ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENTS

OF

wireless amplifier

MODEL No.: W Amp

FCC ID: IPUWAMPLIFIER

Trade Mark: D.

REPORT NO.: ES140829426E2

ISSUE DATE: September 26, 2014

Prepared for

DEI Sales Inc. dba Definitive Technology

One Viper Way, Vista, California, United States

Prepared by

SHENZHEN EMTEK CO., LTD

Bldg 69, Majialong Industry Zone, Nanshan District,
Shenzhen, Guangdong, China
TEL: 86-755-26954280
FAX: 86-755-26954282

VERIFICATION OF COMPLIANCE

Applicant:	DEI Sales Inc. dba Definitive Technology One Viper Way, Vista, California, United States
Manufacturer:	SHENZHEN FENDA TECHNOLOGY CO., LTD. Fenda Hi-Tech Park, Zhoushi Road, Shiyan Town, Baoan District, Shenzhen City, Guangdong, China
Product Description:	wireless amplifier
Model Number:	W Amp
File Number:	ES140829426E2
Date of Test:	August 30, 2014 to September 26, 2014

We hereby certify that:

The above equipment was tested by SHENZHEN EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407 Requirements.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : August 30, 2014 to September 26, 2014

Prepared by : Jack Li/Editor

Reviewer : Joe Xia/Supervisor

Approve & Authorized Signer : Lisa Wang/Manager

Table of Contents

1. GENERAL INFORMATION 5
1.1 PRODUCT DESCRIPTION 5
1.2 RELATED SUBMITTAL(S) / GRANT(S) 6
1.3 TEST METHODOLOGY 6
1.4 SPECIAL ACCESSORIES 6
1.5 EQUIPMENT MODIFICATIONS 6
1.6 TEST FACILITY 6
2. SYSTEM TEST CONFIGURATION 7
2.1 EUT CONFIGURATION 7
2.2 EUT EXERCISE 7
2.3 TEST PROCEDURE 7
2.4 CONFIGURATION OF TESTED SYSTEM 7
3. DESCRIPTION OF TEST MODES 8
4. SUMMARY OF TEST RESULTS 9
5. CONDUCTED EMISSIONS TEST 10
5.1 MEASUREMENT PROCEDURE 10
5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 10
5.3 MEASUREMENT EQUIPMENT USED 10
5.4 CONDUCTED EMISSION LIMIT 10
5.5 MEASUREMENT RESULT 11
6. RADIATED EMISSION TEST 13
6.1 MEASUREMENT PROCEDURE 13
6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 14
6.3 MEASUREMENT EQUIPMENT USED 15
6.4 RADIATED EMISSION LIMIT 15
6.5 MEASUREMENT RESULT 17
7 26DB AND 99% BANDWIDTH TEST 25
7.1 MEASUREMENT PROCEDURE 25
7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 25
7.3 MEASUREMENT EQUIPMENT USED 25
7.4 MEASUREMENT RESULTS 25
8. MAXIMUM CONDUCTED OUTPUT POWER TEST 36
8.1 MEASUREMENT PROCEDURE 36
8.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 36
8.3 MEASUREMENT EQUIPMENT USED 36
8.4 CONDUCTED OUTPUT LIMIT 36
8.5 MEASUREMENT RESULTS 36
9. PEAK POWER DENSITY 39
9.1 TEST PROCEDURES 39
9.2 BLOCK DIAGRAM OF TEST SETUP 39
9.3 TEST EQUIPMENT 39
9.4 LIMIT 39
9.5 TEST RESULT 39
10. TRANSMITTER PEAK EXCURSION 50
10.1 TEST PROCEDURES 50
10.2 TEST EQUIPMENT 50
10.3 BLOCK DIAGRAM OF TEST SETUP 50
10.4 LIMIT 50

10.5 TEST RESULT 50

11. BAND EDGE TEST 67

11.1 TEST PROCEDURES 67
11.2 ST EQUIPMENT 67
11.3 BLOCK DIAGRAM OF TEST SETUP 67
11.4 LIMIT 67
11.5 TEST RESULT 67

12. UNCERTAINTY 74

1. General Information

1.1 Product Description

A major technical descriptions of EUT is described as following:

A). Operation Frequency:
2.4G 802.11b/g/n(HT20):2412MHz-2462MHz; 802.11n(HT40): 2422MHz-2452MHz
5G 802.11a/n(HT20):5180-5240 MHz; 802.11n(HT40): 5190-5230 MHz;
B). Modulation: OFDM with BPSK/QPSK/16QAM/64QAM for 802.11a/g/n,
DSSS with DBPSK/DQPSK/CCK for 802.11b;
C). Number of Channel: 2.4G 802.11b/g/n(HT20): 11channels; 802.11n(HT40): 7channels
5G 802.11a/n(HT20): 7channels; 802.11n(HT40): 2 channels;
D).Max Peak Conducted Power: 2.4G wifi 22.48dBm, 5G wifi 15.09dBm
E). Antenna Gain: 2.0dBi for 2.4G WIFI; 2.0dBi for 5G WIFI;
F). Antenna Type: Metal antenna
G). Power Supply: AC 100-240V~50/60Hz

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	48	5240
38	5190		
40	5200		
42	5210		
44	5220		
46	5230		

Note:
1. This device is included 802.11b, 802.11g, 802.11n 2.4GHz and 802.11a/n 5GHz transceiver function.
2. Test of channel was included the lowest middle and highest frequency in lowest data rate and to perform the test, then record on this report.

1.2 Related Submittal(s) / Grant(s)

This submittal(s) (test report) is intended for FCC ID: IPUWAMPLIFIER filing to comply with Section 15.407 of the FCC Part 15, Subpart C Rules.
The composite system is compliance with Subpart B is authorized under a DOC procedure.

1.3 Test Methodology

All the test program has follow FCC new test procedure KDB789033 D01v01r04, Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2009). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description

EMC Lab.	:	Accredited by CNAS, 2013.10.29 The certificate is valid until 2016.10.28 The Laboratory has been assessed and proved to be in compliance with CNAS/CL01: 2006(identical to ISO/IEC17025: 2005) The Certificate Registration Number is L2291 Accredited by TUV Rheinland Shenzhen 2010.5.25 The Laboratory has been assessed according to the requirements ISO/IEC 17025 Accredited by FCC, October 28, 2010 The Certificate Registration Number is 406365. Accredited by Industry Canada, March 05, 2010 The Certificate Registration Number is 46405-4480.
Name of Firm	:	SHENZHEN EMTEK CO., LTD.
Site Location	:	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

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 Transmitter was operated in the normal operating mode. The TX frequency was fixed which 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 13.1.4.1 of ANSI C63.4-2009 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR 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 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 according to the requirements in Section 13.1.4.1 of ANSI C63.4-2009.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

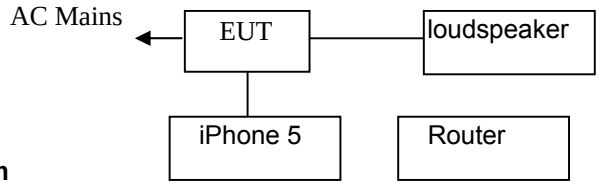


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	wireless amplifier	D.	W Amp	IPUWAMPLIFIER	N/A	EUT
2.	Mobile Phone	Apple	iPhone 5/A1526	BCG-E2694A	N/A	accessory equipment
3.	Router	TP-Link	TL-WR841HP	TE7WR841HP	N/A	accessory equipment

Note:
(1) Unless otherwise denoted as EUT in『Remark』column, device(s) used in tested system is a support equipment.

3. Description of Test Modes

These is Digital Transmission system (DTS) and have modulation OFDM, DSSS, DBPSK, DQPSK, CCK, 16QAM, 64QAM. According exploratory test, EUT will have maximum output power in those data rate (802.11a/n: MCS0), so those data rate were used for all test.
The equipment enables high-speed access without wires to network assets. This adapter uses the IEEE 802.11 protocol to enable wireless communications between the host and Wireless rooter.

For 802.11a/n(HT20):
1. For lowest channel : 5180MHz (Channel 36)
2. For middle channel : 5210MHz (Channel 42)
3. For highest channel : 5240MHz (Channel 48)

For 802.11n(HT40):
4. For lowest channel : 5190MHz (Channel 38)
5. For highest channel : 5230MHz (Channel 46)

4. Summary of Test Results

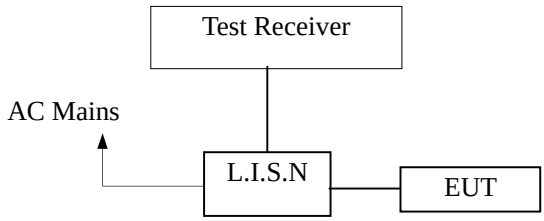
FCC Rules	Description Of Test	Result
§15.207	AC Power Conducted Emission	Pass
§15.407(b), §15.209	Radiated Emission	Pass
§15.407 (a)	26dB bandwidth and 99%dB Bandwidth	Pass
§15.407 (a)	Maximum conducted output Power	Pass
§15.407 (a)	Power density	Pass
§15.407 (b)	Band edge test	Pass
§15.407 (a)	Peak Excursion	Pass

5. Conducted Emissions Test

5.1 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.

5.2 Test SET-UP (Block Diagram of Configuration)



5.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/17/2014	05/16/2015
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/17/2014	05/16/2015
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/17/2014	05/16/2015

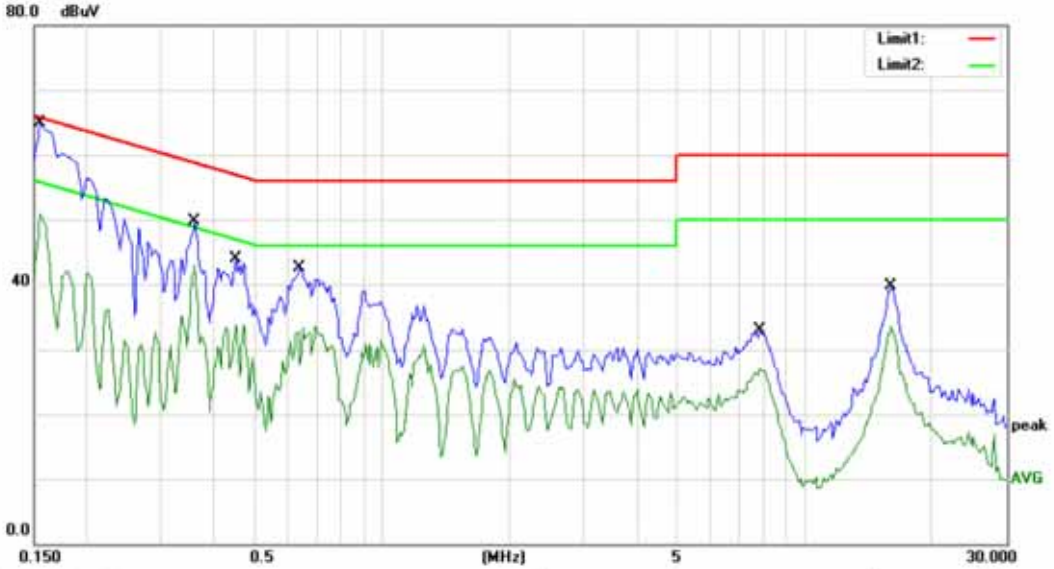
5.4 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

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

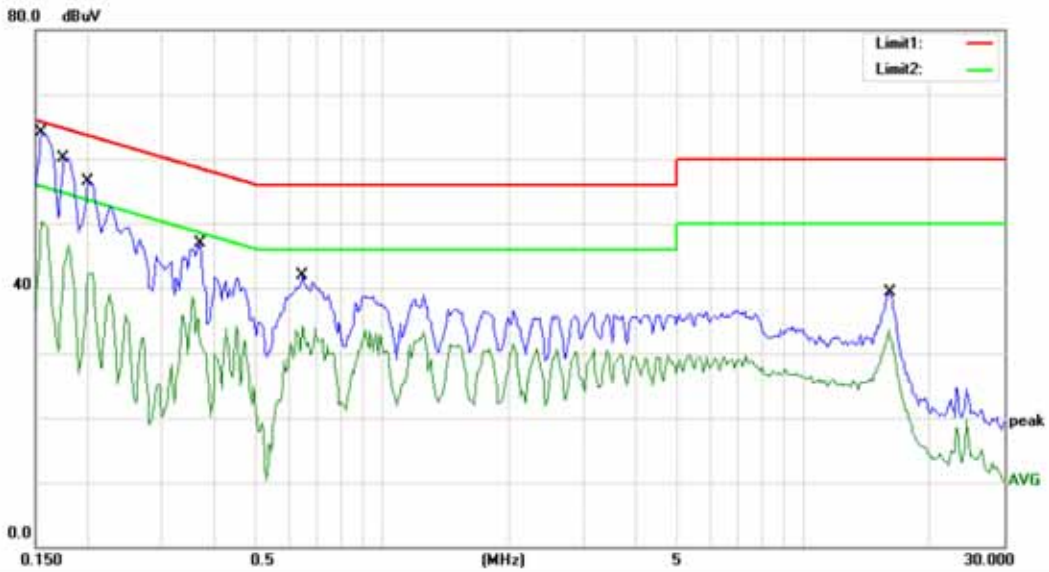
5.5 Measurement Result



Site Conduction #1 Phase: L1 Temperature: 26
Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 60 %
Mode: WIFI ON
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1550	61.82	0.00	61.82	65.73	-3.91	QP	
2		0.1550	50.83	0.00	50.83	55.73	-4.90	AVG	
3		0.3600	49.68	0.00	49.68	58.73	-9.05	QP	
4		0.3600	42.91	0.00	42.91	48.73	-5.82	AVG	
5		0.4500	43.86	0.00	43.86	56.88	-13.02	QP	
6		0.4500	33.71	0.00	33.71	46.88	-13.17	AVG	
7		0.6400	42.45	0.00	42.45	56.00	-13.55	QP	
8		0.6400	33.54	0.00	33.54	46.00	-12.46	AVG	
9		7.8300	32.92	0.00	32.92	60.00	-27.08	QP	
10		7.8300	27.02	0.00	27.02	50.00	-22.98	AVG	
11		15.9750	39.66	0.00	39.66	60.00	-20.34	QP	
12		15.9750	33.55	0.00	33.55	50.00	-16.45	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: ZHL



Site Conduction #1 Phase: N Temperature: 26
Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 60 %
Mode: WIFI ON
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1550	62.10	0.00	62.10	65.73	-3.63	QP	
2		0.1550	50.30	0.00	50.30	55.73	-5.43	AVG	
3		0.1750	60.17	0.00	60.17	64.72	-4.55	QP	
4		0.1750	46.65	0.00	46.65	54.72	-8.07	AVG	
5		0.2000	56.43	0.00	56.43	63.61	-7.18	QP	
6		0.2000	42.26	0.00	42.26	53.61	-11.35	AVG	
7		0.3700	46.81	0.00	46.81	58.50	-11.69	QP	
8		0.3700	38.74	0.00	38.74	48.50	-9.76	AVG	
9		0.6450	41.89	0.00	41.89	56.00	-14.11	QP	
10		0.6450	34.08	0.00	34.08	46.00	-11.92	AVG	
11		16.1000	39.30	0.00	39.30	60.00	-20.70	QP	
12		16.1000	32.30	0.00	32.30	50.00	-17.70	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: ZHL

6. Radiated Emission Test

6.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured was complete.
5. We use software control the EUT, Let EUT hopping on and transmit with highest power, All the modes GFSK, 1/4Π-DQPSK, 8DPSK have been tested and the worst result was reported with modulation GFSK. 79 Channels are provided by EUT.

