



TEST REPORT

Applicant: Hangzhou Sunyard Technology Co., Ltd.
Address: Sunyard Science & Technology Building, 3888
Jiangnan Ave., Binjiang Dist., Hangzhou, China
Equipment Type: Android POS Terminal
Model Name: S60P (refer to section 2.3)
Brand Name: SUNYARD
FCC ID: 2BFZW-S60
Test Standard: 47 CFR Part 15 Subpart C
(refer to section 3.1)
Sample Arrival Date: Feb. 06, 2025
Test Date: Feb. 08, 2025 - Feb. 11, 2025
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ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Julie Zhu**Checked by:** Ye Hongji**Approved by:** Sunny Zou
(Technical Director)

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Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Mar. 07, 2025</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☒ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Hangzhou Sunyard Technology Co., Ltd.
Address	Sunyard Science & Technology Building, 3888 Jiangnan Ave., Binjiang Dist., Hangzhou, China

2.2 Manufacturer Information

Manufacturer	Hangzhou Sunyard Technology Co., Ltd.
Address	Sunyard Science & Technology Building, 3888 Jiangnan Ave., Binjiang Dist., Hangzhou, China

2.3 General Description for Equipment under Test (EUT)

EUT Name	Android POS Terminal		
Model Name Under Test	S60P		
Series Model Name	S60		
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ as below. (this information provided by the applicant).		
	Model	Screen	Button
	S60P	4 inch	Physical buttons
	S60	5 inch	Virtual buttons
Hardware Version	V1.10		
Software Version	20_24_13001		
Dimensions (Approx.)	N/A		
Weight (Approx.)	N/A		

2.4 Technical Information

Network and Wireless connectivity	2G Network GSM/GPRS/EDGE 850/1900 MHz 3G Network WCDMA/HSDPA/HSUPA Band 2/4/5 4G Network FDD LTE Band 2/4/5/7/12/17/66 TDD LTE Band 38/41 Bluetooth (BR+EDR+BLE) WIFI 802.11a, 802.11b, 802.11g, 802.11n(HT20/40) and 802.11ac(VHT20/40/80), NFC
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The requirement for the following technical information of the EUT was tested in this report:

Frequency Range	802.11b/g/n(20 MHz): 2.412 GHz - 2.462 GHz $f_c = 2412 \text{ MHz} + (N-1)*5 \text{ MHz}$, where - f_c = “Operating Frequency” in MHz, - N = “Channel Number” with the range from 1 to 11. 802.11n(40 MHz): 2.422 GHz - 2.452 GHz $f_c = 2412 \text{ MHz} + (N-1)*5 \text{ MHz}$, where - f_c = “Operating Frequency” in MHz, - N = “Channel Number” with the range from 3 to 9.
Modulation Type	DSSS, OFDM
Product Type	☐ Mobile ☒ Portable ☐ Fix Location
Antenna System (eg., MIMO, Smart Antenna)	N/A
Categorization as Correlated or Completely Uncorrelated	N/A
Antenna Type	PIFA Antenna
Antenna Gain	1.54 dBi
About the Product	Only the WIFI 802.11b, 802.11g and 802.11n (HT20/40) was tested in this report.

Modulation technology	Modulation Type	Transfer Rate (Mbps)(Single RF path)
DSSS (802.11b)	DBPSK	1
	DQPSK	2
	CCK	5.5/11
OFDM (802.11g)	BPSK	6/9
	QPSK	12/18
	16QAM	24/36
	64QAM	48/54
OFDM (802.11n-20 MHz)	BPSK	6.5/7.2
	QPSK	13/19.5/14.4/21.7
	16QAM	26/39/28.9/43.3
	64QAM	52/58.5/65/57.8/65/72.2
OFDM (802.11n-40 MHz)	BPSK	13.5/15
	QPSK	27/40.5/30/45
	16QAM	54/81/60/90
	64QAM	108/121.5/135/120/150

Note: Preliminary tests were performed in different data rate in above table to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	
Output Power	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Occupied Bandwidth	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Conducted Spurious Emission	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Conducted Emission	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Radiated Spurious Emission	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Band Edge	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Power spectral density (PSD)	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9

Note: The above EUT information in section 2.4 was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Intentional radiators of radio frequency equipment
2	ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
3 ☆	KDB Publication 558074 D01v05r02	GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES

3.2 Test Verdict

No.	Description	FCC PART No.	Test Result	Verdict
1	Antenna Requirement	15.203	N/A	Pass ^{Note}
2	Output Power	15.247 (b)	ANNEX A.1	Pass
3	Occupied Bandwidth	15.247 (a)	ANNEX A.2	Pass
4	Conducted Spurious Emission	15.247 (d)	ANNEX A.3	Pass
5	Band Edge(Authorized-band band-edge)	15.247 (d)	ANNEX A.4	Pass
6	Conducted Emission	15.207	ANNEX A.5	Pass
7	Radiated Spurious Emission	15.209; 15.247 (d)	ANNEX A.6	Pass
8	Band Edge(Restricted-band band-edge)	15.209; 15.247 (d)	ANNEX A.7	Pass
9	Power spectral density (PSD)	15.247 (e)	ANNEX A.8	Pass

Note: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	25% to 52%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+20.1℃ to +23.1℃
Working Voltage of the EUT	NV (Normal Voltage)	7.2 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	KEYSIGHT	N9020A	MY46471071	2024.07.04	2025.07.03
Power Sensor	KEYSIGHT	U2063XA	MY58000251	2024.07.04	2025.07.03
Spectrum Analyzer	KEYSIGHT	N9020A	MY52510065	2024.08.01	2025.07.31
Signaling Unit	ROHDE&SCHWARZ	CMW500	171150	2024.05.22	2025.05.21
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	01631	2022.02.23	2025.02.22
Test Antenna-Horn	A-INFO	LB-180400KF	J211060273	2024.06.15	2027.06.14
Anechoic Chamber	RAINFORD	9m*6m*6m	144	2022.02.19	2025.09.03
Amplifier	COM-MV	LSCX_LNA1-12G-01	180602	2024.08.01	2025.07.31
Amplifier	COM-MV	XKu_LNA7-18G-01	180601	2024.08.01	2025.07.31
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2024.08.01	2025.07.31
Test Antenna-Loop	SCHWARZBECK	FMZB 1519	1519-037	2024.01.23	2027.01.22
Amplifier	COM-MV	ZT30-1000M	B2018054558	2024.11.28	2025.11.27
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7.35m	130	2024.07.13	2027.07.12
EMI Receiver	Agilent	N9038A	MY55330120	2024.08.01	2025.07.31
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9168	9168-00867	2022.04.12	2025.04.11
Amplifier	COM-MV	ZT30-1000M	B2017119081	2024.11.28	2025.11.27
Anechoic Chamber	YiHeng	9m*6m*6m	142	2024.07.21	2027.07.20
EMI Receiver	KEYSIGHT	N9010B	MY57110309	2024.08.01	2025.07.31
LISN	SCHWARZBECK	NSLK 8127	8127-687	2024.05.09	2025.05.08
Shielded Enclosure	YiHeng Electronic Co., Ltd	3.5m*3.1m*2.8m	112	2022.02.19	2025.02.18

4.3 Test Software List

Description	Manufacturer	Software Version	Serial No.	Applicable test Setup
BL410R	BALUN	V2.1.1.488	N/A	The section 4.5.1
BL410E	BALUN	V22.930	N/A	The section 4.5.2&4.5.3&4.5.4&4.5.5

4.4 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.8℃
Humidity	4%

4.5 Description of Test Setup

4.5.1 For Antenna Port Test

Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

For example: the measurement value is 10 dBm and the cable 0.5dBm used, then the final result of EUT:

Conducted value (dBm) = 10 dBm + 0.5 dB = 10.5 dBm



(Diagram 1)

4.5.2 For AC Power Supply Port Test



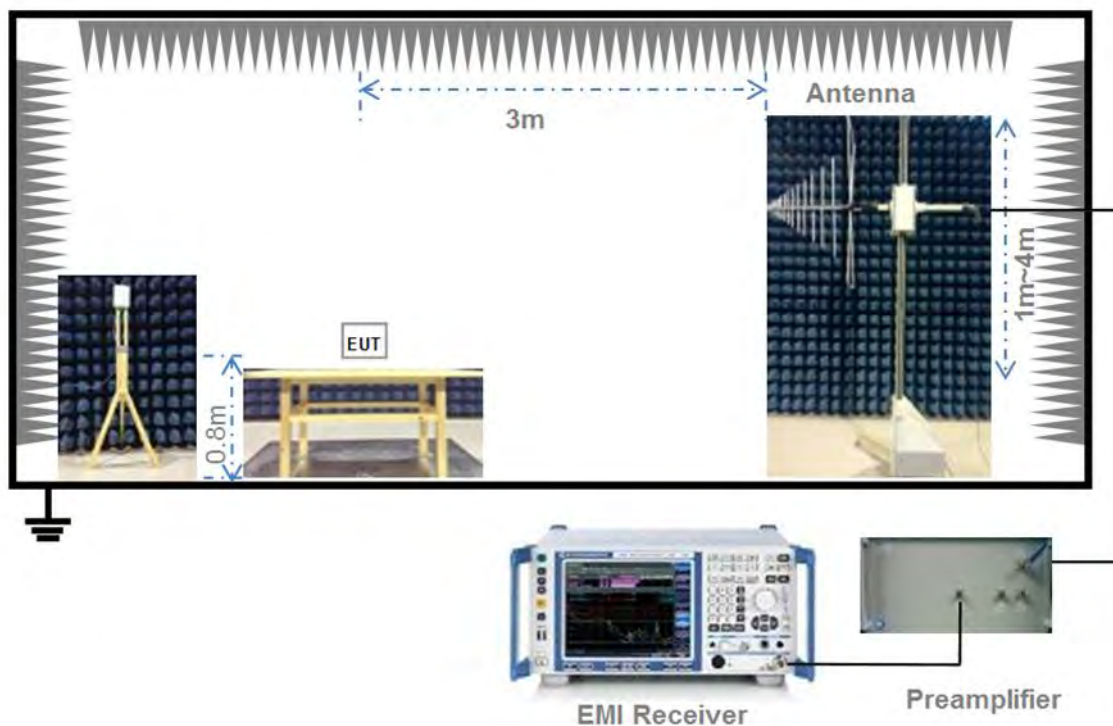
(Diagram 2)

4.5.3 For Radiated Test (Below 30 MHz)



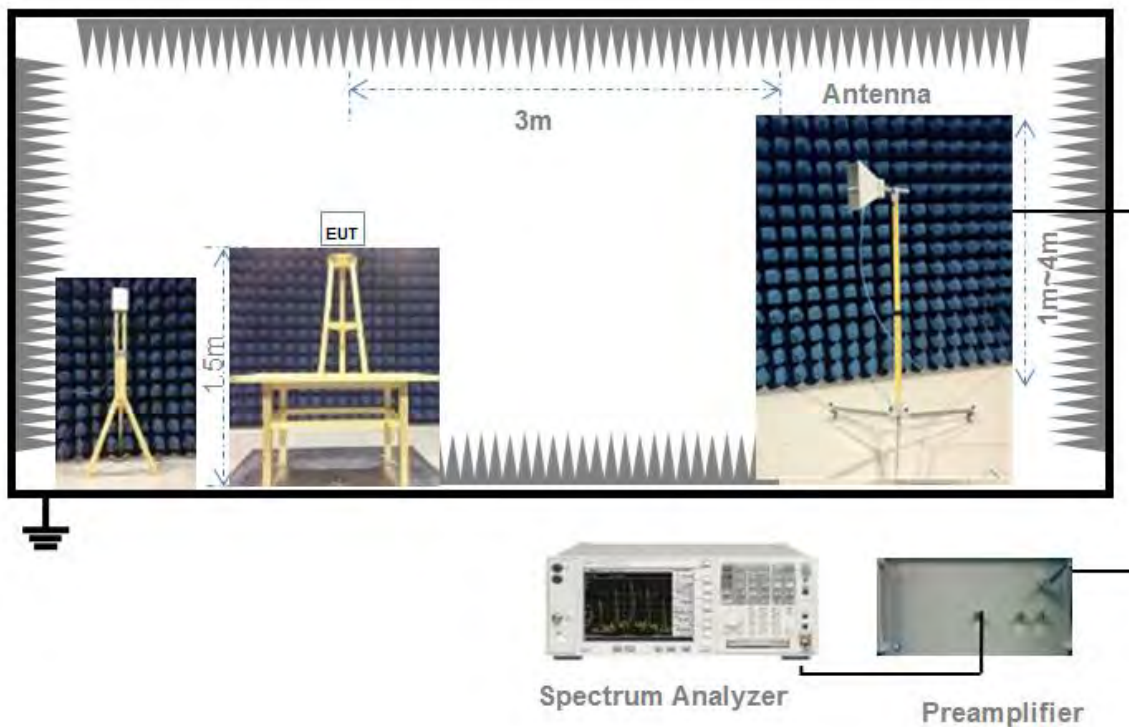
(Diagram 3)

4.5.4 For Radiated Test (30 MHz-1 GHz)



(Diagram 4)

4.5.5 For Radiated Test (Above 1 GHz)



(Diagram 5)

4.6 Measurement Results Explanation Example

4.6.1 For conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

4.6.2 For radiated band edges and spurious emission test:

$$E = \text{EIRP} - 20\log D + 104.8$$

where:

E = electric field strength in dB μ V/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

EIRP = Measure Conducted output power Value (dBm) + Maximum transmit antenna gain (dBi) + the appropriate maximum ground reflection factor (dB)

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

FCC §15.203

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, or § 15.221. 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.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is embedded in the product.	An embedded-in antenna design is used.

Reference Documents	Item
Photo	Please refer to the EUT Photo documents.

5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5.2 Output Power

5.2.1 Test Limit

FCC § 15.247(b)

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements.

5.2.2 Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

Maximum peak conducted output power

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The EUT shall be transmitted at its maximum power control level.

Maximum conducted (average) output power (Reporting Only)

a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

- 1) The EUT is configured to transmit continuously, or to transmit with a constant duty factor.
- 2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
- 3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

b) If the transmitter does not transmit continuously, measure the duty cycle (x) of the transmitter output signal.

c) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

d) Adjust the measurement in dBm by adding $10\log(1/x)$, where x is the duty cycle.

Measurements of duty cycle

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal.

Set the center frequency of the instrument to the center frequency of the transmission.

Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value.

Set $VBW \geq RBW$. Set detector = peak or average.

The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

5.2.4 Test Result

Please refer to ANNEX A.1.

5.3 Occupied Bandwidth

5.3.1 Limit

FCC §15.247(a)

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.

5.3.2 Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

Use the following spectrum analyzer settings:

Set RBW = 100 kHz.

Set the video bandwidth (VBW) ≥ 3 RBW.

Detector = Peak.

Trace mode = max hold.

Sweep = auto couple.

Allow the trace to stabilize.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.3.4 Test Result

Please refer to ANNEX A.2.

5.4 Conducted Spurious Emission

5.4.1 Limit

FCC §15.247(d)

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.

5.4.2 Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

- a) If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).
- b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).
- c) In either case, attenuation to levels below the 15.209 general radiated emissions limits is not required.

The following procedures shall be used to demonstrate compliance to these limits. Note that these procedures can be used in either an antenna-port conducted or radiated test set-up. Radiated tests must conform to the test site requirements and utilize maximization procedures defined herein.

Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to ≥ 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW $\geq 3 \times$ RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

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

Emission level measurement

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

Set the RBW = 100 kHz.

Set the VBW $\geq 3 \times$ RBW.

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.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

5.4.4 Test Result

Please refer to ANNEX A.3.

5.5 Band Edge (Authorized-band band-edge)

5.5.1 Limit

FCC §15.247(d)

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.

5.5.2 Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

The following procedures may be used to determine the peak or average field strength or power of an unwanted emission that is within 2 MHz of the authorized band edge. If a peak detector is utilized, use the procedure described in 13.2.1. Use the procedure described in 13.2.2 when using an average detector and the EUT can be configured to transmit continuously (i.e., duty cycle $\geq 98\%$). Use the procedure described in 13.2.3 when using an average detector and the EUT cannot be configured to transmit continuously but the duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent). Use the procedure described in 13.2.4 when using an average detector for those cases where the EUT cannot be configured to transmit continuously and the duty cycle is not constant (duty cycle variations equal or exceed 2 percent).

When using a peak detector to measure unwanted emissions at or near the band edge (within 2 MHz of the authorized band), the following integration procedure can be used.

Set instrument center frequency to the frequency of the emission to be measured (must be within 2 MHz of the authorized band edge).

Set span to 2 MHz

RBW = 100 kHz.

VBW $\geq 3 \times$ RBW.

Detector = peak.

Sweep time = auto.

Trace mode = max hold.

Allow sweep to continue until the trace stabilizes (required measurement time may increase for low duty cycle applications)

Compute the power by integrating the spectrum over 1 MHz using the analyzer's band power measurement function with band limits set equal to the emission frequency (femission) ± 0.5 MHz. If the instrument does not have a band power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by femission ± 0.5 MHz.

Standard method(The 99% OBW of the fundamental emission is without 2 MHz of the authorized band):

Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.

Reference level: As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (\text{OBW/RBW})]$ below the reference level. Specific guidance is given in 4.1.5.2.

Attenuation: Auto (at least 10 dB preferred).

Sweep time: Coupled.

Resolution bandwidth: 100 kHz.

Video bandwidth: 300 kHz.

Detector: Peak.

Trace: Max hold.

5.5.4 Test Result

Please refer to ANNEX A.4.

5.6 Conducted Emission

5.6.1 Limit

FCC §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

5.6.2 Test Setup

See section 4.5.2 for test setup description for the AC power supply port. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.6.4 Test Result

Please refer to ANNEX A.5.

