



# TEST REPORT

<b>Application No.:</b>	ZEWM2306000892RG
<b>Applicant:</b>	Spark Technology iQsim
<b>Address of Applicant:</b>	731 Rt 18 East Brunswick NJ USA 08816
<b>Manufacturer:</b>	Shenzhen Huasifei Technology Co., Ltd
<b>Address of Manufacturer:</b>	1203, No.1 Langrong Road, Xinshi Community, Dalang Street, Longhua District, Shenzhen City, Guangdong Province, China
<b>EUT Description:</b>	WIFI Router
<b>Model No.:</b>	MR40
<b>Trade Mark:</b>	HUASIFEI
<b>FCC ID:</b>	2BCEZ-MR40
<b>Standards:</b>	FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart E
<b>Date of Receipt:</b>	2023/07/03
<b>Date of Test:</b>	2023/07/06 to 2023/08/01
<b>Date of Issue:</b>	2023/08/02

<b>Test Result :</b>	<b>PASS *</b>
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\* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Ervin Li  
Regulatory Manager



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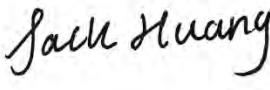
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## 1 Version

### Revision Record

Version	Chapter	Date	Modifier	Remark
01		2023/08/02		Original

Prepared By	 (Jack Huang) / Test Engineer
Checked By	 (Daniel Wang) / Reviewer

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## 2 Test Summary

Test Item	Band <sup>[1]</sup>	FCC rules No.	Test Requirements	Test Result	Result	Lab <sup>[2]</sup>
Antenna Requirement	--	15.203/15.407(a)	--	Clause 4.1	PASS	--
6dB Emission Bandwidth	Band III	15.407(e)	$\geq 500$ kHz.	Clause 4.5	PASS	B
99% Occupied Bandwidth	Band III	KDB 789033 D02§ D	No limit.	Clause 4.6	For Report Purpose	B
Duty Cycle	Band III	--	No limit.	Clause 4.3	For Report Purpose	B
Maximum Conducted Output Power	Band III	15.407(a)(3)	< 1W	Clause 4.4	PASS	B
Maximum Power Spectral Density	Band III	15.407(a)(3)	<30dBm/500KHz	Clause 4.7	PASS	B
Radiated Spurious Emissions	Band III	15.407(b) 15.205/15.209	F<1GHz: §15.209 limit (QP) F≥1GHz & out-restricted:(PK) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. F≥1GHz & in-restricted: §15.209 limit (AV&PK).	Clause 4.8	PASS	A
Restricted bands around fundamental frequency	Band III	15.407(b) 15.205/15.209	---	Clause 4.9	PASS	A



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# SGS-CSTC Standards Technical Services Co., Ltd.

## Shenzhen Branch

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AC Power Line Conducted Emissions	Band III	15.207	---	Clause 4.2	PASS	B
Frequency Stability	Band III	15.407(g)	Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual	N/A	N/A	N/A
Note 1: Band III: 5725-5850MHz Note 2: Lab A SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch Lab B SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd.						



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### 3 General Information

#### 3.1 Details of Client

Applicant:	Spark Technology iQsim
Address of Applicant:	731 Rt 18 East Brunswick NJ USA 08816
Manufacturer:	Shenzhen Huasifei Technology Co., Ltd
Address of Manufacturer:	1203, No.1 Langrong Road, Xinshi Community, Dalang Street, Longhua District, Shenzhen City, Guangdong Province, China

#### 3.2 Test Location

<b>Lab A:</b>	
Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China
Post code:	518057
Test engineer:	Xing Guo
<b>Lab B:</b>	
Company:	SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd.
Address:	1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi'an, Shaanxi China
Post code:	710086
Test engineer:	Qiang Zhang, Ken Liu

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### 3.3 Test Facility

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

#### Lab A:

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

- **FCC –Designation Number: CN1336**

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch has been recognized as an accredited testing laboratory.

Designation Number: CN1336.

Test Firm Registration Number: 787754

#### Lab B:

- **A2LA (Certificate No. 4854.01)**

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0095.

IC#: 25613.

- **FCC –Designation Number: CN1337**

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN1337.

Test Firm Registration Number: 917410



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### 3.4 General Description of EUT

EUT Description:	WIFI Router	
Model No.:	MR40	
Trade Mark:	HUASIFEI	
Hardware Version:	WS1208 V2.0	
Software Version:	openwrt	
Power Supply:	12.0V-3.0A (DC Supply)	
SN:	RF Conducted & AC power line	MR40-A0-00015636
	RSE	MR40-A0-00015273
WLAN Mode Supported:	802.11a:	20 MHz channel bandwidth
	802.11n:	20 MHz / 40 MHz channel bandwidth
	802.11ac:	20 MHz / 40 MHz / 80 MHz channel bandwidth
Operation Frequency:	5725MHz to 5850MHz	
Modulation Type:	802.11a:	OFDM (BPSK, QPSK, 16QAM, 64QAM)
	802.11n:	OFDM (BPSK, QPSK, 16QAM, 64QAM)
	802.11ac:	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Spacing:	20MHz:	802.11a/n(HT20)/ac(VHT20)
	40MHz:	802.11n(HT40)/ac(VHT40)
	80MHz:	802.11ac(VHT80)
Antenna Type:	<input checked="" type="checkbox"/> External, <input type="checkbox"/> Integrated	
Antenna Gain:	5725MHz to 5850MHz: 6.13dBi(Ant0); 6.13dBi(Ant1);	
	<b>Note:</b> The antenna gain are derived from the gain information report provided by the manufacturer.	
Smart System:	<input type="checkbox"/> SISO	802.11a
	<input checked="" type="checkbox"/> MIMO	802.11n/ac 2Tx & 2Rx
	<input checked="" type="checkbox"/> Diversity	CDD:802.11a: 2Tx & 2Rx
RF Cable:	1.5dB	
Remark:	As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.	



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**Remark:**

In FCC 15.31, for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table, and the selected channel to perform the test as below:

Frequency range over which device operates	Number of Measurement Frequencies Required	Location of Measurement Frequency in Band of Operation
1 MHz or less	1	centre
1 MHz to 10 MHz	2	1 near high end, 1 near low end
Greater than 10 MHz	3	1 near high end, 1 near centre

For UNII Band III:		
Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5745
	The Middle channel	5785
	The Highest channel	5825
IEEE 802.11n/ac 40MHz	The Lowest channel	5755
	The Highest channel	5795
IEEE 802.11ac 80MHz	The Middle channel	5775

### 3.5 Test Environment and Mode

<b>Environment Parameter</b>	101 kPa Selected Values During Tests	
<b>Relative Humidity</b>	40-60 % RH Ambient	
<b>Value</b>	<b>Temperature(°C)</b>	<b>Voltage(V)</b>
NTNV	22~25	12

Remark:  
 NV: Normal Voltage  
 NT: Normal Temperature

### 3.6 Description of Support Units

Description	Manufacturer	Model No.
Adapter	Shenzhen Junchen Technology Co., Ltd.	J302-1203000UX

Remark: all above the information of table are provided by client.



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### 3.7 Worst-case configuration and mode

Low data rate was used to test on antenna port conducted tests and radiated spurious emissions since it has the highest maximum power. Following are the worst-case data rates set for test:

Modulation Type	SISO - Data Rate	CDD/MIMO - Data Rate
802.11a	/	12 Mbps
802.11n (HT 20)	/	MCS0 (13 Mbps)
802.11n (HT 40)	/	MCS0 (27 Mbps)
802.11ac (VHT 20)	/	MCS0 (13 Mbps)
802.11ac (VHT 40)	/	MCS0 (27 Mbps)
802.11ac (VHT 80)	/	MCS0 (58.5 Mbps)



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## 4 Test results and Measurement Data

### 4.1 Antenna Requirement

<b>Standard requirement:</b>	47 CFR Part 15 Section 15.203
The antenna is External Antenna and no consideration of replacement. The best case gain of the antenna is 5725MHz to 5850MHz: 6.13dBi(Ant0); 6.13dBi(Ant1).*	
<i>*Note:</i> <i>The antenna gain are derived from the gain information report provided by the manufacturer.</i>	
<i>Remark:</i> <i>As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.</i>	

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**Cyclic Delay Diversity (CDD) System:**

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

 If all antennas have the same gain,  $G_{ANT}$ , Directional gain =  $G_{ANT} + \text{Array Gain}$ , where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,  
 $\text{Array Gain} = 10 \log(N_{ANT}/N_{SS}) = 1 \text{ dB}$ .
- For power measurements on IEEE 802.11 devices:  
 $\text{Array Gain} = 0 \text{ dB} \text{ (i.e., no array gain) for } N_{ANT} \leq 4$ ;

Directional gain may be calculated by using the formulas applicable to equal gain antennas with GANT set equal to the gain of the antenna having the highest gain.

**The Power and PSD limit should be modified if the directional gain of eut is over 6dbi.**

The EUT supports CDD System.

All antennas have the same gain:

Operation Frequency	ANT Gain0 (dBi)	ANT Gain1 (dBi)	Directional gain For Power (dBi)	Directional gain For PSD (dBi)	Power Limit Reduction (dBm)	PSD Limit Reduction (dBm)
5725MHz to 5850MHz	6.13	6.13	6.13	9.14	0.13	3.14

5725MHz to 5850MHz:

Power Limit Reduction = Directional gain – 6dBi, (Directional gain &gt; 6dBi) = 0.13

PSD Limit Reduction = Directional gain – 6dBi, (Directional gain &gt; 6dBi) = 3.14



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## 4.2 AC Power Line Conducted Emissions

Test Requirement:	47 CFR Part 15 Section 15.207		
Test Method:	ANSI C63.10-2020 Section 6.2		
Test Frequency Range:	150kHz to 30MHz		
Receiver Setup:	RBW = 9kHz, VBW = 30kHz		
Limit:	Frequency range (MHz)		Limit (dBuV)
			Quasi-peak      Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10-2020 on conducted measurement.		

