MEASUREMENT REPORT

FCC PART 15.247 WLAN 802.11b/g/n

FCC ID: A2HCN6Q14

Applicant: ALCO Electronics Limited.

Application Type: Certification

Product: Notebook

Model No.: NS14A6, CN6Q14

Brand Name: AVITA, VENTURER

FCC Classification: Digital Transmission System (DTS)

FCC Rule Part(s): Part 15 Subpart C (Section 15.247)

Test Procedure(s): ANSI C63.10-2013

Test Date: February 01 ~ 23, 2020

Reviewed By: (Sunny Sun)

Approved By: (Robin Wu)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2002RSU005-U3	Rev. 01	Initial Report	04-17-2020	Valid

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General Information

Applicant:	ALCO Electronics Limited.
Applicant Address:	11/F Metropole Square, 2 On Yiu Street, Sha Tin, New Territories, Hong Kong
Manufacturer:	ALCO Electronics (Dongguan) Limited.
Manufacturer Address:	Gong Ye Xi Road, Houjie Technology Industrial Park, Dongguan, Guangdong, P.R.C.
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Designation No. CN1166) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.**

Accredited Laboratory

A2LA has accredited

MRT TECHNOLOGY (SUZHOU) CO., LTD.

Suzhou, Jiangsu, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

Presented this 24th day of July 2018.

President and CEO
For the Accreditation Council
Certificate Number 3628.01
Valid to August 31, 2020

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

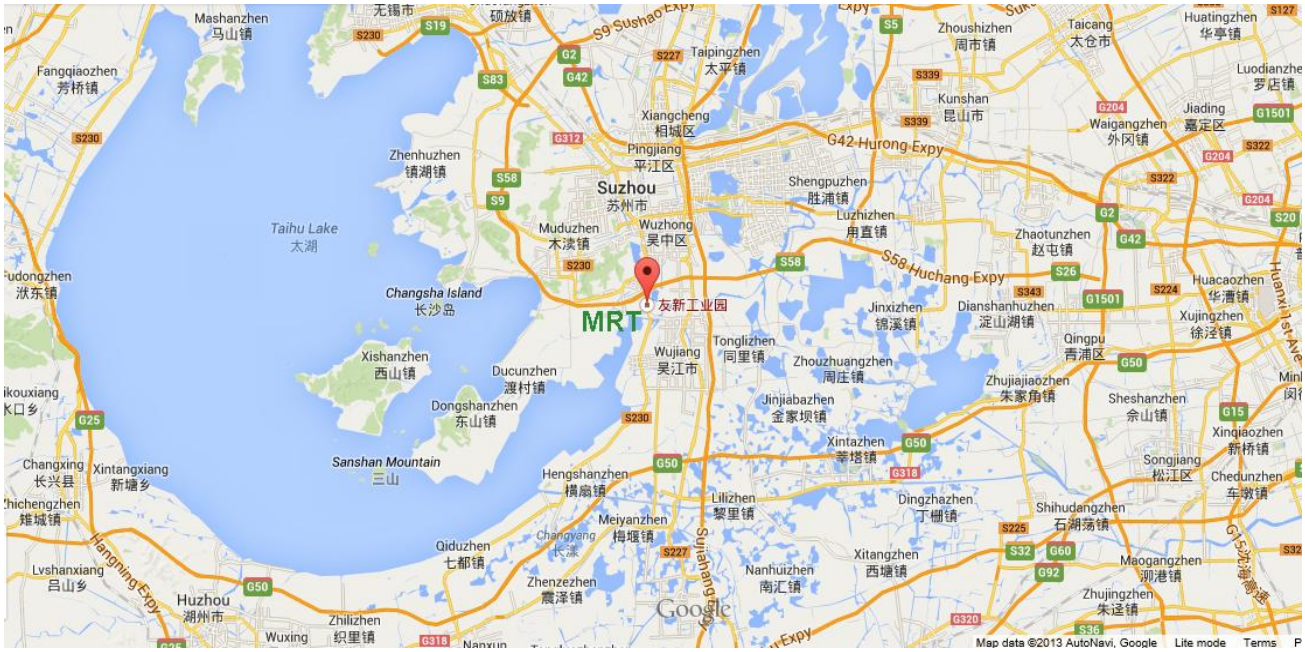
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada and Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

Product Name	Notebook
Model No.	NS14A6, CN6Q14
Brand Name	AVITA, VENTURER
Wi-Fi Specification	802.11a/b/g/n/ac
Bluetooth Version	v4.1 dual mode
Antenna Delivery	Main Antenna: WiFi (TX/RX) & Bluetooth (TX/RX) Aux Antenna: WiFi (RX)
Accessory	
Adapter #1	MODEL: ADS-45SN-19-3 INPUT: 100-240V ~ 50/60Hz, Max. 1.0A OUTPUT: 19Vdc, 2.1A
Adapter #2	MODEL: ADS-25SGP-12 INPUT: 100-240V ~ 50/60Hz, Max. 0.7A OUTPUT: 12Vdc, 2.0A

Note: The different models are only for marketing different clients, others are the same.

2.2. Product Specification Subjective to this Report

Frequency Range	802.11b/g/n-HT20: 2412 ~ 2462 MHz 802.11n-HT40: 2422 ~ 2452 MHz
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM
Data Rate	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps
Antenna Type	PIFA Antenna
Antenna Gain	Main Antenna: 0.45 dBi Aux Antenna: 0.03 dBi

Note: For other features of this EUT, test report will be issued separately.

2.3. Working Frequencies for this report

802.11b/g/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	--	--

802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	--	--	--	--

2.4. Test Mode

Test Mode	Mode 1: Transmit by 802.11b (1Mbps)
	Mode 2: Transmit by 802.11g (6Mbps)
	Mode 3: Transmit by 802.11n-HT20 (MCS0)
	Mode 4: Transmit by 802.11n-HT40 (MCS0)

2.5. Test Software

The test utility software used during testing was “QRCT”, and the version was “3.0.203.0”.

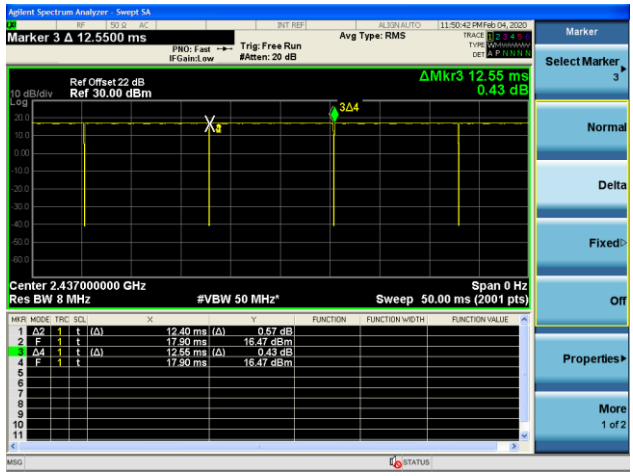
Detail power parameter values refer to Operation Description.

2.6. Duty Cycle

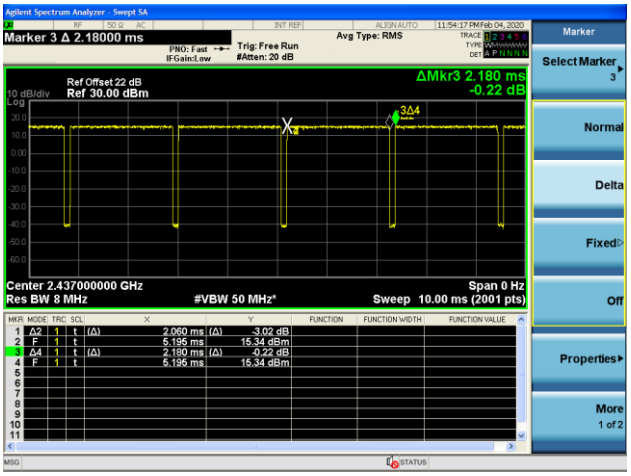
2.4GHz WLAN (DTS) operation is possible in 20MHz and 40MHz channel bandwidth. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Test Mode	Duty Cycle
802.11b	98.80%
802.11g	94.50%
802.11n-HT20	94.36%
802.11n-HT40	88.81%

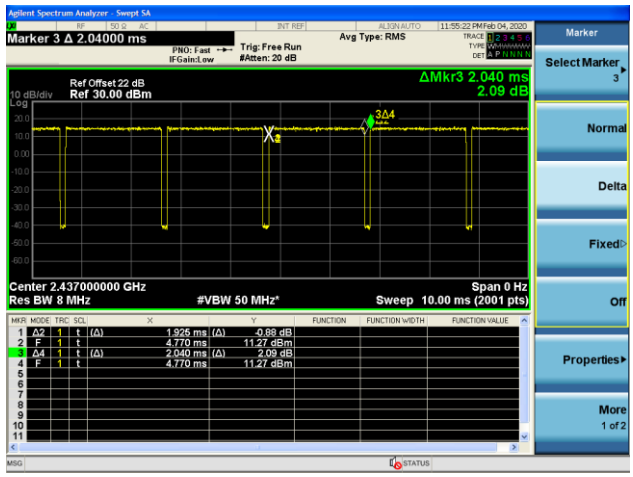
802.11b (T = 12.40 ms)



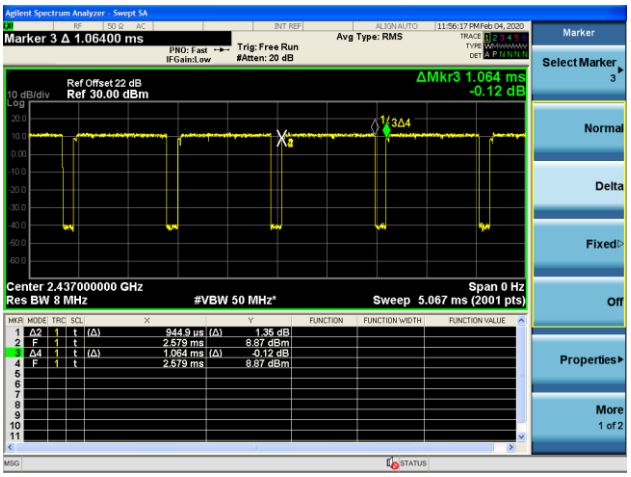
802.11g (T = 2.06 ms)



802.11n-HT20 (T = 1.925 ms)



802.11n-HT40 (T = 944.9 us)



2.7. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.8. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION of TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013) was used in the measurement of the device.

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the unit is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2021/01/18
Two-Line V-Network	R&S	ENV 216	MRTSUE06002	1 year	2020/06/13
Two-Line V-Network	R&S	ENV 216	MRTSUE06003	1 year	2020/06/13
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2020/08/08
Shielding Room	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2020/08/01
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2020/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/04/03
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2020/10/13
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2020/12/17
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2020/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2020/08/08
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2020/04/30

Radiated Emission - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2020/08/01
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2020/10/13
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2020/10/27
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2020/12/17
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2020/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2020/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2020/04/30

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2021/04/14
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06452	1 year	2020/07/11
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2020/11/18
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2020/06/30
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2020/06/30
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2020/06/13
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2020/06/13
Modulation Analyzer	HP	8901A	MRTSUE06098	1 year	2020/10/10
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2020/11/07
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2020/11/07
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2020/08/08

Software	Version	Function
EMI Software	V3	EMI Test Software

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test 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.

