ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

EUT Description	Sparrow Wi-Fi Module
Applicant:	BOTS UNLIMITED LLC 5817 La Colonia, San Antonio, Texas 78218, USA
Manufacturer:	BOTS UNLIMITED LLC 5817 La Colonia, San Antonio, Texas 78218, USA
Product Name:	Sparrow Wi-Fi Module
Brand Name:	Bots Unlimited
Model No./ISED HVIN:	SP-01-100
ISED PMN:	SP-01-100
Report Number:	TERF2506001928ER
FCC ID	2BPPF-SP01
IC:	34356-SP01
Date of EUT Received:	June 6, 2025
Date of Test:	June 9, 2025～August 1, 2025
Issue Date:	August 26, 2025

Approved By _____

Jim Chang

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 C63.10:2020 and the energy emitted by the sample EUT comply with FCC rule part §15.247, ISED RSS-247.

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

Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2506001928ER	00	Original	Aug. 26, 2025	Candice Li	

Note:

1、 The remark "*" indicates modification of the report upon requests from certification body.

Table of Contents

1 GENERAL INFORMATION

1.1 Product Description

EUT Description	Sparrow Wi-Fi Module
Brand Name	Bots Unlimited
Model No./ISED HVIN	SP-01-100
Hardware Version	1
Firmware Version	W16.88.10.p173-16.26.10.p173-C4X16698_V4
EUT Series No.	254WSP-01-EVKAAAA101000001
Power Supply	3.3 Vdc, 1.8 Vdc
Test Software (Name/Version)	Dut labtool

1.2 RF Specification

WLAN 2.4GHz

Mode	Frequency Range	Channels	Rated Power (dBm)		Modulation Technology
			Peak	Avg.	
802.11b	2412~2462	11	25.32	23.95	DSSS
802.11g	2412~2462	11	28.32	20.74	OFDM
802.11n_HT20	2412~2462	11	29.31	20.85	OFDM
802.11n_HT40	2422~2452	7	25.09	14.82	OFDM
Modulation type:		CCK, DQPSK, DBPSK for DSSS in 802.11b			
		64QAM, 16QAM, QPSK, BPSK for OFDM in 802.11g,11n			
Data Rate:		802.11b: 1/2/5.5/11 Mbps			
		802.11g: 6/9/12/18/24/36/48/54 Mbps			
		802.11n_HT20:up to 144.4Mbps			
		802.11n_HT40:up to 300Mbps			

WLAN 2.4GHz for IC

Mode	Frequency Range	Channels	Rated Power (dBm)		Rated Power in dBm (EIRP)	Modulation Technology
			Peak	Avg.		
802.11b	2412~2462	11	25.32	23.95	30.57	DSSS
802.11g	2412~2462	11	28.32	20.74	27.36	OFDM
802.11n_HT20	2412~2462	11	29.31	20.85	27.47	OFDM
802.11n_HT40	2422~2452	7	25.09	14.82	21.44	OFDM
Modulation type:		CCK, DQPSK, DBPSK for DSSS in 802.11b				
		64QAM, 16QAM, QPSK, BPSK for OFDM in 802.11g,11n				
Data Rate:		802.11b: 1/2/5.5/11 Mbps				
		802.11g: 6/9/12/18/24/36/48/54 Mbps				
		802.11n_HT20:up to 144.4Mbps				
		802.11n_HT40:up to 300Mbps				

1.3 Antenna Designation

Antenna Type	Supplier	Antenna Model No.	Ant No.	Freq. (MHz)	Peak Antenna Gain (dBi)
Flexible Printed Circuit	ABRACON	AFG4507W2	Ant0	2400 - 2500	6.62
Flexible Printed Circuit	ABRACON	AFG4507W2	Ant1	2400 - 2500	6.62

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. The antenna information is provided by the applicant. The laboratory does not verify the accuracy of this information, and all test results related to antenna characteristics are based solely on the data supplied. Responsibility for the authenticity and accuracy of these specifications rests entirely with the party who provided the information.
3. The antenna complies with part 15.203 requirement and no consideration of replace-ment. Please see EUT photo for details.
4. The directional gain is calculated according to section F. 2). e). (ii) of FCC KDB 662911 D01.

SS

1.4 Operating Frequencies

2400~2483.5 MHz

20MHz		40MHz	
CH	Freq. (MHz)	CH	Freq. (MHz)
1	2412	3	2422
2	2417	4	2427
3	2422	5	2432
4	2427	6	2437
5	2432	7	2442
6	2437	8	2447
7	2442	9	2452
8	2447		
9	2452		
10	2457		
11	2462		

1.5 EUT Availability and The Worst Test Modes

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
3. 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.
4. Investigation has been done on all the possible configurations for searching the worst case.

Mode		Transmission Chain								Single Transmission Spatial		Multi Transmission Spatial	
V	802.11 b	V	Ch0	V	Ch1		Ch2		Ch3	V	1TX		2TX
V	802.11 g	V	Ch0	V	Ch1		Ch2		Ch3	V	1TX		2TX
V	802.11 n	V	Ch0	V	Ch1		Ch2		Ch3		1TX	V	2TX
	802.11 ac		Ch0		Ch1		Ch2		Ch3		1TX		2TX
	802.11 ax		Ch0		Ch1		Ch2		Ch3		1TX		2TX
	802.11 be		Ch0		Ch1		Ch2		Ch3		1TX		2TX

5. 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	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1,2,3,4,5,6,11	DSSS	1	Ch0
802.11g	1 to 11	1,2,3,4,5,6,9,10,11	OFDM	6	Ch0
802.11n_HT20	1 to 11	1,2,3,4,5,6,9,10,11	OFDM	MCS0	2TX
802.11n_HT40	3 to 9	3,4,5,6,9	OFDM	MCS0	2TX

TRANSMIT RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11g	1 to 11	6	OFDM	6	Ch0

TRANSMIT RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11b	1 to 11	1,2,3,4,5,6,11	DSSS	1	Ch0
802.11g	1 to 11	1,2,3,4,5,6,9,10, 11	OFDM	6	Ch0
802.11n20	1 to 11	1,2,3,4,5,6,9,10, 11	OFDM	MCS0	2Tx
802.11n40	3 to 9	3,4,5,6,9	OFDM	MCS0	2Tx

2 SUMMARY OF TEST RESULTS

FCC Rules	ISED Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b)(3)	RSS-247 §6.3.2	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §6.3.1.a RSS-Gen §6.7	Emission Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §6.6 RSS-Gen §8.9 RSS-Gen §8.10	Out of Band Emission	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §6.6 RSS-Gen §8.9 RSS-Gen §8.10	Unwanted Emission	Compliant
§15.247(e)	RSS-247 §6.3.1.b	Power Spectral Density	Compliant
§15.203	N/A	Antenna Requirement	Compliant

2.1 Test Methodology of Applied Standards

1. FCC Part 15, Subpart C §15.247
2. FCC KDB 558074 D01 15.247 Meas Guidance v05r02
3. FCC KDB 662911 D01 Multiple Transmitter Output v02r01
4. ISED RSS-247 issue 4 July 2025
5. ISED RSS-Gen, Issue 5 April 2018, Amendment 2 (February 2021)
6. ANSI C63.10:2020
7. ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024

2.2 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	+/- 0.60 °C
Humidity	+/- 3.00 %
DC / AC Power Source	+/- 1.00 %

Radiated Spurious Emission Measurement Uncertainty		
Polarization: Vertical	+/- 1.89 dB	9kHz - 30MHz
	+/- 4.10 dB	30MHz - 1000MHz
	+/- 3.37 dB	1GHz - 18GHz
	+/- 3.83 dB	18GHz - 40GHz
Polarization: Horizontal	+/- 1.89 dB	9kHz - 30MHz
	+/- 4.10 dB	30MHz - 1000MHz
	+/- 3.37 dB	1GHz - 18GHz
	+/- 3.83 dB	18GHz - 40GHz
Radiated Spurious Emission	+/- 2.00 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.

2.3 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number / Registration 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 / 891563	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 / 200037	
		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.

Temperature:	20-23	°C	Relative Humidity:	48-79	%
Test site	Conducted 2		Test Start:	07/07/2025	
Test Engineer:	Dannis Chen		Test Done:	08/01/2025	

3 CONTROL UNIT(S) AND PERIPHERAL(S)

3.1 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.
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.

3.2 Diagrams

Conduction Setup

Conducted Setup

Radiated Setup

3.3 List

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)
AC Adapter	Tri-Mag, LLC	L6R24-120	N/A	N/A	N/A
Test Kit	Bots Unlimited	SP-01-EVK	N/A	N/A	N/A
Notebook	HP	HSN-Q35C-4	5CD238GDV5	N/A	N/A

Conducted Emission Test Site: Conducted 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
AC Adapter	Tri-Mag, LLC	L6R24-120	N/A	N/A	N/A
Test Kit	Bots Unlimited	SP-01-EVK	N/A	N/A	N/A
Notebook	HP	HSN-Q35C-4	5CD238GDV5	N/A	N/A

Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
AC Adapter	Tri-Mag, LLC	L6R24-120	N/A	N/A	N/A
Test Kit	Bots Unlimited	SP-01-EVK	N/A	N/A	N/A
Notebook	HP	HSN-Q35C-4	5CD238GDV5	N/A	N/A

4 TEST INSTRUMENT

4.1 Conducted Measurement

Conducted Emission Test Site: Conducted 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
Attenuator	Mini-Circuits	BW-S10W2+	4	12/11/2024	12/10/2025
DC Block	Titan	T0610A00127A	SNK47008	12/11/2024	12/10/2025
MXA Spectrum Analyzer	KEYSIGHT	N9021B	MY62242004	06/11/2025	06/10/2026
Power Meter	Anritsu	ML2496A	2138003	10/09/2024	10/08/2025
Power Sensor	Anritsu	MA2411B	1911393	10/09/2024	10/08/2025
Power Sensor	Anritsu	MA2411B	1911394	10/09/2024	10/08/2025
Test Software	SGS	Radio Test Software	Ver. 21	N.C.R	N.C.R

4.2 Radiated Measurement

Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL. (mm/dd/yyyy)	CAL DUE. (mm/dd/yyyy)
4G High Pass Filter	WI	WHKX4.0	22	12/11/2024	12/10/2025
Attenuator	Mini-Circuits	BW-S10W2+	16	12/11/2024	12/10/2025
Band Reject Filter 2400-2483.5	EWT	EWT-14-0166	M2	12/11/2024	12/10/2025
Bi-log Antenna	SCHWARZBECK	VULB9168	378	08/09/2024	08/08/2025
Coaxial Cables	EMCI+Huber Suhner	EMC107-SM-SM-1000 +SUCOFLEX 104PEA +EMC107-SM-SM-1500 +SUCOFLEX 106	RX Cable 9K-18G (221110+MY4251/4PEA+221106+76096/6)	08/30/2024	08/29/2025
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	ESCI 7	100759	08/28/2024	08/27/2025
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY63440386	02/05/2025	02/04/2026
Horn Antenna	SCHWARZBECK	BBHA9170	184	12/20/2024	12/19/2025
Horn Antenna	SCHWARZBECK	BBHA9120D	1441	09/23/2024	09/22/2025
Loop Antenna	COM-POWER	AL-130R	10160104	12/19/2024	12/18/2025
Pre-Amplifier	EMCI	EMC118A45SEE	980868	08/30/2024	08/29/2025
Pre-Amplifier	EMCI	EMC184045SEE	9080939	08/30/2024	08/29/2025
Pre-Amplifier	HP	8447D	2944A07676	08/30/2024	08/29/2025
Site Cal	SGS	SAC 3	N/A	06/30/2025	06/29/2026
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

4.3 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	06/22/2025	06/21/2026
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
Pulse Limiter	SCHWARZBECK	VTSD 9561F-N	793	06/22/2025	06/21/2026
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

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

5 REGULATORY REQUIREMENTS

5.1 Emission Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

5.2 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.

5.3 Maximum Output Power

FCC

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

ISED

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt and the e.i.r.p. shall not exceed 4 W, except a) and b).

a. Fixed point-to-point systems are permitted to have an e.i.r.p. higher than 4 W provided that the higher e.i.r.p. is achieved by employing higher gain directional antennas and not higher transmitter output powers.
b. Point-to-multipoint, omnidirectional applications and multiple co-located transmitters, transmitting the same information are prohibited from exceeding an e.i.r.p. of 4 W. However, remote stations of point-to-multipoint systems shall be permitted to operate at an e.i.r.p. greater than 4 W under the same conditions as for fixed point-to-point systems under a).

5.4 Maximum Power Spectral Density

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. The power spectral density shall be determined using the same method as is used to determine the maximum conducted output power.

5.5 Out of Band Emission

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section 8, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

In addition, radiated emissions which fall in restricted bands must also comply with the radiated emission limits applicable to those bands.

5.6 Unwanted Emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section 8, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

In addition, radiated emissions which fall in the restricted bands must also comply with the applicable radiated emission limits as defined in the general emission limit tables.

Moreover, for an intentional radiator operating below 10 GHz, the frequency range of measurements shall extend up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note: The lower limit shall apply at the transition frequencies.

5.7 AC Power Line Conducted Emission

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

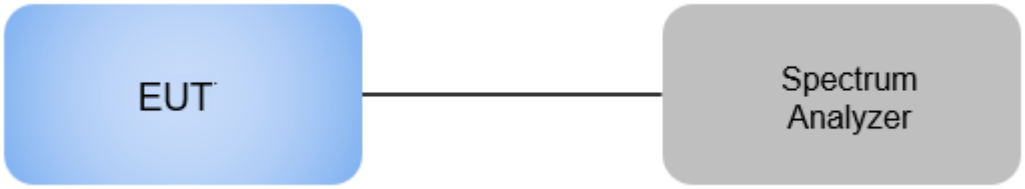
Frequency range MHz	Limits (dBuV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

5.8 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

6 TEST CONFIGURATION

6.1 Emission Bandwidth



Place the EUT on the table and set it in transmitting mode.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6dB BW measurements

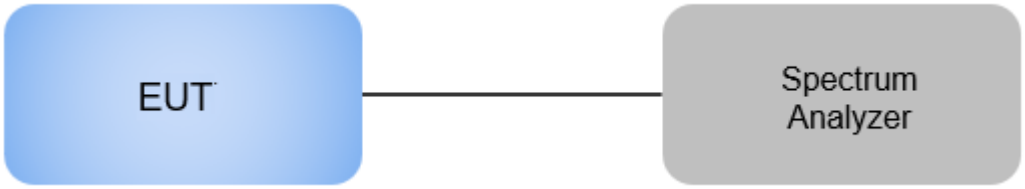
The testing is performed in accordance with the applicable regulatory measurement procedure.
Set the spectrum analyzer as
RBW= 100 kHz,
VBW = 3 X RBW,
Span= 2 to 5 times of the OBW,
Sweep=Auto, Detector = Peak, and Trace mode = Max Hold.
Mark the upper and lower frequencies of -6dB.
Repeat above procedures until all test default channel is completed.

