

# Test Report

## FCC 15 Subpart E 15.407

Product Name : IP-STB  
Model No. : 4210X,4230X,4210X1,4230X1,4200X1,4205X1  
FCC ID : TC2-R1011

Applicant : Roku Inc.  
Address : 12980 Saratoga Ave, Suite D Saratoga, CA 95070

Date of Receipt : Jul.07, 2015  
Test Date : Jul.09, 2015~Aug.24, 2015  
Issued Date : Sept.18, 2015  
Report No. : 1570212R-RF-US-P09V01  
Report Version : V2.0

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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# Test Report Certification

Issued Date : Sept.18, 2015  
Report No. : 1570212R-RF-US-P09V01



Product Name : IP-STB  
Applicant : Roku Inc.  
Address : 12980 Saratoga Ave, Suite D Saratoga, CA 95070  
Manufacturer : Ambit Mircosystems (Shanghai) LTD.  
Address : 1925, Nanle Road, Songjiang Export Processing Zone,  
Shanghai, China 201613  
Model No. : 4210X,4230X,4210X1, 4230X1, 4200X1, 4205X1  
FCC ID : TC2-R1011  
EUT Voltage : 12V DC  
Brand Name : Roku  
Applicable Standard : FCC 15.407: 2015;  
ANSI C63.4:2014;  
ANSI C63.10:2013;  
Test Result : Complied  
Performed Location : Suzhou EMC Laboratory  
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TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098  
FCC Registration Number: 800392; IC Lab Code: 4075B

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## Laboratory Information

We, **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

<b>Taiwan R.O.C.</b>	<b>:</b>	<b>BSMI, NCC,TAF</b>
<b>USA</b>	<b>:</b>	<b>FCC</b>
<b>Japan</b>	<b>:</b>	<b>VCCI</b>
<b>China</b>	<b>:</b>	<b>CNAS</b>

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site :<http://www.quietek.com/tw/ctg/cts/accreditations.htm>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :  
<http://www.quietek.com/>

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### History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1570212R-RF-US-P09V01	V1.0	Initial Issued Report	Aug. 24, 2015
1570212R-RF-US-P09V01	V2.0	Update model list	Sept. 18, 2015

## 1. General Information

### 1.1. EUT Description

Product Name	IP-STB
Brand Name	Roku
Model No.	4210X,4230X,4210X1, 4230X1, 4200X1, 4205X1
EUT Voltage	12V DC
Frequency Range	<b>For 2.4GHz Band</b> 802.11b/g/n(20MHz): 2412~2462MHz 802.11n(40MHz): 2422~2452MHz <b>For 5.0GHz Band</b> 802.11a/n(20MHz): 5180~5240MHz, 5745~5825MHz 802.11n(40MHz): 5190~5230MHz, 5755~5795MHz
Channel Number	For 2.4GHz Band 802.11b/g/n(20MHz): 11 802.11n(40MHz): 7 For 5.0GHz Band 802.11a/n(20MHz): 9 802.11n(40MHz): 4
Type of Modulation	802.11b: DSSS 802.11a/g/n: OFDM
Data Rate	802.11a/g: 6/9/12/18/24/36/48/54 Mbps 802.11b: 1/2/5.5/11 Mbps 802.11n: up to 300 Mbps
Channel Control	Auto
Antenna Delivery	2*Tx + 2*Rx
Antenna Type	Reference to Antenna List
Peak Antenna Gain	Reference to Antenna List
<b>Components</b>	
Power Adapter	MFR: Roku M/N:FA-1201000SUD Input: AC 120~60Hz, 0.5A Output: DC 12V, 1.0A

Note: The RF specifications of these models are identical. The difference is the marketing sale. We choose model 4210X1 to perform all the test items.



**For 2.4GHz Band**

802.11b/g/n(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz	04	2427 MHz
05	2432 MHz	06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	10	2457 MHz	11	2462 MHz	N/A	N/A

802.11n(40MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz	N/A	N/A

**For 5.0GHz Band**

802.11a/n(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz	48	5240 MHz
149	5745 MHz	153	5765 MHz	157	5785 MHz	161	5805 MHz
165	5825 MHz	N/A	N/A	N/A	N/A	N/A	N/A

802.11n(40MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	151	5755 MHz	159	5795 MHz

**802.11a/b/g/n Antenna List**

Antenna	Manufacturer	Model No.	Peak Gain
Antenna 1	Cortec Technology Inc.	N/A	2dBi for 2.4GHz, 1dBi for 5GHz
Antenna 2	Cortec Technology Inc.	N/A	2dBi for 2.4GHz, 1dBi for 5GHz

**Duty Cycle**

5GHz Band

Test Mode	Duty Cycle
802.11a	98.0%
802.11n(20MHz)	98.3%
802.11n(40MHz)	95.8%

## 1.2. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit by 802.11a
Mode 2: Transmit by 802.11n (20MHz)
Mode 3: Transmit by 802.11n (40MHz)

Note:

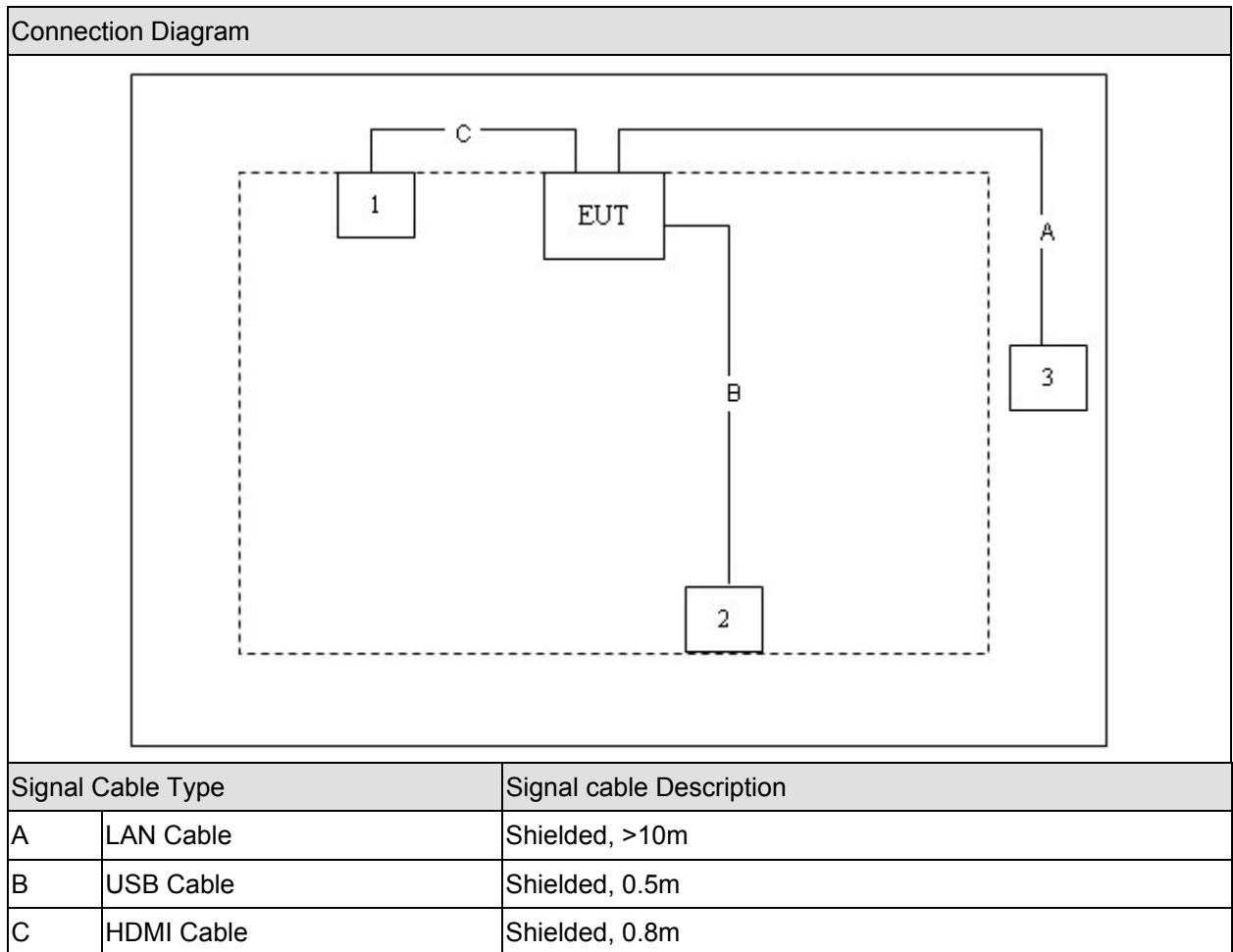
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

### 1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 LCD Monitor	DELL	ST2420LB	CN-OXOK27-74261-189-OA4U	Non-Shielded, 1.8m
2 iPod	Apple	A1199	7J71085BVQ5E	Power by PC
3 Laptop PC	Asus	N80V	8BN0AS226971468	N/A

### 1.4. Configuration of Tested System



### 1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of equipment.
3	Execute some commands on the PC provided by applicant.
4	Setup the test channel and the test mode press ok to start the continue transmit.

## 2. Technical Test

### 2.1. Summary of Test Result

- No deviations from the test standards  
 Deviations from the test standards as below description:

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart E: 2015 Section 15.207	Yes	No
Radiated Emission	FCC CFR Title 47 Part 15 Subpart E: 2015 Section 15.209	Yes	No
26dB Occupied Bandwidth	FCC CFR Title 47 Part 15 Subpart E: 2015 Section 15.407(a)	Yes	No
6dB Occupied Bandwidth	FCC CFR Title 47 Part 15 Subpart E: 2014 Section 15.407(e)	Yes	No
Power Output	FCC CFR Title 47 Part 15 Subpart E: 2015 Section 15.407(a)	Yes	No
Peak Power Spectral Density	FCC CFR Title 47 Part 15 Subpart E: 2015 Section 15.407(a)	Yes	No
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart E: 2015 Section 15.205, 15.407(b)	Yes	No
Frequency Stability	FCC CFR Title 47 Part 15 Subpart E: 2015 Section 15.407(g)	Yes	No

## 2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

### 3. Conducted Emission

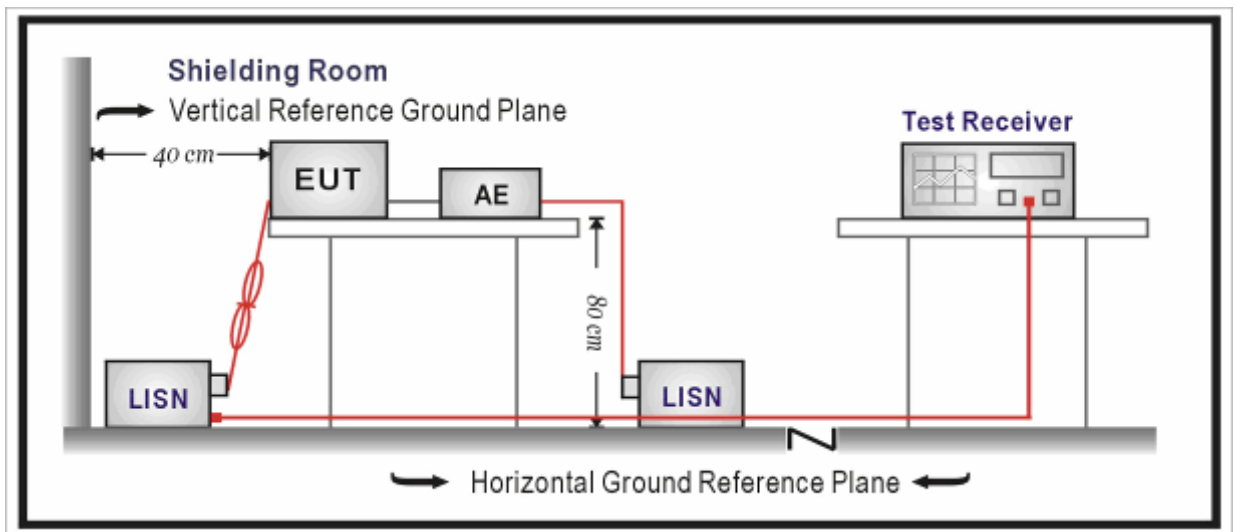
#### 3.1. Test Equipment

Conducted Emission / TR-1

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100726	2016.03.28
Two-Line V-Network	R&S	ENV216	100043	2016.03.28
Two-Line V-Network	R&S	ENV216	100044	2016.09.16
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2016.03.01
50ohm Termination	SHX	TF2	07081401	2016.09.16
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2016.01.08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

#### 3.2. Test Setup





**3.3. Limit**

RSS-GEN Issue		
Frequency (MHz)	QP (dBuV)	AV(Note2) (dBuV)
0.15 - 0.50	66 – 56(Note1)	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The level decreases linearly with the logarithm of the frequency.

Note 2: A linear average detector is required.

**3.4. Test Procedure**

According to ANSI C63.4:2014& ANSI C63.10:2013&789033 D02 General UNII Test Procedures New Rules v01.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

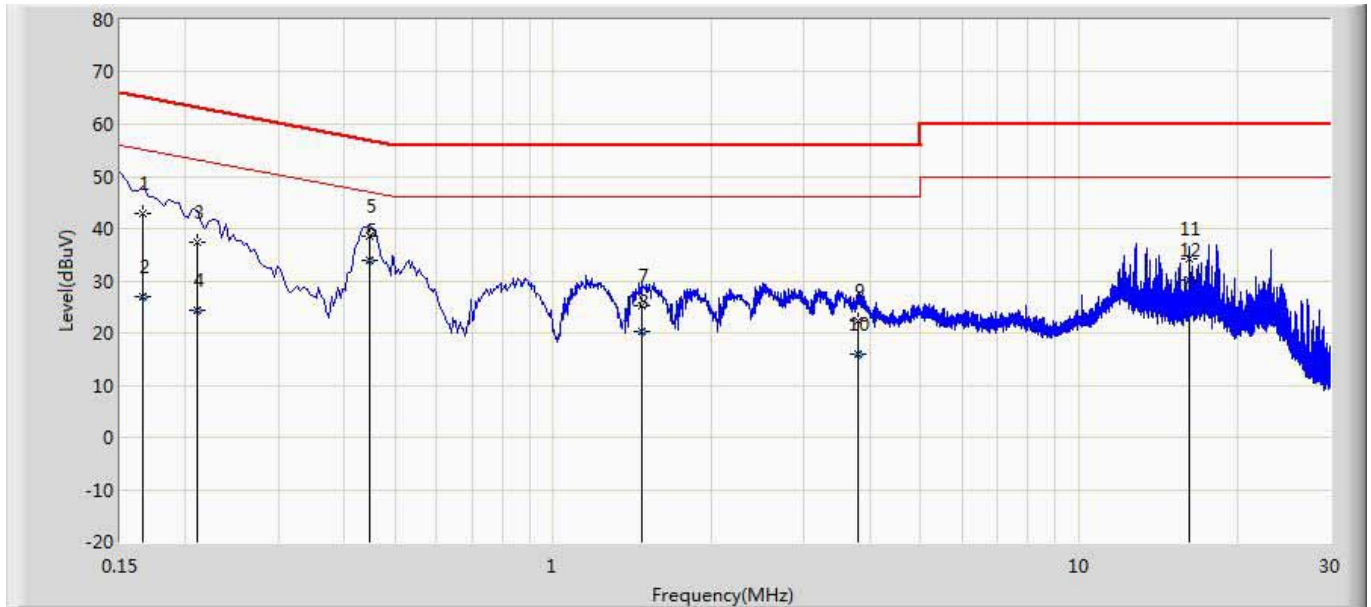
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

**3.5. Uncertainty**

The measurement uncertainty is defined as  $\pm 2.02$  dB

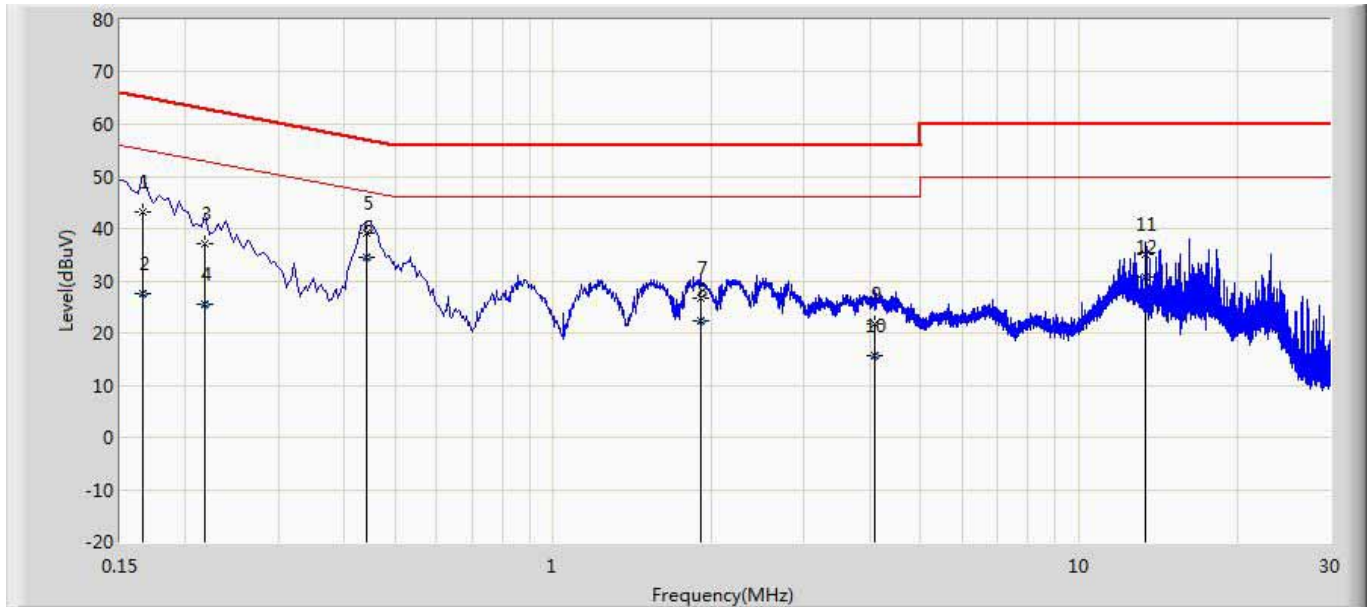
### 3.6. Test Result

Engineer: Scott	
Site: TR1	Time: 2015/07/29 - 17:47
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Line
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.166	42.992	33.267	-22.166	65.158	9.665	0.060	0.000	QP
2		0.166	26.990	17.265	-28.168	55.158	9.665	0.060	0.000	AV
3		0.210	37.491	27.781	-25.714	63.205	9.650	0.060	0.000	QP
4		0.210	24.222	14.512	-28.983	53.205	9.650	0.060	0.000	AV
5		0.446	38.500	28.800	-18.449	56.949	9.630	0.070	0.000	QP
6	*	0.446	33.977	24.277	-12.972	46.949	9.630	0.070	0.000	AV
7		1.478	25.261	15.541	-30.739	56.000	9.630	0.090	0.000	QP
8		1.478	20.193	10.473	-25.807	46.000	9.630	0.090	0.000	AV
9		3.798	22.314	12.514	-33.686	56.000	9.660	0.140	0.000	QP
10		3.798	15.847	6.047	-30.153	46.000	9.660	0.140	0.000	AV
11		16.226	34.343	24.123	-25.657	60.000	9.830	0.390	0.000	QP
12		16.226	30.087	19.867	-19.913	50.000	9.830	0.390	0.000	AV

Engineer: Scott	
Site: TR1	Time: 2015/07/29 - 17:47
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Neutral
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.166	43.086	33.358	-22.072	65.158	9.668	0.060	0.000	QP
2		0.166	27.514	17.786	-27.644	55.158	9.668	0.060	0.000	AV
3		0.218	37.207	27.487	-25.688	62.895	9.660	0.060	0.000	QP
4		0.218	25.447	15.727	-27.448	52.895	9.660	0.060	0.000	AV
5		0.442	39.008	29.302	-18.016	57.024	9.636	0.070	0.000	QP
6	*	0.442	34.467	24.761	-12.557	47.024	9.636	0.070	0.000	AV
7		1.902	26.799	17.059	-29.201	56.000	9.640	0.100	0.000	QP
8		1.902	22.199	12.459	-23.801	46.000	9.640	0.100	0.000	AV
9		4.074	21.662	11.862	-34.338	56.000	9.660	0.140	0.000	QP
10		4.074	15.776	5.976	-30.224	46.000	9.660	0.140	0.000	AV
11		13.358	35.013	24.883	-24.987	60.000	9.800	0.330	0.000	QP
12		13.358	30.847	20.717	-19.153	50.000	9.800	0.330	0.000	AV

## 4. Radiated Emission

### 4.1. Test Equipment

#### Radiated Emission / AC-2

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2016.03.28
Loop Antenna	R&S	HFH2-Z2	833799/003	2015.11.17
Bilog Chainenna	Teseq GmbH	CBL6112D	27611	2015.10.15
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2016.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2016.01.08

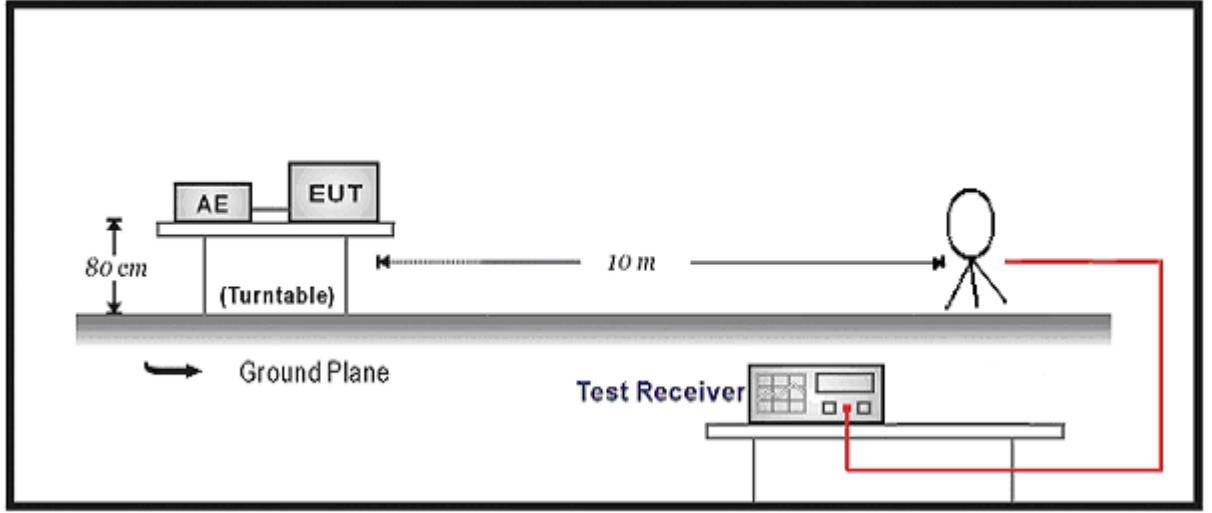
#### Radiated Emission / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MY49100159	2016.03.28
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Preamplifier	Miteq	NSP1800-25	1364185	2016.05.05
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016.05.05
DRG Horn	ETS-Lindgren	3117	00123988	2016.01.21
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2015.11.24
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016.03.01
EMI Receiver	Agilent	N9038A	MY51210196	2016.06.09
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2016.01.08

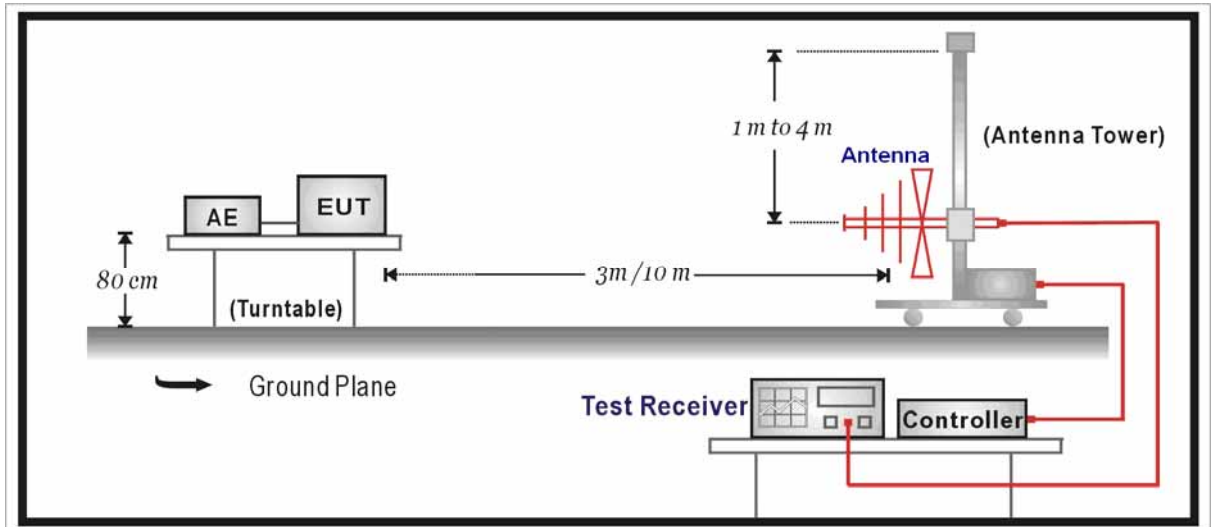
Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 4.2. Test Setup

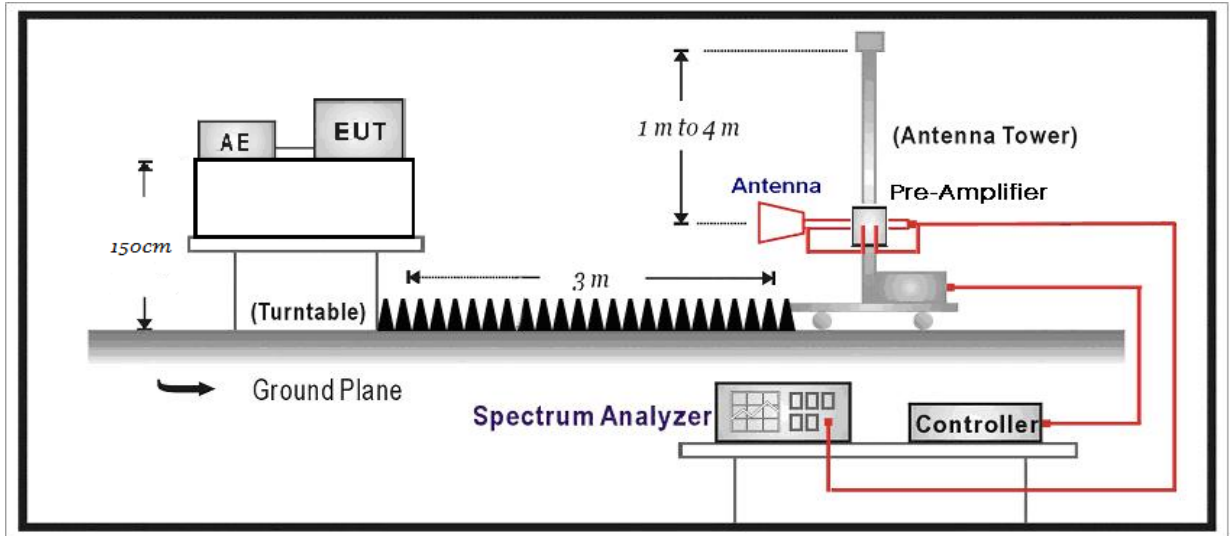
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



**4.3. Limit**

For FCC

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

**4.4. Test Procedure**

According to ANSI C63.4:2014& ANSI C63.10:2013&789033 D02 General UNII Test Procedures New Rules v01.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This

is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2014 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 60~10 degrees for H-plane and 90~10 degrees for E-plane.

