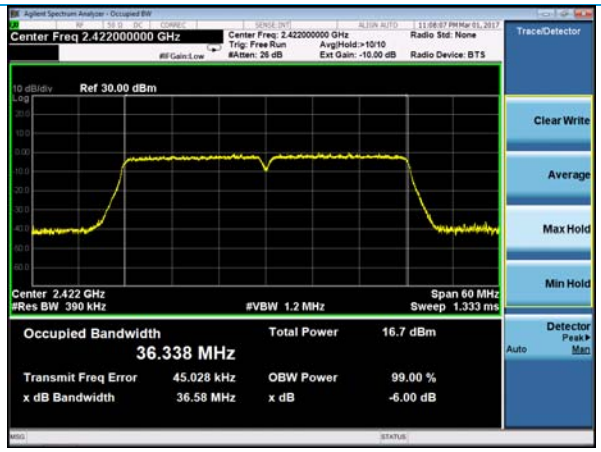
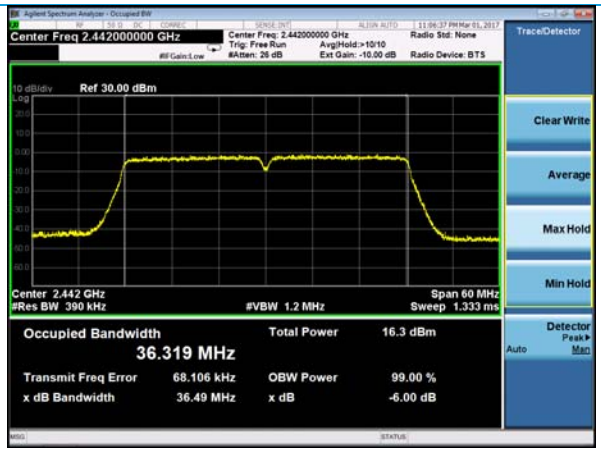
Plots – WLAN 99% BW