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Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.
Final Test Mode:	Refer to section 3.7 for details. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 6 for details.
Test Results:	Pass

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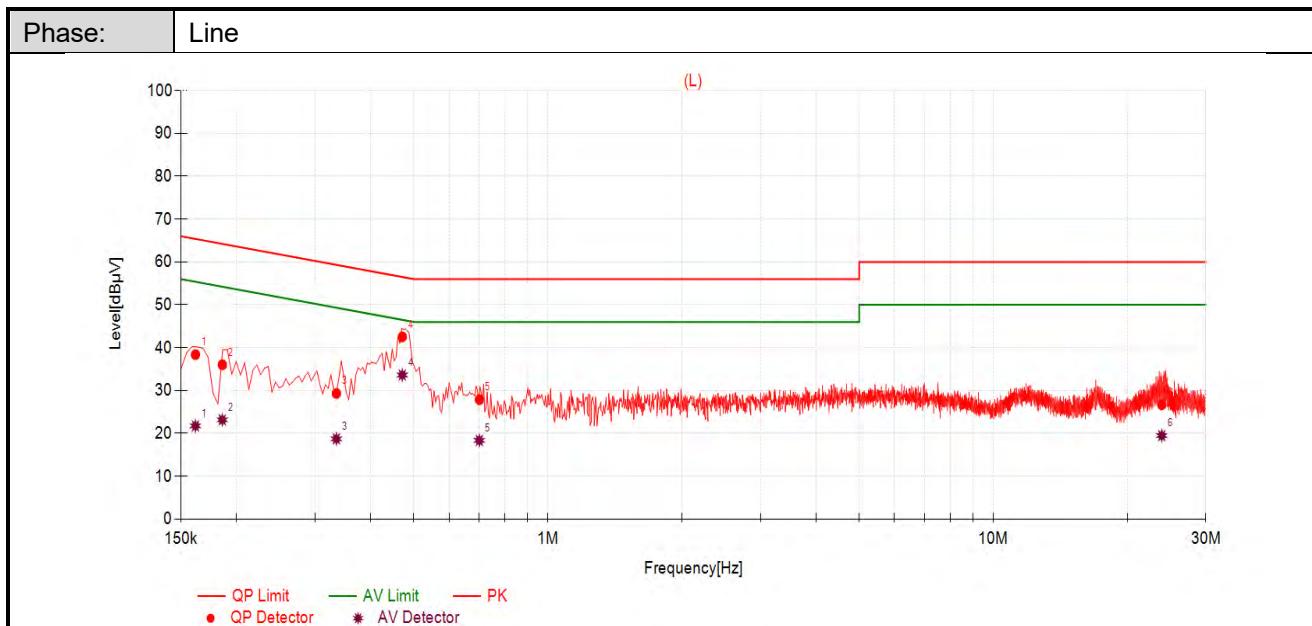


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**Measurement Data**

An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



Final Data List												
NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict	
1	0.1616	9.86	28.54	38.40	65.38	26.98	11.89	21.75	55.38	33.63	PASS	
2	0.1857	9.85	26.17	36.02	64.23	28.21	13.32	23.17	54.23	31.06	PASS	
3	0.3349	9.89	19.43	29.32	59.33	30.01	8.84	18.73	49.33	30.60	PASS	
4	0.4709	9.88	32.64	42.52	56.50	13.98	23.75	33.63	46.50	12.87	PASS	
5	0.7015	9.95	17.93	27.88	56.00	28.12	8.42	18.37	46.00	27.63	PASS	
6	23.9000	10.28	16.43	26.71	60.00	33.29	9.21	19.49	50.00	30.51	PASS	

**Remark:**

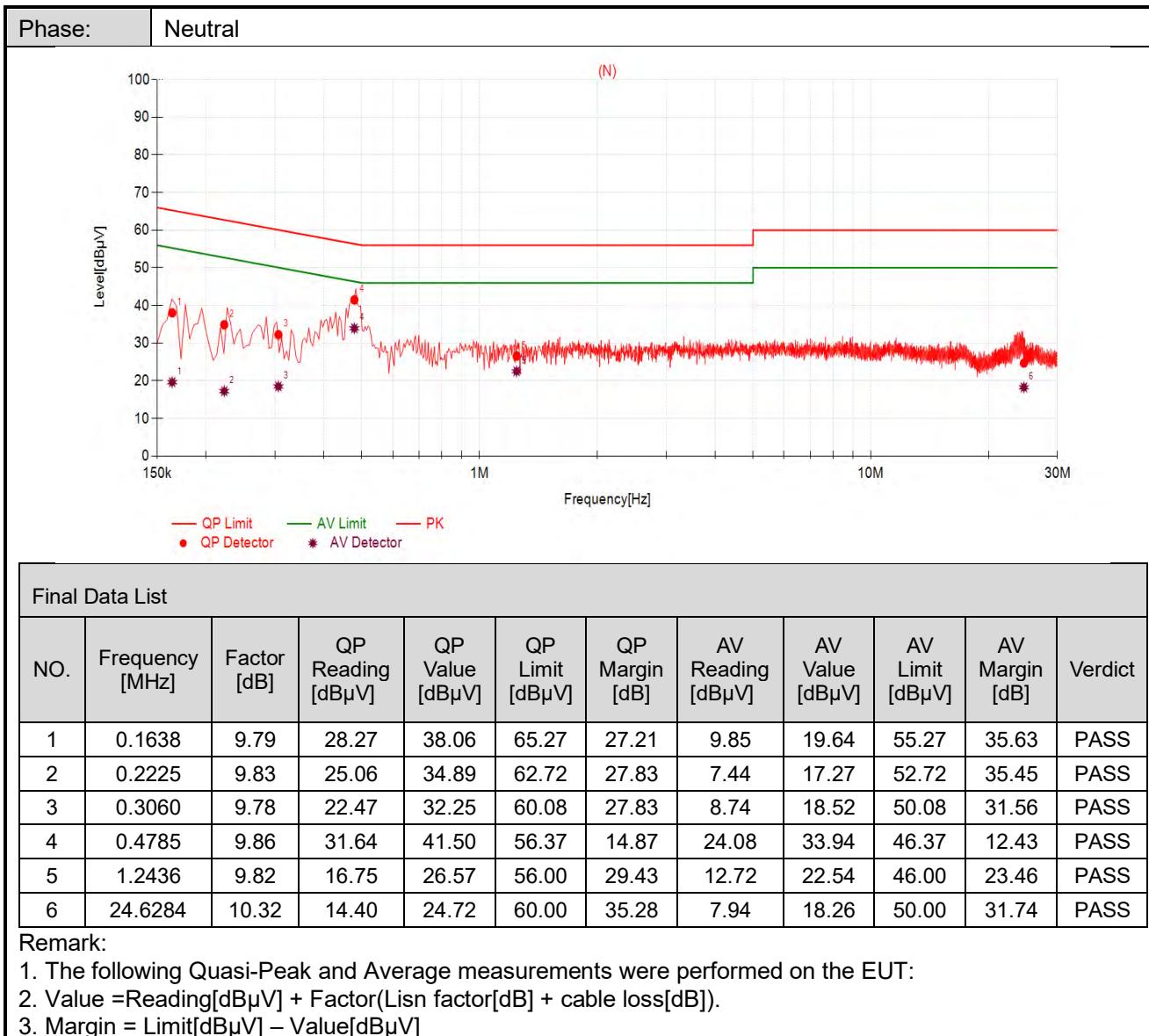
1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Value =Reading[dBμV] + Factor(List factor[dB] + cable loss[dB]).
3. Margin = Limit[dBμV] – Value[dBμV]



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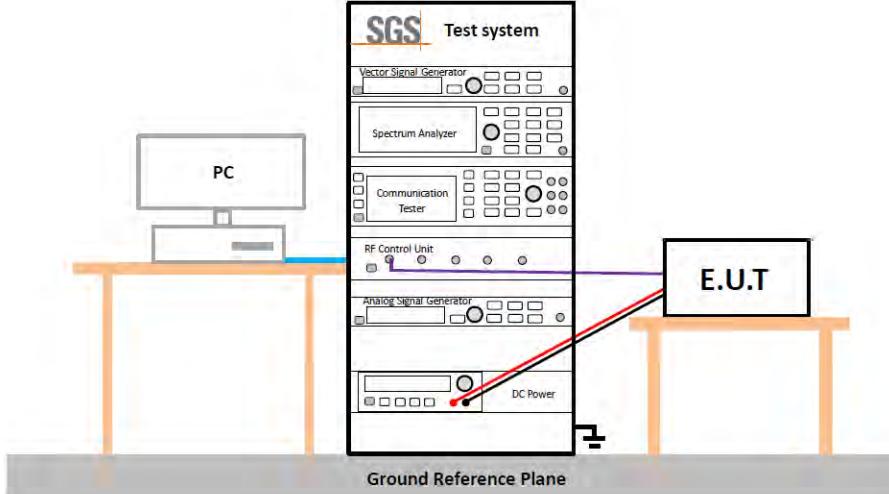
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### 4.3 Duty Cycle

Test Requirement:	ANSI C63.10-2020 Section 12.2
Test Method:	ANSI C63.10-2020 Section 12.2
Test Setup:	
Instruments Used:	Refer to section 6 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	No restriction limits
Test Results:	For report purpose
The detailed test data see: <b>Appendix</b>	

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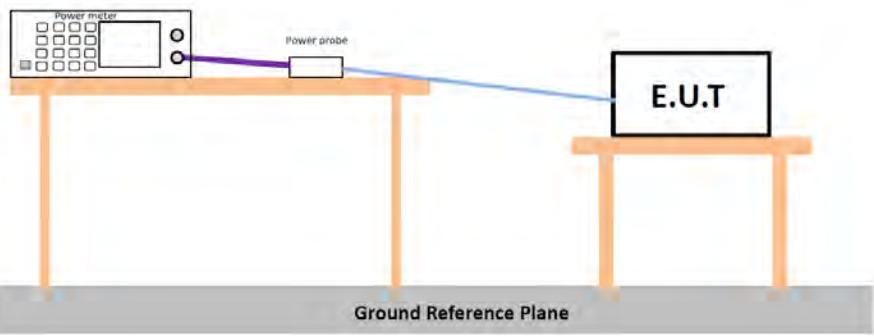
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## 4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15 Section 15.407(a)	
Test Method:	ANSI C63.10-2020 Section 12.4.3.2	
Test Setup:	 <p>* Test with power meter (Detector function: Average)      Method PM-G is measurement using a gated RF average power meter. Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.</p>	
Test Instruments:	Refer to section 6 for details.	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Refer to section 3.7 for details.	
Limit:	Frequency Band	Limit
	5725-5850MHz	Not exceed 1W(30dBm)
	*Where B is the 26dB emission bandwidth in MHz	
Test Results:	Pass	
The detailed test data see: <b>Appendix</b>		



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## 4.5 6dB Emission Bandwidth

Test Requirement:	47 CFR Part 15 Section 15.407(e)	
Test Method:	ANSI C63.10-2020 Section 12.5.1	
Test Setup:		
Test Instruments:	Refer to section 6 for details.	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Refer to section 3.7 for details.	
Limit:	Frequency Band	Limit
	5725-5850MHz	At least 500kHz
Test Results:	Pass	
The detailed test data see: <b>Appendix</b>		



