

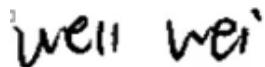
Report No.: SEWM2305000178RG03
Rev.: 01
Page: 1 of 213

TEST REPORT

Application No.:	SEWM2305000178RG
Applicant:	Cloud Mobile Holdings, LLC
Address of Applicant:	1149 S. HILL ST. SUITE H400, LOS ANGELES, CA 90015
Manufacturer:	Shenzhen Along Eletctonice Co.,LTD
Address of Manufacturer:	No.35, Xinyuan Industrial Zone, Gushu Community, Xixiang Street, Bao 'an District, Shenzhen City
EUT Description:	MIFI
Model No.:	Sky_M2
Trade Mark:	Cloud Mobile
FCC ID:	2AY6A-M2
Standards:	FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart E
Date of Receipt:	2023/05/19
Date of Test:	2023/06/19 to 2023/07/07
Date of Issue:	2023/07/14
Test Result :	PASS *

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:



Well Wei
Wireless Laboratory Manager



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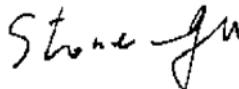
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1 Version

Revision Record

Version	Chapter	Date	Modifier	Remark
01		2023/07/14		Original

Prepared By	 (Ives Cheng) / Test Engineer
Checked By	 (Stone Gu) / Reviewer



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Wireless Laboratory

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2 Test Summary

Test Item	Band ^[1]	FCC rules No.	Test Requirements	Test Result	Result		
Antenna Requirement	--	15.203/15.407(a)	--	Clause 4.1	PASS		
26dB Emission Bandwidth	Band I	15.407(a)(1)	No limit.	Clause 4.5	For Report Purpose		
	Band II-A	15.407(a)(2)					
	Band II-C	15.407(a)(2)					
6dB Emission Bandwidth	Band III	15.407(e)	≥ 500 kHz.	Clause 4.6	PASS		
99% Occupied Bandwidth	Band I	KDB 789033 D02§ D	No limit.	Clause 4.7	For Report Purpose		
	Band II-A						
	Band II-C						
	Band III						
Duty Cycle	Band I Band II-A Band II-C Band III	--	No limit.	Clause 4.3	For Report Purpose		
Maximum Conducted Output Power	Band I	15.407(a)(iv)	< 250mW	Clause 4.4	PASS		
	Band II-A	15.407(a)(2)	<MIN{250mW, 11dBm+10*Ig(EBW)}				
	Band II-C						
	Band III	15.407(a)(3)	< 1W				
Maximum Power Spectral Density	Band I	15.407(a)(iv)	<11dBm/MHz	Clause 4.8	PASS		
	Band II-A	15.407(a)(2)	<11dBm/MHz				
	Band II-C						
	Band III	15.407(a)(3)	<30dBm/500KHz				
Radiated Spurious Emissions	Band I	15.407(b) 15.205/15.209	F<1GHz: §15.209 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.15- 5.35 GHz). F≥1GHz & in-restricted: §15.209 limit (AV&PK).	Clause 4.9	PASS		
	Band II-A	15.407(b) 15.205/15.209	F<1GHz: §15.209 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.25- 5.35 GHz). F≥1GHz & in-restricted: §15.209 limit (AV&PK).		PASS		

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	Band II-C	15.407(b) 15.205/15.209	F<1GHz: §15.209 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (excl. 5.47-5.725 GHz). F≥1GHz & in-restricted: §15.209 limit (AV&PK).		PASS
	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).		PASS
Restricted bands around fundamental frequency	Band I Band II-A Band II-C Band III	15.407(b) 15.205/15.209	---	Clause 4.10	PASS
AC Power Line Conducted Emissions	Band I Band II-A Band II-C Band III	15.207	---	Clause 4.2	PASS
Dynamic Frequency Selection	Band II-A Band II-C	15.407	Channel Move Time:10 Seconds	Clause 4.11	PASS
Frequency Stability	Band I Band II-A Band II-C 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

Note 1:

Band I: 5150-5250MHz

Band II-A: 5250-5350MHz

Band II-C: 5470-5725MHz

Band III: 5725-5850MHz



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3 General Information

3.1 Details of Client

Applicant:	Cloud Mobile Holdings, LLC
Address of Applicant:	1149 S. HILL ST. SUITE H400, LOS ANGELES, CA 90015
Manufacturer:	Shenzhen Along Eletctonice Co.,LTD
Address of Manufacturer:	No.35, Xinyuan Industrial Zone, Gushu Community, Xixiang Street, Bao 'an District, Shenzhen City

3.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	Ives Cheng, Tizzy Song

3.3 Test Facility

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

• **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

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

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

• **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327

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3.4 General Description of EUT

EUT Description:	MIFI	
Model No.:	Sky_M2	
Trade Mark:	Cloud Mobile	
Hardware Version:	AL_M02_MB_V12_B	
Software Version:	Android 12.0	
IMEI:	RF Conducted	356842541506908
	RSE & AC power line	356842541506403
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:	5150MHz to 5250MHz	
	5250MHz to 5350MHz	
	5470MHz to 5725MHz	
	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 type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated	
Antenna Gain:	5150MHz to 5250MHz: 0.98dBi(Ant11); 5250MHz to 5350MHz: 0.68dBi(Ant11); 5470MHz to 5725MHz: 0.75dBi(Ant11); 5725MHz to 5850MHz: 0.42dBi(Ant11);	
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.	
Smart System:	<input checked="" type="checkbox"/> SISO	802.11a/n/ac
	<input type="checkbox"/> MIMO	CDD: 802.11a/n/ac: Tx & Rx
		STBC: 802.11n/ac: Tx & Rx
		TXBF: 802.11n/ac: Tx & Rx
	<input type="checkbox"/> Diversity	802.11a: Tx & Rx
TPC Function:	<input type="checkbox"/> Support, <input checked="" type="checkbox"/> Not Support	
DFS Function:	<input type="checkbox"/> Master	
	<input type="checkbox"/> Slave with radar detection	<input checked="" type="checkbox"/> Slave without radar detection



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RF Cable:	2.0dB
Remark:	
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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 I:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5180
	The Middle channel	5200
	The Highest channel	5240
IEEE 802.11n/ac 40MHz	The Lowest channel	5190
	The Highest channel	5230
IEEE 802.11ac 80MHz	The Middle channel	5210

For UNII Band II-A:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5260
	The Middle channel	5280
	The Highest channel	5320
IEEE 802.11n/ac 40MHz	The Lowest channel	5270
	The Highest channel	5310
IEEE 802.11ac 80MHz	The Middle channel	5290



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For UNII Band II-C:

Mode	Channel	Frequency(MHz)
IEEE 802.11a/n/ac 20MHz	The Lowest channel	5500
	The Middle channel	5580
	The Highest channel	5700
IEEE 802.11n/ac 40MHz	The Lowest channel	5510
	The Middle channel	5550
	The Highest channel	5670
IEEE 802.11ac 80MHz	The Middle channel	5530

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

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3.5 Test Environment and Mode

Environment Parameter	101.0 kPa Selected Values During Tests	
Relative Humidity	44-46 % RH Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	22~23	3.8

Remark:
NV: Normal Voltage
NT: Normal Temperature

3.6 Description of Support Units

The EUT has been tested as an independent unit.

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	MIMO - Data Rate
802.11a	6 Mbps	/
802.11n (HT 20)	MCS0 (6.5 Mbps)	/
802.11n (HT 40)	MCS0 (13.5 Mbps)	/
802.11ac (VHT 20)	MCS0 (6.5 Mbps)	/
802.11ac (VHT 40)	MCS0 (13.5 Mbps)	/
802.11ac (VHT 80)	MCS0 (29.3 Mbps)	/



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4 Test results and Measurement Data

4.1 Antenna Requirement

Standard requirement:	47 CFR Part 15 Section 15.203
The antenna is Integrated Antenna and no consideration of replacement. The best case gain of the antenna is 5150MHz to 5250MHz: 0.98dBi(Ant11);* 5250MHz to 5350MHz: 0.68dBi(Ant11);* 5470MHz to 5725MHz: 0.75dBi(Ant11);* 5725MHz to 5850MHz: 0.42dBi(Ant11);*	
*Note: <i>The antenna gain are derived from the gain information report provided by the manufacturer.</i>	
Remark: <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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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
	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:	<ol style="list-style-type: none">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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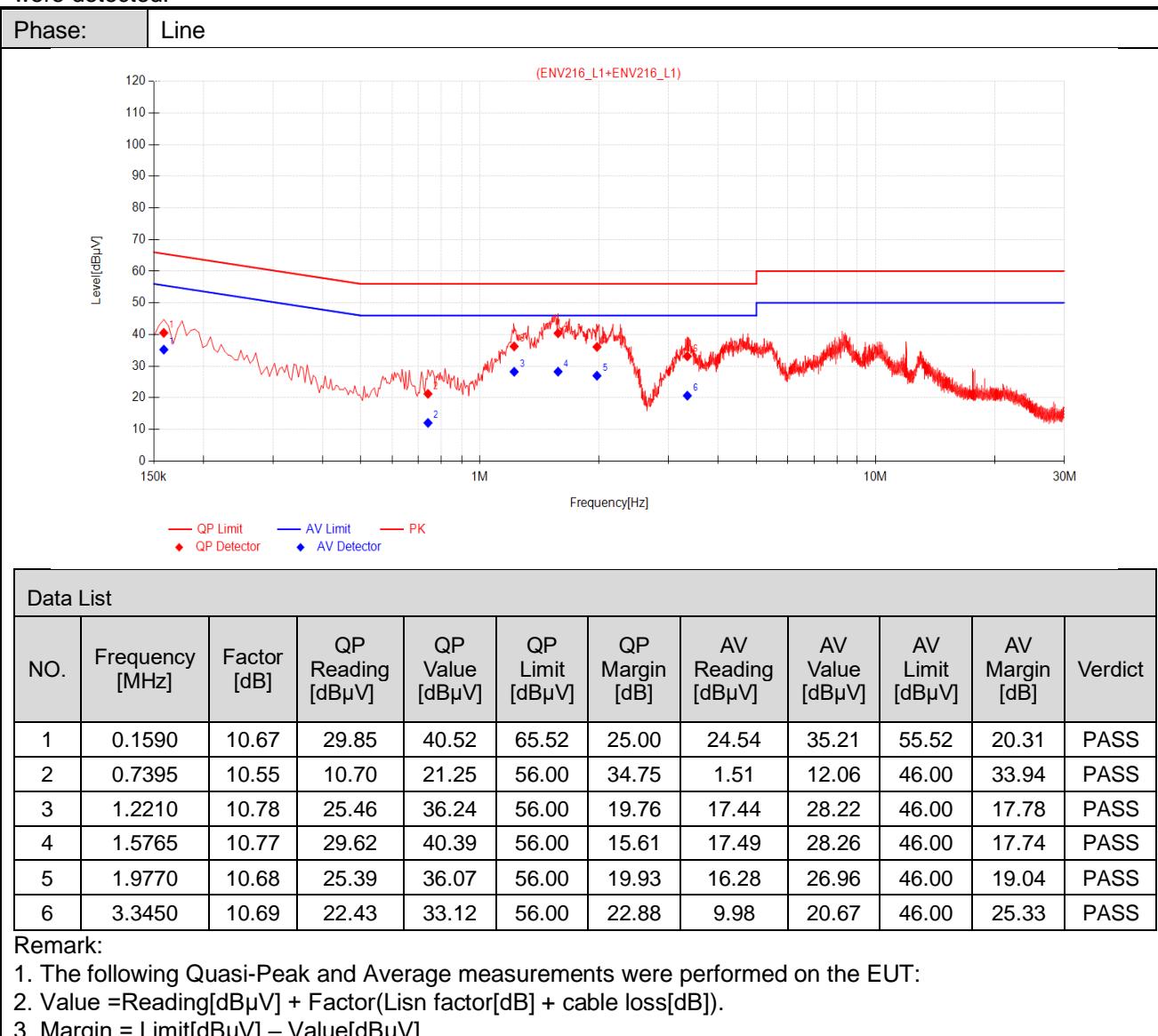
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Measurement Data

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.

