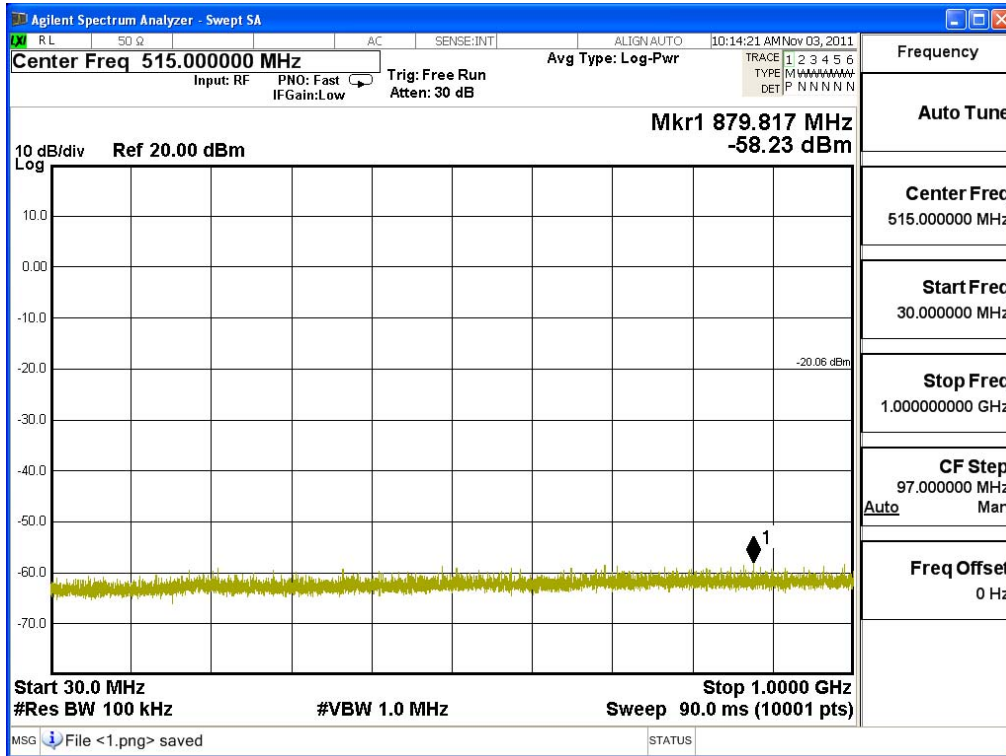
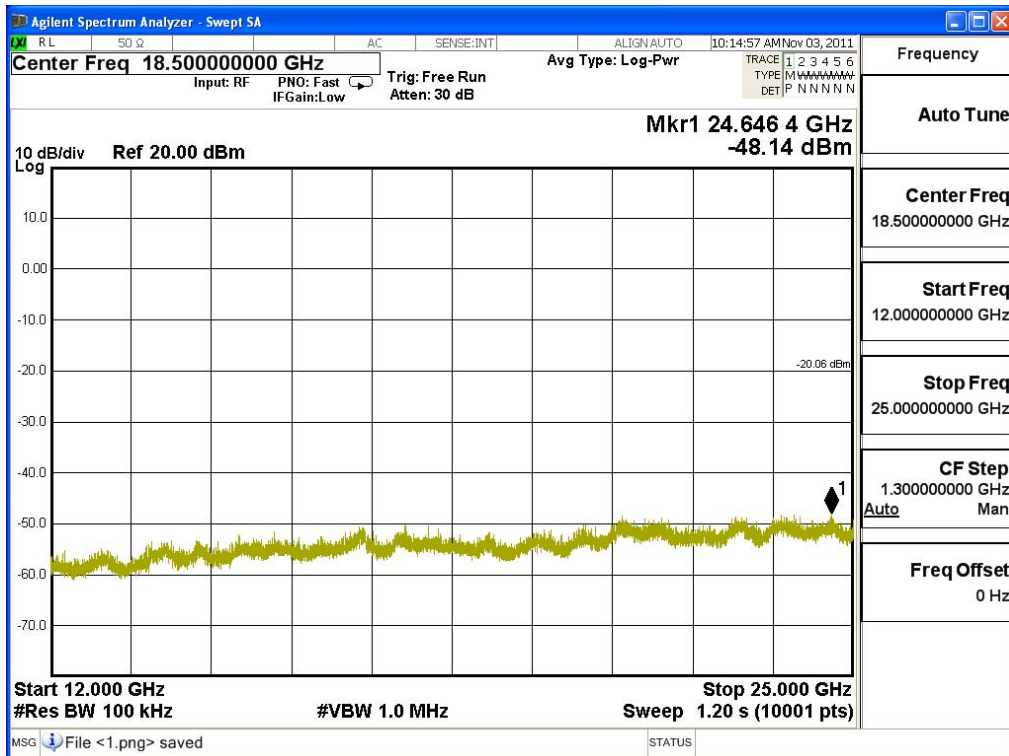
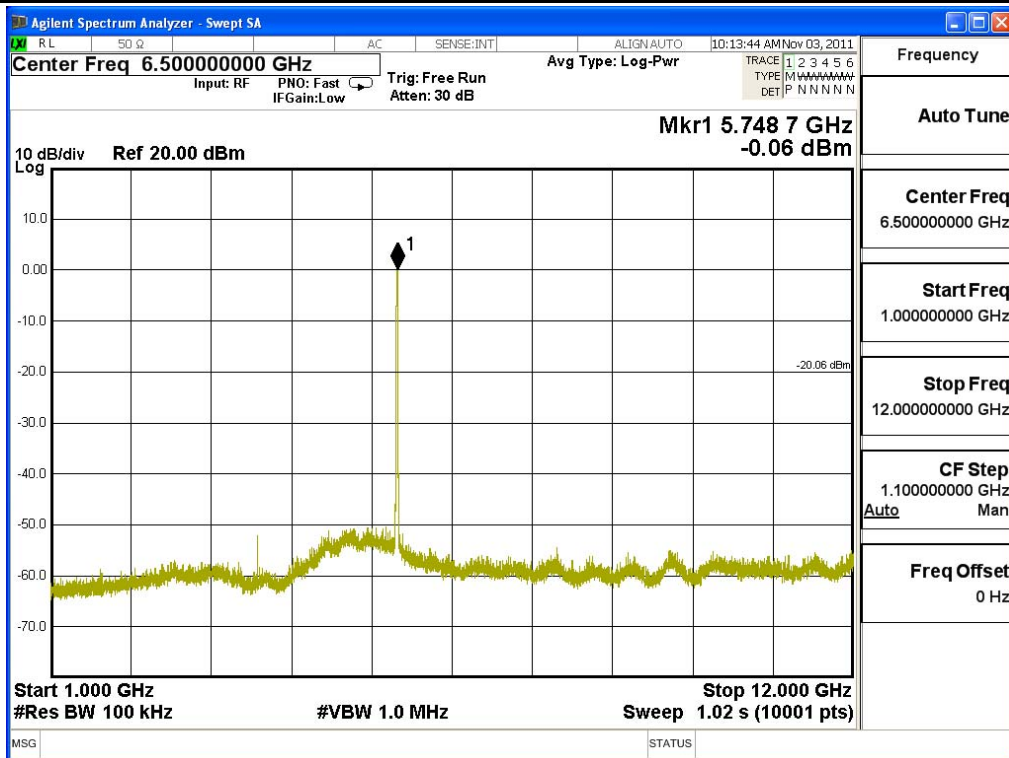


Product : MOXA IEEE 802.11 a/b/g/n PCI-e  
 Test Item : RF Antenna Conducted Spurious  
 Test Site : No.3 OATS  
 Test Mode : Mode 6: Transmit - 802.11n-20BW\_14.4Mbps(5G Band)

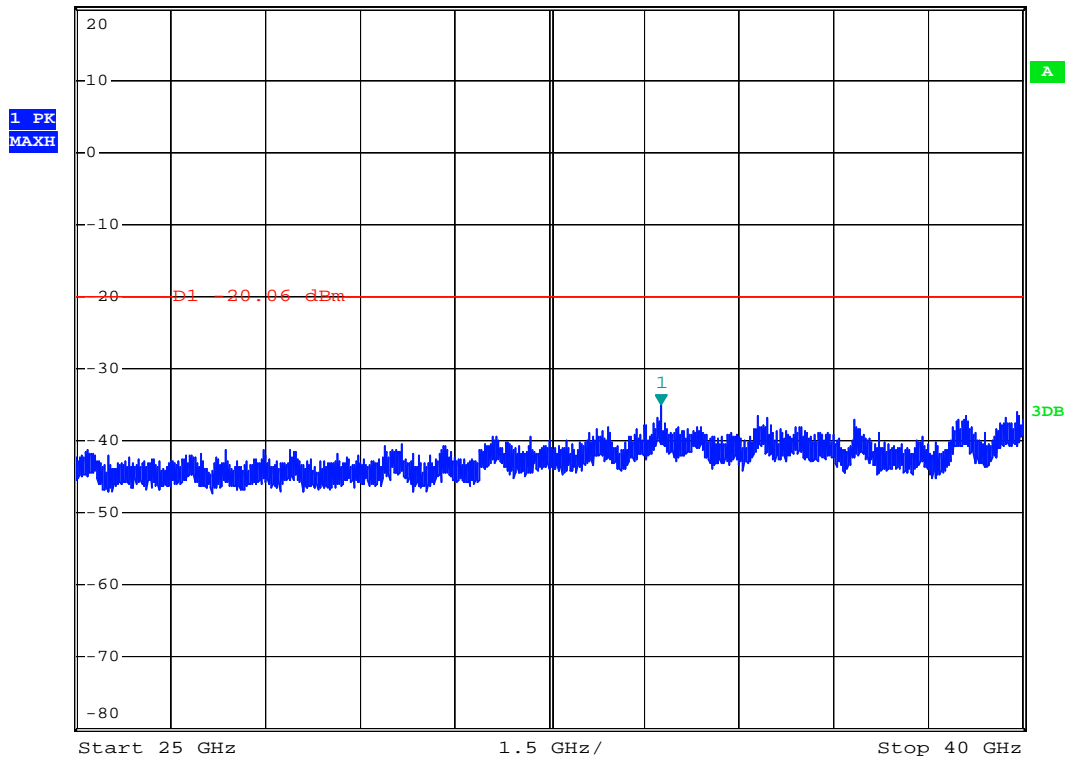
**Channel 149 (5745MHz) 30MHz -40GHz-Chain A**





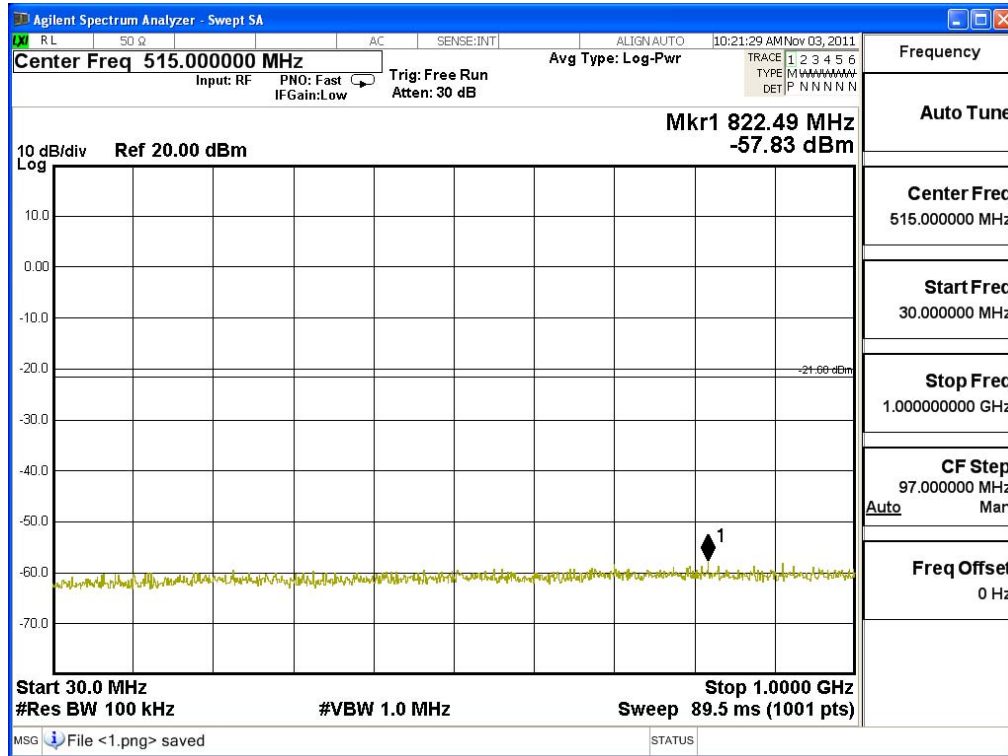


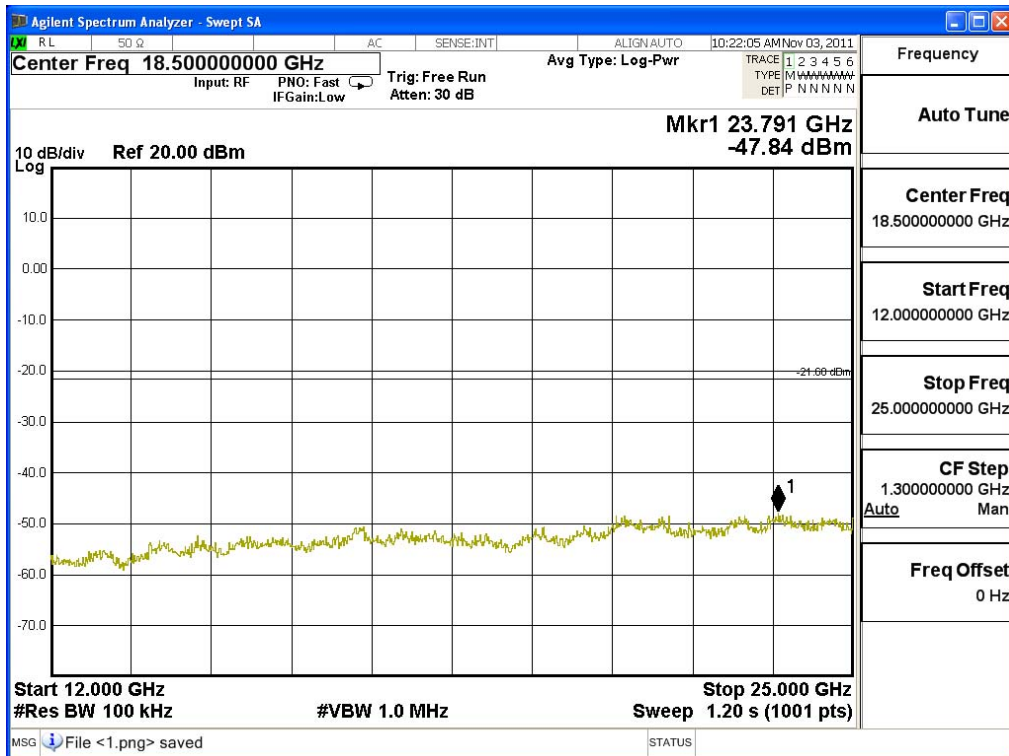
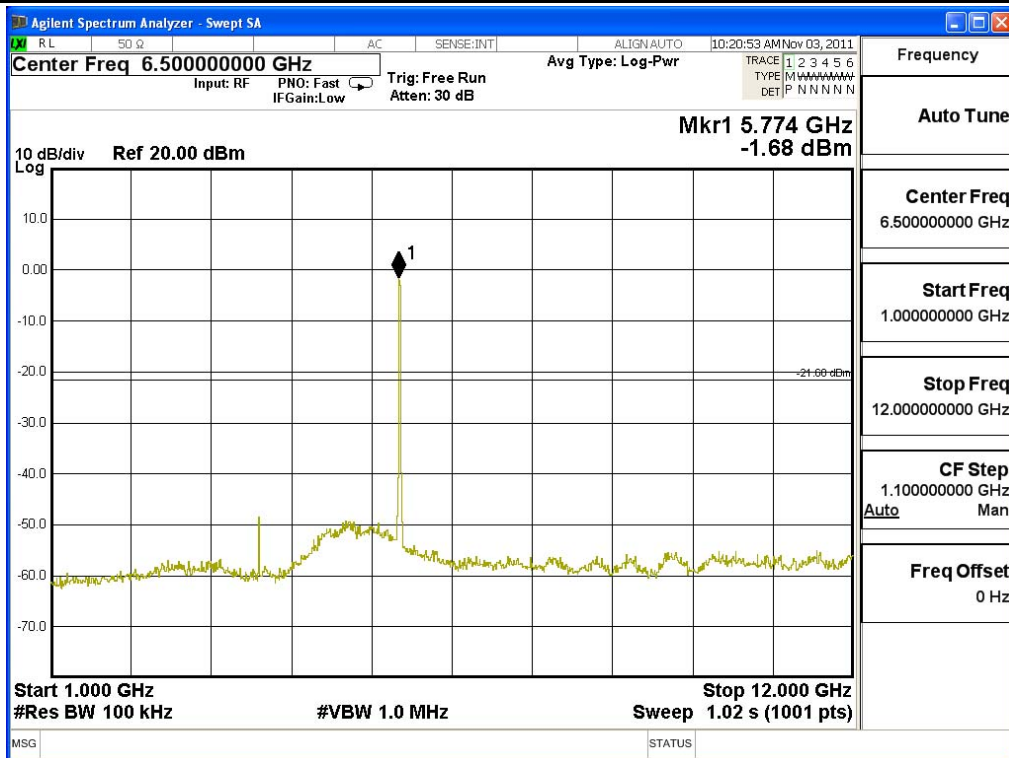
Ref 20 dBm \*Att 30 dB \*RBW 100 kHz Marker 1 [T1] \*VBW 1 MHz -34.88 dBm SWT 1.5 s 34.268125000 GHz



