# FCC Test Report

| | |
|---|---|
| Product Name | WiFi AP |
| Model No | Bitlomat 100 Panel CPE |
| FCC ID. | RNF-BTLM100 |

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

| | |
|---|---|
| Date of Receipt | Dec. 27, 2012 |
| Issue Date | May 06, 2013 |
| Report No. | 132239R-RFUSP28V01 |
| Report Version | V1.0 |

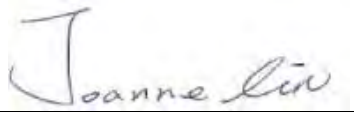
Testing Laboratory
0914

# Test Report Certification

Issue Date: May 06, 2013
Report No.: 132239R-RFUSP28V01

| | |
|---|---|
| Product Name | WiFi AP |
| Applicant | Bitlomat, LLC. |
| Address | 1850 SECOND ST STE 201 HIGHLAND PARK, IL 60035, USA |
| Manufacturer | Bitlomat, LLC. |
| Model No. | Bitlomat 100 Panel CPE |
| 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<br>ANSI C63.4: 2003, ANSI C63.10: 2009 |
| Test Result | Complied |

The test results relate only to the samples tested.
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.
This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented By : 

( Adm. Specialist / Joanne Lin )

Tested By : 

( Engineer / Jack Hsu )

Approved By : 

( Manager / Vincent Lin)

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# 1. GENERAL INFORMATION

## 1.1. EUT Description

| | |
|---|---|
| Product Name | WiFi AP |
| Trade Name | Bitlomat |
| Model No. | Bitlomat 100 Panel CPE |
| FCC ID. | RNF-BTLM100 |
| 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 Adapter | MFR: Bitlomat, M/N: GFP121DA-240050HB<br>Input: AC 100-240V, 50-60Hz, 0.3A<br>Output: DC 24V, 0.5A<br>Power Cord: Non-Shielded, 0.6m |

**Antenna List**

| No. | Manufacturer | Part No. | Antenna Type | Peak Gain |
|---|---|---|---|---|
| 1 | LYNwave | ALO120-093150 | Cross-Polarized Antenna | 11.98dBi 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 an 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.

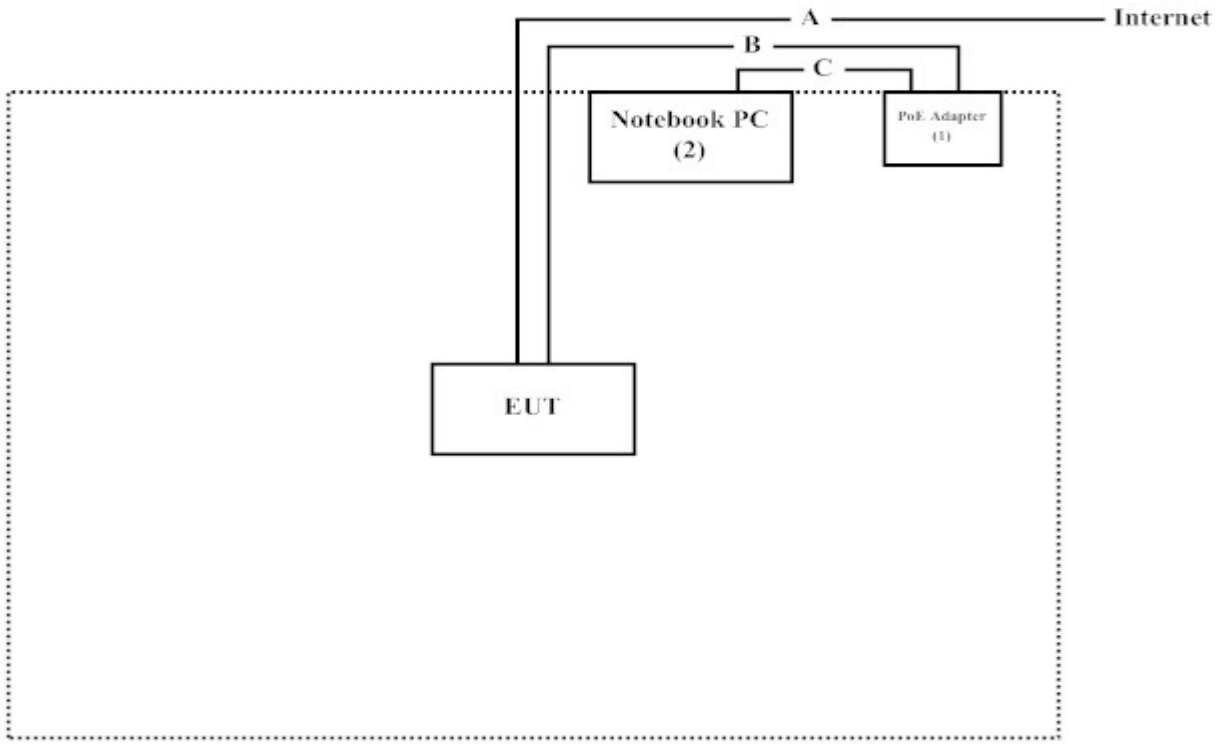
## 1.3. Tested System Details

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) | PoE Adapter | FLUIDMESH | GFP121DA-240050HB | N/A | Non-Shielded, 0.6m |
| (2) | Notebook PC | DELL | PPT | N/A | Non-Shielded, 0.8m |

| Signal Cable Type | | Signal cable Description |
|---|---|---|
| A | LAN Cable | Non-Shielded, 3.0m |
| B | LAN Cable | Shielded, 3.0m |
| C | LAN Cable | Non-Shielded, 1.7m |

## 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

Site Name: Quietek Corporation
Site Address: No.5-22, Ruishukeng,
Linkou Dist. New Taipei City 24451,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

## 2. Conducted Emission

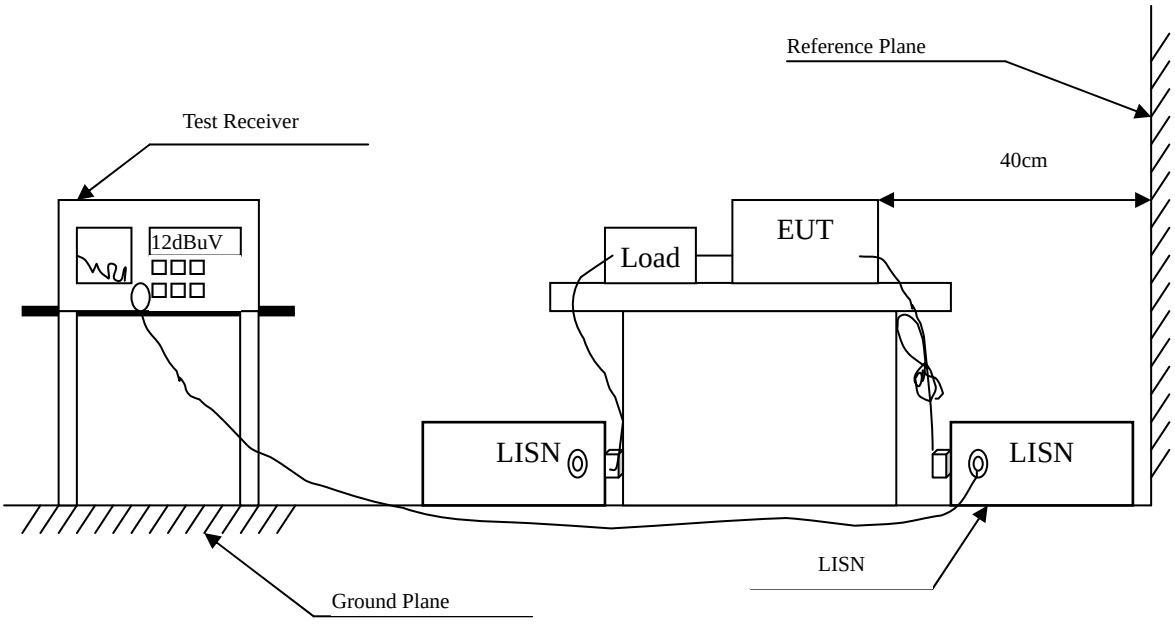
### 2.1. Test Equipment

| | 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), ( Adapter:GFP121DA-240050HB)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV | dB | dBuV |
| **Line 1** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.173 | 9.830 | 34.850 | 44.680 | -20.663 | 65.343 |
| 0.244 | 9.830 | 32.020 | 41.850 | -21.464 | 63.314 |
| 0.369 | 9.830 | 34.700 | 44.530 | -15.213 | 59.743 |
| 0.599 | 9.830 | 28.570 | 38.400 | -17.600 | 56.000 |
| 0.896 | 9.830 | 26.640 | 36.470 | -19.530 | 56.000 |
| 5.369 | 9.883 | 21.890 | 31.773 | -28.227 | 60.000 |
| **Average** | | | | | |
| 0.173 | 9.830 | 30.120 | 39.950 | -15.393 | 55.343 |
| 0.244 | 9.830 | 13.650 | 23.480 | -29.834 | 53.314 |
| 0.369 | 9.830 | 18.580 | 28.410 | -21.333 | 49.743 |
| 0.599 | 9.830 | 12.310 | 22.140 | -23.860 | 46.000 |
| 0.896 | 9.830 | 13.210 | 23.040 | -22.960 | 46.000 |
| 5.369 | 9.883 | 15.060 | 24.943 | -25.057 | 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),
( Adapter:GFP121DA-240050HB)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV | dB | dBuV |
| **Line 2** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.185 | 9.832 | 37.300 | 47.132 | -17.868 | 65.000 |
| 0.248 | 9.830 | 36.150 | 45.980 | -17.220 | 63.200 |
| 0.349 | 9.840 | 44.940 | 54.780 | -5.534 | 60.314 |
| 0.638 | 9.840 | 39.880 | 49.720 | -6.280 | 56.000 |
| 1.127 | 9.850 | 36.420 | 46.270 | -9.730 | 56.000 |
| 2.400 | 9.860 | 34.460 | 44.320 | -11.680 | 56.000 |
| **Average** | | | | | |
| 0.185 | 9.832 | 31.380 | 41.212 | -13.788 | 55.000 |
| 0.248 | 9.830 | 29.350 | 39.180 | -14.020 | 53.200 |
| 0.349 | 9.840 | 32.770 | 42.610 | -7.704 | 50.314 |
| 0.638 | 9.840 | 30.370 | 40.210 | -5.790 | 46.000 |
| 1.127 | 9.850 | 26.660 | 36.510 | -9.490 | 46.000 |
| 2.400 | 9.860 | 27.080 | 36.940 | -9.060 | 46.000 |

Note:

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

## 2.7. 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),
( Adapter:GFP241DA-240100HB)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV | dB | dBuV |
| **Line 1** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.181 | 9.790 | 30.210 | 40.000 | -25.114 | 65.114 |
| 0.263 | 9.790 | 26.580 | 36.370 | -26.401 | 62.771 |
| 0.353 | 9.790 | 33.520 | 43.310 | -16.890 | 60.200 |
| 0.463 | 9.790 | 25.090 | 34.880 | -22.177 | 57.057 |
| 0.662 | 9.790 | 23.290 | 33.080 | -22.920 | 56.000 |
| 1.240 | 9.790 | 22.160 | 31.950 | -24.050 | 56.000 |
| **Average** | | | | | |
| 0.181 | 9.790 | 19.980 | 29.770 | -25.344 | 55.114 |
| 0.263 | 9.790 | 19.510 | 29.300 | -23.471 | 52.771 |
| 0.353 | 9.790 | 27.090 | 36.880 | -13.320 | 50.200 |
| 0.463 | 9.790 | 17.210 | 27.000 | -20.057 | 47.057 |
| 0.662 | 9.790 | 15.950 | 25.740 | -20.260 | 46.000 |
| 1.240 | 9.790 | 13.530 | 23.320 | -22.680 | 46.000 |

Note:

4. All Reading Levels are Quasi-Peak and average value.
5. “ “ means the worst emission level.
6. 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),
( Adapter:GFP241DA-240100HB)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV | dB | dBuV |
| **Line 2** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.185 | 9.770 | 28.890 | 38.660 | -26.340 | 65.000 |
| 0.279 | 9.770 | 28.430 | 38.200 | -24.114 | 62.314 |
| 0.349 | 9.770 | 31.630 | 41.400 | -18.914 | 60.314 |
| 0.666 | 9.770 | 29.370 | 39.140 | -16.860 | 56.000 |
| 1.259 | 9.780 | 21.400 | 31.180 | -24.820 | 56.000 |
| 8.908 | 9.962 | 16.020 | 25.982 | -34.018 | 60.000 |
| **Average** | | | | | |
| 0.185 | 9.770 | 16.450 | 26.220 | -28.780 | 55.000 |
| 0.279 | 9.770 | 22.380 | 32.150 | -20.164 | 52.314 |
| 0.349 | 9.770 | 25.400 | 35.170 | -15.144 | 50.314 |
| 0.666 | 9.770 | 21.260 | 31.030 | -14.970 | 46.000 |
| 1.259 | 9.780 | 13.530 | 23.310 | -22.690 | 46.000 |
| 8.908 | 9.962 | 8.840 | 18.802 | -31.198 | 50.000 |

Note:

4. All Reading Levels are Quasi-Peak and average value.
5. “ “ means the worst emission level.
6. Measurement Level = Reading Level + Correct Factor

# 3. Peak Power Output

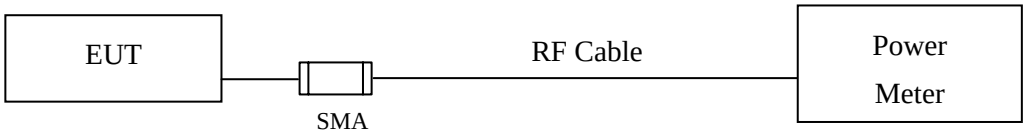
## 3.1. Test Equipment

| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|---|---|---|---|
| X | Power Meter | Anritsu | ML2495A/6K00003357 | May, 2013 |
| 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

± 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 | 14.4 | | |
| | | Measurement Level (dBm) | | | | | | | | | | |
| 149 | 5745 | 19.46 | -- | -- | -- | -- | -- | -- | -- | 26.81 | <30dBm | Pass |
| 157 | 5785 | 18.93 | 18.9 | 18.87 | 18.83 | 18.79 | 18.73 | 18.68 | 18.61 | 26.74 | <30dBm | Pass |
| 165 | 5825 | 18.13 | -- | -- | -- | -- | -- | -- | -- | 26.51 | <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 | 14.4 | | |
| | | Measurement Level (dBm) | | | | | | | | | | |
| 149 | 5745 | 18.27 | -- | -- | -- | -- | -- | -- | -- | 26.77 | <30dBm | Pass |
| 157 | 5785 | 18.25 | 18.21 | 18.18 | 18.15 | 18.09 | 18.04 | 18.02 | 17.99 | 26.56 | <30dBm | Pass |
| 165 | 5825 | 18.83 | -- | -- | -- | -- | -- | -- | -- | 26.5 | <30dBm | Pass |

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

**CHAIN A+B**

| Channel | Frequency (MHz) | Data Rata (Mbps) | Chain A Power (dBm) | Chain B Power (dBm) | Chain A+B Power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 149 | 5745 | 7.2 | 26.81 | 26.77 | 29.80 | <30dBm | Pass |
| 157 | 5785 | 7.2 | 26.74 | 26.56 | 29.66 | <30dBm | Pass |
| 165 | 5825 | 7.2 | 26.51 | 26.50 | 29.52 | <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 | 19.97 | -- | -- | -- | -- | -- | -- | -- | 26.79 | <30dBm | Pass |
| 159 | 5795 | 19.02 | 18.94 | 18.9 | 18.86 | 18.84 | 18.77 | 18.71 | 18.68 | 26.61 | <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 | 18.15 | -- | -- | -- | -- | -- | -- | -- | 26.35 | <30dBm | Pass |
| 159 | 5795 | 18.75 | 18.71 | 18.67 | 18.62 | 18.58 | 18.52 | 18.47 | 18.33 | 26.36 | <30dBm | Pass |

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

**CHAIN A+B**

| Channel | Frequency (MHz) | Data Rata (Mbps) | Chain A Power (dBm) | Chain B Power (dBm) | Chain A+B Power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 151 | 5755 | 30 | 26.79 | 26.35 | 29.59 | <30dBm | Pass |
| 159 | 5795 | 30 | 26.61 | 26.36 | 29.50 | <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:

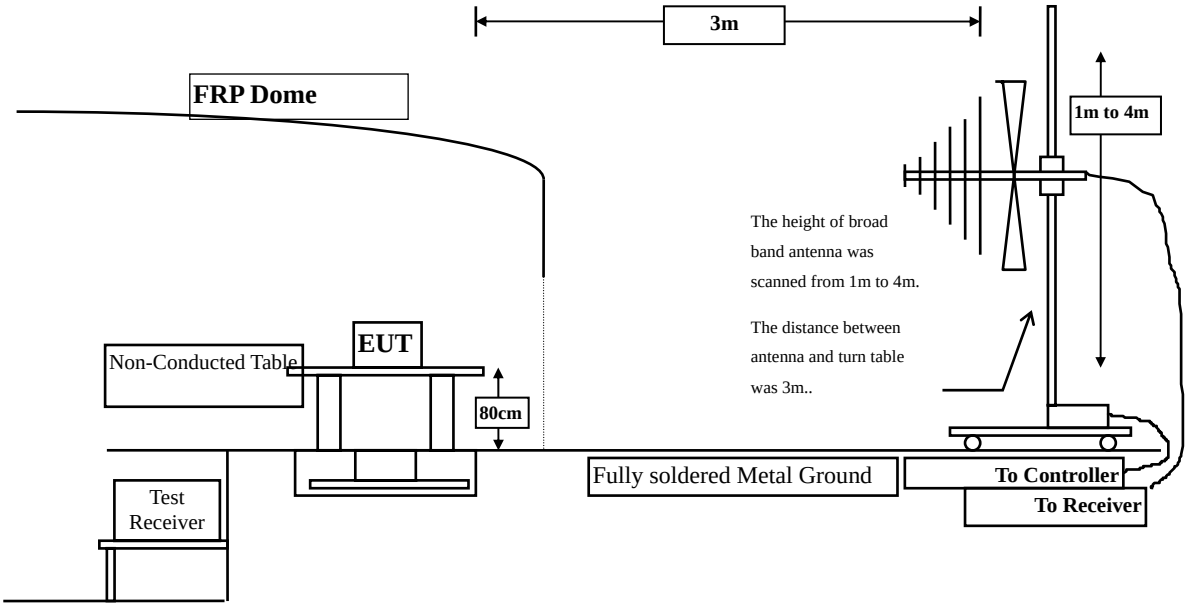
| Test Site | Equipment | | Manufacturer | Model No./Serial No. | Last Cal. |
|---|---|---|---|---|---|
| ☒Site # 3 | X | Bilog Antenna | Schaffner Chase | CBL6112B/2673 | Sep., 2012 |
| | X | Horn Antenna | Schwarzbeck | BBHA9120D/D305 | Sep., 2012 |
| | X | Horn Antenna | Schwarzbeck | BBHA9170/208 | Jul., 2012 |
| | X | Pre-Amplifier | QTK | QTK-AMP-03 / 0003 | May, 2013 |
| | 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, 2013 |
| | 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.

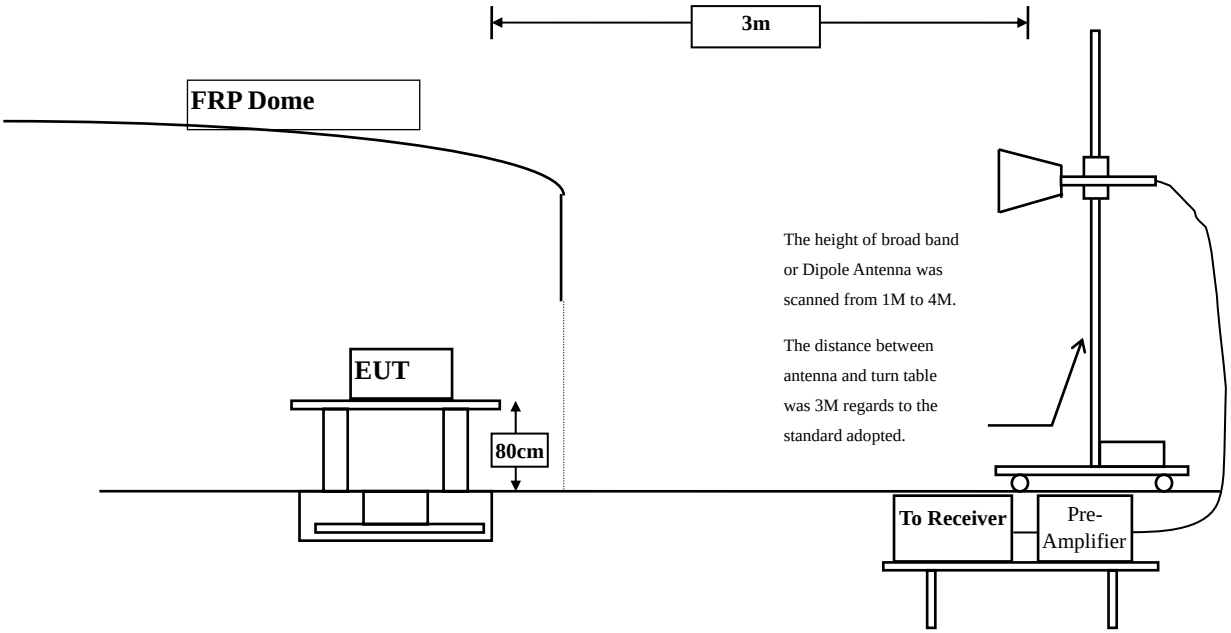
2. The test instruments marked with “X” are used to measure the final test results.

