



## **Electromagnetic Compatibility Test Report**

**Test Report No: MOT 310510**

**Issued on: July 18, 2010**

**Product Name**  
**WiMAX VSM VM2500**  
**Model: F7400A**

**Tested According to**  
**FCC 47 CFR, Part 27**  
**Industry Canada RSS 199**

**Tests Performed for**  
**Motorola Inc.**

One Motorola Plaza, Holtsville, N.Y 11742, USA

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ELECTRICAL TESTING  
CERT #1633.01

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## **Test Personnel**



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## Test Report details:

Test commencement date: 13.05.2010  
Test completion date: 31.05.2010  
Customer's representative: Assi Gershon  
Issued on: 18.07.2010

## Revision details:

Version	Date	Details/Reasons
Rev. 1	31.05.2010	-
Rev. 2	07.07.2010	Industry Canada RSS 199 requirements added on pages 1, 4 & 7.
Rev. 3	11.07.2010	Added conducted output power & 26 dB Bandwidth measurements for all modulation types.
Rev.4	14.07.2010	The lowest frequencies were changed for Channel Edge Measurements test and the start frequency measurement was 2496MHz.
Rev.5	18.07.2010	The lowest frequencies were changed for all measurements

## Assessment information:

This report contains an assessment of the EUT against Electromagnetic Compatibility based upon tests carried out on the samples submitted. The results contained in this report relate only to the items tested. Manufactured products will not necessarily give identical results due to production and measurement tolerances. QualiTech, EMC Lab does not assume responsibility for any conclusion and generalization drawn from the test results with regards to other specimens or samples of type of the equipment represented by test item.

The EUT was set up and exercised using the configuration, modes of operation and arrangements defined in this report only.

## Modifications:

### Modifications made to the EUT

None

### Modifications made to the Test Standard

None

## Summary of Compliance Status

Test Spec. /Clause	Remarks
e.i.r.p. Output Power, §27.50(h)(2) & §2.1046 & RSS 199 Sec.4.4	Comply
Emission Bandwidth, §27.53(m)(6) & §2.1049 & RSS 199 Sec.4.2	Comply
Conducted Spurious Emissions, §27.53(m)(6) & §2.1051 & RSS 199 Sec.4.5	Comply
Channel Edge Emissions, §27.53(m)(6) & §2.1051 & RSS 199 Sec.4.5	Comply
Radiated Spurious Emissions, §2.1053 & RSS 199 Sec.4.5	Comply
Frequency stability, §27.54 & §2.1055 & RSS 199 Sec.4.3	Comply

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## 1. General Description

### General Information:

Product: VSM, Model F7400A

FCC ID: AZ492FT7041

IC: 109U-92FT7041

Power Supply: Vehicular 12VDC

Maximum Output Power: 1,122 mW

Modulation Type: QPSK and 16 QAM

Modulation Technique: OFDM

Data Rates: 1.25, 1.88, 2.5, 3.75, 5, 7.5 Mbps

Downlink		Uplink	
Modulation	Coding Rate	Modulation	Coding Rate
QPSK	1/2	QPSK	1/2
	3/4		3/4
16 QAM	1/2	16 QAM	1/2
	3/4		3/4

Duplex Method: TDD

Operating Range: 2495MHz ÷ 2690MHz

Channel Bandwidth: 5MHz and 10MHz

Antenna Type: Vehicular Colinear Two Dipole Array

Operation Temperature range: -30°C ÷ 60°C

**The above EUT information was declared by the manufacturer.**

## 2. Test Facility & Uncertainty of Measurement

### 2.1. Accreditation/ Registration reference:

- A2LA Certificate Number: 1633.01
- Industry Canada File Number: IC4808

### 2.2. Test Facility description

The tests were performed at the EMC Laboratory, QualiTech Division, ECI Telecom Group

**Address:** 30, Hasivim St., Petah Tikva, Israel.  
Tel: 972-3-926-8443

#### 3m Anechoic Chamber:

The 3m-screened chamber is used in two configurations: the semi-anechoic configuration for Radiated Emission measurements and the full-anechoic configuration for Radiated Immunity tests.

#### Semi Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	9.5m x 6.5m x 5.2m
Antenna height	1 - 4m
Shielding Effectiveness	Magnetic field $\geq 80$ dB at 15 kHz $\geq 90$ dB at 100 kHz Electric field $> 120$ dB from 1MHz to 1GHz $> 110$ dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Frankonia hybrid absorbing material in selected positions on the walls
Normalized Site Attenuation measured at 5 positions	$\pm 3.49$ dB, 30MHz to 1GHz
Transmission Loss measured at 5 positions, at 1.5m height	$\pm 3$ dB, 1GHz to 18GHz

#### Full-Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	7m x 4m x 3m
Antenna height	1.55m at Horizontal & Vertical polarizations
Shielding Effectiveness	Magnetic field $\geq 80$ dB at 15 kHz $\geq 90$ dB at 100 kHz Electric field $> 120$ dB from 1MHz to 1GHz $> 110$ dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Frankonia hybrid absorbing material in selected positions on the walls and floor
Field Uniformity to EN61000-4-3	$\pm 3$ dB 80MHz to 18GHz

**2.3. Uncertainty of Measurement:**

Test Name	Test Method & Range	Uncertainty	
		Combined std. Uc(y) [dB]	Expanded U [dB]
Radiated Emission	30MHz÷230MHz, Horiz. polar.	1.8	3.6
	30MHz÷230MHz, Ver. polar.	2.0	3.9
	230MHz÷1000MHz, Horiz. polar.	1.5	3.0
	230MHz÷1000MHz, Vert. polar.	1.5	3.0
Conducted Emission	9 kHz÷150 kHz	1.4	2.8
	150 kHz÷30MHz	1.1	2.2

### 3. Method of Measurements

#### 3.1. Conducted RF Measurements:

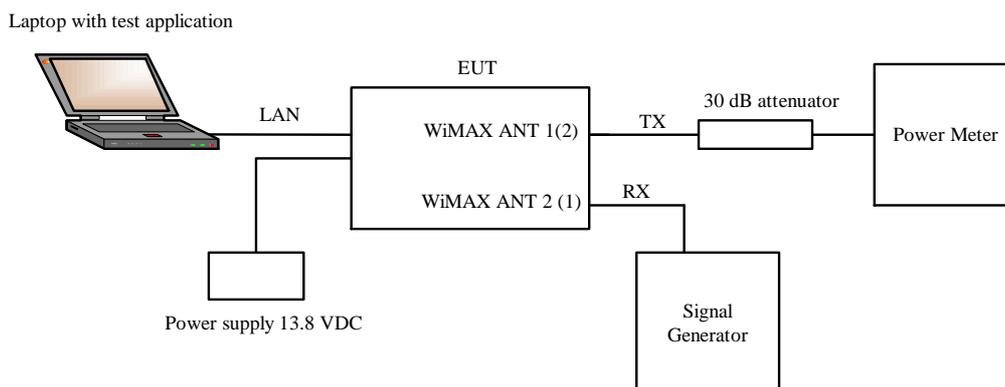
The RF output of the transmitter under test was directly connected to the input of the Spectrum analyzer through a specialized antenna connector provided by the manufacturer and an attenuator as specified. The external attenuator and cable loss were added to the reading. Worst-case results of the various modulation modes (where applicable) were reported.

For Maximum Conducted Output Power, the spectrum analyzer was set for free run, and 100 traces were averaged in power averaging mode. The transmitter was continuously transmitting at a duty cycle of about 99% and power was integrated across a bandwidth of the 26dB EBW of the signal, using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges. Alternatively, Peak Output Power was measured using a Peak Power Meter.

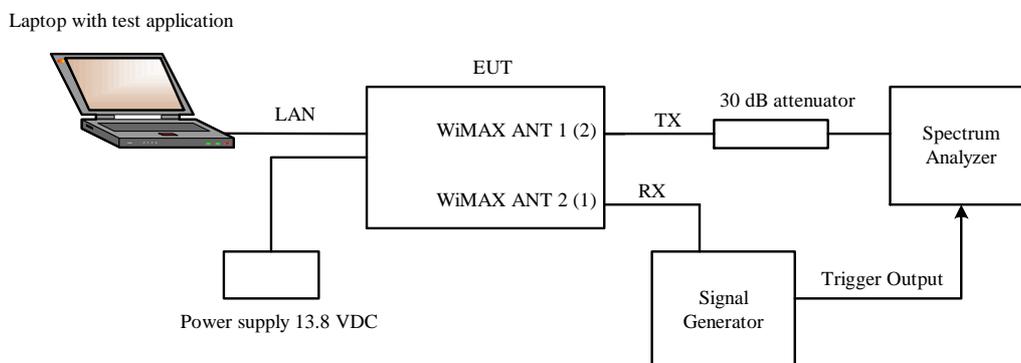
For spurious emissions measurement, the spectrum from 9 kHz to 40 GHz was investigated with the transmitter set to the lowest, middle and highest channel frequencies.

#### Test Setup

##### Conducted Output Power



##### Conducted Spurious Emissions

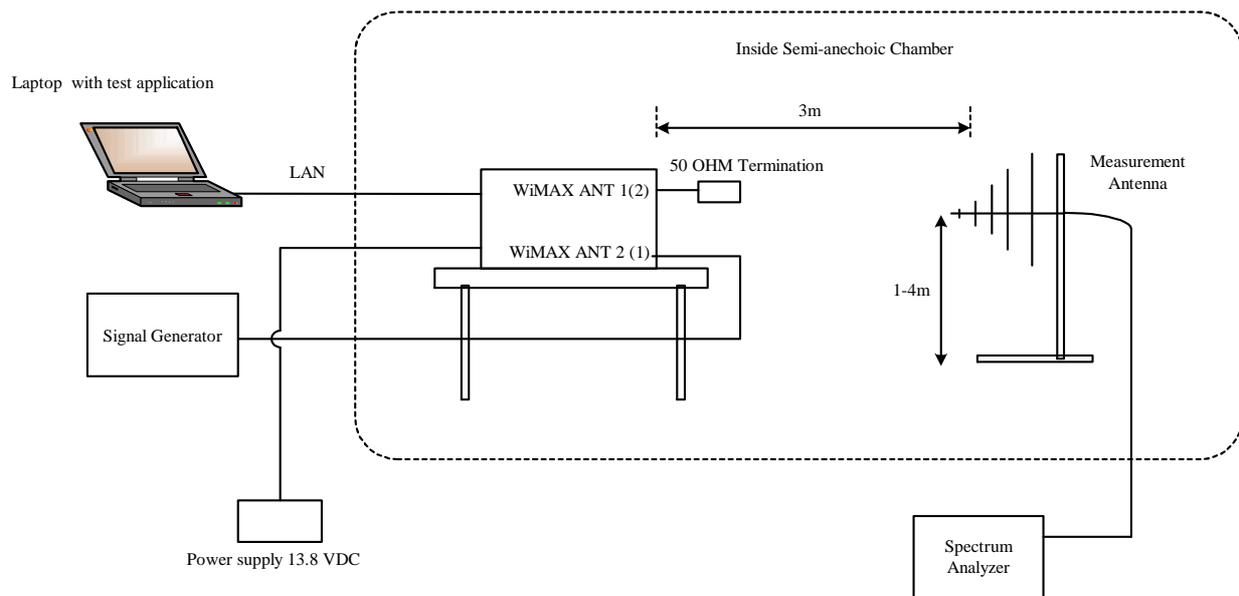


### 3.2. Radiated Emission measurements:

Measurements were performed in a semi-anechoic chamber at a 3-meter measurement distance in order to evaluate the radiated electromagnetic interference characteristics of the EUT. The EUT was placed on a non-metallic table/support, 0.8m above the turntable, was configured, arranged and operated in a manner consistent with typical application and load conditions. The test program of exercising the equipment ensured that various parts of the EUT were exercised to permit detection of all EUT disturbances. While the turntable was being rotated around 360 degrees, the height of the antenna was varied from 1 to 4m for the frequency range of 30MHz to 40GHz. Measurements were performed for vertical and horizontal polarization.

Using the Substitution Method in accordance to TIA/EIA 603, an antenna with a known gain substituted the EUT, and an RF signal source was connected to the antenna input. The signal source level was adjusted until the previously recorded maximum reading was obtained. The power source reading was corrected for the cable loss, and the antenna gain was added to obtain the EIRP peak power. EIRP measurements were made at the upper, center, and lower carrier frequencies.

### Test Setup



### 3.3. Frequency Stability

The frequency stability shall be measured with variations of ambient temperature from -30°C to +50°C. Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of 10°C.

Frequency stability shall be measured with variations of primary supply voltage to the battery-operating end point, which shall be specified by the manufacturer.

### 3.4. Worst Case Results:

Worst case result is determined for applicable modulation types and data rates. Pre-scan has been conducted to determine the worst-case.

## 4. Measurements

### 4.1. Conducted Output Power

Reference document:	47 CFR §27.50 (h) (2) & §2.1046		
Test Requirements:	Mobile stations are limited to 2.0 watts EIRP.		
Test setup:	See sec 3.1	<b>Pass</b>	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
Power meter Settings:	AVG		
Environment conditions:	Ambient Temperature: 23.1°C	Relative Humidity: 55.4%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	---	

#### Test results: Output ANT 1:

Channel	Frequency [MHz]	Output Power* [dBm]	Output Power* [mW]	Antenna Gain** [dBi]	EIRP calculated [dBm]	Limit [dBm]	Margin [dB]
<b>WiMAX 802.16e (5MHz), OFDMA, QPSK, Duty Cycle 32%</b>							
Low	2498.5	29.91	916.220	1.71	31.33	33	-1.67
Middle	2600	29.70	933.25	2.55	32.25	33	-0.75
High	2687.5	29.19	829.85	1.71	30.90	33	-2.10
<b>WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%</b>							
Low	2498.5	29.94	986.279	1.71	31.65	33	-1.35
Middle	2600.0	29.61	914.11	2.55	32.16	33	-0.84
High	2687.5	29.21	833.68	1.71	30.92	33	-2.08
<b>WiMAX 802.16e (10MHz), OFDMA, QPSK, Duty Cycle 27%</b>							
Low	2501	29.62	916.220	1.71	31.33	33	-1.67
Middle	2600	29.07	807.24	2.55	31.62	33	-1.38
High	2685	28.71	743.02	1.73	30.44	33	-2.56
<b>WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%</b>							
Low	2501	29.71	935.406	1.71	31.42	33	-1.58
Middle	2600	29.22	835.60	2.55	31.77	33	-1.23
High	2685	28.83	763.84	1.73	30.56	33	-2.44

\* Corrected for external attenuations.

\*\* As provided by the manufacturer (including cable loss).

**Test results: Output ANT 2:**

Channel	Frequency [MHz]	Output Power* [dBm]	Output Power* [mW]	Antenna Gain** [dBi]	EIRP calculated [dBm]	Limit [dBm]	Margin [dB]
<b>WiMAX 802.16e (5MHz), OFDMA, QPSK, Duty Cycle 32%</b>							
Low	2498.5	29.97	993.116	1.71	31.68	33	-1.32
Middle	2600.0	29.98	995.41	2.55	32.53	33	-0.47
High	2687.5	29.97	993.12	1.71	31.68	33	-1.32
<b>WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%</b>							
Low	2498.5	29.94	986.279	1.71	31.65	33	-1.35
Middle	2600.0	29.32	855.07	2.55	31.87	33	-1.13
High	2687.5	29.34	859.01	1.71	31.05	33	-1.95
<b>WiMAX 802.16e (10MHz), OFDMA, QPSK, Duty Cycle 27%</b>							
Low	2501	29.66	924.698	1.71	31.37	33	-1.63
Middle	2600	29.47	885.12	2.55	32.02	33	-0.98
High	2685	29.42	874.98	1.73	31.15	33	-1.85
<b>WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%</b>							
Low	2501	29.84	963.829	1.71	31.55	33	-1.45
Middle	2600	28.99	792.50	2.55	31.54	33	-1.46
High	2685	29.04	801.68	1.73	30.77	33	-2.23

\* Corrected for external attenuations.

\*\* As provided by the manufacturer (including cable loss).

#### 4.2. 26 dB Bandwidth

Reference document:	47 CFR §27.53 (m) (6) & §2.1049		
Test Requirements:	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.		
Test setup:	See sec 3.1	<b>Pass</b>	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 100kHz, VBW: 300kHz for 5MHz channel bandwidth RBW: 300kHz, VBW: 1MHz for 10MHz channel bandwidth		
Environment conditions:	Ambient Temperature: 23.1°C	Relative Humidity: 55.4%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.2.1 - Plot 4.2.24	

#### Test results for output ANT 1:

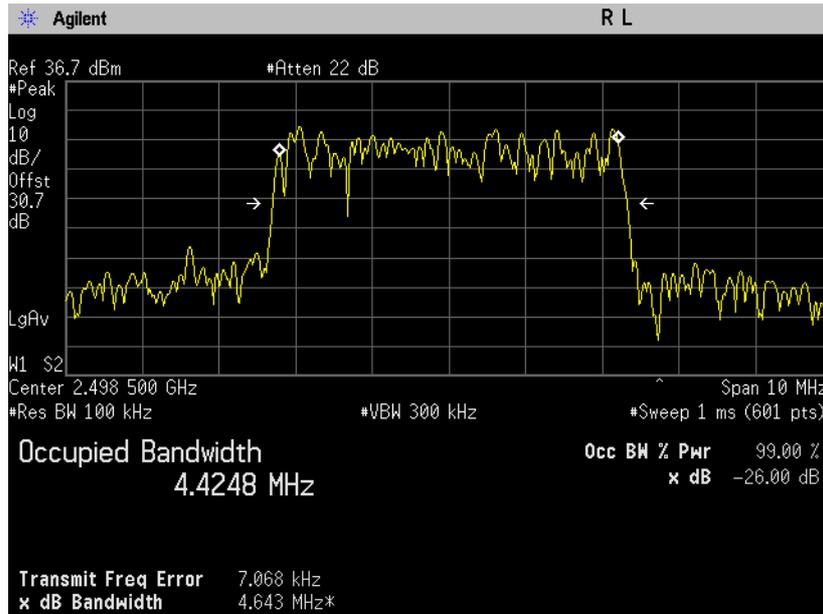
Channel	Frequency [MHz]	Occupied BW 99% Power [MHz]	26 dB Bandwidth [MHz]	Ref Plots
<b>WiMAX 802.16e (5MHz), OFDMA, QPSK, Duty Cycle 32%</b>				
Low	2498.5	4.4248	4.643	4.2.1
Middle	2600.0	4.4279	4.642	4.2.2
High	2687.5	4.4315	4.640	4.2.3
<b>WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%</b>				
Low	2498.5	4.4785	4.672	4.2.4
Middle	2600.0	4.4704	4.674	4.2.5
High	2687.5	4.4749	4.675	4.2.6
<b>WiMAX 802.16e (10MHz), OFDMA, QPSK, Duty Cycle 27%</b>				
Low	2501	9.1729	9.728	4.2.7
Middle	2600	9.1796	9.723	4.2.8
High	2685	9.1787	9.726	4.2.9
<b>WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%</b>				
Low	2501	8.9769	9.692	4.2.10
Middle	2600	8.9863	9.696	4.2.11
High	2685	8.9896	9.698	4.2.12

**Test results for output ANT 2:**

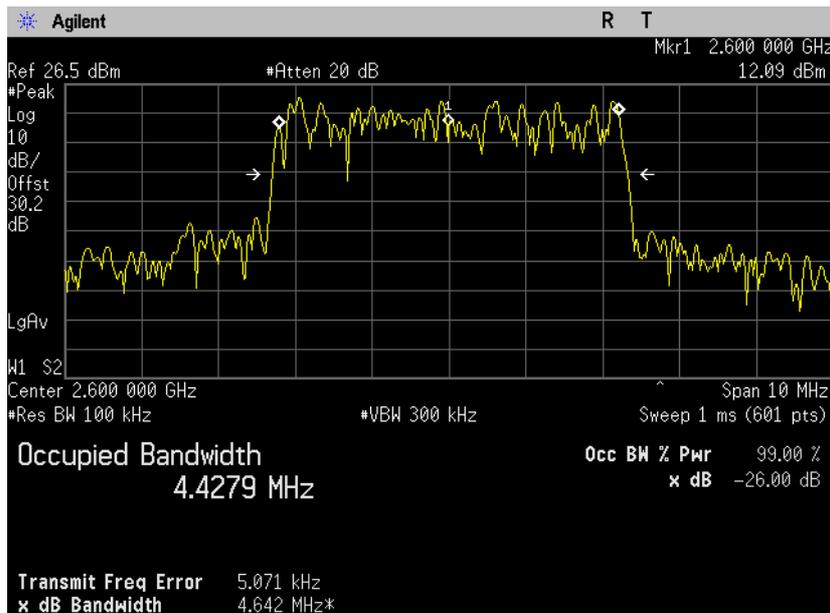
Channel	Frequency [MHz]	Occupied BW 99% Power [MHz]	26 dB Bandwidth [MHz]	Ref Plots
<b>WiMAX 802.16e (5MHz), OFDMA, QPSK, Duty Cycle 32%</b>				
Low	2498.5	4.4247	4.638	4.2.13
Middle	2600.0	4.4296	4.639	4.2.14
High	2687.5	4.4288	4.641	4.2.15
<b>WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%</b>				
Low	2498.5	4.4692	4.673	4.2.16
Middle	2600.0	4.4744	4.675	4.2.17
High	2687.5	4.4741	4.677	4.2.18
<b>WiMAX 802.16e (10MHz), OFDMA, QPSK, Duty Cycle 27%</b>				
Low	2501	9.1685	9.726	4.2.19
Middle	2600	9.1787	9.722	4.2.20
High	2685	9.1772	9.725	4.2.21
<b>WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%</b>				
Low	2501	8.9789	9.695	4.2.22
Middle	2600	8.9852	9.699	4.2.23
High	2685	8.9886	9.698	4.2.24

**WiMAX 802.16e (5MHz), OFDMA, QPSK, Duty Cycle 32%**  
**Output ANT 1**

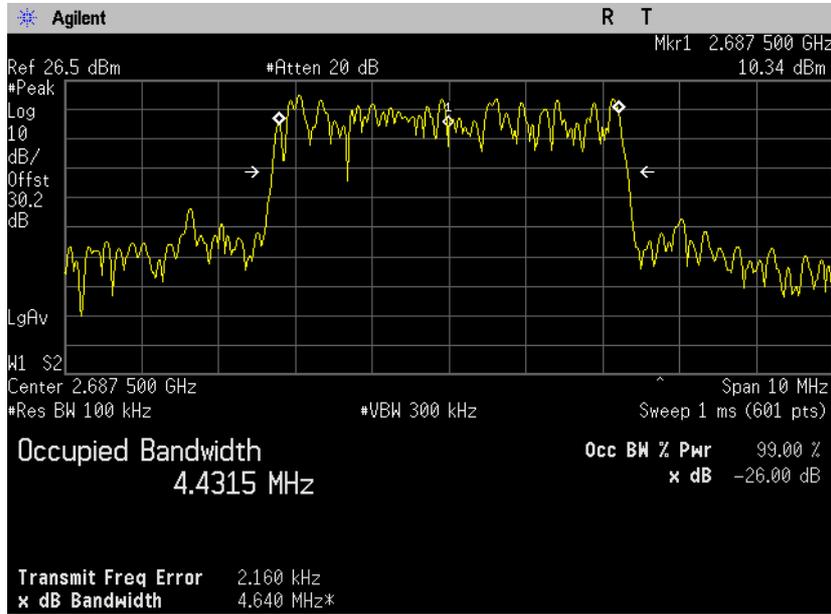
**Low Frequency 2498.5 MHz**  
**Plot 4.2.1**