#### **4.5. Uncertainty**

The measurement uncertainty above 1G is defined as  $\pm 3.9$  dB  
below 1G is defined as  $\pm 3.8$  dB

#### 4.6. Test Result

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

Average detector: RBW = 1MHz, VBW = 10Hz, sweep time = auto.

Mode1: Transmit by 802.11a

	CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Chain 0	36	H	10360.0	46.5	2.4	48.9	54(Note3)	-5.1	PK
		V	10360.0	46.2	2.4	48.6	54(Note3)	-5.4	PK
	40	H	10400.0	48.1	2.9	51.0	54(Note3)	-3.0	PK
		V	10400.0	50.3	2.9	53.2	54(Note3)	-0.8	PK
	48	H	10480.0	48.1	2.3	50.4	54(Note3)	-3.6	PK
		V	10480.0	50.3	2.3	52.6	54(Note3)	-1.4	PK
Chain 1	36	H	10360.0	52.1	2.4	54.5	74	-19.5	PK
		H	10360.0	39.9	2.4	42.3	54	-11.7	AV
		V	10360.0	53.8	2.4	56.2	74	-17.8	PK
		V	10360.0	41.7	2.4	44.1	54	-9.9	AV
	40	H	10400.0	54.6	2.9	57.5	74	-16.5	PK
		H	10400.0	44.3	2.9	47.2	54	-6.8	AV
		V	10400.0	54.8	2.9	57.7	74	-16.3	PK
		V	10400.0	43.1	2.9	46.0	54	-8.0	AV
	48	H	10480.0	56.8	2.3	59.1	74	-14.9	PK
		H	10480.0	46.1	2.3	48.4	54	-5.6	AV
		V	10480.0	57.2	2.3	59.5	74	-14.5	PK
		V	10480.0	47.0	2.3	49.3	54	-4.7	AV

Note: 1. Measure Level = Reading Level + Factor.

- The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.
- This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
- Three times harmonic of PK value are at least 10dBm below the AV limits, therefore no data appear in the report.



Mode2: Transmit by 802.11n(20MHz)

	CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Chain 1	36	H	10360.0	45.1	2.4	47.5	54(Note3)	-6.5	PK
		V	10360.0	45.6	2.4	48.0	54(Note3)	-6.0	PK
	40	H	10400.0	49.6	2.9	52.5	54(Note3)	-1.5	PK
		V	10400.0	51.1	2.9	54.0	74	-20.0	PK
		H	10400.0	40.1	2.9	43.0	54	-11.0	AV
	48	H	10480.0	47.5	2.3	49.8	54(Note3)	-4.2	PK
V		10480.0	47.6	2.3	49.9	54(Note3)	-4.1	PK	
Chain 2	36	H	10360.0	54.6	2.4	57.0	74	-17.0	PK
		V	10360.0	39.8	2.4	42.2	54	-11.8	AV
		H	10360.0	53.0	2.4	55.4	74	-18.6	PK
		V	10360.0	42.5	2.4	44.9	54	-9.1	AV
	40	H	10400.0	56.1	2.9	59.0	74	-15.0	PK
		V	10400.0	41.2	2.9	44.1	54	-9.9	AV
		H	10400.0	53.8	2.9	56.7	74	-17.3	PK
		V	10400.0	38.7	2.9	41.6	54	-12.4	AV
	48	H	10480.0	58.2	2.3	60.5	74	-13.5	PK
		H	10480.0	48.6	2.3	50.9	54	-3.1	AV
	V	10480.0	47.5	2.3	49.8	54(Note3)	-4.2	PK	
Chain 1+2	36	H	10360.0	52.9	2.4	55.3	74	-18.7	PK
		V	10360.0	42.7	2.4	45.1	54	-8.9	AV
		H	10360.0	52.6	2.4	55.0	74	-19.0	PK
		V	10360.0	42.3	2.4	44.7	54	-9.3	AV
	40	H	10400.0	46.7	2.9	49.6	54(Note3)	-4.4	PK
		V	10400.0	49.0	2.9	51.9	54(Note3)	-2.1	PK
	48	H	10480.0	55.3	2.3	57.6	74	-16.4	PK
		V	10480.0	45.2	2.3	47.5	54	-6.5	AV
	H	10480.0	54.6	2.3	56.9	74	-17.1	PK	
	V	10480.0	44.8	2.3	47.1	54	-6.9	AV	

Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

4. Three times harmonic of PK value are at least 10dBm below the AV limits, therefore no data appear in the report.

Mode3: Transmit by 802.11n(40MHz)

CH		Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Chain 0	38	H	10380.0	43.9	3.1	47.0	54(Note3)	-7.0	PK
		V	10380.0	44.1	3.1	47.2	54(Note3)	-6.8	PK
	46	H	10460.0	44.3	2.2	46.5	54(Note3)	-7.5	PK
		V	10460.0	45.0	2.2	47.2	54(Note3)	-6.8	PK
Chain 1	38	H	10380.0	49.7	3.1	52.8	54(Note3)	-1.2	PK
		V	10380.0	49.5	3.1	52.6	54(Note3)	-1.4	PK
	46	H	10460.0	53.0	2.2	55.2	74	-18.8	PK
		H	10460.0	43.3	2.2	45.5	54	-8.5	AV
		V	10460.0	50.8	2.2	53.0	54(Note3)	-1.0	PK
Chain 0+1	38	H	10380.0	48.9	3.1	52.0	54(Note3)	-2.0	AV
		V	10380.0	50.8	3.1	53.9	54(Note3)	-0.1	PK
	46	H	10460.0	51.9	2.2	54.1	74	-19.9	PK
		H	10460.0	42.3	2.2	44.5	54	-9.5	AV
		V	10460.0	52.7	2.2	54.9	74	-19.1	PK
		V	10460.0	42.6	2.2	44.8	54	-9.2	AV

Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
4. Three times harmonic of PK value are at least 10dBm below the AV limits, therefore no data appear in the report.

802.11a

Chain	CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Chain 1	149	H	11490.0	44.5	6.2	50.7	54(note3)	-3.3	PK
		H	17235.0	38.7	13.3	52.0	54(note3)	-2.0	PK
		V	11489.0	53.0	6.2	59.2	74.0	-14.8	PK
		V	11489.0	43.0	6.2	49.2	54.0	-4.8	AV
		V	17235.0	38.5	13.3	51.7	54(note3)	-2.3	PK
	157	H	11565.5	45.4	6.5	51.9	54(note3)	-2.1	PK
		H	17355.0	38.0	11.9	50.0	54(note3)	-4.0	PK
		V	11565.5	47.0	6.5	53.5	54(note3)	-0.5	PK
		V	17355.0	39.1	11.9	51.0	54(note3)	-3.0	PK
	165	H	11650.0	44.0	7.1	51.1	54(note3)	-2.9	PK
		H	17475.0	39.0	11.8	50.8	54(note3)	-3.2	PK
		V	11650.5	50.4	7.2	57.6	74.0	-16.4	PK
		V	11650.5	44.0	7.2	51.2	54.0	-2.8	AV
		V	17475.0	38.6	11.8	50.4	54(note3)	-3.6	PK
	Chain 2	149	H	11490.0	45.9	6.2	52.1	54(note3)	-1.9
H			17235.0	39.3	13.3	52.6	54(note3)	-1.4	PK
V			11480.5	50.5	5.9	56.4	74.0	-17.6	PK
V			11480.5	42.8	5.9	48.7	54.0	-5.3	AV
V			17235.0	38.7	13.3	52.0	54(note3)	-2.0	PK
157		H	11570.0	44.9	6.5	51.4	54(note3)	-2.6	PK
		H	17355.0	38.5	11.9	50.4	54(note3)	-3.6	PK
		V	11565.5	52.7	6.5	59.2	74.0	-14.8	PK
		V	11565.5	43.2	6.5	49.7	54.0	-4.3	AV
		V	17355.0	38.7	11.9	50.7	54(note3)	-3.3	PK
165		H	11659.0	46.1	7.8	53.9	54(note3)	-0.1	PK
		H	17475.0	38.7	11.8	50.6	54(note3)	-3.4	PK
		V	11650.5	53.0	7.2	60.2	74.0	-13.8	PK
		V	11650.5	42.6	7.2	49.8	54.0	-4.2	AV
		V	17475.0	39.6	11.8	51.4	54(note3)	-2.6	PK

Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average

limit, then average measurement needn't be performed.

4. Three times harmonic of PK value are at least 10dBm below the AV limits, therefore no data appear in the report.

802.11n(20MHz)

Chain	CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Chain 1	149	H	11490.0	44.9	6.2	51.1	54(note3)	-2.9	PK
		H	17235.0	37.3	13.3	50.6	54(note3)	-3.4	PK
		V	11489.0	53.8	6.2	60.0	74.0	-14.0	PK
		V	11489.0	42.3	6.2	48.5	54.0	-5.5	AV
		V	17235.0	37.9	13.3	51.1	54(note3)	-2.9	PK
	157	H	11570.0	44.7	6.5	51.2	54(note3)	-2.8	PK
		H	17355.0	38.4	11.9	50.3	54(note3)	-3.7	PK
		V	11565.5	54.4	6.5	60.9	74.0	-13.1	PK
		V	11568.8	39.3	6.5	45.8	54.0	-8.2	AV
		V	17355.0	38.1	11.9	50.0	54(note3)	-4.0	PK
	165	H	11650.0	44.7	7.1	51.8	54(note3)	-2.2	PK
		H	17475.0	39.2	11.8	51.0	54(note3)	-3.0	PK
		V	11659.0	51.6	7.8	59.5	74.0	-14.5	PK
		V	11659.0	45.0	7.8	52.8	54.0	-1.2	AV
		V	17475.0	38.4	11.8	50.2	54(note3)	-3.8	PK
Chain 2	149	H	11490.0	44.6	6.2	50.8	54(note3)	-3.2	PK
		H	17235.0	37.2	13.3	50.5	54(note3)	-3.5	PK
		V	11489.0	50.6	6.2	56.8	74.0	-17.2	PK
		V	11489.0	45.0	6.2	51.2	54.0	-2.8	AV
		V	17235.0	38.4	13.3	51.6	54(note3)	-2.4	PK
	157	H	11565.5	47.0	6.5	53.5	54(note3)	-0.5	PK
		H	17355.0	39.6	11.9	51.5	54(note3)	-2.5	PK
		V	11570.0	46.8	6.5	53.3	54(note3)	-0.7	PK
		V	17355.0	39.0	11.9	50.9	54(note3)	-3.1	PK
	165	H	11650.5	47.2	7.2	54.4	54(note3)	0.4	PK
		H	17475.0	39.2	11.8	51.0	54(note3)	-3.0	PK
		V	11650.5	53.2	7.2	60.4	74.0	-13.6	PK
V		11650.5	42.4	7.2	49.6	54.0	-4.4	AV	

		V	17475.0	39.3	11.8	51.2	54(note3)	-2.8	PK
Chain 1+2	149	H	11489.0	46.1	6.2	52.3	54(note3)	-1.7	PK
		H	17235.0	37.7	13.3	51.0	54(note3)	-3.0	PK
		V	11497.5	52.3	6.4	58.7	74.0	-15.3	PK
		V	11497.5	43.3	6.4	49.7	54.0	-4.3	AV
		V	17235.0	38.1	13.3	51.4	54(note3)	-2.6	PK
	157	H	11570.0	44.7	6.5	51.2	54(note3)	-2.8	PK
		H	17355.0	38.3	11.9	50.2	54(note3)	-3.8	PK
		V	11565.5	53.2	6.5	59.7	74.0	-14.3	PK
		V	11565.5	42.2	6.5	48.7	54.0	-5.3	AV
		V	17355.0	38.5	11.9	50.4	54(note3)	-3.6	PK
	165	H	11650.0	45.3	7.1	52.4	54(note3)	-1.6	PK
		H	17475.0	38.6	11.8	50.5	54(note3)	-3.5	PK
		V	11650.5	52.3	7.2	59.4	74.0	-14.6	PK
		V	11650.5	42.3	7.2	49.5	54.0	-4.5	AV
		V	17475.0	38.7	11.8	50.5	54(note3)	-3.5	PK

Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
4. Three times harmonic of PK value are at least 10dBm below the AV limits, therefore no data appear in the report.

802.11n(40MHz)

Chain	CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
Chain 1	151	H	11510.0	45.5	6.6	52.1	54(note3)	-1.9	PK
		H	17265.0	39.5	11.4	50.8	54(note3)	-3.2	PK
		V	11506.0	54.6	6.5	61.1	74.0	-12.9	PK
		V	11506.0	44.3	6.5	50.8	54.0	-3.2	AV
		V	17265.0	39.2	11.4	50.6	54(note3)	-3.4	PK
	159	H	11590.0	46.0	6.3	52.2	54(note3)	-1.8	PK
		H	17385.0	37.2	12.9	50.1	54(note3)	-3.9	PK
		V	11599.5	52.4	6.1	58.5	74.0	-15.5	PK
		V	11599.5	42.4	6.1	48.5	54.0	-5.5	AV

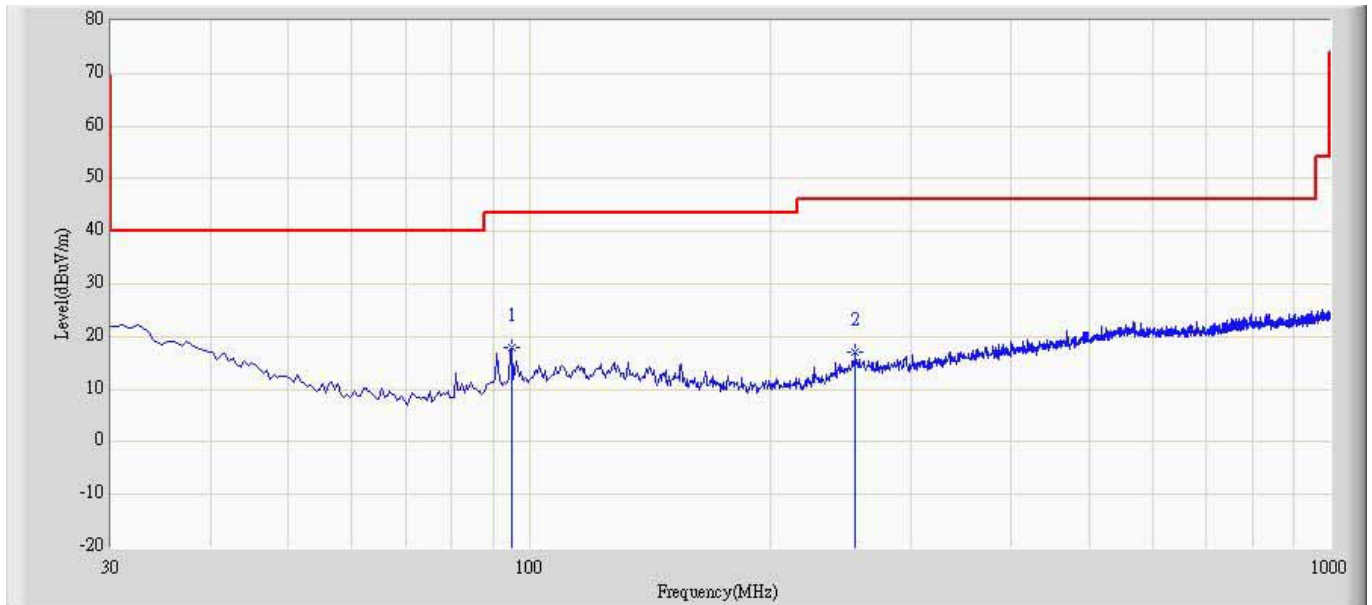
		V	17385.0	37.2	12.9	50.1	54(note3)	-3.9	PK
Chain 2	151	H	11514.5	48.4	6.6	55.0	54(note3)	1.0	PK
		H	17265.0	38.7	11.4	50.0	54(note3)	-4.0	PK
		V	11506.0	55.4	6.5	61.9	74.0	-12.1	PK
		V	11506.0	44.1	6.5	50.6	54.0	-3.4	AV
		V	17265.0	39.2	11.4	50.6	54(note3)	-3.4	PK
	159	H	11590.0	45.2	6.3	51.5	54(note3)	-2.6	PK
		H	17385.0	37.0	12.9	49.9	54(note3)	-4.1	PK
		V	11599.5	51.8	6.1	57.9	74.0	-16.1	PK
		V	11599.5	42.1	6.1	48.2	54.0	-5.8	AV
		V	17385.0	36.8	12.9	49.7	54(note3)	-4.3	PK
Chain 1+2	151	H	11514.5	48.0	6.6	54.6	54(note3)	0.6	PK
		H	17325.0	37.1	12.9	50.0	54(note3)	-4.0	PK
		V	11523.0	53.6	6.8	60.3	74.0	-13.7	PK
		V	11523.0	43.2	6.8	50.0	54.0	-4.0	AV
		V	17325.0	36.4	12.9	49.3	54(note3)	-4.7	PK
	159	H	11582.5	47.4	6.5	53.9	54(note3)	-0.1	PK
		H	17385.0	37.4	12.9	50.3	54(note3)	-3.7	PK
		V	11599.5	54.2	6.1	60.3	74.0	-13.7	PK
		V	11599.5	44.8	6.1	50.9	54.0	-3.1	AV
		V	17385.0	37.3	12.9	50.2	54(note3)	-3.8	PK

Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
4. Three times harmonic of PK value are at least 10dBm below the AV limits, therefore no data appear in the report.

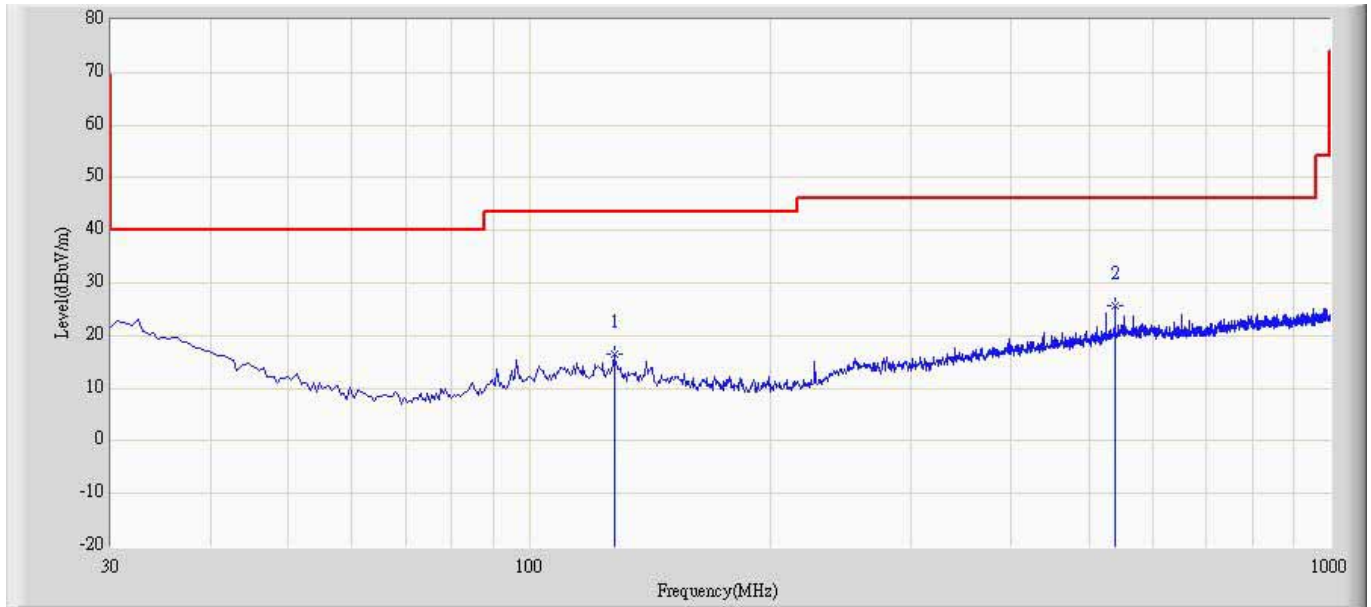
**The worst case of Radiated Emission below 1GHz:**

Engineer: Scott	
Site: AC2	Time: 2015/07/31 - 09:57
Limit: FCC_Part15.209_RE(3m)_ClassB	Margin: 0
Probe: AC2_10M(30-1000M)20150408	Polarity: Horizontal
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	94.970	17.997	7.478	-25.503	43.500	10.519	QP
2		255.413	16.899	2.378	-29.101	46.000	14.521	QP

Engineer: Scott	
Site: AC2	Time: 2015/07/31 - 09:57
Limit: FCC_Part15.209_RE(3m)_ClassB	Margin: 0
Probe: AC2_10M(30-1000M)20150408	Polarity: Vertical
EUT: IP-STB	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		127.485	16.547	3.612	-26.953	43.500	12.935	QP
2	*	539.250	25.601	4.689	-20.399	46.000	20.912	QP



## 5. Occupied Bandwidth

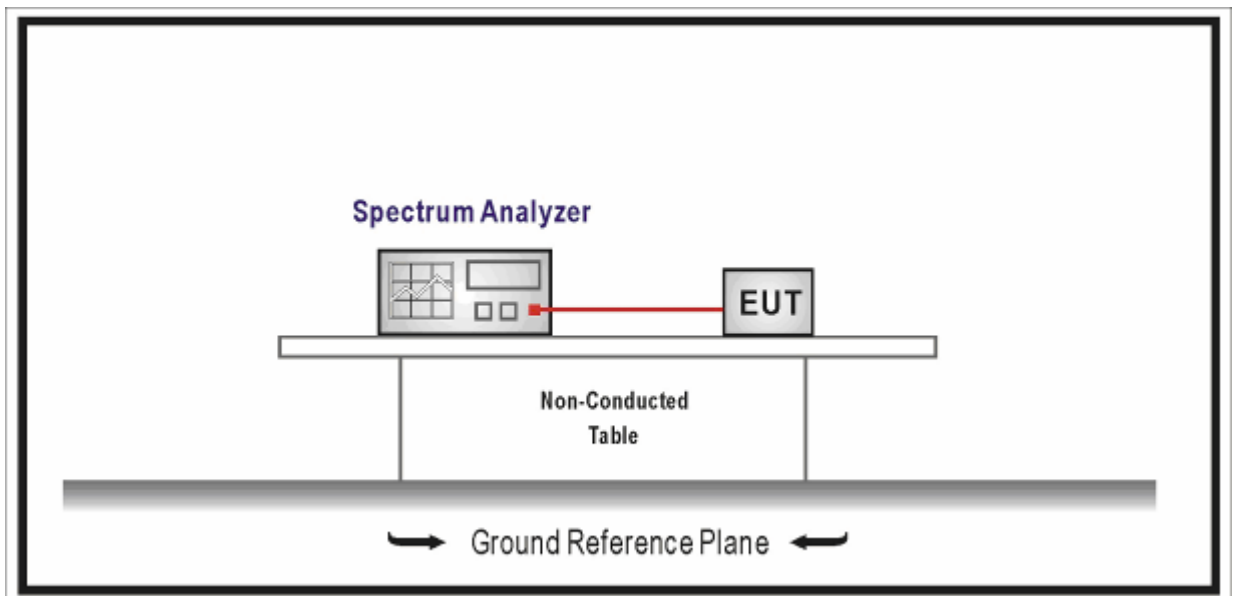
### 5.1. Test Equipment

Occupied Bandwidth / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal.Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2016.03.10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 5.2. Test Setup



### 5.3. Limit

N/A

## 5.4. Test Procedure

According to ANSI C63.4:2014& ANSI C63.10:2013&789033 D02 General UNII Test Procedures New Rules v01& FCC CFR Title 47 Part 15 Subpart E: 2015

### Emission Bandwidth

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

### 99% Occupied Bandwidth

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than  $[10 \log (OBW/RBW)]$  below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

## 5.5. Uncertainty

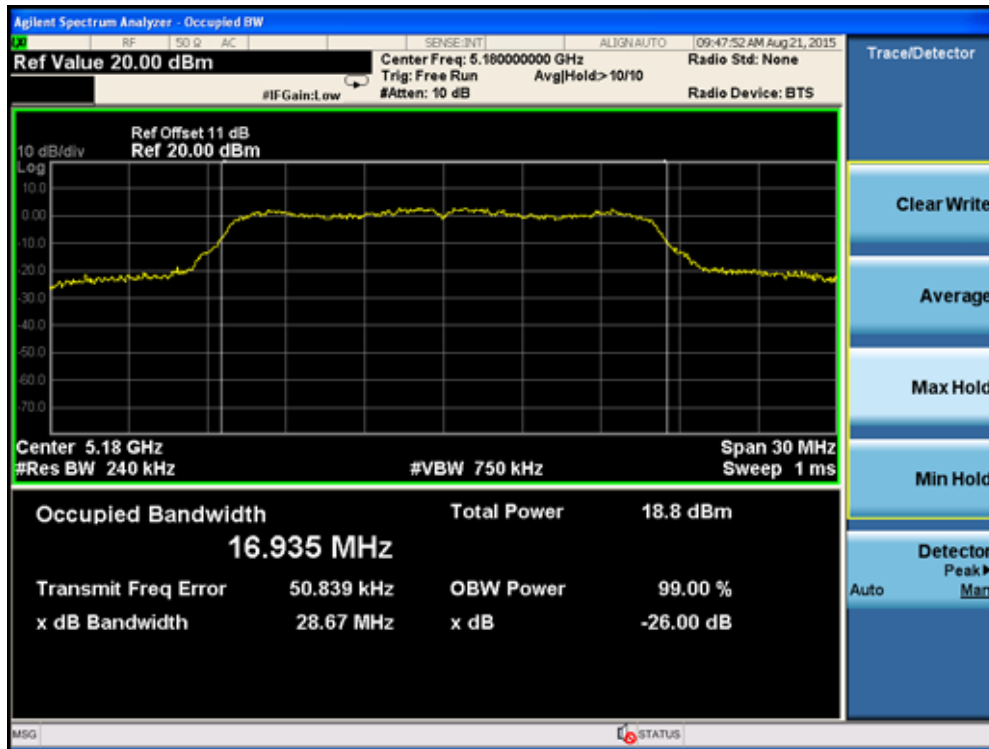
The measurement uncertainty is defined as  $\pm 1$  kHz

**5.6. Test Result**

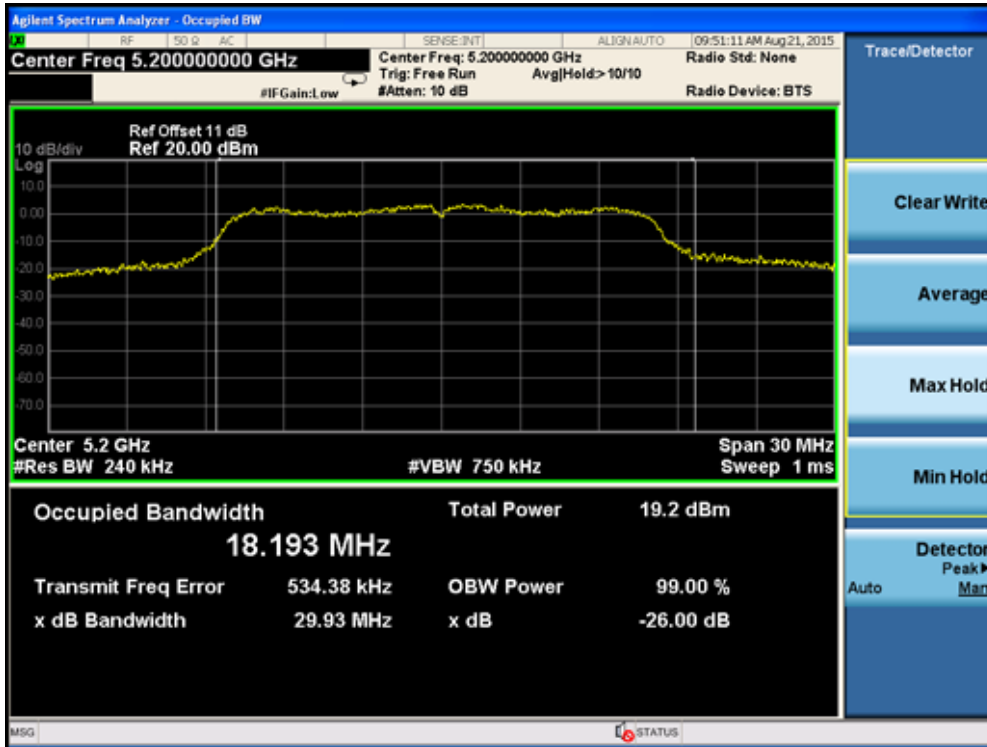
Product	:	IP-STB
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11a

