

**ELECTROMAGNETIC EMISSIONS
COMPLIANCE REPORT**

FCC Applicant: Sercomm Corporation
8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan,
R.O.C.

FCC Manufacturer: Sercomm Corporation
8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan,
R.O.C.

Product Name: wireless device

Brand Name: N/A

Model No.: G7LYP

Family Model No.: GPJ15

Report Number: TERF2501000384ER

FCC ID P27-G7LYP

Date of EUT Received: November 14, 2024

Date of Test: January 17, 2025 ~ April 2, 2025

Issue Date: April 2, 2025

Jazz Huang

Approved By

Jazz Huang

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab 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 comply with FCC rule part §15.407.

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

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2501000384ER	00	Original	February 27, 2025	Yuri Tsai	
TERF2501000384ER	01	Update section8 test result	April 2, 2025	Yuri Tsai	*

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.
- 2、Variant information of model numbers is provided by the applicant, test results of this report are applicable to the sample EUT(s) received.

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	wireless device
Brand Name:	N/A
Model No.:	G7LYP
Family Model No.:	GPJ15
Model Difference:	The model difference is detailed in Theory of Operation
EUT Series No.:	51111XHCW013L8
Power Supply:	G7LYP: 12 Vdc GPJ15: 7.5 Vdc
Test Software (Name/Version)	Tera Term /Version 4.106

1.2 Modulation & Data Rate

Modulation type:	64QAM, 16QAM, QPSK, BPSK for OFDM in 802.11a,11n
	256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM in 802.11ac
Transition Rate:	802.11 a: 6 - 54 Mbps
	802.11 n_HT20: up to 72.2 Mbps
	802.11 ac_VHT20: up to 86.7 Mbps

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1.3 Antenna Designation

Antenna Type	Ant 1 / Ant 2	Freq. (MHz)	Peak Antenna Gain (dBi)
PIFA	Ant 1	5150~5250	4.62
		5250~5350	4.62
		5470~5725	4.62
		5725~5850	4.62
PIFA	Ant 2	5150~5250	4.47
		5250~5350	4.47
		5470~5725	4.47
		5725~5850	4.47

Note:

1. Pre-scanned was done on the above antennas, measurements were demonstrated by using the antenna with the highest gain as the worst case scenarios.
2. Antenna information is provided by the applicant.

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SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

Wi-Fi	Frequency Range	Channels	EIRP/Avg	Rated Power(EIRP/Avg) (dBm) (Worst Case)	Modulation Technology
802.11a/ 802.11n_HT20/ 802.11ac_VHT20	5180~5240	4	Avg	16.48 dBm	OFDM
	5260~5320	4	Avg	16.48 dBm	OFDM
	5500~5720	12	Avg	18.22 dBm	OFDM
	5745-5825	5	Avg	19.98 dBm	OFDM

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1.5 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407
 FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01
 ANSI C63.10:2013

1.6 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
	Conducted 6			
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
Conducted F				
Conducted G				

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

1.7 Special Accessories

There are no special accessories used while test was conducted.

1.8 Equipment Modifications

There was no modification incorporated into the EUT.

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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 placed on a 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. The two LISNs provide 50uH/50 ohm 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 placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. 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.

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2.4 Measurement Results Explanation Example

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

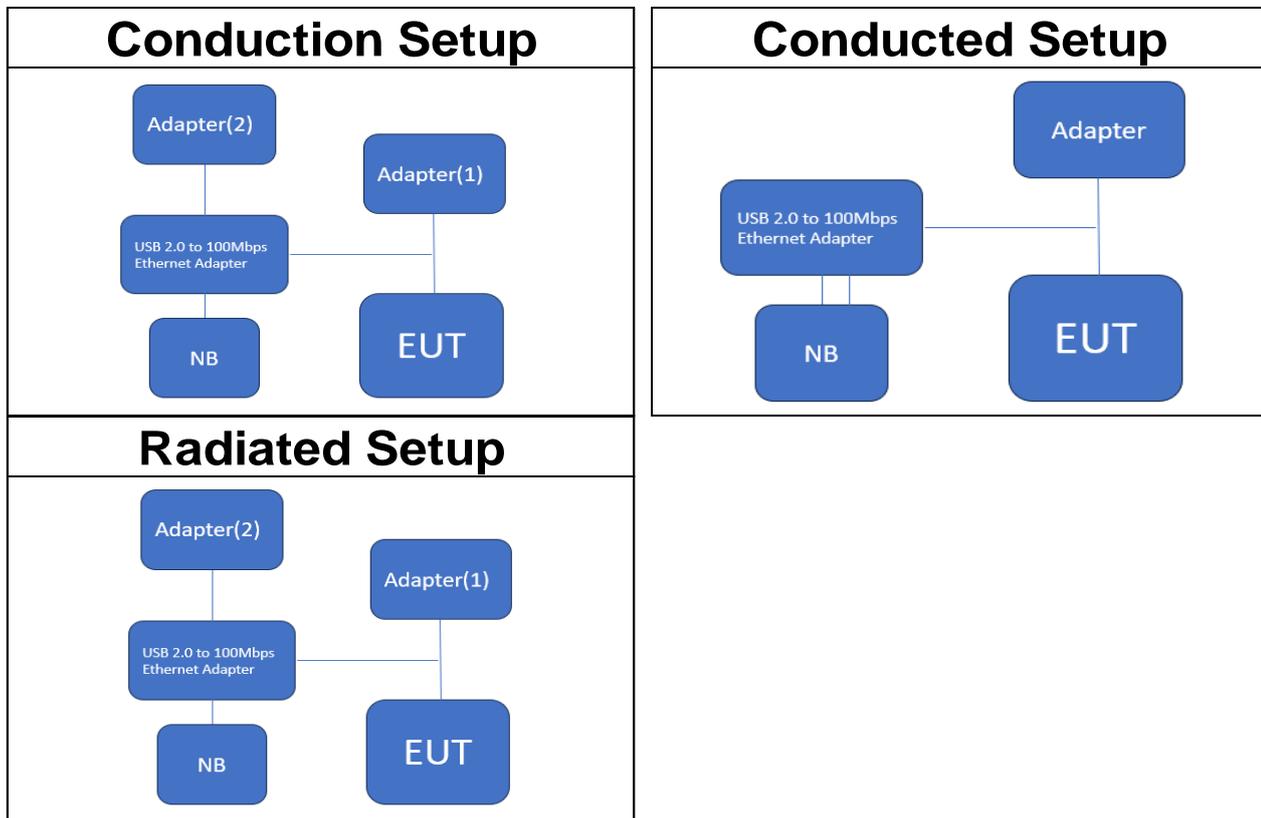
Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

2.4.2 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.

2.5 Test Configuration



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2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
USB Cable	N/A	N/A	N/A	N/A	N/A
Adapter(1)	Mass Power Electronics inc	G6F3X	N/A	N/A	N/A
Adapter(2)	Apple	A1385	N/A	N/A	N/A
LAN Cable	UGREEN	50184	N/A	N/A	N/A
USB 2.0 to 100Mbps Ethernet Adapter	UGREEN	CR110	N/A	N/A	N/A
Notebook	Lenovo	L480	PF-1S9Q32 19/07	N/A	N/A
Conducted Emission Test Site: Conducted 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
USB Cable	N/A	N/A	N/A	N/A	N/A
LAN Cable	Mediabridge	Cat5e	N/A	N/A	N/A
USB 2.0 to 100Mbps Ethernet Adapter	UGREEN	CR110	N/A	N/A	N/A
Adapter	Mass Power Electronics inc	G6F3X	N/A	N/A	N/A
Notebook	Lenovo	L480	PF-1S9Q32 19/07	N/A	N/A
Radiated Emission Test Site: SAC 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
USB Cable	N/A	N/A	N/A	N/A	N/A
Adapter(1)	Mass Power Electronics inc	G6F3X	N/A	N/A	N/A
Adapter(2)	Apple	A1385	N/A	N/A	N/A
LAN Cable	UGREEN	50184	N/A	N/A	N/A
USB 2.0 to 100Mbps Ethernet Adapter	UGREEN	CR110	N/A	N/A	N/A
Notebook	Lenovo	L480	PF-1S9Q32 19/07	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
§15.407(e)	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
§15.203	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

UNII-1 5150 MHz ~ 5250MHz

20MHz	
CH	Freq. (MHz)
36	5180
40	5200
44	5220
48	5240

UNII-2A 5250 MHz ~ 5350MHz

20MHz	
CH	Freq. (MHz)
52	5260
56	5280
60	5300
64	5320

UNII-2C 5470 MHz ~ 5725MHz

20MHz	
CH	Freq. (MHz)
100	5500
104	5520
108	5540
112	5560
116	5580
120	5600
124	5620
128	5640
132	5660
136	5680
140	5700
144	5720

UNII-3 5725 MHz ~ 5850MHz

20MHz	
CH	Freq. (MHz)
149	5745
153	5765
157	5785
161	5805
165	5825

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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 programmed.
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 Chain							Single Transmission Spatial		
V	802.11 a	V	Ch0	V	Ch1		Ch2		Ch3	V	1TX
V	802.11 n	V	Ch0	V	Ch1		Ch2		Ch3	V	1TX
V	802.11 ac	V	Ch0	V	Ch1		Ch2		Ch3	V	1TX
	802.11 ax		Ch0		Ch1		Ch2		Ch3		1TX
	802.11 be		Ch0		Ch1		Ch2		Ch3		1TX

The worst-case Ch1 data will be presented in the test report.

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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.

