TEST REPORT

Applicant:	Libre Wireless Technologies, Inc.
Address:	17835 Newhope Street, Ste A, Fountain Valley, CA 92708, US
Equipment Type:	High Performance Wireless Media Module
Model Name:	LS8 (refer to section 2.3)
Brand Name:	LIBRE
FCC ID:	2ADBM-LS8
ISED Number:	20276-LS8
Test Standard:	47 CFR Part 15 Subpart C RSS-Gen Issue 5 RSS-247 Issue 3 (refer to section 3.1)
Sample Arrival Date:	Sep. 09, 2024
Test Date:	Sep. 19, 2024 - Oct. 13, 2024
Date of Issue:	Nov. 04, 2024

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

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

Revision History

Version	Issue Date	Revisions
Rev. 01	Nov. 04, 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	Libre Wireless Technologies, Inc.
Address	17835 Newhope Street, Ste A, Fountain Valley, CA 92708, US

2.2 Manufacturer Information

Manufacturer	Libre Wireless Technologies, Inc.
Address	17835 Newhope Street, Ste A, Fountain Valley, CA 92708, US

2.3 General Description for Equipment under Test (EUT)

EUT Name	High Performance Wireless Media Module
Model Name Under Test	LS8
Series Model Name	LS8-NFK-22G-S, LS8-NFK-24G-S, LS8-NFK-44G-S, LS8-NFK-22G-R, LS8-NFK-24G-R, LS8-NFK-44G-R, LS8-NFK-11G-R, LS8-NFK-12G-R, LS8-NFK-21G-R, LS8-NFK-42G-R
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in model name and memory, the R series WIFI only has one IPEX port. (this information provided by the applicant)
Serial Number	20240902LS8
Hardware Version	MP1.0
Software Version	8118
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

Antenna Information:

Antenna Manufacturer	Model	Antenna Type	Antenna Gain
AUDEN COMMUNICATIONS & MULTIMEDIA TECHNO (KUNSHAN) CO., LTD	LSANT-1C-180	PCB	3.5 dBi
Suzhou Point Positive Electronic Technology Co., Ltd	RC1WFI0886A	Rod	2.6651 dBi
AUDEN COMMUNICATIONS & MULTIMEDIA TECHNO (KUNSHAN) CO., LTD	AUK01966B-2.4&5.8G	FPC	3.0 dBi
Note: Antenna model AUK01966B-2.4&5.8G and RC1WFI0886A are alternative antennas, the max gain antenna is chosen for all test.			

2.4 Technical Information

Network and Wireless connectivity	Bluetooth (BR+EDR+BLE) WIFI 802.11a, 802.11b, 802.11g, 802.11n and 802.11ac

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)	N/A
Categorization as Correlated or Completely Uncorrelated	N/A
Antenna Type	PCB Antenna
Antenna Gain	3.5 dBi
About the Product	Only the WIFI 802.11b, 802.11g and 802.11n (HT20/40) was tested in this report.

Mode	Antenna	
	Antenna 1	Antenna 3
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	ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
5	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	42% to 68%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+20.3℃ to +24.8℃
Working Voltage of the EUT	NV (Normal Voltage)	5 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	KEYSIGHT	N9020A	MY50330200	2024.05.08	2025.05.07
Spectrum Analyzer	KEYSIGHT	N9020A	MY46471071	2024.07.04	2025.07.03
Power Sensor	KEYSIGHT	U2063XA	MY58000251	2024.07.04	2025.07.03
Spectrum Analyzer	KEYSIGHT	N9020A	MY50531259	2024.08.01	2025.07.31
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	02460	2024.05.16	2027.05.15
Test Antenna-Horn	A-INFO	LB-180400KF	J211060273	2024.06.15	2027.06.14
Anechoic Chamber	RAINFORD	9m*6m*6m	140	2024.07.28	2027.07.27
Amplifier	COM-MV	LSCX_LNA1-12G-01	7210214	2024.08.01	2025.07.31
Amplifier	COM-MV	XKu_LNA7-18G-01	7210209	2024.08.01	2025.07.31
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2024.08.01	2025.07.31
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9168	9168-01162	2023.08.04	2026.08.03
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	2024.07.13	2027.07.12
EMI Receiver	KEYSIGHT	N9010B	MY57110309	2024.08.01	2025.07.31
LISN	SCHWARZBECK	NSLK 8127	8127-687	2024.05.09	2025.05.08
Shielded Enclosure	YiHeng Electronic Co., Ltd	3.5m*3.1m*2.8m	112	2022.02.19	2025.02.18

4.3 Test Software List

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

4.4 Measurement Uncertainty

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

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

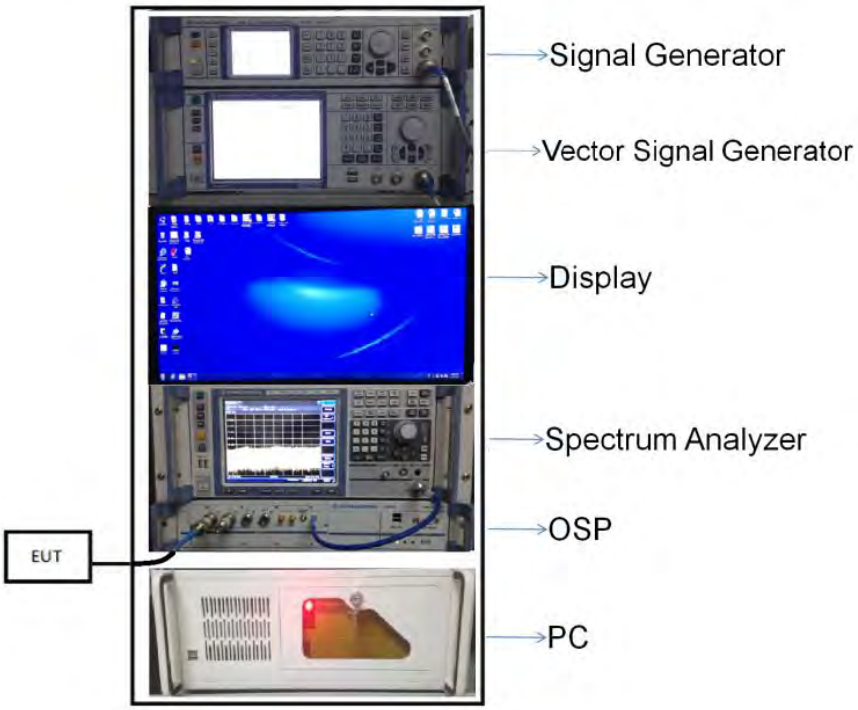
Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.8℃
Humidity	4%

4.5 Description of Test Setup

4.5.1 For Antenna Port Test

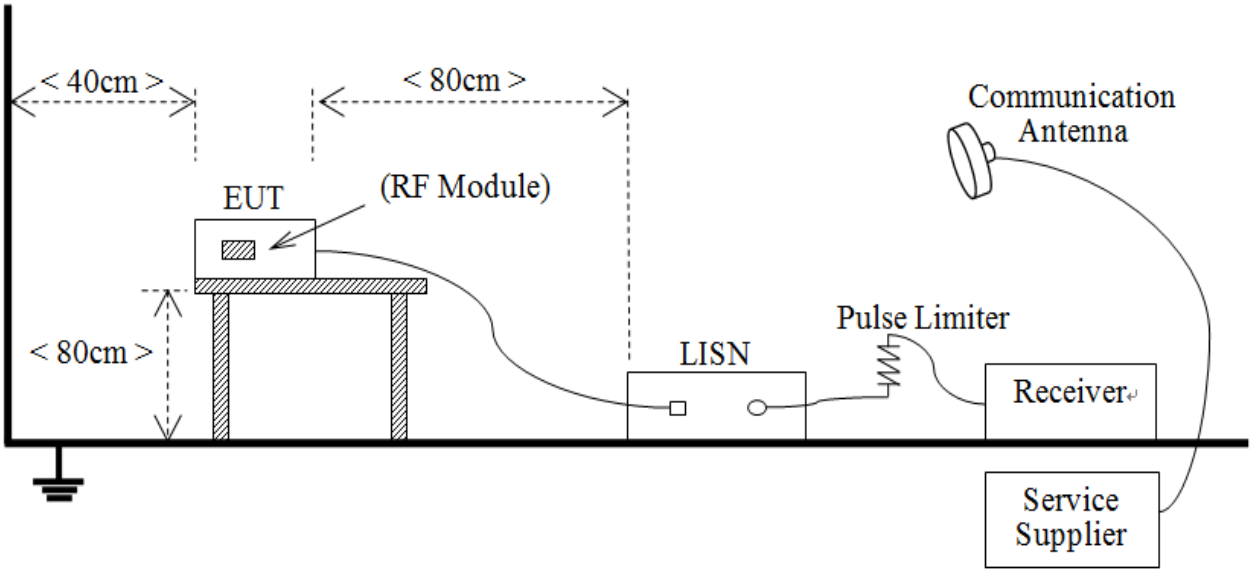
Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

For example: the measurement value is 10 dBm and the cable 0.5dBm used, then the final result of EUT: Conducted value (dBm) = 10 dBm + 0.5 dB = 10.5 dBm



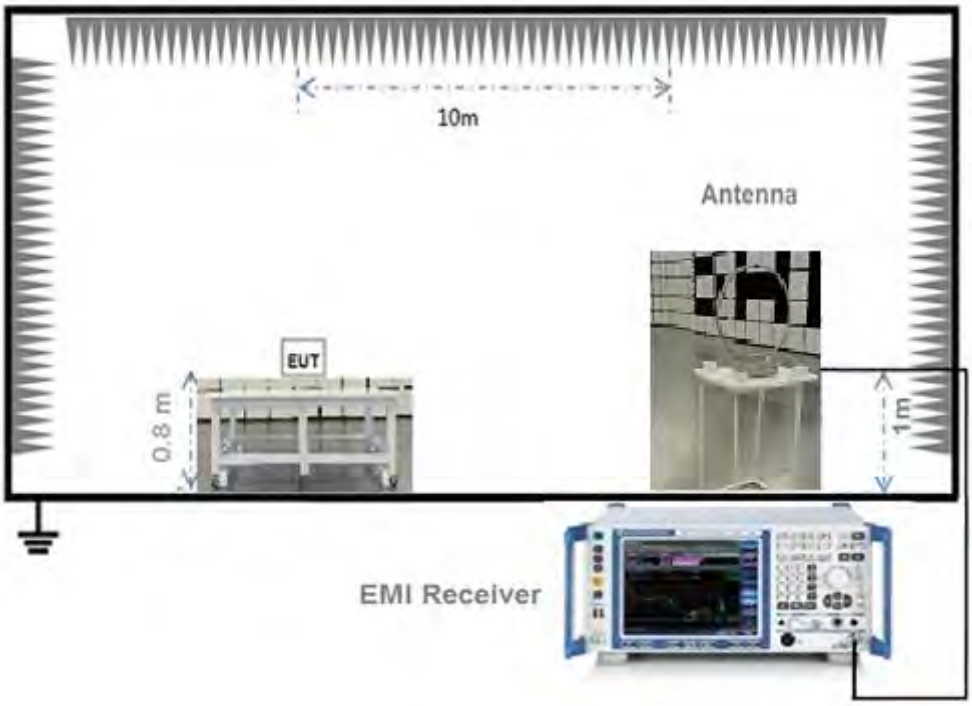
(Diagram 1)

4.5.2 For AC Power Supply Port Test



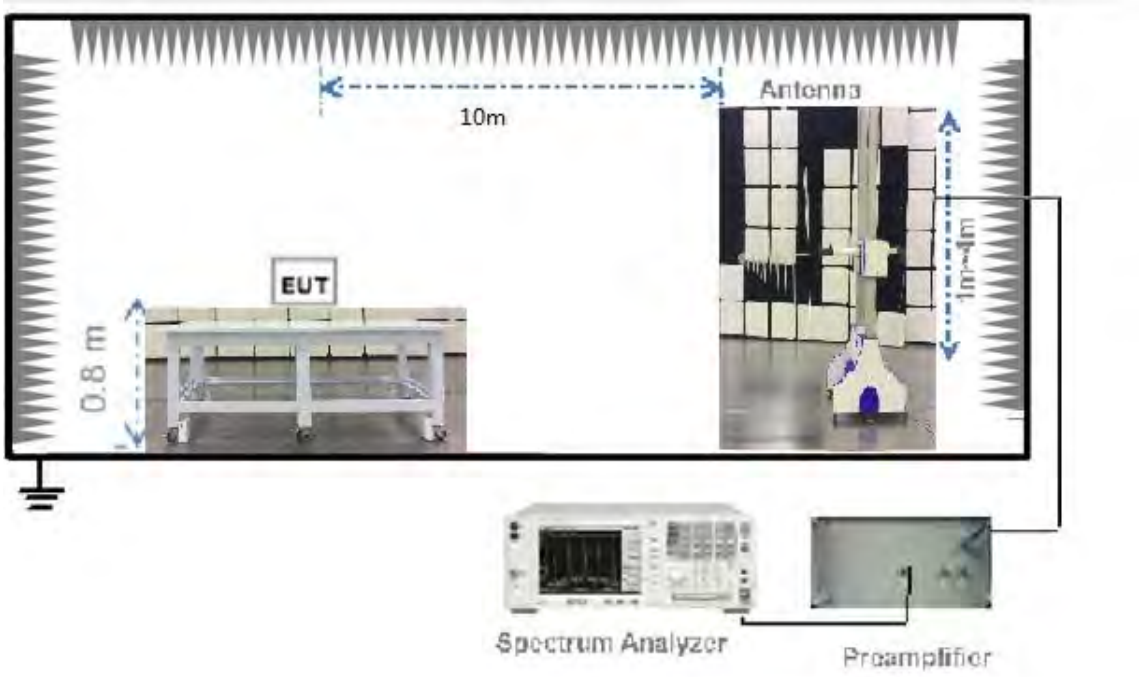
(Diagram 2)

4.5.3 For Radiated Test (Below 30 MHz)



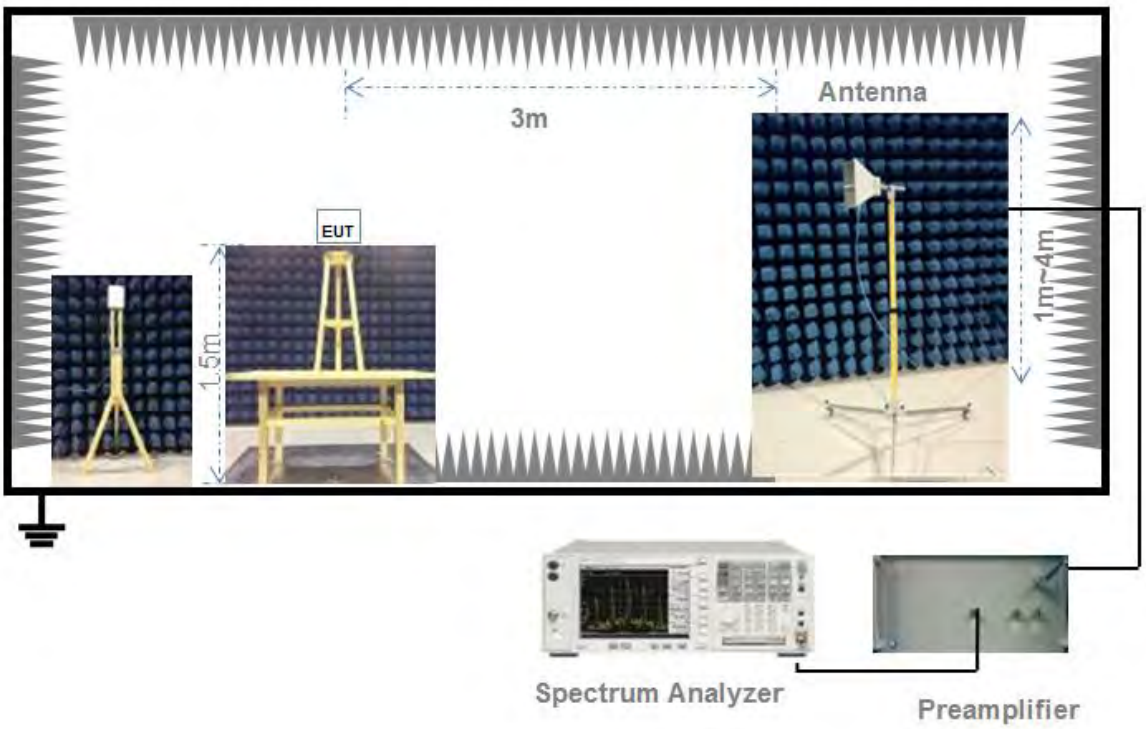
(Diagram 3)

4.5.4 For Radiated Test (30 MHz-1 GHz)



(Diagram 4)

4.5.5 For Radiated Test (Above 1 GHz)



(Diagram 5)

4.6 Measurement Results Explanation Example

4.6.1 For conducted test items:

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

4.6.2 For radiated band edges and spurious emission test:

$$E = EIRP - 20\log D + 104.8$$

where:

E = electric field strength in dBμV/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

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

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

FCC §15.203; RSS-247, 5.4 (f)
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

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

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

5.1.3 Antenna Gain

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

5.2 Output Power

5.2.1 Test Limit

FCC § 15.247(b); RSS-247, 5.4 (d)

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

5.2.2 Test Setup

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

5.2.3 Test Procedure

Maximum peak conducted output power

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

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

EIRP= Maximum peak conducted output power +Antenna Gain.

