TEST REPORT

Applicant:	REOLINK INNOVATION LIMITED
Address:	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG
Equipment Type:	WiFi IP Camera
Model Name:	CX410W (refer to section 2.3)
Brand Name:	Reolink
FCC ID:	2AYHE-2310D
ISED Number:	26839-2310D
Test Standard:	47 CFR Part 15 Subpart C RSS-Gen Issue 5 RSS-247 Issue 3 (refer to section 3.1)
Sample Arrival Date:	Nov. 28, 2023
Test Date:	Jan. 04, 2024 - May 29, 2024
Date of Issue:	Jun. 05, 2024

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Si Xiao **Checked by:** Ye Hongji **Approved by:** Liao Jianming (Technical Director)

Revision History

Version	Issue Date	Revisions
Rev. 01	Jun. 05, 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	REOLINK INNOVATION LIMITED
Address	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG

2.2 Manufacturer Information

Manufacturer	REOLINK INNOVATION LIMITED
Address	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG

2.3 General Description for Equipment under Test (EUT)

EUT Name	WiFi IP Camera
Model Name Under Test	CX410W
Series Model Name	ColorX Series W320X
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in model name. (this information provided by the applicant)
Serial Number	952700Y006E4X8VN
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.4 Technical Information

Network and Wireless connectivity	2.4G WIFI 802.11b, 802.11g and 802.11n(HT20/40) 5G WIFI 802.11a, 802.11n(HT20/40) and 802.11ac(VHT20/40/80) U-NII-1/2A/2C/3

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

Frequency Range		802.11b/g/n(20 MHz): 2.412 GHz - 2.462 GHz f_c = 2412 MHz + (N-1)*5 MHz, where - f_c = “Operating Frequency” in MHz, - N = “Channel Number” with the range from 1 to 11. 802.11n(40 MHz): 2.422 GHz - 2.452 GHz f_c = 2412 MHz + (N-1)*5 MHz, where - f_c = “Operating Frequency” in MHz, - N = “Channel Number” with the range from 3 to 9.
Modulation Type		DSSS, OFDM
Product Type		☒ Mobile ☐ Portable ☐ Fix Location
Antenna System (eg., MIMO, Smart Antenna)		Cyclic Delay Diversity (CDD) for 802.11b/g Multi Input Multi Output (MIMO) for 802.11n
Categorization as Correlated or Completely Uncorrelated		Categorization as Correlated for 802.11b/g Categorization as Uncorrelated for 802.11n
Antenna Type	SISO-Antenna A	Dipole Antenna
	SISO-Antenna B	
Antenna Gain	SISO-Antenna A	2.89 dBi
	SISO-Antenna B	
Total directional gain	For power spectral density (PSD) measurements	Correlated: 5.90 dBi Formulas: Directional gain = *GANT* + 10 log(*NANT*) dBi Uncorrelated: 5.81 dBi Formulas: Directional gain = *GANT*
	For power measurements	Correlated: 5.90 dBi Formulas: Directional gain = *GANT* + 10 log(*NANT*) dBi Uncorrelated: 5.81 dBi Formulas: Directional gain = *GANT*
	For	Correlated:

	Conducted Out-of-Band and Spurious Measurements	5.90 dBi Formulas: Directional gain = *GANT* + 10 log(*NANT*) dBi Uncorrelated: 5.81 dBi Formulas: Directional gain = *GANT*
About the Product		Only the WIFI 802.11b, 802.11g and 802.11n (HT20/40) was tested in this report.

Mode	Antenna		
	SISO-Antenna A	SISO-Antenna B	MIMO
802.11b	√	√	√
802.11g	√	√	√
802.11n20	√	√	√
802.11n40	√	√	√
Note: All the configurations were tested, but only the worst data was shown in this report.			

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

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

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

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

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Intentional radiators of radio frequency equipment
2	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	40% to 70%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+21.6℃ to +25.0℃
Working Voltage of the EUT	NV (Normal Voltage)	12.0 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	KEYSIGHT	N9020A	MY46471071	2023.07.25	2024.07.24
Power Sensor	KEYSIGHT	U2063XA	MY58000251	2023.07.12	2024.07.11
Spectrum Analyzer	KEYSIGHT	N9020A	MY50531259	2023.09.05	2024.09.04
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	02460	2021.05.20	2024.05.19
				2024.05.16	2027.05.15
Test Antenna-Horn	A-INFO	LB-180400KF	J211060273	2021.07.02	2024.07.01
Anechoic Chamber	RAINFORD	9m*6m*6m	140	2022.02.19	2024.08.15
Amplifier	COM-MV	LSCX_LNA1-12G-01	7210214	2023.09.05	2024.09.04
Amplifier	COM-MV	XKu_LNA7-18G-01	7210209	2023.09.05	2024.09.04
Amplifier	COM-MV	KA LNA18 40G-01	18050001	2023.12.06	2024.12.05
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2023.09.05	2024.09.04
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9168	9168-01162	2023.08.04	2024.08.03
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	2021.08.15	2024.08.14
EMI Receiver	KEYSIGHT	N9010B	MY57110309	2023.09.05	2024.09.04
LISN	SCHWARZBECK	NSLK 8127	8127-687	2023.05.16	2024.05.15
				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.

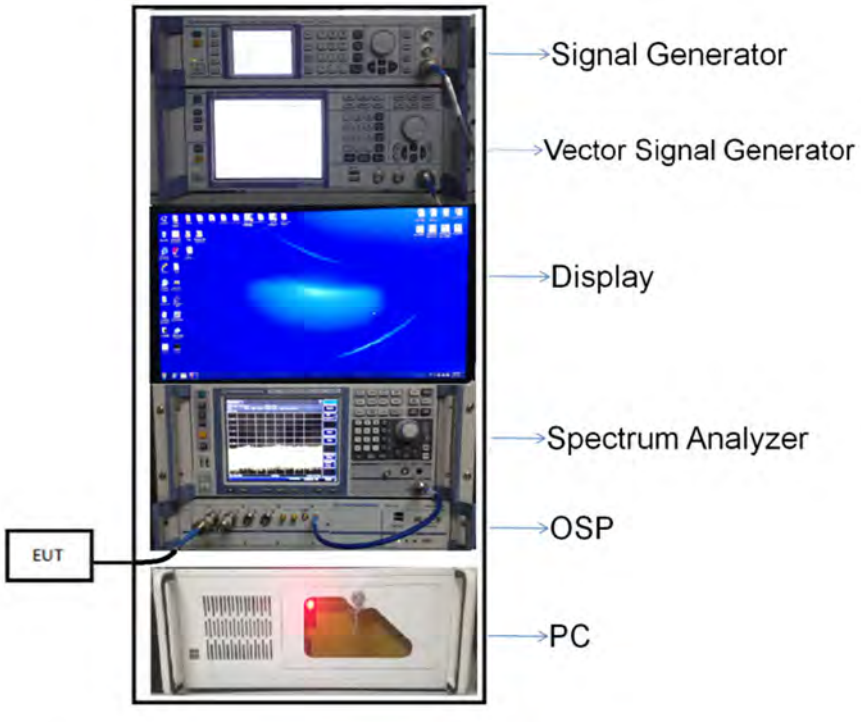
Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.8°C
Humidity	4%

4.5 Description of Test Setup

4.5.1 For Antenna Port Test

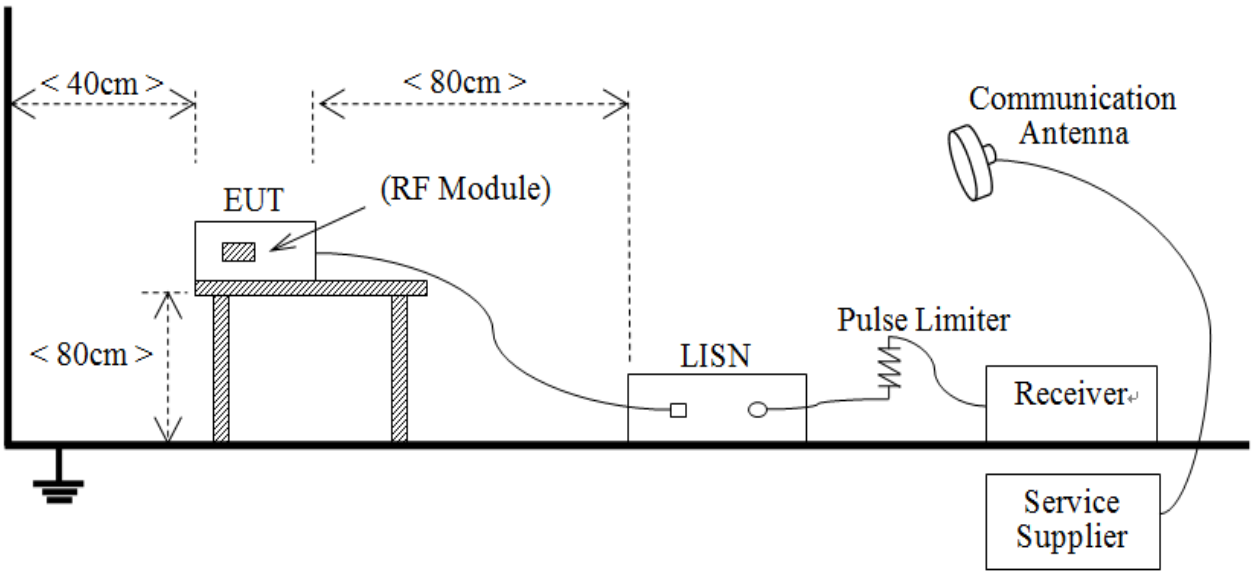
Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

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



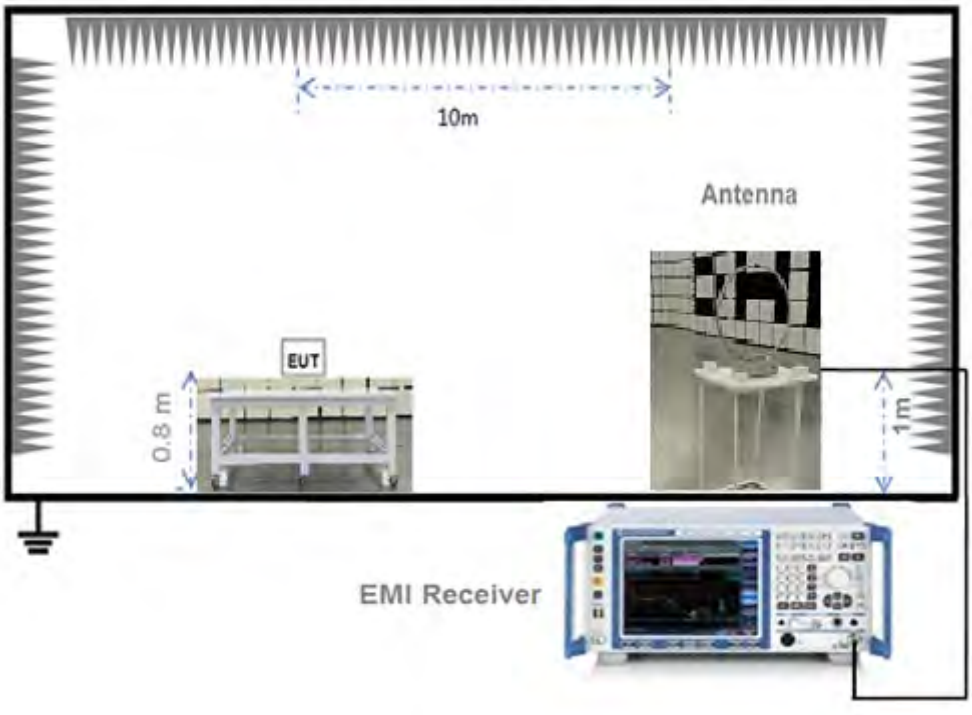
(Diagram 1)

4.5.2For AC Power Supply Port Test



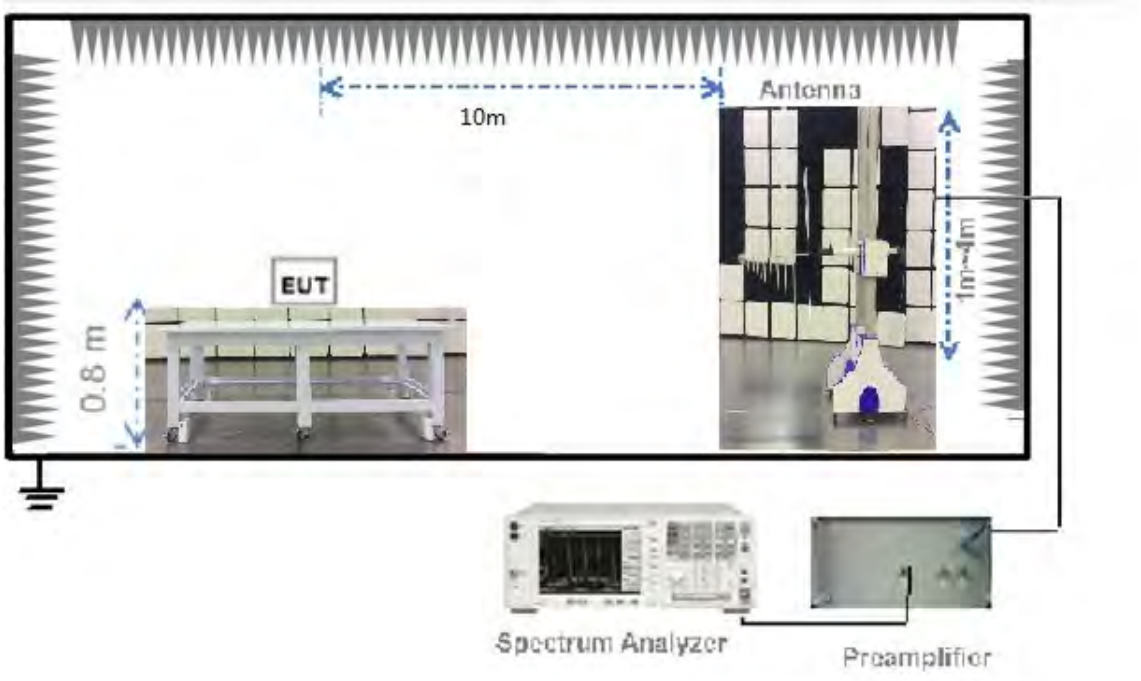
(Diagram 2)

4.5.3For Radiated Test (Below 30 MHz)



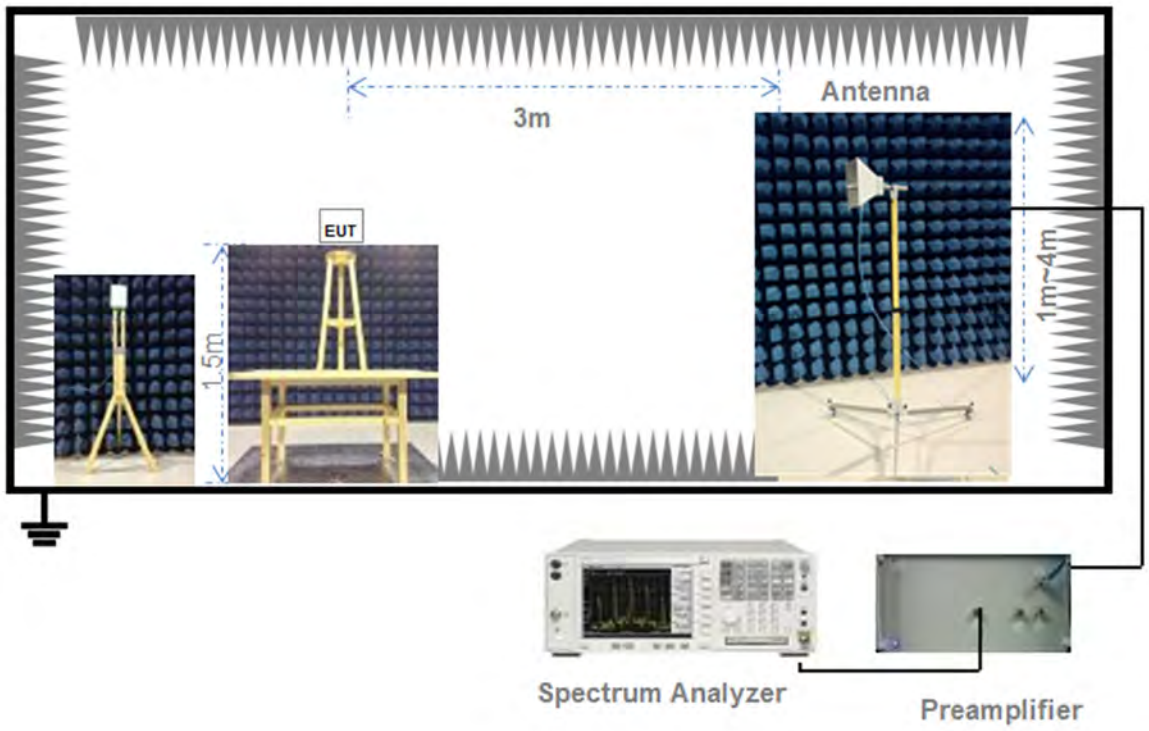
(Diagram 3)

