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**Test Report:** 81036-3TRFWL


**Applicant:** Nortel Networks  
3500 Carling Ave  
Nepean, Ontario  
K2H 8E9

**Apparatus:** 2.5GHz Radio (NTQ220AB)

**FCC ID:** AB6NTQ220AB

**In Accordance With:** FCC Part 27 Miscellaneous Wireless  
Communications Services

**Tested By:** Nemko Canada Inc.  
303 River Road  
Ottawa, Ontario  
K1V 1H2

**Authorized By:**   
Jin Xu, Wireless Specialist

**Date:** May 29, 2007

**Total Number of Pages:** 45

## Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 27. Conducted measurements were performed in accordance with ANSI TIA-603-B-2002. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

<b>Apparatus Assessed:</b>	2.5GHz Radio (NTQ220AB)
<b>Specification:</b>	FCC Part 27 Miscellaneous Wireless Communications Services
<b>Compliance Status:</b>	Complies
<b>Exclusions:</b>	None
<b>Non-compliances:</b>	None
<b>Report Release History:</b>	Original Release

Author: Jason Nixon, Telecom Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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## TABLE OF CONTENTS

<b>Report Summary</b> .....	<b>2</b>
<b>Section 1 : Equipment Under Test</b> .....	<b>4</b>
1.1 Product Identification .....	4
1.2 Samples Submitted for Assessment.....	4
1.3 Theory of Operation .....	4
1.4 Technical Specifications of the EUT .....	5
1.5 Block Diagram of the EUT.....	5
<b>Section 2 : Test Conditions</b> .....	<b>6</b>
2.1 Specifications .....	6
2.2 Deviations From Laboratory Test Procedures .....	6
2.3 Test Environment .....	6
2.4 Test Equipment.....	6
<b>Section 3 : Observations</b> .....	<b>7</b>
3.1 Modifications Performed During Assessment .....	7
3.2 Record Of Technical Judgements .....	7
3.3 EUT Parameters Affecting Compliance .....	7
3.4 Test Deleted.....	7
3.5 Additional Observations .....	7
<b>Section 4 : Results Summary</b> .....	<b>8</b>
4.1 FCC Part 27 : Test Results .....	9
<b>Appendix A : Test Results</b> .....	<b>10</b>
Clause 27.50(h) Equivalent Isotropically Radiated Power .....	10
Clause 27.53(l)(6) Occupied Bandwidth .....	19
Clause 27.53(l) spurious emissions at the antenna terminal .....	22
Clause 27.53(l) Field Strength of Spurious emissions .....	40
Clause 27.54 Frequency Stability .....	43
<b>Appendix B : Setup Photographs</b> .....	<b>45</b>

## Section 1 : Equipment Under Test

### 1.1 Product Identification

The Equipment Under Test was identified as follows:

2.5GHz Radio (NTQ220AB)

### 1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Serial No.
1	2.5GHz Radio (NTQ220AB)	NNTMJTM0009H
2	2.5GHz Radio Modem (NTQ212AB)	NNTMJTM0008P
3	2503.5-2533.5MHz Filter (NTQ22AA)	CLWVWW104KNA
4	2593-2623MHz Filter (NTQ222EA)	CLWVWW103RPO
5	2658.5-2688.5MHz Filter (NTQ222DA)	CLWVWW104LEE
6	2.5GHz WiMAX TTLNA (NTQ223AAE6)	NNTMJT00002Y
7	Surge protector/ bias T (DAS-HYU-DFDM-03)	None
8	Kathrein Central Control unit (RETCX61380358)	86010006

The first samples were received on: April 10, 2007

### 1.3 Theory of Operation

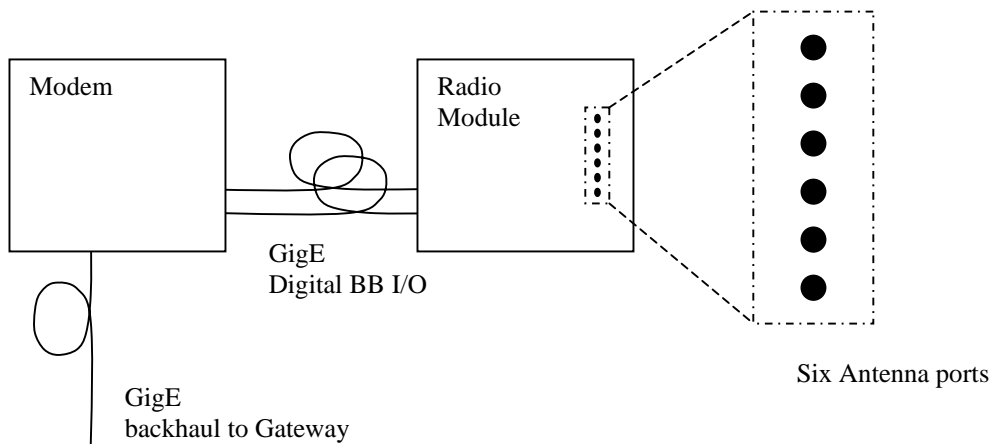
The Radio Module operates in the BRS Band from 2496 MHz - 2690 MHz in discrete frequency steps of 125kHz with 3 sector Transceivers (2 transmitter per sector) operating in a TDD mode. Radio Standard is WiMax 802.16E with Radio configuration to enable a 2x2 MIMO operating mode with an output rated power of 14.6W at the antenna port.

The Modulation schemes of BPSK, QPSK, 16QAM, and 64QAM will be supported along with Bandwidth of 10MHz. For QPSK, 16QAM, and 64 QAM will employ 3/4 CTC data rate coding. Initial release will operate in a 10MHz BW.

### 1.4 Technical Specifications of the EUT

<b>Operating Frequency:</b>	2501 – 2685MHz
<b>Emission Designator:</b>	9M05G7W
<b>Rated Power:</b>	14.6Watts
<b>Measured Power:</b>	14.9Watts
<b>Modulation:</b>	IEEE 802.16e, MIMO Technology (Two transmitters per sector)
<b>Antenna Data:</b>	18dBi (max), Andrew Antenna: SA2500-065X-18
<b>Power Source:</b>	48VDC

### 1.5 Block Diagram of the EUT



## Section 2: Test Conditions

### 2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures  
 FCC Part 27 Miscellaneous Wireless Communications Services

### 2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

### 2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range : 15 – 30 °C  
 Humidity range : 20 - 75 %  
 Pressure range : 86 - 106 kPa  
 Power supply range : +/- 5% of rated voltages

### 2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
Spectrum Analyzer	Agilent	E4440A	Nortel 663217	Oct 17/07
Coupler	MECA	7155-10-3-100	None	COU
30dB Attenuator	Weinschel	WA24-30-43	B692	COU
30dB Attenuator	Weinschel	WA24-30-43	B684	COU
Combiner	JFW	50PD-292	None	COU
Spectrum Analyzer	Hewlett-Packard	8565E	FA000981	Oct. 06/07
Biconical (1) Antenna	EMCO	3109	FA000805	May 03/07
Log Periodic Antenna #1	EMCO	LPA-25	FA000477	Sept. 12/07
Horn Antenna #2	EMCO	3115	FA000825	Jan. 30/08
18.0 – 40.0GHz Horn Antenna	EMCO	3116	FA001847	May 3/07
1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	Aug. 02/07
2.0 – 4.0 GHz Amplifier	JCA	24-600	FA001496	Aug. 02/07
4.0 – 8.0 GHz Amplifier	JCA	48-600	FA001497	Aug. 02/07
5.0 – 18.0 GHz Amplifier	NARDA	DWT-186N23U40	FA001409	COU
18.0 – 26.0 GHz Amplifier	NARDA	BBS-1826N612	FA001550	COU
Frequency Counter	HP	5352B	FA001915	Nov 22/07
Temperature Chamber	Thermotron	SM-16C	FA001030	NCR
Fluke	Multimeter	16	FA001831	Jan 10/08
Fluke	Air probe	None	FA001248	NCR

COU – Calibrate on Use

NCR – No Calibration Required

## **Section 3 : Observations**

### **3.1 Modifications Performed During Assessment**

No modifications were performed during assessment.

### **3.2 Record Of Technical Judgements**

The following technical judgements were made during this assessment:

#### **3.2.1 Technical Judgement 1**

The Radio always has a cavity filter in series with the transmitter. The typical loss of these filters was measured to be 0.7dB. This was subtracted from the conducted power measured at the output of the radio during the calculation of the EIRP power. All other measurements were performed directly at the output of the transmitter.

#### **3.2.2 Technical Judgement 2**

The radio has a TTLNA option, which can be used with the Radio. It is used in series with the radio. The TTLNA provides an LNA in the receive path to improve the noise figure of the radio. All testing was repeated with a TTLNA in series with the transmitter to show that it does not affect compliance.

### **3.3 EUT Parameters Affecting Compliance**

The user of the apparatus could not alter parameters that would affect compliance.

### **3.4 Test Deleted**

No Tests were deleted from this assessment.

### **3.5 Additional Observations**

There were no additional observations made during this assessment.

## **Section 4 : Results Summary**

This section contains the following:

FCC Part 27 : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No : not applicable / not relevant.
- Y Yes : Mandatory i.e. the apparatus shall conform to these tests.
- N/T Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.



**4.1 FCC Part 27: Test Results**

Clause	Test Method	Test Description	Required	Result
27.50(h)	2.1046	Equivalent isotropically radiated power	Y	PASS
27.53(l)	2.1049	Occupied bandwidth	Y	PASS
27.53(l)	2.1051	Spurious emissions at the antenna terminal	Y	PASS
27.53(l)	2.1053	Field strength of spurious radiation	Y	PASS
27.54	2.1055	Frequency stability	Y	PASS

Notes:

## Appendix A : Test Results

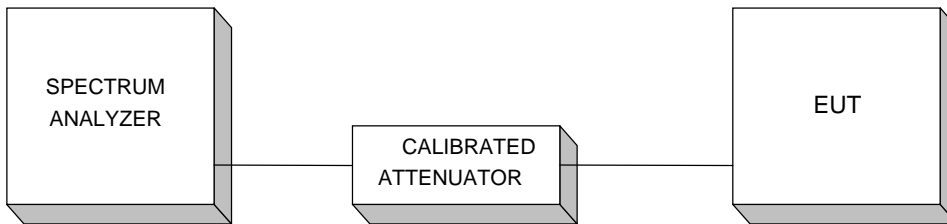
### Clause 27.50(h) Equivalent Isotropically Radiated Power

(h) The following power limits shall apply in the BRS and EBS:

(1) Main, booster and base stations.

(i) The maximum EIRP of a main, booster or base station shall not exceed  $33 \text{ dBW} + 10\log(X/Y) \text{ dBW}$ , where  $X$  is the actual channel width in MHz and  $Y$  is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.

### Test Setup



### Test conditions:

All modulations (BPSK, QPSK, 16QAM, and 64QAM) modes and different data rates would be evaluated using a combined waveform representative of all 4-modulation schemes.

### Setting Remarks

1. RF output power would be determined by the channel power measurement function of the spectrum analyzer.
2. Low, medium and high frequencies shall be tested. Worst-case data would be presented
3. Spectrum analyzer settings:  
RBW/VBW: 1MHz/3MHz  
Detector: RMS and Peak detector with gated power measurement method (TDD).
4.  $EIRP = \text{Measured Output Power (dBm)} + \text{Antenna Gain (dBi)}$
5. Test would be conducted at each chain of transmitters.
6.  $\text{Aggregate power PdBm} = 10\log(10^{(P_1\text{dBm}/10)} + 10^{(P_2\text{dBm}/10)})$

**Output Power – Average Detector**

**Main Signal Path**

Frequency (MHz)	Measured Power (dBm)	Filter Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)
2501	42.19	0.7	18	59.49
2600	42.18	0.7	18	59.48
2685	42.19	0.7	18	59.49

**Diversity Signal Path**

Frequency (MHz)	Measured Power (dBm)	Filter Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)
2501	42.25	0.7	18	59.55
2600	42.35	0.7	18	59.65
2685	42.42	0.7	18	59.72

**Aggregate**

Frequency (MHz)	EIRP (dBm)	EIRP (dBW)	Limit (dBW)
2501	62.53	32.53	35.36
2600	62.58	32.58	34.98
2685	62.62	32.62	35.36

**Output Power – Peak Detector**

**Main Signal Path**

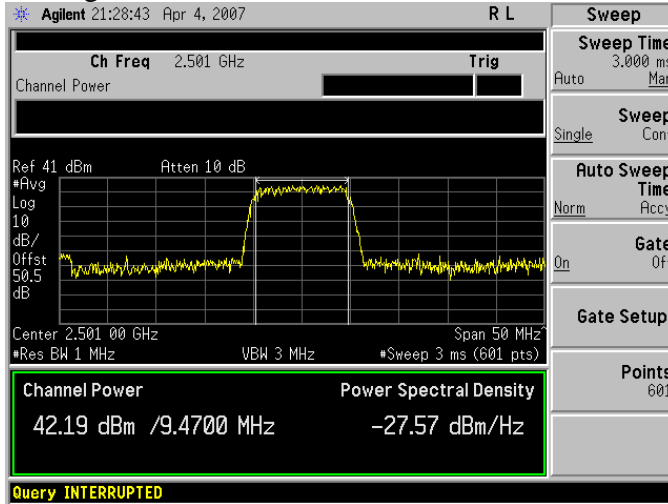
Frequency (MHz)	Measured Power (dBm)	Filter Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)
2501	47.55	0.7	18	64.85
2600	47.81	0.7	18	65.11
2685	47.57	0.7	18	64.87

**Diversity Signal Path**

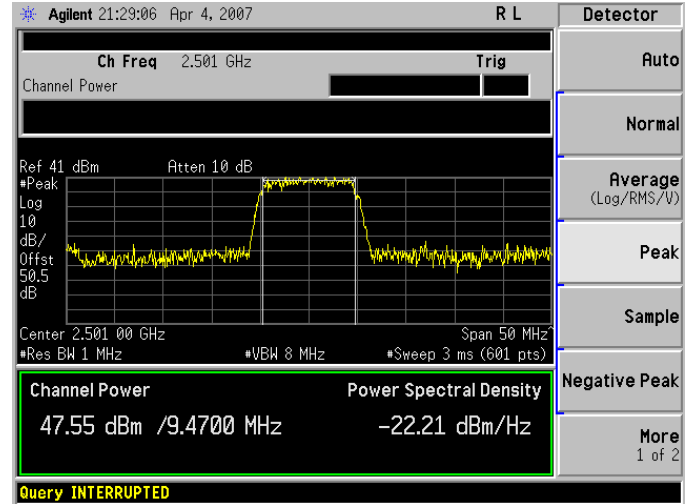
Frequency (MHz)	Measured Power (dBm)	Filter Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)
2501	47.34	0.7	18	64.64
2600	47.47	0.7	18	64.77
2685	47.54	0.7	18	64.84