**Middle Frequency 2600 MHz**  
**Plot 4.2.2**

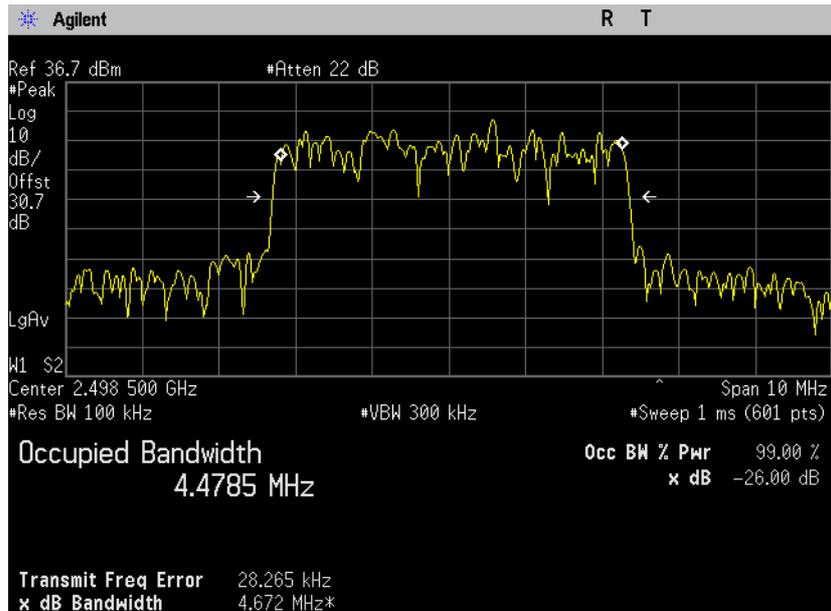


**High Frequency 2687.5 MHz**  
**Plot 4.2.3**

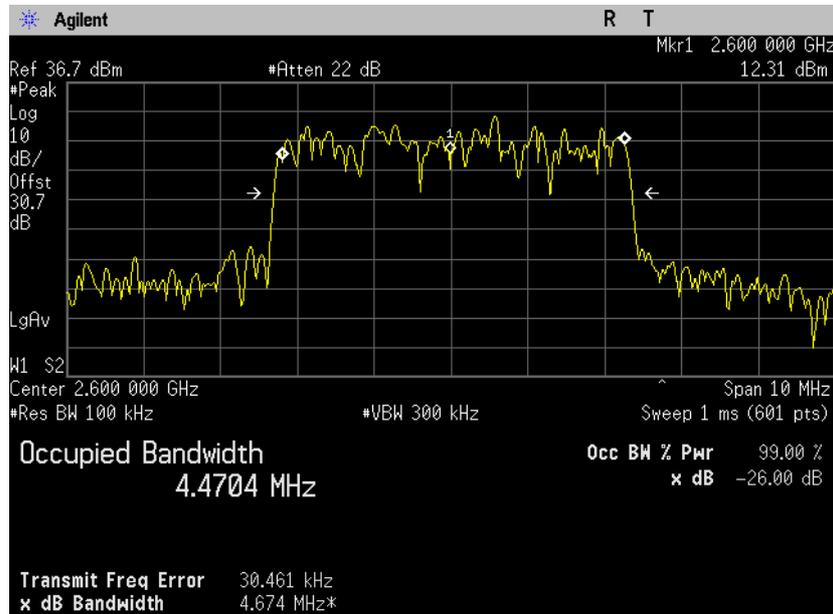


**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 1**

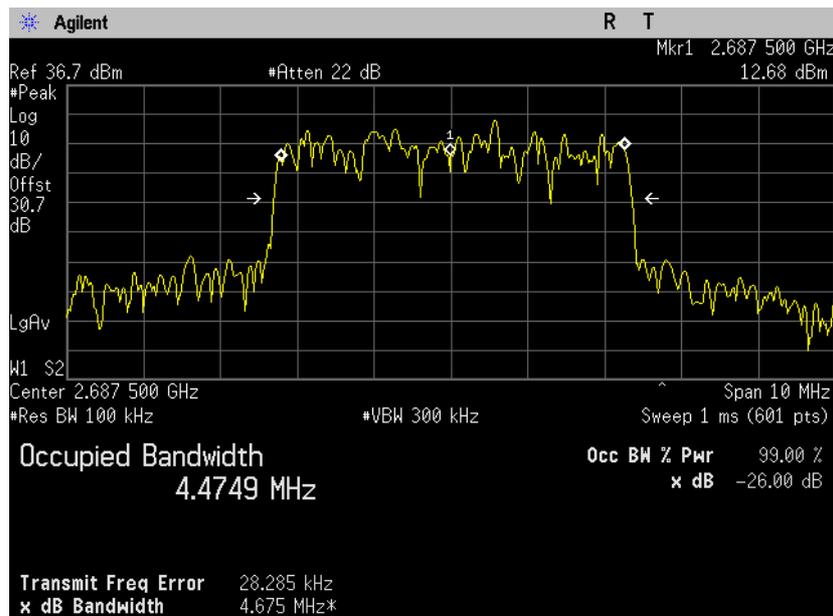
**Low Frequency 2498.5 MHz**  
**Plot 4.2.4**



**Middle Frequency 2600 MHz**  
**Plot 4.2.5**

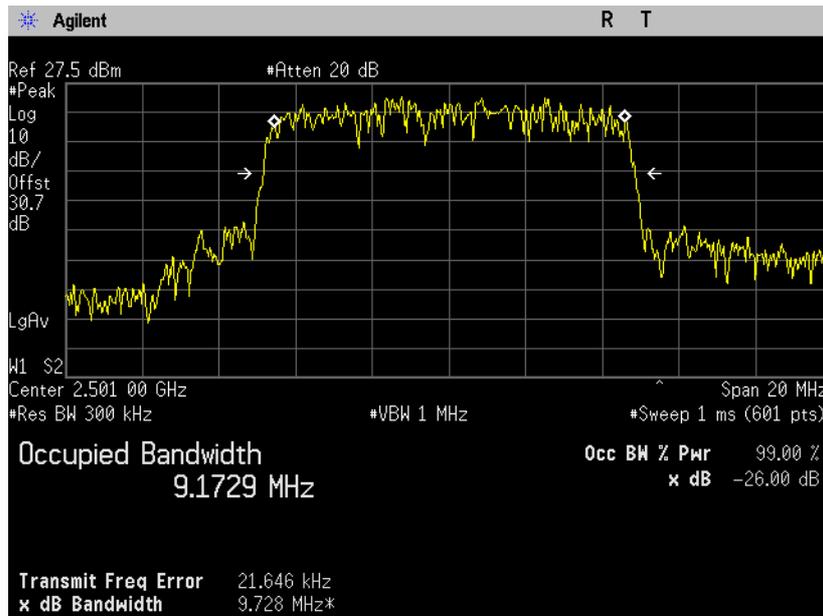


**High Frequency 2687.5 MHz**  
**Plot 4.2.6**

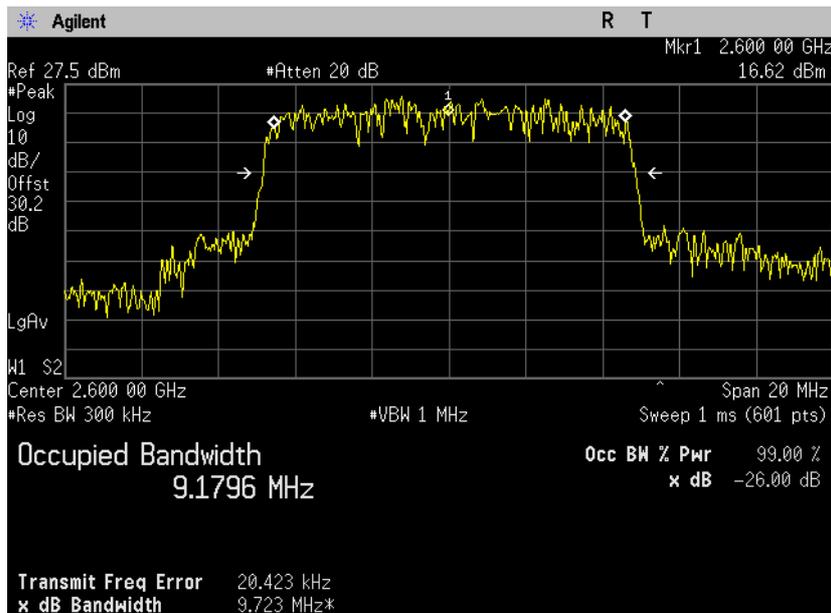


**WiMAX 802.16e (10MHz), OFDMA, QPSK, Duty Cycle 27%  
Output ANT 1**

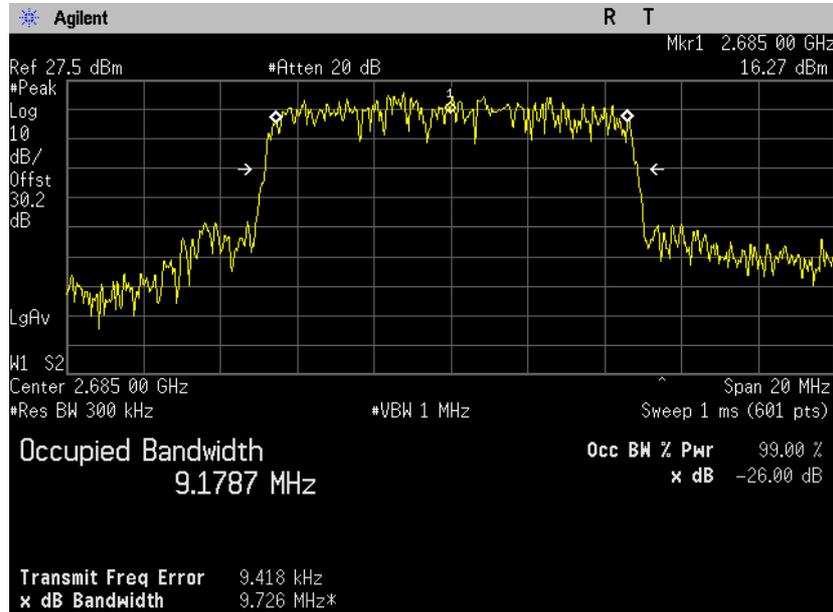
**Low Frequency 2501 MHz  
Plot 4.2.7**



**Middle Frequency 2600 MHz  
Plot 4.2.8**

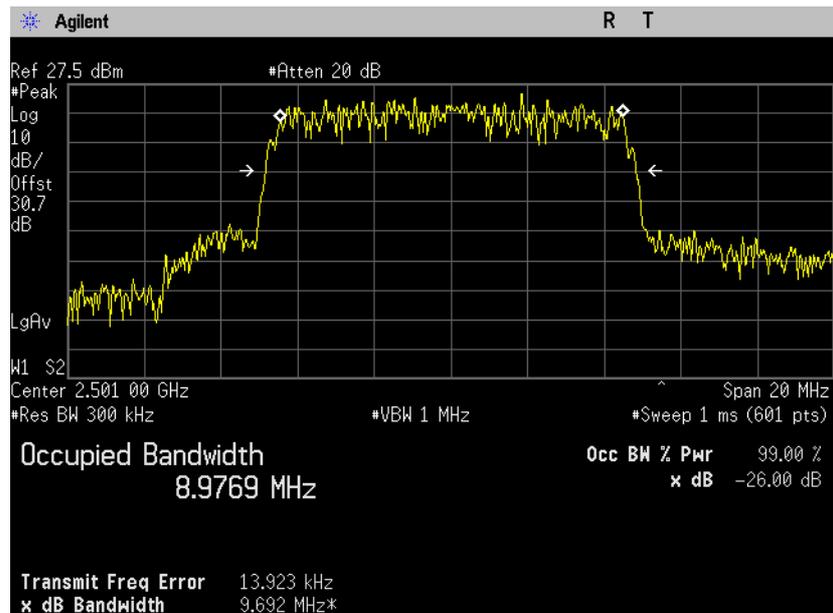


**High Frequency 2685 MHz**  
**Plot 4.2.9**

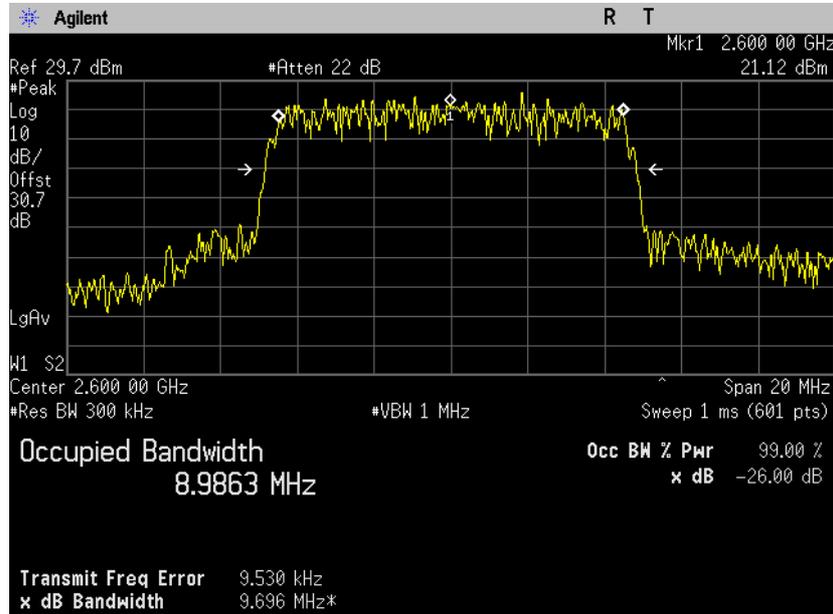


**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 1**

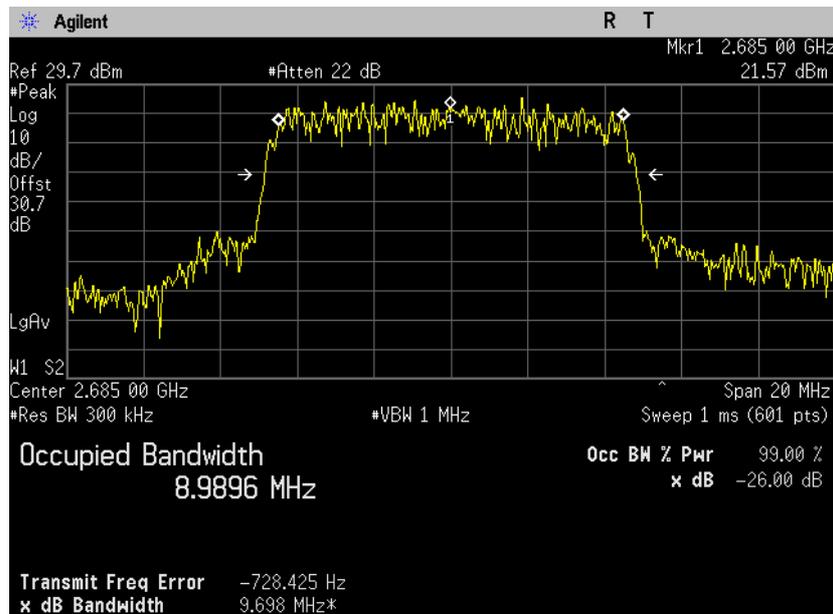
**Low Frequency 2501 MHz**  
**Plot 4.2.10**



**Middle Frequency 2600 MHz**  
**Plot 4.2.11**

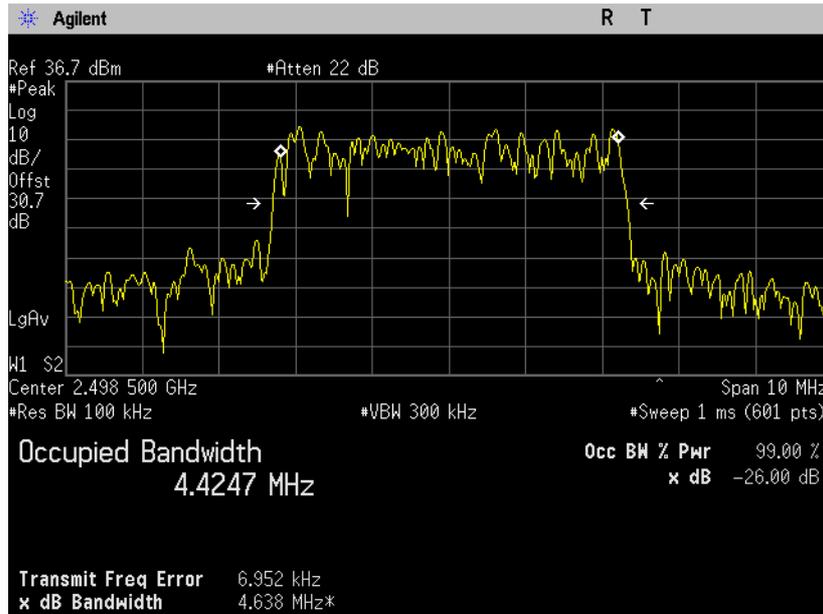


**High Frequency 2685 MHz**  
**Plot 4.2.12**

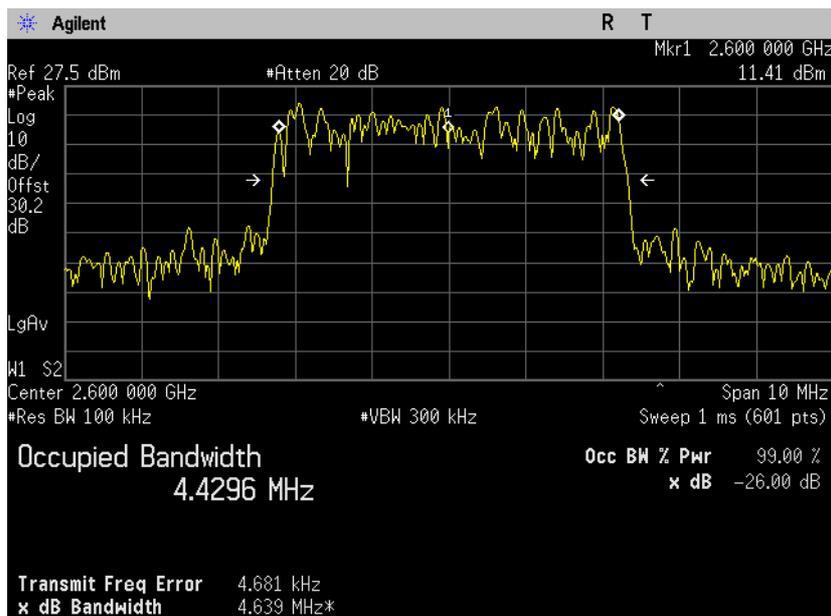


**WiMAX 802.16e (5MHz), OFDMA, QPSK, Duty Cycle 32%**  
**Output ANT 2**

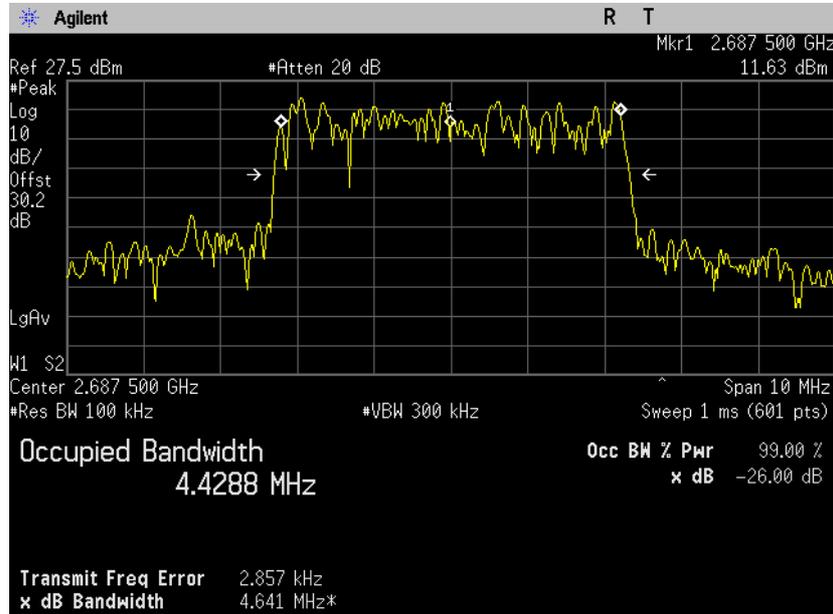
**Low Frequency 2498.5 MHz**  
**Plot 4.2.13**



**Middle Frequency 2600 MHz**  
**Plot 4.2.14**

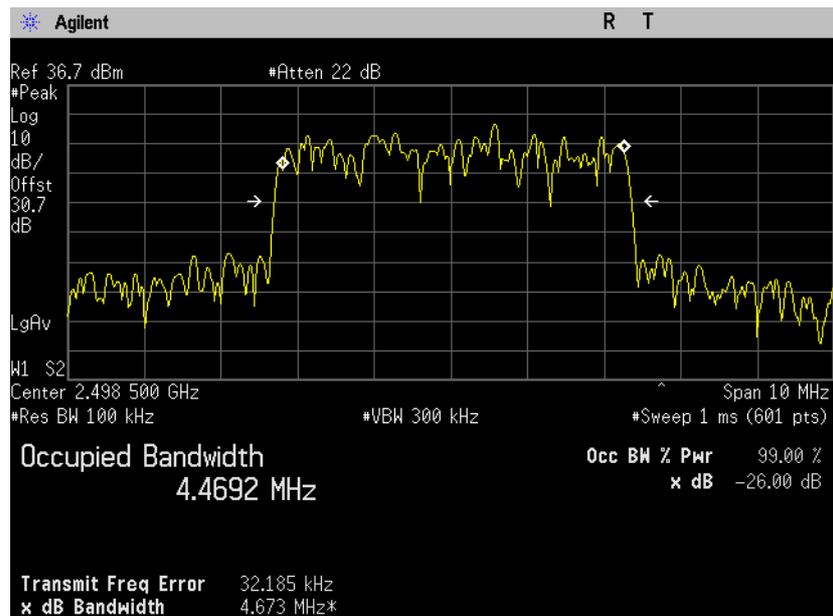


**High Frequency 2687.5 MHz**  
**Plot 4.2.15**

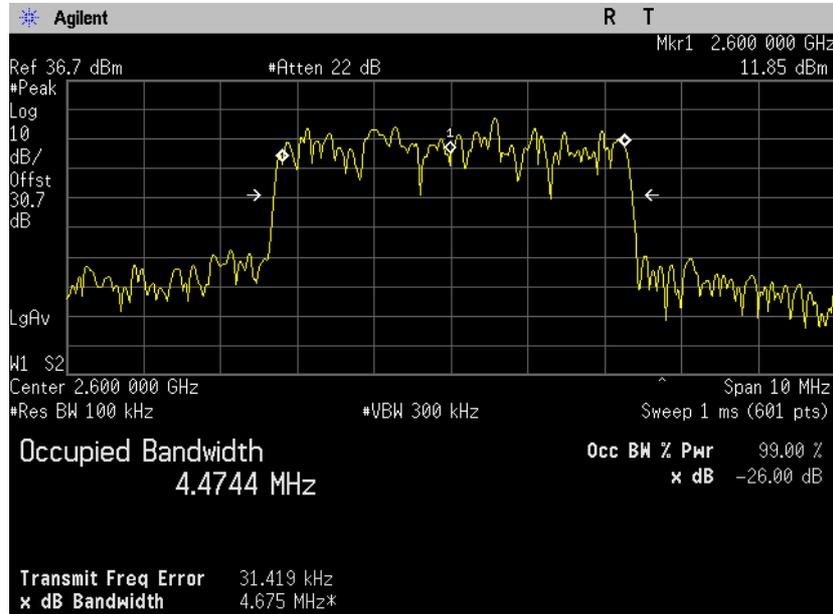


**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 2**

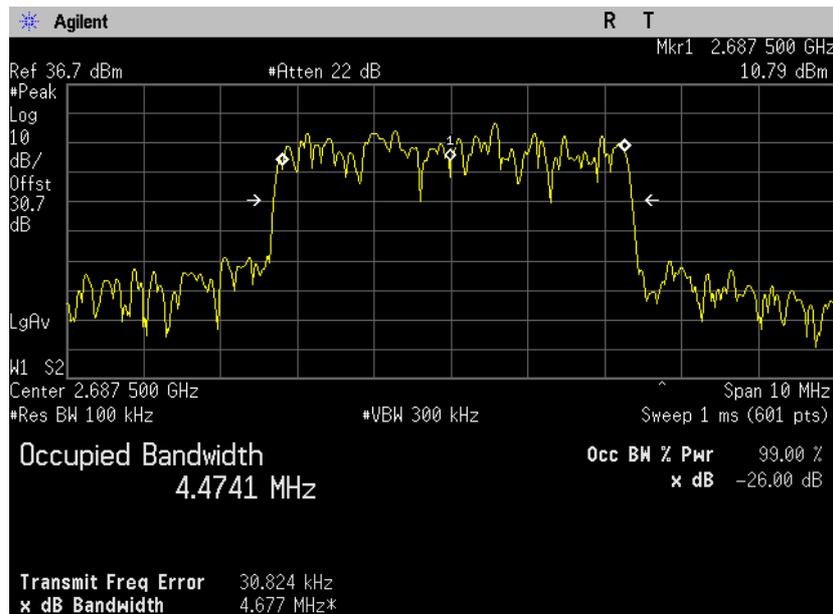
**Low Frequency 2498.5 MHz**  
**Plot 4.2.16**



**Middle Frequency 2600 MHz**  
**Plot 4.2.17**

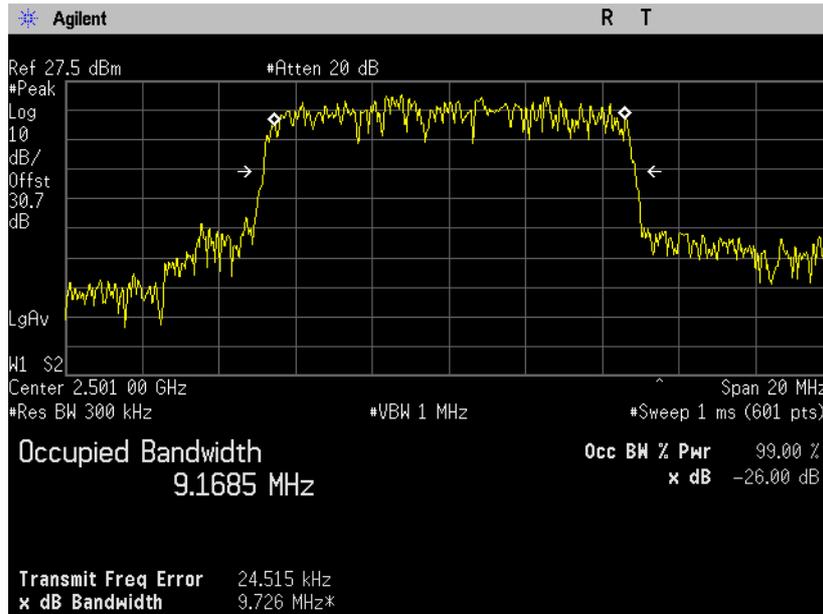


**High Frequency 2687.5 MHz**  
**Plot 4.2.18**

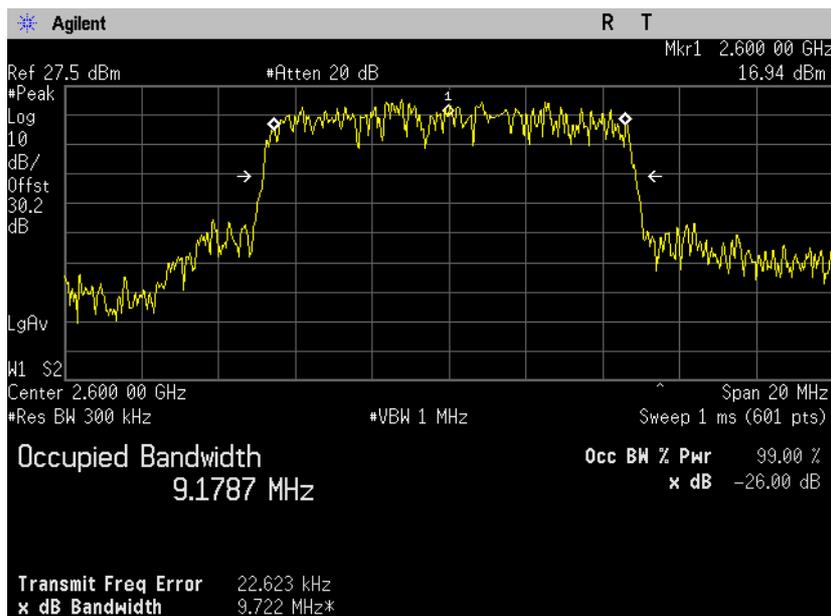


**WiMAX 802.16e (10MHz), OFDMA, QPSK, Duty Cycle 27%**  
**Output ANT 2**

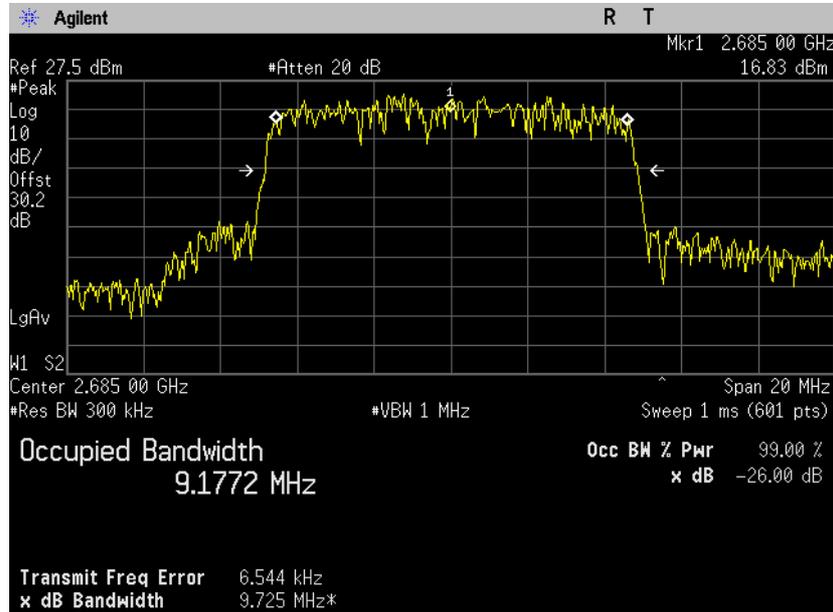
**Low Frequency 2501 MHz**  
**Plot 4.2.19**



