RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: FCC IC_RF_SL17062101-AFE-001 Rev 1.0
Supersede Report No.: FCC IC_RF_SL17062101-AFE-001

Applicant	:	Afero, Inc.
Product Name	:	Afero Modulo-2 Secure WLAN Radio Development Board
Model No.	:	Modulo-2
Test Standard	:	47 CFR 15.247 RSS 247 Iss 2: Feb 2017
Test Method	:	ANSI C63.10: 2013 RSS Gen Iss 4: Nov 2014 558074 D01 DTS Meas Guidance v04
FCC ID	:	2AGLL-MODULO2
IC ID	:	20929-MODULO2
Dates of test	:	06/26/2017 to 07/03/2017
Issue Date	:	07/18/2017
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification [X] Equipment did not comply with the specification [ ]		

This Test Report is Issued Under the Authority of:	
Gary Chou	
Gary Chou	**Chen Ge**
Test Engineer	Engineer Reviewer

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, 95035 CA

ilac-MRA
A2LA ACCREDITED
TESTING CERT # 2742-01

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC IC_RF_SL17062101-AFE-001 Rev 1.0	None	Original	07/18/2017

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: Afero, Inc.
Product: Afero Modulo-2 Secure WLAN Radio Development Board
Model: Modulo-2

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	Afero, Inc
Applicant Address	4970 W El Camino Real #100, Los Altos, CA 94022
Manufacturer Name	Afero, Inc
Manufacturer Address	4970 W El Camino Real #100, Los Altos, CA 94022

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	881796
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	Afero Modulo-2 Secure WLAN Radio Development Board
Model No.	Modulo-2
Trade Name	Afero
Serial No.	N/A
Host Model No.	N/A
Input Power	5VDC
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Date of EUT received	06/26/2016
Equipment Class/ Category	DTS
Clock Frequencies	N/A
Port/Connectors	MicroUSB

6.2 Radio Description

Wi-Fi:

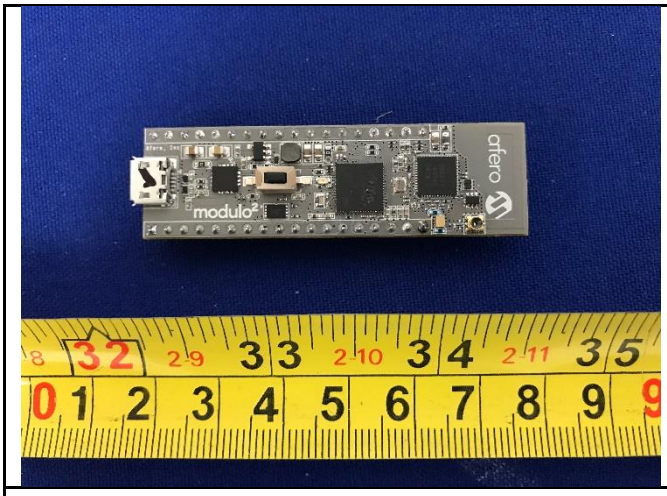
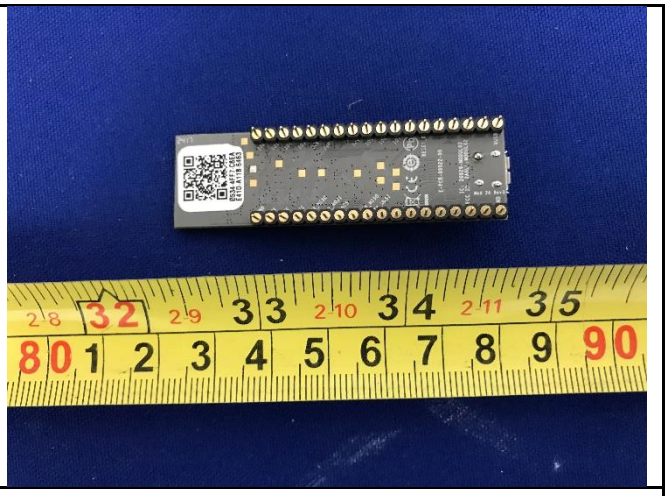
Radio Type	802.11b	802.11g	802.11n-20M
Operating Frequency	2412-2462MHz	2412-2462MHz	2412-2462MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz	5MHz
Number of Channels	11	11	11
Antenna Type	PCB Antenna		
Antenna Gain (Peak)	0 dBi		
Antenna Connector Type	SWF		
Note	N/A		

Bluetooth LE:

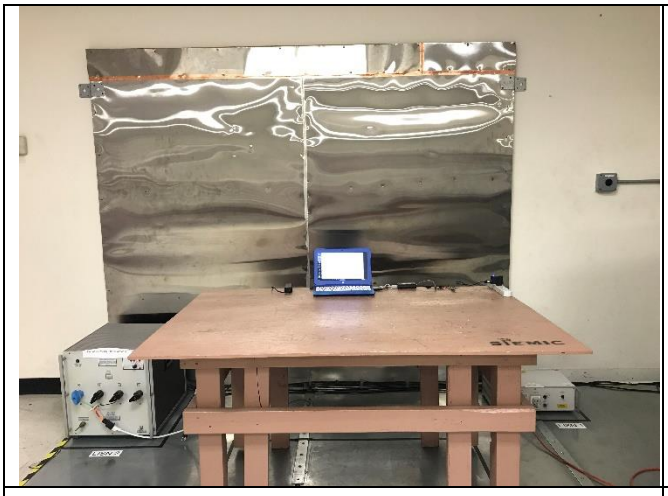
Radio Type	Bluetooth (Ver4.1)
Operating Frequency	2402MHz-2480MHz
Modulation	GFSK
Channel Spacing	2MHz
Antenna Type	PCB Antenna
Antenna Gain	0 dBi
Antenna Connector Type	SWF
Note	N/A

Note: 99% duty cycle modulated signal was used for testing.

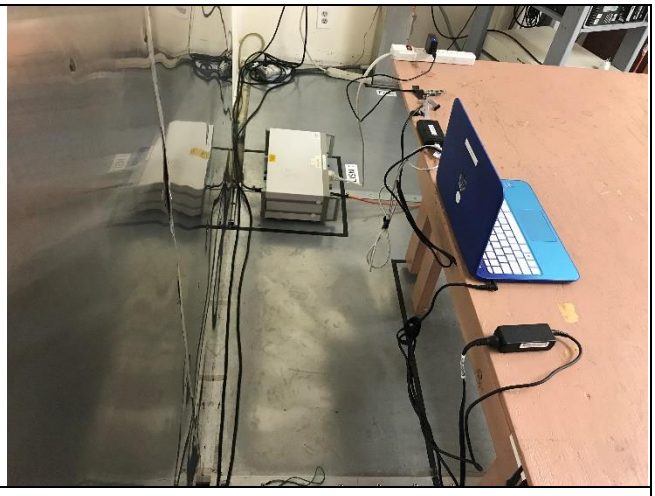
6.3 EUT Photos

	
Top View	**Bottom View**

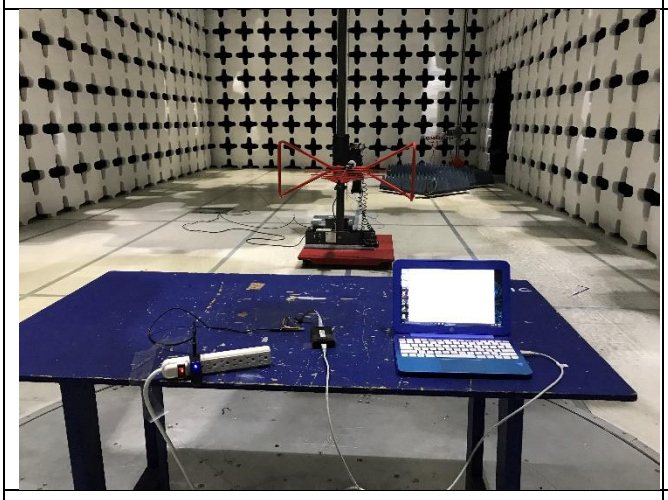
6.4 EUT Test Setup Photos



AC Line Conducted Emissions – Front View



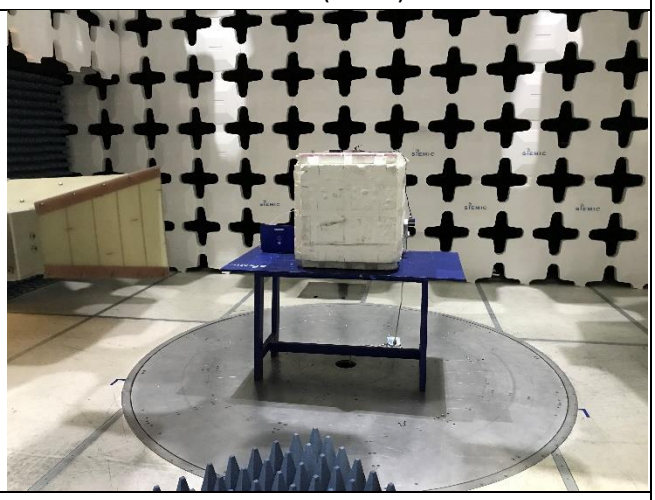
AC Line Conducted Emissions – Rear View



Radiated Emissions (<1GHz) – Front View

Radiated Emissions (<1GHz) – Rear View

Radiated Emissions (>1GHz) – Front View



Radiated Emissions (>1GHz) – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	HP Stream	N/A	HP	-
2					-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
USB	EUT	Laptop	EUT	Laptop	1	Unshielded	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	ATWILC3000	Set the EUT to transmit continuously in diferent test mode

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Restricted Band of Operation	FCC	15.205	FCC	ANSI C63.10:2013 558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A
	IC	RSS Gen 8.10	IC		
AC Conducted Emissions	FCC	15.207(a)	FCC	ANSI C63.10:2013	☒ Pass ☐ N/A
	IC	RSS Gen 8.8	IC	RSS Gen Issue 4: 2014	

DTS Band Requirement

Test Item	Test standard		Test Method/Procedure		Pass / Fail
99% Occupied Bandwidth	-	-	-	-	☒ Pass ☐ N/A
	IC	RSS Gen 6.6	IC	RSS Gen Issue 4: 2014 -	
6dB Bandwidth	FCC	15.247(a)(2)	FCC	558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A
	IC	RSS247 (5.2.1)	IC		
Band Edge and Radiated Spurious Emissions	FCC	15.247(d)	FCC	ANSI C63.10:2013 558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A
	IC	RSS247 (5.5)	IC		
Output Power	FCC	15.247(b)	FCC	558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A
	IC	RSS247 (5.4.4)	IC		
Receiver Spurious Emissions	IC	RSS Gen (4.8)	IC	RSS Gen Issue 4: 2014	☐ Pass ☒ N/A
Antenna Gain > 6 dBi	FCC	15.247(e)	FCC	-	☐ Pass ☒ N/A
	IC	-	IC	-	
Power Spectral Density	FCC	15.247(e)	FCC	558074 D01 DTS Meas Guidance v04	☒ Pass ☐ N/A
	IC	RSS247 (5.2.2)	IC		
RF Exposure requirement	FCC	15.247(i)	FCC	-	☐ Pass ☒ N/A
	IC	RSS Gen(5.5)	IC	RSS Gen Issue 4: 2014	
Remark	1. All measurement uncertainties do not take into consideration for all presented test results. 2. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.				

9 Measurement Uncertainty

9.1 Radiated Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:
- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
NSA Calibration	4.0	U-Shape	1.414	1	2.8288543
Combined Standard Uncertainty					3.0059131
Expanded Uncertainty (K=2)					**6.0118262**

The total derived measurement uncertainty is +/- 6.00 dB.

9.2 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:
- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.0692840
Cable Insertion Loss	0.21	Normal	2	1	0.1050000
Filter Insertion Loss	0.25	Normal	2	1	0.1250000
Antenna Factor	0.65	Normal	2	1	0.3250000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508
PRF Response	1.5	Rectangular	1.732	1	0.8660508
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
VSWR Calibration	2.0	U-Shape	1.414	1	1.4144272
Combined Standard Uncertainty					4.2363
Expanded Uncertainty (K=2)					**8.4726**

The total derived measurement uncertainty is +/- 8.47 dB.

9.3 RF conducted measurement

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					0.476087
Expanded Uncertainty (K=2)					**0.952174**

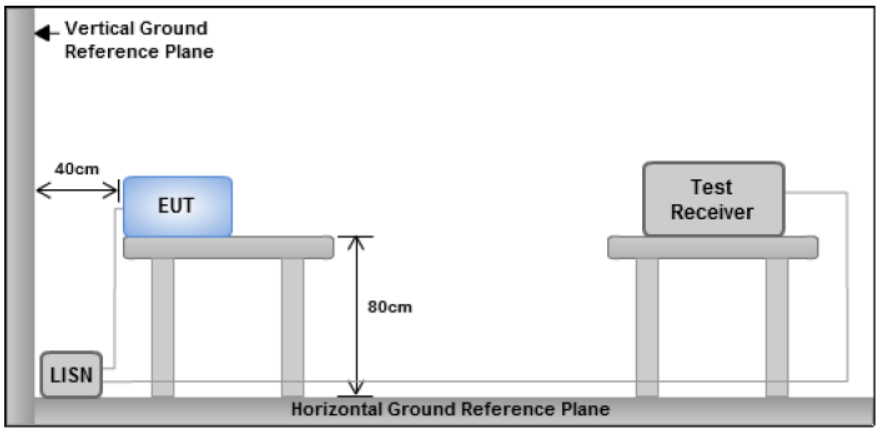
The total derived measurement uncertainty is +/- 0.95 dB.

10 Measurements, Examination and Derived Results

10.1 Conducted Emissions

Conducted Emission Limit

Frequency ranges (MHz)	Limit (dBuV)	
	QP	Average
0.15 ~ 0.5	66 – 56	56 – 46
0.5 ~ 5	56	46
5 ~ 30	60	50

Spec	Item	Requirement	Applicable
47CFR§15.207 RSS-GEN	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.	☒
Test Setup		 Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes	
Procedure		- The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B. - The power supply for the EUT was fed through a 50Ω/50µH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment was powered separately from another main supply.	
Remark		EUT tested with AC 120V 60Hz	
Result		☒ Pass ☐ Fail	

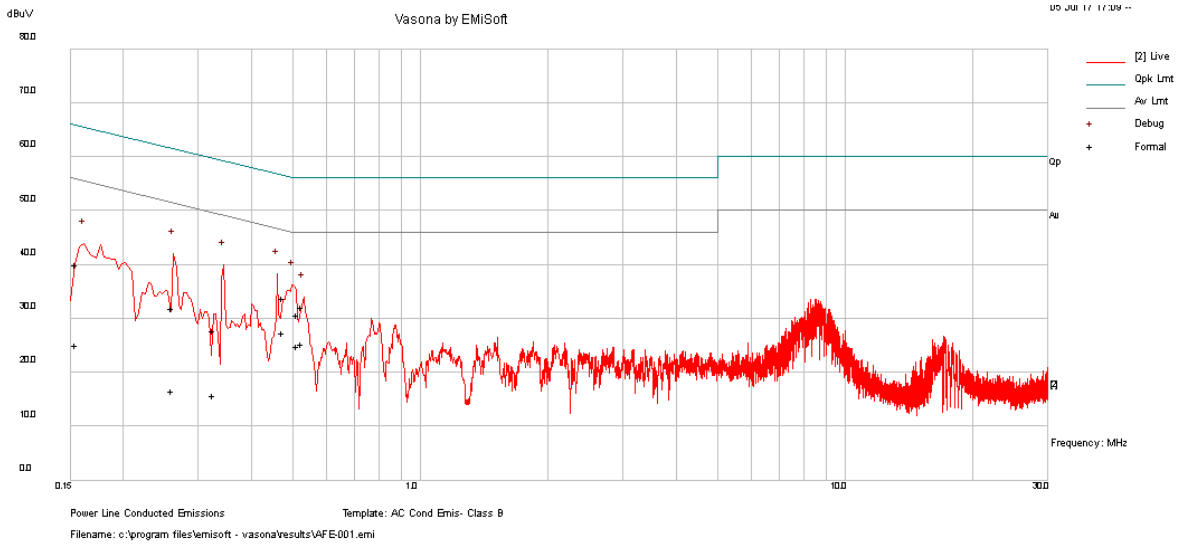
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at Conducted Emission test site.

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120VAC, 60Hz			
Tested by:	Chen Ge			
Test Date:	07/05/2016			
Remarks	AC Line @ Live			



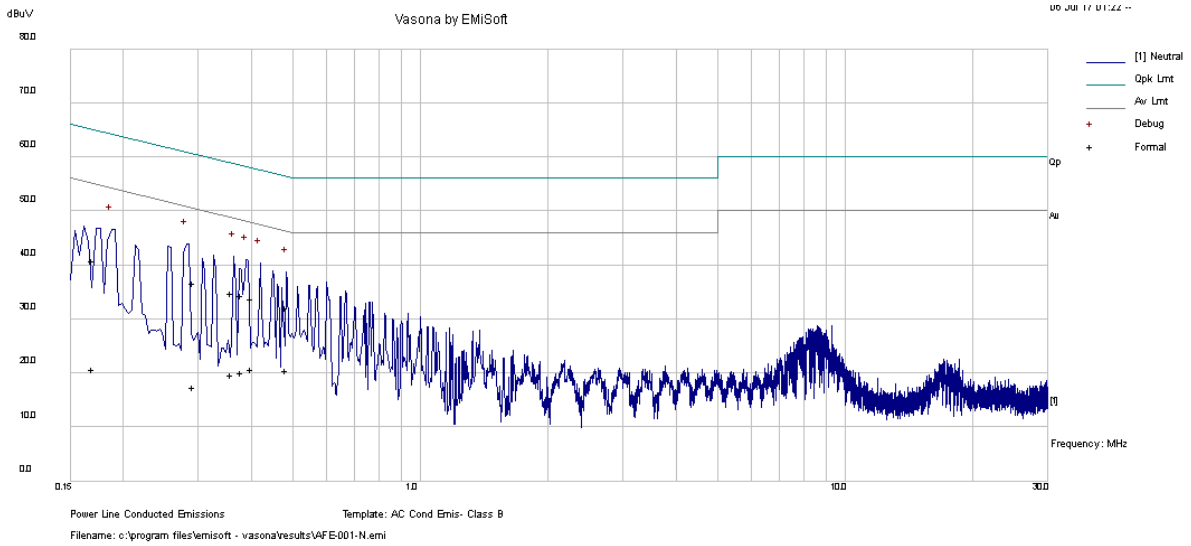
Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.47	23.15	10.01	0.65	33.8	Quasi Peak	Live	56.43	-22.63	Pass
0.33	16.95	10.01	0.8	27.76	Quasi Peak	Live	59.54	-31.78	Pass
0.26	20.89	10	0.96	31.85	Quasi Peak	Live	61.4	-29.54	Pass
0.51	19.93	10.01	0.62	30.56	Quasi Peak	Live	56	-25.44	Pass
0.15	28.31	10	1.68	39.99	Quasi Peak	Live	65.75	-25.76	Pass
0.53	21.49	10.01	0.62	32.12	Quasi Peak	Live	56	-23.88	Pass
0.47	16.74	10.01	0.65	27.39	Average	Live	46.43	-19.04	Pass
0.33	4.85	10.01	0.8	15.65	Average	Live	49.54	-33.88	Pass
0.26	5.57	10	0.96	16.53	Average	Live	51.4	-34.86	Pass
0.51	14.14	10.01	0.62	24.77	Average	Live	46	-21.23	Pass
0.15	13.38	10	1.68	25.07	Average	Live	55.75	-30.68	Pass
0.53	14.66	10.01	0.62	25.29	Average	Live	46	-20.71	Pass

Note: The results above show only the worst case.

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120VAC, 60Hz			
Tested by:	Chen Ge			
Test Date:	07/05/2016			
Remarks	AC Line @ Neutral			



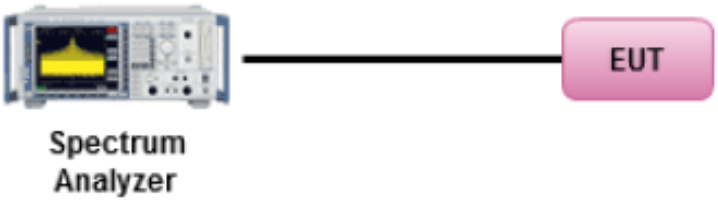
Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.29	25.84	10	0.87	36.71	Quasi Peak	Neutral	60.44	-23.72	Pass
0.38	23.72	10.01	0.72	34.45	Quasi Peak	Neutral	58.28	-23.83	Pass
0.36	24.03	10.01	0.75	34.78	Quasi Peak	Neutral	58.72	-23.93	Pass
0.40	23.09	10.01	0.7	33.79	Quasi Peak	Neutral	57.82	-24.02	Pass
0.48	21.36	10.01	0.64	32.01	Quasi Peak	Neutral	56.29	-24.28	Pass
0.17	29.32	10	1.5	40.82	Quasi Peak	Neutral	64.95	-24.14	Pass
0.29	6.52	10	0.87	17.39	Average	Neutral	50.44	-33.05	Pass
0.38	9.41	10.01	0.72	20.14	Average	Neutral	48.28	-28.15	Pass
0.36	8.95	10.01	0.75	19.7	Average	Neutral	48.72	-29.02	Pass
0.40	9.99	10.01	0.7	20.69	Average	Neutral	47.82	-27.12	Pass
0.48	9.81	10.01	0.64	20.46	Average	Neutral	46.29	-25.83	Pass
0.17	9.24	10	1.5	20.74	Average	Neutral	54.95	-34.21	Pass

Note: The results above show only the worst case.

