TEST REPORT

of

FCC PART 15 SUBPART E AND CANADA RSS-247

☒ New Application; ☐ Class I PC; ☐ Class II PC

Product :	**Almond 3**
Brand:	**SECURIFI**
Model:	**AL3**
Model Difference:	**N/A**
FCC ID:	**AHLAL3**
IC:	**10114A-AL3**
FCC Rule Part:	**§15.407, Cat:NII**
IC Rule Part:	**RSS-247 issue 1: 2015**
	RSS-Gen issue 4: 2014
Applicant:	**SECURIFI LTD.**
Address:	**11F, No.92, Sec. 5, Nanjing E. Rd., Songshan Dist., Taipei City 105, Taiwan**

Test Performed by:

International Standards Laboratory

<Lung-Tan LAB>
*Site Registration No.
BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;
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Report No.: **ISL-16LR161FCNII**
Issue Date : **2016/09/01**

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.
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VERIFICATION OF COMPLIANCE

Applicant:	SECURIFI LTD.
Product Description:	Almond 3
Brand Name:	SECURIFI
Model No.:	AL3
Model Difference:	N/A
FCC ID:	AHLAL3
IC:	10114A-AL3
FCC Rule Part:	§15.407, Cat: NII
IC Rule Part	RSS-247 issue 1: 2015 RSS-Gen issue 4: 2014
Date of test:	2016/08/08 ~ 2016/08/30
Date of EUT Received:	2016/08/01

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

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Prepared By:	Elisa Chen	***Date:***	2016/09/01
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Version

Version No.	Date	Description
00	2016/09/01	Initial creation of document

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1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name	Almond 3
Brand Name	SECURIFI
Model Name	AL3
Model Difference	N/A
Operation Environment	Indoor used
TPC	No
DFS	No
WAN Port:	One provided
LAN Port:	Two provided
USB port	One provided for data link
Power Supply	12Vdc from AC adapter
Adapter:	Model No.: WB-18D12FU WB-18D12R S18B72-120A150-C4 QX18W120150FU MSP-C1500IC12.0-18A-US

IC RSS-Gen:

PMN (Product Marketing Name)	Almond3
HVIN (Hardware Version Identification Number)	AL3
FVIN (Firmware Version Identification Number)	AL3-R008
Test SoftWare Version	Teraterm-4.75

RF power setting in TEST SoftWare for FCC

2.4G	802.11b	802.11g		802.11n20 Ant0	802.11n20 Ant1	802.11n40 Ant0	802.11n40 Ant1
Low	15	12		7	7	6	7
Mid	16	17		18	18	20	21
High	18	14		12	12	10	11
5G B1	**802.11a**	**802.11HT20 Ant0**	**802.11HT20 Ant1**	**802.11HT40 Ant0**	**802.11HT40 Ant1**	**802.11AC80 Ant0**	**802.11AC80 Ant1**
Low	33	30	31	25	25		
Mid	34	31	32	25	25	23	22
High	34	32	33	25	25		
5G B4	**802.11a**	**802.11HT20 Ant0**	**802.11HT20 Ant1**	**802.11HT40 Ant0**	**802.11HT40 Ant1**	**802.11AC80 Ant0**	**802.11AC80 Ant1**
Low	25	20	21	17	18		
Mid	26	20	21	17	18	20	21
High	25	21	21	17	18		

WLAN: 2TX/2RX SM-MIMO for FCC

Wi-Fi	Frequency Range (MHz)	Channels	Peak / Average Rated Power	Modulation Technology
802.11b	2412 – 2462(DTS)	11	23.5dBm (PK)	DSSS
802.11g	2412 – 2462(DTS)	11	24.52dBm (PK)	OFDM
802.11n (2.4G)	HT20 2412 – 2462(DTS)	11	27.42dBm (PK)	
	HT40 2422 – 2452(DTS)	7	27.35dBm (PK)	
802.11a	5180 – 5240(NII)	4	17.88dBm (AV)	
	5745 – 5825(NII)	5	12.93dBm (AV)	
802.11n(5G)	HT20, 5180 – 5240(NII)	4	15.66dBm (AV)	
	HT20, 5745 – 5825(NII)	5	9.44dBm (AV)	
	HT40, 5190 – 5230(NII)	3	11.27dBm (AV)	
	HT40, 5755 – 5815(NII)	4	6.58dBm (AV)	
802.11ac	HT80, 5210(NII)	1	9.56dBm (AV)	
	HT80, 5775(NII)	1	6.13dBm (AV)	
Modulation type		CCK, DQPSK, DBPSK for DSSS 256QAM.64QAM. 16QAM, QPSK, BPSK for OFDM		
Antenna Designation		WiFi: Fixed PIFA Antenna WLA-EM-1607-0051-B: 2.4GHz: 3.12dBi; 5GHz: 6.14dBi WLA-EM-1607-0050-B: 2.4GHz: 1.94dBi; 5GHz: 2.62dBi According to KDB662911 D01 SM-MIMO signals could be considered uncorrelated for purposes of directional gain computation. Directional gain = GANT		

The EUT is compliance with IEEE 802.11 a/b/g/n/ac Standard.

RF power setting in TEST SoftWare for IC

2.4G	802.11b	802.11g		802.11n20 Ant0	802.11n20 Ant1	802.11n40 Ant0	802.11n40 Ant1
Low	15	12		7	7	6	7
Mid	16	17		18	18	20	21
High	18	14		12	12	10	11
5G B1	**802.11a**	**802.11HT20 Ant0**	**802.11HT20 Ant1**	**802.11HT40 Ant0**	**802.11HT40 Ant1**	**802.11AC80 Ant0**	**802.11AC80 Ant1**
Low	19	16	17	20	20		
Mid	20	17	18	20	20	23	22
High	20	17	18	20	20		
5G B4	**802.11a**	**802.11HT20 Ant0**	**802.11HT20 Ant1**	**802.11HT40 Ant0**	**802.11HT40 Ant1**	**802.11AC80 Ant0**	**802.11AC80 Ant1**
Low	25	20	21	17	18		
Mid	26	20	21	17	18	20	21
High	25	21	21	17	18		

WLAN: 2TX/2RX SM-MIMO for IC

Wi-Fi	Frequency Range (MHz)	Channels	Peak / Average Rated Power	Modulation Technology
802.11b	2412 – 2462(DTS)	11	23.5dBm (PK)	DSSS
802.11g	2412 – 2462(DTS)	11	24.52dBm (PK)	OFDM
802.11n (2.4G)	HT20 2412 – 2462(DTS)	11	27.42dBm (PK)	
	HT40 2422 – 2452(DTS)	7	27.35dBm (PK)	
802.11a	**5180 – 5240(NII)**	**4**	**14.73 dBm EIRP (AV)**	
	5745 – 5825(NII)	5	12.93dBm (AV)	
802.11n(5G)	**HT20, 5180 – 5240(NII)**	**4**	**14.91 dBm EIRP (AV)**	
	HT20, 5745 – 5825(NII)	5	9.44dBm (AV)	
	HT40, 5190 – 5230(NII)	**3**	**16.39 dBm EIRP (AV)**	
	HT40, 5755 – 5815(NII)	4	6.58dBm (AV)	
802.11ac	**HT80, 5210(NII)**	**1**	**17.17 dBm EIRP (AV)**	
	HT80, 5775(NII)	1	6.13dBm (AV)	
Modulation type		CCK, DQPSK, DBPSK for DSSS 256QAM.64QAM. 16QAM, QPSK, BPSK for OFDM		
Antenna Designation		WiFi: Fixed PIFA Antenna WLA-EM-1607-0051-B: 2.4GHz: 3.12dBi; 5GHz: 6.14dBi WLA-EM-1607-0050-B: 2.4GHz: 1.94dBi; 5GHz: 2.62dBi According to KDB662911 D01 SM-MIMO signals could be considered uncorrelated for purposes of directional gain computation. Directional gain = GANT		

The EUT is compliance with IEEE 802.11 a/b/g/n/ac Standard.

Zigbee

Frequency Range(MHz)	2405-2480MHz
Modulation type	OQPSK
Channel Number	16
Antenna Designation:	PIFA Antenna / 2.7 dBi

This report applies for Wifi frequency band 5150 MHz– 5250 MHz, 5725 MHz– 5850 MHz

Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: AHLAL3** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules. and **IC: 10114A-AL3** filing to comply with Industry Canada RSS-247 issue 1: 2015.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10: 2013 and RSS-Gen issue 4: 2014. Radiated testing was performed at an antenna to EUT distance 3 meters.

KDB Document: 789033 D02 General UNII Test Procedures New Rules v01r03

FCC 14-30 Revision UNII

594280 D02 U-NII Device Security v01r03

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of International Standards Laboratory <Lung-Tan LAB> No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.10: 2013. FCC Registration Number is: 872200; Designation Number is: TW1036, Canada Registration Number: 4067B-3.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 6 of ANSI C63.10: 2013 and RSS-Gen issue 4: 2014. Con-ducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR 16-1-1 Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m/1.5m(Frequency above 1GHz) above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 6 and 11 of ANSI C63.10: 2013

2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

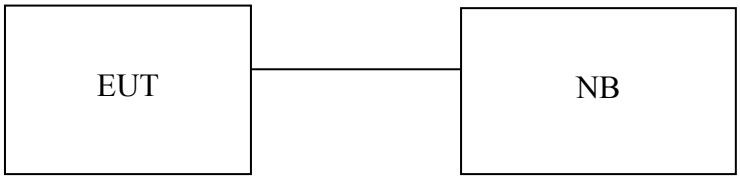


Table 1-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	NB	HP	440	NA	Non-shielding	Non-shielding

3. SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207 RSS-Gen §7.2.4	AC Power Line Conducted Emission	Compliant
§15.407(a)(2) RSS-247, 6.2	Output Power/ EIRP/ Spectral Density Measurement	Compliant
§15.407(a) RSS-247, 6.2 RSS-Gen §4.6.3	26dB/99% Emission Bandwidth	Compliant
§15.407(e) RSS-247, 6.2.4 RSS-Gen §4.6.3	6dB Emission Bandwidth	Compliant
§15.407(b) RSS-247, 6.2	Undesirable Emission – Radiated Measurement	Compliant
§15.407(c) RSS-247, 6.4(2)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.407(a) RSS-GEN 7.1.2, RSS-247 issue 8,§A8.4	Antenna Requirement	Compliant
§15.407(d) RSS-247, 6.3	TPC and DFS Measurement	N/A
§15.407(i) RSS-247, 6.4(4)	Device Security	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.
Test program used to control the EUT for staying in continuous transmitting mode is programmed.

5150MHz-5250MHz:
a mode: Channel lowest (5180MHz)、Mid (5220MHz) and Highest (5240MHz) with 6Mbps data rate are chosen for full testing.

n HT 20 mode: Channel lowest (5180MHz)、Mid (5220MHz) and Highest (5240MHz) with 6.5Mbps data rate are chosen for full testing

n HT 40 mode: Channel lowest (5190MHz) 、Mid (5210MHz)and Highest (5230MHz) with 13.5Mbps data rate are chosen for full testing

802.11 AC HT80: Channel (5210MHz) with lowest data rate is chosen for full testing

The worst case 802.11 n HT20 (5GHz) was reported for Radiated Emission.

5725-5850MHz:
802.11a mode: Channel low (5745MHz)、mid (5785MHz) and high (5825MHz) with 6Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 n HT20: Channel low (5745MHz)、mid (5785MHz) and high (5825MHz) with 6.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 n HT40: Channel low (5755MHz) and high (5815MHz) with 13.5Mbps lowest data rate are chosen for pre-test testing of radiated emissions.

802.11 AC HT80: Channel (5775MHz) with lowest data rate is chosen for full testing

The worst case 802.11 n HT40 (5GHz) was reported for Radiated Emission.

