

Report No.: E2/2015/50080 Issue Date: Jul. 30, 2015

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## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT AND INDUSTRY CANADA RSS 247

OF

**Product Name: Tablet Computer** 

**Brand Name:** acer

**Marketing Name: Predator 8 GT-810** 

Model No.: A5002

**Model Difference:** N/A

FCC ID: **HLZA5002** 

IC: 1754F-A5002

**Report No.:** E2/2015/50080

**Issue Date:** Jul. 30, 2015

**FCC Rule Part:** §15.407

IC Rule Part: RSS-247 issue 1:2015

**Acer Incorporated** 

8F., No.88, Sec. 1, Hsintai 5th Rd., Hsichih, **Prepared for:** 

New Taipei City 22181, Taiwan (R.O.C.)

SGS Taiwan Ltd.

**Electronics & Communication Laboratory** Prepared by:

No.2, Keji 1st Rd., Guishan District,

Taoyuan City, Taiwan 333



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## VERIFICATION OF COMPLIANCE

**Applicant:** Acer Incorporated

8F., No.88, Sec. 1, Hsintai 5th Rd., Hsichih, New Taipei City

22181, Taiwan (R.O.C.)

**Product Name:** Tablet Computer

Brand Name:

Marketing Name: Predator 8 GT-810

Model No.: A5002

FCC ID: HLZA5002

IC: 1754F-A5002

Report Number: E2/2015/50080

**Date of test:** May. 29, 2015 ~ Jul. 17, 2015

N/A

Date of EUT Received: May. 29, 2015

We hereby certify that:

Test By:

**Model Difference:** 

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

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

Jerry Lu / Engineer

Prepared By: Date: Jul. 30, 2015

Tiffany Kao / Clerk

Approved By: Jul. 30, 2015

Jim Chang / Asst. Manager

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# **Revision History**

Report Number	Revision	Description	Issue Date	
E2/2015/50080 Rev.00		Initial creation of document	Jul. 30, 2015	

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#### **GENERAL INFORMATION**

## 1.1 Product Description

#### General:

	erierai.				
Product Name:	Tablet Computer				
Brand Name:	acer				
Marketing Name:	Predator 8 GT-810				
Model No.:	A5002				
Model Difference:	N/A				
Product SW/HW version:	Acer_AV0L0_GT-810_RV1BRB03_TWN_GEN1 / E0				
Radio SW/HW version:	6.10.197.111.1 (r446629) FWID 01-dfa59dca / 0A				
Test SW Version:	N/A				
RF power setting in TEST SW:	N/A				
USB Cable:	Model No	.: N/A, Supplier: Mingji			
	3.8V from Rechargeable Li-polymer battery or 5.35Vdc f				
Power Supply:	Battery:	Model No.:AP14F8K, Supplier: N/A			
	Adapter :	<ol> <li>Model No.: PA-1100-25, Supplier: LITEON.</li> <li>Model No.: ADP-10HW A, Supplier: DELTA.</li> </ol>			

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#### WLAN 5GHz:

I I I I I I I I I I I I I I I I I I I					
Wi-Fi	Frequency Range	Channels	Rated Power (Avg.) / Average Rated Power(EIRP)	Modulation Technology	Type of Emission
	5150~5250	4	13.97dBm (Avg.) 15.22dBm (EIRP)		16M4D1D
11a	5250~5350	4	13.96dBm (Avg.) 15.21dBm (EIRP) OFDM		16M4D1D
IIa	5470~5725	11	13.62dBm (Avg.) 15.15dBm (EIRP)	OI DIVI	16M4D1D
	5725-5850	5	13.99dBm (Avg.) 15.52dBm (EIRP)		16M4D1D
	HT20 5150~5250	4	(MIMO Chain 0+1) 12.00dBm (Avg.) 16.26dBm (EIRP)		17M5D1D
44.5	HT20 5250~5350	4	(MIMO Chain 0+1) 12.00dBm (Avg.) 16.26dBm (EIRP)	OFDM	17M6D1D
11n	HT20 5470~5725	11	(MIMO Chain 0+1) 11.99dBm (Avg.) 16.76dBm (EIRP)	OPDIVI	17M5D1D
	HT20 5725-5850	5	(MIMO Chain 0+1) 11.99dBm (Avg.) 16.76dBm (EIRP)		17M4D1D
	HT40 5150~5250	2	(MIMO Chain 0+1) 11.79dBm (Avg.) 16.05dBm (EIRP)		36M4D1D
44.	HT40 5250~5350	2	(MIMO Chain 0+1) 11.99dBm (Avg.) 16.25dBm (EIRP)	OFDM	36M3D1D
11n	HT40 5470~5725	5	(MIMO Chain 0+1) 11.99dBm (Avg.) 16.76dBm (EIRP)	OFDM	36M3D1D
	HT40 5725-5850	2	(MIMO Chain 0+1) 11.82dBm (Avg.) 16.59dBm (EIRP)		36M3D1D

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Antenna Designation	PIFA Antenna, Main: Gain: -0.83dBi (5150MHz-5350MHz) 1.76dBi (5470MHz-5725MHz) / 1.76dBi (5725MHz-5850MHz) Aux: Gain: 1.25dBi (5150MHz-5350MHz) 1.53dBi (5470MHz-5725MHz) / 1.53dBi (5725MHz-5850MHz)
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 135Mbps 802.11 n_40MHz: 13.5 – 300Mbps

## 1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is Tablet Computer supporting, Wi-Fi 802 11ahan Bluetooth features, and below is details of information

Product Feature			
Product Name: Tablet Computer			
Brand Name:	acer		
Marketing Name: Predator 8 GT-810			
Model Difference:	A5002		
Model No.: N/A			
FCC ID:	HLZA5006		
IC:	1754F-A5002		
Wi-Fi Specification	802.11a/b/g/n		
Bluetooth Version	V4.0 dual mode		

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

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## 1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v01

FCC KDB 662911 D01 Multiple Transmitter Output

Canada RSS-247 issue 1 May 2015

RSS-Gen Issue 4 Nov. 2014

ANSI C63.10:2013

#### Note:

- 1. All test items have been performed and record as per the above standards.
- The composite system is compliance with FCC Subpart B is authorized under the certification procedure.

## 1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan. (TAF code 0513)

FCC Registration Numbers are: 628985

Canada Registration Number: 4620A-5.

## 1.5 Special Accessories

There are no special accessories used while test was conducted.

## 1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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#### 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

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

#### 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. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table. For emissions testing at or below 1 GHz. the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. 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.

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# 2.4 Measurement Results Explanation Example For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

#### Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example with cable loss 2.8dB and 10dB attenuator.

Single mode offset

= RF cable loss (dB)+ attenuation factor(dB)+duty factor=13(dB)

N20 MIMO mode offset

= RF cable loss (dB)+ attenuation factor(dB)+ 10 log(NANT) dB+duty factor =16.24(dB)

N40 MIMO mode offset

= RF cable loss (dB)+ attenuation factor(dB)+ 10 log(NANT) dB+duty factor =16.6(dB)

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## 2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission

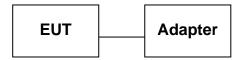


Fig. 2-2 Conducted (Antenna Port) Configuration

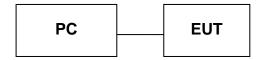
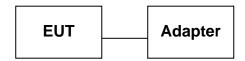


Fig. 2-3 AC Power Line Conducted Emission



**Table 2-1 Equipment Used in Tested System** 

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	PC	N/A	N/A	N/A	N/A	N/A

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#### **SUMMARY OF TEST RESULT**

FCC Rules /	Description Of Test	Result	
IC Rules			
§15.207	AC Power Line Conducted Emission	Compliant	
RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant	
§15.403(i)			
§15.407(e)	26 dB & 6dB & 99%	Compliant	
RSS-247 §6.2.1~ 4 (1)	Emission Bandwidth	Compliant	
RSS-Gen §6.6			
§15.407(a)	Maximum Conducted Output Power	Compliant	
RSS-247 §6.2.1~ 4 (1)	Maximum Conducted Output Power	Compliant	
§15.407(a)	Power Spectral Density	Compliant	
RSS-247 §6.2.1~ 4 (1)	Power Spectral Density	Compliant	
§15.407(b)	Undesirable Radiated Emissions	Compliant	
RSS-247 §6.2.1~ 4 (2)	Officestrable Radiated Effissions	Compliant	
§15.407(c)	Transmission in case of Absence of	Compliant	
RSS-247 §6.4	Information	Compliant	
§15.407(g)	Eroguanay Stability	Compliant	
RSS-Gen §6.11	Frequency Stability	Compliant	
§15.203			
§15.407(a)	Antenna Requirement	Compliant	
RSS- Gen §6.7	Antonna requirement	Compliant	
RSS- Gen §8.3			

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## **DESCRIPTION OF TEST MODES**

## 4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

4 channels are provided for 802.11a, 802.11n\_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n\_HT40

CHANNEL FREQUENCY		CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

Operated band in 5250 MHz ~5350 MHz:

4 channels are provided for 802.11a, 802.11n\_HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n\_HT40

	<del></del>		
CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
54	5270 MHz	62	5310 MHz

Operated band in 5470 MHz ~5725 MHz:

11 channels are provided for 802.11a, 802.11n\_HT20

	, , , , , , , , , , , , , , , , , , ,		
CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
100 5500 MHz		124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz		

5 channels are provided for 802.11n HT40

CHANNEL FREQUENCY		CHANNEL	FREQUENCY
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz		

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Operated band in 5725 MHz ~5850 MHz:

5 channels are provided for 802.11a, 802.11n\_HT20

	, , , , , , , , , , , , , , , , , , ,		
CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n\_HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755 MHz	159	5795 MHz

## Directional gain (MIMO)

The Tx transmission to construct MIMO operation is cyclic delay diversity, and the following deduction to obtain the array gain of MIMO operation is based on the approach given by KDB 662911 D01.

Array gain = 3.01dBi (peak spectral density, conducted spurious emission) Gain that is combined with different magnitude of two antennas:

- (ii) If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream:
  - Directional gain may be calculated by using the formulas applicable to equal gain antennas
    with G<sub>ANT</sub> set equal to the gain of the antenna having the highest gain; or,

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

where

Each antenna is driven by no more than one spatial stream;

 $N_{SS}$  = the number of independent spatial streams of data:

 $N_{ANT}$  = the total number of antennas

 $g_{j,k} = 10^{G_k/20}$  if the kth antenna is being fed by spatial stream j, or zero if it is not;  $G_k$  is the gain in dBi of the kth antenna.

**Note:** Devices subject to this section shall not be capable of transmitting in the band 5600-5650 MHz for Canada.

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#### 4.2 The Worst Test Modes and Channel Details

- The EUT has been tested under operating condition.
- 2. Test program used to control the EUT for staying in continuous transmitting mode is pro grammed.
- 3. Investigation has been done on all the possible configurations for searching the worst case.

#### **RADIATED EMISSION TEST:**

RADIATED EMISSION TEST (BELOW 1 GHz)						
	,					
MODE	BAND (MHz)	CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	44	OFDM	6	MAIN
802.11a	5260~5320	52 to 64	60	OFDM	6	MAIN
802.11a	5500~5700	100 to 140	116	OFDM	6	MAIN
802.11a	5745~5825	149 to 165	157	OFDM	6	MAIN
	RAI	DIATED EMIS	SSION TEST (A	ABOVE 1 GHz)		
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5400 5040	00 1- 40	00.44.40	OFDM	6	MAIN
802.11n_HT20	.11n_HT20 5180~5240 36 to 48	36 to 48	to 48   36,44,48	OFDM	MCS8	MIMO
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	MAIN
802.11n_HT20	5200~5520	52 10 64	52,00,04	OFDM	MCS8	MIMO
802.11n_HT40	5270~5310	54 to 62	54,62	OFDM	MCS8	MIMO
802.11a	5500~5700	100 to 140	100,116,140	OFDM	6	MAIN
802.11n_HT20	5500~5700	100 to 140	100,116,140	OFDM	MCS8	MIMO
802.11n_HT40	5510~5670	102 to 134	102,110,134	OFDM	MCS8	MIMO
802.11a	E74E E00E	149 to 165	140 157 165	OFDM	6	MAIN
802.11n_HT20	5745~5825 302.11n_HT20		149,157,165	OFDM	MCS8	MIMO
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO

#### Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11a/n WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

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#### ANTENNA PORT CONDUCTED MEASUREMENT:

	CONDUCTED TEST					
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	26 44 40	OFDM	6	MAIN
802.11n_HT20	3160~3240	30 10 40	36,44,48	OFDM	MCS8	MIMO
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
802.11a		E0 60 64	OFDM	6	MAIN	
802.11n_HT20	5260~5320	52 to 64	52,60,64	OFDM	MCS8	MIMO
802.11n_HT40	5270~5310	54 to 62	54,62	OFDM	MCS8	MIMO
802.11a	EE00 E700	100 to 110	100 110 110	OFDM	6	MAIN
802.11n_HT20	5500~5700	100 to 140	100,116,140	OFDM	MCS8	MIMO
802.11n_HT40	5510~5670	102 to 134	102,110,134	OFDM	MCS8	MIMO
802.11a	F74F F00F	140 +- 405	440 457 405	OFDM	6	MAIN
802.11n_HT20	5745~5825	149 to 165	149,157,165	OFDM	MCS8	MIMO
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO

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#### **MEASUREMENT UNCERTAINTY**

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 0.96 dB
Peak Power Spectral Density Measurement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

Radiated Spurious Emission:

	30MHz - 180MHz: +/- 3.37dB
Measurement uncertainty	180MHz -417MHz: +/- 3.19dB
(Polarization : <b>Vertical</b> )	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

	30MHz - 167MHz: +/- 4.22dB
Measurement uncertainty	167MHz -500MHz: +/- 3.44dB
(Polarization : Horizontal)	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

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

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#### **CONDUCTED EMISSION TEST**

## 6.1. Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

Frequency range	Limits dB(uV)				
MHz	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.

## 6.2. Measurement Equipment Used

Conducted Emission Test Site								
EQUIPMENT	EQUIPMENT MFR MODEL SERIAL LAST							
TYPE		NUMBER	NUMBER	CAL.				
<b>EMI Test Receiver</b>	R&S	ESCI 7	100950	12/12/2014	12/11/2015			
Coaxial Cables	N/A	N30N30-1042-150c m	N/A	01/06/2015	01/07/2016			
LISN	Schwarzbeck	NSLK 8127	8127-648	06/09/2015	06/08/2016			
LISN	Rolf-Heine	NNB-2/16Z	99012	03/04/2015	03/03/2016			

#### 6.3. 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 rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 3. The LISN was connected with 120Vac/60Hz power source.

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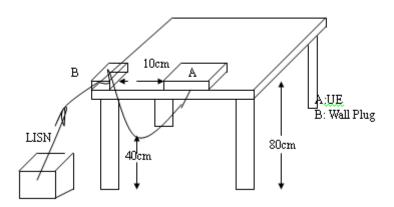
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#### 6.4. Test SET-UP



#### 6.5. 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 phases of power being supplied by given UE are completed.

#### 6.6. Measurement Result

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

Note2: The \* reveals the worst-case results that that closet to the limit

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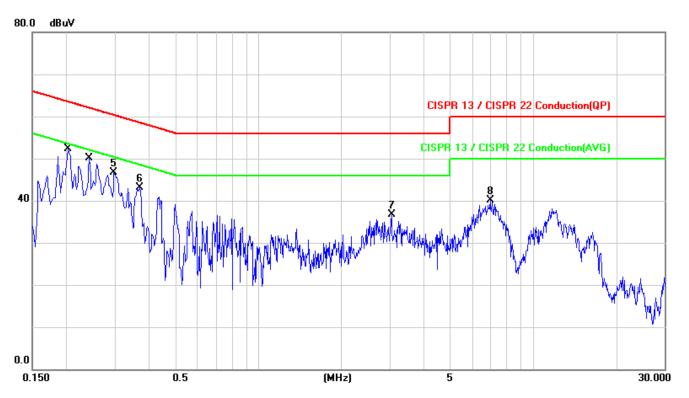


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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test Date:	Jul. 10, 2015
Temperature:	26	Humidity:	Test By:	Ashton	
Model No.:	Adapter: PA-1100-25, Supplier: LITEON			Phase:	L1



No.+	Mk.+	Freq.€	Reading	Factor₽	Measurement€	Limit₽	Over₽	Detector₽	Comment€
43	40	(MHz)√	dBuV₽	(dB)√ <sup>□</sup>	(dBuV)₽	(dBuV)4□	(dB)← <sup>3</sup>	4	₽
1↔	€2	0.2020₽	46.30₽	0.12₽	46.42₽	63.53₽	-17.11₽	QP₄⋾	₽
2↔	47	0.2020₽	34.20₽	0.12₽	34.32₽	53.53₽	-19.21₽	AVG₽	₽
3⇔	47	0.2420₽	44.00₽	0.12₽	44.12₽	62.03₽	-17.91₽	QP₄□	₽
4↔	47	0.2420₽	32.60₽	0.12₽	32.72₽	52.03₽	-19.31₽	AVG€	₽
540	*+7	0.2980₽	46.57₽	0.12₽	46.69₽	60.30₽	-13.61₽	peak₽	₽
64□	€2	0.3700₽	42.91₽	0.12₽	43.03₽	58.50₽	-15.47₽	peak∉³	₽
7₽	47	3.0500₽	36.42₽	0.22₽	36.64₽	56.00₽	-19.36₽	peak∉	₽
8€	47	6.9660₽	39.81₽	0.33₽	40.14₽	60.00₽	-19.86₽	peak₽	₽

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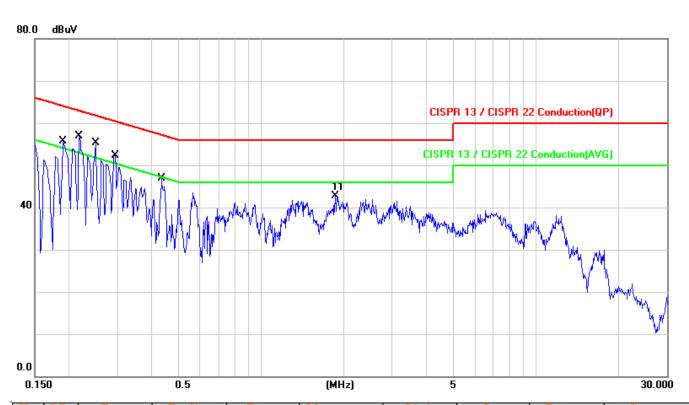
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Operation Mode:	Operation mode			Test Date:	Jul. 10, 2015
Temperature:	26	Humidity:	Test By:	Ashton	
Model No.:	Adapter: PA-1100-25, Supplier: LITEON			Phase:	N



No	Mk	Freq.↔	Reading₽	Factor€	Measurement←	Limit↔	Over⊎	Detector₽	Comment₽
43	42	(MHz)√	dBuV₽	(dB)√ <sup>□</sup>	(dBuV)₽	(dBuV)↔	(dB)√ <sup>□</sup>	÷,	₽
142	47	0.1900₽	49.30₽	0.12₽	49.42₽	64.04₽	-14.62+2	QP₄⋾	₽
2₽	٦	0.1900₽	35.20₽	0.12₽	35.32₽	54.04₽	-18.72₽	AVG₽	₽
34□	47	0.2180₽	47.50₽	0.12₽	47.62₽	62.89₽	-15.27↔	QP₄⋾	₽
4↔	٦	0.2180₽	32.60₽	0.12₽	32.72₽	52.89₽	-20.17₽	AVG₽	₽
540	47	0.2500₽	46.50₽	0.12₽	46.62₽	61.76₽	-15.14↔	QP₄⋾	₽
64□	٦	0.2500₽	31.30₽	0.12₽	31.42₽	51.76₽	-20.34↔	AVG₽	₽
7₽	٦	0.2940₽	43.70₽	0.12₽	43.82₽	60.41₽	-16.59₽	QP₄□	₽
84□	٦	0.2940₽	33.00₽	0.12₽	33.12₽	50.41₽	-17.29↔	AVG₽	₽
942	ت	0.4340₽	43.10₽	0.12₽	43.22₽	57.18₽	-13.96↔	QP₄□	₽
10↩	*4	0.4340₽	39.30₽	0.12₽	39.42₽	47.18₽	-7.76↔	AVG₽	₽
11₽	٦	1.8660₽	42.48₽	0.18₽	42.66₽	56.00₽	-13.34₽	peak₽	47

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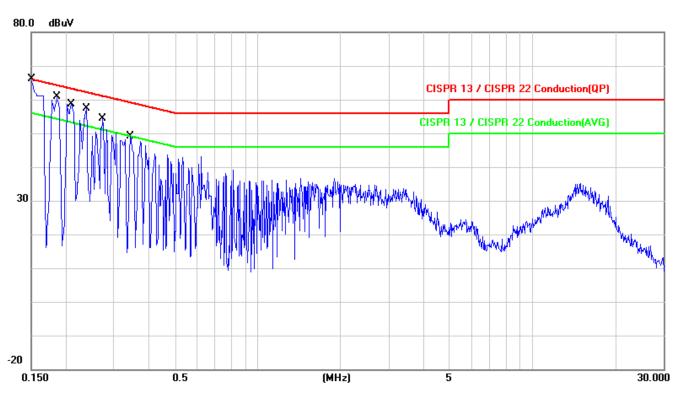
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Operation Mode:	Operation mode		Test Date:	Jul. 10, 2015	
Temperature:	26	Humidity:	Test By:	Ashton	
Model No.:	Adapter: ADP-10HW A, Supplier: DELTA			Phase:	L1



No.	Mk	Freq.↔	Reading€	Factor₽	Measurement€	Limit↔	Over↔	Detector€	Comment€
47	42	(MHz)₄□	dBuV₽	(dB)4 <sup>□</sup>	(dBuV)₽	(dBuV)₽	(dB)√	47	₽
1↔	*0	0.1500₽	58.61₽	0.08₽	58.69₽	66.00₽	-7.31₽	QP₄⋾	₽
2↔	42	0.1500₽	41.91₽	0.08₽	41.99₽	56.00₽	-14.01₽	AVG₽	÷.
34□	42	0.1860₽	54.90₽	0.07₽	54.97₽	64.21₽	-9.24₽	QP₄⋾	P
4↔	42	0.1860₽	38.20₽	0.07₽	38.27₽	54.21₽	-15.94₽	AVG₽	₽
540	42	0.2100₽	52.60₽	0.07₽	52.67₽	63.21₽	-10.54₽	QP₄⋾	÷.
64□	42	0.2100₽	36.70₽	0.07₽	36.77₽	53.21₽	-16.44₽	AVG₽	₽
7₽	42	0.2380₽	49.90₽	0.09₽	49.99₽	62.17₽	-12.18₽	QP₄⋾	₽
84□	42	0.2380₽	33.60₽	0.09₽	33.69₽	52.17₽	-18.48₽	AVG₽	÷.
9₽	42	0.2740₽	48.70₽	0.10₽	48.80₽	61.00₽	-12.20₽	QP₄⋾	÷.
10↔	42	0.2740₽	33.00₽	0.10₽	33.10₽	51.00₽	-17.90₽	AVG₽	₽
11₽	42	0.3460₽	41.20₽	0.14₽	41.34₽	59.06₽	-17.72₽	QP₄⋾	₽
12₽	42	0.3460₽	25.00₽	0.14₽	25.14₽	49.06₽	-23.92₽	AVG₽	P

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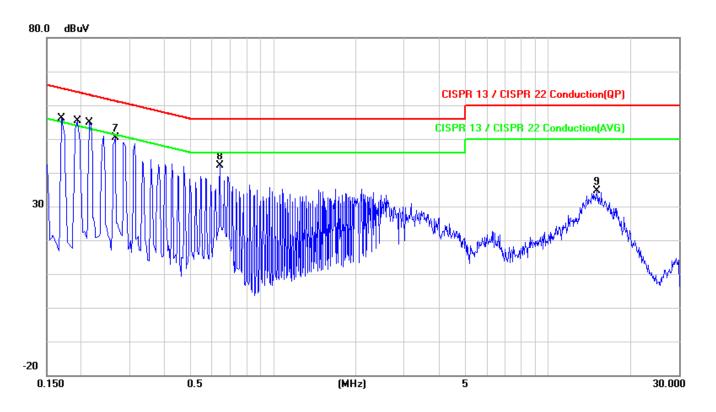
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Operation Mode:	Operation mode			Test Date:	Jul. 10, 2015
Temperature:	26	Humidity:	Test By:	Ashton	
Model No.:	Adapter: ADP-10HW A, Supplier: DELTA			Phase:	N



No.	Mk.	Freq.₽	Reading₽	Factor₽	Measurement₽	Limit↩	Over₽	Detector€	Comment+ <sup>3</sup>
42	47	(MHz)√	dBuV₄□	(dB)√	(dBuV)₄□	(dBuV)₄□	(dB)← <sup>3</sup>	4	4
1↔	٠	0.1700₽	52.30₽	0.14₽	52.44₽	64.96₽	-12.52₽	QP₽	÷.
2↔	47	0.1700₽	35.00₽	0.14₽	35.14₽	54.96₽	-19.82₽	AVG₽	÷2
3↔	٠	0.1940↩	51.80₽	0.13₽	51.93₽	63.86₽	-11.93₽	QP₽	ė.
4↔	47	0.1940₽	35.30₽	0.13₽	35.43₽	53.86₽	-18.43₽	AVG₽	÷2
540	٠	0.2140₽	50.20₽	0.14₽	50.34₽	63.05₽	-12.71₽	QP₽	ė.
64⊃	47	0.2140₽	33.80₽	0.14₽	33.94₽	53.05₽	-19.11₽	AVG₽	÷,
7₽	**	0.2660₽	50.29₽	0.16₽	50.45₽	61.24₽	-10.79₽	peak∉	ė.
84⊃	47	0.6420↔	41.87₽	0.31₽	42.18₽	56.00₽	-13.82₽	peak∉	Ð
94□	47	15.1220₽	34.01₽	0.65₽	34.66₽	60.00₽	-25.34₽	peak∉	₽

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#### 7. DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

#### Formula:

Duty Cycle = Ton / (Ton+Toff)

#### **Measurement Procedure:**

- 1. Set span = Zero
- 2. RBW = 8MHz
- 3. VBW = 8MHz.
- 4. Detector = Peak

#### **Duty Cycle:**

	Duty Cycle	Duty Factor (dB)
802.11a	95.4%	0.20
802.11n_20 (MIMO)	90.6%	0.43
802.11n_40 (MIMO)	83.3%	0.79

Duty Cycle Factor: 10 \* log (1/0.954) = 0.21 Duty Cycle Factor: 10 \* log (1/0.906) = 0.43Duty Cycle Factor:  $10 * \log (1/0.833) = 0.79$ 

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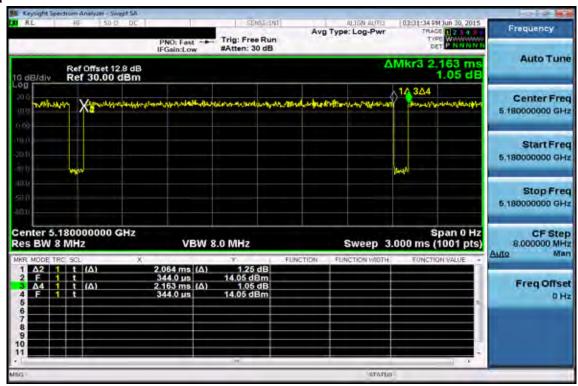
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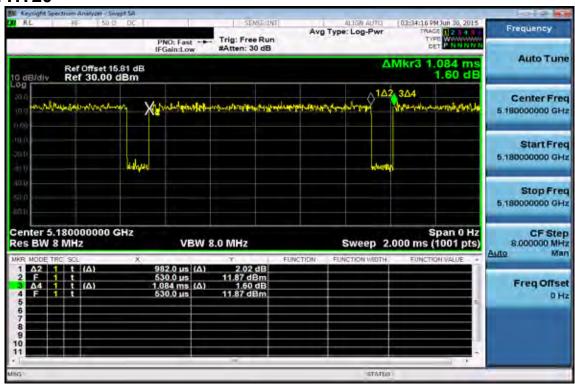
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## **DUTY CYCLE TEST SIGNAL Measurement Result** 802.11a



## 802.11n HT20



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## 802.11n HT40



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## 8. 26dB & 6dB & 99% EMISSION BANDWIDTH MEASUREMENT

## 8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

#### 8.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
  - a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
  - b. 99% Band width Measurement: set resolution BW as close to 1% of the selected span without it is being lower than 1%, & VBW = 3 \*RBW. Detector = Sample, where sample must be selected whenever it is appropriate.
  - Mark the peak frequency and –26dB and 99 %( upper and lower) frequency.
- 4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
- 5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
  - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3\*RBW, Span = 30MHz/50MHz, Detector=Peak, Sweep=auto
  - b. Mark the peak frequency and –6dB (upper and lower) frequency.
- 6. Repeat above procedures until all test default channel measured were complete.