Conducted Emission Measurement - SR2
The maximum measurement uncertainty is evaluated as: 9kHz~150kHz: 3.84dB 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
The maximum measurement uncertainty is evaluated as: Horizontal: 30MHz~300MHz: 4.07dB 300MHz~1GHz: 3.63dB 1GHz~18GHz: 4.16dB Vertical: 30MHz~300MHz: 4.18dB 300MHz~1GHz: 3.60dB 1GHz~18GHz: 4.76dB
Radiated Emission Measurement - AC2
The maximum measurement uncertainty is evaluated as: Horizontal: 30MHz~300MHz: 3.75dB 300MHz~1GHz: 3.53dB 1GHz~18GHz: 4.28dB Vertical: 30MHz~300MHz: 3.86dB 300MHz~1GHz: 3.53dB 1GHz~18GHz: 4.33dB

7. TEST RESULT

7.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	≥ 500kHz	Conducted	Pass	Section 7.2
15.247(b)(3)	Output Power	≤ 1Watt		Pass	Section 7.3
15.247(e)	Power Spectral Density	≤ 8dBm / 3kHz		Pass	Section 7.4
15.247(d)	Band Edge / Out-of-Band Emissions	≤ 30dBc (Average)		Pass	Section 7.5
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.6 & 7.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.8

Notes:

1) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

7.2. Occupied Bandwidth Measurement

7.2.1.Test Limit

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

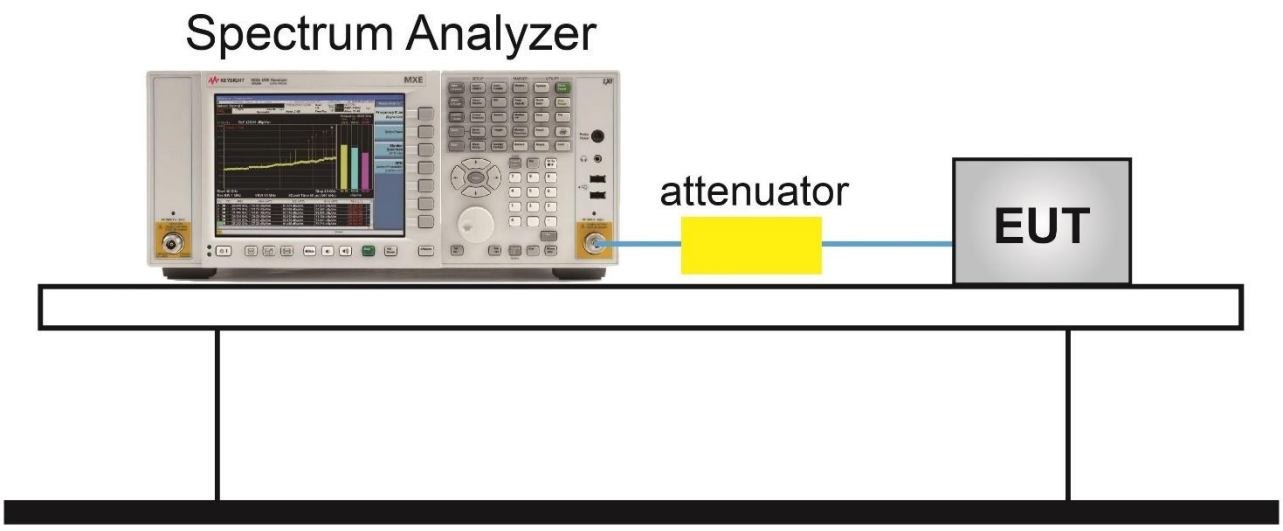
7.2.2.Test Procedure used

ANSI C63.10-2013 - Section 11.8

7.2.3.Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace was allowed to stabilize

7.2.4.Test Setup



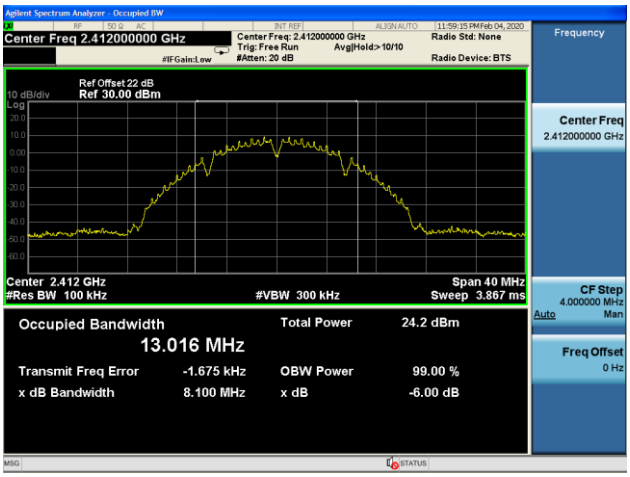
7.2.5.Test Result

Product	Notebook	Temperature	24°C
Test Engineer	Lewis Huang	Relative Humidity	52%
Test Site	TR3	Test Date	2020/02/04 ~ 2020/02/05

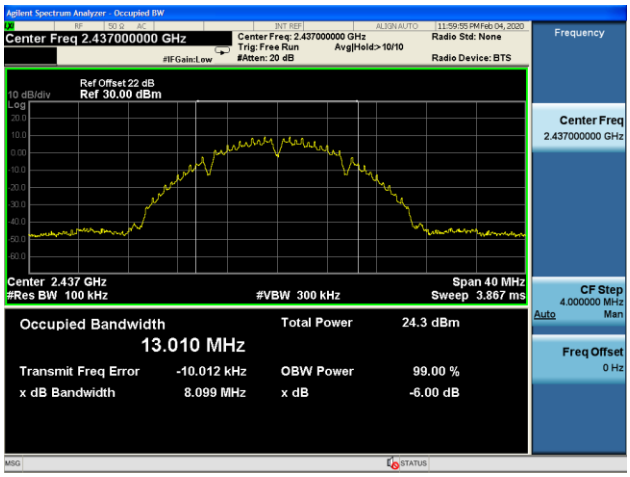
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
11b	1Mbps	01	2412	8.10	≥ 0.5	Pass
11b	1Mbps	06	2437	8.10	≥ 0.5	Pass
11b	1Mbps	11	2462	8.10	≥ 0.5	Pass
11g	6Mbps	01	2412	15.17	≥ 0.5	Pass
11g	6Mbps	06	2437	15.17	≥ 0.5	Pass
11g	6Mbps	11	2462	15.16	≥ 0.5	Pass
11n-HT20	MCS0	01	2412	15.18	≥ 0.5	Pass
11n-HT20	MCS0	06	2437	15.17	≥ 0.5	Pass
11n-HT20	MCS0	11	2462	15.16	≥ 0.5	Pass
11n-HT40	MCS0	03	2422	35.18	≥ 0.5	Pass
11n-HT40	MCS0	06	2437	35.18	≥ 0.5	Pass
11n-HT40	MCS0	09	2452	35.17	≥ 0.5	Pass

802.11b 6dB Bandwidth

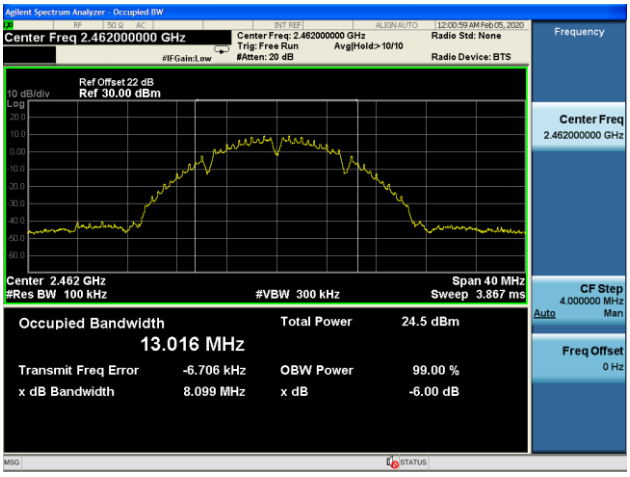
Channel 01 (2412MHz)



Channel 06 (2437MHz)

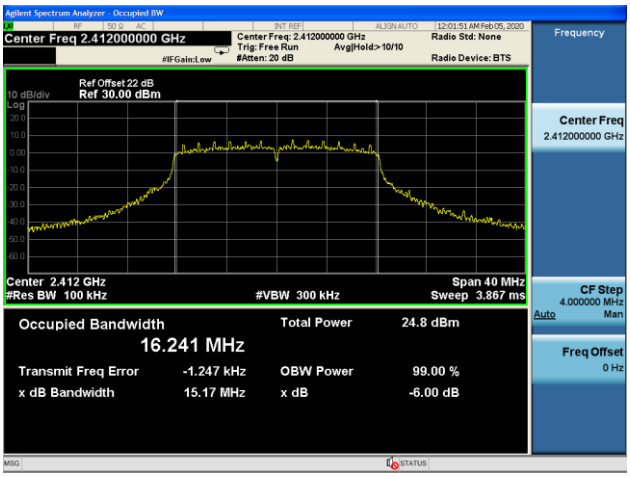


Channel 11 (2462MHz)

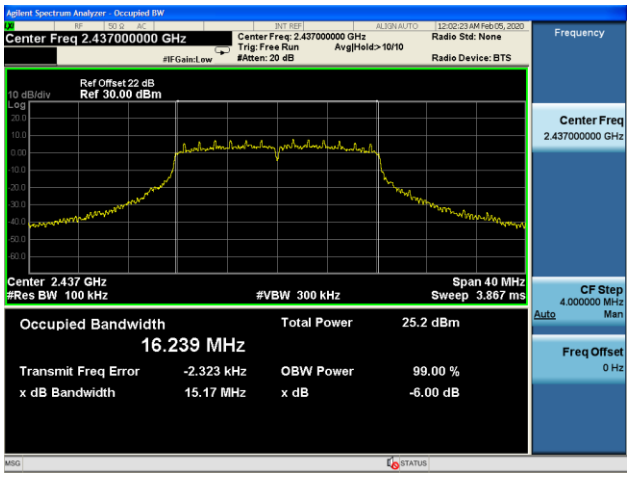


802.11g 6dB Bandwidth

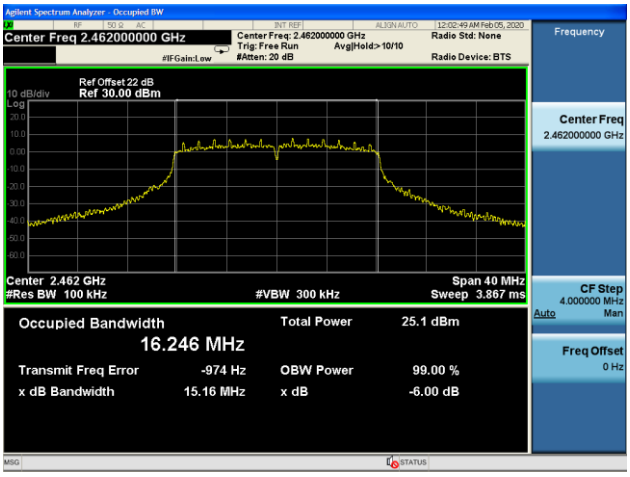
Channel 01 (2412MHz)



Channel 06 (2437MHz)

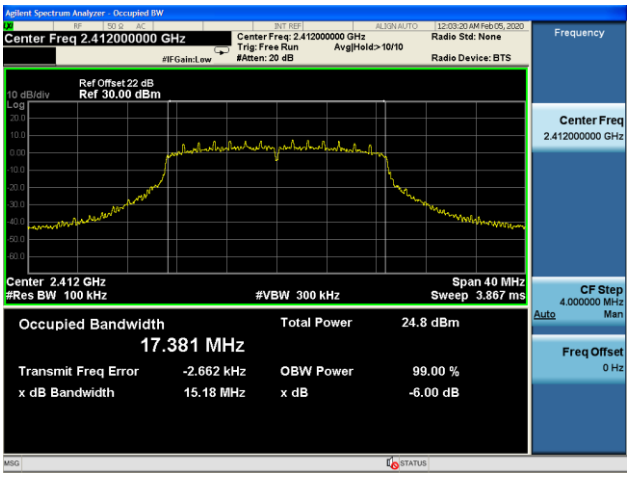


Channel 11 (2462MHz)