Maximum conducted (average) output power (Reporting Only)

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

1) The EUT is configured to transmit continuously, or to transmit with a constant duty factor.

2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.

3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

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

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

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

Measurements of duty cycle

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

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

Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.

Set VBW ≥ RBW. Set detector = peak or average.

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

5.2.4 Test Result

Please refer to ANNEX A.1.

5.3 Occupied Bandwidth

5.3.1 Limit

FCC §15.247(a); RSS-GEN, 6.7; RSS-247, 5.2 (a)

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

5.3.2 Test Setup

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

5.3.3 Test Procedure

Use the following spectrum analyzer settings:

Set RBW = 100 kHz.

Set the video bandwidth (VBW) ⩾ 3 RBW.

Detector = Peak.

Trace mode = max hold.

Sweep = auto couple.

Allow the trace to stabilize.

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

5.3.4 Test Result

Please refer to ANNEX A.2.

5.4 Conducted Spurious Emission

5.4.1 Limit

FCC §15.247(d); RSS-247, 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.4.2 Test Setup

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

5.4.3 Test Procedure

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

a) If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

c) In either case, attenuation to levels below the 15.209 general radiated emissions limits is not required.

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

<u>Reference level measurement</u>

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to ⩾ 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW ⩾ 3 x RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

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

Emission level measurement

Use the following spectrum analyzer settings:

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

Set the RBW = 100 kHz.

Set the VBW ⩾ 3 x RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

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

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

5.4.4 Test Result

Please refer to ANNEX A.3.

5.5 Band Edge (Authorized-band band-edge)

5.5.1 Limit

FCC §15.247(d); RSS-GEN, 8.9, RSS-247, 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.5.2 Test Setup

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

5.5.3 Test Procedure

The following procedures may be used to determine the peak or average field strength or power of an unwanted emission that is within 2 MHz of the authorized band edge. If a peak detector is utilized, use the procedure described in 13.2.1. Use the procedure described in 13.2.2 when using an average detector and the EUT can be configured to transmit continuously (i.e., duty cycle ⩾ 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 ⩾ 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 ⩽ RBW ⩽ 100 kHz.

Set the VBW ⩾ 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

Note 1: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note 2: All antenna were tested, but only the worst case has been reported in this report.

Duty Cycle

Test Mode	On Time (ms)	On+Off time (ms)	Duty Cycle	Duty Factor
802.11b	2.27	2.427	93.53%	0.29
802.11g	0.37	0.529	69.94%	1.55
802.11n-20 MHz	0.37	0.512	72.27%	1.41
802.11n-40 MHz	0.371	0.523	70.94%	1.49

Peak Power Test Data

802.11b Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	21.05	127.35	30	1000	Pass
Middle	20.97	125.03			Pass
High	20.89	122.74			Pass

802.11g Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	25.83	382.82	30	1000	Pass
Middle	25.75	375.84			Pass
High	25.62	364.75			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	26.15	412.10	30	1000	Pass
Middle	25.90	389.05			Pass
High	25.68	369.83			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	25.06	320.63	30	1000	Pass
Middle	24.96	313.33			Pass
High	24.92	310.46			Pass

Average Power Test Data

802.11b Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	17.58	57.28	30	1000	Pass
Middle	17.54	56.75			Pass
High	17.39	54.83			Pass

802.11g Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.55	71.61	30	1000	Pass
Middle	18.47	70.31			Pass
High	18.28	67.30			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	18.86	76.91	30	1000	Pass
Middle	18.57	71.94			Pass
High	18.36	68.55			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Average Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	17.70	58.88	30	1000	Pass
Middle	17.64	58.08			Pass
High	17.59	57.41			Pass

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

802.11b Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	24.55	285.10	36	4	Pass
Middle	24.47	279.90			Pass
High	24.39	274.79			Pass

802.11g Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	29.33	857.04	36	4	Pass
Middle	29.25	841.40			Pass
High	29.12	816.58			Pass

802.11n-20 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	29.65	922.57	36	4	Pass
Middle	29.40	870.96			Pass
High	29.18	827.94			Pass

802.11n-40 MHz Mode:

Channel	E.I.R.P		Limit		Verdict
	dBm	mW	dBm	W	
Low	28.56	717.79	36	4	Pass
Middle	28.46	701.46			Pass
High	28.42	695.02			Pass

A.2 Occupied Bandwidth

Note 1: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note 2: All antenna were tested, but only the worst case has been reported in this report.

Test Data

802.11b Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	10.200000	15.044000	⩾500
Middle	10.200000	15.041000	⩾500
High	10.200000	15.052000	⩾500

802.11g Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	15.300000	18.399000	⩾500
Middle	15.300000	18.371000	⩾500
High	15.300000	18.357000	⩾500

802.11n-20 MHz Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	15.300000	18.984000	⩾500
Middle	15.200000	18.617000	⩾500
High	15.300000	18.390000	⩾500

802.11n-40 MHz Mode:

Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limits (kHz)
Low	35.200000	36.699000	⩾500
Middle	35.200000	36.800000	⩾500
High	35.200000	36.690000	⩾500

Test Plots

6 dB Bandwidth

802.11b LOW CHANNEL

802.11b MIDDLE CHANNEL

802.11b HIGH CHANNEL

802.11g LOW CHANNEL

802.11g MIDDLE CHANNEL

802.11g HIGH CHANNEL

802.11n-20 MHz LOW CHANNEL

802.11n-20 MHz MIDDLE CHANNEL

802.11n-20 MHz HIGH CHANNEL

802.11n-40 MHz LOW CHANNEL

802.11n-40 MHz MIDDLE CHANNEL

802.11n-40 MHz HIGH CHANNEL

99% Bandwidth

802.11b LOW CHANNEL

802.11b MIDDLE CHANNEL

802.11b HIGH CHANNEL

802.11g LOW CHANNEL

802.11g MIDDLE CHANNEL

802.11g HIGH CHANNEL

802.11n-20 MHz LOW CHANNEL

802.11n-20 MHz MIDDLE CHANNEL

802.11n-20 MHz HIGH CHANNEL

802.11n-40 MHz LOW CHANNEL

802.11n-40 MHz MIDDLE CHANNEL

802.11n-40 MHz HIGH CHANNEL

A.3 Conducted Spurious Emissions

Note 1: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note 2: All antenna were tested, but only the worst case has been reported in this report.

Test Data

802.11b Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-35.57	8.64	-11.36	Pass
Middle	-38.21	8.64	-11.36	Pass
High	-36.19	8.55	-11.45	Pass

802.11g Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-36.45	10.32	-9.68	Pass
Middle	-36.42	10.24	-9.76	Pass
High	-36.91	10.20	-9.80	Pass

802.11n-20 MHz Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-36.61	10.68	-9.32	Pass
Middle	-35.89	10.42	-9.58	Pass
High	-36.00	10.17	-9.83	Pass

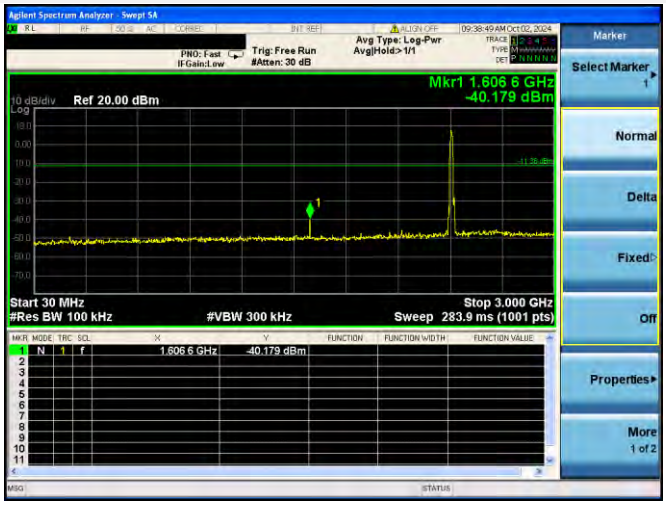
802.11n-40 MHz Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-35.65	6.41	-13.59	Pass
Middle	-35.60	6.27	-13.73	Pass
High	-36.62	6.35	-13.66	Pass

Test Plots

802.11b LOW CHANNEL CARRIER LEVEL

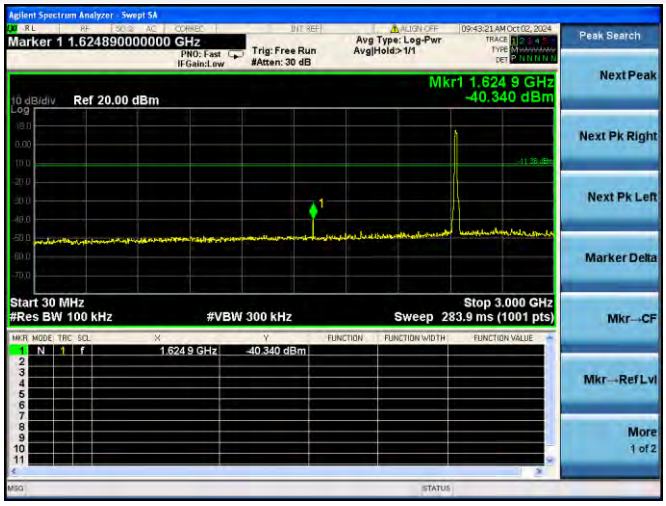
802.11b LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



802.11b LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

802.11b MIDDLE CHANNEL CARRIER LEVEL

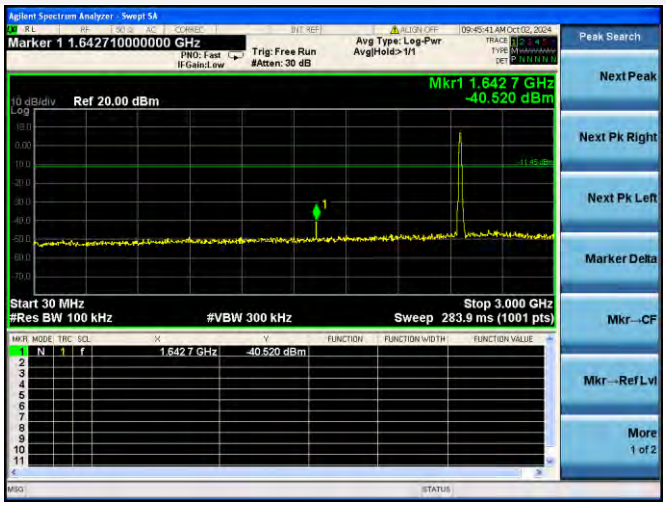
802.11b MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



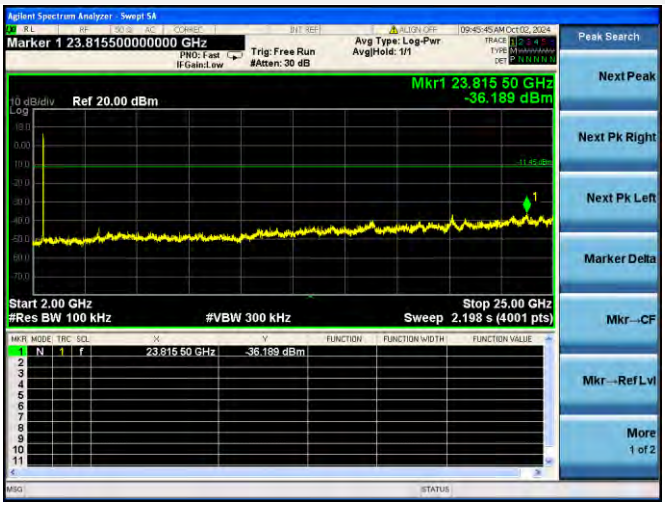
802.11b MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

802.11b HIGH CHANNEL CARRIER LEVEL

802.11b HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

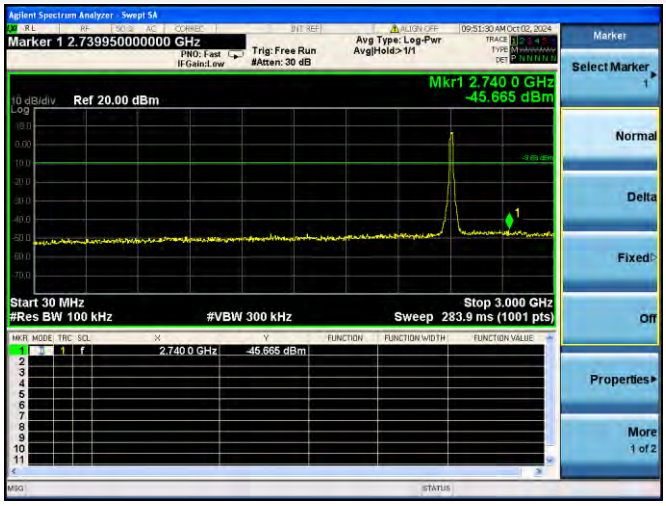


802.11b HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz



802.11g LOW CHANNEL CARRIER LEVEL

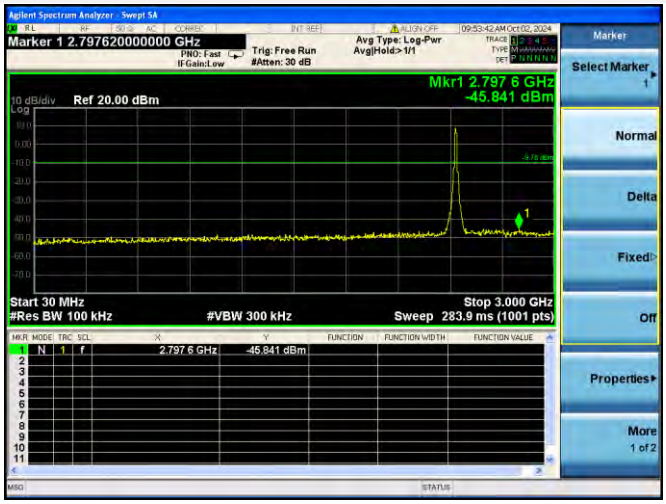
802.11g LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



802.11g LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

802.11g MIDDLE CHANNEL CARRIER LEVEL

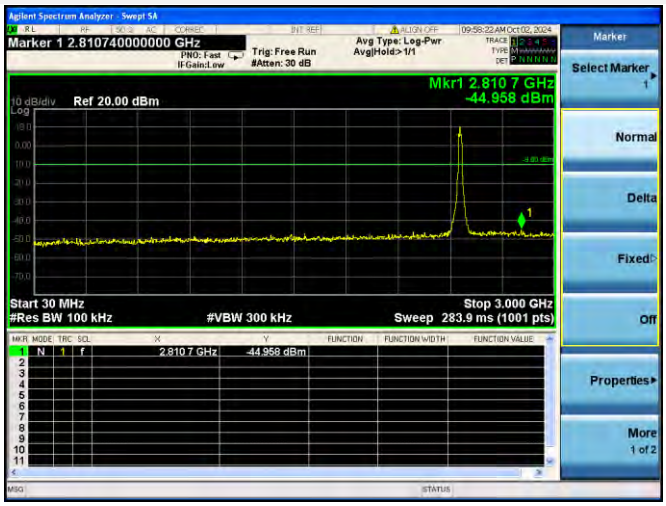
802.11g MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



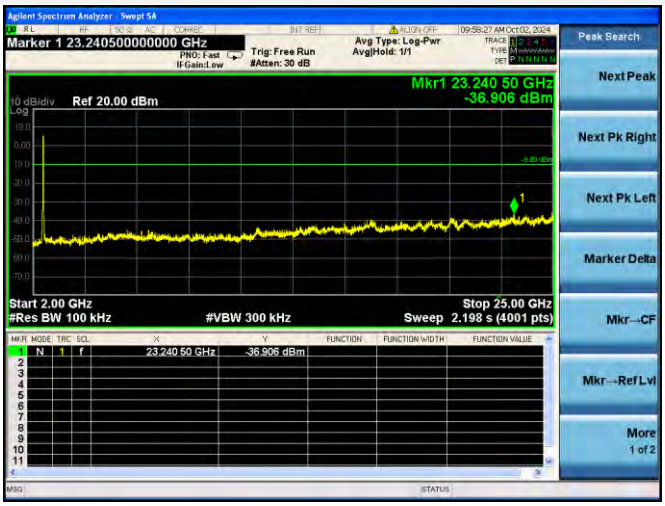
802.11g MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