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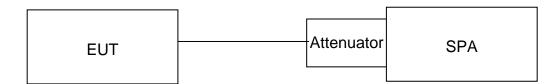
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## 8.3 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015		
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015		
Splitter	RF-LAMBAD	RFLT2W1G18 G	RF35	12/19/2014	12/18/2015		
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015		

#### 8.4 Test Set-up



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#### 8.5 Measurement Result

#### 26dB Bandwidth

802.11a

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5180	19.46	12.89
5220	19.51	12.90
5240	19.20	12.83
5260	19.46	12.89
5300	19.31	12.86
5320	20.11	13.03
5500	19.53	12.91
5580	19.06	12.80
5700	19.44	12.89

#### 802.11n\_HT20 (Main)

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5180	19.98	13.01
5220	19.85	12.98
5240	19.58	12.92
5260	19.78	12.96
5300	19.68	12.94
5320	19.66	12.94
5500	19.91	12.99
5580	19.59	12.92
5700	19.74	12.95

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#### 802.11n\_HT20 (Aux)

Frequency (MHz)	26dB Bandwidth (MHz)	10 Log (B) (dB)
5180	19.10	12.81
5220	19.36	12.87
5240	19.65	12.93
5260	19.53	12.91
5300	19.54	12.91
5320	19.45	12.89
5500	19.76	12.96
5580	19.49	12.90
5700	19.59	12.92

### 802.11n \_HT40 (Main)

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5190	45.71	16.60
5230	45.29	16.56
5270	45.11	16.54
5310	45.30	16.56
5510	45.27	16.56
5550	45.52	16.58
5670	45.15	16.55

#### 802.11n \_HT40 (Aux)

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5190	45.87	16.62
5230	44.85	16.52
5270	45.57	16.59
5310	45.13	16.54
5510	45.38	16.57
5550	45.87	16.62
5670	44.93	16.53

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#### 99% Bandwidth

802 11a

Frequency (MHz)	99% Bandwidth (MHz)	10 Log (B) (dB)
5180	16.368	12.14
5220	16.432	12.16
5240	16.433	12.16
5260	16.408	12.15
5300	16.413	12.15
5320	16.426	12.16
5500	16.330	12.13
5580	16.416	12.15
5700	16.355	12.14
5745	16.408	12.15
5785	16.357	12.14
5825	16.425	12.16

#### 802.11a\_HT20 (Main)

Frequency (MHz)	99% Bandwidth (MHz)	10 Log (B) (dB)
5180	17.451	12.42
5220	17.383	12.40
5240	17.492	12.43
5260	17.561	12.45
5300	17.329	12.39
5320	17.539	12.44
5500	17.343	12.39
5580	17.520	12.44
5700	17.450	12.42
5745	17.418	12.41
5785	17.402	12.41
5825	17.398	12.40

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#### 802.11a HT20 (Aux)

Frequency (MHz)	99% Bandwidth (MHz)	10 Log (B) (dB)
5180	17.444	12.42
5220	17.417	12.41
5240	17.451	12.42
5260	17.051	12.32
5300	17.378	12.40
5320	17.514	12.43
5500	17.410	12.41
5580	17.394	12.40
5700	17.408	12.41
5745	17.314	12.38
5785	17.413	12.41
5825	17.355	12.39

#### 802.11a \_HT40 (Main)

Frequency (MHz)	99% Bandwidth (MHz)	10 Log (B) (dB)
5190	36.372	15.61
5230	36.343	15.60
5270	36.295	15.60
5310	36.293	15.60
5510	36.263	15.59
5550	36.213	15.59
5670	36.316	15.60
5755	36.223	15.59
5795	36.304	15.60

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## 802.11a \_HT40 (Aux)

Frequency (MHz)	99% Bandwidth (MHz)	10 Log (B) (dB)
5190	36.136	15.58
5230	36.132	15.58
5270	36.242	15.59
5310	36.352	15.61
5510	35.958	15.56
5550	36.335	15.60
5670	36.305	15.60
5755	36.223	15.59
5795	36.232	15.59

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## 6dB Bandwidth (5725 MHz~ 5850 MHz)

802.11a

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5745	15.15	11.80
5785	14.20	11.52
5825	14.68	11.67

## 802.11n\_HT20 (Main)

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5745	15.13	11.80
5785	15.14	11.80
5825	16.28	12.12

#### 802.11n\_HT20 (Aux)

Frequency (MHz)	6dB Bandwidth (MHz)	10 Log (B) (dB)
5745	15.67	11.95
5785	15.09	11.79
5825	15.44	11.89

#### 802.11n\_HT40 (Main)

Frequency (MHz)	6dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5755	36.13	15.58
5795	36.13	15.58

#### 802.11n\_HT40 (Aux)

Frequency (MHz)	6dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5755	36.10	15.58
5795	36.04	15.57

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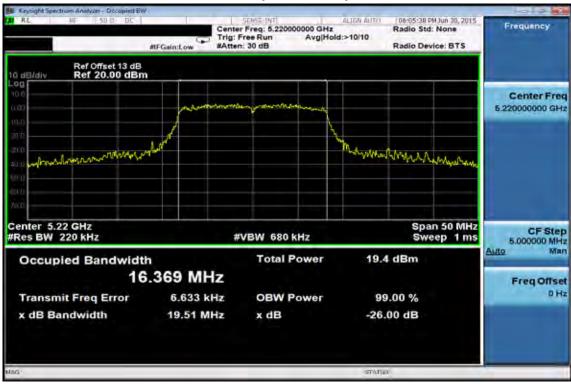
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# 802.11a, 5150~5250 MHz 26dB Band Width Test Data CH-Low (5180MHz)



# 26dB Band Width Test Data CH-Mid (5220MHz)



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# 26dB Band Width Test Data CH-High (5240MHz)



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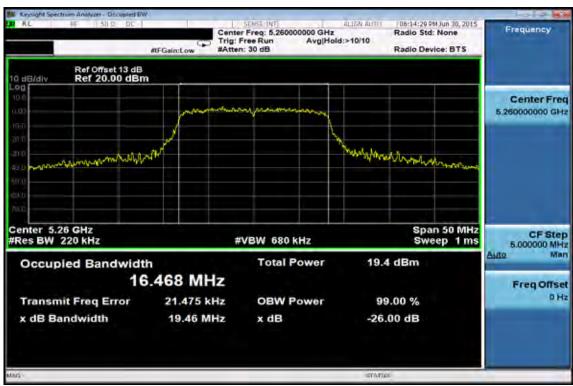
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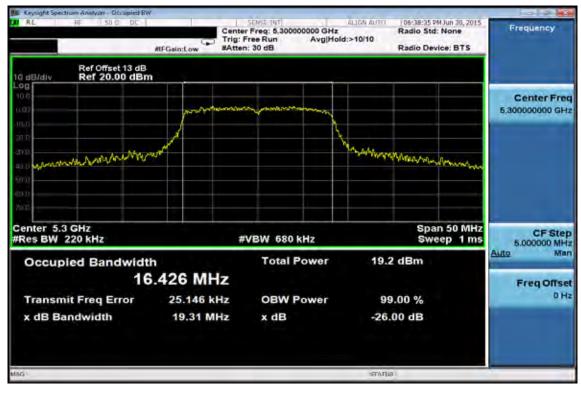
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### 802.11a, 5250~5350 MHz 26dB Band Width Test Data CH-Low (5260MHz)



# 26dB Band Width Test Data CH-Mid (5300MHz)



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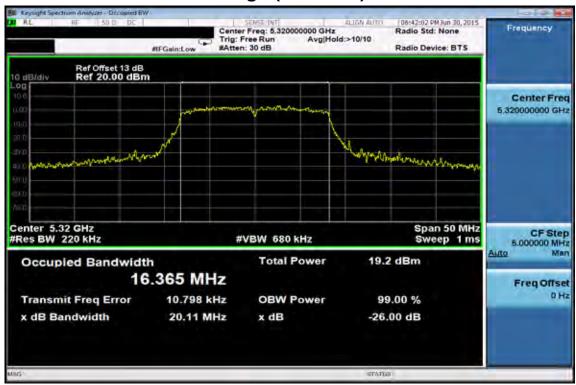
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#### 26dB Band Width Test Data CH-High (5320MHz)



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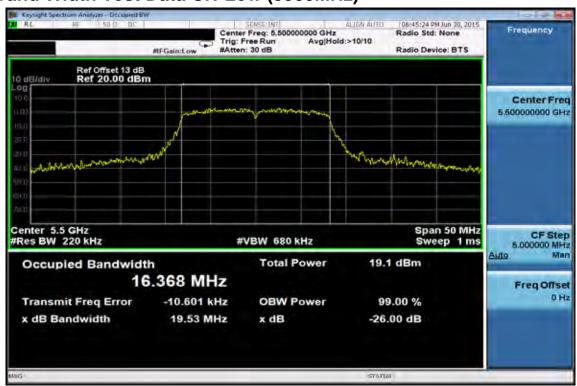
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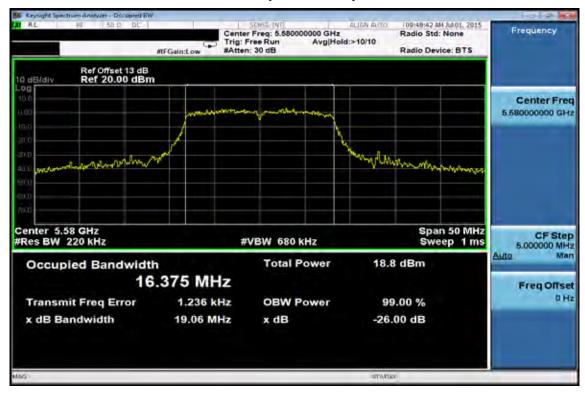
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### 802.11a, 5470~5725 MHz 26dB Band Width Test Data CH-Low (5500MHz)



# 26dB Band Width Test Data CH-Mid (5580MHz)



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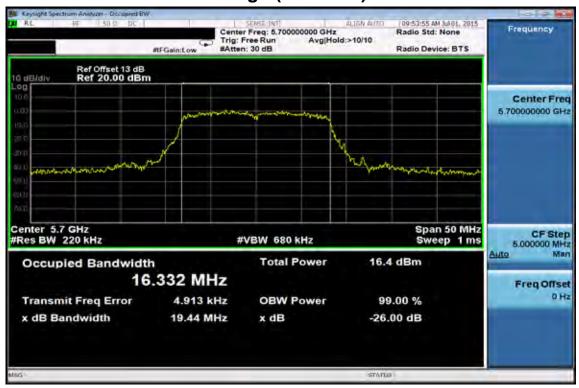
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### 26dB Band Width Test Data CH-High (5700MHz)



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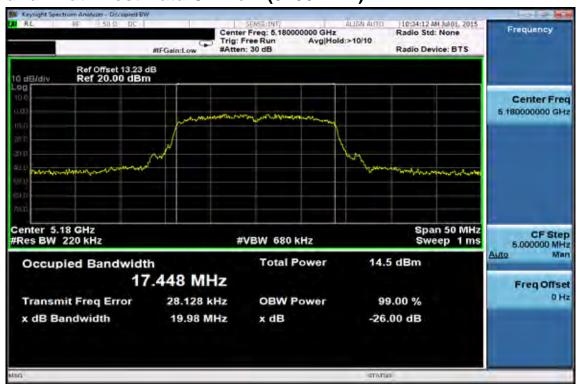
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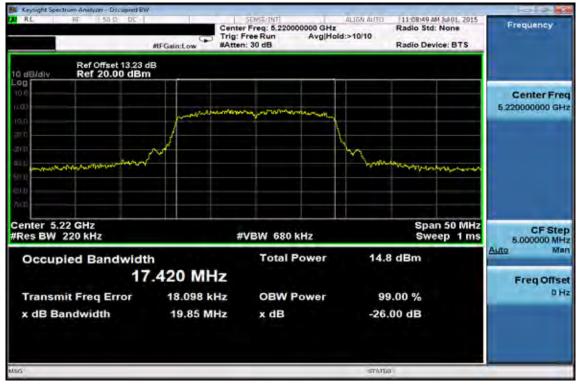
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#### 802.11n HT20, 5150~5250 MHz (Main) 26dB Band Width Test Data CH-Low (5180 MHz)



### 26dB Band Width Test Data CH-Mid (5220 MHz)



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# 26dB Band Width Test Data CH-High (5240 MHz)



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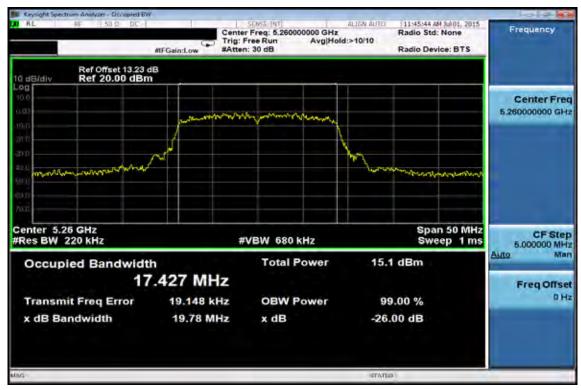
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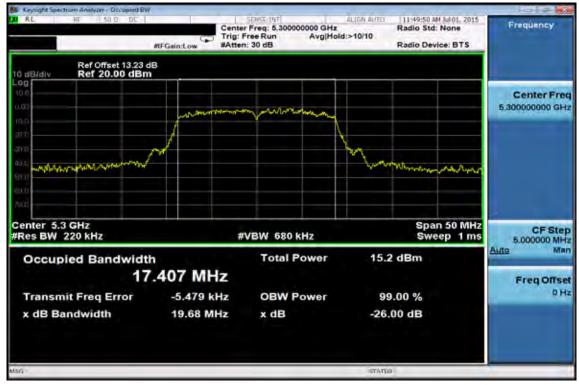
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#### 802.11n HT20, 5250~5350 MHz (Main) 26dB Band Width Test Data CH-Low (5260 MHz)



# 26dB Band Width Test Data CH-Mid (5300 MHz)



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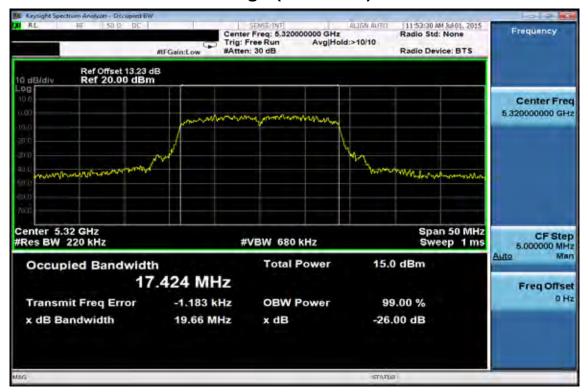
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#### 26dB Band Width Test Data CH-High (5320 MHz)



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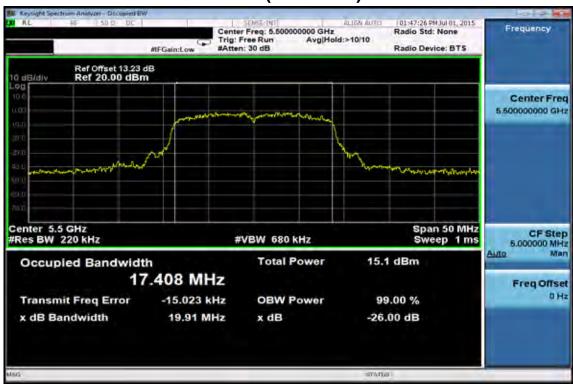
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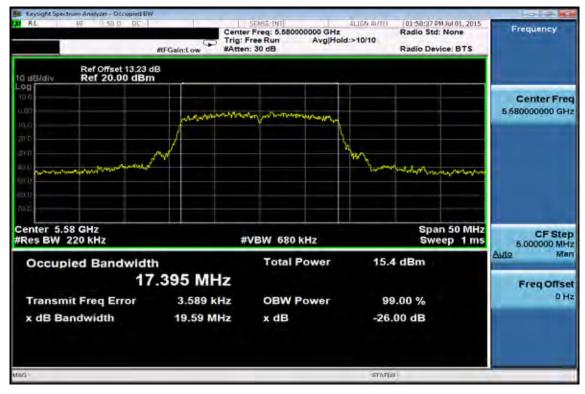
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### 802.11n HT20, 5470~5725 MHz (Main) 26dB Band Width Test Data CH-Low (5500 MHz)



### 26dB Band Width Test Data CH-Mid (5580 MHz)



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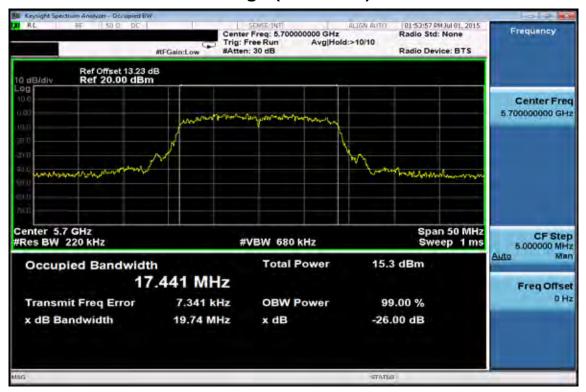
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#### 26dB Band Width Test Data CH-High (5700 MHz)



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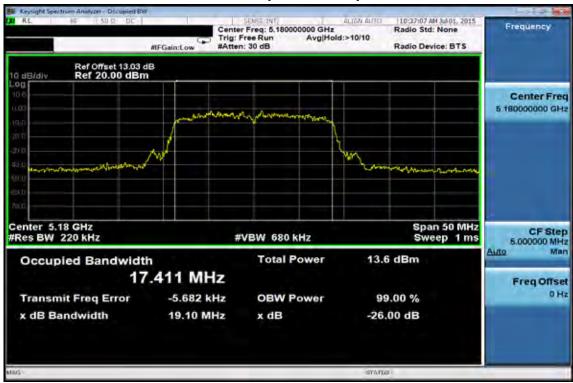
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### 802.11n HT20, 5150~5250 MHz (Aux) 26dB Band Width Test Data CH-Low (5180 MHz)



## 26dB Band Width Test Data CH-Mid (5220 MHz)



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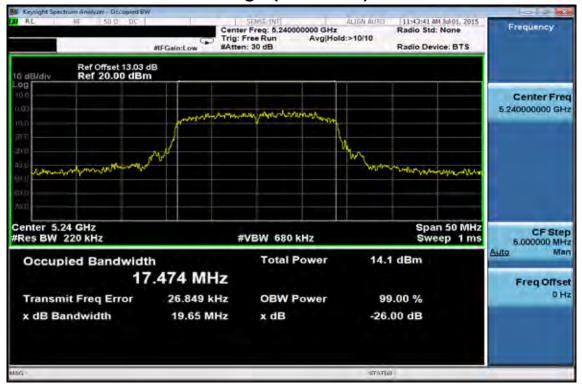
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# 26dB Band Width Test Data CH-High (5240 MHz)



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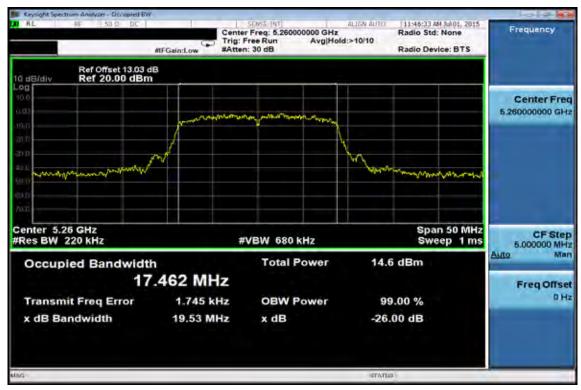
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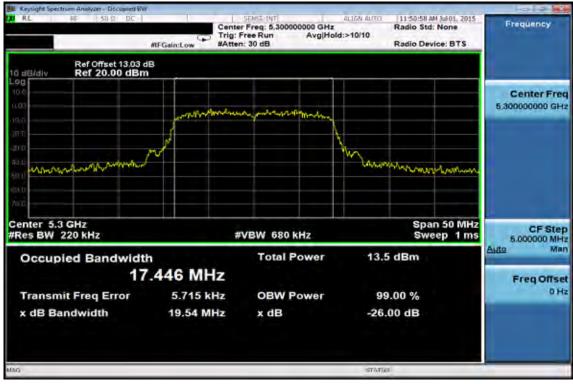
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#### 802.11n HT20, 5250~5350 MHz (Aux) 26dB Band Width Test Data CH-Low (5260 MHz)



# 26dB Band Width Test Data CH-Mid (5300 MHz)



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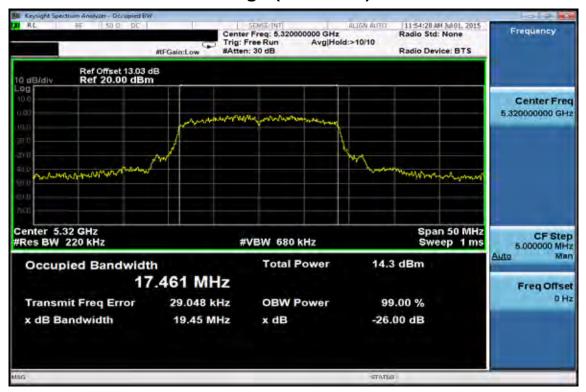
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#### 26dB Band Width Test Data CH-High (5320 MHz)



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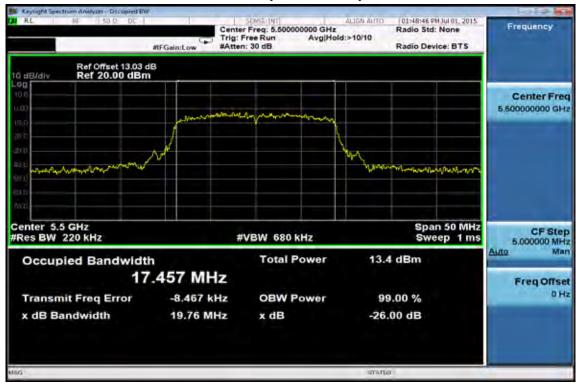
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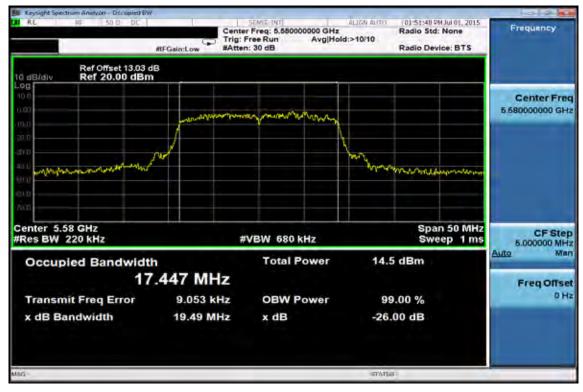
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#### 802.11n HT20, 5470~5725 MHz (Aux) 26dB Band Width Test Data CH-Low (5500 MHz)



## 26dB Band Width Test Data CH-Mid (5580 MHz)



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# 26dB Band Width Test Data CH-High (5700 MHz)



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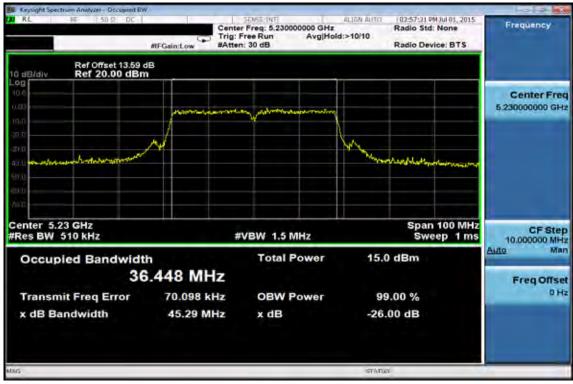
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# 802.11n HT40, 5150~5250 MHz (Main) 26dB Band Width Test Data CH-Low (5190 MHz)



# 26dB Band Width Test Data CH-High (5230 MHz)



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### 802.11n HT40, 5250~5350 MHz (Main) 26dB Band Width Test Data CH-Low (5270 MHz)



26dB Band Width Test Data CH-High (5310MHz)



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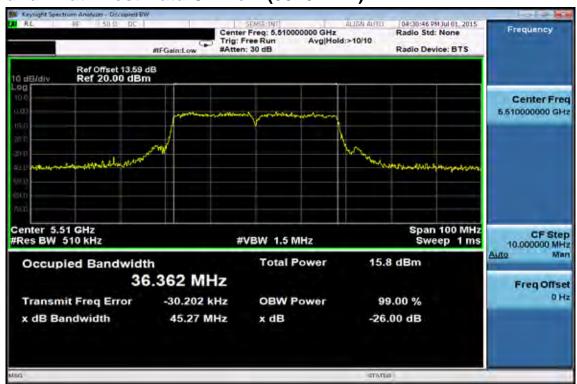
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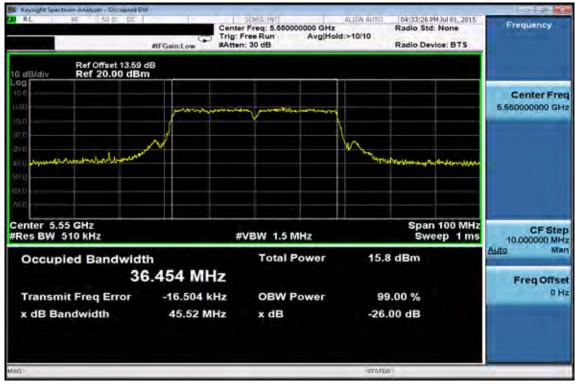
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#### 802.11n HT40, 5470~5725 MHz (Main) 26dB Band Width Test Data CH-Low (5510 MHz)



### 26dB Band Width Test Data CH-Mid (5550 MHz)



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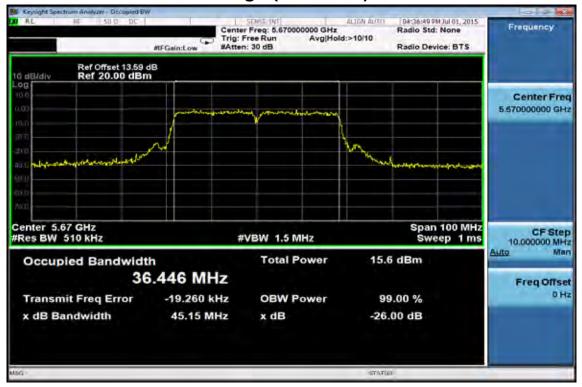
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#### 26dB Band Width Test Data CH-High (5670 MHz)



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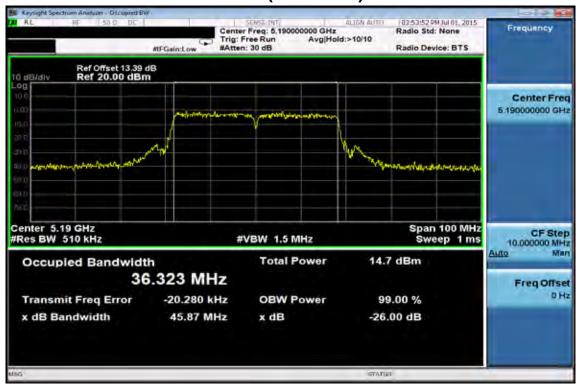
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## 802.11n HT40, 5150~5250 MHz (Aux) 26dB Band Width Test Data CH-Low (5190 MHz)