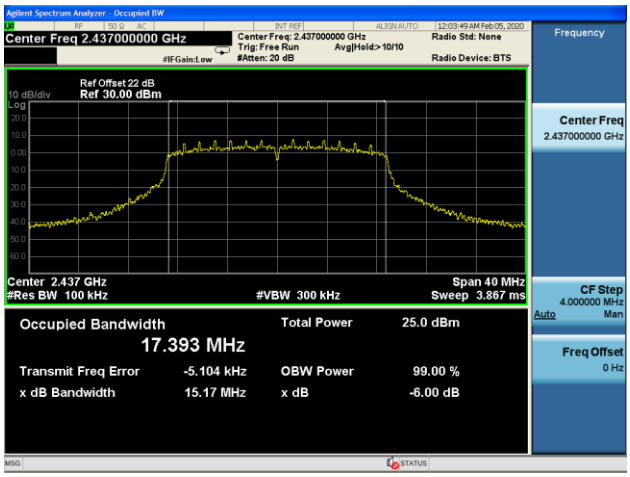


802.11n-HT20 6dB Bandwidth

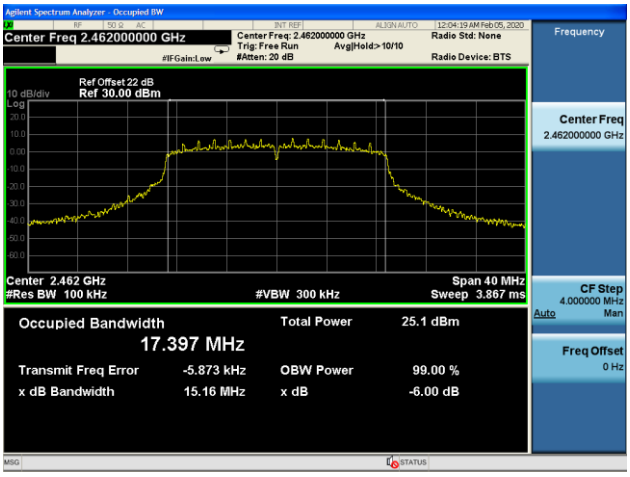
Channel 01 (2412MHz)



Channel 06 (2437MHz)

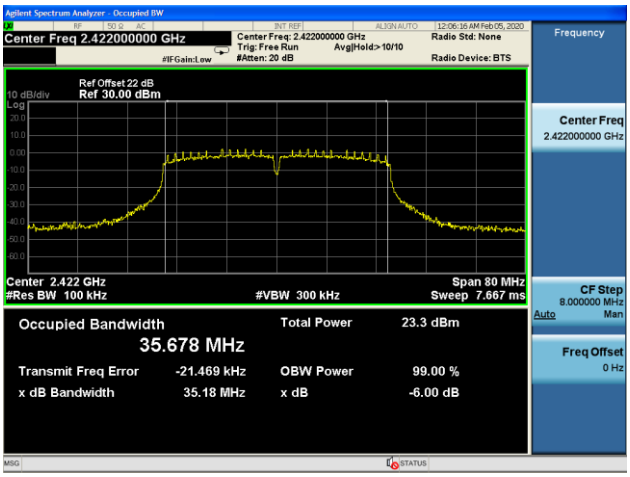


Channel 11 (2462MHz)

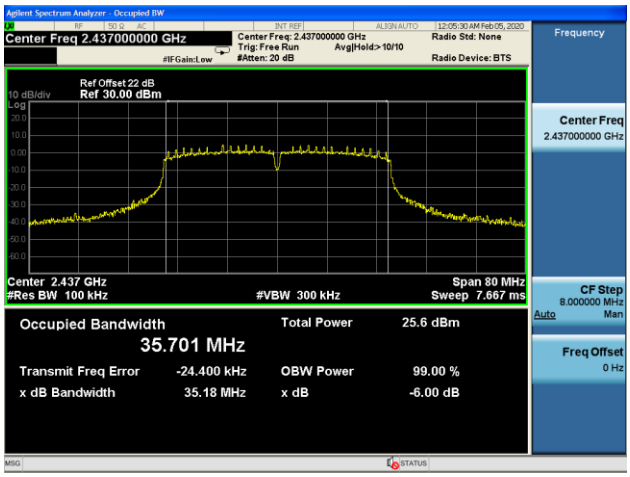


802.11n-HT40 6dB Bandwidth

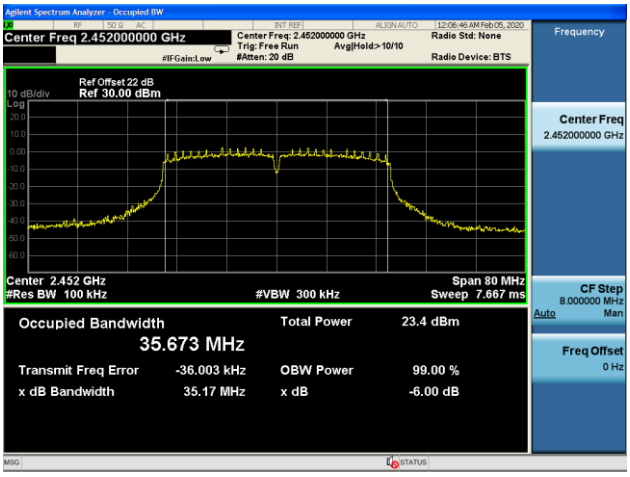
Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



7.3. Output Power Measurement

7.3.1.Test Limit

The maximum out power shall be less 1 Watt (30dBm).

The conducted output power limit specified in paragraph FCC Part 15.247(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs FCC Part 15.247(b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.3.2.Test Procedure Used

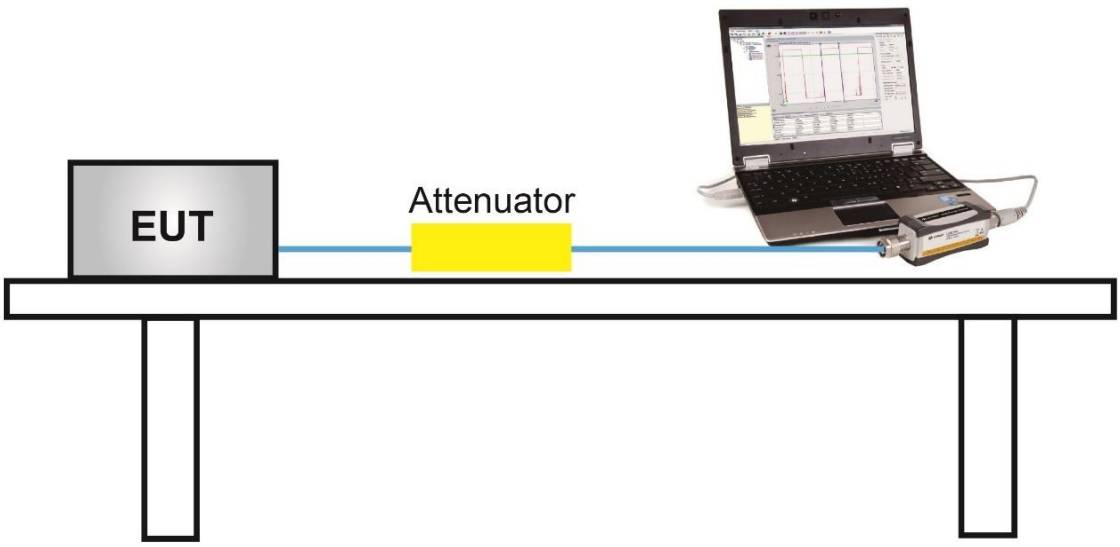
ANSI C63.10 Section 11.9.2.3

7.3.3.Test Setting

Method AVGPM-G (Measurement using a gated RF average-reading power meter)

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

7.3.4.Test Setup



7.3.5.Test Result of Output Power

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (Gray marker) for final test of each channel.

Output power at various data rates:

Test Mode	Bandwidth (MHz)	Channel No.	Frequency (MHz)	Data Rate/ MCS	Average Power (dBm)
802.11b	20	6	2437	1Mbps	14.47
				5.5Mbps	14.13
				11Mbps	13.72
802.11g	20	6	2437	6Mbps	12.89
				24Mbps	12.41
				54Mbps	12.03
802.11n	20	6	2437	MCS0	12.83
				MCS3	12.51
				MCS7	12.19
802.11n	40	6	2437	MCS0	12.86
				MCS3	12.43
				MCS7	12.13

Product	Notebook	Temperature	24°C
Test Engineer	Lewis Huang	Relative Humidity	52%
Test Site	TR3	Test Date	2020/02/05

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Average Power (dBm)	Limit (dBm)	Result
11b	1Mbps	01	2412	15.05	≤ 30.00	Pass
11b	1Mbps	06	2437	14.47	≤ 30.00	Pass
11b	1Mbps	11	2462	15.32	≤ 30.00	Pass
11g	6Mbps	01	2412	13.38	≤ 30.00	Pass
11g	6Mbps	06	2437	12.89	≤ 30.00	Pass
11g	6Mbps	11	2462	13.68	≤ 30.00	Pass
11n-HT20	MCS0	01	2412	13.12	≤ 30.00	Pass
11n-HT20	MCS0	06	2437	12.83	≤ 30.00	Pass
11n-HT20	MCS0	11	2462	13.46	≤ 30.00	Pass
11n-HT40	MCS0	03	2422	13.14	≤ 30.00	Pass
11n-HT40	MCS0	06	2437	12.86	≤ 30.00	Pass
11n-HT40	MCS0	09	2452	13.48	≤ 30.00	Pass

7.4. Power Spectral Density Measurement

7.4.1.Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

The same method of determining the conducted output power shall be used to determine the power spectral density.

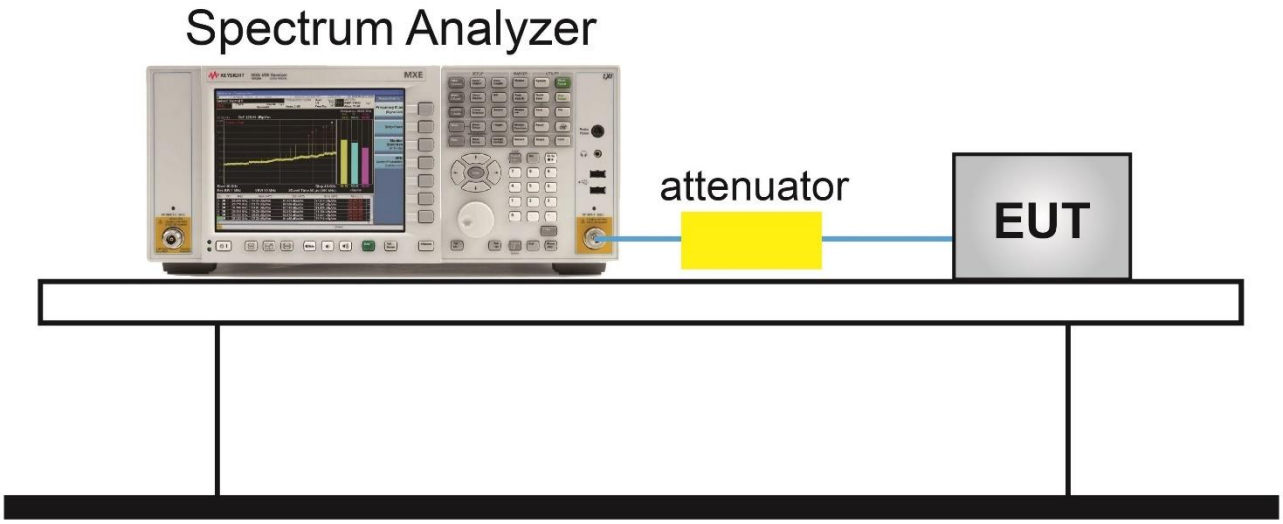
7.4.2.Test Procedure Used

ANSI C63.10 Section 11.10.3

7.4.3.Test Setting

1. Measure the duty cycle (x) of the transmitter output signal.
2. Set instrument center frequency to DTS channel center frequency.
3. Set span to at least 1.5 times the OBW.
4. RBW = 10kHz.
5. VBW = 30kHz.
6. Detector = RMS.
7. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
8. Sweep time = auto couple.
9. Don’t use sweep triggering. Allow sweep to “free run”.
10. Employ trace averaging (RMS) mode over a minimum of 100 traces.
11. Use the peak marker function to determine the maximum amplitude level.
12. Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.
13. Add Constant Factor = 10*log(3kHz / 10kHz) = -5.23.