802.11n – Low Channel



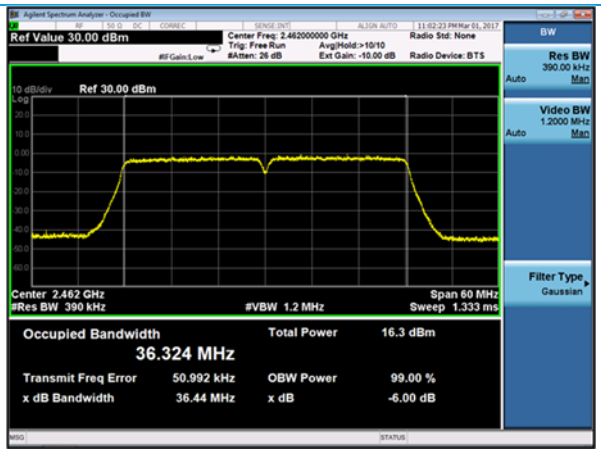
802.11n – HT40 – Low Channel

802.11n – Mid Channel



802.11n – HT40 – Mid Channel

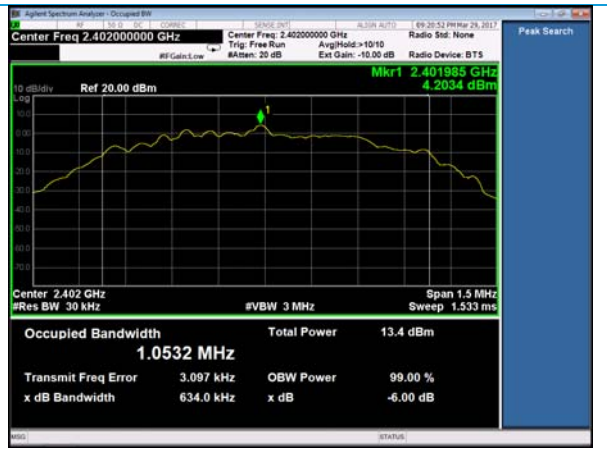
802.11n – High Channel



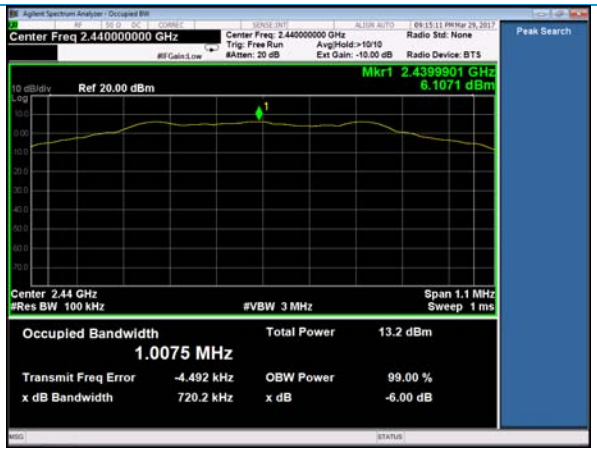
802.11n – HT40 – High Channel

Plots – BLE 6 dB and 99% BW

6dB BW – Low Channel

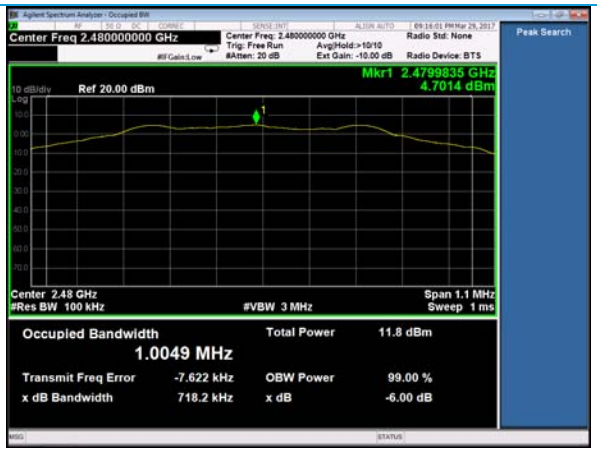


99% BW – Low Channel

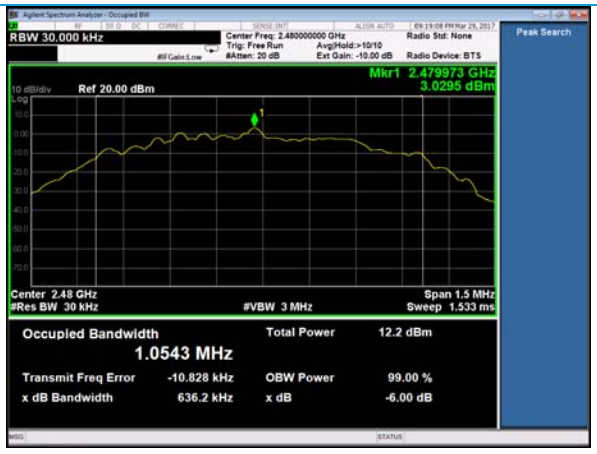


6dB BW – Mid Channel

99% BW – Mid Channel



6dB BW – High Channel



99% BW – High Channel

5.1.3 Antenna Port Conducted Emissions – Conducted Power Output

Operator	Kimberly Bay / Shane Dock
QA	Shane Dock / Kimberly Bay
Test Date	March 1, 2017 / March 29, 2017
Location	Conducted RF Test Bench
Temp. / R.H.	21-22°C / 34-35% RH
Requirement	FCC 15.247 (b)(3) / RSS-247 Section 5.4 (d)
Method	WLAN - ANSI C63.10 2013 Section 11.9.1.2 Integrated band power method BLE – ANSI C63.10 2013 Section 11.9.1.1

Limits:

Maximum Conducted Output Power
30 dBm

Test Parameters

Settings	802.11b HT-20, 1 Mbps: 2412, 2437, 2462 MHz
Settings	802.11g HT-20, 6 Mbps: 2412, 2437, 2462 MHz
Settings	802.11n HT-20, MCS0: 2412, 2437, 2462 MHz
Settings	802.11n HT-40, MCS0: 2422, 2442, 2462 MHz
Settings	BLE: 2402, 2440, 2480 MHz

Instrumentation

LSR a Laird Business

Date: 6-Feb-2017 Type Test: DTS Conducted RF Measurements Job #: C-2602

Prepared By: Kim/Shane Customer: Laird Technologies, Inc. Quote #: 316356

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960087	Spectrum Analyzer	Agilent	N9010A	MY53400296	12/22/2016	12/22/2017	Active Calibration
2	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	6/26/2015	6/25/2017	Active Calibration
3	AA 960172	Cable - low loss 1m	A.H. Systems, Inc	SAC-26G-1	387	5/16/2016	5/16/2017	Active Verification
4	EE 960085	EMI Receiver	Agilent	N9038A	MY51210148	5/12/2016	5/12/2017	Active Calibration

Table – WLAN Power Out

Channel	Limit (dBm)	802.11b (dBm)	Margin 802.11b (dB)	802.11g (dBm)	Margin 802.11g (dB)	802.11n (dBm)	Margin 802.11n (dB)	802.11n - HT40 (dBm)	Margin 802.11n - HT40 (dB)
Low	30	18.2	11.8	21.5	8.5	19.8	10.2	17.3	12.7
Mid	30	19.0	11.0	21.2	8.8	19.8	10.2	17.0	13.0
High	30	16.7	13.3	18.9	11.1	18.8	11.2	16.9	13.1

Table – BLE Power Out

Channel	Limit (dBm)	BLE Reading (dBm)	Margin (dB)
Low	30	6.7	23.3
Mid	30	6.9	23.1
High	30	5.5	24.5