# 26dB Band Width Test Data CH-High (5230 MHz)



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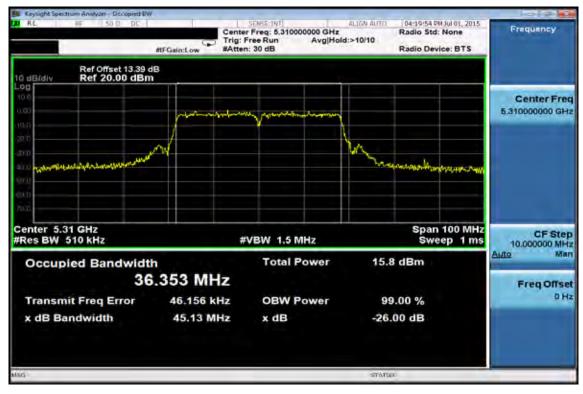
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#### 802.11n HT40, 5250~5350 MHz (Aux) 26dB Band Width Test Data CH-Low (5270 MHz)



### 26dB Band Width Test Data CH-High (5310MHz)



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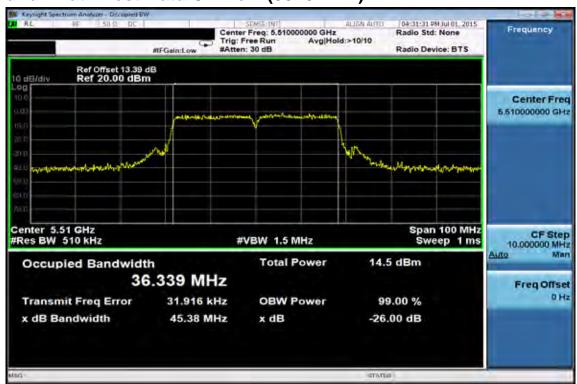
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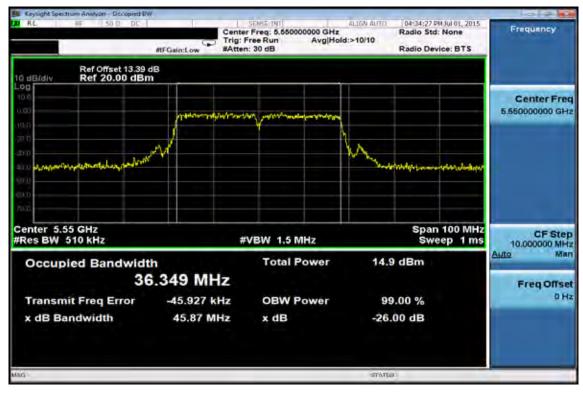
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#### 802.11n HT40, 5470~5725 MHz (Aux) 26dB Band Width Test Data CH-Low (5510 MHz)



### 26dB Band Width Test Data CH-Mid (5550 MHz)



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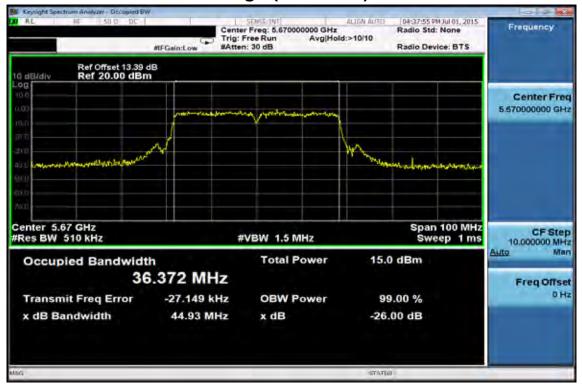
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#### 26dB Band Width Test Data CH-High (5670 MHz)



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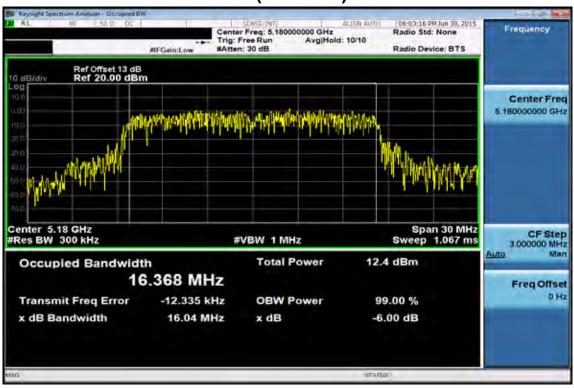
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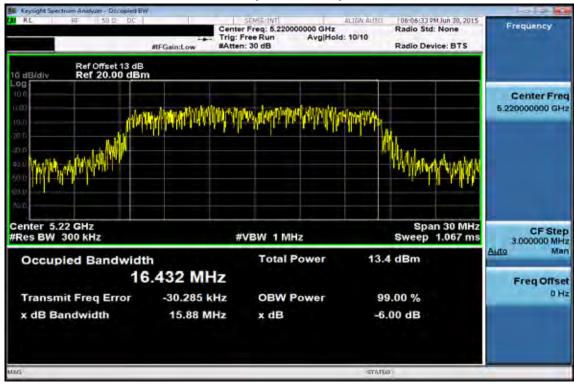
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## 802.11a, 5150~5250 MHz 99% Band Width Test Data CH-Low (5180MHz)



#### 99% Band Width Test Data CH-Mid (5220MHz)



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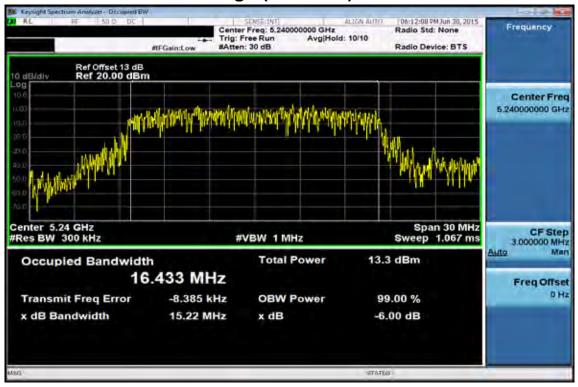
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#### 99% Band Width Test Data CH-High (5240MHz)



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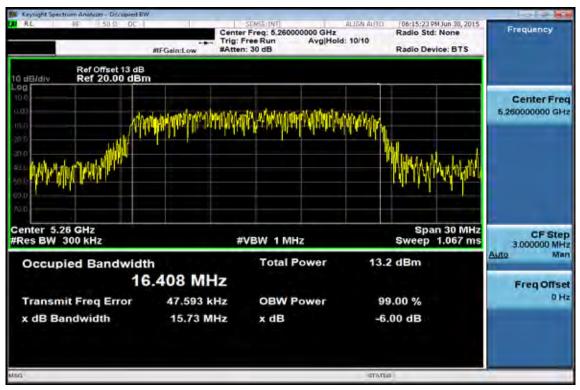
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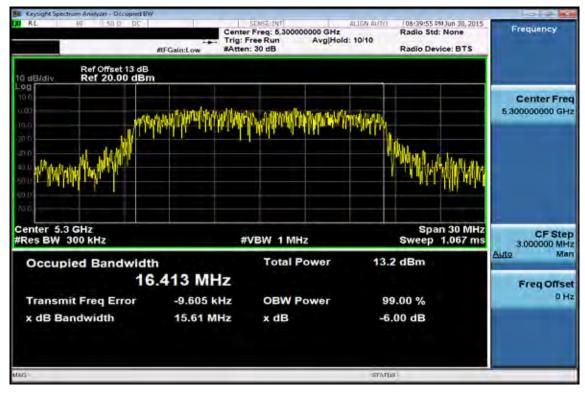
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### 802.11a, 5250~5350 MHz 99% Band Width Test Data CH-Low (5260MHz)



## 99% Band Width Test Data CH-Mid (5300MHz)



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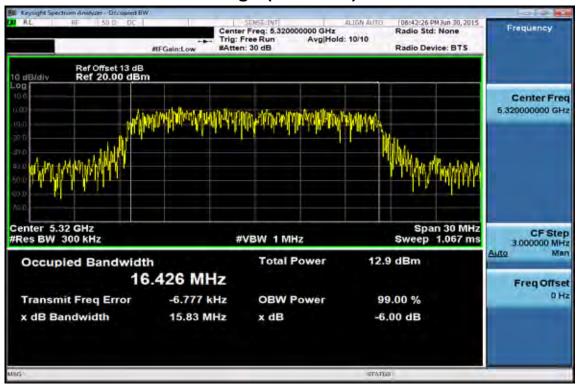
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# 99% Band Width Test Data CH-High (5320MHz)



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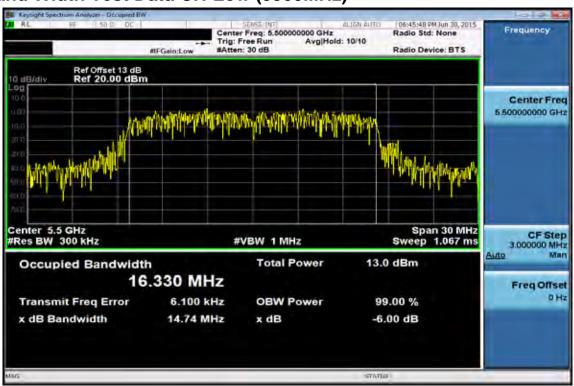
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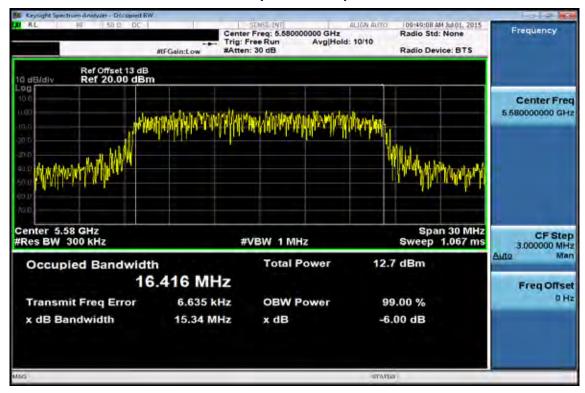
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### 802.11a, 5470~5725 MHz 99% Band Width Test Data CH-Low (5500MHz)



# 99% Band Width Test Data CH-Mid (5580MHz)



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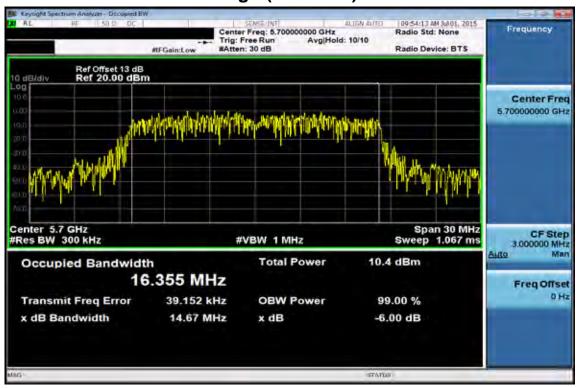
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#### 99% Band Width Test Data CH-High (5700MHz)



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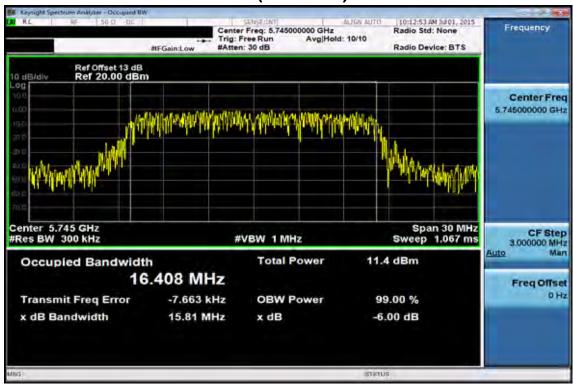
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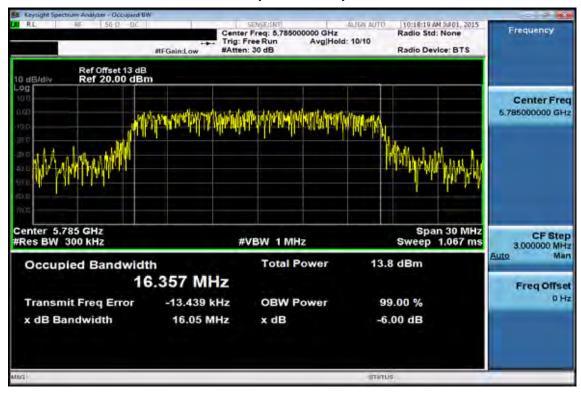
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### 802.11a, 5725~5850 MHz 99% Band Width Test Data CH-Low (5745MHz)



# 99% Band Width Test Data CH-Mid (5785MHz)



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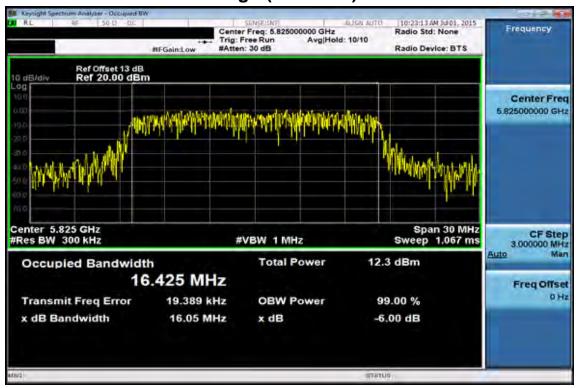
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### 99% Band Width Test Data CH-High (5825MHz)



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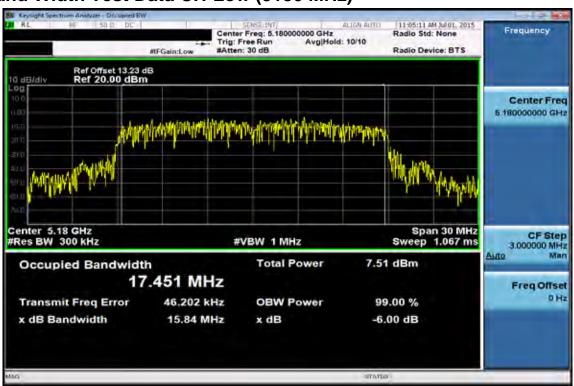
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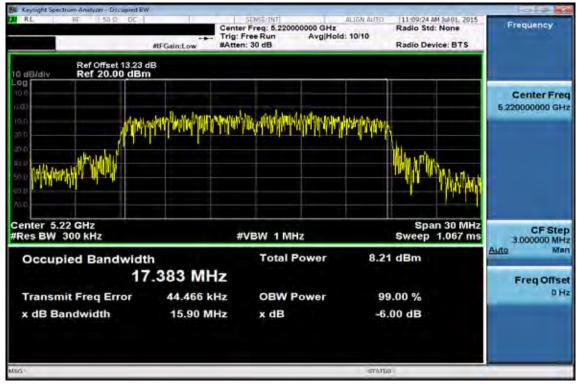
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#### 802.11n HT20, 5150~5250 MHz (Main) 99% Band Width Test Data CH-Low (5180 MHz)



### 99% Band Width Test Data CH-Mid (5220 MHz)



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# 99% Band Width Test Data CH-High (5240 MHz)



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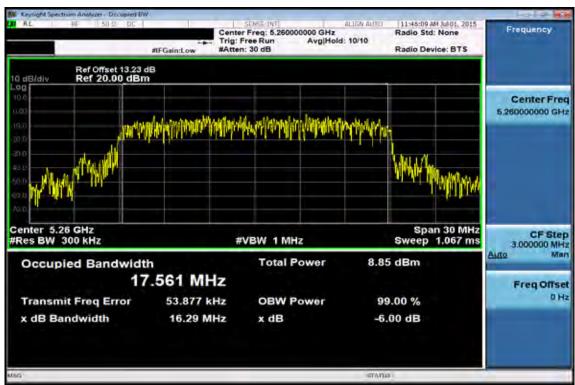
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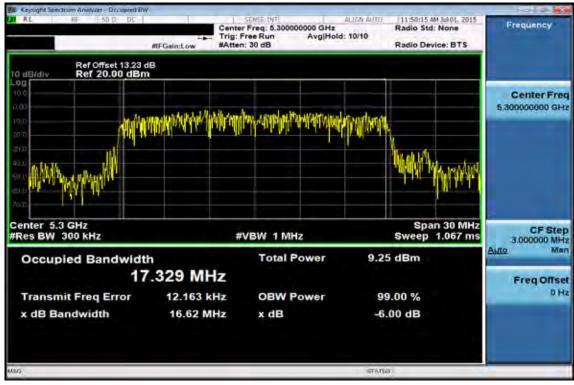
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### 802.11n HT20, 5250~5350 MHz (Main) 99% Band Width Test Data CH-Low (5260 MHz)



### 99% Band Width Test Data CH-Mid (5300 MHz)



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#### 99% Band Width Test Data CH-High (5320 MHz)



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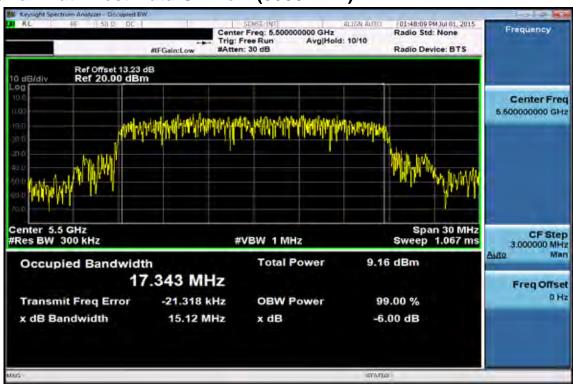
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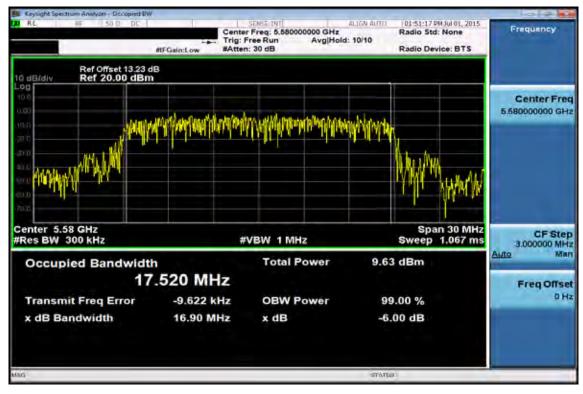
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#### 802.11n HT20, 5470~5725 MHz (Main) 99% Band Width Test Data CH-Low (5500 MHz)



## 99% Band Width Test Data CH-Mid (5580 MHz)



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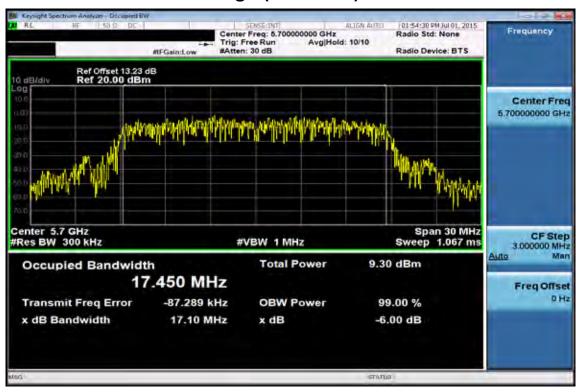
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#### 99% Band Width Test Data CH-High (5700 MHz)



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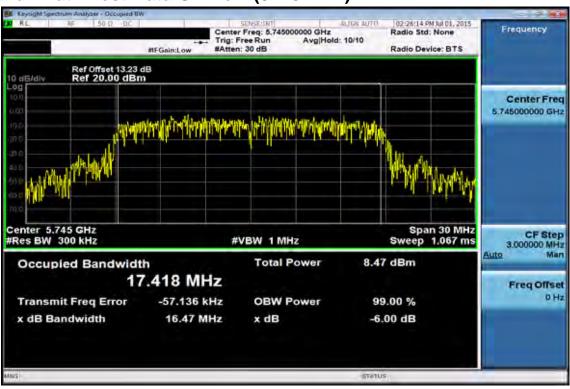
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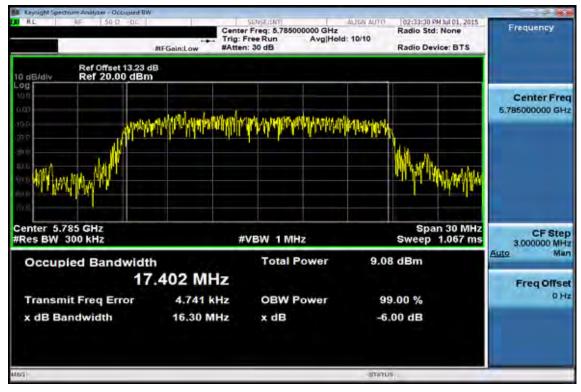
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#### 802.11n HT20, 5725~5850 MHz (Main) 99% Band Width Test Data CH-Low (5745 MHz)



# 99% Band Width Test Data CH-Mid (5785 MHz)



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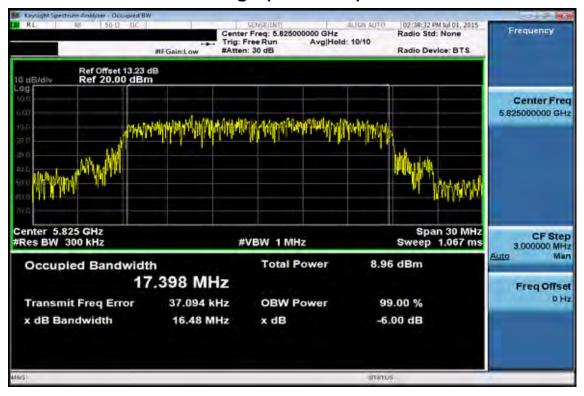
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#### 99% Band Width Test Data CH-High (5825 MHz)



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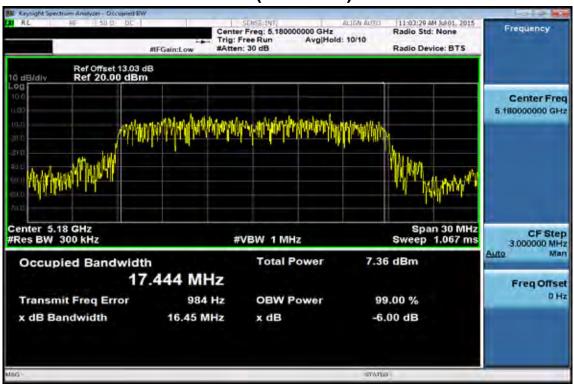
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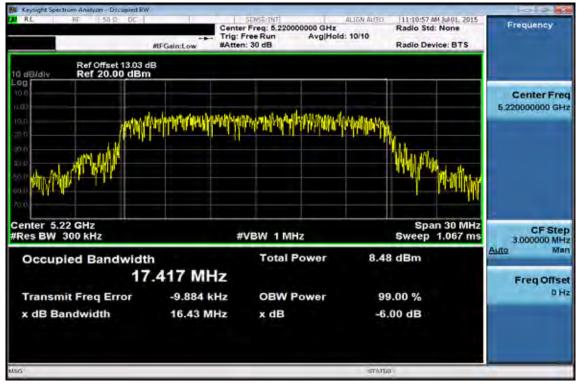
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#### 802.11n HT20, 5150~5250 MHz (Aux) 99% Band Width Test Data CH-Low (5180 MHz)



## 99% Band Width Test Data CH-Mid (5220 MHz)



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# 99% Band Width Test Data CH-High (5240 MHz)



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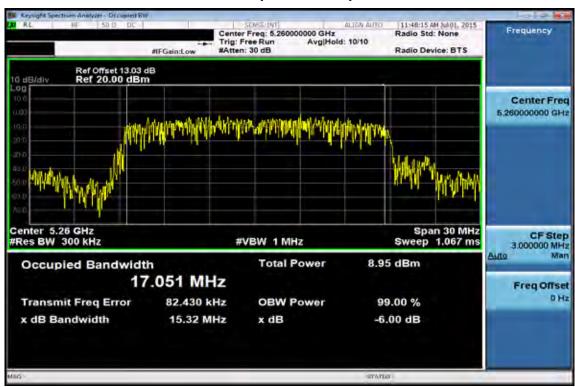
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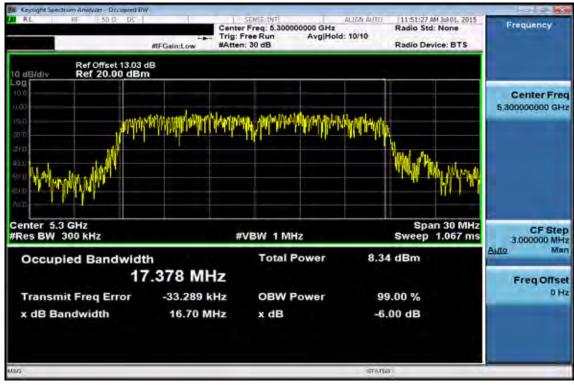
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#### 802.11n HT20, 5250~5350 MHz (Aux) 99% Band Width Test Data CH-Low (5260 MHz)



#### 99% Band Width Test Data CH-Mid (5300 MHz)



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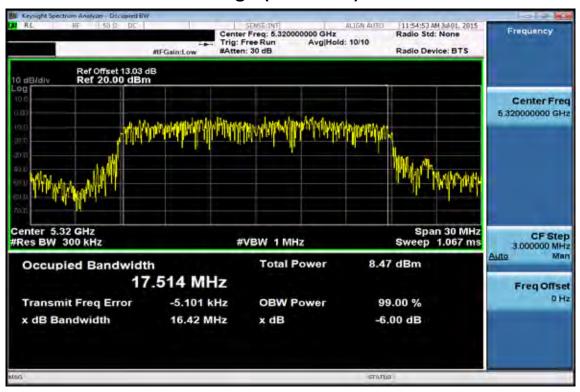
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#### 99% Band Width Test Data CH-High (5320 MHz)



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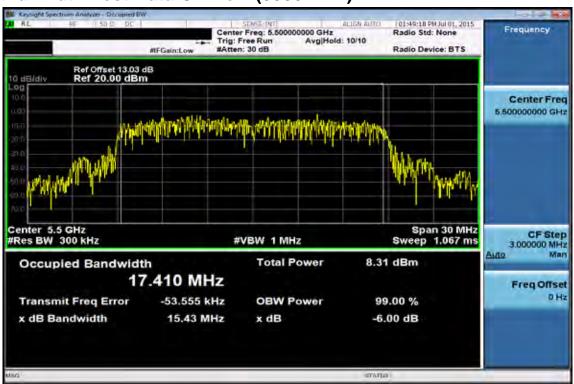
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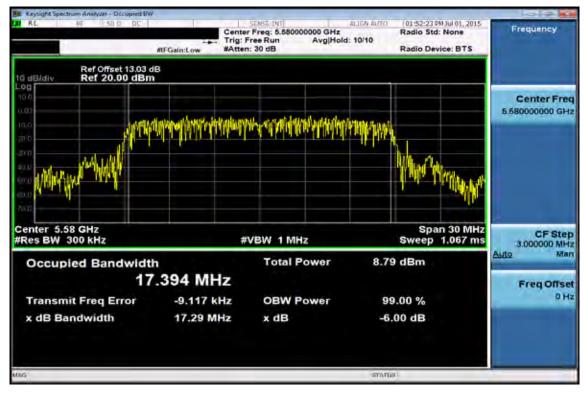
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#### 802.11n HT20, 5470~5725 MHz (Aux) 99% Band Width Test Data CH-Low (5500 MHz)



## 99% Band Width Test Data CH-Mid (5580 MHz)



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# 99% Band Width Test Data CH-High (5700 MHz)