Main Signal – 2501MHz

Average

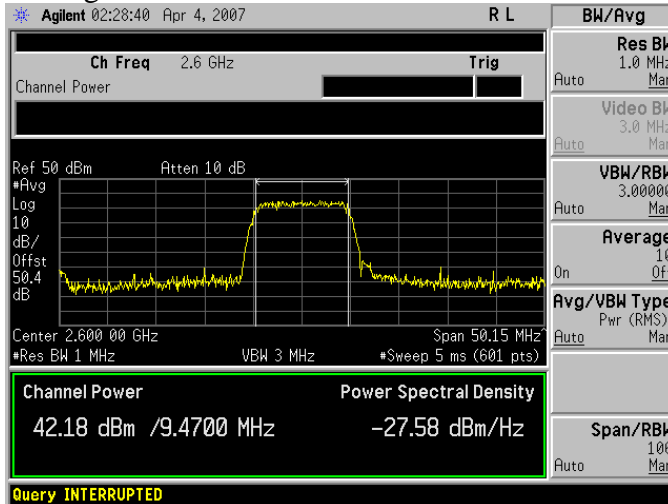


Peak

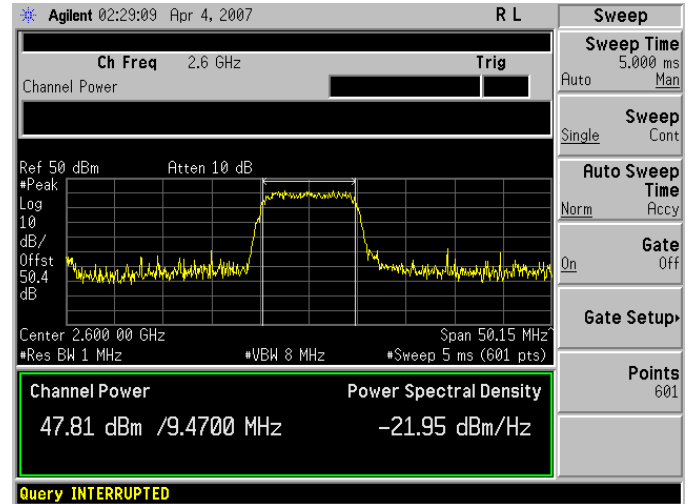


Main Signal – 2600MHz

Average

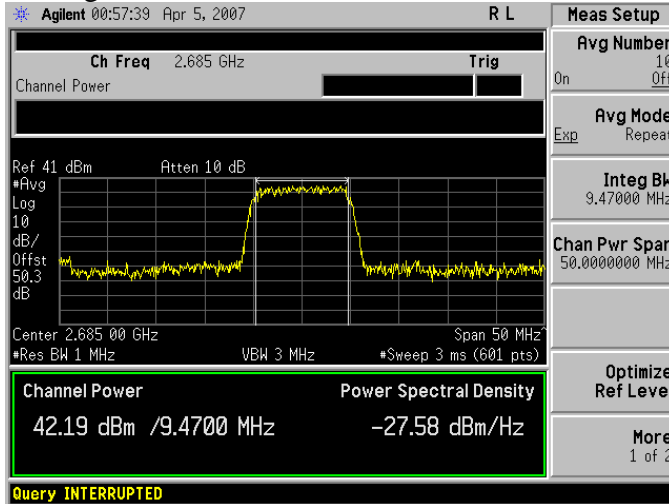


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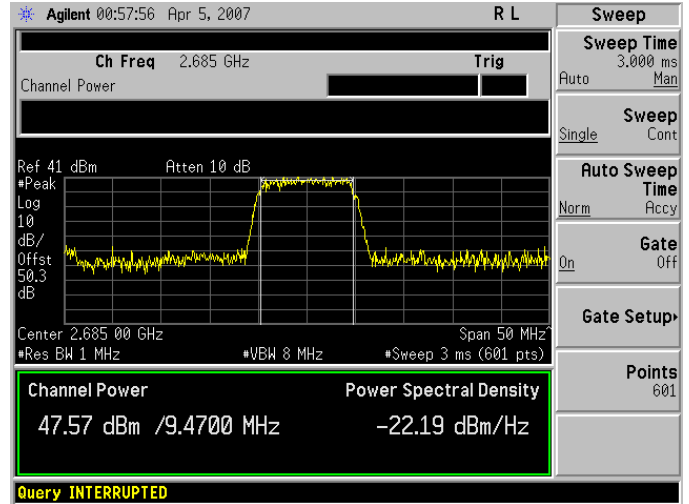


Main Signal – 2685MHz

Average

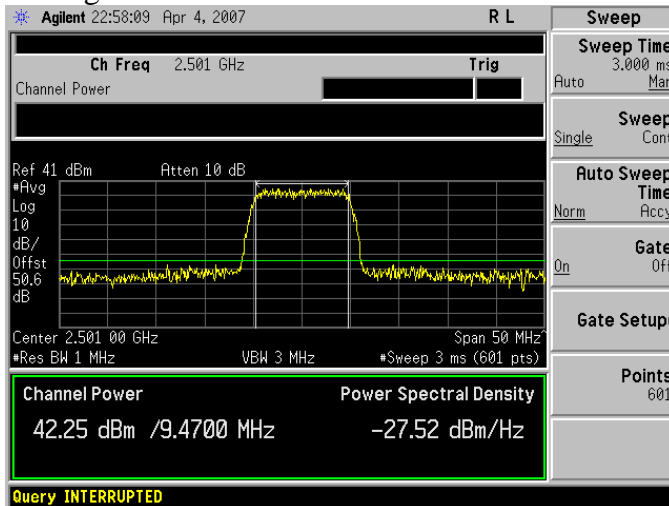


Peak

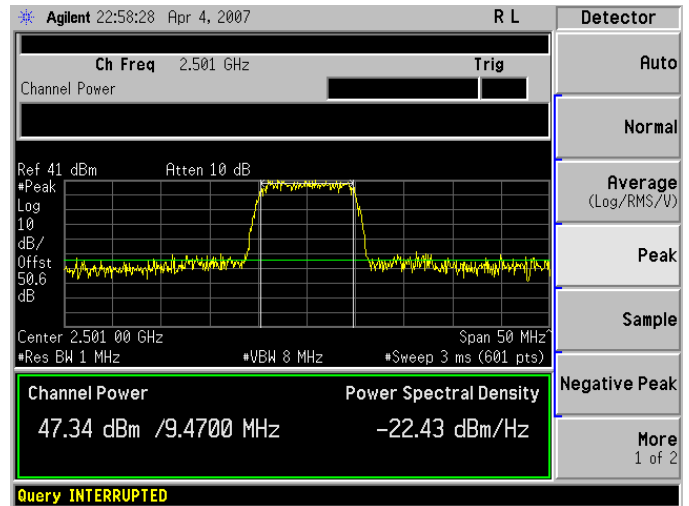


Diversity Signal – 2501MHz

Average

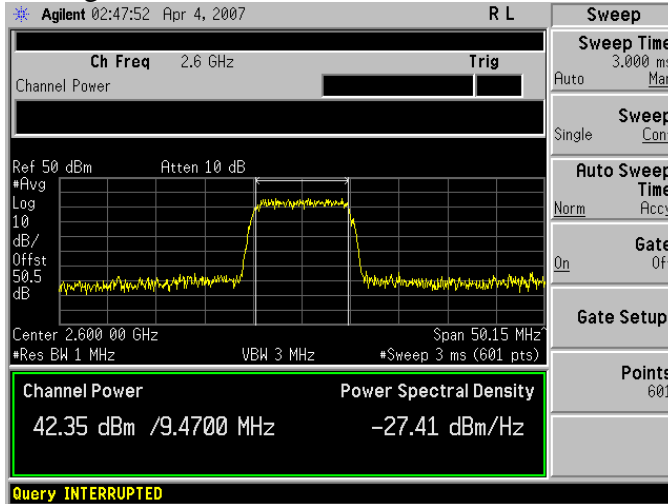


Peak

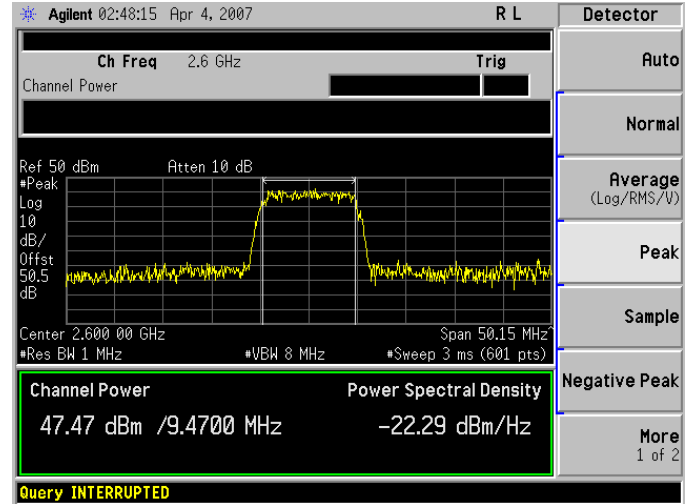


Diversity Signal – 2600MHz

Average

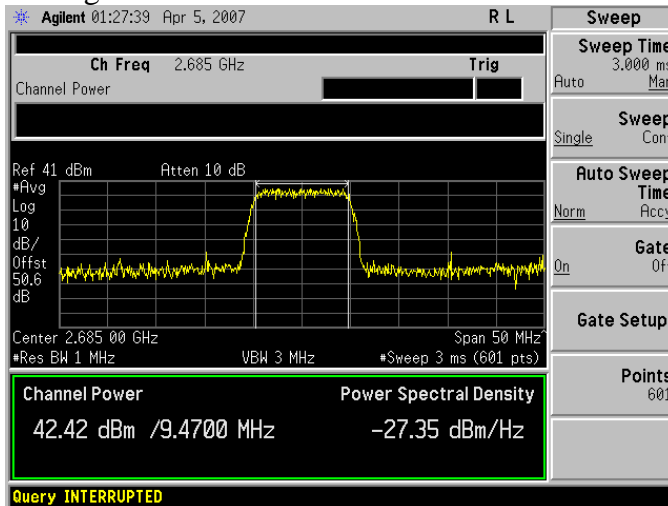


Peak

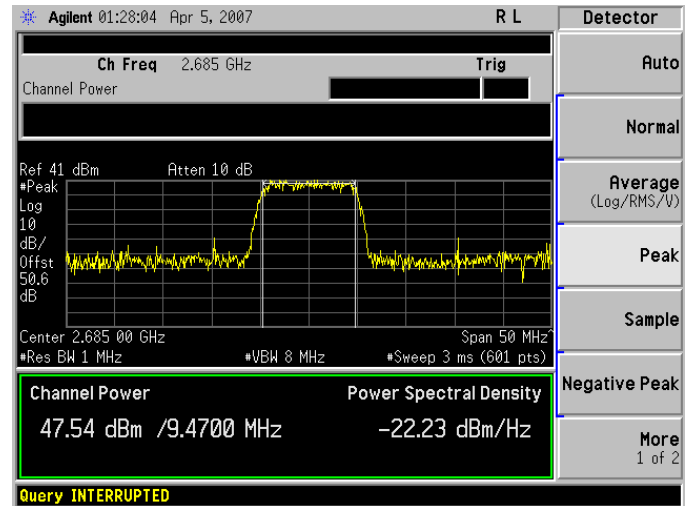


Diversity Signal – 2685MHz

Average



Peak



**Output Power with TTLNA – Average Detector**

**Main Signal Path**

Frequency (MHz)	Measured Power (dBm)	Filter Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)
2501	41.15	0.7	18	58.45
2600	41.29	0.7	18	58.59
2685	41.07	0.7	18	58.37

**Diversity Signal Path**

Frequency (MHz)	Measured Power (dBm)	Filter Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)
2501	41.18	0.7	18	58.48
2600	41.53	0.7	18	58.83
2685	41.18	0.7	18	58.48

**Aggregate**

Frequency (MHz)	EIRP (dBm)	EIRP (dBW)	Limit (dBW)
2501	61.48	31.48	35.36
2600	61.72	31.72	34.98
2685	61.44	31.44	35.36

**Output Power with TTLNA – Peak Detector**

**Main Signal Path**

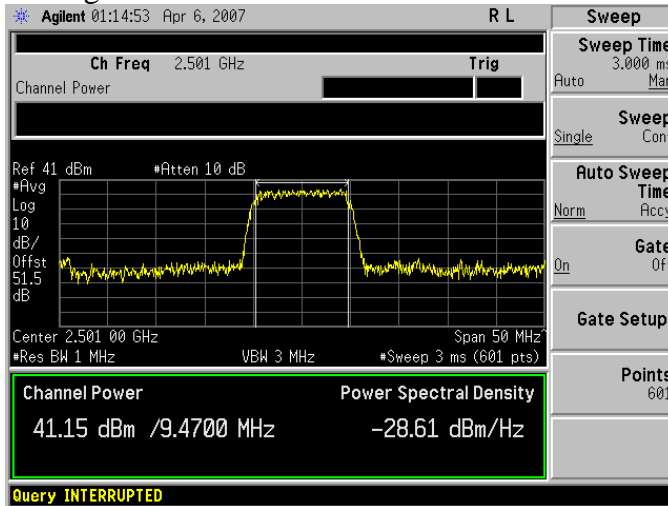
Frequency (MHz)	Measured Power (dBm)	Filter Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)
2501	46.54	0.7	18	63.84
2600	46.68	0.7	18	63.98
2685	45.41	0.7	18	62.71

**Diversity Signal Path**

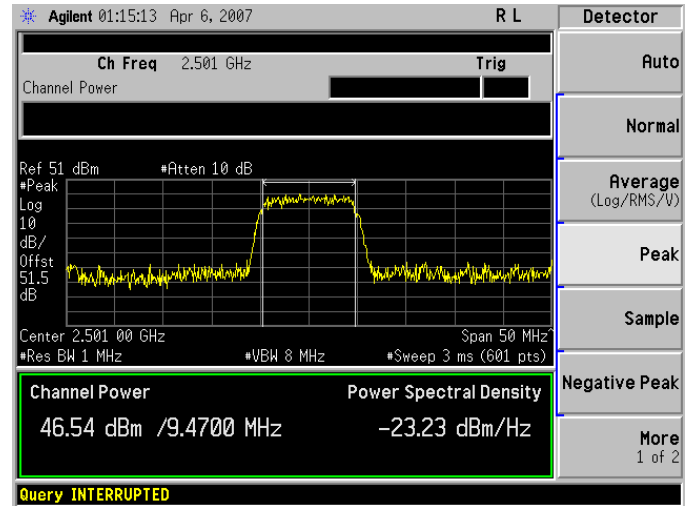
Frequency (MHz)	Measured Power (dBm)	Filter Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)
2501	46.30	0.7	18	63.60
2600	46.65	0.7	18	63.95
2685	46.27	0.7	18	63.57