7.4.4.Test Setup



7.4.5.Test Result

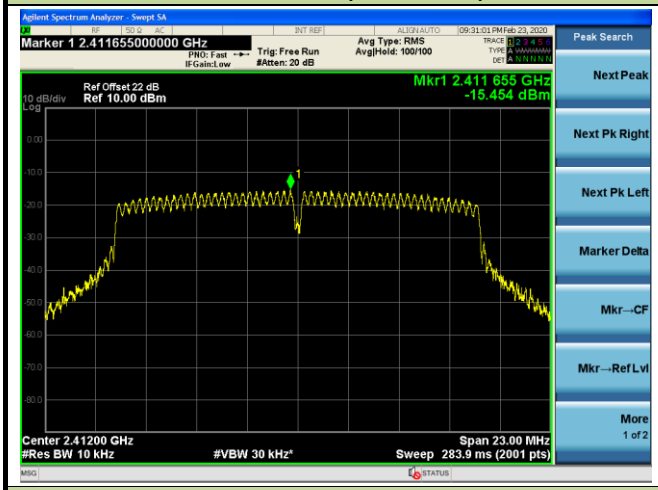
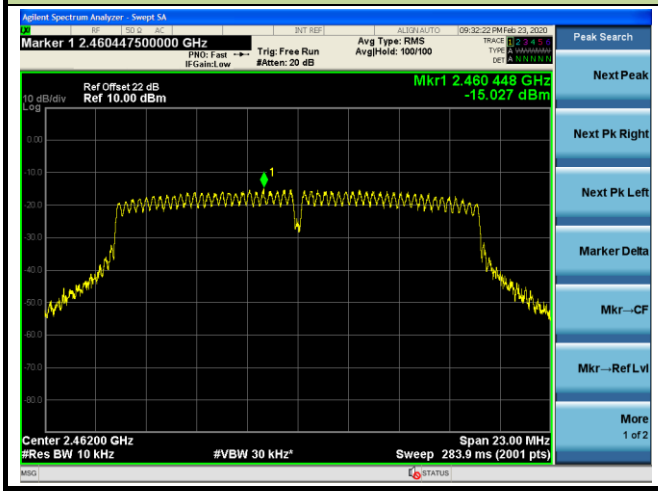
Product	Notebook	Temperature	24°C
Test Engineer	Lewis Huang	Relative Humidity	52%
Test Site	TR3	Test Date	2020/02/23

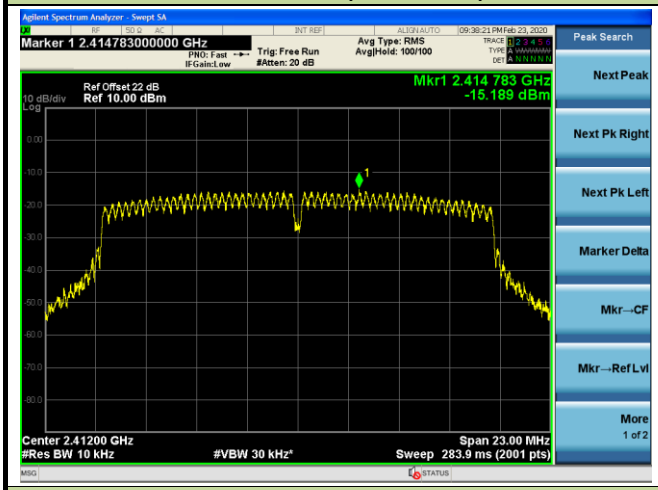
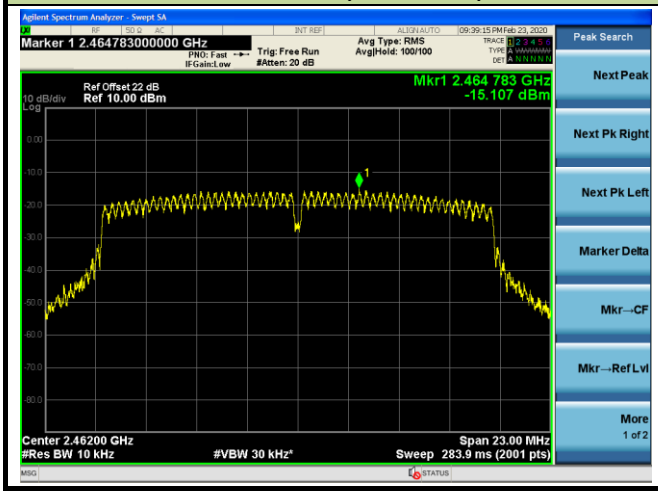
Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm / 10kHz)	Duty Cycle (%)	Constant Factor (dB)	Final PSD (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
11b	1Mbps	01	2412	-11.52	98.80	-5.23	-16.75	≤ 8.00	Pass
11b	1Mbps	06	2437	-12.16	98.80	-5.23	-17.39	≤ 8.00	Pass
11b	1Mbps	11	2462	-11.55	98.80	-5.23	-16.78	≤ 8.00	Pass
11g	6Mbps	01	2412	-15.45	94.50	-5.23	-20.43	≤ 8.00	Pass
11g	6Mbps	06	2437	-15.83	94.50	-5.23	-20.81	≤ 8.00	Pass
11g	6Mbps	11	2462	-15.03	94.50	-5.23	-20.01	≤ 8.00	Pass
11n-HT20	MCS0	01	2412	-15.19	94.36	-5.23	-20.17	≤ 8.00	Pass
11n-HT20	MCS0	06	2437	-16.12	94.36	-5.23	-21.10	≤ 8.00	Pass
11n-HT20	MCS0	11	2462	-15.11	94.36	-5.23	-20.09	≤ 8.00	Pass
11n-HT40	MCS0	03	2422	-19.02	88.81	-5.23	-23.73	≤ 8.00	Pass
11n-HT40	MCS0	06	2437	-19.63	88.81	-5.23	-24.34	≤ 8.00	Pass
11n-HT40	MCS0	09	2452	-18.65	88.81	-5.23	-23.36	≤ 8.00	Pass

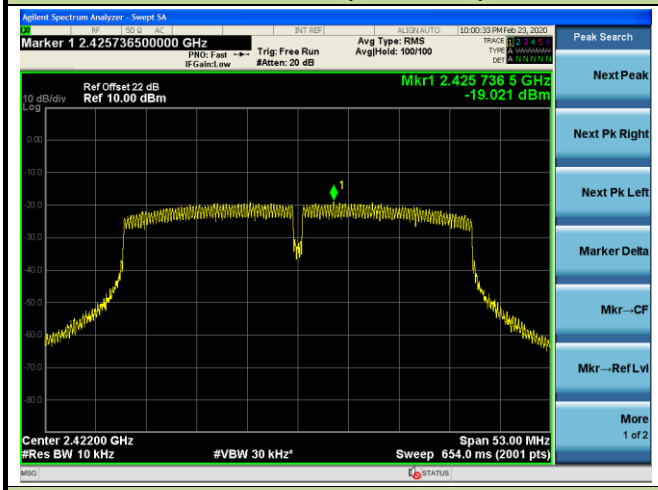
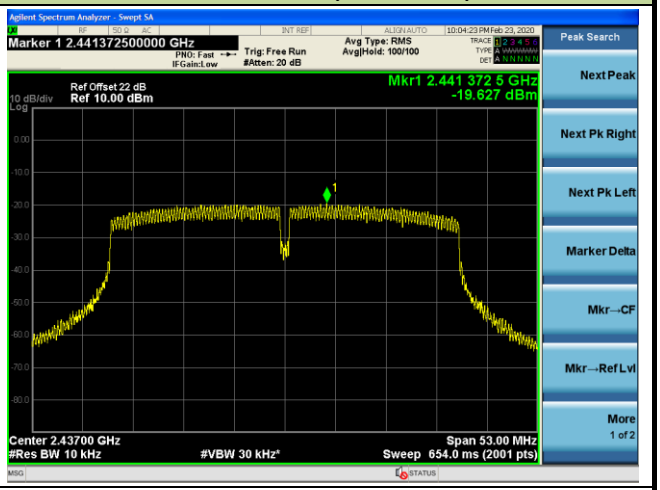
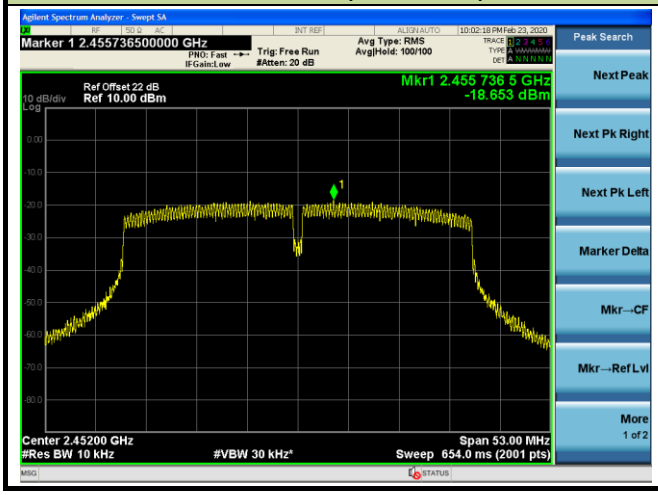
Note 1: When EUT duty cycle ≥ 98%, Final PSD = PSD (dBm / 3kHz) + Constant Factor.

Note 2: When EUT duty cycle < 98%, Final PSD = PSD (dBm / 3kHz) + 10*log (1/duty cycle) + Constant Factor.

802.11b PSD	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
Channel 11 (2462MHz)	

802.11g PSD	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

802.11n-HT20 PSD	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

802.11n-HT40 PSD	
Channel 03 (2422MHz)	Channel 06 (2437MHz)
	
Channel 09 (2452MHz)	
	

7.5. Conducted Band Edge and Out-of-Band Emissions

7.5.1.Test Limit

The limit for out-of-band spurious emissions at the band edge is 30dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

7.5.2.Test Procedure Used

ANSI C63.10 Section 11.11

7.5.3.Test Settitng

Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW ≥ 3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

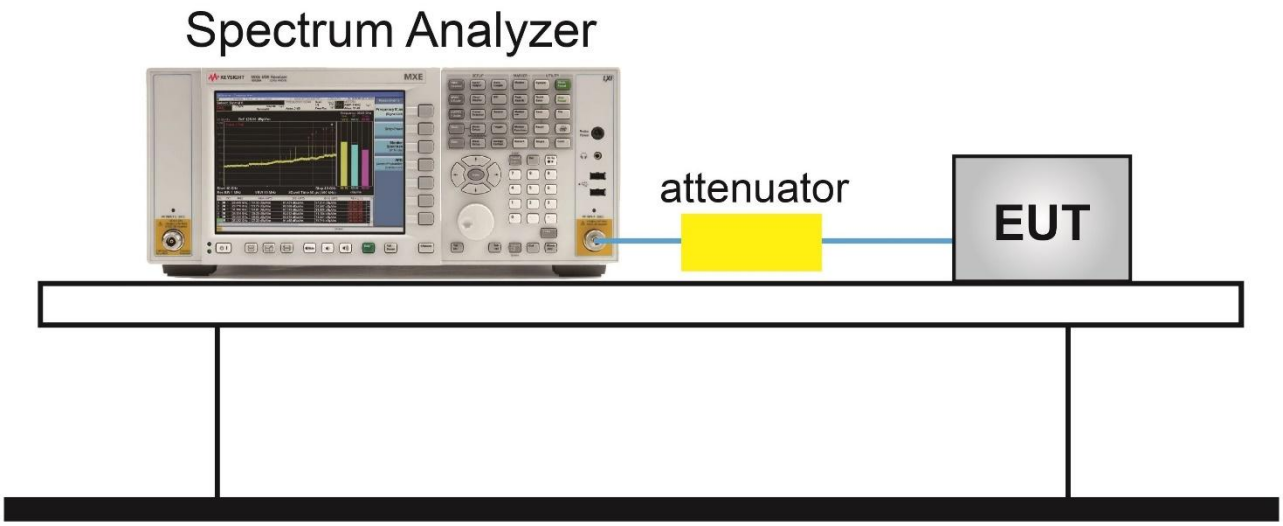
Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Notes

1. RBW was set to 1.3MHz rather than 100kHz in order to increase the measurement speed.
2. The display line shown in the following plots denotes the limit at 20dB below the fundamental emission level measured in a 100kHz bandwidth. However, since the traces in the following plots are measured with a 1.3MHz RBW, the display line may not necessarily appear to be 20dB below the level of the fundamental in a 1.3MHz bandwidth.
3. For plots showing conducted spurious emissions near the limit, the frequencies were investigated with a reduced RBW to ensure that no emissions were present.