Channel No.	Frequency (MHz)	26dB Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180	28.670	16.935
40	5200	29.930	18.193
48	5240	29.960	17.763

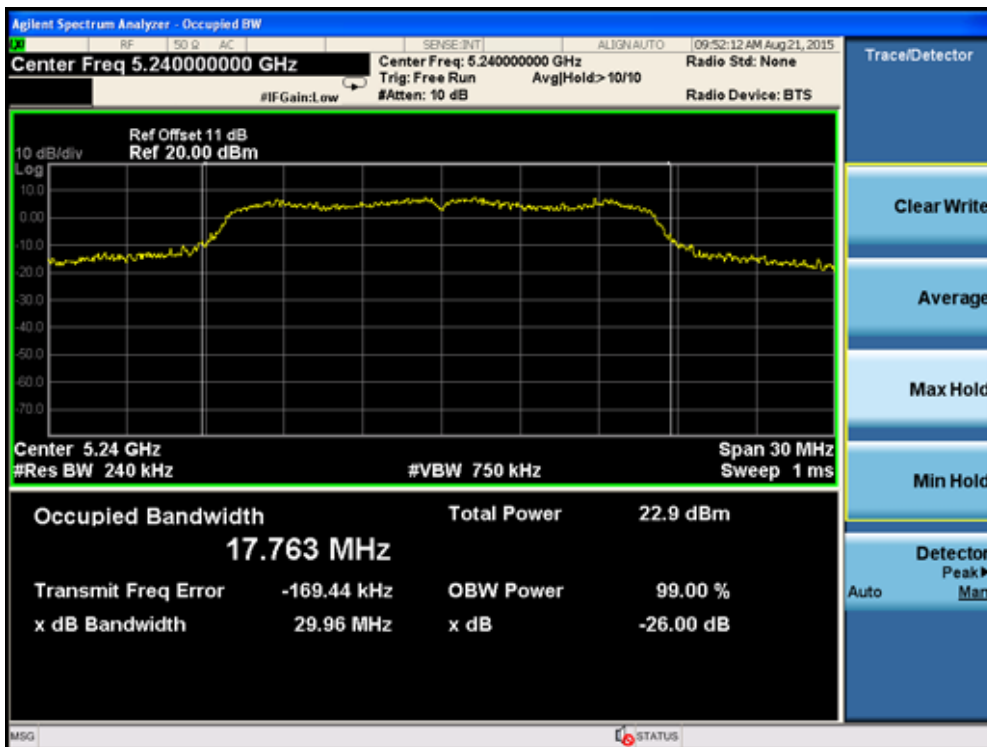
**Channel 36 (5180MHz)**



### Channel 40 (5200MHz)



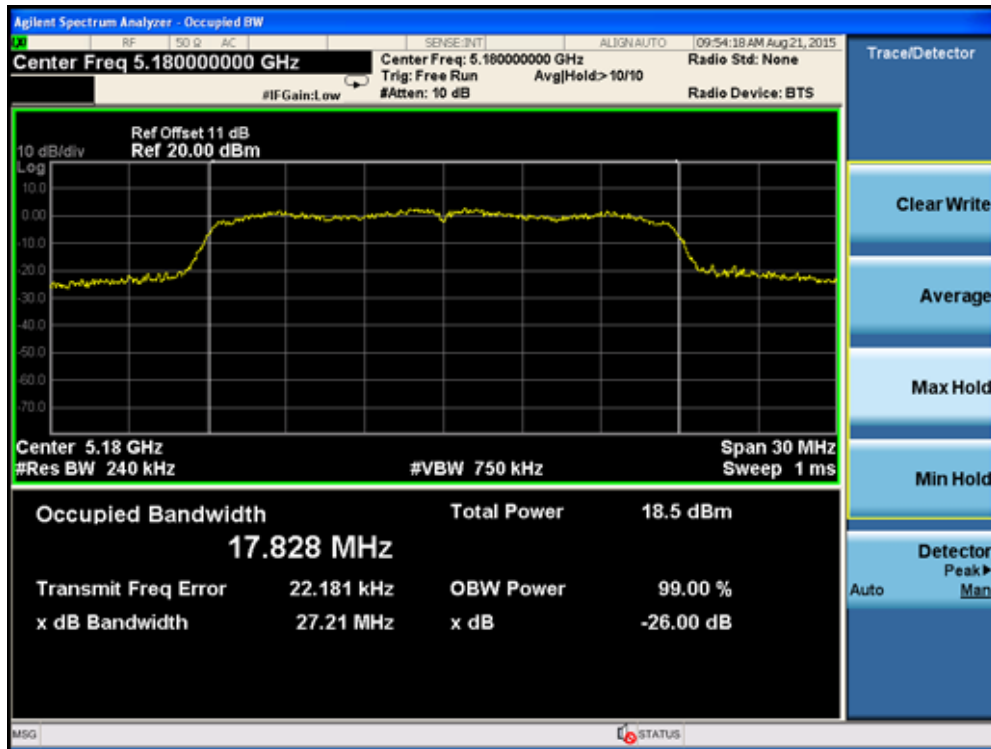
### Channel 48 (5240MHz)



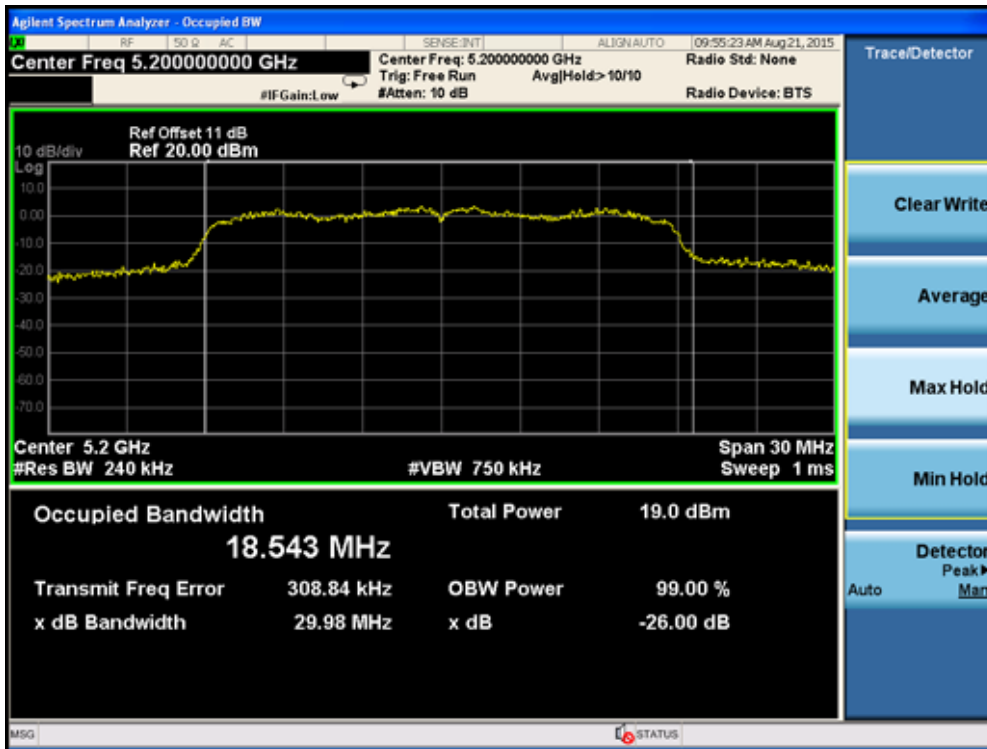
Product	:	IP-STB
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11n(20MHz)

Channel No.	Frequency (MHz)	26dB Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180	27.210	17.828
40	5200	29.980	18.543
48	5240	26.260	17.699

**Channel 36 (5180MHz)**



### Channel 40 (5200MHz)



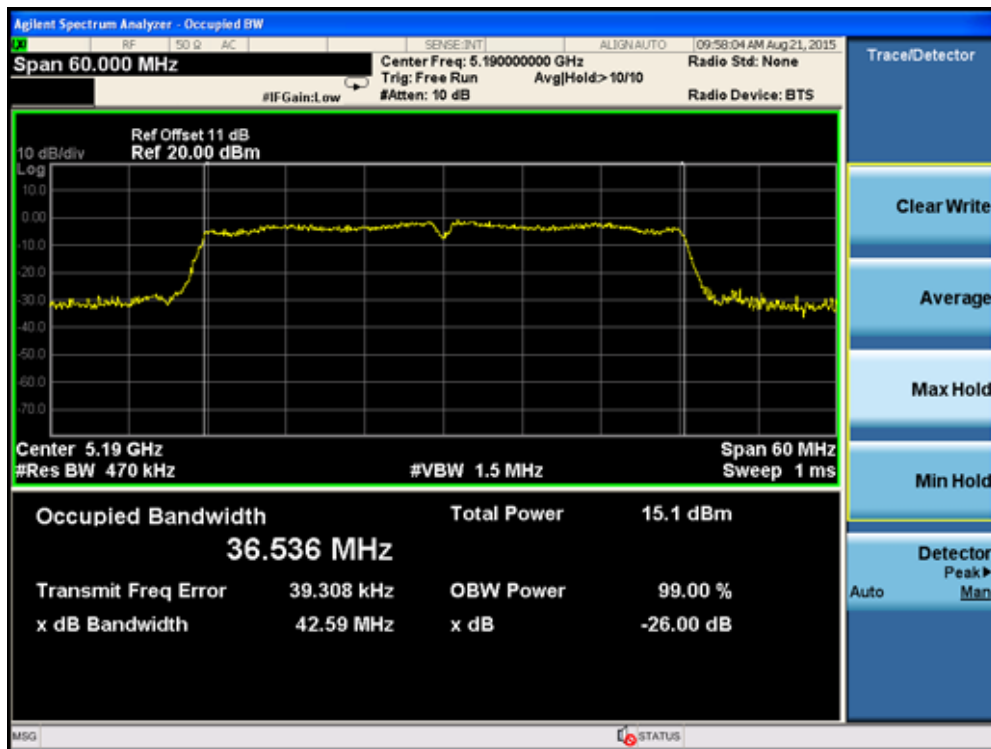
### Channel 48 (5240MHz)



Product	:	IP-STB
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n (40MHz)

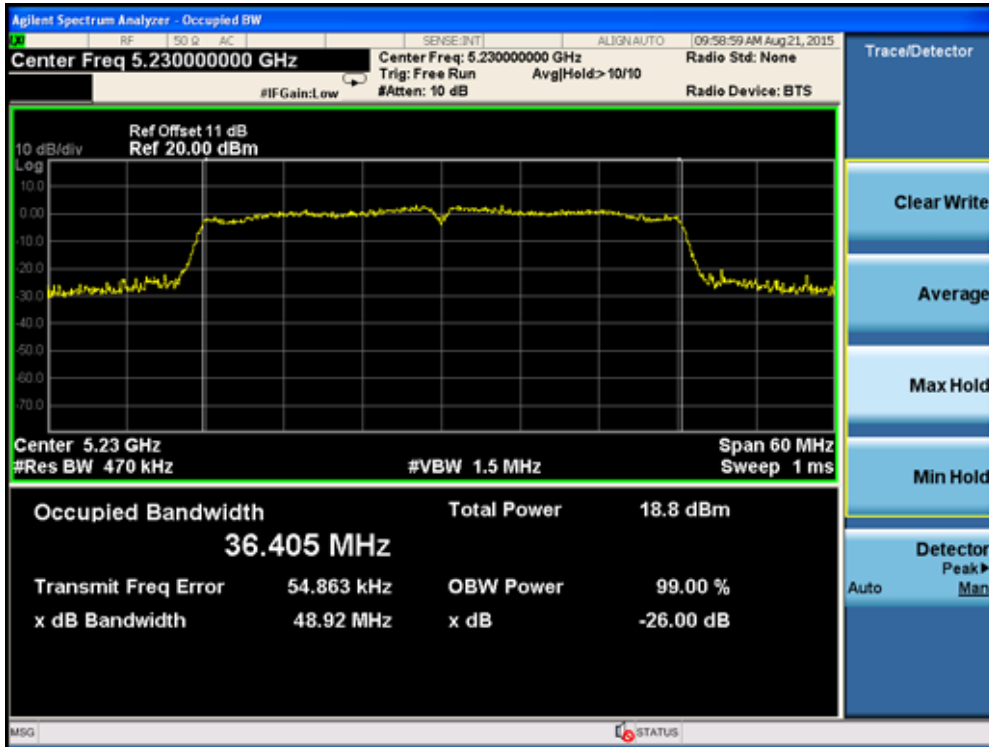
Channel No.	Frequency (MHz)	26dB Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190	42.590	36.536
46	5230	48.920	36.405

### Channel 38 (5190MHz)





**Channel 46 (5230MHz)**



## 6. 6dB Occupied Bandwidth

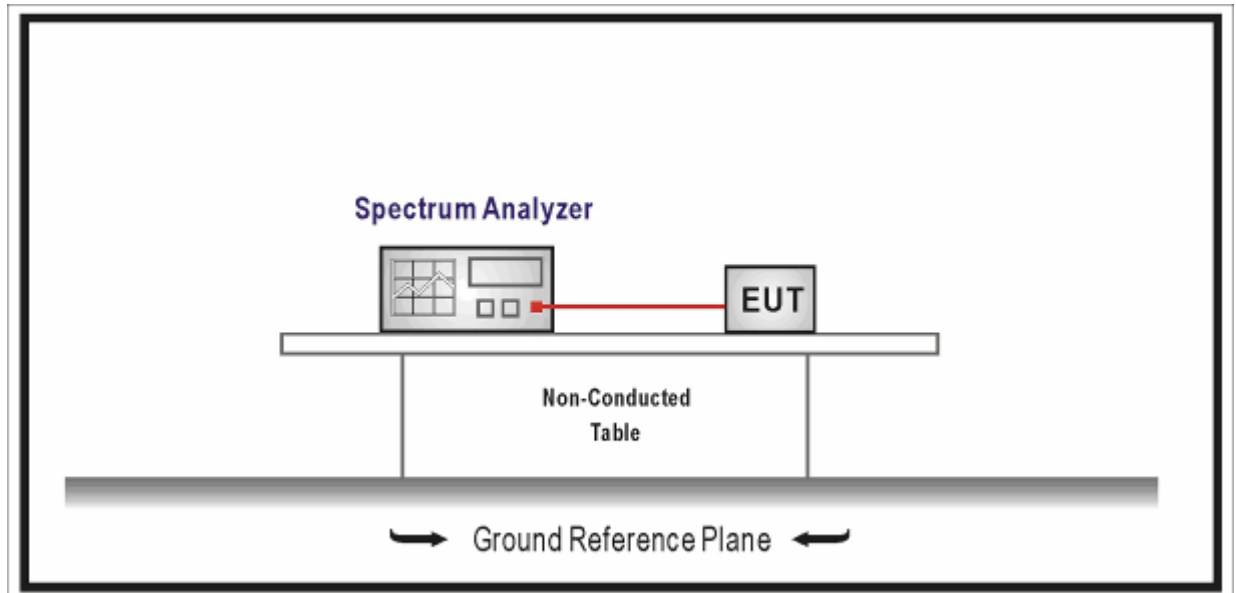
### 6.1. Test Equipment

Occupied Bandwidth / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2016.03.10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 6.2. Test Setup



### 6.3. Limit

For FCC&IC

The minimum 6 dB bandwidth shall be 500 kHz.

### 6.4. Test Procedure

According to ANSI C63.4:2014& ANSI C63.10:2013&789033 D02 General UNII Test Procedures New Rules v01& FCC CFR Title 47 Part 15 Subpart E: 2014& Industry Canada RSS-Gen Issue 4 Industry Canada RSS-247 Issue 1

- a) Set RBW = in the range of 1% to 5% of the OBW.
- b) Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Use the -6dBm function of the instrument (if available) and report the measured bandwidth.

## 6.5. Uncertainty

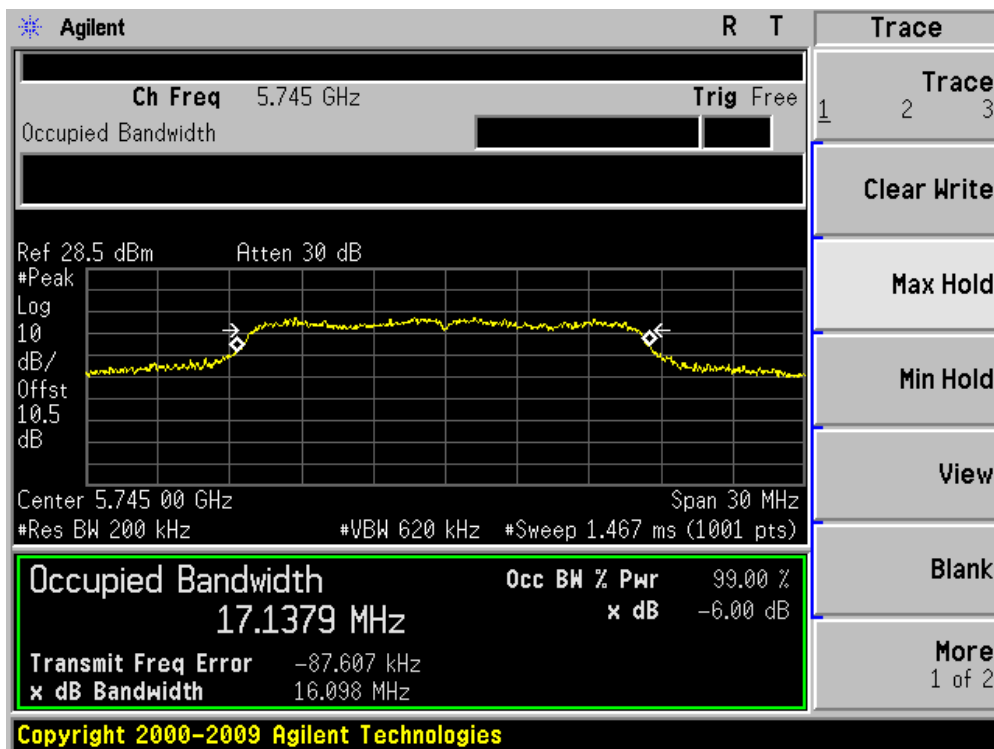
The measurement uncertainty is defined as  $\pm 1$  kHz

**6.6. Test Result**

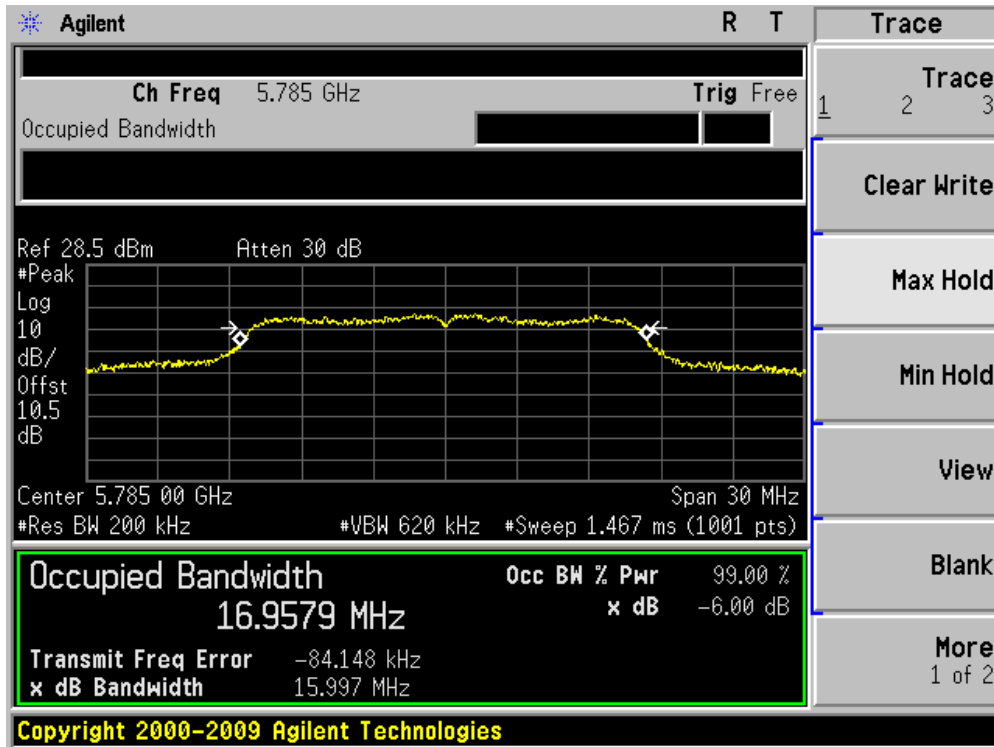
Product	:	IP-STB
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11a

Channel No.	Frequency (MHz)	6dB Occupied Bandwidth (MHz)
149	5745	16.098
157	5785	15.997
165	5825	15.948

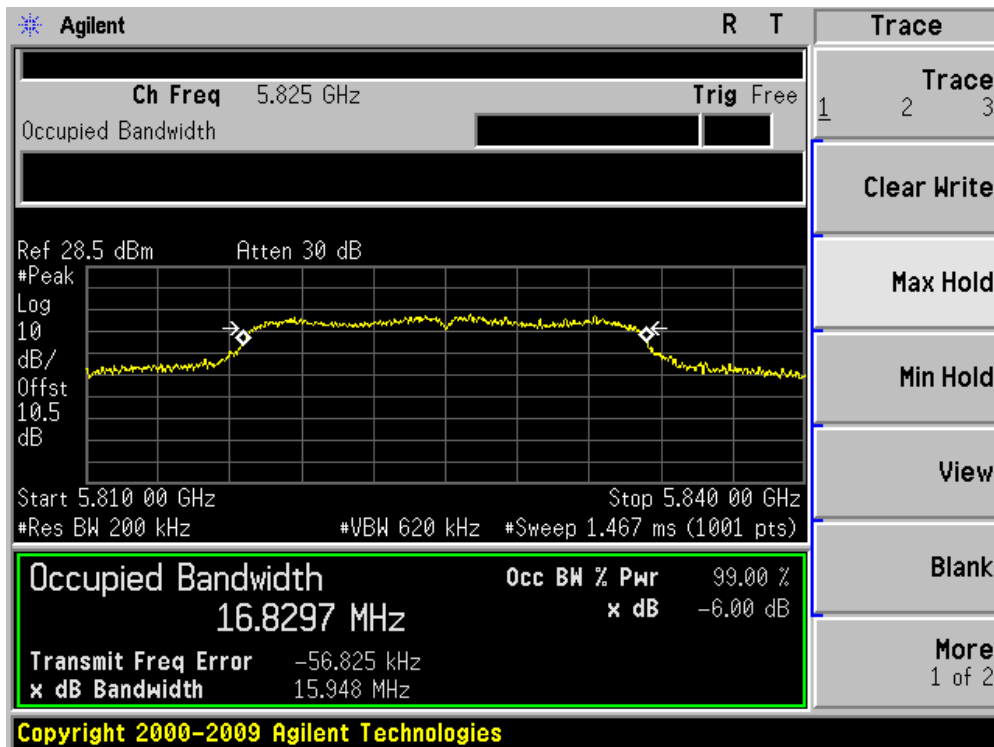
**Channel 149 (5745MHz)**



### Channel 157(5785MHz)



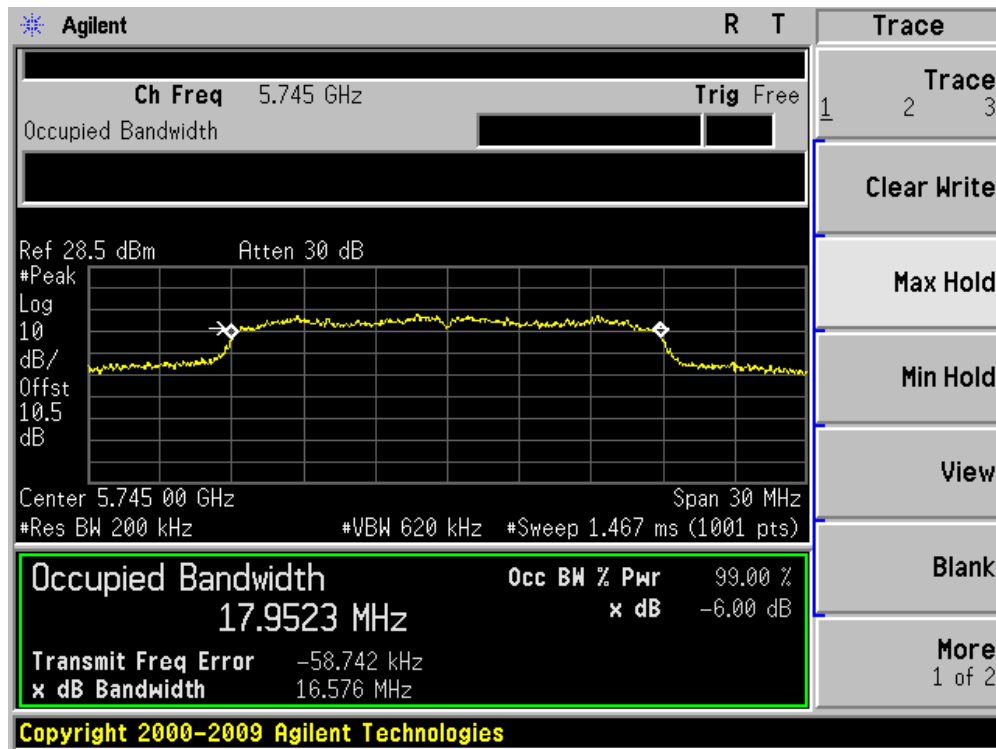
### Channel 165 (5825MHz)



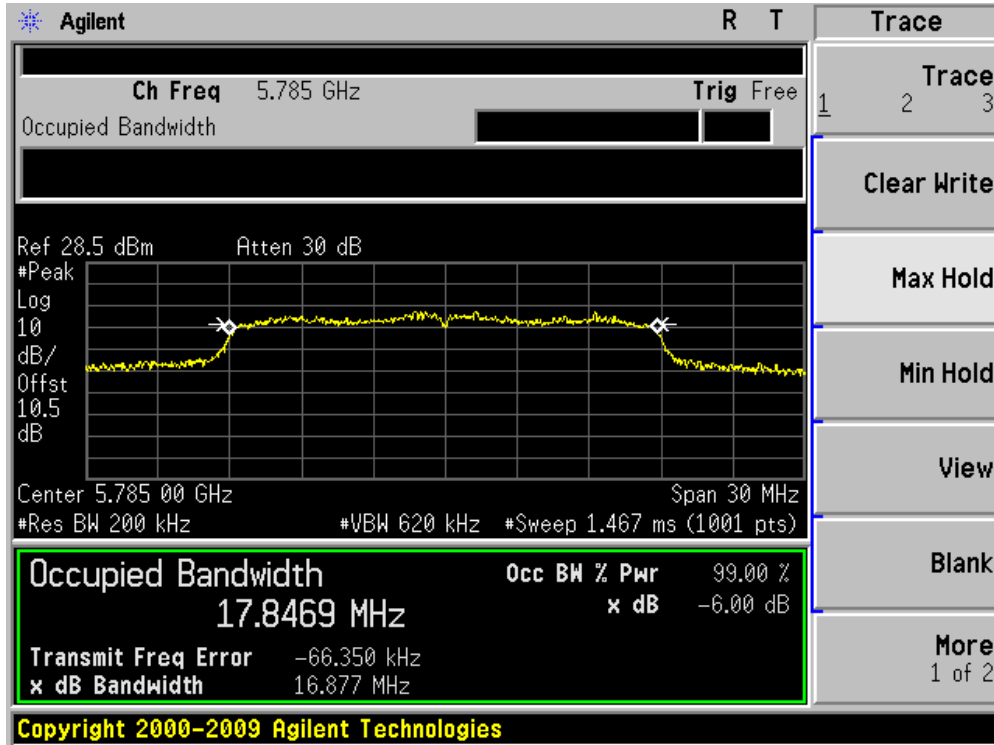
Product	: IP-STB
Test Item	: Occupied Bandwidth
Test Site	: TR-8
Test Mode	: Mode 2: Transmit by 802.11n(20MHz)