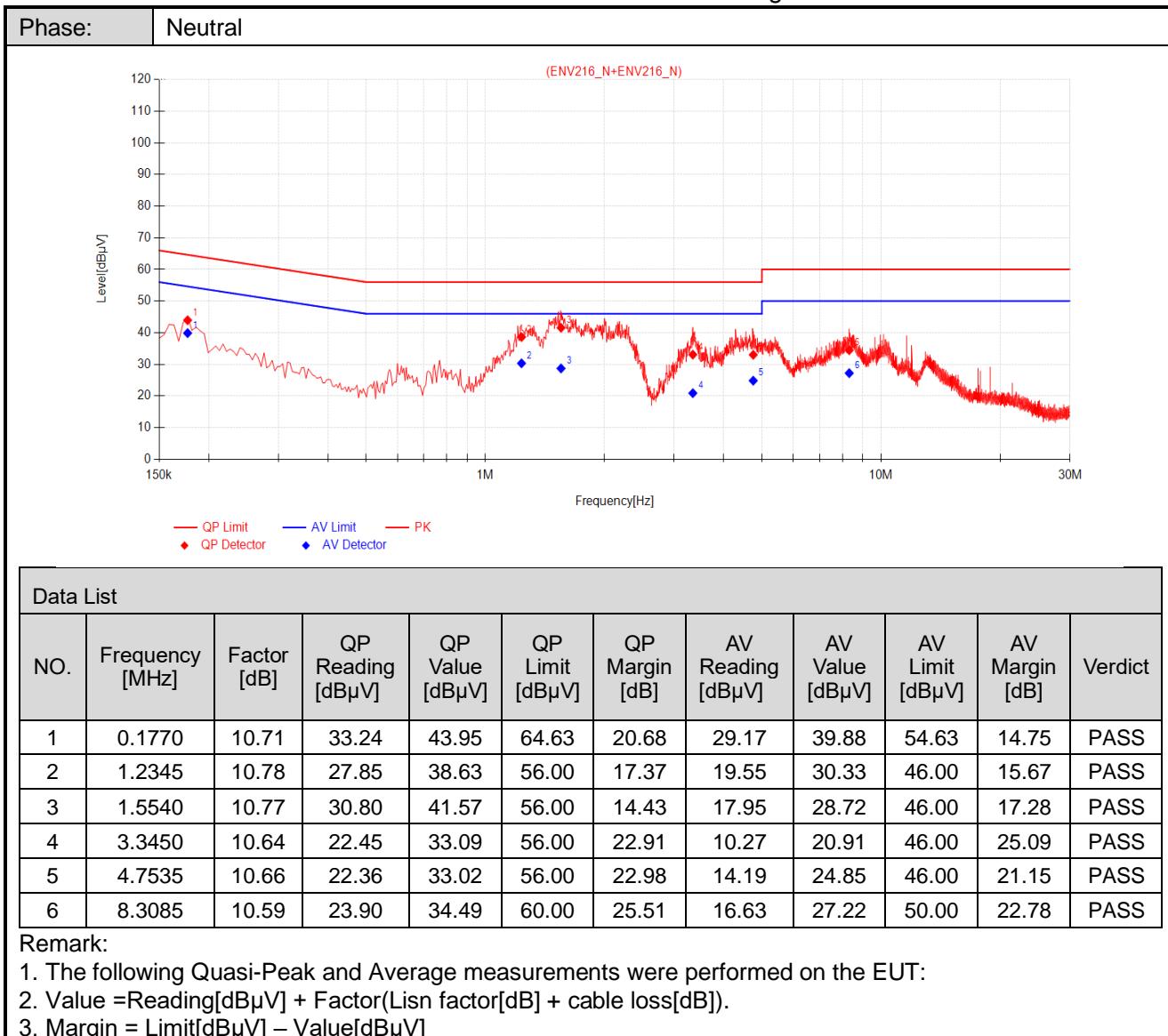


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4.3 Duty Cycle

The detailed test data see: **Appendix**



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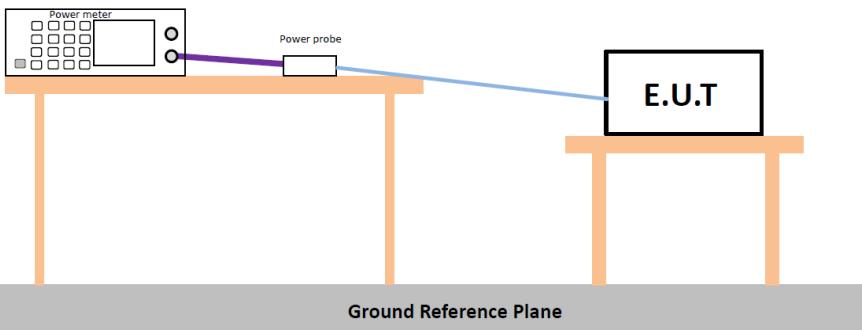
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4.4 Conducted Output Power

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
	5150-5250MHz	Not exceed 250mW(23.98dBm)
	5250-5350MHz	The lesser of 250mW(23.98dBm) or $11 + 10\log B$
	5470-5725MHz	The lesser of 250mW(23.98dBm) or $11 + 10\log B$
	5725-5850MHz	Not exceed 1W(30dBm)
	*Where B is the 26dB emission bandwidth in MHz	
Test Results:	Pass	
The detailed test data see: Appendix		



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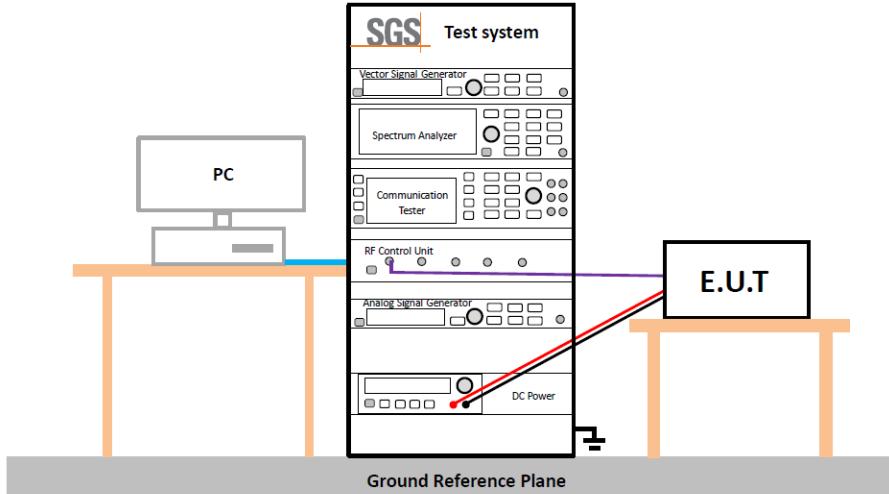
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4.5 26dB Emission Bandwidth

Test Requirement:	47 CFR Part 15 Section 15.407(a), KDB 789033 D02& C
Test Method:	ANSI C63.10-2020 Section 12.5.2
Test Setup:	 <p>The diagram illustrates the test setup for 26dB Emission Bandwidth. A central 'Test system' block contains a Vector Signal Generator, Spectrum Analyzer, Communication Tester, RF Control Unit, Analog Signal Generator, and a DC Power source. A PC is connected to the Vector Signal Generator and the E.U.T. The E.U.T is connected to the Spectrum Analyzer and the DC Power source. The RF Control Unit and Analog Signal Generator are also connected to the E.U.T. The entire setup is grounded to a 'Ground Reference Plane'.</p>
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:	Pass
The detailed test data see: Appendix	

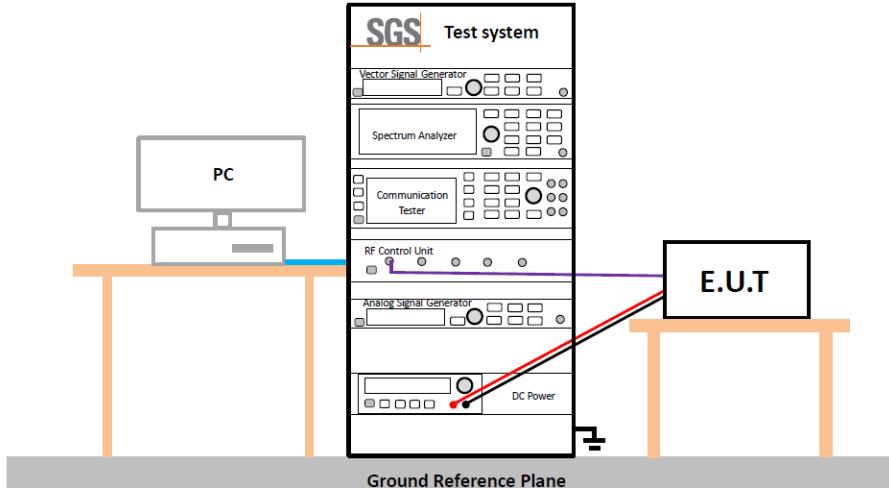
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4.6 6dB Emission Bandwidth

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: Appendix		



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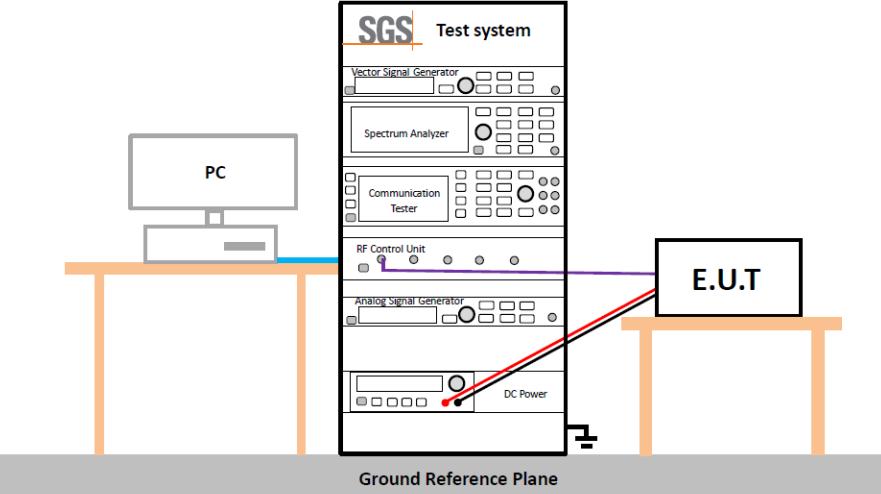
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4.7 99% Occupied Bandwidth

Test Requirement:	KDB 789033 D02§ D
Test Method:	ANSI C63.10-2020 Section 12.5.3
Test Setup:	 <p>The diagram illustrates the test setup. A PC is connected to a vertical stack of test instruments: a Vector Signal Generator, a Spectrum Analyzer, a Communication Tester, an RF Control Unit, an Analog Signal Generator, and a DC Power source. A red line connects the PC to the test system. A red line also connects the test system to a rectangular box labeled 'E.U.T'. The entire setup is placed on a light-colored desk, and the instruments are resting on a dark grey 'Ground Reference Plane'.</p>
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:	Pass
The detailed test data see: Appendix	



