

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



Applicant: Qualcomm Technologies, Inc.
5775 Morehouse Drive, San Diego, CA 92121-1714, United States

Manufacturer: Qualcomm Technologies, Inc.
5775 Morehouse Drive, San Diego, CA 92121-1714, United States

Product Name: Micro-Power Wi-Fi LGA Module for IoT applications

Brand Name: Qualcomm

Model No.: QCC730M-0X

Report Number: TERF2501000170E2

FCC ID J9C-QCC730M0X

Date of EUT Received: January 09, 2025

Date of Test: January 14, 2025 ~ April 25, 2025

Issue Date: July 04, 2025

Approved By

Arno Hsieh

Arno Hsieh

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
TERF2501000170E2	00	Original	May 16, 2025	Sharon Kuo	
TERF2501000170E2	01	Update antenna information in page 5	July 04, 2025	Karen Huang	

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.
- 2、Variant information of HW SKU is provided by the applicant, test results of this report are applicable to the sample EUT(s) received.
And are assessed as electrically identical in RF characteristics, therefore, no further assessment required for the variant(s).

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1 GENERAL INFORMATION

1.1 Product Description

Product Name	Micro-Power Wi-Fi LGA Module for IoT applications
Brand Name	Qualcomm
Model No.	QCC730M-0X
HW SKU	QCC730M-0XB, QCC730M-0XU
Hardware Version	N/A
Firmware Version	N/A
EUT Series No.	02E0X19489016
Power Supply	3.3Vdc
Test Software (Name/Version)	Qualcomm Sequence Profiling Resource Version 6.00.00156.1

1.2 Modulation & Data Rate

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

1.3 HW SKU Difference Table

HW SKU	QCC730M-0XU	QCC730M-0XB
Antenna type	3 types: PIFA, Monopole, Dipole	1 type: PCB
ANT	No antenna matching	L3=0.3nH C40=0R L4=0.2pF L6=0R L7=NC

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1.4 Antenna Designation

Antenna Type	Antenna Part No.	Freq.(MHz)	Peak Antenna Gain (dBi)
PCB Antenna	RFIQM0730010XB001	5150~5250	0.72
		5250~5350	1.04
		5470~5725	2.7
		5725~5850	3.17
PIFA Antenna	RFPCA303510EMMB101	5150~5250	2.27
		5250~5350	2.56
		5470~5725	3.43
		5725~5850	3.19
Dipole Antenna	RFPCA331010EMMB101	5150~5250	2.97
		5250~5350	3.09
		5470~5725	3.37
		5725~5850	3.28
Monopole Antenna	RFPCA501010EMMB101	5150~5250	3
		5250~5350	2.87
		5470~5725	3.29
		5725~5850	3.18

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.

1.5 FCC

Wi-Fi	Frequency Range	Channels	EIRP/Avg	Rated Power(EIRP/Avg) (dBm) (Worst Case)	Modulation Technology
802.11a/ 802.11n_HT20	5180~5240	4	Avg	20.39 dBm	OFDM
	5260~5320	4	Avg	20.40 dBm	OFDM
	5500~5720	12	Avg	20.38 dBm	OFDM
	5745-5825	5	Avg	20.44 dBm	OFDM

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1.6 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

1.7 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designa- tion 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 indica- tion where measurements occurred in specific test site and address.				

1.8 Special Accessories

There are no special accessories used while test was conducted.

1.9 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

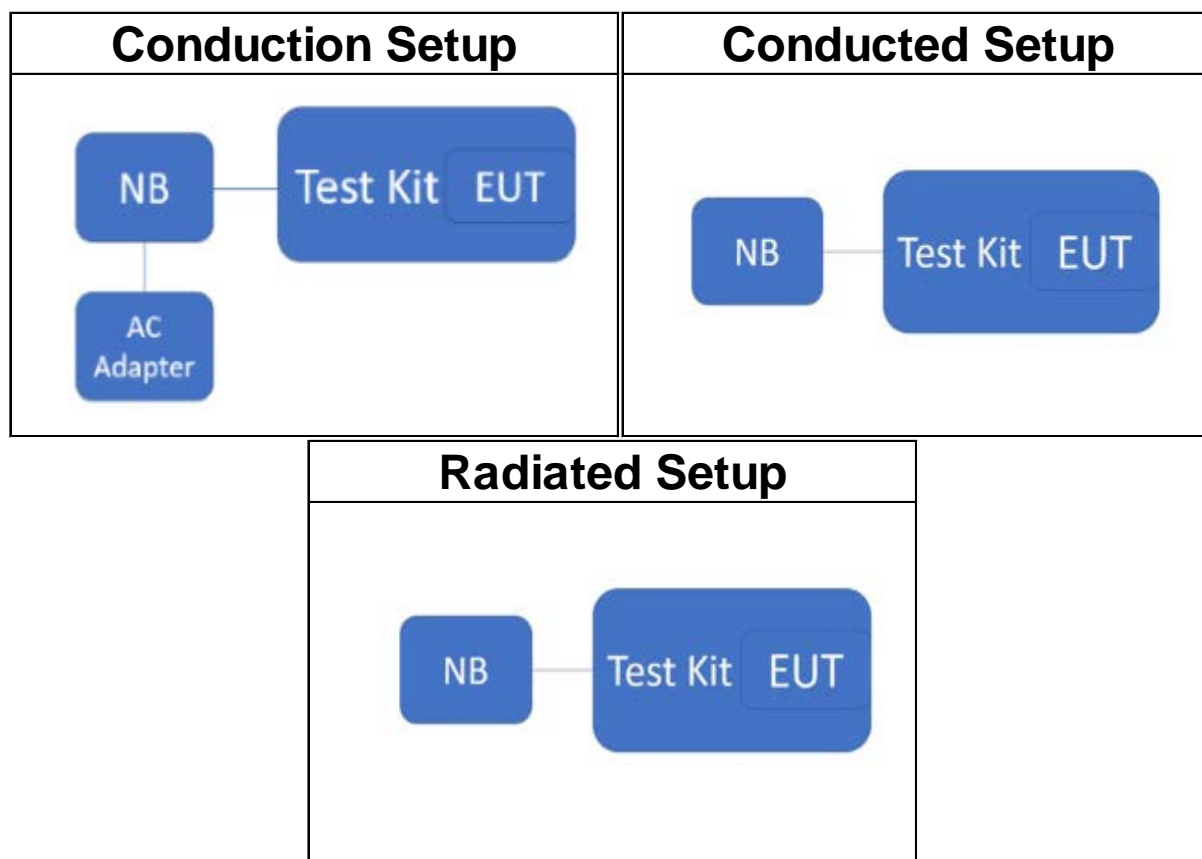
Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

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 C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
USB to Type-c	A-GOOD	USB to Type-c	N/A	N/A	N/A
USB Cable	Qionho	USB-C100	N/A	N/A	N/A
Notebook	Lenovo	L412	S0011357	N/A	N/A
NB Adapter	Lenovo	ADLX65YLC3A	8SSA10M13945L1C Z88N0F8W	N/A	N/A
QCC73X Module Development Kit Board	Walsin	QCC730-DVK	N/A	N/A	N/A

Conducted Emission Test Site: Conducted F					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Notebook	Lenovo	T14	P0003332	N/A	N/A
Type C USB cable	PowerSync	CUBCVARA0010	N/A	N/A	N/A
QCC73X Module Development Kit Board	Walsin	QCC730-DVK	N/A	N/A	N/A

Radiated Emission Test Site: SAC D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
USB to Type-c	A-GOOD	USB to Type-c	N/A	N/A	N/A
USB Cable	Qionho	USB-C100	N/A	N/A	N/A
Notebook	Lenovo	L412	S0011357	N/A	N/A
QCC73X Module Development Kit Board	Walsin	QCC730-DVK	N/A	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.

