FCC 47 CFR PART 15 SUBPART C AND ANSI C63.10:2013 TEST REPORT

For

3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router

Model: BiPAC 7820NZ

Data Applies To : BiPAC 7820NZL ; BiPAC 6820NZ ; BiPAC 6820NZL ; BEC 7820NZ ; BEC 7820NZL ; BEC 6820NZ ; BEC 6820NZL ; BiPAC 7800NZ ; BiPAC 7800NZL ; BiPAC 6800NZ ; BiPAC 6800NZL ; BEC 7800NZ ; BEC 7800NZL ; BEC 6800NZ ; BEC 6800NZL

Trade Name: Billion ; BEC

Issued for

Billion Electric Co., Ltd.

8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)

Issued by

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Issued Date: May 05, 2017

Testing Laboratory
0240

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	03/31/2017	Initial Issue	All Page 116	Gloria Chang
01	05/05/2017	Added Operation Mode	P.5	Gloria Chang

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1. TEST REPORT CERTIFICATION

Applicant	：	Billion Electric Co., Ltd.
Address	：	8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)
Equipment Under Test	：	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router
Model	：	BiPAC 7820NZ
Data Applies To	：	BiPAC 7820NZL ; BiPAC 6820NZ ; BiPAC 6820NZL ; BEC 7820NZ ; BEC 7820NZL ; BEC 6820NZ ; BEC 6820NZL ; BiPAC 7800NZ ; BiPAC 7800NZL ; BiPAC 6800NZ ; BiPAC 6800NZL ; BEC 7800NZ ; BEC 7800NZL ; BEC 6800NZ ; BEC 6800NZL
Trade Name	：	Billion ; BEC
Tested Date	：	December 19, 2016 ~ January 13, 2017

APPLICABLE STANDARD	
Standard	**Test Result**
FCC Part 15 Subpart C AND ANSI C63.10:2013	PASS

WE HEREBY CERTIFY THAT: The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:

Sb. Lu
Sr. Engineer

Reviewed by:

Gundam Lin
Sr. Engineer

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2. EUT DESCRIPTION

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router
Model Number	BiPAC 7820NZ
Identify Number	T161219S07
Received Date	December 19, 2016
Frequency Range	IEEE 802.11b/g, 802.11gn HT20 Mode: 2412MHz ~ 2462MHz IEEE 802.11gn HT40 Mode: 2422MHz ~ 2452MHz
Transmit Power	IEEE 802.11b Mode: 23.18 dBm (0.2080 W) IEEE 802.11g Mode: 26.72 dBm (0.4699 W) IEEE 802.11gn HT20 MCS0 Mode: 28.92 dBm (0.7798 W) IEEE 802.11gn HT40 MCS0 Mode: 24.88 dBm (0.3076 W)
Channel Spacing	5MHz
Channel Number	IEEE 802.11b/g, 802.11gn HT20 Mode: 11 Channels IEEE 802.11gn HT40 Mode: 7 Channels
Transmit Data Rate	IEEE 802.11b Mode: up to 11 Mbps IEEE 802.11g Mode: up to 54 Mbps IEEE 802.11gn HT20 Mode (800ns GI): up to 130.00 Mbps IEEE 802.11gn HT20 Mode (400ns GI): up to 144.40 Mbps IEEE 802.11gn HT40 Mode (800ns GI): up to 270.00 Mbps IEEE 802.11gn HT40 Mode (400ns GI): up to 300.00 Mbps
Type of Modulation	IEEE 802.11b Mode: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g Mode: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11gn HT20/40 Mode: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type	Embedded Dipole Antenna × 2, Ant. 1 (Chain 0), Antenna Gain: 2.4 dBi Ant. 2 (Chain 1), Antenna Gain: 2.8 dBi
Power Rating	12Vdc
Test Voltage	120Vac, 60Hz
DC Power Cable Type	Non-shielded cable, 1.5 m × 1 (Non-detachable)
I/O Port	DSL(RJ-11) Port × 1, LAN(RJ-45) Port × 4, USB Port × 1, SIM Port × 2, Power Port × 1
Operation Mode	☒CDD Mode ☐Beamforming Mode ☐Other

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Power Adapter:

No.	Manufacturer	Model No.	Power Input	Power Output
1	BILLION	BA018-120120AXU	100-240Vac, 50/60Hz, 0.5A	12Vdc, 1.2A

The difference of the series model

Model / Difference Item	BiPAC 7820NZ	BiPAC 7820NZL	BiPAC 6820NZ	BiPAC 6820NZL
Trade Name	Billion	Billion	Billion	Billion
External Feature	Wide-band Antenna	Wide-band Antenna	Wide-band Antenna	Wide-band Antenna
External color	Upper/lower Casing: blue/ white	Upper/lower Casing: blue/ white	Upper/lower Casing: blue/ white	Upper/lower Casing: blue/ white
Housing Drawing	D3-1	D3-1	D3-1	D3-1
Dual-SIM Slots	O	O	O	O
VPN	O	X	O	X
ADSL Function	O	O	X	X
Power Adaptor	DC12V/1.2A	DC12V/1.2A	DC12V/1.2A	DC12V/1.2A

Note：

1. "O" means all the same and "X" means the difference.

2. Please refer to the difference between the actual product differences in the case of changes in the instructions.

3. N represents the models support 802.11n, there are Z represents 4G LTE Function.

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Model / Difference Item	BEC 7820NZ	BEC 7820NZL	BEC 6820NZ	BEC 6820NZL
Trade Name	BEC	BEC	BEC	BEC
External Feature	Wide-band Antenna	Wide-band Antenna	Wide-band Antenna	Wide-band Antenna
External color	Upper/lower Casing: gray/ silver	Upper/lower Casing: gray/ silver	Upper/lower Casing: gray/ silver	Upper/lower Casing: gray/ silver
Housing Drawing	D3-1	D3-1	D3-1	D3-1
Dual-SIM Slots	O	O	O	O
VPN	O	X	O	X
ADSL Function	O	O	X	X
Power Adaptor	DC12V/1.2A	DC12V/1.2A	DC12V/1.2A	DC12V/1.2A

Note：

1. "O" means all the same and "X" means the difference.

2. Please refer to the difference between the actual product differences in the case of changes in the instructions.

3. N represents the models support 802.11n, there are Z represents 4G LTE Function.

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Model / Difference Item	BiPAC 7800NZ	BiPAC 7800NZL	BiPAC 6800NZ	BiPAC 6800NZL
Trade Name	Billion	Billion	Billion	Billion
External Feature	Wide-band Antenna	Wide-band Antenna	Wide-band Antenna	Wide-band Antenna
External color	Upper/lower Casing: blue/ white	Upper/lower Casing: blue/ white	Upper/lower Casing: blue/ white	Upper/lower Casing: blue/ white
Housing Drawing	D3-1	D3-1	D3-1	D3-1
Dual-SIM Slots	X	X	X	X
VPN	O	X	O	X
ADSL Function	O	O	X	X
Power Adaptor	DC12V/1.2A	DC12V/1.2A	DC12V/1.2A	DC12V/1.2A

Note：

1. "O" means all the same and "X" means the difference.

2. Please refer to the difference between the actual product differences in the case of changes in the instructions.

3. N represents the models support 802.11n, there are Z represents 4G LTE Function.

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Model / Difference Item	BEC 7800NZ	BEC 7800NZL	BEC 6800NZ	BEC 6800NZL
Trade Name	BEC	BEC	BEC	BEC
External Feature	Wide-band Antenna	Wide-band Antenna	Wide-band Antenna	Wide-band Antenna
External color	Upper/lower Casing: gray/ silver	Upper/lower Casing: gray/ silver	Upper/lower Casing: gray/ silver	Upper/lower Casing: gray/ silver
Housing Drawing	D3-1	D3-1	D3-1	D3-1
Dual-SIM Slots	X	X	X	X
VPN	O	X	O	X
ADSL Function	O	O	X	X
Power Adaptor	DC12V/1.2A	DC12V/1.2A	DC12V/1.2A	DC12V/1.2A

Note：

1. "O" means all the same and "X" means the difference.

2. Please refer to the difference between the actual product differences in the case of changes in the instructions.

3. N represents the models support 802.11n, there are Z represents 4G LTE Function.

Remark:

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *For more details, please refer to the User's manual of the EUT.*
3. *This submittal(s) (test report) is intended for FCC ID: QI3BIL-7820NZ-4G filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*
4. *The model BiPAC 7820NZ was considered the main model for testing.*

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3. DESCRIPTION OF TEST MODES

The EUT (3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router) is an 802.11n transceiver had been tested under operating condition.
For IEEE 802.11b/g Mode (1TX / 1RX): Ant. 1 / Chain 0 transmit/receive.
For IEEE 802.11gn HT20/HT40 Mode (2TX / 2RX):
Ant. 1 / Chain 0 and Ant. 2 / Chain 1 transmit/receive.

Conducted Emission / Radiated Emission Test (Below 1 GHz)

1. The following test modes were scanned during the preliminary test:

No.	Pre-Test mode
1	Normal Operating (Full Function)

2. After the preliminary scan, the following test mode was found to produce the highest emission level.

Final Test mode		
Emission	Radiated Emission	Mode 1
	Conducted Emission	Mode 1

Remark: *Then, the above highest emission mode of the configuration of the EUT and cable was chosen for all final test items.*

Conducted / Radiated Emission Test (Above 1 GHz)

IEEE 802.11b/g, 802.11gn HT20 Mode:

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b Mode: 1Mbps data rate (worst case) was chosen for full testing.
IEEE 802.11g Mode: 6Mbps data rate (worst case) was chosen for full testing.
IEEE 802.11gn HT20 MCS0 Mode: 6.5Mbps data rate (worst case) was chosen for full testing.

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IEEE 802.11gn HT40 Mode:

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2422
Middle	2437
High	2452

IEEE 802.11gn HT40 MCS0 Mode: 13.5Mbps data rate (worst case) was chosen for full testing.

Remark：*The field strength of spurious emission was measured in the following position: EUT stand-up position(Y axis), lie-down position(X, Z axis). The worst emission was found in lie-down position(Z axis) and the worst case was recorded.*

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4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10:2013 and FCC CFR 47, 15.207, 15.209 and 15.247.

5. FACILITIES AND ACCREDITATION

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No.989-1, Wenshan Rd., Shangshan Village,
Qionglin Township, Hsinchu County 30741, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.10:2013 and CISPR 22. All receiving equipment conforms to CISPR 16-1-1, CISPR 16-1-2, CISPR 16-1-3, CISPR 16-1-4 and CISPR 16-1-5.

5.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Taiwan	TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	INDUSTRY CANADA
Japan	VCCI
Taiwan	BSMI
USA	FCC MRA

Copies of granted accreditation certificates are available for downloading from our web site, http:///www.ccsrf.com

Remark: *FCC Designation Number TW1027.*

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5.3 MEASUREMENT UNCERTAINTY

The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4-2.

PARAMETER	UNCERTAINTY
Semi Anechoic Chamber (966 Chamber_C) / Radiated Emission, 30 to 1000 MHz	+/- 3.97
Semi Anechoic Chamber (966 Chamber_C) / Radiated Emission, 1 to 18GHz	+/- 3.58
Semi Anechoic Chamber (966 Chamber_C) / Radiated Emission, 18 to 26 GHz	+/- 3.59
Semi Anechoic Chamber (966 Chamber_C) / Radiated Emission, 26 to 40 GHz	+/- 3.81
Conducted Emission (Mains Terminals), 9kHz to 30MHz	+/- 2.48

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Consistent with industry standard (e.g. CISPR 22, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.

The acceptable measurement uncertainty value without requiring revision of the compliance statement is base on conducted and radiated emissions being less than U_{CISPR} which is 3.6dB and 5.2dB respectively. CCS values (called U_{Lab} in CISPR 16-4-2) is less than U_{CISPR} as shown in the table above. Therefore, MU need not be considered for compliance.

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6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Serial No.
1	Notebook PC	TOSHIBA	PORTEGE R30-A	7F097011H
2	Notebook PC	TOSHIBA	PORTEGE R30-A	7F097009H
3	Notebook PC	TOSHIBA	PORTEGE R30-A	7F096978H
4	Notebook PC	TOSHIBA	M840	9C104267C
5	USB2.0 Flash Disk	Kingston	DTSE9H/8GB	-----
6	CMTS	ZyXEL	IES-1000	S2Z3322195
7	Communication System	Anritsu	MT8820C	6201465349

No.	Signal Cable Description
1	Non-shielded RJ-45 cable, 10 m × 2
2	Non-shielded RJ-45 cable, 1.5 m × 3
3	Non-shielded RJ-11 cable, 10 m × 1

SETUP DIAGRAM FOR TESTS

EUT & peripherals setup diagram is shown in appendix setup photos.

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EUT OPERATING CONDITION

1. EUT & peripherals setup diagram is shown in appendix setup photos.
2. TX mode:
   ⇨ **Data Rate:** 1Mbps Bandwidth 20 (IEEE 802.11b Mode)
   6Mbps Bandwidth 20 (IEEE 802.11g Mode)
   6.5Mbps Bandwidth 20 (IEEE 802.11gn HT20 MCS0 Mode)
   13.5Mbps Bandwidth 40 (IEEE 802.11gn HT40 MCS0 Mode)
   ⇨ **Power control**

Mode	Channel	Frequency (MHz)	Chain	Power Set
IEEE 802.11b	Low	2412	0	66
	Middle	2437	0	63
	High	2462	0	55
IEEE 802.11g	Low	2412	0	76
	Middle	2437	0	78
	High	2462	0	58
IEEE 802.11gn HT20 MCS0	Low	2412	0/1	63
	Middle	2437	0/1	72
	High	2462	0/1	52
IEEE 802.11gn HT40 MCS0	Low	2422	0/1	48
	Middle	2437	0/1	46
	High	2452	0/1	39

3. All of the functions are under run.
4. Start test.

Normal Mode:

1. EUT & peripherals setup diagram is shown in appendix setup photos.
2. Turn on the power of all equipment.
3. EUT LAN port 1 link to Notebook PC.
4. EUT LAN port 4 link to Notebook PC.
5. EUT RJ-11 port link to CMTS.
6. EUT 2.4G WiFi link to Notebook PC.
7. EUT LTE link to communication system.
8. All of the functions are under run.
9. Start test.

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7. FCC PART 15.247 REQUIREMENTS

7.1 DUTY CYCLE CORRECTION FACTOR

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/05
Test Mode	TX Mode	Temp. & Humidity	17°C, 50%

Mode	TX on (ms)	TX on + off (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
IEEE 802.11b	1.000	1.000	100.00%	0.00	0.010
IEEE 802.11g	2.058	2.075	99.18%	0.04	0.010
IEEE 802.11gn HT20	1.908	1.925	99.12%	0.04	0.010
IEEE 802.11gn HT40	0.925	0.950	97.37%	0.12	1.081

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7.2 6dB BANDWIDTH

LIMITS

§ 15.247(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Signal Analyzer	Agilent	N9010A	MY52220817	03/15/2017
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP

TEST PROCEDURE

1. The transmitter output was connected to a spectrum analyzer.
2. Set RBW = 100 kHz.
3. Set the video bandwidth (VBW) ≥ 3 x RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

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TEST RESULTS

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Waternil Guan
Test Model	BiPAC 7820NZ	Test Date	2017/01/09
Test Mode	TX Mode	Temp. & Humidity	23°C, 63%

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Result
		Chain 0		
Low	2412	7.61	500	PASS
Middle	2437	8.04	500	PASS
High	2462	8.08	500	PASS

IEEE 802.11g Mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Result
		Chain 1		
Low	2412	13.83	500	PASS
Middle	2437	15.31	500	PASS
High	2462	14.47	500	PASS

IEEE 802.11gn HT20 MCS0 Mode (2TX)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (kHz)	Result
		Chain 0	Chain 1		
Low	2412	15.86	17.31	500	PASS
Middle	2437	14.24	15.06	500	PASS
High	2462	15.63	16.30	500	PASS

IEEE 802.11gn HT40 MCS0 Mode (2TX)

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (kHz)	Result
		Chain 0	Chain 1		
Low	2422	36.08	36.36	500	PASS
Middle	2437	36.33	36.03	500	PASS
High	2452	36.30	36.33	500	PASS

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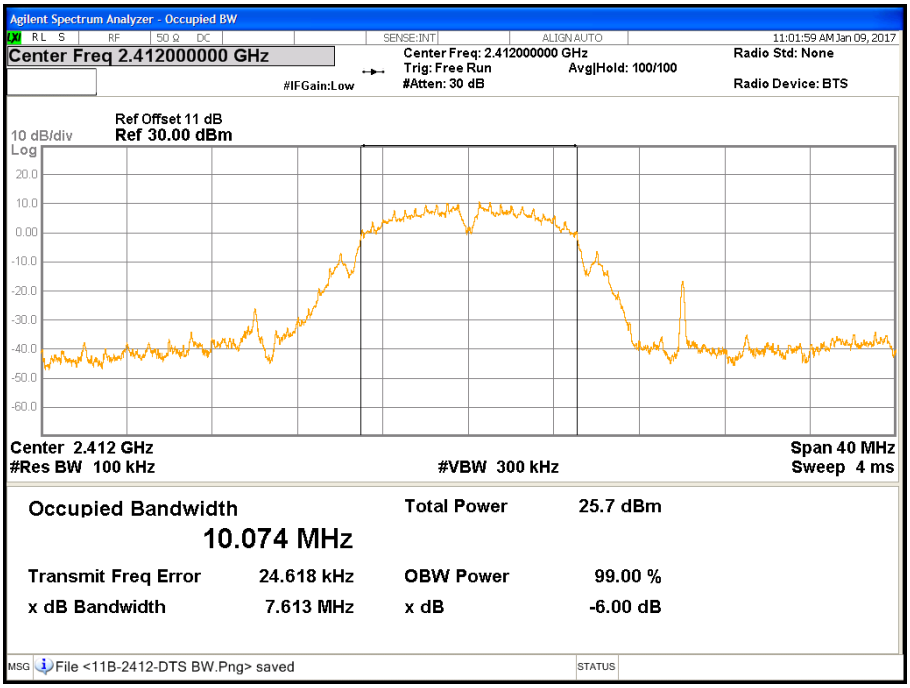
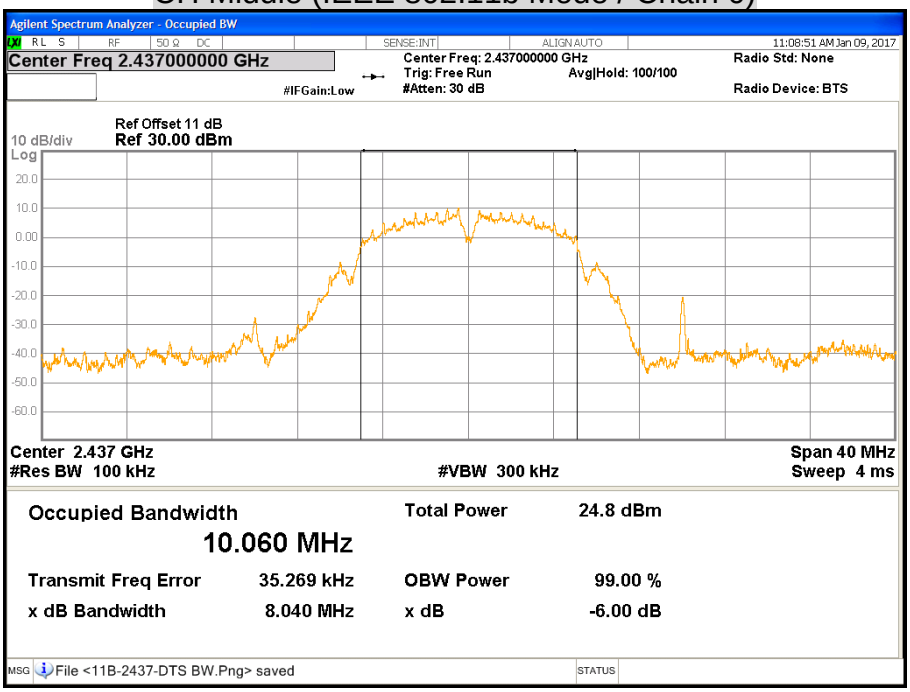
6dB BANDWIDTH

CH Low (IEEE 802.11b Mode / Chain 0)



CH Middle (IEEE 802.11b Mode / Chain 0)



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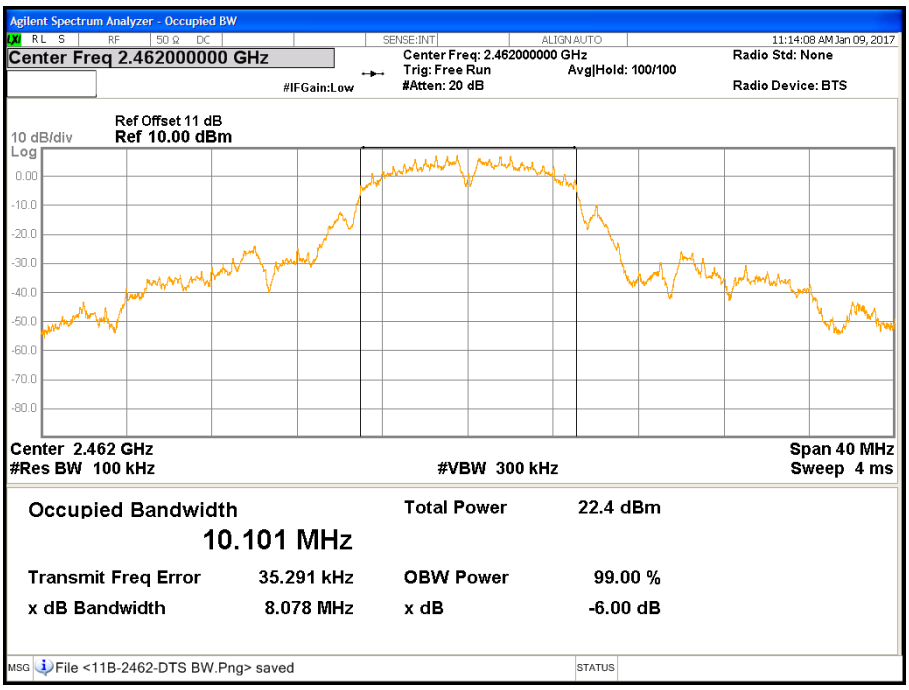
CH High (IEEE 802.11b Mode / Chain 0)



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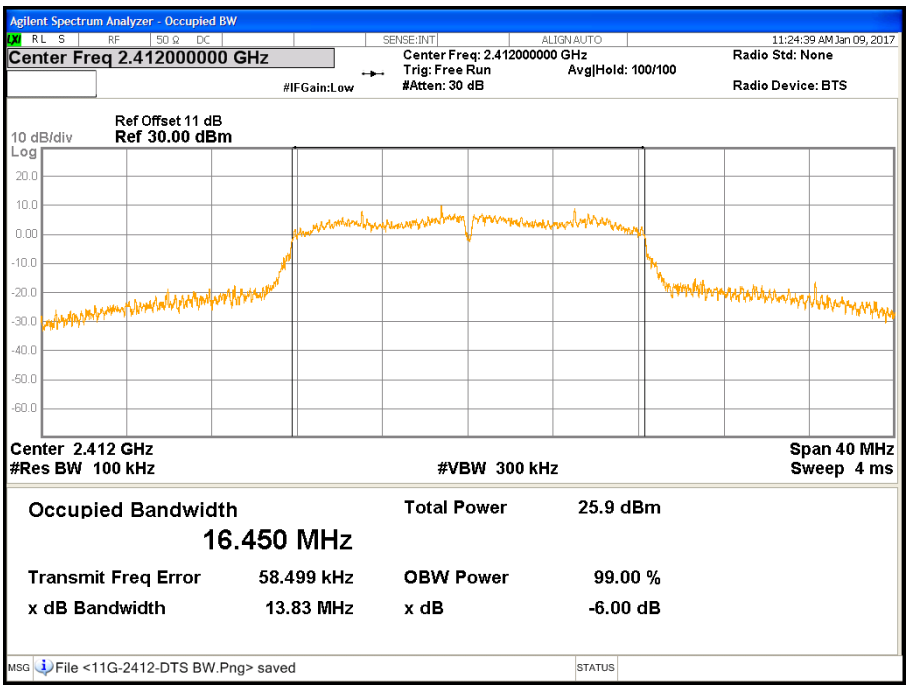
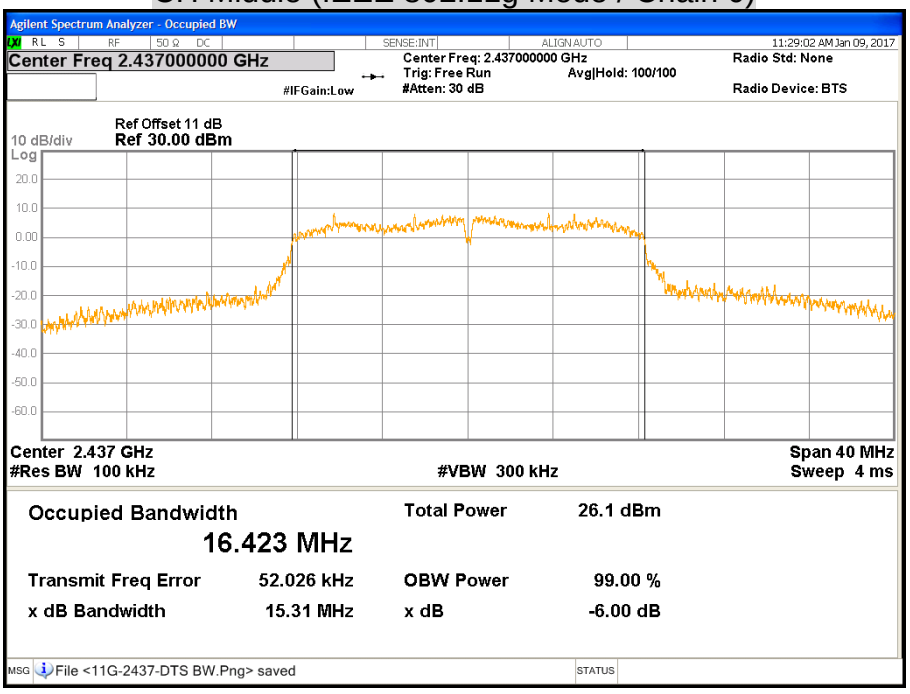
CH Low (IEEE 802.11g Mode / Chain 0)



CH Middle (IEEE 802.11g Mode / Chain 0)



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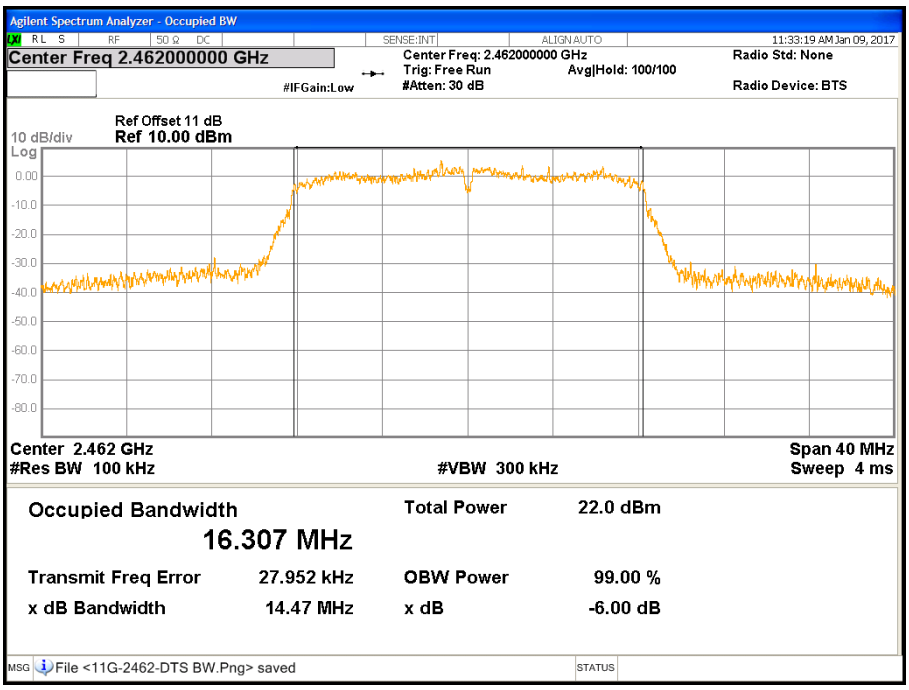
CH High (IEEE 802.11g Mode / Chain 0)



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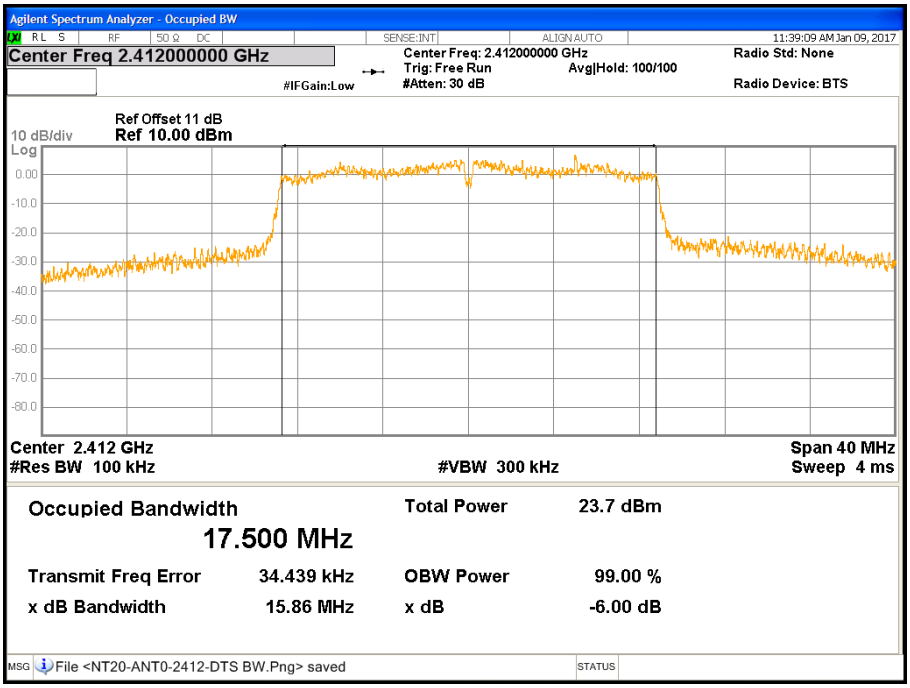
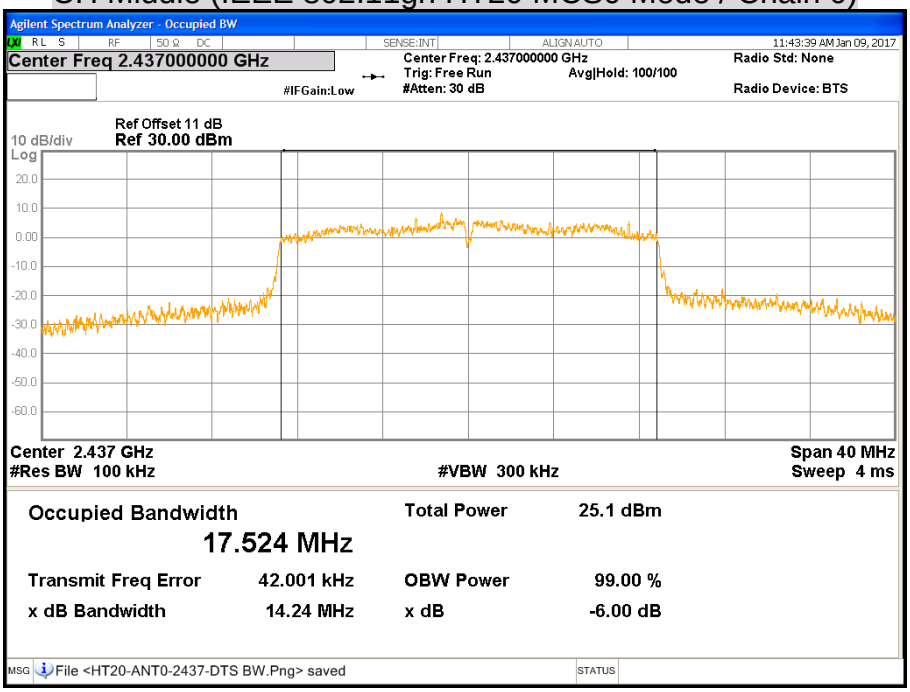
CH Low (IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



CH Middle (IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



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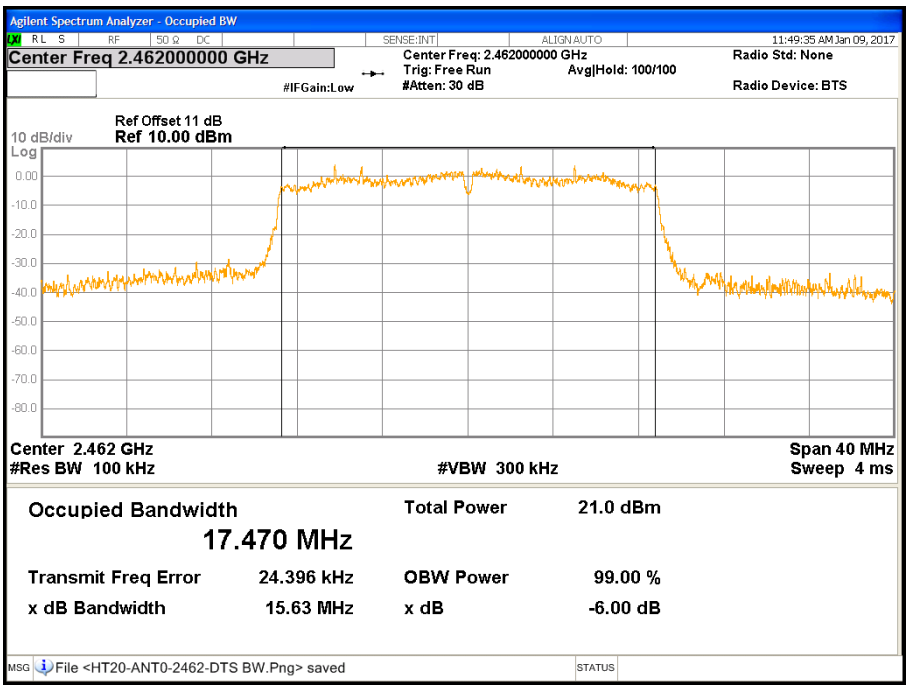
CH High (IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