## 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 form 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 | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 11490.000 | 17.106 | 36.650 | 53.757 | -20.243 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 11490.000 | 18.034 | 35.860 | 53.895 | -20.105 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

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 Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 11570.000 | 16.809 | 35.570 | 52.379 | -21.621 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 11570.000 | 17.698 | 35.800 | 53.498 | -20.502 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

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 Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 11650.000 | 16.158 | 35.150 | 51.308 | -22.692 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 11650.000 | 17.274 | 34.840 | 52.115 | -21.885 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

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 Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 11510.000 | 17.124 | 36.180 | 53.304 | -20.696 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 11510.000 | 18.081 | 35.690 | 53.771 | -20.229 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

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 Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 11590.000 | 16.701 | 35.800 | 52.500 | -21.500 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 11590.000 | 17.567 | 35.550 | 53.116 | -20.884 | 74.000 |
| **Average Detector:** | | | | | |
| -- | | | | | |

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),
( Adapter:GFP121DA-240050HB)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 249.220 | -6.014 | 42.493 | 36.479 | -9.521 | 46.000 |
| 313.240 | -4.111 | 40.735 | 36.624 | -9.376 | 46.000 |
| 499.480 | 0.048 | 34.917 | 34.965 | -11.035 | 46.000 |
| 625.580 | 1.770 | 32.413 | 34.183 | -11.817 | 46.000 |
| 800.180 | 5.141 | 28.835 | 33.976 | -12.024 | 46.000 |
| 965.080 | 6.852 | 24.045 | 30.897 | -23.103 | 54.000 |
| **Vertical** | | | | | |
| 256.980 | -7.573 | 40.891 | 33.318 | -12.682 | 46.000 |
| 398.600 | -4.678 | 40.839 | 36.161 | -9.839 | 46.000 |
| 532.460 | -0.563 | 33.052 | 32.489 | -13.511 | 46.000 |
| 666.320 | -1.809 | 33.426 | 31.618 | -14.382 | 46.000 |
| 825.400 | 3.430 | 31.025 | 34.455 | -11.545 | 46.000 |
| 967.020 | 8.071 | 27.349 | 35.420 | -18.580 | 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 2: Transmit - 802.11n-40BW_30Mbps(5G Band) (5755MHz),
( Adapter:GFP121DA-240050HB)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 249.220 | -6.014 | 42.871 | 36.857 | -9.143 | 46.000 |
| 313.240 | -4.111 | 40.418 | 36.307 | -9.693 | 46.000 |
| 499.480 | 0.048 | 35.366 | 35.414 | -10.586 | 46.000 |
| 625.580 | 1.770 | 33.250 | 35.020 | -10.980 | 46.000 |
| 800.180 | 5.141 | 28.681 | 33.822 | -12.178 | 46.000 |
| 963.140 | 6.664 | 25.295 | 31.959 | -22.041 | 54.000 |
| **Vertical** | | | | | |
| 105.660 | -0.253 | 37.371 | 37.118 | -6.382 | 43.500 |
| 256.980 | -7.573 | 39.777 | 32.204 | -13.796 | 46.000 |
| 367.560 | -2.545 | 36.246 | 33.701 | -12.299 | 46.000 |
| 532.460 | -0.563 | 32.423 | 31.860 | -14.140 | 46.000 |
| 800.180 | 2.801 | 29.993 | 32.794 | -13.206 | 46.000 |
| 928.220 | 6.203 | 30.128 | 36.331 | -9.669 | 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 1: Transmit - 802.11n-20BW_14.4Mbps(5G Band) (5785 MHz),
( Adapter:GFP241DA-240100HB)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 154.160 | -8.002 | 42.585 | 34.583 | -8.917 | 43.500 |
| 286.080 | -5.619 | 44.747 | 39.128 | -6.872 | 46.000 |
| 431.580 | 0.757 | 37.133 | 37.890 | -8.110 | 46.000 |
| 610.060 | 3.657 | 35.550 | 39.207 | -6.793 | 46.000 |
| 714.820 | 3.801 | 32.100 | 35.901 | -10.099 | 46.000 |
| 965.080 | 7.222 | 26.700 | 33.922 | -20.078 | 54.000 |
| **Vertical** | | | | | |
| 111.480 | -3.439 | 39.289 | 35.851 | -7.649 | 43.500 |
| 237.580 | -6.537 | 43.191 | 36.654 | -9.346 | 46.000 |
| 330.700 | -2.244 | 42.557 | 40.314 | -5.686 | 46.000 |
| 495.600 | -1.237 | 38.039 | 36.802 | -9.198 | 46.000 |
| 666.320 | -0.951 | 34.458 | 33.507 | -12.493 | 46.000 |
| 809.880 | 3.026 | 25.668 | 28.694 | -17.306 | 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),
( Adapter:GFP241DA-240100HB)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 156.100 | -8.497 | 44.357 | 35.860 | -7.640 | 43.500 |
| 291.900 | -5.202 | 45.241 | 40.039 | -5.961 | 46.000 |
| 460.680 | 4.030 | 36.074 | 40.104 | -5.896 | 46.000 |
| 666.320 | 1.879 | 35.969 | 37.848 | -8.152 | 46.000 |
| 809.880 | 6.266 | 27.922 | 34.188 | -11.812 | 46.000 |
| 965.080 | 7.222 | 25.821 | 33.043 | -20.957 | 54.000 |
| **Vertical** | | | | | |
| 76.560 | -6.510 | 41.055 | 34.545 | -5.455 | 40.000 |
| 266.680 | -5.600 | 44.213 | 38.613 | -7.387 | 46.000 |
| 396.660 | -2.039 | 37.381 | 35.342 | -10.658 | 46.000 |
| 505.300 | 0.056 | 35.039 | 35.095 | -10.905 | 46.000 |
| 695.420 | 1.352 | 33.068 | 34.420 | -11.580 | 46.000 |
| 941.800 | 3.460 | 32.995 | 36.455 | -9.545 | 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

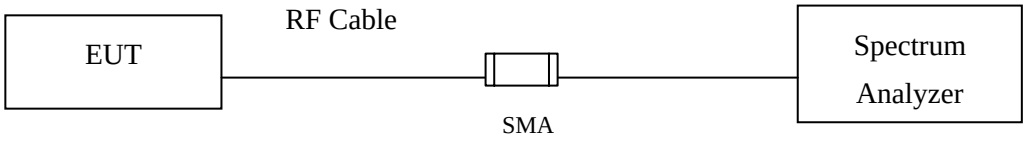
| | Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---|---|---|---|---|
| X | Spectrum Analyzer | R&S | FSP40 / 100170 | Jun, 2012 |
| | Spectrum Analyzer | Agilent | E4407B / US39440758 | Jun, 2012 |
| | Spectrum Analyzer | Agilent | N9010A / MY48030495 | Apr., 2013 |

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.

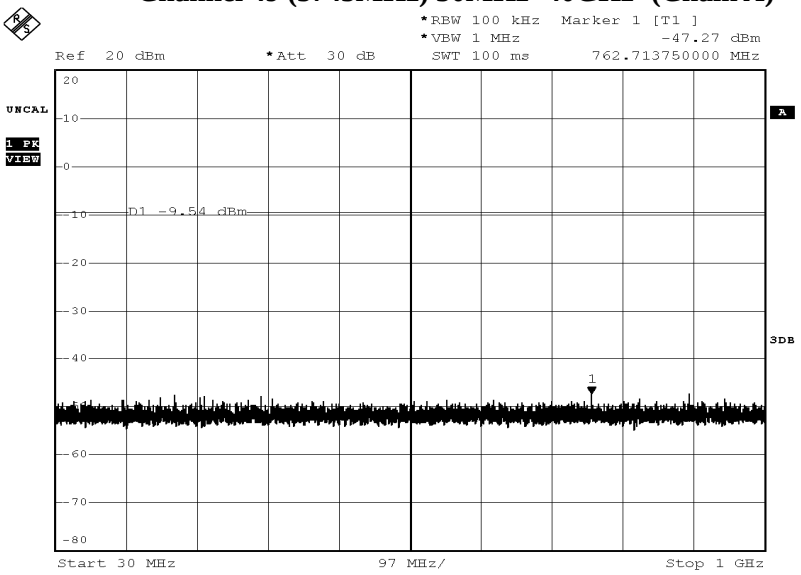
## 5.5. Uncertainty

The measurement uncertainty
Conducted is defined as ± 1.27dB

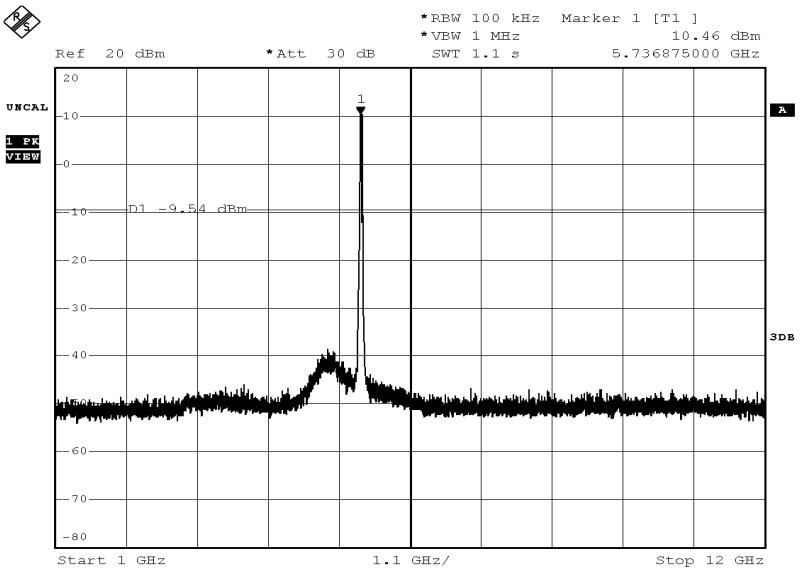
## 5.6. Test Result of RF antenna conducted test

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)

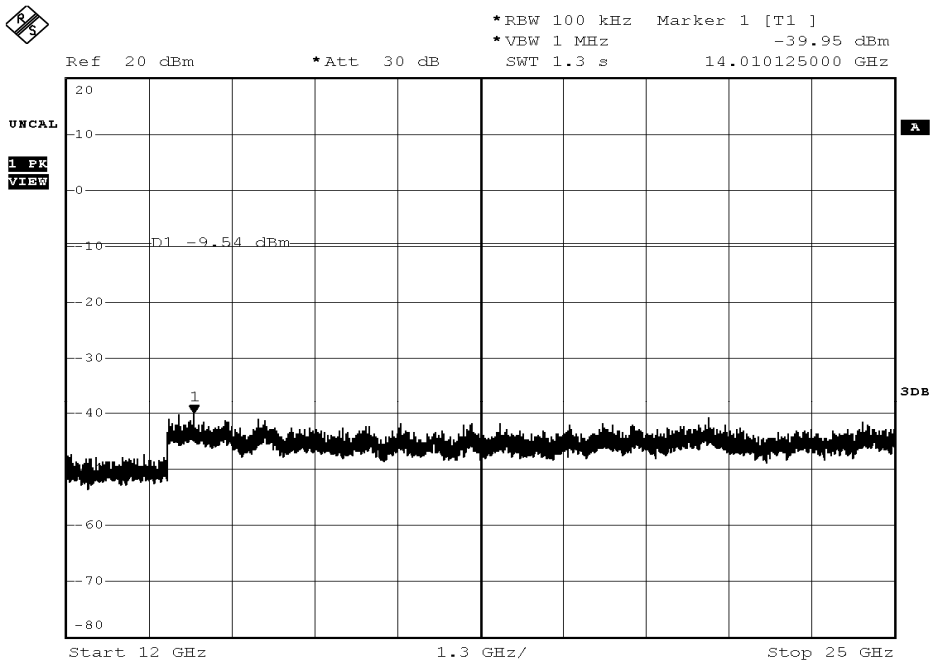
**Channel 49 (5745MHz) 30MHz -40GHz- (Chain A)**



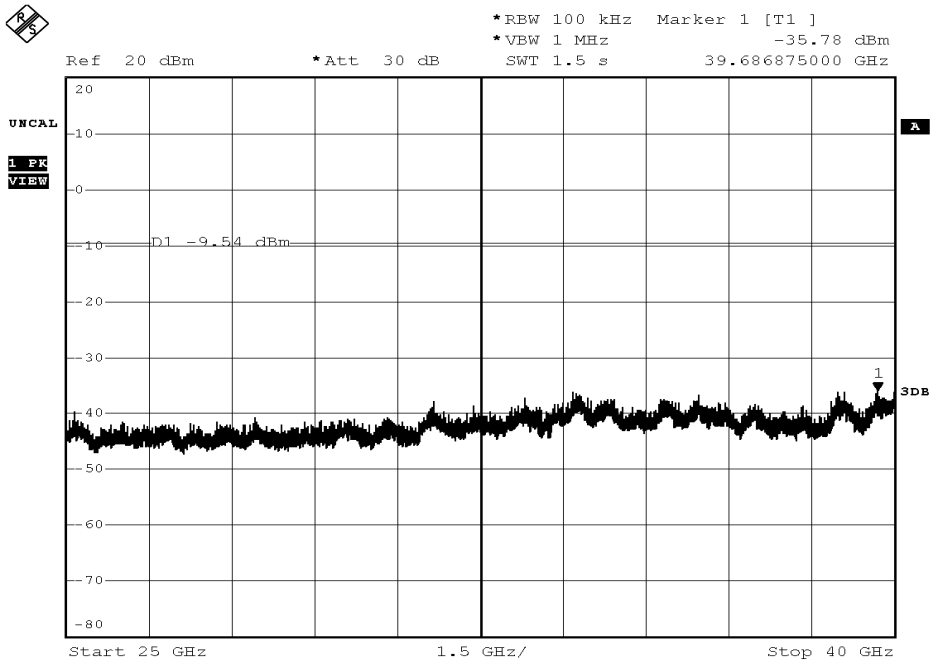

Date: 11.MAR.2013 17:07:13




Date: 11.MAR.2013 17:06:36

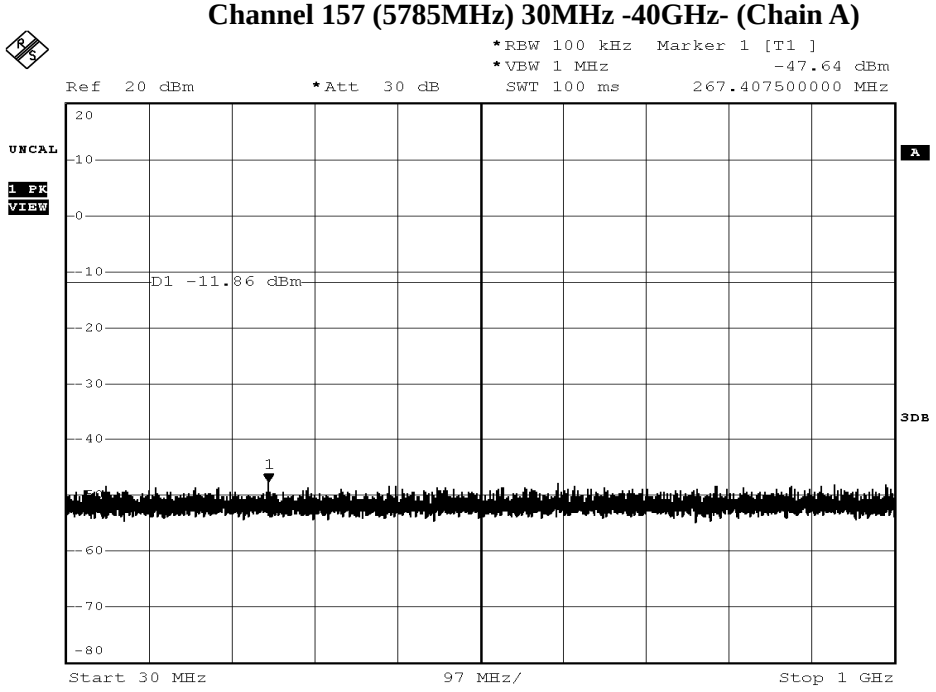



Date: 11.MAR.2013 17:07:50

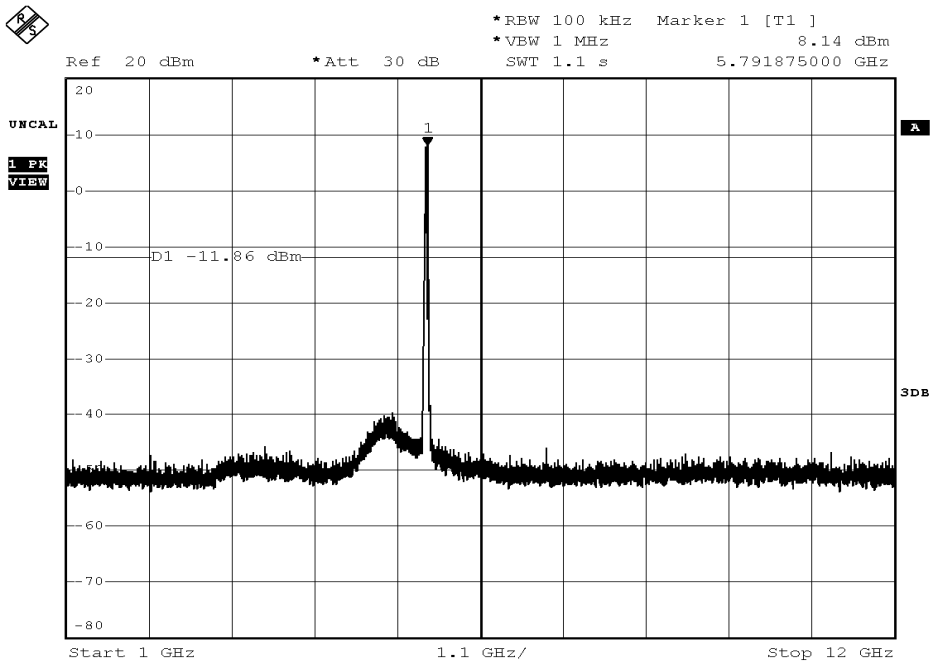



Date: 11.MAR.2013 17:08:27

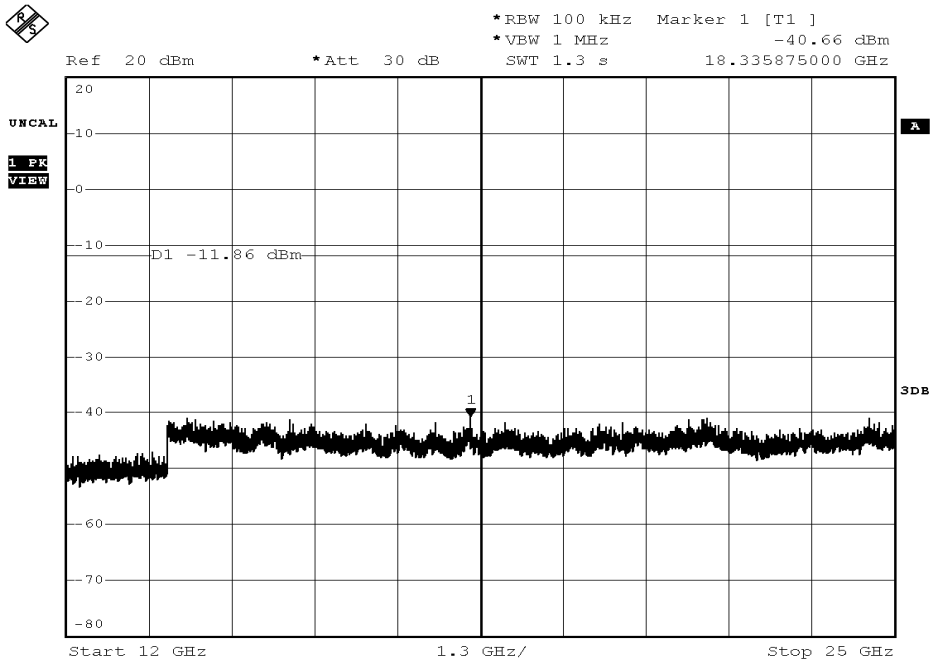
## Channel 157 (5785MHz) 30MHz -40GHz- (Chain A)



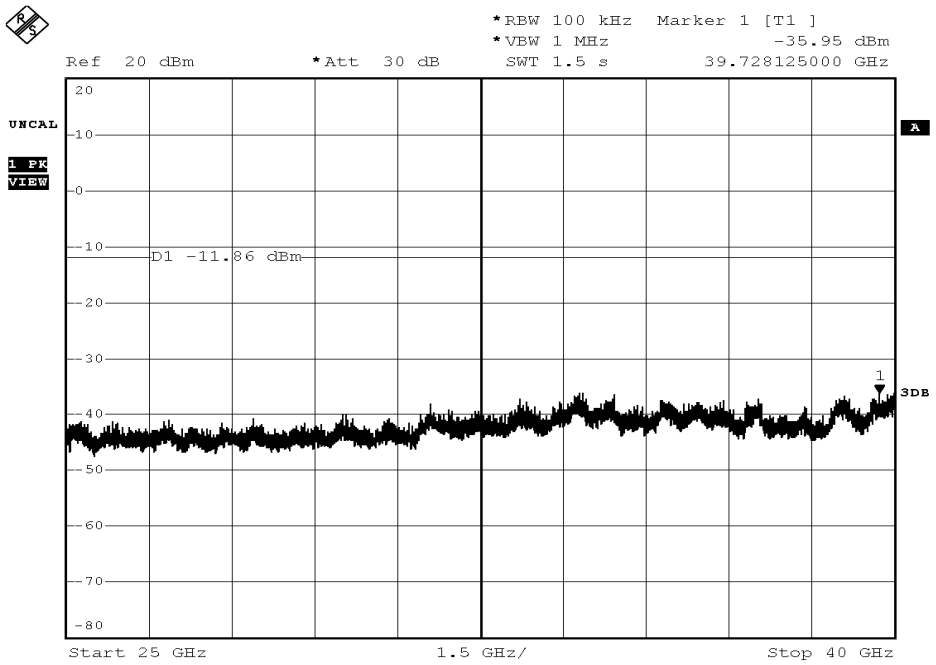

Date: 11.MAR.2013 17:13:07




Date: 11.MAR.2013 17:12:30

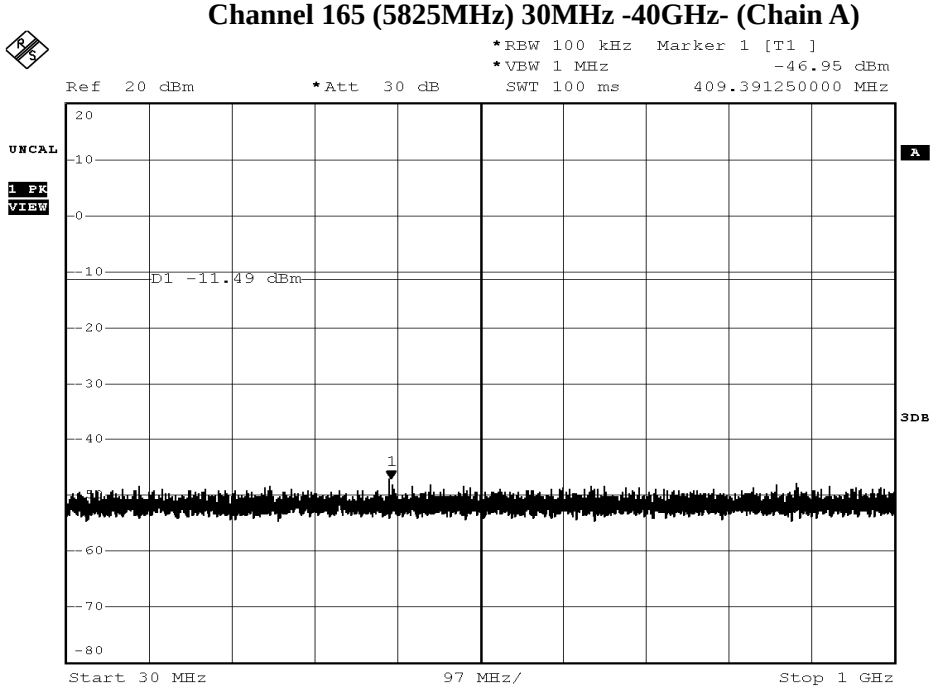



Date: 11.MAR.2013 17:13:44

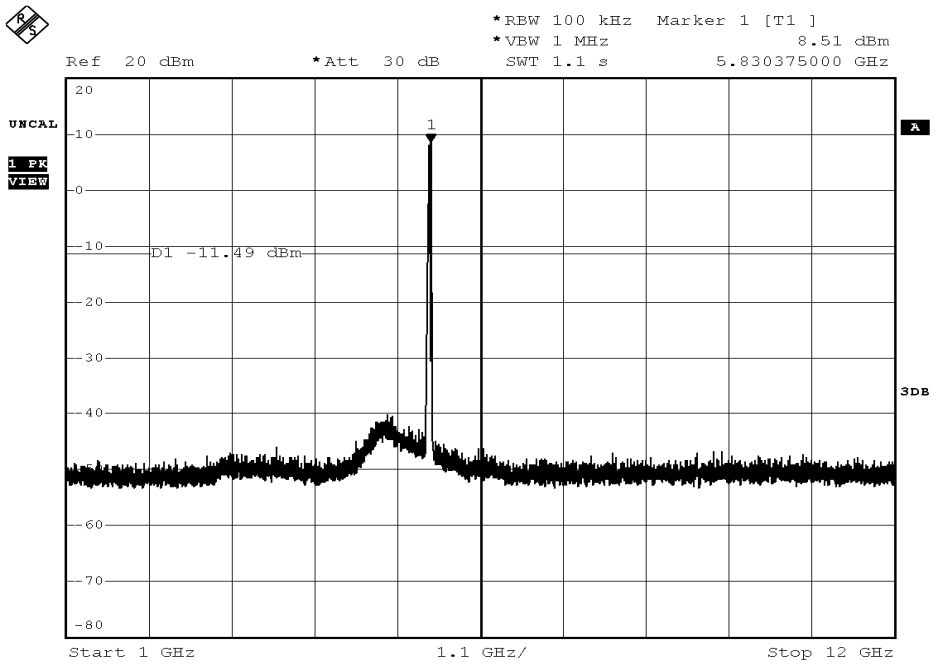



Date: 11.MAR.2013 17:14:22

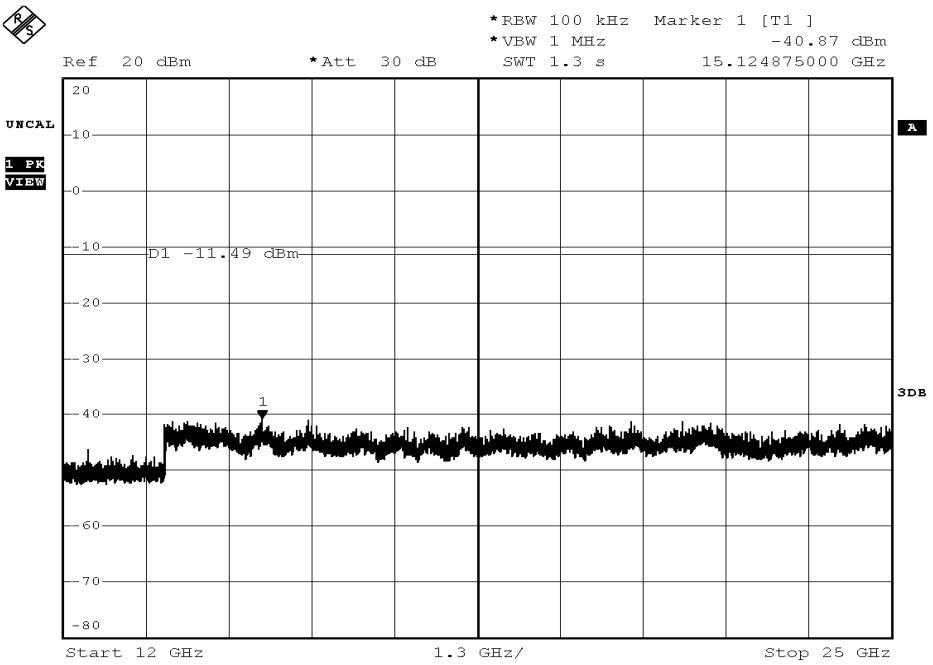
## Channel 165 (5825MHz) 30MHz -40GHz- (Chain A)