5.7 Radiated Spurious Emission

5.7.1 Limit

FCC §15.209&15.247(d)

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

1. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.7.2 Test Setup

See section 4.5.3 to 4.5.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.7.3 Test Procedure

Since the emission limits are specified in terms of radiated field strength levels, measurements performed to demonstrate compliance have traditionally relied on a radiated test configuration. Radiated measurements remain the principal method for demonstrating compliance to the specified limits; however antenna-port conducted measurements are also now acceptable to demonstrate compliance (see below for details). When radiated measurements are utilized, test site requirements and procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 shall be followed.

Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

General Procedure for conducted measurements in restricted bands

- a) Measure the conducted output power (in dBm) using the detector specified (see guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
- b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see guidance on determining the applicable antenna gain)
- c) Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).
- d) For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
- e) Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20\log D + 104.8$$

where:

E = electric field strength in dB μ V/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

- f) Compare the resultant electric field strength level to the applicable limit.
- g) Perform radiated spurious emission test.

Quasi-Peak measurement procedure

The specifications for measurements using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Frequency Interference (CISPR) of the International Electrotechnical Commission.

As an alternative to CISPR quasi-peak measurement, compliance can be demonstrated to the applicable emission limits using a peak detector.

Peak power measurement procedure

Peak emission levels are measured by setting the instrument as follows:

- a) RBW = as specified in Table 1.
- b) VBW $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Sweep time = auto.
- e) Trace mode = max hold.
- f) Allow sweeps to continue until the trace stabilizes. (Note that the required measurement time may be

longer for low duty cycle applications).

Table 1—RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

Trace averaging across on and off times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT (i.e., duty cycle ≥ 98 percent) cannot be achieved and the duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent), then the following procedure shall be used:

- a) The EUT shall be configured to operate at the maximum achievable duty cycle.
- b) Measure the duty cycle, x , of the transmitter output signal as described in section 6.0.
- c) RBW = 1 MHz (unless otherwise specified).
- d) VBW $\geq 3 \times$ RBW.
- e) Detector = RMS, if $\text{span}/(\# \text{ of points in sweep}) \leq (\text{RBW}/2)$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
- f) Averaging type = power (i.e., RMS).
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
- g) Sweep time = auto.
- h) Perform a trace average of at least 100 traces.
- i) A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (RMS) mode was used in step f), then the applicable correction factor is $10 \log(1/x)$, where x is the duty cycle.
 - 2) If linear voltage averaging mode was used in step f), then the applicable correction factor is $20 \log(1/x)$, where x is the duty cycle.
 - 3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

NOTE: Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.

Determining the applicable transmit antenna gain

A conducted power measurement will determine the maximum output power associated with a restricted band emission; however, in order to determine the associated EIRP level, the gain of the transmitting antenna (in dBi) must be added to the measured output power (in dBm).

Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.

See KDB 662911 for guidance on calculating the additional array gain term when determining the effective antenna gain for a EUT with multiple outputs occupying the same or overlapping frequency ranges in the same band.

Radiated spurious emission test

An additional consideration when performing conducted measurements of restricted band emissions is that unwanted emissions radiating from the EUT cabinet, control circuits, power leads, or intermediate circuit elements will likely go undetected in a conducted measurement configuration. To address this concern, a radiated test shall be performed to ensure that emissions emanating from the EUT cabinet (rather than the antenna port) also comply with the applicable limits.

For these cabinet radiated spurious emission measurements the EUT transmit antenna may be replaced with a termination matching the nominal impedance of the antenna. Procedures for performing radiated measurements are specified in ANSI C63.10. All detected emissions shall comply with the applicable limits.

The measurement frequency range is from 30 MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.7.4 Test Result

Please refer to ANNEX A.6.

5.8 Band Edge (Restricted-band band-edge)

5.8.1 Limit

FCC §15.209&15.247(d)

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

5.8.2 Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.8.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

For transmitters operating above 1 GHz repeat the measurement with an average detector.

5.8.4 Test Result

Please refer to ANNEX A.7.

5.9 Power Spectral density (PSD)

5.9.1 Limit

FCC §15.247(e)

The same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used.

5.9.2 Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.9.3 Test Procedure

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.

Set the VBW $\geq 3 \text{ RBW}$.

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 within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.9.4 Test Result

Please refer to ANNEX A.8.

ANNEX A TEST RESULT

A.1 Output Power

Duty Cycle

Test Mode	On Time (ms)	On+Off time (ms)	Duty Cycle	Duty Factor
802.11b	8.368	8.425	99.32%	0.03
802.11g	1.388	1.436	96.66%	0.15
802.11n-20 MHz	1.297	1.345	96.43%	0.16
802.11n-40 MHz	0.646	0.692	93.35%	0.30

Peak Power Test Data

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	20.84	121.34	30	1000	Pass
Middle	21.02	126.47			Pass
High	20.87	122.18			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	22.43	174.98	30	1000	Pass
Middle	22.11	162.55			Pass
High	21.89	154.53			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.92	155.60	30	1000	Pass
Middle	21.50	141.25			Pass
High	21.56	143.22			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	20.44	110.66	30	1000	Pass
Middle	20.55	113.50			Pass
High	20.47	111.43			Pass

Average Power Test Data

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.49	70.63	30	1000	Pass
Middle	18.68	73.79			Pass
High	18.59	72.28			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	16.36	43.25	30	1000	Pass
Middle	16.78	47.64			Pass
High	16.36	43.25			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	15.55	35.89	30	1000	Pass
Middle	15.52	35.65			Pass
High	15.69	37.07			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.54	28.44	30	1000	Pass
Middle	14.40	27.54			Pass
High	14.39	27.48			Pass

A.2 Occupied Bandwidth

Test Data

802.11b Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	8.200000	13.028000	≥500
Middle	8.200000	13.248000	≥500
High	8.200000	13.075000	≥500

802.11g Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	15.300000	17.140000	≥500
Middle	15.600000	17.330000	≥500
High	15.300000	17.061000	≥500

802.11n-20 MHz Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	15.400000	18.049000	≥500
Middle	15.200000	18.219000	≥500
High	15.500000	17.957000	≥500

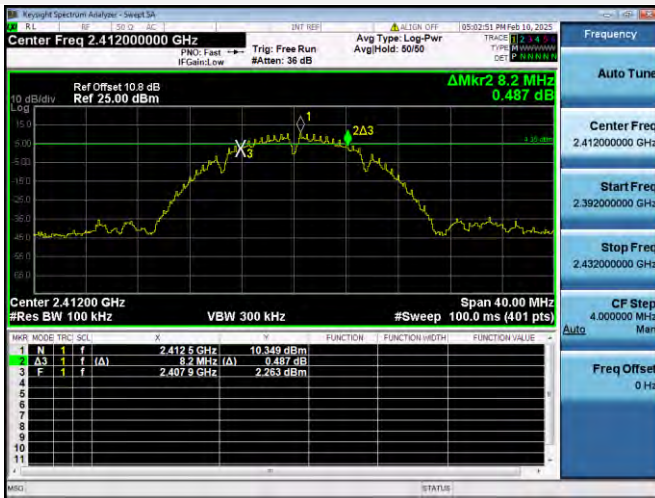
802.11n-40 MHz Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	35.200000	36.148000	≥500
Middle	35.500000	36.396000	≥500
High	34.000000	35.961000	≥500

Test Plots

6 dB Bandwidth

802.11b LOW CHANNEL



802.11b MIDDLE CHANNEL



802.11b HIGH CHANNEL



802.11g LOW CHANNEL



802.11g MIDDLE CHANNEL



802.11g HIGH CHANNEL



802.11n-20 MHz LOW CHANNEL



802.11n-20 MHz MIDDLE CHANNEL



802.11n-20 MHz HIGH CHANNEL



802.11n-40 MHz LOW CHANNEL



802.11n-40 MHz MIDDLE CHANNEL

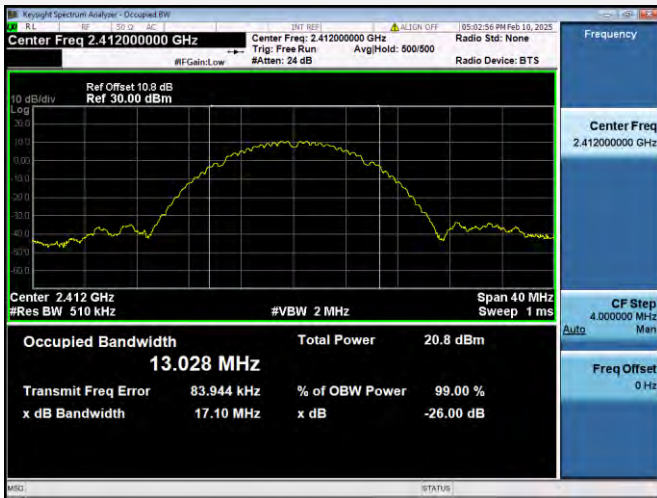


802.11n-40 MHz HIGH CHANNEL

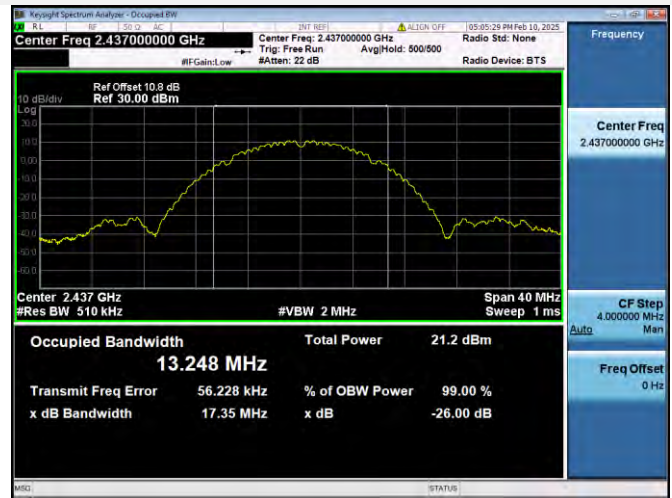


99% Bandwidth

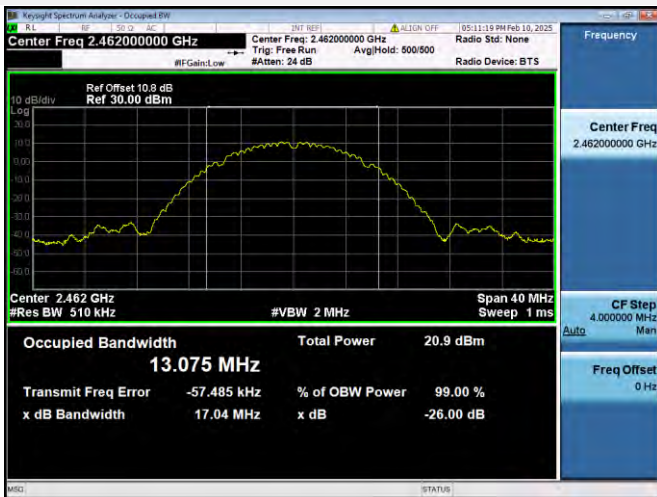
802.11b LOW CHANNEL



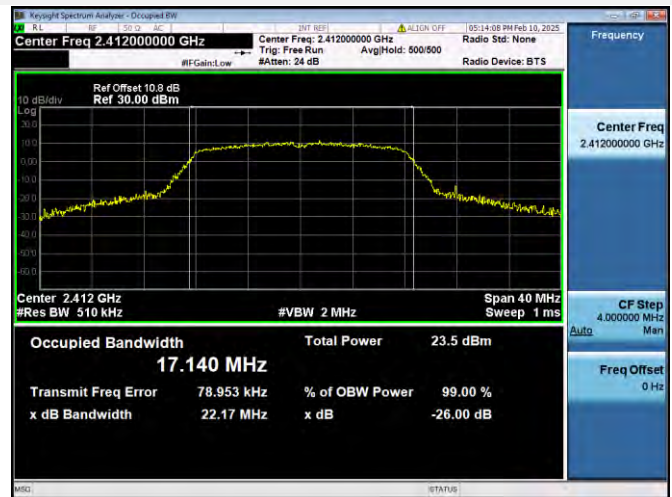
802.11b MIDDLE CHANNEL



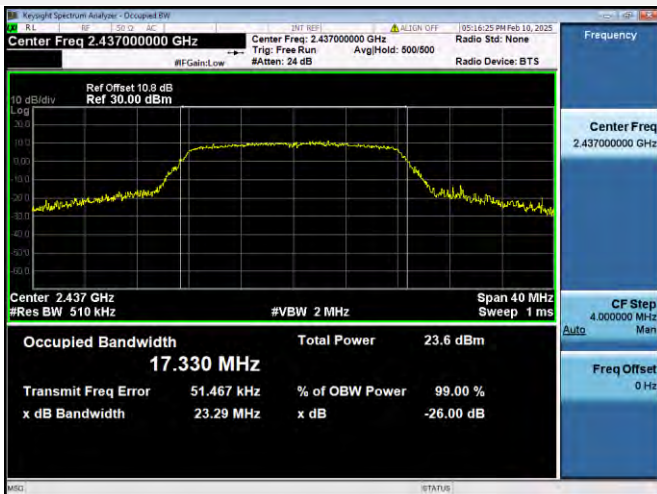
802.11b HIGH CHANNEL



802.11g LOW CHANNEL



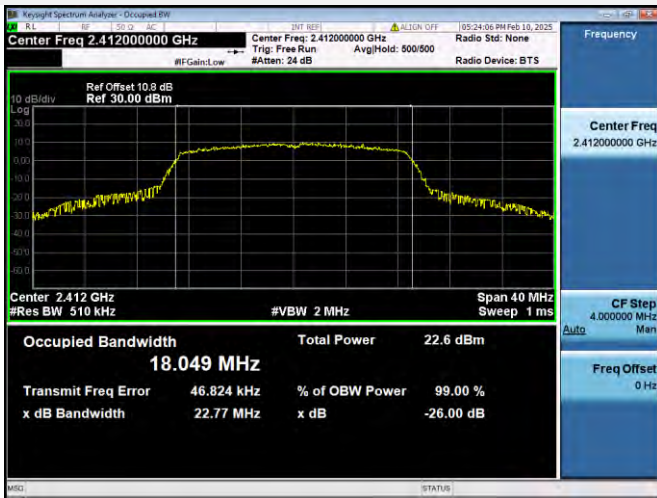
802.11g MIDDLE CHANNEL



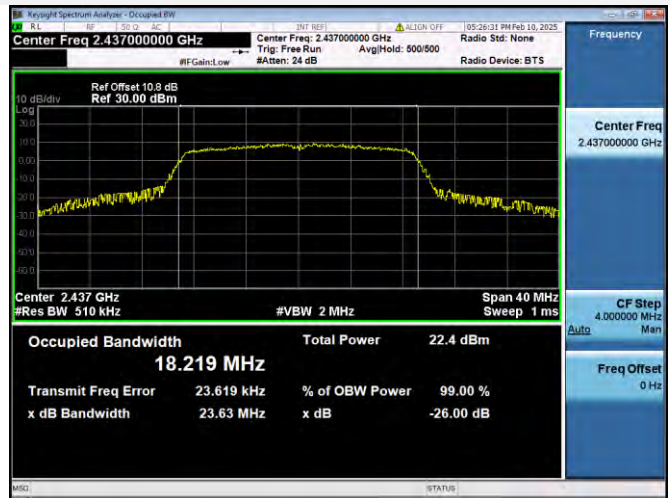
802.11g HIGH CHANNEL



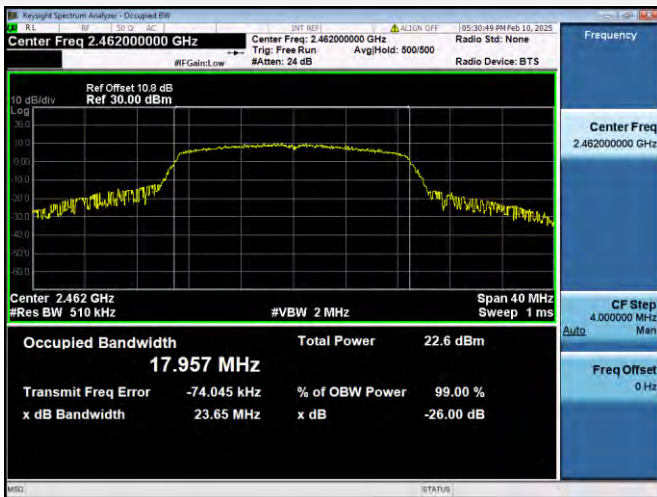
802.11n-20 MHz LOW CHANNEL



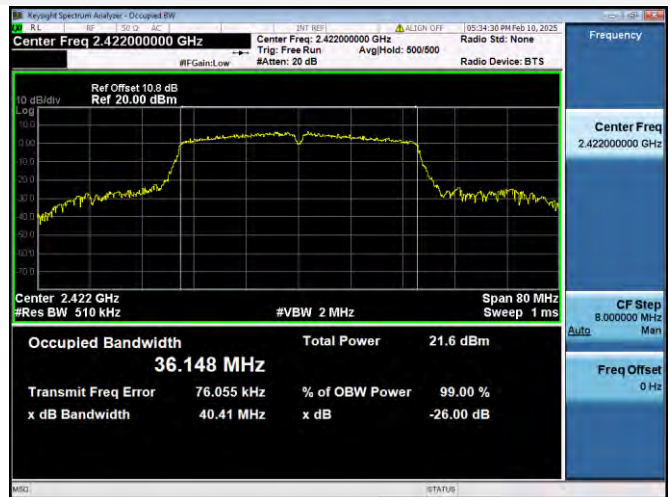
802.11n-20 MHz MIDDLE CHANNEL



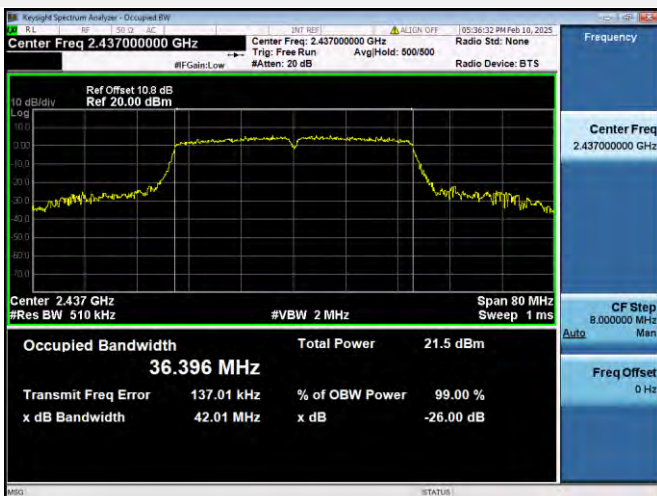
802.11n-20 MHz HIGH CHANNEL



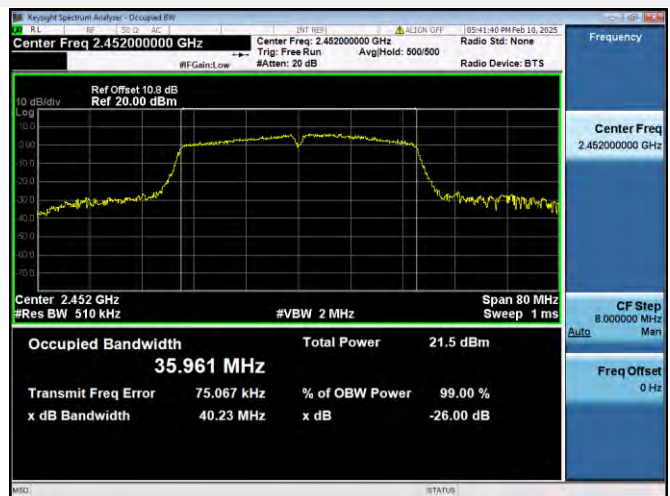
802.11n-40 MHz LOW CHANNEL



802.11n-40 MHz MIDDLE CHANNEL



802.11n-40 MHz HIGH CHANNEL



A.3 Conducted Spurious Emissions

Test Data

802.11b Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-28.30	10.26	-9.74	Pass
Middle	-29.79	10.77	-9.23	Pass
High	-29.21	10.31	-9.69	Pass

