

# FCC Test Report

Product Name	WiFi AP
Model No	Bitlomat 200 Sector Base Station
FCC ID.	RNF-BTLM200

Applicant	Bitlomat, LLC.
Address	1850 SECOND ST STE 201 HIGHLAND PARK, IL 60035,USA

Date of Receipt	Jan. 18, 2013
Issue Date	Apr. 22, 2013
Report No.	131352R-RFUSP28V01
Report Version	V1.0



The test results relate only to the samples tested.

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# Test Report Certification

Issue Date: Apr. 22, 2013

Report No.: 131352R-RFUSP28V01


**Accredited by NIST (NVLAP)**

NVLAP Lab Code: 200533-0

Product Name	WiFi AP
Applicant	Bitlomat, LLC.
Address	1850 SECOND ST STE 201 HIGHLAND PARK, IL 60035,USA
Manufacturer	Bitlomat, LLC.
Model No.	Bitlomat 200 Sector Base Station
EUT Rated Voltage	AC 100-240V, 50-60Hz
EUT Test Voltage	AC 120V/60Hz
Trade Name	Bitlomat
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2012 ANSI C63.4: 2003, ANSI C63.10: 2009
Test Result	Complied

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	WiFi AP
Trade Name	Bitlomat
Model No.	Bitlomat 200 Sector Base Station
FCC ID.	RNF-BTLM200
Frequency Range	802.11n-20MHz:5745-5825MHz ,802.11n-40MHz:5755-5795MHz
Number of Channels	802.11n-20MHz: 5, n-40MHz: 2
Data Speed	802.11n: up to 300Mbps
Channel separation	802.11n-20MHz: 20MHz, 802.11n-40MHz: 40MHz
Type of Modulation	802.11n: OFDM, BPSK, QPSK, 16QAM, 64QAM
Antenna Type	Cross-Polarized Antenna
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Power Cable	Non-Shielded, 0.7m
Power Adapter	MFR: BITLOMAT, M/N: GFP241DA-240100HB Input: AC 100-240V, 50-60Hz, 0.55A Output: DC 24V, 1A Power Cord: Non-Shielded, 0.8m

#### Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	JING HONG	N/A	Cross-Polarized Antenna	15.74dBi For 5.725~5.850GHz

Note: The antenna of EUT is conform to FCC 15.203

## 802.11n-20MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 149: 5745 MHz		Channel 153: 5765 MHz		Channel 157: 5785 MHz		Channel 161: 5805 MHz	
Channel 165: 5825 MHz							

## 802.11n-40MHz (5G Band) Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency
Channel 151: 5755 MHz		Channel 159: 5795 MHz	

## Note:

1. This device is a WiFi AP with a built-in 5GHz WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report. (802.11n is chain A+ chain B)
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11n(20M-BW) is 14.4Mbps and 、802.11n(40M-BW) is 30Mbps).
5. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
6. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11a/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.

Test Mode	Mode 1: Transmit - 802.11n-20BW_14.4Mbps(5G Band)
	Mode 2: Transmit - 802.11n-40BW_30Mbps(5G Band)

## 1.2. Operational Description

The EUT is a WiFi AP with a built-in 5GHz WLAN transceiver.

The device provided of eight kinds of transmitting speed 14.4,28.9,43.3,57.8,86.7,115.6,130 and 144.4Mbps in 802.11n(20BW) mode and 30,60,90,120,180,240,270 and 300Mbps(40BW) the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM (IEEE 802.11n), the IEEE 802.11n is Multiple In, Multiple Out" (MIMO) technology.

The device adapts direct sequence spread spectrum modulation. The antenna provides diversity function to improve the receiving function and the antennas to support 2(Transmit) × 2(Receive) MIMO technology.

This WiFi AP, compliant with IEEE 802.11n, is a high-efficiency Wireless LAN adapter. It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Orthogonal Frequency Division Multiplexing (OFDM) radio transmission, the WiFi AP Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any IEEE 802.11n network.

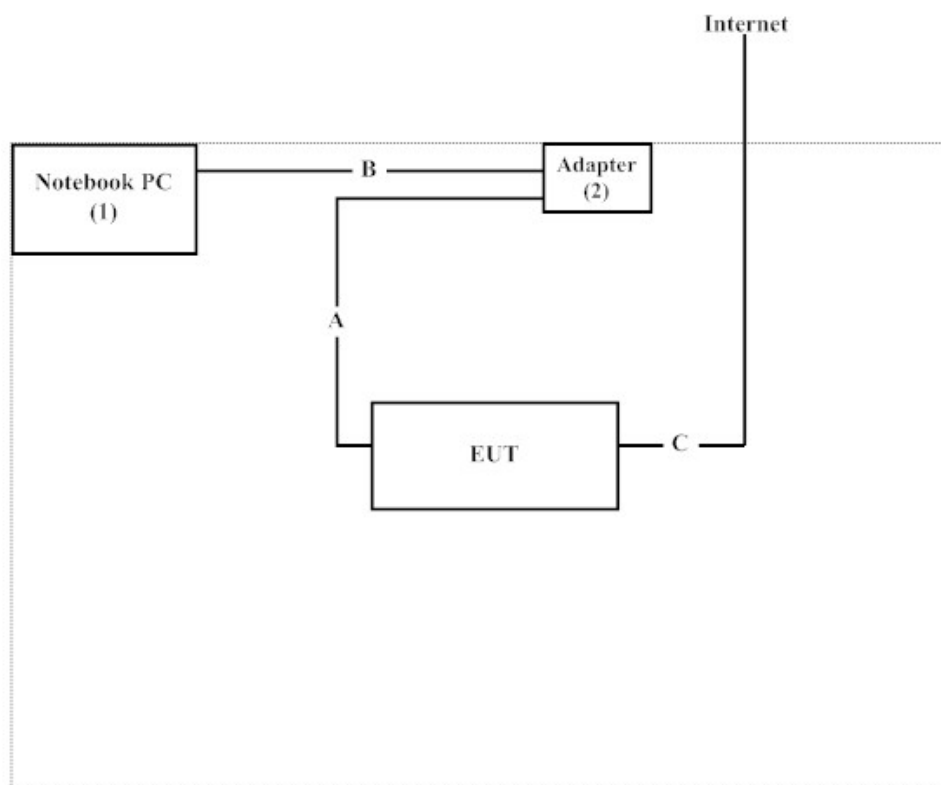
### 1.3. Tested System Details

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

Product	Manufacturer	Model No.	Serial No.	Power Cord
(1) Notebook PC	DELL	PPT	N/A	Non-Shielded, 0.8m
(2) Adapter	BITLOMAT	GFP241DA-240100HB	N/A	Non-Shielded, 0.8m

Signal Cable Type	Signal cable Description
A LAN Cable	Non-Shielded, 1.0m
B LAN Cable	Non-Shielded, 1.0m
C LAN Cable	Non-Shielded, 2.0m

### 1.4. Configuration of Tested System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4.
- (2) Execute Test program (ART.exe v0.9) on the Notebook
- (3) Configure the test mode, the test channel to start the continuous transmit
- (4) Verify that the EUT works properly.



## 1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

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/>

Site Description: File on  
Federal Communications Commission  
FCC Engineering Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046  
Registration Number: 92195

Accreditation on NVLAP  
NVLAP Lab Code: 200533-0

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FCC Accreditation Number: TW1014

## 2. Conducted Emission

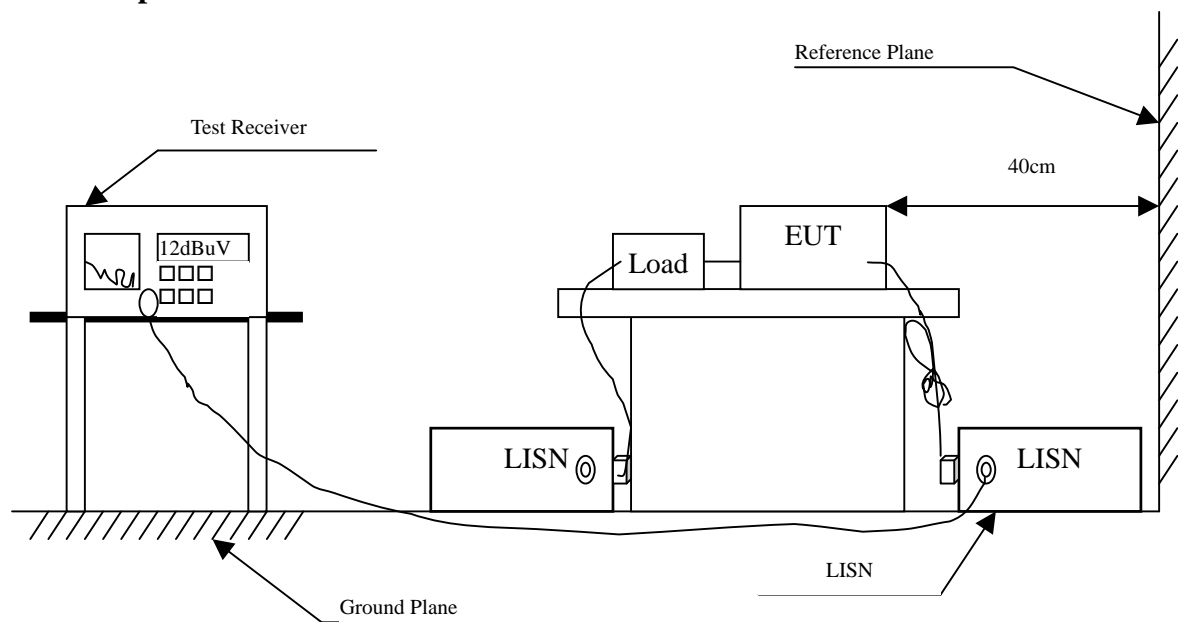
### 2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2012	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2013	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2013	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2013	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2013	
	No.1 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

### 2.2. Test Setup



### 2.3. Limits

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

### 2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2009 on conducted measurement.

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

### 2.5. Uncertainty

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product : WiFi AP  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band) (5755MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>Line 1</b>					
<b>Quasi-Peak</b>					
0.158	9.790	34.240	44.030	-21.741	65.771
0.189	9.790	28.750	38.540	-26.346	64.886
0.244	9.790	25.240	35.030	-28.284	63.314
0.341	9.790	25.530	35.320	-25.223	60.543
0.650	9.790	19.310	29.100	-26.900	56.000
27.220	10.155	17.310	27.465	-32.535	60.000
<b>Average</b>					
0.158	9.790	18.360	28.150	-27.621	55.771
0.189	9.790	14.030	23.820	-31.066	54.886
0.244	9.790	14.450	24.240	-29.074	53.314
0.341	9.790	15.770	25.560	-24.983	50.543
0.650	9.790	11.340	21.130	-24.870	46.000
27.220	10.155	8.730	18.885	-31.115	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : WiFi AP  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band) (5755MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
<b>Line 2</b>					
<b>Quasi-Peak</b>					
0.150	9.770	34.390	44.160	-21.840	66.000
0.201	9.770	27.720	37.490	-27.053	64.543
0.388	9.770	21.730	31.500	-27.700	59.200
0.658	9.770	25.540	35.310	-20.690	56.000
5.826	9.849	14.990	24.839	-35.161	60.000
27.205	10.304	25.960	36.264	-23.736	60.000
<b>Average</b>					
0.150	9.770	19.460	29.230	-26.770	56.000
0.201	9.770	12.530	22.300	-32.243	54.543
0.388	9.770	12.150	21.920	-27.280	49.200
0.658	9.770	15.720	25.490	-20.510	46.000
5.826	9.849	7.730	17.579	-32.421	50.000
27.205	10.304	17.550	27.854	-22.146	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

### 3. Peak Power Output

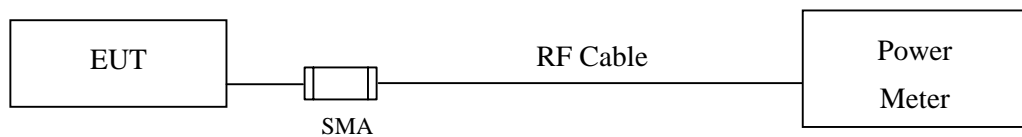
#### 3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2012
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2012

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

#### 3.2. Test Setup



#### 3.3. Limits

The maximum peak power shall be less 1 Watt.

#### 3.4. Test Procedure

The EUT was tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

#### 3.5. Uncertainty

$\pm 1.27$  dB

### 3.6. Test Result of Peak Power Output

Product : WiFi AP  
 Test Item : Peak Power Output Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band)

#### Chain A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4			
		Measurement Level (dBm)										
149	5745	19.81	--	--	--	--	--	--	--	25.32	<30dBm	Pass
157	5785	20.55	20.51	20.47	20.42	20.33	20.29	20.21	20.16	25.42	<30dBm	Pass
165	5825	20.52	--	--	--	--	--	--	--	25.32	<30dBm	Pass

Note: Peak Power Output Value =Reading value on power meter + cable loss

#### Chain B

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4			
		Measurement Level (dBm)										
149	5745	19.52	--	--	--	--	--	--	--	27.02	<30dBm	Pass
157	5785	19.52	19.46	19.42	19.37	19.32	19.26	19.18	19.11	27.04	<30dBm	Pass
165	5825	19.52	--	--	--	--	--	--	--	26.97	<30dBm	Pass

Note: Peak Power Output Value =Reading value on power meter + cable loss

## CHAIN A+B

Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
149	5745	14.4	25.32	27.02	29.26	<30dBm	Pass
157	5785	14.4	25.42	27.04	29.32	<30dBm	Pass
165	5825	14.4	25.32	26.97	29.23	<30dBm	Pass

Note: Peak Power Output Value =Reading value on power meter + cable loss



Product : WiFi AP  
 Test Item : Peak Power Output Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band)

#### Chain A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		30	60	90	120	180	240	270	300	30		
		Measurement Level (dBm)										
151	5755	20.91	--	--	--	--	--	--	--	25.50	<30dBm	Pass
159	5795	21.52	21.49	21.44	21.39	21.33	21.26	21.19	21.12	25.48	<30dBm	Pass

Note: Peak Power Output Value =Reading value on power meter + cable loss

#### Chain B

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		30	60	90	120	180	240	270	300	30		
		Measurement Level (dBm)										
151	5755	19.64	--	--	--	--	--	--	--	27.11	<30dBm	Pass
159	5795	19.96	19.88	19.82	19.74	19.71	19.65	19.61	19.54	27.05	<30dBm	Pass

Note: Peak Power Output Value =Reading value on power meter + cable loss

## CHAIN A+B

Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
151	5755	30	25.50	27.11	29.39	<30dBm	Pass
159	5795	30	25.48	27.05	29.35	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

## 4. Radiated Emission

### 4.1. Test Equipment

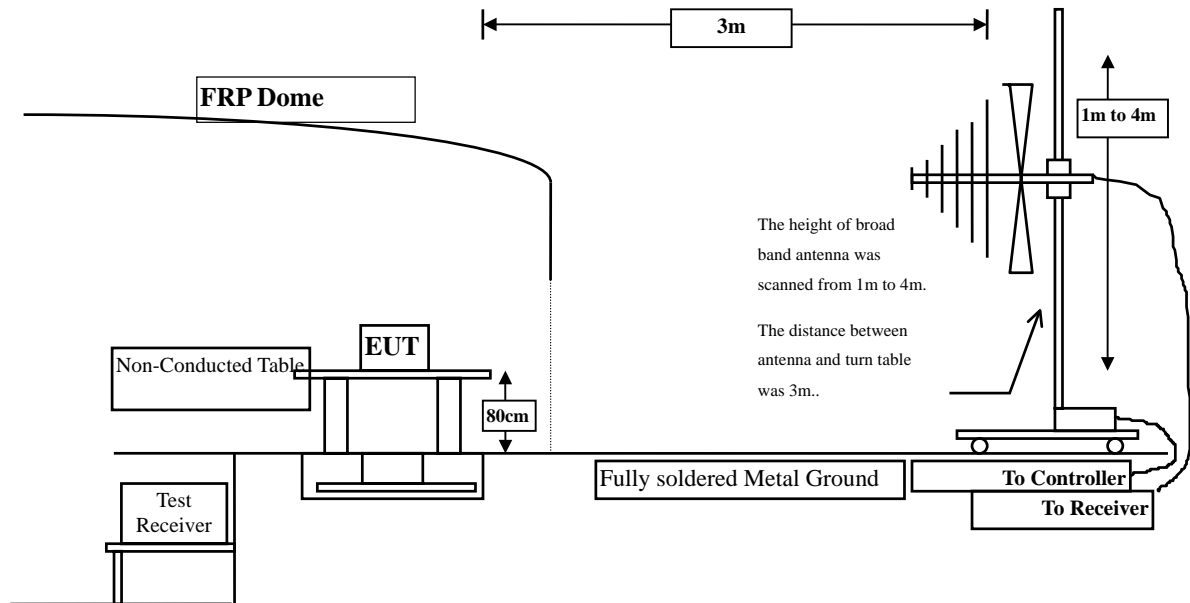
The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input checked="" type="checkbox"/> Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2012
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2012
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2013
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

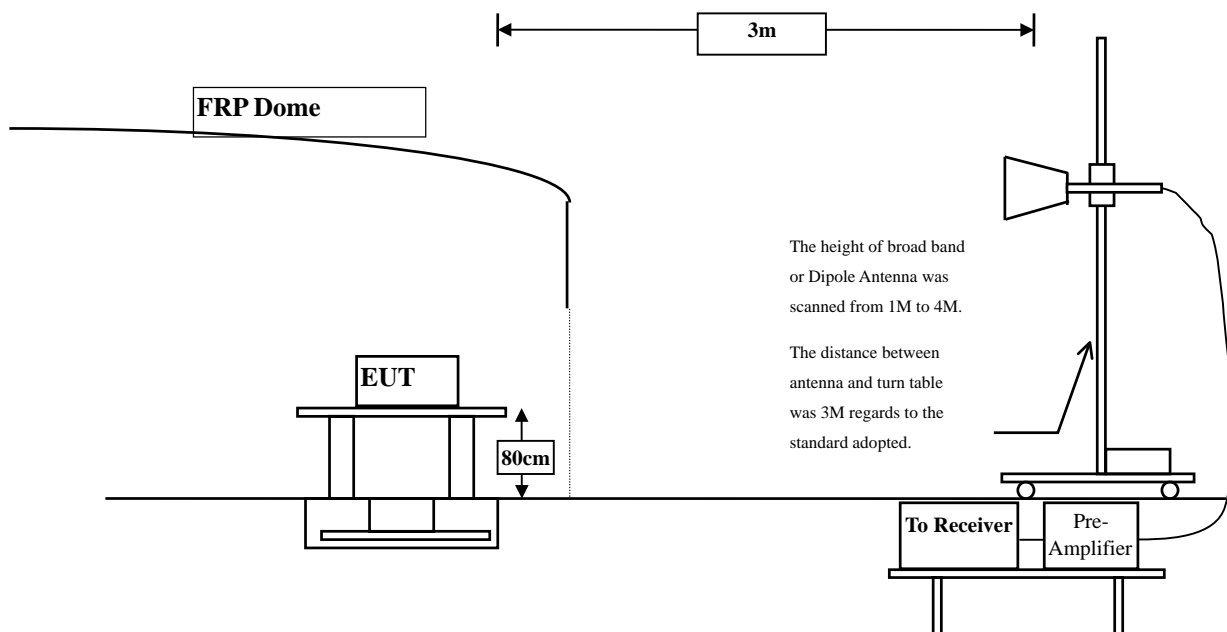
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
  2. The test instruments marked with "X" are used to measure the final test results.

## 4.2. Test Setup

### Radiated Emission Below 1GHz



### Radiated Emission Above 1GHz



### 4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

#### **4.4. Test Procedure**

The EUT was setup according to ANSI C63.10, 2009 and tested according to DTS test procedure of ANSI C63.10, 2009 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 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 between 1 meter and 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 C63.10, 2009 on radiated measurement.

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

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range from 30MHz - 10th Harmonic of fundamental was investigated.

#### **4.5. Uncertainty**

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

#### 4.6. Test Result of Radiated Emission

Product : WiFi AP  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band) (5745MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
11490.000	17.106	42.900	60.007	-13.993	74.000
<b>Average Detector:</b>					
11490.000	17.106	28.040	45.147	-8.853	54.000
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
11490.000	18.034	42.220	60.255	-13.745	74.000
<b>Average Detector:</b>					
11490.000	18.034	26.590	44.625	-9.375	54.000
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WiFi AP  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band) (5785 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
11570.000	16.809	43.210	60.019	-13.981	74.000
<b>Average Detector:</b>					
11570.000	16.809	28.010	44.819	-9.181	54.000
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
11570.000	17.698	45.070	62.768	-11.232	74.000
<b>Average Detector:</b>					
11570.000	17.698	29.360	47.058	-6.942	54.000
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product : WiFi AP  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band) (5825 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
11650.000	16.158	41.060	57.218	-16.782	74.000
<b>Average Detector:</b>					
11650.000	16.158	26.020	42.178	-11.822	54.000
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
11650.000	17.274	43.050	60.325	-13.675	74.000
<b>Average Detector:</b>					
11650.000	17.274	27.960	45.235	-8.765	54.000
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WiFi AP  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band) (5755MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
11510.000	17.124	40.930	58.054	-15.946	74.000
<b>Average Detector:</b>					
11510.000	17.124	24.490	41.614	-12.386	54.000
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
11510.000	18.081	42.540	60.621	-13.379	74.000
<b>Average Detector:</b>					
11510.000	18.081	25.550	43.631	-10.369	54.000
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WiFi AP  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band) (5795 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
11590.000	16.701	41.790	58.490	-15.510	74.000
<b>Average Detector:</b>					
11590.000	16.701	25.060	41.760	-12.240	54.000
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
11590.000	17.567	43.150	60.716	-13.284	74.000
<b>Average Detector:</b>					
11590.000	17.567	25.030	42.596	-11.404	54.000
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WiFi AP  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band) (5785 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
132.820	-10.230	46.341	36.111	-7.389	43.500
249.220	-6.014	46.031	40.017	-5.983	46.000
499.480	0.048	37.406	37.454	-8.546	46.000
650.800	2.175	33.102	35.277	-10.723	46.000
800.180	5.141	29.808	34.949	-11.051	46.000
875.840	5.271	28.291	33.562	-12.438	46.000
<b>Vertical</b>					
249.220	-7.634	45.214	37.580	-8.420	46.000
373.380	-2.373	42.099	39.726	-6.274	46.000
499.480	-0.852	36.557	35.705	-10.295	46.000
689.600	2.538	31.454	33.992	-12.008	46.000
829.280	2.864	26.746	29.610	-16.390	46.000
941.800	6.585	30.530	37.115	-8.885	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : WiFi AP  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band) (5755MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
150.280	-10.194	44.179	33.985	-9.515	43.500
414.120	-3.242	39.826	36.584	-9.416	46.000
610.060	4.101	36.261	40.362	-5.638	46.000
689.600	3.628	31.454	35.082	-10.918	46.000
829.280	6.344	26.746	33.090	-12.910	46.000
941.800	6.435	32.625	39.060	-6.940	46.000
<b>Vertical</b>					
132.820	-4.440	36.679	32.239	-11.261	43.500
249.220	-7.634	38.130	30.496	-15.504	46.000
396.660	-4.356	41.019	36.663	-9.337	46.000
532.460	-0.563	32.676	32.113	-13.887	46.000
800.180	2.801	32.159	34.960	-11.040	46.000
889.420	2.512	32.369	34.881	-11.119	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

## 5. RF antenna conducted test

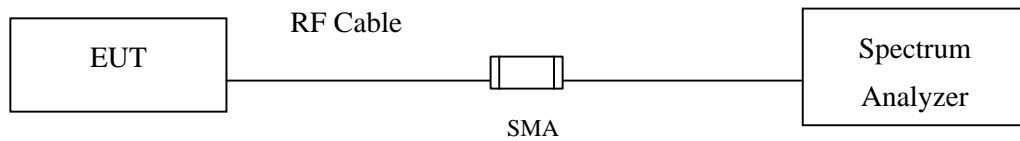
### 5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
  2. The test instruments marked with "X" are used to measure the final test results.