99% BW measurements

The testing is performed in accordance with the applicable regulatory measurement procedure.
Set the spectrum analyzer as
RBW= 1 % to 5% of 99% Bandwidth,
VBW≥3 X RBW
Span= large enough to capture all products of the modulation process
Sweep=Auto, Detector = Peak, and Trace mode = Max Hold.
Mark the upper and lower frequencies of 99%.
Repeat above procedures until all test default channel is completed.

6.2 Maximum Output Power

6.2.1 Duty Cycle:

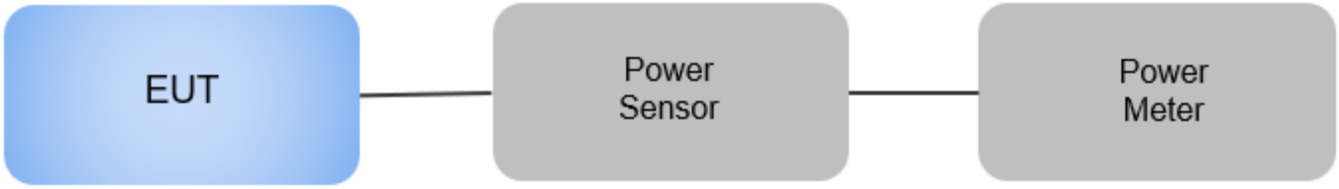


Place the EUT on the table and set it in transmitting mode.

Set the spectrum analyzer as

Span = Zero,
RBW = 8 MHz,
VBW = 8 MHz,
Detector = Peak,

6.2.2 Maximum Output Power



The testing is performed in accordance with the applicable output power measurement procedure.

Place the EUT on the table and set it to transmit mode.

Remove the antenna from the EUT and connect a low-loss RF cable from the antenna port to the power meter.

The power meter is used as auxiliary test equipment to conduct the output power measurement. Record the maximum reading as observed from the spectrum analyzer or power meter.

When testing for multiple output ports in simultaneous transmission mode, the measured values of each individual output port are tested separately and then linearly summed.

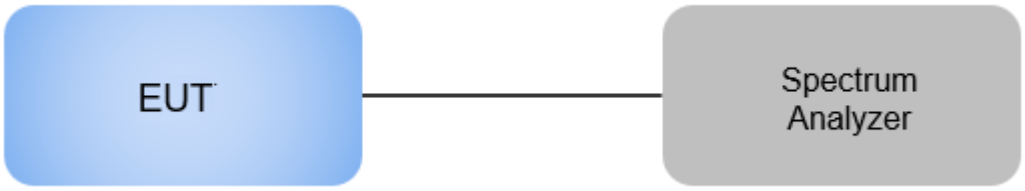
The directional gain is calculated using the formula

$$Directional\ Gain\ =\ 10\ \backslash times \log_{\{10\}}\left[\frac{\left(10^{\{\frac{G1}{20}\}}+10^{\{\frac{G2}{20}\}}+\backslash cdots+10^{\{\frac{Gn}{20}\}}\right)^{2}}{N_{\{ant\}}}\right]$$

Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.

Note: When the antenna gain is greater than 6 dBi, the power limit attenuated accordingly.

6.3 Maximum Power Spectral Density



The test is conducted in accordance with the applicable regulatory measurement procedure.

Set spectrum analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS channel bandwidth.

Set the RBW = 3 kHz and VBW = 10 kHz.

Detector = Peak

Sweep time = Auto Couple.

Trace mode = Max Hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

When testing for multiple output ports in simultaneous transmission mode, the measured values of each individual output port are tested separately and then linearly summed.

The directional gain is calculated using the formula

$$Directional\ Gain\ =\ 10\ \backslash times \log_{\{10\}}\left[\frac{\left(10^{\{\frac{G1}{20}\}}+10^{\{\frac{G2}{20}\}}+\backslash cdots+10^{\{\frac{Gn}{20}\}}\right)^{2}}{N_{\{ant\}}}\right]$$

6.4 Out of Band Emission

6.4.1 Reference Level of Emission Limit:

The testing is performed in accordance with the applicable measurement procedure.

Set the analyzer center frequency to the DTS channel center frequency.

Set the span to 1.5 times the DTS channel bandwidth.

Set RBW = 100 kHz and VBW = 300 kHz.

Detector = Peak

Sweep time = Auto Couple.

Trace mode = Max Hold.

Allow the trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

6.4.2 Conducted Band Edge:

The testing is performed in accordance with the applicable measurement procedure.

Connect the antenna port of the EUT to the spectrum analyzer.

Remove the antenna from the EUT and connect a low-loss RF cable from the antenna port to the spectrum analyzer.

Set the start frequency and stop frequency of the spectrum analyzer to encompass the spectrum to be examined.

Configure the spectrum analyzer as follows:

RBW = 100 kHz

VBW = 300 kHz

Detector = Peak

Sweep = Auto

Mark the highest reading of the emission as the reference level.

Set the display limit as: reference level marker reading -20 dBm.

Mark the highest emissions observed outside of the 2400 MHz to 2483.5 MHz band.

Repeat the above procedure for each default test channel (low, middle, and high).

6.4.3 Conducted Spurious Emission:

The testing is performed in accordance with the applicable measurement procedure.

Connect the antenna port of the EUT to the spectrum analyzer.

Configure the spectrum analyzer as follows:

RBW = 100 kHz

VBW = 300 kHz

Detector = Peak

Sweep = Auto.

Allow the trace to fully stabilize.

Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental emission bandwidth (EBW).

Repeat the above procedures until all default test channels (low, middle, and high) have been measured.

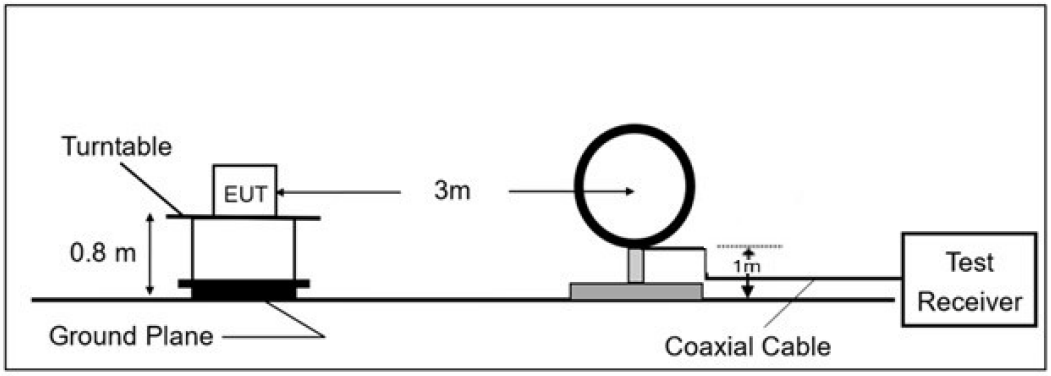
6.5 Unwanted Emissions

For Measurements From 9 kHz To 30 MHz

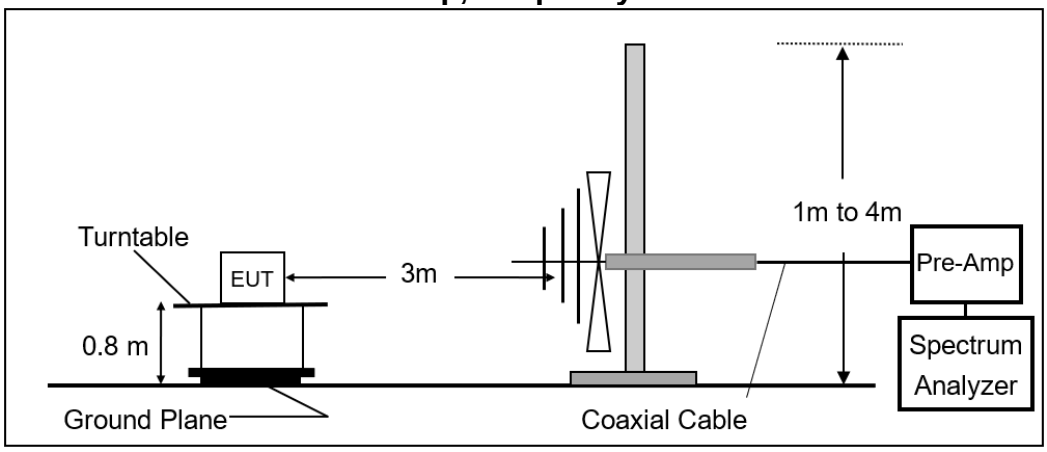
Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

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

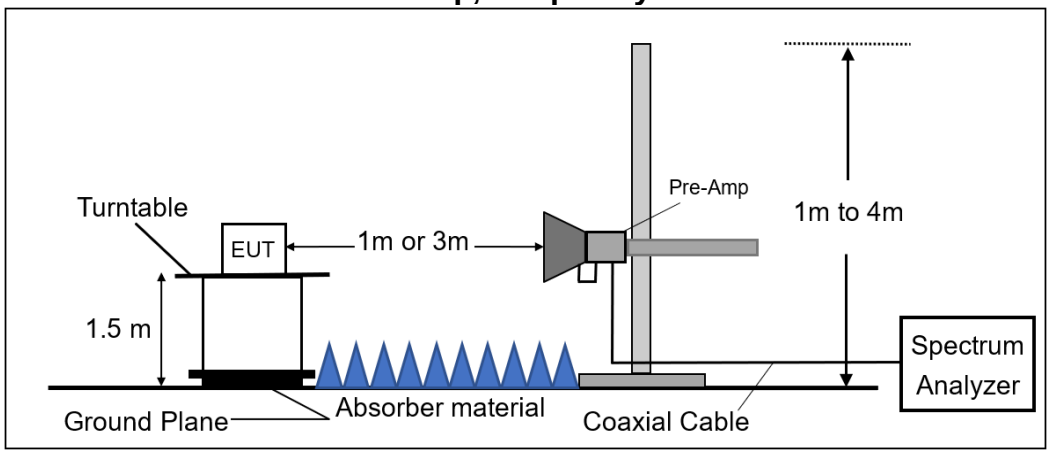
Radiated Emission Test Set-Up, Frequency Below 30MHz.



Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



Radiated Emission Test Set-Up, Frequency Above 1GHz.



Radiated emissions below 30 MHz were measured in a 9 m × 6 m × 6 m semi-anechoic chamber. The measurement results are equivalent to those obtained at an open-area test site (OATS).

A comparison between data measured at the open-area test site and the semi-anechoic chamber shows very similar results.

1. The testing was performed in accordance with the applicable radiated emission measurement procedure.
2. The EUT was placed on a turntable at a height of 0.8 m for frequencies below 1 GHz and 1.5 m for frequencies above 1 GHz.
3. The turntable was rotated 360 degrees to determine the position of the maximum emission level.
4. The EUT was positioned 3 meters away from the receiving antenna, which was varied in height from 1 m to 4 m to locate the highest emissions.
5. The spectrum analyzer was set with RBW = 100 kHz and VBW = 300 kHz, using a Peak detector for frequencies between 30 MHz and 1 GHz.
6. A receiver mode with RBW = 120 kHz was used for Quasi-Peak (QP) measurements between 30 MHz and 1 GHz.
7. For frequencies above 1 GHz, the spectrum analyzer was set with RBW = 1 MHz, VBW = 3 MHz, and Detector = Peak for maximum emission measurements.
8. For average emission measurements above 1 GHz where the duty cycle (D) is ≥ 98%, the analyzer was set with RBW = 1 MHz, VBW = 3 MHz, and the RMS detector with correction factor [10 log(1/D)]. If the emission is continuous (D ≥ 98%) and does not switch ON/OFF with the transmit cycle, then no duty cycle correction is required.
9. For average emission measurements above 1 GHz where D < 98%, the analyzer was set with RBW = 1 MHz and VBW ≥ 1/T.
10. When measuring radiated emissions above 1 GHz, the receiving antenna was maintained within the "cone of radiation" and pointed at the emission source in both azimuth and elevation, with polarization oriented for maximum response, ensuring it remained within the 3 dB illumination beamwidth of the measurement antenna.
11. The six highest emissions were fully maximized using the above procedures to ensure EUT compliance.
12. Each emission was further maximized by changing the receiving antenna polarization between horizontal and vertical.
13. Repeat the above procedures until all default test channels (low, middle, and high) are measured.

Note: Emissions from 9 kHz to 30 MHz were pre-scanned and found to be at least 20 dB below the applicable limits, and are therefore not reported.

6.5.1 Field Strength Calculation

The field strength is calculated by adding the antenna factor and cable loss, then subtracting the amplifier gain and any applicable duty cycle correction factor from the measured reading. The basic equation and an example calculation are as follows:

FS = RA + AF + CL – AG

Where:

FS = Field Strength (dBµV/m)

RA = Reading Amplitude (dBµV)

AF = Antenna Factor (dB/m)

CL = Cable Loss (dB)

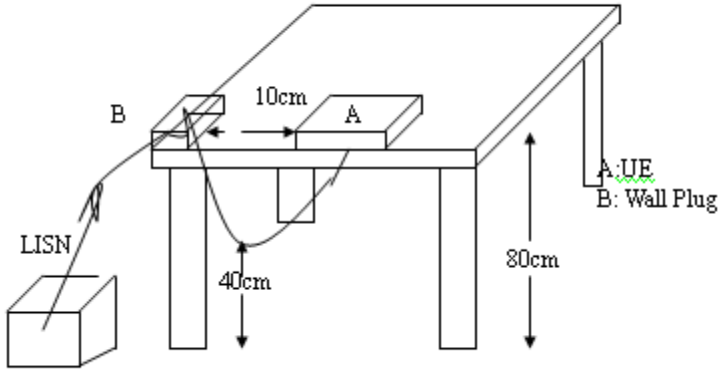
AG = Amplifier Gain (dB)

The emission limit is expressed in dBµV/m, which corresponds to the logarithmic conversion of $20 \times \log_{10}$ (µV/m).