802.11g Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-34.86	6.79	-13.21	Pass
Middle	-33.40	6.83	-13.17	Pass
High	-34.34	6.45	-13.55	Pass

802.11n-20 MHz Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-34.67	5.39	-14.61	Pass
Middle	-34.23	5.62	-14.38	Pass
High	-33.44	5.71	-14.30	Pass

802.11n-40 MHz Mode:

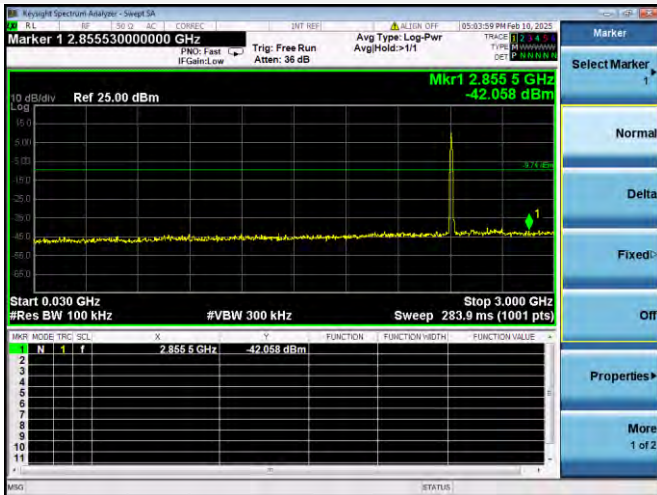
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-38.55	1.92	-18.08	Pass
Middle	-38.35	1.14	-18.86	Pass
High	-38.02	2.37	-17.63	Pass

Test Plots

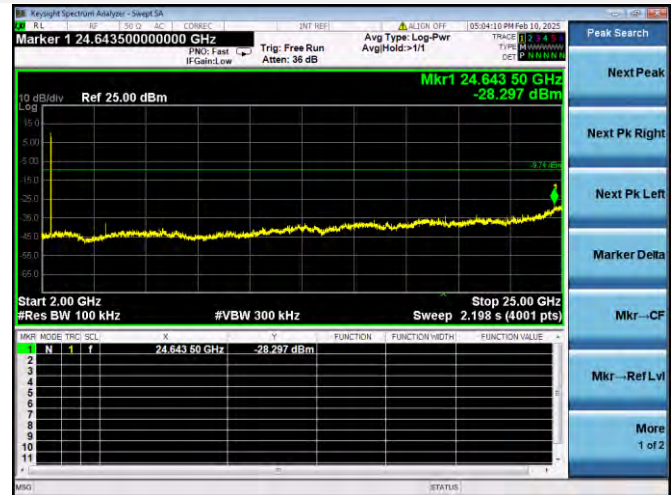
802.11b LOW CHANNEL CARRIER LEVEL



802.11b LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



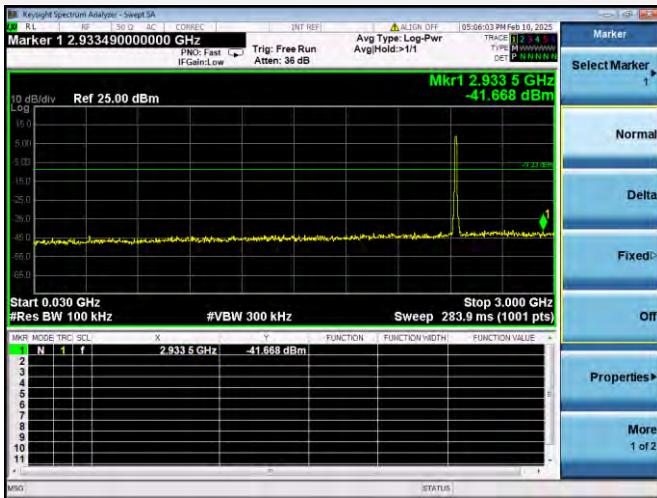
802.11b LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



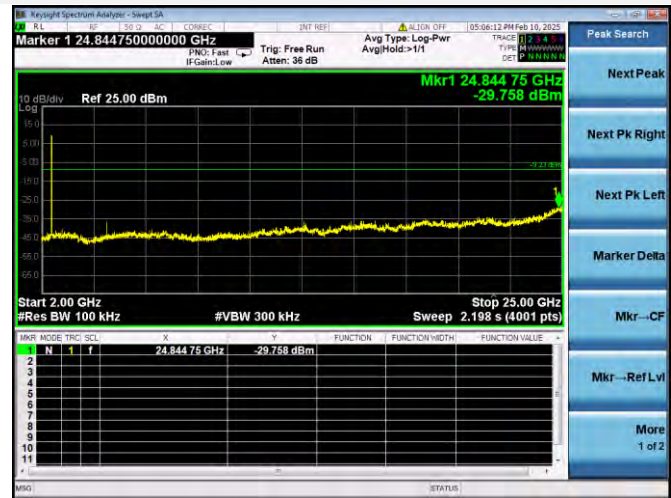
802.11b MIDDLE CHANNEL CARRIER LEVEL



802.11b MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



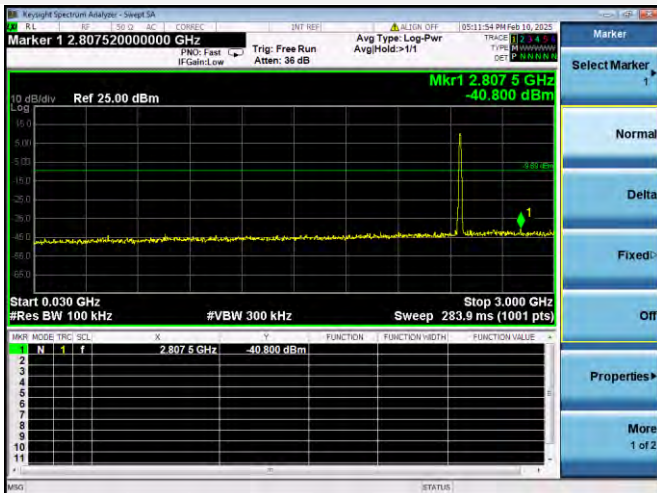
802.11b MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



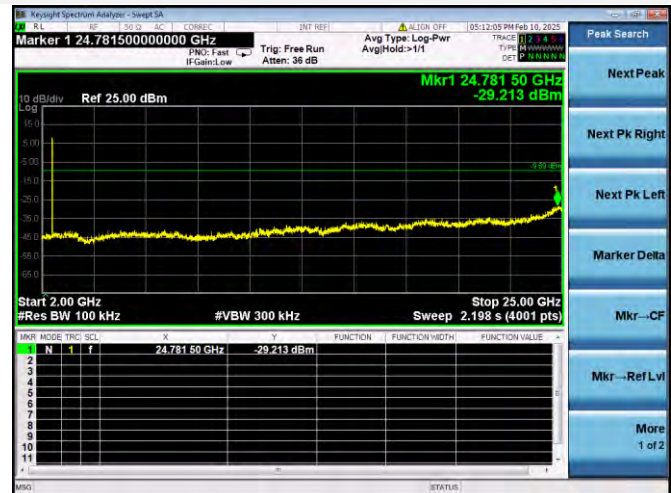
802.11b HIGH CHANNEL CARRIER LEVEL



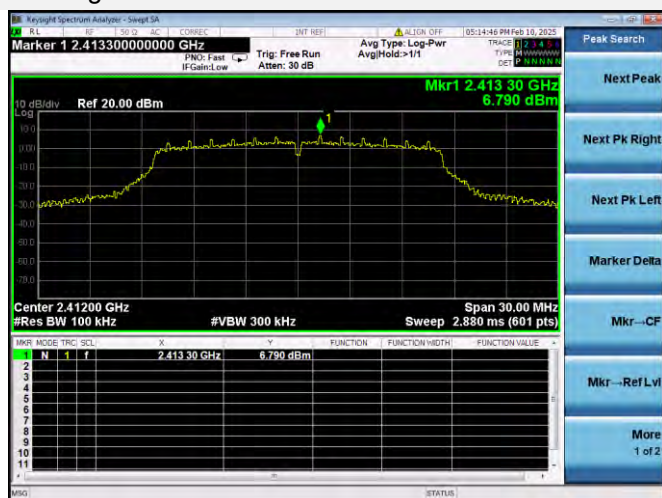
802.11b HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



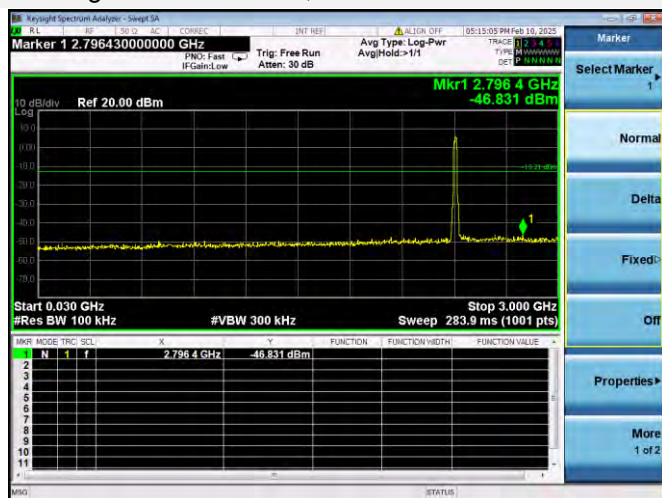
802.11b HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



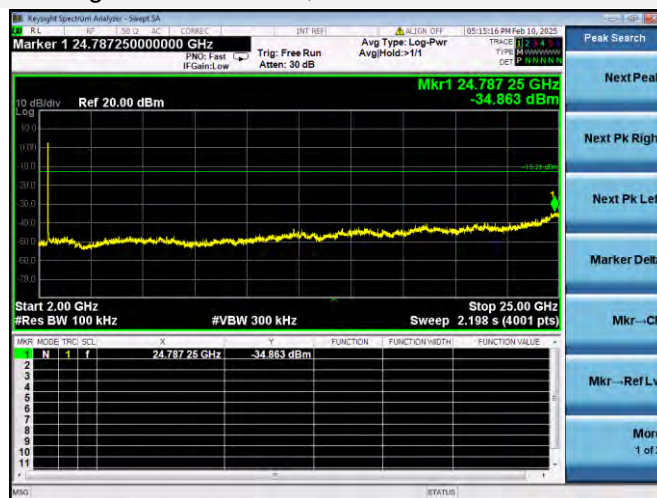
802.11g LOW CHANNEL CARRIER LEVEL



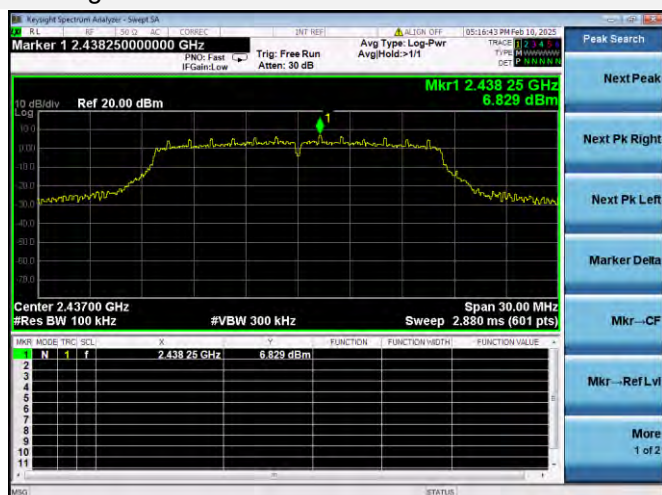
802.11g LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



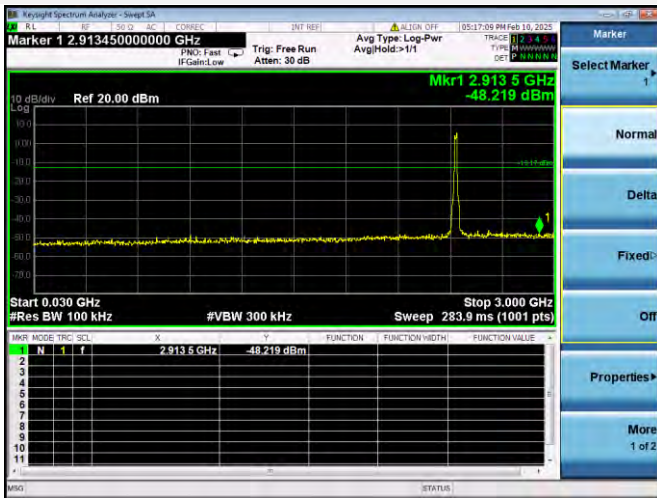
802.11g LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



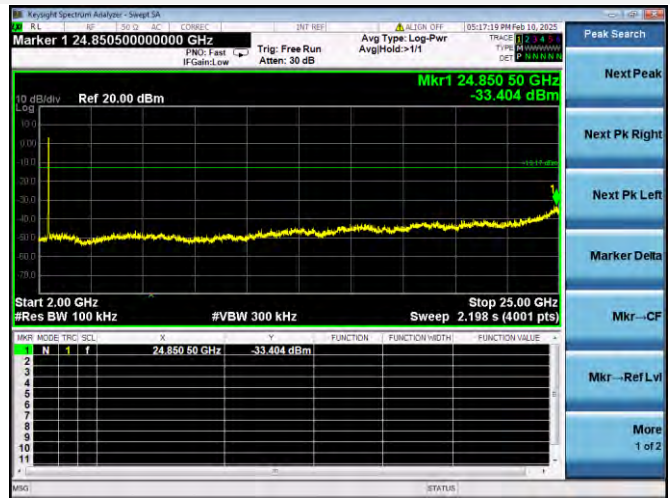
802.11g MIDDLE CHANNEL CARRIER LEVEL



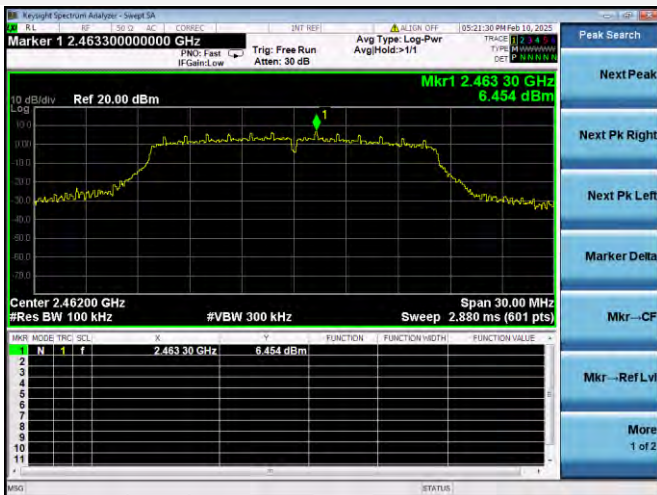
802.11g MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



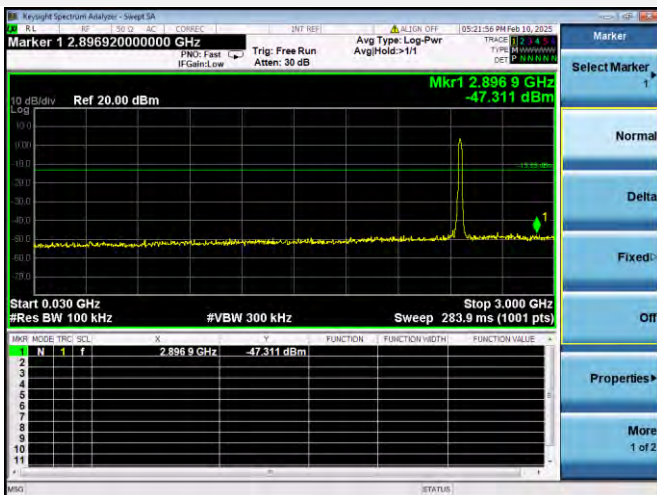
802.11g MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