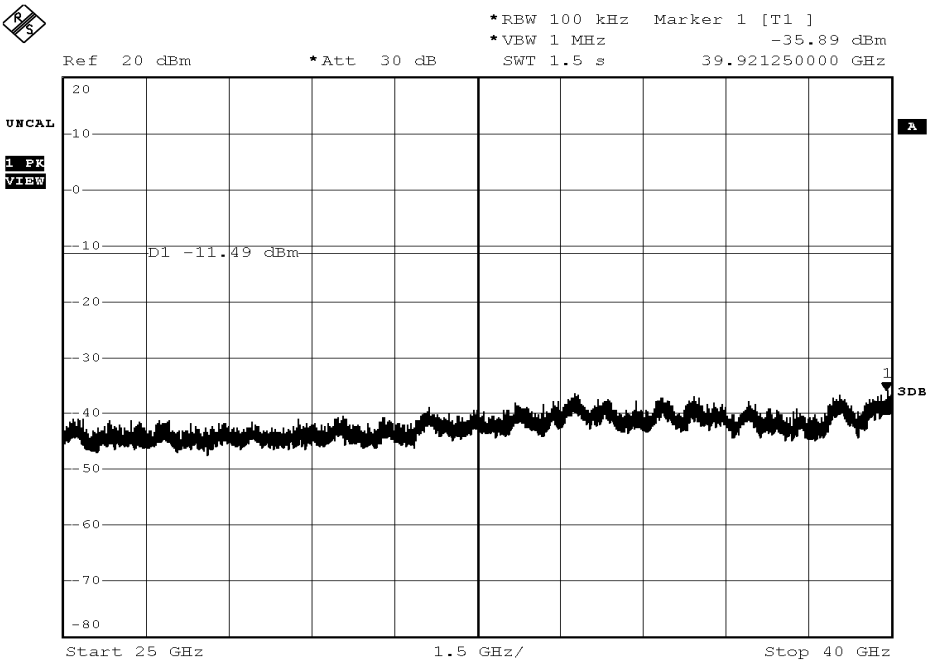

Date: 11.MAR.2013 17:18:46




Date: 11.MAR.2013 17:18:09

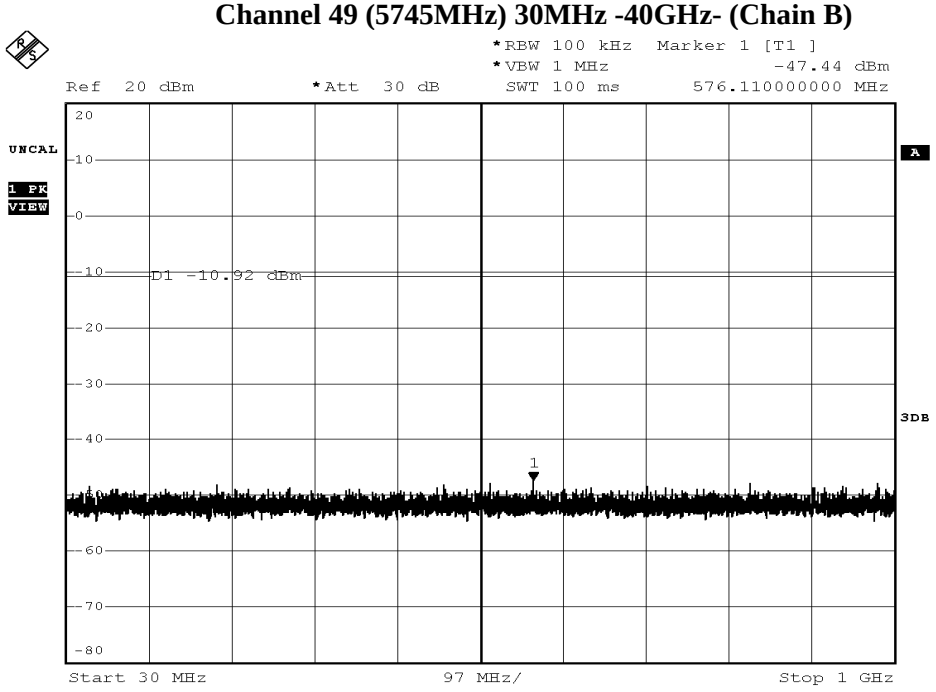



Date: 11.MAR.2013 17:19:24

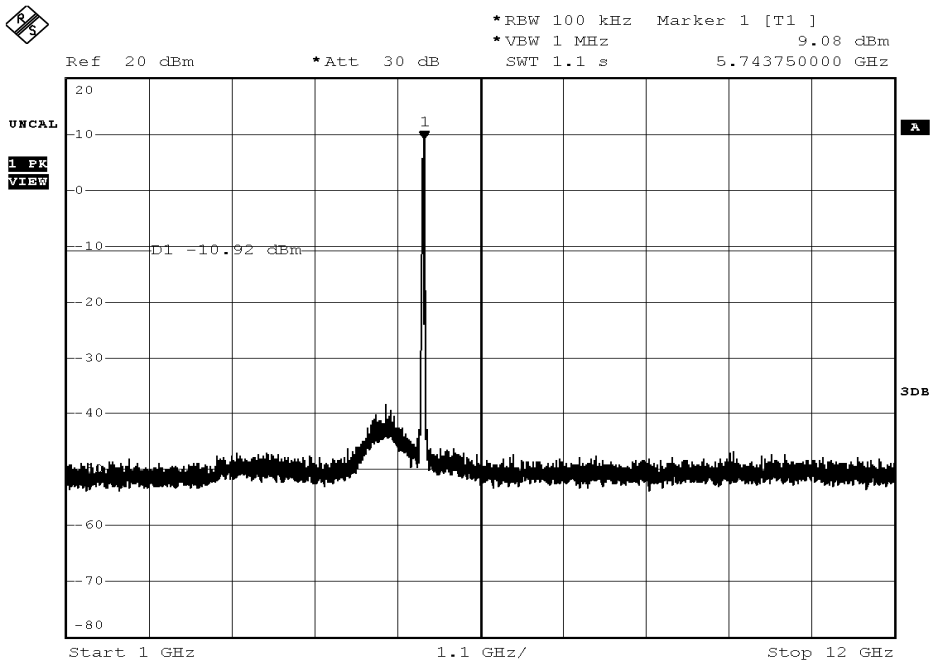



Date: 11.MAR.2013 17:20:01

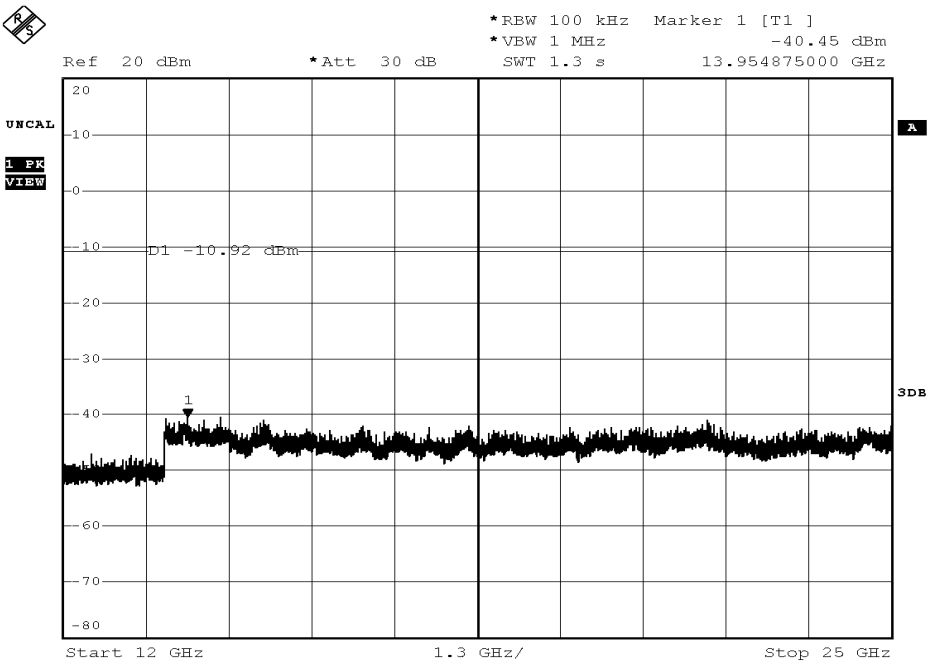
## Channel 49 (5745MHz) 30MHz -40GHz- (Chain B)



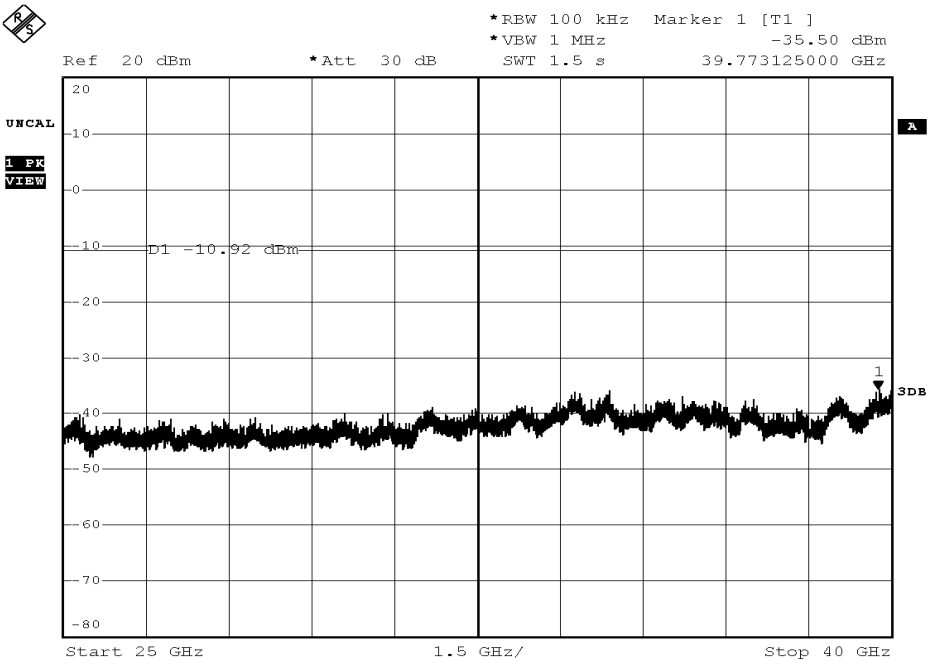

Date: 11.MAR.2013 17:10:03




Date: 11.MAR.2013 17:09:25

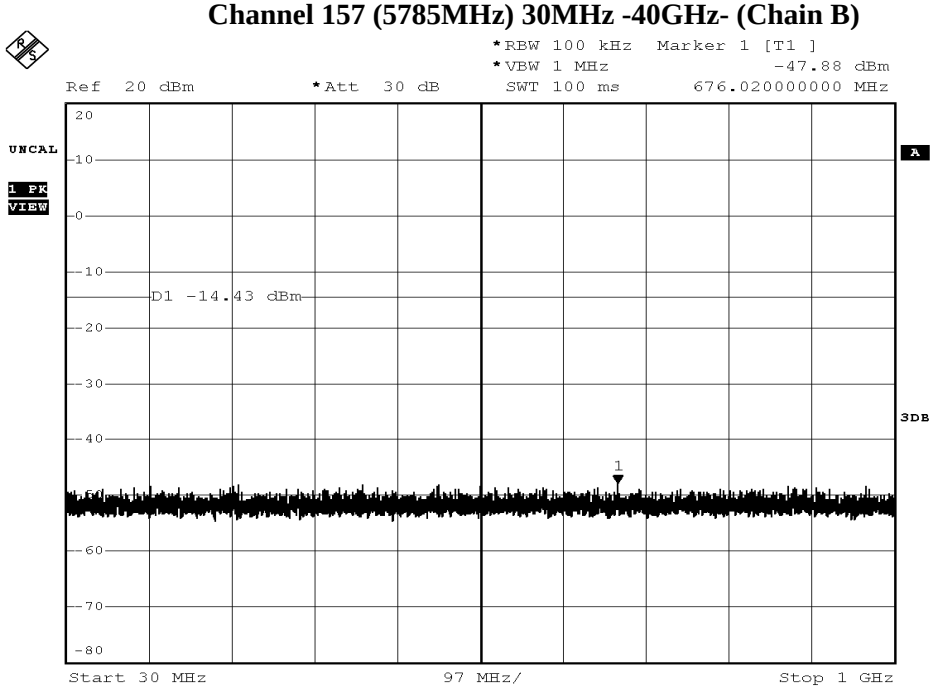



Date: 11.MAR.2013 17:10:40

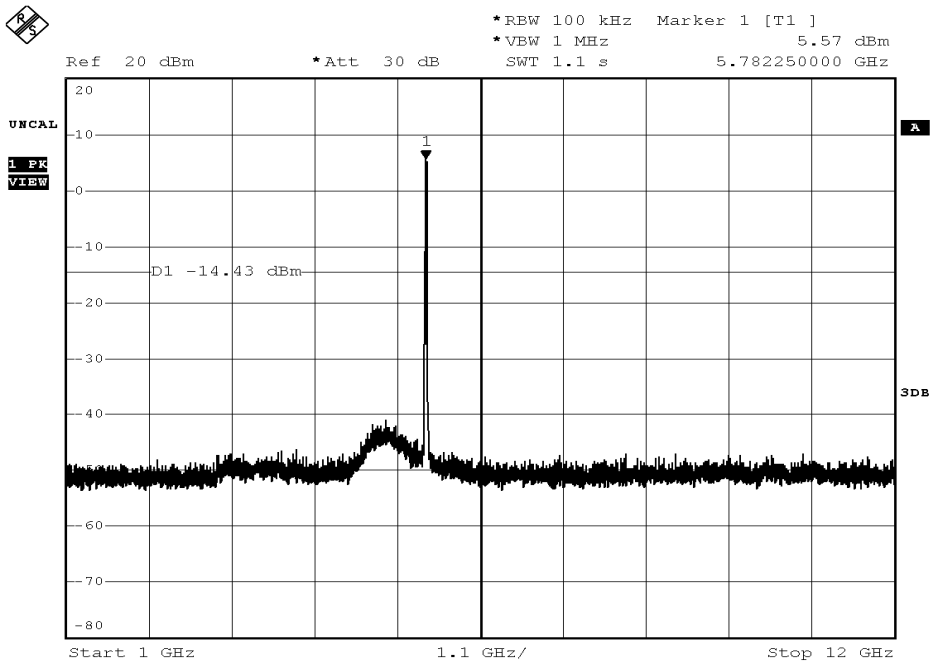



Date: 11.MAR.2013 17:11:17

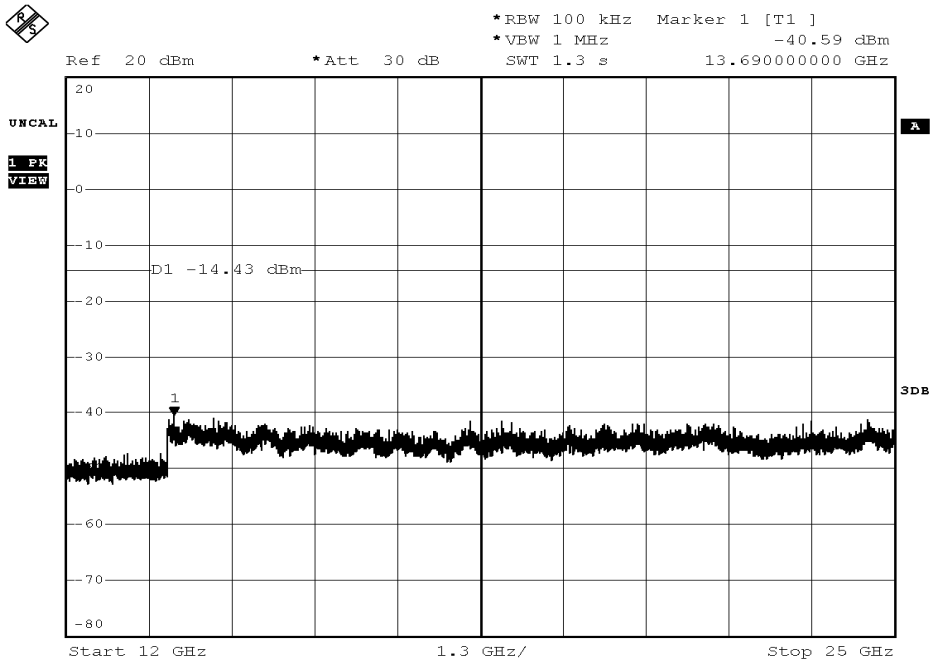
## Channel 157 (5785MHz) 30MHz -40GHz- (Chain B)



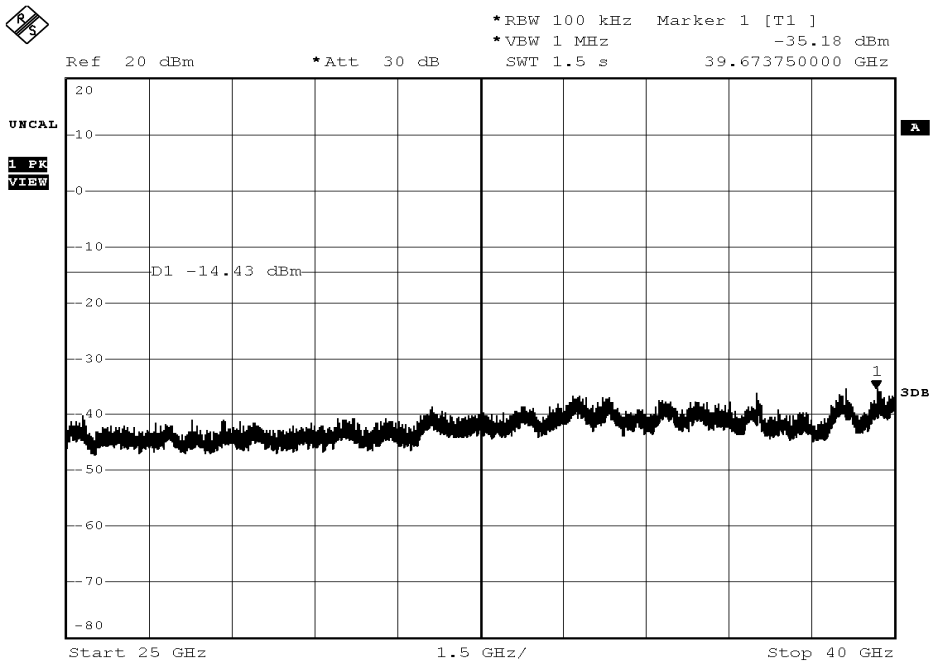

Date: 11.MAR.2013 17:15:52




Date: 11.MAR.2013 17:15:15

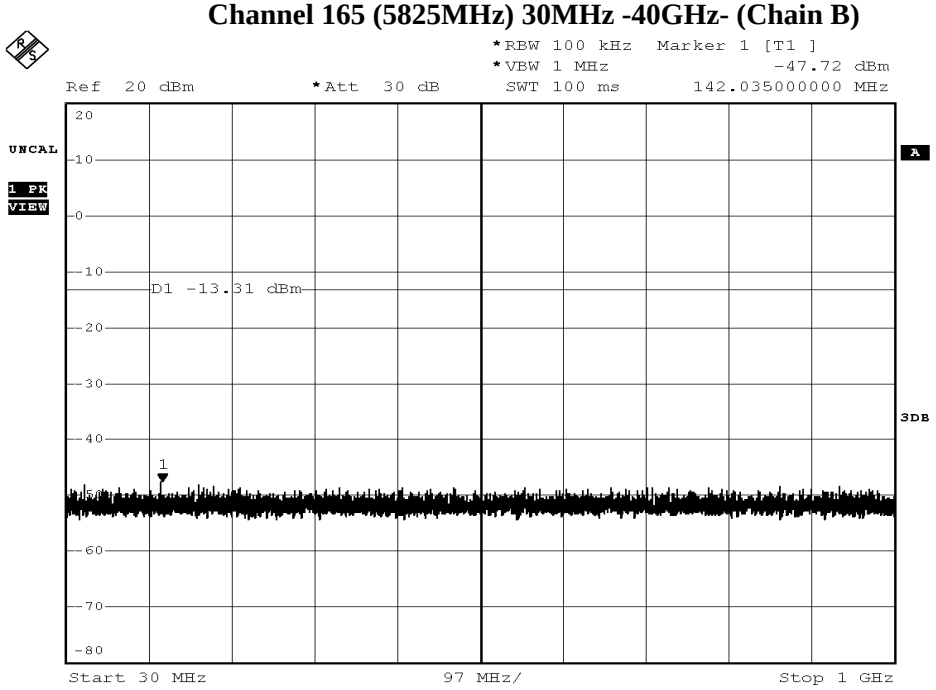



Date: 11.MAR.2013 17:16:30

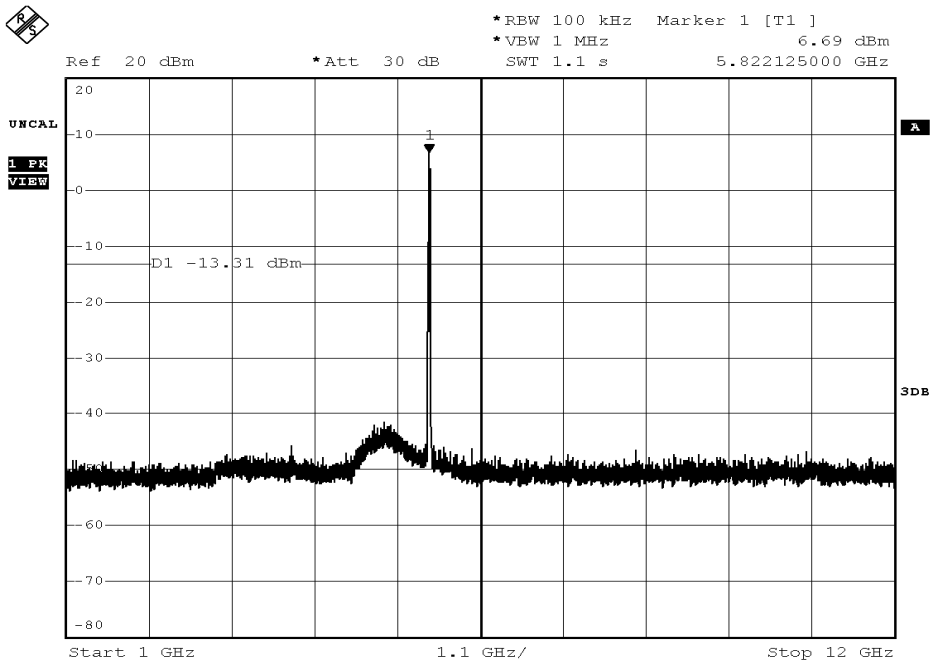



Date: 11.MAR.2013 17:17:07

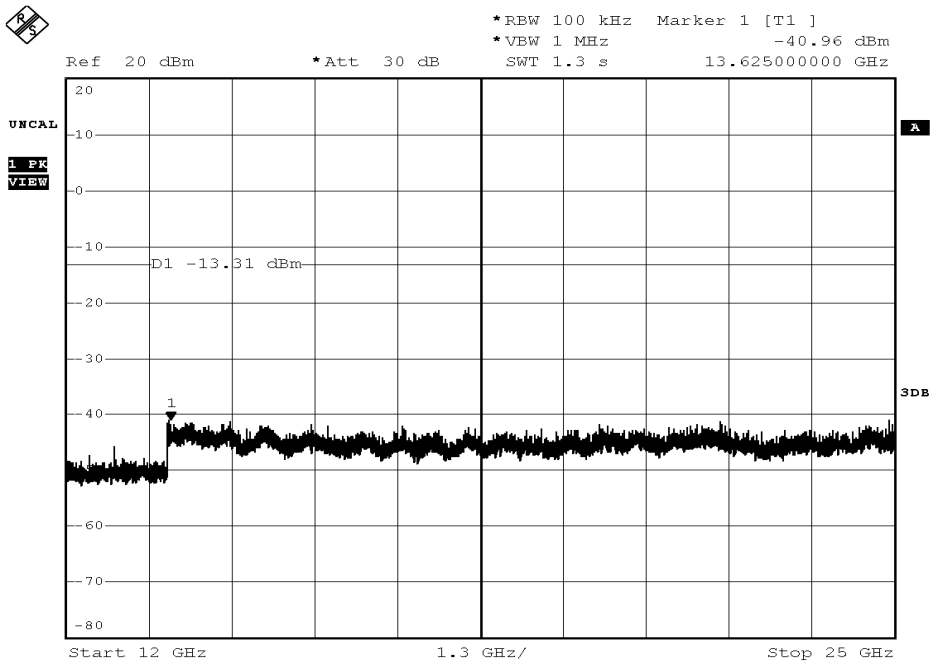
## Channel 165 (5825MHz) 30MHz -40GHz- (Chain B)