### 5.2. Test Setup

#### RF antenna Conducted Measurement:



### 5.3. Limits

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

### 5.4. Test Procedure

The EUT was tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

## 5.5. Uncertainty

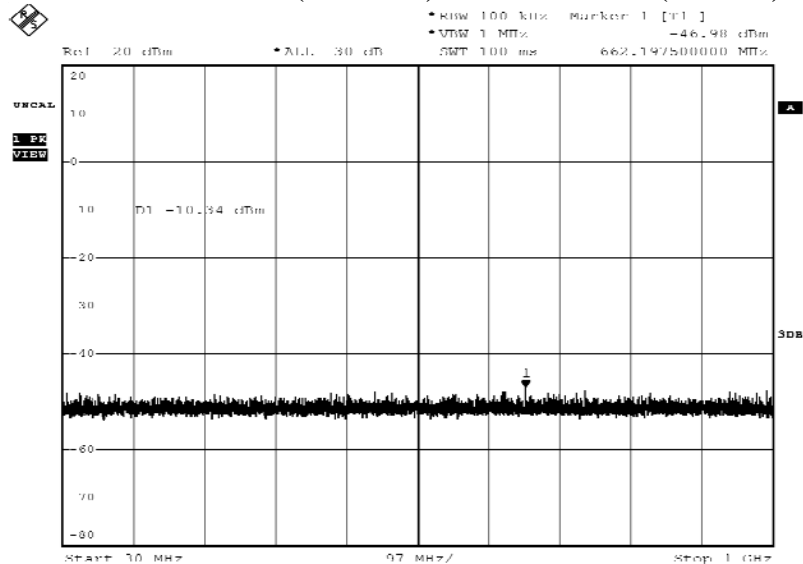
The measurement uncertainty

Conducted is defined as  $\pm 1.27\text{dB}$

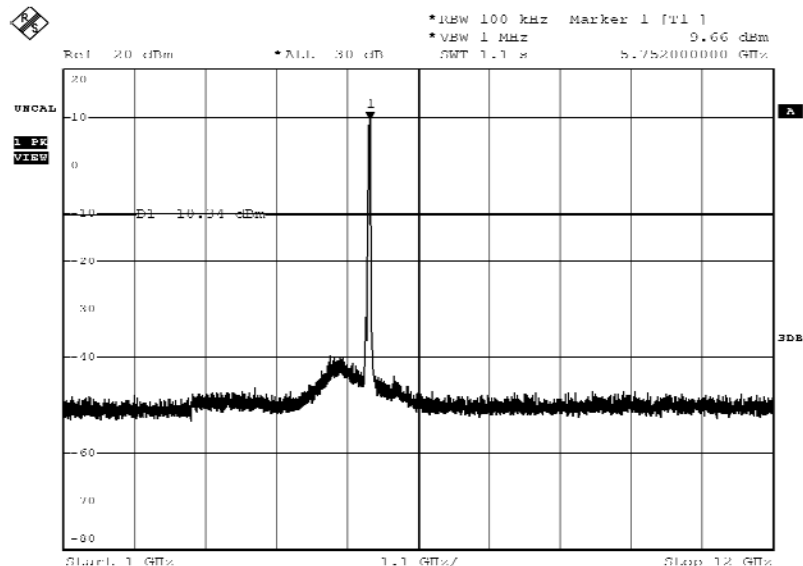
## 5.6. Test Result of RF antenna conducted test

Product : WiFi AP  
 Test Item : RF Antenna Conducted Spurious  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band)

### Channel 49 (5745MHz) 30MHz -40GHz- (Chain A)

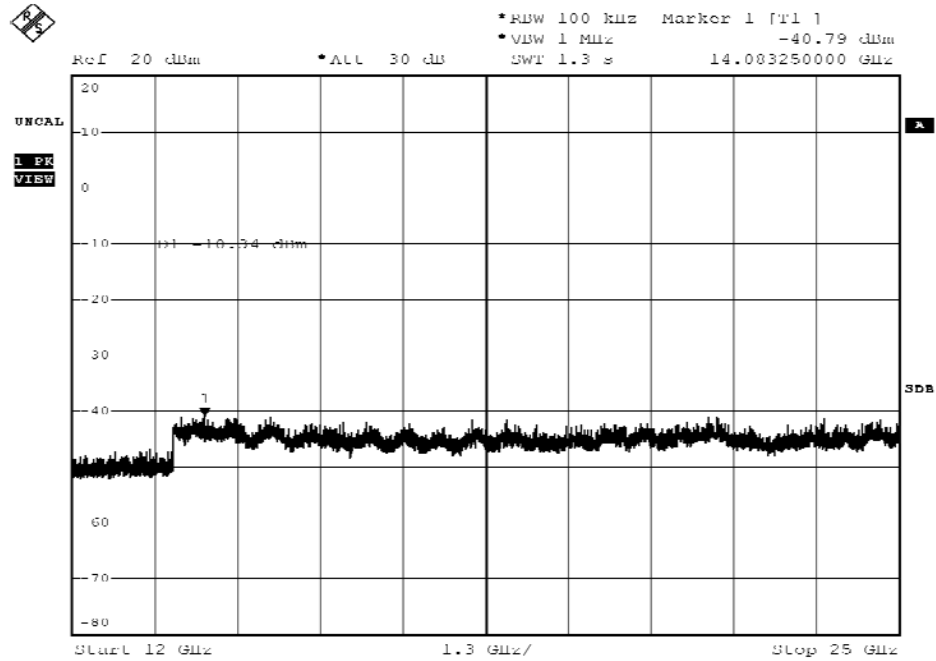


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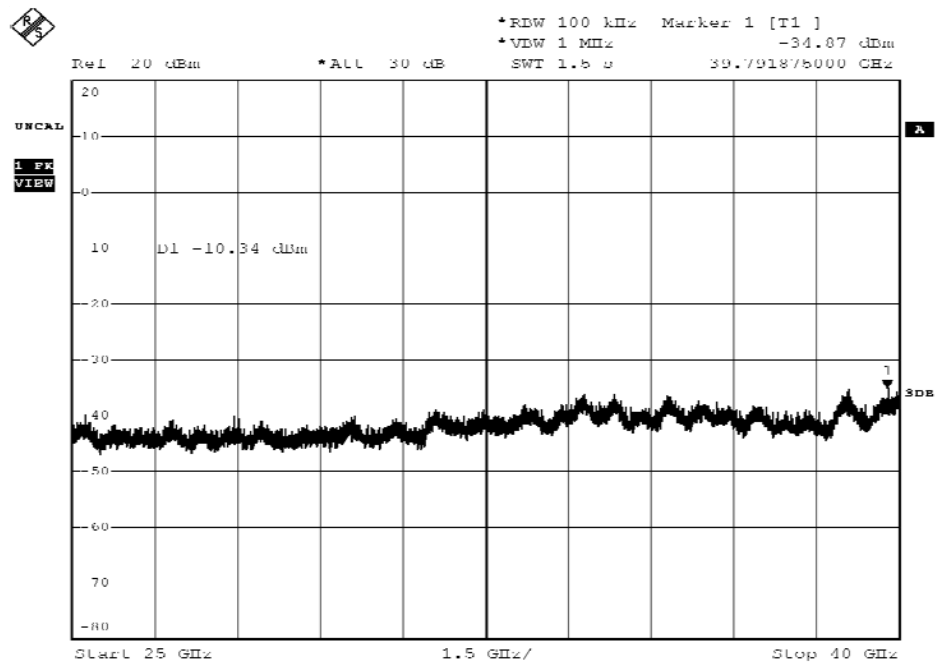


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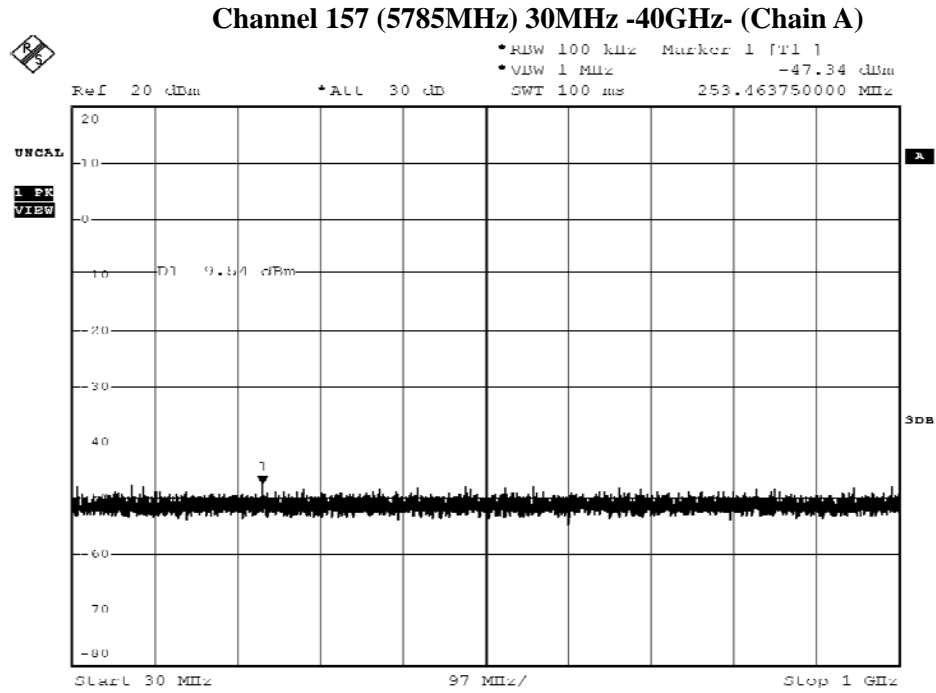




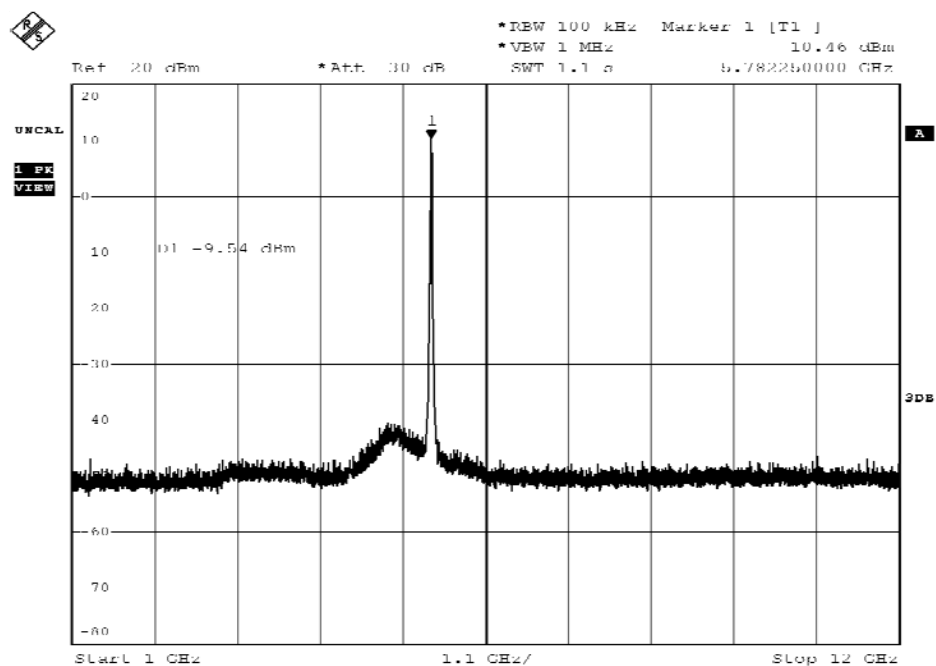
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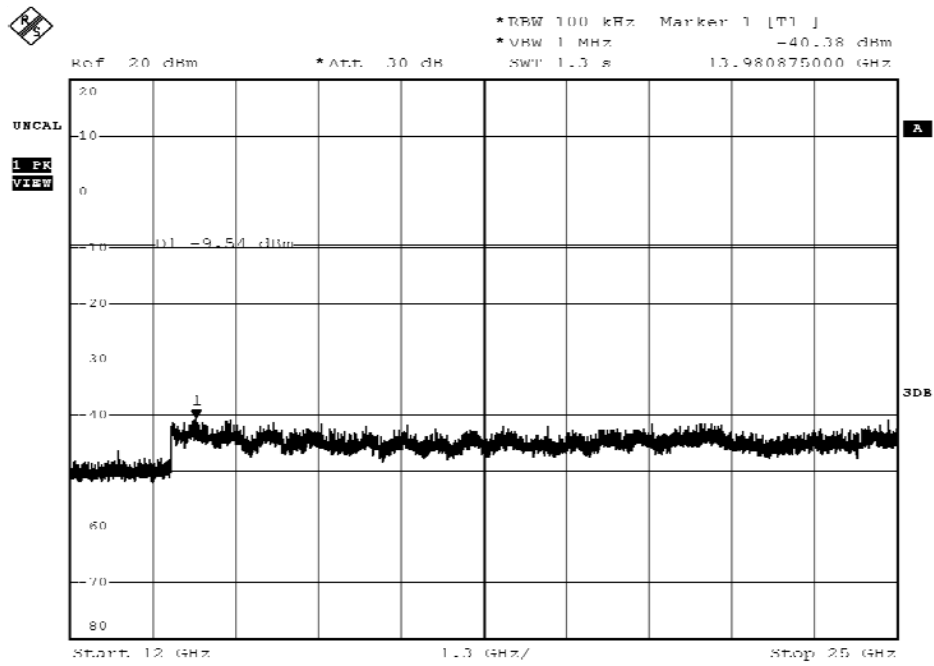
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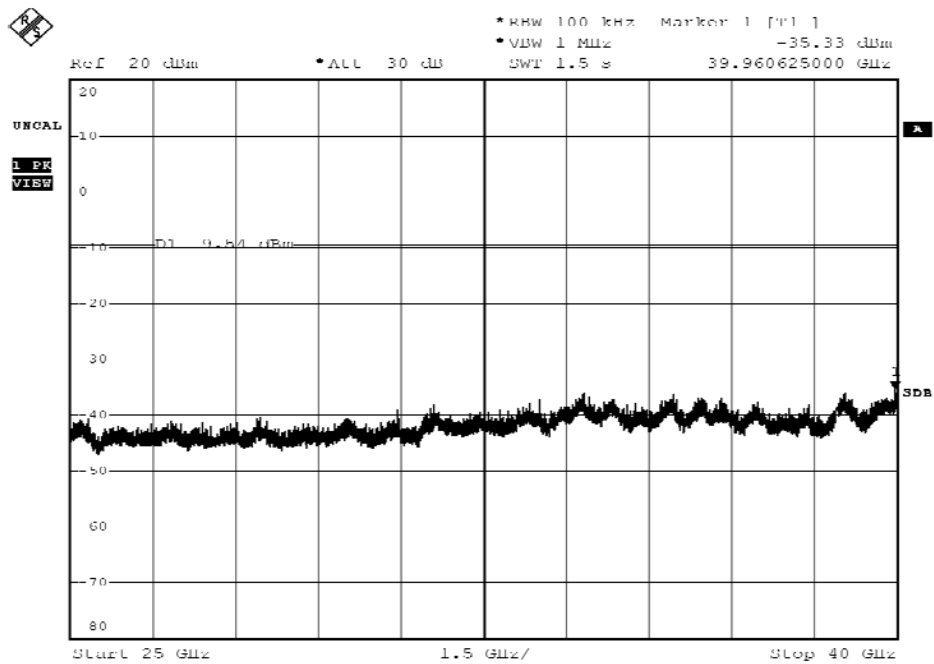
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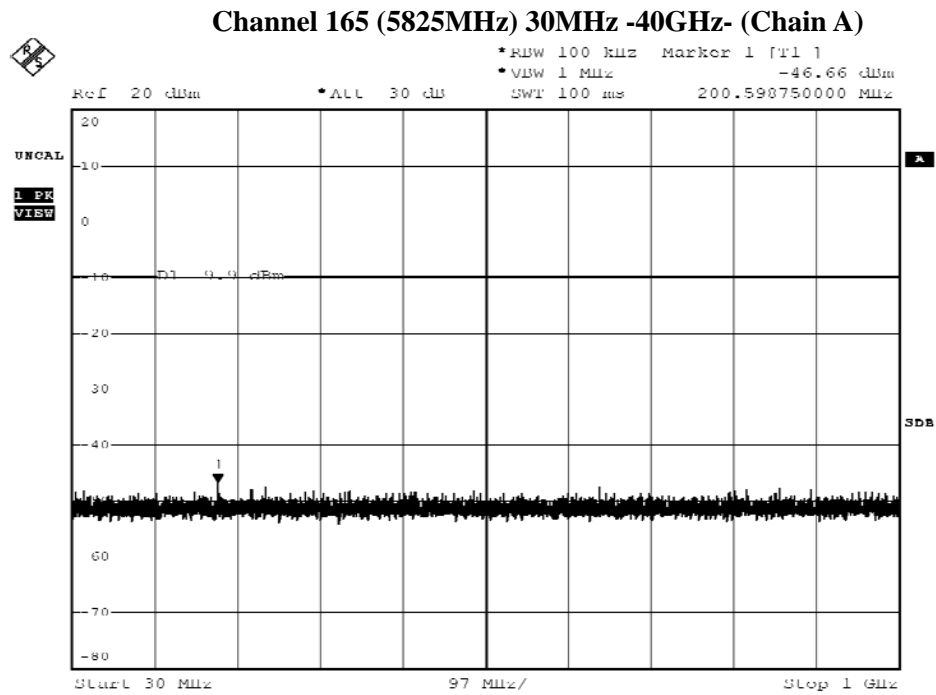
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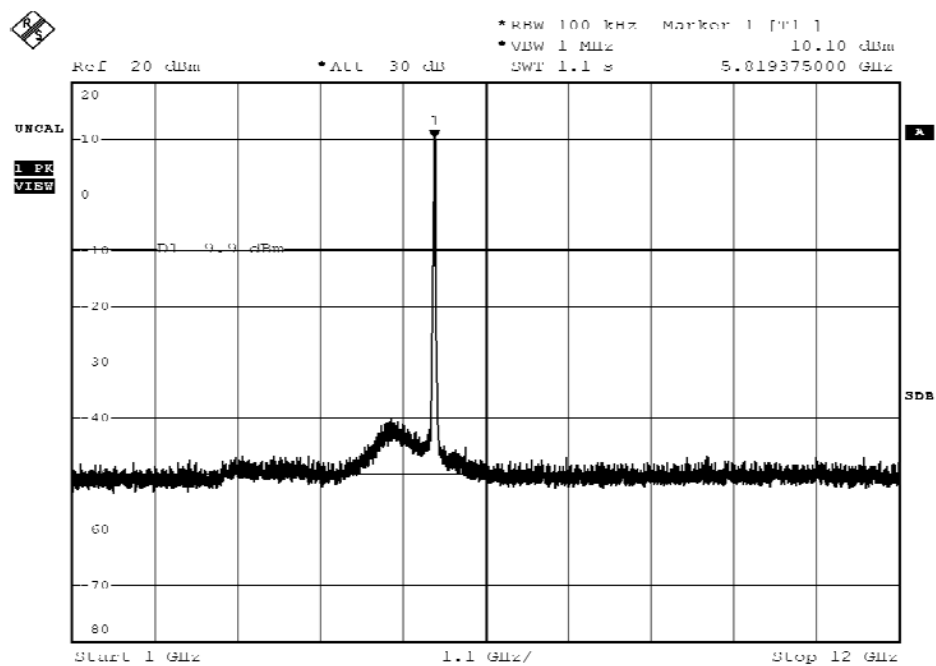
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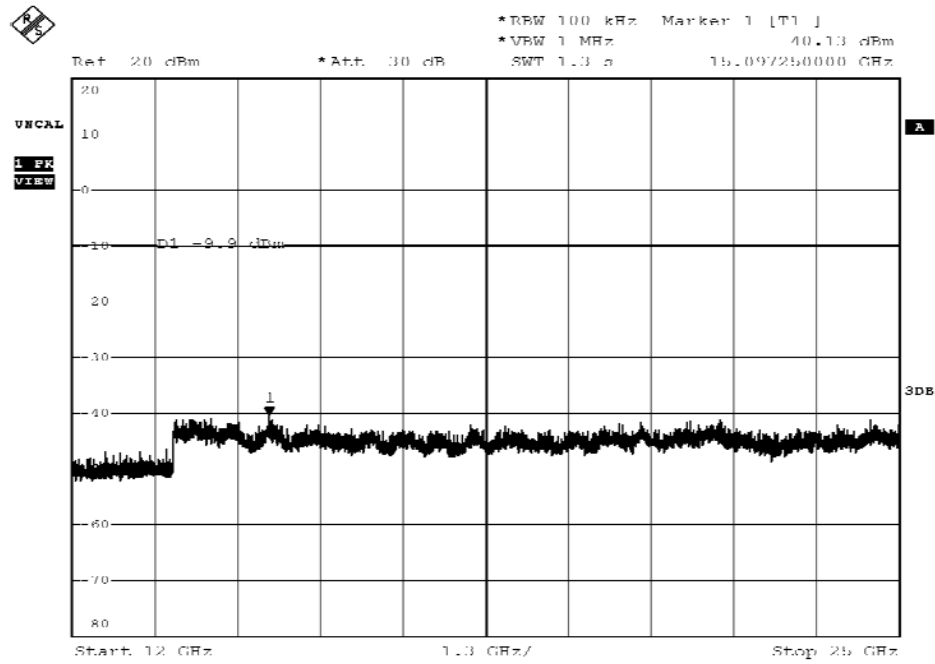
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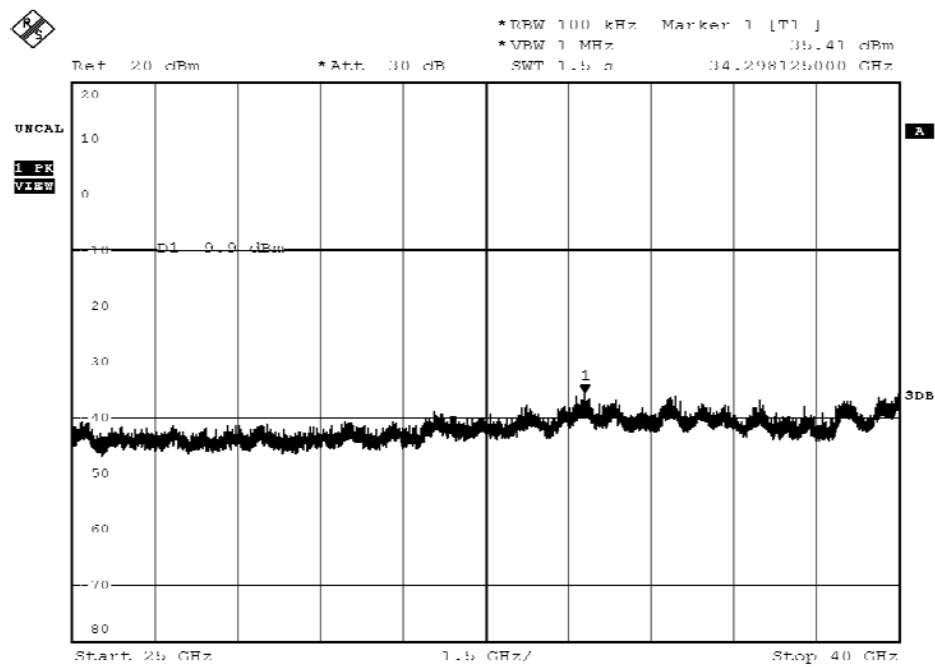
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Date: 11.MAR.2013 16:34:03