Use the following spectrum analyzer settings:
When spectrum scanned from 30 MHz to 1GHz setting resolution bandwidth 120 kHz and video bandwidth 300kHz.

EMI Test Receiver	Setting
Attenuation	Auto
RB	120kHz
VB	300kHz
Detector	QP
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz.

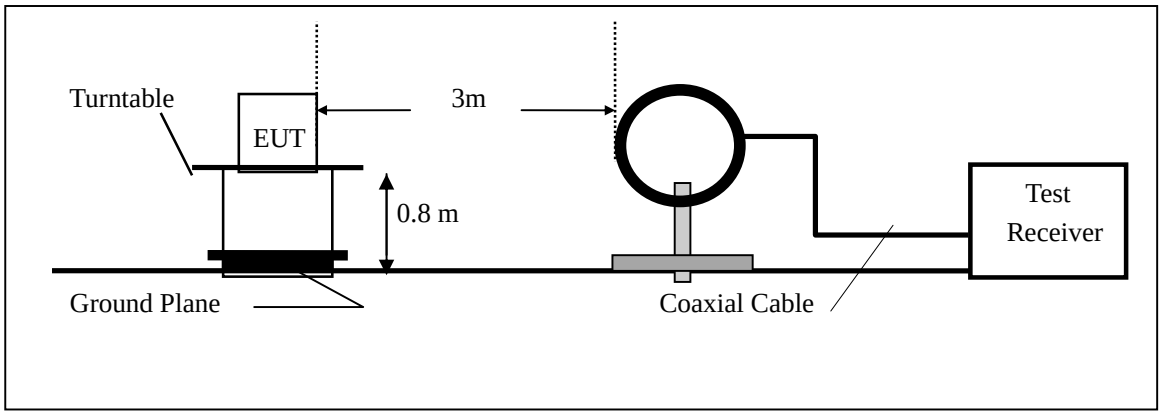
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	3MHz
Detector	Peak
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz.

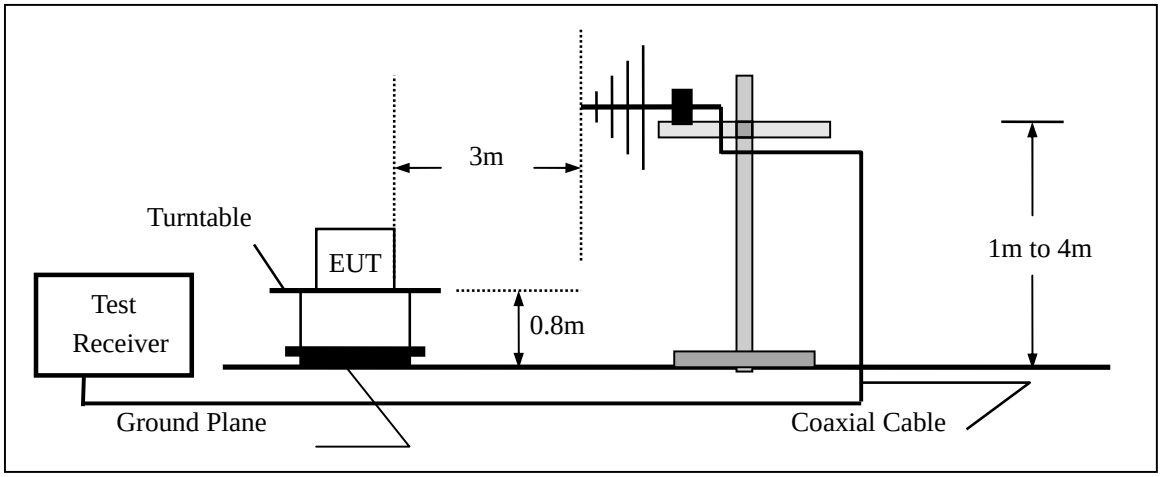
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	10Hz
Detector	Peak
Trace	Max hold

6.2 Test SET-UP (Block Diagram of Configuration)

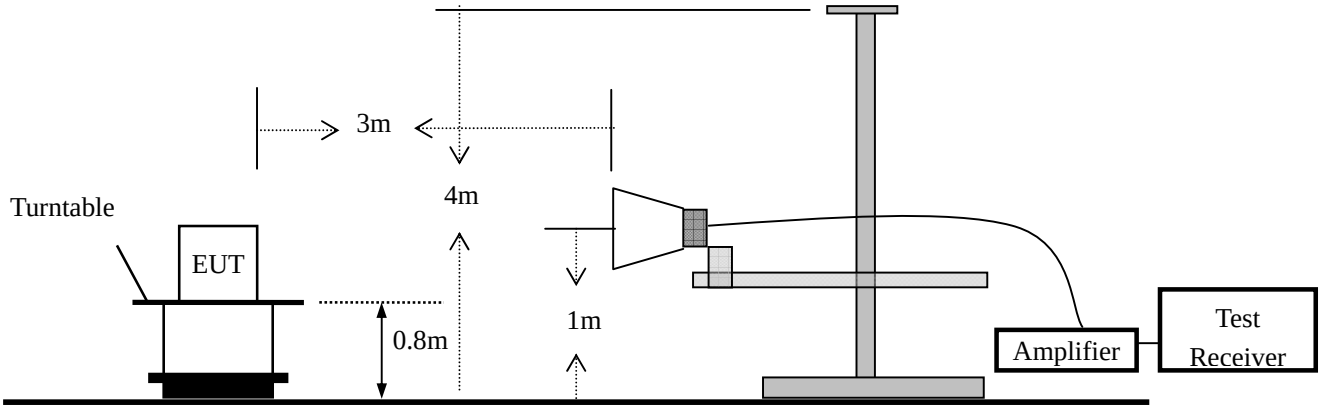
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



6.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Pre-Amplifier	HP	8447D	2944A07999	05/17/2014	05/16/2015
Spectrum Analyzer	Agilent	E4448A	56481557	05/17/2014	05/16/2015
Bilog Antenna	Schwarzbeck	VULB9163	142	05/17/2014	05/16/2015
Loop Antenna	ARA	PLA-1030/B	1029	05/17/2014	05/16/2015
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/17/2014	05/16/2015
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/17/2014	05/16/2015
Pre-Amplifier	A.H.	PAM-0126	1415261	05/17/2014	05/16/2015
Cable	Schwarzbeck	AK9513	ACRX1	05/17/2014	05/16/2015
Cable	Rosenberger	N/A	FP2RX2	05/17/2014	05/16/2015
Cable	Schwarzbeck	AK9513	CRPX1	05/17/2014	05/16/2015
Cable	Schwarzbeck	AK9513	CRRX2	05/17/2014	05/16/2015

6.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

Frequencies (MHz)	Field Strength (micorvolts/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

15.205 Restricted bands of operation

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	2690 - 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 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

6.5 Measurement Result

All the modes 802.11a/n has been tested and the worst result 802.11a recorded as below:

Operation Mode:	TX Mode	Test Date:	September 23, 2014
Frequency Range:	9KHz~30MHz	Temperature:	24℃
Test Result:	PASS	Humidity:	63 %
Measured Distance:	3m	Test By:	RU
Note:			

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

Site 3m Chamber #1 Polarization: *Horizontal* Temperature: 24 C

Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %

Mode: TX CH36

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		84.3200	45.81	-17.91	27.90	40.00	-12.10	QP			
2	*	204.6000	53.26	-15.62	37.64	43.50	-5.86	QP			
3		368.5300	46.76	-9.18	37.58	46.00	-8.42	QP			
4		418.0000	47.42	-7.94	39.48	46.00	-6.52	QP			
5		664.3800	37.93	-4.28	33.65	46.00	-12.35	QP			
6		811.8200	40.37	-2.74	37.63	46.00	-8.37	QP			

*:Maximum data x:Over limit !:over margin Operator: KK

Site 3m Chamber #1 Polarization: *Vertical* Temperature: 24 C
Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %
Mode: TX CH36
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	!	46.4900	49.50	-12.83	36.67	40.00	-3.33	QP			
2	*	87.2300	55.46	-16.96	38.50	40.00	-1.50	QP			
3		204.6000	47.22	-15.62	31.60	43.50	-11.90	QP			
4		288.9900	45.84	-10.80	35.04	46.00	-10.96	QP			
5		418.0000	40.02	-7.94	32.08	46.00	-13.92	QP			
6		811.8200	38.49	-2.74	35.75	46.00	-10.25	QP			

*:Maximum data x:Over limit !:over margin Operator: KK

Site 3m Chamber #1 Polarization: ***Horizontal*** Temperature: 24 C

Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %

Mode: TX CH42

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	204.6000	53.79	-15.62	38.17	43.50	-5.33	QP			
2		335.5500	49.35	-10.80	38.55	46.00	-7.45	QP			
3		418.0000	47.45	-7.94	39.51	46.00	-6.49	QP			
4		664.3800	37.61	-4.28	33.33	46.00	-12.67	QP			
5		811.8200	39.54	-2.74	36.80	46.00	-9.20	QP			
6		909.7900	38.40	-0.35	38.05	46.00	-7.95	QP			

*:Maximum data x:Over limit !:over margin Operator: KK

Site 3m Chamber #1 Polarization: *Vertical* Temperature: 24 C
Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %
Mode: TX CH42
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	!	45.5200	48.55	-12.25	36.30	40.00	-3.70	QP			
2	*	87.2300	54.46	-16.96	37.50	40.00	-2.50	QP			
3		204.6000	50.56	-15.62	34.94	43.50	-8.56	QP			
4		284.1400	46.18	-10.83	35.35	46.00	-10.65	QP			
5		418.0000	39.38	-7.94	31.44	46.00	-14.56	QP			
6		664.3800	37.19	-4.28	32.91	46.00	-13.09	QP			

*:Maximum data x:Over limit !:over margin Operator: KK

Site 3m Chamber #1 Polarization: *Horizontal* Temperature: 24 C
Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %
Mode: TX CH48
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	203.6300	56.15	-15.63	40.52	43.50	-2.98	QP			
2		336.5200	49.75	-10.74	39.01	46.00	-6.99	QP			
3	!	418.0000	48.85	-7.94	40.91	46.00	-5.09	QP			
4		762.3500	39.78	-2.83	36.95	46.00	-9.05	QP			
5		811.8200	42.33	-2.74	39.59	46.00	-6.41	QP			
6		861.2900	42.00	-2.52	39.48	46.00	-6.52	QP			

*:Maximum data x:Over limit !:over margin Operator: KK

Site 3m Chamber #1 Polarization: *Vertical* Temperature: 24 C
Limit: (RE)FCC PART 15 CLASS B Power: AC 120V/60Hz Humidity: 53 %
Mode: TX CH48
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	!	45.5200	48.65	-12.25	36.40	40.00	-3.60	QP			
2	*	87.2300	55.46	-16.96	38.50	40.00	-1.50	QP			
3		205.5700	51.75	-15.61	36.14	43.50	-7.36	QP			
4		284.1400	46.70	-10.83	35.87	46.00	-10.13	QP			
5		418.0000	40.26	-7.94	32.32	46.00	-13.68	QP			
6		533.4300	36.98	-5.76	31.22	46.00	-14.78	QP			

*:Maximum data x:Over limit !:over margin Operator: KK

Operation Mode:	802.11a TX Channel 36	Test Date :	September 23, 2014
Frequency Range:	1-40GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	63 %
Measured Distance:	3m	Test By:	RU

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
10354.91	V	64.62	47.27	74.00	54.00	-9.38	-6.73
--	--	--	--	--	--	--	--
10327.66	H	62.79	48.82	74.00	54.00	-11.21	-5.18

All emissions not reported were more than 20dB below the specified limit or in the noise floor.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	802.11a TX Channel 42	Test Date :	September 23, 2014
Frequency Range:	1-40GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	63 %
Measured Distance:	3m	Test By:	RU

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
10455.14	V	65.11	46.69	74.00	54.00	-8.89	-7.31
--	--	--	--	--	--	--	--
10473.20	H	64.43	45.16	74.00	54.00	-9.57	-8.84

All emissions not reported were more than 20dB below the specified limit or in the noise floor.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	802.11a TX Channel 48	Test Date :	September 23, 2014
Frequency Range:	1-40GHz	Temperature :	24℃
Test Result:	PASS	Humidity :	63 %
Measured Distance:	3m	Test By:	RU

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
10480.57	V	63.88	45.11	74.00	54.00	-10.12	-8.89
--	--	--	--	--	--	--	--
10499.01	H	60.76	43.78	74.00	54.00	-13.24	-10.22

All emissions not reported were more than 20dB below the specified limit or in the noise floor.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

7 26dB and 99% Bandwidth Test

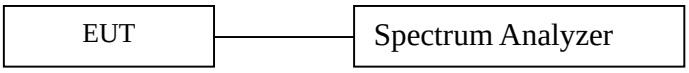
7.1 Measurement Procedure

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033, at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.
The 26 dB bandwidth is used to determine the conducted power limits.

