LSR a Laird Business

ACCREDITED
TESTING CERT #1255.01

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TEST REPORT # 316050 DTS
LSR Job #: C-2391

Compliance Testing of:

Sterling-LWB

Test Date(s):

2/10/16 – 4/18/16

Prepared For:

Attention: Josh Bablitch
LSR
W66 N220 Commerce Court
Cedarburg, WI 53012

This Test Report is issued under the Authority of:
Coty Hammerer, EMC Engineer

Signature: Coty Hammerer Date: 4-20-16

Test Report Reviewed by:	Project Engineer:
Adam Alger, Quality Systems Engineer – Test Services	Coty Hammerer, EMC Engineer.
Signature: Adam O Alger Date: 4-20-16	Signature: Coty Hammerer Date:4-20-16

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EXHIBIT 1. INTRODUCTION

1.1 - Scope

References:	FCC Part 15, Subpart C, Section 15.247 RSS GEN issue 4 and RSS 247 issue 1
Title:	FCC : Telecommunication – Code of Federal Regulations, CFR 47, Part 15. IC : Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
Purpose of Test:	To gain FCC and IC Certification Authorization for Low-Power License-Exempt Transmitters.
Test Procedures:	FCC KDB 558074 D01 DTS Measurement Guidance v03r05 ANSI C63.10

1.2 – Normative References

Publication	Year	Title
FCC CFR Parts 0-15	2016	Code of Federal Regulations – Telecommunications
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
RSS-247 Issue 1	2015	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS-GEN Issue 4	2014	General Requirements and Information for the Certification of Radio Apparatus
ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
FCC KDB 558074 D01 DTS Measurement Guidance v03r05	2015	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.3 - LS Research, LLC Test Facility

LS Research, LLC is accredited by A2LA (American Association for Laboratory Accreditation) as conforming to ISO/IEC 17025, 2005 “General Requirements for the Competence of Calibration and Testing Laboratories”.

LS Research, LLC’s scope of accreditation includes all test methods listed herein, unless otherwise noted. Accreditation status can be verified at A2LA’s web site: www.a2la2.net.

1.4 – Location of Testing

All testing was performed at the following location utilizing the facilities listed below, unless otherwise noted.

LS Research, LLC
W66 N220 Commerce Court
Cedarburg, Wisconsin, 53012 USA,

List of Facilities Located at LS Research, LLC:

Semi-Anechoic Chamber

1.5 – Test Equipment Utilized

A complete list of equipment utilized in testing is provided in Appendix A of this test report. Calibration dates are indicated in Appendix A. All test equipment is calibrated by a calibration laboratory accredited to the requirements of ISO/IEC 17025, and traceable to the SI standard.

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1 – Client Information

Manufacturer Name:	LSR
Address:	W66 N220 Commerce Court, Cedarburg, WI 53012
Contact Name:	Josh Bablitch

2.2 - Equipment Under Test (EUT) Information

The following information has been supplied by the applicant.

Product Name:	Sterling-LWB
Model Number:	Sterling-LWB
Serial Number:	Radiated: WLAN: 15, BLE: 29 Conducted: WLAN: 23, BLE 26

2.3 - Associated Antenna Description

The antennas associated with the EUT are:

1. Johanson Technology high frequency ceramic chip antenna, part number 2450AT18D0100. The chip antenna has a peak gain of 1.5dBi.
2. LSR 2.4 GHz FlexPIFA antenna. Part number 001-0014 with a peak antenna gain of 2.0 dBi.
3. LSR 2.4 GHz FlexNotch antenna. Part number 001-0015 with peak antenna gain of 2.0 dBi.
4. LSR 2.4 GHz Dipole antenna. Part number 001-0010 with peak antenna gain of 2.0 dBi.

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2.4 - EUT'S Technical Specifications

EUT Frequency Range (in MHz)	2412MHz – 2462MHz (WLAN)
RF Power in Watts (Conducted measurement)	
Minimum:	2.4GHz WLAN 802.11 b: 0.0537watts 802.11 g: 0.1820watts 802.11 n (HT20): 0.1202watts 2.4 GHz BLE: 0.0045watts
Maximum:	2.4GHz WLAN 802.11 b: 0.1023watts 802.11 g: 0.2519watts 802.11 n (HT20): 0.21877watts 2.4 GHz BLE: 0.0056watts
Conducted Output Power, peak (in dBm)	2.4GHz WLAN 802.11 b: Maximum = 20.05dBm Minimum = 17.31dBm 802.11 g: Maximum = 24.00dBm Minimum = 22.64dBm 802.11 n (HT20): Maximum = 23.38dBm Minimum = 20.77dBm 2.4 GHz BLE : Maximum = 7.5dBm Minimum = 6.5dBm
Field Strength at 3 meters (Maximum)	Not Applicable
99% Bandwidth	2.4GHz WLAN: 802.11 b: 13.99MHz 802.11 g: 16.62MHz 802.11 n (HT20): 17.69MHz 2.4GHz BLE: 1.09MHz
Type of Modulation	OFDM (WLAN), DSSS(WLAN), GFSK (BLE)
Occupied Bandwidth (6dB BW)	2.4GHz WLAN: 802.11 b: 10MHz 802.11 g: 16.0MHz 802.11 n (HT20):16.3MHz 2.4 GHz BLE: 727.0kHz
Transmitter Spurious (worst case) at 3 meters	49.4dBµV/m at 7386MHz , Peak
Frequency Tolerance %, Hz, ppm	Better than 100 ppm

Transceiver Model #	Transceiver: SPIL SB-WB-N08
Antenna Information	
Detachable/non-detachable	Non-detachable
Type	Ceramic chip antenna
Gain	Peak Gain in 2.4GHz band = 1.5 dBi
Detachable/non-detachable	Detachable
Type	Dipole
Gain	Peak Gain in 2.4GHz band = 2.0 dBi
EUT will be operated under FCC Rule Part(s)	Title 47 part 15.247
EUT will be operated under RSS Rule Part(s)	RSS 247
Modular Filing	☒ Yes ☐ No

2.5 - Product Description

The Sterling-LWB is a multi-standard module with support for WLAN (802.11 b/g/n), and Bluetooth V2.1 and Bluetooth 4.0 & 4.1 with multiple antenna options.

Chip Antenna: Johanson Part # 2450AT18D0100 Peak Gain 1.5 dBi

U.FL Antenna port utilizes the following antenna options:

LSR 2.4 GHz Dipole Antenna 2dBi
LSR 2.4 GHz FlexPIFA 2dBi
LSR 2.4 GHz FlexNotch 2dBi

EXHIBIT 3. EUT OPERATING CONDITIONS & CONFIGURATIONS DURING TESTS

3.1 - Climate Test Conditions

Temperature:	70 -71° F
Humidity:	32-44%
Pressure:	728-741mmHg

3.2 - Applicability & Summary Of EMC Emission Test Results

FCC and IC Paragraph	Test Requirements	Compliance (Yes/No)
FCC : 15.207 IC : RSS GEN sect. 8.8	Power Line Conducted Emissions Measurements	Yes
FCC : 15.247(b) & 1.1310 2.1046 IC : RSS 247 5.4	Maximum Output Power	Yes
FCC : 15.247(i), 1.1307, 1.1310, 2.1091 & 2.1093 IC : RSS 102	RF Exposure Limit	Yes
FCC :15.247(d) IC : RSS 247 5.5	RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	Yes
FCC:15.247 (a)(2) IC: RSS 247 5.2	6 dB Bandwidth of a Digital Modulation System	Yes
FCC:15.247 (e) IC: RSS 247 5.2	Power Spectral Density of a Digital Modulation System	Yes
FCC : 15.247(c), 15.209 & 15.205, 2.1053 IC : RSS GEN 8.9, 8.10	Transmitter Radiated Emissions in the restricted bands	Yes

3.3 - Modifications Incorporated In The EUT For Compliance Purposes

☒ None ☐ Yes (explain below)

3.4 - Deviations & Exclusions From Test Specifications

☒ None ☐ Yes (explain below)

EXHIBIT 4. DECLARATION OF CONFORMITY

The EUT was found to MEET the requirements as described within the specification of FCC Title 47, CFR Part 15.247, and Industry Canada RSS-247, Issue 1.

Note: If some emissions are seen to be within 3 dB of their respective limits; as these levels are within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

LS Research, LLC certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specifications. The results in this Test Report apply only to the item(s) tested on the above-specified dates. Any modifications made to the EUT subsequent to the indicated test date(s) will invalidate the data herein, and void this certification.

EXHIBIT 5. UNWANTED EMISSIONS INTO THE RESTRICTED FREQUENCY BANDS.

5.1 - Test Setup

The test setup was assembled in accordance with Title 47, CFR FCC Part 15, RSS GEN and ANSI C63.10-2013. The EUT was placed on an 80cm high non-conductive pedestal below 1 GHz and 150cm non-conductive pedestal above 1 GHz, centered on a flush mounted turntable inside a 3 meter Semi-Anechoic, FCC listed Chamber. The EUT was operated in continuous transmit mode for final testing using power as provided by a DC power supply that is sold separately from EUT. The unit has the capability to operate on 11 WLAN channels and 40 BLE channels, controllable via proprietary software provided by the manufacturer.

The applicable limits apply at a 3 meter distance. The calculations to determine these limits are detailed in the following pages. Please refer to Appendix A for a complete list of test equipment. The test sample was operated on one of three (3) standard channels to comply with FCC Part 15.31(m).

5.2 - Test Procedure

Radiated RF measurements were performed on the EUT in a 3 meter Semi-Anechoic, FCC listed Chamber. The frequency range from 30 MHz to 25000 MHz was scanned and investigated. The radiated RF emission levels were manually noted at the various fixed degree settings of azimuth on the turntable and antenna height. The EUT was placed on a non-conductive pedestal in the 3 meter Semi-Anechoic Chamber, with the antenna mast placed such that the antenna was 3 meters from the EUT. A Biconical Antenna was used to measure emissions from 30 MHz to 200 MHz, and a Log Periodic Antenna was used to measure emissions from 200 MHz to 1000 MHz. A Double-Ridged Waveguide Horn Antenna was used from 1 GHz to 18 GHz while a standard gain horn antenna was used in the 18 GHz to 25 GHz range. The maximum radiated RF emissions between 30MHz to 25 GHz were found by raising and lowering the sense antenna between 1 and 4 meters in height, using both horizontal and vertical antenna polarities and ensuring that the EUT was within the cone of radiation of the receive antenna.

The EUT was positioned in 3 orthogonal orientations.

5.3 - Test Equipment Utilized

A list of the test equipment and antennas utilized for the Radiated Emissions test can be found in Appendix A. This list includes calibration information and equipment descriptions. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All calibrations of the antennas used were performed at a calibration laboratory accredited to ISO 17025, and are traceable to the SI standard. In addition, the Connecting Cables were measured for losses using a calibrated Signal Generator and an EMI Receiver. The resulting correction factors and the cable loss factors from these calibrations were entered into the EMI Receiver database. As a result, the data taken from the EMI Receiver accounts for the antenna correction factor as well as cable loss or other corrections, and can therefore be entered into the database as a corrected meter reading. The EMI Receiver was operated with a resolution bandwidth of 120 kHz for measurements below 1 GHz (video bandwidth of 1.2 MHz) using quasi-peak detector, and a bandwidth of 1 MHz for measurements above 1 GHz (video bandwidth of 3 MHz) for Peak measurements using a Peak detector. Average measurements were performed using an average detector using 1MHz bandwidth (video bandwidth of 3MHz)

5.4 - Test Results

The EUT was found to **MEET** the Radiated Emissions requirements of Title 47 CFR, FCC Part 15.247 and Canada RSS-247, Issue 1, for a DTS transmitter. The frequencies with significant RF signal strength were recorded and plotted as shown in the Data Charts and Graphs.

5.5 - Calculation of Radiated Emissions Limits and reported data.

Reported data:

For both fundamental and spurious emissions measurement, the data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dBμV/m) + Antenna correction Factor + Cable factor (dB) + Miscellaneous factors when applicable (dB) – amplification factor when applicable (dB).

Generic example of reported data at 200 MHz:

Reported Measurement data = 18.2 (raw receiver measurement) + 15.8 (antenna factor) + 1.45 (cable factor) = 35.45 (dBμV/m).

As specified in 15.247 (d), radiated emissions that fall within the restricted band described in 15.205(c), must comply with the general emissions limit.

The following table depicts the general radiated emission limits above 30 MHz. These limits are obtained from Title 47 CFR, Part 15.209, for radiated emissions measurements. These limits were applied to any signals found in the 15.205 restricted bands. The mentioned limits correspond to those limits listed in RSS GEN.

Frequency (MHz)	3 m Limit μV/m	3 m Limit (dBμV/m)	1 m Limit (dBμV/m)
30-88	100	40.0	-
88-216	150	43.5	-
216-960	200	46.0	-
960-40,000	500	54.0	63.5

Sample conversion of field strength (μV/m to dBμV/m):
dBμV/m = 20 log $_{10}$ (100)= 40 dBμV/m (from 30-88 MHz)

Per KDB 558074 section 10, an EIRP measurement can be converted to field strength using this relationship:

EIRP = E (electric field strength in dBμV/m) + 20log(d)-104.8
E = EIRP – 20log(d) + 104.8
Sample conversion:
For EIRP = -56.6 dBm,
E (dBμV/m) = -56.6 – 20log(3m) +104.8 = 38.7 dBμV/m
For EIRP = -60.9 dBm,
E (dBμV/m) = -60.9 – 20log(3m) + 104.8 = 34.4 dBμV/

5.6 - Data:

Manufacturer:	LSR					
Date(s) of Test:	2/10/16 - 4/18/16					
Project Engineer(s):	Coty Hammerer					
Test Engineer(s):	Coty Hammerer/Kimberly Bay					
Voltage:	3.6VDC					
Operation Mode:	Continuous transmit, modulated					
Environmental Conditions in the Lab:	Temperature: 70° F Relative Humidity: 36%					
EUT Power:		Single Phase 120VAC		3 Phase ___VAC		
		Battery	X	Other: Bench DC Supply		
EUT Placement:	X	80cm non-conductive pedestal	X	150cm non-conductive pedestal		
EUT Test Location:	X	3 Meter Semi-Anechoic FCC Listed Chamber		3/10m OATS		
Measurements:		Pre-Compliance		Preliminary	X	Final
Detectors Used:	X	Peak	X	Quasi-Peak	X	Average

WLAN:

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Quasi-Peak Reading (dBµV/m)	Average Reading (dBµV/m)	Peak Limit (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Average Limit (dBµV/m)	Peak Margin (dB)	Quasi-Peak Margin (dB)	Average Margin (dB)	Antenna Polarity	Antenna	EUT orientation
76.60	1.00	0.00	N/A	22.5	N/A	N/A	40.0	N/A	N/A	17.5	N/A	H	Chip	Flat
76.70	1.00	0.00	N/A	29.6	N/A	N/A	40.0	N/A	N/A	10.4	N/A	V	Chip	Flat
266.70	1.00	291.00	N/A	27.2	N/A	N/A	46.0	N/A	N/A	18.8	N/A	H	Port Term.	Vertical
400.00	1.50	316.50	N/A	32.2	N/A	N/A	46.0	N/A	N/A	13.8	N/A	V	Port Term.	Vertical
400.00	1.00	202.00	N/A	35.7	N/A	N/A	46.0	N/A	N/A	10.3	N/A	H	Port Term.	Flat
1302.00	1.00	0.00	46.2	N/A	40.6	74.0	N/A	54.0	27.8	N/A	13.4	V	Chip	Vertical
3690.00	2.62	47.25	49.0	N/A	45.1	74.0	N/A	54.0	25.0	N/A	8.9	H	Chip	Vertical
4824.00	1.00	234.75	43.3	N/A	35.4	74.0	N/A	54.0	30.7	N/A	18.6	H	Chip	Flat
7311.00	1.00	290.00	48.6	N/A	42.8	74.0	N/A	54.0	25.4	N/A	11.2	H	Chip	Side
7386.00	1.00	282.25	49.4	N/A	43.3	74.0	N/A	54.0	24.6	N/A	10.7	H	Chip	Side
7311.00	2.65	322.50	49.4	N/A	41.4	74.0	N/A	54.0	24.6	N/A	12.6	V	Port Term.	Flat
7386.00	2.71	323.25	48.3	N/A	42	74.0	N/A	54.0	25.7	N/A	12.0	V	Port Term.	Flat

BLE:

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Quasi-Peak Reading (dBµV/m)	Average Reading (dBµV/m)	Peak Limit (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Average Limit (dBµV/m)	Peak Margin (dB)	Quasi-Peak Margin (dB)	Average Margin (dB)	Antenna Polarity	Antenna	Mode	EUT orientation
76.40	1.00	296.80	N/A	29.8	N/A	N/A	40.0	N/A	N/A	10.2	N/A	V	Port Term.	GFSK	Vertical
4804.00	1.00	0.00	42.0	N/A	36.9	74.0	N?A	54.0	32.0	N/A	17.1	H	Port Term.	GFSK	Vertical
4804.00	3.20	353.00	41.6	N/A	36.3	74.0	N/A	54.0	32.4	N/A	17.7	V	Chip	GFSK	Vertical
4804.00	2.60	295.80	42.0	N/A	37.3	74.0	N/A	54.0	32.0	N/A	16.7	H	Chip	GFSK	Vertical
4804.00	2.10	188.50	41.7	N/A	35.9	74.0	N/A	54.0	32.3	N/A	18.1	V	Chip	GFSK	Side
4804.00	1.80	333.50	42.3	N/A	38.0	74.0	N/A	54.0	31.7	N/A	16.0	H	Chip	GFSK	Side
7440.00	1.00	53.50	40.0	N/A	33.3	74.0	N/A	54.0	34.0	N/A	20.7	H	Chip	GFSK	Flat

Note:

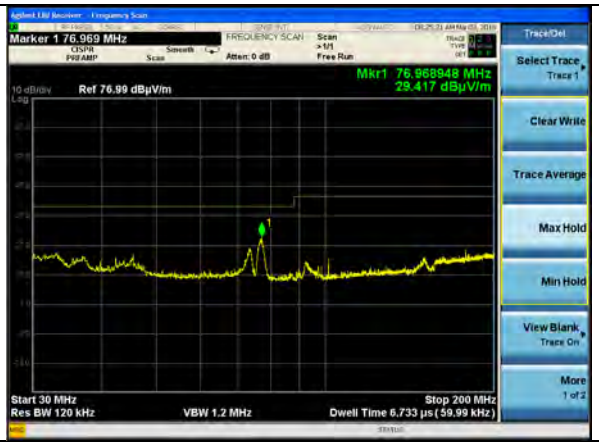
1) *Refer to exhibit 5.5 on explanation of how data is reported.*

5.7 – Screen Captures.