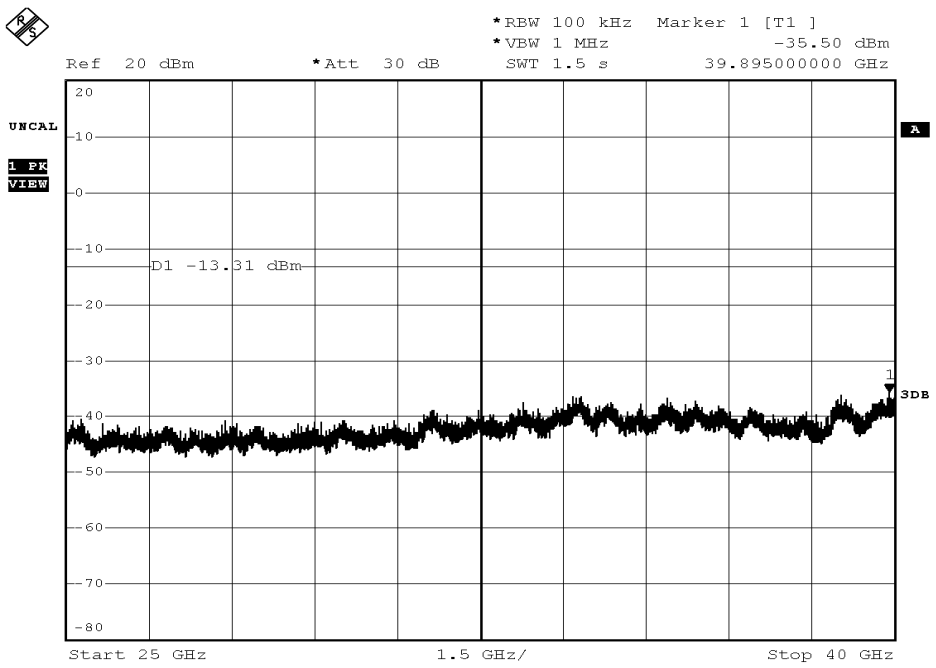

Date: 11.MAR.2013 17:21:28




Date: 11.MAR.2013 17:20:51



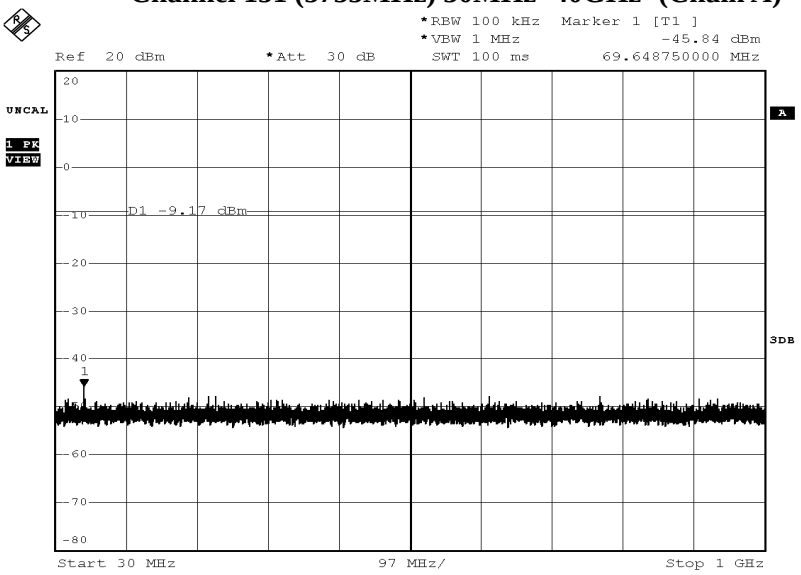

Date: 11.MAR.2013 17:22:05



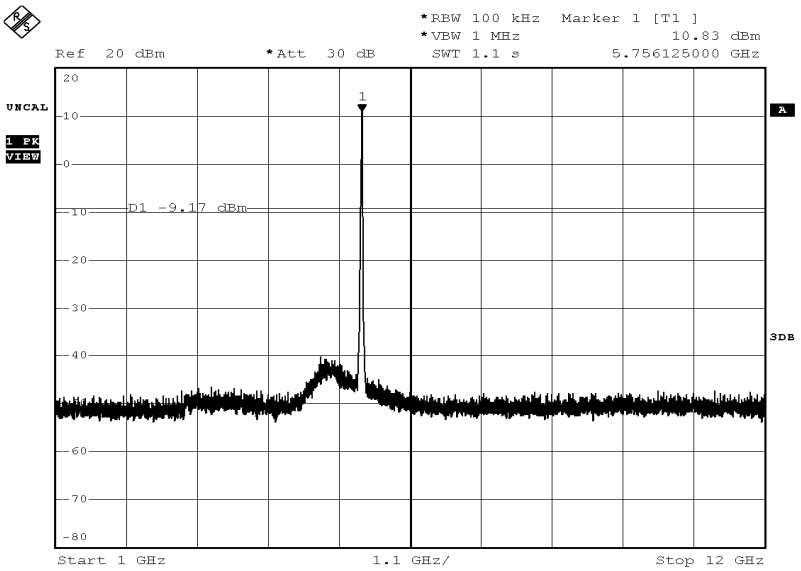

Date: 11.MAR.2013 17:22:43

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)

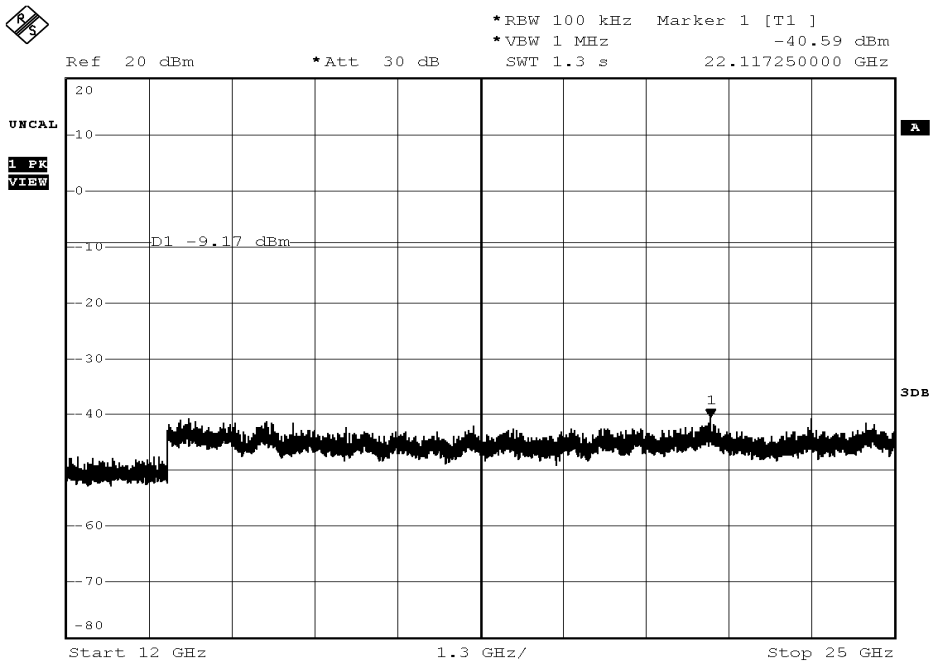
**Channel 151 (5755MHz) 30MHz -40GHz- (Chain A)**



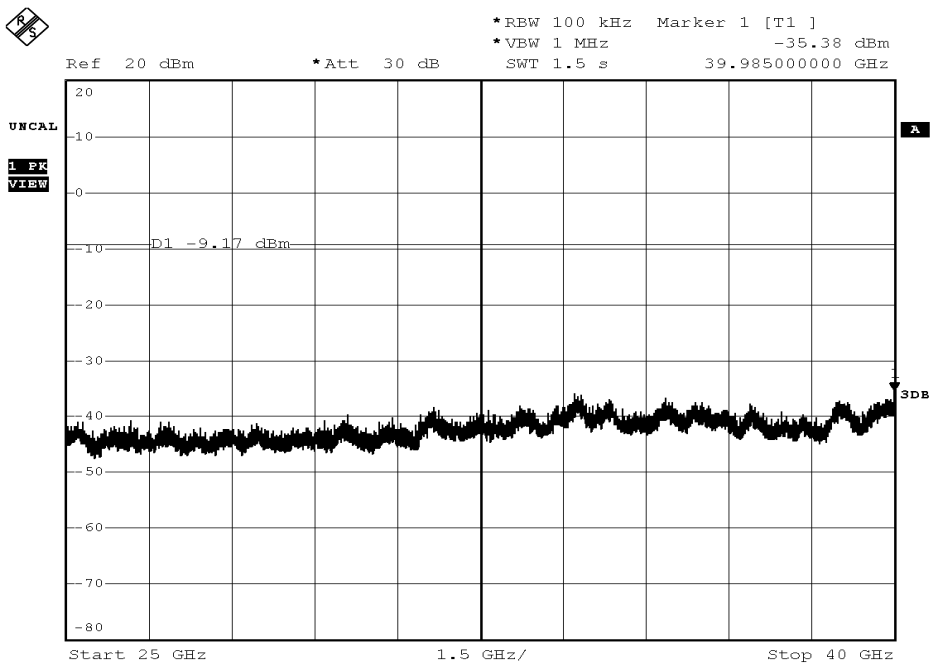

Date: 11.MAR.2013 17:24:31




Date: 11.MAR.2013 17:23:54

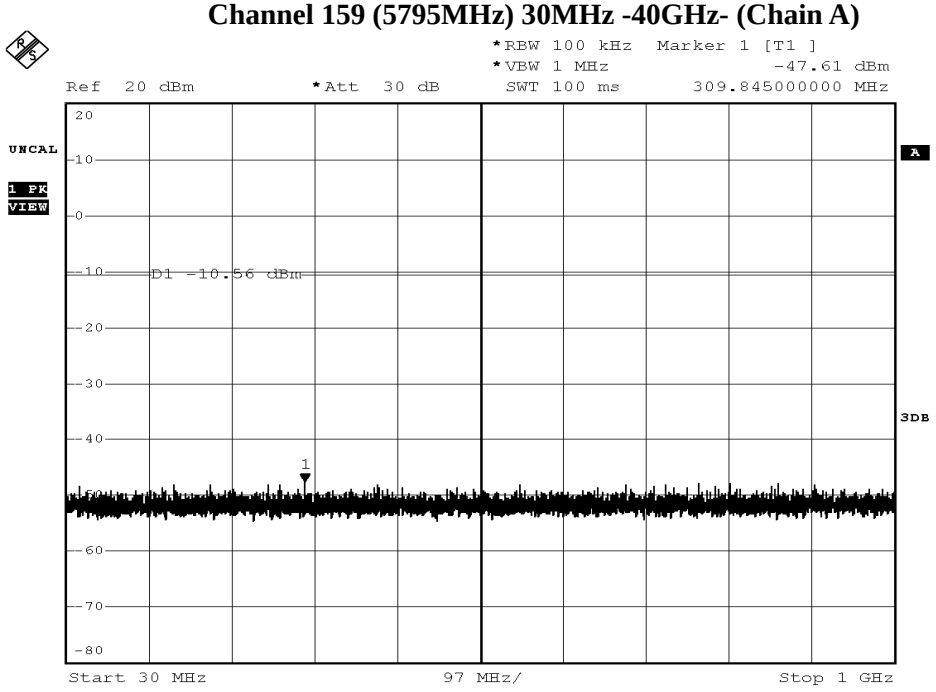



Date: 11.MAR.2013 17:25:09

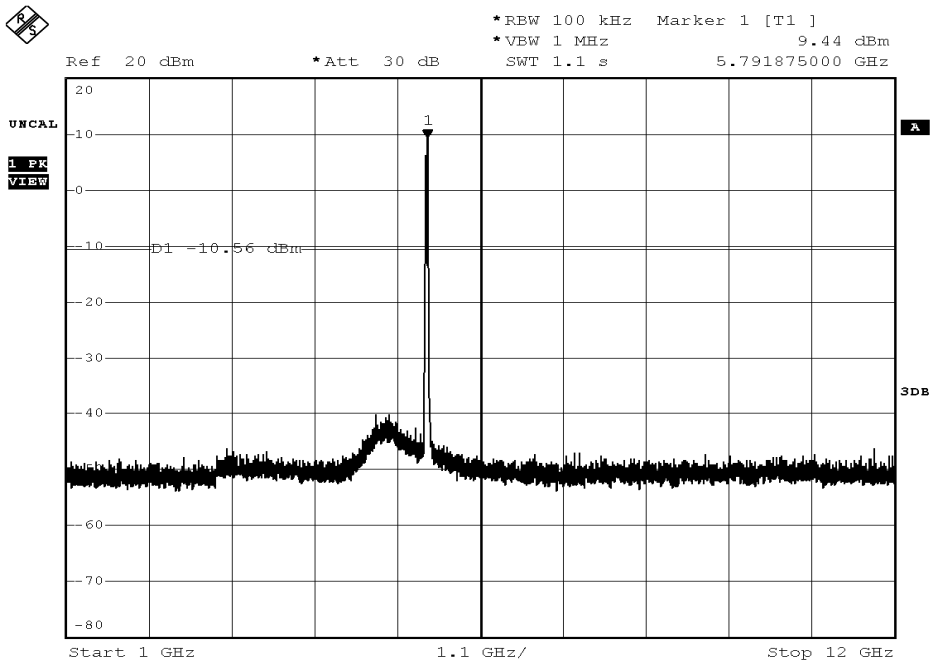



Date: 11.MAR.2013 17:25:46

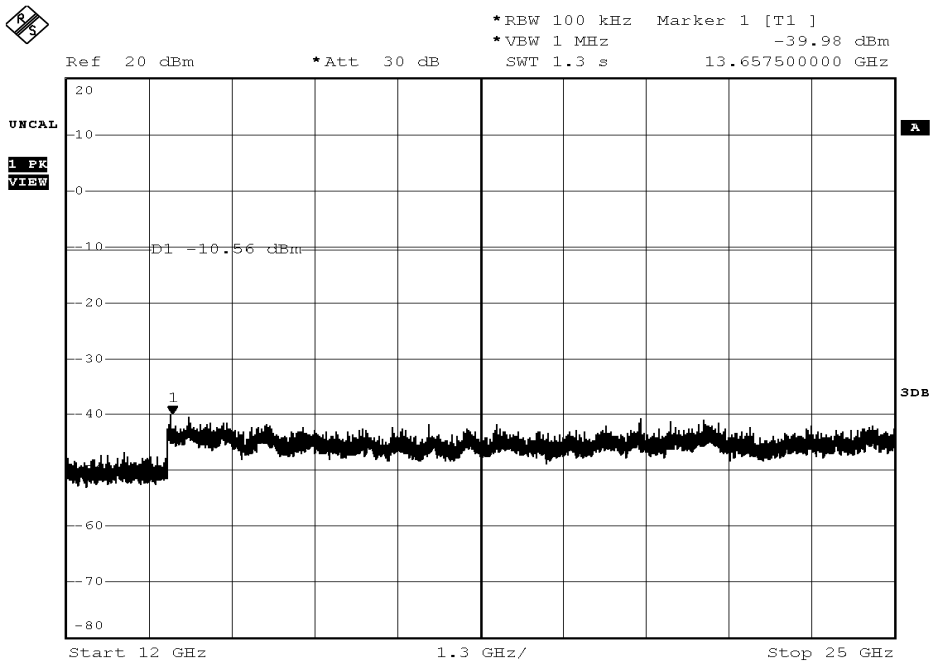
## Channel 159 (5795MHz) 30MHz -40GHz- (Chain A)



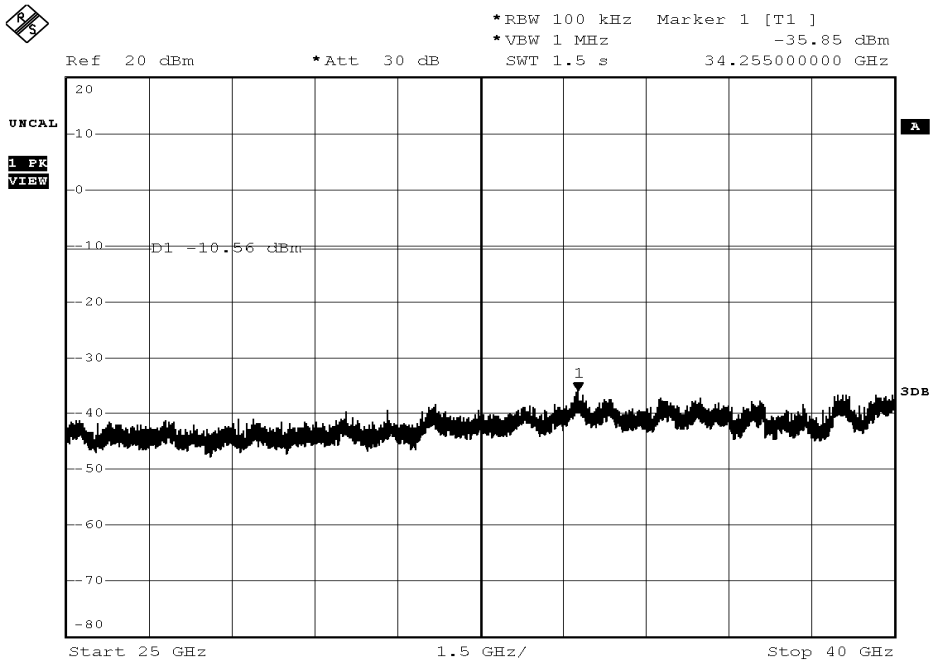

Date: 11.MAR.2013 17:36:04




Date: 11.MAR.2013 17:35:27

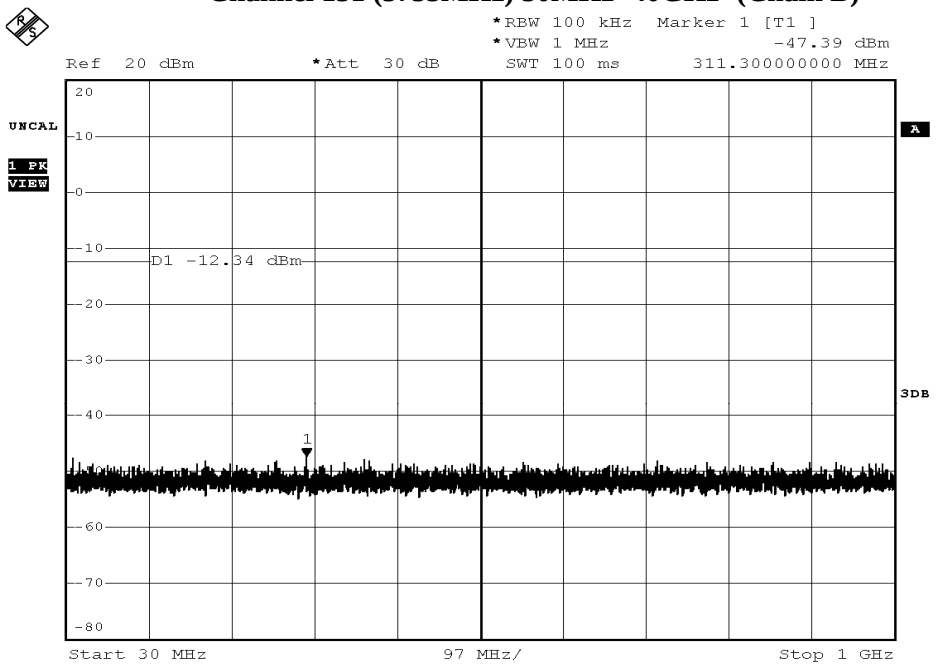



Date: 11.MAR.2013 17:36:41

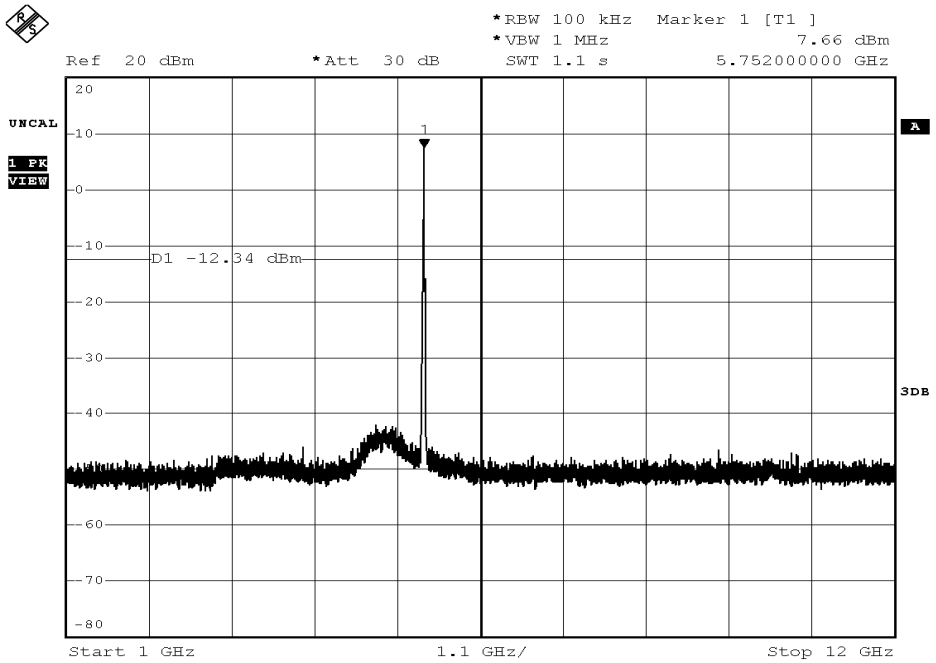



Date: 11.MAR.2013 17:37:18

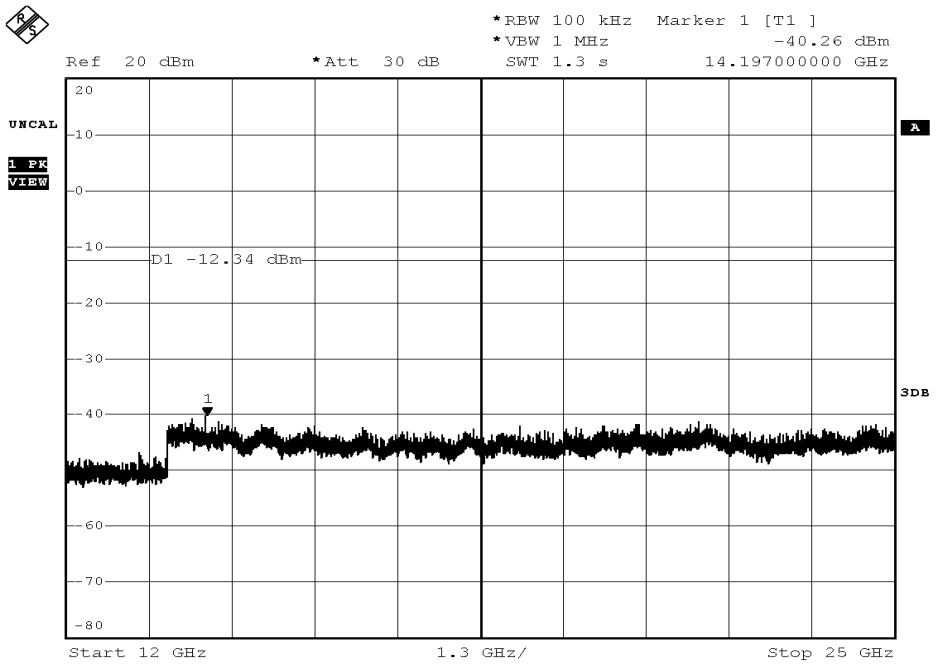
## Channel 151 (5755MHz) 30MHz -40GHz- (Chain B)