Full test_Model No._G7LYP

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	Ch1
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS0	Ch1
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11ac_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS0	Ch1
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	44	OFDM	6	Ch1
	5260~5320	52 to 64	60			
	5500~5720	100 to 144	116			
	5745~5825	149 to 165	157			
TRANSMIT RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	Ch1
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11n_HT20	5180~5240	36 to 48	36,44,48	OFDM	MCS0	Ch1
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			
802.11ac_VHT20	5180~5240	36 to 48	36,44,48	OFDM	MCS0	Ch1
	5260~5320	52 to 64	52,60,64			
	5500~5720	100 to 144	100,116,140,144			
	5745~5825	149 to 165	149,157,165			

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Spot check Model No. GPJ15

TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	44	OFDM	6	Ch1
	5260~5320	52 to 64	60			
	5500~5720	100 to 144	116			
	5745~5825	149 to 165	157			

Note:

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 1.54 dB
Output Power measurement	+/- 0.97 dB
Emission Bandwidth	+/- 1.38 Hz
Conducted emission measurement	+/- 0.77 dB
Peak Power Density	+/- 0.61 dB
Temperature	+/- 0.6 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/-	1.89 dB	9kHz~30MHz
	+/-	4.15 dB	30MHz - 1000MHz
	+/-	3.43 dB	1GHz - 18GHz
	+/-	3.86 dB	18GHz - 40GHz
Polarization: Horizontal	+/-	1.89 dB	9kHz~30MHz
	+/-	4.02 dB	30MHz - 1000MHz
	+/-	3.43 dB	1GHz - 18GHz
	+/-	3.86 dB	18GHz - 40GHz
Radiated Spurious Emission	+/-	2 dB	33GHz-50GHz
	+/-	1.59 dB	50GHz-60GHz
	+/-	1.7 dB	60GHz-90GHz
	+/-	1.64 dB	90GHz-140GHz
	+/-	3.83 dB	140GHz-220GHz

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 MEASUREMENT EQUIPMENT USED

6.1 Emission from AC power line

AC Power-Line Conducted Emission Test Site: Conduction 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Coaxial Cables	EMC Instruments Corp.	EMCCFD300-BM-BM-3000	161207	06/22/2024	06/21/2025
EMI Test Receiver	R&S	ESCI 7	100759	08/28/2024	08/27/2025
LISN	SCHWARZBECK	NSLK 8127	1040	09/07/2024	09/06/2025
LISN	SCHWARZBECK	NSLK 8127	1041	11/04/2024	11/03/2025
Pulse Limiter	SCHWARZBECK	VTSD 9561F-N	793	06/22/2024	06/21/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

6.2 Conducted Measurement

Conducted Emission Test Site: Conducted 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Attenuator	Mini-Circuits	BW-S10W2+	1	12/11/2024	12/10/2025
DC Block	Mini-Circuits	BLK-18-S+	10	12/11/2024	12/10/2025
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071570	06/25/2024	06/24/2025
Power Meter	Anritsu	ML2496A	1242004	10/23/2024	10/22/2025
Power Sensor	Anritsu	MA2411B	1207365	10/23/2024	10/22/2025
Power Sensor	Anritsu	MA2411B	1207368	10/23/2024	10/22/2025
Test Software	SGS	Radio Test Software	Ver. 21	N.C.R	N.C.R

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6.3 Radiated Measurement

Radiated Emission Test Site: SAC 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
7G High Pass Filter	WI	WHKX10-6090	3	12/11/2024	12/10/2025
Attenuator	Mini-Circuits	BW-S10W2+	23	12/11/2024	12/10/2025
Band Reject Filter 5150-5350	Titan	T04N5150535050S0 1	211112-2-1	12/11/2024	12/10/2025
Band Reject Filter 5470-5725	Titan	T04N5470572550S0 1	211112-2-2	12/11/2024	12/10/2025
Band Reject Filter 5725-5895	Titan	T04N5725589550S0 1	210519-2-1	12/11/2024	12/10/2025
Band Reject Filter 5895-5925	Titan	T04N5895592550S0 1	210519-2-4	12/11/2024	12/10/2025
Bi-log Antenna	SCHWARZBECK	VULB9168	9168-1278	03/04/2024	03/03/2025
Coaxial Cables	Huber Suhner	SUCOFLEX 102	RX Cable 18G-40G MY2630/2+805062/ 2	08/30/2024	08/29/2025
EMI Test Receiver	R&S	ESR 7	102525	02/17/2024	02/16/2025
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY60242392	12/24/2024	12/23/2025
Horn Antenna	RF SPIN	DRH0844	LE2D05A0844	07/10/2024	07/09/2025
Horn Antenna	RF SPIN	DRH18-E	210303A18-ES	02/16/2024	02/15/2025
Loop Antenna	COM-POWER	AL-130R	10160104	12/19/2024	12/18/2025
Pre-Amplifier	EMCI	EMC118A45SEE	980867	08/30/2024	08/29/2025
Pre-Amplifier	EMCI	EMC184045SEE	9080939	08/30/2024	08/29/2025
Pre-Amplifier	EMCI	EMC330N	980826	08/30/2024	08/29/2025
Site Cal	SGS	SAC 2	N/A	08/30/2024	08/29/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

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

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7 CONDUCTED EMISSION TEST

7.1 Standard Applicable

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

Frequency range MHz	Limits (dBuV)	
	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

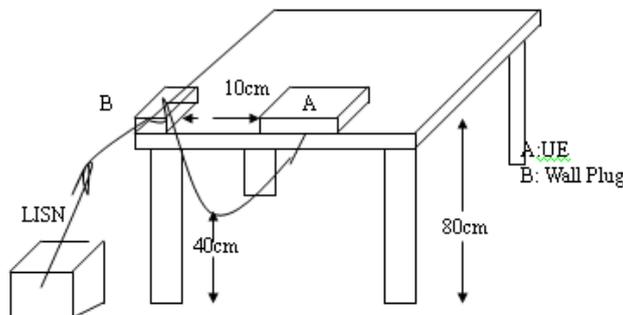
Note

- 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.

7.2 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 EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

7.3 Test SET-UP



7.4 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.

7.5 Measurement Result

Note: Refer to next page for measurement data and plots.

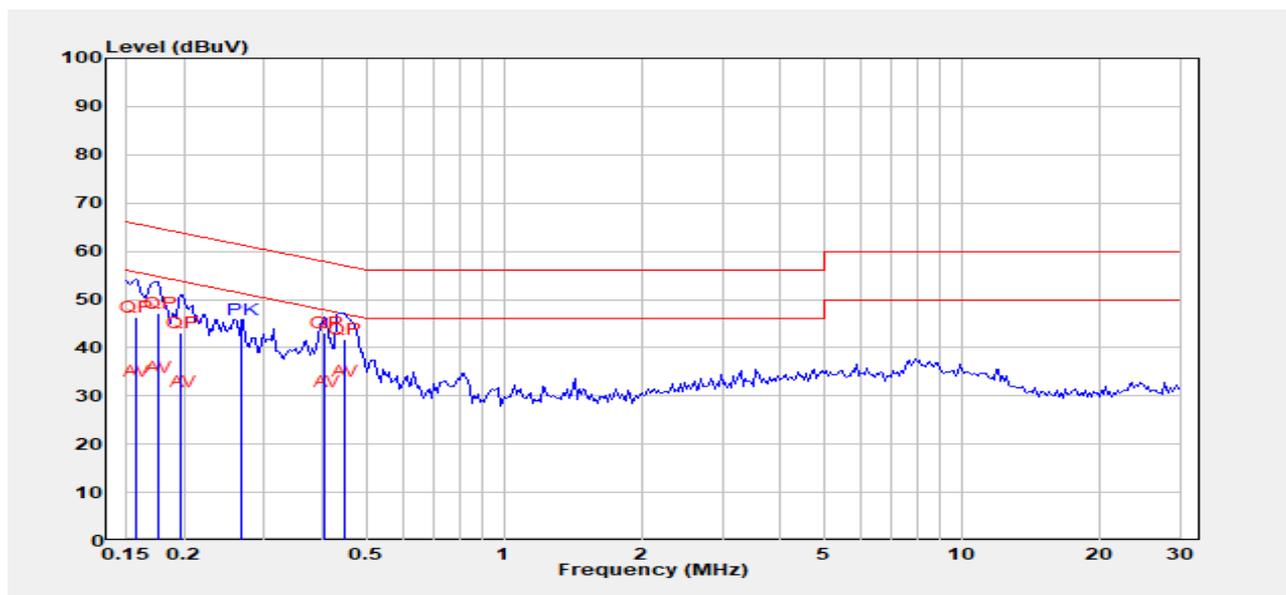
Note2: The * reveals the worst-case results that closest to the limit.

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AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:TERF2501000384ER	Test Site	:Conduction 1
Operation Mode	:WLAN 5G	Test Date	:2025-02-04
Power	:120V/60Hz	Temp./Humi.	:22.1°C/58%
Probe	:L	Engineer	:Bob Chao
Note:	:		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V	Limit dB μ V	Margin dB
0.156	Average	22.95	10.13	33.08	55.65	-22.57
0.156	QP	36.23	10.13	46.36	65.65	-19.29
0.176	Average	23.85	10.13	33.98	54.68	-20.70
0.176	QP	37.03	10.13	47.16	64.68	-17.52
0.198	Average	20.63	10.13	30.76	53.71	-22.95
0.198	QP	32.92	10.13	43.05	63.71	-20.66
0.266	Peak	35.77	10.14	45.91	61.25	-15.34
0.406	Average	20.69	10.15	30.84	47.73	-16.89
0.406	QP	32.98	10.15	43.13	57.73	-14.60
0.447	Average	22.85	10.16	33.01	46.93	-13.93
0.447	QP	31.47	10.16	41.63	56.93	-15.31

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Report Number :TERF2501000384ER