Mode	Transmission Chain				Single Transmission Spatial	Multiple Transmission Spatial
<input checked="" type="checkbox"/> 802.11 a	<input checked="" type="checkbox"/> Ch0	<input type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input checked="" type="checkbox"/> 1TX	<input type="checkbox"/> 2TX
<input checked="" type="checkbox"/> 802.11 n	<input checked="" type="checkbox"/> Ch0	<input type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input checked="" type="checkbox"/> 1TX	<input type="checkbox"/> 2TX
<input type="checkbox"/> 802.11 ac	<input type="checkbox"/> Ch0	<input type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> 1TX	<input type="checkbox"/> 2TX
<input type="checkbox"/> 802.11 ax	<input type="checkbox"/> Ch0	<input type="checkbox"/> Ch1	<input type="checkbox"/> Ch2	<input type="checkbox"/> Ch3	<input type="checkbox"/> 1TX	<input type="checkbox"/> 2TX

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.

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	Ch0
	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	Ch0
	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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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	Ch0
	5260~5320	52 to 64	60	OFDM		
	5500~5720	100 to 144	116	OFDM		
	5745~5825	149 to 165	157	OFDM		

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	Ch0
	5260~5320	52 to 64	52,60,64	OFDM		
	5500~5700	100 to 140	100,116,140,144	OFDM		
	5745~5825	149 to 165	149,157,165	OFDM		
802.11n20	5180~5240	36 to 48	36,44,48	OFDM	MCS0	Ch0
	5260~5320	52 to 64	52,60,64	OFDM		
	5500~5700	100 to 140	100,116,140,144	OFDM		
	5745~5825	149 to 165	149,157,165	OFDM		

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
Emission Bandwidth	+/- 1.38 Hz
Output Power measurement	+/- 0.97 dB
Peak Power Spectral Density Measurement	+/- 0.61 dB
Frequency Stability	+/- 1.48 Hz
Temperature	+/- 0.6 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/-	1.89 dB	9kHz~30MHz
	+/-	4.1 dB	30MHz - 1000MHz
	+/-	3.37 dB	1GHz - 18GHz
	+/-	3.83 dB	18GHz - 40GHz
Polarization: Horizontal	+/-	1.89 dB	9kHz~30MHz
	+/-	4.1 dB	30MHz - 1000MHz
	+/-	3.37 dB	1GHz - 18GHz
	+/-	3.83 dB	18GHz - 40GHz
Radiated Spurious Emission	+/-	2 dB	33GHz-50GHz
	+/-	1.59 dB	50GHz-60GHz
	+/-	1.71 dB	60GHz-90GHz
	+/-	1.64 dB	90GHz-140GHz
	+/-	3.84 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 C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2025	03/26/2026
EMI Test Receiver	R&S	ESCI	101342	04/29/2024	04/28/2025
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	974	06/26/2024	06/25/2025
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2025	03/26/2026
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

6.2 Conducted Measurement

Conducted Emission Test Site: Conducted F					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Attenuator	Marvelous	MVE2213-10	RF04	11/14/2024	11/13/2025
Attenuator	Woken	WATT-218FS-10	RF12	11/14/2024	11/13/2025
DC Block	PASTERNAK	PE8210	RF38	11/14/2024	11/13/2025
Power Meter	Anritsu	ML2496A	2138005	09/25/2024	09/24/2025
Power Sensor	Anritsu	MA2411B	1911395	09/25/2024	09/24/2025
Power Sensor	Anritsu	MA2411B	1911396	09/25/2024	09/24/2025
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	10/16/2024	10/15/2025
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071574	06/28/2024	06/27/2025
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N.C.R
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

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6.3 Radiated Measurement

Radiated Emission Test Site: SAC D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
3m Site NSA	SGS	966 chamber D	N/A	04/30/2024	04/29/2025
Attenuator	Woken	WATT-218FS-10	RF17	11/14/2024	11/13/2025
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-617	12/17/2024	12/16/2025
Coaxial Cable	EMCI+Huber Suhner	RG 214/U+EMC104- SM-SM- 500+SUCOFLEX 104+16+EMC105- SM-SM- 11000+EMC106- SM-SM-2300	W22.01+W21.01+1 50707+MY969/4+1 6+190825+150702	11/14/2024	11/13/2025
Horn Antenna	Schwarzbeck	BBHA9120D	1341	05/30/2024	05/29/2025
Horn Antenna	Schwarzbeck	BBHA9170	184	12/20/2024	12/19/2025
Notch Filter	Micro-Tronics	BRC50703-G015	RF204	11/14/2024	11/13/2025
Notch Filter	Micro-Tronics	BRC50704-G016	RF205	11/14/2024	11/13/2025
Notch Filter	Micro-Tronics	BRC50705-G021	RF206	11/14/2024	11/13/2025
Pre-Amplifier	EMC Instruments	EMC12630SE	980273	11/14/2024	11/13/2025
Pre-Amplifier	EMC Instruments	EMC9135	980234	11/14/2024	11/13/2025
Pre-Amplifier	EMC Instruments	EMC184045SEE	980881	11/14/2024	11/13/2025
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	10/16/2024	10/15/2025
H-Loop Near Field Antenna	LANGER EMV- Technik	LF-R 400	02-1597	N.C.R	N.C.R
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	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

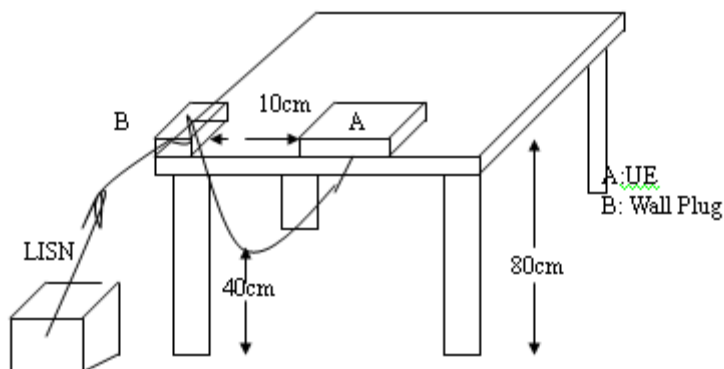
Note

- 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



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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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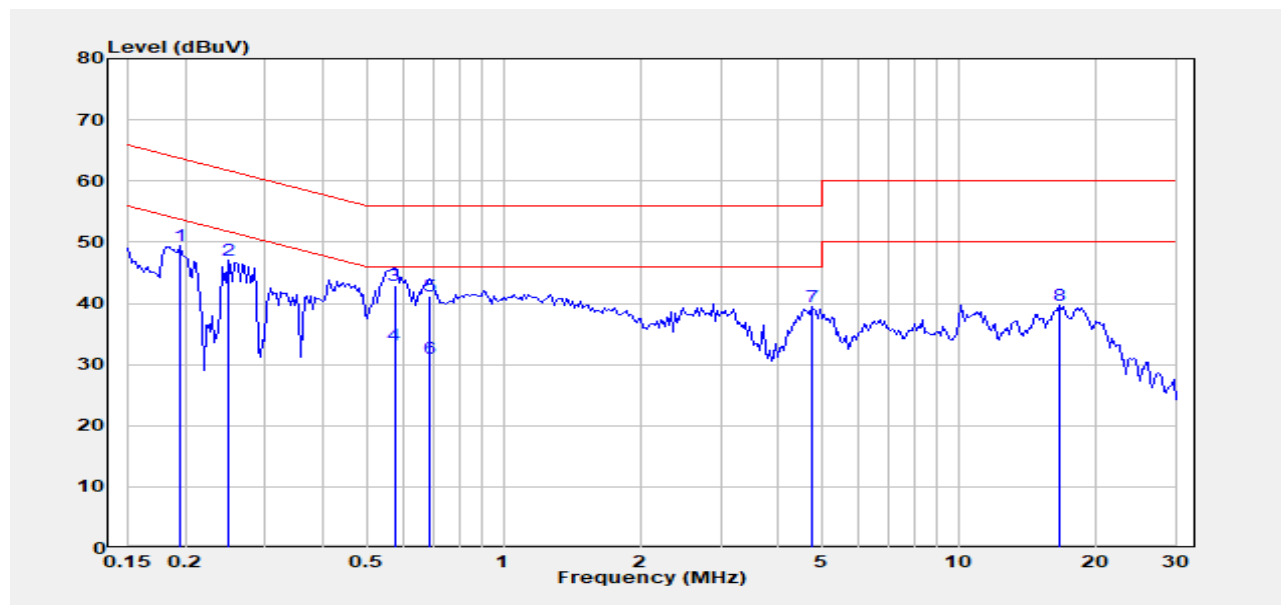
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Report Number	:TERF2501000170E2	Test Site	:Conduction C
Test Mode	:5G	Test Date	:2025-04-23
Power	:120V/60Hz	Temp./Humi.	:23.0°C/63%
Probe	:L1	Engineer	:Temo Chen



