TEST REPORT

Applicant:	Hansong(Nanjing) Technology Ltd.
Address:	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China.
Equipment Type:	Wireless Module
Model Name:	X501-W1R4M16-AA
Brand Name:	Platin
FCC ID:	XCO-X501
ISED Number:	7756A-X501
Test Standard:	47 CFR Part 15 Subpart C RSS-Gen Issue 5 RSS-247 Issue 3 (refer to section 3.1)
Sample Arrival Date:	Oct. 21, 2024
Test Date:	Oct. 22, 2024 - Nov. 07, 2024
Date of Issue:	Nov. 21, 2024

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Julie Zhu

Checked by: Ye Hongji

Approved by: Sunny Zou

(Technical Director)

Revision History

Version	Issue Date	Revisions
Rev. 01	Nov. 21, 2024	Initial Issue

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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. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Hansong(Nanjing) Technology Ltd.
Address	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China.

2.2 Manufacturer Information

Manufacturer	Hansong(Nanjing) Technology Ltd.
Address	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China.

2.3 General Description for Equipment under Test (EUT)

EUT Name	Wireless Module
Model Name Under Test	X501-W1R4M16-AA
Series Model Name	N/A
Description of Model name differentiation	N/A
Serial Number	85-2-144701-0
Hardware Version	VP1_1
Software Version	V001
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

Antenna Information:

Antenna Manufacturer	Model	Antenna Type	Antenna Gain
Suzhou Point Positive Electronic Technology Co., ltd	PCB Antenna	PCB	4.14 dBi
Suzhou Point Positive Electronic Technology Co., ltd	RC12WFI0272A1	Dipole	2.94 dBi
Note: Antenna model RC12WFI0272A1 are alternative antenna, the max gain antenna is chosen for all test.			

2.4 Technical Information

Network and Wireless connectivity	WIFI 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac and 802.11ax

The requirement for the following technical information of the EUT was tested in this report:

Frequency Range		802.11b/g/n/ax(20 MHz): 2.412 GHz - 2.462 GHz f_c = 2412 MHz + (N-1)*5 MHz, where - f_c = "Operating Frequency" in MHz, - N = "Channel Number" with the range from 1 to 11.
Modulation Type		DSSS, OFDM, OFDMA
Product Type		☒ Mobile ☐ Portable ☐ Fix Location
Antenna System (eg., MIMO, Smart Antenna)		Cyclic Delay Diversity (CDD) for 802.11b/g Multi Input Multi Output (MIMO) for 802.11n/ax
Categorization as Correlated or Completely Uncorrelated		Categorization as Correlated for 802.11b/g Categorization as Uncorrelated for 802.11n/ax
Antenna Type	SISO-Antenna 0	PCB Antenna
	SISO-Antenna 1	
Antenna Gain	SISO-Antenna 0	4.14 dBi
	SISO-Antenna 1	
Total directional gain	For power spectral density (PSD) measurements	Correlated: 7.15 dBi Formulas: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2$ /NANT] dBi Uncorrelated: 4.14 dBi Formulas: Directional gain = 10 log[$(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10})$/NANT] dBi
	For power measurements	Correlated: 7.15 dBi Formulas: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2$ /NANT] dBi Uncorrelated: 4.14 dBi Formulas: Directional gain = 10 log[$(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10})$/NANT] dBi
	For Conducted	Correlated: 7.15 dBi

	Out-of-Band and Spurious Measurements	Formulas: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2$ /NANT] dBi Uncorrelated: 4.14 dBi Formulas: Directional gain = 10 log[$(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10})$/NANT] dBi
About the Product		Only the WIFI 802.11b, 802.11g, 802.11n (HT20) and 802.11ax (HE20) was tested in this report.

Mode	Antenna		
	SISO-Antenna 0	SISO-Antenna 1	MIMO
802.11b	√	√	√
802.11g	√	√	√
802.11n20	√	√	√
802.11ax20	√	√	√
Note: All the configurations were tested, but only the worst data was shown in this report.			

802.11ax RU configuration table					
Mode	Full RU (SU)	RU_26	RU_52	RU_106	RU_242
802.11ax20	√	--	--	--	--

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
OFDMA (802.11ax-20 MHz)	BPSK	4
	QPSK	16/24/17/26
	16QAM	33/49/34/52
	64QAM	65/73/81/69/77/86
	256QAM	98/108/103/115
	1024QAM	122/135/129/143

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/11n20/11ax20	1/6/6.5/4 Mbps	1/6/11
Occupied Bandwidth	11b/11g/11n20/11ax20	1/6/6.5/4 Mbps	1/6/11
Conducted Spurious Emission	11b/11g/11n20/11ax20	1/6/6.5/4 Mbps	1/6/11
Conducted Emission	11b/11g/11n20/11ax20	1/6/6.5/4 Mbps	1/6/11
Radiated Spurious Emission	11b/11g/11n20/11ax20	1/6/6.5/4 Mbps	1/6/11
Band Edge	11b/11g/11n20/11ax20	1/6/6.5/4 Mbps	1/6/11
Power spectral density (PSD)	11b/11g/11n20/11ax20	1/6/6.5/4 Mbps	1/6/11

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	RSS-Gen Issue 5	General Requirements for Compliance of Radio Apparatus
3	RSS-247 Issue 3	Digital Transmission Systems (DTSs), Frequency Hopping Systems(FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
4	KDB Publication 662911 D01v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)
5	ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
6	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.	ISED Part No.	Test Result	Verdict
1	Antenna Requirement	15.203	RSS-247, 5.4 (f)	N/A	Pass[Note 1]
2	Output Power	15.247 (b)	RSS-247, 5.4 (d)	ANNEX A.1	Pass
3	Occupied Bandwidth	15.247 (a)	RSS-GEN, 6.7; RSS-247, 5.2 (a)	ANNEX A.2	Pass
4	Conducted Spurious Emission	15.247 (d)	RSS-247, 5.5	ANNEX A.3	Pass
5	Band Edge(Authorized-band band-edge)	15.247 (d)	RSS-GEN, 8.9; RSS-247, 5.5	ANNEX A.4	Pass
6	Conducted Emission	15.207	RSS-GEN, 8.8	ANNEX A.5	Pass
7	Radiated Spurious Emission	15.209; 15.247 (d)	RSS-247, 5.5	ANNEX A.6	Pass
8	Band Edge(Restricted-band band-edge)	15.209; 15.247 (d)	RSS-247, 5.5	ANNEX A.7	Pass
9	Power spectral density (PSD)	15.247 (e)	RSS-247, 5.2 (b)	ANNEX A.8	Pass
10	Receiver Spurious Emissions	N/A	RSS-Gen, 7.3	N/A	N/A [Note 2]

Note [1]: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.

Note [2]: Only radio communication receivers operating in stand-alone mode within the band 30-960 MHz, as well as scanner receivers, are subject to Industry Canada requirements, so this test is not applicable.

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

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

Relative Humidity	43% to 58%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22.6℃ to +25.4℃
Working Voltage of the EUT	NV (Normal Voltage)	5 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
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	2025.01.22
Amplifier	COM-MV	ZT30-1000M	B2018054558	2023.12.05	2024.12.04
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	2023.12.05	2024.12.04
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.

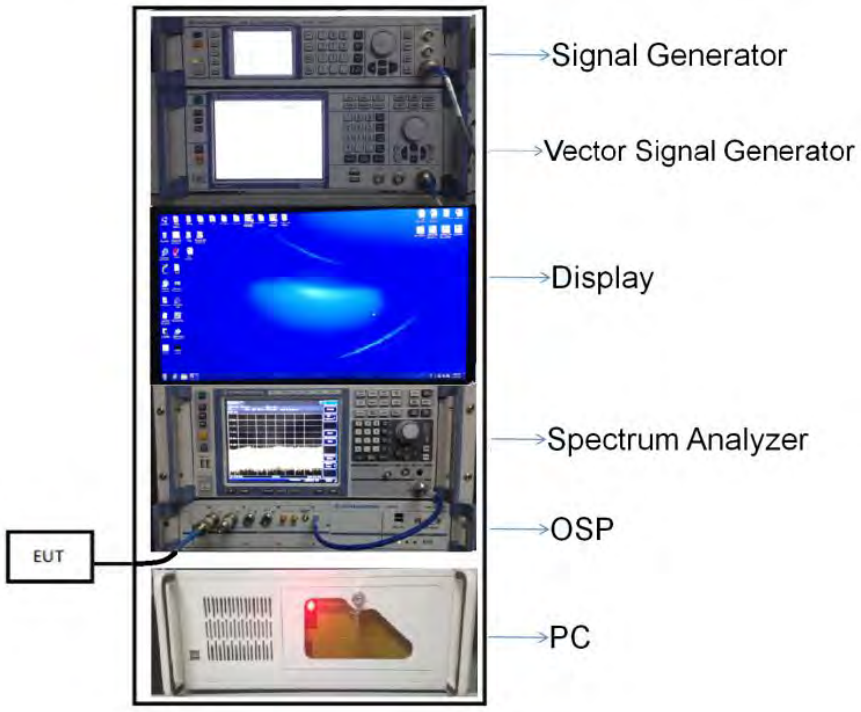
Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.8℃
Humidity	4%

4.5 Description of Test Setup

4.5.1 For Antenna Port Test

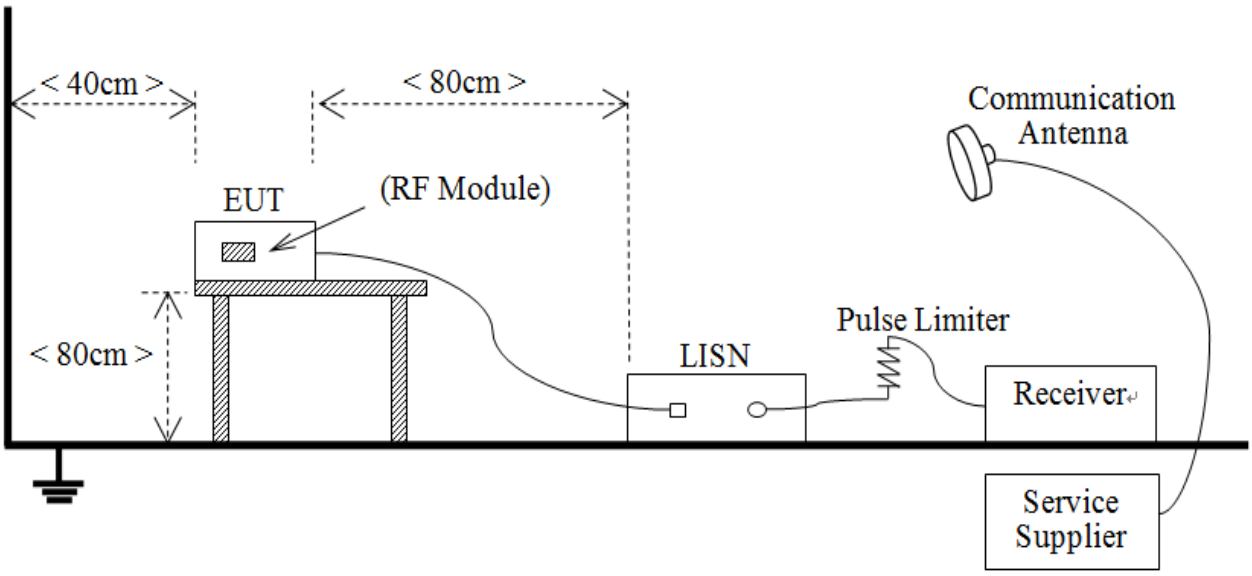
Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

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



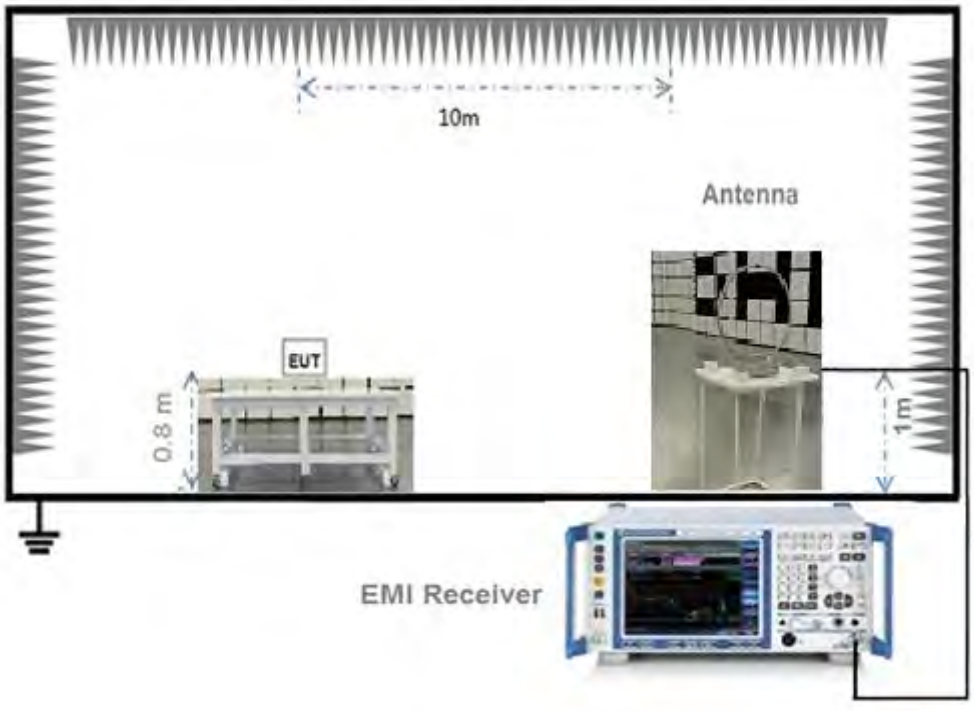
(Diagram 1)

4.5.2 For AC Power Supply Port Test



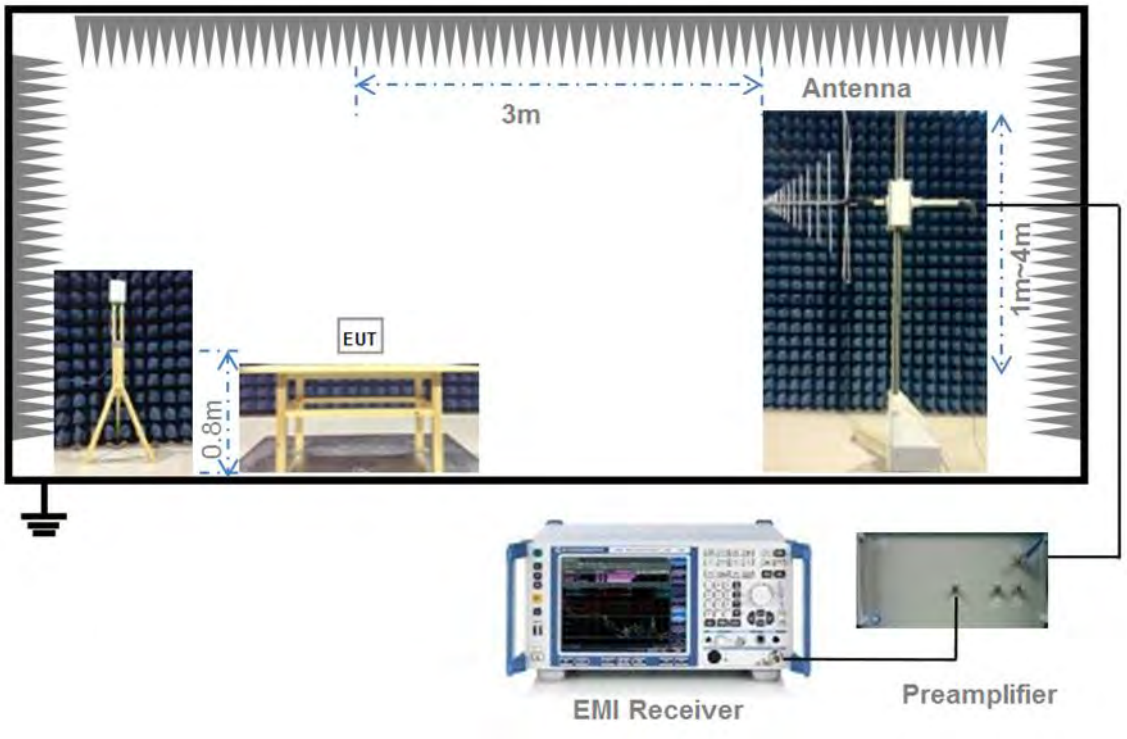
(Diagram 2)