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) $\geqslant$ 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 $\geqslant$ 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW $\geqslant$ 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	12.19	12.42	98.15%	0.08
802.11g	2.019	2.25	89.73%	0.47
802.11n-20 MHz	1.883	2.113	89.12%	0.50
802.11n-40 MHz	0.9261	1.155	80.18%	0.96

Peak Power Test Data

SISO-Antenna A

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	20.46	111.17	30	1000	Pass
Middle	20.19	104.47			Pass
High	20.33	107.89			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	25.19	330.37	30	1000	Pass
Middle	25.63	365.59			Pass
High	24.05	254.10			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	24.33	271.02	30	1000	Pass
Middle	26.11	408.32			Pass
High	23.89	244.91			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	23.80	239.88	30	1000	Pass
Middle	24.79	301.30			Pass
High	22.96	197.70			Pass

SISO-Antenna B

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.41	69.34	30	1000	Pass
Middle	18.52	71.12			Pass
High	18.66	73.45			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	23.52	224.91	30	1000	Pass
Middle	24.19	262.42			Pass
High	22.34	171.40			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	23.42	219.79	30	1000	Pass
Middle	24.33	271.02			Pass
High	22.21	166.34			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	22.44	175.39	30	1000	Pass
Middle	22.57	180.72			Pass
High	20.11	102.57			Pass

MIMO-Antenna A

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	17.03	50.47	30	1000	Pass
Middle	17.14	51.76			Pass
High	16.96	49.66			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.78	150.66	30	1000	Pass
Middle	21.98	157.76			Pass
High	20.65	116.14			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	20.94	124.17	30	1000	Pass
Middle	22.78	189.67			Pass
High	20.77	119.40			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	19.31	85.31	30	1000	Pass
Middle	21.39	137.72			Pass
High	18.51	70.96			Pass

MIMO-Antenna B

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	17.15	51.88	30	1000	Pass
Middle	16.91	49.09			Pass
High	17.29	53.58			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.73	148.94	30	1000	Pass
Middle	22.52	178.65			Pass
High	20.68	116.95			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.47	140.28	30	1000	Pass
Middle	23.15	206.54			Pass
High	20.78	119.67			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	19.92	98.17	30	1000	Pass
Middle	21.74	149.28			Pass
High	18.79	75.68			Pass

MIMO

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	20.10	102.35	30	1000	Pass
Middle	20.04	100.85			Pass
High	20.14	103.24			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	24.77	299.60	30	1000	Pass
Middle	25.27	336.41			Pass
High	23.68	233.09			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	24.22	264.45	30	1000	Pass
Middle	25.98	396.21			Pass
High	23.79	239.07			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	22.64	183.48	30	1000	Pass
Middle	24.58	287.00			Pass
High	21.66	146.64			Pass

Average Power Test Data

SISO-Antenna A

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.60	72.44	30	1000	Pass
Middle	18.79	75.68			Pass
High	18.54	71.45			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	16.62	45.92	30	1000	Pass
Middle	17.75	59.57			Pass
High	15.49	35.40			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	15.77	37.76	30	1000	Pass
Middle	17.59	57.41			Pass
High	14.98	31.48			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.85	30.55	30	1000	Pass
Middle	17.86	61.09			Pass
High	14.01	25.18			Pass

SISO-Antenna B

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	16.71	46.88	30	1000	Pass
Middle	16.79	47.75			Pass
High	16.69	46.67			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	14.89	30.83	30	1000	Pass
Middle	15.98	39.63			Pass
High	13.58	22.80			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	13.90	24.55	30	1000	Pass
Middle	15.49	35.40			Pass
High	12.99	19.91			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	13.33	21.53	30	1000	Pass
Middle	15.95	39.36			Pass
High	12.21	16.63			Pass

MIMO-Antenna A

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	13.81	24.04	30	1000	Pass
Middle	13.90	24.55			Pass
High	13.70	23.44			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	12.11	16.26	30	1000	Pass
Middle	12.99	19.91			Pass
High	10.93	12.39			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	10.88	12.25	30	1000	Pass
Middle	12.55	17.99			Pass
High	10.11	10.26			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	10.42	11.02	30	1000	Pass
Middle	13.07	20.28			Pass
High	9.39	8.69			Pass

MIMO-Antenna B

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	13.87	24.38	30	1000	Pass
Middle	13.72	23.55			Pass
High	13.78	23.88			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	12.01	15.89	30	1000	Pass
Middle	13.07	20.28			Pass
High	10.76	11.91			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	11.04	12.71	30	1000	Pass
Middle	12.80	19.05			Pass
High	10.03	10.07			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	10.50	11.22	30	1000	Pass
Middle	12.96	19.77			Pass
High	9.39	8.69			Pass

MIMO

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	16.85	48.42	30	1000	Pass
Middle	16.82	48.10			Pass
High	16.75	47.32			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	15.07	32.14	30	1000	Pass
Middle	16.04	40.18			Pass
High	13.86	24.30			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	13.97	24.95	30	1000	Pass
Middle	15.69	37.04			Pass
High	13.08	20.33			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	13.47	22.24	30	1000	Pass
Middle	16.03	40.05			Pass
High	12.40	17.38			Pass

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

SISO-Antenna A

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	23.35	216.27	36	4	Pass
Middle	23.08	203.24			Pass
High	23.22	209.89			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	28.08	642.69	36	4	Pass
Middle	28.52	711.21			Pass
High	26.94	494.31			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	27.22	527.23	36	4	Pass
Middle	29.00	794.33			Pass
High	26.78	476.43			Pass

802.11n-40 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	26.69	466.66	36	4	Pass
Middle	27.68	586.14			Pass
High	25.85	384.59			Pass

SISO-Antenna B

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	21.30	134.90	36	4	Pass
Middle	21.41	138.36			Pass
High	21.55	142.89			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	26.41	437.52	36	4	Pass
Middle	27.08	510.50			Pass
High	25.23	333.43			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	26.31	427.56	36	4	Pass
Middle	27.22	527.23			Pass
High	25.10	323.59			Pass

802.11n-40 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	25.33	341.19	36	4	Pass
Middle	25.46	351.56			Pass
High	23.00	199.53			Pass

MIMO-Antenna A

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	19.92	98.17	36	4	Pass
Middle	20.03	100.69			Pass
High	19.85	96.61			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	24.67	293.09	36	4	Pass
Middle	24.87	306.90			Pass
High	23.54	225.94			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	23.83	241.55	36	4	Pass
Middle	25.67	368.98			Pass
High	23.66	232.27			Pass

802.11n-40 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	22.20	165.96	36	4	Pass
Middle	24.28	267.92			Pass
High	21.40	138.04			Pass

MIMO-Antenna B

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	20.04	100.93	36	4	Pass
Middle	19.80	95.50			Pass
High	20.18	104.23			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	24.62	289.73	36	4	Pass
Middle	25.41	347.54			Pass
High	23.57	227.51			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	24.36	272.90	36	4	Pass
Middle	26.04	401.79			Pass
High	23.67	232.81			Pass

802.11n-40 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	22.81	190.99	36	4	Pass
Middle	24.63	290.40			Pass
High	21.68	147.23			Pass

MIMO

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	22.99	199.10	36	4	Pass
Middle	22.93	196.19			Pass
High	23.03	200.84			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	27.66	582.82	36	4	Pass
Middle	28.16	654.44			Pass
High	26.57	453.45			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	27.11	514.44	36	4	Pass
Middle	28.87	770.77			Pass
High	26.68	465.08			Pass

802.11n-40 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	25.53	356.94	36	4	Pass
Middle	27.47	558.32			Pass
High	24.55	285.27			Pass

A.2 Occupied Bandwidth

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

Test Data

SISO-Antenna A

802.11b Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	10.200000	14.528000	⩾500
Middle	10.200000	14.627000	⩾500
High	10.300000	14.629000	⩾500

802.11g Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	15.900000	17.066000	⩾500
Middle	15.800000	17.084000	⩾500
High	16.000000	16.921000	⩾500

802.11n-20 MHz Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	16.400000	18.223000	⩾500
Middle	16.400000	18.223000	⩾500
High	16.500000	18.178000	⩾500

802.11n-40 MHz Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	35.700000	36.381000	⩾500
Middle	35.300000	36.444000	⩾500
High	35.400000	36.306000	⩾500

Test Plots

SISO-Antenna A

6 dB Bandwidth

802.11b LOW CHANNEL

802.11b MIDDLE CHANNEL

802.11b HIGH CHANNEL

802.11g LOW CHANNEL

802.11g MIDDLE CHANNEL

802.11g HIGH CHANNEL

802.11n-20 MHz LOW CHANNEL

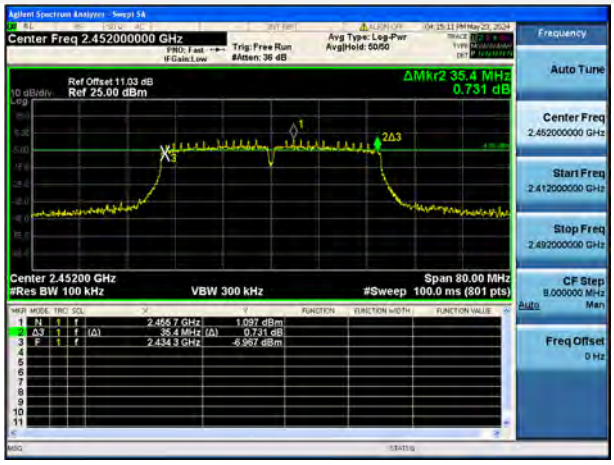
802.11n-20 MHz MIDDLE CHANNEL

802.11n-20 MHz HIGH CHANNEL

802.11n-40 MHz LOW CHANNEL

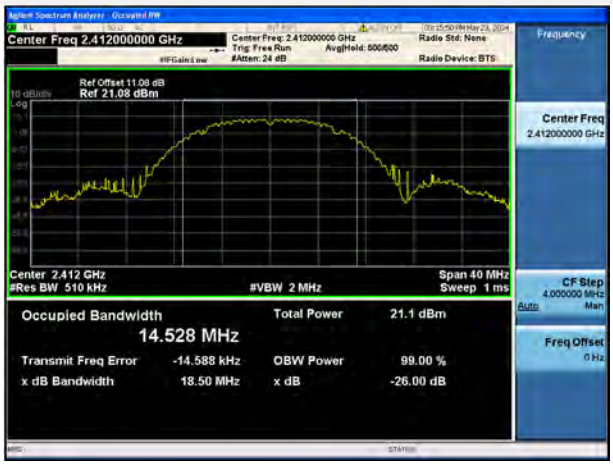
802.11n-40 MHz MIDDLE CHANNEL

802.11n-40 MHz HIGH CHANNEL



99% Bandwidth

802.11b LOW CHANNEL

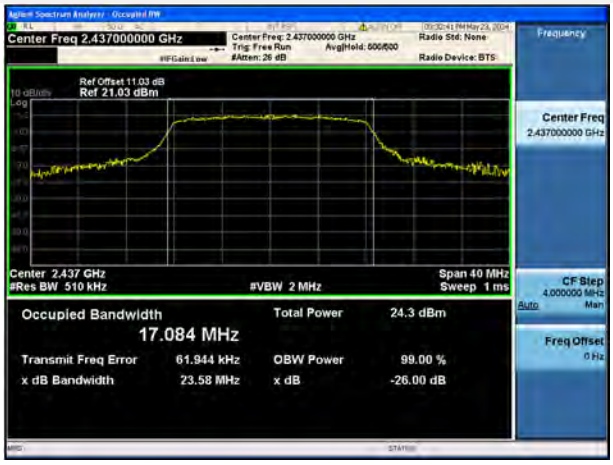


802.11b MIDDLE CHANNEL

802.11b HIGH CHANNEL

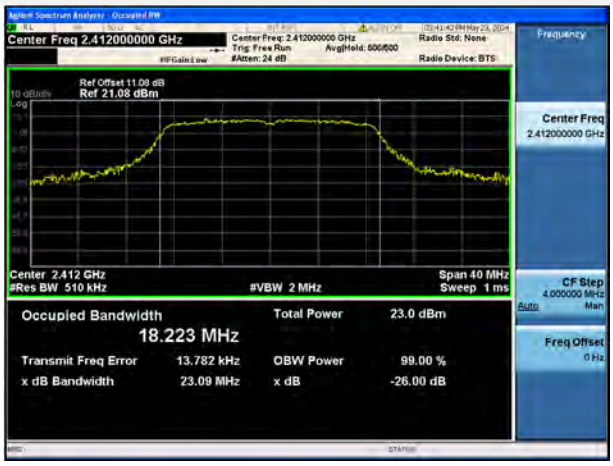
802.11g LOW CHANNEL

802.11g MIDDLE CHANNEL



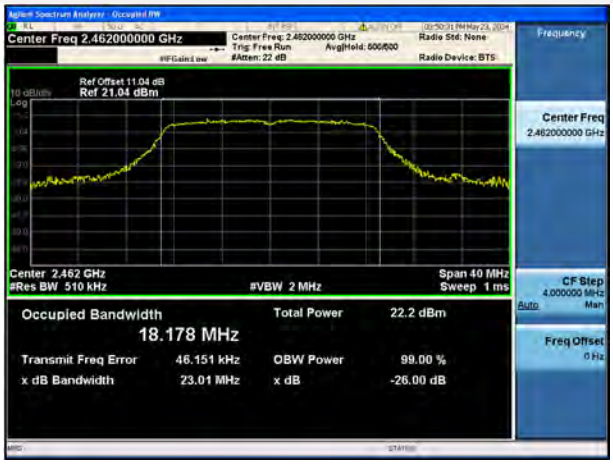
802.11g HIGH CHANNEL

802.11n-20 MHz LOW CHANNEL



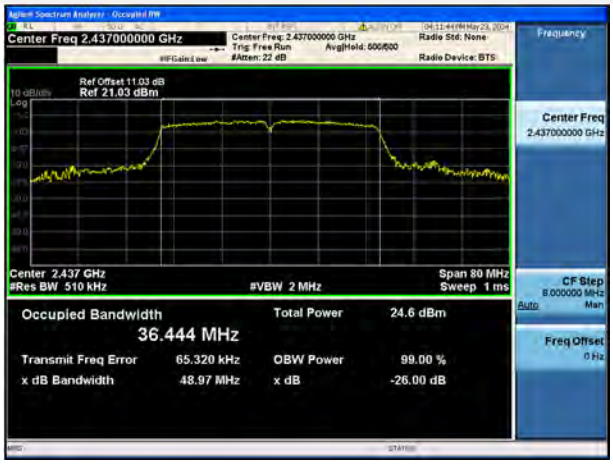
802.11n-20 MHz MIDDLE CHANNEL

802.11n-20 MHz HIGH CHANNEL



802.11n-40 MHz LOW CHANNEL

802.11n-40 MHz MIDDLE CHANNEL



802.11n-40 MHz HIGH CHANNEL

A.3 Conducted Spurious Emissions

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

Test Data

SISO-Antenna A

802.11b Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-39.15	9.21	-10.79	Pass
Middle	-38.92	8.79	-11.21	Pass
High	-38.87	8.66	-11.34	Pass

802.11g Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-38.94	6.66	-13.34	Pass
Middle	-39.95	6.99	-13.01	Pass
High	-38.84	5.50	-14.50	Pass

802.11n-20 MHz Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-39.97	5.82	-14.18	Pass
Middle	-38.51	6.84	-13.16	Pass
High	-38.90	5.21	-14.79	Pass

802.11n-40 MHz Mode:

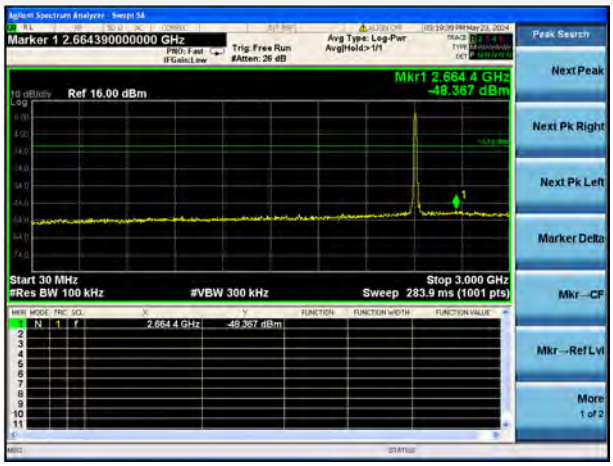
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-41.24	1.98	-18.02	Pass
Middle	-39.54	4.36	-15.64	Pass
High	-39.37	1.36	-18.64	Pass