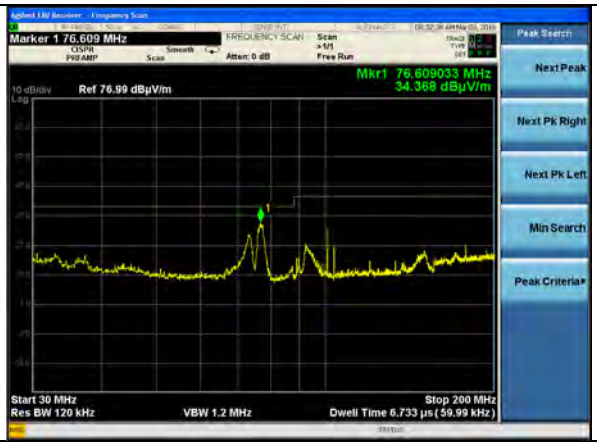
The screen captures below are those using the Peak detector of the analyzer. In addition, the screen captures presented are those which were deemed to be an appropriate representation of the spectrum scan.

WLAN Chip:

30 to 200 MHz, 3m distance.



Horizontal



Vertical

Note: Emissions seen above are not a function of the EUT but is of the power supply used.

200 to 1000 MHz, 3m distance.

Horizontal

Vertical

Note: Emissions seen above are not a function of the EUT but is of the power supply used.

1000 to 2310 MHz, 3m distance.

Horizontal

Vertical

.

2310 to 2390 MHz, 3m distance.

Average

Peak

Notes:

1. The plot above taken when EUT was in IEEE 802.11g mode and represents worst case. IEEE 802.11b and IEEE 802.11n modes were tested.
2. Table below shows points on the plot of the maximum emission:

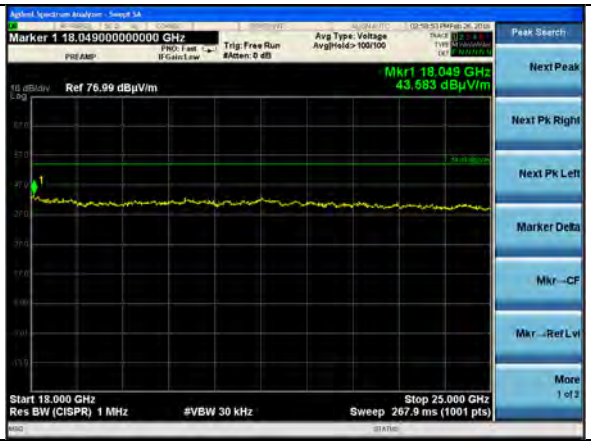
Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2390.00	72.53	74.00	1.47	2390.00	51.64	54.00	2.36

Note: The range 2483.5 to 2500 MHz is in section 8 of this report (Band-edges).

2500 to 4000 MHz, 3m distance.

	
Horizontal	Vertical

4000 to 25000 MHz, 3m distance.

	
4000 to 18000 MHz (reduced bandwidth)	18000 to 25000 MHz (reduced bandwidth)

WLAN: Port Terminated

30 to 200 MHz, 3m distance.

Horizontal

Vertical

Note: Emissions seen above are not a function of the EUT but is of the power supply used.

200 to 1000 MHz, 3m distance.

Horizontal

Vertical

Note: Emissions seen above are not a function of the EUT but is of the power supply used.

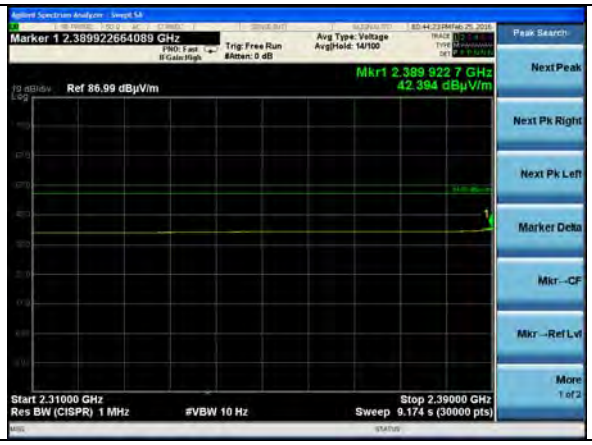
1000 to 2310 MHz, 3m distance.

Horizontal

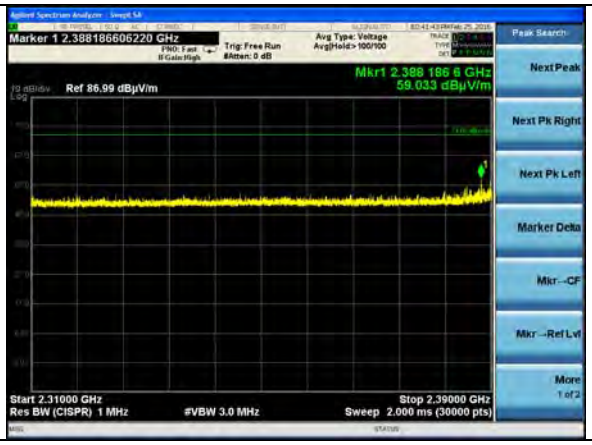
Vertical

.

2310 to 2390 MHz, 3m distance.



Average



Peak

Notes:

1. The plot above taken when EUT was in IEEE 802.11n mode and represents worst case. IEEE 802.11b and IEEE 802.11g modes were tested.
2. Table below shows points on the plot of the maximum emission:

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2388.19	59.03	74	14.97	2389.92	42.39	54	11.61

Note: The range 2483.5 to 2500 MHz is in section 8 of this report (Band-edges).

2500 to 4000 MHz, 3m distance.

	
Horizontal	Vertical

4000 to 25000 MHz, 3m distance.

	
4000 to 18000 MHz (reduced bandwidth)	18000 to 25000 MHz (reduced bandwidth)

BLE Chip:

30 to 200 MHz, 3m distance

Horizontal

Vertical

Note: Emissions seen above are not a function of the EUT but is of the power supply used.

200 to 1000 MHz, 3m distance.

Horizontal

Vertical

Note: Emissions seen above are not a function of the EUT but is of the power supply used.

1000 to 2310 MHz, 3m distance.

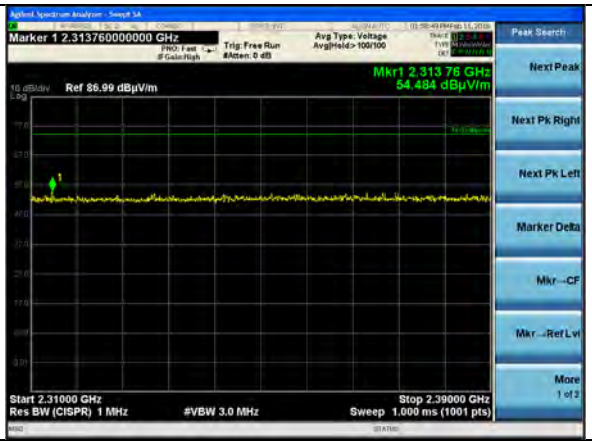
Horizontal

Vertical

.

2310 to 2390 MHz, 3m distance.

Average



Peak

Notes:

1. Table below shows points on the plot of the maximum emission:

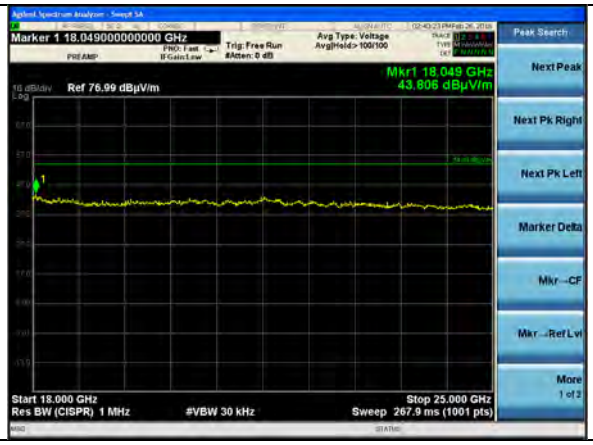
Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2313.76	54.48	74	19.52	2364.64	41.66	54	12.34

Note: The range 2483.5 to 2500 MHz is in section 8 of this report (Band-edges).

2500 to 4000 MHz, 3m distance.

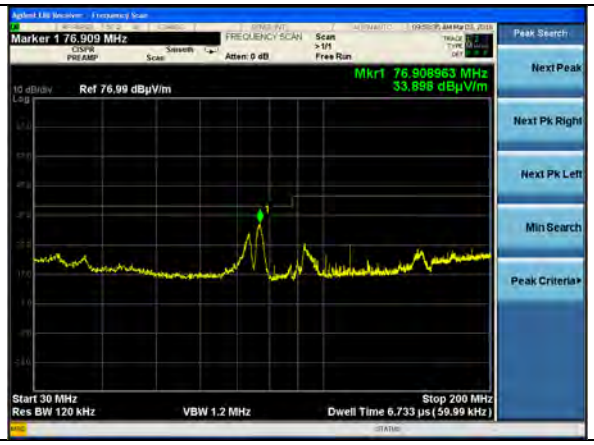
	
Horizontal	Vertical

4000 to 25000 MHz, 3m distance.

	
4000 to 18000 MHz (reduced bandwidth)	18000 to 25000 MHz (reduced bandwidth)

BLE Port Terminated:

30 to 200 MHz, 3m distance

	
Horizontal	Vertical

Note: Emissions seen above are not a function of the EUT but is of the power supply used.

200 to 1000 MHz, 3m distance.

	
Horizontal	Vertical

Note: Emissions seen above are not a function of the EUT but is of the power supply used.

1000 to 2310 MHz, 3m distance.

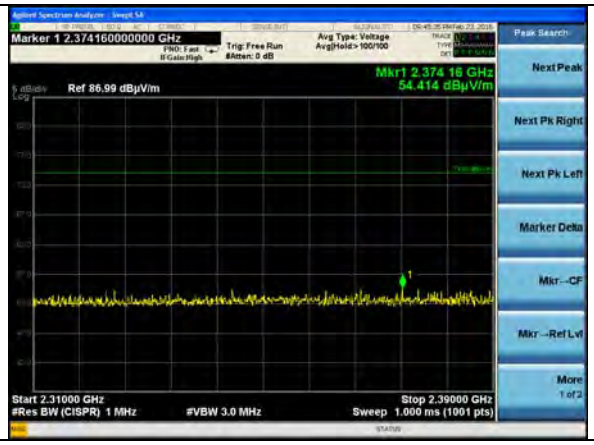
Horizontal

Vertical

.

2310 to 2390 MHz, 3m distance.

Average



Peak

Notes:

1. Table below shows points on the plot of the maximum emission:

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2374.16	54.41	74	19.59	2351.84	41.5	54	12.5

2500 to 4000 MHz, 3m distance.

Horizontal

Vertical

4000 to 25000 MHz, 3m distance.

4000 to 18000 MHz (reduced bandwidth)

18000 to 25000 MHz (reduced bandwidth)

Upper Band-edge in Restricted Band

WLAN: Chip Data:

A. 1 MBPS

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2490.00	59.14	74	14.86	2487.33	49.44	54	4.56

B. 11 MBPS

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2483.96	62.97	74	11.03	2483.52	49.86	54	4.14

C. 6 MBPS

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2483.96	72.59	74	1.41	2483.50	47.671	54	6.329

D. 54 MBPS

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2484.16	71.21	74	2.79	2483.50	49.971	54	4.029

E. MCS0 HT20

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2484.37	72.83	74	1.17	2483.50	48.153	54	5.847

F. MCS7 HT20

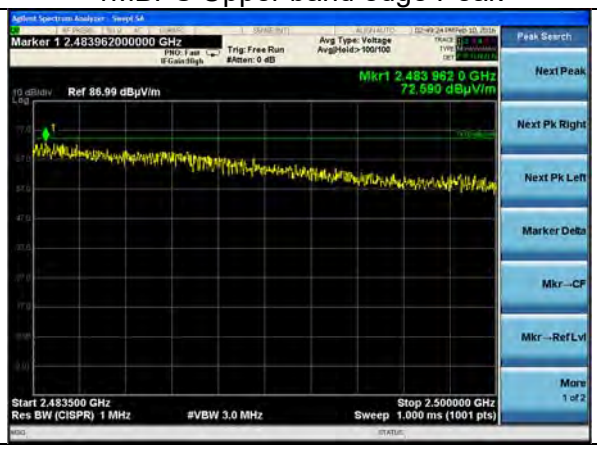
Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2484.23	71.15	74	2.85	2483.50	49.232	54	4.768

Screen captures

2483.5 to 2500 MHz Restricted band

1MBPS Upper band edge Peak

1MBPS Upper band edge Average



6MBPS Upper band edge Peak

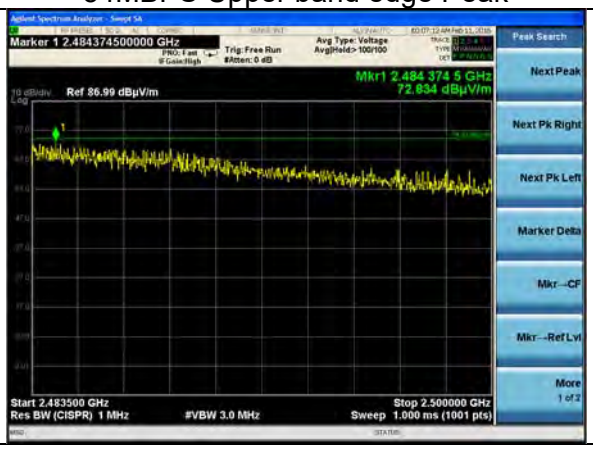
6MBPS Upper band edge Average

11MBPS Upper band edge Peak

11MBPS Upper band edge Average

54MBPS Upper band edge Peak

54MBPS Upper band edge Average



MCS0 HT20 Upper band edge Peak

MCS0 HT20 Upper band edge Average

MCS7 HT20 Upper band edge Peak

MCS7 HT20 Upper band edge Average

WLAN: Port Terminated Data/Cabinet radiation:

Note: The conducted measurements to supplement this antenna port terminated radiated (cabinet radiation) measurements is in Exhibit 8 (band-edges).

A. 1 MBPS

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2487.86	54.43	74	19.57	2484.21	41.79	54	12.21

B. 11 MBPS

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2494.37	54.39	74	19.61	2484.37	41.71	54	12.29

C. 6 MBPS

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2493.4	54.41	74	19.59	2483.58	41.84	54	12.16

D. 54 MBPS

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2484.36	55.3	74	18.7	2483.78	41.76	54	12.24

E. MCS0 HT20

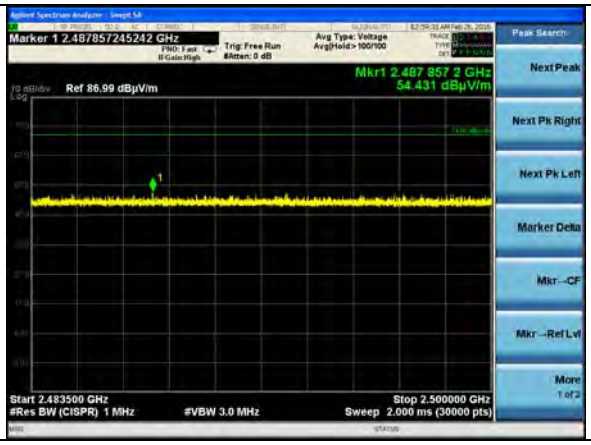
Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2485.76	53.96	74	20.04	2483.73	41.74	54	12.26

F. MCS7 HT20

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2490.95	55.18	74	18.82	2483.79	41.72	54	12.28