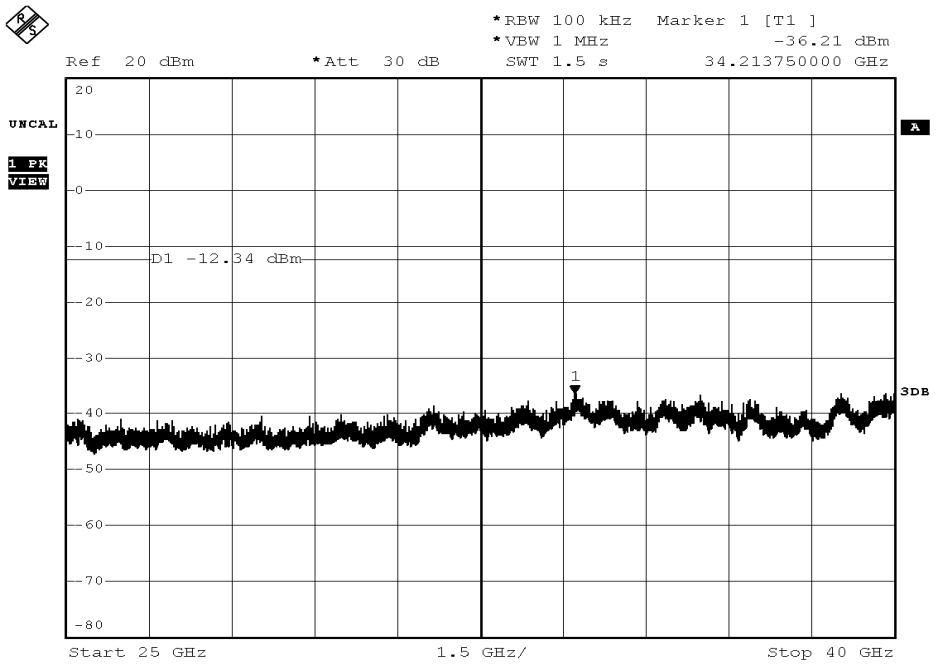

Date: 11.MAR.2013 17:27:14




Date: 11.MAR.2013 17:26:37

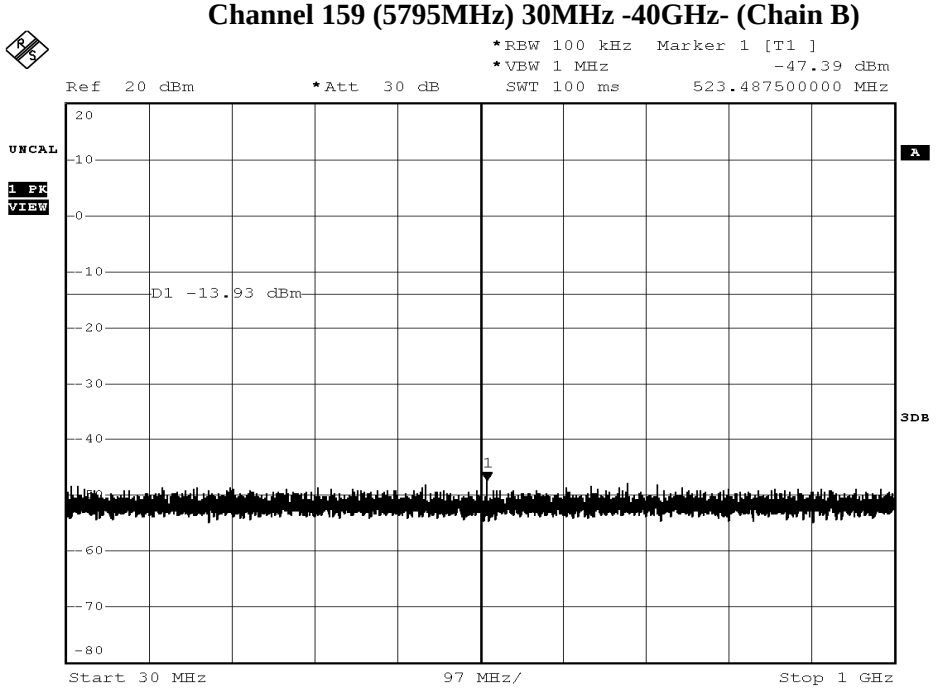



Date: 11.MAR.2013 17:27:52

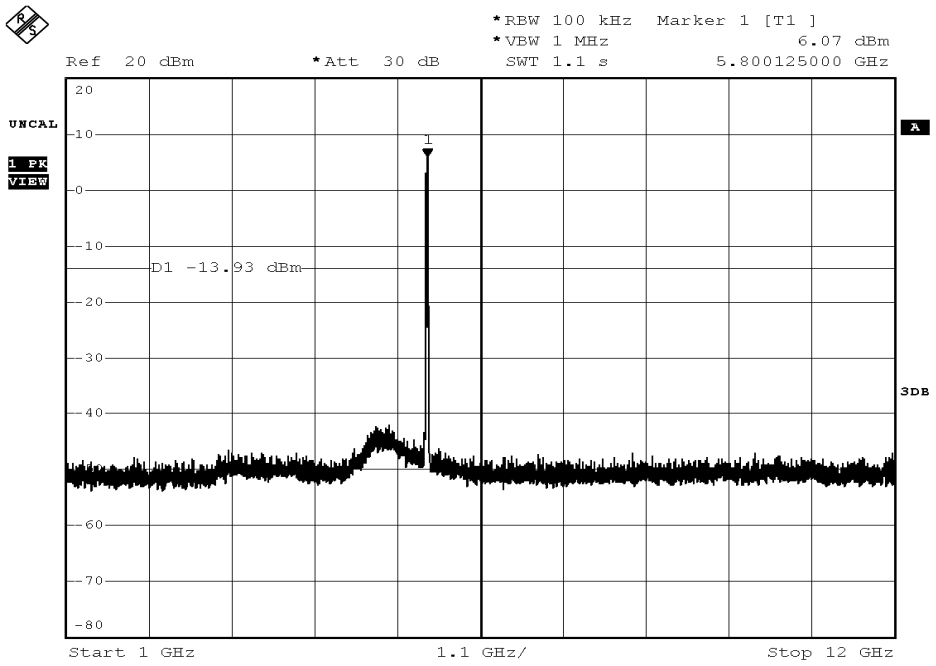



Date: 11.MAR.2013 17:28:29

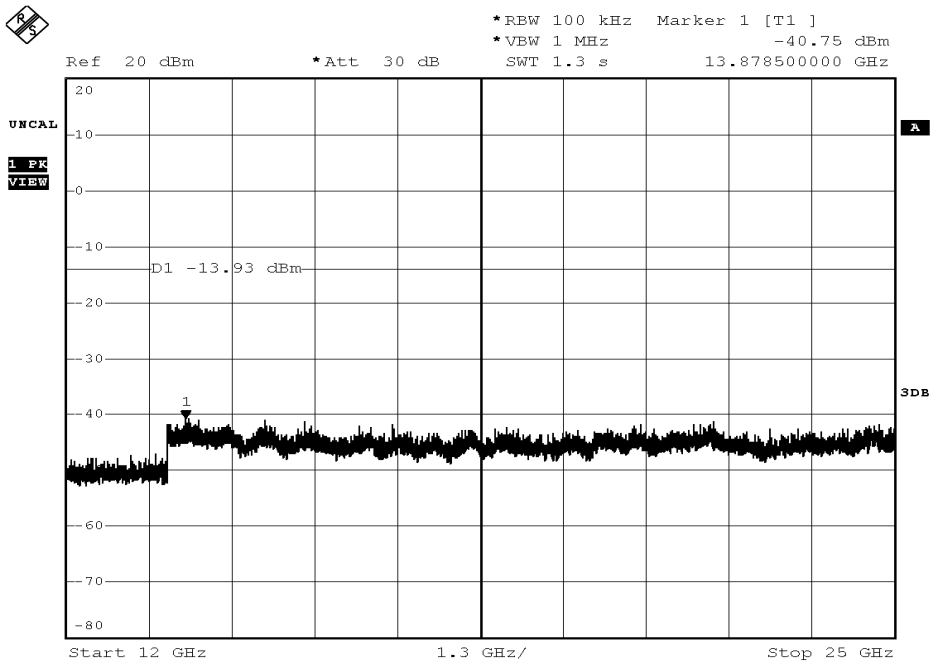
## Channel 159 (5795MHz) 30MHz -40GHz- (Chain B)



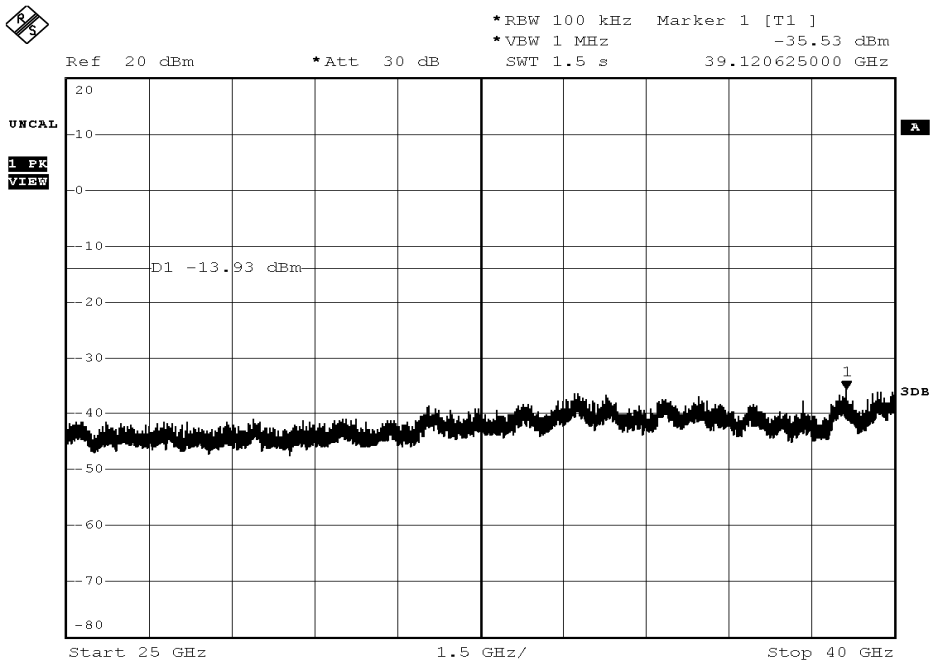

Date: 11.MAR.2013 17:42:24




Date: 11.MAR.2013 17:41:47




Date: 11.MAR.2013 17:43:01




Date: 11.MAR.2013 17:43:39

# 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:

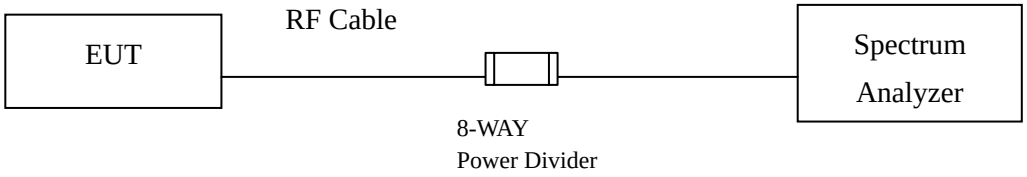
The following test equipments are used during the band edge tests:

| 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, 2013 |
| | 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, 2013 |
| | | 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 |

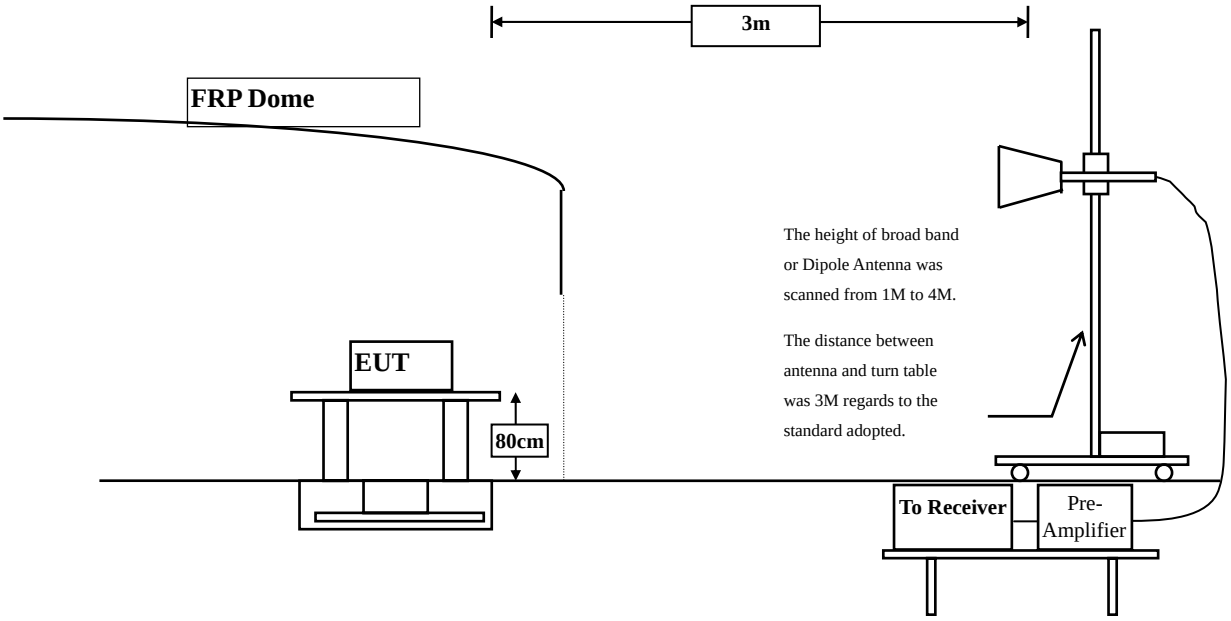
Note: 1. All instruments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

## 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

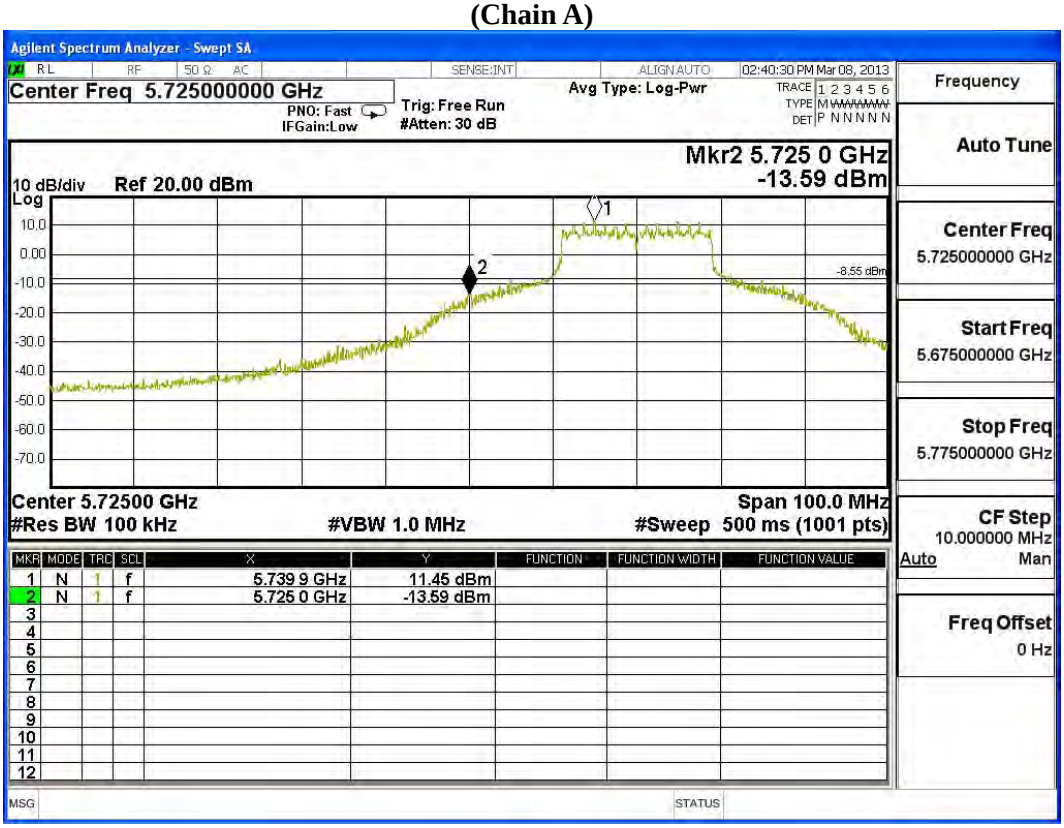
± 3.9 dB above 1GHz
± 3.8 dB below 1GHz

## 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)

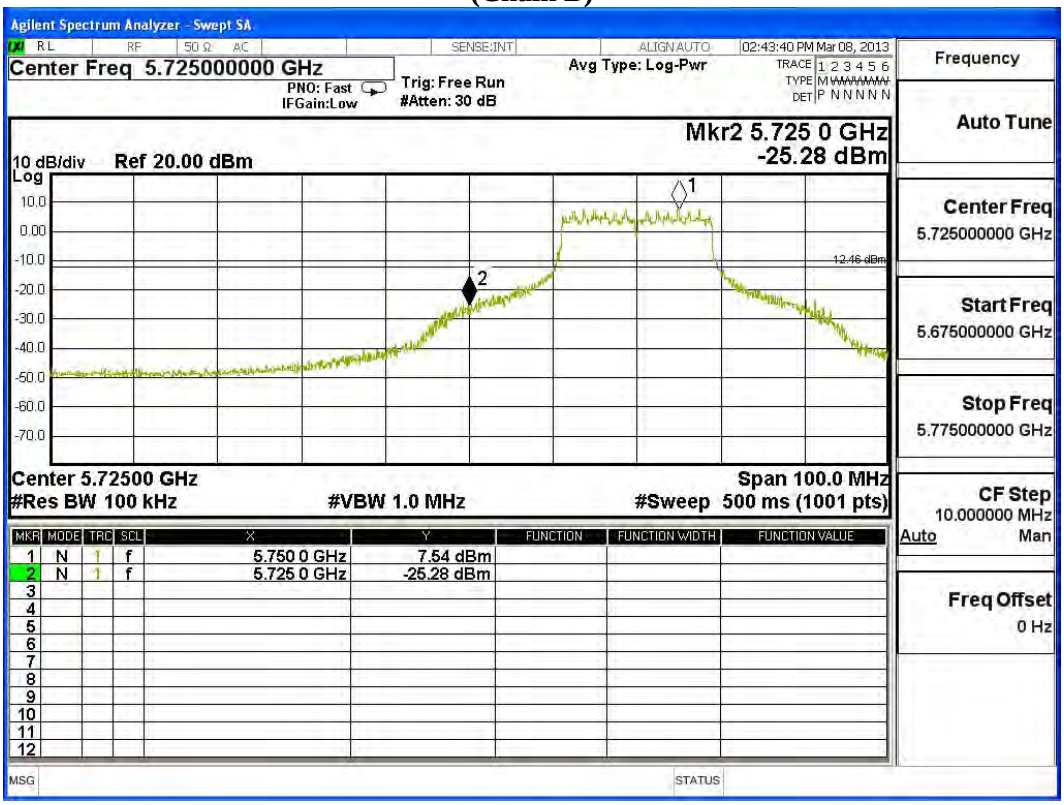
| Test Frequency (MHz) | Measurement Level Δ (dB) | Limit Δ (dB) | Result |
|---|---|---|---|
| 5745 | 25.04 | >20 | PASS |

**(Chain A)**



| Test Frequency (MHz) | Measurement Level Δ (dB) | Limit Δ (dB) | Result |
|---|---|---|---|
| 5745 | 32.82 | >20 | PASS |

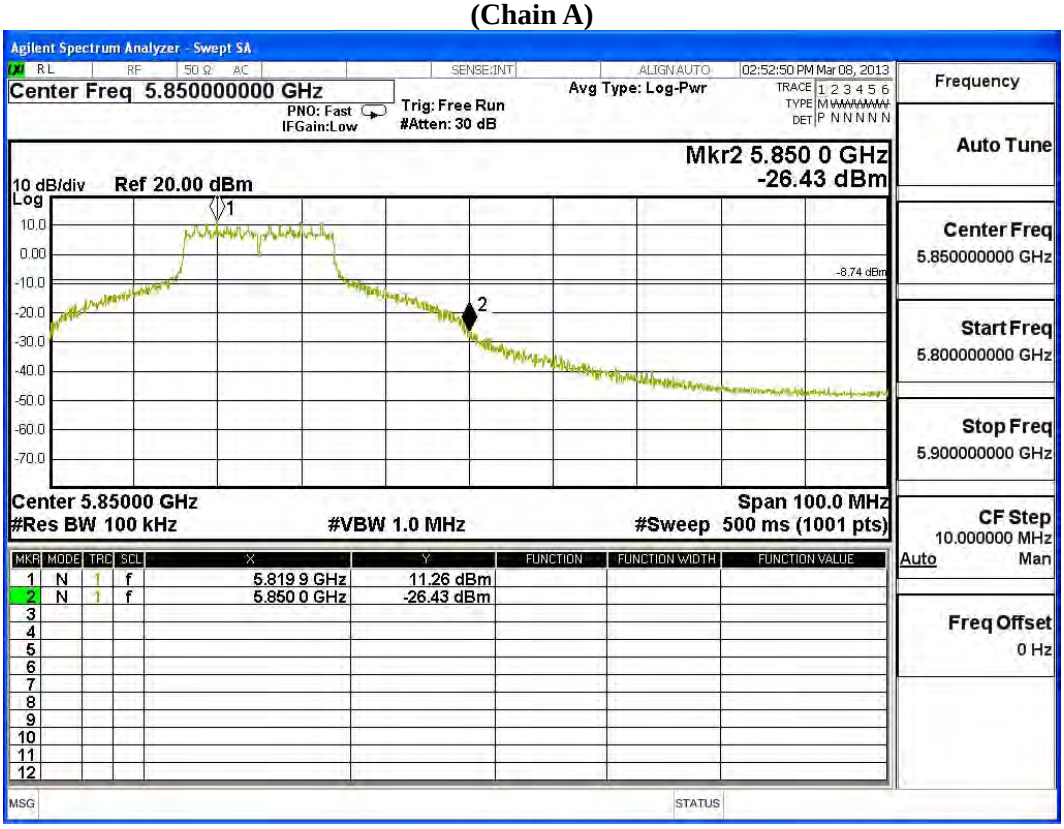
**(Chain B)**



Product : WiFi AP
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit - 802.11n-20BW_14.4Mbps(5G Band)