Test Plots

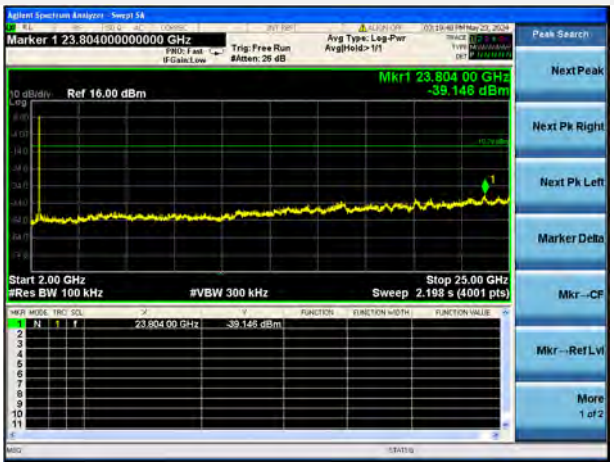
SISO-Antenna A

802.11b LOW CHANNEL CARRIER LEVEL

802.11b LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

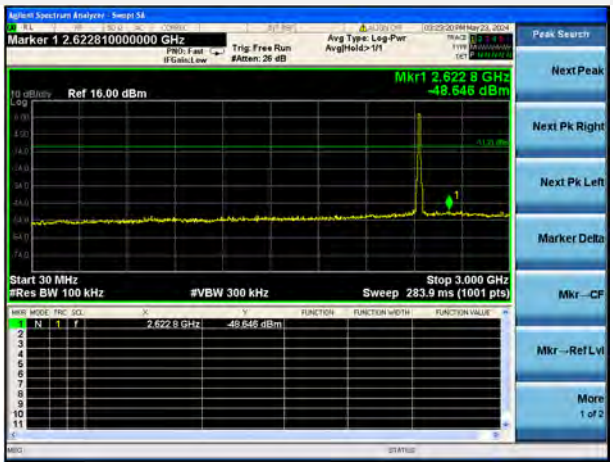


802.11b LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

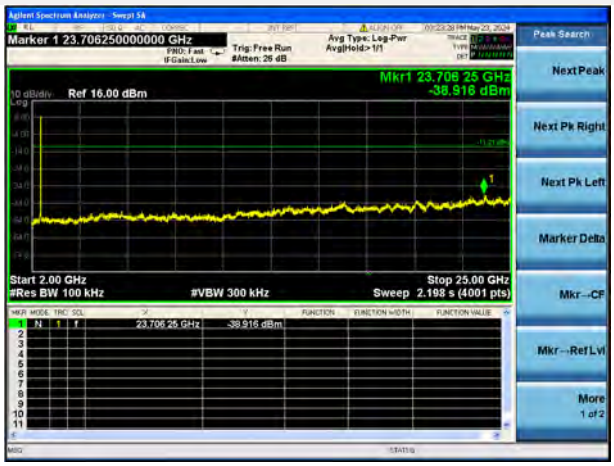


802.11b MIDDLE CHANNEL CARRIER LEVEL

802.11b MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

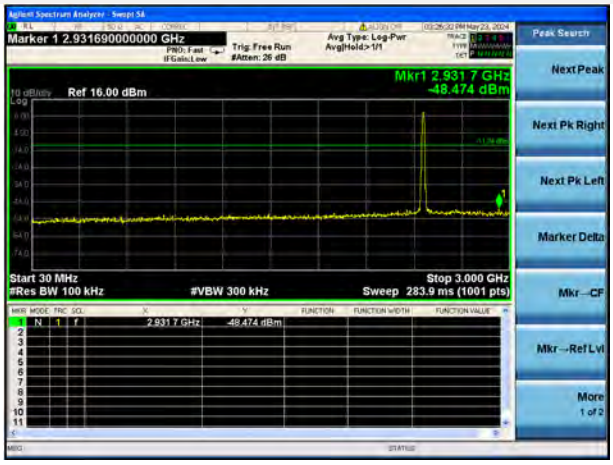


802.11b MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

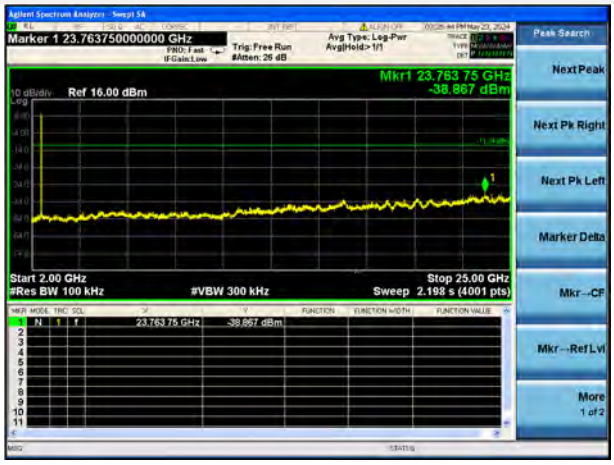


802.11b HIGH CHANNEL CARRIER LEVEL

802.11b HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

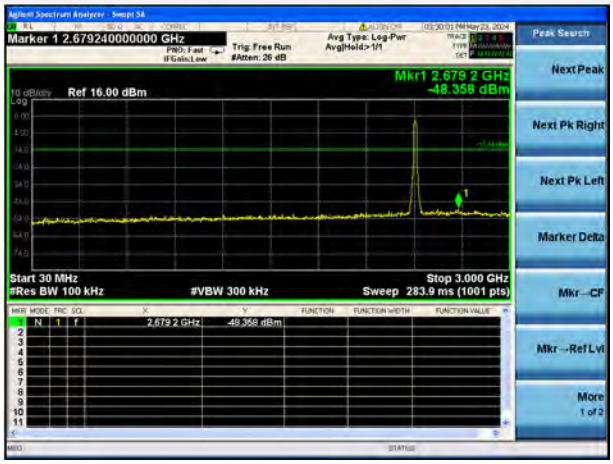


802.11b HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

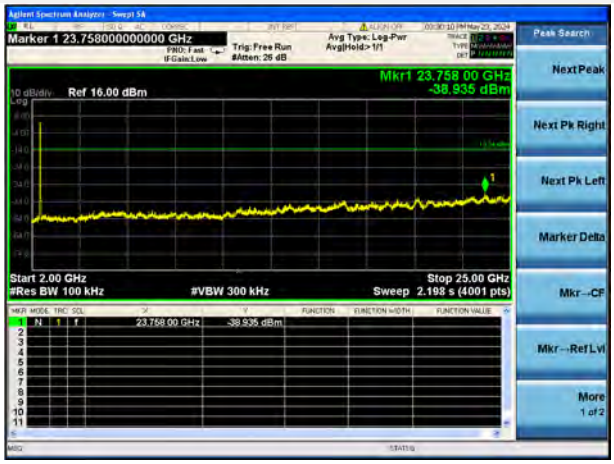


802.11g LOW CHANNEL CARRIER LEVEL

802.11g LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

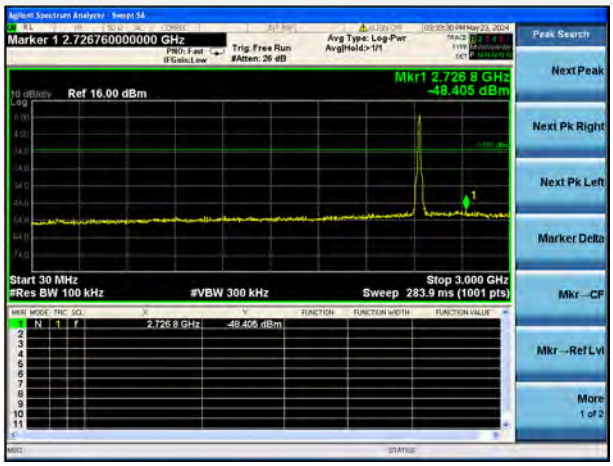


802.11g LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

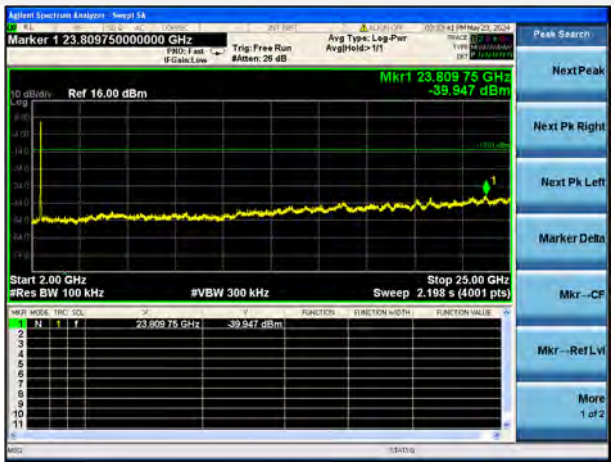


802.11g MIDDLE CHANNEL CARRIER LEVEL

802.11g MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

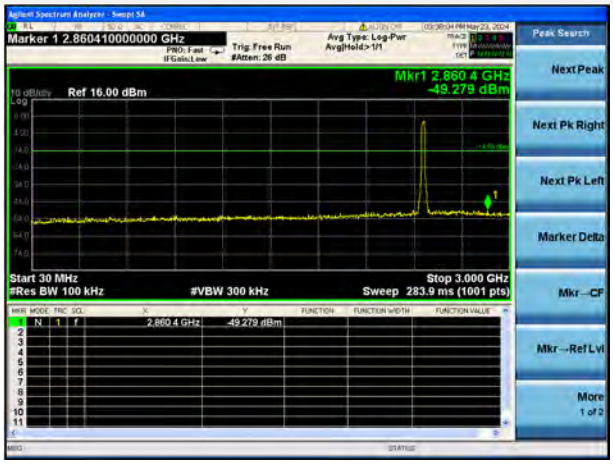


802.11g MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz



802.11g HIGH CHANNEL CARRIER LEVEL

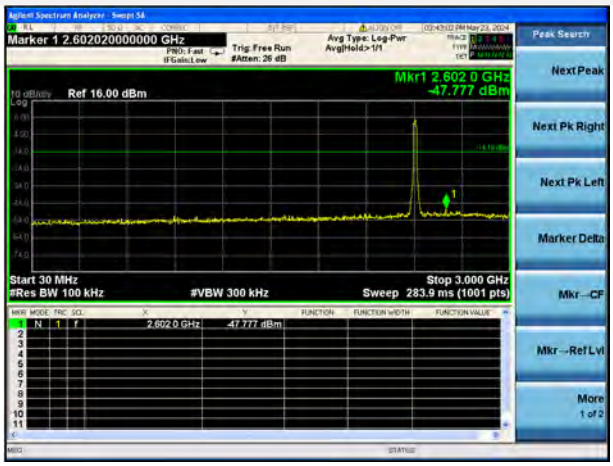
802.11g HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



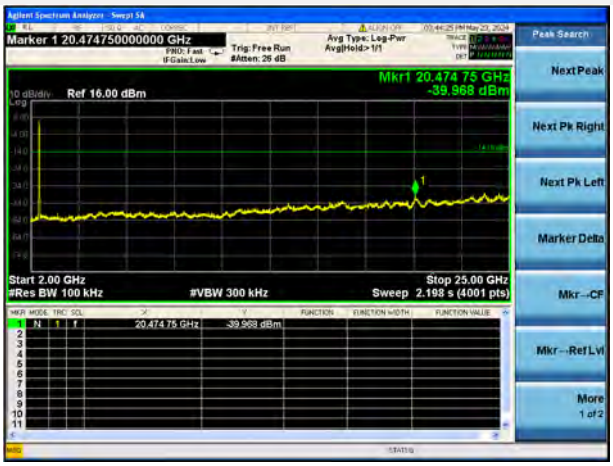
802.11g HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

802.11n-20 MHz LOW CHANNEL CARRIER LEVEL

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

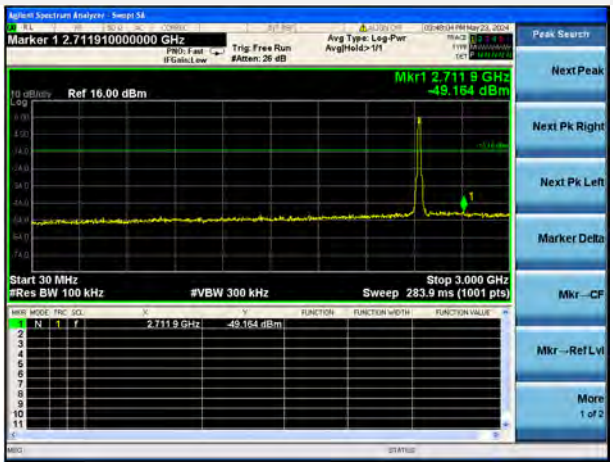


802.11n-20 MHz LOW CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

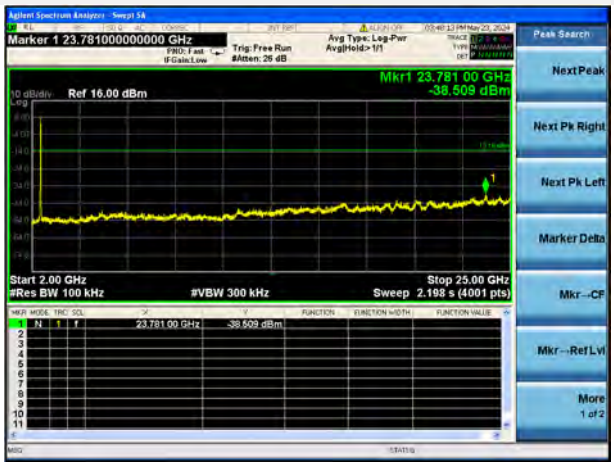


802.11n-20 MHz MIDDLE CHANNEL CARRIER LEVEL

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

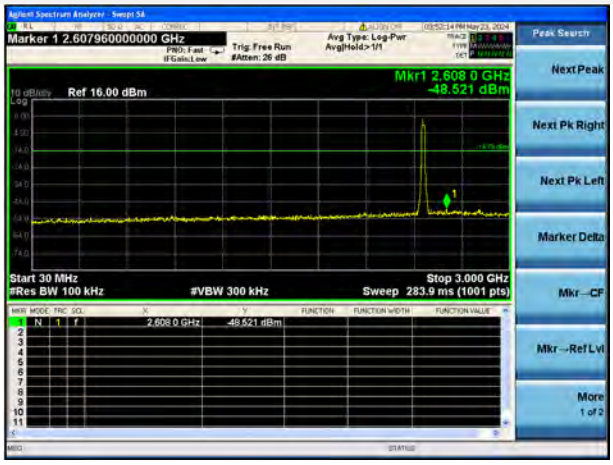


802.11n-20 MHz MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



802.11n-20 MHz HIGH CHANNEL CARRIER LEVEL

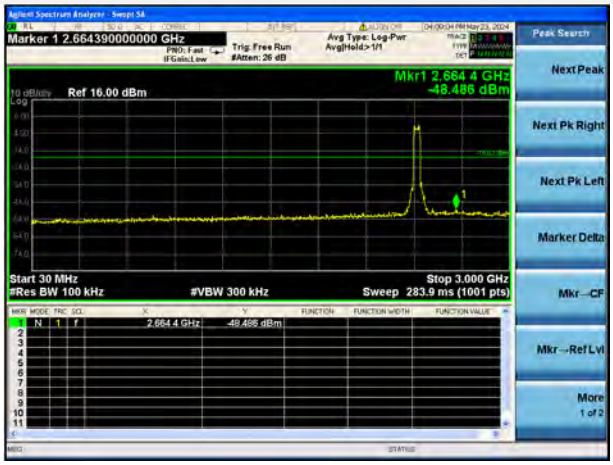
802.11n-20 MHz HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



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

802.11n-40 MHz LOW CHANNEL CARRIER LEVEL

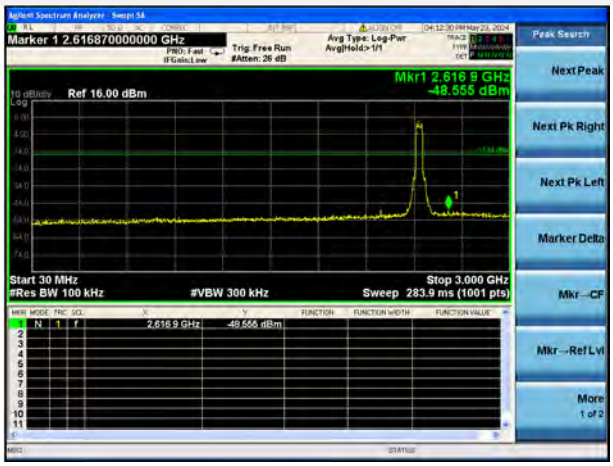
802.11n-40 MHz LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