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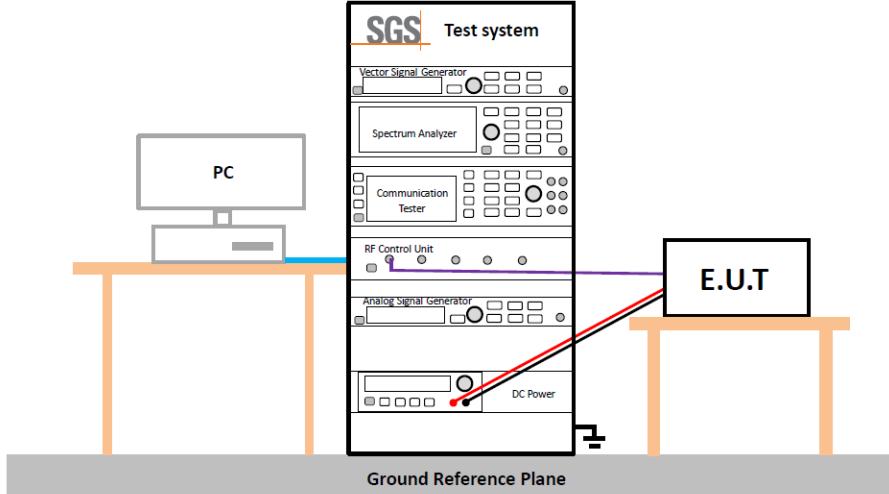
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4.8 Power Spectral Density

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
	5150-5250MHz	The power spectral density less than 11dBm/1MHz
	5250-5350MHz	The power spectral density less than 11dBm/1MHz
	5470-5725MHz	The power spectral density less than 11dBm/1MHz
	5725-5850MHz	The power spectral density less than <30dBm/500KHz
Test Results:	Pass	
The detailed test data see: Appendix		

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4.9 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:

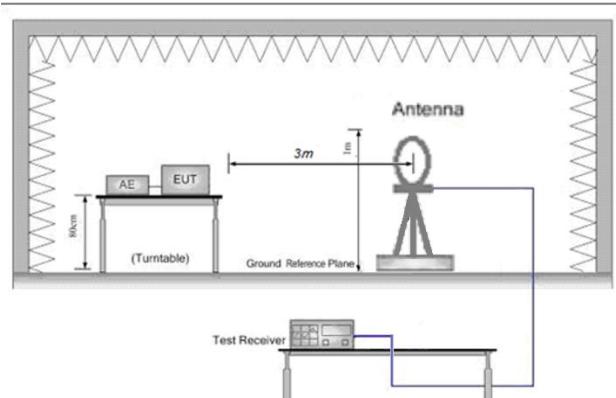


Figure 1. 9kHz to 30MHz

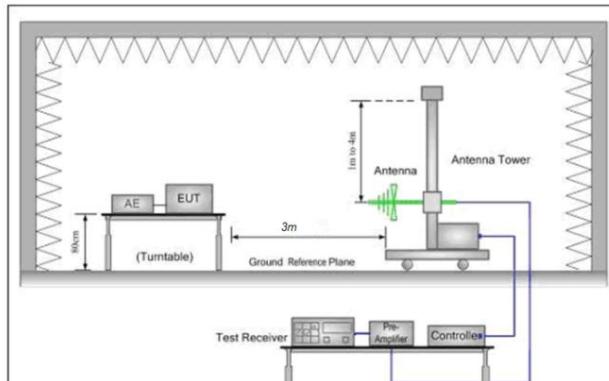


Figure 1. 30MHz to 1GHz

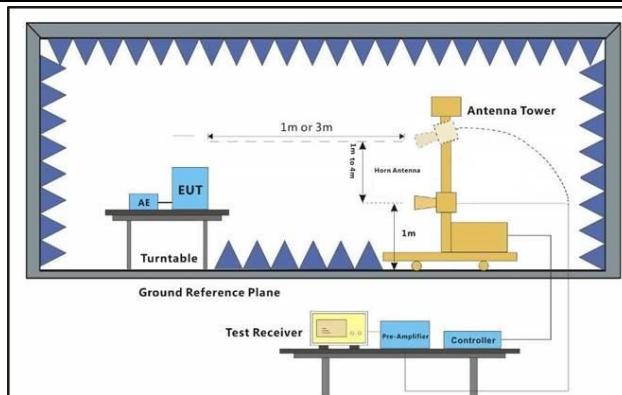


Figure 2. Above 1 GHz

Test Procedure:	<ol style="list-style-type: none"> 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. 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 >18GHz). 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. 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.
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	<ol style="list-style-type: none">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.f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.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.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 reportedk. 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.l. At a measurement distance of 1 meter the limit line was increased by $20 \times \log(3/1) = 9.54$ dB.
Test Configuration:	<p>Measurements below 30MHz</p> <ul style="list-style-type: none">• RBW = 10 kHz• VBW = 30 kHz• Detector = Peak & Average & Quasi-peak• Trace mode = max hold <p>Measurements Below 1000MHz</p> <ul style="list-style-type: none">• RBW = 120 kHz• VBW = 300 kHz• Detector = Quasi-peak• Trace mode = max hold <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none">• RBW = 1 MHz• VBW \geq 3 MHz• Detector = Peak• Sweep time = auto• Trace mode = max hold <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none">• RBW = 1 MHz• VBW = 10Hz, when duty cycle is no less than 98 percent.• VBW \geq 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.
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: Appendix	



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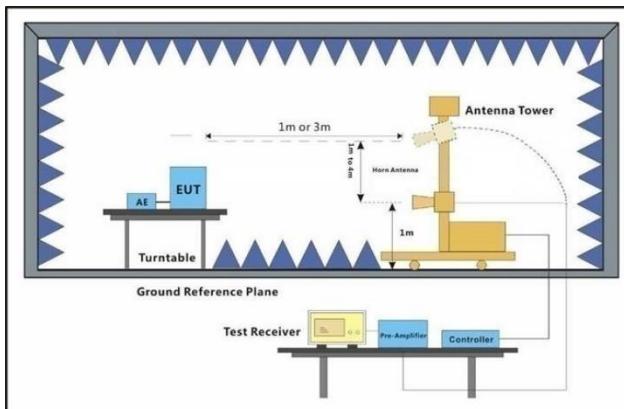
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4.10 Restricted bands around fundamental frequency

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"> 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. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 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. 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. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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 Test the EUT in the outermost channels. The radiation measurements are performed in X, Y, Z axis positioning for
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	<p>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>
Test Configuration:	<p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> • RBW = 120 kHz • VBW = 300 kHz • Detector = Quasi-peak • Trace mode = max hold <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> • RBW = 1 MHz • VBW \geq 3 MHz • Detector = Peak • Sweep time = auto • Trace mode = max hold <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> • RBW = 1 MHz • VBW = 10Hz, when duty cycle is no less than 98 percent. • VBW \geq 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.
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: Appendix	

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4.11 Dynamic Frequency Selection

4.11.1 DFS Overview

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
<i>Non-Occupancy Period</i>	Yes	Not required	Yes
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Availability Check Time</i>	Yes	Not required	Not required
<i>U-NII Detection Bandwidth</i>	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>DFS Detection Threshold</i>	Yes	Not required
<i>Channel Closing Transmission Time</i>	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes
<i>U-NII Detection Bandwidth</i>	Yes	Not required
Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>U-NII Detection Bandwidth and Statistical Performance Check</i>	All BW modes must be tested	Not required
<i>Channel Move Time and Channel Closing Transmission Time</i>	Test using widest BW mode available	Test using the widest BW mode available for the link
<i>All other tests</i>	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

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4.11.2 DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP \geq 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.

Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

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4.11.3 RADAR TEST WAVEFORMS

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup $\left\lceil \left(\frac{1}{360} \right) \cdot \left(\frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \right\rceil$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

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Table 5a - Pulse Repetition Intervals Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

The aggregate is the average of the percentage of successful detections of Short Pulse Radar Types 1-4. For example, the following table indicates how to compute the aggregate of percentage of successful detections.

Radar Type	Number of Trials	Number of Successful Detections	Minimum Percentage of Successful Detection
1	35	29	82.9%
2	30	18	60%
3	30	27	90%
4	50	44	88%
Aggregate $(82.9\% + 60\% + 90\% + 88\%) / 4 = 80.2\%$			

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Table 6 – Long Pulse Radar Test Waveform

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Table 7 – Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

4.11.4 Response Requirements

Table 4: DFS Response Requirement Values

Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

The detailed test data see: **Appendix**



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

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.54dB
2	RF power density, conducted	±1.03dB
3	Spurious emissions, conducted	±0.54dB
4	Radio Frequency	±1.0 %
5	Duty Cycle	±0.37%
6	Occupied Bandwidth	±1.0 %
7	Conduction Emission	± 2.90dB (150kHz to 30MHz)
8	Radiated Emission	± 3.13dB (9k -30MHz)
		± 4.88dB (30M -1GHz)
		± 4.75dB (1GHz to 18GHz)
		± 4.77dB (Above 18GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than $U_{cispr/ETSI}$ (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 Equipment					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Shielding Room	Brilliant-emc	N/A	SUWI-04-01-06	2021/05/08	2024/05/07
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-07	2023/02/06	2024/02/05
Measurement Software	Tonscend	JS1120-3 Test System V 3.3.20	SUWI-02-09-09	NCR	NCR
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2023/05/11	2024/05/10
Temperature Chamber	ESPEC	SU-242	SUWI-01-13-01	2023/02/06	2024/02/05
Wideband Radio Communication Tester	ROHDE&SCHWARZ	CMW500	SUWI-01-16-05	2023/02/06	2024/02/05
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2023/02/06	2024/02/05
Power meter	Anritsu	ML2495A	SUWI-01-31-01	2022/11/23	2023/11/22
Pulse power sensor	Anritsu	MA2411B	SUWI-01-32-01	2022/11/23	2023/11/22
MXG Vector signal genitor	KEYSIGHT	N5182B	SUWI-01-38-01	2023/02/06	2024/02/05

CE Test System					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Shielding Room	Brilliant-emc	N/A	SUWI-04-03-01	2021/05/08	2024/05/07
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2023/02/08	2024/02/07
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2023/02/07	2024/02/06
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-03	2023/02/08	2024/02/07
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-04	2023/02/08	2024/02/07
Measurement Software	Tonscend	JS32-CE V4.0.0.2	SUWI-02-09-05	NCR	NCR

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RSE Test System

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-02	2021/11/25	2024/11/24
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-13	2022/02/07	2024/02/06
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2023/05/11	2024/05/10
Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-06	2022/11/23	2023/11/22
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2023/02/08	2024/02/07
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9163	SUWI-01-11-04	2021/12/05	2023/12/04
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-05	2021/12/05	2023/12/04
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	2023/05/12	2024/05/11
Active Loop Antenna	SCHWRZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	2023/05/13	2024/05/12
Amplifier	Tonscend	TAP9K3G32	SUWI-01-14-06	2022/11/23	2023/11/22
Amplifier	Tonscend	TAP01018050	SUWI-01-14-04	2022/11/23	2023/11/22
Amplifier	Tonscend	TAP30M7G30	SUWI-01-14-05	2022/11/23	2023/11/22
Measurement Software	Tonscend	JS32-RE 4.0.0.0	SUWI-02-09-04	NCR	NCR

