EMTEK
Access to the World

FCC 47 CFR PART 15 SUBPART C
AND
INDUSTRY CANADA RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

For

Hand tremor data collector

MODEL No.: TC20

FCC ID: 2ACGF-TC20

IC: 24095-TC20

TRADE MARK: N/A

REPORT NO: ES180704018W01

ISSUE DATE: Augutst 03, 2018

Prepared for

GYENNO Technologies CO., LTD.
Room 805, Building A, IER of Huazhong University of Science and Technology, Nanshan District, Shenzhen, China

Prepared by

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1 TEST RESULT CERTIFICATION

Applicant:	GYENNO Technologies CO., LTD. Room 805, Building A, IER of Huazhong University of Science and Technology, Nanshan District, Shenzhen, China
Manufacturer:	GYENNO Technologies CO., LTD. Room 805, Building A, IER of Huazhong University of Science and Technology, Nanshan District, Shenzhen, China
EUT Description:	Hand tremor data collector
Model Number:	TC20
Trade Mark:	N/A

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C IC RSS-GEN, Issue 5 April 2018 IC RSS-247 Issue 2, Feb. 2017	PASS

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.247; IC Rules RSS-247, Issue 2 and IC RSS-GEN, Issue 5

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

Date of Test : July 05, 2018 to Augutst 03, 2018

Prepared by : Doris Su /Tester

Reviewer : Sevin Li / Supervisor

Approve & Authorized Signer : Lisa Wang/Manager

2 EUT TECHNICAL DESCRIPTION

Characteristics	Description
IEEE 802.11 WLAN Mode Supported	☒802.11b ☒802.11g ☒802.11n(20MHz channel bandwidth)
Data Rate	☒802.11 b:1,2,5.5,11Mbps; ☒802.11 g:6,9,12,18,24,36,48,54Mbps; ☒802.11n(HT20):MCS0-MCS7;
Modulation	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAMfor 802.11g/n;
Operating Frequency Range	☒2412-2462MHz for 802.11b/g; ☒2412-2462MHz for 802.11n(HT20);
Number of Channels	☒11 channels for 802.11b/g; ☒11 channels for 802.11n(HT20);
Transmit Power Max	15.28 dBm
Antenna Type	PCB antenna
Gain	2dBi
HW version	V0.4
SW version	V1.0.0
Power supply	☒DC 3.7V internal rechargeable lithium battery ☒DC 5V from USB Cable
Temperature Range	0°C ~ +45°C

3 SUMMARY OF TEST RESULT

FCC/IC Part Clause	Test Parameter	Verdict	Remark
FCC15.247(a)(2) IC RSS-247.5.2(a)	DTS (6dB) Bandwidth	PASS	
IC RSS-Gen.6.6	99% Occupied Bandwidth	PASS	
FCC 15.247(b)(3) IC RSS-247.5.4(d)	Maximum Peak Conducted Output Power	PASS	
IC RSS-247.5.4(d)	Equivalent Isotropically Radiated Power	PASS	
FCC 15.247(e) IC RSS-247.5.2(b)	Maximum Power Spectral Density Level	PASS	
FCC 15.247(d) IC RSS-247.5.5	Unwanted Emission Into Non-Restricted Frequency Bands	PASS	
FCC 15.247(d) 15.209 IC RSS-247.5.5	Unwanted Emission Into Restricted Frequency Bands (conducted)	PASS	
FCC 15.247(d) 15.209 IC RSS-Gen.6.13	Radiated Spurious Emission	PASS	
FCC15.207 RSS-Gen 6.12	Conducted Emission Test	PASS	
FCC 15.247(b) IC RSS-Gen.8.3 RSS-247.5.4	Antenna Application	PASS	
NOTE1:N/A (Not Applicable) NOTE2: According to FCC OET KDB 558074, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.			

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2ACGF-TC20 and IC: 24095-TC20 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and IC RSS-247.

4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:
FCC 47 CFR Part 2, Subpart J
FCC 47 CFR Part 15, Subpart C
IC RSS-GEN, Issue 5 April 2018
IC RSS-247, ISSUE 2 February 2017
FCC KDB 558074 D01 DTS Meas Guidance v04

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	DUE CAL.
Test Receiver	Rohde & Schwarz	ESCI	26115-010-0027	May 19, 2018	May 18, 2019
L.I.S.N.	Rohde & Schwarz	ENV216	101161	May 19, 2018	May 18, 2019
50Ω Coaxial Switch	Anritsu	MP59B	6100175589	May 20, 2018	May 19, 2019
Voltage Probe	Rohde & Schwarz	ESH2-Z3	100122	May 20, 2018	May 19, 2019
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	May 19, 2018	May 18, 2019
I.S.N	Teseq GmbH	ISN T800	30327	May 20, 2018	May 19, 2019

4.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	DUE CAL.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 20, 2018	May 19, 2019
Pre-Amplifier	HP	8447F	2944A07999	May 19, 2018	May 18, 2019
Bilog Antenna	Schwarzbeck	VULB9163	142	May 19, 2018	May 18, 2019
Loop Antenna	ARA	PLA-1030/B	1029	May 19, 2018	May 18, 2019
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 20, 2018	May 19, 2019
Horn Antenna	Schwarzbeck	BBHA 9120	D143	May 19, 2018	May 18, 2019
Cable	Schwarzbeck	AK9513	ACRX1	May 20, 2018	May 19, 2019
Cable	Rosenberger	N/A	FP2RX2	May 20, 2018	May 19, 2019
Cable	Schwarzbeck	AK9513	CRPX1	May 20, 2018	May 19, 2019
Cable	Schwarzbeck	AK9513	CRRX2	May 20, 2018	May 19, 2019

4.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	DUE CAL.
Spectrum Analyzer	Agilent	E4407B	88156318	May 20, 2018	May 19, 2019
Signal Analyzer	Agilent	N9010A	My53470879	May 20, 2018	May 19, 2019
Power meter	Anritsu	ML2495A	0824006	May 20, 2018	May 19, 2019
Power sensor	Anritsu	MA2411B	0738172	May 20, 2018	May 19, 2019

Remark: *Each piece of equipment is scheduled for calibration once a year.*

4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.
The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b: 1 Mbps; 802.11g: 6 Mbps; 802.11n (HT20); were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for 802.11 b/g/n(HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462
4	2427	8	2447		

Test Frequency and Channel for 802.11 b/g/n (HT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	11	2462

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab. : Accredited by CNAS, 2016.10.24
The certificate is valid until 2022.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005)
The Certificate Registration Number is L229

: Accredited by TUV Rheinland Shenzhen, 2016.5.19
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

: Accredited by FCC, August 03, 2017
Designation Number: CN1204
Test Firm Registration Number: 882943

: Accredited by Industry Canada, November 24, 2015
The Certificate Registration Number is 4480A.

6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

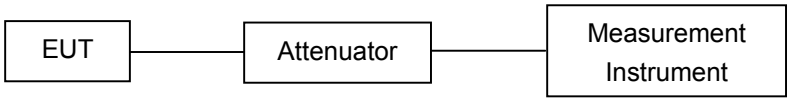
Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Peak Output Power Test	±1.0dB
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Power Density	±2.0dB
Occupied Bandwidth Test	±1.0dB
Band Edge Test	±3dB
All emission, radiated	±3dB
Antenna Port Emission	±3dB
Temperature	±0.5℃
Humidity	±3%

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP 1

The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.
The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Below 30MHz：
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Above 30MHz：
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:
The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Measurements shall be taken, using the following steps, at a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment (see RSS-Gen for applicable versions of ANSI and CISPR standards).
(1) Line the ground plane with absorbers between the transmitter and the receive antenna to minimize reflections. The absorbers used should have a minimum-rated attenuation of 20 dB through the measurement frequency range of interest. The absorbers shall be positioned to replicate the layout used when compliance with the applicable acceptability criterion was achieved, as set forth in the aforementioned standards on site validation.
(2) Set the height of the receive antenna to 1.5 m. The receive antenna must be one that was designed and fabricated to operate over the entire frequency range of interest, for example, an appropriate standard gain horn.
(3) The distance between the receive antenna and the radiating source shall be sufficient in order to ensure far-field conditions.
(4) Mount the transmitter at a height of 1.5 m.
(5) Configure the device under test (DUT) to produce the maximum power spectral density as measured while assessing compliance with Section 6.2.2 (i.e. channel frequency, modulation type and data rate). If the DUT is equipped with a detachable antenna and the antenna is intended for remote installation (i.e. tower-mounted), the DUT may be substituted with a suitable signal generator. The level and frequency settings on the generator shall be set so as to reproduce the maximum power spectral density, measured within a 1 MHz bandwidth, obtained while assessing compliance to Section 6.2.2.

(6) Position the transmitter or the radiating antenna so that elevation pattern measurements can be taken.
(7) Find the 0° reference point in the horizontal plane.
(8) Care should be taken when positioning the receive antenna to avoid cross-polarization. Antennas of known mounting polarization should be assessed with the receive antenna oriented in the same polarity. If the polarization of the transmit antenna is unknown or the transmit antenna can be mounted in either polarization, e.i.r.p. measurements should be performed to find which
mounting polarity provides the highest e.i.r.p. value. Testing shall be carried out with the receive antenna and the DUT mounted in each polarity.
(9) The emission shall be centred on the display of the spectrum analyzer with the following settings:
i. If the power spectral density of the DUT was assessed with a peak detector and the antenna cannot be detached from the DUT, the spectrum analyzer shall be set to a peak detector with a resolution bandwidth and video bandwidth of 1 MHz.
ii. If the power spectral density of the DUT was assessed using a sample detector with power averaging and the antenna cannot be detached from the DUT, the spectrum analyzer shall be set to a sample detector, configured to produce 100 power averages and set with a resolution bandwidth, as well as a video bandwidth of 1 MHz.
iii. If the antenna can be detached from the DUT, a continuous wave (CW) signal equal to that of the power spectral density measurement may be used, the spectrum analyzer shall be set to peak detector with a resolution bandwidth and video bandwidth of 1 MHz.

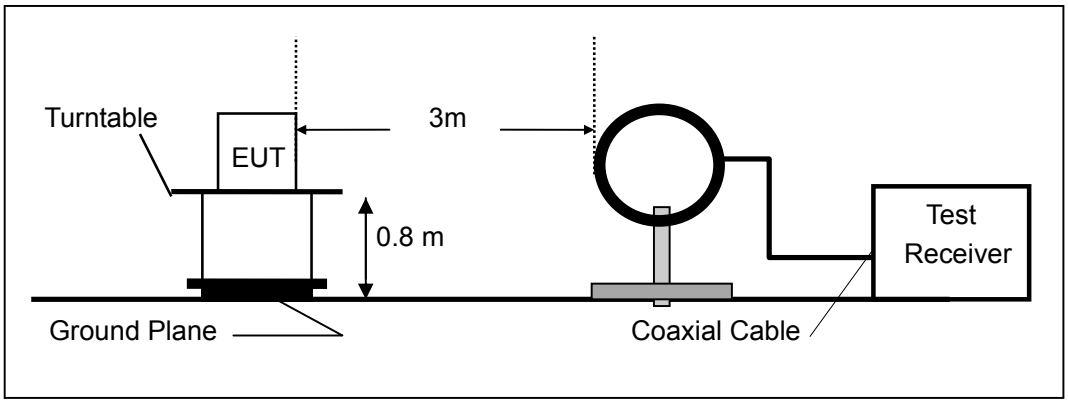
(10) Rotate the turntable 360° recording the field strength at each step. Throughout the main beam of the antenna, the step size shall be kept to a maximum of 1°.
Once outside the main beam of the antenna, the maximum step size shall be as follows, when compared to the requirements of Section 6.2.2:
i. Between 0° and 8°, maximum step size of 2°;
ii. Between 8° and 40°, maximum step size of 4°;
iii. Between 40° and 45°, maximum step size of 1°;
iv. Between 45° and 90°, maximum step size of 5°.
Once the mask reaches 90°, the mask will be inverted and the step size will follow in the same manner as above.
For the purpose of this procedure, the main beam of the antenna is defined as the 3 dB beamwidth.
(11) Convert the measured field strength values in terms of e.i.r.p. density (dBW/1 MHz) using the following equation:

$$\text{e.i.r.p density(dBW/MHz)} = 10\log((E*r)^2/30)$$

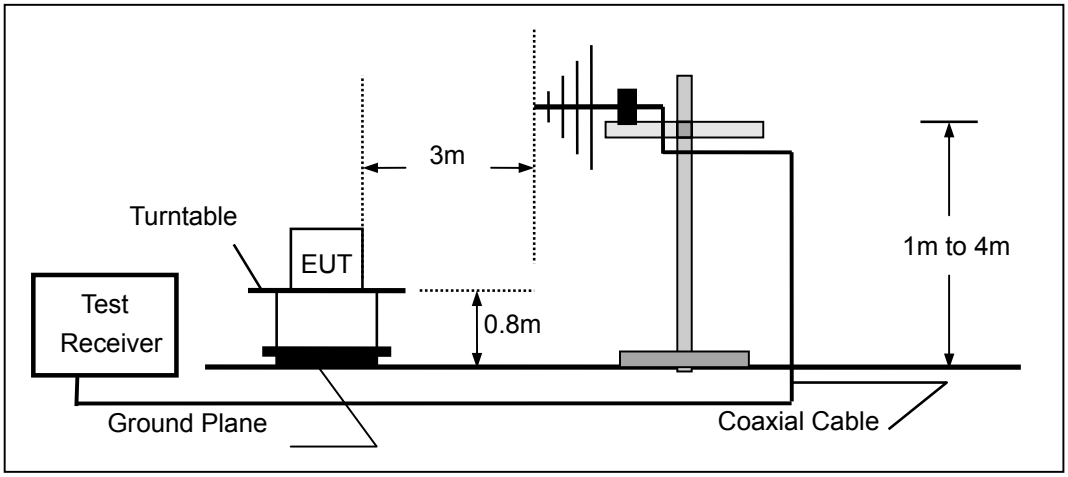
E = field strength in V/m
r = measurement distance in metres

(12) Plot the results against the emission mask with reference to the horizontal plane.
(13) Using the plot, the 0° can be rotated to determine the worst-case installation tilt angle.
(14) Testing shall be performed using the highest gain antenna for every antenna type, if applicable.
(15) Antenna type(s), antenna model number(s), and worst-case tilt angle(s) necessary to remain compliant with the elevation mask requirement set forth in Section 6.2.2(3) of RSS-247 shall be clearly indicated in the user manual.
The following figure is an example of a polar elevation mask measured using the Method 1 reference to dBµV/m at 3 m.