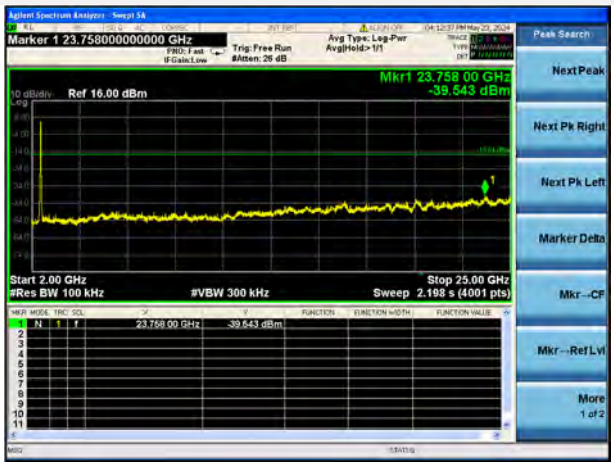
802.11n-40 MHz LOW CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

802.11n-40 MHz MIDDLE CHANNEL CARRIER LEVEL

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



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



802.11n-40 MHz HIGH CHANNEL CARRIER LEVEL

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

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

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

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

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-34.92	9.21	-10.79	Pass
High Channel	-45.99	8.66	-11.34	Pass

802.11g Mode：

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-25.71	6.66	-13.34	Pass
High Channel	-41.08	5.50	-14.50	Pass

802.11n-20 MHz Mode:

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-28.36	5.82	-14.18	Pass
High Channel	-39.62	5.21	-14.79	Pass

802.11n-40 MHz Mode:

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-32.13	1.98	-18.02	Pass
High Channel	-38.75	1.36	-18.64	Pass

Test Plots

SISO-Antenna A

802.11b LOW CHANNEL, CARRIER LEVEL

802.11b LOW CHANNEL, BAND EDGE

802.11b HIGH CHANNEL, CARRIER LEVEL

802.11b HIGH CHANNEL, BAND EDGE

802.11g LOW CHANNEL, CARRIER LEVEL

802.11g LOW CHANNEL, BAND EDGE

802.11g HIGH CHANNEL, CARRIER LEVEL

802.11g HIGH CHANNEL, BAND EDGE

802.11n-20 MHz LOW CHANNEL, CARRIER LEVEL

802.11n-20 MHz LOW CHANNEL, BAND EDGE

802.11n-20 MHz HIGH CHANNEL, CARRIER LEVEL

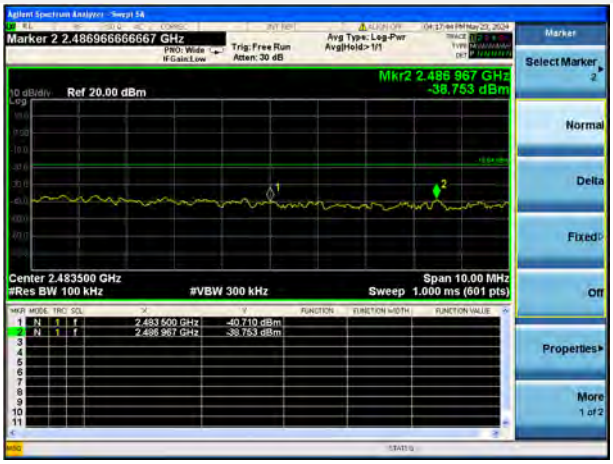
802.11n-20 MHz HIGH CHANNEL, BAND EDGE

802.11n-40 MHz LOW CHANNEL, CARRIER LEVEL

802.11n-40 MHz LOW CHANNEL, BAND EDGE

802.11n-40 MHz HIGH CHANNEL, CARRIER LEVEL

802.11n-40 MHz HIGH CHANNEL, BAND EDGE



A.5 Conducted Emissions

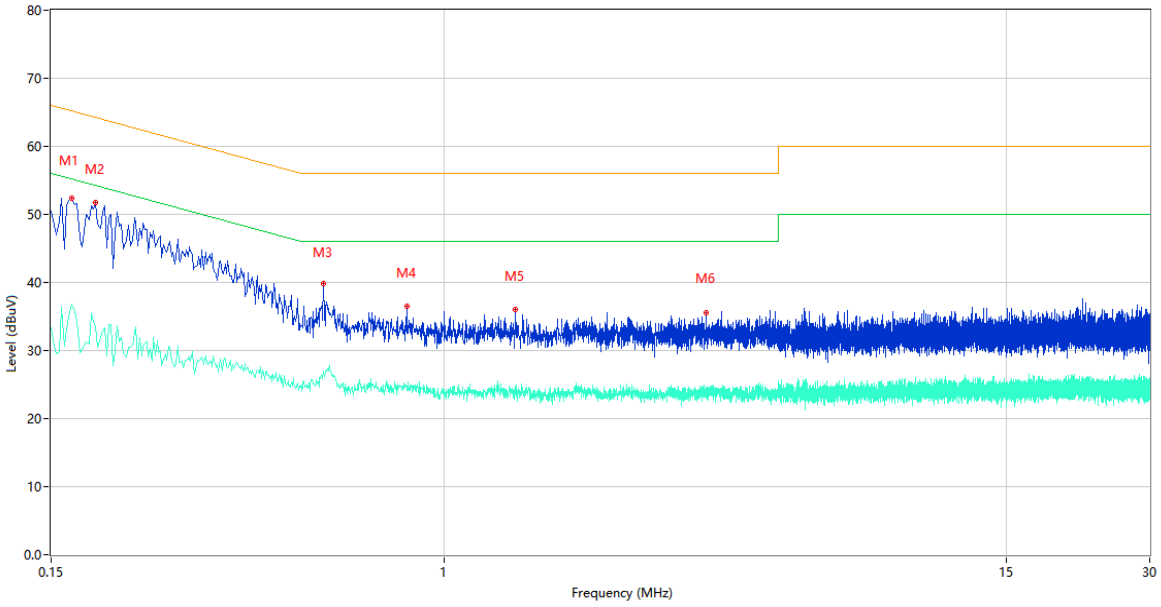
Note [1]: The EUT is working in the Normal link mode. All modes have been tested and normal link mode is worst.

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)

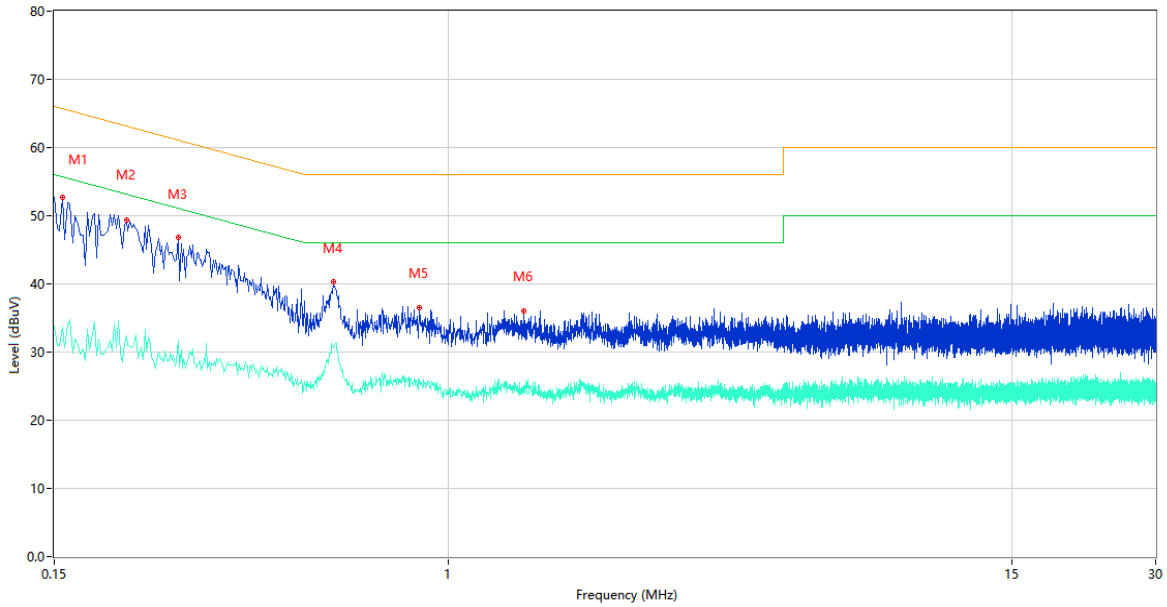
Test Data and Plots

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.166	52.41	9.78	65.16	12.75	Peak	L	Pass
1**	0.166	36.88	9.78	55.16	18.28	AV	L	Pass
2	0.186	51.67	9.78	64.21	12.54	Peak	L	Pass
2**	0.186	33.52	9.78	54.21	20.69	AV	L	Pass
3	0.558	39.89	10.05	56.00	16.11	Peak	L	Pass
3**	0.558	27.06	10.05	46.00	18.94	AV	L	Pass
4	0.834	36.46	10.59	56.00	19.54	Peak	L	Pass
4**	0.834	24.51	10.59	46.00	21.49	AV	L	Pass
5	1.410	35.97	9.81	56.00	20.03	Peak	L	Pass
5**	1.410	24.52	9.81	46.00	21.48	AV	L	Pass
6	3.526	35.58	10.16	56.00	20.42	Peak	L	Pass
6**	3.526	24.66	10.16	46.00	21.34	AV	L	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.156	52.70	9.78	65.67	12.97	Peak	N	Pass
1**	0.156	33.58	9.78	55.67	22.09	AV	N	Pass
2	0.212	49.30	9.77	63.13	13.83	Peak	N	Pass
2**	0.212	32.40	9.77	53.13	20.73	AV	N	Pass
3	0.272	46.81	9.76	61.06	14.25	Peak	N	Pass
3**	0.272	31.80	9.76	51.06	19.26	AV	N	Pass
4	0.574	40.24	10.09	56.00	15.76	Peak	N	Pass
4**	0.574	30.57	10.09	46.00	15.43	AV	N	Pass
5	0.870	36.52	10.43	56.00	19.48	Peak	N	Pass
5**	0.870	26.10	10.43	46.00	19.90	AV	N	Pass
6	1.438	36.08	9.99	56.00	19.92	Peak	N	Pass
6**	1.438	24.20	9.99	46.00	21.80	AV	N	Pass

A.6 Radiated Emission

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

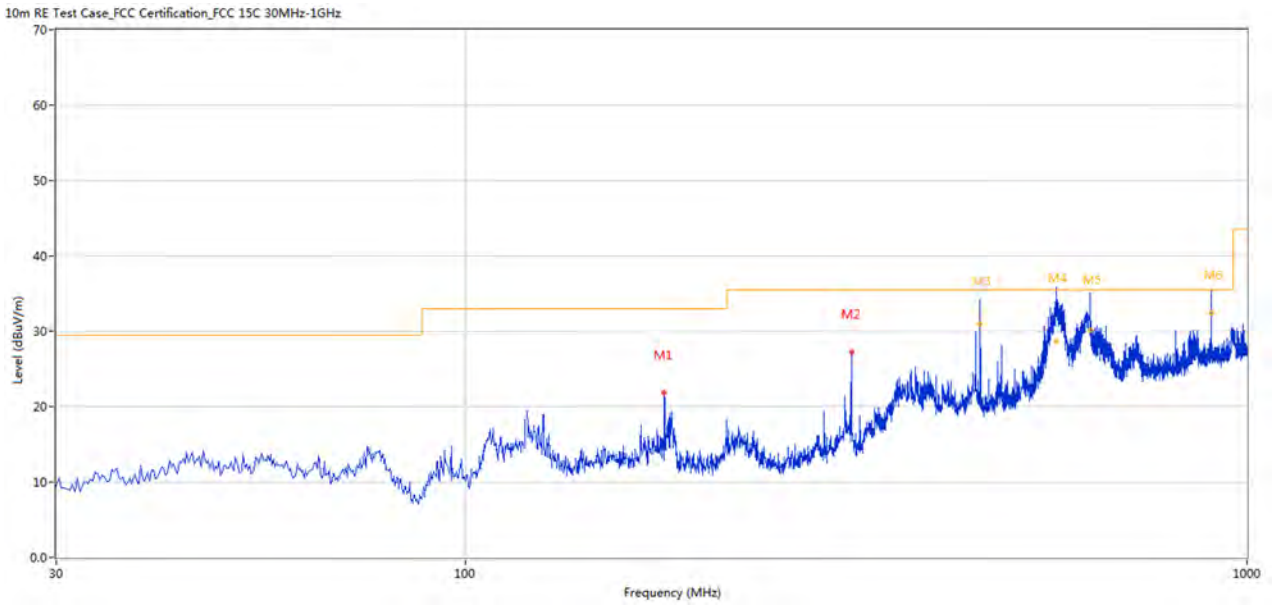
Note [2]: For the test data above 1 GHz，According the ANSI C63.10-2013, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

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.

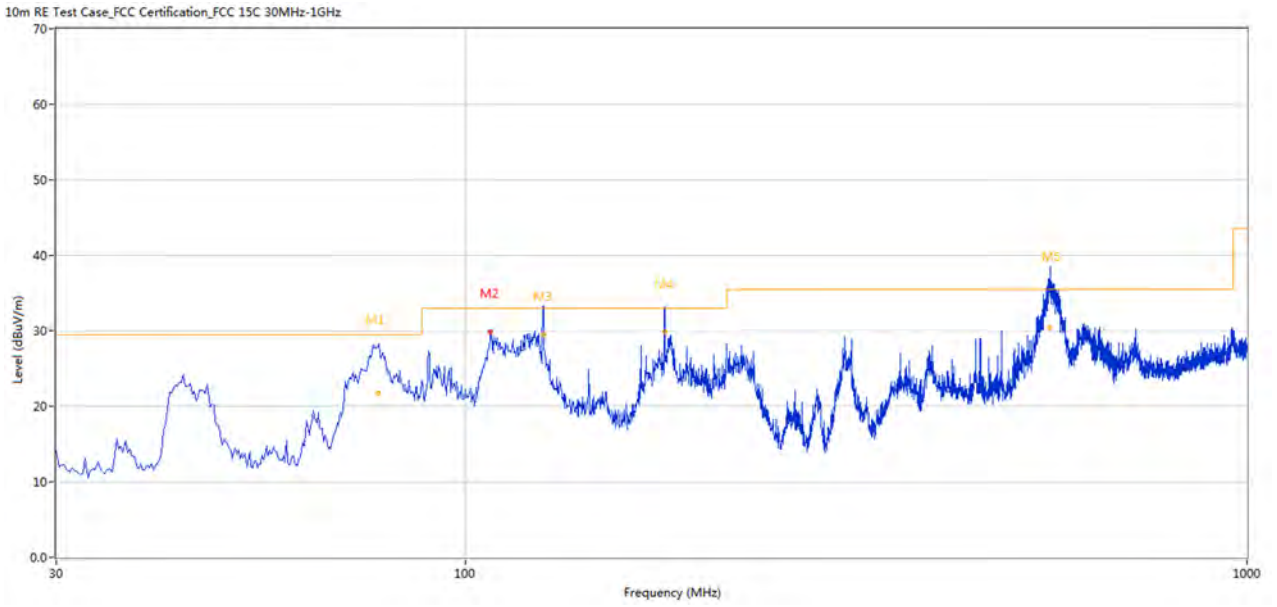
Test Data and Plots

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	179.828	21.91	-26.98	33.0	11.09	Peak	91.00	200	Horizontal	Pass
2	311.957	27.24	-24.38	35.5	8.26	Peak	0.00	200	Horizontal	Pass
3	456.000	32.51	-20.50	35.5	2.99	Peak	37.00	189	Horizontal	N/A
3*	456.000	31.01	-20.50	35.5	4.49	QP	37.00	189	Horizontal	Pass
4	569.953	35.28	-17.76	35.5	0.22	Peak	40.00	171	Horizontal	N/A
4*	569.953	28.75	-17.76	35.5	6.75	QP	40.00	171	Horizontal	Pass
5	630.001	37.70	-15.89	35.5	-2.20	Peak	53.00	172	Horizontal	N/A
5*	630.001	30.22	-15.89	35.5	5.28	QP	53.00	172	Horizontal	Pass
6	900.001	37.16	-10.84	35.5	-1.66	Peak	241.00	102	Horizontal	N/A
6*	900.001	32.47	-10.84	35.5	3.03	QP	241.00	102	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	77.294	25.12	-29.78	29.5	4.38	Peak	302.00	188	Vertical	N/A
1*	77.294	21.71	-29.78	29.5	7.79	QP	302.00	188	Vertical	Pass
2	89.883	29.69	-31.49	33.0	3.31	Peak	0.00	200	Vertical	Pass
3	107.823	29.95	-29.19	33.0	3.05	Peak	166.00	100	Vertical	Pass
4	126.000	34.51	-27.71	33.0	-1.51	Peak	340.00	110	Vertical	N/A
4*	126.000	29.55	-27.71	33.0	3.45	QP	340.00	110	Vertical	Pass
5	180.000	33.42	-26.99	33.0	-0.42	Peak	259.00	109	Vertical	N/A
5*	180.000	29.88	-26.99	33.0	3.12	QP	259.00	109	Vertical	Pass
6	559.425	35.61	-18.05	35.5	-0.11	Peak	161.00	100	Vertical	N/A
6*	559.425	30.41	-18.05	35.5	5.09	QP	161.00	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.