5. AC POWER LINE CONDUCTED EMISSION TEST

5.1. Standard Applicable

According to §15.207 and RSS-Gen §8.8, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note
1.The lower limit shall apply at the transition frequencies
2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

5.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Conduction 04-3 Cable	WOKEN	CFD 300-NL	Conduction 04 -3	07/27/2016	07/26/2017
EMI Receiver 17	Rohde & Schwarz	ESCI 7	100887	09/08/2016	09/07/2017
LISN 18	ROHDE & SCHWARZ	ENV216	101424	02/11/2016	02/10/2017
LISN 19	ROHDE & SCHWARZ	ENV216	101425	03/12/2016	03/11/2017
Test Software	Farad	EZEMC Ver:ISL-03A2	N/A	N/A	N/A

5.3. EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10: 2013
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

5.4. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

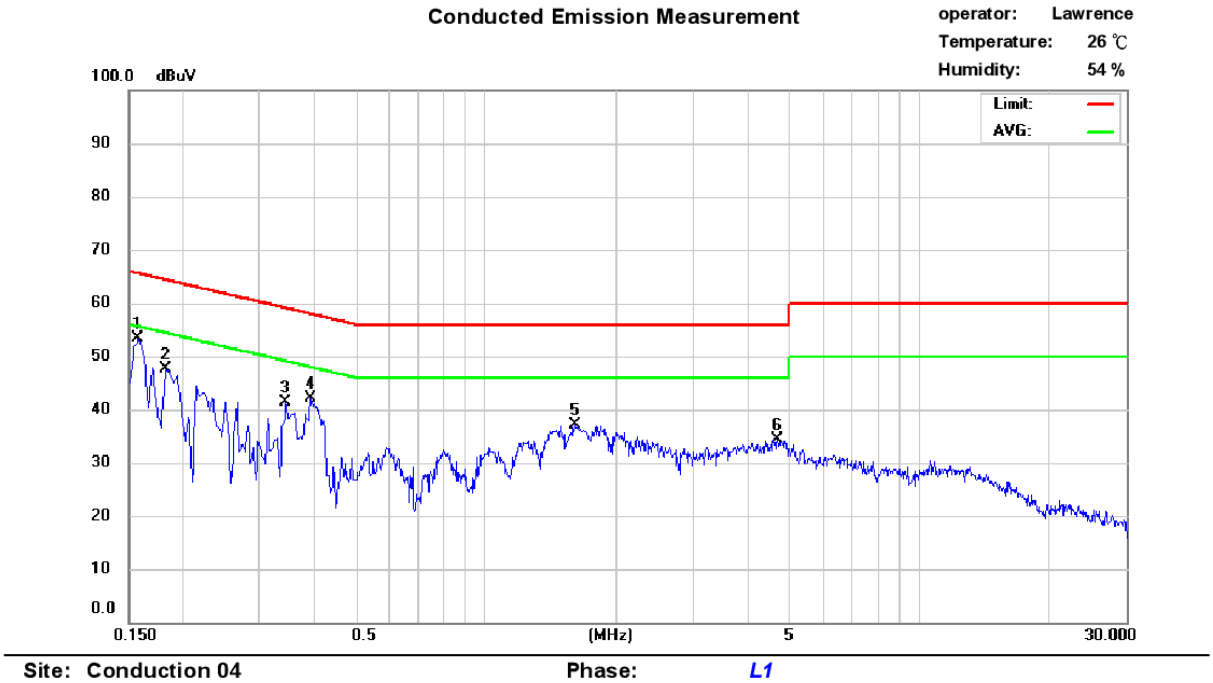
5.5. Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

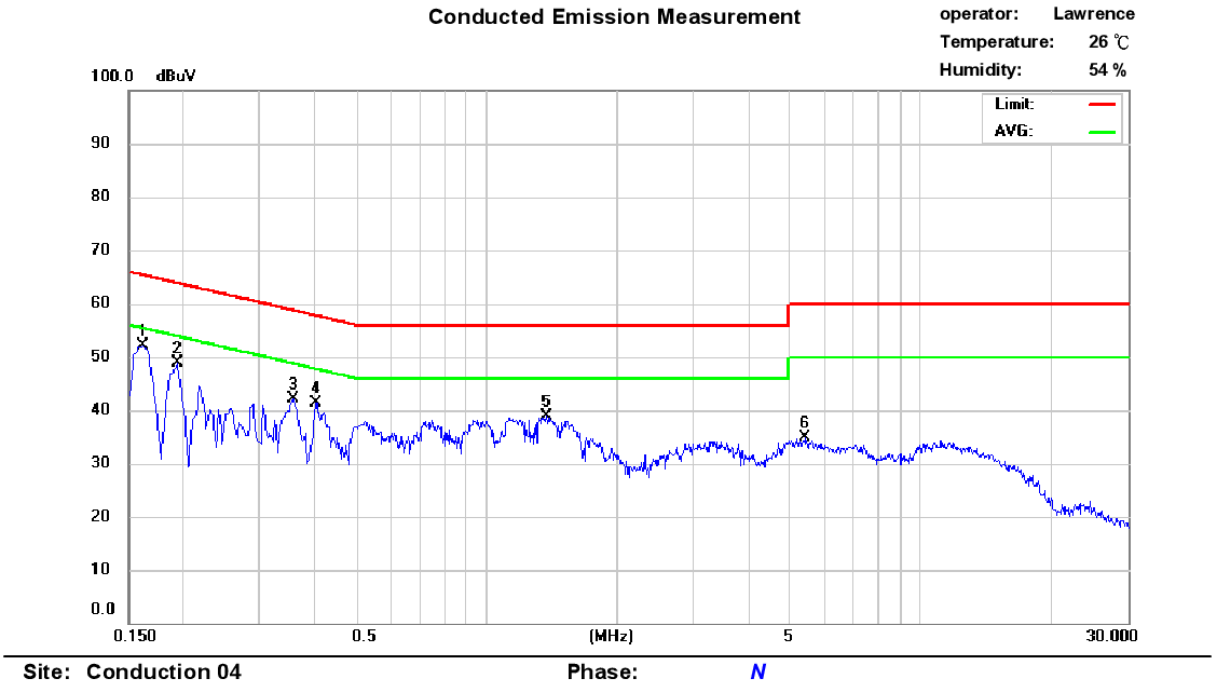
Note: Refer to next page for measurement data and plots.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode	Test Date:	2016/08/16
Test By:	Dino		



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.158	41.96	28.92	9.63	51.59	65.57	-13.98	38.55	55.57	-17.02
2	0.182	34.93	16.24	9.61	44.54	64.39	-19.85	25.85	54.39	-28.54
3	0.346	29.32	20.99	9.60	38.92	59.06	-20.14	30.59	49.06	-18.47
4	0.394	29.88	20.06	9.61	39.49	57.98	-18.49	29.67	47.98	-18.31
5	1.602	25.28	17.46	9.67	34.95	56.00	-21.05	27.13	46.00	-18.87
6	4.702	21.27	13.78	9.75	31.02	56.00	-24.98	23.53	46.00	-22.47



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.162	40.92	27.55	9.62	50.54	65.36	-14.82	37.17	55.36	-18.19
2	0.194	35.62	21.61	9.62	45.24	63.86	-18.62	31.23	53.86	-22.63
3	0.358	30.90	21.69	9.62	40.52	58.77	-18.25	31.31	48.77	-17.46
4	0.406	29.74	21.37	9.62	39.36	57.73	-18.37	30.99	47.73	-16.74
5	1.374	27.48	19.69	9.66	37.14	56.00	-18.86	29.35	46.00	-16.65
6	5.446	21.29	14.06	9.79	31.08	60.00	-28.92	23.85	50.00	-26.15

6. OUTPUT POWER / EIRP /SPECTRAL DENSITY MEASUREMENT

6.1 Standard Applicable

According to §15.407(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed **1 W** provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed **17 dBm in any 1 megahertz band**. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15 – 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed pointto-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15 – 5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBiare used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

NOTE TO PARAGRAPH (a)(3): The Commission strongly recommends that parties employing U-NII devices to provide critical communications services should determine if there are any nearby Government radar systems that could affect their operation.

According to RSS-247

6.2.1 Frequency Band 5150-5250 MHz

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 $\log_{10}$B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

6.2.2 Frequency Band 5250-5350 MHz

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

6.2.3 Frequency Bands 5470-5600 MHz and 5650-5725 MHz

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W

6.2.4 Frequency Band 5725-5850 MHz

The maximum conducted output power shall not exceed 1 W.

The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint3 systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

6.2 Measurement Procedure

For Output Power

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

For Power Spectral Density

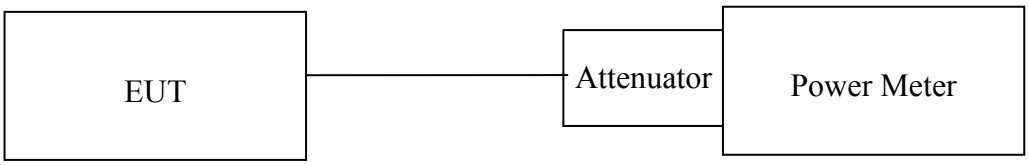
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
3. Set RBW=1MHz,VBW=3MHz, Span=50MHz (Base Mode), Sweep time = Auto, traces 100 sweeps of video averaging for 5150-5725MHz;
4. Set RBW=500KHz,VBW=1.5MHz, Span=60MHz (Base Mode), Sweep time = Auto, traces 100 sweeps of video averaging for 5725-5850MHz;
5. Record the max. reading.
6. Repeat above procedures until all frequency measured were complete.

Refer to section E3 of KDB Document: KDB 789033 D02 General UNII Test Procedures New Rules v01r03

6.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter 05	Anritsu	ML2495A	1116010	07/28/2016	07/27/2017
Power Sensor 05	Anritsu	MA2411B	34NKF50	07/28/2016	07/27/2017
Power Sensor 06	DARE	RPR3006W	13I00030SNO33	11/03/2015	11/02/2016
Power Sensor 07	DARE	RPR3006W	13I00030SNO34	11/03/2015	11/02/2016
Temperature Chamber	KSON	THS-B4H100	2287	06/28/2016	06/27/2017
DC Power supply	ABM	8185D	N/A	09/05/2016	09/04/2017
AC Power supply	EXTECH	CFC105W	NA	12/26/2015	12/25/2016
Attenuator	Woken	Watt-65m3502	11051601	NA	NA
Splitter	MCLI	PS4-199	12465	12/26/2015	12/25/2017
Spectrum analyzer	Agilent	N9030A	MY51360021	10/02/2015	10/01/2016
Test Sofware	DARE	Radimation Ver:2013.1.23	NA	NA	NA

6.4 Measurement Equipment Used:



6.5 Measurement Result

For FCC

Band: 5150-5250 MHz

Average Power Measurement:

802.11a

Mode	Freq(MHz)	power (dBm)	limit(dBm)	result
802.11a	5180	17.72	29.86	pass
	5220	17.88	29.86	pass
	5240	17.53	29.86	pass

2*2 MIMO

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)	Result
		Chain A	chain B			
802.11N HT20	5180	15.112	13.897	17.56	29.86	Pass
	5220	15.587	14.275	17.99	29.86	Pass
	5240	15.66	14.573	18.16	29.86	Pass

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)	Result
		Chain A	chain B			
802.11N HT40	5190	11.27	9.576	13.52	29.86	Pass
	5210	11.225	9.458	13.44	29.86	Pass
	5230	10.979	9.387	13.27	29.86	Pass

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)	Result
		Chain A	chain B			
AC HT80	5210	9.563	7.515	11.67	29.86	Pass

Remark: The max. antenna gain is 6.14dBi, the limit shall reduce 0.14 dB.

Band: 5150-5250 MHz

Power Spectral Density Measurement:

802.11a Mode

Frequency MHz	RF Power Density Reading (dBm/MHz)	Cable loss (dB)	Maximum Limit (dBm/MHz)
5180	10.77	0.00	16.86
5220	11.19	0.00	16.86
5240	10.93	0.00	16.86

2*2 MIMO

802.11n HT20					
Frequency MHz	Chain 1 RF Power Density Reading (dBm/MHz)	Chain 2 RF Power Density Reading (dBm/MHz)	Cable loss (dB)	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5180	8.43	6.97	0.00	10.77	16.86
5220	8.52	7.08	0.00	10.87	16.86
5240	8.39	7.17	0.00	10.83	16.86

802.11n HT40 Mode

Frequency MHz	Chain 1 RF Power Density Reading (dBm/MHz)	Chain 2 RF Power Density Reading (dBm/MHz)	Cable loss (dB)	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5190	2.02	0.41	0.00	4.30	16.86
5210	2.06	0.56	0.00	4.38	16.86
5230	2.10	0.14	0.00	4.24	16.86

802.11AC HT80 Mode

Frequency MHz	Chain 1 RF Power Density Reading (dBm/MHz)	Chain 2 RF Power Density Reading (dBm/MHz)	Cable loss (dB)	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5210	-0.76	-2.91	0.00	1.31	16.86

Remark: The max. antenna gain is 6.14dBi, the limit shall reduce 0.14 dB.