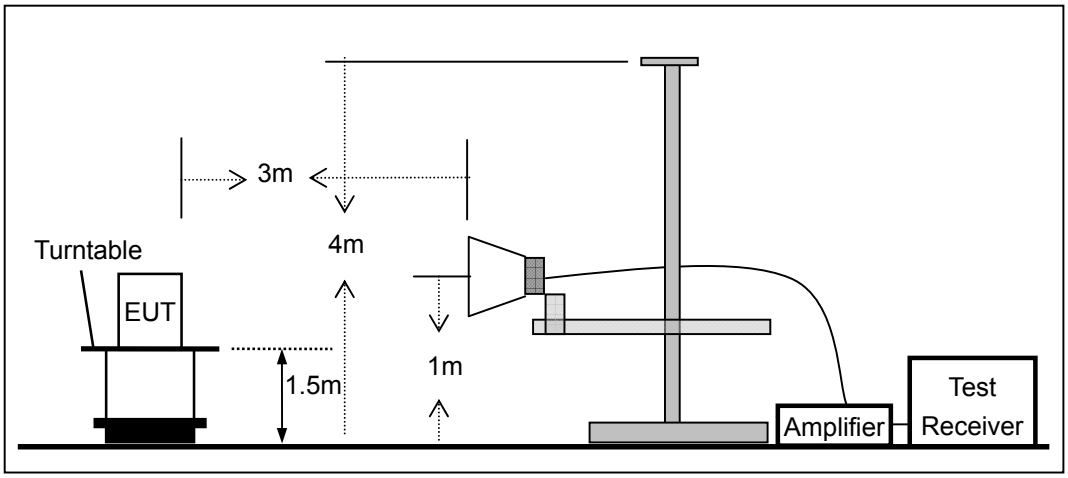
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

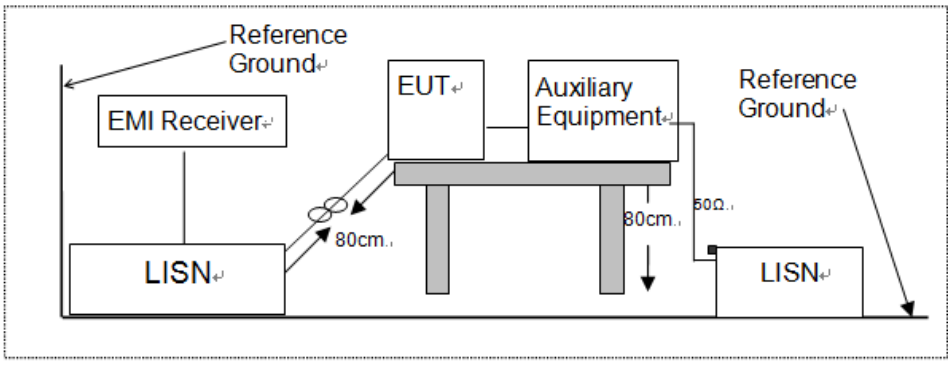


7.3 CONDUCTED EMISSION TEST SETUP

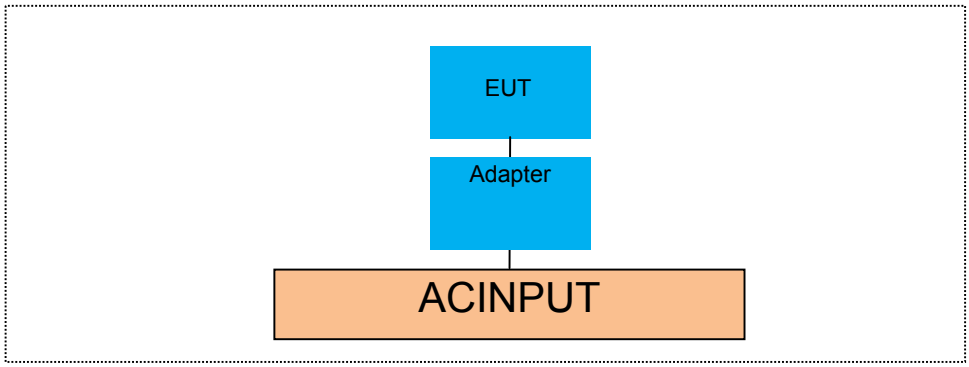
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1	Adapter	AMC	EJVD+10050-2000	N/A	N/A	Input: AC 100-240V, 50/60Hz,0.3A Output: DC 5V,2A

Notes:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

8 TEST REQUIREMENTS

8.1 DTS (6DB) BANDWIDTH

8.1.1 Applicable Standard

According to FCC Part15.247(a)(2) and IC RSS-247.5.2(a)

8.1.2 Conformance Limit

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

8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.1.4 Test Procedure

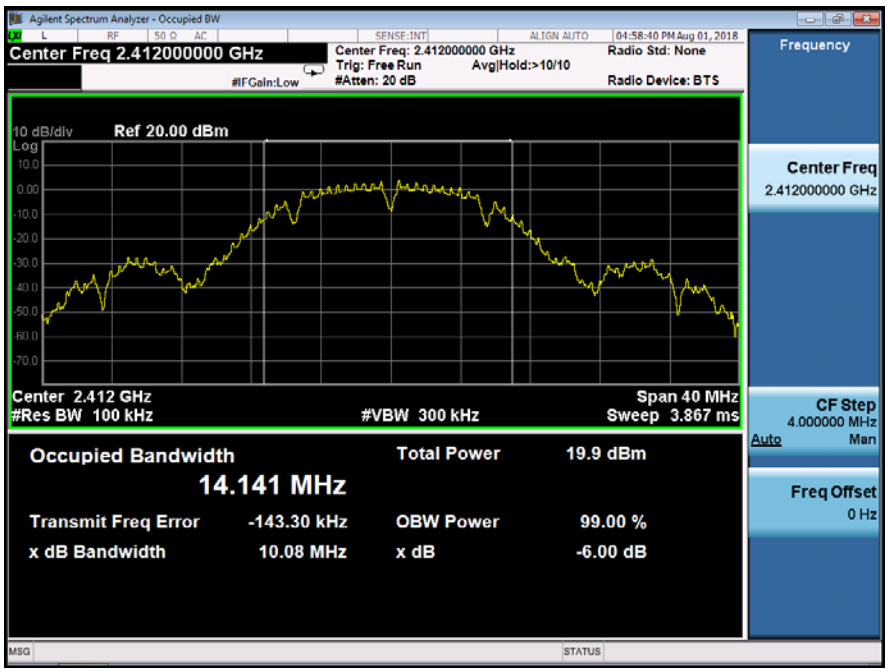
The EUT was operating in IEEE 802.11b/g/n mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
Set to the maximum power setting and enable the EUT transmit continuously
Set RBW = 100 kHz.
Set the video bandwidth (VBW) =300kHz.
Set Span=2 times OBW
Set Detector = Peak.
Set Trace mode = max hold.
Set 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.
Measure and record the results in the test report.

8.1.5 Test Results

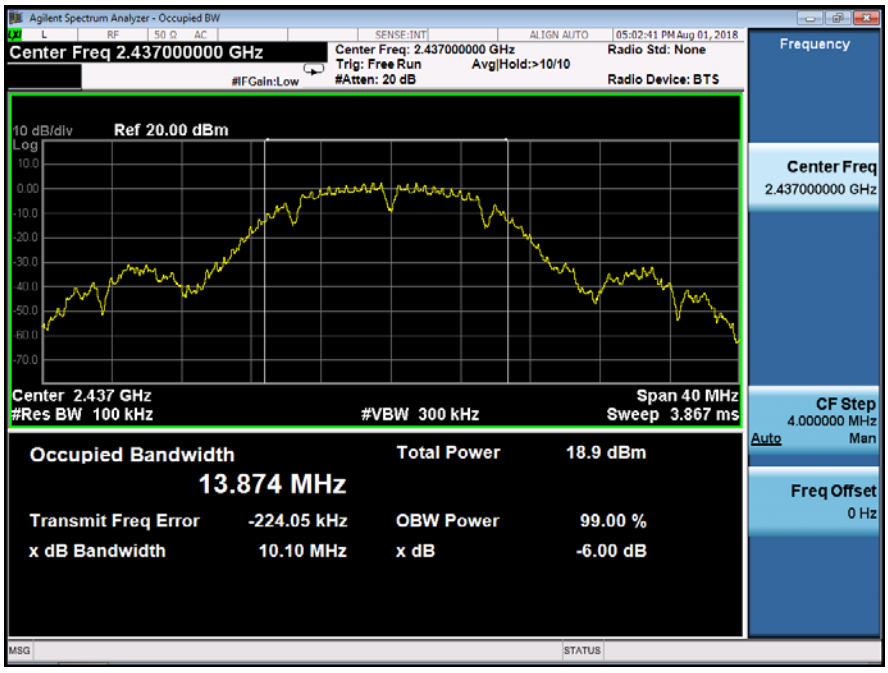
Temperature : 26℃ Test By: King Kong
Humidity : 60 %

Operation Mode	Channel Number	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Verdict
802.11b	1	2412	10.08	>=500	PASS
	6	2437	10.10	>=500	PASS
	11	2462	10.08	>=500	PASS
802.11g	1	2412	16.59	>=500	PASS
	6	2437	16.54	>=500	PASS
	11	2462	16.57	>=500	PASS
802.11n (HT20)	1	2412	17.69	>=500	PASS
	6	2437	17.70	>=500	PASS
	11	2462	17.70	>=500	PASS

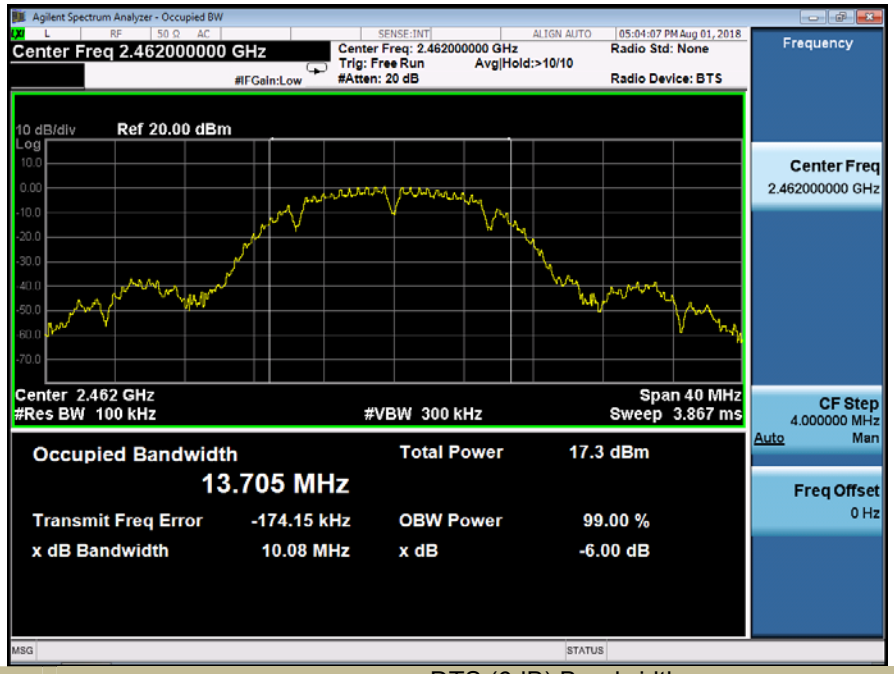
Test Model	DTS (6dB) Bandwidth 802.11b Channel 1: 2412MHz



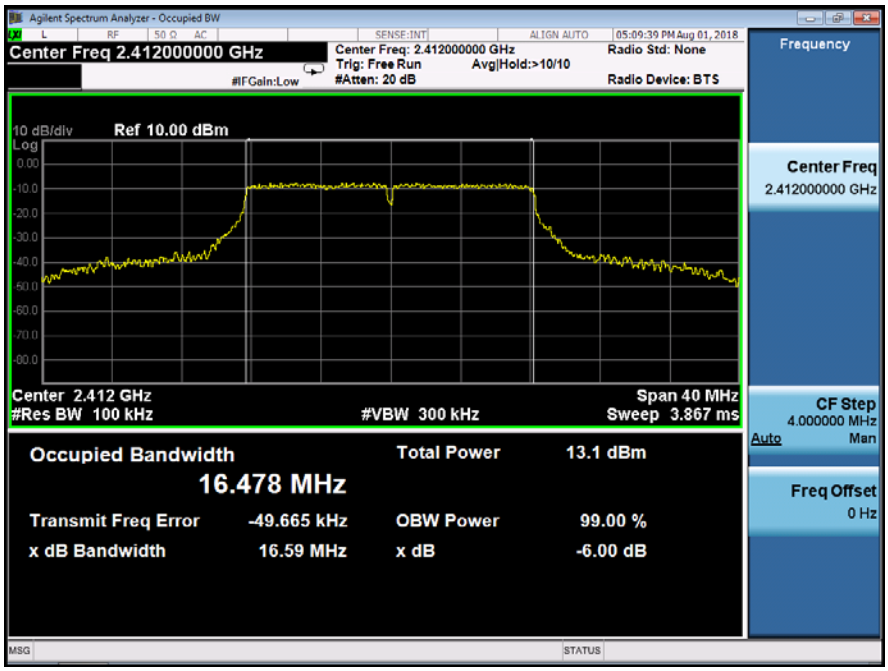
Test Model	DTS (6dB) Bandwidth 802.11b Channel 6: 2437MHz



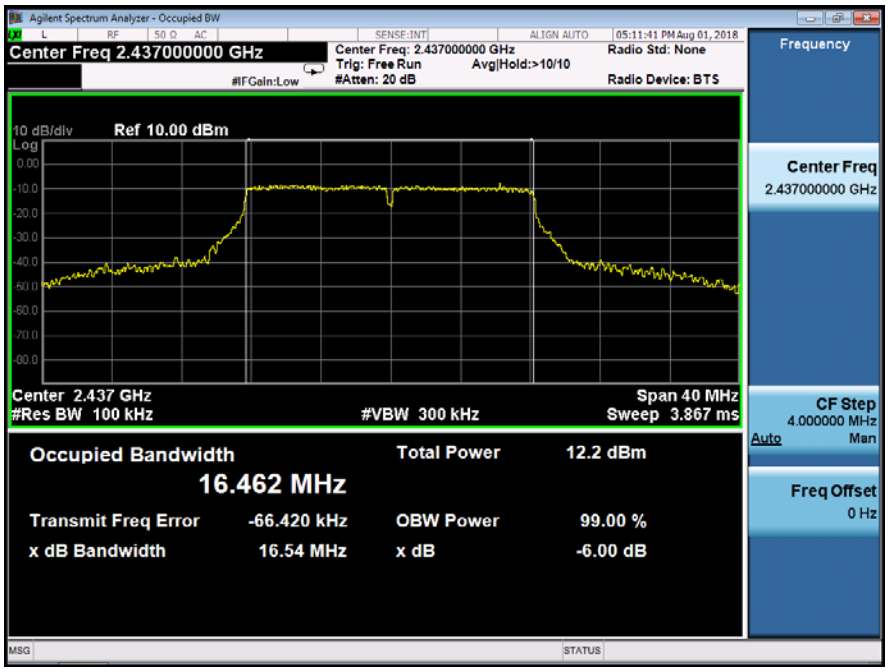
Test Model	DTS (6dB) Bandwidth 802.11b Channel 11: 2462MHz



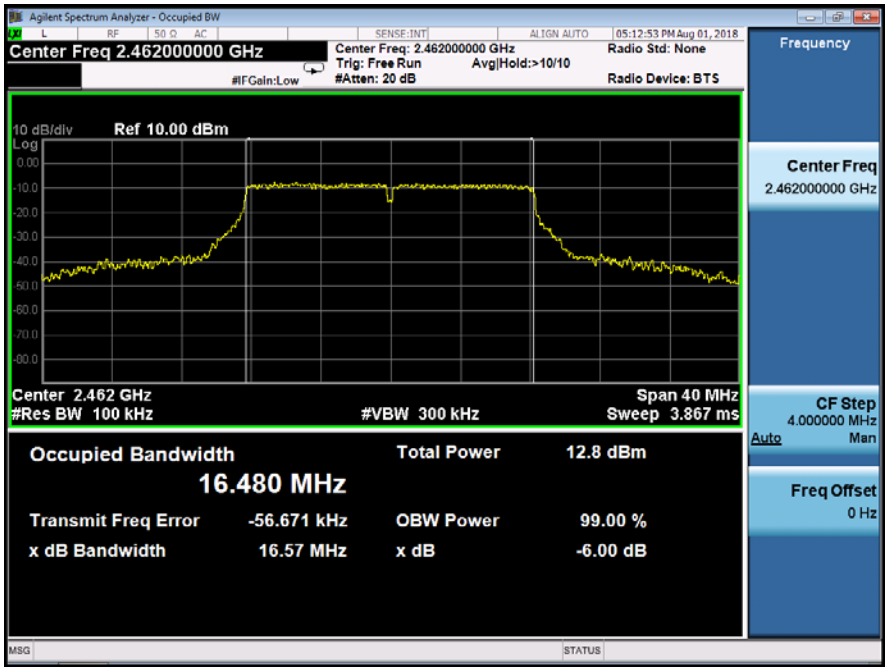
Test Model	DTS (6dB) Bandwidth 802.11g Channel 1: 2412MHz