SISO-Antenna A

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1633.100	41.85	-17.71	74.0	32.15	Peak	360.00	100	Horizontal	Pass
1**	1633.100	32.14	-17.71	54.0	21.86	AV	360.00	100	Horizontal	Pass
2	2410.500	102.76	-13.13	74.0	-28.76	Peak	299.00	200	Horizontal	N/A
2**	2410.500	100.01	-13.13	54.0	-46.01	AV	299.00	200	Horizontal	N/A
3	2977.800	50.33	-10.37	74.0	23.67	Peak	360.00	300	Horizontal	Pass
3**	2977.800	41.39	-10.37	54.0	12.61	AV	360.00	300	Horizontal	Pass
4	4838.400	48.98	-3.51	74.0	25.02	Peak	321.00	100	Horizontal	Pass
4**	4838.400	39.69	-3.51	54.0	14.31	AV	321.00	100	Horizontal	Pass
5	6960.400	52.59	-0.54	74.0	21.41	Peak	207.00	200	Horizontal	Pass
5**	6960.400	43.89	-0.54	54.0	10.11	AV	207.00	200	Horizontal	Pass
6	16023.638	55.65	6.56	74.0	18.35	Peak	18.00	100	Horizontal	Pass
6**	16023.638	45.45	6.56	54.0	8.55	AV	18.00	100	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1513.600	41.74	-17.80	74.0	32.26	Peak	172.00	200	Vertical	Pass
1**	1513.600	32.15	-17.80	54.0	21.85	AV	172.00	200	Vertical	Pass
2	2410.700	105.45	-13.13	74.0	-31.45	Peak	83.00	100	Vertical	N/A
2**	2410.700	102.48	-13.13	54.0	-48.48	AV	83.00	100	Vertical	N/A
3	2979.100	50.30	-10.29	74.0	23.70	Peak	138.00	200	Vertical	Pass
3**	2979.100	41.81	-10.29	54.0	12.19	AV	138.00	200	Vertical	Pass
4	4852.600	49.34	-3.51	74.0	24.66	Peak	353.00	100	Vertical	Pass
4**	4852.600	39.51	-3.51	54.0	14.49	AV	353.00	100	Vertical	Pass
5	6963.200	52.96	-0.53	74.0	21.04	Peak	225.00	200	Vertical	Pass
5**	6963.200	43.59	-0.53	54.0	10.41	AV	225.00	200	Vertical	Pass
6	16022.850	54.97	6.56	74.0	19.03	Peak	167.00	300	Vertical	Pass
6**	16022.850	45.60	6.56	54.0	8.40	AV	167.00	300	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1198.800	51.20	-18.18	74.0	22.80	Peak	220.00	150	Horizontal	Pass
1**	1198.800	34.31	-18.18	54.0	19.69	AV	220.00	150	Horizontal	Pass
2	2435.700	102.47	-12.45	74.0	-28.47	Peak	159.00	200	Horizontal	N/A
2**	2435.700	99.51	-12.45	54.0	-45.51	AV	159.00	200	Horizontal	N/A
3	2986.200	50.99	-10.14	74.0	23.01	Peak	311.00	100	Horizontal	Pass
3**	2986.200	42.23	-10.14	54.0	11.77	AV	311.00	100	Horizontal	Pass
4	4939.600	49.23	-3.90	74.0	24.77	Peak	234.00	300	Horizontal	Pass
4**	4939.600	40.02	-3.90	54.0	13.98	AV	234.00	300	Horizontal	Pass
5	6988.000	52.95	-0.46	74.0	21.05	Peak	277.00	400	Horizontal	Pass
5**	6988.000	43.29	-0.46	54.0	10.71	AV	277.00	400	Horizontal	Pass
6	17289.677	55.35	6.48	74.0	18.65	Peak	147.00	300	Horizontal	Pass
6**	17289.677	45.83	6.48	54.0	8.17	AV	147.00	300	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1198.900	42.43	-18.18	74.0	31.57	Peak	209.00	150	Vertical	Pass
1**	1198.900	31.86	-18.18	54.0	22.14	AV	209.00	150	Vertical	Pass
2	2435.500	104.88	-12.46	74.0	-30.88	Peak	52.00	200	Vertical	N/A
2**	2435.500	102.00	-12.46	54.0	-48.00	AV	52.00	200	Vertical	N/A
3	2978.200	50.81	-10.35	74.0	23.19	Peak	241.00	100	Vertical	Pass
3**	2978.200	42.50	-10.35	54.0	11.50	AV	241.00	100	Vertical	Pass
4	4973.600	49.16	-3.95	74.0	24.84	Peak	271.00	200	Vertical	Pass
4**	4973.600	40.03	-3.95	54.0	13.97	AV	271.00	200	Vertical	Pass
5	6990.200	52.49	-0.42	74.0	21.51	Peak	105.00	100	Vertical	Pass
5**	6990.200	43.99	-0.42	54.0	10.01	AV	105.00	100	Vertical	Pass
6	17271.300	54.98	6.36	74.0	19.02	Peak	118.00	400	Vertical	Pass
6**	17271.300	45.96	6.36	54.0	8.04	AV	118.00	400	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1440.400	48.42	-17.57	74.0	25.58	Peak	230.00	150	Horizontal	Pass
1**	1440.400	35.97	-17.57	54.0	18.03	AV	230.00	150	Horizontal	Pass
2	2463.500	101.35	-13.03	74.0	-27.35	Peak	196.00	100	Horizontal	N/A
2**	2463.500	98.35	-13.03	54.0	-44.35	AV	196.00	100	Horizontal	N/A
3	2986.500	50.48	-10.14	74.0	23.52	Peak	313.00	100	Horizontal	Pass
3**	2986.500	41.97	-10.14	54.0	12.03	AV	313.00	100	Horizontal	Pass
4	4888.200	49.24	-3.58	74.0	24.76	Peak	0.00	200	Horizontal	Pass
4**	4888.200	39.96	-3.58	54.0	14.04	AV	0.00	200	Horizontal	Pass
5	6836.200	53.15	-1.12	74.0	20.85	Peak	291.00	200	Horizontal	Pass
5**	6836.200	43.02	-1.12	54.0	10.98	AV	291.00	200	Horizontal	Pass
6	17290.725	55.16	6.49	74.0	18.84	Peak	97.00	400	Horizontal	Pass
6**	17290.725	46.17	6.49	54.0	7.83	AV	97.00	400	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1200.100	43.94	-18.16	74.0	30.06	Peak	340.00	150	Vertical	Pass
1**	1200.100	31.87	-18.16	54.0	22.13	AV	340.00	150	Vertical	Pass
2	2463.400	104.11	-13.03	74.0	-30.11	Peak	181.00	200	Vertical	N/A
2**	2463.400	101.15	-13.03	54.0	-47.15	AV	181.00	200	Vertical	N/A
3	2997.100	50.92	-10.14	74.0	23.08	Peak	1.00	200	Vertical	Pass
3**	2997.100	41.69	-10.14	54.0	12.31	AV	1.00	200	Vertical	Pass
4	4955.400	49.42	-3.96	74.0	24.58	Peak	349.00	100	Vertical	Pass
4**	4955.400	40.01	-3.96	54.0	13.99	AV	349.00	100	Vertical	Pass
5	6893.200	53.37	-0.51	74.0	20.63	Peak	3.00	100	Vertical	Pass
5**	6893.200	43.18	-0.51	54.0	10.82	AV	3.00	100	Vertical	Pass
6	17271.562	55.39	6.36	74.0	18.61	Peak	0.00	150	Vertical	Pass
6**	17271.562	45.34	6.36	54.0	8.66	AV	0.00	150	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1086.100	44.45	-18.73	74.0	29.55	Peak	208.00	150	Horizontal	Pass
1**	1086.100	30.63	-18.73	54.0	23.37	AV	208.00	150	Horizontal	Pass
2	2410.600	100.60	-13.13	74.0	-26.60	Peak	196.00	150	Horizontal	N/A
2**	2410.600	97.65	-13.13	54.0	-43.65	AV	196.00	150	Horizontal	N/A
3	2957.800	50.71	-10.32	74.0	23.29	Peak	311.00	200	Horizontal	Pass
3**	2957.800	40.89	-10.32	54.0	13.11	AV	311.00	200	Horizontal	Pass
4	4944.600	50.36	-3.88	74.0	23.64	Peak	278.00	400	Horizontal	Pass
4**	4944.600	39.71	-3.88	54.0	14.29	AV	278.00	400	Horizontal	Pass
5	6967.200	52.59	-0.47	74.0	21.41	Peak	139.00	200	Horizontal	Pass
5**	6967.200	43.59	-0.47	54.0	10.41	AV	139.00	200	Horizontal	Pass
6	17298.338	55.36	6.54	74.0	18.64	Peak	153.00	200	Horizontal	Pass
6**	17298.338	46.24	6.54	54.0	7.76	AV	153.00	200	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1668.600	41.44	-17.41	74.0	32.56	Peak	356.00	400	Vertical	Pass
1**	1668.600	32.31	-17.41	54.0	21.69	AV	356.00	400	Vertical	Pass
2	2410.600	103.30	-13.13	74.0	-29.30	Peak	52.00	100	Vertical	N/A
2**	2410.600	100.24	-13.13	54.0	-46.24	AV	52.00	100	Vertical	N/A
3	2959.500	50.17	-10.38	74.0	23.83	Peak	74.00	200	Vertical	Pass
3**	2959.500	41.24	-10.38	54.0	12.76	AV	74.00	200	Vertical	Pass
4	4880.400	49.20	-3.64	74.0	24.80	Peak	360.00	300	Vertical	Pass
4**	4880.400	39.97	-3.64	54.0	14.03	AV	360.00	300	Vertical	Pass
5	6931.400	52.67	-0.35	74.0	21.33	Peak	248.00	100	Vertical	Pass
5**	6931.400	43.35	-0.35	54.0	10.65	AV	248.00	100	Vertical	Pass
6	17253.450	54.65	6.24	74.0	19.35	Peak	341.00	400	Vertical	Pass
6**	17253.450	44.80	6.24	54.0	9.20	AV	341.00	400	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1199.000	47.23	-18.17	74.0	26.77	Peak	243.00	150	Horizontal	Pass
1**	1199.000	33.77	-18.17	54.0	20.23	AV	243.00	150	Horizontal	Pass
2	2435.600	99.74	-12.45	74.0	-25.74	Peak	141.00	150	Horizontal	N/A
2**	2435.600	96.79	-12.45	54.0	-42.79	AV	141.00	150	Horizontal	N/A
3	2982.600	50.24	-10.25	74.0	23.76	Peak	260.00	200	Horizontal	Pass
3**	2982.600	42.34	-10.25	54.0	11.66	AV	260.00	200	Horizontal	Pass
4	4823.800	49.71	-3.67	74.0	24.29	Peak	270.00	100	Horizontal	Pass
4**	4823.800	39.76	-3.67	54.0	14.24	AV	270.00	100	Horizontal	Pass
5	6837.400	53.22	-1.15	74.0	20.78	Peak	204.00	200	Horizontal	Pass
5**	6837.400	42.53	-1.15	54.0	11.47	AV	204.00	200	Horizontal	Pass
6	16100.025	55.17	6.89	74.0	18.83	Peak	175.00	400	Horizontal	Pass
6**	16100.025	45.37	6.89	54.0	8.63	AV	175.00	400	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1512.100	41.45	-17.81	74.0	32.55	Peak	323.00	400	Vertical	Pass
1**	1512.100	31.67	-17.81	54.0	22.33	AV	323.00	400	Vertical	Pass
2	2435.600	103.52	-12.45	74.0	-29.52	Peak	52.00	150	Vertical	N/A
2**	2435.600	100.57	-12.45	54.0	-46.57	AV	52.00	150	Vertical	N/A
3	2968.100	51.20	-10.50	74.0	22.80	Peak	235.00	200	Vertical	Pass
3**	2968.100	40.96	-10.50	54.0	13.04	AV	235.00	200	Vertical	Pass
4	4872.600	49.33	-3.58	74.0	24.67	Peak	30.00	300	Vertical	Pass
4**	4872.600	40.02	-3.58	54.0	13.98	AV	30.00	300	Vertical	Pass
5	6946.800	52.27	-0.42	74.0	21.73	Peak	52.00	200	Vertical	Pass
5**	6946.800	43.47	-0.42	54.0	10.53	AV	52.00	200	Vertical	Pass
6	17273.661	56.00	6.37	74.0	18.00	Peak	297.00	400	Vertical	Pass
6**	17273.661	45.50	6.37	54.0	8.50	AV	297.00	400	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1439.900	44.81	-17.58	74.0	29.19	Peak	327.00	150	Horizontal	Pass
1**	1439.900	36.22	-17.58	54.0	17.78	AV	327.00	150	Horizontal	Pass
2	2463.500	98.60	-13.03	74.0	-24.60	Peak	305.00	150	Horizontal	N/A
2**	2463.500	95.65	-13.03	54.0	-41.65	AV	305.00	150	Horizontal	N/A
3	2977.700	51.17	-10.38	74.0	22.83	Peak	133.00	200	Horizontal	Pass
3**	2977.700	41.43	-10.38	54.0	12.57	AV	133.00	200	Horizontal	Pass
4	4850.800	49.40	-3.50	74.0	24.60	Peak	313.00	100	Horizontal	Pass
4**	4850.800	39.90	-3.50	54.0	14.10	AV	313.00	100	Horizontal	Pass
5	6988.400	52.57	-0.44	74.0	21.43	Peak	226.00	300	Horizontal	Pass
5**	6988.400	43.31	-0.44	54.0	10.69	AV	226.00	300	Horizontal	Pass
6	17800.761	54.87	5.32	74.0	19.13	Peak	5.00	100	Horizontal	Pass
6**	17800.761	45.71	5.32	54.0	8.29	AV	5.00	100	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1866.500	43.50	-16.42	74.0	30.50	Peak	341.00	150	Vertical	Pass
1**	1866.500	37.64	-16.42	54.0	16.36	AV	341.00	150	Vertical	Pass
2	2463.500	101.84	-13.03	74.0	-27.84	Peak	164.00	200	Vertical	N/A
2**	2463.500	98.91	-13.03	54.0	-44.91	AV	164.00	200	Vertical	N/A
3	2613.000	52.69	-12.10	74.0	21.31	Peak	41.00	150	Vertical	Pass
3**	2613.000	39.42	-12.10	54.0	14.58	AV	41.00	150	Vertical	Pass
4	4974.800	49.84	-3.94	74.0	24.16	Peak	265.00	300	Vertical	Pass
4**	4974.800	40.19	-3.94	54.0	13.81	AV	265.00	300	Vertical	Pass
5	6875.000	53.15	-0.95	74.0	20.85	Peak	251.00	100	Vertical	Pass
5**	6875.000	43.21	-0.95	54.0	10.79	AV	251.00	100	Vertical	Pass
6	17311.726	55.35	6.36	74.0	18.65	Peak	308.00	100	Vertical	Pass
6**	17311.726	45.72	6.36	54.0	8.28	AV	308.00	100	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1276.700	43.75	-17.46	74.0	30.25	Peak	279.00	150	Horizontal	Pass
1**	1276.700	33.07	-17.46	54.0	20.93	AV	279.00	150	Horizontal	Pass
2	2410.700	100.54	-13.13	74.0	-26.54	Peak	195.00	150	Horizontal	N/A
2**	2410.700	97.54	-13.13	54.0	-43.54	AV	195.00	150	Horizontal	N/A
3	2517.900	52.20	-12.81	74.0	21.80	Peak	64.00	150	Horizontal	Pass
3**	2517.900	48.00	-12.81	54.0	6.00	AV	64.00	150	Horizontal	Pass
4	4920.800	50.13	-3.76	74.0	23.87	Peak	89.00	100	Horizontal	Pass
4**	4920.800	39.62	-3.76	54.0	14.38	AV	89.00	100	Horizontal	Pass
5	6974.600	52.71	-0.40	74.0	21.29	Peak	312.00	200	Horizontal	Pass
5**	6974.600	43.52	-0.40	54.0	10.48	AV	312.00	200	Horizontal	Pass
6	17298.338	55.93	6.54	74.0	18.07	Peak	220.00	400	Horizontal	Pass
6**	17298.338	46.11	6.54	54.0	7.89	AV	220.00	400	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1866.200	43.64	-16.42	74.0	30.36	Peak	227.00	150	Vertical	Pass
1**	1866.200	38.95	-16.42	54.0	15.05	AV	227.00	150	Vertical	Pass
2	2410.600	103.38	-13.13	74.0	-29.38	Peak	55.00	100	Vertical	N/A
2**	2410.600	100.47	-13.13	54.0	-46.47	AV	55.00	100	Vertical	N/A
3	2988.700	51.89	-10.18	74.0	22.11	Peak	360.00	200	Vertical	Pass
3**	2988.700	41.97	-10.18	54.0	12.03	AV	360.00	200	Vertical	Pass
4	4863.800	49.84	-3.57	74.0	24.16	Peak	272.00	200	Vertical	Pass
4**	4863.800	40.19	-3.57	54.0	13.81	AV	272.00	200	Vertical	Pass
5	6872.400	52.53	-0.92	74.0	21.47	Peak	265.00	100	Vertical	Pass
5**	6872.400	43.28	-0.92	54.0	10.72	AV	265.00	100	Vertical	Pass
6	16095.037	55.41	6.89	74.0	18.59	Peak	308.00	400	Vertical	Pass
6**	16095.037	46.26	6.89	54.0	7.74	AV	308.00	400	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1199.300	49.30	-18.17	74.0	24.70	Peak	197.00	150	Horizontal	Pass
1**	1199.300	33.10	-18.17	54.0	20.90	AV	197.00	150	Horizontal	Pass
2	2435.600	99.38	-12.45	74.0	-25.38	Peak	197.00	100	Horizontal	N/A
2**	2435.600	96.32	-12.45	54.0	-42.32	AV	197.00	100	Horizontal	N/A
3	2973.100	50.55	-10.48	74.0	23.45	Peak	93.00	200	Horizontal	Pass
3**	2973.100	40.70	-10.48	54.0	13.30	AV	93.00	200	Horizontal	Pass
4	4848.800	50.12	-3.45	74.0	23.88	Peak	276.00	400	Horizontal	Pass
4**	4848.800	40.23	-3.45	54.0	13.77	AV	276.00	400	Horizontal	Pass
5	6996.400	53.22	-0.45	74.0	20.78	Peak	254.00	300	Horizontal	Pass
5**	6996.400	43.54	-0.45	54.0	10.46	AV	254.00	300	Horizontal	Pass
6	17275.501	55.25	6.39	74.0	18.75	Peak	231.00	300	Horizontal	Pass
6**	17275.501	44.99	6.39	54.0	9.01	AV	231.00	300	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1866.400	43.87	-16.42	74.0	30.13	Peak	311.00	150	Vertical	Pass
1**	1866.400	37.79	-16.42	54.0	16.21	AV	311.00	150	Vertical	Pass
2	2435.500	103.37	-12.46	74.0	-29.37	Peak	53.00	100	Vertical	N/A
2**	2435.500	100.52	-12.46	54.0	-46.52	AV	53.00	100	Vertical	N/A
3	2983.200	50.87	-10.23	74.0	23.13	Peak	133.00	200	Vertical	Pass
3**	2983.200	40.90	-10.23	54.0	13.10	AV	133.00	200	Vertical	Pass
4	4862.600	49.73	-3.55	74.0	24.27	Peak	197.00	200	Vertical	Pass
4**	4862.600	39.33	-3.55	54.0	14.67	AV	197.00	200	Vertical	Pass
5	6938.200	52.60	-0.41	74.0	21.40	Peak	0.00	300	Vertical	Pass
5**	6938.200	43.35	-0.41	54.0	10.65	AV	0.00	300	Vertical	Pass
6	16126.800	54.84	6.77	74.0	19.16	Peak	263.00	100	Vertical	Pass
6**	16126.800	44.97	6.77	54.0	9.03	AV	263.00	100	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1201.300	44.04	-18.14	74.0	29.96	Peak	319.00	150	Horizontal	Pass
1**	1201.300	35.29	-18.14	54.0	18.71	AV	319.00	150	Horizontal	Pass
2	2463.400	99.01	-13.03	74.0	-25.01	Peak	307.00	100	Horizontal	N/A
2**	2463.400	96.09	-13.03	54.0	-42.09	AV	307.00	100	Horizontal	N/A
3	2970.300	50.69	-10.59	74.0	23.31	Peak	276.00	200	Horizontal	Pass
3**	2970.300	41.16	-10.59	54.0	12.84	AV	276.00	200	Horizontal	Pass
4	4903.800	49.86	-3.53	74.0	24.14	Peak	272.00	300	Horizontal	Pass
4**	4903.800	39.74	-3.53	54.0	14.26	AV	272.00	300	Horizontal	Pass
5	6969.800	52.29	-0.43	74.0	21.71	Peak	222.00	200	Horizontal	Pass
5**	6969.800	43.57	-0.43	54.0	10.43	AV	222.00	200	Horizontal	Pass
6	17259.225	55.98	6.28	74.0	18.02	Peak	29.00	100	Horizontal	Pass
6**	17259.225	46.18	6.28	54.0	7.82	AV	29.00	100	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1866.400	43.86	-16.42	74.0	30.14	Peak	218.00	150	Vertical	Pass
1**	1866.400	36.85	-16.42	54.0	17.15	AV	218.00	150	Vertical	Pass
2	2463.300	102.26	-13.03	74.0	-28.26	Peak	179.00	200	Vertical	N/A
2**	2463.300	99.39	-13.03	54.0	-45.39	AV	179.00	200	Vertical	N/A
3	2990.000	50.57	-10.24	74.0	23.43	Peak	298.00	200	Vertical	Pass
3**	2990.000	40.89	-10.24	54.0	13.11	AV	298.00	200	Vertical	Pass
4	4893.600	49.32	-3.63	74.0	24.68	Peak	348.00	300	Vertical	Pass
4**	4893.600	40.17	-3.63	54.0	13.83	AV	348.00	300	Vertical	Pass
5	6975.200	52.24	-0.41	74.0	21.76	Peak	100.00	400	Vertical	Pass
5**	6975.200	44.54	-0.41	54.0	9.46	AV	100.00	400	Vertical	Pass
6	17304.637	55.55	6.48	74.0	18.45	Peak	108.00	400	Vertical	Pass
6**	17304.637	45.03	6.48	54.0	8.97	AV	108.00	400	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1866.300	44.22	-16.42	74.0	29.78	Peak	78.00	150	Horizontal	Pass
1**	1866.300	36.39	-16.42	54.0	17.61	AV	78.00	150	Horizontal	Pass
2	2413.700	94.37	-13.08	74.0	-20.37	Peak	194.00	100	Horizontal	N/A
2**	2413.700	91.41	-13.08	54.0	-37.41	AV	194.00	100	Horizontal	N/A
3	2943.400	51.41	-10.55	74.0	22.59	Peak	155.00	100	Horizontal	Pass
3**	2943.400	40.62	-10.55	54.0	13.38	AV	155.00	100	Horizontal	Pass
4	4953.400	49.11	-3.85	74.0	24.89	Peak	250.00	100	Horizontal	Pass
4**	4953.400	40.32	-3.85	54.0	13.68	AV	250.00	100	Horizontal	Pass
5	6891.400	52.40	-0.57	74.0	21.60	Peak	178.00	200	Horizontal	Pass
5**	6891.400	43.50	-0.57	54.0	10.50	AV	178.00	200	Horizontal	Pass
6	16089.000	55.11	6.89	74.0	18.89	Peak	187.00	200	Horizontal	Pass
6**	16089.000	45.86	6.89	54.0	8.14	AV	187.00	200	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1866.200	43.55	-16.42	74.0	30.45	Peak	184.00	150	Vertical	Pass
1**	1866.200	37.44	-16.42	54.0	16.56	AV	184.00	150	Vertical	Pass
2	2430.300	97.56	-12.53	74.0	-23.56	Peak	47.00	200	Vertical	N/A
2**	2430.300	94.72	-12.53	54.0	-40.72	AV	47.00	200	Vertical	N/A
3	2949.300	50.48	-10.34	74.0	23.52	Peak	293.00	100	Vertical	Pass
3**	2949.300	40.36	-10.34	54.0	13.64	AV	293.00	100	Vertical	Pass
4	4876.400	49.10	-3.60	74.0	24.90	Peak	272.00	100	Vertical	Pass
4**	4876.400	40.12	-3.60	54.0	13.88	AV	272.00	100	Vertical	Pass
5	6997.400	52.55	-0.46	74.0	21.45	Peak	0.00	300	Vertical	Pass
5**	6997.400	43.69	-0.46	54.0	10.31	AV	0.00	300	Vertical	Pass
6	16149.375	55.41	6.67	74.0	18.59	Peak	265.00	100	Vertical	Pass
6**	16149.375	45.14	6.67	54.0	8.86	AV	265.00	100	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1198.900	50.68	-18.18	74.0	23.32	Peak	210.00	150	Horizontal	Pass
1**	1198.900	33.84	-18.18	54.0	20.16	AV	210.00	150	Horizontal	Pass
2	2428.800	94.18	-12.57	74.0	-20.18	Peak	193.00	150	Horizontal	N/A
2**	2428.800	91.28	-12.57	54.0	-37.28	AV	193.00	150	Horizontal	N/A
3	2959.500	51.19	-10.38	74.0	22.81	Peak	148.00	150	Horizontal	Pass
3**	2959.500	41.23	-10.38	54.0	12.77	AV	148.00	150	Horizontal	Pass
4	4845.200	49.40	-3.54	74.0	24.60	Peak	25.00	100	Horizontal	Pass
4**	4845.200	40.14	-3.54	54.0	13.86	AV	25.00	100	Horizontal	Pass
5	6983.200	52.46	-0.51	74.0	21.54	Peak	177.00	300	Horizontal	Pass
5**	6983.200	42.88	-0.51	54.0	11.12	AV	177.00	300	Horizontal	Pass
6	17265.263	55.27	6.32	74.0	18.73	Peak	41.00	400	Horizontal	Pass
6**	17265.263	45.63	6.32	54.0	8.37	AV	41.00	400	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1864.100	43.51	-16.38	74.0	30.49	Peak	216.00	150	Vertical	Pass
1**	1864.100	33.88	-16.38	54.0	20.12	AV	216.00	150	Vertical	Pass
2	2428.600	98.41	-12.56	74.0	-24.41	Peak	50.00	150	Vertical	N/A
2**	2428.600	95.43	-12.56	54.0	-41.43	AV	50.00	150	Vertical	N/A
3	2990.600	51.34	-10.23	74.0	22.66	Peak	133.00	150	Vertical	Pass
3**	2990.600	41.49	-10.23	54.0	12.51	AV	133.00	150	Vertical	Pass
4	4938.000	49.26	-3.91	74.0	24.74	Peak	91.00	100	Vertical	Pass
4**	4938.000	40.32	-3.91	54.0	13.68	AV	91.00	100	Vertical	Pass
5	6939.200	52.83	-0.39	74.0	21.17	Peak	170.00	400	Vertical	Pass
5**	6939.200	43.47	-0.39	54.0	10.53	AV	170.00	400	Vertical	Pass
6	16142.026	55.21	6.70	74.0	18.79	Peak	130.00	200	Vertical	Pass
6**	16142.026	45.35	6.70	54.0	8.65	AV	130.00	200	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1091.100	44.18	-18.62	74.0	29.82	Peak	205.00	150	Horizontal	Pass
1**	1091.100	30.19	-18.62	54.0	23.81	AV	205.00	150	Horizontal	Pass
2	2441.100	99.94	-12.47	74.0	-25.94	Peak	156.00	200	Horizontal	N/A
2**	2441.100	91.97	-12.47	54.0	-37.97	AV	156.00	200	Horizontal	N/A
3	2993.200	51.03	-10.12	74.0	22.97	Peak	165.00	150	Horizontal	Pass
3**	2993.200	41.27	-10.12	54.0	12.73	AV	165.00	150	Horizontal	Pass
4	4804.200	49.81	-3.48	74.0	24.19	Peak	105.00	400	Horizontal	Pass
4**	4804.200	41.24	-3.48	54.0	12.76	AV	105.00	400	Horizontal	Pass
5	6932.400	52.43	-0.37	74.0	21.57	Peak	0.00	400	Horizontal	Pass
5**	6932.400	43.25	-0.37	54.0	10.75	AV	0.00	400	Horizontal	Pass
6	17308.051	55.37	6.42	74.0	18.63	Peak	63.00	100	Horizontal	Pass
6**	17308.051	46.03	6.42	54.0	7.97	AV	63.00	100	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1866.300	44.54	-16.42	74.0	29.46	Peak	226.00	150	Vertical	Pass
1**	1866.300	37.44	-16.42	54.0	16.56	AV	226.00	150	Vertical	Pass
2	2442.200	102.44	-12.52	74.0	-28.44	Peak	49.00	200	Vertical	N/A
2**	2442.200	94.95	-12.52	54.0	-40.95	AV	49.00	200	Vertical	N/A
3	2986.900	50.29	-10.14	74.0	23.71	Peak	294.00	100	Vertical	Pass
3**	2986.900	41.91	-10.14	54.0	12.09	AV	294.00	100	Vertical	Pass
4	4825.400	48.82	-3.63	74.0	25.18	Peak	98.00	300	Vertical	Pass
4**	4825.400	39.99	-3.63	54.0	14.01	AV	98.00	300	Vertical	Pass
5	6928.600	52.76	-0.37	74.0	21.24	Peak	332.00	400	Vertical	Pass
5**	6928.600	43.06	-0.37	54.0	10.94	AV	332.00	400	Vertical	Pass
6	16117.349	55.04	6.81	74.0	18.96	Peak	196.00	300	Vertical	Pass
6**	16117.349	45.28	6.81	54.0	8.72	AV	196.00	300	Vertical	Pass