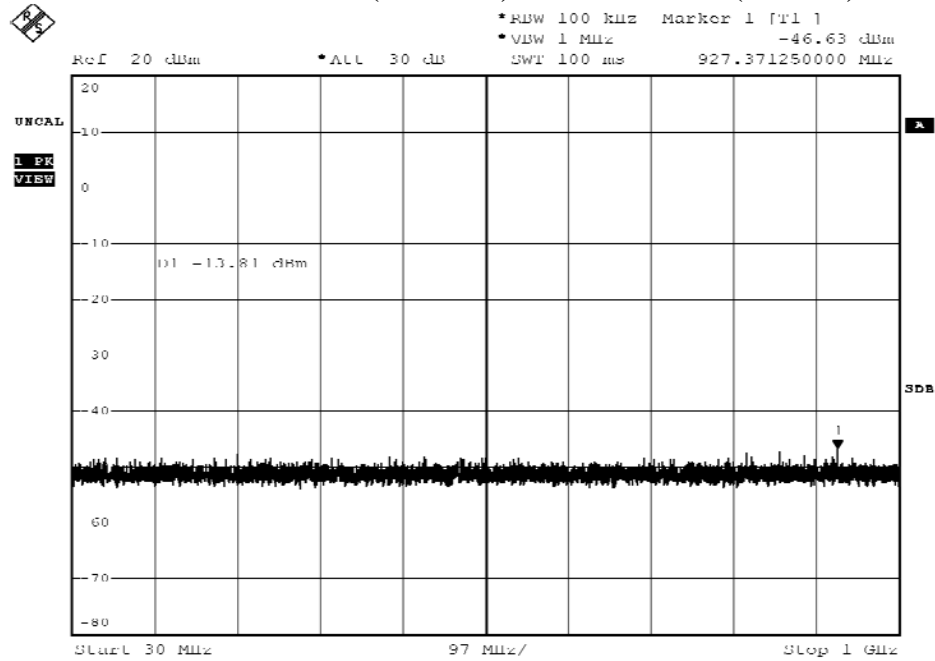


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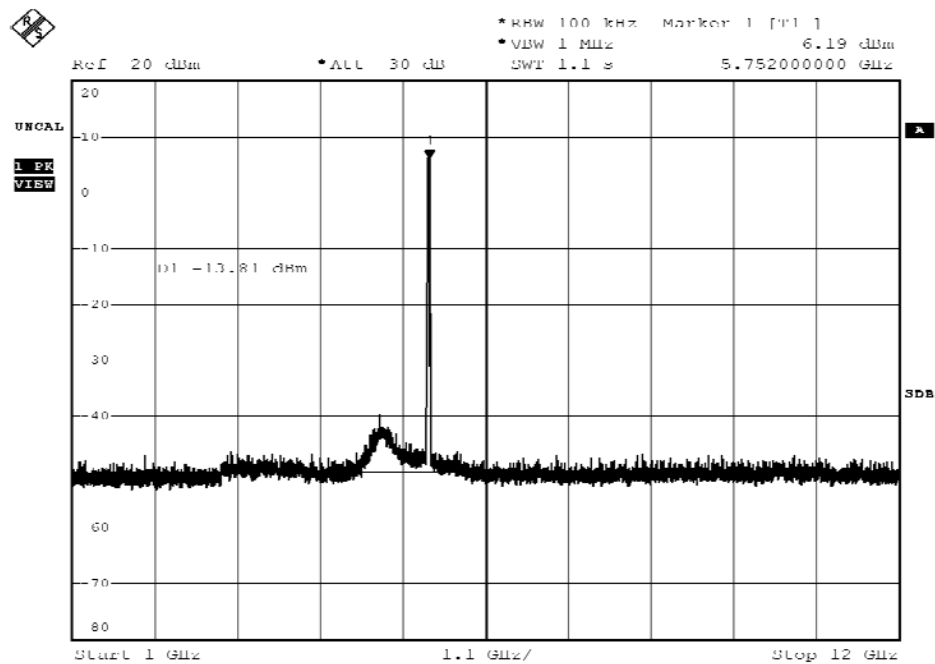


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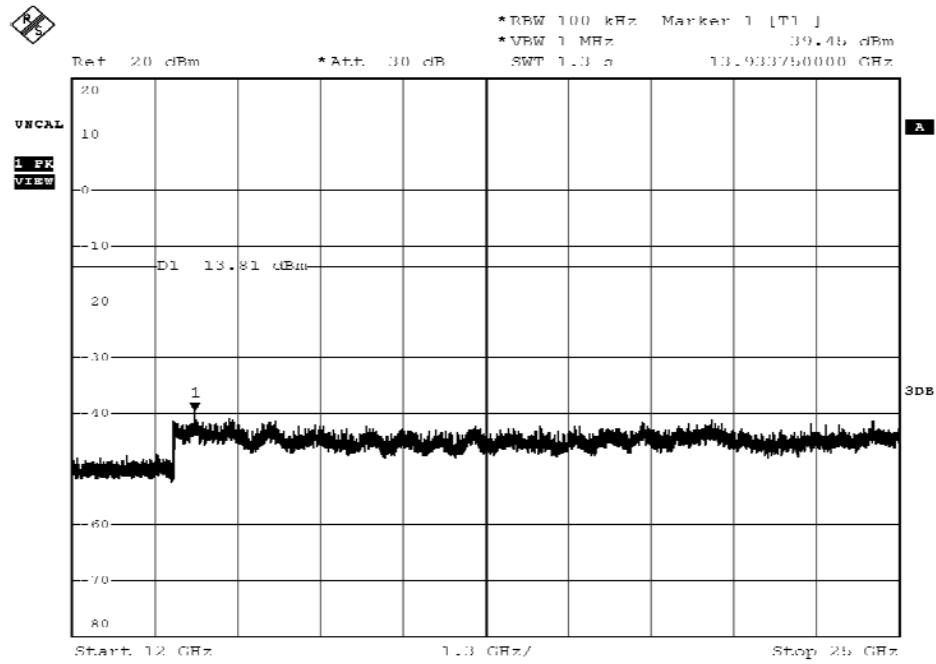
### Channel 49 (5745MHz) 30MHz -40GHz- (Chain B)



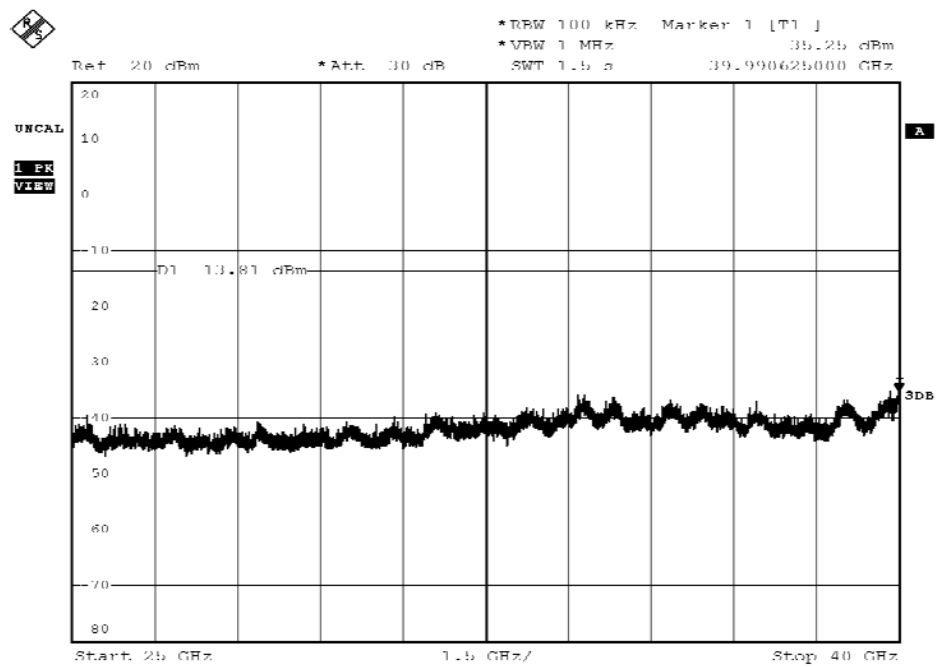
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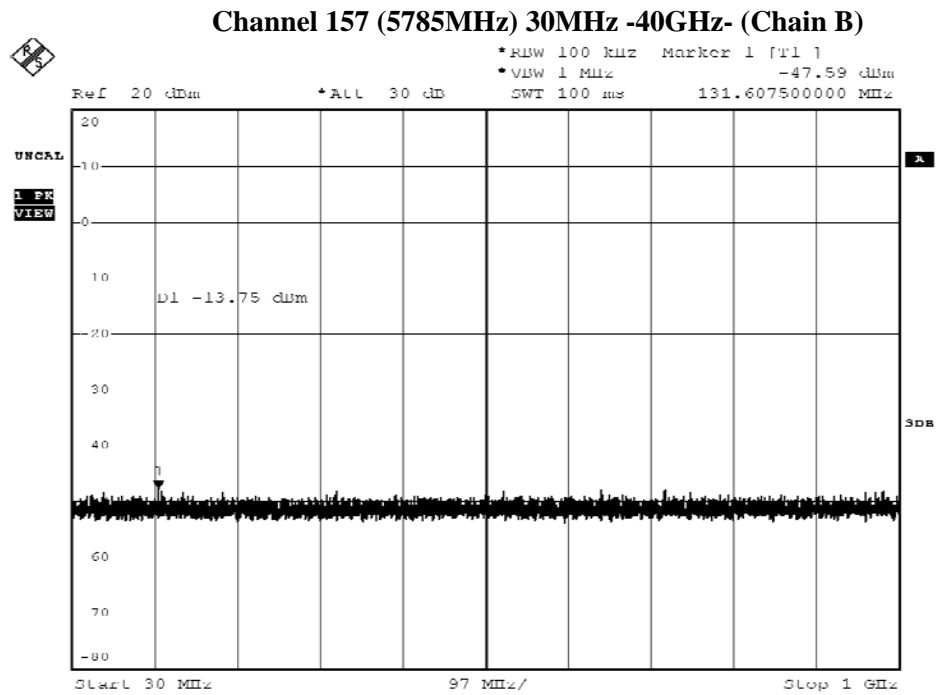
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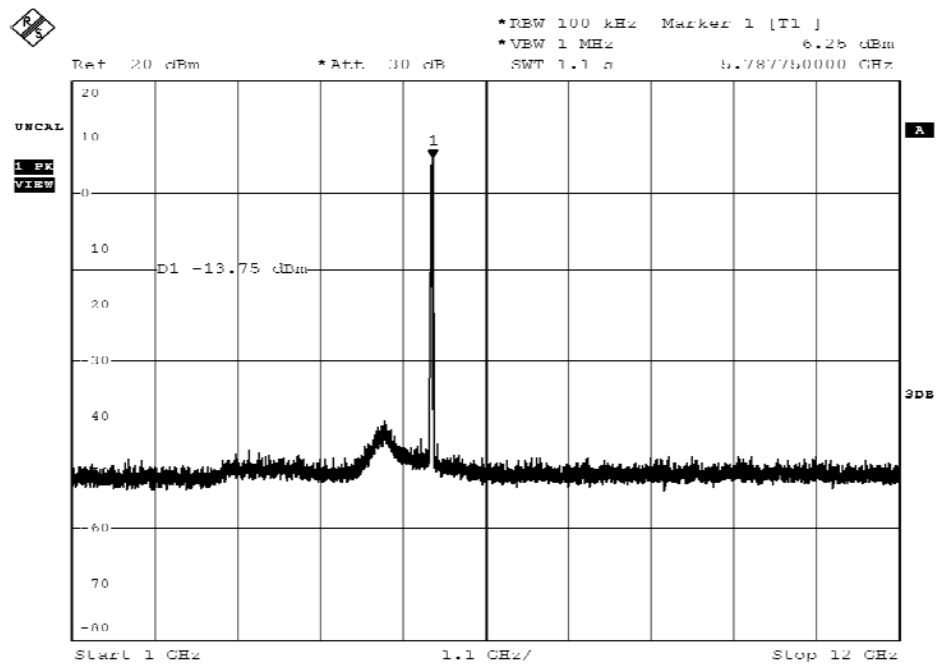
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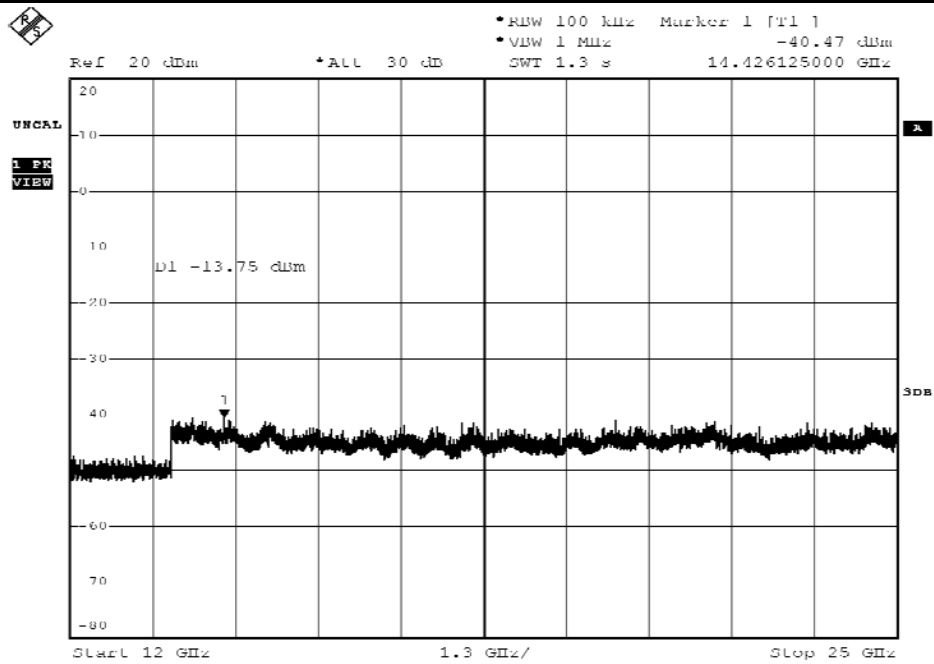


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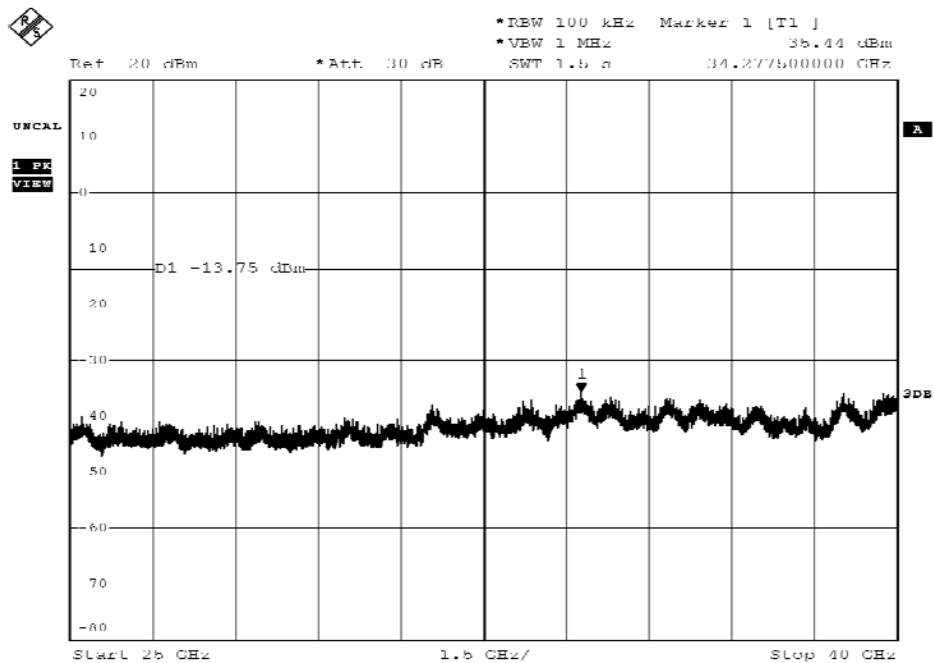


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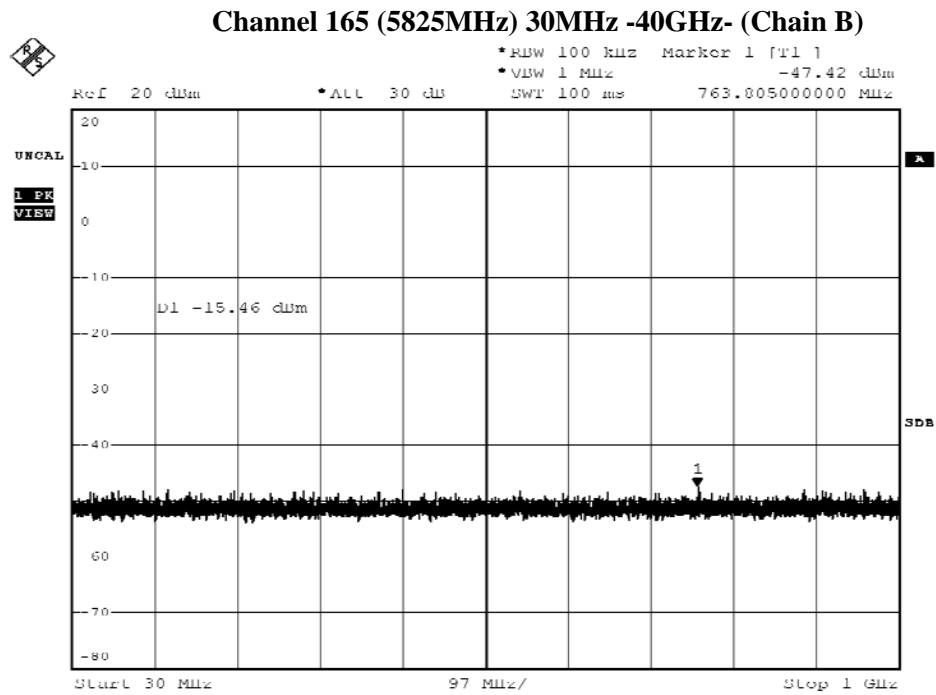




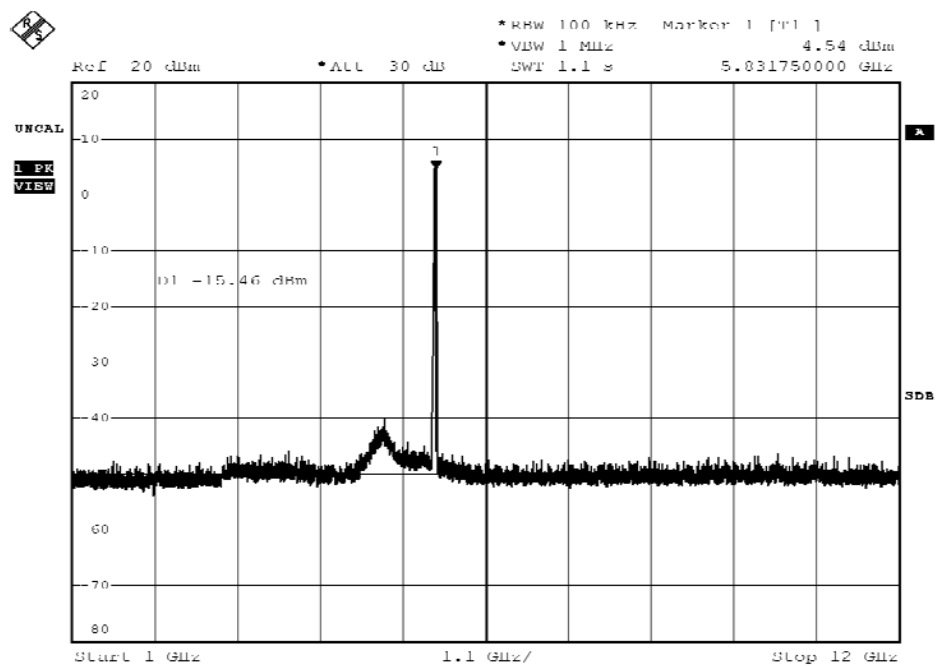
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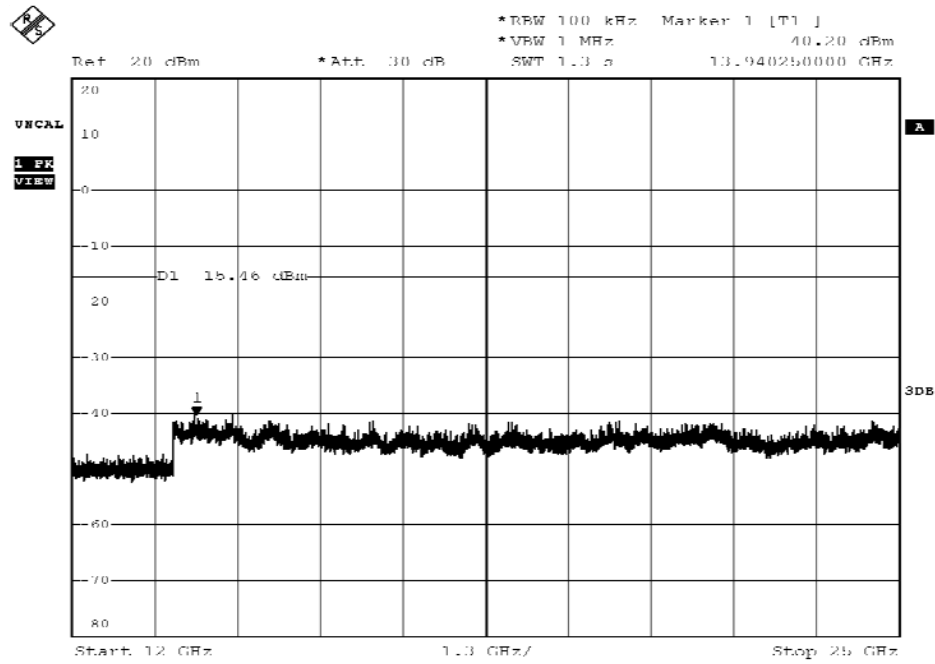
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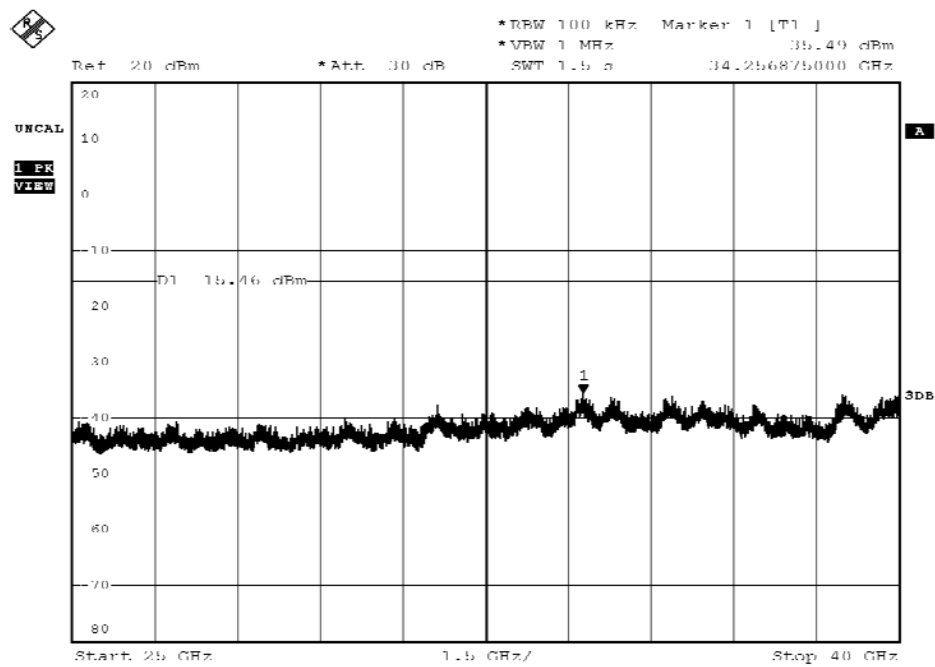
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Date: 11.MAR.2013 16:37:39