4.5.3 For Radiated Test (Below 30 MHz)



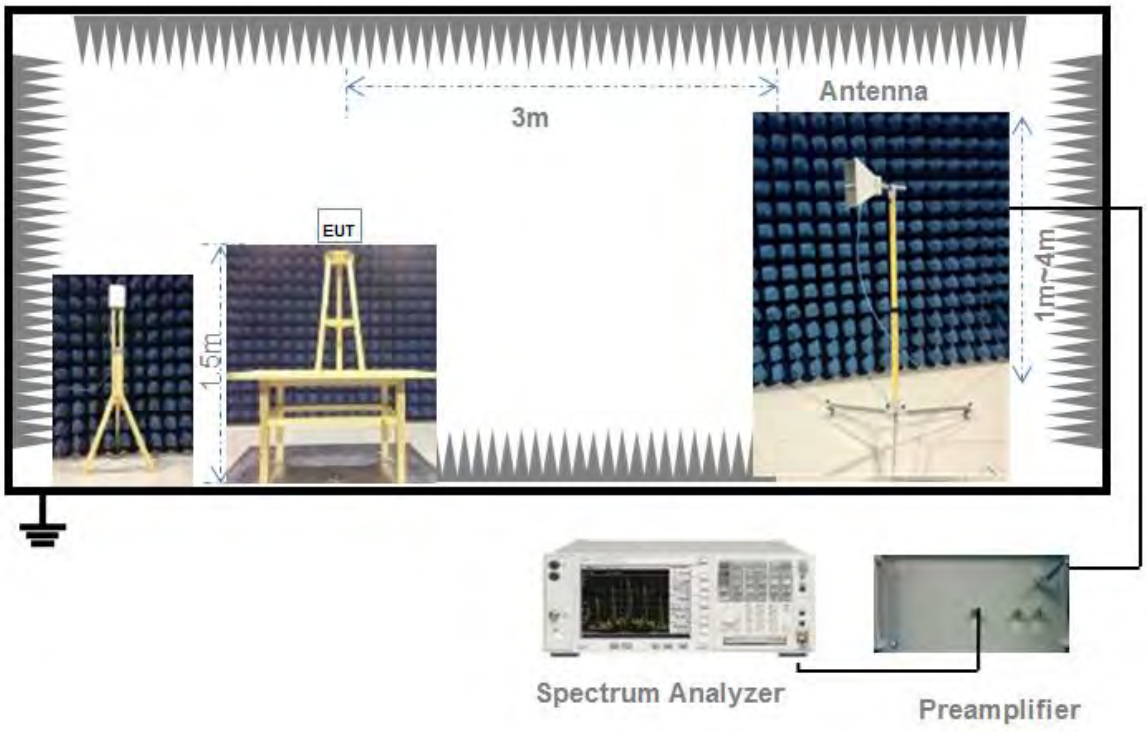
(Diagram 3)

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 = EIRP – 20log D + 104.8

where:

E = electric field strength in dBμV/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; RSS-247, 5.4 (f)

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); RSS-247, 5.4 (d)

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.

EIRP= Maximum peak conducted output power +Antenna Gain.

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 10log (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 ≥ OBW if possible; otherwise, set RBW to the largest available value.

Set VBW ≥ 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 ≤ 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); RSS-GEN, 6.7; RSS-247, 5.2 (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); RSS-247, 5.5

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 ≥ 3 x 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 ⩾ 3 x 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); RSS-GEN, 8.9, RSS-247, 5.5

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 $\geqslant$ 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 $\geqslant$ 3 x 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 (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; RSS-GEN, 8.8

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 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	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); RSS-247, 5.5

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 (μV/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:

$E = EIRP – 20\log D + 104.8$

where:

E = electric field strength in dBμV/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 ≥ 3 x 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 ≥ 3 x RBW.

e) Detector = RMS, if span/(# of points in sweep) ≤ (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 ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ 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); RSS-247, 5.5

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 ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ 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); RSS-247, 5.2 (b)

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 kHz $\leqslant$ RBW $\leqslant$ 100 kHz.

Set the VBW $\geqslant$ 3 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	8.402	8.504	98.80%	0.01
802.11g	1.386	1.495	92.71%	0.03
802.11n-20 MHz	1.297	1.403	92.44%	0.03
802.11ax-20 MHz	1.008	1.117	90.24%	0.04

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Peak Power Test Data

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	13.63	23.07	30	1000	Pass
Middle	13.82	24.10			Pass
High	14.73	29.72			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.79	151.01	30	1000	Pass
Middle	21.86	153.46			Pass
High	22.09	161.81			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.83	152.41	30	1000	Pass
Middle	21.49	140.93			Pass
High	22.12	162.93			Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.79	151.01	30	1000	Pass
Middle	21.57	143.55			Pass
High	21.37	137.09			Pass

Average Power Test Data

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	10.86	12.19	30	1000	Pass
Middle	12.11	16.26			Pass
High	11.62	14.52			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.86	30.62	30	1000	Pass
Middle	14.23	26.49			Pass
High	15.17	32.89			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.82	30.34	30	1000	Pass
Middle	14.30	26.92			Pass
High	15.06	32.06			Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.83	30.41	30	1000	Pass
Middle	14.57	28.64			Pass
High	14.54	28.44			Pass

E.I.R.P Test Data (For ISED)

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	17.77	59.84	36	4	Pass
Middle	17.96	62.52			Pass
High	18.87	77.09			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	25.93	391.74	36	4	Pass
Middle	26.00	398.11			Pass
High	26.23	419.76			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	25.97	395.37	36	4	Pass
Middle	25.63	365.59			Pass
High	26.26	422.67			Pass

802.11ax-20 MHz(SU) Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	25.93	391.74	36	4	Pass
Middle	25.71	372.39			Pass
High	25.51	355.63			Pass

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Peak Power Test Data

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	13.57	22.75	30	1000	Pass
Middle	13.22	20.99			Pass
High	14.33	27.10			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.89	154.53	30	1000	Pass
Middle	21.46	139.96			Pass
High	22.09	161.81			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.83	152.41	30	1000	Pass
Middle	21.29	134.59			Pass
High	21.72	148.59			Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.39	137.72	30	1000	Pass
Middle	21.67	146.89			Pass
High	21.37	137.09			Pass

Average Power Test Data

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	10.66	11.64	30	1000	Pass
Middle	11.71	14.83			Pass
High	11.52	14.19			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	15.06	32.06	30	1000	Pass
Middle	14.23	26.49			Pass
High	15.07	32.14			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.42	27.67	30	1000	Pass
Middle	14.10	25.70			Pass
High	14.86	30.62			Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.63	29.04	30	1000	Pass
Middle	14.17	26.12			Pass
High	14.64	29.11			Pass

E.I.R.P Test Data (For ISED)

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	17.71	59.02	36	4	Pass
Middle	17.36	54.45			Pass
High	18.47	70.31			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	26.03	400.87	36	4	Pass
Middle	25.60	363.08			Pass
High	26.23	419.76			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	25.97	395.37	36	4	Pass
Middle	25.43	349.14			Pass
High	25.86	385.48			Pass

802.11ax-20 MHz(SU) Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	25.53	357.27	36	4	Pass
Middle	25.81	381.07			Pass
High	25.51	355.63			Pass

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Peak Power Test Data

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	10.53	11.30	30	1000	Pass
Middle	11.02	12.65			Pass
High	11.53	14.22			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.69	73.96	30	1000	Pass
Middle	18.76	75.16			Pass
High	19.19	82.99			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.93	78.16	30	1000	Pass
Middle	18.69	73.96			Pass
High	19.02	79.80			Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.39	69.02	30	1000	Pass
Middle	18.57	71.94			Pass
High	18.17	65.61			Pass

Average Power Test Data

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	7.76	5.97	30	1000	Pass
Middle	8.91	7.78			Pass
High	8.62	7.28			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	11.66	14.66	30	1000	Pass
Middle	11.43	13.90			Pass
High	11.77	15.03			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	11.42	13.87	30	1000	Pass
Middle	10.90	12.30			Pass
High	11.86	15.35			Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	11.73	14.89	30	1000	Pass
Middle	11.17	13.09			Pass
High	11.44	13.93			Pass

E.I.R.P Test Data (For ISED)

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	14.67	29.31	36	4	Pass
Middle	15.16	32.81			Pass
High	15.67	36.90			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	22.83	191.87	36	4	Pass
Middle	22.90	194.98			Pass
High	23.33	215.28			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	23.07	202.77	36	4	Pass
Middle	22.83	191.87			Pass
High	23.16	207.01			Pass

802.11ax-20 MHz(SU) Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	22.53	179.06	36	4	Pass
Middle	22.71	186.64			Pass
High	22.31	170.22			Pass

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Peak Power Test Data

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	10.43	11.04	30	1000	Pass
Middle	10.92	12.36			Pass
High	11.13	12.97			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.89	77.45	30	1000	Pass
Middle	18.56	71.78			Pass
High	19.09	81.10			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.63	72.95	30	1000	Pass
Middle	18.39	69.02			Pass
High	18.42	69.50			Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.09	64.42	30	1000	Pass
Middle	18.77	75.34			Pass
High	18.37	68.71			Pass

Average Power Test Data

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	7.86	6.11	30	1000	Pass
Middle	8.41	6.93			Pass
High	8.42	6.95			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	12.06	16.07	30	1000	Pass
Middle	11.23	13.27			Pass
High	12.07	16.11			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	11.12	12.94	30	1000	Pass
Middle	10.80	12.02			Pass
High	11.76	15.00			Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	11.53	14.22	30	1000	Pass
Middle	10.97	12.50			Pass
High	11.44	13.93			Pass

E.I.R.P Test Data (For ISED)

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	14.57	28.64	36	4	Pass
Middle	15.06	32.06			Pass
High	15.27	33.65			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	23.03	200.91	36	4	Pass
Middle	22.70	186.21			Pass
High	23.23	210.38			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	22.77	189.23	36	4	Pass
Middle	22.53	179.06			Pass
High	22.56	180.30			Pass

802.11ax-20 MHz(SU) Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	22.23	167.11	36	4	Pass
Middle	22.91	195.43			Pass
High	22.51	178.24			Pass

MIMO

Peak Power Test Data

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	13.49	22.34	30	1000	Pass
Middle	13.98	25.01			Pass
High	14.34	27.20			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.80	151.41	30	1000	Pass
Middle	21.67	146.94			Pass
High	22.15	164.08			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.79	151.11	30	1000	Pass
Middle	21.55	142.98			Pass
High	21.74	149.30			Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.25	133.44	30	1000	Pass
Middle	21.68	147.28			Pass
High	21.28	134.32			Pass

Average Power Test Data

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	10.82	12.08	30	1000	Pass
Middle	11.68	14.71			Pass
High	11.53	14.23			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.87	30.72	30	1000	Pass
Middle	14.34	27.17			Pass
High	14.93	31.14			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.28	26.81	30	1000	Pass
Middle	13.86	24.33			Pass
High	14.82	30.34			Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.64	29.12	30	1000	Pass
Middle	14.08	25.59			Pass
High	14.45	27.86			Pass

E.I.R.P Test Data (For ISED)

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	17.63	57.95	36	4	Pass
Middle	18.12	64.87			Pass
High	18.48	70.55			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	25.94	392.78	36	4	Pass
Middle	25.81	381.19			Pass
High	26.29	425.66			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	25.93	392.00	36	4	Pass
Middle	25.69	370.93			Pass
High	25.88	387.32			Pass

802.11ax-20 MHz(SU) Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	25.39	346.17	36	4	Pass
Middle	25.82	382.07			Pass
High	25.42	348.45			Pass

A.2 Occupied Bandwidth

Note [1]: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note [2]: All antenna were pre tested, but only the worst case has been reported in this report.
Test Data
SISO-Antenna 0
802.11b Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	7.700000	11.291000	≥500
Middle	7.700000	11.246000	≥500
High	7.300000	11.252000	≥500

802.11g Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	16.500000	17.611000	≥500
Middle	16.500000	17.561000	≥500
High	16.500000	17.587000	≥500

802.11n-20MHz Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	17.700000	18.569000	≥500
Middle	17.700000	18.559000	≥500
High	17.700000	18.577000	≥500

802.11ax-20 MHz(SU) Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	18.800000	19.078000	≥500
Middle	18.700000	19.062000	≥500
High	18.900000	19.072000	≥500