1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

The following procedure shall be used for measuring (99 %) power bandwidth.
1) Set center frequency to the nominal EUT channel center frequency.
2) Set span = 1.5 times to 5.0 times the OBW.
3) Set RBW = 1 % to 5 % of the OBW
4) Set VBW ≥ 3 · RBW
5) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

7.2 Test SET-UP (Block Diagram of Configuration)



7.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	88156318	05/17/2014	05/16/2015
Signal Analyzer	Agilent	N9010A	My53470879	05/17/2014	05/16/2015

7.4 Measurement Results

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %

Operation Mode: 802.11a

Channel number	Channel frequency (MHz)	26dB Bandwidth (MHz)
36	5180	21.74
42	5210	21.71
48	5240	20.20

Center Freq 5.210000000 GHz
Center Freq: 5.210000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 12.00 dBm
Center Freq
5.210000000 GHz
Center 5.21 GHz
#Res BW 200 kHz
#VBW 1 MHz
Span 40 MHz
Sweep 1 ms
CF Step
4.000000 MHz
Auto
Man
Occupied Bandwidth
16.708 MHz
Total Power
17.1 dBm
Freq Offset
0 Hz
Transmit Freq Error
-3.514 kHz
OBW Power
99.00 %
x dB Bandwidth
21.71 MHz
x dB
-26.00 dB

Center Freq 5.240000000 GHz
Center Freq: 5.240000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 12.00 dBm
Center Freq
5.240000000 GHz
Center 5.24 GHz
#Res BW 200 kHz
#VBW 1 MHz
Span 40 MHz
Sweep 1 ms
CF Step
4.000000 MHz
Auto
Man
Occupied Bandwidth
16.669 MHz
Total Power
16.5 dBm
Freq Offset
0 Hz
Transmit Freq Error
9.078 kHz
OBW Power
99.00 %
x dB Bandwidth
20.20 MHz
x dB
-26.00 dB

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %

Operation Mode: 802.11n(HT20)

Channel number	Channel frequency (MHz)	26dB Bandwidth (MHz)
36	5180	20.67
42	5210	20.35
48	5240	20.48

Center Freq 5.210000000 GHz
Center Freq: 5.210000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 12.00 dBm
Center Freq
5.210000000 GHz
Center 5.21 GHz
#Res BW 200 kHz
#VBW 1 MHz
Span 40 MHz
Sweep 1 ms
CF Step
4.000000 MHz
Auto
Man
Occupied Bandwidth
17.826 MHz
Total Power
16.7 dBm
Transmit Freq Error
-4.446 kHz
OBW Power
99.00 %
x dB Bandwidth
20.35 MHz
x dB
-26.00 dB
Freq Offset
0 Hz

Center Freq 5.240000000 GHz
Center Freq: 5.240000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 12.00 dBm
Center Freq
5.240000000 GHz
Center 5.24 GHz
#Res BW 200 kHz
#VBW 1 MHz
Span 40 MHz
Sweep 1 ms
CF Step
4.000000 MHz
Auto
Man
Occupied Bandwidth
17.810 MHz
Total Power
16.8 dBm
Transmit Freq Error
-4.657 kHz
OBW Power
99.00 %
x dB Bandwidth
20.48 MHz
x dB
-26.00 dB
Freq Offset
0 Hz

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %

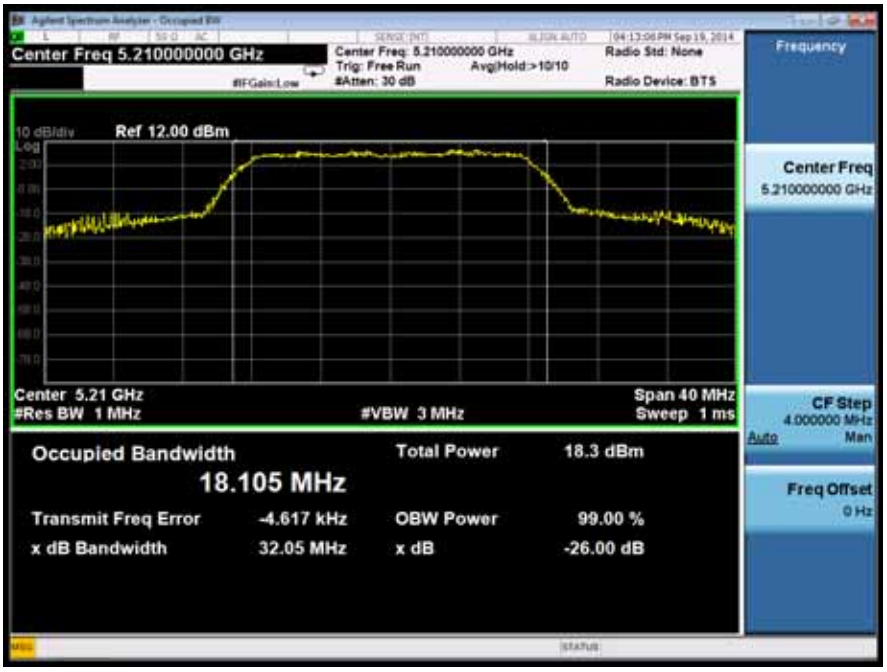
Operation Mode: 802.11n(HT40)

Channel number	Channel frequency (MHz)	26dB Bandwidth (MHz)
38	5190	41.10
46	5230	56.40

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %

Operation Mode: 802.11a

Channel number	Channel frequency (MHz)	99%dB Bandwidth (MHz)
36	5180	18.331
42	5210	18.105
48	5240	18.053


Center Freq 5.210000000 GHz
Center Freq: 5.210000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 12.00 dBm
Center Freq
5.210000000 GHz
Center 5.21 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 40 MHz
Sweep 1 ms
CF Step
4.000000 MHz
Auto
Man
Occupied Bandwidth
18.105 MHz
Total Power
18.3 dBm
Transmit Freq Error
-4.617 kHz
OBW Power
99.00 %
x dB Bandwidth
32.05 MHz
x dB
-26.00 dB
Freq Offset
0 Hz

Center Freq 5.240000000 GHz
Center Freq: 5.240000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 12.00 dBm
Center Freq
5.240000000 GHz
Center 5.24 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 40 MHz
Sweep 1 ms
CF Step
4.000000 MHz
Auto
Man
Occupied Bandwidth
18.053 MHz
Total Power
17.8 dBm
Transmit Freq Error
-40.510 kHz
OBW Power
99.00 %
x dB Bandwidth
22.97 MHz
x dB
-26.00 dB
Freq Offset
0 Hz

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %

Operation Mode: 802.11n(HT20)

Channel number	Channel frequency (MHz)	99%dB Bandwidth (MHz)
36	5180	18.465
42	5210	18.559
48	5240	18.466

Center Freq 5.210000000 GHz
Center Freq: 5.210000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 12.00 dBm
Center Freq
5.210000000 GHz
Center 5.21 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 40 MHz
Sweep 1 ms
CF Step
4.000000 MHz
Auto
Man
Occupied Bandwidth
18.559 MHz
Total Power
18.3 dBm
Freq Offset
0 Hz
Transmit Freq Error
16.142 kHz
OBW Power
99.00 %
x dB Bandwidth
34.93 MHz
x dB
-26.00 dB

VBW 3.0000 MHz
Center Freq: 5.240000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Trace/Detector
10 dB/div
Ref 12.00 dBm
Clear Write
Average
Max Hold
Min Hold
Center 5.24 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 40 MHz
Sweep 1 ms
Occupied Bandwidth
18.466 MHz
Total Power
18.0 dBm
Detector
Peak
Auto
Man
Transmit Freq Error
-978 Hz
OBW Power
99.00 %
x dB Bandwidth
27.17 MHz
x dB
-26.00 dB

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %

Operation Mode: 802.11n(HT40)

Channel number	Channel frequency (MHz)	99% Bandwidth (MHz)
38	5190	36.989
46	5230	36.921

8 Maximum Conducted Output Power Test

8.1 Measurement Procedure

The maximum average conducted output power can be measured using Method PM-G (Measurement using a gated RF average power meter):
Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

a. The Transmitter output (antenna port) was connected to the power meter.
b. Turn on the EUT and power meter and then record the power value.
c. Repeat above procedures on all channels needed to be tested.

8.2 Test SET-UP (Block Diagram of Configuration)

8.3 Measurement Equipment Used

EQUIPMENT TYPE	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power meter	ML2495A	0824006	05/17/2014	05/16/2015
Power sensor	MA2411B	0738172	05/17/2014	05/16/2015

8.4 Conducted output limit

Band 5.15-5.25GHz:

The maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm+10log B, where B is the-26dB emission bandwidth in MHz.

8.5 Measurement Results

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11a	Antenna:	A

Channel number	Channel Frequency(MHz)	Power output(dBm)	Power Limit(dBm) FCC	Pass/Fail
36	5180	14.46	17.00	PASS
42	5210	14.43	17.00	PASS
48	5240	**15.09**	17.00	PASS

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11a	Antenna:	B

Channel number	Channel Frequency(MHz)	Power output(dBm)	Power Limit(dBm) FCC	Pass/Fail
36	5180	14.09	17.00	PASS
42	5210	14.25	17.00	PASS
48	5240	14.29	17.00	PASS

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT20)	Antenna:	A

Channel number	Channel Frequency(MHz)	Power output(dBm)	Power Limit(dBm) FCC	Pass/Fail
36	5180	14.12	17.00	PASS
42	5210	14.50	17.00	PASS
48	5240	14.32	17.00	PASS

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT20)	Antenna:	B

Channel number	Channel Frequency(MHz)	Power output(dBm)	Power Limit(dBm) FCC	Pass/Fail
36	5180	14.00	17.00	PASS
42	5210	14.13	17.00	PASS
48	5240	14.21	17.00	PASS

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT40)	Antenna:	A

Channel number	Channel Frequency(MHz)	Power output(dBm)	Power Limit(dBm) FCC	Pass/Fail
38	5190	13.16	17.00	PASS
46	5230	13.31	17.00	PASS

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT40)	Antenna:	B

Channel number	Channel Frequency(MHz)	Power output(dBm)	Power Limit(dBm) FCC	Pass/Fail
38	5190	13.05	17.00	PASS
46	5230	13.12	17.00	PASS

7. Peak Power Density

9.1 Test Procedures

Methods refer to FCC KDB 789033

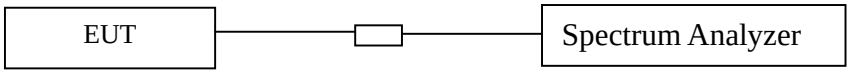
1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”.

2) Use the peak search function on the instrument to find the peak of the spectrum.

3) The result is the PPSD.

4) The above procedures make use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified in the 15.407(a)(5). That rule section also permits use of resolution bandwidths less than 1 MHz “provided that the measured power is integrated to show the total power over the measurement bandwidth” (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth

9.2 Block Diagram of Test Setup



9.3 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	88156318	05/17/2014	05/16/2015
Signal Analyzer	Agilent	N9010A	My53470879	05/17/2014	05/16/2015

9.4 Limit

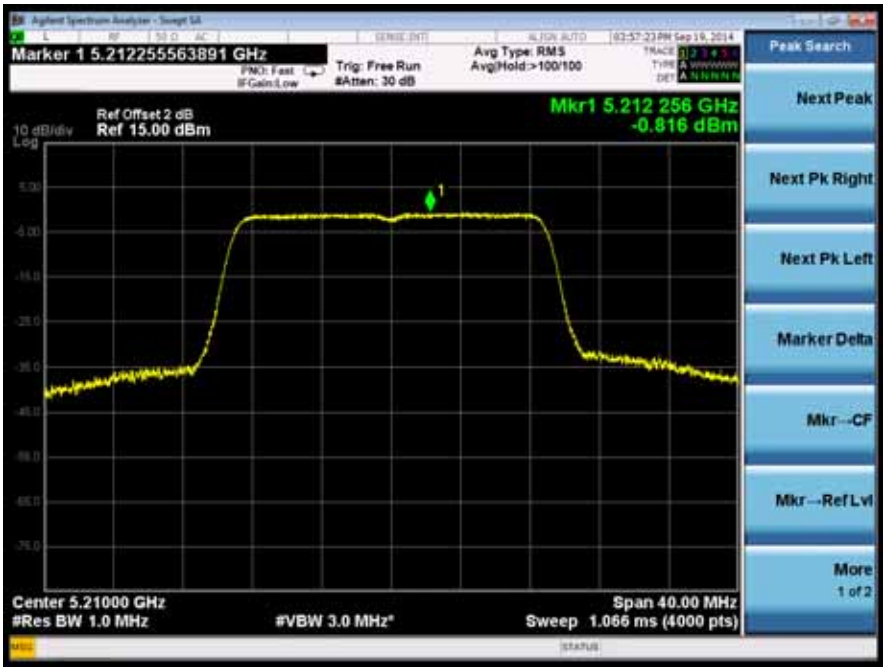
Band 5.15-5.25GHz:

FCC: the peak power spectral density shall not exceed 4 dBm in any 1MHz band.

9.5 Test Result

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11a	Antenna:	A

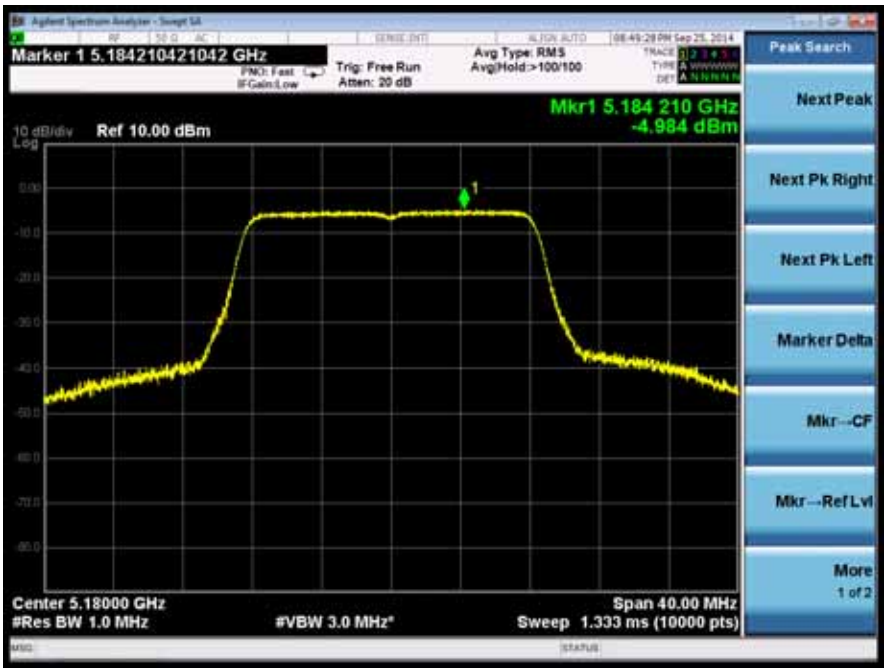
Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(dBm) FCC	Pass/Fail
36	5180	-0.744	4	PASS
42	5210	-0.816	4	PASS
48	5240	-0.849	4	PASS

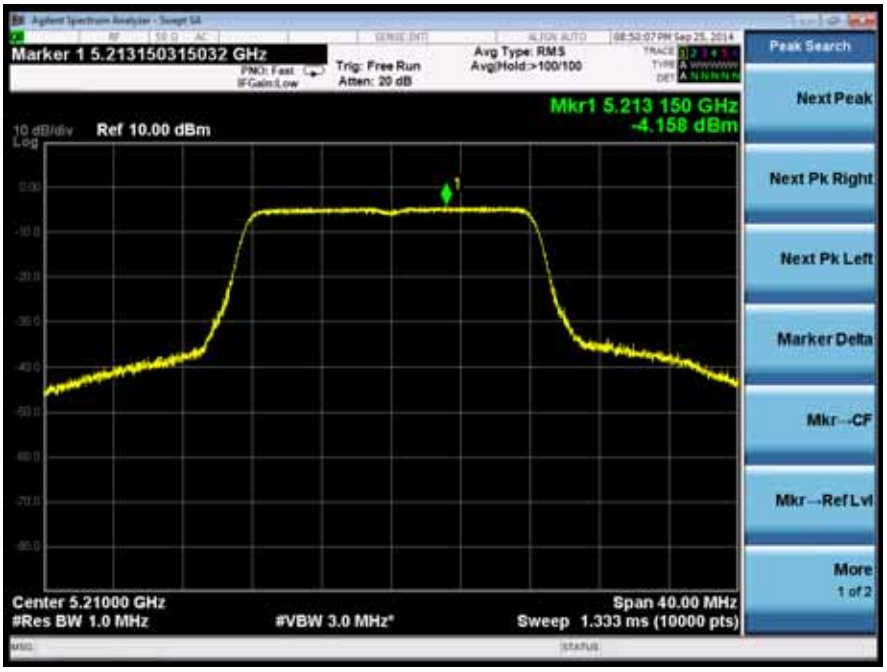

Marker 1 5.212255563891 GHz
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 2 dB
10 dB/div
Ref 15.00 dBm
Mkr1 5.212 256 GHz
-0.816 dBm
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.066 ms (4000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