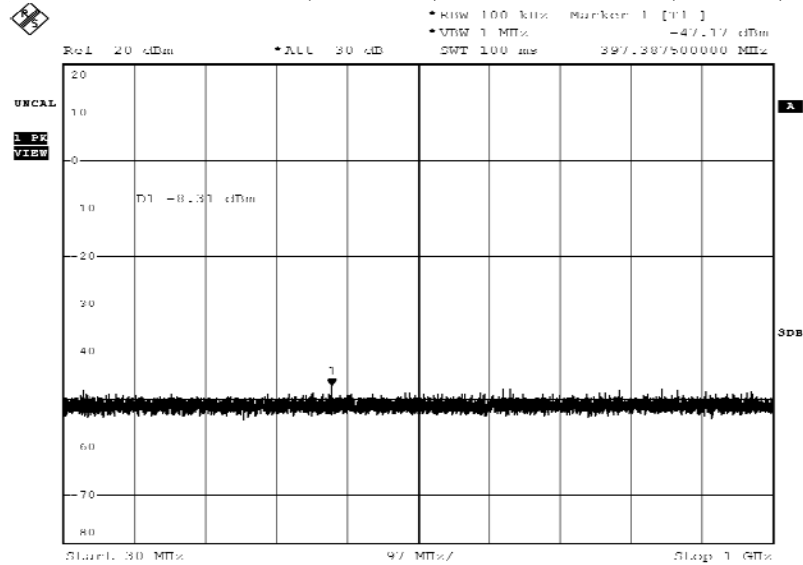
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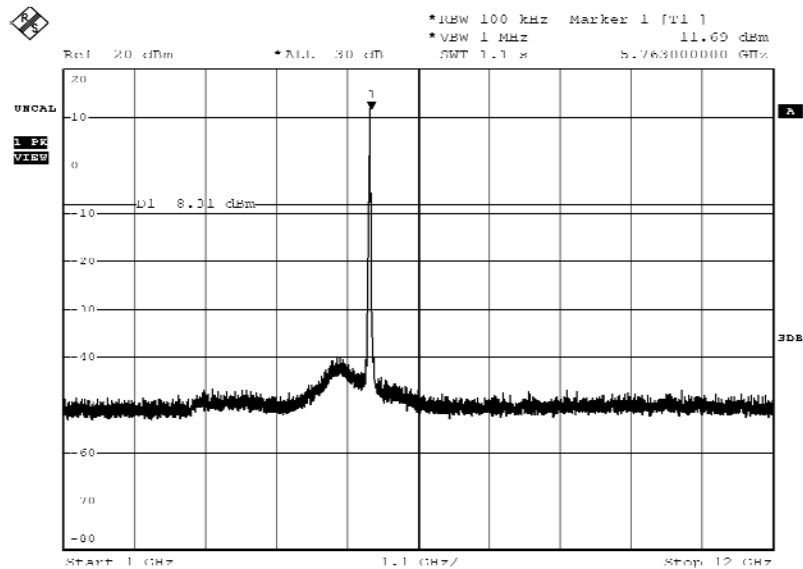
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Product : WiFi AP  
 Test Item : RF Antenna Conducted Spurious  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band)

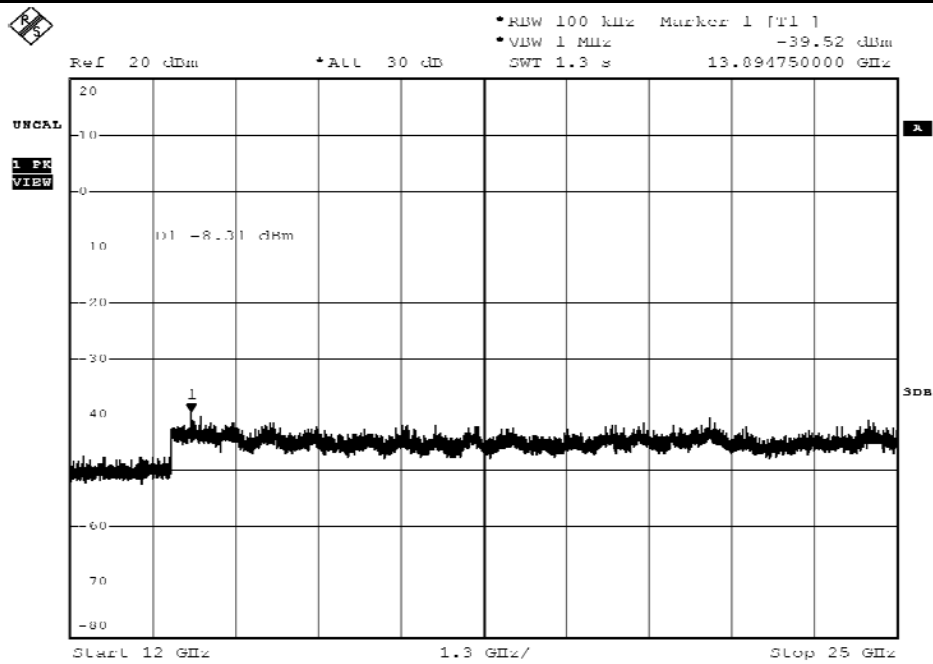
**Channel 151 (5755MHz) 30MHz -40GHz- (Chain A)**



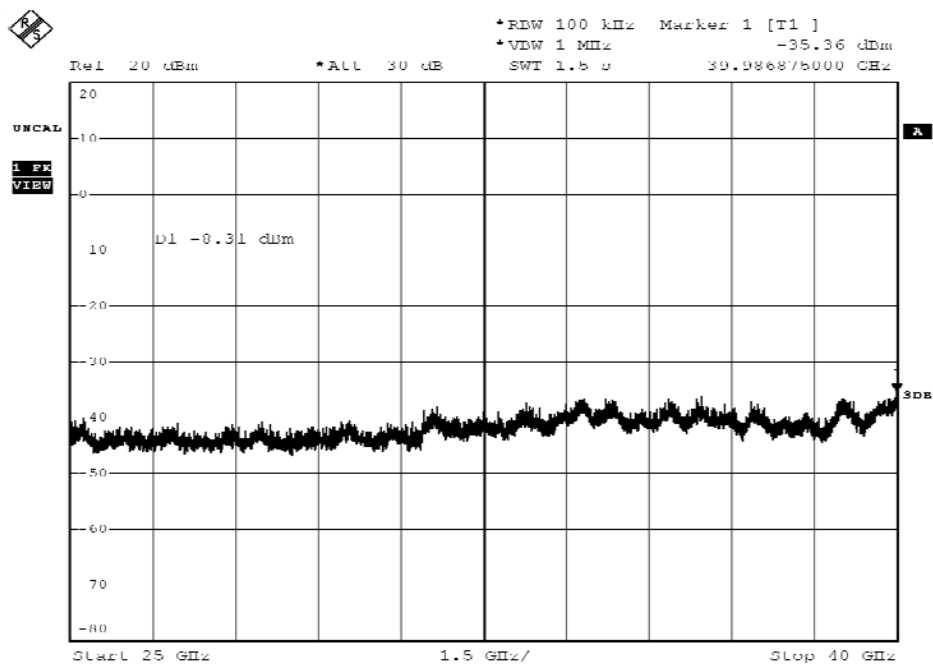
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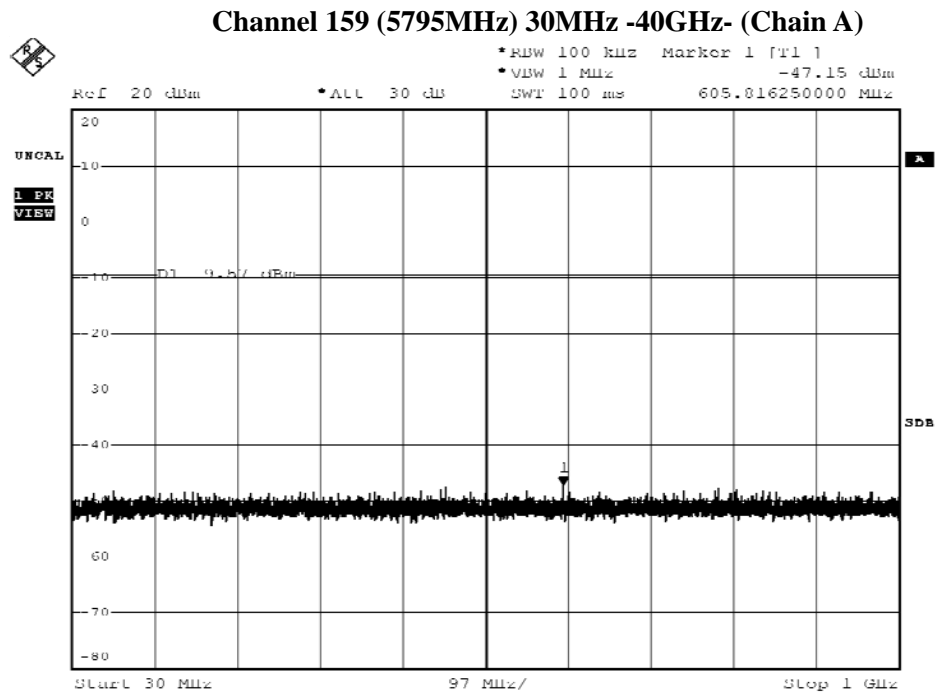
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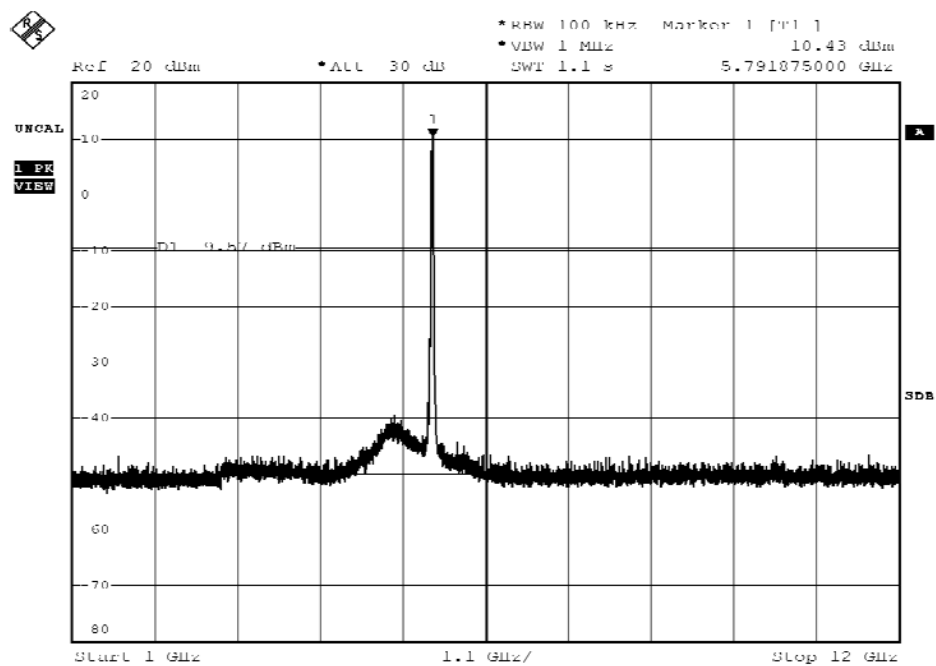
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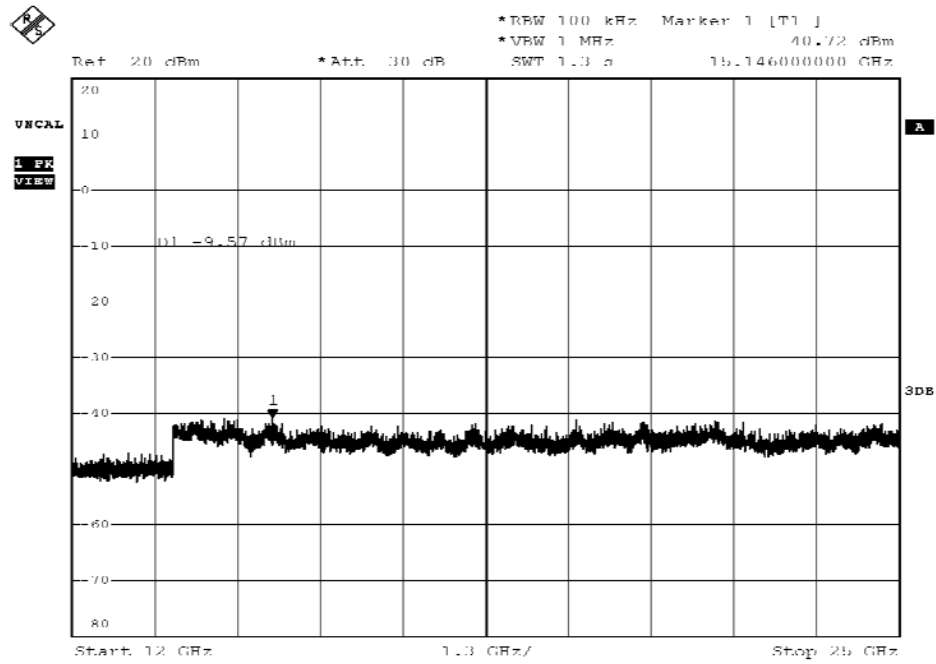
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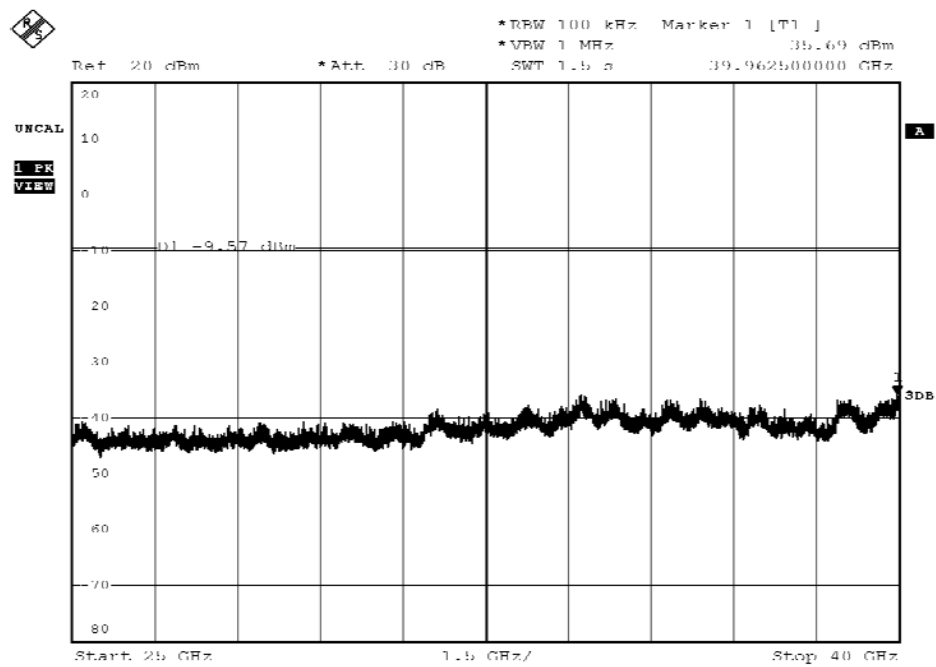
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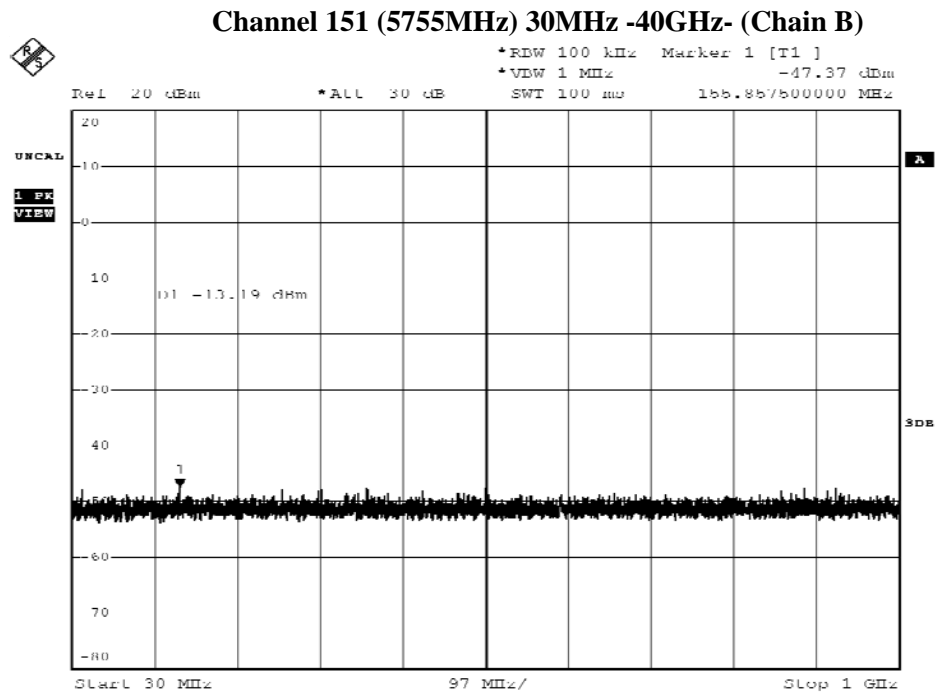
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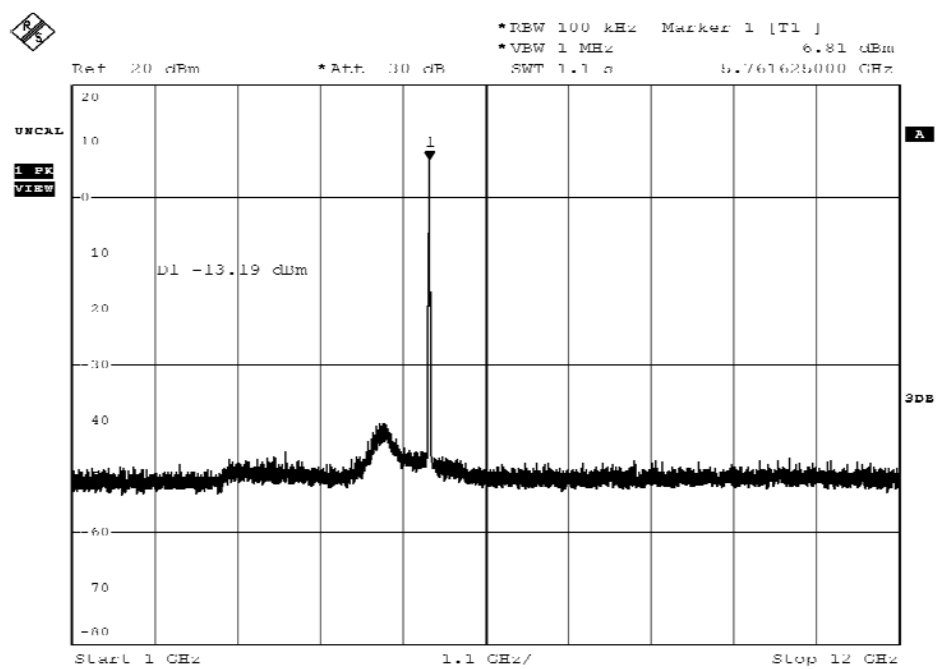
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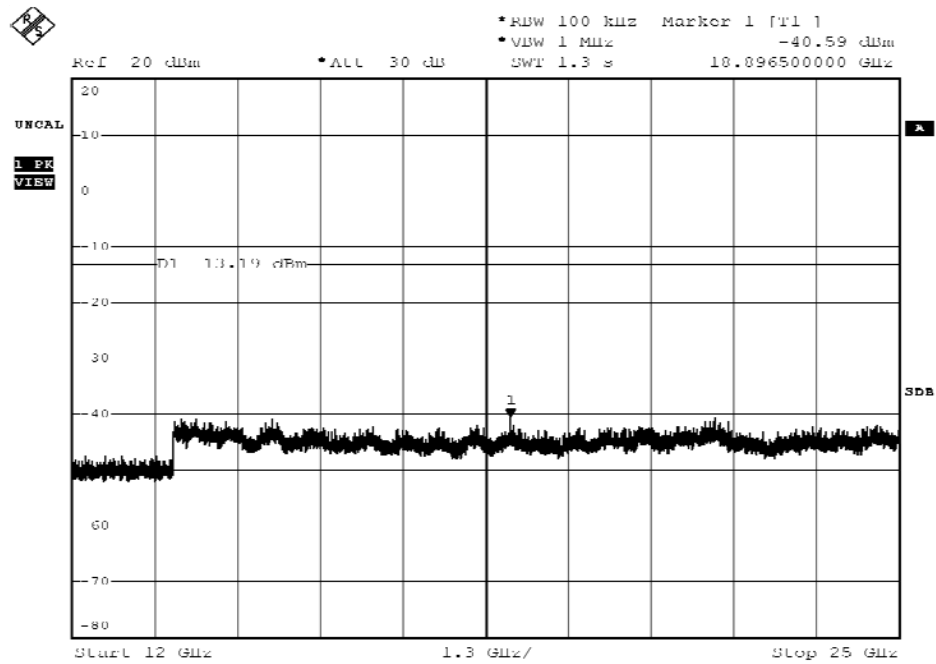