Test Plots

SISO-Antenna 0

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

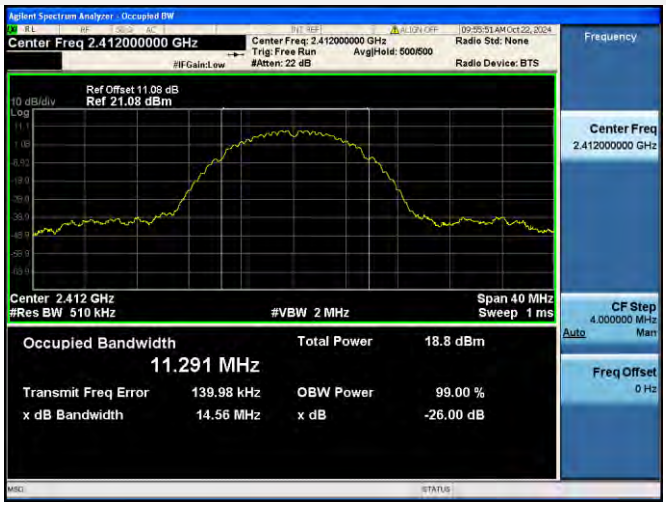
802.11ax-20 MHz(SU) LOW CHANNEL

802.11ax-20 MHz(SU) MIDDLE CHANNEL

802.11ax-20 MHz(SU) HIGH CHANNEL

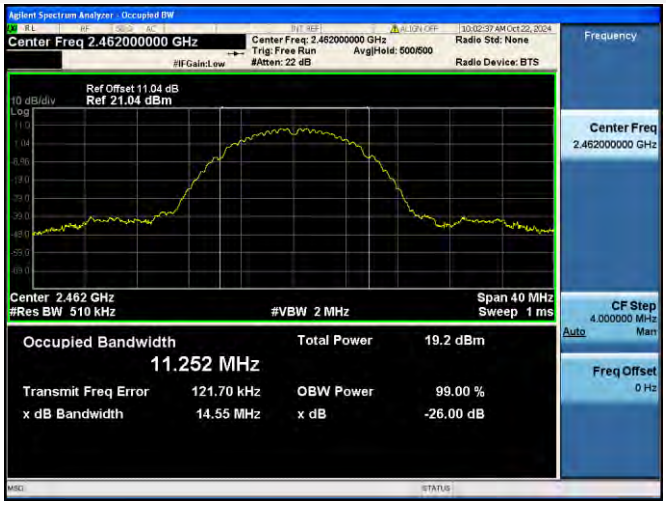
99% Bandwidth

802.11b LOW CHANNEL



802.11b MIDDLE CHANNEL

802.11b HIGH CHANNEL

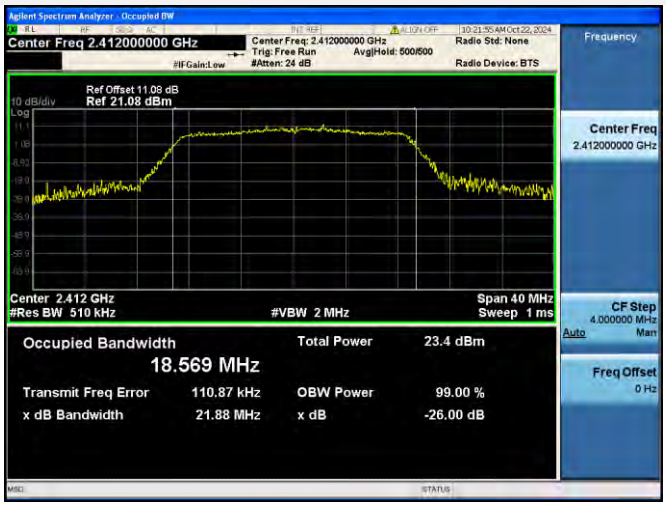


802.11g LOW CHANNEL

802.11g MIDDLE CHANNEL

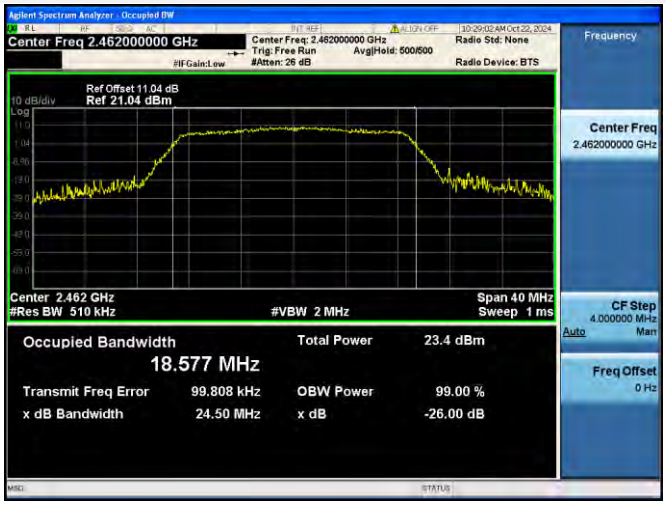
802.11g HIGH CHANNEL

802.11n-20 MHz LOW CHANNEL

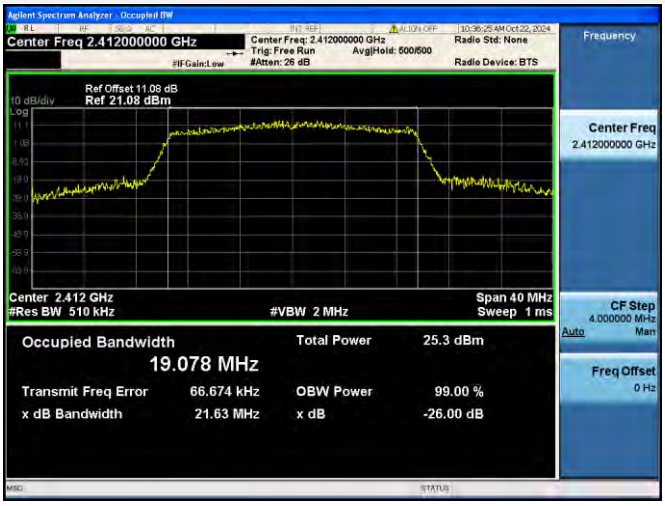


802.11n-20 MHz MIDDLE CHANNEL

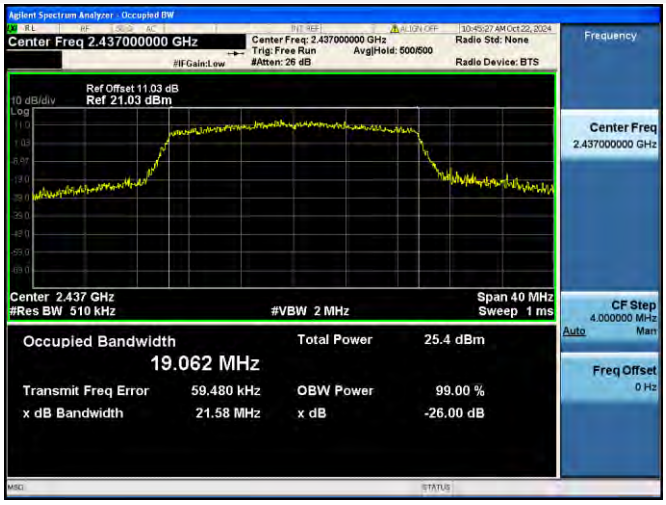
802.11n-20 MHz HIGH CHANNEL



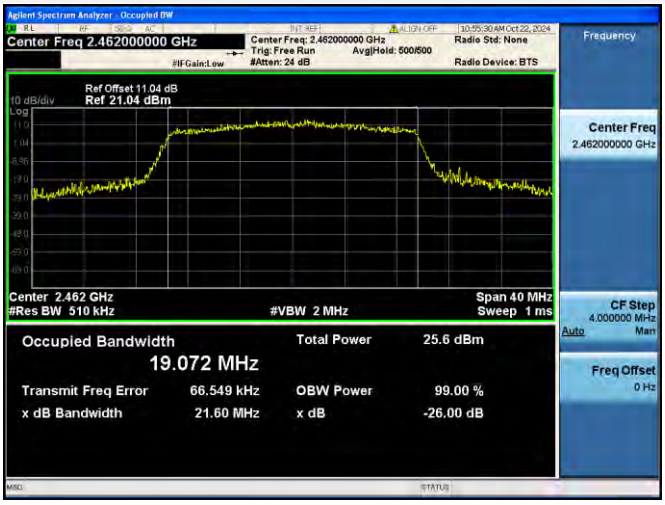
802.11ax-20 MHz(SU) LOW CHANNEL



802.11ax-20 MHz(SU) MIDDLE CHANNEL



802.11ax-20 MHz(SU) HIGH CHANNEL



A.3 Conducted Spurious Emissions

Note [1]: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note [2]: All antenna were pre tested, but only the worst case has been reported in this report.
Test Data
SISO-Antenna 0
802.11b Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-37.86	1.78	-18.22	Pass
Middle	-38.28	2.73	-17.27	Pass
High	-37.99	3.98	-16.02	Pass

802.11g Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-35.39	1.77	-18.23	Pass
Middle	-35.20	2.54	-17.46	Pass
High	-36.27	1.78	-18.22	Pass

802.11n-20MHz Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-37.91	1.94	-18.06	Pass
Middle	-37.32	3.07	-16.93	Pass
High	-36.13	2.23	-17.77	Pass

802.11ax-20 MHz(SU) Mode:

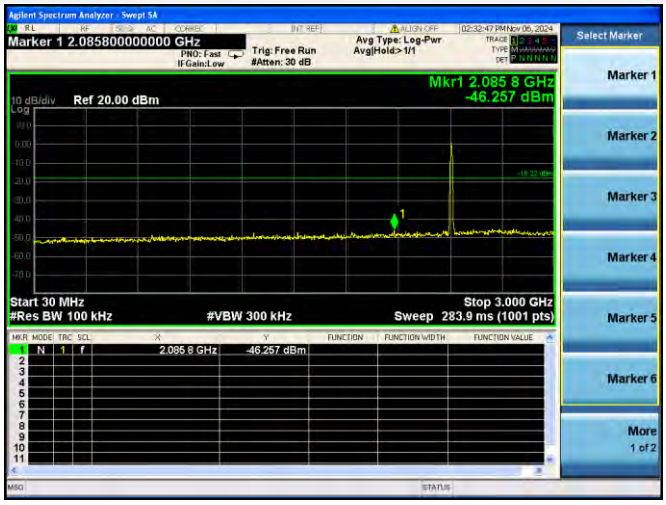
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-38.26	2.15	-17.85	Pass
Middle	-35.82	2.75	-17.25	Pass
High	-35.45	1.91	-18.09	Pass

Test Plots

SISO-Antenna 0

802.11b LOW CHANNEL CARRIER LEVEL

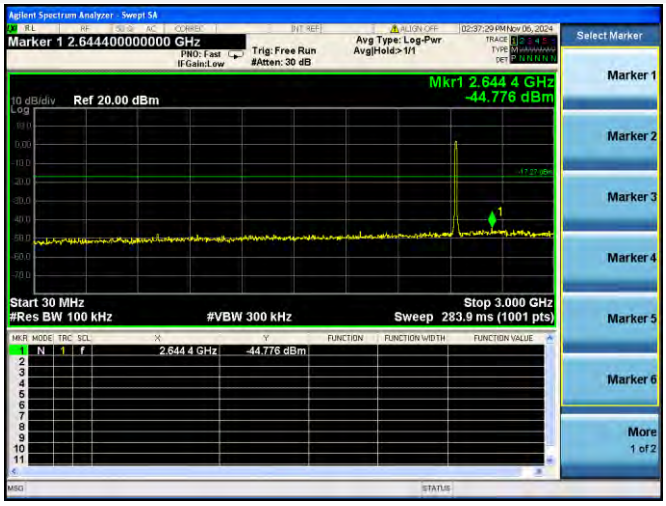
802.11b LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



802.11b LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

802.11b MIDDLE CHANNEL CARRIER LEVEL

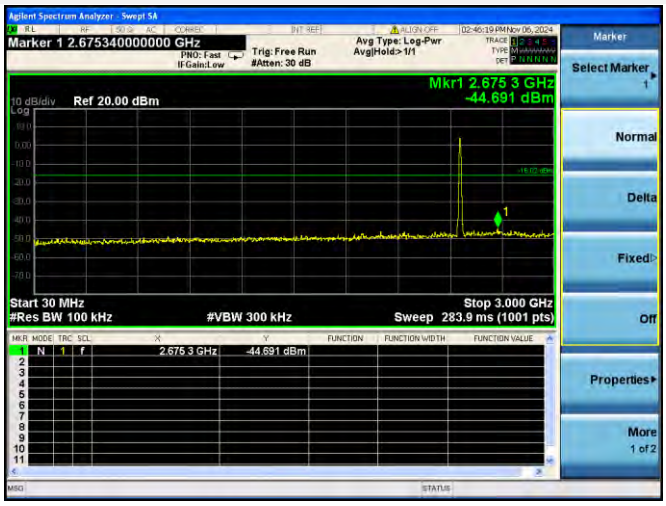
802.11b MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



802.11b MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

802.11b HIGH CHANNEL CARRIER LEVEL

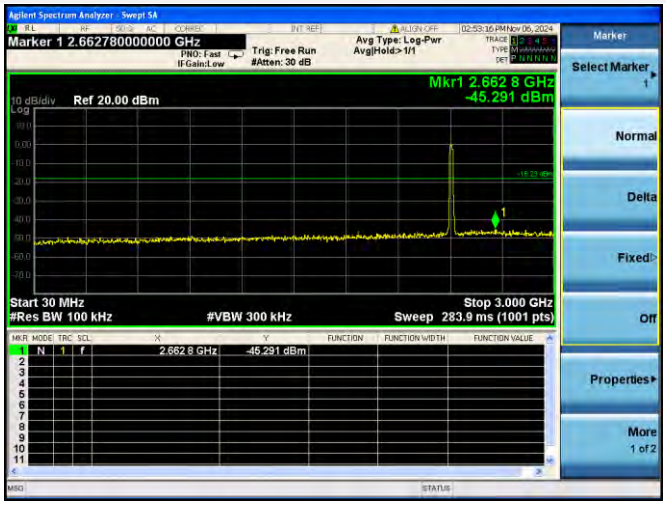
802.11b HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



802.11b HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

802.11g LOW CHANNEL CARRIER LEVEL

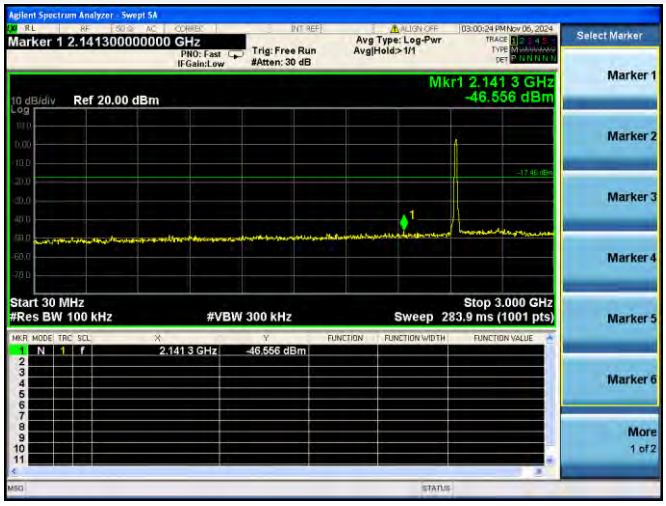
802.11g LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



802.11g LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

802.11g MIDDLE CHANNEL CARRIER LEVEL

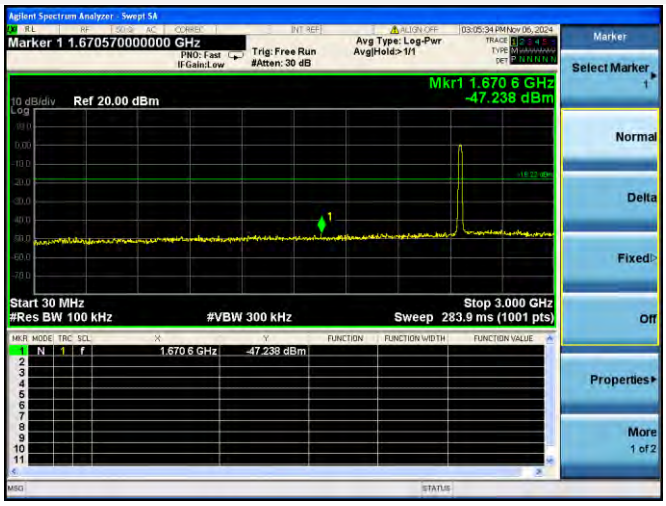
802.11g MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



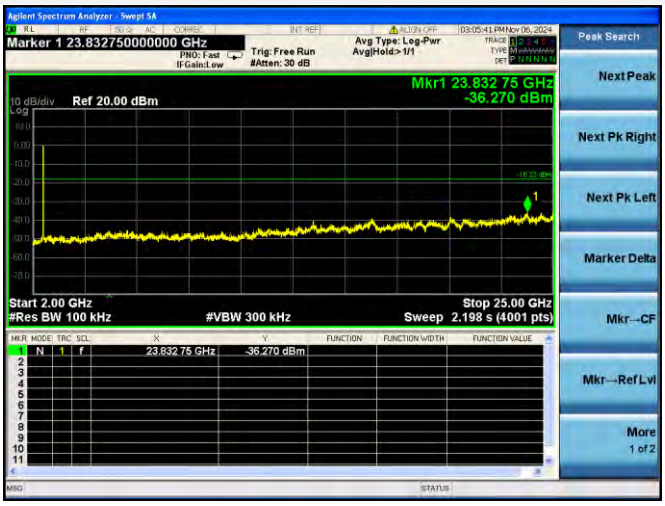
802.11g MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

802.11g HIGH CHANNEL CARRIER LEVEL

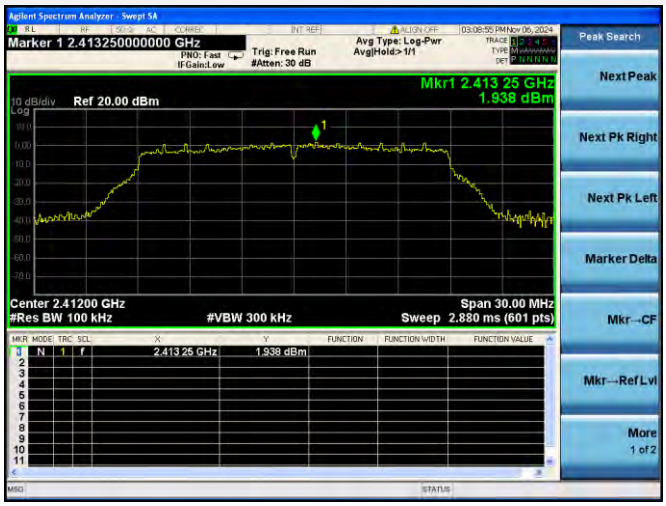
802.11g HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



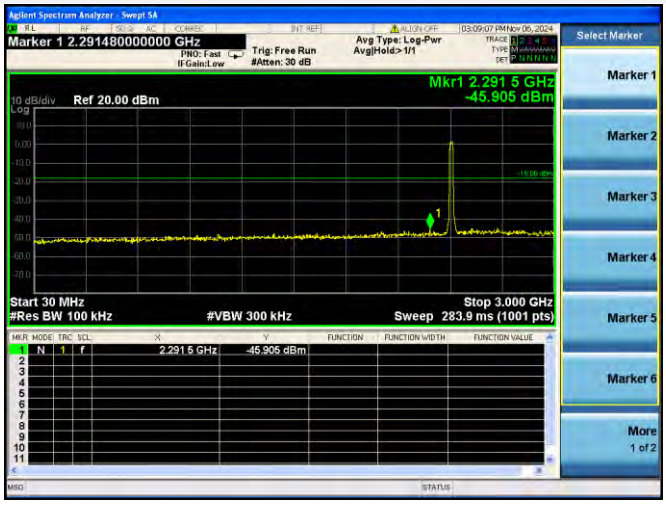
802.11g HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz



802.11n-20 MHz LOW CHANNEL CARRIER LEVEL



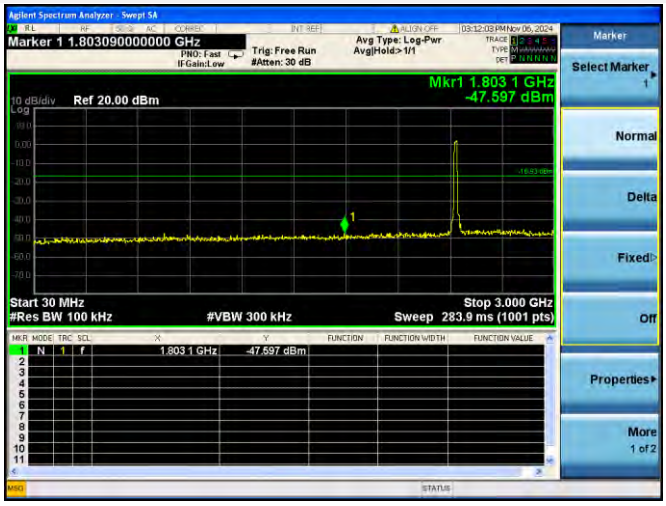
802.11n-20 MHz LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