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.195	Peak	38.78	10.65	49.43	63.80	-14.37
0.249	Peak	36.43	10.64	47.08	61.78	-14.70
0.576	QP	32.30	10.63	42.93	56.00	-13.07
0.576	Average	22.50	10.63	33.13	46.00	-12.87
0.690	QP	30.60	10.65	41.25	56.00	-14.75
0.690	Average	20.40	10.65	31.05	46.00	-14.95
4.746	Peak	28.61	10.94	39.55	56.00	-16.45
16.750	Peak	28.56	11.11	39.67	60.00	-20.33

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Report Number :TERF2501000170E2

Test Site :Conduction C

Test Mode :5G

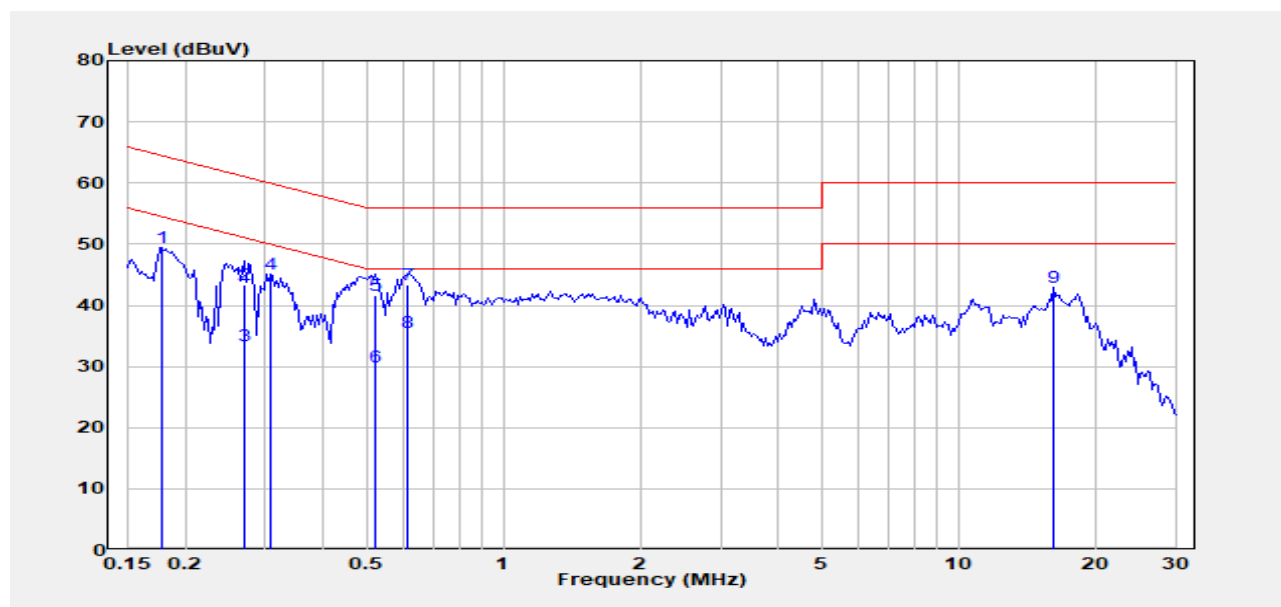
Test Date :2025-04-23

Power :120V/60Hz

Temp./Humi. :23.0°C/63%

Probe :N

Engineer :Temo Chen



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
0.178	Peak	38.86	10.65	49.52	64.59	-15.07
0.269	QP	32.70	10.63	43.34	61.16	-17.82
0.269	Average	22.80	10.63	33.44	51.16	-17.72
0.308	Peak	34.45	10.63	45.08	60.02	-14.94
0.524	QP	31.01	10.61	41.62	56.00	-14.38
0.524	Average	19.41	10.61	30.02	46.00	-15.98
0.614	QP	32.71	10.62	43.34	56.00	-12.66
0.614	Average	24.91	10.62	35.54	46.00	-10.46
16.226	Peak	31.92	11.10	43.02	60.00	-16.98

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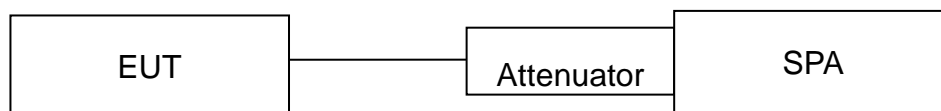
8 EMISSION BANDWIDTH MEASUREMENT

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*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*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_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.62	13.350
5220	22.29	13.480
5240	21.21	13.270
5260	21.61	13.350
5300	21.33	13.290
5320	21.52	13.330
5500	21.53	13.330
5580	21.80	13.380
5700	22.34	13.490
5720(U-NII 2C)	16.04	12.050
5720(U-NII 3)	6.04	7.810

802.11a_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.07	12.060
5785	15.93	12.020
5825	16.10	12.070

802.11a_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.427458	< 5250
5745	5736.728471	> 5725

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802.11n_HT20_Ch0

Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	21.98	13.420
5220	22.13	13.450
5240	21.73	13.370
5260	22.19	13.460
5300	22.02	13.430
5320	22.02	13.430
5500	22.41	13.500
5580	22.06	13.440
5700	22.16	13.460
5720(U-NII 2C)	16.04	12.050
5720(U-NII 3)	6.04	7.810

802.11n_HT20_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.93	12.020
5785	17.35	12.390
5825	17.00	12.300

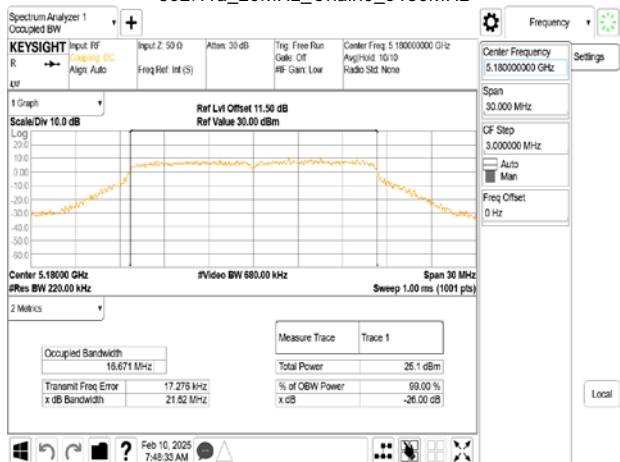
802.11n_HT20_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.853342	< 5250
5745	5736.162876	> 5725