Operation Mode :WLAN 5G

Power :120V/60Hz

Probe :N

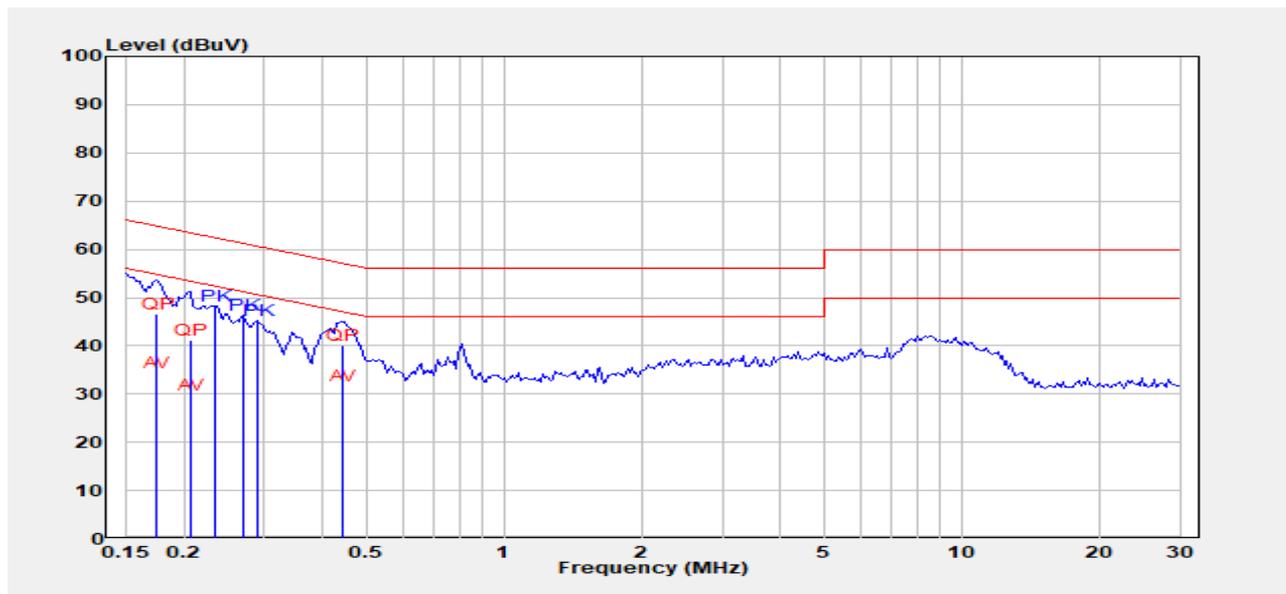
Note: :

Test Site :Conduction 1

Test Date :2025-02-04

Temp./Humi. :22.1°C/58%

Engineer :Bob Chao



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.174	Average	24.35	10.12	34.47	54.77	-20.30
0.174	QP	36.42	10.12	46.54	64.77	-18.23
0.206	Average	19.76	10.12	29.88	53.36	-23.48
0.206	QP	31.11	10.12	41.23	63.36	-22.13
0.234	Peak	38.17	10.13	48.30	62.30	-14.01
0.269	Peak	36.23	10.13	46.36	61.16	-14.80
0.289	Peak	35.00	10.14	45.13	60.54	-15.41
0.442	Average	21.64	10.16	31.80	47.02	-15.23
0.442	QP	29.88	10.16	40.04	57.02	-16.99

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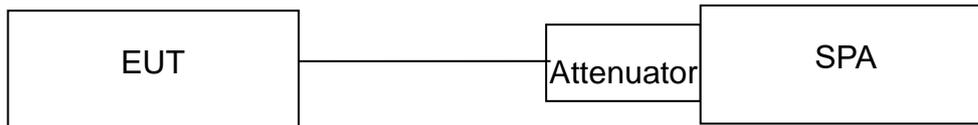
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8 EMISSION BANDWIDTH MEASUREMENT

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 Test Setup



8.3 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.
 - 3.a. 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.
 - 3.b. 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 = $3 \times \text{RBW}$,
Span = large enough to capture all products of the modulation process,
Detector=Peak,
Sweep=auto
 - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. For 99% Bandwidth: Set the spectrum analyzer as
RBW = 1%,
VBW = $3 \times \text{RBW}$,
Span = large enough to capture all products of the modulation process,
Detector=Sample,
Sweep=auto.
7. Turn on the 99% bandwidth function, max reading.
8. Repeat above procedures until all frequency of interest measured was complete.

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8.4 Measurement Result

8.4.1 FCC Occupied Bandwidth

802.11a_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.20	13.260
5220	21.43	13.310
5240	21.31	13.290
5260	21.22	13.270
5300	21.59	13.340
5320	21.07	13.240
5500	21.37	13.300
5580	21.29	13.280
5700	21.06	13.230
5720(U-NII 2C)	20.00	13.010
5720(U-NII 3)	10.00	10.000

802.11n_HT20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.16	13.260
5220	21.38	13.300
5240	21.56	13.340
5260	21.53	13.330
5300	21.57	13.340
5320	21.38	13.300
5500	21.34	13.290
5580	21.47	13.320
5700	21.16	13.260
5720(U-NII 2C)	20.00	13.010
5720(U-NII 3)	10.00	10.000

802.11a_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5720	3.16	5.000
5745	16.30	12.120
5785	16.04	12.050
5825	16.35	12.140

802.11n_HT20_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5720	3.76	5.750
5745	17.59	12.450
5785	15.39	11.870
5825	17.33	12.390

802.11a_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.355819	< 5250
5745	5734.648870	> 5725

802.11n_HT20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.910298	< 5250
5745	5734.452737	> 5725

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802.11ac_VHT20_Ch1

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.33	13.290
5220	21.87	13.400
5240	21.36	13.300
5260	21.31	13.290
5300	21.30	13.280
5320	21.72	13.370
5500	21.41	13.310
5580	21.32	13.290
5700	21.27	13.280
5720(U-NII 2C)	20.00	13.010
5720(U-NII 3)	10.00	10.000

802.11ac_VHT20_Ch1

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5720	3.73	5.720
5745	17.28	12.380
5785	17.31	12.380
5825	17.70	12.480

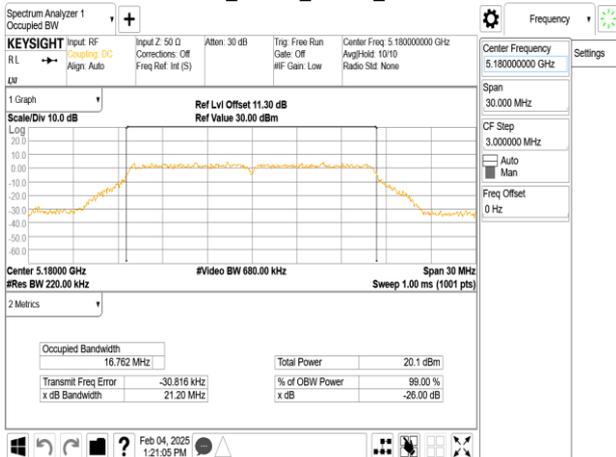
802.11ac_VHT20_Ch1

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.896318	< 5250
5745	5734.572945	> 5725

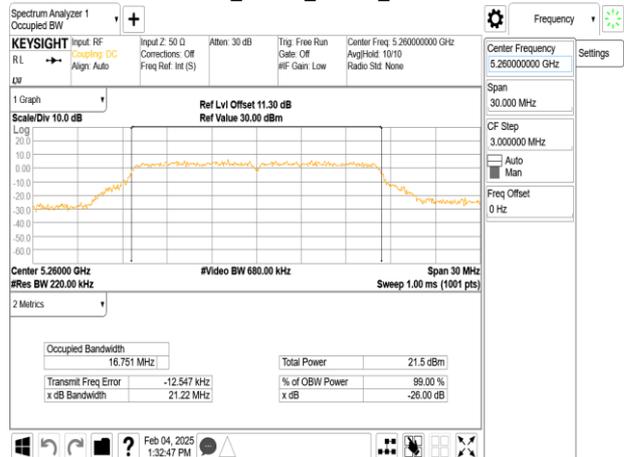
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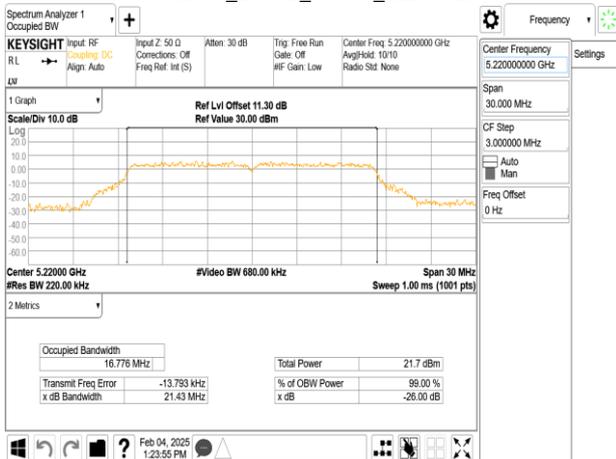
802.11a_20MHz_Chain1_5180MHz



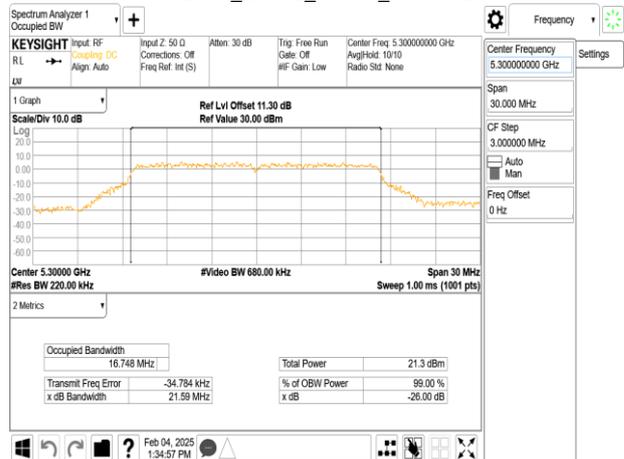
802.11a_20MHz_Chain1_5260MHz



802.11a_20MHz_Chain1_5220MHz



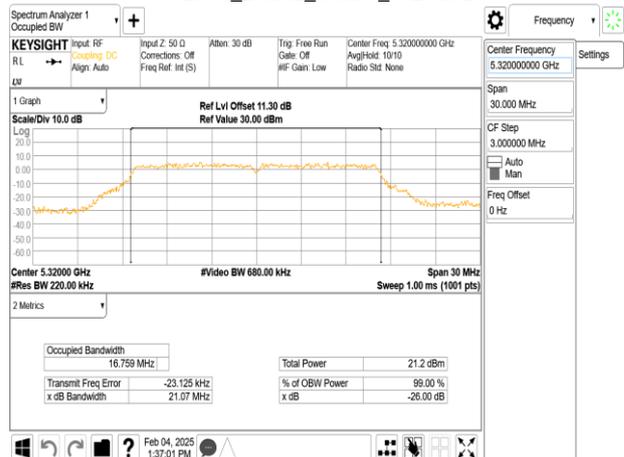
802.11a_20MHz_Chain1_5300MHz



802.11a_20MHz_Chain1_5240MHz



802.11a_20MHz_Chain1_5320MHz



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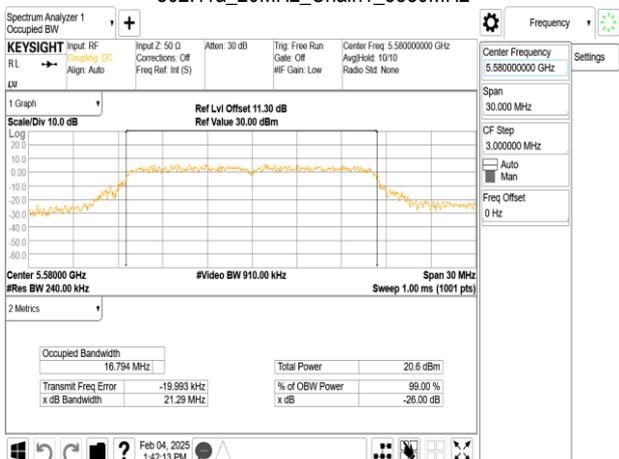
802.11a_20MHz_Chain1_5500MHz