**Middle Frequency 2600 MHz**  
**Plot 4.2.20**

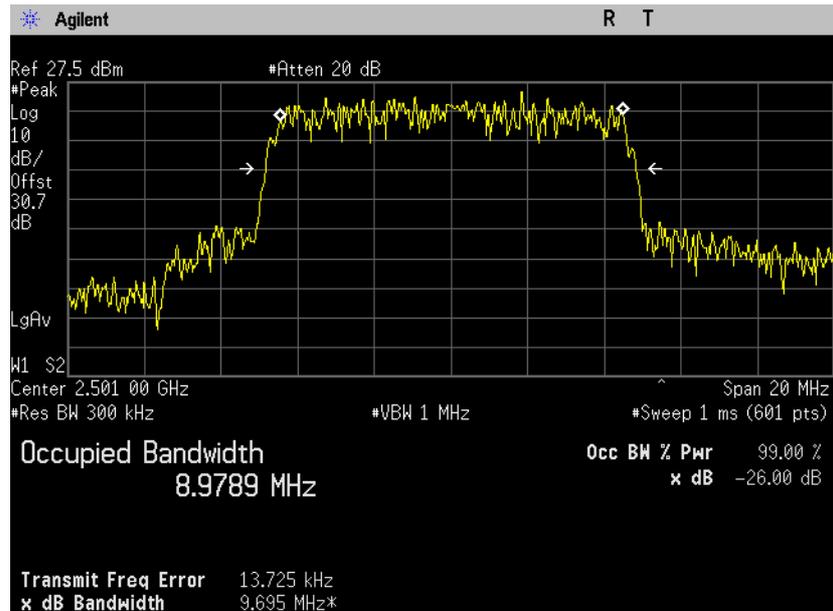


**High Frequency 2685 MHz**  
**Plot 4.2.21**

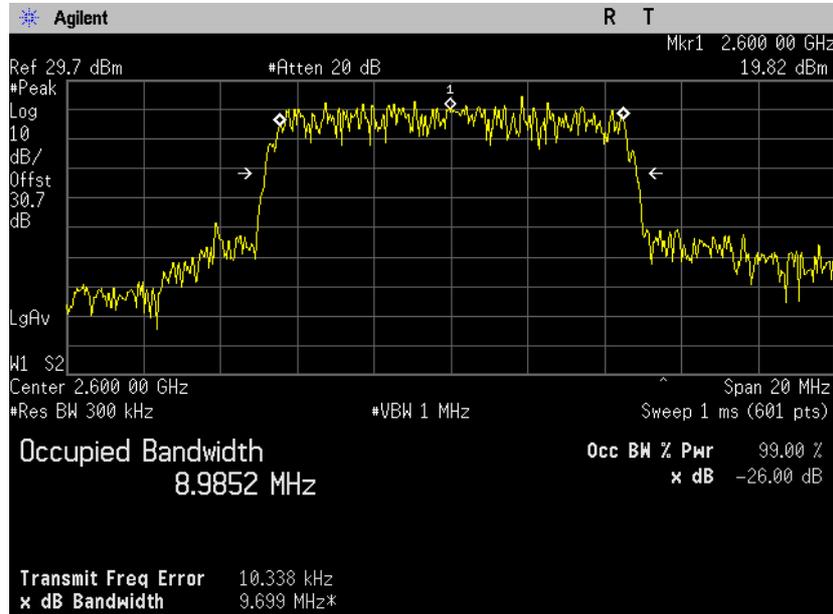


**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 2**

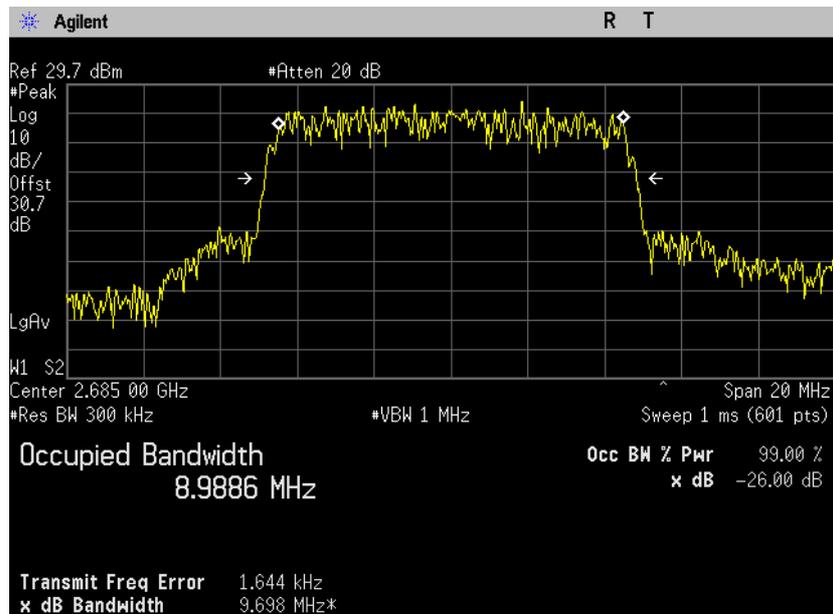
**Low Frequency 2501 MHz**  
**Plot 4.2.22**



**Middle Frequency 2600 MHz**  
**Plot 4.2.23**



**High Frequency 2685 MHz**  
**Plot 4.2.24**

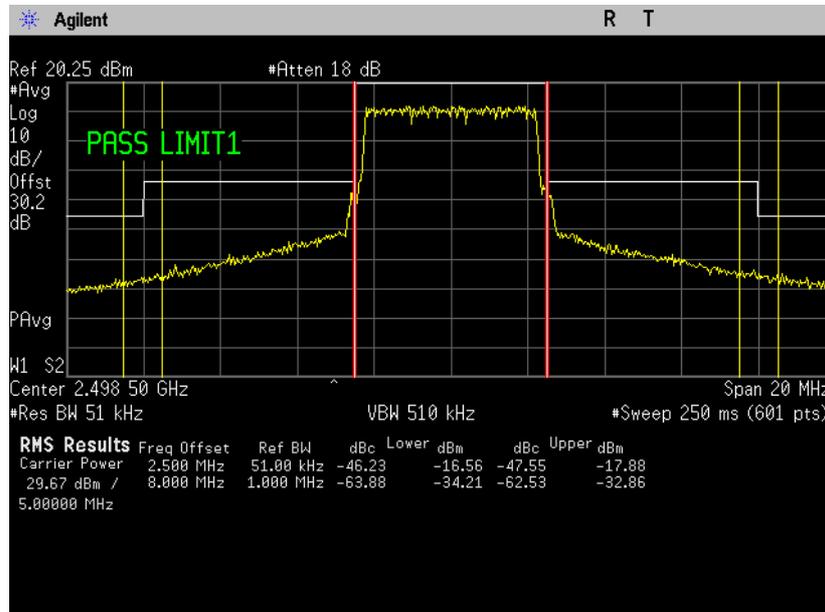


### 4.3. Channel Edge Measurement

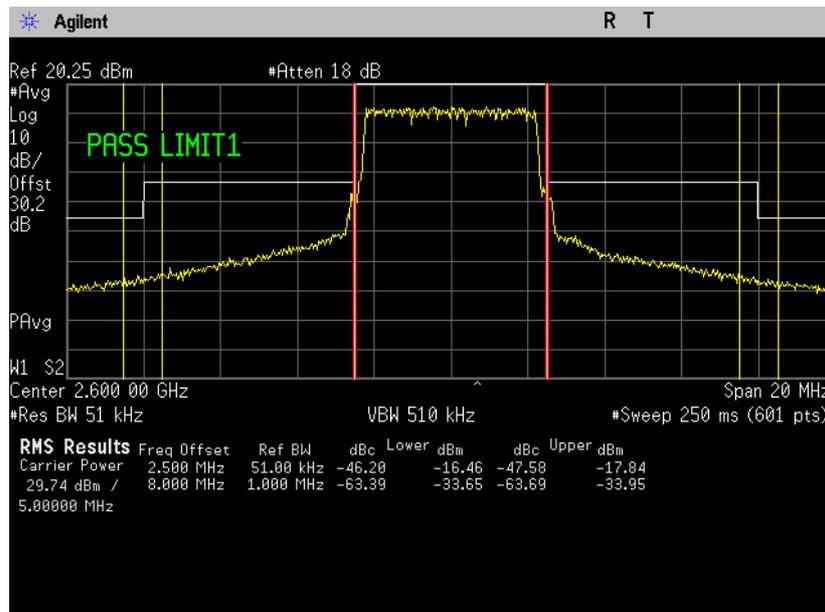
Reference document:	47 CFR §27.53 (m) (4) (6) & §2.1049		
Test Requirements:	For mobile digital stations, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB at the channel edge and $55 + 10 \log (P)$ dB at 5.5 megahertz from the channel edges. In the 1 MHz bands immediately outside and 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.		
Test setup:	See sec 3.1	<b>Pass</b>	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 51kHz, VBW: 510kHz for 5MHz channel bandwidth RBW: 100kHz, VBW: 1MHz for 10MHz channel bandwidth		
Environment conditions:	Ambient Temperature: 23.1°C	Relative Humidity: 55.4%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.3.1 - Plot 4.3.12	

**Test results for output ANT 1 & ANT 2:** All readings below the emissions mask.

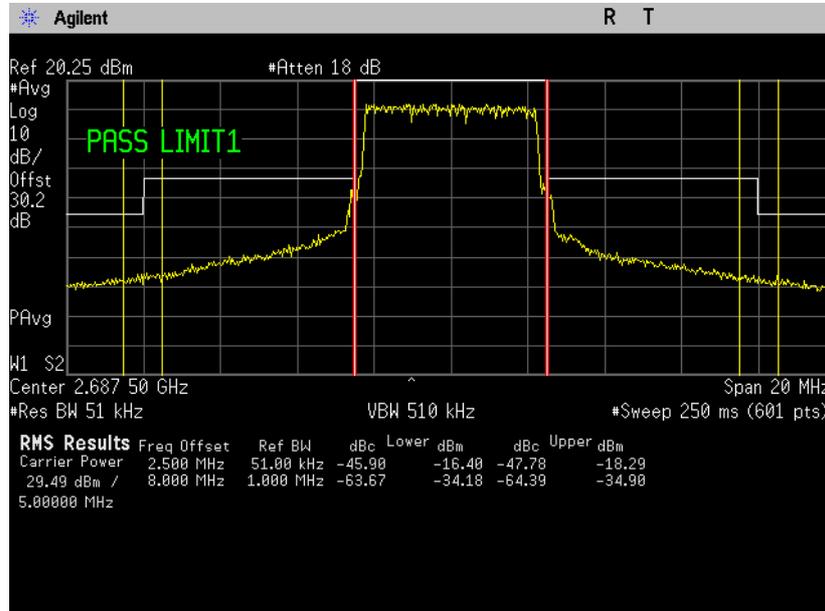
**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 1**  
**Low Frequency 2498.5 MHz**  
**Plot 4.3.1**



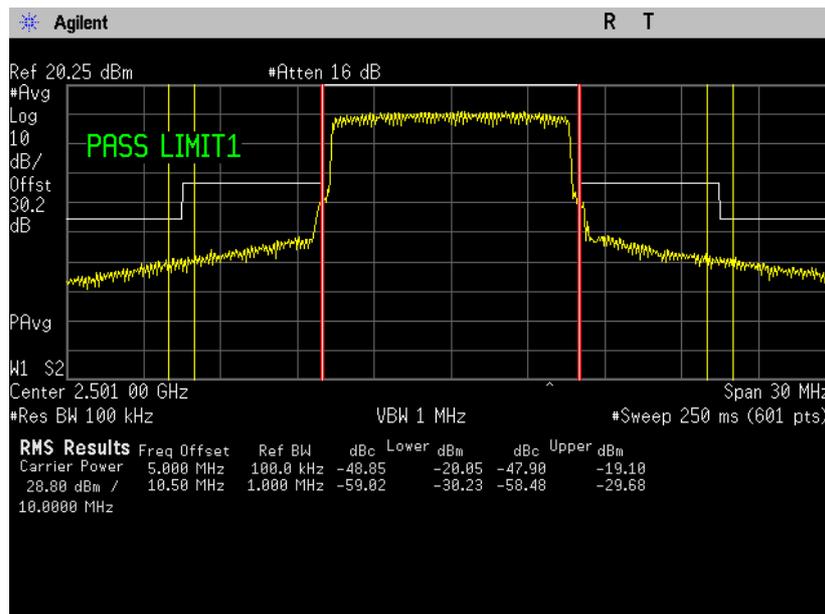
**Middle Frequency 2600 MHz**  
**Plot 4.3.2**



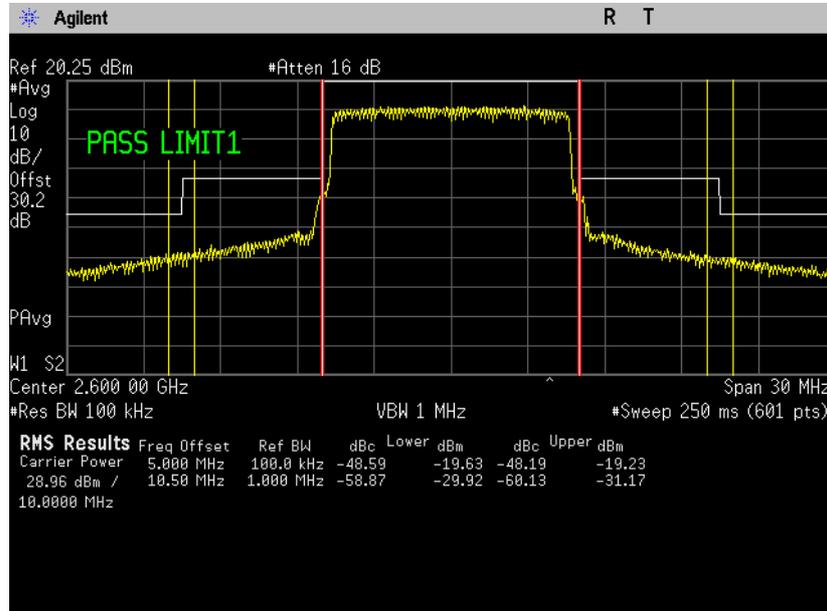
**High Frequency 2687.5 MHz**  
**Plot 4.3.3**



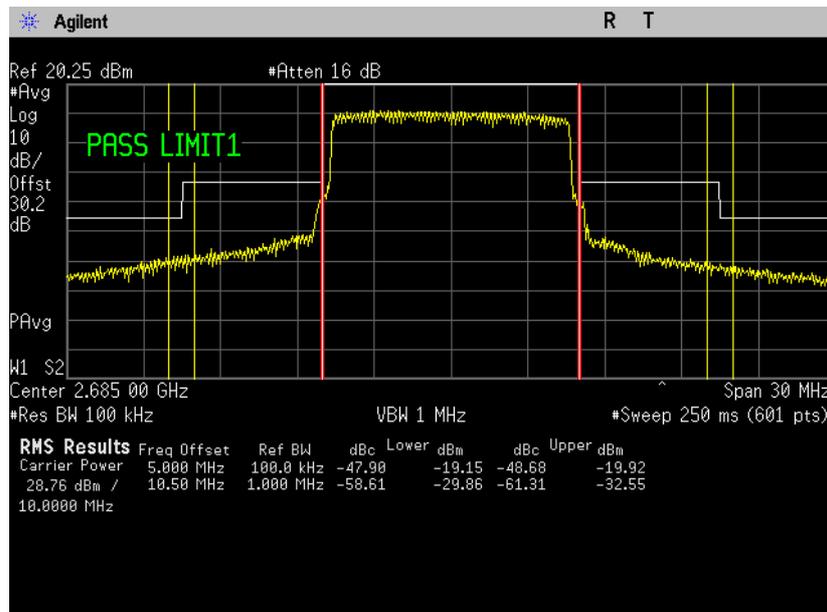
**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 1**  
**Low Frequency 2501 MHz**  
**Plot 4.3.4**



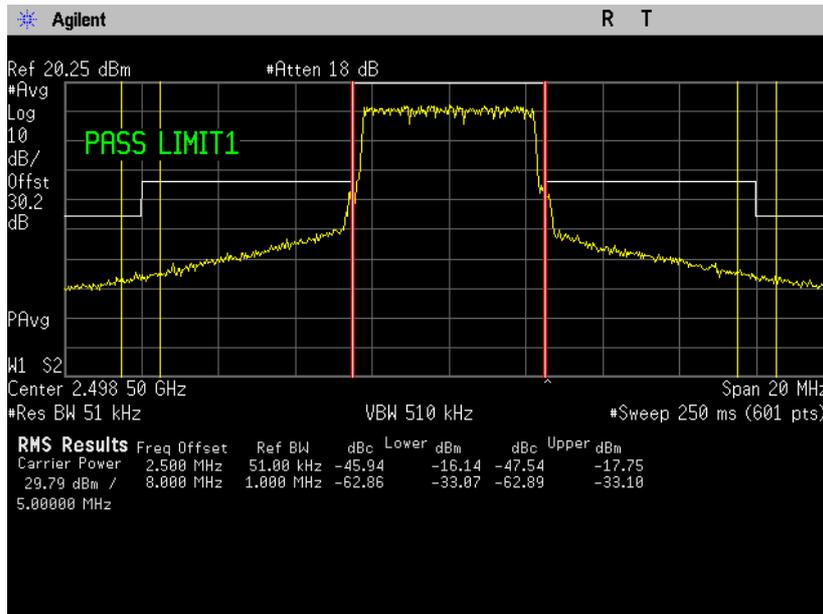
**Middle Frequency 2600 MHz**  
**Plot 4.3.5**



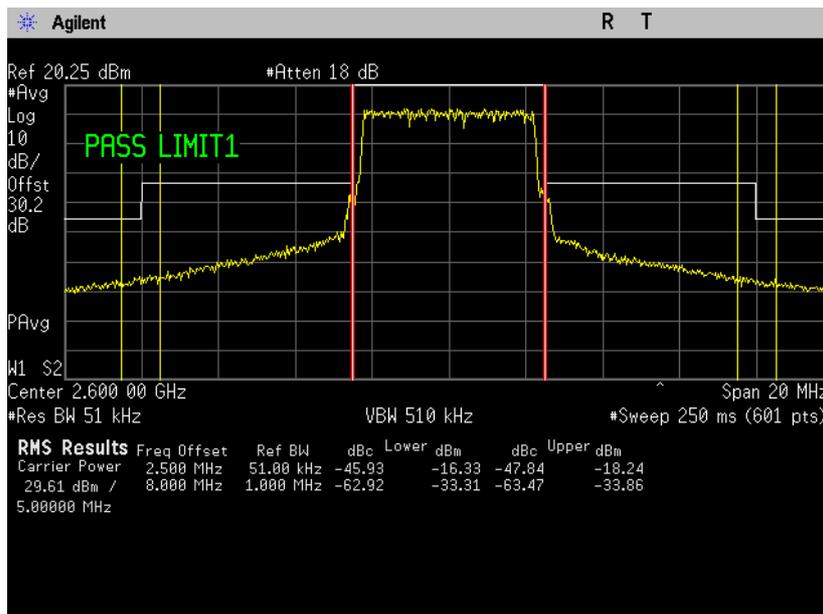
**High Frequency 2685 MHz**  
**Plot 4.3.6**



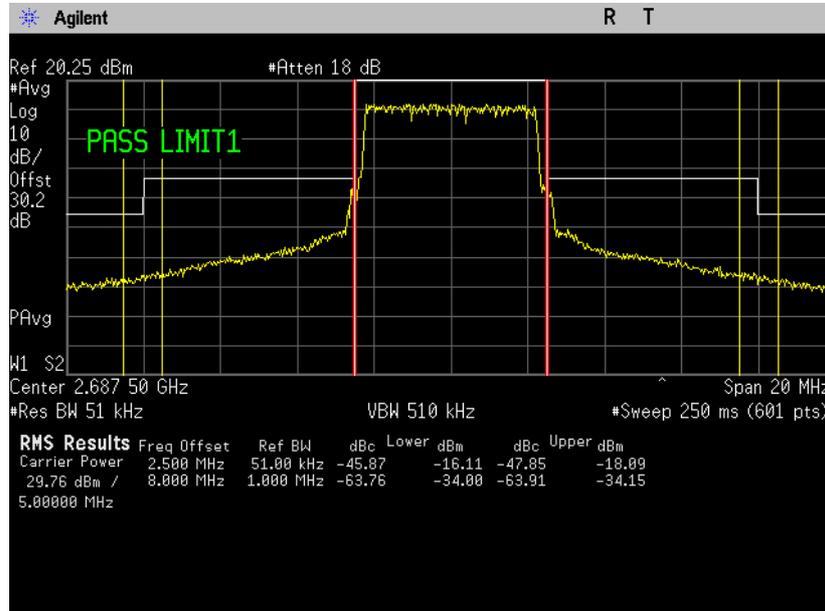
**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 2**  
**Low Frequency 2498.5 MHz**  
**Plot 4.3.7**



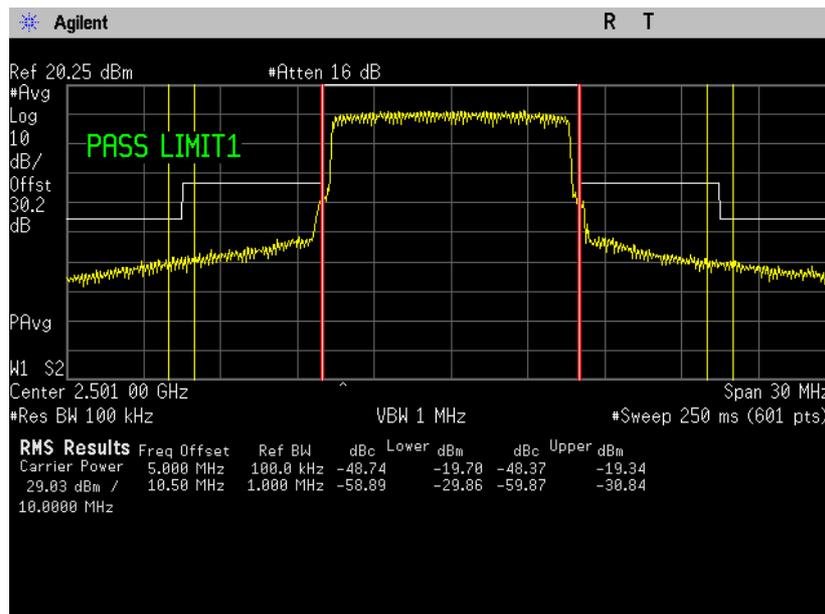
**Middle Frequency 2600 MHz**  
**Plot 4.3.8**



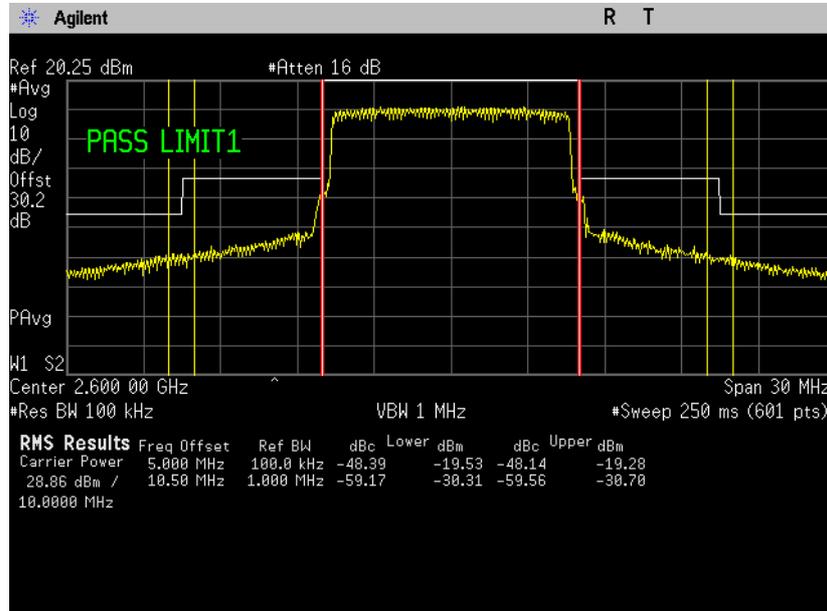
**High Frequency 2687.5 MHz**  
**Plot 4.3.9**