802.11g HIGH CHANNEL CARRIER LEVEL

802.11g HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

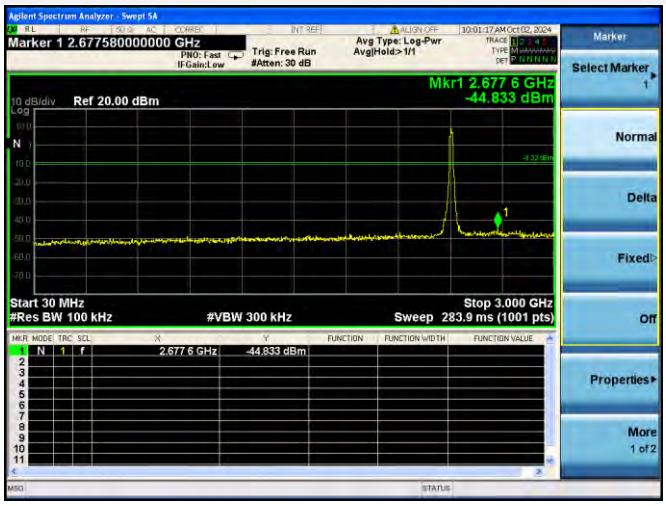


802.11g HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz



802.11n-20 MHz LOW CHANNEL CARRIER LEVEL

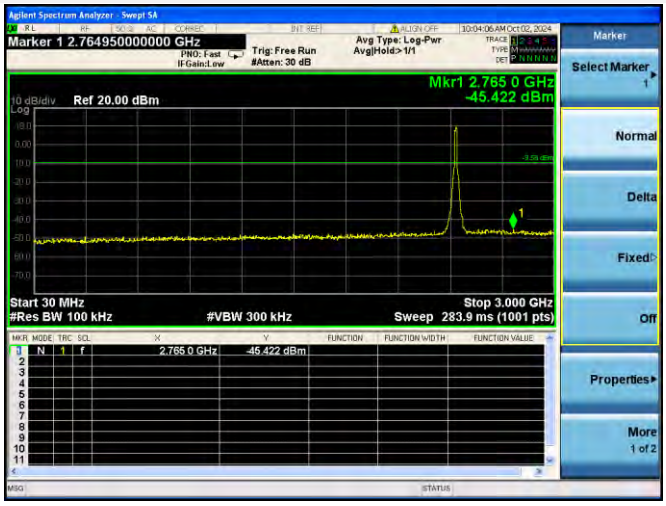
802.11n-20 MHz LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



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

802.11n-20 MHz MIDDLE CHANNEL CARRIER LEVEL

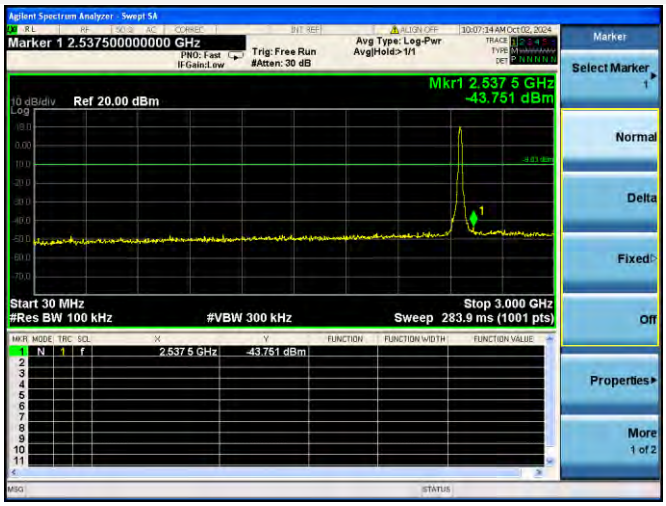
802.11n-20 MHz MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



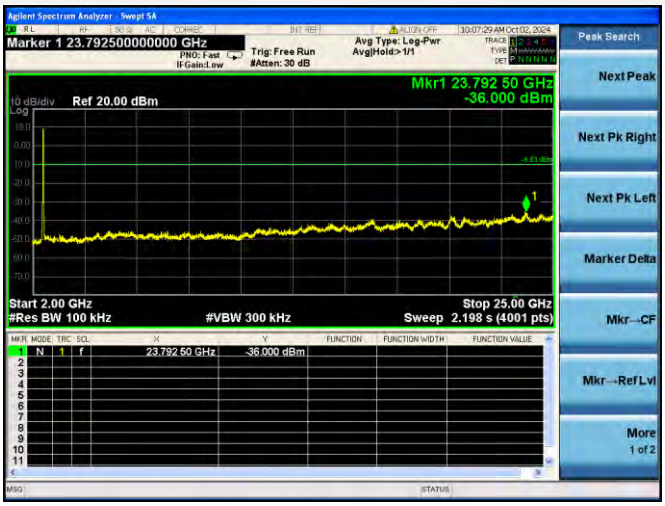
802.11n-20 MHz MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

802.11n-20 MHz HIGH CHANNEL CARRIER LEVEL

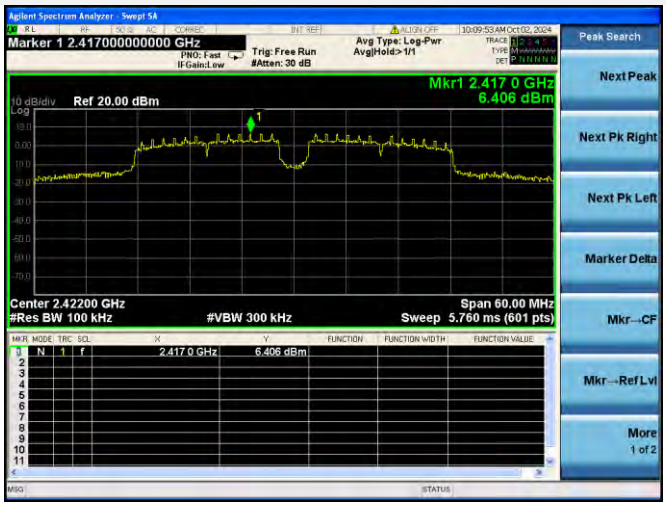
802.11n-20 MHz HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



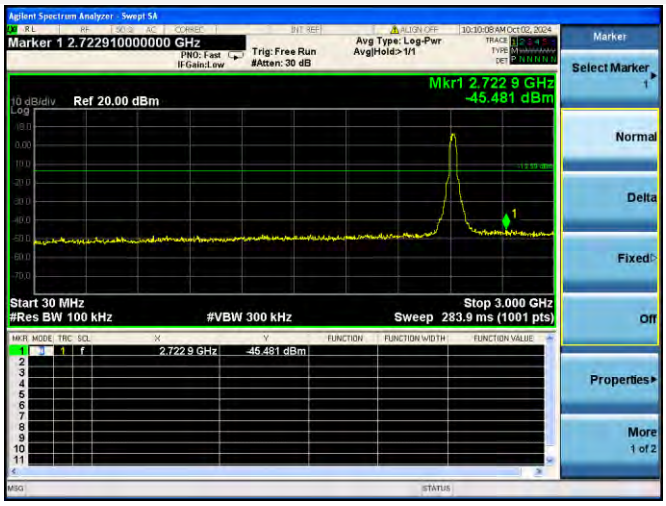
802.11n-20 MHz HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



802.11n-40 MHz LOW CHANNEL CARRIER LEVEL

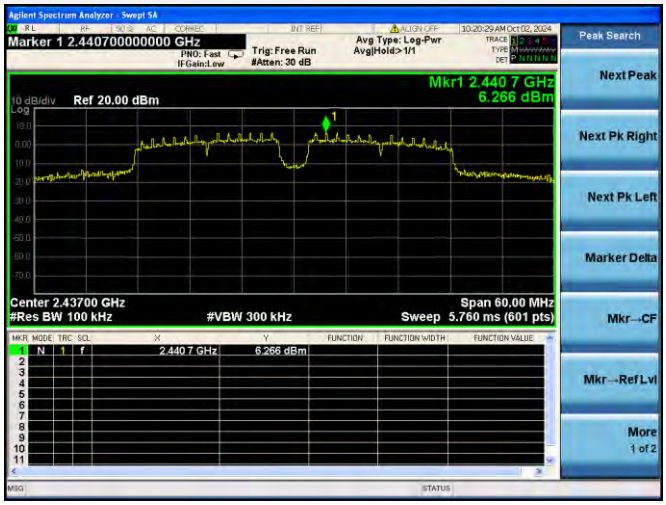


802.11n-40 MHz LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

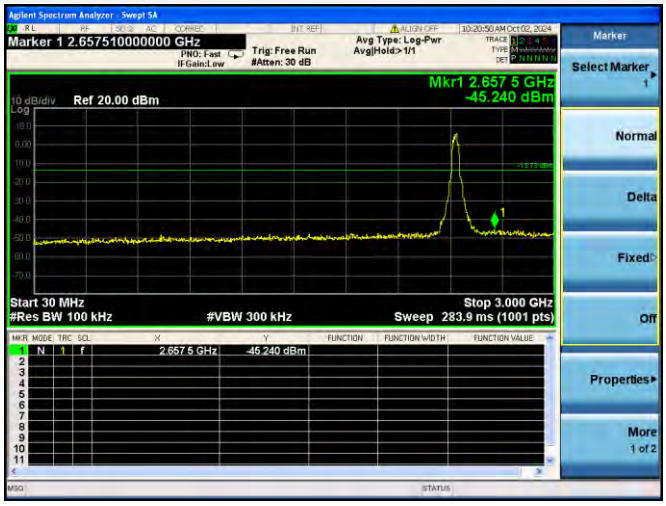


802.11n-40 MHz LOW CHANNEL, SPURIOUS
2 GHz ~ 25 GHz

802.11n-40 MHz MIDDLE CHANNEL CARRIER LEVEL

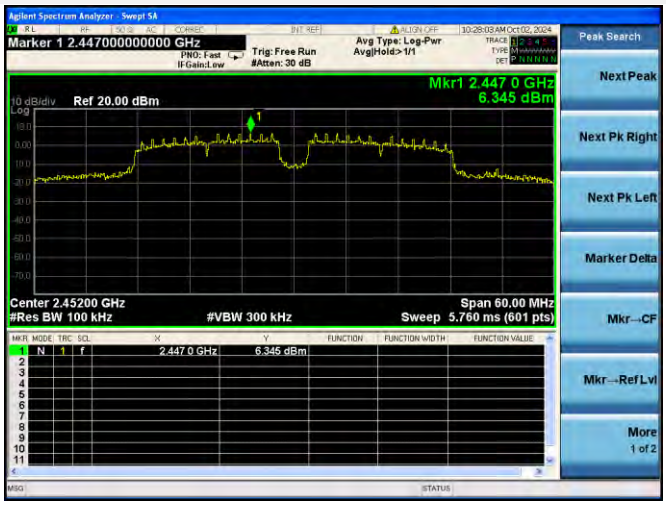


802.11n-40 MHz MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

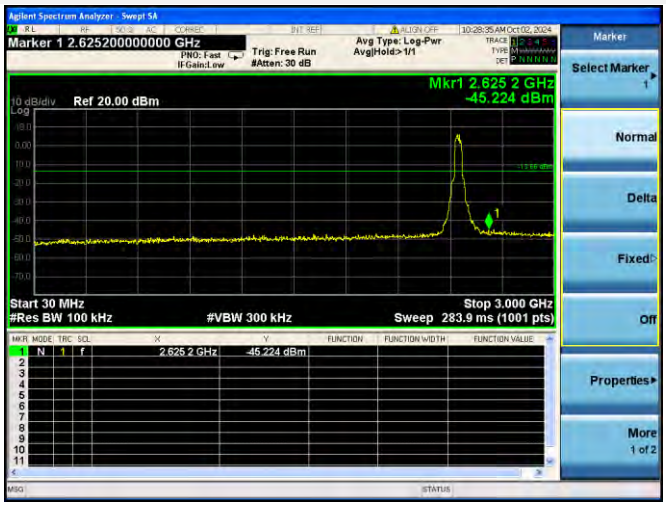


802.11n-40 MHz MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

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: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note 2: All antenna were tested, but only the worst case has been reported in this report.
Note 3: The 99% OBW of the fundamental emission is without 2 MHz of the authorized band.

Test Data

802.11b Mode：

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-31.35	8.64	-11.36	Pass
High Channel	-47.70	8.55	-11.45	Pass

802.11g Mode：

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-15.11	10.32	-9.68	Pass
High Channel	-27.31	10.20	-9.80	Pass

802.11n-20 MHz Mode:

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-13.01	10.68	-9.32	Pass
High Channel	--26.74	10.17	-9.83	Pass

802.11n-40 MHz Mode:

Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-23.31	6.41	-13.59	Pass
High Channel	-18.14	6.35	-13.66	Pass

Test Plots

802.11b LOW CHANNEL, CARRIER LEVEL

802.11b LOW CHANNEL, BAND EDGE

802.11b HIGH CHANNEL, CARRIER LEVEL

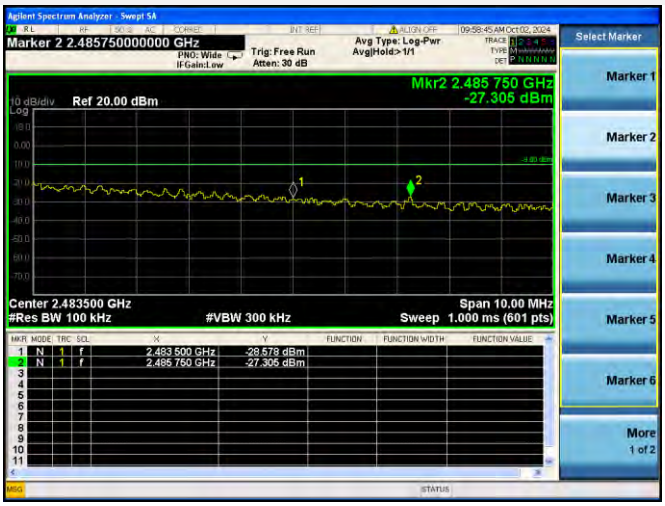
802.11b HIGH CHANNEL, BAND EDGE

802.11g LOW CHANNEL, CARRIER LEVEL

802.11g LOW CHANNEL, BAND EDGE

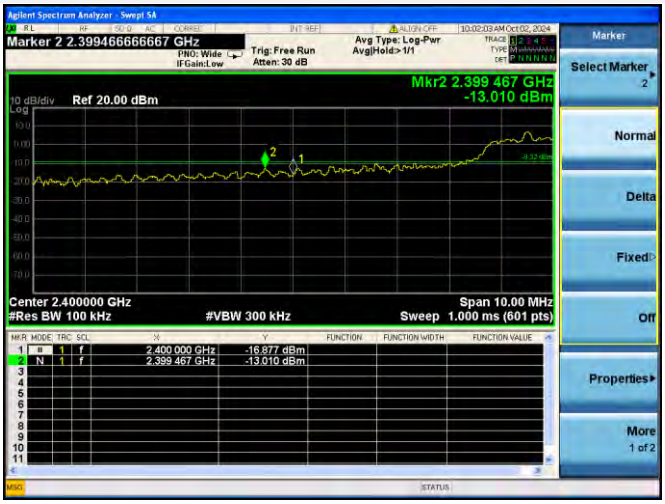
802.11g HIGH CHANNEL, CARRIER LEVEL

802.11g HIGH CHANNEL, BAND EDGE



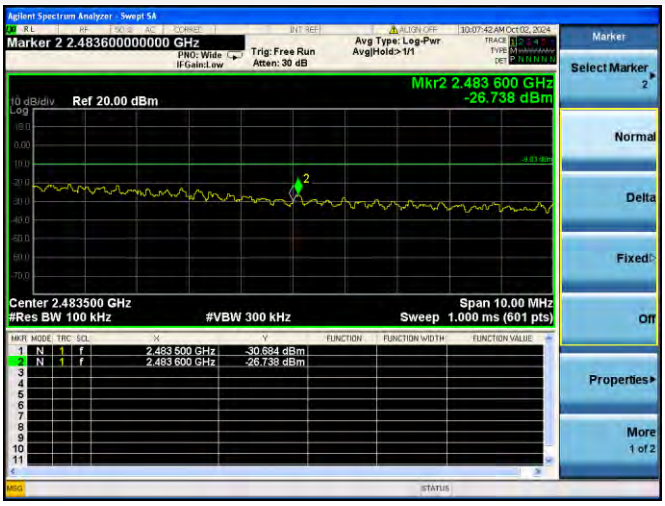
802.11n-20 MHz LOW CHANNEL, CARRIER LEVEL