Actual Field Strength (dBµV/m) = Spectrum Analyzer Reading (dBµV) + Total Factor (dB)

Total Factor (dB) = Antenna Factor (dB) + Cable Loss (dB) – Preamplifier Gain (dB)

6.6 AC Power Line Conducted Emission



The conducted emission tests were performed at the designated test site using a setup in accordance with the applicable version of ANSI C63.10.

1. The EUT was placed on a non-conductive table that is 0.8 meters above the ground plane. Conducted emissions were measured in the frequency range from 0.15 MHz to 30 MHz using CISPR Quasi-Peak and Average detector modes. Two LISNs were used to provide 50 µH / 50 ohm coupling impedance to the measuring instrument. Both lines of the AC power mains connected to the EUT were evaluated to identify the maximum conducted interference.
2. The AC/DC power adapter of the EUT was connected to the LISN. The EUT was positioned flush with the rear edge of the table, maintaining at least 0.4 meters of separation from the shielding wall.
3. The LISNs were connected to the power source and configured in accordance with the test requirements.
4. The maximum emission levels were investigated for each operating mode. The six highest emissions were further maximized to ensure compliance.
5. The above procedures were repeated for all applicable power supply configurations of the EUT.

Calculation Formula:

Level = Read Level + Factor

Factor = LISN/ISN/Current Probe Factor + Cable Loss + Attenuator

7 TEST RESULTS

7.1 Emission Bandwidth

7.1.1 6dB BW measurements

802.11b Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	10110	≧ 500	PASS
2437	10110	≧ 500	PASS
2462	10120	≧ 500	PASS

802.11n_HT_20M Ch1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	17620	≧ 500	PASS
2437	17610	≧ 500	PASS
2462	17610	≧ 500	PASS

802.11g Ch0

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	16390	≧ 500	PASS
2437	16390	≧ 500	PASS
2462	16390	≧ 500	PASS

802.11n_HT_40M Ch0

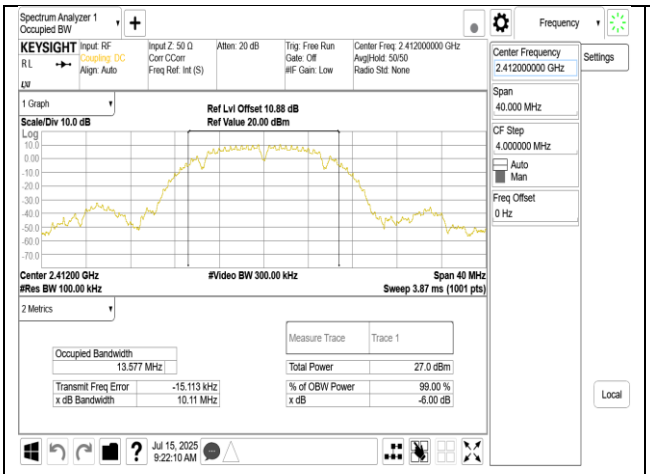
Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	36110	≧ 500	PASS
2437	35860	≧ 500	PASS
2452	35750	≧ 500	PASS

802.11n_HT_20M Ch0

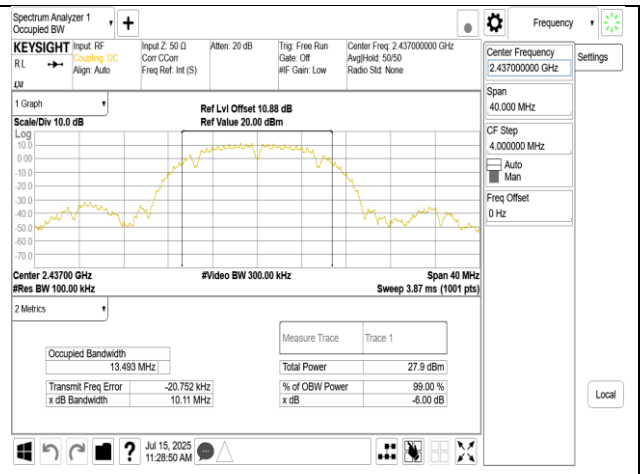
Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	17610	≧ 500	PASS
2437	17610	≧ 500	PASS
2462	17600	≧ 500	PASS

802.11n_HT_40M Ch1

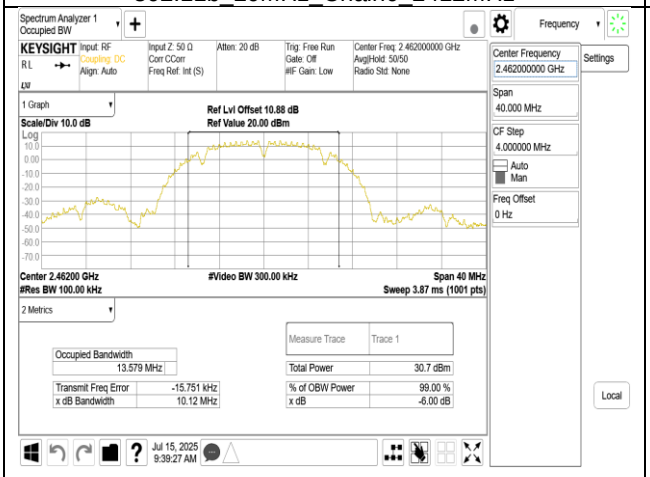
Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	36110	≧ 500	PASS
2437	36030	≧ 500	PASS
2452	36100	≧ 500	PASS