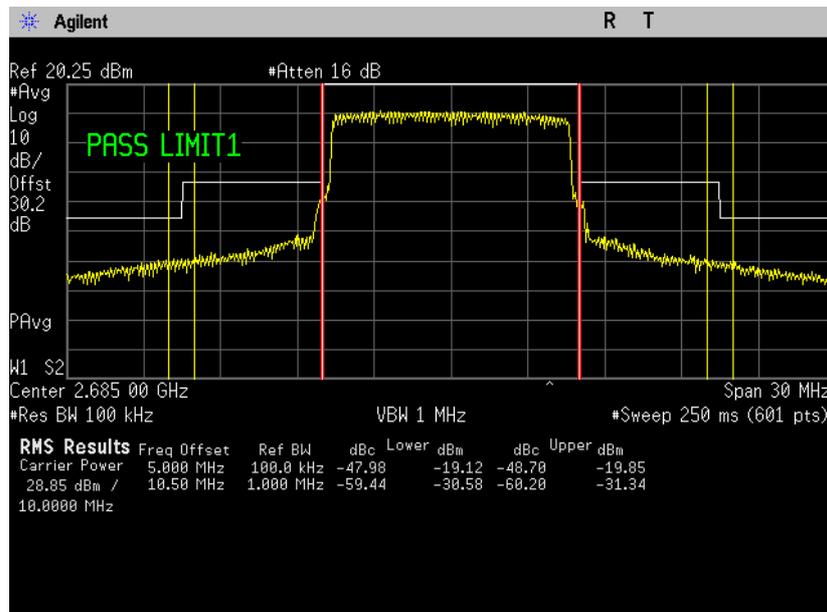
**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 2**  
**Low Frequency 2501 MHz**  
**Plot 4.3.10**



**Middle Frequency 2600 MHz**  
**Plot 4.3.11**



**High Frequency 2685 MHz**  
**Plot 4.3.12**



#### 4.4. Conducted Spurious Emissions

Reference document:	47 CFR §27.53 (m) (4) (6) & §2.1049		
Test Requirements:	For mobile digital stations, the attenuation factor shall not be less than 43 + 10 log (P) dB at the channel edge and 55 + 10 log (P) dB at 5.5 megahertz from the channel edges.		
Test setup:	See sec 3.1	<b>Pass</b>	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	Peak: RBW= 1MHz, VBW= 3MHz		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.4.1 to Plot 4.4.36	

#### Test results for output ANT 1:

Channel	Spurious Emission Frequency [MHz]	Measured [dBm]	Limit [dBm]	Reference Plots*	Result
<b>WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%</b>					
Low	*	*	-25	4.4.1 - 4.4.3	Comply
Middle	*	*	-25	4.4.4 - 4.4.6	Comply
High	5375	-27.81	-25	4.4.7 - 4.4.9	Comply
<b>WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%</b>					
Low	*	*	-25	4.4.10 - 4.4.12	Comply
Middle	*	*	-25	4.4.13 - 4.4.15	Comply
High	5370	-30.92	-25	4.4.16 - 4.4.18	Comply

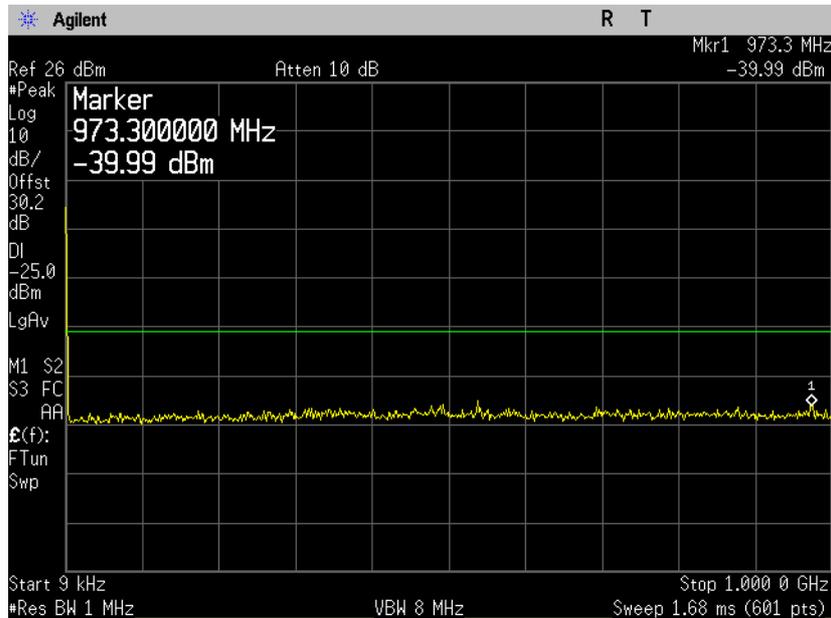
\* All readings below the limit.

#### Test results for output ANT 2:

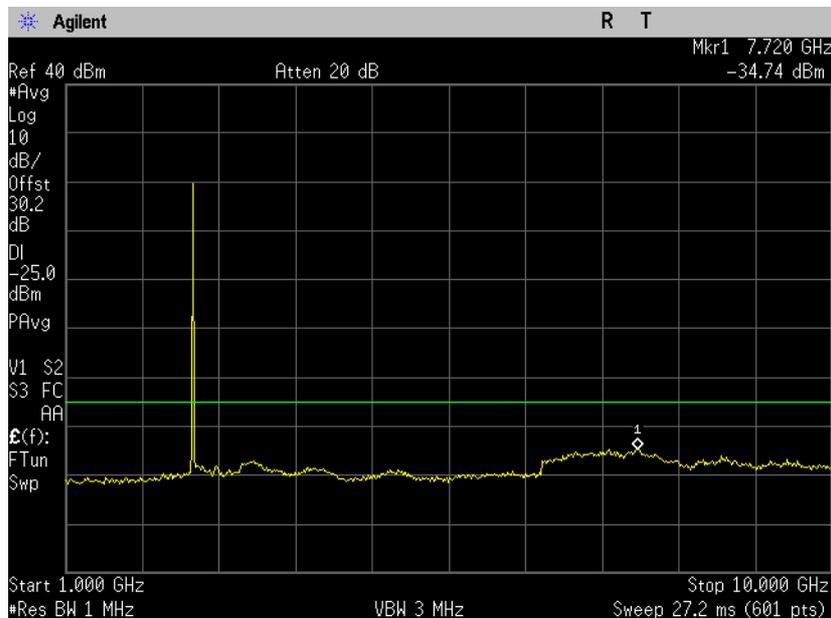
Channel	Spurious Emission Frequency [MHz]	Measured [dBm]	Limit [dBm]	Reference Plots*	Result
<b>WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%</b>					
Low	*	*	-25	4.4.19 - 4.4.21	Comply
Middle	*	*	-25	4.4.22 - 4.4.24	Comply
High	*	*	-25	4.4.25 - 4.4.27	Comply
<b>WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%</b>					
Low	*	*	-25	4.4.28 - 4.4.30	Comply
Middle	*	*	-25	4.4.31 - 4.4.33	Comply
High	*	*	-25	4.4.34 - 4.4.36	Comply

\* All readings below the limit.

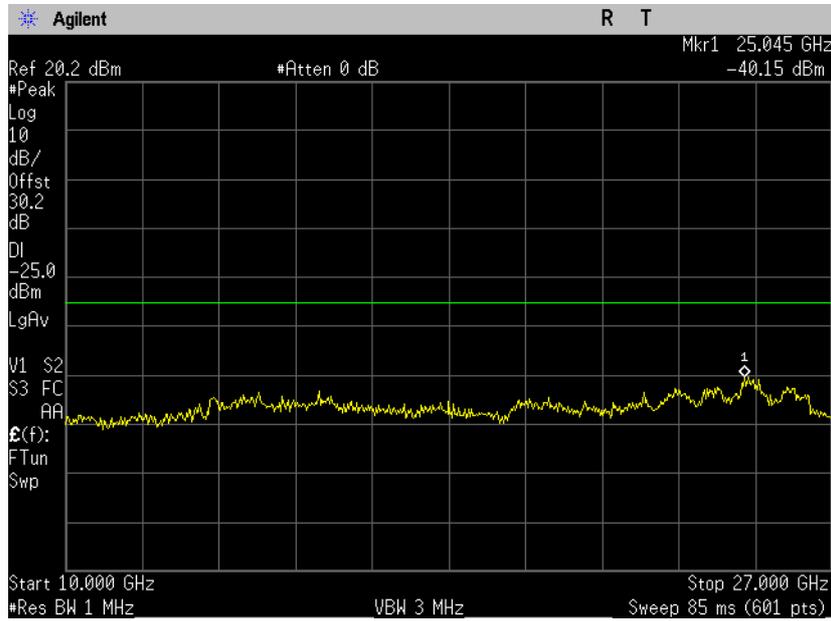
**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 1**  
**Low Frequency 2498.5 MHz**  
**Plot 4.4.1**



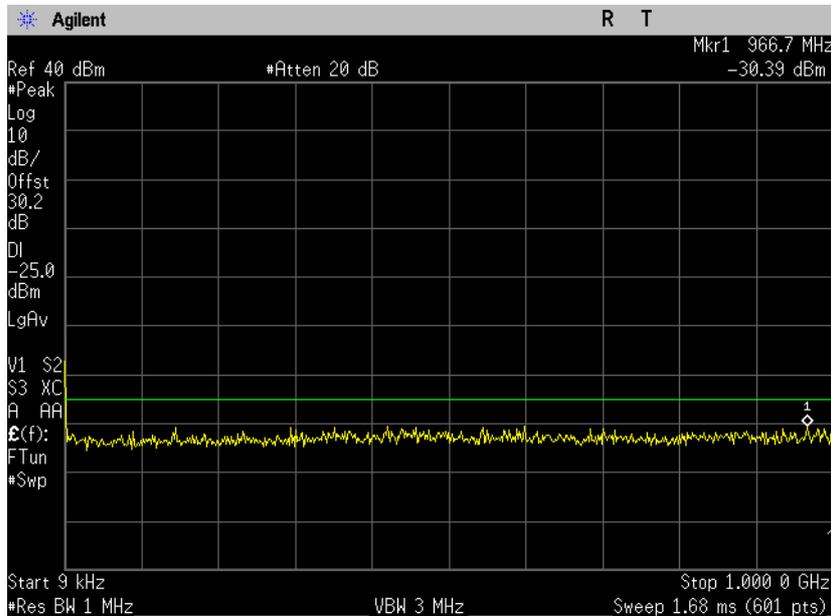
**Plot 4.4.2**



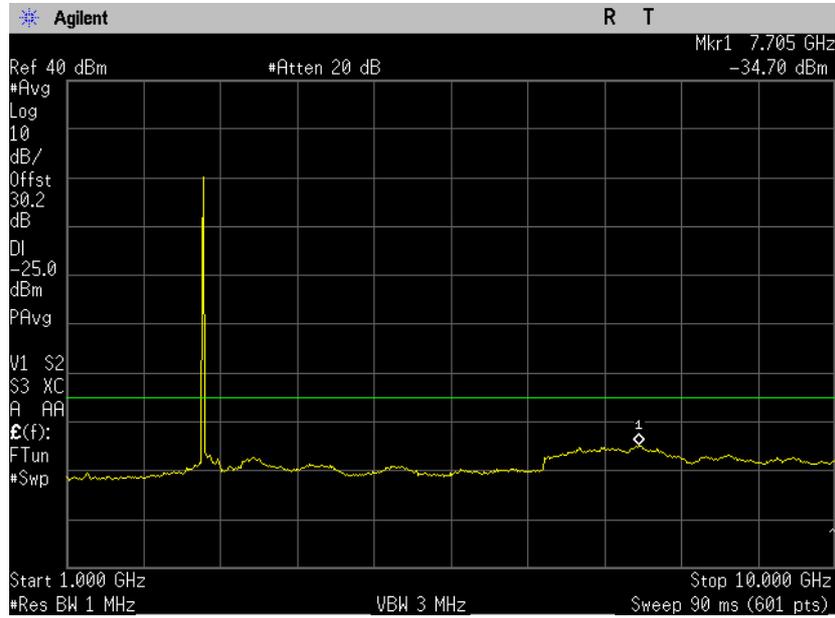
**Plot 4.4.3**



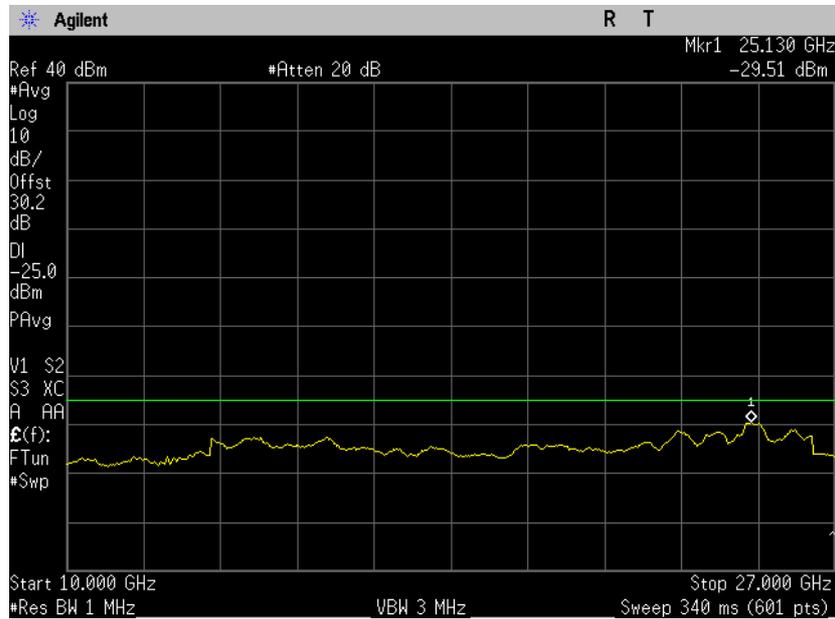
**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 1**  
**Middle Frequency 2600 MHz**  
**Plot 4.4.4**



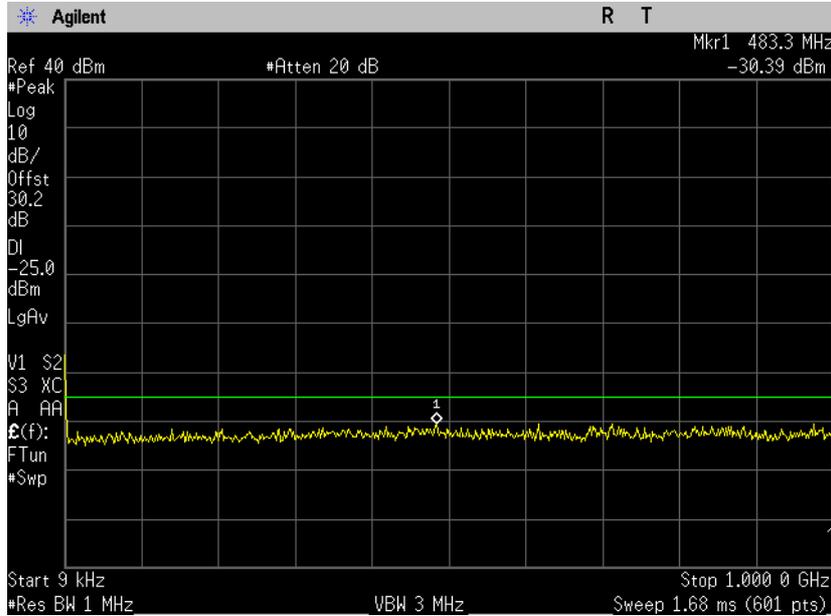
**Plot 4.4.5**



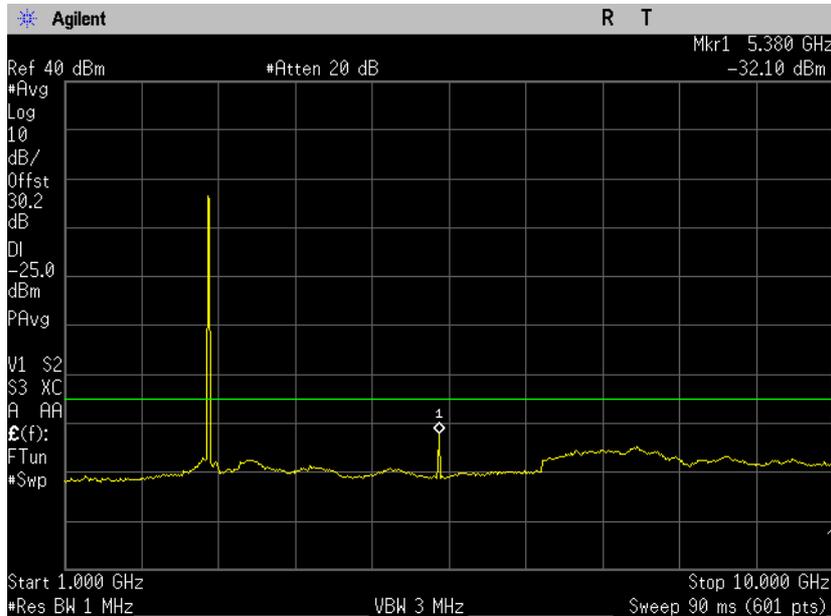
**Plot 4.4.6**



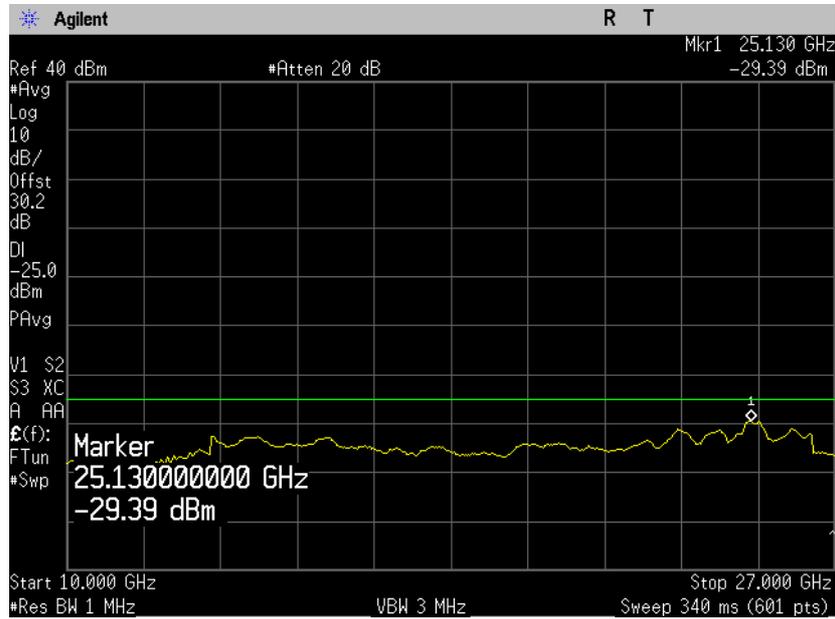
**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 1**  
**High Frequency 2687.5 MHz**  
**Plot 4.4.7**



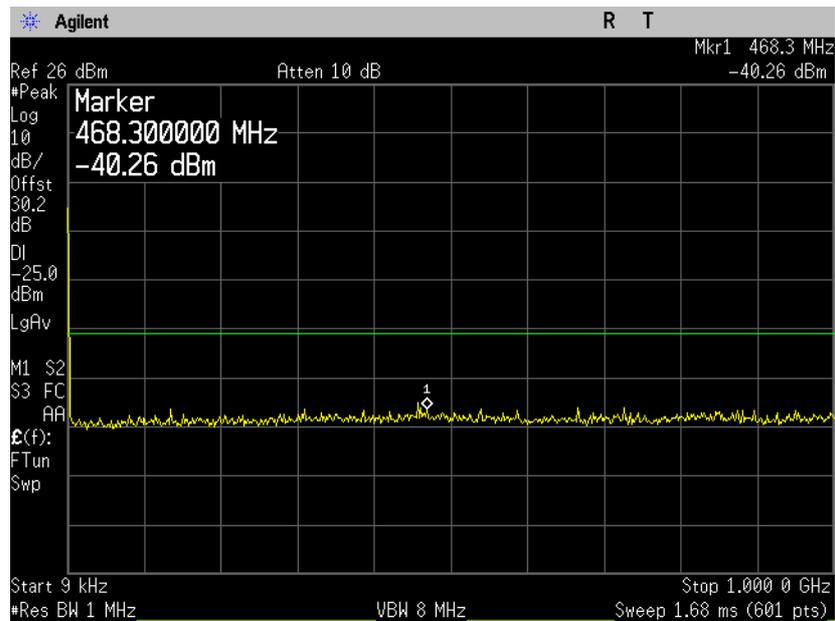
**Plot 4.4.8**



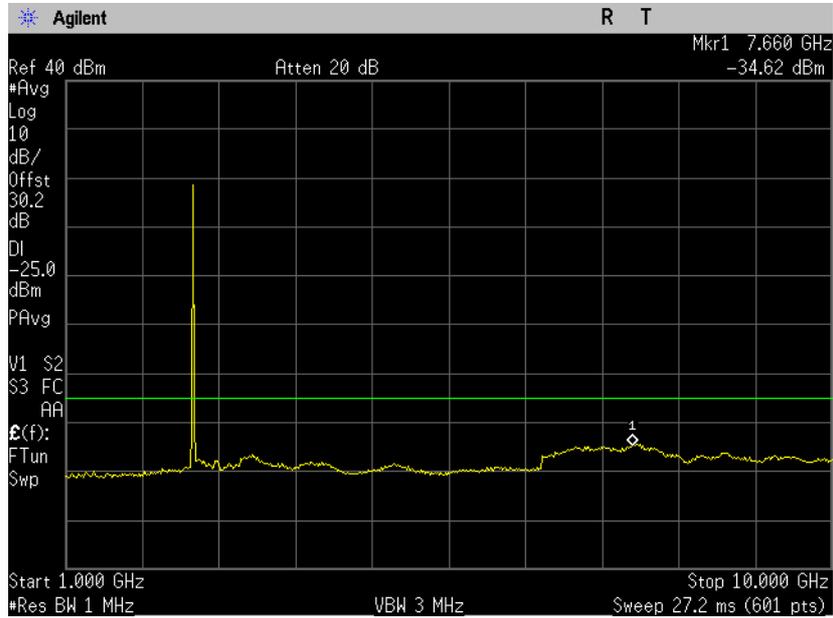
**Plot 4.4.9**



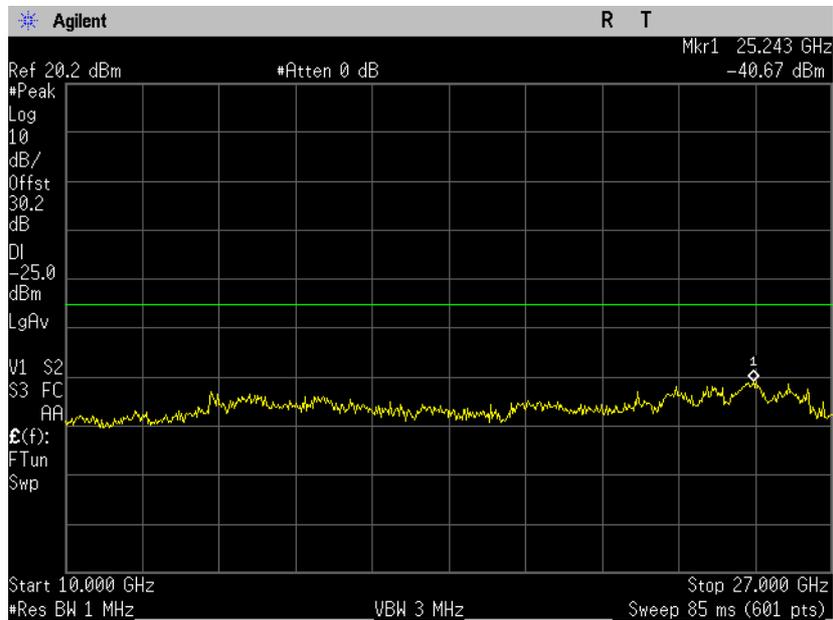
**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 1**  
**Low Frequency 2501 MHz**  
**Plot 4.4.10**