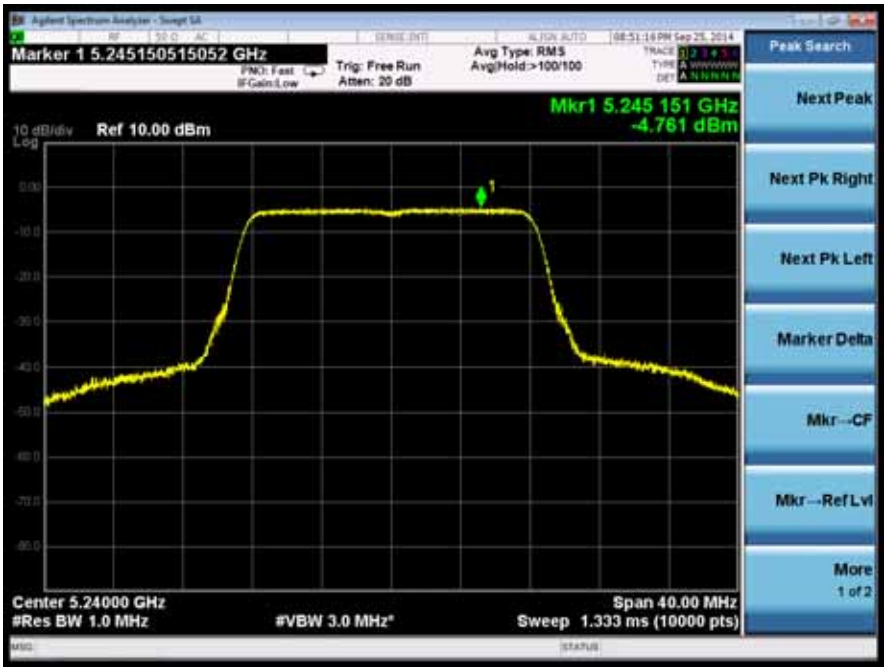
Marker 1 5.245376344086 GHz
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 2 dB
10 dB/div
Ref 15.00 dBm
Mkr1 5.245 376 GHz
-0.849 dBm
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.066 ms (4000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11a	Antenna:	B

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(dBm) FCC	Pass/Fail
36	5180	-4.984	4	PASS
42	5210	-4.158	4	PASS
48	5240	-4.761	4	PASS

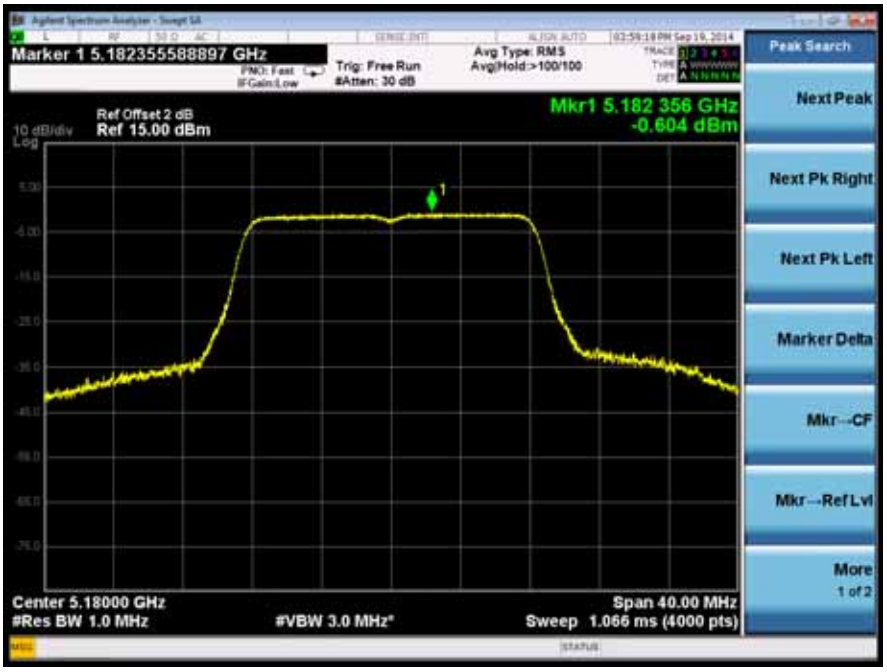



Marker 1 5.213150315032 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: RMS
Avg|Hold:>100/100
Mkr1 5.213 150 GHz
-4.158 dBm
10 dB/div
Ref 10.00 dBm
Log
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Marker 1 5.245150515052 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: RMS
Avg|Hold:>100/100
Mkr1 5.245 151 GHz
-4.761 dBm
10 dB/div
Ref 10.00 dBm
Log
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT20)	Antenna:	A

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(dBm) FCC	Pass/Fail
36	5180	-0.604	4	PASS
42	5210	-0.307	4	PASS
48	5240	-1.165	4	PASS

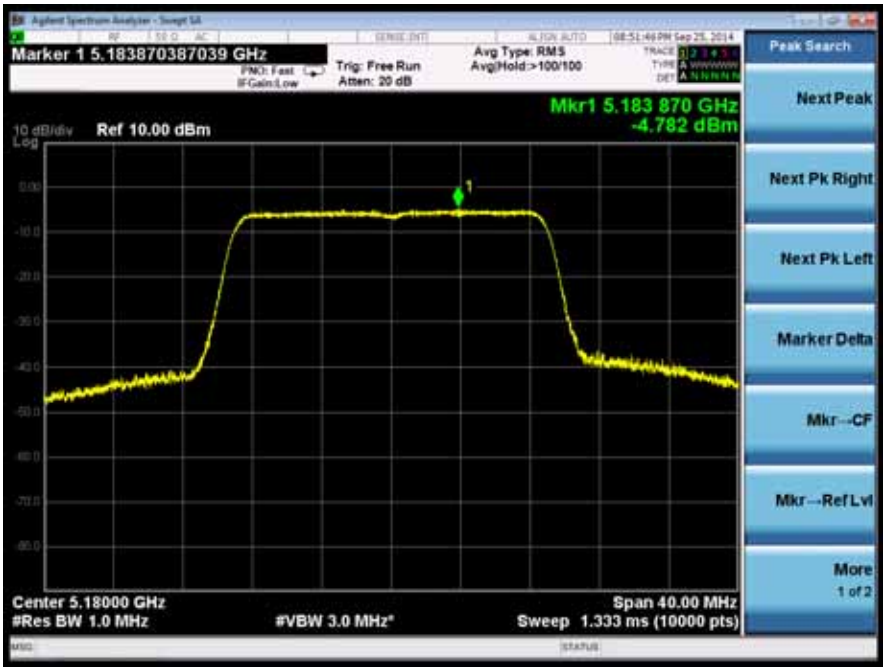


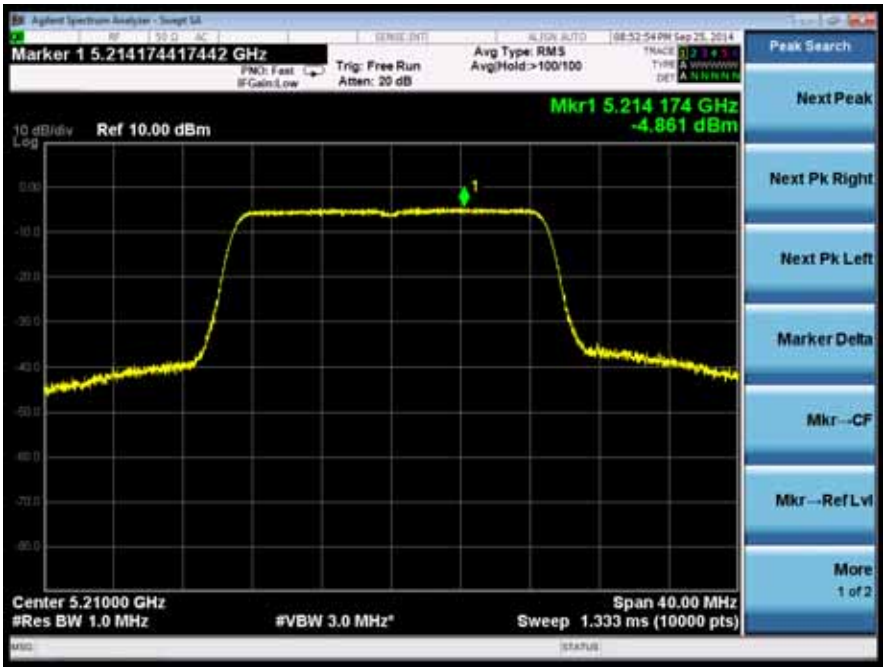
Marker 1 5.212825706427 GHz
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 2 dB
10 dB/div
Ref 15.00 dBm
Mkr1 5.212 826 GHz
-0.307 dBm
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.066 ms (4000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Marker 1 5.245356339085 GHz
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 2 dB
10 dB/div
Ref 15.00 dBm
Mkr1 5.245 356 GHz
-1.165 dBm
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.066 ms (4000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT20)	Antenna:	B

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(dBm) FCC	Pass/Fail
36	5180	-4.782	4	PASS
42	5210	-4.861	4	PASS
48	5240	-5.181	4	PASS




Marker 1 5.214174417442 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: RMS
Avg|Hold:>100/100
Mkr1 5.214 174 GHz
-4.861 dBm
10 dB/div
Log
Ref 10.00 dBm
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Marker 1 5.245554555456 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: RMS
Avg|Hold:>100/100
Mkr1 5.245 555 GHz
-5.181 dBm
10 dB/div
Log
Ref 10.00 dBm
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT40)	Antenna:	A

Channel number	Channel Frequency(MHz)	Power output(dBm)	Peak Power Limit(dBm) FCC	Pass/Fail
38	5190	-4.024	4	PASS
46	5230	-3.776	4	PASS

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT40)	Antenna:	B

Channel number	Channel Frequency(MHz)	Power output(dBm)	Peak Power Limit(dBm) FCC	Pass/Fail
38	5190	-7.978	4	PASS
46	5230	-8.121	4	PASS

8. Transmitter Peak Excursion

10.1Test Procedures

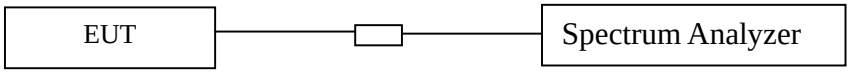
Methods refer to FCC KDB 789033

1) Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth.
2) Find the maximum of the peak-max-hold spectrum.
a) Set RBW = 1 MHz.
b) VBW ≥ 3 MHz.
c) Detector = peak.
d) Trace mode = max-hold.
e) Allow the sweeps to continue until the trace stabilizes.
f) Use the peak search function to find the peak of the spectrum.
3) Use the procedure found under 4. to measure the PPSD.
4) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

10.2Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Signal Analyzer	Agilent	N9010A	My53470879	05/17/2014	05/16/2015
Spectrum Analyzer	Agilent	E4407B	88156318	05/17/2014	05/16/2015

10.3Block Diagram of Test setup



10.4Limit

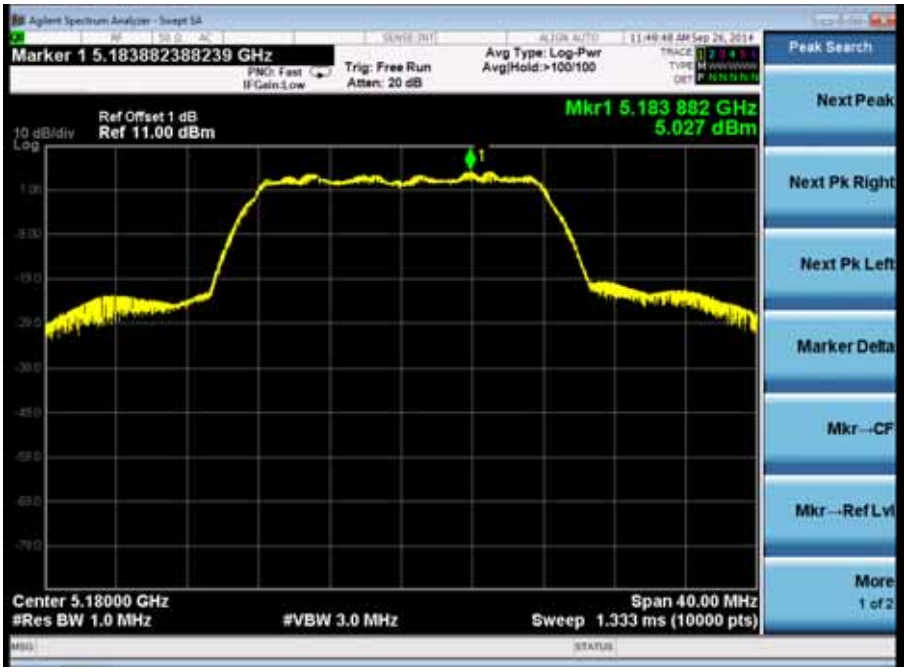
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