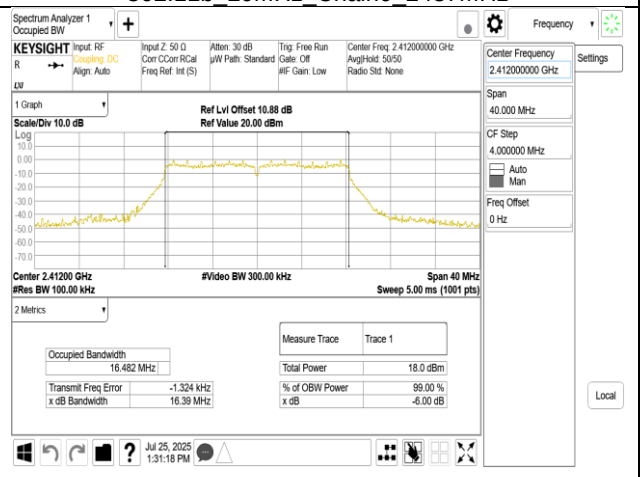
802.11b_20MHz_Chain0_2412MHz



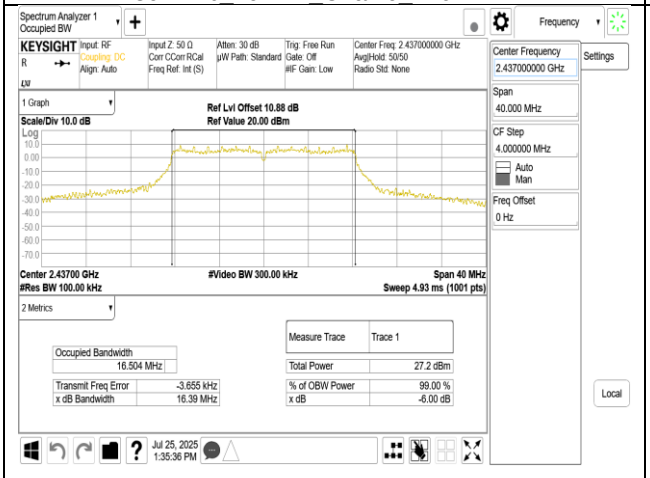
802.11b_20MHz_Chain0_2437MHz



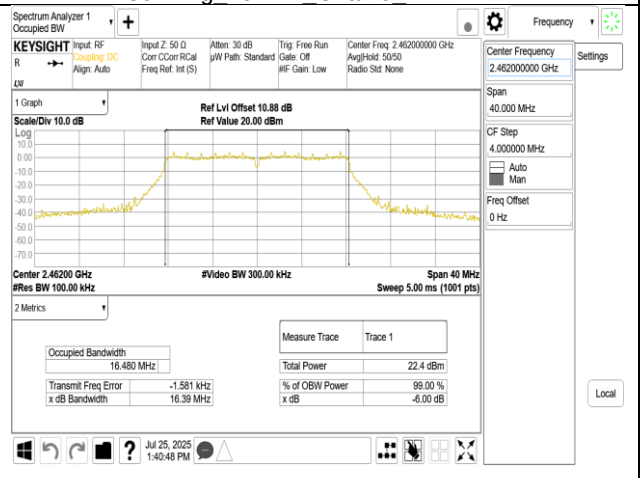
802.11b_20MHz_Chain0_2462MHz



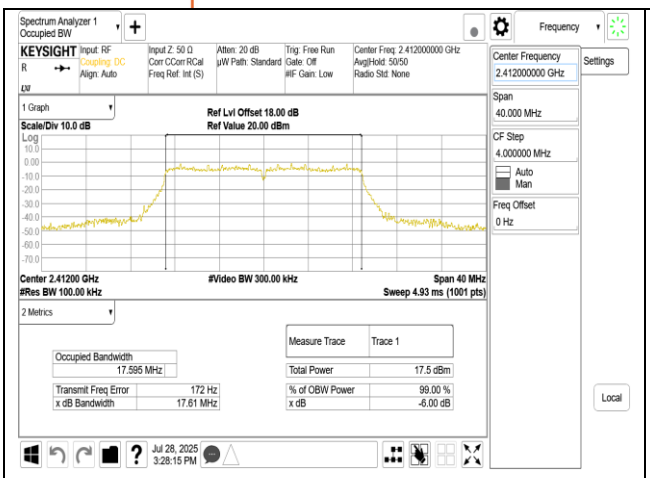
802.11g_20MHz_Chain0_2412MHz



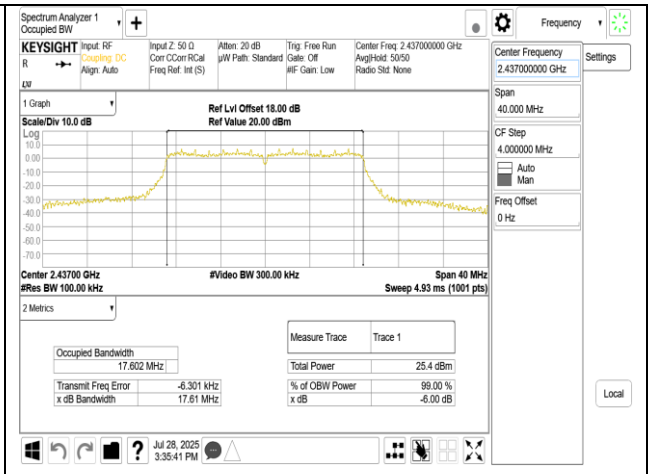
802.11g_20MHz_Chain0_2437MHz



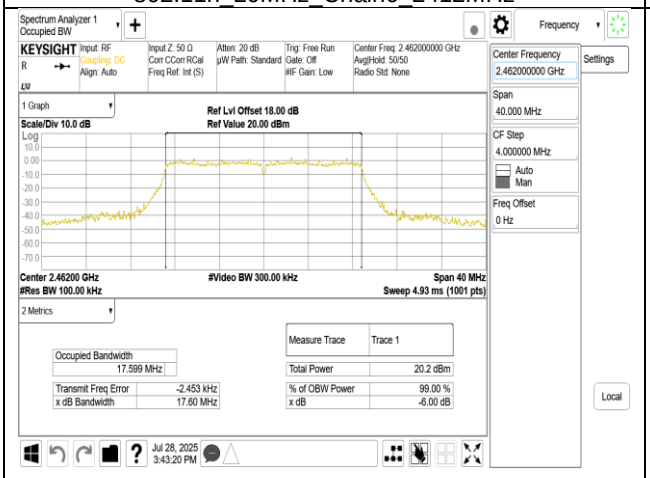
802.11g_20MHz_Chain0_2462MHz



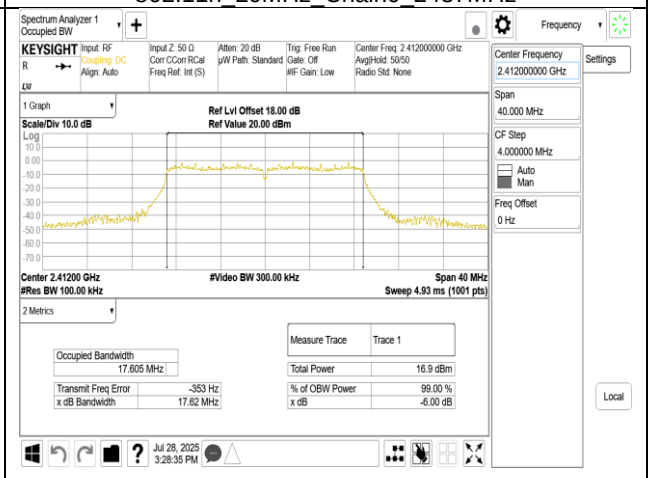
802.11n_20MHz_Chain0_2412MHz



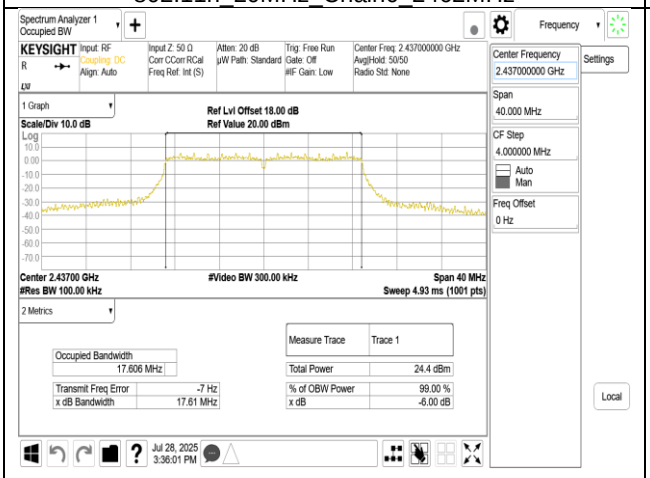
802.11n_20MHz_Chain0_2437MHz



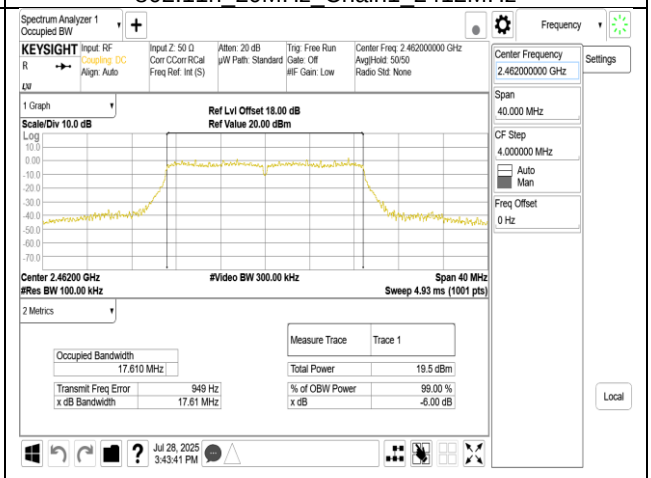
802.11n_20MHz_Chain0_2462MHz



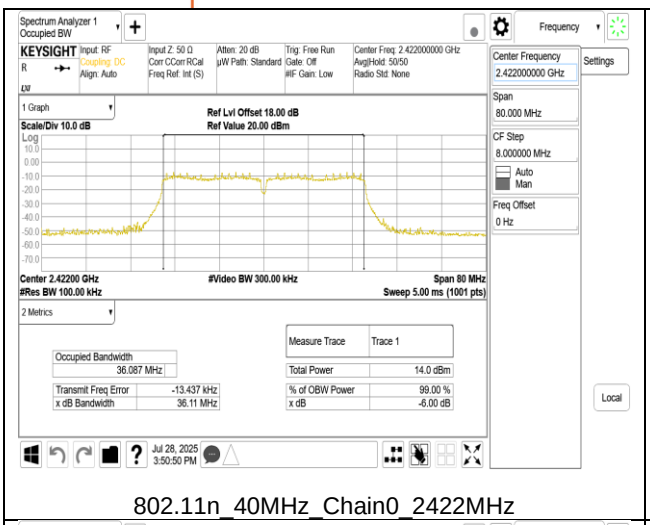
802.11n_20MHz_Chain1_2412MHz



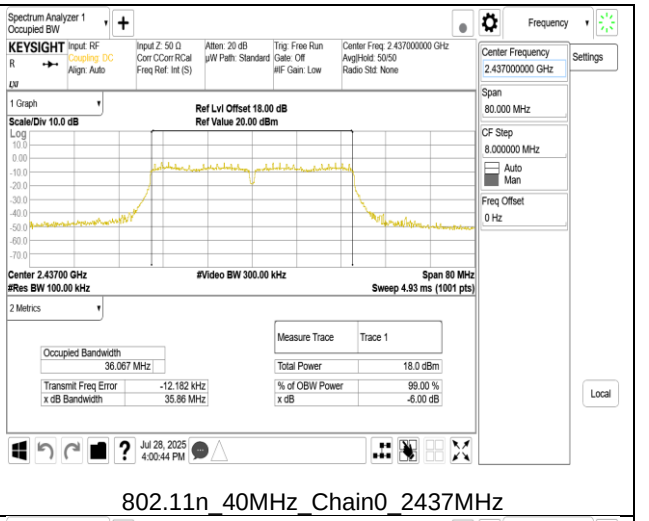
802.11n_20MHz_Chain1_2437MHz



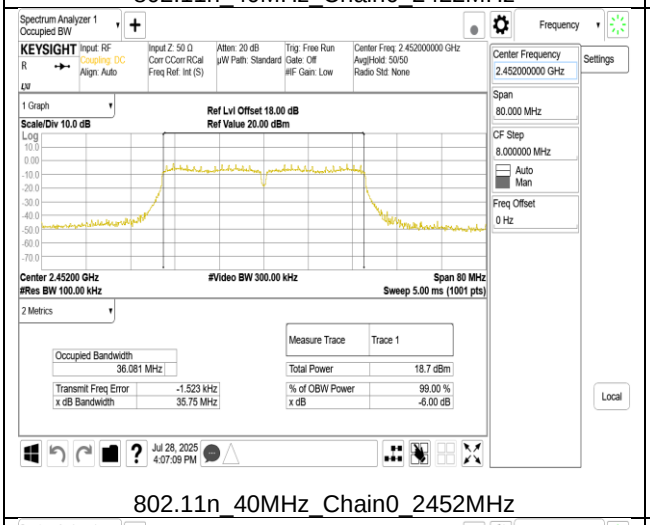
802.11n_20MHz_Chain1_2462MHz



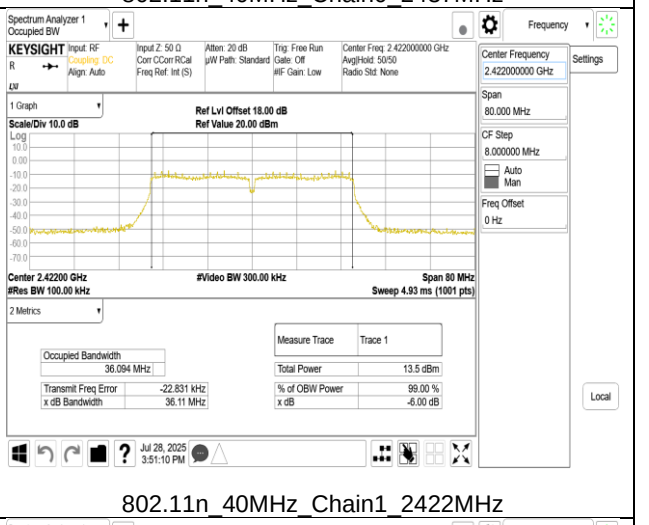
802.11n_40MHz_Chain0_2422MHz



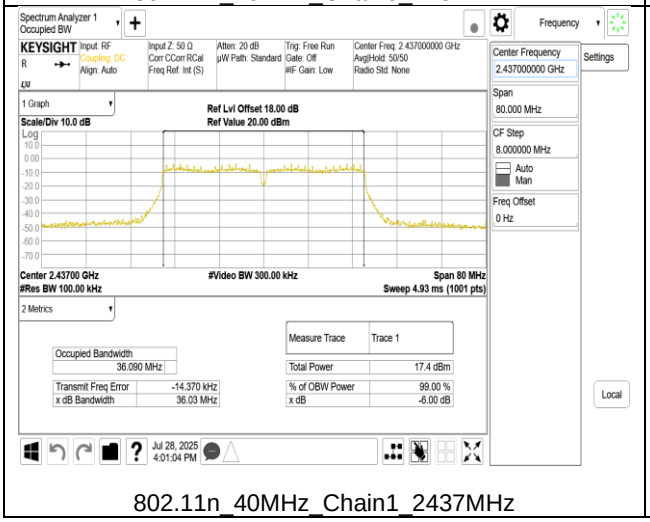
802.11n_40MHz_Chain0_2437MHz



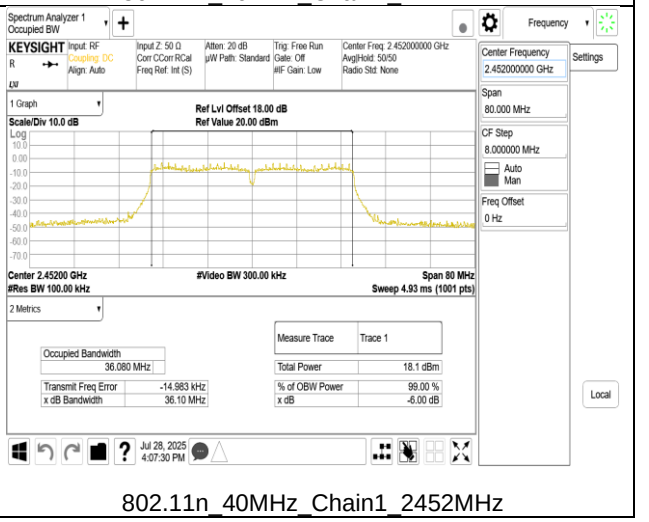
802.11n_40MHz_Chain0_2452MHz



802.11n_40MHz_Chain1_2422MHz



802.11n_40MHz_Chain1_2437MHz



802.11n_40MHz_Chain1_2452MHz

7.1.2 99% Bandwidth

802.11b Ch0

Freq. (MHz)	99% BW (MHz)
2412	13.578
2437	13.544
2462	13.588

802.11g Ch0

Freq. (MHz)	99% BW (MHz)
2412	16.830
2437	16.856
2462	16.807

802.11n_HT20M Ch0

Freq. (MHz)	99% BW (MHz)
2412	17.714
2437	17.743
2462	17.703

802.11n_HT20M Ch1

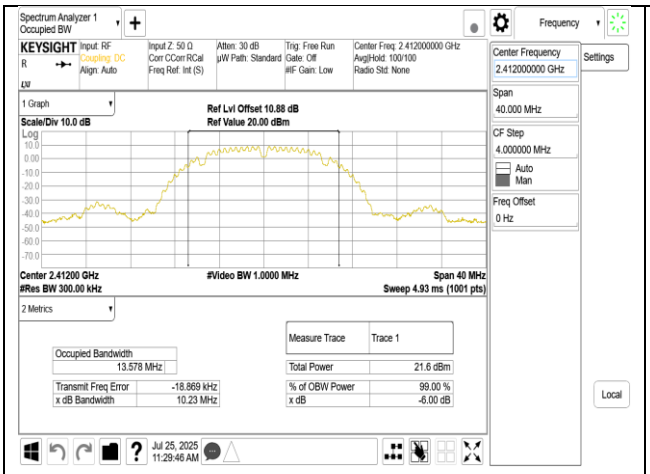
Freq. (MHz)	99% BW (MHz)
2412	17.685
2437	17.700
2462	17.697

802.11n_HT40M Ch0

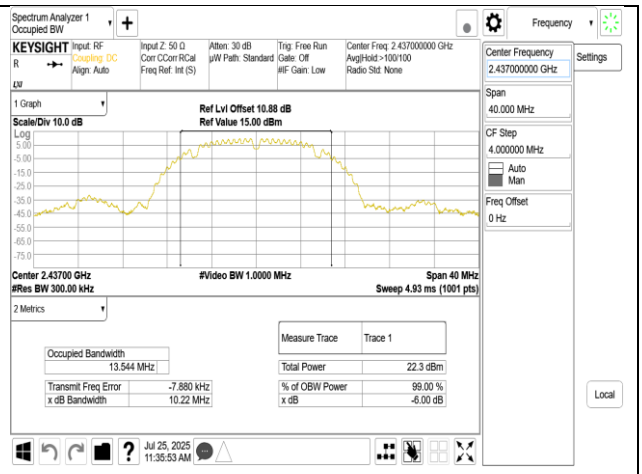
Freq. (MHz)	99% BW (MHz)
2422	36.266
2437	36.288
2452	36.246

802.11n_HT40M Ch1

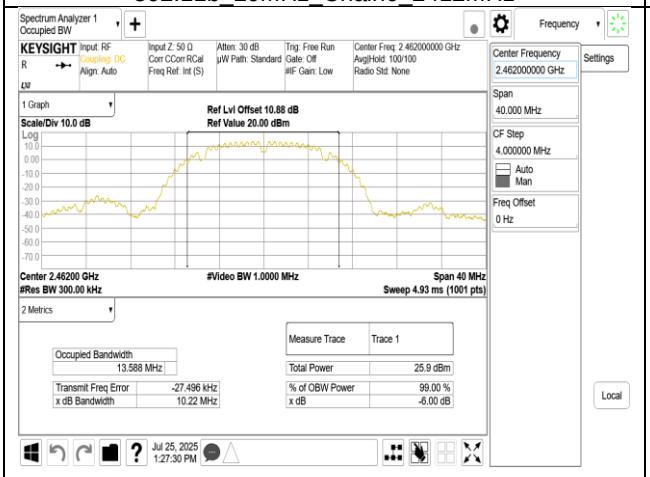
Freq. (MHz)	99% BW (MHz)
2422	36.210
2437	36.192
2452	36.214