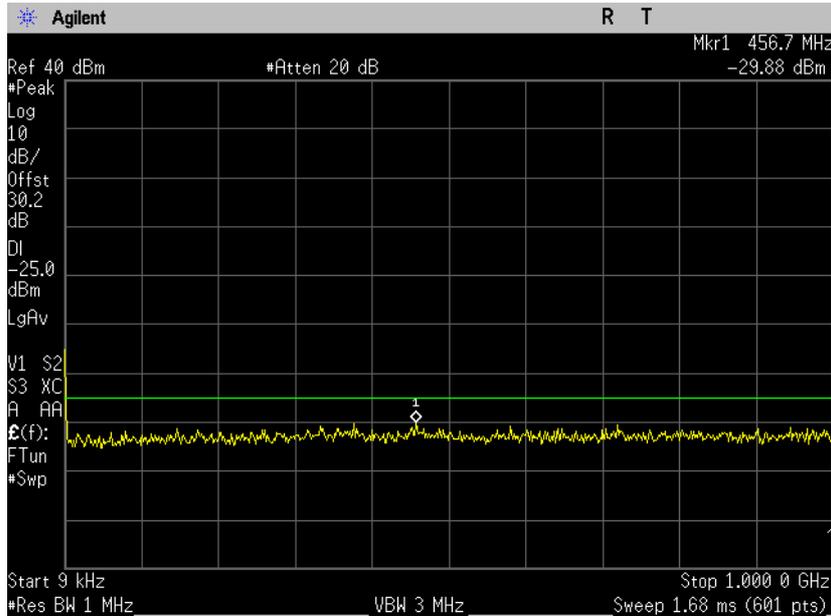
**Plot 4.4.11**



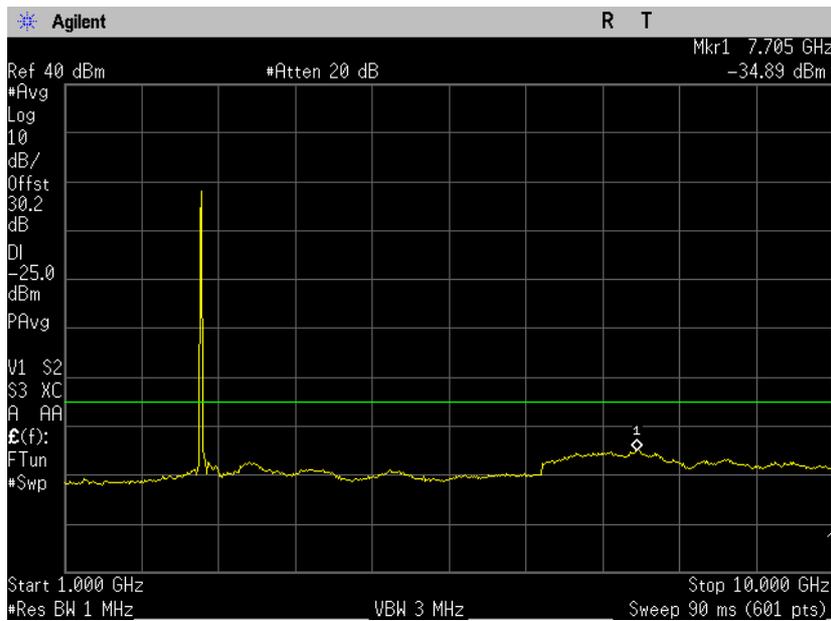
**Plot 4.4.12**



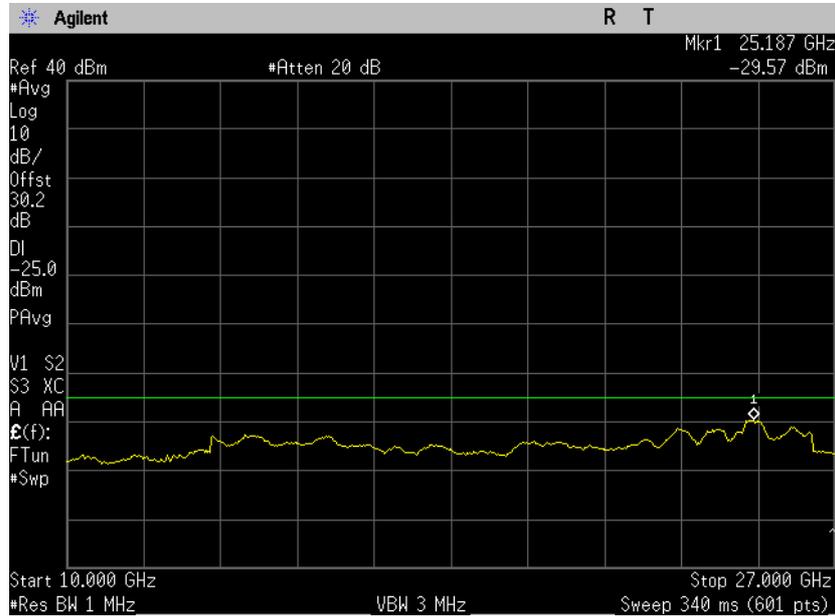
**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 1**  
**Middle Frequency 2600 MHz**  
**Plot 4.4.13**



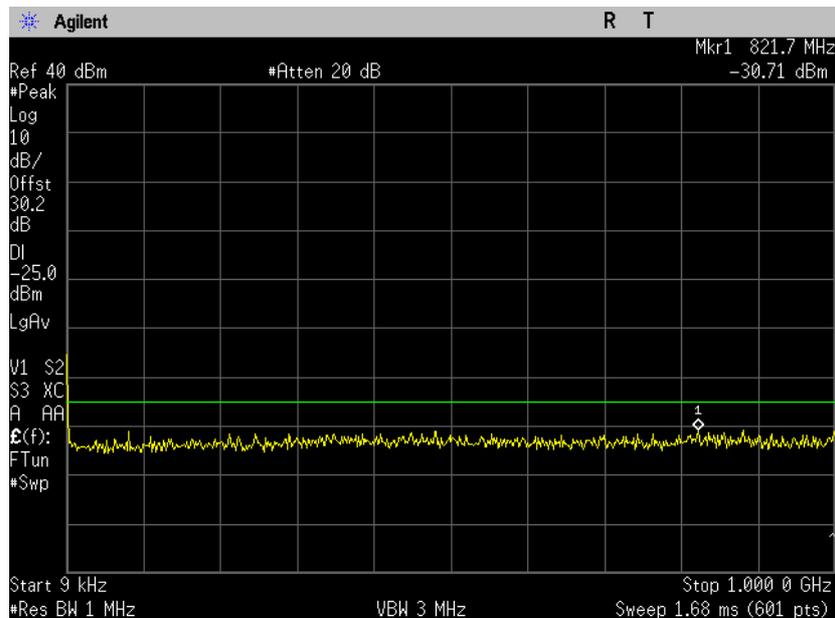
**Plot 4.4.14**



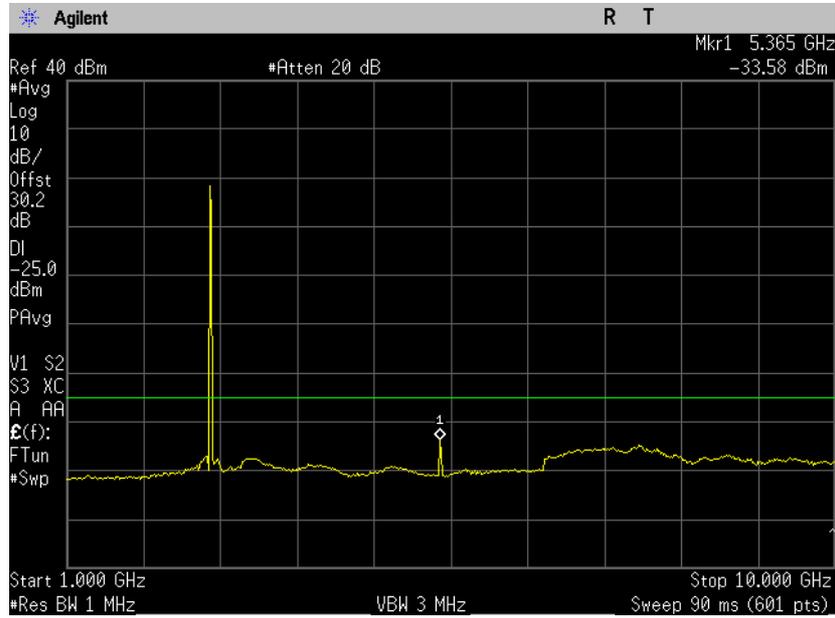
**Plot 4.4.15**



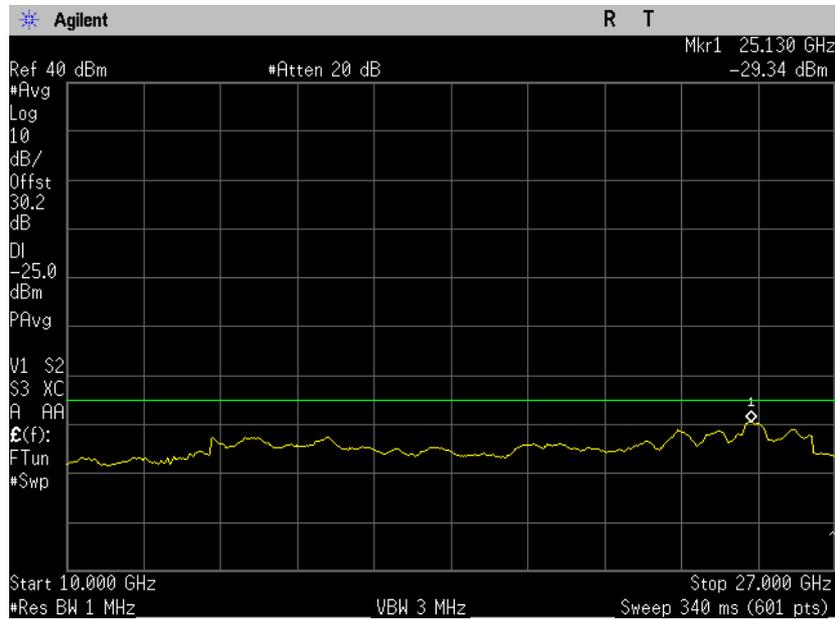
**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 1**  
**High Frequency 2685 MHz**  
**Plot 4.4.16**



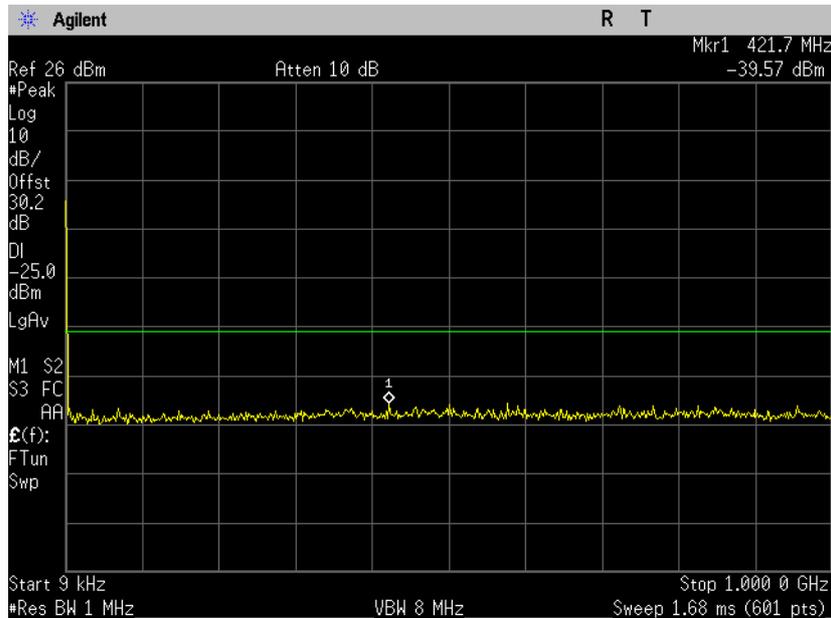
**Plot 4.4.17**



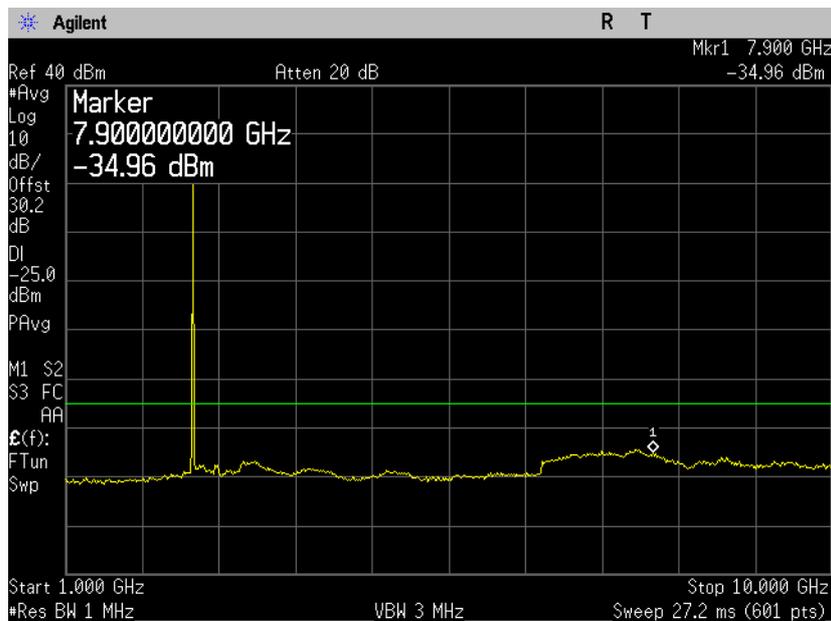
**Plot 4.4.18**



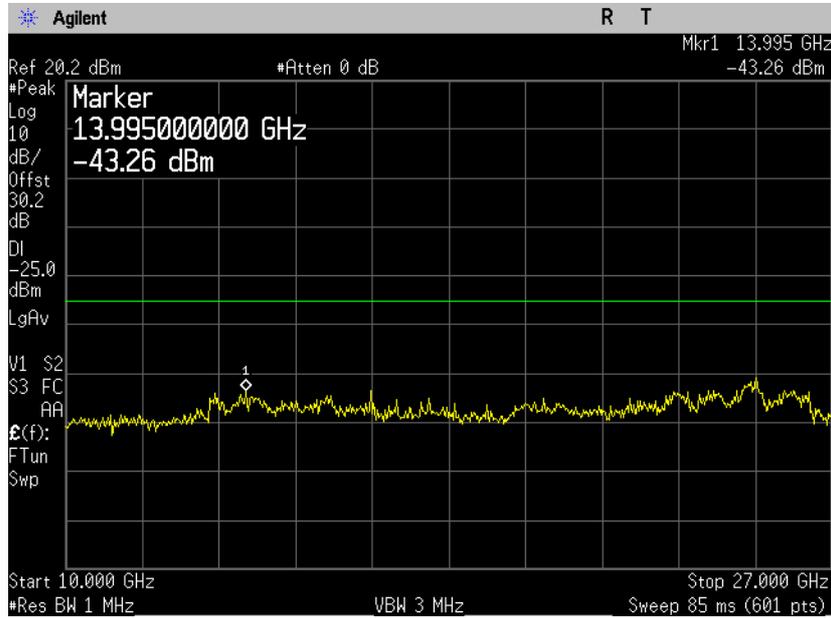
**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 2**  
**Low Frequency 2498.5 MHz**  
**Plot 4.4.19**



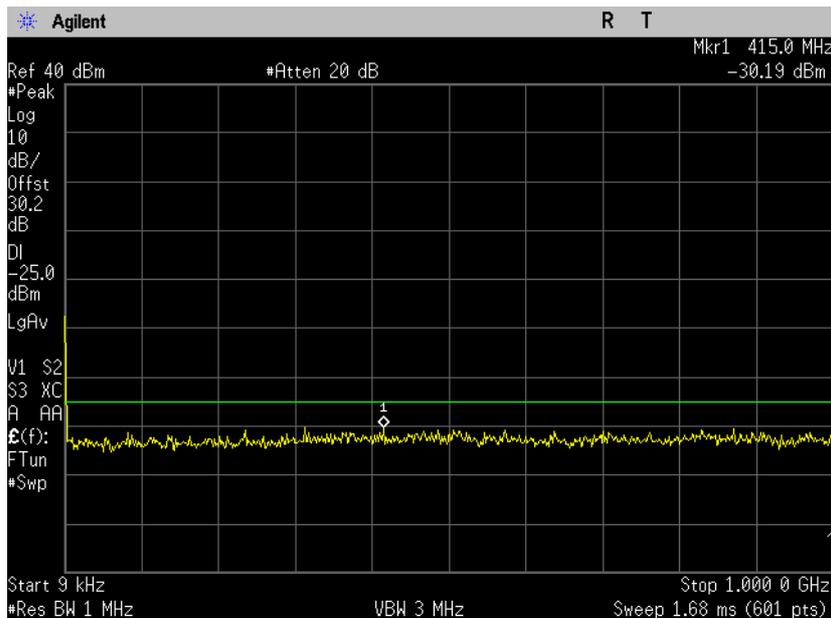
**Plot 4.4.20**



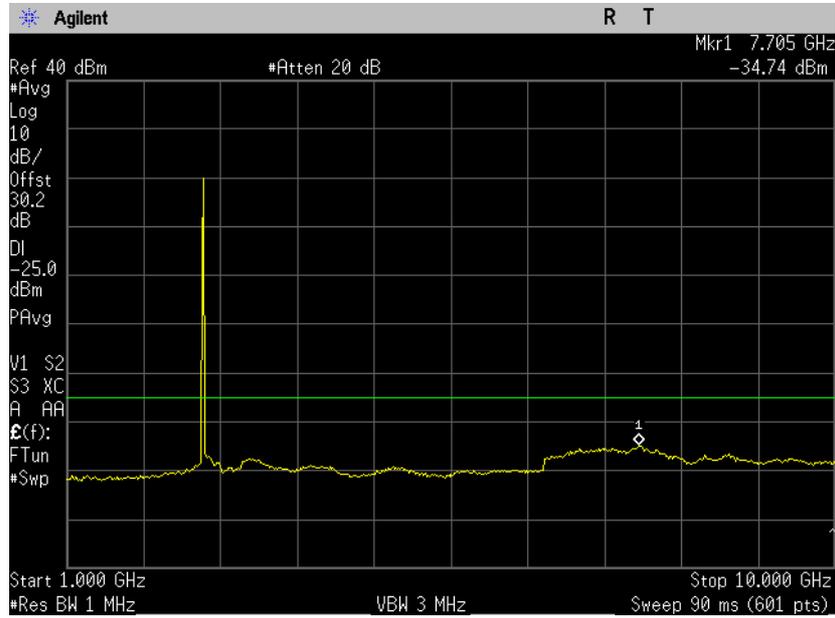
**Plot 4.4.21**



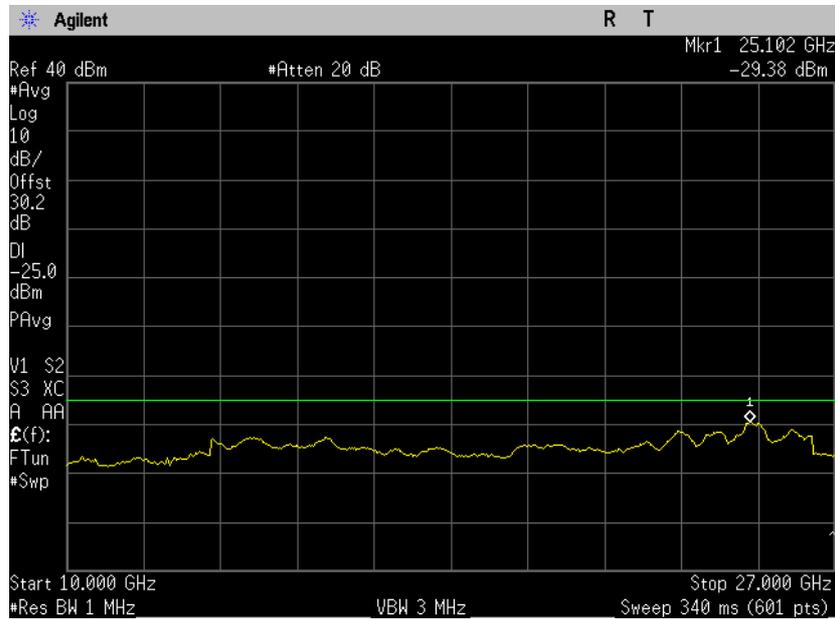
**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 2**  
**Middle Frequency 2600 MHz**  
**Plot 4.4.22**



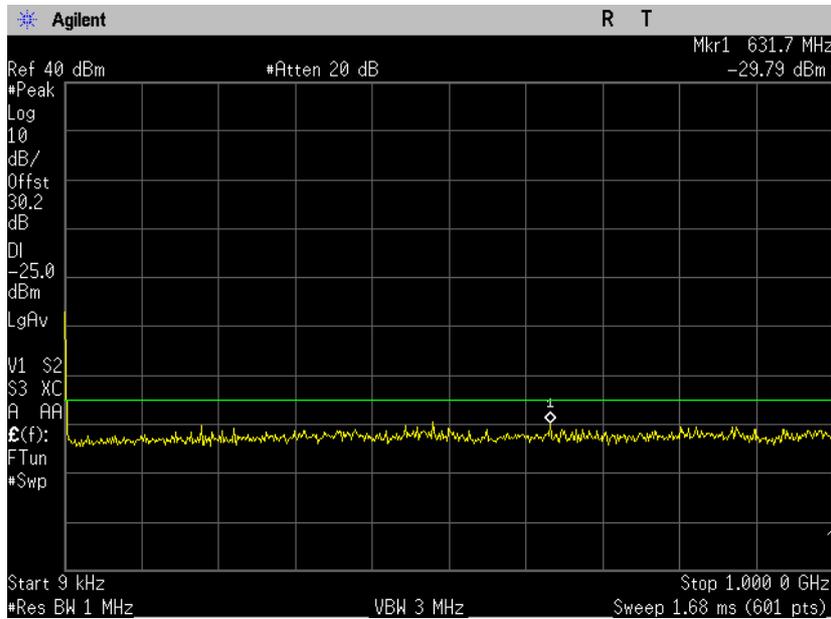
**Plot 4.4.23**



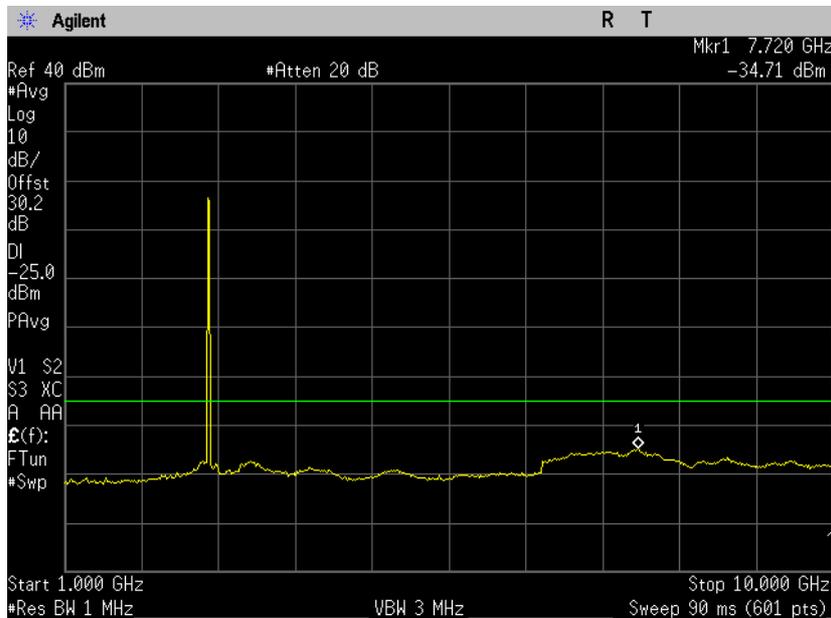
**Plot 4.4.24**



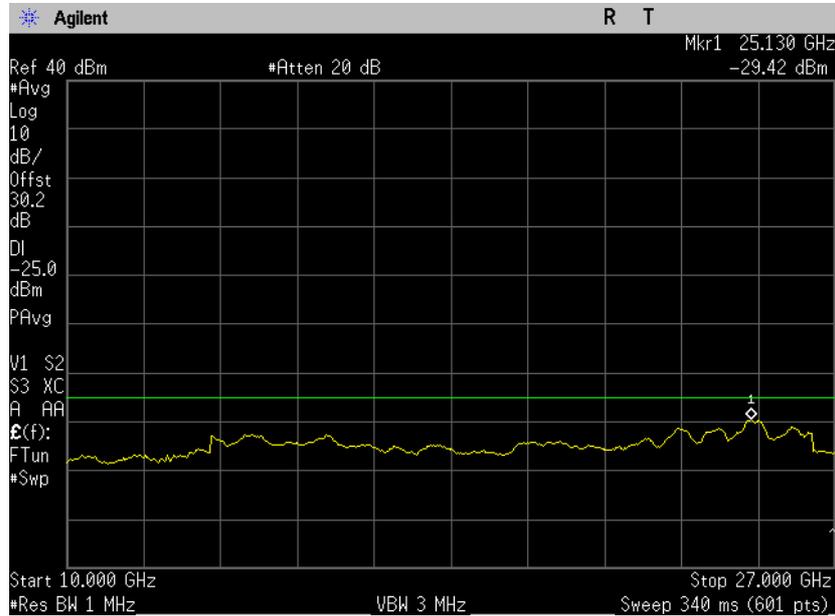
**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 2**  
**High Frequency 2687.5 MHz**  
**Plot 4.4.25**