For IC
Band: 5150-5250 MHz
EIRP Power

802.11a

Mode	Channel	conducted power (dBm)	conducted power limit(dBm)	EIRP(dBm)	EIRP limit(dBm)
802.11a	5180	7.81	NA	13.95	22.28
	5220	8.59	NA	14.73	22.28
	5240	8.39	NA	14.53	22.28

Limit = 200mW(23dBm) or 10+ 10Log(16.88(99% BW)) =22.28 dBm

2*2 MIMO

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	output power Limit(dBm)	EIRP Power (dBm)	EIRP Power Limit (dBm)
		Chain A	chain B				
802.11N HT20	5180	5.791	4.383	8.15	NA	14.29	22.48
	5200	6.23	5.23	8.77	NA	14.91	22.48
	5240	6.074	5.014	8.59	NA	14.73	22.48

Limit = 200mW(23dBm) or 10+ 10Log(17.64(99% BW)) =22.48 dBm

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	output power Limit(dBm)	EIRP Power (dBm)	EIRP Power Limit (dBm)
		Chain A	chain B				
802.11N HT40	5190	7.98	6.23	10.20	NA	16.34	23.01
	5210	8.07	6.2	10.25	NA	16.39	23.01
	5230	7.87	6.15	10.10	NA	16.24	23.01

Limit = 200mW(23dBm) or 10+ 10Log(36.29(99% BW)) =25.59 dBm

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	output power Limit(dBm)	EIRP Power (dBm)	EIRP Power Limit (dBm)
		Chain A	chain B				
AC HT80	5210	8.94	6.85	11.03	NA	17.17	23.01

Limit = 200mW(23dBm) or 10+ 10Log(74.74(99% BW)) =28.74 dBm

EIRP Power = Conducted Power + Antenna Gain

Band: 5150-5250 MHz

Power Spectral Density Measurement:

802.11a Mode

Mode	Channel	Power Density Read-ing(dBmMHz)	EIRP Density (dBm/MHz)	EIRP Density limit(dBm/MHz)
802.11a	5180	3.24	9.38	10
	5220	3.51	9.65	10
	5240	3.52	9.66	10

2*2 MIMO

Mode	Freq(MHz)	Power Density Read-ing(dBmMHz)		Combine Power Density Read-ing(dBmMHz)	EIRP Density (dBm/MHz)	EIRP Density limit(dBm/MHz)
		Chain A	chain B			
802.11N HT20	5180	0.48	-0.31	3.11	9.25	10
	5200	0.92	-0.17	3.42	9.56	10
	5240	0.77	-0.17	3.34	9.48	10

Mode	Freq(MHz)	Power Density Read-ing(dBmMHz)		Combine Power Density Read-ing(dBmMHz)	EIRP Density (dBm/MHz)	EIRP Density limit(dBm/MHz)
		Chain A	chain B			
802.11N HT40	5190	0.01	-2.04	2.12	8.26	10
	5210	-0.10	-2.03	2.05	8.19	10
	5230	-0.26	-1.87	2.02	8.16	10

Mode	Freq(MHz)	Power Density Read-ing(dBmMHz)		Combine Power Density Read-ing(dBmMHz)	EIRP Density (dBm/MHz)	EIRP Density limit(dBm/MHz)
		Chain A	chain B			
AC HT80	5210	-0.15	-2.51	1.84	7.98	10

2*2 MIMO

802.11n HT20					
Frequency MHz	Chain 1 RF Power Density Reading (dBm/MHz)	Chain 2 RF Power Density Reading (dBm/MHz)	Cable loss (dB)	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5180	0.48	-0.31	0.00	3.11	10
5220	0.92	-0.17	0.00	3.42	10
5240	0.77	-0.17	0.00	3.34	10

802.11n HT40 Mode

Frequency MHz	Chain 1 RF Power Density Reading (dBm/MHz)	Chain 2 RF Power Density Reading (dBm/MHz)	Cable loss (dB)	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5190	0.01	-2.04	0.00	2.12	10
5210	-0.10	-2.03	0.00	2.05	10
5230	-0.26	-1.87	0.00	2.02	10

802.11AC HT80 Mode

Frequency MHz	Chain 1 RF Power Density Reading (dBm/MHz)	Chain 2 RF Power Density Reading (dBm/MHz)	Cable loss (dB)	RF Power Density Reading (dBm/MHz)	Maximum Limit (dBm/MHz)
5210	-0.15	-2.51	0.00	1.84	10

EIRP Power = Conducted Power + Antenna Gain

For Both FCC and IC

Band: 5725-5850 MHz

Average Power Measurement:

802.11a

Mode	Channel	power (dBm)	limit(dBm)	result
802.11a	5745	12.23	29.86	pass
	5785	12.93	29.86	pass
	5825	12.21	29.86	pass

2*2 MIMO

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)	Result
		Chain A	chain B			
N HT20	5745	8.934	8.792	11.87	29.86	Pass
	5785	8.972	8.52	11.76	29.86	Pass
	5825	9.44	8.45	11.98	29.86	Pass

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)	Result
		Chain A	chain B			
N HT40	5755	6.498	6.509	9.51	29.86	Pass
	5795	6.543	6.359	9.46	29.86	Pass
	5815	6.582	6.334	9.47	29.86	Pass

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)	Result
		Chain A	chain B			
AC HT80	5775	6.136	6.187	9.17	29.86	Pass

Max. EIRP is 12.93 +6.14 = 19.07dBm

Remark: The max. antenna gain is 6.14dBi, the limit shall reduce 0.14 dB.

For Both FCC and IC

Band: 5725-5850 MHz

Power Spectral Density Measurement:

802.11a Mode

Frequency MHz	RF Power Density Reading (dBm/500KHz)	Cable loss (dB)	Maximum Limit (dBm/500KHz)
5745	8.29	0.00	29
5785	9.53	0.00	29
5825	7.98	0.00	29

2*2 MIMO

802.11n HT20

Frequency MHz	Chain 1 RF Power Density Reading (dBm/500KHz)	Chain 2 RF Power Density Reading (dBm/500KHz)	Cable loss (dB)	RF Power Density Reading (dBm/500KHz)	Maximum Limit (dBm/500KHz)
5745	6.11	5.48	0.00	8.81	29
5785	5.78	5.85	0.00	8.82	29
5825	5.25	4.55	0.00	7.92	29

802.11n HT40 Mode

Frequency MHz	Chain 1 RF Power Density Reading (dBm/500KHz)	Chain 2 RF Power Density Reading (dBm/500KHz)	Cable loss (dB)	RF Power Density Reading (dBm/500KHz)	Maximum Limit (dBm/500KHz)
5755	1.03	0.41	0.00	3.74	29
5795	0.55	0.88	0.00	3.73	29
5815	0.01	0.15	0.00	3.09	29

802.11AC HT80 Mode

Frequency MHz	Chain 1 RF Power Density Reading (dBm/500KHz)	Chain 2 RF Power Density Reading (dBm/500KHz)	Cable loss (dB)	RF Power Density Reading (dBm/500KHz)	Maximum Limit (dBm/500KHz)
5775	0.95	0.16	0.00	3.58	29

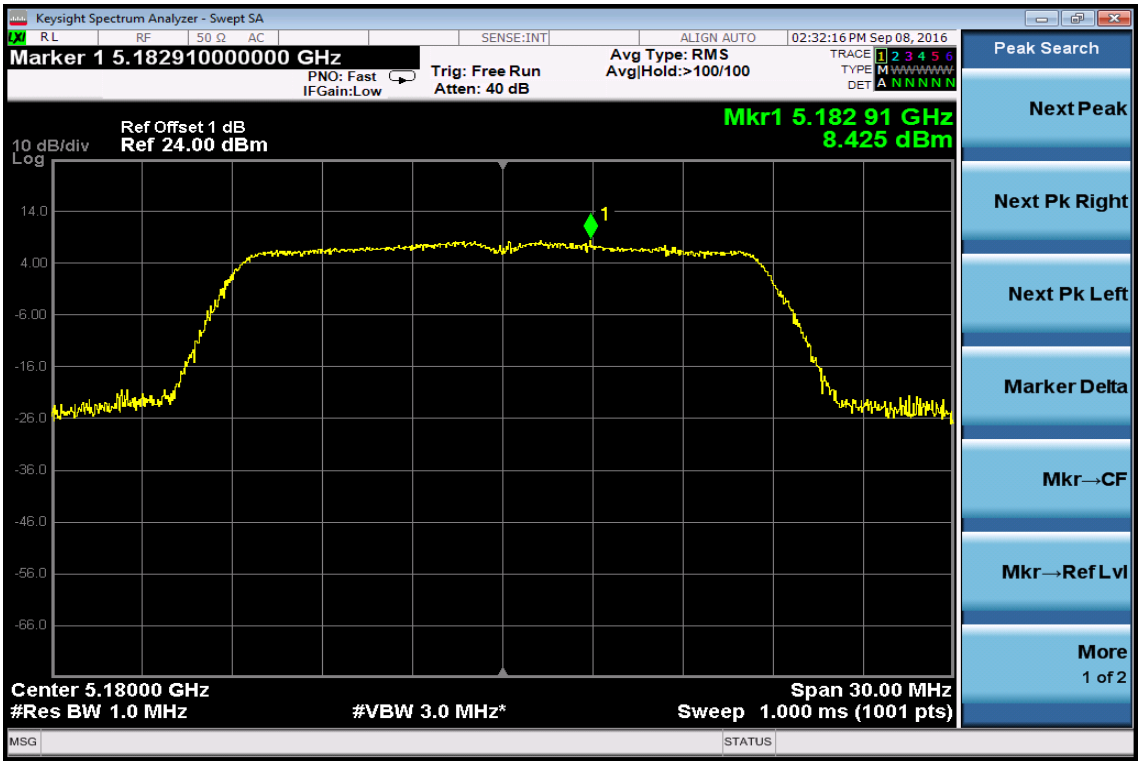
5150-5250 MHz for FCC
802.11a
Power Spectral Density Data Plot (CH Low)

Power Spectral Density Data Plot (CH Mid)

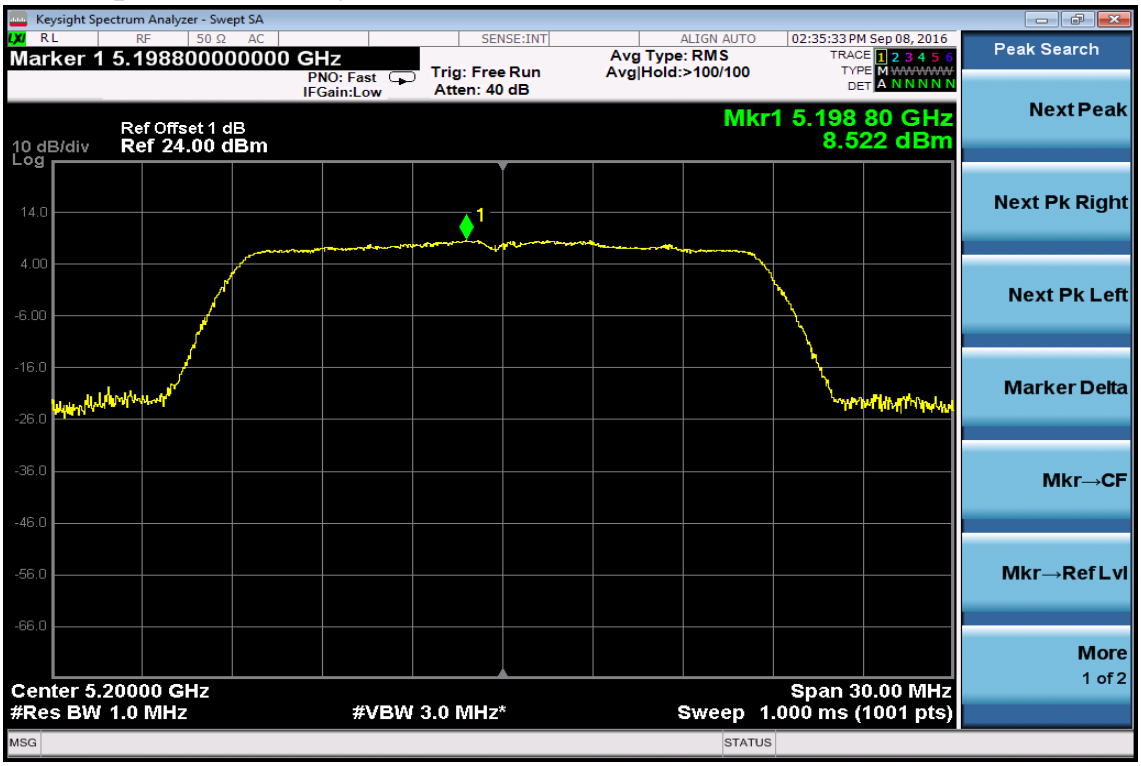
Power Spectral Density Data Plot (CH High)