Date: 30.NOV.2011 08:53:49

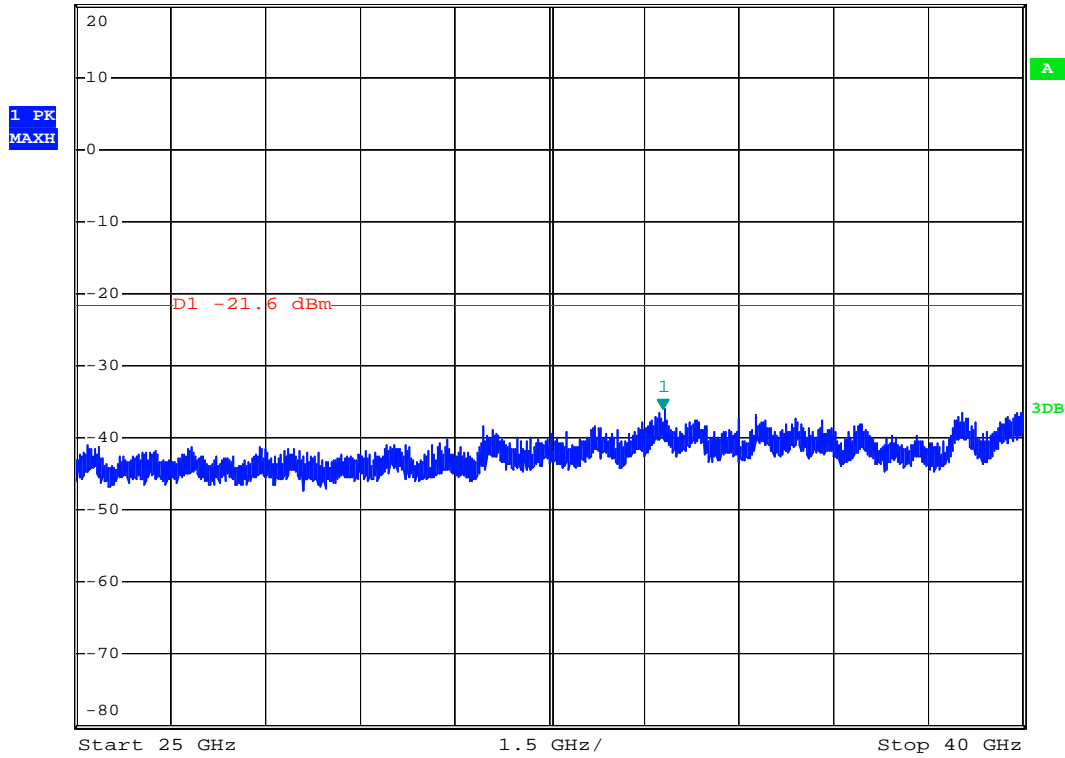
**Channel 157 (5785MHz) 30MHz -40GHz-Chain A**





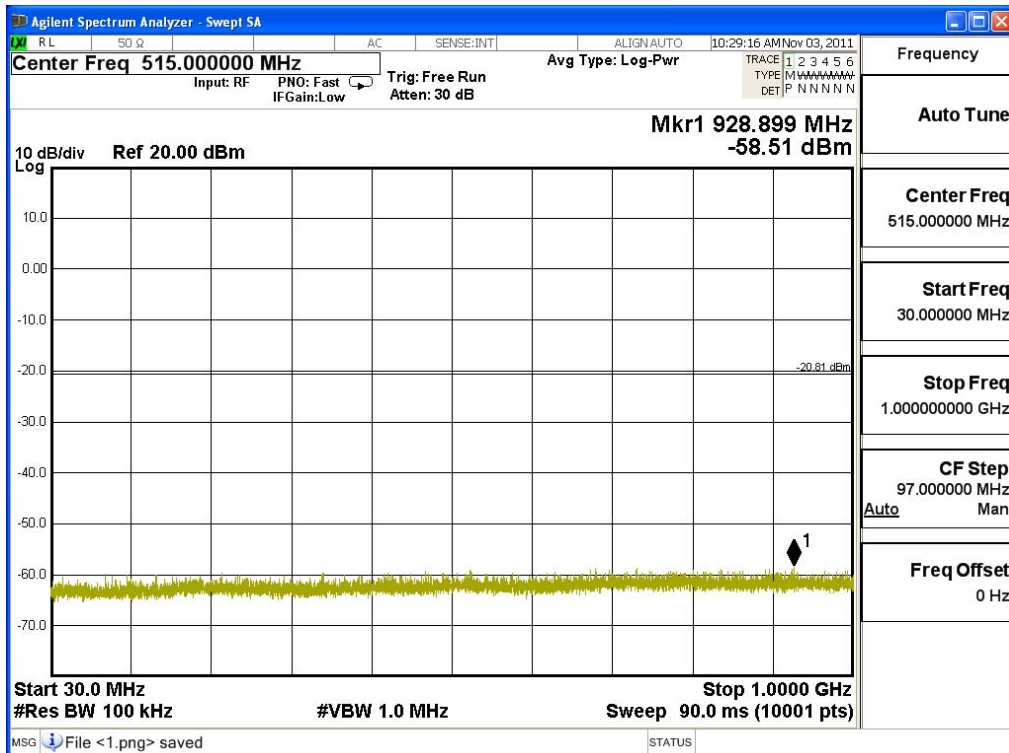


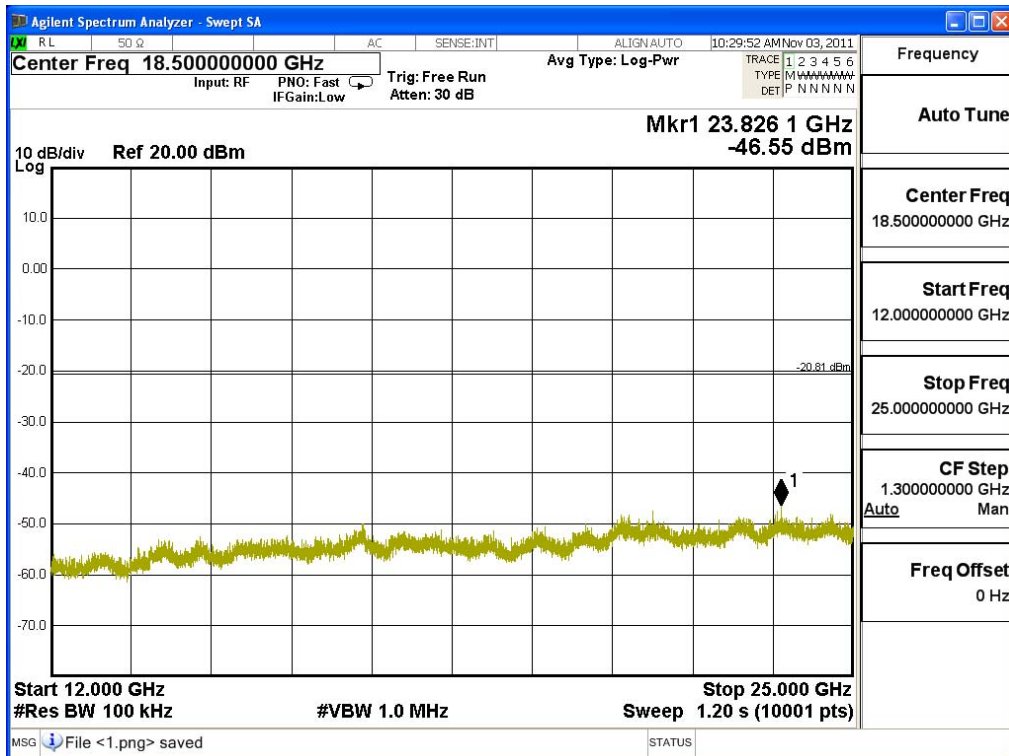
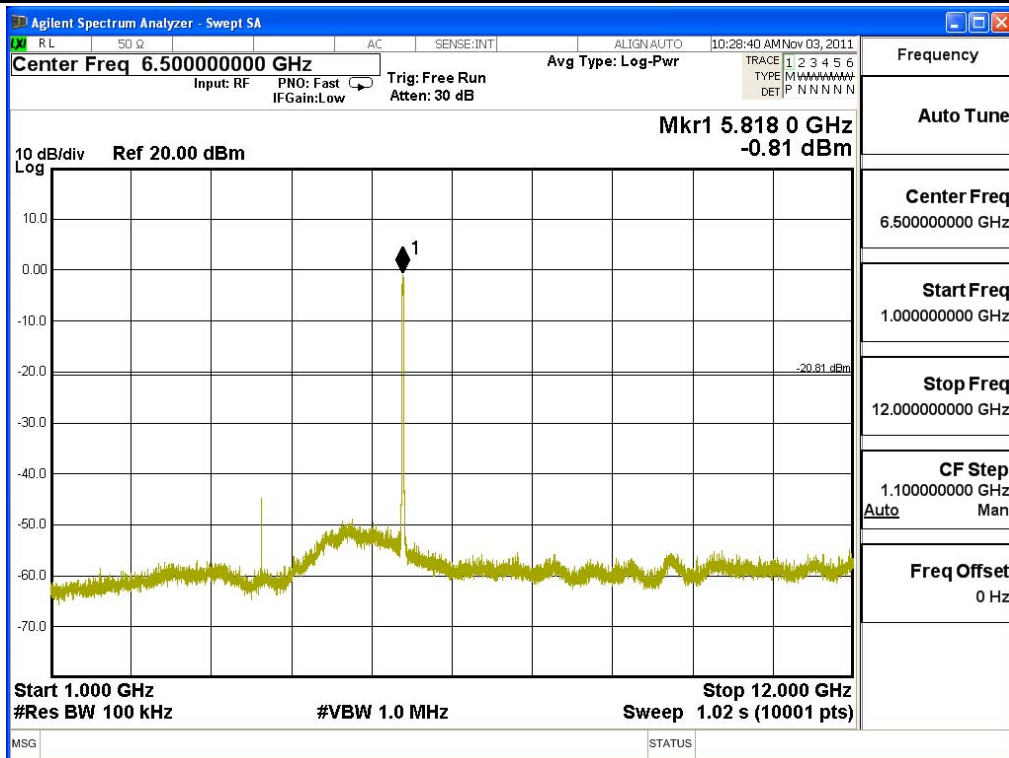
\*RBW 100 kHz Marker 1 [T1]  
 \*VBW 1 MHz -36.09 dBm  
 Ref 20 dBm \*Att 30 dB SWT 1.5 s 34.313125000 GHz



Date: 30.NOV.2011 08:52:32

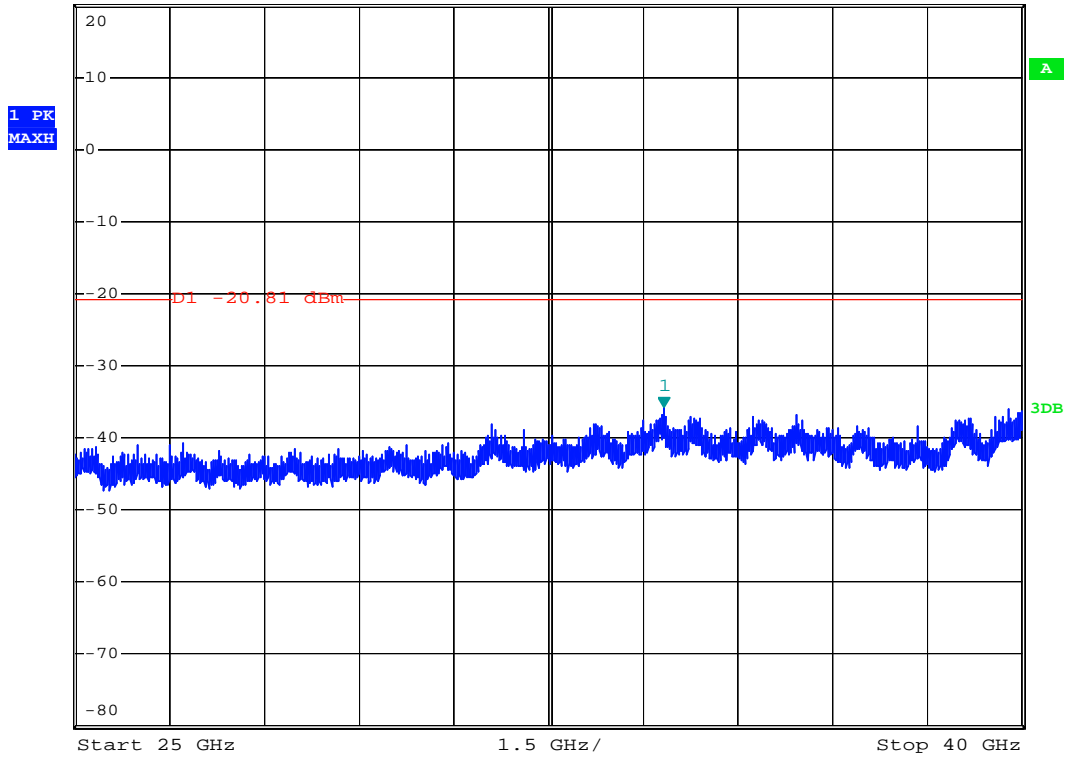
**Channel 165 (5825MHz) 30MHz -40GHz-Chain A**





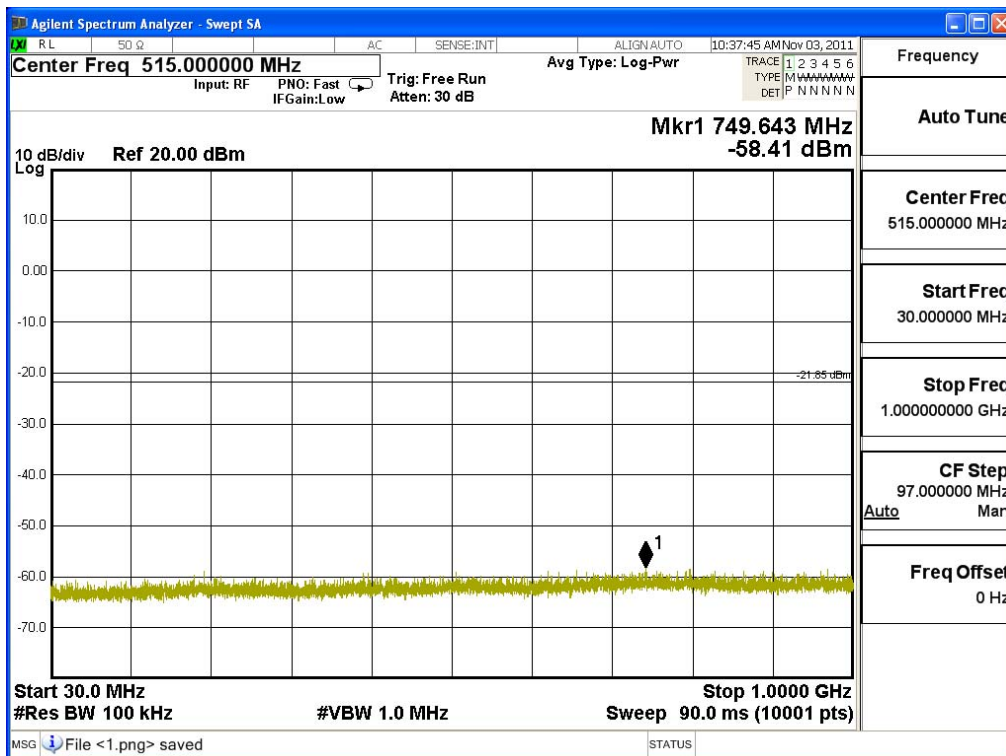


Ref 20 dBm      \*Att 30 dB      \*RBW 100 kHz      Marker 1 [T1]      -35.84 dBm  
 \*VBW 1 MHz      -35.84 dBm  
 SWT 1.5 s      34.316875000 GHz