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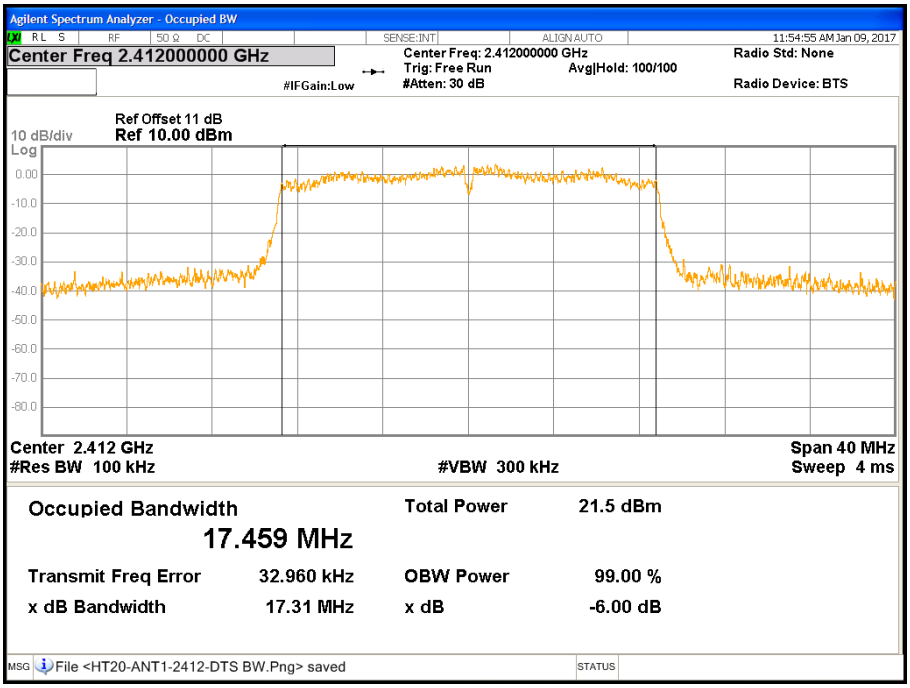
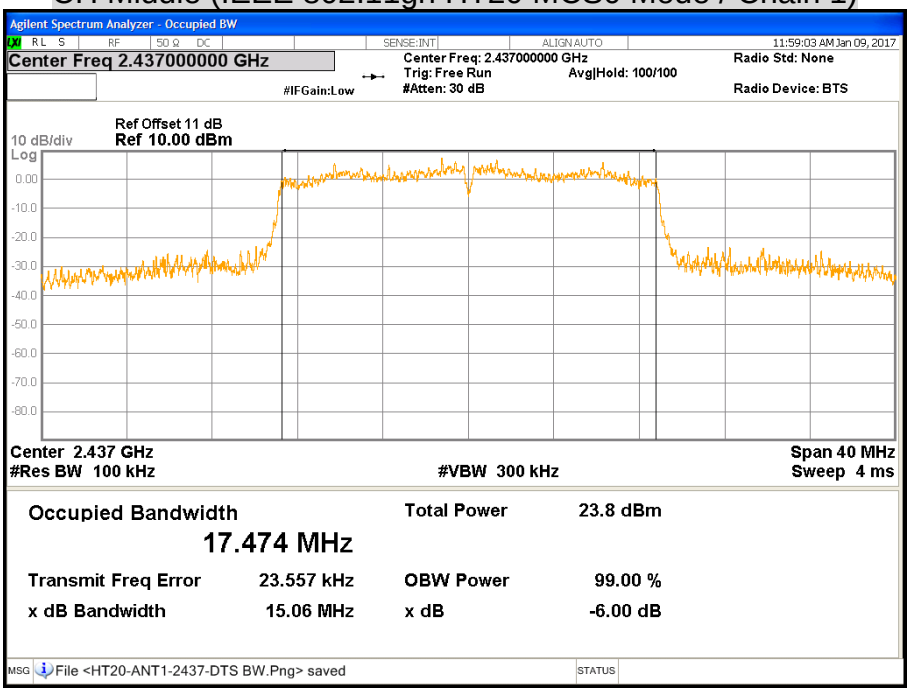
CH Low (IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



CH Middle (IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



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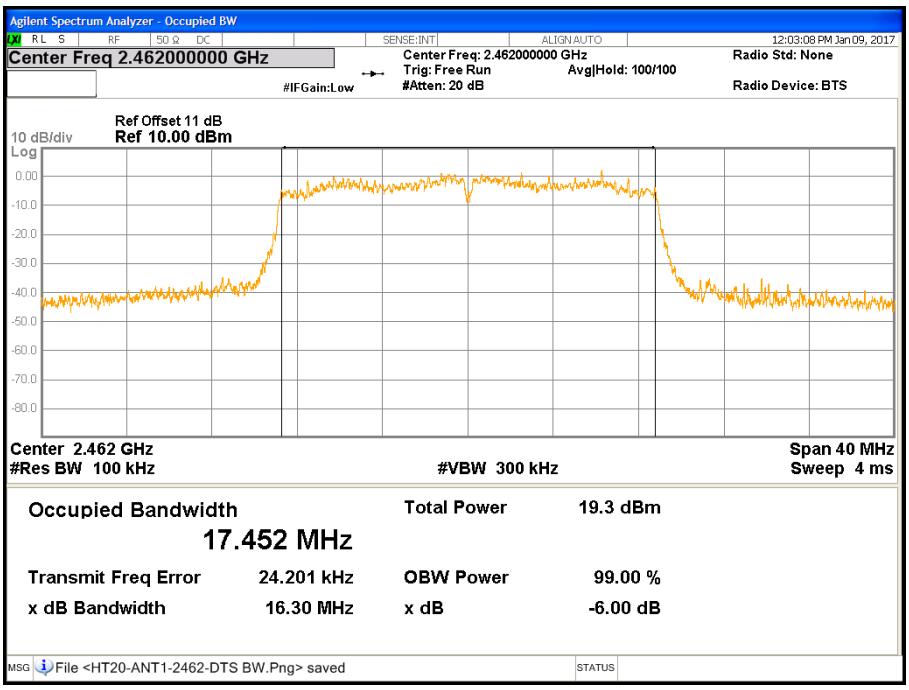
CH High (IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



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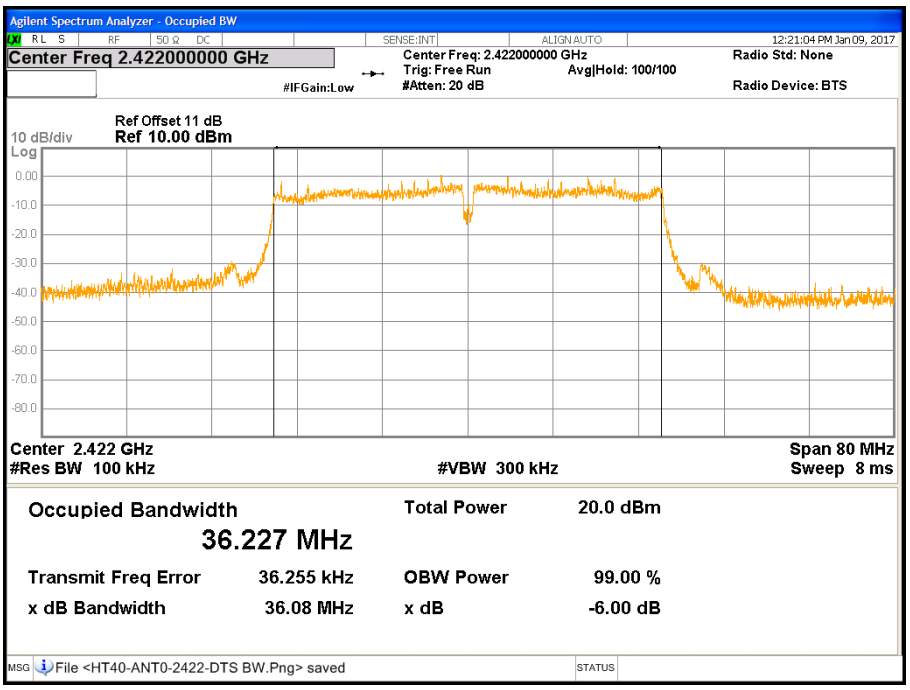
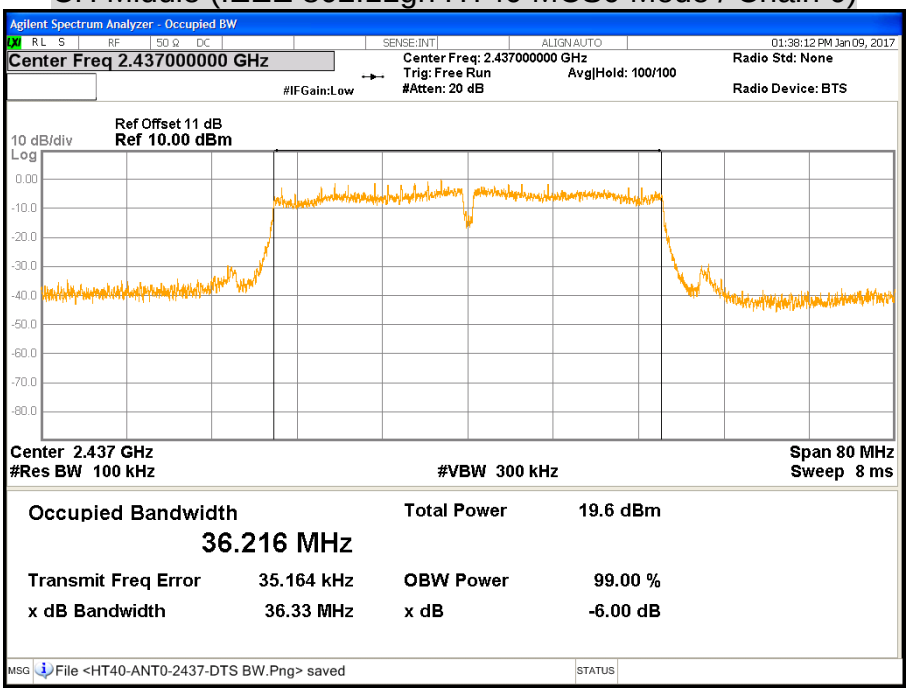
CH Low (IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



CH Middle (IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



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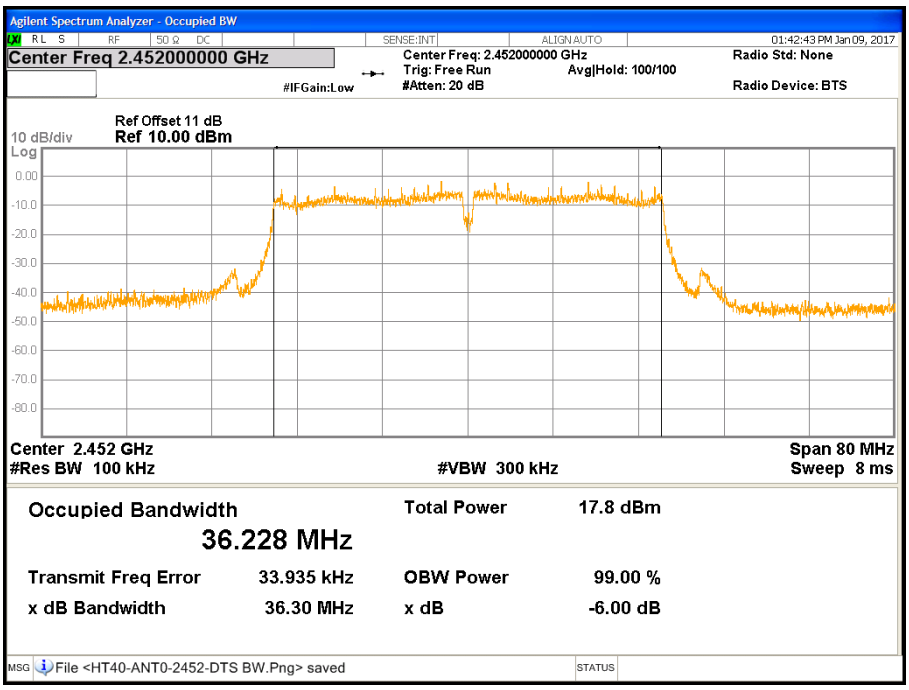
CH High (IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



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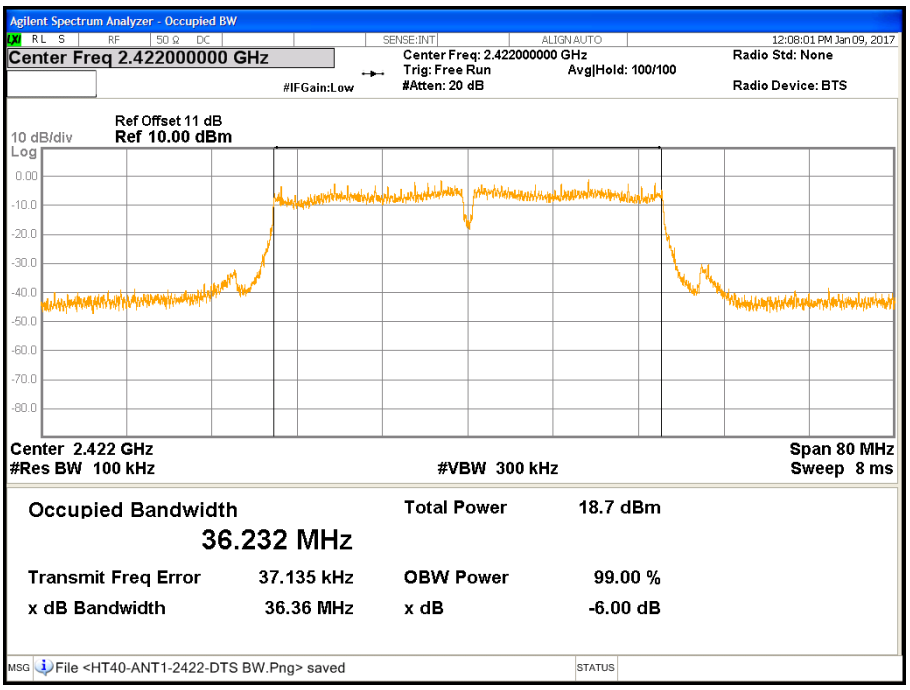
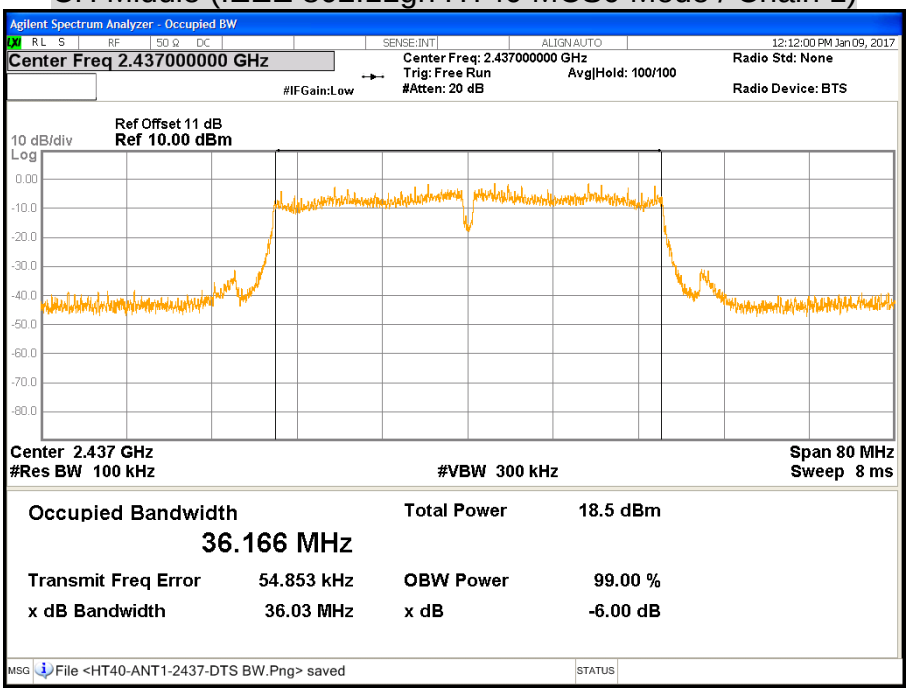
CH Low (IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



CH Middle (IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



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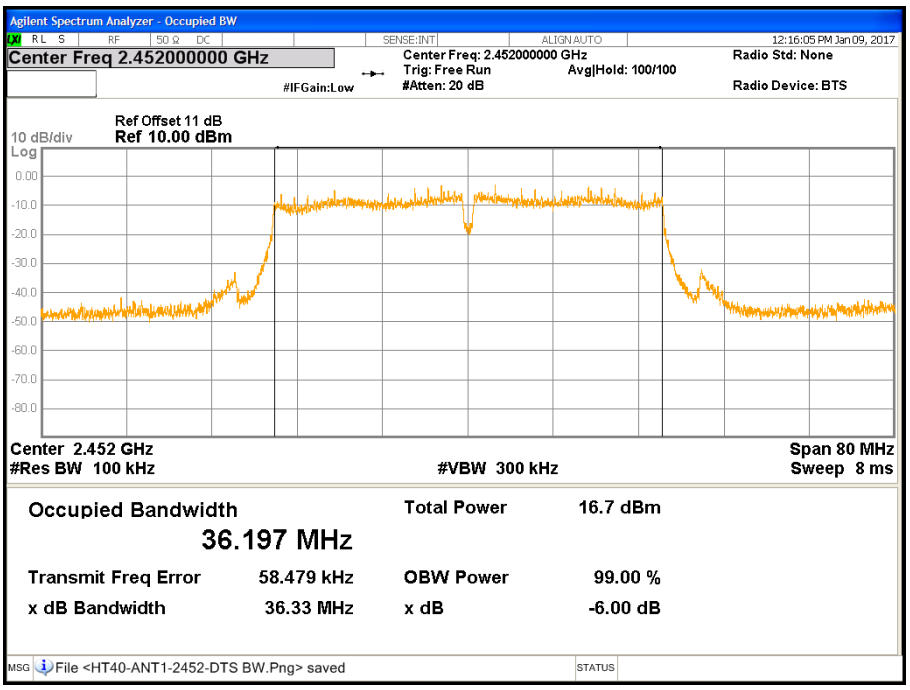
CH High (IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



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7.3 MAXIMUM PEAK OUTPUT POWER

LIMITS

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following:
§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 watt.
§ 15.247(b) (4) Except as shown in paragraphs (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§ KDB 662911:
If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.
If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream:
Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain; or,

$$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Power Meter	Anritsu	ML2495A	1149001	12/05/2017
Power Sensor	Anritsu	MA2411B	1126148	12/05/2017
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

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TEST SETUP

TEST PROCEDURE

The transmitter output is connected to the power meter. The power meter is set to the peak power detection.

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TEST RESULTS

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Waternil Guan
Test Model	BiPAC 7820NZ	Test Date	2017/01/09
Test Mode	TX Mode	Temp. & Humidity	23°C, 63%

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	Maximum Peak Output Power				Result
		Chain 0		Limit		
		(dBm)	(W)	(dBm)	(W)	
Low	2412	23.18	0.2080	30	1.000	PASS
Middle	2437	21.45	0.1396	30	1.000	PASS
High	2462	19.75	0.0944	30	1.000	PASS

Remark:

1. *At finial test to get the worst-case emission at 1Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.*
3. *The maximum antenna gain is 2.4 dBi which is less than 6dBi, the limit should be 30 dBm.*

IEEE 802.11g Mode

Channel	Channel Frequency (MHz)	Maximum Peak Output Power				Result
		Chain 0		Limit		
		(dBm)	(W)	(dBm)	(W)	
Low	2412	26.34	0.4305	30	1.000	PASS
Middle	2437	26.72	0.4699	30	1.000	PASS
High	2462	25.10	0.3236	30	1.000	PASS

Remark:

1. *At finial test to get the worst-case emission at 6Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.*
3. *The maximum antenna gain is 2.4 dBi which is less than 6dBi, the limit should be 30 dBm.*

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IEEE 802.11gn HT20 MCS0 Mode (2TX)

Channel	Channel Frequency (MHz)	Maximum Peak Output Power						Result
		Chain 0	Chain 1	Total		Limit		
		(dBm)	(dBm)	(dBm)	(W)	(dBm)	(W)	
Low	2412	25.66	24.38	28.08	0.6427	30	1.000	PASS
Middle	2437	26.30	25.48	28.92	0.7798	30	1.000	PASS
High	2462	23.11	22.30	25.73	0.3741	30	1.000	PASS

Remark:

1. *At finial test to get the worst-case emission at 6.5Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.*
3. *Total peak power = Chain 0 + Chain 1.*
4. *The maximum antenna gain is 2.8 dBi which is less than 6dBi, the limit should be 30 dBm.*

IEEE 802.11gn HT40 MCS0 Mode (2TX)

Channel	Channel Frequency (MHz)	Maximum Peak Output Power						Result
		Chain 0	Chain 1	Total		Limit		
		(dBm)	(dBm)	(dBm)	(W)	(dBm)	(W)	
Low	2422	22.16	21.56	24.88	0.3076	30	1.000	PASS
Middle	2437	21.51	20.86	24.21	0.2636	30	1.000	PASS
High	2452	20.85	19.14	23.09	0.2037	30	1.000	PASS

Remark:

1. *At finial test to get the worst-case emission at 13.5Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.*
3. *Total peak power = Chain 0 + Chain 1.*
4. *The maximum antenna gain is 2.8 dBi which is less than 6dBi, the limit should be 30 dBm.*

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7.4 AVERAGE POWER

LIMITS

None: For reporting purposes only.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Power Meter	Anritsu	ML2495A	1149001	12/05/2017
Power Sensor	Anritsu	MA2411B	1126148	12/05/2017
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP

TEST PROCEDURE

The transmitter output is connected to the power meter. The power meter is set to the average power detection.

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TEST RESULTS

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Waternil Guan
Test Model	BiPAC 7820NZ	Test Date	2017/01/09
Test Mode	TX Mode	Temp. & Humidity	23°C, 63%

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
		Chain 0
Low	2412	19.27
Middle	2437	17.55
High	2462	15.86

Remark:

1. *At finial test to get the worst-case emission at 1Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11g Mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
		Chain 0
Low	2412	19.95
Middle	2437	20.71
High	2462	16.37

Remark:

1. *At finial test to get the worst-case emission at 6Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11gn HT20 MCS0 Mode

Channel	Channel Frequency (MHz)	Average Power (dBm)	
		Chain 0	Chain 1
Low	2412	18.05	15.65
Middle	2437	19.10	17.33
High	2462	14.77	13.21

Remark:

1. *At finial test to get the worst-case emission at 6.5Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.*

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IEEE 802.11gn HT40 MCS0 Mode

Channel	Channel Frequency (MHz)	Average Power (dBm)	
		Chain 0	Chain 1
Low	2422	13.67	12.55
Middle	2437	13.43	12.04
High	2452	11.57	10.52

Remark:

1. *At finial test to get the worst-case emission at 13.5Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.*

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7.5 POWER SPECTRAL DENSITY

LIMITS

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

§ KDB 662911:

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

Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream:

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain; or,

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Signal Analyzer	Agilent	N9010A	MY52220817	03/15/2017
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP

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TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set analyzer center frequency to DTS channel center frequency.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
5. Set the VBW ≥ 3 x RBW.
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level within the RBW.
11. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

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TEST RESULTS

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Waternil Guan
Test Model	BiPAC 7820NZ	Test Date	2017/01/09
Test Mode	TX Mode	Temp. & Humidity	23°C, 63%

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)		Result
		Chain 0	Limit	
Low	2412	1.99	8	PASS
Middle	2437	0.99	8	PASS
High	2462	-1.16	8	PASS

Remark:
1. *At finial test to get the worst-case emission at 1Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.*
3. *The maximum antenna gain is 2.4 dBi which is less than 6dBi, the limit should be 8 dBm.*

IEEE 802.11g Mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)		Result
		Chain 0	Limit	
Low	2412	1.93	8	PASS
Middle	2437	1.15	8	PASS
High	2462	-2.81	8	PASS

Remark:
1. *At finial test to get the worst-case emission at 6Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.*
3. *The maximum antenna gain is 2.4 dBi which is less than 6dBi, the limit should be 8 dBm.*

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IEEE 802.11gn HT20 MCS0 Mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)				Result
		Chain 0	Chain 1	Total	Limit	
Low	2412	0.23	-3.14	1.87	8	PASS
Middle	2437	-0.17	-1.03	2.43	8	PASS
High	2462	-3.73	-5.99	-1.70	8	PASS

Remark:

1. *At finial test to get the worst-case emission at 6.5Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.*
3. *Total power spectral density = Chain 0 + Chain 1.*
4. *The directional gain is 5.61 dBi which is less than 6dBi, the limit should be 8 dBm.*

IEEE 802.11gn HT40 MCS0 Mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)				Result
		Chain 0	Chain 1	Total	Limit	
Low	2422	-7.18	-10.00	-5.36	8	PASS
Middle	2437	-7.60	-9.26	-5.34	8	PASS
High	2452	-9.95	-10.54	-7.22	8	PASS

Remark:

1. *At finial test to get the worst-case emission at 13.5Mbps.*
2. *The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.*
3. *Total power spectral density = Chain 0 + Chain 1.*
4. *The directional gain is 5.61 dBi which is less than 6dBi, the limit should be 8 dBm.*

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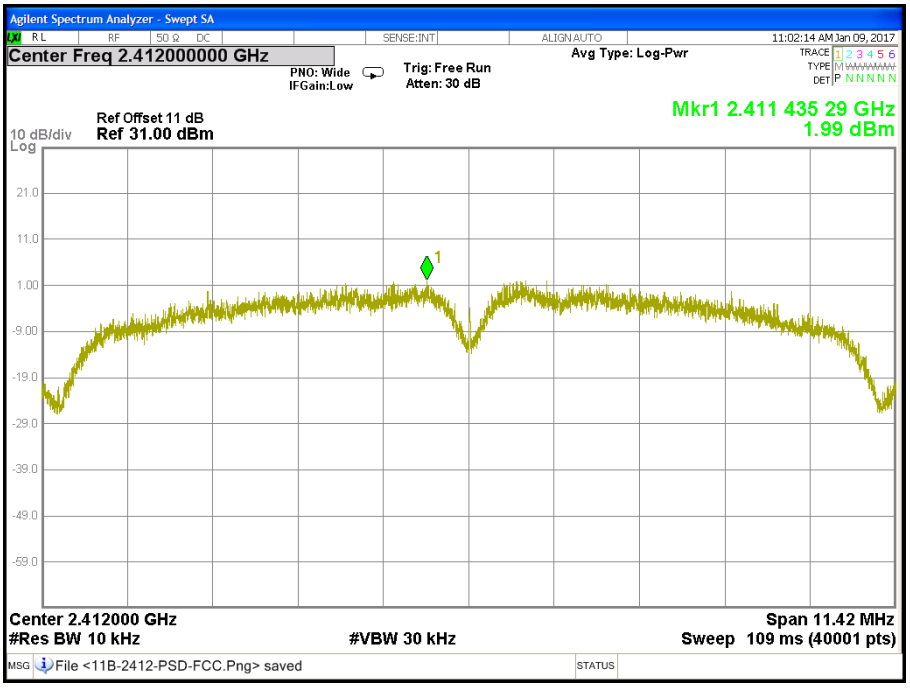
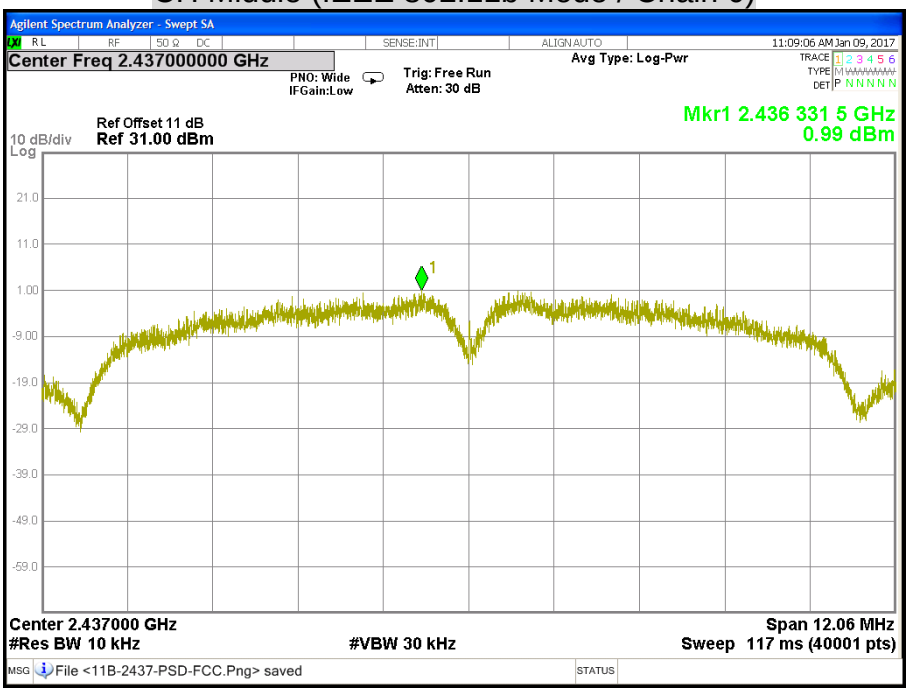
POWER SPECTRAL DENSITY

CH Low (IEEE 802.11b Mode / Chain 0)



CH Middle (IEEE 802.11b Mode / Chain 0)



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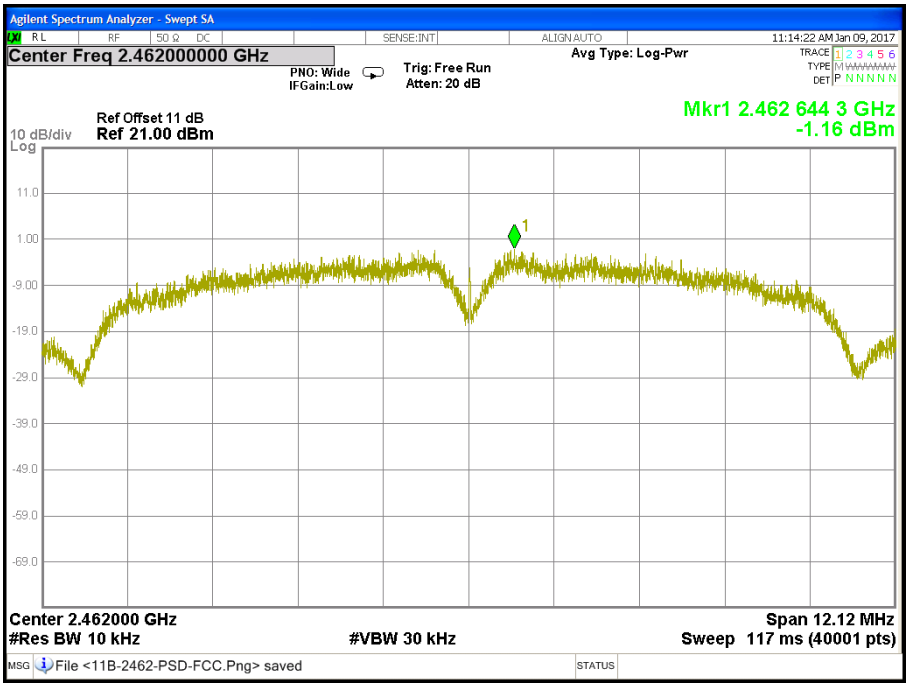
CH High (IEEE 802.11b Mode / Chain 0)