802.11n HT20 (chain a)

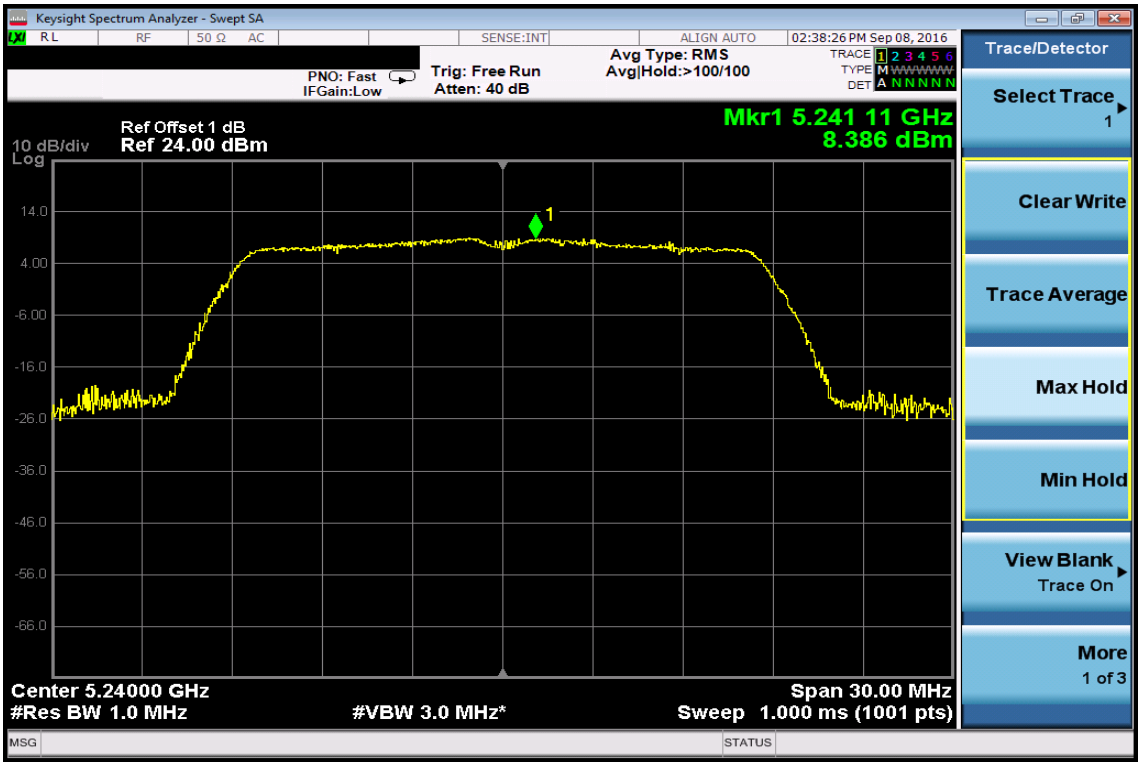
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



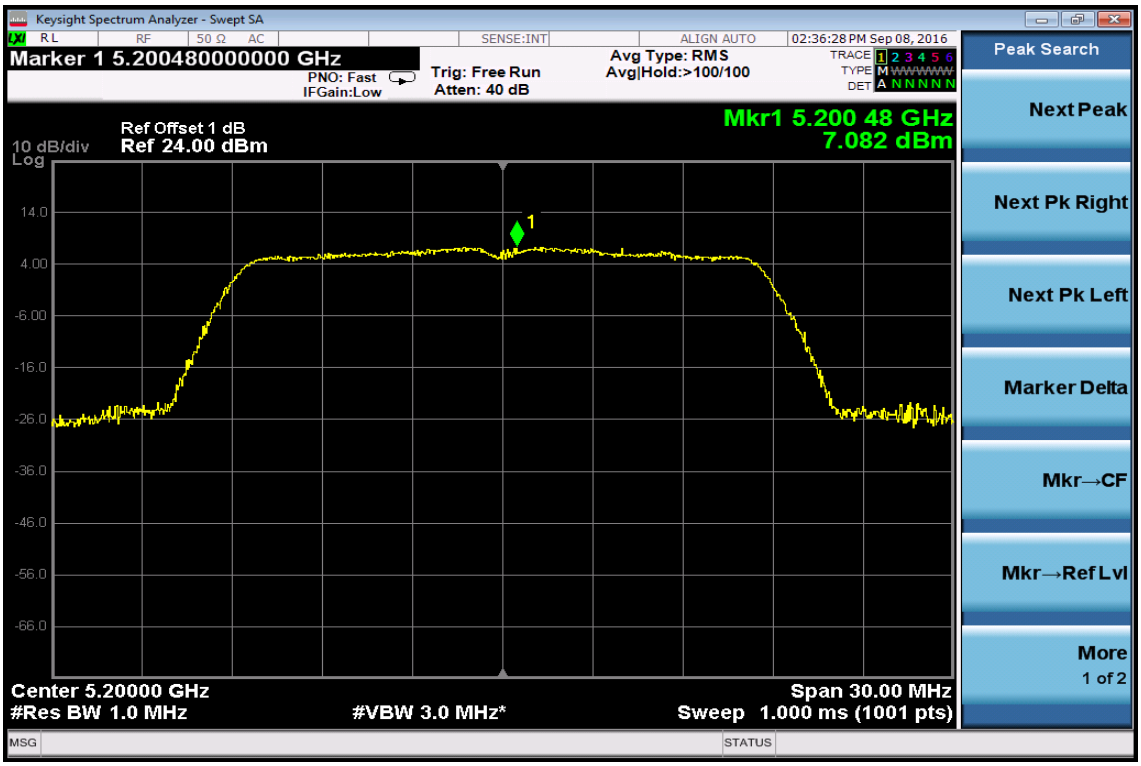
Power Spectral Density Test Plot (CH-High)



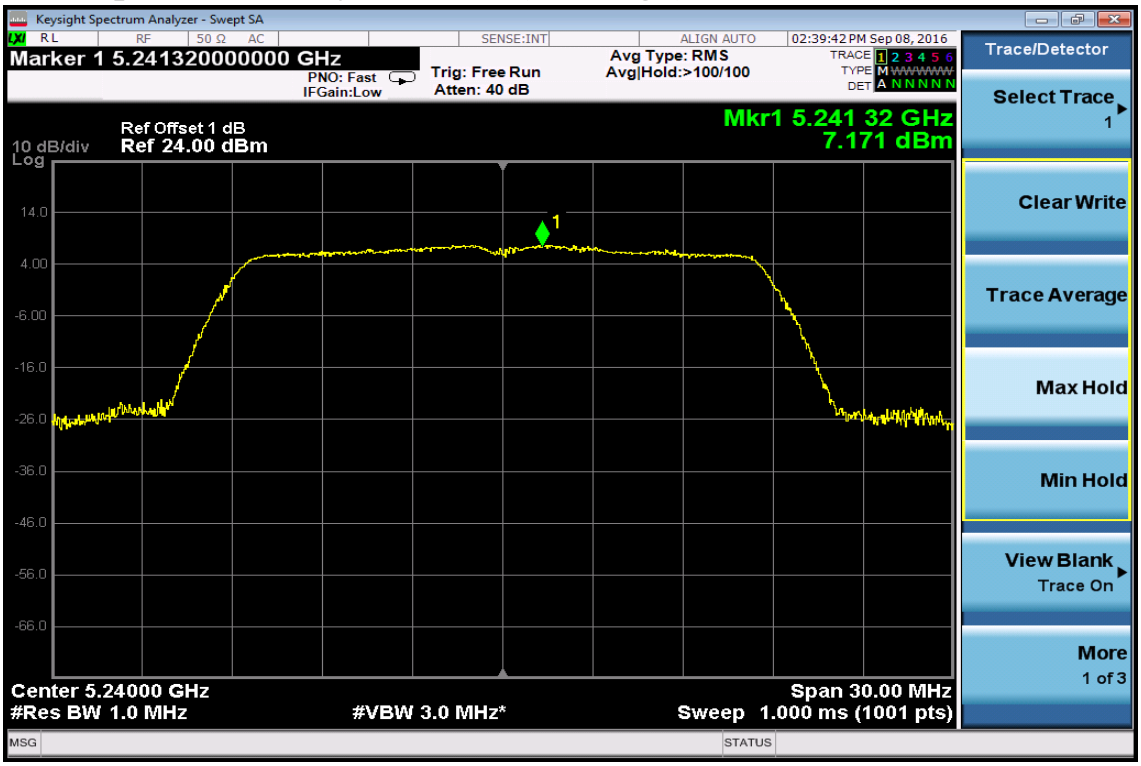
802.11n HT20 (chain b)

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)



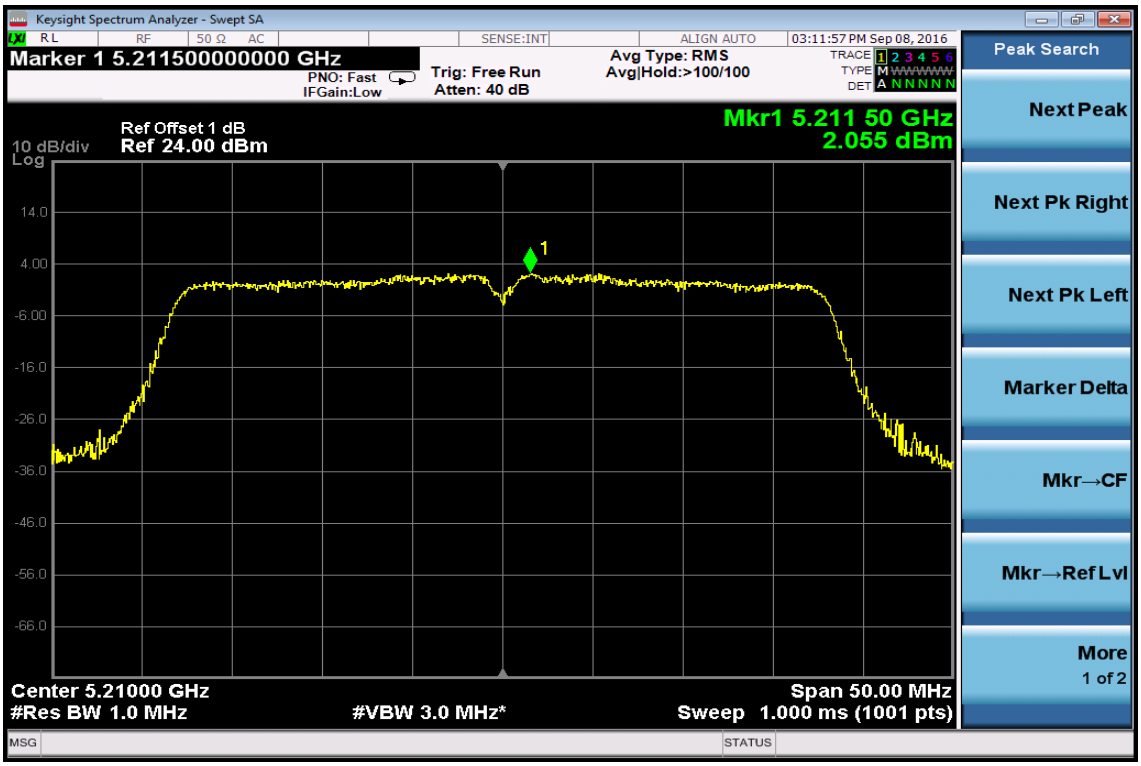
Power Spectral Density Test Plot (CH-High)



802.11n HT40 (chain a)

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)