10.2 6dB & 99% Bandwidth

Requirement(s):

Spec	Requirement	Applicable
§ 15.247 RSS247 (5.2.1)	6dB BW≥500KHz;	☒
RSS Gen 4.6.1	The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual. The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth	☒
Test Setup		
Test Procedure	558074 D01 DTS Meas Guidance v04, 8.1 DTS bandwidth 6dB Emission bandwidth measurement procedure - Set RBW = 100 kHz. - Set the video bandwidth (VBW) ⩾ 3 x RBW. - Detector = Peak. - Trace mode = max hold. - Sweep = auto couple. - Allow the trace to stabilize. - Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.	

Test Date	06/26/2017	Environmental condition	Temperature 23ºC Relative Humidity 42% Atmospheric Pressure 1021mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A
Test Plot ☒ Yes ☐ N/A

Test was done by Chen Ge at RF test site.

Wi-Fi:

6dB Bandwidth measurement result for 2.4GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)	Result
6dB BW	802.11b	2412	Low	9.94	≥0.5	Pass
		2437	Mid	10.59	≥0.5	Pass
		2462	High	9.84	≥0.5	Pass
	802.11g	2412	Low	16.53	≥0.5	Pass
		2437	Mid	15.75	≥0.5	Pass
		2462	High	16.37	≥0.5	Pass
	802.11n-20M	2412	Low	17.62	≥0.5	Pass
		2437	Mid	16.37	≥0.5	Pass
		2462	High	17.57	≥0.5	Pass

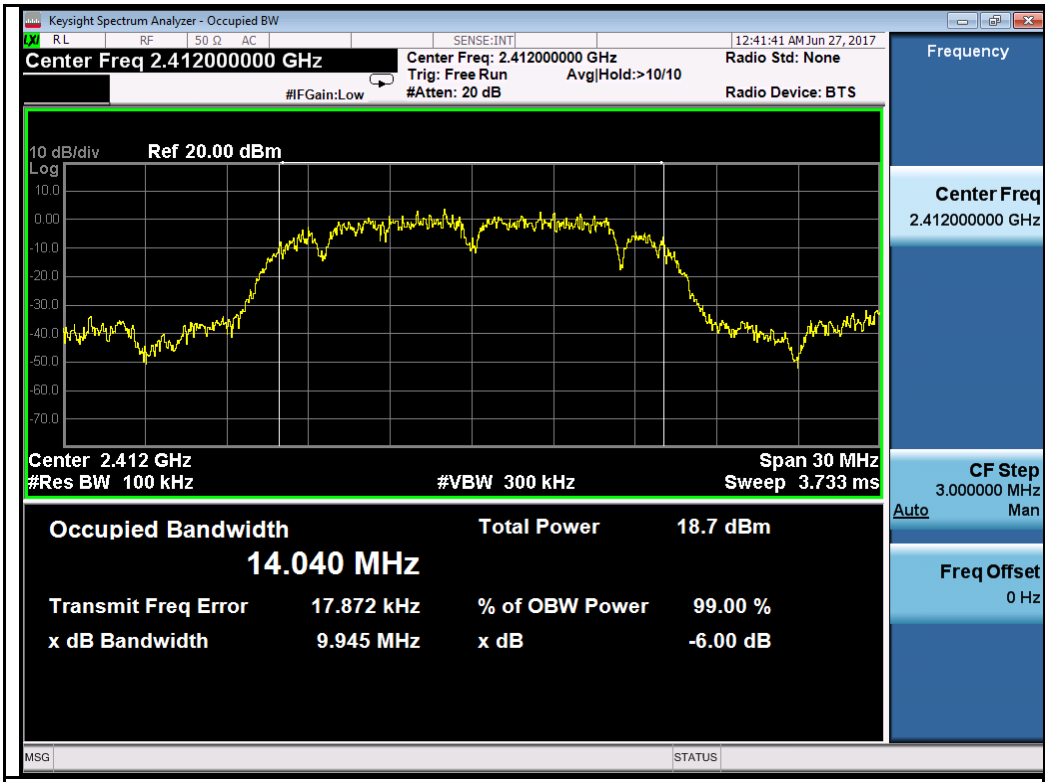
99% OBW measurement result for 2.4GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
99% OBW	802.11b	2412	Low	14.04
		2437	Mid	14.76
		2462	High	13.96
	802.11g	2412	Low	16.49
		2437	Mid	16.71
		2462	High	16.49
	802.11n-20M	2412	Low	17.68
		2437	Mid	18.02
		2462	High	17.65

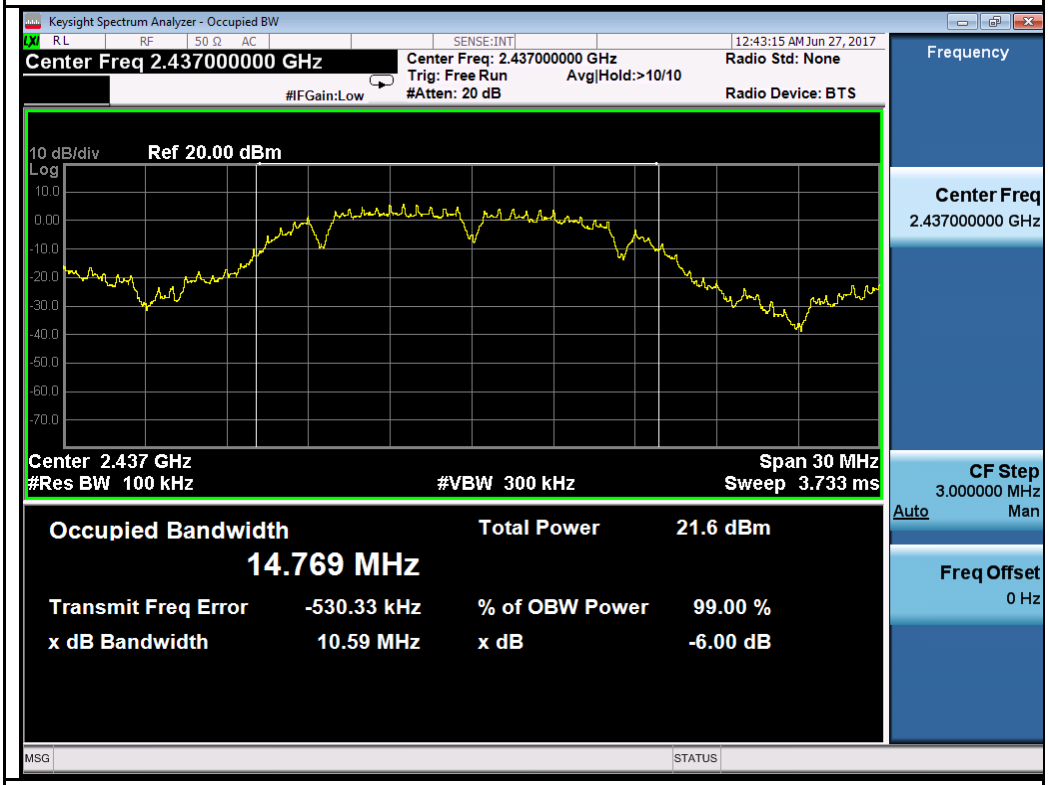
BLE:

Channel	Channel Frequency (MHz)	OBW	
		99% (MHz)	6dB(KHz)
Low	2402	1.04	628.6
Mid	2440	1.03	636.8
High	2480	1.04	642.8