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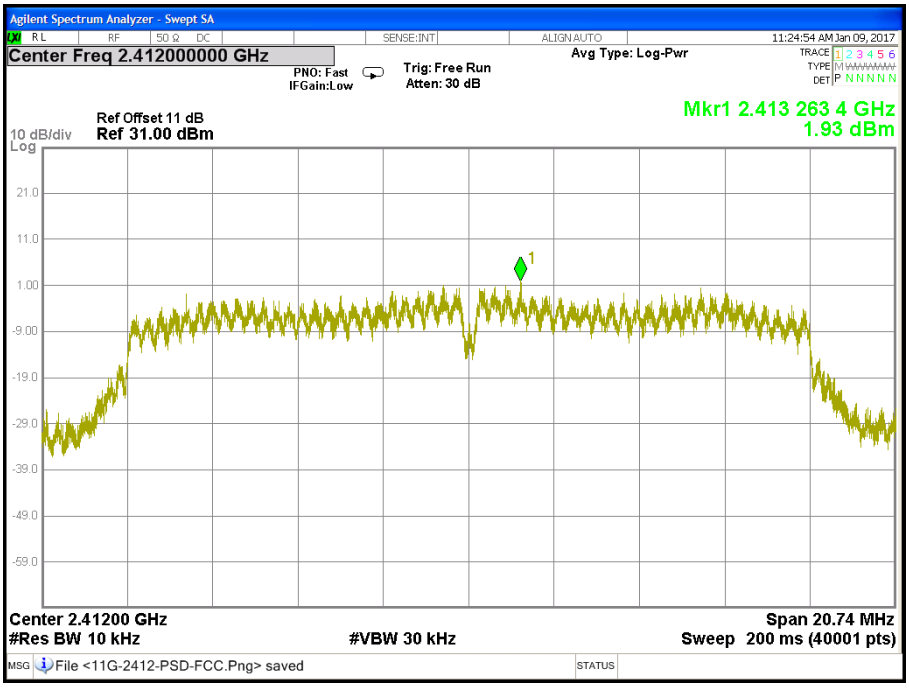
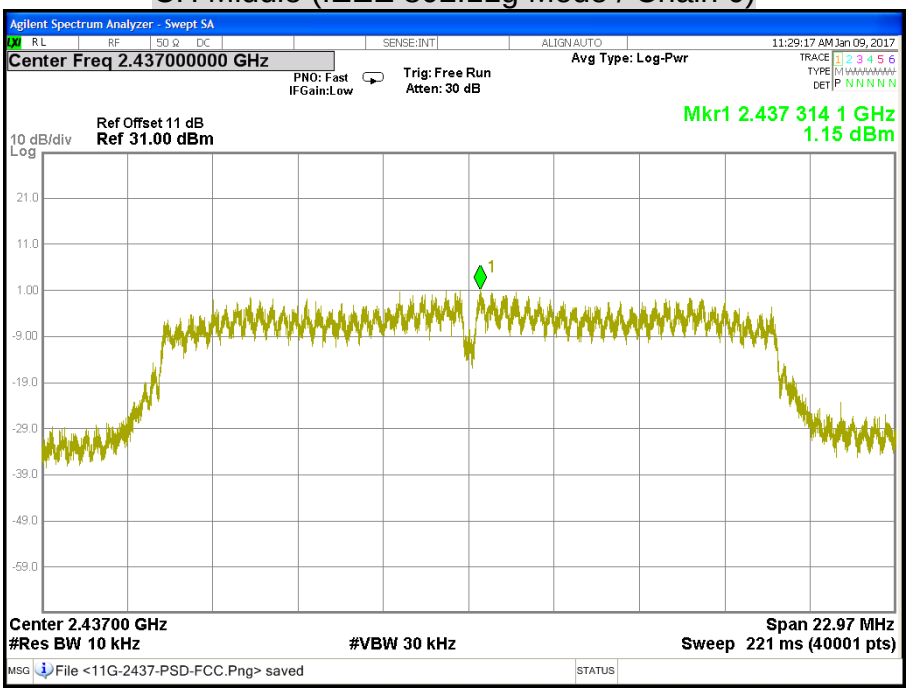
CH Low (IEEE 802.11g Mode / Chain 0)



CH Middle (IEEE 802.11g Mode / Chain 0)



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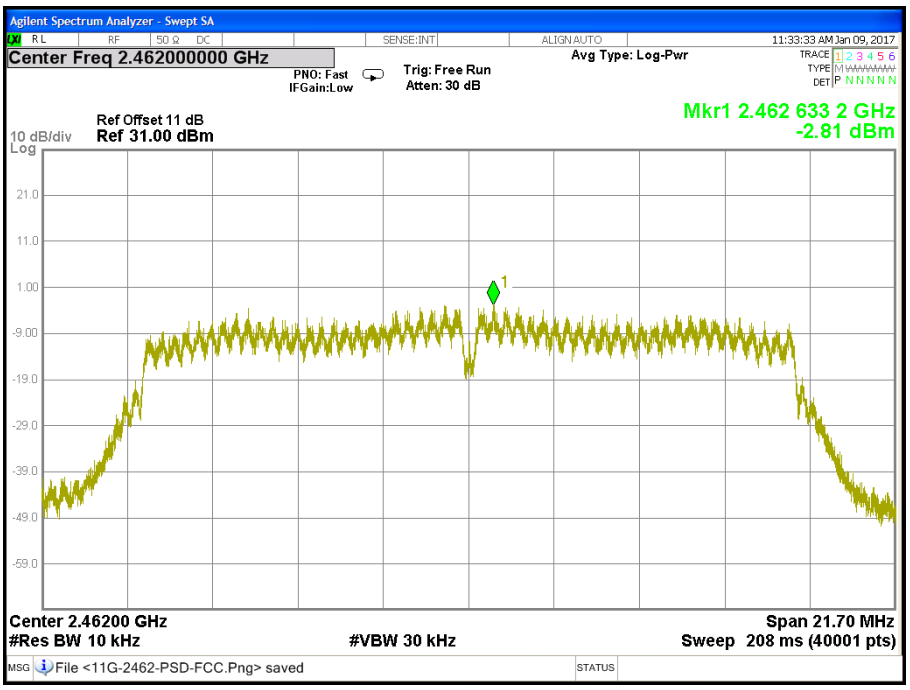
CH High (IEEE 802.11g Mode / Chain 0)



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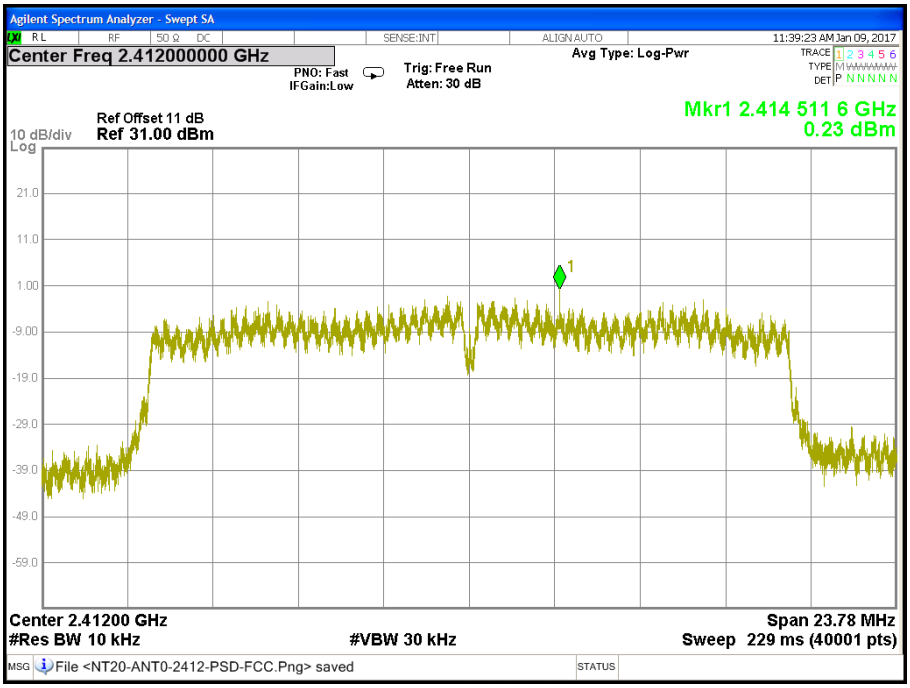
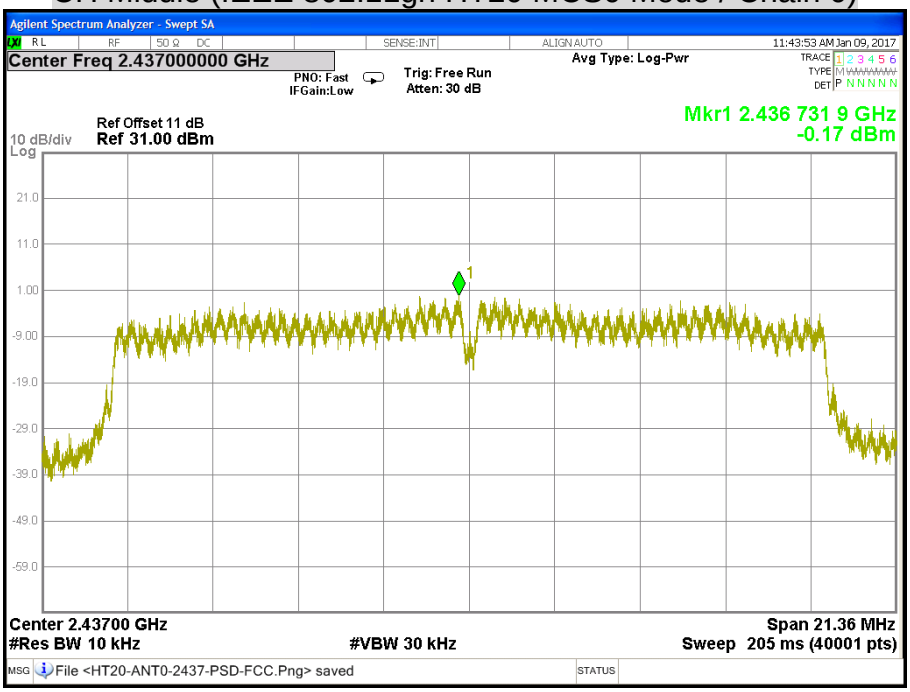
CH Low (IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



CH Middle (IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



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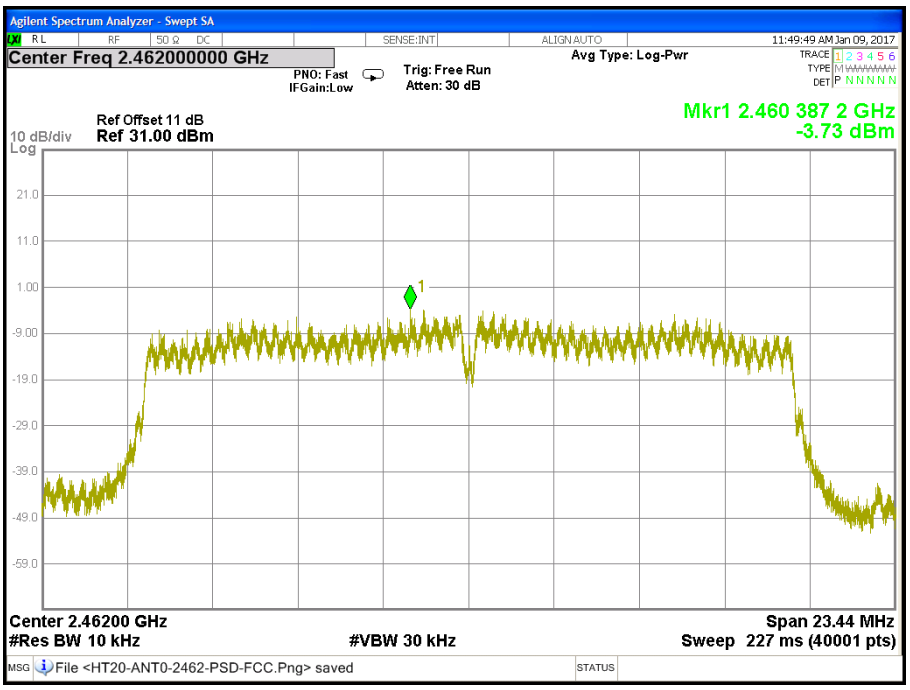
CH High (IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



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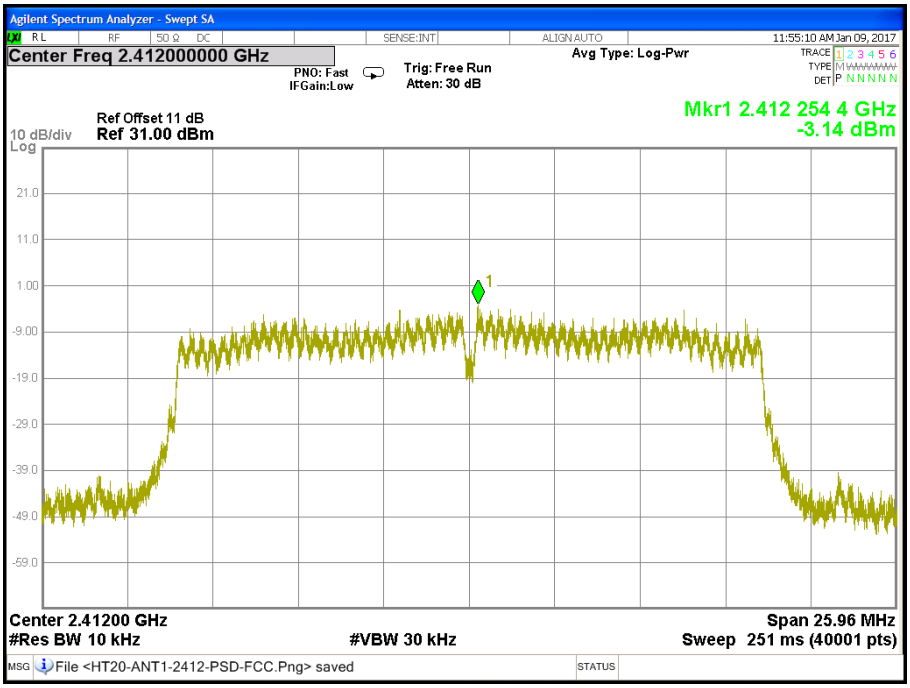
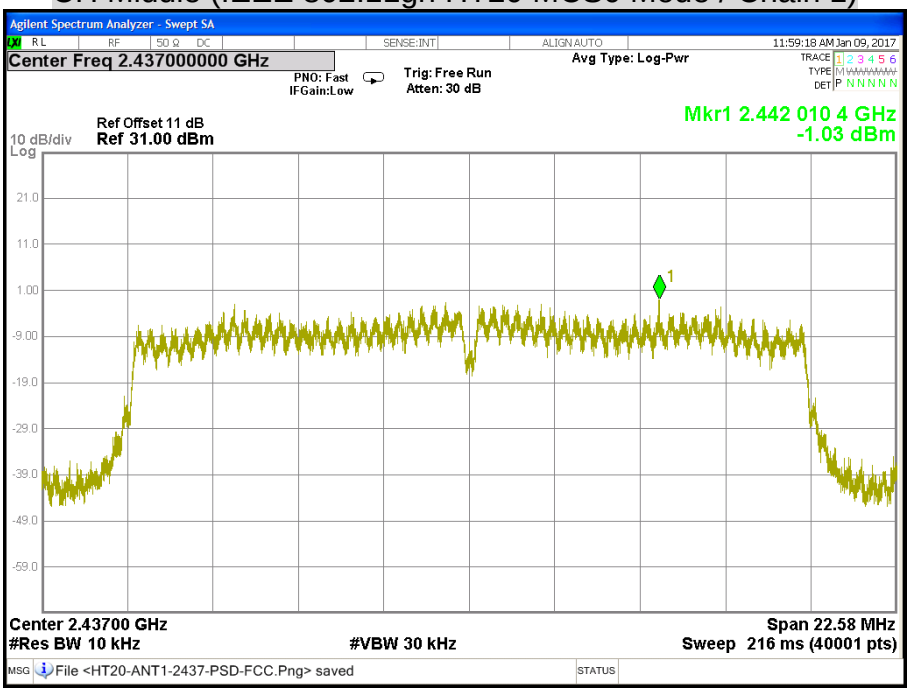
CH Low (IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



CH Middle (IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



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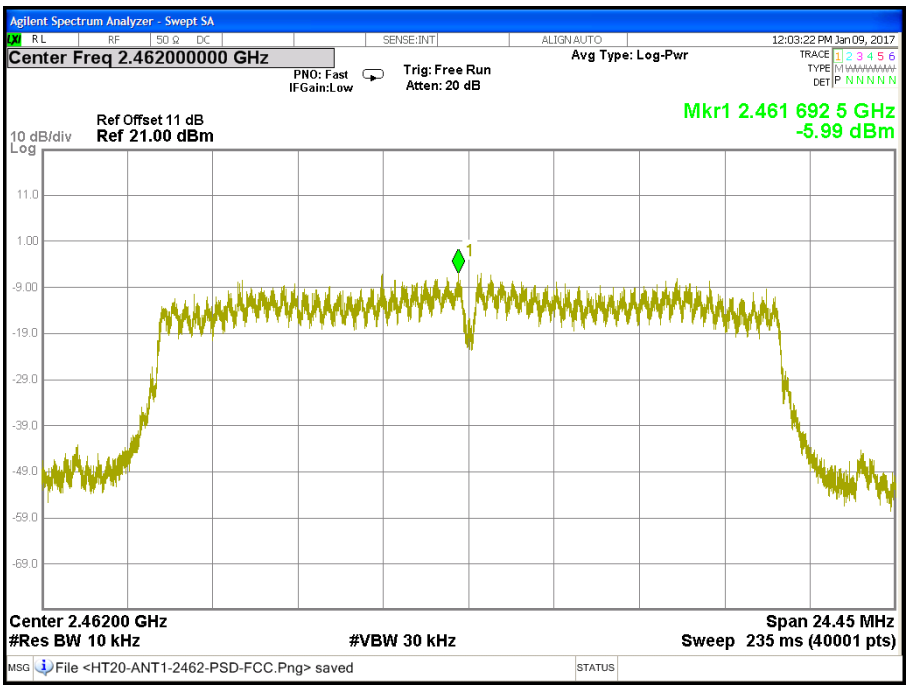
CH High (IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



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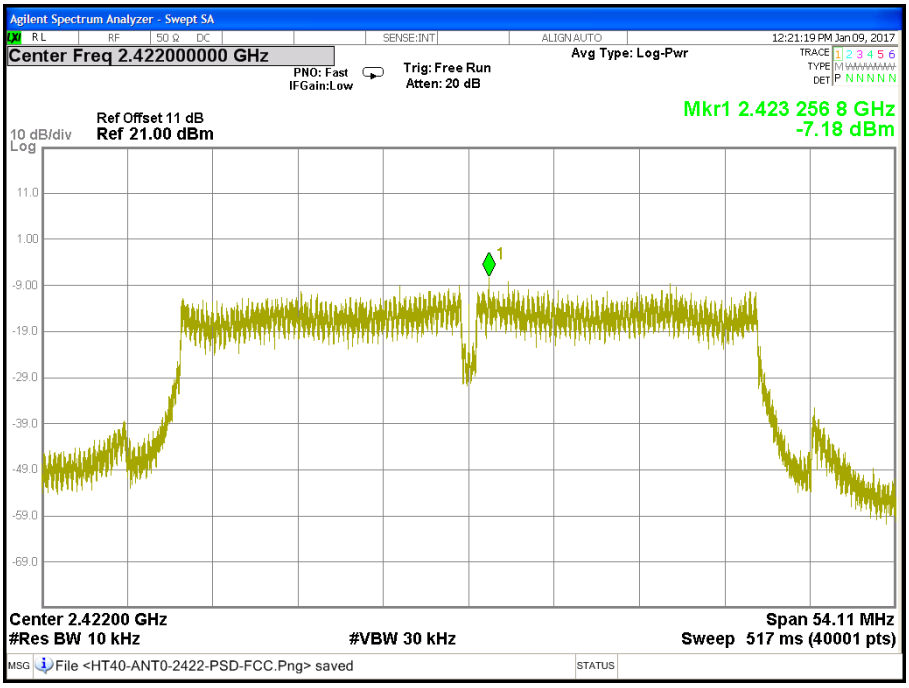
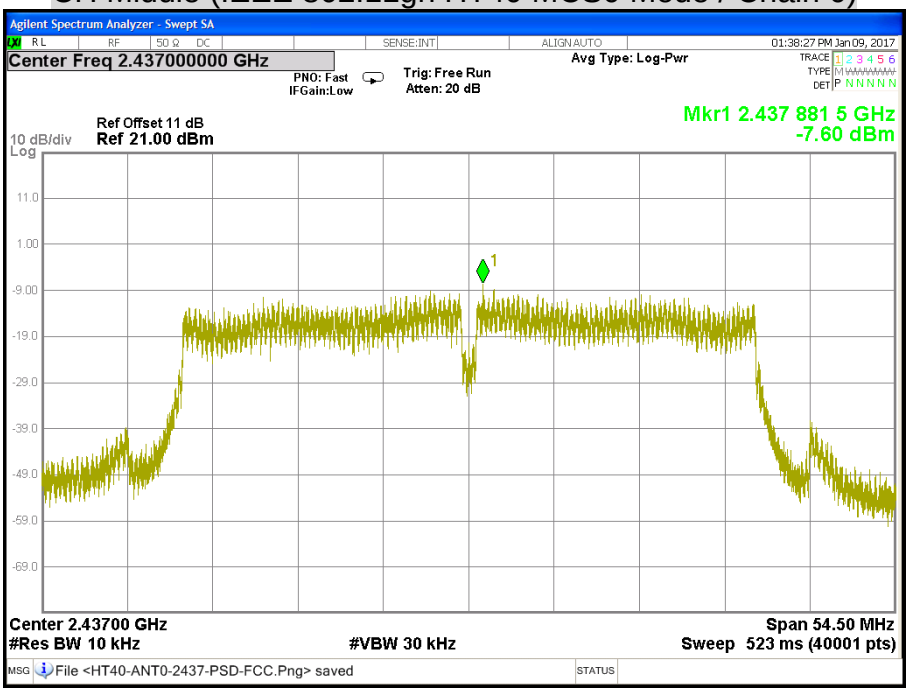
CH Low (IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



CH Middle (IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



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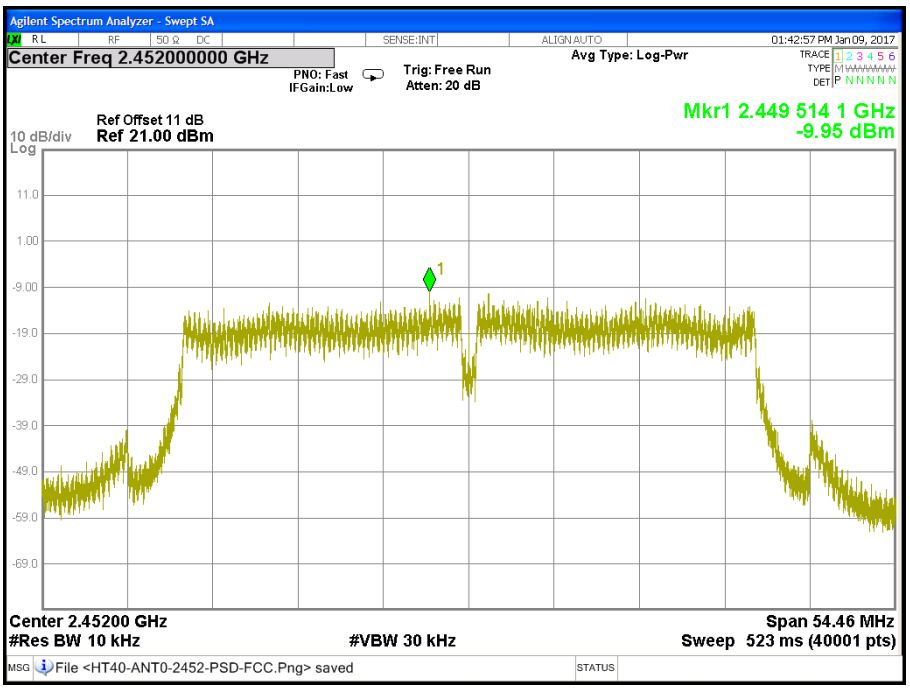
CH High (IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



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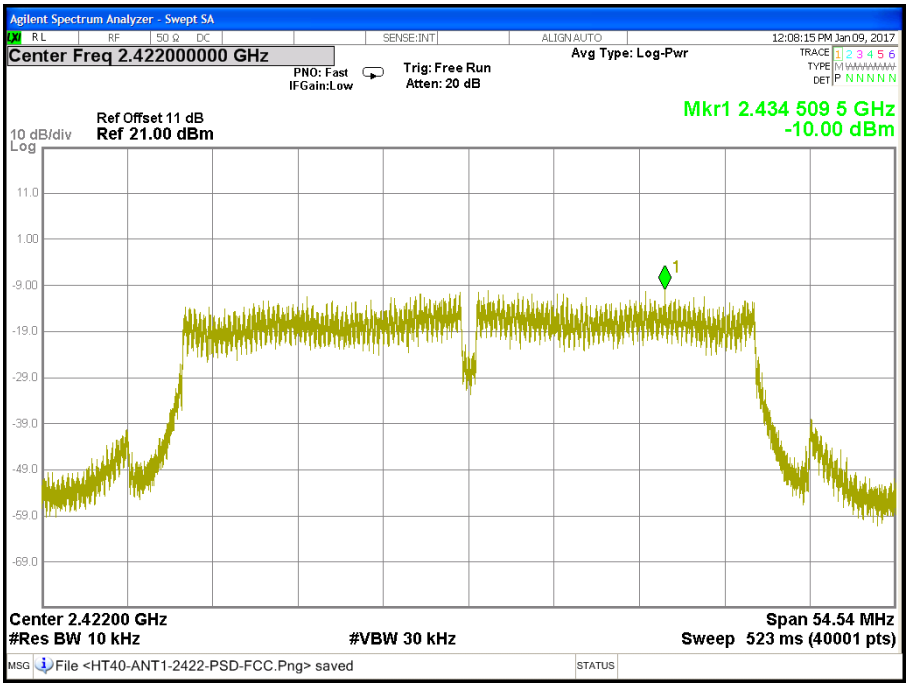
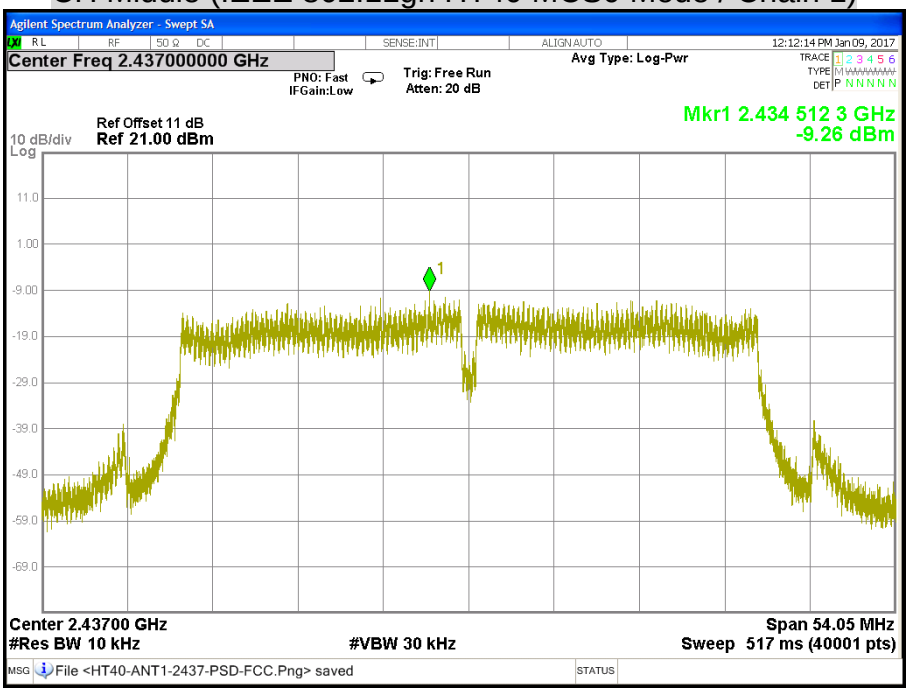
CH Low (IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



CH Middle (IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



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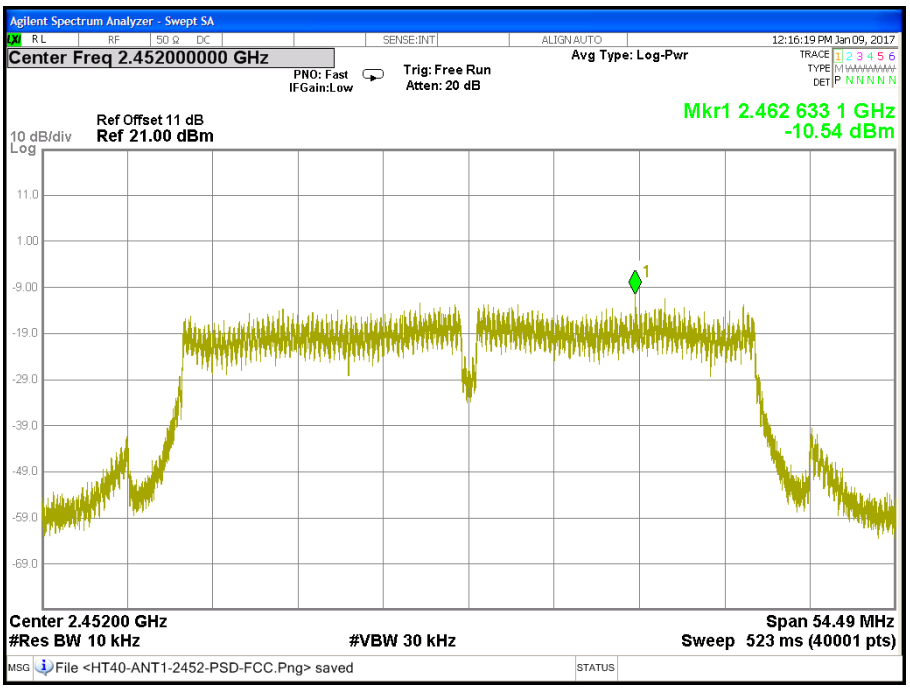
CH High (IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



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7.6 CONDUCTED SPURIOUS EMISSION

LIMITS

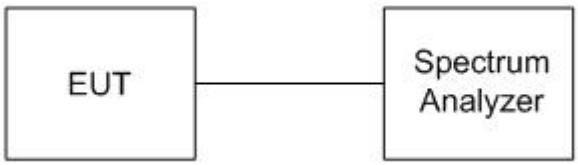
§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Signal Analyzer	Agilent	N9010A	MY52220817	03/15/2017
Test S/W	N/A			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.
The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

TEST RESULTS

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Waternil Guan
Test Model	BiPAC 7820NZ	**Test Date**	2017/01/09
Test Mode	TX Mode	**Temp. & Humidity**	23°C, 63%

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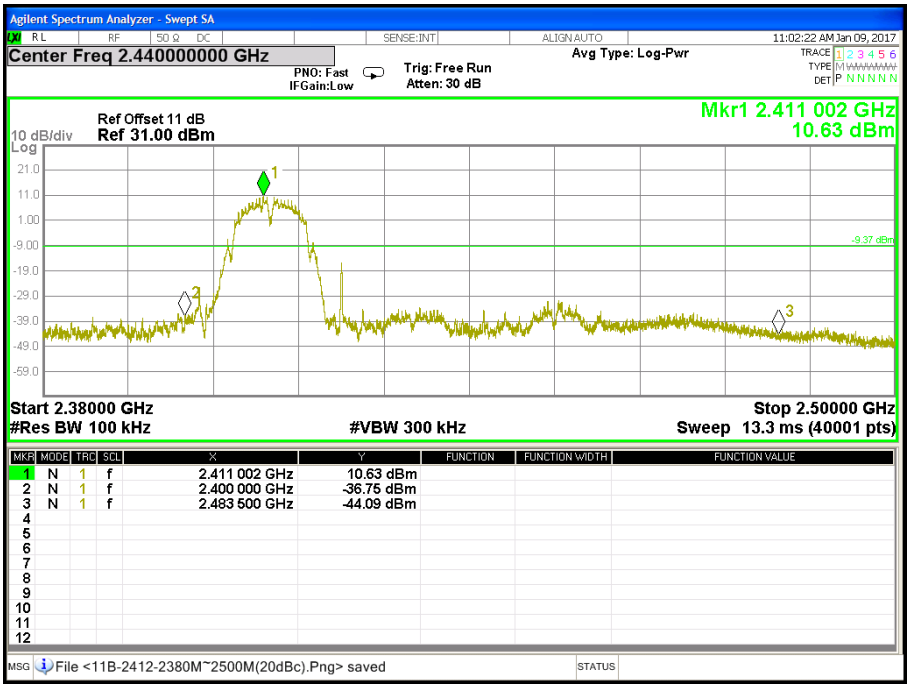
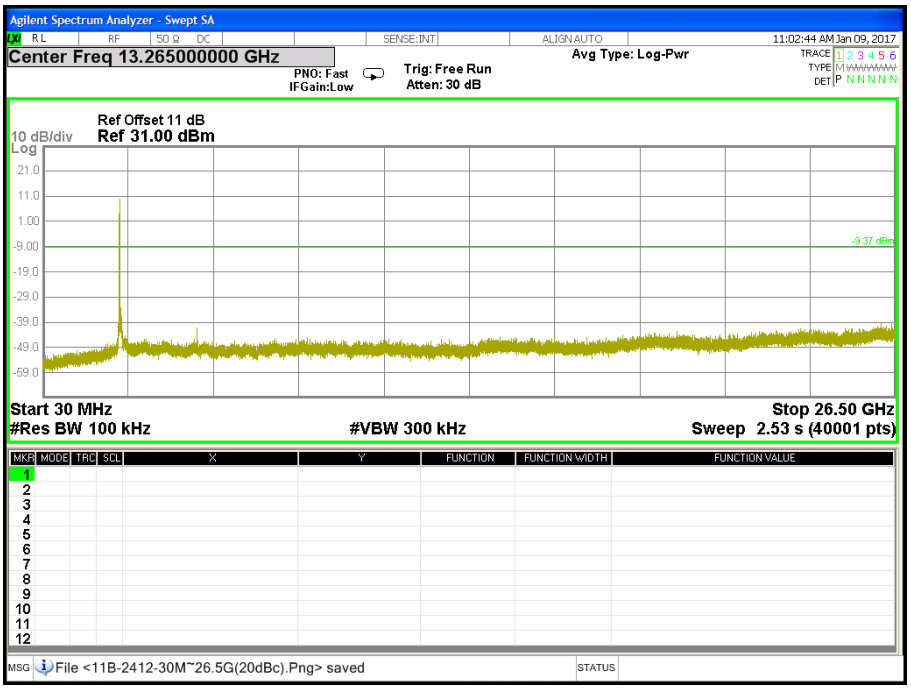
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

CH Low (2.38GHz ~ 2.5GHz / IEEE 802.11b Mode / Chain 0)



CH Low (30MHz ~ 26.5GHz / IEEE 802.11b Mode / Chain 0)