Plots – WLAN Power Out

1 Mbps – Low Channel

6 Mbps – Low Channel

1 Mbps – Mid Channel

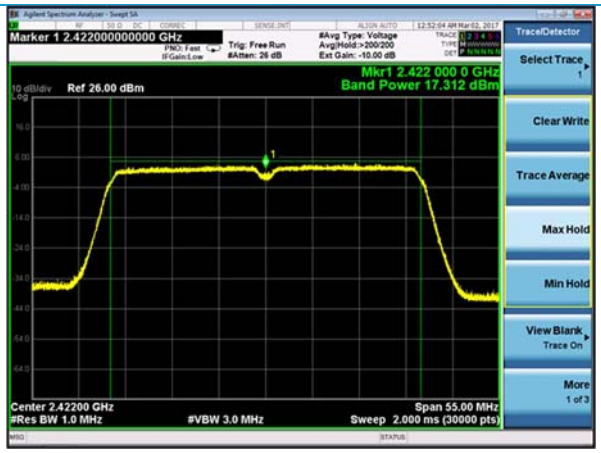
6 Mbps – Mid Channel

1 Mbps – High Channel

6 Mbps – High Channel

Plots – WLAN Power Out, continued

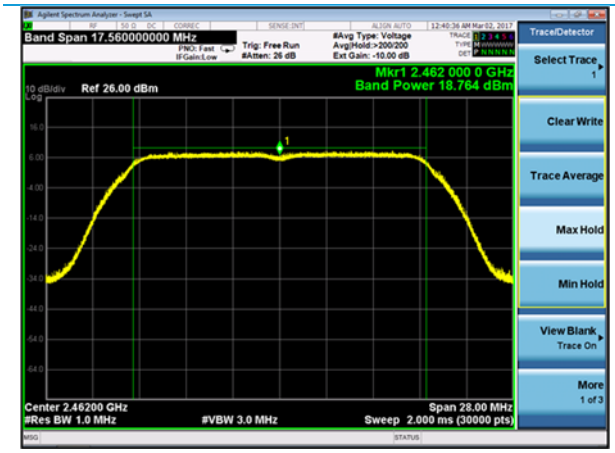
MCS0 – Low Channel



MCS0 – HT40 – Low Channel

MCS0 – Mid Channel

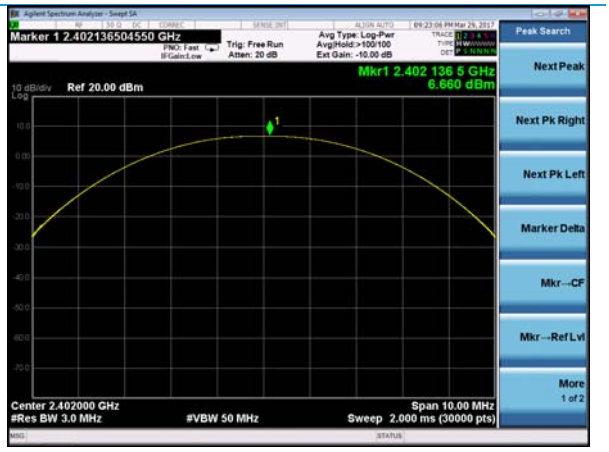
MCS0 – HT40 – Mid Channel



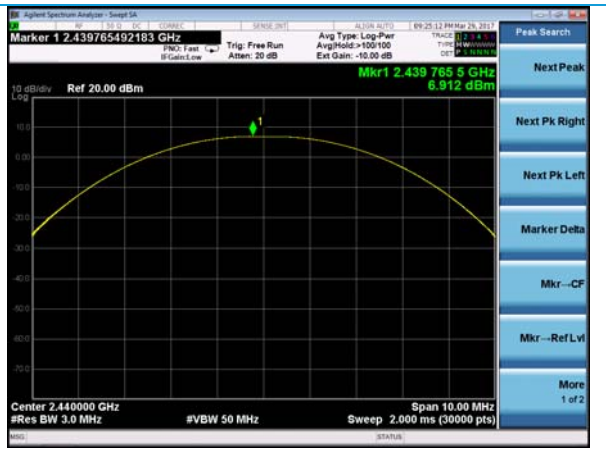
MCS0 – High Channel

MCS0 – HT40 – High Channel

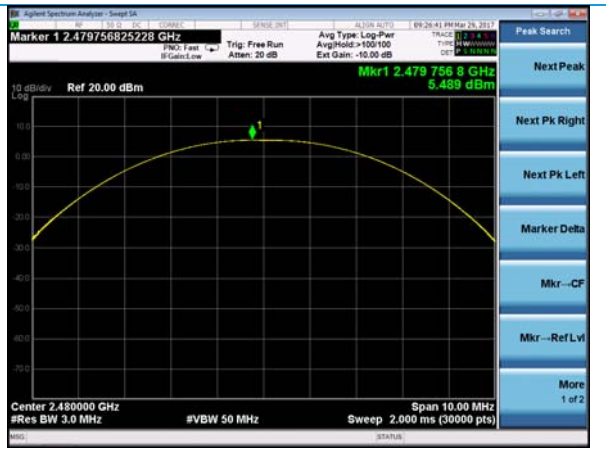
Plots – BLE Power Out



Low Channel



Mid Channel



High Channel

5.1.4 Antenna Port Conducted Emissions – Power Spectral Density (PSD)

Operator	Kimberly Bay / Shane Dock
QA	Shane Dock / Kimberly Bay
Test Date	March 1, 2017 / March 29, 2017
Location	Conducted RF Test Bench
Temp. / R.H.	21-22°C / 34-35% RH
Requirement	FCC 15.247 (e) / RSS-247 Section 5.2 (b)
Method	ANSI C63.10 2013 Section 11.10.2