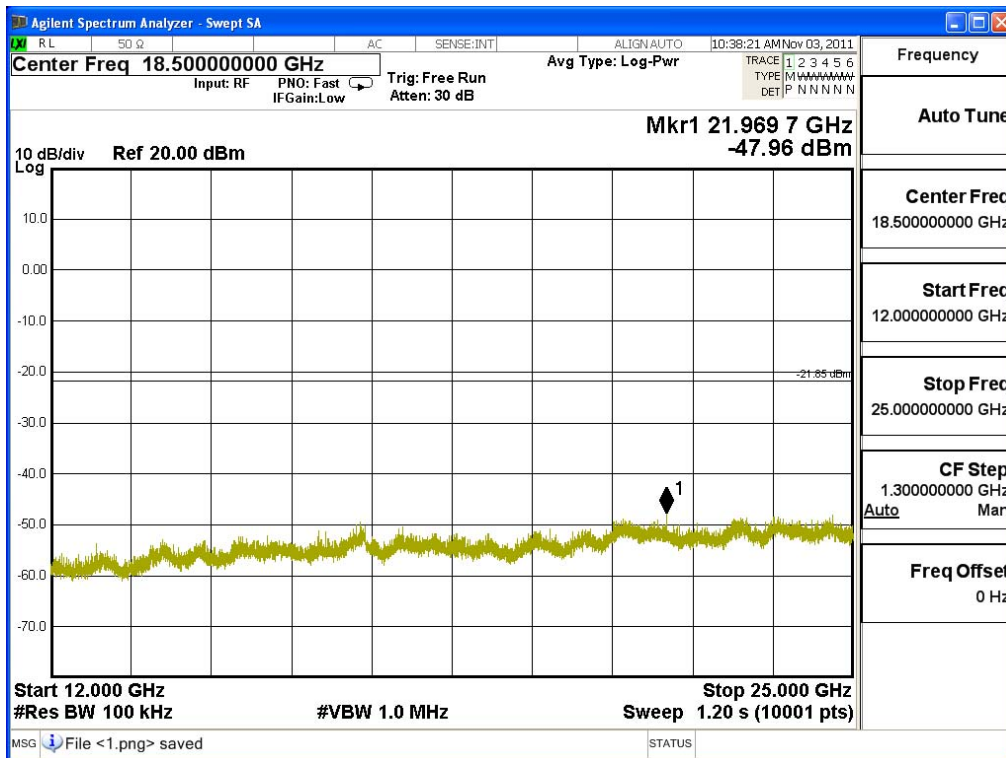
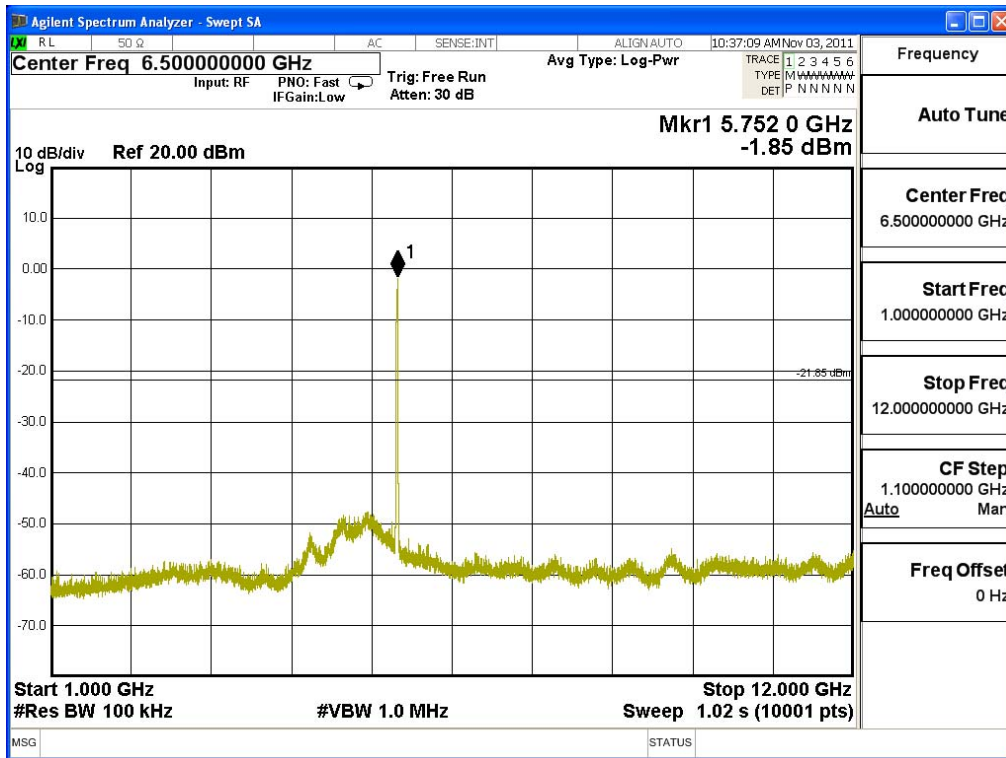


Date: 30.NOV.2011 08:50:59

**Channel 149 (5745MHz) 30MHz -40GHz-Chain B**



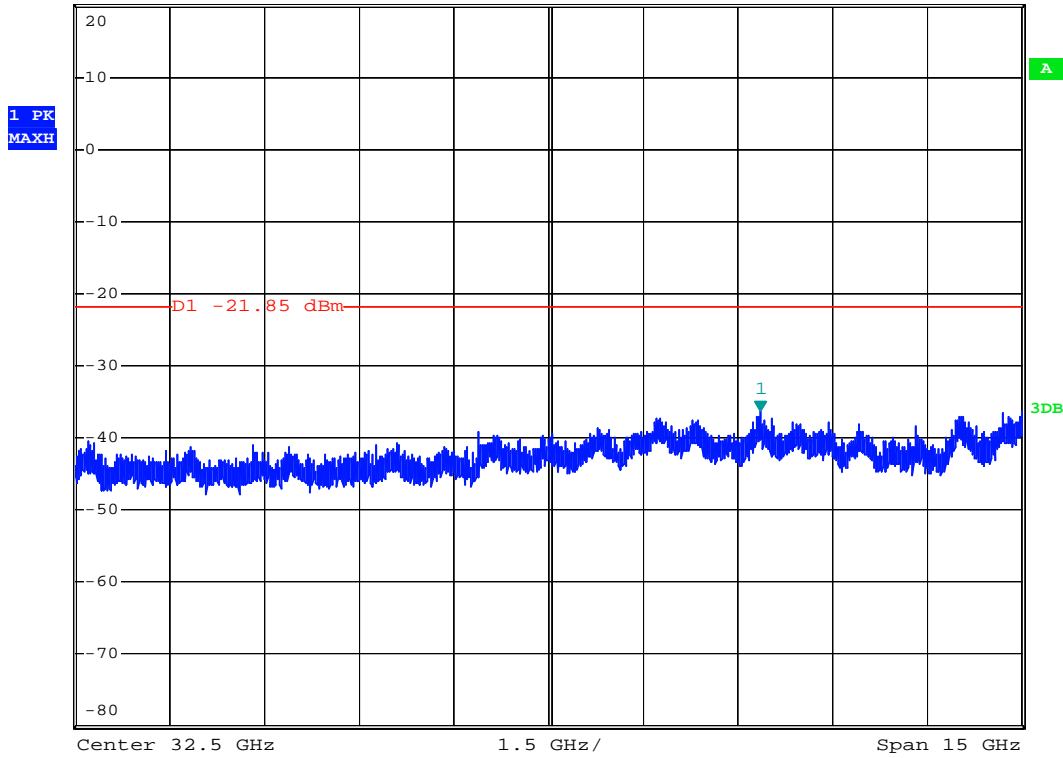






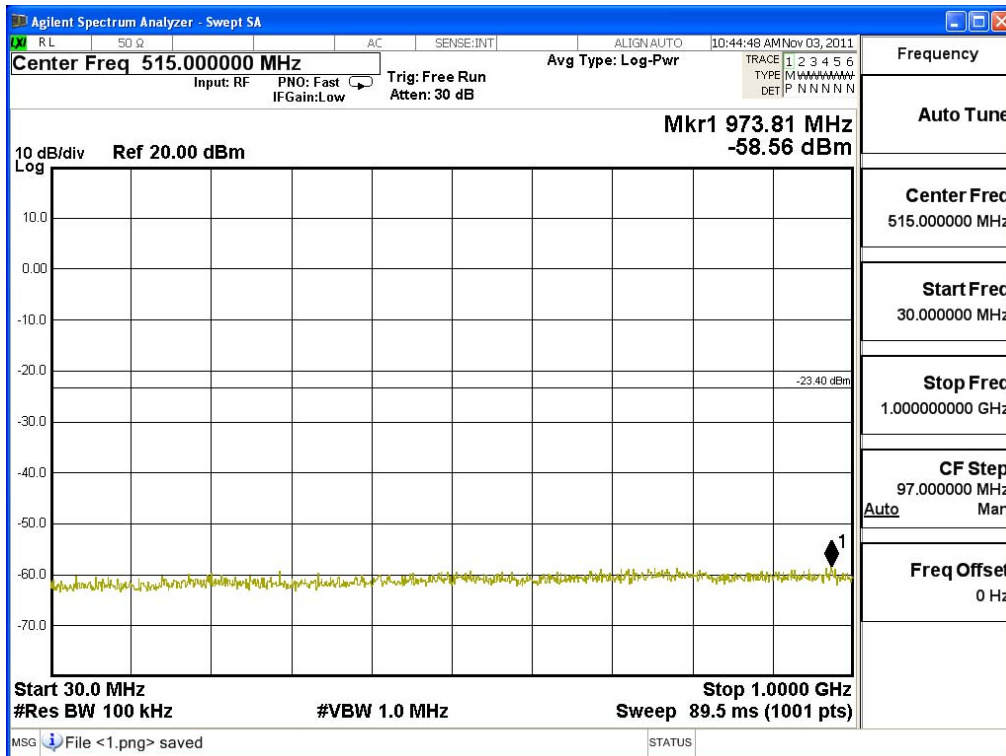


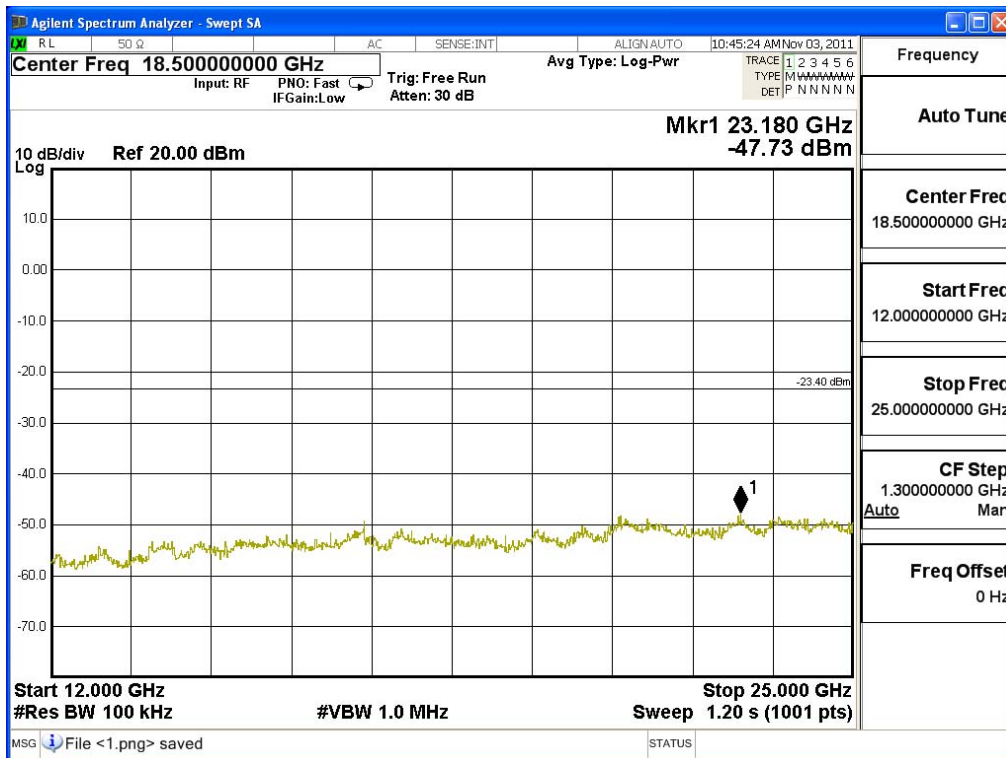
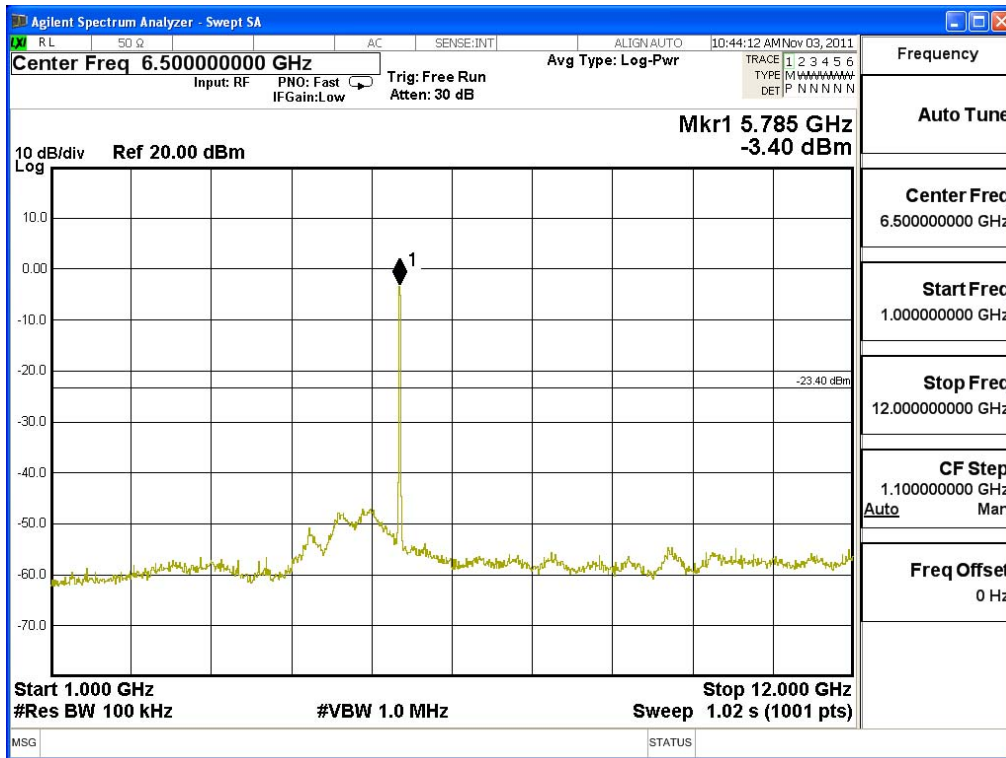
Ref 20 dBm      \*Att 30 dB      \*RBW 100 kHz      Marker 1 [T1]      -36.28 dBm  
 \*VBW 1 MHz      -36.28 dBm  
 SWT 1.5 s      35.867500000 GHz



Date: 30.NOV.2011 08:33:56

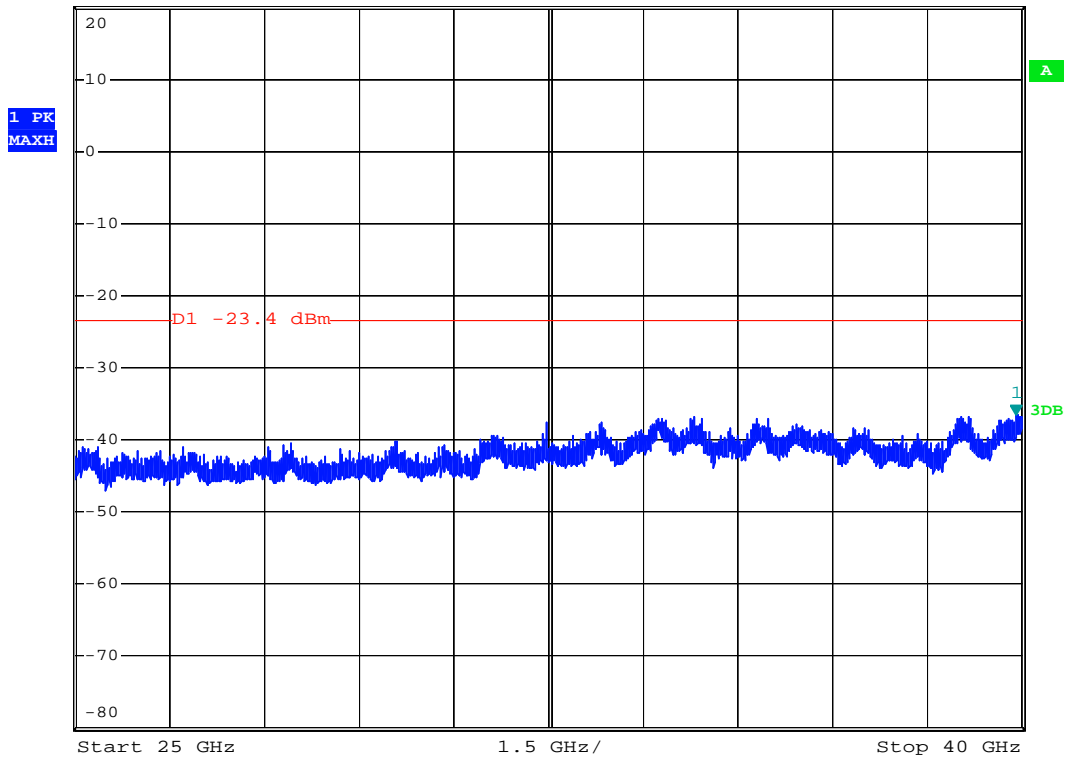
**Channel 157 (5785MHz) 30MHz -40GHz-Chain B**