Main Signal – 2501MHz

Average

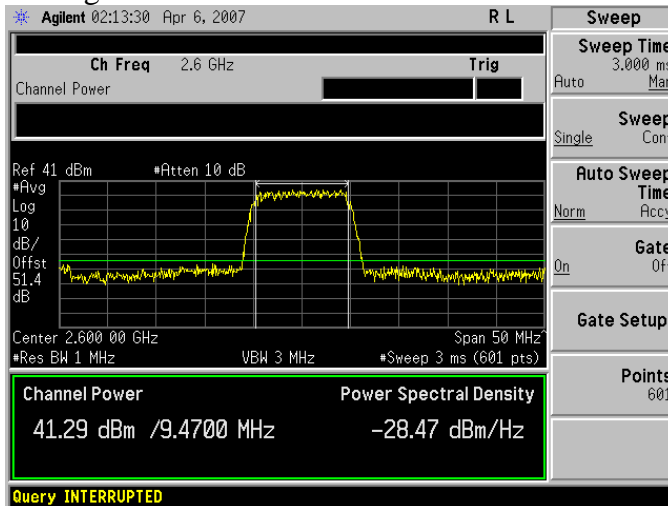


Peak

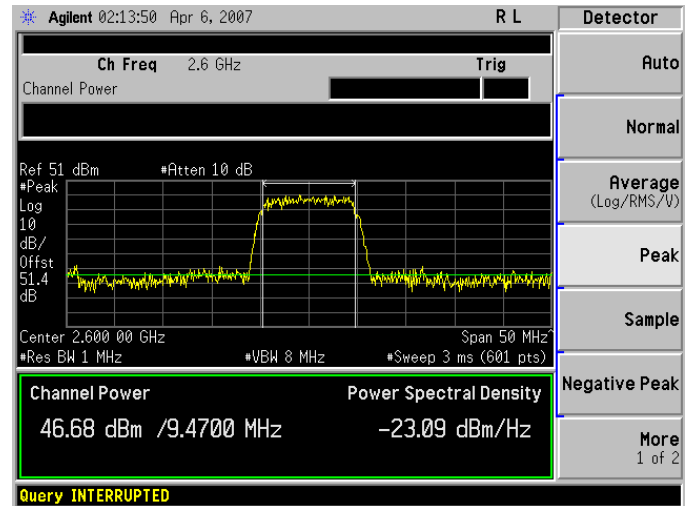


Main Signal – 2600MHz

Average



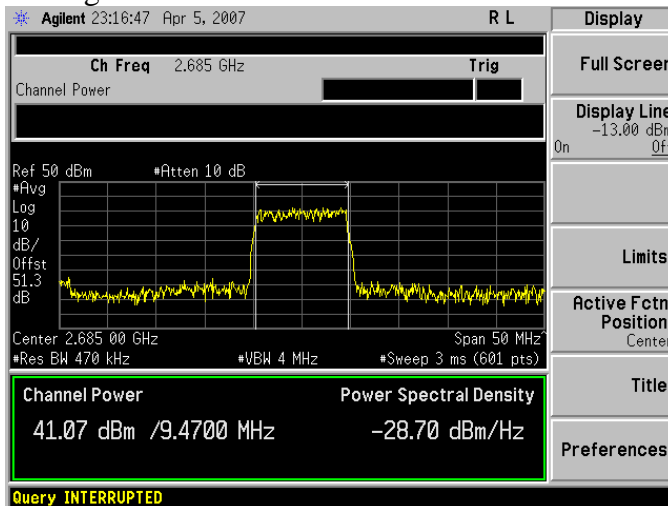
Peak



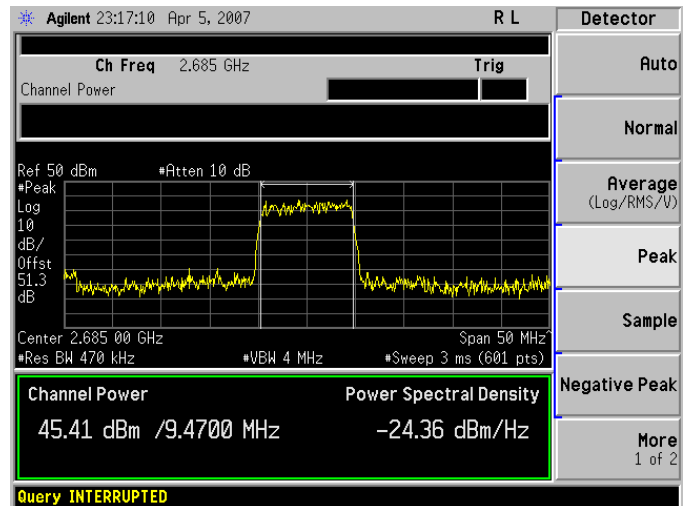


Main Signal – 2685MHz

Average

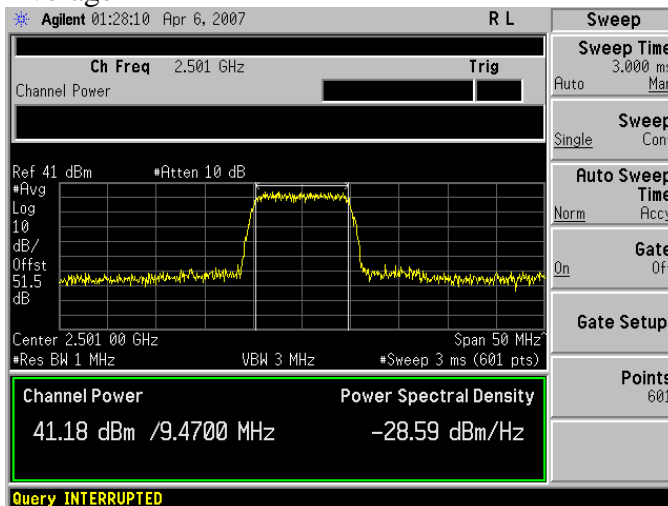


Peak

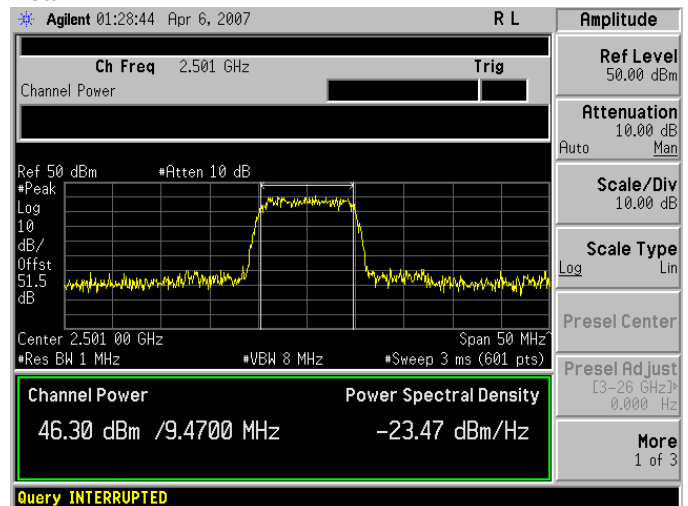


Diversity Signal – 2501MHz

Average

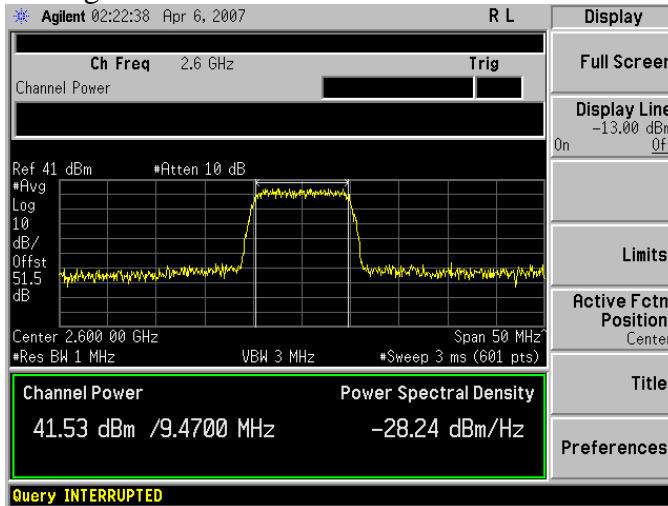


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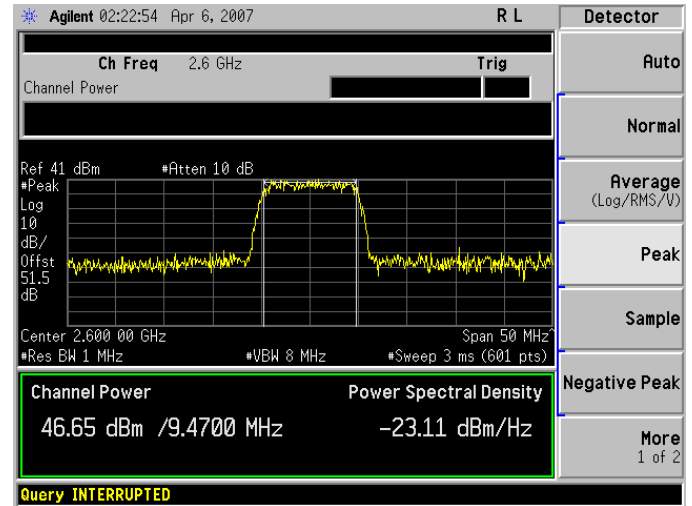


Diversity Signal – 2600MHz

Average

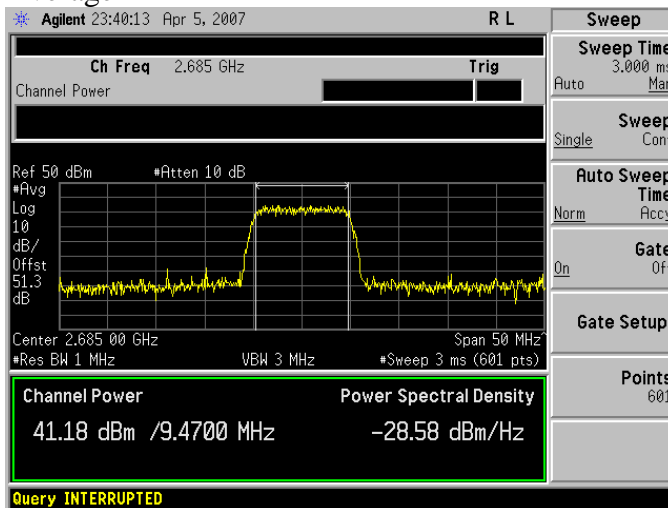


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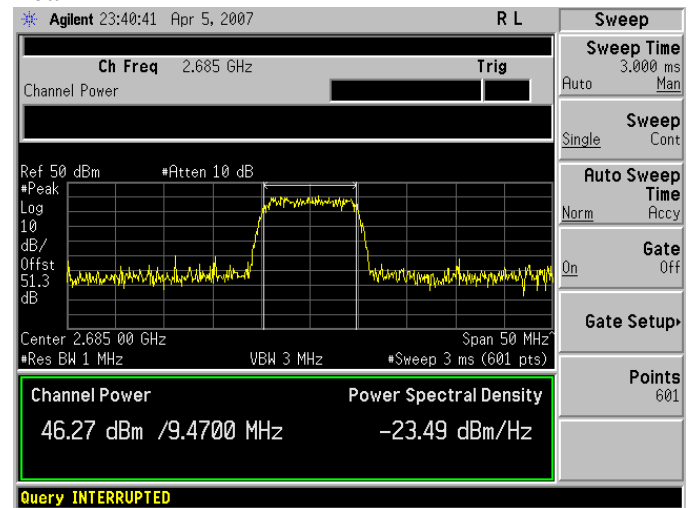


Diversity Signal – 2685MHz

Average



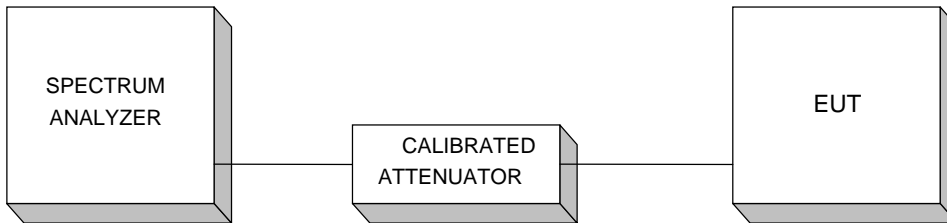
Peak



**Clause 27.53(l)(6) Occupied Bandwidth**

(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

**Test Setup**

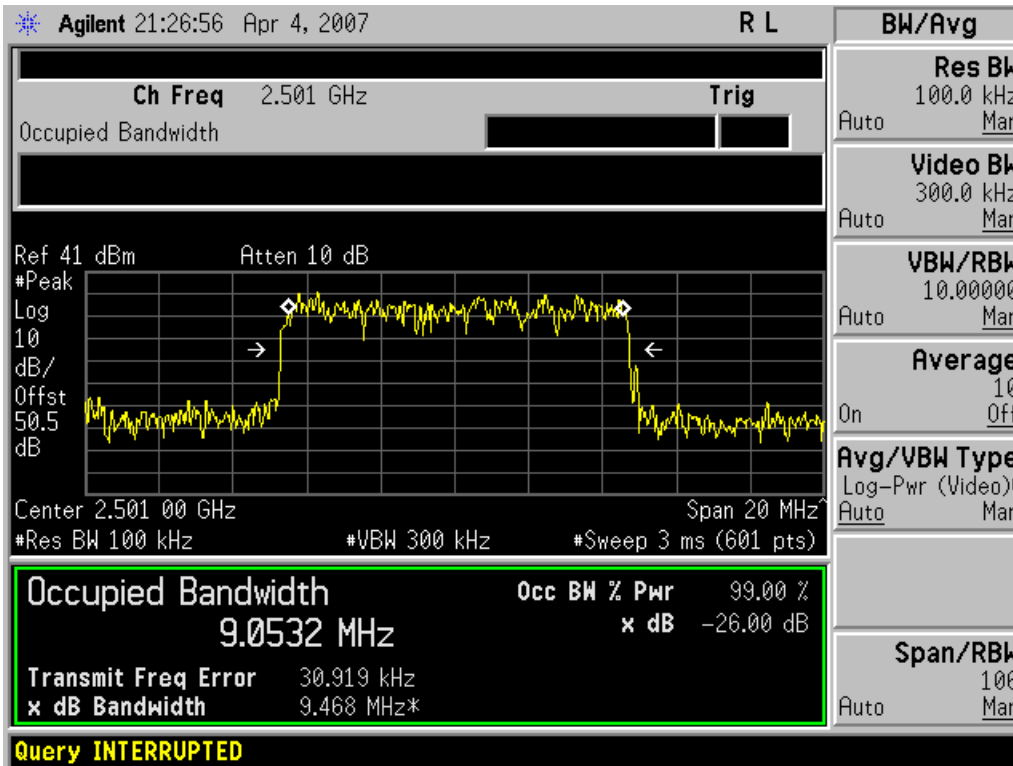


**Setting remarks**

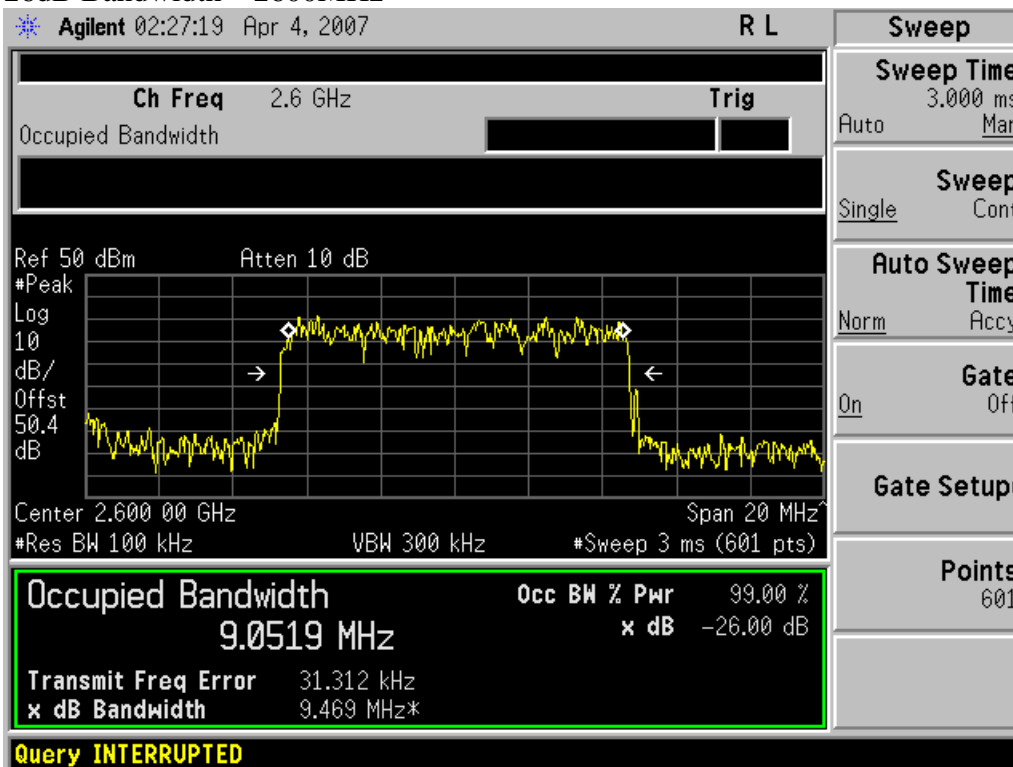
1. 26dB occupied bandwidth would be measured using the spectrum analyzer.
2. Low, medium and high frequencies would be tested. All modulations (BPSK, QPSK, 16QAM, and 64QAM) modes and different data rates would be evaluated using a combined waveform representative of all 4-modulation schemes.
3. Spectrum analyzer settings:  
 RBW/VBW: More than 1% of rated occupied bandwidth  
 VBW:  $\geq$ RBW  
 Detector: Peak