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

802.11n-20 MHz MIDDLE CHANNEL CARRIER LEVEL

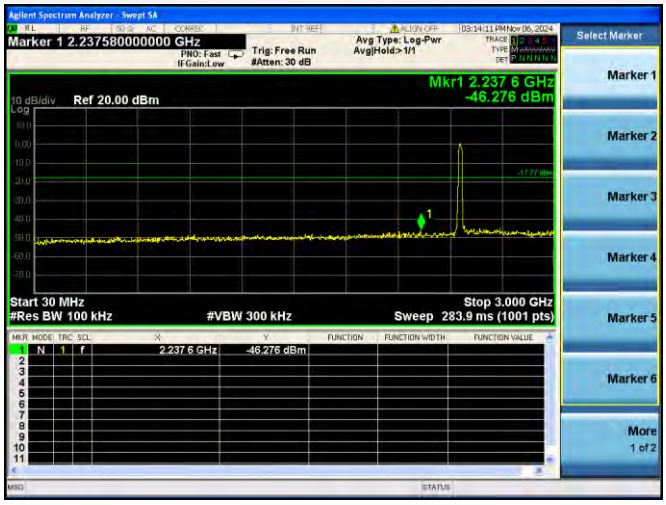
802.11n-20 MHz MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



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

802.11n-20 MHz HIGH CHANNEL CARRIER LEVEL

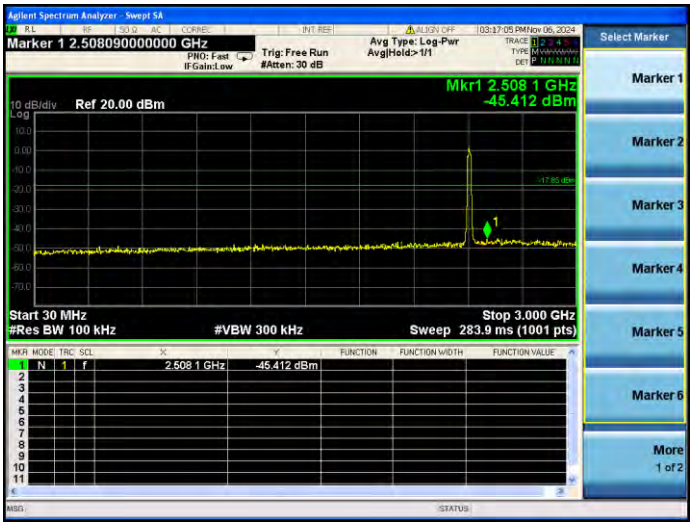
802.11n-20 MHz HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



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

802.11ax-20 MHz(SU) LOW CHANNEL CARRIER LEVEL

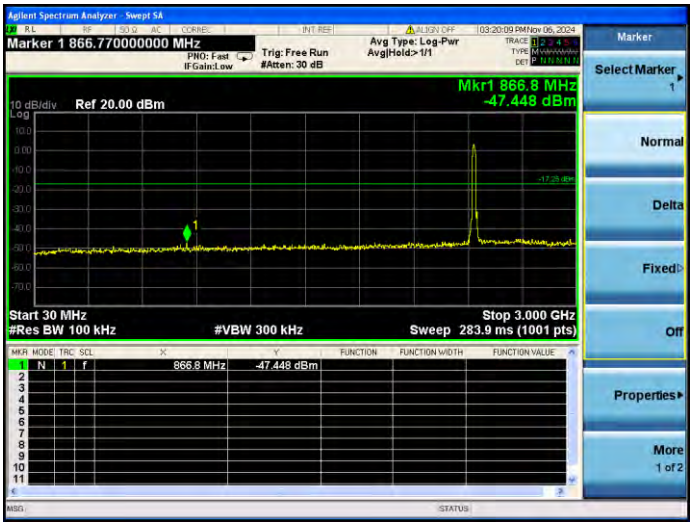
802.11ax-20 MHz(SU) LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



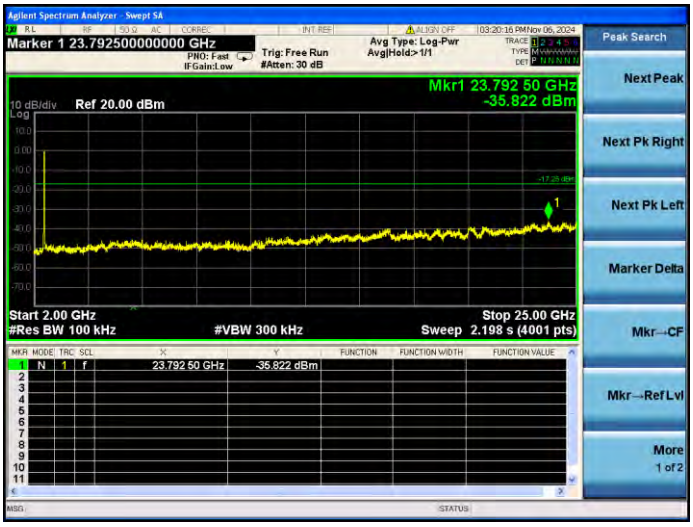
802.11ax-20 MHz(SU) LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

802.11ax-20 MHz(SU) MIDDLE CHANNEL CARRIER LEVEL

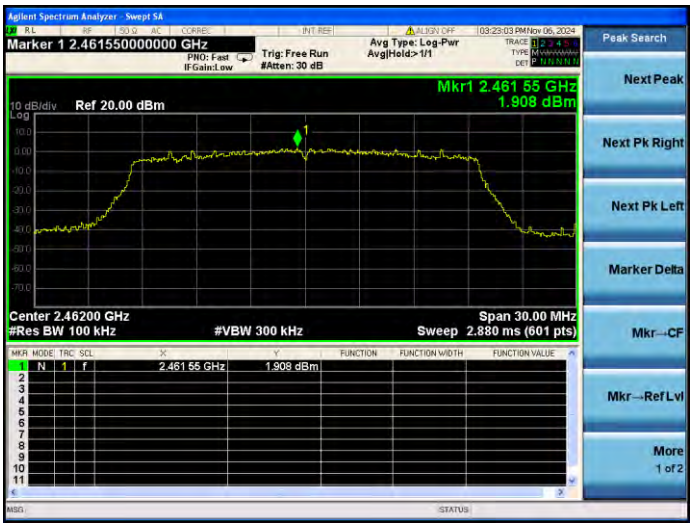
802.11ax-20 MHz(SU) MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



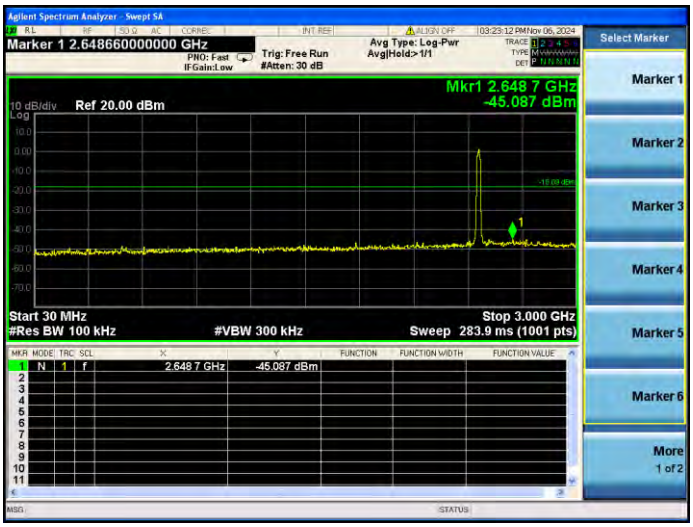
802.11ax-20 MHz(SU) MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



802.11ax-20 MHz(SU) HIGH CHANNEL CARRIER LEVEL



802.11ax-20 MHz(SU) HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



802.11ax-20 MHz(SU) HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

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

Note [1]: The 99% OBW of the fundamental emission is without 2 MHz of the authorized band.
Note [2]: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note [3]: All antenna were pre tested, but only the worst case has been reported in this report.
Test Data
SISO-Antenna 0
802.11b Mode：

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-43.84	1.78	-18.22	Pass
High Channel	-43.52	3.98	-16.02	Pass

802.11g Mode：

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-36.60	1.77	-18.23	Pass
High Channel	-44.02	1.78	-18.22	Pass

802.11n-20 MHz Mode:

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-34.42	1.94	-18.06	Pass
High Channel	-44.42	2.23	-17.77	Pass

802.11ax-20 MHz(SU) Mode:

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-34.71	2.15	-17.85	Pass
High Channel	-46.09	1.91	-18.09	Pass

Test Plots

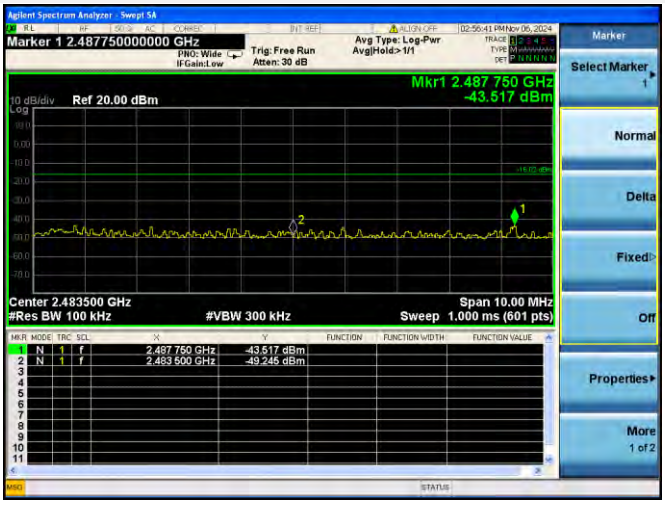
SISO-Antenna 0

802.11b LOW CHANNEL, CARRIER LEVEL

802.11b LOW CHANNEL, BAND EDGE

802.11b HIGH CHANNEL, CARRIER LEVEL

802.11b HIGH CHANNEL, BAND EDGE

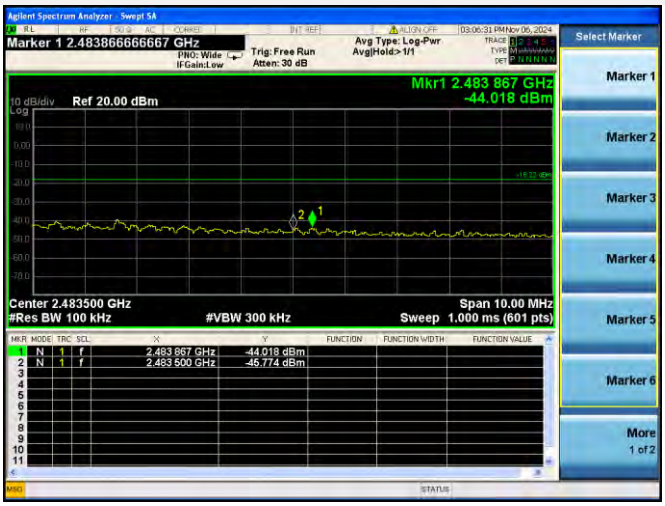


802.11g LOW CHANNEL, CARRIER LEVEL

802.11g LOW CHANNEL, BAND EDGE

802.11g HIGH CHANNEL, CARRIER LEVEL

802.11g HIGH CHANNEL, BAND EDGE

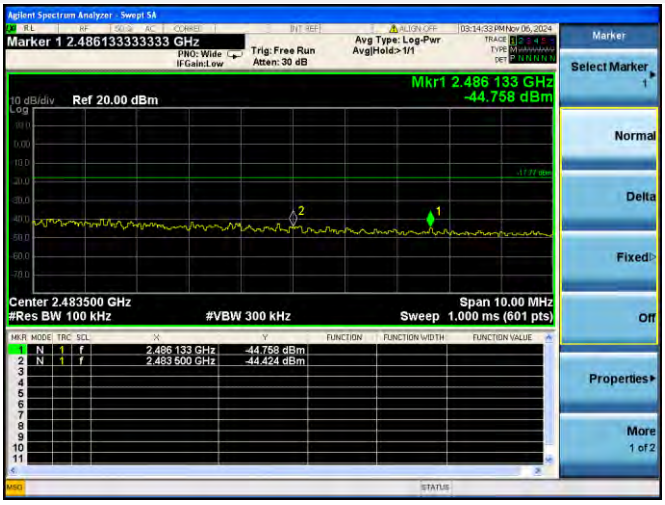


802.11n-20 MHz LOW CHANNEL, CARRIER LEVEL

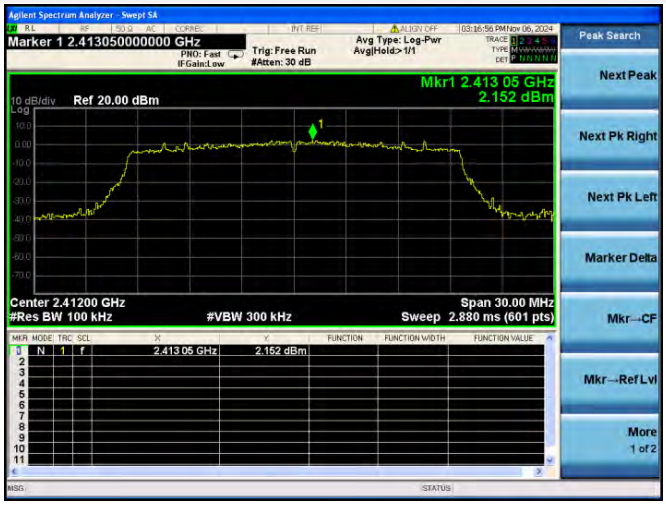
802.11n-20 MHz LOW CHANNEL, BAND EDGE

802.11n-20 MHz HIGH CHANNEL, CARRIER LEVEL

802.11n-20 MHz HIGH CHANNEL, BAND EDGE

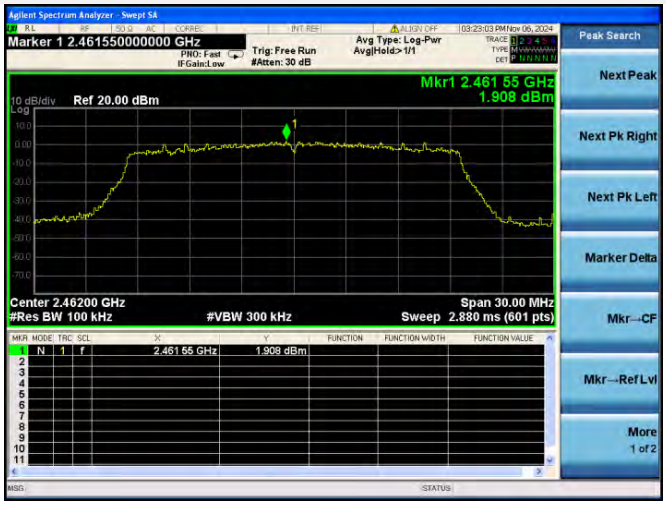


802.11ax-20 MHz(SU) LOW CHANNEL, CARRIER LEVEL

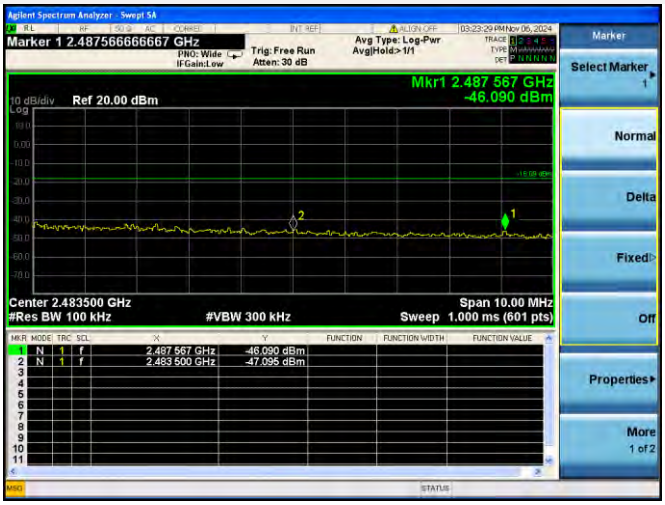


802.11ax-20 MHz(SU) LOW CHANNEL, BAND EDGE

802.11ax-20 MHz(SU) HIGH CHANNEL, CARRIER LEVEL



802.11ax-20 MHz(SU) HIGH CHANNEL, BAND EDGE



A.5 Conducted Emissions

Note [1]: The EUT is working in the Normal link mode. All modes have been tested and normal link mode is worst.