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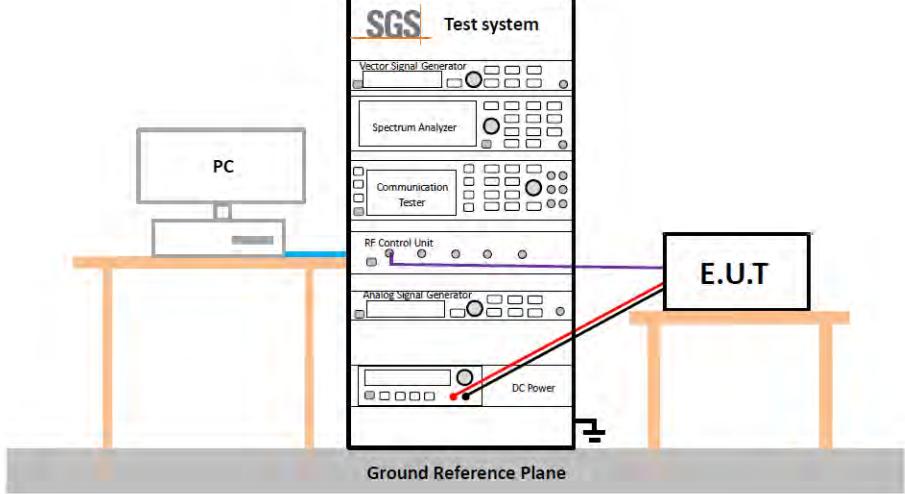
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## 4.6 99% Occupied Bandwidth

Test Requirement:	KDB 789033 D02§ D
Test Method:	ANSI C63.10-2020 Section 12.5.3
Test Setup:	
Instruments Used:	Refer to section 6 for details.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Refer to section 3.7 for details.
Limit:	No restriction limits
Test Results:	For report purpose
The detailed test data see: <b>Appendix</b>	

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## 4.7 Power Spectral Density

Test Requirement:	47 CFR Part 15 Section 15.407(a)	
Test Method:	ANSI C63.10-2020 Section 12.6 KDB 789033 D02 v02r01, Section F.	
Test Setup:		
Instruments Used:	Refer to section 6 for details.	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Refer to section 3.7 for details.	
Limit:	Frequency Band	Limit
	5725-5850MHz	The power spectral density less than <30dBm/500KHz
Test Results:	Pass	
The detailed test data see: <b>Appendix</b>		



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## 4.8 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15 Section 15.205/15.209/15.407(b)
Test Method:	ANSI C63.10-2020 Section 6.4 / 6.5 / 6.6
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)
Test frequency:	9kHz ~ 40GHz(or 10 Harmonic)

Test Setup:

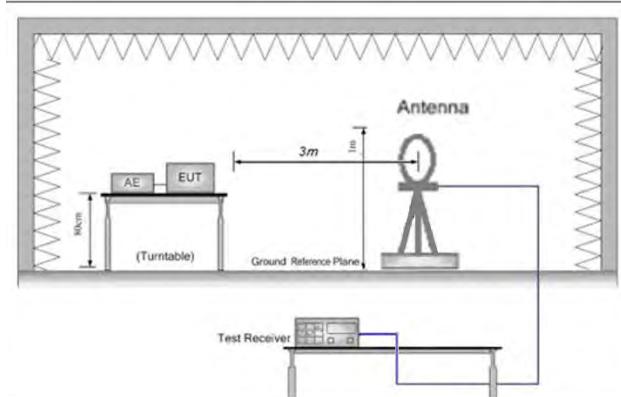


Figure 1. 9kHz to 30MHz

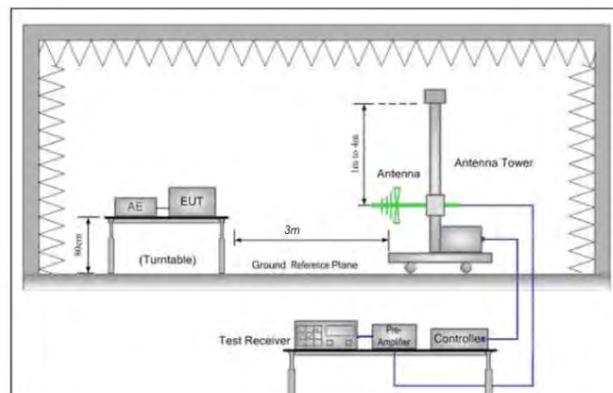


Figure 1. 30MHz to 1GHz

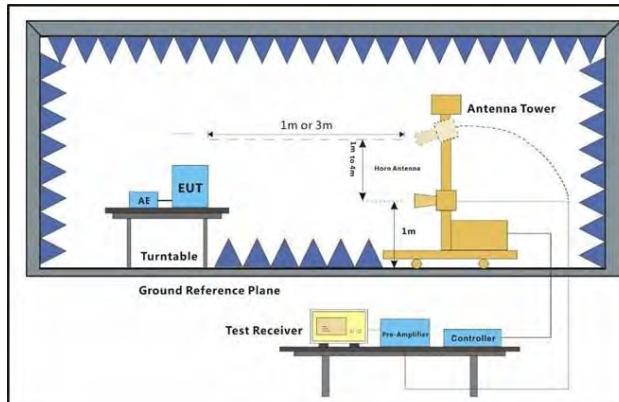


Figure 2. Above 1 GHz

Test Procedure:	<ol style="list-style-type: none"> <li>For below 1GHz test, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>For above 1GHz test, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. (Distance from antenna to EUT is 1m for measurements &gt;18GHz).</li> <li>The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground</li> </ol>
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	<p>to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</p> <p>e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>g. Test the EUT in the outermost channels.</p> <p>h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.</p> <p>i. Repeat above procedures until all frequencies measured was complete.</p> <p>j. The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported</p> <p>k. The disturbance above 18GHz was very low, and the harmonics were the highest point could be found when testing, so only the harmonics had been displayed.</p> <p>l. At a measurement distance of 1 meter the limit line was increased by <math>20 \times \log(3/1) = 9.54</math> dB.</p>
<b>Test Configuration:</b>	<p>Measurements below 30MHz</p> <ul style="list-style-type: none"> <li>• RBW = 10 kHz</li> <li>• VBW = 30 kHz</li> <li>• Detector = Peak &amp; Average &amp; Quasi-peak</li> <li>• Trace mode = max hold</li> </ul> <p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 120 kHz</li> <li>• VBW = 300 kHz</li> <li>• Detector = Quasi-peak</li> <li>• Trace mode = max hold</li> </ul> <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW <math>\geq</math> 3 MHz</li> <li>• Detector = Peak</li> <li>• Sweep time = auto</li> <li>• Trace mode = max hold</li> </ul> <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW = 10Hz, when duty cycle is no less than 98 percent.</li> <li>• VBW <math>\geq</math> 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.</li> </ul>
<b>Exploratory Test Mode:</b>	Transmitting with all kind of modulations, data rates.
<b>Final Test Mode:</b>	Refer to section 3.7 for details. For below 1GHz part, through pre-scan all channels, but only the worst case is



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# SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Report No.: ZEWM2306000892RG02  
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	recorded in the report.
Instruments Used:	Refer to section 6 for details.
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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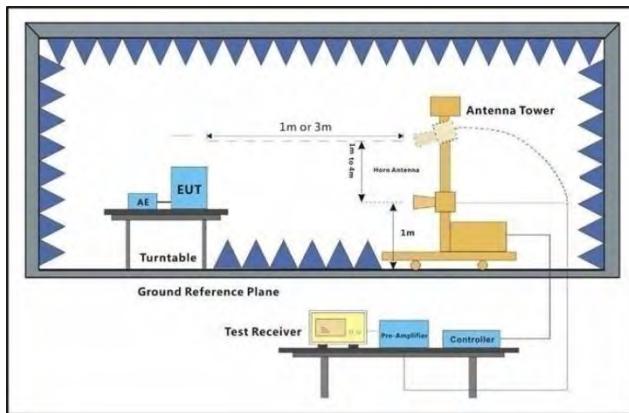
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## 4.9 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15 Section 15.205/15.209/15.407(b)		
Test Method:	ANSI C63.10-2020 Section 12.7		
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m)	Remark
	30MHz-88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1GHz	54.0	Quasi-peak
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

### Test Setup:



Test Procedure:	<ol style="list-style-type: none"> <li>The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel</li> </ol>
-----------------	---



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	g. Test the EUT in the outermost channels. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. i. Repeat above procedures until all frequencies measured was complete.
Test Configuration:	Measurements Below 1000MHz <ul style="list-style-type: none"> <li>• RBW = 120 kHz</li> <li>• VBW = 300 kHz</li> <li>• Detector = Quasi-peak</li> <li>• Trace mode = max hold</li> </ul> Peak Measurements Above 1000 MHz <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW <math>\geq</math> 3 MHz</li> <li>• Detector = Peak</li> <li>• Sweep time = auto</li> <li>• Trace mode = max hold</li> </ul> Average Measurements Above 1000MHz <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW = 10Hz, when duty cycle is no less than 98 percent.</li> <li>• VBW <math>\geq</math> 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.</li> </ul>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates.
Final Test Mode:	Refer to section 3.7 for details.
Instruments Used:	Refer to section 6 for details.
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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

Lab A		
No.	Item	Measurement Uncertainty
2	Radiated Emission	±4.8dB (30MHz-1GHz)
		±4.68dB (1GHz-6GHz)
		±4.52dB (6GHz-18GHz)
		±5.26dB (18GHz-40GHz)

Remark:  
 The  $U_{lab}$  (lab Uncertainty) is less than  $U_{cispri/ETSI}$  (CISPR/ETSI Uncertainty), so the test results  
 – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;  
 – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

Lab B		
No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$ GHz
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 0.2\%$
4	RF conducted power	$\pm 0.21$ dB
5	RF power density	$\pm 2.84$ dB
6	Conducted Spurious emissions	$\pm 0.75$ dB
7	Conduction Emission	$\pm 3.0$ dB (150kHz to 30MHz)

Remark:  
 The  $U_{lab}$  (lab Uncertainty) is less than  $U_{cispri/ETSI}$  (CISPR/ETSI Uncertainty), so the test results  
 – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;  
 – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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## 6 Equipment List

RF Test System Lab B					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
MXA signal analyzer	Agilent	N9020A	XAW01-06-07	2023/02/16	2024/02/15
Measurement Software	Tonscend	JS1120-3 (3.2.18)	XAW02-14-01	NCR	NCR
RF control unit	Tonscend	JS0806-2	XAW03-37-01	NCR	NCR
Power Meter	Anritsu	ML2495A	XAW01-25-03	2022/09/14	2023/09/13
Power Supply	Agilent	66311B	XAW01-17-01	2023/02/16	2024/02/15
Temperature and humidity meter	MingGao	T809	XAW01-01-16	2022/09/18	2023/09/17

CE Test System Lab B					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Shielding Room	Brilliant-emc	N/A	XAW04-03-01	N/A	N/A
Test receiver	ROHDE & SCHWARZ	ESR	XAW01-08-01	2022/09/08	2023/09/07
Artificial network	ROHDE & SCHWARZ	ENV216	XAW01-04-01	2023/06/30	2024/06/29
Temperature and humidity meter	MingGao	TH101B	XAW01-01-02	2022/09/18	2023/09/17
Measurement Software	Tonscend	TS+ V4.0.0.0	XAW02-07-01	NCR	NCR
Artificial network	ROHDE & SCHWARZ	ENV216	XAW01-04-02	2023/06/30	2024/06/29

