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.
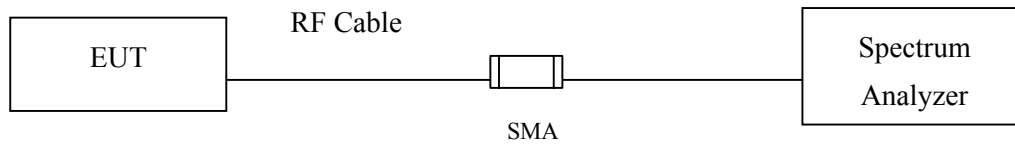
RF Radiated Measurement:

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

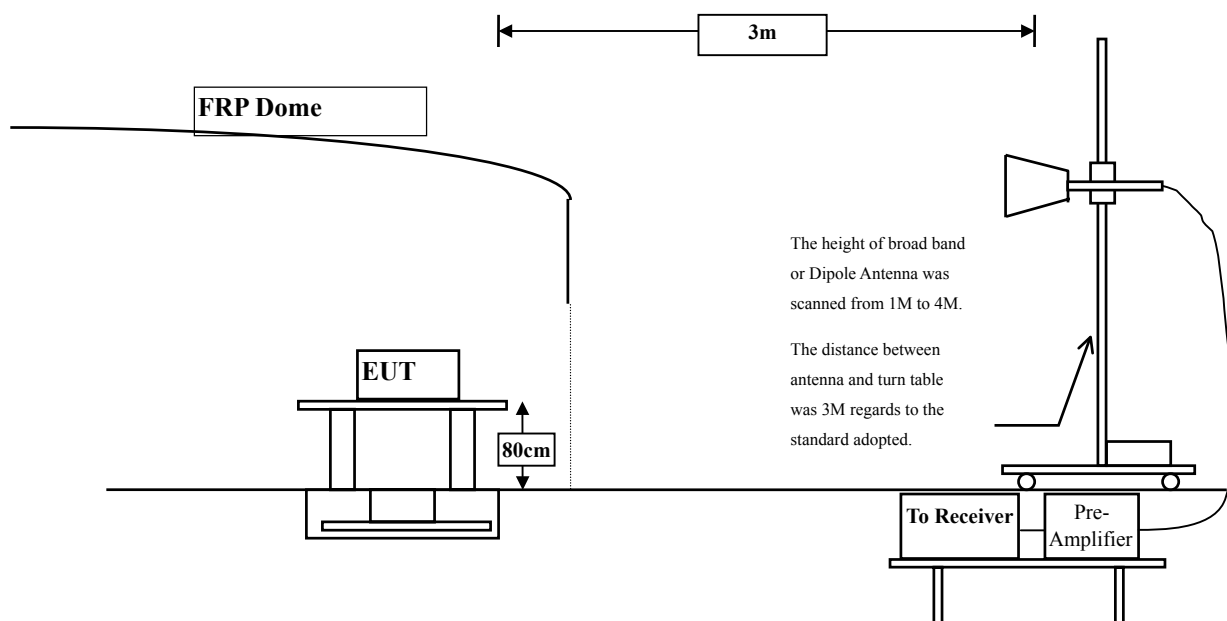| Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2010
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2010
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2010
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2010
	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 Cable                │ Spectrum│
│   EUT   │──────────────┤  ├───────────│ Analyzer│
│         │              SMA             │         │
└─────────┘                              └─────────┘
```

RF Radiated Measurement:

| 3m |

FRP Dome

EUT

80cm

The height of broad band or Dipole Antenna was scanned from 1M to 4M.

The distance between antenna and turn table was 3M regards to the standard adopted.

To Receiver | Pre-Amplifier

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   :   IEEE 802.11b/g/n WIFI/ BT Combo slim module