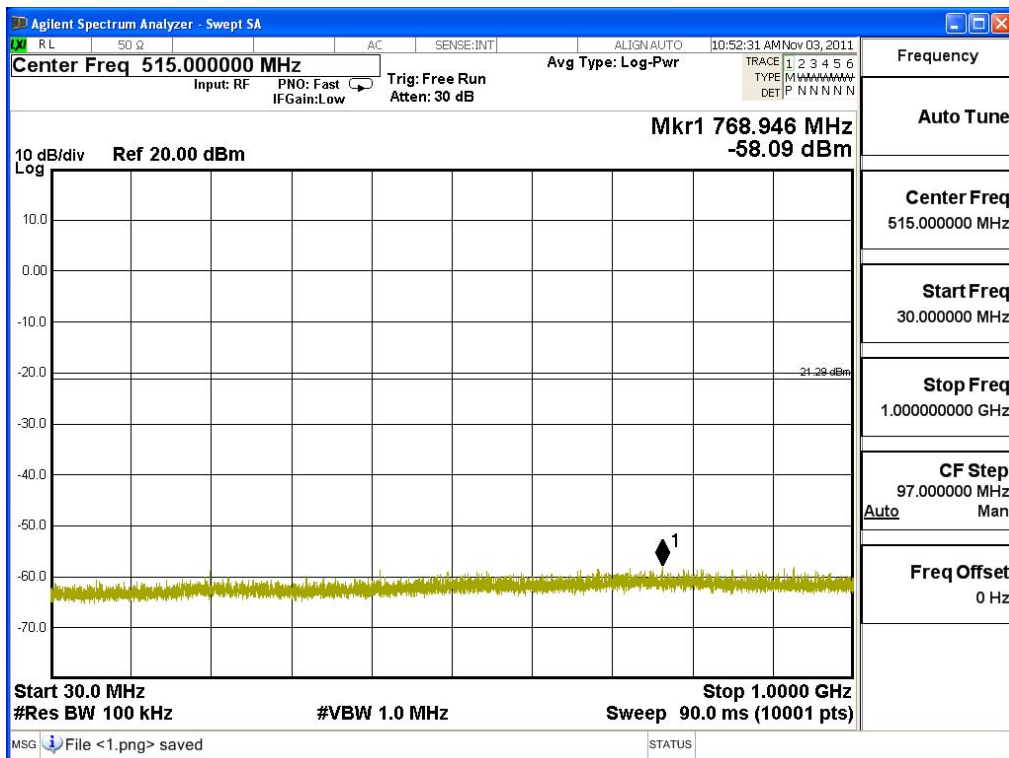


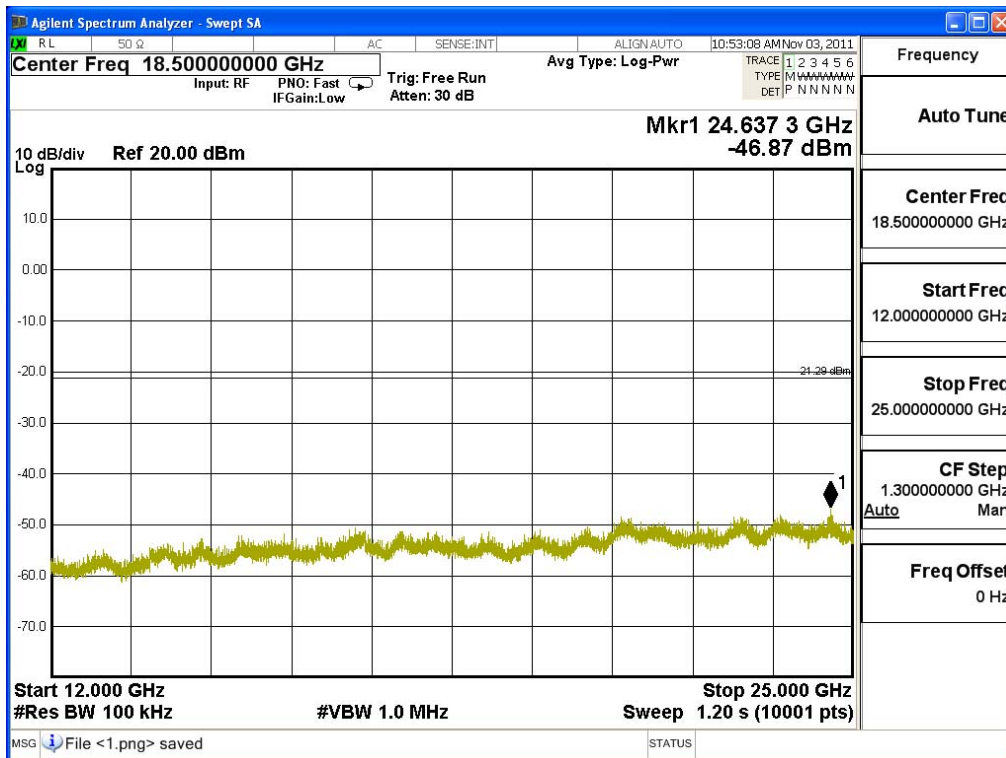
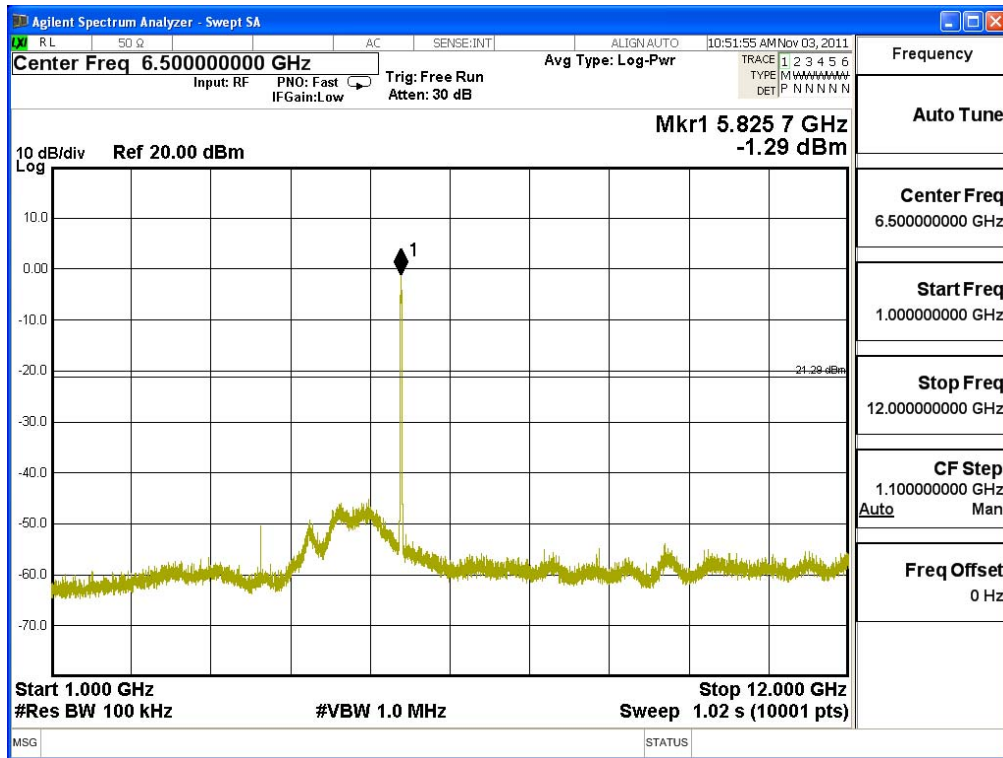
\*RBW 100 kHz Marker 1 [ T1 ]  
\*VBW 1 MHz -36.57 dBm  
Ref 20 dBm \*Att 30 dB SWT 1.5 s 39.900625000 GHz



Date: 30.NOV.2011 08:35:18

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





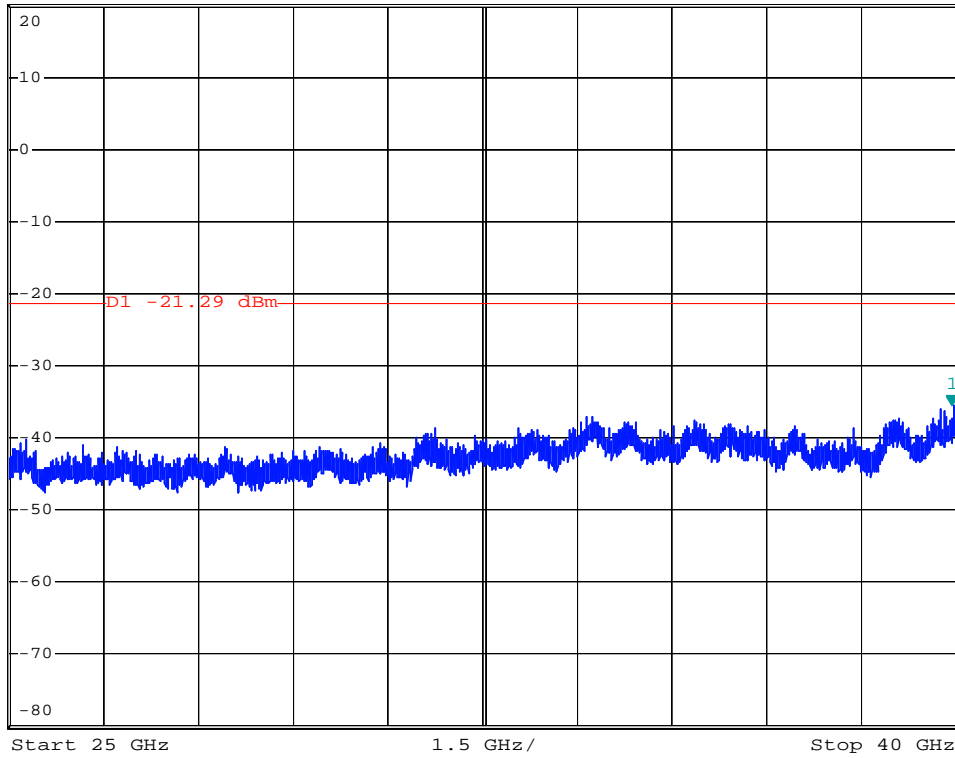


\*RBW 100 kHz    Marker 1 [T1 ]  
\*VBW 1 MHz                    -35.42 dBm  
SWT 1.5 s                        39.953125000 GHz

Ref 20 dBm

\*Att 30 dB

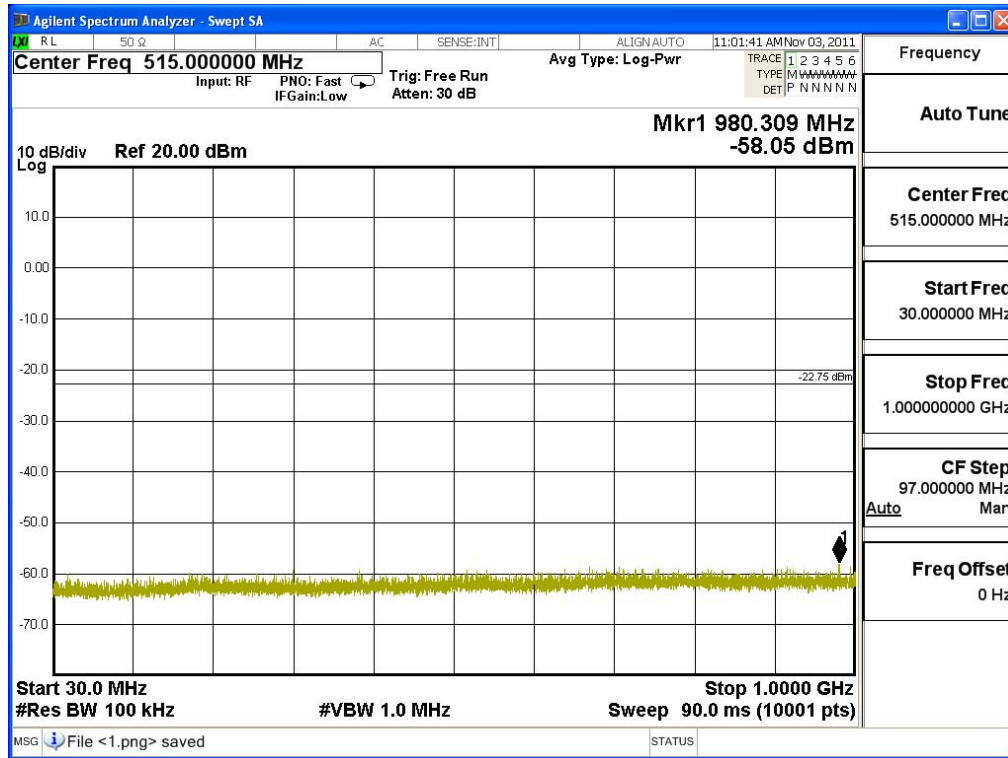
1 PR  
MAXH

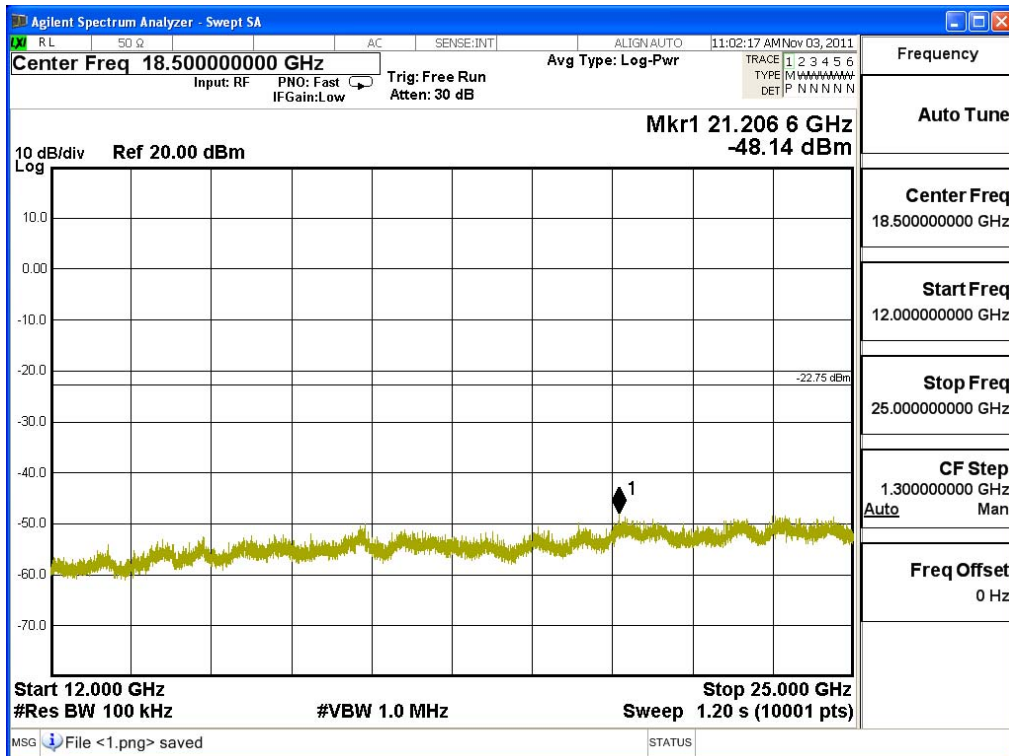
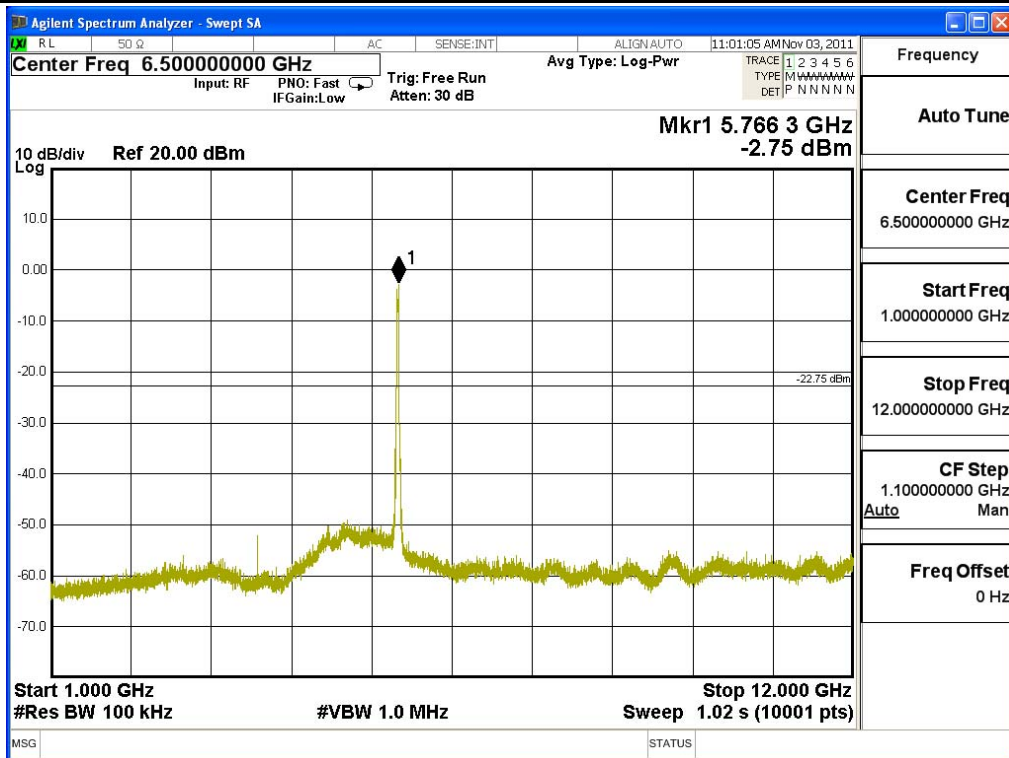


Date: 30.NOV.2011 08:37:51

Product : MOXA IEEE 802.11 a/b/g/n PCI-e  
 Test Item : RF Antenna Conducted Spurious  
 Test Site : No.3 OATS  
 Test Mode : Mode 7: Transmit - 802.11n-40BW\_30Mbps(5G Band)