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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	Ant11	5180	20.12	5170.00	5190.12	For Report Purpose
11a	Ant11	5220	20.24	5209.96	5230.20	
11a	Ant11	5240	20.20	5229.88	5250.08	
11a	Ant11	5260	20.16	5249.92	5270.08	
11a	Ant11	5300	20.04	5289.84	5309.88	
11a	Ant11	5320	20.04	5310.00	5330.04	
11a	Ant11	5500	20.16	5489.92	5510.08	
11a	Ant11	5580	20.20	5570.00	5590.20	
11a	Ant11	5700	20.16	5689.88	5710.04	
11a	Ant11	5745	19.96	5734.92	5754.88	
11a	Ant11	5785	20.12	5774.96	5795.08	
11a	Ant11	5825	19.92	5815.04	5834.96	
11ac20SISO	Ant11	5180	20.48	5169.80	5190.28	
11ac20SISO	Ant11	5220	20.40	5209.76	5230.16	
11ac20SISO	Ant11	5240	20.44	5229.76	5250.20	
11ac20SISO	Ant11	5260	20.24	5249.88	5270.12	
11ac20SISO	Ant11	5300	20.20	5289.88	5310.08	
11ac20SISO	Ant11	5320	20.32	5309.80	5330.12	
11ac20SISO	Ant11	5500	20.32	5489.84	5510.16	
11ac20SISO	Ant11	5580	20.44	5569.76	5590.20	
11ac20SISO	Ant11	5700	20.36	5689.72	5710.08	
11ac20SISO	Ant11	5745	20.48	5734.68	5755.16	
11ac20SISO	Ant11	5785	20.68	5774.68	5795.36	
11ac20SISO	Ant11	5825	20.56	5814.68	5835.24	
11ac40SISO	Ant11	5190	40.32	5169.76	5210.08	
11ac40SISO	Ant11	5230	40.56	5209.52	5250.08	
11ac40SISO	Ant11	5270	40.32	5249.84	5290.16	
11ac40SISO	Ant11	5310	40.64	5289.60	5330.24	
11ac40SISO	Ant11	5510	40.40	5489.92	5530.32	
11ac40SISO	Ant11	5550	40.40	5529.76	5570.16	
11ac40SISO	Ant11	5670	48.00	5649.60	5697.60	
11ac40SISO	Ant11	5755	46.08	5729.16	5775.24	
11ac40SISO	Ant11	5795	41.28	5773.96	5815.24	
11ac80SISO	Ant11	5210	81.44	5169.36	5250.80	
11ac80SISO	Ant11	5290	81.28	5249.36	5330.64	
11ac80SISO	Ant11	5530	81.44	5489.36	5570.80	
11ac80SISO	Ant11	5775	94.88	5720.92	5815.80	

Note: For 802.11n HT20/ac VHT20 and 802.11n HT40/ac VHT40 mode, the whole testing have assessed only 802.11 ac VHT20/40 by referring to their higher output power

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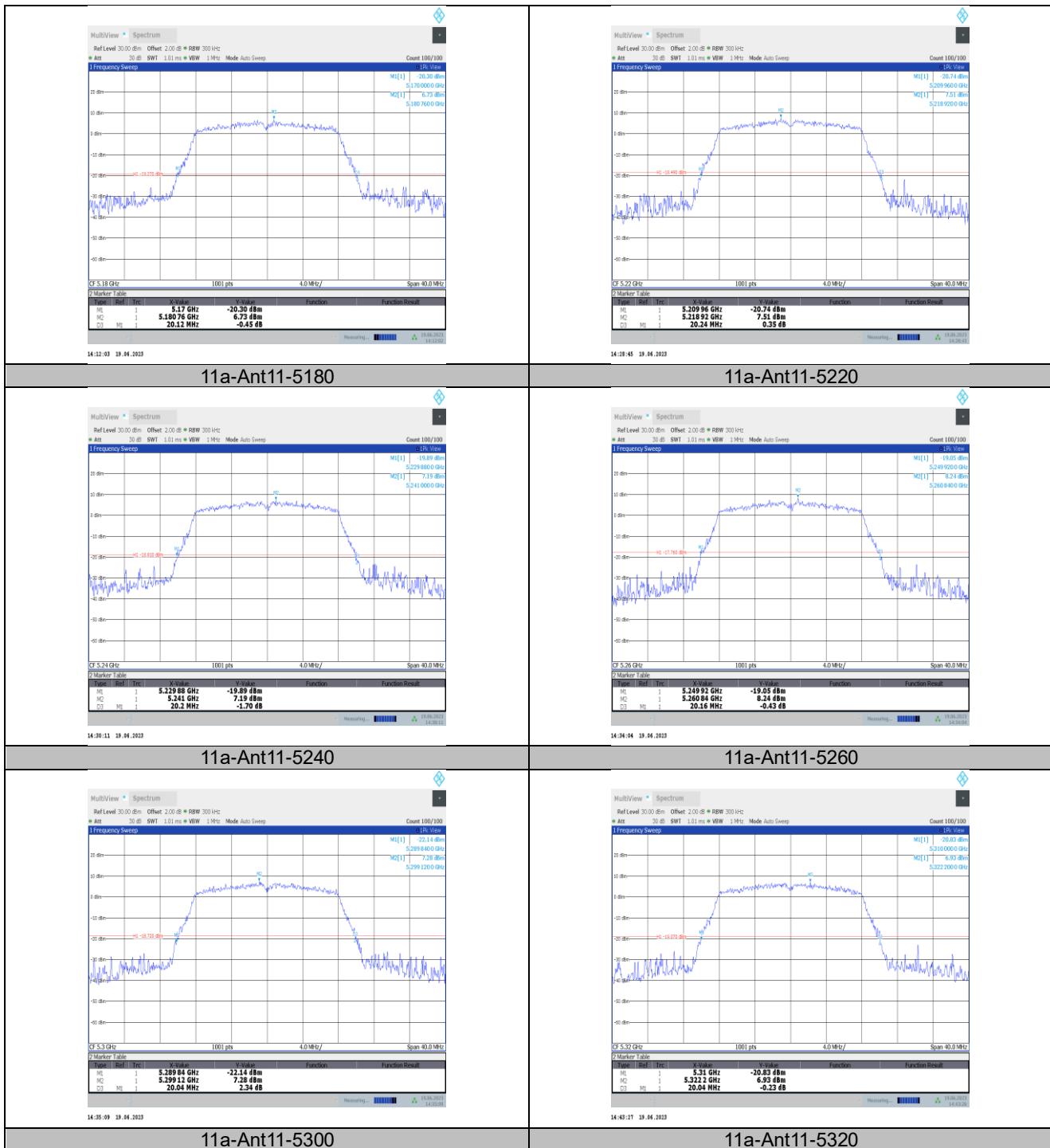


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Test Graphs



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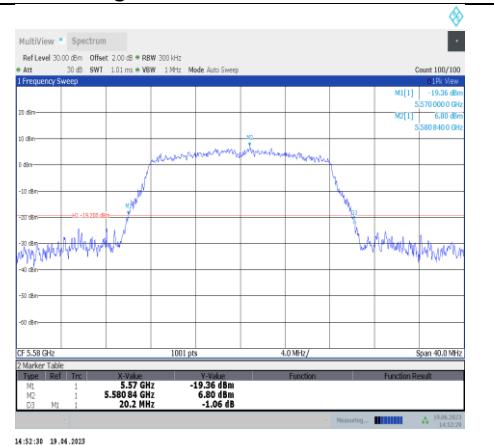
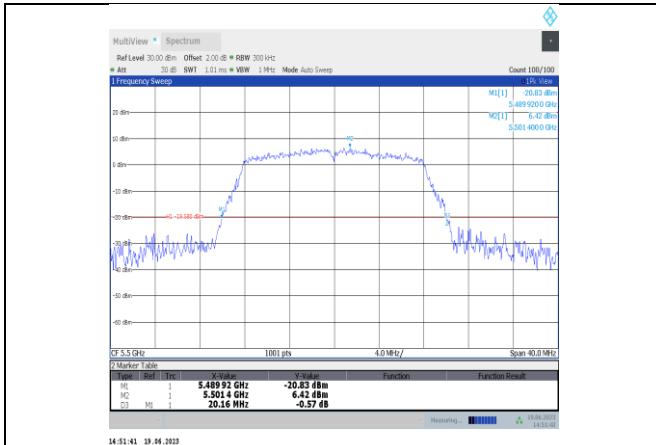
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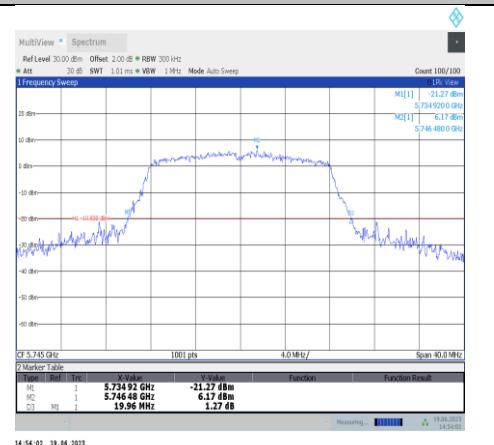
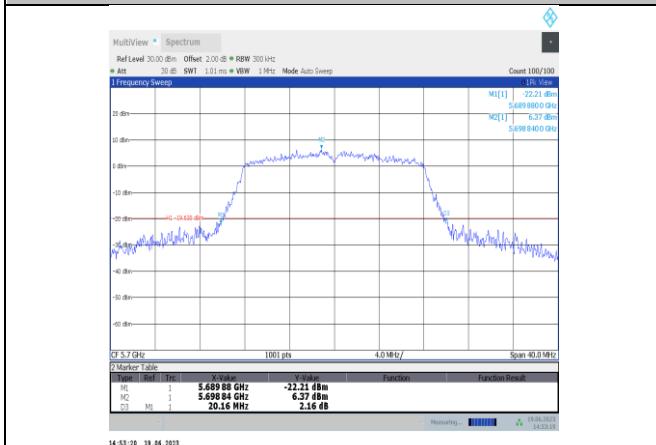
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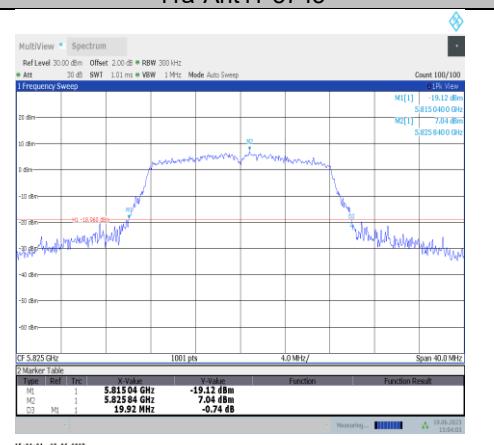
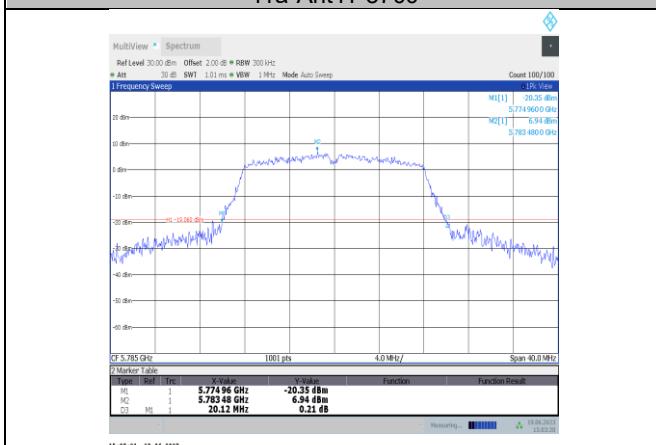
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11a-Ant11-5580