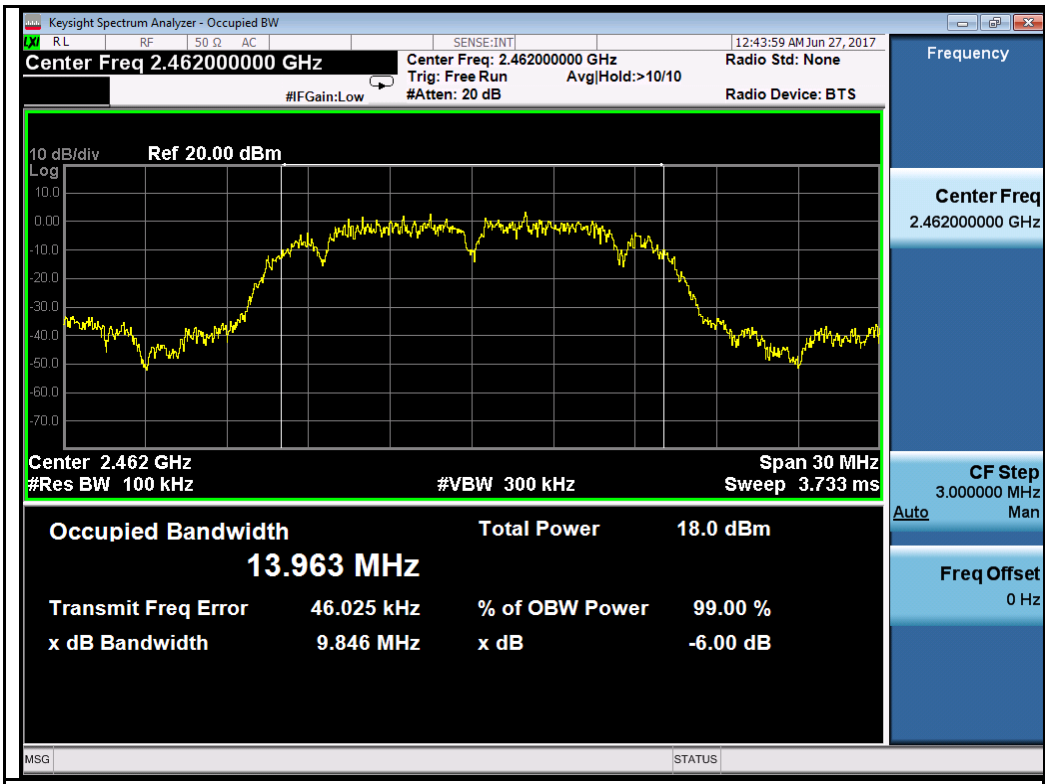
6dB & 99% Bandwidth Test Plots



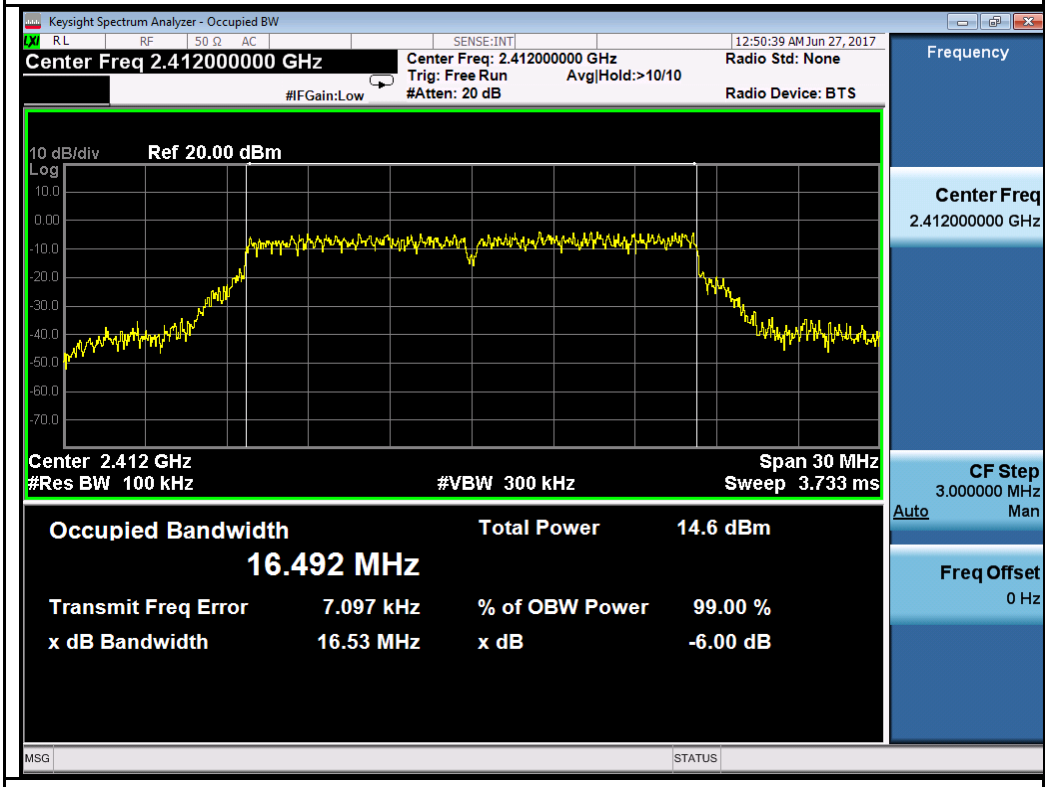
802.11b-2412MHz



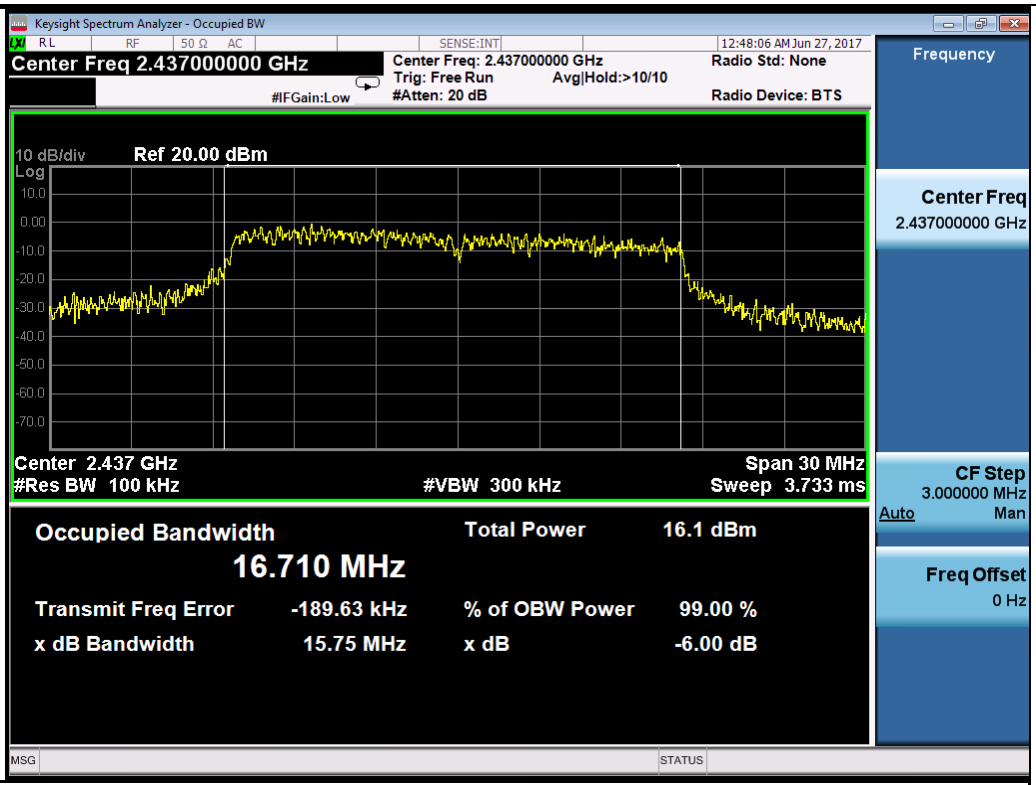
802.11b-2437MHz



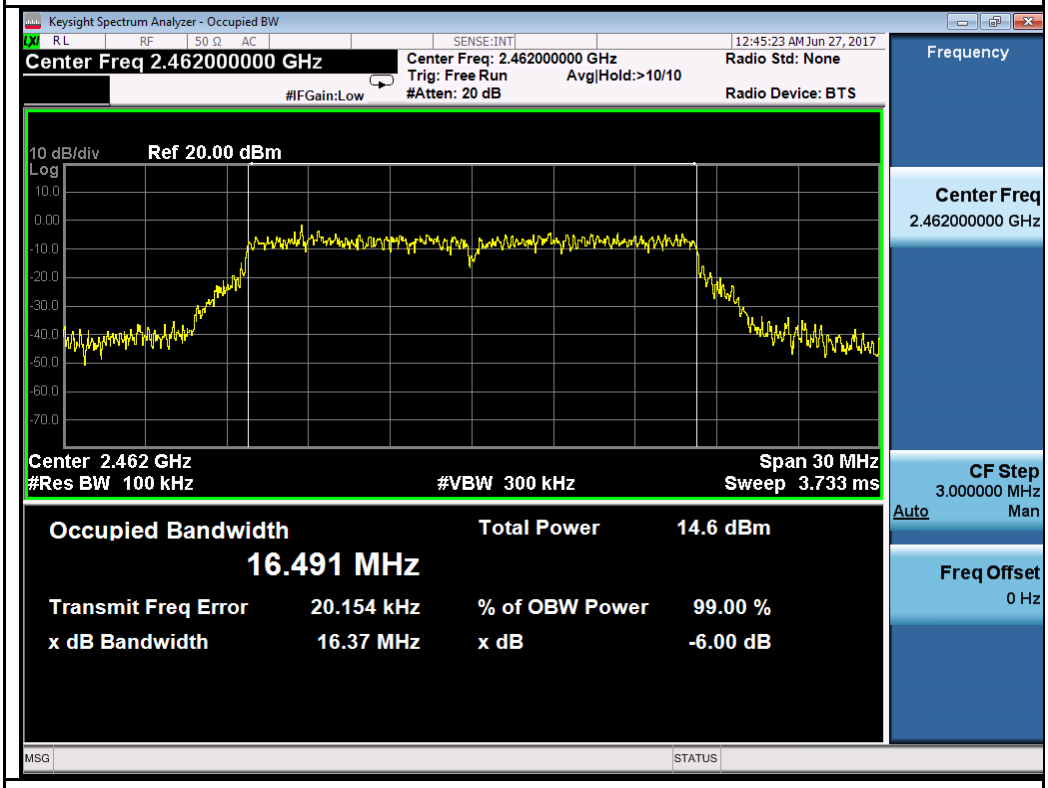
802.11b-2462MHz



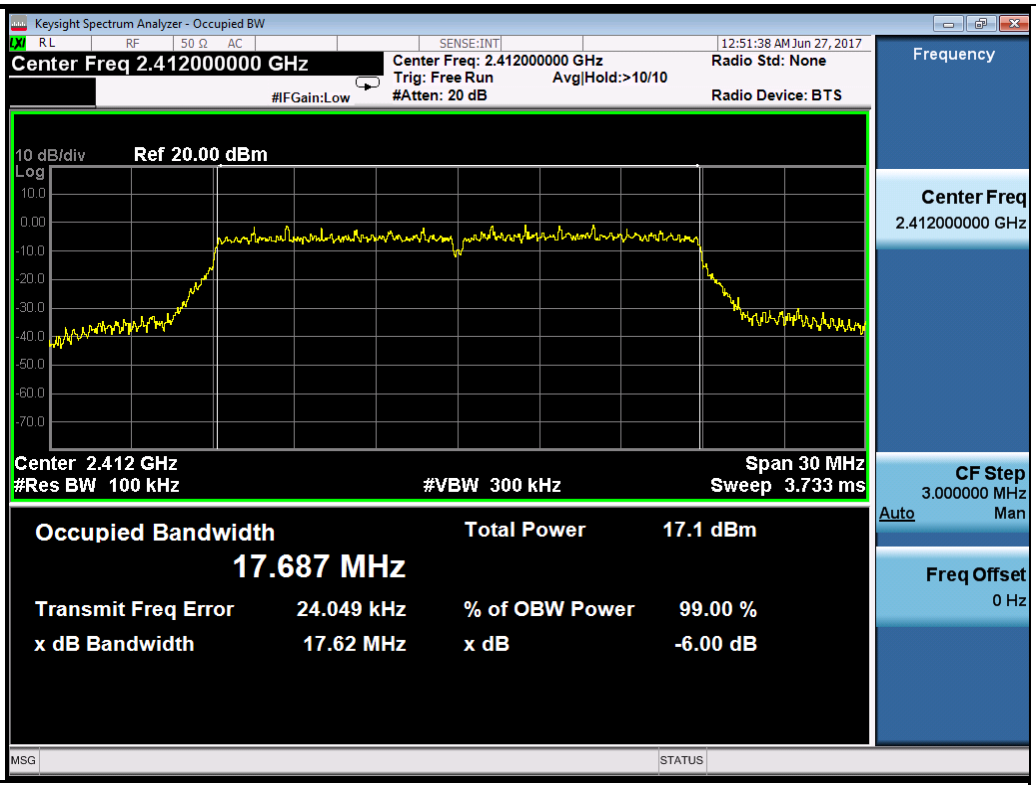
802.11g-2412MHz



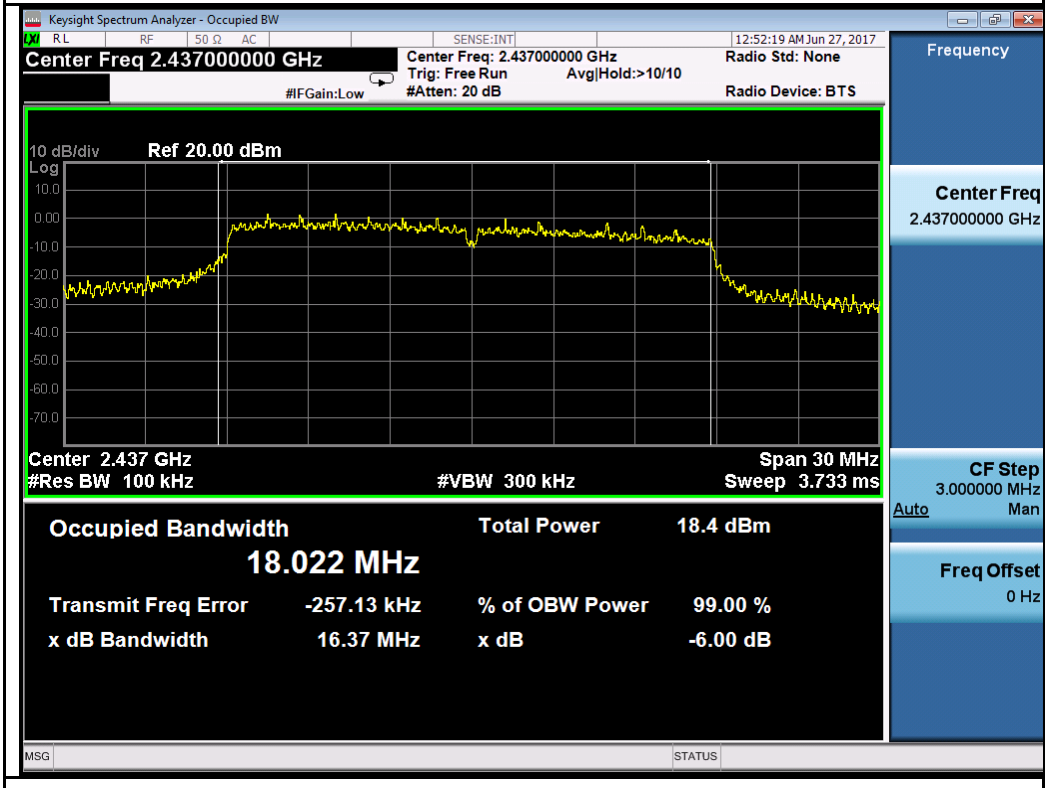
802.11g-2437MHz



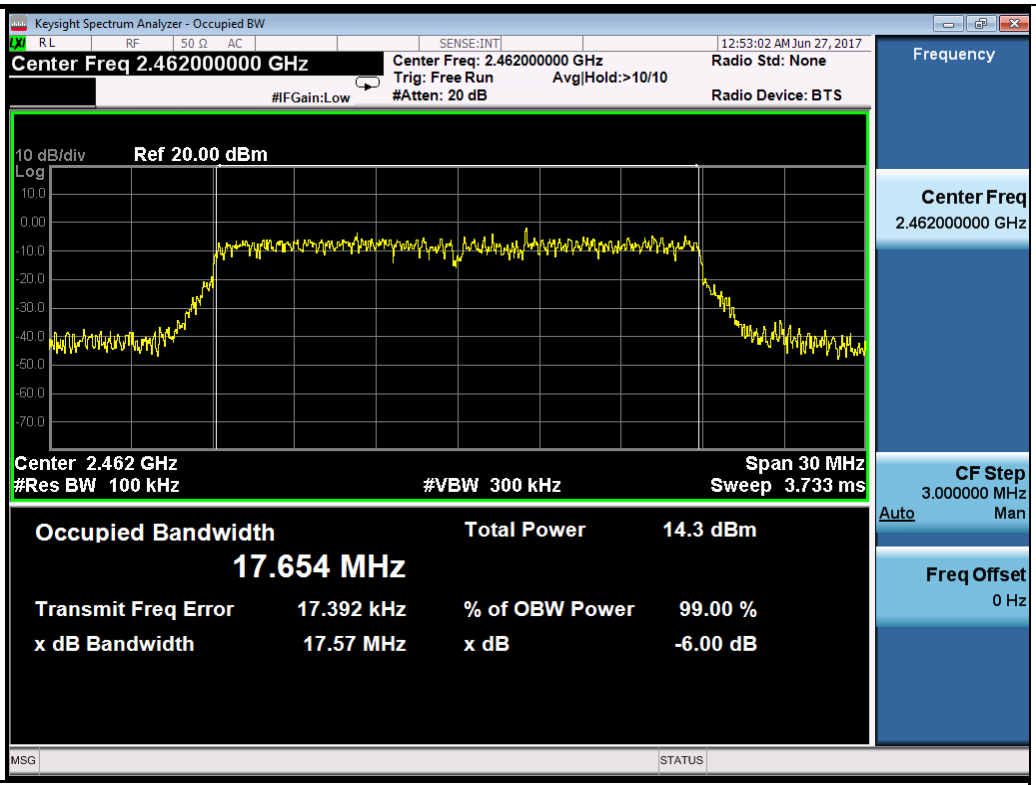
802.11g-2462MHz



802.11n-HT20-2412MHz



802.11n-HT20-2437MHz



802.11n-HT20-2462MHz

BLE-2402MHz

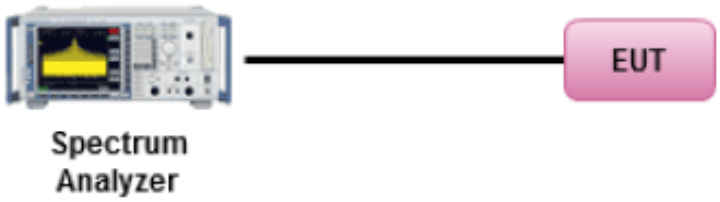
BLE-2440MHz


Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:INT
02:06:19 AM Jun 27, 2017
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.0408 MHz
Total Power
4.12 dBm
Transmit Freq Error
-3.751 kHz
% of OBW Power
99.00 %
x dB Bandwidth
642.8 kHz
x dB
-6.00 dB
Freq Offset
0 Hz
MSG
STATUS

BLE-2480MHz

10.3 Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247 RSS247 (5.4.4)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤1 Watt	☐
	b)	FHSS in 5725-5850MHz: ≤1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤0.125 Watt.	☐
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤0.25 Watt	☐
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤1 Watt	☒
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v04, 9.2.2.2 Measurement using a Spectrum Analyzer (SA) (a) Set span to at least 1.5 times the OBW (b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz. (c) Set VBW ≥ 3 x RBW. (d) Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.) (e) Sweep time = auto. (f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode. (g) If transmit duty cycle < 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run". (h) Trace average at least 100 traces in power averaging (i.e., RMS) mode (i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.		

Test Date	06/26/2017	Environmental condition	Temperature	23°C
			Relative Humidity	44%
			Atmospheric Pressure	1021mbar
Remark	NONE			
Result	☒ Pass ☐ Fail			

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

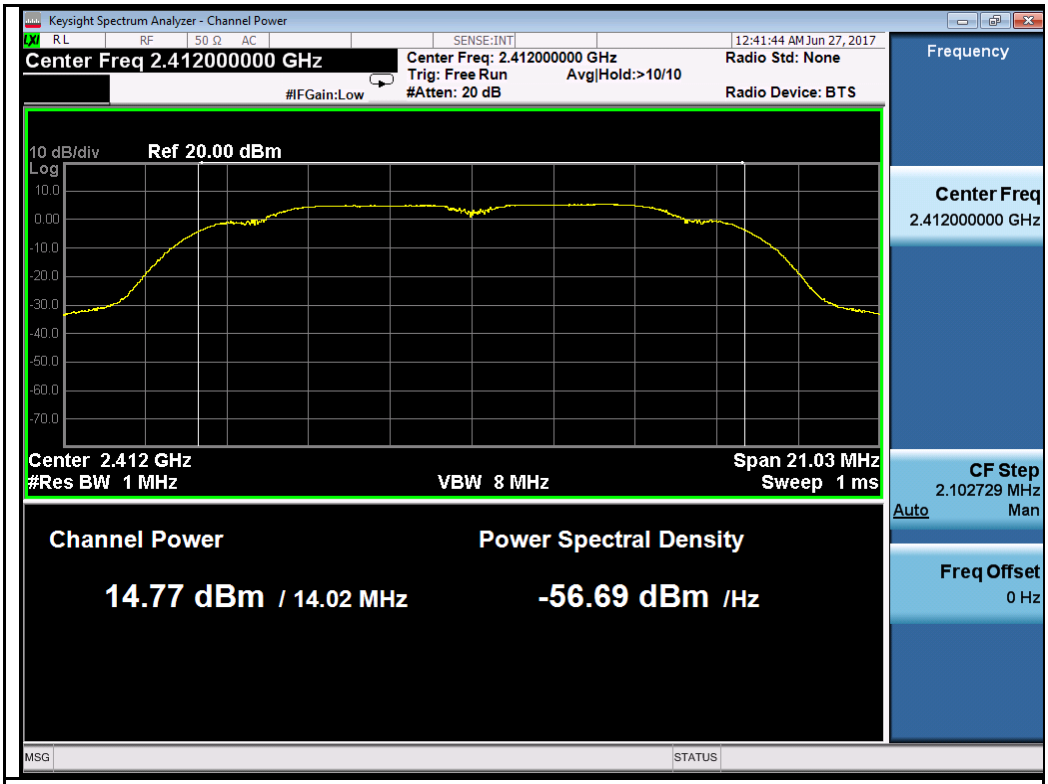
Output Power measurement result for Wi-Fi:

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
Output power	802.11b	2412	Low	14.77	30	Pass
		2437	Mid	15.29	30	Pass
		2462	High	14.13	30	Pass
	802.11g	2412	Low	10.68	30	Pass
		2437	Mid	12.03	30	Pass
		2462	High	10.47	30	Pass
	802.11n-20M	2412	Low	10.82	30	Pass
		2437	Mid	12.01	30	Pass
		2462	High	10.65	30	Pass

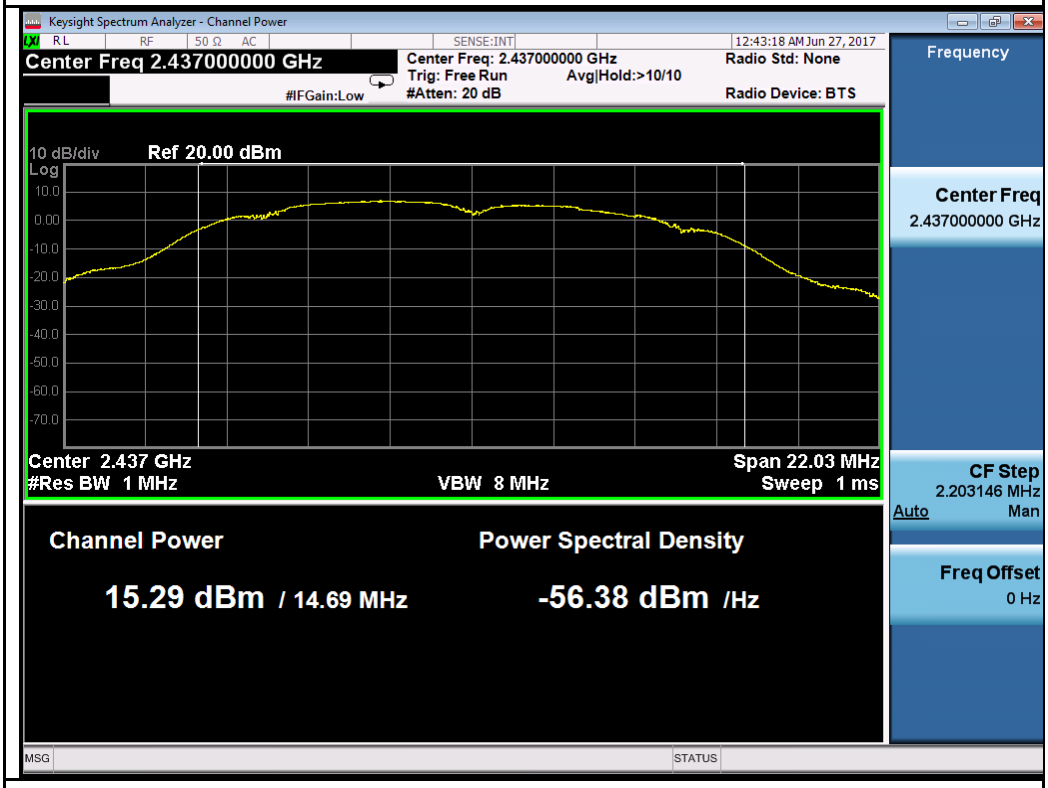
Output Power measurement results for BLE:

Type	Freq (MHz)	Test mode	CH	Conducted Power (dBm)	Limit (dBm)	Result
Output power	2402	Bluetooth LE	Low	6.03	≤30	Pass
	2440	Bluetooth LE	Mid	3.17	≤30	Pass
	2480	Bluetooth LE	High	-1.69	≤30	Pass

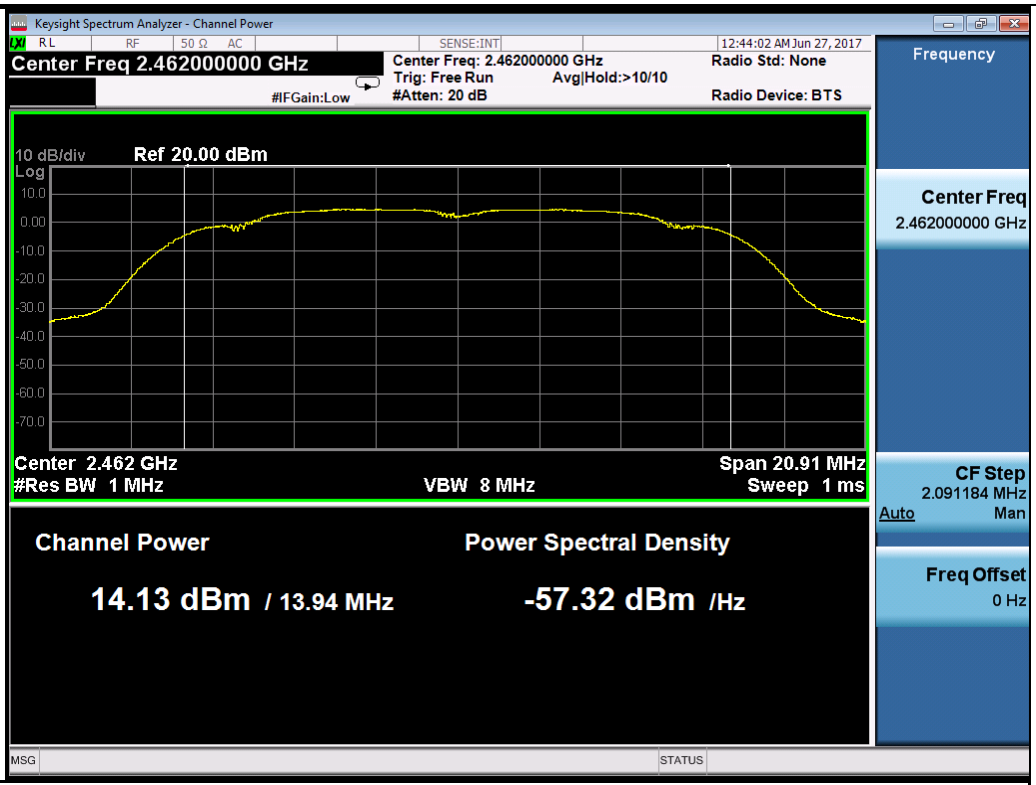
Test Plots:



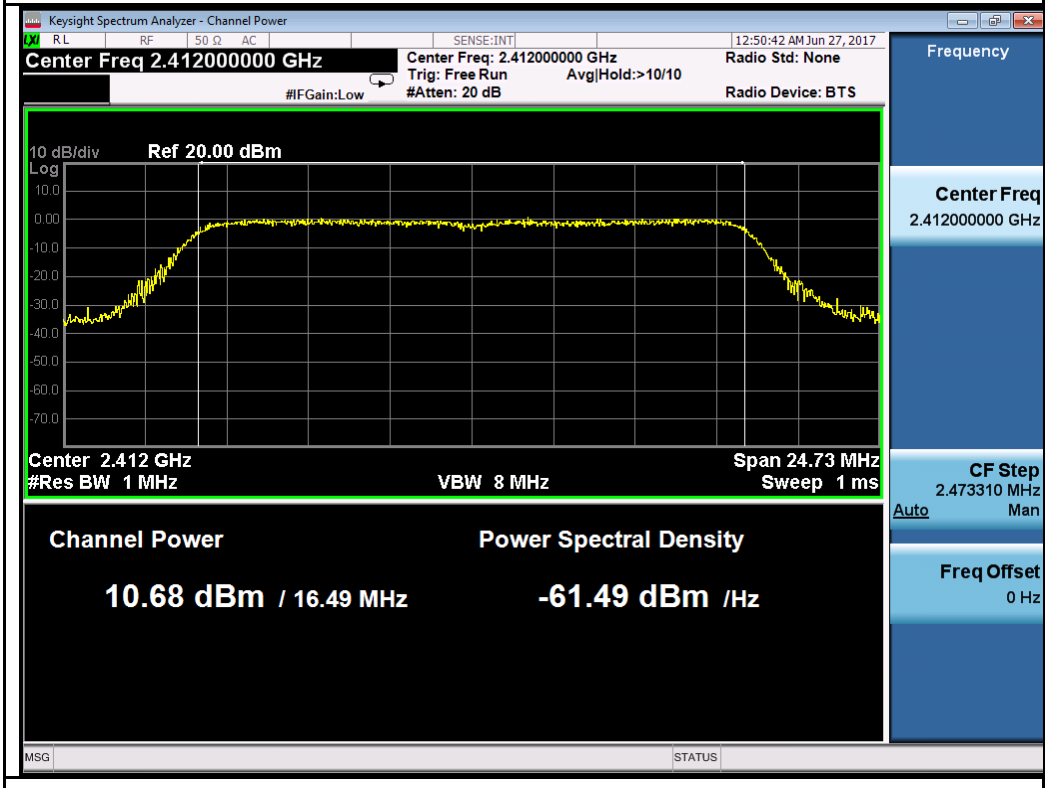
802.11b-2412MHz



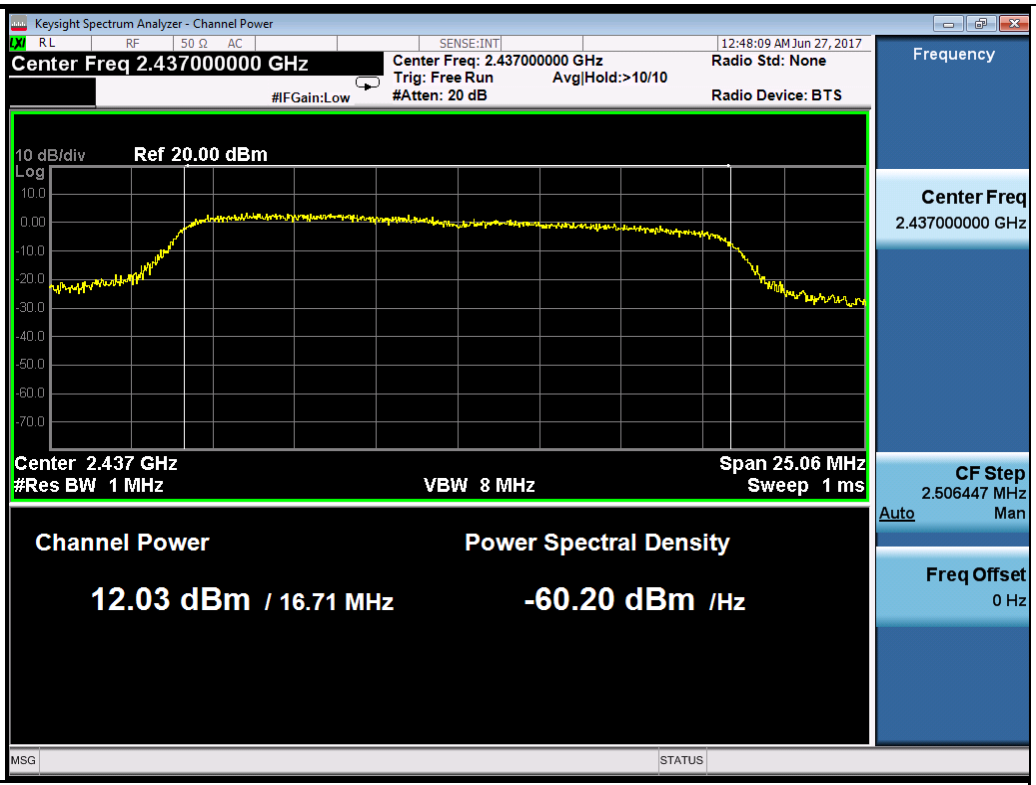
802.11b-2437MHz



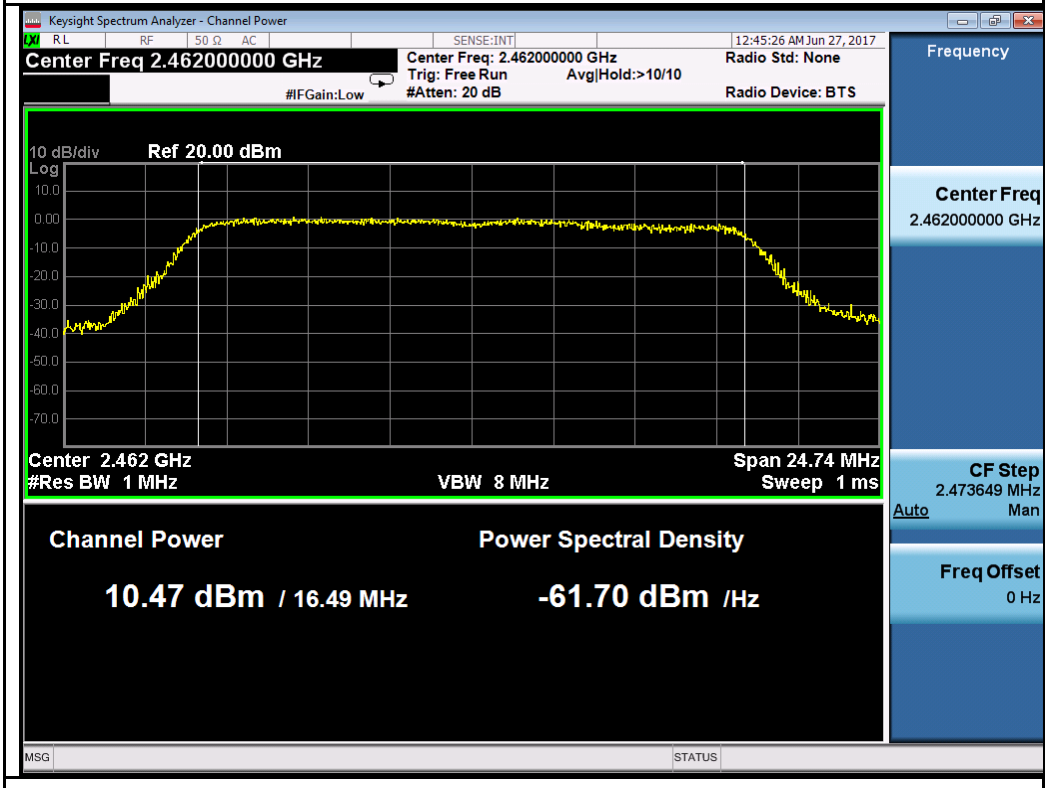
802.11b-2462MHz



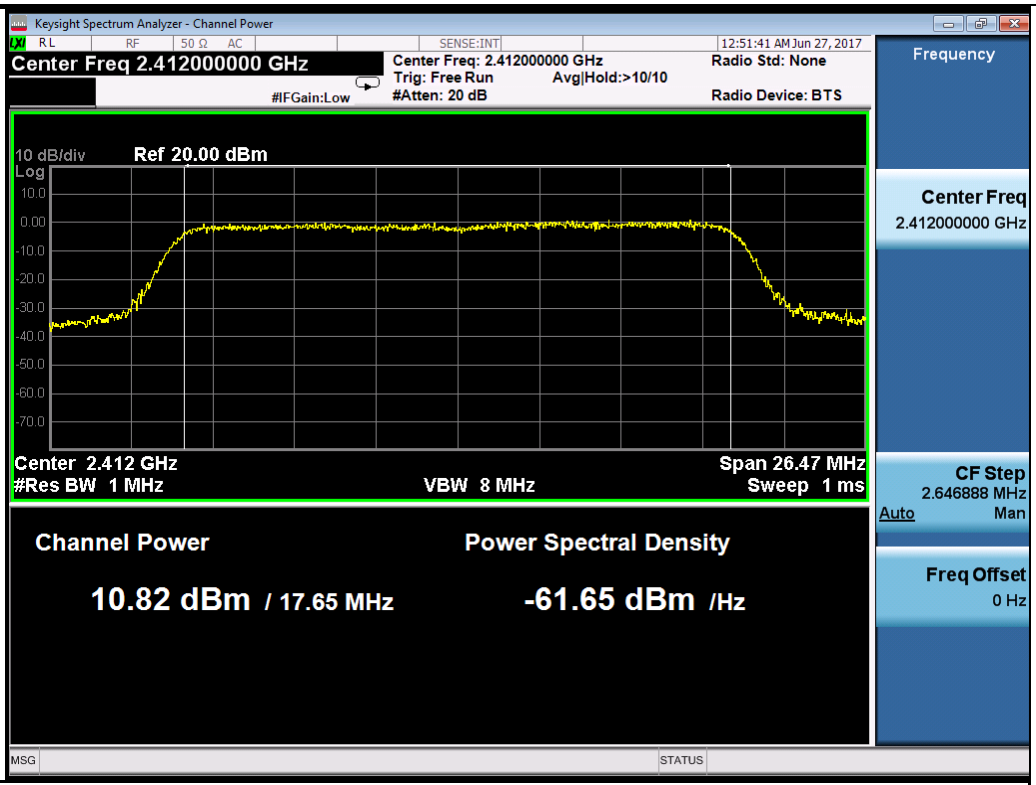
802.11g-2412MHz



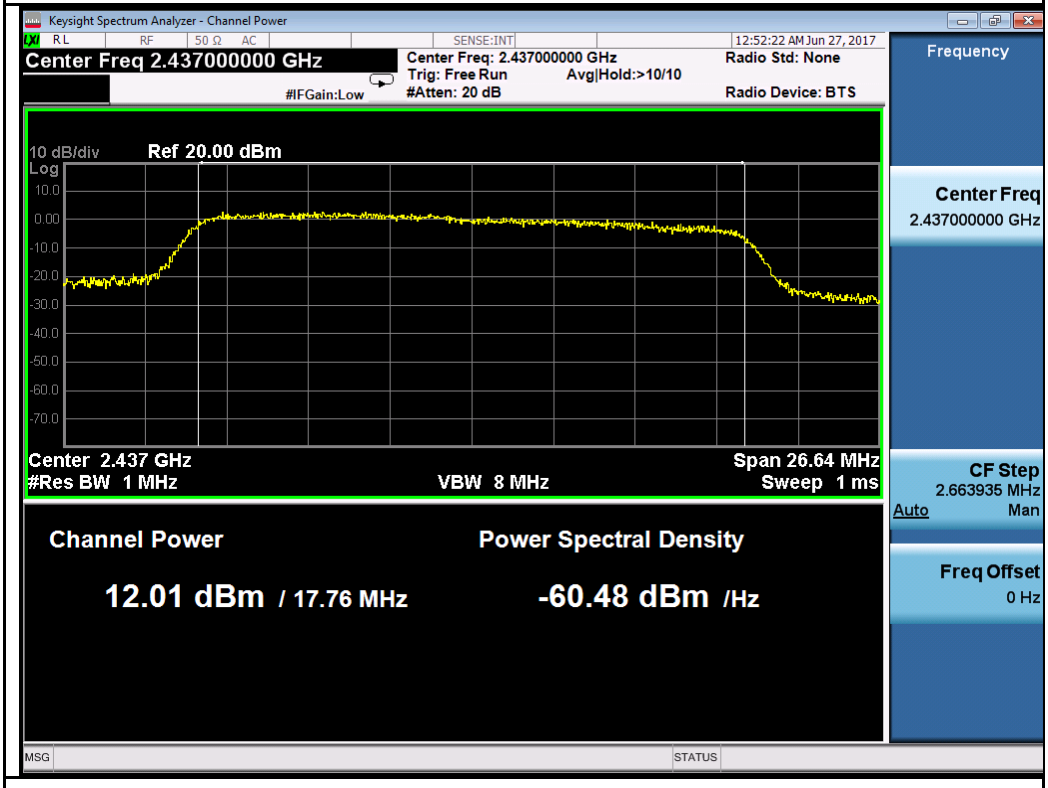
802.11g-2437MHz



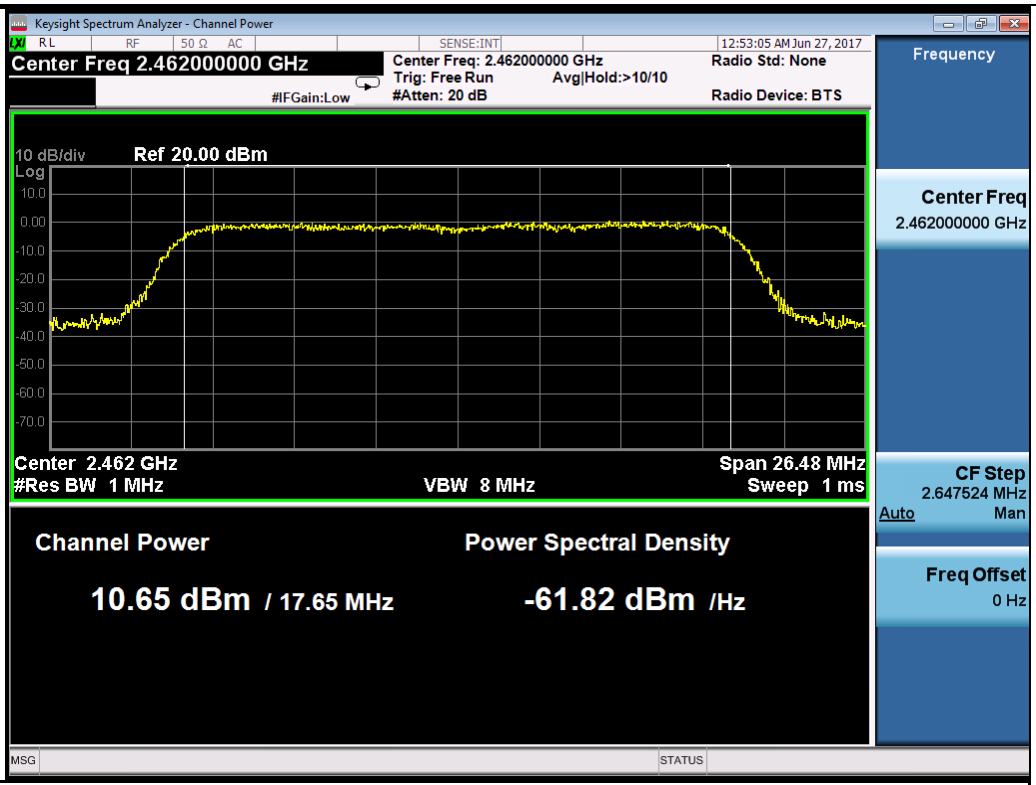
802.11g-2462MHz



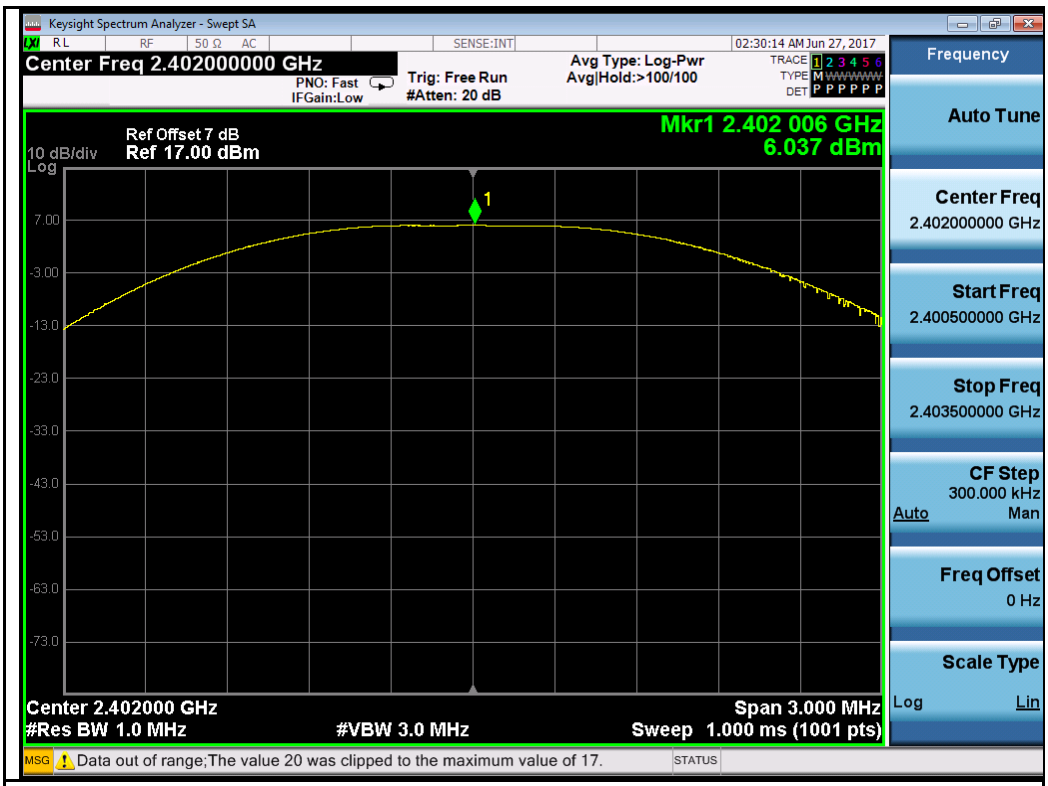
802.11n-HT20 2412MHz



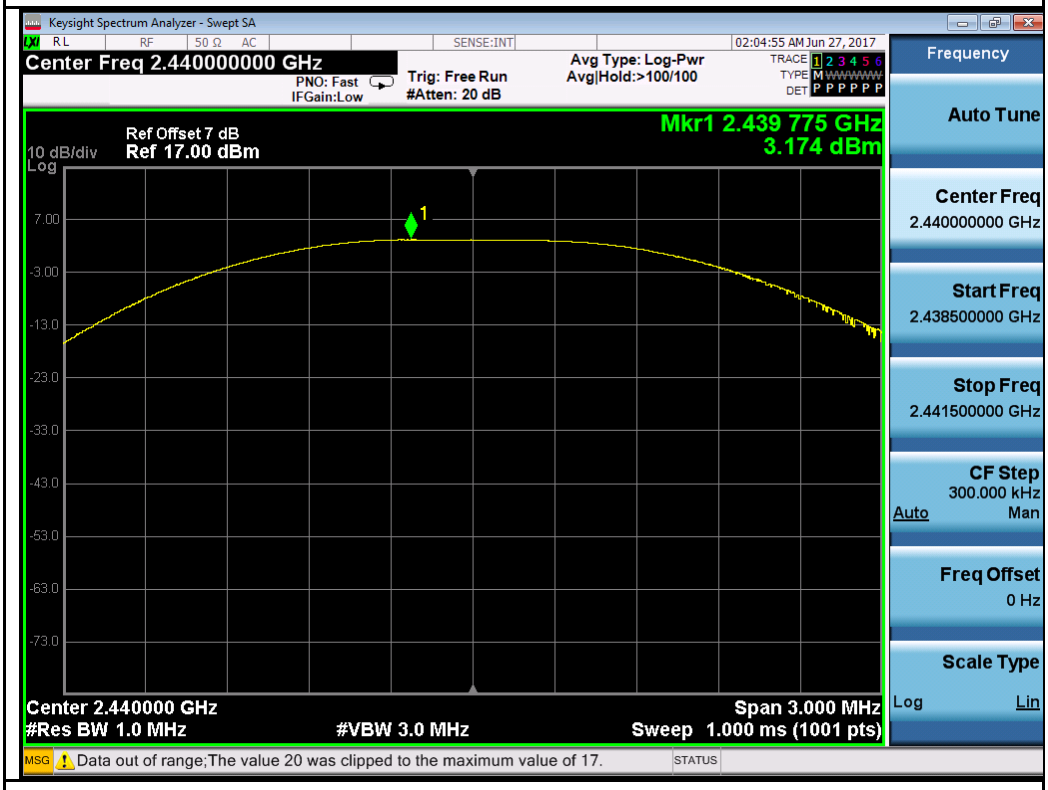
802.11n-HT20 2437MHz



802.11n-HT20 2462MHz



BLE-2402MHz



BLE-2440MHz

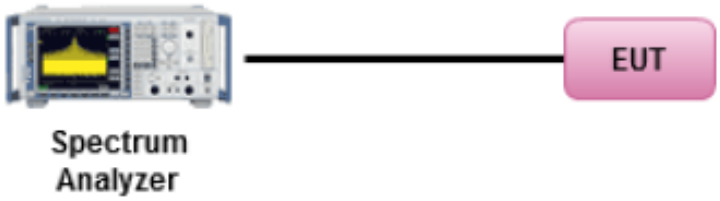

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
02:06:17 AM Jun 27, 2017
Ref Offset 7 dB
10 dB/div
Log
Ref 17.00 dBm
Mkr1 2.479 730 GHz
-1.695 dBm
7.00
-3.00
-13.0
-23.0
-33.0
-43.0
-53.0
-63.0
-73.0
Center 2.480000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
Data out of range;The value 20 was clipped to the maximum value of 17.
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.481500000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

BLE-2480MHz

10.4 Band Edge

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247 RSS247(5.5)	d)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209 (a) is not required ☐ 20 dB down ☒ 30 dB down	☒

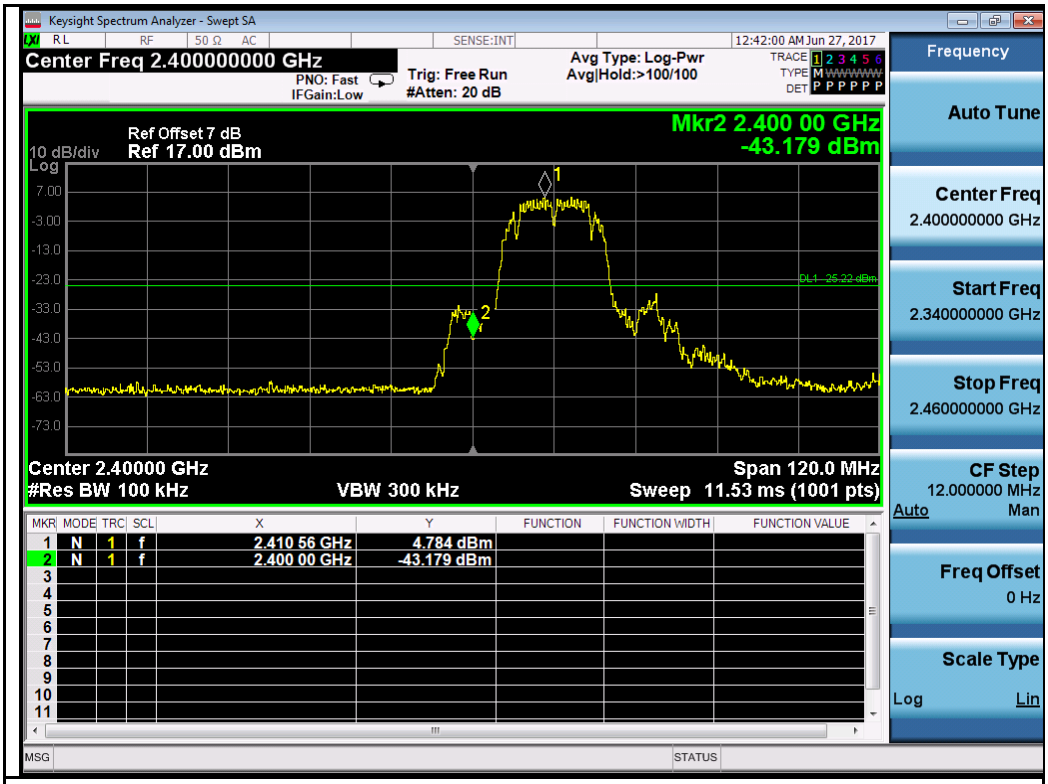
Test Setup				
Test Procedure	558074 D01 DTS Meas Guidance v04 Band Edge measurement procedure 1. Set the EUT to maximum power setting and enable the EUT transmit continuously. 2. Band edge emissions must be at least 30 dB down from the highest emission level within the authorized band as a measured. The attunation shall be be 30 dB instead of 20 dB when Peak conducted output power procedure is used. 3. Change modulation and channel bandwidth then repeat step 1 to 2. 4. Measured and record the results in the test report.			
Test Date	06/26/2017	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22ºC 46% 1020mbar
Remark	-			
Result	☒ Pass ☐ Fail			