Limits:

Power Spectral Density
8 dBm / 3 kHz

Test Parameters

Settings	WLAN – RBW = 30 kHz; BLE – RBW = 100 kHz
EUT	802.11b HT-20, 1 Mbps: 2412, 2437, 2462 MHz
EUT	802.11g HT-20, 6 Mbps: 2412, 2437, 2462 MHz
EUT	802.11n HT-20, MCS0: 2412, 2437, 2462 MHz
EUT	802.11n HT-40, MCS0: 2422, 2442, 2462 MHz
EUT	BLE: 2402, 2440, 2480 MHz

Instrumentation

LSR a Laird Business

Date: 6-Feb-2017 Type Test: DTS Conducted RF Measurements Job #: C-2602

Prepared By: Kim/Shane Customer: Laird Technologies, Inc. Quote #: 316356

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960087	Spectrum Analyzer	Agilent	N9010A	MY53400296	12/22/2016	12/22/2017	Active Calibration
2	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	6/26/2015	6/25/2017	Active Calibration
3	AA 960172	Cable - low loss 1m	A.H. Systems, Inc	SAC-26G-1	387	5/16/2016	5/16/2017	Active Verification
4	EE 960085	EMI Receiver	Agilent	N9038A	MY51210148	5/12/2016	5/12/2017	Active Calibration

Table – WLAN PSD in 3 kHz

Channel	Limit (dBm/3 kHz)	802.11b (dBm)	80211b Margin (dB)	802.11g (dBm)	802.11g Margin (dB)	802.11n (dBm)	802.11n Margin (dB)	802.11n - HT40 (dBm)	802.11n HT-40 Margin (dB)
Low	8	4.2	3.8	-2.2	10.2	-4.1	12.1	-9.9	17.9
Mid	8	5.9	2.1	-2.7	10.7	-4.2	12.2	-10.0	18
High	8	4.4	3.6	-4.9	12.9	-5.6	13.6	-10.0	18

Table – BLE PSD

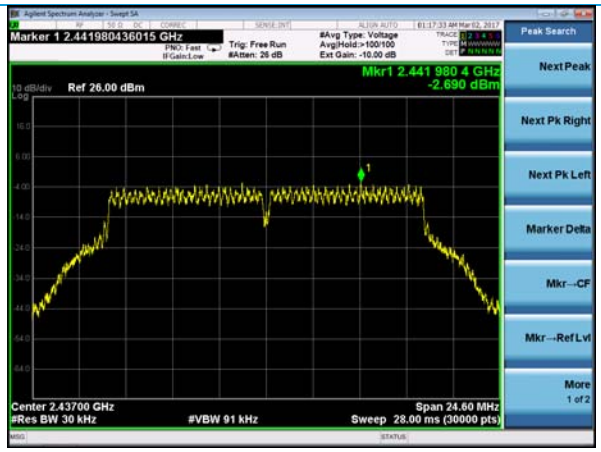
Channel	Limit (dBm/3 kHz)	BLE Reading (dBm)	Margin (dB)
Low	8	5.9	2.1
Mid	8	6.1	1.9
High	8	4.7	3.3