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Lab A Radiated spurious emissions					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
EMI TEST RECEIVER	Rohde & Schwarz	ESR	SZ-WRG-M-047	2023/02/16	2024/02/15
Signal &Spectrum Analyzer	Rohde & Schwarz	FSV	SZ-WRG-M-048	2023/02/16	2024/02/15
Low Noise Amplifier 9K-3GHz	Tonscend	TAP9K3G32	SZ-WRG-M-049	2023/02/16	2024/02/15
Low Noise Amplifier 30M-8GHz	Tonscend	TAP30M8G30	SZ-WRG-M-050	2023/02/16	2024/02/15
Low Noise Amplifier 1G-18GHz	Tonscend	TAP01018050	SZ-WRG-M-051	2023/02/16	2024/02/15
Low Noise Amplifier 18G-40GHz	Tonscend	TAP18040048	SZ-WRG-M-052	2023/02/16	2024/02/15
Active Loop Antenna 9kHz-30MHz	SCHWARZBECK	FMZB 1519B	SZ-WRG-M-053	2022/01/16	2024/01/15
TRILOG Breitband Antenne 30MHz-1GHz	SCHWARZBECK	VULB 9168	SZ-WRG-M-054	2022/01/16	2024/01/15
Double Ridge Horn Antenna 1GHz-18GHz	SCHWARZBECK	BBHA 9120 D	SZ-WRG-M-055	2022/01/16	2024/01/15
SHF-EHF Horn 15GHz-40GHz	SCHWARZBECK	BBHA 9170	SZ-WRG-M-056	2022/01/16	2024/01/15
RSE Test Software	Tonscend	JS32-RSE V4.0.0	SZ-WRG-M-058	NCR	NCR
Chamber	CRTSGSSAC966	N/A	SZ-WRG-C-063	2022/01/05	2025/01/04
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	HTC-1	SZ-WRG-M-022	2023/02/17	2024/02/16
Spectrum Analyzer	Keysight	N9020A	SZ-WRG-M-002	2022/11/18	2023/11/17



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## 7 Photographs - Setup Photos

Refer to Appendix A.2 WLAN Setup Photos.



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# Appendix



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**Emission Bandwidth  
Test Result**

TestMode	Antenna	Frequency[MHz]	26dB EBW [MHz]	FL[MHz]	FH[MHz]	Verdict
11a-CDD	Ant0	5745	35.640	5727.080	5762.720	For Report Purpose
	Ant1	5745	31.200	5729.240	5760.440	
	Ant0	5785	23.000	5773.960	5796.960	
	Ant1	5785	26.960	5772.040	5799.000	
	Ant0	5825	24.680	5813.960	5838.640	
	Ant1	5825	32.360	5809.360	5841.720	
11n20MIMO	Ant0	5745	20.040	5735.080	5755.120	For Report Purpose
	Ant1	5745	24.080	5732.720	5756.800	
	Ant0	5785	20.360	5774.690	5795.050	
	Ant1	5785	31.360	5769.280	5800.640	
	Ant0	5825	20.040	5815.240	5835.280	
	Ant1	5825	27.640	5812.080	5839.720	
11n40MIMO	Ant0	5755	41.280	5733.880	5775.160	For Report Purpose
	Ant1	5755	64.160	5722.520	5786.680	
	Ant0	5795	41.840	5773.480	5815.320	
	Ant1	5795	61.040	5765.240	5826.280	
11ac20MIMO	Ant0	5745	22.120	5733.960	5756.080	For Report Purpose
	Ant1	5745	34.040	5727.960	5762.000	
	Ant0	5785	21.020	5774.120	5795.140	
	Ant1	5785	29.880	5770.800	5800.680	
	Ant0	5825	20.160	5815.080	5835.240	
	Ant1	5825	30.720	5810.840	5841.560	
11ac40MIMO	Ant0	5755	40.800	5734.440	5775.240	For Report Purpose
	Ant1	5755	70.200	5720.360	5790.560	
	Ant0	5795	40.880	5774.520	5815.400	
	Ant1	5795	70.960	5760.840	5831.800	
11ac80MIMO	Ant0	5775	82.240	5734.200	5816.440	For Report Purpose
	Ant1	5775	144.160	5702.040	5846.200	

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**Test Graphs**


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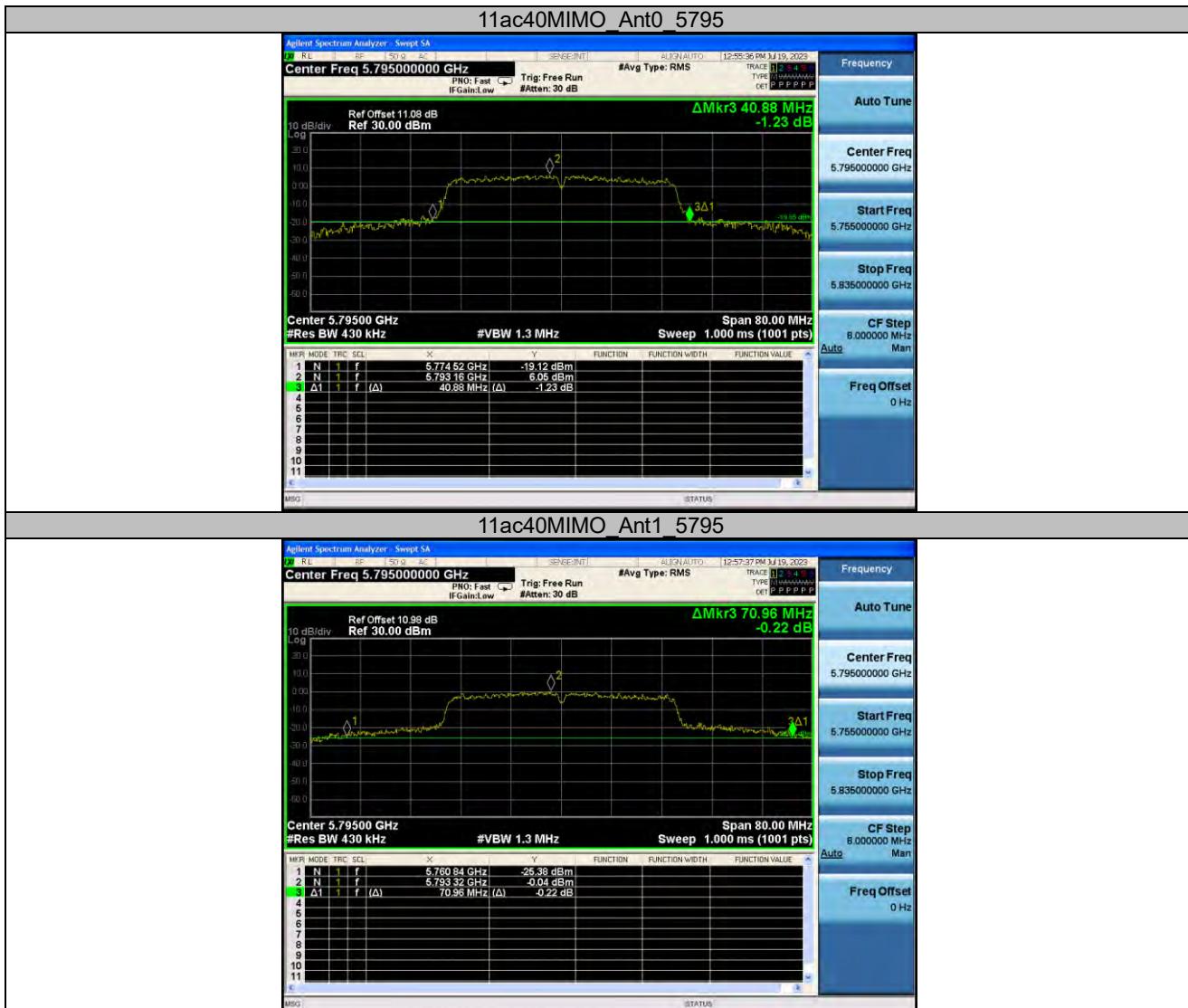
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**Occupied channel bandwidth  
Test Result**

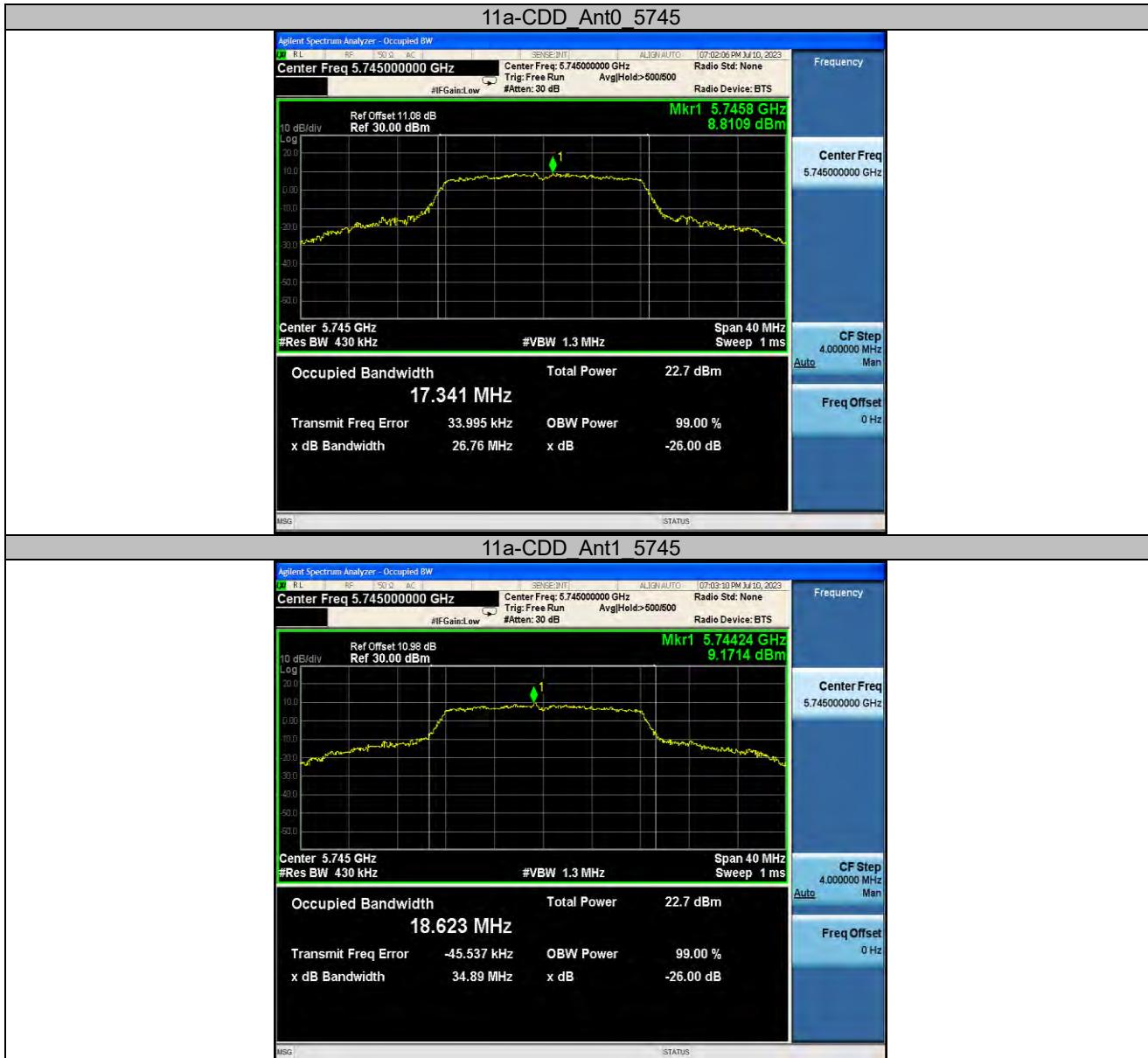
TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
11a-CDD	Ant0	5745	17.323	5736.3727	5753.6957	For Report Purpose
	Ant1	5745	18.620	5735.6451	5754.2651	
	Ant0	5785	17.274	5776.4209	5793.6949	
	Ant1	5785	18.690	5775.8928	5794.5828	
	Ant0	5825	17.455	5816.3659	5833.8209	
	Ant1	5825	18.111	5816.2299	5834.3409	
11n20MIMO	Ant0	5745	18.011	5736.0593	5754.0703	For Report Purpose
	Ant1	5745	18.016	5736.0537	5754.0697	
	Ant0	5785	18.059	5776.0565	5794.1155	
	Ant1	5785	18.028	5776.0690	5794.0970	
	Ant0	5825	18.017	5816.0996	5834.1166	
	Ant1	5825	19.120	5815.8555	5834.9755	
11n40MIMO	Ant0	5755	36.598	5736.7689	5773.3669	For Report Purpose
	Ant1	5755	36.639	5736.7798	5773.4188	
	Ant0	5795	36.451	5776.7688	5813.2198	
	Ant1	5795	38.525	5775.7718	5814.2968	
11ac20MIMO	Ant0	5745	18.053	5736.0470	5754.1000	For Report Purpose
	Ant1	5745	19.404	5735.4197	5754.8237	
	Ant0	5785	18.052	5776.0634	5794.1154	
	Ant1	5785	19.856	5775.4800	5795.3360	
	Ant0	5825	18.217	5816.0297	5834.2467	
	Ant1	5825	19.791	5815.7555	5835.5465	
11ac40MIMO	Ant0	5755	36.637	5736.8304	5773.4674	For Report Purpose
	Ant1	5755	38.703	5735.8558	5774.5588	
	Ant0	5795	36.591	5776.7023	5813.2933	
	Ant1	5795	37.953	5776.3400	5814.2930	
11ac80MIMO	Ant0	5775	75.516	5737.2954	5812.8114	For Report Purpose
	Ant1	5775	78.632	5736.0201	5814.6521	