Test Item   :   Band Edge Data
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	2412	31.639	73.12	104.758	Peak
Horizontal	2412	31.639	69.61	101.248	Average
Vertical	2412	30.95	73.35	104.299	Peak
Vertical	2412	30.95	69.94	100.889	Average

Note: 1:Spectrum Analyzer setting:

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

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

Band Edge Test Data

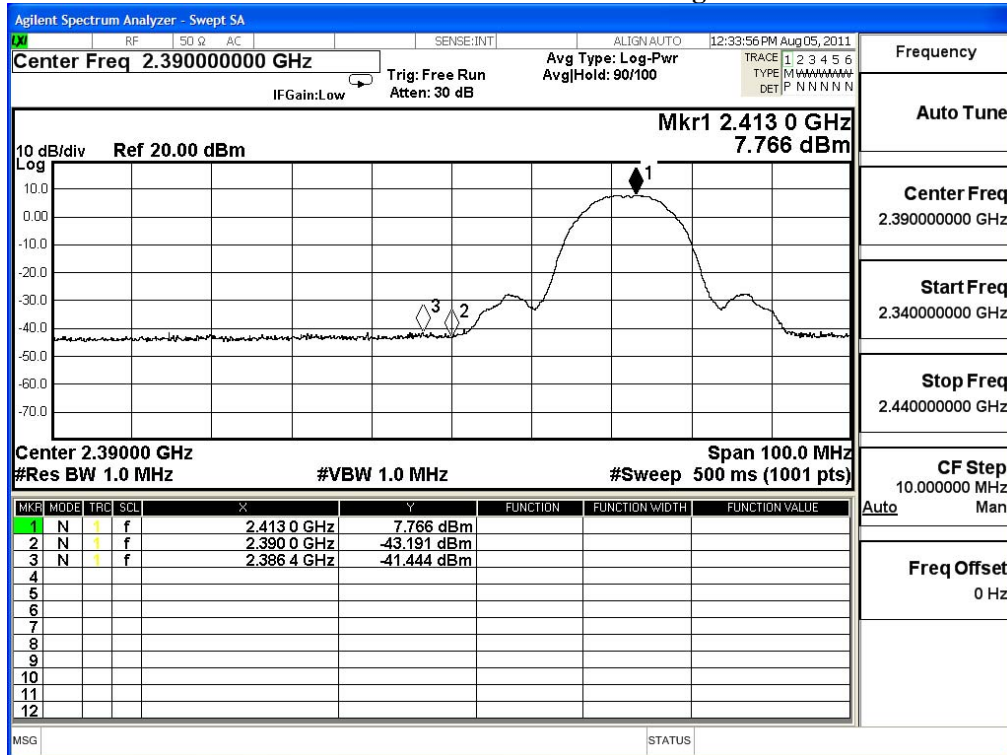| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2386.4	104.758	49.21	55.548	74.000	Peak
Horizontal	2386.8	101.248	58.982	42.266	54.000	Average
Vertical	2386.4	104.299	49.21	55.089	74.000	Peak
Vertical	2386.8	100.889	58.982	41.907	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:
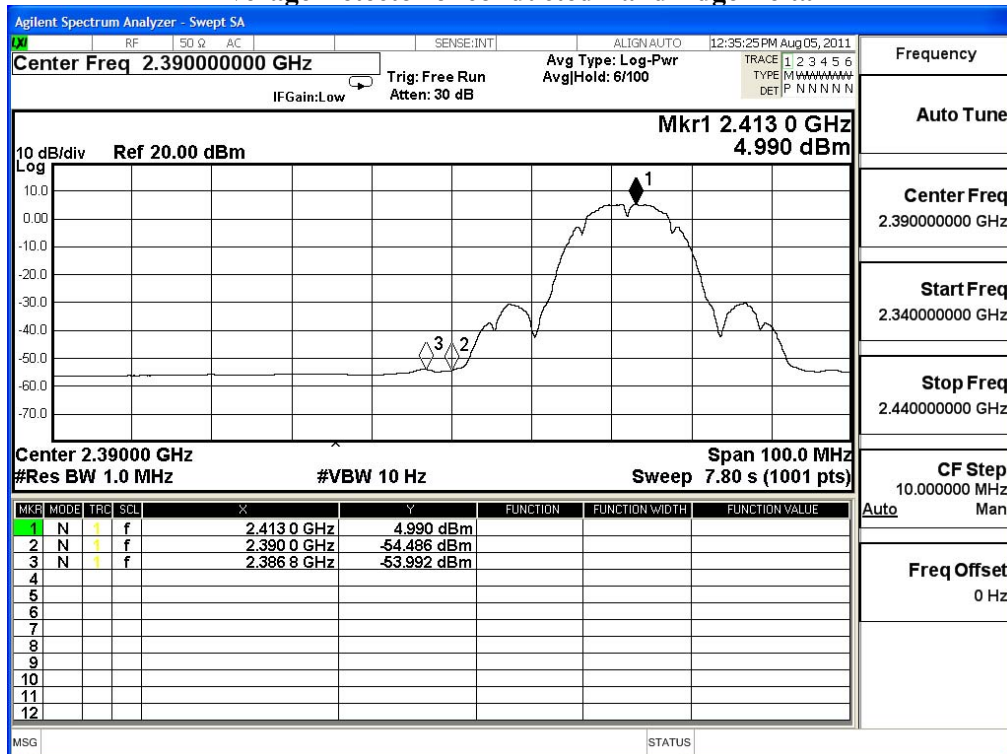
Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product   :   IEEE 802.11b/g/n WIFI/ BT Combo slim module

Test Item   :   Band Edge Data

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	72.8	104.819	Peak
Horizontal	2462	32.019	68.97	100.989	Average