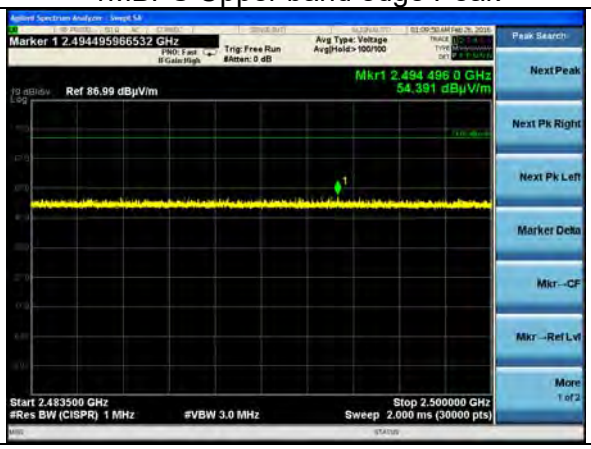
Screen Captures

2483.5 to 2500 MHz Restricted band



1MBPS Upper band edge Peak

1MBPS Upper band edge Average

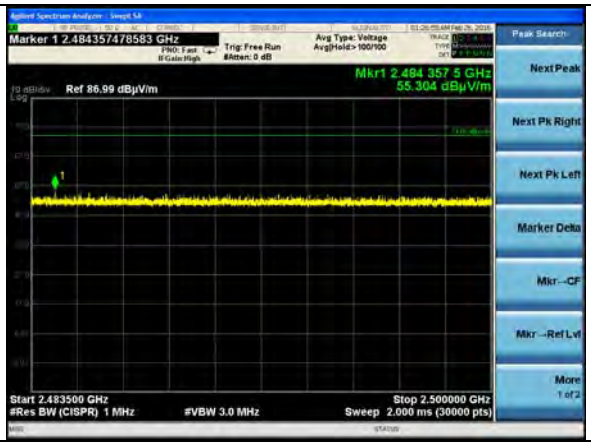


11MBPS Upper band edge Peak

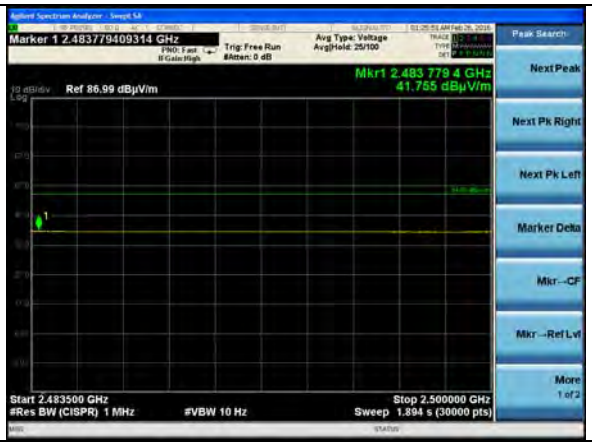
11MBPS Upper band edge Average

6MBPS Upper band edge Peak

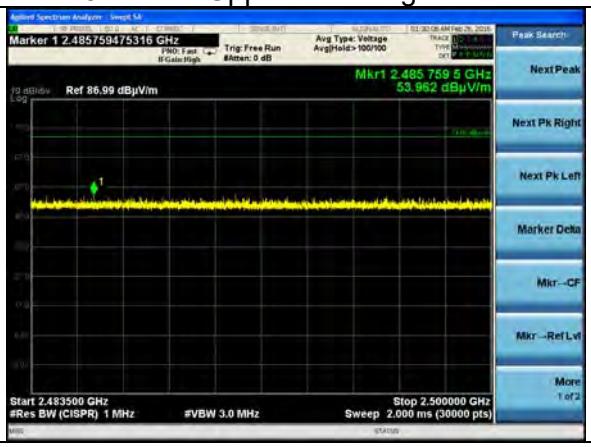
6MBPS Upper band edge Average



54MBPS Upper band edge Peak



54MBPS Upper band edge Average



MCS0 HT20 Upper band edge Peak

MCS0 HT20 Upper band edge Average

MCS7 HT20 Upper band edge Peak

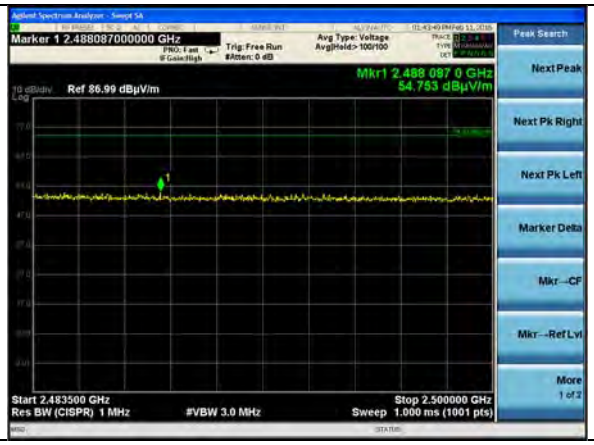
MCS7 HT20 Upper band edge Average

BLE: Chip data:

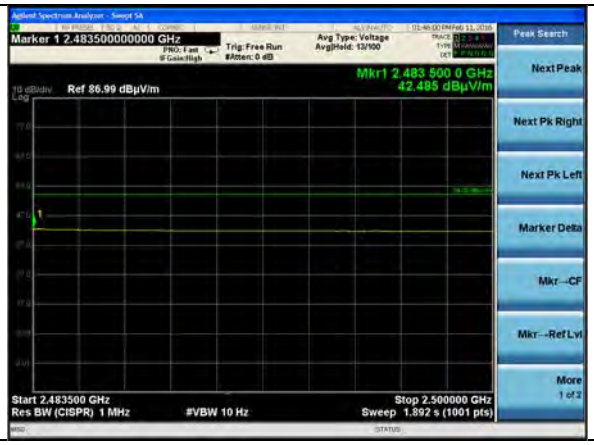
Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2488.09	54.75	74	19.25	2438.50	42.49	54	11.51

Screen captures

2483.5 to 2500 MHz Restricted band



Upper band edge Peak



Upper band edge Average

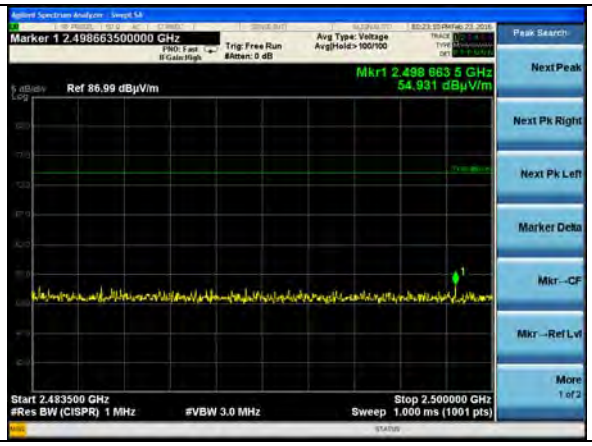
BLE: Port Terminated data:

Note: The conducted measurements to supplement this antenna port terminated radiated (cabinet radiation) measurements is in Exhibit 8 (band-edges).

Peak Frequency (MHz)	Peak (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	Average Frequency (MHz)	Average (dBµV/m)	Average Limit (dBµV/m)	Average Margin (dB)
2498.66	54.93	74	19.07	2485.71	41.84	54	12.16

Screen Captures

2483.5 to 2500 MHz Restricted band



Upper band edge Peak

Upper band edge Average

EXHIBIT 6. CONDUCTED EMISSIONS TEST, AC POWER LINE

6.1 Test Setup

The test area and setup are in accordance with ANSI C63.4 and with Title 47 CFR, FCC Part 15, Industry Canada RSS GEN. The EUT was placed on a non-conductive table, with a height of 80 cm above the reference ground plane. The power supply was then plugged into a 50Ω (ohm), Line Impedance Stabilization Network (LISN). An "off the shelf" AC-DC adapter provided a 3.3VDC supply via an appropriate broadband EMI Filter, and then to the LISN line input. Final readings were then taken and recorded. Final readings were then taken and recorded. After the EUT was setup and connected to the LISN, the RF Sampling Port of the EMI receiver System. The LSIN used has the ability to terminate the unused port with a 50Ω (ohm) load when switched to either L1 (line) or L2 (neutral).

6.2 Test Procedure

The EUT was investigated in continuous modulated transmit mode for this portion of the testing. The appropriate frequency range and bandwidths were selected on the EMI Receiver, and measurements were made. The bandwidth used for these measurements is 9 kHz, as specified in CISPR 16-1, Section 1, Table 1, for Quasi-Peak and Average detectors in the frequency range of 150 kHz to 30 MHz. Final readings were then taken and recorded.

6.3 Test Equipment Utilized

A list of the test equipment and accessories utilized for the Conducted Emissions test is provided in Appendix A. This list includes calibration information and equipment descriptions. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. Calibrations of the LISN and Limiter were performed at an IEC/ISO 17025 accredited calibration laboratory, traceable to the SI standard. All cables are calibrated and checked periodically for conformance. The emissions are measured on the EMI System, which has automatic correction for all factors stored in memory and allows direct readings to be taken.

6.4 Test Results

The EUT was found to **MEET** the Conducted Emission requirements of FCC Part 15.207 and RSS GEN 7.2.4 for Conducted Emissions for an Intentional Radiator. See the Data Charts and Graphs for more details of the test results.

6.5 FCC Limits of Conducted Emissions at the AC Mains Ports

Frequency Range (MHz)	Class B Limits (dBµV)		Measuring Bandwidth
	Quasi-Peak	Average	
0.150 -0.50 *	66-56	56-46	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
0.5 – 5.0	56	46	
5.0 – 30	60	50	
* The limit decreases linearly with the logarithm of the frequency in this range.			

6.6 CONDUCTED EMISSIONS TEST DATA CHART

Frequency Range inspected: 150 KHz to 30 MHz

Manufacturer:	LSR					
Date(s) of Test:	4/14/16					
Project Engineer:	Coty Hammerer					
Test Engineer:	Coty Hammerer					
Voltage:	120VAC (stepped down from 120VAC to 3.3 VDC)					
Operation Mode:	Continuous transmit, modulated					
Environmental Conditions in the Lab:	Temperature: 71° F Relative Humidity: 40%					
Test Location:	X	AC Mains Test area				Chamber
EUT Placed On:	X	40cm from Vertical Ground Plane				10cm Spacers
	X	80cm above Ground Plane				Other:
Measurements:		Pre-Compliance		Preliminary	X	Final
Detectors Used:		Peak	X	Quasi-Peak	X	Average

WLAN: Ch.1, 1 Mbps 3.3 VDC

Line	Frequency (MHz)	Q-Peak Reading (dBµV)	Q-Peak Limit (dBµV)	Quasi-Peak Margin (dB)	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Notes
1	0.20	44.60	63.83	19.23	31.50	53.83	22.33	Tx
1	0.62	40.70	56.00	15.30	30.00	46.00	16.00	Tx
1	0.20	46.50	63.62	17.12	36.20	53.62	17.42	Tx
2	0.20	41.90	63.62	21.72	26.50	53.62	27.12	Tx
2	0.67	41.40	56.00	14.60	25.10	46.00	20.90	Tx
2	0.27	41.30	61.24	19.94	27.30	51.24	23.94	Tx

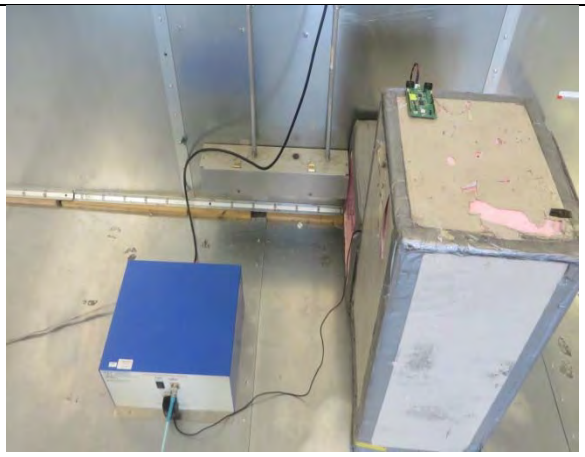
BLE: Ch. 0, GFSK 3.3 VDC

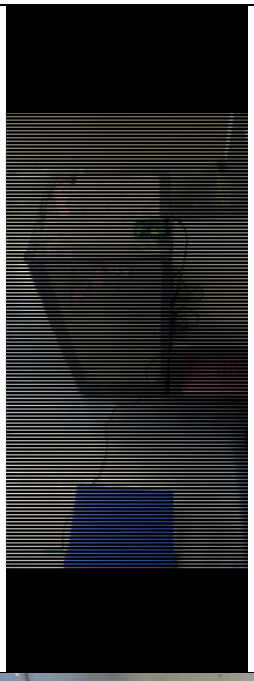
Line	Frequency (MHz)	Q-Peak Reading (dBµV)	Q-Peak Limit (dBµV)	Quasi-Peak Margin (dB)	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Notes
1	0.15	40.50	66.00	25.50	28.30	56.00	27.70	Tx
1	0.63	33.60	56.00	22.40	25.50	46.00	20.50	Tx
1	0.16	39.80	65.42	25.62	28.70	55.42	26.72	Tx
2	0.62	34.00	56.00	22.00	24.90	46.00	21.10	Tx
2	0.16	33.00	65.73	32.73	19.90	55.73	35.83	Tx
2	0.16	34.70	65.47	30.77	21.60	55.47	33.87	Tx

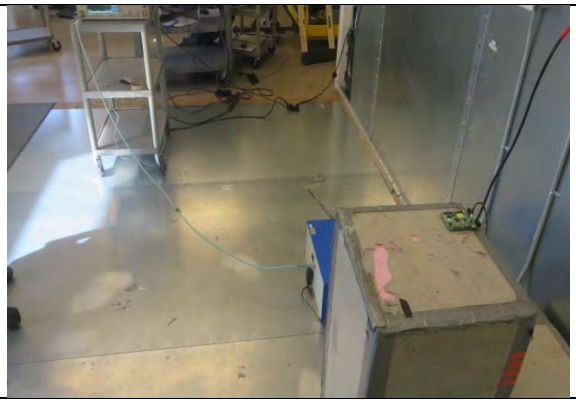
Notes:

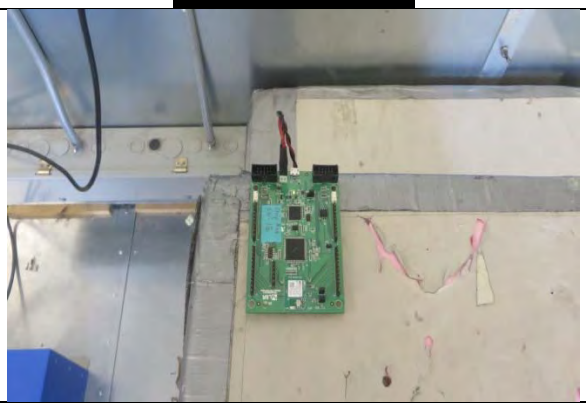
1) The emissions listed are characteristic of the power supply used and not that of the transmitter. Changing transmit channels did not change the emissions for WLAN or BLE. Data rate tested was that of highest current draw in transmit mode.

6.7 Test Setup Photo(s) – Conducted Emissions Test









Prepared For: LSR	Model #: Sterling-LWB	Report #: 316050
EUT: Sterling-LWB	Serial #: Radiated: WLAN: 15, BLE: 29 Conducted: WLAN: 23, BLE 26	LSR Job #: C-2391

6.8 Screen Captures – Conducted Emissions Test

These screen captures represent Peak Emissions. For conducted emission measurements, both a Quasi-Peak detector function and an Average detector function are utilized.

WLAN

Line 1

Line 2

BLE

Line 1

Line 2

EXHIBIT 7. OCCUPIED BANDWIDTH

Test Engineer(s): Coty Hammerer

7.1 - Limits

For a DTS system operating in the 2400 to 2483.5 MHz band, the 6dB emission bandwidth limit is 500 kHz.

7.2 - Method of Measurements

For this portion of the tests, a direct measurement of the transmitted signal was performed at the antenna port of the EUT, via a cable connection to a spectrum analyzer. An attenuator was placed in series with the cable to protect the spectrum analyzer. The loss from the cable and the attenuator were added on the analyzer as gain offset settings there by allowing direct measurements, without the need for any further corrections. The EUT was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source. A bandwidth measurement function that is built into the spectrum analyzer was used to measure the 20dB/emission bandwidth while the 6dB bandwidth was measured using **FCC OET KDB 558074 section 8 option2.**

Note:
The 20dB bandwidth was measured for use with the measurement method prescribed in FCC OET KDB 558074 for maximum conducted power.

7.3 - Test Data

WLAN

Eval tool power setting (dBm)	802.11 Standard	Data Rate (MBPS)	Channel	6dB Bandwidth (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	6dB Bandwidth minimum limit (MHz)
20	b	1 (DBPSK)	1	9.0	15.4	13.7	0.5
20			6	8.6	15.4	13.8	0.5
20			9	9.5	15.4	14.0	0.5
19			10	8.6	15.4	13.8	0.5
18			11	9.1	15.4	13.8	0.5
16	g	6 (BPSK)	1	15.1	19.3	16.6	0.5
16			6	15.1	19.0	15.6	0.5
16			9	15.1	18.9	16.6	0.5
15			10	15.1	19.1	16.6	0.5
14			11	15.1	18.9	16.6	0.5
14	n (HT20)	MCS0 (BPSK)	1	15.1	19.8	17.6	0.5
14			6	15.2	19.9	17.6	0.5
14			9	15.1	19.6	17.6	0.5
13			10	15.1	18.3	17.5	0.5
12			11	15.2	20.2	17.6	0.5
20	b	11 (8QPSK)	1	10.0	15.8	13.9	0.5
20			6	9.7	15.9	13.8	0.5
20			9	8.8	15.8	13.8	0.5
19			10	9.9	15.8	13.8	0.5
18			11	8.9	15.7	13.8	0.5
16	g	54 (64QAM)	1	16.0	18.4	16.5	0.5
16			6	16.0	18.4	16.5	0.5
16			9	16.0	18.3	16.5	0.5
15			10	15.8	18.4	16.5	0.5
14			11	16.0	18.5	16.5	0.5
14	n (HT20)	MCS7 (64QAM)	1	16.3	19.1	17.7	0.5
14			6	16.3	19.0	17.6	0.5
14			9	16.1	19.2	17.7	0.5
13			10	16.3	19.2	17.6	0.5
12			11	16.3	19.1	17.6	0.5

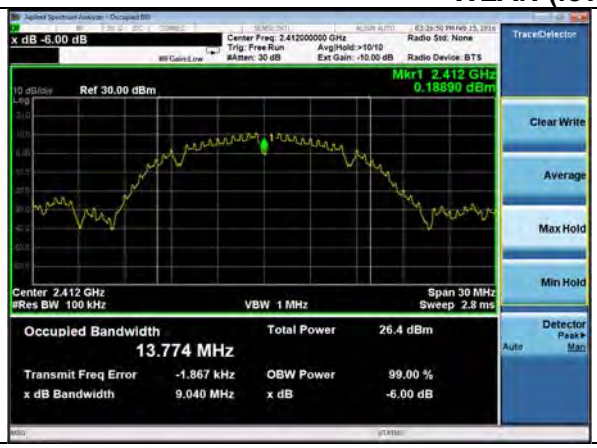
BLE

Data Rate (MBPS)	Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	6dB Bandwidth minimum limit (MHz)
1 (GFSK)	0	0.712	1.087	0.500
	19	0.683	1.091	0.500
	39	0.727	1.086	0.500

7.4 – Screen Captures

Examples of bandwidth measurements:

WLAN (lowest channel)