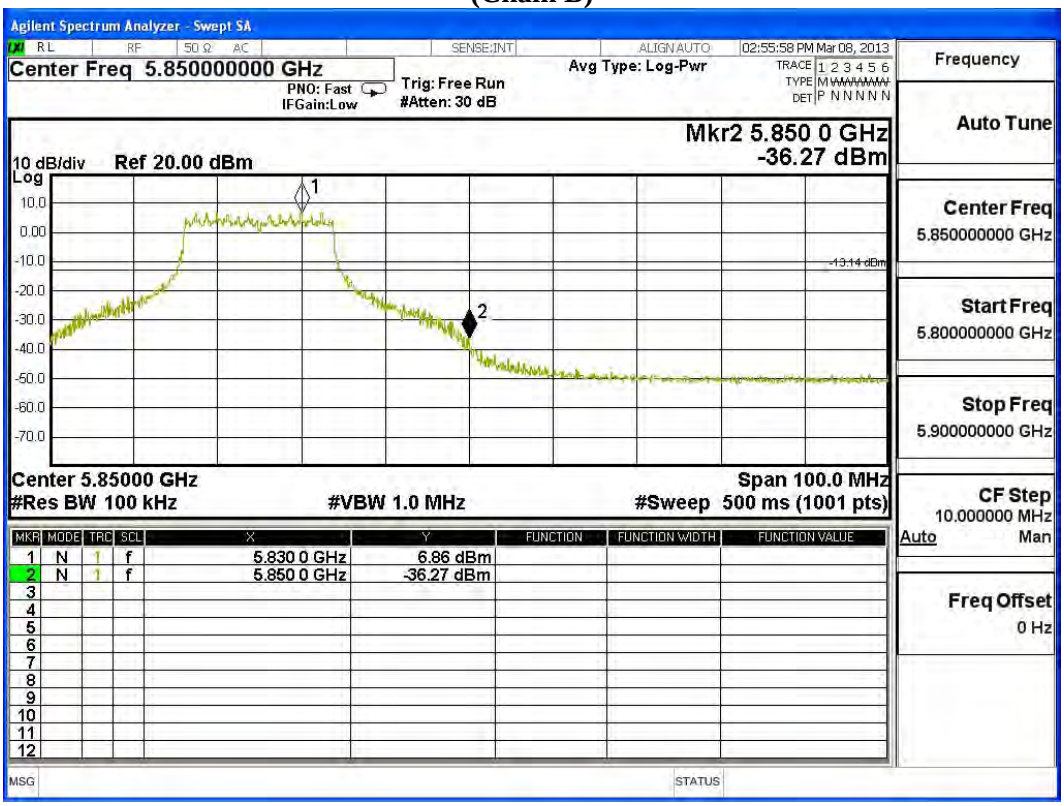
| Test Frequency (MHz) | Measurement Level Δ (dB) | Limit Δ (dB) | Result |
|---|---|---|---|
| 5825 | 37.69 | >20 | PASS |

**(Chain A)**



| Test Frequency (MHz) | Measurement Level Δ (dB) | Limit Δ (dB) | Result |
|---|---|---|---|
| 5825 | 43.13 | >20 | PASS |

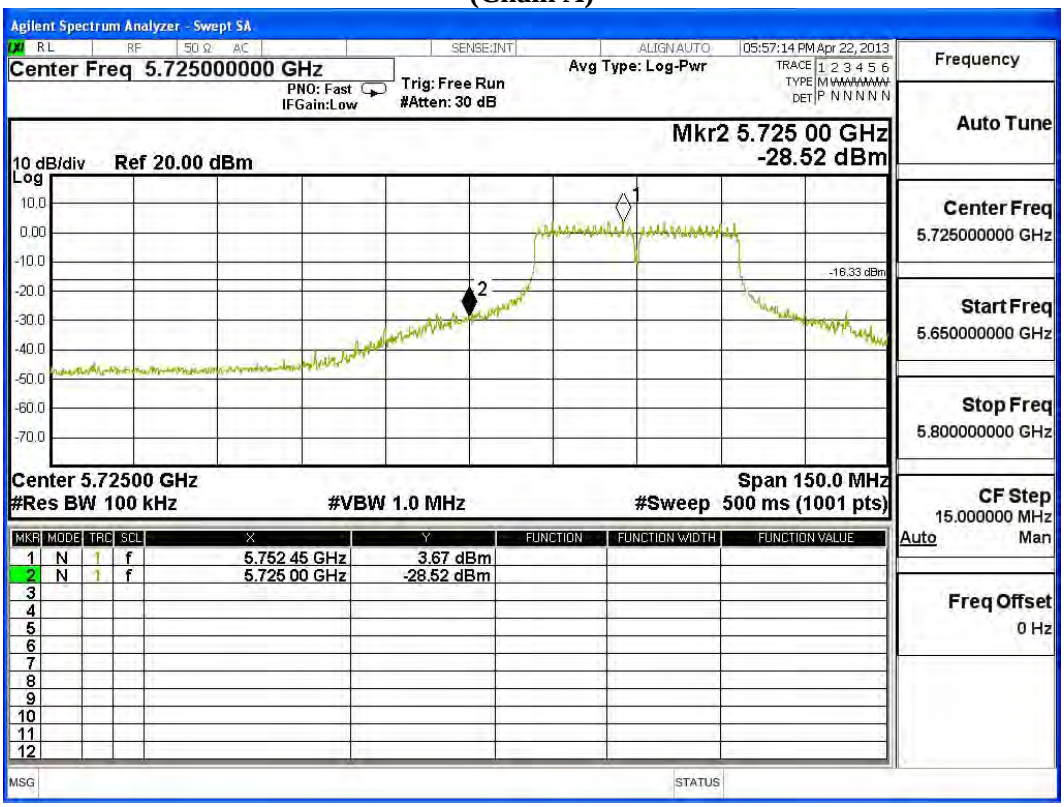
**(Chain B)**



Product : WiFi AP
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 802.11n-40BW_30Mbps(5G Band)

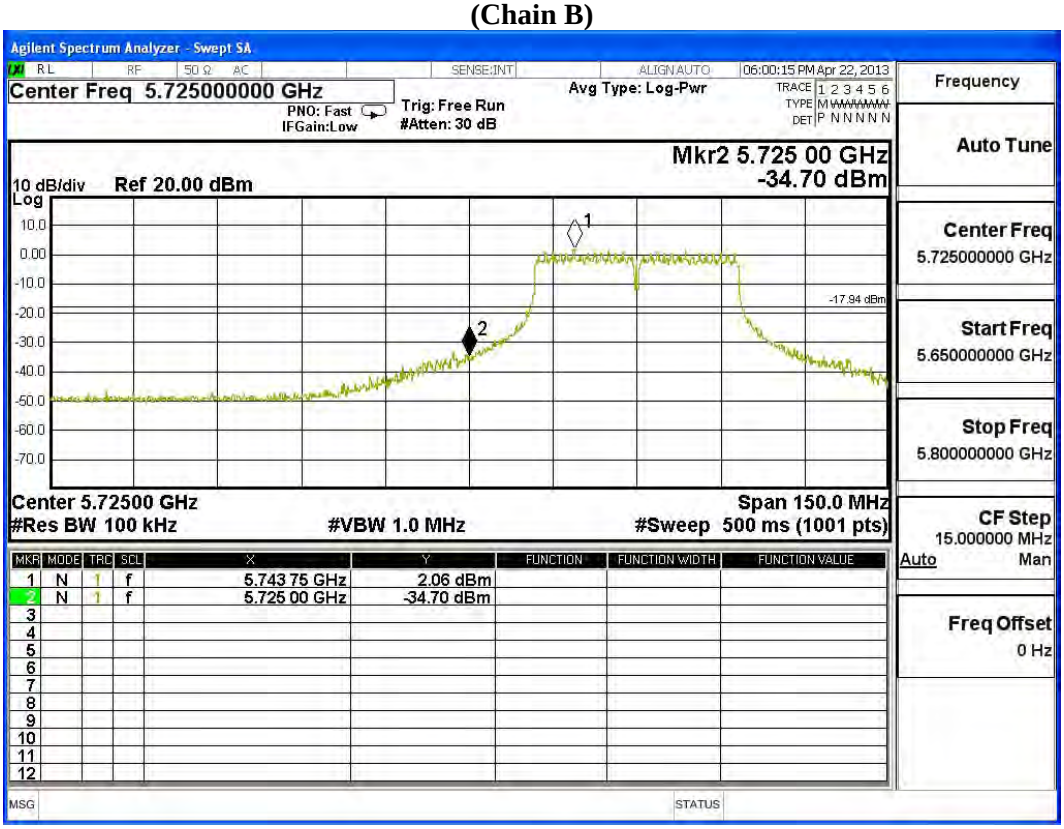
| Test Frequency (MHz) | Measurement Level Δ (dB) | Limit Δ (dB) | Result |
|---|---|---|---|
| 5755 | 32.19 | >20 | PASS |

**(Chain A)**



| Test Frequency (MHz) | Measurement Level Δ (dB) | Limit Δ (dB) | Result |
|---|---|---|---|
| 5755 | 36.76 | >20 | PASS |

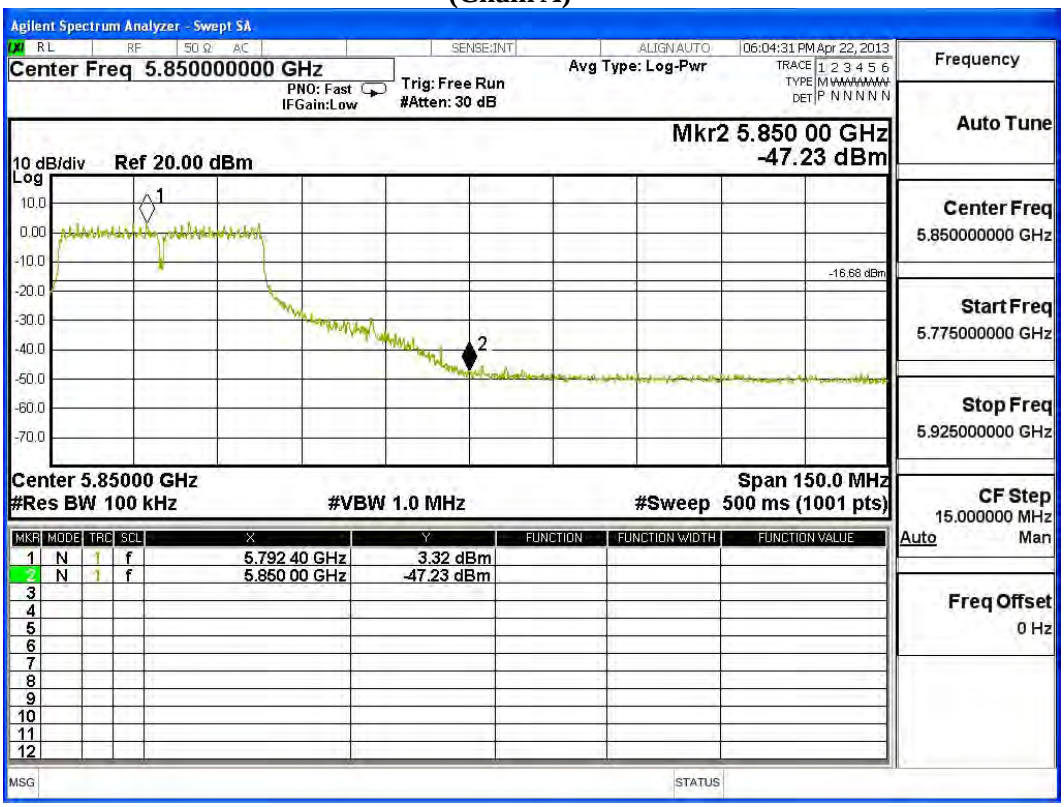
**(Chain B)**



Product : WiFi AP
Test Item : Band Edge
Test Site : No.3 OATS
Test Mode : Mode 2: Transmit - 802.11n-40BW_30Mbps(5G Band)

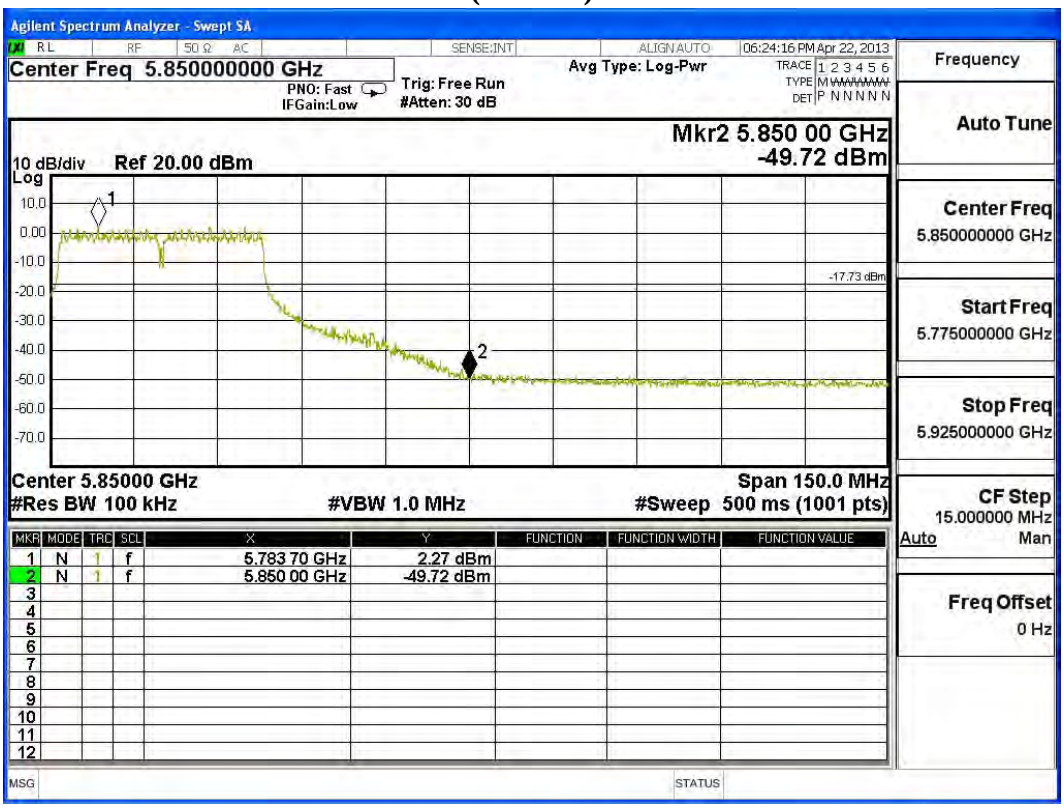
| Test Frequency (MHz) | Measurement Level Δ (dB) | Limit Δ (dB) | Result |
|---|---|---|---|
| 5795 | 50.55 | >20 | PASS |

**(Chain A)**



| Test Frequency (MHz) | Measurement Level Δ (dB) | Limit Δ (dB) | Result |
|---|---|---|---|
| 5795 | 51.99 | >20 | PASS |

**(Chain B)**



# 7. Occupied Bandwidth

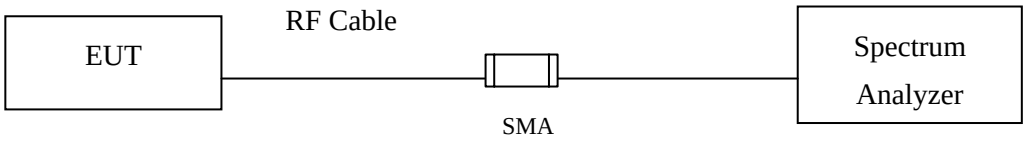
## 7.1. Test Equipment

| | 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≥3*RBW

## 7.5. Uncertainty

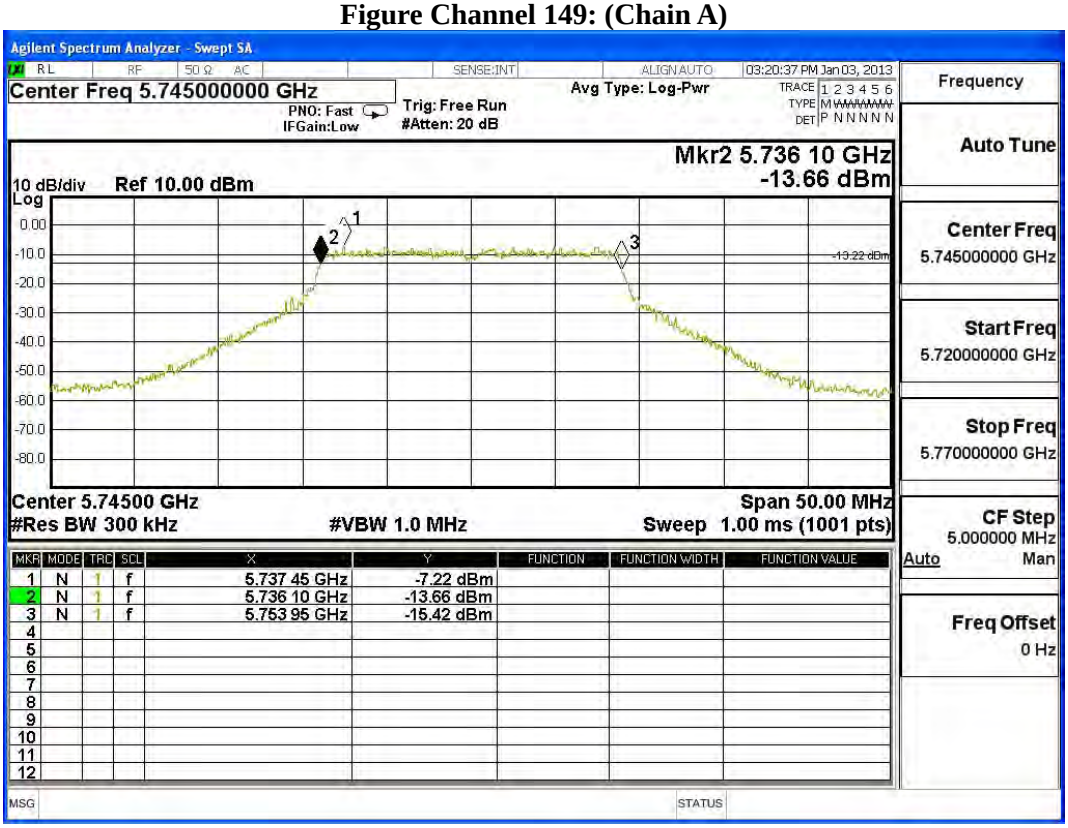
± 150Hz

## 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)

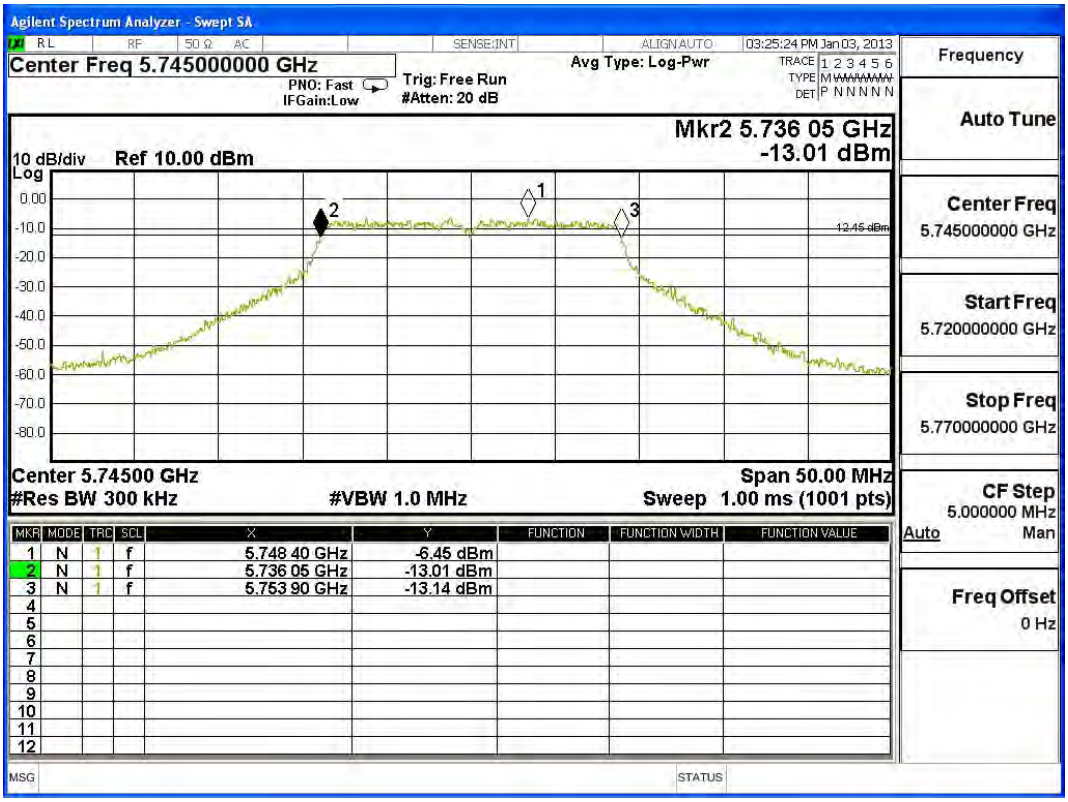
| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 149 | 5745.00 | 17900 | >500 | Pass |

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



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

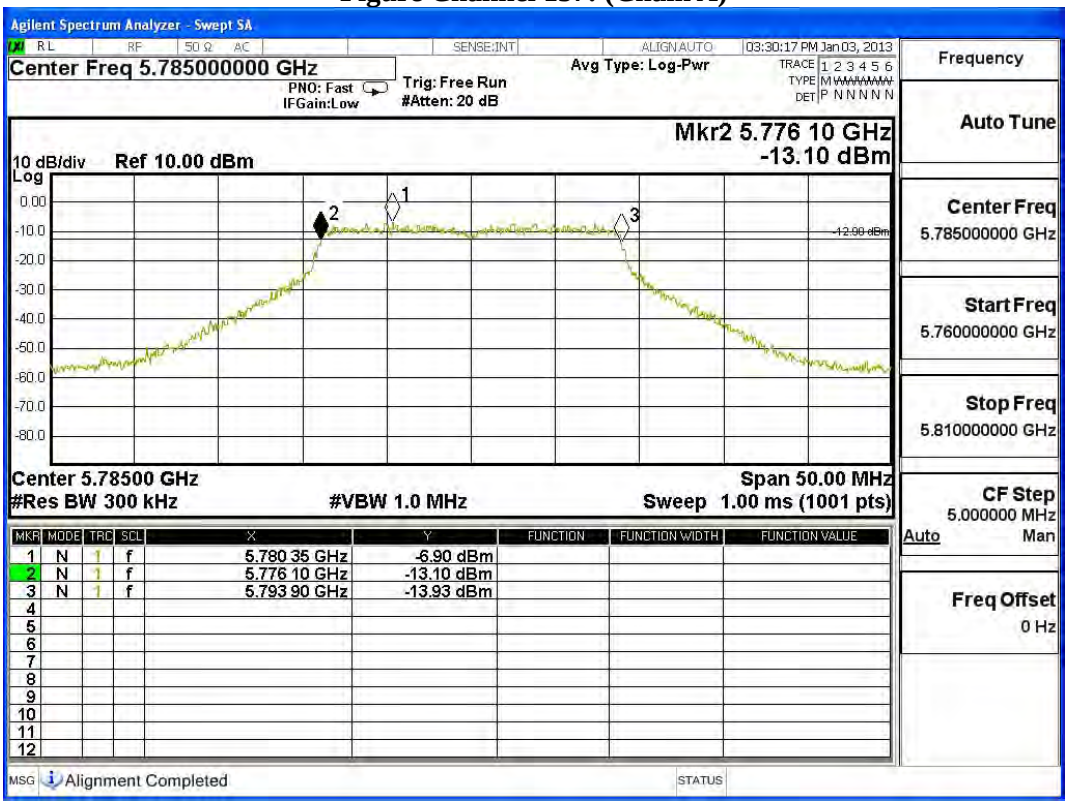
**Figure Channel 149: (Chain B)**



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)

