MEASUREMENT REPORT

FCC PART 15.247 / ISED RSS-247 WLAN 802.11b/g/n

FCC ID:	H8N-ASK8822
IC:	1353A-ASK8822
Applicant:	Askey Computer Corp.
Application Type:	Certification
Product:	WIFI+BT Combo Module
Model No.:	ASK8822
Brand Name:	ASKEY
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part15 Subpart C (Section 15.247)
ISED Rule(s):	RSS-247 Issue 2, RSS-GEN Issue 5
Test Procedure(s):	ANSI C63.10-2013, KDB 558074 D01v05r02 KDB 662911 D01v02r01
Test Date:	June 07 ~ August 18, 2020

Reviewed By: (Kevin Guo)

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.

Revision History

Report No.	Version	Description	Issue Date	Note
2006RSU028-U3	Rev. 01	Initial Report	08-31-2020	Valid

CONTENTS

Description Page

General Information

Applicant:	Askey Computer Corp.
Applicant Address:	10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY, TAIWAN
Manufacturer:	Askey Computer Corp.
Manufacturer Address:	10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY, TAIWAN
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 an FCC accredited testing laboratory (MRT Designation No. CN1166) on the FCC website.**
- **MRT facility is an ISED recognized testing laboratory (MRT Reg. No. CN0001) on the ISED website.**
- **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 A2LA under the A2LA Program (Cert. No. 3628.01) and CNAS under the CNAS Program (Cert. No. L10551) in EMC, Safety, Radio, Telecommunications and SAR testing.**

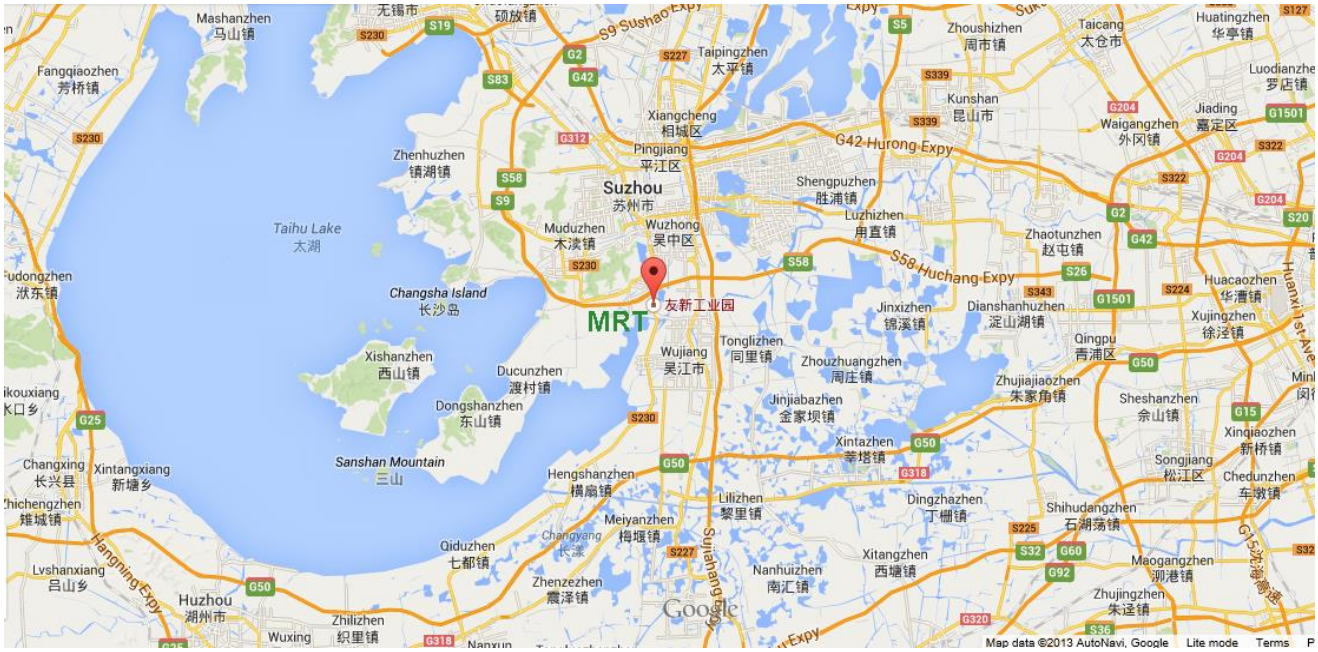
1. INTRODUCTION

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. Equipment Description

Product Name:	WIFI+BT Combo Module
Model No.:	ASK8822
PMN & HVIN:	ASK8822
Brand Name:	ASKEY
Wi-Fi Specification:	802.11a/b/g/n/ac
Bluetooth Specification:	v4.2 dual mode
Serial No.:	G1A9A007625BD493 F00

2.2. Product Specification Subjective to this Report

Frequency Range:	802.11b/g/n-HT20: 2412 ~ 2462MHz 802.11n-HT40: 2422 ~ 2452MHz
Channel Number:	802.11b/g/n-HT20: 11 802.11n-HT40: 7
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 300Mbps

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. Description of Available Antennas

Antenna Type	Frequency Band (GHz)	T_X Paths	Per Chain Max Antenna Gain (dBi)		Directional Gain (dBi)	
			Ant 0	Ant 1	For Power	For PSD
Wi-Fi Internal Antenna						
PIFA	2412 ~ 2462	2	2.40	1.98	2.40	5.41
	5150 ~ 5825	2	4.34	3.14	4.34	7.35
Bluetooth Internal Antenna						
PIFA	2402 ~ 2480	1	1.98		--	

Note:

The EUT supports Cyclic Delay Diversity (CDD) technology and CDD signals are correlated.

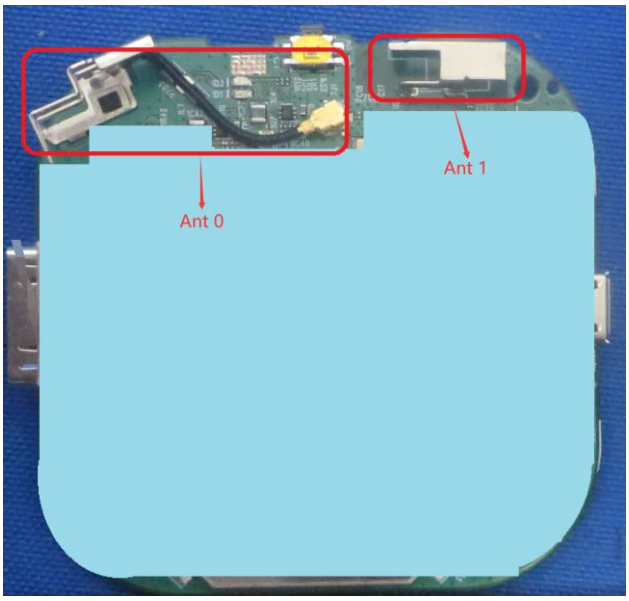
For CDD transmissions, directional gain is calculated as follows, $N_{ANT} = 2$, $N_{SS} = 1$.

If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,
  Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 3.01;
- For power measurements on IEEE 802.11 devices,
  Array Gain = 0 dB for $N_{ANT} \leq 4$;

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

2.5. Description of Antenna

Wi-Fi & Bluetooth Antenna		
Software Control Port	Ant 0 (Wi-Fi)	Ant 1 (Wi-Fi & Bluetooth)
		
Note: A temporary RF connector to test conveniently in Ant 1 was provided by manufacturer		

2.6. Test Mode

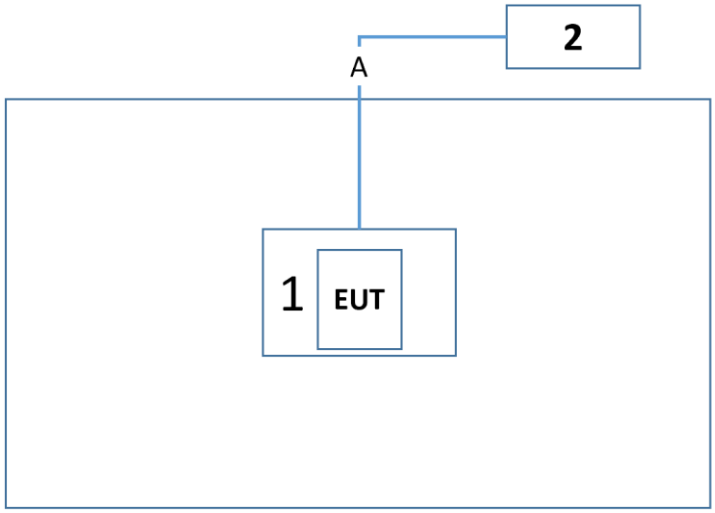
Test Mode	Mode 1: Transmit by 802.11b (1Mbps) (CDD Mode)
	Mode 2: Transmit by 802.11g (6Mbps) (CDD Mode)
	Mode 3: Transmit by 802.11n-HT20 (MCS0) (CDD Mode)
	Mode 4: Transmit by 802.11n-HT40 (MCS0) (CDD Mode)

Note: EUT is as a stand-alone device when the test is processing, but a test fixture will be used as a tool.