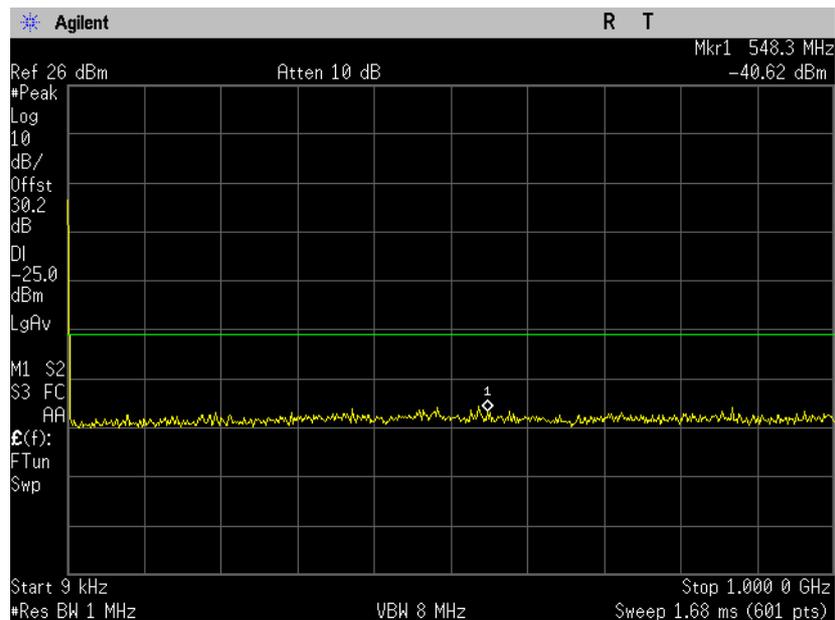
**Plot 4.4.26**



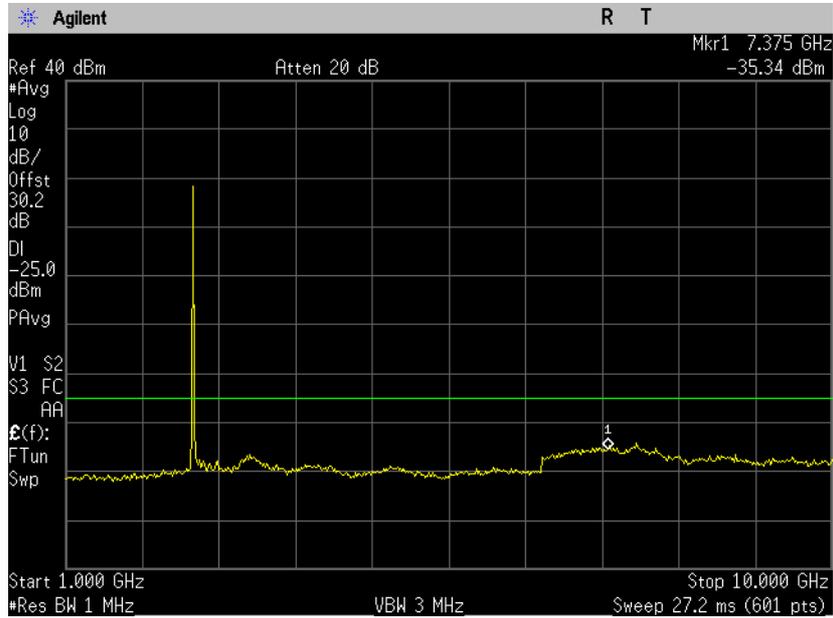
**Plot 4.4.27**



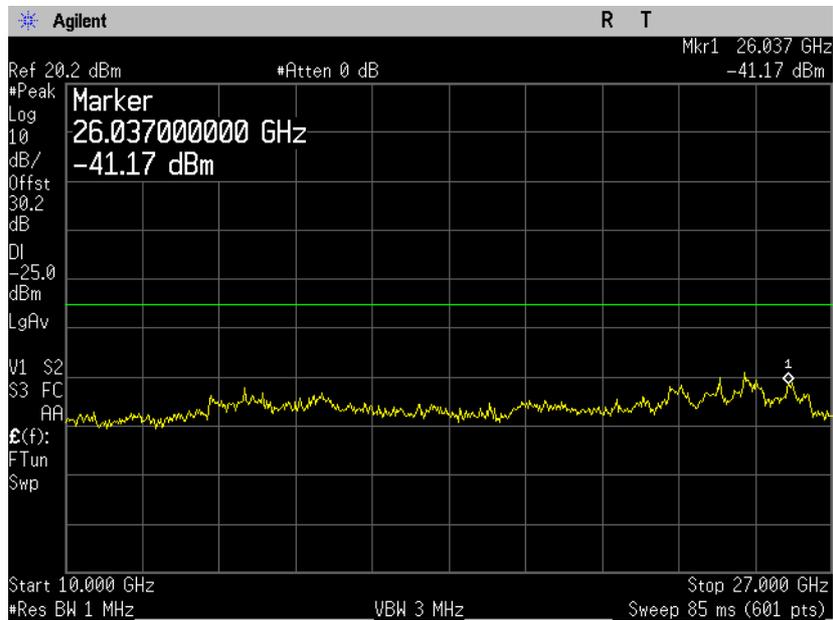
**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%  
Output ANT 2  
Low Frequency 2501 MHz  
Plot 4.4.28**



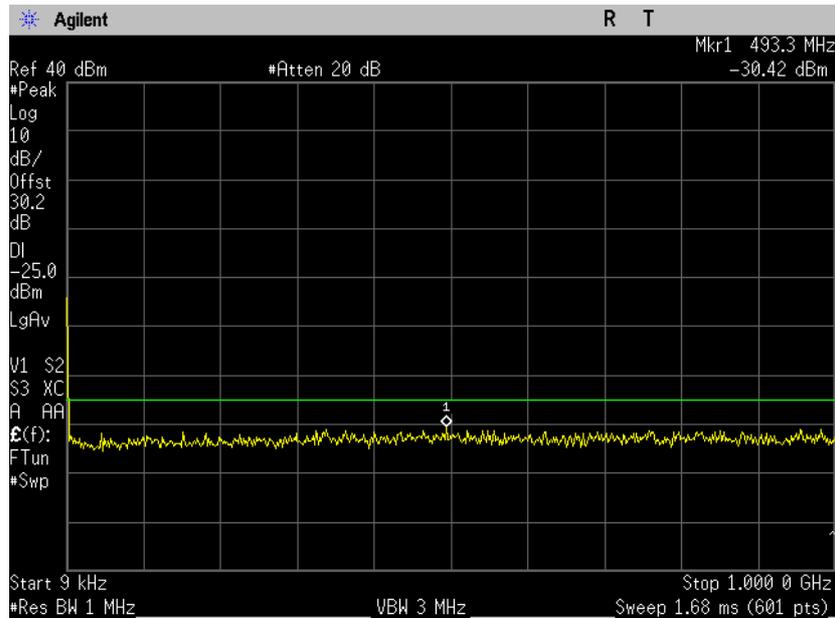
**Plot 4.4.29**



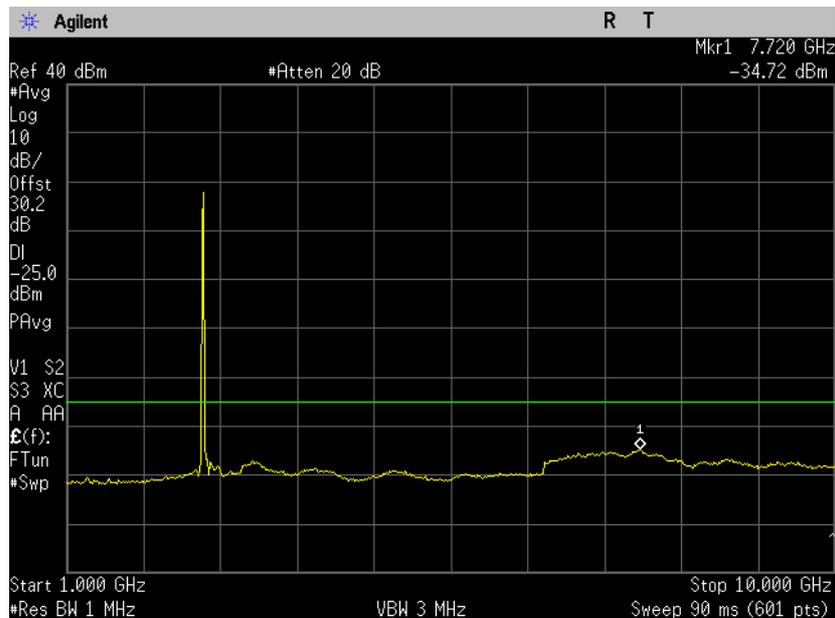
**Plot 4.4.30**



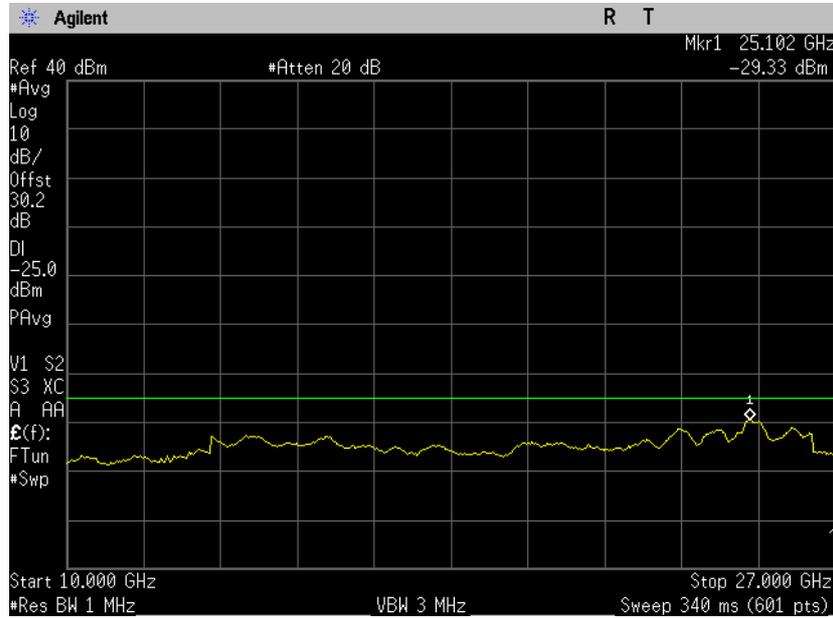
**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 2**  
**Middle Frequency 2600 MHz**  
**Plot 4.4.31**



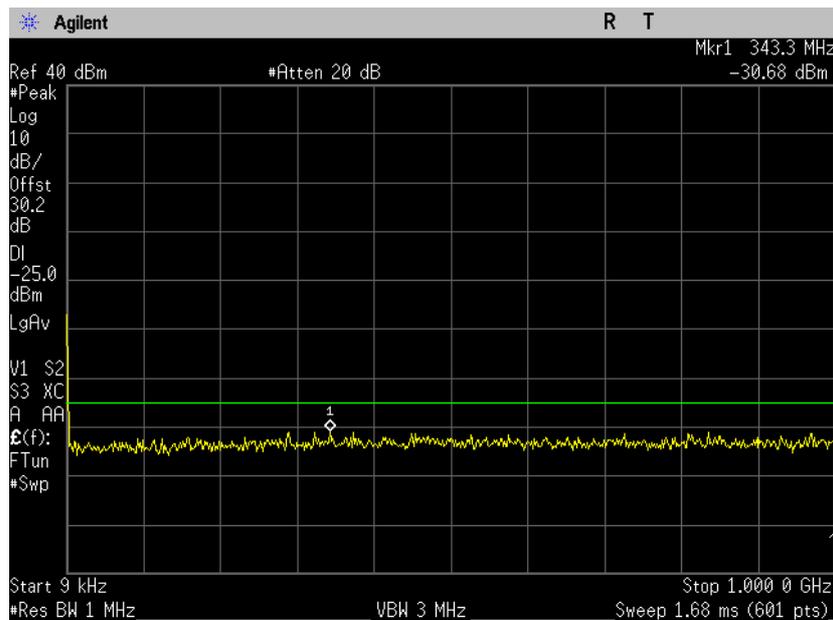
**Plot 4.4.32**



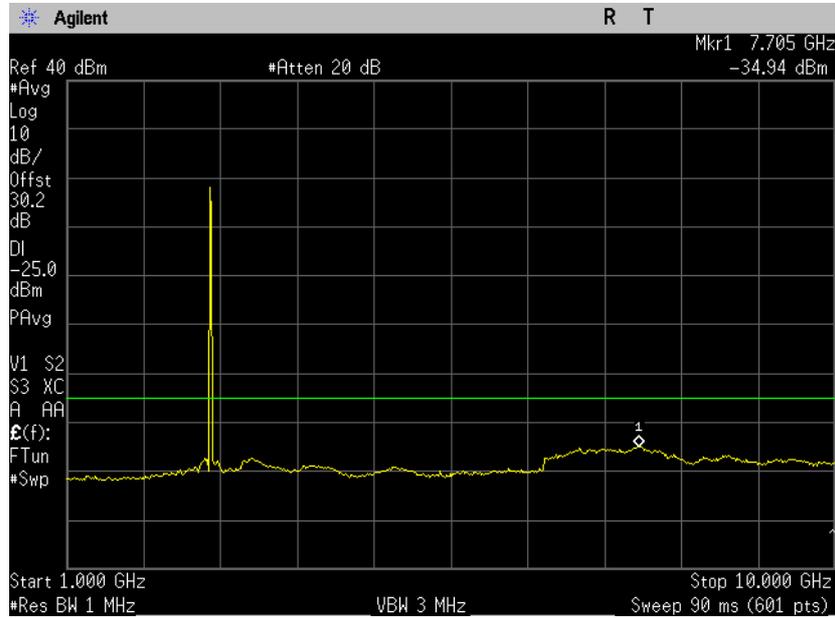
**Plot 4.4.33**



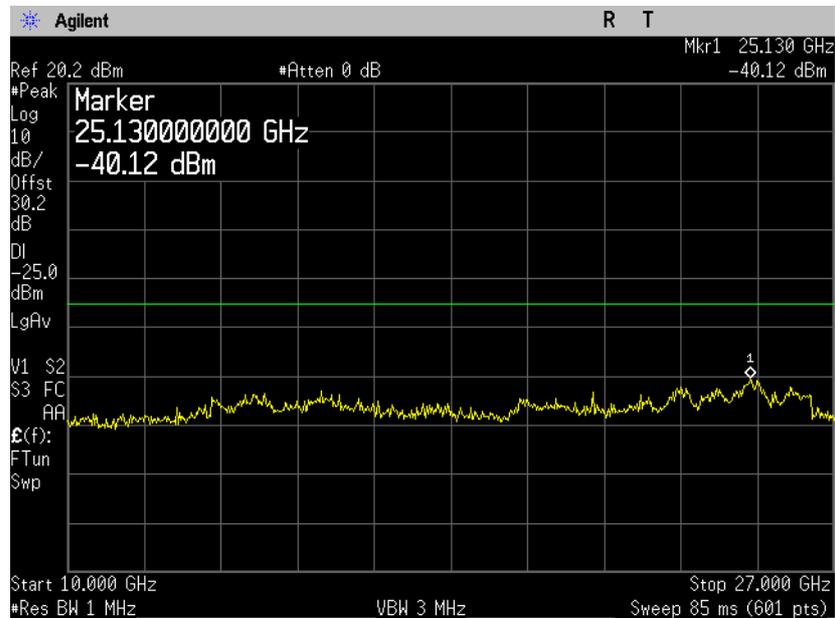
**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%  
Output ANT 2  
High Frequency 2685 MHz  
Plot 4.4.34**



**Plot 4.4.35**



**Plot 4.4.36**



#### 4.5. Radiated Spurious Emissions

Reference document:	47 CFR §27.53 (m) (4) (6)		
Test Requirements:	For mobile digital stations, the attenuation factor shall not be less than 43 + 10 log (P) dB at the channel edge and 55 + 10 log (P) dB at 5.5 megahertz from the channel edges.		
Test setup:	See sec 3.2	<b>Pass</b>	
Method of testing:	Radiated		
Operating conditions:	Under normal test conditions		
S.A. Settings:	Peak: RBW= 1MHz, VBW= 3MHz		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.5.1 to Plot 4.5.64	

#### Test results: Output ANT 1:

All measurements were done in horizontal and vertical polarizations; the results show the worst case.

Frequency [MHz]	Max Reading [dBμV/m]	Polarization [H/V]	*Signal Generator Level [dBm]	Antenna Gain [dBd]	Emission power calculated [dBm]	Limit [dBm]	Result
<b>WiMAX 802.16e (5MHz), Low Frequency 2498.5 MHz, OFDMA, 16 QAM, Duty Cycle 32%</b>							
All emission at least 10 below the limit.							<b>Pass</b>
<b>WiMAX 802.16e (5MHz), Middle Frequency 2600 MHz, OFDMA, 16 QAM, Duty Cycle 32%</b>							
5200	67.91	V	-38.85	7.21	-31.64	-25	<b>Pass</b>
<b>WiMAX 802.16e (5MHz), High Frequency 2687.5 MHz, OFDMA, 16 QAM, Duty Cycle 32%</b>							
5375	56.11	V	-50.71	7.18	-43.53	-25	<b>Pass</b>
<b>WiMAX 802.16e (10MHz), Low Frequency 2501 MHz, OFDMA, 16 QAM, Duty Cycle 27%</b>							
All emission at least 10 below the limit.							<b>Pass</b>
<b>WiMAX 802.16e (10MHz), Middle Frequency 2600 MHz, OFDMA, 16 QAM, Duty Cycle 27%</b>							
5200	62.98	V	-43.78	7.21	-36.57	-25	<b>Pass</b>
<b>WiMAX 802.16e (10MHz), High Frequency 2685 MHz, OFDMA, 16 QAM, Duty Cycle 27%</b>							
5370	52.45	V	-55.26	7.18	-48.08	-25	<b>Pass</b>

\* Corrected for cable loss

Ref. Plots: Plot 4.5.1 – Plot 4.5.30

**Note:** Measurements were taken using a notch filter (where appropriate) at the spectrum analyzer input, adjusted to the operating frequency.

**Test results below 1GHz:**

All measurements were done in horizontal and vertical polarizations; the results show the worst case for all frequencies.

Frequency [MHz]	Max Reading [dBμV/m]	Polarization [H/V]	*Signal Generator Level [dBm]	Antenna Gain [dBd]	Emission power calculated [dBm]	Limit [dBm]	Result
34.8	39.52	V	-50.82	-16.93	-67.75	-25	<b>Pass</b>
104.2	36.18	V	-67.38	-3.36	-70.74	-25	<b>Pass</b>

\* Corrected for cable loss

Ref. Plots: Plot 4.5.31 – Plot 4.5.32

**Test results: Output ANT 2**

All measurements were done in horizontal and vertical polarizations; the results show the worst case.

Frequency [MHz]	Max Reading [dBμV/m]	Polarization [H/V]	*Signal Generator Level [dBm]	Antenna Gain [dBd]	Emission power calculated [dBm]	Limit [dBm]	Result
<b>WiMAX 802.16e (5MHz), Low Frequency 2498.5 MHz, OFDMA, 16 QAM, Duty Cycle 32%</b>							
All emission at least 10 below the limit.							<b>Pass</b>
<b>WiMAX 802.16e (5MHz), Middle Frequency 2600 MHz, OFDMA, 16 QAM, Duty Cycle 32%</b>							
5200	68.59	V	-38.17	7.21	-30.96	-25	<b>Pass</b>
<b>WiMAX 802.16e (5MHz), High Frequency 2687.5 MHz, OFDMA, 16 QAM, Duty Cycle 32%</b>							
5375	58.72	V	-48.10	7.18	-40.92	-25	<b>Pass</b>
<b>WiMAX 802.16e (10MHz), Low Frequency 2501 MHz, OFDMA, 16 QAM, Duty Cycle 27%</b>							
All emission at least 10 below the limit.							<b>Pass</b>
<b>WiMAX 802.16e (10MHz), Middle Frequency 2600 MHz, OFDMA, 16 QAM, Duty Cycle 27%</b>							
5200	65.03	V	-41.73	7.21	-34.52	-25	<b>Pass</b>
<b>WiMAX 802.16e (10MHz), High Frequency 2685 MHz, OFDMA, 16 QAM, Duty Cycle 27%</b>							
5370	52.19	V	-55.52	7.18	-48.34	-25	<b>Pass</b>

\* Corrected for cable loss

Ref. Plots: Plot 4.5.33 – Plot 4.5.62

**Note:** All measurements were taken using a notch filter (where appropriate) at the spectrum analyzer input, adjusted to the operating frequency.

**Test results below 1GHz:**

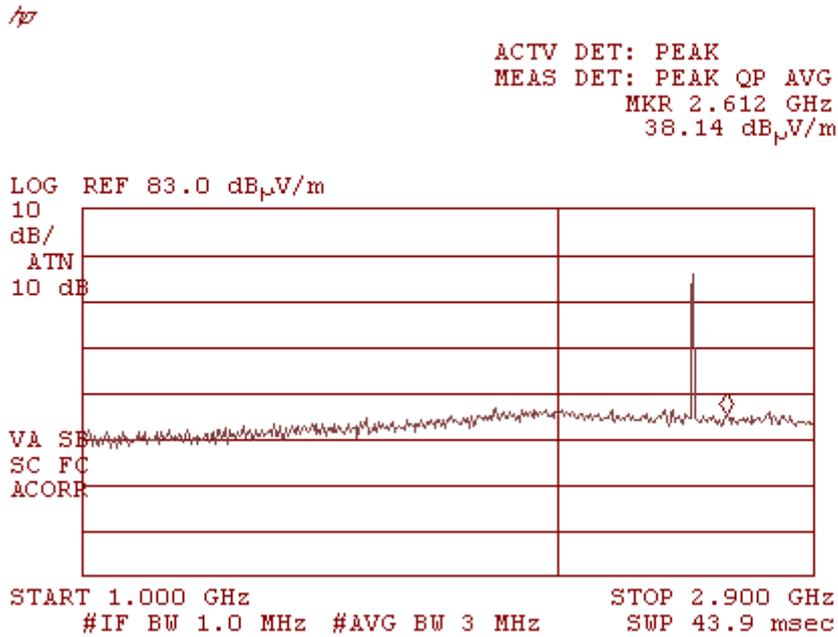
All measurements were done in horizontal and vertical polarizations; the results show the worst case for all frequencies.

Frequency [MHz]	Max Reading [dB $\mu$ V/m]	Polarization [H/V]	*Signal Generator Level [dBm]	Antenna Gain [dBd]	Emission power calculated [dBm]	Limit [dBm]	Result
34.8	39.26	V	-51.08	-16.93	-68.01	-25	<b>Pass</b>
104.2	37.89	V	-65.67	-3.36	-69.03	-25	<b>Pass</b>

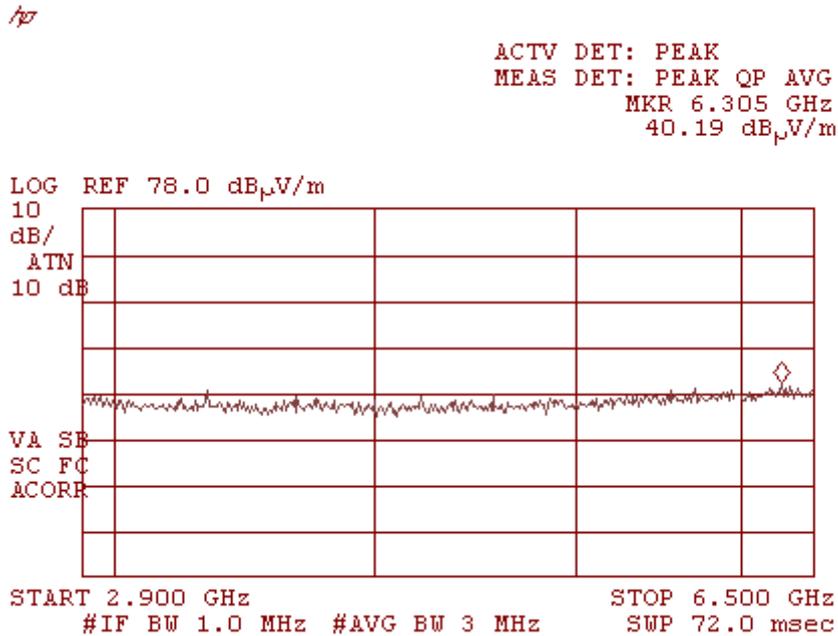
\* Corrected for cable loss

Ref. Plots: Plot 4.5.63 – Plot 4.5.64

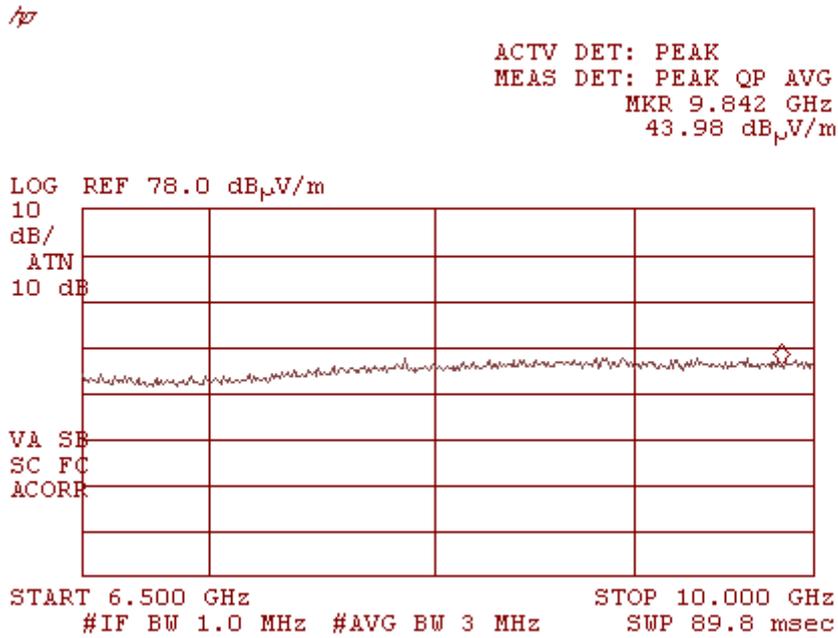
**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 1**  
**Low Frequency 2498.5 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.1**



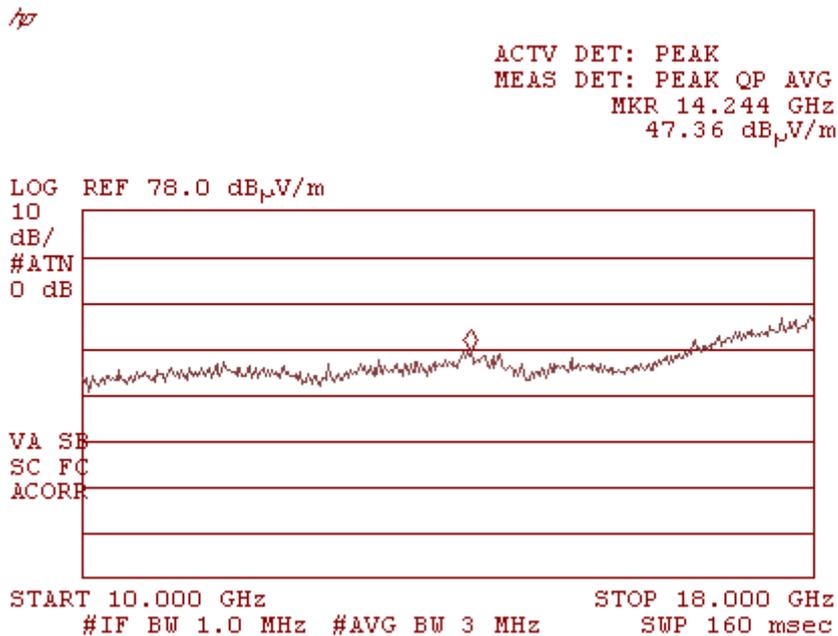
**Horizontal & Vertical Polarization**  
**Plot 4.5.2**