Test Data ☐ Yes ☒ N/A

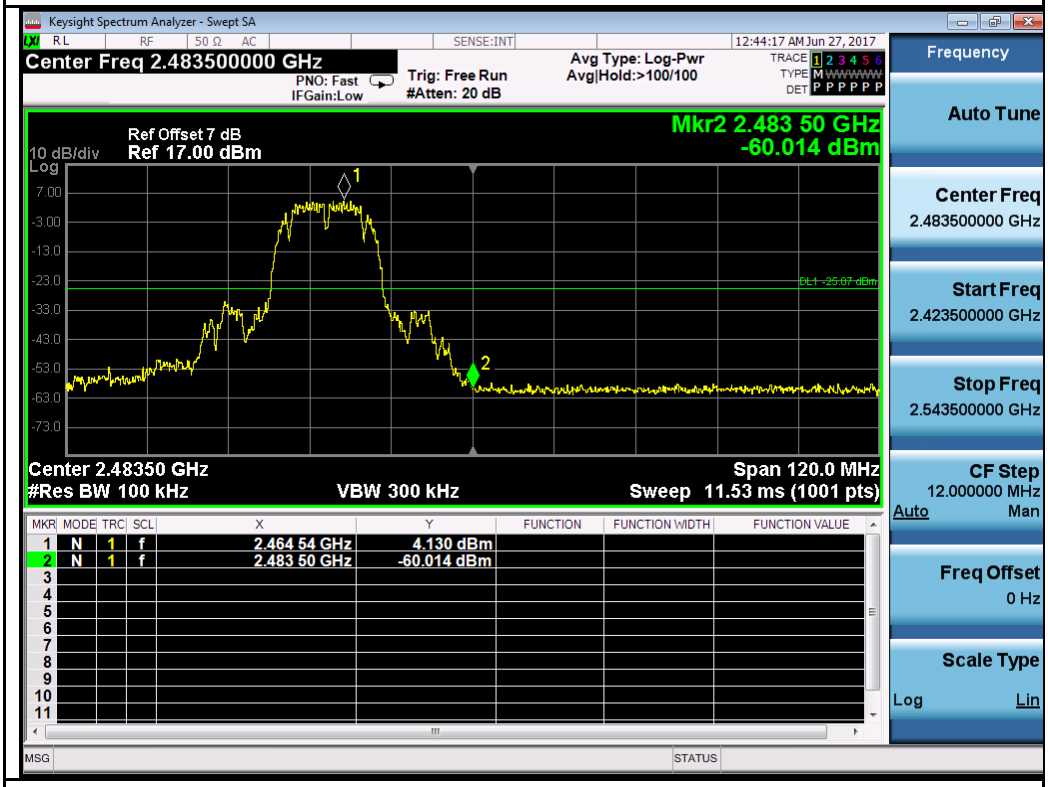
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

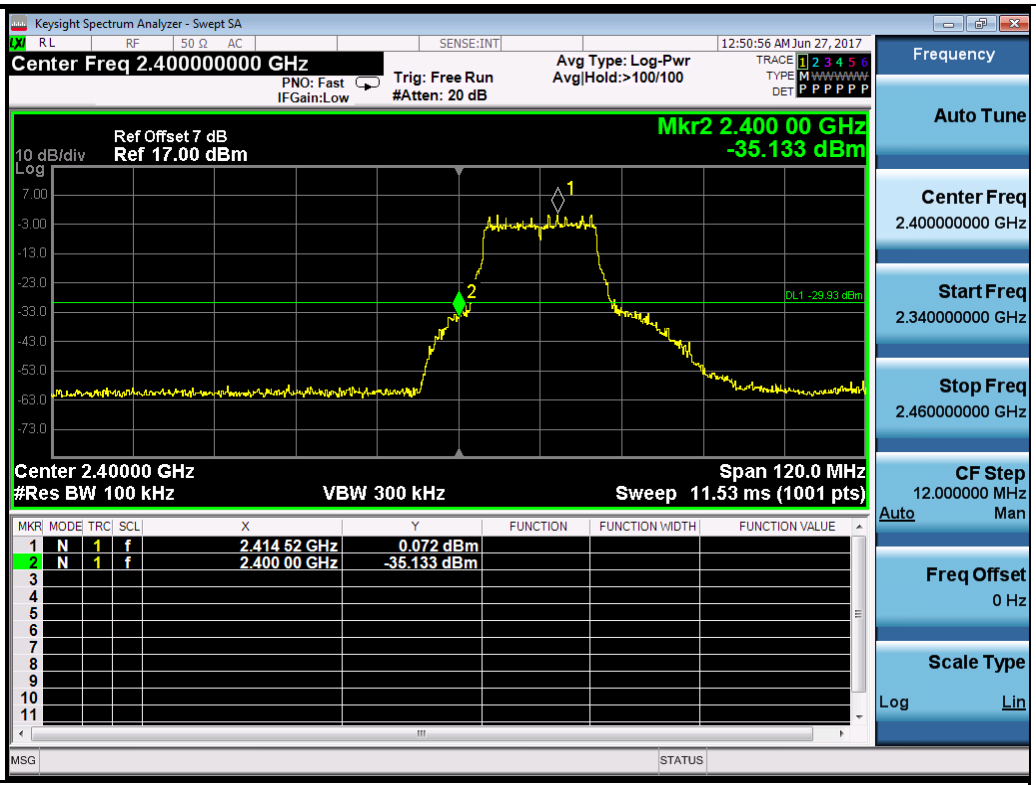
Test Plots:



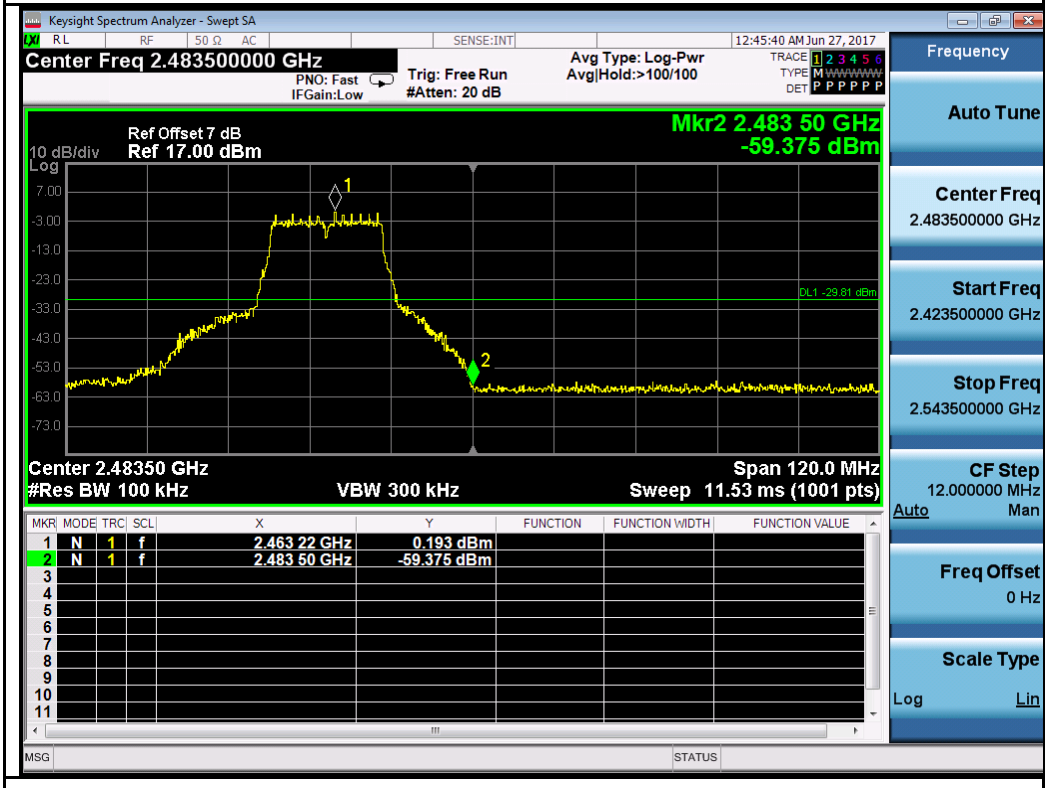
802.11b-2412MHz



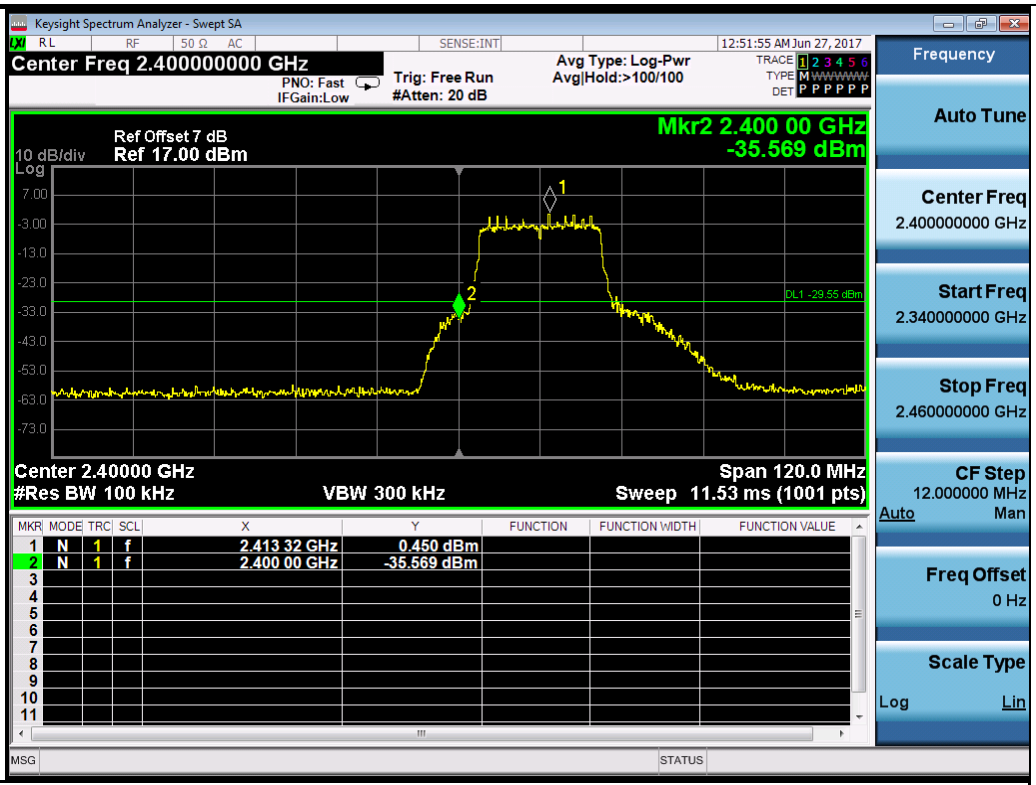
802.11b-2462MHz



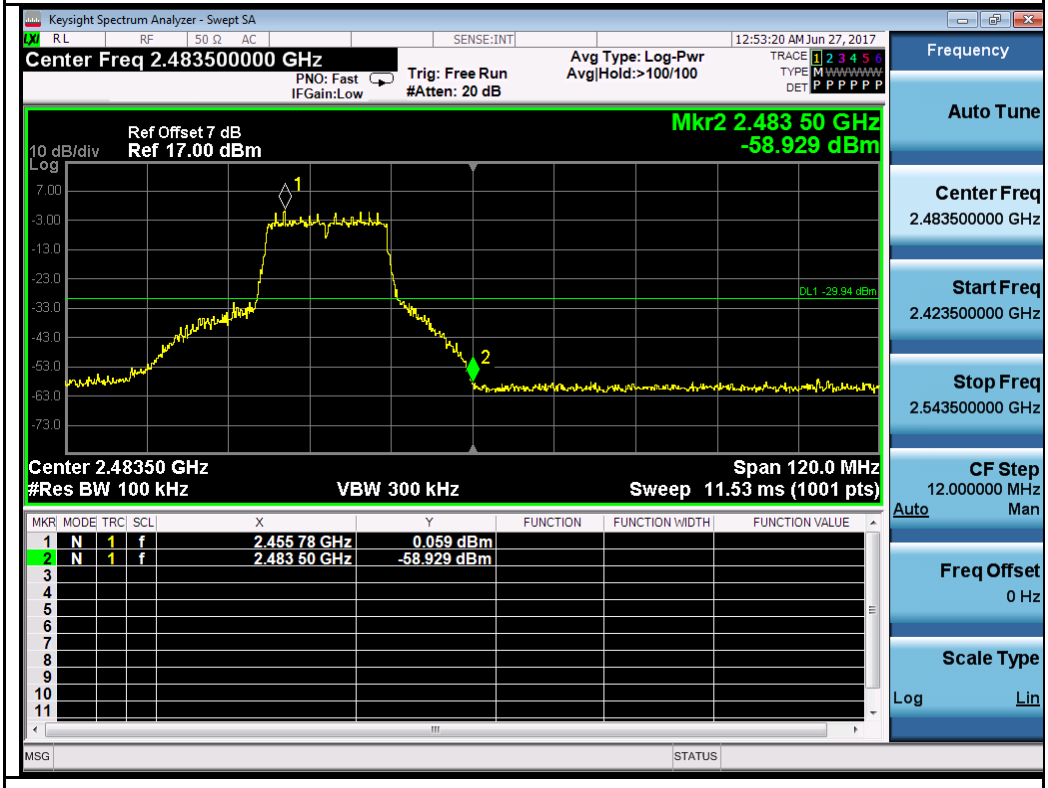
802.11g-2412MHz



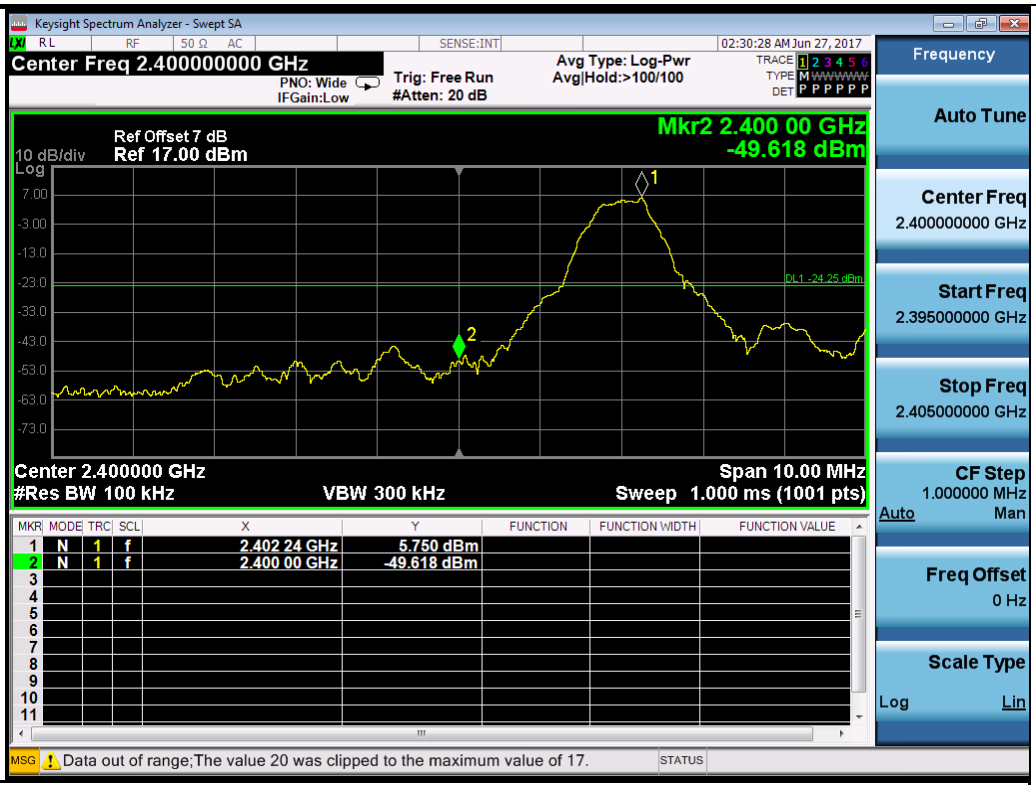
802.11g-2462MHz



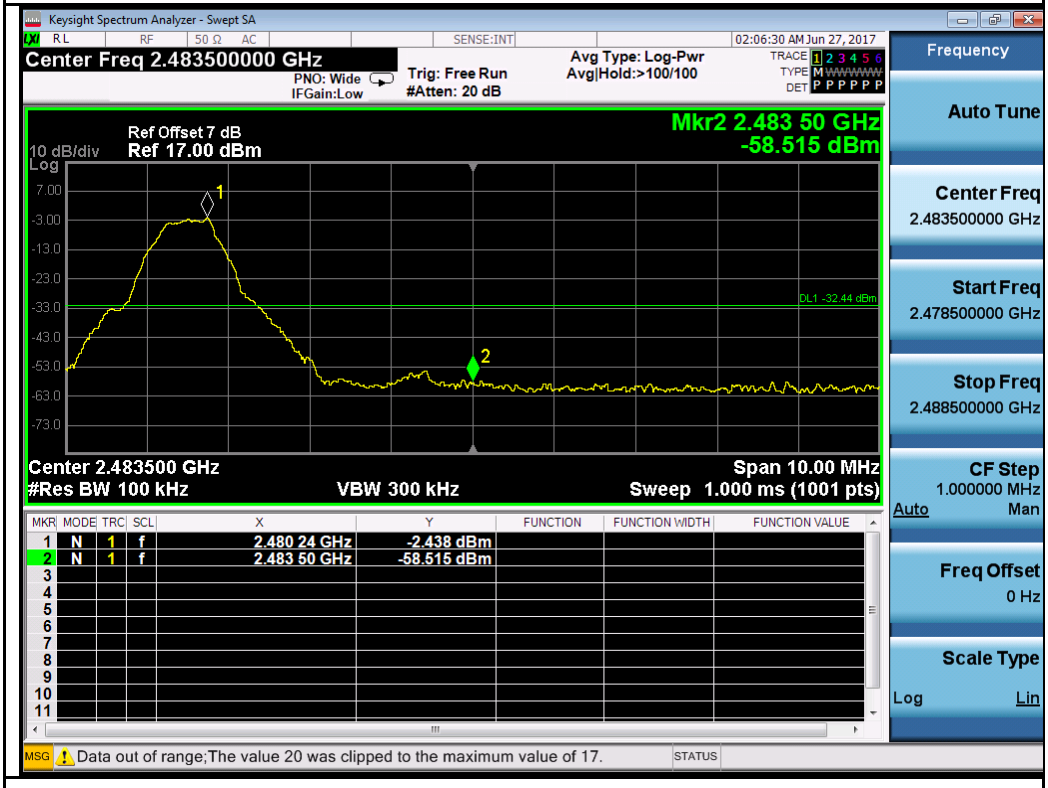
802.11n-HT20-2412MHz



802.11n-HT20-2462MHz



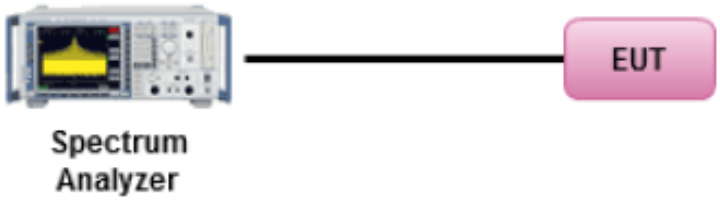
BLE-2402MHz



BLE-2480MHz

10.5 Peak Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(e) RSS247 (5.2.2)	e)	DSSS: ≤8dBm/3KHz	☒
	f)	DSSS in hybrid sys with FH turned off: ≤8dBm/3KHz	☐
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v04, 10.2 Method PKPSD (peak PSD) Peak spectral density measurement procedure - Set analyzer center frequency to DTS channel center frequency. - Set the span to 1.5 times the DTS bandwidth. - Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz. - Set the VBW ≥ 3 x RBW. - Detector = Peak - Sweep time = auto couple. - Trace mode = Max Hold - Allow trace to fully stabilize. - Use the peak marker function to determine the maximum amplitude level within the RBW. - If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.		
Test Date	06/26/2017	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

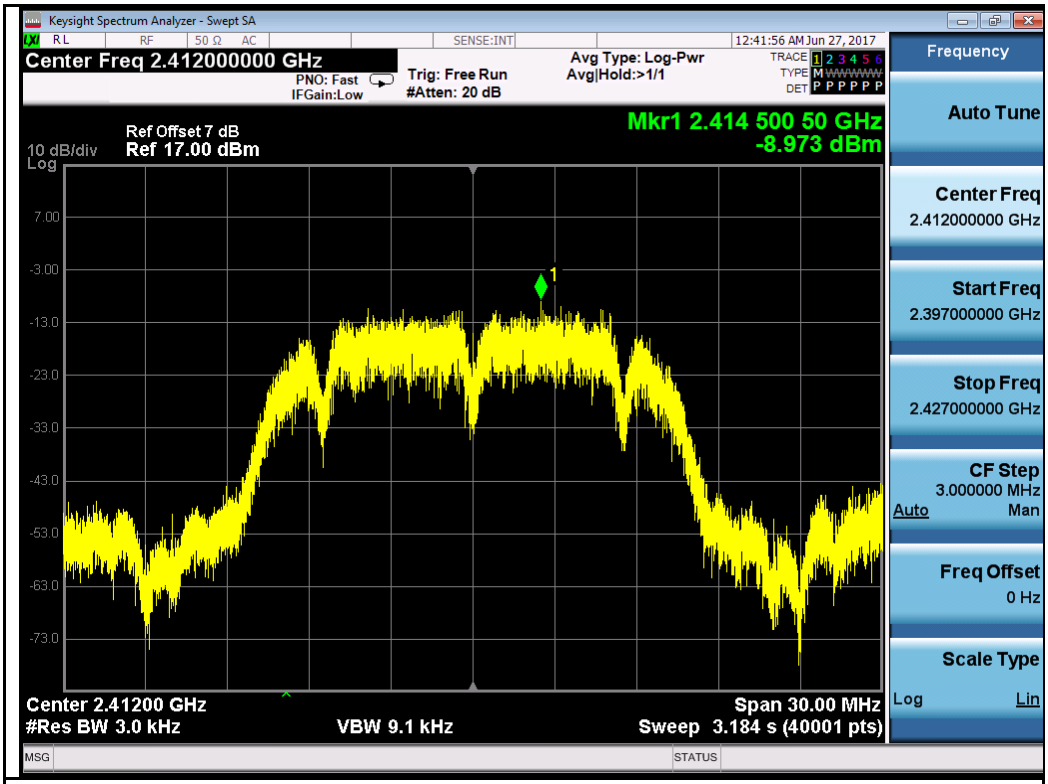
PSD measurement results for Wi-Fi:

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
PSD	802.11b	2412	Low	-8.97	8	Pass
		2437	Mid	-6.93	8	Pass
		2462	High	-9.71	8	Pass
	802.11g	2412	Low	-14.59	8	Pass
		2437	Mid	-11.62	8	Pass
		2462	High	-14.92	8	Pass
	802.11n-20M	2412	Low	-14.96	8	Pass
		2437	Mid	-12.21	8	Pass
		2462	High	-14.61	8	Pass

PSD measurement results for BLE:

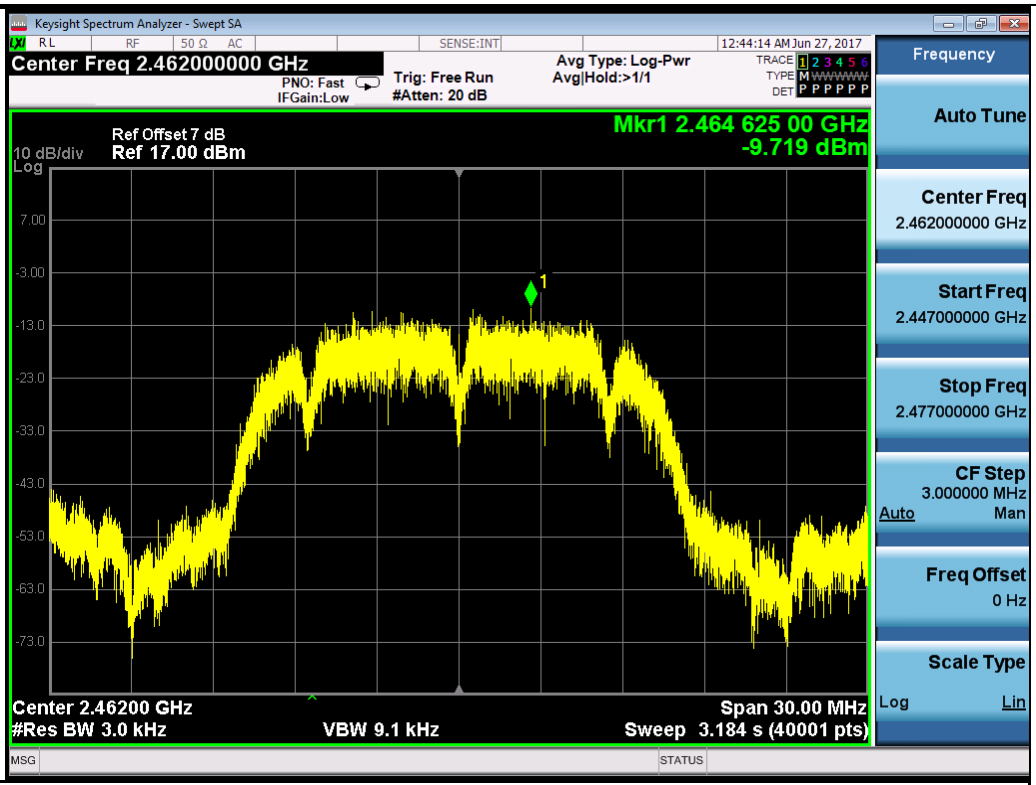
Type	Freq (MHz)	Test mode	CH	Conducted PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
PSD	2402	Bluetooth LE	Low	-8.26	8	Pass
	2441	Bluetooth LE	Mid	-11.12	8	Pass
	2480	Bluetooth LE	High	-16.27	8	Pass