Channel No.	Frequency (MHz)	6dB Occupied Bandwidth (MHz)
149	5745	16.576
157	5785	16.877
165	5825	16.498

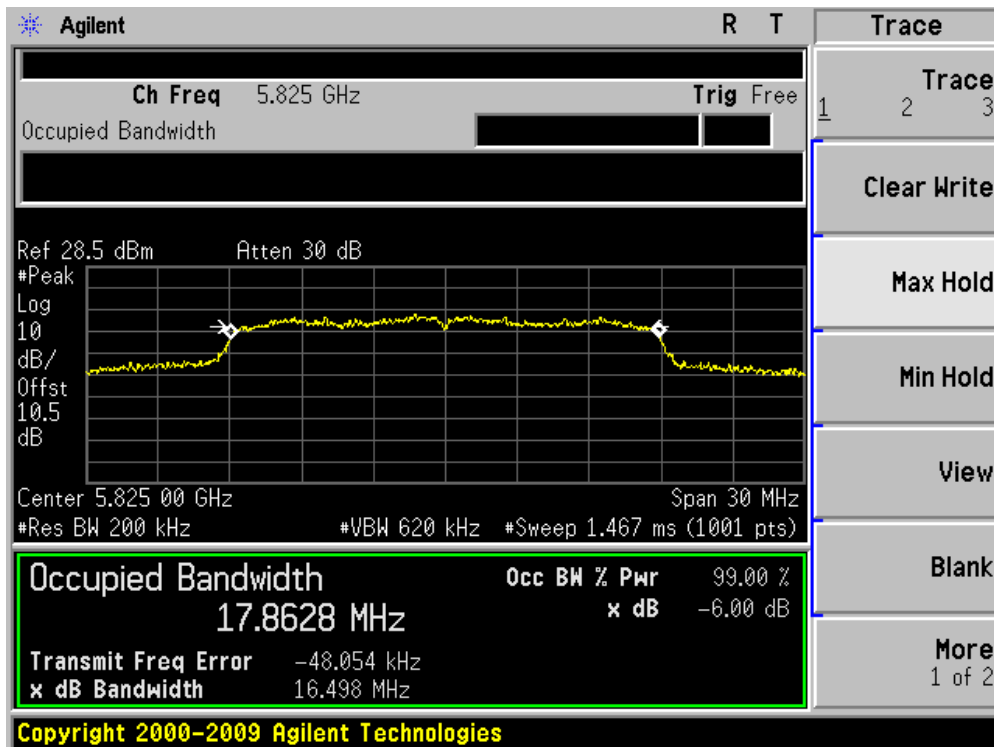
**Channel 149 (5745MHz)**



### Channel 157(5785MHz)



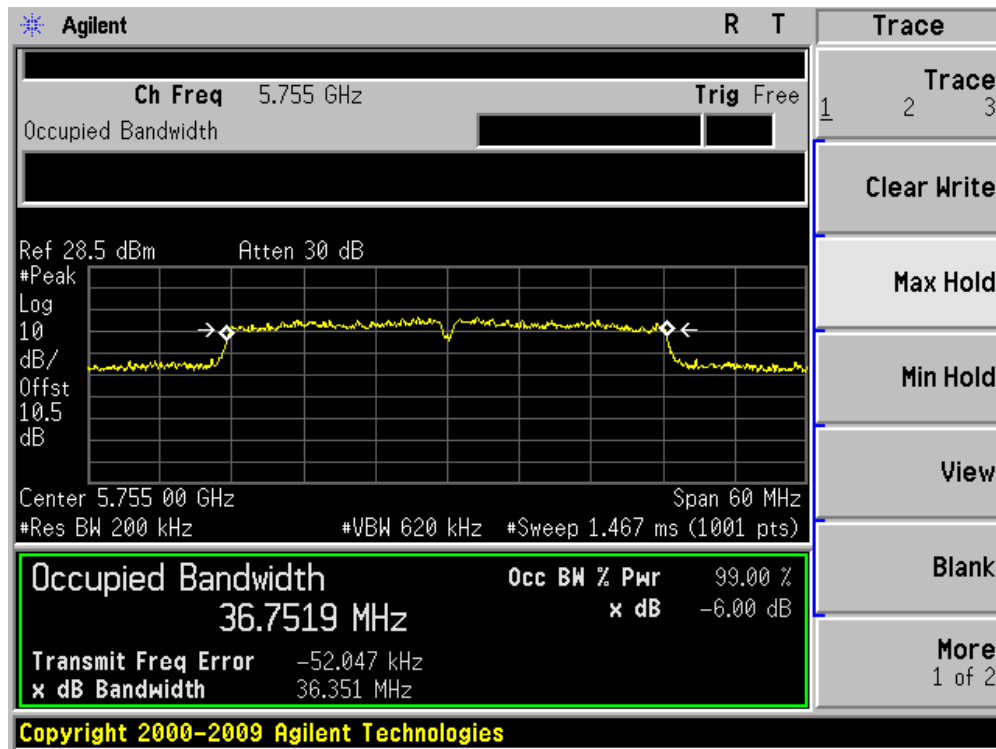
### Channel 165 (5825MHz)



Product	: IP-STB
Test Item	: Occupied Bandwidth
Test Site	: TR-8
Test Mode	: Mode 3: Transmit by 802.11n(40MHz)

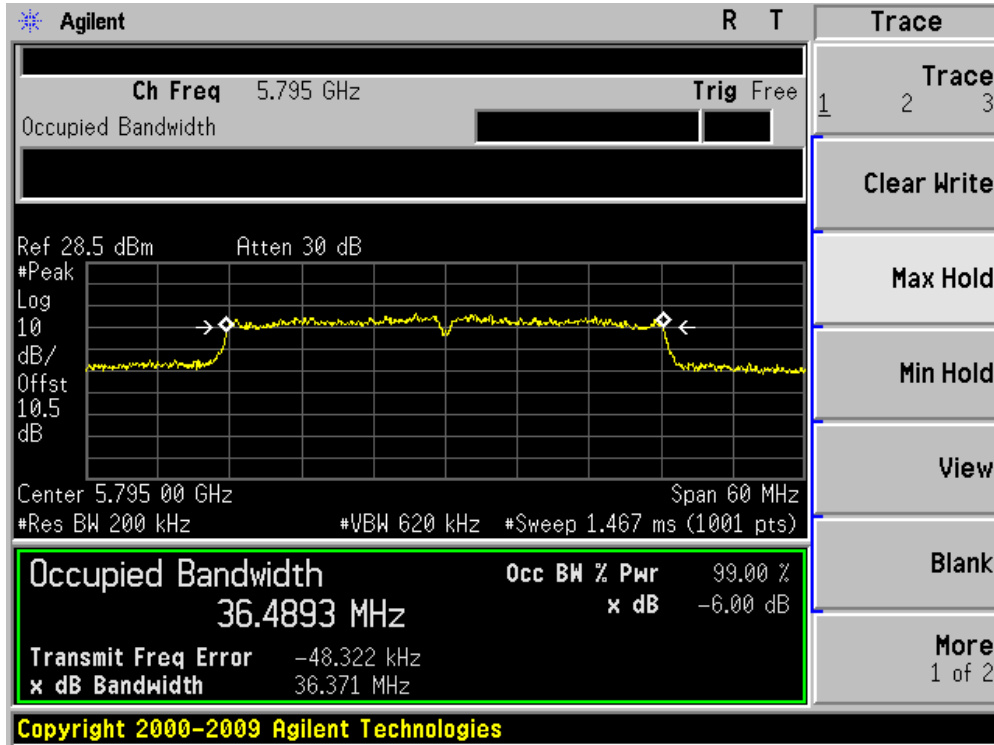
Channel No.	Frequency (MHz)	6dB Occupied Bandwidth (MHz)
151	5755	36.351
159	5795	36.371

**Channel 151 (5755MHz)**





**Channel 159(5795MHz)**



## 7. Power Output

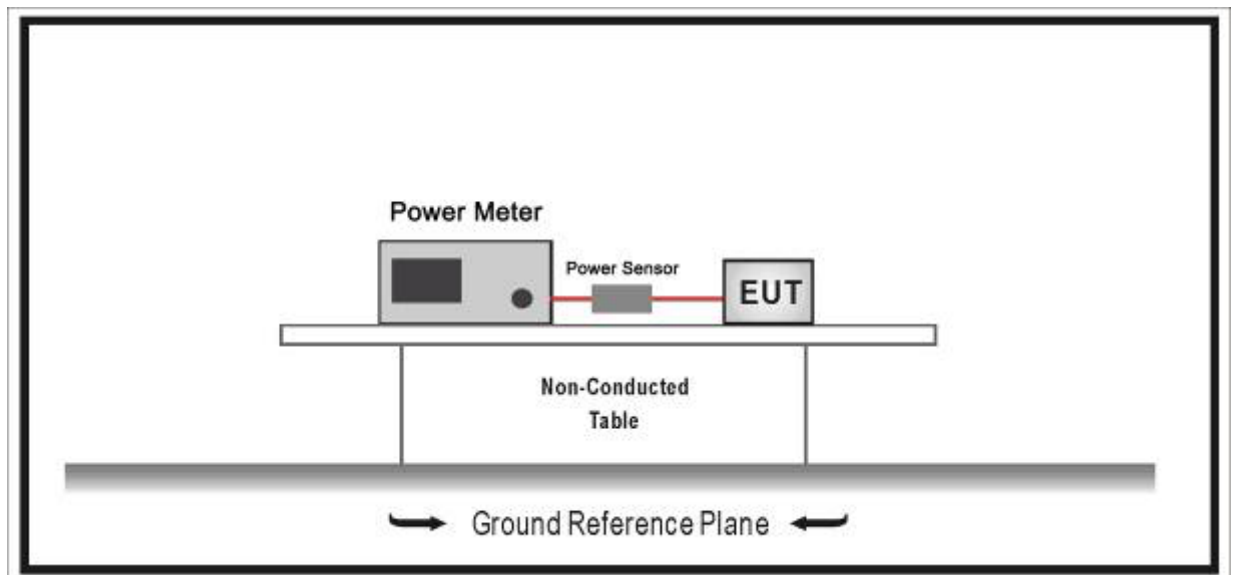
### 7.1. Test Equipment

Power Output / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2016.03.10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 7.2. Test Setup



### 7.3. Limit

#### For FCC

- For the band 5.15-5.25 GHz.

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

dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

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

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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

- For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the peak

power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

#### 7.4. Test Procedure

According to ANSI C63.4:2014& ANSI C63.10:2013&789033 D02 General UNII Test Procedures New Rules v01

Use the wideband power meter to test peak power and record the result.

#### 7.5. Uncertainty

The measurement uncertainty is defined as  $\pm 1.27$  dB

## 7.6. Test Result

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (blue marker) for final test of each channel.

MCS Index for 802.11n	Spatial Streams	Data Rate (Mbps)				
		802.11a	20MHz Bandwidth		40MHz Bandwidth	
			800ns GI	400ns GI	800ns GI	400ns GI
0	1	6	6.5	7.2	13.5	15.0
1	1	9	13.0	14.4	27.0	30.0
2	1	12	19.5	21.7	40.5	45.0
3	1	18	26.0	28.9	54.0	60.0
4	1	24	39.0	43.3	81.0	90.0
5	1	36	52.0	57.8	108.0	120.0
6	1	48	58.5	65.0	121.5	135.0
7	1	54	65.0	72.2	135.0	150.0
8	2	---	13.0	14.4	27.0	30.0
9	2	---	26.0	28.9	54.0	60.0
10	2	---	39.0	43.3	81.0	90.0
11	2	---	52.0	57.8	108.0	120.0
12	2	---	78.0	86.7	162.0	180.0
13	2	---	104.0	115.6	216.0	240.0
14	2	---	117.0	130.0	243.0	270.0
15	2	---	130.0	144.0	270.0	300.0

Power output at various data rates:

Test Mode	Bandwidth	Frequency (MHz)	Channel	Data Rate	Peak Power (dBm)
802.11a(Chain 1)	20	5200	40	6	13.93
				24	13.87
				54	13.84
802.11n(Chain 1)	20	5200	40	HT0	14.01
				HT4	13.96
				HT7	13.85
802.11n(Chain 1)	40	5190	38	HT0	7.34
				HT4	7.25
				HT7	7.23

Product	:	IP-STB
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11a (Chain 1)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Total Power (dBm)	Limit (dBm)	Result
36	5180	10.72	10.72	24.00	Pass
40	5200	13.93	13.93	24.00	Pass
48	5240	15.95	15.95	24.00	Pass
149	5745	15.32	15.32	30.00	Pass
157	5785	14.66	14.66	30.00	Pass
165	5825	15.09	15.09	30.00	Pass

Product	:	IP-STB
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11n(20MHz) (Chain 1)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Total Power (dBm)	Limit (dBm)	Result
36	5180	10.86	10.86	24.00	Pass
40	5200	14.01	14.01	24.00	Pass
48	5240	12.51	12.51	24.00	Pass
149	5745	15.14	15.14	30.00	Pass
157	5785	14.62	14.62	30.00	Pass
165	5825	15.05	15.05	30.00	Pass

Product	:	IP-STB
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(40MHz) (Chain 1)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Duty Cycle (%)	Total Power (dBm)	Limit (dBm)	Result
38	5190	7.34	95.8	7.53	24.00	Pass
46	5230	11.96	95.8	12.15	24.00	Pass
151	5755	15.23	95.8	15.42	30.00	Pass
159	5795	14.81	95.8	15.00	30.00	Pass

Note1: When EUT duty cycle < 98%, the total PSD = Reading Level + 10\*log(1/duty cycle)



Product	:	IP-STB
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11a (Chain 2)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Total Power (dBm)	Limit (dBm)	Result
36	5180	10.33	10.33	24.00	Pass
40	5200	11.42	11.42	24.00	Pass
48	5240	16.50	16.50	24.00	Pass
149	5745	13.37	13.37	30.00	Pass
157	5785	13.11	13.11	30.00	Pass
165	5825	13.79	13.79	30.00	Pass

Product	:	IP-STB
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11n(20MHz) (Chain 2)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Total Power (dBm)	Limit (dBm)	Result
36	5180	10.59	10.59	24.00	Pass
40	5200	11.47	11.47	24.00	Pass
48	5240	14.22	14.22	24.00	Pass
149	5745	13.47	13.47	30.00	Pass
157	5785	13.23	13.23	30.00	Pass
165	5825	13.81	13.81	30.00	Pass

Product	:	IP-STB
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(40MHz) (Chain 2)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Duty Cycle (%)	Total Power (dBm)	Limit (dBm)	Result
38	5190	8.73	95.8	8.92	24.00	Pass
46	5230	12.89	95.8	13.08	24.00	Pass
151	5755	13.41	95.8	13.60	30.00	Pass
159	5795	13.26	95.8	13.45	30.00	Pass

Note1: When EUT duty cycle < 98%, the total PSD = Reading Level + 10\*log(1/duty cycle)

Product	:	IP-STB
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11n(20MHz) (Chain 1+2)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Total Power (dBm)	Limit (dBm)	Result
		Chain 1+Chain 2			
36	5180	12.26	12.26	24.00	Pass
40	5200	15.16	15.16	24.00	Pass
48	5240	16.28	16.28	24.00	Pass
149	5745	16.72	16.72	30.00	Pass
157	5785	15.73	15.73	30.00	Pass
165	5825	16.32	16.32	30.00	Pass

Product	:	IP-STB
Test Item	:	Power Output
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(40MHz) (Chain 1+2)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Duty Cycle (%)	Total Power (dBm)	Limit (dBm)	Result
		Chain 1+Chain 2				
38	5190	10.08	95.8	10.27	24.00	Pass
46	5230	15.33	95.8	15.52	24.00	Pass
151	5755	15.84	95.8	16.03	30.00	Pass
159	5795	15.56	95.8	15.75	30.00	Pass

Note1: When EUT duty cycle < 98%, the total PSD = Reading Level + 10\*log(1/duty cycle)

## 8. Peak Power Spectral Density

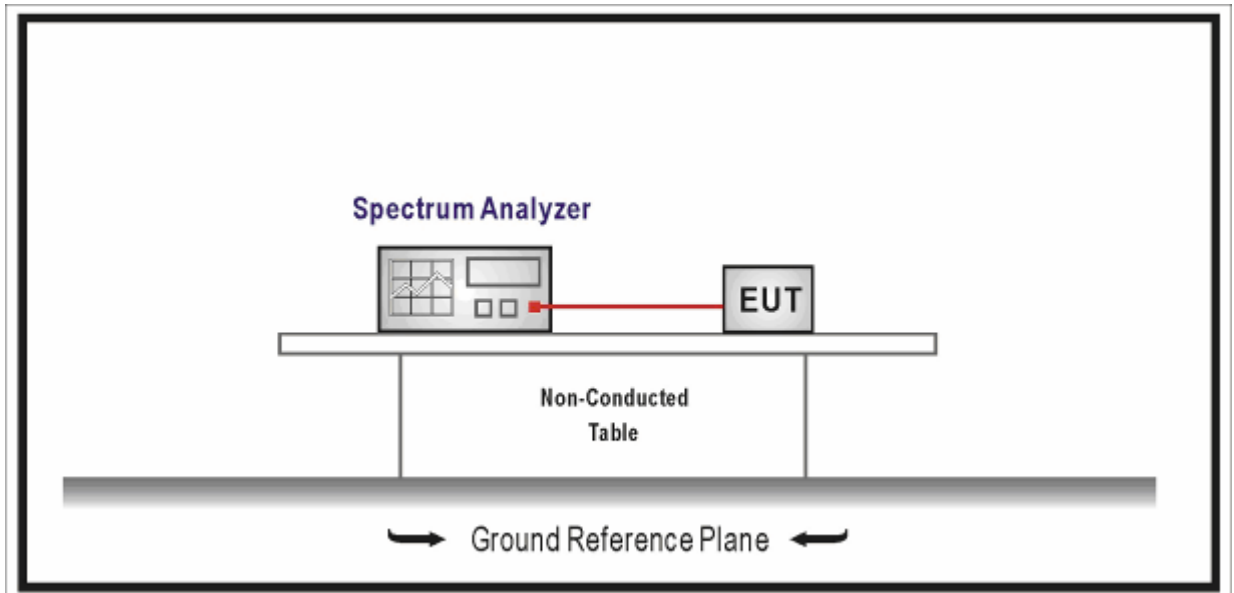
### 8.1. Test Equipment

Peak Power Spectral Density / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2016.03.10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016.04.09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 8.2. Test Setup



### 8.3. Limit

For FCC

- For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted

output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

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

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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

- For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm +

10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

#### 8.4. Test Procedure

According to ANSI C63.4:2014& ANSI C63.10:2013&789033 D02 General UNII Test Procedures New Rules v01.

Set span to encompass the entire emission bandwidth (EBW) of the signal.

For 5150-5725MHz

- a) Set RBW = 1 MHz.
- b) Set VBW  $\geq$  3 MHz.
- c) Sweep time = auto.
- d) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

For 5725-5875MHz

- e) Set RBW=510KHz
- f) VBW $\geq$ 3RBW
- g) Sweep time=auto
- h) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

- i) Scale the observed power level to an equivalent value in 500 kHz by adjusting (increase) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(500 \text{ kHz}/100 \text{ kHz}) = 6.98 \text{ dB}$ .

## **8.5. Uncertainty**

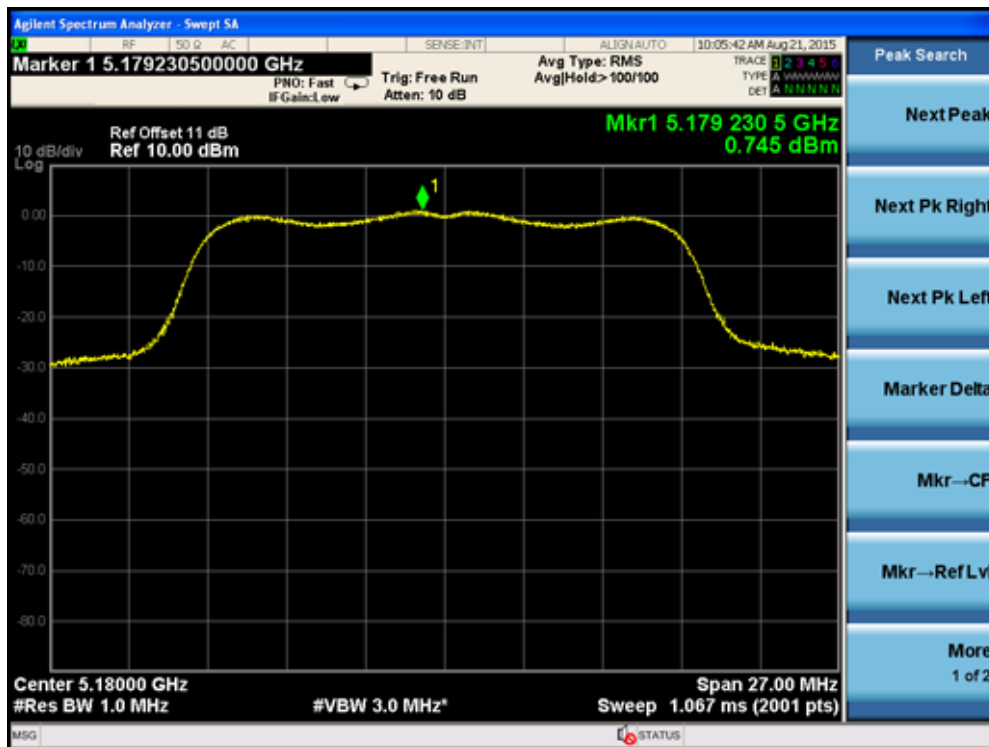
The measurement uncertainty is defined as  $\pm 1.27 \text{ dB}$

### 8.6. Test Result

Product	:	IP-STB
Test Item	:	Peak Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11a (Chain 1)

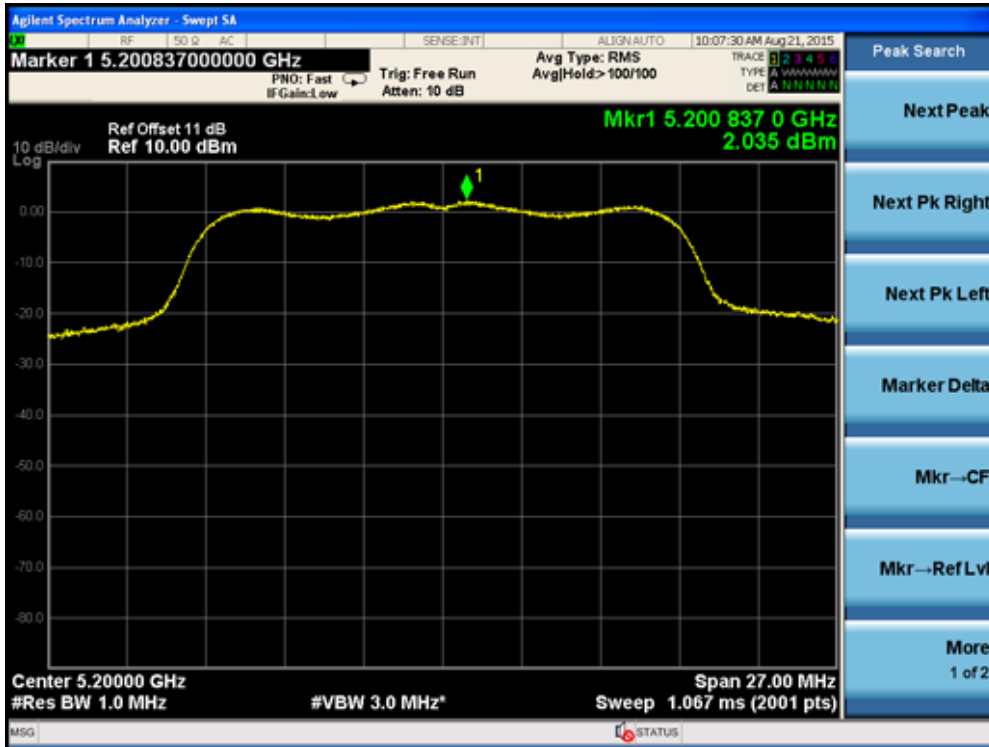
Channel No.	Frequency (MHz)	Measurement PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	0.745	0.745	11	Pass
40	5200	2.035	2.035	11	Pass
48	5240	5.327	5.327	11	Pass
149	5745	4.570	4.570	30	Pass
157	5785	4.085	4.085	30	Pass
165	5825	4.402	4.402	30	Pass