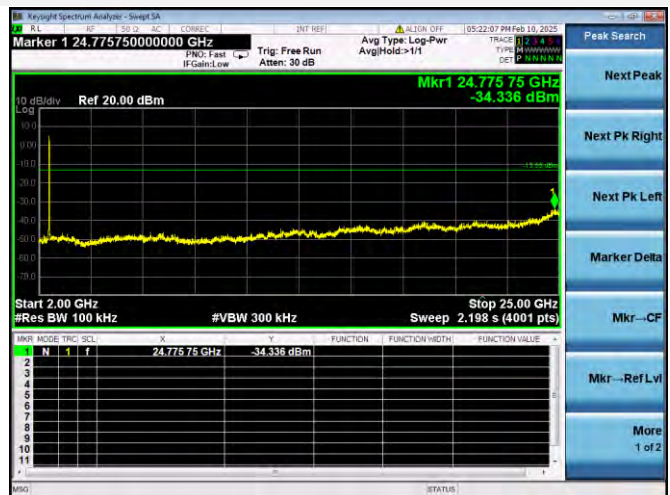
802.11g HIGH CHANNEL CARRIER LEVEL



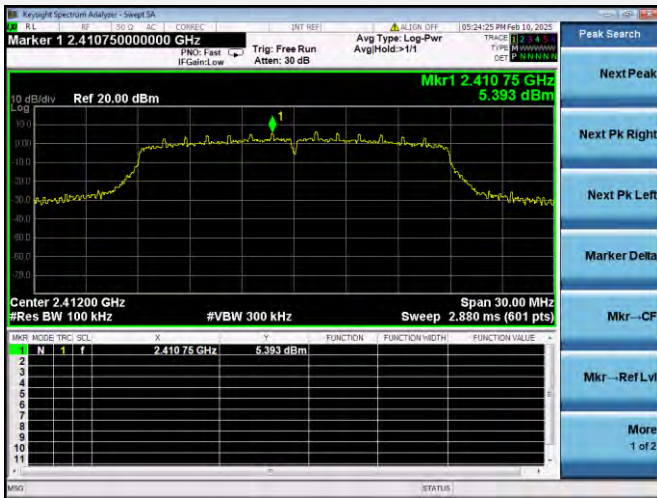
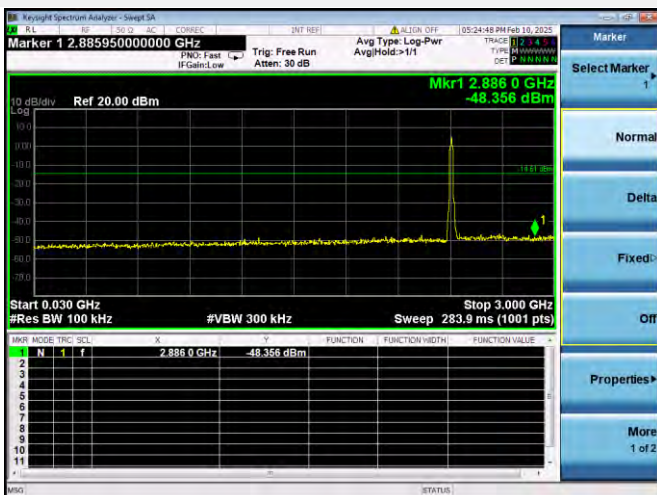
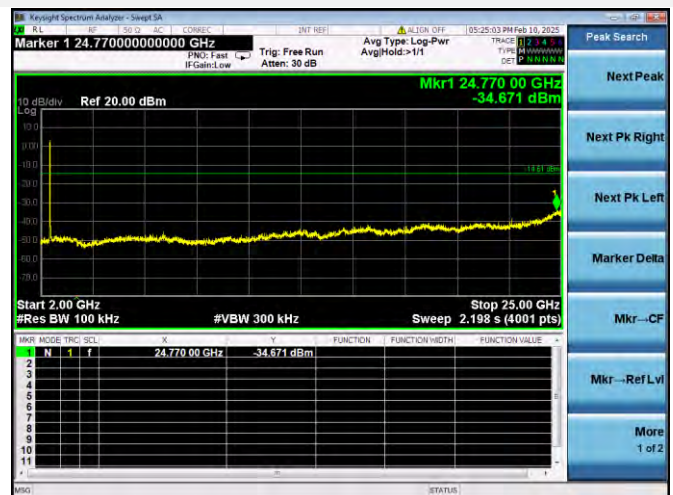
802.11g HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



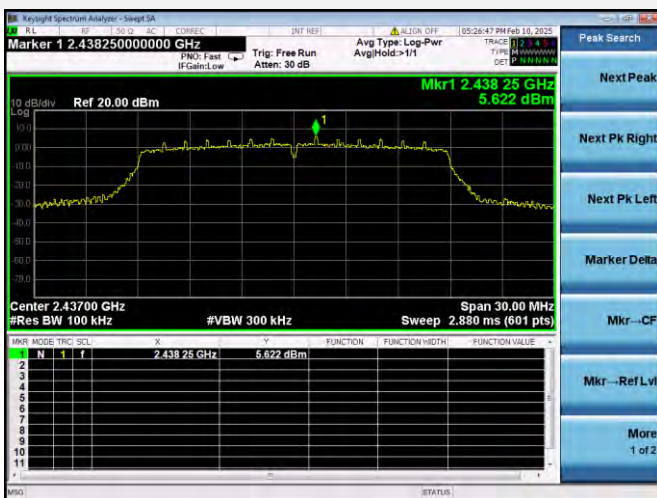
802.11g HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



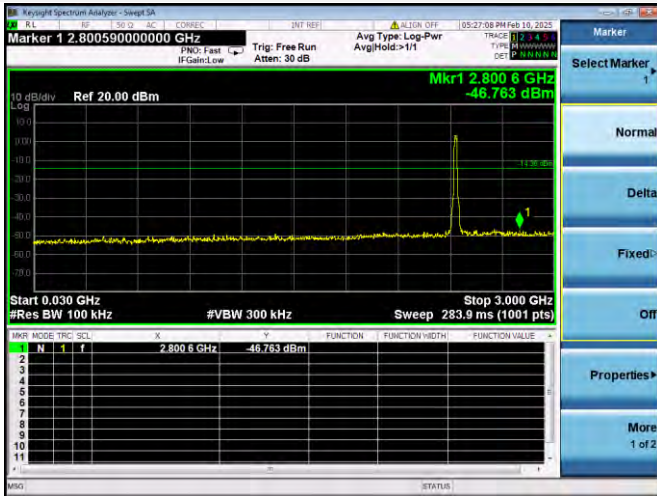
802.11n-20 MHz LOW CHANNEL CARRIER LEVEL

802.11n-20 MHz LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz802.11n-20 MHz LOW CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

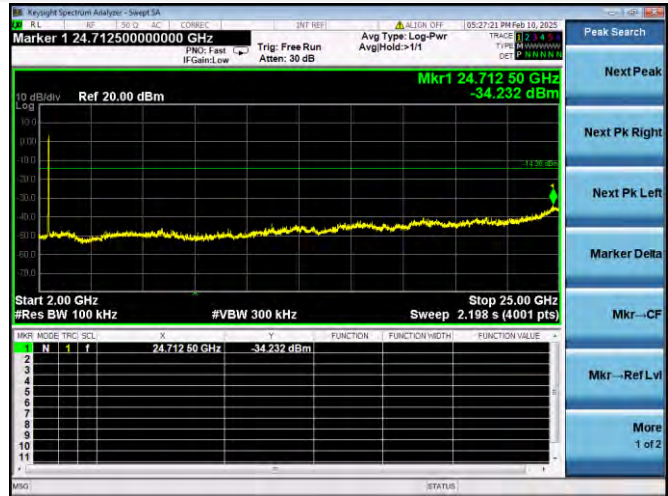
802.11n-20 MHz MIDDLE CHANNEL CARRIER LEVEL



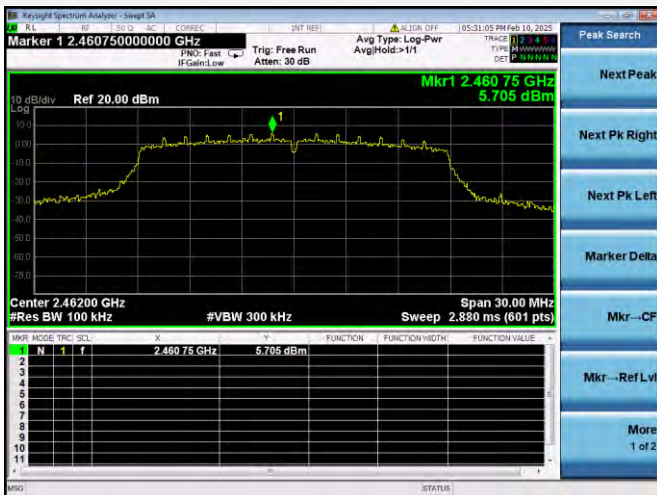
802.11n-20 MHz MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



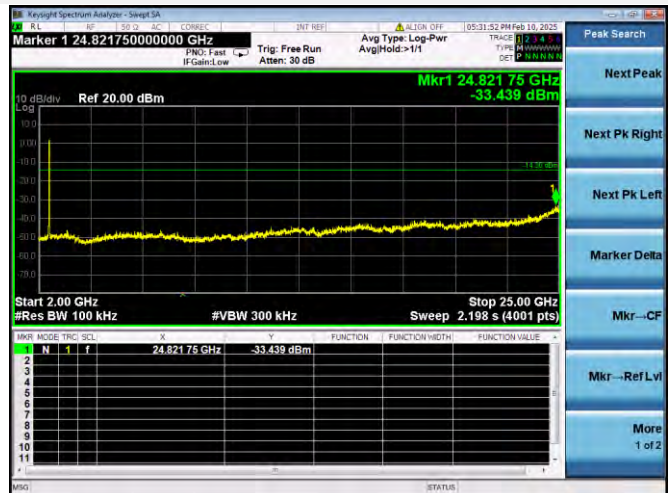
802.11n-20 MHz MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



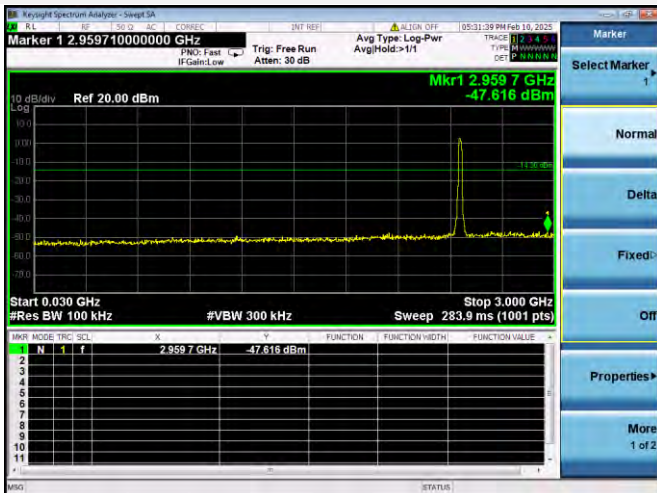
802.11n-20 MHz HIGH CHANNEL CARRIER LEVEL



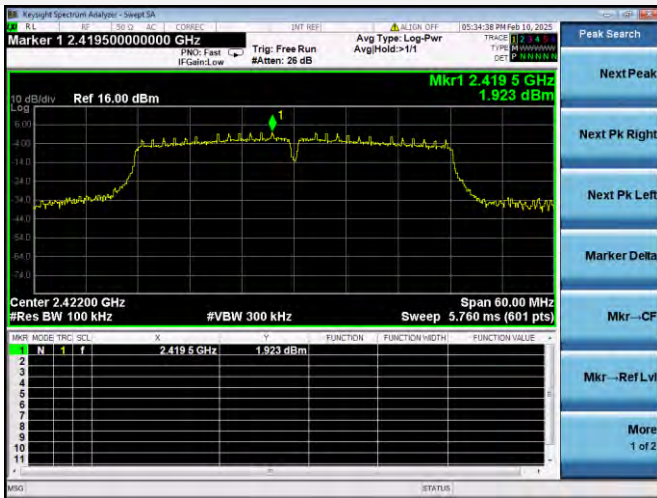
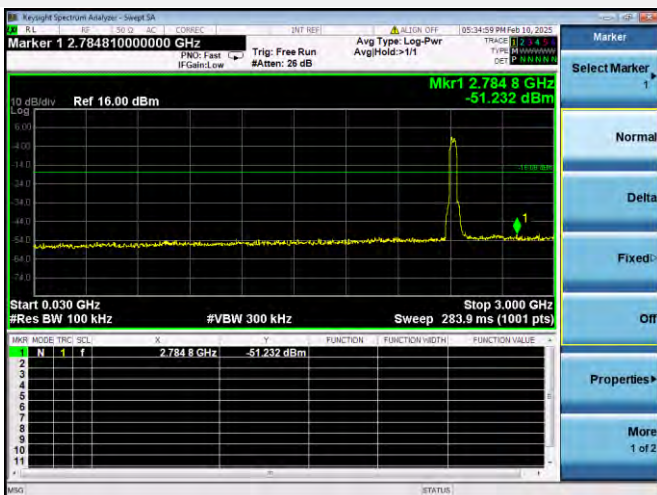
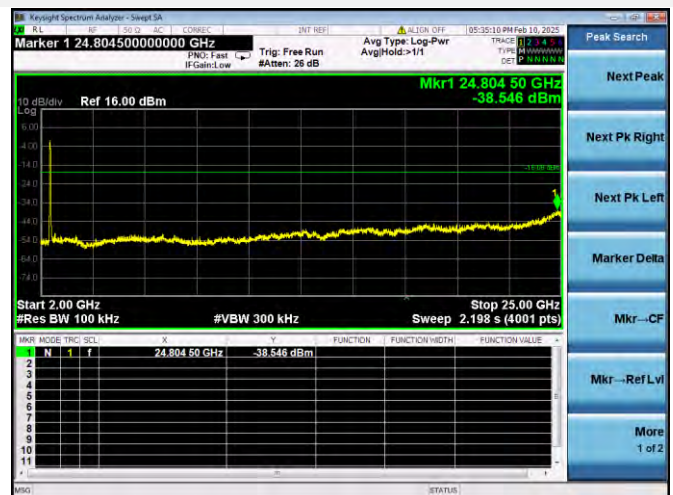
802.11n-20 MHz HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



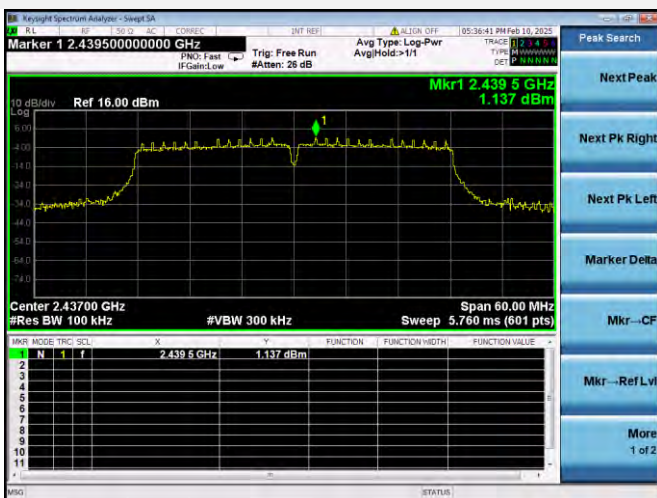
802.11n-20 MHz HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



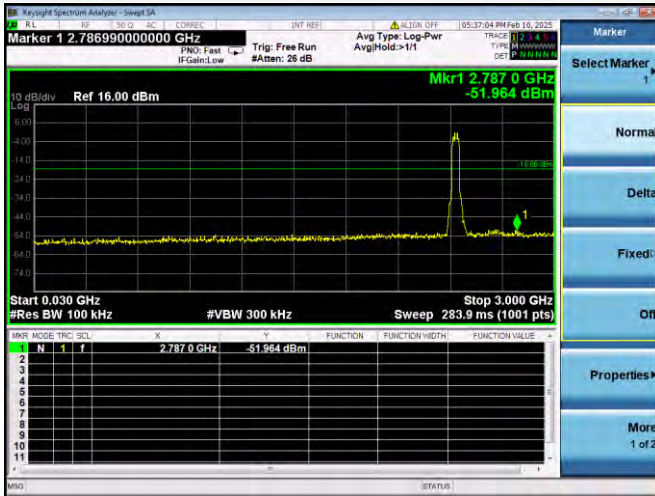
802.11n-40 MHz LOW CHANNEL CARRIER LEVEL

802.11n-40 MHz LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz802.11n-40 MHz LOW CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

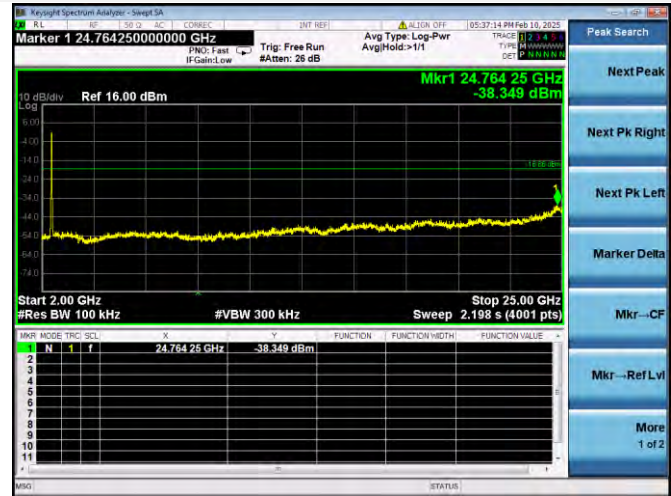
802.11n-40 MHz MIDDLE CHANNEL CARRIER LEVEL