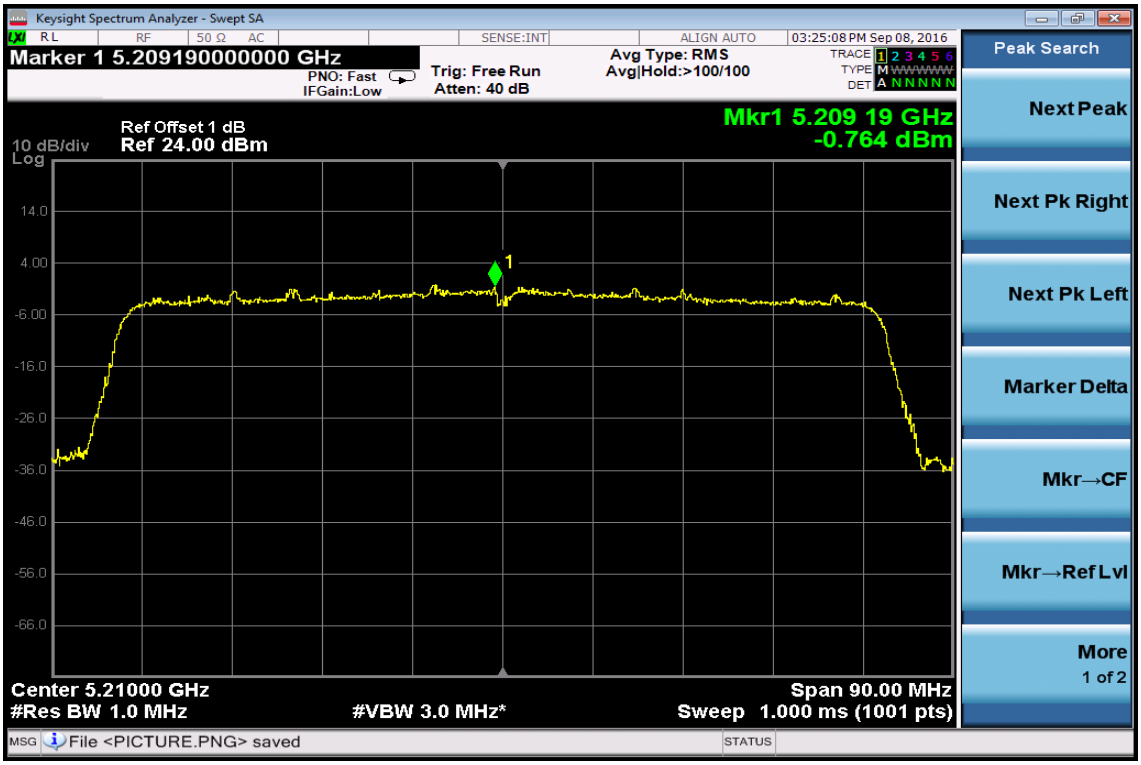
802.11n HT40 (chain b)

Power Spectral Density Test Plot (CH-Low)

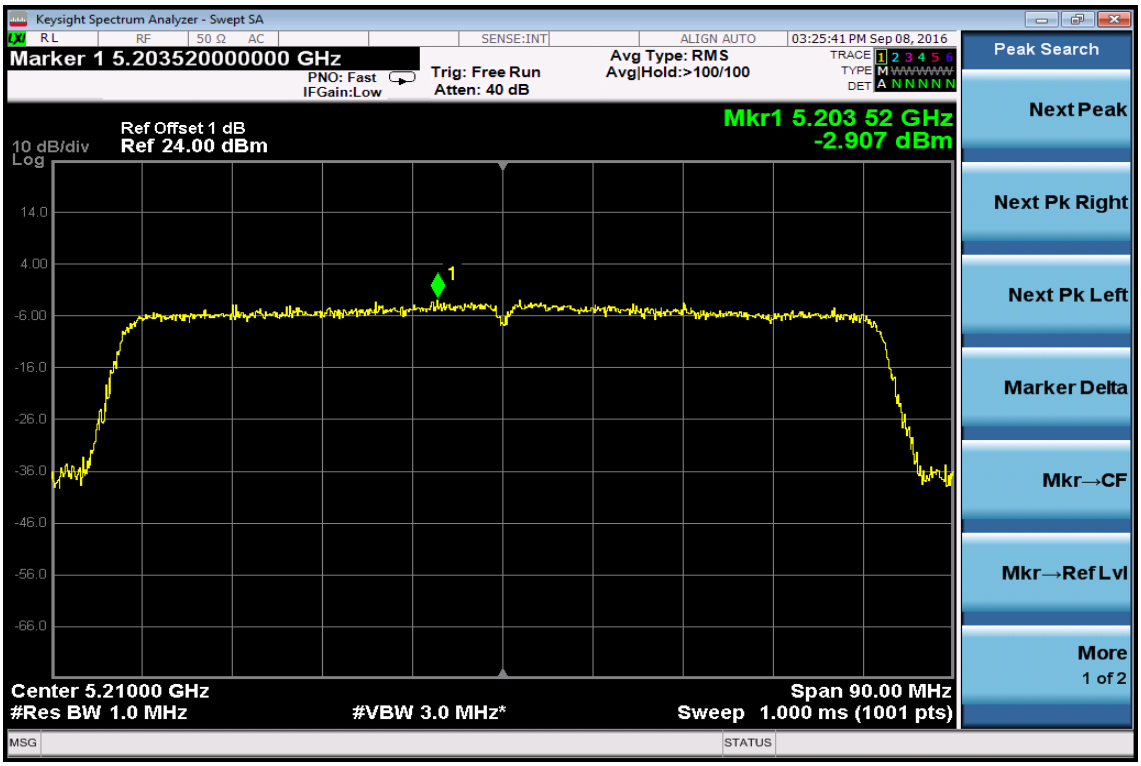
Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)

802.11AC HT80 (chain a)
Power Spectral Density Test Plot (CH-Low)



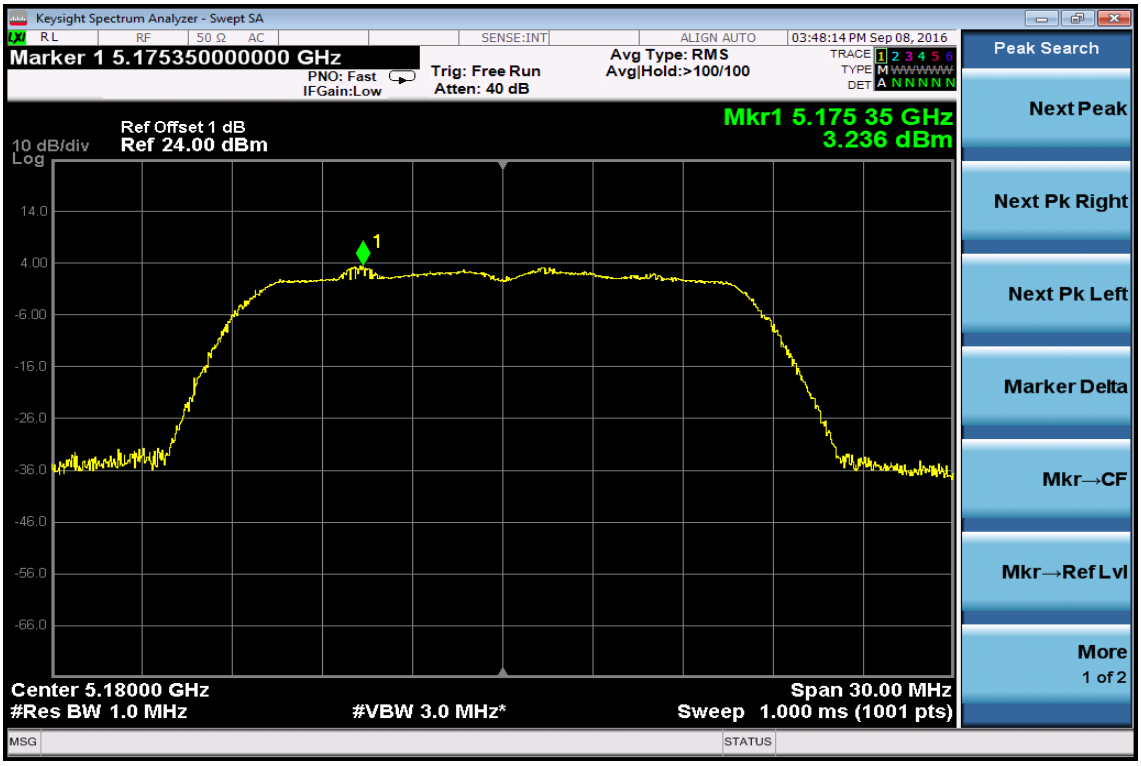
802.11AC HT80 (chain b)
Power Spectral Density Test Plot (CH-Low)