7.5.4.Test Setup



7.5.5.Test Result

Product	Notebook	Temperature	24°C
Test Engineer	Lewis Huang	Relative Humidity	52%
Test Site	TR3	Test Date	2020/02/05

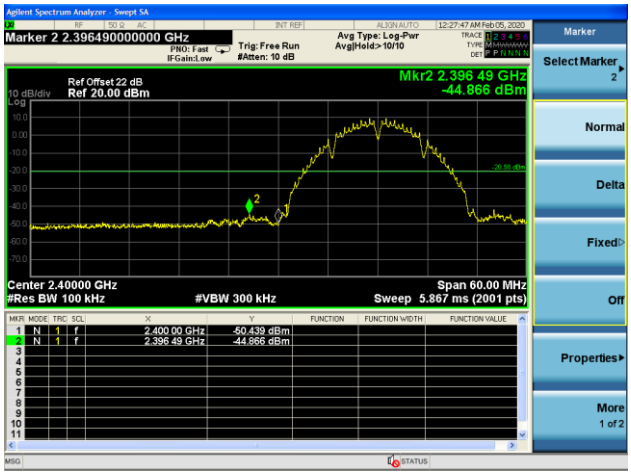
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Limit	Result
802.11b	1Mbps	01	2412	30dBc	Pass
802.11b	1Mbps	06	2437	30dBc	Pass
802.11b	1Mbps	11	2462	30dBc	Pass
802.11g	6Mbps	01	2412	30dBc	Pass
802.11g	6Mbps	06	2437	30dBc	Pass
802.11g	6Mbps	11	2462	30dBc	Pass
802.11n-HT20	MCS0	01	2412	30dBc	Pass
802.11n-HT20	MCS0	06	2437	30dBc	Pass
802.11n-HT20	MCS0	11	2462	30dBc	Pass
802.11n-HT40	MCS0	03	2422	30dBc	Pass
802.11n-HT40	MCS0	06	2437	30dBc	Pass
802.11n-HT40	MCS0	09	2452	30dBc	Pass

802.11b Out-of-Band Emissions

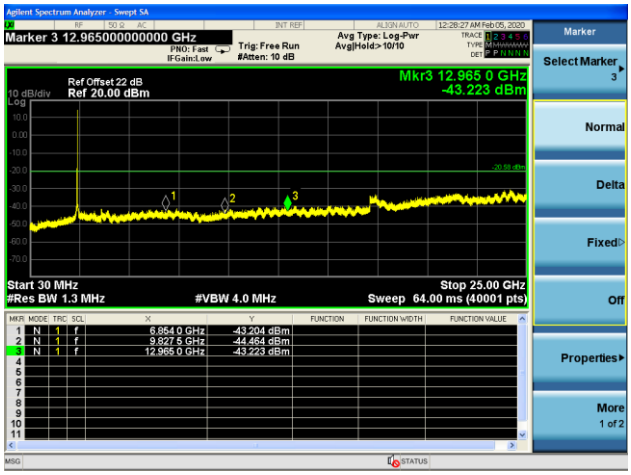
Channel 01 (2412MHz)

100kHz PSD reference Level

Low Band Edge



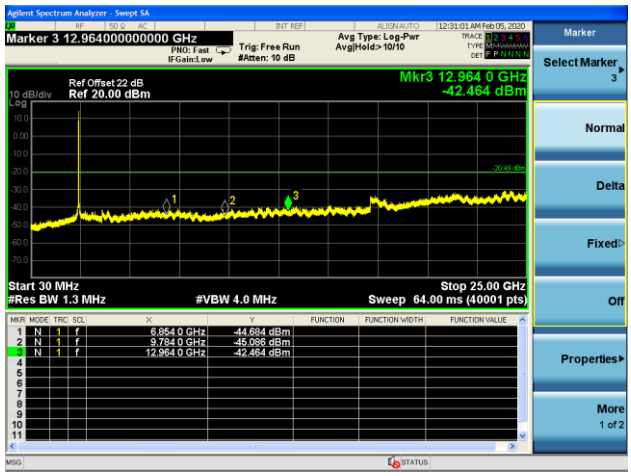
Spurious Emission

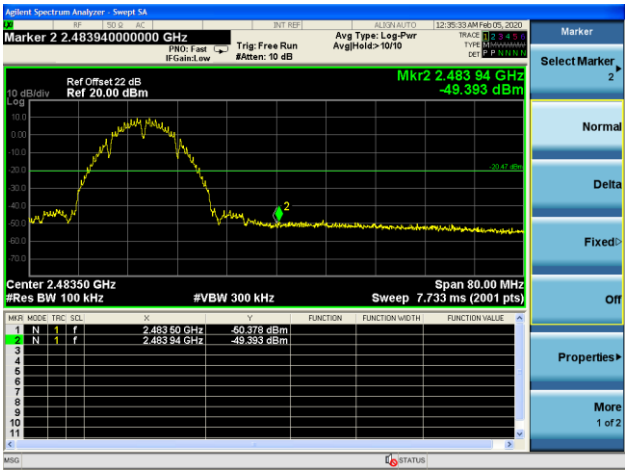
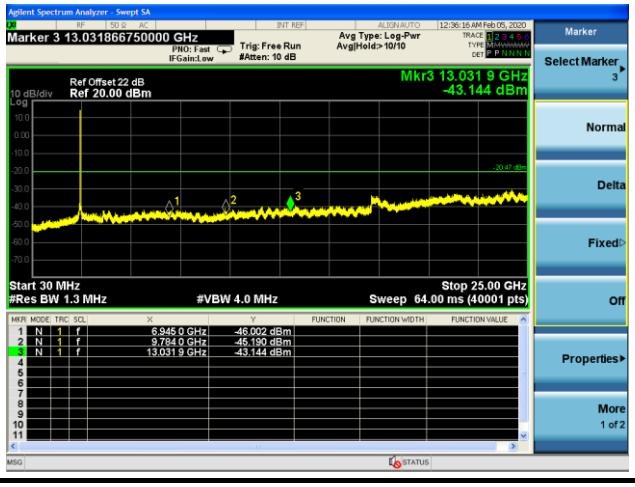


Channel 06 (2437MHz)

100kHz PSD reference Level

Spurious Emission



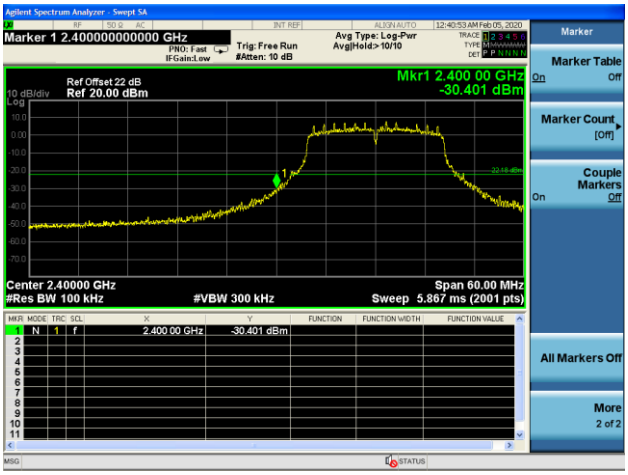
Channel 11 (2462MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission	
	

802.11g Out-of-Band Emissions

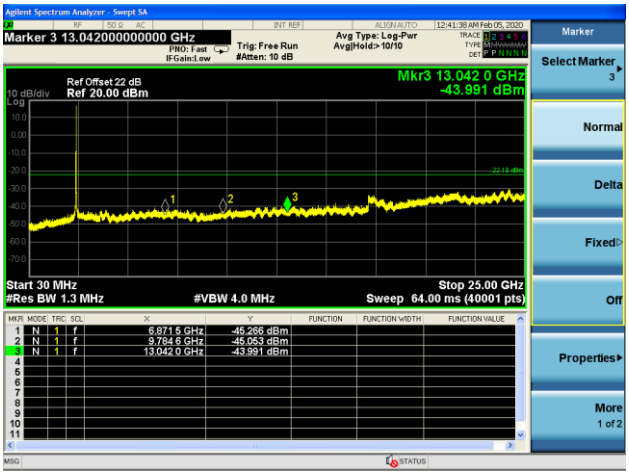
Channel 01 (2412MHz)

100kHz PSD reference Level

Low Band Edge



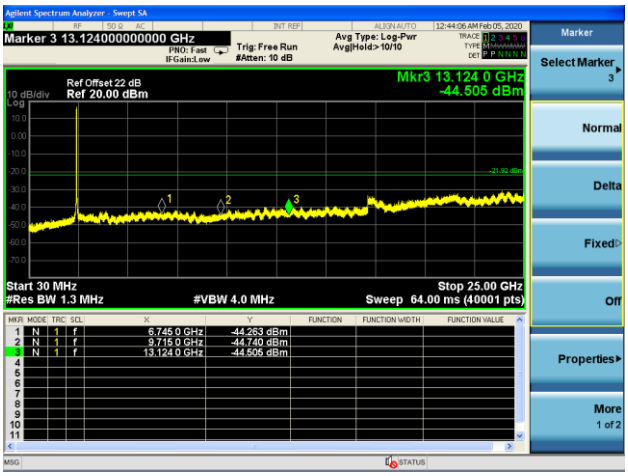
Spurious Emission

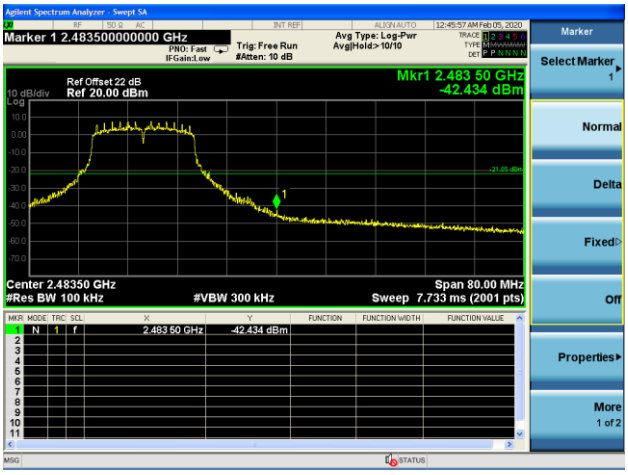
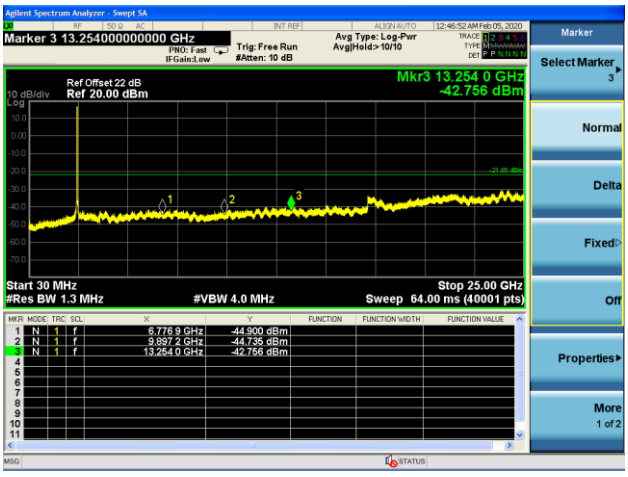