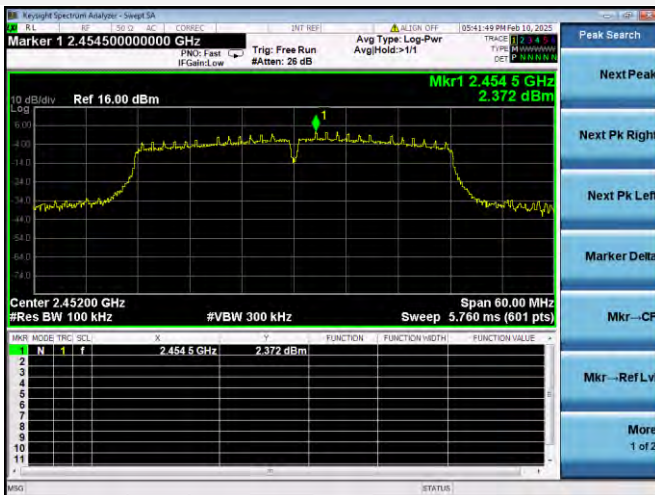
802.11n-40 MHz MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



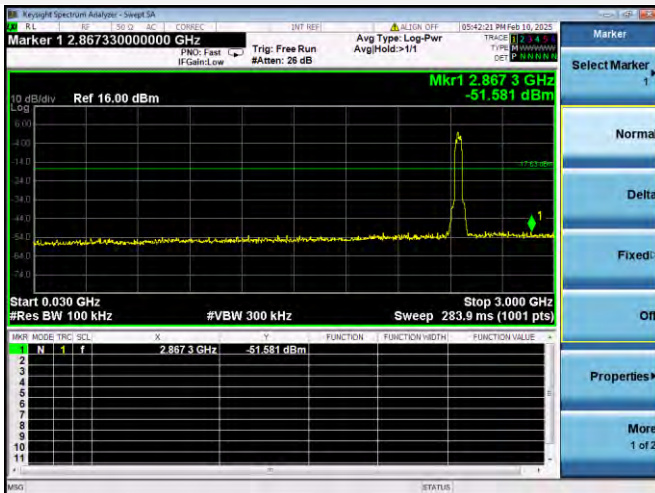
802.11n-40 MHz MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



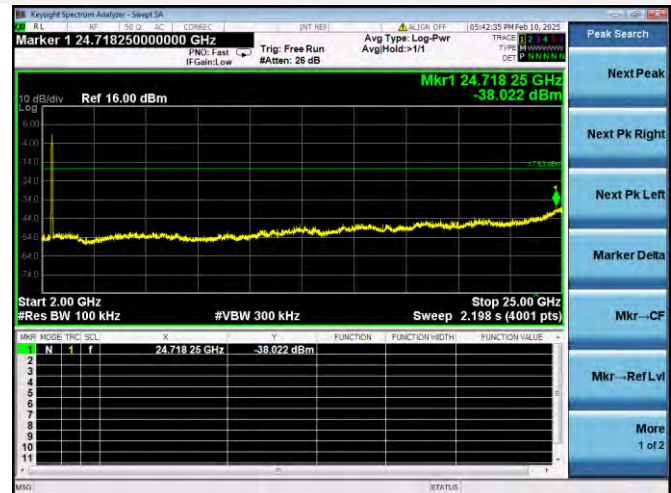
802.11n-40 MHz HIGH CHANNEL CARRIER LEVEL



802.11n-40 MHz HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



802.11n-40 MHz HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



A.4 Band Edge (Authorized-band band-edge)

Note: The 99% OBW of the fundamental emission is without 2 MHz of the authorized band.

Test Data

802.11b Mode:

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-35.61	10.26	-9.74	Pass
High Channel	-45.33	10.31	-9.69	Pass

802.11g Mode:

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-25.25	6.79	-13.21	Pass
High Channel	-41.12	6.45	-13.55	Pass

802.11n-20 MHz Mode:

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-27.16	5.39	-14.61	Pass
High Channel	-40.25	5.71	-14.30	Pass

802.11n-40 MHz Mode:

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-31.59	1.92	-18.08	Pass
High Channel	-36.11	2.37	-17.63	Pass

Test Plots

802.11b LOW CHANNEL, CARRIER LEVEL



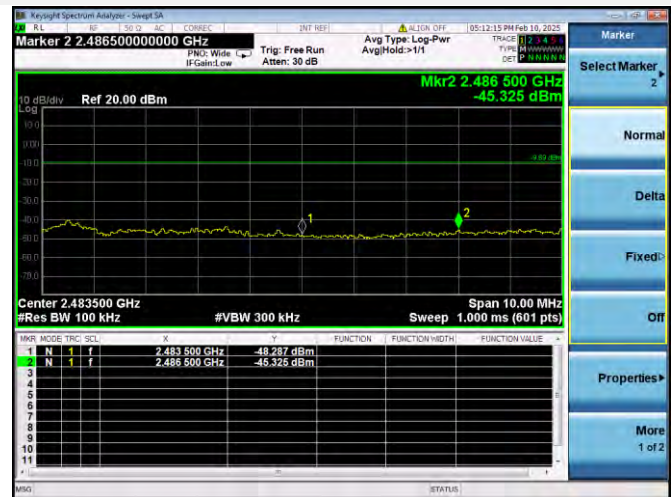
802.11b LOW CHANNEL, BAND EDGE



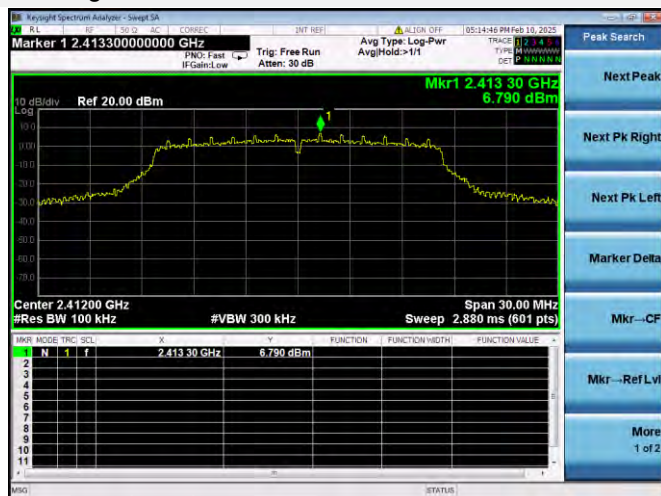
802.11b HIGH CHANNEL, CARRIER LEVEL



802.11b HIGH CHANNEL, BAND EDGE



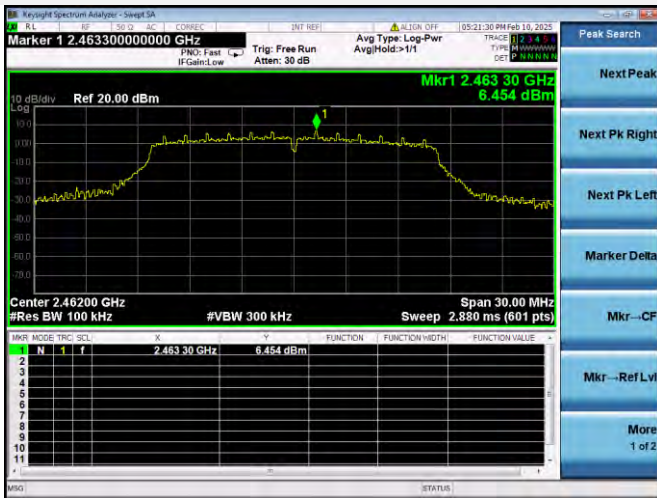
802.11g LOW CHANNEL, CARRIER LEVEL



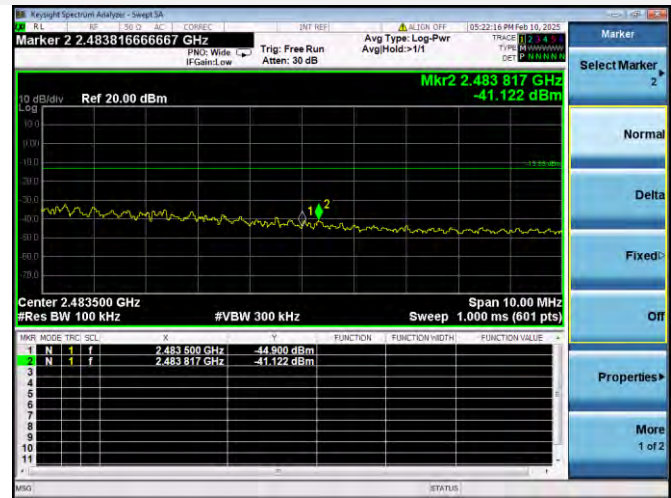
802.11g LOW CHANNEL, BAND EDGE



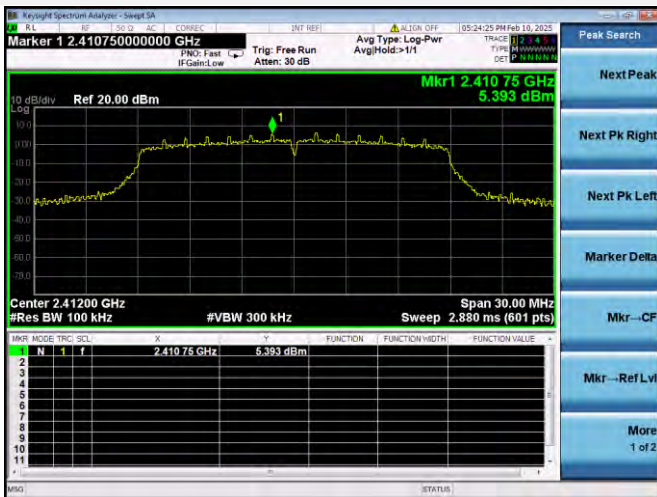
802.11g HIGH CHANNEL, CARRIER LEVEL



802.11g HIGH CHANNEL, BAND EDGE



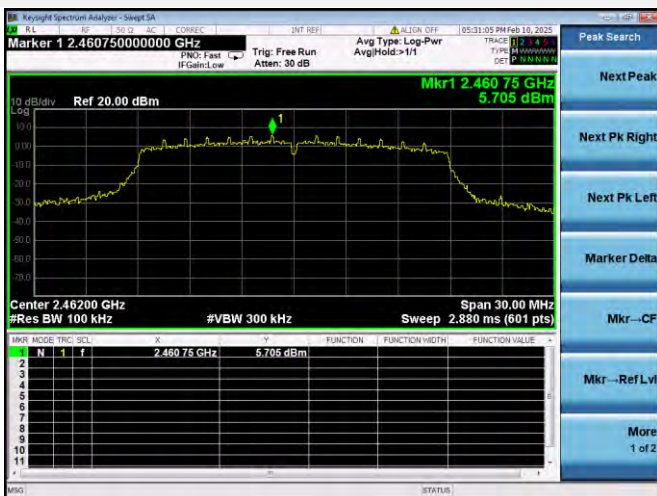
802.11n-20 MHz LOW CHANNEL, CARRIER LEVEL



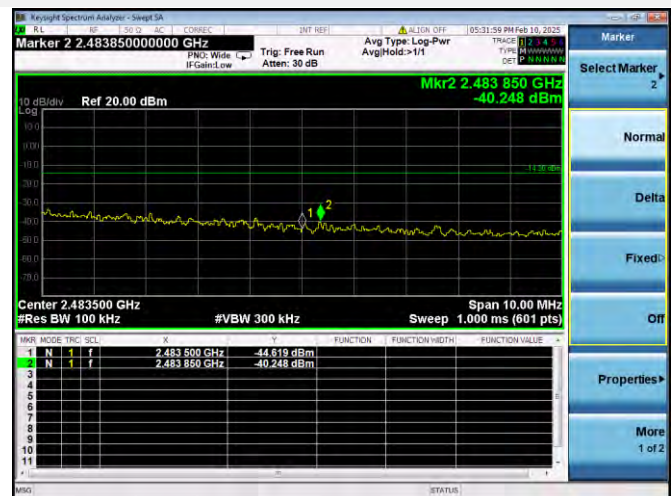
802.11n-20 MHz LOW CHANNEL, BAND EDGE



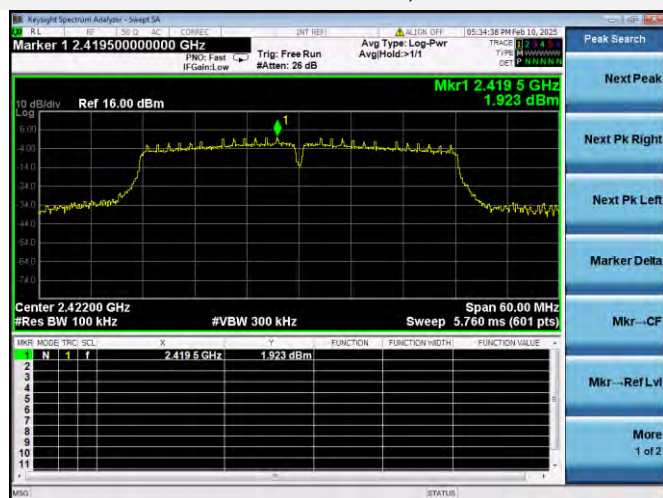
802.11n-20 MHz HIGH CHANNEL, CARRIER LEVEL



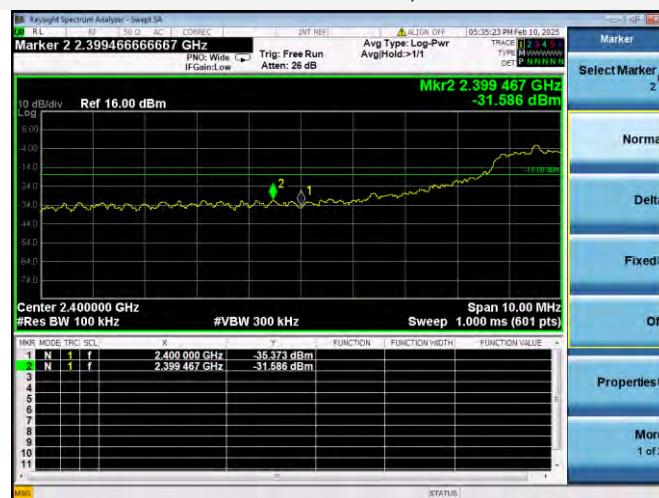
802.11n-20 MHz HIGH CHANNEL, BAND EDGE



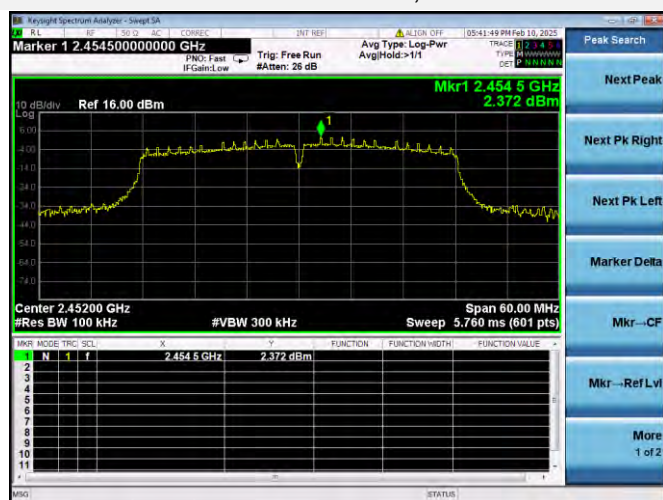
802.11n-40 MHz LOW CHANNEL, CARRIER LEVEL



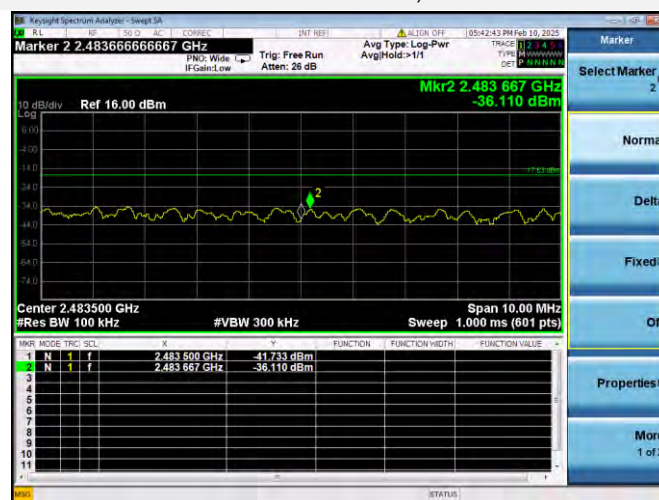
802.11n-40 MHz LOW CHANNEL, BAND EDGE



802.11n-40 MHz HIGH CHANNEL, CARRIER LEVEL



802.11n-40 MHz HIGH CHANNEL, BAND EDGE



A.5 Conducted Emissions

Note¹: The EUT is working in the Normal link mode. All modes have been tested and normal link mode is worst.