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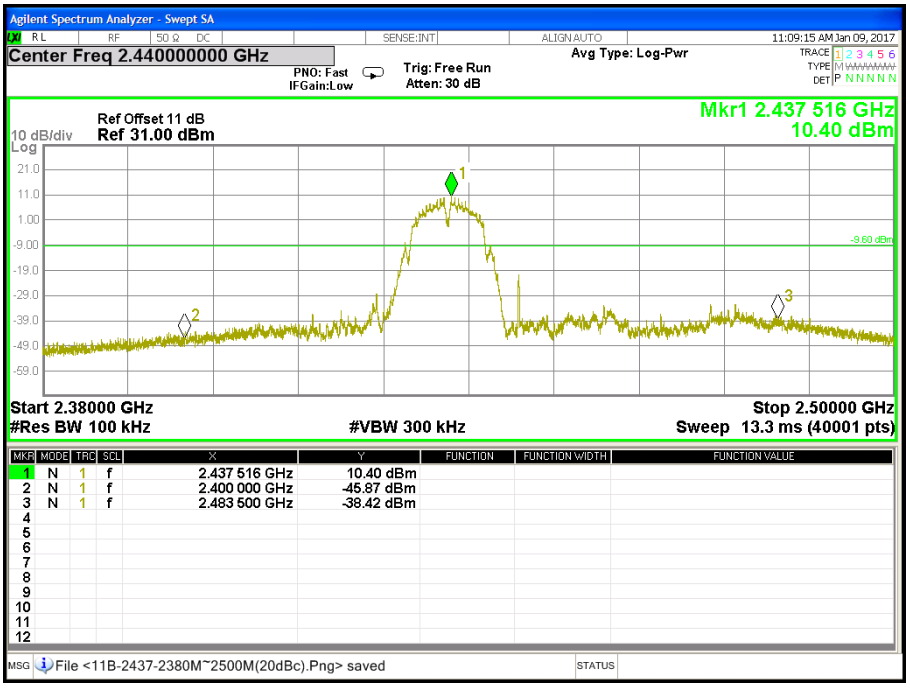
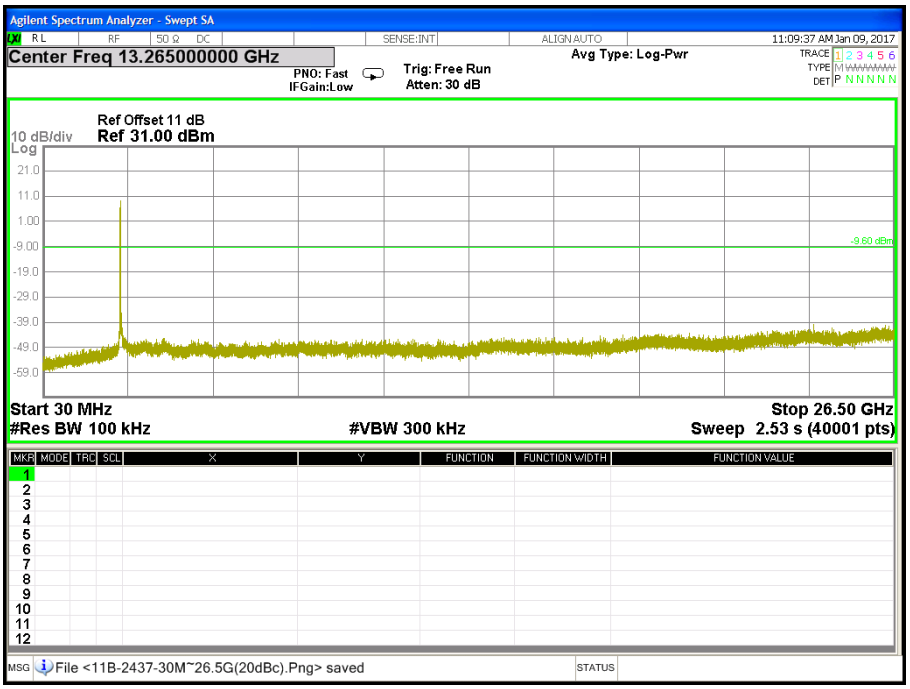
CH Middle (2.38GHz ~ 2.5GHz / IEEE 802.11b Mode / Chain 0)



CH Middle (30MHz ~ 26.5GHz / IEEE 802.11b Mode / Chain 0)



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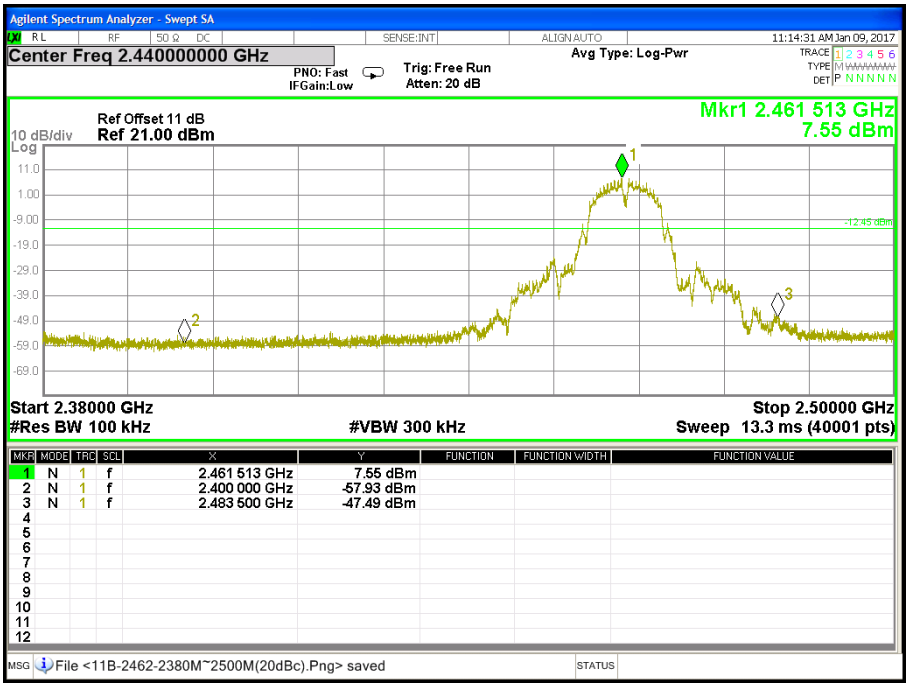
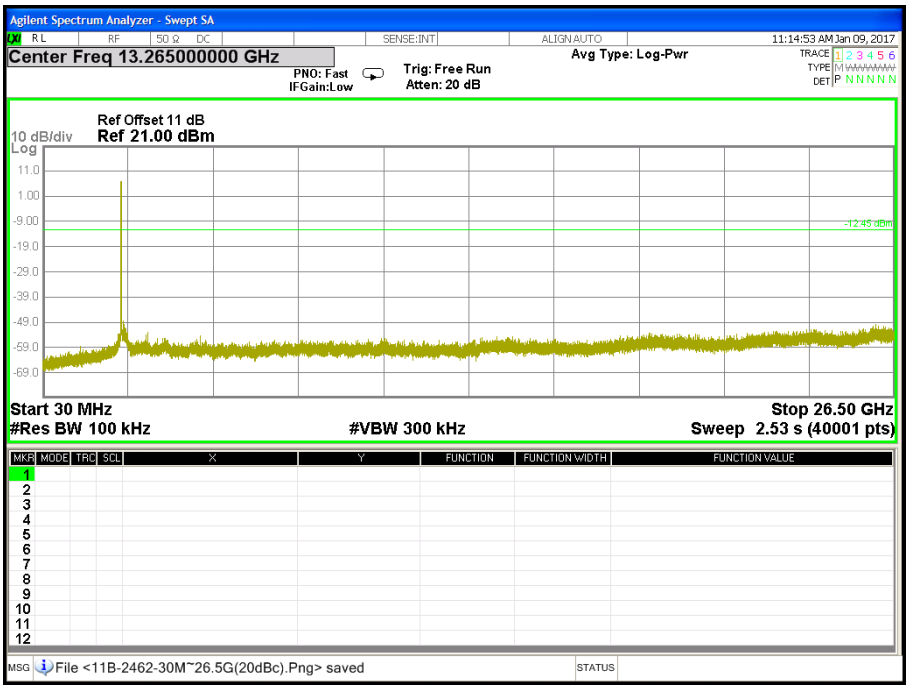
CH High (2.38GHz ~ 2.5GHz / IEEE 802.11b Mode / Chain 0)



CH High (30MHz ~ 26.5GHz / IEEE 802.11b Mode / Chain 0)



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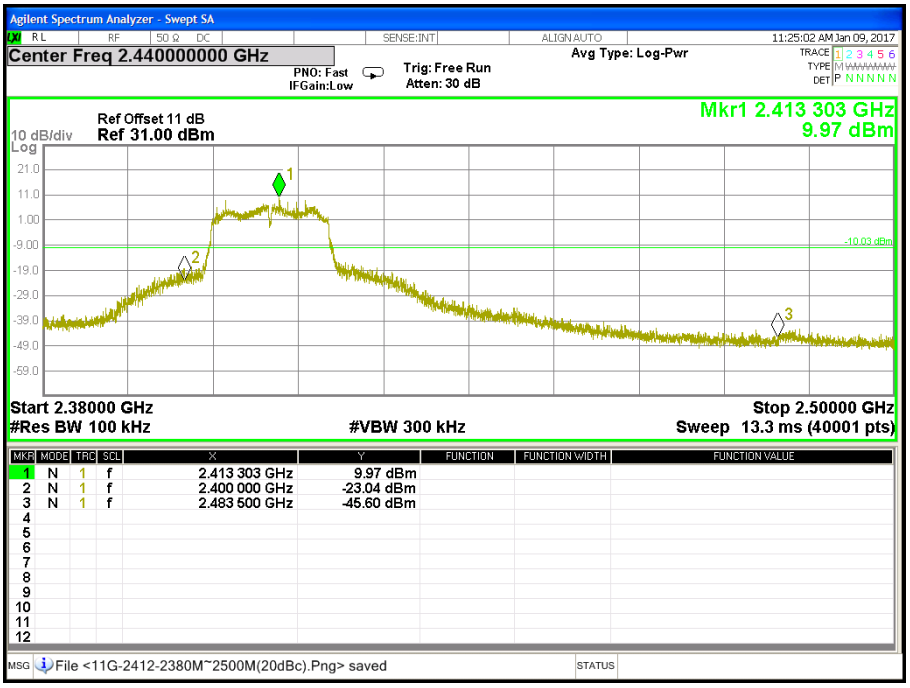
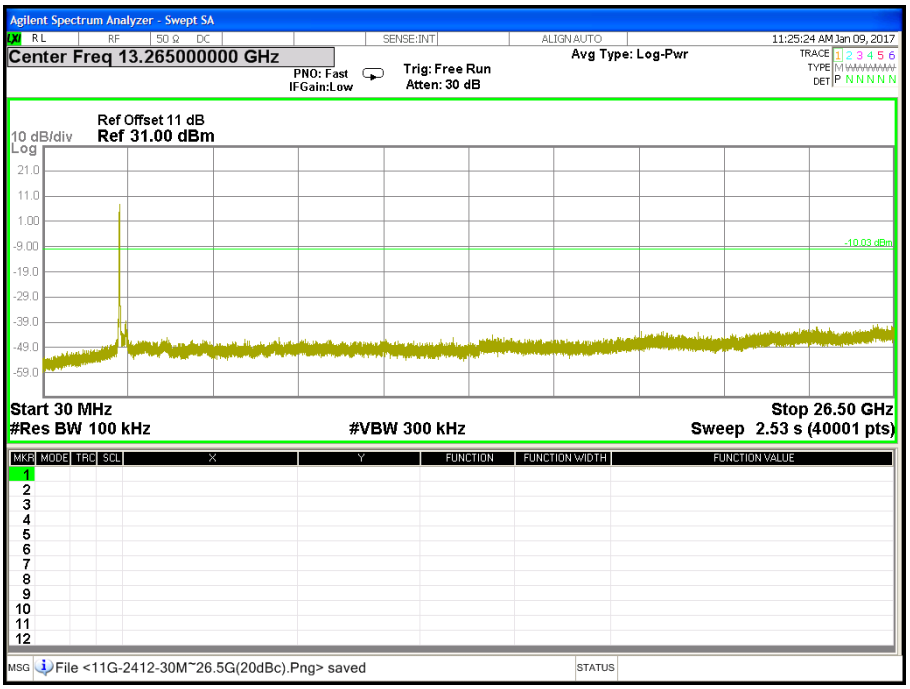
CH Low (2.38GHz ~ 2.5GHz / IEEE 802.11g Mode / Chain 0)



CH Low (30MHz ~ 26.5GHz / IEEE 802.11g Mode / Chain 0)



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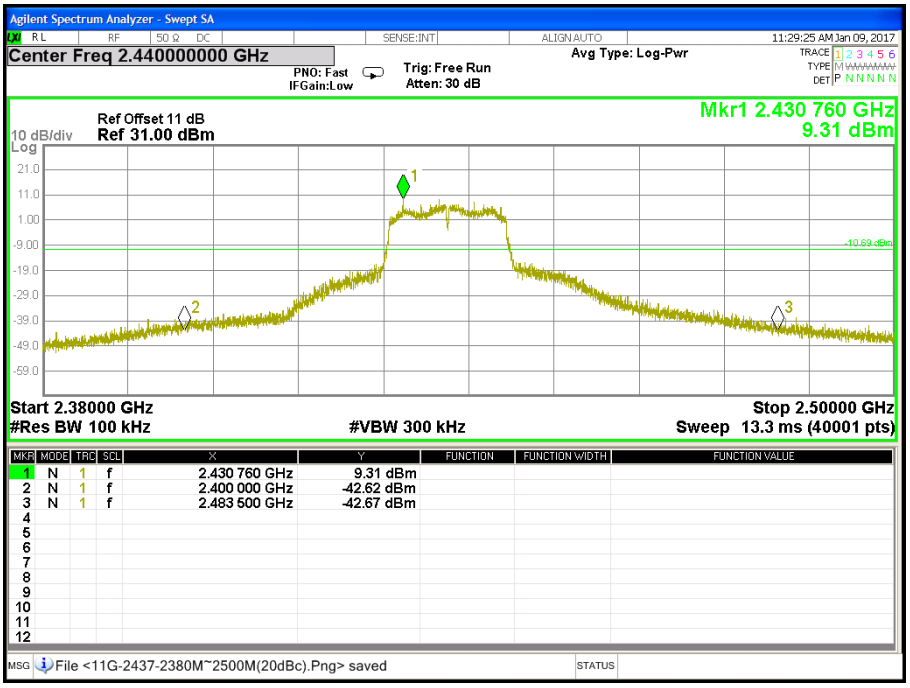
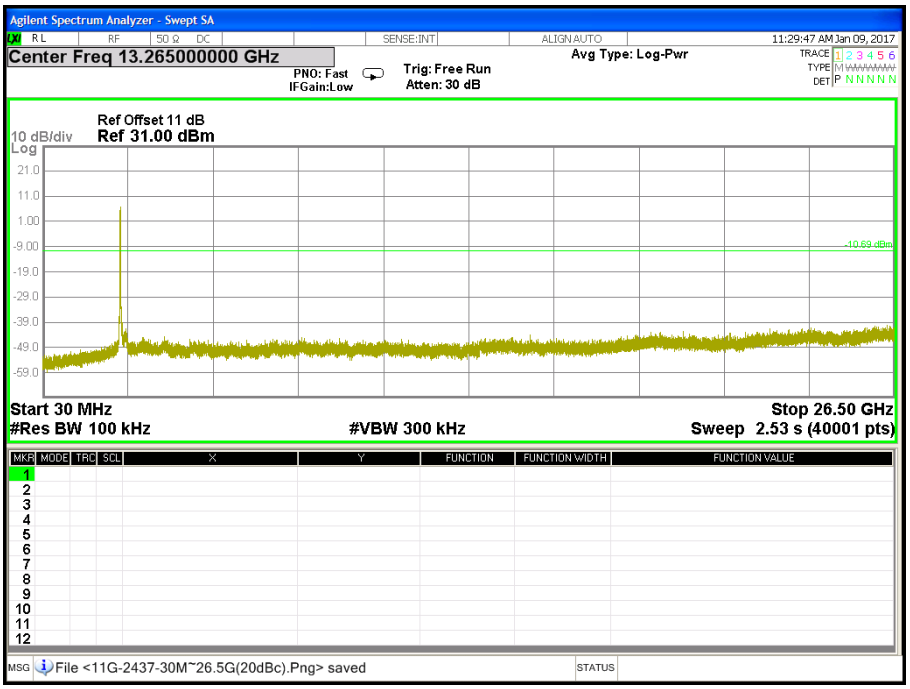
CH Middle (2.38GHz ~ 2.5GHz / IEEE 802.11g Mode / Chain 0)



CH Middle (30MHz ~ 26.5GHz / IEEE 802.11g Mode / Chain 0)



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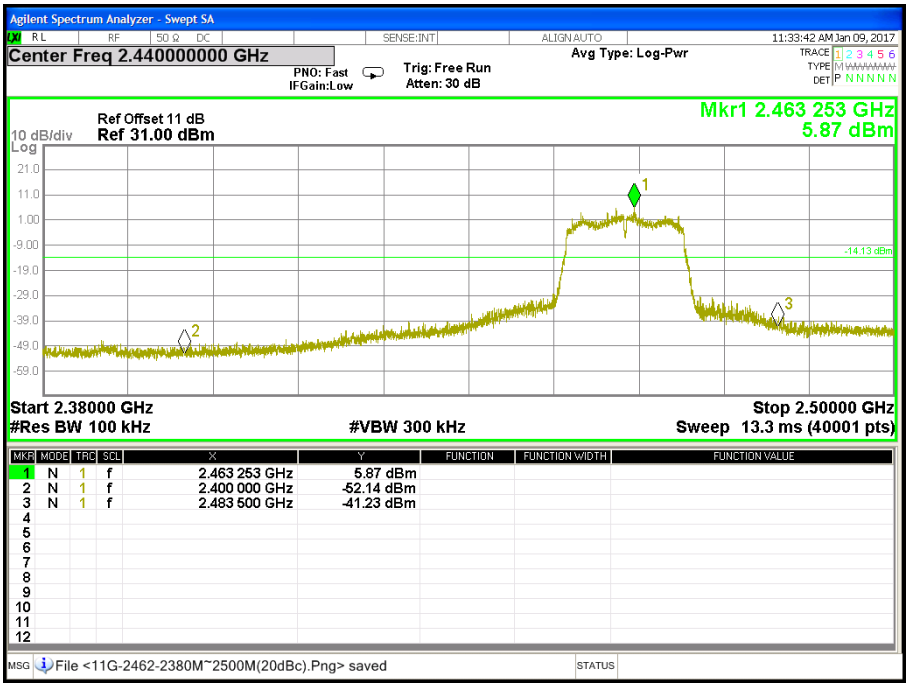
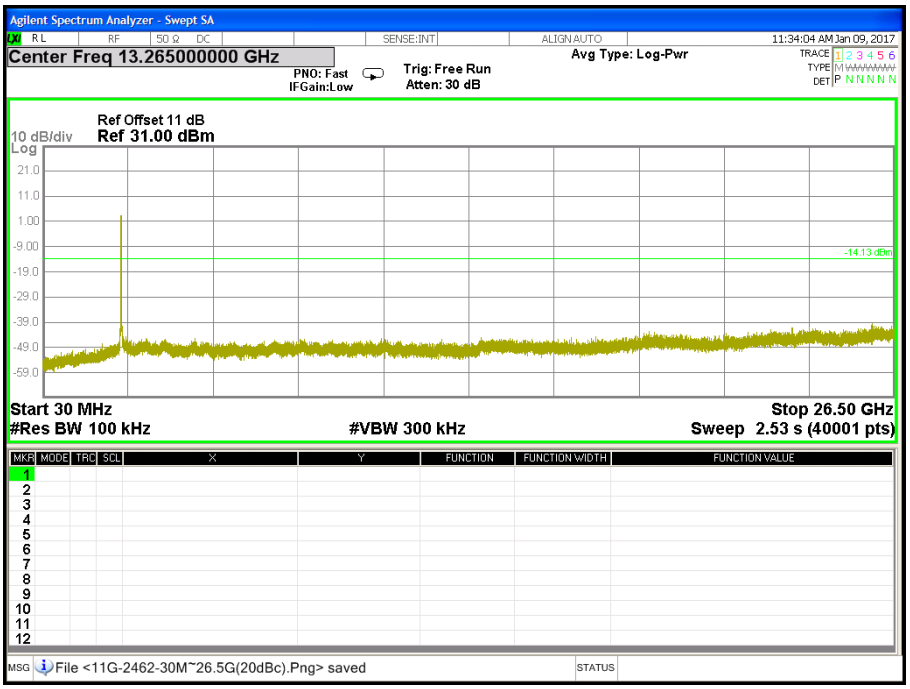
CH High (2.38GHz ~ 2.5GHz / IEEE 802.11g Mode / Chain 0)



CH High (30MHz ~ 26.5GHz / IEEE 802.11g Mode / Chain 0)



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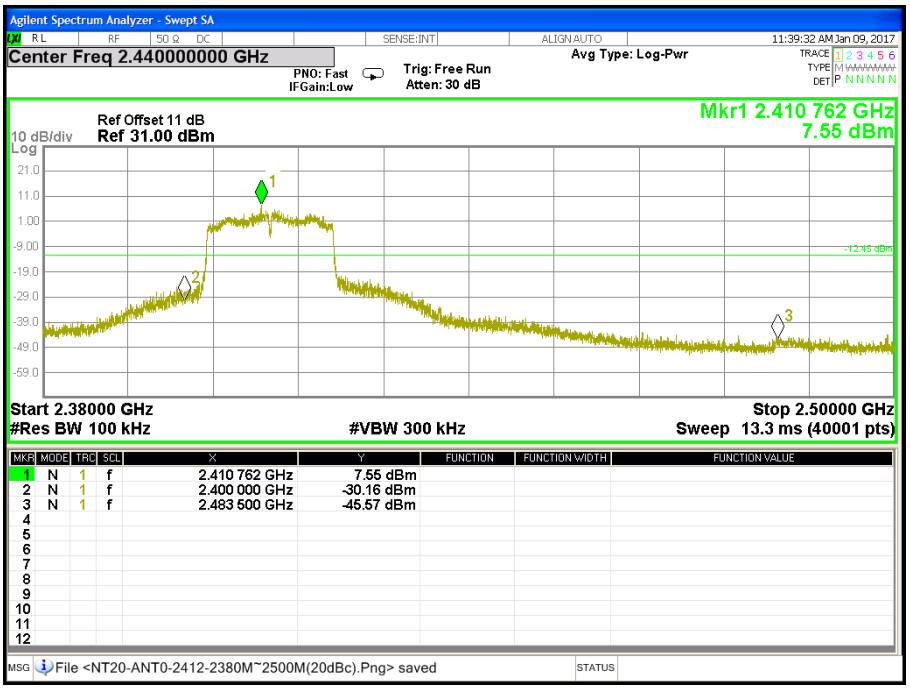
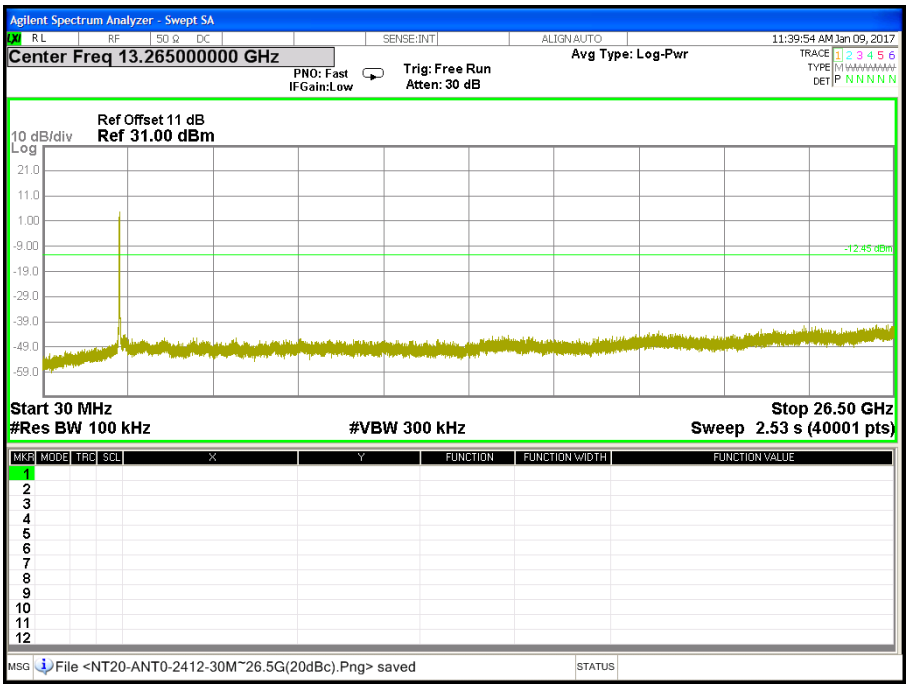
CH Low (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



CH Low (30MHz ~ 26.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



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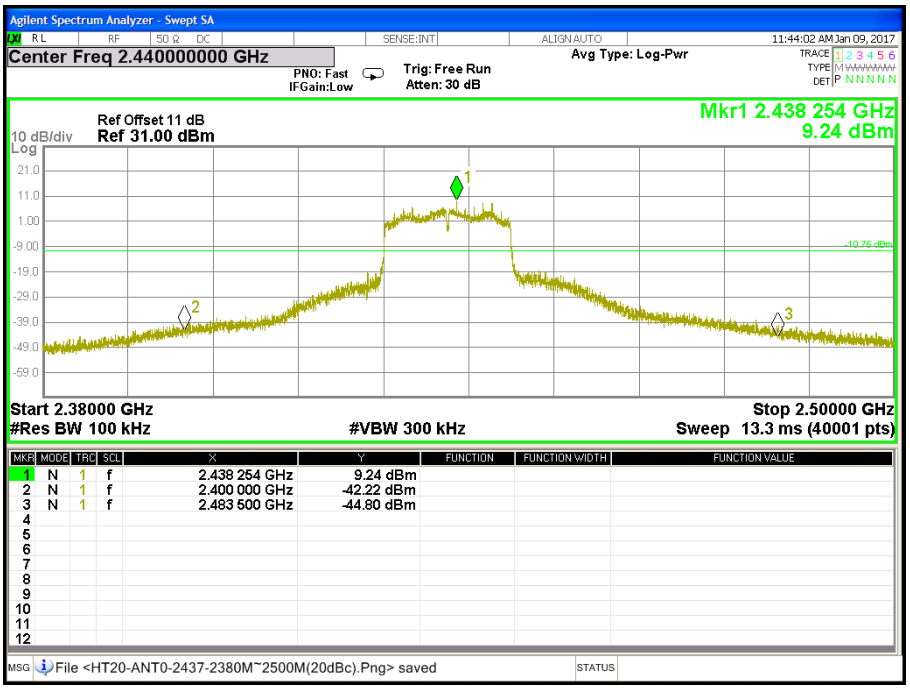
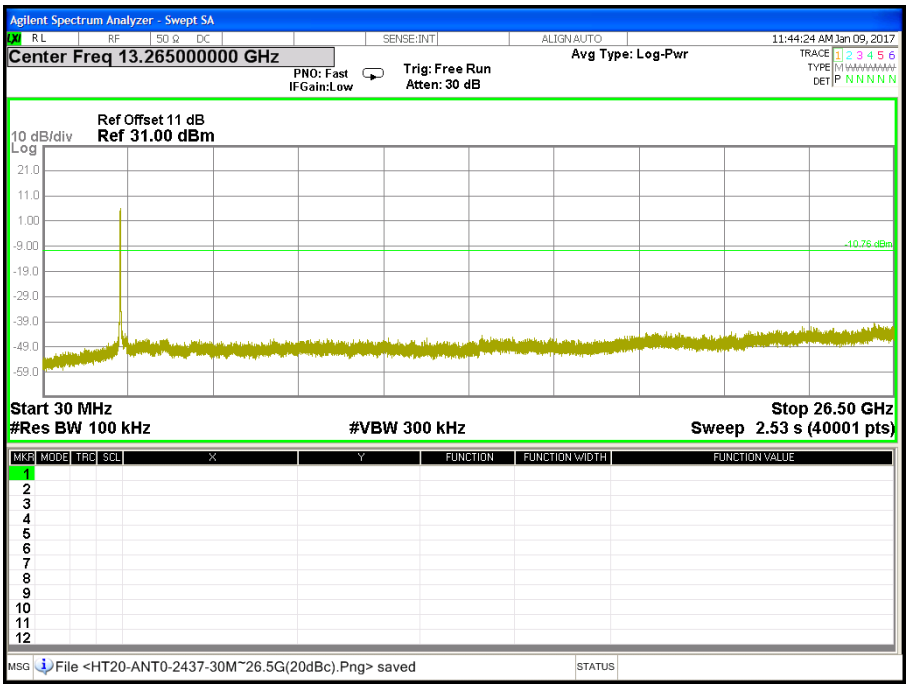
CH Middle (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



CH Middle (30MHz ~ 26.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



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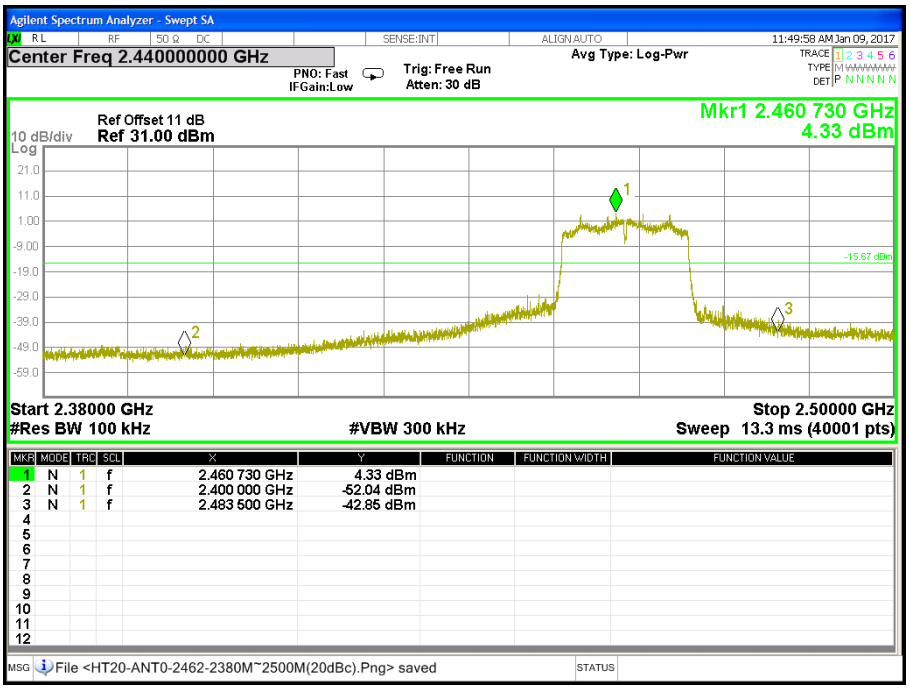
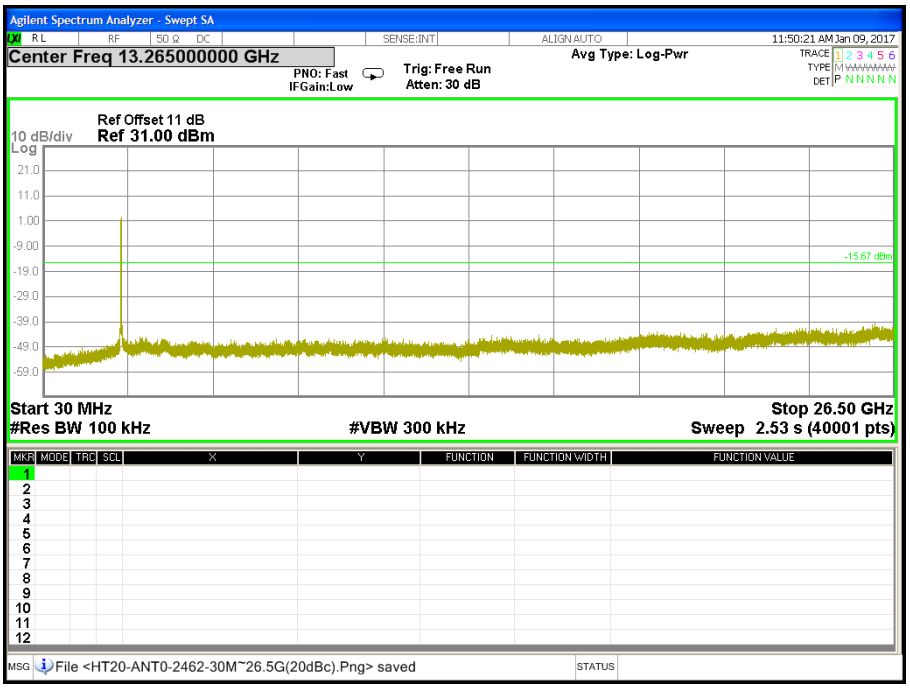
CH High (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



CH High (30MHz ~ 26.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 0)