Frequency (MHz)	Occupied Bandwidth (MHz)
2501	9.468
2600	9.469
2685	9.469

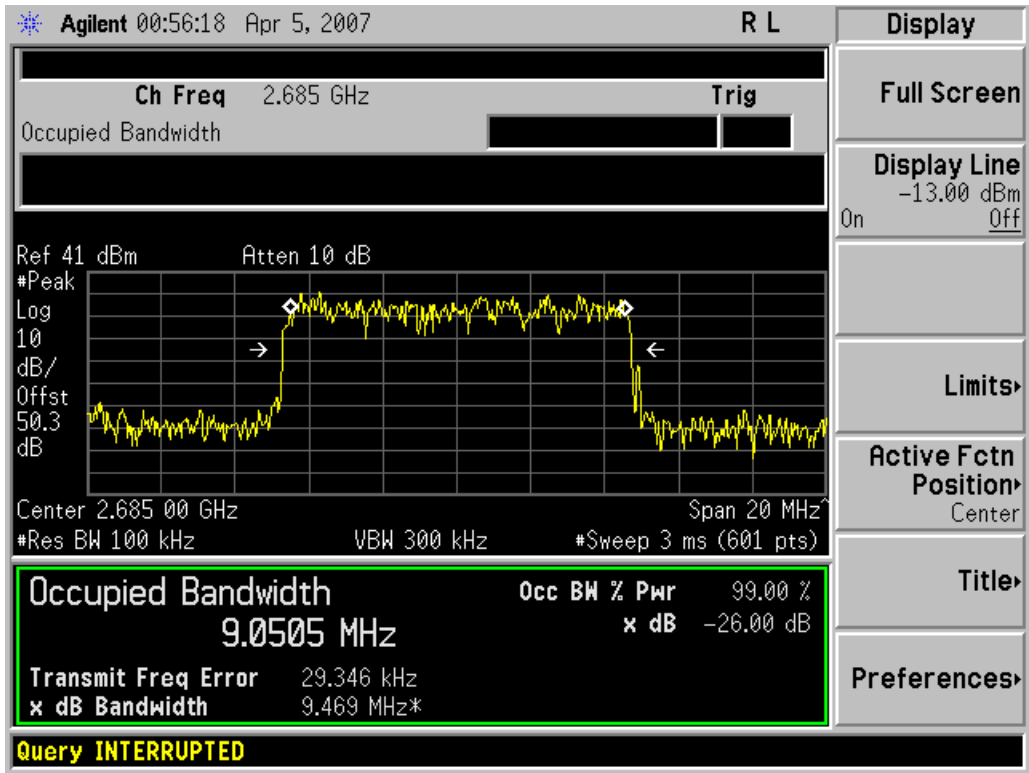
26dB Bandwidth – 2501MHz



26dB Bandwidth – 2600MHz



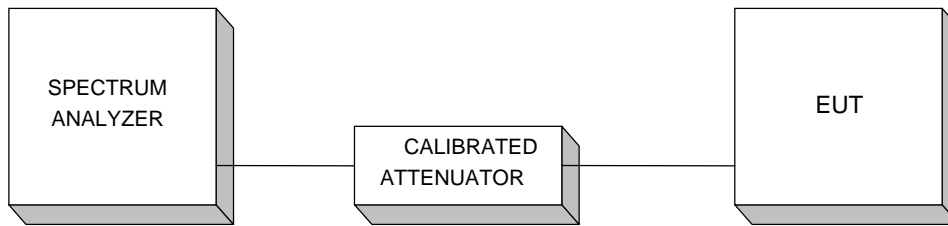
26dB Bandwidth – 2685MHz



**Clause 27.53(l) spurious emissions at the antenna terminal**

- (1) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts.
- (2) For fixed and temporary fixed digital stations, the attenuation shall be not less than  $43 + 10 \log (P)$  dB, unless a documented interference complaint is received from an adjacent channel licensee. Provided that the complaint cannot be mutually resolved between the parties, both licensees of existing and new systems shall reduce their out-of-band emissions by at least  $67 + 10 \log (P)$  dB measured at 3 MHz from their channel's edges for distances between stations exceeding 1.5 km.
- (6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

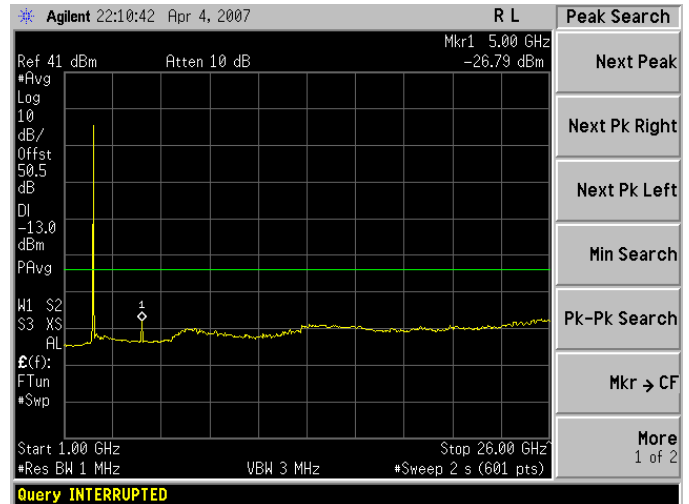
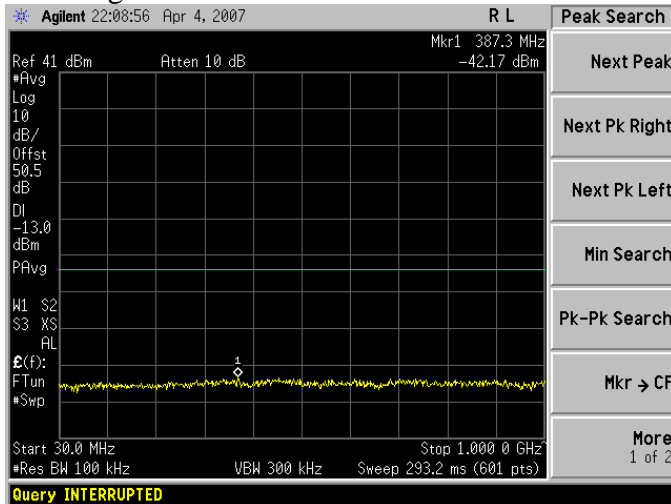
**Test Setup:**



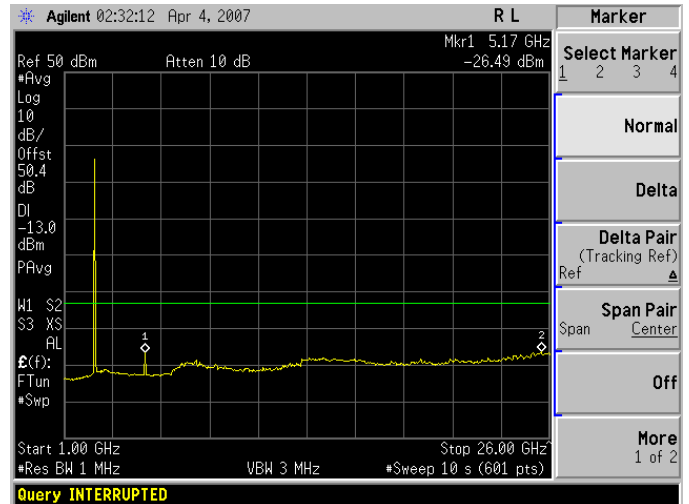
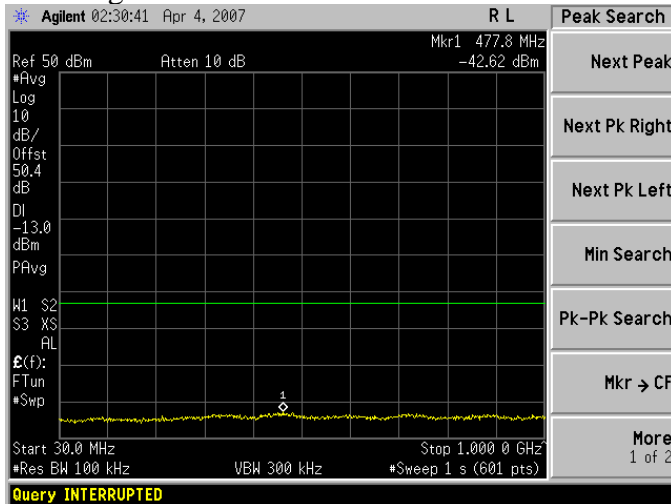
**Setting Remarks:**

1. Conducted spurious emission measurement would be performed.
2. Frequency scan would start from 30MHz to 10<sup>th</sup> Harmonics. The measurements would be performed using RMS detector with 1MHz/3MHz RBW/VBW settings.
3. Band edge check would be conducted with the EUT operated the nearest channel to the band edge.
4. To measure the emission level at the 1 MHz bands immediately outside the frequency band, RBW/VBW in the spectrum analyzer would be set up to more than 1% of the emission bandwidth. RM detector would be applied.
5. To measure the emission level more than the 1 MHz bands outside the frequency band, RBW/VBW in the spectrum analyzer would be set up to more than 1% of the emission bandwidth, with the measured power being integrated to 1MHz. The RMS detector would be applied.
6. The test would be repeated both for individual chain and combined transmitters configuration.
7. All modulations (BPSK, QPSK, 16QAM, and 64QAM) modes and different data rates would be evaluated using a combined waveform representative of all 4-modulation schemes.

### Conducted Emissions Main Signal – 2501MHz

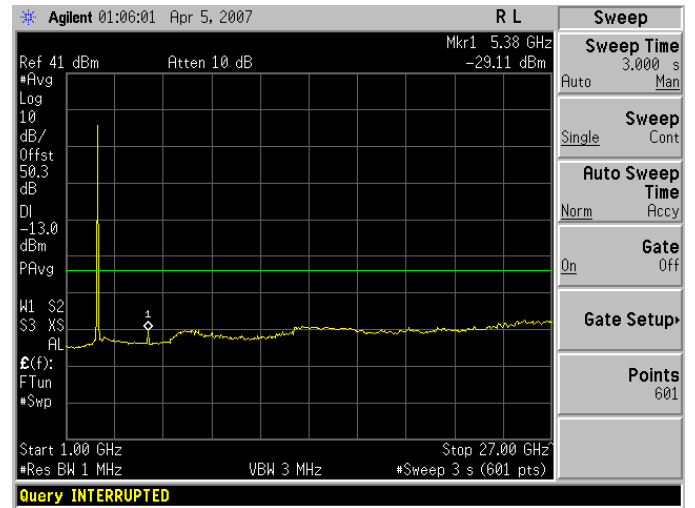
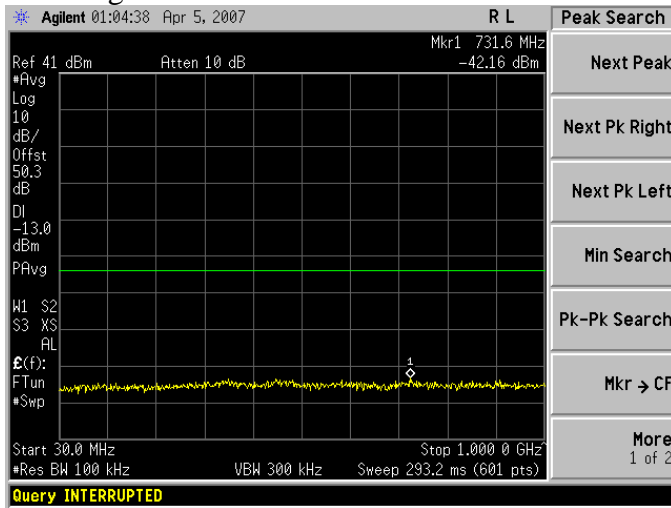


### Main Signal – 2600MHz

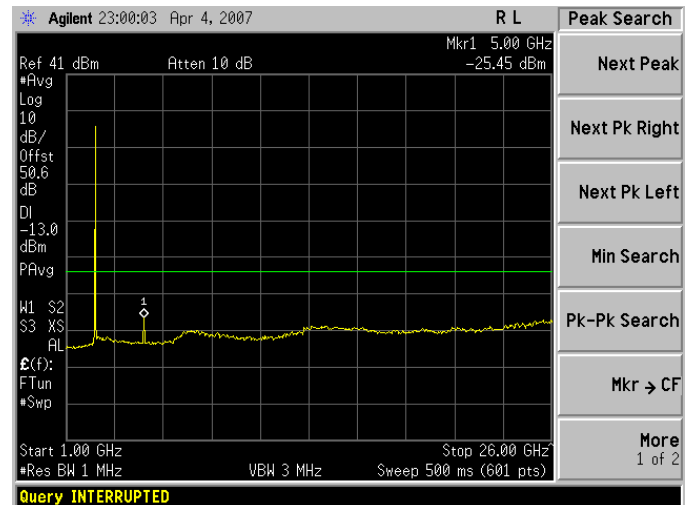
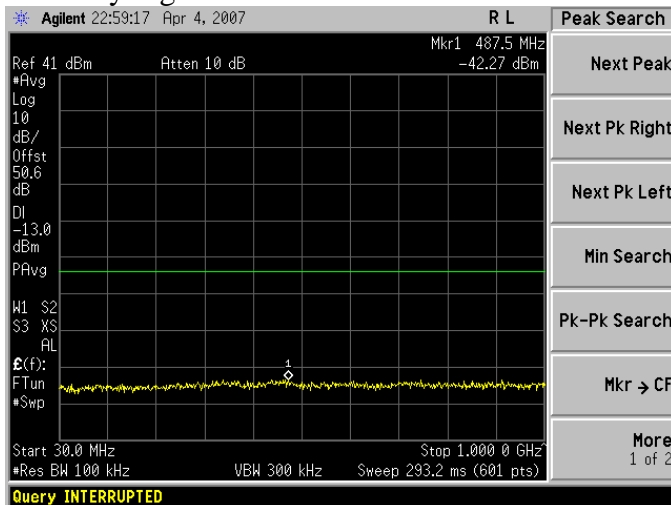




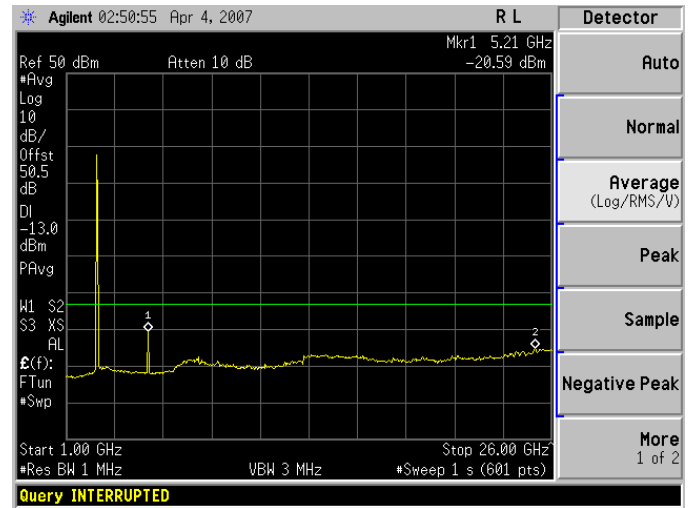
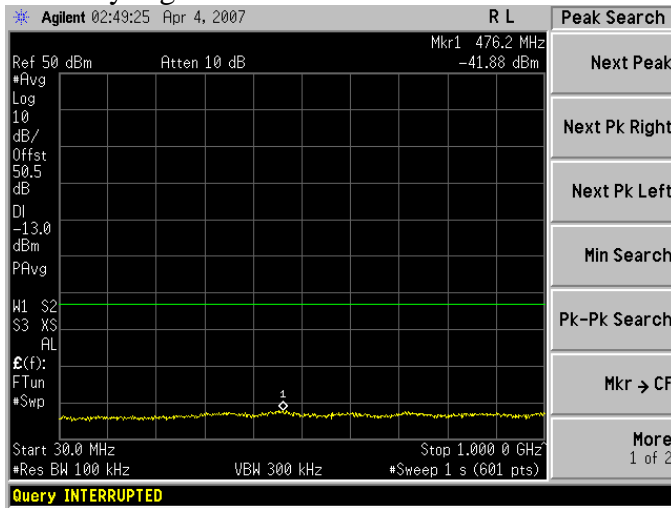
Main Signal – 2685MHz