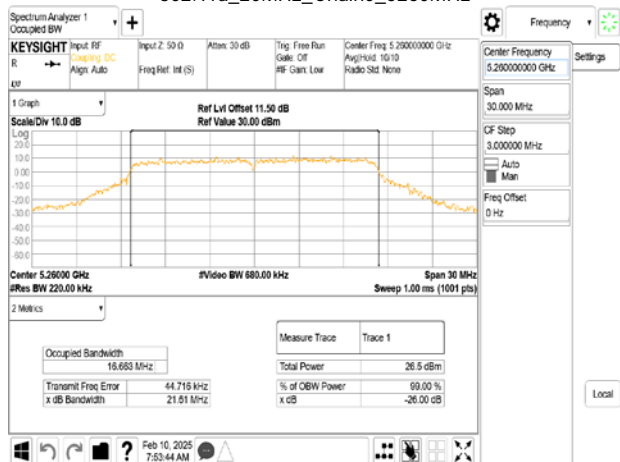
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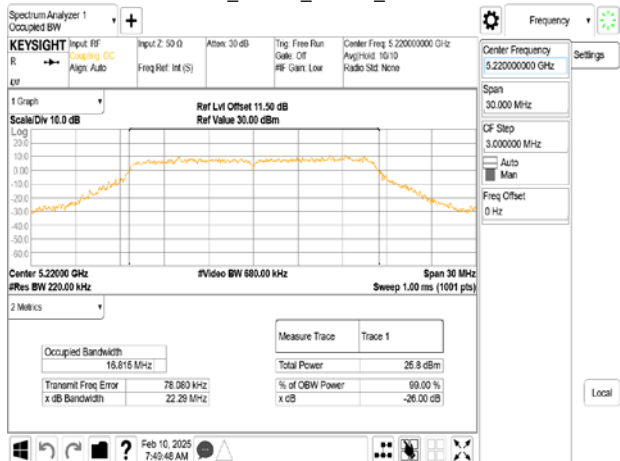
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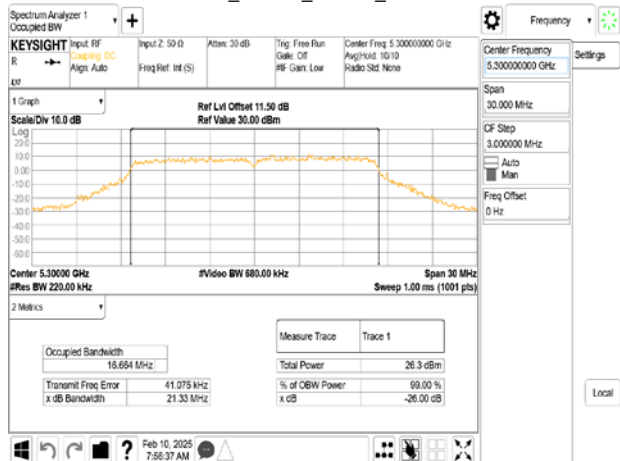
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802.11a_20MHz_Chain0_5220MHz



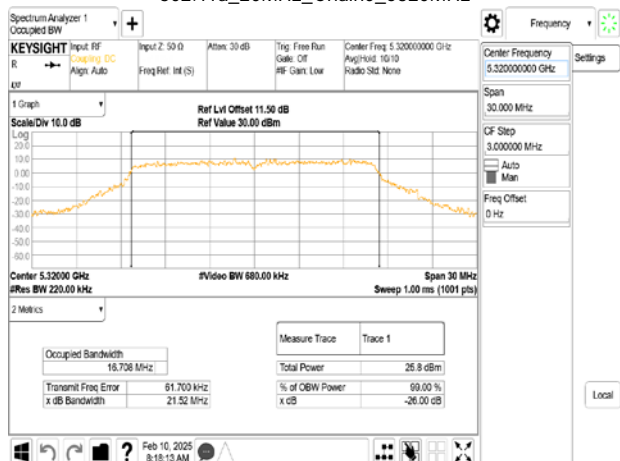
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802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5320MHz

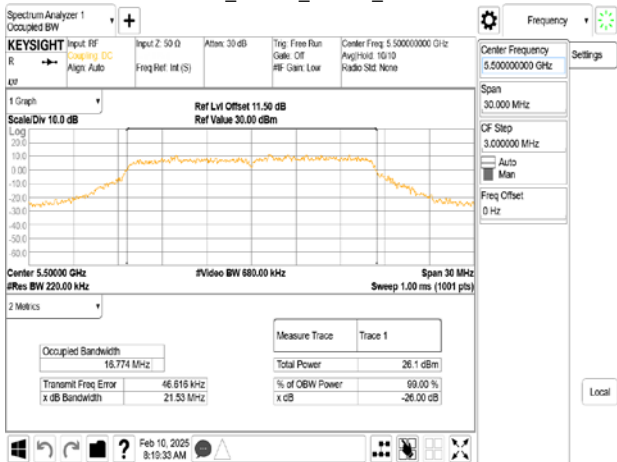


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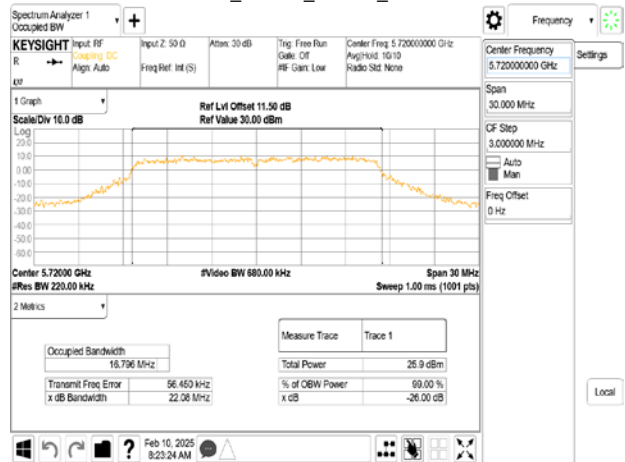
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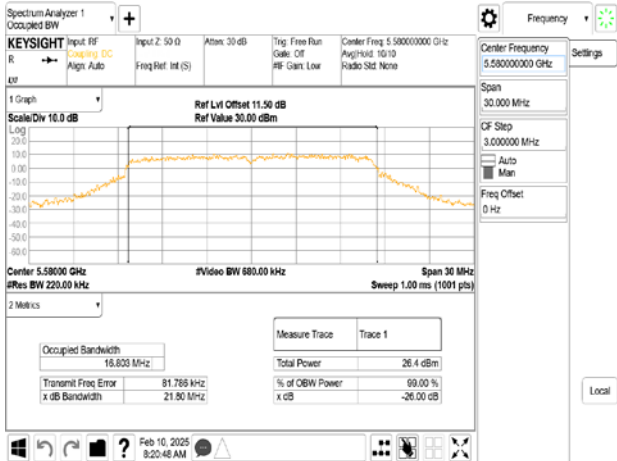
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802.11a_20MHz_Chain0_5720MHz



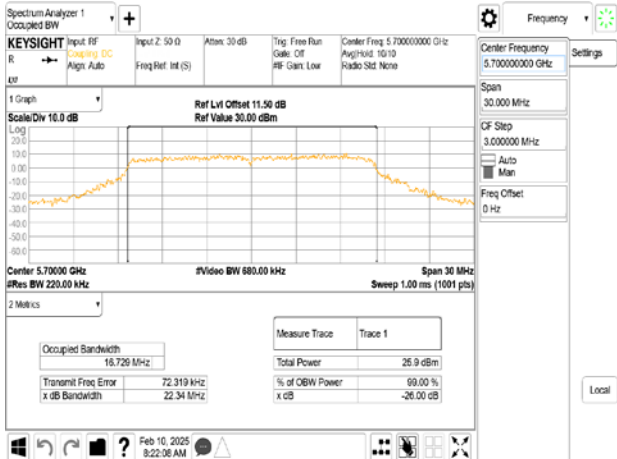
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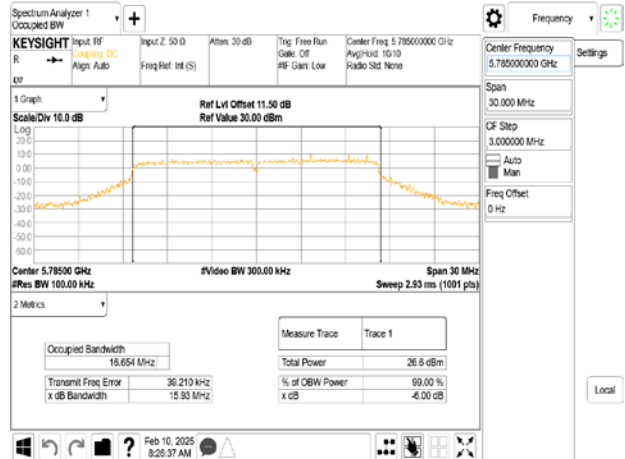
802.11a_20MHz_Chain0_5745MHz