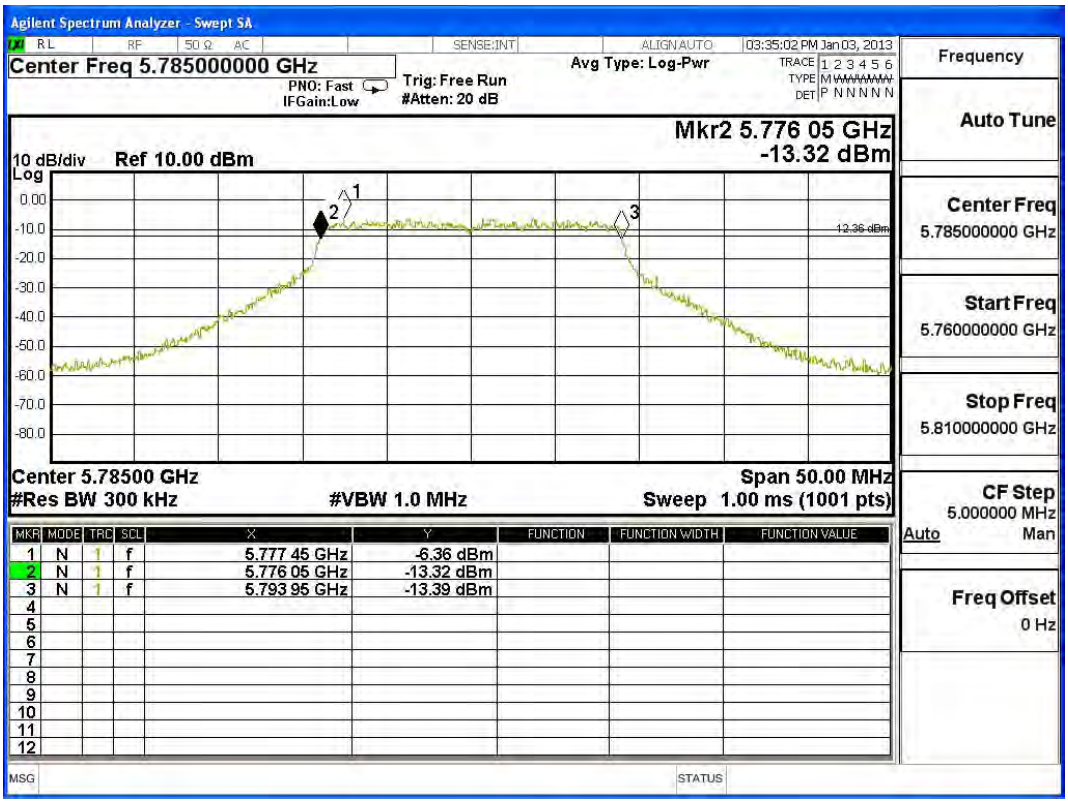
| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 157 | 5785.00 | 17850 | >500 | Pass |

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



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

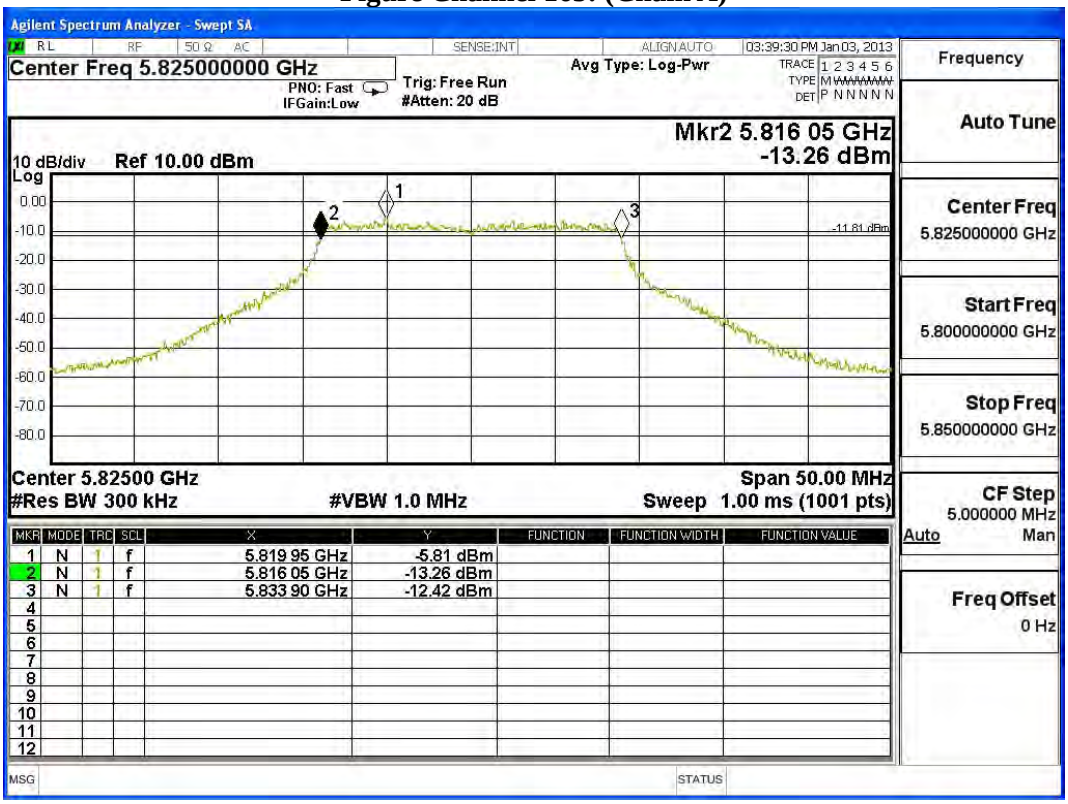
**Figure Channel 157: (Chain B)**



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)

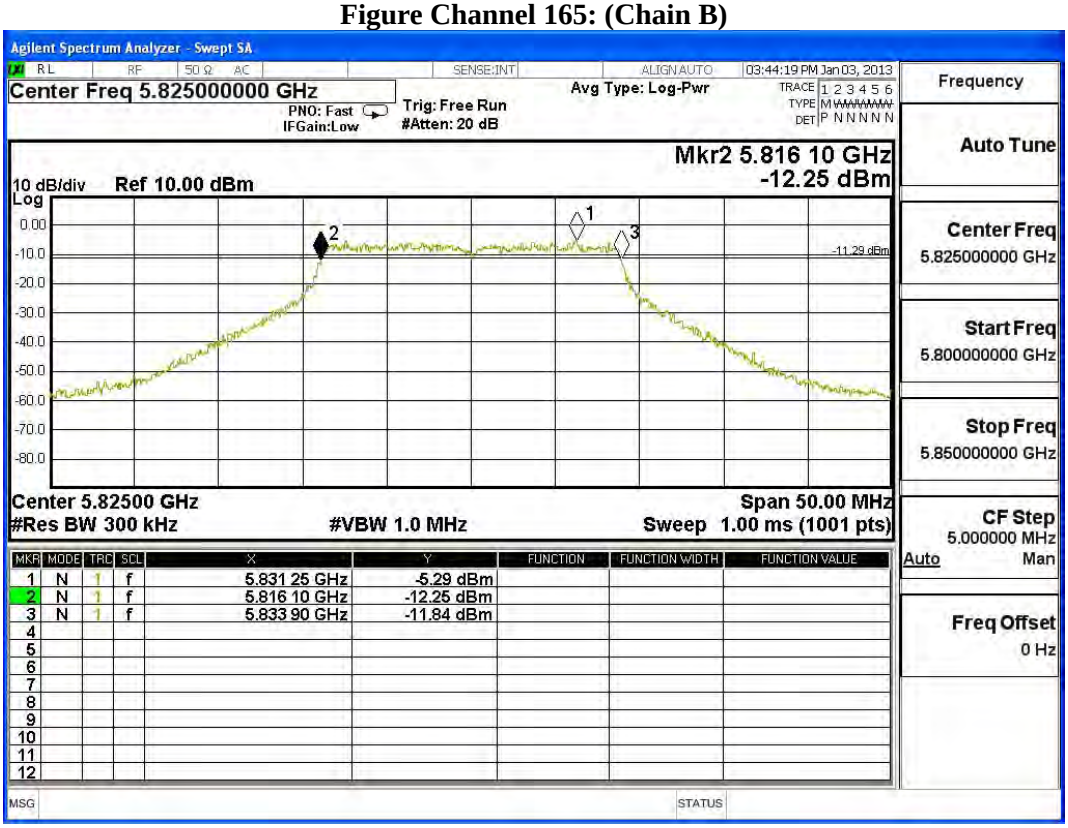
| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 165 | 5825.00 | 17850 | >500 | Pass |

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



| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 165 | 5825.00 | 17800 | >500 | Pass |

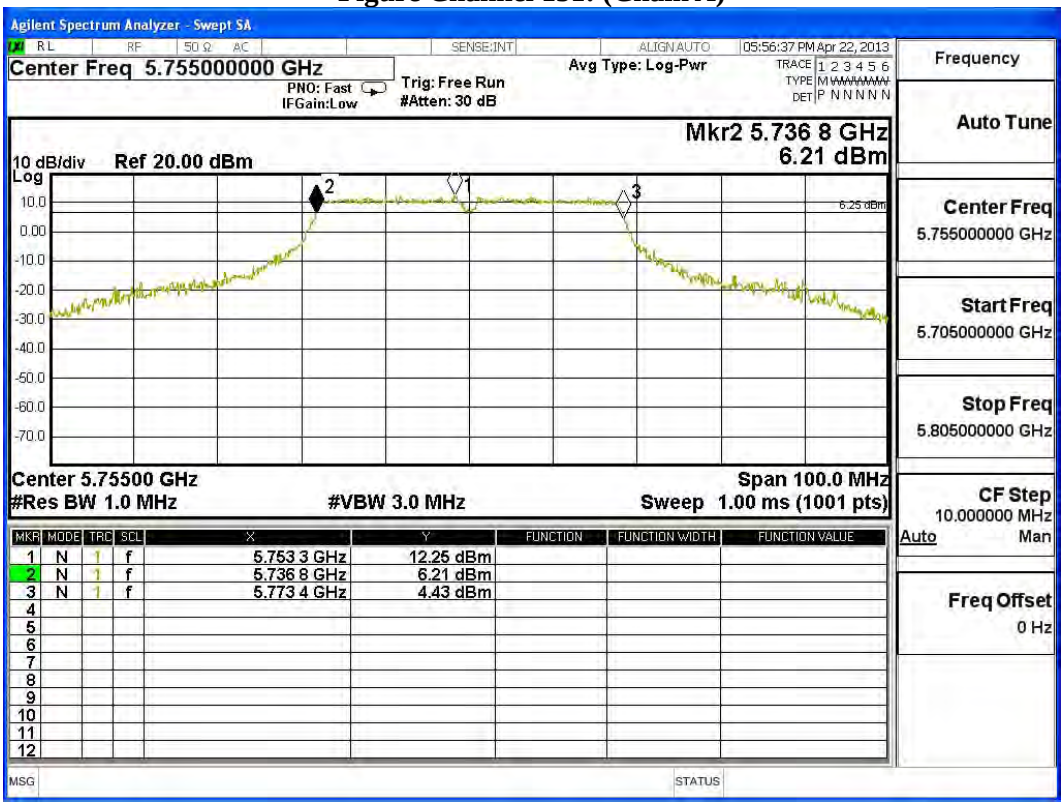
**Figure Channel 165: (Chain B)**



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)

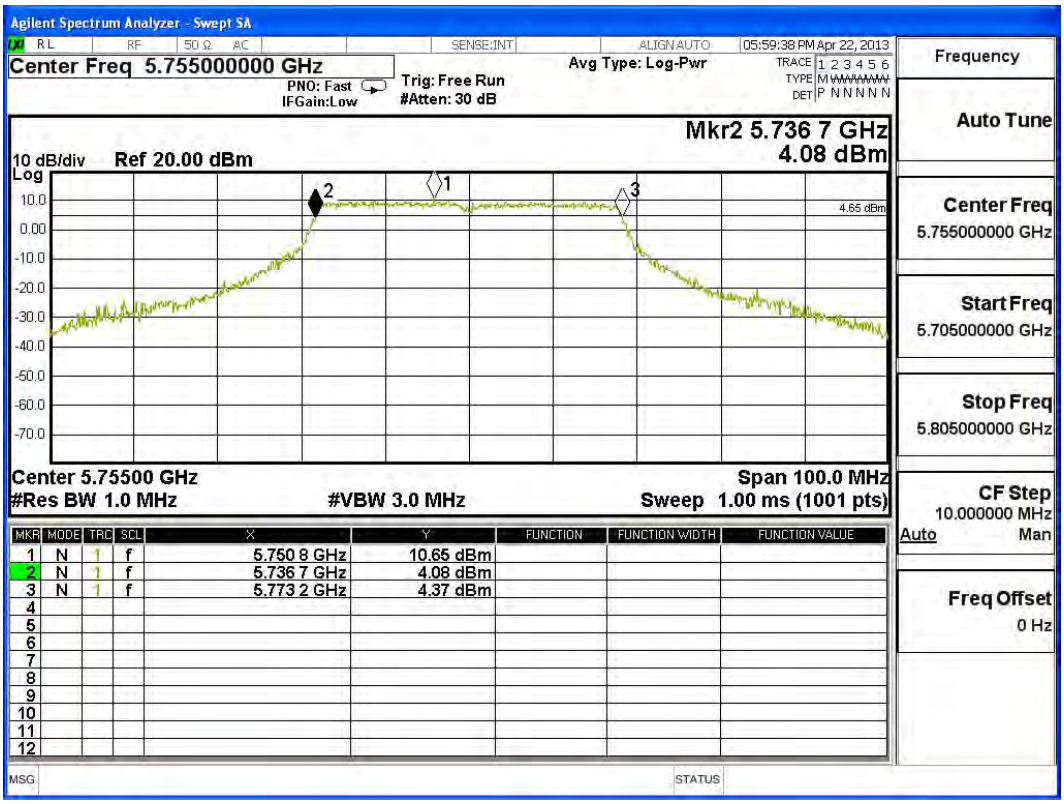
| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 151 | 5755.00 | 36600 | >500 | Pass |

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



| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 151 | 5755.00 | 36500 | >500 | Pass |

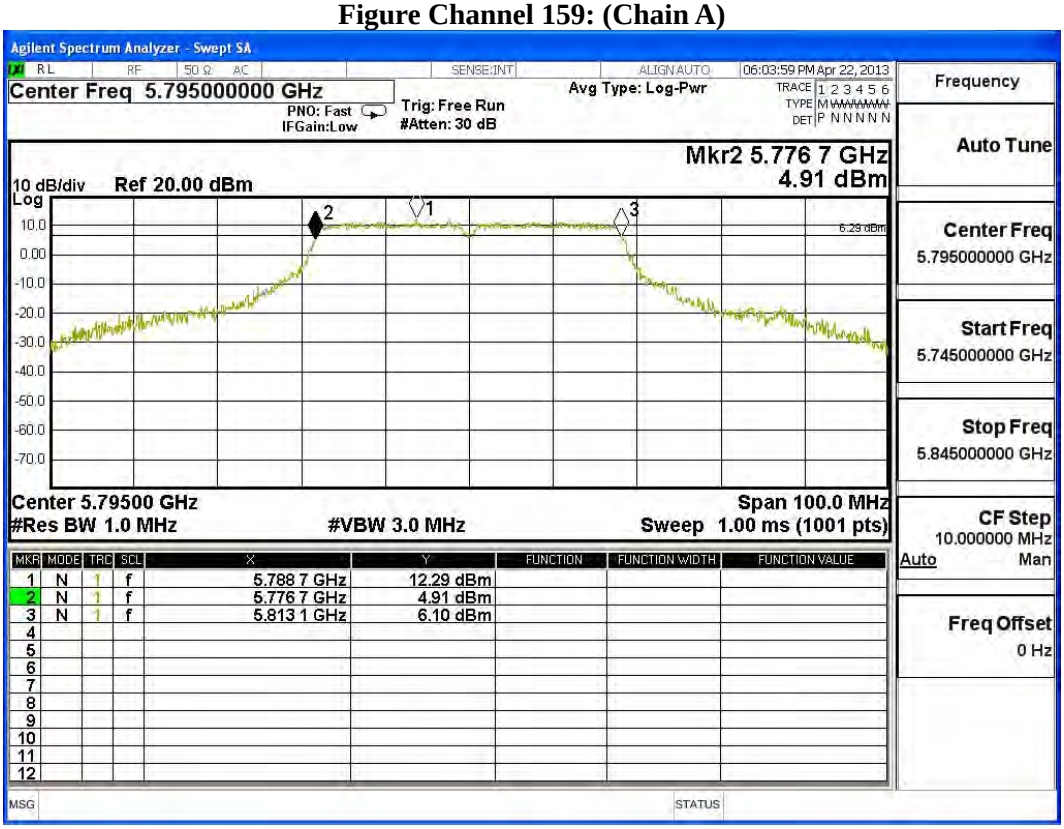
**Figure Channel 151: (Chain B)**



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)

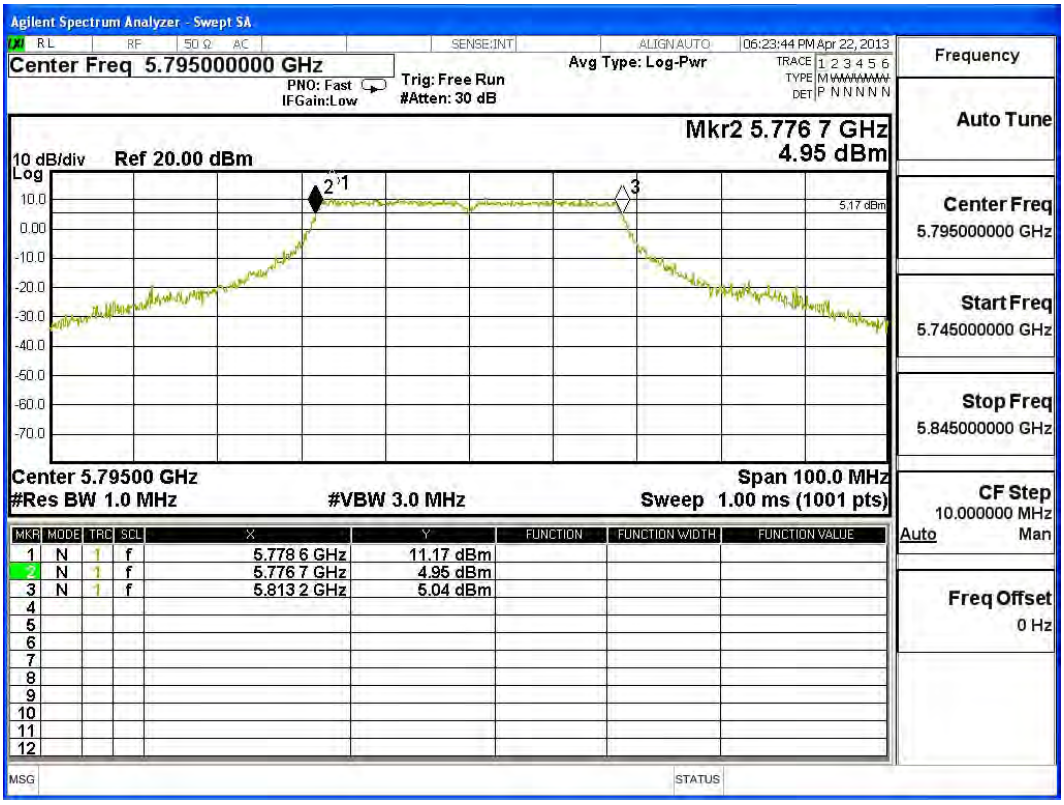
| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 159 | 5795.00 | 36400 | >500 | Pass |

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



| Channel No. | Frequency (MHz) | Measurement Level (kHz) | Required Limit (kHz) | Result |
|---|---|---|---|---|
| 159 | 5795.00 | 36500 | >500 | Pass |

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



# 8. Power Density

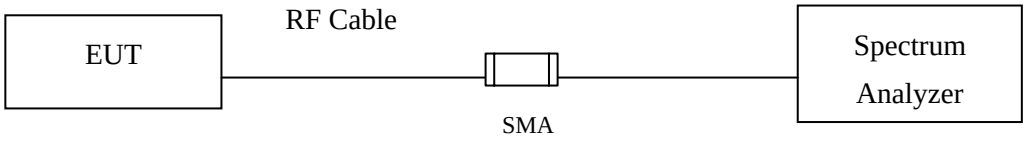
## 8.1. Test Equipment

| | 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≥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 = 10log (3 kHz/100 kHz = -15.2 dB).

## 8.5. Uncertainty

± 1.27 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 | -8.368 | -9.901 | -6.057 | <8dBm | Pass |

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

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

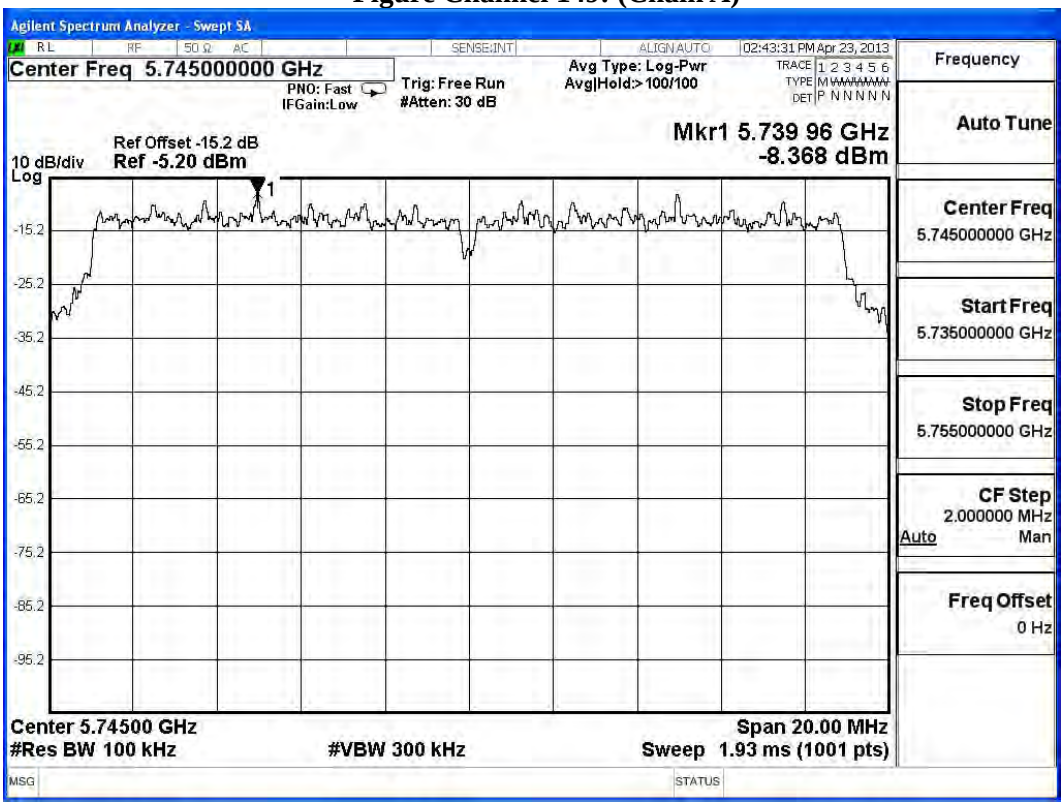
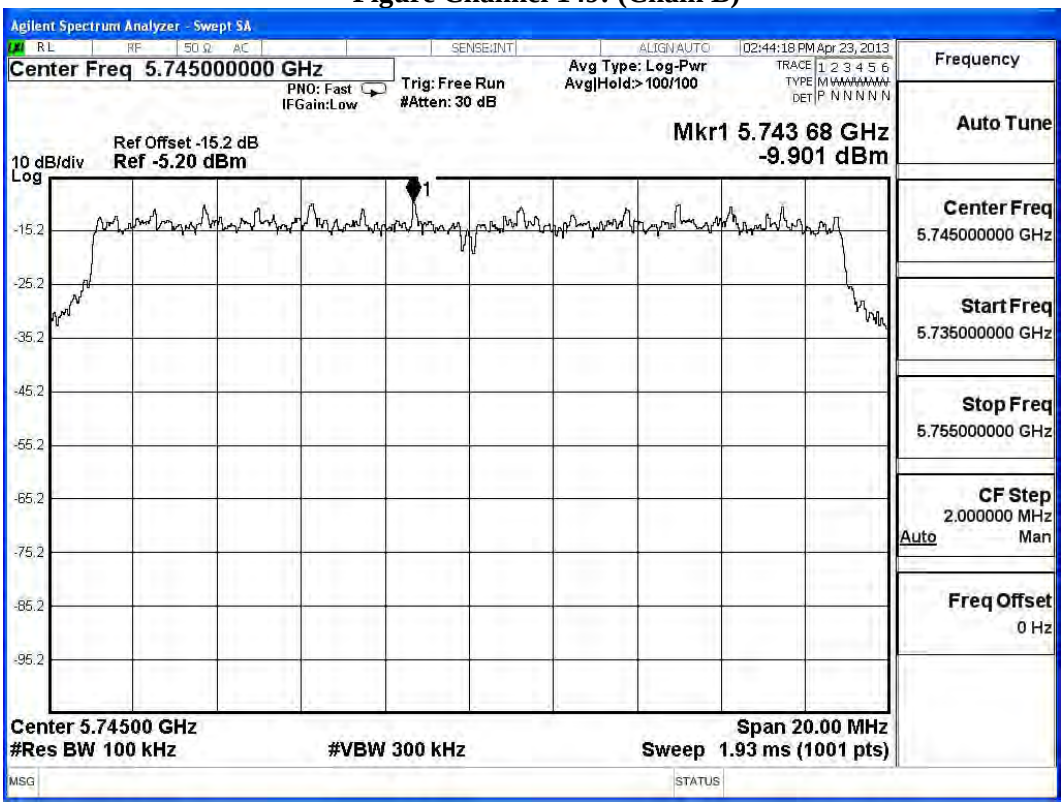