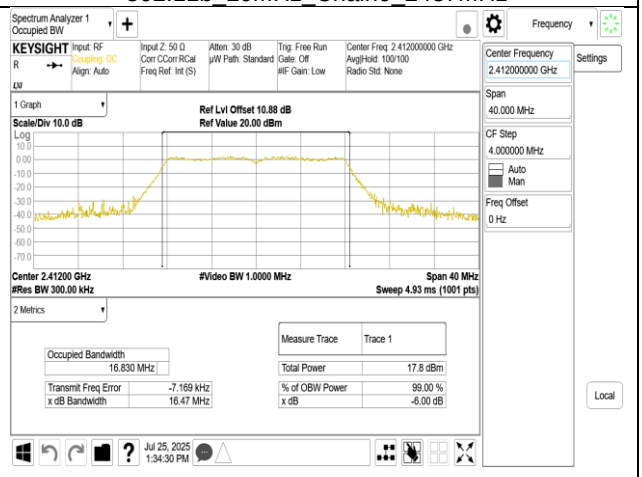
802.11b_20MHz_Chain0_2412MHz



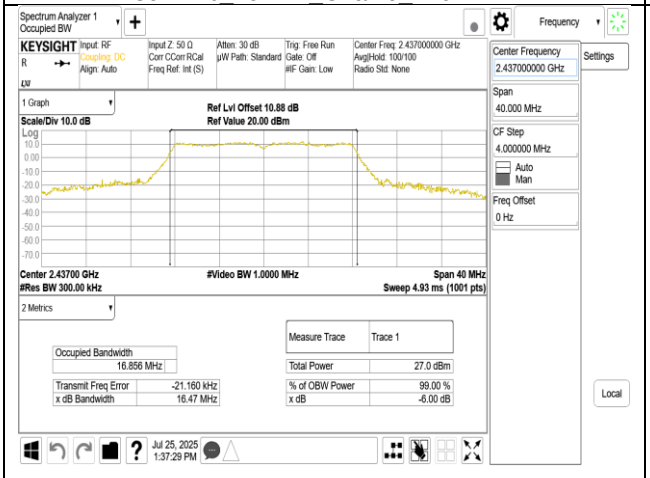
802.11b_20MHz_Chain0_2437MHz



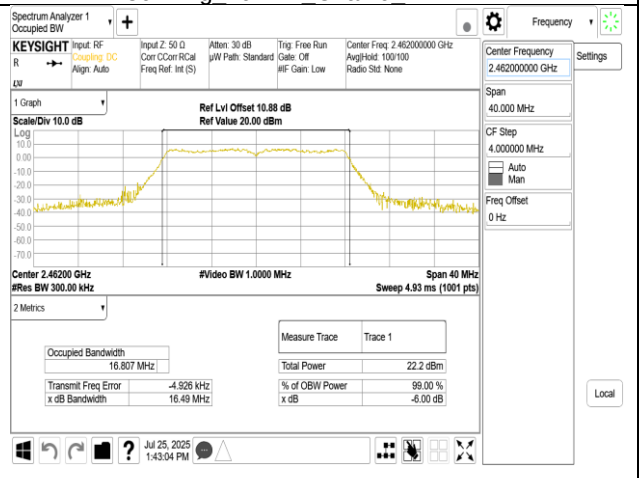
802.11b_20MHz_Chain0_2462MHz



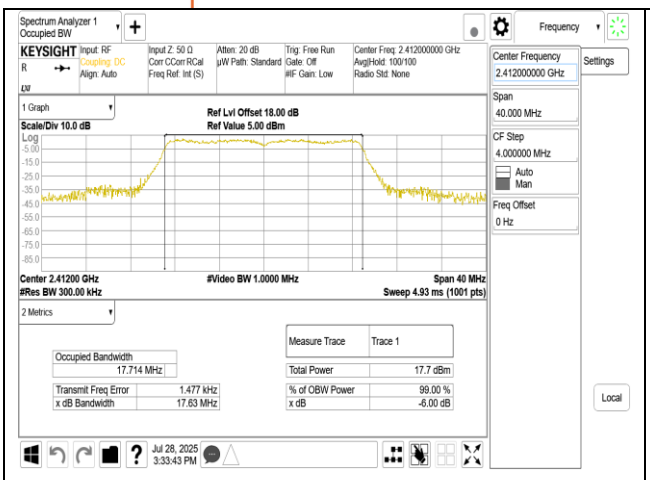
802.11g_20MHz_Chain0_2412MHz



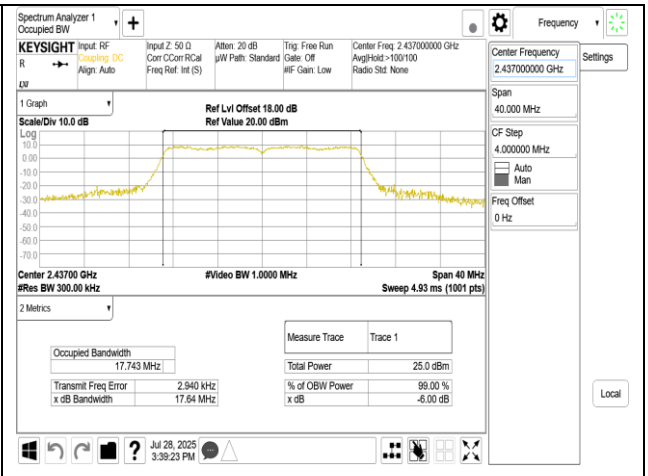
802.11g_20MHz_Chain0_2437MHz



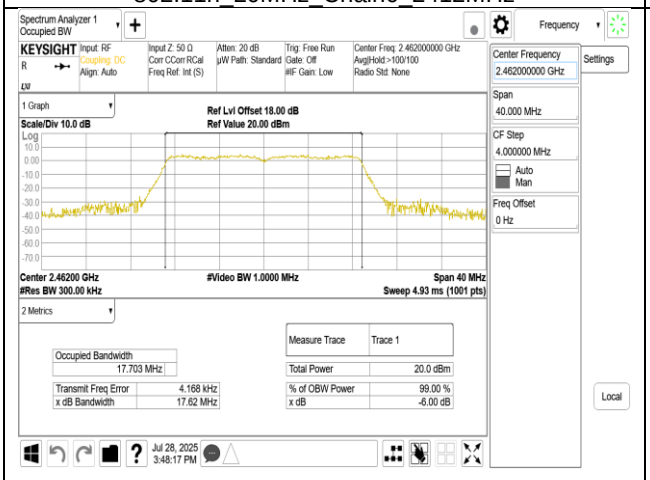
802.11g_20MHz_Chain0_2462MHz



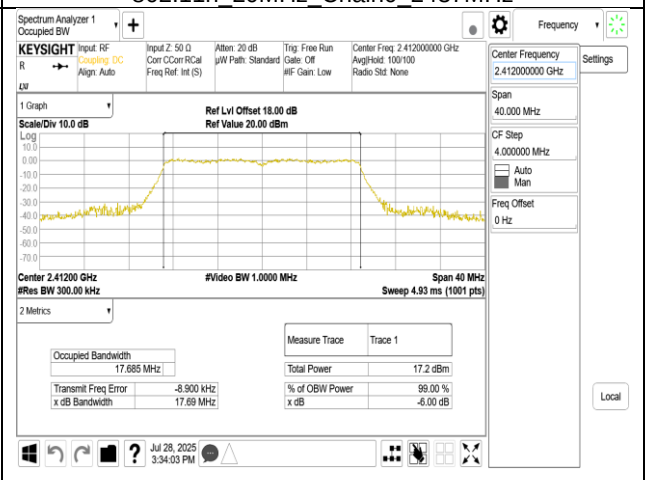
802.11n_20MHz_Chain0_2412MHz



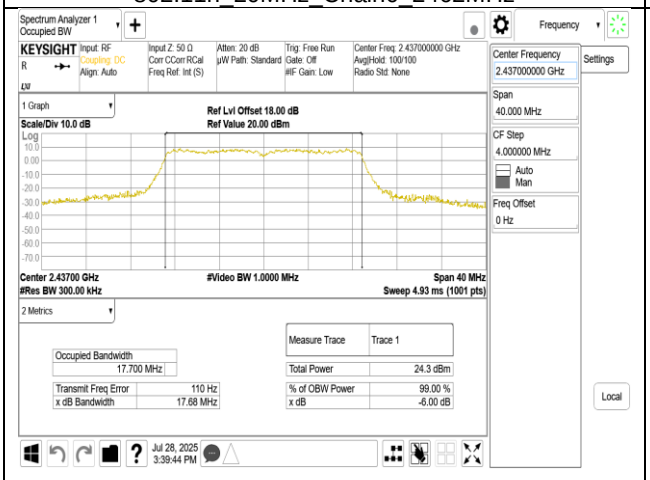
802.11n_20MHz_Chain0_2437MHz



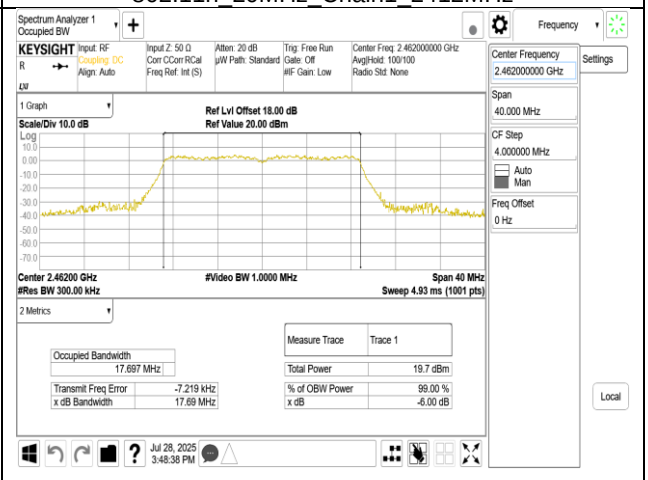
802.11n_20MHz_Chain0_2462MHz



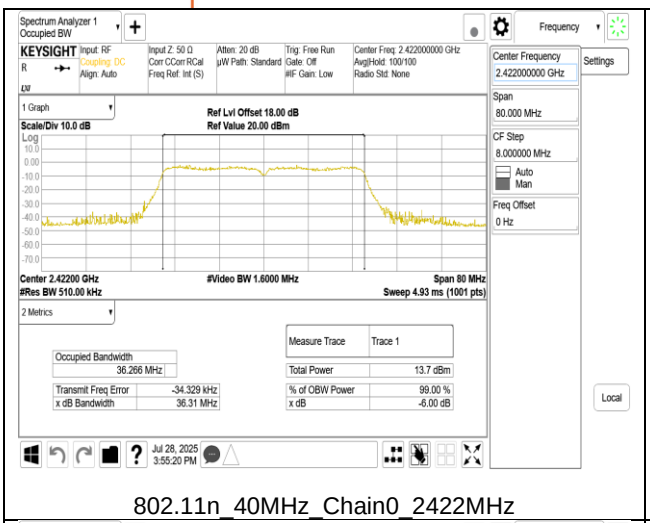
802.11n_20MHz_Chain1_2412MHz



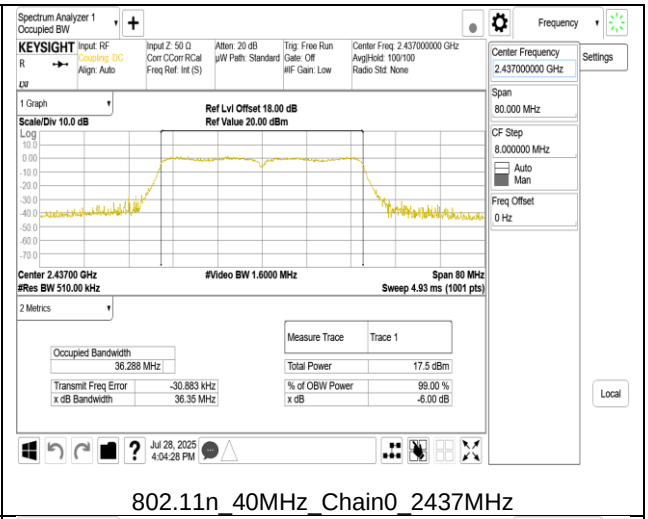
802.11n_20MHz_Chain1_2437MHz



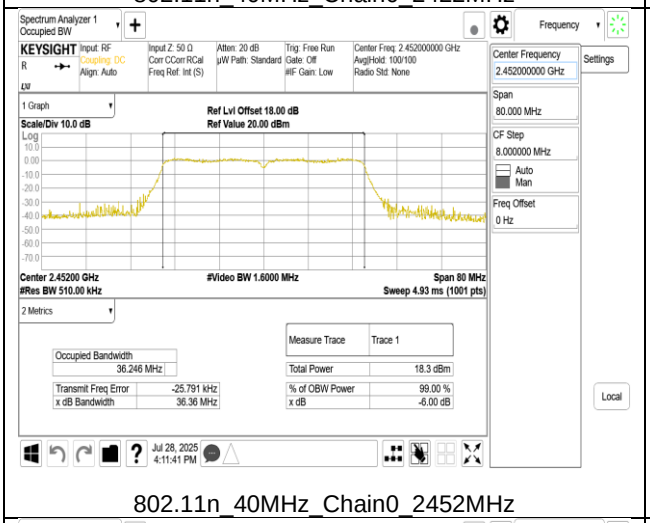
802.11n_20MHz_Chain1_2462MHz



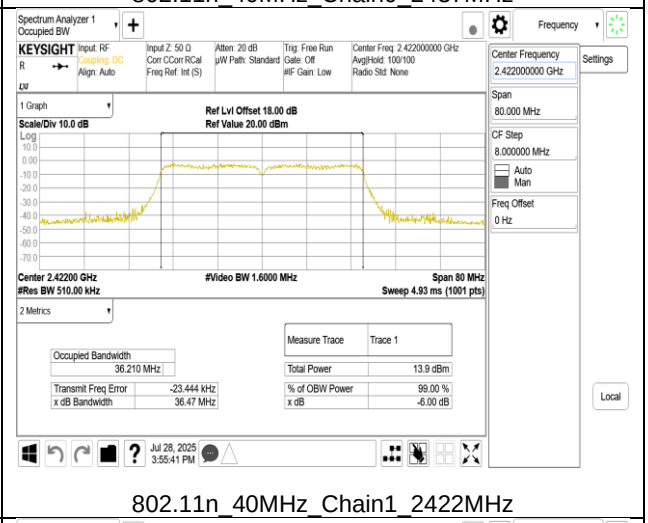
802.11n_40MHz_Chain0_2422MHz



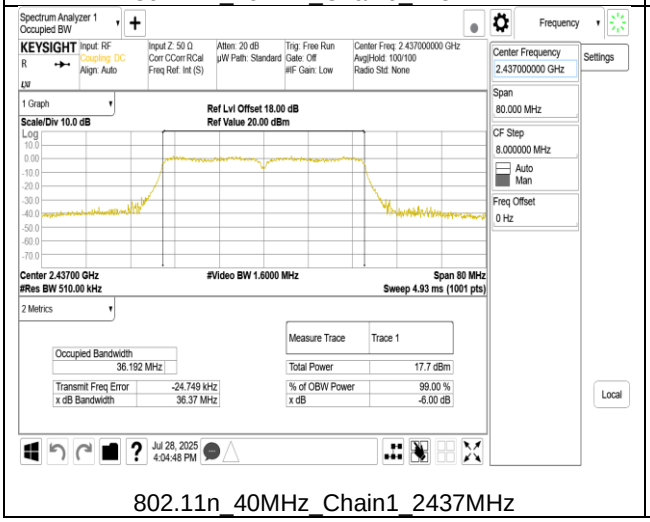
802.11n_40MHz_Chain0_2437MHz



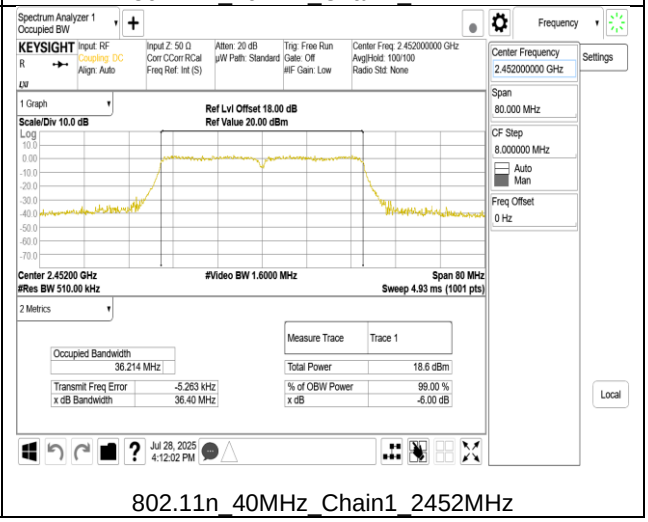
802.11n_40MHz_Chain0_2452MHz



802.11n_40MHz_Chain1_2422MHz



802.11n_40MHz_Chain1_2437MHz

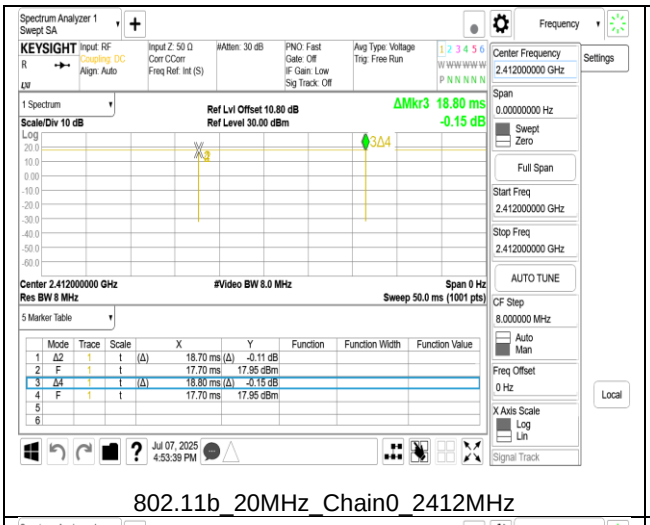


802.11n_40MHz_Chain1_2452MHz

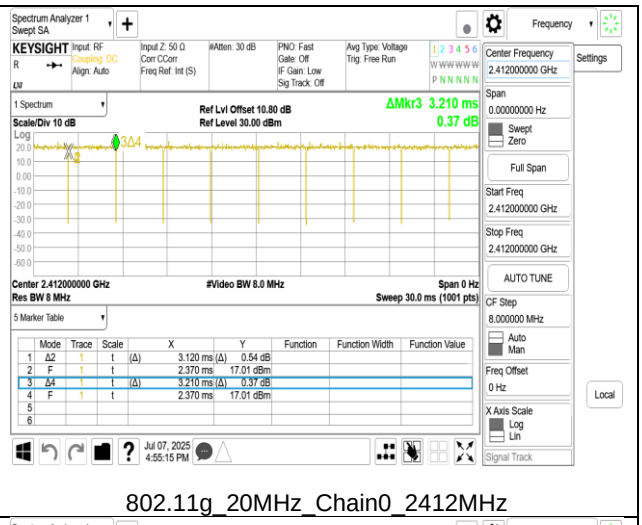
7.2 Duty Cycle

Mode	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11b	99.47	0.02	0.05	0.01
802.11g	97.20	0.12	0.32	1.00
802.11n_20	97.75	0.10	0.21	1.00
802.11n_40	95.45	0.20	0.43	1.00

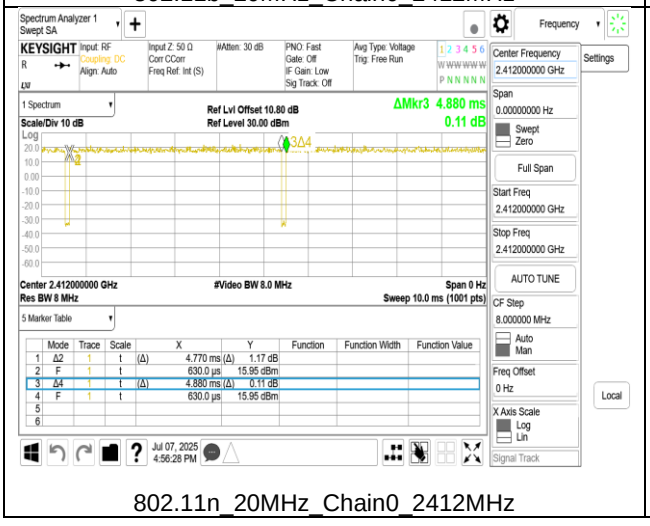
7.2.1 Duty Cycle test plots



802.11b_20MHz_Chain0_2412MHz



802.11g_20MHz_Chain0_2412MHz



802.11n_20MHz_Chain0_2412MHz

802.11n_40MHz_Chain0_2422MHz

7.3 Maximum Output Power

802.11b Ch0							
CH	Freq. (MHz)	Data Rate	Power Setting	Peak Output Power (mW)	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	19.5	125.03	20.97	29.38	PASS
2	2417	1	20	149.28	21.74	29.38	PASS
3	2422	1	22.5	237.14	23.75	29.38	PASS
4	2427	1	22.5	237.14	23.75	29.38	PASS
5	2432	1	24	340.41	**25.32**	29.38	PASS
6	2437	1	24	340.41	**25.32**	29.38	PASS
11	2462	1	24	338.06	25.29	29.38	PASS
802.11b Ch0							
CH	Freq. (MHz)	Data Rate	Power Setting	Avg. Output Power (mW)	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	19.5	69.71	18.43	29.38	PASS
2	2417	1	20	84.39	19.26	29.38	PASS
3	2422	1	22.5	134.37	21.28	29.38	PASS
4	2427	1	22.5	134.37	21.28	29.38	PASS
5	2432	1	24	248.49	**23.95**	29.38	PASS
6	2437	1	24	189.81	22.78	29.38	PASS
11	2462	1	24	192.00	22.83	29.38	PASS

802.11b Ch1							
CH	Freq. (MHz)	Data Rate	Power Setting	Peak Output Power (mW)	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	19.5	120.23	20.80	29.38	PASS
2	2417	1	20	144.21	21.59	29.38	PASS
3	2422	1	22.5	229.61	23.61	29.38	PASS
4	2427	1	22.5	230.67	23.63	29.38	PASS
5	2432	1	24	330.37	25.19	29.38	PASS
6	2437	1	24	330.37	25.19	29.38	PASS
11	2462	1	24	326.59	25.14	29.38	PASS
802.11b Ch1							
CH	Freq. (MHz)	Data Rate	Power Setting	Avg. Output Power (mW)	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	19.5	67.19	18.27	29.38	PASS
2	2417	1	20	82.09	19.14	29.38	PASS
3	2422	1	22.5	131.01	21.17	29.38	PASS
4	2427	1	22.5	129.21	21.11	29.38	PASS
5	2432	1	24	240.05	23.80	29.38	PASS
6	2437	1	24	181.68	22.59	29.38	PASS
11	2462	1	24	184.21	22.65	29.38	PASS

802.11g Ch0							
CH	Freq. (MHz)	Data Rate	Power Setting	Peak Output Power (mW)	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	11.5	143.22	21.56	29.38	PASS
2	2417	6	15.5	335.74	25.26	29.38	PASS
3	2422	6	17.5	487.53	26.88	29.38	PASS
4	2427	6	18.5	537.03	27.30	29.38	PASS
5	2432	6	19.5	591.56	27.72	29.38	PASS
6	2437	6	21.5	679.20	**28.32**	29.38	PASS
9	2452	6	21.5	669.88	28.26	29.38	PASS
10	2457	6	19	583.45	27.66	29.38	PASS
11	2462	6	16.5	349.95	25.44	29.38	PASS
802.11g Ch0							
CH	Freq. (MHz)	Data Rate	Power Setting	Avg. Output Power (mW)	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	11.5	14.60	11.64	29.38	PASS
2	2417	6	15.5	34.94	15.43	29.38	PASS
3	2422	6	17.5	54.24	17.34	29.38	PASS
4	2427	6	18.5	62.57	17.96	29.38	PASS
5	2432	6	19.5	76.62	18.84	29.38	PASS
6	2437	6	21.5	118.67	**20.74**	29.38	PASS
9	2452	6	21.5	112.29	20.50	29.38	PASS
10	2457	6	19	71.83	18.56	29.38	PASS
11	2462	6	16.5	36.50	15.62	29.38	PASS

802.11g Ch1							
CH	Freq. (MHz)	Data Rate	Power Setting	Peak Output Power (mW)	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	11.5	138.36	21.41	29.38	PASS
2	2417	6	15.5	321.37	25.07	29.38	PASS