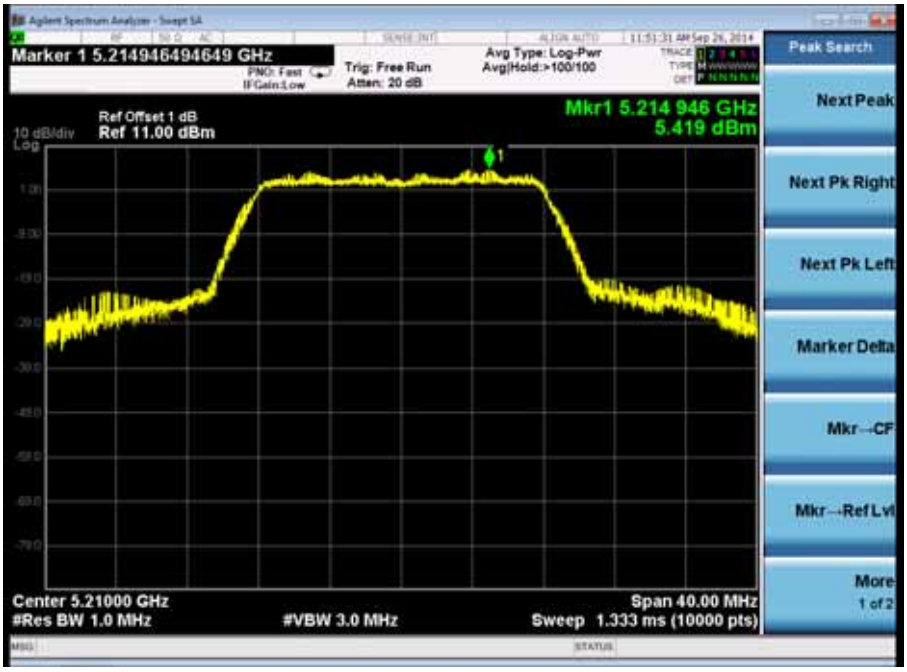
10.5Test Result

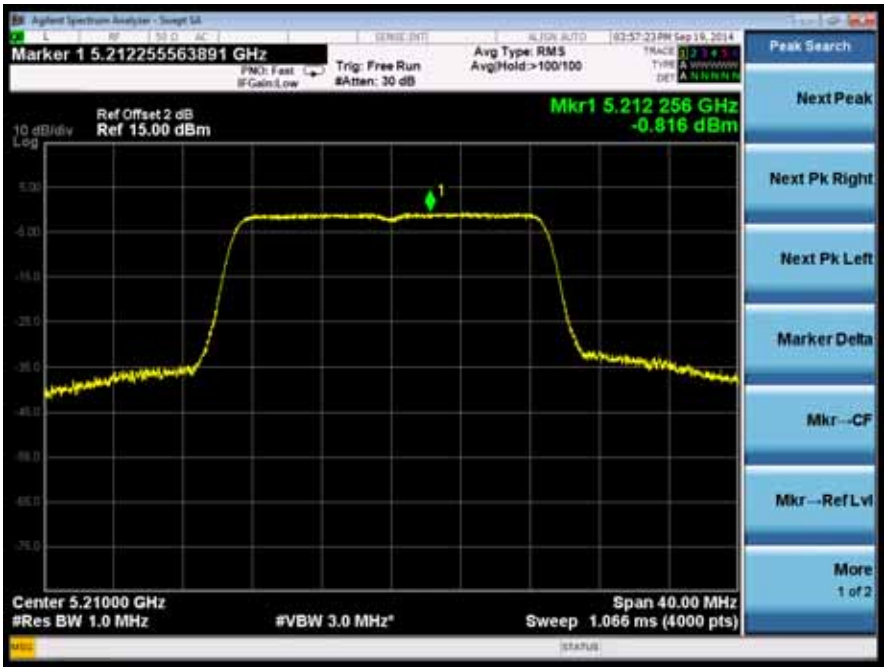
PASS.

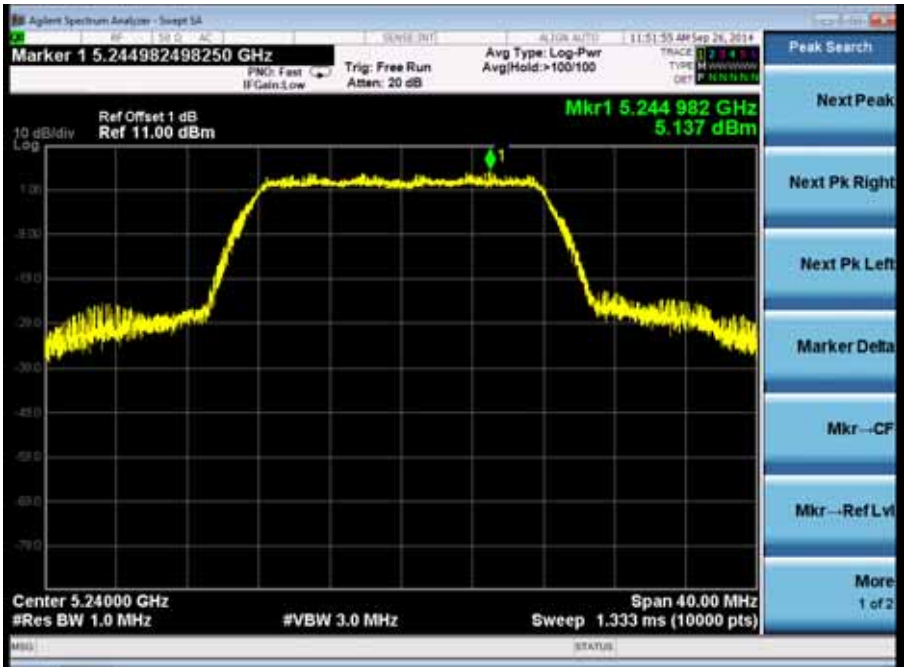
Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11a	Antenna:	A

Channel number	Channel Frequency(MHz)	Peak Excursion (dBm)	Peak Excursion Limit(dBm)	Pass/Fail
36	5180	5.771	13	Pass
42	5210	6.235	13	Pass
48	5240	5.986	13	Pass




Marker 1 5.214946494649 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ref Offset 1 dB
10 dB/div
Ref 11.00 dBm
Mkr1 5.214 946 GHz
5.419 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)

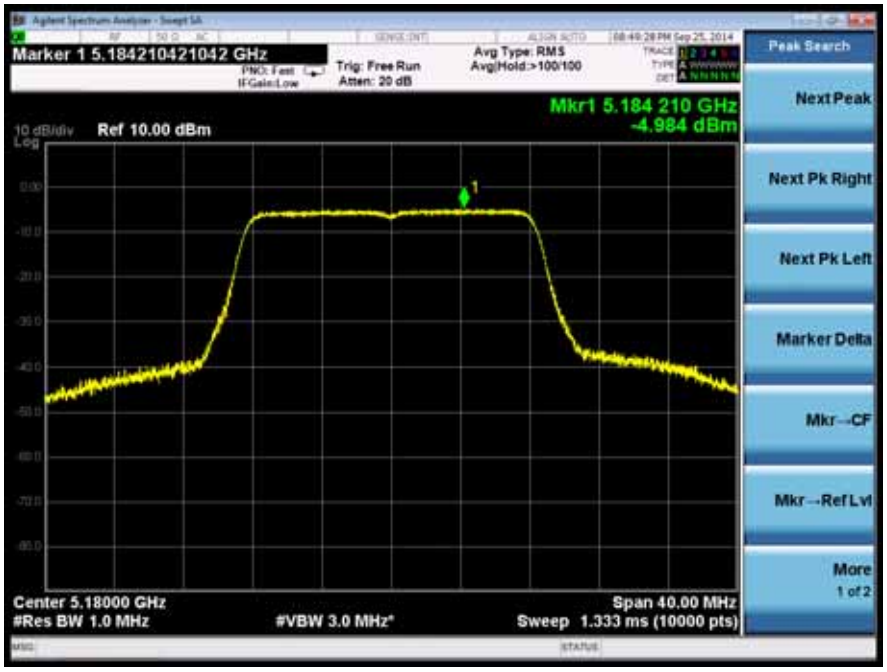

Marker 1 5.212255563891 GHz
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 2 dB
10 dB/div
Ref 15.00 dBm
Mkr1 5.212 256 GHz
-0.816 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.066 ms (4000 pts)


Marker 1 5.244982498250 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ref Offset 1 dB
10 dB/div
Ref 11.00 dBm
Mkr1 5.244 982 GHz
5.137 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)

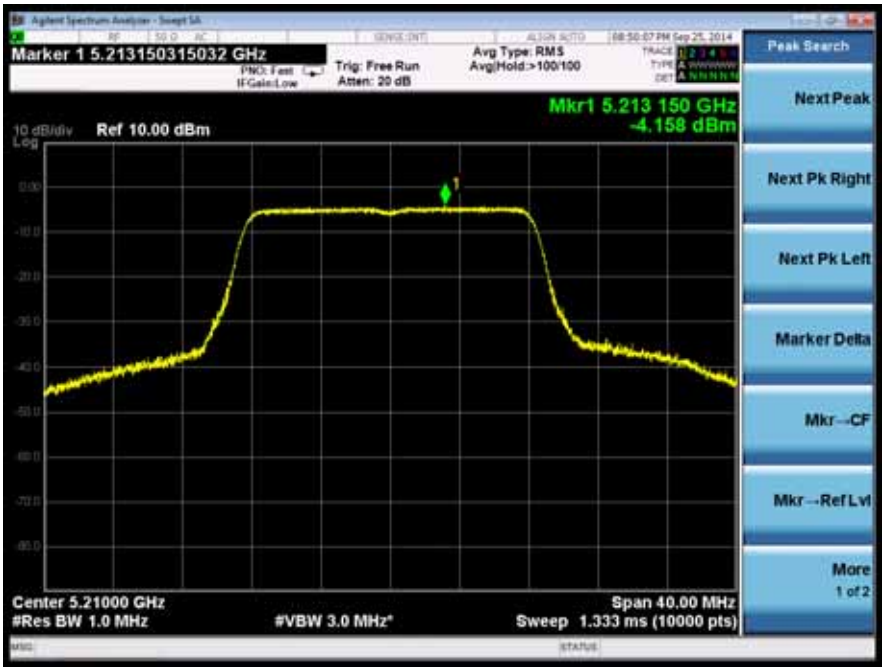
Marker 1 5.245376344086 GHz
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 2 dB
10 dB/div
Ref 15.00 dBm
Mkr1 5.245 376 GHz
-0.849 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.066 ms (4000 pts)

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11a	Antenna:	B

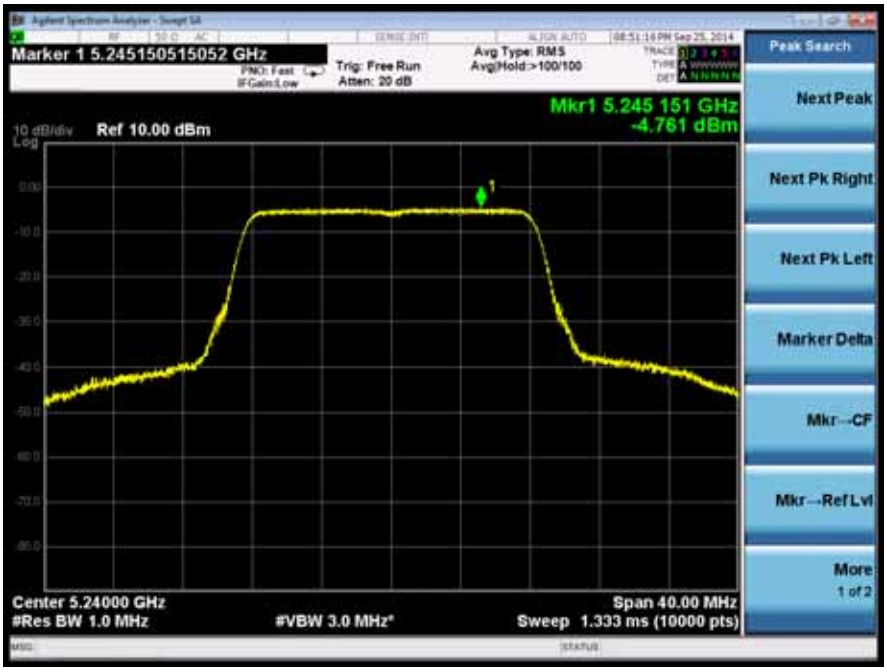
Channel number	Channel Frequency(MHz)	Peak Excursion (dBm)	Peak Excursion Limit(dBm)	Pass/Fail
36	5180	8.699	13	Pass
42	5210	7.288	13	Pass
48	5240	8.654	13	Pass



Marker 1 5.214866486649 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 5.214 866 GHz
3.130 dBm
10 dB/div
Ref 10.00 dBm
Log
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

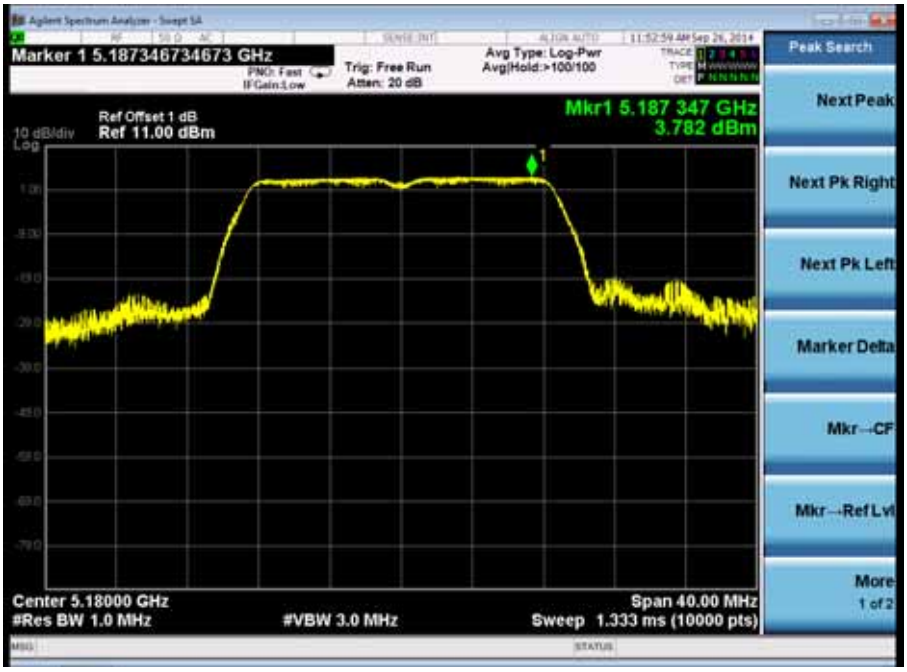

Marker 1 5.213150315032 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: RMS
Avg|Hold:>100/100
Mkr1 5.213 150 GHz
-4.158 dBm
10 dB/div
Ref 10.00 dBm
Log
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