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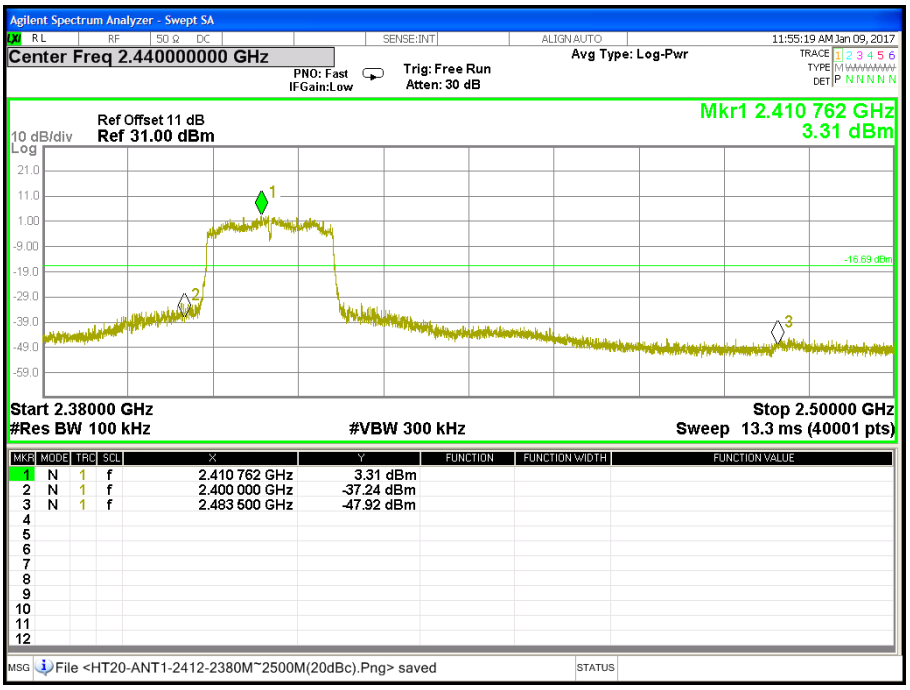
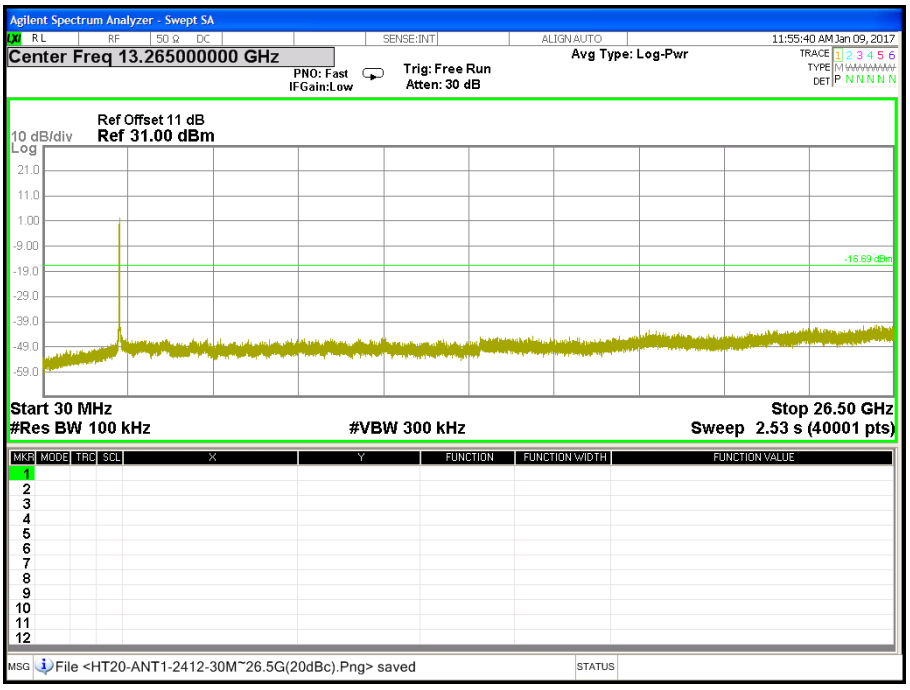
CH Low (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



CH Low (30MHz ~ 26.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



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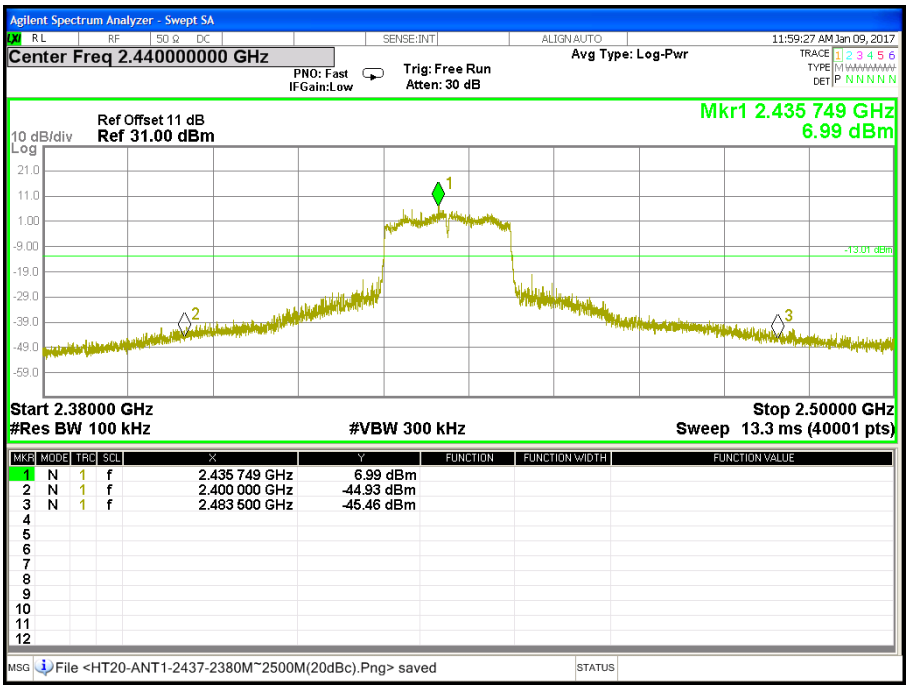
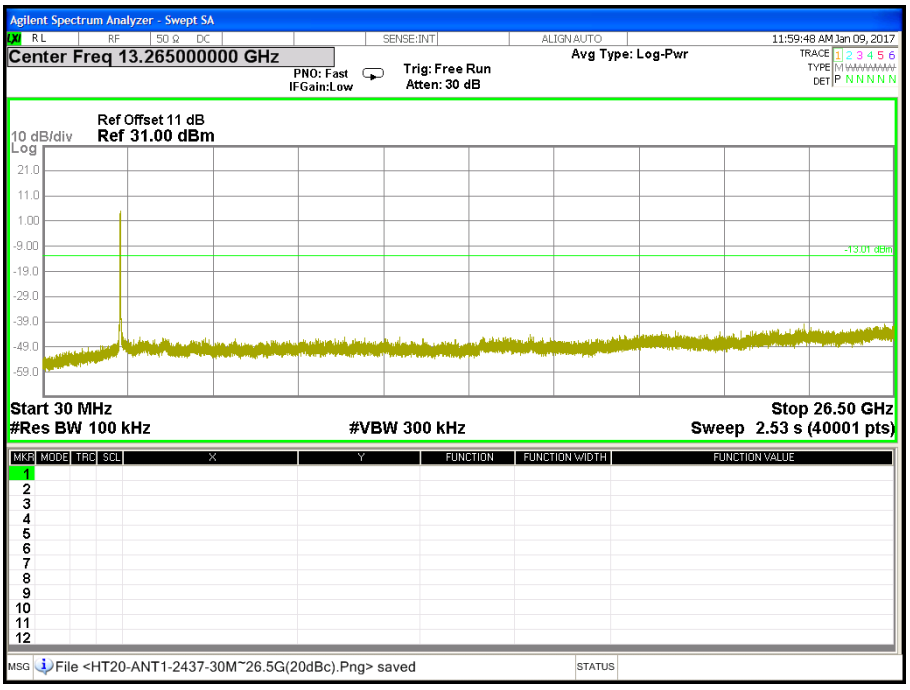
CH Middle (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



CH Middle (30MHz ~ 26.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



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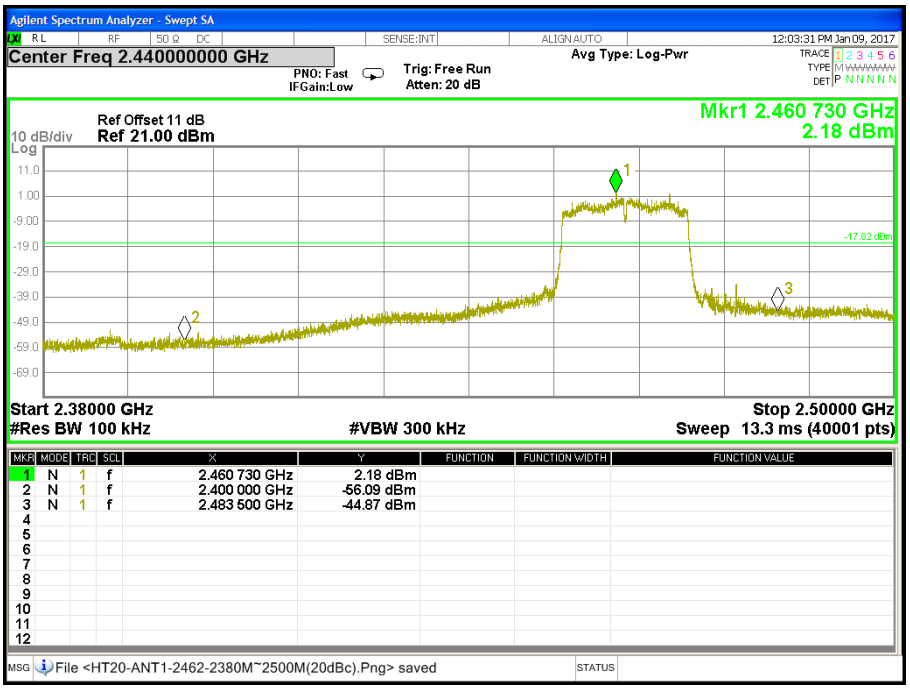
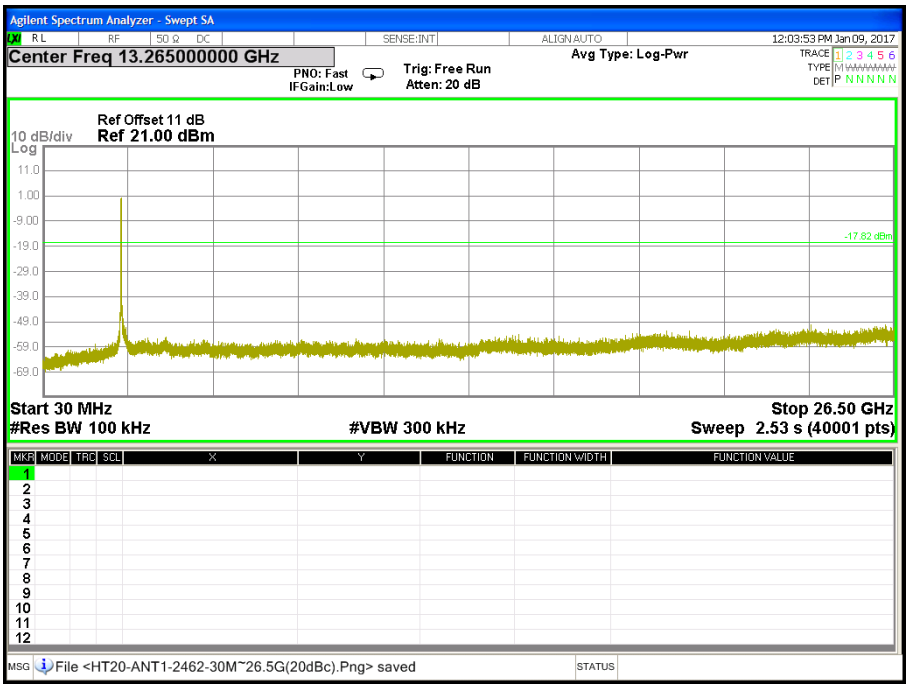
CH High (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



CH High (30MHz ~ 26.5GHz / IEEE 802.11gn HT20 MCS0 Mode / Chain 1)



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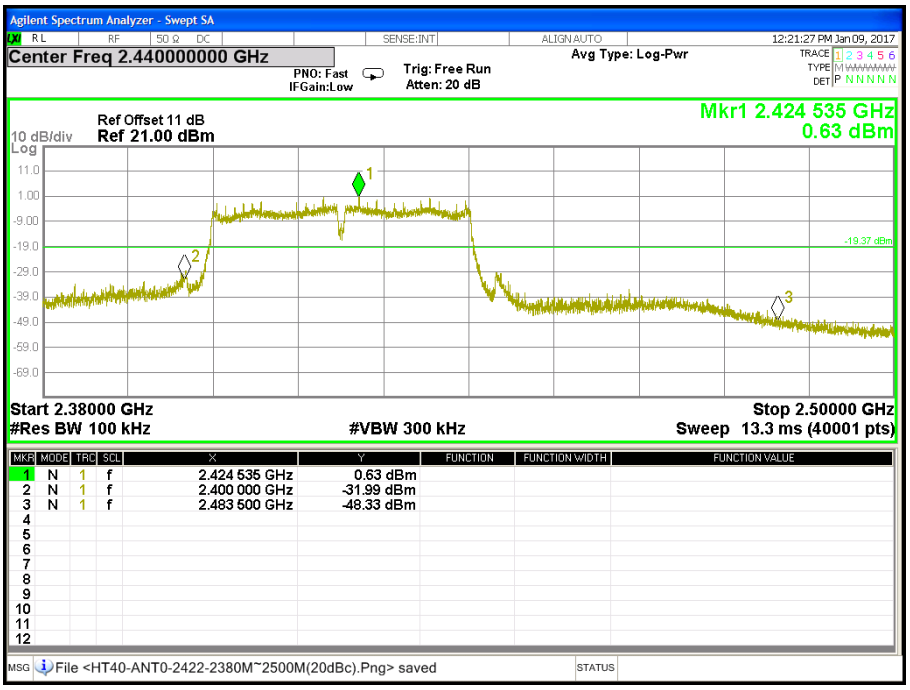
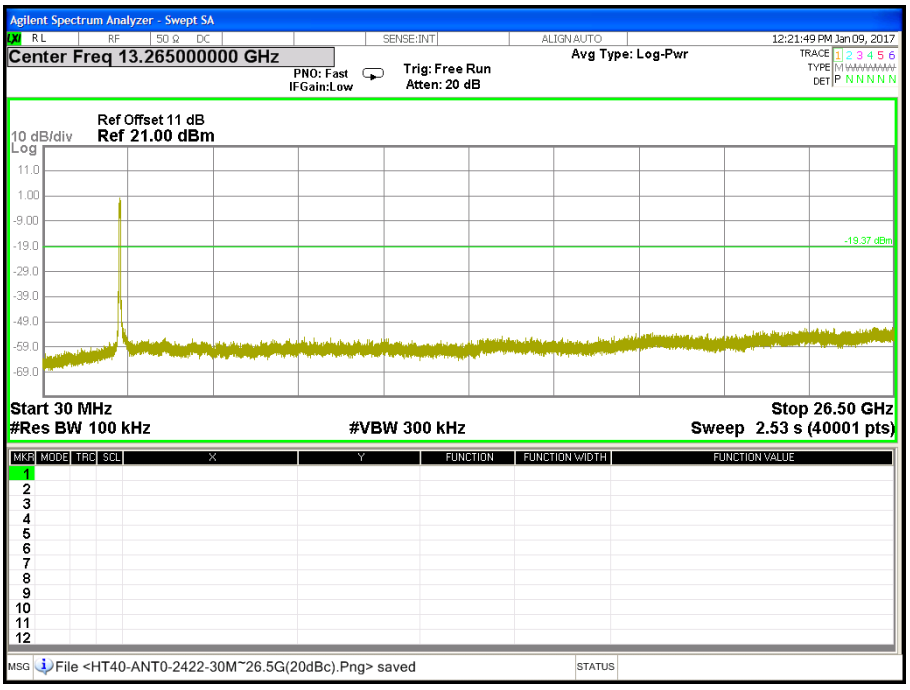
CH Low (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



CH Low (30MHz ~ 26.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



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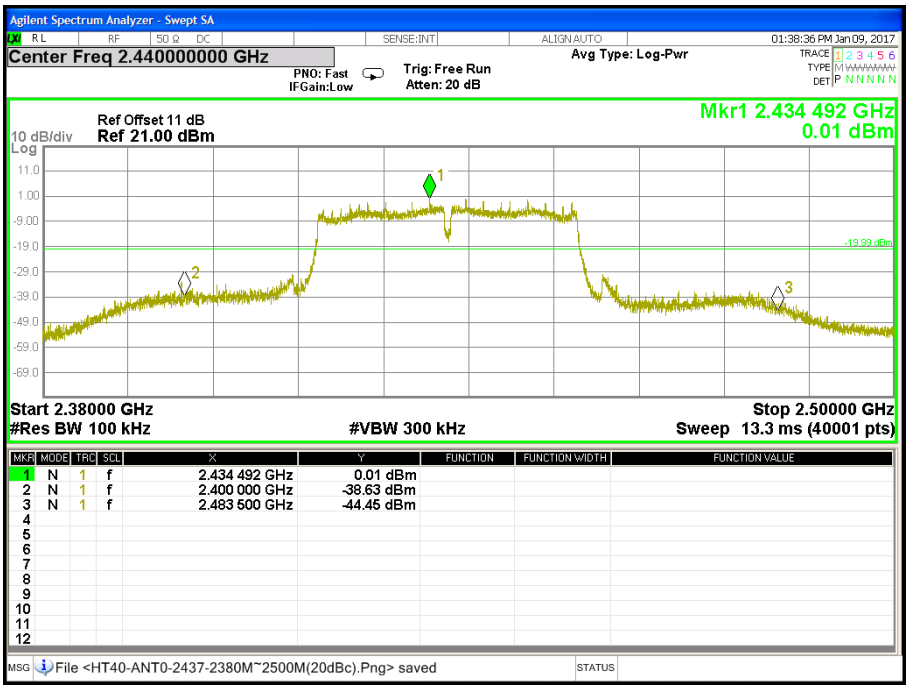
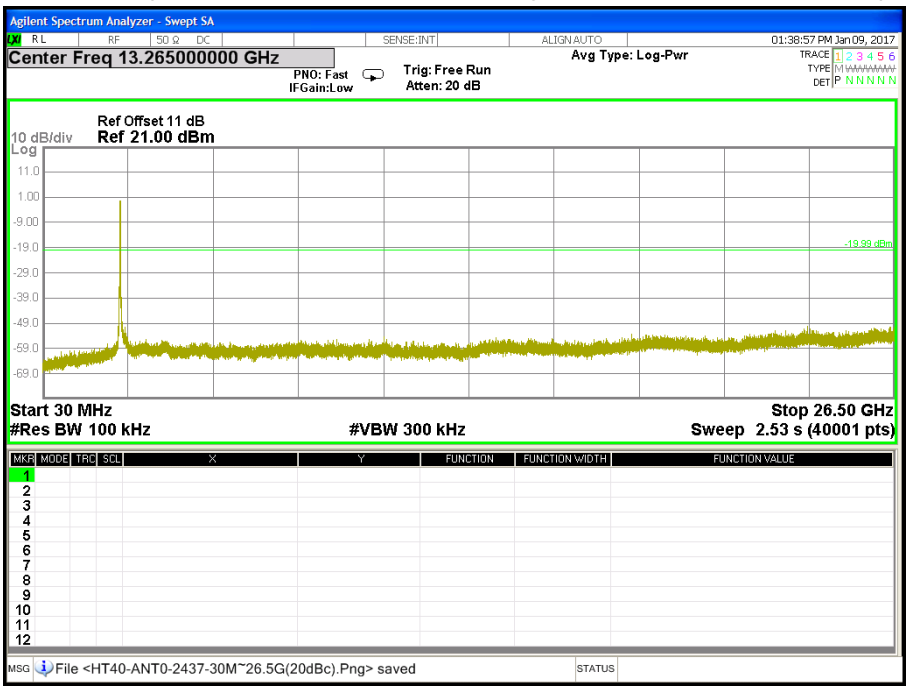
CH Middle (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



CH Middle (30MHz ~ 26.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



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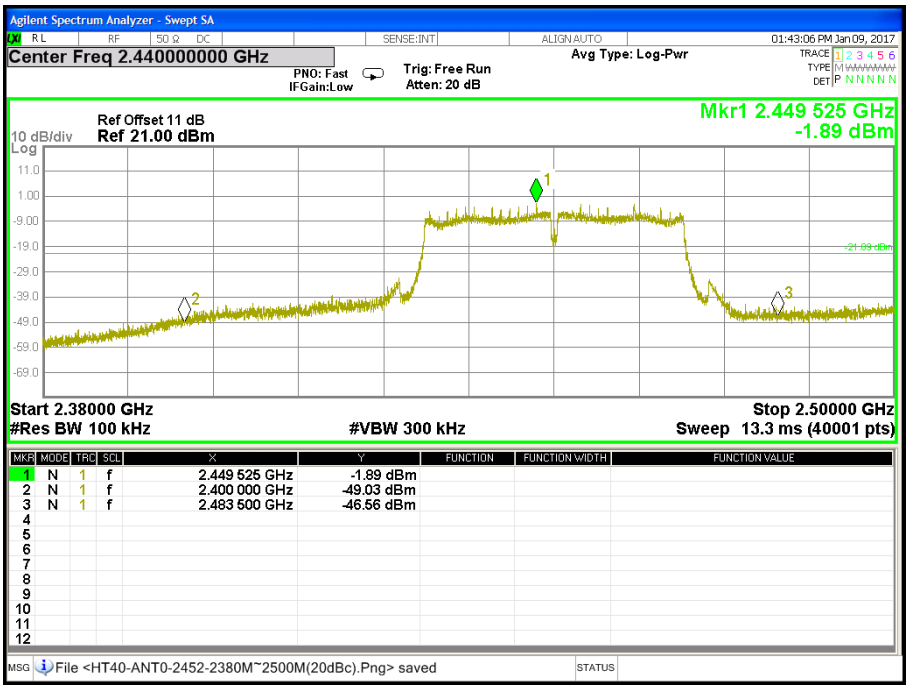
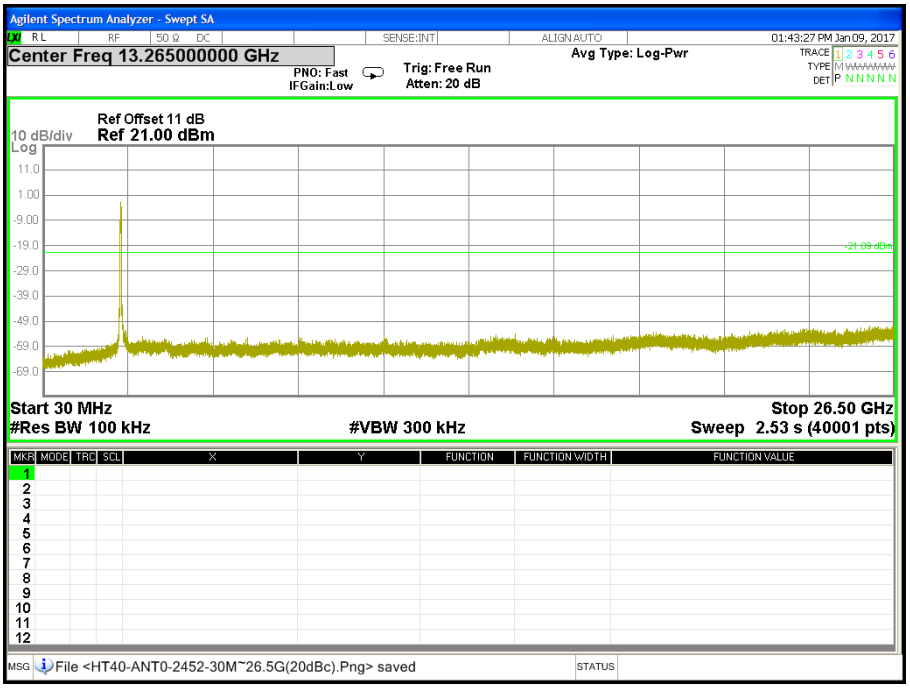
CH High (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



CH High (30MHz ~ 26.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 0)



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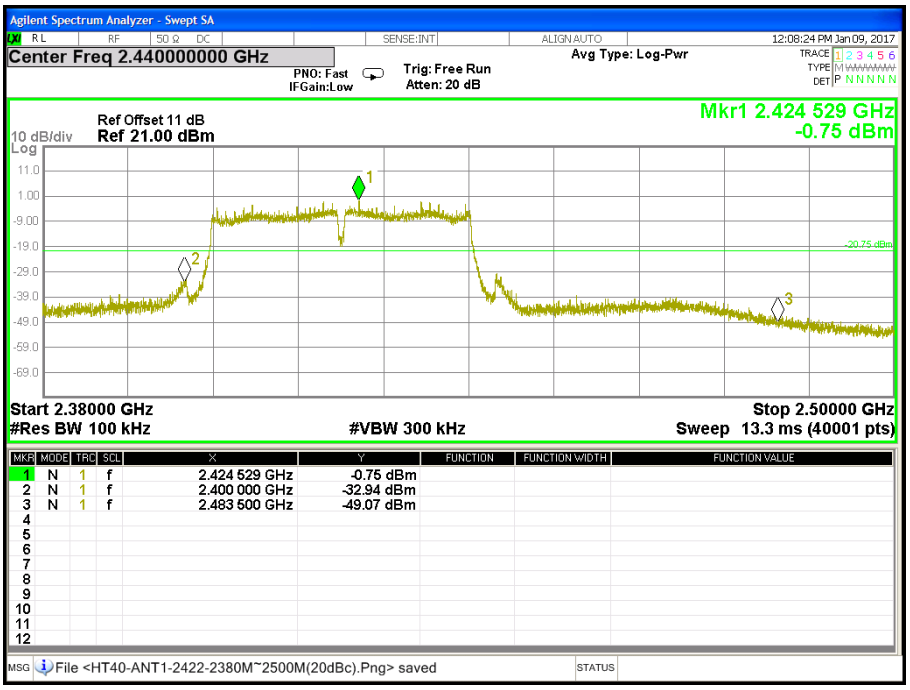
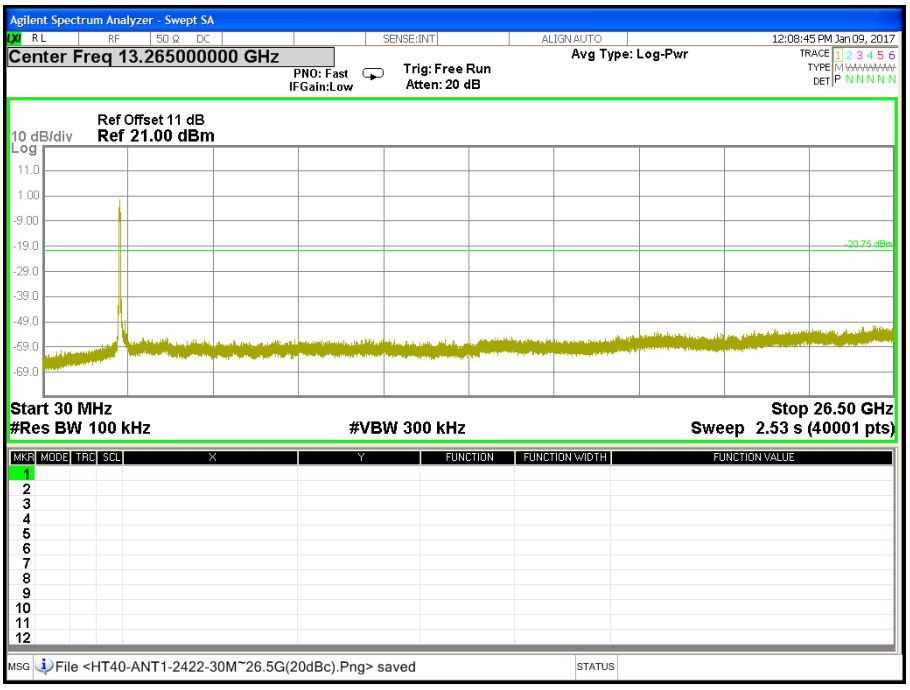
CH Low (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



CH Low (30MHz ~ 26.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



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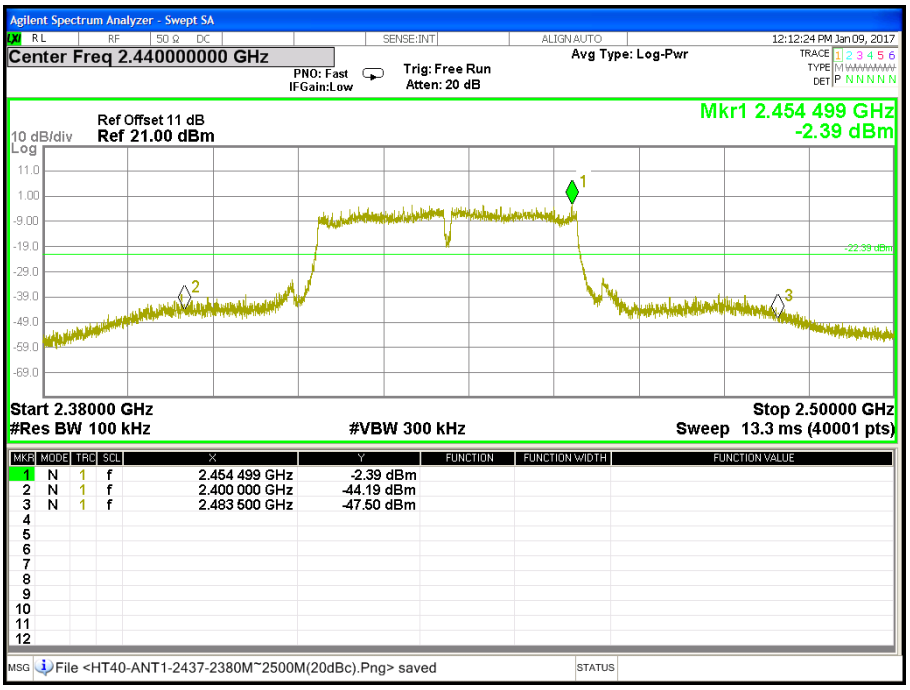
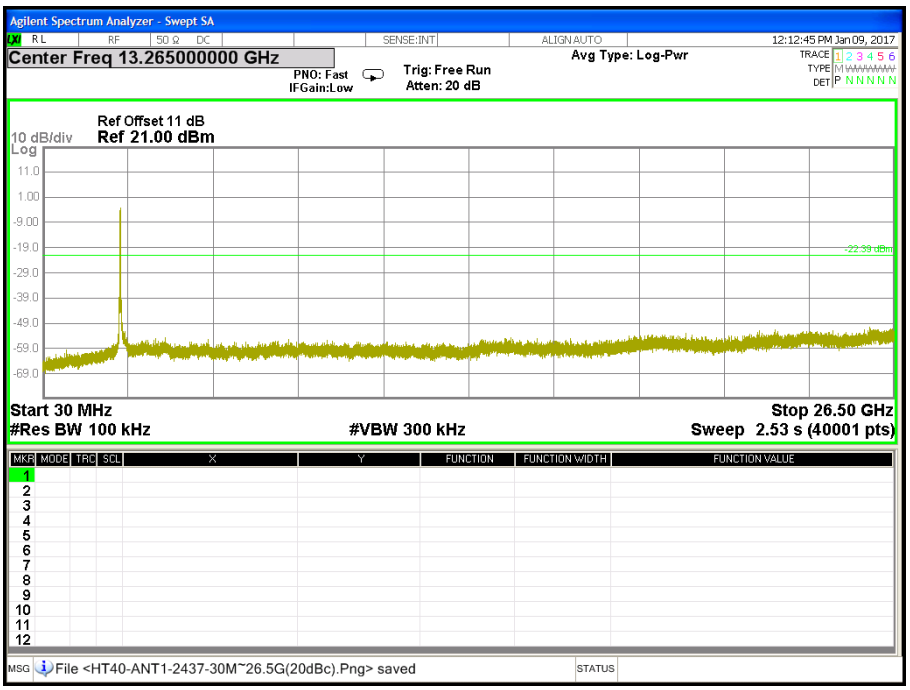
CH Middle (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



CH Middle (30MHz ~ 26.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



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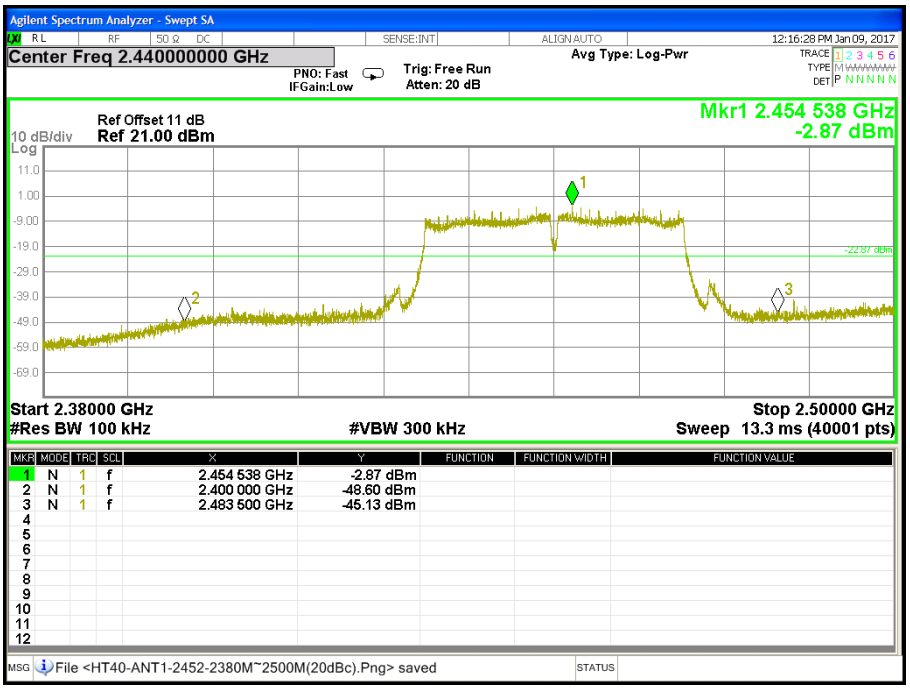
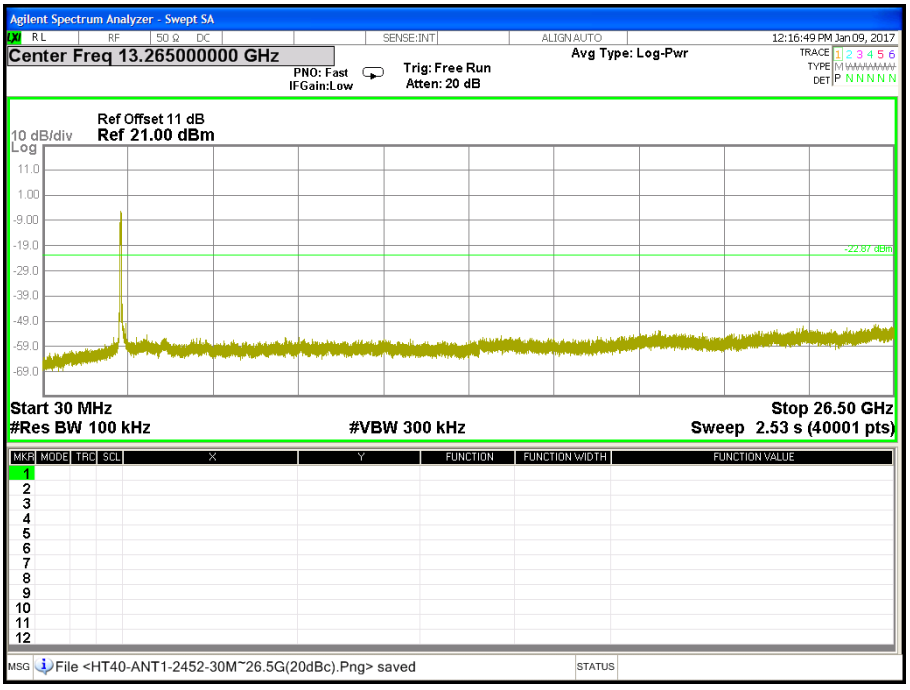
CH High (2.38GHz ~ 2.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