11a-Ant11-5700

11a-Ant11-5745



11a-Ant11-5785

11a-Ant11-5825

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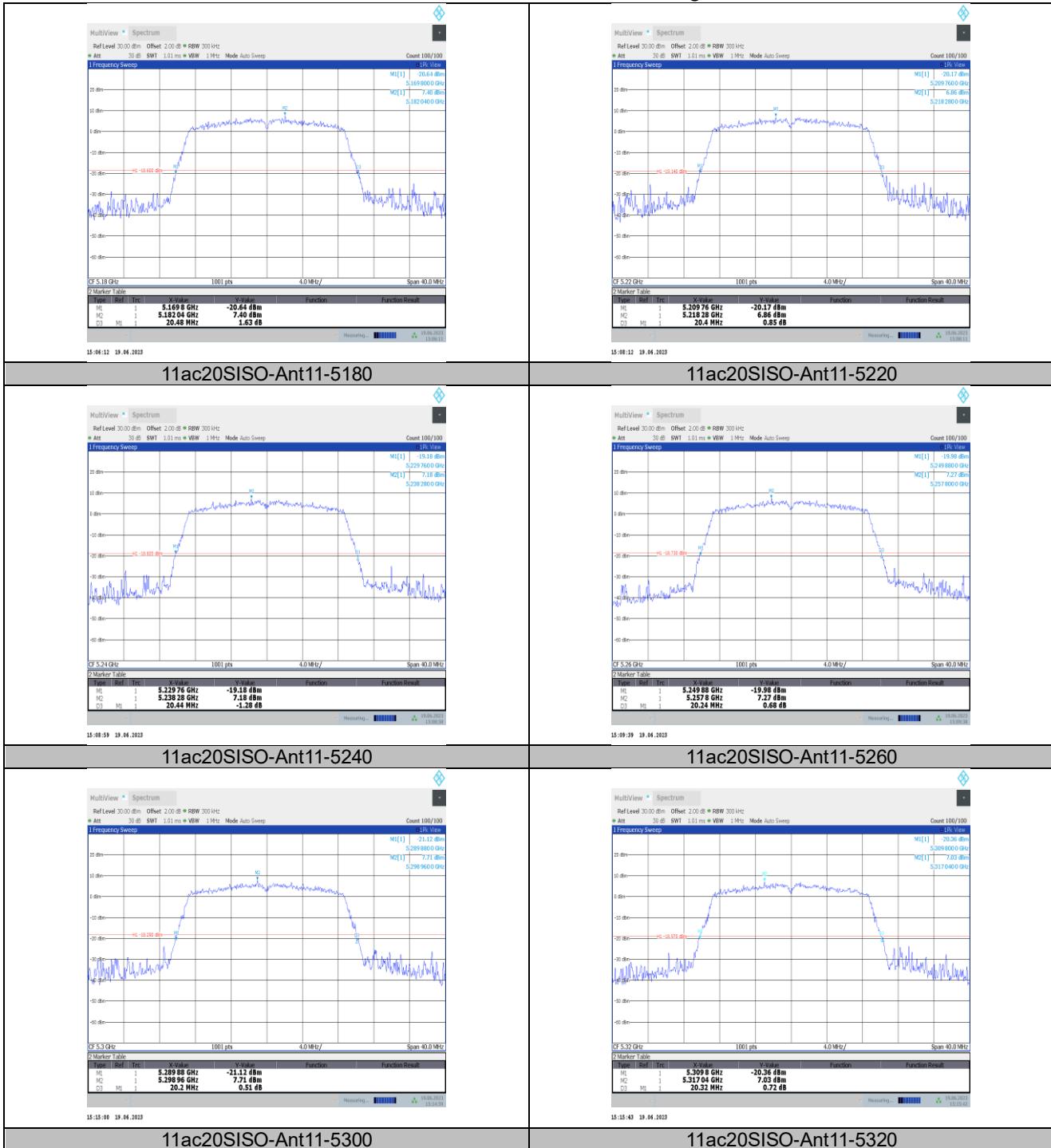
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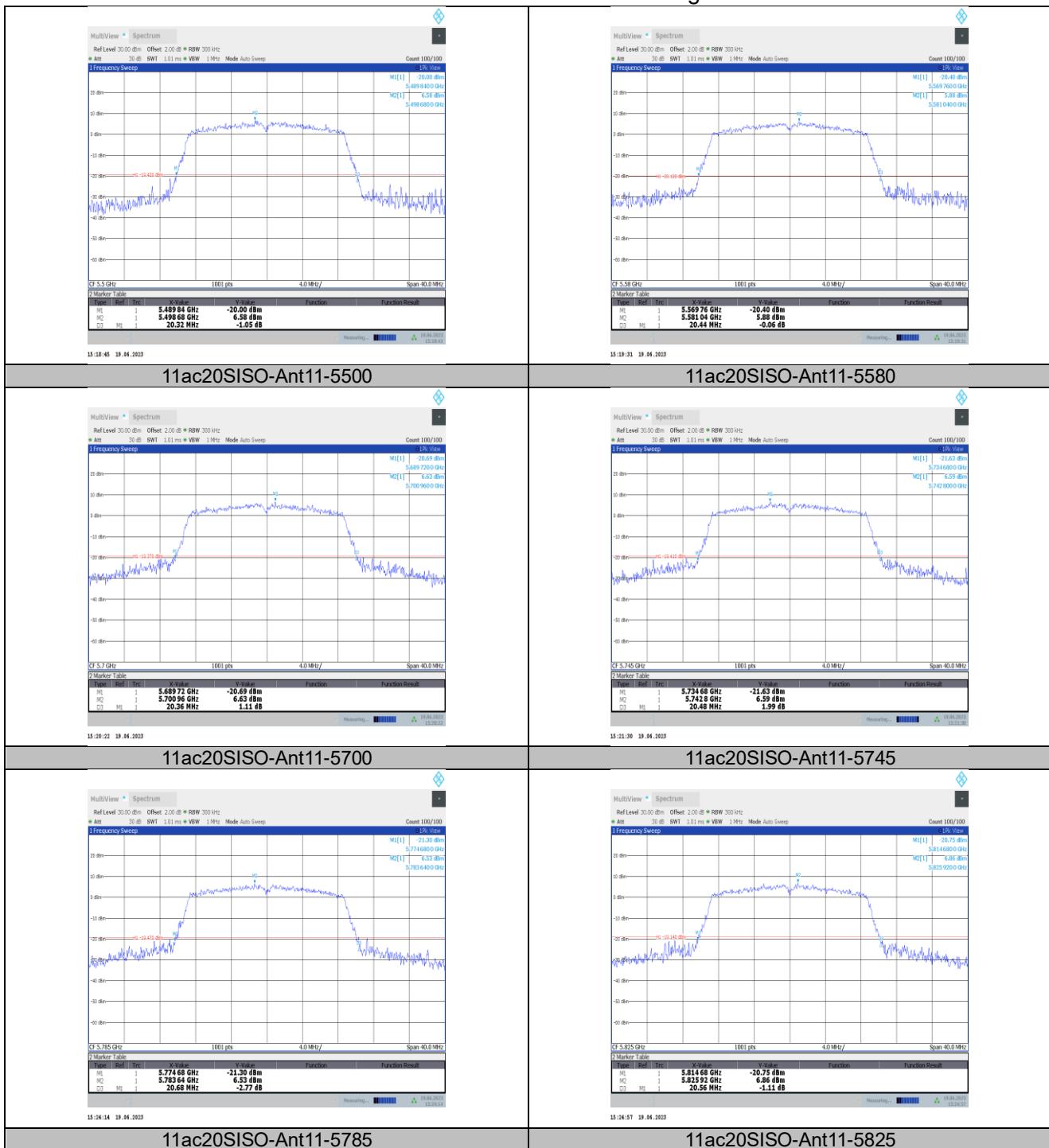


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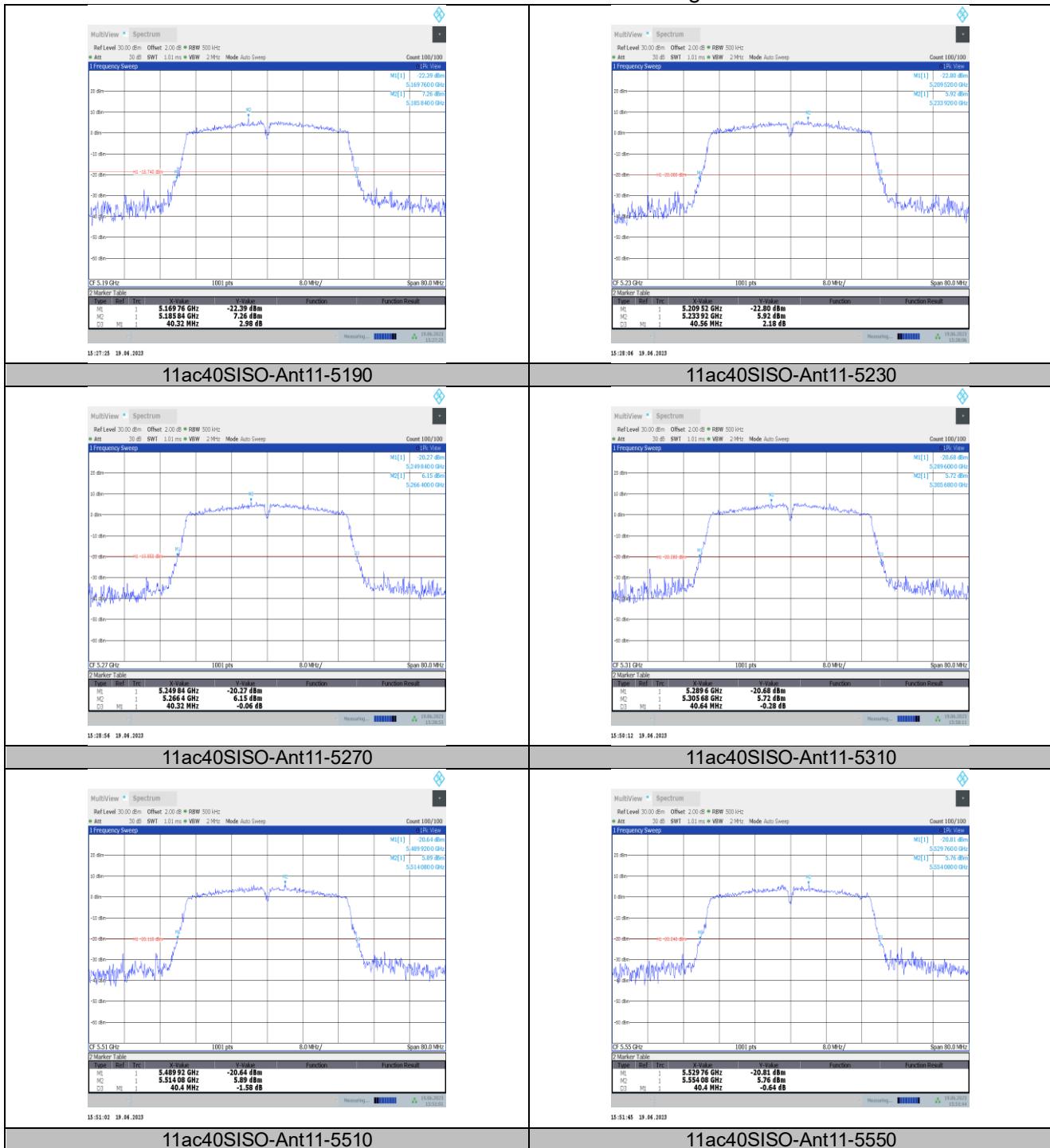