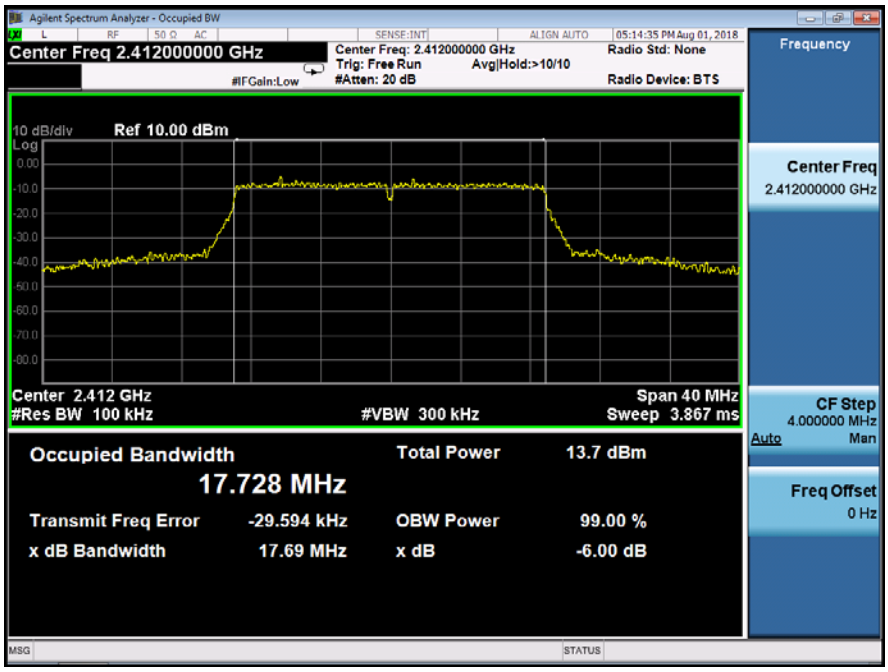
Test Model	DTS (6dB) Bandwidth 802.11g Channel 6: 2437MHz



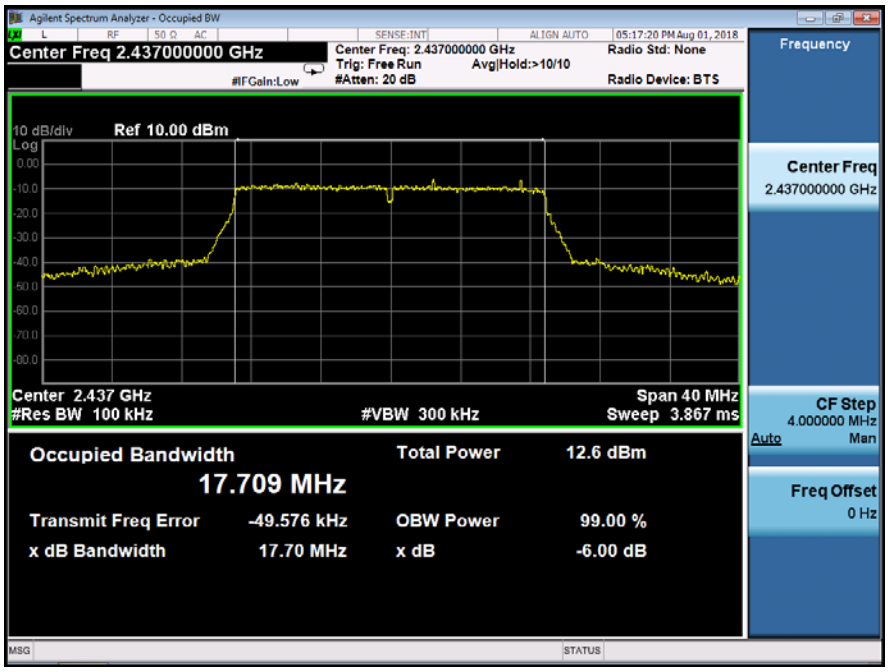
Test Model	DTS (6dB) Bandwidth 802.11g Channel 11: 2462MHz



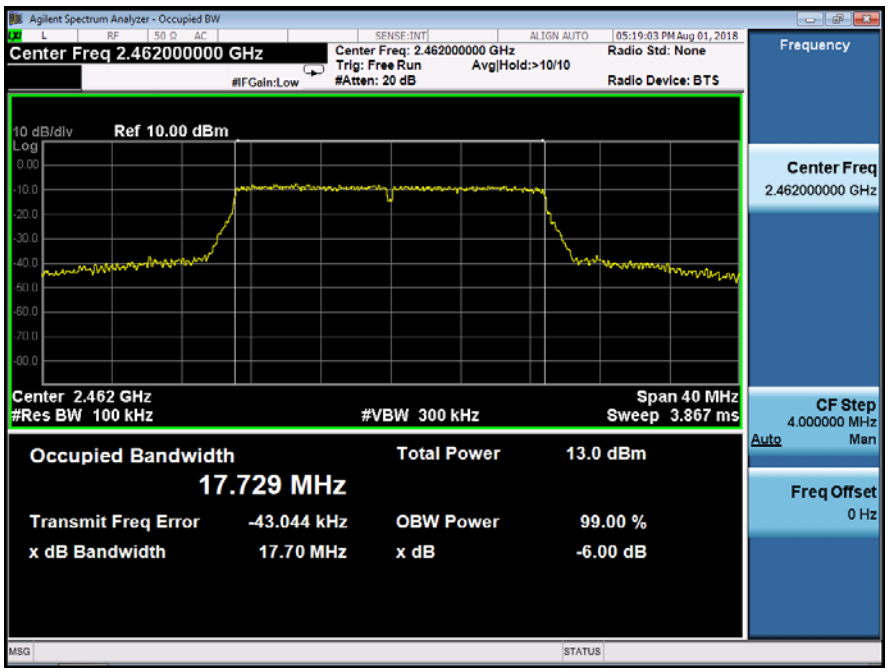
Test Model	DTS (6dB) Bandwidth 802.11n (HT20) Channel 1: 2412MHz



Test Model	DTS (6dB) Bandwidth 802.11n (HT20) Channel 6: 2437MHz



Test Model	DTS (6dB) Bandwidth 802.11n (HT20) Channel 11: 2462MHz



8.2 99% OCCUPIED BANDWIDTH

8.2.1 Applicable Standard

According to IC RSS-Gen 6.6

8.2.2 Conformance Limit

No limit requirement.

8.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.2.4 Test Procedure

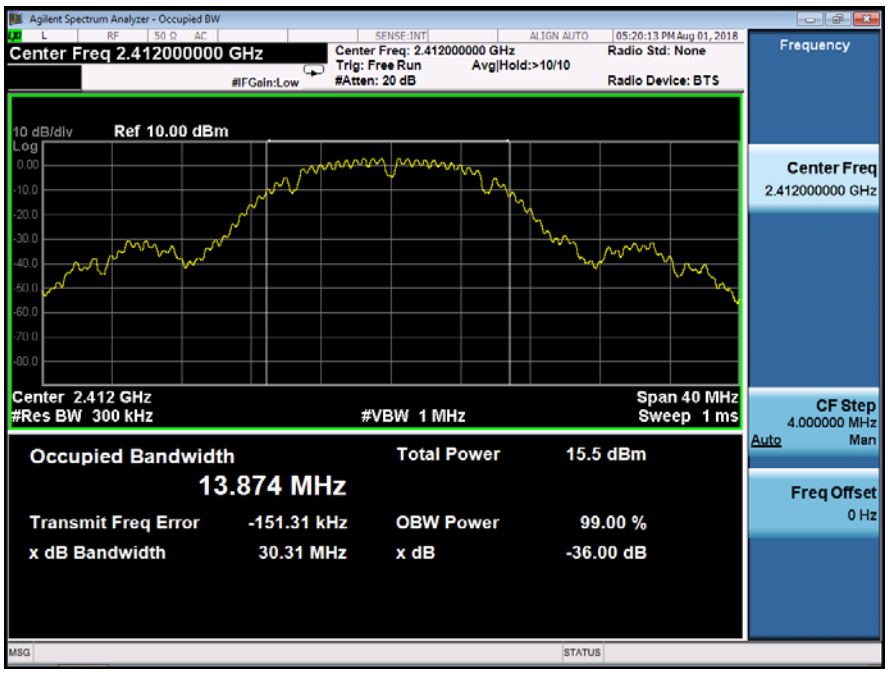
The EUT was operating in Bluetooth transmitter mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
Set to the maximum power setting and enable the EUT transmit continuously
Set RBW = 1-5% of 99% occupied bandwidth.
Set the video bandwidth (VBW) ≥3*RBW.
Set Span= approximately 2 to 3 times the 20 dB bandwidth
Set Detector = Peak.
Set Trace mode = max hold.
Set Sweep = auto couple.
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the markerdelta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.
If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.
Measure and record the results in the test report.

8.2.5 Test Results

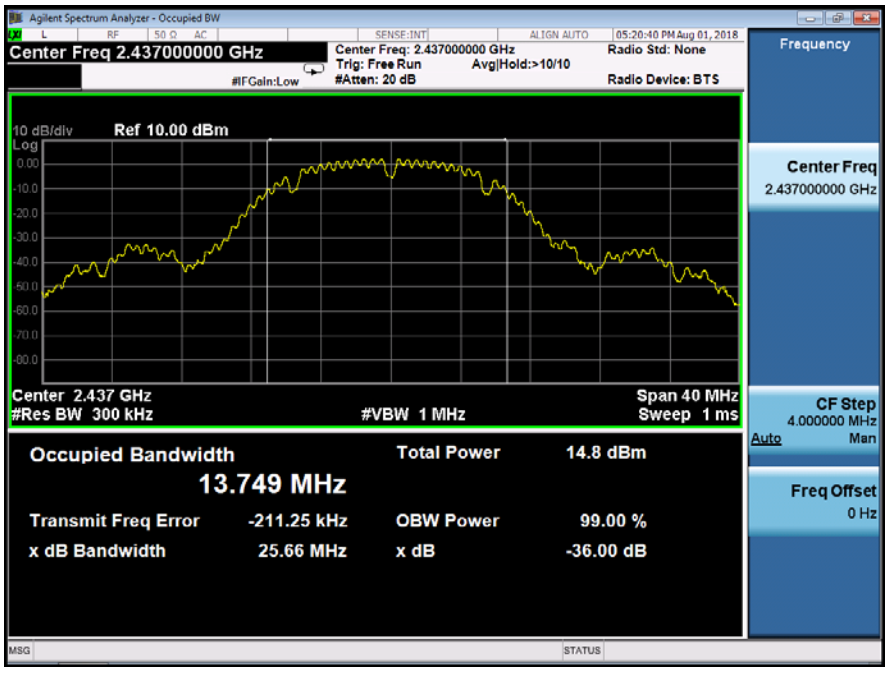
Temperature :	26℃	Test Date :	November 03, 2017
Humidity :	60 %	Test By:	King Kong

Operation Mode	Channel Number	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	Limit (kHz)	Verdict
802.11b	1	2412	13.874	N/A	PASS
	6	2437	13.749	N/A	PASS
	11	2462	13.836	N/A	PASS
802.11g	1	2412	16.832	N/A	PASS
	6	2437	16.797	N/A	PASS
	11	2462	16.833	N/A	PASS
802.11n (ht20)	1	2412	17.971	N/A	PASS
	6	2437	17.935	N/A	PASS
	11	2462	17.968	N/A	PASS

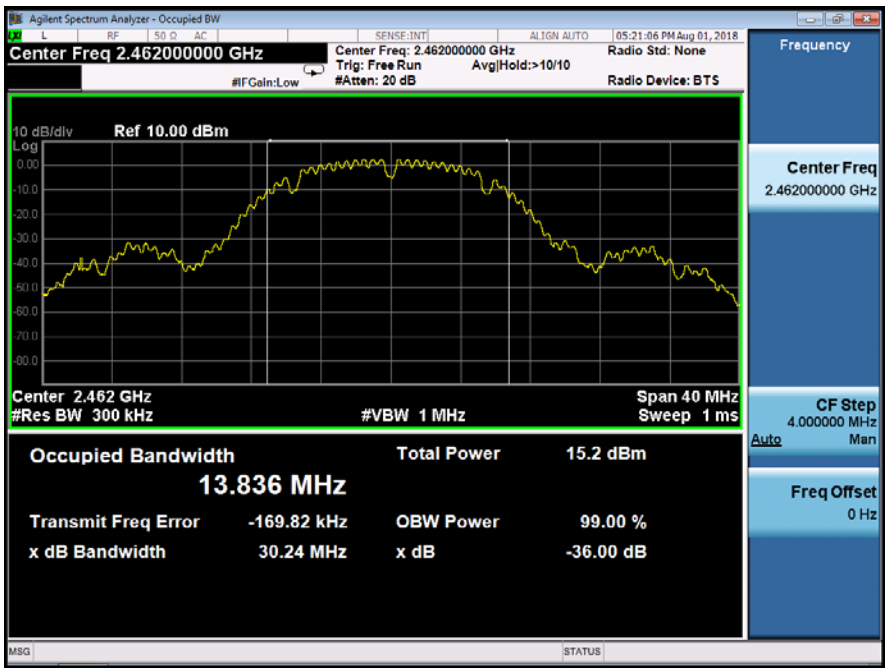
Test Model	99% Occupied Bandwidth 802.11b Channel 1: 2412MHz



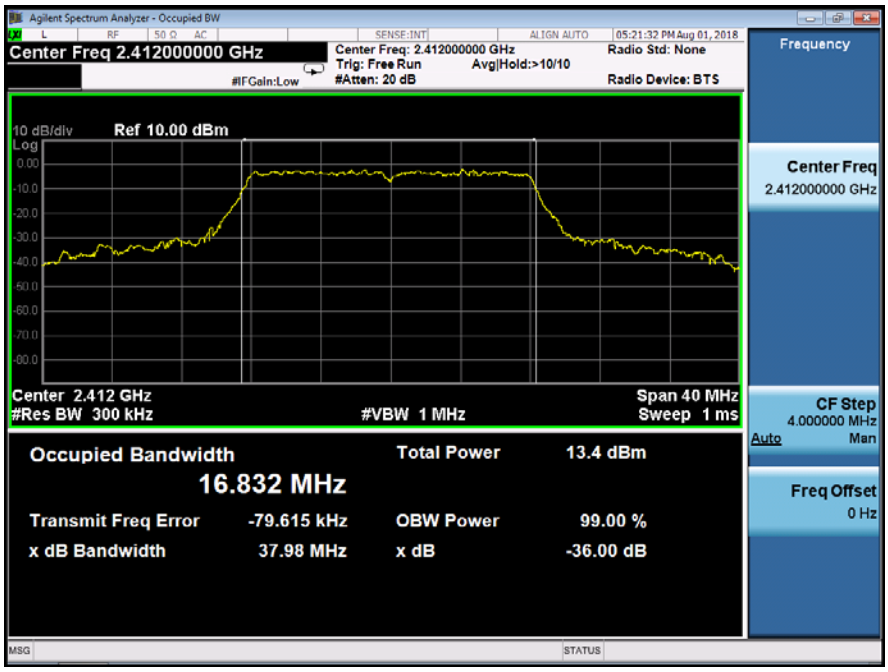
Test Model	99% Occupied Bandwidth 802.11b Channel 6: 2437MHz