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**Test Graphs**


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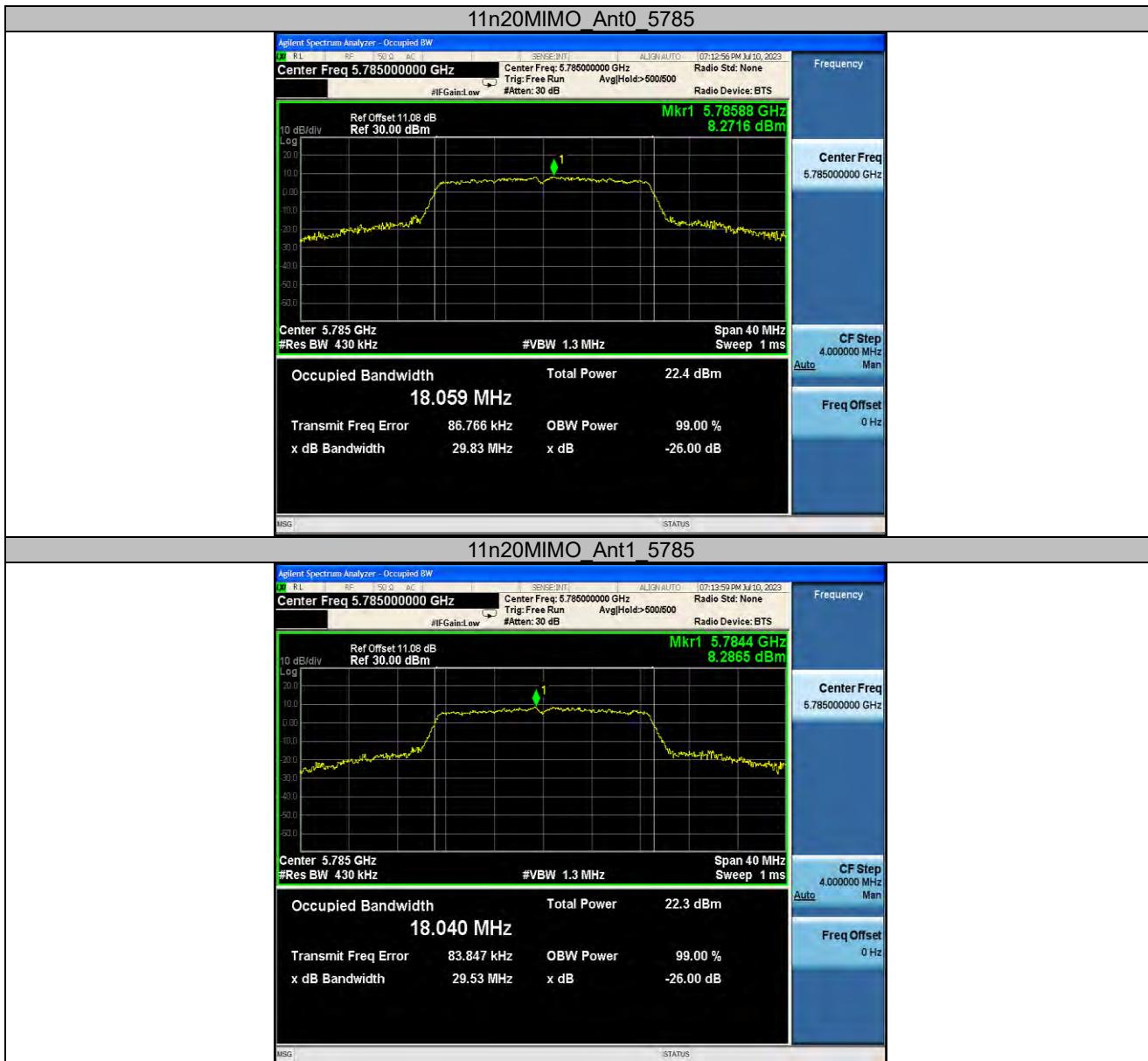
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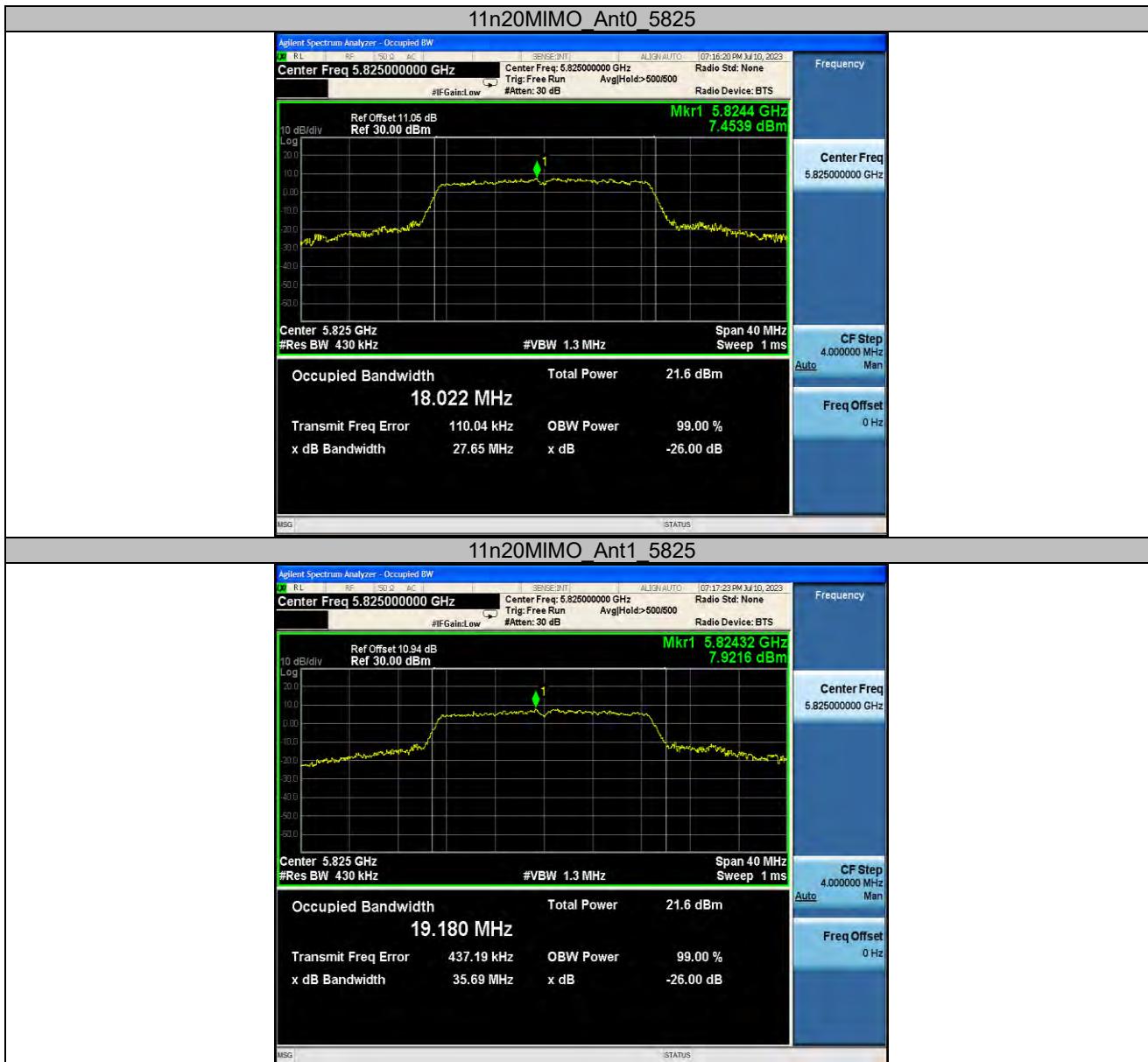
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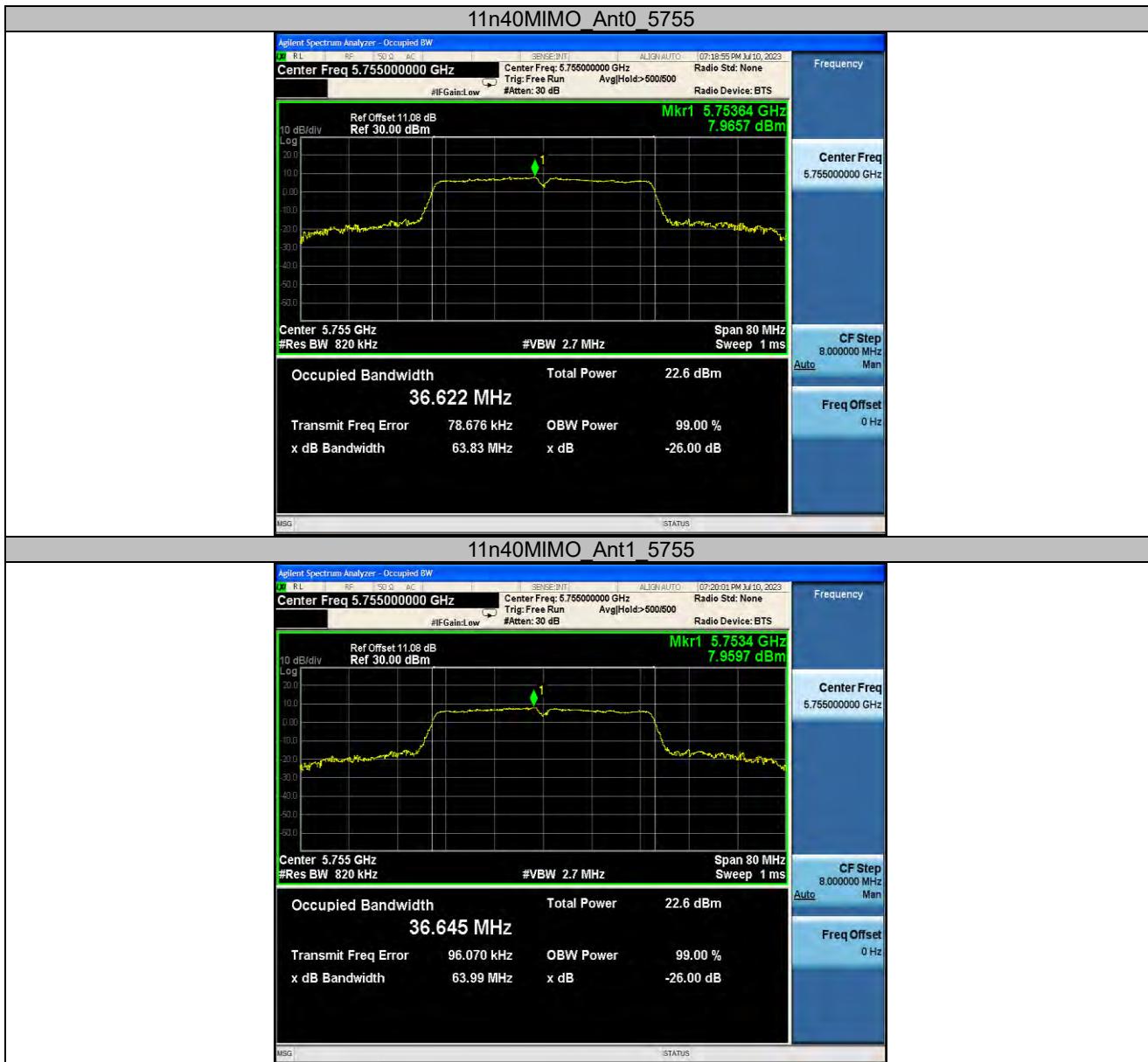
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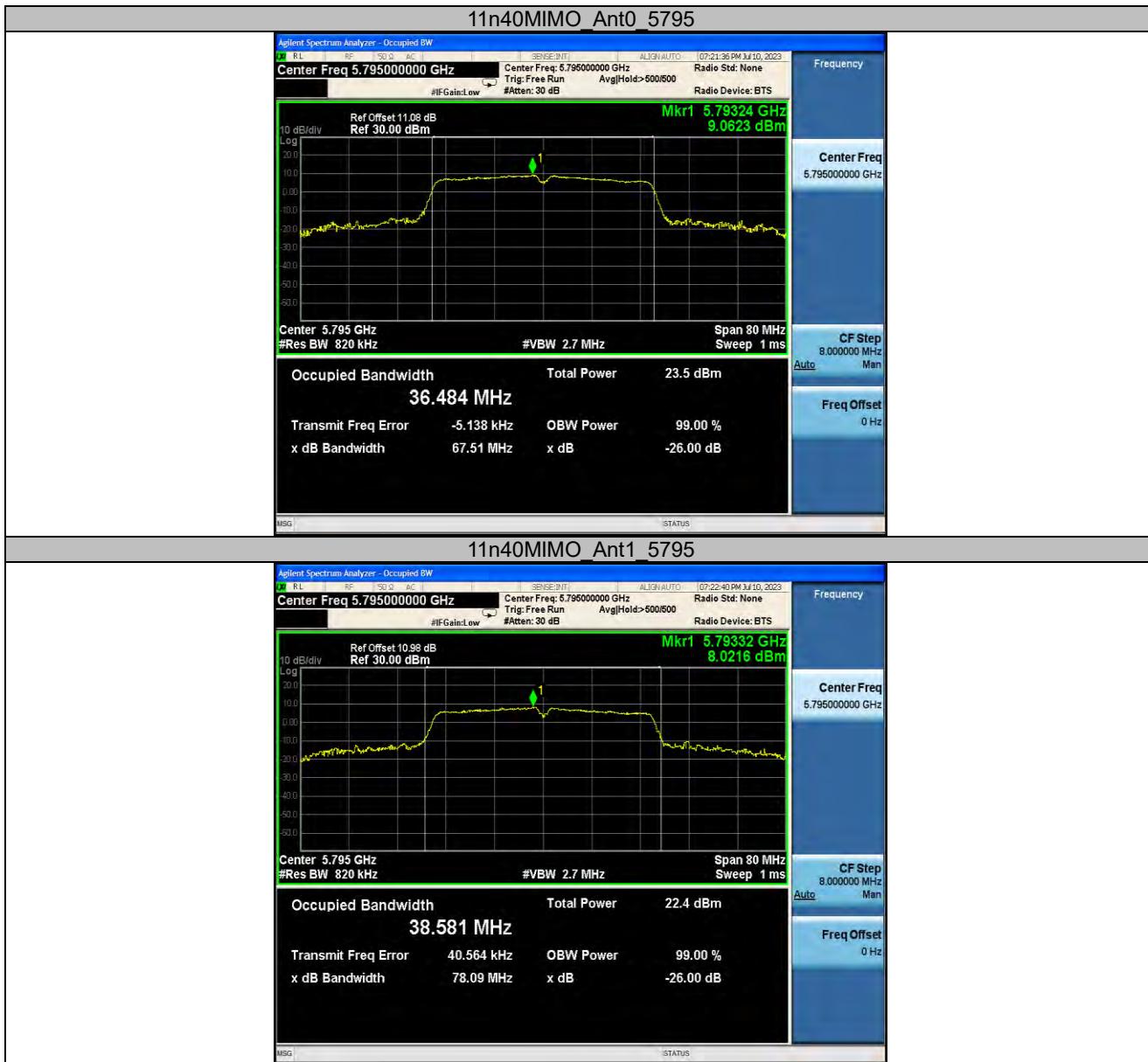