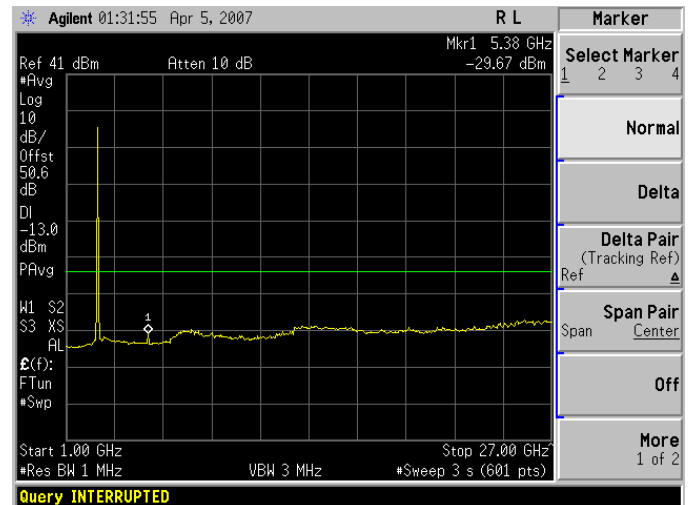
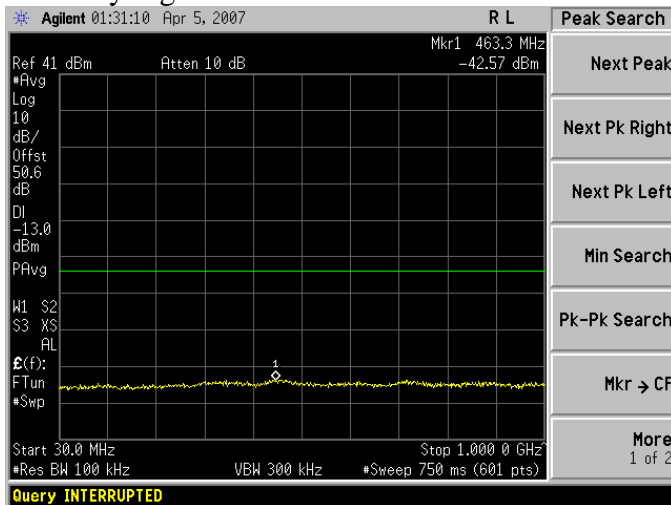
Diversity Signal – 2501MHz



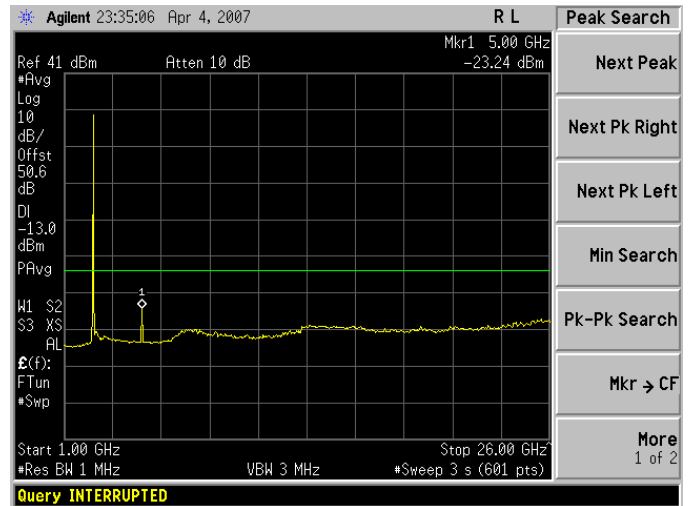
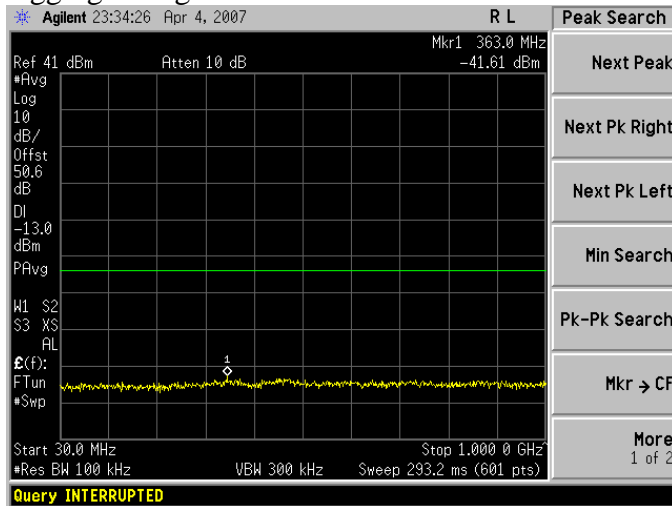
Diversity Signal – 2600MHz



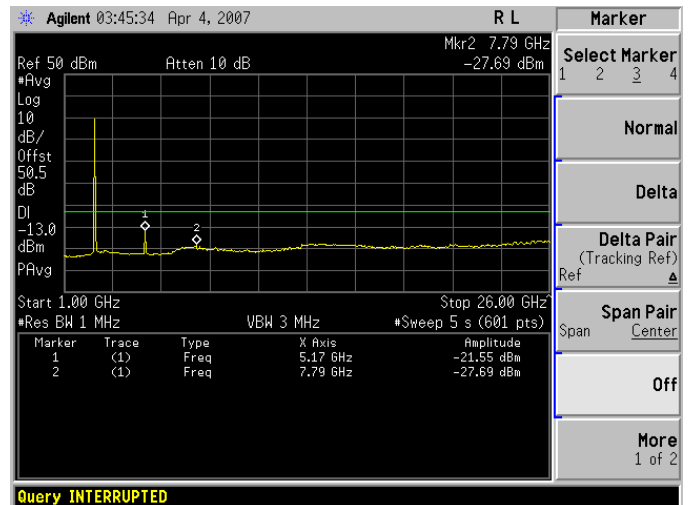
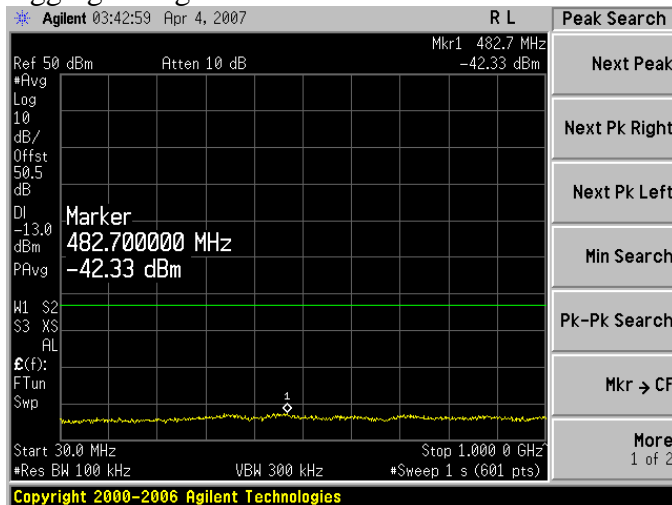
Diversity Signal – 2685MHz



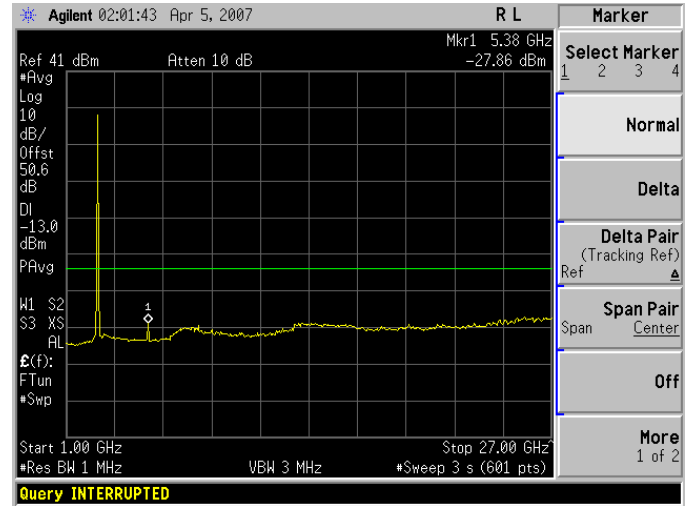
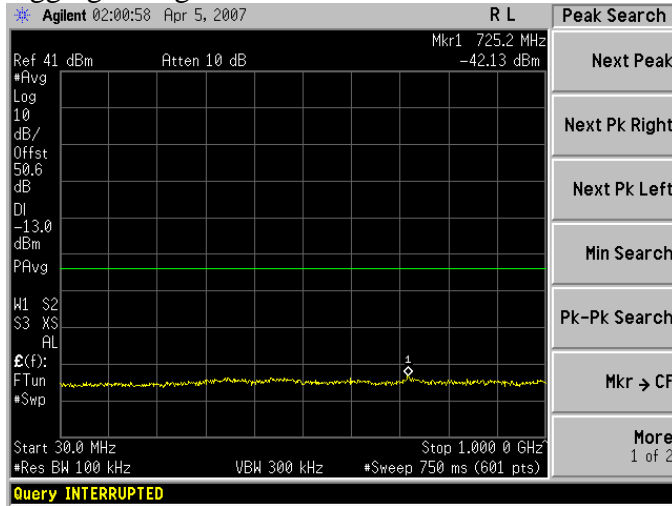
### Aggregate Signal – 2501MHz