**Channel 36 (5180MHz)**

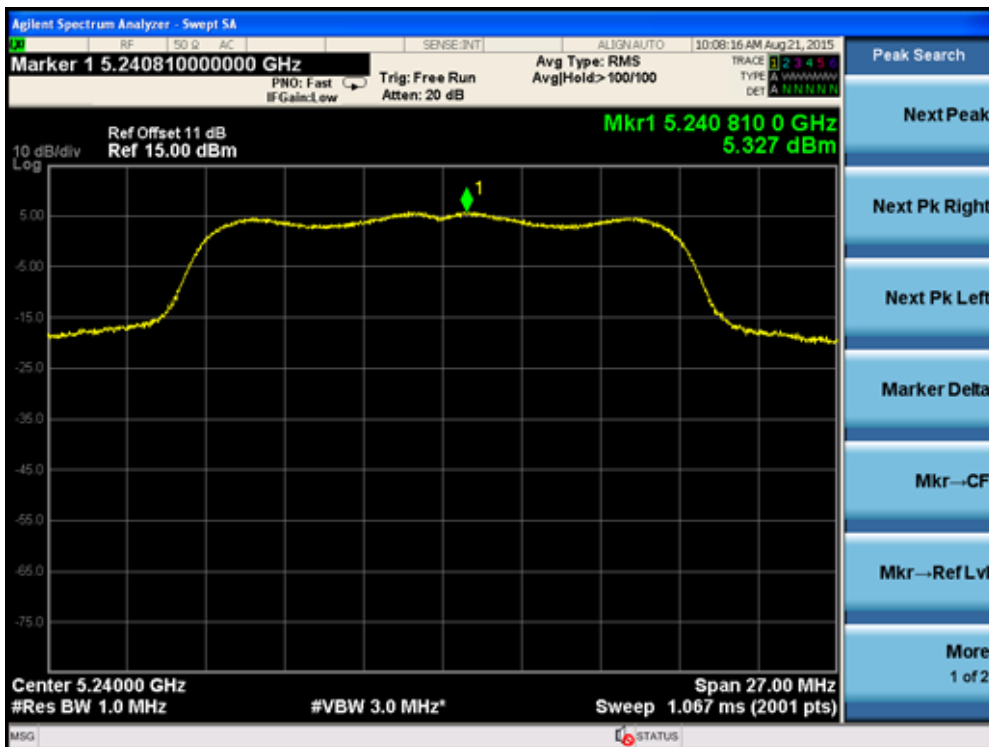




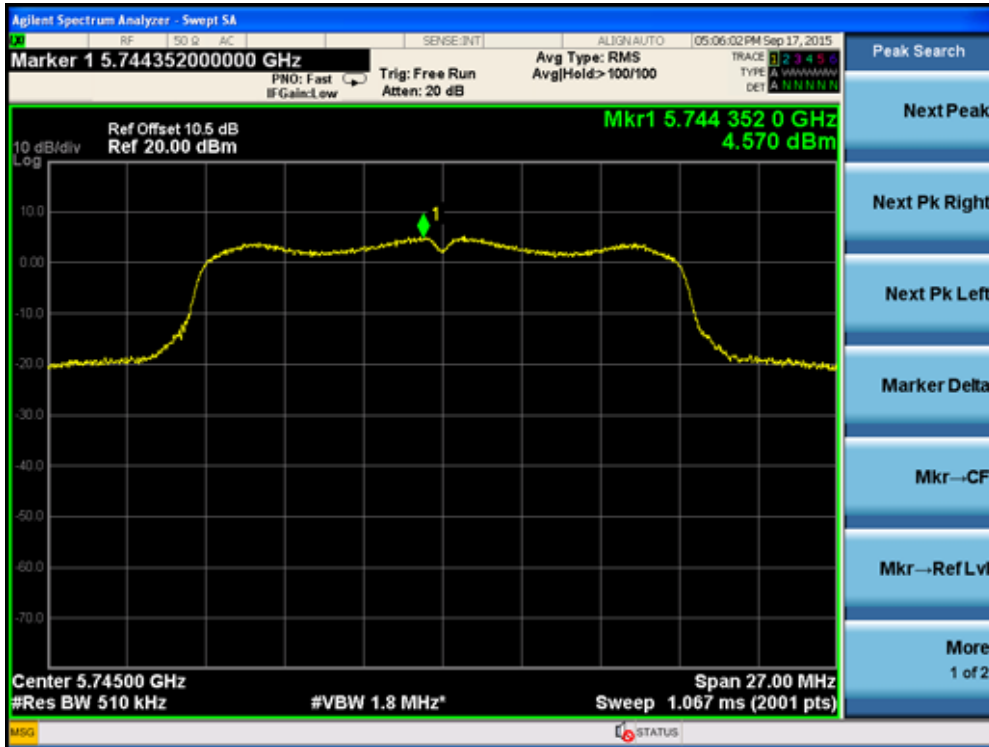
### Channel 40 (5200MHz)



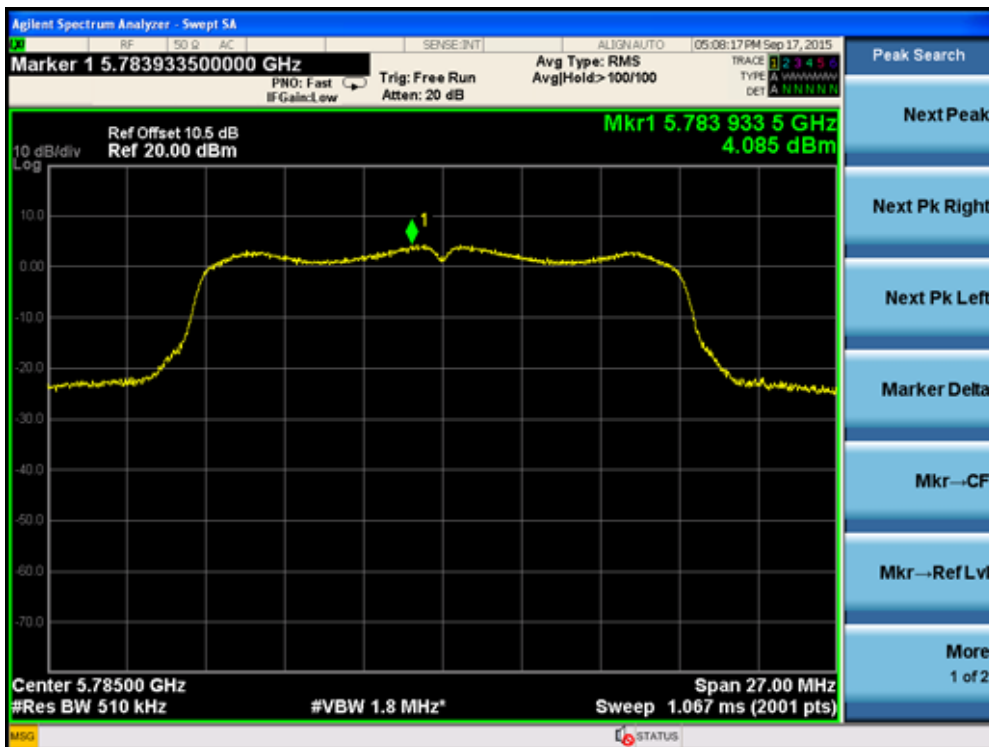
### Channel 48 (5240MHz)



### Channel 149 (5745MHz)



### Channel 157(5785MHz)



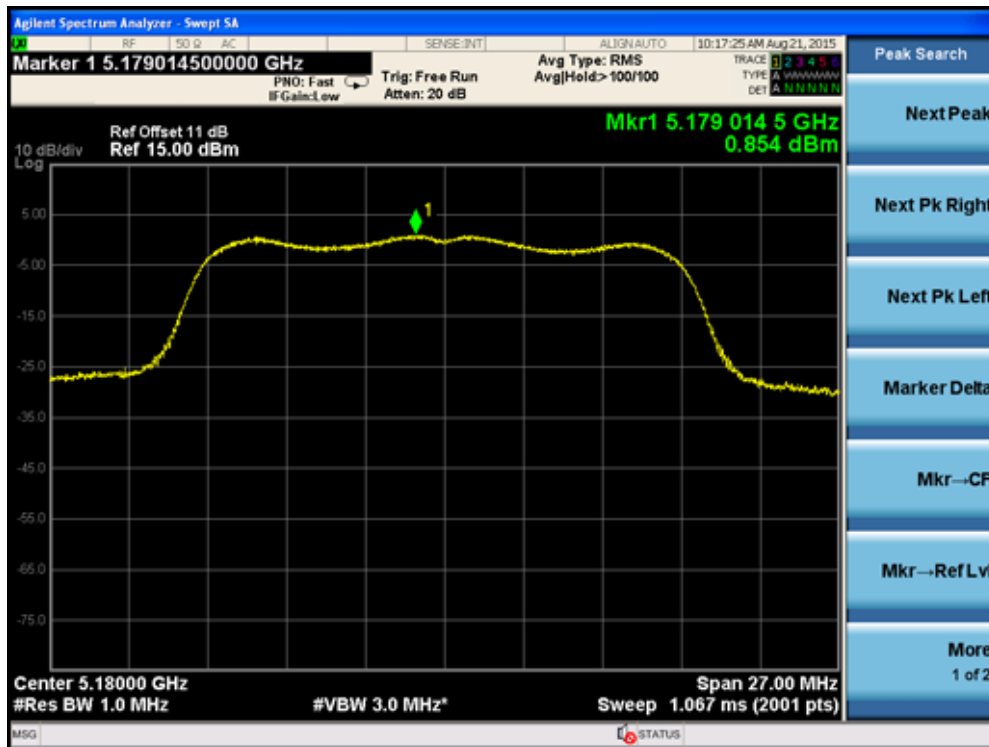
### Channel 165 (5825MHz)



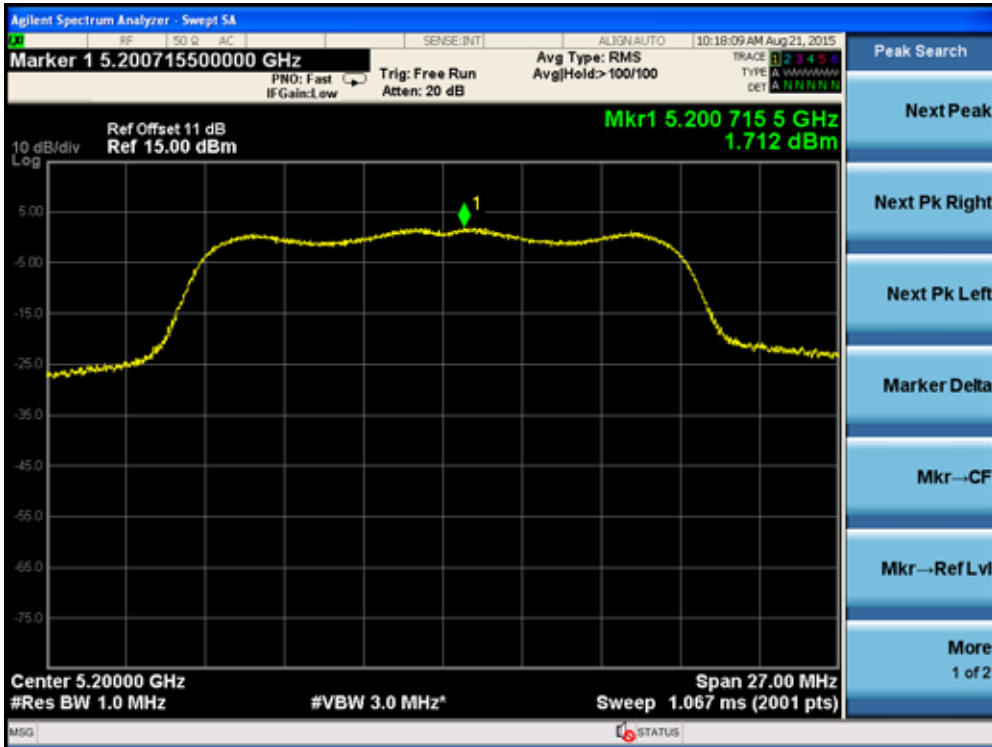
Product	:	IP-STB
Test Item	:	Peak Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11a (Chain 2)

Channel No.	Frequency (MHz)	Measurement PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	0.854	0.854	11	Pass
40	5200	1.712	1.712	11	Pass
48	5240	6.620	6.620	11	Pass
149	5745	3.834	3.834	30	Pass
157	5785	2.957	2.957	30	Pass
165	5825	1.163	1.163	30	Pass

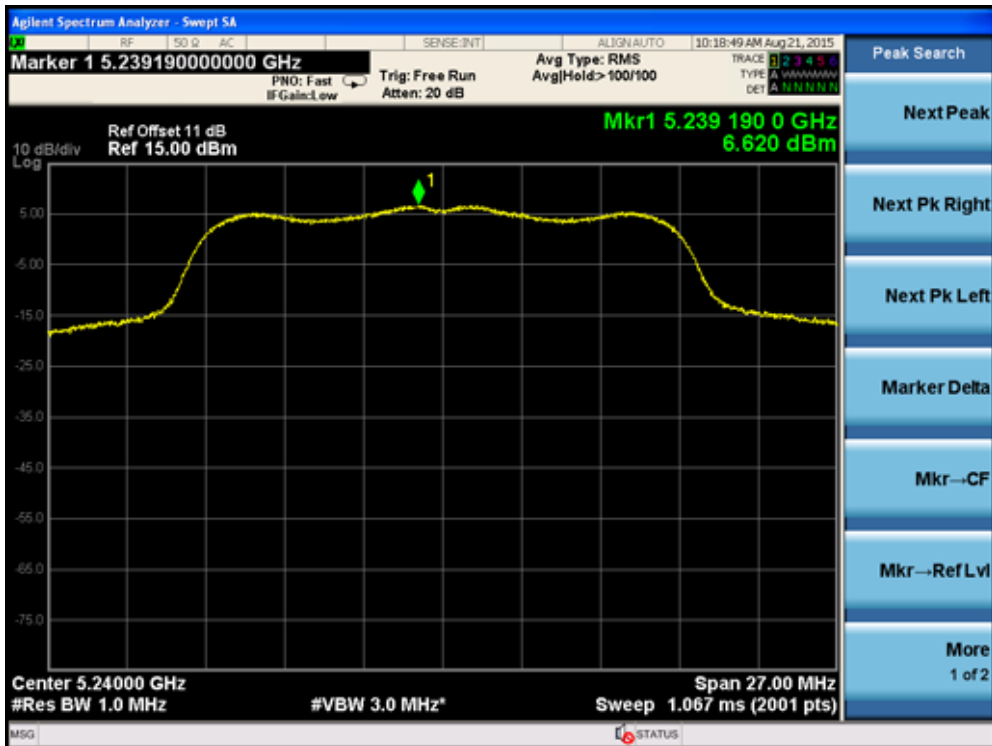
Channel 36 (5180MHz)



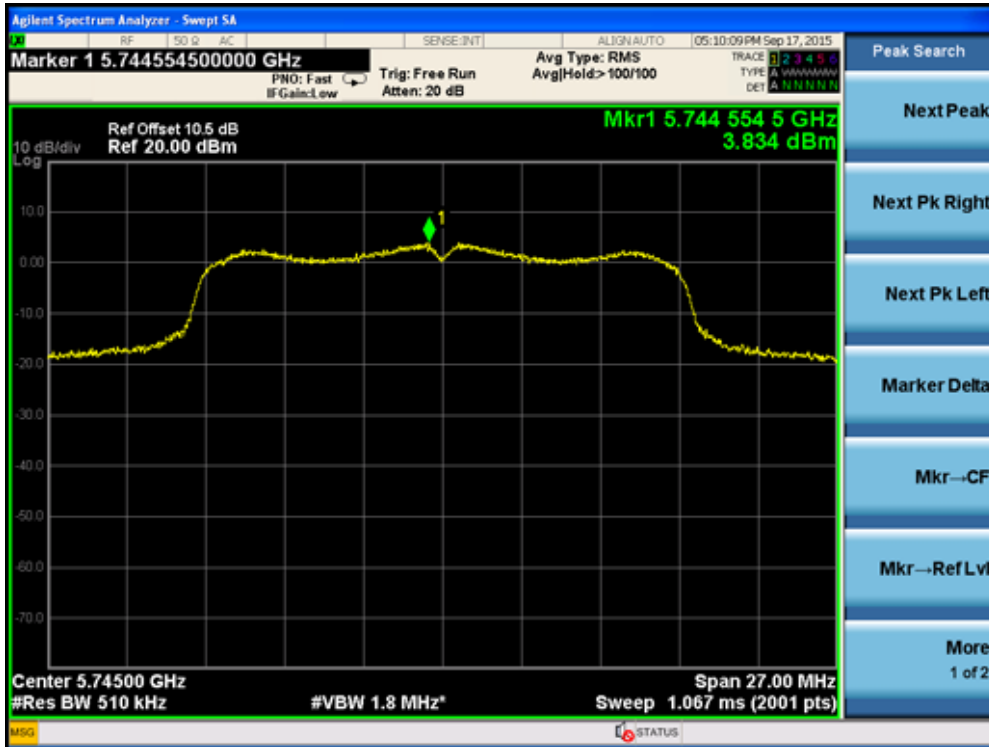
### Channel 40 (5200MHz)



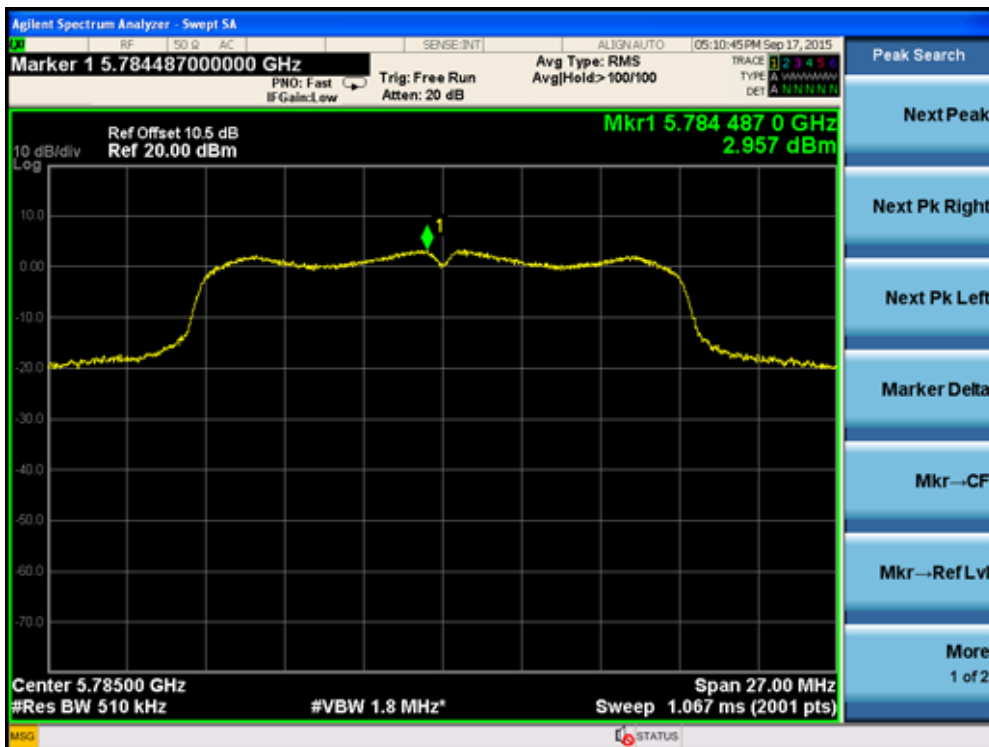
### Channel 48 (5240MHz)



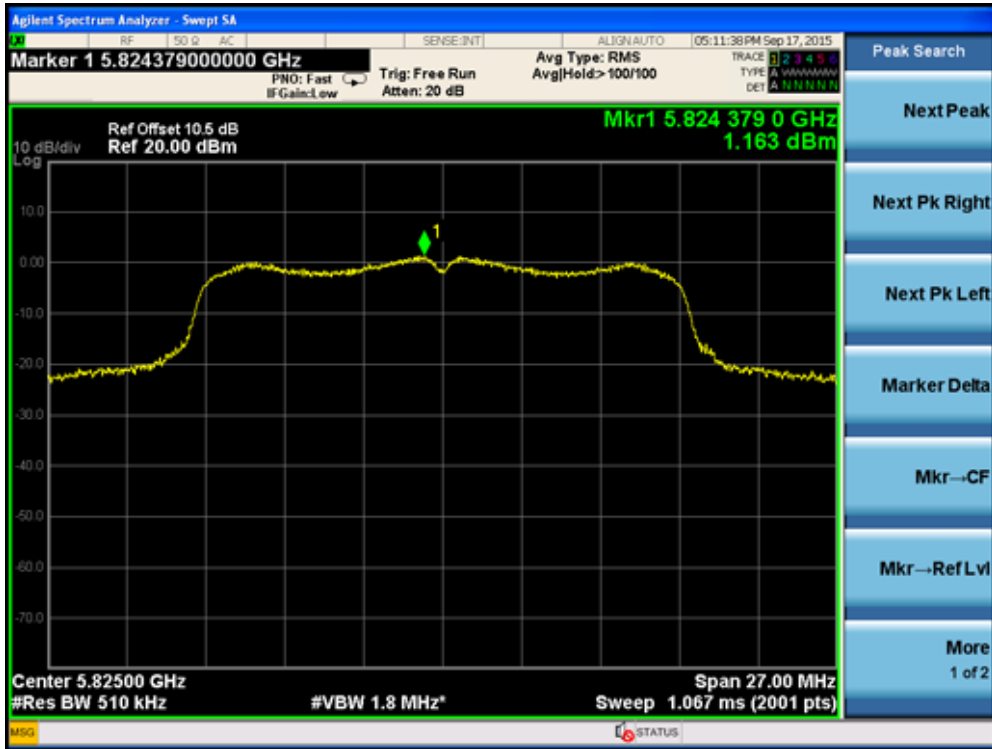
### Channel 149 (5745MHz)



### Channel 157(5785MHz)



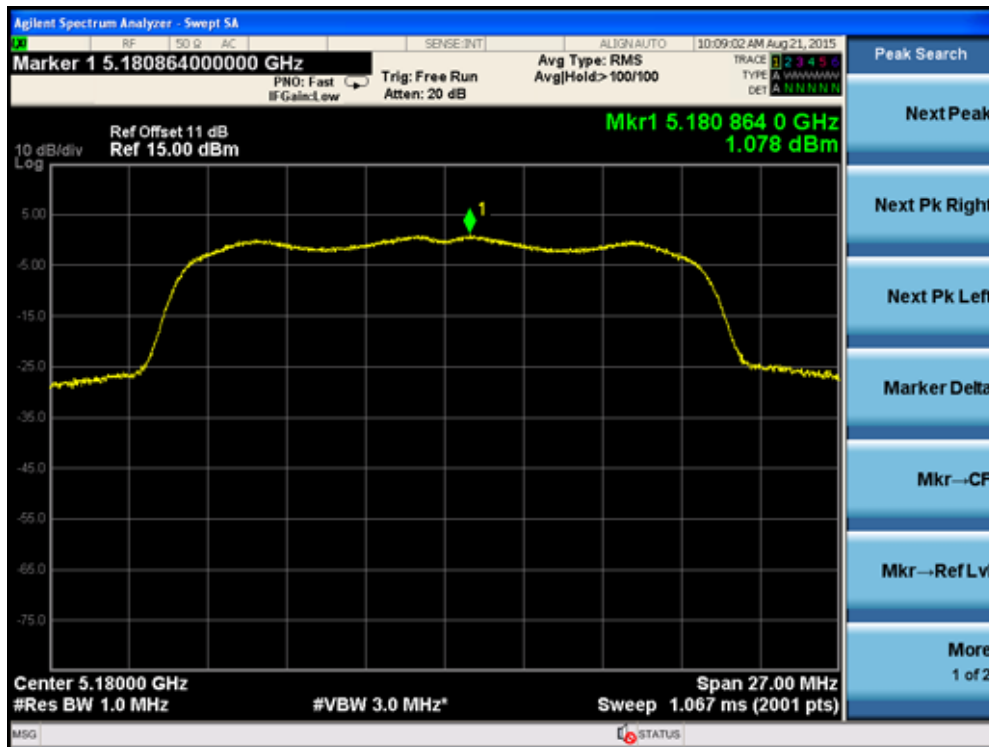
Channel 165 (5825MHz)



Product	:	IP-STB
Test Item	:	Peak Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11n(20MHz) (Chain 1)

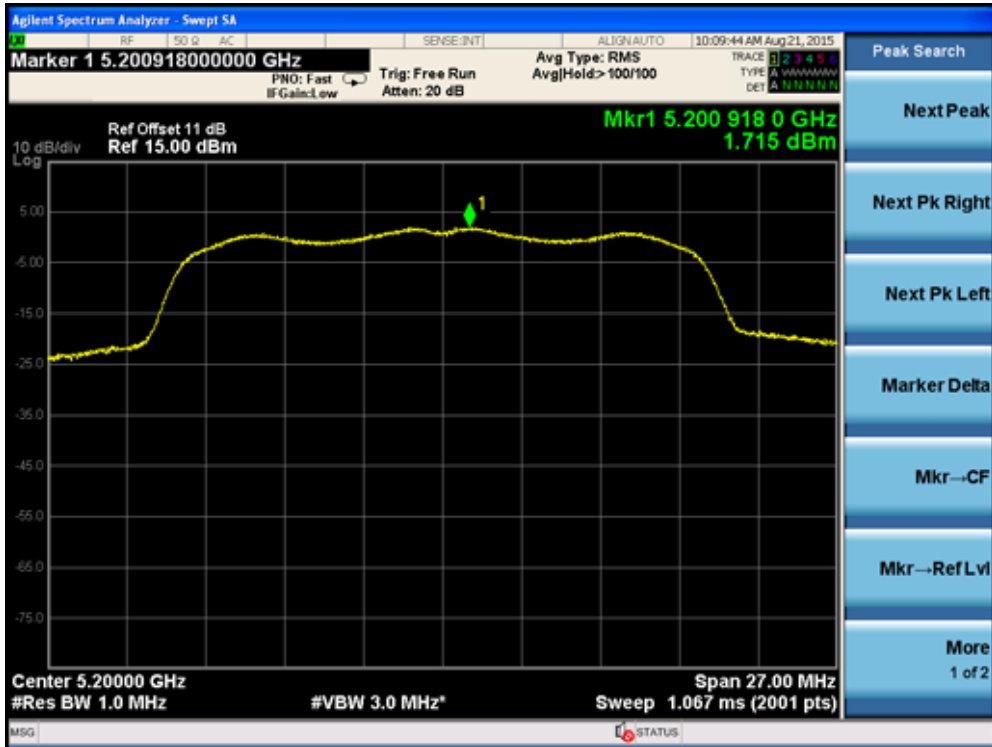
Channel No.	Frequency (MHz)	Measurement PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	1.078	1.078	11	Pass
40	5200	1.715	1.715	11	Pass
48	5240	2.635	2.635	11	Pass
149	5745	4.328	4.328	30	Pass
157	5785	3.926	3.926	30	Pass
165	5825	4.508	4.508	30	Pass

**Channel 36 (5180MHz)**

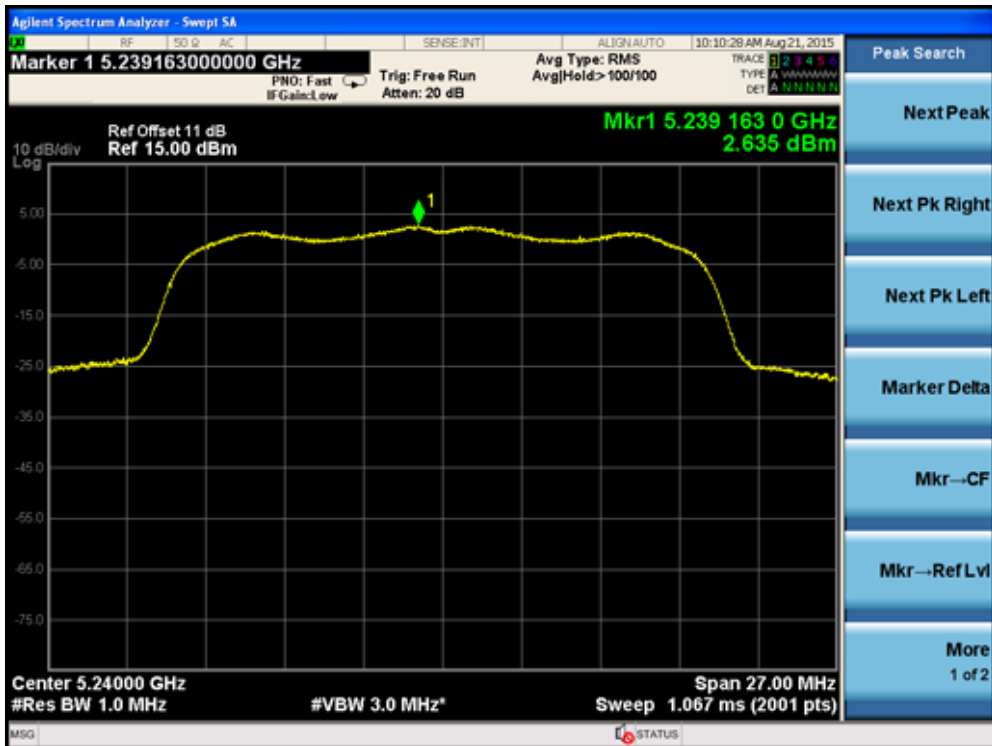




### Channel 40 (5200MHz)



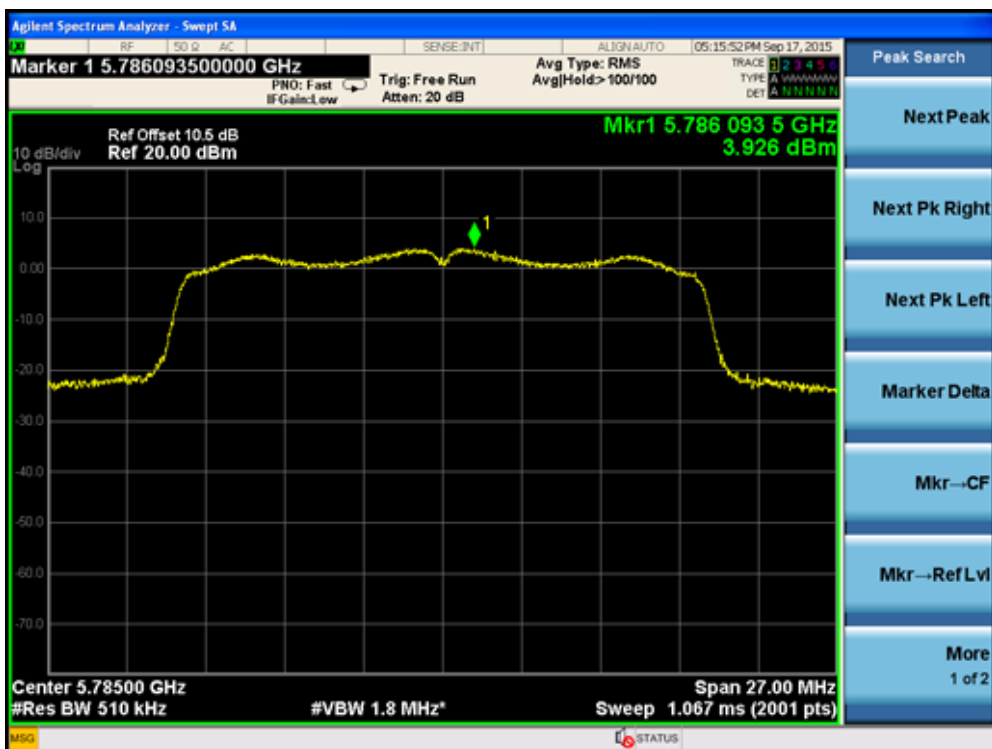
### Channel 48 (5240MHz)