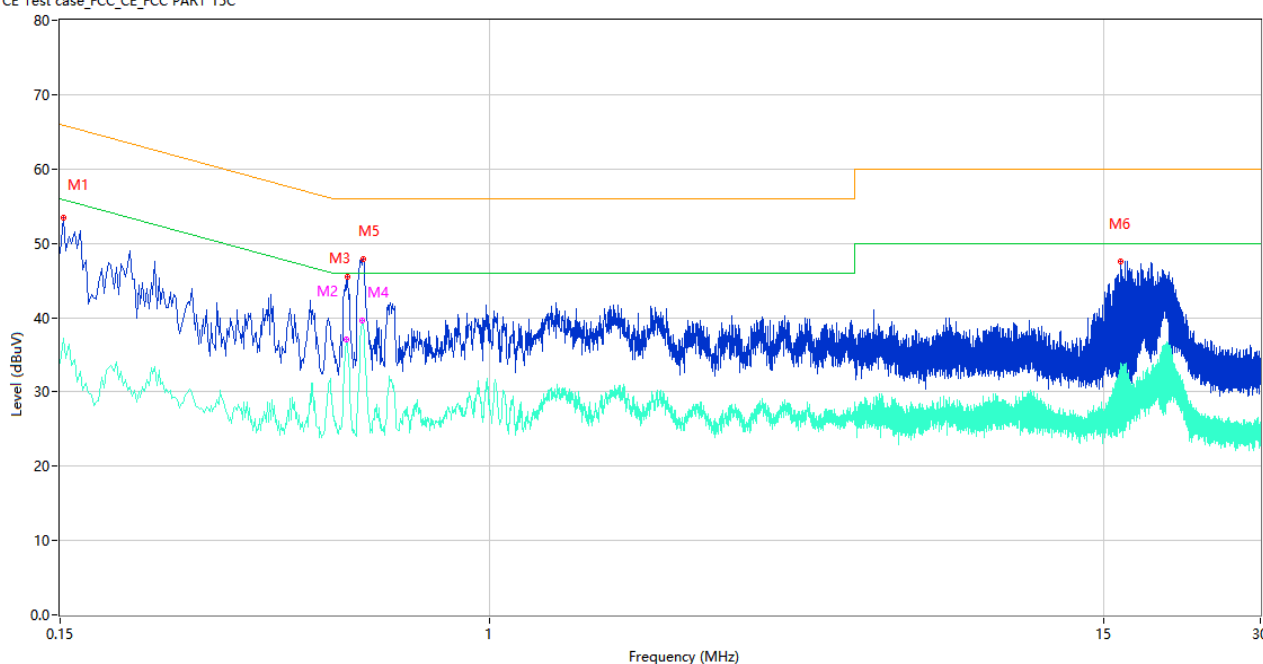
Note²: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 60 Hz and 240 VAC, 50 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

Note³: Results (dBuV) = Original reading level of Spectrum Analyzer (dBuV) + Factor (dB)

Test Data and Plots

PHASE L

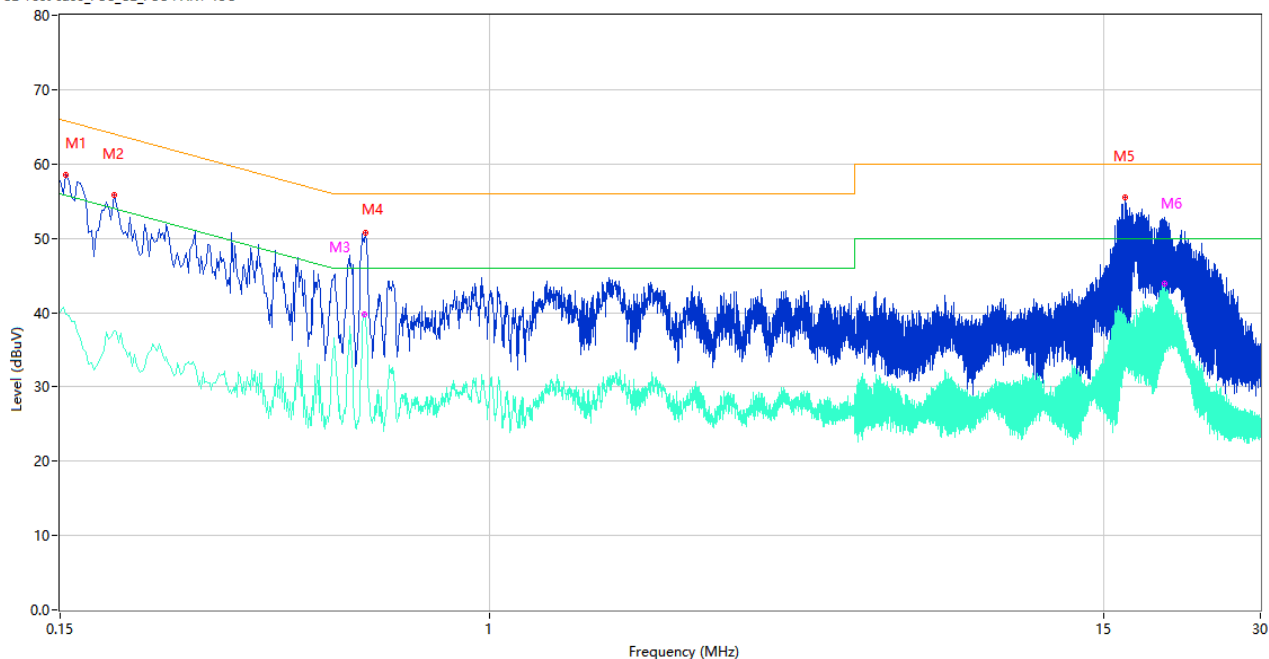
CE Test case_FCC_CE_FCC PART 15C



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.152	53.44	9.78	65.89	12.45	Peak	L	Pass
1**	0.152	37.27	9.78	55.89	18.62	AV	L	Pass
2	0.530	45.23	10.01	56.00	10.77	Peak	L	Pass
2**	0.530	37.03	10.01	46.00	8.97	AV	L	Pass
3	0.534	45.50	10.01	56.00	10.50	Peak	L	Pass
3**	0.534	36.31	10.01	46.00	9.69	AV	L	Pass
4	0.568	47.11	10.08	56.00	8.89	Peak	L	Pass
4**	0.568	39.54	10.08	46.00	6.46	AV	L	Pass
5	0.572	47.82	10.09	56.00	8.18	Peak	L	Pass
5**	0.572	39.10	10.09	46.00	6.90	AV	L	Pass
6	16.164	47.61	10.63	60.00	12.39	Peak	L	Pass
6**	16.164	31.52	10.63	50.00	18.48	AV	L	Pass

PHASE N

CE Test case_FCC_CE_FCC PART 15C



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.154	58.47	9.78	65.78	7.31	Peak	N	Pass
1**	0.154	39.71	9.78	55.78	16.07	AV	N	Pass
2	0.190	55.84	9.78	64.04	8.20	Peak	N	Pass
2**	0.190	37.49	9.78	54.04	16.55	AV	N	Pass
3	0.574	49.90	10.09	56.00	6.10	Peak	N	Pass
3**	0.574	39.80	10.09	46.00	6.20	AV	N	Pass
4	0.578	50.67	10.10	56.00	5.33	Peak	N	Pass
4**	0.578	39.35	10.10	46.00	6.65	AV	N	Pass
5	16.532	55.48	10.93	60.00	4.52	Peak	N	Pass
5**	16.532	33.46	10.93	50.00	16.54	AV	N	Pass
6	19.622	51.60	10.85	60.00	8.40	Peak	N	Pass
6**	19.622	43.90	10.85	50.00	6.10	AV	N	Pass

A.6 Radiated Emission

Note¹: The symbol of “--” in the table which means not application.

Note²: For the test data above 1 GHz, According the ANSI C63.10-2013, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

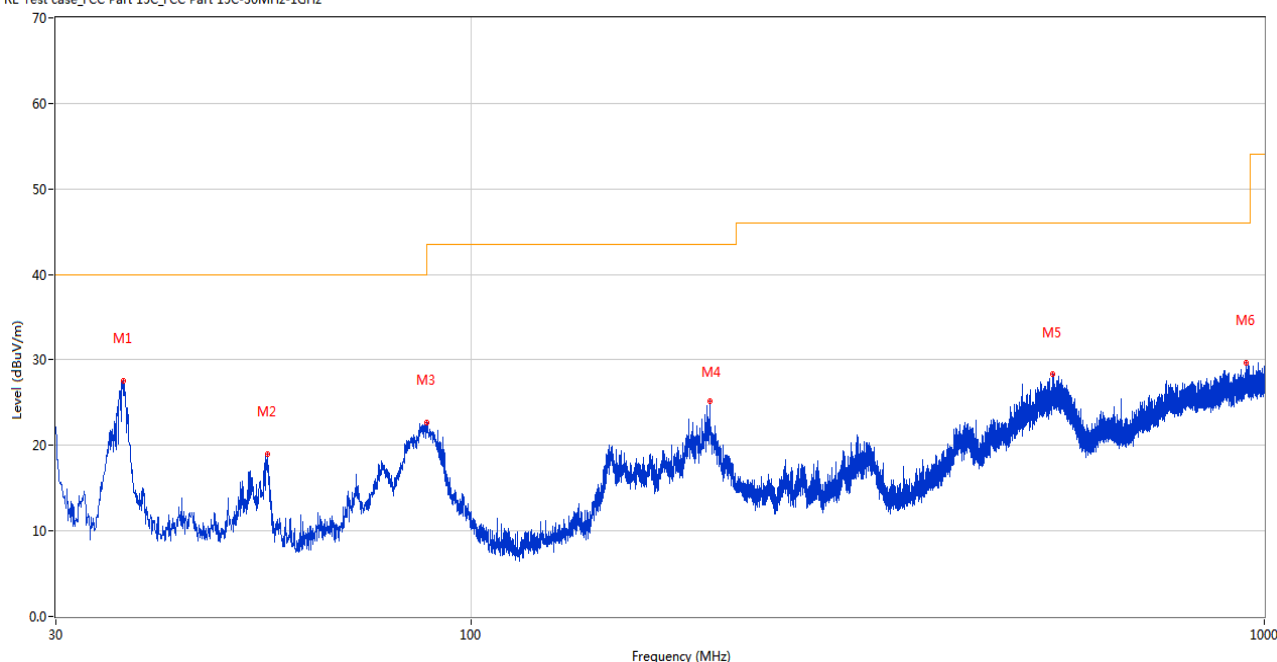
Note³: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Note⁴: The EUT is working in the Normal link mode below 1 GHz. All modes have been tested and normal link mode is worst.

Test Data and Plots

30 MHz to 1 GHz, ANT H

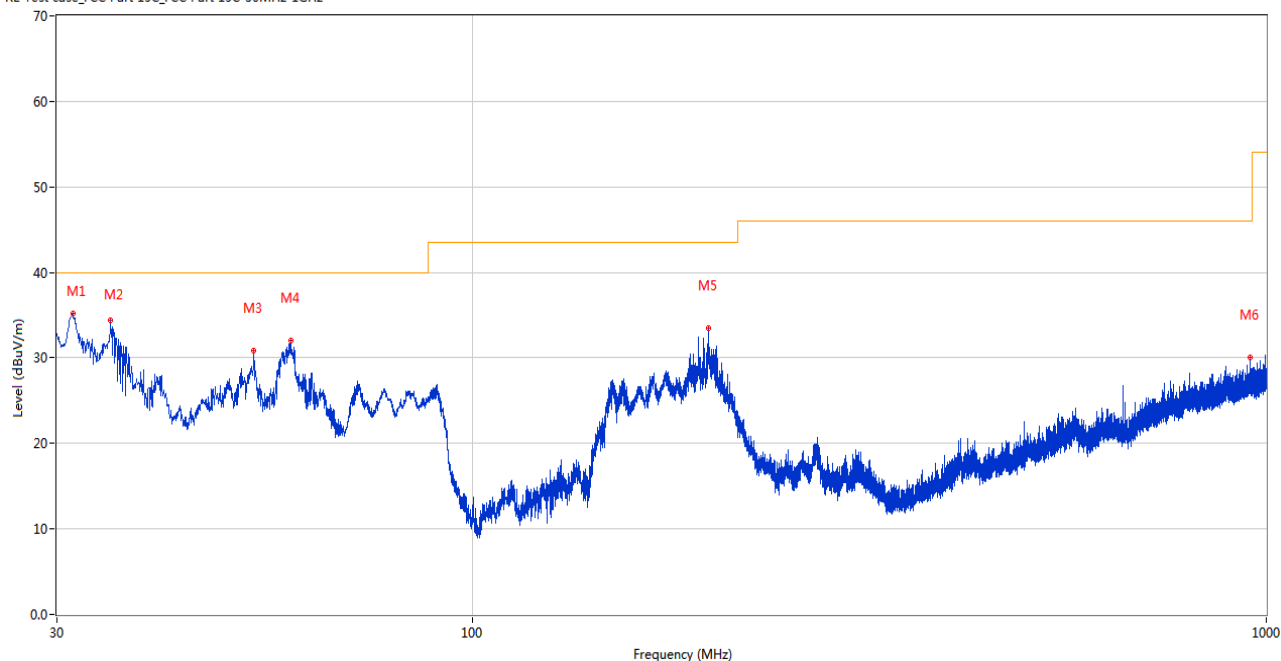
RE Test case_FCC Part 15C_FCC Part 15C-30MHz-1GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	36.450	27.56	-27.22	40.0	12.44	Peak	321.00	100	Horizontal	Pass
2	55.414	18.95	-26.98	40.0	21.05	Peak	358.00	100	Horizontal	Pass
3	87.957	22.66	-30.46	40.0	17.34	Peak	0.00	200	Horizontal	Pass
4	200.332	25.13	-28.79	43.5	18.37	Peak	118.00	100	Horizontal	Pass
5	541.335	28.28	-18.05	46.0	17.72	Peak	0.00	200	Horizontal	Pass
6	949.269	29.64	-9.85	46.0	16.36	Peak	334.00	100	Horizontal	Pass

30 MHz to 1 GHz, ANT V

RE Test case_FCC Part 15C_FCC Part 15C-30MHz-1GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	31.407	35.16	-27.50	40.0	4.84	Peak	190.00	100	Vertical	Pass
2	35.044	34.37	-26.92	40.0	5.63	Peak	102.00	100	Vertical	Pass
3	53.135	30.84	-26.70	40.0	9.16	Peak	236.00	100	Vertical	Pass
4	59.051	31.99	-27.10	40.0	8.01	Peak	343.00	100	Vertical	Pass
5	198.586	33.43	-28.62	43.5	10.07	Peak	98.00	100	Vertical	Pass
6	955.331	30.06	-10.03	46.0	15.94	Peak	96.00	100	Vertical	Pass

Note 1: The marked spikes near 2400 MHz with circle should be ignored because they are Fundamental signal.

Note 2: The spurious above 18G is noise only, do not show on the report.