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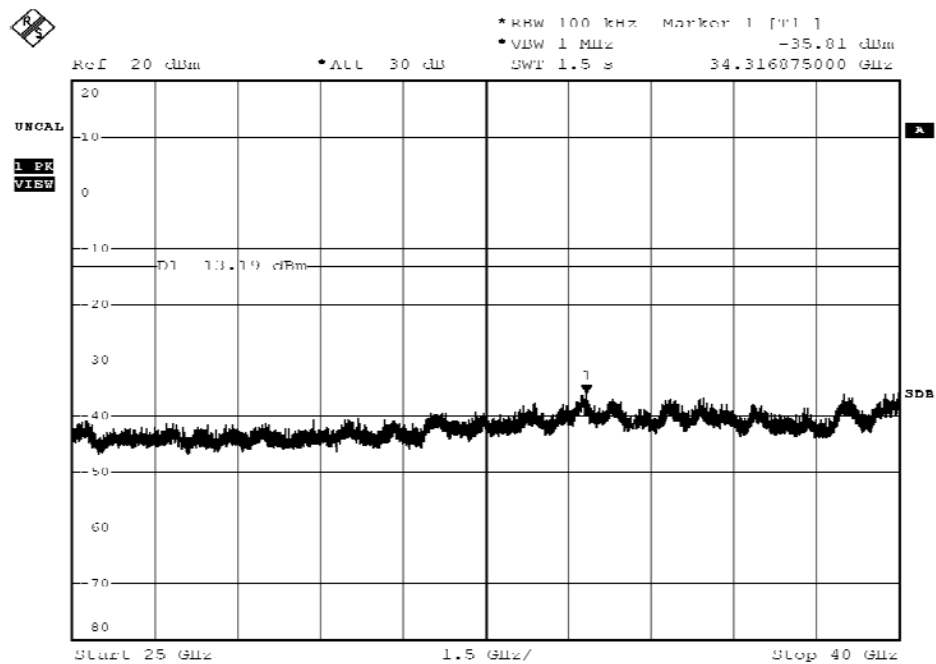


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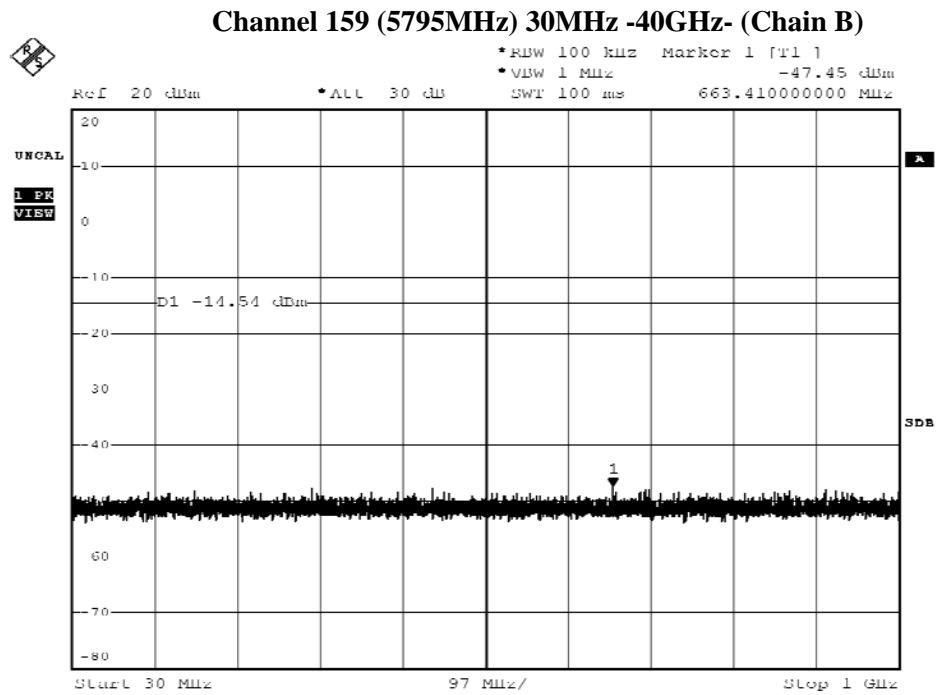




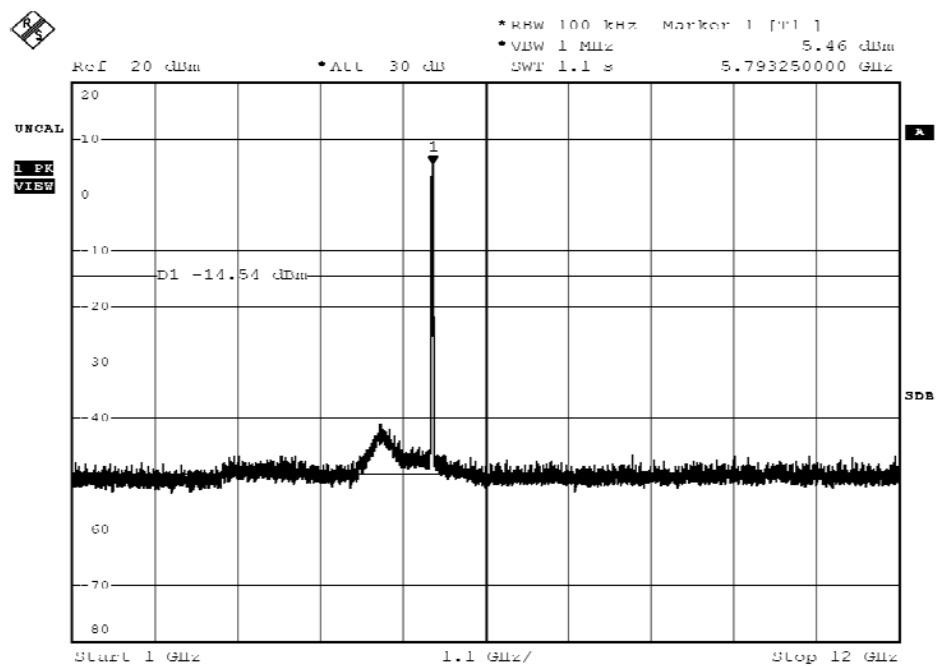
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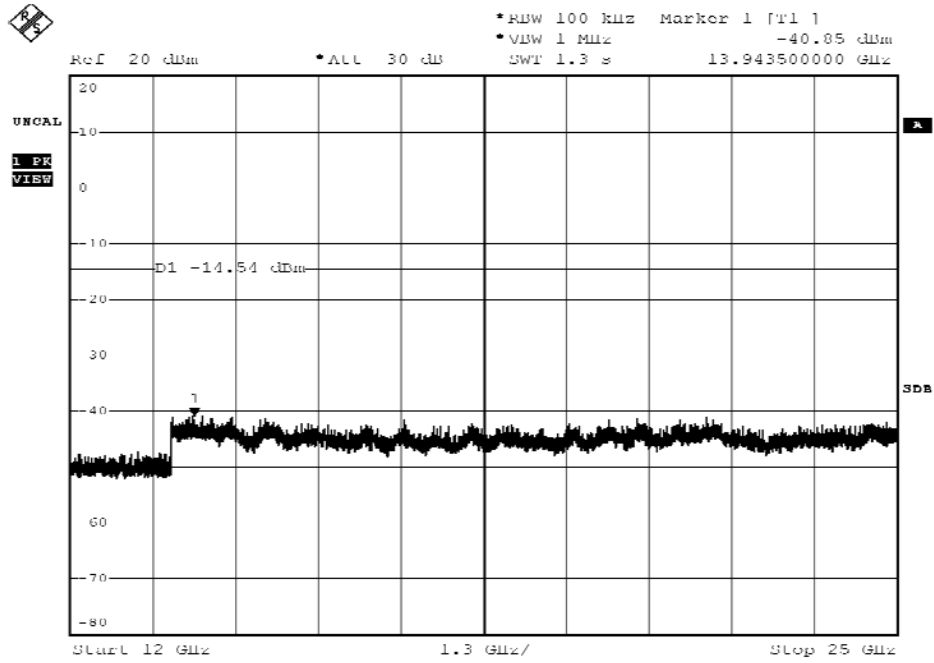
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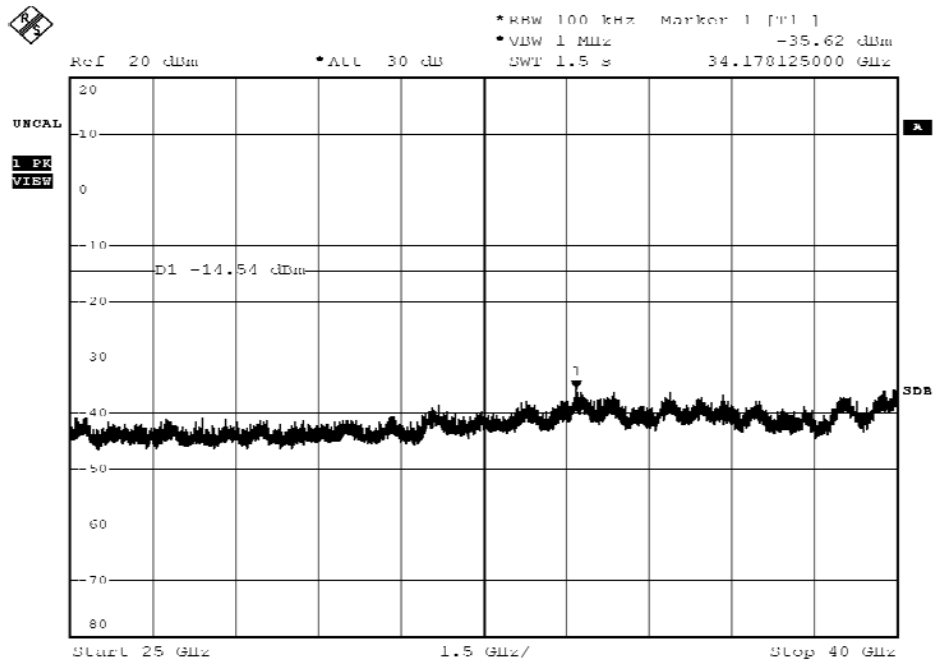
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Date: 11.MAR.2013 16:56:36



Date: 11.MAR.2013 16:58:11



Date: 11.MAR.2013 16:58:59

## 6. Band Edge

### 6.1. Test Equipment

#### RF Conducted Measurement

The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013
	8-WAY Power Divider	JFW	50PD-647 / 526770 0916	Apr., 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

#### RF Radiated Measurement:

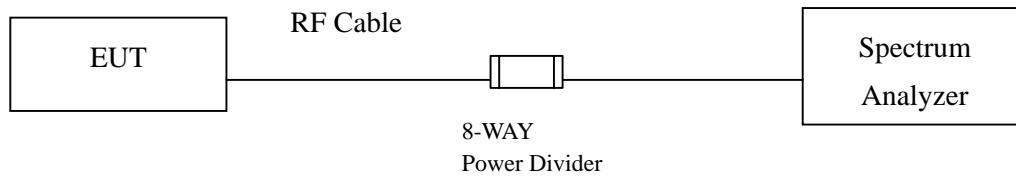
The following test equipments are used during the band edge tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2012
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2012
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2013
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

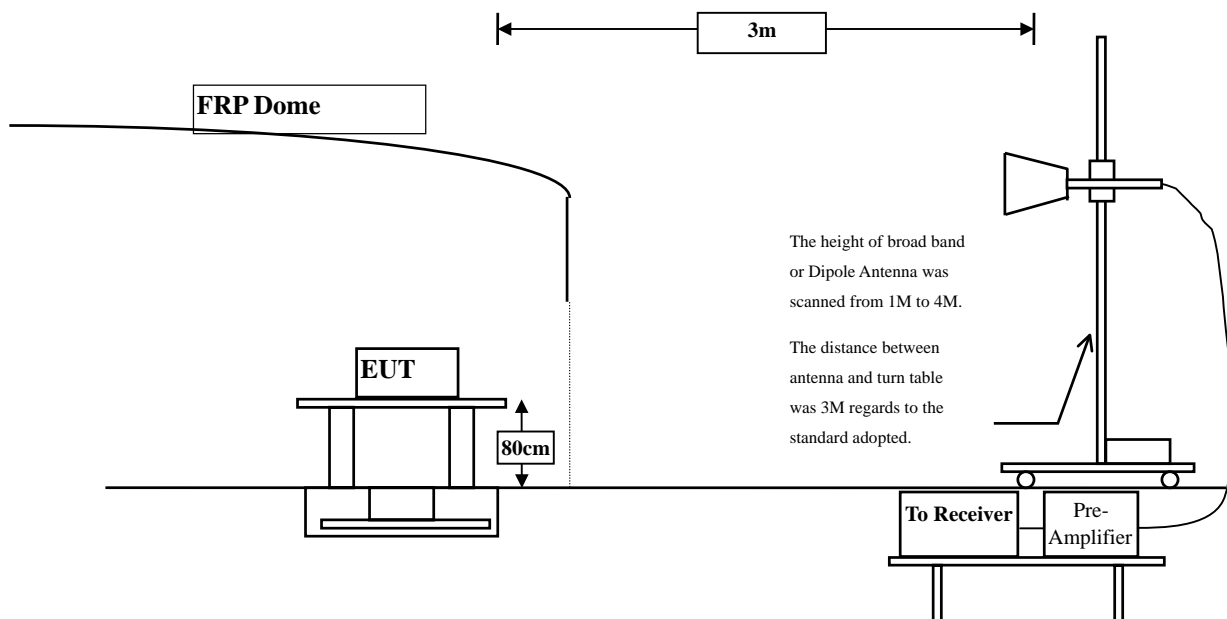
- Note:
1. All instruments are calibrated every one year.
  2. The test instruments marked by “X” are used to measure the final test results.

## 6.2. Test Setup

### RF Conducted Measurement



### RF Radiated Measurement:



## 6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

#### **6.4. Test Procedure**

The EUT was setup according to ANSI C63.10: 2009 and tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 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 C63.10: 2009. on radiated measurement.

#### **6.5. Uncertainty**

± 3.9 dB above 1GHz

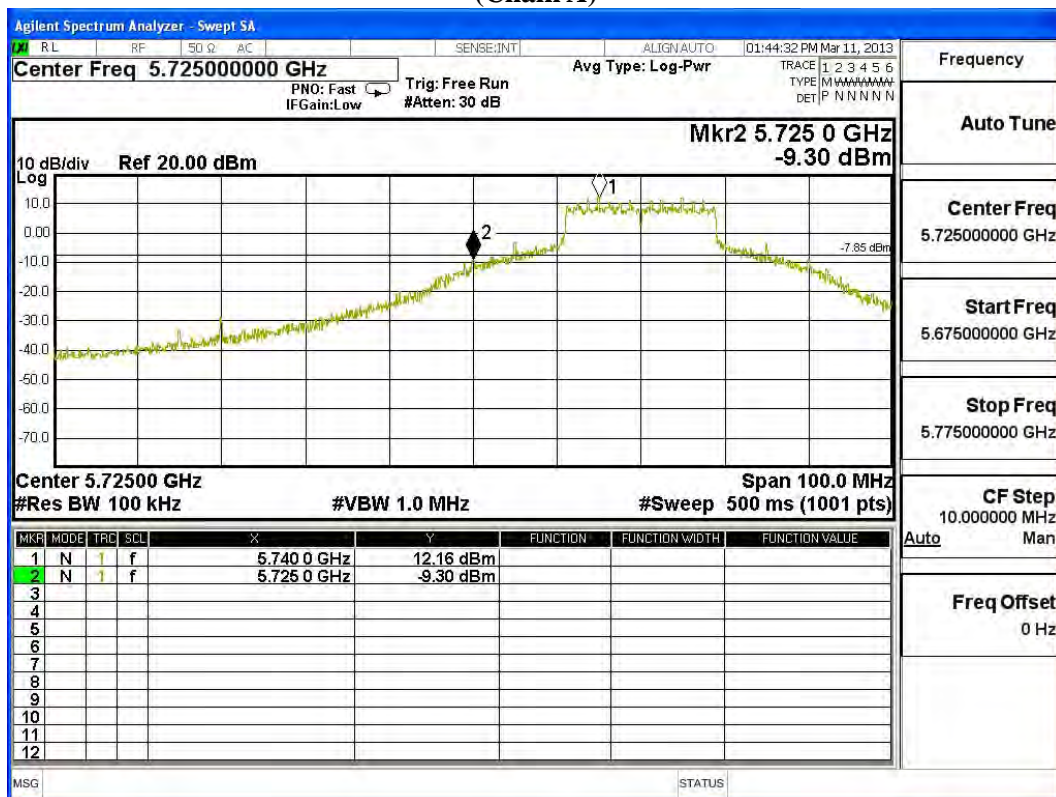
± 3.8 dB below 1GHz

## 6.6. Test Result of Band Edge

Product : WiFi AP  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band)

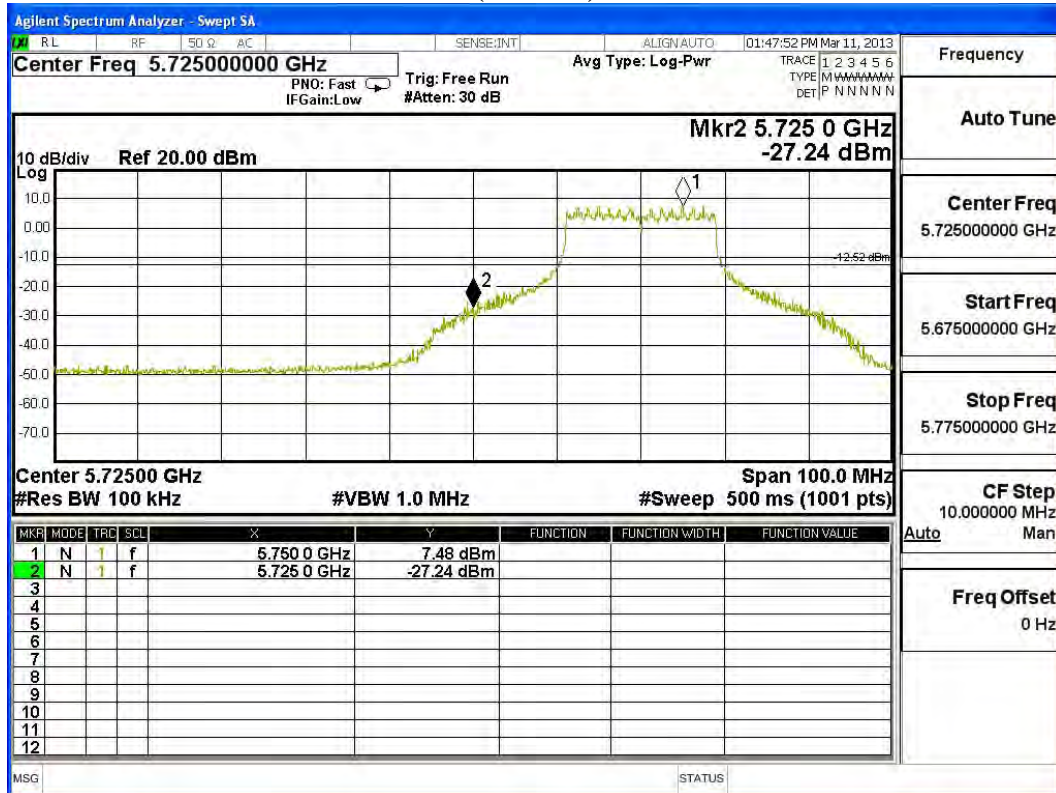
Test Frequency (MHz)	Measurement Level $\Delta$ (dB)	Limit $\Delta$ (dB)	Result
5745	21.46	>20	PASS

(Chain A)



Test Frequency (MHz)	Measurement Level $\Delta$ (dB)	Limit $\Delta$ (dB)	Result
5745	34.72	>20	PASS

(Chain B)

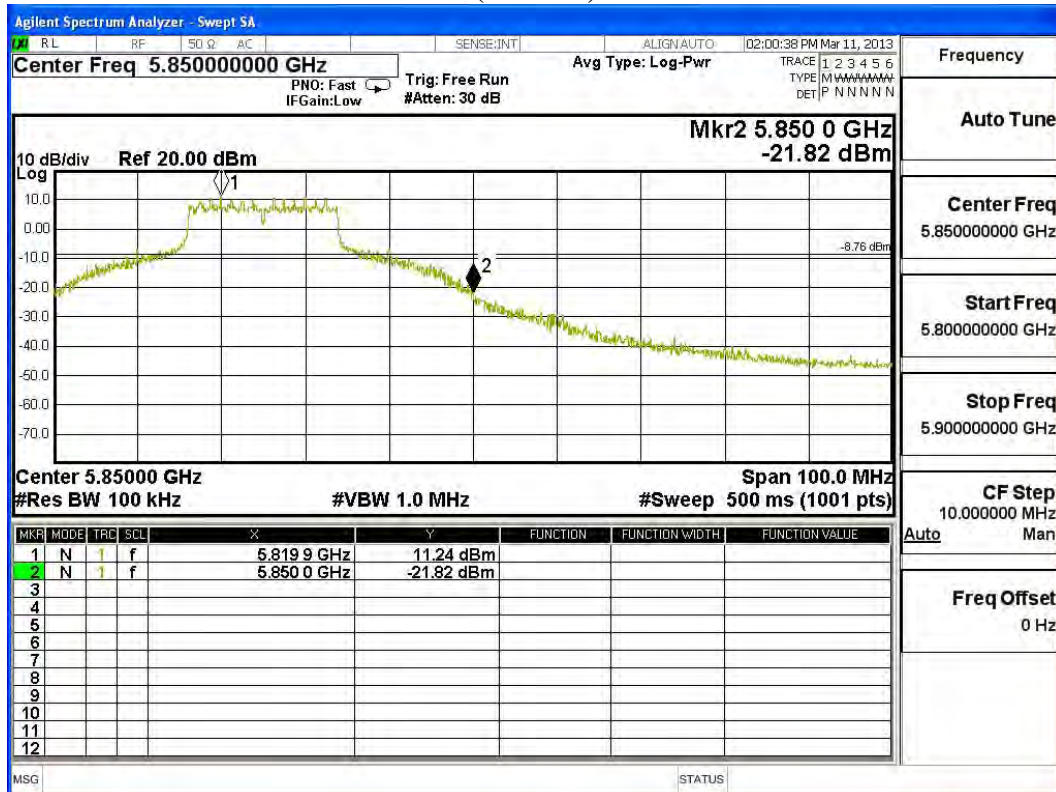




Product : WiFi AP  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band)