Test Plots

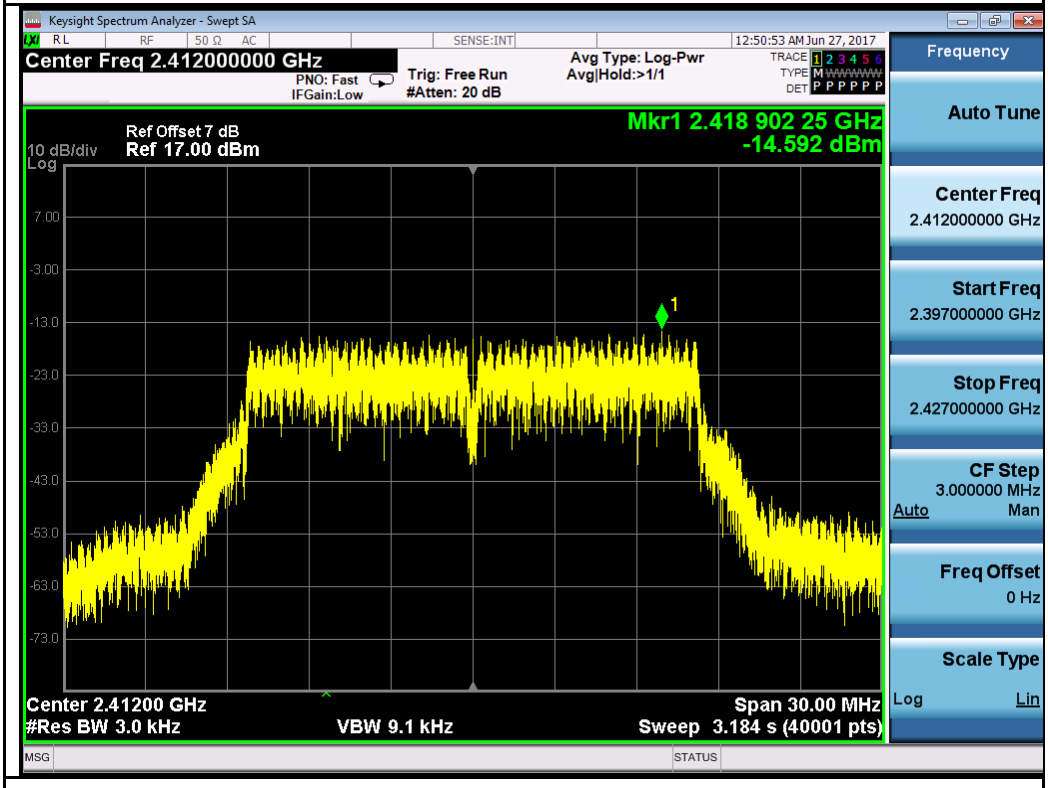


802.11b-2412MHz

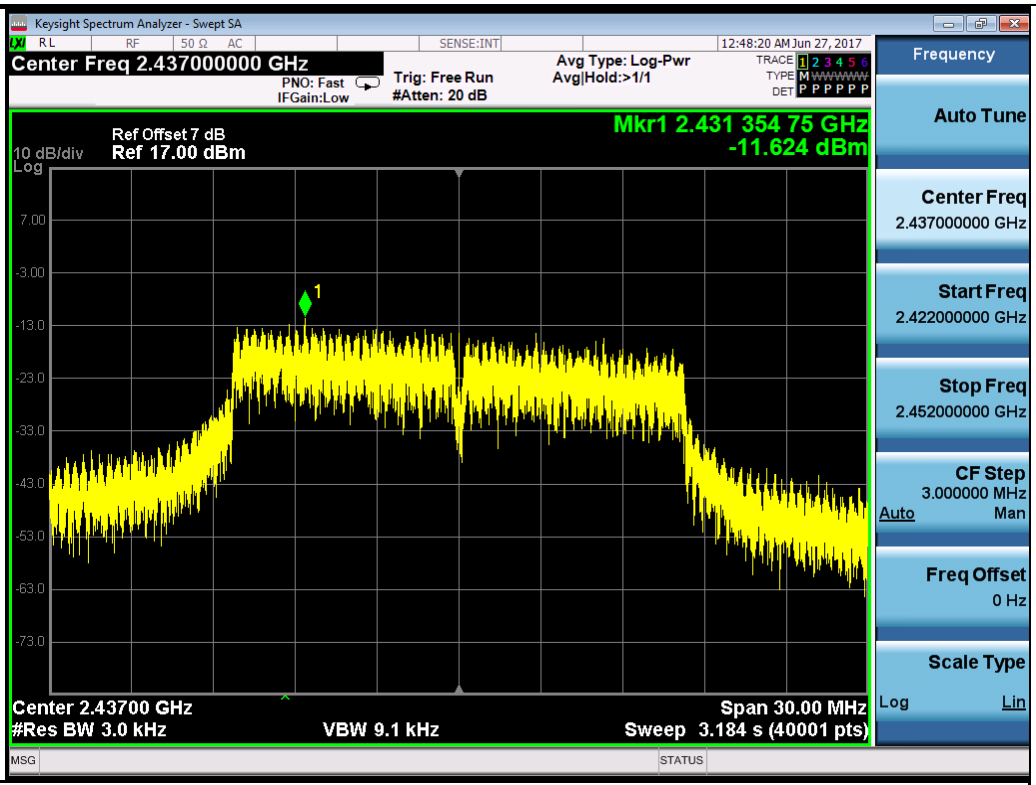
802.11b-2437MHz



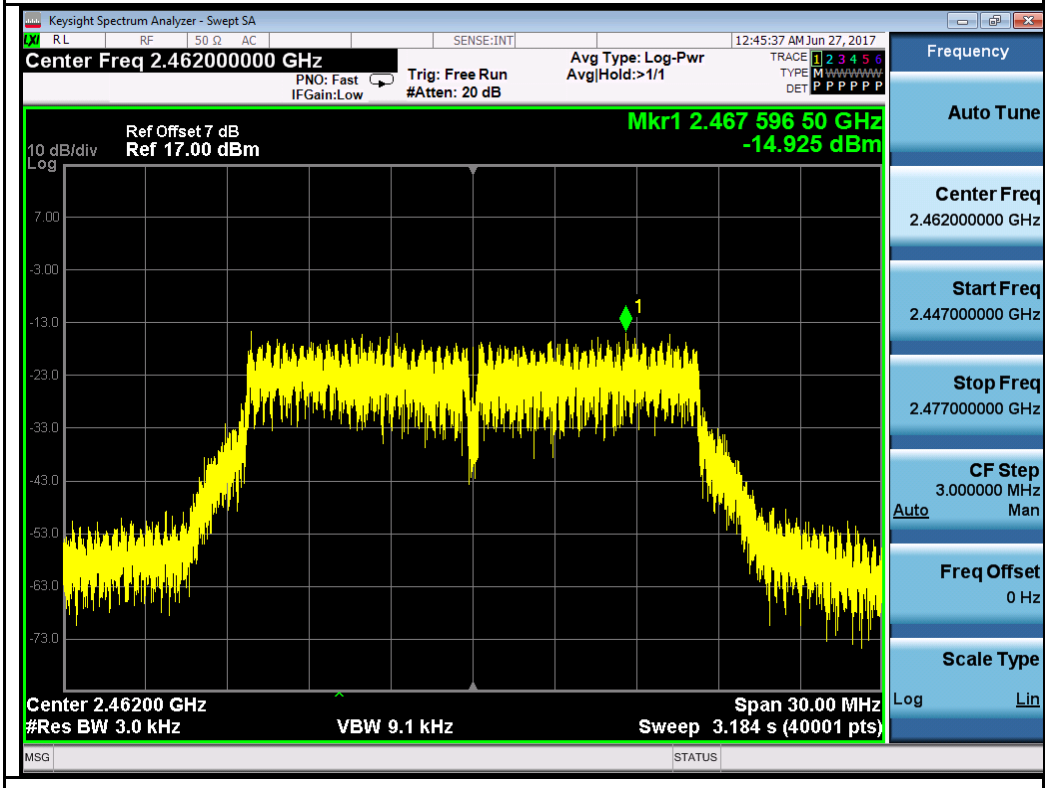
802.11b-2462MHz



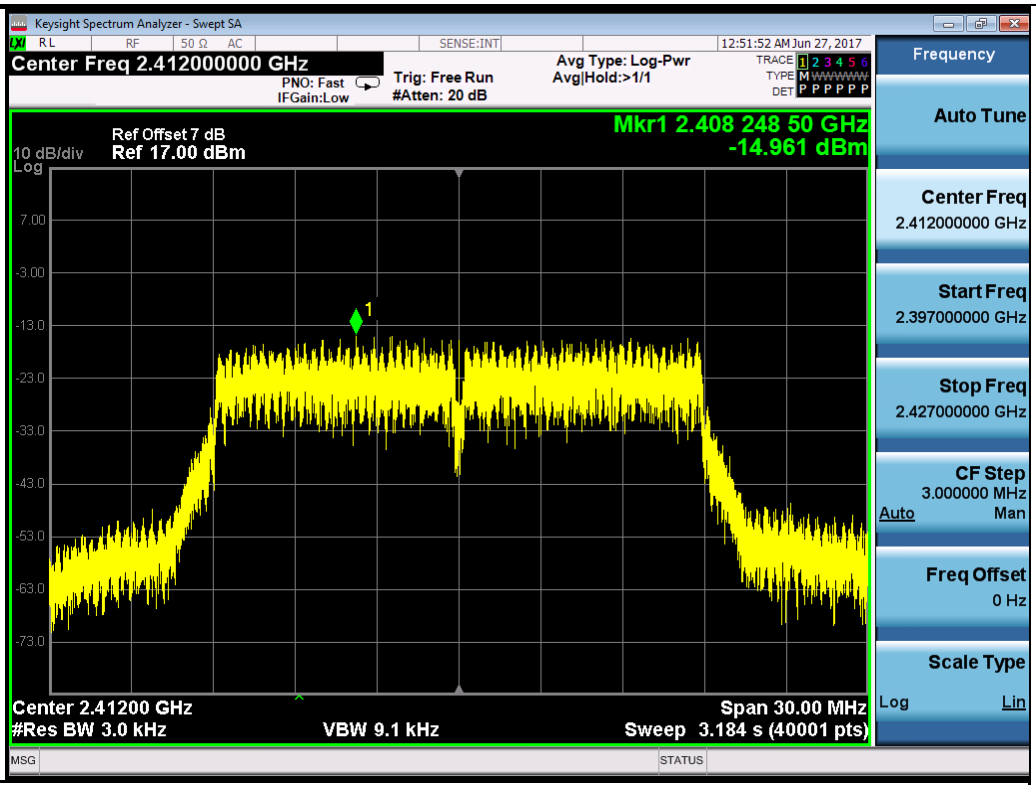
802.11g-2412MHz



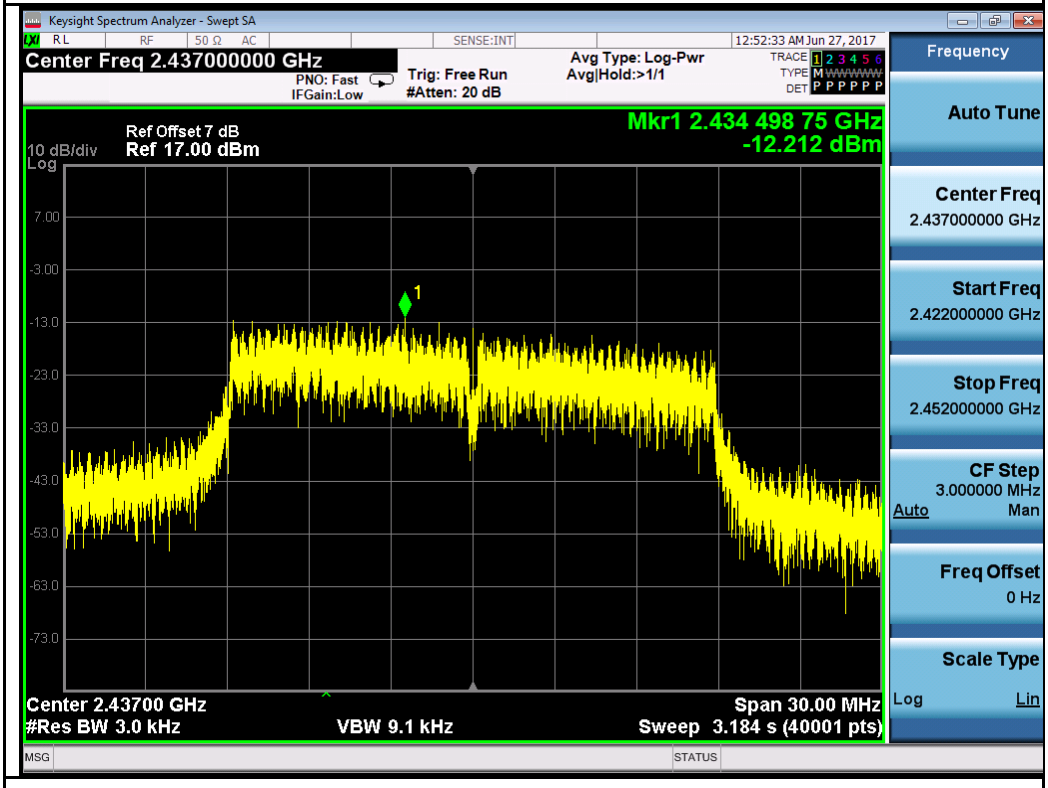
802.11g-2437MHz



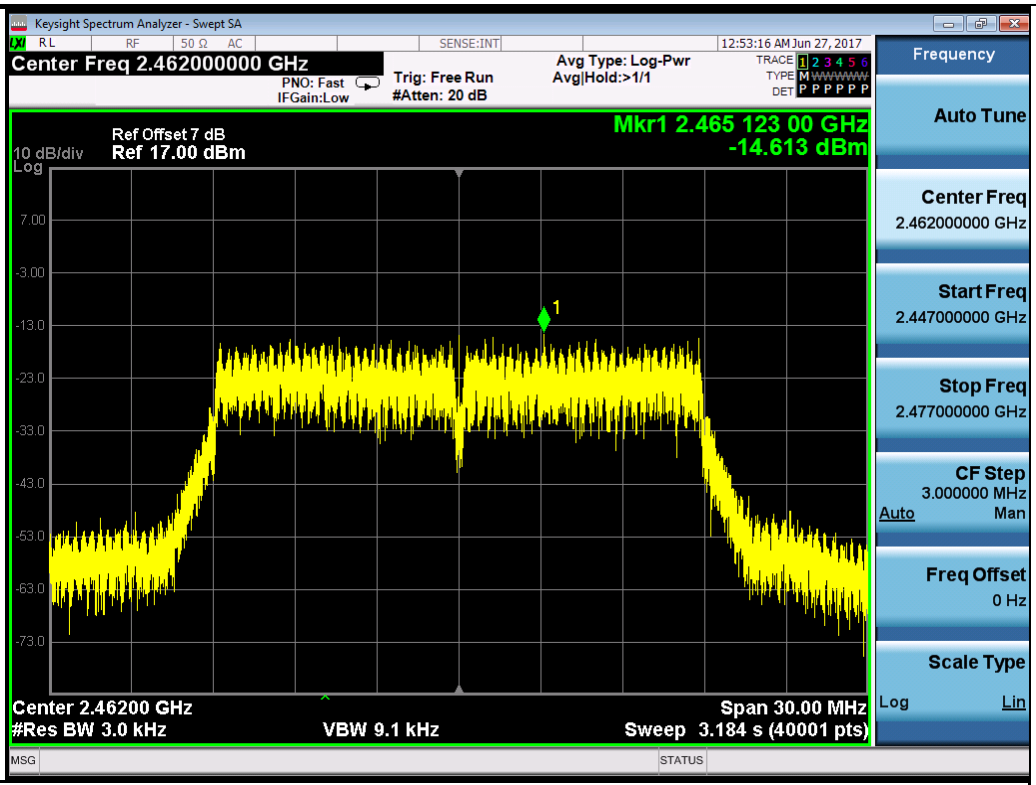
802.11g-2462MHz



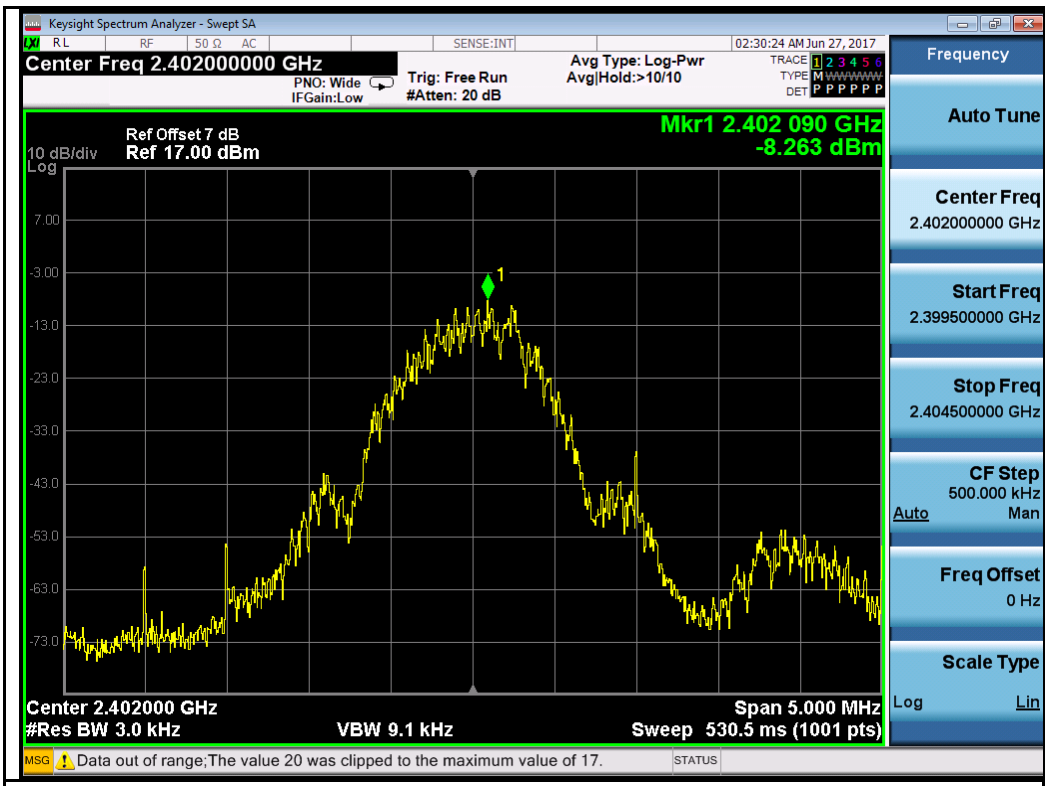
802.11n-HT20 2412MHz



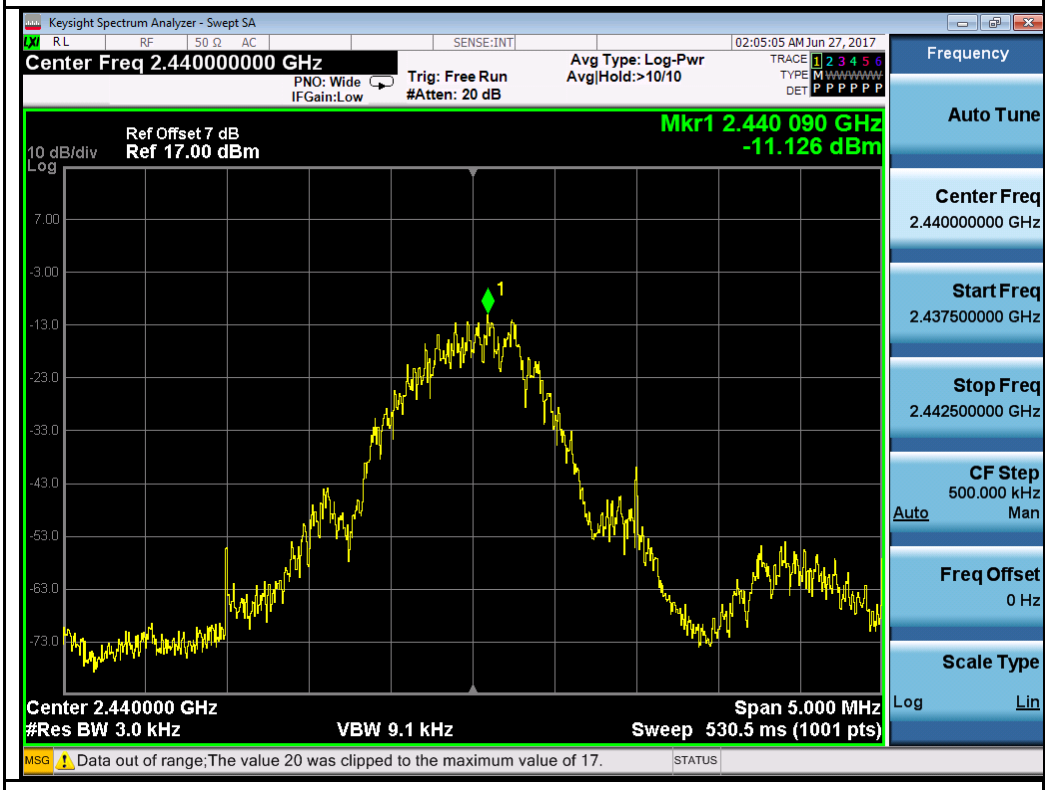
802.11n-HT20 2437MHz



802.11n-HT20 2462MHz



BLE-2402MHz



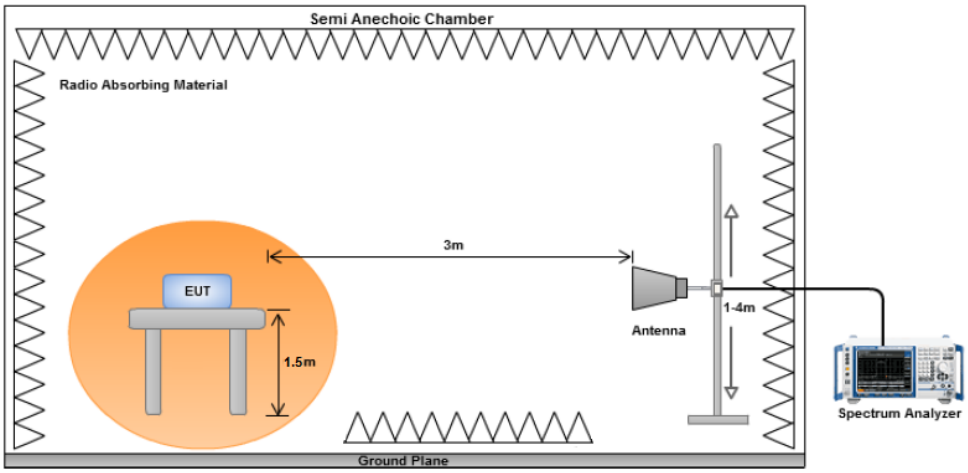
BLE-2440MHz


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
02:06:27 AM Jun 27, 2017
Ref Offset 7 dB
10 dB/div
Log
Ref 17.00 dBm
Mkr1 2.480 090 GHz
-16.277 dBm
Center 2.480000 GHz
#Res BW 3.0 kHz
VBW 9.1 kHz
Span 5.000 MHz
Sweep 530.5 ms (1001 pts)
Data out of range;The value 20 was clipped to the maximum value of 17.
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477500000 GHz
Stop Freq
2.482500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

BLE-2480MHz

10.6 Radiated Spurious Emissions in restricted band

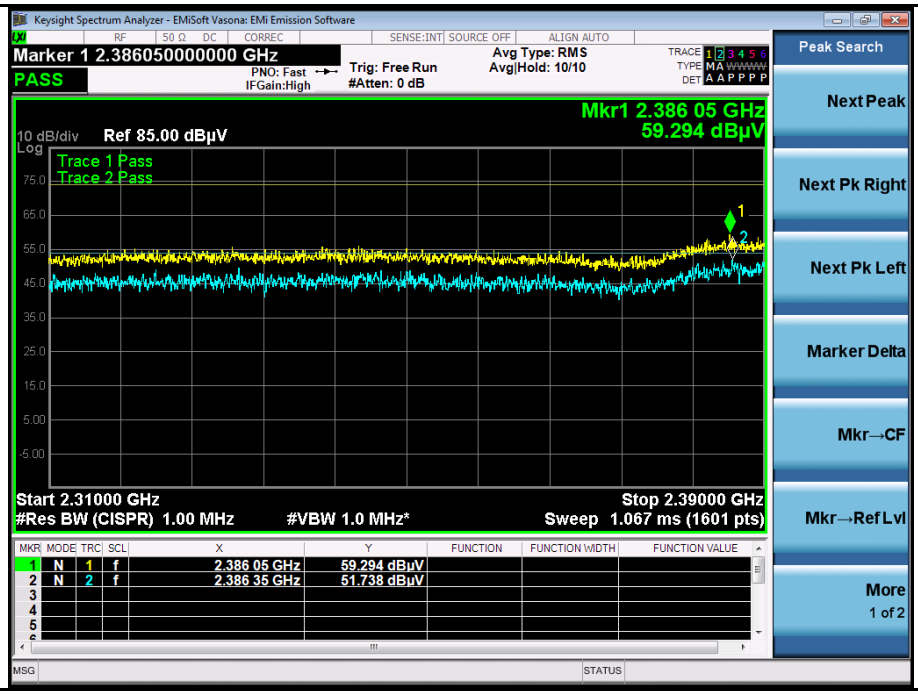
Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS210(A8.5)	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required ☐ 20 dB down ☒ 30 dB down	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure		1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. An average measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.	
Remark		The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case. Radiated measurement was measured with antenna port terminated, there isn't outstanding emission found at the edge of restricted frequency, within x dB margin	
Result		☒ Pass ☐ Fail	

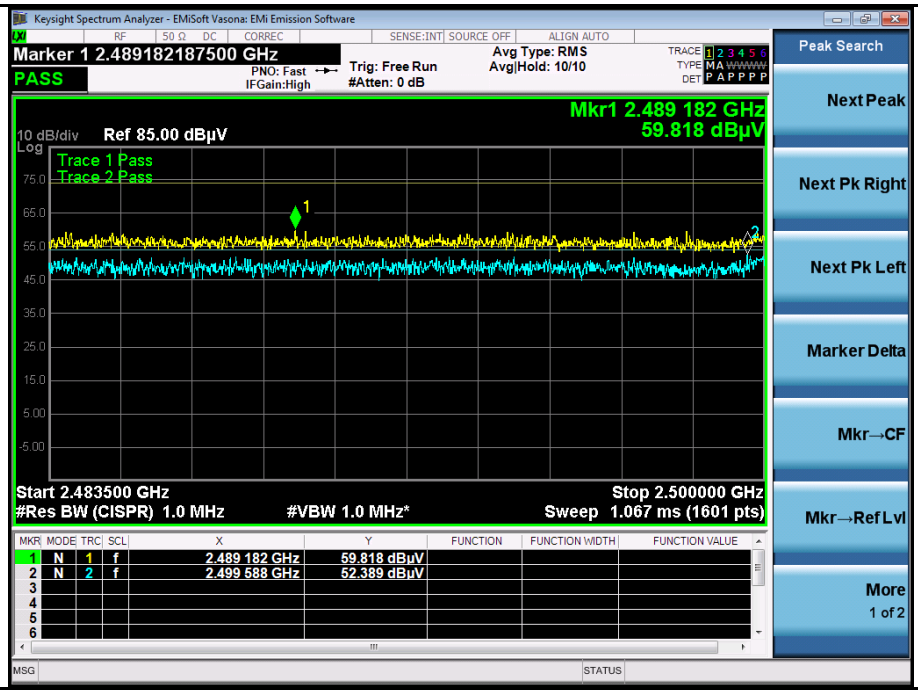
Test Data ☐ Yes (See below) ☒ N/A
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at 10m chamber.

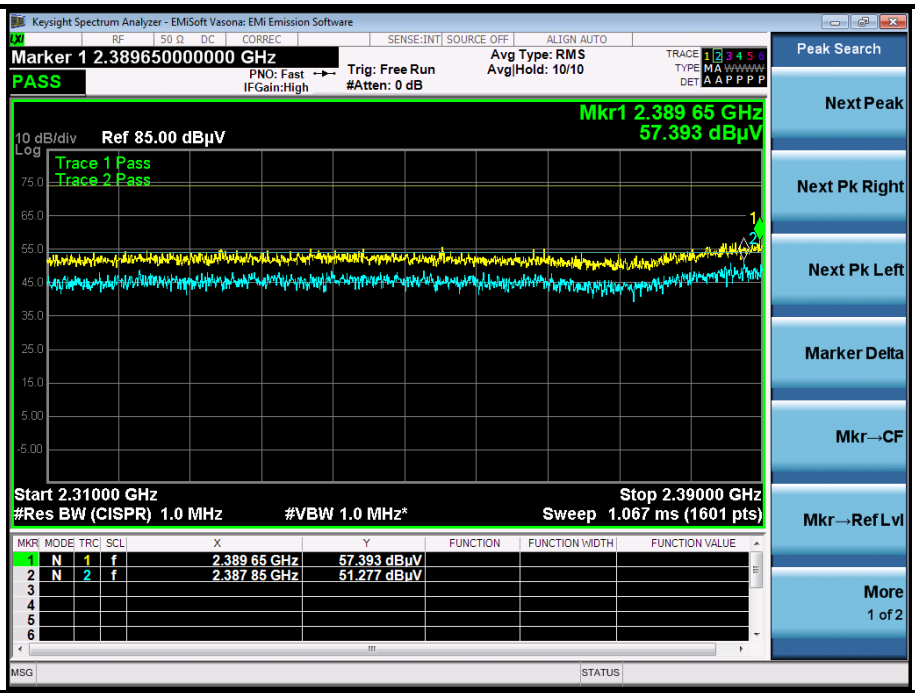
Restricted Band Measurement Plots:



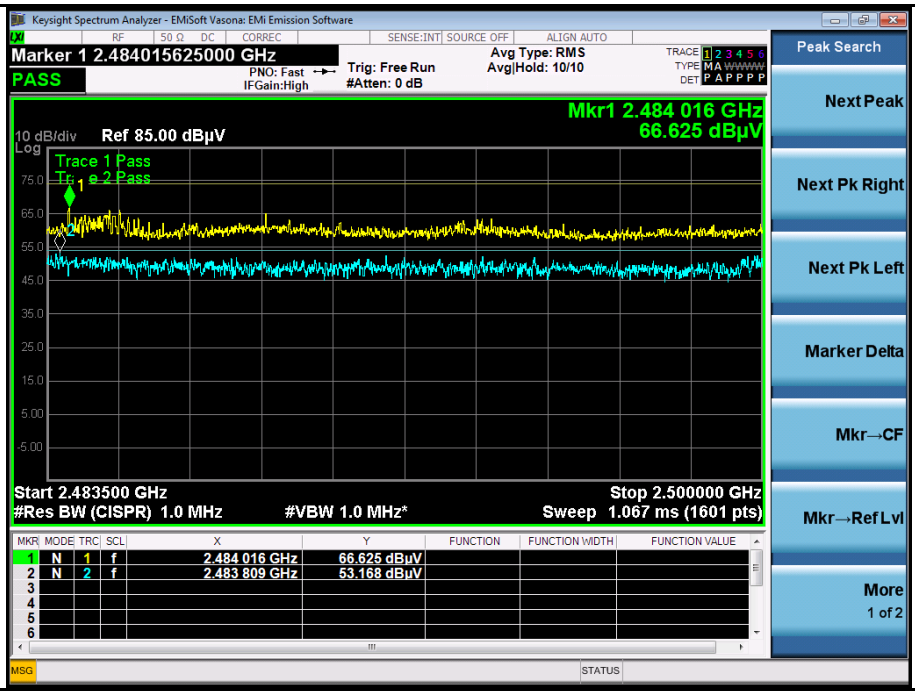
802.11b-2412MHz



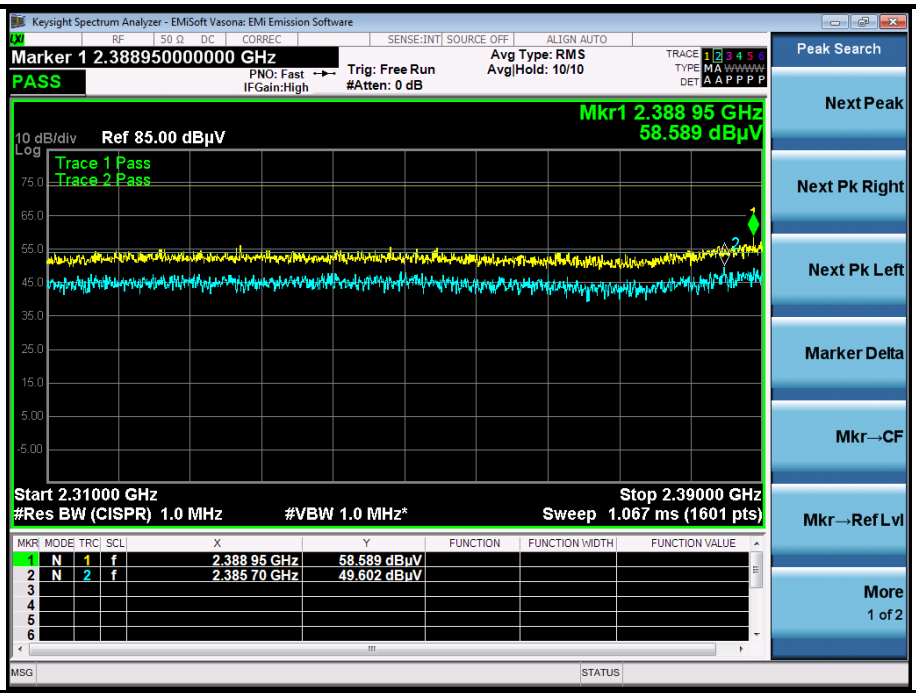
802.11b-2462MHz



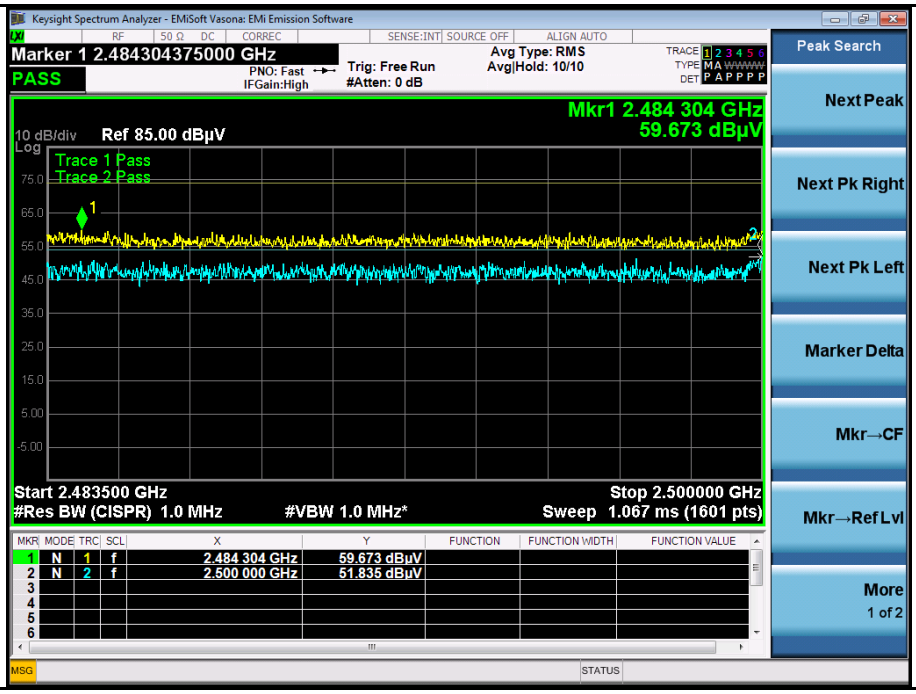
802.11g-2412MHz



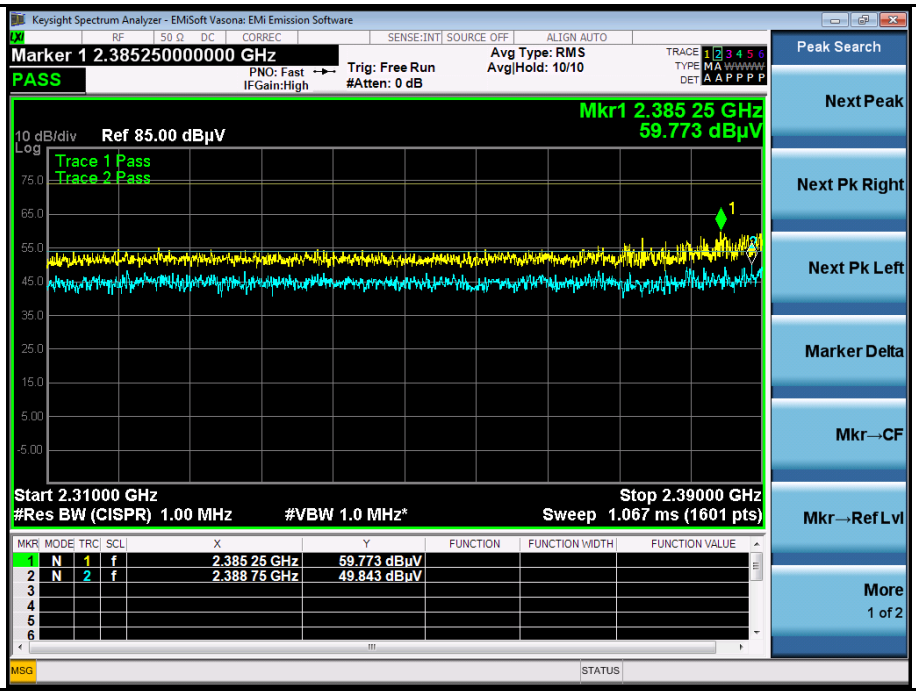
802.11g-2462MHz



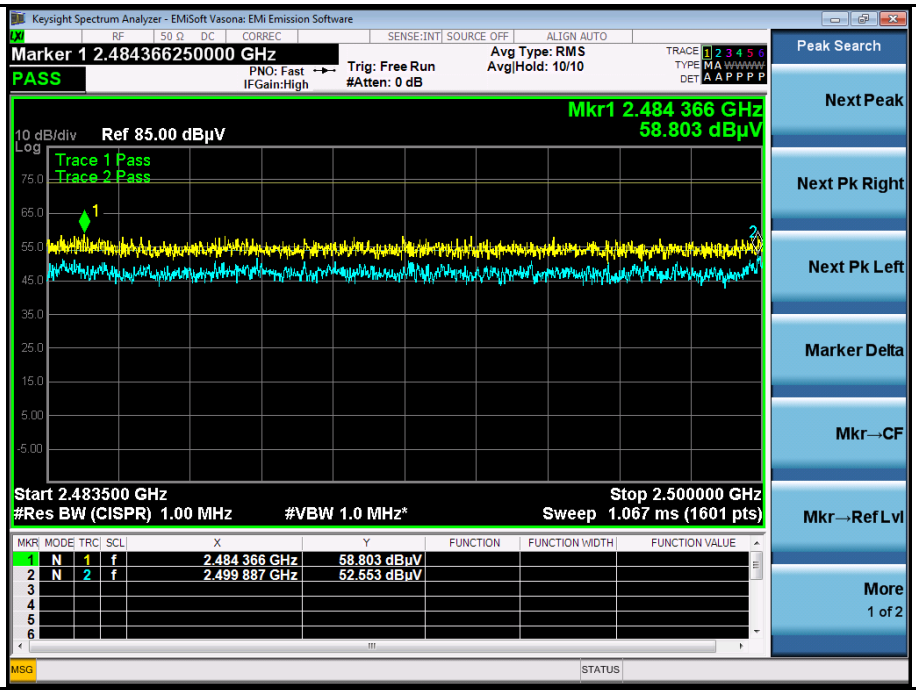
802.11n-HT20-2412MHz



802.11n-HT20-2462MHz



BLE-2402MHz



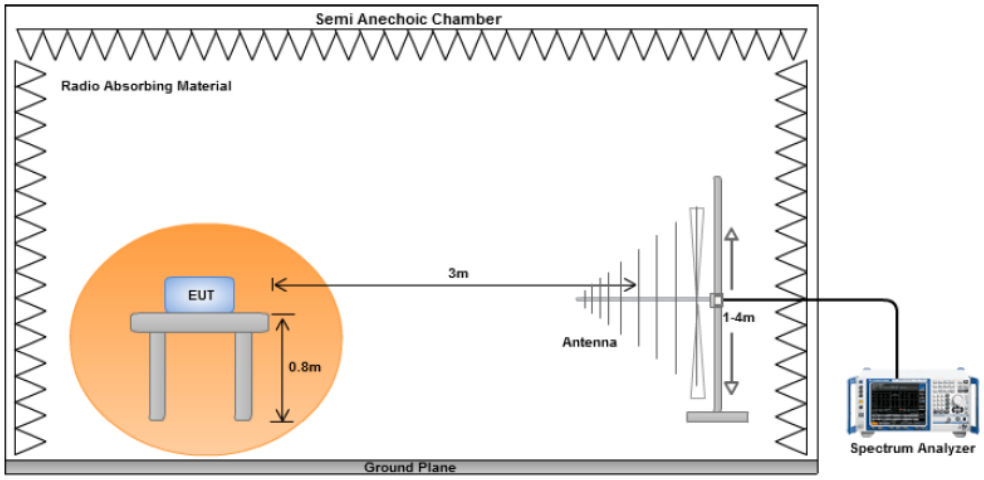
BLE-2480MHz

10.7 Radiated Spurious Emissions below 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d) RSS247 (5.5)	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges	☒

Frequency range (MHz)	Field Strength (uV/m)
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

Test Setup	
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.
Result	☒ Pass ☐ Fail

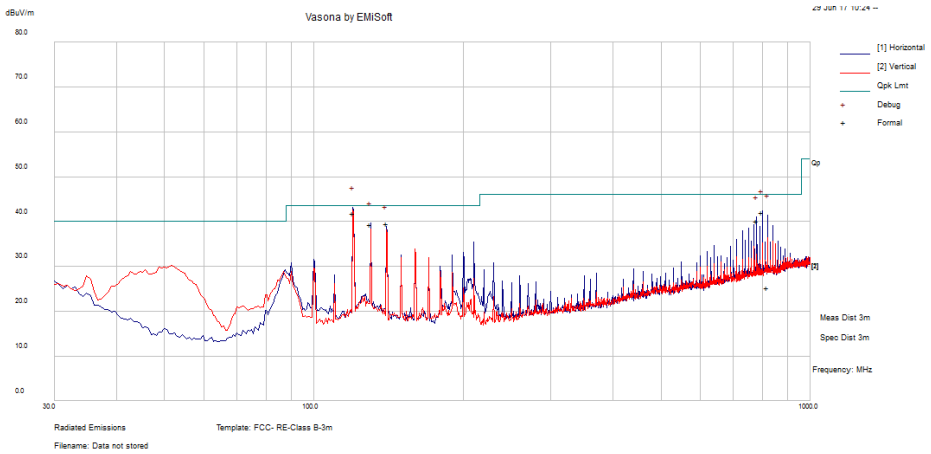
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

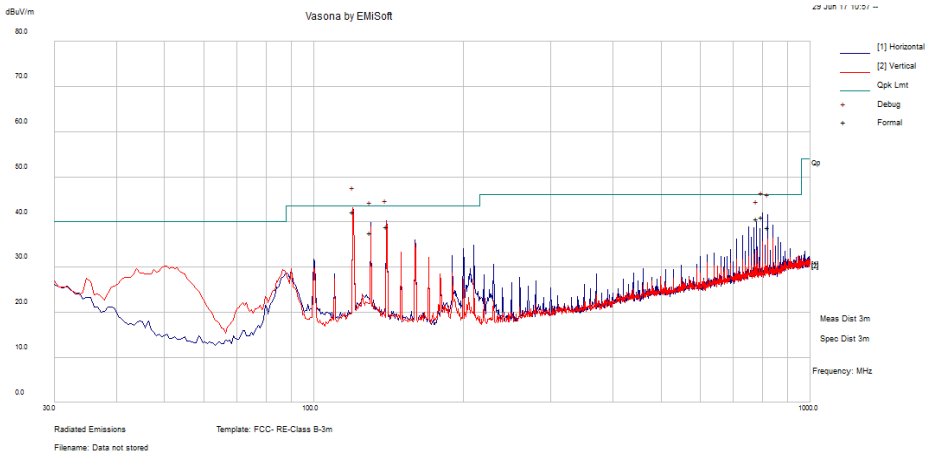
Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	26.1	Result	Pass
	Humidity (%)	47.5		
	Atmospheric (mbar):	1020		
Mains Power:	120VAC, 60Hz			
Tested by:	Chen Ge			
Test Date:	06/29/2017			
Remarks:	802.11n HT20, middle channel			



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
119.98	52.75	11.8	-22.59	41.95	Quasi Max	H	210	68	43.5	-1.55	Pass
799.99	41.79	14.62	-14.39	42.01	Quasi Max	H	100	128	46	-3.99	Pass
130.01	50.18	11.85	-22.67	39.35	Quasi Max	H	225	103	43.5	-4.15	Pass
139.98	51.12	11.9	-23.47	39.56	Quasi Max	H	214	106	43.5	-3.94	Pass
819.77	24.58	14.62	-13.89	25.31	Quasi Max	H	169	124	46	-20.69	Pass
779.99	39.98	14.54	-14.41	40.1	Quasi Max	H	110	118	46	-5.90	Pass

Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	26.1	Result	Pass
	Humidity (%)	47.5		
	Atmospheric (mbar):	1020		
Mains Power:	120VAC, 60Hz			
Tested by:	Chen Ge			
Test Date:	06/29/2017			
Remarks:	BLE, middle channel			

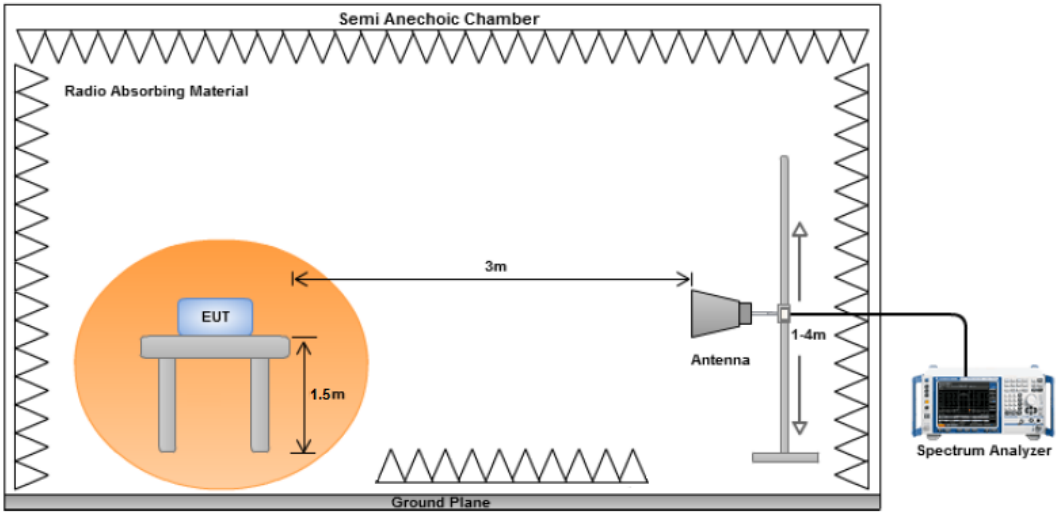


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
119.97	53.12	11.8	-22.59	42.33	Quasi Max	H	267	79	43.5	-1.17	Pass
139.98	50.51	11.9	-23.47	38.95	Quasi Max	H	154	106	43.5	-4.55	Pass
129.97	48.48	11.85	-22.67	37.66	Quasi Max	H	132	97	43.5	-5.84	Pass
800.02	40.92	14.62	-14.39	41.15	Quasi Max	H	106	121	46	-4.85	Pass
819.96	38.1	14.62	-13.89	38.83	Quasi Max	H	99	133	46	-7.17	Pass
779.99	40.69	14.54	-14.41	40.81	Quasi Max	H	100	127	46	-5.19	Pass

Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

10.8 Radiated Spurious Emissions between 1GHz – 25GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS210(A8.5)	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required ☐ 20 dB down ☒ 30 dB down	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure		1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. An average measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.	
Remark		The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case. There isn't outstanding emission found at the edge of restricted frequency.	
Result		☒ Pass ☐ Fail	

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Chen Ge at 3m chamber.

Radiated Emission Test Results (Above 1GHz)

1GHz-25GHz – 802.11b – 2412MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17869.02	37.61	11.21	8.29	57.12	Peak Max	H	336	174	74	-16.88	Pass
7234.85	40.2	6.63	0.02	46.85	Peak Max	H	254	67	74	-27.15	Pass
4824.04	42.26	5.48	-5	42.74	Peak Max	V	215	228	74	-31.26	Pass
3840.29	45.85	4.86	-6.1	44.61	Peak Max	H	99	83	74	-29.39	Pass
17869.02	25.21	11.21	8.29	44.71	Average Max	H	336	174	54	-9.29	Pass
7234.85	28.94	6.63	0.02	35.59	Average Max	H	254	67	54	-18.41	Pass
4824.04	32.61	5.48	-5	33.08	Average Max	V	215	228	54	-20.92	Pass
3840.29	40.38	4.86	-6.1	39.14	Average Max	H	99	83	54	-14.86	Pass

1GHz-25GHz- 802.11b - 2437MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17841.57	38.28	11.21	8.01	57.5	Peak Max	H	151	247	74	-16.5	Pass
9747.95	40.32	7.92	-0.46	47.78	Peak Max	V	127	125	74	-26.22	Pass
7311.72	40.12	6.68	0.06	46.86	Peak Max	V	235	356	74	-27.14	Pass
4876.48	40.18	5.51	-5.1	40.6	Peak Max	H	373	64	74	-33.4	Pass
17841.57	25.76	11.21	8.01	44.98	Average Max	H	151	247	54	-9.02	Pass
9747.95	27.98	7.92	-0.46	35.44	Average Max	V	127	125	54	-18.56	Pass
7311.72	28.85	6.68	0.06	35.6	Average Max	V	235	356	54	-18.4	Pass
4876.48	28.74	5.51	-5.1	29.15	Average Max	H	373	64	54	-24.85	Pass

1GHz-25GHz- 802.11b – 2462MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4919.29	39.94	15.54	-5.14	50.34	Peak Max	H	396	104	74	-23.66	Pass
7385.78	40.01	16.73	-0.25	56.5	Peak Max	V	251	101	74	-17.5	Pass
9846.37	39.02	17.85	-0.45	56.42	Peak Max	H	326	239	74	-17.58	Pass
4919.29	28.23	15.54	-5.14	38.63	Average Max	H	396	104	54	-15.37	Pass
7385.78	27.89	16.73	-0.25	44.37	Average Max	H	387	282	54	-9.63	Pass
9846.37	27.29	17.85	-0.45	44.69	Average Max	V	310	339	54	-9.31	Pass

1GHz-25GHz – 802.11g – 2412MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7233.14	39.83	16.63	0.01	56.48	Peak Max	V	169	271	74	-17.52	Pass
9647.97	39.73	17.99	-0.34	57.38	Peak Max	V	117	4	74	-16.62	Pass
4822.69	43.6	15.48	-5	54.08	Peak Max	V	190	85	74	-19.92	Pass
7233.14	28.21	16.63	0.01	44.85	Average Max	V	169	271	54	-9.15	Pass
9647.97	28.15	17.99	-0.34	45.8	Average Max	V	117	4	54	-8.2	Pass
4822.69	30.57	15.48	-5	41.05	Average Max	V	190	85	54	-12.96	Pass

1GHz-25GHz- 802.11g – 2437MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4876.21	45.14	15.51	-5.1	55.56	Peak Max	H	99	160	74	-18.44	Pass
7310.00	40.25	16.68	0.07	57	Peak Max	H	208	255	74	-17	Pass
9748.20	40.04	17.92	-0.46	57.5	Peak Max	V	257	271	74	-16.5	Pass
4876.21	32.05	15.51	-5.1	42.46	Average Max	H	99	160	54	-11.54	Pass
7310.00	28.26	16.68	0.07	45.01	Average Max	H	208	255	54	-8.99	Pass
9748.20	27.66	17.92	-0.46	45.12	Average Max	V	257	271	54	-8.88	Pass

1GHz-25GHz- 802.11g - 2462MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4922.64	41.5	15.54	-5.14	51.9	Peak Max	H	270	347	74	-22.1	Pass
7385.51	39.95	16.73	-0.24	56.44	Peak Max	H	147	251	74	-17.56	Pass
9848.12	40.87	17.85	-0.45	58.27	Peak Max	V	98	330	74	-15.73	Pass
4922.64	29.18	15.54	-5.14	39.59	Average Max	H	270	347	54	-14.42	Pass
7385.51	28.14	16.73	-0.24	44.62	Average Max	H	147	251	54	-9.38	Pass
9848.12	27.52	17.85	-0.45	44.92	Average Max	V	98	330	54	-9.08	Pass

1GHz-25GHz – 802.11n-20M – 2412MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
9646.33	39.66	17.99	-0.33	57.32	Peak Max	H	177	183	74	-16.68	Pass
4822.49	41.21	15.48	-5	51.69	Peak Max	V	314	21	74	-22.31	Pass
7234.45	39.74	16.63	0.02	56.39	Peak Max	V	263	294	74	-17.61	Pass
9646.33	27.01	17.99	-0.33	44.67	Average Max	V	141	289	54	-9.33	Pass
4822.49	29.06	15.48	-5	39.54	Average Max	H	100	301	54	-14.46	Pass
7234.45	27.61	16.63	0.02	44.26	Average Max	H	341	329	54	-9.74	Pass

1GHz-25GHz- 802.11n-20M - 2437MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4872.00	41.07	15.51	-5.09	51.49	Peak Max	V	275	333	74	-22.51	Pass
7310.89	40.96	16.68	0.07	57.71	Peak Max	H	131	291	74	-16.29	Pass
9747.84	39.06	17.92	-0.46	56.52	Peak Max	V	184	166	74	-17.48	Pass
4872.00	29	15.51	-5.09	39.42	Average Max	V	275	333	54	-14.58	Pass
7310.89	29.46	16.68	0.07	46.21	Average Max	H	131	291	54	-7.8	Pass
9747.84	27.08	17.92	-0.46	44.54	Average Max	V	184	166	54	-9.46	Pass

1GHz-25GHz- 802.11n-20M – 2462MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4925.30	40.79	15.54	-5.14	51.19	Peak Max	H	259	272	74	-22.81	Pass
7386.19	39.62	16.73	-0.25	56.11	Peak Max	H	243	317	74	-17.89	Pass
9846.38	39.41	17.85	-0.45	56.81	Peak Max	V	214	288	74	-17.19	Pass
4925.30	28.26	15.54	-5.14	38.67	Average Max	H	259	272	54	-15.33	Pass
7386.19	27.56	16.73	-0.25	44.04	Average Max	H	243	317	54	-9.96	Pass
9846.38	27.27	17.85	-0.45	44.67	Average Max	V	214	288	54	-9.33	Pass

Above 1GHz-25GHz- BLE - 2402MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
4801.93	41.35	15.47	-4.97	51.86	Peak Max	V	104	230	74	-22.14	Pass
9607.77	39.19	18.02	-0.2	57	Peak Max	H	103	4	74	-17	Pass
7207.88	39.49	16.62	-0.02	56.08	Peak Max	H	189	162	74	-17.92	Pass
4801.93	28.47	15.47	-4.97	38.97	Average Max	V	104	230	54	-15.03	Pass
9607.77	27.56	18.02	-0.2	45.38	Average Max	H	103	4	54	-8.62	Pass
7207.88	27.31	16.62	-0.02	43.9	Average Max	V	224	124	54	-10.1	Pass

Above 1GHz-25GHz- BLE - 2440MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7321.26	39.61	16.69	0.02	56.32	Peak Max	H	248	240	74	-17.68	Pass
9760.79	39.41	17.91	-0.44	56.88	Peak Max	H	242	107	74	-17.12	Pass
4879.73	44.53	15.51	-5.1	54.94	Peak Max	H	140	183	74	-19.06	Pass
7321.26	27.78	16.69	0.02	44.49	Average Max	H	248	240	54	-9.51	Pass
9760.79	27.23	17.91	-0.44	44.7	Average Max	V	172	347	54	-9.31	Pass
4879.73	32.37	15.51	-5.1	42.78	Average Max	H	140	183	54	-11.22	Pass

Above 1GHz-25GHz- BLE - 2480MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7440.23	39.82	16.76	-0.13	56.45	Peak Max	V	145	356	74	-17.55	Pass
9921.68	39.74	17.8	-0.42	57.12	Peak Max	H	154	207	74	-16.88	Pass
4959.34	41.53	15.56	-5.13	51.96	Peak Max	H	166	164	74	-22.04	Pass
7440.23	27.64	16.76	-0.13	44.27	Average Max	V	145	356	54	-9.73	Pass
9921.68	27.57	17.8	-0.42	44.95	Average Max	H	154	207	54	-9.05	Pass
4959.34	29.11	15.56	-5.13	39.53	Average Max	H	166	164	54	-14.47	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	06/08/2017	1 Year	06/08/2018	☑
CHASE LISN	MN2050B	1018	08/07/2016	1 Year	08/07/2017	☑
Radiated Emissions						
Spectrum Analyzer	N9010A	10SL0219	08/20/2016	1 Year	08/20/2017	☑
RF Preamplifier	LPA-6-30	11140711	02/19/2017	1 Year	02/19/2018	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	08/12/2016	1 Year	08/12/2017	☑
Horn Antenna (1GHz~26GHz)	3115	100059	08/25/2016	1 Year	08/25/2017	☑
10 Meters SAC	10M	N/A	09/05/2016	1 Year	09/05/2017	☑
RF Conducted Measurement						
Spectrum Analyzer	N9010A	10SL0219	08/20/2016	1 Year	08/20/2017	☑

Annex B. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
ISO 17025 (A2LA)		Please see the documents for the detailed scope
ISO Guide 65 (A2LA)		Please see the documents for the detailed scope
TCB Designation		A1, A2, A3, A4, B1, B2, B3, B4, C
FCC DoC Accreditation		FCC Declaration of Conformity Accreditation
FCC Site Registration		3 meter site
FCC Site Registration		10 meter site
IC Site Registration		3 meter site
IC Site Registration		10 meter site
EU NB		**Radio & Telecommunications Terminal Equipment:** EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
Singapore iDA CB(Certification Body)		Phase I, Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		**(Phase II)** OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		**Radio:** Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		**Radio**: A1. Terminal equipment for purpose of calling **Telecom**: B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
Korea CAB Accreditation		**EMI:** KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI **EMS:** KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS
		Radio: RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68
		Telecom: President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4
Taiwan NCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		R-3083: Radiation 3 meter site C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measurement
Australia CAB Recognition		**EMC:** AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4
		Radio communications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771
		Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06 AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
Australia NATA Recognition		AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016,AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2