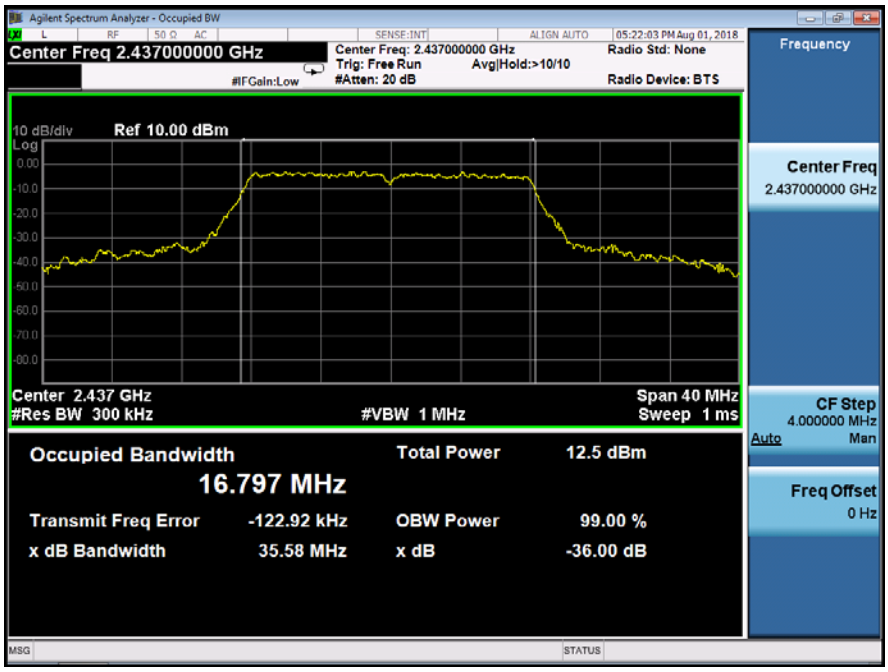
Test Model	99% Occupied Bandwidth 802.11b Channel 11: 2462MHz



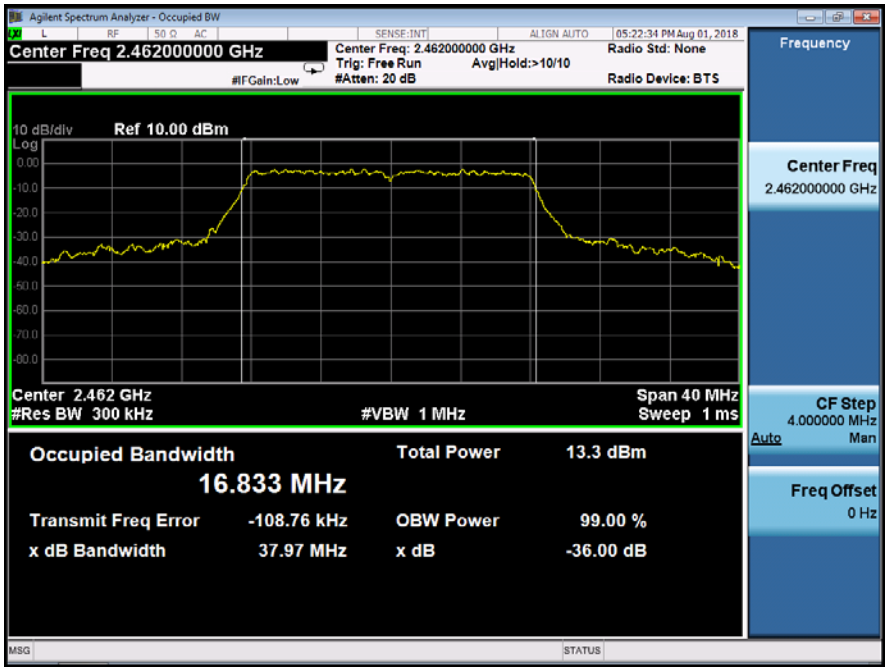
Test Model	99% Occupied Bandwidth 802.11g Channel 1: 2412MHz



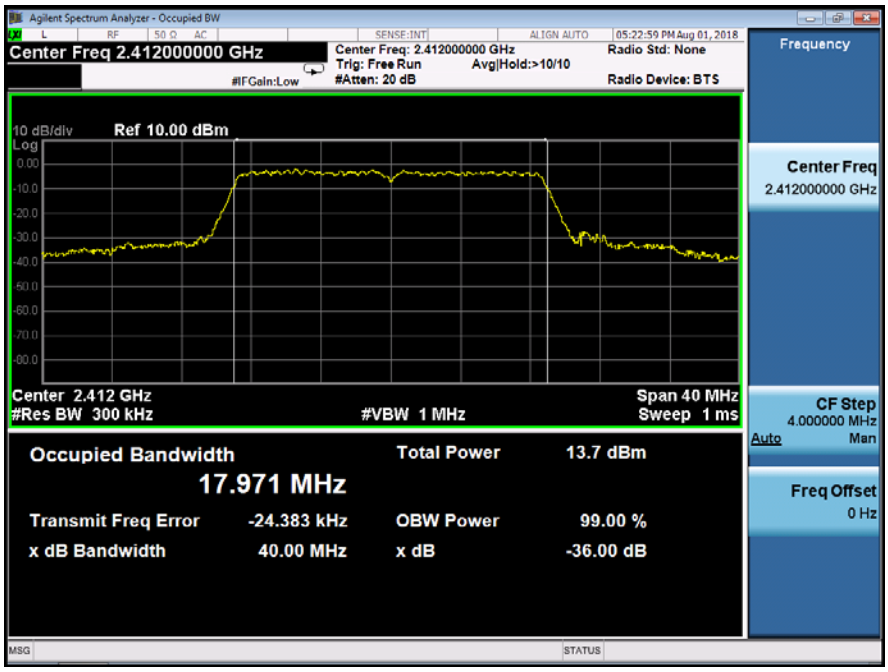
Test Model	99% Occupied Bandwidth 802.11g Channel 6: 2437MHz



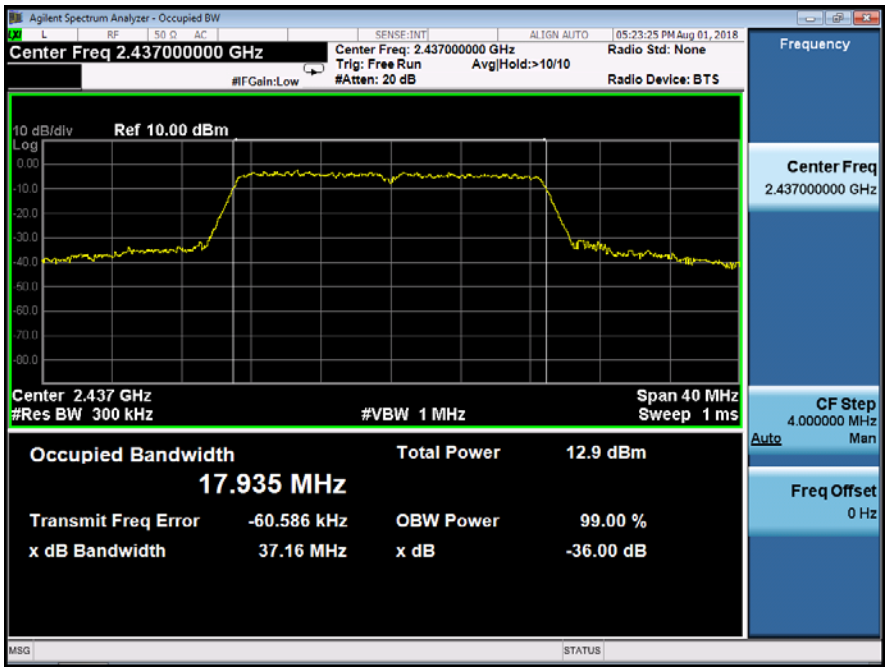
Test Model	99% Occupied Bandwidth 802.11g Channel 11: 2462MHz



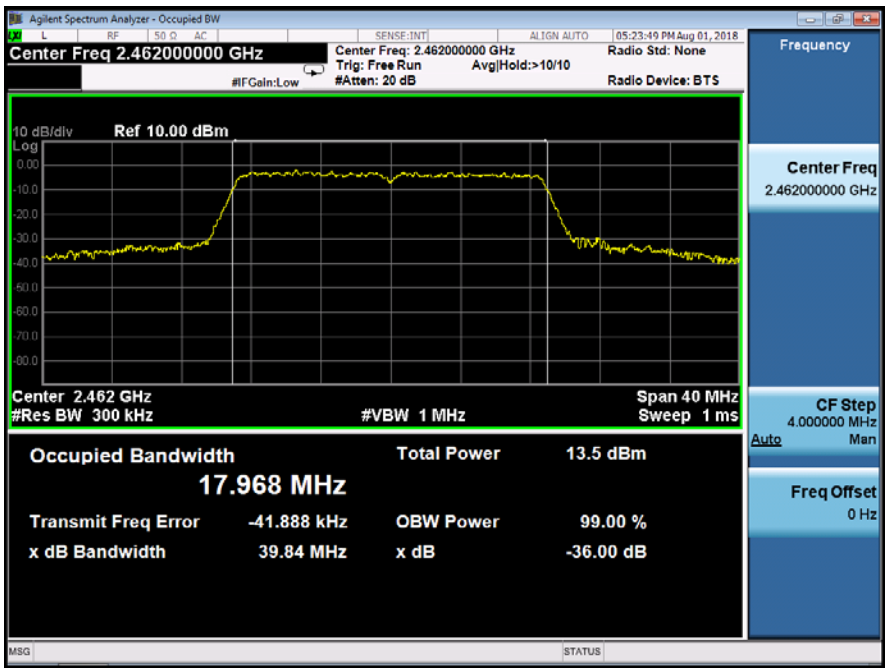
Test Model	99% Occupied Bandwidth 802.11n (HT20) Channel 1: 2412MHz



Test Model	99% Occupied Bandwidth 802.11n (HT20) Channel 6: 2437MHz



Test Model	99% Occupied Bandwidth 802.11n (HT20) Channel 11: 2462MHz



8.3 MAXIMUM PEAK CONDUCTED OUTPUT POWER AND EIRP

8.3.1 Applicable Standard

According to FCC Part15.247(b)(3) and IC RSS-Gen 6.12, IC RSS-247.5.4(d)

8.3.2 Conformance Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm).
The e.i.r.p. shall not exceed 4 W

8.3.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.3.4 Test Procedure

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 RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
Set to the maximum output power setting and enable the EUT transmit continuously.
Measure the conducted output power with cable loss and record the results in the test report.
Measure and record the results in the report.

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode

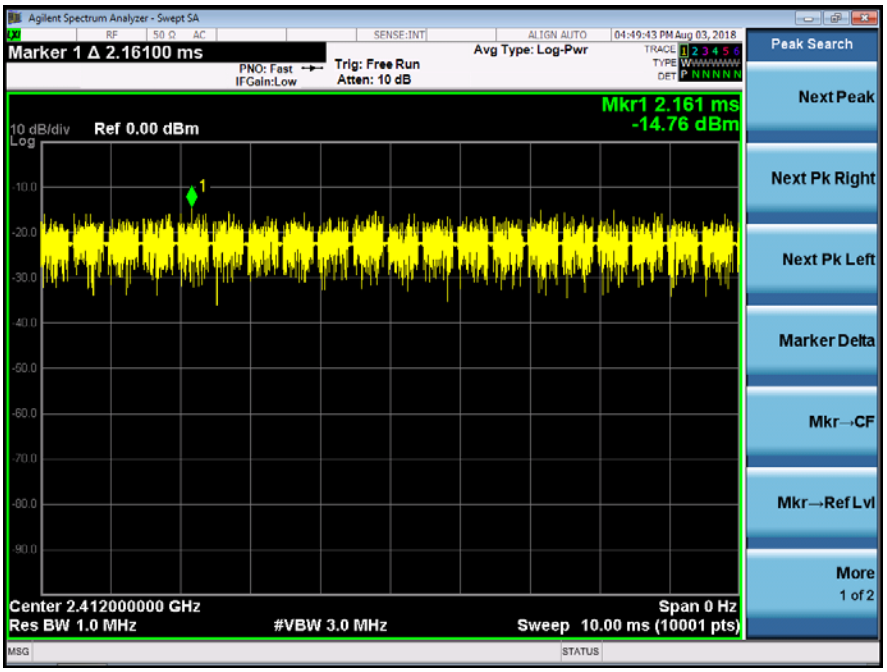
If the transmitter employs an antenna system that emits multiple directional beams, but does not emit multiple directional beams simultaneously, the total output power conducted to the array or arrays that comprise the device (i.e. the sum of the power supplied to all antennas, antenna elements, staves, etc., and summed across all carriers or frequency channels) shall not exceed the applicable output power limit specified insections 5.4(b) and 5.4(d). However, the total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6 dBi. The directional antenna gain shall be computed as the sum of 10 log (number of array elements or staves) plus the directional gain of the element or stave having the highest gain.

8.3.5 Test Results

Temperature : 26℃ Test By: King Kong
Humidity : 60 %

Operation Mode	Channel Number	Channel Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Verdict
802.11b	1	2412	15.28	30	PASS
	6	2437	14.55	30	PASS
	11	2462	14.86	30	PASS
802.11g	1	2412	14.17	30	PASS
	6	2437	13.24	30	PASS
	11	2462	14.06	30	PASS
802.11n (ht20)	1	2412	14.48	30	PASS
	6	2437	13.35	30	PASS
	11	2462	14.06	30	PASS

Duty cycle: (8.5217-0.1014)/8.5217*100%=98.8%



For EIRP Power

Operation Mode	Channel Frequency (MHz)	Measurement Level (dBm)	Antenna Gain	EIRP (dBm)	Limit (dBm)	Verdict
☒802.11b	2412	15.28	2.0	17.28	36	PASS
	2437	14.55	2.0	16.55	36	PASS
	2462	14.86	2.0	16.86	36	PASS
☒802.11g	2412	14.17	2.0	16.17	36	PASS
	2437	13.24	2.0	15.24	36	PASS
	2462	14.06	2.0	16.06	36	PASS
☒802.11n (HT20)	2412	14.48	2.0	16.48	36	PASS
	2437	13.35	2.0	15.35	36	PASS
	2462	14.06	2.0	16.06	36	PASS
Note: EIRP(Power)=Conducted Power(dBm) + Antenna Gain(dBi)						

8.4 MAXIMUM POWER SPECTRAL DENSITY

8.4.1 Applicable Standard

According to FCC Part15.247(e) and IC RSS- Gen 6.12, IC RSS-247 5.2(b)

8.4.2 Conformance Limit

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.4.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.4.4 Test Procedure

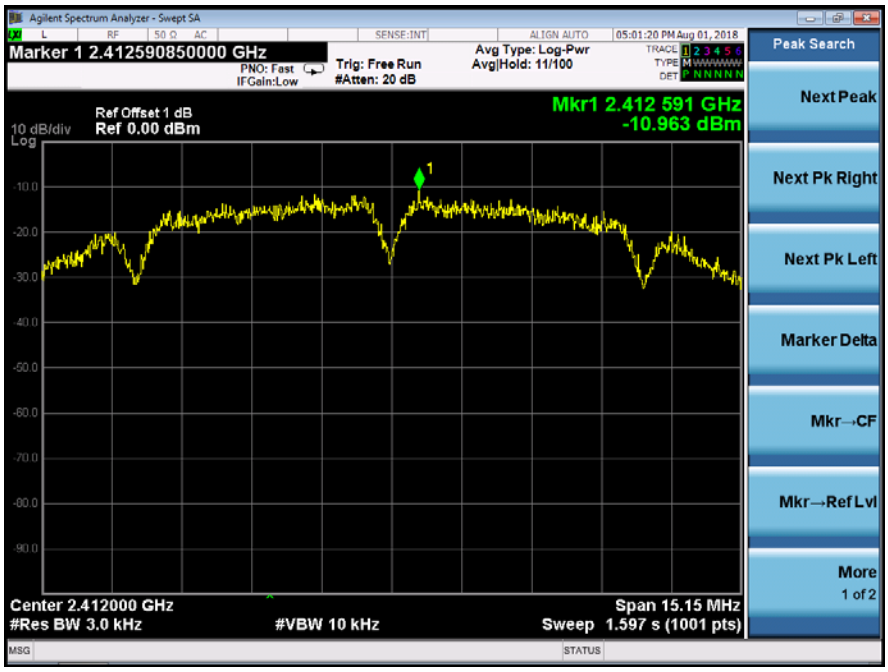
This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance
The transmitter output (antenna port) was connected to the spectrum analyzer
Set analyzer center frequency to DTS channel center frequency.
Set the span to 1.5 times the DTS bandwidth.
Set the RBW to: 3 kHz
Set the VBW to:10 kHz.
Set Detector = peak.
Set Sweep time = auto couple.
Set Trace mode = max hold.
Allow trace to fully stabilize.
Use the peak marker function to determine the maximum amplitude level within the RBW.
Note: If antenna Gain exceeds 6 dBi, then PSD Limit=8-(Gain- 6)