Vertical	2462	31.29	72.26	103.55	Peak
Vertical	2462	31.29	68.07	99.36	Average

Note: 1:Spectrum Analyzer setting:

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

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

Band Edge Test Data

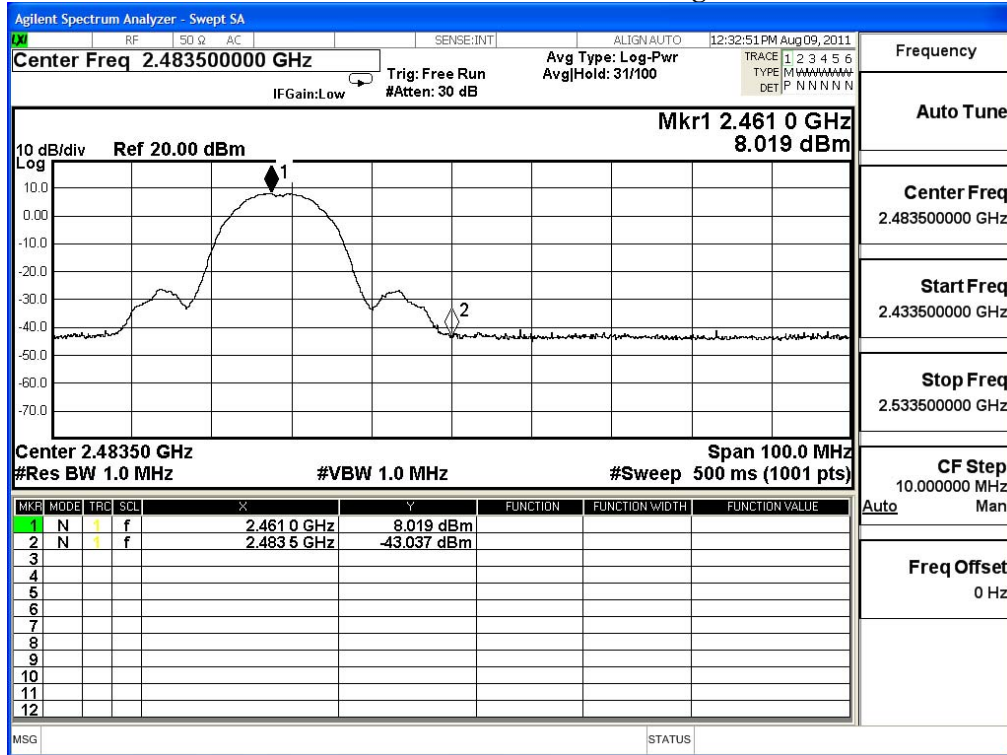| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2483.5	104.819	51.056	53.763	74.000	Peak
Horizontal	2483.5	100.989	60.038	40.951	54.000	Average
Vertical	2483.5	103.55	51.056	52.494	74.000	Peak
Vertical	2483.5	99.36	60.038	39.322	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:
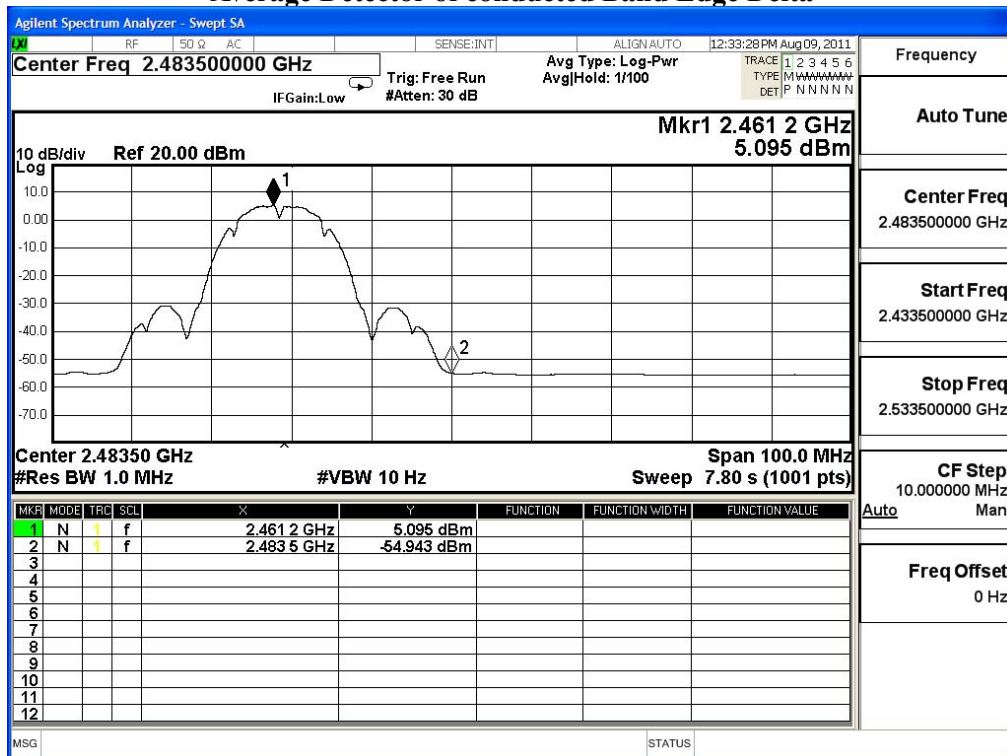
    Band Edge field Strength = F - Δ

    F = Fundamental field Strength (Peak or Average)

    Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product : IEEE 802.11b/g/n WIFI/ BT Combo slim module
Test Item : Band Edge Data
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	2412	31.639	71.4	103.038	Peak
Horizontal	2412	31.639	59.35	90.988	Average
Vertical	2412	32.019	70.19	102.209	Peak