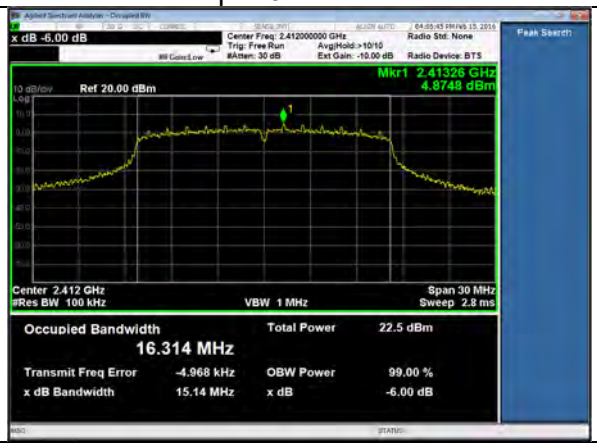


1 Mbps -6dB bandwidth

1 Mbps -20dB and 99% bandwidth

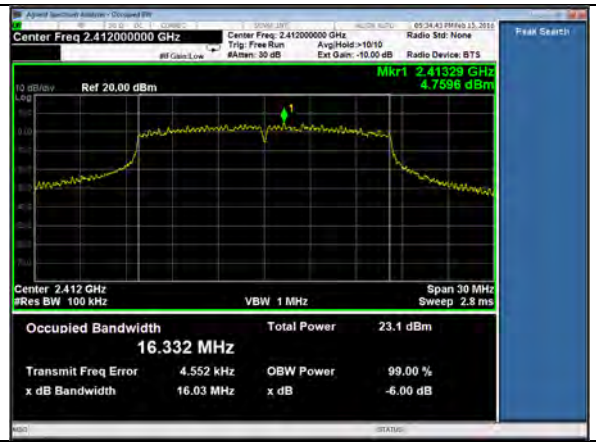
11 Mbps -6dB bandwidth

11 Mbps -20dB and 99% bandwidth



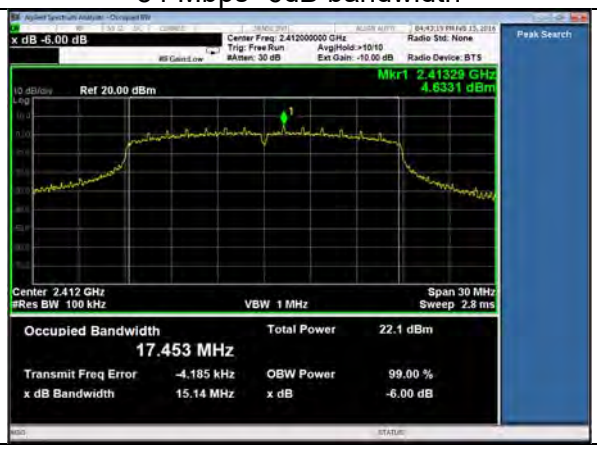
6 Mbps -6dB bandwidth

6 Mbps -20dB and 99% bandwidth



54 Mbps -6dB bandwidth

54 Mbps -20dB and 99% bandwidth



MCS0 -6dB bandwidth

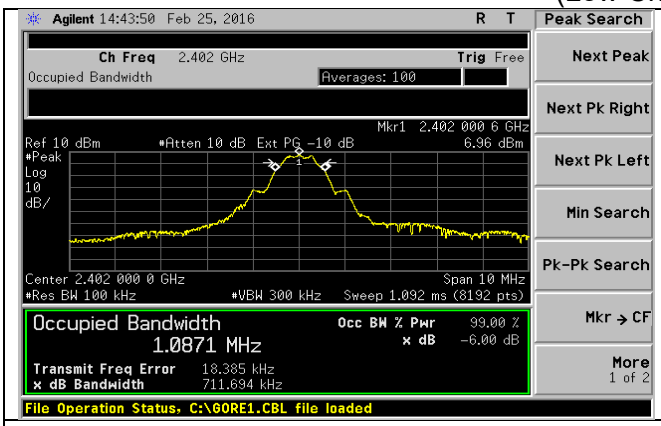
MCS0 -20dB and 99% bandwidth

MCS7 -6dB bandwidth

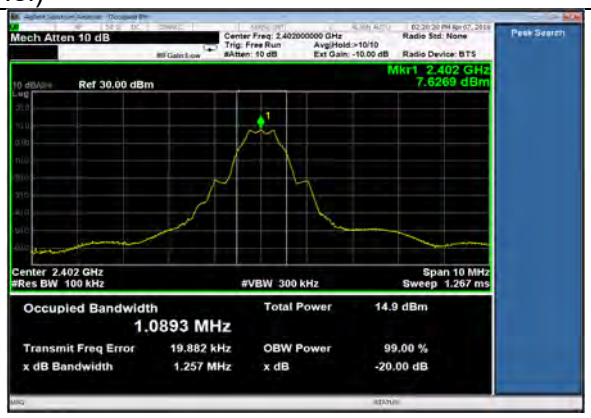
MCS7 -20dB and 99% bandwidth

BLE

(Low Channel)

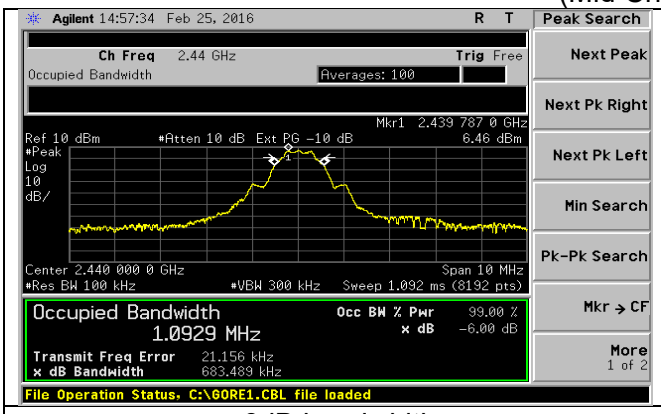


-6dB bandwidth

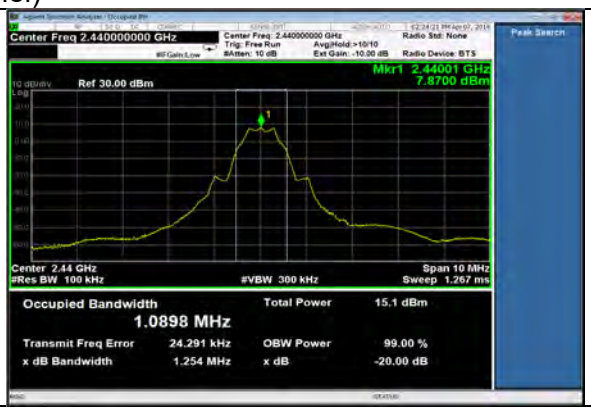


-20dB and 99% bandwidth

(Mid Channel)

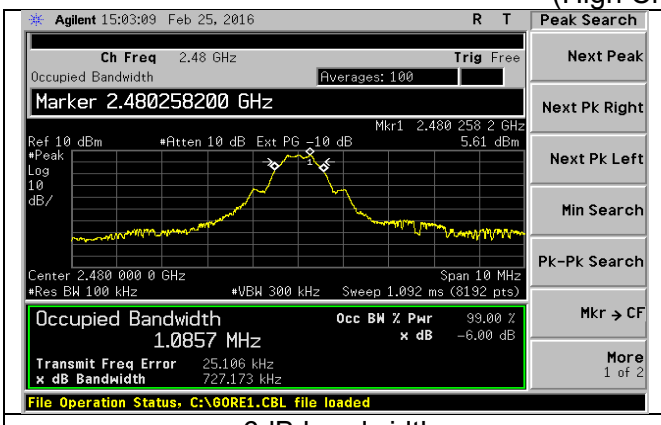


-6dB bandwidth

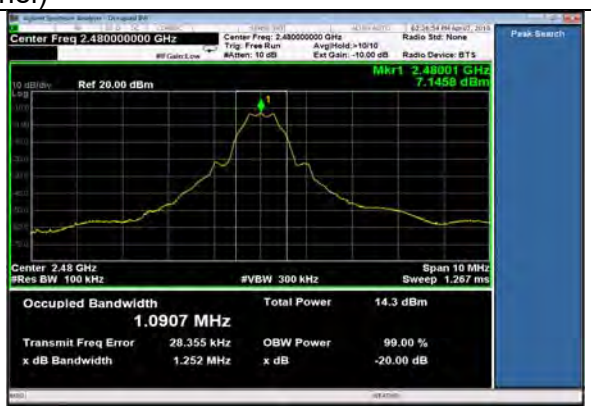


-20dB and 99% bandwidth

(High Channel)



-6dB bandwidth



-20dB and 99% bandwidth

EXHIBIT 8. BAND EDGE MEASUREMENTS

Test Engineer(s): Coty Hammerer

8.1 - Method of Measurements

FCC 15.247 requires a measurement of spurious emission levels at the restricted band to be compliant to the general emissions limit, in particular at the Band-Edges where the intentional radiator operates. The EUT was operated in continuous transmit mode with continuous modulation, with internally generated data as the modulating source. The EUT was operated at the lowest channel for the investigation of the lower Band-Edge, and at the highest channel for the investigation of the higher Band-Edge.

For radiated measurements, the EMI Receiver was operated with a resolution bandwidth of 120 kHz for measurements below 1 GHz (video bandwidth of 1.2 MHz) using quasi-peak detector, and a bandwidth of 1 MHz for measurements above 1 GHz (video bandwidth of 3 MHz) for Peak measurements using a Peak detector. Average measurement was performed using a Peak detector with 1MHz resolution bandwidth and 10Hz video bandwidth.

The Band-edge measurements were performed conducted (100kHz bandwidth). The measurement of band-edge was performed to satisfy FCC 15.247(d).

Per FCC KDB 558074 D01 Measurement Guidance v03r05 (section 11), conducted measurements were performed with 100 kHz bandwidth for all emissions outside of the band of operation.

Per FCC KDB 558074 D01 Measurement Guidance v03r05, section 12.2, conducted measurements were performed to supplement cabinet radiation measurements.

For both conducted and radiated measurements, correction factors and the cable loss factors were entered into the EMI Receiver database. **As a result, the plots taken from the EMI Receiver accounts for all applicable correction factor as well as cable loss, and can therefore be entered into the database as a corrected meter reading.**

8.2. Band edge screen captures.

The data presented below are samples selected from the various data rates and channels tested.

Conducted measurements to supplement cabinet radiation measurements per FCC KDB 558074 D01 Measurement Guidance v03r05 section 12.2.

Per KDB 558074 D01 v03r05 section 12.2.5.2, average power measurement procedure requires that when averaging across on and off times of the EUT (when EUT transmission is ≤ 98%), the measurement shall be followed with a duty cycle correction.

The data shall be corrected by adding the duty cycle correction factor:

Duty cycle correction factor = 10log(1/x)
X is the duty cycle.

Final measurement = Average measurement + Duty cycle correction factor.

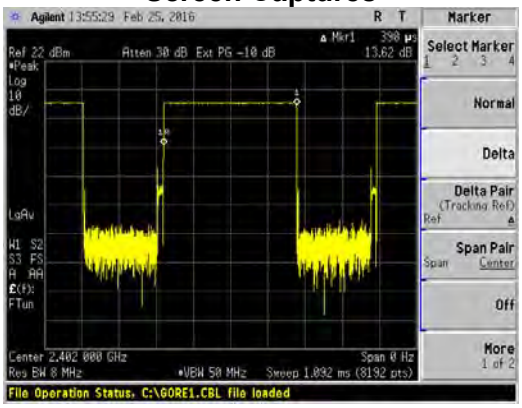
Final band-edge measurement = Average measurement + duty cycle correction factor + antenna gain

Duty Cycle measurements:

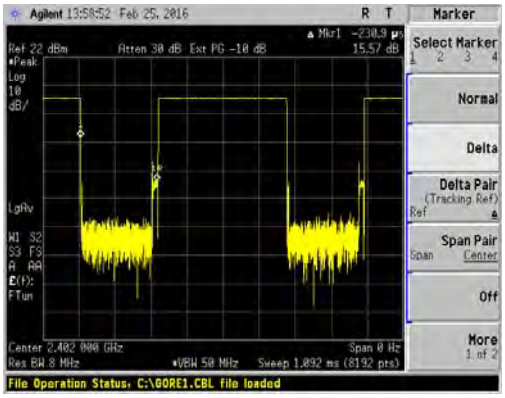
BLE:

Modulation	Data Rate (MBPS)	TX on time (ms)	TX off time (ms)	Duty Cycle	Duty cycle correction factor (dB)
GFSK	1.0	0.390	0.231	0.63	2.0

Screen Captures



ON time



OFF time

WLAN:

Modulation	802.11 Standard	Data Rate (MBPS)	TX on time (ms)	TX off time (ms)	Duty Cycle	Duty cycle correction factor (dB)
DBPSK	b	1.0	8.600	0.050	0.99	0.0
BPSK	g	6.0	1.392	0.041	0.97	0.1
8-QPSK	b	11.0	0.857	0.038	0.96	0.2
64-QAM	g	54.0	0.175	0.043	0.80	1.0
BPSK	n	MCS0	1.300	0.040	0.97	0.1
64-QAM	n	MCS7	0.164	0.042	0.80	1.0

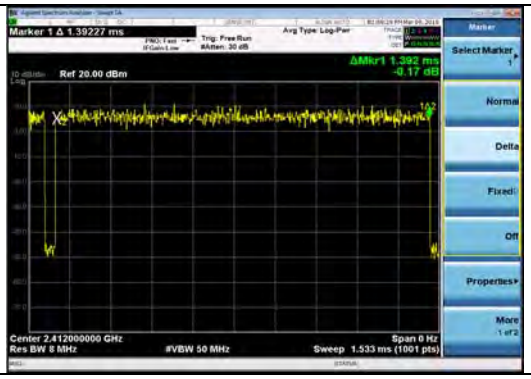
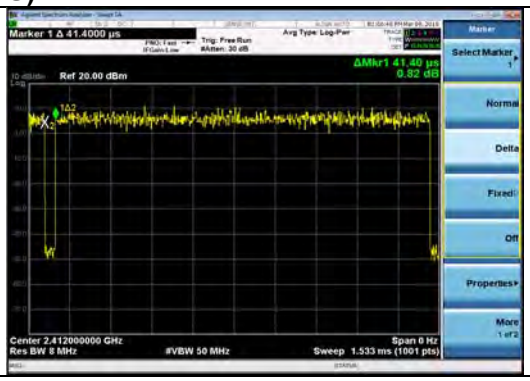
Example Screen Captures

802.11b (1MBPS)

On Time

Off Time

802.11g (6MBPS)

	
On Time	Off Time

802.11n (MCS0)

	
On Time	Off Time

WLAN

Upper Band-edge:

Chan	802.11 Standard	Data Rate (MBPS)	Peak data Frequency (MHz)	Restricted band Band-edge: Peak (dBm)	Average data Frequency (MHz)	Restricted band Band-edge: Avg (dBm)	Duty Cycle correction for average measurement (dB)	Antenna gain (dBi)	Final peak Band-edge	Peak Limit (dBm)	Peak Margin (dB)	Final average Band-edge	Average Limit (dBm)	Average Margin (dB)
9	b	1	2483.7	-41.0	2486.3	-48.6	0.0	2.0	-39.0	-21.2	17.8	-46.6	-41.2	5.4
10	b	1	2485.7	-39.5	2486.2	-47.8	0.0	2.0	-37.5	-21.2	16.3	-45.8	-41.2	4.6
11	b	1	2488.3	-40.5	2488.5	-49.1	0.0	2.0	-38.5	-21.2	17.3	-47.1	-41.2	5.8
9	b	11	2448.5	-34.8	2488.5	-47.1	0.2	2.0	-32.8	-21.2	11.6	-44.9	-41.2	3.6
10	b	11	2488.2	-36.7	2486.1	-49.7	0.2	2.0	-34.7	-21.2	13.4	-47.5	-41.2	6.3
11	b	11	2487.3	-38.2	2483.9	-50.5	0.2	2.0	-36.2	-21.2	15.0	-48.3	-41.2	7.0
9	n	MCS7	2483.5	-29.5	2483.5	-49.9	1.0	2.0	-27.5	-21.2	6.3	-46.9	-41.2	5.7
10	n	MCS7	2483.5	-27.9	2483.6	-50.3	1.0	2.0	-25.9	-21.2	4.6	-47.3	-41.2	6.1
11	n	MCS7	2486.3	-26.4	2483.5	-48.5	1.0	2.0	-24.4	-21.2	3.2	-45.5	-41.2	4.2
9	n	MCS0	2486.5	-28.2	2483.6	-49.7	0.1	2.0	-26.2	-21.2	4.9	-47.6	-41.2	6.4
10	n	MCS0	2483.9	-25.7	2484.3	-49.6	0.1	2.0	-23.7	-21.2	2.5	-47.5	-41.2	6.3
11	n	MCS0	2483.6	-24.9	2483.7	-49.6	0.1	2.0	-22.9	-21.2	1.7	-47.5	-41.2	6.3
9	a,g	6	2483.6	-28.3	2483.7	-50.6	0.1	2.0	-26.3	-21.2	5.0	-48.5	-41.2	7.2
10	a,g	6	2483.5	-25.1	2483.9	-50.6	0.1	2.0	-23.1	-21.2	1.9	-48.5	-41.2	7.3
11	a,g	6	2483.6	-26.2	2484.6	-46.3	0.1	2.0	-24.2	-21.2	3.0	-44.2	-41.2	3.0
9	a,g	54	2483.6	-32.0	2484.5	-50.9	1.0	2.0	-30.0	-21.2	8.8	-47.9	-41.2	6.7
10	a,g	54	2483.7	-29.2	2483.9	-50.5	1.0	2.0	-27.2	-21.2	6.0	-47.5	-41.2	6.3
11	a,g	54	2483.9	-24.0	2486.0	-47.6	1.0	2.0	-22.0	-21.2	0.8	-44.6	-41.2	3.4