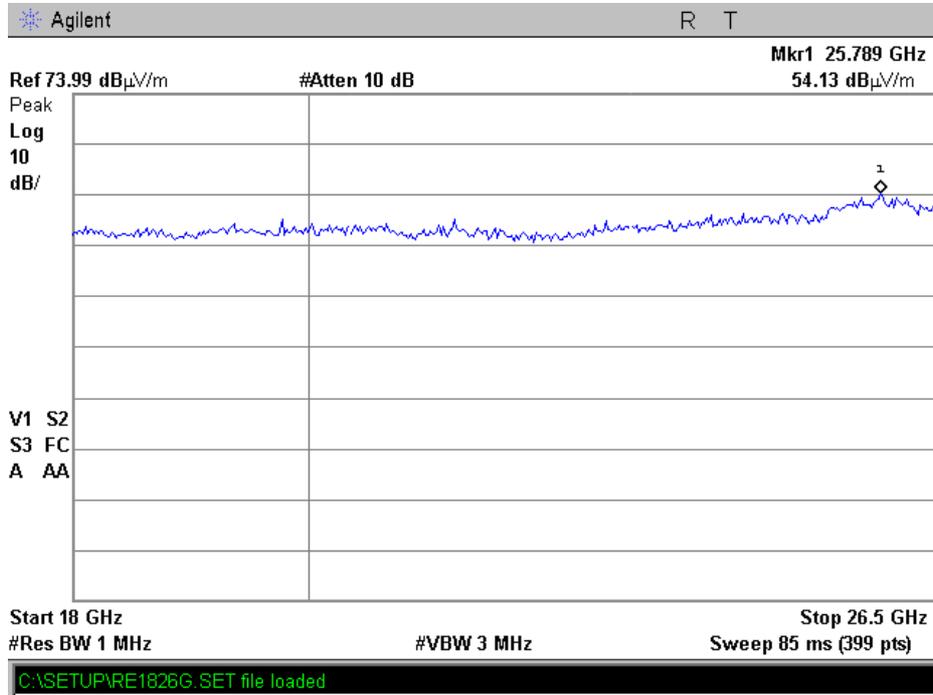
**Horizontal & Vertical Polarization**  
**Plot 4.5.3**



**Horizontal & Vertical Polarization**  
**Plot 4.5.4**



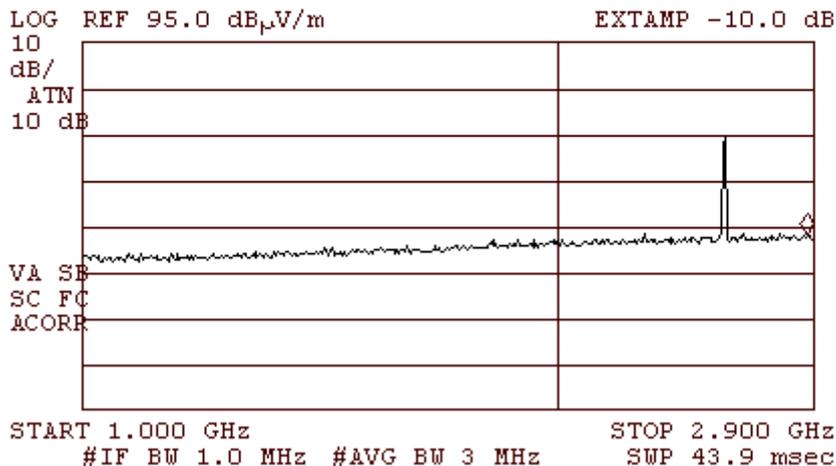
**Horizontal & Vertical Polarization  
Plot 4.5.5**



**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%  
Output ANT 1  
Middle Frequency 2600 MHz  
Horizontal & Vertical Polarization  
Plot 4.5.6**

VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.876 GHz  
53.06 dB $\mu$ V/m

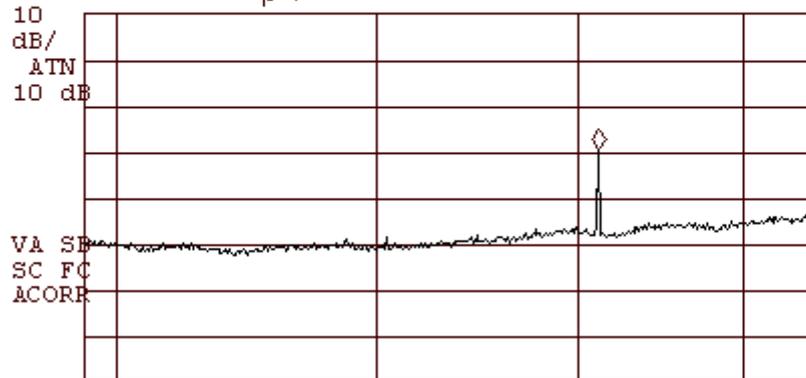


**Horizontal & Vertical Polarization**  
**Plot 4.5.7**

*/p* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.212 GHz  
65.53 dB $\mu$ V/m

LOG REF 95.0 dB $\mu$ V/m



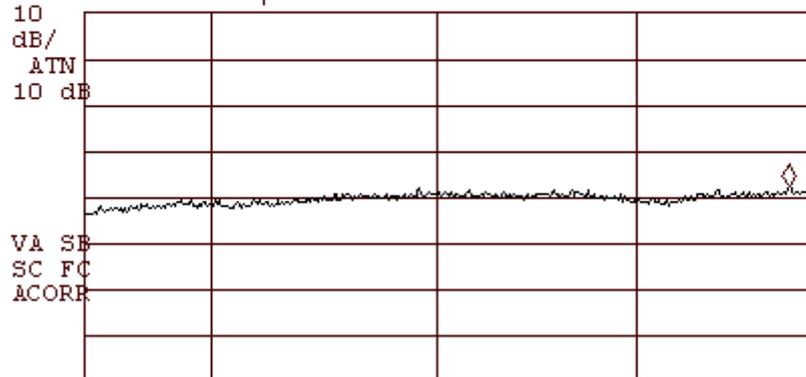
START 2.900 GHz STOP 6.500 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 72.0 msec

**Horizontal & Vertical Polarization**  
**Plot 4.5.8**

*/p* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 9.869 GHz  
57.36 dB $\mu$ V/m

LOG REF 95.0 dB $\mu$ V/m

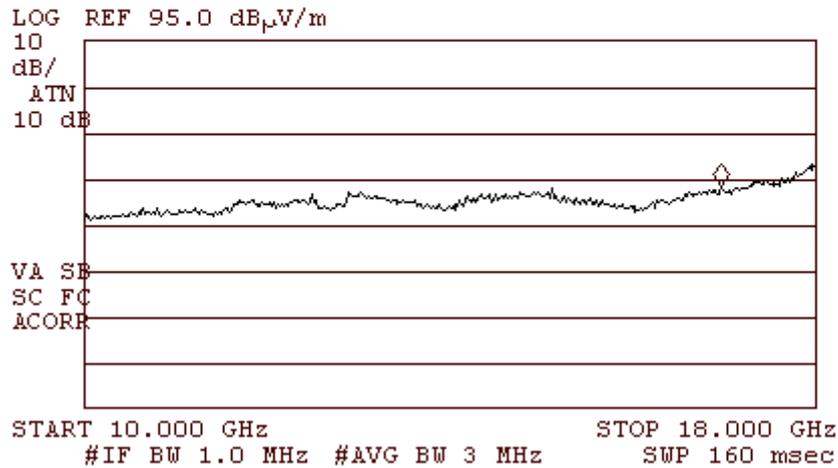


START 6.500 GHz STOP 10.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 89.8 msec

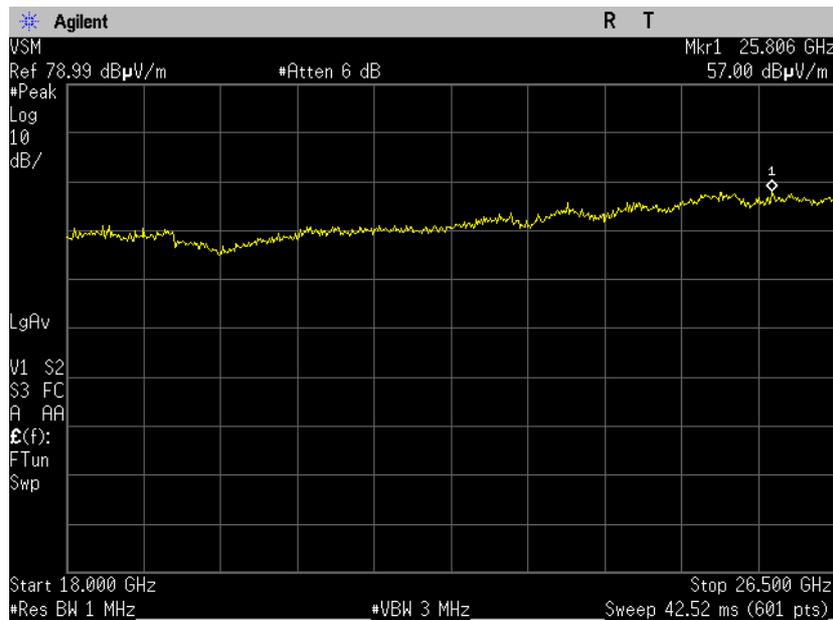
**Horizontal & Vertical Polarization**  
**Plot 4.5.9**

VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 16.961 GHz  
63.48 dB $\mu$ V/m



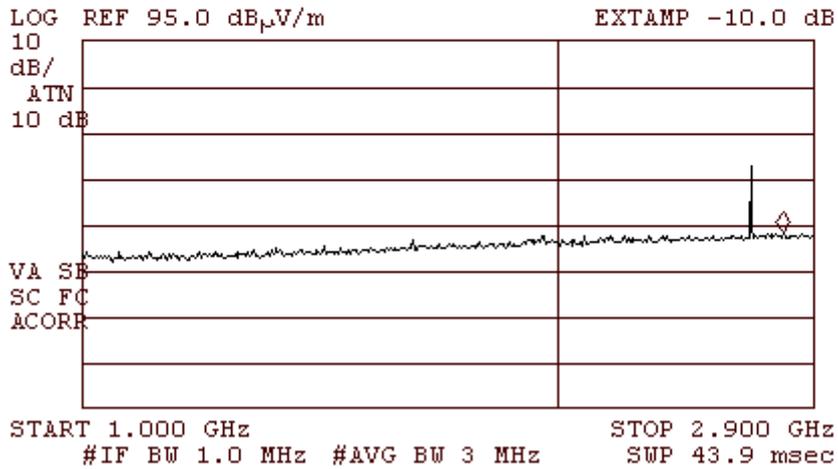
**Horizontal & Vertical Polarization**  
**Plot 4.5.10**



**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 1**  
**High Frequency 2687.5 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.11**

VSM

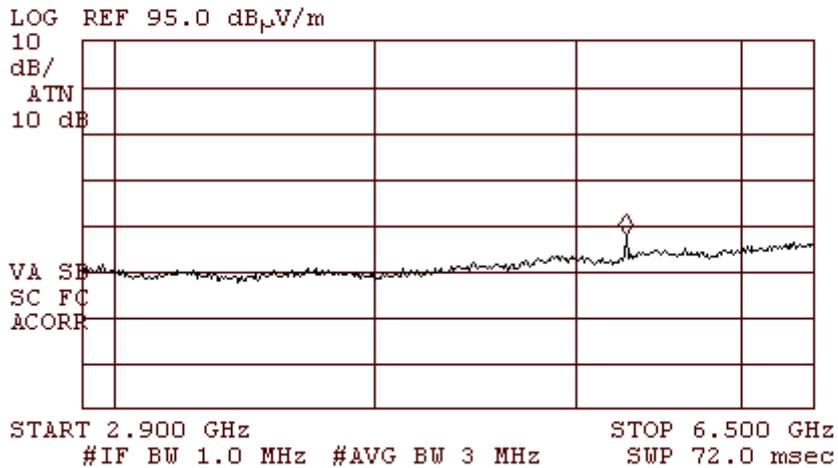
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.798 GHz  
53.27 dB $\mu$ V/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.12**

VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.385 GHz  
52.99 dB $\mu$ V/m

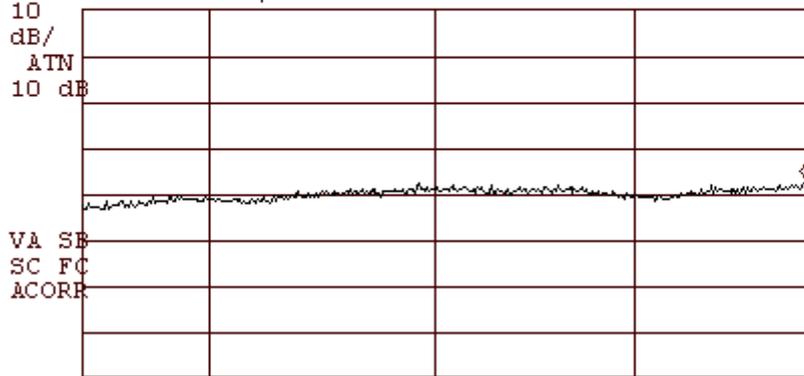


**Horizontal & Vertical Polarization**  
**Plot 4.5.13**

*/p* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 9.965 GHz  
57.50 dB<sub>μ</sub>V/m

LOG REF 95.0 dB<sub>μ</sub>V/m



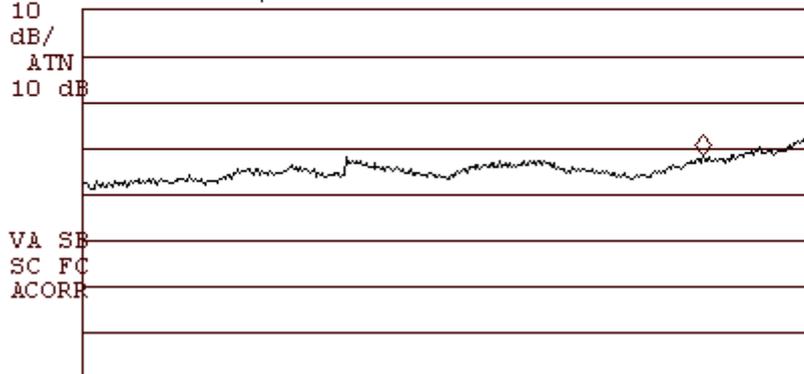
START 6.500 GHz STOP 10.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 89.8 msec

**Horizontal & Vertical Polarization**  
**Plot 4.5.14**

*/p* VSM

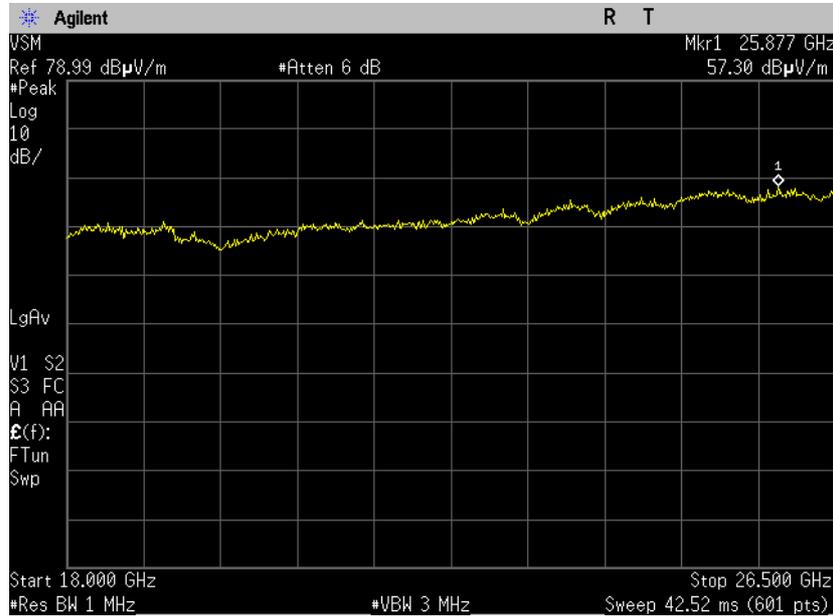
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 16.781 GHz  
63.38 dB<sub>μ</sub>V/m

LOG REF 95.0 dB<sub>μ</sub>V/m



START 10.000 GHz STOP 18.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 160 msec

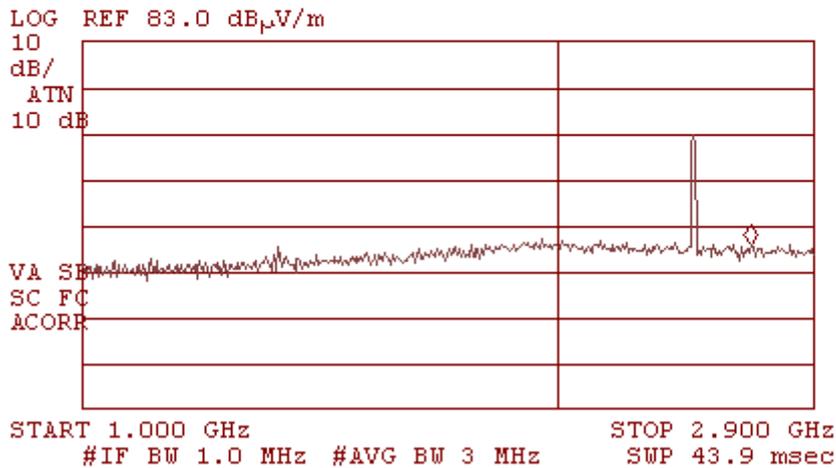
**Horizontal & Vertical Polarization**  
**Plot 4.5.15**



**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 1**  
**Low Frequency 2501 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.16**

hp

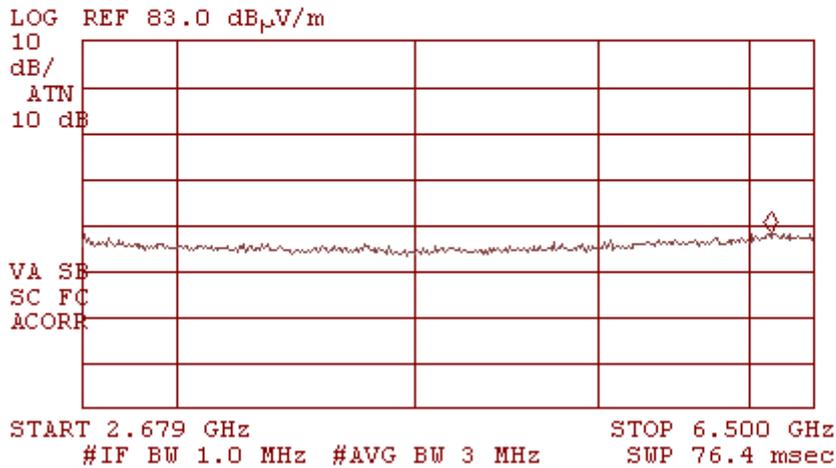
ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 2.690 GHz  
 38.61 dBµV/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.17**

*hp*

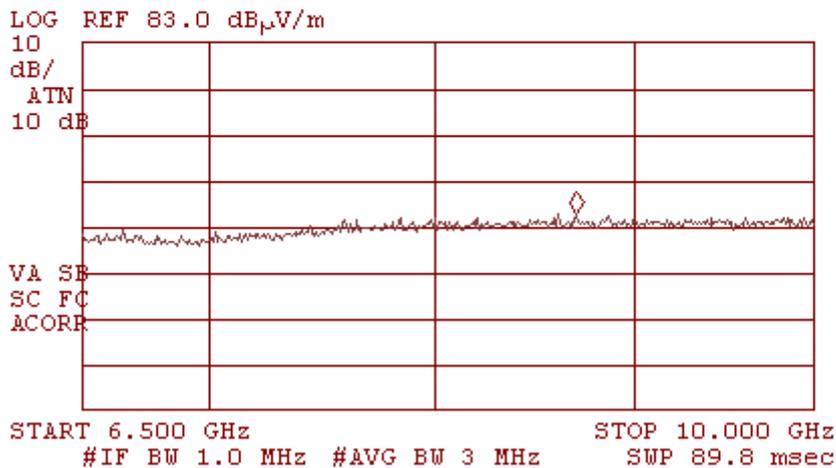
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 6.220 GHz  
41.21 dB<sub>μ</sub>V/m



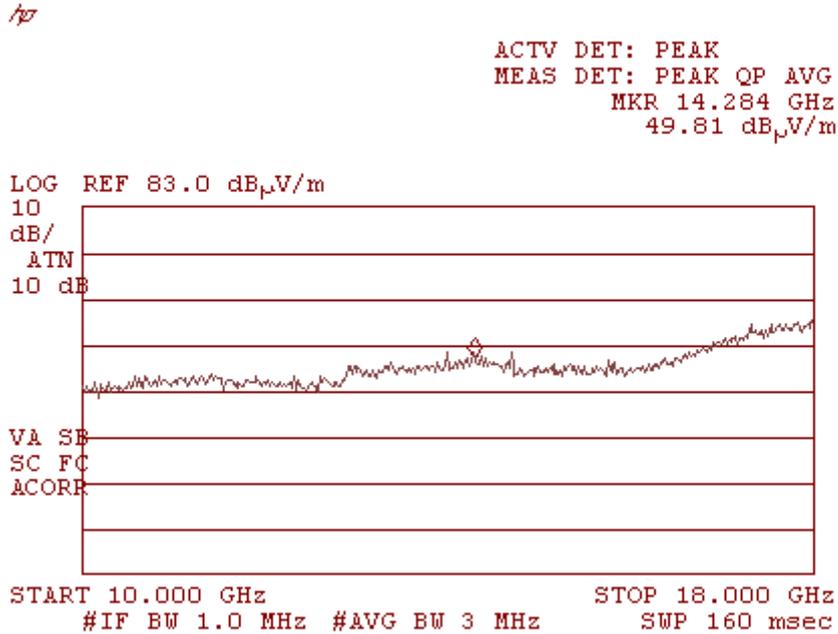
**Horizontal & Vertical Polarization**  
**Plot 4.5.18**

*hp*

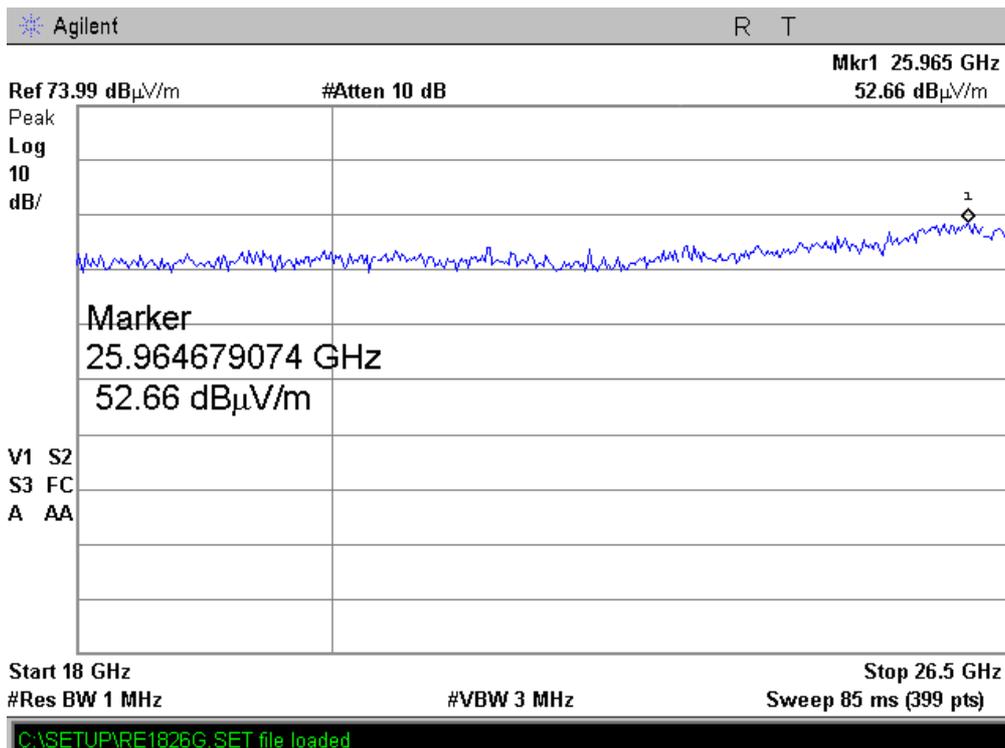
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 8.862 GHz  
45.83 dB<sub>μ</sub>V/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.19**



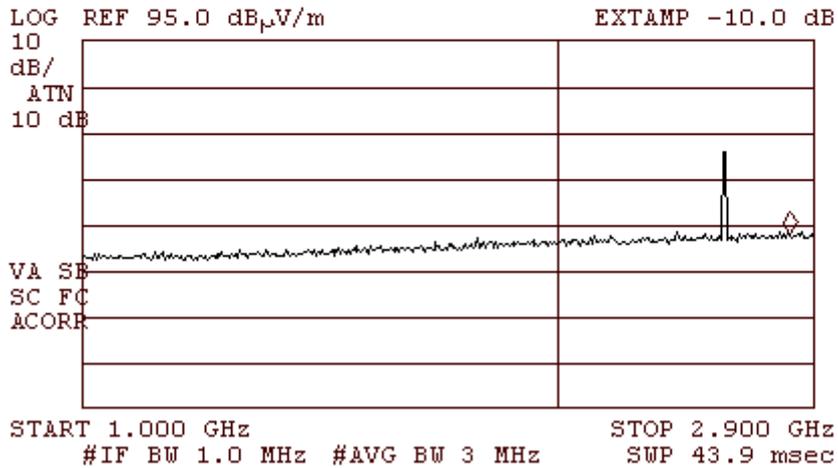
**Horizontal & Vertical Polarization**  
**Plot 4.5.20**



**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 1**  
**Middle Frequency 2600 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.21**