Vertical	2412	32.019	57.96	89.979	Average

Note: 1:Spectrum Analyzer setting:

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

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

Band Edge Test Data

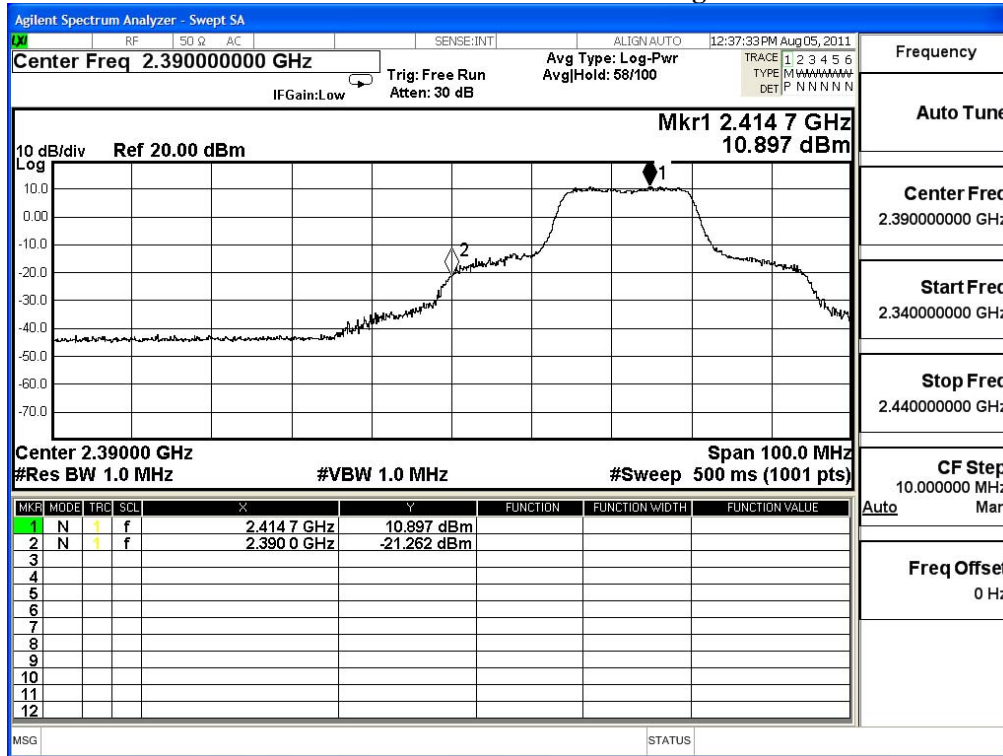| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2390	103.038	32.159	70.879	74.000	Peak
Horizontal	2390	90.988	41.277	49.711	54.000	Average
Vertical	2390	102.209	32.159	70.05	74.000	Peak
Vertical	2390	89.979	41.277	48.702	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:

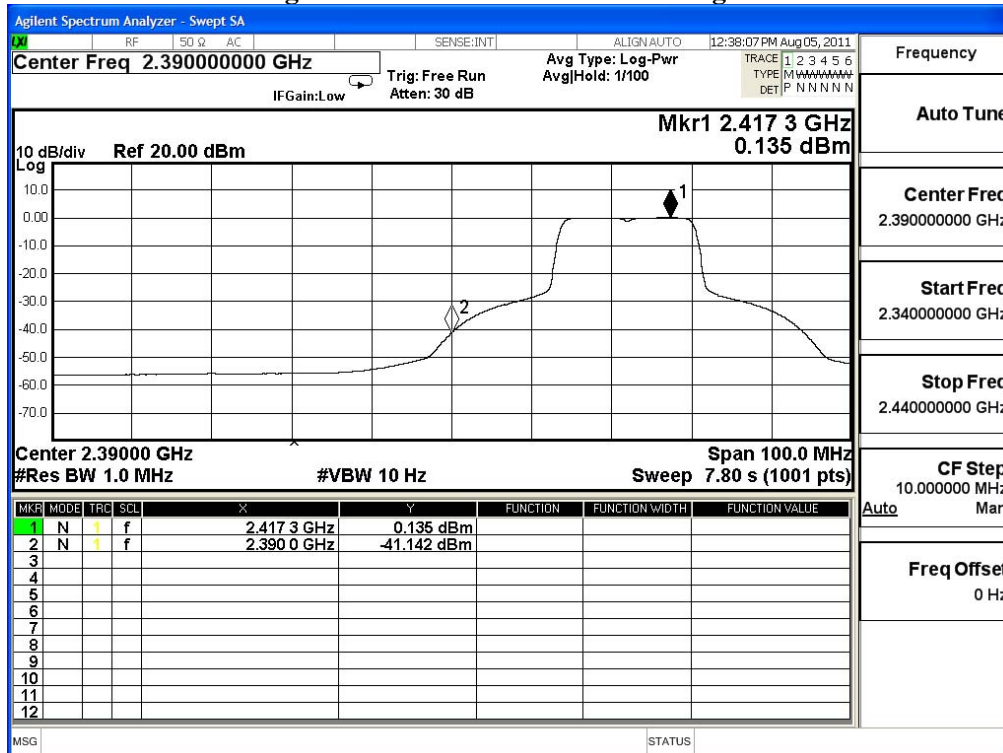 Band Edge field Strength = F - Δ

 F = Fundamental field Strength (Peak or Average)

 Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product   :   IEEE 802.11b/g/n WIFI/ BT Combo slim module
Test Item   :   Band Edge Data
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	30.95	73.08	104.029	Peak
Horizontal	2462	30.95	61.3	92.249	Average
Vertical	2462	31.29	73.71	105	Peak
Vertical	2462	31.29	61.71	93	Average

Note: 1:Spectrum Analyzer setting:

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

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

Band Edge Test Data

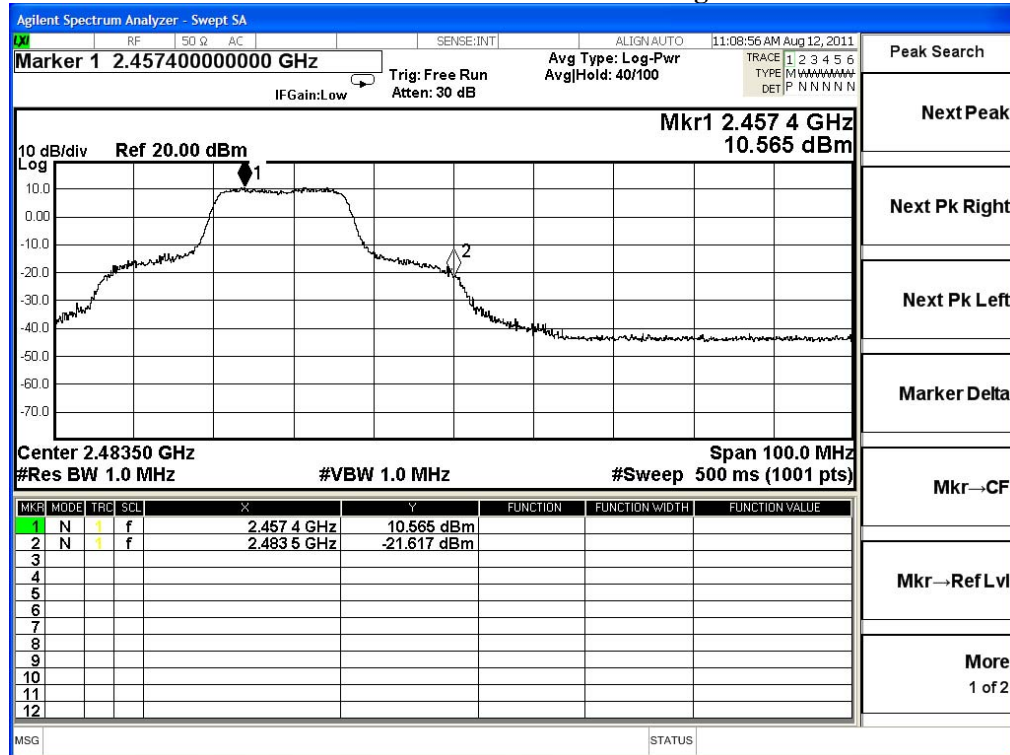| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2483.5	104.029	32.182	71.847	74.000	Peak
Horizontal	2483.5	92.249	41.149	51.1	54.000	Average
Vertical	2483.5	105	32.182	72.818	74.000	Peak
Vertical	2483.5	93	41.149	51.851	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:
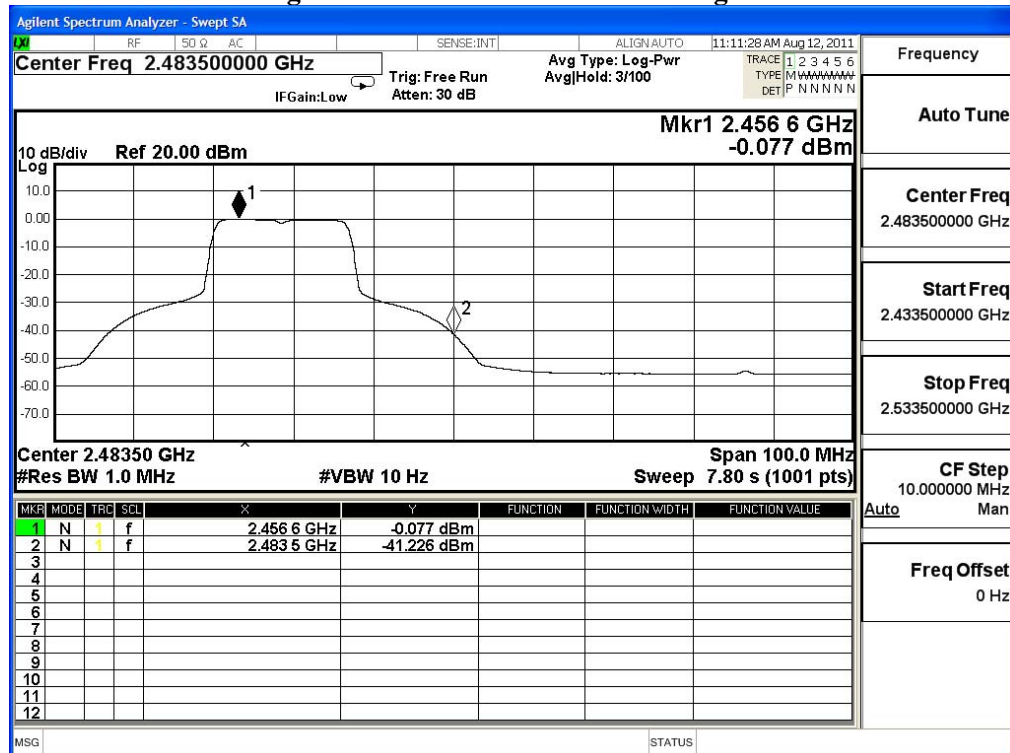
Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product : IEEE 802.11b/g/n WIFI/ BT Combo slim module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2412	31.639	71.41	103.048	Peak
Horizontal	2412	31.639	59.66	91.298	Average
Vertical	2412	30.95	70.55	101.499	Peak
Vertical	2412	30.95	58.66	89.609	Average

Note: 1:Spectrum Analyzer setting:

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

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

Band Edge Test Data