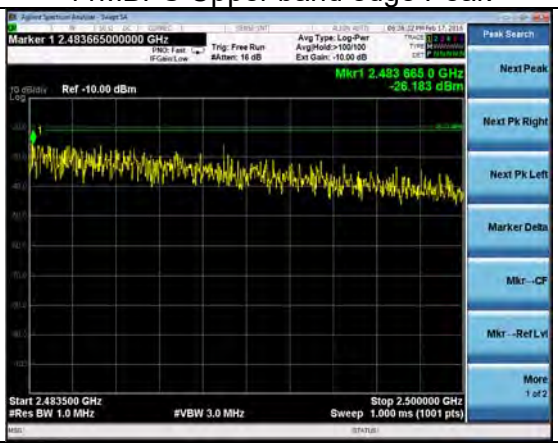
Sample screen captures (Channel 11)

1MBPS Upper band edge Peak

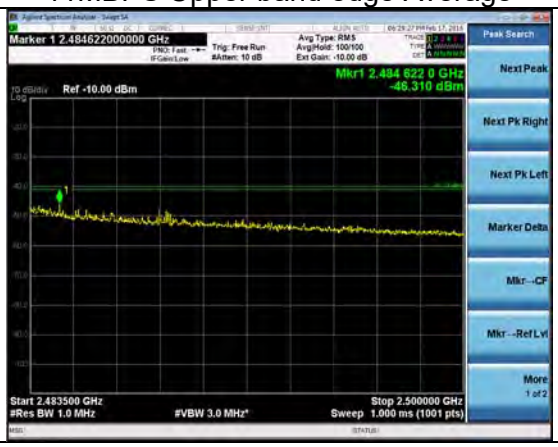
1MBPS Upper band edge Average

11MBPS Upper band edge Peak

11MBPS Upper band edge Average



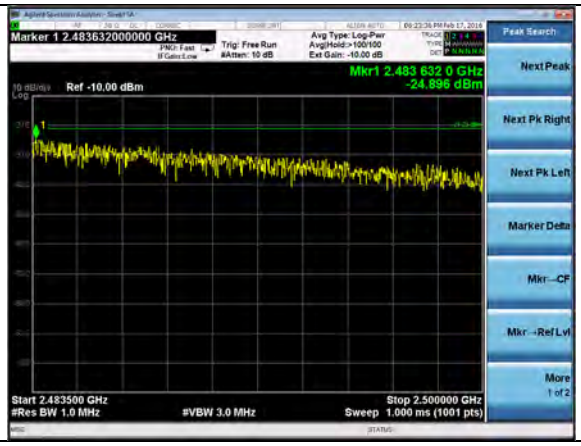
6MBPS Upper band edge Peak



6MBPS Upper band edge Average

54MBPS Upper band edge Peak

54MBPS Upper band edge Average



MCS0 HT20 Upper band edge Peak

MCS0 HT20 Upper band edge Average

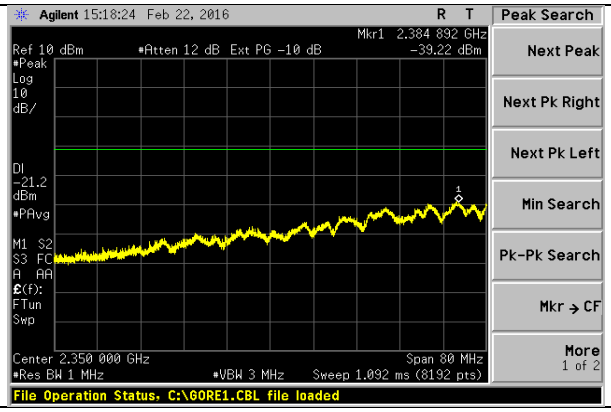
MCS7 HT20 Upper band edge Peak

MCS7 HT20 Upper band edge Average

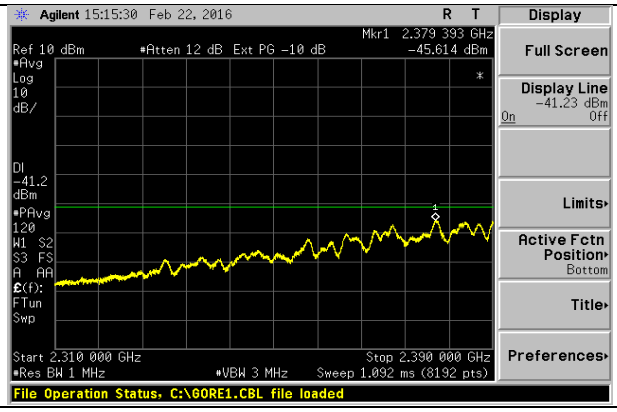
Lower Band-edge (2310 to 2390 MHz):

Chan	803.11 Standard	Data Rate (MBPS)	Peak data Frequency (MHz)	Restricted band Band-edge: Peak (dBm)	Average data Frequency (MHz)	Restricted band Band-edge: Avg (dBm)	Duty Cycle correction for average measurement (dB)	Antenna gain (dBi)	Final peak Band-edge (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Final average Band-edge (dBm)	Average Limit (dBm)	Average Margin (dB)
1	b	1	2384.9	-39.2	2379.4	-45.6	0.0	2.0	-37.2	-21.2	16.0	-43.6	-41.2	2.4
1	b	11	2381.8	-39.6	2389.2	-50.0	0.2	2.0	-37.6	-21.2	16.3	-47.8	-41.2	6.6
1	n	MCS7	2389.8	-27.5	2389.5	-46.0	1.0	2.0	-25.5	-21.2	4.3	-43.0	-41.2	1.8
1	n	MCS0	2389.9	-28.1	2389.4	-45.1	0.1	2.0	-26.1	-21.2	4.9	-43.0	-41.2	1.8
1	a,g	6	2388.4	-27.2	2387.2	-45.7	0.1	2.0	-25.2	-21.2	4.0	-43.6	-41.2	2.4
1	a,g	54	2386.7	-32.8	2389.9	-48.0	1.0	2.0	-30.8	-21.2	9.6	-45.0	-41.2	3.8

Screen Captures



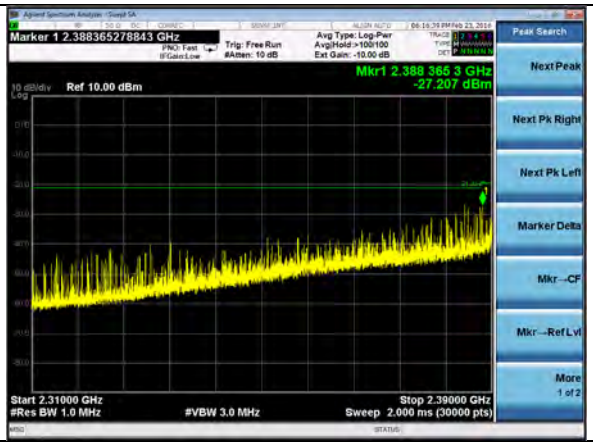
1MBPS Lower band edge Peak



1MBPS Lower band edge Average

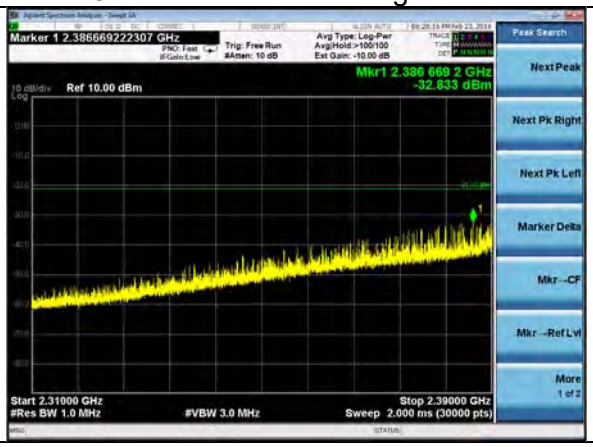
11MBPS Lower band edge Peak

11MBPS Lower band edge Average



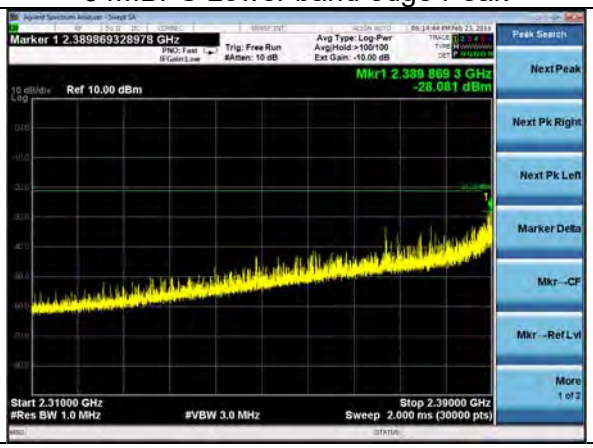
6MBPS Lower band edge Peak

6MBPS Lower band edge Average



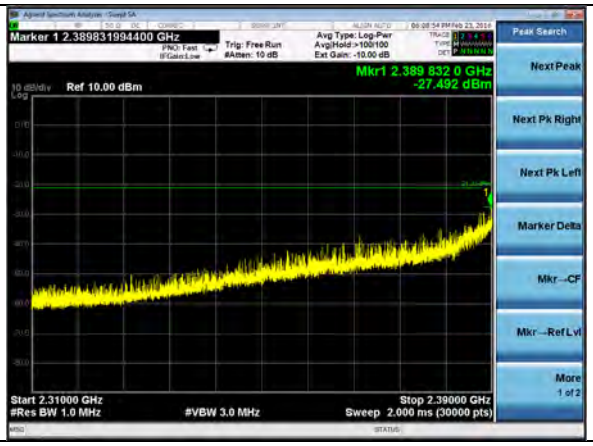
54MBPS Lower band edge Peak

54MBPS Lower band edge Average



MCS0 HT20 Lower band edge Peak

MCS0 HT20 Lower band edge Average



MCS7 HT20 Lower band edge Peak

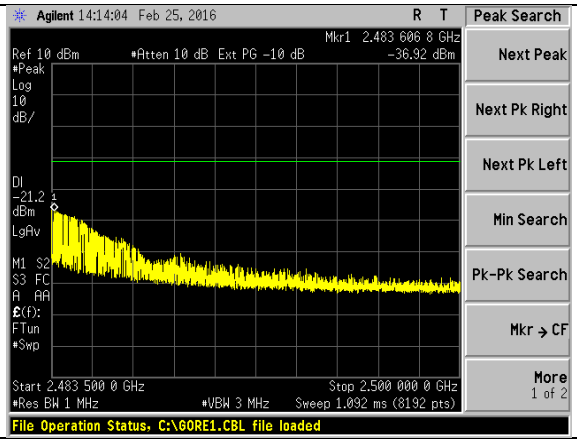
MCS7 HT20 Lower band edge Average

BLE

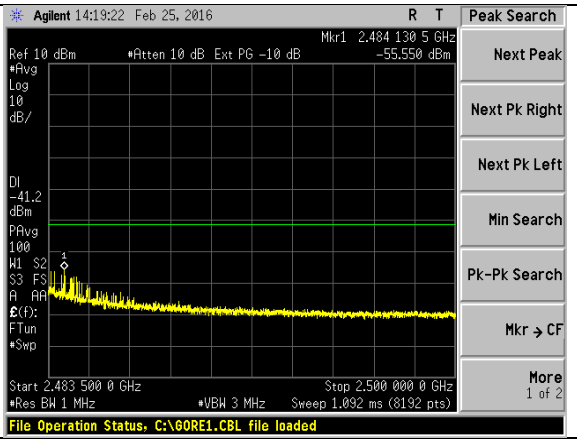
Upper Band-edge:

Data Rate (MBPS)	Peak data Frequency (MHz)	Restricted band Band-edge: Peak (dBm)	Average data Frequency (MHz)	Restricted band Band-edge: Avg (dBm)	Duty Cycle correction for average measurement (dB)	Antenna gain (dBi)	Final peak Band-edge (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Final average Band-edge (dBm)	Average Limit (dBm)	Average Margin (dB)
1	2483.6	-36.9	2484.1	-55.6	2.0	2.0	-34.9	-21.2	13.7	-51.6	-41.2	10.3

Screen captures



1MBPS Upper band edge Peak

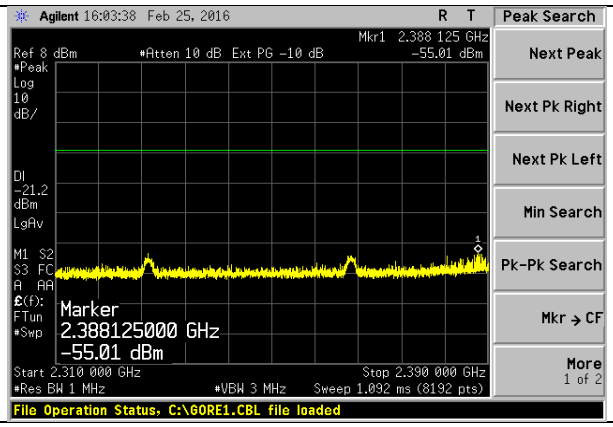


1MBPS Upper band edge Average

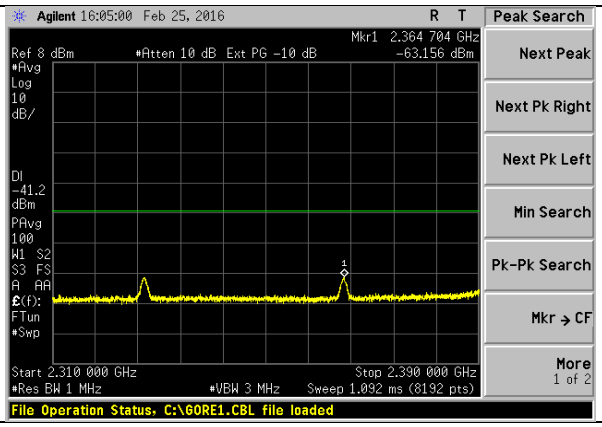
Lower Band-edge:

Data Rate (MBPS)	Peak data Frequency (MHz)	Restricted band emission: Peak (dBm)	Average data Frequency (MHz)	Restricted band emission: Avg (dBm)	Duty Cycle correction for average measurement (dB)	Antenna gain (dBi)	Final peak emission (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Final average emission (dBm)	Average Limit (dBm)	Average Margin (dB)
1	2388.1	-55.0	2364.7	-63.2	2.0	2.0	-53.0	-21.2	31.8	-59.2	-41.2	17.9

Screen captures



1MBPS Lower band edge Peak



1MBPS Lower band edge Average

Conducted measurements FCC KDB 558074 D01 Measurement Guidance v03r05 section 11 to satisfy spurious emissions in 100kHz bandwidth requirement.

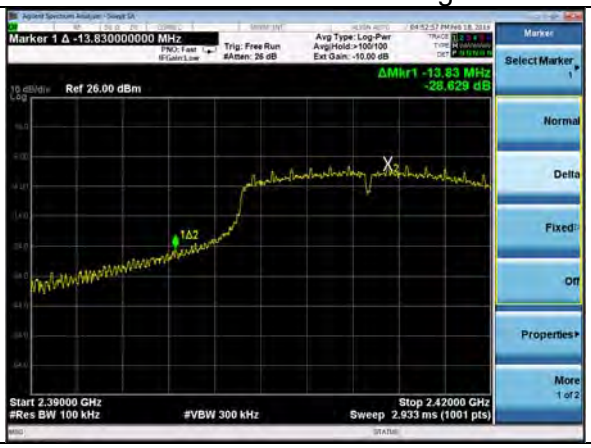
WLAN

1 MBPS upper band-edge

1 MBPS lower band-edge

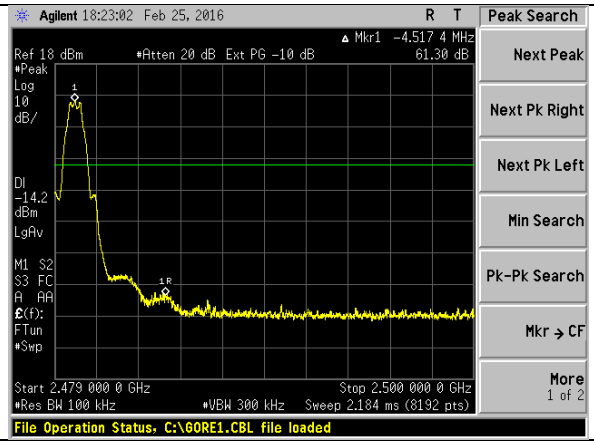
11 MBPS upper band-edge

11 MBPS lower band-edge

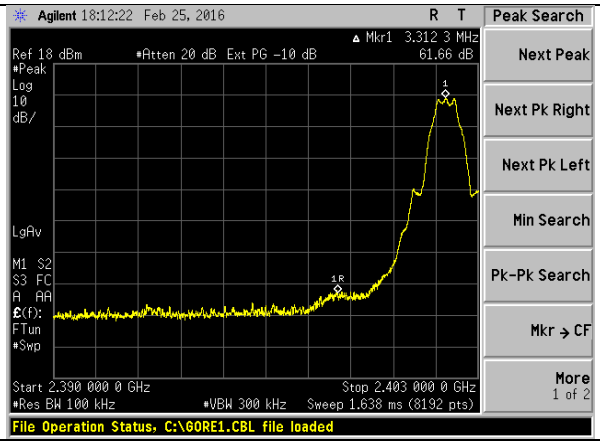


6 MBPS upper band-edge	6 MBPS lower band-edge
	
54 MBPS upper band-edge	54 MBPS lower band-edge
	
MCS0 upper band-edge	MCS0 lower band-edge
	
MCS7 upper band-edge	MCS7 lower band-edge

BLE



upper band-edge



lower band-edge

EXHIBIT 9. POWER OUTPUT (CONDUCTED): 15.247(b)

Test Engineer(s): Coty Hammerer

9.1 - Method of Measurements

The conducted RF output power of the EUT was measured at the antenna port using a short RF cable along with an attenuator as protection for the spectrum analyzer. The loss from the cable and the attenuator were added on the analyzer as gain offset settings there by allowing direct measurements without the need for any further corrections. The unit was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source.

Measurement procedure used was FCC OET KDB 558074 D01 Measurement Guidance v03r05 section 9.1.2 for WLAN and 9.1.1 for BLE

9.2 - Test Data

The data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dBm) + Cable factor (dB) + Miscellaneous factors when applicable (dB).