802.11n-20 MHz LOW CHANNEL, BAND EDGE

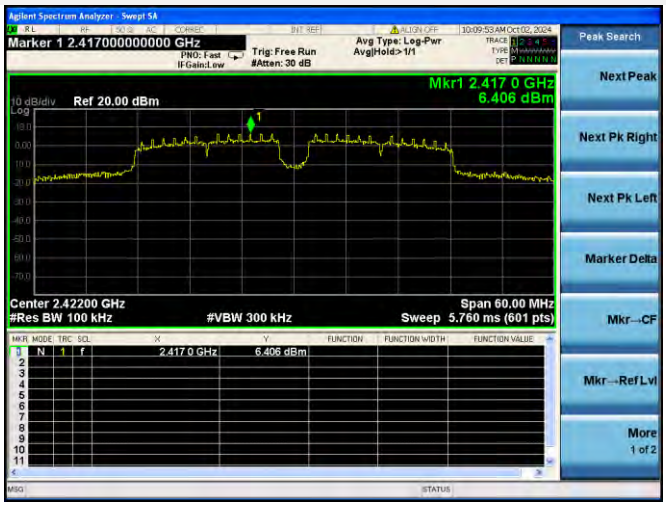


802.11n-20 MHz HIGH CHANNEL, CARRIER LEVEL

802.11n-20 MHz HIGH CHANNEL, BAND EDGE



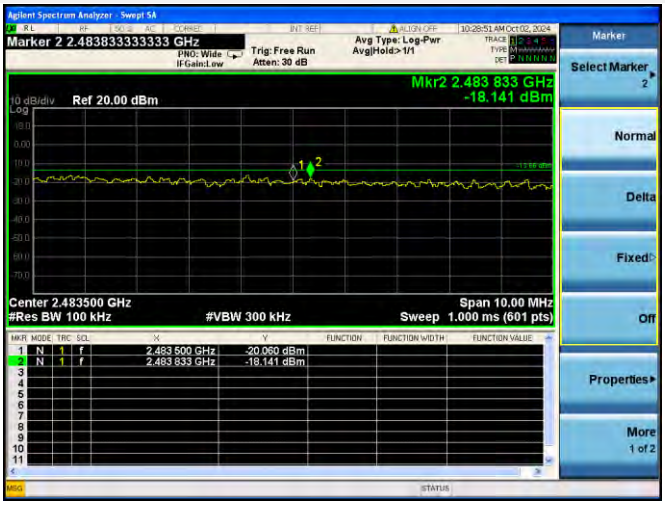
802.11n-40 MHz LOW CHANNEL, CARRIER LEVEL



802.11n-40 MHz LOW CHANNEL, BAND EDGE

802.11n-40 MHz HIGH CHANNEL, CARRIER LEVEL

802.11n-40 MHz HIGH CHANNEL, BAND EDGE



A.5 Conducted Emissions

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

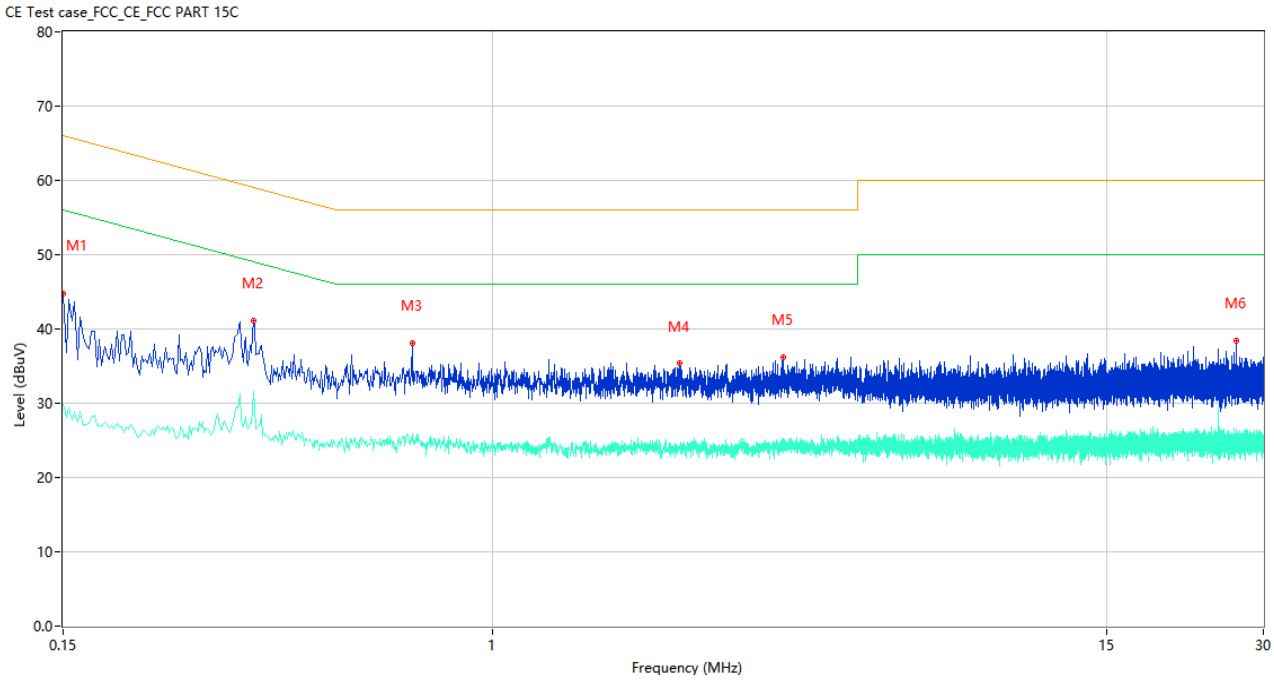
Note 2: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 60 Hz and 240 VAC, 50 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration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

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

Test Data and Plots

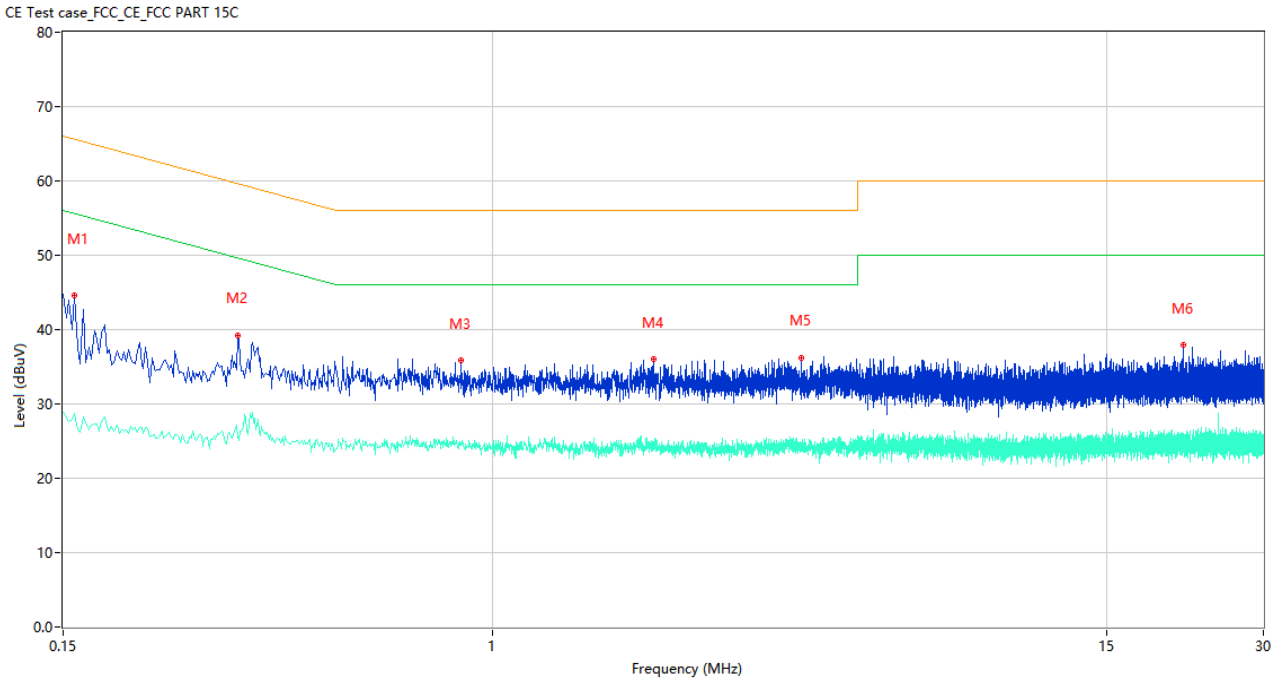
PCB Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.150	44.76	9.78	66.00	21.24	Peak	L	Pass
1**	0.150	29.91	9.78	56.00	26.09	AV	L	Pass
2	0.348	41.17	10.72	59.01	17.84	Peak	L	Pass
2**	0.348	31.64	10.72	49.01	17.37	AV	L	Pass
3	0.700	38.12	10.65	56.00	17.88	Peak	L	Pass
3**	0.700	25.85	10.65	46.00	20.15	AV	L	Pass
4	2.276	35.33	10.23	56.00	20.67	Peak	L	Pass
4**	2.276	24.30	10.23	46.00	21.70	AV	L	Pass
5	3.600	36.20	10.36	56.00	19.80	Peak	L	Pass
5**	3.600	25.17	10.36	46.00	20.83	AV	L	Pass
6	26.568	38.33	10.90	60.00	21.67	Peak	L	Pass
6**	26.568	25.68	10.90	50.00	24.32	AV	L	Pass

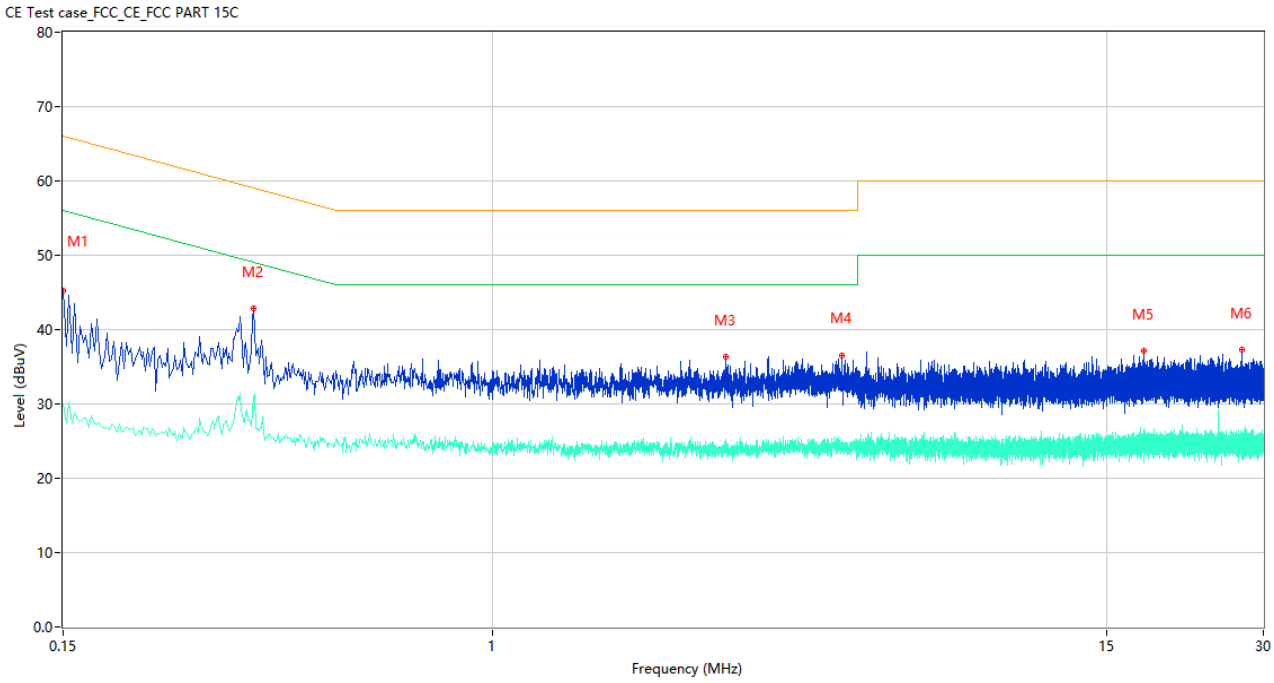
PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.158	44.55	9.78	65.57	21.02	Peak	N	Pass
1**	0.158	28.80	9.78	55.57	26.77	AV	N	Pass
2	0.324	39.21	10.24	59.60	20.39	Peak	N	Pass
2**	0.324	25.58	10.24	49.60	24.02	AV	N	Pass
3	0.870	35.81	10.43	56.00	20.19	Peak	N	Pass
3**	0.870	24.45	10.43	46.00	21.55	AV	N	Pass
4	2.034	35.99	10.42	56.00	20.01	Peak	N	Pass
4**	2.034	24.93	10.42	46.00	21.07	AV	N	Pass
5	3.906	36.25	10.28	56.00	19.75	Peak	N	Pass
5**	3.906	24.43	10.28	46.00	21.57	AV	N	Pass
6	21.090	37.88	10.98	60.00	22.12	Peak	N	Pass
6**	21.090	25.12	10.98	50.00	24.88	AV	N	Pass

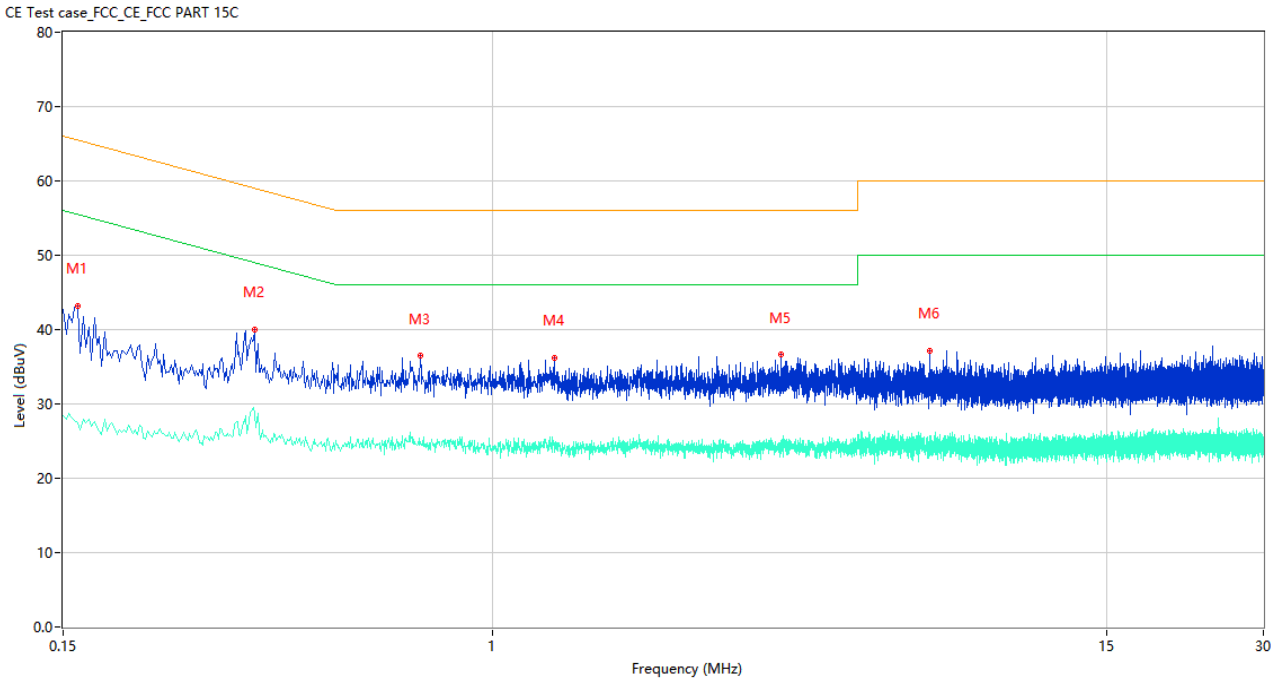
Rod Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.150	45.26	9.78	66.00	20.74	Peak	L	Pass
1**	0.150	29.98	9.78	56.00	26.02	AV	L	Pass
2	0.348	42.82	10.72	59.01	16.19	Peak	L	Pass
2**	0.348	31.12	10.72	49.01	17.89	AV	L	Pass
3	2.792	36.27	10.36	56.00	19.73	Peak	L	Pass
3**	2.792	23.98	10.36	46.00	22.02	AV	L	Pass
4	4.660	36.55	10.20	56.00	19.45	Peak	L	Pass
4**	4.660	24.54	10.20	46.00	21.46	AV	L	Pass
5	17.700	37.08	11.03	60.00	22.92	Peak	L	Pass
5**	17.700	24.14	11.03	50.00	25.86	AV	L	Pass
6	27.362	37.24	11.01	60.00	22.76	Peak	L	Pass
6**	27.362	26.06	11.01	50.00	23.94	AV	L	Pass