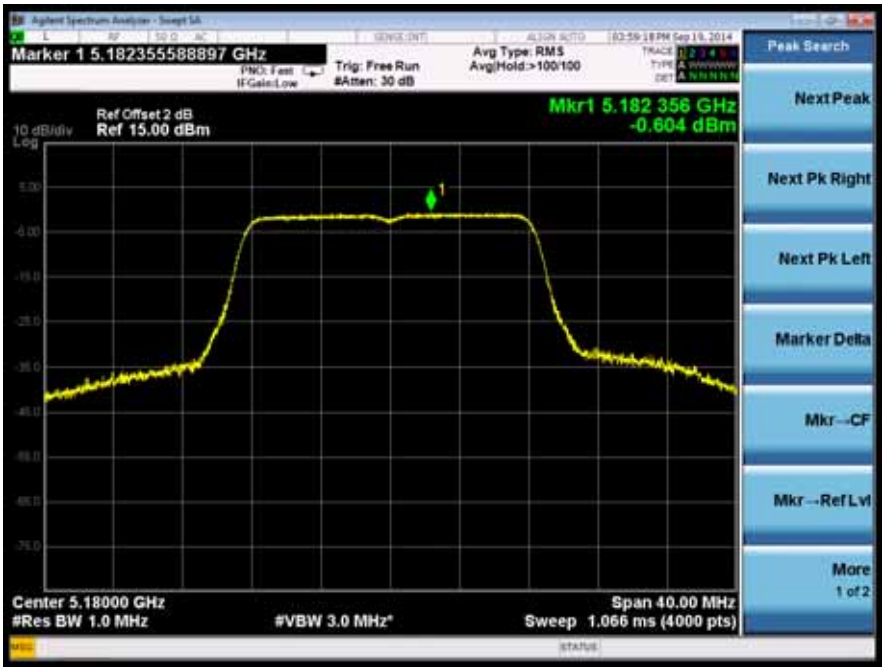
Marker 1 5.244986498650 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 5.244 986 GHz
3.893 dBm
10 dB/div
Ref 10.00 dBm
Log
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Marker 1 5.245150515052 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: RMS
Avg|Hold:>100/100
Mkr1 5.245 151 GHz
-4.761 dBm
10 dB/div
Ref 10.00 dBm
Log
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

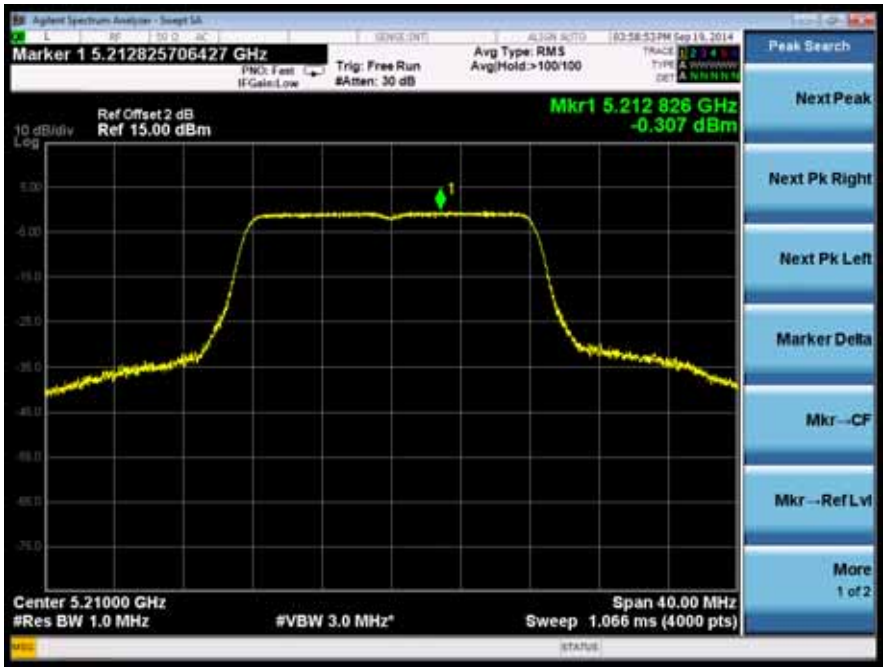
Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT20)	Antenna:	A

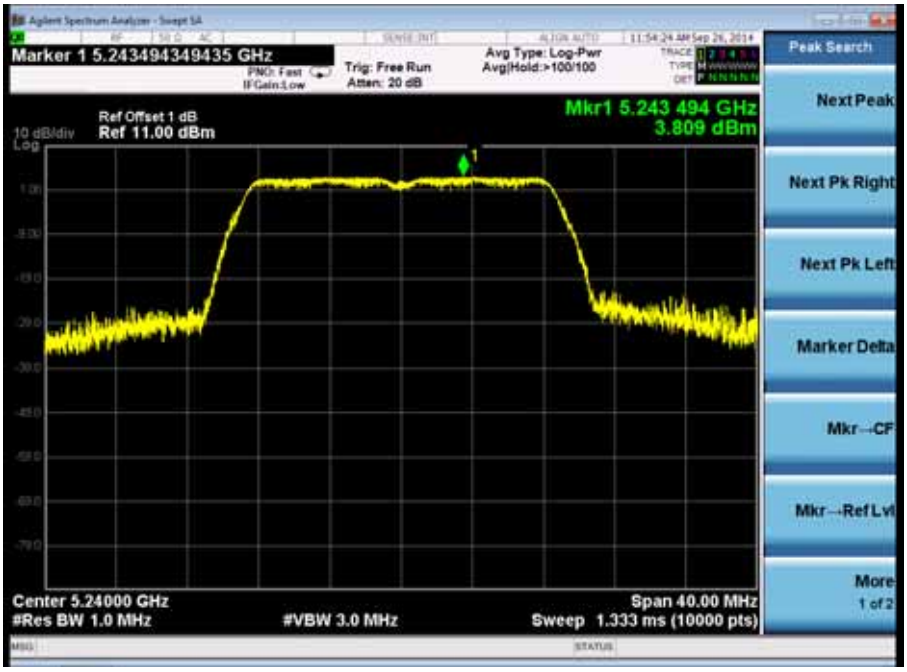
Channel number	Channel Frequency(MHz)	Peak Excursion (dBm)	Peak Excursion Limit(dBm)	Pass/Fail
36	5180	4.386	13	Pass
42	5210	4.425	13	Pass
48	5240	4.975	13	Pass





Marker 1 5.217450745075 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ref Offset 1 dB
10 dB/div
Ref 11.00 dBm
Mkr1 5.217 451 GHz
4.118 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)

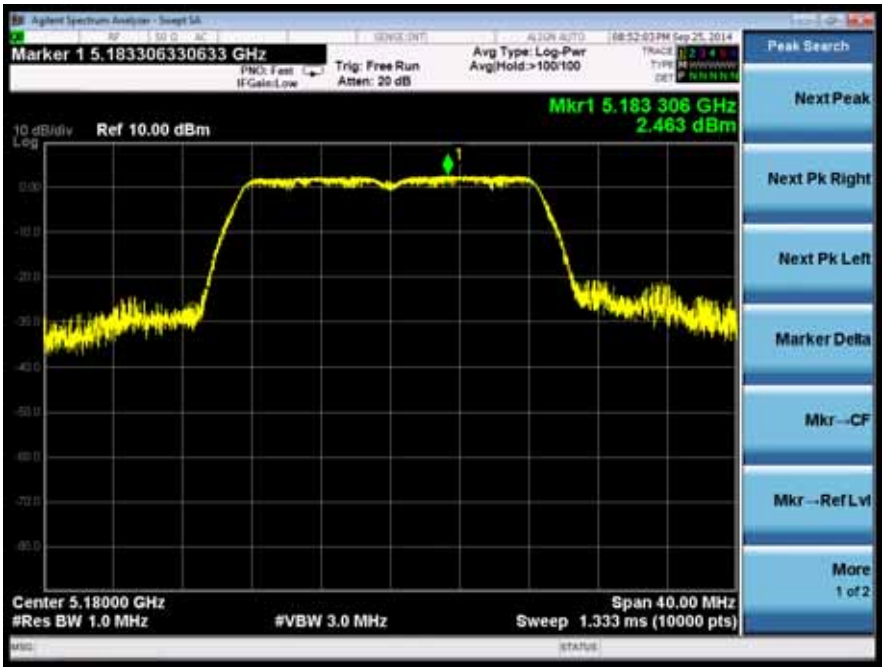

Marker 1 5.212825706427 GHz
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 2 dB
10 dB/div
Ref 15.00 dBm
Mkr1 5.212 826 GHz
-0.307 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.066 ms (4000 pts)

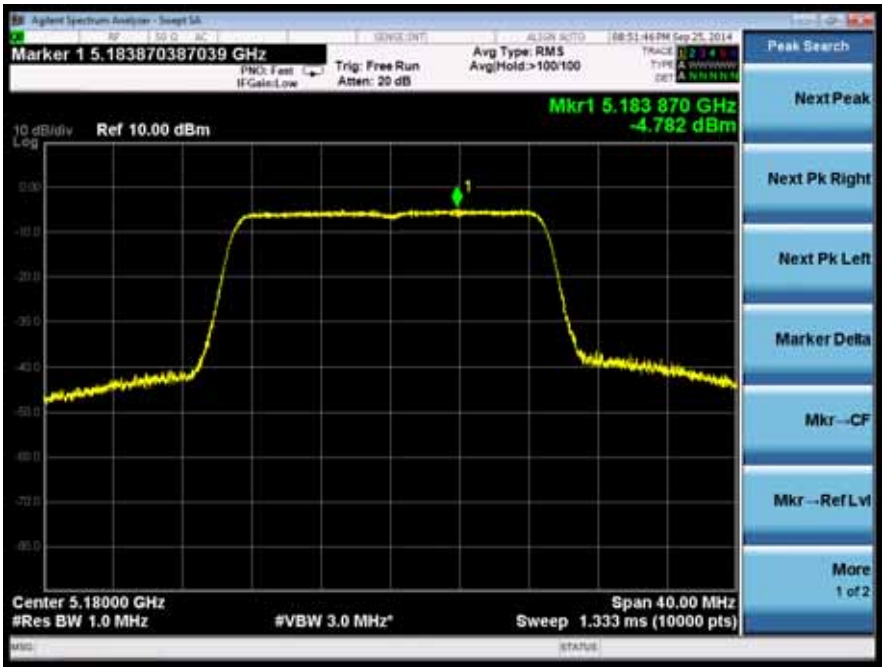

Marker 1 5.243494349435 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ref Offset 1 dB
10 dB/div
Ref 11.00 dBm
Mkr1 5.243 494 GHz
3.809 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)

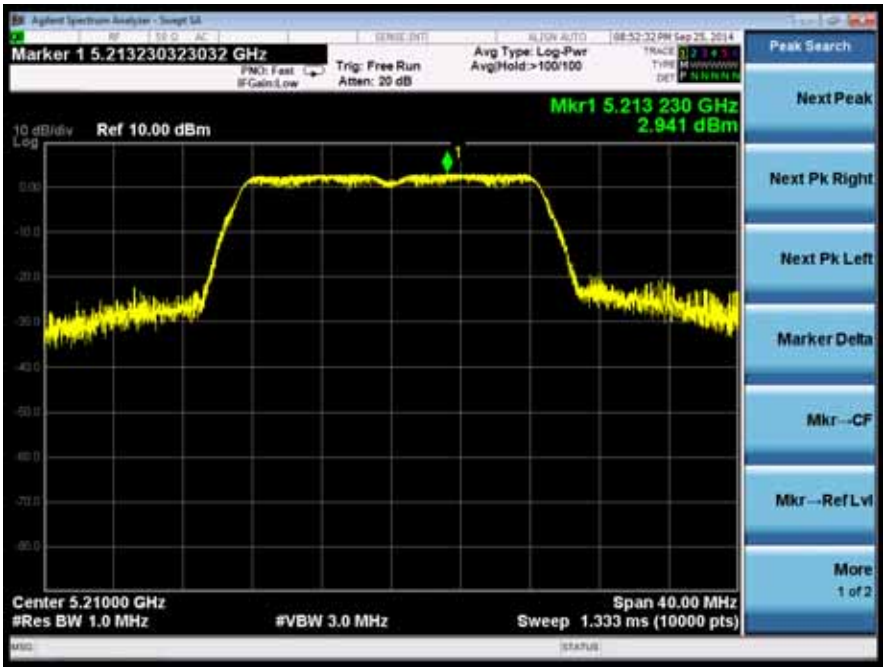
Marker 1 5.245356339085 GHz
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 2 dB
10 dB/div
Ref 15.00 dBm
Mkr1 5.245 356 GHz
-1.165 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.066 ms (4000 pts)

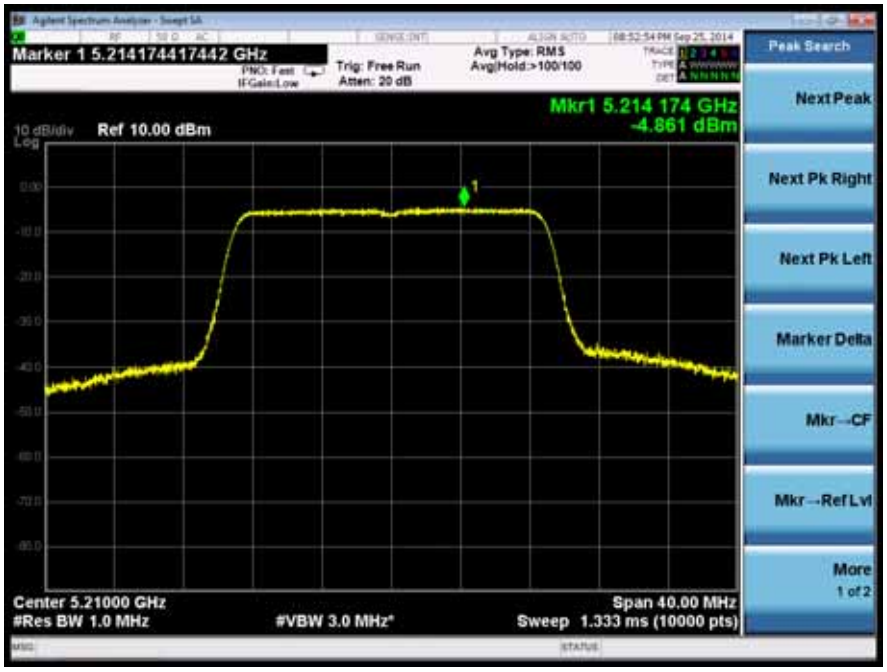
Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT20)	Antenna:	B

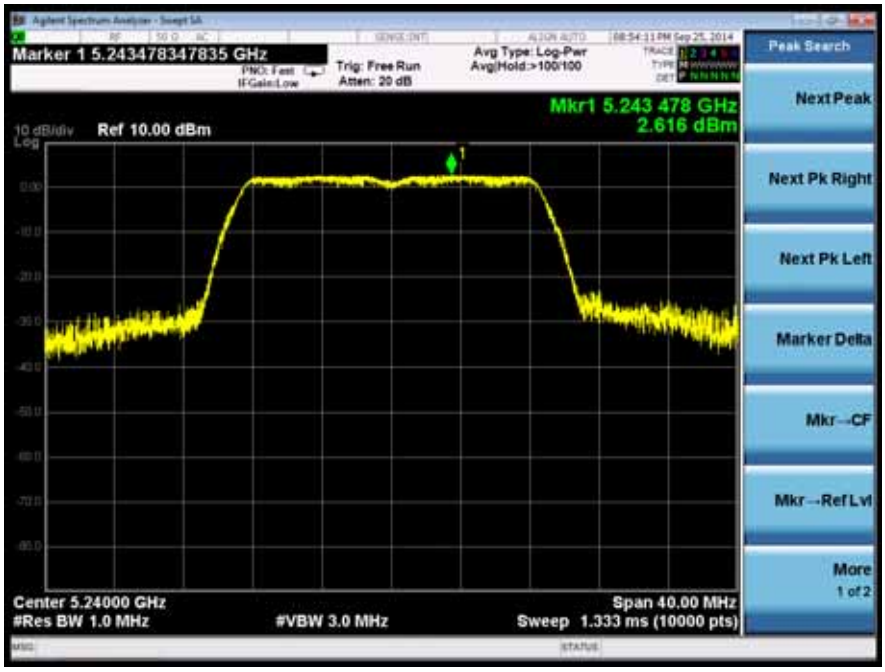
Channel number	Channel Frequency(MHz)	Peak Excursion (dBm)	Peak Excursion Limit(dBm)	Pass/Fail
36	5180	7.245	13	Pass
42	5210	7.802	13	Pass
48	5240	7.797	13	Pass