2.7. Configuration of Test System

The measurement procedures and appropriate EUT setup described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) was used in the measurement.

Connection Diagram – Radiated Emission testing (CDD mode) & AC Conducted Emissions



Signal Cable Type		Signal Cable Description
A	USB Cable	Shielded, 1.5m

2.8. Test System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Description
1	Test Fixture	ASKEY	N/A	N/A	As a power and signal control board
2	Notebook	DELL	Vostro 3300	DN62SP1	Non-Shielded, 1.8m

2.9. Description of Test Software

The test utility software used during testing was the command provided by the customer.

Note: Final power setting please refer to operational description.

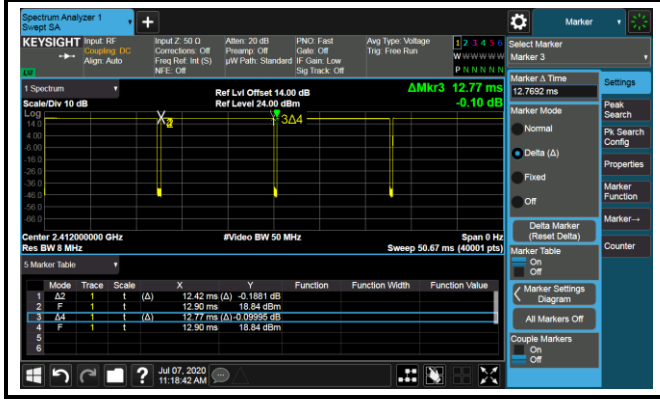
2.10. Test Environment Condition

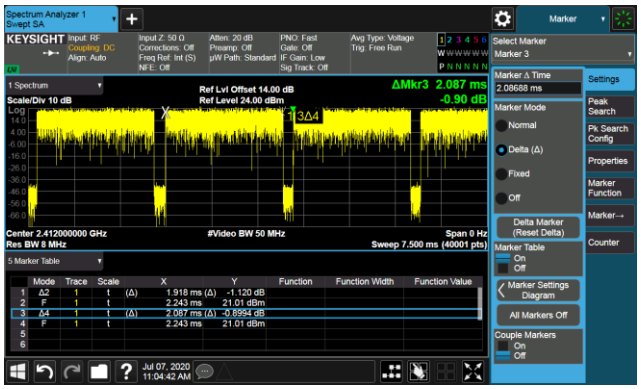
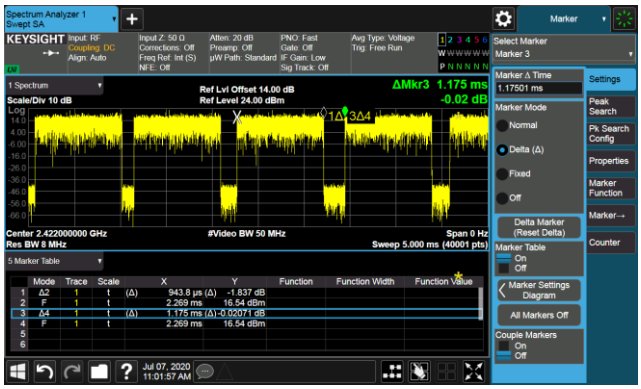
Ambient Temperature	15°C~35°C
Relative Humidity	20%RH ~75%RH

2.11. Duty Cycle

2.4GHz WLAN (DTS) operation is possible in 20MHz and 40MHz channel bandwidths. 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. 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	97.26%
802.11g	94.68%
802.11n-HT20	91.90%
802.11n-HT40	80.32%

Duty Cycle (T = Transmission Duration)	
802.11b (T = 12.42ms)	802.11g (T = 2.063ms)
	

Duty Cycle (T = Transmission Duration)	
802.11n-HT20 (T =1.918ms)	802.11n-HT40 (T = 943.8us)
	

2.12. EMI Suppression Device(s)/Modifications

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

2.13. 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.

RSS-Gen Issue 5 Section 4

In addition to complying with the applicable RSSs and RSP-100, each unit of a product model (i.e. of a radio apparatus) shall meet the labelling requirements set out in this section prior to being marketed in Canada or imported into Canada.

For information regarding the labelling option, see Section 4.1, 4.2, 4.3 4.4. The label for the certified product represents the manufacturer's or importer's compliance with Innovation, Science and Economic Development Canada's (ISED) regulatory requirements.

Please see attachment for IC label and label location.

3. 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."

Conclusion:

The unit complies with the requirement of §15.203.

4. 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	2021/06/11
Two-Line V-Network	R&S	ENV 216	MRTSUE06003	1 year	2021/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2021/07/26

Radiated Emissions – AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2021/01/18
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	MRTSUE06597	1 year	2020/12/17
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2021/07/26
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/30

Radiated Emission - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2021/07/02
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	MRTSUE06597	1 year	2020/12/17
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2020/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

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	2021/01/08
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	2021/06/11
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2021/06/11
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2021/06/11
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
Attenuator	MVE	6dB	MRTSUE06534	1 year	2020/12/12
Attenuator	MVE	10dB	MRTSUE06543	1 year	2020/12/12
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2020/11/07
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2021/07/26

Software	Version	Function
EMI Software	V3	EMI Test Software

5. 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
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 9KHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~6GHz: 6.40dB Vertical: 9KHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

6. TEST RESULT

6.1. Summary

FCC Section(s)	ISED Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth	≥ 500kHz	Conducted	Pass	Section 6.2
N/A	RSS-Gen [6.7]	99% Bandwidth	N/A		Pass	
15.247(b)(3)	RSS-247 [5.4(d)]	Output Power	≤ 1Watt (30dBm) & EIRP ≤ 4Watt (36dBm)		Pass	Section 6.3
15.247(e)	RSS-247 [5.2]	Power Spectral Density	≤ 8dBm/3kHz		Pass	Section 6.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	20dBc		Pass	Section 6.5
15.205 15.209	RSS-247 [5.5]	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 6.6 & 6.7
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 6.8

Notes:

1) 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.
2) Output power test was verified over all data rates of each mode (data refers to operational description), and then choose the maximum power output (low data rate) for the final test of each channel.
3) For radiated emission tests, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
4) Test Items “6dB Bandwidth” & “99% Bandwidth” showed the worst test data in this report.

6.2. Occupied Bandwidth Measurement

6.2.1.Test Limit

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

6.2.2.Test Procedure used

ANSI C63.10-2013 - Section 11.8 (6dB bandwidth)

ANSI C63.10-2013 - Section 6.9.3 (99% bandwidth)

6.2.3.Test Setting

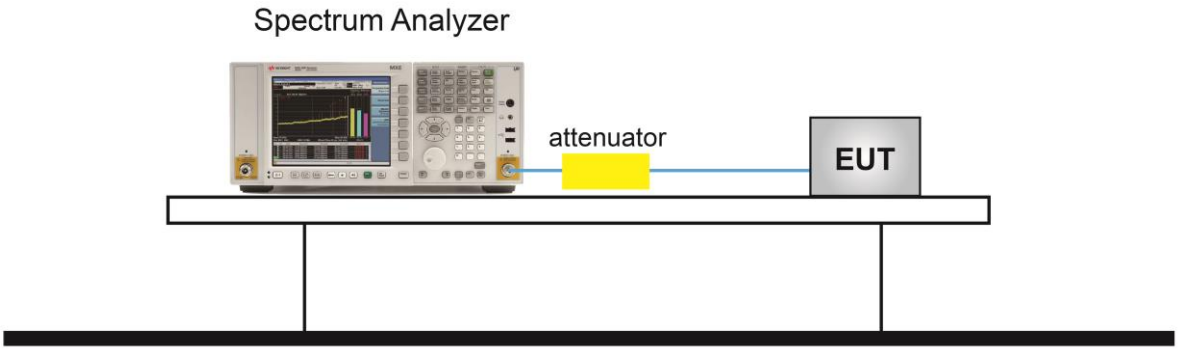
For 6dB bandwidth

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

For 99% bandwidth

1. Span = 1.5 times to 5 times the OBW
2. Set RBW = 1% to 5% the OBW
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace was allowed to stabilize