802.11a_20MHz_Chain1_5720MHz_26dB BW



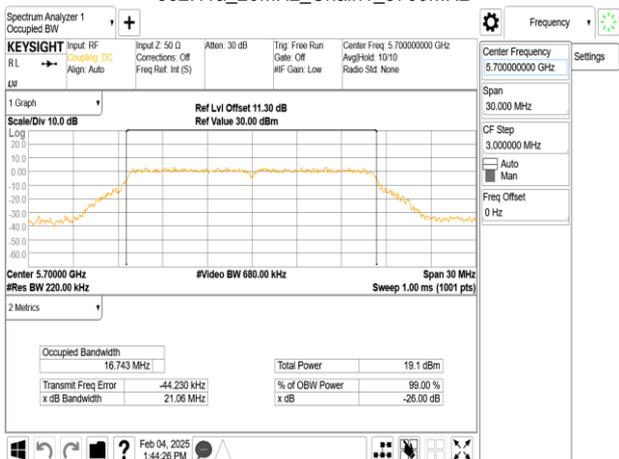
802.11a_20MHz_Chain1_5580MHz



802.11a_20MHz_Chain1_5720MHz_6dB BW



802.11a_20MHz_Chain1_5700MHz



802.11a_20MHz_Chain1_5745MHz

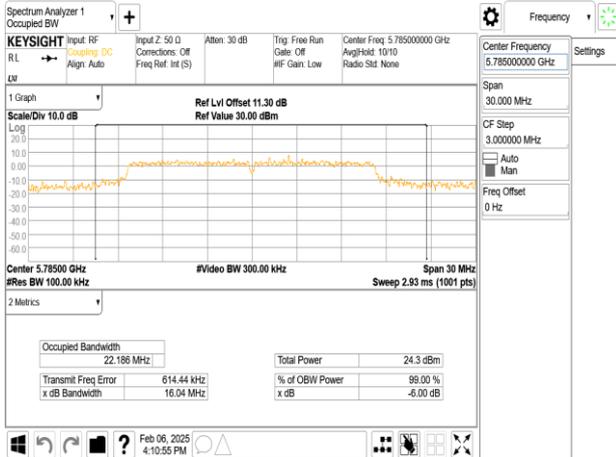


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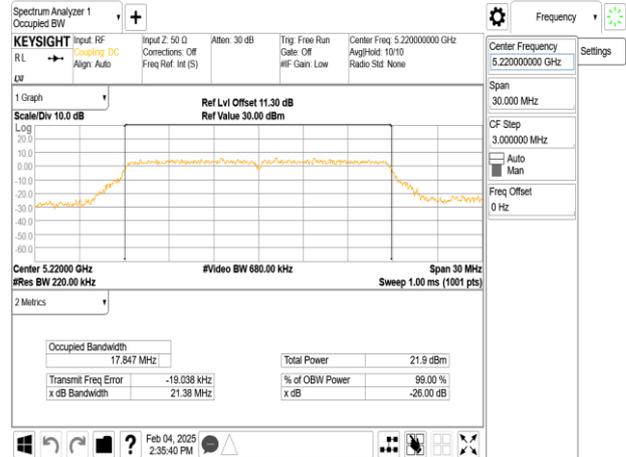
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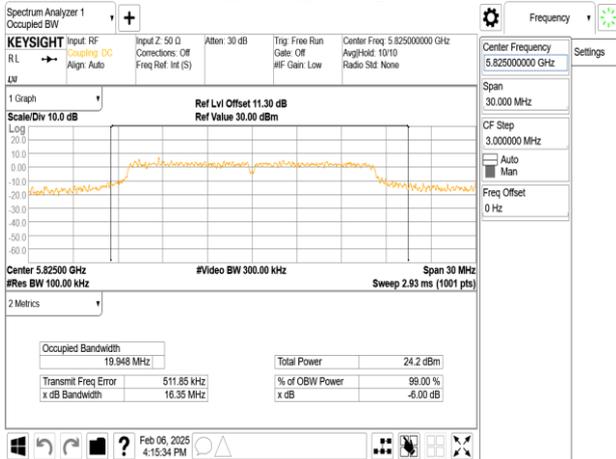
802.11a_20MHz_Chain1_5785MHz



802.11n_20MHz_Chain1_5220MHz



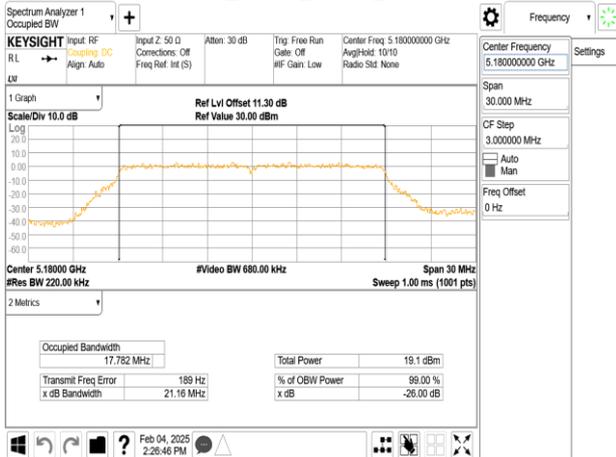
802.11a_20MHz_Chain1_5825MHz



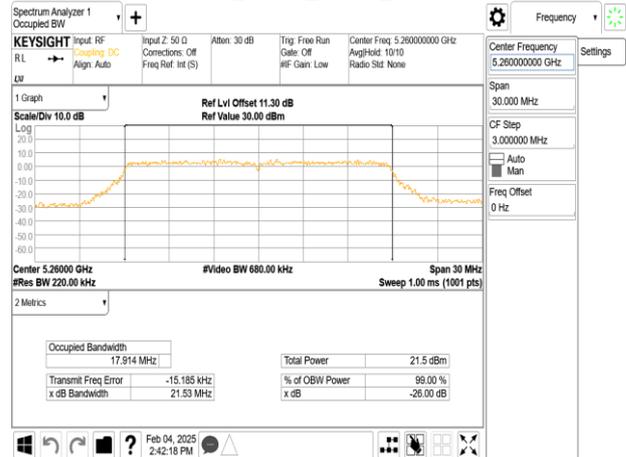
802.11n_20MHz_Chain1_5240MHz



802.11n_20MHz_Chain1_5180MHz



802.11n_20MHz_Chain1_5260MHz

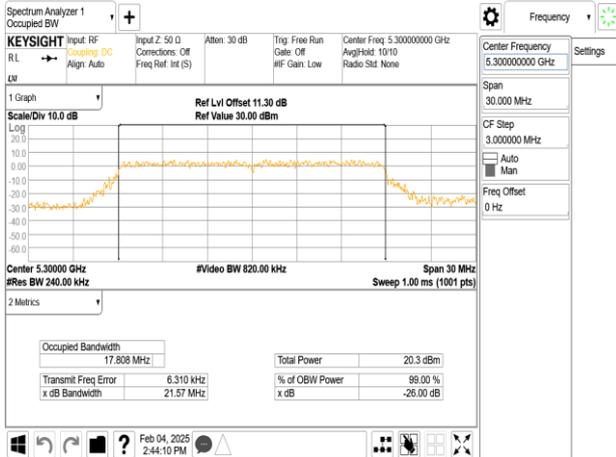


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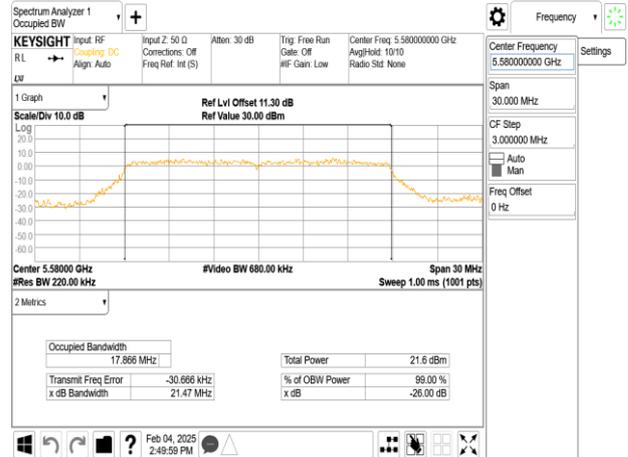
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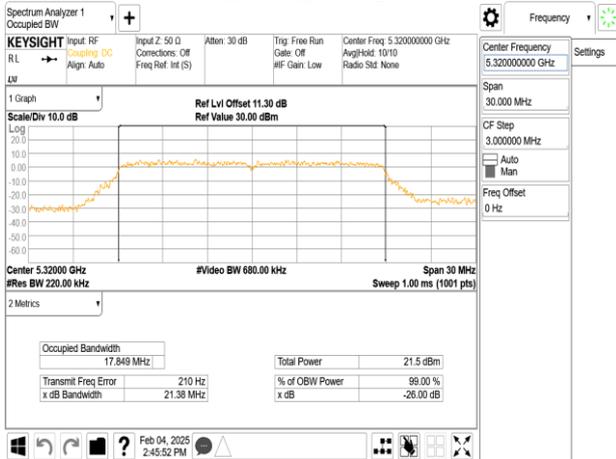
802.11n_20MHz_Chain1_5300MHz