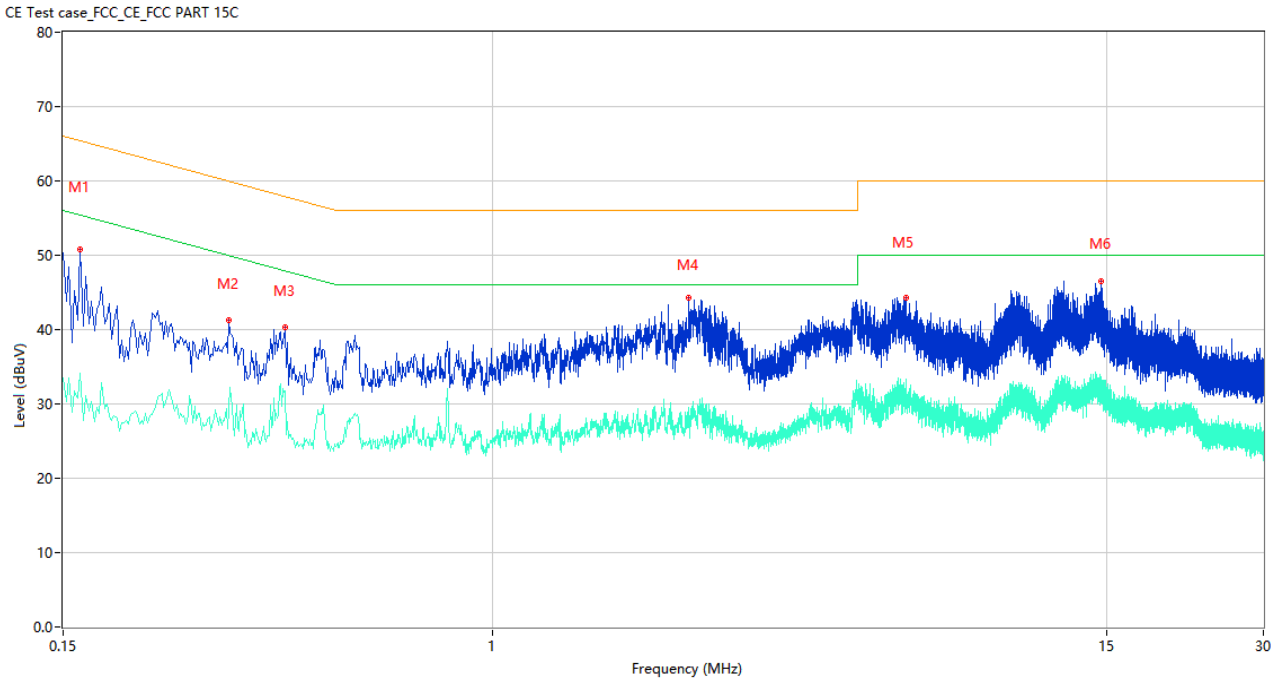
PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.160	43.22	9.78	65.46	22.24	Peak	N	Pass
1**	0.160	27.48	9.78	55.46	27.98	AV	N	Pass
2	0.350	40.05	10.76	58.96	18.91	Peak	N	Pass
2**	0.350	28.80	10.76	48.96	20.16	AV	N	Pass
3	0.726	36.50	10.40	56.00	19.50	Peak	N	Pass
3**	0.726	24.71	10.40	46.00	21.29	AV	N	Pass
4	1.312	36.24	10.38	56.00	19.76	Peak	N	Pass
4**	1.312	23.42	10.38	46.00	22.58	AV	N	Pass
5	3.570	36.66	10.29	56.00	19.34	Peak	N	Pass
5**	3.570	24.70	10.29	46.00	21.30	AV	N	Pass
6	6.890	37.20	10.60	60.00	22.80	Peak	N	Pass
6**	6.890	24.78	10.60	50.00	25.22	AV	N	Pass

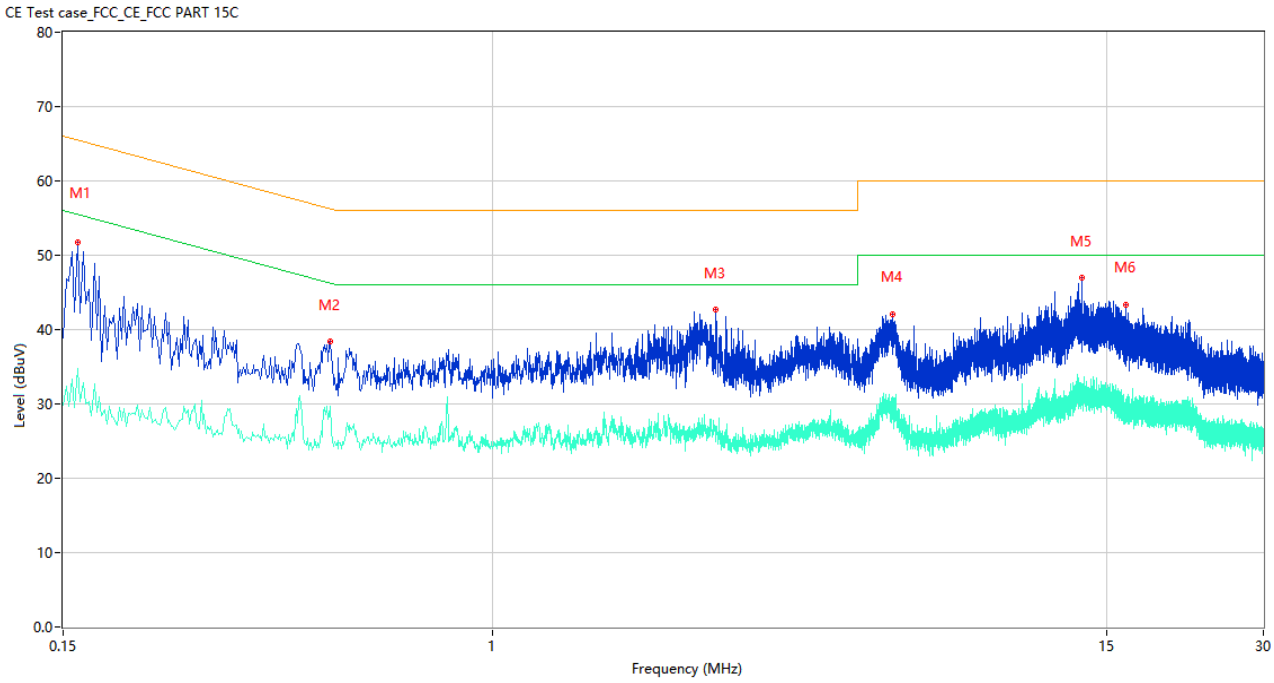
FPC Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.162	50.74	9.78	65.36	14.62	Peak	L	Pass
1**	0.162	34.19	9.78	55.36	21.17	AV	L	Pass
2	0.312	41.24	10.00	59.92	18.68	Peak	L	Pass
2**	0.312	29.34	10.00	49.92	20.58	AV	L	Pass
3	0.400	40.27	10.55	57.85	17.58	Peak	L	Pass
3**	0.400	31.74	10.55	47.85	16.11	AV	L	Pass
4	2.376	44.34	10.17	56.00	11.66	Peak	L	Pass
4**	2.376	28.24	10.17	46.00	17.76	AV	L	Pass
5	6.206	44.32	10.15	60.00	15.68	Peak	L	Pass
5**	6.206	33.41	10.15	50.00	16.59	AV	L	Pass
6	14.642	46.54	10.60	60.00	13.46	Peak	L	Pass
6**	14.642	31.64	10.60	50.00	18.36	AV	L	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.160	51.69	9.78	65.46	13.77	Peak	N	Pass
1**	0.160	34.74	9.78	55.46	20.72	AV	N	Pass
2	0.488	38.36	9.99	56.20	17.84	Peak	N	Pass
2**	0.488	29.61	9.99	46.20	16.59	AV	N	Pass
3	2.674	42.66	10.12	56.00	13.34	Peak	N	Pass
3**	2.674	26.92	10.12	46.00	19.08	AV	N	Pass
4	5.848	42.08	10.21	60.00	17.92	Peak	N	Pass
4**	5.848	27.90	10.21	50.00	22.10	AV	N	Pass
5	13.476	46.93	10.58	60.00	13.07	Peak	N	Pass
5**	13.476	32.67	10.58	50.00	17.33	AV	N	Pass
6	16.378	43.38	10.39	60.00	16.62	Peak	N	Pass
6**	16.378	30.52	10.39	50.00	19.48	AV	N	Pass

A.6 Radiated Emission

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

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

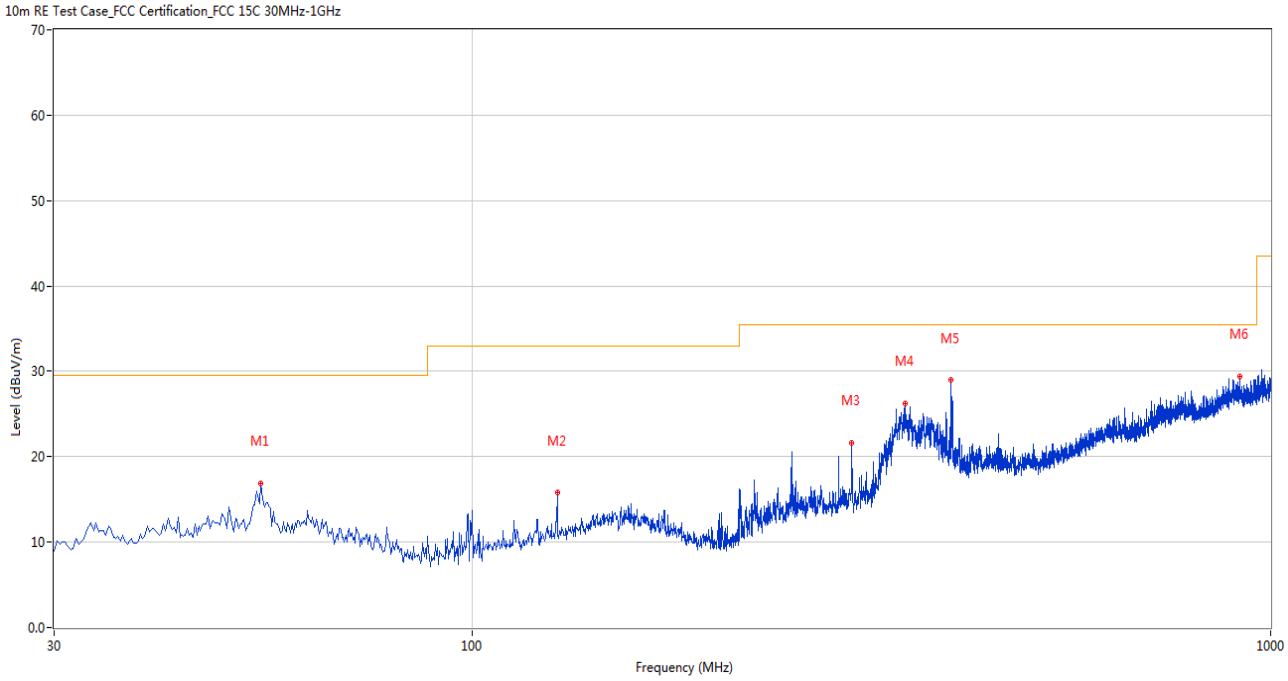
Note 3: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Note 4: The EUT is working in the Normal link mode below 1 GHz. All modes have been tested and normal link mode is worst.

Test Data and Plots

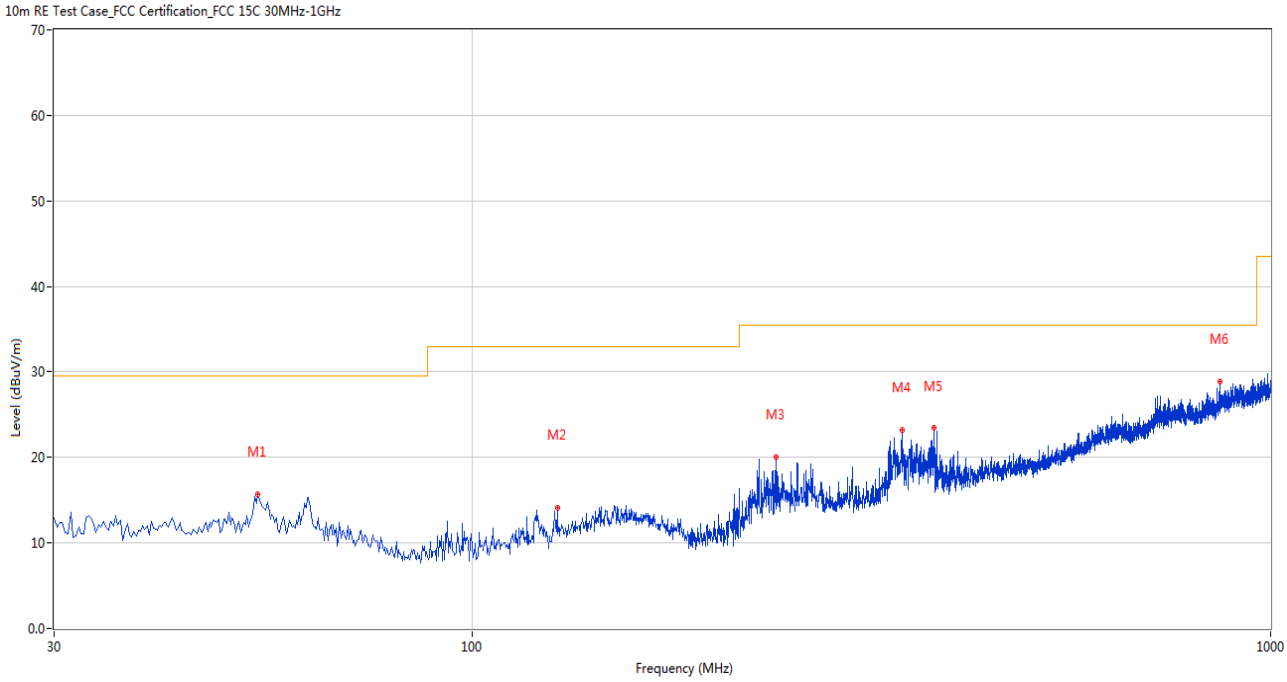
PCB Antenna

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	54.486	16.88	-26.11	29.5	12.62	Peak	38.00	200	Horizontal	Pass
2	127.946	15.84	-27.27	33.0	17.16	Peak	0.00	200	Horizontal	Pass
3	298.623	21.57	-24.80	35.5	13.93	Peak	112.00	100	Horizontal	Pass
4	348.565	26.19	-23.72	35.5	9.31	Peak	146.00	100	Horizontal	Pass
5	398.265	28.94	-22.35	35.5	6.56	Peak	0.00	200	Horizontal	Pass
6	915.874	29.38	-10.45	35.5	6.12	Peak	211.00	100	Horizontal	Pass

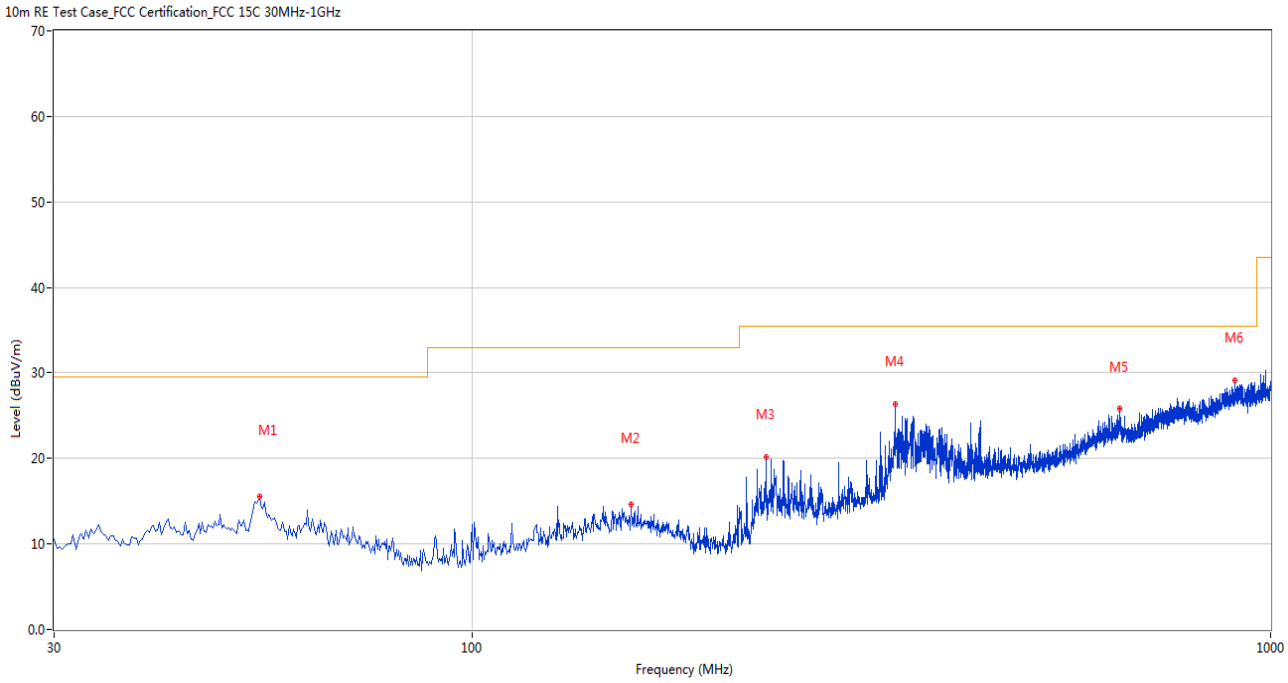
30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	54.002	15.64	-26.08	29.5	13.86	Peak	0.00	200	Vertical	Pass
2	127.946	14.14	-27.27	33.0	18.86	Peak	127.00	200	Vertical	Pass
3	240.680	19.99	-27.09	35.5	15.51	Peak	0.00	200	Vertical	Pass
4	345.656	23.20	-23.82	35.5	12.30	Peak	86.00	100	Vertical	Pass
5	379.113	23.44	-22.73	35.5	12.06	Peak	288.00	100	Vertical	Pass
6	863.992	28.90	-11.72	35.5	6.60	Peak	329.00	200	Vertical	Pass