6.2.4.Test Setup



6.2.5.Test Result

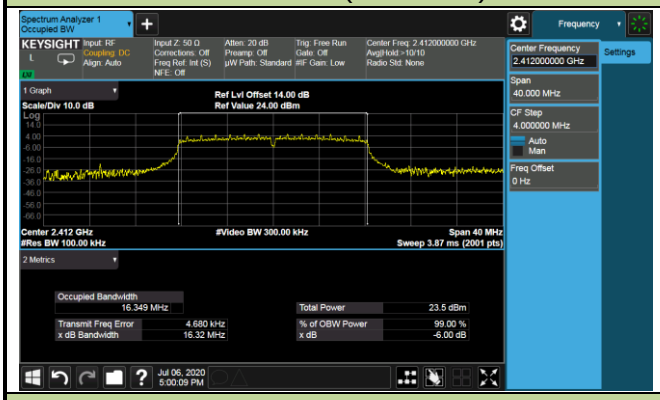
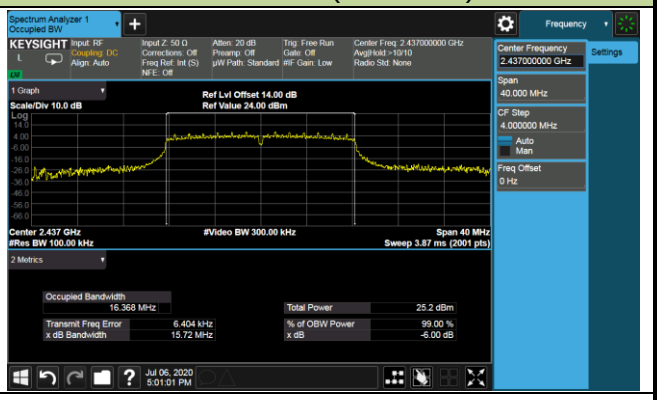
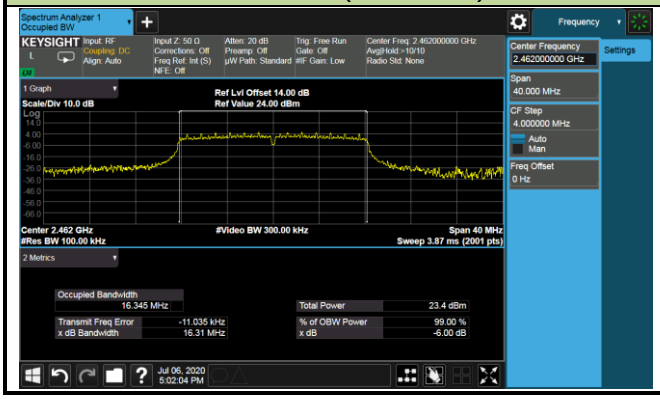
Product	WIFI+BT Combo Module	Test Engineer	Amy Zhang
Test Date	2020/07/06	Test Site	TR3

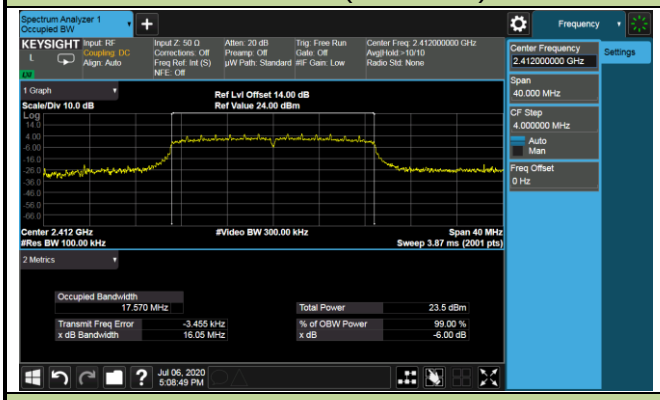
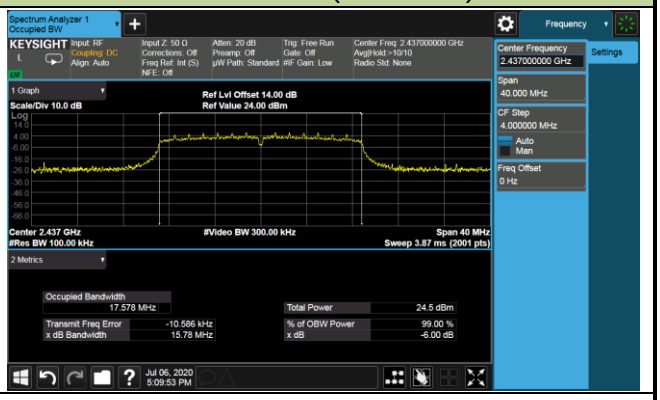
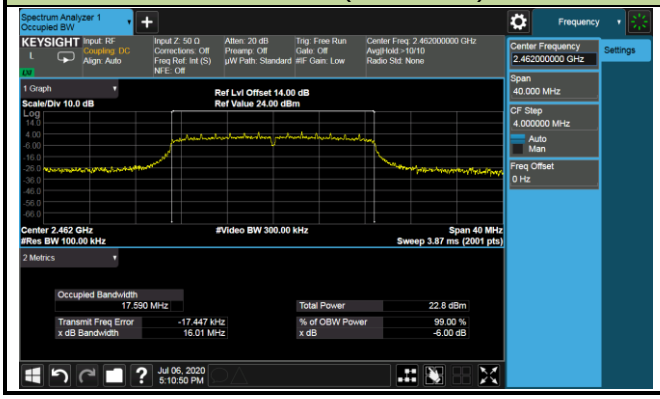
Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Ant 0 / Ant 0 + 1						
802.11b	1Mbps	01	2412	10.11	≥ 0.5	Pass
802.11b	1Mbps	06	2437	10.11	≥ 0.5	Pass
802.11b	1Mbps	11	2462	10.11	≥ 0.5	Pass
802.11g	6Mbps	01	2412	16.32	≥ 0.5	Pass
802.11g	6Mbps	06	2437	15.72	≥ 0.5	Pass
802.11g	6Mbps	11	2462	16.31	≥ 0.5	Pass
802.11n-HT20	MCS0	01	2412	16.05	≥ 0.5	Pass
802.11n-HT20	MCS0	06	2437	15.78	≥ 0.5	Pass
802.11n-HT20	MCS0	11	2462	16.01	≥ 0.5	Pass
802.11n-HT40	MCS0	03	2422	35.16	≥ 0.5	Pass
802.11n-HT40	MCS0	06	2437	35.13	≥ 0.5	Pass
802.11n-HT40	MCS0	09	2452	35.16	≥ 0.5	Pass

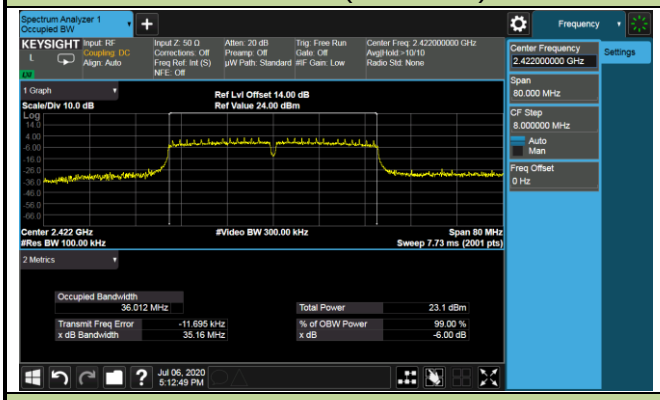
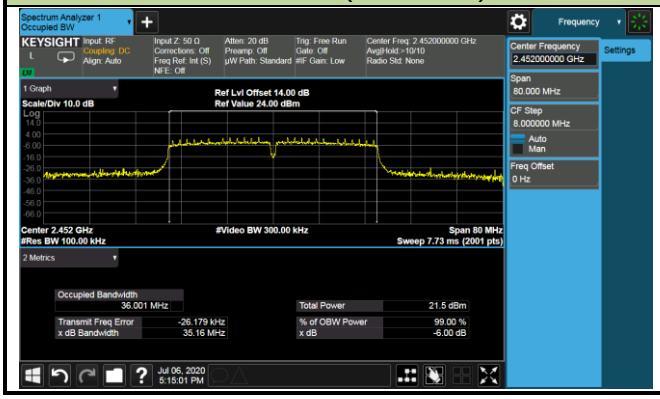
Product	WIFI+BT Combo Module	Test Engineer	Amy Zhang
Test Date	2020/08/12	Test Site	TR3