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

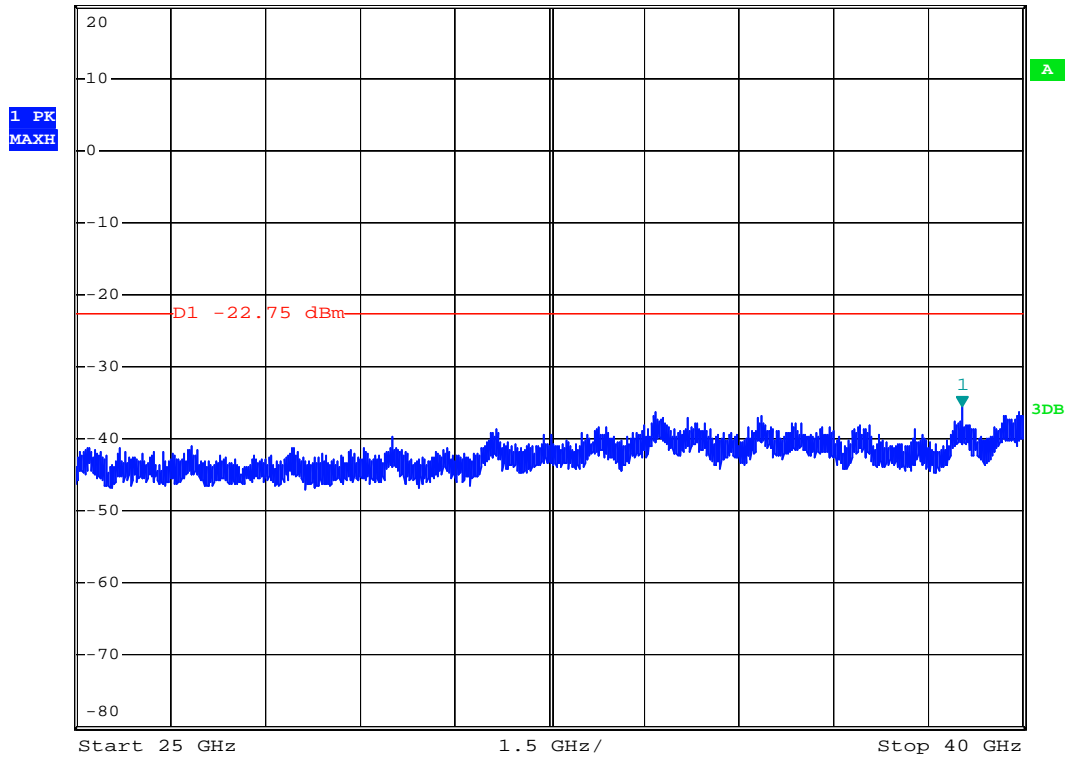






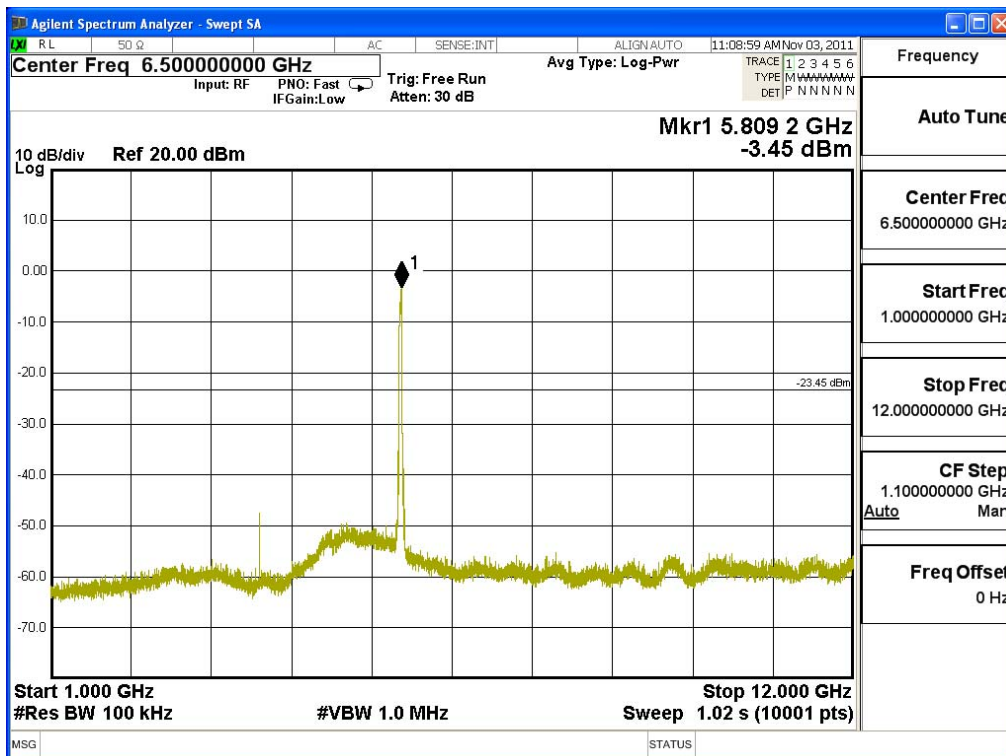
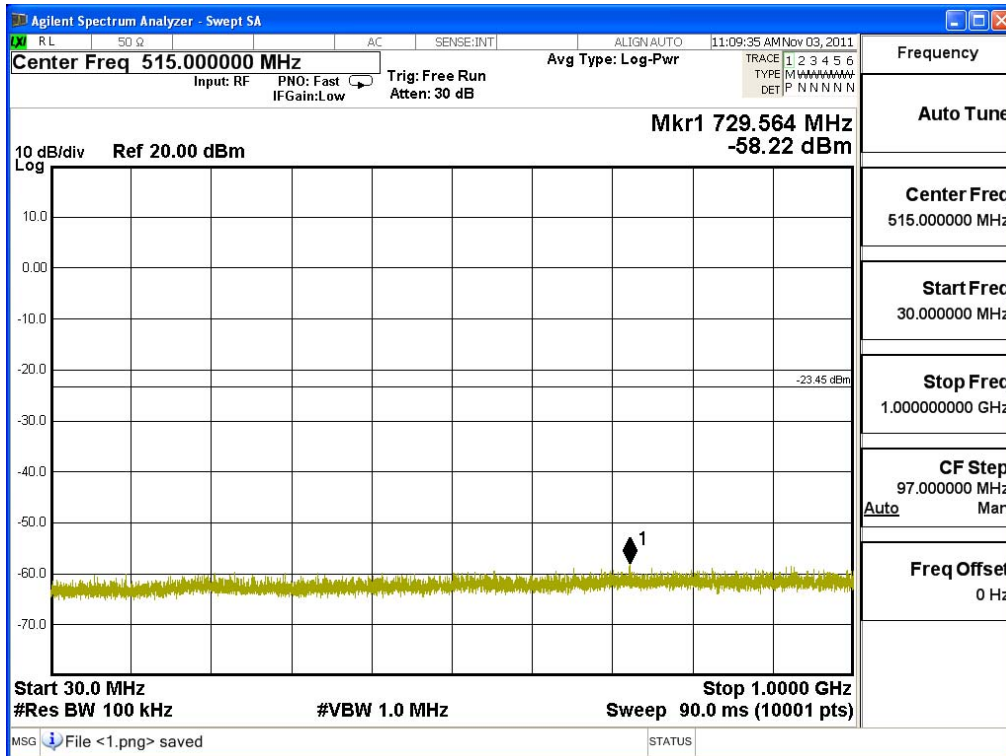


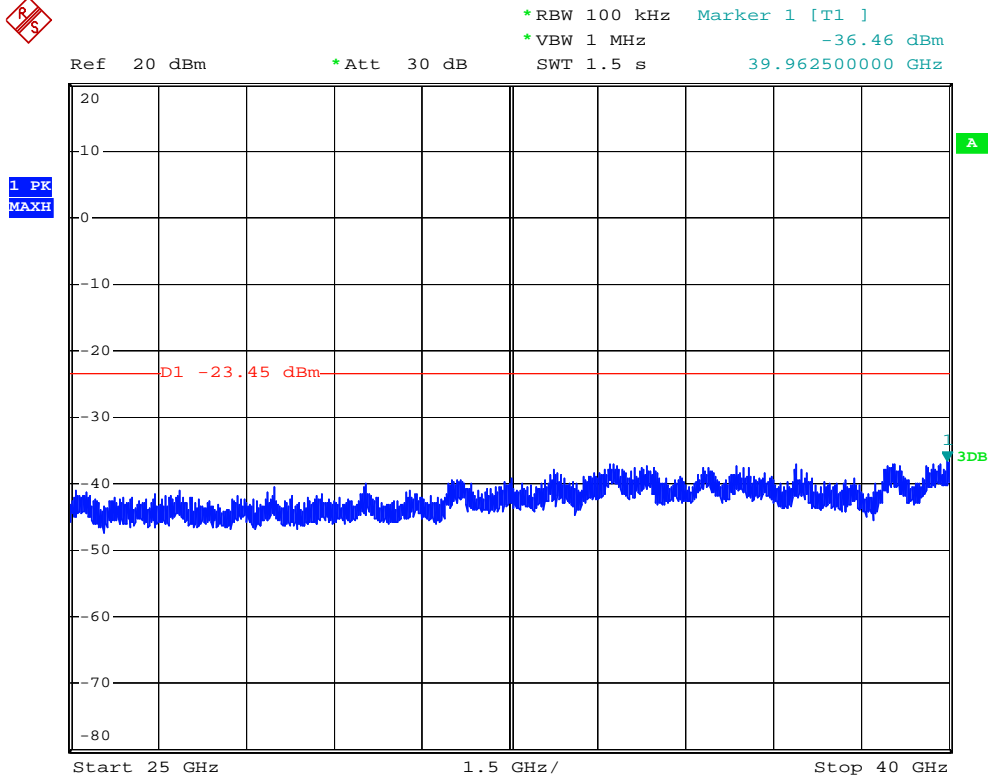
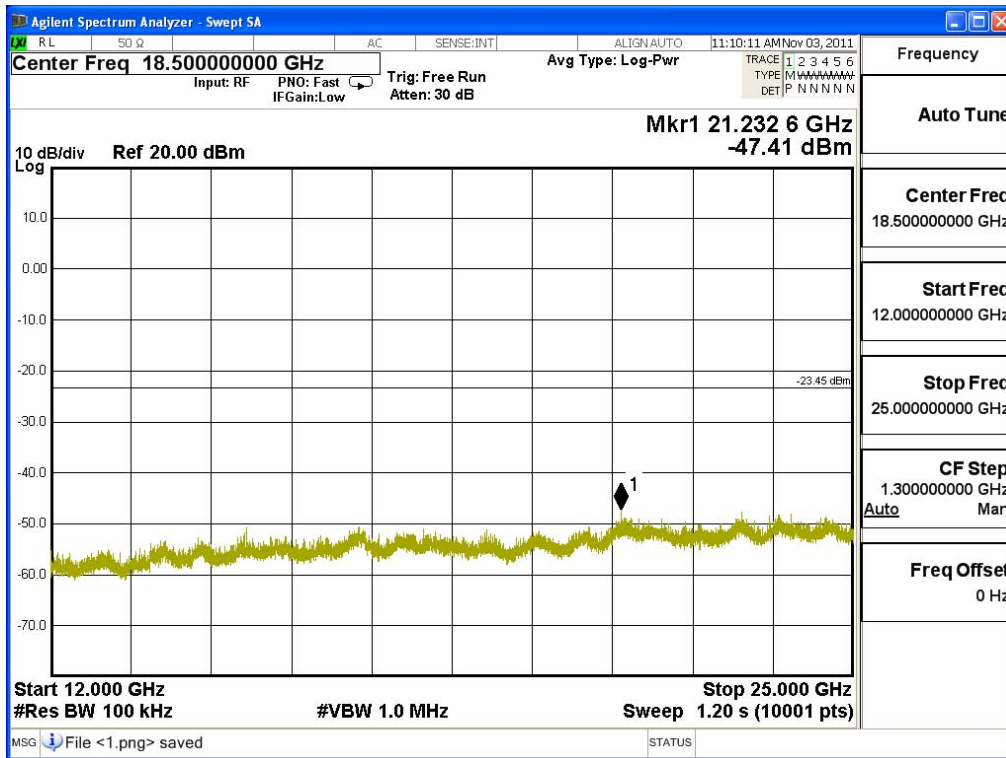
Ref 20 dBm      \*Att 30 dB      \*RBW 100 kHz      Marker 1 [T1]      -35.58 dBm  
\*VBW 1 MHz      SWT 1.5 s      39.02500000 GHz



Date: 30.NOV.2011 08:49:30

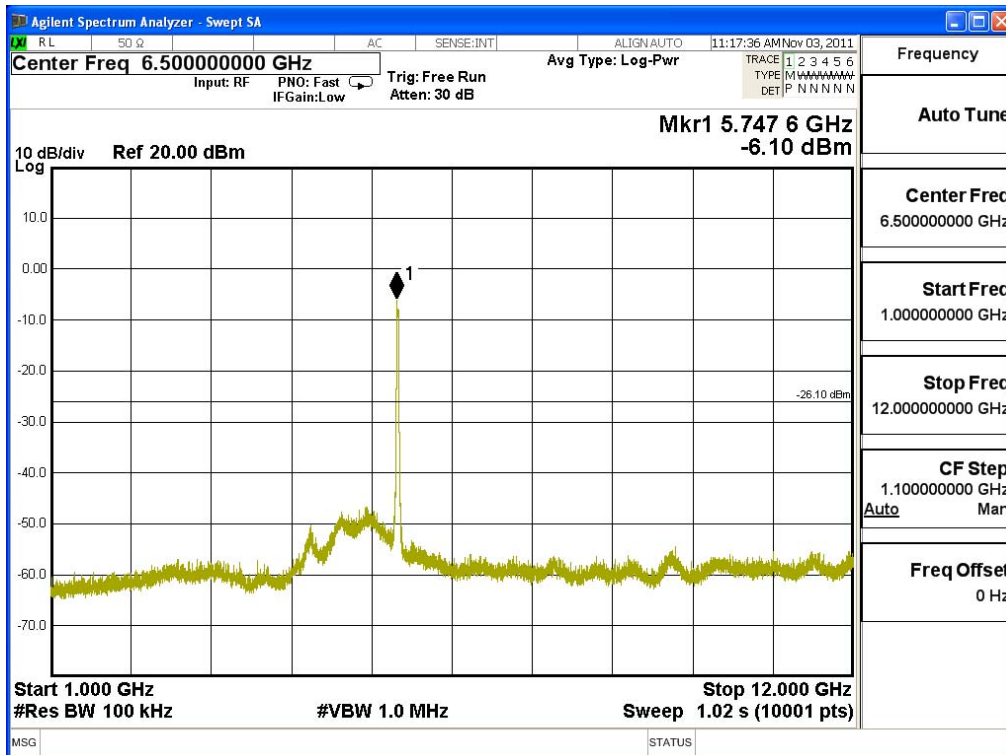
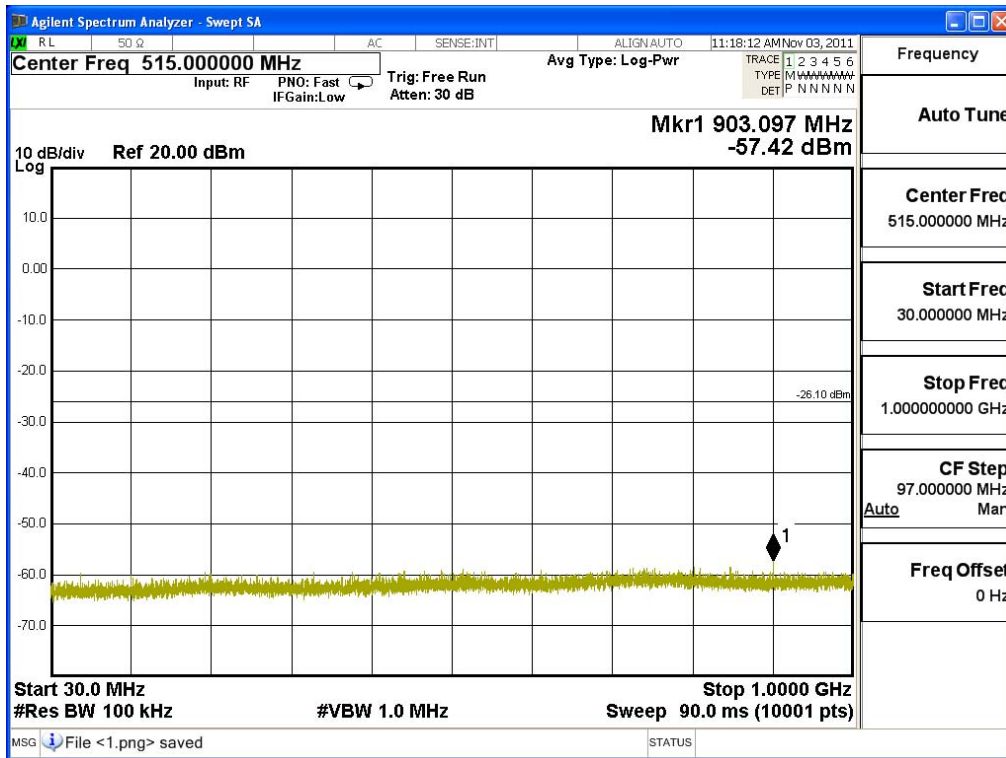
**Channel 159 (5795MHz) 30MHz -40GHz-Chain A**