Channel 06 (2437MHz)

100kHz PSD reference Level

Spurious Emission



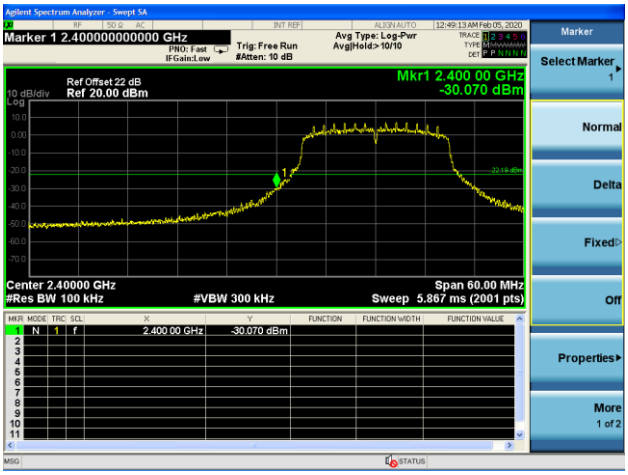
Channel 11 (2462MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission	
	

802.11n-HT20 Out-of-Band Emissions

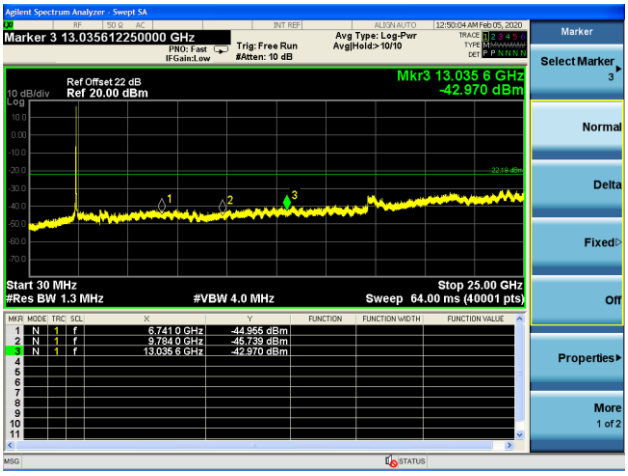
Channel 01 (2412MHz)

100kHz PSD reference Level

Low Band Edge



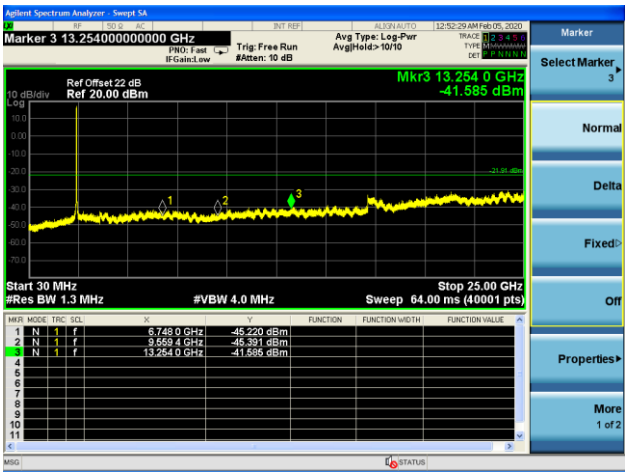
Spurious Emission

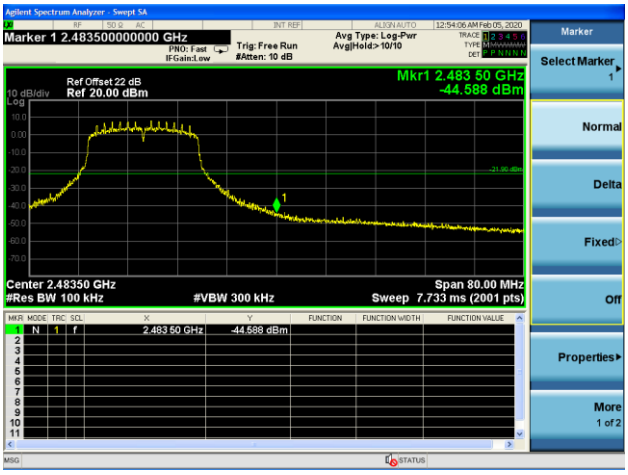
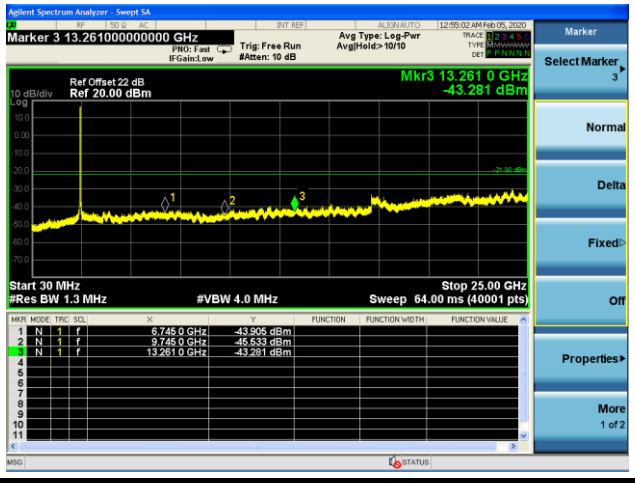


Channel 06 (2437MHz)

100kHz PSD reference Level

Spurious Emission

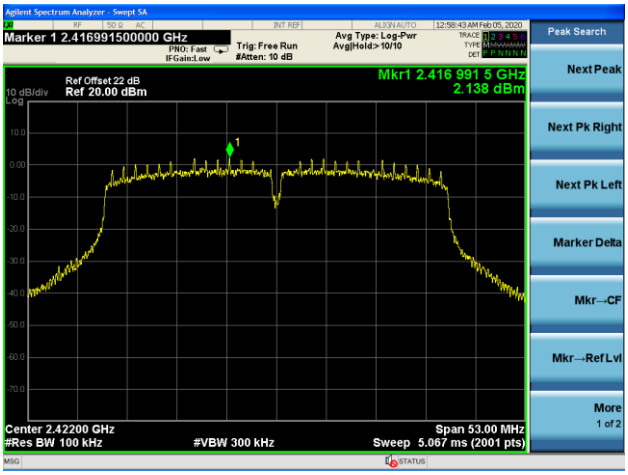


Channel 11 (2462MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission	
	

802.11n-HT40 Out-of-Band Emissions

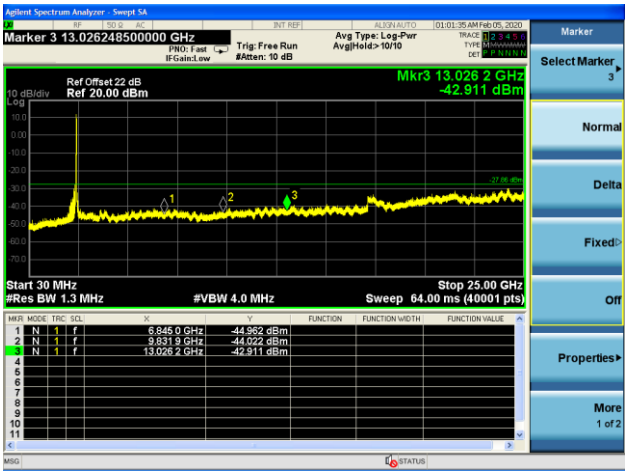
Channel 03 (2422MHz)

100kHz PSD reference Level



Low Band Edge

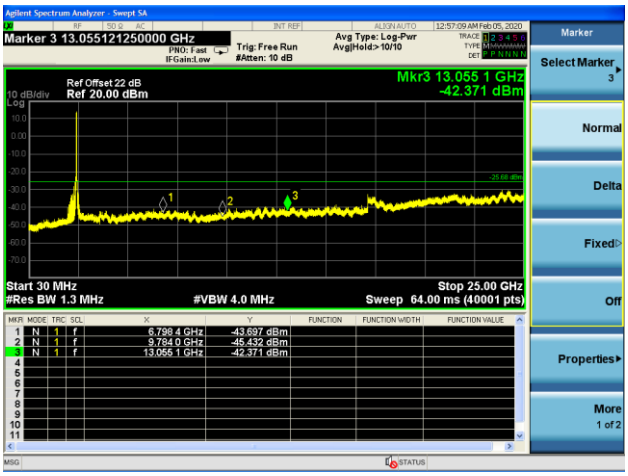
Spurious Emission

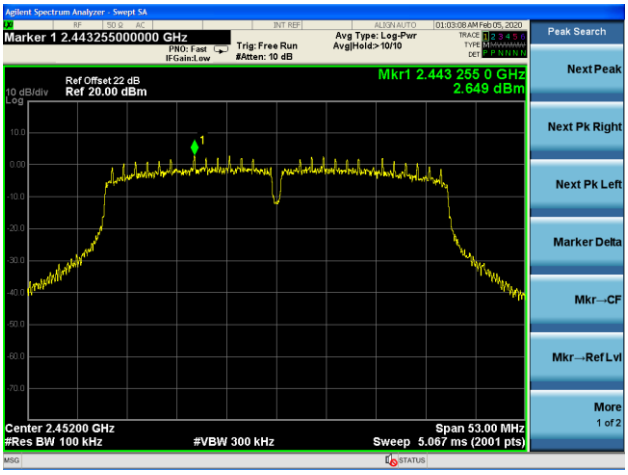
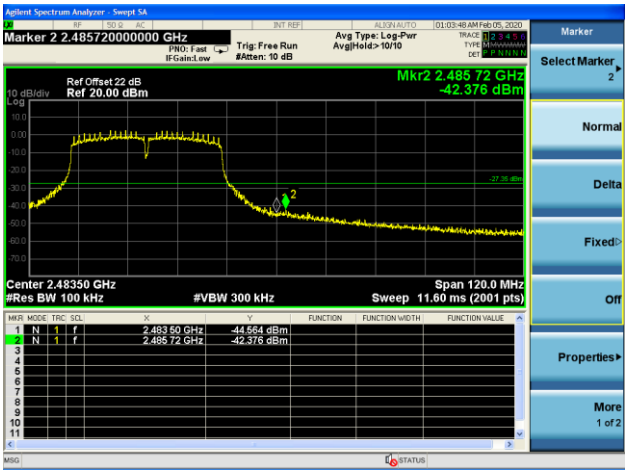
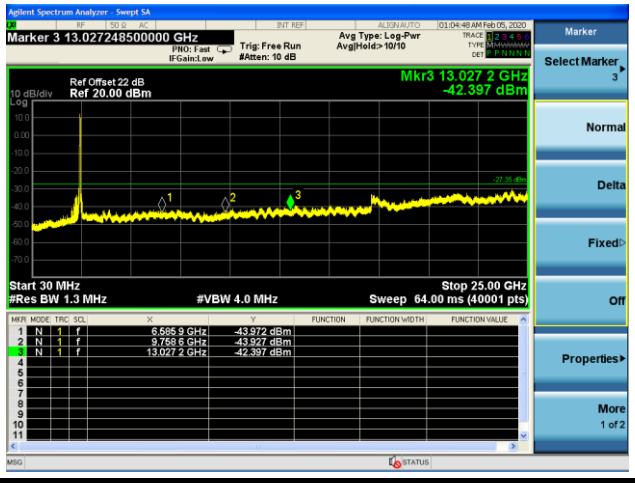


Channel 06 (2437MHz)

100kHz PSD reference Level

Spurious Emission



Channel 09 (2452MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission	
	

7.6. Radiated Spurious Emission Measurement

7.6.1.Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in below table.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.6.2.Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

7.6.3.Test Setting

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

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. Span was set greater than 1MHz

3. RBW = as specified in Table 1

4. Detector = CISPR quasi-peak

5. Sweep time = auto couple

6. Trace was allowed to stabilize

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = 1MHz

3. VBW = 3MHz

4. Detector = peak

5. Sweep time = auto couple

6. Trace mode = max hold

7. Trace was allowed to stabilize

Average Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = 1MHz

3. VBW; If the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10 Hz.

If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.