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

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

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

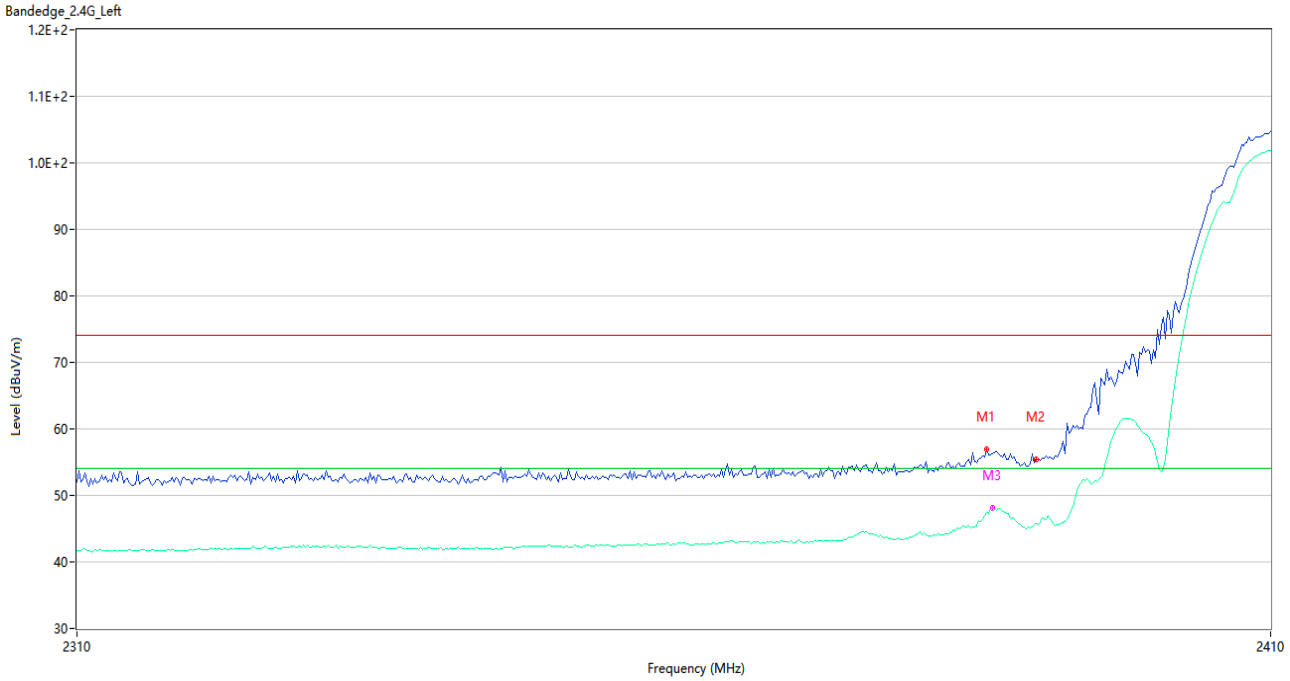
Note [3]: According the ANSI C63.10-2013, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