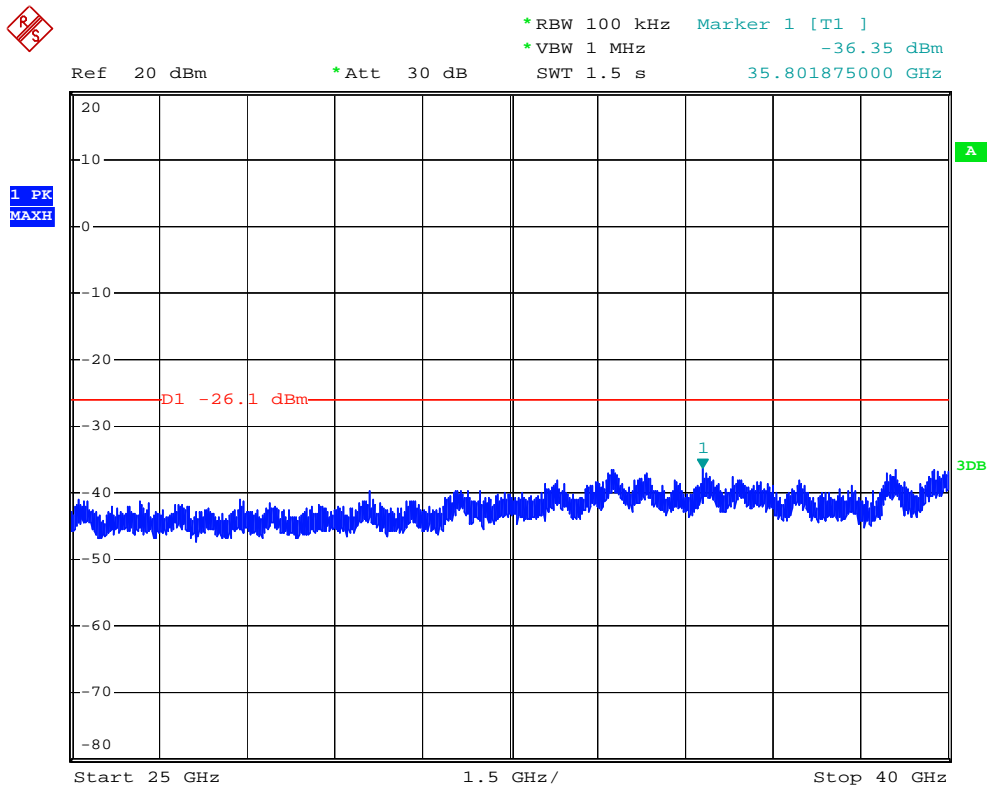
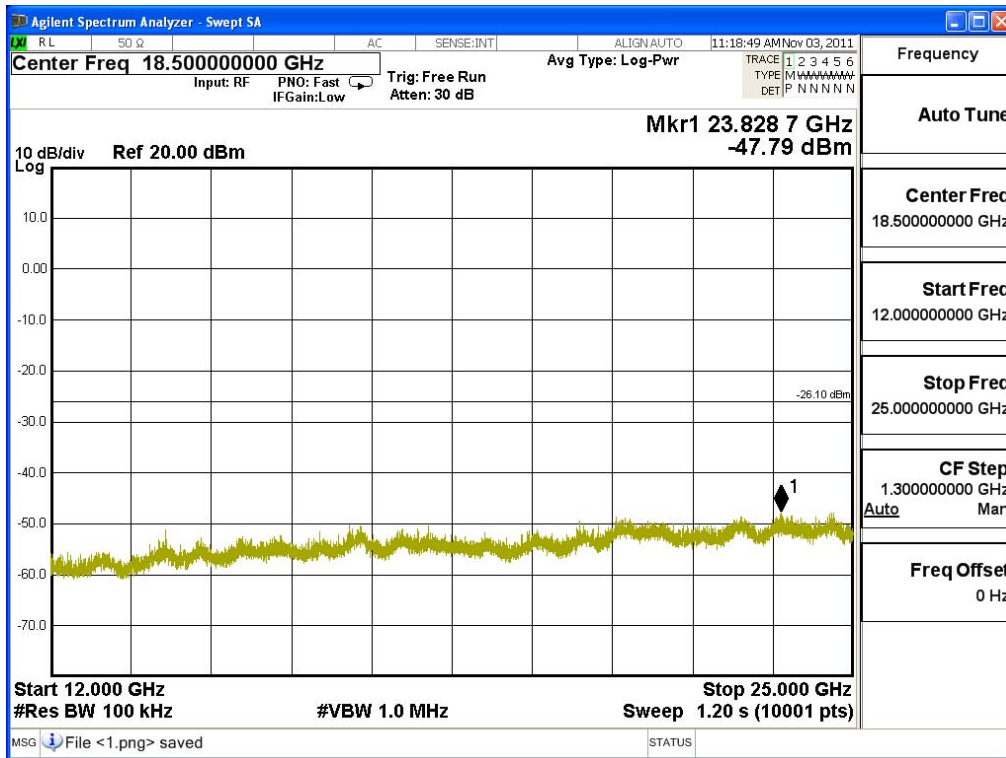




Date: 30.NOV.2011 08:48:21

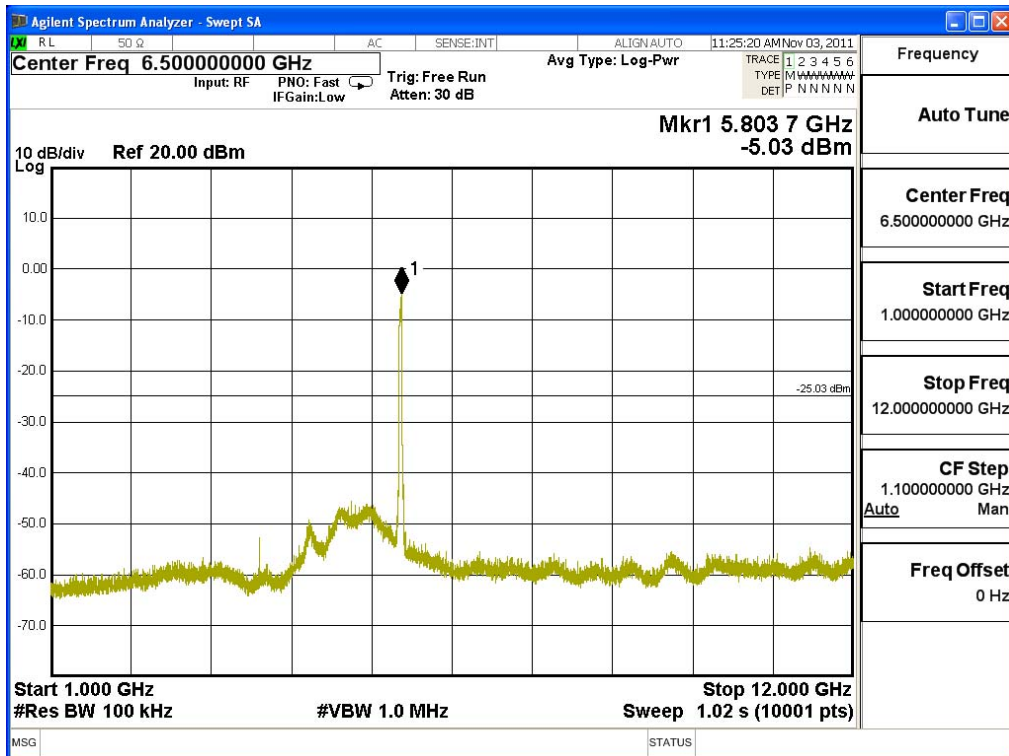
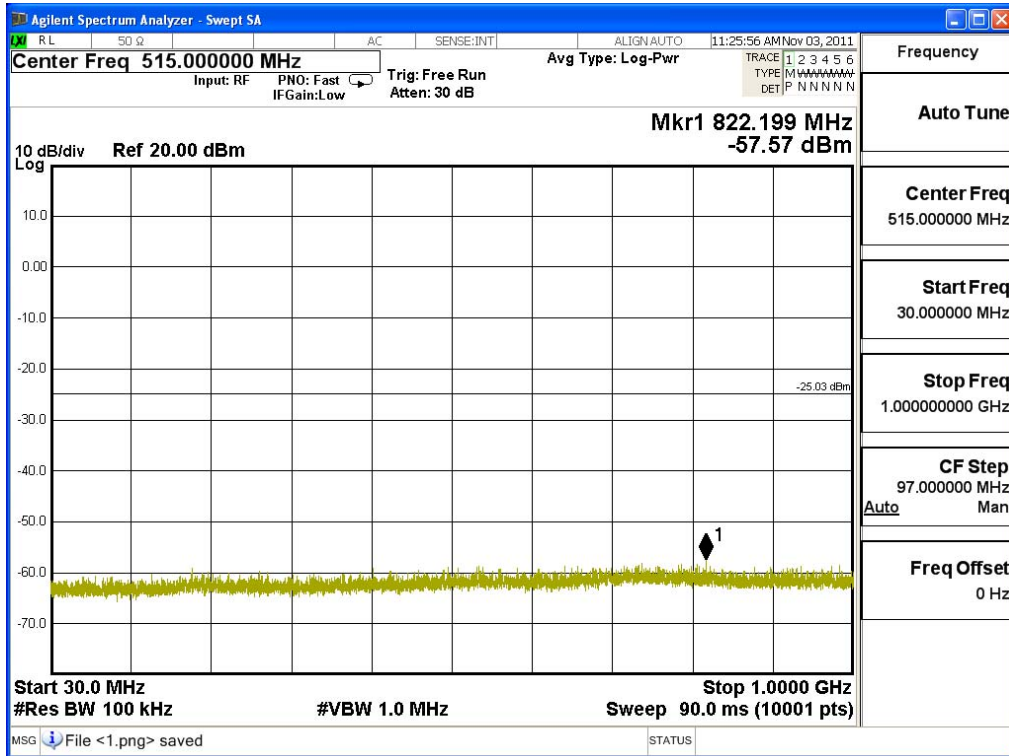
**Channel 151 (5755MHz) 30MHz -40GHz-Chain B**

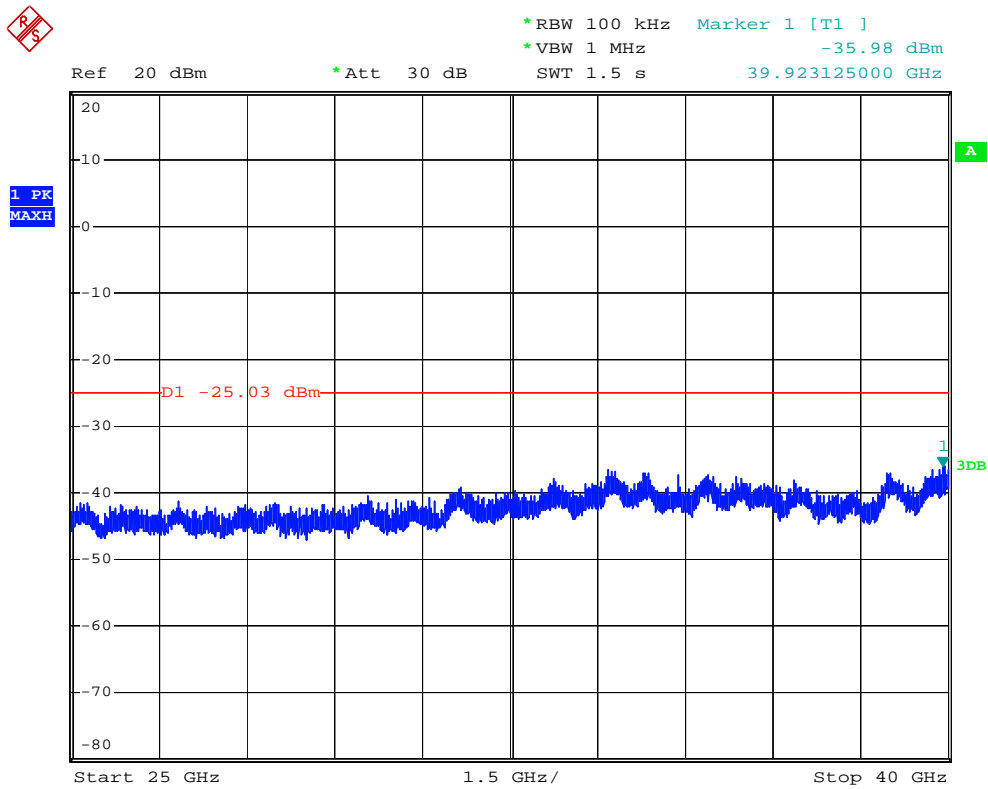
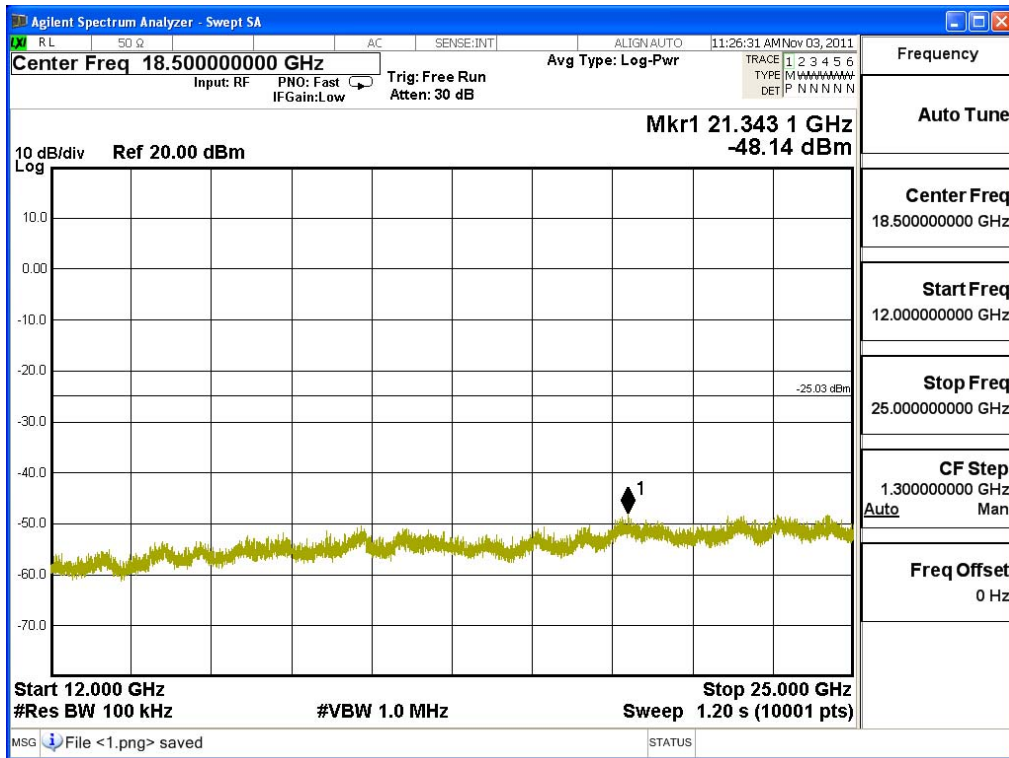




Date: 30.NOV.2011 08:41:05

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





Date: 30.NOV.2011 08:46:13



## 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, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

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:

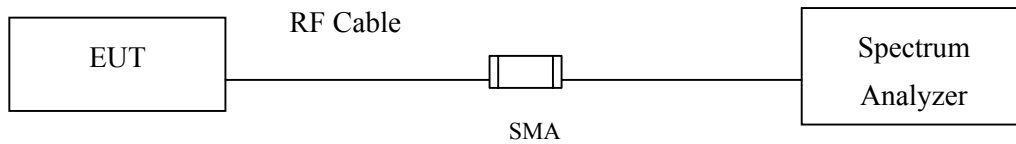
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	
☒ Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2011
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2011
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

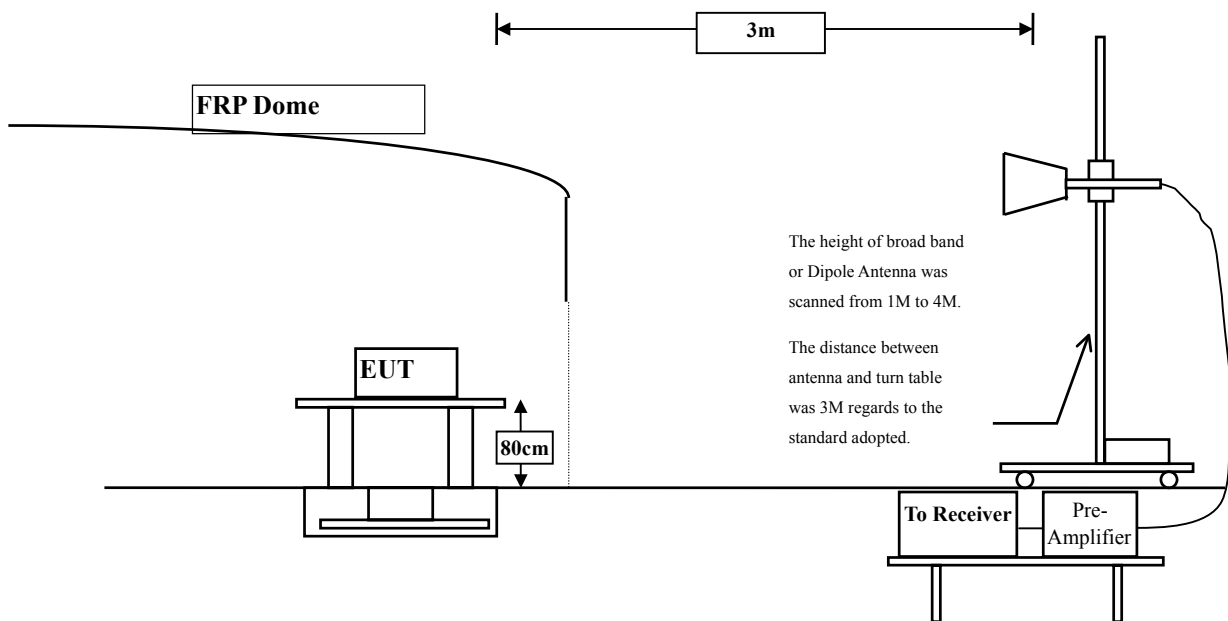
- Note:
1. All instruments are calibrated every one year.
  2. The test instruments marked by "X" are used to measure the final test results.

## 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 C63.4, 2009 and tested according to DTS test procedure of Mar. 2005 KDB558074 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 C63.4:2009 on radiated measurement.