CH High (30MHz ~ 26.5GHz / IEEE 802.11gn HT40 MCS0 Mode / Chain 1)



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7.7 RADIATED EMISSION

LIMITS

(1) According to § 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

Remark:
1. [1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
2. [2] Above 38.6

(2) According to § 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

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(3) According to § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

Remark: ***Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

(4) According to § 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST EQUIPMENT

Radiated Emission / 966Chamber_C

Name of Equipment	Manufacture	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY48250064	04/21/2017
EMI Test Receiver	Rohde & Schwarz	ESCI	101387	10/04/2017
Bi-log Antenna	TESEQ	CBL 6112D	35404	07/22/2017
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-285	04/17/2017
Double-Ridged Waveguide Horn	ETS-LINDGREN	3117	00078732	07/10/2017
Horn Antenna	COM-POWER	AH-840	03077	12/01/2017
Pre-Amplifier	EMCI	EMC001625	980243	04/11/2017
Pre-Amplifier	COM-POWER	PAM-118A	551043	04/11/2017
LOOP Antenna	COM-POWER	AL-130	121060	05/23/2017
Test S/W	E3.815206a			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

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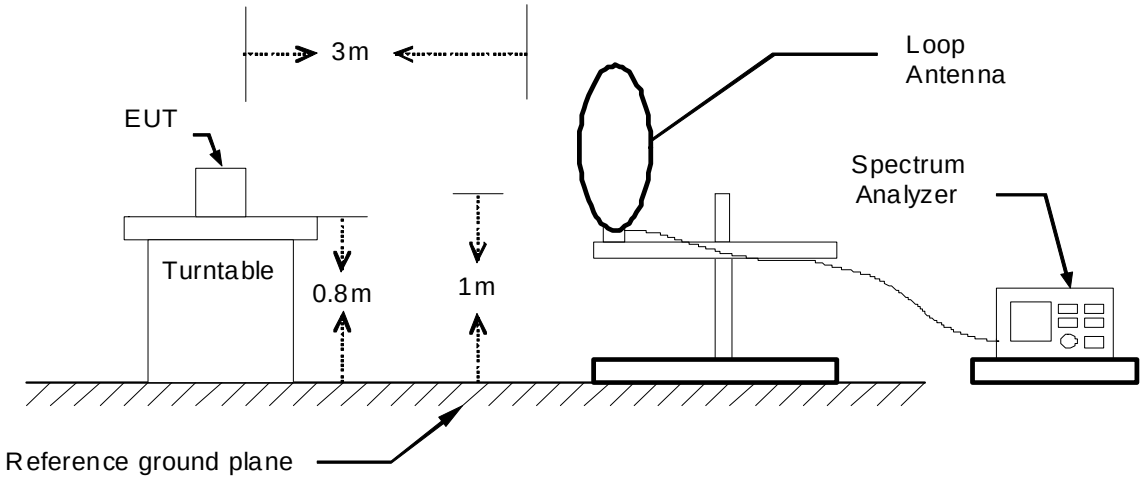
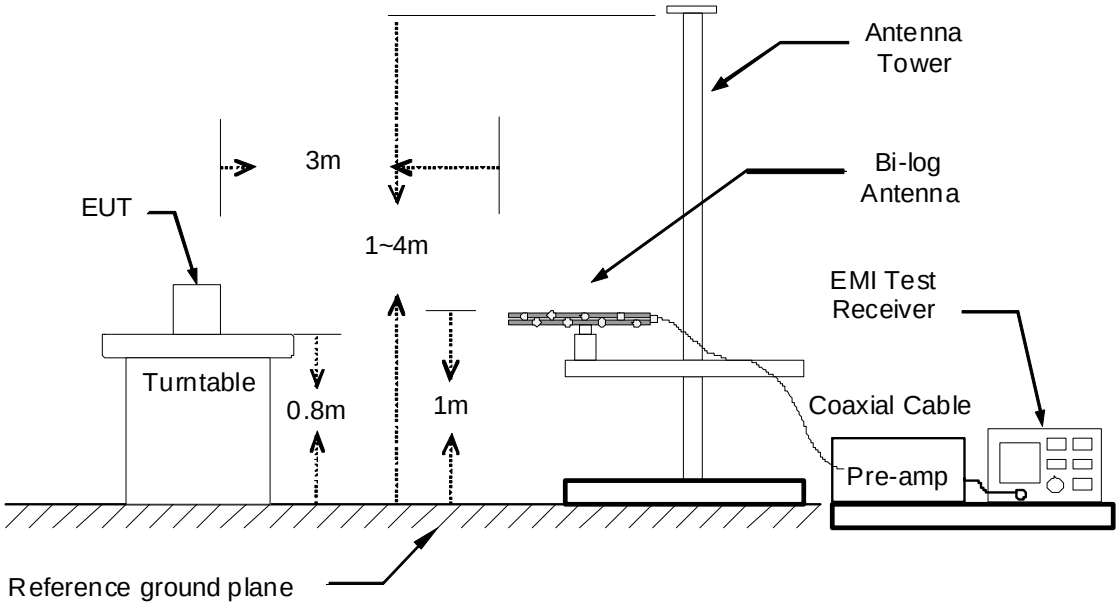
TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission below 1GHz.

9kHz ~ 30MHz



30MHz ~ 1GHz



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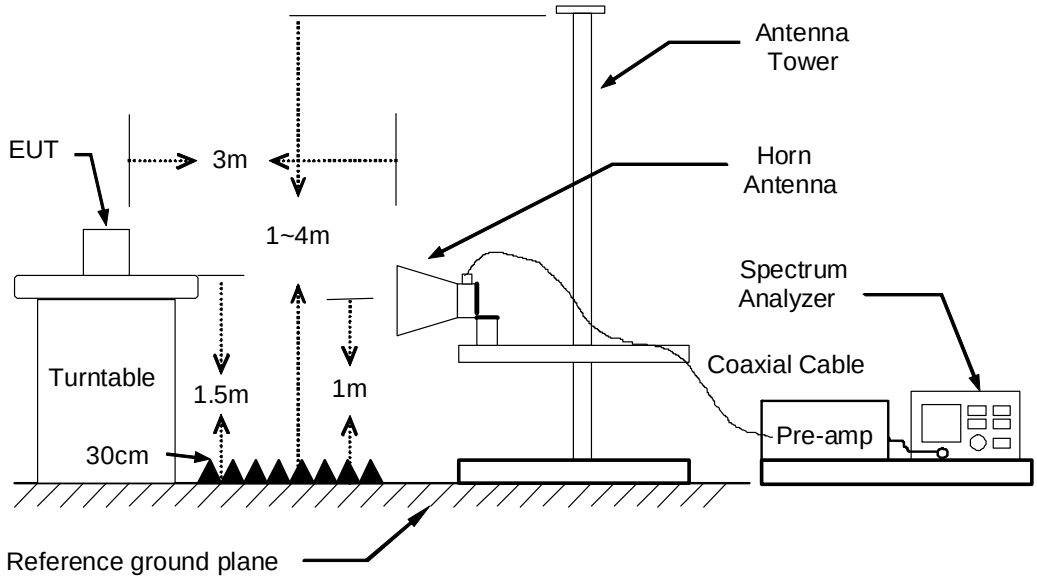
The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



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TEST PROCEDURE

1. The EUT was placed on the top of a rotating table 0.8 and 1.5 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.
2. While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Remark:

1. *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.*
2. *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.*
3. *The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.*

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TEST RESULTS

Below 1 GHz (9kHz ~ 30MHz)

No emission found between lowest internal used/generated frequency to 30MHz.

Below 1 GHz (30MHz ~ 1GHz)

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Jey Li
Test Model	BiPAC 7820NZ	Test Date	2017/01/10
Test Mode	Mode 1	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
125.06	48.60	-13.89	34.71	43.50	-8.79	212	100	Peak
250.19	55.41	-12.84	42.57	46.00	-3.43	192	100	Peak
375.32	47.91	-9.92	37.99	46.00	-8.01	337	100	Peak
500.45	46.56	-7.37	39.19	46.00	-6.81	55	200	Peak
750.71	42.24	-4.50	37.74	46.00	-8.26	220	100	Peak
875.84	39.86	-3.51	36.35	46.00	-9.65	79	100	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
31.94	44.32	-8.39	35.93	40.00	-4.07	214	100	Peak
125.06	53.79	-13.89	39.90	43.50	-3.60	17	100	Peak
250.19	55.60	-12.84	42.76	46.00	-3.24	143	200	QP
375.32	46.41	-9.92	36.49	46.00	-9.51	156	100	Peak
500.45	45.47	-7.37	38.10	46.00	-7.90	133	100	Peak
750.71	38.38	-4.50	33.88	46.00	-12.12	17	100	Peak

Remark:

1. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.*
2. *Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) – PreAmp.Gain (dB)*
3. *Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)*
4. *Margin (dB) = Remark result (dBuV/m) - Quasi-peak limit (dBuV/m).*

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Above 1 GHz

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/04
Test Mode	IEEE 802.11b Mode / TX / CH Low	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2158.00	49.85	-1.44	48.41	74.00	-25.59	241	200	Peak
2498.00	50.56	-0.05	50.51	74.00	-23.49	168	100	Peak
2880.00	42.68	1.16	43.84	54.00	-10.16	282	100	Average
2880.00	50.00	1.16	51.16	74.00	-22.84	282	100	Peak
3471.00	38.82	2.05	40.87	74.00	-33.13	67	200	Peak
4158.00	39.18	3.77	42.95	74.00	-31.05	149	200	Peak
4824.00	41.32	5.74	47.06	74.00	-26.94	295	200	Peak
6156.00	43.20	2.45	45.65	74.00	-28.35	272	100	Peak
6600.00	43.42	3.04	46.46	74.00	-27.54	218	200	Peak
6936.00	44.65	2.83	47.48	74.00	-26.52	338	200	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1832.00	49.74	-2.48	47.26	74.00	-26.74	30	100	Peak
2492.00	44.69	-0.07	44.62	54.00	-9.38	60	200	Average
2492.00	56.82	-0.07	56.75	74.00	-17.25	60	200	Peak
2546.00	43.00	0.11	43.11	54.00	-10.89	70	200	Average
2546.00	55.78	0.11	55.89	74.00	-18.11	70	200	Peak
3216.00	39.91	1.77	41.68	74.00	-32.32	53	200	Peak
4347.00	40.05	4.34	44.39	74.00	-29.61	70	200	Peak
4824.00	45.71	5.74	51.45	54.00	-2.55	358	200	Average
4824.00	46.44	5.74	52.18	74.00	-21.82	358	200	Peak
6456.00	43.70	3.02	46.72	74.00	-27.28	342	100	Peak
6624.00	44.22	3.02	47.24	74.00	-26.76	3	200	Peak
7236.00	50.61	2.96	53.57	54.00	-0.43	127	200	Average
7236.00	51.47	2.96	54.43	74.00	-19.57	127	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/04
Test Mode	IEEE 802.11b Mode / TX / CH Middle	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2386.00	48.74	-0.51	48.23	74.00	-25.77	221	100	Peak
2492.00	49.61	-0.07	49.54	74.00	-24.46	20	200	Peak
2518.00	40.48	0.02	40.50	54.00	-13.50	154	100	Average
2518.00	51.03	0.02	51.05	74.00	-22.95	154	100	Peak
3444.00	38.59	2.02	40.61	74.00	-33.39	316	200	Peak
4188.00	39.44	3.86	43.30	74.00	-30.70	161	200	Peak
4875.00	43.07	5.89	48.96	74.00	-25.04	158	100	Peak
6144.00	43.16	2.43	45.59	74.00	-28.41	57	100	Peak
6720.00	43.80	2.96	46.76	74.00	-27.24	145	200	Peak
7308.00	46.05	3.02	49.07	74.00	-24.93	244	200	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2350.00	50.50	-0.65	49.85	74.00	-24.15	185	200	Peak
2498.00	48.94	-0.05	48.89	54.00	-5.11	84	200	Average
2498.00	51.92	-0.05	51.87	74.00	-22.13	84	200	Peak
2518.00	47.92	0.02	47.94	54.00	-6.06	94	200	Average
2518.00	56.84	0.02	56.86	74.00	-17.14	94	200	Peak
3249.00	39.94	1.81	41.75	74.00	-32.25	37	100	Peak
4137.00	39.48	3.71	43.19	74.00	-30.81	326	200	Peak
4875.00	46.14	5.89	52.03	54.00	-1.97	124	100	Average
4875.00	47.97	5.89	53.86	74.00	-20.14	124	100	Peak
6180.00	43.76	2.50	46.26	74.00	-27.74	57	200	Peak
6516.00	44.06	3.09	47.15	74.00	-26.85	330	200	Peak
7308.00	49.47	3.02	52.49	54.00	-1.51	131	200	Average
7308.00	53.18	3.02	56.20	74.00	-17.80	131	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/04
Test Mode	IEEE 802.11b Mode / TX / CH High	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1776.00	49.41	-2.62	46.79	74.00	-27.21	30	200	Peak
2142.00	49.66	-1.50	48.16	74.00	-25.84	0	200	Peak
2330.00	48.97	-0.73	48.24	74.00	-25.76	98	100	Peak
3390.00	38.36	1.96	40.32	74.00	-33.68	136	200	Peak
3870.00	38.65	2.98	41.63	74.00	-32.37	176	100	Peak
4923.00	44.86	6.03	50.89	74.00	-23.11	295	200	Peak
6132.00	44.32	2.41	46.73	74.00	-27.27	178	200	Peak
6696.00	44.52	2.98	47.50	74.00	-26.50	209	200	Peak
7392.00	46.37	3.08	49.45	74.00	-24.55	133	200	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1734.00	49.05	-2.72	46.33	74.00	-27.67	136	200	Peak
2000.00	50.23	-2.08	48.15	74.00	-25.85	235	100	Peak
2388.00	51.42	-0.50	50.92	74.00	-23.08	349	100	Peak
3189.00	39.72	1.74	41.46	74.00	-32.54	77	200	Peak
3282.00	42.71	1.84	44.55	74.00	-29.45	37	100	Peak
4923.00	47.63	6.03	53.66	54.00	-0.34	44	100	Average
4923.00	49.03	6.03	55.06	74.00	-18.94	44	100	Peak
6036.00	44.41	2.23	46.64	74.00	-27.36	97	100	Peak
6852.00	43.46	2.88	46.34	74.00	-27.66	132	200	Peak
7392.00	50.59	3.08	53.67	54.00	-0.33	106	200	Average
7392.00	53.36	3.08	56.44	74.00	-17.56	106	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/05
Test Mode	IEEE 802.11g Mode / TX / CH Low	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1578.00	49.64	-3.09	46.55	74.00	-27.45	39	200	Peak
2486.00	41.01	-0.10	40.91	54.00	-13.09	153	100	Average
2486.00	52.21	-0.10	52.11	74.00	-21.89	153	100	Peak
2562.00	43.91	0.16	44.07	54.00	-9.93	353	150	Average
2562.00	55.29	0.16	55.45	74.00	-18.55	353	150	Peak
3177.00	39.33	1.73	41.06	74.00	-32.94	62	100	Peak
3669.00	38.70	2.49	41.19	74.00	-32.81	96	100	Peak
4830.00	39.33	5.76	45.09	74.00	-28.91	266	100	Peak
6456.00	43.57	3.02	46.59	74.00	-27.41	90	200	Peak
6720.00	43.56	2.96	46.52	74.00	-27.48	242	200	Peak
7236.00	37.78	2.96	40.74	54.00	-13.26	26	200	Average
7236.00	48.74	2.96	51.70	74.00	-22.30	26	200	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1568.00	49.86	-3.12	46.74	74.00	-27.26	100	150	Peak
2494.00	48.18	-0.06	48.12	54.00	-5.88	85	150	Average
2494.00	58.80	-0.06	58.74	74.00	-15.26	85	150	Peak
2568.00	49.86	0.17	50.03	54.00	-3.97	78	200	Average
2568.00	66.54	0.17	66.71	74.00	-7.29	78	200	Peak
3000.00	40.08	1.54	41.62	74.00	-32.38	145	200	Peak
3216.00	40.50	1.77	42.27	74.00	-31.73	26	200	Peak
4833.00	38.39	5.77	44.16	54.00	-9.84	166	200	Average
4833.00	47.99	5.77	53.76	74.00	-20.24	166	200	Peak
6528.00	43.73	3.08	46.81	74.00	-27.19	287	200	Peak
7236.00	45.78	2.96	48.74	54.00	-5.26	305	200	Average
7236.00	57.47	2.96	60.43	74.00	-13.57	305	200	Peak
7764.00	45.57	3.34	48.91	74.00	-25.09	186	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/05
Test Mode	IEEE 802.11g Mode / TX / CH Middle	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2386.00	44.57	-0.51	44.06	54.00	-9.94	359	200	Average
2386.00	58.14	-0.51	57.63	74.00	-16.37	359	200	Peak
2484.00	46.70	-0.11	46.59	54.00	-7.41	1	200	Average
2484.00	60.08	-0.11	59.97	74.00	-14.03	1	200	Peak
2568.00	46.68	0.17	46.85	54.00	-7.15	358	200	Average
2568.00	70.53	0.17	70.70	74.00	-3.30	358	200	Peak
3393.00	39.21	1.96	41.17	74.00	-32.83	123	100	Peak
4326.00	39.89	4.28	44.17	74.00	-29.83	318	200	Peak
4872.00	43.09	5.88	48.97	74.00	-25.03	134	100	Peak
6516.00	43.53	3.09	46.62	74.00	-27.38	122	100	Peak
6936.00	44.41	2.83	47.24	74.00	-26.76	229	200	Peak
7308.00	39.67	3.02	42.69	54.00	-11.31	308	200	Average
7308.00	49.06	3.02	52.08	74.00	-21.92	308	200	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2390.00	46.84	-0.49	46.35	54.00	-7.65	354	100	Average
2390.00	60.87	-0.49	60.38	74.00	-13.62	354	100	Peak
2484.00	52.66	-0.11	52.55	54.00	-1.45	76	200	Average
2484.00	63.76	-0.11	63.65	74.00	-10.35	76	200	Peak
2570.00	50.57	0.18	50.75	54.00	-3.25	204	100	Average
2570.00	71.71	0.18	71.89	74.00	-2.11	204	100	Peak
3249.00	42.57	1.81	44.38	74.00	-29.62	33	100	Peak
3945.00	39.09	3.16	42.25	74.00	-31.75	312	200	Peak
4875.00	39.48	5.89	45.37	54.00	-8.63	121	200	Average
4875.00	51.08	5.89	56.97	74.00	-17.03	121	200	Peak
6144.00	44.04	2.43	46.47	74.00	-27.53	162	100	Peak
6888.00	43.50	2.86	46.36	74.00	-27.64	360	200	Peak
7308.00	47.85	3.02	50.87	54.00	-3.13	127	200	Average
7308.00	57.39	3.02	60.41	74.00	-13.59	127	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/05
Test Mode	IEEE 802.11g Mode / TX / CH High	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1534.00	50.06	-3.20	46.86	74.00	-27.14	265	200	Peak
2174.00	49.97	-1.37	48.60	74.00	-25.40	50	200	Peak
2354.00	49.70	-0.64	49.06	74.00	-24.94	330	100	Peak
3159.00	39.53	1.71	41.24	74.00	-32.76	298	100	Peak
4230.00	39.58	3.99	43.57	74.00	-30.43	140	100	Peak
4932.00	40.01	6.05	46.06	74.00	-27.94	162	200	Peak
6060.00	44.68	2.27	46.95	74.00	-27.05	184	100	Peak
7392.00	45.02	3.08	48.10	74.00	-25.90	249	200	Peak
7608.00	45.04	3.23	48.27	74.00	-25.73	138	100	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1860.00	49.07	-2.42	46.65	74.00	-27.35	191	150	Peak
2012.00	49.03	-2.03	47.00	74.00	-27.00	323	150	Peak
2388.00	41.31	-0.50	40.81	54.00	-13.19	0	150	Average
2388.00	51.82	-0.50	51.32	74.00	-22.68	0	150	Peak
3282.00	42.46	1.84	44.30	74.00	-29.70	27	200	Peak
3909.00	39.17	3.07	42.24	74.00	-31.76	191	200	Peak
4923.00	43.04	6.03	49.07	74.00	-24.93	119	200	Peak
6576.00	43.86	3.05	46.91	74.00	-27.09	319	100	Peak
7392.00	40.52	3.08	43.60	54.00	-10.40	129	200	Average
7392.00	52.72	3.08	55.80	74.00	-18.20	129	200	Peak
8856.00	45.47	4.25	49.72	74.00	-24.28	103	100	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/05
Test Mode	IEEE 802.11gn HT20 MCS0 Mode / TX / CH Low	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2088.00	49.83	-1.72	48.11	74.00	-25.89	227	200	Peak
2484.00	50.54	-0.11	50.43	74.00	-23.57	189	200	Peak
2562.00	38.00	0.16	38.16	54.00	-15.84	140	200	Average
2562.00	51.14	0.16	51.30	74.00	-22.70	140	200	Peak
3108.00	39.13	1.66	40.79	74.00	-33.21	241	100	Peak
4209.00	39.04	3.93	42.97	74.00	-31.03	273	100	Peak
4824.00	39.38	5.74	45.12	74.00	-28.88	302	200	Peak
6612.00	43.62	3.03	46.65	74.00	-27.35	187	100	Peak
6936.00	44.31	2.83	47.14	74.00	-26.86	269	200	Peak
7236.00	45.85	2.96	48.81	74.00	-25.19	246	200	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1604.00	48.90	-3.03	45.87	74.00	-28.13	296	100	Peak
2486.00	48.41	-0.10	48.31	54.00	-5.69	74	200	Average
2486.00	57.21	-0.10	57.11	74.00	-16.89	74	200	Peak
2538.00	43.72	0.08	43.80	54.00	-10.20	87	200	Average
2538.00	55.47	0.08	55.55	74.00	-18.45	87	200	Peak
3216.00	40.80	1.77	42.57	74.00	-31.43	39	200	Peak
3795.00	38.85	2.79	41.64	74.00	-32.36	188	200	Peak
4824.00	31.40	5.74	37.14	54.00	-16.86	128	200	Average
4824.00	46.08	5.74	51.82	74.00	-22.18	128	200	Peak
6372.00	43.66	2.86	46.52	74.00	-27.48	348	100	Peak
6684.00	43.84	2.99	46.83	74.00	-27.17	64	100	Peak
7236.00	39.03	2.96	41.99	54.00	-12.01	253	200	Average
7236.00	51.30	2.96	54.26	74.00	-19.74	253	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/05
Test Mode	IEEE 802.11gn HT20 MCS0 Mode / TX / CH Middle	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2390.00	44.75	-0.49	44.26	54.00	-9.74	360	200	Average
2390.00	55.09	-0.49	54.60	74.00	-19.40	360	200	Peak
2492.00	43.11	-0.07	43.04	54.00	-10.96	5	150	Average
2492.00	56.54	-0.07	56.47	74.00	-17.53	5	150	Peak
2500.00	42.47	-0.04	42.43	54.00	-11.57	1	200	Average
2500.00	58.09	-0.04	58.05	74.00	-15.95	1	200	Peak
3537.00	38.56	2.17	40.73	74.00	-33.27	46	200	Peak
4389.00	39.45	4.47	43.92	74.00	-30.08	359	100	Peak
4869.00	41.51	5.87	47.38	74.00	-26.62	298	200	Peak
6060.00	44.11	2.27	46.38	74.00	-27.62	360	100	Peak
6696.00	43.29	2.98	46.27	74.00	-27.73	195	100	Peak
7308.00	39.71	3.02	42.73	54.00	-11.27	292	200	Average
7308.00	49.54	3.02	52.56	74.00	-21.44	292	200	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2390.00	48.60	-0.49	48.11	54.00	-5.89	92	150	Average
2390.00	61.73	-0.49	61.24	74.00	-12.76	92	150	Peak
2484.00	52.95	-0.11	52.84	54.00	-1.16	71	200	Average
2484.00	64.85	-0.11	64.74	74.00	-9.26	71	200	Peak
2560.00	47.65	0.15	47.80	54.00	-6.20	138	100	Average
2560.00	64.00	0.15	64.15	74.00	-9.85	138	100	Peak
3249.00	43.24	1.81	45.05	74.00	-28.95	33	200	Peak
3936.00	38.68	3.14	41.82	74.00	-32.18	186	100	Peak
4878.00	39.15	5.90	45.05	54.00	-8.95	296	200	Average
4878.00	48.60	5.90	54.50	74.00	-19.50	296	200	Peak
6444.00	43.17	2.99	46.16	74.00	-27.84	108	100	Peak
6708.00	44.00	2.97	46.97	74.00	-27.03	188	100	Peak
7308.00	46.06	3.02	49.08	54.00	-4.92	105	200	Average
7308.00	55.61	3.02	58.63	74.00	-15.37	105	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/05
Test Mode	IEEE 802.11gn HT20 MCS0 Mode / TX / CH High	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1416.00	49.64	-3.49	46.15	74.00	-27.85	259	100	Peak
1810.00	49.34	-2.54	46.80	74.00	-27.20	199	100	Peak
2312.00	49.43	-0.81	48.62	74.00	-25.38	220	150	Peak
3984.00	39.11	3.25	42.36	74.00	-31.64	310	100	Peak
4929.00	38.94	6.05	44.99	74.00	-29.01	152	100	Peak
5040.00	39.61	6.32	45.93	74.00	-28.07	91	200	Peak
6132.00	44.02	2.41	46.43	74.00	-27.57	312	200	Peak
7392.00	44.40	3.08	47.48	74.00	-26.52	133	200	Peak
7740.00	44.56	3.32	47.88	74.00	-26.12	84	200	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1418.00	49.55	-3.48	46.07	74.00	-27.93	215	150	Peak
1646.00	49.46	-2.93	46.53	74.00	-27.47	315	100	Peak
2388.00	43.04	-0.50	42.54	54.00	-11.46	189	150	Average
2388.00	52.92	-0.50	52.42	74.00	-21.58	189	150	Peak
3282.00	44.55	1.84	46.39	74.00	-27.61	30	200	Peak
3855.00	38.84	2.94	41.78	74.00	-32.22	310	100	Peak
4923.00	42.94	6.03	48.97	74.00	-25.03	75	100	Peak
6564.00	43.11	3.06	46.17	74.00	-27.83	237	200	Peak
6708.00	43.83	2.97	46.80	74.00	-27.20	254	200	Peak
7380.00	37.68	3.07	40.75	54.00	-13.25	78	200	Average
7380.00	51.05	3.07	54.12	74.00	-19.88	78	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/05
Test Mode	IEEE 802.11gn HT40 MCS0 Mode / TX / CH Low	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1348.00	50.04	-3.66	46.38	74.00	-27.62	36	200	Peak
2486.00	50.32	-0.10	50.22	74.00	-23.78	340	200	Peak
2562.00	50.80	0.16	50.96	74.00	-23.04	351	200	Peak
3486.00	39.24	2.06	41.30	74.00	-32.70	94	100	Peak
4140.00	39.43	3.72	43.15	74.00	-30.85	347	200	Peak
4977.00	39.21	6.18	45.39	74.00	-28.61	204	100	Peak
7740.00	44.98	3.32	48.30	74.00	-25.70	176	100	Peak
8436.00	43.13	4.11	47.24	74.00	-26.76	120	200	Peak
9372.00	45.19	4.60	49.79	74.00	-24.21	129	100	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1620.00	49.38	-2.99	46.39	74.00	-27.61	133	100	Peak
2490.00	44.74	-0.08	44.66	54.00	-9.34	79	200	Average
2490.00	57.50	-0.08	57.42	74.00	-16.58	79	200	Peak
2582.00	48.08	0.22	48.30	54.00	-5.70	99	100	Average
2582.00	55.64	0.22	55.86	74.00	-18.14	99	100	Peak
3228.00	39.71	1.79	41.50	74.00	-32.50	172	100	Peak
3894.00	38.55	3.03	41.58	74.00	-32.42	238	100	Peak
4578.00	38.98	5.03	44.01	74.00	-29.99	100	100	Peak
6624.00	44.01	3.02	47.03	74.00	-26.97	242	200	Peak
7776.00	44.30	3.35	47.65	74.00	-26.35	183	200	Peak
9324.00	44.87	4.56	49.43	74.00	-24.57	55	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/05
Test Mode	IEEE 802.11gn HT40 MCS0 Mode / TX / CH Middle	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2390.00	44.07	-0.49	43.58	54.00	-10.42	24	100	Average
2390.00	60.25	-0.49	59.76	74.00	-14.24	24	100	Peak
2484.00	42.15	-0.11	42.04	54.00	-11.96	208	100	Average
2484.00	58.00	-0.11	57.89	74.00	-16.11	208	100	Peak
2500.00	39.76	-0.04	39.72	54.00	-14.28	1	200	Average
2500.00	51.53	-0.04	51.49	74.00	-22.51	1	200	Peak
3822.00	38.30	2.86	41.16	74.00	-32.84	140	200	Peak
4293.00	38.50	4.18	42.68	74.00	-31.32	316	100	Peak
4587.00	39.37	5.06	44.43	74.00	-29.57	292	100	Peak
6528.00	43.74	3.08	46.82	74.00	-27.18	301	200	Peak
7572.00	44.42	3.21	47.63	74.00	-26.37	325	200	Peak
8172.00	44.46	3.74	48.20	74.00	-25.80	126	200	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2390.00	51.07	-0.49	50.58	54.00	-3.42	340	100	Average
2390.00	62.64	-0.49	62.15	74.00	-11.85	340	100	Peak
2484.00	53.50	-0.11	53.39	54.00	-0.61	118	100	Average
2484.00	65.47	-0.11	65.36	74.00	-8.64	118	100	Peak
2500.00	44.43	-0.04	44.39	54.00	-9.61	318	200	Average
2500.00	58.01	-0.04	57.97	74.00	-16.03	318	200	Peak
3249.00	40.24	1.81	42.05	74.00	-31.95	35	200	Peak
4320.00	38.65	4.26	42.91	74.00	-31.09	296	100	Peak
4866.00	38.68	5.86	44.54	74.00	-29.46	39	200	Peak
6564.00	43.82	3.06	46.88	74.00	-27.12	289	200	Peak
7380.00	44.20	3.07	47.27	74.00	-26.73	103	200	Peak
8136.00	43.86	3.69	47.55	74.00	-26.45	219	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Allen Liu
Test Model	BiPAC 7820NZ	Test Date	2017/01/05
Test Mode	IEEE 802.11gn HT40 MCS0 Mode / TX / CH High	Temp. & Humidity	17°C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1270.00	48.30	-3.85	44.45	74.00	-29.55	7	200	Peak
1662.00	49.29	-2.89	46.40	74.00	-27.60	298	100	Peak
2330.00	49.08	-0.73	48.35	74.00	-25.65	254	100	Peak
3948.00	40.12	3.16	43.28	74.00	-30.72	234	100	Peak
4602.00	38.09	5.10	43.19	74.00	-30.81	112	200	Peak
5160.00	40.18	6.54	46.72	74.00	-27.28	169	100	Peak
6492.00	43.12	3.08	46.20	74.00	-27.80	351	200	Peak
6672.00	44.11	2.99	47.10	74.00	-26.90	175	100	Peak
7452.00	44.62	3.12	47.74	74.00	-26.26	150	100	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1416.00	48.70	-3.49	45.21	74.00	-28.79	152	100	Peak
1650.00	49.72	-2.92	46.80	74.00	-27.20	353	100	Peak
2390.00	41.37	-0.49	40.88	54.00	-13.12	99	100	Average
2390.00	51.75	-0.49	51.26	74.00	-22.74	99	100	Peak
3270.00	41.21	1.83	43.04	74.00	-30.96	41	200	Peak
4062.00	39.02	3.48	42.50	74.00	-31.50	222	100	Peak
4599.00	39.52	5.10	44.62	74.00	-29.38	254	100	Peak
6696.00	44.38	2.98	47.36	74.00	-26.64	141	100	Peak
7392.00	44.25	3.08	47.33	74.00	-26.67	312	200	Peak
8424.00	44.01	4.09	48.10	74.00	-25.90	263	200	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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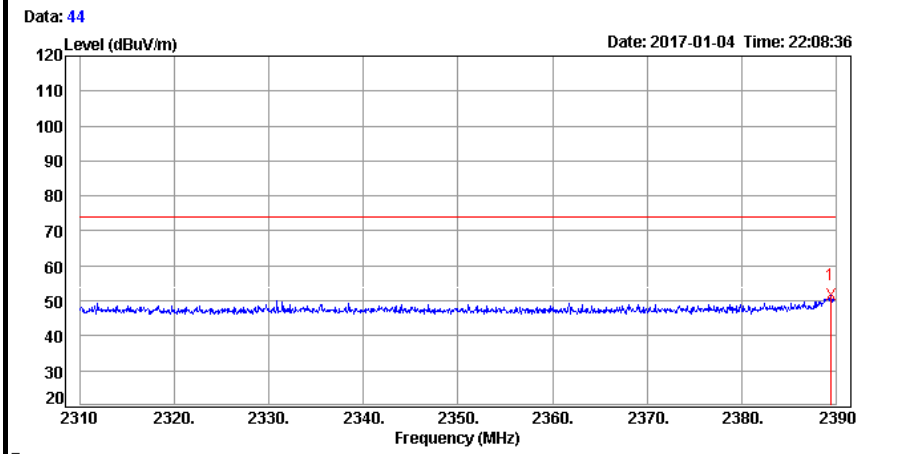
Restricted Band Edges