### Channel 149 (5745MHz)



### Channel 157(5785MHz)



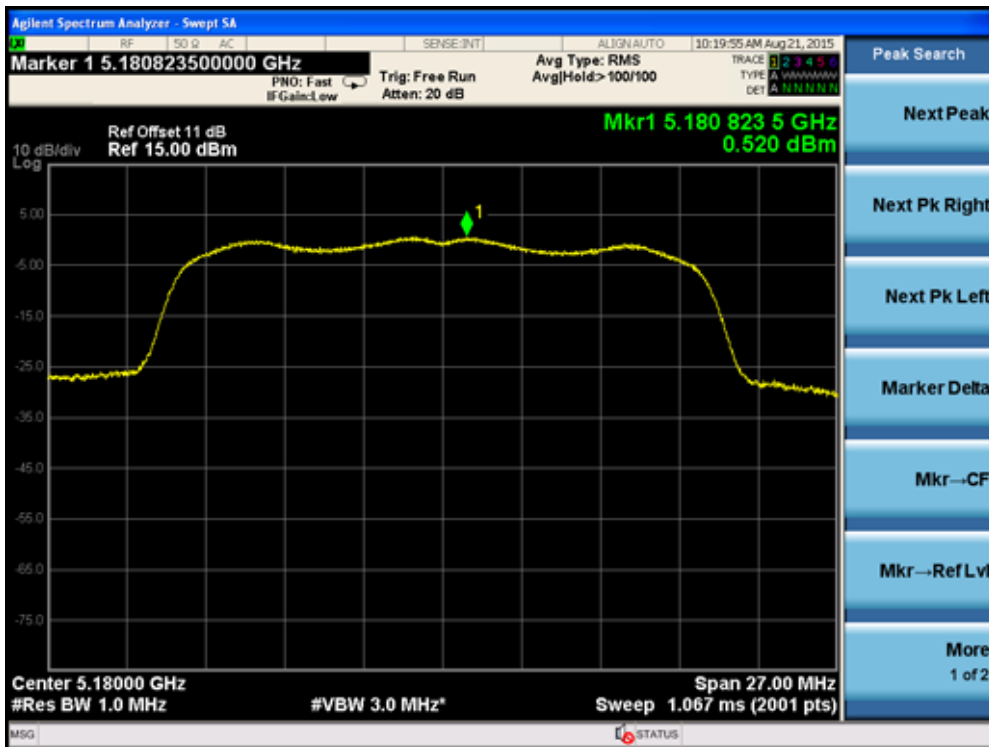
Channel 165 (5825MHz)



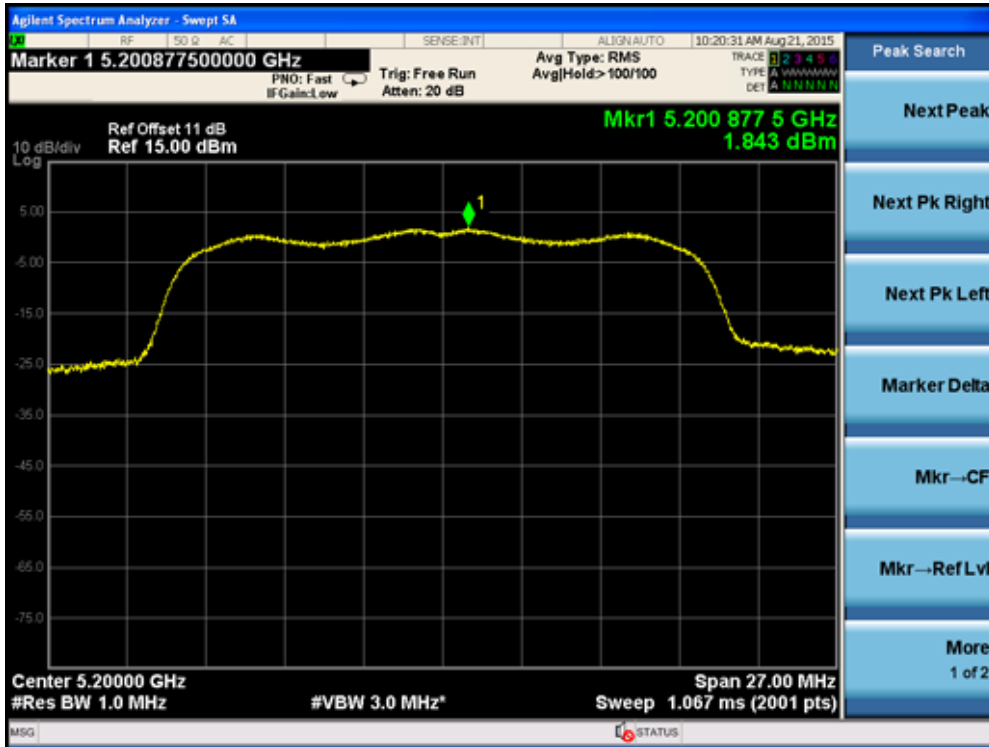
Product	:	IP-STB
Test Item	:	Peak Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11n(20MHz) (Chain 2)

Channel No.	Frequency (MHz)	Measurement PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	0.520	0.520	11	Pass
40	5200	1.843	1.843	11	Pass
48	5240	3.826	3.826	11	Pass
149	5745	3.606	3.606	30	Pass
157	5785	3.274	3.274	30	Pass
165	5825	3.682	3.682	30	Pass

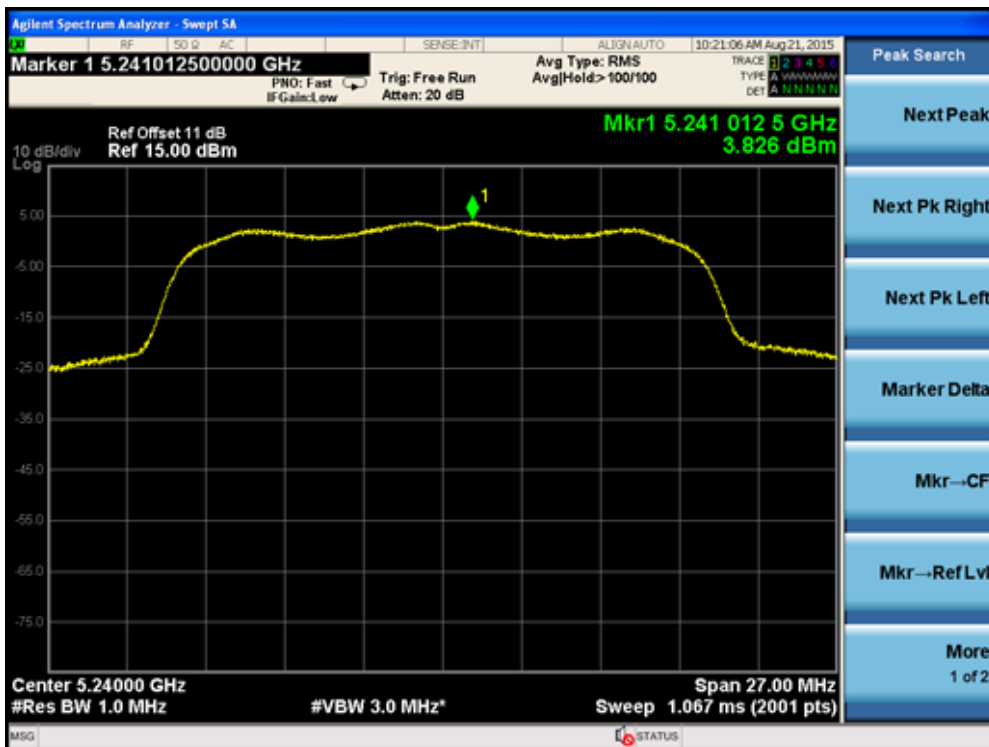
**Channel 36 (5180MHz)**



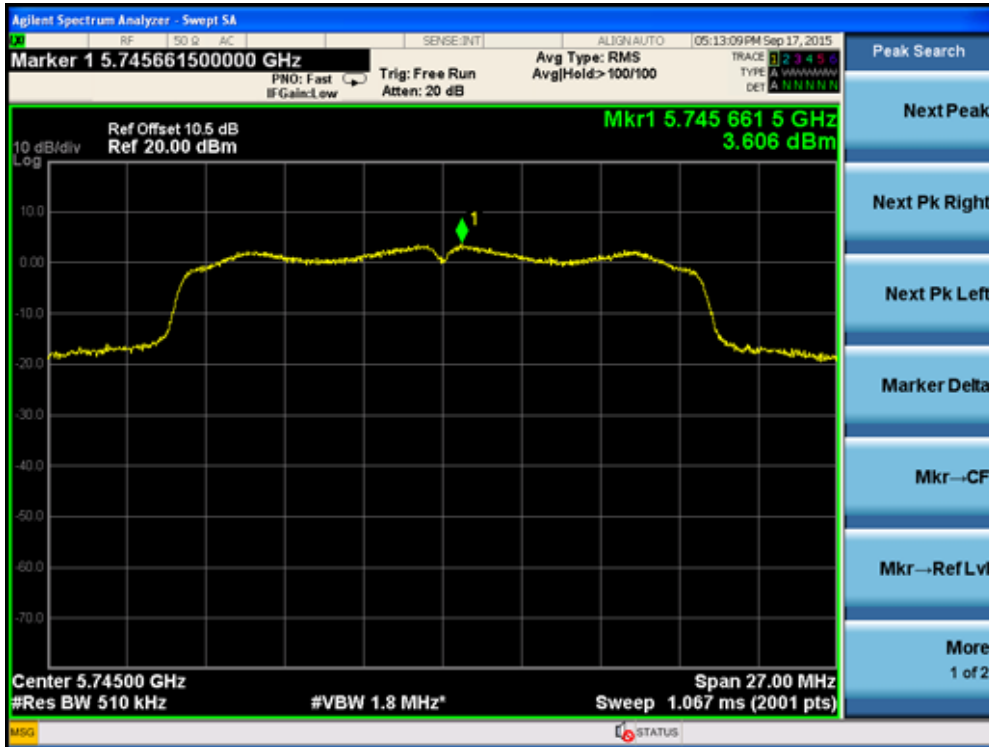
### Channel 40 (5200MHz)



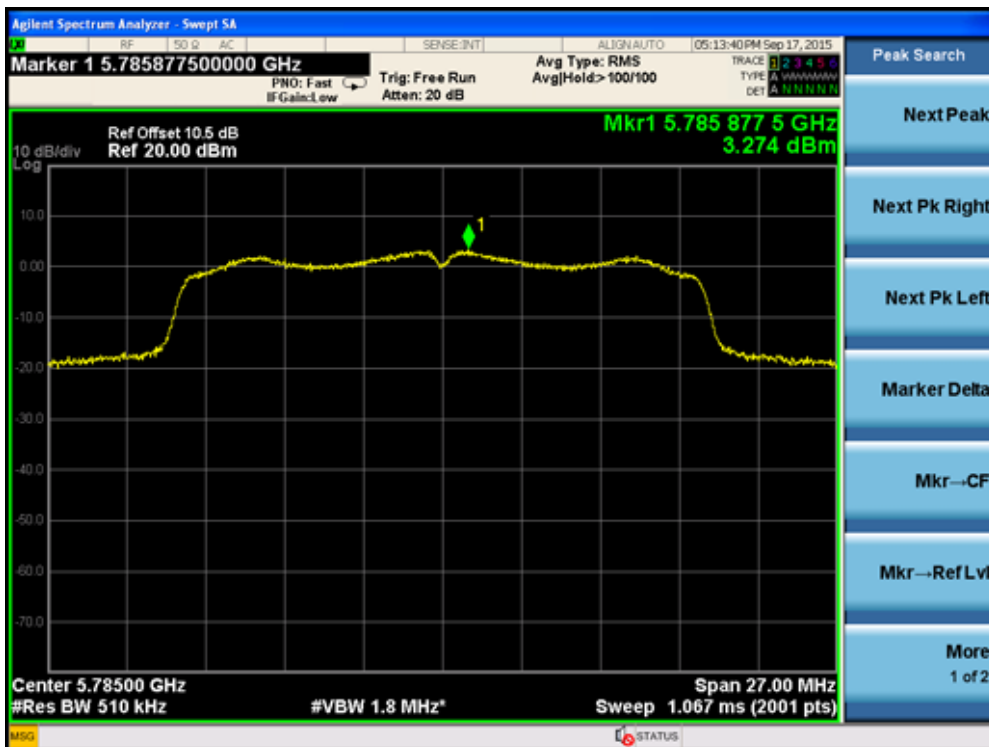
### Channel 48 (5240MHz)



### Channel 149 (5745MHz)



### Channel 157(5785MHz)



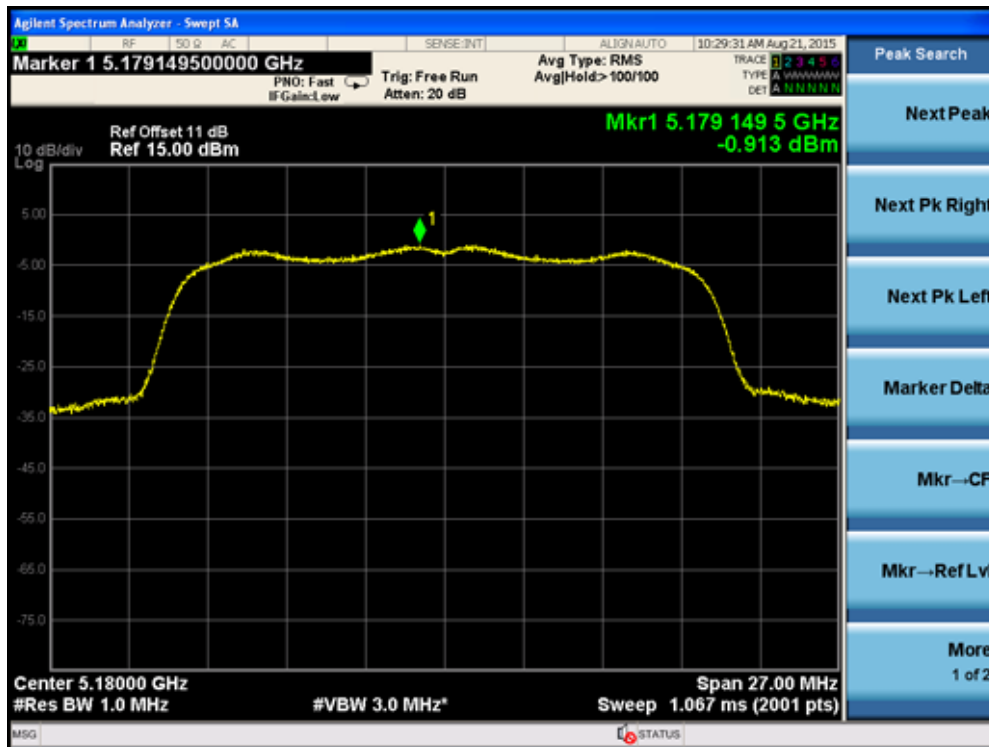
### Channel 165 (5825MHz)



Product	:	IP-STB
Test Item	:	Peak Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11n(20MHz) (Chain 1+2)

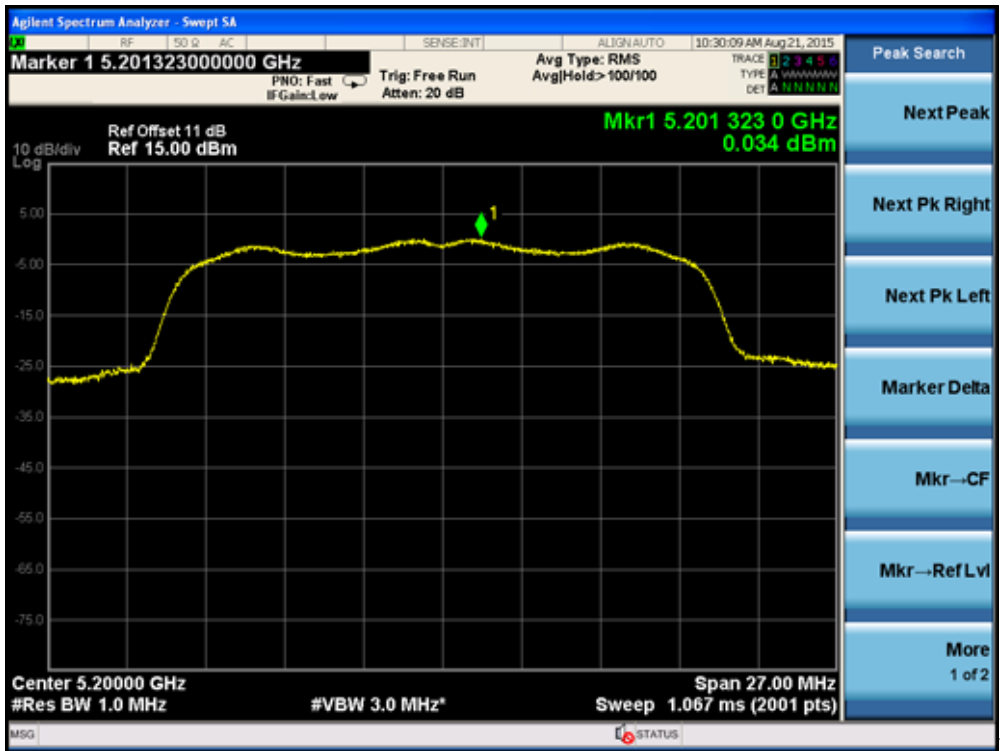
Channel No.	Frequency (MHz)	Measurement PPSD (dBm/MHz)		Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
		Chain 1	Chain 2			
36	5180	-0.913	0.427	2.82	11	Pass
40	5200	0.034	0.842	3.47	11	Pass
48	5240	2.543	3.743	6.19	11	Pass
149	5745	3.995	2.097	6.159	30	Pass
157	5785	3.171	1.845	5.569	30	Pass
165	5825	3.574	2.568	6.110	30	Pass