8.4.5 Test Results

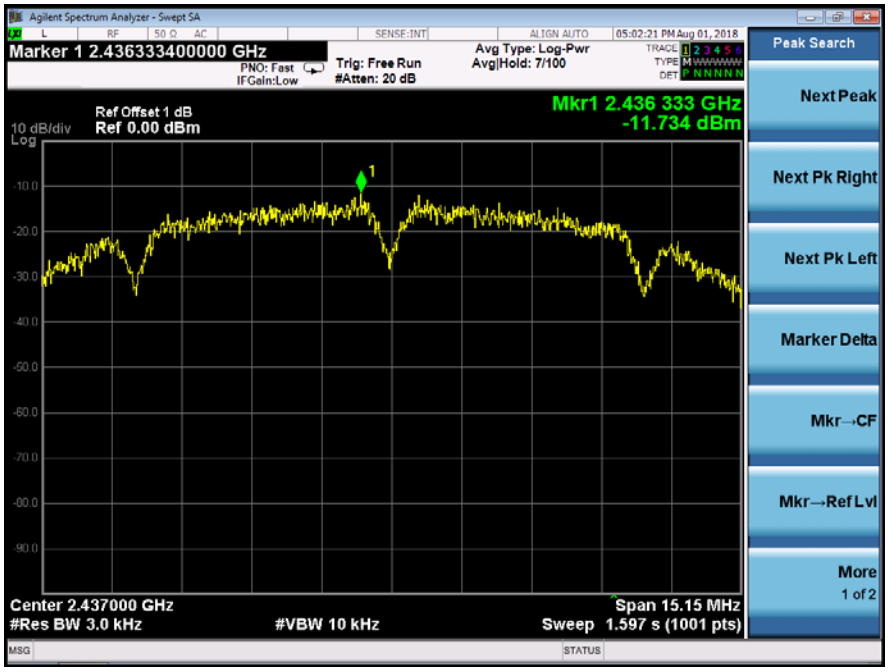
Temperature : 26℃ Test By: King Kong
Humidity : 60 %

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
802.11b	1	2412	-10.963	=<8	PASS
	6	2437	-11.734	=<8	PASS
	11	2462	-11.261	=<8	PASS
802.11g	1	2412	-21.880	=<8	PASS
	6	2437	-22.319	=<8	PASS
	11	2462	-21.991	=<8	PASS
802.11n (HT20)	1	2412	-19.374	=<8	PASS
	6	2437	-20.499	=<8	PASS
	11	2462	-20.148	=<8	PASS

Test Model	Power Spectral Density 802.11b Channel 1: 2412MHz

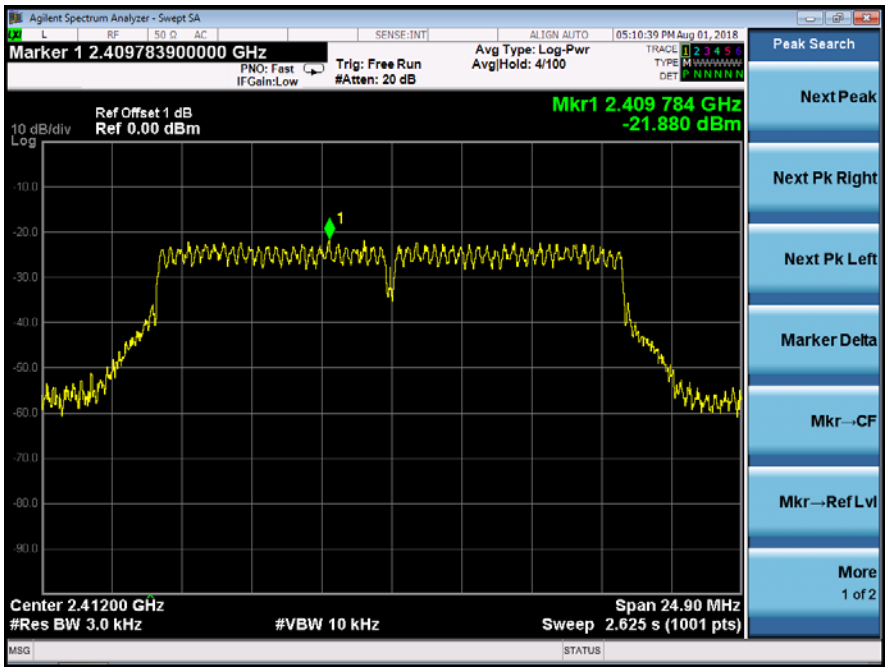


Test Model	Power Spectral Density 802.11b Channel 6: 2437MHz

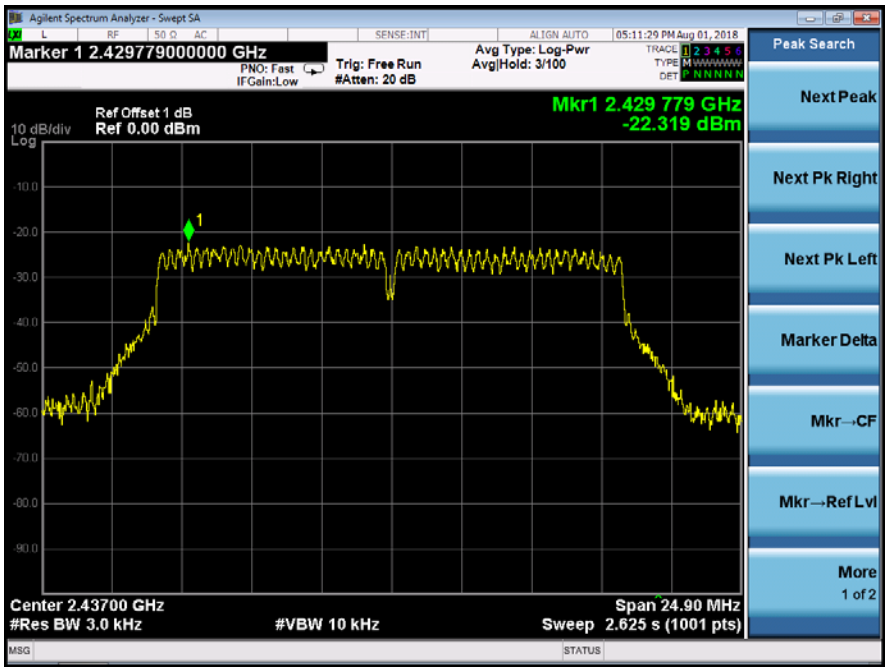


Test Model	Power Spectral Density 802.11b Channel 11: 2462MHz

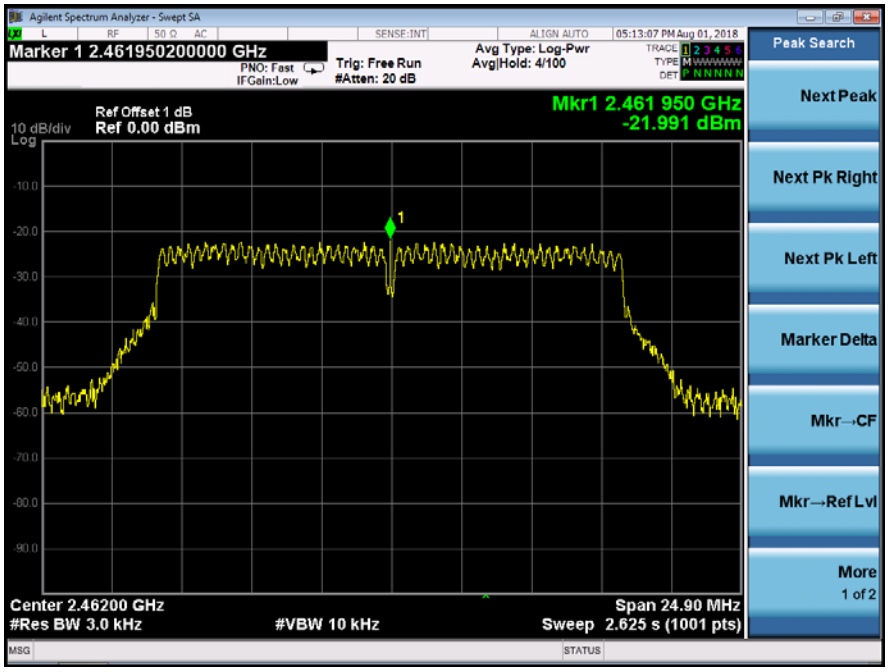
Test Model	Power Spectral Density 802.11g Channel 1: 2412MHz



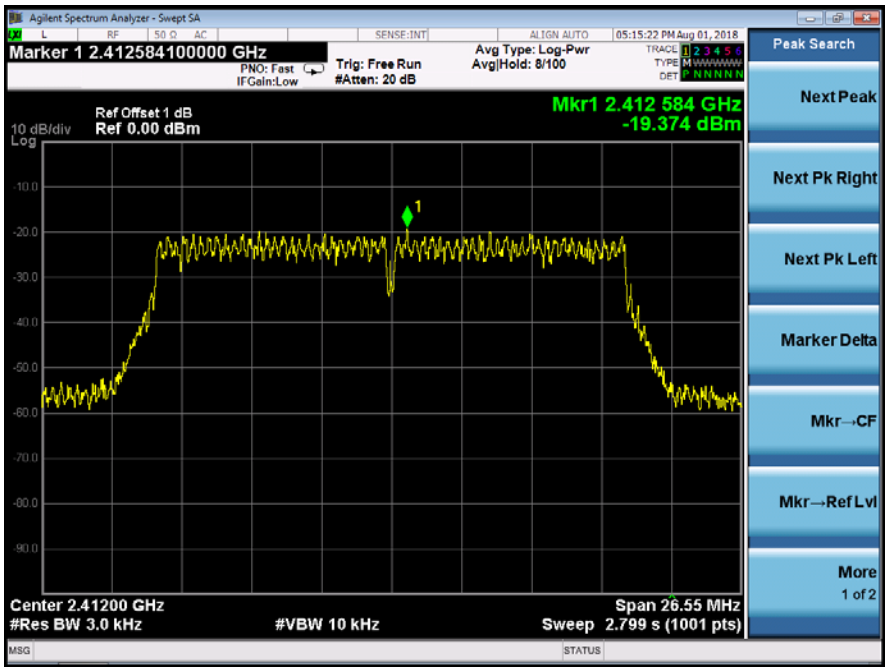
Test Model	Power Spectral Density 802.11g Channel 6: 2437MHz



Test Model	Power Spectral Density 802.11g Channel 11: 2462MHz

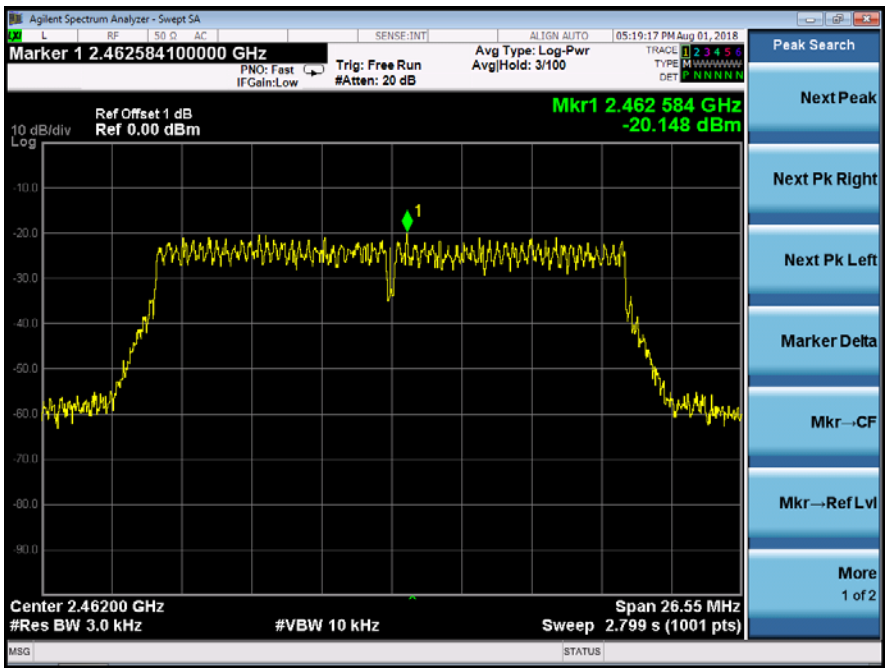


Test Model	Power Spectral Density 802.11n (HT20) Channel 1: 2412MHz



Test Model	Power Spectral Density 802.11n (HT20) Channel 6: 2437MHz

Test Model	Power Spectral Density 802.11n (HT20) Channel 11: 2462MHz



8.5 UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

8.5.1 Applicable Standard

According to FCC Part15.247(d) and IC RSS- Gen 6.13, IC RSS-247 5.5

8.5.2 Conformance Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

8.5.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.5.4 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

- **Reference level measurement**

Establish a reference level by using the following procedure:
Set instrument center frequency to DTS channel center frequency.
Set the span to ≥ 1.5 times the DTS bandwidth.
Set the RBW = 100 kHz.
Set the VBW ≥ 3 x RBW.
Set Detector = peak.
Set Sweep time = auto couple.
Set Trace mode = max hold.
Allow trace to fully stabilize.
Use the peak marker function to determine the maximum PSD level.
Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

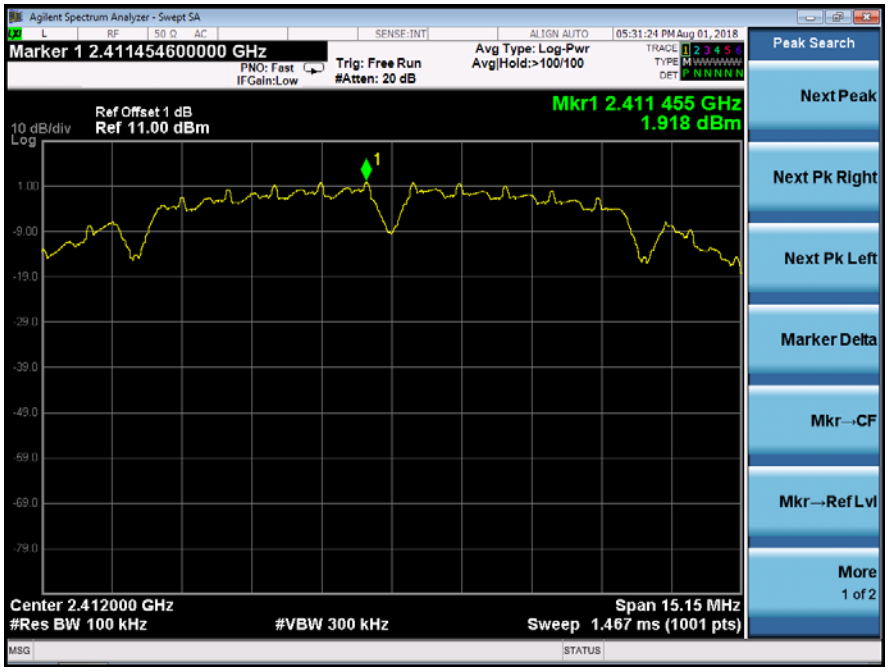
- **Emission level measurement**

Set the center frequency and span to encompass frequency range to be measured.
Set the RBW = 100 kHz.
Set the VBW =300 kHz.
Set 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 . Report the three highest emissions relative to the limit.