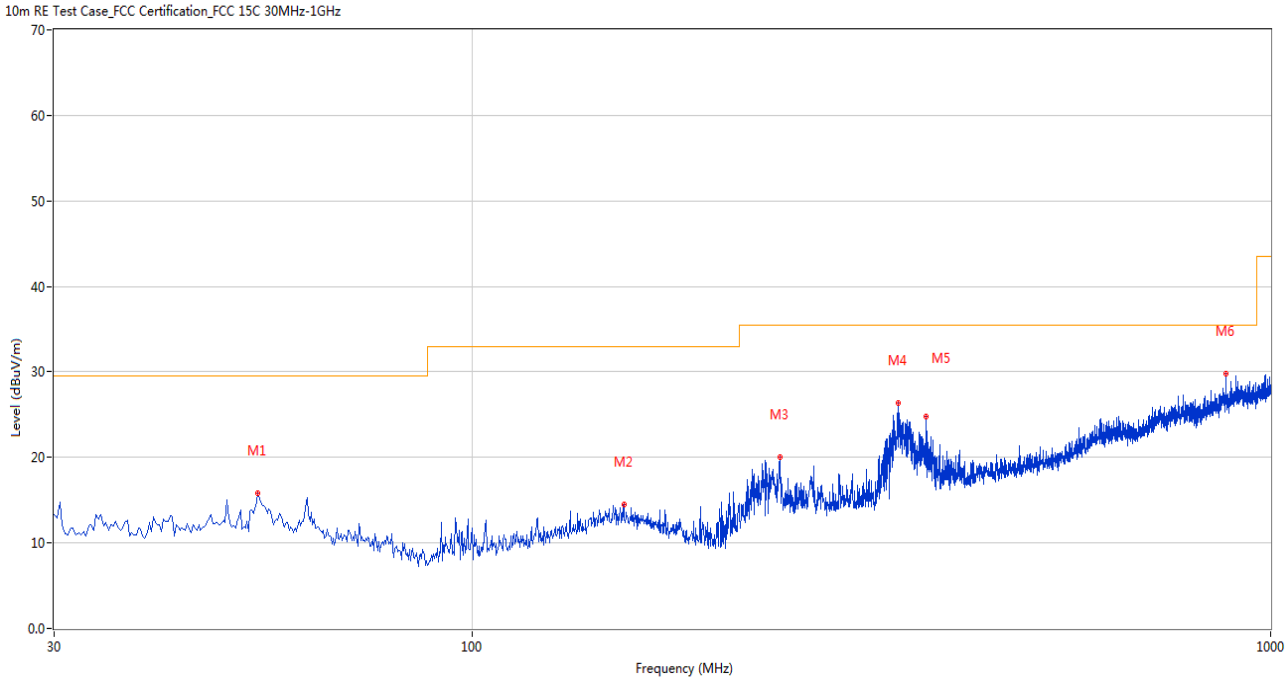
Rod Antenna

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	54.244	15.56	-26.09	29.5	13.94	Peak	0.00	200	Horizontal	Pass
2	158.250	14.62	-25.66	33.0	18.38	Peak	360.00	100	Horizontal	Pass
3	233.649	20.12	-27.80	35.5	15.38	Peak	273.00	200	Horizontal	Pass
4	339.110	26.42	-23.67	35.5	9.08	Peak	103.00	200	Horizontal	Pass
5	647.008	25.78	-15.52	35.5	9.72	Peak	109.00	100	Horizontal	Pass
6	902.539	29.17	-10.51	35.5	6.33	Peak	165.00	100	Horizontal	Pass

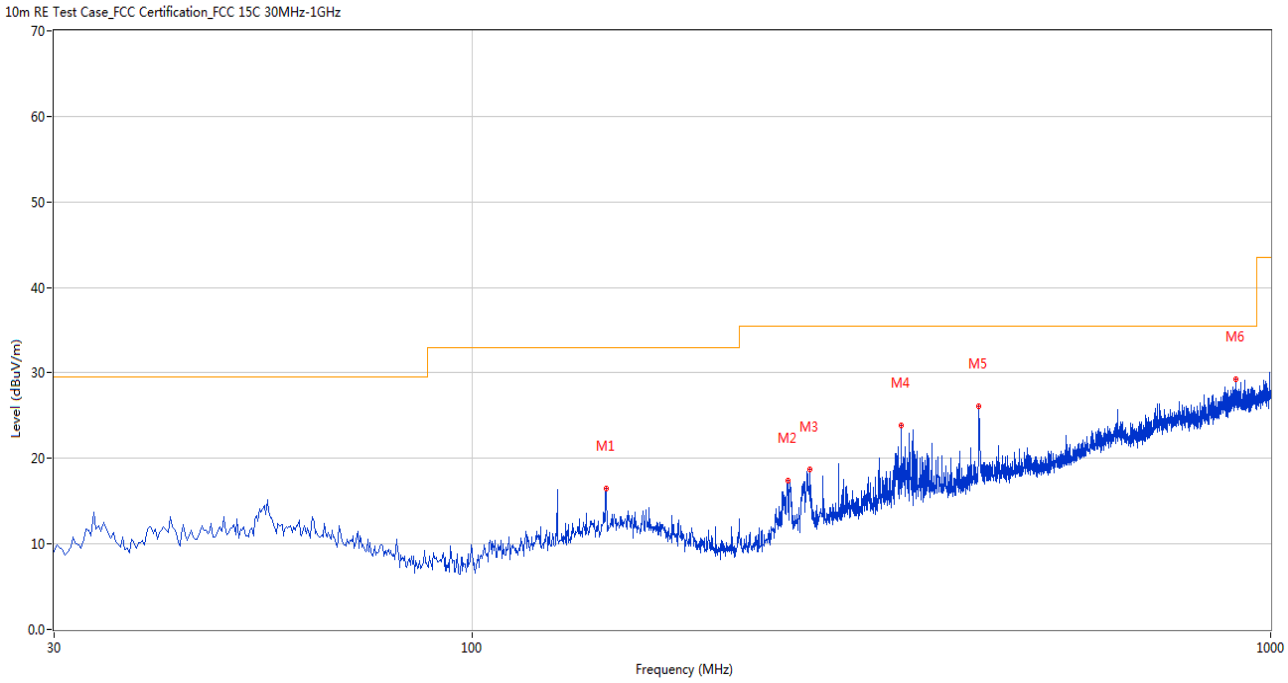
30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	54.002	15.77	-26.08	29.5	13.73	Peak	251.00	100	Vertical	Pass
2	155.099	14.46	-25.42	33.0	18.54	Peak	0.00	200	Vertical	Pass
3	243.104	20.01	-26.94	35.5	15.49	Peak	0.00	200	Vertical	Pass
4	341.535	26.36	-23.78	35.5	9.14	Peak	31.00	100	Vertical	Pass
5	370.385	24.84	-23.02	35.5	10.66	Peak	329.00	100	Vertical	Pass
6	878.780	29.82	-11.16	35.5	5.68	Peak	199.00	200	Vertical	Pass

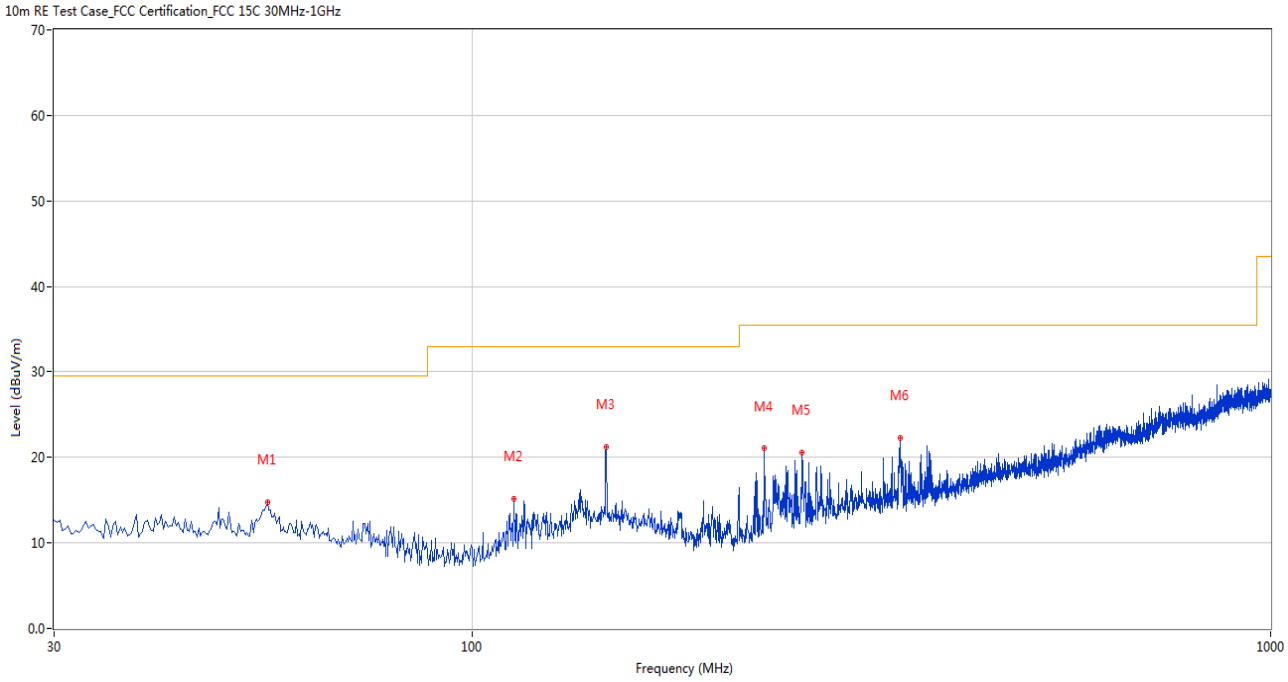
FPC Antenna

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	147.341	16.54	-25.58	33.0	16.46	Peak	308.00	200	Horizontal	Pass
2	248.438	17.39	-26.80	35.5	18.11	Peak	134.00	200	Horizontal	Pass
3	265.166	18.76	-26.37	35.5	16.74	Peak	308.00	200	Horizontal	Pass
4	344.686	23.88	-23.71	35.5	11.62	Peak	134.00	200	Horizontal	Pass
5	431.480	26.08	-21.07	35.5	9.42	Peak	237.00	200	Horizontal	Pass
6	904.479	29.31	-10.56	35.5	6.19	Peak	275.00	200	Horizontal	Pass

30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	55.456	14.83	-26.16	29.5	14.67	Peak	318.00	200	Vertical	Pass
2	112.914	15.13	-28.74	33.0	17.87	Peak	323.00	100	Vertical	Pass
3	147.341	21.21	-25.58	33.0	11.79	Peak	145.00	100	Vertical	Pass
4	232.194	21.03	-28.09	35.5	14.47	Peak	349.00	100	Vertical	Pass
5	259.105	20.56	-26.52	35.5	14.94	Peak	307.00	100	Vertical	Pass
6	343.474	22.23	-23.76	35.5	13.27	Peak	220.00	100	Vertical	Pass

Note 1: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note 2: All antenna were tested, but only the worst case has been reported in this report.
Note 3: The marked spikes near 2400 MHz with circle should be ignored because they are Fundamental signal.
Note 4: The spurious above 18G is noise only, do not show on the report.