3	2422	6	17.5	472.06	26.74	29.38	PASS
4	2427	6	18.5	523.60	27.19	29.38	PASS
5	2432	6	19.5	567.54	27.54	29.38	PASS
6	2437	6	21.5	662.22	28.21	29.38	PASS
9	2452	6	21.5	639.73	28.06	29.38	PASS
10	2457	6	19	562.34	27.50	29.38	PASS
11	2462	6	16.5	338.06	25.29	29.38	PASS
802.11g Ch1							
CH	Freq. (MHz)	Data Rate	Power Setting	Avg. Output Power (mW)	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	11.5	14.17	11.51	29.38	PASS
2	2417	6	15.5	33.91	15.30	29.38	PASS
3	2422	6	17.5	52.40	17.19	29.38	PASS
4	2427	6	18.5	60.16	17.79	29.38	PASS
5	2432	6	19.5	73.17	18.64	29.38	PASS
6	2437	6	21.5	114.90	20.60	29.38	PASS
9	2452	6	21.5	108.73	20.36	29.38	PASS
10	2457	6	19	69.56	18.42	29.38	PASS
11	2462	6	16.5	35.02	15.44	29.38	PASS

802.11n_HT20M_2TX									
CH	Freq. (MHz)	Data Rate	Power Setting	Peak Output Power (dBm)		Total Peak Output Power (mW)	Total Peak Output Power (dBm)	Limit (dBm)	RESULT
				Ch0	Ch1				
1	2412	MCS0	11.5	21.54	20.55	256.06	24.08	29.38	PASS
2	2417	MCS0	14.5	24.32	23.43	490.69	26.91	29.38	PASS
3	2422	MCS0	15	25.19	24.26	597.06	27.76	29.38	PASS
4	2427	MCS0	17	26.77	25.72	848.59	29.29	29.38	PASS
5	2432	MCS0	18	26.70	25.59	829.98	29.19	29.38	PASS
6	2437	MCS0	19.5	26.72	25.61	833.81	29.21	29.38	PASS
9	2452	MCS0	18.5	26.83	25.69	852.63	29.31	29.38	PASS
10	2457	MCS0	18.5	26.80	25.73	852.74	**29.31**	29.38	PASS
11	2462	MCS0	14.5	23.63	22.82	422.10	26.25	29.38	PASS

802.11n_HT20M_2TX									
CH	Freq. (MHz)	Data Rate	Power Setting	Avg. Output Power (dBm)		Total Avg. Output Power (mW)	Total Avg. Output Power (dBm)	Limit (dBm)	RESULT
				Ch0	Ch1				
1	2412	MCS0	11.5	11.59	10.98	26.95	14.30	29.38	PASS
2	2417	MCS0	14.5	14.65	13.98	54.16	17.34	29.38	PASS
3	2422	MCS0	15	15.62	14.94	67.65	18.30	29.38	PASS
4	2427	MCS0	17	16.66	15.43	81.24	19.10	29.38	PASS
5	2432	MCS0	18	17.65	16.40	101.83	20.08	29.38	PASS
6	2437	MCS0	19.5	18.42	17.18	121.71	**20.85**	29.38	PASS
9	2452	MCS0	18.5	17.51	16.44	100.39	20.02	29.38	PASS
10	2457	MCS0	18.5	17.46	16.51	100.46	20.02	29.38	PASS
11	2462	MCS0	14.5	13.80	13.34	45.55	16.59	29.38	PASS

802.11n_HT40M_2TX									
CH	Freq. (MHz)	Data Rate	Power Setting	Peak Output Power (dBm)		Total Peak Output Power (mW)	Total Peak Output Power (dBm)	Limit (dBm)	RESULT
				Ch0	Ch1				
3	2422	MCS0	7.5	18.11	17.06	115.53	20.63	29.38	PASS
4	2427	MCS0	8	18.33	18.12	132.94	21.24	29.38	PASS
5	2432	MCS0	9.5	19.90	19.13	179.57	22.54	29.38	PASS
6	2437	MCS0	11	21.24	20.76	252.17	24.02	29.38	PASS
9	2452	MCS0	12	21.68	22.44	322.62	**25.09**	29.38	PASS

802.11n_HT40M_2TX									
CH	Freq. (MHz)	Data Rate	Power Setting	Avg. Output Power (dBm)		Total Avg. Output Power (mW)	Total Avg. Output Power (dBm)	Limit (dBm)	RESULT
				Ch0	Ch1				
3	2422	MCS0	7.5	7.54	7.21	10.94	10.39	29.38	PASS
4	2427	MCS0	8	8.64	8.36	14.17	11.51	29.38	PASS
5	2432	MCS0	9.5	9.44	9.08	16.89	12.28	29.38	PASS
6	2437	MCS0	11	11.33	10.91	25.93	14.14	29.38	PASS
9	2452	MCS0	12	11.93	11.69	30.37	**14.82**	29.38	PASS

7.3.1 EIRP

802.11b Ch0							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	1	18.43	6.62	25.05	35.38	PASS
2	2417	1	19.26	6.62	25.88	35.38	PASS
3	2422	1	21.28	6.62	27.90	35.38	PASS
4	2427	1	21.28	6.62	27.90	35.38	PASS
5	2432	1	23.95	6.62	**30.57**	35.38	PASS
6	2437	1	22.78	6.62	29.40	35.38	PASS
11	2462	1	22.83	6.62	29.45	35.38	PASS

802.11b Ch1							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	1	18.27	6.62	24.89	35.38	PASS
2	2417	1	19.14	6.62	25.76	35.38	PASS
3	2422	1	21.17	6.62	27.79	35.38	PASS
4	2427	1	21.11	6.62	27.73	35.38	PASS
5	2432	1	23.80	6.62	30.42	35.38	PASS
6	2437	1	22.59	6.62	29.21	35.38	PASS
11	2462	1	22.65	6.62	29.27	35.38	PASS

802.11g Ch0							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	6	11.64	6.62	18.26	35.38	PASS
2	2417	6	15.43	6.62	22.05	35.38	PASS
3	2422	6	17.34	6.62	23.96	35.38	PASS
4	2427	6	17.96	6.62	24.58	35.38	PASS
5	2432	6	18.84	6.62	25.46	35.38	PASS
6	2437	6	20.74	6.62	**27.36**	35.38	PASS
9	2452	6	20.50	6.62	27.12	35.38	PASS
10	2457	6	18.56	6.62	25.18	35.38	PASS
11	2462	6	15.62	6.62	22.24	35.38	PASS

802.11g Ch1							
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
1	2412	6	11.51	6.62	18.13	35.38	PASS
2	2417	6	15.30	6.62	21.92	35.38	PASS
3	2422	6	17.19	6.62	23.81	35.38	PASS
4	2427	6	17.79	6.62	24.41	35.38	PASS
5	2432	6	18.64	6.62	25.26	35.38	PASS
6	2437	6	20.60	6.62	27.22	35.38	PASS
9	2452	6	20.36	6.62	26.98	35.38	PASS
10	2457	6	18.42	6.62	25.04	35.38	PASS
11	2462	6	15.44	6.62	22.06	35.38	PASS