Generic example of reported data at 2440 MHz:

Reported Measurement data = 8.55 (raw receiver measurement in dBm) + 0.85 (cable factor in dB) = 9.4 (dBm).

9.2.1. WLAN Maximum conducted peak power:

9.1.2 WLAN Maximum conducted (Peak) output power:

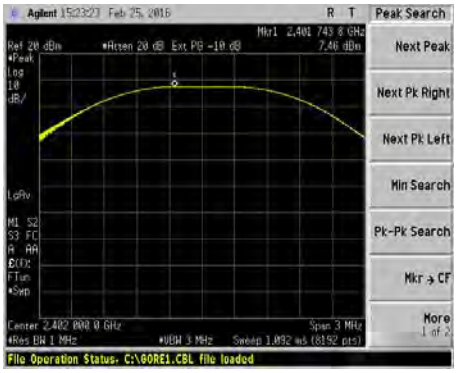
802.11 Standard	Data Rate (MBPS)	Channel	Maximum Peak Power (dBm)	Power Limit (dBm)	Power margin (dB)
b	1 (DBPSK)	1	19.9	30.0	10.1
		6	19.6	30.0	10.5
		9	19.3	30.0	10.7
		10	18.6	30.0	11.5
		11	17.3	30.0	12.7
g	6 (BPSK)	1	24.0	30.0	6.0
		6	23.8	30.0	6.2
		9	23.7	30.0	6.3
		10	23.4	30.0	6.6
		11	23.0	30.0	7.0
n (HT20)	MCS0 (BPSK)	1	23.3	30.0	6.8
		6	23.4	30.0	6.6
		9	23.4	30.0	6.6
		10	22.8	30.0	7.3
		11	22.4	30.0	7.6
b	11 (8QPSK)	1	20.0	30.0	10.0
		6	20.1	30.0	10.0
		9	19.9	30.0	10.1
		10	18.9	30.0	11.1
		11	18.0	30.0	12.0
g	54 (64QAM)	1	23.7	30.0	6.3
		6	23.6	30.0	6.4
		9	23.6	30.0	6.4
		10	23.4	30.0	6.7
		11	22.6	30.0	7.4
n (HT20)	MCS7 (64QAM)	1	23.2	30.0	6.8
		6	23.1	30.0	7.0
		9	23.0	30.0	7.0
		10	22.4	30.0	7.6
		11	20.8	30.0	9.2

Note: All WLAN power measurements were completed with a Power Meter.

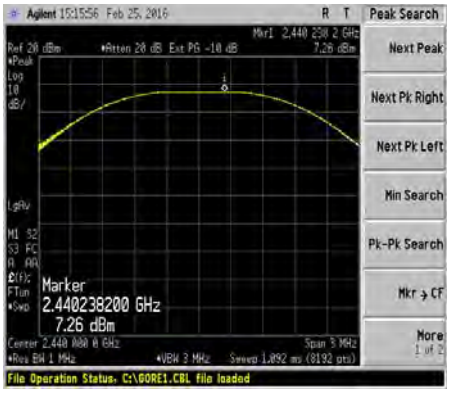
9.2.2. BLE Maximum peak conducted power:

Data Rate (MBPS)	Channel	Maximum Peak Power (dBm)	Limit (dBm)	Power margin (dB)
1Mbps	0	7.5	30.0	22.5
	19	7.3	30.0	22.7
	39	6.5	30.0	23.5

Low


Agilent 15:23:23 Feb 25, 2016
R T
Peak Search
Mkr1 2.401 743 0 GHz
Ref 20 dBm
#Atten 20 dB Ext PG -10 dB
7.46 dBm
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
A AA
£(f):
FTun
#Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 2.402 000 0 GHz
Span 3 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1.092 ms (8192 pts)
File Operation Status: C:\GORE1.CBL file loaded

Mid


Agilent 15:15:56 Feb 25, 2016
R T
Peak Search
Mkr1 2.440 238 2 GHz
Ref 20 dBm
#Atten 20 dB Ext PG -10 dB
7.26 dBm
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
A AA
£(f):
FTun
#Swp
Marker
2.440238200 GHz
7.26 dBm
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 2.440 000 0 GHz
Span 3 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1.092 ms (8192 pts)
File Operation Status: C:\GORE1.CBL file loaded

High

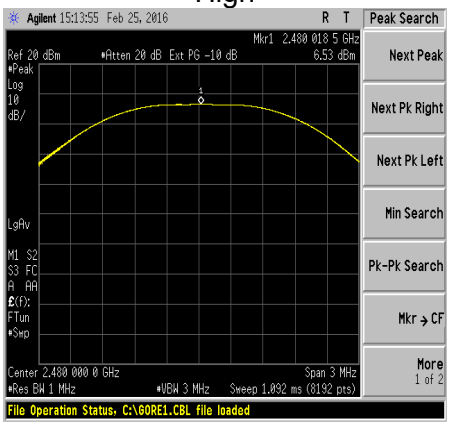

Agilent 15:13:55 Feb 25, 2016
R T
Peak Search
Mkr1 2.480 018 5 GHz
Ref 20 dBm
#Atten 20 dB Ext PG -10 dB
6.53 dBm
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
A AA
£(f):
FTun
#Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 2.480 000 0 GHz
Span 3 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 1.092 ms (8192 pts)
File Operation Status: C:\GORE1.CBL file loaded

EXHIBIT 10. CONDUCTED SPURIOUS EMISSIONS: 15.247(d)

Test Engineer(s): Coty Hammerer

10.1 - Limits

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

10.2 – Conducted Harmonic and Spurious RF Measurements

FCC Part 15.247(d) and IC RSS 210 A8.5 both require a measurement of conducted harmonic and spurious RF emission levels, as reference to the carrier level when measured in a 100 kHz bandwidth. For this test, the spurious and harmonic RF emissions from the EUT were measured at the EUT antenna port using a short RF cable along with an attenuator as protection for the spectrum analyzer. The loss from the cable and the attenuator were added on the analyzer as gain offset settings, thereby allowing direct readings of the measurements made without the need for any further corrections. A spectrum analyzer was used with the resolution bandwidth set to 100 kHz for this portion of the tests. The unit was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source. The spectrum analyzer was used with measurements from a peak detector presented in the chart below. Screen captures were acquired and any noticeable spurious and harmonic signals were identified and measured.

Measurement procedure used was FCC OET KDB 558074 D01 Measurement Guidance v03r05 section 11.

In addition, conducted measurements were performed to supplement cabinet radiation measurements and is included in this section. Measurement procedure used was **FCC KDB 558074 D01 Measurement Guidance v03r05, section 12.2.**

The data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dBm) + Cable factor (dB) + Miscellaneous factors when applicable (dB).

Generic example of reported data at 2440 MHz:

Reported Measurement data = 8.55 (raw receiver measurement in dBm) + 0.85 (cable factor in dB) = 9.4 (dBm).

10.3.a - Test Data

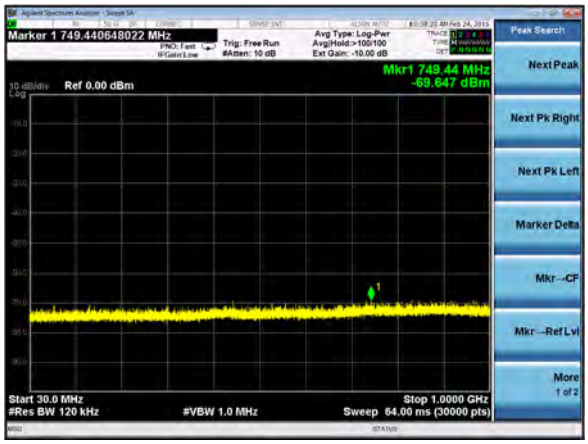
Transmit channel	Restricted band emission frequency (MHz)	Peak (dBm)	Ground Reflection factor (dB)	Out of band antenna correction (dBi)	Final peak emission (dBm)	Peak Limit (dBm)	Peak Margin (dB)
1	2204.2	-55.1	0.0	2.0	-53.1	-21.2	31.9
	3747.5	-54.1	0.0	2.0	-52.1	-21.2	30.9
6	2232.4	-55.5	0.0	2.0	-53.5	-21.2	32.2
	2500.8	-51.2	0.0	2.0	-49.2	-21.2	28.0
	7310.5	-46.9	0.0	2.0	-44.9	-21.2	23.7
11	2256.5	-56.3	0.0	2.0	-54.3	-21.2	33.1
	2503.7	-49.0	0.0	2.0	-47.0	-21.2	25.8
	7387.3	-49.9	0.0	2.0	-47.9	-21.2	26.7
	2392.5	-50.7	0.0	2.0	-48.7	-21.2	27.5

The plots presented below are samples selected from the various data rates and channels tested. Peak emissions meet the Average limit for all of the following plots.

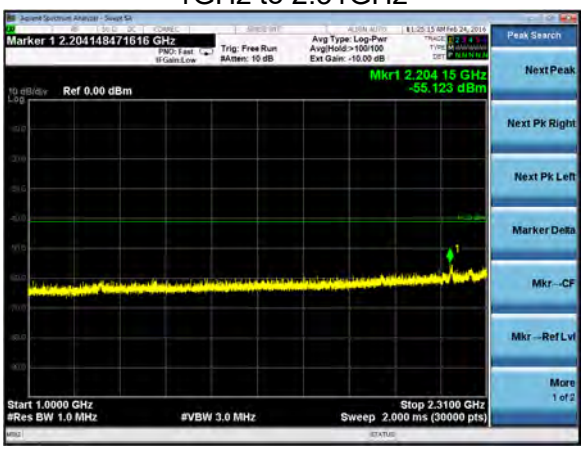
10.3.1 2.4GHz WLAN 1 Mbps (highest power setting) in 1MHz BW

Low Channel in 1MHz:

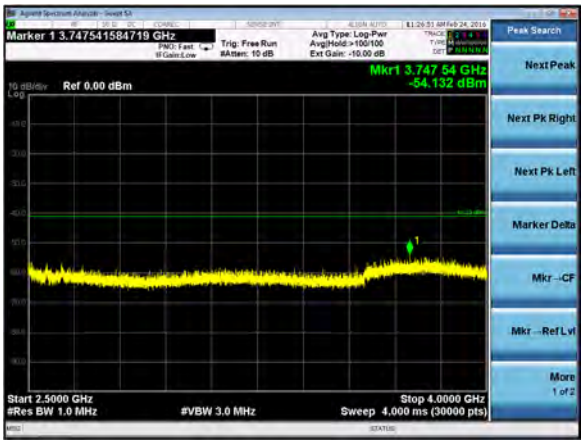
30MHz to 1000MHz



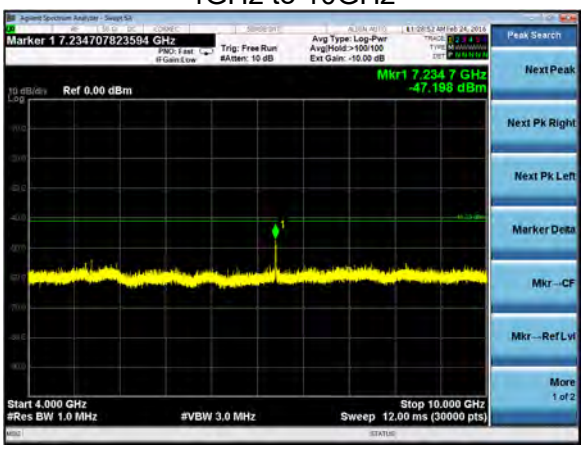
1GHz to 2.31GHz



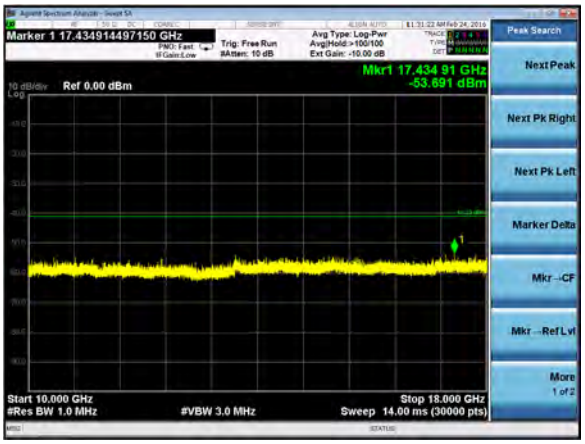
2.5GHz to 4GHz



4GHz to 10GHz



10GHz to 18GHz



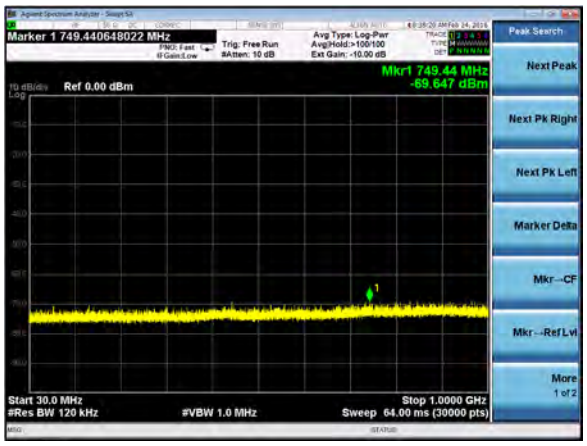
18GHz to 25GHz

10.3.b - Test Data

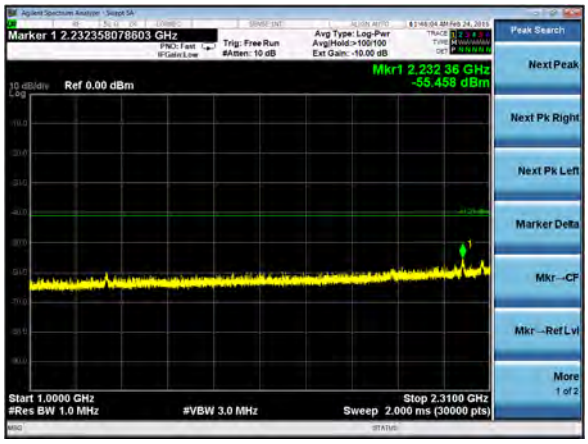
10.3.2 2.4GHz BLE
(Only Middle Channel Shown)
Lowest Margin

Transmit channel	Restricted band emission frequency (MHz)	Peak (dBm)	Ground Reflection factor (dB)	Out of band antenna correction (dBi)	Final peak emission (dBm)	Peak Limit (dBm)	Peak Margin (dB)
0	1441.5	-55.3	0.0	2.0	-53.3	-21.2	32.1
	4698.0	-53.7	0.0	2.0	-51.7	-21.2	30.5
19	1464.4	-56.5	0.0	2.0	-54.5	-21.2	33.3
	2387.4	-50.8	0.0	2.0	-48.8	-21.2	27.6
39	1488.2	-56.8	0.0	2.0	-54.8	-21.2	33.6
	3760.7	-54.1	0.0	2.0	-52.1	-21.2	30.9
	4989.8	-54.8	0.0	2.0	-52.8	-21.2	31.6
	17905.3	-52.7	0.0	2.0	-50.7	-21.2	29.5
	23940.0	-50.9	0.0	2.0	-48.9	-21.2	27.7

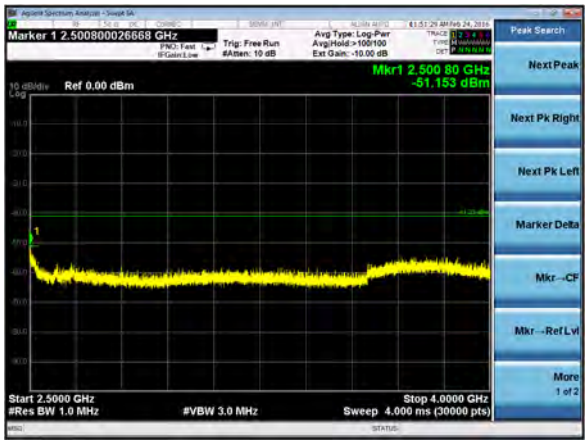
30MHz to 1000MHz



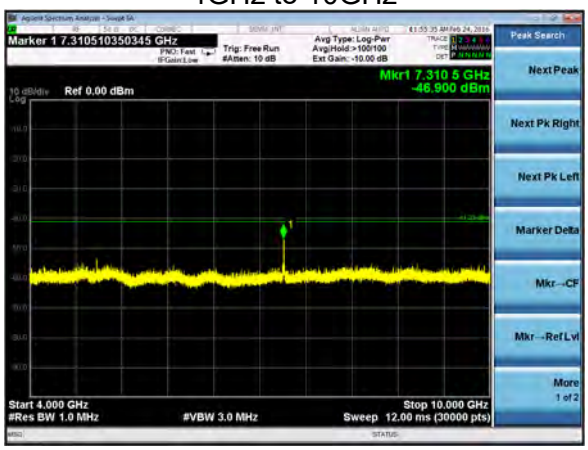
1GHz to 2.31GHz



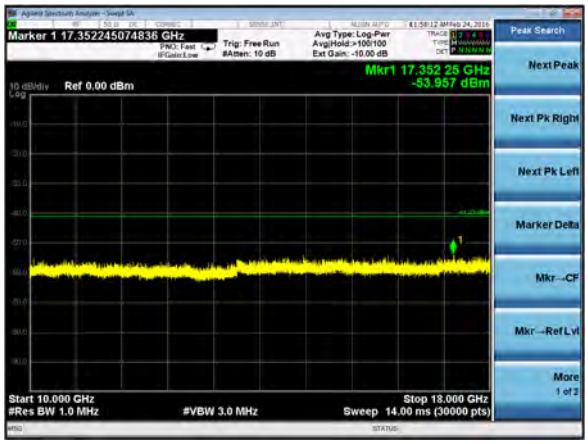
2.5GHz to 4GHz



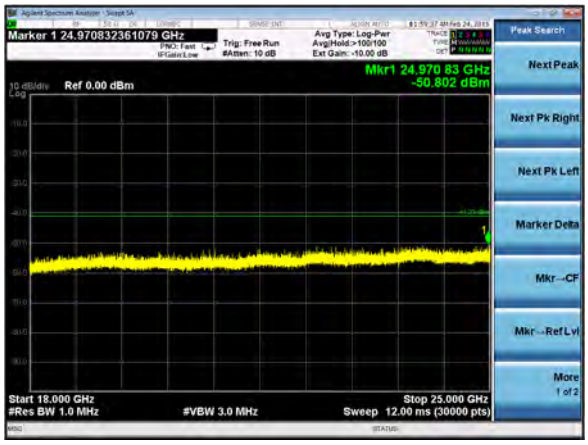
4GHz to 10GHz



10GHz to 18GHz



18GHz to 25GHz



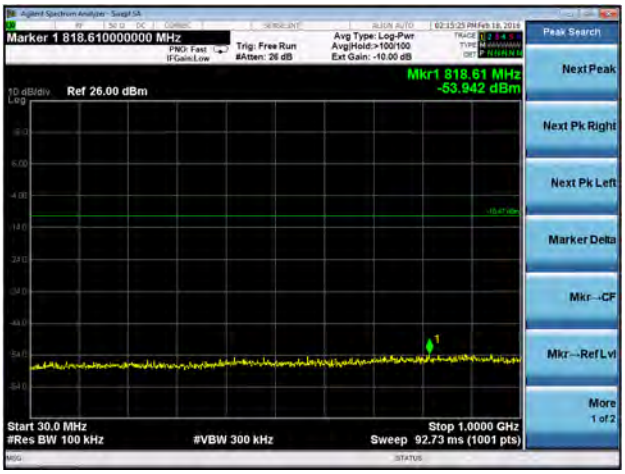
10.4 - Test Data

The plots presented below are samples selected from the various data rates and channels tested.