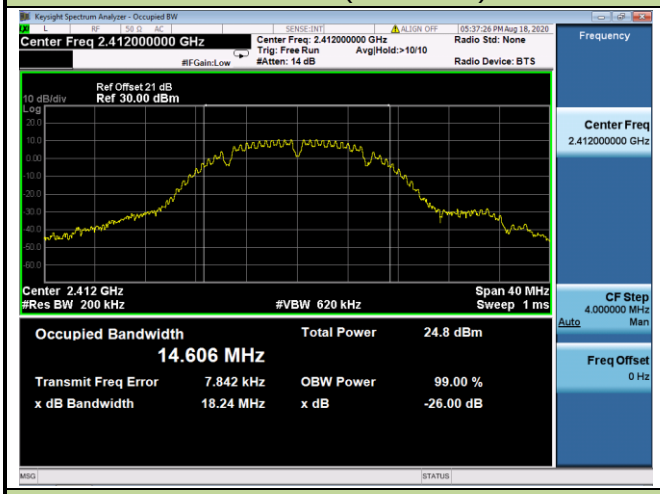
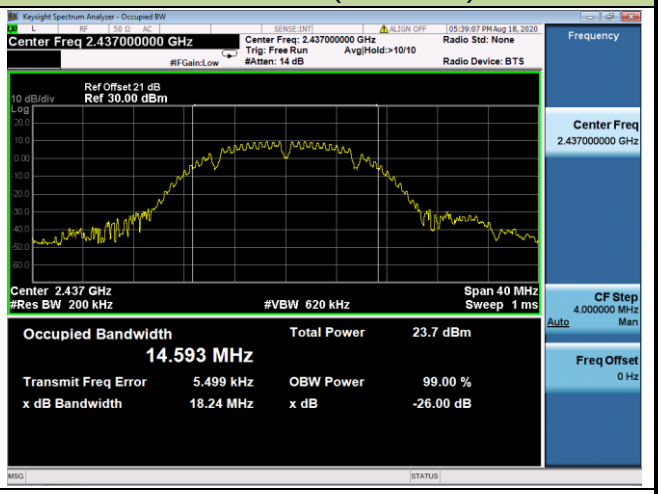
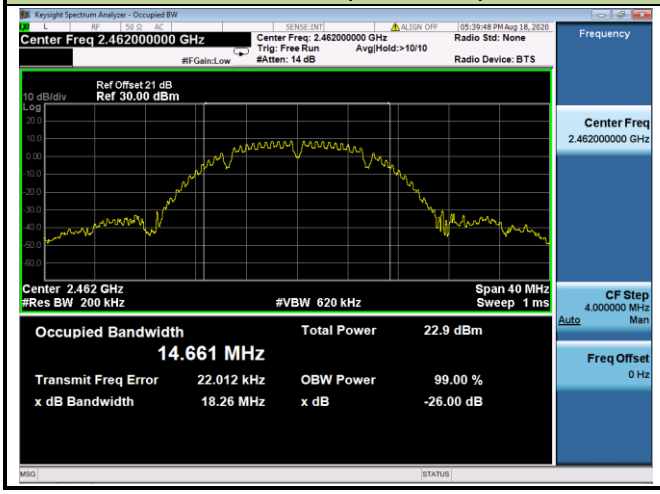
Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)
Ant 0 / Ant 0 + 1				
802.11b	1Mbps	01	2412	14.61
802.11b	1Mbps	06	2437	14.59
802.11b	1Mbps	11	2462	14.66
802.11g	6Mbps	01	2412	16.48
802.11g	6Mbps	06	2437	16.52
802.11g	6Mbps	11	2462	16.43
802.11n-HT20	MCS0	01	2412	17.61
802.11n-HT20	MCS0	06	2437	17.63
802.11n-HT20	MCS0	11	2462	17.56
802.11n-HT40	MCS0	03	2422	36.13
802.11n-HT40	MCS0	06	2437	36.18
802.11n-HT40	MCS0	09	2452	36.09

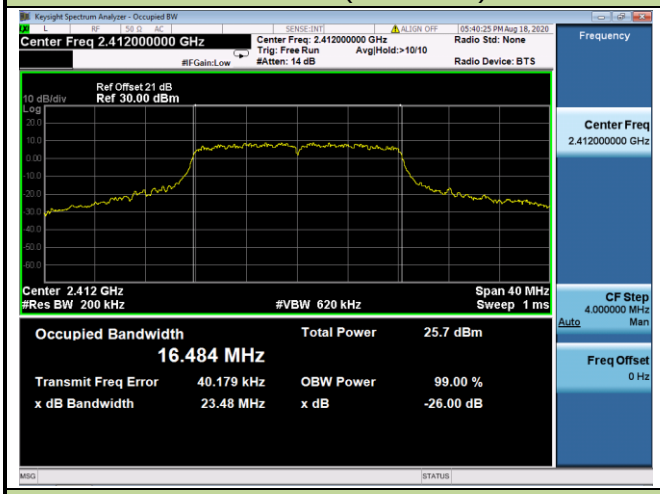
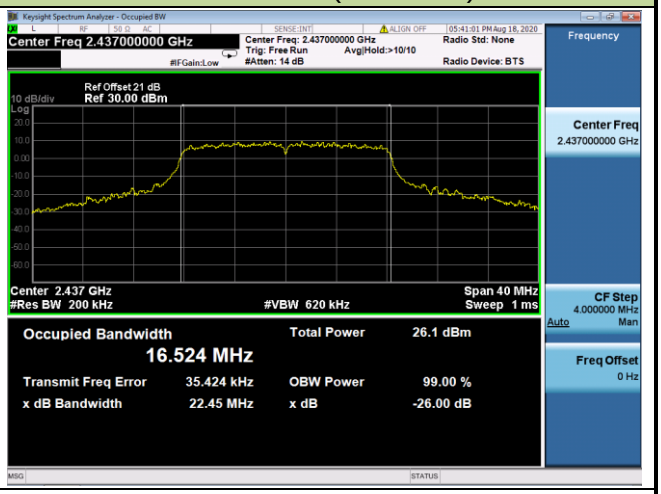
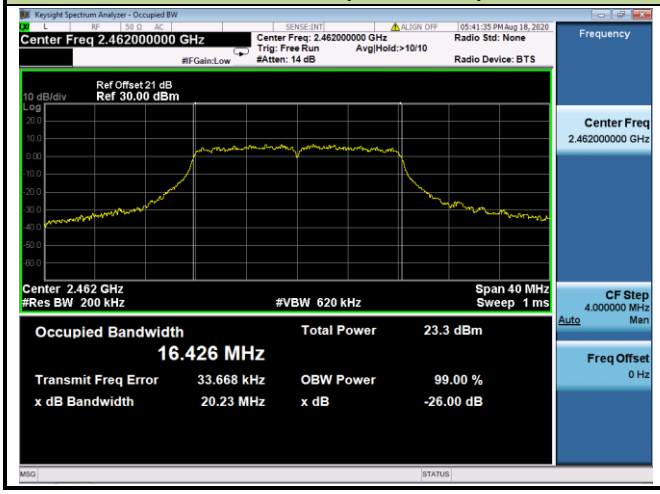
802.11b 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