802.11n_HT20M_2TX									
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Total Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
			Ch0	Ch1					
1	2412	MCS0	11.59	10.98	14.30	6.62	20.92	35.38	PASS
2	2417	MCS0	14.65	13.98	17.34	6.62	23.96	35.38	PASS
3	2422	MCS0	15.62	14.94	18.30	6.62	24.92	35.38	PASS
4	2427	MCS0	16.66	15.43	19.10	6.62	25.72	35.38	PASS
5	2432	MCS0	17.65	16.40	20.08	6.62	26.70	35.38	PASS
6	2437	MCS0	18.42	17.18	20.85	6.62	**27.47**	35.38	PASS
9	2452	MCS0	17.51	16.44	20.02	6.62	26.64	35.38	PASS
10	2457	MCS0	17.46	16.51	20.02	6.62	26.64	35.38	PASS
11	2462	MCS0	13.80	13.34	16.59	6.62	23.21	35.38	PASS

802.11n_HT40M_2TX									
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)		Total Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	RESULT
			Ch0	Ch1					
3	2422	MCS0	7.54	7.21	10.39	6.62	17.01	35.38	PASS
4	2427	MCS0	8.64	8.36	11.51	6.62	18.13	35.38	PASS
5	2432	MCS0	9.44	9.08	12.28	6.62	18.90	35.38	PASS
6	2437	MCS0	11.33	10.91	14.14	6.62	20.76	35.38	PASS
9	2452	MCS0	11.93	11.69	14.82	6.62	**21.44**	35.38	PASS

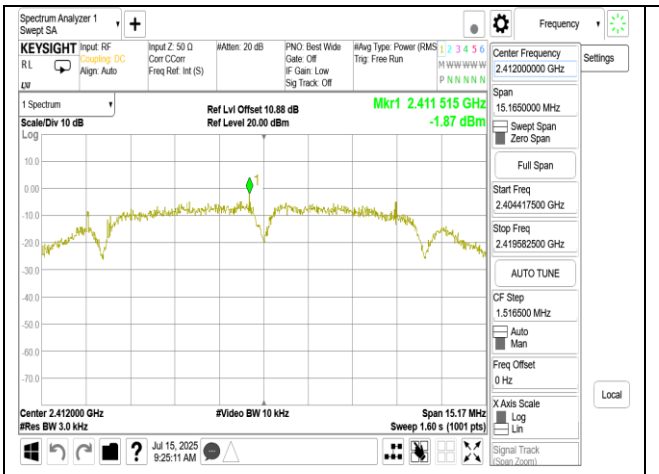
7.4 Maximum Power Spectral Density

POWER DENSITY 802.11b					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-1.87	-	-1.87	7.38	PASS
2437	-0.75	-	-0.75	7.38	PASS
2462	2.98	-	2.98	7.38	PASS

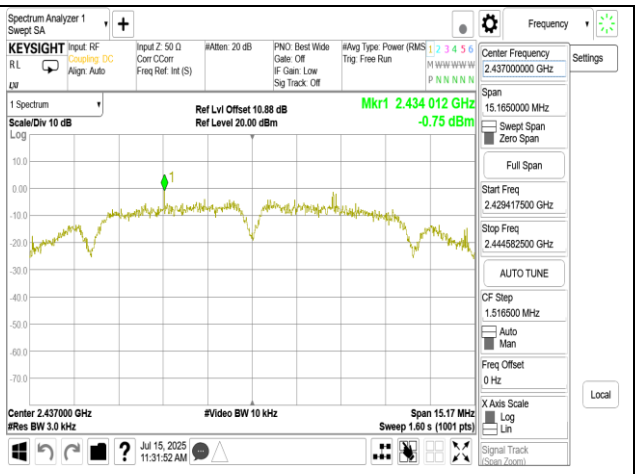
POWER DENSITY 802.11g					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-16.39	-	-16.39	7.38	PASS
2437	-6.99	-	-6.99	7.38	PASS
2462	-11.41	-	-11.41	7.38	PASS

POWER DENSITY 802.11n HT20					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-14.76	-15.59	-12.14	4.37	PASS
2437	-8.02	-8.47	-5.23	4.37	PASS
2462	-12.53	-12.58	-9.54	4.37	PASS

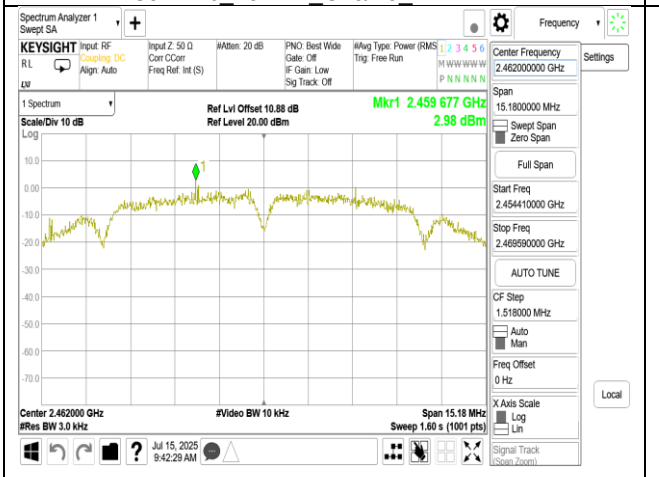
POWER DENSITY 802.11n HT40					
Freq. (MHz)	Ch0 PSD	Ch1 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2422	-22.52	-22.32	-19.41	4.37	PASS
2437	-18.9	-19.00	-15.94	4.37	PASS
2452	-17.94	-18.54	-15.22	4.37	PASS