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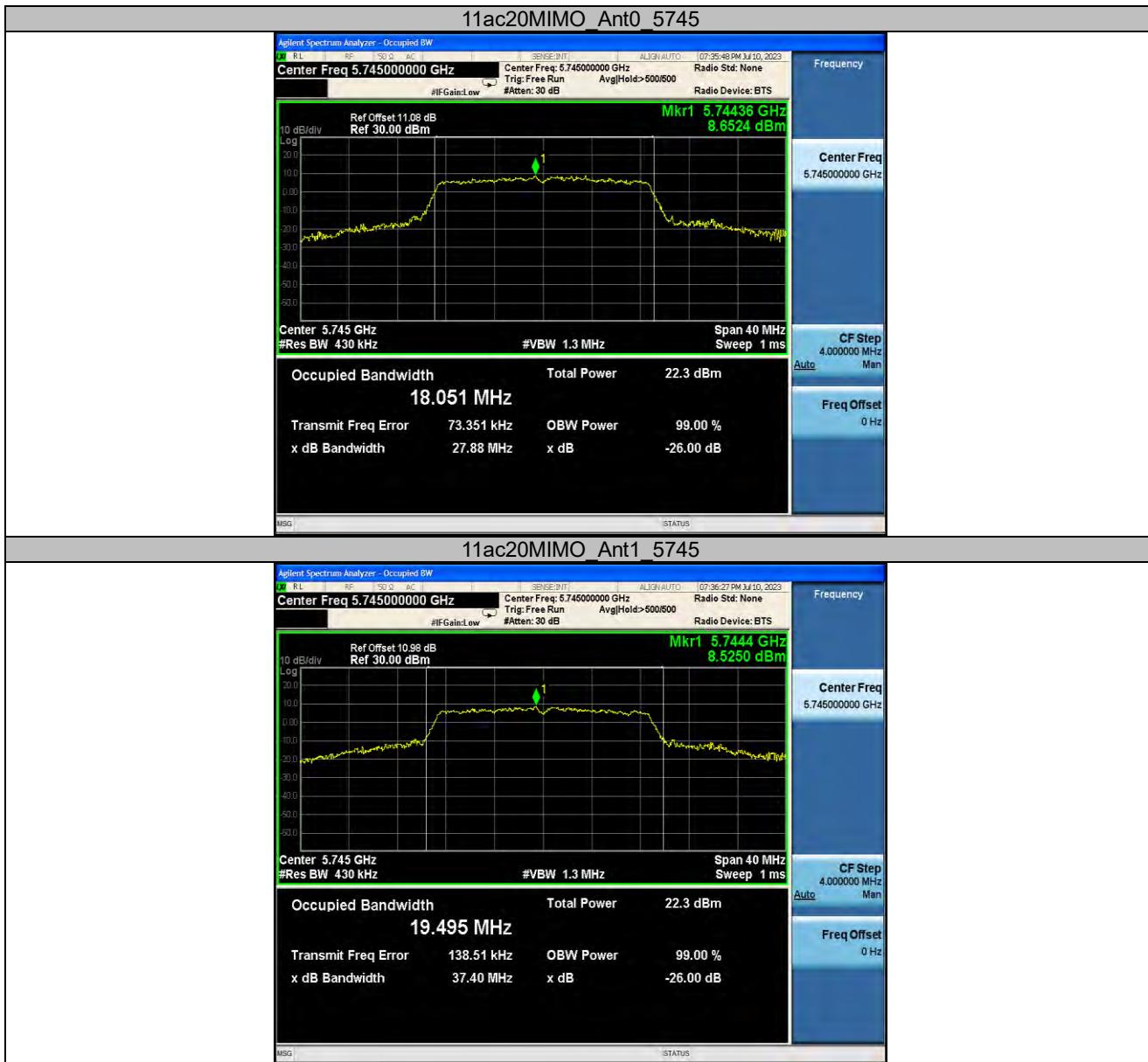
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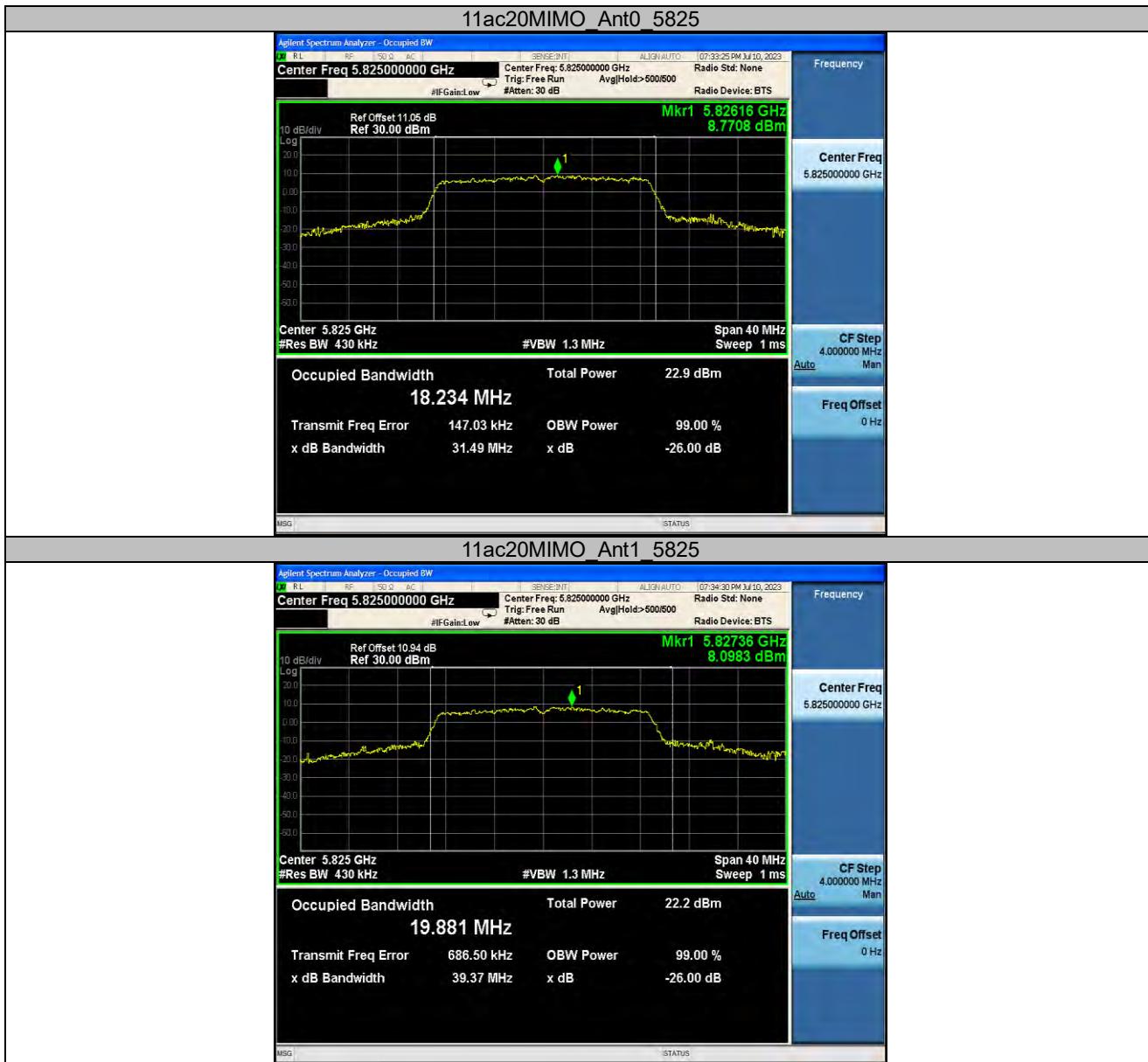
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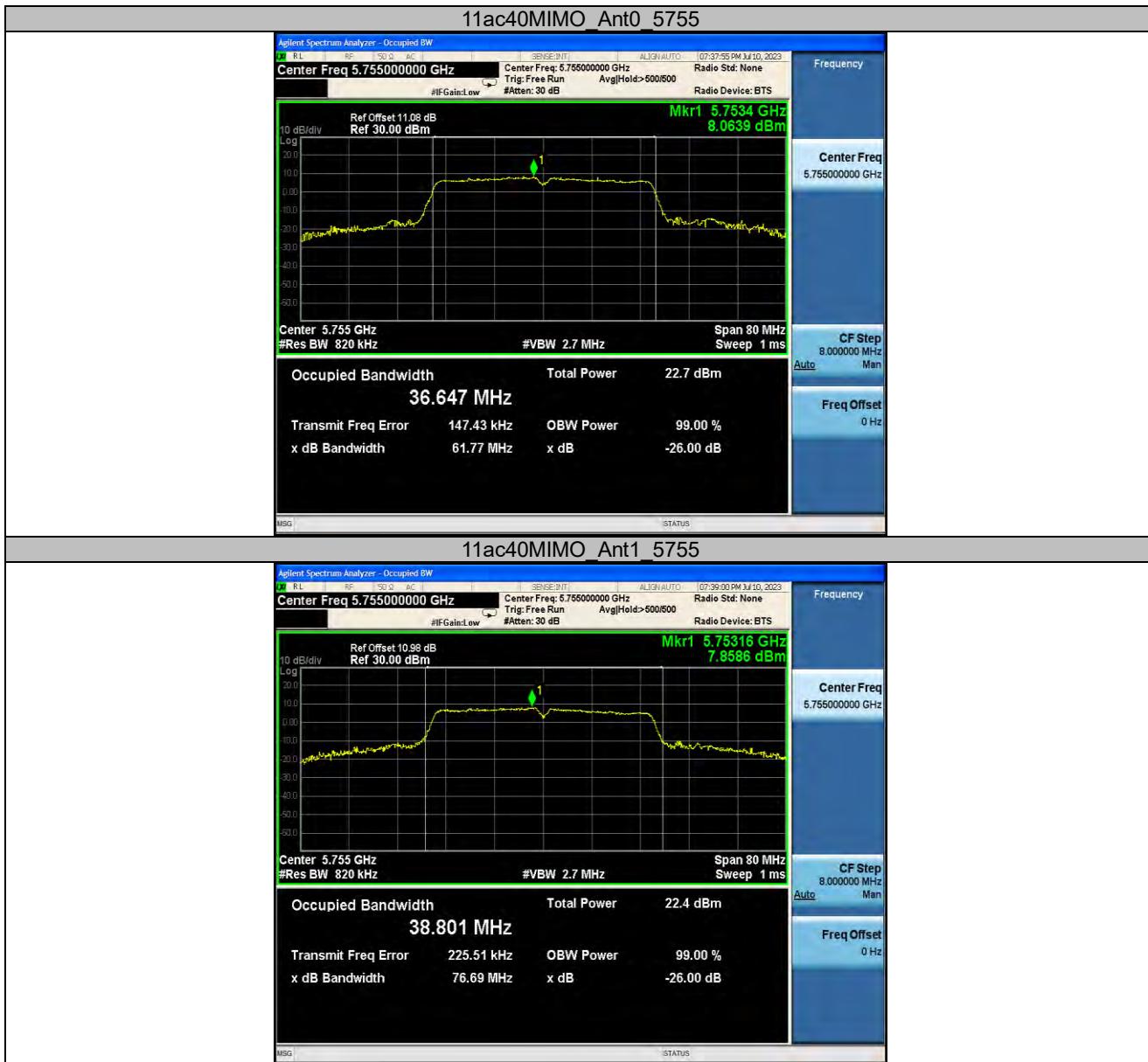
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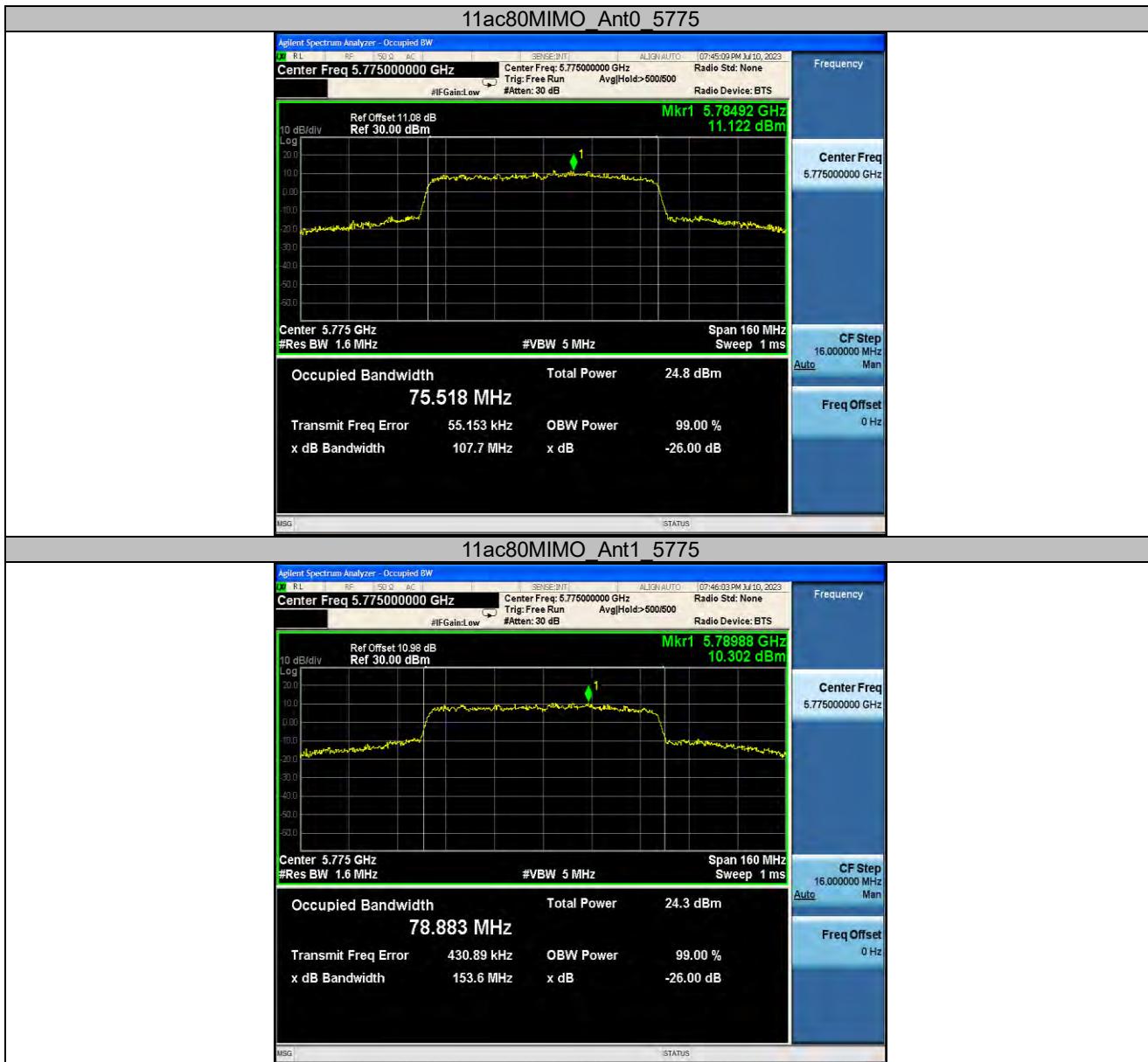
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**6dB emission bandwidth**
**Test Result B4**