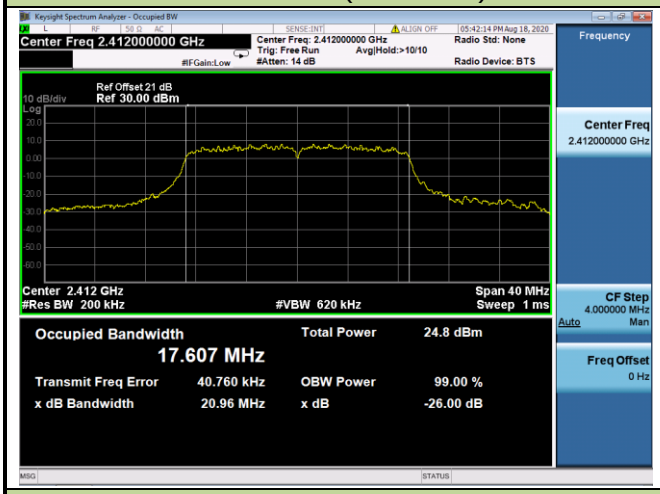
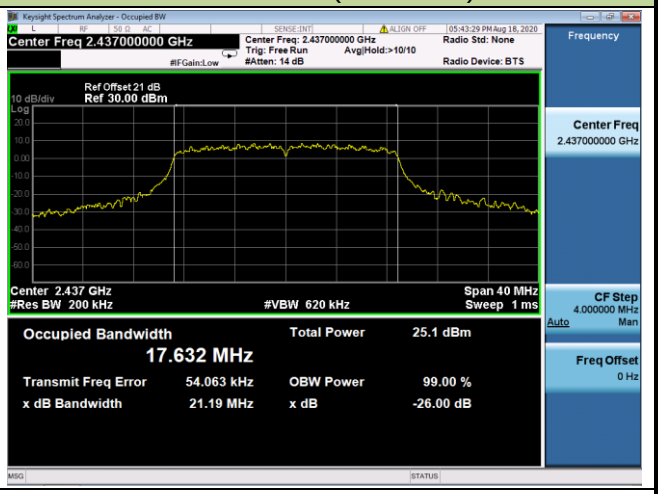
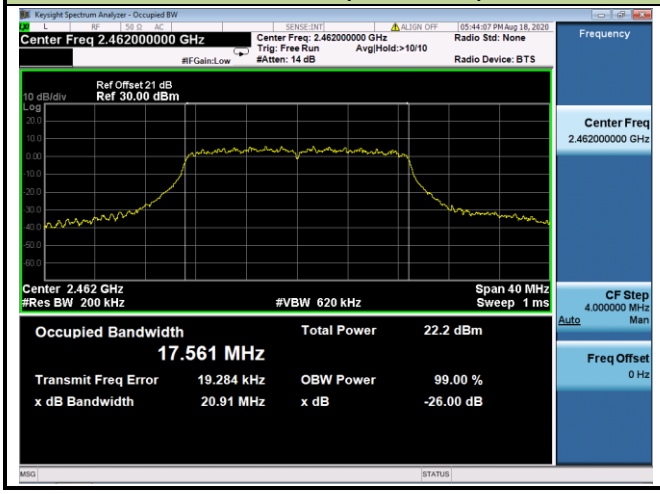
802.11g 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

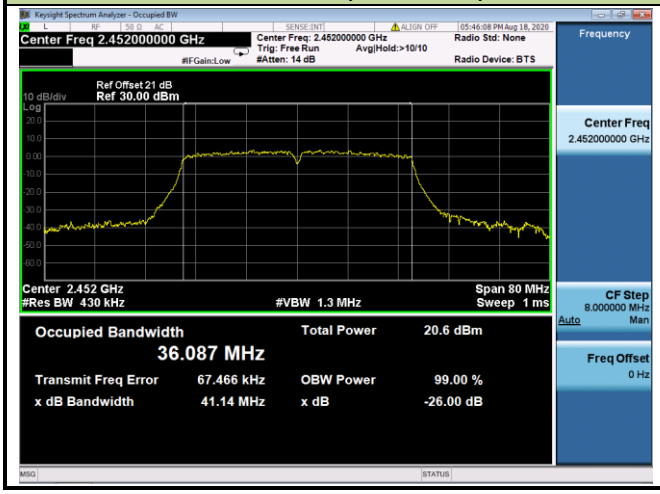
802.11n-HT20 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

802.11n-HT40 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 03 (2422MHz)	Channel 06 (2437MHz)
	
Channel 09 (2452MHz)	
	

802.11b 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

802.11g 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

802.11n-HT20 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

802.11n-HT40 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 03 (2422MHz)	Channel 06 (2437MHz)
	
Channel 09 (2452MHz)	
	

6.3. Output Power Measurement

6.3.1.Test Limit

The maximum output power shall be less 1 Watt (30dBm), and the E.I.R.P shall not exceed 4 Watt (36dBm).

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.

6.3.2.Test Procedure Used

ANSI C63.10-2013 - Section 11.9.1.3 PKPM1 Peak-reading power meter method

ANSI C63.10-2013 - Section 11.9.2.3.2 Method AVGPM-G

6.3.3.Test Setting

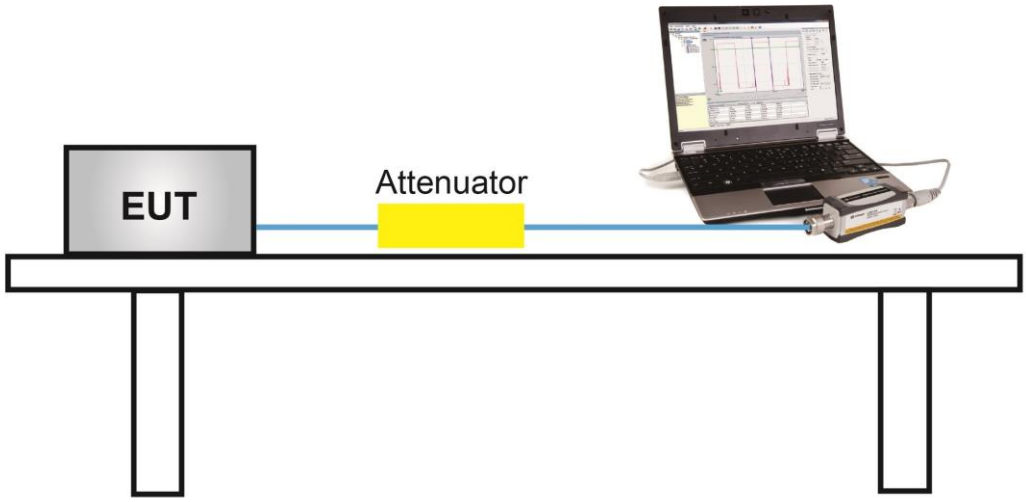
Method PKPM1 (Peak power measurement)

Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

6.3.4.Test Setup



6.3.5.Test Result

Product	WIFI+BT Combo Module	Test Engineer	Amy Zhang
Test Date	2020/07/06	Test Site	TR3

Test Result of Peak Output Power

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Peak Power (dBm)	Ant 1 Peak Power (dBm)	Total Peak Power (dBm)	Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
11b	1Mbps	01	2412	21.72	18.46	23.40	≤ 30.00	25.80	≤ 36.00	Pass
11b	1Mbps	06	2437	21.06	19.77	23.47	≤ 30.00	25.87	≤ 36.00	Pass
11b	1Mbps	11	2462	20.62	20.47	23.56	≤ 30.00	25.96	≤ 36.00	Pass
11g	6Mbps	01	2412	21.45	19.07	23.43	≤ 30.00	25.83	≤ 36.00	Pass
11g	6Mbps	06	2437	21.96	21.00	24.52	≤ 30.00	26.92	≤ 36.00	Pass
11g	6Mbps	11	2462	20.54	20.51	23.54	≤ 30.00	25.94	≤ 36.00	Pass
11n-HT20	MCS0	01	2412	21.41	19.15	23.44	≤ 30.00	25.84	≤ 36.00	Pass
11n-HT20	MCS0	06	2437	21.55	20.25	23.96	≤ 30.00	26.36	≤ 36.00	Pass
11n-HT20	MCS0	11	2462	18.73	18.34	21.55	≤ 30.00	23.95	≤ 36.00	Pass
11n-HT40	MCS0	03	2422	19.59	18.34	22.02	≤ 30.00	24.42	≤ 36.00	Pass
11n-HT40	MCS0	06	2437	21.57	20.28	23.98	≤ 30.00	26.38	≤ 36.00	Pass
11n-HT40	MCS0	09	2452	17.12	17.15	20.15	≤ 30.00	22.55	≤ 36.00	Pass