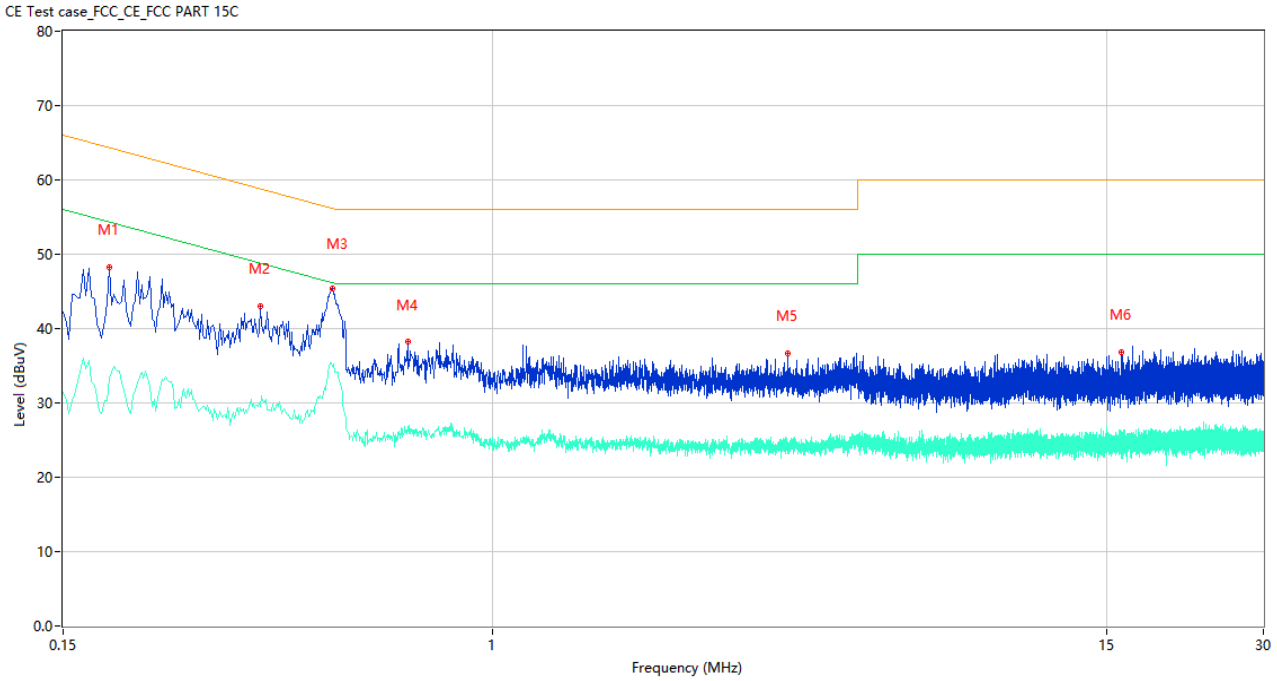
Note [2]: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 60 Hz and 240 VAC, 50 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

Note [3]: Results (dBuV) = Original reading level of Spectrum Analyzer (dBuV) + Factor (dB)

Test Data and Plots

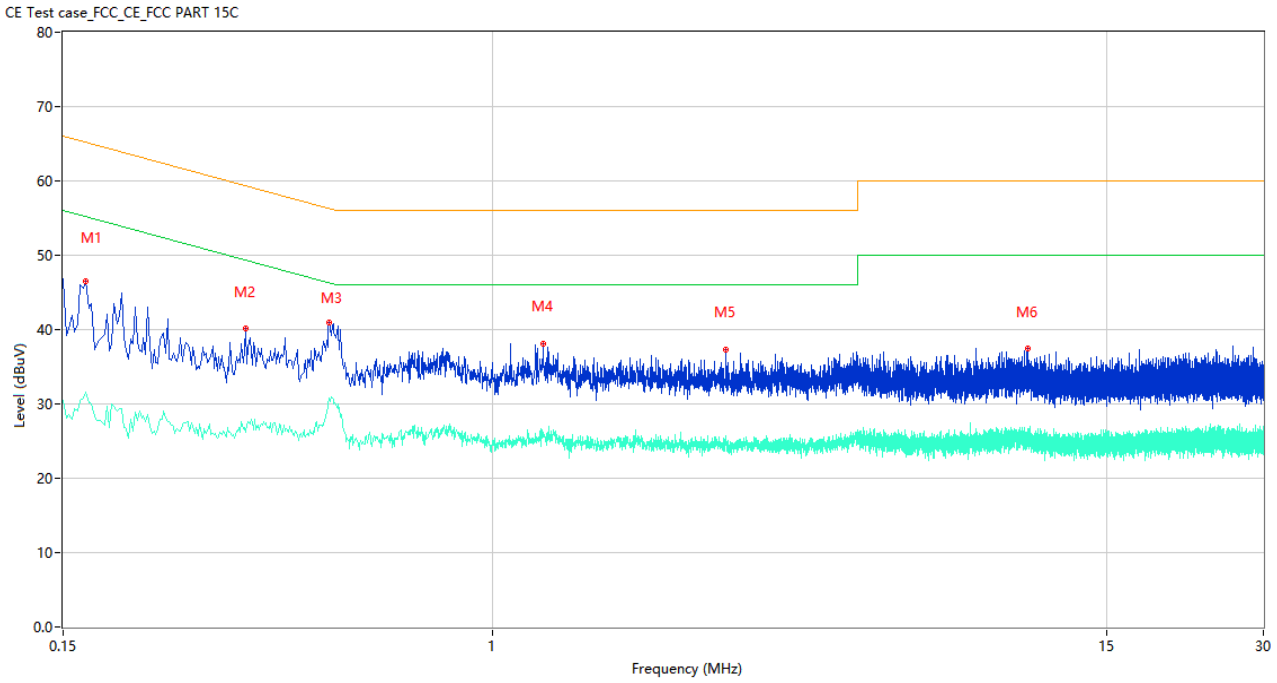
PCB Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.184	48.26	9.78	64.30	16.04	Peak	L	Pass
1**	0.184	33.38	9.78	54.30	20.92	AV	L	Pass
2	0.358	43.06	10.73	58.77	15.71	Peak	L	Pass
2**	0.358	29.45	10.73	48.77	19.32	AV	L	Pass
3	0.492	45.40	9.99	56.13	10.73	Peak	L	Pass
3**	0.492	34.91	9.99	46.13	11.22	AV	L	Pass
4	0.686	38.23	10.54	56.00	17.77	Peak	L	Pass
4**	0.686	26.90	10.54	46.00	19.10	AV	L	Pass
5	3.672	36.72	10.32	56.00	19.28	Peak	L	Pass
5**	3.672	24.82	10.32	46.00	21.18	AV	L	Pass
6	15.996	36.88	10.58	60.00	23.12	Peak	L	Pass
6**	15.996	24.07	10.58	50.00	25.93	AV	L	Pass

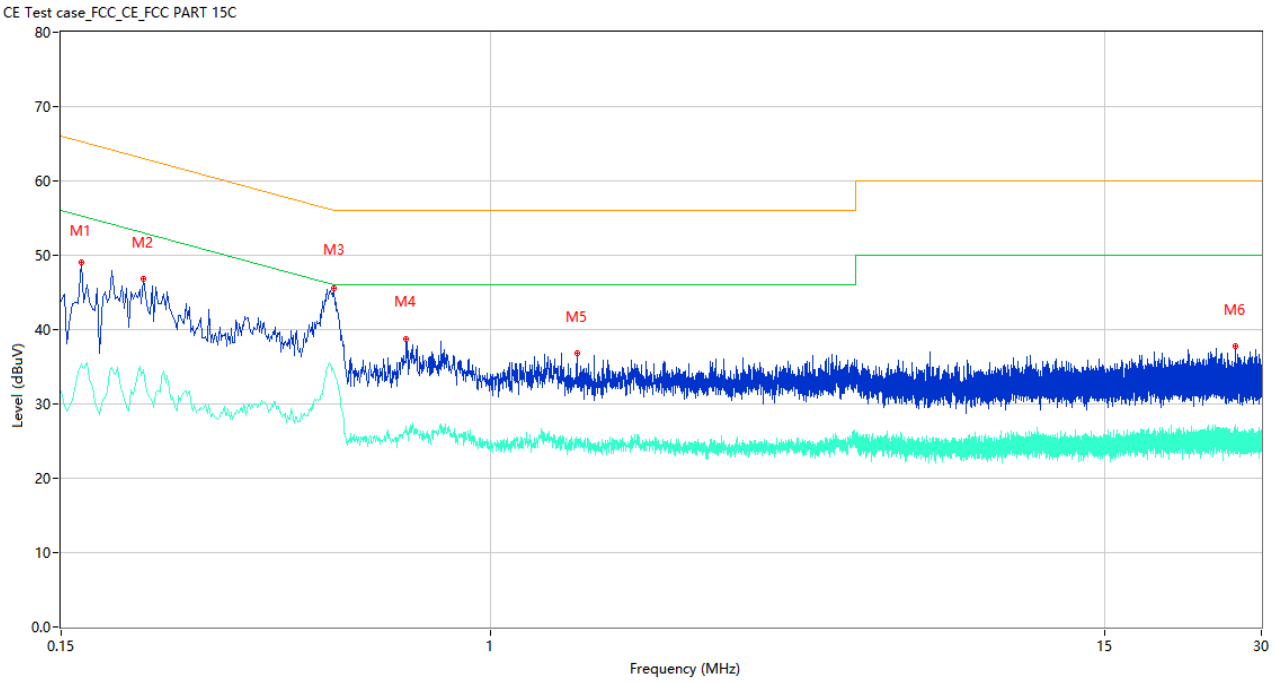
PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.166	46.56	9.78	65.16	18.60	Peak	N	Pass
1**	0.166	31.66	9.78	55.16	23.50	AV	N	Pass
2	0.336	40.11	10.48	59.30	19.19	Peak	N	Pass
2**	0.336	26.27	10.48	49.30	23.03	AV	N	Pass
3	0.486	40.96	9.99	56.24	15.28	Peak	N	Pass
3**	0.486	30.82	9.99	46.24	15.42	AV	N	Pass
4	1.248	38.15	10.44	56.00	17.85	Peak	N	Pass
4**	1.248	26.03	10.44	46.00	19.97	AV	N	Pass
5	2.798	37.33	10.36	56.00	18.67	Peak	N	Pass
5**	2.798	25.79	10.36	46.00	20.21	AV	N	Pass
6	10.586	37.41	10.70	60.00	22.59	Peak	N	Pass
6**	10.586	25.75	10.70	50.00	24.25	AV	N	Pass

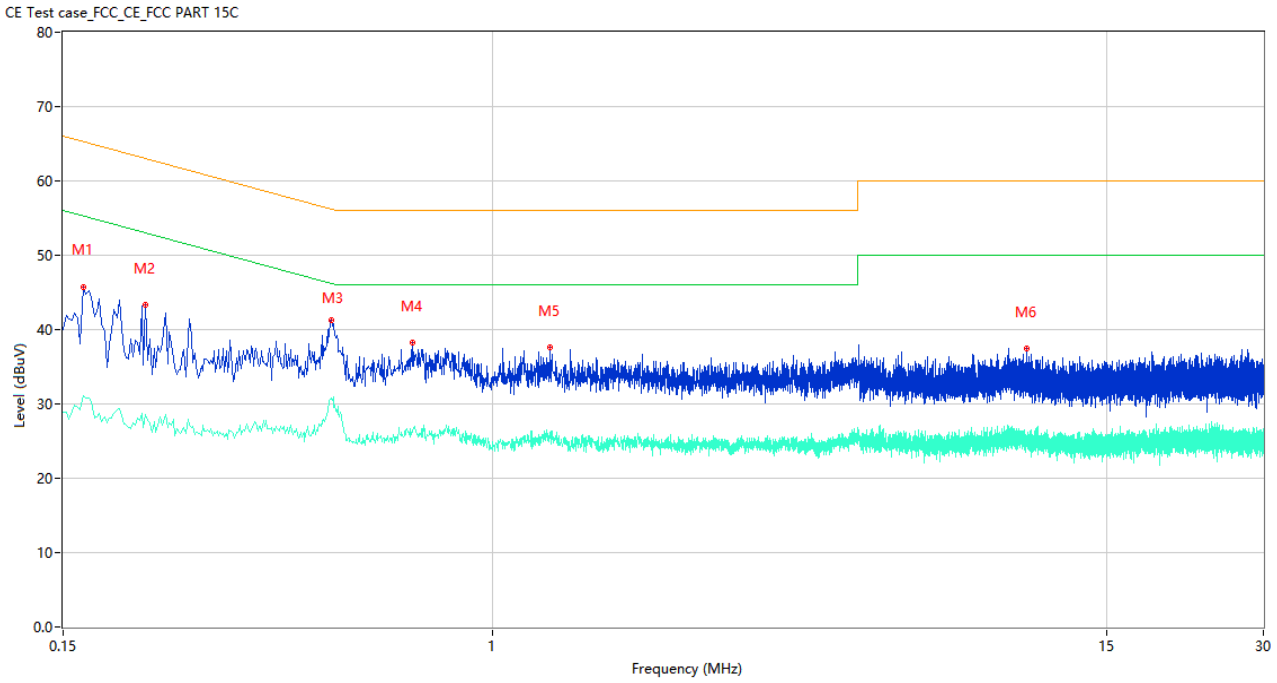
Dipole Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.164	49.00	9.78	65.26	16.26	Peak	L	Pass
1**	0.164	35.46	9.78	55.26	19.80	AV	L	Pass
2	0.216	46.76	9.77	62.97	16.21	Peak	L	Pass
2**	0.216	34.53	9.77	52.97	18.44	AV	L	Pass
3	0.500	45.54	9.98	56.00	10.46	Peak	L	Pass
3**	0.500	34.42	9.98	46.00	11.58	AV	L	Pass
4	0.688	38.77	10.55	56.00	17.23	Peak	L	Pass
4**	0.688	26.29	10.55	46.00	19.71	AV	L	Pass
5	1.462	36.81	10.11	56.00	19.19	Peak	L	Pass
5**	1.462	25.23	10.11	46.00	20.77	AV	L	Pass
6	26.740	37.73	10.82	60.00	22.27	Peak	L	Pass
6**	26.740	24.33	10.82	50.00	25.67	AV	L	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.164	45.73	9.78	65.26	19.53	Peak	N	Pass
1**	0.164	31.09	9.78	55.26	24.17	AV	N	Pass
2	0.216	43.33	9.77	62.97	19.64	Peak	N	Pass
2**	0.216	28.58	9.77	52.97	24.39	AV	N	Pass
3	0.490	41.21	9.99	56.17	14.96	Peak	N	Pass
3**	0.490	30.81	9.99	46.17	15.36	AV	N	Pass
4	0.700	38.25	10.65	56.00	17.75	Peak	N	Pass
4**	0.700	26.51	10.65	46.00	19.49	AV	N	Pass
5	1.284	37.54	10.49	56.00	18.46	Peak	N	Pass
5**	1.284	25.69	10.49	46.00	20.31	AV	N	Pass
6	10.548	37.51	10.27	60.00	22.49	Peak	N	Pass
6**	10.548	25.78	10.27	50.00	24.22	AV	N	Pass

A.6 Radiated Emission

Note [1]: The symbol of "--" in the table which means not application.

Note [2]: 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.