802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5785MHz

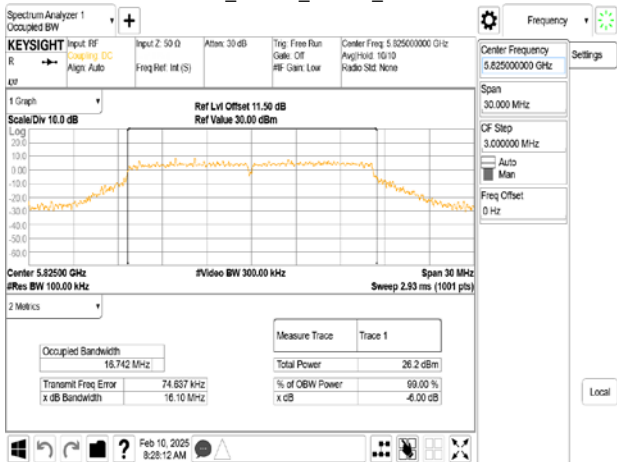


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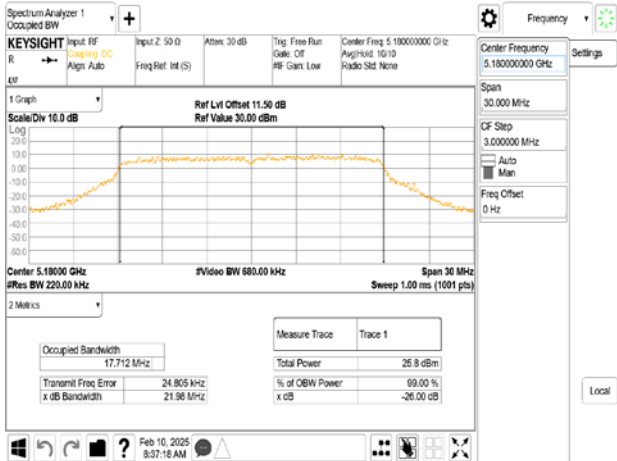
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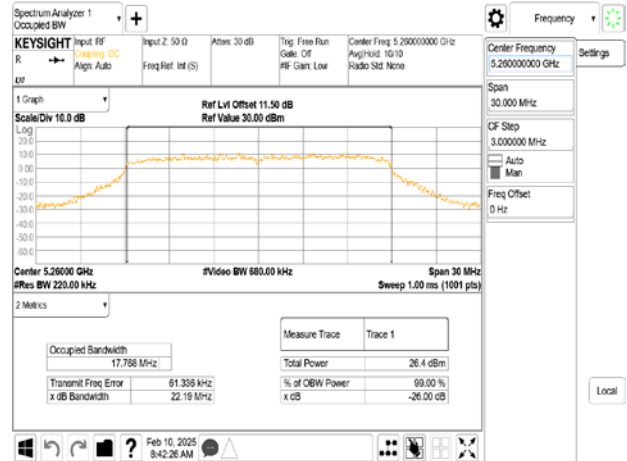
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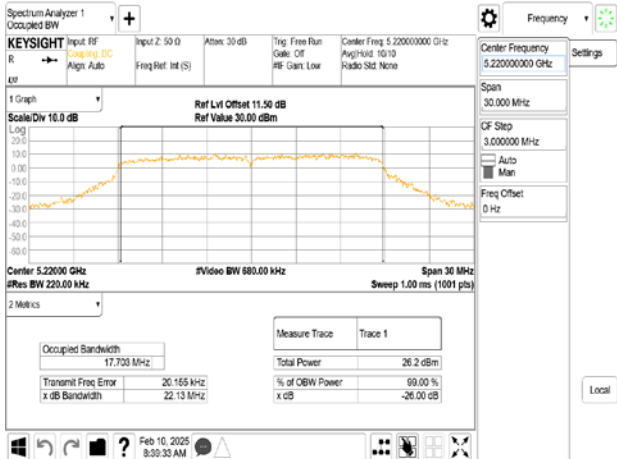
802.11n_20MHz_Chain0_5180MHz