#### **6.5. Uncertainty**

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

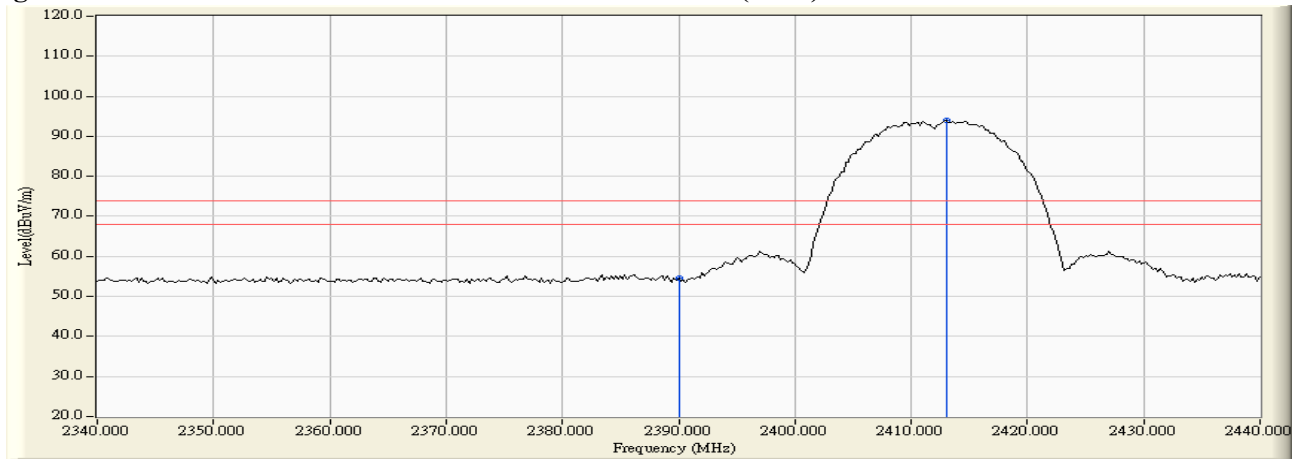
### 6.6. Test Result of Band Edge

Product : MOXA IEEE 802.11 a/b/g/n PCI-e  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11b 1Mbps

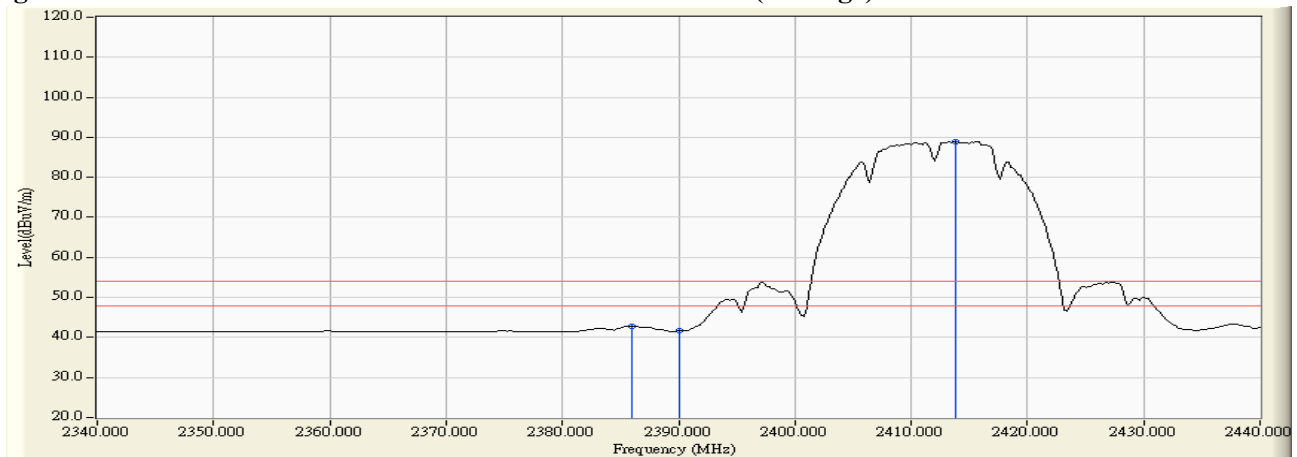
#### RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2390.000	31.509	22.942	54.451	74.00	54.00	Pass
01 (Peak)	2413.000	31.646	62.307	93.953	--	--	--
01 (Average)	2386.000	31.493	11.277	42.771	74.00	54.00	Pass
01 (Average)	2390.000	31.509	10.079	41.588	74.00	54.00	Pass
01 (Average)	2413.800	31.651	57.339	88.991	--	--	--

**Figure Channel 01: Horizontal (Peak)**



**Figure Channel 01: Horizontal (Average)**



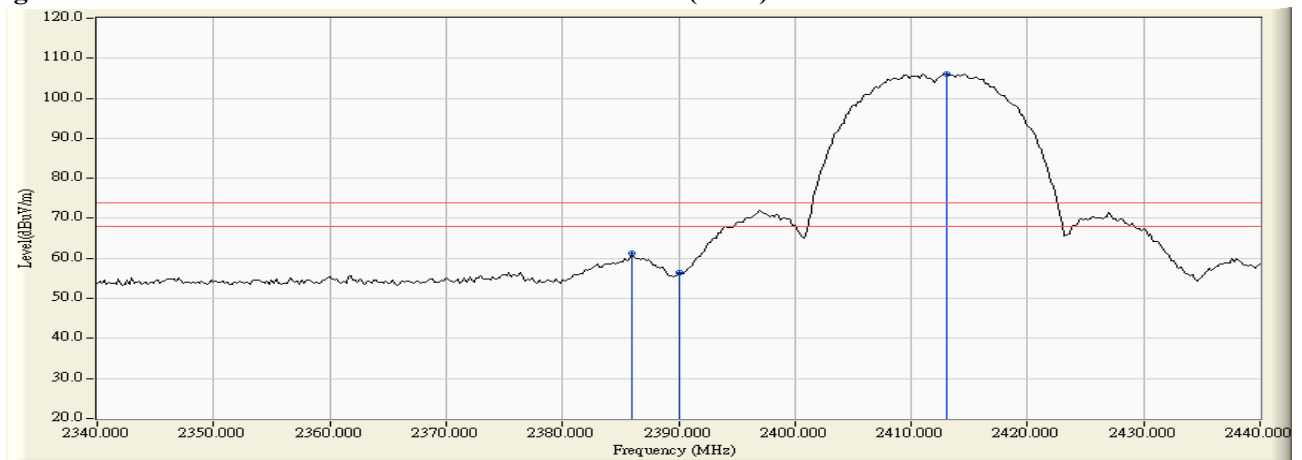
- Note: 1. All readings above 1GHz are performed with peak and/or average measurements as necessary.  
 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.  
 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.  
 4. “ \* ”, means this data is the worst emission level.  
 5. Measurement Level = Reading Level + Correct Factor.  
 6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n PCI-e  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11b 1Mbps

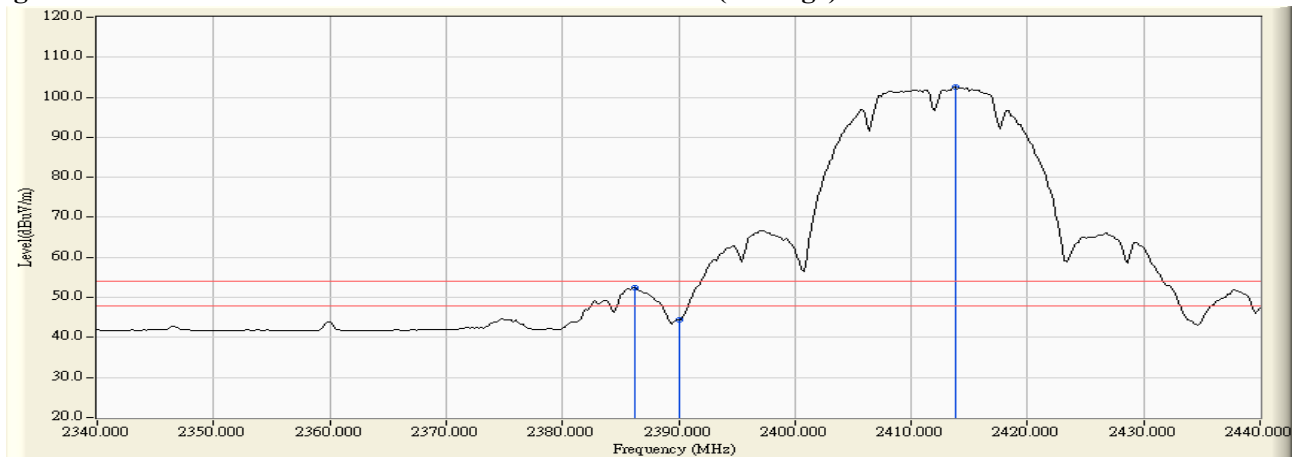
**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2386.000	30.934	30.289	61.223	74.00	54.00	Pass
01 (Peak)	2390.000	30.915	25.422	56.337	74.00	54.00	Pass
01 (Peak)	2413.000	30.956	75.199	106.155	--	--	--
01 (Average)	2386.200	30.933	21.391	52.324	74.00	54.00	Pass
01 (Average)	2390.000	30.915	13.569	44.484	74.00	54.00	Pass
01 (Average)	2413.800	30.961	71.495	102.456	--	--	--

**Figure Channel 01: Vertical (Peak)**



**Figure Channel 01: Vertical (Average)**



**Note:**

1. All readings 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. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n PCI-e  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 802.11b 1Mbps

**Fundamental Filed Strength**

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2462	32.019	59.71	91.729	Peak
Horizontal	2462	32.019	55.29	87.309	Average
Vertical	2462	31.29	75.08	106.37	Peak
Vertical	2462	31.29	70.59	101.88	Average

Note: 1: Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

**Band Edge Test Data**

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2487.5	91.729	43.5	48.229	74.000	Peak
Horizontal	2488.1	87.309	52.56	34.749	54.000	Average
Vertical	2487.5	106.37	43.5	62.87	74.000	Peak
Vertical	2488.1	101.88	52.56	49.32	54.000	Average

Note:

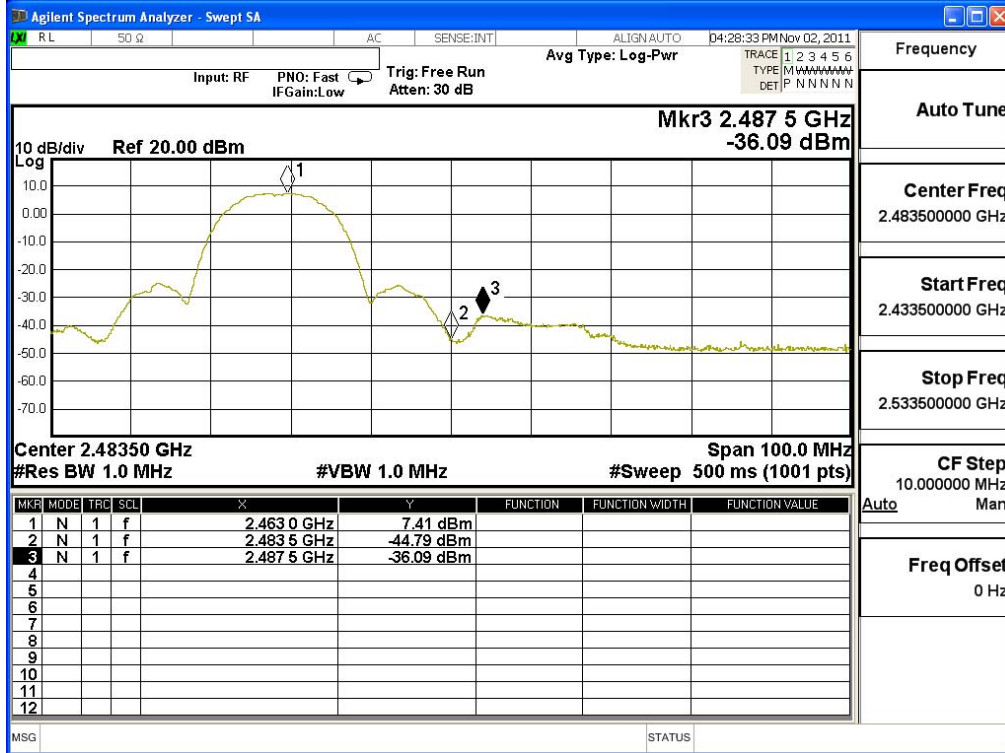
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$

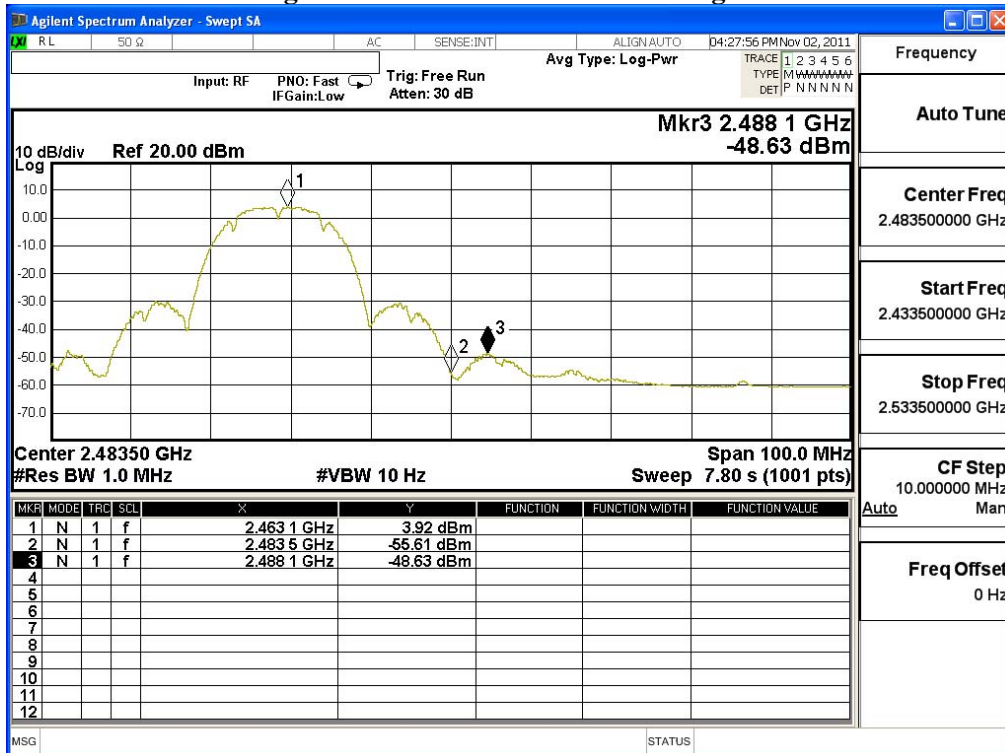
F = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

### Peak Detector of conducted Band Edge Delta



### Average Detector of conducted Band Edge Delta



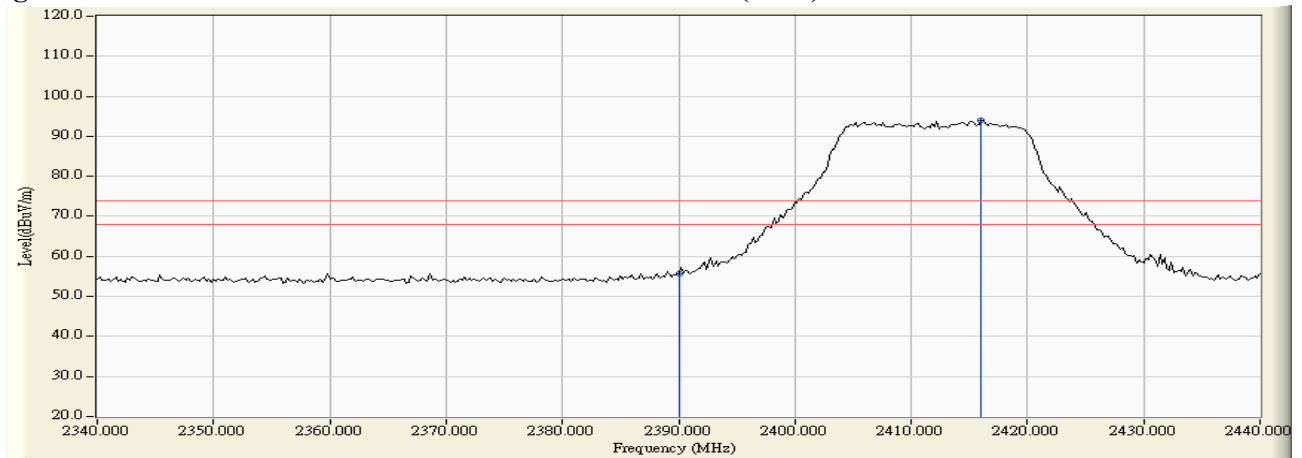


Product : MOXA IEEE 802.11 a/b/g/n PCI-e  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11g 6Mbps

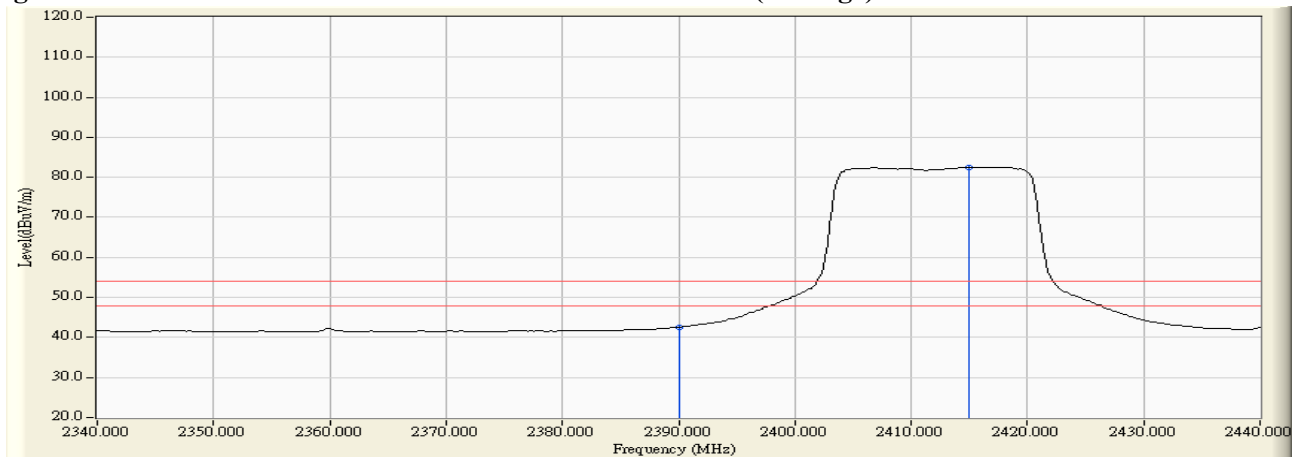
**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2390.000	31.509	24.020	55.529	74.00	54.00	Pass
01 (Peak)	2416.000	31.670	62.330	93.999	--	--	--
01 (Average)	2390.000	31.509	11.030	42.539	74.00	54.00	Pass
01 (Average)	2415.000	31.661	50.931	82.592	--	--	--