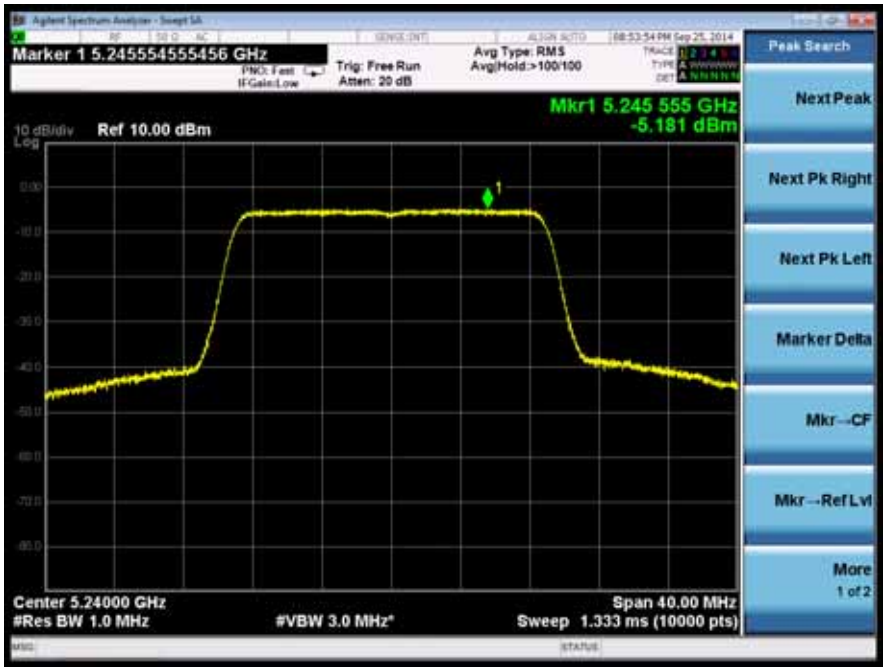





Marker 1 5.213230323032 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 5.213 230 GHz
2.941 dBm
10 dB/div
Ref 10.00 dBm
Log
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

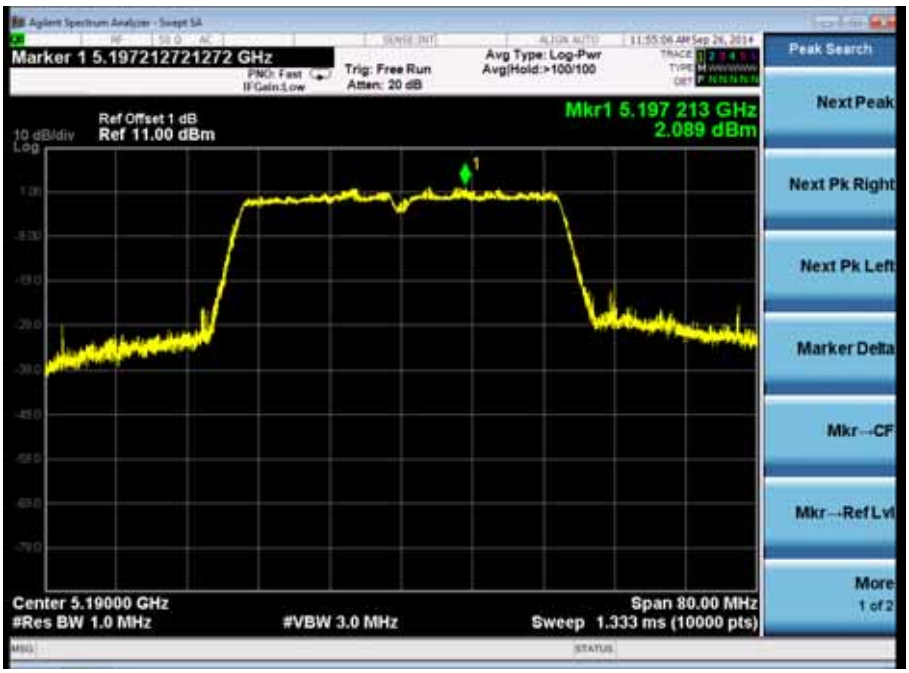

Marker 1 5.214174417442 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: RMS
Avg|Hold:>100/100
Mkr1 5.214 174 GHz
-4.861 dBm
10 dB/div
Ref 10.00 dBm
Log
Center 5.21000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

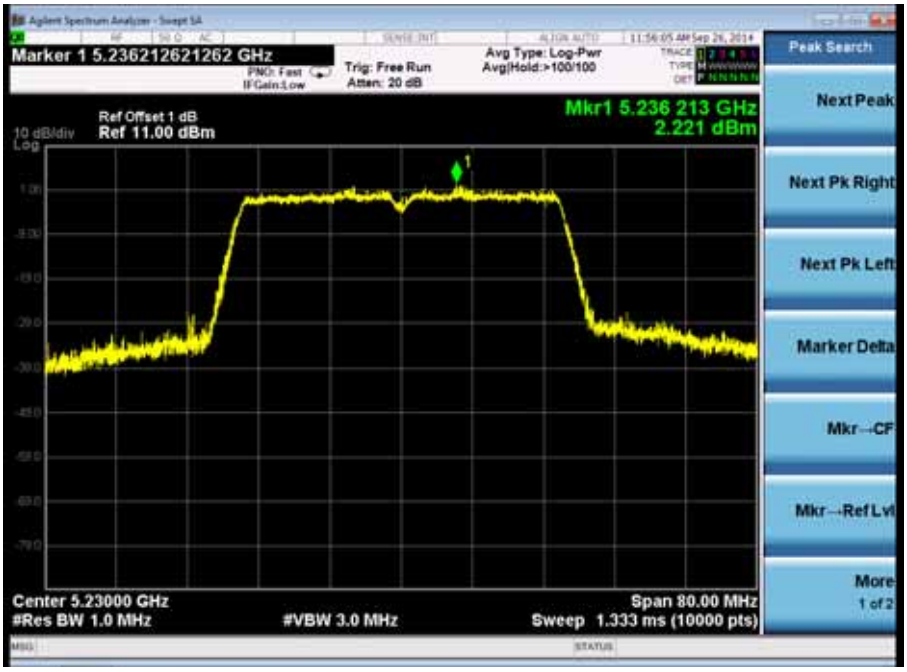

Agilent Spectrum Analyzer - Swept SA
Marker 1 5.243478347835 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 5.243 478 GHz
2.616 dBm
10 dB/div
Log
Ref 10.00 dBm
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Marker 1 5.245554555456 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: RMS
Avg|Hold:>100/100
Mkr1 5.245 555 GHz
-5.181 dBm
10 dB/div
Log
Ref 10.00 dBm
Center 5.24000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 40.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT40)	Antenna:	A

Channel number	Channel Frequency(MHz)	Peak Excursion (dBm)	Peak Excursion Limit(dBm)	Pass/Fail
38	5190	6.113	13	Pass
46	5230	5.997	13	Pass

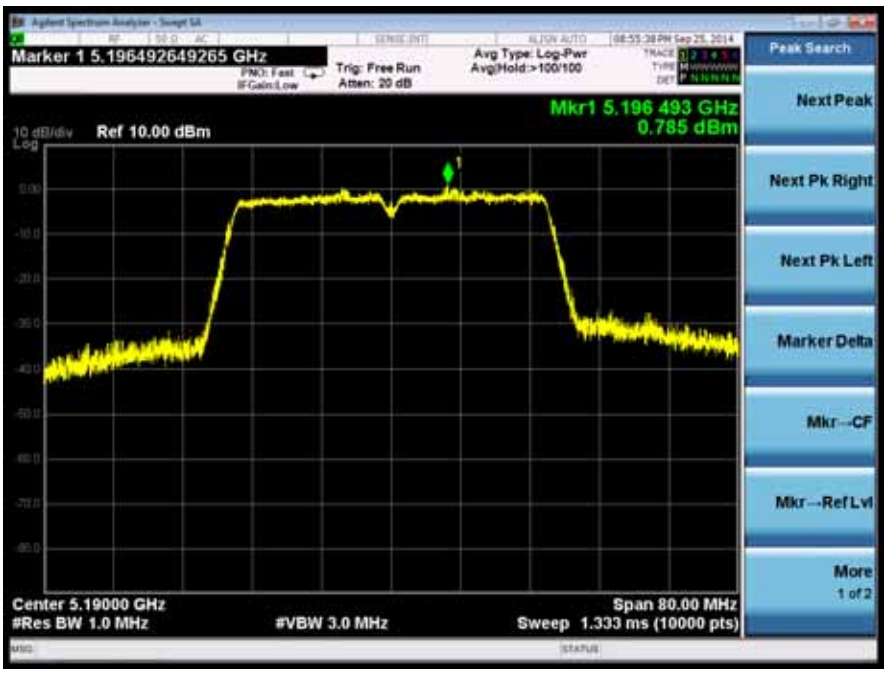


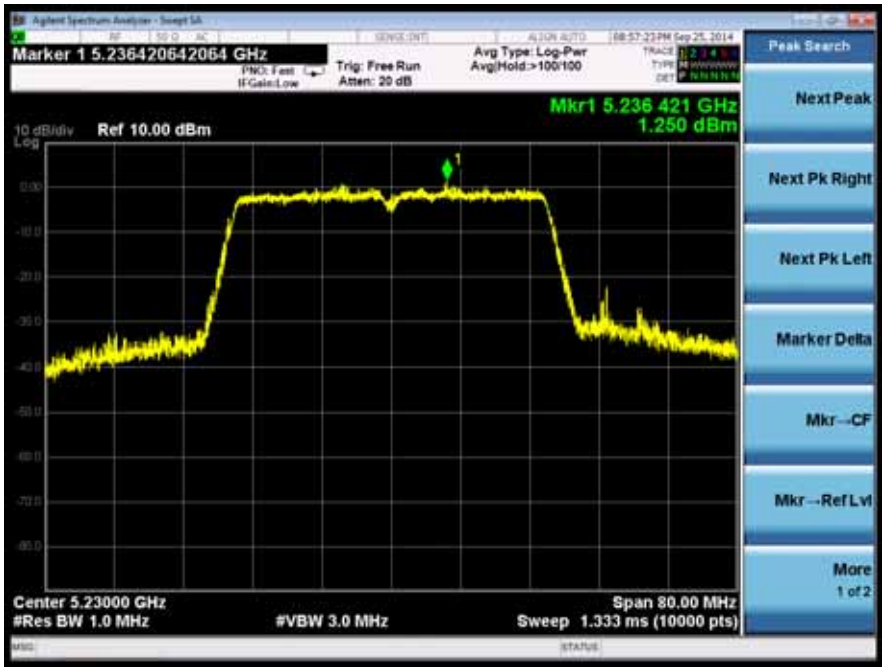

Marker 1 5.236212621262 GHz
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ref Offset 1 dB
10 dB/div
Ref 11.00 dBm
Mkr1 5.236 213 GHz
2.221 dBm
Center 5.23000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 80.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Marker 1 5.205253813453 GHz
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 2 dB
10 dB/div
Ref 15.00 dBm
Mkr1 5.205 254 GHz
-3.776 dBm
Center 5.19000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 80.00 MHz
Sweep 1.066 ms (4000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT40)	Antenna:	B

Channel number	Channel Frequency(MHz)	Peak Excursion (dBm)	Peak Excursion Limit(dBm)	Pass/Fail
38	5190	8.763	13	Pass
46	5230	9.371	13	Pass




Agilent Spectrum Analyzer - Swept SA
Marker 1 5.236420642064 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 5.236 421 GHz
1.250 dBm
10 dB/div
Log
Ref 10.00 dBm
Center 5.23000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 80.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Agilent Spectrum Analyzer - Swept SA
Marker 1 5.233644364436 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: RMS
Avg|Hold:>100/100
Mkr1 5.233 644 GHz
-8.121 dBm
10 dB/div
Log
Ref 10.00 dBm
Center 5.23000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Span 80.00 MHz
Sweep 1.333 ms (10000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

9. Band Edge Test

9.1 Test Procedures

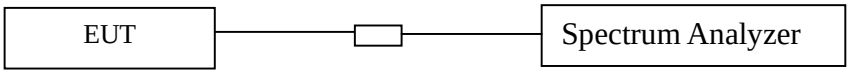
Test method: FCC KDB 789033 G.6
Method AD (Average Detection): Primary method

1) Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth.
2) Find the maximum of the peak-max-hold spectrum.
a) RBW = 1 MHz.
b) VBW ≥ 3 MHz.
c) Detector = RMS,
d) Averaging type = power
e) Sweep time = auto.
f) Allow the sweeps to continue until the trace stabilizes.
g) Use the peak search function to find the peak of the spectrum.
h) e.i.r.p Peak Level(dBm)= continued Peak Level(dBm) + Antenna Gain

9.2 st Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Signal Analyzer	Agilent	N9010A	My53470879	05/17/2014	05/16/2015

9.3 Block Diagram of Test setup



9.4 Limit

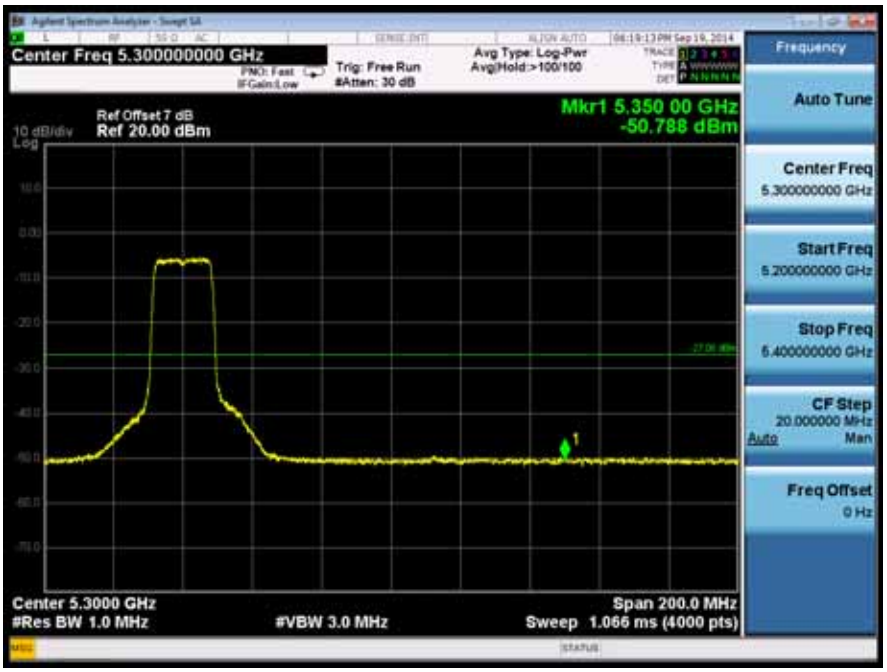
Band 5.15-5.25GHz:
all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

9.5 Test Result

PASS.