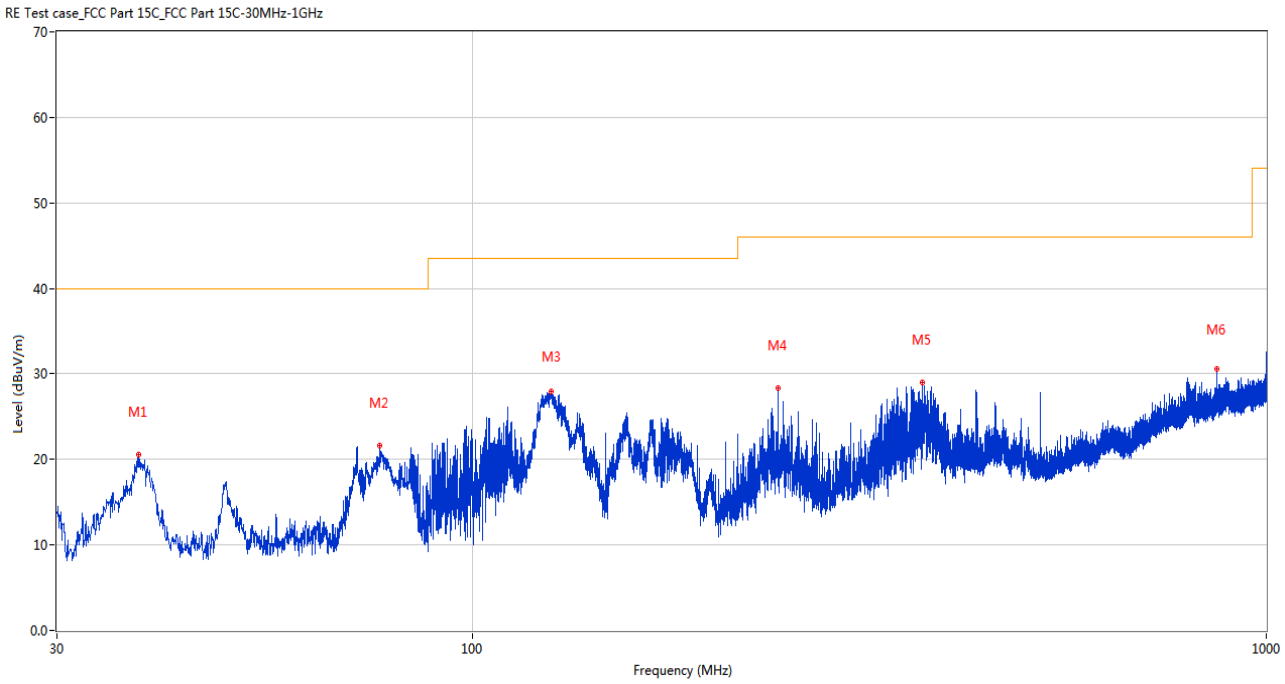
Note [3]: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Note [4]: 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

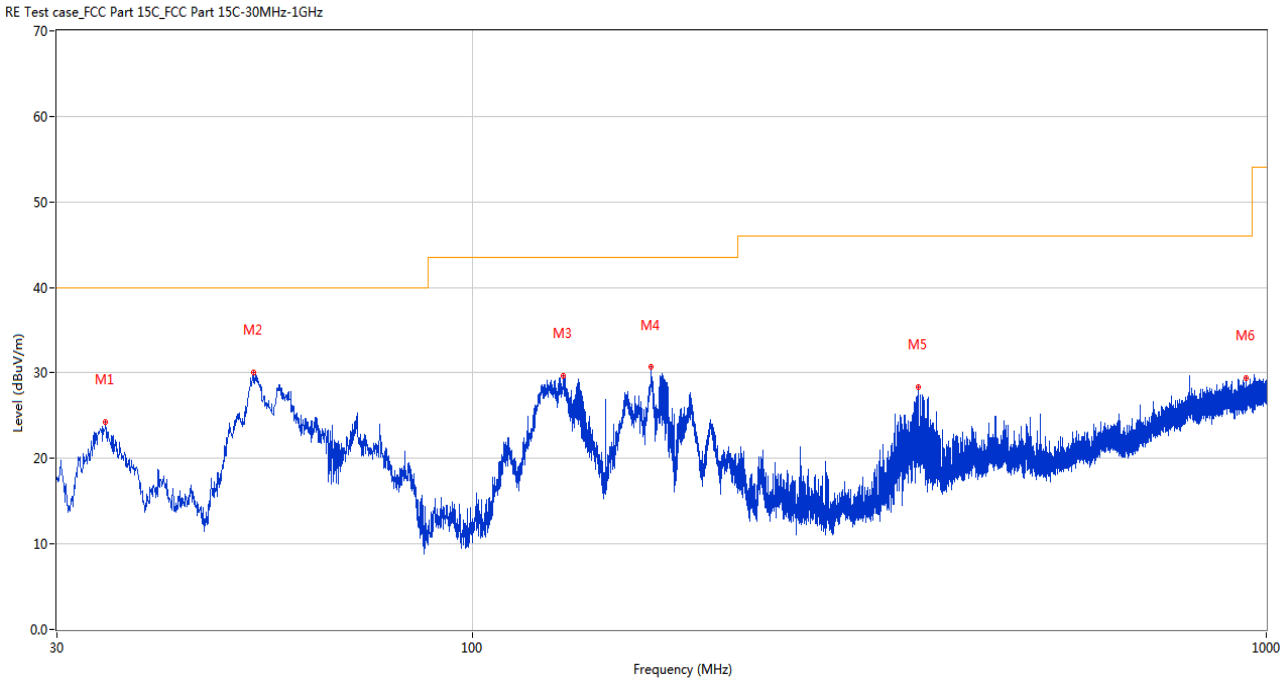
PCB Antenna

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	38.051	20.58	-26.78	40.0	19.42	Peak	194.00	100	Horizontal	Pass
2	76.560	21.68	-29.92	40.0	18.32	Peak	149.00	100	Horizontal	Pass
3	125.884	27.94	-27.52	43.5	15.56	Peak	139.00	200	Horizontal	Pass
4	242.818	28.35	-27.07	46.0	17.65	Peak	54.00	100	Horizontal	Pass
5	368.578	28.97	-22.66	46.0	17.03	Peak	29.00	100	Horizontal	Pass
6	866.237	30.53	-11.53	46.0	15.47	Peak	310.00	200	Horizontal	Pass

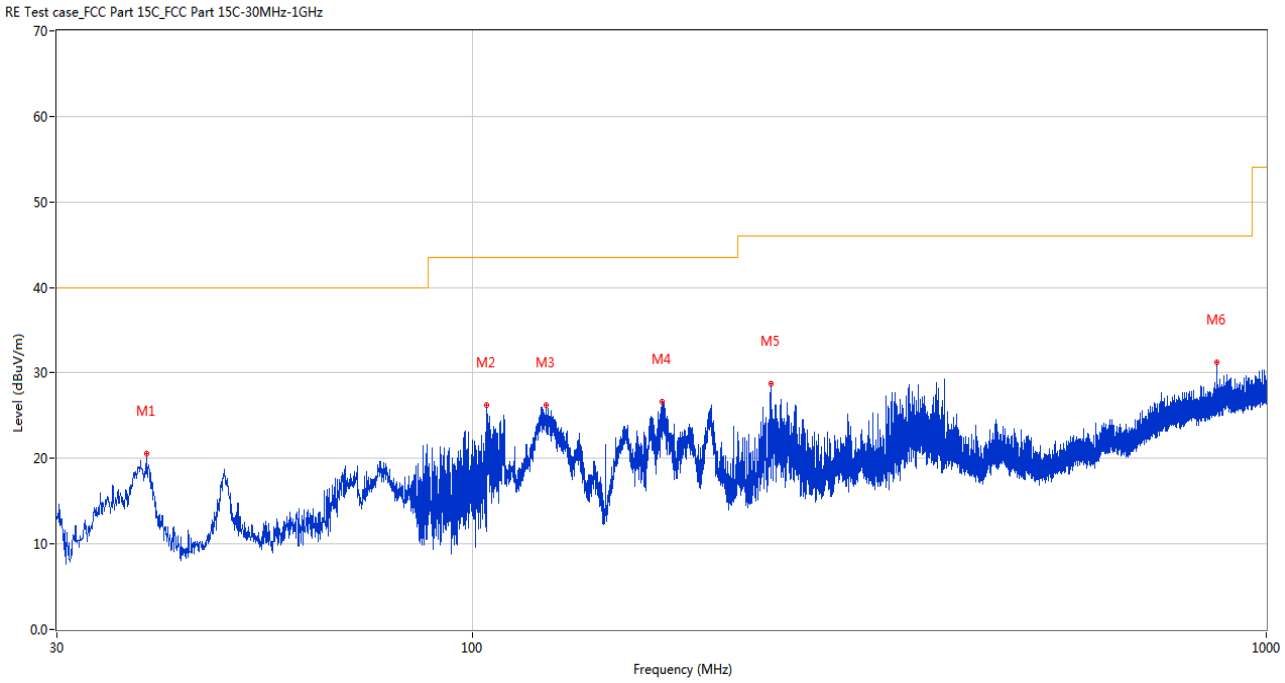
30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	34.559	24.31	-27.27	40.0	15.69	Peak	62.00	100	Vertical	Pass
2	52.989	30.12	-26.64	40.0	9.88	Peak	44.00	100	Vertical	Pass
3	130.395	29.68	-27.39	43.5	13.82	Peak	194.00	100	Vertical	Pass
4	167.982	30.65	-25.50	43.5	12.85	Peak	328.00	100	Vertical	Pass
5	364.747	28.30	-22.59	46.0	17.70	Peak	153.00	100	Vertical	Pass
6	944.516	29.38	-10.26	46.0	16.62	Peak	117.00	100	Vertical	Pass

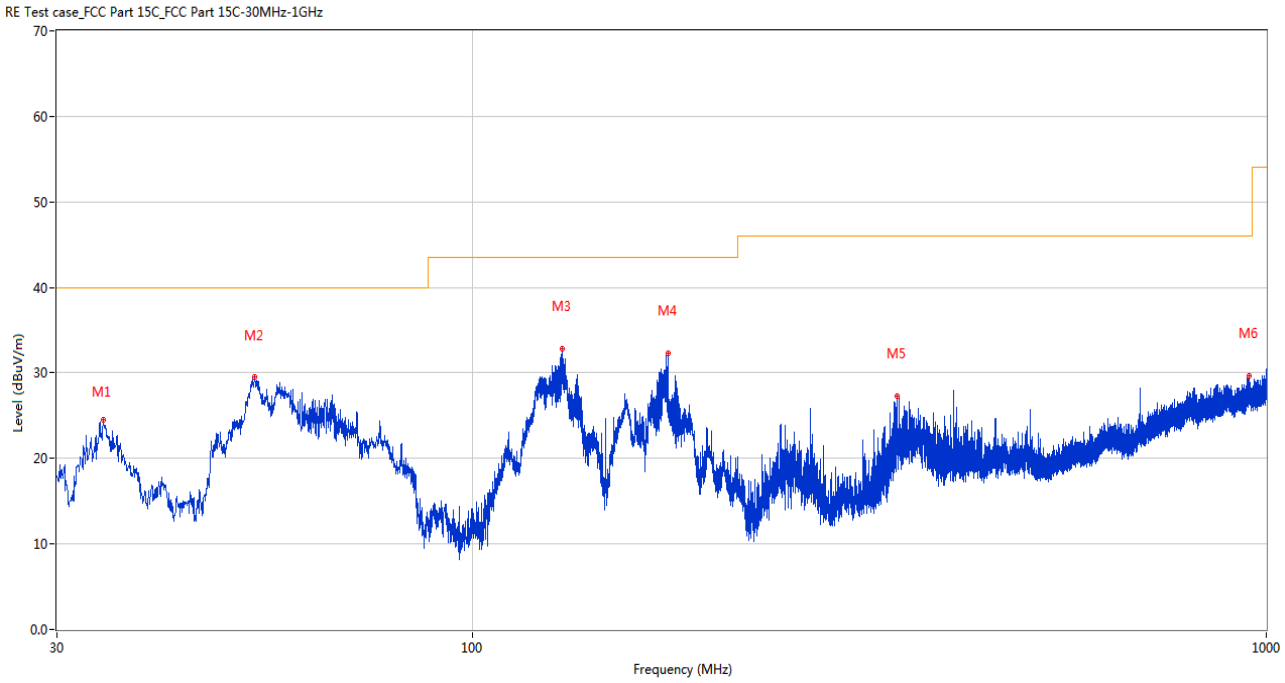
Dipole Antenna

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	38.876	20.55	-26.83	40.0	19.45	Peak	174.00	100	Horizontal	Pass
2	104.205	26.27	-29.51	43.5	17.23	Peak	114.00	200	Horizontal	Pass
3	123.848	26.23	-27.89	43.5	17.27	Peak	306.00	200	Horizontal	Pass
4	173.318	26.59	-26.17	43.5	16.91	Peak	128.00	200	Horizontal	Pass
5	237.822	28.72	-27.59	46.0	17.28	Peak	87.00	100	Horizontal	Pass
6	866.237	31.29	-11.53	46.0	14.71	Peak	329.00	100	Horizontal	Pass

30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	34.316	24.48	-27.47	40.0	15.52	Peak	132.00	100	Vertical	Pass
2	53.280	29.46	-26.78	40.0	10.54	Peak	109.00	100	Vertical	Pass
3	129.813	32.78	-27.46	43.5	10.72	Peak	174.00	100	Vertical	Pass
4	176.615	32.25	-26.59	43.5	11.25	Peak	0.00	100	Vertical	Pass
5	343.068	27.25	-23.67	46.0	18.75	Peak	41.00	100	Vertical	Pass
6	951.258	29.72	-9.80	46.0	16.28	Peak	314.00	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.

Note [3]: All antenna were pre tested, but only the worst case has been reported in this report.

Note [4]: All the configurations were pre tested, only the worst configuration has been reported in this report.