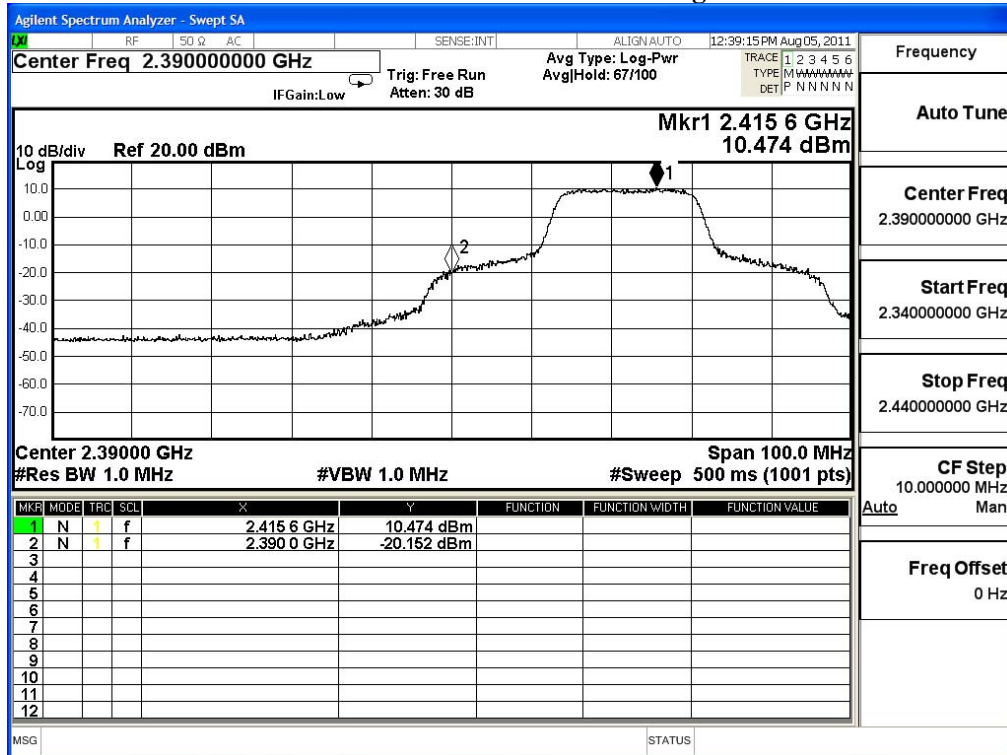| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2390	103.048	30.626	72.422	74.000	Peak
Horizontal	2390	91.298	39.405	51.893	54.000	Average
Vertical	2390	101.499	30.626	70.873	74.000	Peak
Vertical	2390	89.609	39.405	50.204	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:
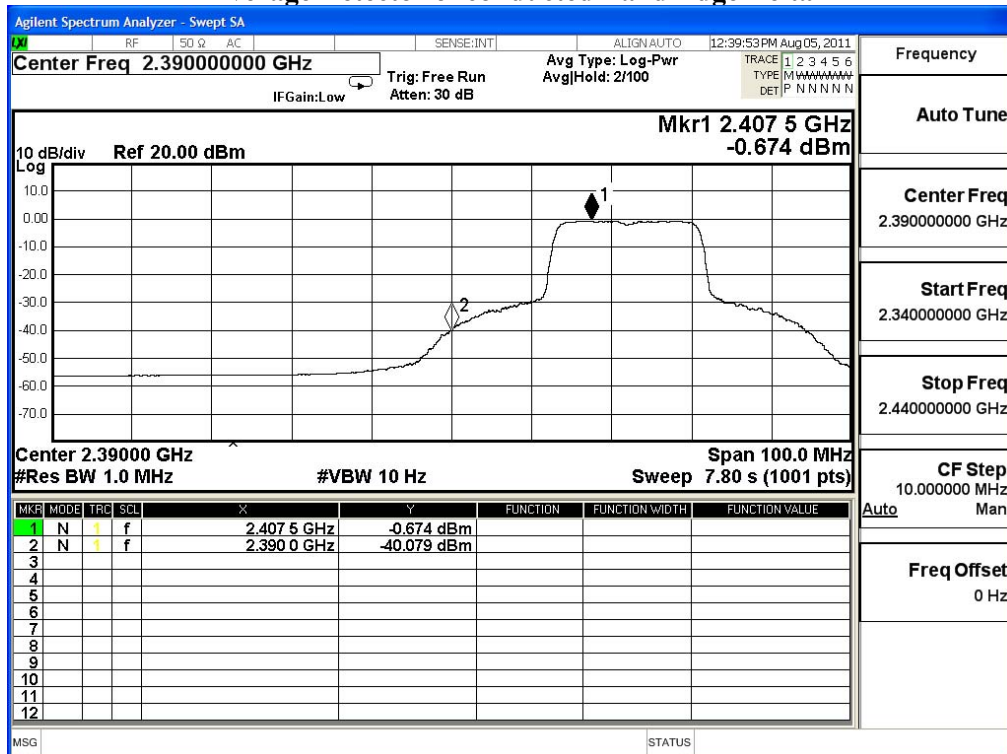
  Band Edge field Strength = F - Δ

  F = Fundamental field Strength (Peak or Average)

  Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product   :   IEEE 802.11b/g/n WIFI/ BT Combo slim module
Test Item   :   Band Edge Data
Test Site   :   No.3 OATS
Test Mode   :   Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2462	32.019	70.44	102.459	Peak
Horizontal	2462	32.019	58.82	90.839	Average
Vertical	2462	31.29	70.94	102.23	Peak
Vertical	2462	31.29	59.17	90.46	Average

Note: 1:Spectrum Analyzer setting:

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

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

Band Edge Test Data

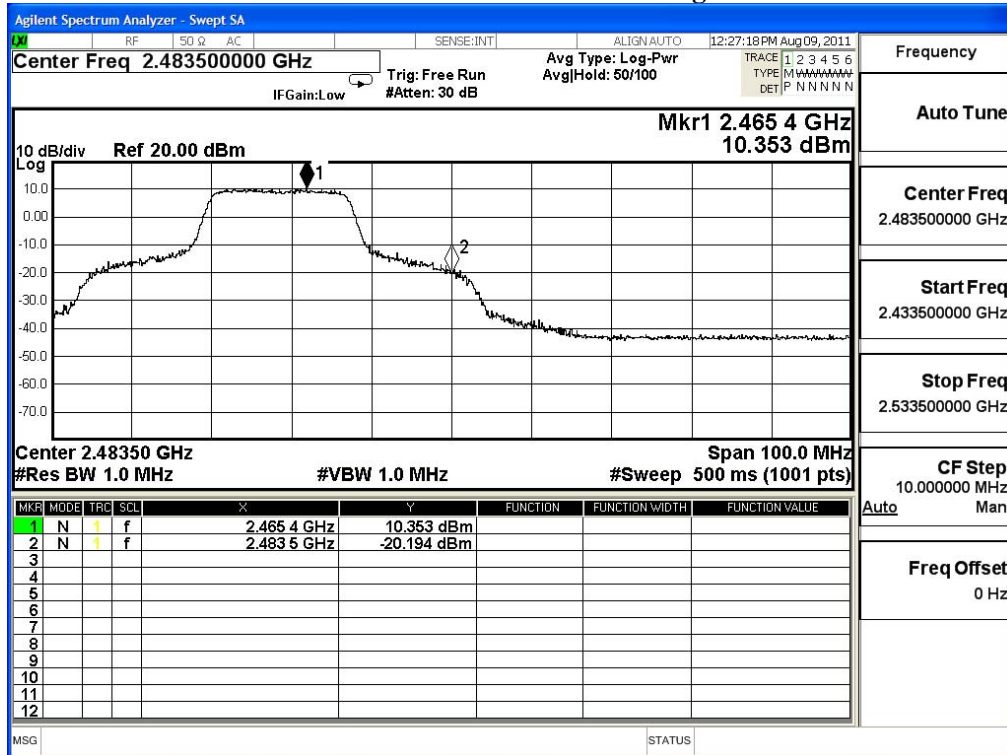| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2483.5	102.459	30.547	71.912	74.000	Peak