TestMode	Antenna	Frequency[MHz]	6dB EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11a-CDD	Ant0	5745	15.680	5737.480	5753.160	0.5	PASS
	Ant1	5745	15.560	5737.080	5752.640	0.5	PASS
	Ant0	5785	16.360	5776.880	5793.240	0.5	PASS
	Ant1	5785	11.240	5781.320	5792.560	0.5	PASS
	Ant0	5825	15.680	5817.520	5833.200	0.5	PASS
	Ant1	5825	16.320	5816.920	5833.240	0.5	PASS
11n20MIMO	Ant0	5745	17.040	5736.520	5753.560	0.5	PASS
	Ant1	5745	16.520	5736.920	5753.440	0.5	PASS
	Ant0	5785	15.880	5777.560	5793.440	0.5	PASS
	Ant1	5785	17.040	5776.560	5793.600	0.5	PASS
	Ant0	5825	17.160	5816.640	5833.800	0.5	PASS
	Ant1	5825	16.160	5817.280	5833.440	0.5	PASS
11n40MIMO	Ant0	5755	35.120	5737.480	5772.600	0.5	PASS
	Ant1	5755	35.040	5737.480	5772.520	0.5	PASS
	Ant0	5795	35.120	5777.480	5812.600	0.5	PASS
	Ant1	5795	34.240	5778.360	5812.600	0.5	PASS
11ac20MIMO	Ant0	5745	17.000	5736.520	5753.520	0.5	PASS
	Ant1	5745	16.080	5736.520	5752.600	0.5	PASS
	Ant0	5785	16.880	5776.600	5793.480	0.5	PASS
	Ant1	5785	14.960	5778.560	5793.520	0.5	PASS
	Ant0	5825	17.240	5816.600	5833.840	0.5	PASS
	Ant1	5825	17.600	5816.280	5833.880	0.5	PASS
11ac40MIMO	Ant0	5755	35.120	5737.480	5772.600	0.5	PASS
	Ant1	5755	35.120	5737.480	5772.600	0.5	PASS
	Ant0	5795	35.040	5777.560	5812.600	0.5	PASS
	Ant1	5795	35.040	5777.560	5812.600	0.5	PASS
11ac80MIMO	Ant0	5775	73.920	5738.680	5812.600	0.5	PASS
	Ant1	5775	75.040	5737.560	5812.600	0.5	PASS