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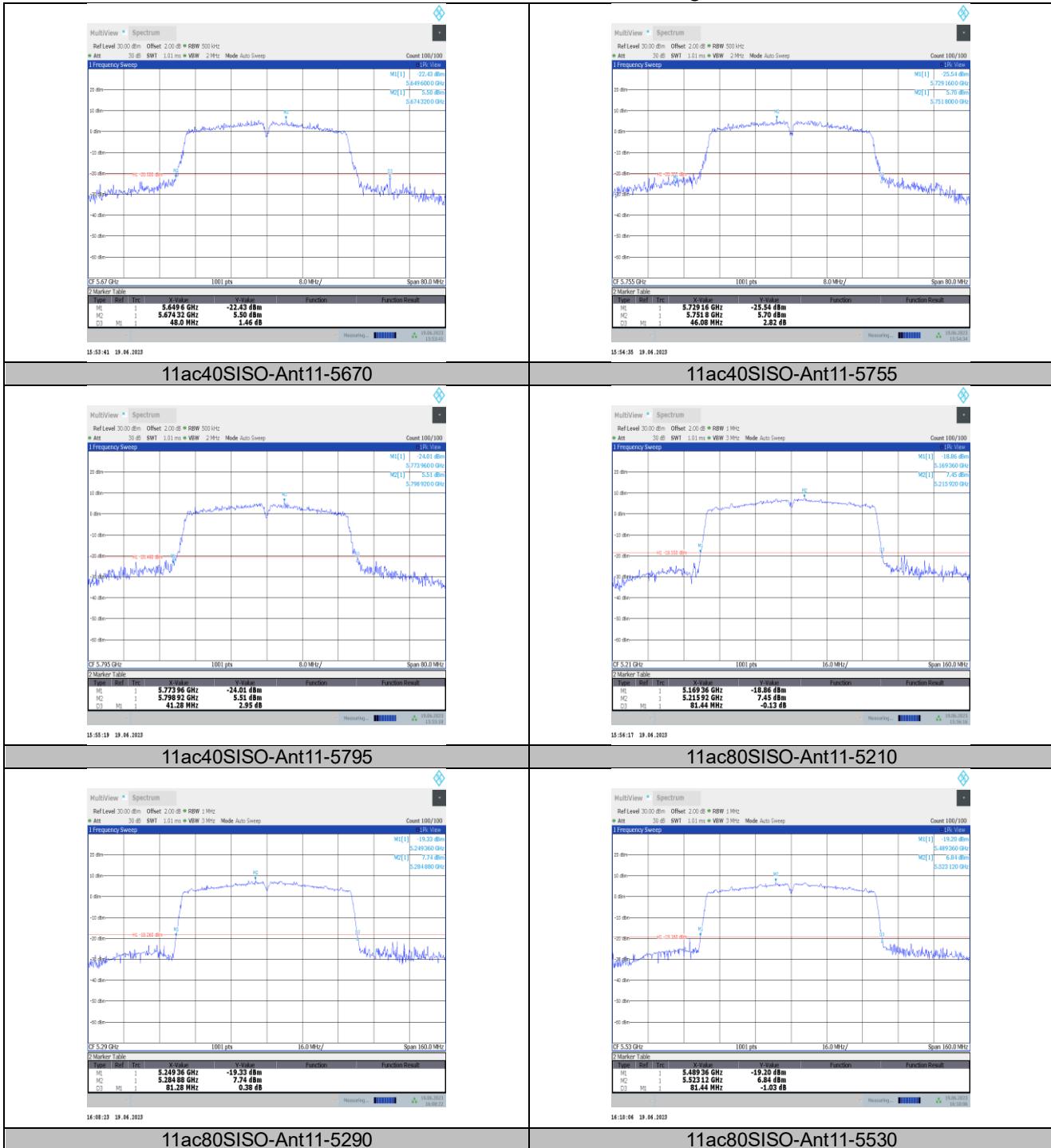
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Occupied channel bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
11a	Ant11	5180	16.988	5171.5073	5188.4952	
11a	Ant11	5220	16.984	5211.5178	5228.5015	
11a	Ant11	5240	17.007	5231.4389	5248.4462	
11a	Ant11	5260	16.888	5251.5173	5268.4053	
11a	Ant11	5300	16.922	5291.5166	5308.4383	
11a	Ant11	5320	17.009	5311.4749	5328.4836	
11a	Ant11	5500	17.057	5491.4540	5508.5110	
11a	Ant11	5580	17.015	5571.4089	5588.4243	
11a	Ant11	5700	16.993	5691.4468	5708.4402	
11a	Ant11	5745	17.06	5736.3962	5753.4563	
11a	Ant11	5785	17.06	5776.4120	5793.4724	
11a	Ant11	5825	17.058	5816.4060	5833.4639	
11ac20SISO	Ant11	5180	17.899	5171.0472	5188.9463	
11ac20SISO	Ant11	5220	17.944	5211.0344	5228.9785	
11ac20SISO	Ant11	5240	17.903	5231.0232	5248.9264	
11ac20SISO	Ant11	5260	17.878	5251.0861	5268.9640	
11ac20SISO	Ant11	5300	17.933	5291.0151	5308.9477	
11ac20SISO	Ant11	5320	17.88	5311.0070	5328.8869	
11ac20SISO	Ant11	5500	17.934	5491.0146	5508.9482	
11ac20SISO	Ant11	5580	17.928	5571.0168	5588.9450	
11ac20SISO	Ant11	5700	18.002	5690.9678	5708.9702	
11ac20SISO	Ant11	5745	18.074	5735.8917	5753.9659	
11ac20SISO	Ant11	5785	18.068	5775.8919	5793.9594	
11ac20SISO	Ant11	5825	17.961	5816.0022	5833.9635	
11ac40SISO	Ant11	5190	36.337	5171.9066	5208.2438	
11ac40SISO	Ant11	5230	36.348	5211.8825	5248.2309	
11ac40SISO	Ant11	5270	36.361	5251.9119	5288.2729	
11ac40SISO	Ant11	5310	36.241	5291.8411	5328.0824	
11ac40SISO	Ant11	5510	36.274	5491.9144	5528.1888	
11ac40SISO	Ant11	5550	36.362	5531.9226	5568.2844	
11ac40SISO	Ant11	5670	36.51	5651.6735	5688.1834	
11ac40SISO	Ant11	5755	36.518	5736.6676	5773.1852	
11ac40SISO	Ant11	5795	36.414	5776.7367	5813.1508	
11ac80SISO	Ant11	5210	75.441	5172.4542	5247.8948	
11ac80SISO	Ant11	5290	75.371	5252.3908	5327.7615	
11ac80SISO	Ant11	5530	75.527	5492.2931	5567.8203	
11ac80SISO	Ant11	5775	75.707	5736.9050	5812.6122	

For
Report
Purpose

Note: For 802.11n HT20/ac VHT20 and 802.11n HT40/ac VHT40 mode, the whole testing have assessed only 802.11 ac VHT20/40 by referring to their higher output power

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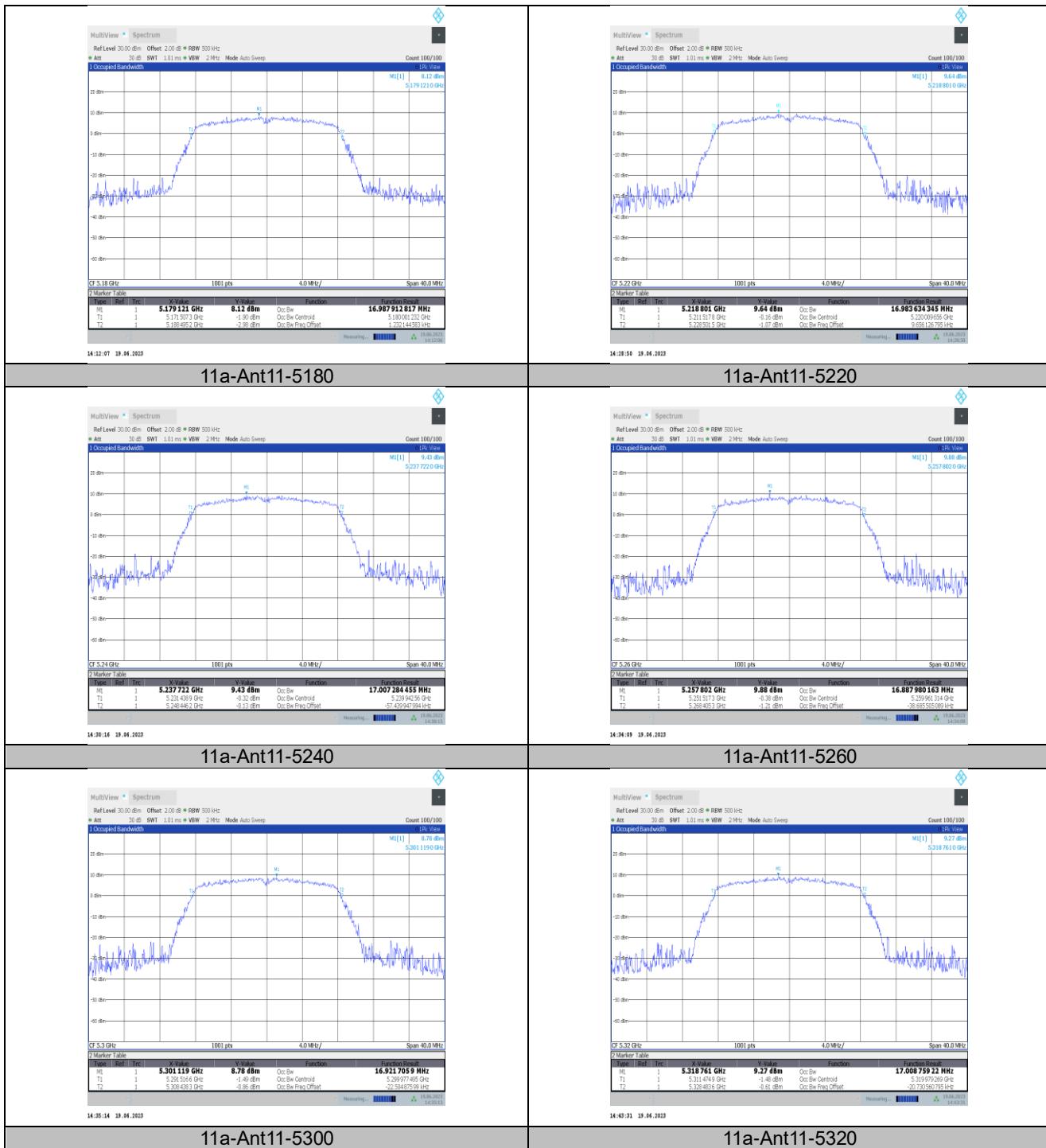