Plots – WLAN PSD

1 Mbps – Low Channel

6 Mbps – Low Channel

1 Mbps – Mid Channel

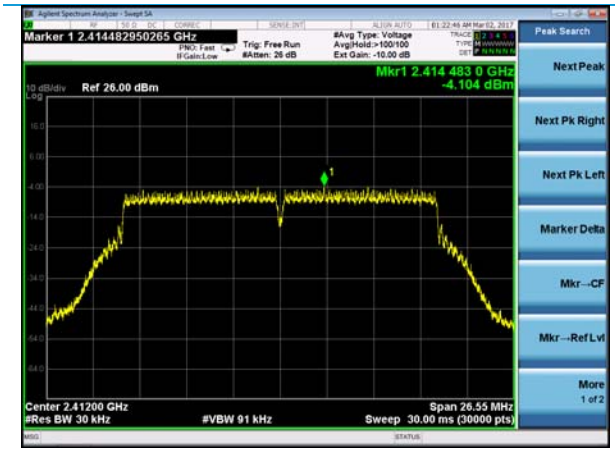


6 Mbps – Mid Channel

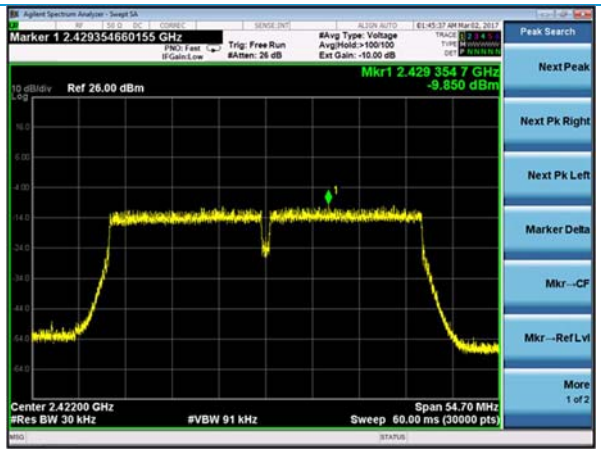
1 Mbps – High Channel

6 Mbps – High Channel

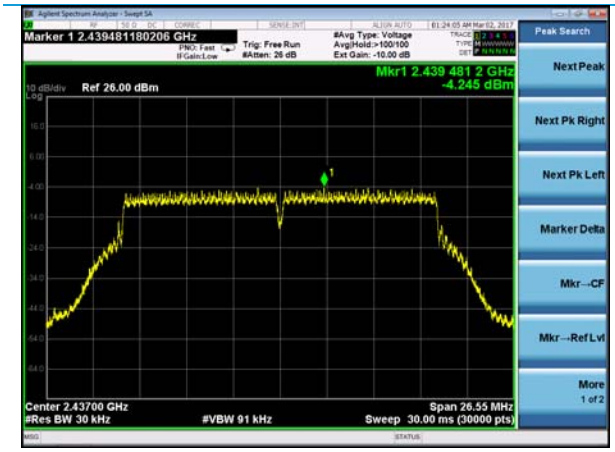
Plots – WLAN PSD



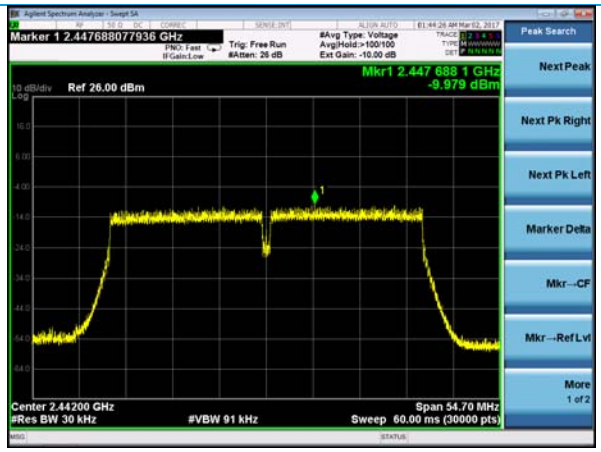
MCS0 – Low Channel



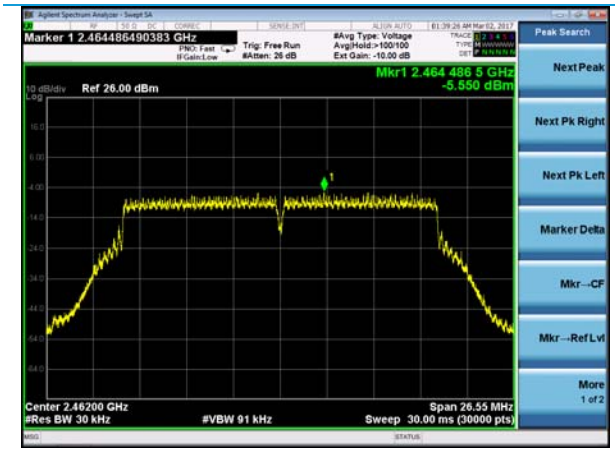
MCS0 – HT40 – Low Channel



MCS0 – Mid Channel



MCS0 – HT40 – Mid Channel



MCS0 – High Channel

MCS0 – HT40 – High Channel

Plots – BLE PSD

Low Channel

Mid Channel

High Channel

5.1.5 Antenna Port Conducted Emissions – 100 kHz Band Edge

Operator	Kimberly Bay
QA	Shane Dock
Test Date	March 2, 2017 / May 6, 2017
Location	Conducted RF Test Bench
Temp. / R.H.	21-22°C / 34-37% RH
Requirement	FCC 15.247 (d) / RSS-247 Section 5.5
Method	ANSI C63.10 Section 6.10.4

Limits:

100 kHz Band Edge
-20 dBc

Test Parameters

Settings	802.11b HT-20, 1 Mbps: 2412, 2462 MHz
Settings	802.11g HT-20, 6 Mbps: 2412, 2462 MHz
Settings	802.11n HT-20, MCS0: 2412, 2462 MHz
Settings	802.11n HT-40, MCS0: 2422, 2462 MHz
Settings	BLE: 2402, 2480 MHz