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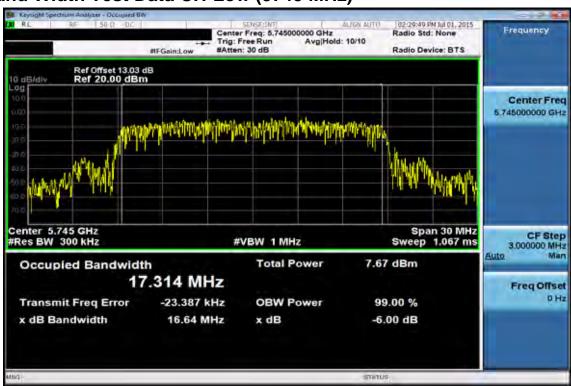
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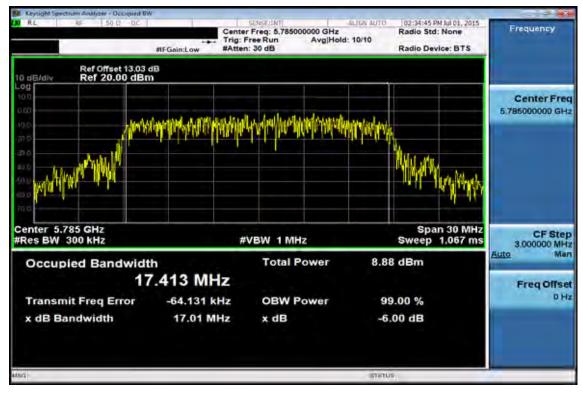
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#### 802.11n HT20, 5725~5850 MHz (Aux) 99% Band Width Test Data CH-Low (5745 MHz)



## 99% Band Width Test Data CH-Mid (5785 MHz)



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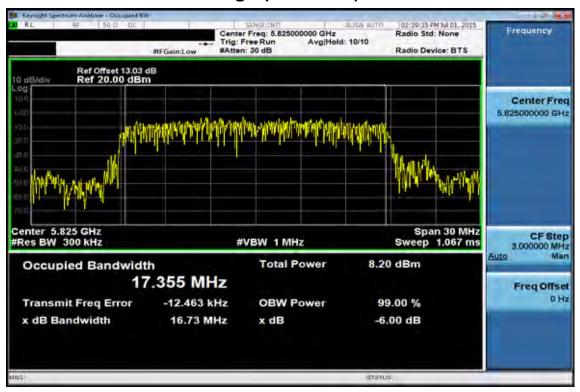
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#### 99% Band Width Test Data CH-High (5825 MHz)



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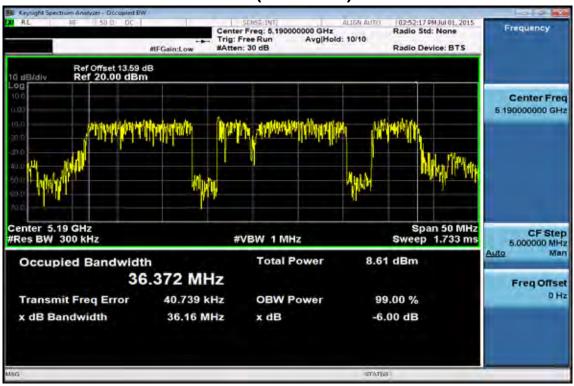
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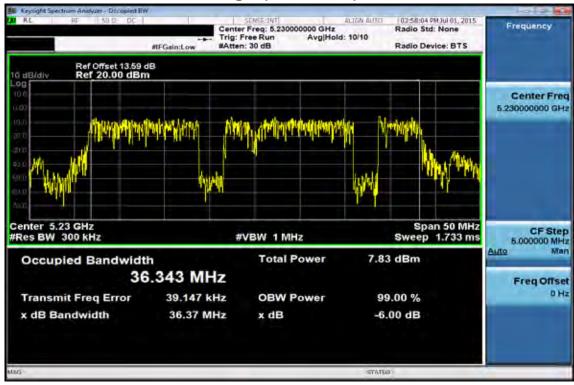
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# 802.11n HT40, 5150~5250 MHz (Main) 99% Band Width Test Data CH-Low (5190 MHz)



# 99% Band Width Test Data CH-High (5230 MHz)



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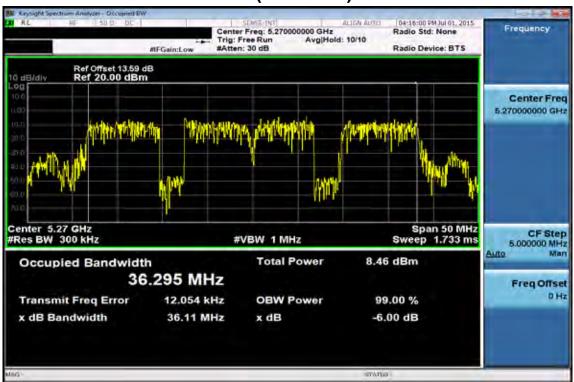
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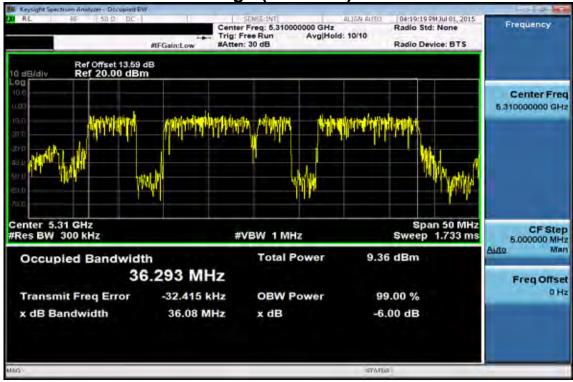
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#### 802.11n HT40, 5250~5350 MHz (Main) 99% Band Width Test Data CH-Low (5270 MHz)



99% Band Width Test Data CH-High (5310MHz)



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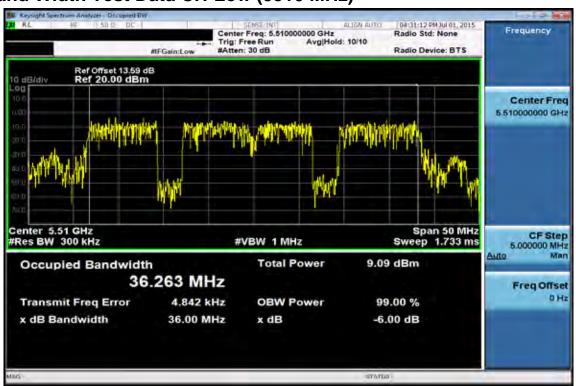
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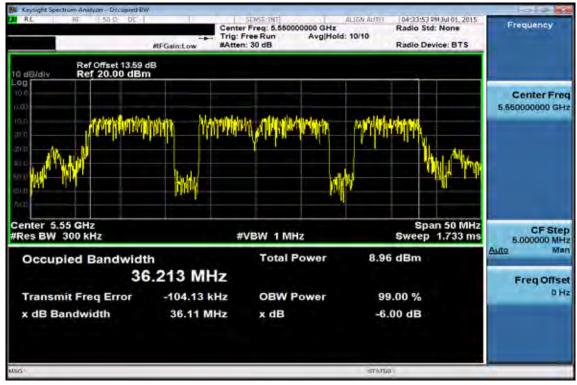
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#### 802.11n HT40, 5470~5725 MHz (Main) 99% Band Width Test Data CH-Low (5510 MHz)



## 99% Band Width Test Data CH-Mid (5550 MHz)



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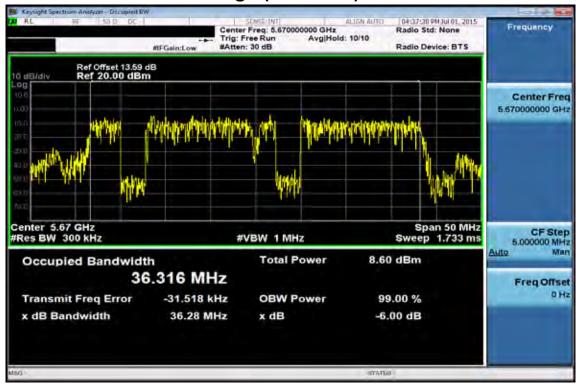
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# 99% Band Width Test Data CH-High (5670 MHz)



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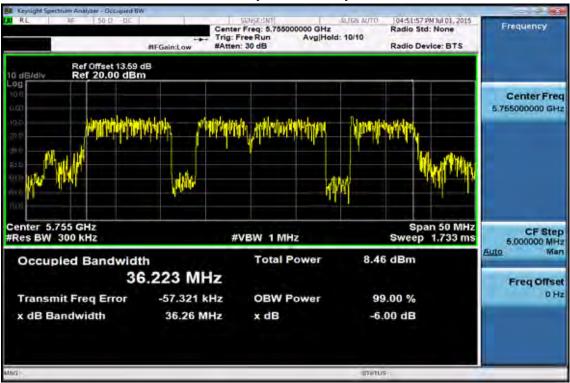
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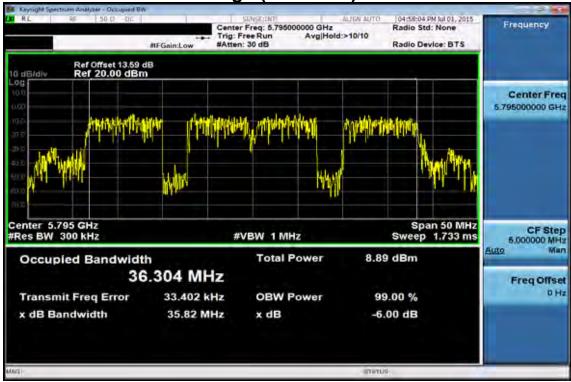
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#### 802.11n HT40, 5725~5850 MHz (Main) 99% Band Width Test Data CH-Low (5755 MHz)



99% Band Width Test Data CH-High (5795 MHz)



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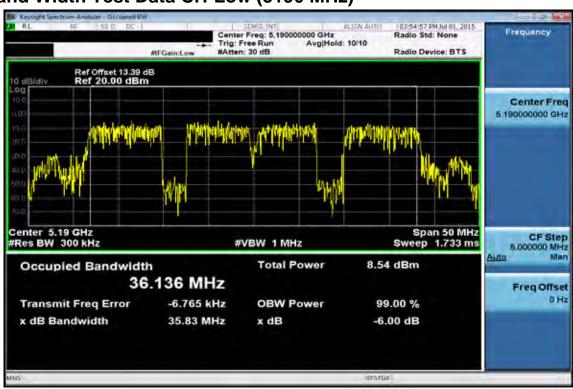
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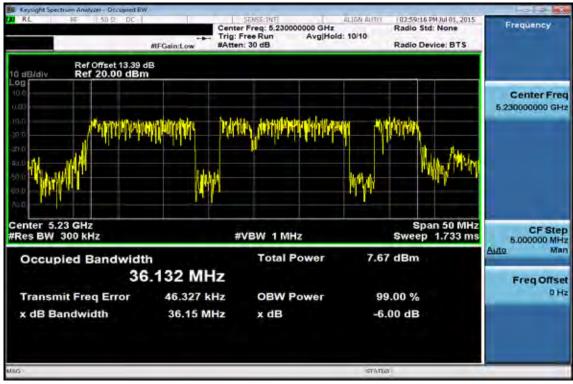
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# 802.11n HT40, 5150~5250 MHz (Aux) 99% Band Width Test Data CH-Low (5190 MHz)



# 99% Band Width Test Data CH-High (5230 MHz)



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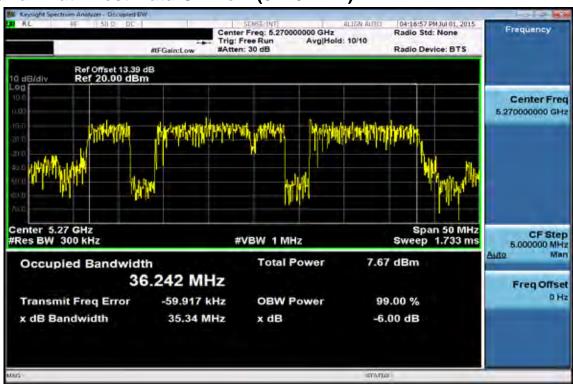
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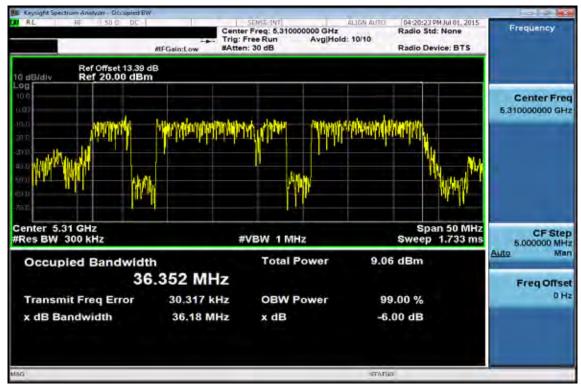
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#### 802.11n HT40, 5250~5350 MHz (Aux) 99% Band Width Test Data CH-Low (5270 MHz)



# 99% Band Width Test Data CH-High (5310MHz)



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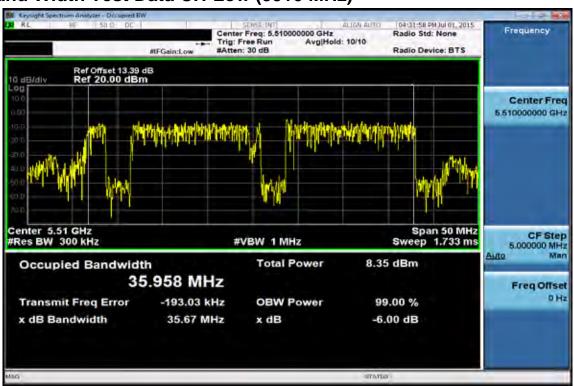
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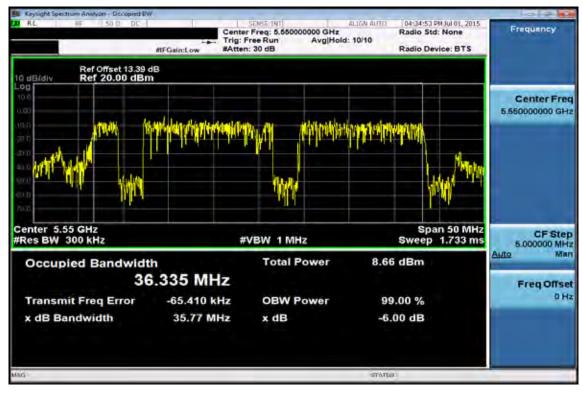
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#### 802.11n HT40, 5470~5725 MHz (Aux) 99% Band Width Test Data CH-Low (5510 MHz)



## 99% Band Width Test Data CH-Mid (5550 MHz)



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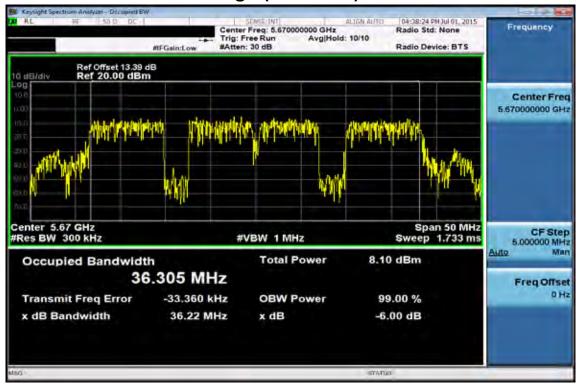
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# 99% Band Width Test Data CH-High (5670 MHz)



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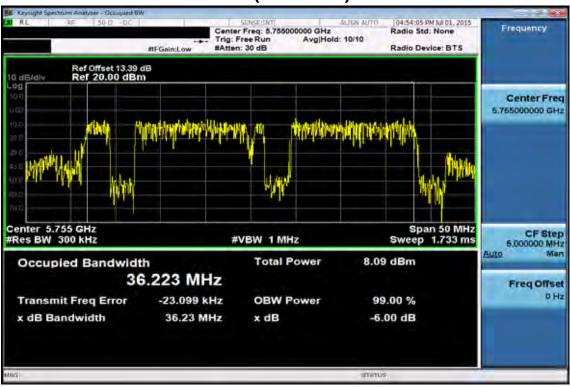
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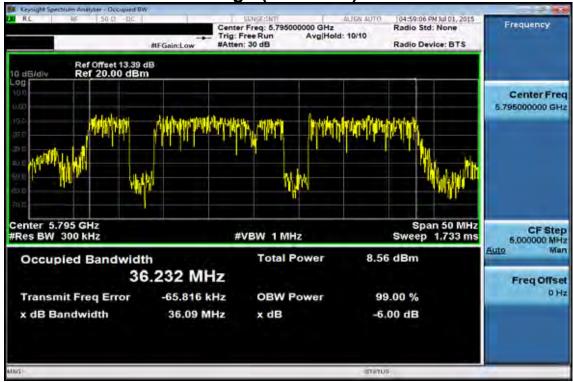
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#### 802.11n HT40, 5725~5850 MHz (Aux) 99% Band Width Test Data CH-Low (5755 MHz)



99% Band Width Test Data CH-High (5795 MHz)



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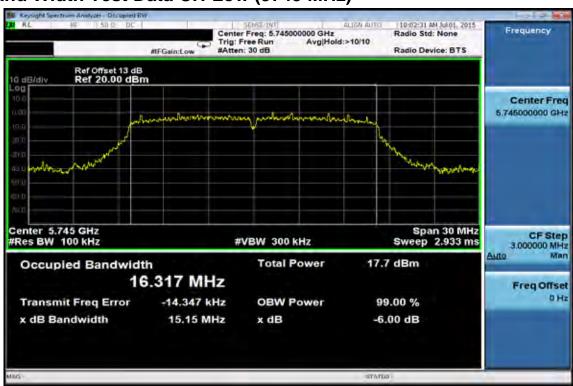
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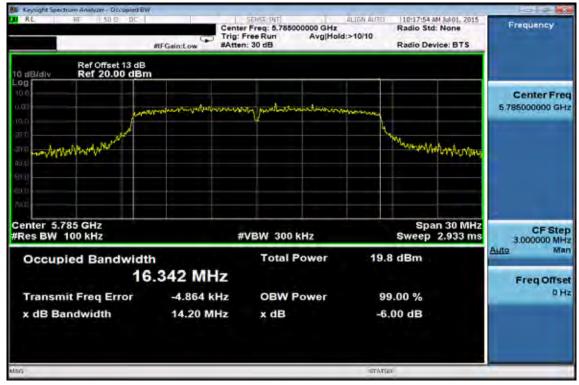
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#### 802.11a, 5725~5850 MHz 6dB Band Width Test Data CH-Low (5745 MHz)



## 6dB Band Width Test Data CH-Mid (5785 MHz)



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# 6dB Band Width Test Data CH-High (5825 MHz)



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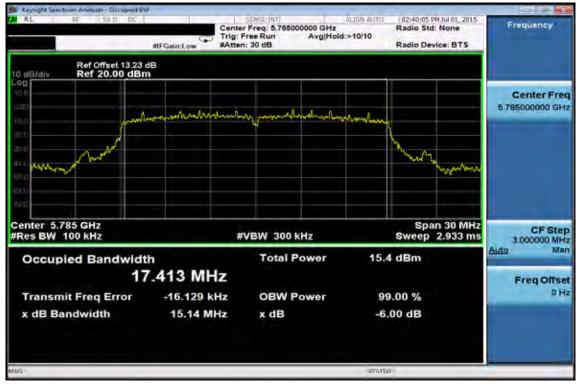
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#### 802.11n HT20, 5725~5850 MHz (Main) 6dB Band Width Test Data CH-Low (5745 MHz)



## 6dB Band Width Test Data CH-Mid (5785 MHz)



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# 6dB Band Width Test Data CH-High (5825 MHz)



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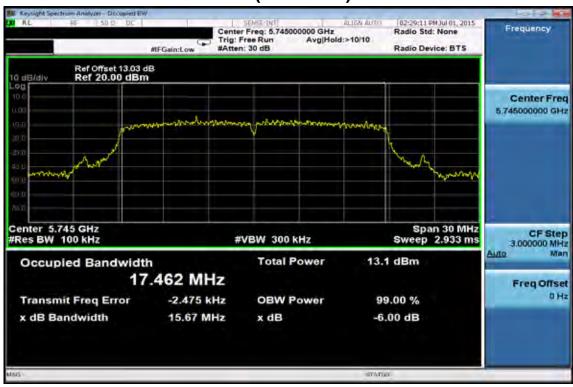
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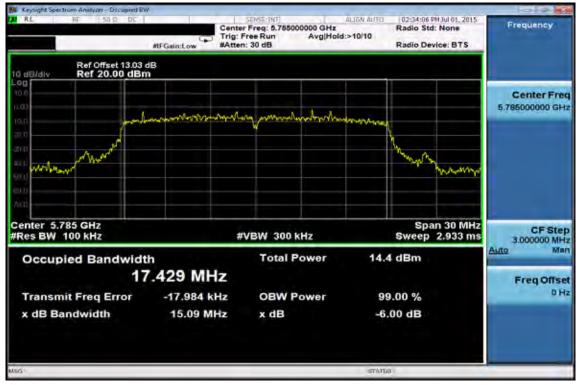
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#### 802.11n HT20, 5725~5850 MHz (Aux) 6dB Band Width Test Data CH-Low (5745 MHz)



## 6dB Band Width Test Data CH-Mid (5785 MHz)



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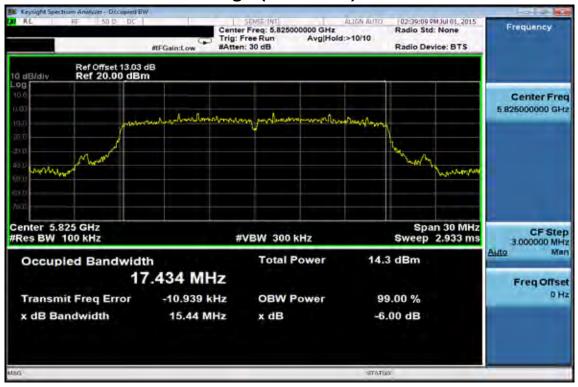
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# 6dB Band Width Test Data CH-High (5825 MHz)



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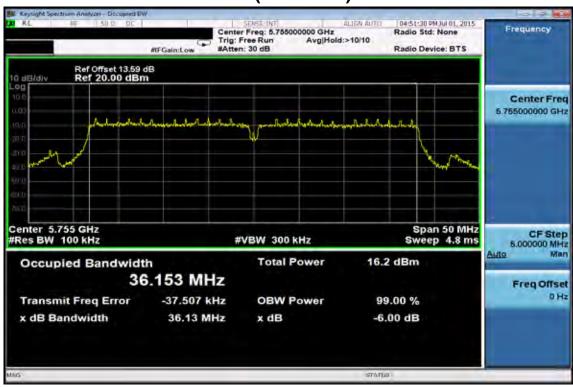
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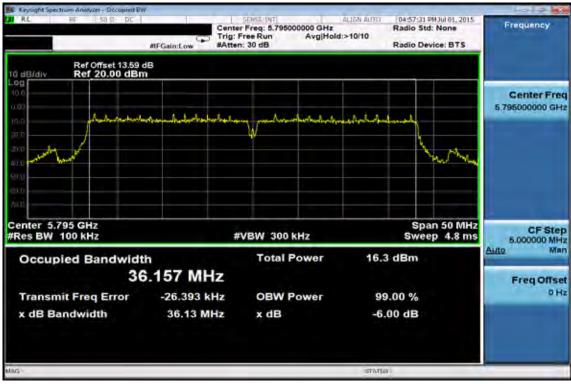
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# 802.11n HT40, 5725~5850 MHz (Main) 6dB Band Width Test Data CH-Low (5755 MHz)



# 6dB Band Width Test Data CH-High (5795 MHz)



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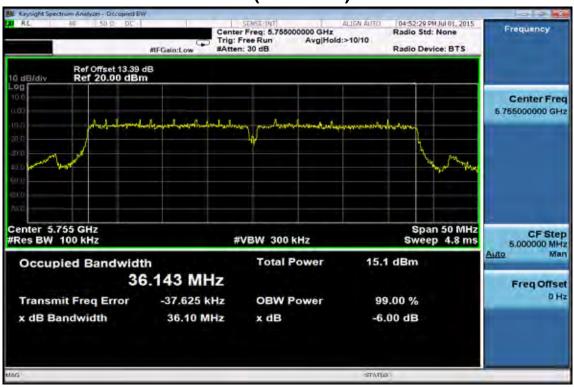
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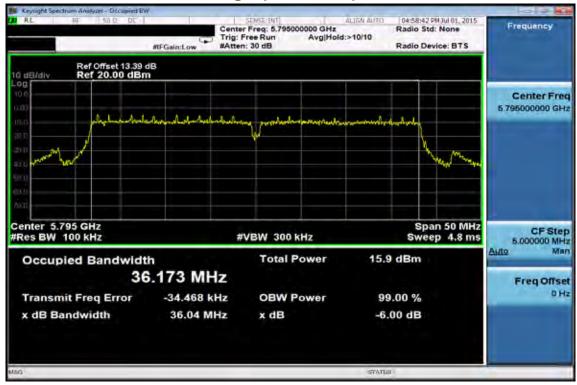
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# 802.11n HT40, 5725~5850 MHz (Aux) 6dB Band Width Test Data CH-Low (5755 MHz)



# 6dB Band Width Test Data CH-High (5795 MHz)



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#### 9. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

#### 9.1 Standard Applicable

According to §15.407(a)

OPERZTION Band		EUT CATEGORY	LIMIT				
U-NII-1		Access Point (Mater device)	1 Watt(30dBm)				
		Fixed point-to-point Acess Ponit	1 Watt(30dBm)				
		Mobile and portable clinet device	250mW(23.98dBm)				
U-NII-2A			250mW(23.98dBm) or 11dBm+10 log B				
U-NII-2C	√		250mW(23.98dBm) or 11dBm+10 log B				
U-NII-3 √			1 Watt(30dBm)				
Note: B is the 26dB emission bandwidth in MHz.							

According to RSS-247 §6.2.1~ 4 (1)

7.6667 aming 16 1766 2 17 36.2.1 1 (1)							
OPERZTION FREQUENCY BAND	LIMIT						
5150~5250 MHz	EIRP shall not exceed 200 mW or 10 + 10 log10 B						
5250~5350 MHz	Conducted output power shall not exceed 250 mW or 11 +10 log10 B EIRP shall not exceed 1.0 W or 17 + 10 log10 B, dBm						
5470-5600 MHz and	Conducted output power shall not exceed 250 mW or 11 +10 log10 B						
5650-5725 MHz	EIRP shall not exceed 1.0 W or 17 + 10 log10 B, dBm						
5725~5850 MHz	Conducted output power shall not exceed 1 W						
Note: B is the 99% emission bandwidth in MHz.							

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6dBi.

Note: Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain (dBi) = 1.25+3.01=4.26dBi for the U-NII-1 and U-NII-2A band.

Effective Legacy Gain (dBi) =1.76+3.01=4.77dBi for the U-NII-2C band and U-NII-3 Band.

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#### 9.2 Measurement Procedure

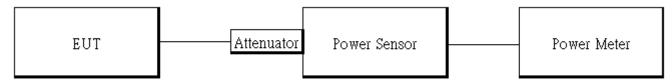
- Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
- Power Meter is used as the auxiliary test equipment to conduct the output power meas-4. urement.
- Record the max. reading and add 10 log(1/duty cycle).
- Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.
- Employing step 1 to 5 obtaining per-chain basis in MIMO operation, and sum the power in linear to result the output of MIMO operation at frequency of interest (where MIMO is applicable)

Note: For EIRP/ERP measurement complying with RSS-247 §6.2.1~ 4 (1), the formula as deduced in 1.3.2 of KDB 412172 D01 is used to calculate. ERP/EIRP = Pt + Gt – Lc, where Pt= transmitter output power measured directly at antenna port, expressing in dBm, and Gt = gain of the transmitting antenna in dBi that can be referred in antenna spec provided by the manufacturer in section 1.1, Lc = signal attenuation in the cable between the transmitting port and antenna.

#### **Measurement Equipment Used** 9.3

Refer to section 8.3 for details.