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Test Graphs



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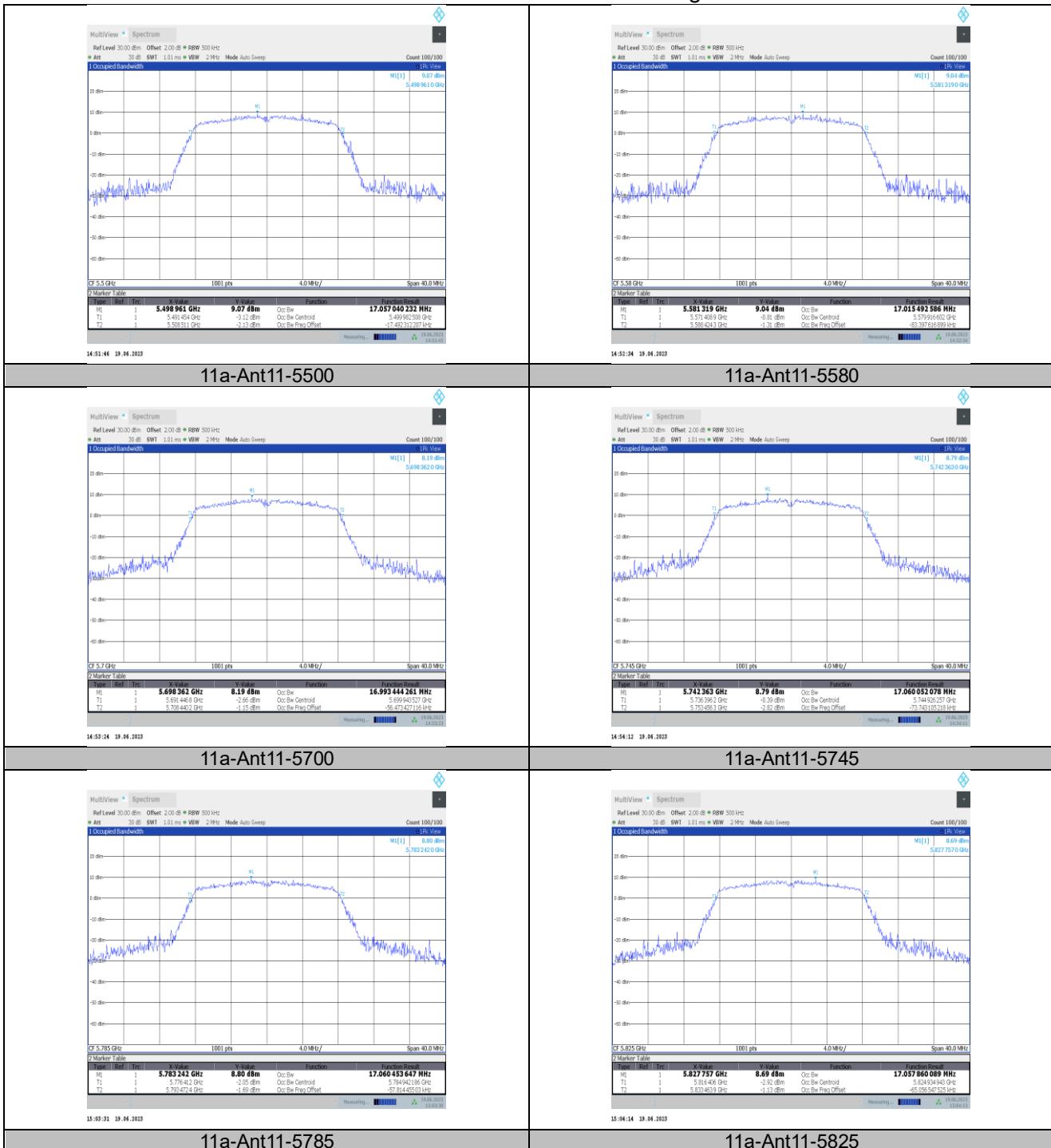
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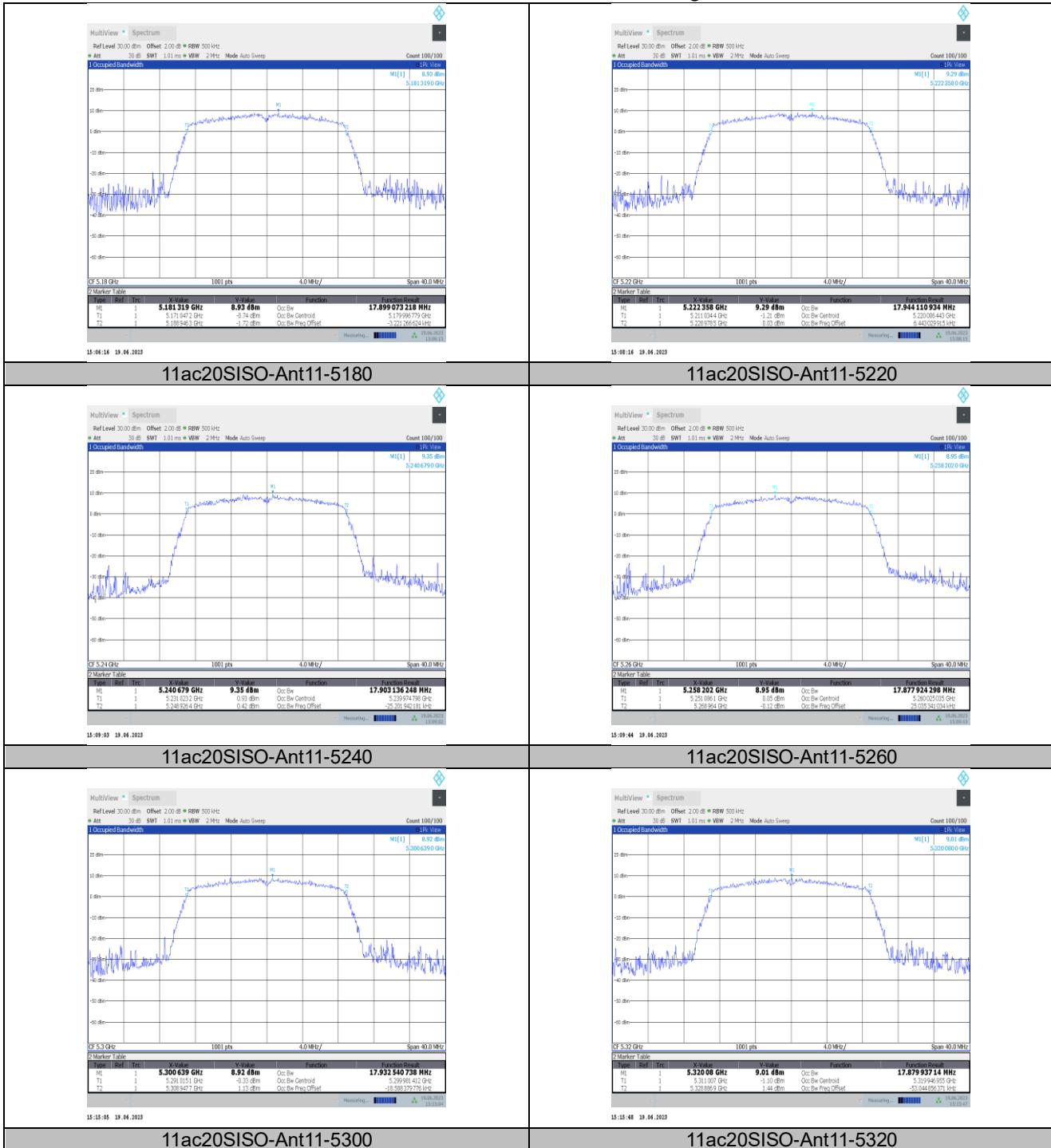
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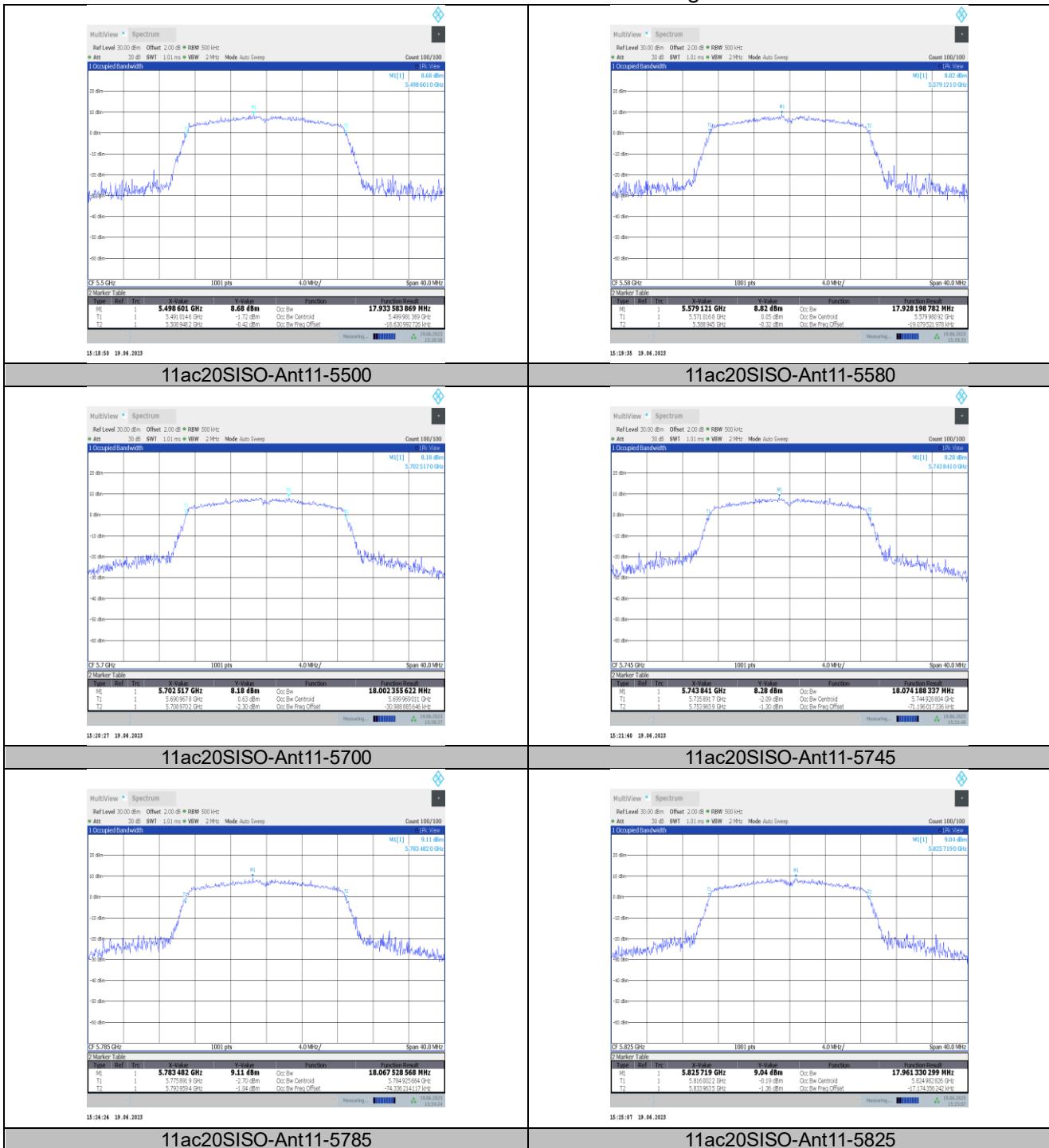