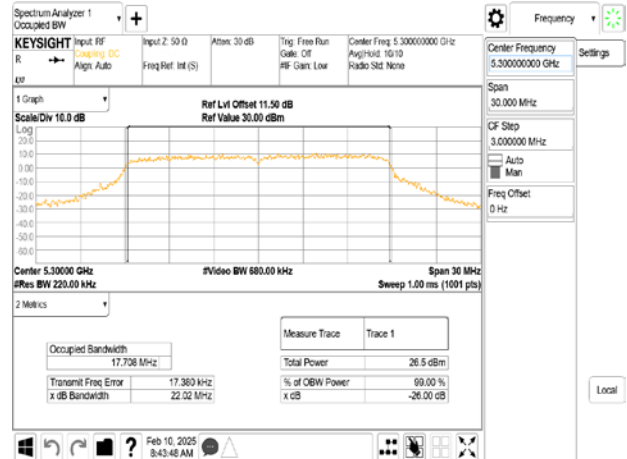
802.11n_20MHz_Chain0_5260MHz



802.11n_20MHz_Chain0_5220MHz



802.11n_20MHz_Chain0_5300MHz

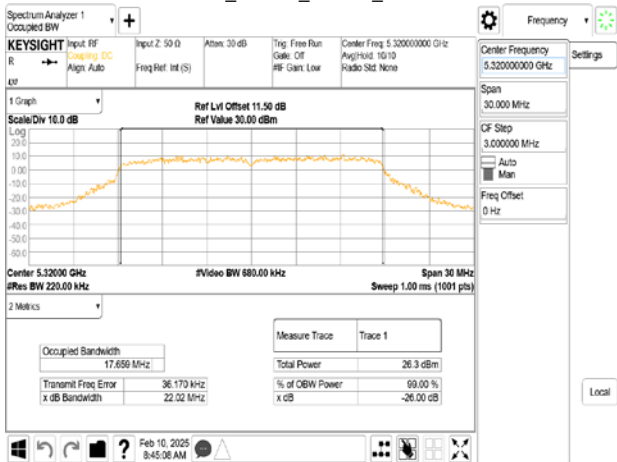


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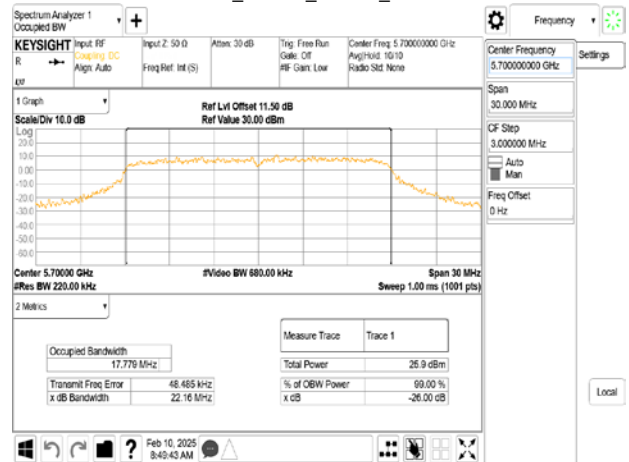
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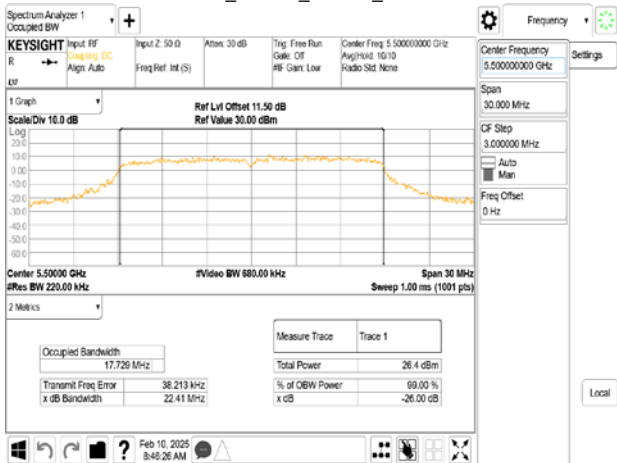
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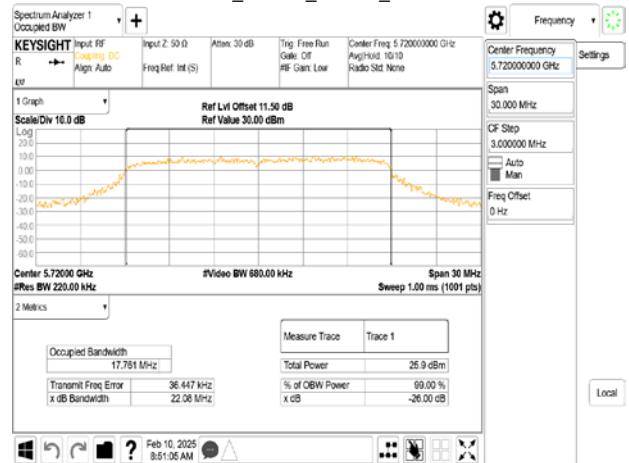
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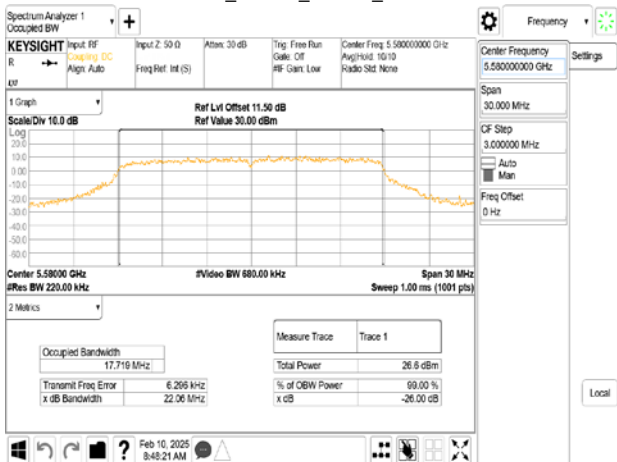
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802.11n_20MHz_Chain0_5720MHz



802.11n_20MHz_Chain0_5580MHz



802.11n_20MHz_Chain0_5745MHz

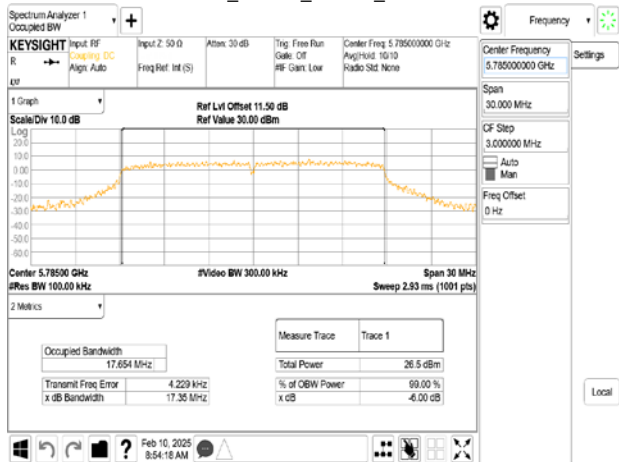


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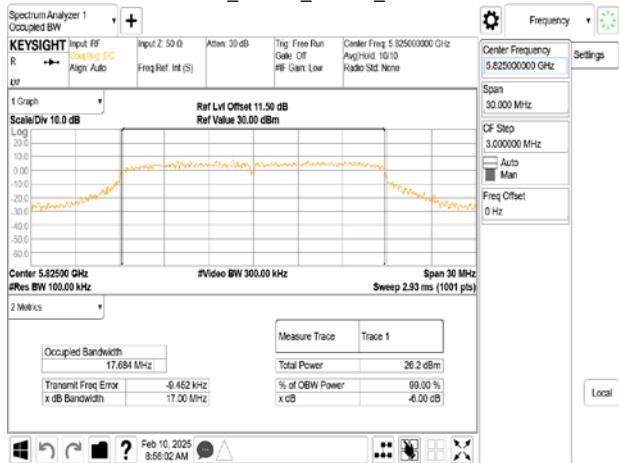
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802.11n_20MHz_Chain0_5785MHz



802.11n_20MHz_Chain0_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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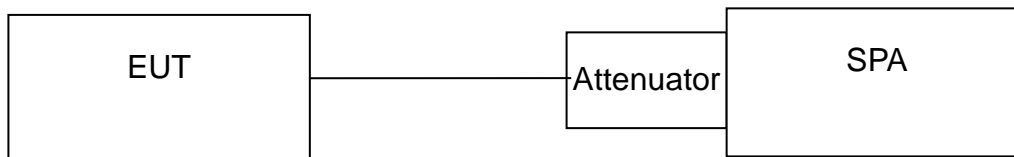
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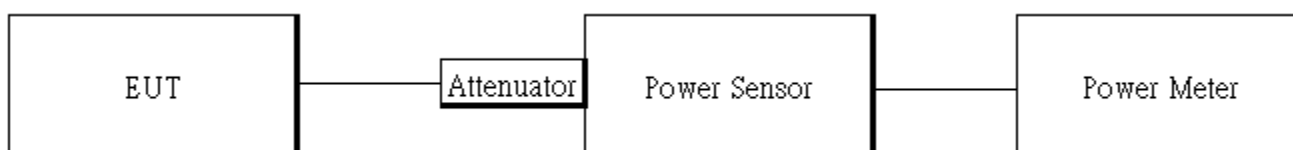
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9.2 Test Setup

9.2.1 Duty Cycle



9.2.2 Output Power



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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:

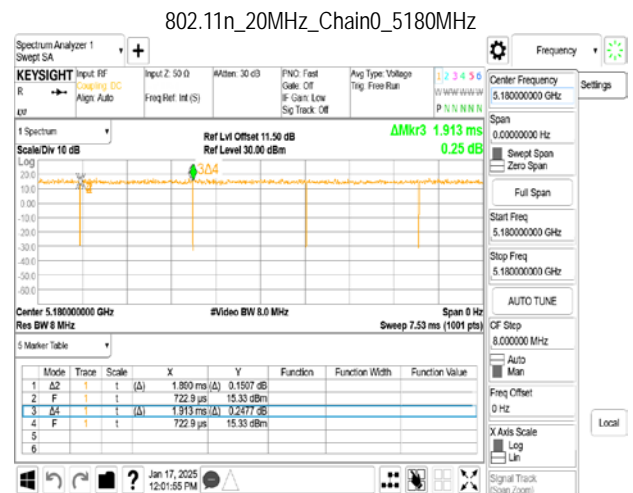
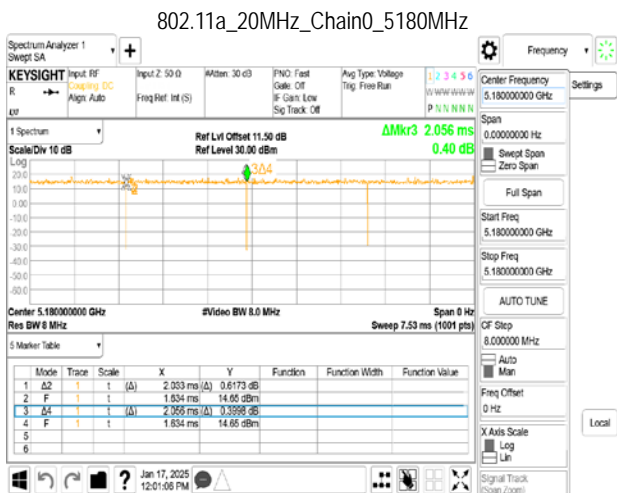
For U-NII1, 2A, 2C and 3 Bands, when the antenna gain is greater than 6 dBi, the power limit attenuated accordingly.