#### 9.4 Test Set-up



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#### 9.5 Measurement Result

802.11a

СН	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	13.52	22.491	23.98	PASS
44	5220	13.97	24.946	23.98	PASS
48	5240	13.83	24.155	23.98	PASS
52	5260	13.96	24.889	23.98 or 11+10log(B) =23.89	PASS
60	5300	13.87	24.378	23.98 or 11+10log(B) =23.86	PASS
64	5320	13.79	23.933	23.98 or 11+10log(B) =24.03	PASS
100	5500	13.62	23.014	23.98 or 11+10log(B) =23.91	PASS
116	5580	13.46	22.182	23.98 or 11+10log(B) =23.80	PASS
140	5700	11.53	14.223	23.98 or 11+10log(B) =23.89	PASS
149	5745	12.53	17.906	30	PASS
157	5785	13.99	25.061	30	PASS
165	5825	12.52	17.865	30	PASS

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#### 802.11n HT20 (MIMO)

	Eroguepov	AVERAGE F	POWER (dBm	TOTAL	TOTAL	REQUIRED	
СН	Frequency (MHz)	CHAIN 0	CHAIN 1	<b>POWER</b>	<b>POWER</b>	LIMIT	RESULT
	(1411.12)	CHAIN 0	CHAIN	(dBm)	(mW)	(dBm)	
36	5180	8.63	8.58	11.62	14.506	23.98	PASS
44	5220	9.49	8.43	12.00	15.858	23.98	PASS
48	5240	9.41	8.51	11.99	15.825	23.98	PASS
52	5260	9.45	8.48	12.00	15.857	23.98 or	PASS
52	3200	3.43	0.40	12.00	13.037	$11+10\log(B) = 23.96$	PASS
60	5300	9.43	8.27	11.90	15.484	23.98 or	PASS
00	3300	9.43	0.27	11.30	13.707	$11+10\log(B) = 23.94$	1 700
64	5320	9.29	8.06	11.73	14.889	23.98 or	PASS
U-7	0020	0.20	0.00	11.70	14.000	$11+10\log(B) = 23.94$	17.00
100	5500	9.02	8.54	11.80	15.125	23.98 or	PASS
		0.02	0.0 1	11.00	10.120	$11+10\log(B) = 23.99$	17.00
116	5580	9.31	8.63	11.99	15.826	23.98 or	PASS
		0.01	0.00	11.55	10.020	$11+10\log(B) = 23.92$	17.00
140	5700	9.31	8.61	11.98	15.792	23.98 or	PASS
						$11+10\log(B) = 23.95$	
149	5745	8.63	8.21	11.44	13.917	30	PASS
157	5785	9.49	8.35	11.97	15.731	30	PASS
165	5825	9.46	8.44	11.99	15.813	30	PASS

#### 802.11n HT40 (MIMO)

	Frequency	AVERAGE I	POWER (dBm)	TOTAL	TOTAL	REQUIRED	
СН	(MHz)	CHAIN 0	CHAIN 1	<b>POWER</b>	<b>POWER</b>	LIMIT	RESULT
	(1411 12)	CHAIN	CHAIN	(dBm)	(mW)	(dBm)	
38	5190	8.83	8.72	11.79	15.086	23.98	PASS
46	5230	8.91	8.34	11.64	14.604	0.98	PASS
54	5270	8.88	8.36	11.64	14.582	23.98 or	PASS
J+	3270	0.00	0.50	11.04	14.502	$11+10\log(B) = 27.54$	1 700
62	5310	9.62	8.24	11.99	15.830	23.98 or	PASS
02	0010	5.02	0.24	11.55	13.030	$11+10\log(B) = 27.56$	17.00
102	5510	9.22	8.73	11.99	15.821	23.98 or	PASS
102	0010	5.22	0.70	11.55	13.021	$11+10\log(B) = 27.56$	17.00
110	5550	9.18	8.75	11.98	15.778	23.98 or	PASS
	0000	0.10	0.70	11.00	10.770	$11+10\log(B) = 27.58$	17.00
134	5670	8.91	8.63	11.78	15.075	23.98 or	PASS
104	3070	0.51	0.00	11.70	10.070	$11+10\log(B) = 27.55$	1 7,00
151	5755	9.15	8.45	11.82	15.221	30	PASS
159	5795	9.05	8.46	11.78	15.050	30	PASS

<sup>\*</sup> Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.

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#### **EIRP Measurement:**

802.11a

СН	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
36	5180	13.52	22.491		14.77	23.01 or 10+10log(B) =22.14	PASS
44	5220	13.97	24.946	1.25	15.22	23.01 or 10+10log(B) =22.16	PASS
48	5240	13.83	24.155		15.08	23.01 or 10+10log(B) =22.16	PASS
52	5260	13.96	24.889		15.21	30 or 17+10log(B) =29.15	PASS
60	5300	13.87	24.378	1.25	15.12	30 or 17+10log(B) =29.15	PASS
64	5320	13.79	23.933		15.04	30 or 17+10log(B) =29.16	PASS
100	5500	13.62	23.014		15.15	30 or 17+10log(B) =29.13	PASS
116	5580	13.46	22.182	1.53	14.99	30 or 17+10log(B) =29.15	PASS
140	5700	11.53	14.223		13.06	30 or 17+10log(B) =29.14	PASS
149	5745	12.53	17.906		14.06	30	PASS
157	5785	13.99	25.061	1.53	15.52	30	PASS
165	5825	12.52	17.865		14.05	30	PASS

<sup>\*</sup> Note: EIRP = Average Power + Gain

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### 802.11n HT20 (MIMO)

СН	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
36	5180	11.62	14.521		15.88	23.01 or 10+10log(B) =22.42	PASS
44	5220	12.00	15.849	4.26	16.26	23.01 or 10+10log(B) =22.40	PASS
48	5240	11.99	15.812		16.25	23.01 or 10+10log(B) =22.43	PASS
52	5260	12.00	15.849		16.26	30 or 17+10log(B) =29.45	PASS
60	5300	11.90	15.488	4.26	16.16	30 or 17+10log(B) =29.39	PASS
64	5320	11.73	14.894		15.99	30 or 17+10log(B) =29.44	PASS
100	5500	11.80	15.136		16.57	30 or 17+10log(B) =29.39	PASS
116	5580	11.99	15.812	4.77	16.76	30 or 17+10log(B) =29.44	PASS
140	5700	11.98	15.776		16.75	30 or 17+10log(B) =29.42	PASS
149	5745	11.44	13.932		16.21	30	PASS
157	5785	11.97	15.740	4.77	16.74	30	PASS
165	5825	11.99	15.812		16.76	30	PASS

### 802.11n HT40 (MIMO)

СН	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	GAIN (dBi)	EIRP	REQUIRED LIMIT (dBm)	RESULT
38	5190	11.79	15.101	4.26	16.05	23.01 or 10+10log(B) =25.61	PASS
46	5230	11.64	14.588	4.20	15.90	23.01 or 10+10log(B) =25.60	PASS
54	5270	11.64	14.588	4.26	15.90	30 or 17+10log(B) =32.60	PASS
62	5310	11.99	15.812		16.25	30 or 17+10log(B) =32.60	PASS
102	5510	11.99	15.812		16.76	30 or 17+10log(B) =32.59	PASS
110	5550	11.98	15.776	4.77	16.75	30 or 17+10log(B) =32.59	PASS
134	5670	11.78	15.066		16.55	30 or 17+10log(B) =32.60	PASS
151	5755	11.82	15.205	4.77	16.59	30	PASS
159	5795	11.78	15.066	4.77	16.55	30	PASS

\* Note: EIRP = Average Power + Gain

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### 10. PEAK POWER SPECTRAL DENSITY

### 10.1 Standard Applicable

According to §15.407(a)

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Mater device )	17dBm/ MHz
		Fixed point-to-point Acess Ponit	
		Mobile and portable clinet device	11dBm/ MHz
U-NII-2A	√		11dBm/ MHz
U-NII-2C	V		11dBm/ MHz
U-NII-3			30dBm/ 500kHz

According to RSS-247 §6.2.1~ 4 (1)

OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP spectral density 10 dBm / MHz
5250~5350 MHz	11dBm / MHz
5470-5600 MHz and 5650-5725 MHz	11dBm / MHz
5725~5850 MHz	30dBm / MHz

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Note: Directional gain = gain of antenna element + 10 log (# of TX antenna elements)

Effective Legacy Gain (dBi) = 1.25+3.01=4.26dBi for the U-NII-1.

Effective Legacy Gain (dBi) =1.76+3.01=4.77dBi for the U-NII-2C band and U-NII-3 Band.

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#### 10.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.

### 4. For U-NII1, U-NII-2A, U-NII-2C Band:

Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

#### For U-NII-3 Band:

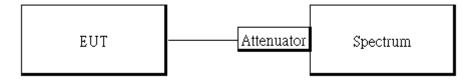
Set RBW=510 kHz, VBW= 3\*RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

- User the cursor on spectrum to peak search the highest level of trace
- Record the max. reading and add 10 log(1/duty cycle).
- 7. MIMO Mode: offset is set following "measure and add 10 Log (N)" on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=2 for this given application.
- 8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

### 10.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015

#### 10.4 Test Set-up



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#### 10.5 Measurement Result

802.11a

Frequency	PPSD	Limit	Margin
(MHz)	(dBm)	(dBm)	(dB)
5180	2.733	17.00	-14.27
5220	2.999	17.00	-14.00
5240	2.163	17.00	-14.84
5260	2.883	11.00	-8.12
5300	2.133	11.00	-8.87
5320	2.193	11.00	-8.81
5500	2.388	11.00	-8.61
5580	2.106	11.00	-8.89
5700	-0.486	11.00	-11.49
5745	0.344	30.00	-29.66
5785	2.774	30.00	-27.23
5825	0.998	30.00	-29.00

### EIRP spectral density

Frequency (MHz)	PPSD (dBm / MHz)	Antenna Gain (dBi)	EIRP spectral density (dBm /	Limit (dBm / MHz)	Margin (dB)
5180	2.733	1.25	3.98	10.00	-6.02
5220	2.999	1.25	4.25	10.00	-5.75
5240	2.163	1.25	3.41	10.00	-6.59

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### 802.11n HT20 (MIMO)

Frequency	PPSD	Limit	Margin
(MHz)	(dBm)	(dBm)	(dB)
5180	0.101	17.00	-16.90
5220	-0.710	17.00	-17.71
5240	-0.394	17.00	-17.39
5260	-0.976	11.00	-11.98
5300	0.406	11.00	-10.59
5320	0.435	11.00	-10.57
5500	-0.612	11.00	-11.61
5580	-0.274	11.00	-11.27
5700	-0.108	11.00	-11.11
5745	-0.951	30.00	-30.95
5785	-0.282	30.00	-30.28
5825	-0.618	30.00	-30.62

### EIRP spectral density

Frequency (MHz)	PPSD (dBm / MHz)	Antenna Gain (dBi)	EIRP spectral density (dBm /	Limit (dBm / MHz)	Margin (dB)
5180	0.101	4.26	4.36	10.00	-5.64
5220	-0.710	4.26	3.55	10.00	-6.45
5240	-0.394	4.26	3.87	10.00	-6.13

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### 802.11n HT40 (MIMO)

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5190	-7.134	11.00	-18.13
5230	-8.412	11.00	-19.41
5270	-9.294	11.00	-20.29
5310	-8.164	11.00	-19.16
5510	-8.061	11.00	-19.06
5550	-8.323	11.00	-19.32
5670	-8.302	11.00	-19.30
5755	-8.788	30.00	-38.79
5795	-9.151	30.00	-39.15

### EIRP spectral density

Frequency (MHz)	PPSD (dBm / MHz)	Antenna Gain (dBi)	EIRP spectral density (dBm /	Limit (dBm / MHz)	Margin (dB)
5190	-7.134	4.26	-2.87	10.00	-12.87
5230	-8.412	4.26	-4.15	10.00	-14.15

Note: As cable loss+ Duty cycle factor that offsets on the Spectrum.

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## 802.11a, 5150~5250 MHz Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



## Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)



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## Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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## 802.11a, 5250~5350 MHz Peak Power Spectral Density Data Plot (CH Low 5260 MHz)



## Peak Power Spectral Density Data Plot (CH Mid 5300 MHz)



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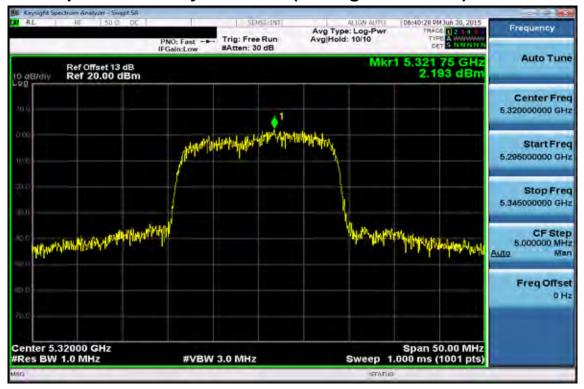
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## Peak Power Spectral Density Data Plot (CH High 5320 MHz)



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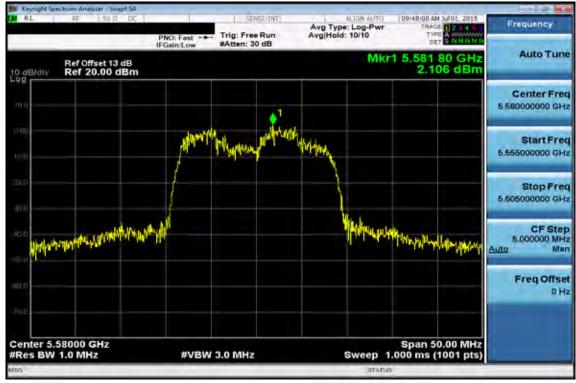
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## 802.11a, 5470~5725 MHz Peak Power Spectral Density Data Plot (CH Low 5500 MHz)



## Peak Power Spectral Density Data Plot (CH Mid 5580 MHz)



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## Peak Power Spectral Density Data Plot (CH High 5700 MHz)



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### 802.11a, 5725~5850 MHz

Peak Power Spectral Density Data Plot (CH Low 5745 MHz)



## Peak Power Spectral Density Data Plot (CH Mid 5785 MHz)



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## Peak Power Spectral Density Data Plot (CH High 5825 MHz)



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## 802.11n HT20, 5150~5250 MHz (MIMO) Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



## Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)



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## Peak Power Spectral Density Data Plot (CH High 5240 MHz)



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## 802.11n HT20, 5250~5350 MHz (MIMO) Peak Power Spectral Density Data Plot (CH Low 5260MHz)



## Peak Power Spectral Density Data Plot (CH Mid 5300 MHz)



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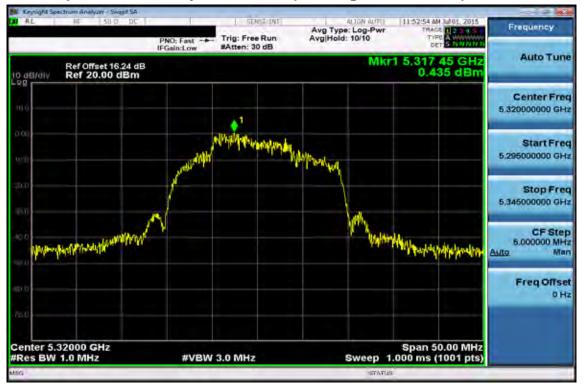
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## Peak Power Spectral Density Data Plot (CH High 5320 MHz)



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## 802.11n HT20, 5470~5725 MHz (MIMO) Peak Power Spectral Density Data Plot (CH Low 5500 MHz)



## Peak Power Spectral Density Data Plot (CH Mid 5580MHz)



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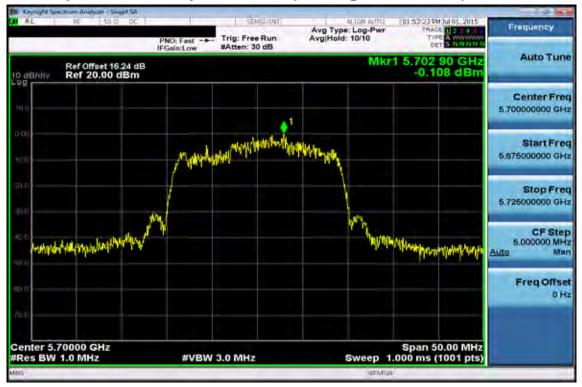
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## Peak Power Spectral Density Data Plot (CH High 5700 MHz)



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## 802.11n HT20, 5725~5850 MHz (MIMO) Peak Power Spectral Density Data Plot (CH Low 5745 MHz)



## Peak Power Spectral Density Data Plot (CH Mid 5785 MHz)



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## Peak Power Spectral Density Data Plot (CH High 5825 MHz)



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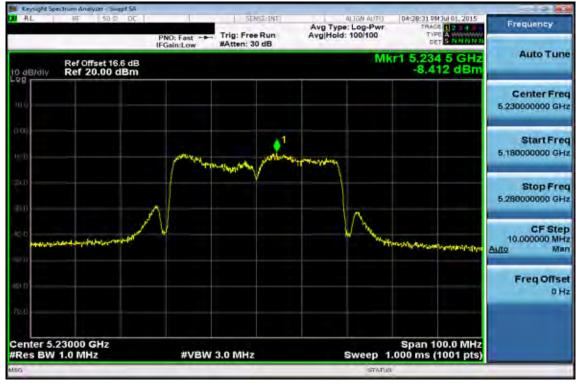
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## 802.11n HT40, 5150~5250 MHz (MIMO) Peak Power Spectral Density Data Plot (CH Low 5190MHz)



## Peak Power Spectral Density Data Plot (CH High 5230MHz)



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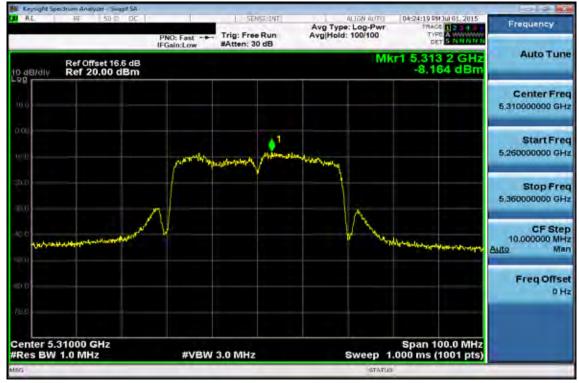
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## 802.11n HT40, 5250~5350 MHz (MIMO) Peak Power Spectral Density Data Plot (CH Low 5270MHz)



## Peak Power Spectral Density Data Plot (CH High 5310MHz)



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# 802.11n HT40, 5470~5725 MHz (MIMO)

Peak Power Spectral Density Data Plot (CH Low 5510 MHz)



## Peak Power Spectral Density Data Plot (CH Mid 5550 MHz)



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## Peak Power Spectral Density Data Plot (CH High 5670 MHz)



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## 802.11n HT40, 5725~5850 MHz (MIMO) Peak Power Spectral Density Data Plot (CH Low 5755 MHz)



## Peak Power Spectral Density Data Plot (CH High 5795 MHz)



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### 11. UNDESIRABLE RADIATED EMISSION MEASUREMENT1

### 11.1 Standard Applicable

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- 1. For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- 2. For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- 3. For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
- 4. For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

APPLICABLE TO	LIMIT		
FCC KDB 789033 D02 General UNII Test Procedures New Rules	FIELD STRENGTH AT 3m		
v01	PK: 74 (dBµV/m)	AV 54 (dBμV/m)	
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m	
15.407(b)(1)			
15.407(b)(2)	PK: -27 (dBm/MHz)	PK: 68.3 (dBµV/m)	
15.407(b)(3)			
15.407(b)(4)	PK: -27 (dBm/MHz) PK: -17 (dBm/MHz)	PK: 68.3 (dBµV/m) PK: 78.2 (dBµV/m)	

EIRP =  $((E^*d)^2) / 30$ , where E is the field in V/m, d is the measurement distance (3m), EIRP is the equivalent isotropically radiated power in Watts.

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Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

#### Note:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level  $(dB\mu V/m) = 20 \log Emission level (dB\mu V/m)$

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### 11.2 Measurement Equipment Used

966 Chamber									
EQUIPMENT	MFR MODEL SERIAL LAST CAL DI								
TYPE		NUMBER	NUMBER	CAL.					
EMI Test Receiver	R&S	ESU 40	100363	04/09/2015	04/08/2016				
Loop Antenna	ETS-Lindgren	6502	00143303	12/09/2014	12/08/2015				
Broadband Antenna	TESEQ	CBL 6112D	35240	12/05/2014	12/04/2015				
Horn Antenna	ETS-Lindgren	3117	00143272	12/08/2014	12/07/2015				
Horn Antenna	ETS-Lindgren	3160-09	00117911	11/13/2014	11/12/2015				
Horn Antenna	ETS-Lindgren	3160-10	00117783	11/13/2014	11/12/2015				
Pre Amplifier	EMC Instruments	EMC330	980096	12/19/2014	12/18/2015				
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/19/2014	12/18/2015				
Pre Amplifier	R&S	SCU-18	10204	12/19/2014	12/18/2015				
Pre Amplifier	R&S	SCU-26	100780	12/19/2014	12/18/2015				
Pre Amplifier	R&S	SCU-40	100356	12/19/2014	12/18/2015				
Pre Amplifier	EMC Instruments	EMC184045B	980135	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/19/2014	12/18/2015				
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/19/2014	12/18/2015				
Attenuator	WOKEN	218FS-10	RF27	12/19/2014	12/18/2015				
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016				
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016				
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2015	05/03/2016				
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.				
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.				
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.				
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.				
				J	=				

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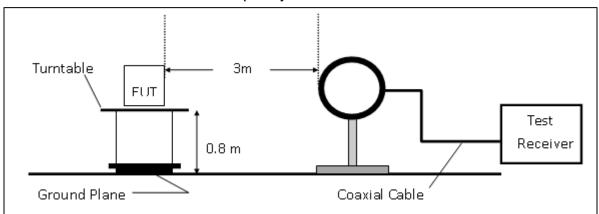


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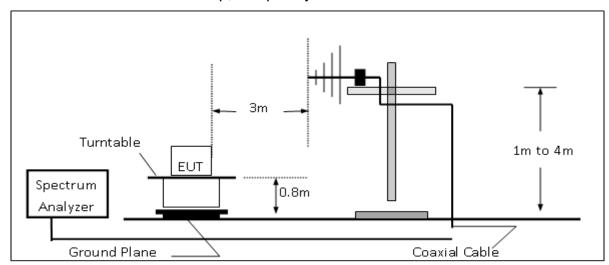
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### 11.3 Test SET-UP

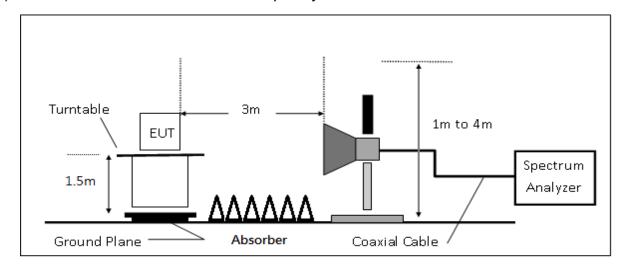
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency form 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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#### 11.4 Measurement Procedure

- The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
- The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 0.8m for frequen-3. cy> 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 emissions.
- Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) 6. and Quasi-peak (QP) at frequency below 1 GHz.
- Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency 7. above 1 GHz.
- Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
- 9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 11. Repeat above procedures until all frequency measured were complete.

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### 11.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB) Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) - Pre\_Amplifier Gain(dB)

#### Note:

"F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

## 11.6 Test Results of Radiated Spurious Emissions form 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

### 11.7 Measurement Result

Refer to attach tabular data sheets.

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### Band edge falling to restricted band 802.11a, 5150~5250 MHz

**Operation Band** Test Date :2015-06-23 :802.11 a

**Fundamental Frequency** Temp./Humi. :5180 MHz :23 deg C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5150.00	Peak	E	52.99	11.14	64.13	74.00	-9.87
5150.00	Average	Е	33.09	11.14	44.23	54.00	-9.77

**Operation Band** :802.11 a Test Date :2015-06-23

Fundamental Frequency :5180 MHz Temp./Humi. :23 deg\_C / 58 RH

:Band Edge LOW Operation Mode Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5150.00	Peak	Е	57.25	11.14	68.39	74.00	-5.61
5150.00	Average	Е	34.17	11.14	45.31	54.00	-8.69

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## Band edge falling to restricted band 802.11n HT20, 5150~5250 MHz (MIMO)

**Operation Band** :802.11 n20M **Test Date** :2015-07-10

Fundamental Frequency :5180 MHz Temp./Humi. :23 deg C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5149.36	Peak	S	50.61	11.14	61.75	74.00	-12.25
5149.36	Average	S	32.90	11.14	44.04	54.00	-9.96
5150.00	Peak	Е	49.32	11.14	60.46	74.00	-13.54
5150.00	Average	Е	32.90	11.14	44.04	54.00	-9.96

**Operation Band Test Date** :2015-07-10 :802.11 n20M Fundamental Frequency :5180 MHz Temp./Humi. :23 deg\_C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5149.36	Peak	S	45.39	11.14	56.54	74.00	-17.46
5149.36	Average	S	32.32	11.14	43.46	54.00	-10.54
5150.00	Peak	Е	43.26	11.14	54.40	74.00	-19.60
5150.00	Average	Е	32.31	11.14	43.45	54.00	-10.55

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## Band edge falling to restricted band 802.11n HT40, 5150~5250 MHz (MIMO)

**Operation Band** :802.11 n40M Test Date :2015-07-10

Fundamental Frequency :5190 MHz Temp./Humi. :23 deg C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton EUT Pol. :H Plan :VERTICAL Measurement Antenna Pol.