Horizontal	2483.5	90.839	38.003	52.836	54.000	Average
Vertical	2483.5	102.23	30.547	71.683	74.000	Peak
Vertical	2483.5	90.46	38.003	52.457	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:
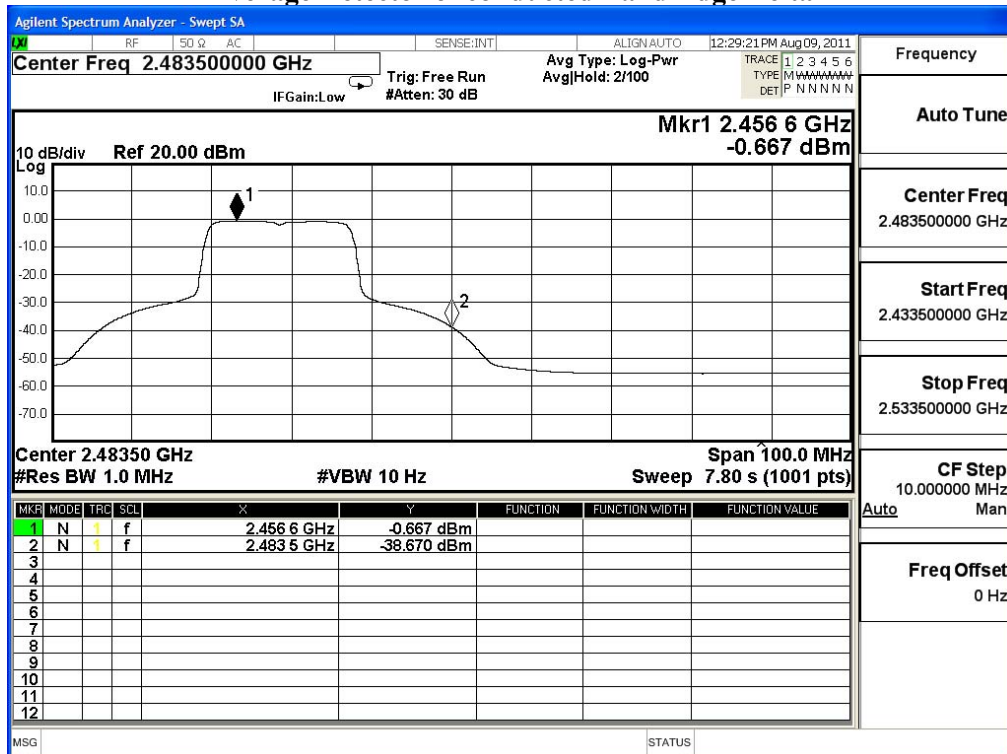
Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product : IEEE 802.11b/g/n WIFI/ BT Combo slim module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2422	30.715	71.37	103.085	Peak
Horizontal	2422	30.715	59.26	90.975	Average
Vertical	2422	30.017	71.89	102.907	Peak
Vertical	2422	30.017	60.1	91.117	Average

Note: 1:Spectrum Analyzer setting:

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

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

Band Edge Test Data

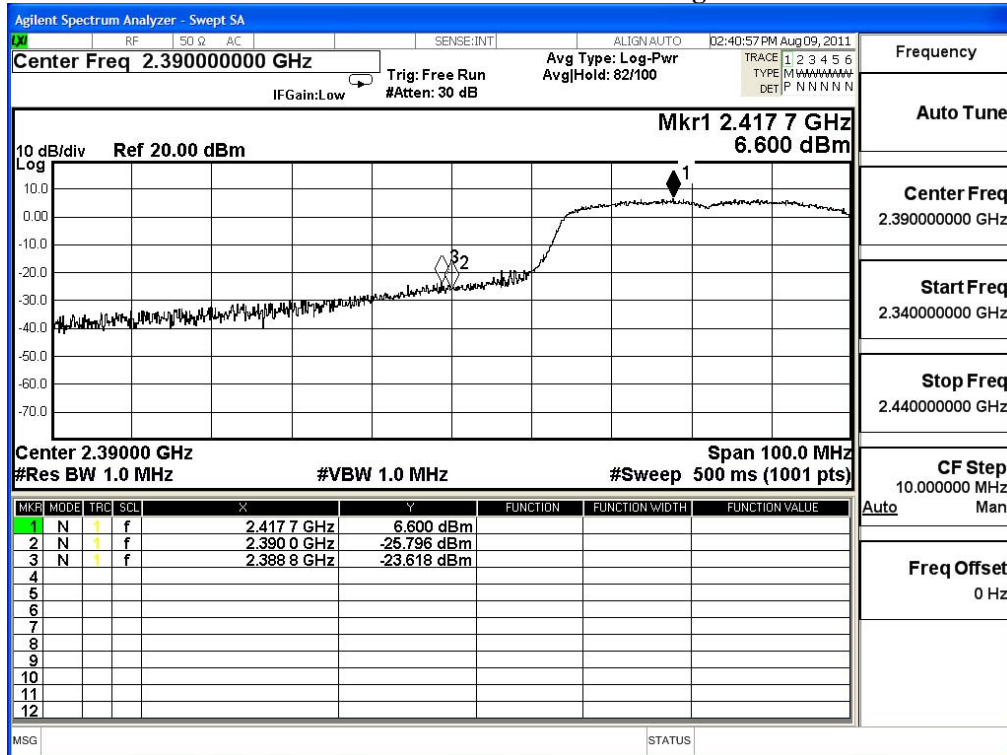| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2388.8	103.085	30.218	72.867	74.000	Peak
Horizontal	2390	90.975	37.708	53.267	54.000	Average
Vertical	2388.8	102.907	30.218	72.689	74.000	Peak