**Figure Channel 149: (Chain B)**



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 | -8.615 | -10.623 | -6.494 | < 8dBm | Pass |

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

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

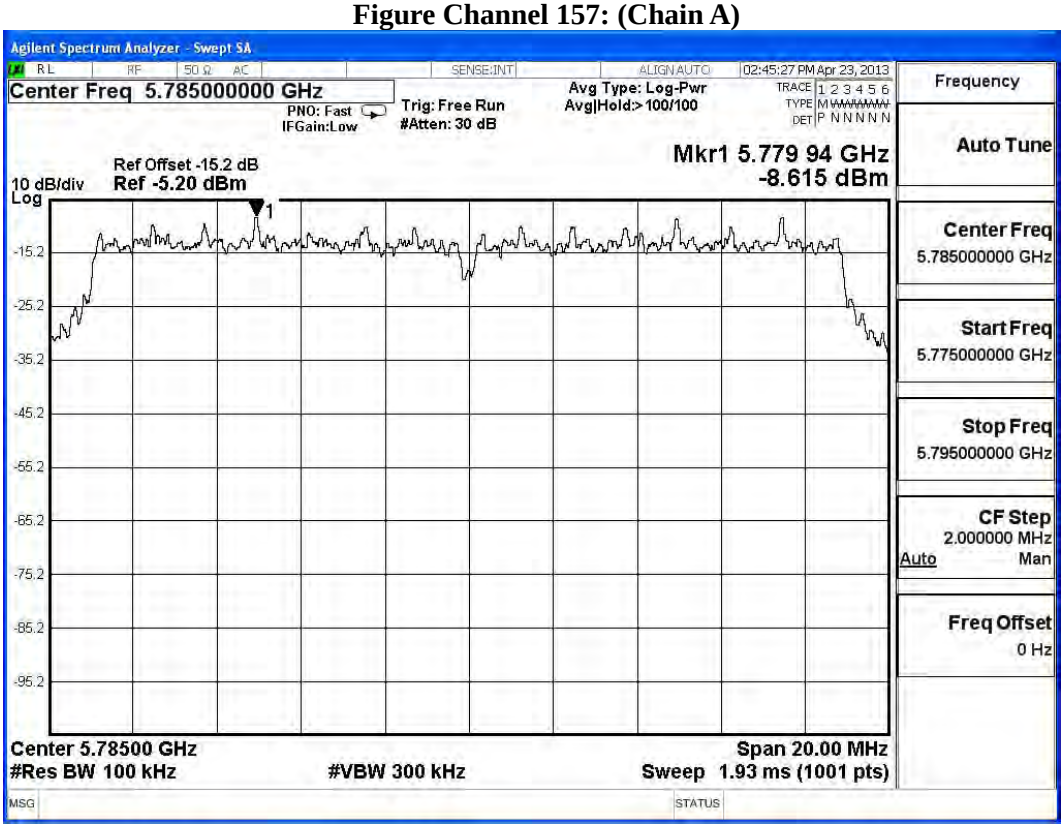
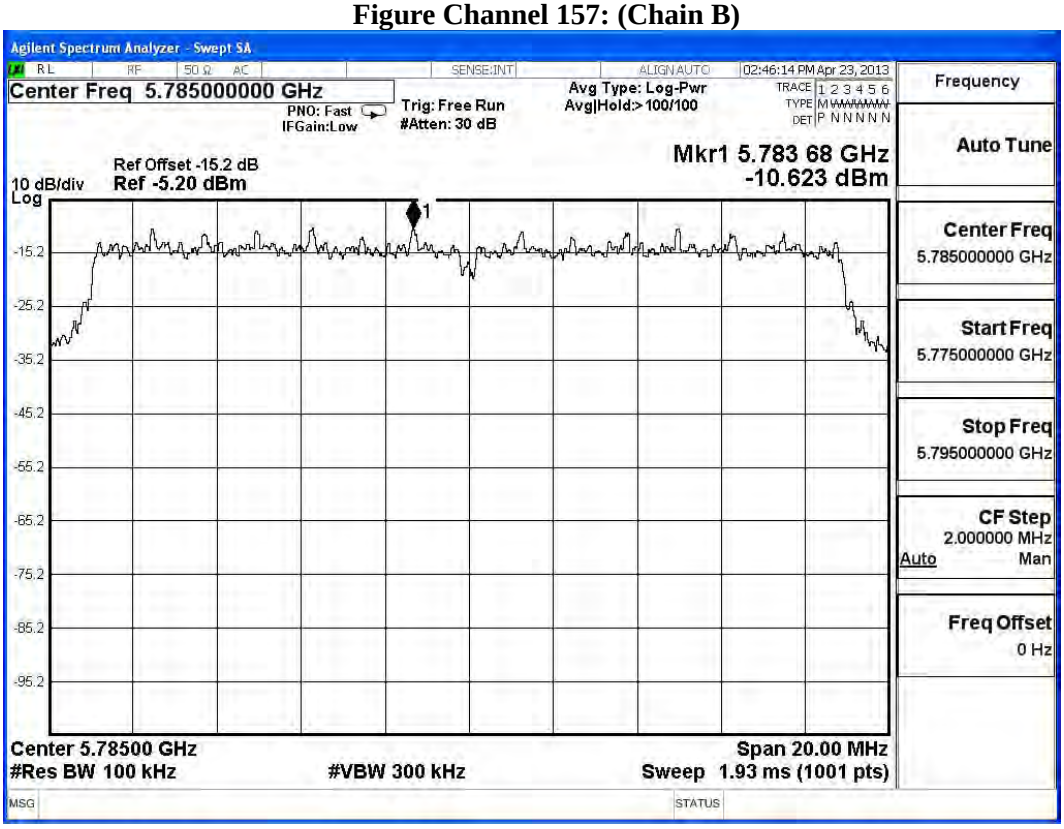


**Figure Channel 157: (Chain B)**



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 | -8.772 | -9.792 | -6.242 | < 8dBm | Pass |

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

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

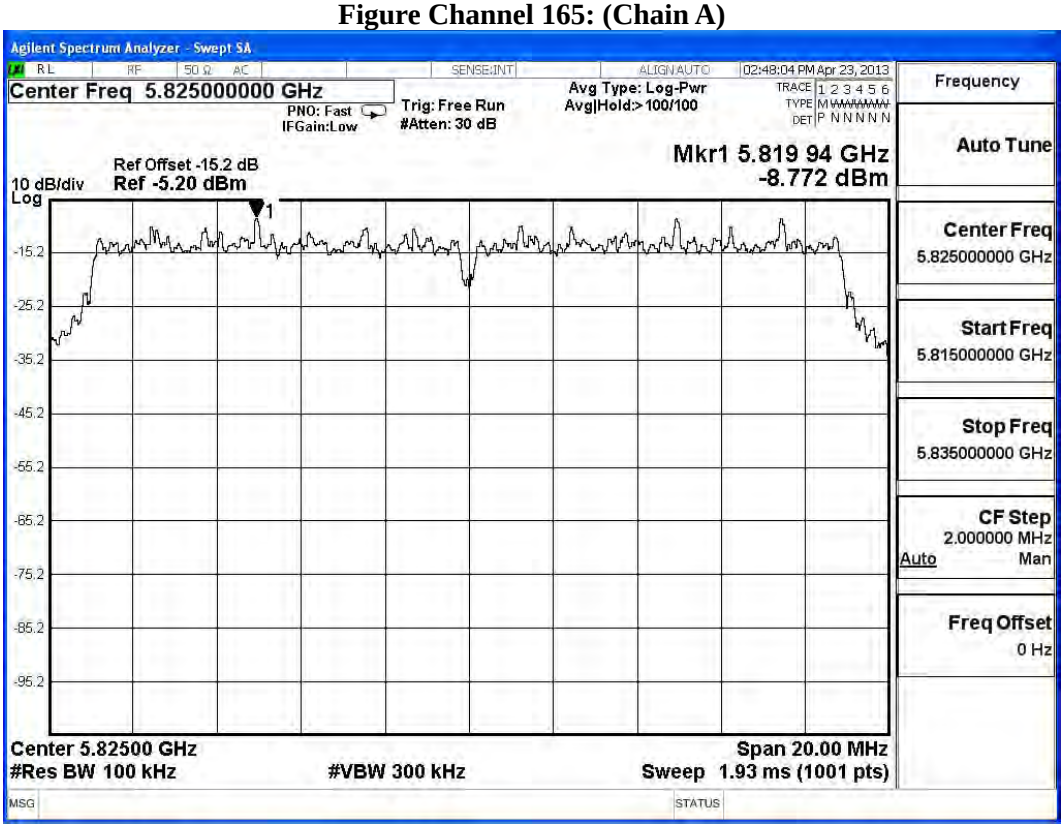
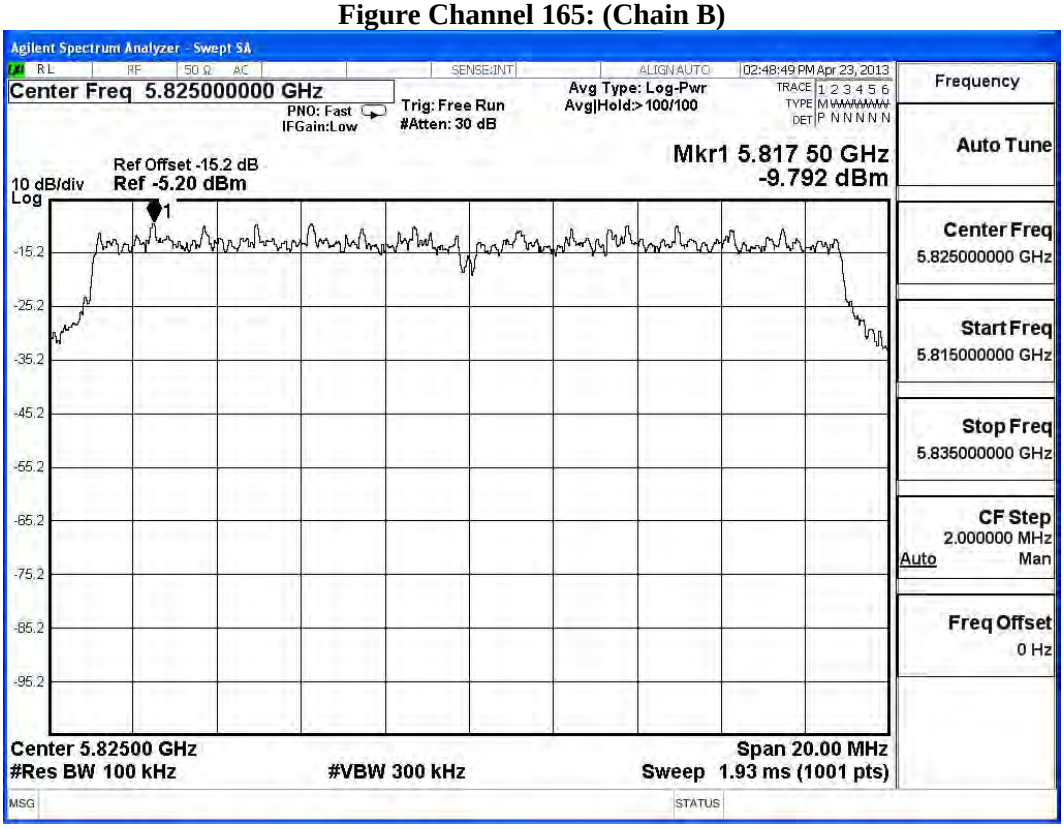


**Figure Channel 165: (Chain B)**



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 | -10.976 | -13.229 | -8.948 | < 8dBm | Pass |

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

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

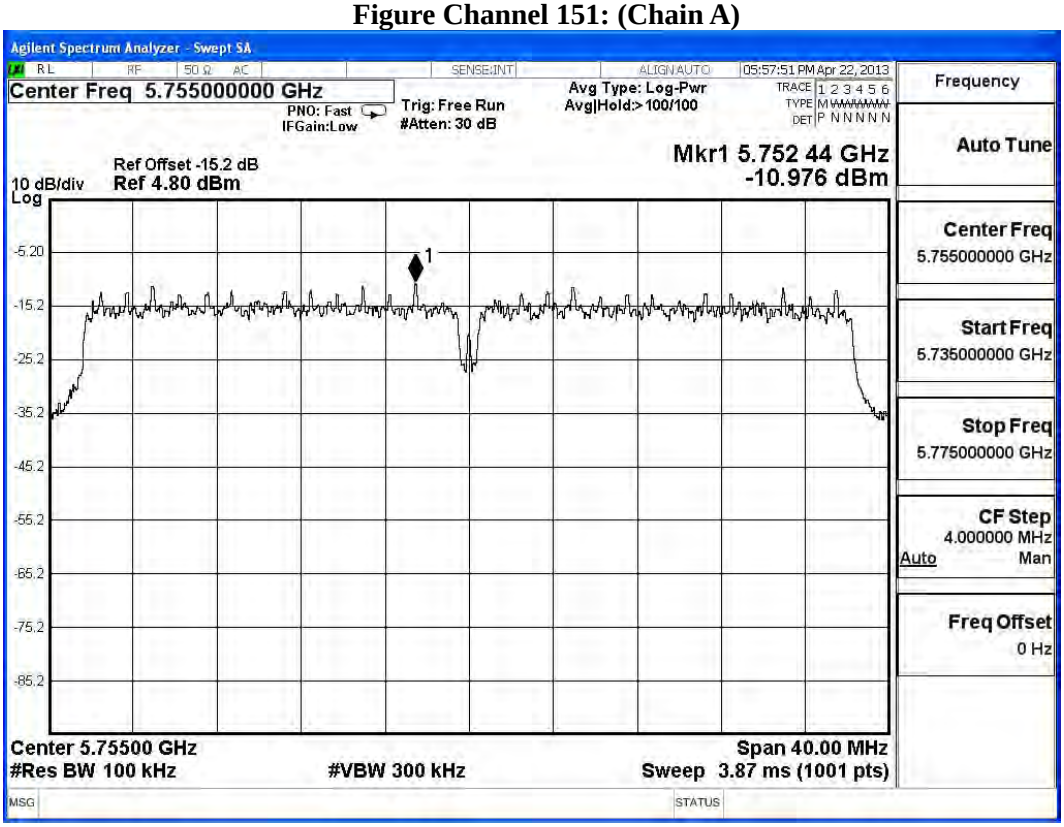
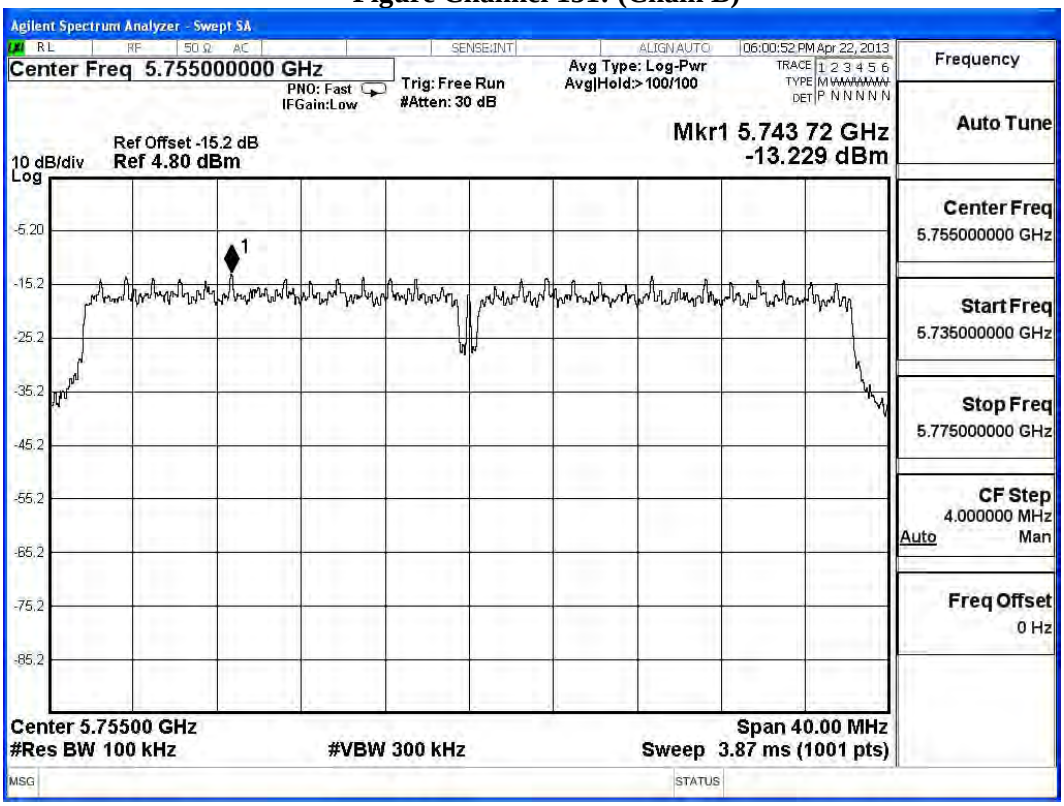


**Figure Channel 151: (Chain B)**



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 | -11.683 | -13.077 | -9.314 | < 8dBm | Pass |

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

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

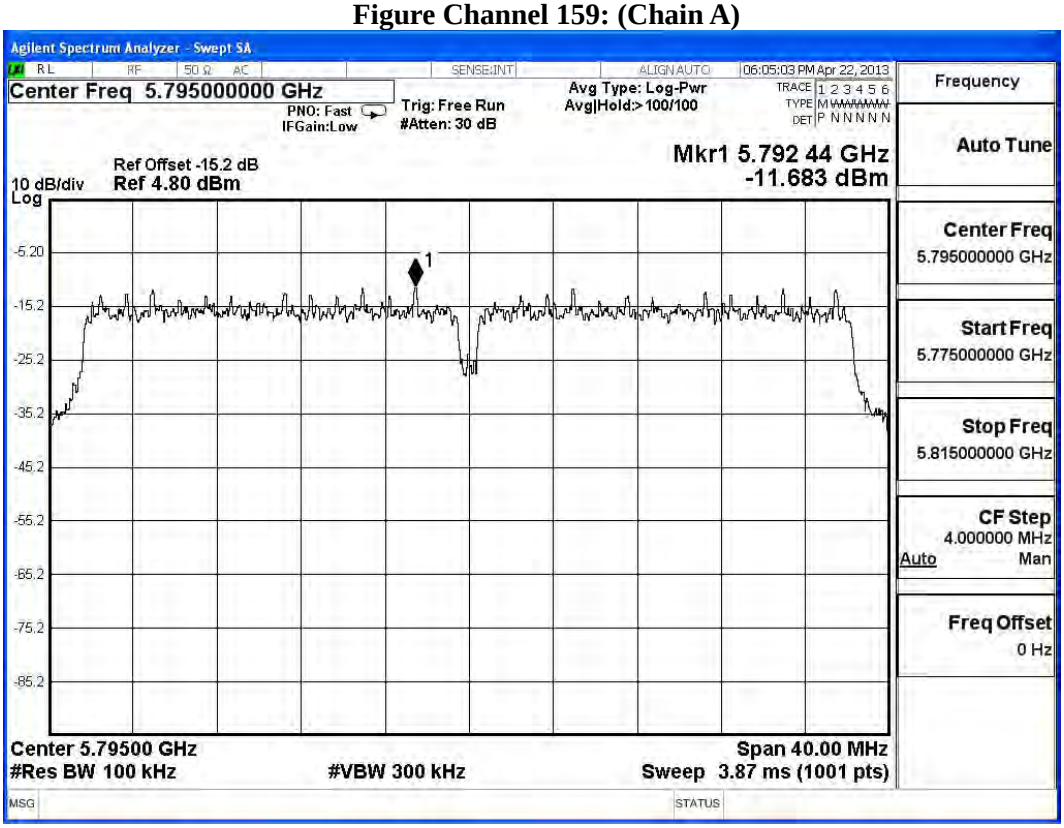
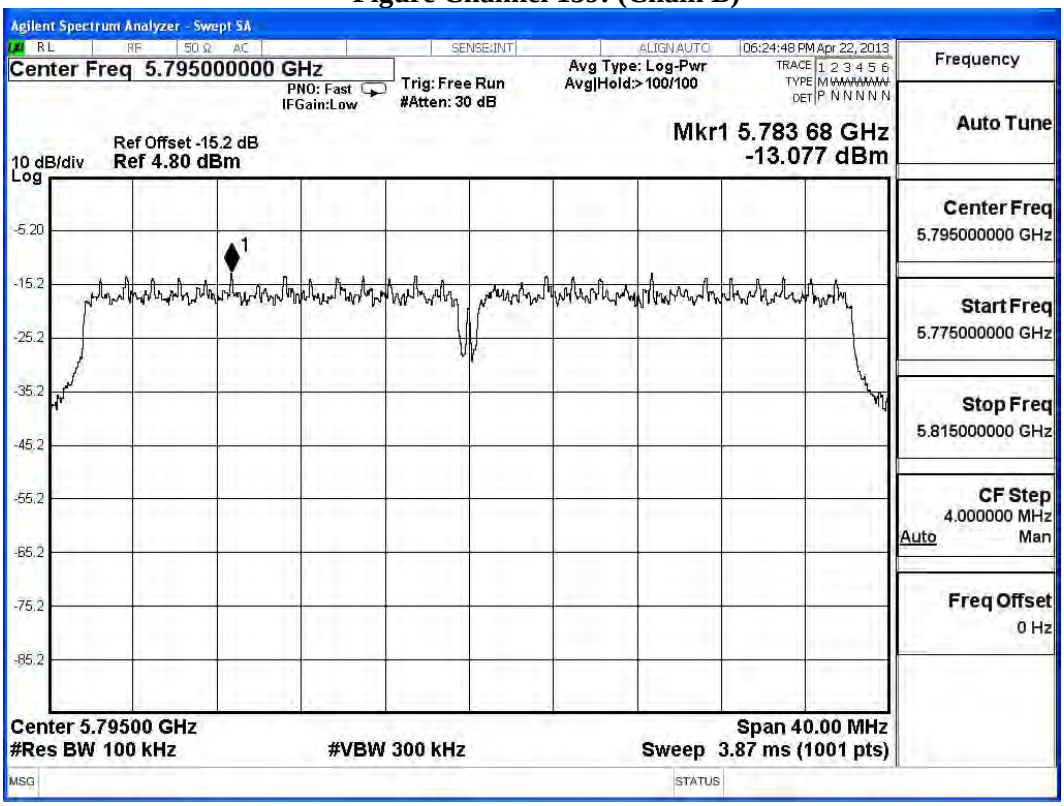


**Figure Channel 159: (Chain B)**



## 9. EMI Reduction Method During Compliance Testing

No modification was made during testing.