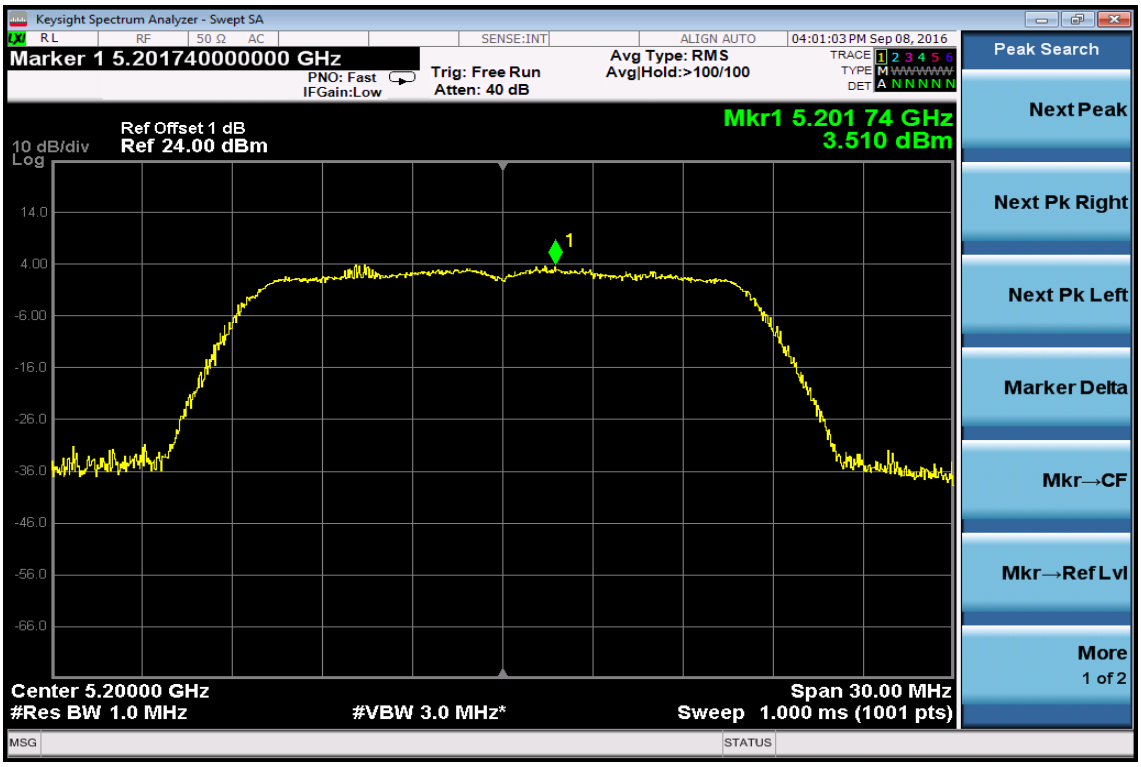
5150-5250 MHz for IC

802.11a

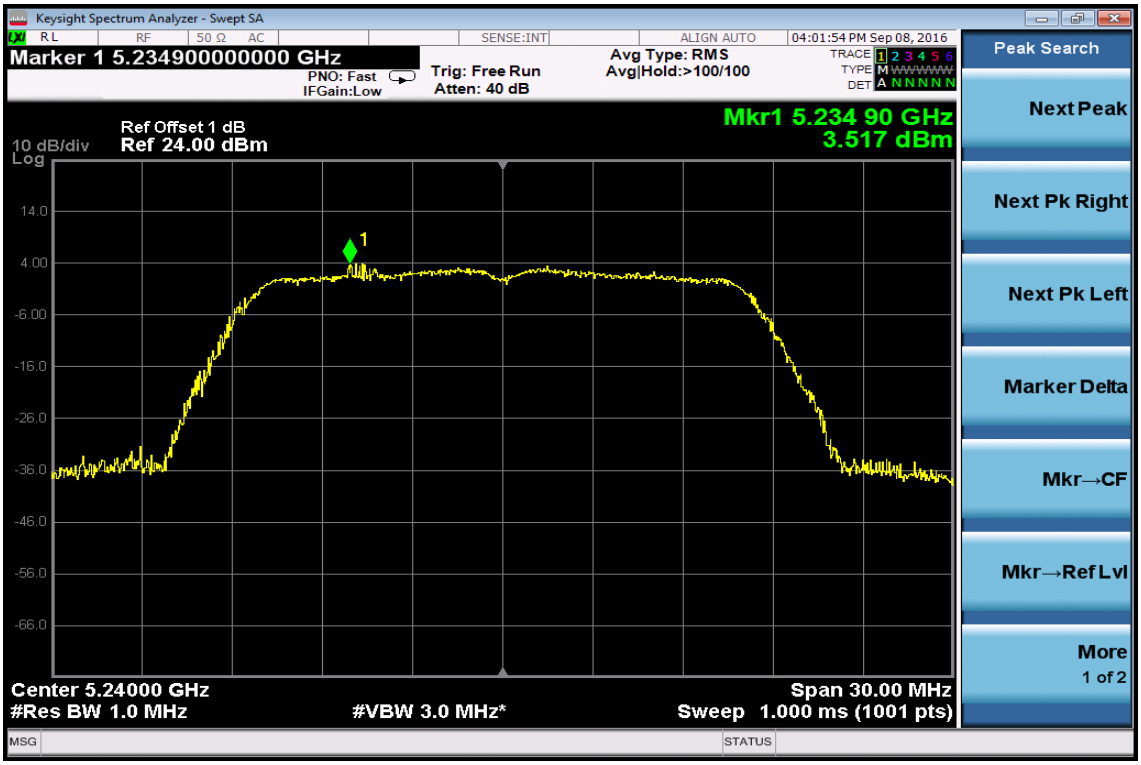
Power Spectral Density Data Plot (CH Low)



Power Spectral Density Data Plot (CH Mid)

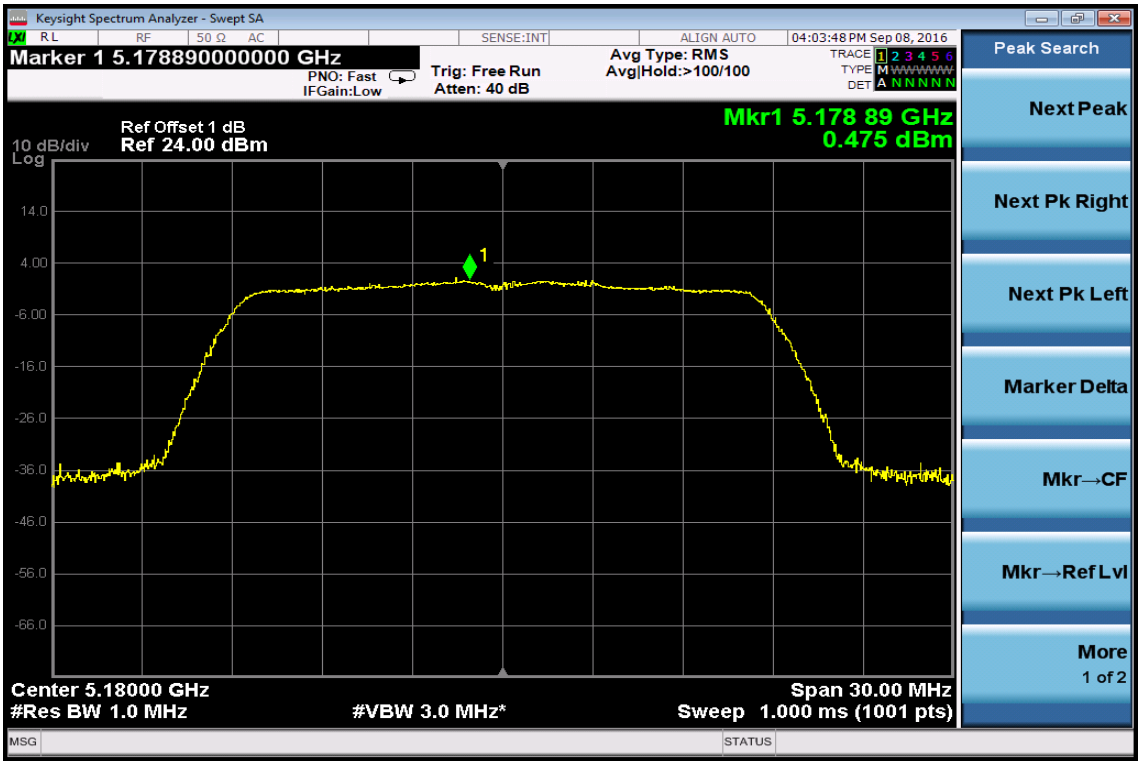


Power Spectral Density Data Plot (CH High)

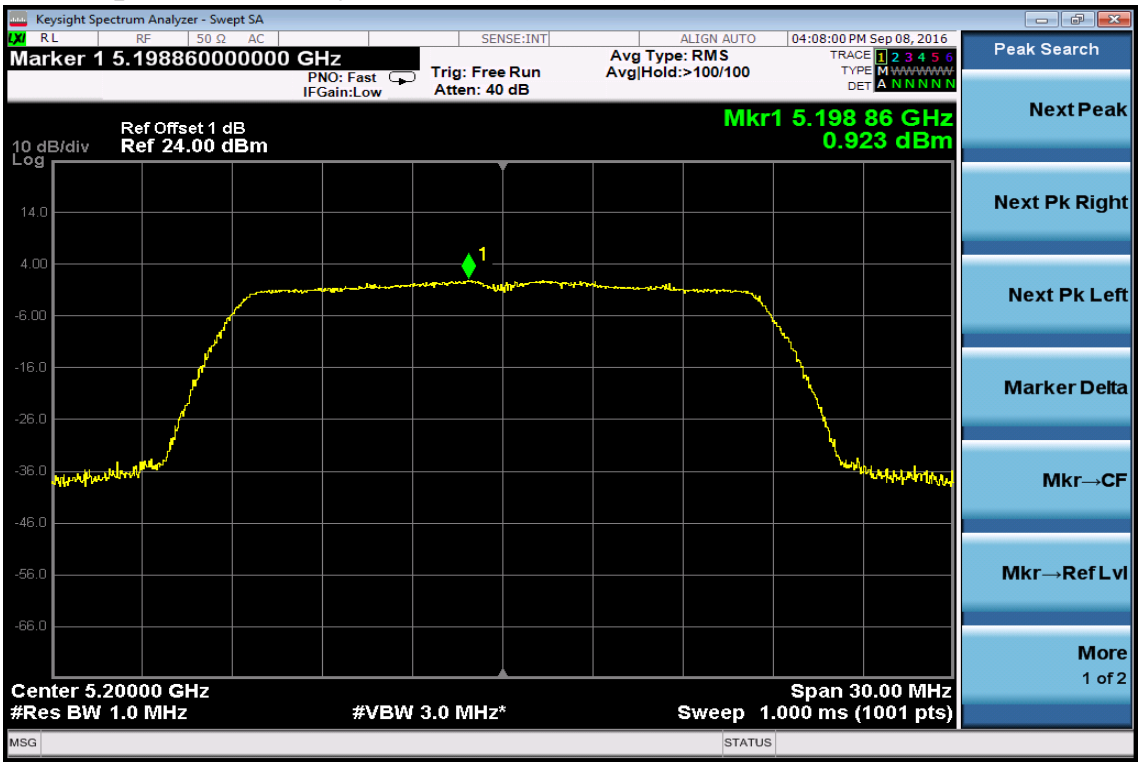


802.11n HT20 (chain a)

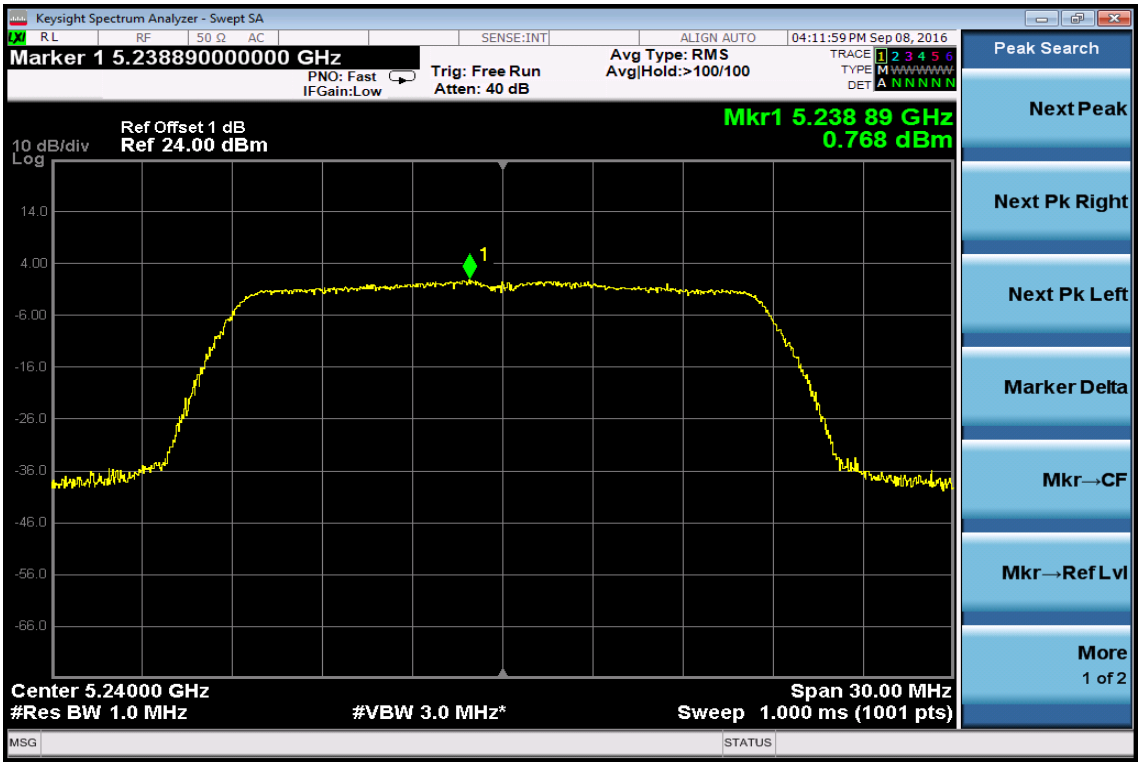
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

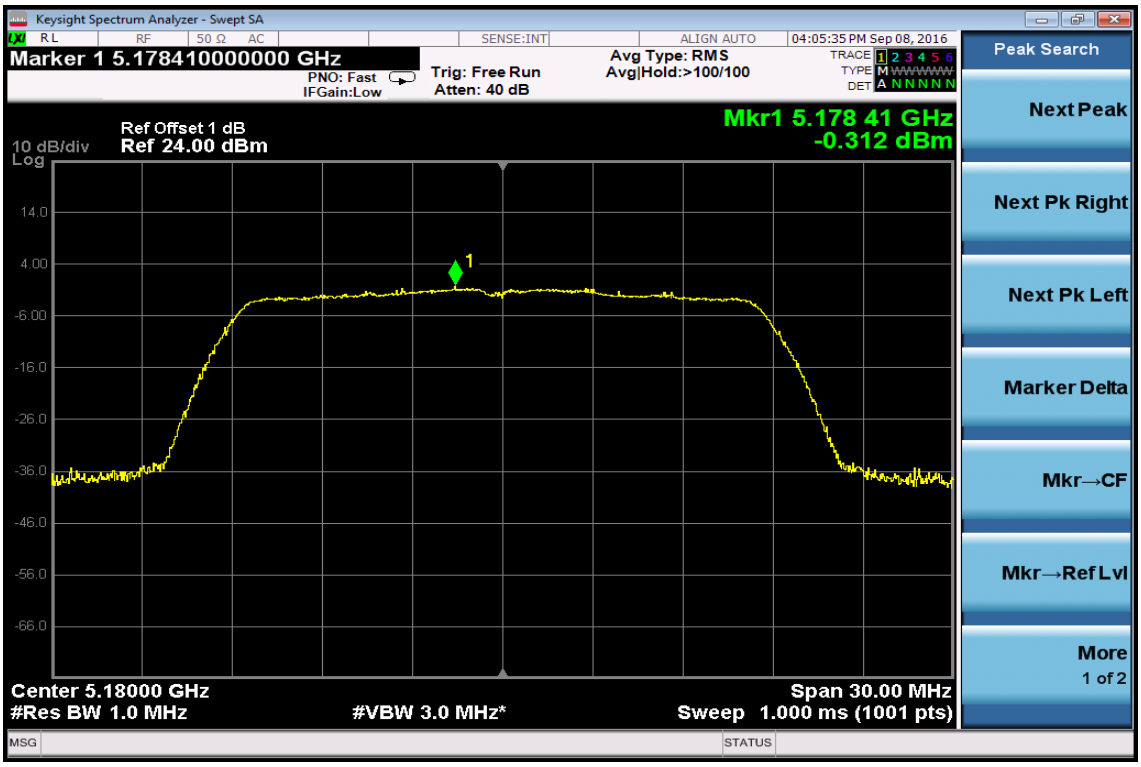


Power Spectral Density Test Plot (CH-High)