4. Detector = Peak

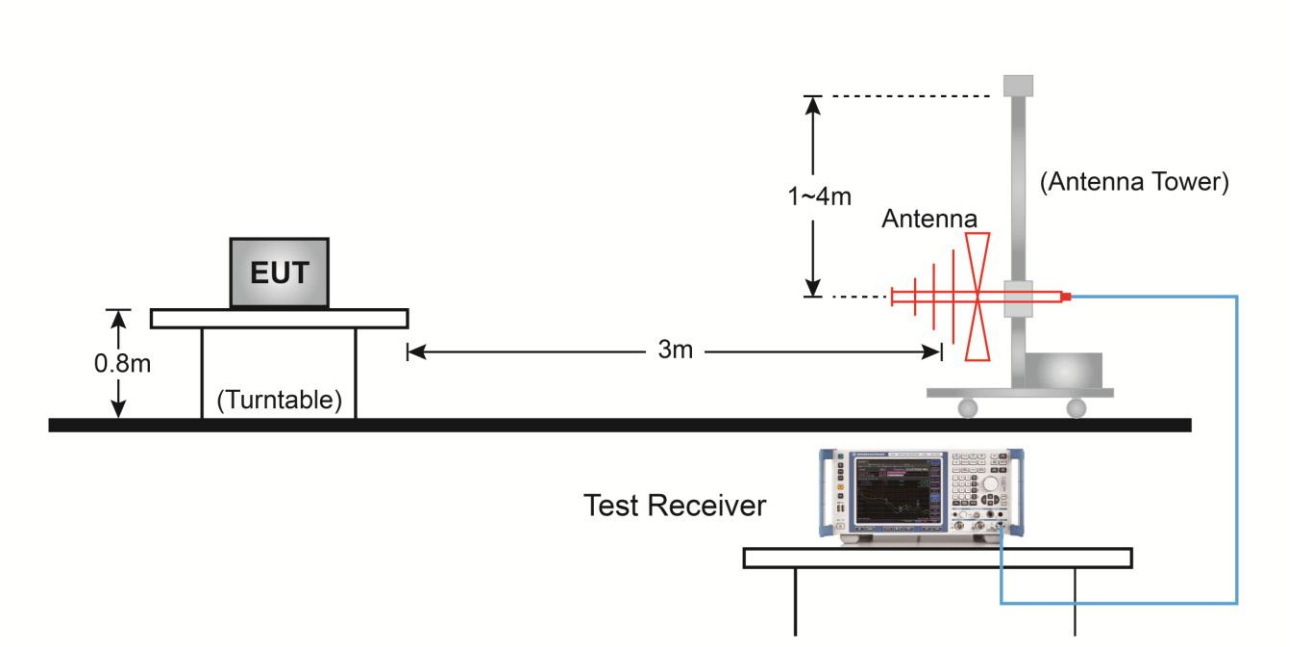
5. Sweep time = auto

6. Trace mode = max hold

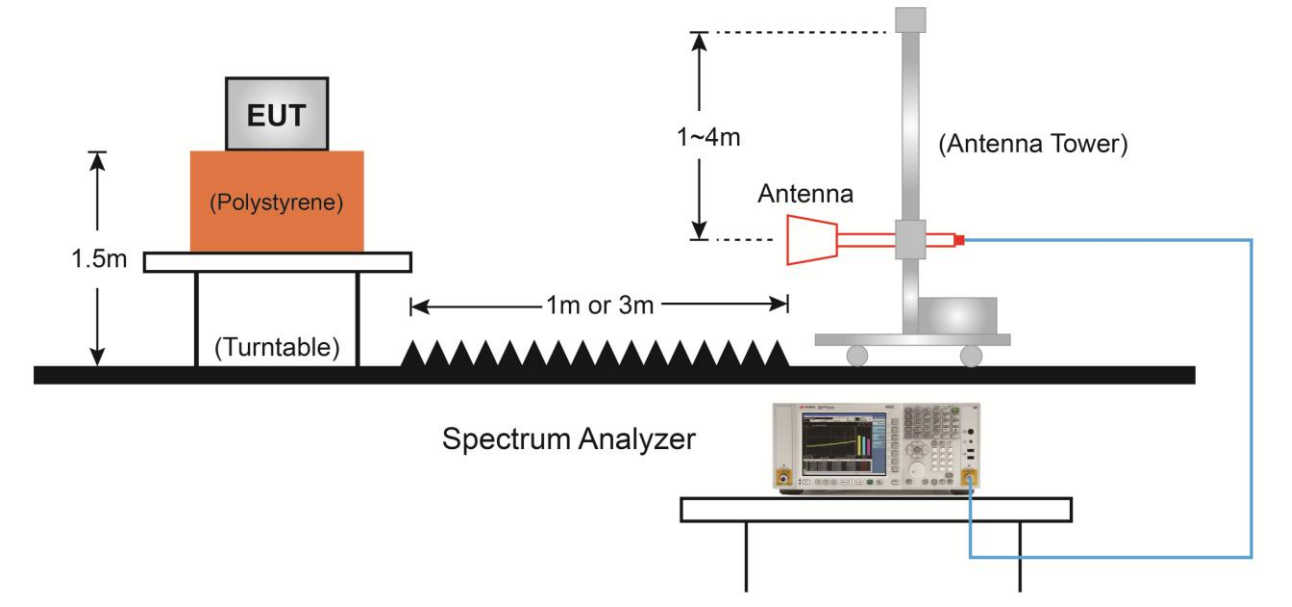
7. Trace was allowed to stabilize

7.6.4.Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



7.6.5.Test Result

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11b	Test Channel:	01
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3218.5	44.6	-1.0	43.6	78.0	-34.4	Peak	Horizontal
*	3541.5	37.0	0.3	37.3	78.0	-40.7	Peak	Horizontal
	4825.0	39.9	4.0	43.9	74.0	-30.1	Peak	Horizontal
	5122.5	37.3	4.5	41.8	74.0	-32.2	Peak	Horizontal
*	3218.5	39.8	-1.0	38.8	78.0	-39.2	Peak	Vertical
	3728.5	38.7	0.3	39.0	74.0	-35.0	Peak	Vertical
	4825.0	39.1	4.0	43.1	74.0	-30.9	Peak	Vertical
*	5581.5	39.8	4.8	44.6	78.0	-33.4	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (108.0dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11b	Test Channel:	06
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3252.5	41.4	-0.7	40.7	78.2	-37.5	Peak	Horizontal
*	3584.0	37.1	0.1	37.2	78.2	-41.0	Peak	Horizontal
	4391.5	36.8	2.6	39.4	74.0	-34.6	Peak	Horizontal
	4876.0	39.0	3.7	42.7	74.0	-31.3	Peak	Horizontal
*	3524.5	37.6	0.3	37.9	78.2	-40.3	Peak	Vertical
	3864.5	40.7	0.6	41.3	74.0	-32.7	Peak	Vertical
	4876.0	39.0	3.7	42.7	74.0	-31.3	Peak	Vertical
*	5590.0	41.6	4.7	46.3	78.2	-31.9	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (108.2dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11b	Test Channel:	11
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3286.5	41.3	-0.6	40.7	78.4	-37.7	Peak	Horizontal
	4187.5	36.0	2.0	38.0	74.0	-36.0	Peak	Horizontal
	4927.0	38.0	4.3	42.3	74.0	-31.7	Peak	Horizontal
*	6083.0	35.3	7.0	42.3	78.4	-36.1	Peak	Horizontal
*	3431.0	36.8	-0.3	36.5	78.4	-41.9	Peak	Vertical
	3737.0	38.5	0.5	39.0	74.0	-35.0	Peak	Vertical
	4927.0	37.7	4.3	42.0	74.0	-32.0	Peak	Vertical
*	5590.0	39.6	4.7	44.3	78.4	-34.1	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (108.4dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11g	Test Channel:	01
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3218.5	43.5	-1.0	42.5	80.6	-38.1	Peak	Horizontal
	3881.5	36.6	0.8	37.4	74.0	-36.6	Peak	Horizontal
	4825.0	39.6	4.0	43.6	74.0	-30.4	Peak	Horizontal
*	7239.0	34.2	11.9	46.1	80.6	-34.5	Peak	Horizontal
*	3218.5	38.4	-1.0	37.4	80.6	-43.2	Peak	Vertical
	4663.5	36.6	4.0	40.6	74.0	-33.4	Peak	Vertical
	4816.5	37.2	4.1	41.3	74.0	-32.7	Peak	Vertical
*	5598.5	40.4	4.8	45.2	80.6	-35.4	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (110.6dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11g	Test Channel:	06
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3252.5	40.8	-0.7	40.1	80.9	-40.8	Peak	Horizontal
	4697.5	35.4	4.2	39.6	74.0	-34.4	Peak	Horizontal
	4876.0	37.0	3.7	40.7	74.0	-33.3	Peak	Horizontal
*	5785.5	37.7	5.8	43.5	80.9	-37.4	Peak	Horizontal
*	3218.5	38.2	-1.0	37.2	80.9	-43.7	Peak	Vertical
	4663.5	36.3	4.0	40.3	74.0	-33.7	Peak	Vertical
	4876.0	37.1	3.7	40.8	74.0	-33.2	Peak	Vertical
*	5751.5	39.0	5.7	44.7	80.9	-36.2	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (110.9dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11g	Test Channel:	11
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3286.5	40.1	-0.6	39.5	81.1	-41.6	Peak	Horizontal
	4340.5	33.1	2.4	35.5	74.0	-38.5	Peak	Horizontal
	4927.0	36.2	4.3	40.5	74.0	-33.5	Peak	Horizontal
*	6355.0	34.2	7.9	42.1	81.1	-39.0	Peak	Horizontal
*	3210.0	40.0	-1.1	38.9	81.1	-42.2	Peak	Vertical
	3856.0	39.9	0.4	40.3	74.0	-33.7	Peak	Vertical
	4927.0	35.9	4.3	40.2	74.0	-33.8	Peak	Vertical
*	5590.0	40.1	4.7	44.8	81.1	-36.3	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (111.1dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11n-HT20	Test Channel:	01
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3218.5	44.4	-1.0	43.4	80.3	-36.9	Peak	Horizontal
	4179.0	36.5	1.9	38.4	74.0	-35.6	Peak	Horizontal
	4825.0	40.7	4.0	44.7	74.0	-29.3	Peak	Horizontal
*	5785.5	40.4	5.8	46.2	80.3	-34.1	Peak	Horizontal
*	3524.5	37.8	0.3	38.1	80.3	-42.2	Peak	Vertical
	4663.5	37.1	4.0	41.1	74.0	-32.9	Peak	Vertical
	4816.5	39.1	4.1	43.2	74.0	-30.8	Peak	Vertical
*	5598.5	38.4	4.8	43.2	80.3	-37.1	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (110.3dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11n-HT20	Test Channel:	06
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3252.5	41.0	-0.7	40.3	80.5	-40.2	Peak	Horizontal
	4000.5	37.3	1.1	38.4	74.0	-35.6	Peak	Horizontal
	4876.0	37.1	3.7	40.8	74.0	-33.2	Peak	Horizontal
*	6550.5	34.5	8.7	43.2	80.5	-37.3	Peak	Horizontal
*	3567.0	38.1	0.0	38.1	80.5	-42.4	Peak	Vertical
	4672.0	37.3	4.1	41.4	74.0	-32.6	Peak	Vertical
	4876.0	37.1	3.7	40.8	74.0	-33.2	Peak	Vertical
*	5598.5	39.7	4.8	44.5	80.5	-36.0	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (110.5dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11n-HT20	Test Channel:	11
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3286.5	40.0	-0.6	39.4	80.6	-41.2	Peak	Horizontal
	4187.5	35.8	2.0	37.8	74.0	-36.2	Peak	Horizontal
	4918.5	36.6	4.2	40.8	74.0	-33.2	Peak	Horizontal
*	6831.0	33.7	9.7	43.4	80.6	-37.2	Peak	Horizontal
*	3592.5	37.2	0.2	37.4	80.6	-43.2	Peak	Vertical
	4663.5	37.0	4.0	41.0	74.0	-33.0	Peak	Vertical
	4918.5	37.5	4.2	41.7	74.0	-32.3	Peak	Vertical
*	5590.0	39.8	4.7	44.5	80.6	-36.1	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (110.6dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11n-HT40	Test Channel:	03
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3227.0	42.3	-0.9	41.4	75.0	-33.6	Peak	Horizontal
	4187.5	35.9	2.0	37.9	74.0	-36.1	Peak	Horizontal
	4842.0	36.1	4.0	40.1	74.0	-33.9	Peak	Horizontal
*	6508.0	34.5	8.6	43.1	75.0	-31.9	Peak	Horizontal
*	3227.0	38.6	-0.9	37.7	75.0	-37.3	Peak	Vertical
	4043.0	36.9	1.4	38.3	74.0	-35.7	Peak	Vertical
	4825.0	36.4	4.0	40.4	74.0	-33.6	Peak	Vertical
*	5590.0	39.8	4.7	44.5	75.0	-30.5	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (105.0dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11n-HT40	Test Channel:	06
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3252.5	41.5	-0.7	40.8	77.0	-36.2	Peak	Horizontal
	4085.5	36.3	1.4	37.7	74.0	-36.3	Peak	Horizontal
	4884.5	35.8	3.9	39.7	74.0	-34.3	Peak	Horizontal
*	6593.0	33.7	9.2	42.9	77.0	-34.1	Peak	Horizontal
*	3210.0	38.5	-1.1	37.4	77.0	-39.6	Peak	Vertical
	3728.5	38.6	0.3	38.9	74.0	-35.1	Peak	Vertical
	4663.5	36.2	4.0	40.2	74.0	-33.8	Peak	Vertical
*	5598.5	39.2	4.8	44.0	77.0	-33.0	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (107.0dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Notebook	Temperature	23°C
Test Engineer	Lewis Huang	Relative Humidity	53 %
Test Site	AC2	Test Date	2020/02/03
Test Mode:	802.11n-HT40	Test Channel:	09
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	3269.5	40.7	-0.5	40.2	75.9	-35.7	Peak	Horizontal
	4663.5	35.7	4.0	39.7	74.0	-34.3	Peak	Horizontal
	5148.0	36.2	4.4	40.6	74.0	-33.4	Peak	Horizontal
*	6542.0	34.1	8.8	42.9	75.9	-33.0	Peak	Horizontal
*	3167.5	37.9	-0.6	37.3	75.9	-38.6	Peak	Vertical
	3856.0	37.6	0.4	38.0	74.0	-36.0	Peak	Vertical
	4927.0	35.6	4.3	39.9	74.0	-34.1	Peak	Vertical
*	5581.5	40.6	4.8	45.4	75.9	-30.5	Peak	Vertical