Channel 36 (5180MHz) - Chain 1

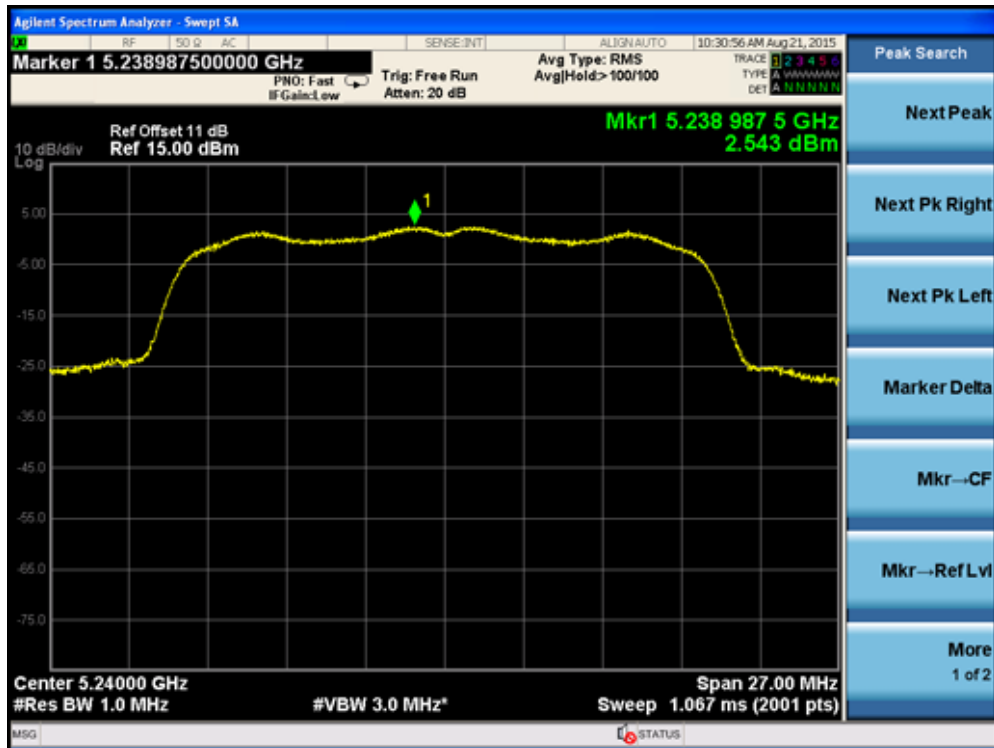




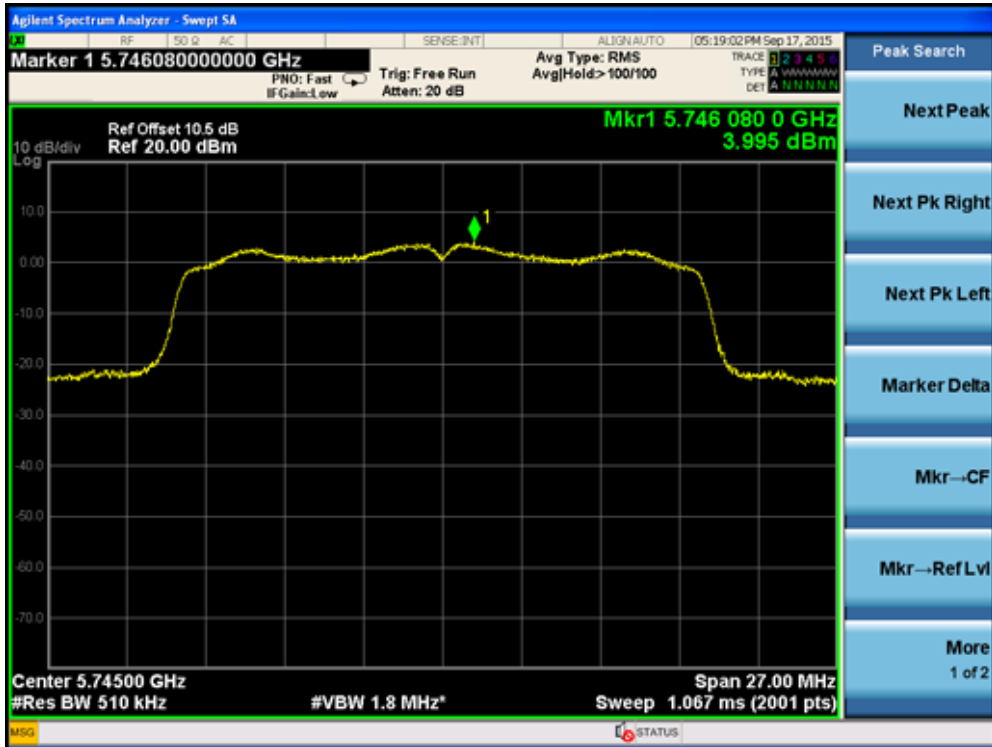
Channel 40 (5200MHz) - Chain 1



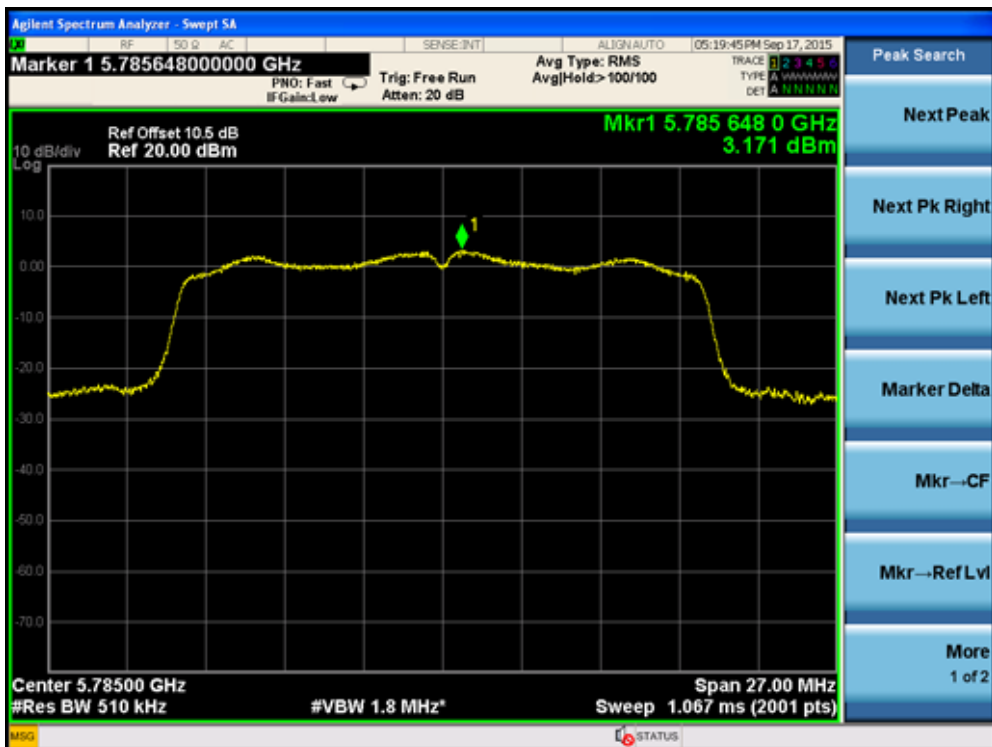
Channel 48 (5240MHz) - Chain 1



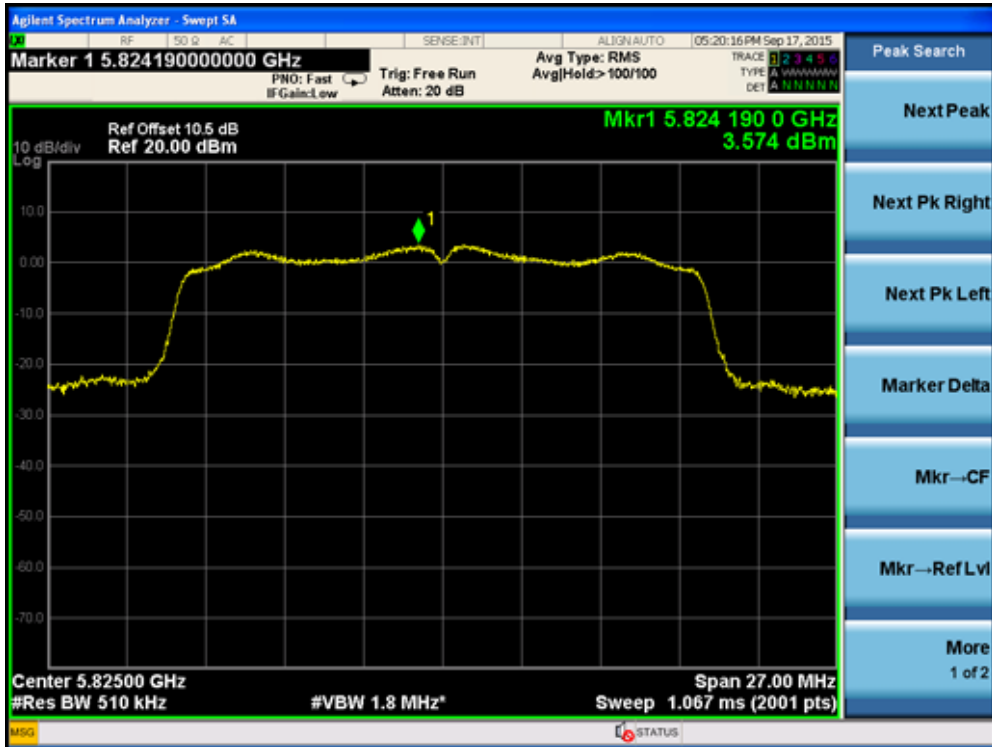
Channel 149 (5745MHz) - Chain 1



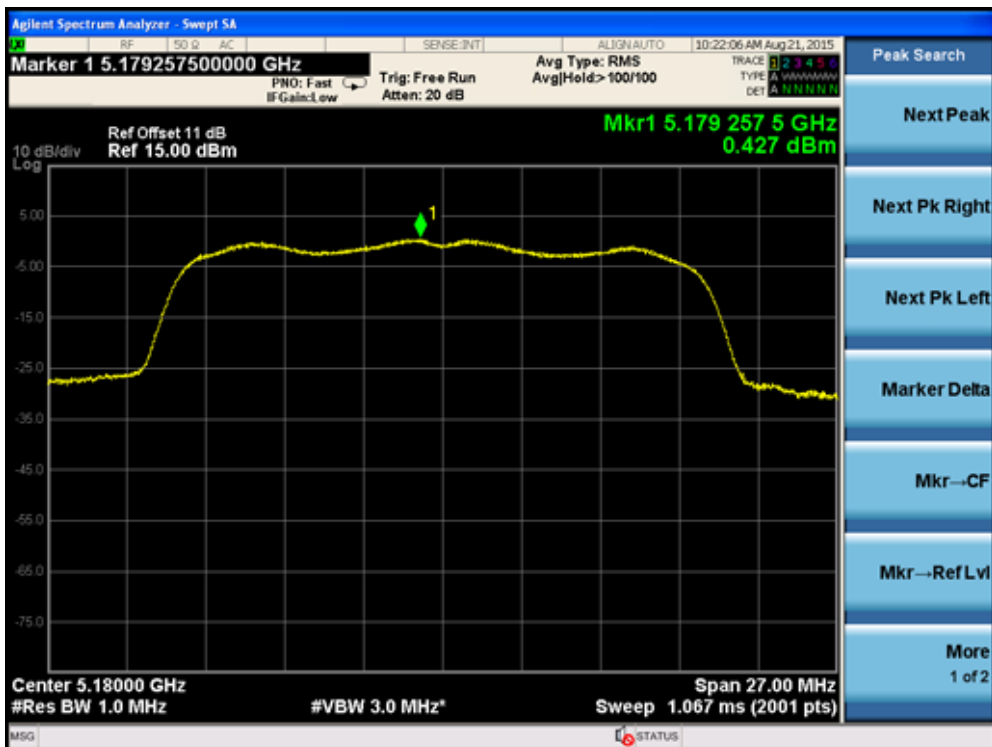
Channel 157(5785MHz) - Chain 1



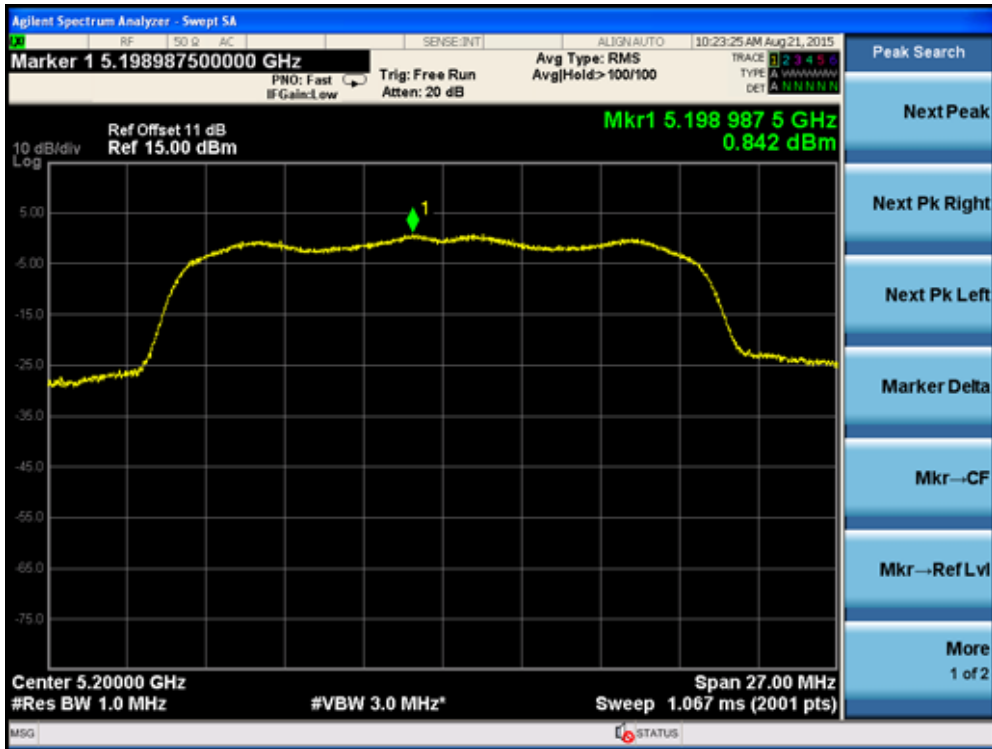
### Channel 165 (5825MHz) - Chain 1



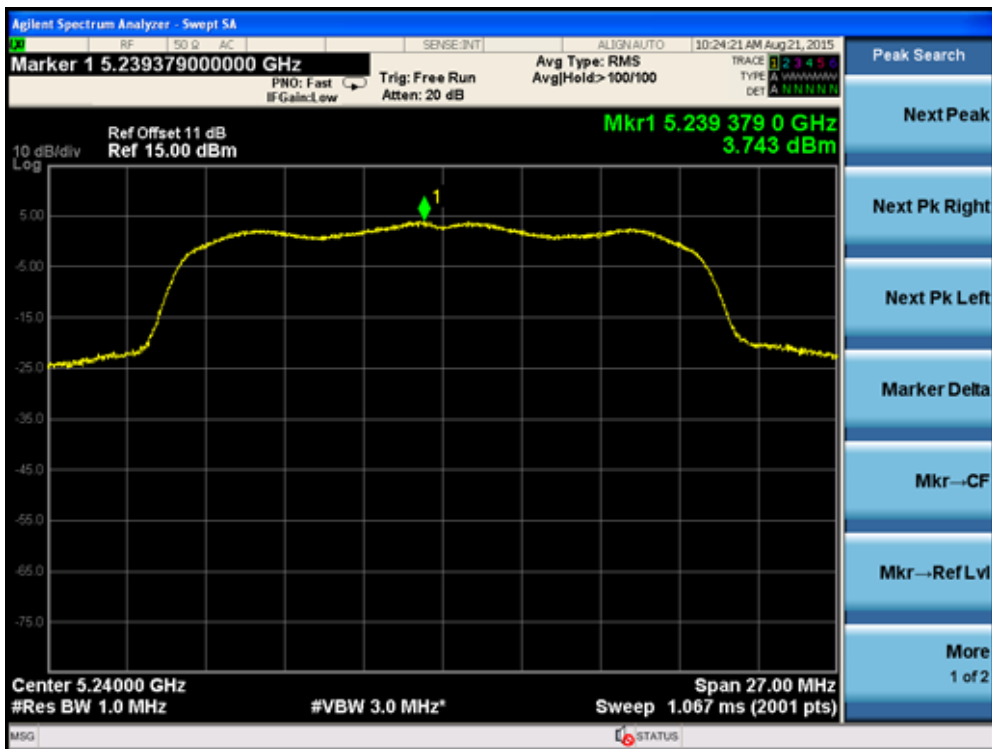
### Channel 36 (5180MHz) - Chain 2



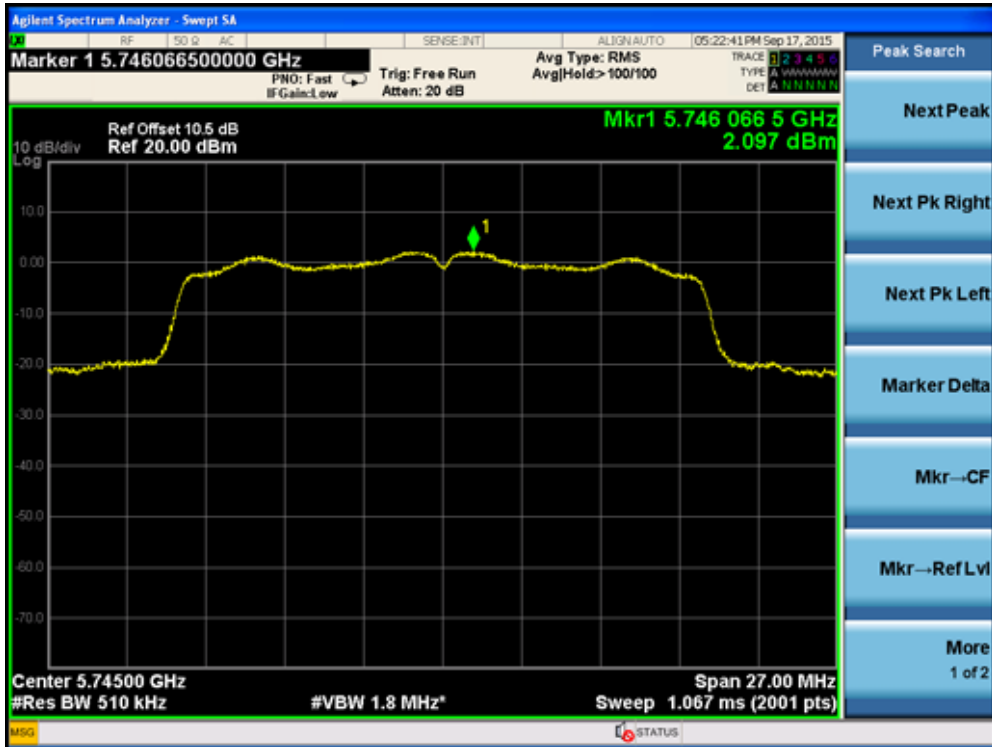
### Channel 40 (5200MHz) - Chain 2



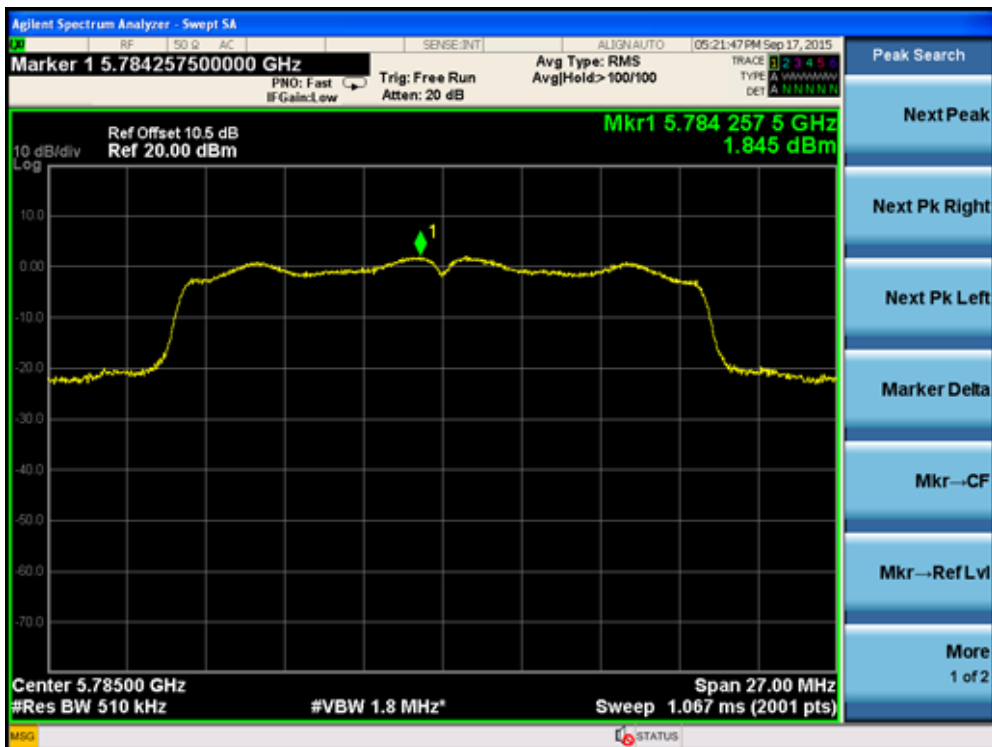
### Channel 48 (5240MHz) - Chain 2



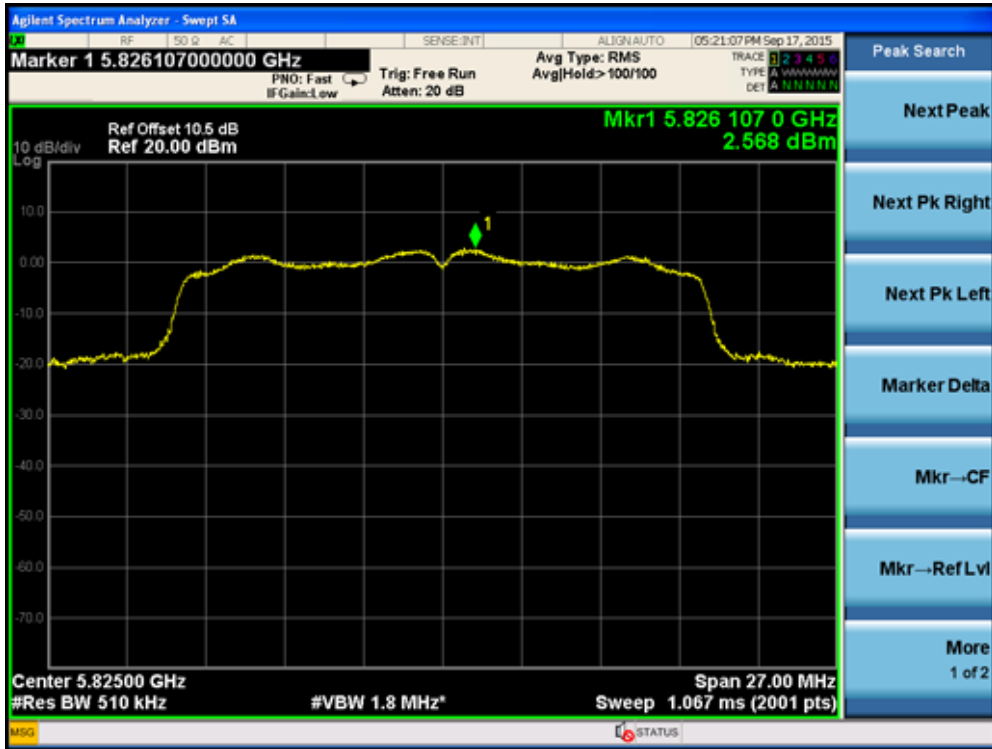
### Channel 149 (5745MHz) - Chain 2



### Channel 157(5785MHz) - Chain 2



### Channel 165 (5825MHz) - Chain 2

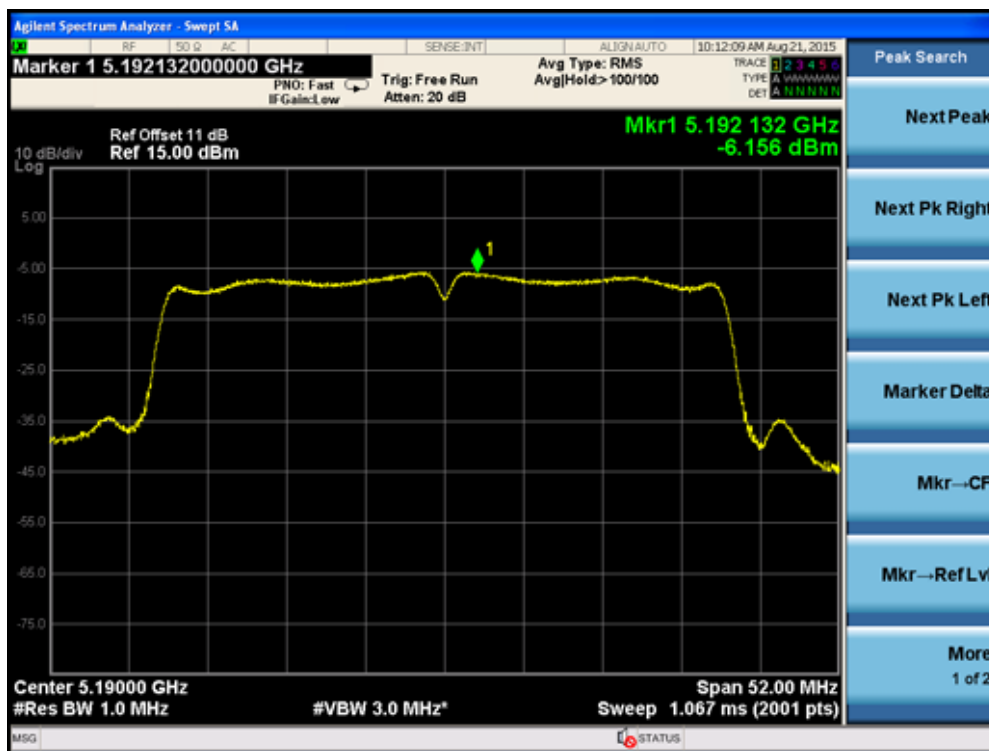


Product	:	IP-STB
Test Item	:	Peak Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(40MHz) (Chain 1)

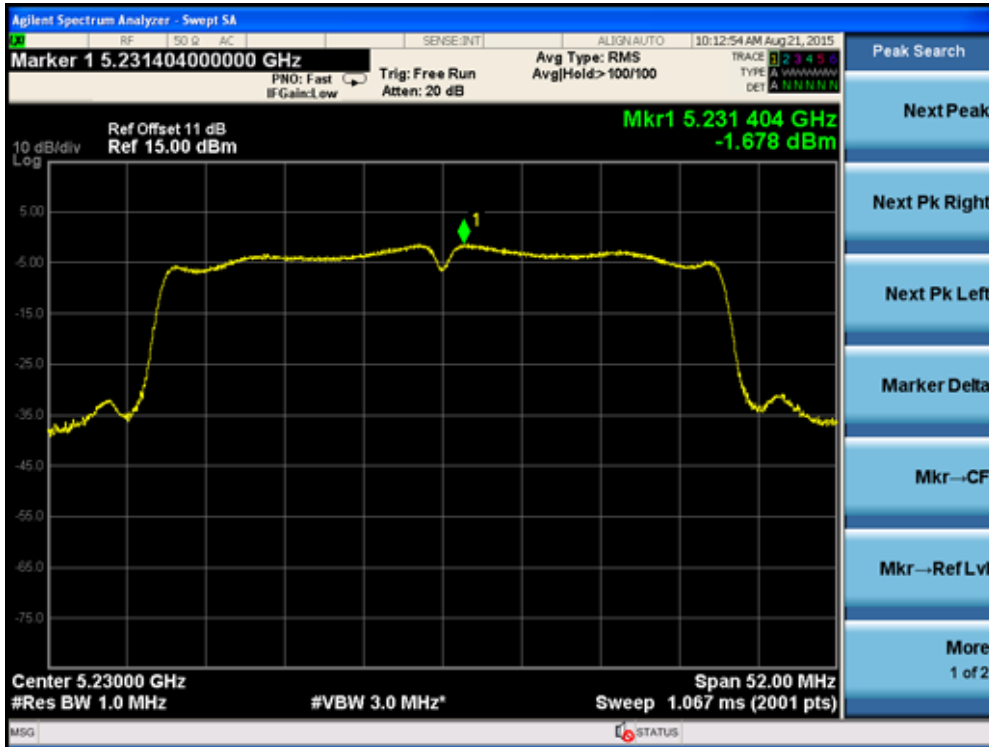
Channel No.	Frequency (MHz)	Measurement PPSD (dBm/MHz)	Duty Cycle (%)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
38	5190	-6.156	95.8	-5.97	11	Pass
46	5230	-1.678	95.8	-1.49	11	Pass
151	5755	1.374	95.8	1.56	30	Pass
159	5795	0.637	95.8	0.82	30	Pass

Note1: When EUT duty cycle < 98%, the total PSD = Reading Level + 10\*log(1/duty cycle)

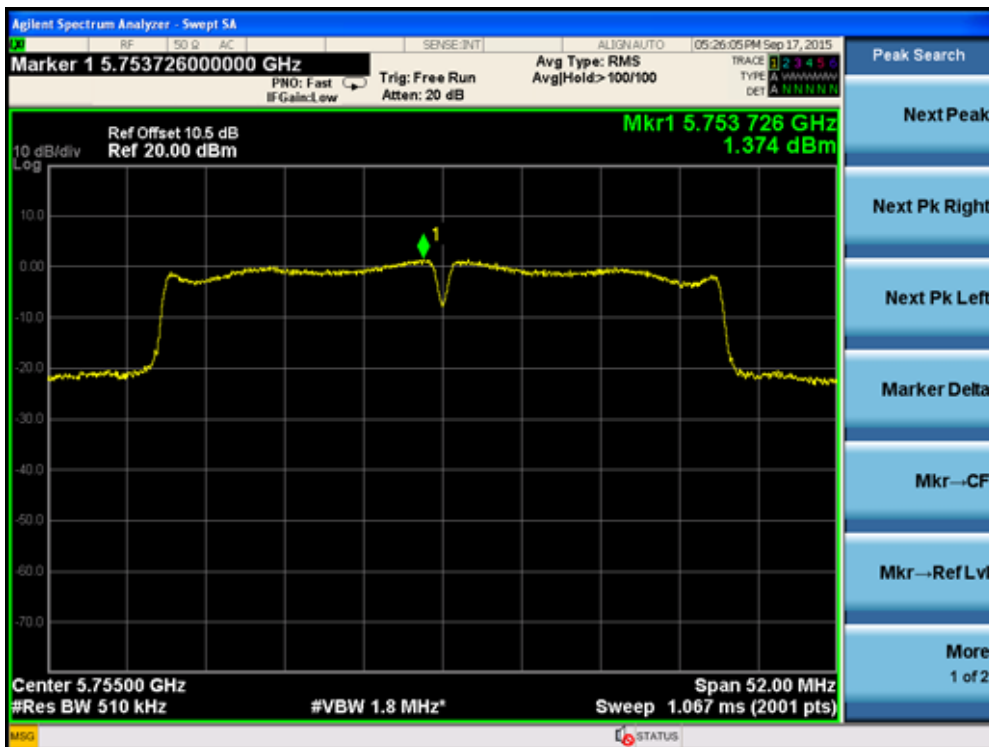
### Channel 38 (5190MHz)



### Channel 46 (5230MHz)



### Channel 151 (5755MHz)





Channel 159 (5795MHz)

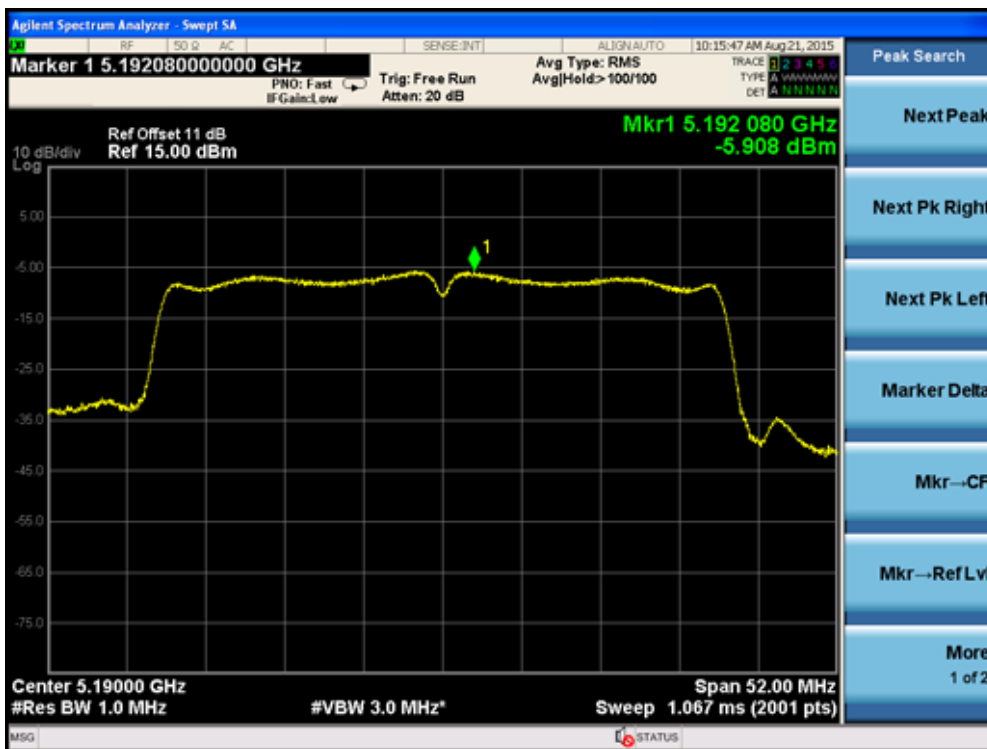


Product	:	IP-STB
Test Item	:	Peak Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(40MHz) (Chain 2)