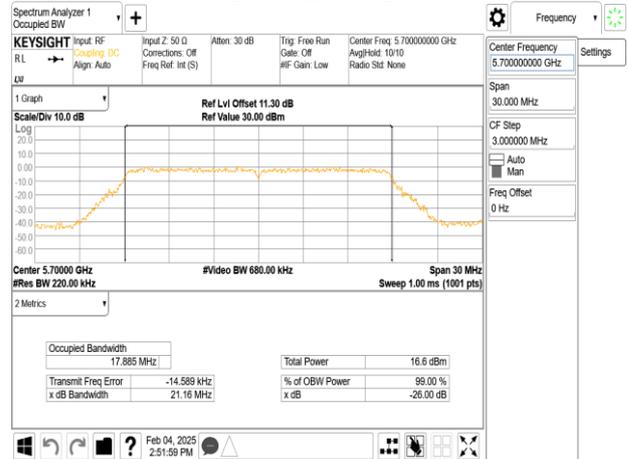
802.11n_20MHz_Chain1_5580MHz



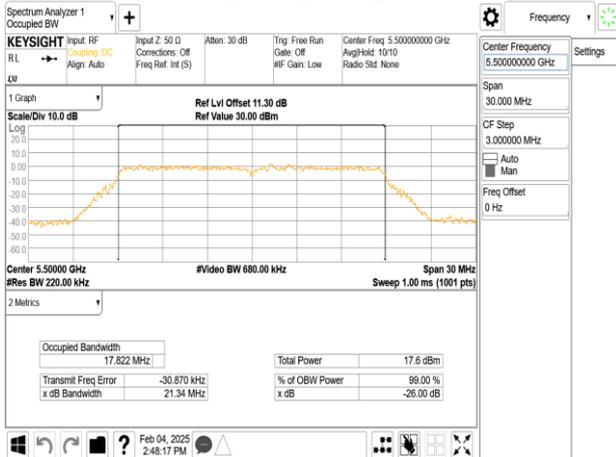
802.11n_20MHz_Chain1_5320MHz



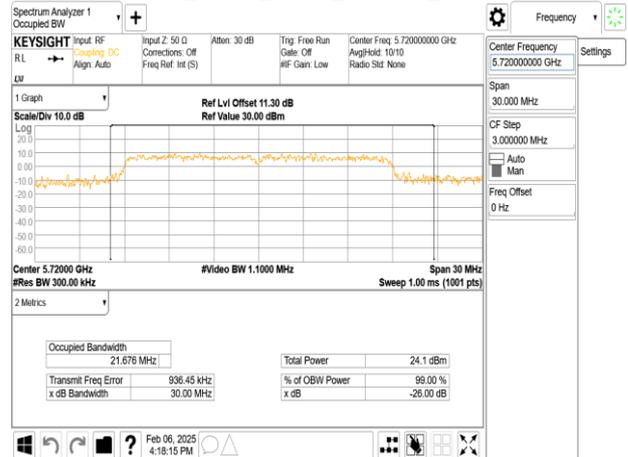
802.11n_20MHz_Chain1_5700MHz



802.11n_20MHz_Chain1_5500MHz



802.11n_20MHz_Chain1_5720MHz_26dB BW

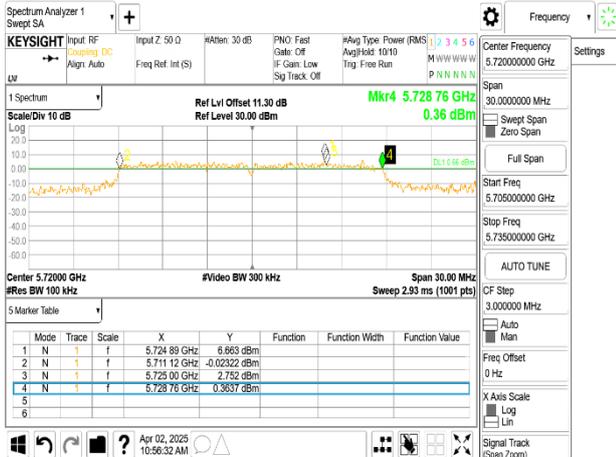


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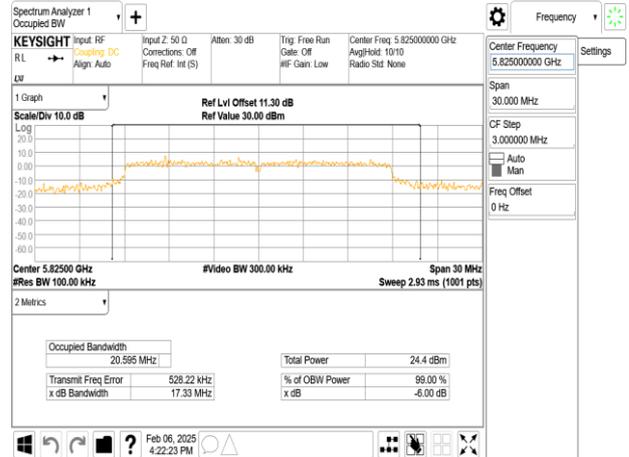
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802.11n_20MHz_Chain1_5720MHz_6dB BW



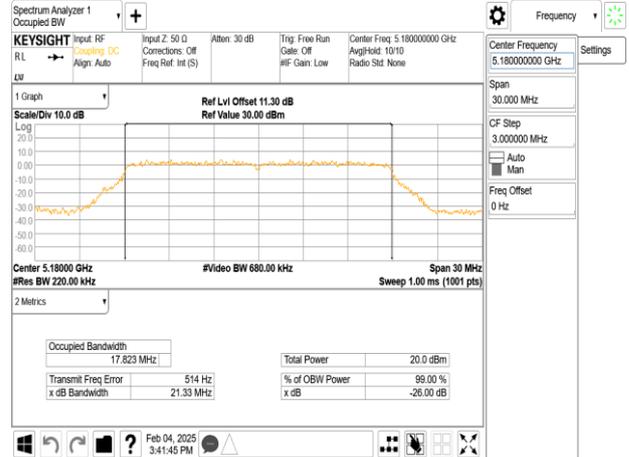
802.11n_20MHz_Chain1_5825MHz



802.11n_20MHz_Chain1_5745MHz



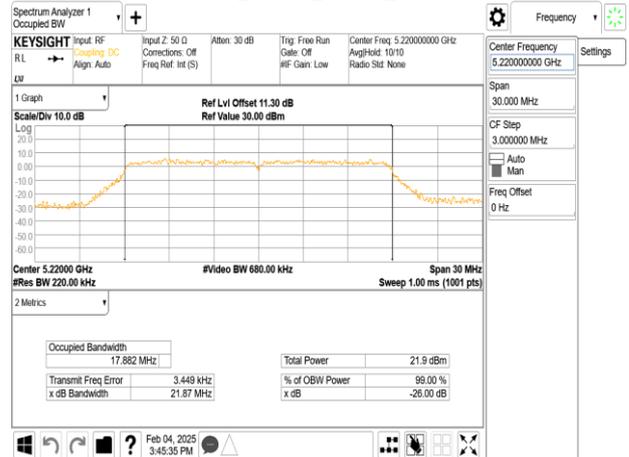
802.11ac_20MHz_Chain1_5180MHz



802.11n_20MHz_Chain1_5785MHz



802.11ac_20MHz_Chain1_5220MHz



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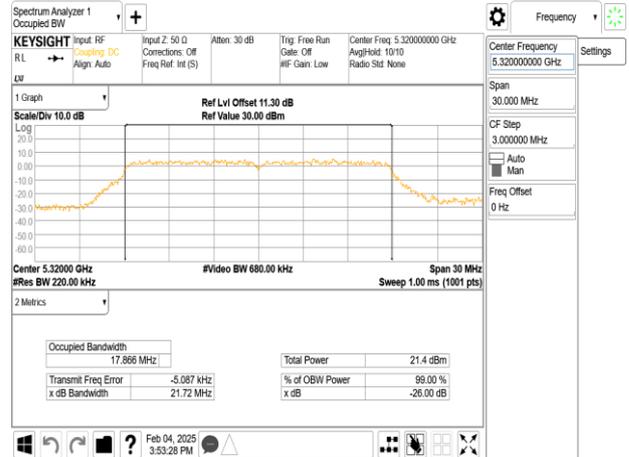
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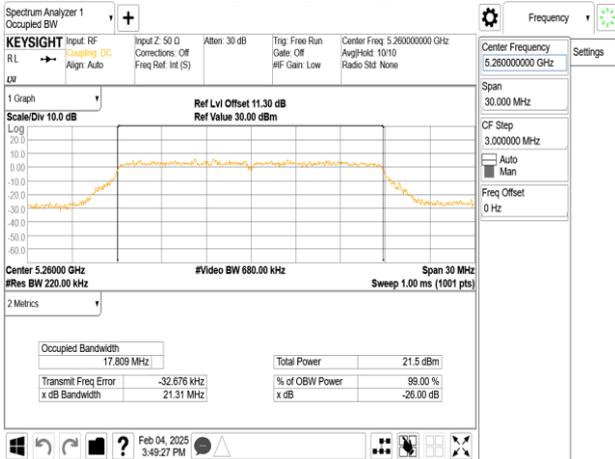
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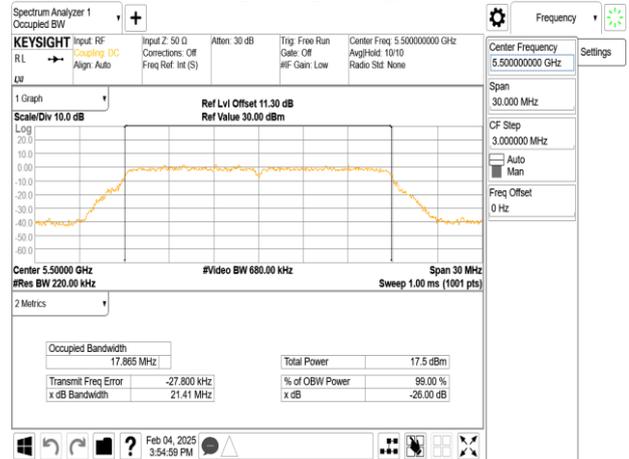
802.11ac_20MHz_Chain1_5320MHz