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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	98.90	0.05	0.49	0.01
802.11n_20	98.82	0.05	0.53	0.01



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9.5 Output Power Measurement Result

9.5.1 FCC Output power

802.11a_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	105.634	20.24	23.98	PASS
44	5220	6	108.844	20.37	23.98	PASS
48	5240	6	107.598	20.32	23.98	PASS
52	5260	6	109.598	20.40	23.98	PASS
60	5300	6	109.346	20.39	23.98	PASS
64	5320	6	104.907	20.21	23.98	PASS
100	5500	6	109.095	20.38	23.98	PASS
116	5580	6	107.350	20.31	23.98	PASS
140	5700	6	105.391	20.23	23.98	PASS
144	5720(U-NII 2C)	6	78.888	18.97	23.05	PASS
144	5720 (U-NII 3)	6	29.706	14.73	30	PASS
149	5745	6	109.346	20.39	30	PASS
157	5785	6	110.104	20.42	30	PASS
165	5825	6	108.844	20.37	30	PASS

802.11n_HT20_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	107.685	20.32	23.98	PASS
44	5220	MCS0	109.435	20.39	23.98	PASS
48	5240	MCS0	107.190	20.30	23.98	PASS
52	5260	MCS0	105.720	20.24	23.98	PASS
60	5300	MCS0	104.750	20.20	23.98	PASS
64	5320	MCS0	106.207	20.26	23.98	PASS
100	5500	MCS0	106.698	20.28	23.98	PASS
116	5580	MCS0	105.720	20.24	23.98	PASS
140	5700	MCS0	106.698	20.28	23.98	PASS
144	5720(U-NII 2C)	MCS0	78.770	18.96	23.98	PASS
144	5720 (U-NII 3)	MCS0	29.661	14.72	30	PASS
149	5745	MCS0	109.940	20.41	30	PASS
157	5785	MCS0	110.193	20.42	30	PASS
165	5825	MCS0	110.702	20.44	30	PASS

Note: For all straddle channels, full bandwidth power is reported in the UNII Band 2C because the combined UNII Band 2C and UNII Band 3 power already passed the worst-case UNII Band 2C limit.

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10 MAXIMUM POWER SPECTRAL DENSITY

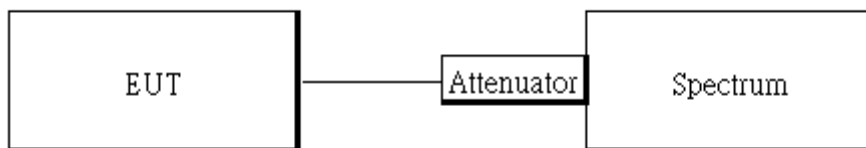
10.1 FCC Standard

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.				

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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)
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 $10 \log (500 \text{ kHz}/\text{RBW})$ 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 $10 \log(1/\text{duty cycle})$.
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.

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10.4 Measurement Result

POWER DENSITY 802.11a MODE						
Frequency (MHz)	Ch0 meas PSD (dBm/MHz)	Duty Factor (dB)	Maximum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5180	9.359	0.00	9.36		11.00 dBm/MHz	-1.64
5220	10.016	0.00	10.02		11.00 dBm/MHz	-0.98
5240	10.101	0.00	10.10		11.00 dBm/MHz	-0.90
5260	10.438	0.00	10.44		11.00 dBm/MHz	-0.56
5300	10.272	0.00	10.27		11.00 dBm/MHz	-0.73
5320	9.438	0.00	9.44		11.00 dBm/MHz	-1.56
5500	9.657	0.00	9.66		11.00 dBm/MHz	-1.34
5580	9.987	0.00	9.99		11.00 dBm/MHz	-1.01
5700	10.312	0.00	10.31		11.00 dBm/MHz	-0.69
5720 (U-NII 2C)	10.130	0.00	10.13		11.00 dBm/MHz	-0.87
Frequency (MHz)	Ch0 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maximum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)
5720 (U-NII 3)	4.872	0.00	2.22	7.09	30.00 dBm/500kHz	-22.91
5745	5.390	0.00	2.22	7.61	30.00 dBm/500kHz	-22.39
5785	5.482	0.00	2.22	7.70	30.00 dBm/500kHz	-22.30
5825	5.358	0.00	2.22	7.58	30.00 dBm/500kHz	-22.42

POWER DENSITY 802.11n HT20 MODE						
Frequency (MHz)	Ch0 meas PSD (dBm/MHz)	Duty Factor (dB)	Maximum Corr'd PSD(dBm/MHz)		Limit	Margin (dB)
5180	9.551	0.00	9.55		11.00 dBm/MHz	-1.45
5220	10.064	0.00	10.06		11.00 dBm/MHz	-0.94
5240	10.271	0.00	10.27		11.00 dBm/MHz	-0.73
5260	10.310	0.00	10.31		11.00 dBm/MHz	-0.69
5300	10.309	0.00	10.31		11.00 dBm/MHz	-0.69
5320	9.819	0.00	9.82		11.00 dBm/MHz	-1.18
5500	9.992	0.00	9.99		11.00 dBm/MHz	-1.01
5580	9.762	0.00	9.76		11.00 dBm/MHz	-1.24
5700	9.849	0.00	9.85		11.00 dBm/MHz	-1.15
5720 (U-NII 2C)	9.758	0.00	9.76		11.00 dBm/MHz	-1.24
Frequency (MHz)	Ch0 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maximum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)
5720 (U-NII 3)	4.960	0.00	2.22	7.18	30.00 dBm/500kHz	-22.82
5745	5.397	0.00	2.22	7.62	30.00 dBm/500kHz	-22.38
5785	5.218	0.00	2.22	7.44	30.00 dBm/500kHz	-22.56
5825	5.127	0.00	2.22	7.35	30.00 dBm/500kHz	-22.65

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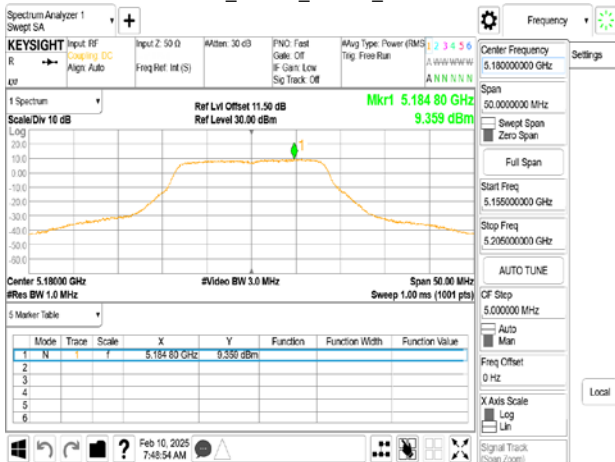
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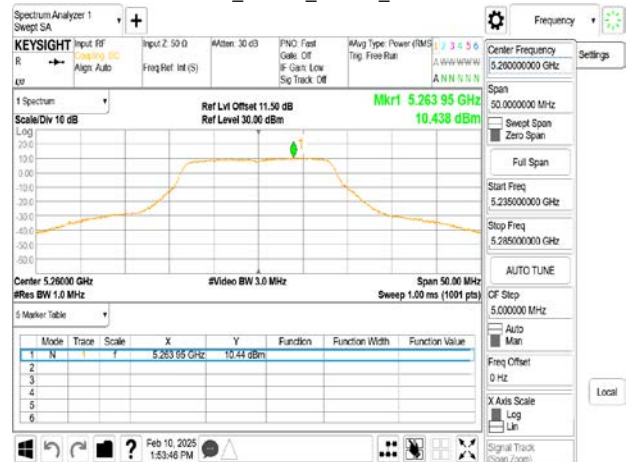
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802.11a_20MHz_Chain0_5180MHz