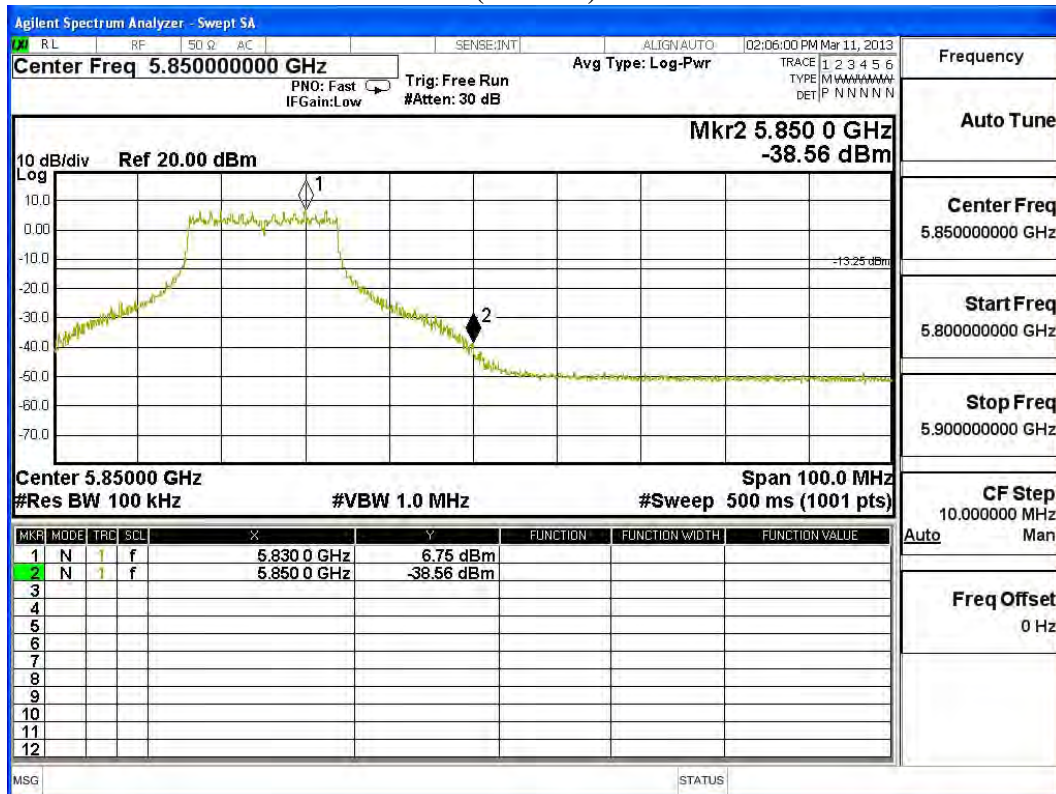
Test Frequency (MHz)	Measurement Level $\Delta$ (dB)	Limit $\Delta$ (dB)	Result
5825	33.06	>20	PASS

(Chain A)



Test Frequency (MHz)	Measurement Level $\Delta$ (dB)	Limit $\Delta$ (dB)	Result
5825	45.31	>20	PASS

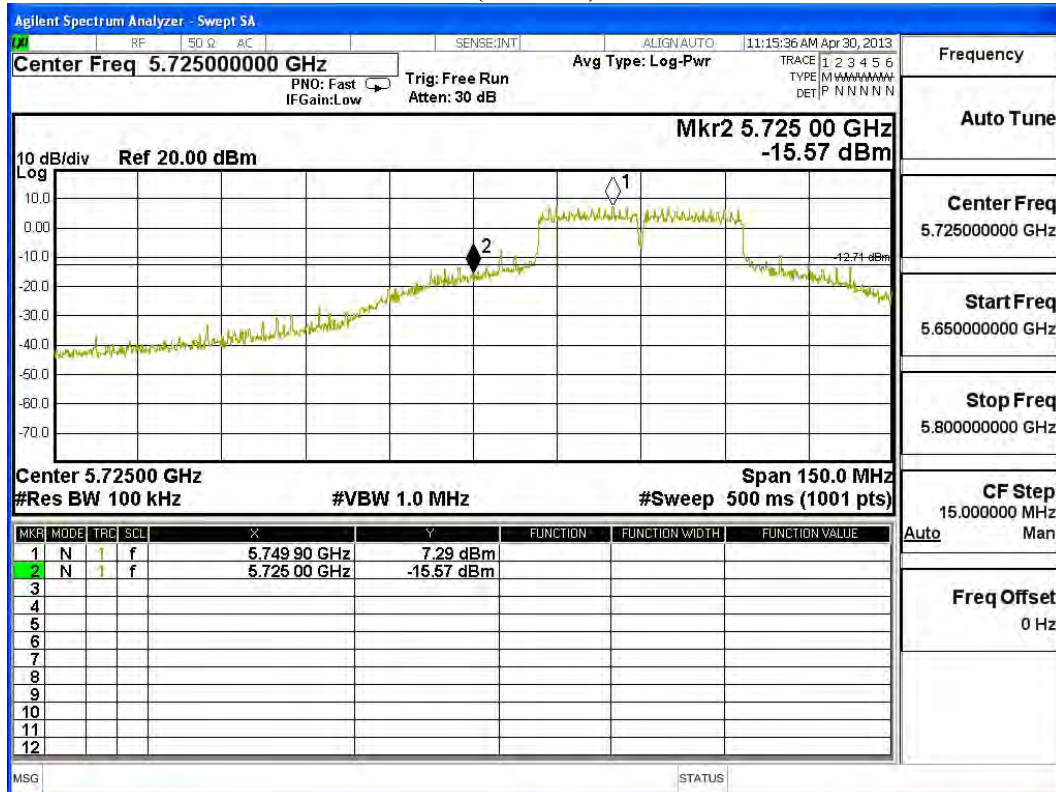
(Chain B)



Product : WiFi AP  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band)

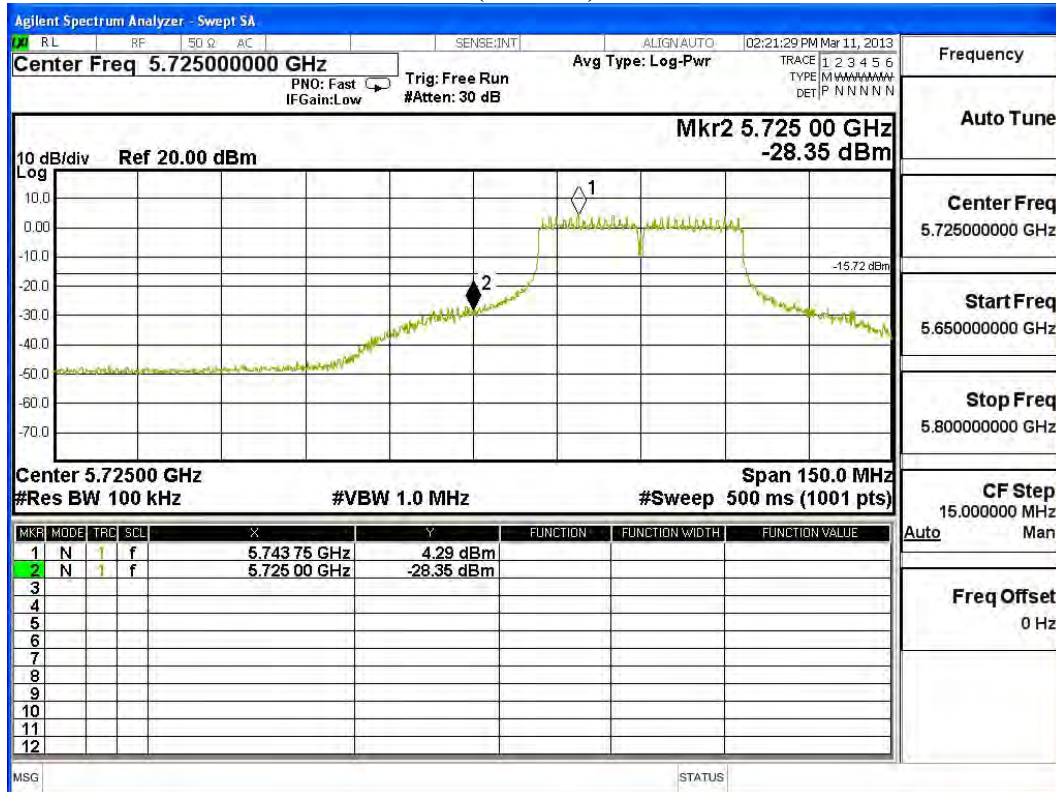
Test Frequency (MHz)	Measurement Level $\Delta$ (dB)	Limit $\Delta$ (dB)	Result
5755	22.86	>20	PASS

(Chain A)



Test Frequency (MHz)	Measurement Level $\Delta$ (dB)	Limit $\Delta$ (dB)	Result
5755	32.64	>20	PASS

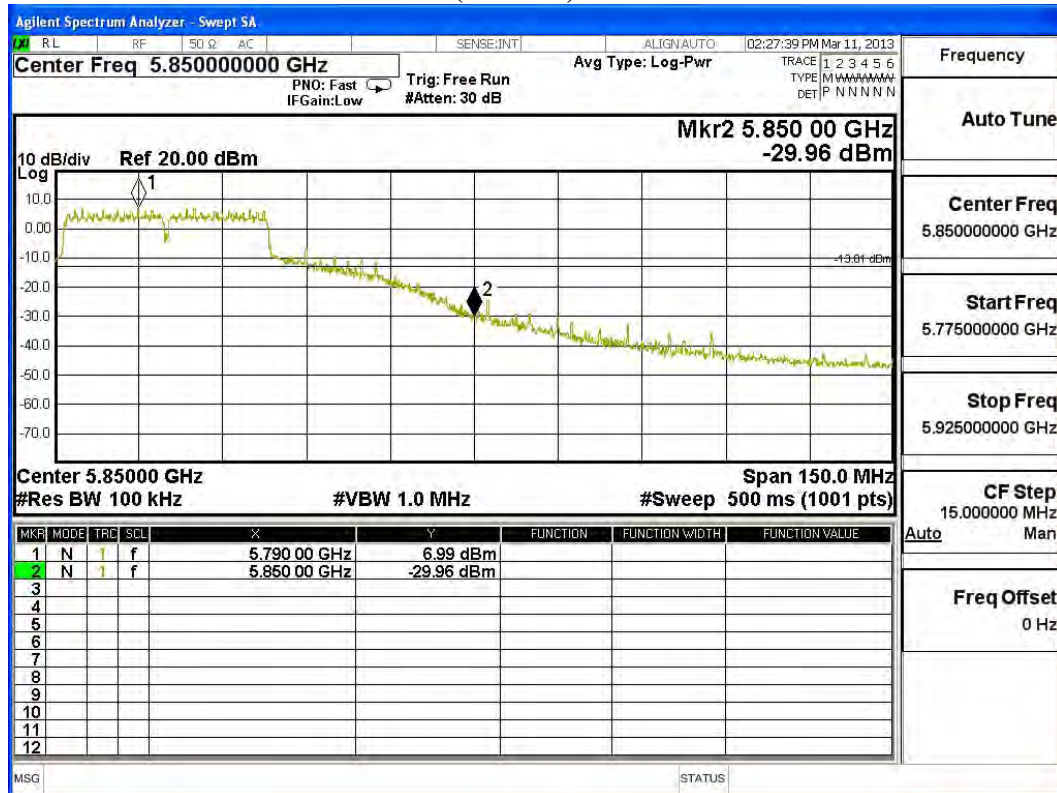
(Chain B)



Product : WiFi AP  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band)

Test Frequency (MHz)	Measurement Level $\Delta$ (dB)	Limit $\Delta$ (dB)	Result
5795	36.95	>20	PASS

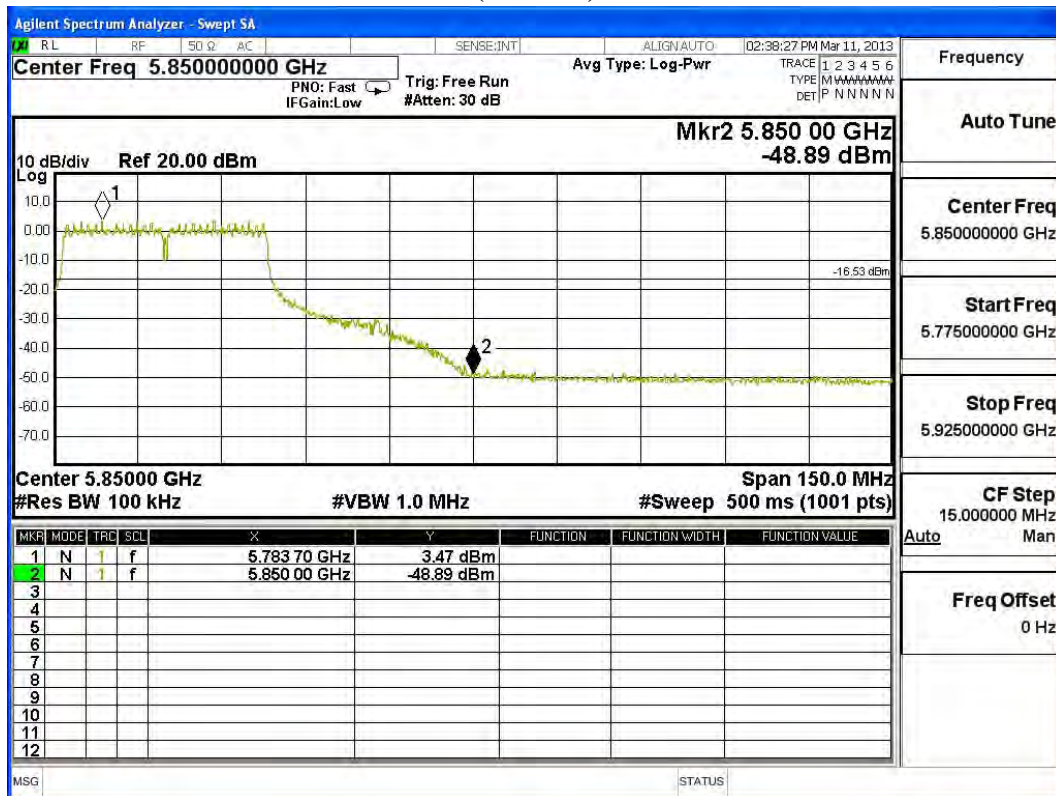
(Chain A)





Test Frequency (MHz)	Measurement Level $\Delta$ (dB)	Limit $\Delta$ (dB)	Result
5795	52.46	>20	PASS

(Chain B)



## 7. Occupied Bandwidth

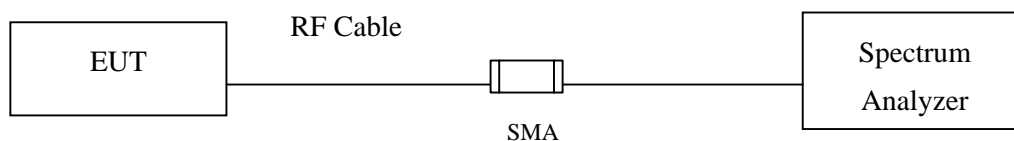
### 7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

### 7.2. Test Setup



### 7.3. Limits

The minimum bandwidth shall be at least 500 kHz.

### 7.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009; tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1-5% of the emission bandwidth,  $VBW \geq 3 \times RBW$

### 7.5. Uncertainty

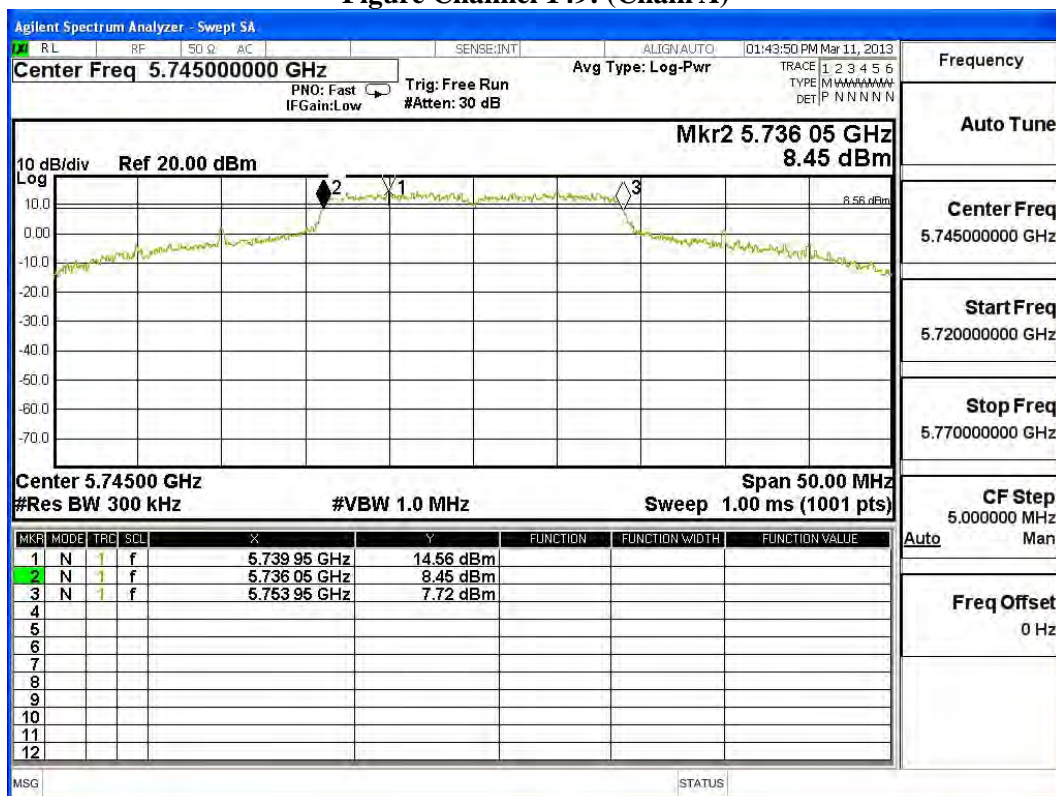
$\pm 150\text{Hz}$

## 7.6. Test Result of Occupied Bandwidth

Product : WiFi AP  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band) (5745MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745.00	17900	>500	Pass

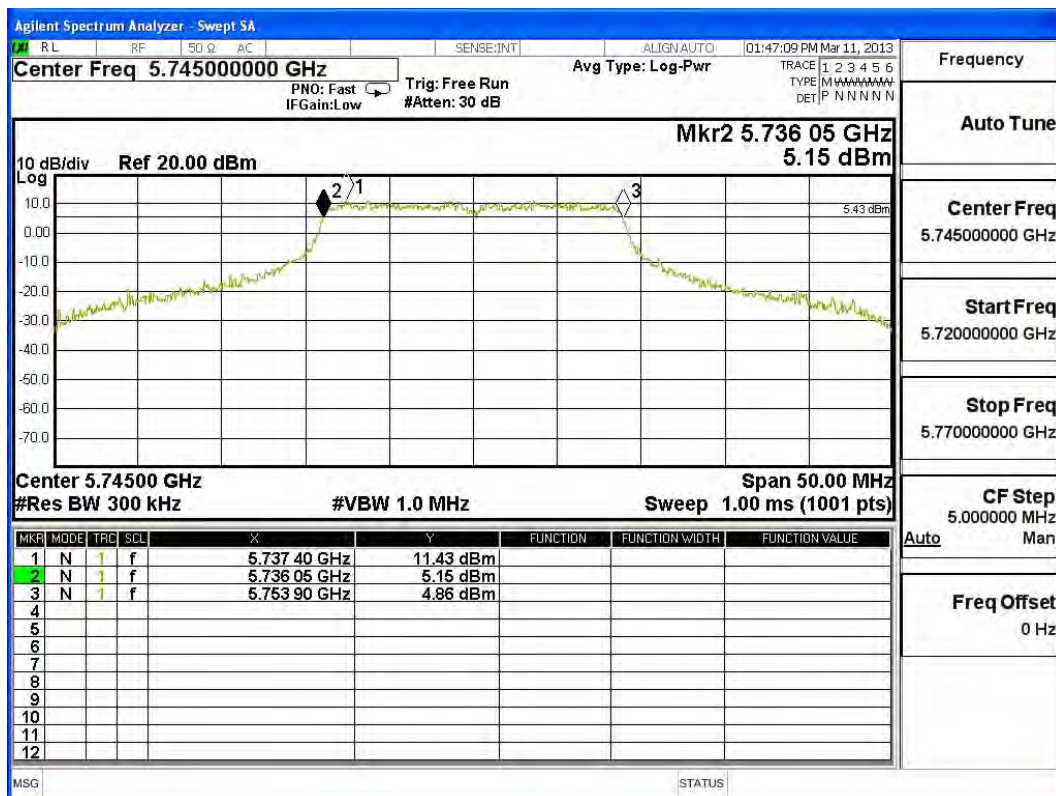
**Figure Channel 149: (Chain A)**





Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745.00	17850	>500	Pass

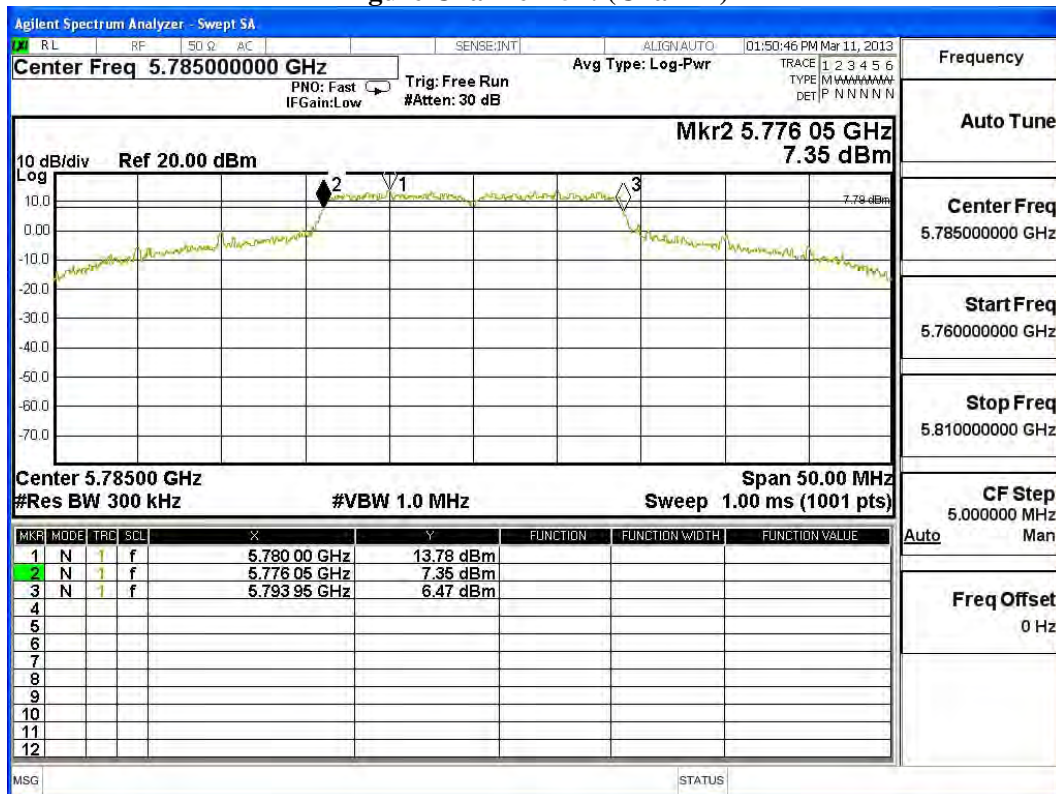
Figure Channel 149: (Chain B)



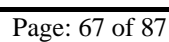
Product : WiFi AP  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band) (5785MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
157	5785.00	17900	>500	Pass