**Figure Channel 01: Horizontal (Peak)**



**Figure Channel 01: Horizontal (Average)**



**Note:**

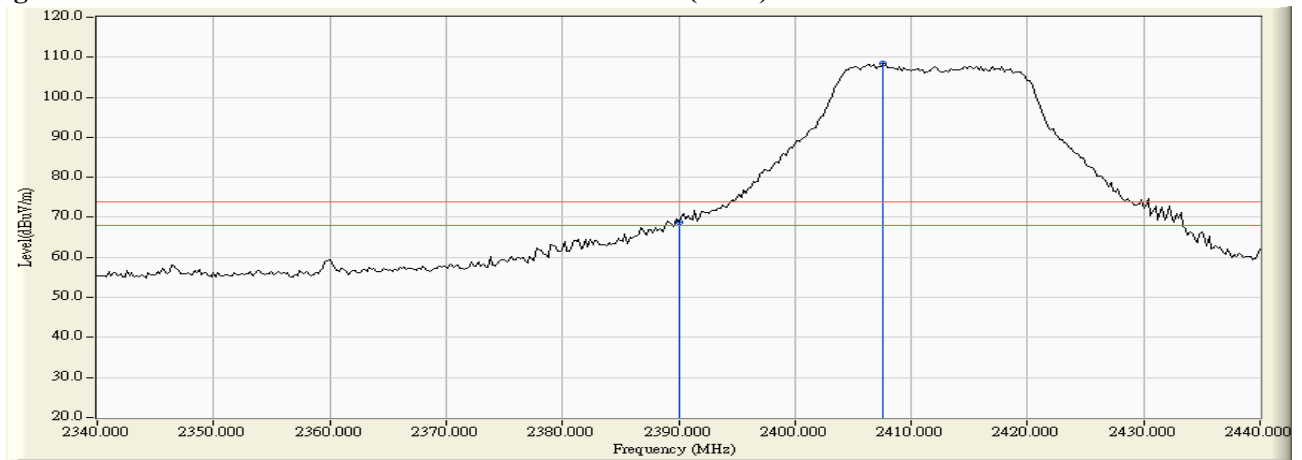
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n PCI-e  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11g 6Mbps

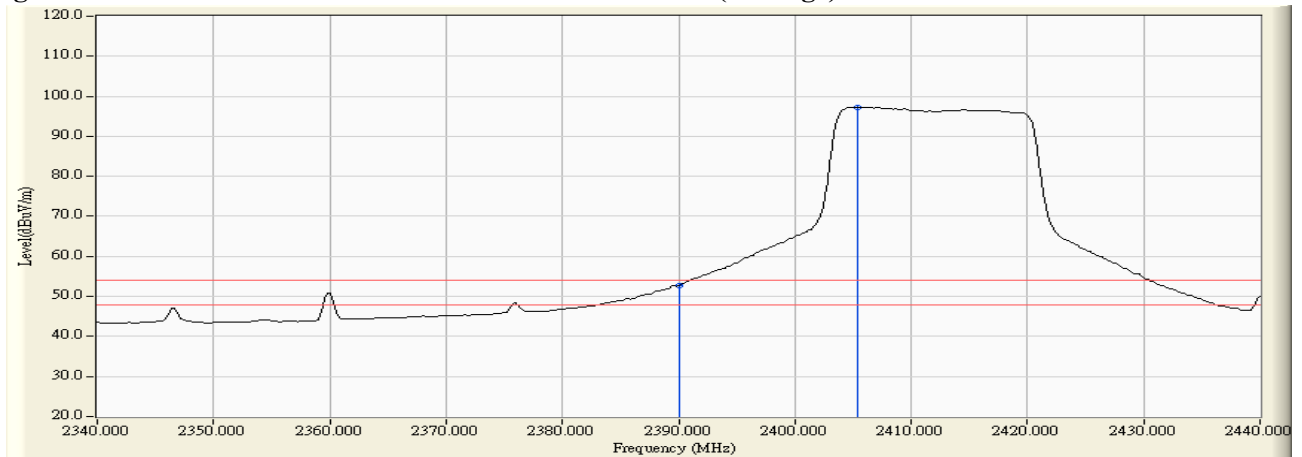
**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2390.000	30.915	37.816	68.731	74.00	54.00	Pass
01 (Peak)	2407.600	30.932	77.409	108.342	--	--	--
01 (Average)	2390.000	30.915	21.917	52.832	74.00	54.00	Pass
01 (Average)	2405.400	30.927	66.306	97.233	--	--	--

**Figure Channel 01: Vertical (Peak)**



**Figure Channel 01: Vertical (Average)**



**Note:**

1. All readings 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. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : MOXA IEEE 802.11 a/b/g/n PCI-e  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 802.11g 6Mbps

**Fundamental Filed Strength**

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2462	32.019	62.94	94.959	Peak
Horizontal	2462	32.019	50.43	82.449	Average
Vertical	2462	31.29	77.21	108.5	Peak
Vertical	2462	31.29	65.19	96.48	Average

Note: 1: Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

**Band Edge Test Data**

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2483.5	94.959	41.39	53.569	74.000	Peak
Horizontal	2483.5	82.449	47.35	35.099	54.000	Average
Vertical	2483.5	108.5	41.39	67.11	74.000	Peak
Vertical	2483.5	96.48	47.35	49.13	54.000	Average

Note:

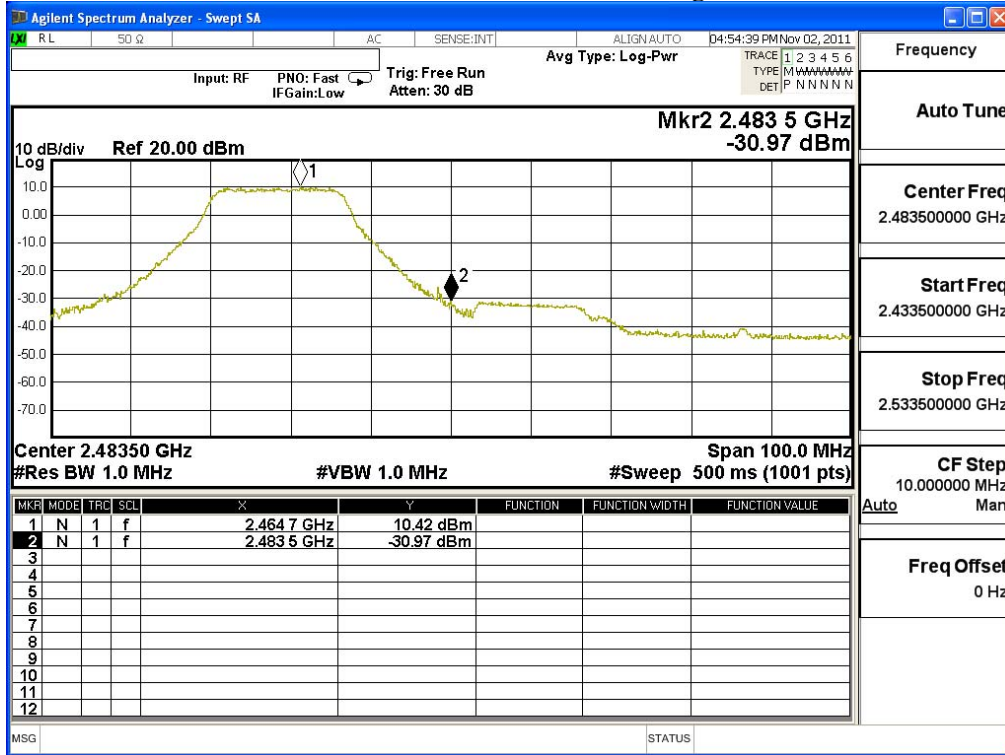
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$

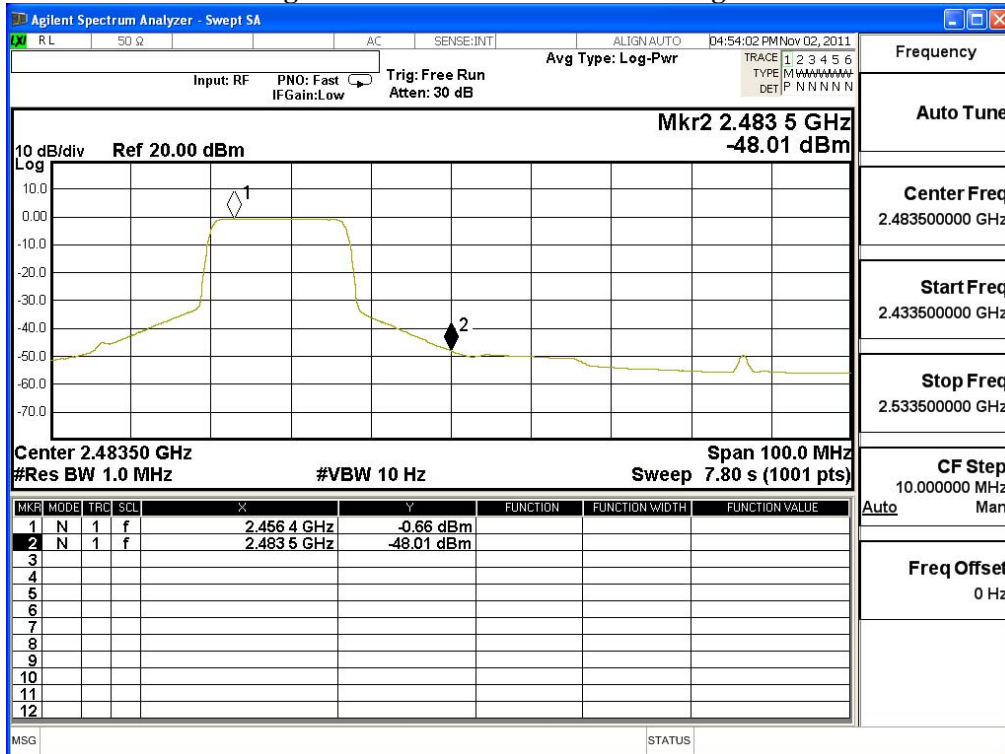
F = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

### Peak Detector of conducted Band Edge Delta



### Average Detector of conducted Band Edge Delta



Product : MOXA IEEE 802.11 a/b/g/n PCI-e  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 4: Transmit - 802.11n-20BW\_14.4Mbps(2.4G Band)

**Fundamental Filed Strength**

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2412	31.639	61.07	92.708	Peak
Horizontal	2412	31.639	47.74	79.378	Average
Vertical	2412	30.95	77.12	108.069	Peak
Vertical	2412	30.95	63.39	94.339	Average

Note: 1: Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

**Band Edge Test Data (Chain A)**

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2390	92.708	39.25	53.458	74.000	Peak
Horizontal	2390	79.378	45.82	33.558	54.000	Average
Vertical	2390	108.069	39.25	68.819	74.000	Peak
Vertical	2390	94.339	45.82	48.519	54.000	Average

**Band Edge Test Data (Chain B)**

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2389.4	92.708	37.77	54.938	74.000	Peak
Horizontal	2390	79.378	43.19	36.188	54.000	Average
Vertical	2389.4	108.069	37.77	70.299	74.000	Peak
Vertical	2390	94.339	43.19	51.149	54.000	Average

Note:

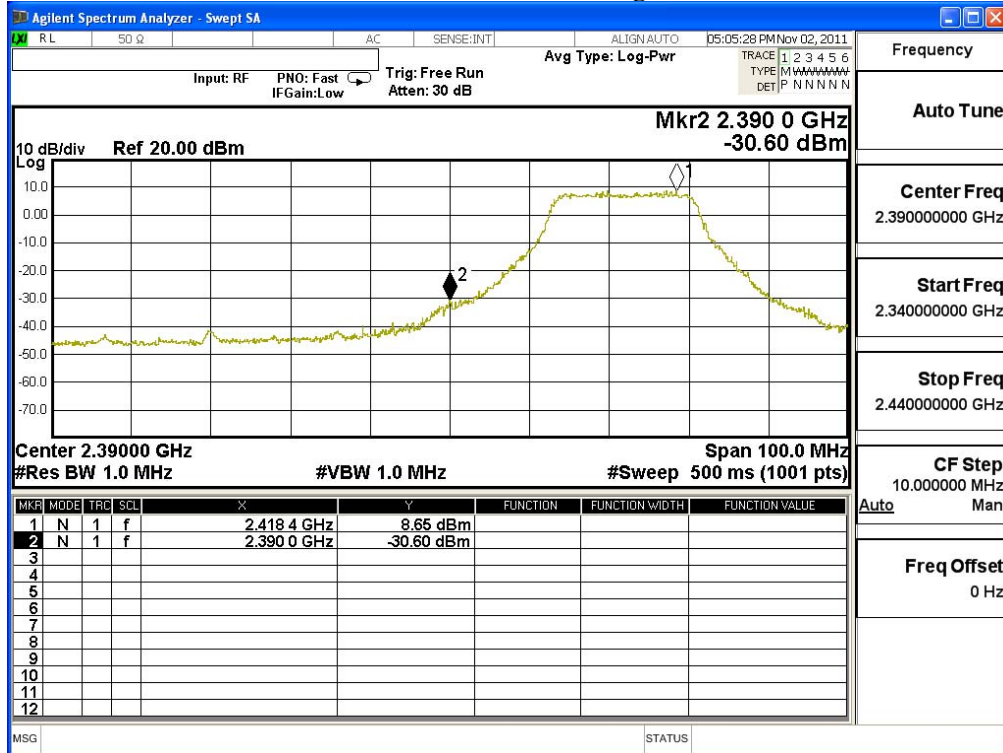
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$

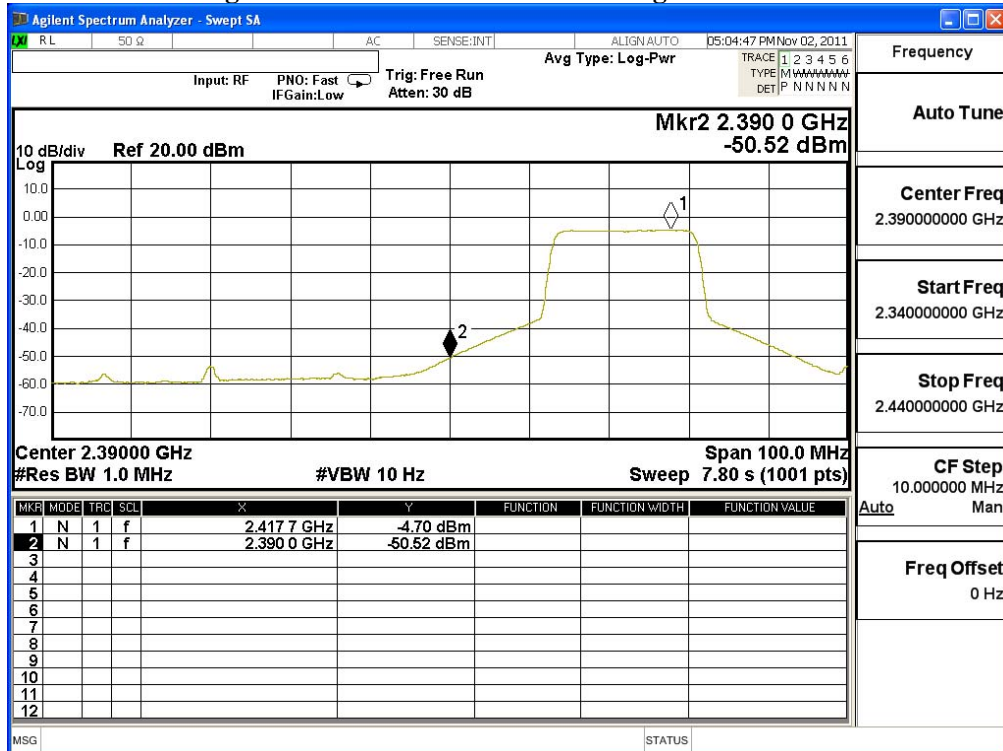
F = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

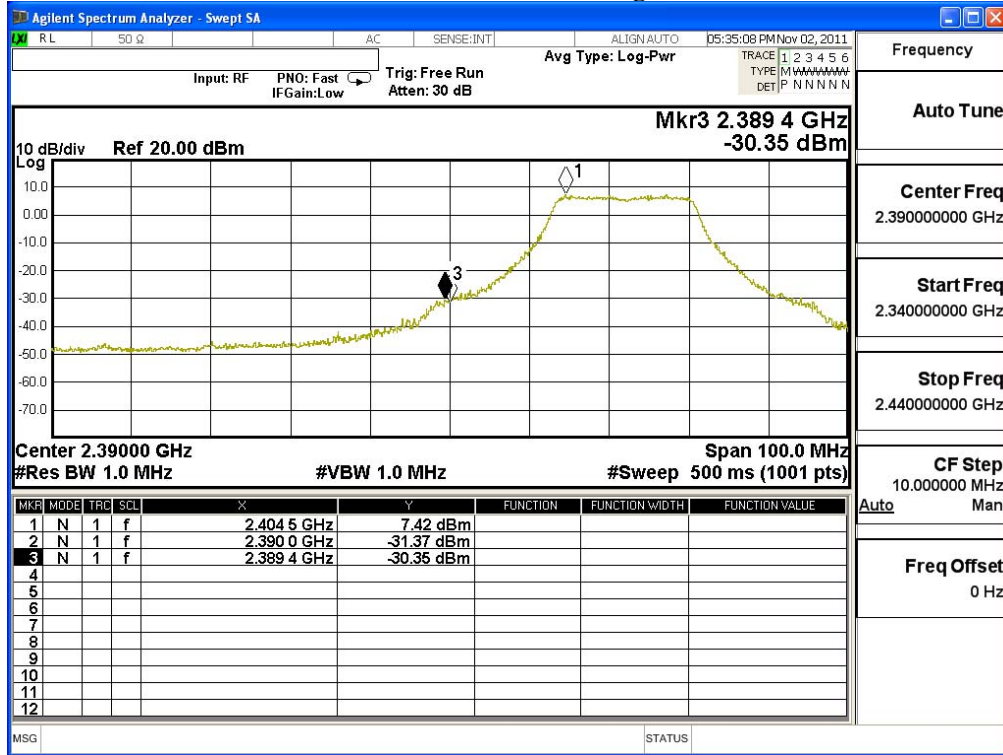
### Peak Detector of conducted Band Edge Delta-Chain A



### Average Detector of conducted Band Edge Delta-Chain A



### Peak Detector of conducted Band Edge Delta-Chain B



### Average Detector of conducted Band Edge Delta-Chain B