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5150.00	Peak	E	53.10	11.14	64.24	74.00	-9.76
5150.00	Average	Е	34.87	11.14	46.01	54.00	-7.99

**Operation Band** :802.11 n40M Test Date :2015-07-10 Fundamental Frequency :5190 MHz Temp./Humi. :23 deg\_C / 58 RH

Operation Mode :Band Edge LOW Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5150.00	Peak	Е	49.26	11.14	60.40	74.00	-13.60
5150.00	Average	E	33.49	11.14	44.63	54.00	-9.37

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# Band edge falling to restricted band

802.11a, 5250MHz-5350MHz

:2015-06-23 **Operation Band** :802.11 a Test Date

Fundamental Frequency Temp./Humi. :5320 MHz :23 deg C / 58 RH

Engineer **Operation Mode** :Band Edge HIGH :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5350.00	Peak	Е	49.86	11.30	61.16	74.00	-12.84
5350.00	Average	Е	33.60	11.30	44.90	54.00	-9.10

**Operation Band** :802.11 a **Test Date** :2015-06-23

**Fundamental Frequency** :5320 MHz Temp./Humi. :23 deg C / 58 RH

Operation Mode :Band Edge HIGH Engineer :Ashton

EUT Pol. Measurement Antenna Pol. :HORIZONTAL :H Plan

	Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
		Mode		Reading Level		FS	@3m	
_	MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
	5350.00	Peak	E	51.18	11.30	62.48	74.00	-11.52
	5350.00	Average	Е	34.47	11.30	45.77	54.00	-8.23

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## Band edge falling to restricted band 802.11n HT20, 5250~5350 MHz (MIMO)

:2015-07-10 **Operation Band** :802.11 n20M Test Date

Fundamental Frequency Temp./Humi. :5320 MHz :23 deg C / 58 RH

Engineer **Operation Mode** :Band Edge HIGH :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5350.00	Peak	Е	46.89	11.30	58.19	74.00	-15.81
5350.00	Average	Е	33.12	11.30	44.42	54.00	-9.58

**Operation Band** :802.11 n20M **Test Date** :2015-07-10

**Fundamental Frequency** Temp./Humi. :23 deg C / 58 RH :5320 MHz

Operation Mode :Band Edge HIGH Engineer :Ashton

EUT Pol. Measurement Antenna Pol. :HORIZONTAL :H Plan

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5350.00	Peak	E	46.30	11.30	57.60	74.00	-16.40
5350.00	Average	Е	32.76	11.30	44.06	54.00	-9.94

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# Band edge falling to restricted band 802.11n HT40, 5250~5350 MHz (MIMO)

**Operation Band** :802.11 n40M Test Date :2015-07-10 Temp./Humi. Fundamental Frequency :5310 MHz :23deg C / 58 RH

Engineer **Operation Mode** :Band Edge HIGH :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5350.00	Peak	E	54.69	11.30	65.99	74.00	-8.01
5350.00	Average	Е	34.94	11.30	46.24	54.00	-7.76

:802.11 n40M **Operation Band Test Date** :2015-07-10 **Fundamental Frequency** Temp./Humi. :5310 MHz :23deg C / 58 RH

Operation Mode :Band Edge HIGH Engineer :Ashton

EUT Pol. Measurement Antenna Pol. :HORIZONTAL :H Plan

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5350.00	Peak	E	50.93	11.30	62.23	74.00	-11.77
5350.00	Average	Е	33.93	11.30	45.23	54.00	-8.77
5353.16	Peak	S	52.60	11.32	63.92	74.00	-10.08
5353.16	Average	S	33.76	11.32	45.08	54.00	-8.92

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## Band edge falling to restricted band

802.11a, 5470~5725 MHz

:2015-07-10 **Operation Band** :802.11 a Test Date

Fundamental Frequency Temp./Humi. :5500 MHz :23 deg C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5455.52	Peak	S	50.03	11.46	61.49	74.00	-12.51
5455.52	Average	S	34.03	11.46	45.49	54.00	-8.51
5460.00	Peak	Е	46.93	11.46	58.39	74.00	-15.61
5460.00	Average	Е	34.18	11.46	45.64	54.00	-8.36
5470.00	Peak	Е	51.52	11.46	62.98	68.30	-5.32

**Operation Band** :802.11 a Test Date :2015-07-10

Fundamental Frequency :5500 MHz Temp./Humi. :23 deg\_C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5459.60	Peak	S	50.38	11.46	61.85	74.00	-12.15
5459.60	Average	S	35.17	11.46	46.63	54.00	-7.37
5460.00	Peak	Е	49.59	11.46	61.05	74.00	-12.95
5460.00	Average	Е	35.17	11.46	46.63	54.00	-7.37
5470.00	Peak	Е	54.92	11.46	66.38	68.30	-1.92

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**Operation Band** :802.11 a **Test Date** :2015-07-10

Fundamental Frequency :5700 MHz Temp./Humi. :23 deg\_C / 58 RH

**Operation Mode** :Band Edge HIGH Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5725.00	Peak	Е	51.60	12.27	63.87	68.30	-4.43

**Operation Band** :802.11 a **Test Date** :2015-07-10

Fundamental Frequency Temp./Humi. :5700 MHz :23 deg\_C / 58 RH

**Operation Mode** :Band Edge HIGH Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5725.00	Peak	Е	54.74	12.27	67.01	68.30	-1.29
5725.64	Peak	S	54.80	12.27	67.07	68.30	-1.23

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## Band edge falling to restricted band 802.11n HT20, 5470~5725 MHz (MIMO)

:2015-07-10 **Operation Band** :802.11 n20M Test Date

**Fundamental Frequency** Temp./Humi. :5500 MHz :23 deg C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5460.00	Peak	E	43.77	11.46	55.23	74.00	-18.77
5460.00	Average	Е	32.58	11.46	44.04	54.00	-9.96
5470.00	Peak	Е	45.16	11.46	56.61	68.30	-11.69

**Operation Band** Test Date :2015-07-10 :802.11 n20M Fundamental Frequency :5500 MHz Temp./Humi. :23 deg\_C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

	Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
		Mode		Reading Level		FS	@3m	
_	MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
	5460.00	Peak	Е	45.13	11.46	56.59	74.00	-17.41
	5460.00	Average	Е	33.25	11.46	44.71	54.00	-9.29
	5470.00	Peak	Е	46.07	11.46	57.53	68.30	-10.77

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**Operation Band** :802.11 n20M Fundamental Frequency :5700 MHz

**Operation Mode** :Band Edge HIGH EUT Pol. :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5725.00	Peak	Е	49.42	12.27	61.69	68.30	-6.61

**Operation Band** :802.11 n20M **Test Date** :2015-07-10

Fundamental Frequency Temp./Humi. :23 deg\_C / 58 RH :5700 MHz

Operation Mode :Band Edge HIGH Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB	
5725.00	Peak	Е	51.17	12.27	63.44	68.30	-4.86	

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## Band edge falling to restricted band 802.11n HT40, 5470~5725 MHz (MIMO)

**Operation Band** :802.11 n40M Test Date :2015-07-10 Fundamental Frequency Temp./Humi. :5510 MHz :23deg C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5460.00	Peak	E	45.46	11.46	56.93	74.00	-17.07
5460.00	Average	Е	32.83	11.46	44.29	54.00	-9.71
5469.72	Peak	S	51.43	11.46	62.88	68.30	-5.42
5470.00	Peak	Е	48.97	11.46	60.43	68.30	-7.87

**Operation Band** :802.11 n40M Test Date :2015-07-10 **Fundamental Frequency** :5510 MHz Temp./Humi. :23deg\_C / 58 RH

Engineer **Operation Mode** :Band Edge LOW :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5460.00	Peak	E	49.36	11.46	60.82	74.00	-13.18
5460.00	Average	Е	34.03	11.46	45.49	54.00	-8.51
5466.72	Peak	S	54.27	11.46	65.73	68.30	-2.57
5470.00	Peak	E	53.88	11.46	65.34	68.30	-2.96

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**Operation Band** Fundamental Frequency **Operation Mode** 

EUT Pol.

:802.11 n40M :5670 MHz :Band Edge HIGH :H Plan

**Test Date** Temp./Humi. Engineer

:2015-07-10 :23deg\_C / 58 RH

:Ashton Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5725.00	Peak	Е	45.27	12.27	57.54	68.30	-10.76

**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5670 MHz :Band Edge HIGH

:H Plan

**Test Date** Temp./Humi. :2015-07-10 :23deg\_C / 58 RH

Engineer :Ashton Measurement Antenna Pol.

:HORIZONTAL

	Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
		Mode		Reading Level		FS	@3m	
_	MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
	5725.00	Peak	Е	45.49	12.27	57.76	68.30	-10.54

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#### Band edge falling to restricted band

802.11a, 5725~5850 MHz

**Operation Band** :802.11 a Test Date :2015-07-10

Fundamental Frequency Temp./Humi. :5745 MHz :23 deg\_C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5724.10	Peak	S	57.33	12.27	69.60	78.20	-8.60
5725.00	Peak	Е	56.53	12.27	68.80	78.20	-9.40

**Operation Band** Test Date :802.11 a :2015-07-10

Fundamental Frequency :5745 MHz Temp./Humi. :23 deg C / 58 RH

Operation Mode :Band Edge LOW Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5715.00	Peak	S	54.67	12.30	66.98	68.30	-1.32
5724.80	Peak	S	63.37	12.27	75.64	78.20	-2.56
5725.00	Peak	Е	61.40	12.27	73.67	78.20	-4.53

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**Operation Band** :802.11 a Test Date :2015-07-10

Fundamental Frequency :5825 MHz Temp./Humi. :23 deg\_C / 58 RH

Operation Mode :Band Edge HIGH Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5850.00	Peak	E	47.41	12.61	60.02	78.20	-18.18
5850.30	Peak	S	52.63	12.61	65.25	78.20	-12.95
5862.90	Peak	S	49.81	12.73	62.54	68.30	-5.76

**Operation Band** Test Date :802.11 a :2015-07-10 Fundamental Frequency :5825 MHz Temp./Humi. :23 deg C / 58 RH

Operation Mode :Band Edge HIGH Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5850.00	Peak	E	57.08	12.61	69.69	78.20	-8.51
5850.80	Peak	S	58.03	12.62	70.65	78.20	-7.55
5862.80	Peak	S	54.10	12.73	66.83	68.30	-1.47

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### Band edge falling to restricted band

802.11n HT20, 5425~5850 MHz (MIMO)

**Operation Band** :802.11 n20M Test Date :2015-07-10

Temp./Humi. Fundamental Frequency :5745 MHz :23 deg\_C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton :VERTICAL EUT Pol. :H Plan Measurement Antenna Pol.

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5724.60	Peak	S	53.53	12.27	65.80	78.20	-12.40
5725.00	Peak	E	53.23	12.27	65.50	78.20	-12.70

**Operation Band** Test Date :802.11 n20M :2015-07-10

Fundamental Frequency :5745 MHz Temp./Humi. :23 deg C / 58 RH

Operation Mode :Band Edge LOW Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dΒμV/m	dB
5725.00	Peak	Е	48.52	12.27	60.78	78.20	-17.42

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**Operation Band** Fundamental Frequency

Operation Mode EUT Pol.

:802.11 n20M :5825 MHz :Band Edge HIGH

:H Plan

Test Date Temp./Humi. :2015-07-10 :23 deg\_C / 58 RH

Engineer :Ashton Measurement Antenna Pol. :VERTICAL

Freq.	Detector Mode	Note	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5850.00	Peak	Е	44.99	12.61	57.60	78.20	-20.60
5852.70	Peak	S	46.11	12.64	58.75	78.20	-19.45

:802.11 n20M Test Date **Operation Band** :2015-07-10

Fundamental Frequency :5825 MHz Temp./Humi. :23 deg\_C / 58 RH

Operation Mode :Band Edge HIGH Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
5850.00	Peak	E	45.29	12.61	57.90	78.20	-20.30
5850.30	Peak	S	47.93	12.61	60.55	78.20	-17.65

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## Band edge falling to restricted band 802.11n HT40, 5425~5850 MHz (MIMO)

**Operation Band** :802.11 n40M Test Date :2015-07-10 Fundamental Frequency Temp./Humi. :5755 MHz :23deg C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5711.90	Peak	S	51.92	12.31	64.23	68.30	-4.07
5725.00	Peak	E	57.78	12.27	70.05	78.20	-8.15

**Operation Band** :802.11 n40M **Test Date** :2015-07-10 **Fundamental Frequency** Temp./Humi. :5755 MHz :23deg C / 58 RH

**Operation Mode** :Band Edge LOW Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5714.80	Peak	S	52.00	12.30	64.30	68.30	-4.00
5723.30	Peak	S	55.40	12.28	67.68	78.20	-10.52
5725.00	Peak	Е	54.36	12.27	66.63	78.20	-11.57

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**Operation Band** Fundamental Frequency Operation Mode

EUT Pol.

:5795 MHz :Band Edge HIGH :H Plan

:802.11 n40M

Test Date Temp./Humi. :2015-07-10 :23deg\_C / 58 RH

Engineer :Ashton Measurement Antenna Pol. :VERTICAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB	
5850.00	Peak	Е	43.86	12.61	56.47	78.20	-21.73	

**Operation Band** Fundamental Frequency Operation Mode

:802.11 n40M :5795 MHz

Test Date Temp./Humi. :2015-07-10 :23deg\_C / 58 RH

:Band Edge HIGH Engineer :Ashton

EUT Pol.

:H Plan

Measurement Antenna Pol.

:HORIZONTAL

Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
5850.00	Peak	Е	42.67	12.61	55.28	78.20	-22.92

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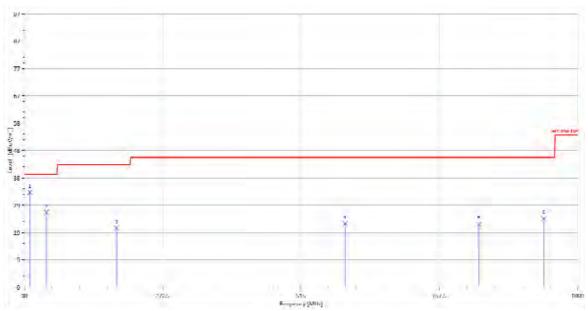
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# **Radiated Spurious Emission Measurement Result Below 1GHz Worst-Case Data:**

802.11a, 5150~5250 MHz

**Operation Band Test Date** :802.11 a :2015-07-10 **Fundamental Frequency** :5220 MHz Temp./Humi. :23 deg\_C / 58 RH

**Operation Mode** :TX MID Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
39.70	Peak	S	52.45	-18.79	33.65	40.00	-6.35
68.80	Peak	S	54.35	-27.88	26.48	40.00	-13.52
191.99	Peak	S	44.88	-23.99	20.89	43.50	-22.61
592.60	Peak	S	34.77	-12.20	22.57	46.00	-23.43
827.34	Peak	S	31.27	-8.96	22.31	46.00	-23.69
940.83	Peak	S	31.87	-7.63	24.24	46.00	-21.76

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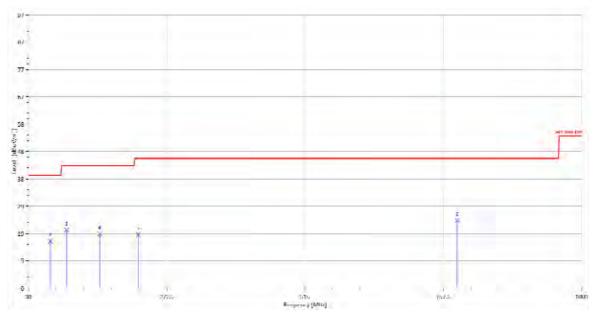
**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5220 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
30.00	Peak	S	32.56	-13.11	19.45	40.00	-20.55
68.80	Peak	S	44.56	-27.88	16.69	40.00	-23.31
96.93	Peak	S	44.97	-24.36	20.60	43.50	-22.90
155.13	Peak	S	42.07	-22.82	19.25	43.50	-24.25
223.03	Peak	S	41.94	-22.81	19.13	46.00	-26.87
781.75	Peak	S	34.22	-10.20	24.02	46.00	-21.98

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#### 802.11a, 5250~5350 MHz

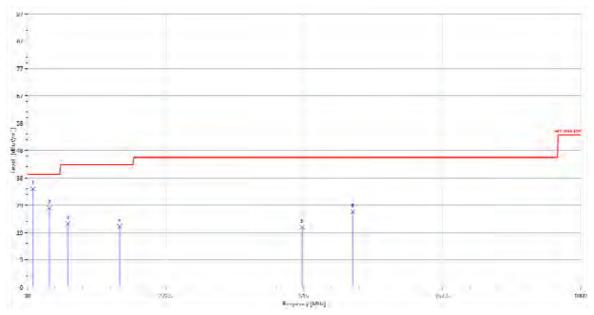
EUT Pol.

**Operation Band** :802.11 a Fundamental Frequency :5300 MHz **Operation Mode** :TX MID

:H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
39.70	Peak	S	53.64	-18.79	34.85	40.00	-5.15
68.80	Peak	S	55.92	-27.88	28.05	40.00	-11.95
100.81	Peak	S	46.27	-23.69	22.58	43.50	-20.92
191.99	Peak	S	45.49	-23.99	21.50	43.50	-22.00
512.09	Peak	S	35.04	-13.75	21.29	46.00	-24.71
600.36	Peak	S	39.19	-12.45	26.74	46.00	-19.26

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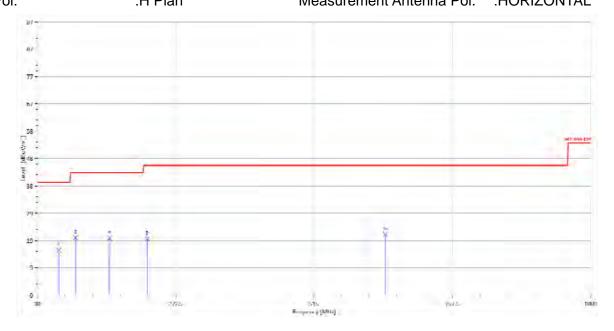
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5300 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer

:Ashton Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
30.00	Peak	S	31.24	-13.11	18.13	40.00	-21.87
67.83	Peak	S	43.90	-27.95	15.95	40.00	-24.05
96.93	Peak	S	44.72	-24.36	20.36	43.50	-23.14
156.10	Peak	S	43.06	-22.90	20.16	43.50	-23.34
223.03	Peak	S	42.74	-22.81	19.93	46.00	-26.07
640.13	Peak	S	32.86	-11.35	21.51	46.00	-24.49

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Report No.: E2/2015/50080 Issue Date: Jul. 30, 2015

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:2015-07-10

#### 802.11a, 5470~5725 MHz

**Operation Band Test Date** :802.11 a Fundamental Frequency :5580 MHz

**Operation Mode** :TX MID EUT Pol. :H Plan

Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
38.73	Peak	S	52.79	-18.19	34.60	40.00	-5.40
68.80	Peak	S	55.50	-27.88	27.62	40.00	-12.38
100.81	Peak	S	46.25	-23.69	22.56	43.50	-20.94
192.96	Peak	S	43.82	-23.91	19.91	43.50	-23.59
534.40	Peak	S	34.17	-13.16	21.02	46.00	-24.98
735.19	Peak	S	32.07	-10.37	21.69	46.00	-24.31

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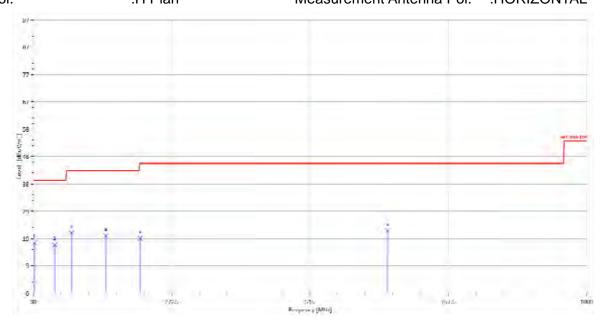
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5580 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer

:Ashton Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
31.94	Peak	S	31.97	-14.17	17.80	40.00	-22.20
67.83	Peak	S	45.09	-27.95	17.14	40.00	-22.86
96.93	Peak	S	45.79	-24.36	21.42	43.50	-22.08
157.07	Peak	S	43.34	-22.98	20.36	43.50	-23.14
217.21	Peak	S	42.42	-22.97	19.45	46.00	-26.55
650.80	Peak	S	33.47	-11.28	22.19	46.00	-23.81

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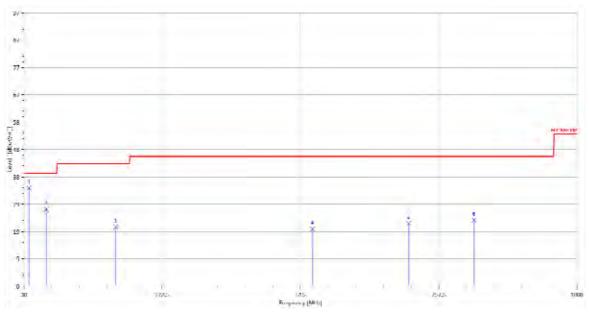
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#### 802.11a, 5725~5850 MHz

**Operation Band Test Date** :2015-07-10 :802.11 a Fundamental Frequency :5785 MHz Temp./Humi. :23 deg\_C / 58 RH

**Operation Mode** :TX MID Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB	
39.70	Peak	S	53.57	-18.79	34.78	40.00	-5.22	
69.77	Peak	S	55.04	-27.80	27.24	40.00	-12.76	
191.02	Peak	S	45.02	-24.07	20.94	43.50	-22.56	
536.34	Peak	S	33.49	-13.24	20.26	46.00	-25.74	
705.12	Peak	S	33.19	-10.93	22.26	46.00	-23.74	
819.58	Peak	S	32.30	-8.86	23.44	46.00	-22.56	

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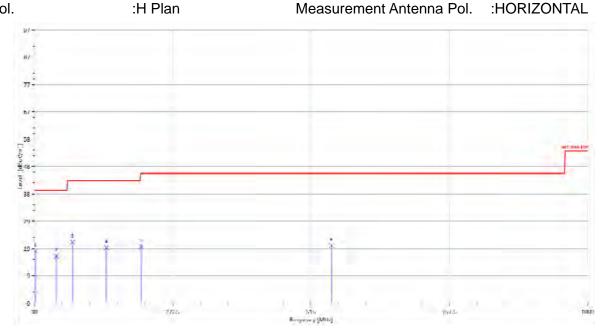
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5785 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
31.94	Peak	S	32.63	-14.17	18.46	40.00	-21.54
68.80	Peak	S	44.56	-27.88	16.69	40.00	-23.31
96.93	Peak	S	46.00	-24.36	21.63	43.50	-21.87
156.10	Peak	S	42.54	-22.90	19.64	43.50	-23.86
217.21	Peak	S	43.04	-22.97	20.07	46.00	-25.93
550.89	Peak	S	33.63	-13.24	20.39	46.00	-25.61

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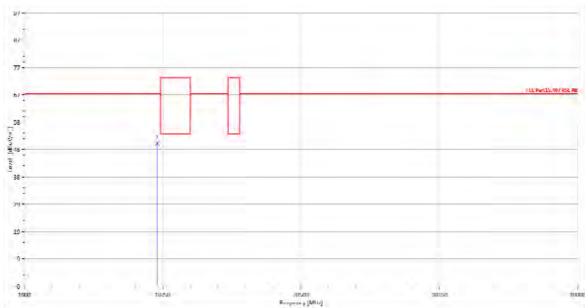
# **Above 1GHz Worst-Case Data:**

802.11a, 5150~5250 MHz

:802.11 a **Operation Band Test Date** :2015-07-10

**Fundamental Frequency** Temp./Humi. :5180 MHz :23 deg C / 58 RH

**Operation Mode** :TX LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10360.00	Peak	Н	31.80	18.94	50.74	68.30	-17.56

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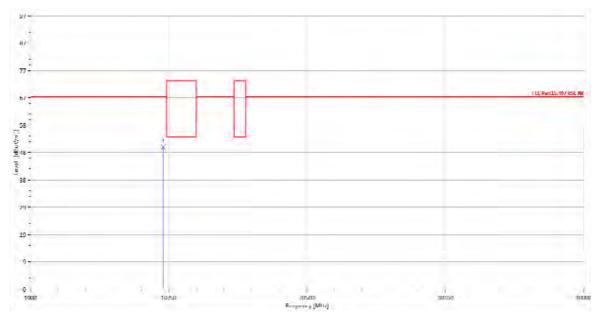
**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5180 MHz :TX LOW :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB	
10360.00	Peak	Н	31.41	18.94	50.35	68.30	-17.95	

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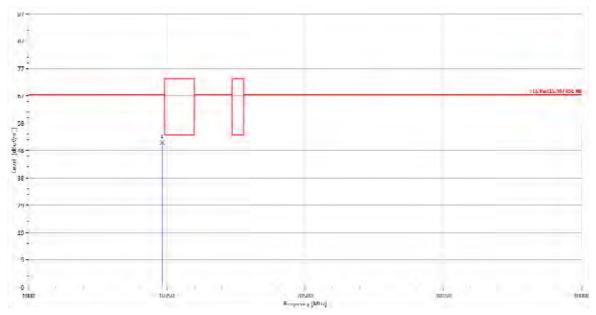
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5220 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
10440.00	Peak	Н	32.27	19.03	51.30	68.30	-17.00

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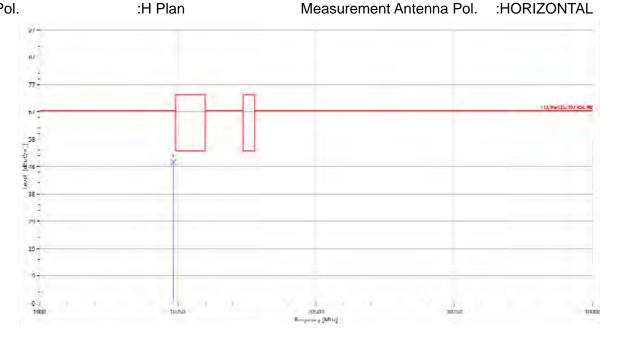
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5220 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
10440.00	Peak	Н	31.02	19.03	50.04	68.30	-18.26

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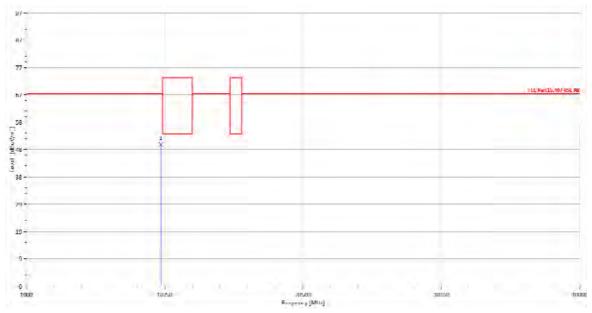
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5240 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
10480.00	Peak	Н	31.10	19.13	50.22	68.30	-18.08

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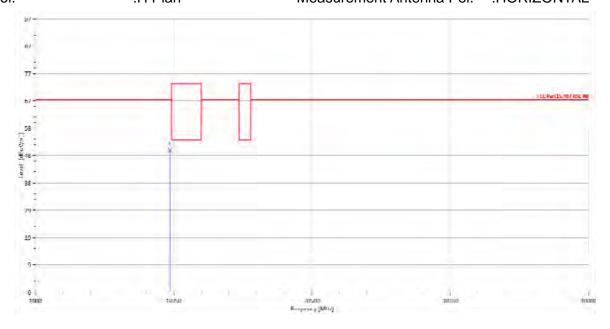
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5240 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10480.00	Peak	Н	31.17	19.13	50.30	68.30	-18.00

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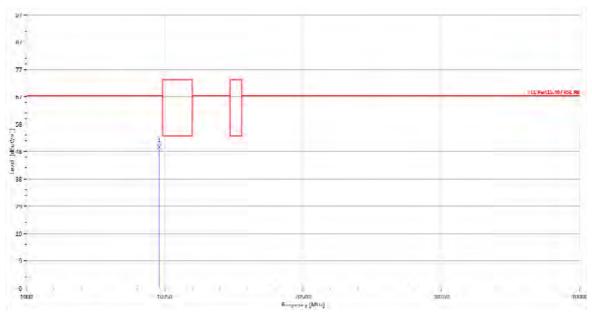
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#### Radiated Spurious Emission Measurement Result 802.11n HT20, 5150~5250 MHz (MIMO)

**Operation Band** :802.11 n20M Test Date :2015-07-10 Fundamental Frequency :5180 MHz Temp./Humi. :23 deg\_C / 58 RH

**Operation Mode** :TX LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB	
10360.00	Peak	Н	31.21	18.94	50.15	68.30	-18.15	

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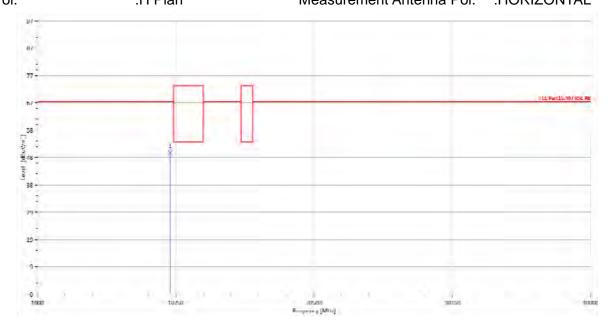
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5180 MHz :TX LOW :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10360.00	Peak	Н	31.24	18.94	50.18	68.30	-18.12

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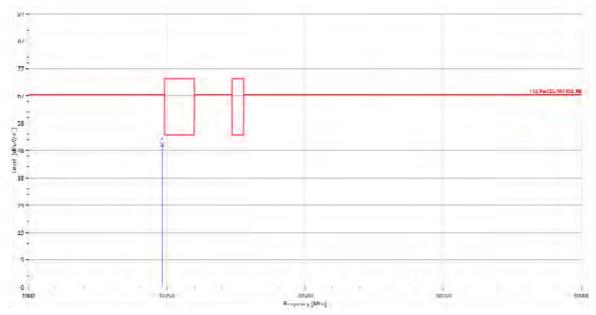
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5220 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
10440.00	Peak	Н	31.43	19.03	50.46	68.30	-17.84

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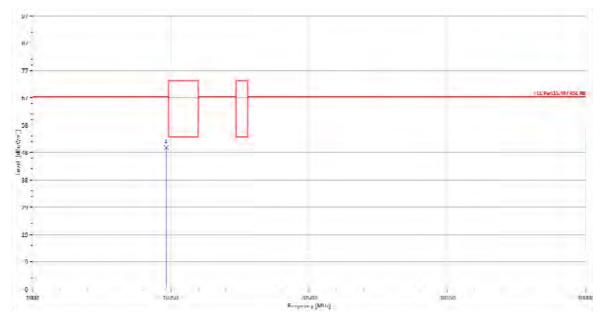
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5220 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB	
10440.00	Peak	Н	31.16	19.03	50.19	68.30	-18.11	