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

Test Data and Plots

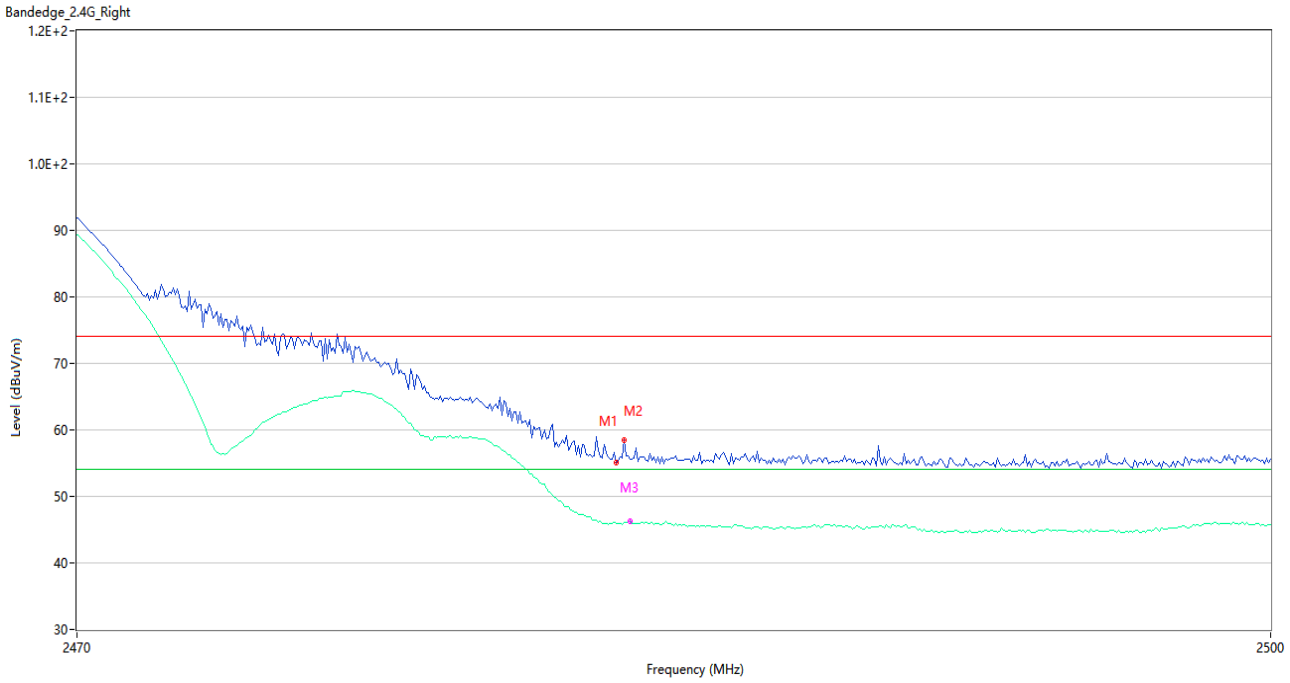
SISO-Antenna A

802.11b LOW CHANNEL



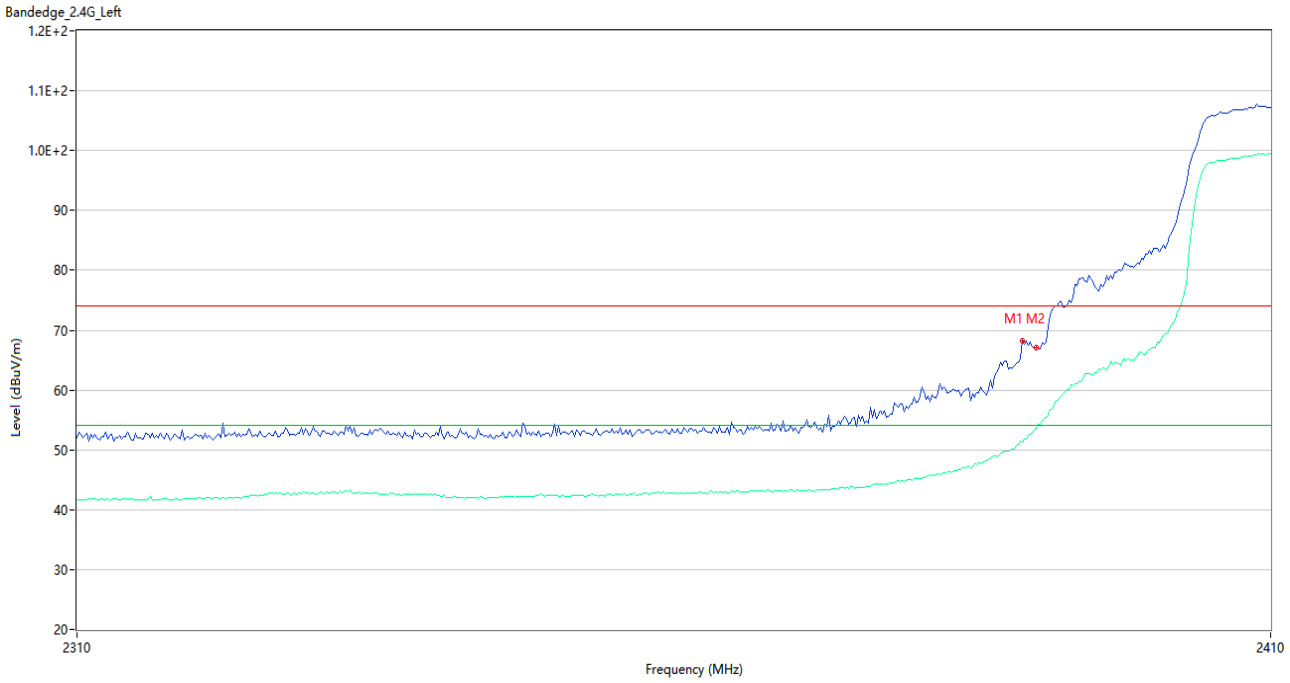
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2385.833	56.94	-2.21	74.0	17.06	Peak	244.00	100	Vertical	Pass
1**	2385.833	47.38	-2.21	54.0	6.62	AV	244.00	100	Vertical	Pass
2	2390.000	55.40	-2.35	74.0	18.60	Peak	221.00	200	Vertical	Pass
2**	2390.000	45.77	-2.35	54.0	8.23	AV	221.00	200	Vertical	Pass
3	2386.333	56.19	-2.20	74.0	17.81	Peak	229.00	150	Vertical	Pass
3**	2386.333	48.08	-2.20	54.0	5.92	AV	229.00	150	Vertical	Pass

802.11b HIGH CHANNEL



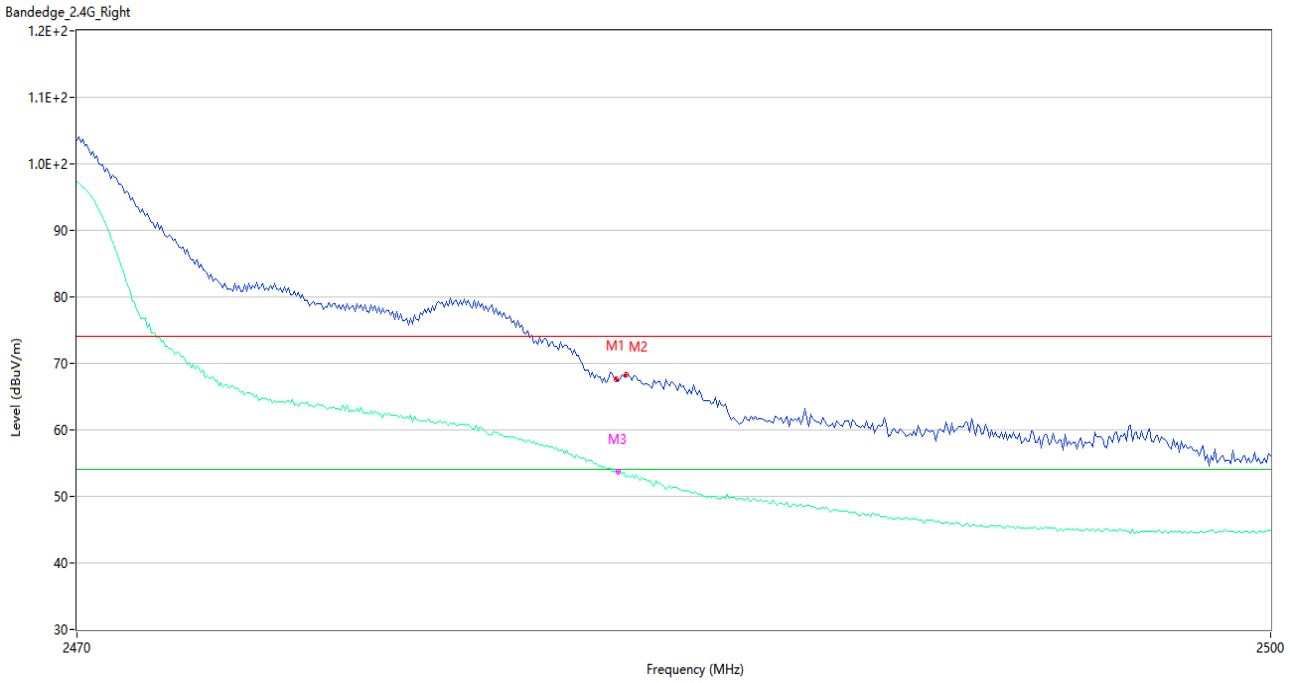
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	55.07	-0.86	74.0	18.93	Peak	206.00	100	Vertical	Pass
1**	2483.500	45.92	-0.86	54.0	8.08	AV	206.00	100	Vertical	Pass
2	2483.700	58.44	-0.85	74.0	15.56	Peak	306.00	150	Vertical	Pass
2**	2483.700	46.06	-0.85	54.0	7.94	AV	306.00	150	Vertical	Pass
3	2483.850	55.67	-0.85	74.0	18.33	Peak	238.00	150	Vertical	Pass
3**	2483.850	46.26	-0.85	54.0	7.74	AV	238.00	150	Vertical	Pass

802.11g LOW CHANNEL



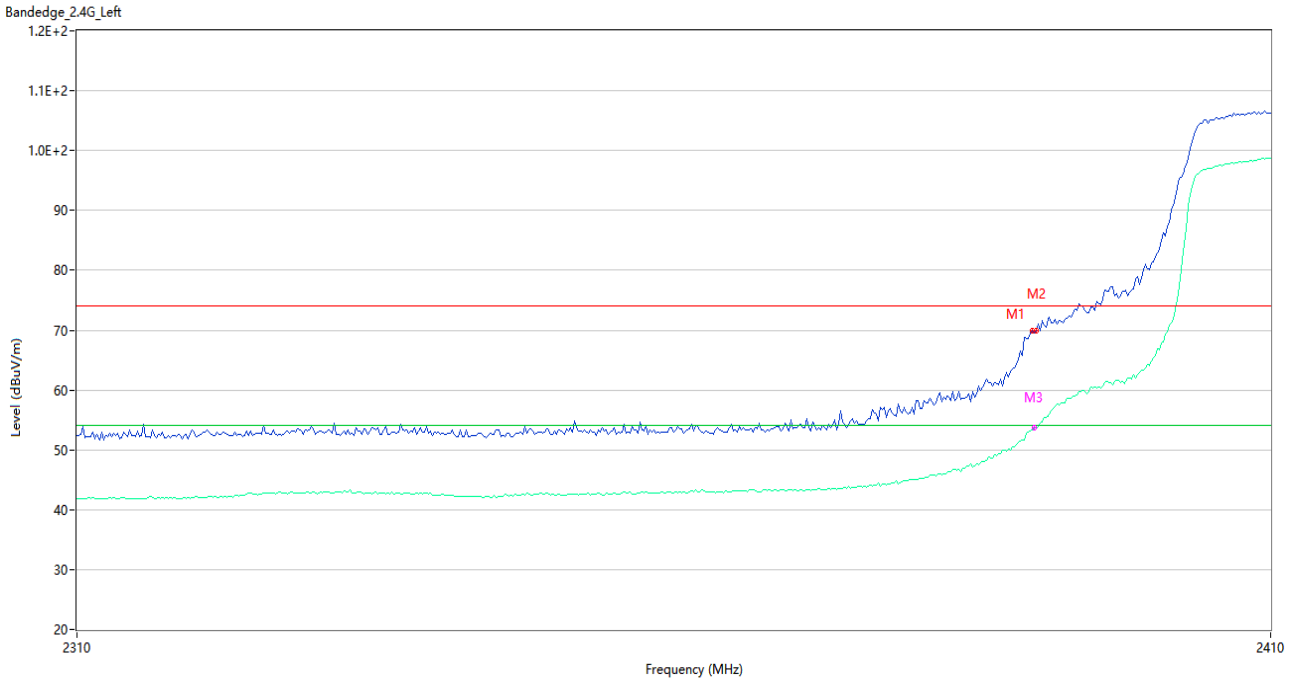
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2388.833	68.26	-2.31	74.0	5.74	Peak	245.00	150	Vertical	Pass
1**	2388.833	51.29	-2.31	54.0	2.71	AV	245.00	150	Vertical	Pass
2	2390.000	67.06	-2.35	74.0	6.94	Peak	245.00	200	Vertical	Pass
2**	2390.000	53.49	-2.35	54.0	0.51	AV	245.00	200	Vertical	Pass

802.11g HIGH CHANNEL



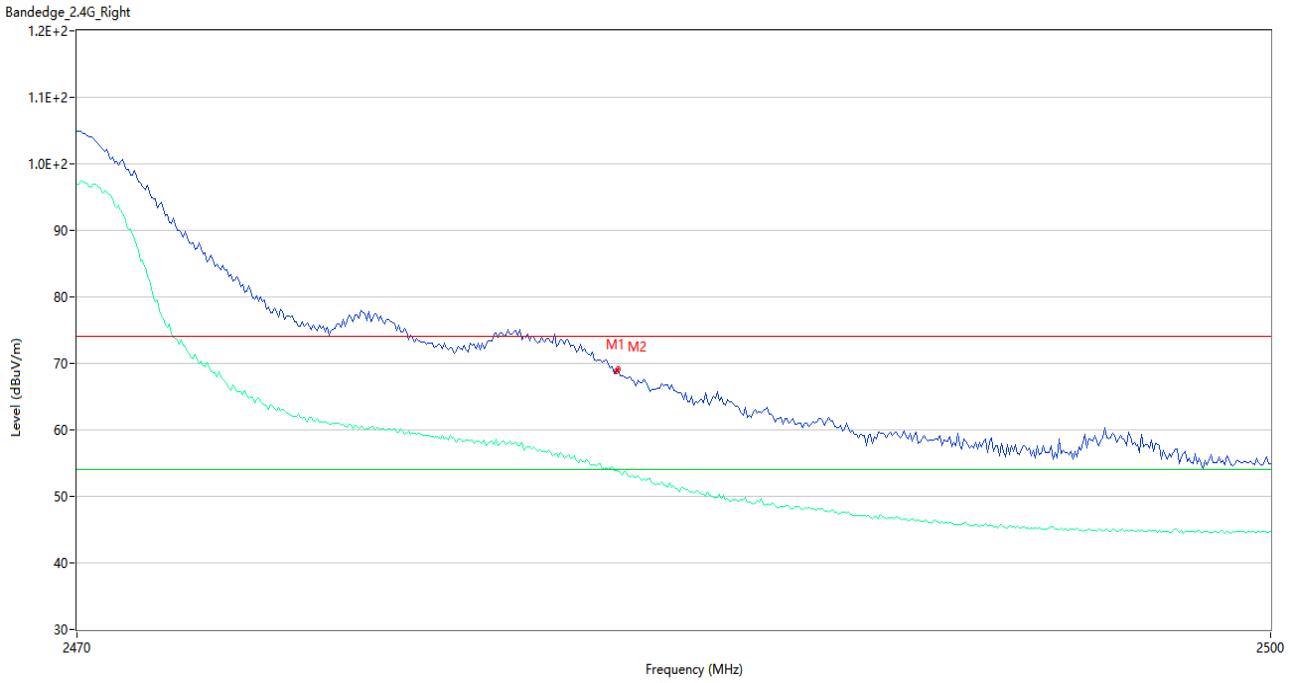
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	67.66	-0.86	74.0	6.34	Peak	311.00	200	Vertical	Pass
1**	2483.500	53.54	-0.86	54.0	0.46	AV	311.00	200	Vertical	Pass
2	2483.750	68.33	-0.85	74.0	5.67	Peak	308.00	200	Vertical	Pass
2**	2483.750	52.96	-0.85	54.0	1.04	AV	308.00	200	Vertical	Pass
3	2483.550	67.28	-0.86	74.0	6.72	Peak	215.00	150	Vertical	Pass
3**	2483.550	53.67	-0.86	54.0	0.33	AV	215.00	150	Vertical	Pass