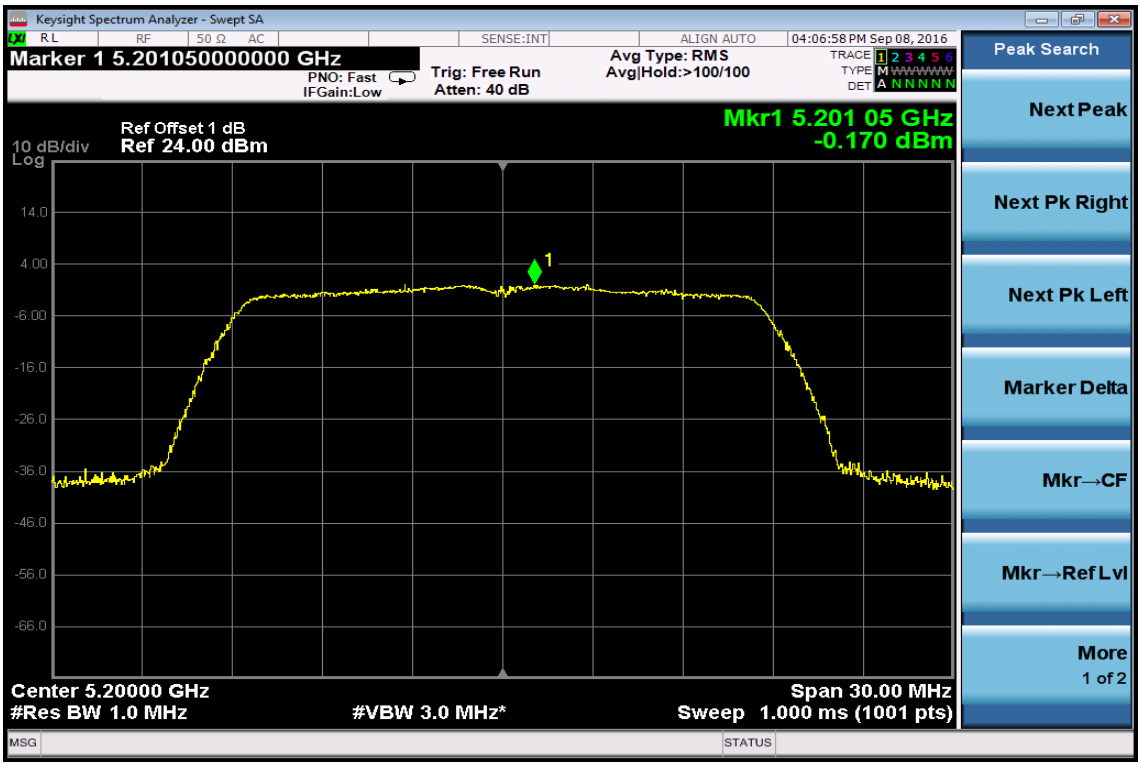


802.11n HT20 (chain b)

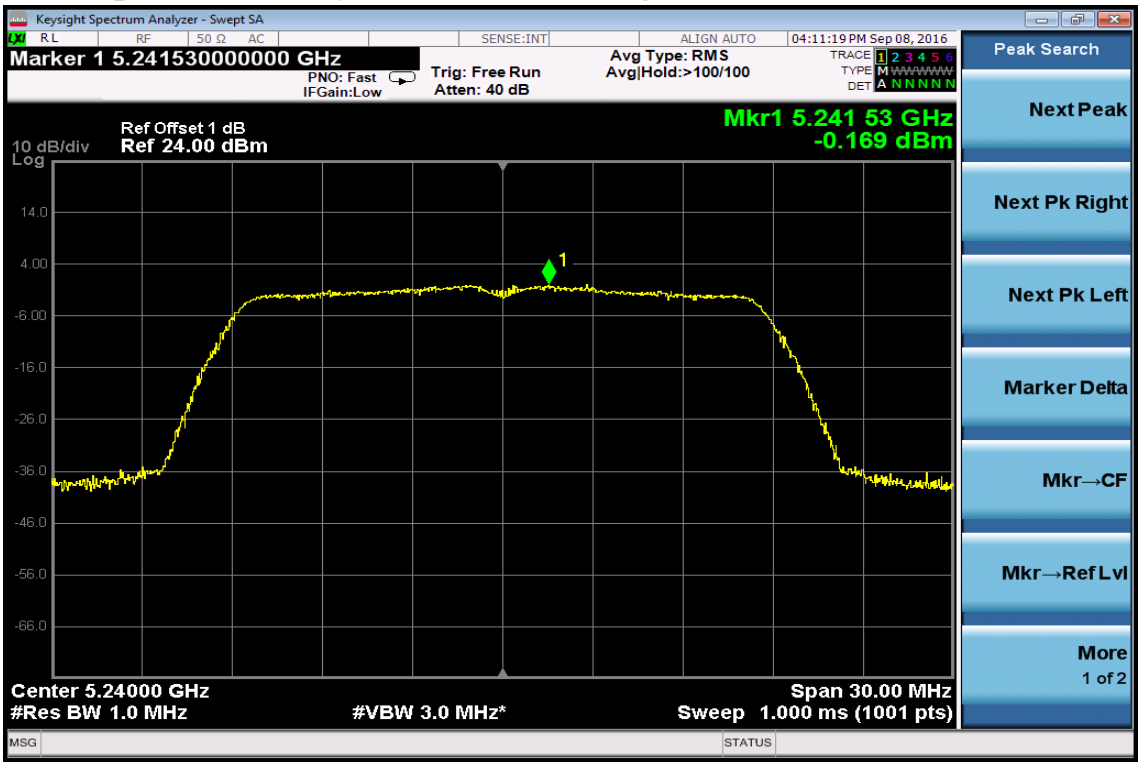
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



802.11n HT40 (chain a)

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)

802.11n HT40 (chain b)

Power Spectral Density Test Plot (CH-Low)

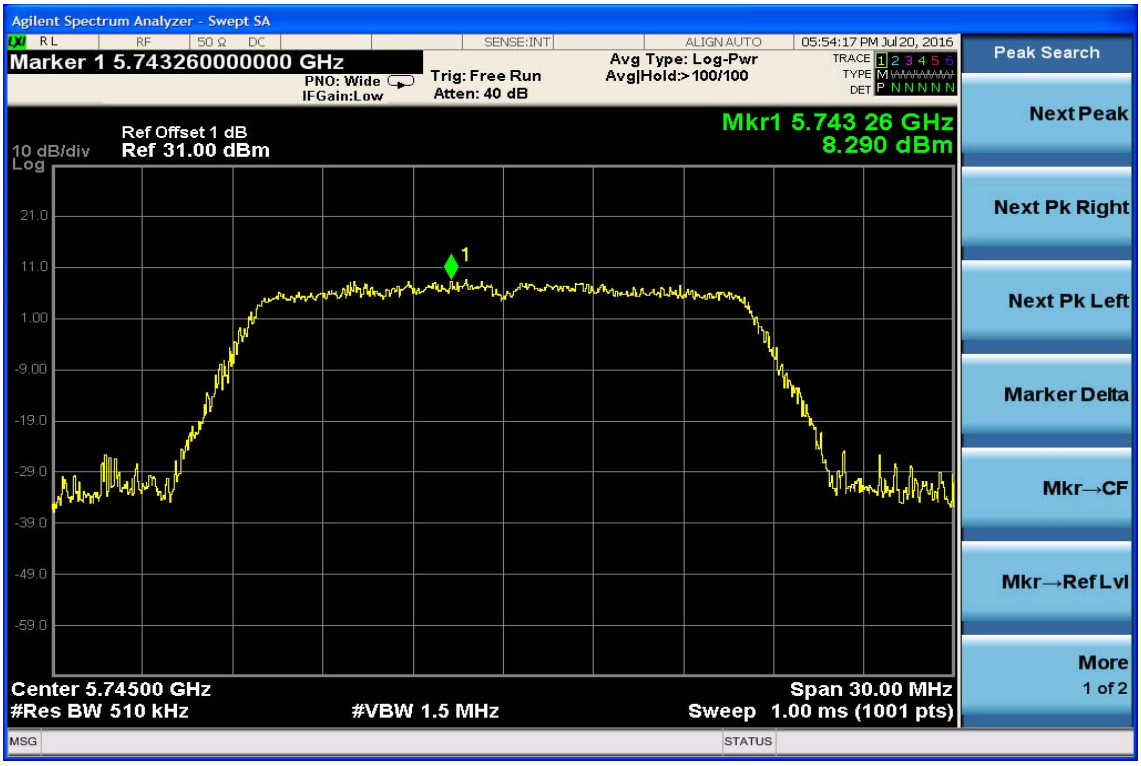
Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)

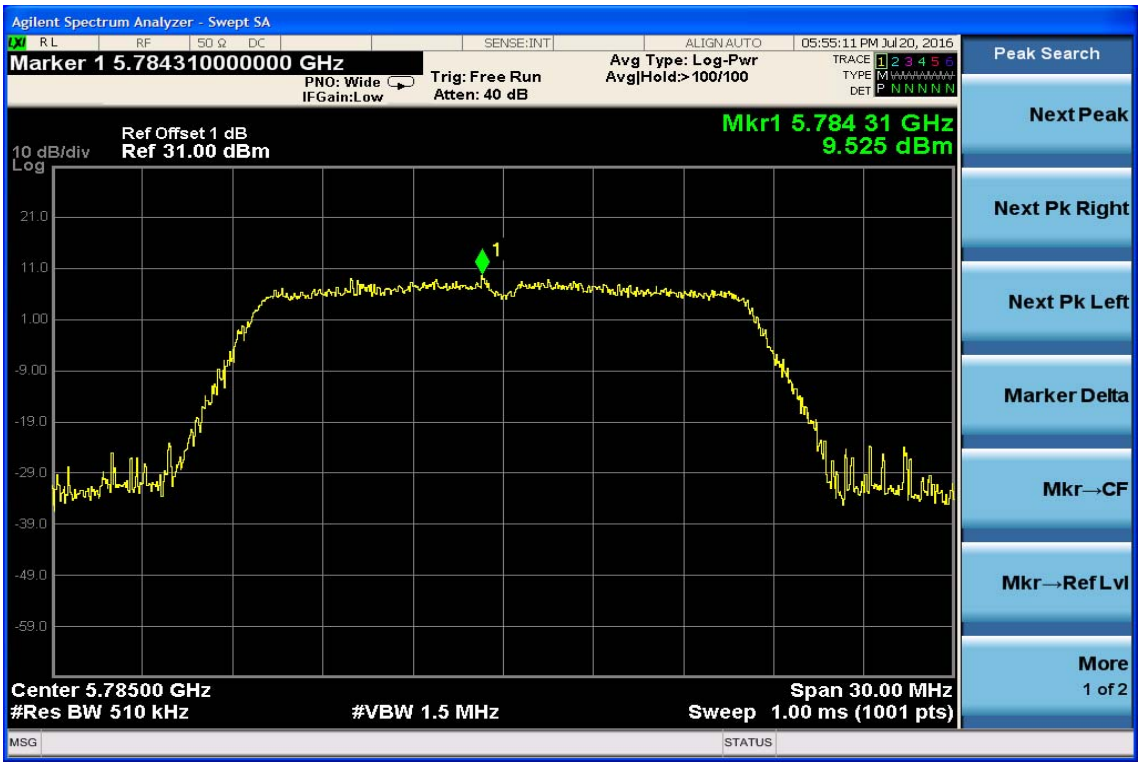
802.11AC HT80 (chain a)
Power Spectral Density Test Plot (CH-Low)