Test Data

PCB Antenna

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1436.943	47.97	74.0	26.03	Peak	200.00	300	Horizontal	Pass
1**	1436.943	42.69	54.0	11.31	AV	200.00	300	Horizontal	Pass
2	2669.360	53.29	74.0	20.71	Peak	24.00	200	Horizontal	Pass
2**	2669.360	44.98	54.0	9.02	AV	24.00	200	Horizontal	Pass
3	4948.166	52.35	74.0	21.65	Peak	133.00	200	Horizontal	Pass
3**	4948.166	37.25	54.0	16.75	AV	133.00	200	Horizontal	Pass
4	7686.554	53.25	74.0	20.75	Peak	162.00	200	Horizontal	Pass
4**	7686.554	42.53	54.0	11.47	AV	162.00	200	Horizontal	Pass
5	12460.916	53.22	74.0	20.78	Peak	67.00	200	Horizontal	Pass
5**	12460.916	43.43	54.0	10.57	AV	67.00	200	Horizontal	Pass
6	14457.495	53.15	74.0	20.85	Peak	265.00	400	Horizontal	Pass
6**	14457.495	48.58	54.0	5.42	AV	265.00	400	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1335.001	42.47	74.0	31.53	Peak	282.00	400	Vertical	Pass
1**	1335.001	31.47	54.0	22.53	AV	282.00	400	Vertical	Pass
2	2952.243	48.99	74.0	25.01	Peak	293.00	300	Vertical	Pass
2**	2952.243	39.91	54.0	14.09	AV	293.00	300	Vertical	Pass
3	4747.683	49.91	74.0	24.09	Peak	259.00	200	Vertical	Pass
3**	4747.683	42.55	54.0	11.45	AV	259.00	200	Vertical	Pass
4	7165.406	52.89	74.0	21.11	Peak	55.00	300	Vertical	Pass
4**	7165.406	46.33	54.0	7.67	AV	55.00	300	Vertical	Pass
5	12519.694	55.44	74.0	18.56	Peak	64.00	100	Vertical	Pass
5**	12519.694	46.65	54.0	7.35	AV	64.00	100	Vertical	Pass
6	17115.362	52.92	74.0	21.08	Peak	30.00	400	Vertical	Pass
6**	17115.362	45.27	54.0	8.73	AV	30.00	400	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1440.155	45.87	74.0	28.13	Peak	63.00	200	Horizontal	Pass
1**	1440.155	43.87	54.0	10.13	AV	63.00	200	Horizontal	Pass
2	2674.044	49.91	74.0	24.09	Peak	63.00	200	Horizontal	Pass
2**	2674.044	41.13	54.0	12.87	AV	63.00	200	Horizontal	Pass
3	4948.608	51.39	74.0	22.61	Peak	299.00	200	Horizontal	Pass
3**	4948.608	39.45	54.0	14.55	AV	299.00	200	Horizontal	Pass
4	7688.700	53.17	74.0	20.83	Peak	333.00	400	Horizontal	Pass
4**	7688.700	40.15	54.0	13.85	AV	333.00	400	Horizontal	Pass
5	12462.343	51.60	74.0	22.40	Peak	259.00	400	Horizontal	Pass
5**	12462.343	46.63	54.0	7.37	AV	259.00	400	Horizontal	Pass
6	14459.829	53.18	74.0	20.82	Peak	135.00	400	Horizontal	Pass
6**	14459.829	46.92	54.0	7.08	AV	135.00	400	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1333.030	41.05	74.0	32.95	Peak	13.00	200	Vertical	Pass
1**	1333.030	36.87	54.0	17.13	AV	13.00	200	Vertical	Pass
2	2945.682	48.91	74.0	25.09	Peak	290.00	400	Vertical	Pass
2**	2945.682	40.41	54.0	13.59	AV	290.00	400	Vertical	Pass
3	4747.226	47.57	74.0	26.43	Peak	267.00	200	Vertical	Pass
3**	4747.226	40.58	54.0	13.42	AV	267.00	200	Vertical	Pass
4	7171.598	56.16	74.0	17.84	Peak	248.00	400	Vertical	Pass
4**	7171.598	42.68	54.0	11.32	AV	248.00	400	Vertical	Pass
5	12518.691	50.89	74.0	23.11	Peak	325.00	400	Vertical	Pass
5**	12518.691	41.86	54.0	12.14	AV	325.00	400	Vertical	Pass
6	17115.405	53.72	74.0	20.28	Peak	312.00	200	Vertical	Pass
6**	17115.405	48.36	54.0	5.64	AV	312.00	200	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1442.992	48.30	74.0	25.70	Peak	102.00	200	Horizontal	Pass
1**	1442.992	40.48	54.0	13.52	AV	102.00	200	Horizontal	Pass
2	2673.921	52.82	74.0	21.18	Peak	290.00	400	Horizontal	Pass
2**	2673.921	40.60	54.0	13.40	AV	290.00	400	Horizontal	Pass
3	4949.896	49.70	74.0	24.30	Peak	33.00	200	Horizontal	Pass
3**	4949.896	37.72	54.0	16.28	AV	33.00	200	Horizontal	Pass
4	7689.091	51.92	74.0	22.08	Peak	51.00	200	Horizontal	Pass
4**	7689.091	41.40	54.0	12.60	AV	51.00	200	Horizontal	Pass
5	12463.426	55.28	74.0	18.72	Peak	40.00	300	Horizontal	Pass
5**	12463.426	42.74	54.0	11.26	AV	40.00	300	Horizontal	Pass
6	14453.929	55.08	74.0	18.92	Peak	201.00	400	Horizontal	Pass
6**	14453.929	46.33	54.0	7.67	AV	201.00	400	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1332.792	43.61	74.0	30.39	Peak	61.00	300	Vertical	Pass
1**	1332.792	34.16	54.0	19.84	AV	61.00	300	Vertical	Pass
2	2949.438	47.79	74.0	26.21	Peak	59.00	400	Vertical	Pass
2**	2949.438	38.53	54.0	15.47	AV	59.00	400	Vertical	Pass
3	4750.693	52.39	74.0	21.61	Peak	4.00	200	Vertical	Pass
3**	4750.693	41.55	54.0	12.45	AV	4.00	200	Vertical	Pass
4	7165.328	51.71	74.0	22.29	Peak	146.00	400	Vertical	Pass
4**	7165.328	43.26	54.0	10.74	AV	146.00	400	Vertical	Pass
5	12520.380	55.63	74.0	18.37	Peak	219.00	400	Vertical	Pass
5**	12520.380	44.29	54.0	9.71	AV	219.00	400	Vertical	Pass
6	17119.569	55.94	74.0	18.06	Peak	61.00	100	Vertical	Pass
6**	17119.569	46.96	54.0	7.04	AV	61.00	100	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1440.440	47.96	74.0	26.04	Peak	316.00	300	Horizontal	Pass
1**	1440.440	43.67	54.0	10.33	AV	316.00	300	Horizontal	Pass
2	2671.754	49.20	74.0	24.80	Peak	215.00	300	Horizontal	Pass
2**	2671.754	39.06	54.0	14.94	AV	215.00	300	Horizontal	Pass
3	4950.422	49.62	74.0	24.38	Peak	125.00	200	Horizontal	Pass
3**	4950.422	40.33	54.0	13.67	AV	125.00	200	Horizontal	Pass
4	7682.230	53.19	74.0	20.81	Peak	180.00	100	Horizontal	Pass
4**	7682.230	43.87	54.0	10.13	AV	180.00	100	Horizontal	Pass
5	12461.391	52.72	74.0	21.28	Peak	24.00	100	Horizontal	Pass
5**	12461.391	41.87	54.0	12.13	AV	24.00	100	Horizontal	Pass
6	14454.275	58.10	74.0	15.90	Peak	250.00	400	Horizontal	Pass
6**	14454.275	44.60	54.0	9.40	AV	250.00	400	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1330.267	45.96	74.0	28.04	Peak	13.00	100	Vertical	Pass
1**	1330.267	33.23	54.0	20.77	AV	13.00	100	Vertical	Pass
2	2945.829	50.45	74.0	23.55	Peak	47.00	300	Vertical	Pass
2**	2945.829	42.82	54.0	11.18	AV	47.00	300	Vertical	Pass
3	4750.457	50.07	74.0	23.93	Peak	152.00	200	Vertical	Pass
3**	4750.457	37.28	54.0	16.72	AV	152.00	200	Vertical	Pass
4	7167.497	56.20	74.0	17.80	Peak	357.00	400	Vertical	Pass
4**	7167.497	45.54	54.0	8.46	AV	357.00	400	Vertical	Pass
5	12520.065	55.65	74.0	18.35	Peak	105.00	400	Vertical	Pass
5**	12520.065	42.23	54.0	11.77	AV	105.00	400	Vertical	Pass
6	17113.699	55.89	74.0	18.11	Peak	257.00	400	Vertical	Pass
6**	17113.699	46.43	54.0	7.57	AV	257.00	400	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1438.235	46.85	74.0	27.15	Peak	49.00	100	Horizontal	Pass
1**	1438.235	41.79	54.0	12.21	AV	49.00	100	Horizontal	Pass
2	2670.625	52.27	74.0	21.73	Peak	18.00	400	Horizontal	Pass
2**	2670.625	42.36	54.0	11.64	AV	18.00	400	Horizontal	Pass
3	4952.216	51.98	74.0	22.02	Peak	341.00	200	Horizontal	Pass
3**	4952.216	38.92	54.0	15.08	AV	341.00	200	Horizontal	Pass
4	7685.084	51.61	74.0	22.39	Peak	49.00	400	Horizontal	Pass
4**	7685.084	42.46	54.0	11.54	AV	49.00	400	Horizontal	Pass
5	12463.844	53.34	74.0	20.66	Peak	18.00	200	Horizontal	Pass
5**	12463.844	40.66	54.0	13.34	AV	18.00	200	Horizontal	Pass
6	14455.104	53.43	74.0	20.57	Peak	18.00	300	Horizontal	Pass
6**	14455.104	47.97	54.0	6.03	AV	18.00	300	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1335.620	42.14	74.0	31.86	Peak	256.00	100	Vertical	Pass
1**	1335.620	36.62	54.0	17.38	AV	256.00	100	Vertical	Pass
2	2944.734	49.14	74.0	24.86	Peak	212.00	100	Vertical	Pass
2**	2944.734	38.97	54.0	15.03	AV	212.00	100	Vertical	Pass
3	4752.073	48.64	74.0	25.36	Peak	328.00	200	Vertical	Pass
3**	4752.073	39.75	54.0	14.25	AV	328.00	200	Vertical	Pass
4	7167.884	55.57	74.0	18.43	Peak	103.00	100	Vertical	Pass
4**	7167.884	43.63	54.0	10.37	AV	103.00	100	Vertical	Pass
5	12518.939	56.41	74.0	17.59	Peak	148.00	400	Vertical	Pass
5**	12518.939	47.62	54.0	6.38	AV	148.00	400	Vertical	Pass
6	17111.867	55.15	74.0	18.85	Peak	250.00	300	Vertical	Pass
6**	17111.867	48.01	54.0	5.99	AV	250.00	300	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1441.636	48.46	74.0	25.54	Peak	10.00	200	Horizontal	Pass
1**	1441.636	41.55	54.0	12.45	AV	10.00	200	Horizontal	Pass
2	2673.747	53.48	74.0	20.52	Peak	40.00	200	Horizontal	Pass
2**	2673.747	39.67	54.0	14.33	AV	40.00	200	Horizontal	Pass
3	4951.432	51.42	74.0	22.58	Peak	16.00	200	Horizontal	Pass
3**	4951.432	38.23	54.0	15.77	AV	16.00	200	Horizontal	Pass
4	7685.697	56.12	74.0	17.88	Peak	295.00	200	Horizontal	Pass
4**	7685.697	45.78	54.0	8.22	AV	295.00	200	Horizontal	Pass
5	12464.904	51.55	74.0	22.45	Peak	15.00	100	Horizontal	Pass
5**	12464.904	41.00	54.0	13.00	AV	15.00	100	Horizontal	Pass
6	14455.181	53.11	74.0	20.89	Peak	45.00	100	Horizontal	Pass
6**	14455.181	46.66	54.0	7.34	AV	45.00	100	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1336.457	43.06	74.0	30.94	Peak	31.00	300	Vertical	Pass
1**	1336.457	32.52	54.0	21.48	AV	31.00	300	Vertical	Pass
2	2950.874	52.05	74.0	21.95	Peak	165.00	400	Vertical	Pass
2**	2950.874	42.87	54.0	11.13	AV	165.00	400	Vertical	Pass
3	4749.244	48.53	74.0	25.47	Peak	153.00	200	Vertical	Pass
3**	4749.244	40.05	54.0	13.95	AV	153.00	200	Vertical	Pass
4	7170.676	51.85	74.0	22.15	Peak	32.00	100	Vertical	Pass
4**	7170.676	45.11	54.0	8.89	AV	32.00	100	Vertical	Pass
5	12521.238	56.12	74.0	17.88	Peak	14.00	200	Vertical	Pass
5**	12521.238	46.44	54.0	7.56	AV	14.00	200	Vertical	Pass
6	17116.450	58.10	74.0	15.90	Peak	94.00	100	Vertical	Pass
6**	17116.450	44.62	54.0	9.38	AV	94.00	100	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1436.380	44.33	74.0	29.67	Peak	83.00	300	Horizontal	Pass
1**	1436.380	44.06	54.0	9.94	AV	83.00	300	Horizontal	Pass
2	2675.059	49.23	74.0	24.77	Peak	88.00	400	Horizontal	Pass
2**	2675.059	41.26	54.0	12.74	AV	88.00	400	Horizontal	Pass
3	4950.011	51.36	74.0	22.64	Peak	68.00	200	Horizontal	Pass
3**	4950.011	39.26	54.0	14.74	AV	68.00	200	Horizontal	Pass
4	7686.783	56.85	74.0	17.15	Peak	260.00	200	Horizontal	Pass
4**	7686.783	43.76	54.0	10.24	AV	260.00	200	Horizontal	Pass
5	12465.380	55.70	74.0	18.30	Peak	269.00	300	Horizontal	Pass
5**	12465.380	46.51	54.0	7.49	AV	269.00	300	Horizontal	Pass
6	14453.315	53.90	74.0	20.10	Peak	156.00	100	Horizontal	Pass
6**	14453.315	47.94	54.0	6.06	AV	156.00	100	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1331.555	43.33	74.0	30.67	Peak	342.00	100	Vertical	Pass
1**	1331.555	31.57	54.0	22.43	AV	342.00	100	Vertical	Pass
2	2951.798	47.97	74.0	26.03	Peak	40.00	100	Vertical	Pass
2**	2951.798	38.71	54.0	15.29	AV	40.00	100	Vertical	Pass
3	4748.346	48.31	74.0	25.69	Peak	79.00	200	Vertical	Pass
3**	4748.346	39.92	54.0	14.08	AV	79.00	200	Vertical	Pass
4	7171.669	54.85	74.0	19.15	Peak	153.00	200	Vertical	Pass
4**	7171.669	47.95	54.0	6.05	AV	153.00	200	Vertical	Pass
5	12516.185	54.49	74.0	19.51	Peak	109.00	400	Vertical	Pass
5**	12516.185	43.29	54.0	10.71	AV	109.00	400	Vertical	Pass
6	17113.116	57.07	74.0	16.93	Peak	99.00	400	Vertical	Pass
6**	17113.116	48.13	54.0	5.87	AV	99.00	400	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1443.728	43.97	74.0	30.03	Peak	23.00	200	Horizontal	Pass
1**	1443.728	40.11	54.0	13.89	AV	23.00	200	Horizontal	Pass
2	2674.631	51.30	74.0	22.70	Peak	224.00	100	Horizontal	Pass
2**	2674.631	41.70	54.0	12.30	AV	224.00	100	Horizontal	Pass
3	4953.059	48.24	74.0	25.76	Peak	60.00	200	Horizontal	Pass
3**	4953.059	39.28	54.0	14.72	AV	60.00	200	Horizontal	Pass
4	7685.349	52.37	74.0	21.63	Peak	309.00	100	Horizontal	Pass
4**	7685.349	42.15	54.0	11.85	AV	309.00	100	Horizontal	Pass
5	12464.052	55.91	74.0	18.09	Peak	72.00	100	Horizontal	Pass
5**	12464.052	42.06	54.0	11.94	AV	72.00	100	Horizontal	Pass
6	14455.580	53.42	74.0	20.58	Peak	104.00	100	Horizontal	Pass
6**	14455.580	47.38	54.0	6.62	AV	104.00	100	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1332.040	44.20	74.0	29.80	Peak	5.00	400	Vertical	Pass
1**	1332.040	32.40	54.0	21.60	AV	5.00	400	Vertical	Pass
2	2950.564	52.19	74.0	21.81	Peak	220.00	300	Vertical	Pass
2**	2950.564	43.48	54.0	10.52	AV	220.00	300	Vertical	Pass
3	4749.126	50.42	74.0	23.58	Peak	279.00	200	Vertical	Pass
3**	4749.126	39.25	54.0	14.75	AV	279.00	200	Vertical	Pass
4	7171.378	52.45	74.0	21.55	Peak	350.00	400	Vertical	Pass
4**	7171.378	45.53	54.0	8.47	AV	350.00	400	Vertical	Pass
5	12522.478	51.29	74.0	22.71	Peak	94.00	300	Vertical	Pass
5**	12522.478	42.66	54.0	11.34	AV	94.00	300	Vertical	Pass
6	17113.862	57.23	74.0	16.77	Peak	146.00	200	Vertical	Pass
6**	17113.862	45.66	54.0	8.34	AV	146.00	200	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1441.033	43.90	74.0	30.10	Peak	229.00	200	Horizontal	Pass
1**	1441.033	44.62	54.0	9.38	AV	229.00	200	Horizontal	Pass
2	2675.327	54.32	74.0	19.68	Peak	1.00	100	Horizontal	Pass
2**	2675.327	42.06	54.0	11.94	AV	1.00	100	Horizontal	Pass
3	4947.779	47.97	74.0	26.03	Peak	298.00	200	Horizontal	Pass
3**	4947.779	42.36	54.0	11.64	AV	298.00	200	Horizontal	Pass
4	7682.304	53.12	74.0	20.88	Peak	272.00	400	Horizontal	Pass
4**	7682.304	45.89	54.0	8.11	AV	272.00	400	Horizontal	Pass
5	12468.097	51.64	74.0	22.36	Peak	292.00	400	Horizontal	Pass
5**	12468.097	44.34	54.0	9.66	AV	292.00	400	Horizontal	Pass
6	14458.229	52.40	74.0	21.60	Peak	99.00	400	Horizontal	Pass
6**	14458.229	45.74	54.0	8.26	AV	99.00	400	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1328.993	42.93	74.0	31.07	Peak	137.00	400	Vertical	Pass
1**	1328.993	32.89	54.0	21.11	AV	137.00	400	Vertical	Pass
2	2945.832	49.07	74.0	24.93	Peak	35.00	300	Vertical	Pass
2**	2945.832	40.72	54.0	13.28	AV	35.00	300	Vertical	Pass
3	4746.661	52.21	74.0	21.79	Peak	193.00	200	Vertical	Pass
3**	4746.661	40.58	54.0	13.42	AV	193.00	200	Vertical	Pass
4	7168.420	51.60	74.0	22.40	Peak	237.00	400	Vertical	Pass
4**	7168.420	44.25	54.0	9.75	AV	237.00	400	Vertical	Pass
5	12522.757	53.35	74.0	20.65	Peak	348.00	200	Vertical	Pass
5**	12522.757	46.44	54.0	7.56	AV	348.00	200	Vertical	Pass
6	17114.041	55.79	74.0	18.21	Peak	176.00	400	Vertical	Pass
6**	17114.041	44.46	54.0	9.54	AV	176.00	400	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1437.592	43.74	74.0	30.26	Peak	297.00	200	Horizontal	Pass
1**	1437.592	40.84	54.0	13.16	AV	297.00	200	Horizontal	Pass
2	2671.193	49.88	74.0	24.12	Peak	344.00	100	Horizontal	Pass
2**	2671.193	41.26	54.0	12.74	AV	344.00	100	Horizontal	Pass
3	4950.511	47.85	74.0	26.15	Peak	60.00	200	Horizontal	Pass
3**	4950.511	36.93	54.0	17.07	AV	60.00	200	Horizontal	Pass
4	7685.392	56.03	74.0	17.97	Peak	186.00	300	Horizontal	Pass
4**	7685.392	44.22	54.0	9.78	AV	186.00	300	Horizontal	Pass
5	12461.530	54.62	74.0	19.38	Peak	108.00	300	Horizontal	Pass
5**	12461.530	41.16	54.0	12.84	AV	108.00	300	Horizontal	Pass
6	14458.123	57.66	74.0	16.34	Peak	12.00	400	Horizontal	Pass
6**	14458.123	45.54	54.0	8.46	AV	12.00	400	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1331.780	42.19	74.0	31.81	Peak	224.00	200	Vertical	Pass
1**	1331.780	30.96	54.0	23.04	AV	224.00	200	Vertical	Pass
2	2951.343	48.26	74.0	25.74	Peak	172.00	400	Vertical	Pass
2**	2951.343	41.78	54.0	12.22	AV	172.00	400	Vertical	Pass
3	4748.942	52.58	74.0	21.42	Peak	175.00	200	Vertical	Pass
3**	4748.942	39.45	54.0	14.55	AV	175.00	200	Vertical	Pass
4	7169.868	54.13	74.0	19.87	Peak	37.00	400	Vertical	Pass
4**	7169.868	43.98	54.0	10.02	AV	37.00	400	Vertical	Pass
5	12515.952	50.97	74.0	23.03	Peak	155.00	300	Vertical	Pass
5**	12515.952	43.95	54.0	10.05	AV	155.00	300	Vertical	Pass
6	17118.376	56.91	74.0	17.09	Peak	23.00	200	Vertical	Pass
6**	17118.376	47.72	54.0	6.28	AV	23.00	200	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1439.593	48.07	74.0	25.93	Peak	268.00	200	Horizontal	Pass
1**	1439.593	40.99	54.0	13.01	AV	268.00	200	Horizontal	Pass
2	2669.067	50.47	74.0	23.53	Peak	135.00	300	Horizontal	Pass
2**	2669.067	41.15	54.0	12.85	AV	135.00	300	Horizontal	Pass
3	4947.929	47.72	74.0	26.28	Peak	355.00	200	Horizontal	Pass
3**	4947.929	38.71	54.0	15.29	AV	355.00	200	Horizontal	Pass
4	7688.921	51.07	74.0	22.93	Peak	162.00	100	Horizontal	Pass
4**	7688.921	42.01	54.0	11.99	AV	162.00	100	Horizontal	Pass
5	12466.953	53.91	74.0	20.09	Peak	218.00	200	Horizontal	Pass
5**	12466.953	44.08	54.0	9.92	AV	218.00	200	Horizontal	Pass
6	14454.469	57.10	74.0	16.90	Peak	296.00	300	Horizontal	Pass
6**	14454.469	42.89	54.0	11.11	AV	296.00	300	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1331.637	40.00	74.0	34.00	Peak	329.00	400	Vertical	Pass
1**	1331.637	33.85	54.0	20.15	AV	329.00	400	Vertical	Pass
2	2946.204	49.56	74.0	24.44	Peak	180.00	300	Vertical	Pass
2**	2946.204	39.39	54.0	14.61	AV	180.00	300	Vertical	Pass
3	4751.946	49.19	74.0	24.81	Peak	167.00	200	Vertical	Pass
3**	4751.946	36.57	54.0	17.43	AV	167.00	200	Vertical	Pass
4	7170.928	52.84	74.0	21.16	Peak	325.00	100	Vertical	Pass
4**	7170.928	44.17	54.0	9.83	AV	325.00	100	Vertical	Pass
5	12520.546	53.11	74.0	20.89	Peak	6.00	100	Vertical	Pass
5**	12520.546	45.24	54.0	8.76	AV	6.00	100	Vertical	Pass
6	17117.699	54.94	74.0	19.06	Peak	135.00	400	Vertical	Pass
6**	17117.699	48.55	54.0	5.45	AV	135.00	400	Vertical	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1442.037	43.75	74.0	30.25	Peak	178.00	200	Horizontal	Pass
1**	1442.037	42.69	54.0	11.31	AV	178.00	200	Horizontal	Pass
2	2668.200	51.92	74.0	22.08	Peak	259.00	200	Horizontal	Pass
2**	2668.200	39.63	54.0	14.37	AV	259.00	200	Horizontal	Pass
3	4950.699	49.27	74.0	24.73	Peak	76.00	200	Horizontal	Pass
3**	4950.699	39.39	54.0	14.61	AV	76.00	200	Horizontal	Pass
4	7684.131	54.66	74.0	19.34	Peak	214.00	400	Horizontal	Pass
4**	7684.131	43.37	54.0	10.63	AV	214.00	400	Horizontal	Pass
5	12468.539	51.88	74.0	22.12	Peak	63.00	300	Horizontal	Pass
5**	12468.539	43.44	54.0	10.56	AV	63.00	300	Horizontal	Pass
6	14458.669	55.38	74.0	18.62	Peak	224.00	200	Horizontal	Pass
6**	14458.669	46.76	54.0	7.24	AV	224.00	200	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1329.796	45.29	74.0	28.71	Peak	20.00	300	Vertical	Pass
1**	1329.796	32.86	54.0	21.14	AV	20.00	300	Vertical	Pass
2	2948.345	50.08	74.0	23.92	Peak	233.00	100	Vertical	Pass
2**	2948.345	38.55	54.0	15.45	AV	233.00	100	Vertical	Pass
3	4750.597	47.26	74.0	26.74	Peak	282.00	200	Vertical	Pass
3**	4750.597	38.80	54.0	15.20	AV	282.00	200	Vertical	Pass
4	7171.361	56.40	74.0	17.60	Peak	349.00	200	Vertical	Pass
4**	7171.361	45.33	54.0	8.67	AV	349.00	200	Vertical	Pass
5	12515.160	53.15	74.0	20.85	Peak	238.00	400	Vertical	Pass
5**	12515.160	45.22	54.0	8.78	AV	238.00	400	Vertical	Pass
6	17116.790	55.01	74.0	18.99	Peak	208.00	400	Vertical	Pass
6**	17116.790	47.18	54.0	6.82	AV	208.00	400	Vertical	Pass