Instrumentation

LSR a Laird Business

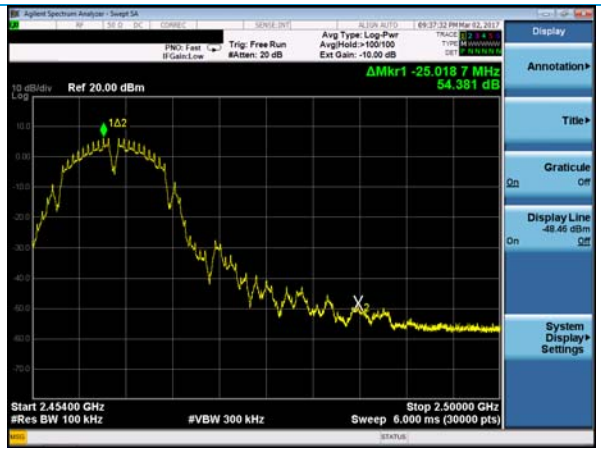
Date: 6-Feb-2017 Type Test: DTS Conducted RF Measurements Job #: C-2602

Prepared By: Kim/Shane Customer: Laird Technologies, Inc. Quote #: 316356

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960087	Spectrum Analyzer	Agilent	N9010A	MY53400296	12/22/2016	12/22/2017	Active Calibration
2	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	6/26/2015	6/25/2017	Active Calibration
3	AA 960172	Cable - low loss 1m	A.H. Systems, Inc	SAC-26G-1	387	5/16/2016	5/16/2017	Active Verification
4	EE 960085	EMI Receiver	Agilent	N9038A	MY51210148	5/12/2016	5/12/2017	Active Calibration

Plots – WLAN 100 kHz Band Edge

1 Mbps – Low Channel

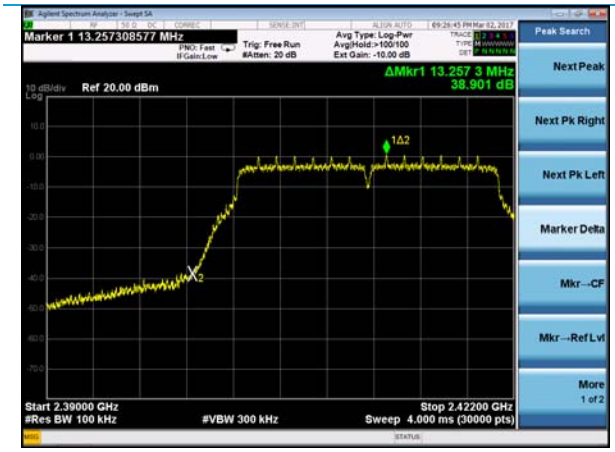


1 Mbps – High Channel

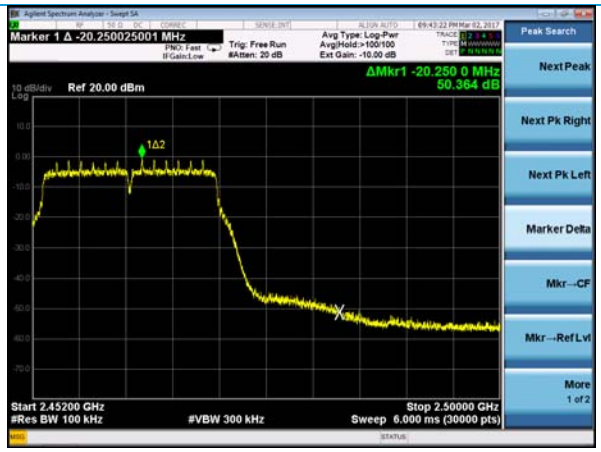
6 Mbps – Low Channel

6 Mbps – High Channel

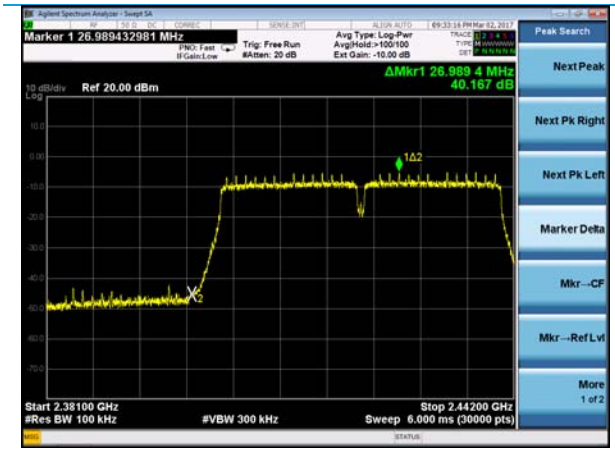
Plots – WLAN 100 kHz Band Edge, continued