Note 1: Total Peak Power (dBm) = $10*\log\{10^{(\text{Ant 0 Peak Power }/10)} + 10^{(\text{Ant 1 Peak Power }/10)}\}$

Note 2: Max EIRP (dBm) = Total Peak Power (dBm) + Antenna Gain (dBi)

Test Result of Average Output Power (Reporting Only)

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
11b	1Mbps	01	2412	19.32	16.33	21.09	≤ 30.00	23.49	≤ 36.00	Pass
11b	1Mbps	06	2437	18.88	17.51	21.26	≤ 30.00	23.66	≤ 36.00	Pass
11b	1Mbps	11	2462	18.33	18.01	21.18	≤ 30.00	23.58	≤ 36.00	Pass
11g	6Mbps	01	2412	19.16	16.88	21.18	≤ 30.00	23.58	≤ 36.00	Pass
11g	6Mbps	06	2437	19.83	18.55	22.25	≤ 30.00	24.65	≤ 36.00	Pass
11g	6Mbps	11	2462	18.18	18.16	21.18	≤ 30.00	23.58	≤ 36.00	Pass
11n-HT20	MCS0	01	2412	19.39	16.85	21.31	≤ 30.00	23.71	≤ 36.00	Pass
11n-HT20	MCS0	06	2437	19.47	18.18	21.88	≤ 30.00	24.28	≤ 36.00	Pass
11n-HT20	MCS0	11	2462	16.58	16.24	19.42	≤ 30.00	21.82	≤ 36.00	Pass
11n-HT40	MCS0	03	2422	17.47	15.95	19.79	≤ 30.00	22.19	≤ 36.00	Pass
11n-HT40	MCS0	06	2437	19.32	18.05	21.74	≤ 30.00	24.14	≤ 36.00	Pass
11n-HT40	MCS0	09	2452	14.96	14.78	17.88	≤ 30.00	20.28	≤ 36.00	Pass

Note 1: Total Average Power (dBm) = $10*\text{Log}\{10^{(\text{Ant 0 Average Power }/10)} + 10^{(\text{Ant 1 Average Power }/10)}\}$

Note 2: Max EIRP (dBm) = Total Average Power (dBm) + Antenna Gain (dBi)

6.4. Power Spectral Density Measurement

6.4.1.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.

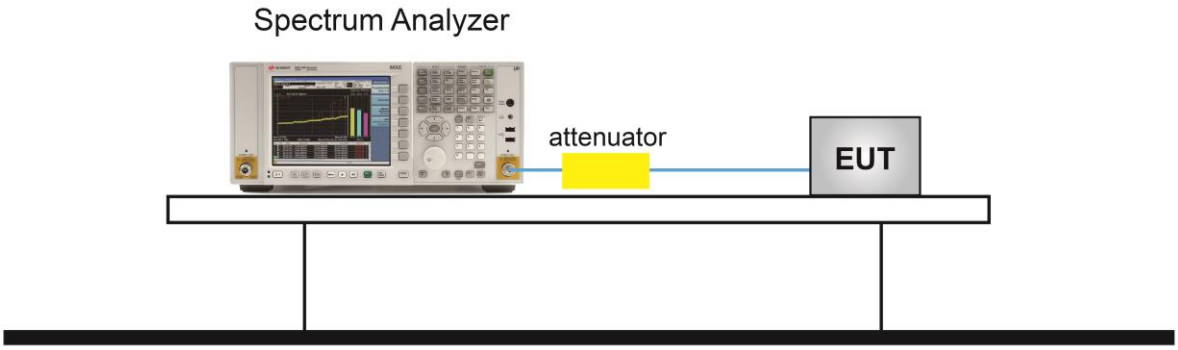
6.4.2.Test Procedure Used

ANSI C63.10 - 2013 Section 11.10.2

6.4.3.Test Setting

1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 3kHz
4. VBW = 10kHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

6.4.4.Test Setup



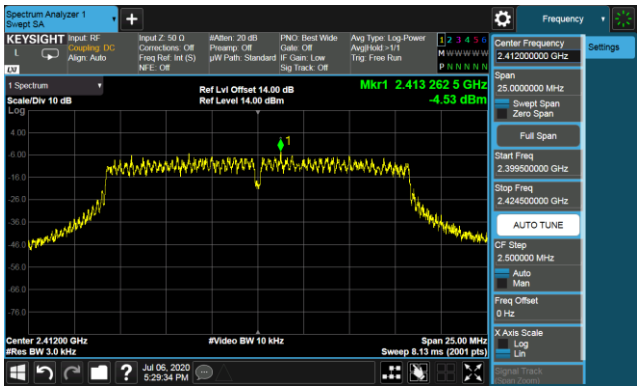
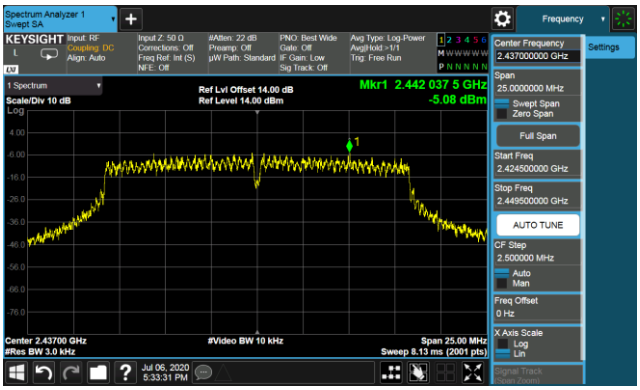
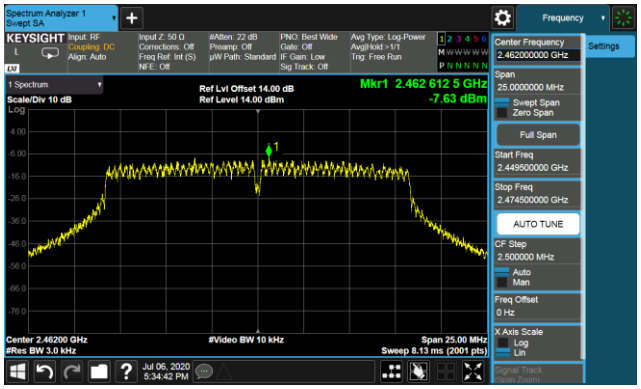
6.4.5.Test Result

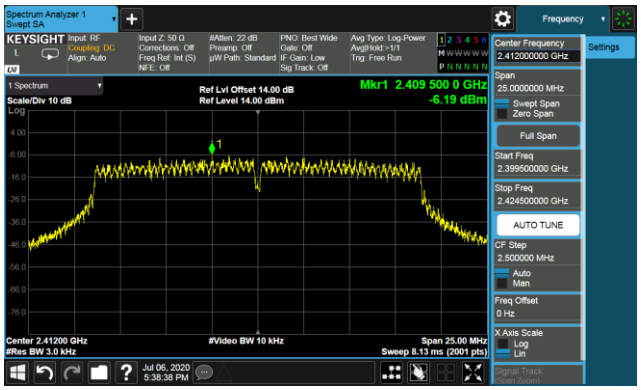
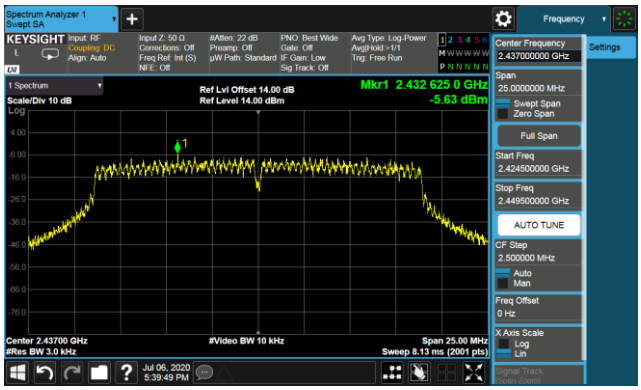
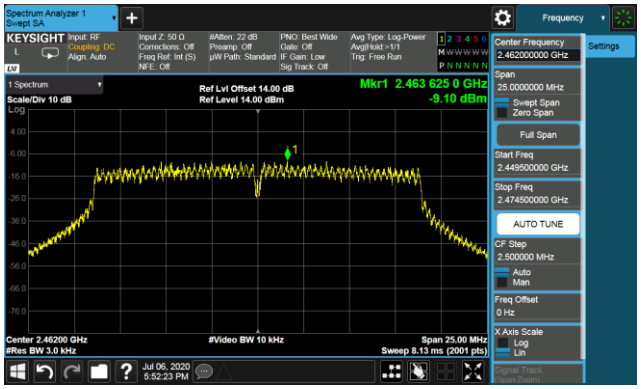
Product	WIFI+BT Combo Module	Test Engineer	Amy Zhang
Test Date	2020/07/06	Test Site	TR3