1 GHz to 18 GHz, ANT H 802.11b Low Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1329.226	43.11	74.0	30.89	Peak	54.00	200	Horizontal	Pass
1**	1329.226	35.96	54.0	18.04	AV	54.00	200	Horizontal	Pass
2	2998.581	49.83	74.0	24.17	Peak	78.00	300	Horizontal	Pass
2**	2998.581	43.34	54.0	10.66	AV	78.00	300	Horizontal	Pass
3	4933.164	49.51	74.0	24.49	Peak	140.00	200	Horizontal	Pass
3**	4933.164	42.05	54.0	11.95	AV	140.00	200	Horizontal	Pass
4	6803.397	56.22	74.0	17.78	Peak	123.00	100	Horizontal	Pass
4**	6803.397	45.41	54.0	8.59	AV	123.00	100	Horizontal	Pass
5	13408.772	53.38	74.0	20.62	Peak	183.00	100	Horizontal	Pass
5**	13408.772	47.01	54.0	6.99	AV	183.00	100	Horizontal	Pass
6	17423.026	53.27	74.0	20.73	Peak	258.00	200	Horizontal	Pass
6**	17423.026	48.27	54.0	5.73	AV	258.00	200	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11b Low Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1329.354	47.39	74.0	26.61	Peak	209.00	300	Vertical	Pass
1**	1329.354	38.37	54.0	15.63	AV	209.00	300	Vertical	Pass
2	2983.781	53.08	74.0	20.92	Peak	168.00	100	Vertical	Pass
2**	2983.781	42.52	54.0	11.48	AV	168.00	100	Vertical	Pass
3	4851.009	46.81	74.0	27.19	Peak	192.00	200	Vertical	Pass
3**	4851.009	40.67	54.0	13.33	AV	192.00	200	Vertical	Pass
4	6606.748	54.78	74.0	19.22	Peak	162.00	400	Vertical	Pass
4**	6606.748	47.21	54.0	6.79	AV	162.00	400	Vertical	Pass
5	13434.539	55.33	74.0	18.67	Peak	33.00	300	Vertical	Pass
5**	13434.539	45.93	54.0	8.07	AV	33.00	300	Vertical	Pass
6	17414.264	57.65	74.0	16.35	Peak	167.00	300	Vertical	Pass
6**	17414.264	45.66	54.0	8.34	AV	167.00	300	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11b Middle Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1328.709	44.15	74.0	29.85	Peak	137.00	300	Horizontal	Pass
1**	1328.709	35.34	54.0	18.66	AV	137.00	300	Horizontal	Pass
2	2993.849	50.80	74.0	23.20	Peak	304.00	200	Horizontal	Pass
2**	2993.849	41.90	54.0	12.10	AV	304.00	200	Horizontal	Pass
3	4931.518	51.43	74.0	22.57	Peak	100.00	200	Horizontal	Pass
3**	4931.518	44.53	54.0	9.47	AV	100.00	200	Horizontal	Pass
4	6807.552	54.74	74.0	19.26	Peak	40.00	300	Horizontal	Pass
4**	6807.552	44.47	54.0	9.53	AV	40.00	300	Horizontal	Pass
5	13413.486	53.43	74.0	20.57	Peak	25.00	100	Horizontal	Pass
5**	13413.486	44.82	54.0	9.18	AV	25.00	100	Horizontal	Pass
6	17423.313	55.41	74.0	18.59	Peak	48.00	200	Horizontal	Pass
6**	17423.313	45.93	54.0	8.07	AV	48.00	200	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11b Middle Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1335.325	47.14	74.0	26.86	Peak	248.00	300	Vertical	Pass
1**	1335.325	39.66	54.0	14.34	AV	248.00	300	Vertical	Pass
2	2984.468	52.04	74.0	21.96	Peak	39.00	300	Vertical	Pass
2**	2984.468	43.87	54.0	10.13	AV	39.00	300	Vertical	Pass
3	4853.660	48.68	74.0	25.32	Peak	335.00	200	Vertical	Pass
3**	4853.660	39.65	54.0	14.35	AV	335.00	200	Vertical	Pass
4	6605.544	52.17	74.0	21.83	Peak	177.00	400	Vertical	Pass
4**	6605.544	44.45	54.0	9.55	AV	177.00	400	Vertical	Pass
5	13435.543	52.97	74.0	21.03	Peak	130.00	300	Vertical	Pass
5**	13435.543	44.34	54.0	9.66	AV	130.00	300	Vertical	Pass
6	17417.803	55.99	74.0	18.01	Peak	110.00	100	Vertical	Pass
6**	17417.803	45.24	54.0	8.76	AV	110.00	100	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11b High Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1329.455	46.45	74.0	27.55	Peak	152.00	300	Horizontal	Pass
1**	1329.455	39.17	54.0	14.83	AV	152.00	300	Horizontal	Pass
2	2997.407	48.91	74.0	25.09	Peak	210.00	300	Horizontal	Pass
2**	2997.407	43.19	54.0	10.81	AV	210.00	300	Horizontal	Pass
3	4930.614	54.17	74.0	19.83	Peak	66.00	200	Horizontal	Pass
3**	4930.614	44.16	54.0	9.84	AV	66.00	200	Horizontal	Pass
4	6807.772	55.57	74.0	18.43	Peak	50.00	300	Horizontal	Pass
4**	6807.772	43.72	54.0	10.28	AV	50.00	300	Horizontal	Pass
5	13414.871	53.44	74.0	20.56	Peak	96.00	100	Horizontal	Pass
5**	13414.871	45.59	54.0	8.41	AV	96.00	100	Horizontal	Pass
6	17427.368	54.93	74.0	19.07	Peak	272.00	300	Horizontal	Pass
6**	17427.368	49.24	54.0	4.76	AV	272.00	300	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11b High Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1329.240	43.08	74.0	30.92	Peak	232.00	400	Vertical	Pass
1**	1329.240	40.03	54.0	13.97	AV	232.00	400	Vertical	Pass
2	2980.747	49.86	74.0	24.14	Peak	280.00	300	Vertical	Pass
2**	2980.747	43.17	54.0	10.83	AV	280.00	300	Vertical	Pass
3	4855.718	51.15	74.0	22.85	Peak	48.00	200	Vertical	Pass
3**	4855.718	39.68	54.0	14.32	AV	48.00	200	Vertical	Pass
4	6603.469	53.42	74.0	20.58	Peak	309.00	100	Vertical	Pass
4**	6603.469	45.92	54.0	8.08	AV	309.00	100	Vertical	Pass
5	13433.524	54.31	74.0	19.69	Peak	97.00	400	Vertical	Pass
5**	13433.524	45.26	54.0	8.74	AV	97.00	400	Vertical	Pass
6	17414.401	60.01	74.0	13.99	Peak	150.00	100	Vertical	Pass
6**	17414.401	47.55	54.0	6.45	AV	150.00	100	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11g Low Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1326.906	42.19	74.0	31.81	Peak	168.00	400	Horizontal	Pass
1**	1326.906	39.33	54.0	14.67	AV	168.00	400	Horizontal	Pass
2	2992.876	47.94	74.0	26.06	Peak	105.00	400	Horizontal	Pass
2**	2992.876	38.61	54.0	15.39	AV	105.00	400	Horizontal	Pass
3	4931.254	54.51	74.0	19.49	Peak	161.00	200	Horizontal	Pass
3**	4931.254	40.92	54.0	13.08	AV	161.00	200	Horizontal	Pass
4	6809.804	51.92	74.0	22.08	Peak	305.00	200	Horizontal	Pass
4**	6809.804	44.08	54.0	9.92	AV	305.00	200	Horizontal	Pass
5	13408.919	56.72	74.0	17.28	Peak	12.00	200	Horizontal	Pass
5**	13408.919	46.68	54.0	7.32	AV	12.00	200	Horizontal	Pass
6	17429.871	56.09	74.0	17.91	Peak	348.00	400	Horizontal	Pass
6**	17429.871	46.96	54.0	7.04	AV	348.00	400	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11g Low Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1336.266	43.28	74.0	30.72	Peak	45.00	300	Vertical	Pass
1**	1336.266	34.77	54.0	19.23	AV	45.00	300	Vertical	Pass
2	2984.912	51.11	74.0	22.89	Peak	239.00	300	Vertical	Pass
2**	2984.912	41.23	54.0	12.77	AV	239.00	300	Vertical	Pass
3	4853.571	52.33	74.0	21.67	Peak	117.00	200	Vertical	Pass
3**	4853.571	37.77	54.0	16.23	AV	117.00	200	Vertical	Pass
4	6605.754	55.25	74.0	18.75	Peak	344.00	400	Vertical	Pass
4**	6605.754	44.98	54.0	9.02	AV	344.00	400	Vertical	Pass
5	13431.024	54.54	74.0	19.46	Peak	248.00	200	Vertical	Pass
5**	13431.024	45.35	54.0	8.65	AV	248.00	200	Vertical	Pass
6	17413.747	56.46	74.0	17.54	Peak	129.00	400	Vertical	Pass
6**	17413.747	47.94	54.0	6.06	AV	129.00	400	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11g Middle Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1331.023	45.43	74.0	28.57	Peak	254.00	200	Horizontal	Pass
1**	1331.023	36.40	54.0	17.60	AV	254.00	200	Horizontal	Pass
2	2994.718	52.72	74.0	21.28	Peak	135.00	100	Horizontal	Pass
2**	2994.718	41.95	54.0	12.05	AV	135.00	100	Horizontal	Pass
3	4933.014	51.80	74.0	22.20	Peak	266.00	200	Horizontal	Pass
3**	4933.014	44.51	54.0	9.49	AV	266.00	200	Horizontal	Pass
4	6805.223	52.13	74.0	21.87	Peak	355.00	100	Horizontal	Pass
4**	6805.223	43.00	54.0	11.00	AV	355.00	100	Horizontal	Pass
5	13410.204	54.88	74.0	19.12	Peak	39.00	200	Horizontal	Pass
5**	13410.204	47.59	54.0	6.41	AV	39.00	200	Horizontal	Pass
6	17427.561	57.77	74.0	16.23	Peak	208.00	100	Horizontal	Pass
6**	17427.561	48.07	54.0	5.93	AV	208.00	100	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11g Middle Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1332.811	44.82	74.0	29.18	Peak	111.00	400	Vertical	Pass
1**	1332.811	35.57	54.0	18.43	AV	111.00	400	Vertical	Pass
2	2982.513	53.01	74.0	20.99	Peak	267.00	400	Vertical	Pass
2**	2982.513	43.21	54.0	10.79	AV	267.00	400	Vertical	Pass
3	4851.619	50.64	74.0	23.36	Peak	358.00	200	Vertical	Pass
3**	4851.619	43.50	54.0	10.50	AV	358.00	200	Vertical	Pass
4	6610.505	51.51	74.0	22.49	Peak	49.00	200	Vertical	Pass
4**	6610.505	43.43	54.0	10.57	AV	49.00	200	Vertical	Pass
5	13433.594	55.51	74.0	18.49	Peak	231.00	400	Vertical	Pass
5**	13433.594	49.11	54.0	4.89	AV	231.00	400	Vertical	Pass
6	17413.917	59.27	74.0	14.73	Peak	322.00	400	Vertical	Pass
6**	17413.917	46.73	54.0	7.27	AV	322.00	400	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11g High Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1330.106	44.76	74.0	29.24	Peak	138.00	300	Horizontal	Pass
1**	1330.106	36.47	54.0	17.53	AV	138.00	300	Horizontal	Pass
2	2992.675	50.35	74.0	23.65	Peak	177.00	200	Horizontal	Pass
2**	2992.675	43.66	54.0	10.34	AV	177.00	200	Horizontal	Pass
3	4933.852	52.16	74.0	21.84	Peak	56.00	200	Horizontal	Pass
3**	4933.852	41.15	54.0	12.85	AV	56.00	200	Horizontal	Pass
4	6808.437	52.83	74.0	21.17	Peak	174.00	300	Horizontal	Pass
4**	6808.437	47.04	54.0	6.96	AV	174.00	300	Horizontal	Pass
5	13411.331	53.61	74.0	20.39	Peak	302.00	100	Horizontal	Pass
5**	13411.331	46.18	54.0	7.82	AV	302.00	100	Horizontal	Pass
6	17429.816	54.18	74.0	19.82	Peak	344.00	400	Horizontal	Pass
6**	17429.816	44.91	54.0	9.09	AV	344.00	400	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11g High Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1331.327	45.46	74.0	28.54	Peak	202.00	200	Vertical	Pass
1**	1331.327	37.65	54.0	16.35	AV	202.00	200	Vertical	Pass
2	2984.006	51.76	74.0	22.24	Peak	192.00	300	Vertical	Pass
2**	2984.006	39.81	54.0	14.19	AV	192.00	300	Vertical	Pass
3	4857.331	48.96	74.0	25.04	Peak	210.00	200	Vertical	Pass
3**	4857.331	37.91	54.0	16.09	AV	210.00	200	Vertical	Pass
4	6609.149	55.35	74.0	18.65	Peak	44.00	100	Vertical	Pass
4**	6609.149	42.45	54.0	11.55	AV	44.00	100	Vertical	Pass
5	13435.580	54.56	74.0	19.44	Peak	68.00	200	Vertical	Pass
5**	13435.580	47.48	54.0	6.52	AV	68.00	200	Vertical	Pass
6	17417.405	57.62	74.0	16.38	Peak	27.00	400	Vertical	Pass
6**	17417.405	50.32	54.0	3.68	AV	27.00	400	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11n20 Low Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1330.902	44.04	74.0	29.96	Peak	224.00	200	Horizontal	Pass
1**	1330.902	35.10	54.0	18.90	AV	224.00	200	Horizontal	Pass
2	2993.321	47.73	74.0	26.27	Peak	257.00	100	Horizontal	Pass
2**	2993.321	43.66	54.0	10.34	AV	257.00	100	Horizontal	Pass
3	4937.178	54.47	74.0	19.53	Peak	225.00	200	Horizontal	Pass
3**	4937.178	41.49	54.0	12.51	AV	225.00	200	Horizontal	Pass
4	6805.245	54.43	74.0	19.57	Peak	290.00	300	Horizontal	Pass
4**	6805.245	47.57	54.0	6.43	AV	290.00	300	Horizontal	Pass
5	13413.155	57.91	74.0	16.09	Peak	35.00	200	Horizontal	Pass
5**	13413.155	48.59	54.0	5.41	AV	35.00	200	Horizontal	Pass
6	17423.703	56.64	74.0	17.36	Peak	218.00	200	Horizontal	Pass
6**	17423.703	48.05	54.0	5.95	AV	218.00	200	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11n20 Low Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1335.419	45.90	74.0	28.10	Peak	150.00	400	Vertical	Pass
1**	1335.419	39.34	54.0	14.66	AV	150.00	400	Vertical	Pass
2	2983.529	49.75	74.0	24.25	Peak	347.00	100	Vertical	Pass
2**	2983.529	39.83	54.0	14.17	AV	347.00	100	Vertical	Pass
3	4853.894	49.23	74.0	24.77	Peak	100.00	200	Vertical	Pass
3**	4853.894	42.07	54.0	11.93	AV	100.00	200	Vertical	Pass
4	6608.270	55.54	74.0	18.46	Peak	358.00	400	Vertical	Pass
4**	6608.270	44.51	54.0	9.49	AV	358.00	400	Vertical	Pass
5	13430.877	55.44	74.0	18.56	Peak	338.00	300	Vertical	Pass
5**	13430.877	47.23	54.0	6.77	AV	338.00	300	Vertical	Pass
6	17418.637	57.15	74.0	16.85	Peak	206.00	100	Vertical	Pass
6**	17418.637	50.22	54.0	3.78	AV	206.00	100	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11n20 Middle Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1332.989	43.30	74.0	30.70	Peak	2.00	400	Horizontal	Pass
1**	1332.989	39.12	54.0	14.88	AV	2.00	400	Horizontal	Pass
2	2994.797	50.14	74.0	23.86	Peak	308.00	100	Horizontal	Pass
2**	2994.797	43.99	54.0	10.01	AV	308.00	100	Horizontal	Pass
3	4934.834	52.12	74.0	21.88	Peak	359.00	200	Horizontal	Pass
3**	4934.834	39.28	54.0	14.72	AV	359.00	200	Horizontal	Pass
4	6807.551	56.31	74.0	17.69	Peak	150.00	100	Horizontal	Pass
4**	6807.551	45.66	54.0	8.34	AV	150.00	100	Horizontal	Pass
5	13407.899	55.86	74.0	18.14	Peak	87.00	100	Horizontal	Pass
5**	13407.899	46.75	54.0	7.25	AV	87.00	100	Horizontal	Pass
6	17428.596	56.78	74.0	17.22	Peak	206.00	100	Horizontal	Pass
6**	17428.596	45.89	54.0	8.11	AV	206.00	100	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11n20 Middle Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1333.521	45.34	74.0	28.66	Peak	184.00	200	Vertical	Pass
1**	1333.521	36.11	54.0	17.89	AV	184.00	200	Vertical	Pass
2	2982.025	48.14	74.0	25.86	Peak	271.00	300	Vertical	Pass
2**	2982.025	39.53	54.0	14.47	AV	271.00	300	Vertical	Pass
3	4852.337	47.63	74.0	26.37	Peak	61.00	200	Vertical	Pass
3**	4852.337	38.27	54.0	15.73	AV	61.00	200	Vertical	Pass
4	6608.056	57.15	74.0	16.85	Peak	31.00	300	Vertical	Pass
4**	6608.056	45.92	54.0	8.08	AV	31.00	300	Vertical	Pass
5	13433.700	56.22	74.0	17.78	Peak	281.00	300	Vertical	Pass
5**	13433.700	44.51	54.0	9.49	AV	281.00	300	Vertical	Pass
6	17416.931	55.93	74.0	18.07	Peak	10.00	100	Vertical	Pass
6**	17416.931	47.39	54.0	6.61	AV	10.00	100	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11n20 High Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1327.674	44.92	74.0	29.08	Peak	217.00	400	Horizontal	Pass
1**	1327.674	36.66	54.0	17.34	AV	217.00	400	Horizontal	Pass
2	2997.843	47.51	74.0	26.49	Peak	108.00	400	Horizontal	Pass
2**	2997.843	41.88	54.0	12.12	AV	108.00	400	Horizontal	Pass
3	4937.884	50.05	74.0	23.95	Peak	120.00	200	Horizontal	Pass
3**	4937.884	39.75	54.0	14.25	AV	120.00	200	Horizontal	Pass
4	6805.697	55.90	74.0	18.10	Peak	305.00	100	Horizontal	Pass
4**	6805.697	47.59	54.0	6.41	AV	305.00	100	Horizontal	Pass
5	13408.351	55.88	74.0	18.12	Peak	256.00	200	Horizontal	Pass
5**	13408.351	44.76	54.0	9.24	AV	256.00	200	Horizontal	Pass
6	17423.715	54.02	74.0	19.98	Peak	223.00	400	Horizontal	Pass
6**	17423.715	49.19	54.0	4.81	AV	223.00	400	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11n20 High Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1333.518	43.02	74.0	30.98	Peak	339.00	400	Vertical	Pass
1**	1333.518	40.64	54.0	13.36	AV	339.00	400	Vertical	Pass
2	2984.720	51.20	74.0	22.80	Peak	79.00	100	Vertical	Pass
2**	2984.720	42.61	54.0	11.39	AV	79.00	100	Vertical	Pass
3	4852.305	49.07	74.0	24.93	Peak	77.00	200	Vertical	Pass
3**	4852.305	42.09	54.0	11.91	AV	77.00	200	Vertical	Pass
4	6603.899	56.57	74.0	17.43	Peak	234.00	300	Vertical	Pass
4**	6603.899	47.54	54.0	6.46	AV	234.00	300	Vertical	Pass
5	13434.488	55.75	74.0	18.25	Peak	5.00	300	Vertical	Pass
5**	13434.488	46.51	54.0	7.49	AV	5.00	300	Vertical	Pass
6	17413.929	55.77	74.0	18.23	Peak	122.00	100	Vertical	Pass
6**	17413.929	47.43	54.0	6.57	AV	122.00	100	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11n40 Low Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1330.733	47.24	74.0	26.76	Peak	204.00	400	Horizontal	Pass
1**	1330.733	38.17	54.0	15.83	AV	204.00	400	Horizontal	Pass
2	2995.298	48.15	74.0	25.85	Peak	42.00	200	Horizontal	Pass
2**	2995.298	41.38	54.0	12.62	AV	42.00	200	Horizontal	Pass
3	4932.627	51.72	74.0	22.28	Peak	254.00	200	Horizontal	Pass
3**	4932.627	39.38	54.0	14.62	AV	254.00	200	Horizontal	Pass
4	6809.460	56.37	74.0	17.63	Peak	355.00	100	Horizontal	Pass
4**	6809.460	44.28	54.0	9.72	AV	355.00	100	Horizontal	Pass
5	13413.058	57.49	74.0	16.51	Peak	4.00	100	Horizontal	Pass
5**	13413.058	46.00	54.0	8.00	AV	4.00	100	Horizontal	Pass
6	17425.245	55.72	74.0	18.28	Peak	40.00	400	Horizontal	Pass
6**	17425.245	48.90	54.0	5.10	AV	40.00	400	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11n40 Low Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1329.872	42.53	74.0	31.47	Peak	343.00	300	Vertical	Pass
1**	1329.872	37.91	54.0	16.09	AV	343.00	300	Vertical	Pass
2	2983.833	52.99	74.0	21.01	Peak	9.00	100	Vertical	Pass
2**	2983.833	43.84	54.0	10.16	AV	9.00	100	Vertical	Pass
3	4854.321	47.67	74.0	26.33	Peak	143.00	200	Vertical	Pass
3**	4854.321	37.82	54.0	16.18	AV	143.00	200	Vertical	Pass
4	6609.768	54.86	74.0	19.14	Peak	87.00	300	Vertical	Pass
4**	6609.768	44.83	54.0	9.17	AV	87.00	300	Vertical	Pass
5	13434.610	56.19	74.0	17.81	Peak	207.00	200	Vertical	Pass
5**	13434.610	47.17	54.0	6.83	AV	207.00	200	Vertical	Pass
6	17417.991	55.42	74.0	18.58	Peak	332.00	300	Vertical	Pass
6**	17417.991	47.50	54.0	6.50	AV	332.00	300	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11n40 Middle Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1329.542	44.16	74.0	29.84	Peak	80.00	300	Horizontal	Pass
1**	1329.542	35.40	54.0	18.60	AV	80.00	300	Horizontal	Pass
2	2995.002	49.89	74.0	24.11	Peak	293.00	300	Horizontal	Pass
2**	2995.002	40.21	54.0	13.79	AV	293.00	300	Horizontal	Pass
3	4932.155	53.54	74.0	20.46	Peak	180.00	200	Horizontal	Pass
3**	4932.155	44.48	54.0	9.52	AV	180.00	200	Horizontal	Pass
4	6809.247	55.67	74.0	18.33	Peak	21.00	100	Horizontal	Pass
4**	6809.247	47.23	54.0	6.77	AV	21.00	100	Horizontal	Pass
5	13411.428	56.50	74.0	17.50	Peak	319.00	400	Horizontal	Pass
5**	13411.428	49.13	54.0	4.87	AV	319.00	400	Horizontal	Pass
6	17424.938	54.80	74.0	19.20	Peak	244.00	100	Horizontal	Pass
6**	17424.938	45.72	54.0	8.28	AV	244.00	100	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11n40 Middle Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1333.242	46.84	74.0	27.16	Peak	342.00	400	Vertical	Pass
1**	1333.242	34.70	54.0	19.30	AV	342.00	400	Vertical	Pass
2	2980.198	50.90	74.0	23.10	Peak	269.00	100	Vertical	Pass
2**	2980.198	40.15	54.0	13.85	AV	269.00	100	Vertical	Pass
3	4857.260	50.43	74.0	23.57	Peak	115.00	200	Vertical	Pass
3**	4857.260	41.12	54.0	12.88	AV	115.00	200	Vertical	Pass
4	6604.405	52.44	74.0	21.56	Peak	99.00	200	Vertical	Pass
4**	6604.405	45.71	54.0	8.29	AV	99.00	200	Vertical	Pass
5	13437.718	55.14	74.0	18.86	Peak	262.00	100	Vertical	Pass
5**	13437.718	45.34	54.0	8.66	AV	262.00	100	Vertical	Pass
6	17419.489	58.78	74.0	15.22	Peak	132.00	100	Vertical	Pass
6**	17419.489	47.57	54.0	6.43	AV	132.00	100	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11n40 High Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1331.508	42.55	74.0	31.45	Peak	30.00	200	Horizontal	Pass
1**	1331.508	34.81	54.0	19.19	AV	30.00	200	Horizontal	Pass
2	2994.949	50.35	74.0	23.65	Peak	95.00	300	Horizontal	Pass
2**	2994.949	43.72	54.0	10.28	AV	95.00	300	Horizontal	Pass
3	4934.679	52.97	74.0	21.03	Peak	302.00	200	Horizontal	Pass
3**	4934.679	42.44	54.0	11.56	AV	302.00	200	Horizontal	Pass
4	6810.025	53.82	74.0	20.18	Peak	322.00	400	Horizontal	Pass
4**	6810.025	41.81	54.0	12.19	AV	322.00	400	Horizontal	Pass
5	13408.799	58.32	74.0	15.68	Peak	266.00	400	Horizontal	Pass
5**	13408.799	46.40	54.0	7.60	AV	266.00	400	Horizontal	Pass
6	17423.058	58.25	74.0	15.75	Peak	185.00	300	Horizontal	Pass
6**	17423.058	47.04	54.0	6.96	AV	185.00	300	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11n40 High Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1334.085	46.24	74.0	27.76	Peak	124.00	200	Vertical	Pass
1**	1334.085	37.83	54.0	16.17	AV	124.00	200	Vertical	Pass
2	2985.116	49.92	74.0	24.08	Peak	82.00	200	Vertical	Pass
2**	2985.116	40.60	54.0	13.40	AV	82.00	200	Vertical	Pass
3	4856.633	47.52	74.0	26.48	Peak	315.00	200	Vertical	Pass
3**	4856.633	39.48	54.0	14.52	AV	315.00	200	Vertical	Pass
4	6606.854	56.80	74.0	17.20	Peak	320.00	300	Vertical	Pass
4**	6606.854	45.59	54.0	8.41	AV	320.00	300	Vertical	Pass
5	13434.120	54.62	74.0	19.38	Peak	326.00	200	Vertical	Pass
5**	13434.120	43.50	54.0	10.50	AV	326.00	200	Vertical	Pass
6	17418.014	54.88	74.0	19.12	Peak	321.00	300	Vertical	Pass
6**	17418.014	46.38	54.0	7.62	AV	321.00	300	Vertical	Pass