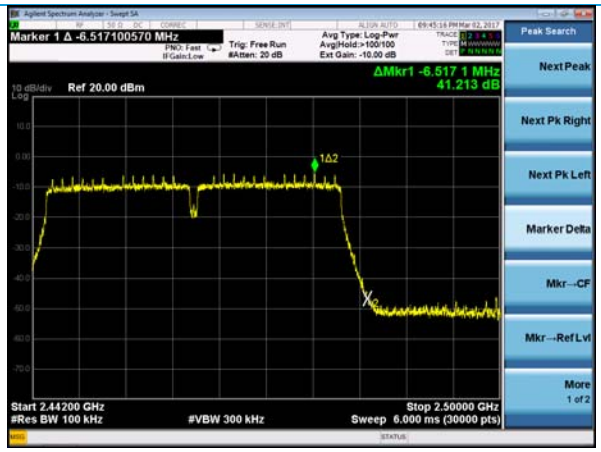
MCS0 – Low Channel



MCS0 – High Channel

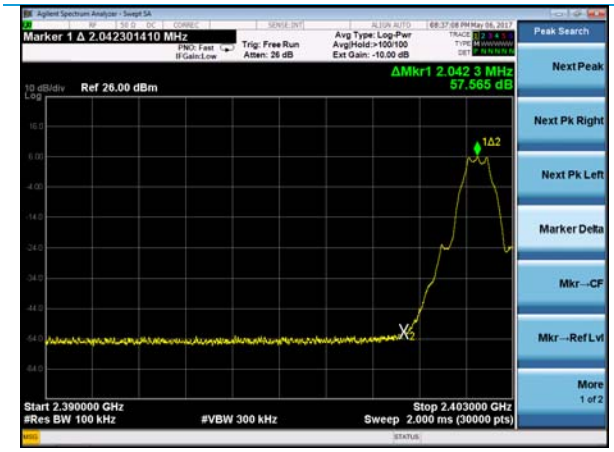


MCS0 – HT40 – Low Channel

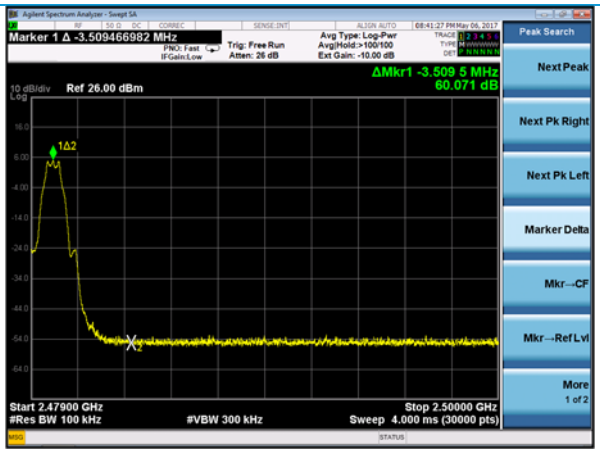


MCS0 – HT40 – High Channel

Plots – BLE 100 kHz Band Edge



Low Channel



High Channel

5.1.6 Antenna Port Conducted Emissions – Restricted-Band Band-Edges

Operator	Kimberly Bay
QA	John Johnston / Shane Dock
Test Date	February 8, 2017 & April 28, 2017
Location	Conducted RF Test Bench
Temp. / R.H.	21°C / 31% RH
Requirement	FCC 15.247 (d) / RSS-GEN Section 8.10
Method	ANSI C63.10 2013 Peak Measurements: Section 11.12.2.4 Average Measurements: 802.11b: Section 11.12.2.5.1; All other: Section 11.12.2.5.2

Limits:

Frequency (MHz)	Average Limit (dBm)	Peak Limit (dBm)
2310-2390	-41.23	-21.23
2483.5-2500	-41.23	-21.23

Test Parameters

Settings	802.11b HT-20, 1 Mbps: 2412, 2462 MHz
Settings	802.11g HT-20, 6 Mbps: 2412, 2462 MHz
Settings	802.11n HT-20, MCS0: 2412, 2462 MHz
Settings	802.11n HT-40, MCS0: 2422, 2462 MHz

Instrumentation

LSR a Laird Business

Date: 6-Feb-2017 Type Test: DTS Conducted RF Measurements Job #: C-2602

Prepared By: Kim/Shane Customer: Laird Technologies, Inc. Quote #: 316356

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960087	Spectrum Analyzer	Agilent	N9010A	MY53400296	12/22/2016	12/22/2017	Active Calibration
2	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	6/26/2015	6/25/2017	Active Calibration
3	AA 960172	Cable - low loss 1m	A.H. Systems, Inc	SAC-26G-1	387	5/16/2016	5/16/2017	Active Verification
4	EE 960085	EMI Receiver	Agilent	N9038A	MY51210148	5/12/2016	5/12/2017	Active Calibration

Table – Lower Band-Edge Measurements (2310-2390 MHz)