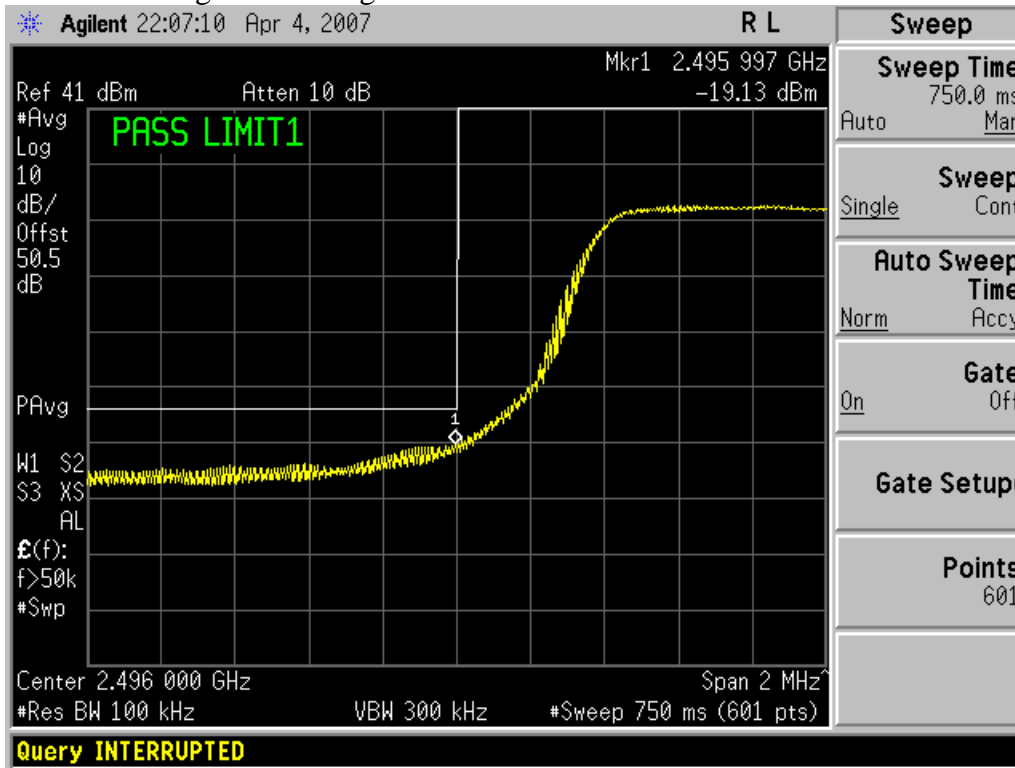
### Aggregate Signal – 2600MHz



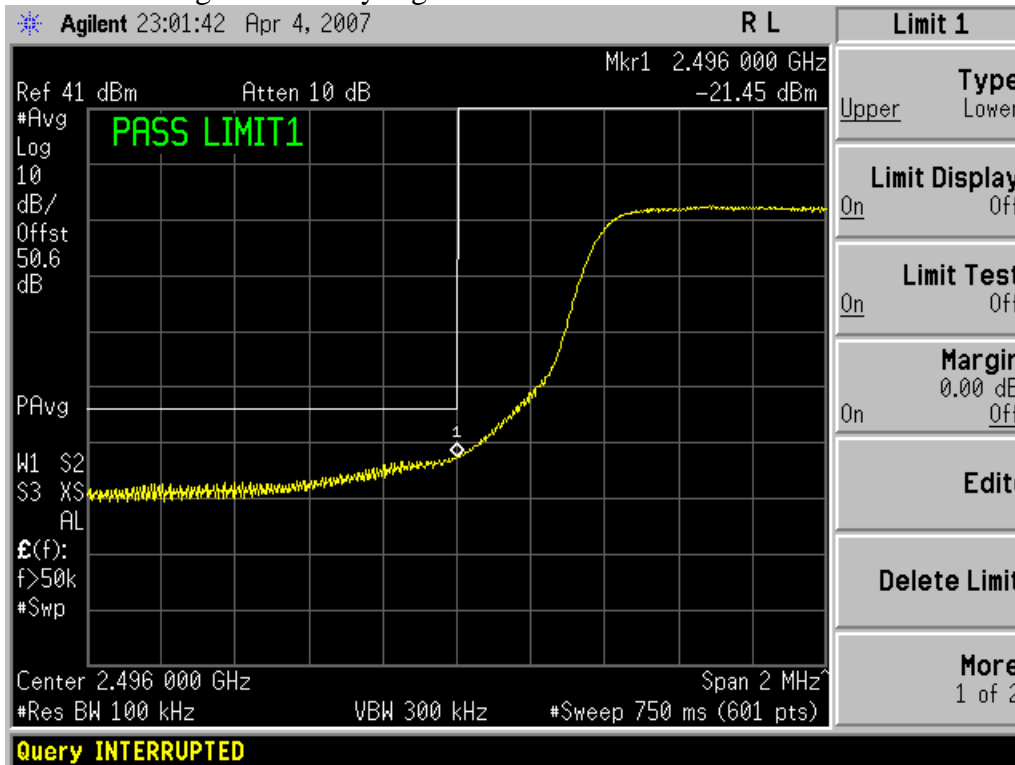
Aggregate Signal – 2685MHz



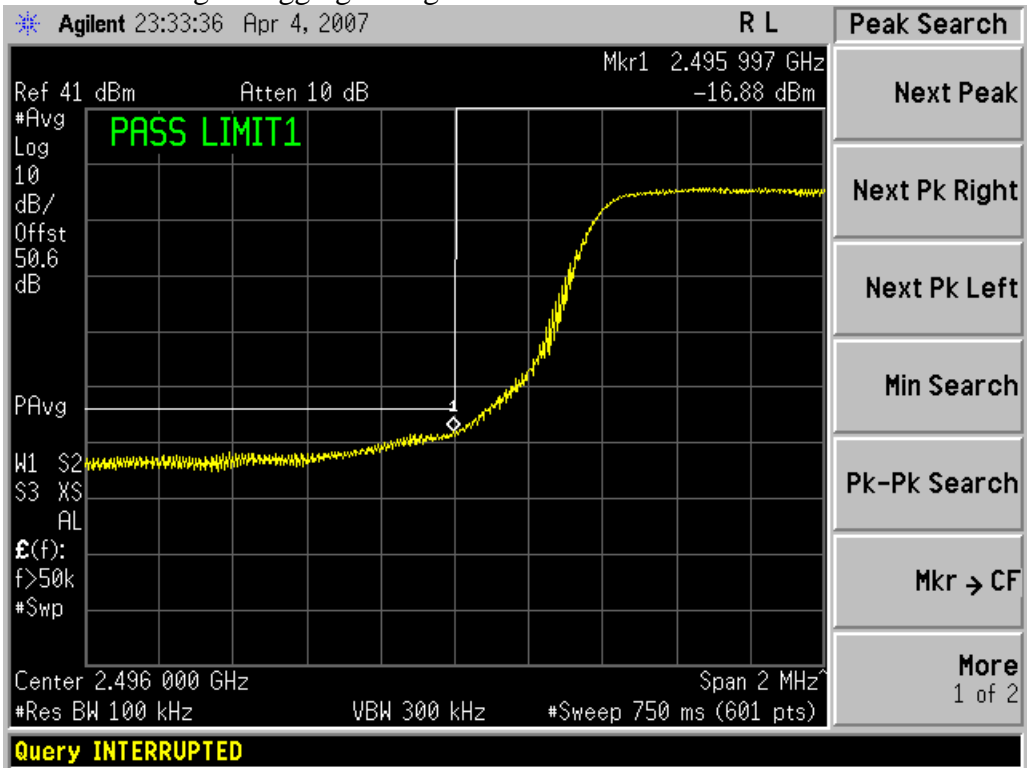
Lower Bandedge – Main Signal



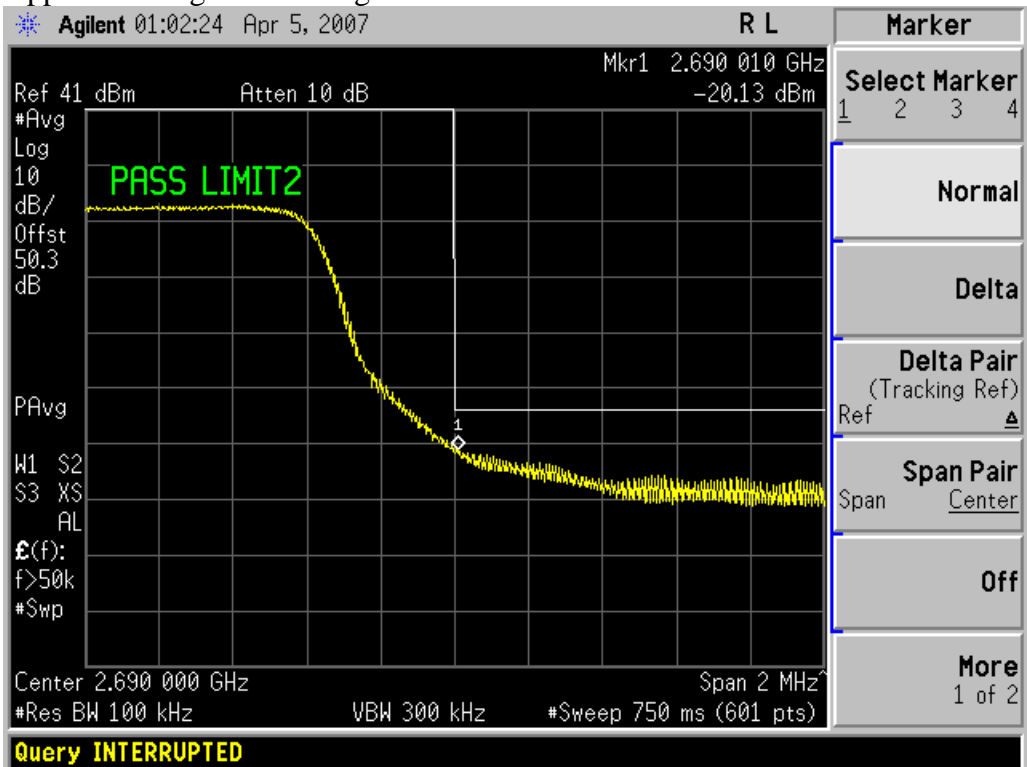
Lower Bandedge – Diversity Signal



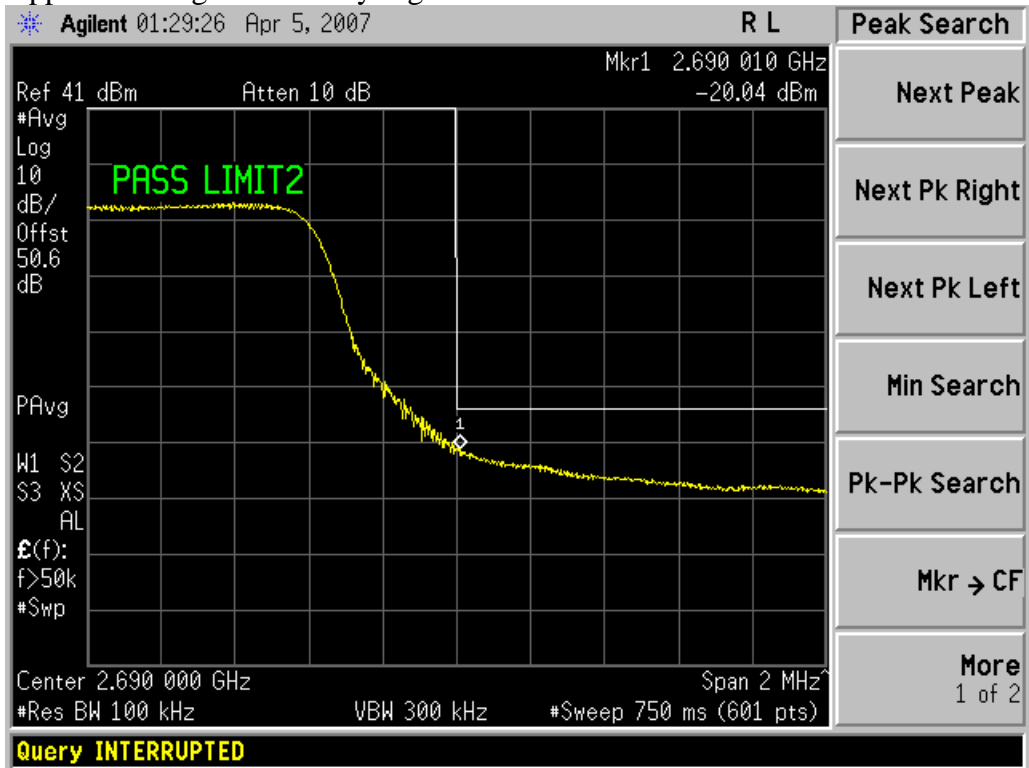
Lower Bandedge – Aggregate Signal



Upper Bandedge – Main Signal



Upper Bandedge – Diversity Signal

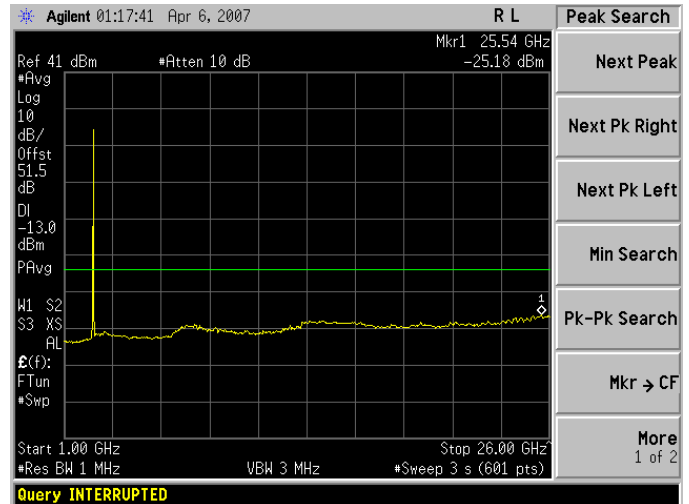
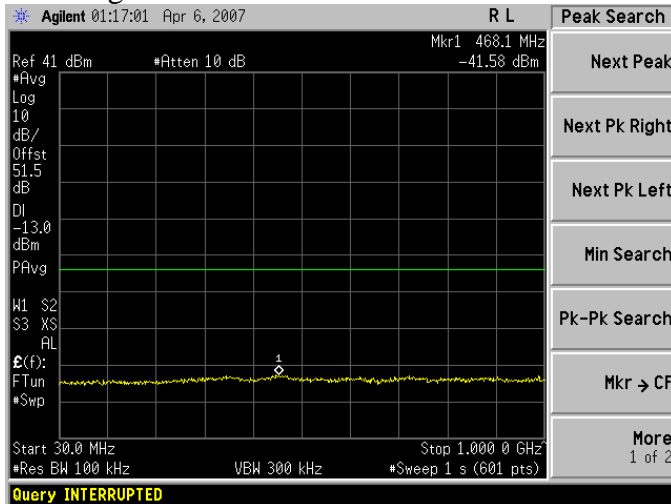


Upper Bandedge – Aggregate Signal

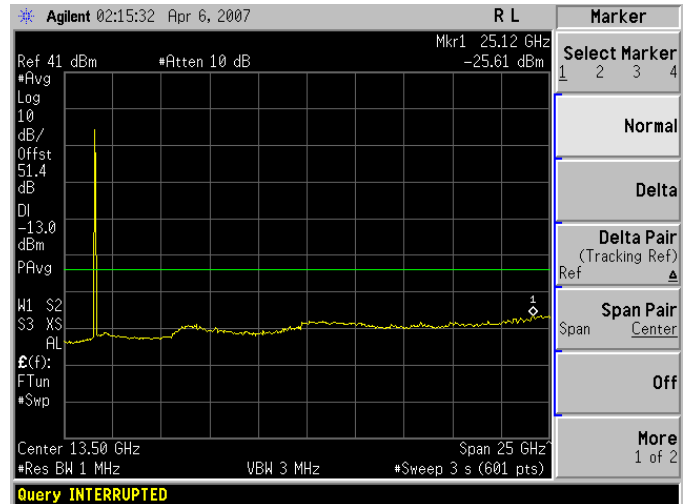
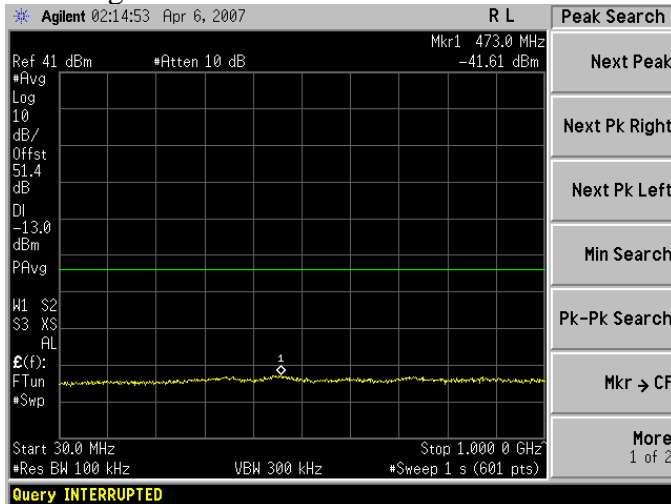


### Conducted Emissions with TTLNA

#### Main Signal – 2501MHz

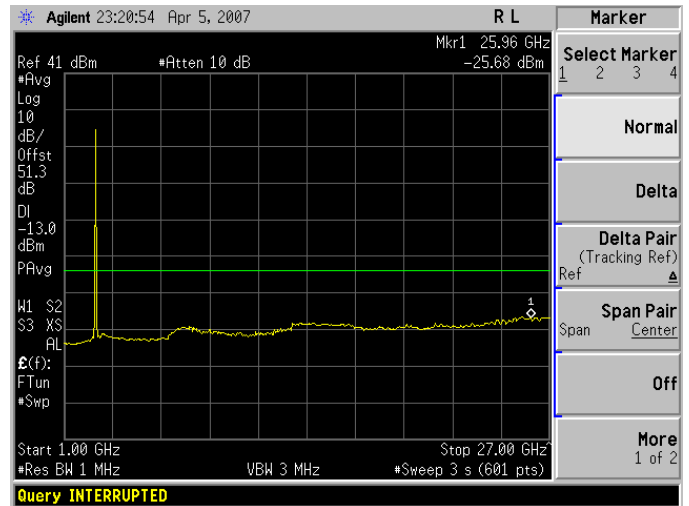
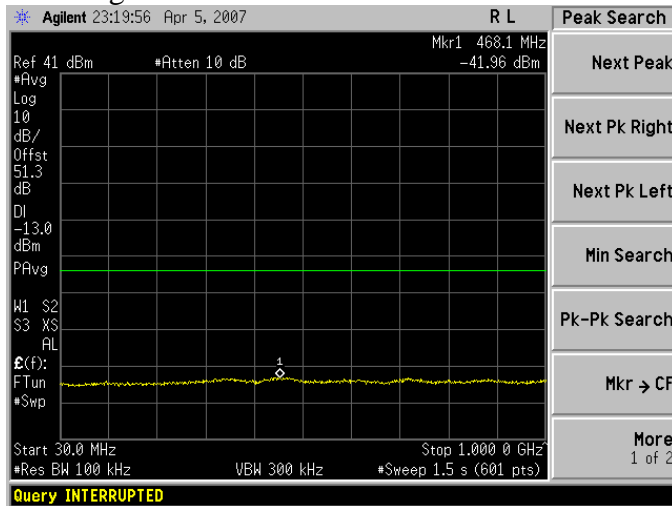


#### Main Signal – 2600MHz

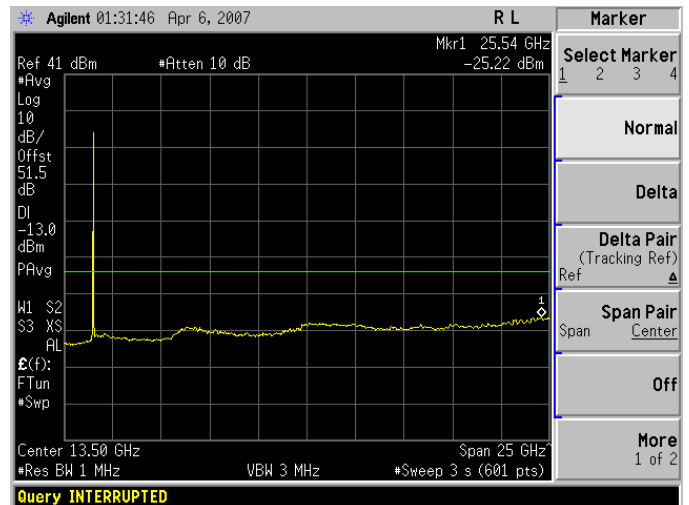
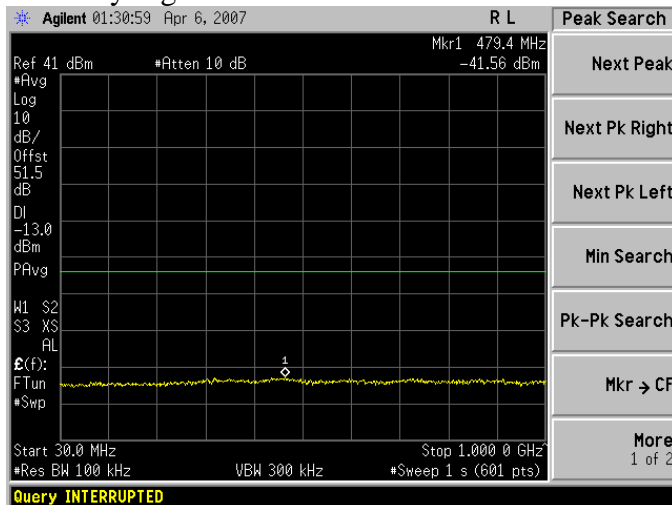




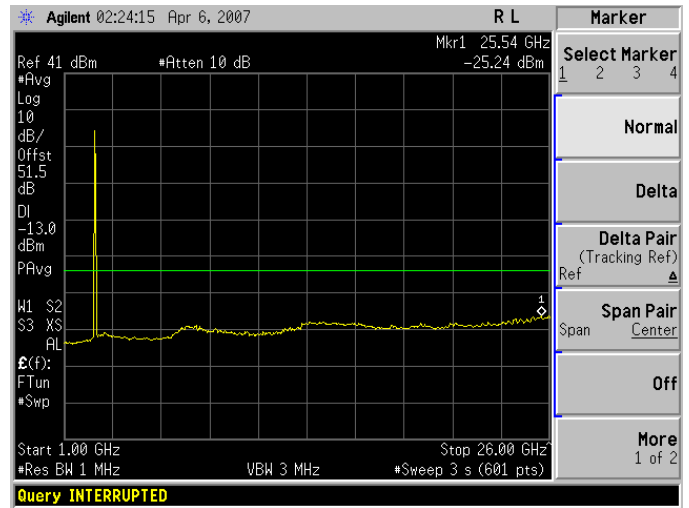
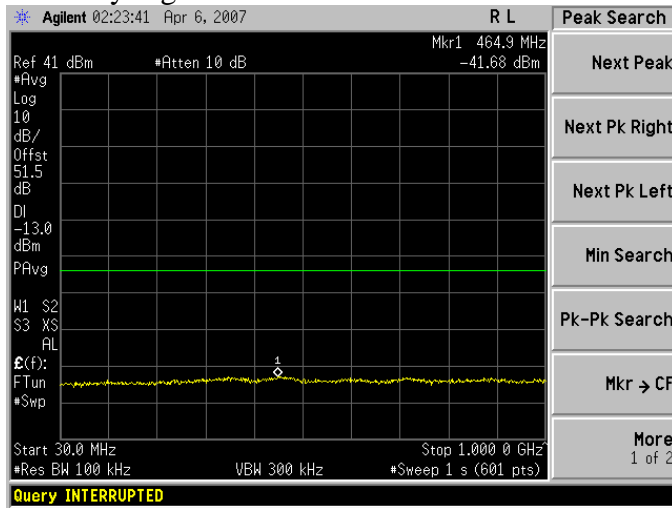
Main Signal – 2685MHz