**Figure Channel 157: (Chain A)**



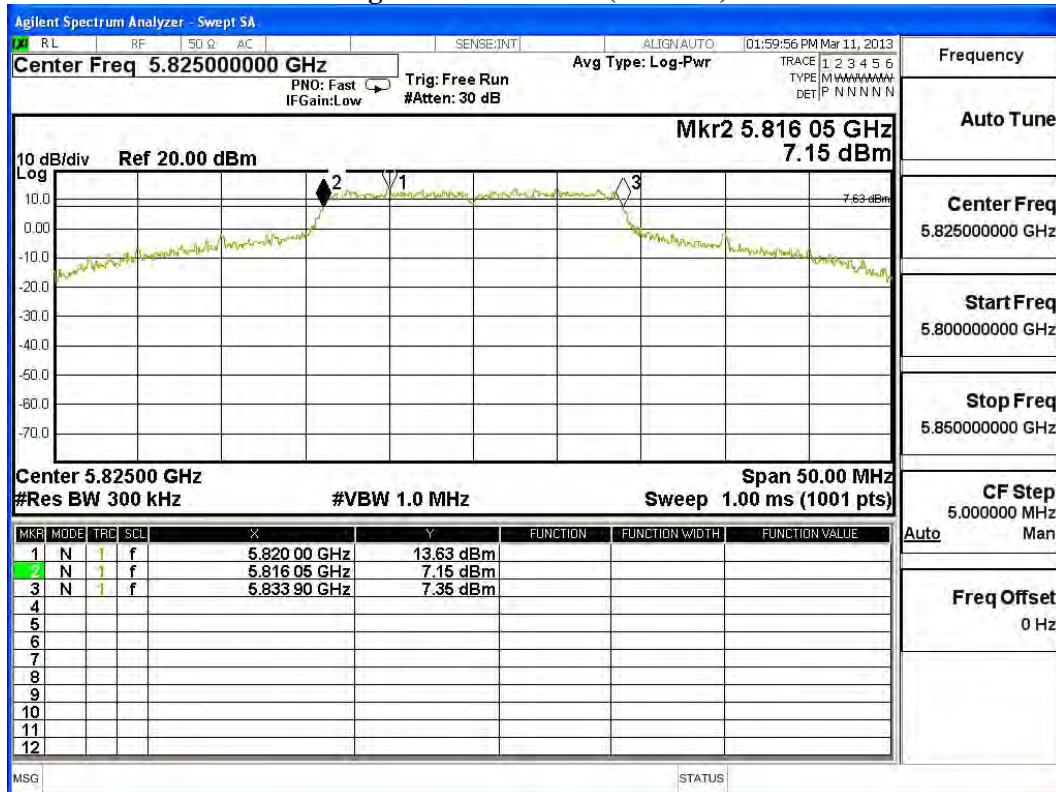
**Figure Channel 157: (Chain B)**



Product : WiFi AP  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band) (5825MHz)

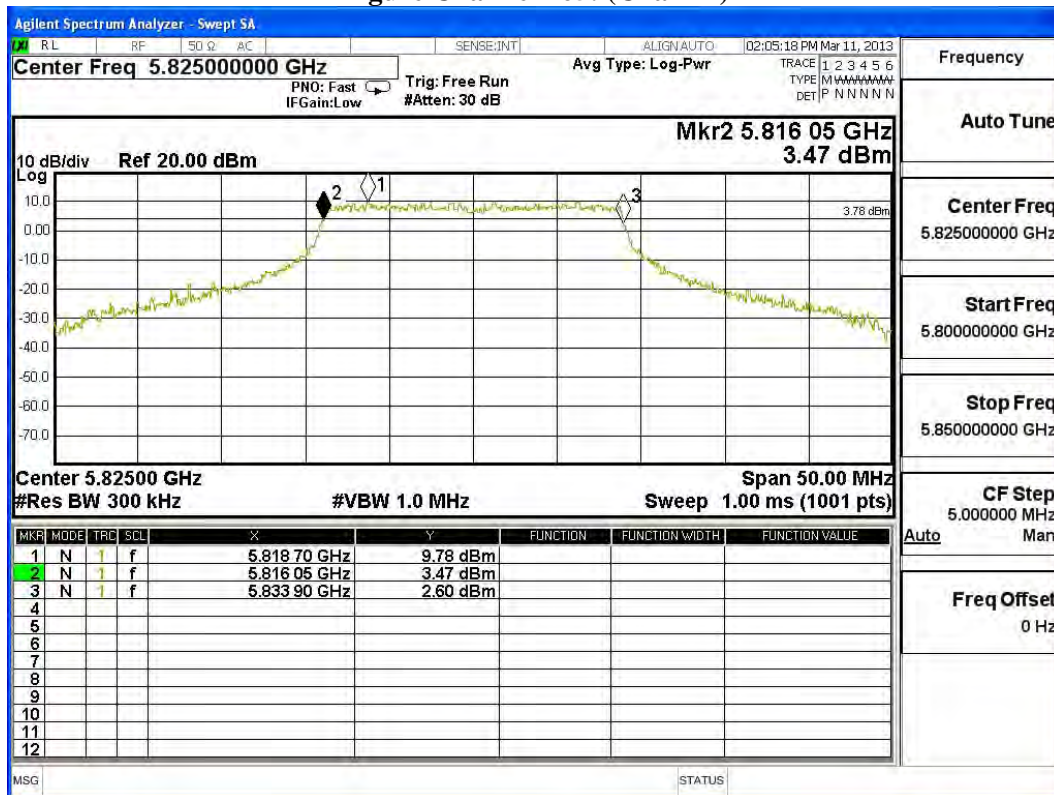
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
165	5825.00	17850	>500	Pass

Figure Channel 165: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
165	5825.00	17850	>500	Pass

Figure Channel 165: (Chain B)

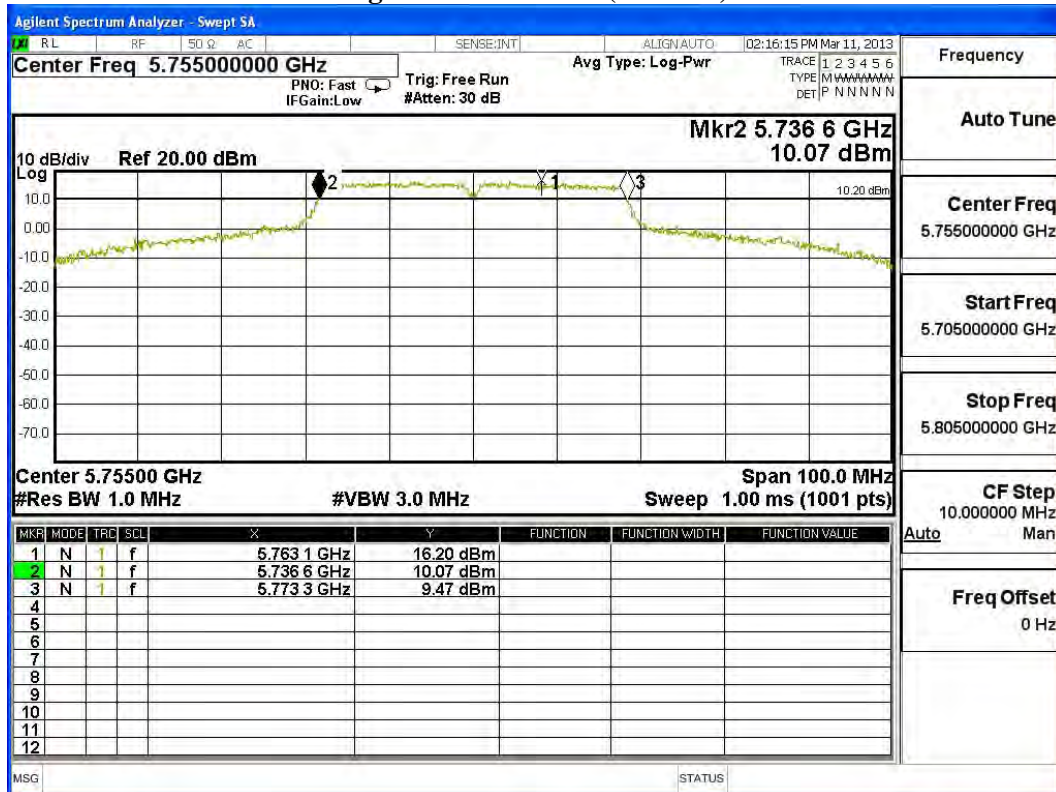




Product : WiFi AP  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band) (5755MHz)

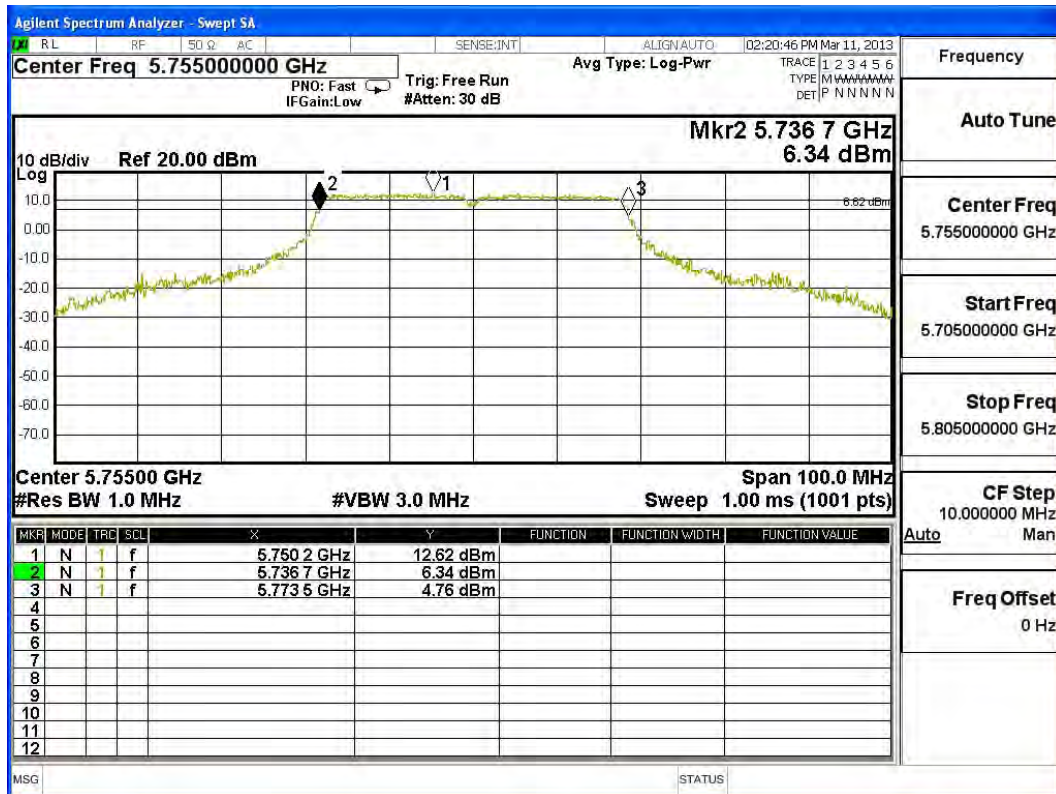
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	36700	>500	Pass

Figure Channel 151: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	36800	>500	Pass

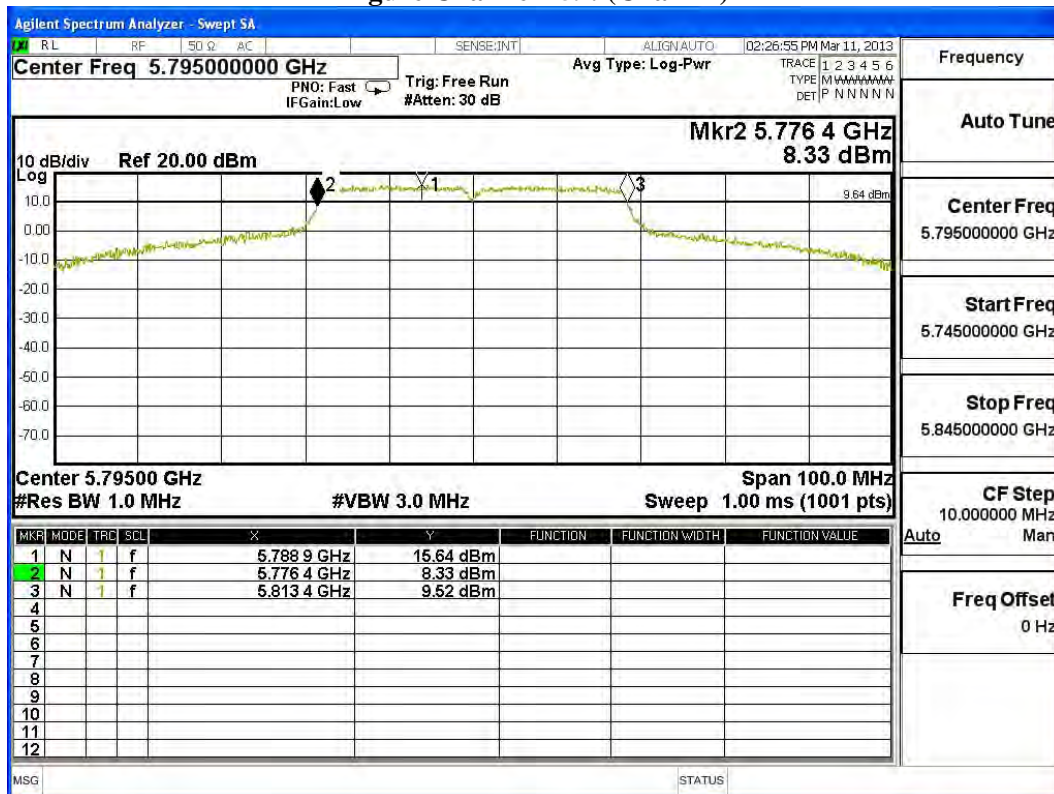
Figure Channel 151: (Chain B)



Product : WiFi AP  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band) (5795MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	37000	>500	Pass

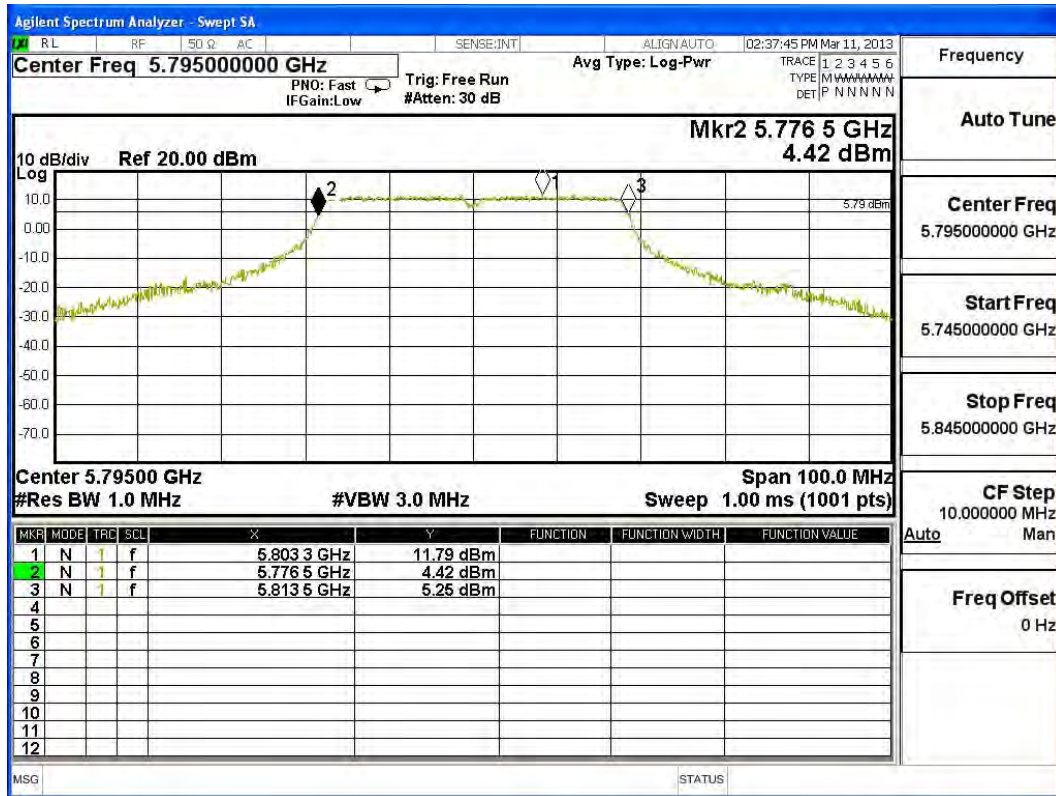
**Figure Channel 159: (Chain A)**





Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	37000	>500	Pass

**Figure Channel 159: (Chain B)**



## 8. Power Density

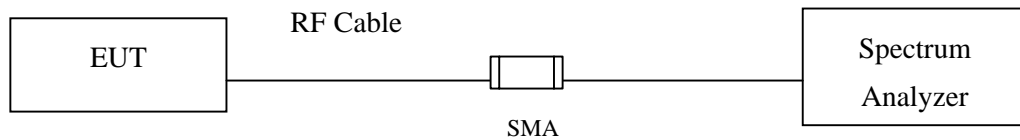
### 8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

### 8.2. Test Setup



### 8.3. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

### 8.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009; tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 100 kHz, VBW $\geq$ 300KHz, SPAN to 5-30 % greater than the EBW,

Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(3\text{ kHz}/100\text{ kHz}) = -15.2\text{ dB}$ .

### 8.5. Uncertainty

$\pm 1.27\text{ dB}$

## 8.6. Test Result of Power Density

Product : WiFi AP  
 Test Item : Power Density Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band) (5745MHz)

Channel No.	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
149	5745.00	-2.283	-4.868	-0.376	< 8dBm	Pass

Note: Power Density Value (dBm) = 10\*LOG (Chain A (mW)+ Chain B (mW))

**Figure Channel 149: (Chain A)**

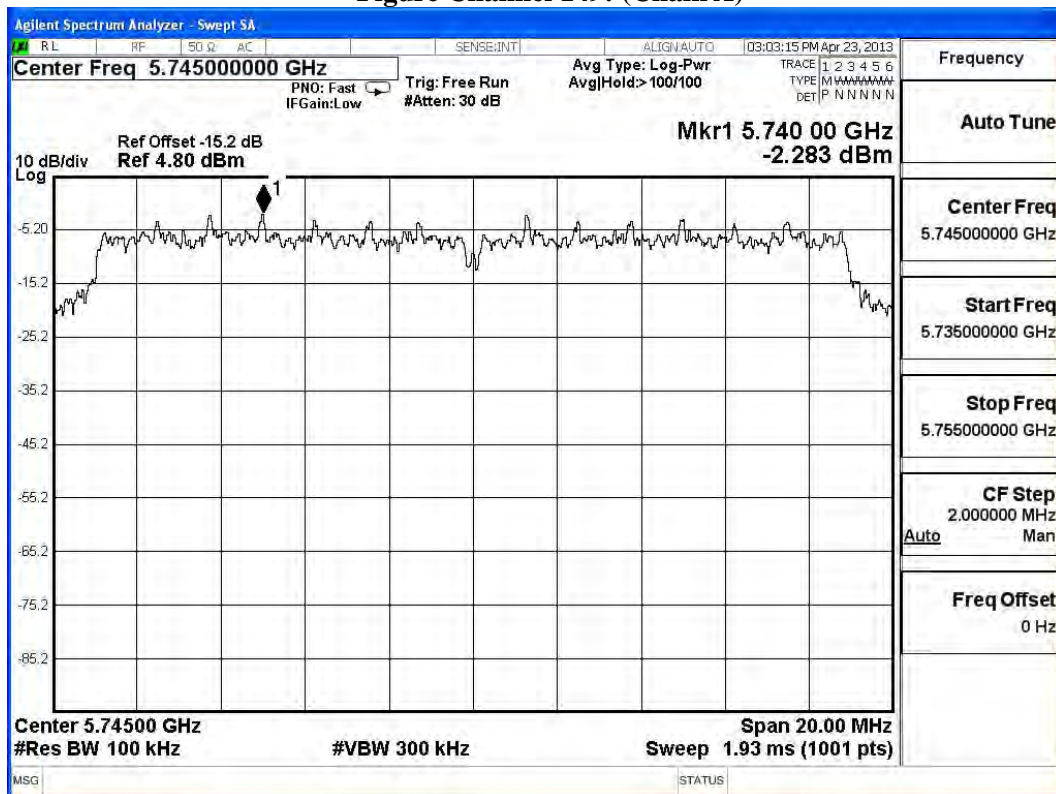
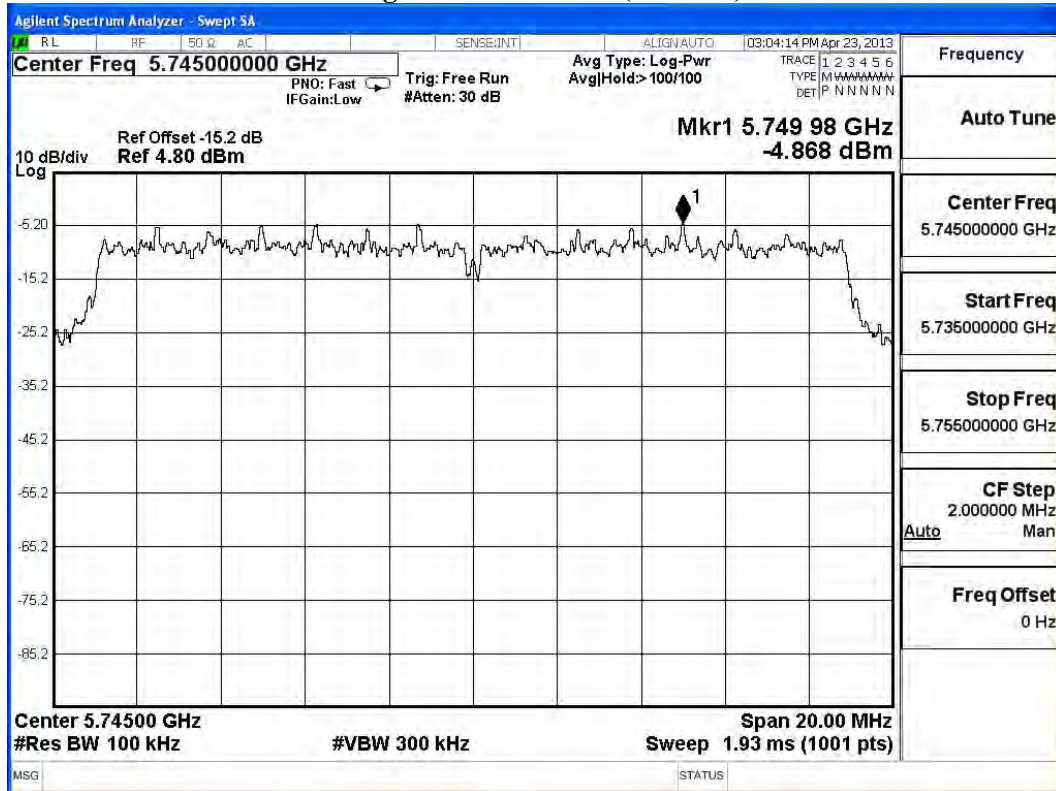