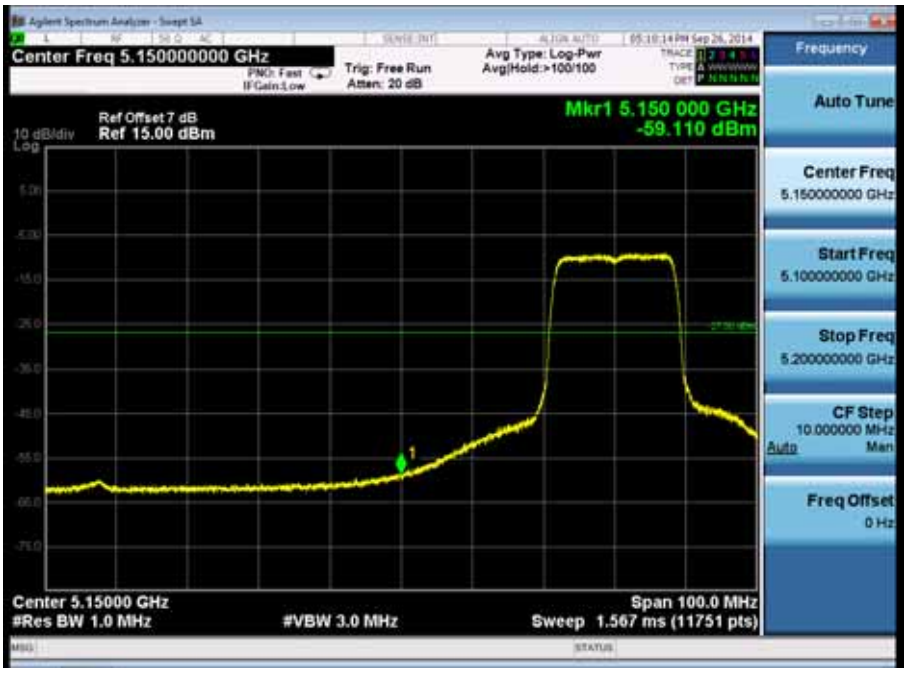
Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11a	Antenna:	A

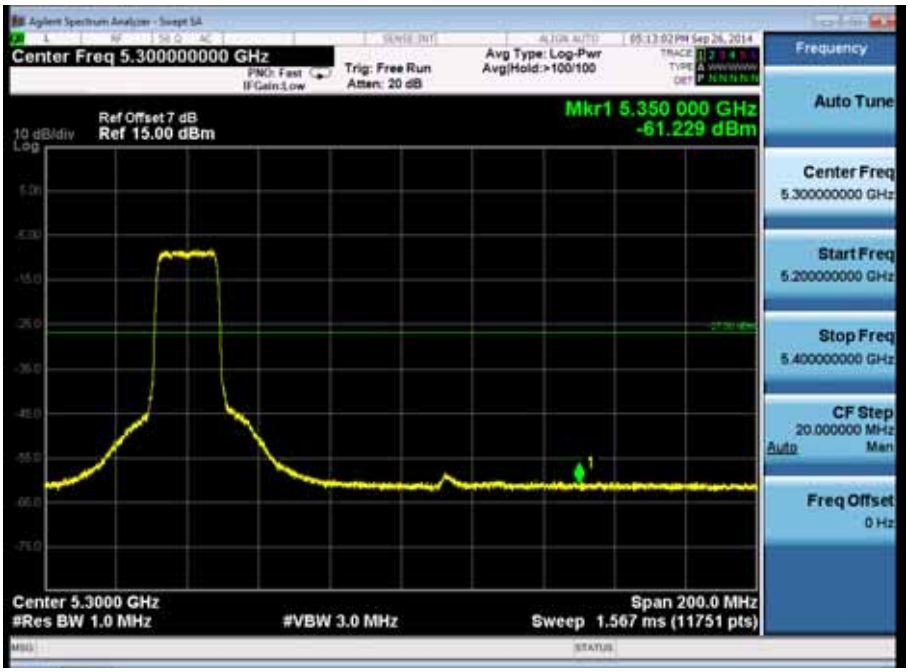
Band Edge Frequency (MHz)	continued Peak Level (dBm)	e.i.r.p Peak Level (dBm)	Limit(dBm)	Pass/Fail
5150	-49.950	-47.950	-27	PASS
5350	-50.788	-48.788	-27	PASS



Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11a	Antenna:	B

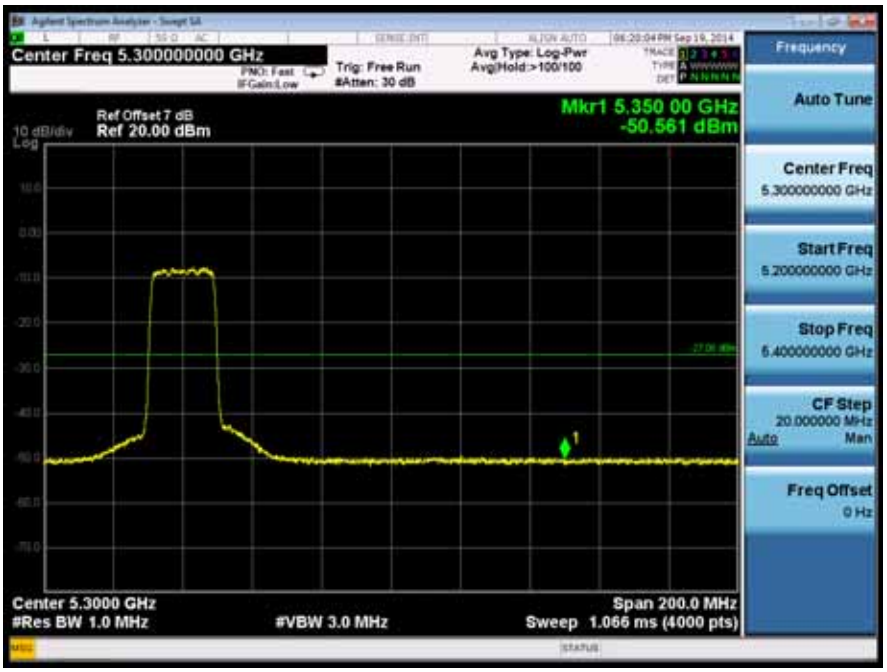
Band Edge Frequency (MHz)	continued Peak Level (dBm)	e.i.r.p Peak Level (dBm)	Limit(dBm)	Pass/Fail
5150	-59.110	-57.110	-27	PASS
5350	-61.229	-59.229	-27	PASS





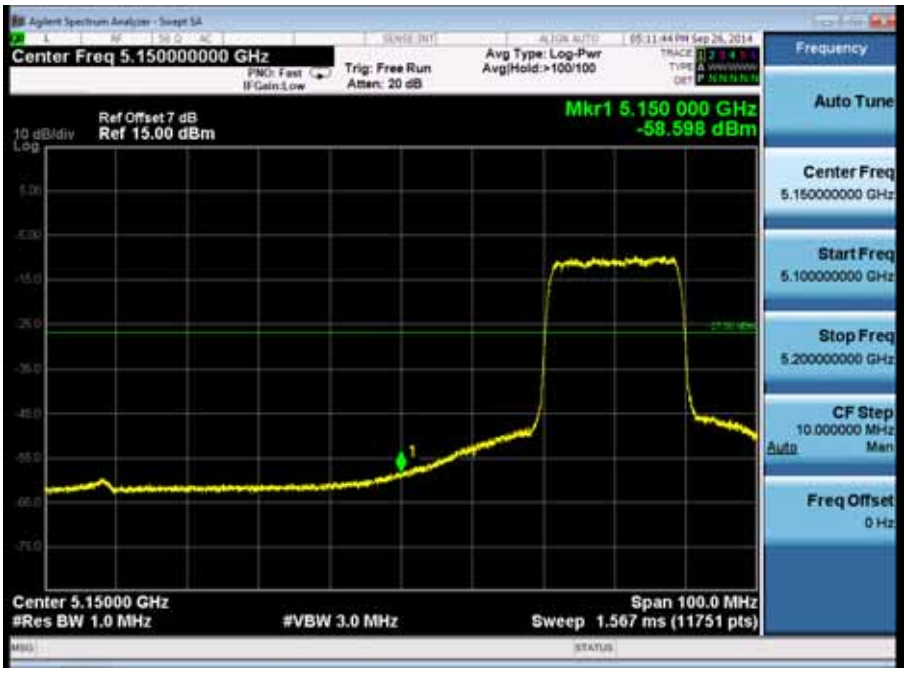
Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT20)	Antenna:	A

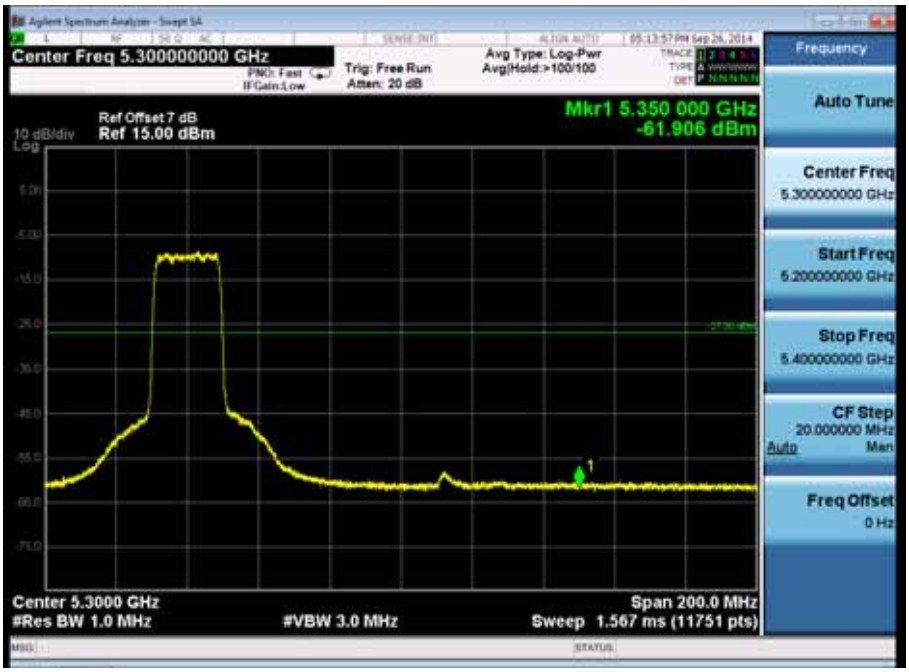
Band Edge Frequency (MHz)	continued Peak Level (dBm)	e.i.r.p Peak Level (dBm)	Limit(dBm)	Pass/Fail
5150	-50.016	-48.016	-27	PASS
5350	-50.561	-48.561	-27	PASS



Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT20)	Antenna:	B

Band Edge Frequency (MHz)	continued Peak Level (dBm)	e.i.r.p Peak Level (dBm)	Limit(dBm)	Pass/Fail
5150	-58.598	-56.598	-27	PASS
5350	-61.906	-59.906	-27	PASS



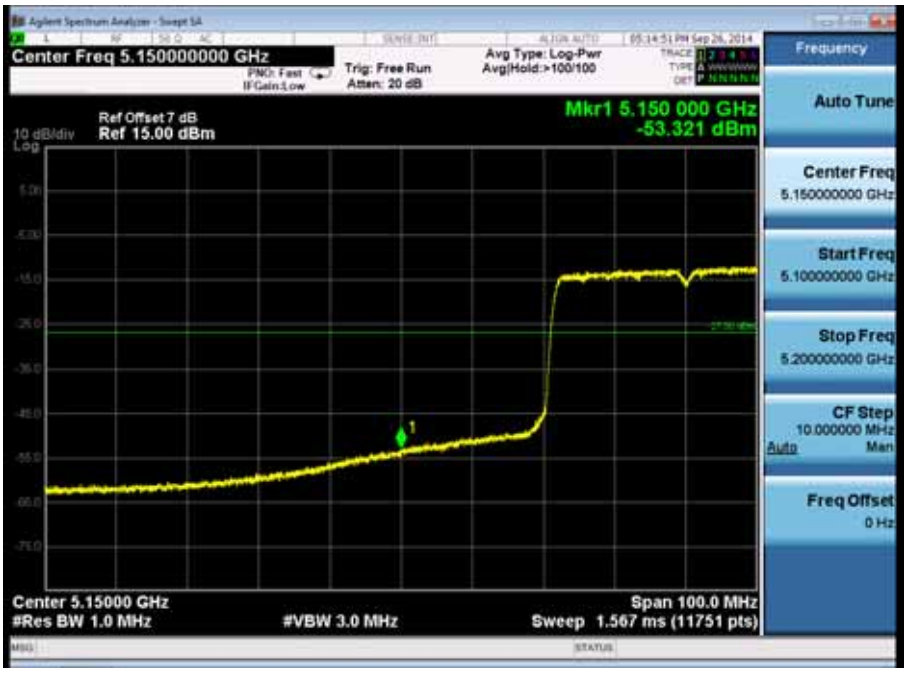


Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT40)	Antenna:	A

Band Edge Frequency (MHz)	continued Peak Level (dBm)	e.i.r.p Peak Level (dBm)	Limit(dBm)	Pass/Fail
5150	-47.375	-45.375	-27	PASS
5350	-37.436	-35.436	-27	PASS

Spectrum Detector:	PK	Test Date :	September 15, 2014
Test By:	KK	Temperature :	24℃
Test Result:	PASS	Humidity :	53 %
Operation Mode:	802.11n(HT40)	Antenna:	B

Band Edge Frequency (MHz)	continued Peak Level (dBm)	e.i.r.p Peak Level (dBm)	Limit(dBm)	Pass/Fail
5150	-53.321	-51.321	-27	PASS
5350	-42.336	-40.336	-27	PASS



10. Uncertainty

Measurement Uncertainty for a level of Confidence of 95%

Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Conducted Output Power Test	±1.0dB
Radiated Emission Test	±2.0dB
Peak Power Density	±2.0dB
Occupied Bandwidth Test	±1.0dB
Band Edge Test	±3dB
All emission, radiated	±3dB
Antenna Port Emission	±3dB
Temperature	±0.5℃
Humidity	±3%