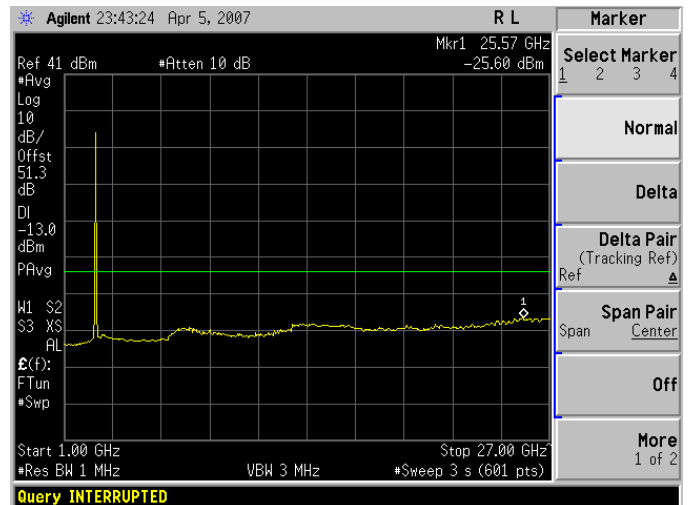
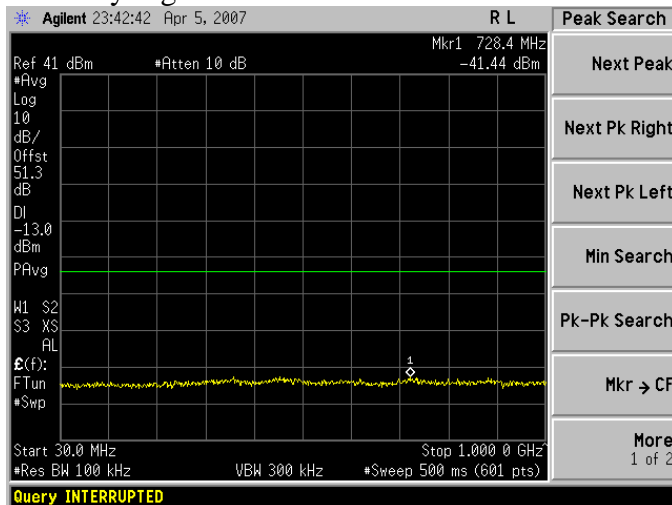
Diversity Signal – 2501MHz



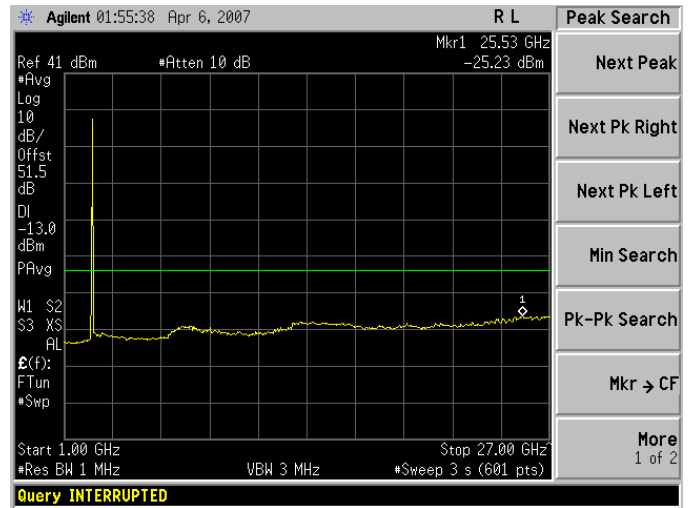
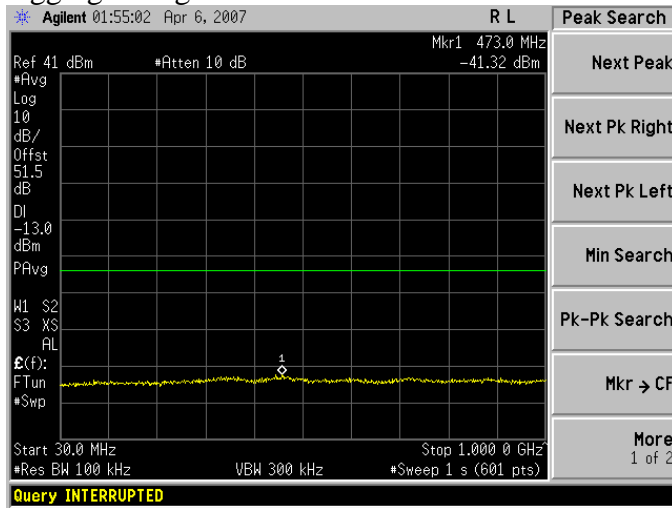
Diversity Signal – 2600MHz



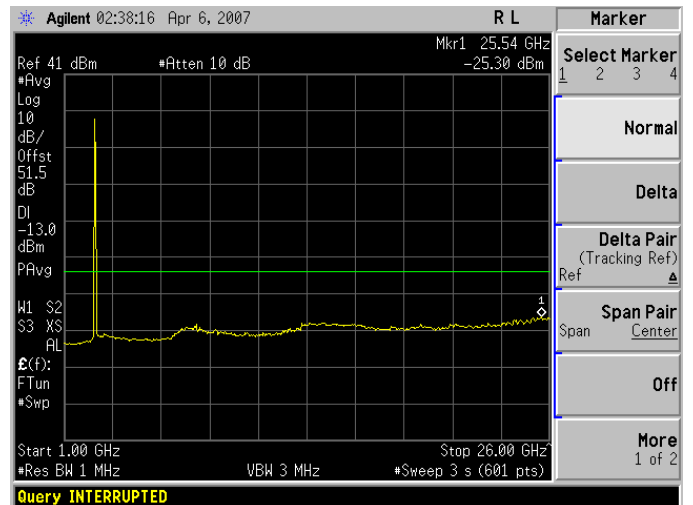
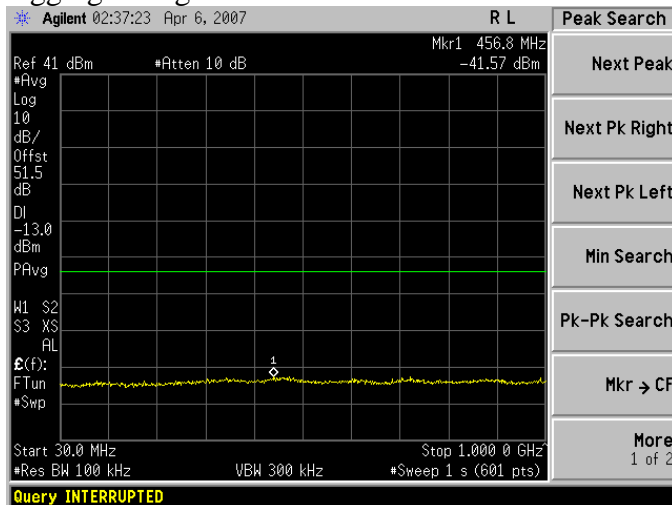
Diversity Signal – 2685MHz



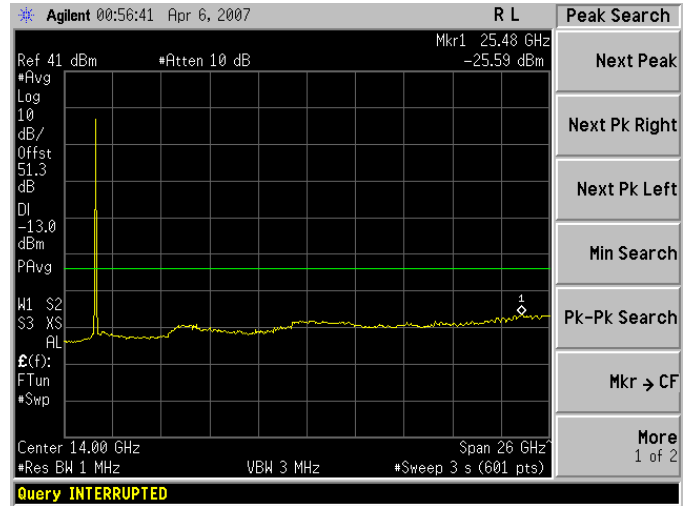
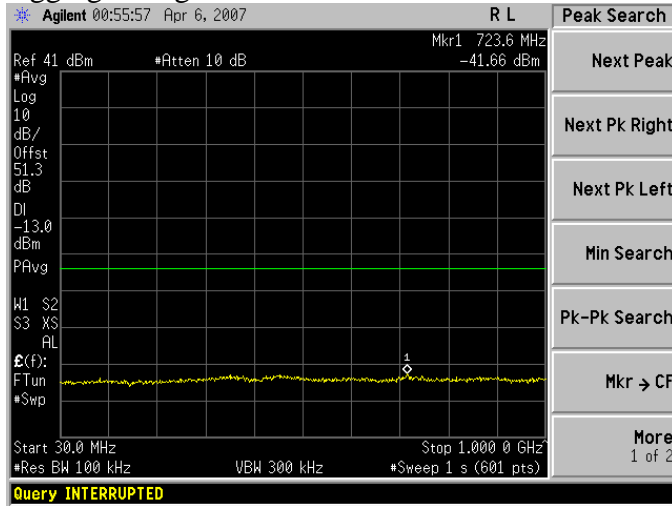
### Aggregate Signal – 2501MHz



