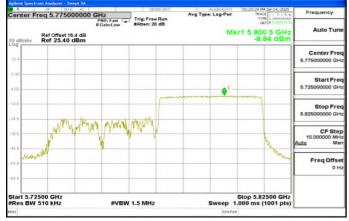
#### RU 484\_65\_802.11ax\_80MHz\_5530MHz



RU 484 65 802.11ax 80MHz 5775MHz



### RU 484 66 802.11ax 80MHz 5775MHz



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