Vertical	2390	91.117	37.708	53.409	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:
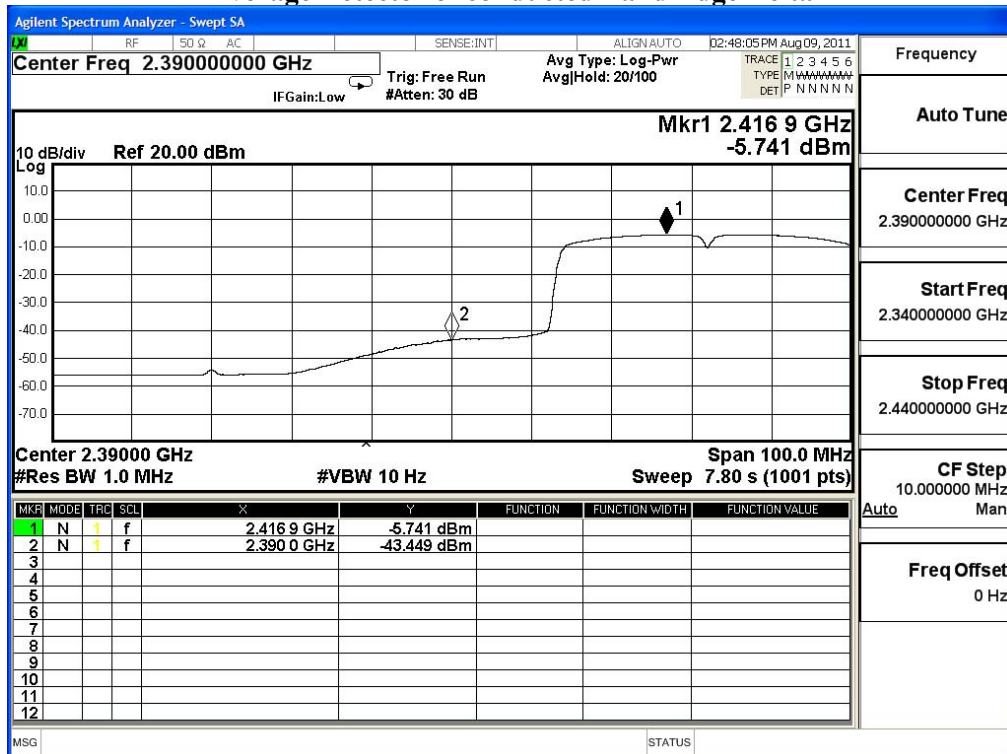
Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta

Product : IEEE 802.11b/g/n WIFI/ BT Combo slim module
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2452	30.944	68.94	100.884	Peak
Horizontal	2452	30.944	56.76	88.704	Average
Vertical	2452	30.222	71.25	102.472	Peak
Vertical	2452	30.222	58.34	89.562	Average

Note: 1:Spectrum Analyzer setting:

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

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

Band Edge Test Data

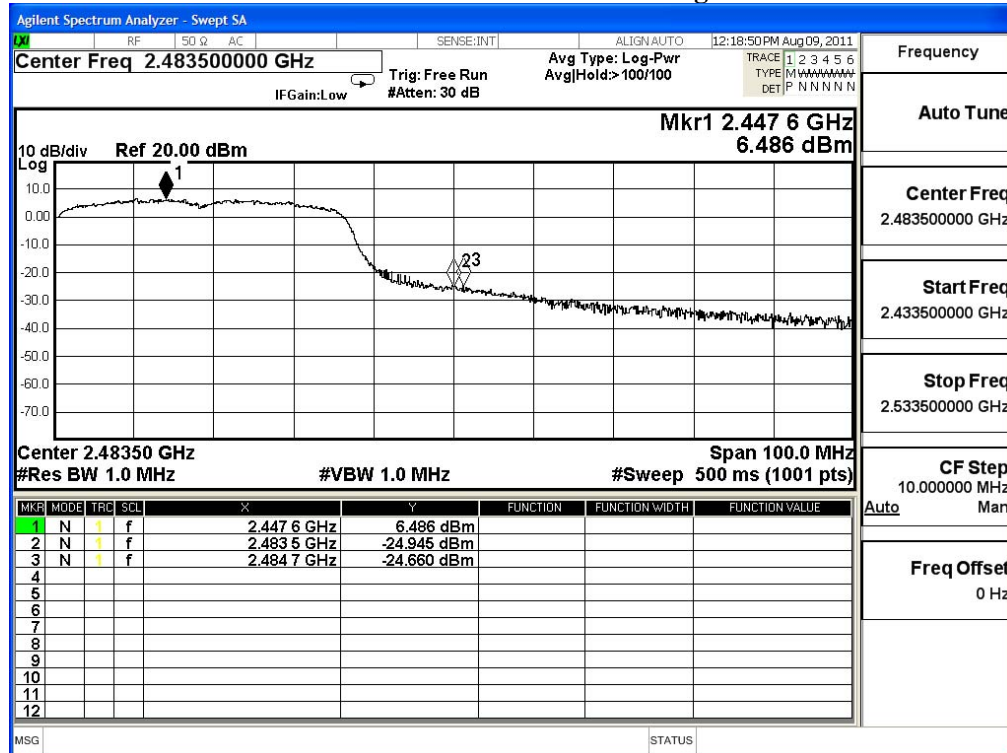| Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2484.7	100.884	31.146	69.738	74.000	Peak
Horizontal	2483.5	88.704	37.052	51.652	54.000	Average
Vertical	2484.7	102.472	31.146	71.326	74.000	Peak
Vertical	2483.5	89.562	37.052	52.51	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 - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta

Average Detector of conducted Band Edge Delta