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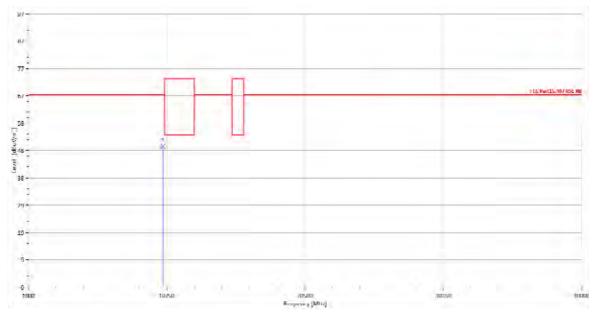
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5240 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB	
10480.00	Peak	Н	30.87	19.13	50.00	68.30	-18.30	

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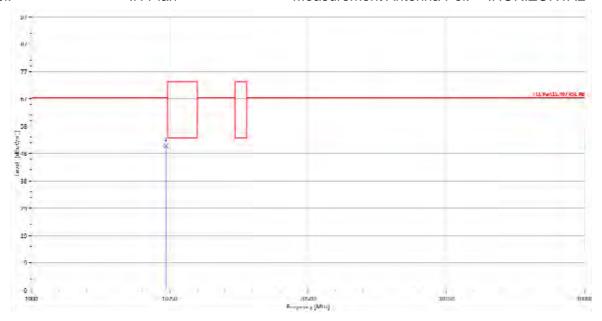
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5240 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10480.00	Peak	Н	32.06	19.13	51.19	68.30	-17.11

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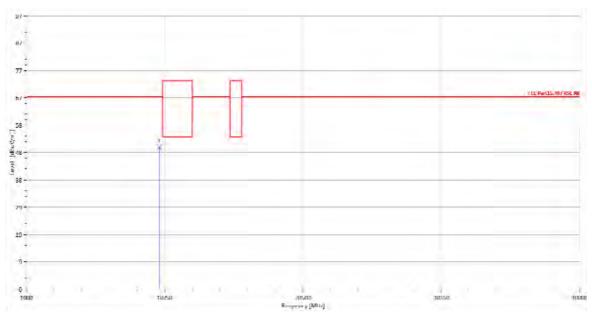
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#### Radiated Spurious Emission Measurement Result 802.11n HT40, 5150~5250 MHz (MIMO)

**Operation Band** :802.11 n40M Test Date :2015-07-10

Fundamental Frequency :5190 MHz Temp./Humi. :23 deg\_C / 58 RH **Operation Mode** :TX LOW Engineer :Ashton

EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB	
10380.00	Peak	Н	31.33	19.01	50.35	68.30	-17.95	

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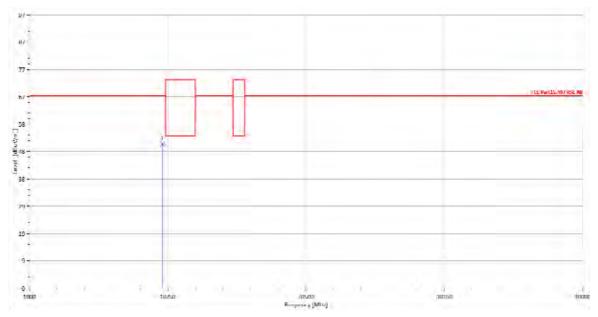
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5190 MHz :TX LOW :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10380.00	Peak	Н	32.07	19.01	51.08	68.30	-17.22

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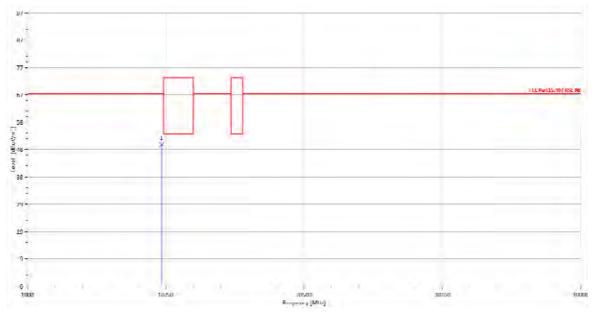
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5230 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB	_
10460.00	Peak	Н	31.08	19.11	50.19	68.30	-18.11	

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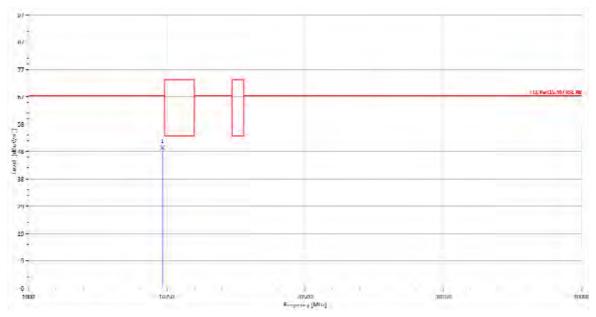
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5230 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10460.00	Peak	Н	30.74	19.11	49.86	68.30	-18.44

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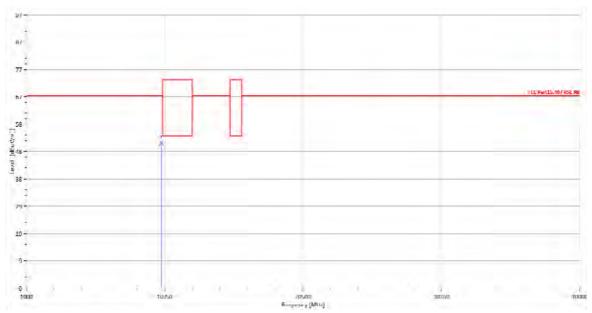
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# Radiated Spurious Emission Measurement Result 802.11a, 5250MHz-5350MHz

**Operation Band** :802.11 a **Test Date** :2015-07-10 Fundamental Frequency :5260 MHz Temp./Humi. :23 deg\_C / 58 RH

**Operation Mode** :TX LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10520.00	Peak	Н	32.18	19.25	51.43	68.30	-16.87

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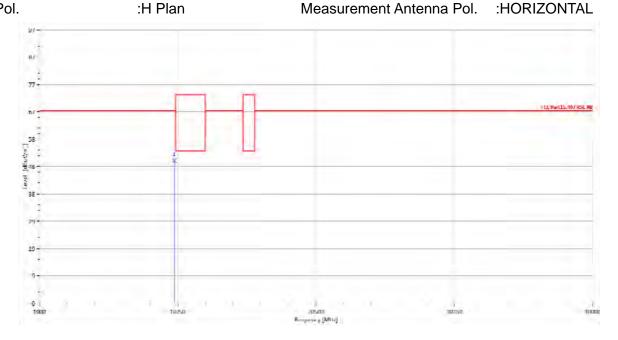
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5260 MHz :TX LOW :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10520.00	Peak	Н	31.35	19.25	50.60	68.30	-17.70

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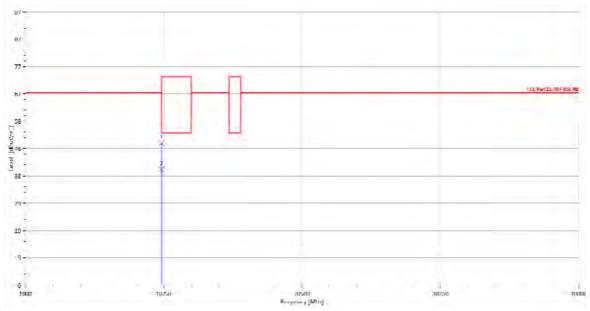
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5300 MHz :TX MID :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
10600.00	Peak	Н	30.92	19.38	50.30	74.00	-23.70
10600.00	Average	Н	21.63	19.38	41.01	54.00	-12.99

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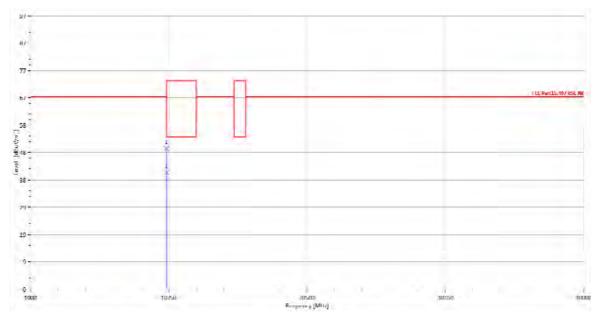
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5300 MHz :TX MID :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10600.00	Peak	Н	30.48	19.38	49.86	74.00	-24.14
10600.00	Average	Н	21.99	19.38	41.37	54.00	-12.63

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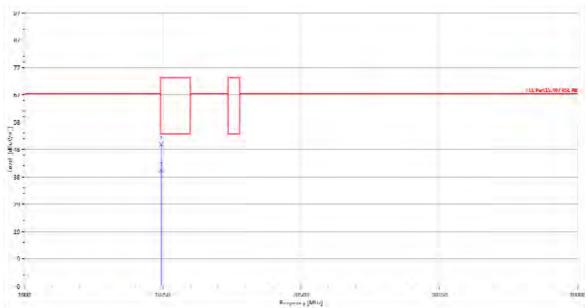
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5320 MHz :TX HIGH :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10640.00	Peak	Н	31.03	19.28	50.31	74.00	-23.69
10640.00	Average	Н	21.93	19.28	41.21	54.00	-12.79

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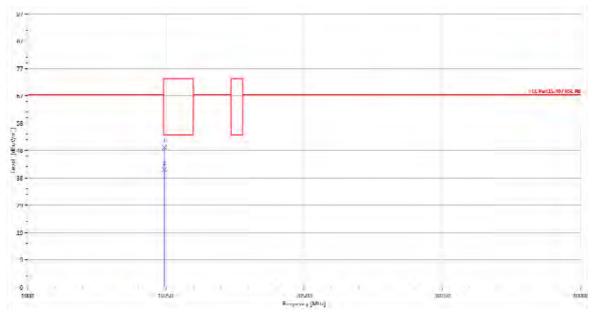
**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5320 MHz :TX HIGH :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



	Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
		Mode		Reading Level		FS	@3m		
_	MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB	
	10640.00	Peak	Н	30.33	19.28	49.61	74.00	-24.39	
	10640.00	Average	Н	22.46	19.28	41.74	54.00	-12.26	

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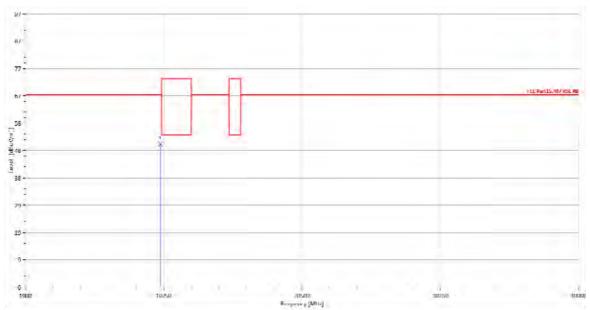
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# Radiated Spurious Emission Measurement Result 802.11n HT20, 5250~5350 MHz (MIMO)

**Operation Band** :802.11 n20M Test Date :2015-07-10

Fundamental Frequency :5260 MHz Temp./Humi. :23 deg\_C / 58 RH

:TX LOW **Operation Mode** Engineer :Ashton :VERTICAL EUT Pol. :H Plan Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB	
10520.00	Peak	Н	31.54	19.25	50.79	68.30	-17.51	

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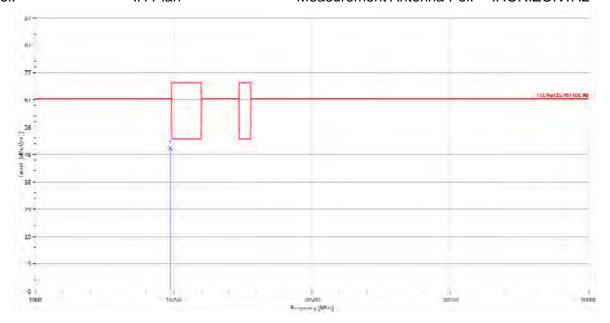
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5260 MHz :TX LOW :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10520.00	Peak	Н	31.48	19.25	50.73	68.30	-17.57

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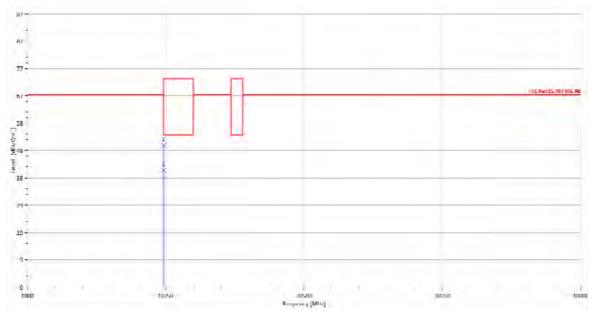
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5300 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
10600.00	Peak	Н	30.81	19.38	50.19	74.00	-23.81
10600.00	Average	Н	22.04	19.38	41.42	54.00	-12.58

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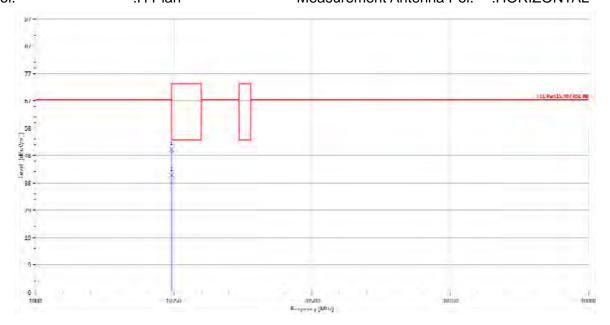
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5300 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
10600.00	Peak	Н	31.30	19.38	50.68	74.00	-23.32
10600.00	Average	Н	22.16	19.38	41.54	54.00	-12.46

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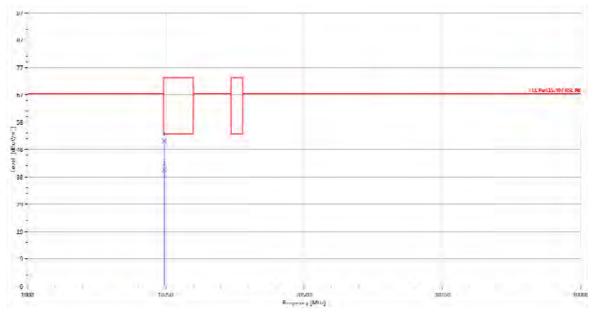
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5320 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
10640.00	Peak	Н	32.23	19.28	51.51	74.00	-22.49
10640.00	Average	Н	21.97	19.28	41.25	54.00	-12.75

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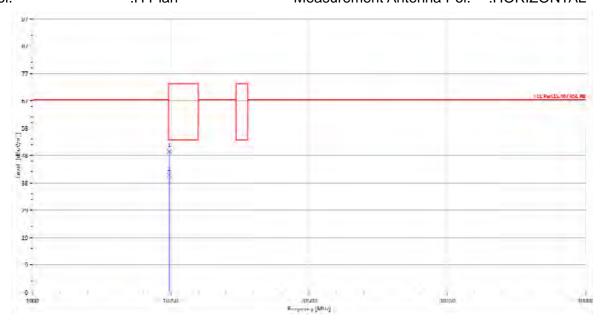
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5320 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
10640.00	Peak	Н	30.59	19.28	49.87	74.00	-24.13
10640.00	Average	Н	22.22	19.28	41.50	54.00	-12.50

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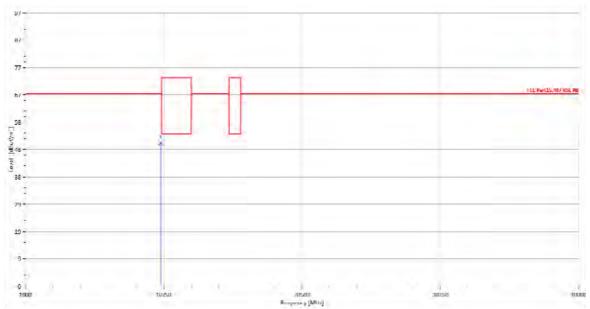
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# Radiated Spurious Emission Measurement Result 802.11n HT40, 5250~5350 MHz (MIMO)

**Operation Band** :802.11 n40M Test Date :2015-07-10 Fundamental Frequency :5270 MHz Temp./Humi. :23deg\_C / 58 RH

:TX LOW **Operation Mode** Engineer :Ashton :VERTICAL EUT Pol. :H Plan Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10540.0	00 Peak	Н	31.62	19.13	50.75	68.30	-17.55

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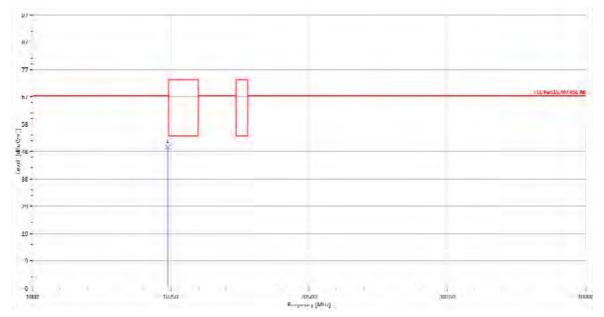
**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5270 MHz :TX LOW :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH

Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



	Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
		Mode		Reading Level		FS	@3m	
_	MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
	10540.00	Peak	Н	30.83	19.13	49.96	68.30	-18.34

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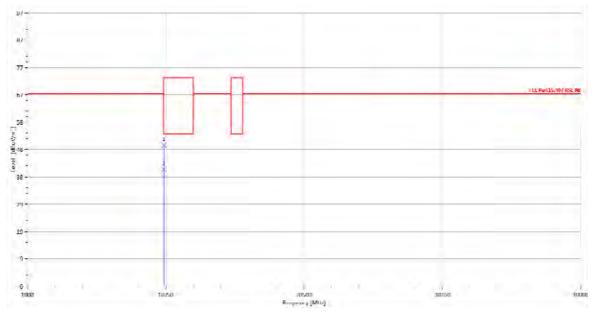
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5310 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
10620.00	Peak	Н	30.60	19.38	49.98	74.00	-24.02
10620.00	Average	Н	22.01	19.38	41.39	54.00	-12.61

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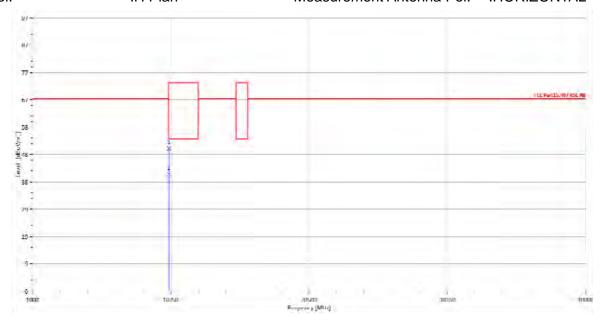
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5310 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
10620.00	Peak	Н	31.23	19.38	50.61	74.00	-23.39
10620.00	Average	Н	22.08	19.38	41.46	54.00	-12.54

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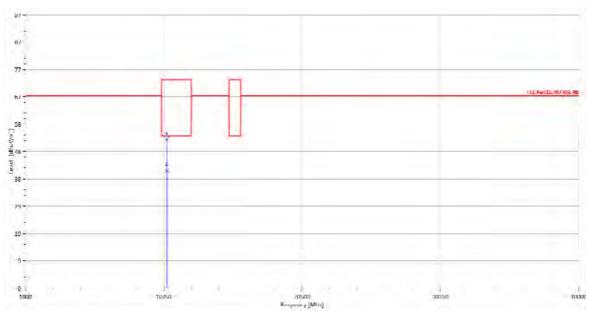
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## Radiated Spurious Emission Measurement Result 802.11a, 5470~5725 MHz

**Operation Band** :802.11 a **Test Date** :2015-07-10 Fundamental Frequency :5500 MHz Temp./Humi. :23 deg\_C / 58 RH

**Operation Mode** :TX LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11000.00	Peak	Н	32.84	20.02	52.85	74.00	-21.15
11000.00	Average	Н	21.72	20.02	41.74	54.00	-12.26

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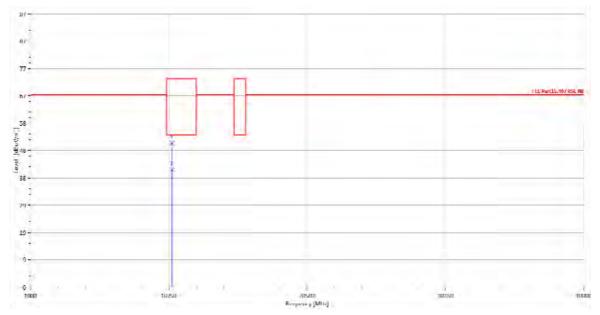
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5500 MHz :TX LOW :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11000.00	Peak	Н	31.06	20.02	51.08	74.00	-22.92
11000.00	Average	Н	21.59	20.02	41.61	54.00	-12.39

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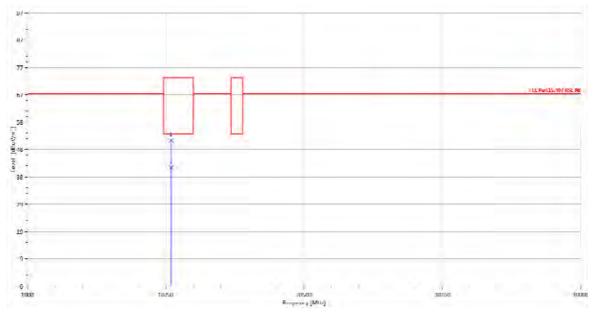
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5580 MHz :TX MID :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11160.00	Peak	Н	31.31	20.38	51.69	74.00	-22.31
11160.00	Average	Н	21.58	20.38	41.96	54.00	-12.04

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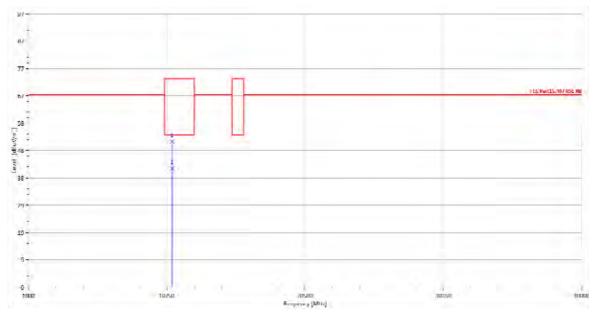
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5580 MHz :TX MID :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



	Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
		Mode		Reading Level		FS	@3m		
_	MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB	
	11160.00	Peak	Н	31.27	20.38	51.65	74.00	-22.35	
	11160.00	Average	Н	21.70	20.38	42.08	54.00	-11.92	

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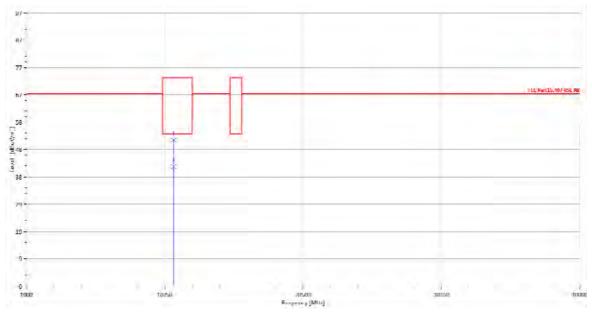
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5700 MHz :TX HIGH :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11400.00	Peak	Н	30.96	20.81	51.77	74.00	-22.23
11400.00	Average	Н	21.64	20.81	42.45	54.00	-11.55

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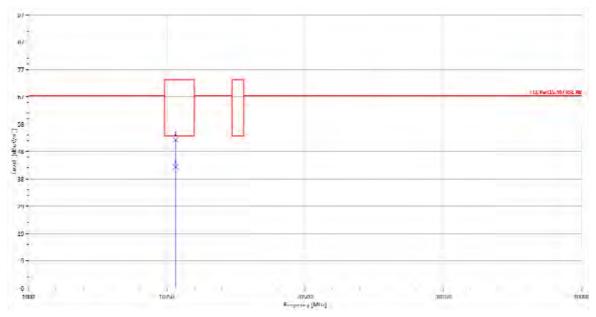
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5700 MHz :TX HIGH :H Plan

**Test Date** :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11400.00	Peak	Н	31.76	20.81	52.57	74.00	-21.43
11400.00	Average	Н	22.16	20.81	42.97	54.00	-11.03

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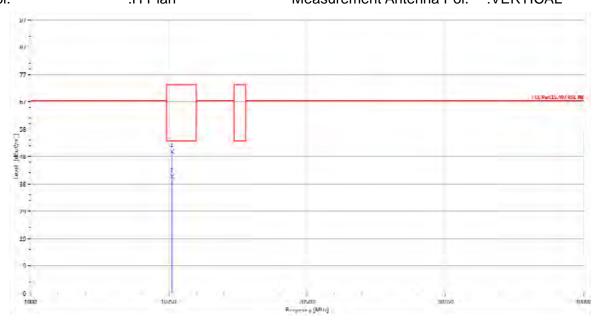
Report No.: E2/2015/50080 Issue Date: Jul. 30, 2015

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### Radiated Spurious Emission Measurement Result 802.11n HT20, 5470~5725 MHz (MIMO)

**Operation Band** :802.11 n20M Test Date :2015-07-10 Fundamental Frequency :5500 MHz Temp./Humi. :23 deg\_C / 58 RH

:TX LOW **Operation Mode** Engineer :Ashton :VERTICAL EUT Pol. :H Plan Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11000.00	Peak	Н	30.22	20.02	50.24	74.00	-23.76
11000.00	Average	Н	21.37	20.02	41.39	54.00	-12.61

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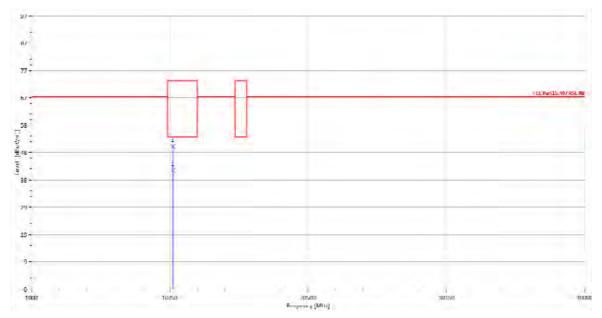
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5500 MHz :TX LOW :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11000.00	Peak	Н	30.61	20.02	50.63	74.00	-23.37
11000.00	Average	Н	22.01	20.02	42.03	54.00	-11.97

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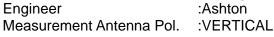
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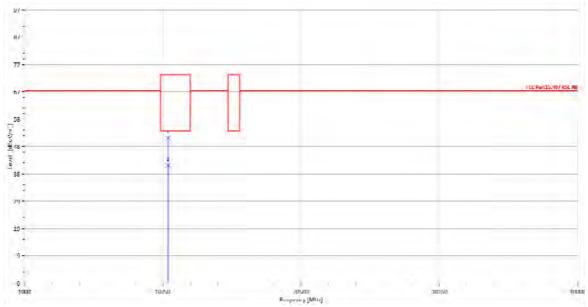
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5580 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH





Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11160.00	Peak	Н	31.07	20.38	51.45	74.00	-22.55
11160.00	Average	Н	21.40	20.38	41.78	54.00	-12.22

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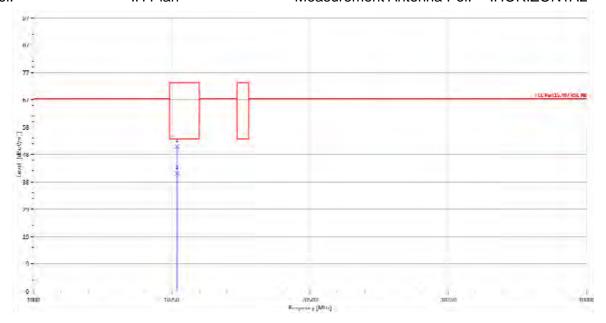
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5580 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11160.00	Peak	Н	30.89	20.38	51.27	74.00	-22.73
11160.00	Average	Н	21.43	20.38	41.81	54.00	-12.19