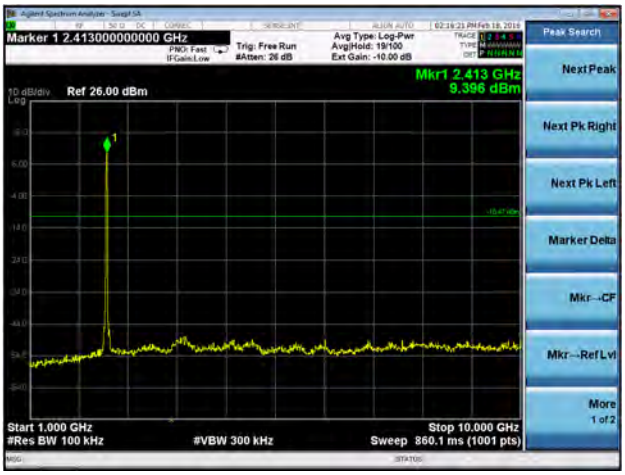
10.4.1 2.4GHz WLAN 1 Mbps (greatest power spectral density) in 100 kHz BW

Low Channel fundamental in 100 kHz:

30MHz to 1000MHz

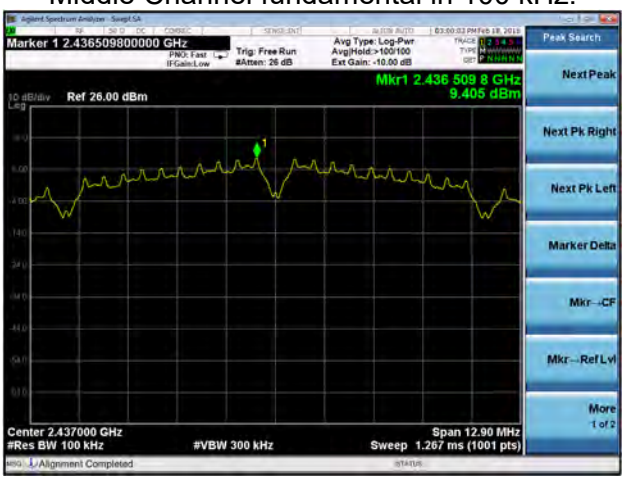


1000MHz to 10000MHz

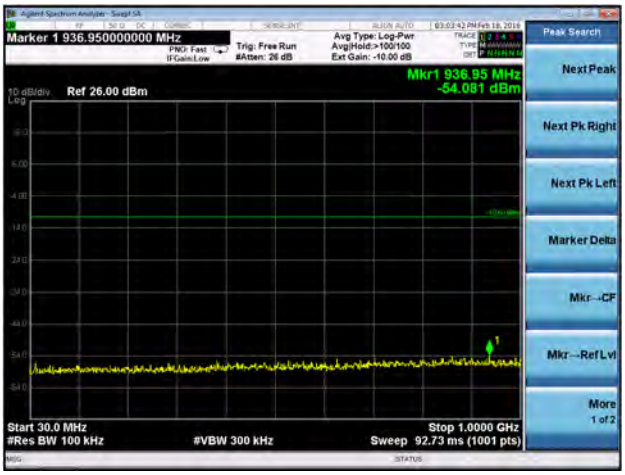


10000 to 25000MHz

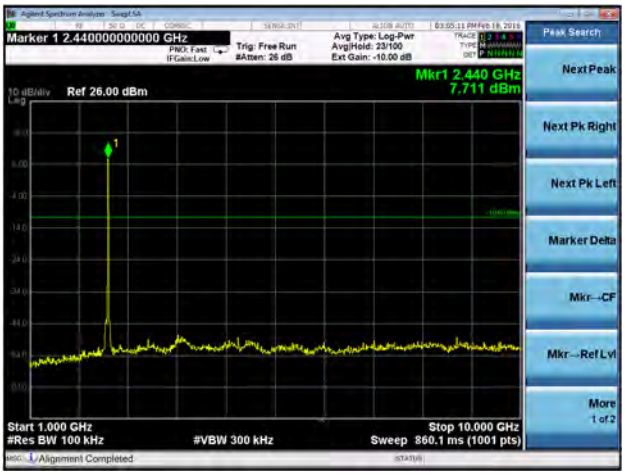
Middle Channel fundamental in 100 kHz:



30MHz to 1000MHz



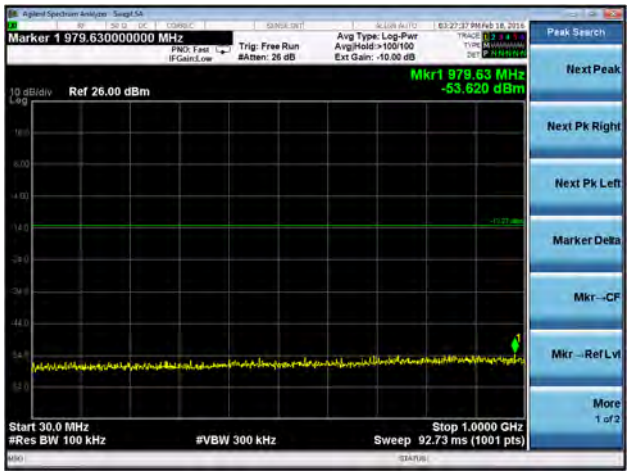
1000MHz to 10000MHz



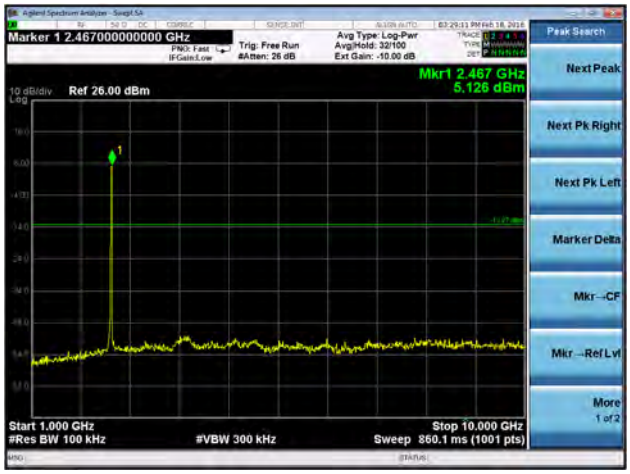
10000MHz to 25000MHz

High Channel fundamental in 100 kHz:

30MHz to 1000MHz



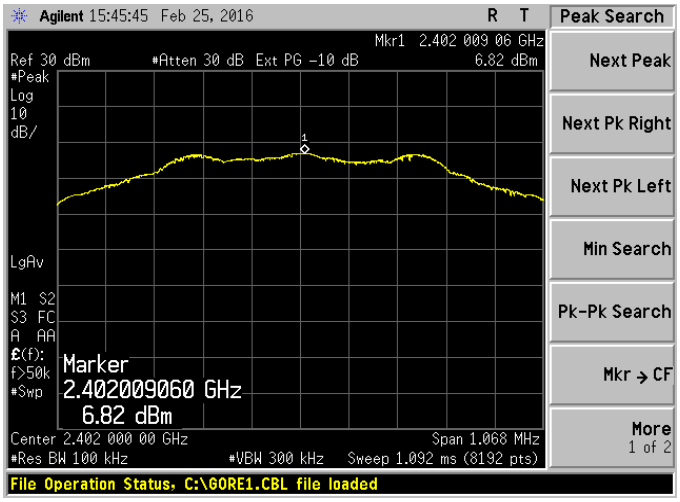
1000MHz to 10000MHz



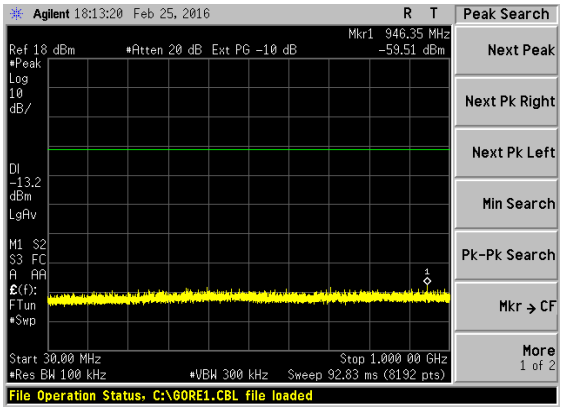
10000MHz to 25000MHz

10.4.2 2.4GHz BLE
(Only Low Channel Shown)
Highest Measured Output Power

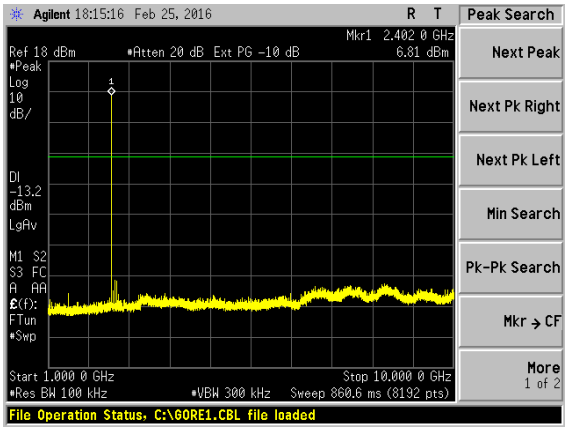
Low Channel fundamental in 100 kHz:



30MHz to 1000MHz



1000MHz to 10000MHz



10000MHz to 25000MHz

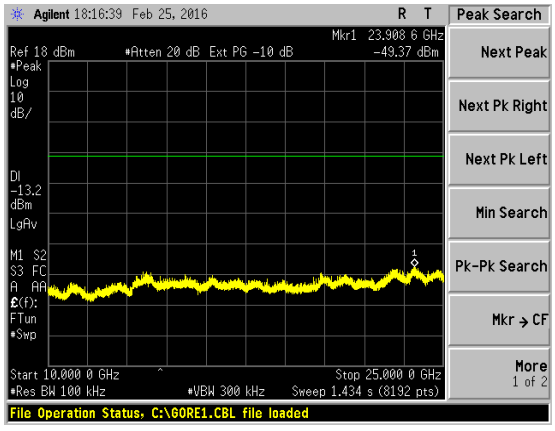


EXHIBIT 11. POWER SPECTRAL DENSITIES: 15.247(e)

11.1 Limits

For digitally modulate systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

In accordance with FCC Part 15.247(e) and RSS-247, the peak power spectral density should not exceed +8 dBm in any 3 kHz band. This measurement was performed along with the conducted power output readings performed as described in previous sections. The peak output frequency for each representative frequency was scanned, with a narrow bandwidth, and reduced sweep, and a power density measurement was performed.

Measurement procedure used was FCC OET KDB 558074 D01 Measurement Guidance v03r05 section 10.2 for WLAN and BLE.

The data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dBm) + Cable factor (dB) + Miscellaneous factors when applicable (dB).

Generic example of reported data at 2440 MHz:

Reported Measurement data = 8.55 (raw receiver measurement in dBm) + 0.85 (cable factor in dB) = 9.4 (dBm).

11.2 Test Data

11.2.1 2.4GHz WLAN

802.11 Standard	Data Rate (MBPS)	Channel	Peak PSD in 3 kHz (dBm)	PSD in 3kHz limit(dBm)	PSD margin (dBm)
b	1 (DBPSK)	1	-4.7	8.0	12.7
		6	-3.8	8.0	11.8
		9	-4.4	8.0	12.4
		10	-5.7	8.0	13.7
		11	-6.2	8.0	14.2
b	11 (8QPSK)	1	-5.1	8.0	13.1
		6	-4.9	8.0	12.9
		9	-6.0	8.0	14.0
		10	-6.1	8.0	14.1
		11	-6.3	8.0	14.3

802.11 Standard	Data Rate (MBPS)	Channel	Peak PSD in 100 kHz (dBm)	PSD in 3kHz limit(dBm)	PSD margin (dBm)
g	6 (BPSK)	1	3.4	8.0	4.6
		6	3.9	8.0	4.1
		9	3.0	8.0	5.0
		10	2.9	8.0	5.1
		11	2.0	8.0	6.0
n	MCS0 (BPSK)	1	2.4	8.0	5.6
		6	1.6	8.0	6.4
		9	1.7	8.0	6.3
		10	0.8	8.0	7.2
		11	-0.3	8.0	8.3
g	54 (64QAM)	1	4.1	8.0	3.9
		6	4.0	8.0	4.0
		9	3.8	8.0	4.2
		10	2.8	8.0	5.2
		11	2.0	8.0	6.0
n	MCS7 (64QAM)	1	2.4	8.0	5.6
		6	2.4	8.0	5.6
		9	2.1	8.0	5.9
		10	1.1	8.0	6.9
		11	-0.1	8.0	8.1

Note: WLAN PSD for 6 Mbps, 54 Mbps, MCS0, and MCS7 was done with a RBW of 100 kHz and not 3 kHz.

11.2.2 BLE

Data Rate (MBPS)	Channel	Peak PSD in 100kHz (dBm)	PSD in 3kHz limit(dBm)	PSD margin (dBm)
1	0	6.8	8.0	1.2
	19	6.6	8.0	1.4
	39	5.8	8.0	2.2