802.11a_20MHz_Chain0_5260MHz



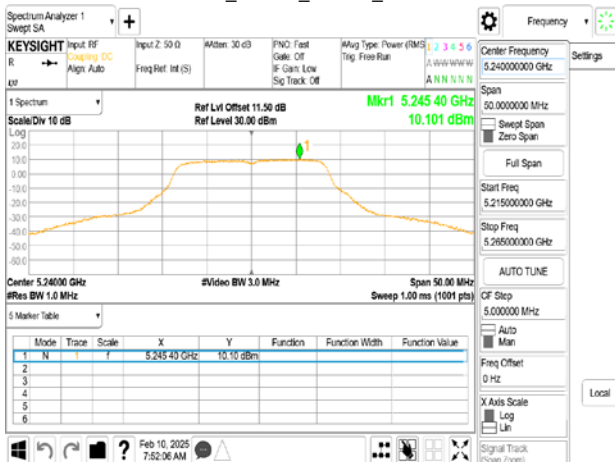
802.11a_20MHz_Chain0_5220MHz



802.11a_20MHz_Chain0_5300MHz



802.11a_20MHz_Chain0_5240MHz



802.11a_20MHz_Chain0_5320MHz

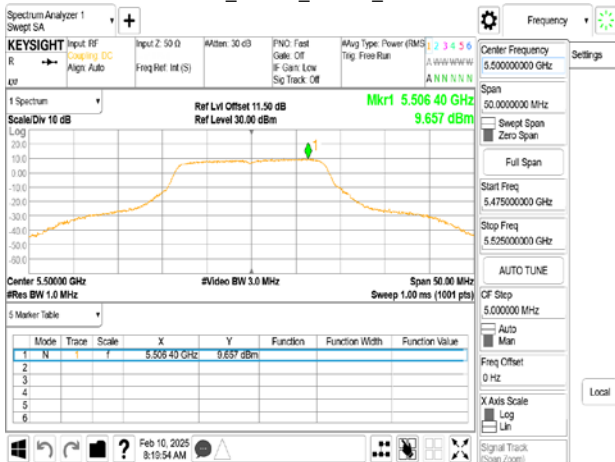


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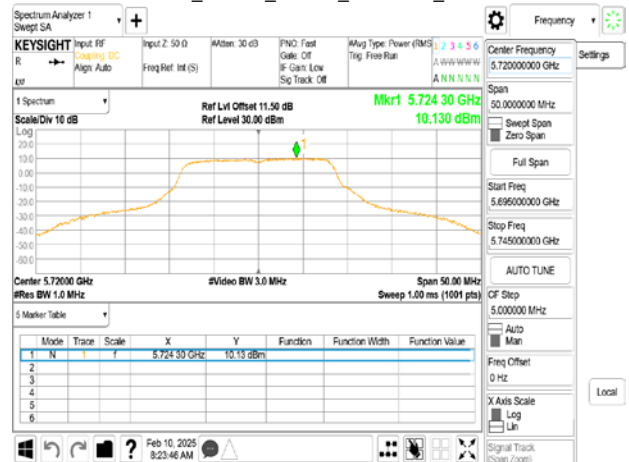
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802.11a_20MHz_Chain0_5500MHz



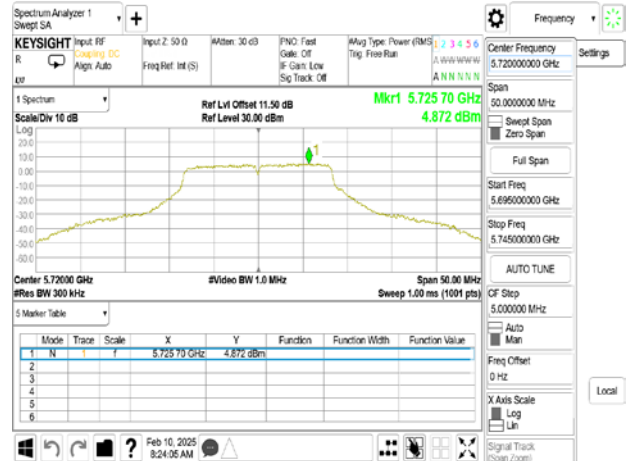
802.11a_20MHz_Chain0_5720MHz_UNII 2C



802.11a_20MHz_Chain0_5580MHz



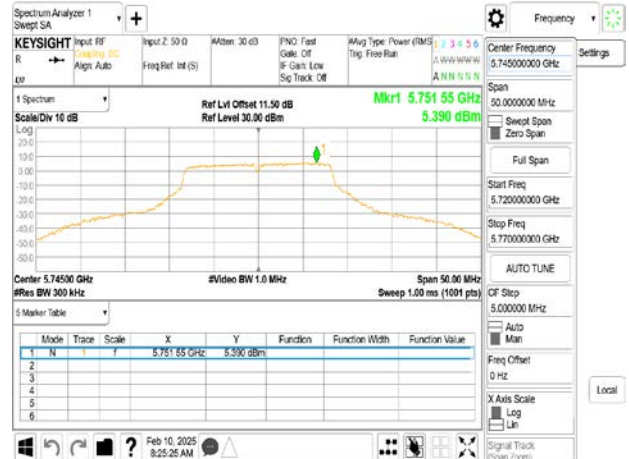
802.11a_20MHz_Chain0_5720MHz_UNII 3



802.11a_20MHz_Chain0_5700MHz



802.11a_20MHz_Chain0_5745MHz

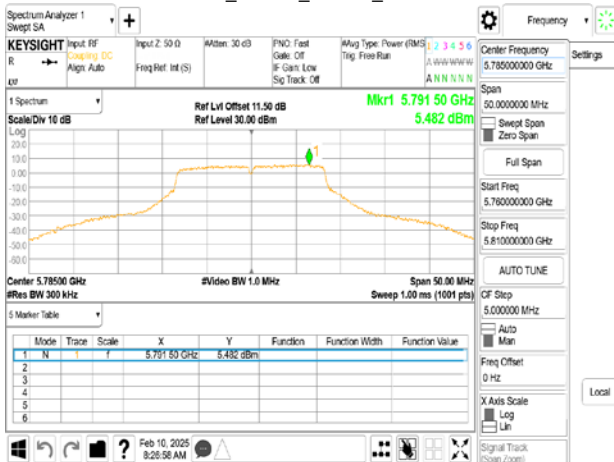


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802.11a_20MHz_Chain0_5785MHz



802.11n_20MHz_Chain0_5220MHz



802.11a_20MHz_Chain0_5825MHz



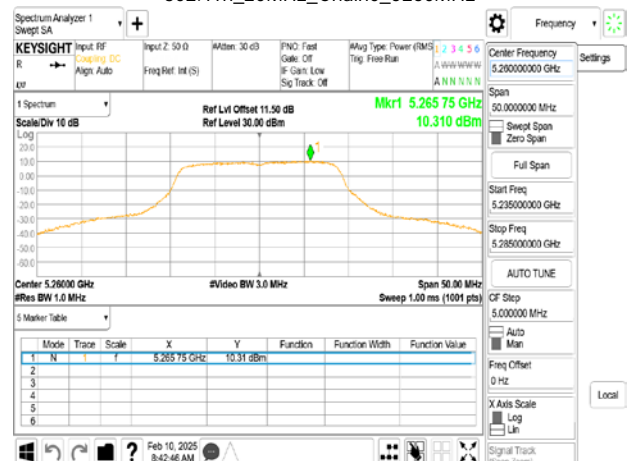
802.11n_20MHz_Chain0_5240MHz



802.11n_20MHz_Chain0_5180MHz



802.11n_20MHz_Chain0_5260MHz



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