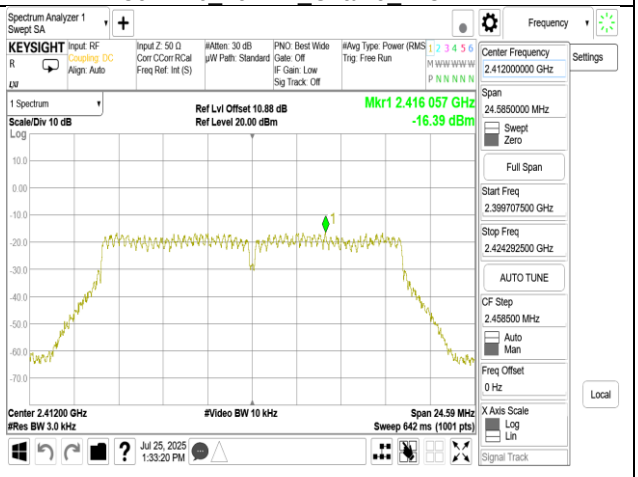
802.11b_20MHz_Chain0_2412MHz



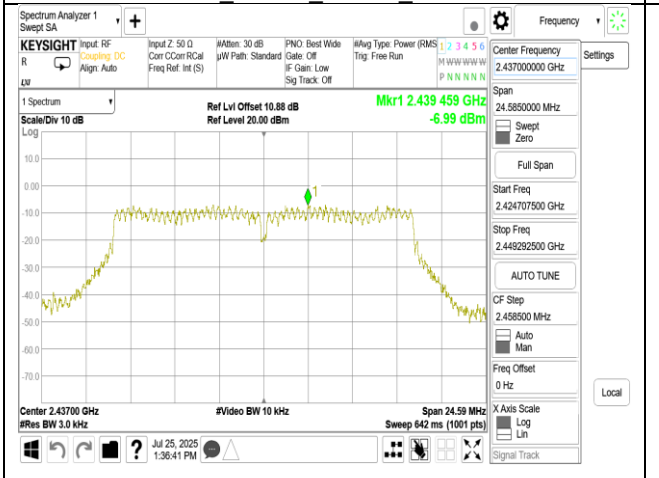
802.11b_20MHz_Chain0_2437MHz



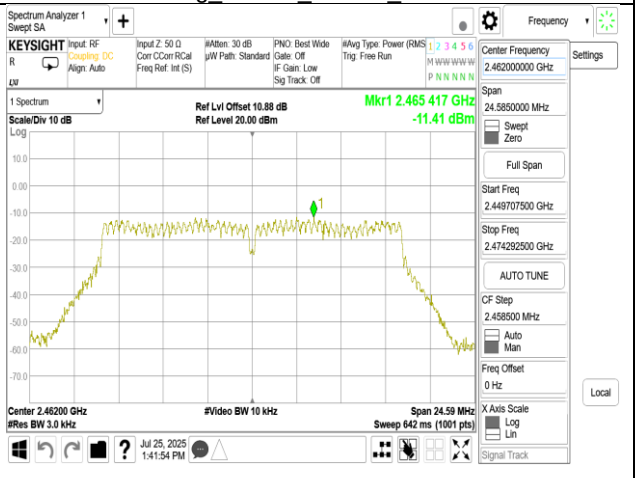
802.11b_20MHz_Chain0_2462MHz



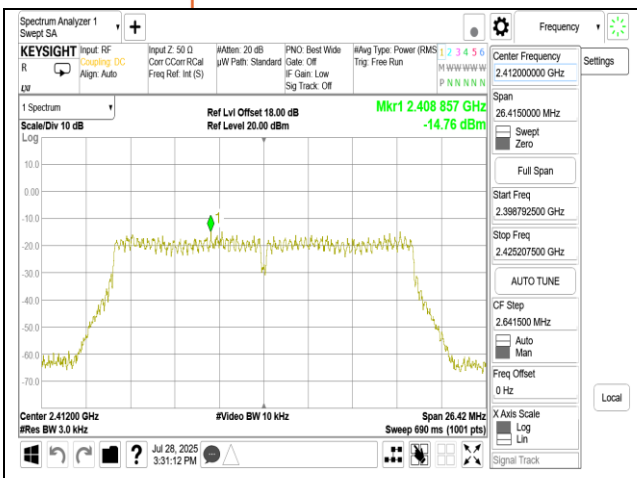
802.11g_20MHz_Chain0_2412MHz



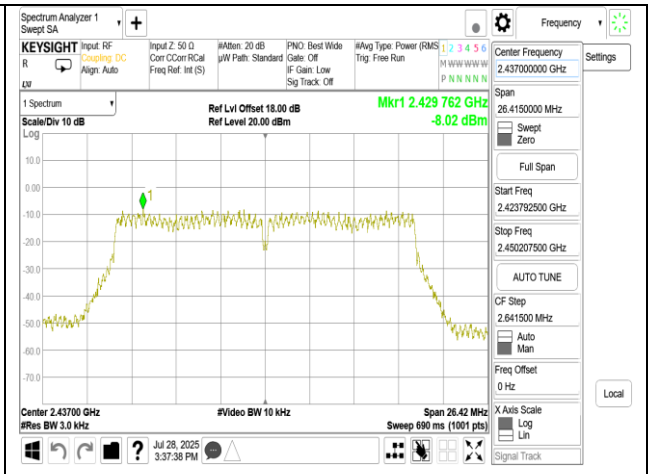
802.11g_20MHz_Chain0_2437MHz



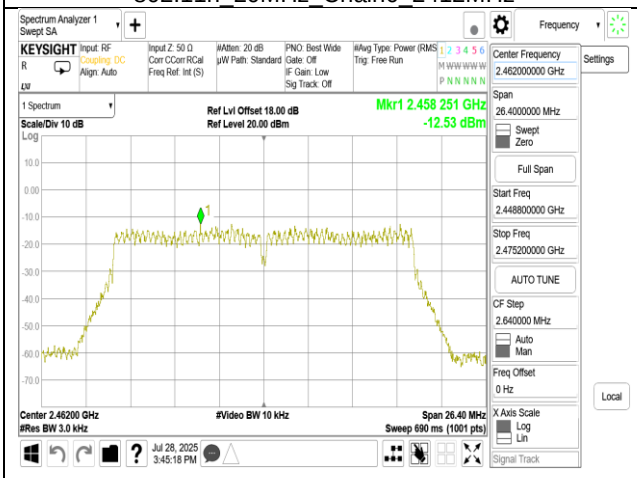
802.11g_20MHz_Chain0_2462MHz



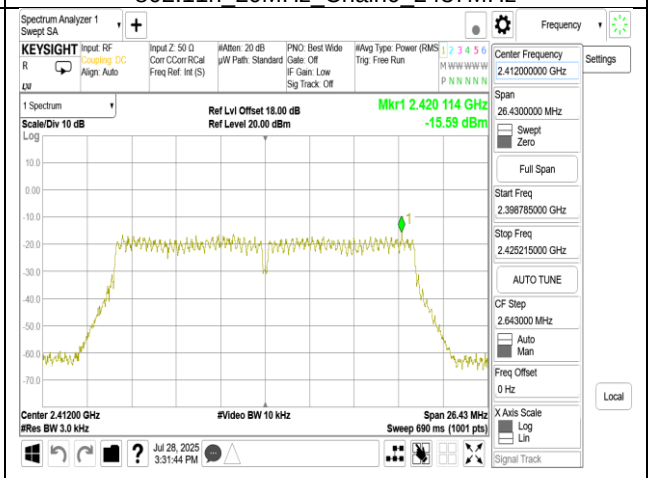
802.11n_20MHz_Chain0_2412MHz



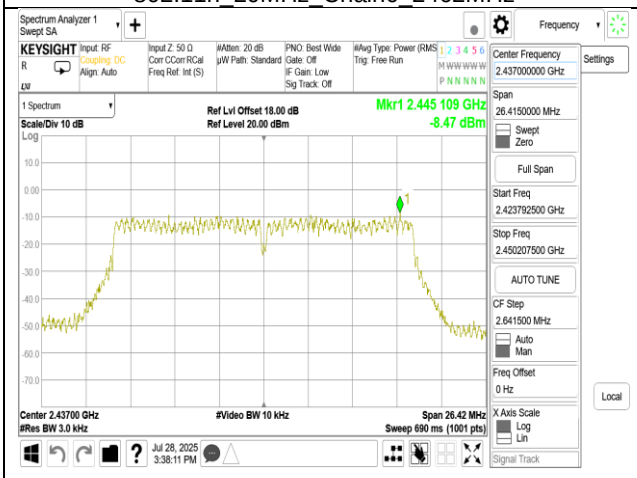
802.11n_20MHz_Chain0_2437MHz



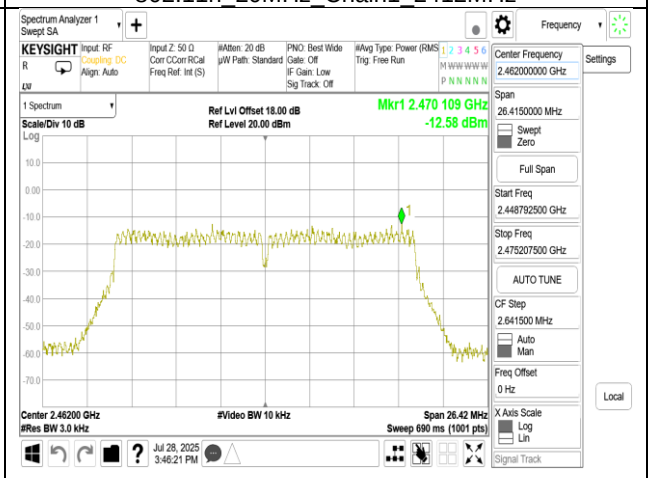
802.11n_20MHz_Chain0_2462MHz



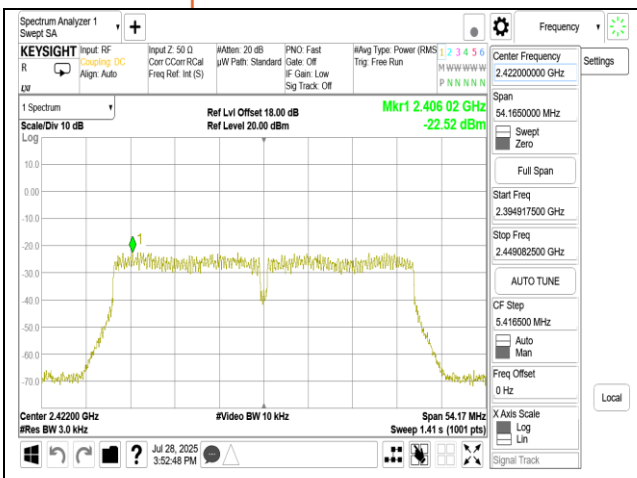
802.11n_20MHz_Chain1_2412MHz



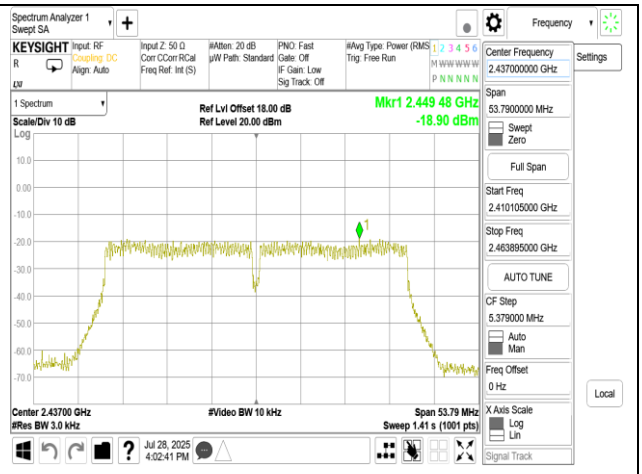
802.11n_20MHz_Chain1_2437MHz



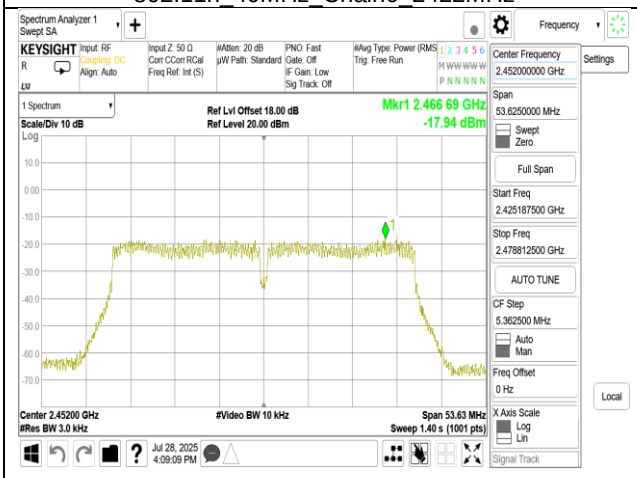
802.11n_20MHz_Chain1_2462MHz



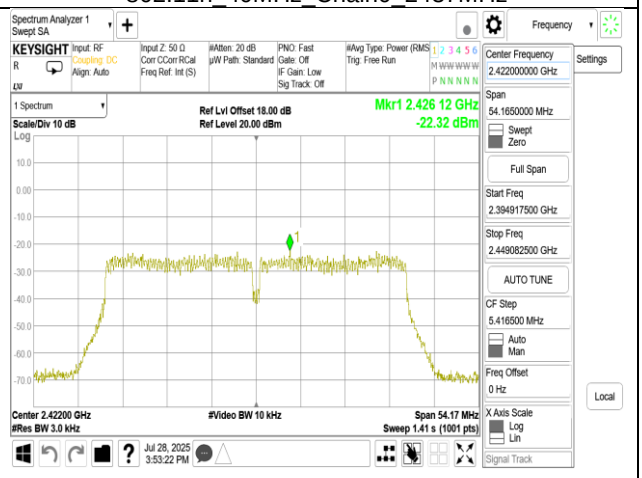
802.11n_40MHz_Chain0_2422MHz



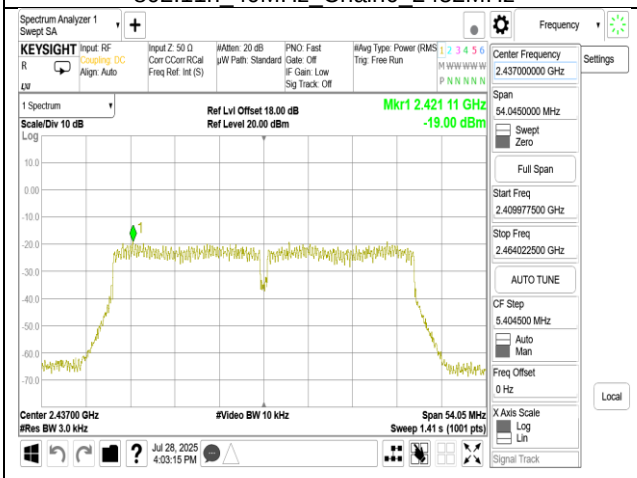
802.11n_40MHz_Chain0_2437MHz



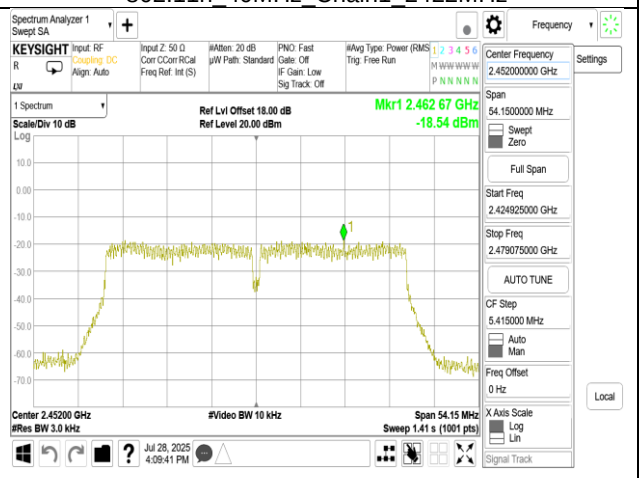
802.11n_40MHz_Chain0_2452MHz



802.11n_40MHz_Chain1_2422MHz



802.11n_40MHz_Chain1_2437MHz



802.11n_40MHz_Chain1_2452MHz

7.5 Out of Band Emission

802.11b Ch0

Reference Level of Limit		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	8.47	-11.53
2437	9.23	-10.77
2462	12.89	-7.11

802.11n_HT_20M Ch1

Reference Level of Limit		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	-0.87	-20.87
2437	6.10	-13.90
2462	1.77	-18.23

802.11g Ch0

Reference Level of Limit		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	-0.04	-20.04
2437	9.12	-10.88
2462	4.33	-15.67

802.11n_HT_40M Ch0

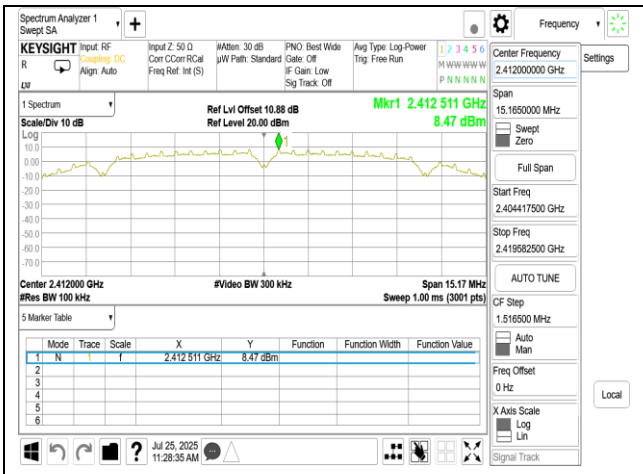
Reference Level of Limit		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2422	-6.86	-26.86
2437	-3.18	-23.18
2452	-2.36	-22.36

802.11n_HT_20M Ch0

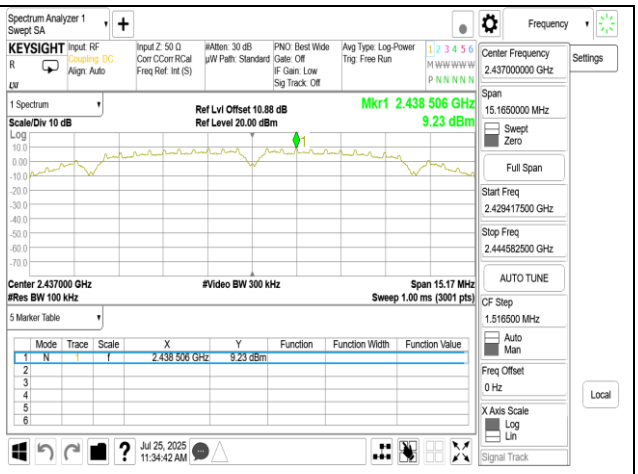
Reference Level of Limit		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2412	-0.41	-20.41
2437	7.06	-12.94
2462	1.99	-18.01

802.11n_HT_40M Ch1

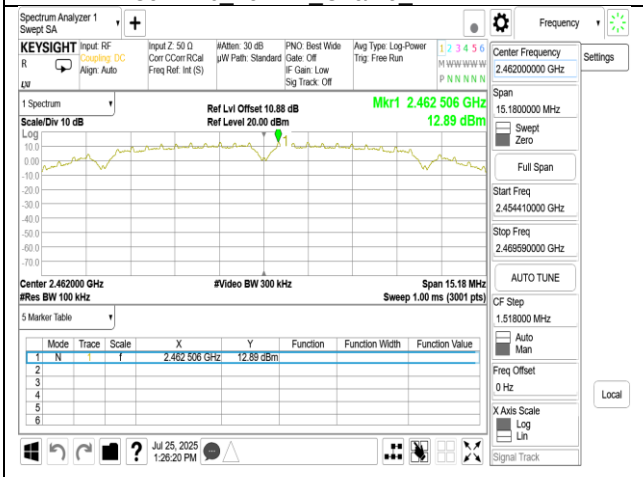
Reference Level of Limit		
Freq. (MHz)	PSD (dBm)	Reference Level of Limit (dBm)
2422	-7.40	-27.40
2437	-3.59	-23.59
2452	-2.83	-22.83



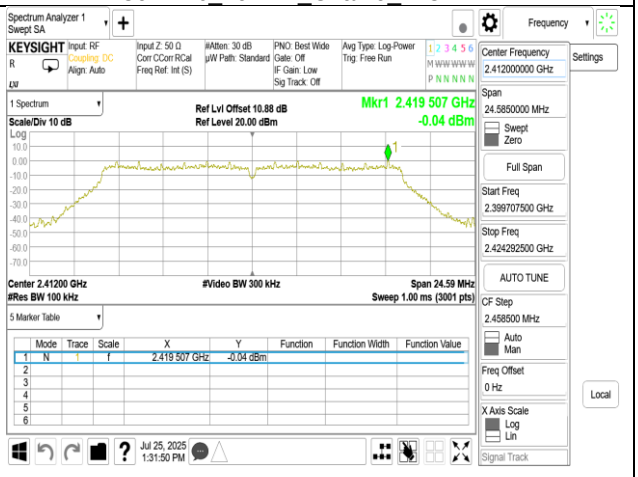
802.11b_20MHz_Chain0_2412MHz



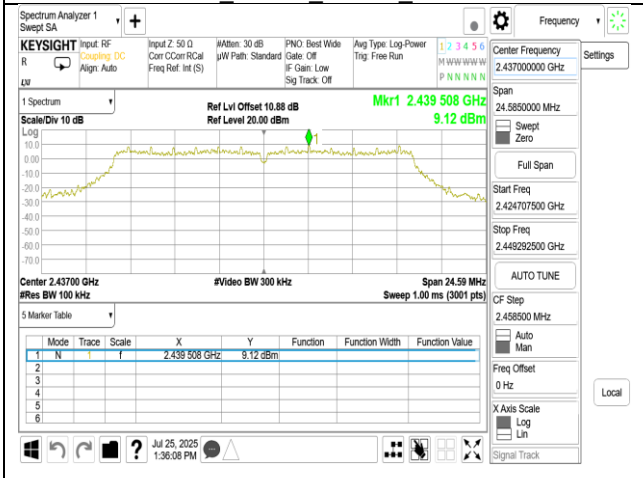
802.11b_20MHz_Chain0_2437MHz



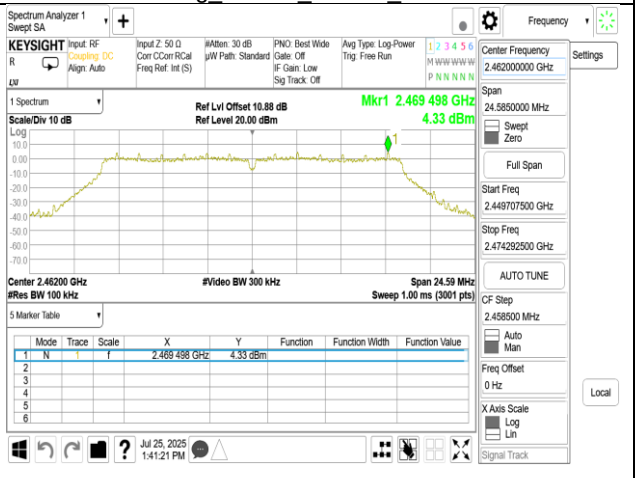
802.11b_20MHz_Chain0_2462MHz



802.11g_20MHz_Chain0_2412MHz



802.11g_20MHz_Chain0_2437MHz



802.11g_20MHz_Chain0_2462MHz