Detector Mode: Peak **Polarity: Horizontal**

CH Low (IEEE 802.11b Mode)



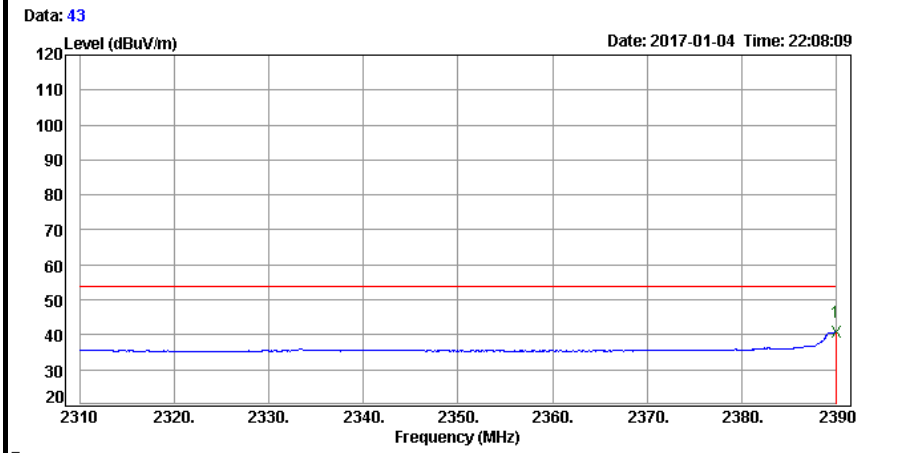
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2389.44	52.24	-0.49	51.75	74.00	-22.25			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Horizontal**

CH Low (IEEE 802.11b Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2390.00	41.32	-0.49	40.83	54.00	-13.17			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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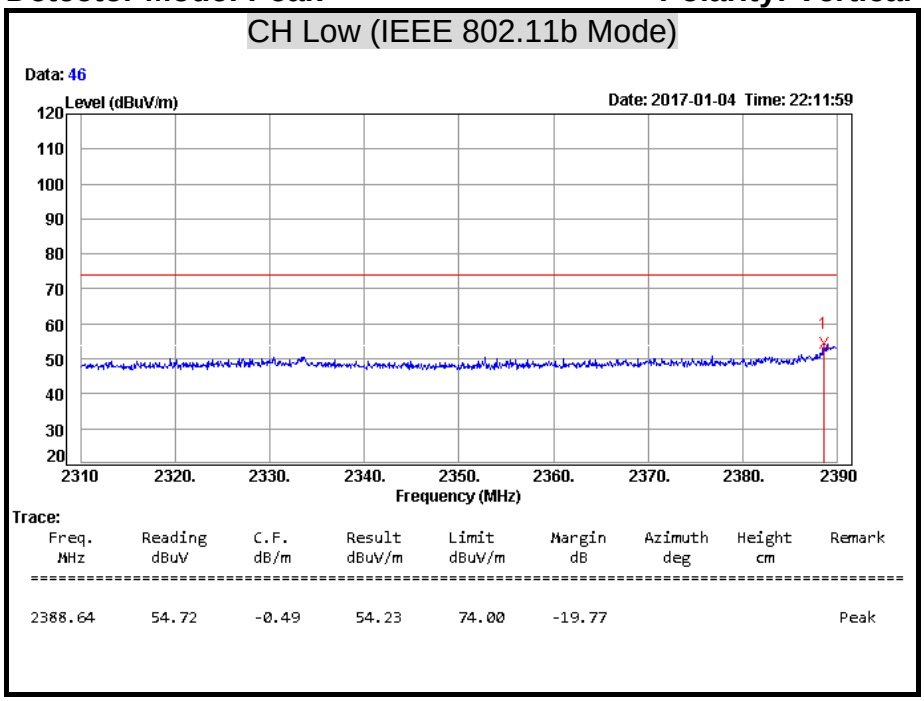
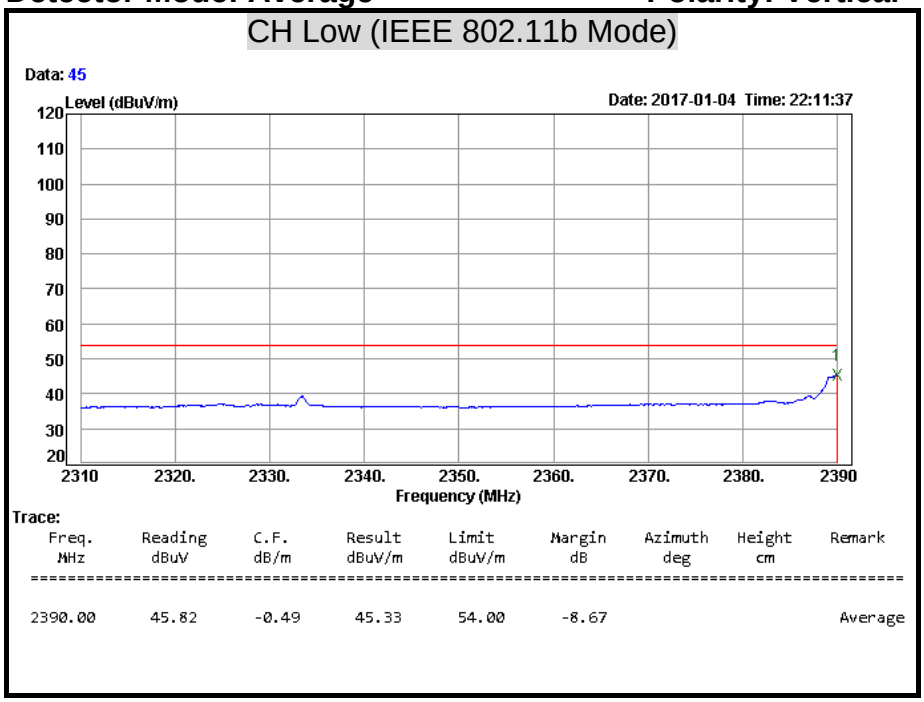
Detector Mode: Peak **Polarity: Vertical**



Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Vertical**



Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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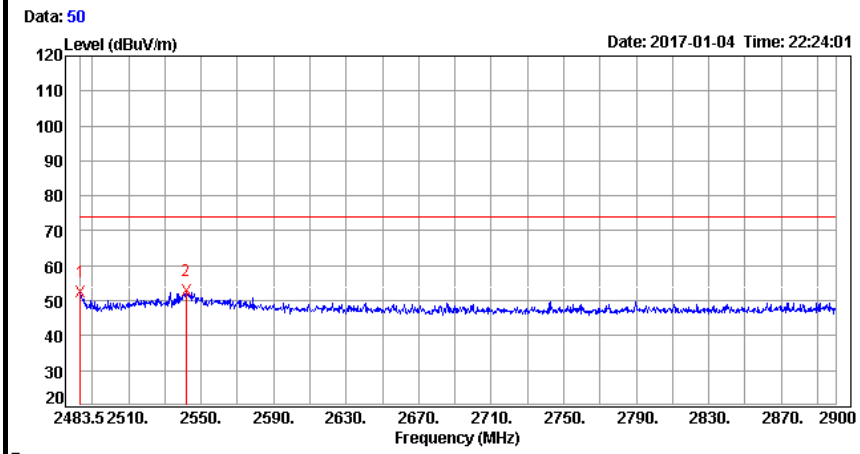
Detector Mode: Peak **Polarity: Horizontal**

CH High (IEEE 802.11b Mode)



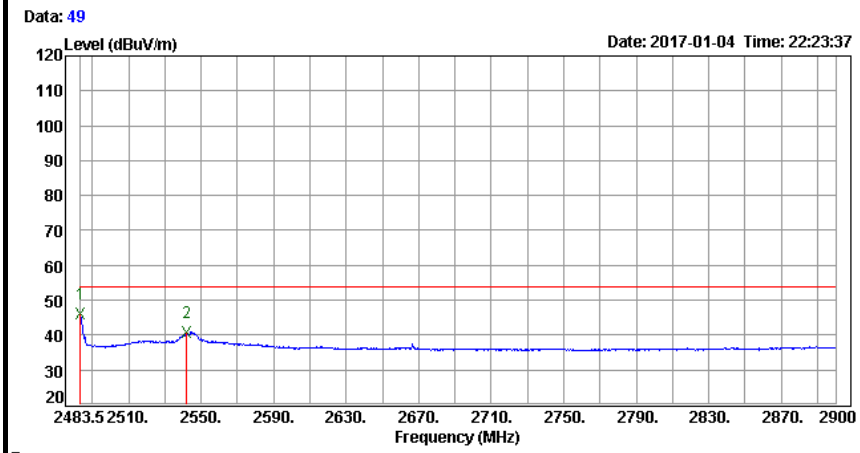
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2483.50	52.61	-0.11	52.50	74.00	-21.50			Peak
2541.81	52.96	0.09	53.05	74.00	-20.95			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Horizontal**

CH High (IEEE 802.11b Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2483.50	46.30	-0.11	46.19	54.00	-7.81			Average
2542.23	40.77	0.09	40.86	54.00	-13.14			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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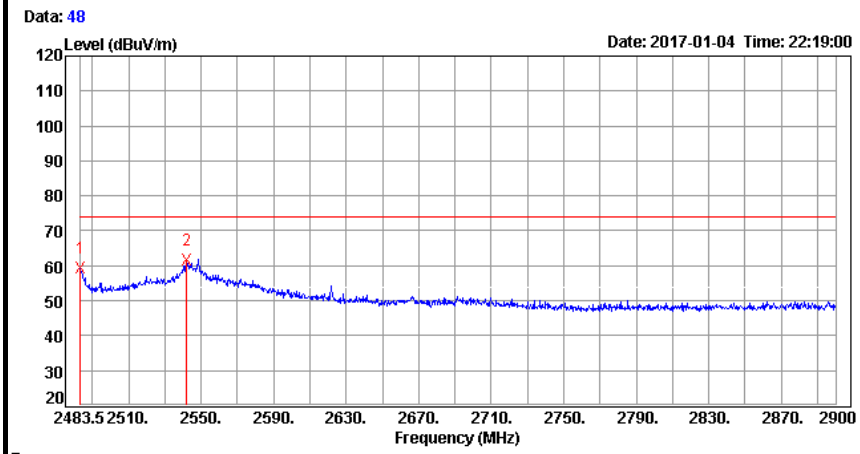
Detector Mode: Peak **Polarity: Vertical**

CH High (IEEE 802.11b Mode)



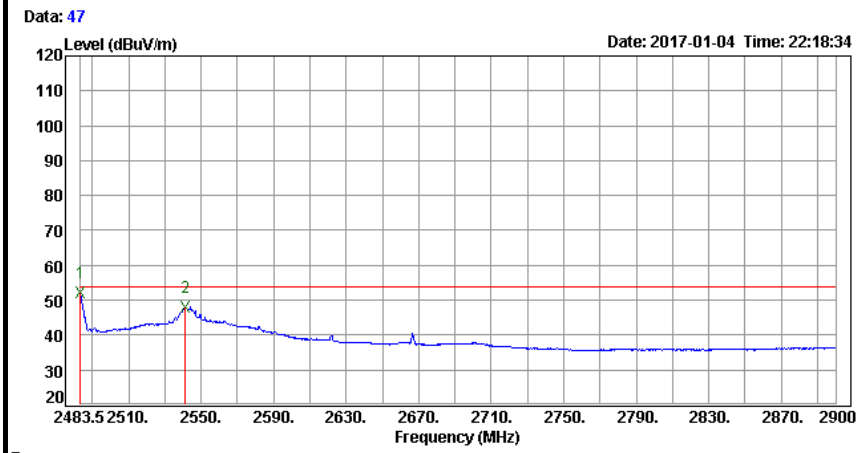
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2483.50	59.43	-0.11	59.32	74.00	-14.68			Peak
2542.23	61.61	0.09	61.70	74.00	-12.30			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Vertical**

CH High (IEEE 802.11b Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2483.50	52.27	-0.11	52.16	54.00	-1.84			Average
2541.39	47.98	0.09	48.07	54.00	-5.93			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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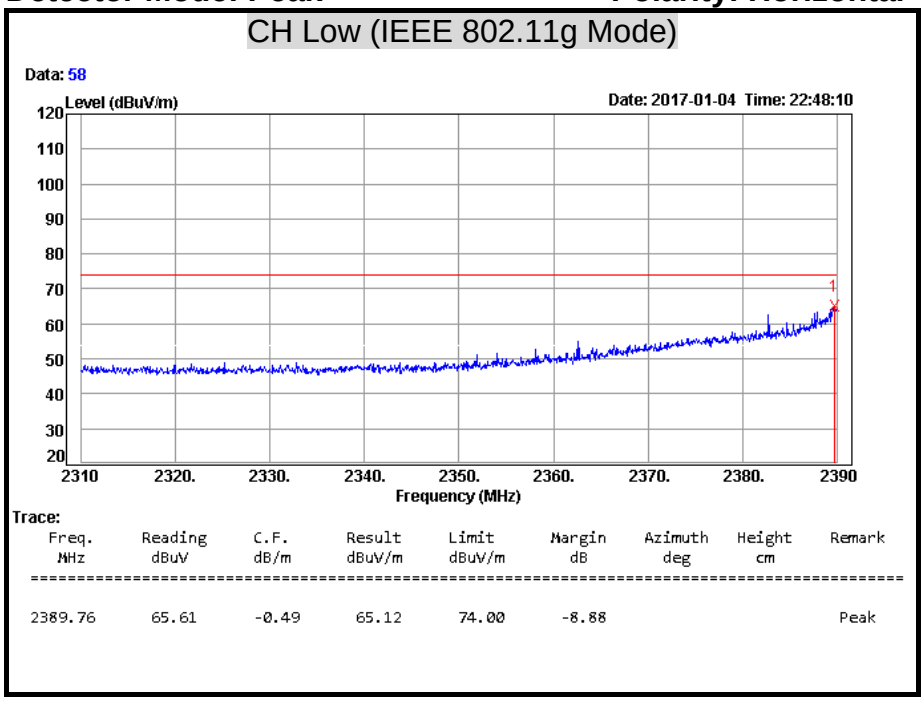
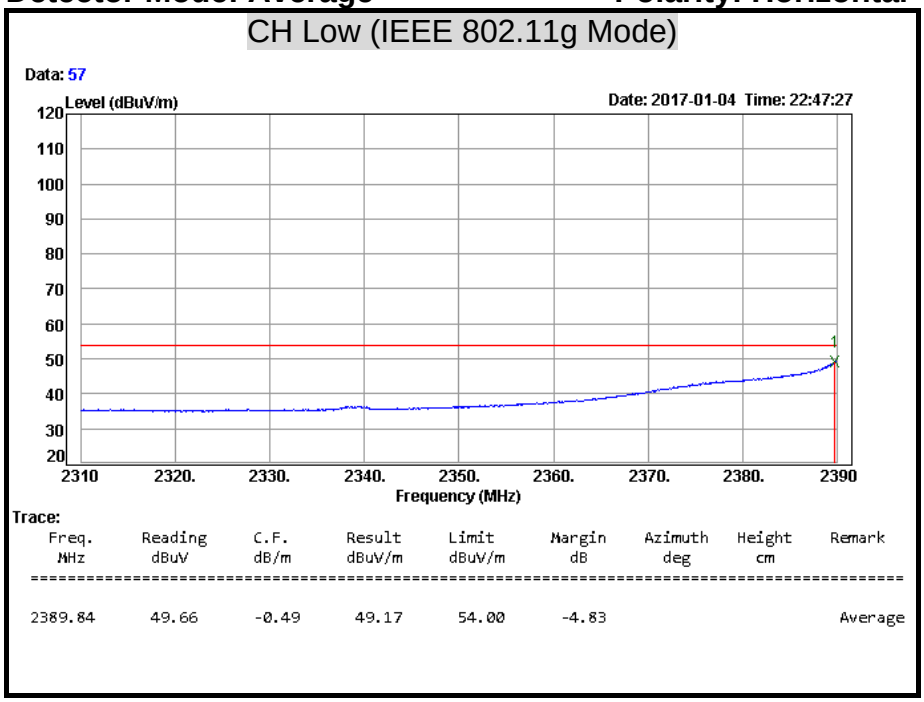
Detector Mode: Peak **Polarity: Horizontal**



Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Horizontal**



Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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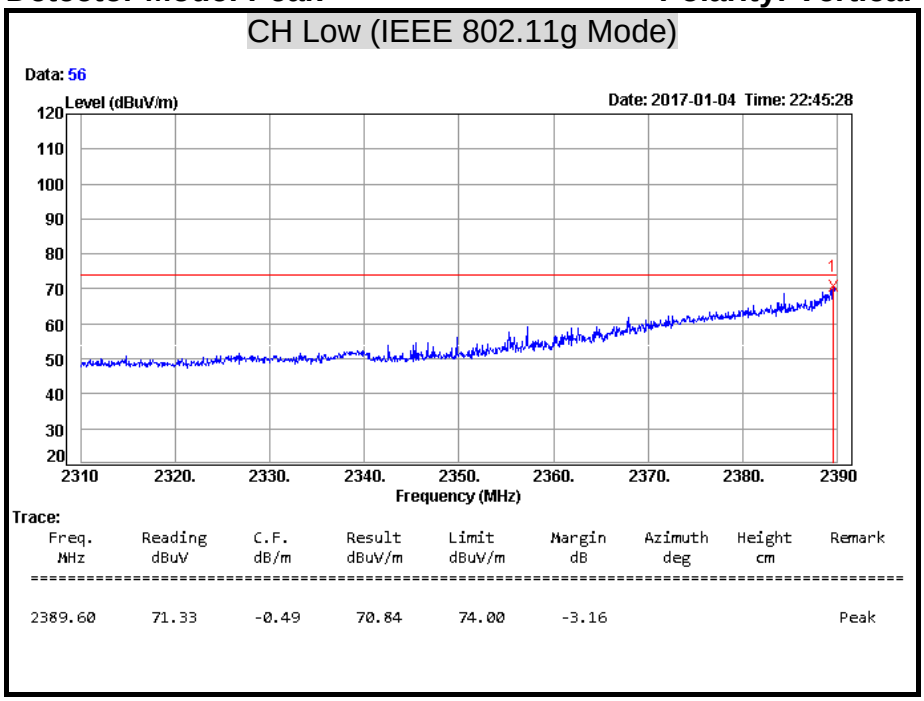
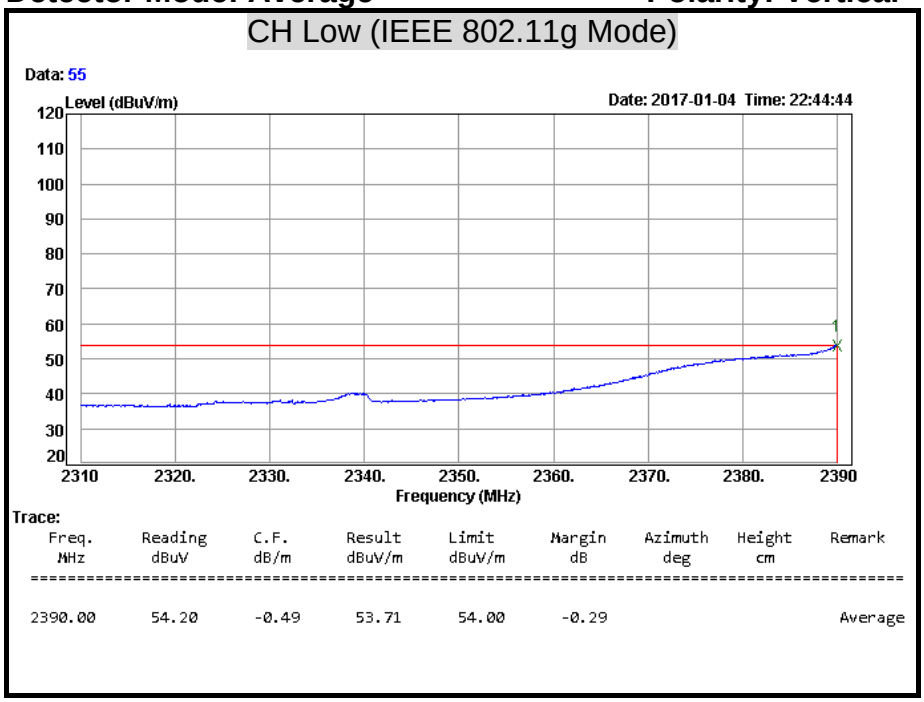
Detector Mode: Peak **Polarity: Vertical**



Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Vertical**



Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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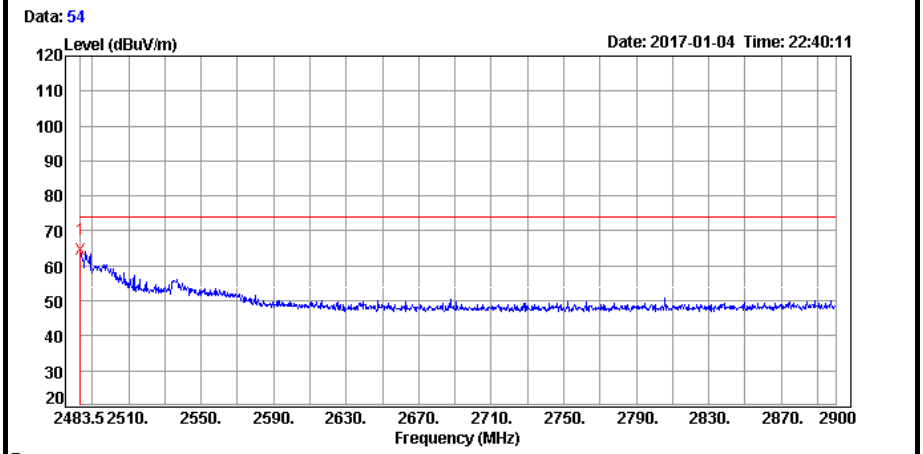
Detector Mode: Peak **Polarity: Horizontal**

CH High (IEEE 802.11g Mode)



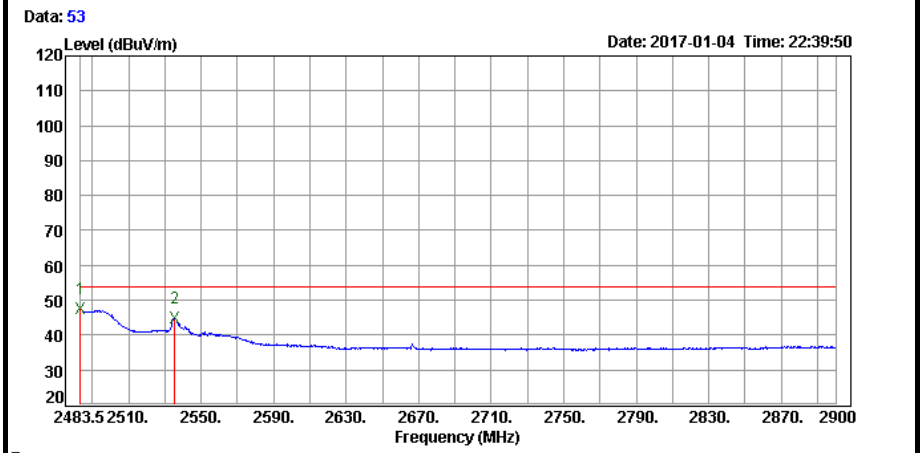
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2483.50	64.85	-0.11	64.74	74.00	-9.26			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Horizontal**

CH High (IEEE 802.11g Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2483.50	47.70	-0.11	47.59	54.00	-6.41			Average
2535.56	44.74	0.07	44.81	54.00	-9.19			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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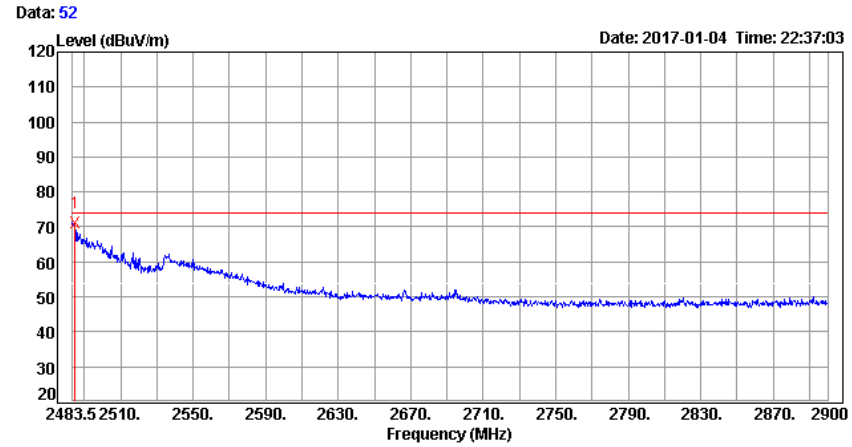
Detector Mode: Peak **Polarity: Vertical**

CH High (IEEE 802.11g Mode)



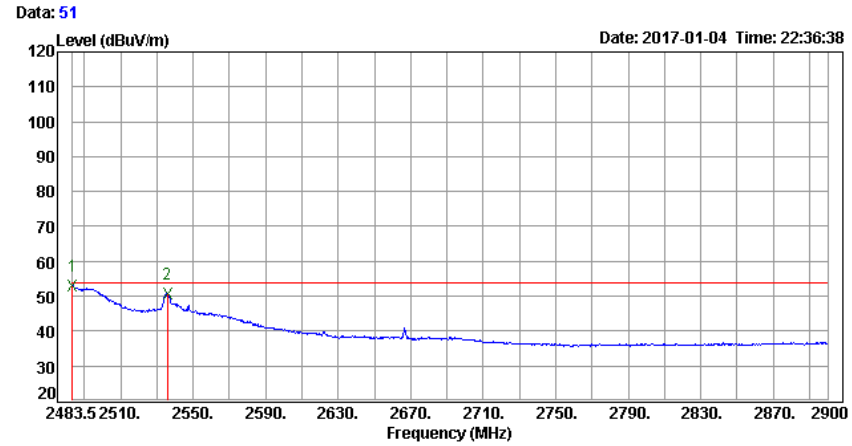
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2484.75	71.33	-0.10	71.23	74.00	-2.77			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Vertical**

CH High (IEEE 802.11g Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2483.50	53.15	-0.11	53.04	54.00	-0.96			Average
2535.98	50.61	0.07	50.68	54.00	-3.32			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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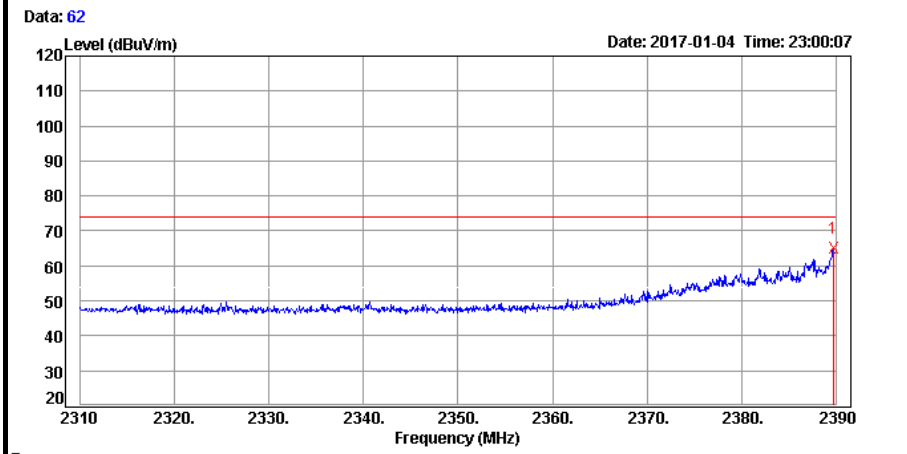
Detector Mode: Peak **Polarity: Horizontal**

CH Low (IEEE 802.11gn HT20 MCS0 Mode)



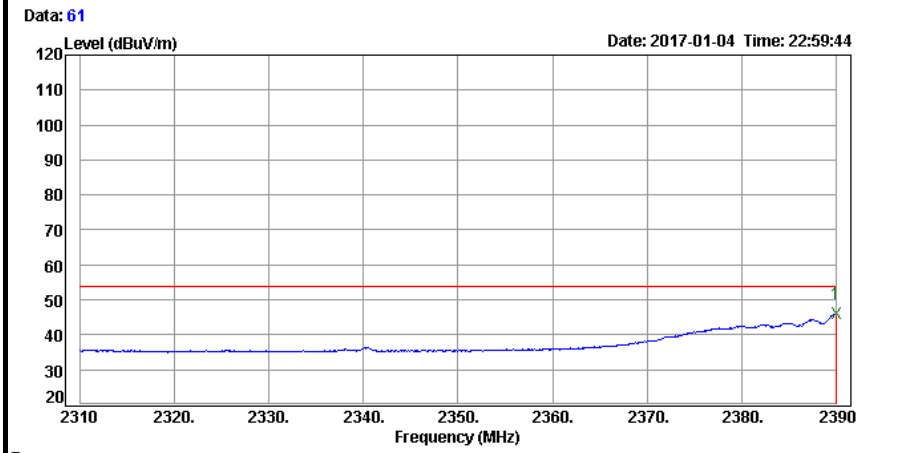
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2389.76	65.62	-0.49	65.13	74.00	-8.87			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Horizontal**

CH Low (IEEE 802.11gn HT20 MCS0 Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2390.00	46.52	-0.49	46.03	54.00	-7.97			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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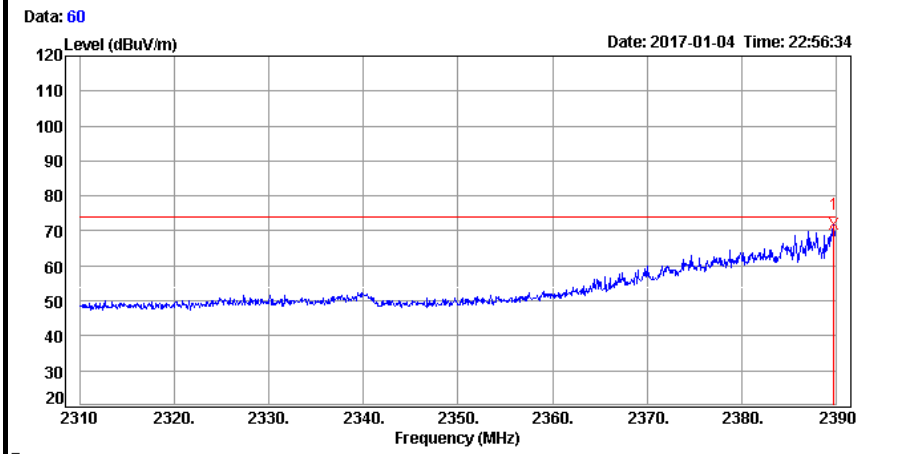
Detector Mode: Peak **Polarity: Vertical**

CH Low (IEEE 802.11gn HT20 MCS0 Mode)



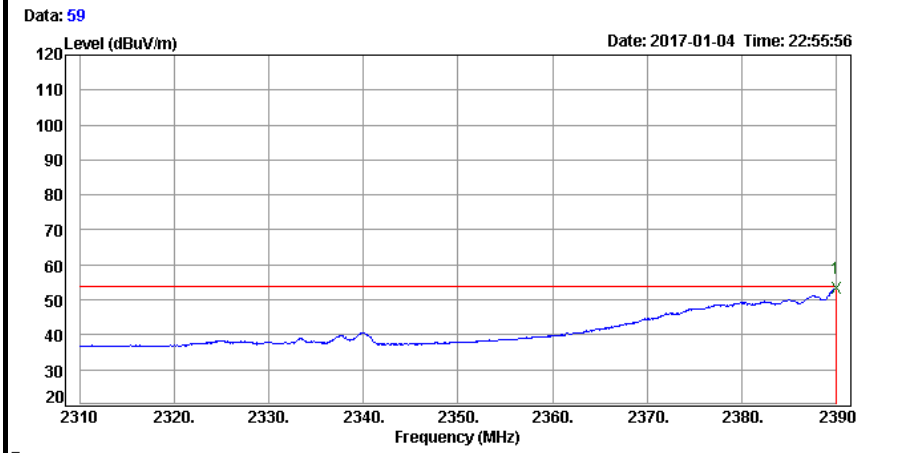
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2389.84	72.34	-0.49	71.85	74.00	-2.15			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Vertical**