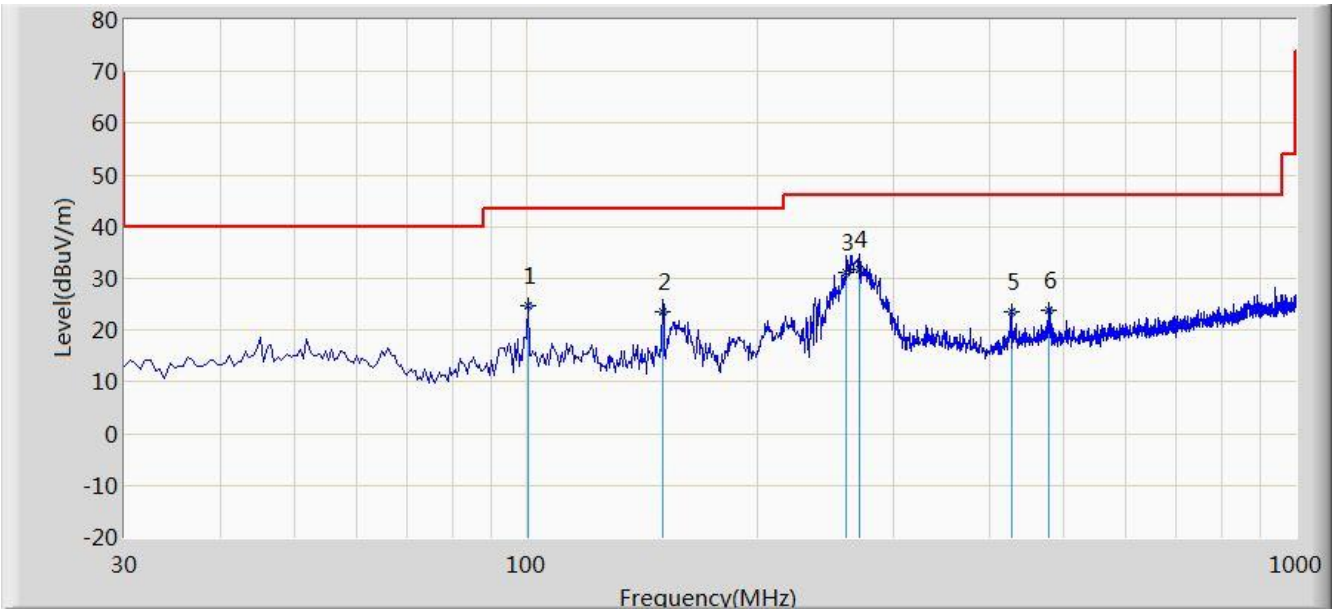
Note 1: "*" is not in restricted band, its limit is 30dBc of the fundamental emission level (105.9dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

The worst case of Radiated Emission below 1GHz:

Site: AC2	Time: 2020/02/03 - 18:58
Limit: FCC_Part15.209_RE(3m)	Engineer: Lewis Huang
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: Notebook	Power: AC 120V/60Hz
Worst Case Mode: Transmit by 802.11b at Channel 2412MHz	



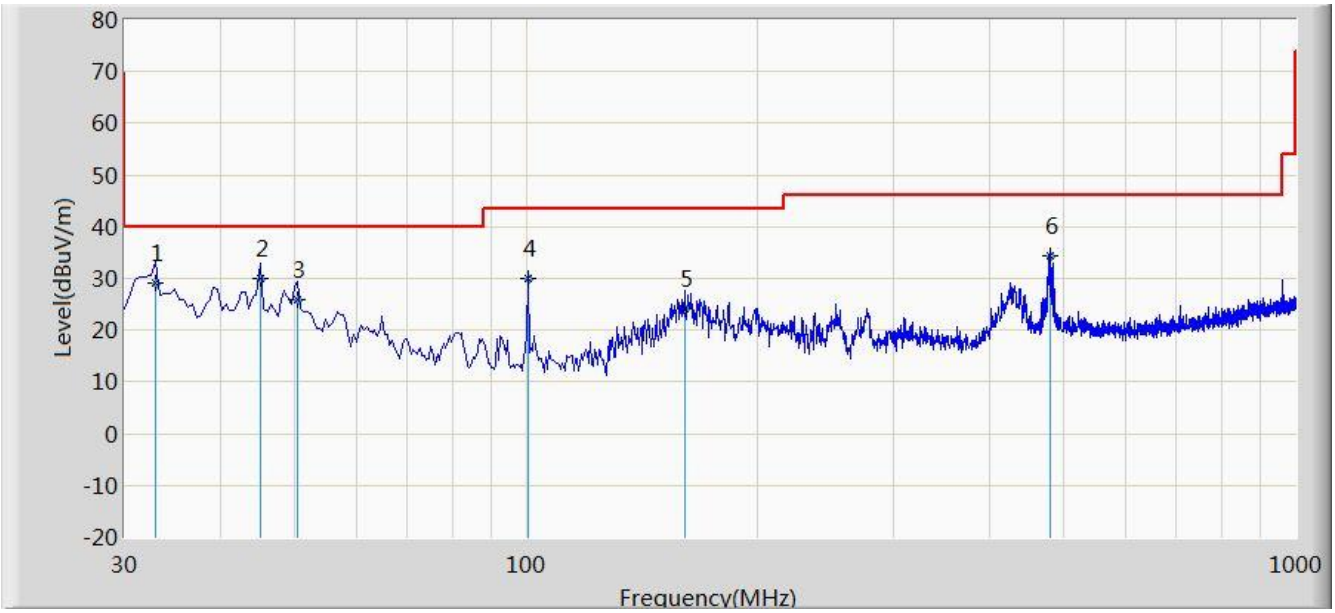
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			100.325	24.819	12.320	-18.681	43.500	12.499	QP
2			150.280	23.574	14.340	-19.926	43.500	9.233	QP
3			260.860	31.064	16.760	-14.936	46.000	14.304	QP
4		*	270.560	31.856	17.540	-14.144	46.000	14.315	QP
5			426.730	23.624	5.760	-22.376	46.000	17.864	QP
6			477.170	23.889	5.120	-22.111	46.000	18.769	QP

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

Site: AC2	Time: 2020/02/03 - 18:59
Limit: FCC_Part15.209_RE(3m)	Engineer: Lewis Huang
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: Notebook	Power: AC 120V/60Hz
Worst Case Mode: Transmit by 802.11b at Channel 2412MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			32.910	29.204	17.870	-10.796	40.000	11.334	QP
2		*	45.035	29.946	15.430	-10.054	40.000	14.516	QP
3			50.370	25.911	11.420	-14.089	40.000	14.491	QP
4			100.325	29.929	17.430	-13.571	43.500	12.499	QP
5			160.465	24.242	14.540	-19.258	43.500	9.702	QP
6			480.080	34.354	15.450	-11.646	46.000	18.905	QP

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

7.7. Radiated Restricted Band Edge Measurement

7.7.1.Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1] 0.495 - 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	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	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	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in below table.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.7.2.Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

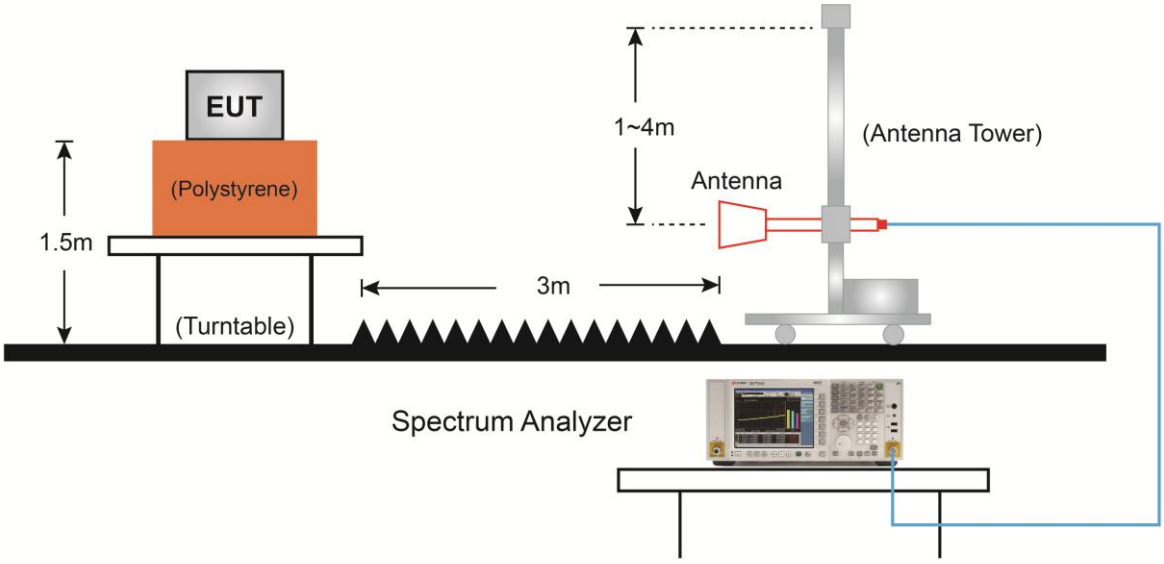
ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

7.7.3.Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

7.7.4.Test Setup