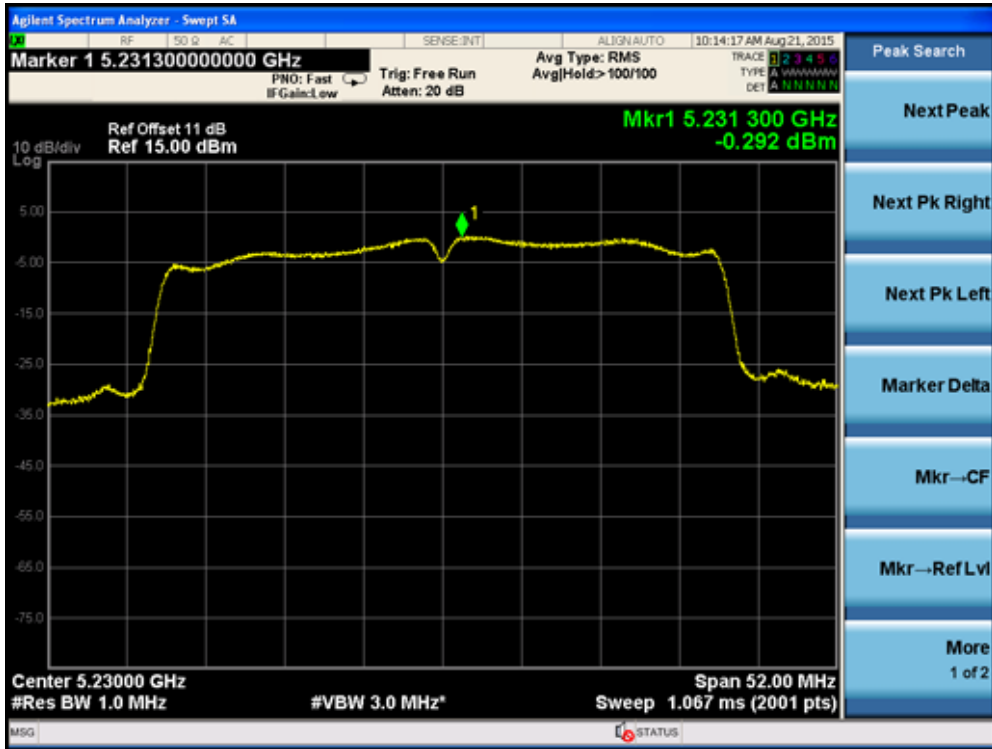
Channel No.	Frequency (MHz)	Measurement PPSD (dBm/MHz)	Duty Cycle (%)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
38	5190	-5.908	95.8	-5.72	11	Pass
46	5230	-0.292	95.8	-0.11	11	Pass
151	5755	-0.516	95.8	-0.33	30	Pass
159	5795	-0.258	95.8	-0.07	30	Pass

Note1: When EUT duty cycle < 98%, the total PSD = Reading Level + 10\*log(1/duty cycle)

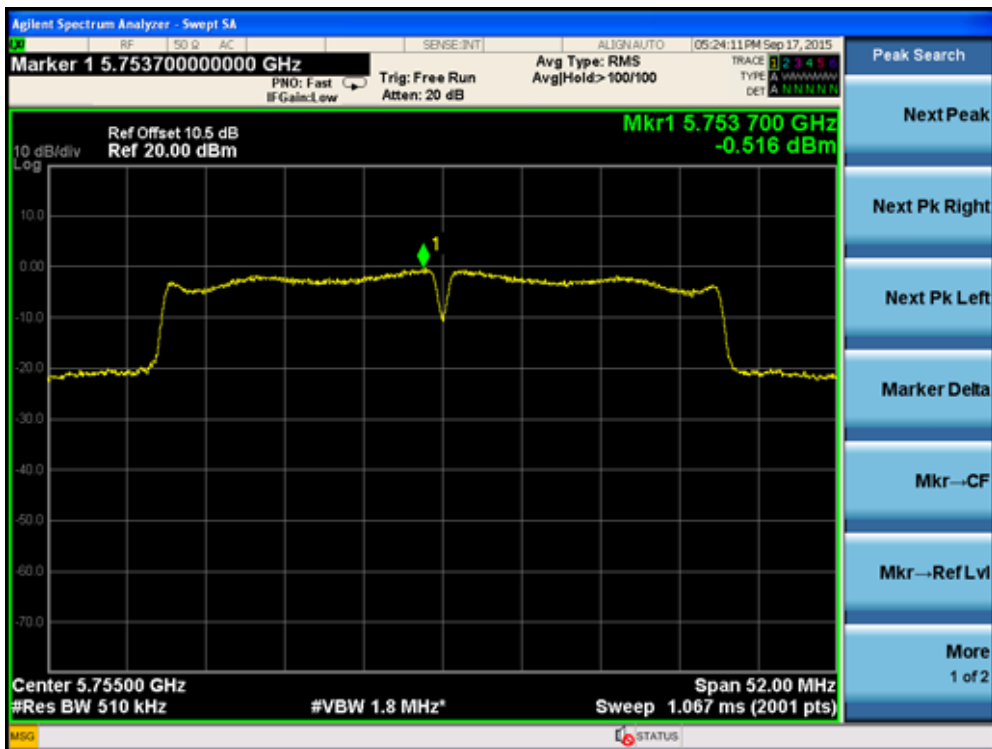
### Channel 38 (5190MHz)



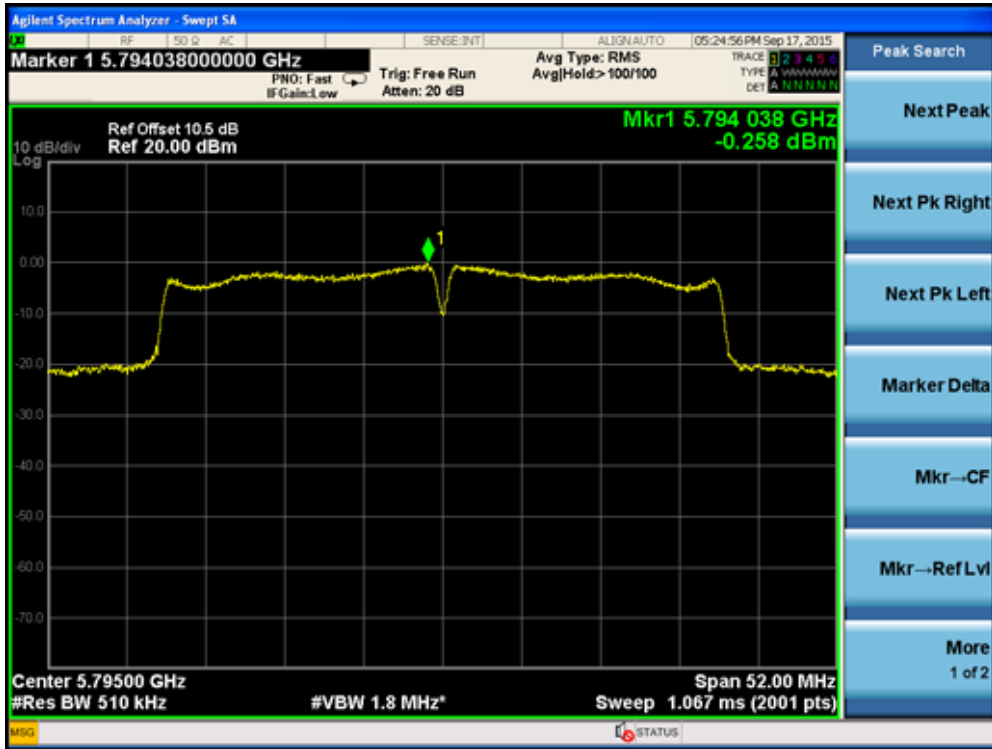
### Channel 46 (5230MHz)



### Channel 151 (5755MHz)



Channel 159 (5795MHz)

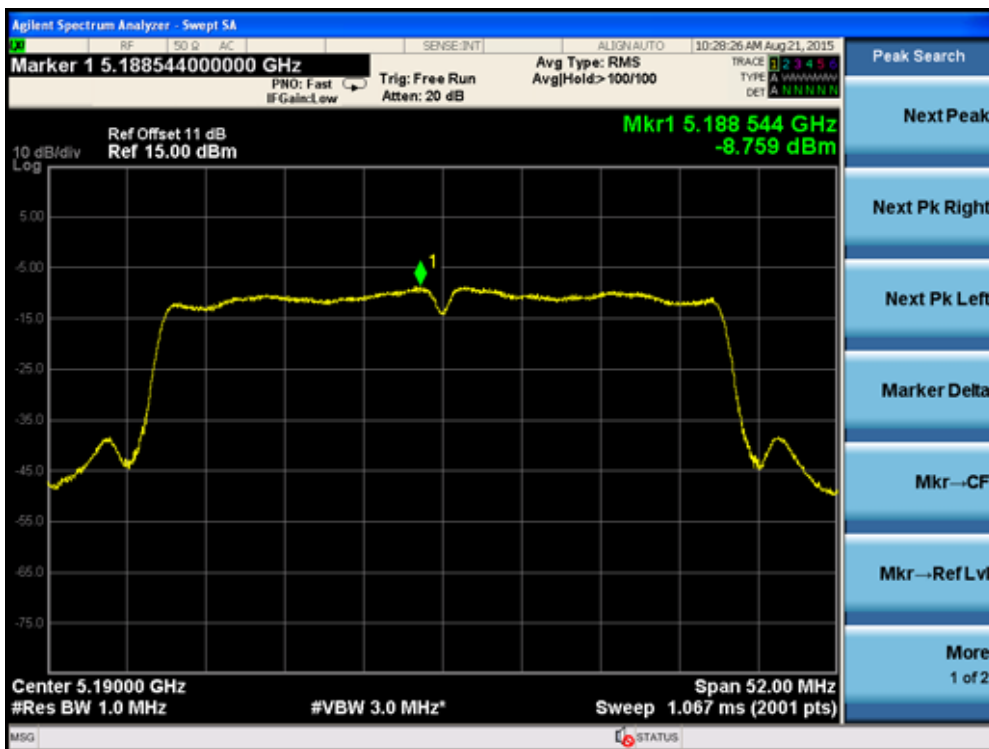


Product	:	IP-STB
Test Item	:	Peak Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(40MHz) (Chain 1+2)

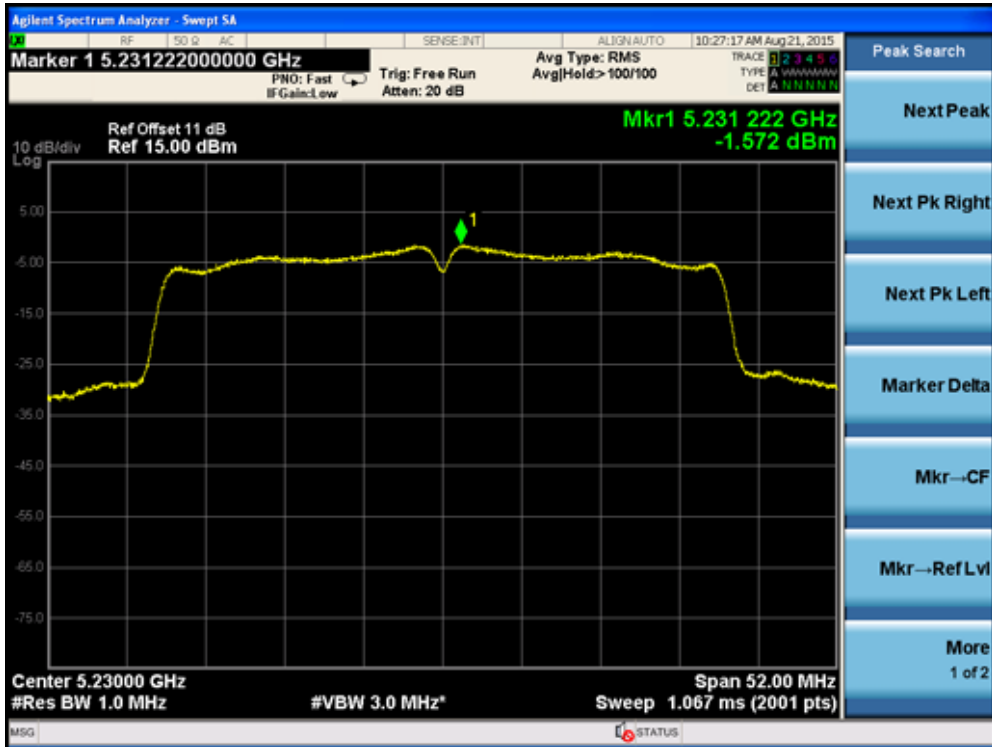
Channel No.	Frequency (MHz)	Measurement PPSD (dBm/MHz)		Duty Cycle (%)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
		Chain 1	Chain 2				
38	5190	-8.759	-6.014	95.8	-3.98	11	Pass
46	5230	-1.572	0.280	95.8	2.65	11	Pass
151	5755	1.017	-0.771	95.8	3.41	30	Pass
159	5795	0.057	-1.095	95.8	2.72	30	Pass

Note1: When EUT duty cycle < 98%, the total PSD = Reading Level + 10\*log(1/duty cycle)

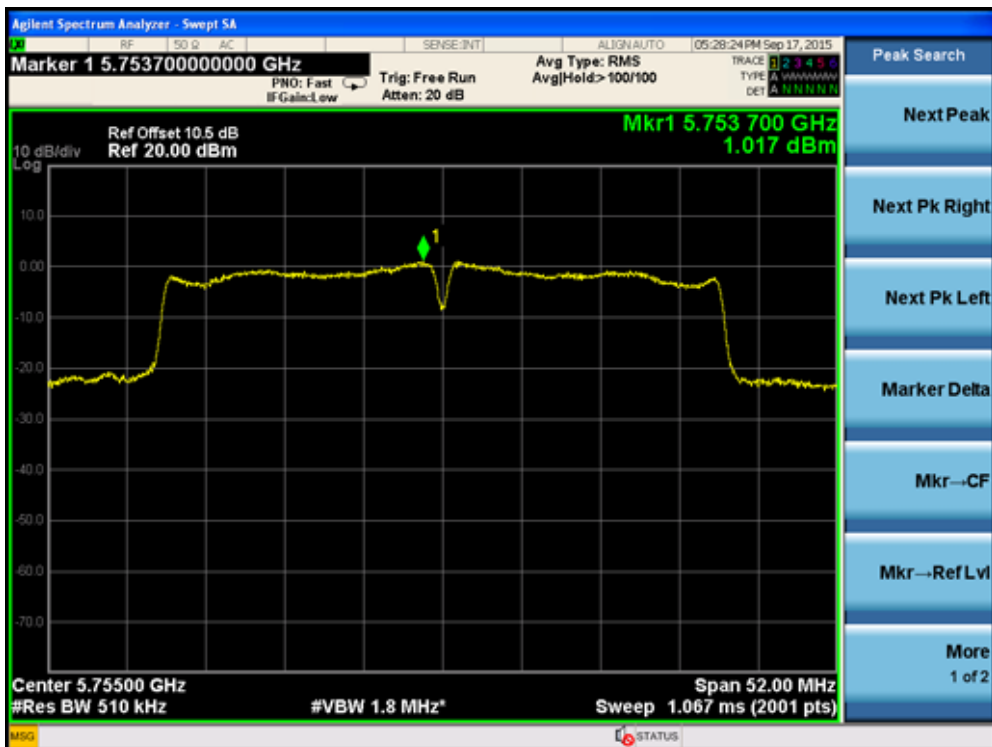
**Channel 38 (5190MHz) - Chain 1**



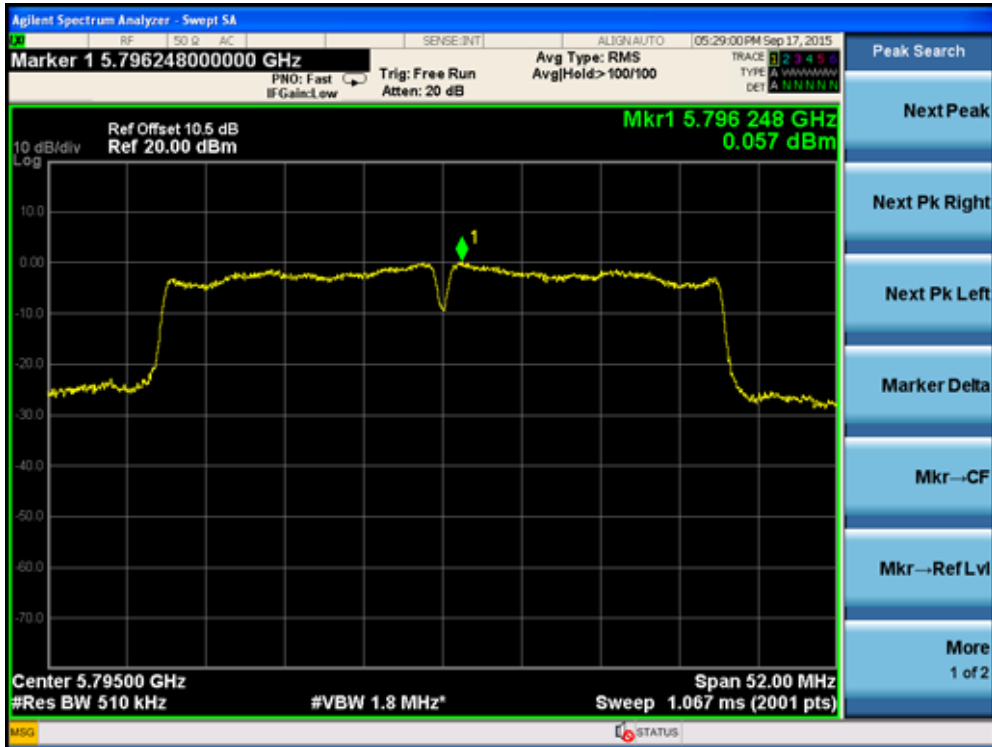
Channel 46 (5230MHz) - Chain 1



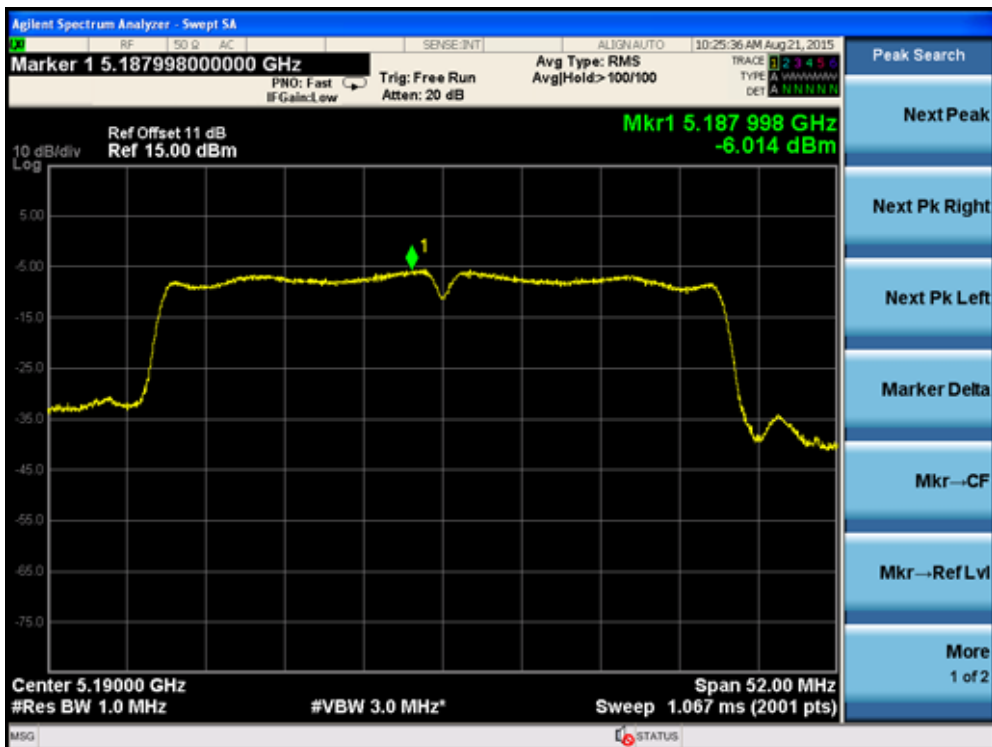
Channel 151 (5755MHz) - Chain 1



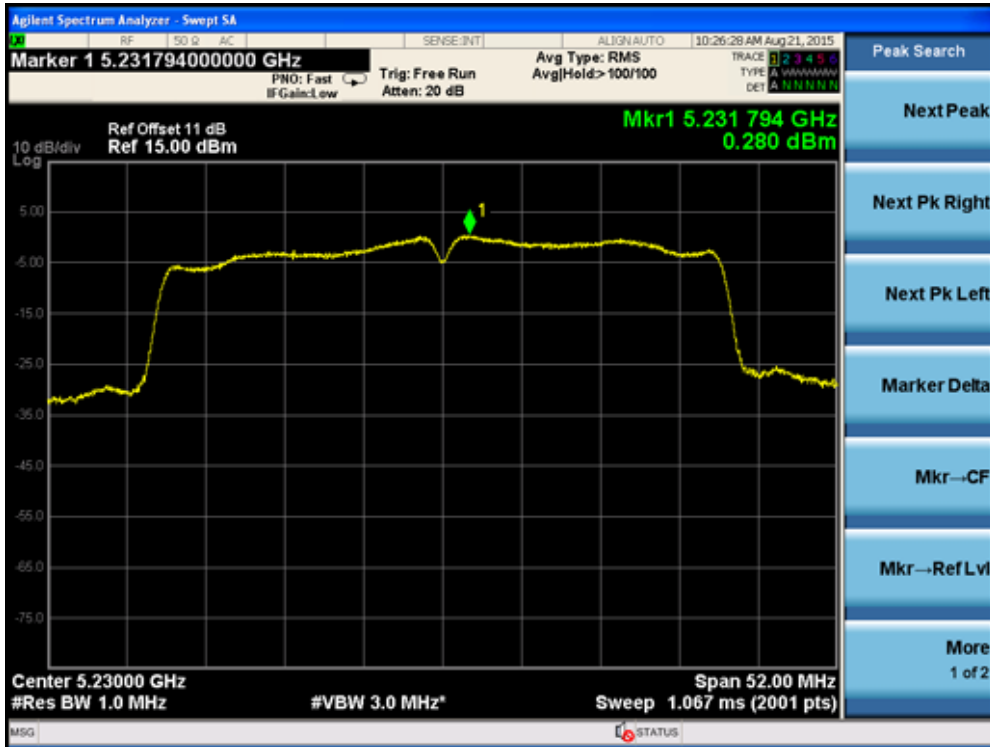
Channel 159 (5795MHz) - Chain 1



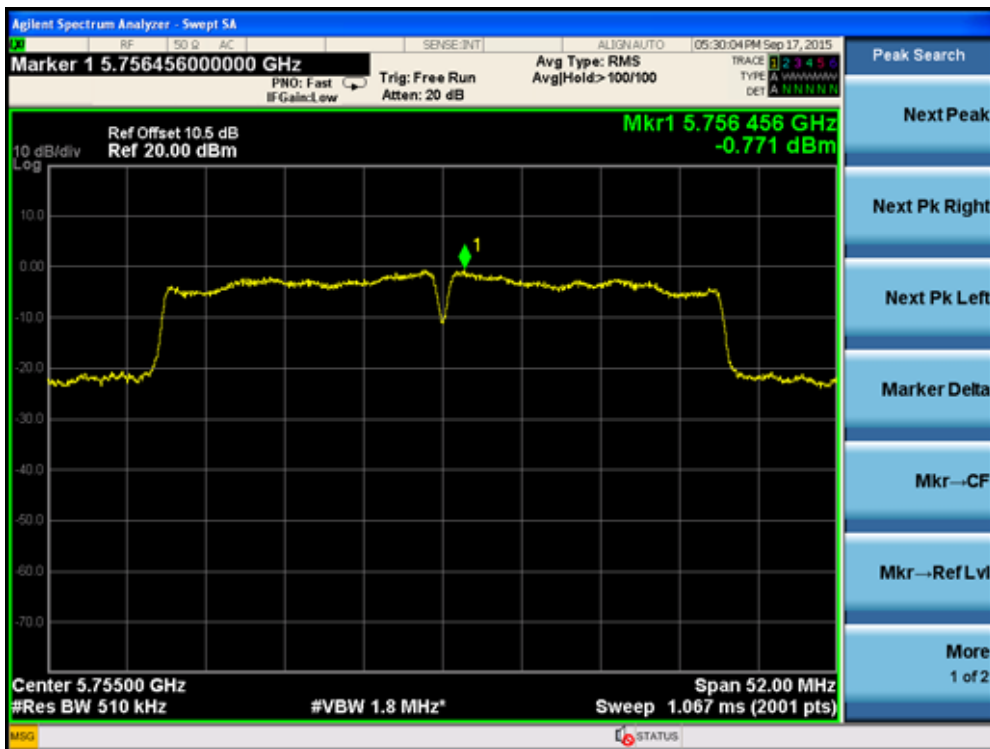
Channel 38 (5190MHz) - Chain 2



**Channel 46 (5230MHz) - Chain 2**



**Channel 151 (5755MHz) - Chain 2**





Channel 159 (5795MHz) - Chain 2



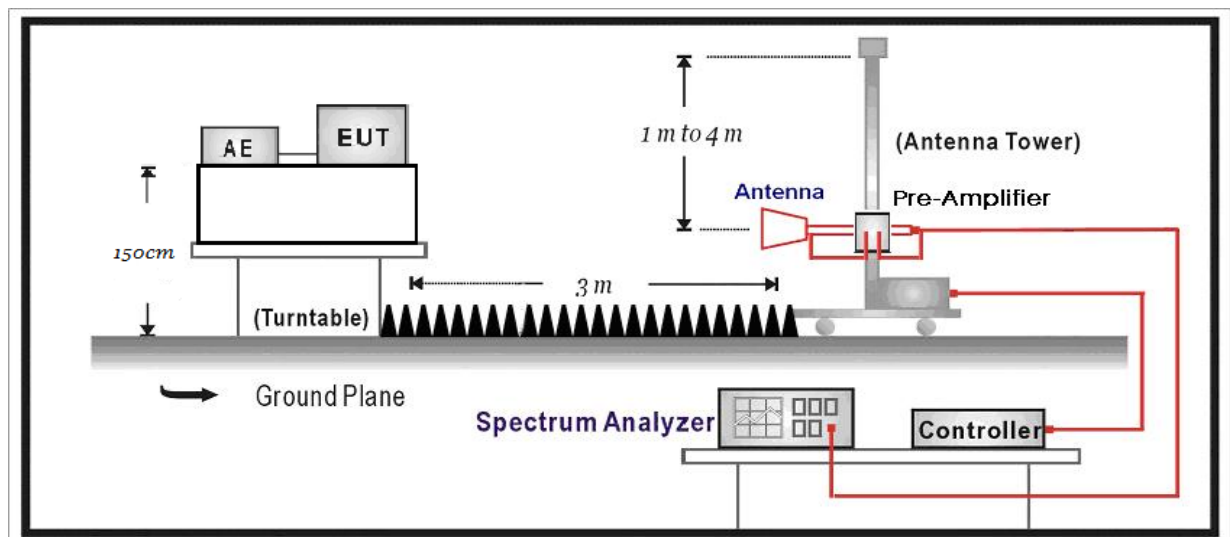
## 9. Radiated Emission Band Edge

### 9.1. Test Equipment

Radiated Emission / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MY49100159	2016.03.28
Spectrum Analyzer	Agilent	E4446A	MY45300103	2016.01.07
Preamplifier	Miteq	NSP1800-25	1364185	2016.05.05
Preamplifier	QuieTek	AP-040G	CHM-0906001	2016.05.05
DRG Horn	ETS-Lindgren	3117	00123988	2016.01.21
Broad-Band Horn				
Antenna	Schwarzbeck	BBHA9170	294	2015.11.24
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2016.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2016.03.01
EMI Receiver	Agilent	N9038A	MY51210196	2016.06.09
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2016.01.08

### 9.2. Test Setup



### 9.3. Limit

#### For FCC

Restricted bands, identified in Table 6, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following restrictions apply:

- Fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands of Clause 15.205 complying under FCC Part15:2015.
- Unwanted emissions that fall into restricted bands of Table 6 shall comply with the limits specified in RSS-Gen.
- Unwanted emissions that do not fall within the restricted frequency bands of Table 6 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	( <sup>1</sup> )
13.36-13.41			

#### For 15.407(b) requirement:

(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.

#### **9.4. Test Procedure**

According to ANSI C63.4:2014& ANSI C63.10:2013&789033 D02 General UNII Test Procedures New Rules v01.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2009 on radiated measurement.

Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the "cone of radiation" of EUT. The 3dB beamwidth is 10~60 degrees for H-plane and 10~90 degrees for E-plane.

#### **9.5. Uncertainty**

The measurement uncertainty above 1GHz is defined as  $\pm 3.9$  dB