PCB Antenna

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	1563.900	42.46	74.0	31.54	Peak	346.00	400	Horizontal	Pass
1**	1563.900	32.86	54.0	21.14	AV	346.00	400	Horizontal	Pass
2	2413.700	100.41	74.0	-26.41	Peak	218.00	100	Horizontal	N/A
2**	2413.700	96.75	54.0	-42.75	AV	218.00	100	Horizontal	N/A
3	4824.200	54.77	74.0	19.23	Peak	19.00	150	Horizontal	Pass
3**	4824.200	50.99	54.0	3.01	AV	19.00	150	Horizontal	Pass
4	6979.000	55.10	74.0	18.90	Peak	54.00	100	Horizontal	Pass
4**	6979.000	45.38	54.0	8.62	AV	54.00	100	Horizontal	Pass
5	13436.174	57.25	74.0	16.75	Peak	0.00	150	Horizontal	Pass
5**	13436.174	46.49	54.0	7.51	AV	0.00	150	Horizontal	Pass
6	16061.175	56.11	74.0	17.89	Peak	324.00	100	Horizontal	Pass
6**	16061.175	46.49	54.0	7.51	AV	324.00	100	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	1257.800	42.75	74.0	31.25	Peak	223.00	300	Vertical	Pass
1**	1257.800	33.00	54.0	21.00	AV	223.00	300	Vertical	Pass
2	2413.200	93.55	74.0	-19.55	Peak	114.00	200	Vertical	N/A
2**	2413.200	90.73	54.0	-36.73	AV	114.00	200	Vertical	N/A
3	2658.200	52.44	74.0	21.56	Peak	209.00	200	Vertical	Pass
3**	2658.200	43.23	54.0	10.77	AV	209.00	200	Vertical	Pass
4	6798.000	54.64	74.0	19.36	Peak	108.00	200	Vertical	Pass
4**	6798.000	45.17	54.0	8.83	AV	108.00	200	Vertical	Pass
5	13431.975	55.77	74.0	18.23	Peak	108.00	150	Vertical	Pass
5**	13431.975	46.30	54.0	7.70	AV	108.00	150	Vertical	Pass
6	17787.113	56.20	74.0	17.80	Peak	342.00	150	Vertical	Pass
6**	17787.113	46.19	54.0	7.81	AV	342.00	150	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	1532.900	43.35	74.0	30.65	Peak	84.00	300	Horizontal	Pass
1**	1532.900	32.80	54.0	21.20	AV	84.00	300	Horizontal	Pass
2	2435.900	102.56	74.0	-28.56	Peak	205.00	150	Horizontal	N/A
2**	2435.900	99.74	54.0	-45.74	AV	205.00	150	Horizontal	N/A
3	4874.200	53.56	74.0	20.44	Peak	351.00	150	Horizontal	Pass
3**	4874.200	50.29	54.0	3.71	AV	351.00	150	Horizontal	Pass
4	6806.400	55.74	74.0	18.26	Peak	202.00	400	Horizontal	Pass
4**	6806.400	46.09	54.0	7.91	AV	202.00	400	Horizontal	Pass
5	13443.262	56.73	74.0	17.27	Peak	0.00	150	Horizontal	Pass
5**	13443.262	47.59	54.0	6.41	AV	0.00	150	Horizontal	Pass
6	17470.276	56.53	74.0	17.47	Peak	320.00	200	Horizontal	Pass
6**	17470.276	46.80	54.0	7.20	AV	320.00	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	1535.400	43.00	74.0	31.00	Peak	351.00	300	Vertical	Pass
1**	1535.400	32.53	54.0	21.47	AV	351.00	300	Vertical	Pass
2	2435.900	97.30	74.0	-23.30	Peak	177.00	200	Vertical	N/A
2**	2435.900	94.43	54.0	-40.43	AV	177.00	200	Vertical	N/A
3	4000.600	52.42	74.0	21.58	Peak	1.00	150	Vertical	Pass
3**	4000.600	45.66	54.0	8.34	AV	1.00	150	Vertical	Pass
4	5331.400	55.06	74.0	18.94	Peak	83.00	200	Vertical	Pass
4**	5331.400	43.56	54.0	10.44	AV	83.00	200	Vertical	Pass
5	9249.401	51.68	74.0	22.32	Peak	97.00	150	Vertical	Pass
5**	9249.401	42.95	54.0	11.05	AV	97.00	150	Vertical	Pass
6	13317.000	56.88	74.0	17.12	Peak	342.00	200	Vertical	Pass
6**	13317.000	46.81	54.0	7.19	AV	342.00	200	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	1490.900	43.00	74.0	31.00	Peak	31.00	200	Horizontal	Pass
1**	1490.900	33.02	54.0	20.98	AV	31.00	200	Horizontal	Pass
2	2463.100	104.63	74.0	-30.63	Peak	359.00	150	Horizontal	N/A
2**	2463.100	101.81	54.0	-47.81	AV	359.00	150	Horizontal	N/A
3	4924.000	53.98	74.0	20.02	Peak	328.00	200	Horizontal	Pass
3**	4924.000	49.12	54.0	4.88	AV	328.00	200	Horizontal	Pass
4	4924.200	53.65	74.0	20.35	Peak	10.00	150	Horizontal	Pass
4**	4924.200	49.94	54.0	4.06	AV	10.00	150	Horizontal	Pass
5	13430.138	55.31	74.0	18.69	Peak	228.00	150	Horizontal	Pass
5**	13430.138	46.61	54.0	7.39	AV	228.00	150	Horizontal	Pass
6	17407.275	56.28	74.0	17.72	Peak	247.00	100	Horizontal	Pass
6**	17407.275	47.67	54.0	6.33	AV	247.00	100	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	1431.100	42.52	74.0	31.48	Peak	63.00	300	Vertical	Pass
1**	1431.100	32.53	54.0	21.47	AV	63.00	300	Vertical	Pass
2	2463.100	99.76	74.0	-25.76	Peak	85.00	100	Vertical	N/A
2**	2463.100	96.91	54.0	-42.91	AV	85.00	100	Vertical	N/A
3	2660.400	53.82	74.0	20.18	Peak	20.00	200	Vertical	Pass
3**	2660.400	43.96	54.0	10.04	AV	20.00	200	Vertical	Pass
4	4923.800	51.46	74.0	22.54	Peak	116.00	150	Vertical	Pass
4**	4923.800	47.02	54.0	6.98	AV	116.00	150	Vertical	Pass
5	11334.638	53.52	74.0	20.48	Peak	49.00	400	Vertical	Pass
5**	11334.638	43.16	54.0	10.84	AV	49.00	400	Vertical	Pass
6	13344.037	55.72	74.0	18.28	Peak	344.00	150	Vertical	Pass
6**	13344.037	48.24	54.0	5.76	AV	344.00	150	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	1000.000	42.73	74.0	31.27	Peak	89.00	400	Horizontal	Pass
1**	1000.000	30.99	54.0	23.01	AV	89.00	400	Horizontal	Pass
2	2414.000	108.53	74.0	-34.53	Peak	336.00	200	Horizontal	N/A
2**	2414.000	101.22	54.0	-47.22	AV	336.00	200	Horizontal	N/A
3	4821.200	52.05	74.0	21.95	Peak	340.00	150	Horizontal	Pass
3**	4821.200	47.28	54.0	6.72	AV	340.00	150	Horizontal	Pass
4	4829.600	54.22	74.0	19.78	Peak	0.00	150	Horizontal	Pass
4**	4829.600	45.73	54.0	8.27	AV	0.00	150	Horizontal	Pass
5	13305.713	55.83	74.0	18.17	Peak	258.00	150	Horizontal	Pass
5**	13305.713	47.83	54.0	6.17	AV	258.00	150	Horizontal	Pass
6	17426.962	56.53	74.0	17.47	Peak	47.00	300	Horizontal	Pass
6**	17426.962	47.31	54.0	6.69	AV	47.00	300	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	1576.200	42.67	74.0	31.33	Peak	253.00	400	Vertical	Pass
1**	1576.200	32.39	54.0	21.61	AV	253.00	400	Vertical	Pass
2	2414.300	104.69	74.0	-30.69	Peak	88.00	200	Vertical	N/A
2**	2414.300	96.66	54.0	-42.66	AV	88.00	200	Vertical	N/A
3	2659.700	54.54	74.0	19.46	Peak	21.00	100	Vertical	Pass
3**	2659.700	41.45	54.0	12.55	AV	21.00	100	Vertical	Pass
4	6147.800	54.01	74.0	19.99	Peak	250.00	150	Vertical	Pass
4**	6147.800	45.06	54.0	8.94	AV	250.00	150	Vertical	Pass
5	13311.225	56.05	74.0	17.95	Peak	0.00	150	Vertical	Pass
5**	13311.225	46.63	54.0	7.37	AV	0.00	150	Vertical	Pass
6	16065.112	56.60	74.0	17.40	Peak	360.00	100	Vertical	Pass
6**	16065.112	46.19	54.0	7.81	AV	360.00	100	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	1406.500	42.58	74.0	31.42	Peak	156.00	100	Horizontal	Pass
1**	1406.500	32.65	54.0	21.35	AV	156.00	100	Horizontal	Pass
2	2434.800	107.18	74.0	-33.18	Peak	347.00	200	Horizontal	N/A
2**	2434.800	99.27	54.0	-45.27	AV	347.00	200	Horizontal	N/A
3	4877.800	50.99	74.0	23.01	Peak	282.00	150	Horizontal	Pass
3**	4877.800	46.18	54.0	7.82	AV	282.00	150	Horizontal	Pass
4	6807.400	54.78	74.0	19.22	Peak	150.00	100	Horizontal	Pass
4**	6807.400	45.54	54.0	8.46	AV	150.00	100	Horizontal	Pass
5	10095.225	52.17	74.0	21.83	Peak	140.00	150	Horizontal	Pass
5**	10095.225	42.04	54.0	11.96	AV	140.00	150	Horizontal	Pass
6	13382.887	56.94	74.0	17.06	Peak	220.00	200	Horizontal	Pass
6**	13382.887	46.17	54.0	7.83	AV	220.00	200	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	1332.500	42.78	74.0	31.22	Peak	90.00	200	Vertical	Pass
1**	1332.500	33.17	54.0	20.83	AV	90.00	200	Vertical	Pass
2	2435.000	102.57	74.0	-28.57	Peak	90.00	150	Vertical	N/A
2**	2435.000	94.79	54.0	-40.79	AV	90.00	150	Vertical	N/A
3	2661.700	53.22	74.0	20.78	Peak	214.00	150	Vertical	Pass
3**	2661.700	40.84	54.0	13.16	AV	214.00	150	Vertical	Pass
4	6147.400	53.89	74.0	20.11	Peak	360.00	150	Vertical	Pass
4**	6147.400	45.25	54.0	8.75	AV	360.00	150	Vertical	Pass
5	13314.375	56.00	74.0	18.00	Peak	248.00	150	Vertical	Pass
5**	13314.375	46.24	54.0	7.76	AV	248.00	150	Vertical	Pass
6	17395.988	56.27	74.0	17.73	Peak	191.00	400	Vertical	Pass
6**	17395.988	46.97	54.0	7.03	AV	191.00	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	1442.100	42.49	74.0	31.51	Peak	25.00	300	Horizontal	Pass
1**	1442.100	32.13	54.0	21.87	AV	25.00	300	Horizontal	Pass
2	2463.600	106.35	74.0	-32.35	Peak	356.00	150	Horizontal	N/A
2**	2463.600	99.61	54.0	-45.61	AV	356.00	150	Horizontal	N/A
3	4926.800	52.90	74.0	21.10	Peak	0.00	150	Horizontal	Pass
3**	4926.800	43.68	54.0	10.32	AV	0.00	150	Horizontal	Pass
4	6625.200	54.41	74.0	19.59	Peak	24.00	100	Horizontal	Pass
4**	6625.200	45.19	54.0	8.81	AV	24.00	100	Horizontal	Pass
5	13430.662	55.53	74.0	18.47	Peak	0.00	150	Horizontal	Pass
5**	13430.662	46.55	54.0	7.45	AV	0.00	150	Horizontal	Pass
6	17420.663	56.64	74.0	17.36	Peak	55.00	100	Horizontal	Pass
6**	17420.663	47.28	54.0	6.72	AV	55.00	100	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	1505.600	42.90	74.0	31.10	Peak	198.00	300	Vertical	Pass
1**	1505.600	33.13	54.0	20.87	AV	198.00	300	Vertical	Pass
2	2463.700	101.37	74.0	-27.37	Peak	87.00	100	Vertical	N/A
2**	2463.700	94.18	54.0	-40.18	AV	87.00	100	Vertical	N/A
3	5314.800	53.50	74.0	20.50	Peak	54.00	150	Vertical	Pass
3**	5314.800	45.86	54.0	8.14	AV	54.00	150	Vertical	Pass
4	6790.200	55.41	74.0	18.59	Peak	75.00	400	Vertical	Pass
4**	6790.200	46.50	54.0	7.50	AV	75.00	400	Vertical	Pass
5	13354.800	56.07	74.0	17.93	Peak	255.00	150	Vertical	Pass
5**	13354.800	47.04	54.0	6.96	AV	255.00	150	Vertical	Pass
6	17455.051	56.29	74.0	17.71	Peak	157.00	100	Vertical	Pass
6**	17455.051	46.59	54.0	7.41	AV	157.00	100	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	1406.500	43.44	74.0	30.56	Peak	48.00	200	Horizontal	Pass
1**	1406.500	32.55	54.0	21.45	AV	48.00	200	Horizontal	Pass
2	2413.800	108.40	74.0	-34.40	Peak	353.00	100	Horizontal	N/A
2**	2413.800	100.77	54.0	-46.77	AV	353.00	100	Horizontal	N/A
3	4825.000	51.47	74.0	22.53	Peak	11.00	150	Horizontal	Pass
3**	4825.000	46.95	54.0	7.05	AV	11.00	150	Horizontal	Pass
4	4825.600	54.14	74.0	19.86	Peak	0.00	150	Horizontal	Pass
4**	4825.600	46.65	54.0	7.35	AV	0.00	150	Horizontal	Pass
5	13433.813	55.90	74.0	18.10	Peak	324.00	150	Horizontal	Pass
5**	13433.813	46.66	54.0	7.34	AV	324.00	150	Horizontal	Pass
6	16049.625	56.01	74.0	17.99	Peak	194.00	200	Horizontal	Pass
6**	16049.625	46.58	54.0	7.42	AV	194.00	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	1331.900	42.62	74.0	31.38	Peak	116.00	400	Vertical	Pass
1**	1331.900	33.78	54.0	20.22	AV	116.00	400	Vertical	Pass
2	2413.300	104.55	74.0	-30.55	Peak	87.00	200	Vertical	N/A
2**	2413.300	97.37	54.0	-43.37	AV	87.00	200	Vertical	N/A
3	2664.900	54.75	74.0	19.25	Peak	217.00	150	Vertical	Pass
3**	2664.900	40.95	54.0	13.05	AV	217.00	150	Vertical	Pass
4	6807.400	54.70	74.0	19.30	Peak	353.00	400	Vertical	Pass
4**	6807.400	46.14	54.0	7.86	AV	353.00	400	Vertical	Pass
5	13348.237	55.87	74.0	18.13	Peak	247.00	150	Vertical	Pass
5**	13348.237	46.11	54.0	7.89	AV	247.00	150	Vertical	Pass
6	17415.412	56.15	74.0	17.85	Peak	322.00	150	Vertical	Pass
6**	17415.412	47.35	54.0	6.65	AV	322.00	150	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	1333.300	42.32	74.0	31.68	Peak	165.00	200	Horizontal	Pass
1**	1333.300	32.62	54.0	21.38	AV	165.00	200	Horizontal	Pass
2	2437.600	106.60	74.0	-32.60	Peak	356.00	150	Horizontal	N/A
2**	2437.600	99.17	54.0	-45.17	AV	356.00	150	Horizontal	N/A
3	4868.400	52.34	74.0	21.66	Peak	0.00	150	Horizontal	Pass
3**	4868.400	43.83	54.0	10.17	AV	0.00	150	Horizontal	Pass
4	6806.400	54.92	74.0	19.08	Peak	9.00	400	Horizontal	Pass
4**	6806.400	46.13	54.0	7.87	AV	9.00	400	Horizontal	Pass
5	13347.974	55.58	74.0	18.42	Peak	283.00	150	Horizontal	Pass
5**	13347.974	46.54	54.0	7.46	AV	283.00	150	Horizontal	Pass
6	15245.587	56.22	74.0	17.78	Peak	199.00	100	Horizontal	Pass
6**	15245.587	46.79	54.0	7.21	AV	199.00	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	1489.300	42.61	74.0	31.39	Peak	56.00	400	Vertical	Pass
1**	1489.300	33.71	54.0	20.29	AV	56.00	400	Vertical	Pass
2	2435.300	102.82	74.0	-28.82	Peak	89.00	150	Vertical	N/A
2**	2435.300	95.12	54.0	-41.12	AV	89.00	150	Vertical	N/A
3	2656.500	54.96	74.0	19.04	Peak	186.00	150	Vertical	Pass
3**	2656.500	47.16	54.0	6.84	AV	186.00	150	Vertical	Pass
4	6833.600	54.25	74.0	19.75	Peak	15.00	200	Vertical	Pass
4**	6833.600	44.71	54.0	9.29	AV	15.00	200	Vertical	Pass
5	13354.013	55.83	74.0	18.17	Peak	360.00	150	Vertical	Pass
5**	13354.013	46.37	54.0	7.63	AV	360.00	150	Vertical	Pass
6	17407.537	56.89	74.0	17.11	Peak	343.00	300	Vertical	Pass
6**	17407.537	46.47	54.0	7.53	AV	343.00	300	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	1596.000	42.34	74.0	31.66	Peak	58.00	200	Horizontal	Pass
1**	1596.000	32.99	54.0	21.01	AV	58.00	200	Horizontal	Pass
2	2463.200	105.71	74.0	-31.71	Peak	0.00	200	Horizontal	N/A
2**	2463.200	98.82	54.0	-44.82	AV	0.00	200	Horizontal	N/A
3	4928.400	51.94	74.0	22.06	Peak	342.00	150	Horizontal	Pass
3**	4928.400	42.76	54.0	11.24	AV	342.00	150	Horizontal	Pass
4	6736.000	54.63	74.0	19.37	Peak	286.00	400	Horizontal	Pass
4**	6736.000	44.32	54.0	9.68	AV	286.00	400	Horizontal	Pass
5	13436.963	57.60	74.0	16.40	Peak	324.00	200	Horizontal	Pass
5**	13436.963	46.52	54.0	7.48	AV	324.00	200	Horizontal	Pass
6	17427.751	56.83	74.0	17.17	Peak	208.00	150	Horizontal	Pass
6**	17427.751	47.37	54.0	6.63	AV	208.00	150	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	1496.900	42.73	74.0	31.27	Peak	121.00	100	Vertical	Pass
1**	1496.900	33.71	54.0	20.29	AV	121.00	100	Vertical	Pass
2	2463.300	101.30	74.0	-27.30	Peak	81.00	200	Vertical	N/A
2**	2463.300	93.92	54.0	-39.92	AV	81.00	200	Vertical	N/A
3	5157.200	52.21	74.0	21.79	Peak	306.00	150	Vertical	Pass
3**	5157.200	42.94	54.0	11.06	AV	306.00	150	Vertical	Pass
4	6609.200	53.85	74.0	20.15	Peak	119.00	150	Vertical	Pass
4**	6609.200	45.48	54.0	8.52	AV	119.00	150	Vertical	Pass
5	13443.526	55.84	74.0	18.16	Peak	360.00	150	Vertical	Pass
5**	13443.526	46.43	54.0	7.57	AV	360.00	150	Vertical	Pass
6	17415.938	56.29	74.0	17.71	Peak	114.00	300	Vertical	Pass
6**	17415.938	47.31	54.0	6.69	AV	114.00	300	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11ax20(SU) Low Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1559.500	42.42	74.0	31.58	Peak	184.00	200	Horizontal	Pass
1**	1559.500	33.39	54.0	20.61	AV	184.00	200	Horizontal	Pass
2	2415.000	109.60	74.0	-35.60	Peak	3.00	100	Horizontal	N/A
2**	2415.000	100.42	54.0	-46.42	AV	3.00	100	Horizontal	N/A
3	4826.600	54.88	74.0	19.12	Peak	360.00	150	Horizontal	Pass
3**	4826.600	44.46	54.0	9.54	AV	360.00	150	Horizontal	Pass
4	4826.800	51.77	74.0	22.23	Peak	360.00	150	Horizontal	Pass
4**	4826.800	47.38	54.0	6.62	AV	360.00	150	Horizontal	Pass
5	13324.875	55.46	74.0	18.54	Peak	130.00	150	Horizontal	Pass
5**	13324.875	46.07	54.0	7.93	AV	130.00	150	Horizontal	Pass
6	15842.775	56.68	74.0	17.32	Peak	22.00	100	Horizontal	Pass
6**	15842.775	46.71	54.0	7.29	AV	22.00	100	Horizontal	Pass

1 GHz to 18 GHz, ANT V802.11ax20(SU) Low Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1451.400	42.90	74.0	31.10	Peak	326.00	200	Vertical	Pass
1**	1451.400	33.93	54.0	20.07	AV	326.00	200	Vertical	Pass
2	2411.000	106.41	74.0	-32.41	Peak	86.00	200	Vertical	N/A
2**	2411.000	97.32	54.0	-43.32	AV	86.00	200	Vertical	N/A
3	2664.800	54.88	74.0	19.12	Peak	213.00	200	Vertical	Pass
3**	2664.800	43.79	54.0	10.21	AV	213.00	200	Vertical	Pass
4	6800.800	54.63	74.0	19.37	Peak	228.00	400	Vertical	Pass
4**	6800.800	45.57	54.0	8.43	AV	228.00	400	Vertical	Pass
5	13351.388	56.21	74.0	17.79	Peak	360.00	150	Vertical	Pass
5**	13351.388	46.54	54.0	7.46	AV	360.00	150	Vertical	Pass
6	17420.663	56.26	74.0	17.74	Peak	0.00	400	Vertical	Pass
6**	17420.663	47.38	54.0	6.62	AV	0.00	400	Vertical	Pass