802.11n20 LOW CHANNEL



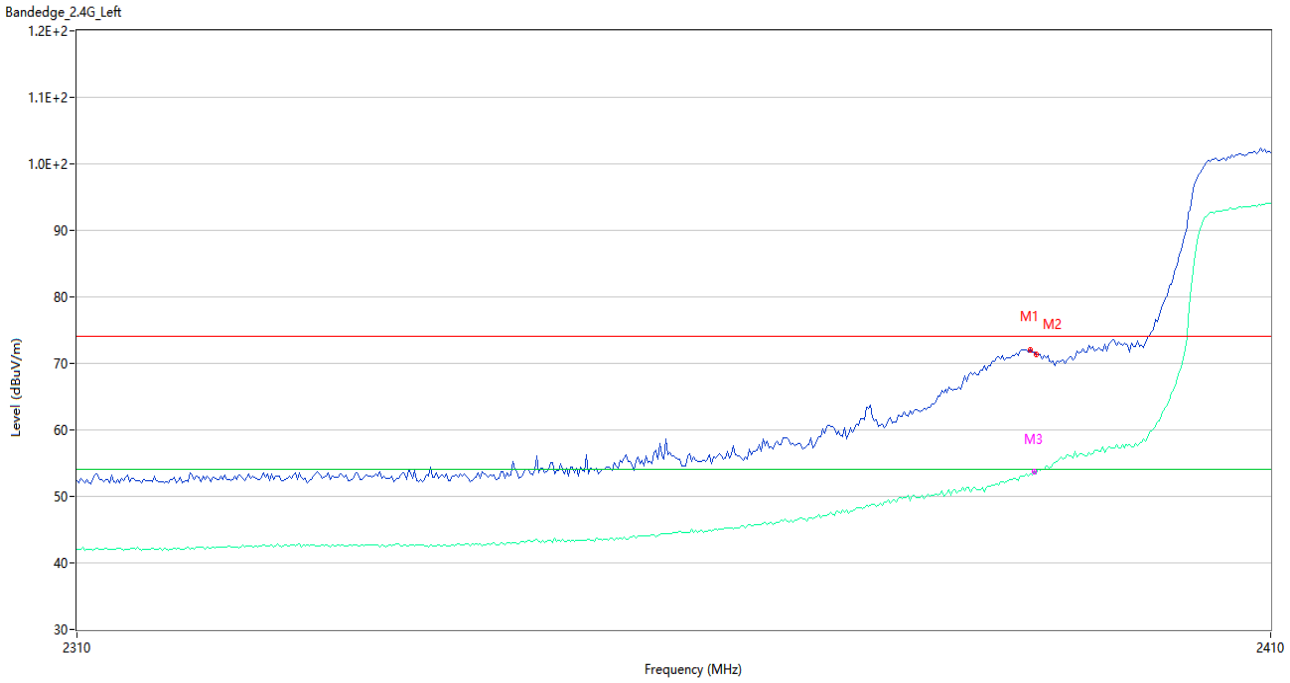
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2389.667	69.93	-2.34	74.0	4.07	Peak	219.00	200	Vertical	Pass
1**	2389.667	53.24	-2.34	54.0	0.76	AV	219.00	200	Vertical	Pass
2	2390.000	69.88	-2.35	74.0	4.12	Peak	213.00	100	Vertical	Pass
2**	2390.000	53.49	-2.35	54.0	0.51	AV	213.00	100	Vertical	Pass
3	2389.833	69.59	-2.34	74.0	4.41	Peak	222.00	150	Vertical	Pass
3**	2389.833	53.64	-2.34	54.0	0.36	AV	222.00	150	Vertical	Pass

802.11n20 HIGH CHANNEL



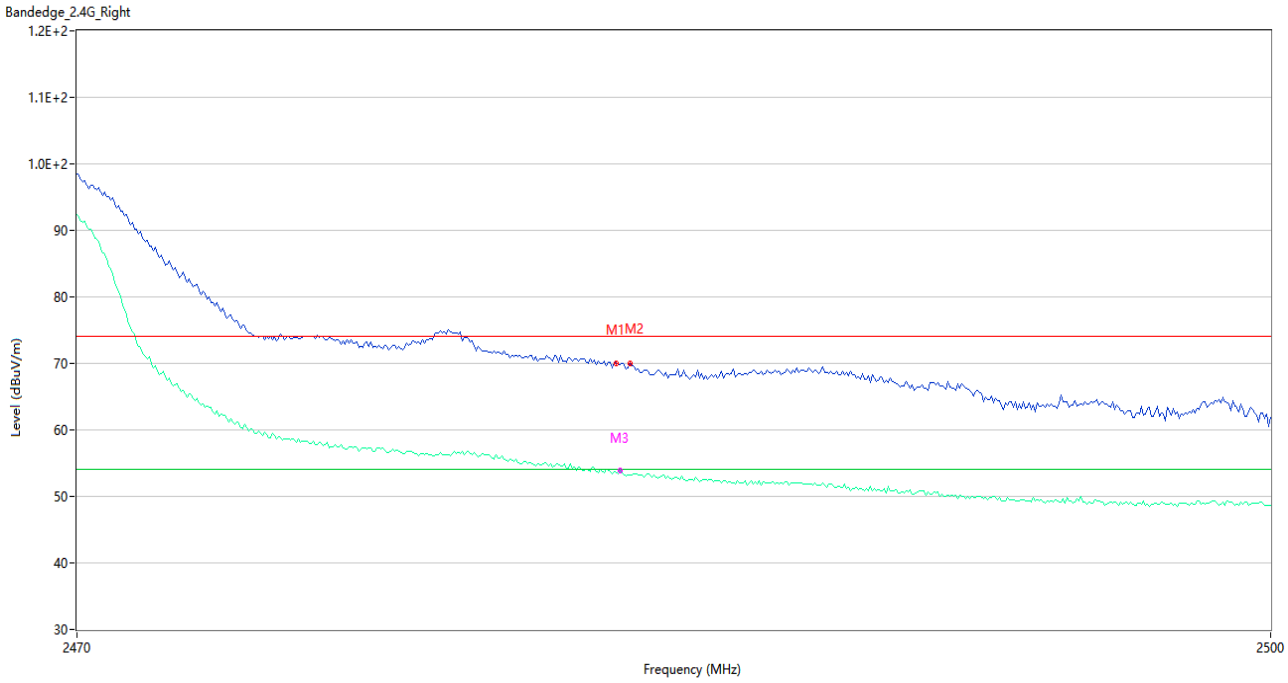
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	68.78	-0.86	74.0	5.22	Peak	238.00	200	Vertical	Pass
1**	2483.500	53.85	-0.86	54.0	0.15	AV	238.00	200	Vertical	Pass
2	2483.550	69.13	-0.86	74.0	4.87	Peak	307.00	150	Vertical	Pass
2**	2483.550	53.70	-0.86	54.0	0.30	AV	307.00	150	Vertical	Pass

802.11n40 LOW CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2389.500	72.10	-2.33	74.0	1.90	Peak	240.00	200	Vertical	Pass
1**	2389.500	53.33	-2.33	54.0	0.67	AV	240.00	200	Vertical	Pass
2	2390.000	71.41	-2.35	74.0	2.59	Peak	245.00	100	Vertical	Pass
2**	2390.000	53.44	-2.35	54.0	0.56	AV	245.00	100	Vertical	Pass
3	2389.833	71.68	-2.34	74.0	2.32	Peak	207.00	150	Vertical	Pass
3**	2389.833	53.74	-2.34	54.0	0.26	AV	207.00	150	Vertical	Pass

802.11n40 HIGH CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	70.02	-0.86	74.0	3.98	Peak	311.00	100	Vertical	Pass
1**	2483.500	53.48	-0.86	54.0	0.52	AV	311.00	100	Vertical	Pass
2	2483.850	70.03	-0.85	74.0	3.97	Peak	311.00	100	Vertical	Pass
2**	2483.850	53.30	-0.85	54.0	0.70	AV	311.00	100	Vertical	Pass
3	2483.600	69.91	-0.86	74.0	4.09	Peak	261.00	150	Vertical	Pass
3**	2483.600	53.85	-0.86	54.0	0.15	AV	261.00	150	Vertical	Pass

A.8 Power Spectral Density (PSD)

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

Test Data

SISO-Antenna A

802.11b Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-6.40	8
Middle	-6.29	8
High	-5.30	8

802.11g Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-8.30	8
Middle	-8.30	8
High	-9.95	8

802.11n-20 MHz Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-9.02	8
Middle	-8.23	8
High	-9.34	8

802.11n-40 MHz Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-13.03	8
Middle	-11.22	8
High	-13.99	8

Test Plots

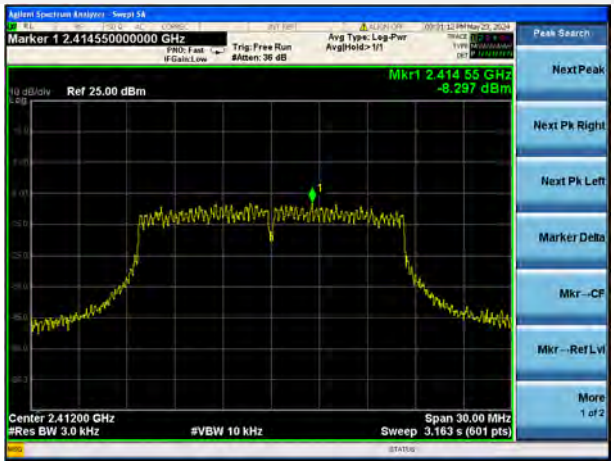
SISO-Antenna A

802.11b LOW CHANNEL

802.11b MIDDLE CHANNEL

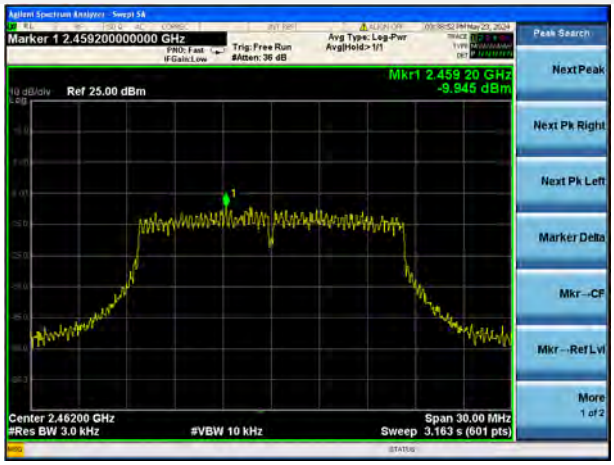
802.11b HIGH CHANNEL

802.11g LOW CHANNEL

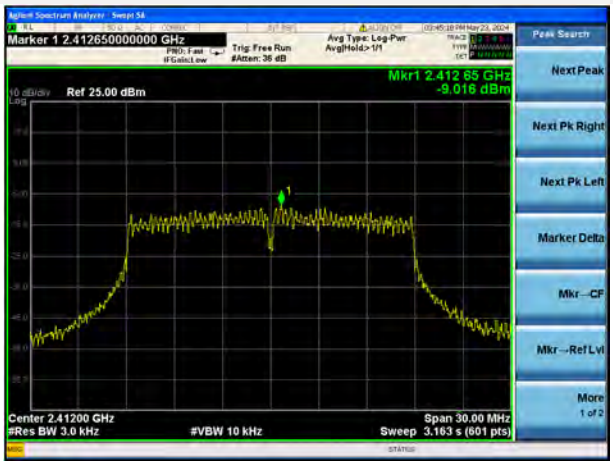


802.11g MIDDLE CHANNEL

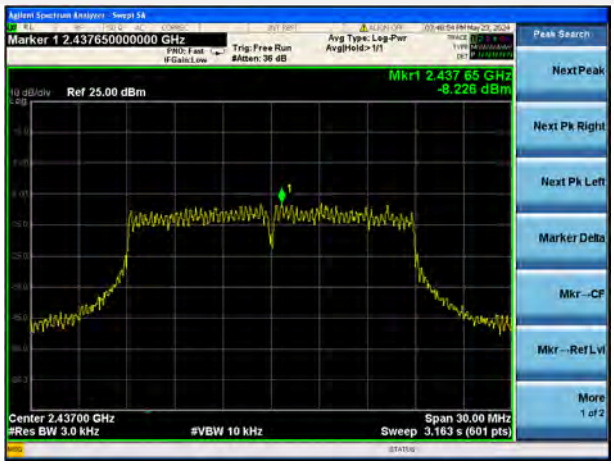
802.11g HIGH CHANNEL



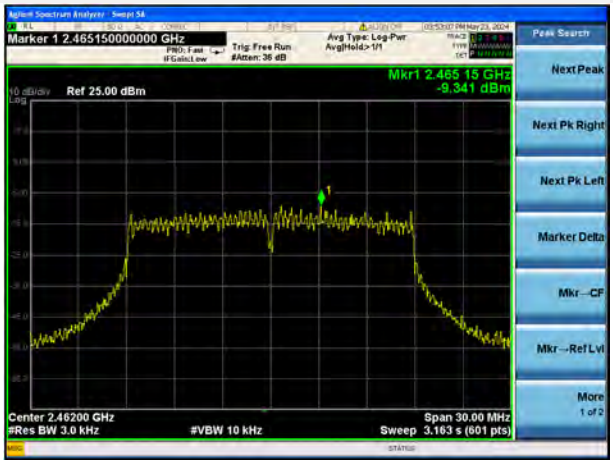
802.11n-20 MHz LOW CHANNEL



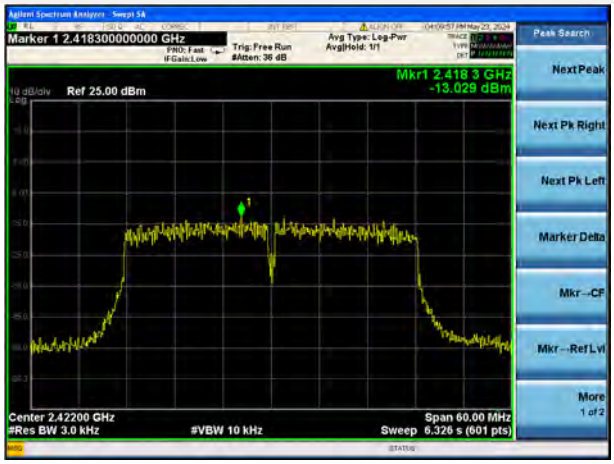
802.11n-20 MHz MIDDLE CHANNEL



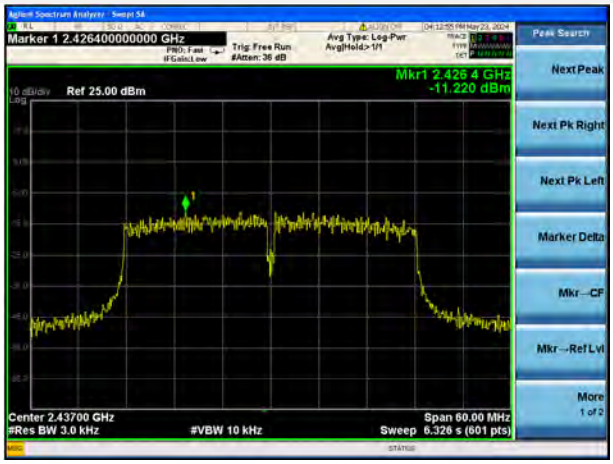
802.11n-20 MHz HIGH CHANNEL



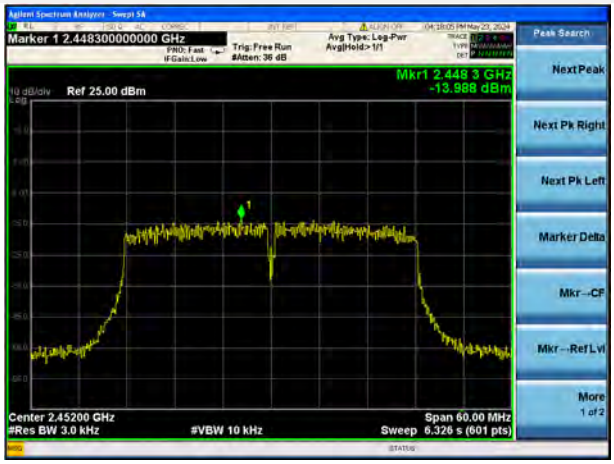
802.11n-40 MHz LOW CHANNEL



802.11n-40 MHz MIDDLE CHANNEL



802.11n-40 MHz HIGH CHANNEL



ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ23A0989-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ23A0989-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ23A0989-AI.PDF”.

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--END OF REPORT--