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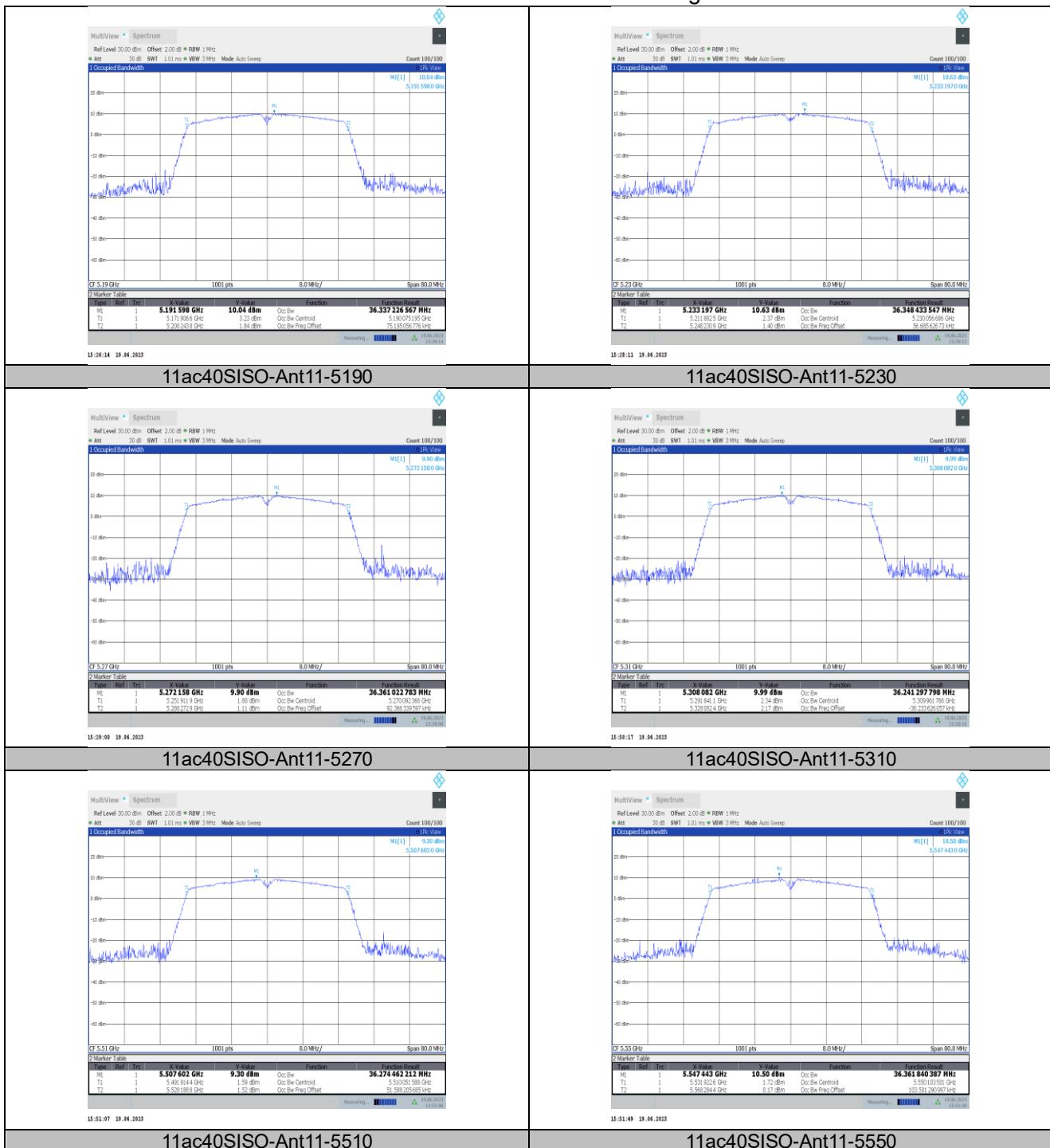
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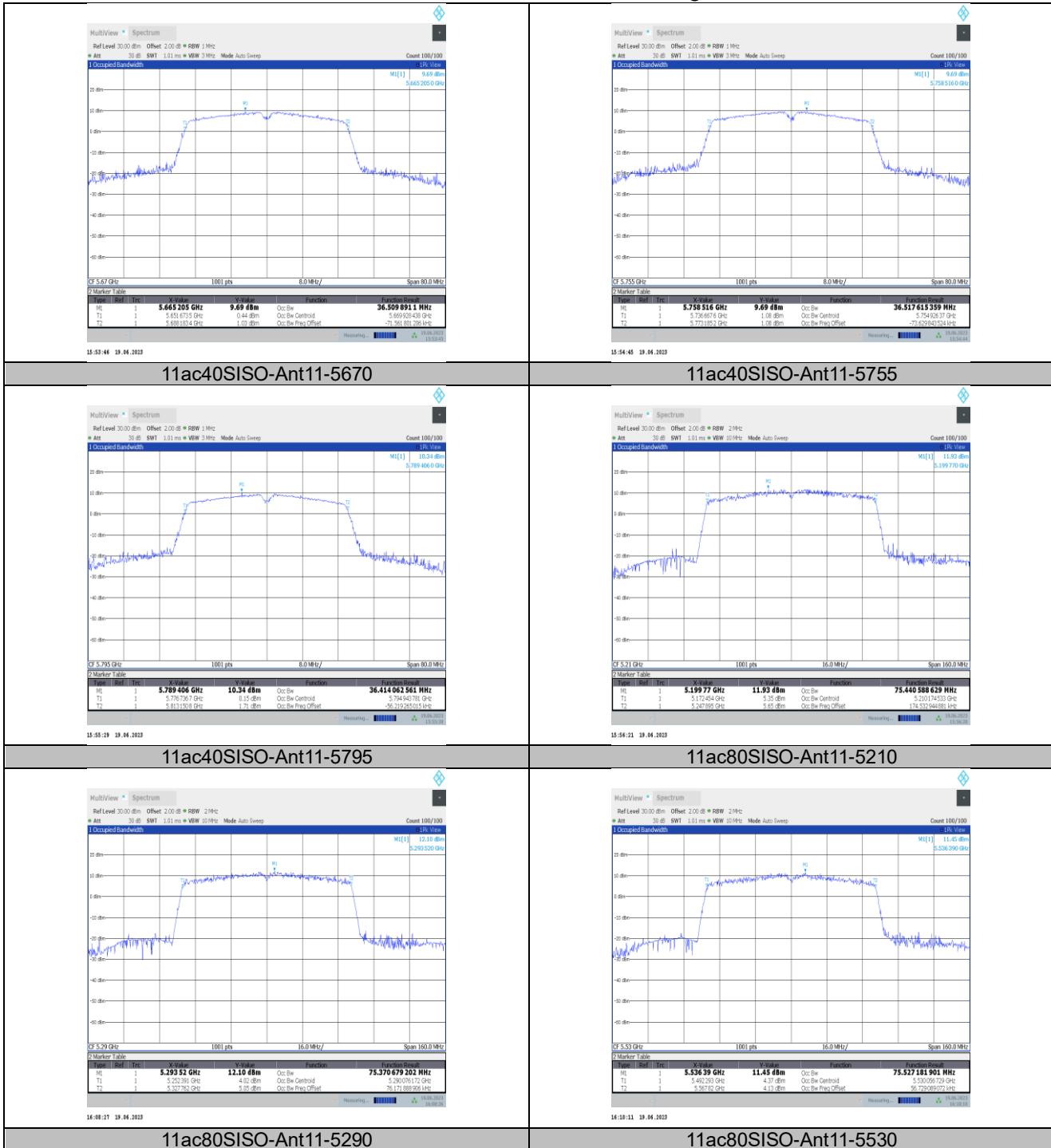
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6dB emission bandwidth

Test Result B4

TestMode	Antenna	Frequency[MHz]	6dB EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11a	Ant11	5745	14.52	5738.04	5752.56	≥0.5	PASS
11a	Ant11	5785	16.40	5776.76	5793.16	≥0.5	PASS
11a	Ant11	5825	15.16	5817.40	5832.56	≥0.5	PASS
11ac20SISO	Ant11	5745	16.40	5736.52	5752.92	≥0.5	PASS
11ac20SISO	Ant11	5785	15.20	5777.36	5792.56	≥0.5	PASS
11ac20SISO	Ant11	5825	15.16	5817.36	5832.52	≥0.5	PASS
11ac40SISO	Ant11	5755	34.00	5738.52	5772.52	≥0.5	PASS
11ac40SISO	Ant11	5795	29.04	5778.52	5807.56	≥0.5	PASS
11ac80SISO	Ant11	5775	75.52	5737.24	5812.76	≥0.5	PASS

Note: For 802.11n HT20/ac VHT20 and 802.11n HT40/ac VHT40 mode, the whole testing have assessed only 802.11 ac VHT20/40 by referring to their higher output power



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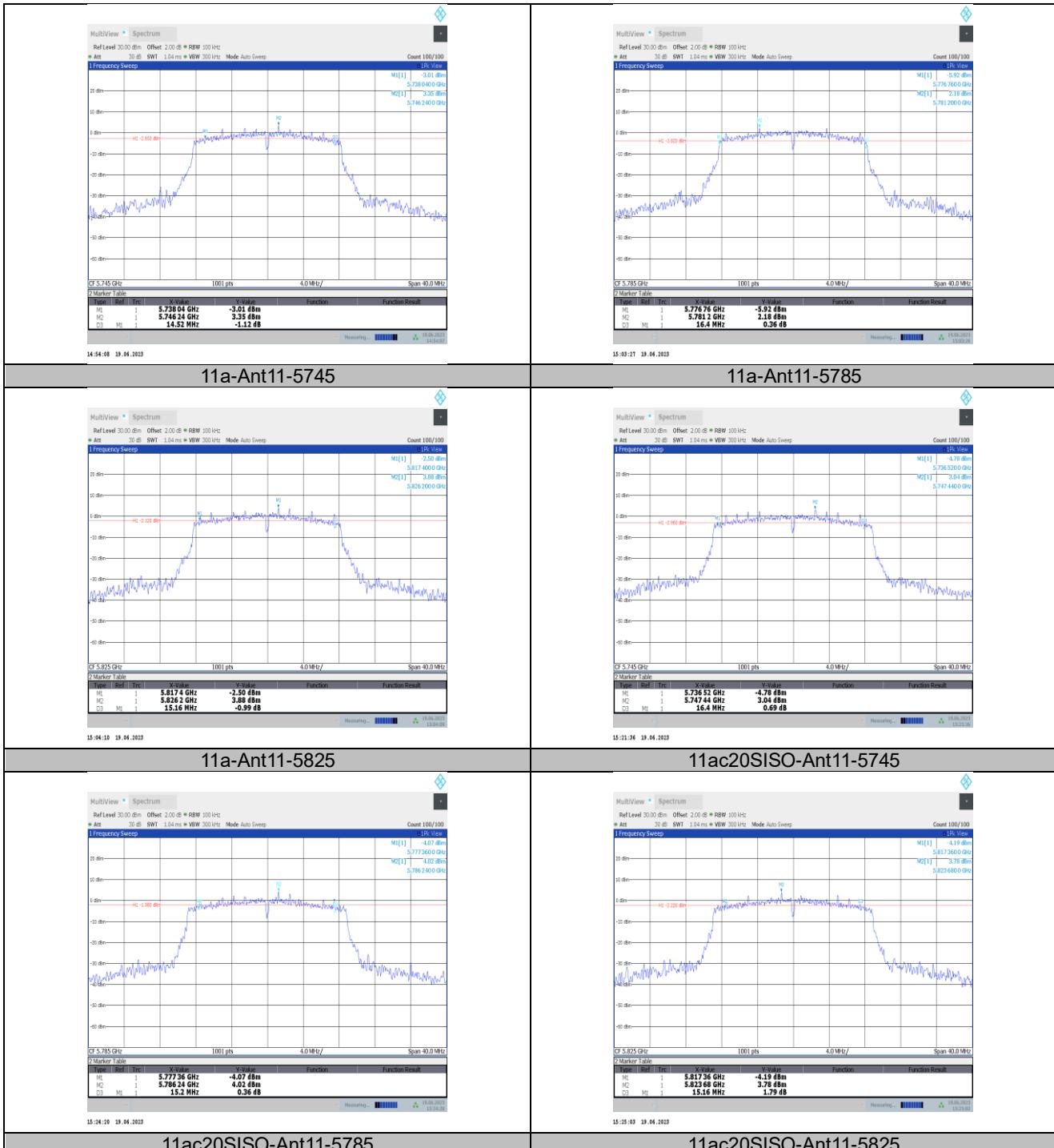
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Test Graphs B4



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