A.7 Band Edge (Restricted-band band-edge)

Note ¹: The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.

Note ²: The test data all are tested in the vertical and horizontal antenna which the trace is max hold. So these plots have shown the worst case.

Note ³: According the ANSI C63.10-2013, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Test Data

802.11b LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2385.024	56.34	74.0	17.66	Peak	206.00	300	Horizontal	Pass
1**	2385.024	48.22	54.0	5.78	AV	206.00	300	Horizontal	Pass
2	2390.000	54.41	74.0	19.59	Peak	238.00	200	Horizontal	Pass
2**	2390.000	46.5	54.0	7.50	AV	238.00	200	Horizontal	Pass

802.11b HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	54.18	74.0	19.82	Peak	165.00	100	Horizontal	Pass
1**	2483.500	46	54.0	8.00	AV	165.00	100	Horizontal	Pass
2	2487.198	56.71	74.0	17.29	Peak	58.00	300	Horizontal	Pass
2**	2487.198	46.74	54.0	7.26	AV	58.00	300	Horizontal	Pass

802.11g LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2385.785	58.24	74.0	15.76	Peak	100.00	100	Horizontal	Pass
1**	2385.785	49.18	54.0	4.82	AV	100.00	100	Horizontal	Pass
2	2390.000	55.96	74.0	18.04	Peak	288.00	300	Horizontal	Pass
2**	2390.000	46.32	54.0	7.68	AV	288.00	300	Horizontal	Pass

802.11g HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	55.12	74.0	18.88	Peak	287.00	300	Horizontal	Pass
1**	2483.500	47	54.0	7.00	AV	287.00	300	Horizontal	Pass
2	2488.231	59.1	74.0	14.90	Peak	351.00	300	Horizontal	Pass
2**	2488.231	44.91	54.0	9.09	AV	351.00	300	Horizontal	Pass

802.11n20 LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2384.924	56.66	74.0	17.34	Peak	277.00	100	Horizontal	Pass
1**	2384.924	49.38	54.0	4.62	AV	277.00	100	Horizontal	Pass
2	2390.000	55.21	74.0	18.79	Peak	54.00	100	Horizontal	Pass
2**	2390.000	45.56	54.0	8.44	AV	54.00	100	Horizontal	Pass

802.11n20 HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	57.58	74.0	16.42	Peak	306.00	200	Horizontal	Pass
1**	2483.500	45.15	54.0	8.85	AV	306.00	200	Horizontal	Pass
2	2488.237	58.48	74.0	15.52	Peak	304.00	100	Horizontal	Pass
2**	2488.237	45.06	54.0	8.94	AV	304.00	100	Horizontal	Pass

802.11n40 LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2384.141	59.41	74.0	14.59	Peak	12.00	300	Horizontal	Pass
1**	2384.141	48.95	54.0	5.05	AV	12.00	300	Horizontal	Pass
2	2390.000	56.17	74.0	17.83	Peak	147.00	200	Horizontal	Pass
2**	2390.000	46.17	54.0	7.83	AV	147.00	200	Horizontal	Pass

802.11n40 HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	55.62	74.0	18.38	Peak	16.00	300	Horizontal	Pass
1**	2483.500	44.91	54.0	9.09	AV	16.00	300	Horizontal	Pass
2	2487.952	57.22	74.0	16.78	Peak	109.00	300	Horizontal	Pass
2**	2487.952	45.03	54.0	8.97	AV	109.00	300	Horizontal	Pass

A.8 Power Spectral Density (PSD)

Test Data

802.11b Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-4.21	8
Middle	-4.30	8
High	-4.51	8

802.11g Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-7.45	8
Middle	-8.47	8
High	-8.72	8

802.11n-20 MHz Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-8.36	8
Middle	-10.26	8
High	-8.90	8

802.11n-40 MHz Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-12.76	8
Middle	-13.52	8
High	-13.09	8

Test Plots

802.11b LOW CHANNEL



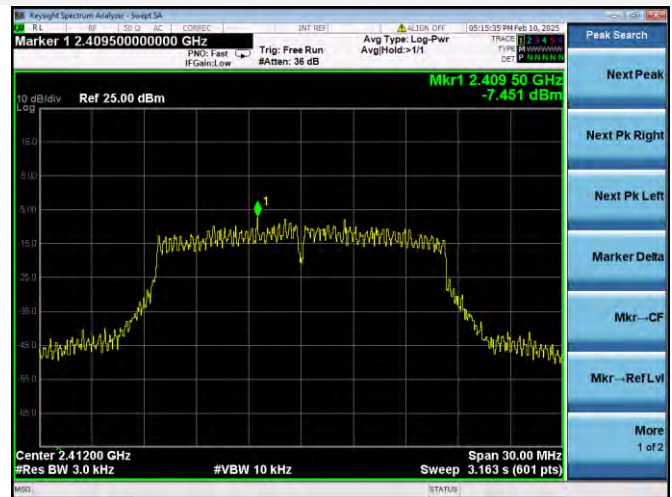
802.11b MIDDLE CHANNEL



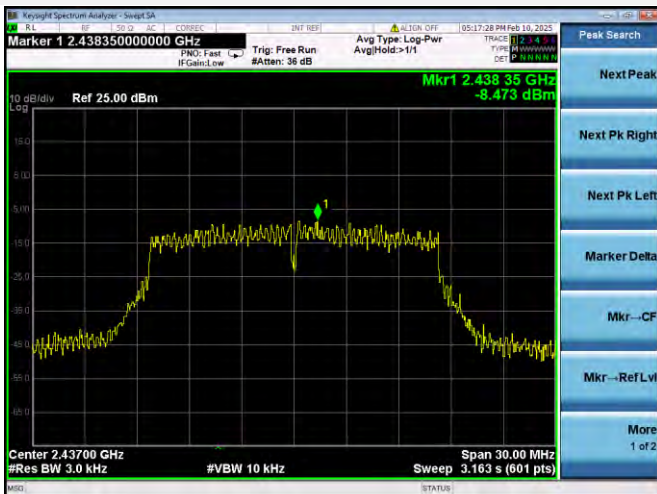
802.11b HIGH CHANNEL



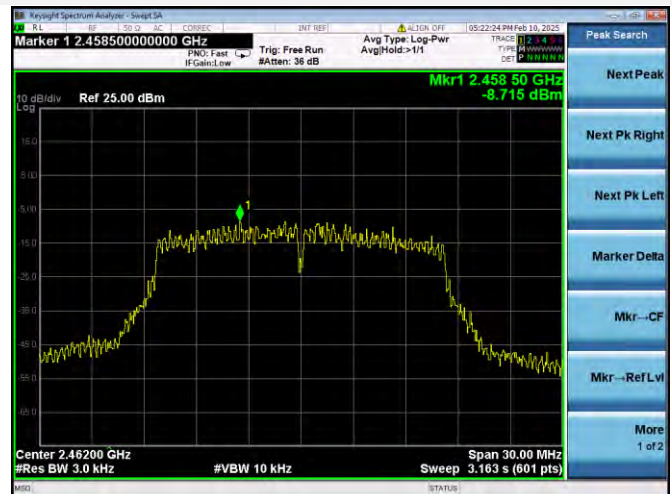
802.11g LOW CHANNEL



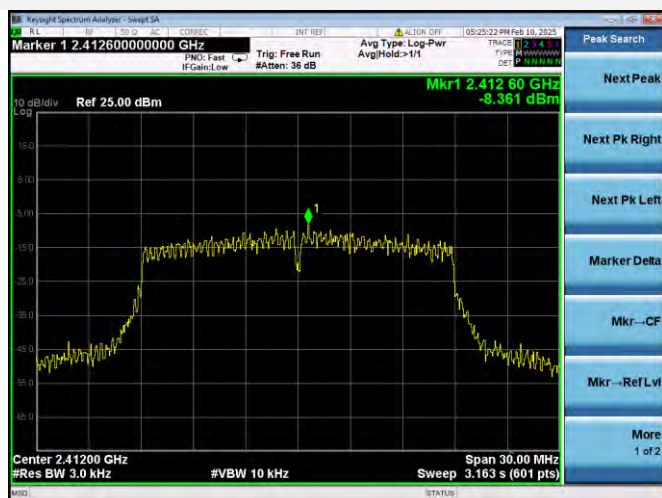
802.11g MIDDLE CHANNEL



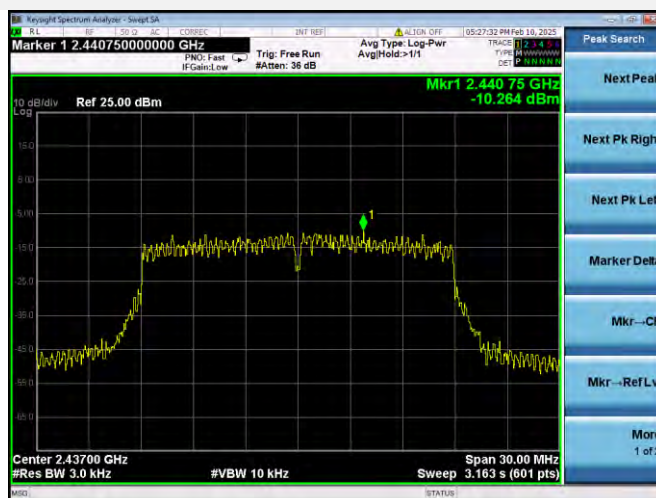
802.11g HIGH CHANNEL



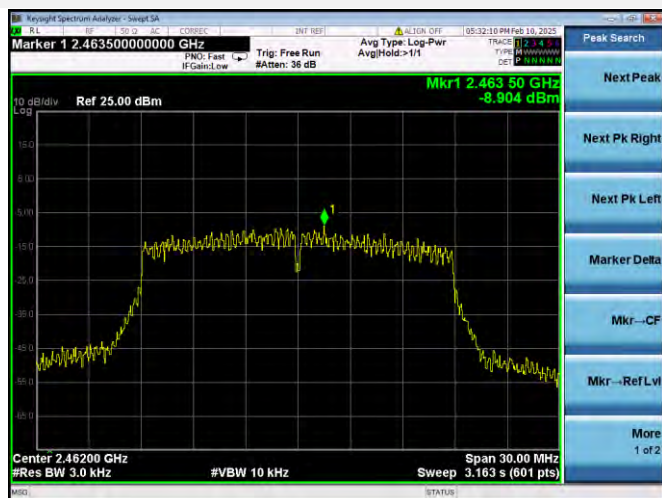
802.11n-20 MHz LOW CHANNEL



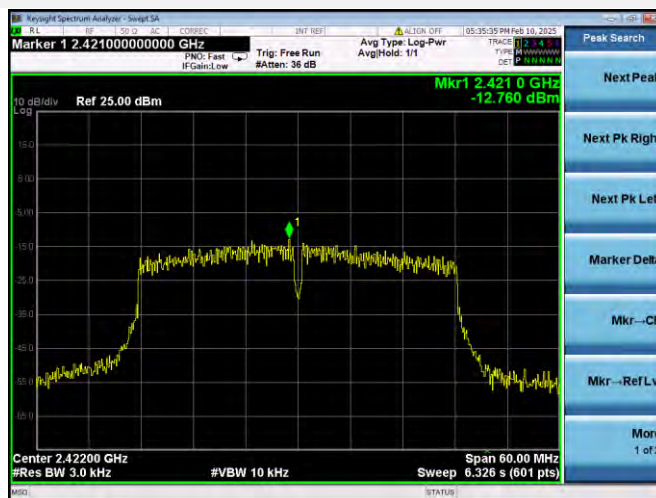
802.11n-20 MHz MIDDLE CHANNEL



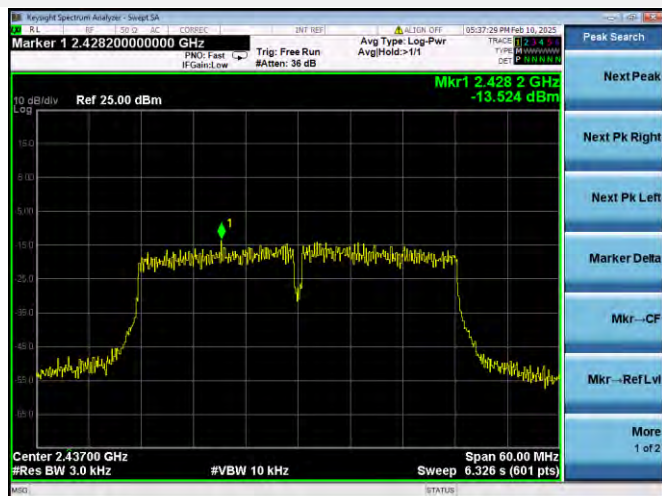
802.11n-20 MHz HIGH CHANNEL



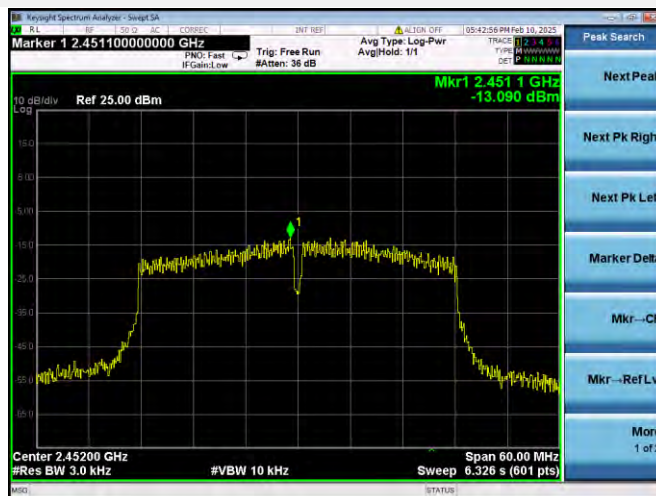
802.11n-40 MHz LOW CHANNEL



802.11n-40 MHz MIDDLE CHANNEL



802.11n-40 MHz HIGH CHANNEL



ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2520129-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2520129-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2520129-AI.PDF”.

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