Rod Antenna

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1441.179	42.95	74.0	31.05	Peak	138.00	400	Horizontal	Pass
1**	1441.179	42.14	54.0	11.86	AV	138.00	400	Horizontal	Pass
2	2675.587	51.04	74.0	22.96	Peak	21.00	100	Horizontal	Pass
2**	2675.587	41.62	54.0	12.38	AV	21.00	100	Horizontal	Pass
3	4952.314	48.31	74.0	25.69	Peak	188.00	200	Horizontal	Pass
3**	4952.314	37.86	54.0	16.14	AV	188.00	200	Horizontal	Pass
4	7684.883	54.24	74.0	19.76	Peak	247.00	100	Horizontal	Pass
4**	7684.883	40.49	54.0	13.51	AV	247.00	100	Horizontal	Pass
5	12463.852	54.96	74.0	19.04	Peak	310.00	100	Horizontal	Pass
5**	12463.852	43.61	54.0	10.39	AV	310.00	100	Horizontal	Pass
6	14460.310	57.68	74.0	16.32	Peak	35.00	300	Horizontal	Pass
6**	14460.310	44.31	54.0	9.69	AV	35.00	300	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1335.061	44.13	74.0	29.87	Peak	234.00	200	Vertical	Pass
1**	1335.061	31.00	54.0	23.00	AV	234.00	200	Vertical	Pass
2	2947.088	53.06	74.0	20.94	Peak	218.00	200	Vertical	Pass
2**	2947.088	42.65	54.0	11.35	AV	218.00	200	Vertical	Pass
3	4749.126	50.07	74.0	23.93	Peak	251.00	200	Vertical	Pass
3**	4749.126	37.95	54.0	16.05	AV	251.00	200	Vertical	Pass
4	7166.285	52.93	74.0	21.07	Peak	53.00	400	Vertical	Pass
4**	7166.285	42.19	54.0	11.81	AV	53.00	400	Vertical	Pass
5	12515.716	52.51	74.0	21.49	Peak	30.00	100	Vertical	Pass
5**	12515.716	42.34	54.0	11.66	AV	30.00	100	Vertical	Pass
6	17117.383	57.60	74.0	16.40	Peak	349.00	100	Vertical	Pass
6**	17117.383	43.72	54.0	10.28	AV	349.00	100	Vertical	Pass

FPC Antenna

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1437.229	45.46	74.0	28.54	Peak	220.00	200	Horizontal	Pass
1**	1437.229	41.00	54.0	13.00	AV	220.00	200	Horizontal	Pass
2	2670.449	50.79	74.0	23.21	Peak	35.00	300	Horizontal	Pass
2**	2670.449	39.07	54.0	14.93	AV	35.00	300	Horizontal	Pass
3	4952.160	52.10	74.0	21.90	Peak	75.00	200	Horizontal	Pass
3**	4952.160	39.04	54.0	14.96	AV	75.00	200	Horizontal	Pass
4	7687.180	53.18	74.0	20.82	Peak	180.00	200	Horizontal	Pass
4**	7687.180	40.15	54.0	13.85	AV	180.00	200	Horizontal	Pass
5	12465.918	54.70	74.0	19.30	Peak	126.00	200	Horizontal	Pass
5**	12465.918	41.67	54.0	12.33	AV	126.00	200	Horizontal	Pass
6	14453.811	55.14	74.0	18.86	Peak	98.00	200	Horizontal	Pass
6**	14453.811	45.72	54.0	8.28	AV	98.00	200	Horizontal	Pass

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

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1330.162	42.07	74.0	31.93	Peak	358.00	200	Vertical	Pass
1**	1330.162	33.67	54.0	20.33	AV	358.00	200	Vertical	Pass
2	2946.948	47.48	74.0	26.52	Peak	154.00	100	Vertical	Pass
2**	2946.948	41.23	54.0	12.77	AV	154.00	100	Vertical	Pass
3	4746.431	49.84	74.0	24.16	Peak	131.00	200	Vertical	Pass
3**	4746.431	38.25	54.0	15.75	AV	131.00	200	Vertical	Pass
4	7166.417	51.07	74.0	22.93	Peak	77.00	300	Vertical	Pass
4**	7166.417	47.51	54.0	6.49	AV	77.00	300	Vertical	Pass
5	12516.411	51.09	74.0	22.91	Peak	229.00	300	Vertical	Pass
5**	12516.411	45.82	54.0	8.18	AV	229.00	300	Vertical	Pass
6	17115.548	53.02	74.0	20.98	Peak	280.00	300	Vertical	Pass
6**	17115.548	48.40	54.0	5.60	AV	280.00	300	Vertical	Pass

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

Note 1: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note 2: All antenna were tested, but only the worst case has been reported in this report.
Note 3: The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.
Note 4: 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 5: According the ANSI C63.10-2013, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Test Data and Plots

PCB Antenna

802.11b LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2362.611	58.4	74.0	15.60	Peak	92.00	100	Horizontal	Pass
1**	2362.611	46.26	54.0	7.74	AV	92.00	100	Horizontal	Pass
2	2390.000	57.58	74.0	16.42	Peak	211.00	100	Horizontal	Pass
2**	2390.000	47.45	54.0	6.55	AV	211.00	100	Horizontal	Pass

802.11b HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	55.23	74.0	18.77	Peak	228.00	300	Horizontal	Pass
1**	2483.500	46.31	54.0	7.69	AV	228.00	300	Horizontal	Pass
2	2485.689	57.36	74.0	16.64	Peak	0.00	100	Horizontal	Pass
2**	2485.689	48.06	54.0	5.94	AV	0.00	100	Horizontal	Pass

802.11g LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2361.327	59.21	74.0	14.79	Peak	27.00	200	Horizontal	Pass
1**	2361.327	46.14	54.0	7.86	AV	27.00	200	Horizontal	Pass
2	2390.000	55.13	74.0	18.87	Peak	264.00	300	Horizontal	Pass
2**	2390.000	48	54.0	6.00	AV	264.00	300	Horizontal	Pass

802.11g HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	55.15	74.0	18.85	Peak	163.00	300	Horizontal	Pass
1**	2483.500	47.81	54.0	6.19	AV	163.00	300	Horizontal	Pass
2	2484.506	57.27	74.0	16.73	Peak	252.00	300	Horizontal	Pass
2**	2484.506	45.83	54.0	8.17	AV	252.00	300	Horizontal	Pass

802.11n20 LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2363.972	57.84	74.0	16.16	Peak	349.00	200	Horizontal	Pass
1**	2363.972	45.02	54.0	8.98	AV	349.00	200	Horizontal	Pass
2	2390.000	57.18	74.0	16.82	Peak	278.00	100	Horizontal	Pass
2**	2390.000	45.89	54.0	8.11	AV	278.00	100	Horizontal	Pass

802.11n20 HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	55.61	74.0	18.39	Peak	352.00	200	Horizontal	Pass
1**	2483.500	45.76	54.0	8.24	AV	352.00	200	Horizontal	Pass
2	2486.934	59.17	74.0	14.83	Peak	160.00	100	Horizontal	Pass
2**	2486.934	45.05	54.0	8.95	AV	160.00	100	Horizontal	Pass

802.11n40 LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2362.462	57.9	74.0	16.10	Peak	202.00	200	Horizontal	Pass
1**	2362.462	45.02	54.0	8.98	AV	202.00	200	Horizontal	Pass
2	2390.000	54.58	74.0	19.42	Peak	212.00	100	Horizontal	Pass
2**	2390.000	47.09	54.0	6.91	AV	212.00	100	Horizontal	Pass

802.11n40 HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	57.25	74.0	16.75	Peak	35.00	300	Horizontal	Pass
1**	2483.500	45.56	54.0	8.44	AV	35.00	300	Horizontal	Pass
2	2485.932	56.62	74.0	17.38	Peak	76.00	200	Horizontal	Pass
2**	2485.932	45.32	54.0	8.68	AV	76.00	200	Horizontal	Pass

Rod Antenna

802.11n40 LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2363.823	57.76	74.0	16.24	Peak	76.00	300	Horizontal	Pass
1**	2363.823	45.33	54.0	8.67	AV	76.00	300	Horizontal	Pass
2	2390.000	54.88	74.0	19.12	Peak	299.00	200	Horizontal	Pass
2**	2390.000	48.69	54.0	5.31	AV	299.00	200	Horizontal	Pass

FPC Antenna

802.11n40 LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	58.12	74.0	15.88	Peak	69.00	300	Horizontal	Pass
1**	2483.500	46.51	54.0	7.49	AV	69.00	300	Horizontal	Pass
2	2484.187	57.33	74.0	16.67	Peak	110.00	100	Horizontal	Pass
2**	2484.187	46.91	54.0	7.09	AV	110.00	100	Horizontal	Pass

A.8 Power Spectral Density (PSD)

Note 1: All the configurations were pre tested, only the worst configuration has been reported in this report.
Note 2: All antenna were tested, but only the worst case has been reported in this report.

Test Data

802.11b Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-7.29	8
Middle	-7.57	8
High	-8.21	8

802.11g Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-7.32	8
Middle	-6.50	8
High	-7.24	8

802.11n-20 MHz Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-6.89	8
Middle	-6.81	8
High	-7.35	8

802.11n-40 MHz Mode:

Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)
Low	-10.49	8
Middle	-10.65	8
High	-9.73	8

Test Plots

802.11b LOW CHANNEL

802.11b MIDDLE CHANNEL

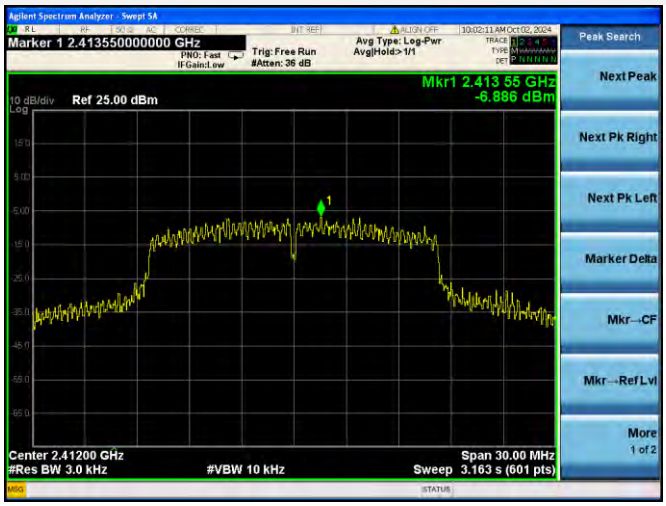
802.11b HIGH CHANNEL

802.11g LOW CHANNEL

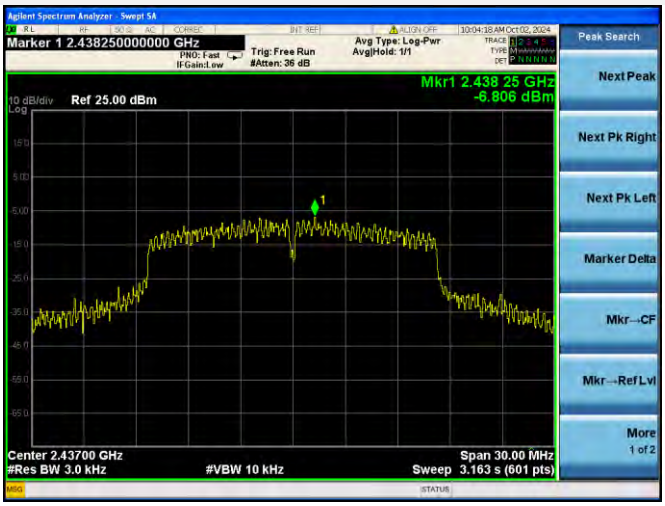
802.11g MIDDLE CHANNEL

802.11g HIGH CHANNEL

802.11n-20 MHz LOW CHANNEL



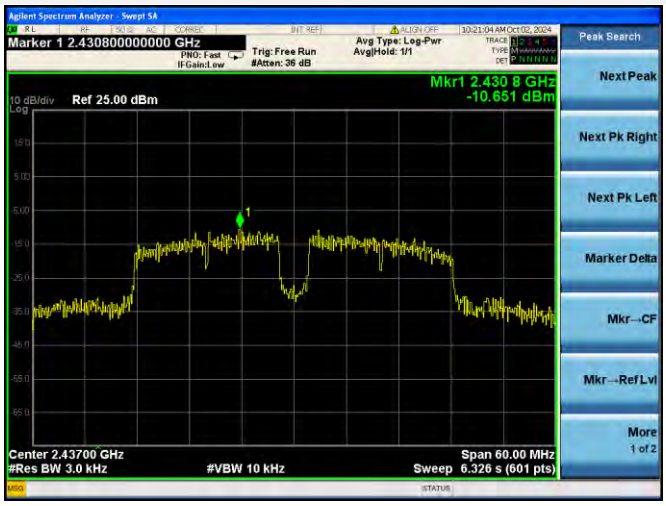
802.11n-20 MHz MIDDLE CHANNEL



802.11n-20 MHz HIGH CHANNEL

802.11n-40 MHz LOW CHANNEL

802.11n-40 MHz MIDDLE CHANNEL



802.11n-40 MHz HIGH CHANNEL

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2490059-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2490059-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2490059-AI.PDF”.

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--END OF REPORT--