Mode	Peak Frequency (MHz)	Peak Reading (dBm)	Avg. Frequency (MHz)	Avg. Reading (dBm)	Correction Factor	Antenna Gain (dBi)	Peak Limit (dBm)	Average Limit (dBm)	Peak Margin (dB)	Average Margin (dB)
802.11b	2386	-38.40	2390	-46.86	0.00	2.5	-21.23	-41.23	14.67	3.13
802.11g	290	-34.41	2390	-47.44	0.18	2.5	-21.23	-41.23	10.50	3.53
802.11n	2388	-36.35	2390	-49.78	0.19	2.5	-21.23	-41.23	12.43	5.86
802.11n (HT-40)	2384	-31.32	2388	-49.16	0.315	2.5	-21.23	-41.23	7.28	5.12

Table – Upper Band-Edge Measurements (2483.5-2500 MHz)

Mode	Data Rate	Peak Frequency (MHz)	Peak Reading (dBm)	Avg. Frequency (MHz)	Avg. Reading (dBm)	Correction Factor	Antenna Gain (dBi)	Peak Limit (dBm)	Average Limit (dBm)	Peak Margin (dB)	Average Margin (dB)
802.11b	1 Mbps	2484	-42.72	2484	-49.50	0.00	2.5	-21.23	-41.23	18.99	5.77
802.11g	6 Mbps	2484	-31.23	2484	-47.75	0.18	2.5	-21.23	-41.23	7.32	3.84
802.11n	MCS0	2484	-35.04	2484	-50.30	0.19	2.5	-21.23	-41.23	11.12	6.38
802.11n (HT-40)	MCS0 (HT-40)	2484	-30.69	2484	-45.60	0.315	2.5	-21.23	-41.23	6.65	1.56

Plots – Lower Band Edge

802.11b – 1 Mbps – Peak

802.11b – 1 Mbps – Average

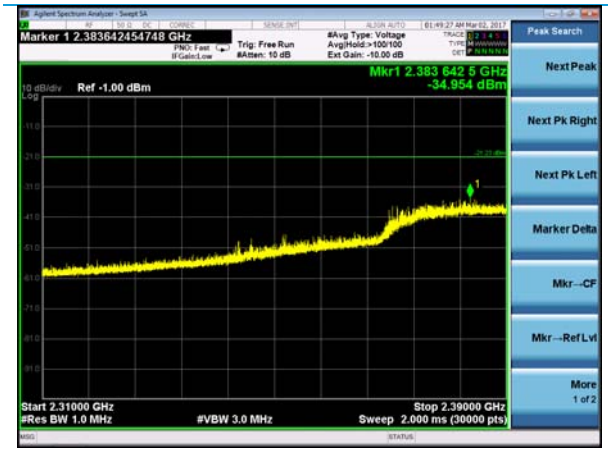
802.11g – 6 Mbps – Peak

802.11g – 6 Mbps – Average

802.11n – MCS0 – Peak

802.11n MCS0 - Average

Plots – Lower Band Edge, continued



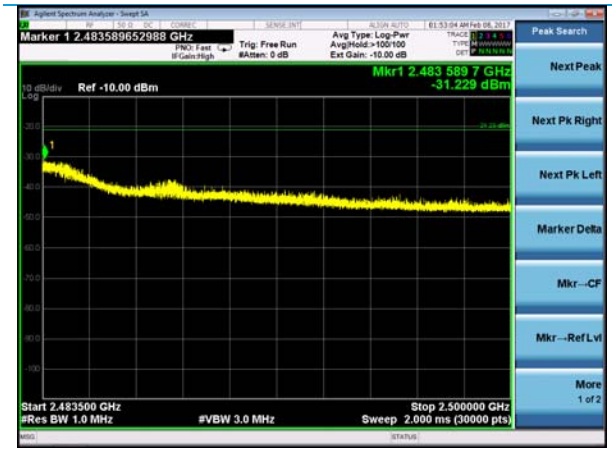
802.11n HT-40 – MCS0 – Peak

802.11n HT-40 – MCS0 - Average

Plots – Upper Band Edge

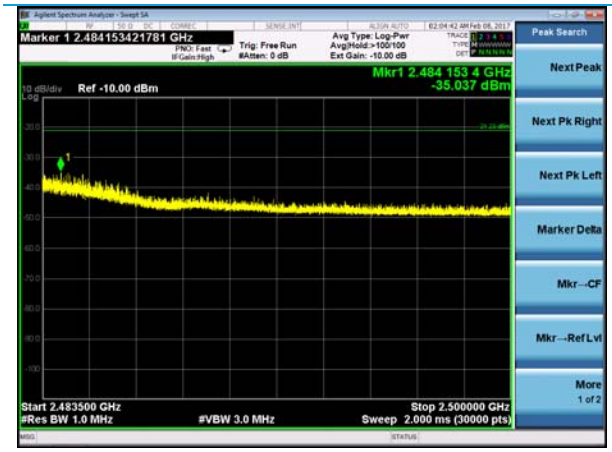
802.11b – 1 Mbps – Peak

802.11b – 1 Mbps – Average



802.11g – 6 Mbps – Peak

802.11g – 6 Mbps – Average



802.11n – MCS0 – Peak

802.11n MCS0 - Average