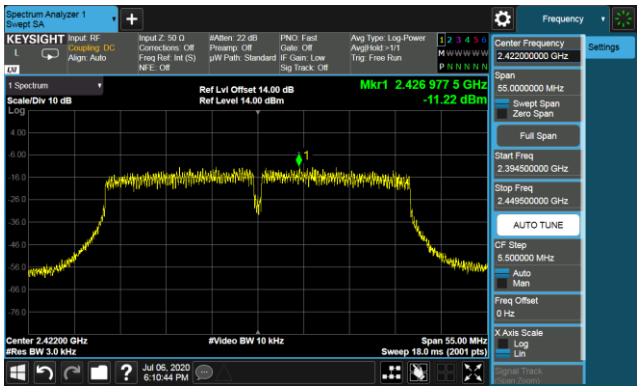
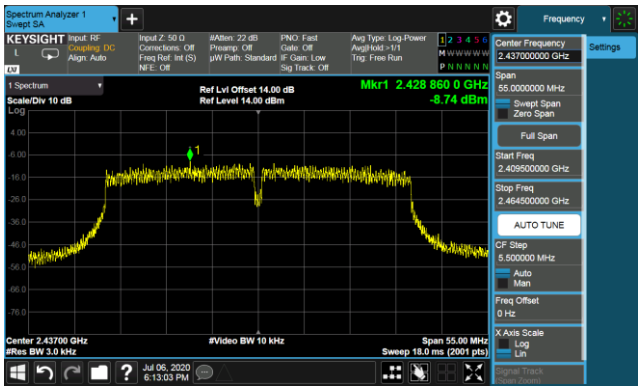
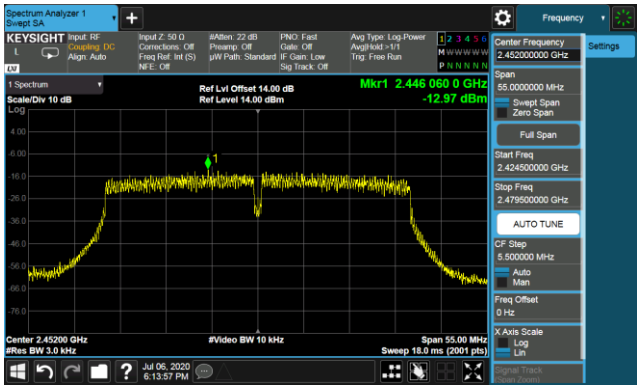
Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ 3kHz)	Ant 1 PSD (dBm/ 3kHz)	Total PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Result
802.11b	1Mbps	01	2412	-2.76	-5.20	-0.68	≤ 8.00	Pass
802.11b	1Mbps	06	2437	-2.73	-4.89	-0.55	≤ 8.00	Pass
802.11b	1Mbps	11	2462	-4.30	-3.69	-0.85	≤ 8.00	Pass
802.11g	6Mbps	01	2412	-4.53	-6.74	-2.25	≤ 8.00	Pass
802.11g	6Mbps	06	2437	-5.08	-6.09	-2.31	≤ 8.00	Pass
802.11g	6Mbps	11	2462	-7.63	-7.98	-4.55	≤ 8.00	Pass
802.11n-HT20	MCS0	01	2412	-6.19	-8.35	-3.76	≤ 8.00	Pass
802.11n-HT20	MCS0	06	2437	-5.63	-6.79	-2.79	≤ 8.00	Pass
802.11n-HT20	MCS0	11	2462	-9.10	-9.40	-5.87	≤ 8.00	Pass
802.11n-HT40	MCS0	03	2422	-11.22	-12.80	-7.98	≤ 8.00	Pass
802.11n-HT40	MCS0	06	2437	-8.74	-9.63	-5.20	≤ 8.00	Pass
802.11n-HT40	MCS0	09	2452	-12.97	-12.95	-9.00	≤ 8.00	Pass

Note: Total PSD (dBm/3kHz) = $10*\log \{10^{(\text{Ant 0 PSD }/10)} + 10^{(\text{Ant 1 PSD }/10)}\}$ (dBm/3kHz)

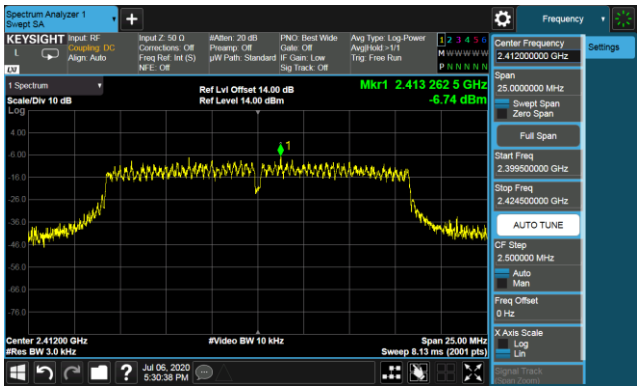
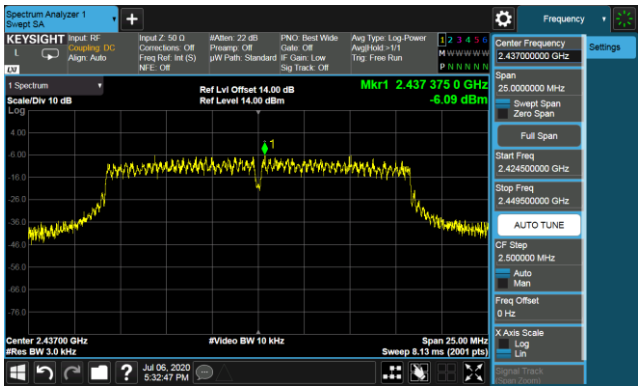
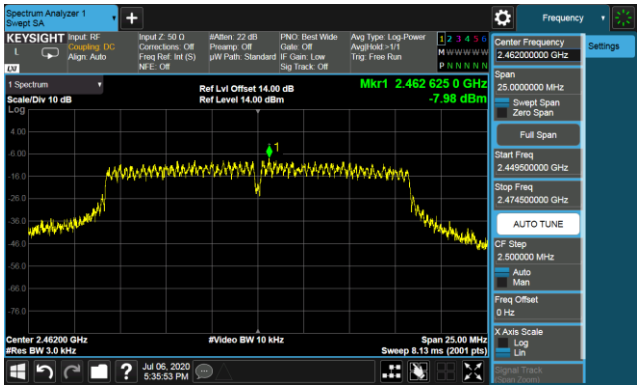
802.11b PSD - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

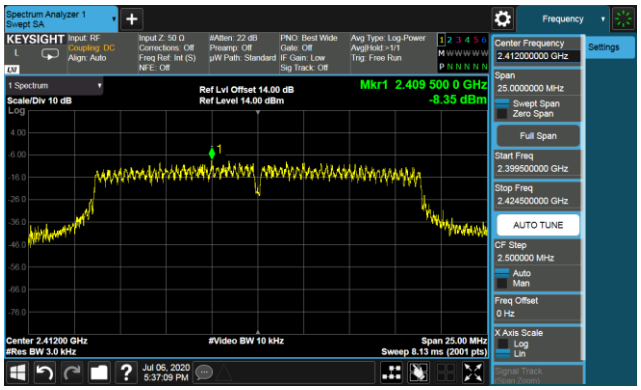
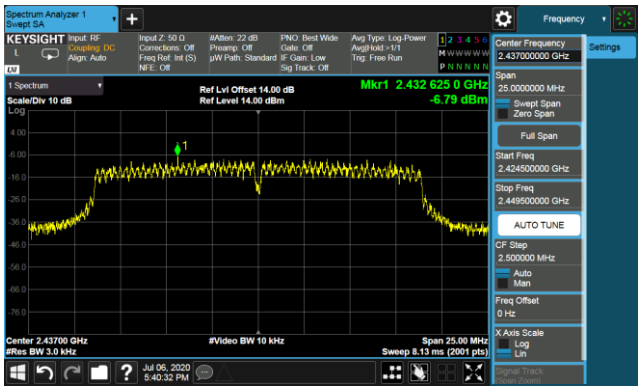
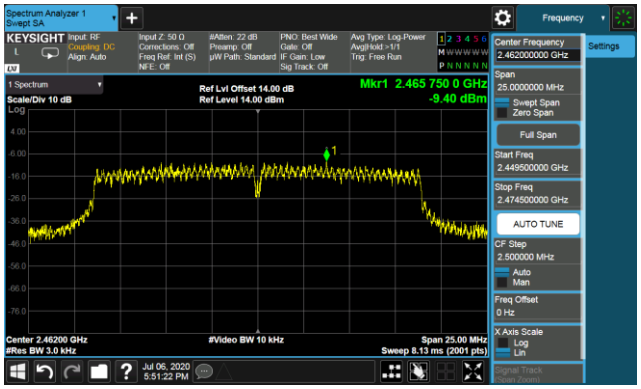
802.11g PSD - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