1 GHz to 18 GHz, ANT H 802.11ax20(SU) Middle Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1562.800	42.91	74.0	31.09	Peak	195.00	300	Horizontal	Pass
1**	1562.800	33.16	54.0	20.84	AV	195.00	300	Horizontal	Pass
2	2436.800	108.30	74.0	-34.30	Peak	355.00	200	Horizontal	N/A
2**	2436.800	99.41	54.0	-45.41	AV	355.00	200	Horizontal	N/A
3	4876.200	52.40	74.0	21.60	Peak	360.00	150	Horizontal	Pass
3**	4876.200	44.95	54.0	9.05	AV	360.00	150	Horizontal	Pass
4	6607.600	54.91	74.0	19.09	Peak	353.00	100	Horizontal	Pass
4**	6607.600	46.20	54.0	7.80	AV	353.00	100	Horizontal	Pass
5	13429.613	56.07	74.0	17.93	Peak	89.00	150	Horizontal	Pass
5**	13429.613	46.79	54.0	7.21	AV	89.00	150	Horizontal	Pass
6	16028.363	56.29	74.0	17.71	Peak	10.00	300	Horizontal	Pass
6**	16028.363	46.24	54.0	7.76	AV	10.00	300	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11ax20(SU) Middle Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1319.900	42.44	74.0	31.56	Peak	282.00	400	Vertical	Pass
1**	1319.900	32.58	54.0	21.42	AV	282.00	400	Vertical	Pass
2	2435.800	104.34	74.0	-30.34	Peak	91.00	100	Vertical	N/A
2**	2435.800	95.92	54.0	-41.92	AV	91.00	100	Vertical	N/A
3	2660.000	53.04	74.0	20.96	Peak	51.00	100	Vertical	Pass
3**	2660.000	42.63	54.0	11.37	AV	51.00	100	Vertical	Pass
4	6809.000	54.64	74.0	19.36	Peak	70.00	200	Vertical	Pass
4**	6809.000	45.41	54.0	8.59	AV	70.00	200	Vertical	Pass
5	13344.562	55.48	74.0	18.52	Peak	253.00	150	Vertical	Pass
5**	13344.562	46.81	54.0	7.19	AV	253.00	150	Vertical	Pass
6	17403.339	56.17	74.0	17.83	Peak	0.00	300	Vertical	Pass
6**	17403.339	47.30	54.0	6.70	AV	0.00	300	Vertical	Pass

1 GHz to 18 GHz, ANT H802.11ax20(SU) High Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1505.500	42.89	74.0	31.11	Peak	107.00	200	Horizontal	Pass
1**	1505.500	33.44	54.0	20.56	AV	107.00	200	Horizontal	Pass
2	2461.400	107.26	74.0	-33.26	Peak	0.00	150	Horizontal	N/A
2**	2461.400	99.55	54.0	-45.55	AV	0.00	150	Horizontal	N/A
3	4926.800	53.32	74.0	20.68	Peak	337.00	150	Horizontal	Pass
3**	4926.800	43.41	54.0	10.59	AV	337.00	150	Horizontal	Pass
4	6795.800	54.28	74.0	19.72	Peak	0.00	400	Horizontal	Pass
4**	6795.800	45.77	54.0	8.23	AV	0.00	400	Horizontal	Pass
5	13320.412	55.16	74.0	18.84	Peak	145.00	150	Horizontal	Pass
5**	13320.412	46.73	54.0	7.27	AV	145.00	150	Horizontal	Pass
6	16041.487	55.95	74.0	18.05	Peak	275.00	100	Horizontal	Pass
6**	16041.487	45.83	54.0	8.17	AV	275.00	100	Horizontal	Pass

1 GHz to 18 GHz, ANT V 802.11ax20(SU) High Channel

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1539.600	43.56	74.0	30.44	Peak	360.00	100	Vertical	Pass
1**	1539.600	32.59	54.0	21.41	AV	360.00	100	Vertical	Pass
2	2459.600	102.37	74.0	-28.37	Peak	89.00	200	Vertical	N/A
2**	2459.600	93.40	54.0	-39.40	AV	89.00	200	Vertical	N/A
3	2655.700	53.28	74.0	20.72	Peak	60.00	150	Vertical	Pass
3**	2655.700	40.89	54.0	13.11	AV	60.00	150	Vertical	Pass
4	5310.400	55.62	74.0	18.38	Peak	78.00	300	Vertical	Pass
4**	5310.400	44.37	54.0	9.63	AV	78.00	300	Vertical	Pass
5	13420.687	56.13	74.0	17.87	Peak	26.00	150	Vertical	Pass
5**	13420.687	46.69	54.0	7.31	AV	26.00	150	Vertical	Pass
6	17472.637	56.68	74.0	17.32	Peak	26.00	400	Vertical	Pass
6**	17472.637	47.05	54.0	6.95	AV	26.00	400	Vertical	Pass

Dipole Antenna

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	1486.100	42.71	74.0	31.29	Peak	165.00	200	Horizontal	Pass
1**	1486.100	32.92	54.0	21.08	AV	165.00	200	Horizontal	Pass
2	2413.100	97.44	74.0	-23.44	Peak	62.00	100	Horizontal	N/A
2**	2413.100	94.56	54.0	-40.56	AV	62.00	100	Horizontal	N/A
3	4785.200	51.69	74.0	22.31	Peak	55.00	100	Horizontal	Pass
3**	4785.200	42.21	54.0	11.79	AV	55.00	100	Horizontal	Pass
4	6787.800	54.31	74.0	19.69	Peak	176.00	400	Horizontal	Pass
4**	6787.800	45.53	54.0	8.47	AV	176.00	400	Horizontal	Pass
5	13344.037	56.02	74.0	17.98	Peak	252.00	150	Horizontal	Pass
5**	13344.037	46.96	54.0	7.04	AV	252.00	150	Horizontal	Pass
6	17421.449	56.27	74.0	17.73	Peak	208.00	300	Horizontal	Pass
6**	17421.449	47.11	54.0	6.89	AV	208.00	300	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	1333.000	42.74	74.0	31.26	Peak	115.00	200	Vertical	Pass
1**	1333.000	33.79	54.0	20.21	AV	115.00	200	Vertical	Pass
2	2413.200	106.90	74.0	-32.90	Peak	109.00	150	Vertical	N/A
2**	2413.200	104.04	54.0	-50.04	AV	109.00	150	Vertical	N/A
3	4824.400	53.64	74.0	20.36	Peak	34.00	150	Vertical	Pass
3**	4824.400	51.00	54.0	3.00	AV	34.00	150	Vertical	Pass
4	4824.200	55.34	74.0	18.66	Peak	86.00	150	Vertical	Pass
4**	4824.200	50.94	54.0	3.06	AV	86.00	150	Vertical	Pass
5	13350.338	56.00	74.0	18.00	Peak	87.00	150	Vertical	Pass
5**	13350.338	46.97	54.0	7.03	AV	87.00	150	Vertical	Pass
6	17429.324	56.26	74.0	17.74	Peak	154.00	200	Vertical	Pass
6**	17429.324	47.52	54.0	6.48	AV	154.00	200	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	1439.500	44.32	74.0	29.68	Peak	37.00	100	Horizontal	Pass
1**	1439.500	33.32	54.0	20.68	AV	37.00	100	Horizontal	Pass
2	2463.000	101.52	74.0	-27.52	Peak	215.00	200	Horizontal	N/A
2**	2463.000	95.30	54.0	-41.30	AV	215.00	200	Horizontal	N/A
3	4807.600	52.07	74.0	21.93	Peak	221.00	150	Horizontal	Pass
3**	4807.600	42.24	54.0	11.76	AV	221.00	150	Horizontal	Pass
4	6720.000	54.53	74.0	19.47	Peak	12.00	100	Horizontal	Pass
4**	6720.000	44.48	54.0	9.52	AV	12.00	100	Horizontal	Pass
5	13433.813	56.72	74.0	17.28	Peak	0.00	400	Horizontal	Pass
5**	13433.813	46.69	54.0	7.31	AV	0.00	400	Horizontal	Pass
6	15846.713	56.34	74.0	17.66	Peak	276.00	150	Horizontal	Pass
6**	15846.713	46.43	54.0	7.57	AV	276.00	150	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	1437.700	42.70	74.0	31.30	Peak	92.00	300	Vertical	Pass
1**	1437.700	33.27	54.0	20.73	AV	92.00	300	Vertical	Pass
2	2464.000	108.14	74.0	-34.14	Peak	220.00	200	Vertical	N/A
2**	2464.000	101.48	54.0	-47.48	AV	220.00	200	Vertical	N/A
3	4921.000	56.26	74.0	17.74	Peak	331.00	150	Vertical	Pass
3**	4921.000	46.02	54.0	7.98	AV	331.00	150	Vertical	Pass
4	4925.800	53.51	74.0	20.49	Peak	347.00	150	Vertical	Pass
4**	4925.800	48.48	54.0	5.52	AV	347.00	150	Vertical	Pass
5	13355.588	55.80	74.0	18.20	Peak	172.00	150	Vertical	Pass
5**	13355.588	46.71	54.0	7.29	AV	172.00	150	Vertical	Pass
6	17420.136	56.78	74.0	17.22	Peak	293.00	200	Vertical	Pass
6**	17420.136	47.41	54.0	6.59	AV	293.00	200	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.

Note [4]: All antenna were pre tested, but only the worst case has been reported in this report.

Note [5]: All the configurations were pre tested, only the worst configuration has been reported in this report.

Test Data

PCB Antenna

802.11b LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2386.150	58.53	74.0	15.47	Peak	355.00	200	Horizontal	Pass
1**	2386.150	48.07	54.0	5.93	AV	355.00	200	Horizontal	Pass
2	2389.950	56.68	74.0	17.32	Peak	183.00	100	Horizontal	Pass
2**	2389.950	47.55	54.0	6.45	AV	183.00	100	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	2483.545	57.61	74.0	16.39	Peak	331.00	100	Horizontal	Pass
1**	2483.545	47.60	54.0	6.40	AV	331.00	100	Horizontal	Pass
2	2484.370	58.80	74.0	15.20	Peak	360.00	200	Horizontal	Pass
2**	2484.370	48.15	54.0	5.85	AV	360.00	200	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	2385.100	61.59	74.0	12.41	Peak	306.00	200	Horizontal	Pass
1**	2385.100	48.05	54.0	5.95	AV	306.00	200	Horizontal	Pass
2	2389.950	59.44	74.0	14.56	Peak	330.00	200	Horizontal	Pass
2**	2389.950	48.92	54.0	5.08	AV	330.00	200	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	2483.590	66.31	74.0	7.69	Peak	330.00	150	Horizontal	Pass
1**	2483.590	50.89	54.0	3.11	AV	330.00	150	Horizontal	Pass
2	2483.575	68.48	74.0	5.52	Peak	318.00	150	Horizontal	Pass
2**	2483.575	48.61	54.0	5.39	AV	318.00	150	Horizontal	Pass
3	2484.130	68.64	74.0	5.36	Peak	318.00	150	Horizontal	Pass
3**	2484.130	50.08	54.0	3.92	AV	318.00	150	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	2389.650	67.32	74.0	6.68	Peak	326.00	100	Horizontal	Pass
1**	2389.650	48.79	54.0	5.21	AV	326.00	100	Horizontal	Pass
2	2389.950	61.71	74.0	12.29	Peak	140.00	150	Horizontal	Pass
2**	2389.950	48.88	54.0	5.12	AV	140.00	150	Horizontal	Pass
3	2388.700	61.61	74.0	12.39	Peak	298.00	150	Horizontal	Pass
3**	2388.700	50.35	54.0	3.65	AV	298.00	150	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	69.49	74.0	4.51	Peak	316.00	150	Horizontal	Pass
1**	2483.500	49.29	54.0	4.71	AV	316.00	150	Horizontal	Pass
2	2484.670	70.75	74.0	3.25	Peak	302.00	100	Horizontal	Pass
2**	2484.670	48.86	54.0	5.14	AV	302.00	100	Horizontal	Pass
3	2483.755	68.04	74.0	5.96	Peak	320.00	150	Horizontal	Pass
3**	2483.755	50.98	54.0	3.02	AV	320.00	150	Horizontal	Pass

802.11ax20(SU) LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2389.550	67.32	74.0	6.68	Peak	298.00	200	Horizontal	Pass
1**	2389.550	49.92	54.0	4.08	AV	298.00	200	Horizontal	Pass
2	2389.950	65.05	74.0	8.95	Peak	302.00	200	Horizontal	Pass
2**	2389.950	49.87	54.0	4.13	AV	302.00	200	Horizontal	Pass

802.11ax20(SU) HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.530	66.47	74.0	7.53	Peak	312.00	150	Horizontal	Pass
1**	2483.530	49.59	54.0	4.41	AV	312.00	150	Horizontal	Pass
2	2484.025	66.09	74.0	7.91	Peak	330.00	150	Horizontal	Pass
2**	2484.025	49.19	54.0	4.81	AV	330.00	150	Horizontal	Pass
3	2483.470	64.70	74.0	9.30	Peak	294.00	150	Horizontal	Pass
3**	2483.470	50.85	54.0	3.15	AV	294.00	150	Horizontal	Pass

Dipole Antenna

802.11b LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2387.000	59.11	74.0	14.89	Peak	320.00	200	Vertical	Pass
1**	2387.000	48.11	54.0	5.89	AV	320.00	200	Vertical	Pass
2	2389.950	58.83	74.0	15.17	Peak	276.00	150	Vertical	Pass
2**	2389.950	48.54	54.0	5.46	AV	276.00	150	Vertical	Pass

802.11b HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.530	66.98	74.0	7.02	Peak	47.00	100	Vertical	Pass
1**	2483.530	49.44	54.0	4.56	AV	47.00	100	Vertical	Pass
2	2484.025	68.21	74.0	5.79	Peak	18.00	100	Vertical	Pass
2**	2484.025	49.29	54.0	4.71	AV	18.00	100	Vertical	Pass
3	2483.665	59.65	74.0	14.35	Peak	0.00	150	Vertical	Pass
3**	2483.665	50.36	54.0	3.64	AV	0.00	150	Vertical	Pass

A.8 Power Spectral Density (PSD)

Note [1]: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note [2]: All antenna were pre tested, but only the worst case has been reported in this report.
Test Data
SISO-Antenna 0
802.11b Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-13.34	8
Middle	-12.77	8
High	-10.42	8

802.11g Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-10.66	8
Middle	-10.69	8
High	-11.17	8

802.11n-20 MHz Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-11.20	8
Middle	-10.46	8
High	-11.37	8

802.11ax-20 MHz(SU) Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-10.96	8
Middle	-11.17	8
High	-11.85	8

Test Plots

SISO-Antenna 0

802.11b LOW CHANNEL

802.11b MIDDLE CHANNEL

802.11b HIGH CHANNEL

802.11g LOW CHANNEL

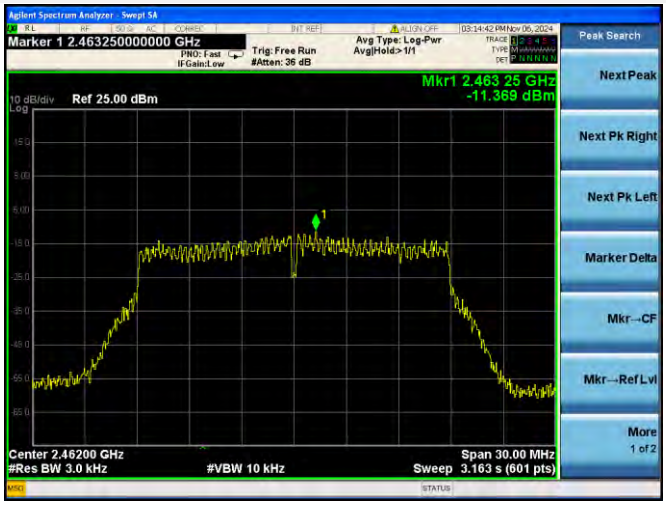
802.11g MIDDLE CHANNEL

802.11g HIGH CHANNEL

802.11n-20 MHz LOW CHANNEL

802.11n-20 MHz MIDDLE CHANNEL

802.11n-20 MHz HIGH CHANNEL



802.11ax-20 MHz(SU) LOW CHANNEL

802.11ax-20 MHz(SU) MIDDLE CHANNEL

802.11ax-20 MHz(SU) HIGH CHANNEL

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ24A0634-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ24A0634-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ24A0634-AI.PDF”.

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--END OF REPORT--