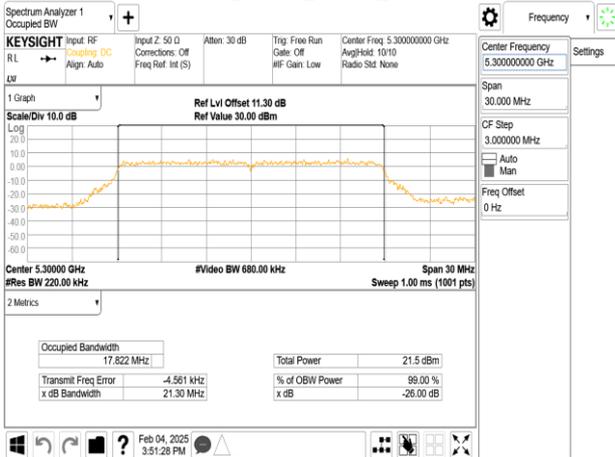
802.11ac_20MHz_Chain1_5260MHz



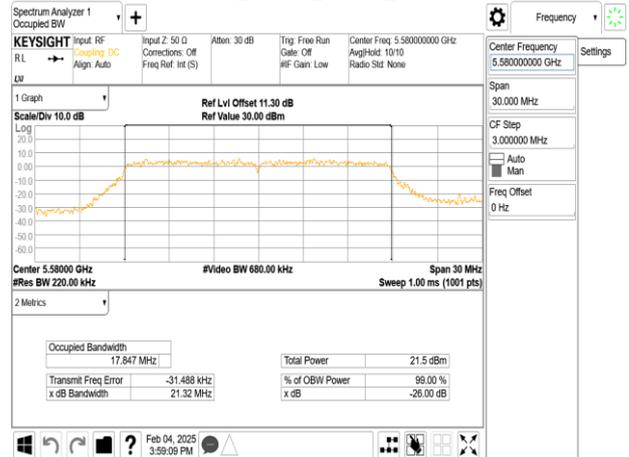
802.11ac_20MHz_Chain1_5500MHz



802.11ac_20MHz_Chain1_5300MHz



802.11ac_20MHz_Chain1_5580MHz

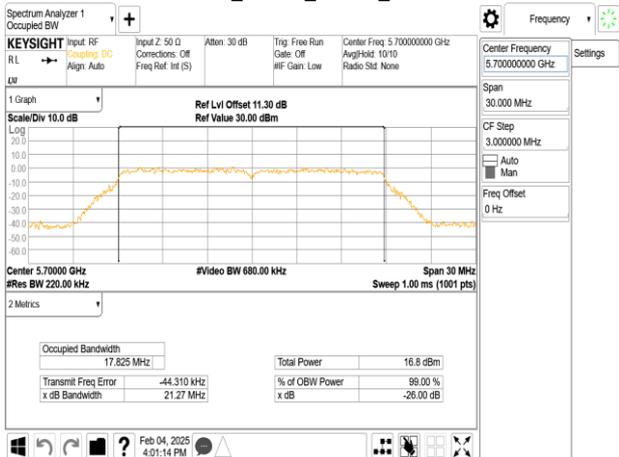


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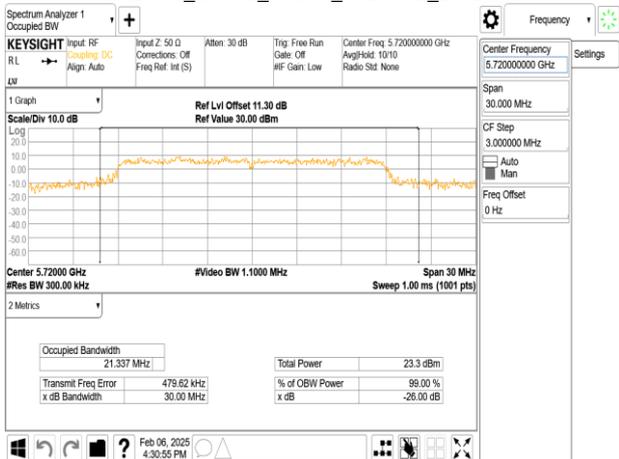
802.11ac_20MHz_Chain1_5700MHz



802.11ac_20MHz_Chain1_5745MHz



802.11ac_20MHz_Chain1_5720MHz_26dB BW



802.11ac_20MHz_Chain1_5785MHz



802.11ac_20MHz_Chain1_5720MHz_6dB BW



802.11ac_20MHz_Chain1_5825MHz



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9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

9.1.1 Duty Cycle

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.

9.1.2 FCC

Band	EUT CATEGORY		e-CRF Title 47 §15.407			
			Conducted Output Power	EIRP	TPC	Antenna Directional Gain Requirements
U-NII-1		Fixed point-to-point	1 Watt(30dBm)	Not required	Not required	23dBi
		Outdoor AP	1 Watt(30dBm)	Elevation angle above 30 degrees 125mW (21dBm)	Not required	6dBi
		Indoor AP	1 Watt(30dBm)	Not required	Not required	6dBi
	V	Other	250mW(23.98dBm)	Not required	Not required	6dBi
U-NII-2A	V	Other	250mW(23.98dBm) or 11dBm+10 log B	Not required	When EIRP >500mW At least 6dB below EIRP 1W (30dBm)	6dBi
U-NII-2C	V	Other	250mW(23.98dBm) or 11dBm+10 log B	Not required		6dBi
U-NII-3	V	Other	1 Watt(30dBm)	Not required	Not required	6dBi
		Fixed point-to-point	1 Watt(30dBm)	Not required	Not required	Not required
U-NII-4		Indoor AP (a channel spans 5725~5850 and 5850~5895MHz)	Not required	36dBm	Not required	Not required
		Indoor client (a channel spans 5725~5850 and 5850~5895MHz)	Not required	30dBm	Not required	Not required
		Subordinate device	Not required	36dBm	Not required	Not required

1. If transmitting antennas of directional gain greater than the antenna requirements column, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna.

2. For the 10 log B, B is the 26 dB emission bandwidth.

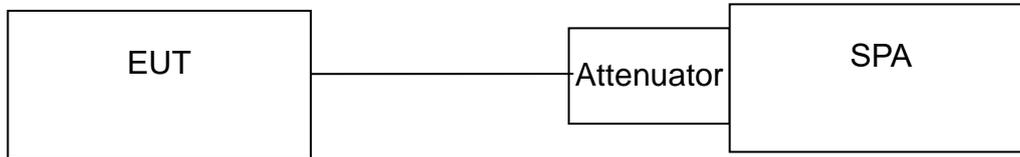
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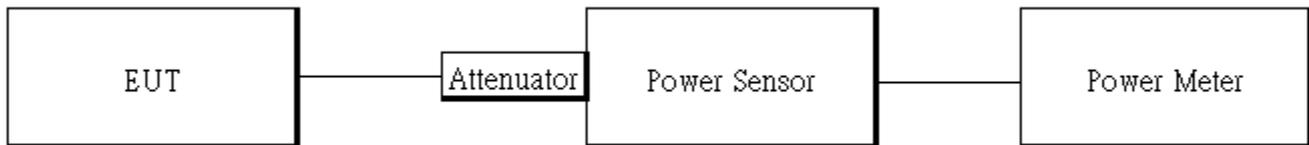
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9.2 Test Setup

9.2.1 Duty Cycle



9.2.2 Output Power



9.3 Measurement Procedure

9.3.1 Duty Cycle Measurements

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

9.3.2 Output Power Measurements

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
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add $10 \log(1/\text{duty cycle})$.
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

Note:

For U-NII1, 2A, 2C and 3 Bands, when the antenna gain is greater than 6 dBi, the power limit attenuated accordingly.

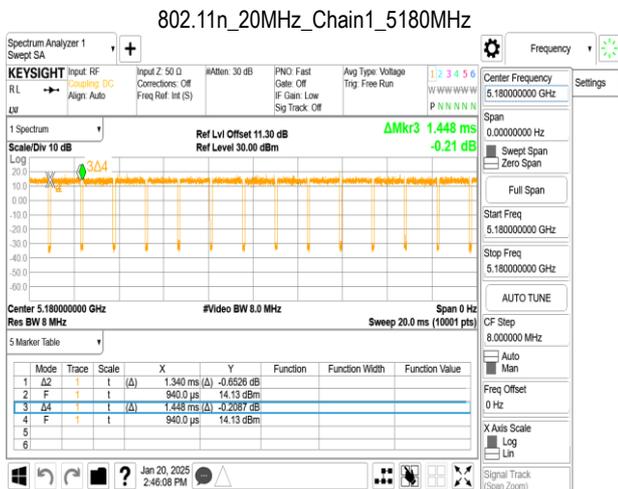
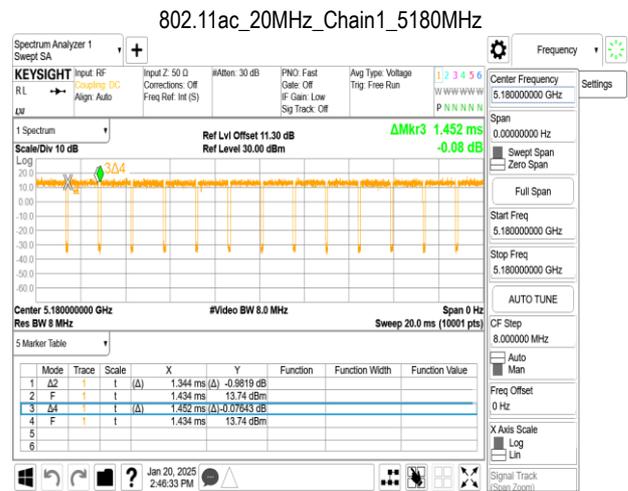
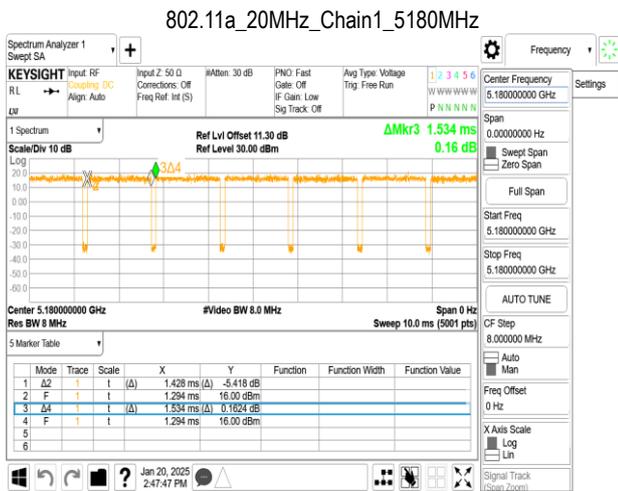
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9.4 Duty Cycle Measurement Result

Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	93.09	0.31	0.70	1.00
802.11n_20	92.54	0.34	0.75	1.00
802.11ac_20	92.56	0.34	0.74	1.00



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9.5 Output Power Measurement Result

9.5.1 FCC Output power

802.11a_Ch1

CH	Frequency (MHz)	Data Rate	Power Setting	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	58	30.137	14.79	23.98	PASS
44	5220	6	64	43.261	16.36	23.98	PASS
48	5240	6	64	43.661	16.40	23.98	PASS
52	5260	6	64	43.661	16.40	23.98	PASS
60	5300	6	64	43.561	16.39	23.98	PASS
64	5320	6	64	43.261	16.36	23.98	PASS
100	5500	6	55	25.828	14.12	23.98	PASS
116	5580	6	66	42.179	16.25	23.98	PASS
140	5700	6	57	27.046	14.32	23.98	PASS
144	5720(U-NII 2C)	6	76	66.375	18.22	23.98	PASS
144	5720 (U-NII 3)	6	76	33.188	15.21	30	PASS
149	5745	6	76	98.877	19.95	30	PASS
157	5785	6	76	99.334	19.97	30	PASS
165	5825	6	76	96.183	19.83	30	PASS

802.11n_HT20_Ch1

CH	Frequency (MHz)	Data Rate	Power Setting	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	54	23.915	13.79	23.98	PASS
44	5220	MCS0	64	44.429	16.48	23.98	PASS
48	5240	MCS0	64	44.124	16.45	23.98	PASS
52	5260	MCS0	64	42.822	16.32	23.98	PASS
60	5300	MCS0	65	43.318	16.37	23.98	PASS
64	5320	MCS0	65	44.429	16.48	23.98	PASS
100	5500	MCS0	46	16.393	12.15	23.98	PASS
116	5580	MCS0	66	43.518	16.39	23.98	PASS
140	5700	MCS0	46	14.577	11.64	23.98	PASS
144	5720(U-NII 2C)	MCS0	76	65.854	18.19	23.98	PASS
144	5720 (U-NII 3)	MCS0	76	32.927	15.18	30	PASS
149	5745	MCS0	75	97.650	19.90	30	PASS
157	5785	MCS0	76	99.465	19.98	30	PASS
165	5825	MCS0	76	94.770	19.77	30	PASS

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802.11ac_VHT20_Ch1

CH	Frequency (MHz)	Data Rate	Power Setting	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	57	27.642	14.42	23.98	PASS
44	5220	MCS0	64	44.114	16.45	23.98	PASS
48	5240	MCS0	64	43.710	16.41	23.98	PASS
52	5260	MCS0	64	42.616	16.30	23.98	PASS
60	5300	MCS0	65	42.813	16.32	23.98	PASS
64	5320	MCS0	65	44.114	16.45	23.98	PASS
100	5500	MCS0	46	16.240	12.11	23.98	PASS
116	5580	MCS0	66	42.813	16.32	23.98	PASS
140	5700	MCS0	47	17.162	12.35	23.98	PASS
144	5720(U-NII 2C)	MCS0	76	64.638	18.10	23.98	PASS
144	5720 (U-NII 3)	MCS0	76	32.319	15.09	30	PASS
149	5745	MCS0	75	96.733	19.86	30	PASS
157	5785	MCS0	76	97.180	19.88	30	PASS
165	5825	MCS0	76	92.593	19.67	30	PASS

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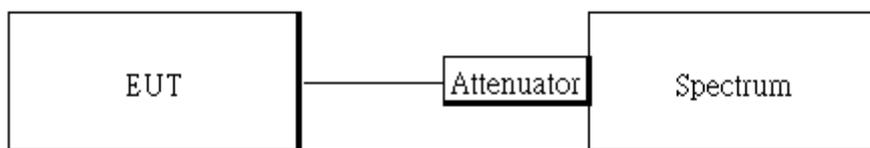
10 MAXIMUM POWER SPECTRAL DENSITY

10.1 FCC Standard

Operation Bands	EUT CATEGORY		e-CRF Title 47 §15.407 Power Spectral Density	Antenna Directional Gain Requirements
U-NII-1		Outdoor Access Point (Master)	1. 17dBm/ MHz 2. EIRP<=125mW(21dBm) at any elevation angle > 30°	6dBi
		Indoor Access Point (Master)	17dBm / MHz	6dBi
		Fixed point-to-point Access Point	17dBm / MHz	23dBi
	V	Client device	11dBm / MHz	6dBi
U-NII-2A	V	All	11dBm / MHz	6dBi
U-NII-2C	V	All	11dBm / MHz	6dBi
U-NII-3	V	All	30dBm / 500kHz	6dBi
U-NII-4		Indoor AP	20dBm / MHz e.i.r.p.	Not required
		Indoor client	14dBm / MHz e.i.r.p.	Not required
		Subordinate device	20dBm / MHz e.i.r.p.	Not required

If transmitting antennas of directional gain greater than the antenna requirements column, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna.

10.2 Test Setup



10.3 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 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 (1001 pts), Detector = power averaging (rms), if available. Otherwise, use sample detector mode, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

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For U-NII-3 Band:

Set RBW=300kHz, VBW=1MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto, detector = RMS or sample, traces 100 sweeps of video averaging.

In addition, measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result.

5. Use the cursor on spectrum to peak search the highest level of trace
6. (1)Duty cycle \geq 98% : Record the max. reading.
(2)Duty cycle < 98% : 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.

Note:

For U-NII1, 2A, 2C and 3 Bands, when the antenna gain is greater than 6 dBi, the power spectral density limit attenuated accordingly.

10.4 Measurement Result

POWER DENSITY 802.11a MODE						
Frequency (MHz)	Ch1 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5180	3.891	0.31	4.20		11.00 dBm/MHz	-6.80
5220	5.430	0.31	5.74		11.00 dBm/MHz	-5.26
5240	5.226	0.31	5.54		11.00 dBm/MHz	-5.46
5260	5.032	0.31	5.34		11.00 dBm/MHz	-5.66
5300	4.549	0.31	4.86		11.00 dBm/MHz	-6.14
5320	4.460	0.31	4.77		11.00 dBm/MHz	-6.23
5500	2.232	0.31	2.54		11.00 dBm/MHz	-8.46
5580	5.280	0.31	5.59		11.00 dBm/MHz	-5.41
5700	3.111	0.31	3.42		11.00 dBm/MHz	-7.58
5720 (U-NII 2C)	8.463	0.31	8.77		11.00 dBm/MHz	-2.23
Frequency (MHz)	Ch1 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)
5720 (U-NII 3)	2.882	0.31	2.22	5.41	30.00 dBm/500kHz	-24.59
5745	2.815	0.31	2.22	5.35	30.00 dBm/500kHz	-24.66
5785	3.327	0.31	2.22	5.86	30.00 dBm/500kHz	-24.14
5825	2.539	0.31	2.22	5.07	30.00 dBm/500kHz	-24.93

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POWER DENSITY 802.11n HT20 MODE						
Frequency (MHz)	Ch1 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5180	2.809	0.34	3.15		11.00 dBm/MHz	-7.85
5220	4.994	0.34	5.33		11.00 dBm/MHz	-5.67
5240	5.282	0.34	5.62		11.00 dBm/MHz	-5.38
5260	4.815	0.34	5.16		11.00 dBm/MHz	-5.85
5300	4.762	0.34	5.10		11.00 dBm/MHz	-5.90
5320	4.552	0.34	4.89		11.00 dBm/MHz	-6.11
5500	0.481	0.34	0.82		11.00 dBm/MHz	-10.18
5580	4.905	0.34	5.25		11.00 dBm/MHz	-5.76
5700	0.286	0.34	0.63		11.00 dBm/MHz	-10.37
5720 (U-NII 2C)	8.313	0.34	8.65		11.00 dBm/MHz	-2.35
Frequency (MHz)	Ch1 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)
5720 (U-NII 3)	3.504	0.34	2.22	6.06	30.00 dBm/500kHz	-23.94
5745	3.202	0.34	2.22	5.76	30.00 dBm/500kHz	-24.24
5785	3.011	0.34	2.22	5.57	30.00 dBm/500kHz	-24.43
5825	2.147	0.34	2.22	4.71	30.00 dBm/500kHz	-25.29
POWER DENSITY 802.11ac VHT20 MODE						
Frequency (MHz)	Ch1 meas PSD (dBm/MHz)	Duty Factor (dB)	Maxmum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5180	3.279	0.34	3.62		11.00 dBm/MHz	-7.38
5220	5.145	0.34	5.49		11.00 dBm/MHz	-5.52
5240	5.097	0.34	5.44		11.00 dBm/MHz	-5.56
5260	4.542	0.34	4.88		11.00 dBm/MHz	-6.12
5300	4.490	0.34	4.83		11.00 dBm/MHz	-6.17
5320	4.209	0.34	4.55		11.00 dBm/MHz	-6.45
5500	0.358	0.34	0.70		11.00 dBm/MHz	-10.30
5580	5.146	0.34	5.49		11.00 dBm/MHz	-5.51
5700	0.310	0.34	0.65		11.00 dBm/MHz	-10.35
5720 (U-NII 2C)	7.961	0.34	8.30		11.00 dBm/MHz	-2.70
Frequency (MHz)	Ch1 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maxmum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)
5720 (U-NII 3)	3.084	0.34	2.22	5.64	30.00 dBm/500kHz	-24.36
5745	3.188	0.34	2.22	5.75	30.00 dBm/500kHz	-24.25
5785	2.804	0.34	2.22	5.36	30.00 dBm/500kHz	-24.64
5825	2.595	0.34	2.22	5.16	30.00 dBm/500kHz	-24.85