Figure Channel 149: (Chain B)



Product : WiFi AP  
 Test Item : Power Density Data  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band) (5785MHz)

Channel No.	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
157	5785.000	-2.548	-6.604	-1.108	< 8dBm	Pass

Note: Power Density Value (dBm) = 10\*LOG (Chain A (mW)+ Chain B (mW))

Figure Channel 157: (Chain A)

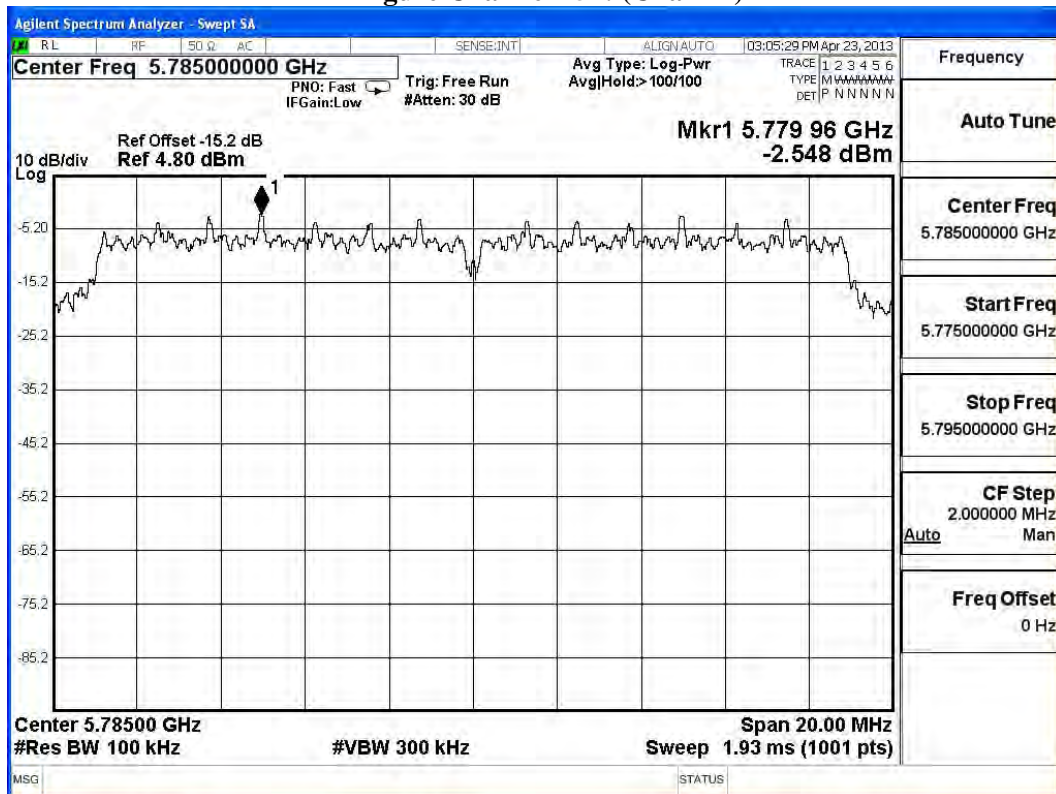
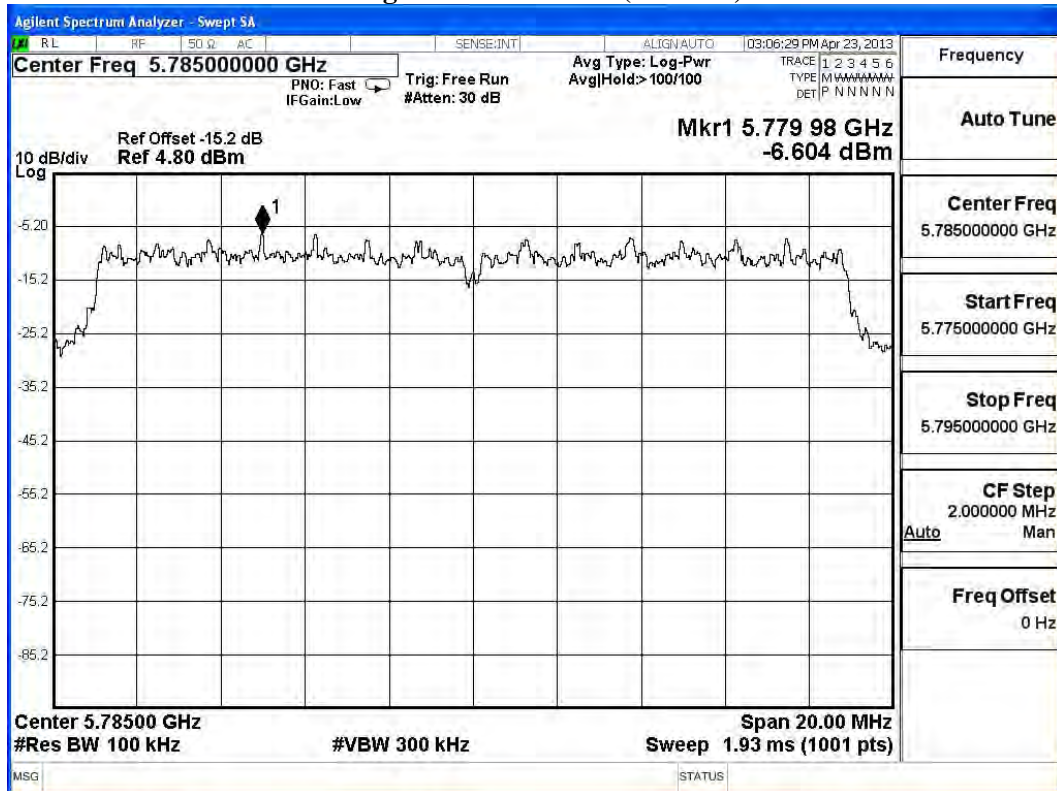


Figure Channel 157: (Chain B)





Product : WiFi AP  
 Test Item : Power Density Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11n-20BW\_14.4Mbps(5G Band) (5825MHz)

Channel No.	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
165	5825.00	-3.467	-7.454	-2.008	< 8dBm	Pass

Note: Power Density Value (dBm) = 10\*LOG (Chain A (mW)+ Chain B (mW))

**Figure Channel 165: (Chain A)**

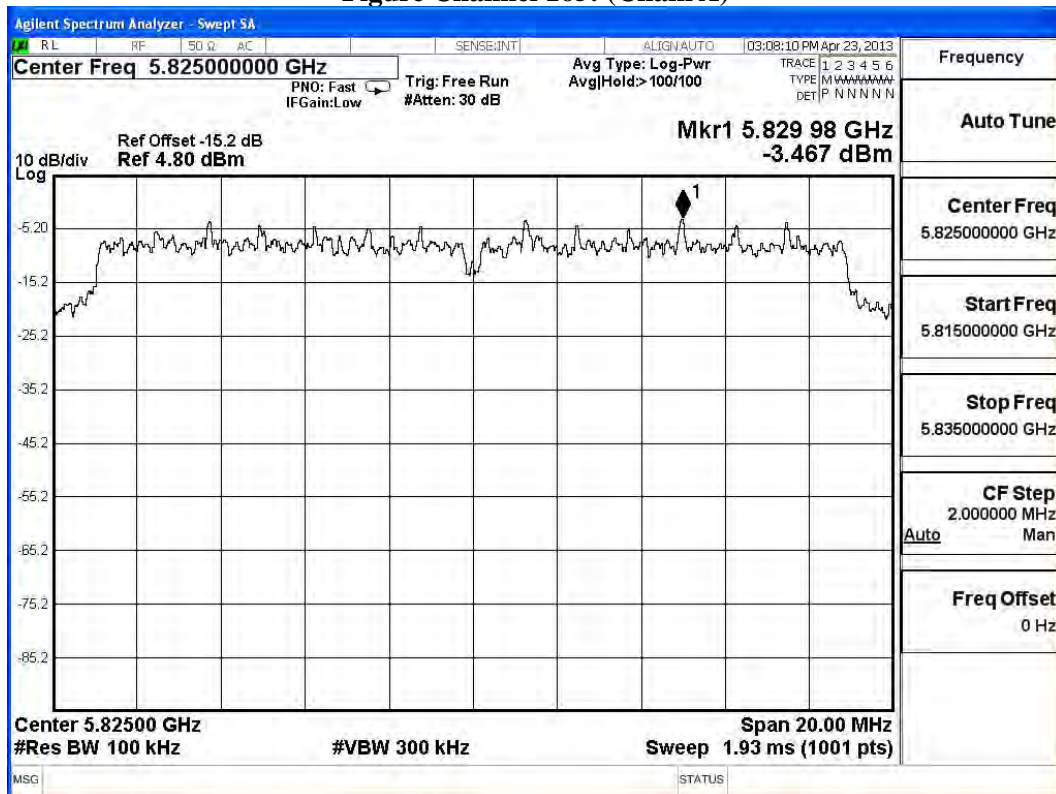
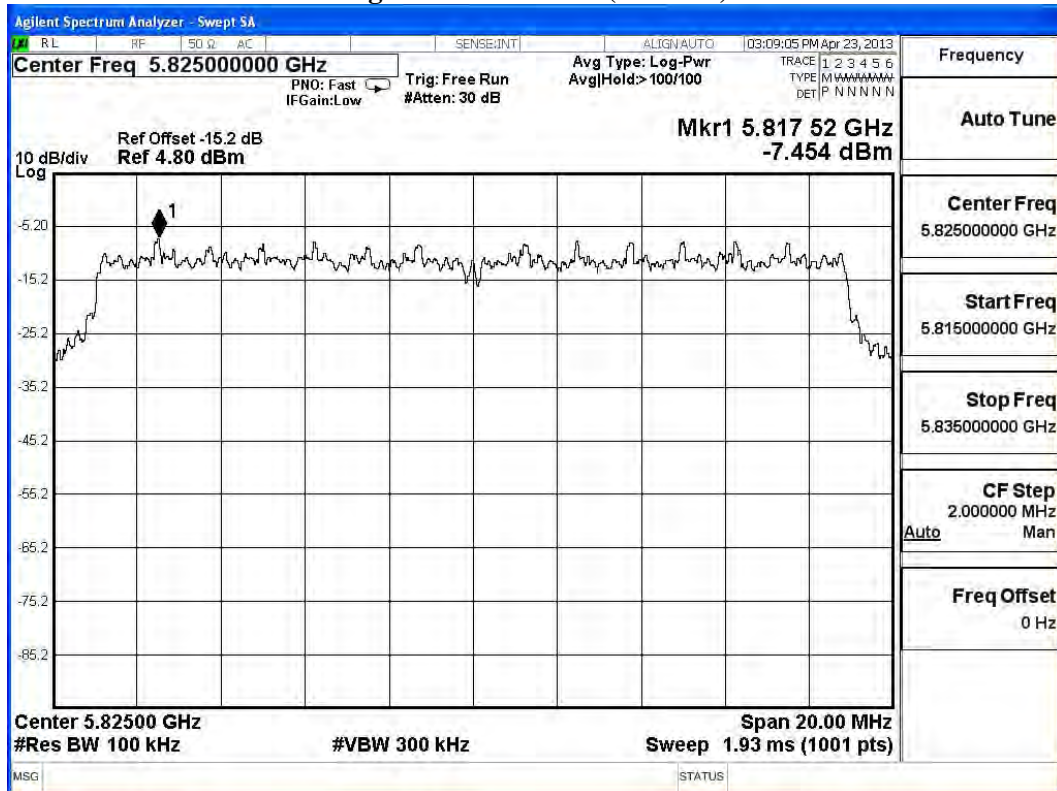


Figure Channel 165: (Chain B)





Product : WiFi AP  
 Test Item : Power Density Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band) (5755MHz)

Channel No.	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
151	5755.00	-6.204	-9.393	-4.502	< 8dBm	Pass

Note: Power Density Value (dBm) = 10\*LOG (Chain A (mW)+ Chain B (mW))

**Figure Channel 151: (Chain A)**

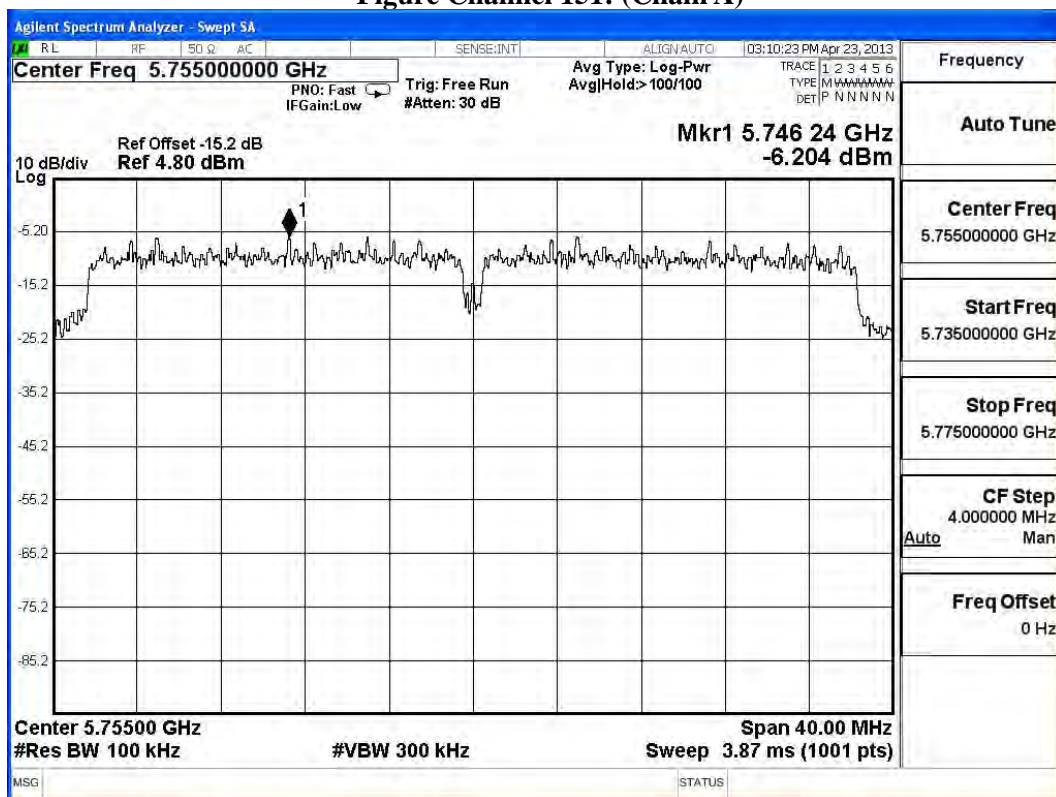
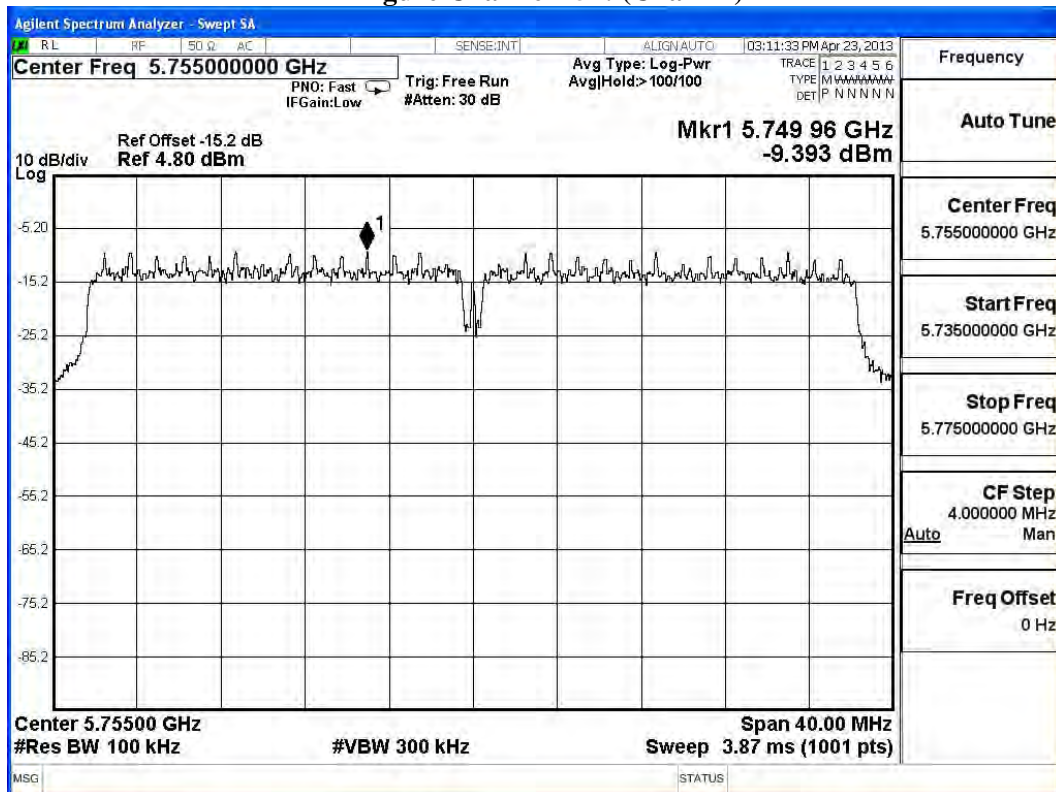


Figure Channel 151: (Chain B)

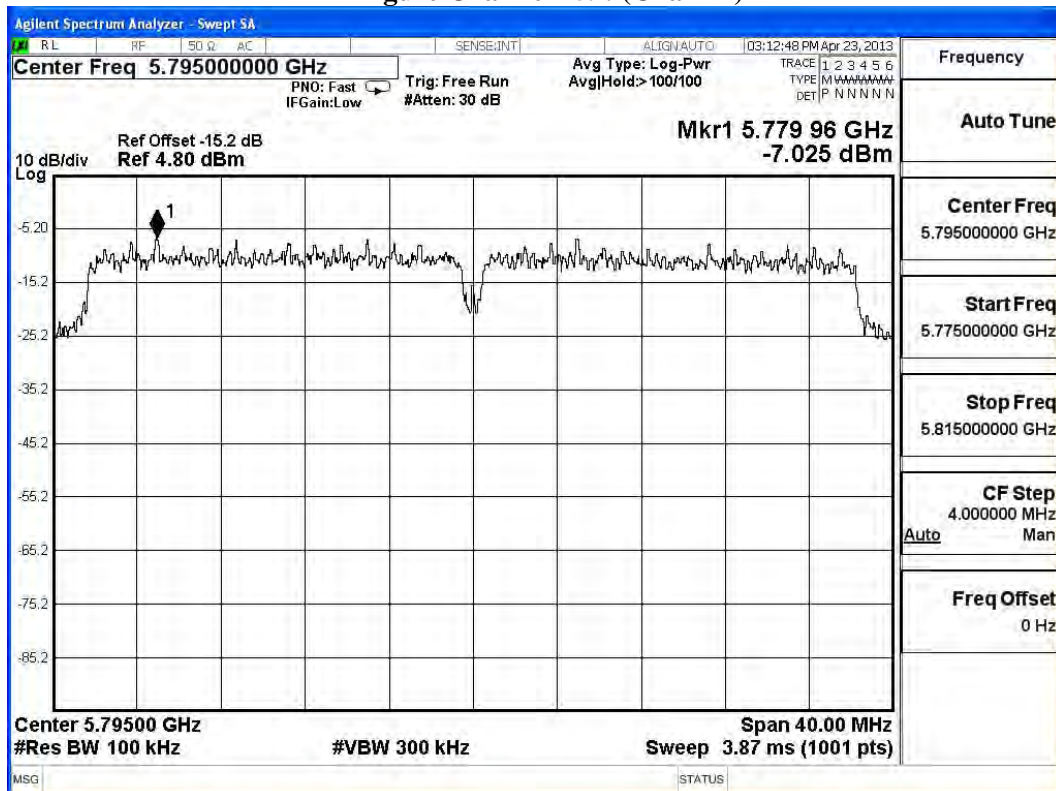


Product : WiFi AP  
 Test Item : Power Density Data  
 Test Site : No.3OATS  
 Test Mode : Mode 2: Transmit - 802.11n-40BW\_30Mbps(5G Band) (5795MHz)

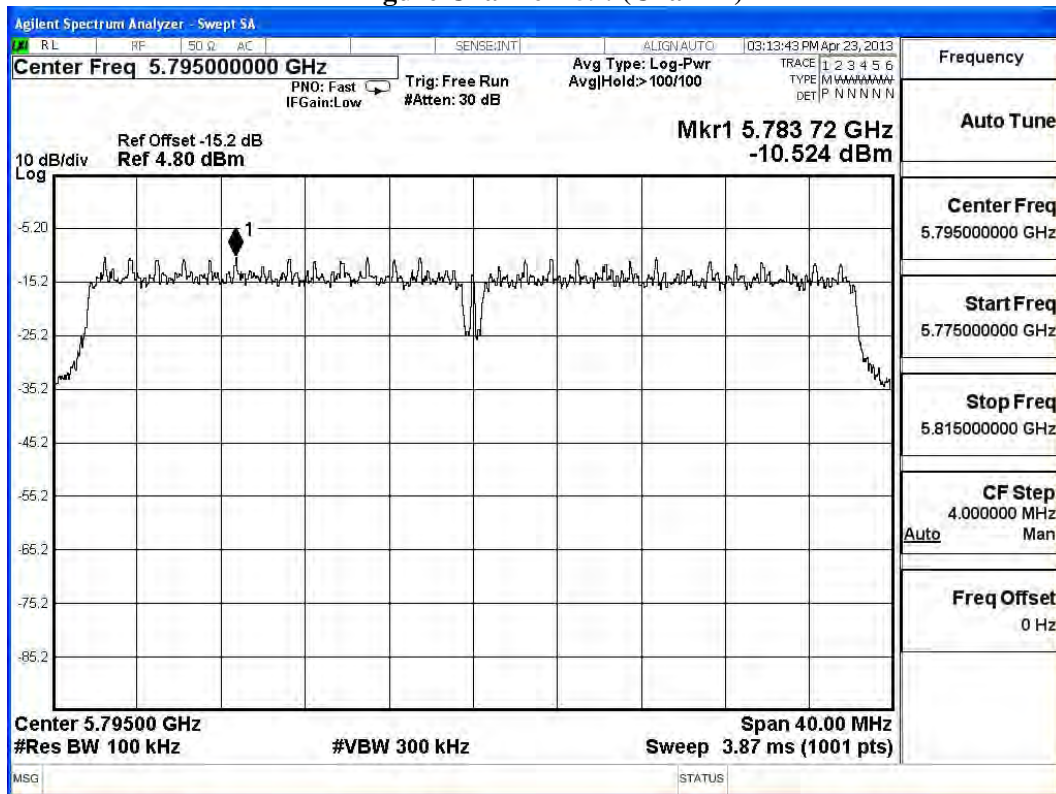
Channel No.	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
159	5795.000	-7.025	-10.524	-5.421	< 8dBm	Pass

Note: Power Density Value (dBm) = 10\*LOG (Chain A (mW)+ Chain B (mW))

Figure Channel 159: (Chain A)



**Figure Channel 159: (Chain B)**



## **9. EMI Reduction Method During Compliance Testing**

No modification was made during testing.