8.5.5 Test Results

All modes 2.4G 802.11b/g/n(HT20) have been tested, and the worst result recorded was report as below:

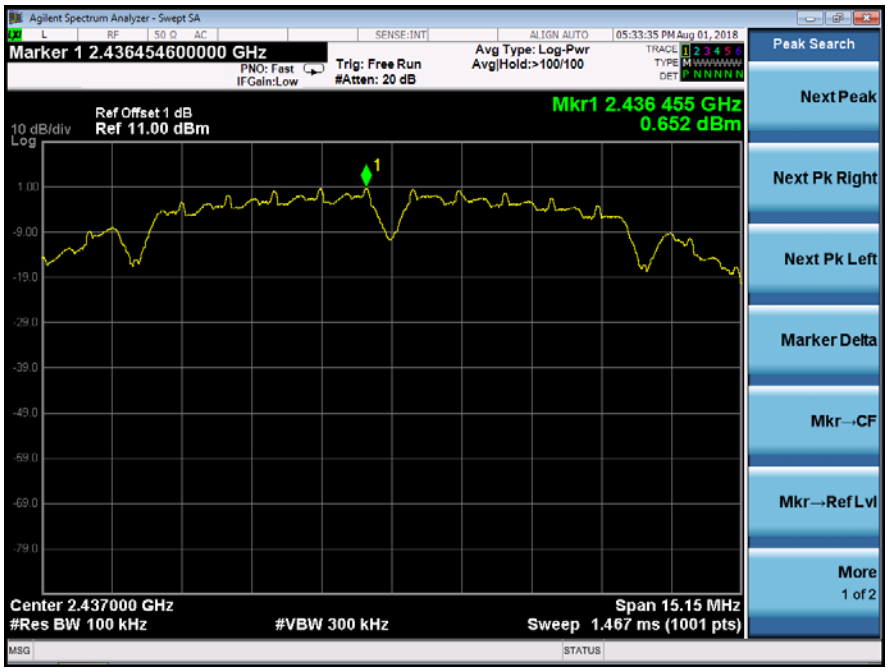
Test Model	PSD(Power Spectral Density) RBW=100kHz ☒802.11b ☐802.11g ☐802.11n(HT20) ☒Channel 1: 2412MHz



Test Model	Unwanted Emissions in non-restricted frequency bands ☒802.11b ☐802.11g ☐802.11n(HT20) ☒Channel 1: 2412MHz

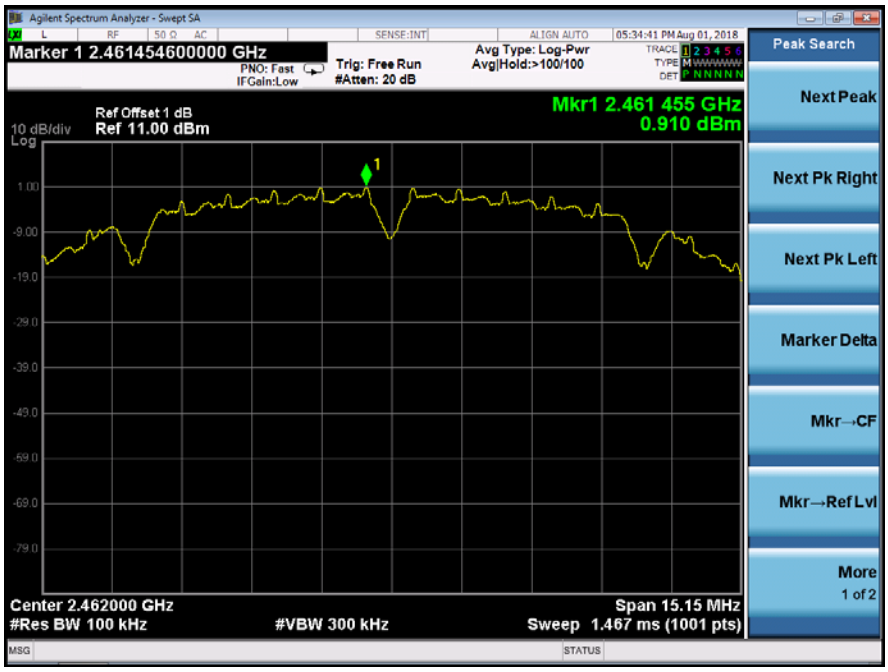
Test Model	Band edge ☒802.11b ☐802.11g ☐802.11n(HT20) ☒Channel 1: 2412MHz

Test Model	PSD(Power Spectral Density) RBW=100kHz ☒802.11b ☐802.11g ☐802.11n(HT20) Channel 6: 2437MHz



Test Model	Unwanted Emissions In Non-Restricted Frequency Bands ☒802.11b ☐802.11g ☐802.11n(HT20) Channel 6: 2437MHz

Test Model	PSD(Power Spectral Density) RBW=100kHz ☒802.11b ☐802.11g ☐802.11n(HT20) ☒Channel 11: 2462MHz



Test Model	Unwanted Emissions In Non-Restricted Frequency Bands ☒802.11b ☐802.11g ☐802.11n(HT20) ☒Channel 11: 2462MHz

Test Model	Band edge ☒802.11b ☐802.11g ☐802.11n(HT20) ☒Channel 11: 2462MHz

8.6 RADIATED SPURIOUS EMISSION

8.6.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and IC RSS-Gen 6.13, IC RSS-Gen 8.9, IC RSS-Gen 8.10

8.6.2 Conformance Limit

Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

The level of any transmitter spurious emission in restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	2400/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

8.6.3 Test Configuration

Test according to clause 7.2 radio frequency test setup 2

8.6.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:
The EUT was placed on a turn table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz(1GHz to 25GHz), 100 kHz for f < 1 GHz(30MHz to 1GHz), 200Hz for f<150KHz(9KHz to 150KHz), 9KHz for f<30MHz(150KHz to 30KHz)
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT,

measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.
Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.
Repeat above procedures until all frequency measured was complete.

8.6.5 Test Results

■ Spurious Emission below 30MHz(9KHz to 30MHz)

Temperature:	24℃	Test Date:	July 15, 2018
Humidity:	53 %	Test By:	King Kong
Test mode:	TX Mode		

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor

■ Spurious Emission Above 1GHz(1GHz to 25GHz)
All modes 2.4G 802.11b/g/n have been tested, and the worst result 802.11b recorded was report as below:

Temperature :	26℃	Test Date :	July 15, 2018
Humidity :	60 %	Test By:	King Kong
Test mode:	802.11b	Frequency:	Channel 1: 2412MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4824.00	V	45.65	36.26	74.00	54.00	-28.35	-17.74
7236.00	V	44.28	34.99	74.00	54.00	-29.72	-19.01
9335.00	V	55.95	36.60	74.00	54.00	-18.05	-17.40
4824.00	H	45.98	36.85	74.00	54.00	-28.02	-17.15
7236.00	H	44.42	34.31	74.00	54.00	-29.58	-19.69
9516.00	H	55.37	36.22	74.00	54.00	-18.63	-17.78

Temperature :	26℃	Test Date :	July 15, 2018
Humidity :	60 %	Test By:	King Kong
Test mode:	802.11b	Frequency:	Channel 6: 2437MHz

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4874.00	V	45.66	36.58	74.00	54.00	-28.34	-17.42
7311.00	V	44.37	35.63	74.00	54.00	-29.63	-18.37
9839.00	V	56.35	35.7	74.00	54.00	-17.65	-18.30
4874.00	H	46.51	36.56	74.00	54.00	-27.49	-17.44
7311.00	H	44.34	33.8	74.00	54.00	-29.66	-20.20
9683.00	H	56.29	35.55	74.00	54.00	-17.71	-18.45

Temperature :	26℃	Test Date :	July 15, 2018
Humidity :	60 %	Test By:	King Kong
Test mode:	802.11b	Frequency:	Channel 11: 2462MHz

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4924.00	V	45.97	37.11	74.00	54.00	-28.03	-16.89
7386.00	V	44.31	36.47	74.00	54.00	-29.69	-17.53
9297.00	V	57.29	36.68	74.00	54.00	-16.71	-17.32
4924.00	H	45.59	37.33	74.00	54.00	-28.41	-16.67
7386.00	H	44.52	33.09	74.00	54.00	-29.48	-20.91
9433.00	H	55.81	35.83	74.00	54.00	-18.19	-18.17

Note: (1) All Readings are Peak Value (VBW=3MHz) and Average Value (VBW=10Hz).
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

■ Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz
All modes 2.4G 802.11b/g/n have been tested, and the worst result 802.11b recorded was report as below:

Temperature :	26℃	Test Date :	July 15, 2018
Humidity :	60 %	Test By:	King Kong
Test mode:	802.11b	Frequency:	Channel 1: 2412MHz

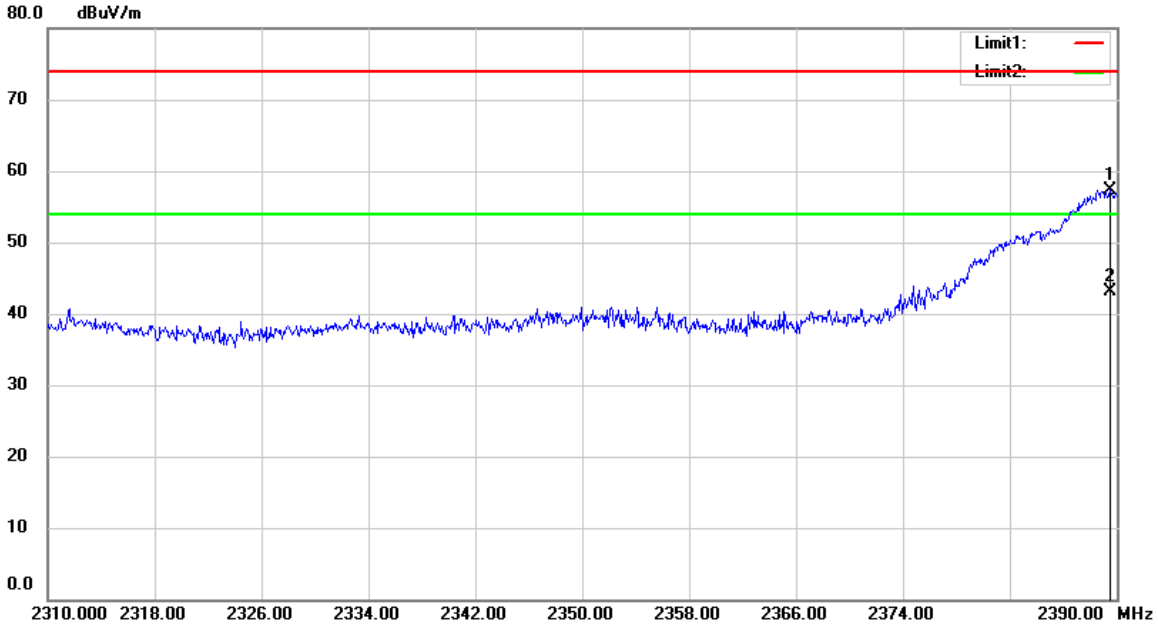
Frequency (MHz)	Polarity	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	Margin (dB)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)	Margin (dB)
2389.52	H	57.39	74.00	-16.61	43.10	54.00	-10.90
2388.96	V	57.32	74.00	-16.68	43.20	54.00	-10.80

Temperature :	26℃	Test Date :	July 15, 2018
Humidity :	60 %	Test By:	King Kong
Test mode:	802.11b	Frequency:	Channel 11: 2462MHz

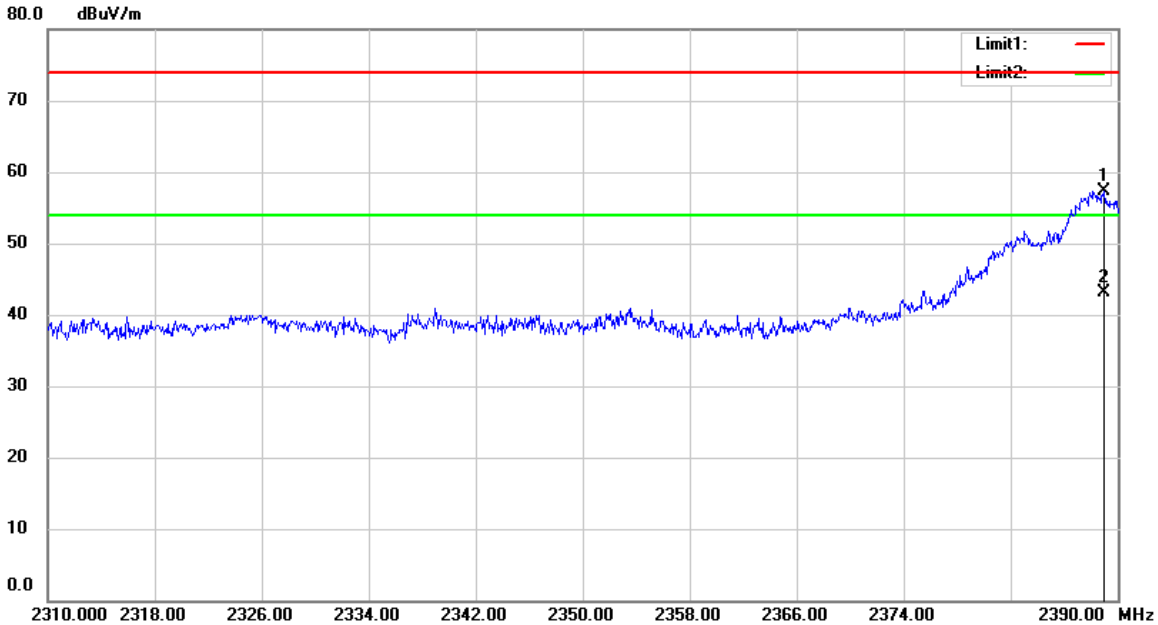
Frequency (MHz)	Polarity	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	Margin (dB)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)	Margin (dB)
2483.65	H	58.88	74.00	-15.12	42.80	54.00	-11.20
2483.75	V	54.90	74.00	-19.10	38.50	54.00	-15.50

Note: (1) All Readings are Peak Value (VBW=3MHz) and Average Value (VBW=10Hz).
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