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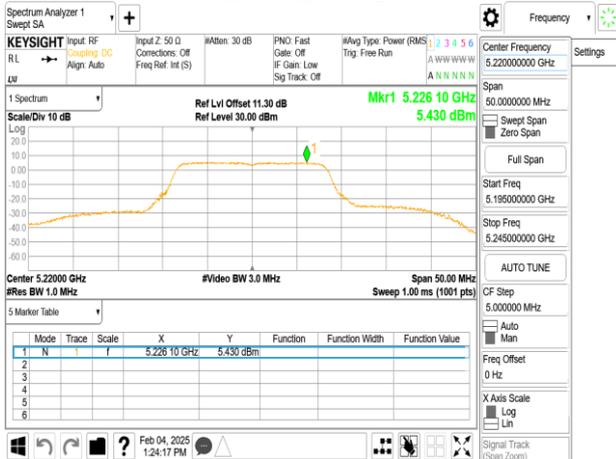
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802.11a_20MHz_Chain1_5260MHz



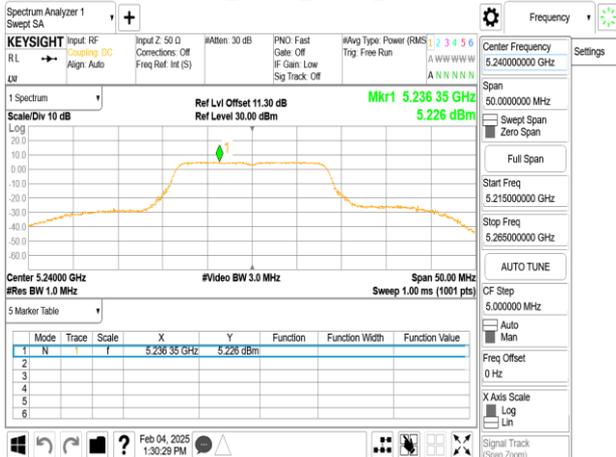
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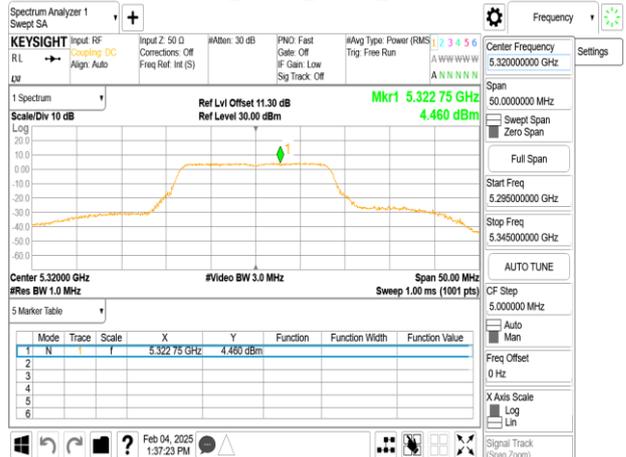
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802.11a_20MHz_Chain1_5240MHz



802.11a_20MHz_Chain1_5320MHz

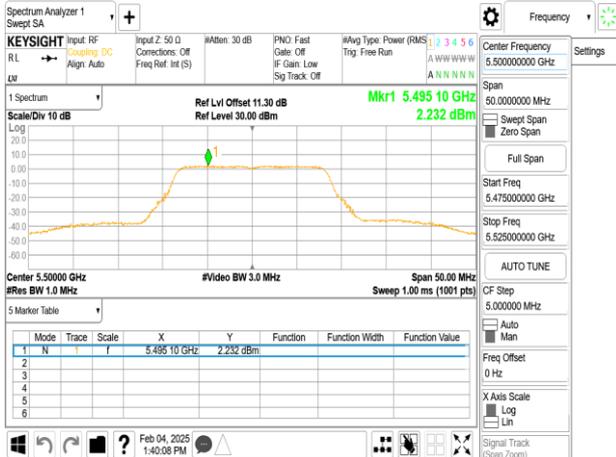


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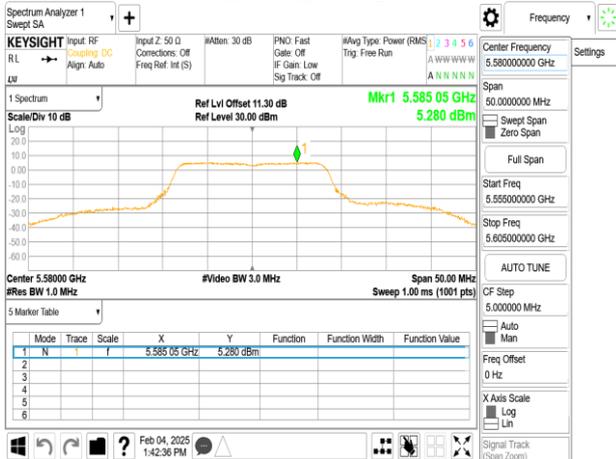
802.11a_20MHz_Chain1_5500MHz



802.11a_20MHz_Chain1_5720MHz_UNII 2C



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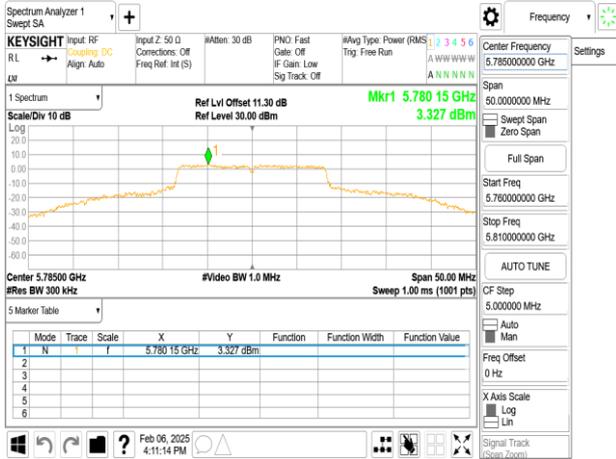


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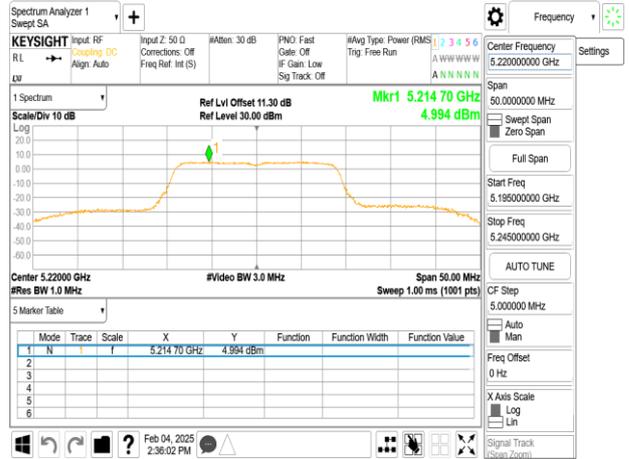
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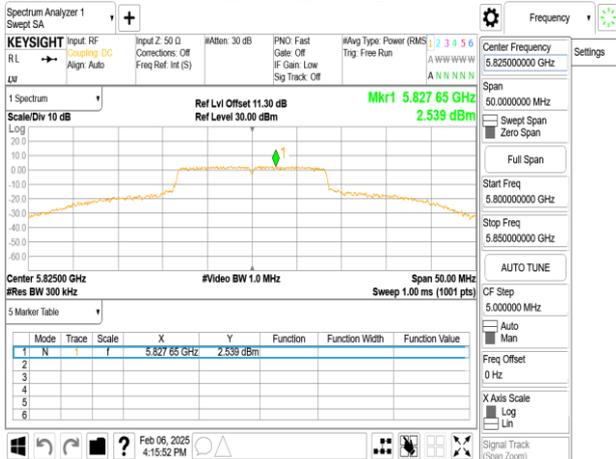
802.11a_20MHz_Chain1_5785MHz



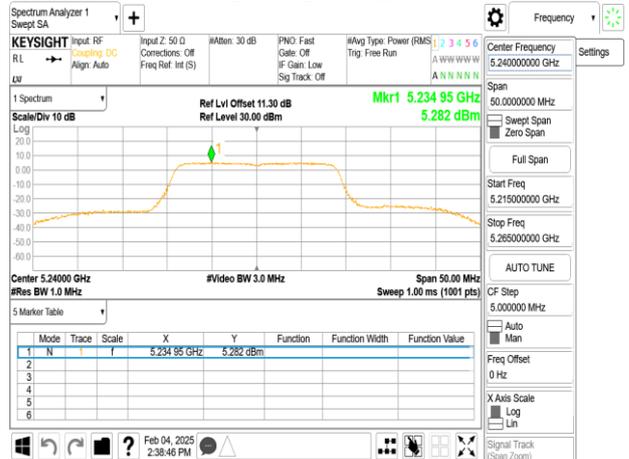
802.11n_20MHz_Chain1_5220MHz



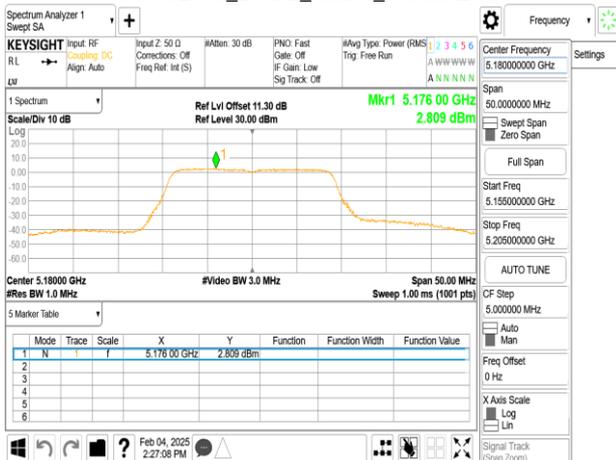
802.11a_20MHz_Chain1_5825MHz



802.11n_20MHz_Chain1_5240MHz



802.11n_20MHz_Chain1_5180MHz



802.11n_20MHz_Chain1_5260MHz



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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