802.11AC HT80 (chain b)
Power Spectral Density Test Plot (CH-Low)

5725-5850 MHz For both FCC and IC
802.11a
Peak Power Spectral Density Data Plot (CH Low)



Peak Power Spectral Density Data Plot (CH Mid)



Peak Power Spectral Density Data Plot (CH High)

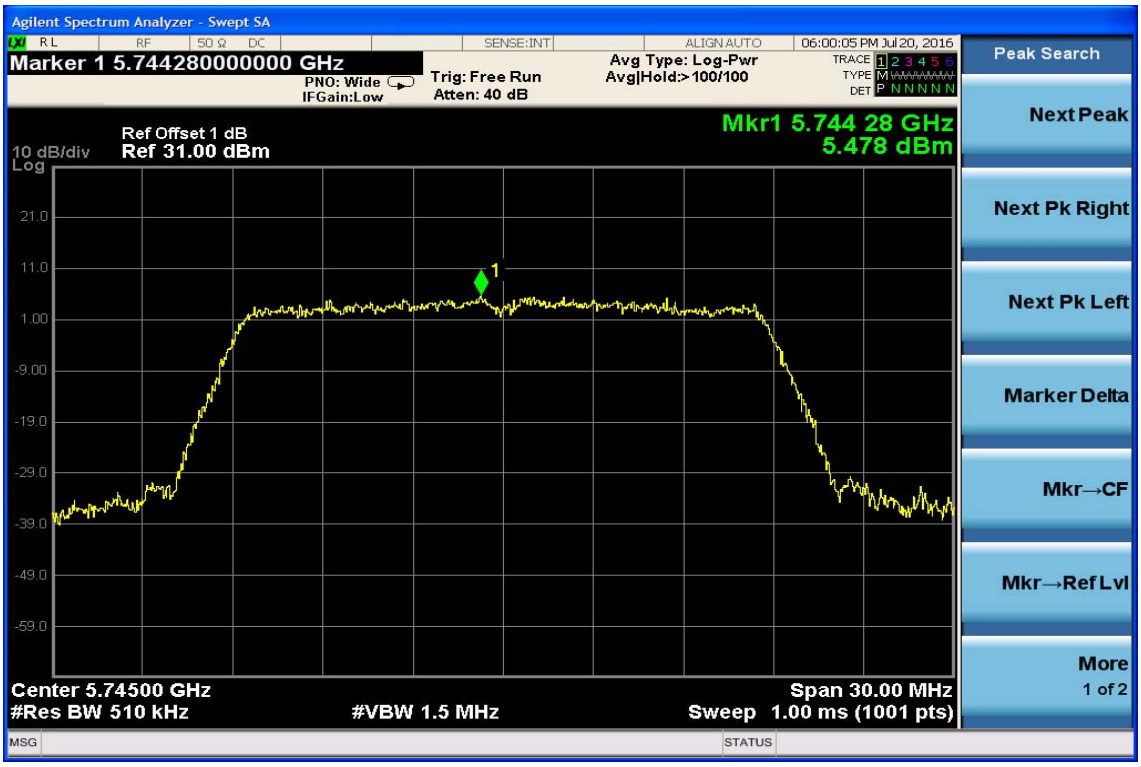
802.11n HT20 (chain a)
Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)

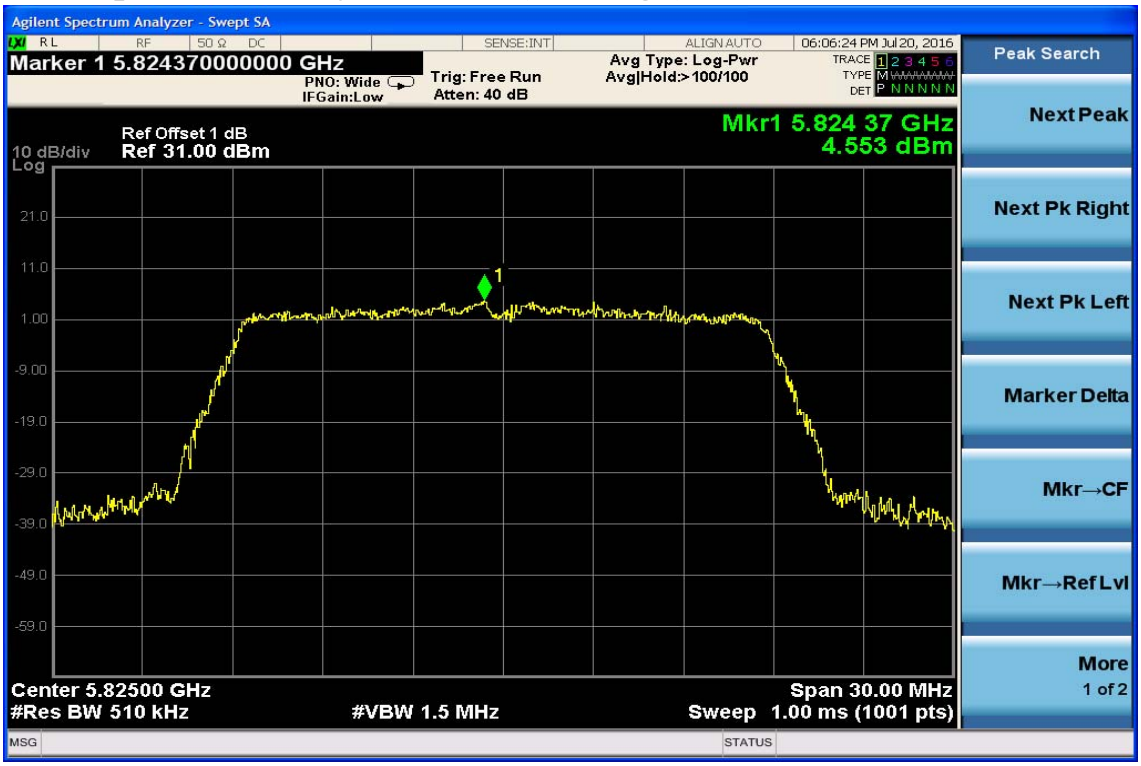
802.11n HT20 (chain b)

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)



802.11n HT40 (chain a)

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)

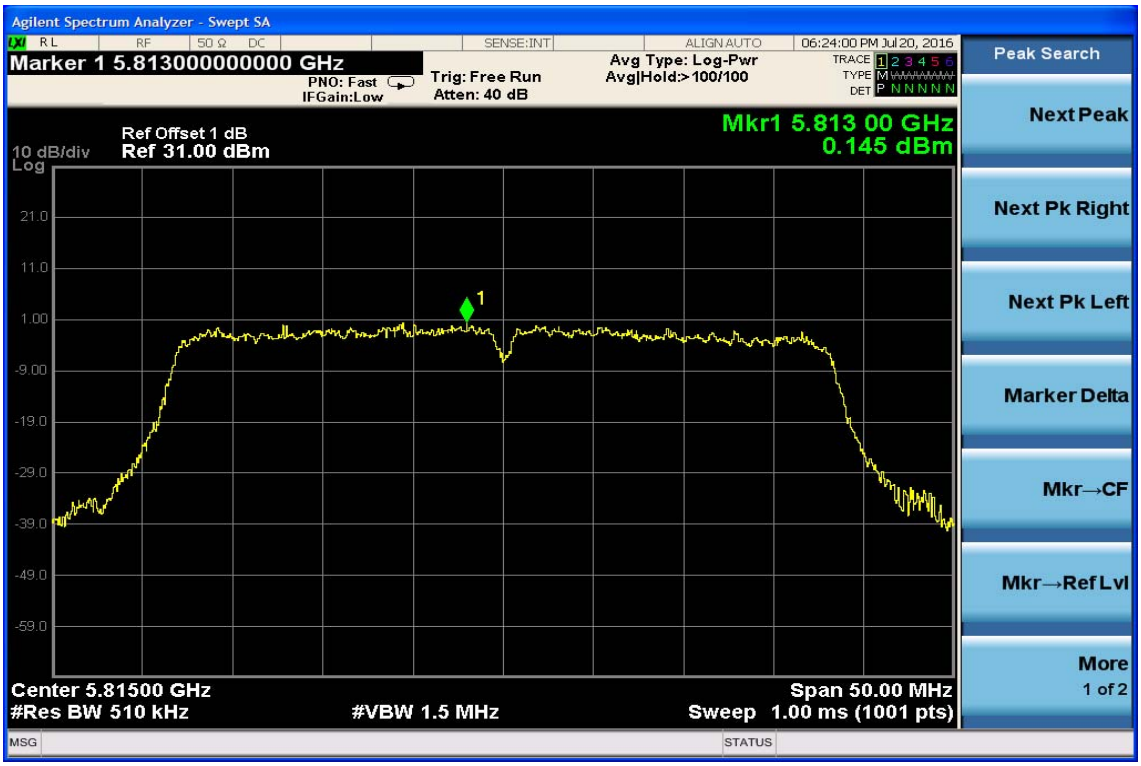
Power Spectral Density Test Plot (CH-High)

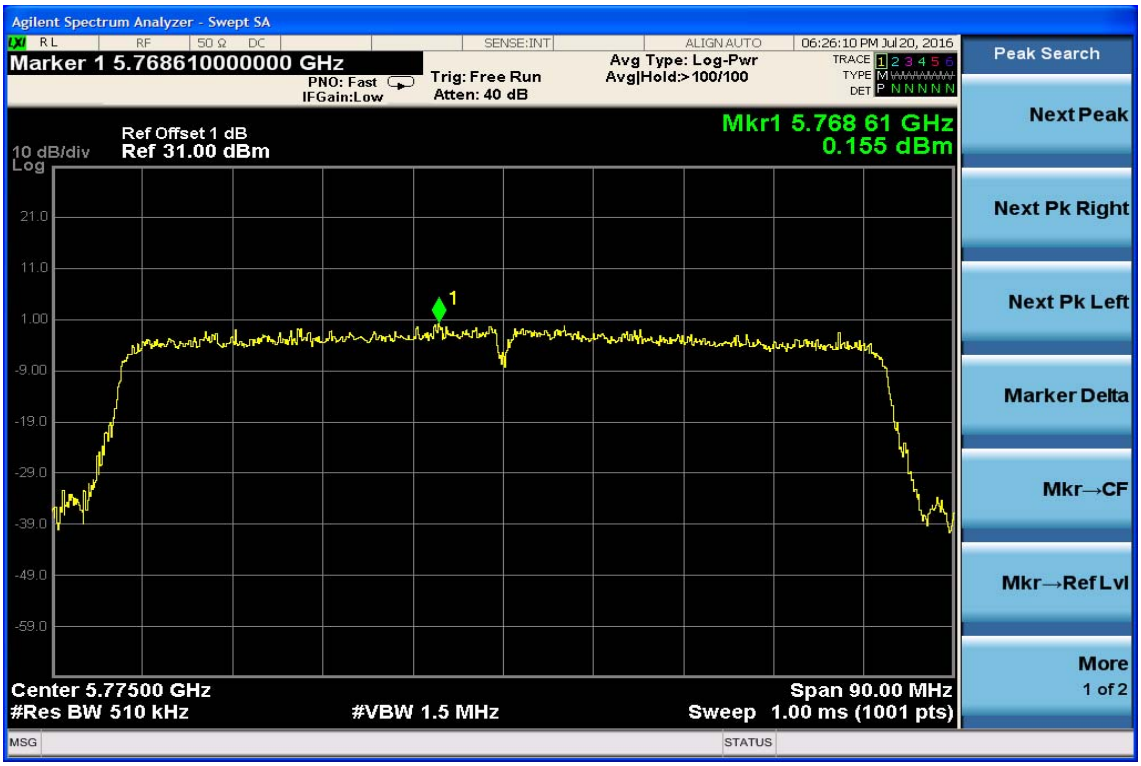
802.11n HT40 (chain b)

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)



802.11AC HT80 (chain a)
Power Spectral Density Test Plot (CH-Low)

802.11AC HT80 (chain b)
Power Spectral Density Test Plot (CH-Low)