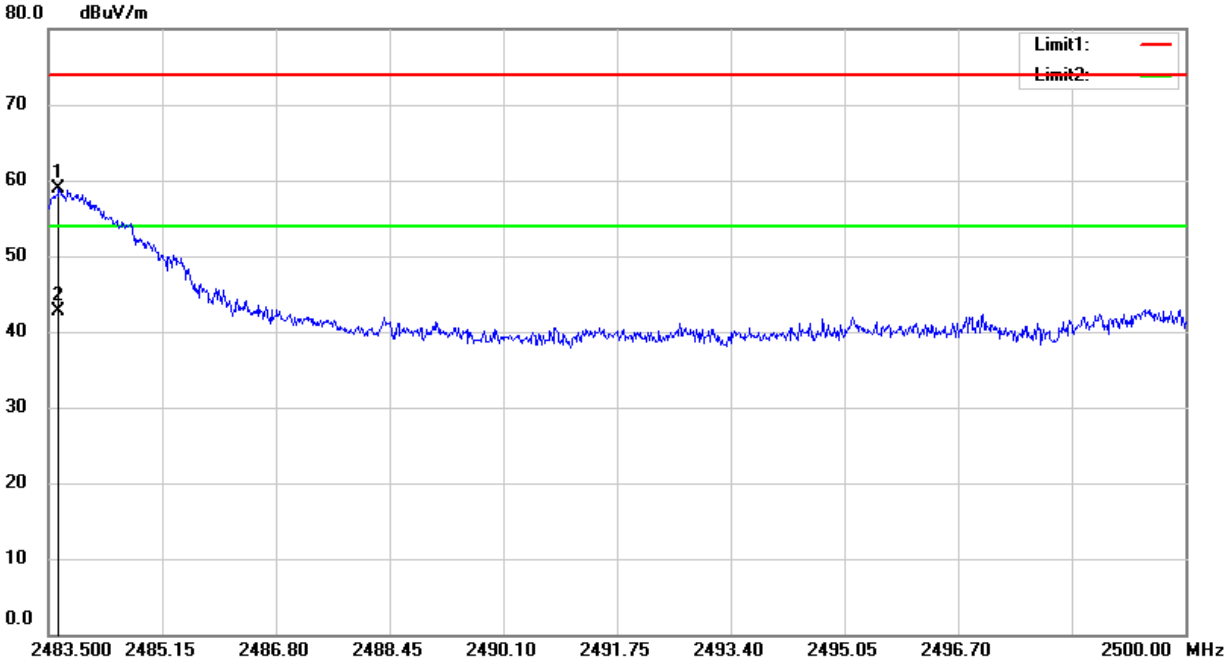
Test Model	Spurious Emission in Restricted Band 2310-2390MHz ☒802.11b ☐802.11g ☐802.11n(HT20) ☒Channel 1: 2412MHz Polarity: H VBW=3MHz Test By: King Kong



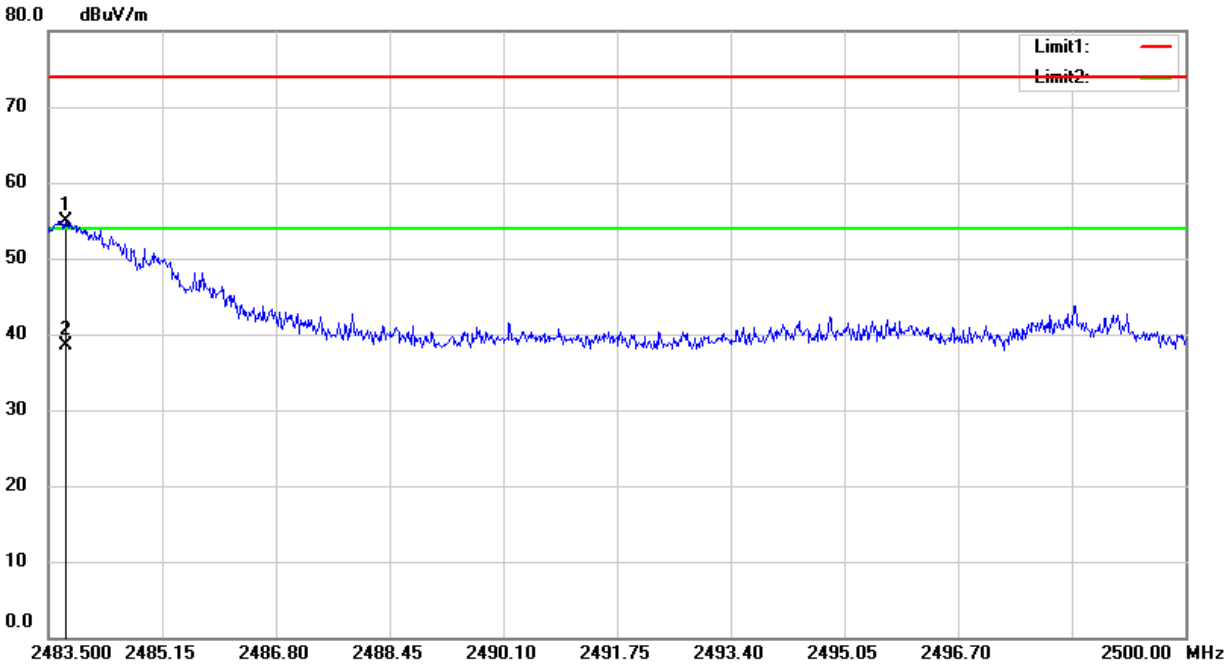
Test Model	Spurious Emission in Restricted Band 2310-2390MHz ☒802.11b ☐802.11g ☐802.11n(HT20) ☒Channel 1: 2412MHz Polarity: V VBW=3MHz Test By: King Kong



Test Model	Spurious Emission in Restricted Band 2483.5-2500MHz ☒802.11b ☐802.11g ☐802.11n(HT20) ☒Channel 11: 2462MHz Polarity: H VBW=3MHz Test By: King Kong

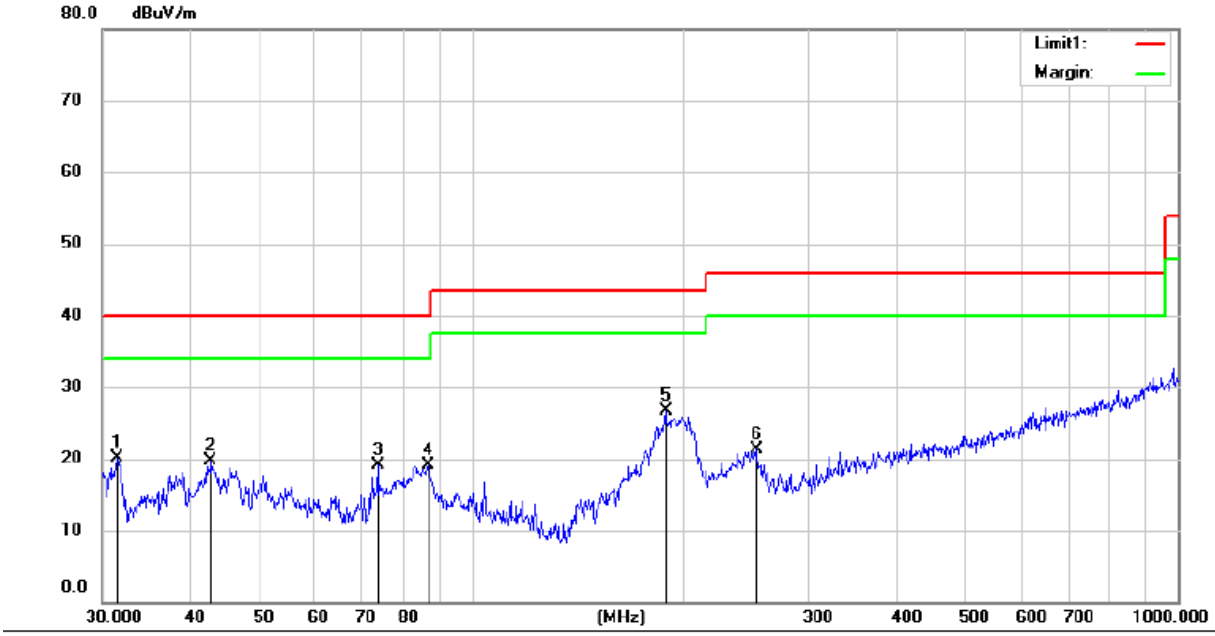


Test Model	Spurious Emission in Restricted Band2483.5-2500MHz ☒802.11b ☐802.11g ☐802.11n(HT20) ☒Channel 11: 2462MHz Polarity: V VBW=3MHz Test By: King Kong



■ Spurious Emission below 1GHz (30MHz to 1GHz)

All modes 2.4G 802.11b/g/n(HT20) have been tested, and the worst result 802.11b recorded was report as below:



Site 3m Chamber #1 Polarization: *Vertical* Temperature: 22 C

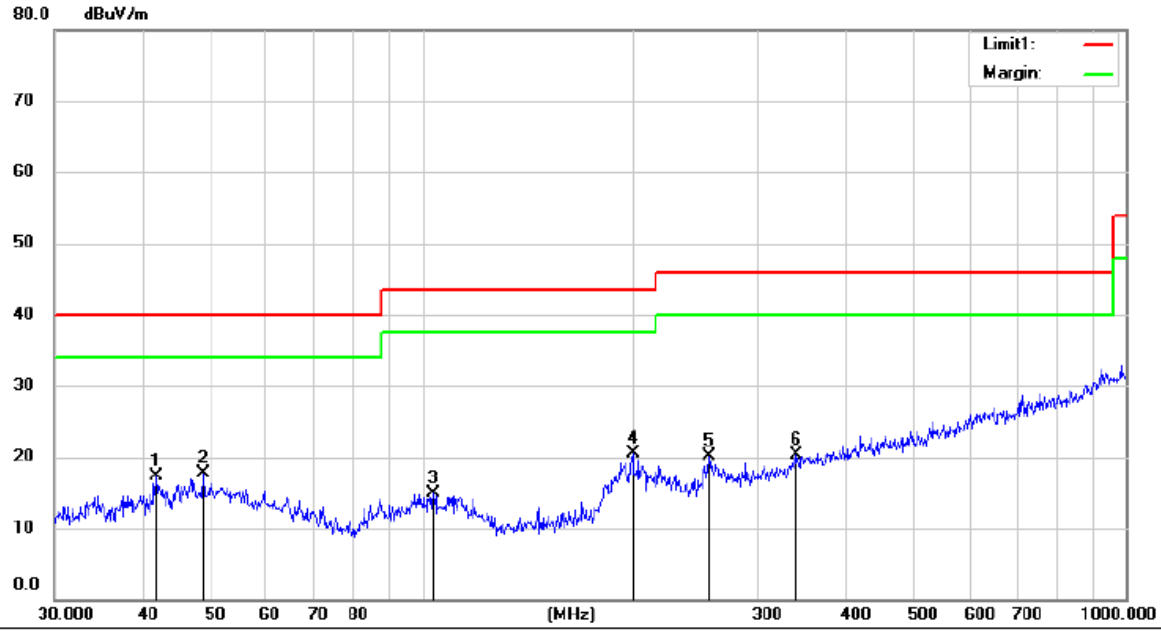
Limit: (RE)FCC PART 15C Power: AC 120V/60Hz Humidity: 50 %

Mode:802.11b low channel

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		31.5095	34.25	-14.14	20.11	40.00	-19.89	QP			
2		42.7496	30.91	-11.29	19.62	40.00	-20.38	QP			
3		73.6170	35.29	-16.16	19.13	40.00	-20.87	QP			
4		86.8068	34.63	-15.61	19.02	40.00	-20.98	QP			
5	*	188.4125	39.49	-12.79	26.70	43.50	-16.80	QP			
6		252.9482	31.16	-9.91	21.25	46.00	-24.75	QP			

*:Maximum data x:Over limit !:over margin Operator: KK



Site 3m Chamber #1 Polarization: *Horizontal* Temperature: 22 C

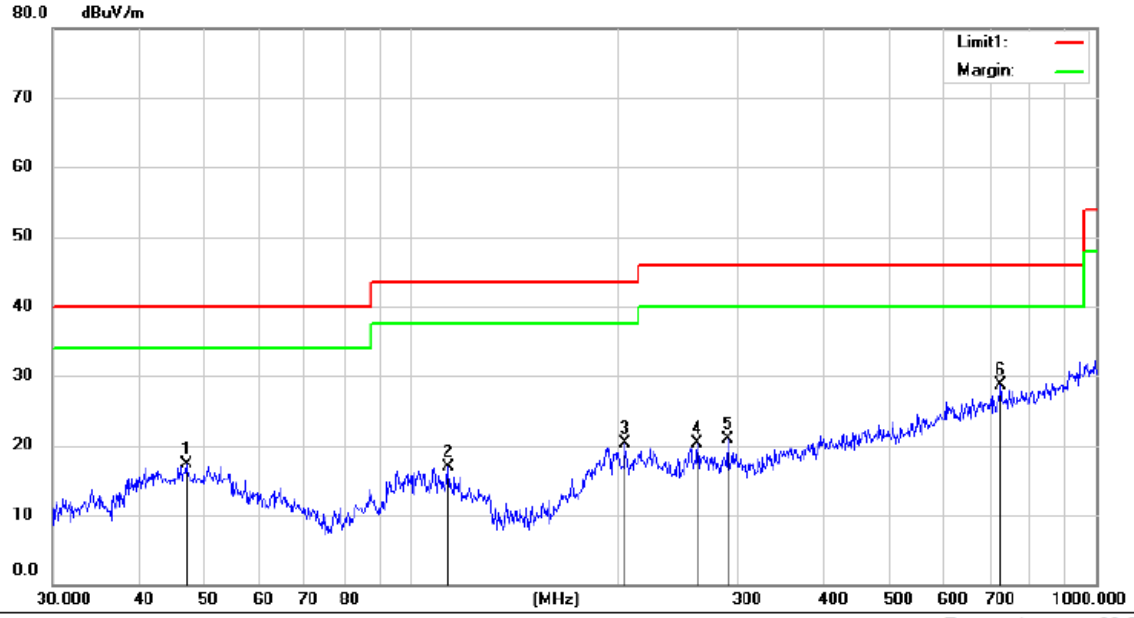
Limit: (RE)FCC PART 15C Power: AC 120V/60Hz Humidity: 50 %

Mode:802.11b low channel

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		41.8596	28.63	-11.42	17.21	40.00	-22.79	QP			
2	*	48.8430	28.58	-10.97	17.61	40.00	-22.39	QP			
3		103.8055	27.52	-12.52	15.00	43.50	-28.50	QP			
4		199.2855	32.23	-11.66	20.57	43.50	-22.93	QP			
5		255.6231	29.96	-9.85	20.11	46.00	-25.89	QP			
6		340.7817	27.58	-7.19	20.39	46.00	-25.61	QP			

*:Maximum data x:Over limit !:over margin Operator: KK



Site 3m Chamber #1 Polarization: *Horizontal* Temperature: 22 C

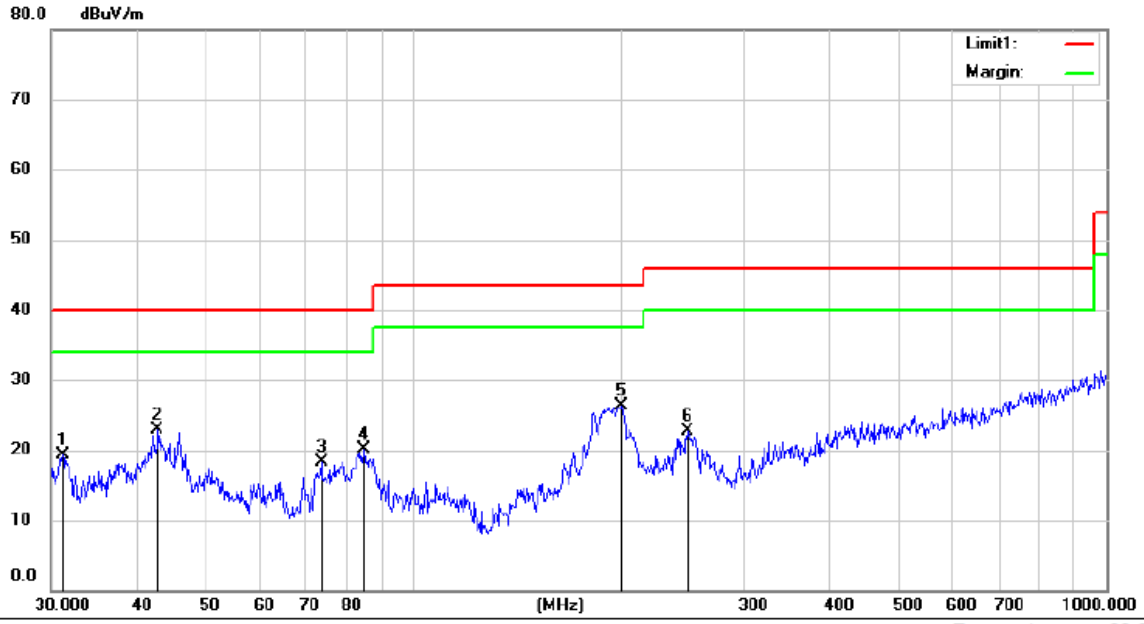
Limit: (RE)FCC PART 15C Power: AC 120V/60Hz Humidity: 50 %