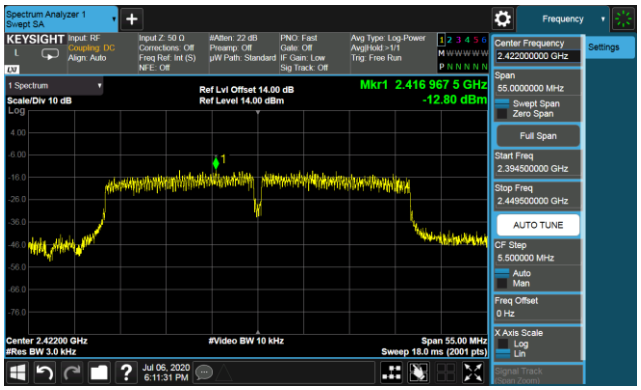
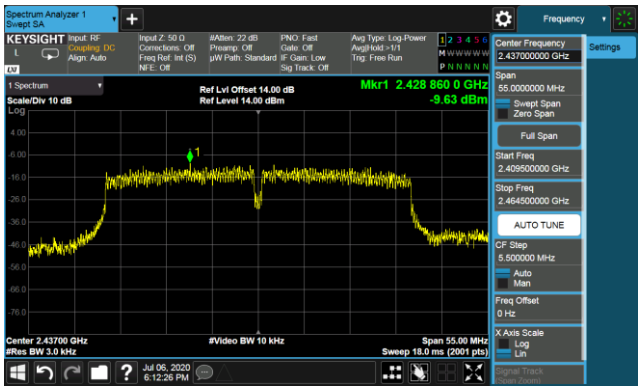
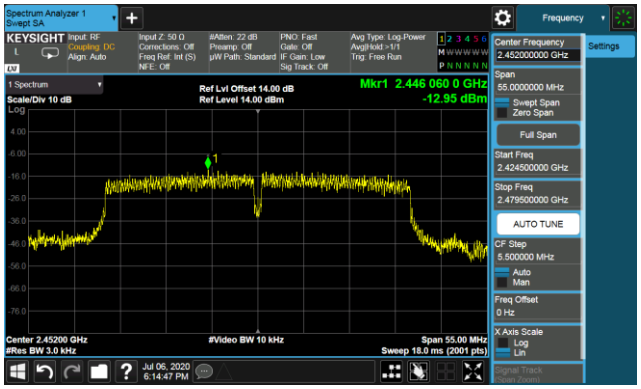
802.11n-HT20 PSD - Ant 0 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

802.11n-HT40 PSD - Ant 0 / Ant 0 + 1	
Channel 03 (2422MHz)	Channel 06 (2437MHz)
	
Channel 09 (2452MHz)	
	

802.11b PSD - Ant 1 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

802.11g PSD - Ant 1 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

802.11n-HT20 PSD - Ant 1 / Ant 0 + 1	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

802.11n-HT40 PSD - Ant 1 / Ant 0 + 1	
Channel 03 (2422MHz)	Channel 06 (2437MHz)
	
Channel 09 (2452MHz)	
	

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

6.5.1.Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB 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.

6.5.2.Test Procedure Used

ANSI C63.10 -2013 Section 11.11.2 & 11.11.3.

6.5.3.Test Setting

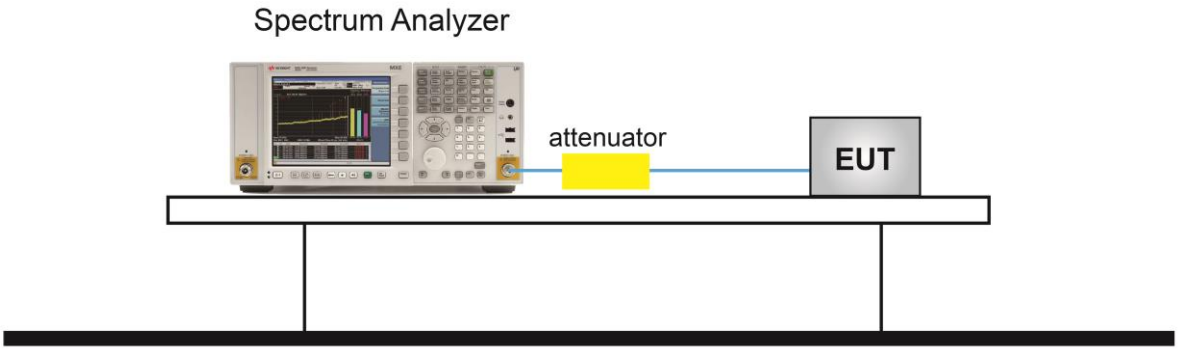
Reference level measurement

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

6.5.4.Test Setup



6.5.5.Test Result

Product	WIFI+BT Combo Module	Test Engineer	Amy Zhang
Test Date	2020/07/07 ~ 2020/08/18	Test Site	TR3

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

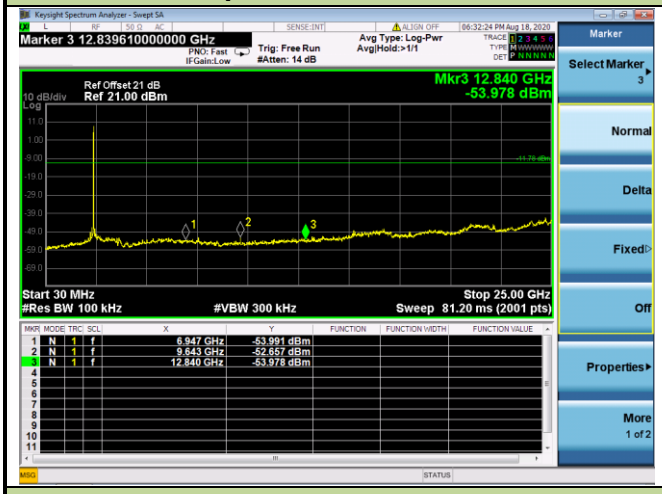
802.11b Out-of-Band Emissions - Ant 0 / Ant 0 + 1

Channel 01 (2412MHz)

100kHz PSD reference Level

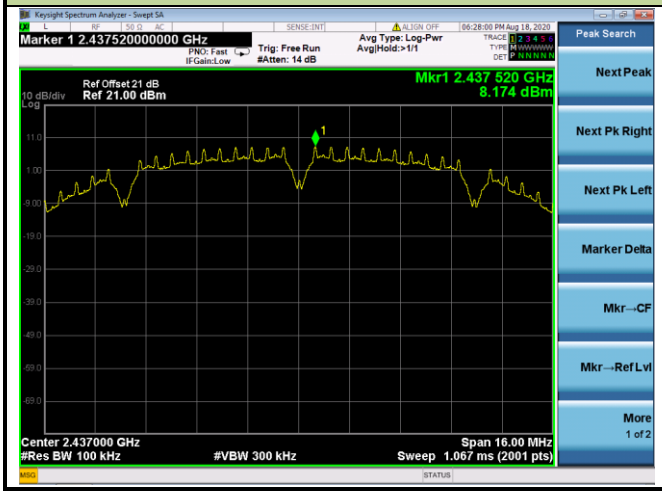
Low Band Edge

Spurious Emission



Channel 06 (2437MHz)

100kHz PSD reference Level



Spurious Emission