11.3 Screen Captures – Power Spectral Density

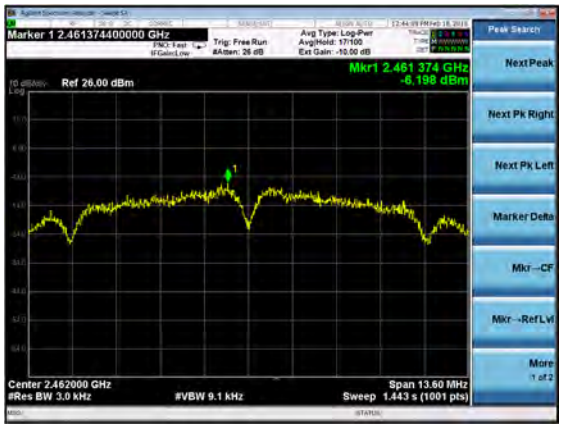
11.3.1 2.4GHz WLAN

11.3.1.1 1MBPS

Low Channel

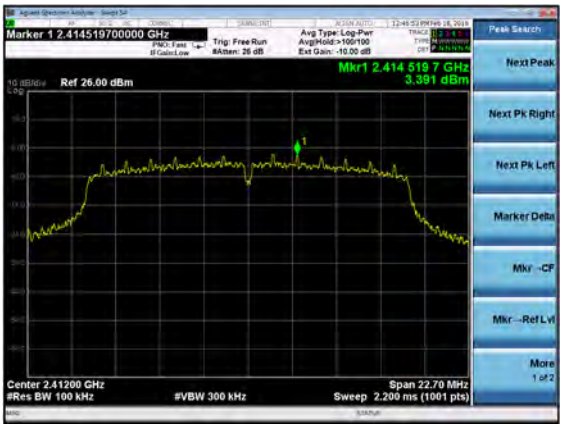
Middle Channel

High Channel

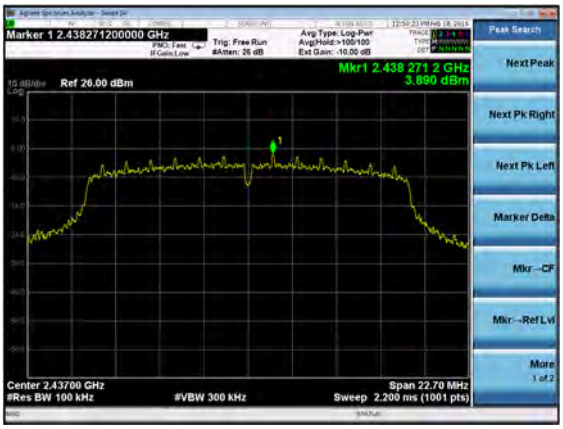


11.3.1.2 6MBPS

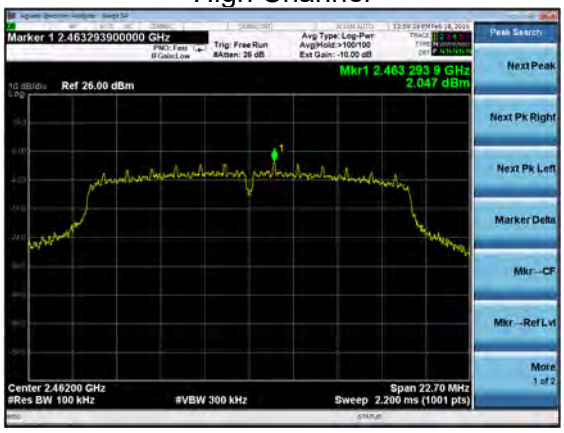
Low Channel



Middle Channel



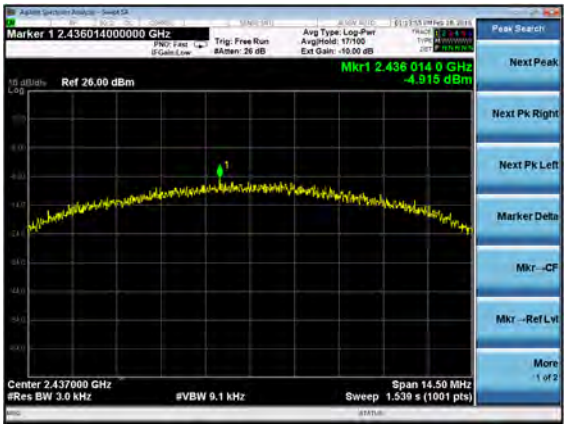
High Channel



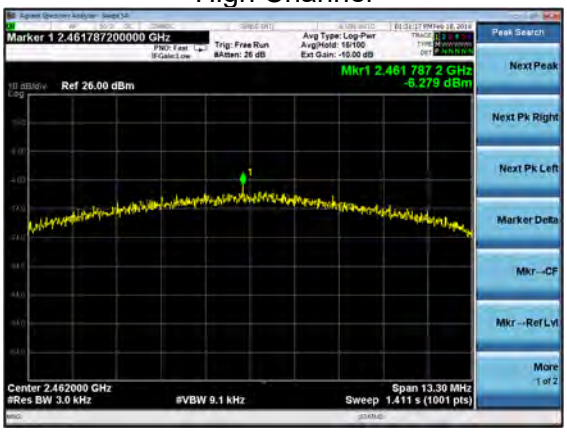
11.3.1.3 11MBPS

Low Channel

Middle Channel

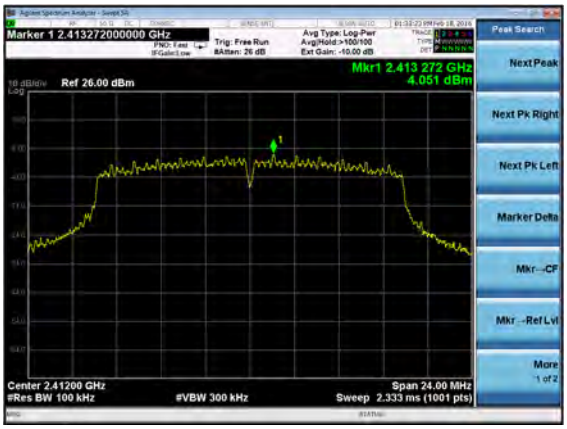


High Channel

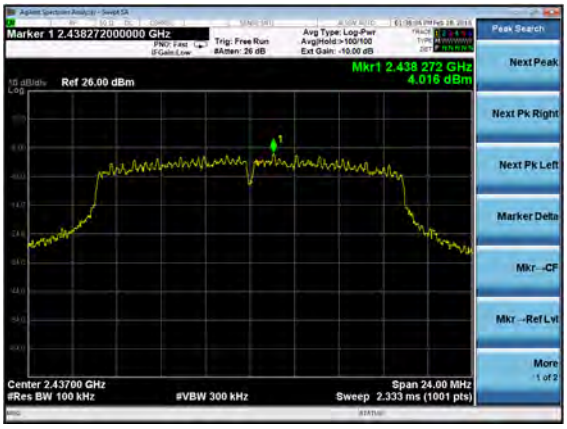


11.3.1.4 54MBPS

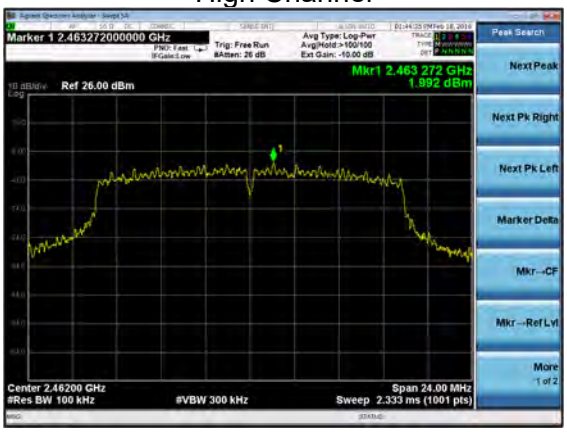
Low Channel



Middle Channel

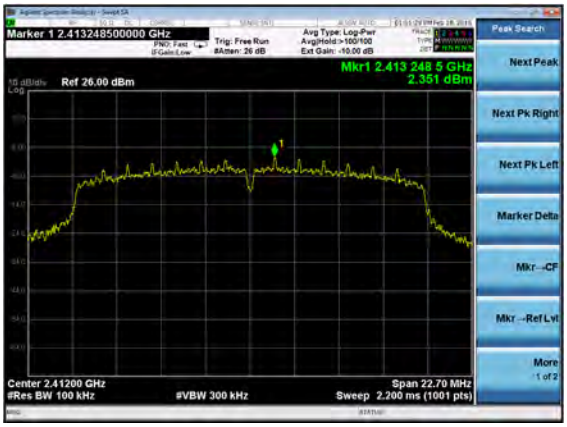


High Channel



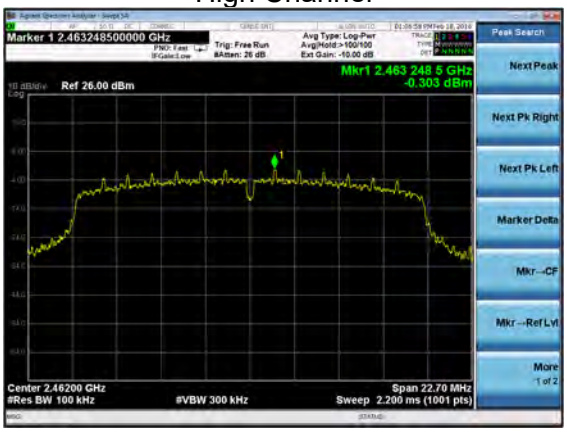
11.3.1.5 MCS0 HT20

Low Channel



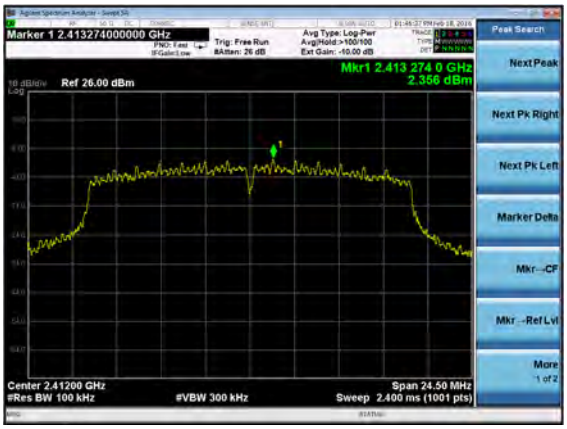
Middle Channel

High Channel

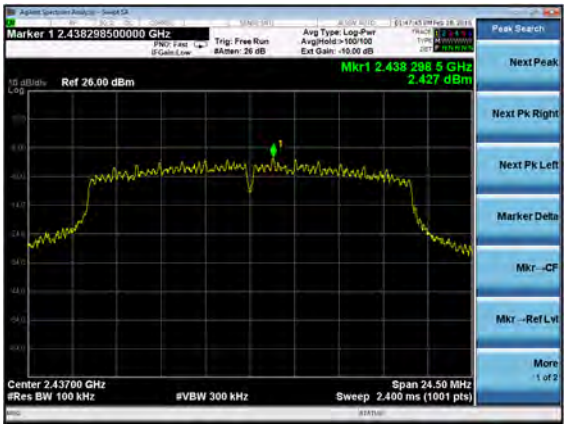


11.3.1.6 MCS7 HT20

Low Channel



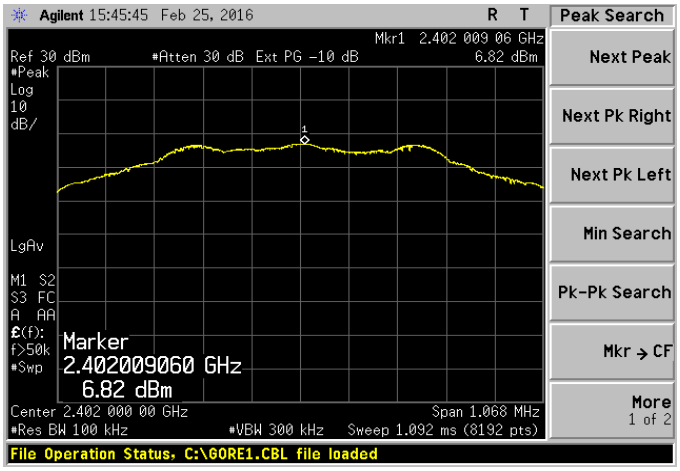
Middle Channel



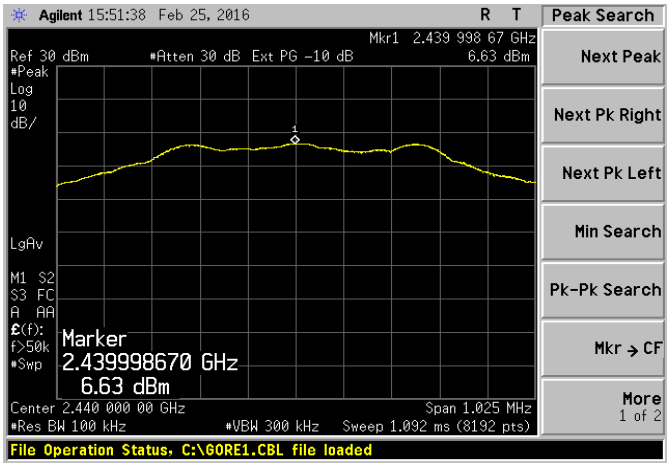
High Channel

11.3.2 BLE

Low Channel



Middle Channel



High Channel

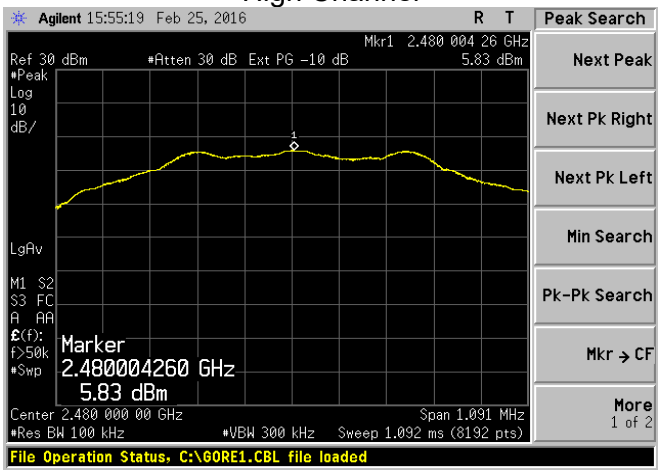


EXHIBIT 12. FREQUENCY STABILITY OVER VOLTAGE VARIATIONS

Test Engineer(s): Coty Hammerer

The frequency stability of the device was examined as a function of the input voltage available to the EUT. A Spectrum Analyzer was used to measure the RF output power and frequency at the appropriate frequency markers. Power was supplied by an external bench-type DC power supply and was varied from the minimum to maximum operating voltage because a variance of ≥10% from the nominal voltage is outside the range of operation.

The power was then cycled On/Off to observe system response. No unusual response was observed, the emission characteristics were well behaved, and the system returned to the same state of operation as before the power cycle.

BT	3.0 VDC	3.3 VDC	3.6 VDC	
Channel	Frequency (Hz)	Frequency (Hz)	Frequency (Hz)	Frequency Drift (Hz)
2402	2402012348	2402012326	2402012253	95
2440	2440016742	2440016691	2440016676	66
2480	2480021597	2480021567	2480021521	76

WLAN	3.0 VDC	3.3 VDC	3.6 VDC	
Channel	Frequency (Hz)	Frequency (Hz)	Frequency (Hz)	Frequency Drift (Hz)
2412	2412006465	2412007301	2412005905	1396
2437	2437006708	2437006097	2437006082	626
2462	2462007066	2462006529	2462007160	631

EXHIBIT 13. COMPLIANCE TO KDB 594280 D01

Manufacturer declaration:

Channels 12 and 13 are not activated for this module. The module will be programmed at the factory to only operate and actively scan on these specific channels:

Channels 1 – 11, 2412-2462 MHz 802.11b mode
Channels 1 – 11, 2412-2462 MHz 802.11g mode
Channels 1 – 11, 2412-2462 MHz 802.11n mode (20 MHz channel)

The module does not support any non-US channels or country code selection in all of the operational modes, like Ad-Hoc.

APPENDIX A – Test Equipment List

LSR
a Laird Business

Date: 11-Feb-2016 Type Test: Radiated Measurements Job #: C-2391

Prepared By: Coty Hammerer Customer: LSR Quote #: 316050

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	AA 960153	2.4GHz High Pass Filter	KWM	HPF-L-14186	7272-04	4/15/2015	4/15/2016	Calibration Due
2	EE 960159	0.8 - 2.1GHz LNA	Mini-Circuits	ZVA-213X-S+	40201429	2/4/2016	2/4/2017	Active Calibration
3	AA 960158	Double Ridge Horn Antenna	ETS Lindgren	3117	109300	2/4/2016	2/4/2017	Active Calibration
4	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	Verification	Verification	System
5	AA 960162	EM Series Cable	MegaPhase	EM26-S1S1-120	12024301 001	6/30/2015	6/30/2016	Active Calibration
6	EE 960085	N9038A MXE 26.5GHz Receiver	Agilent	N9038A	MY51210148	5/6/2015	5/6/2016	Active Calibration
7	EE 960077	DC Power Supply	GW Instek	GPS-3030DD	EJ810521	Verification	Verification	System
8	AA 960005	Biconical Antenna	EMCO	93110B	9601-2280	1/14/2016	1/14/2017	Active Calibration
9	AA 960078	Log Periodic Antenna	EMCO	93146	9701-4855	3/31/2016	3/31/2017	Active Calibration
10	Rental	Horn Antenna 18-40 GHz	AH Systems, Inc	SAS-574	193	11/30/2015	11/30/2016	Active Calibration

LSR
a Laird Business

Date: 14-Apr-2016 Type Test: Conducted Emissions Job #: C-2391

Prepared By: Coty Hammerer Customer: LSR Quote #: 316050

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960162	LISN - 15A	COM-POWER	LI-215A	191969	7/24/2015	7/24/2016	Active Calibration
2	EE 960077	DC Power Supply	GW Instek	GPS-3030DD	EJ810521	Verification	Verification	System
3	EE 960088	8GHz MXE Spectrum Analyzer	Agilent	N9038A	MY51210138	2/24/2016	2/24/2017	Active Calibration

LSR
a Laird Business

Date: 10-Feb-2016 Type Test: Conducted Measurements Job #: C-2391

Prepared By: Coty Hammerer Customer: LSR Quote #: 316050

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	6/26/2015	6/26/2017	Active Calibration
2	EE 960085	N9038A MXE 26.5GHz Receiver	Agilent	N9038A	MY51210148	5/6/2015	5/6/2016	Active Calibration
3	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	Verification	Verification	System
4	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	6/26/2015	6/26/2017	Active Calibration
5	EE 960077	DC Power Supply	GW Instek	GPS-3030DD	EJ810521	Verification	Verification	System
6	EE 960087	44GHz EXA Spectrum Analyzer	Agilent	N9010A	MY53400296	12/18/2015	12/18/2016	Active Calibration
7	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	10/25/2015	10/25/2016	Active Calibration
8	EE 960090	Power Meter	Anritsu	ML2495A	1335006	3/25/2015	3/25/2016	Active Calibration
9	EE 960091	Power Sensor (For Power Meter ML2495A (EE	Anritsu	MA2491A	1243277	3/25/2015	3/25/2016	Active Calibration

Project Engineer: Coty Hammerer Quality Assurance: Dave Dick

Prepared For: LSR	Model #: Sterling-LWB	Report #: 316050
EUT: Sterling-LWB	Serial #: Radiated: WLAN: 15, BLE: 29 Conducted: WLAN: 23, BLE 26	LSR Job #: C-2391

APPENDIX B – Test Standards: CURRENT PUBLICATION DATES RADIO

STANDARD #	DATE	Am. 1	Am. 2
ANSI C63.4	2014		
ANSI C63.10	2013		
FCC 47 CFR, Parts 0-15, 18, 90, 95	2016		
RSS GEN	2014		
RSS 247	2015		

APPENDIX C - Uncertainty Statement

Table of Expanded Uncertainty Values, (K=2) for Specified Measurements

Measurement Type	*Particular Configuration*	*Uncertainty Values*
Radiated Emissions	*3 – Meter chamber, Biconical Antenna*	*4.82 dB*
Radiated Emissions	*3-Meter Chamber, Log Periodic Antenna*	*4.88 dB*
Radiated Emissions	*3-Meter Chamber, Horn Antenna*	*4.85 dB*
Radiated Emissions	*10-Meter OATS, Biconical Antenna*	*4.32 dB*
Radiated Emissions	*10-Meter OATS, Log Periodic Antenna*	*3.63 dB*
Absolute Conducted Emissions	*Agilent PSA/ESA Series*	*1.38 dB*
AC Line Conducted Emissions	*Shielded Room/EMCO LISN*	*3.20 dB*
Radiated Immunity	*3 Volts/Meter in 3-Meter Chamber*	*2.05 Volts/Meter*
Conducted Immunity	*3 Volts level*	*2.33 V*
EFT Burst, Surge, VDI	*230 VAC*	*54.4 V*
ESD Immunity	*Discharge at 15kV*	*3200 V*
Temperature/Humidity	*Thermo-hygrometer*	*0.64° / 2.88 %RH*

APPENDIX D –Bluetooth and WLAN Coexistence

The BCM4343W implements an advance Enhanced Collaborative algorithms and hardware mechanism, allowing for a collaborative WLAN and Bluetooth coexistence. Support is provided for platforms that share a single antenna between Bluetooth and WLAN.