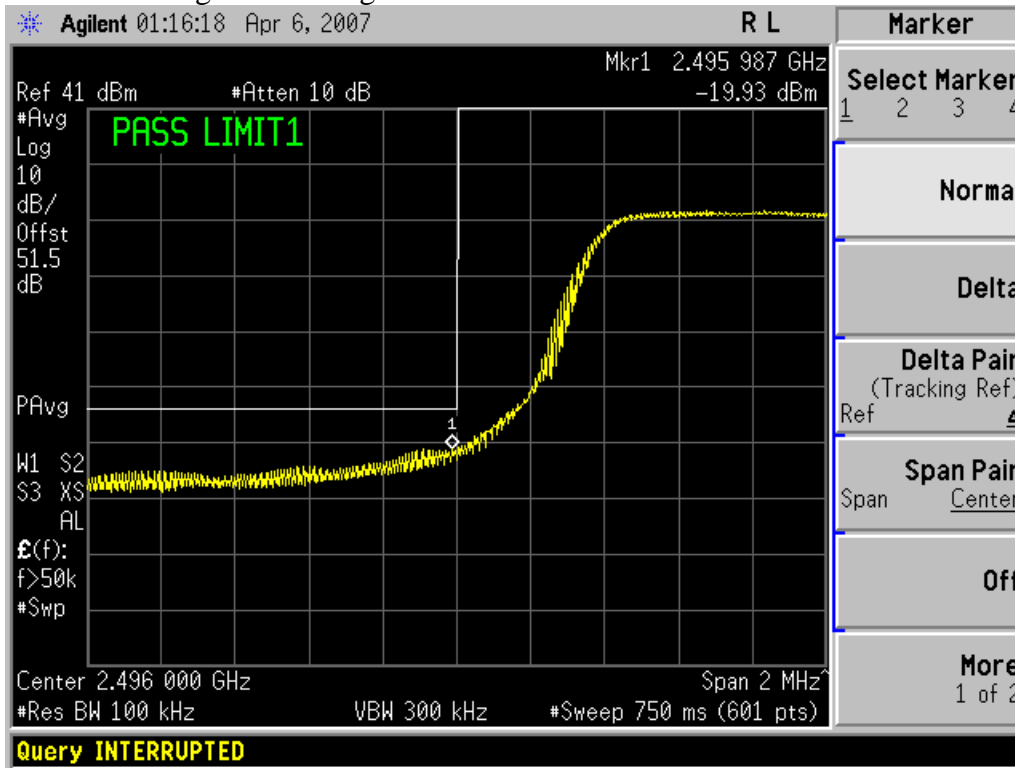
### Aggregate Signal – 2600MHz



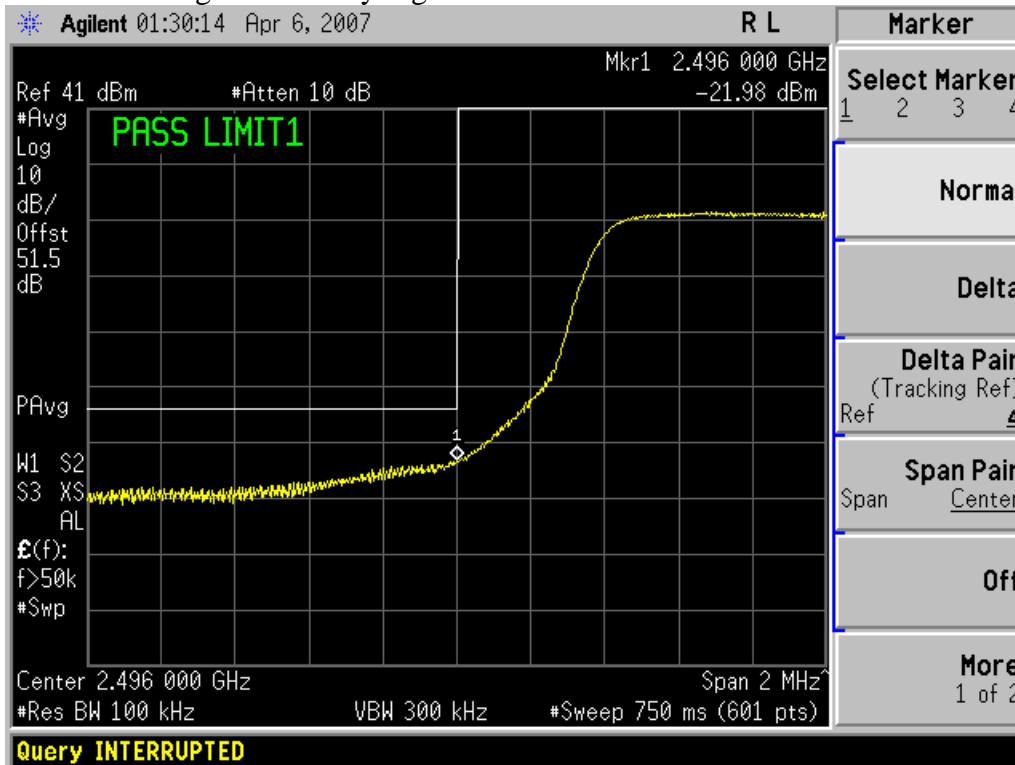
Aggregate Signal – 2685MHz



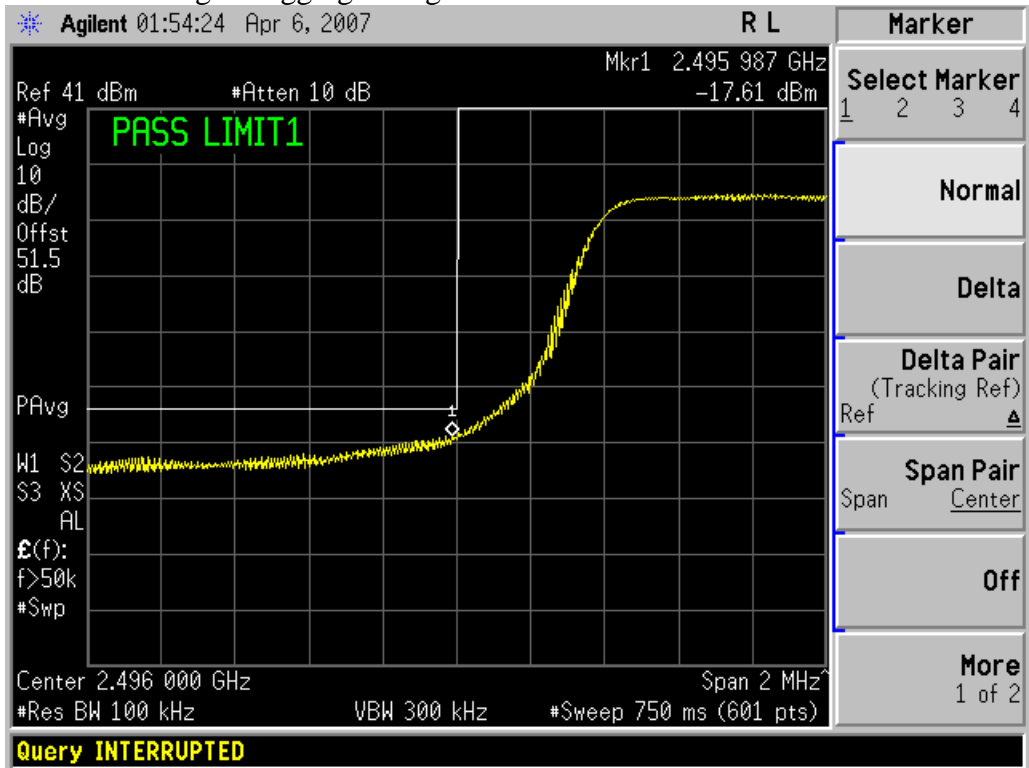
Lower Bandedge – Main Signal



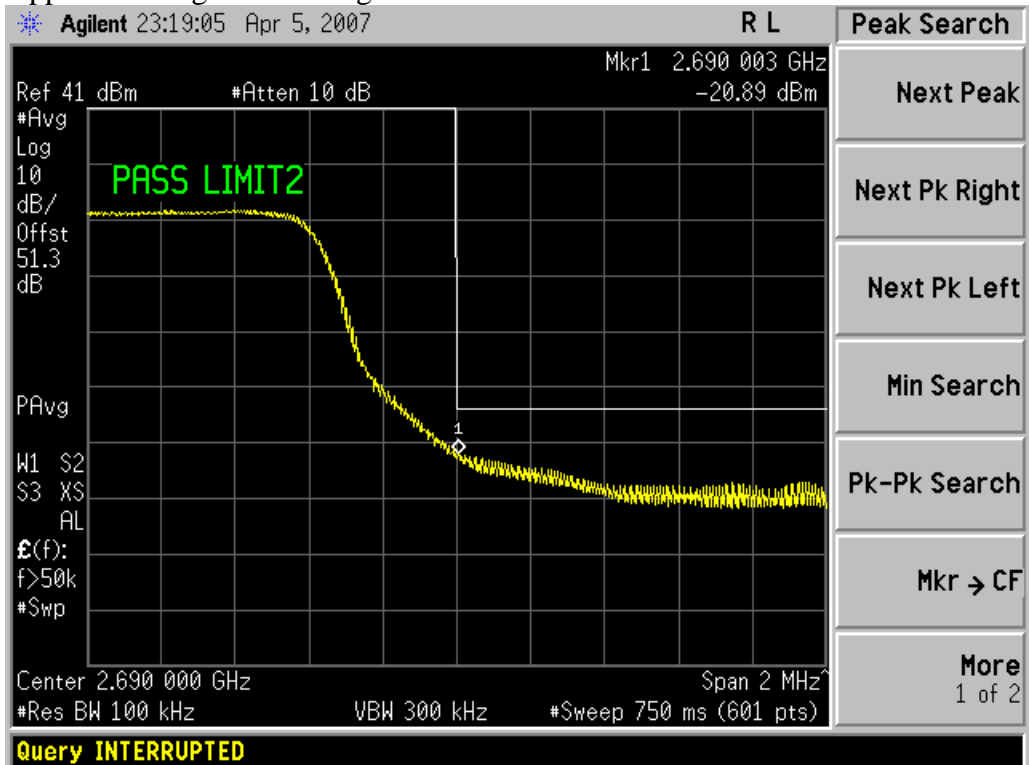
Lower Bandedge – Diversity Signal



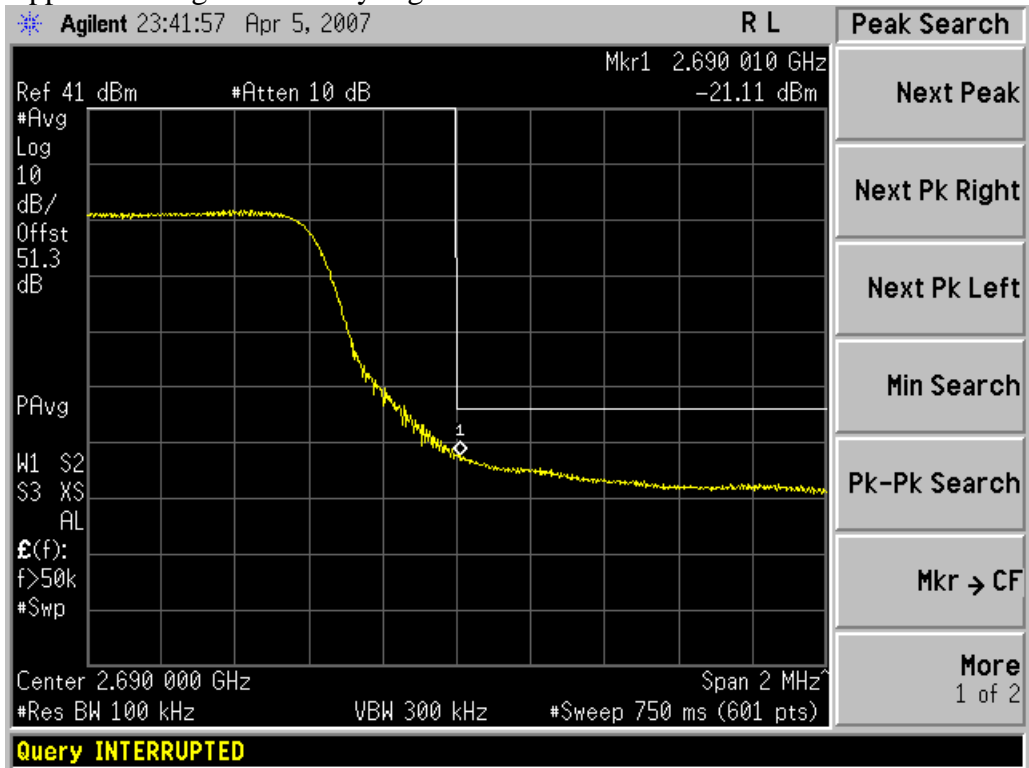
Lower Bandedge – Aggregate Signal



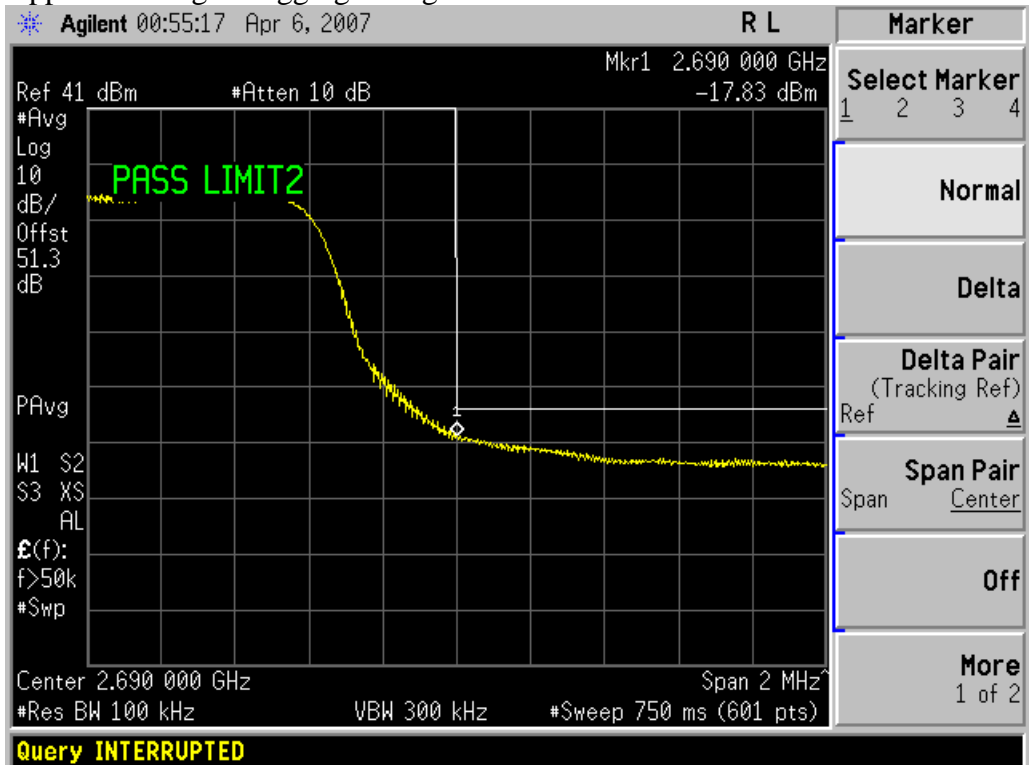
Upper Bandedge – Main Signal



Upper Bandedge – Diversity Signal



Upper Bandedge – Aggregate Signal



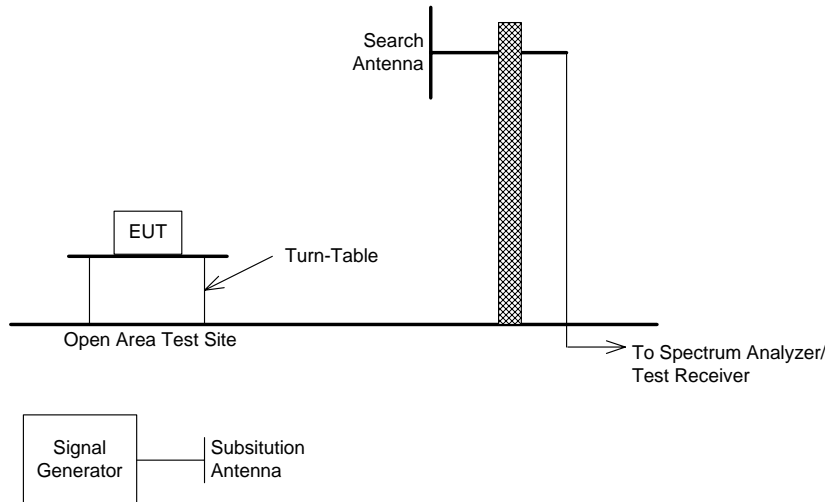
**Clause 27.53(l) Field Strength of Spurious emissions**

(1) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts.

(2) For fixed and temporary fixed digital stations, the attenuation shall be not less than  $43 + 10 \log (P)$  dB, unless a documented interference complaint is received from an adjacent channel licensee. Provided that the complaint cannot be mutually resolved between the parties, both licensees of existing and new systems shall reduce their out-of-band emissions by at least  $67 + 10 \log (P)$  dB measured at 3 MHz from their channel's edges for distances between stations exceeding 1.5 km.

(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

**Test Setup:**





**Settings Remarks:**

1. The test would be conducted at 3meter open area test site with signal substitution method.
2. The low, medium and high operation frequencies would be evaluated.
3. The frequency range would be start from 30MHz to10<sup>th</sup> Harmonics.
4. The measurement would be performed using an RMS detector with 100kHz RBW/VBW below 1GHz and 1MHz RBW/VBW above 1GHz at a distance of 3 meters.
5. All modulations (BPSK, QPSK, 16QAM, and 64QAM) modes and different data rates would be evaluated using a combined waveform representative of all 4-modulation schemes.

**Radiated emissions**

Frequency (MHz)	Antenna	Polarity	RCVD Signal (dBuV)	Sig. Sub. Factor	Emission Level EIRP (dBm)	Limit (dBm)	Margin (dB)
1 5002.0000	Horn2	V	92.3	-111.0	-18.6	-13.0	5.6
2 5002.0000	Horn2	H	95.5	-111.4	-15.9	-13.0	2.9
3 7503.0000	Horn2	V	65.3	-105.4	-40.1	-13.0	27.1
4 7503.0000	Horn2	H	66.2	-106.7	-40.6	-13.0	27.6
5 5200.0000	Horn2	V	93.2	-109.8	-16.6	-13.0	3.6
6 5200.0000	Horn2	H	94.8	-109.3	-14.4	-13.0	1.4
7 7800.0000	Horn2	V	77.5	-104.3	-26.8	-13.0	13.8
8 7800.0000	Horn2	H	75.5	-106.7	-31.2	-13.0	18.2
9 5370.0000	Horn2	V	93.5	-108.7	-15.2	-13.0	2.2
10 5370.0000	Horn2	H	93.2	-108.3	-15.1	-13.0	2.1
11 8045.0000	Horn2	V	62.7	-103.1	-40.4	-13.0	27.4
12 8045.0000	Horn2	H	64.0	-109.2	-45.2	-13.0	32.2

**Radiated emissions with TTLNA**

Frequency (MHz)	Antenna	Polarity	RCVD Signal (dBuV)	Sig. Sub. Factor	Emission Level EIRP (dBm)	Limit (dBm)	Margin (dB)
1 5002.0000	Horn2	V	91.5	-111.0	-19.5	-13.0	6.5
2 5002.0000	Horn2	H	90.2	-111.4	-21.2	-13.0	8.2
3 7503.0000	Horn2	V	65.2	-105.4	-40.3	-13.0	27.3
4 7503.0000	Horn2	H	64.0	-106.7	-42.7	-13.0	29.7
5 5200.0000	Horn2	V	92.3	-109.8	-17.5	-13.0	4.5
6 5200.0000	Horn2	H	88.0	-109.3	-21.3	-13.0	8.3
7 7800.0000	Horn2	V	72.0	-104.3	-32.3	-13.0	19.3
8 7800.0000	Horn2	H	68.0	-106.7	-38.7	-13.0	25.7
9 5370.0000	Horn2	V	93.3	-108.7	-15.3	-13.0	2.3
10 5370.0000	Horn2	H	88.8	-108.3	-19.5	-13.0	6.5
11 8045.0000	Horn2	V	70.8	-103.1	-32.3	-13.0	19.3
12 8045.0000	Horn2	H	64.2	-109.2	-45.0	-13.0	32.0

**Clause 27.54 Frequency Stability**

§27.54 Frequency stability. - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

**FCC Clause 2.1055 Frequency Stability**

§2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

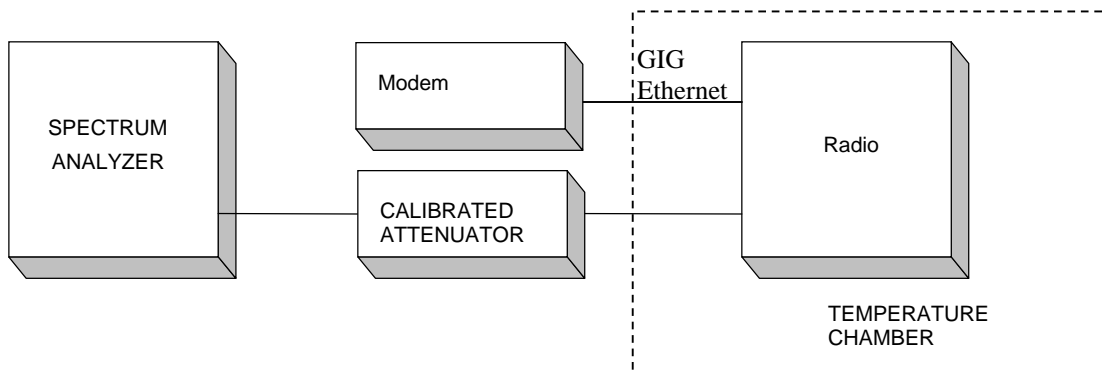
(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a)(2) and (3) of this section

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

**Test Setup**



**Test Conditions:**

Extreme Temperature Condition: -30°C to 50°C

Extreme Voltage Conditions: ±15% of standard voltage condition.

**Settings Remarks**

1. The EUT would be operated at the un-modulated mode.
2. The EUT would be connected to a frequency counter.
3. Test would be conducted at the temperature range from -30°C to 50°C degree with 10°C intervals. Measurement would also be conducted with varying the primary supply voltage from 85% to 115% of the nominal value

Condition	Frequency (Hz)	Offset (ppm)
+50°C	2599999862	0.0
+40°C	2599999863	0.0
+30°C	2599999862	0.0
+20°C, +15% voltage	2599999859	0.002
+20°C	2599999863	——
+20°C, -15% voltage	2599999860	0.001
+10°C	2599999862	0.0
0°C	2599999862	0.0
-10°C	2599999862	0.0
-20°C	2599999862	0.0
-30°C	2599999862	0.0

## Appendix B : Setup Photographs

### Radiated Spurious Emissions Setup:



### With TTLNA