Mode:802.11b Mid channel

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		46.9948	28.21	-10.94	17.27	40.00	-22.73	QP			
2		113.3163	30.04	-13.05	16.99	43.50	-26.51	QP			
3		204.9551	32.02	-11.76	20.26	43.50	-23.24	QP			
4		261.9753	29.86	-9.46	20.40	46.00	-25.60	QP			
5		290.0172	29.57	-8.70	20.87	46.00	-25.13	QP			
6	*	726.8052	29.44	-0.77	28.67	46.00	-17.33	QP			

*:Maximum data x:Over limit !:over margin Operator: KK



Site 3m Chamber #1 Polarization: *Vertical* Temperature: 22 C

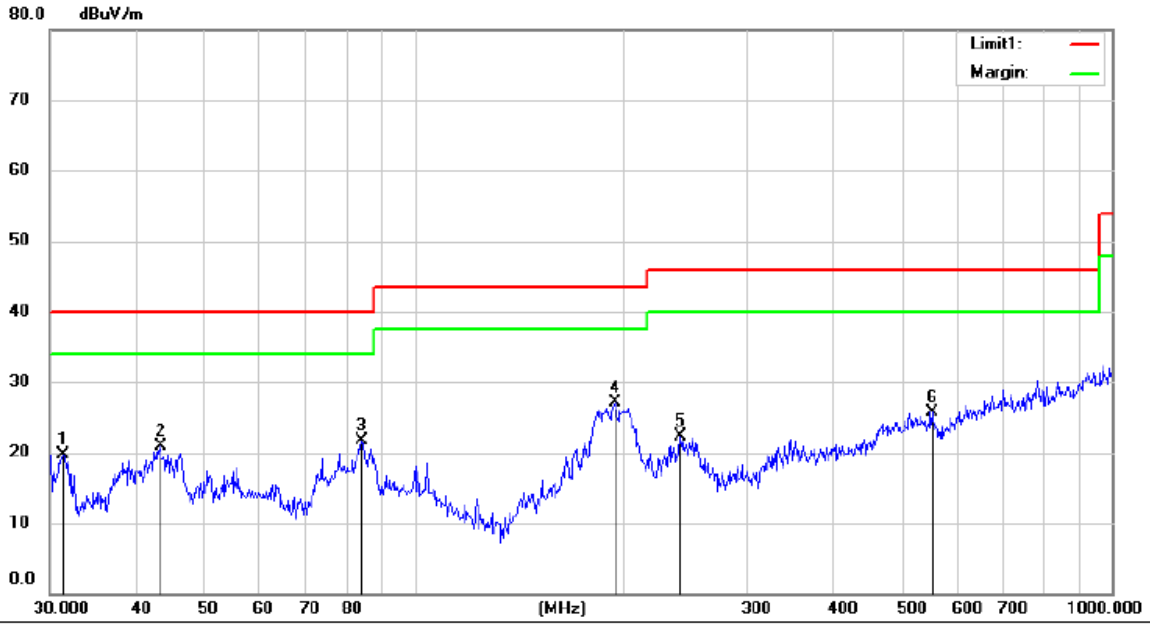
Limit: (RE)FCC PART 15C Power: AC 120V/60Hz Humidity: 50 %

Mode:802.11b Mid channel

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		31.1798	33.41	-14.13	19.28	40.00	-20.72	QP			
2	*	42.7496	34.25	-11.29	22.96	40.00	-17.04	QP			
3		73.6170	34.50	-16.16	18.34	40.00	-21.66	QP			
4		84.9995	36.24	-16.15	20.09	40.00	-19.91	QP			
5		199.9856	37.82	-11.59	26.23	43.50	-17.27	QP			
6		248.5520	32.60	-9.98	22.62	46.00	-23.38	QP			

*:Maximum data x:Over limit !:over margin Operator: KK



Site 3m Chamber #1 Polarization: *Vertical* Temperature: 22 C

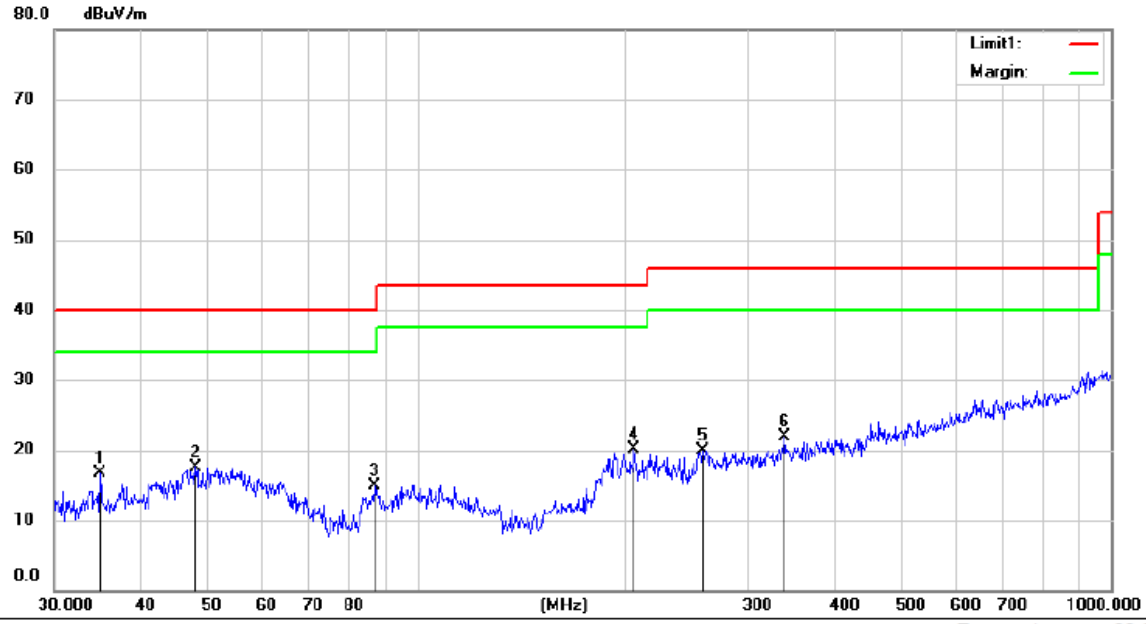
Limit: (RE)FCC PART 15C Power: AC 120V/60Hz Humidity: 50 %

Mode:802.11b High channel

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		31.3992	33.81	-14.13	19.68	40.00	-20.32	QP			
2		43.2017	32.18	-11.24	20.94	40.00	-19.06	QP			
3		84.1100	38.01	-16.28	21.73	40.00	-18.27	QP			
4	*	193.7728	39.32	-12.19	27.13	43.50	-16.37	QP			
5		240.8304	32.42	-10.11	22.31	46.00	-23.69	QP			
6		552.8832	29.79	-4.07	25.72	46.00	-20.28	QP			

*:Maximum data x:Over limit !:over margin Operator: KK



Site 3m Chamber #1 Polarization: *Horizontal* Temperature: 22 C

Limit: (RE)FCC PART 15C Power: AC 120V/60Hz Humidity: 50 %

Mode:802.11b High channel

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		34.8823	29.86	-13.24	16.62	40.00	-23.38	QP			
2	*	47.9940	28.53	-10.93	17.60	40.00	-22.40	QP			
3		86.8068	30.60	-15.61	14.99	40.00	-25.01	QP			
4		205.6751	31.81	-11.78	20.03	43.50	-23.47	QP			
5		258.3264	29.62	-9.68	19.94	46.00	-26.06	QP			
6		338.4001	29.28	-7.30	21.98	46.00	-24.02	QP			

*:Maximum data x:Over limit !:over margin Operator: KK

8.7 CONDUCTED EMISSIONS TEST

8.7.1 Applicable Standard

According to FCC Part 15.207(a) and IC RSS-Gen 8.8

8.7.2 Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

8.7.3 Test Configuration

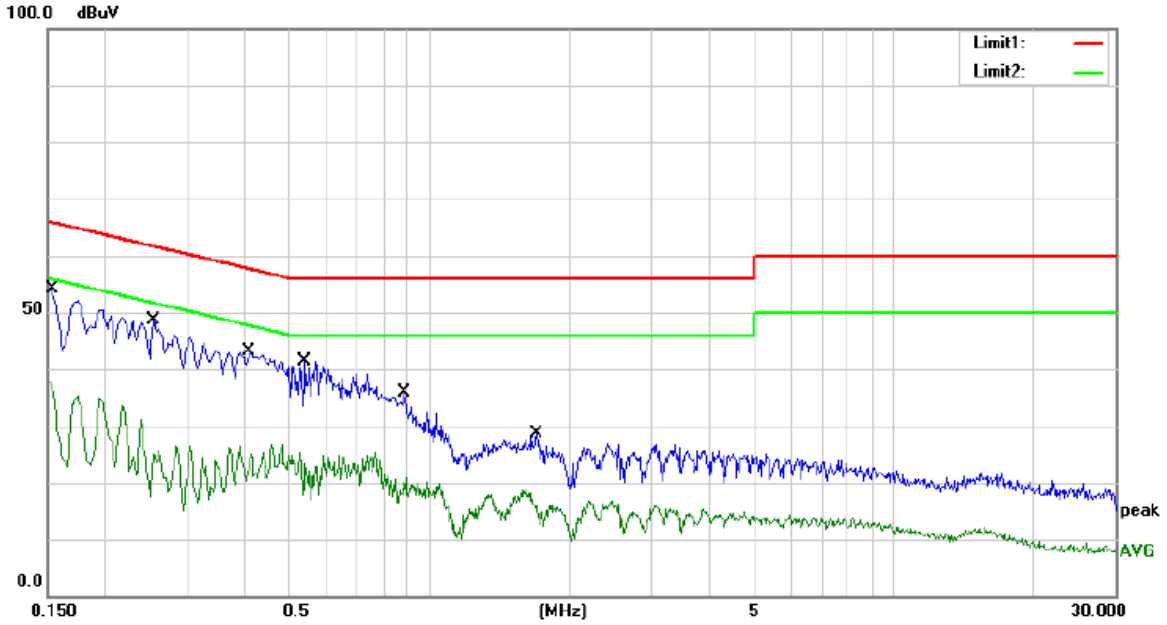
Test according to clause 7.3conducted emission test setup

8.7.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

8.7.5 Test Results

Pass
120V/60Hz & 240V/60Hz have been tested, and the worst result recorded was report as below:



Site Conduction #1 Phase: N Temperature: 24.9

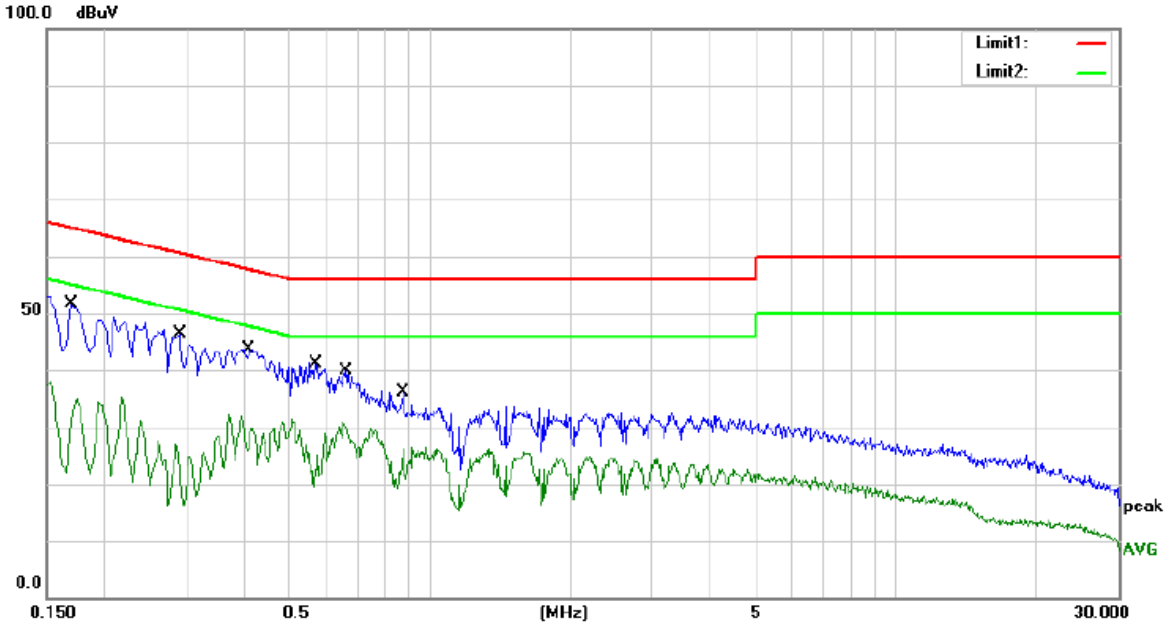
Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 54 %

Mode: 802.11b low channel

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1540	44.51	9.56	54.07	65.78	-11.71	QP	
2		0.1540	28.45	9.56	38.01	55.78	-17.77	AVG	
3		0.2540	39.13	9.56	48.69	61.63	-12.94	QP	
4		0.2540	25.25	9.56	34.81	51.63	-16.82	AVG	
5		0.4100	33.50	9.57	43.07	57.65	-14.58	QP	
6		0.4100	16.87	9.57	26.44	47.65	-21.21	AVG	
7		0.5380	31.80	9.57	41.37	56.00	-14.63	QP	
8		0.5380	15.92	9.57	25.49	46.00	-20.51	AVG	
9		0.8820	26.28	9.59	35.87	56.00	-20.13	QP	
10		0.8820	15.78	9.59	25.37	46.00	-20.63	AVG	
11		1.7020	19.04	9.60	28.64	56.00	-27.36	QP	
12		1.7020	9.03	9.60	18.63	46.00	-27.37	AVG	

:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: CSL



Site Conduction #1 Phase: *L1* Temperature: 24.9

Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 54 %

Mode: 802.11b low channel

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1700	42.04	9.56	51.60	64.96	-13.36	QP	
2		0.1700	28.52	9.56	38.08	54.96	-16.88	AVG	
3		0.2900	36.69	9.56	46.25	60.52	-14.27	QP	
4		0.2900	25.19	9.56	34.75	50.52	-15.77	AVG	
5		0.4100	33.96	9.57	43.53	57.65	-14.12	QP	
6		0.4100	22.45	9.57	32.02	47.65	-15.63	AVG	
7		0.5700	31.44	9.57	41.01	56.00	-14.99	QP	
8		0.5700	21.86	9.57	31.43	46.00	-14.57	AVG	
9		0.6580	30.30	9.58	39.88	56.00	-16.12	QP	
10		0.6580	21.24	9.58	30.82	46.00	-15.18	AVG	
11		0.8780	26.51	9.59	36.10	56.00	-19.90	QP	
12		0.8780	16.72	9.59	26.31	46.00	-19.69	AVG	

:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: CSL

8.8 ANTENNA APPLICATION

8.8.1 Antenna Requirement

FCC requirement

Standard	Requirement
FCC CRF Part15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217,§15.219, or §15.221. Further, this requirement does not apply to intentionalradiators 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.

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

IC requirement

For intentional device, according to RSS-Gen Issue 5 Section 8.3:
The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.
Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for licence-exempt apparatus.

RSS-247 Section 5.4
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

8.8.2 Result

The EUT'S antenna is PCB antenna. The antenna's gain is 2 dBi, and the antenna can't be replaced by the userwhich in accordance to section 15.203, please refer to the photos.