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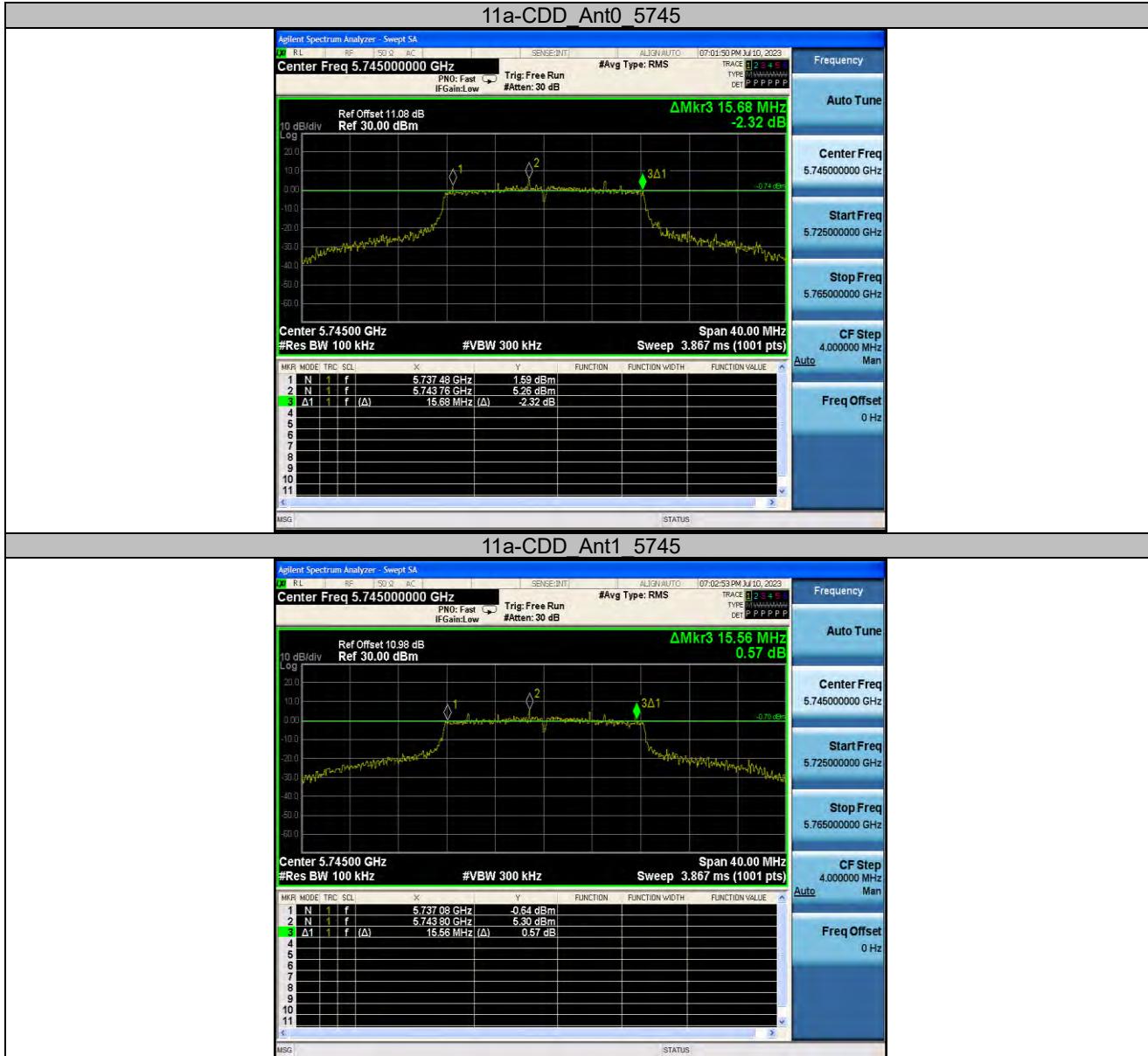


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**Test Graphs B4**


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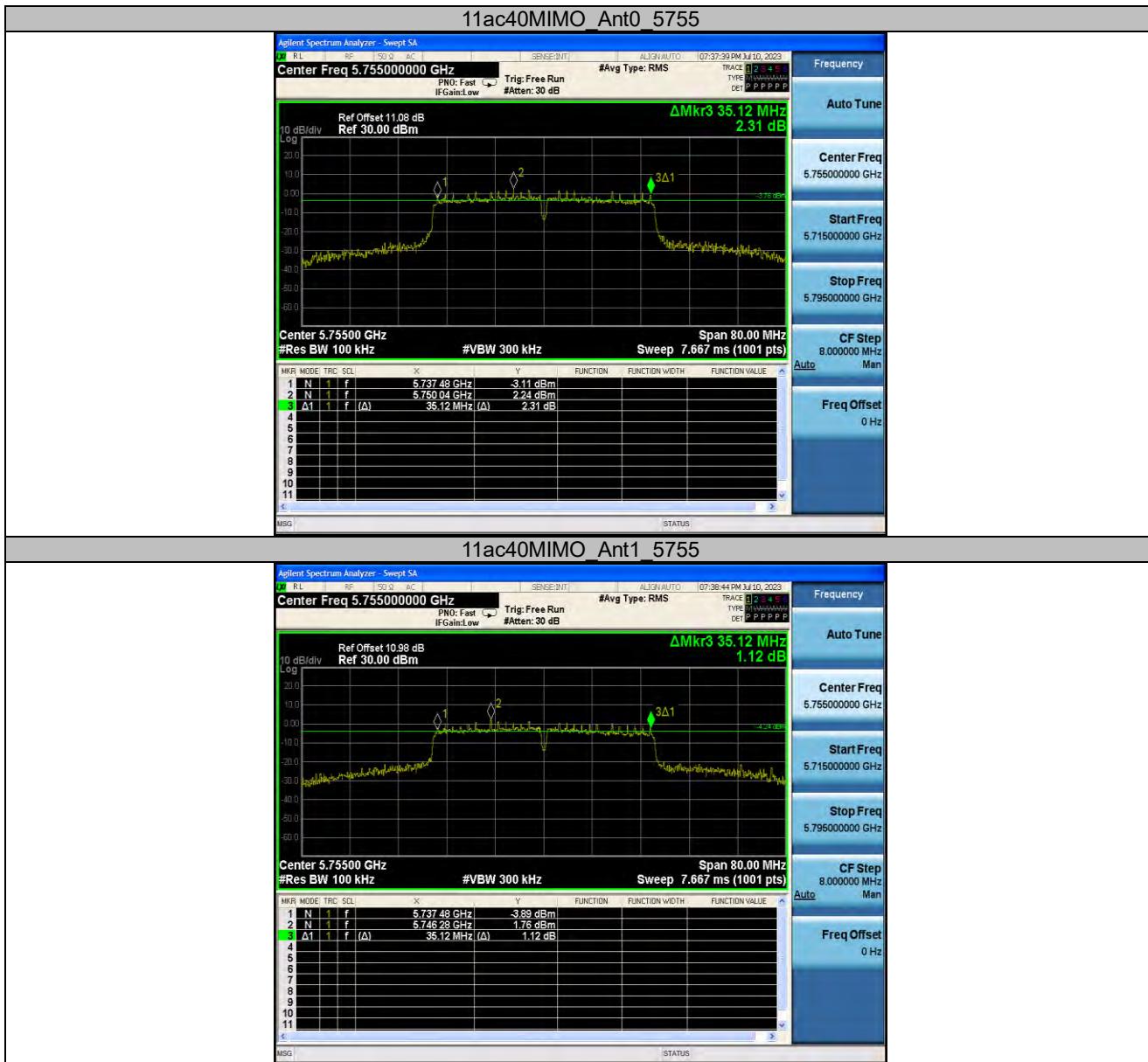
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