CH Low (IEEE 802.11gn HT20 MCS0 Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2390.00	53.69	-0.49	53.20	54.00	-0.80			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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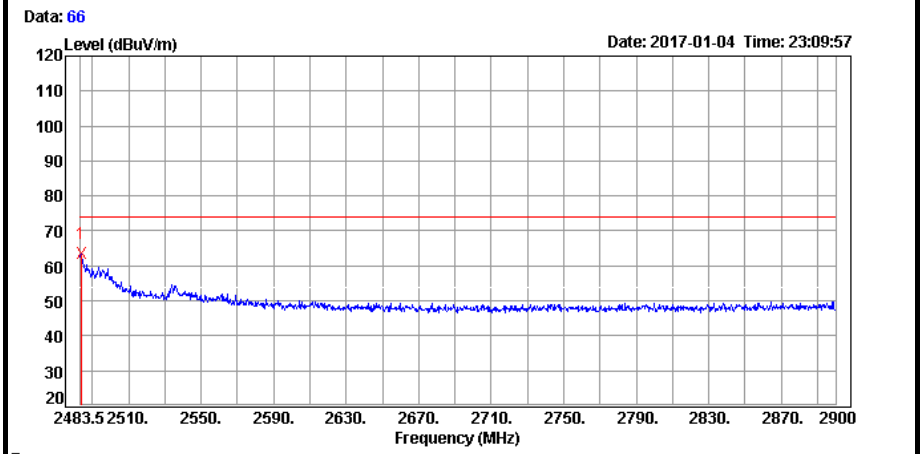
Detector Mode: Peak **Polarity: Horizontal**

CH High (IEEE 802.11gn HT20 MCS0 Mode)



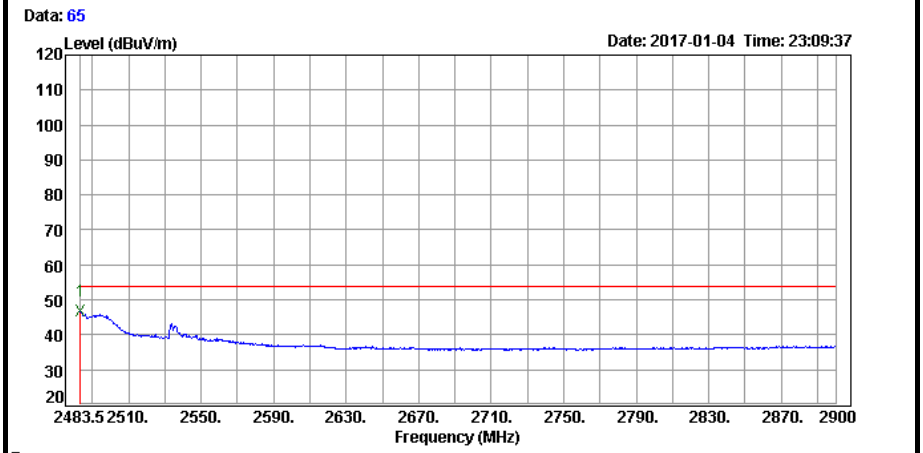
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2483.92	63.57	-0.11	63.46	74.00	-10.54			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Horizontal**

CH High (IEEE 802.11gn HT20 MCS0 Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2483.50	46.87	-0.11	46.76	54.00	-7.24			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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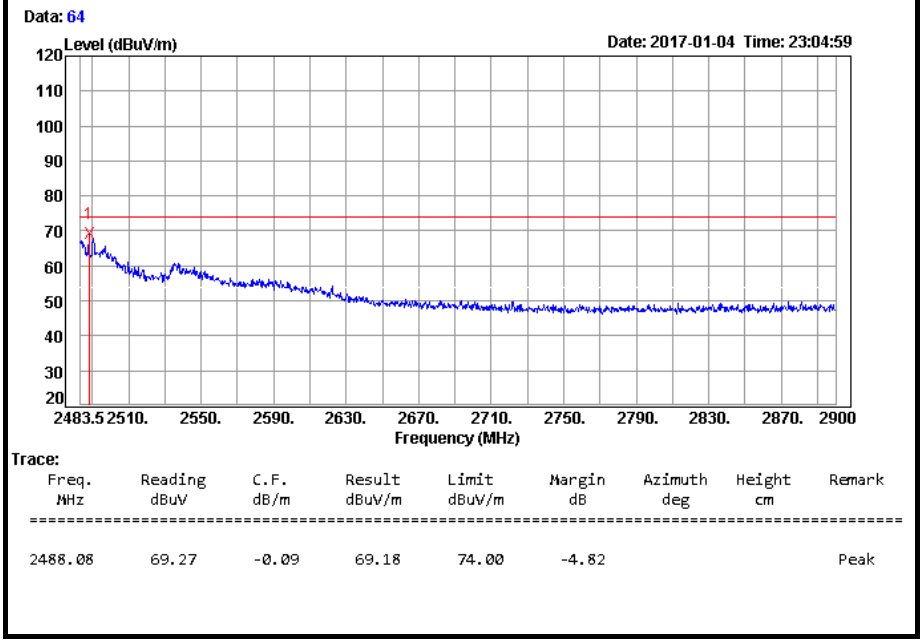
Detector Mode: Peak **Polarity: Vertical**

CH High (IEEE 802.11gn HT20 MCS0 Mode)



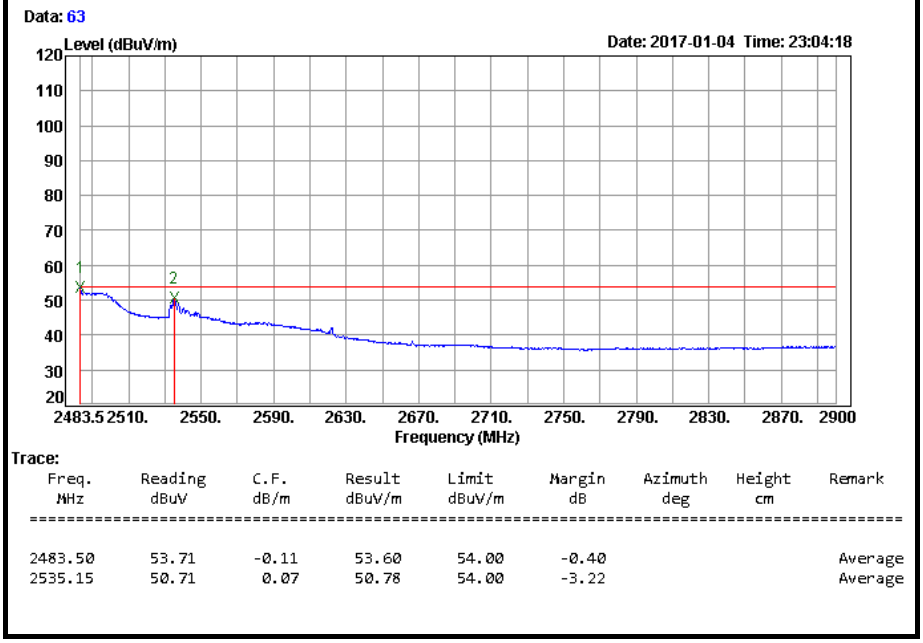
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2488.08	69.27	-0.09	69.18	74.00	-4.82			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Vertical**

CH High (IEEE 802.11gn HT20 MCS0 Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2483.50	53.71	-0.11	53.60	54.00	-0.40			Average
2535.15	50.71	0.07	50.78	54.00	-3.22			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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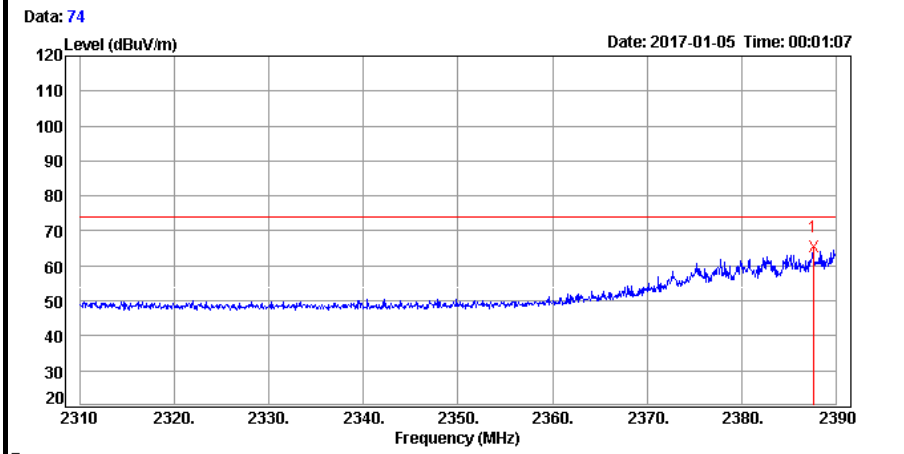
Detector Mode: Peak **Polarity: Horizontal**

CH Low (IEEE 802.11gn HT40 MCS0 Mode)



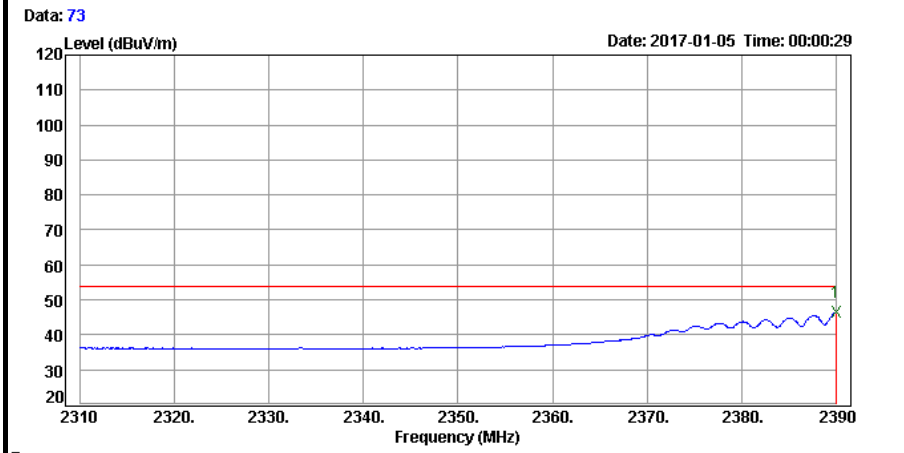
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2387.60	66.07	-0.50	65.57	74.00	-8.43			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Horizontal**

CH Low (IEEE 802.11gn HT40 MCS0 Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2390.00	46.89	-0.49	46.40	54.00	-7.60			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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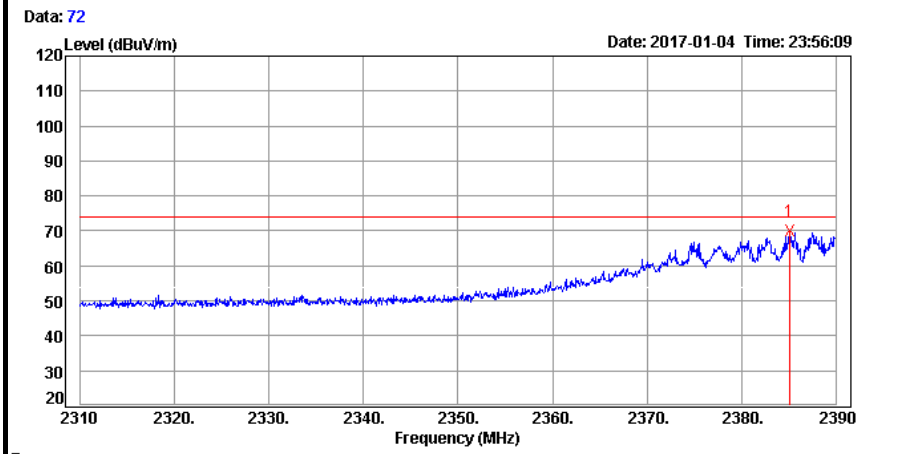
Detector Mode: Peak **Polarity: Vertical**

CH Low (IEEE 802.11gn HT40 MCS0 Mode)



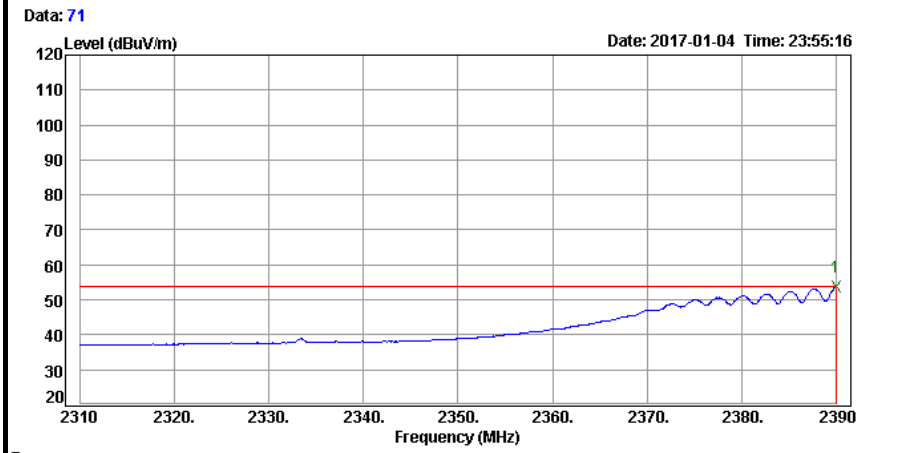
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2385.12	70.56	-0.51	70.05	74.00	-3.95			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Vertical**

CH Low (IEEE 802.11gn HT40 MCS0 Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2390.00	54.04	-0.49	53.55	54.00	-0.45			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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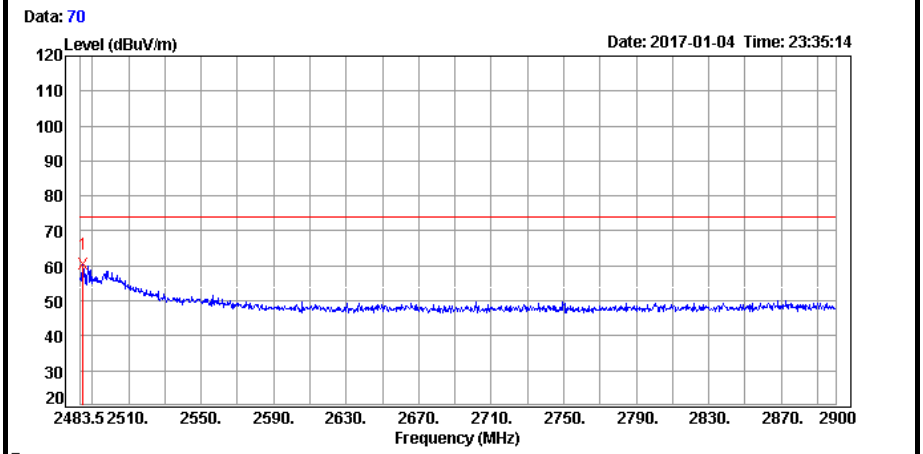
Detector Mode: Peak **Polarity: Horizontal**

CH High (IEEE 802.11gn HT40 MCS0 Mode)



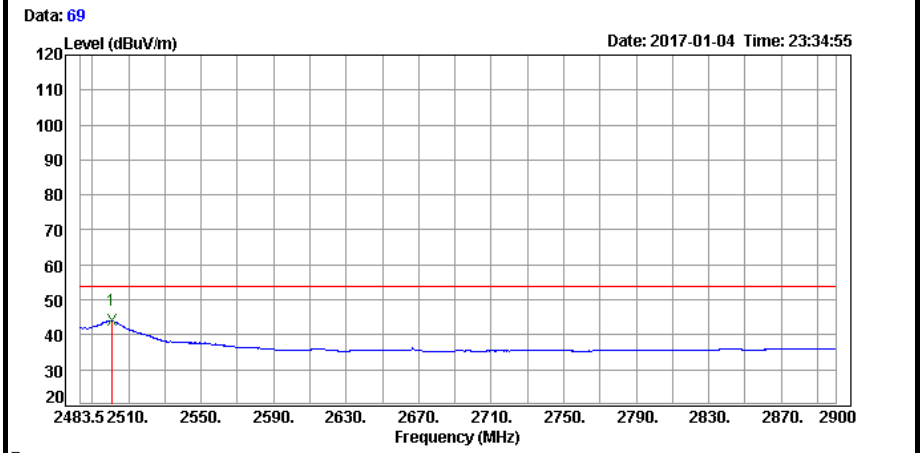
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2484.75	60.46	-0.10	60.36	74.00	-13.64			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Horizontal**

CH High (IEEE 802.11gn HT40 MCS0 Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2500.58	44.05	-0.04	44.01	54.00	-9.99			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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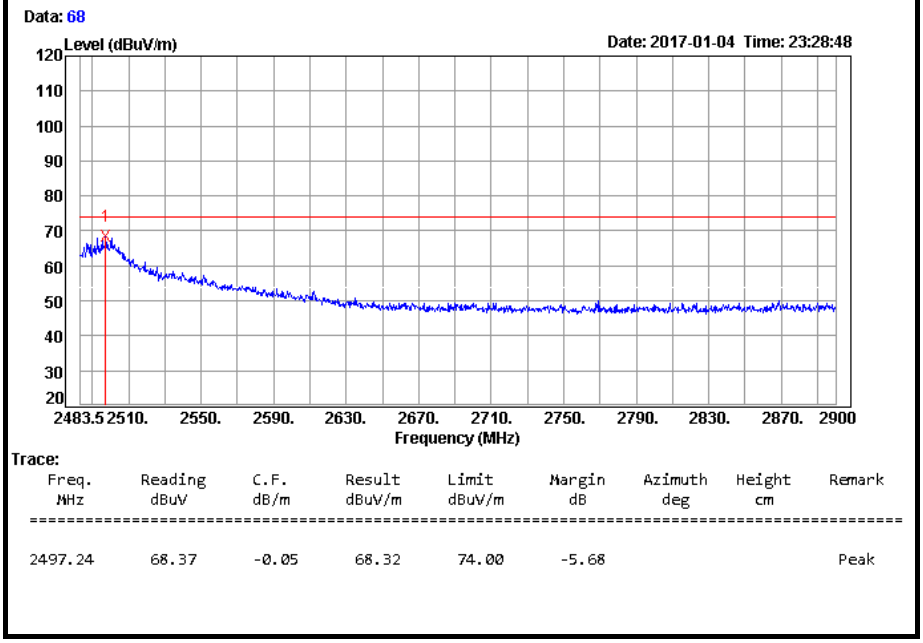
Detector Mode: Peak **Polarity: Vertical**

CH High (IEEE 802.11gn HT40 MCS0 Mode)



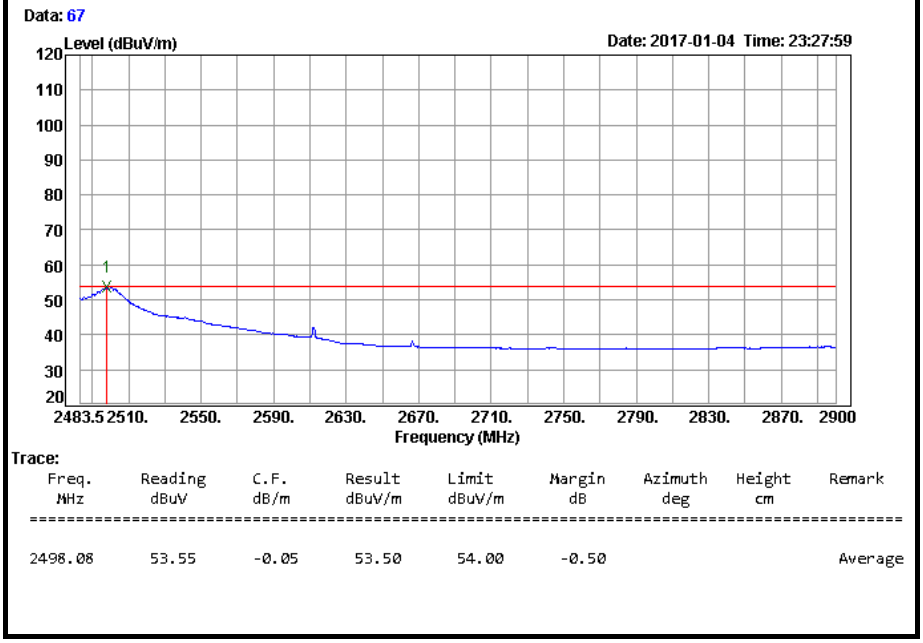
Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2497.24	68.37	-0.05	68.32	74.00	-5.68			Peak

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark Peak = Result(PK) – Limit(PK)

Detector Mode: Average **Polarity: Vertical**

CH High (IEEE 802.11gn HT40 MCS0 Mode)



Trace:

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
2498.08	53.55	-0.05	53.50	54.00	-0.50			Average

Remark: *Result = Reading + Correction Factor*
Margin = Result – Limit
Remark AVG = Result(AV) – Limit(AV)

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7.8 CONDUCTED EMISSION

LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Conducted Limit (dBμv)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5.00	56	46
5.00 - 30.0	60	50

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N	Schwarzbeck	NSLK 8127	8127465	07/28/2017
L.I.S.N	Schwarzbeck	NSLK 8127	8127473	03/10/2017
EMI Test Receiver	Rohde & Schwarz	ESHS 30	838550/003	10/25/2017
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100111	06/27/2017
Test S/W	E3.815206a			

Remark: *Each piece of equipment is scheduled for calibration once a year.*

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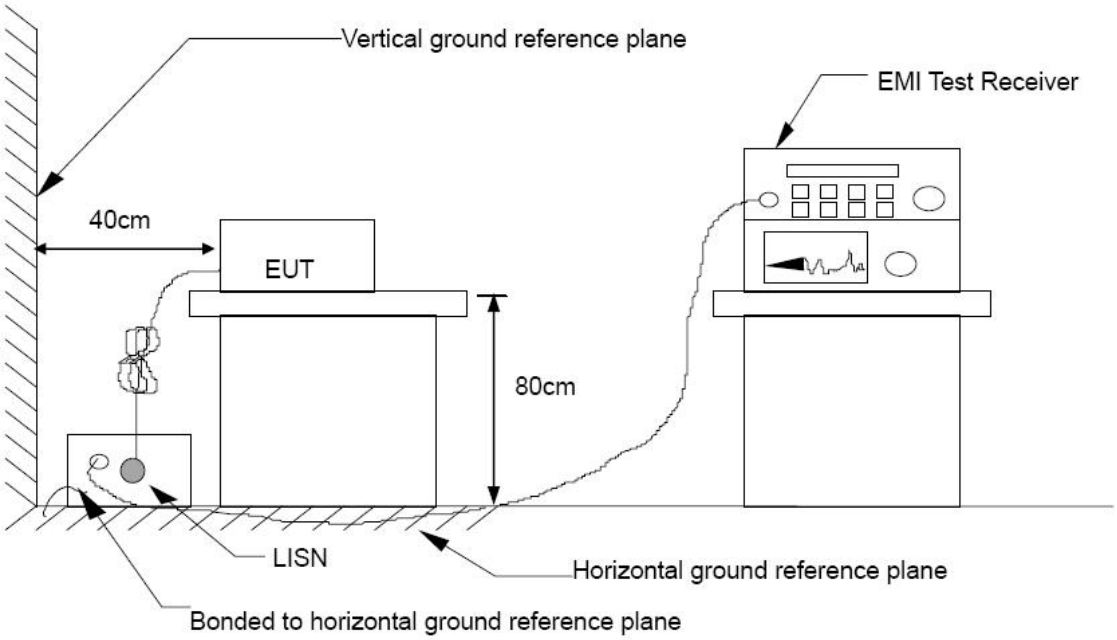
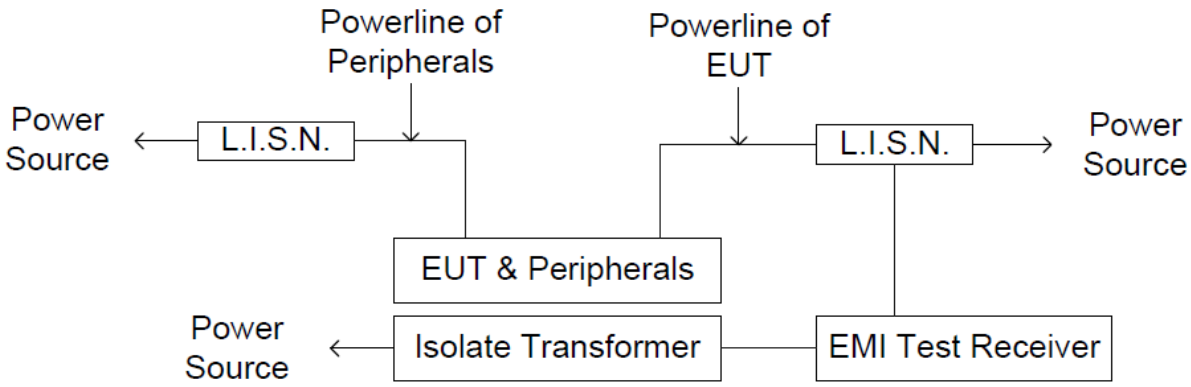
TEST SETUP





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TEST PROCEDURE

The basic test procedure was in accordance with ANSI C63.10:2013.
The test procedure is performed in a 4m × 3m × 2.4m (L×W×H) shielded room.
The EUT along with its peripherals were placed on a 1.0m (W) × 1.5m (L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
The EUT was located so that the distance between the boundary of the EUT and the closest surface of the LISN is 0.8 m. Where a mains flexible cord was provided by the manufacturer shall be 1 m long, or if in excess of 1 m, the excess cable was folded back and forth as far as possible so as to form a bundle not exceeding 0.4 m in length.

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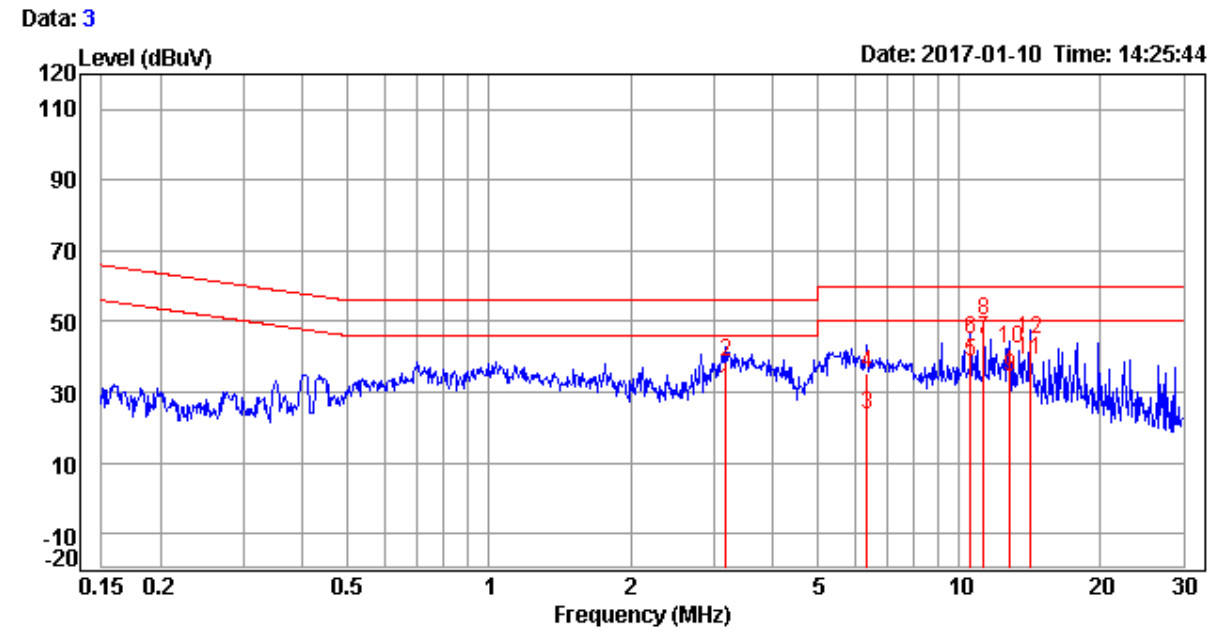
TEST RESULTS

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Jey Li
Test Model	BiPAC 7820NZ	Test Date	2017/01/10
Test Mode	Mode 1	Temp. & Humidity	26°C, 41%

LINE



Trace:

Freq. MHz	Reading dBuV Q.P.	Reading dBuV AV.	C.F. dB	Result dBuV Q.P.	Result dBuV AV.	Limit dBuV Q.P.	Limit dBuV AV.	Margin dB Q.P.	Margin dB AV.
3.173	28.59	20.25	10.12	38.71	30.37	56.00	46.00	-17.29	-15.63
6.352	25.00	13.64	10.27	35.27	23.91	60.00	50.00	-24.73	-26.09
10.569	34.43	27.97	10.46	44.89	38.43	60.00	50.00	-15.11	-11.57
11.277	39.85	34.68	10.49	50.34	45.17	60.00	50.00	-9.66	-4.83
12.745	31.70	23.82	10.55	42.25	34.37	60.00	50.00	-17.75	-15.63
14.094	34.14	28.58	10.61	44.75	39.19	60.00	50.00	-15.25	-10.81

Remark:

1. *Correction Factor = Insertion loss + Cable loss*
2. *Result level = Reading Value + Correction factor*
3. *Margin value = Result level – Limit value*

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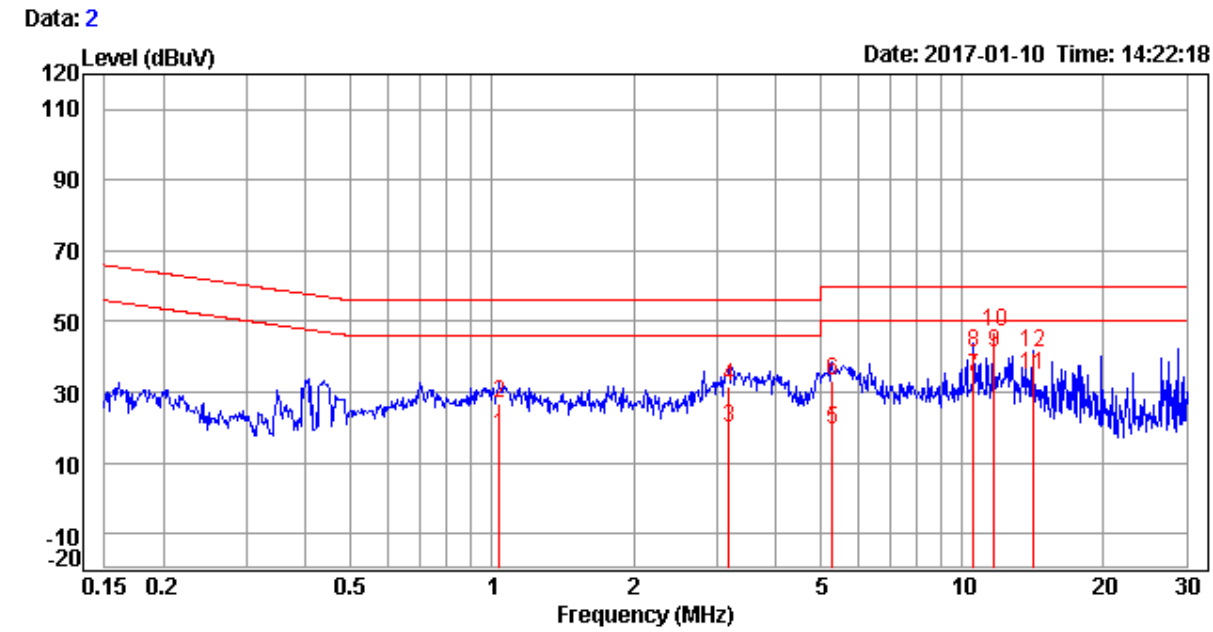
Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Jey Li
Test Model	BiPAC 7820NZ	Test Date	2017/01/10
Test Mode	Mode 1	Temp. & Humidity	26°C, 41%

NEUTRAL



Trace:

Freq. MHz	Reading dBuV Q.P.	Reading dBuV AV.	C.F. dB	Result dBuV Q.P.	Result dBuV AV.	Limit dBuV Q.P.	Limit dBuV AV.	Margin dB Q.P.	Margin dB AV.
1.032	17.05	7.84	10.00	27.05	17.84	56.00	46.00	-28.95	-28.16
3.190	21.29	9.69	10.11	31.40	19.80	56.00	46.00	-24.60	-26.20
5.277	23.04	9.26	10.20	33.24	19.46	60.00	50.00	-26.76	-30.54
10.576	30.68	23.73	10.38	41.06	34.11	60.00	50.00	-18.94	-15.89
11.632	36.52	30.73	10.41	46.93	41.14	60.00	50.00	-13.07	-8.86
14.095	30.54	24.11	10.48	41.02	34.59	60.00	50.00	-18.98	-15.41

Remark:

1. *Correction Factor = Insertion loss + Cable loss*
2. *Result level = Reading Value + Correction factor*
3. *Margin value = Result level – Limit value*

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8. APPENDIX I CO-LOCATION

Product Name	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router	Test By	Jey Li
Test Model	BiPAC 7820NZ	Test Date	2017/01/10
Test Mode	Mode 1	Temp. & Humidity	17˚C, 50%

966Chamber_C at 3Meter / Horizontal

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1335.00	46.43	-12.05	34.38	74.00	-39.62	357	200	Peak
1440.00	48.62	-11.76	36.86	74.00	-37.14	13	200	Peak
1500.00	48.36	-11.60	36.76	74.00	-37.24	233	100	Peak
1665.00	51.62	-11.30	40.32	74.00	-33.68	325	100	Peak
1800.00	49.19	-11.06	38.13	74.00	-35.87	30	200	Peak
2000.00	47.15	-10.70	36.45	74.00	-37.55	178	100	Peak

966Chamber_C at 3Meter / Vertical

Freq. MHz	Reading dBuV	C.F. dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Azimuth deg	Height cm	Remark
1080.00	45.77	-12.73	33.04	74.00	-40.96	24	200	Peak
1440.00	48.75	-11.76	36.99	74.00	-37.01	218	200	Peak
1665.00	51.04	-11.30	39.74	74.00	-34.26	96	100	Peak
2000.00	49.98	-10.70	39.28	74.00	-34.72	212	100	Peak
3000.00	46.81	-7.82	38.99	74.00	-35.01	210	100	Peak
3465.00	49.22	-7.45	41.77	74.00	-32.23	241	100	Peak

Remark:

1. *Average test would be performed if the peak result were greater than the average limit.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
3. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(PK)
   Remark AVG = Result(AV) – Limit(AV)

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