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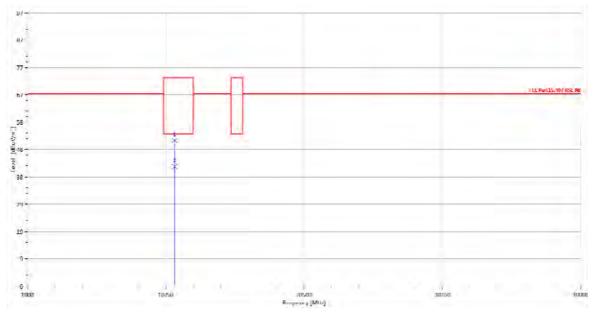
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5700 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11400.00	Peak	Н	30.89	20.81	51.70	74.00	-22.30
11400.00	Average	Н	21.60	20.81	42.41	54.00	-11.59

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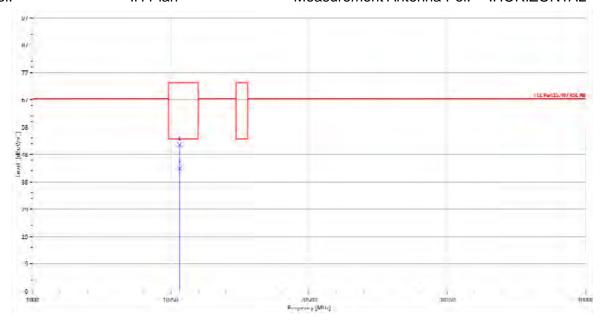
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5700 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11400.00	Peak	Н	31.21	20.81	52.02	74.00	-21.98
11400.00	Average	Н	22.66	20.81	43.47	54.00	-10.53

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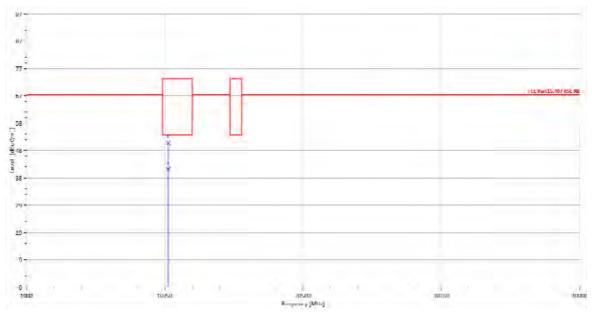
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### Radiated Spurious Emission Measurement Result 802.11n HT40, 5470~5725 MHz (MIMO)

**Operation Band** :802.11 n40M Test Date :2015-07-10 Fundamental Frequency :5510 MHz Temp./Humi. :23deg\_C / 58 RH

:TX LOW **Operation Mode** Engineer :Ashton :VERTICAL EUT Pol. :H Plan Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11020.00	Peak	Н	31.07	20.04	51.11	74.00	-22.89
11020.00	Average	Н	21.83	20.04	41.87	54.00	-12.13

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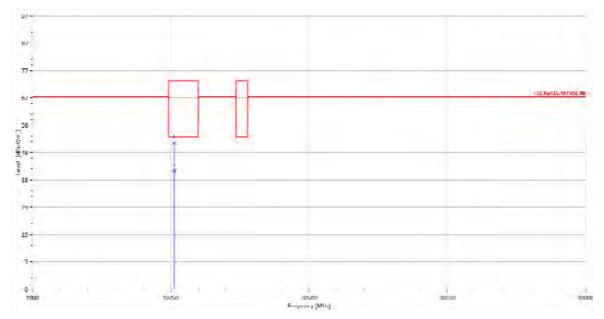
**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5510 MHz :TX LOW :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH

Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11020.00	Peak	Н	31.76	20.04	51.81	74.00	-22.19
11020.00	Average	Н	21.94	20.04	41.98	54.00	-12.02

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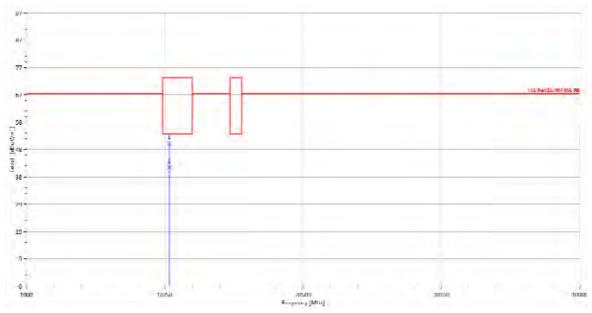
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5550 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11100.00	Peak	Н	30.41	20.21	50.62	74.00	-23.38
11100.00	Average	Н	21.86	20.21	42.07	54.00	-11.93

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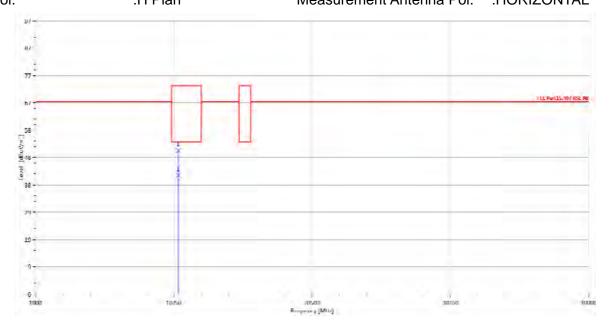
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5550 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11100.00	Peak	Н	30.70	20.21	50.90	74.00	-23.10
11100.00	Average	Н	21.92	20.21	42.13	54.00	-11.87

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Report No.: E2/2015/50080 Issue Date: Jul. 30, 2015

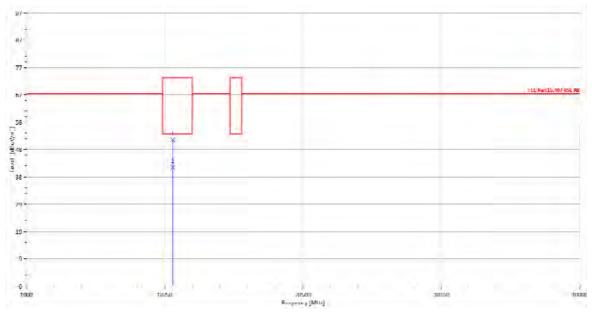
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5670 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11340.00	Peak	Н	31.28	20.61	51.89	74.00	-22.11
11340.00	Average	Н	21.48	20.61	42.09	54.00	-11.91

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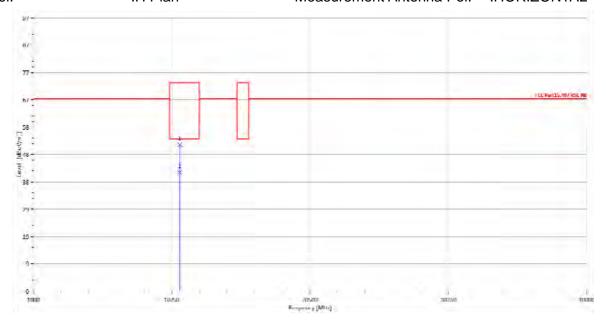
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5670 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11340.00	Peak	Н	31.38	20.61	51.98	74.00	-22.02
11340.00	Average	Н	21.47	20.61	42.08	54.00	-11.92

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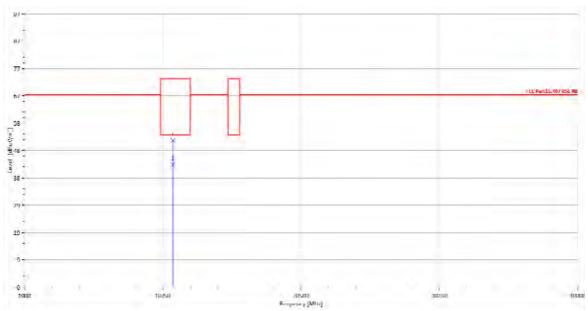
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### Radiated Spurious Emission Measurement Result 802.11a, 5725~5850 MHz

**Operation Band** :802.11 a **Test Date** :2015-07-10 Fundamental Frequency :5745 MHz Temp./Humi. :23 deg\_C / 58 RH

:TX LOW **Operation Mode** Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11490.00	Peak	Н	30.98	21.08	52.06	74.00	-21.94
11490.00	Average	Н	22.32	21.08	43.40	54.00	-10.60

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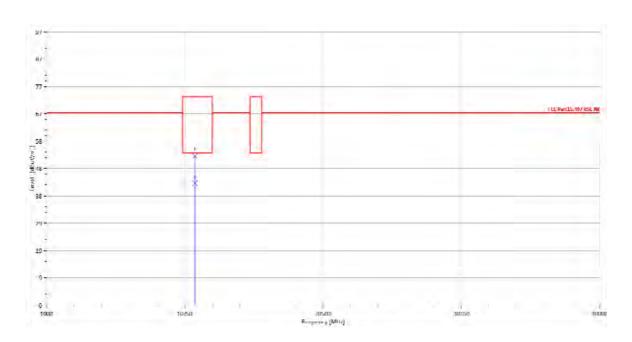
**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5745 MHz :TX LOW :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin	
	Mode		Reading Level		FS	@3m		
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB	_
11490.00	Peak	Н	31.89	21.08	52.97	74.00	-21.03	
11490.00	Average	Н	22.17	21.08	43.25	54.00	-10.75	

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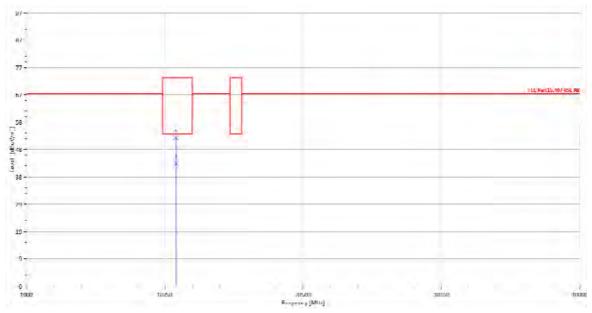
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5785 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11570.00	Peak	Н	31.54	21.14	52.67	74.00	-21.33
11570.00	Average	Н	22.36	21.14	43.50	54.00	-10.50

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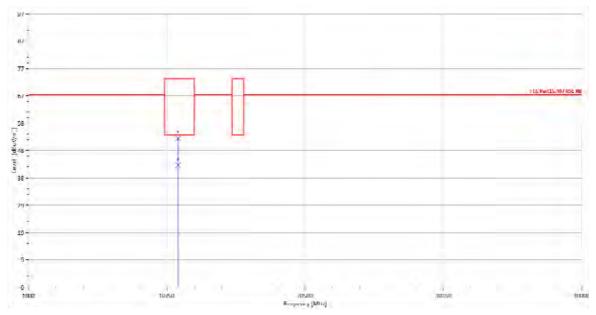
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5785 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11570.00	Peak	Н	31.64	21.14	52.78	74.00	-21.22
11570.00	Average	Н	22.16	21.14	43.30	54.00	-10.70

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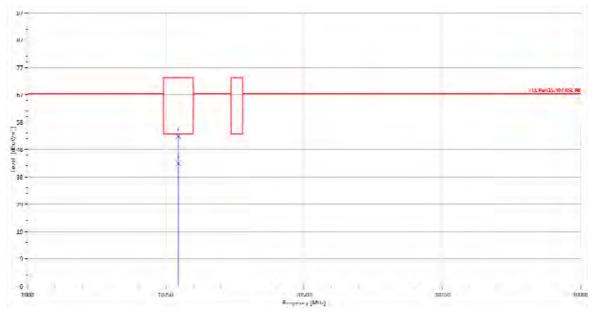
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5825 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11650.00	Peak	Н	31.94	21.27	53.21	74.00	-20.79
11650.00	Average	Н	22.25	21.27	43.52	54.00	-10.48

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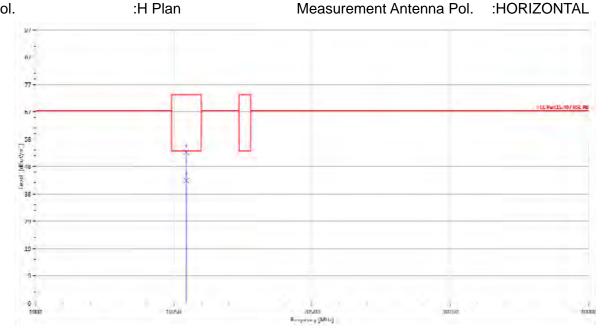
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 a :5825 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11650.00	Peak	Н	32.22	21.27	53.49	74.00	-20.51
11650.00	Average	Н	22.21	21.27	43.48	54.00	-10.52

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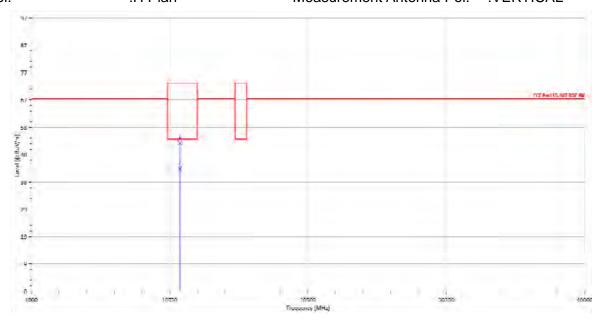
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:2015-07-10

# Radiated Spurious Emission Measurement Result 802.11n HT20, 5725~5850 MHz (MIMO)

**Operation Band** :802.11 n20M Test Date Fundamental Frequency :5745 MHz Temp./Humi.

:23 deg\_C / 58 RH **Operation Mode** :TX LOW Engineer :Ashton EUT Pol. :H Plan Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11490.00	Peak	Н	31.56	21.08	52.64	74.00	-21.36
11490.00	Average	Н	22.29	21.08	43.37	54.00	-10.63

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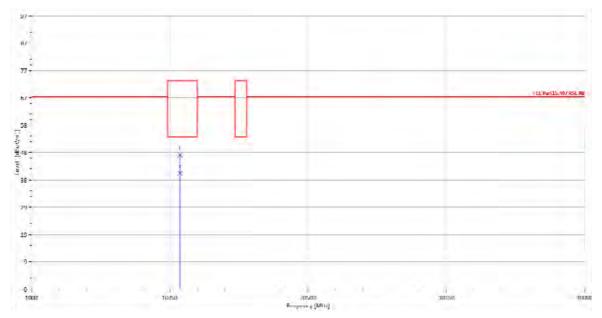
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5745 MHz :TX LOW :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11490.00	Peak	Н	26.57	21.08	47.65	74.00	-26.35
11490.00	Average	Н	20.04	21.08	41.12	54.00	-12.88

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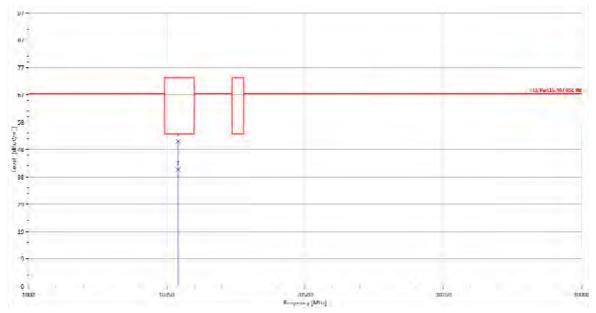
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5785 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



pectrum Factor	Actual	Limit	Margin
ading Level	FS	@3m	
dBµV dB	dBµV/m	dBµV/m	dB
30.27 21.14	51.40	74.00	-22.60
20.14 21.14	41.28	54.00	-12.72
	ding Level dBµV dB 30.27 21.14	ding Level FS dBμV dB dBμV/m 30.27 21.14 51.40	ding Level FS @3m dBμV dB dBμV/m dBμV/m  30.27 21.14 51.40 74.00

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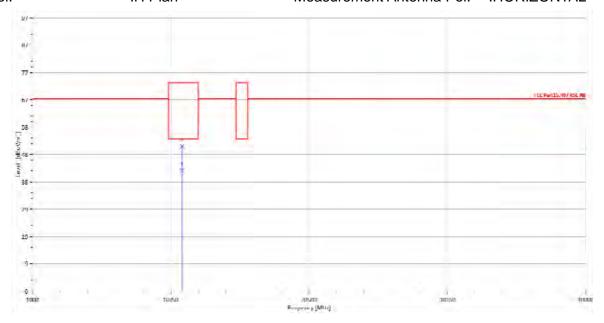
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5785 MHz :TX MID :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11570.00	Peak	Н	30.26	21.14	51.40	74.00	-22.60
11570.00	Average	Н	21.64	21.14	42.78	54.00	-11.22

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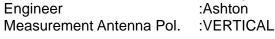
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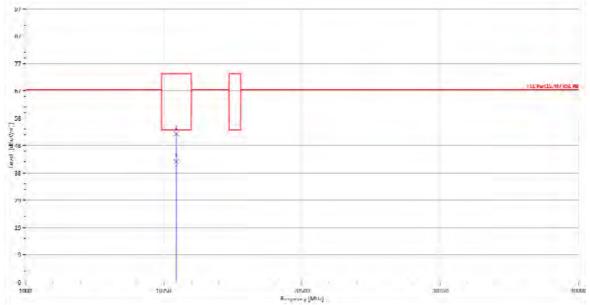
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5825 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH





Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11650.00	Peak	Н	31.34	21.27	52.61	74.00	-21.39
11650.00	Average	Н	21.55	21.27	42.82	54.00	-11.18

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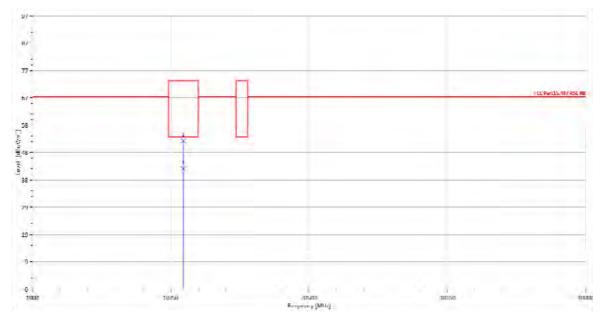
Page 229 of 240

**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n20M :5825 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23 deg\_C / 58 RH Engineer :Ashton

Measurement Antenna Pol. :HORIZONTAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11650.00	Peak	Н	31.36	21.27	52.63	74.00	-21.37
11650.00	Average	Н	21.55	21.27	42.82	54.00	-11.18

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EUT Pol.

FCC ID: HLZA5002 IC: 1754F-A5002

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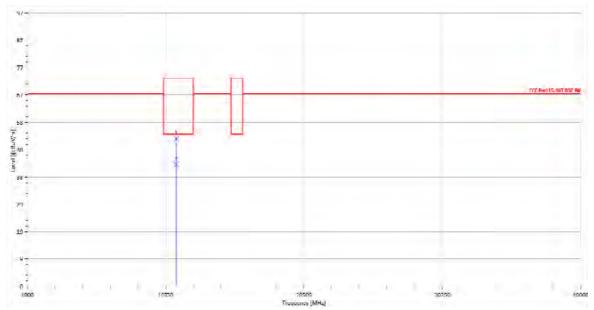
:2015-07-10

# Radiated Spurious Emission Measurement Result 802.11n HT40, 5725~5850 MHz (MIMO)

**Operation Band** :802.11 n40M Test Date :5755 MHz Fundamental Frequency Temp./Humi. **Operation Mode** :TX LOW

:23deg\_C / 58 RH Engineer :Ashton

:H Plan Measurement Antenna Pol. :VERTICAL



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11510.00	Peak	Н	31.24	21.17	52.40	74.00	-21.60
11510.00	Average	Н	22.08	21.17	43.25	54.00	-10.75

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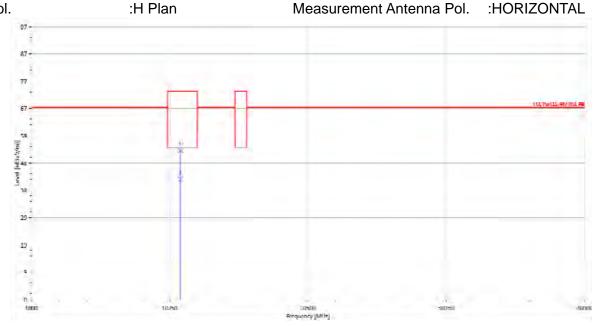
Report No.: E2/2015/50080 Issue Date: Jul. 30, 2015

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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5755 MHz :TX LOW :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH Engineer :Ashton



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBµV/m	dBµV/m	dB
11510.00	Peak	Н	31.79	21.17	52.96	74.00	-21.04
11510.00	Average	Н	21.60	21.17	42.77	54.00	-11.23

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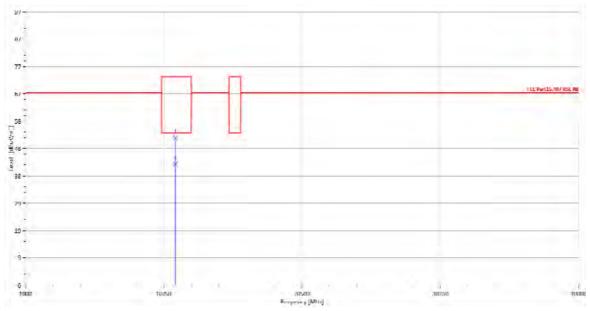
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5795 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH

Engineer :Ashton :VERTICAL Measurement Antenna Pol.



Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11590.00	Peak	Н	30.96	21.28	52.24	74.00	-21.76
11590.00	Average	Н	21.65	21.28	42.93	54.00	-11.07

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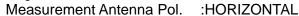
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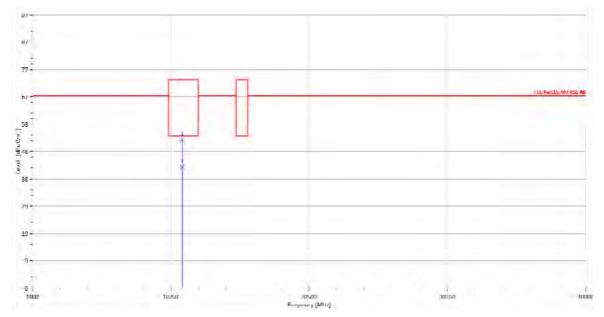
**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11 n40M :5795 MHz :TX HIGH :H Plan

Test Date :2015-07-10 Temp./Humi. :23deg\_C / 58 RH

Engineer :Ashton





Freq.	Detector	Note	Spectrum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	F/H/E/S	dΒμV	dB	dBμV/m	dBµV/m	dB
11590.00	Peak	Н	31.23	21.28	52.50	74.00	-21.50
11590.00	Average	Н	21.60	21.28	42.88	54.00	-11.12

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### 12. TRANSMISSION IN THE ABSENCE OF DATA

# 12.1 Standard Applicable

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

### 12.2 Result

No non-compliance noted:

Refer to the theory of operation.

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### 13. FREQUENCY STABILITY

# 13.1 Standard Applicable

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

#### 13.2 Measurement Procedure

- 1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
- 2. Set EUT as normal operation.
- 3. Turn the EUT on and couple its output to spectrum.
- 4. Turn the EUT off and set the chamber to the highest temperature specified.
- 5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
- 6. Repeat step with the temperature chamber set to the lowest temperature.

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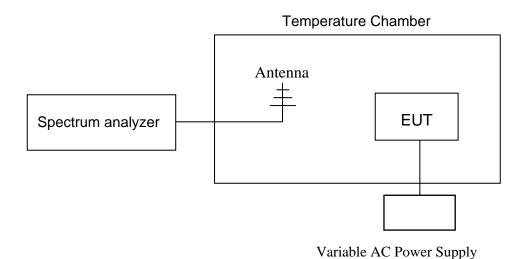
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### 13.3 Test SET-UP



13.4 Measurement Equipment Used

Conducted Emission Test Site									
EQUIPMENT	MED	MODEL SERIAL		LAST	CAL DUE				
TYPE	MFR	NUMBER	NUMBER	CAL.	CAL DUE.				
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015				
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/18/2015	06/17/2016				
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2015	05/03/2016				

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### 13.5 Measurement Result

Operation Mode	TX	Test Date	2015.06.30
Temperature	26	Test By	Wayne
Humidity	58 %		

Test Temp.	Test Volt- age	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
remp.		36	5180.0000	5,180.051940	-0.0519
		44	5220.0000	5,220.050790	-0.0508
		48	5240.0000	5,240.050980	-0.0510
		52	5260.0000	5,260.048040	-0.0480
		60	5300.0000	5,300.043730	-0.0437
40	0.01	64	5320.0000	5,320.051730	-0.0517
-10	3.8V	100	5500.0000	5,500.042110	-0.0421
		116	5580.0000	5,580.051860	-0.0519
		140	5700.0000	5,700.040960	-0.0410
		149	5745.0000	5,745.050260	-0.0503
		157	5785.0000	5,785.057950	-0.0580
		165	5825.0000	5,825.056230	-0.0562
		36	5180.0000	5,180.042080	-0.0421
		44	5220.0000	5,220.044270	-0.0443
		48	5240.0000	5,240.059970	-0.0600
		52	5260.0000	5,260.044380	-0.0444
		60	5300.0000	5,300.042600	-0.0426
25	3.8V	64	5320.0000	5,320.043230	-0.0432
23	3.0 V	100	5500.0000	5,500.046360	-0.0464
		116	5580.0000	5,580.040290	-0.0403
		140	5700.0000	5,700.051430	-0.0514
		149	5745.0000	5,745.043290	-0.0433
		157	5785.0000	5,785.043180	-0.0432
		165	5825.0000	5,825.056260	-0.0563

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		36	5180.0000	5,180.057790	-0.0578
		44	5220.0000	5,220.044380	-0.0444
		48	5240.0000	5,240.048890	-0.0489
		52	5260.0000	5,260.040170	-0.0402
		60	5300.0000	5,300.055510	-0.0555
55	3.8V	64	5320.0000	5,320.043800	-0.0438
55	3.6 V	100	5500.0000	5,500.041510	-0.0415
		116	5580.0000	5,580.054330	-0.0543
		140	5700.0000	5,700.044320	-0.0443
		149	5745.0000	5,745.052940	-0.0529
		157	5785.0000	5,785.057980	-0.0580
		165	5825.0000	5,825.043680	-0.0437

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Operation Mode	TX	Test Date	2015.06.30
Temperature	26	Test By	Wayne
Humidity	58 %		

Test Temp.	Test Volt- age	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
		38	5190.0000	5,190.039250	-0.0392
		46	5230.0000	5,230.037600	-0.0376
		54	5270.0000	5,270.034280	-0.0343
		62	5310.0000	5,310.030440	-0.0304
10	3.8V	102	5510.0000	5,510.021880	-0.0219
		110	5550.0000	5,550.036450	-0.0364
		134	5670.0000	5,670.037810	-0.0378
		151	5755.0000	5,755.029740	-0.0297
		159	5795.0000	5,795.036000	-0.0360
		38	5190.0000	5,190.030840	-0.0308
	3.8V	46	5230.0000	5,230.033340	-0.0333
		54	5270.0000	5,270.034780	-0.0348
		62	5310.0000	5,310.039370	-0.0394
25		102	5510.0000	5,510.031510	-0.0315
		110	5550.0000	5,550.025570	-0.0256
		134	5670.0000	5,670.035590	-0.0356
		151	5755.0000	5,755.038280	-0.0383
		159	5795.0000	5,795.039340	-0.0393
		38	5190.0000	5,190.036080	-0.0361
		46	5230.0000	5,230.033650	-0.0337
		54	5270.0000	5,270.022670	-0.0227
		62	5310.0000	5,310.039070	-0.0391
55	3.8V	102	5510.0000	5,510.027410	-0.0274
		110	5550.0000	5,550.022820	-0.0228
		134	5670.0000	5,670.022110	-0.0221
		151	5755.0000	5,755.020770	-0.0208
		159	5795.0000	5,795.025350	-0.0253

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### 14. ANTENNA REQUIREMENT

# 14.1 Standard Applicable

According to \$15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

According to §15.407, 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.

### According to RSS-GEN 8.3

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.9 When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

#### 14.2 Antenna Connected Construction

An embedded-in antenna design is used.

The antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

The antenna gain is less than 6dBi. Therefore, it is not necessary to reduce maximum output power power limit.

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