VSM

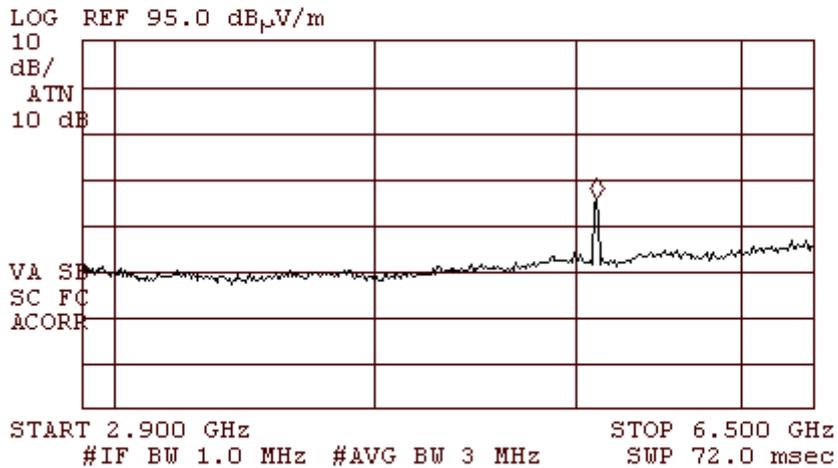
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.822 GHz  
53.06 dB $\mu$ V/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.22**

VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.212 GHz  
60.75 dB $\mu$ V/m

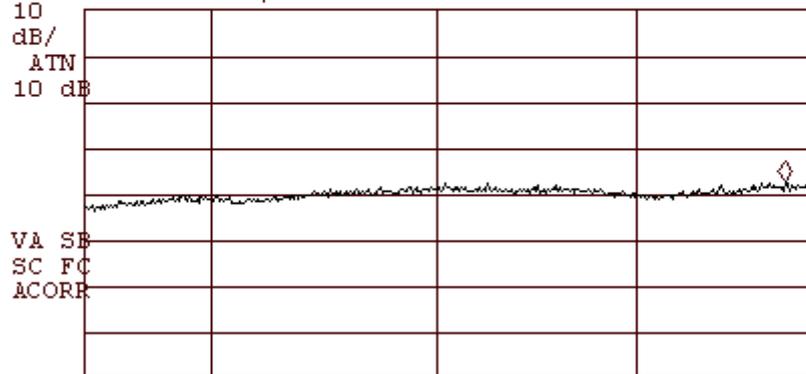


**Horizontal & Vertical Polarization**  
**Plot 4.5.23**

*per* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 9.851 GHz  
57.58 dB $\mu$ V/m

LOG REF 95.0 dB $\mu$ V/m



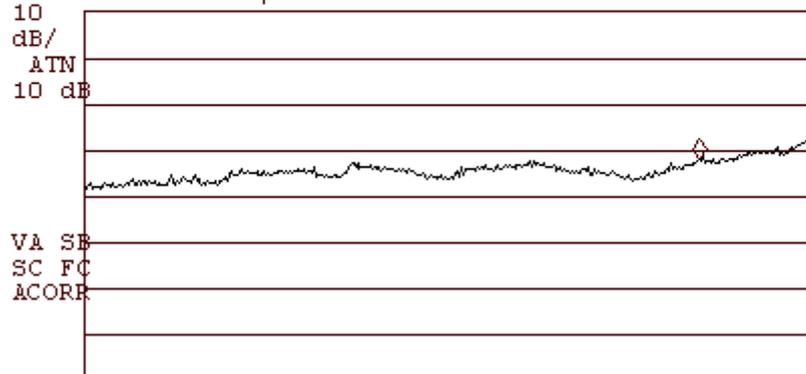
START 6.500 GHz STOP 10.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 89.8 msec

**Horizontal & Vertical Polarization**  
**Plot 4.5.24**

*per* VSM

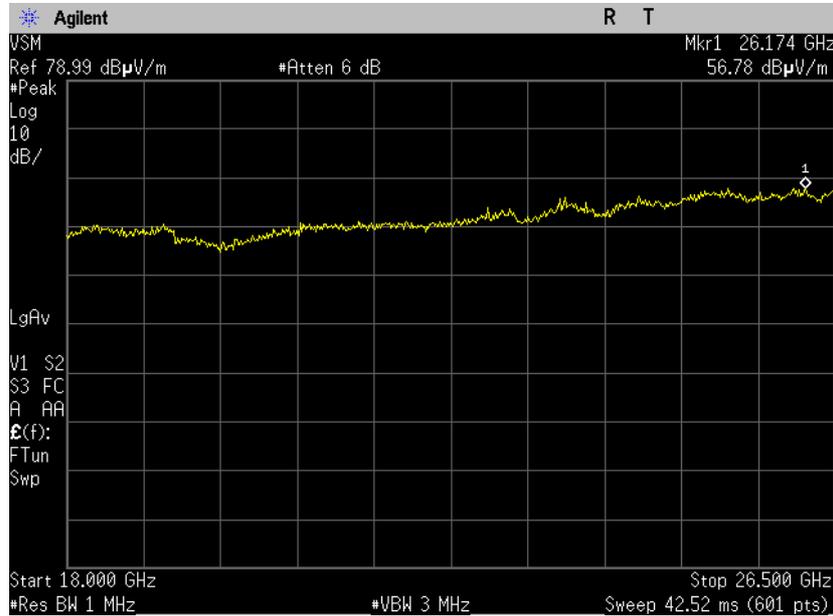
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 16.721 GHz  
62.87 dB $\mu$ V/m

LOG REF 95.0 dB $\mu$ V/m



START 10.000 GHz STOP 18.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 160 msec

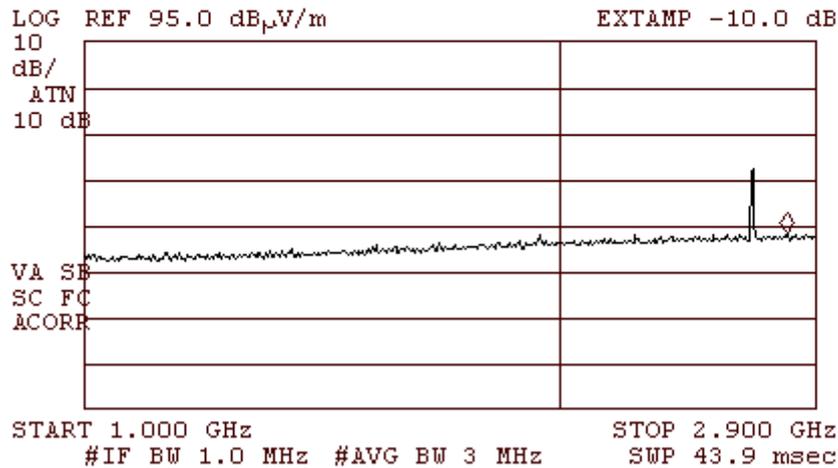
**Horizontal & Vertical Polarization**  
**Plot 4.5.25**



**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 1**  
**High Frequency 2685 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.26**

VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.804 GHz  
53.12 dBµV/m

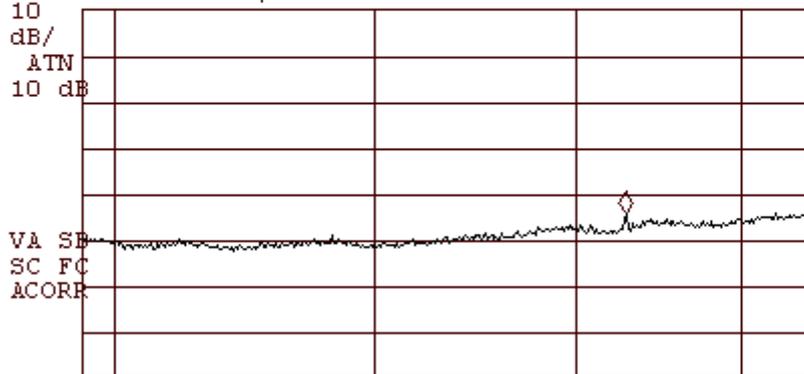


**Horizontal & Vertical Polarization**  
**Plot 4.5.27**

*/p* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.385 GHz  
50.87 dB $\mu$ V/m

LOG REF 95.0 dB $\mu$ V/m



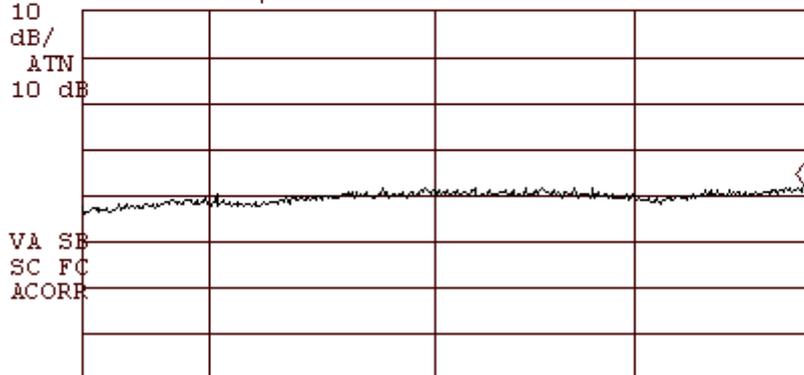
START 2.900 GHz STOP 6.500 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 72.0 msec

**Horizontal & Vertical Polarization**  
**Plot 4.5.28**

*/p* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 9.947 GHz  
57.09 dB $\mu$ V/m

LOG REF 95.0 dB $\mu$ V/m



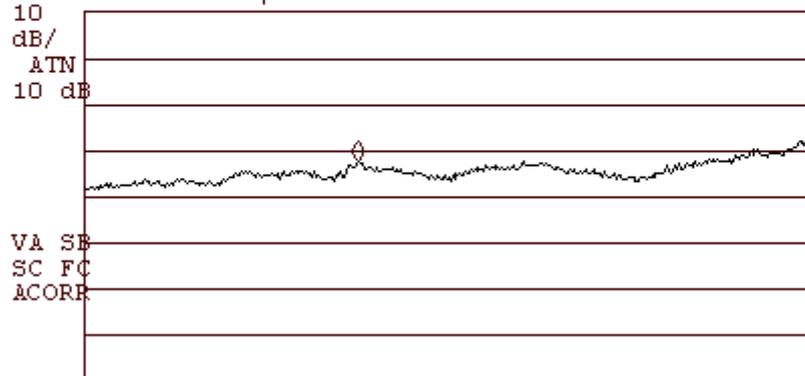
START 6.500 GHz STOP 10.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 89.8 msec

**Horizontal & Vertical Polarization**  
**Plot 4.5.29**

VSM

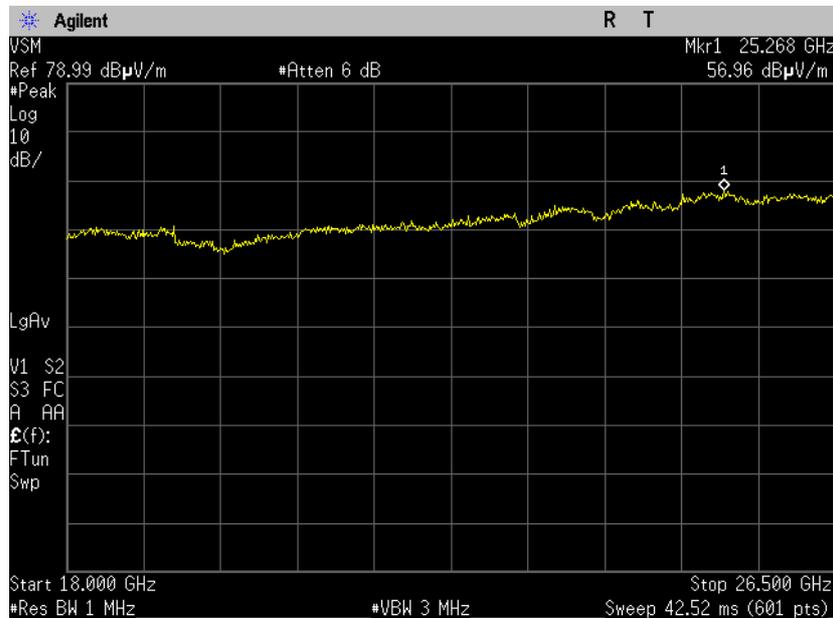
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 12.986 GHz  
62.25 dB $\mu$ V/m

LOG REF 95.0 dB $\mu$ V/m

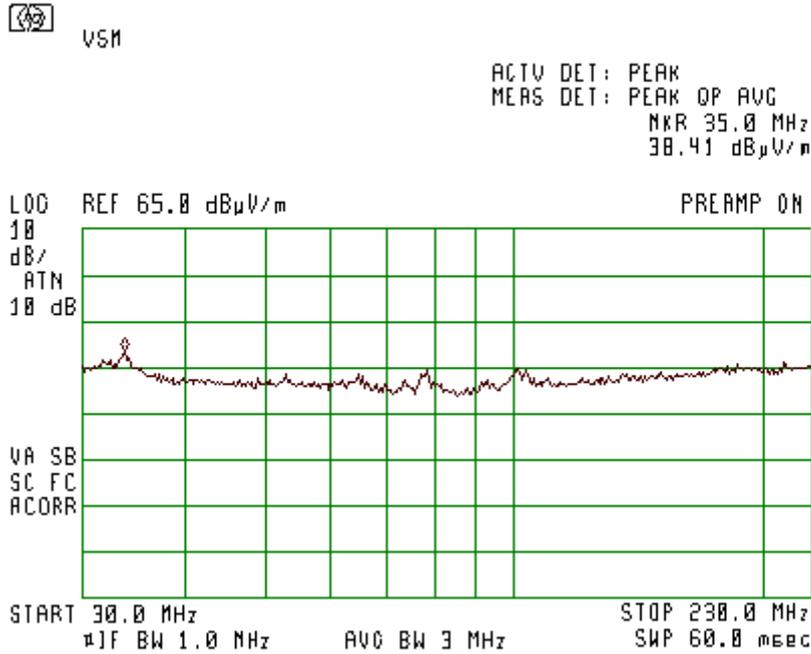


START 10.000 GHz STOP 18.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 160 msec

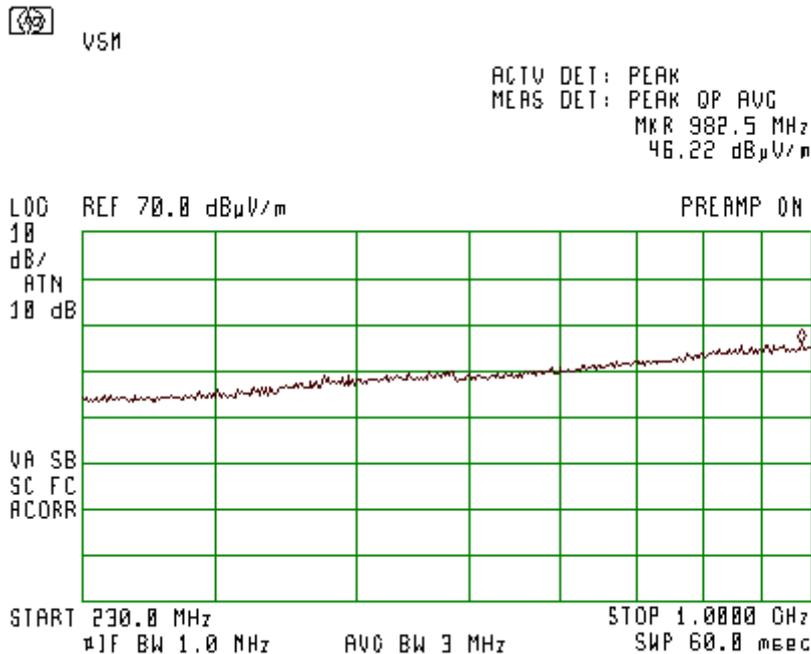
**Horizontal & Vertical Polarization**  
**Plot 4.5.30**



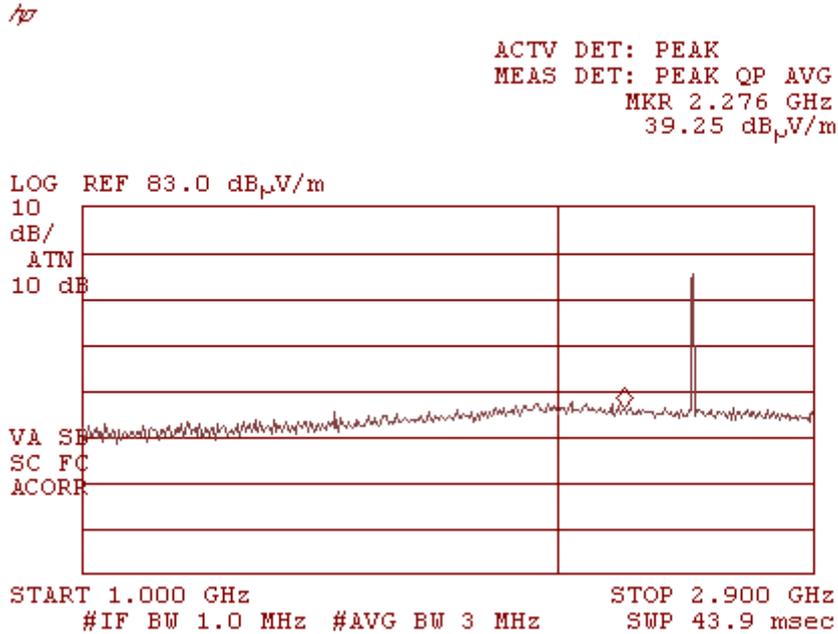
**Below 1 GHz**  
**Worst case for all frequencies**  
**Output ANT 1**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.31**



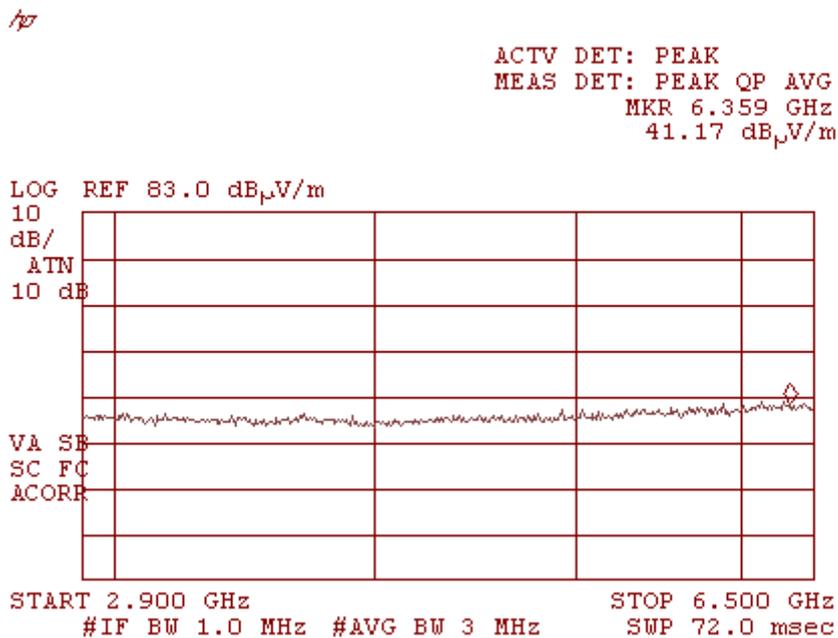
**Horizontal & Vertical Polarization**  
**Plot 4.5.32**



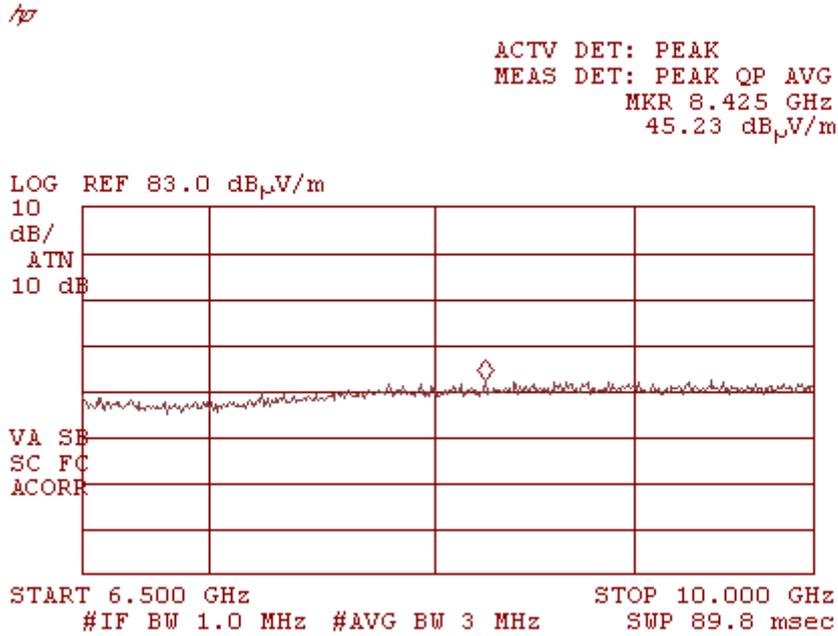
**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 2**  
**Low Frequency 2498.5 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.33**



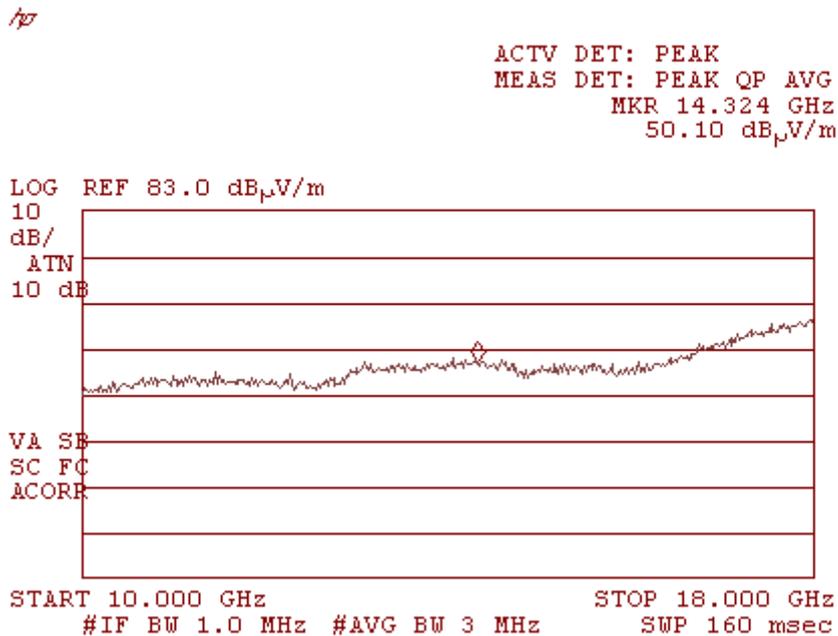
**Horizontal & Vertical Polarization**  
**Plot 4.5.34**



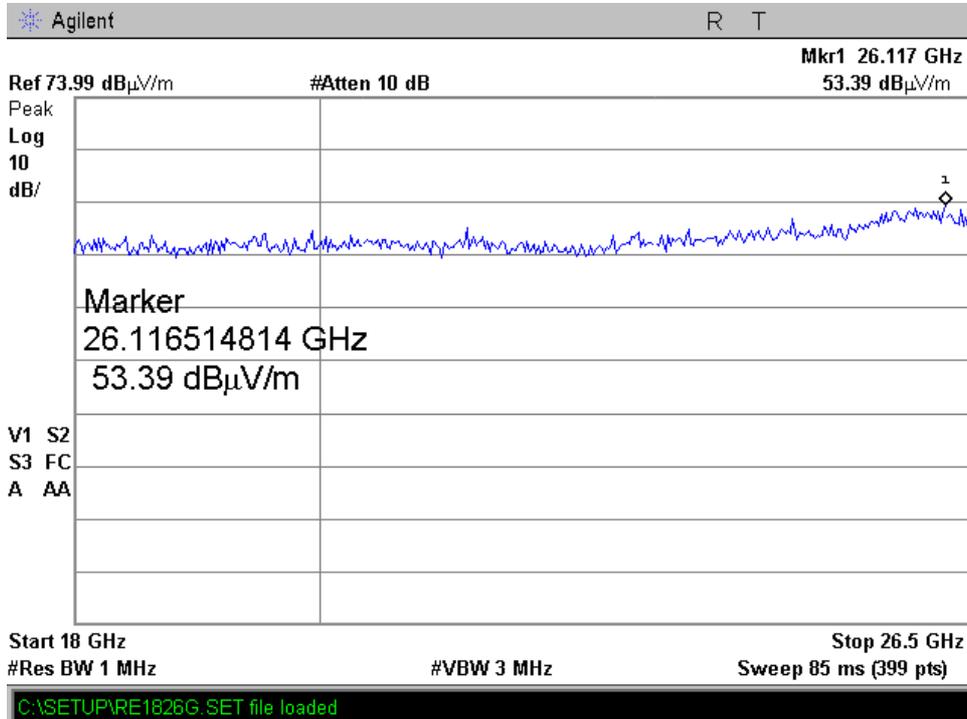
**Horizontal & Vertical Polarization**  
**Plot 4.5.35**



**Horizontal & Vertical Polarization**  
**Plot 4.5.36**



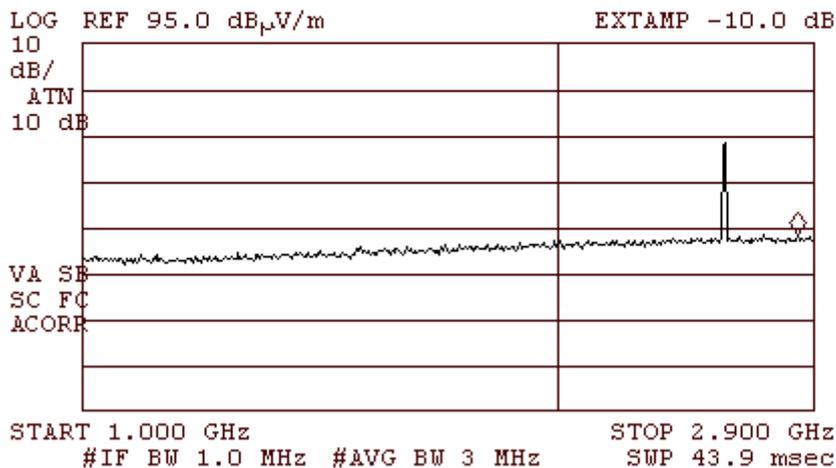
**Horizontal & Vertical Polarization**  
**Plot 4.5.37**



**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 2**  
**Middle Frequency 2600 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.38**

~~per~~ VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.846 GHz  
53.49 dB $\mu$ V/m

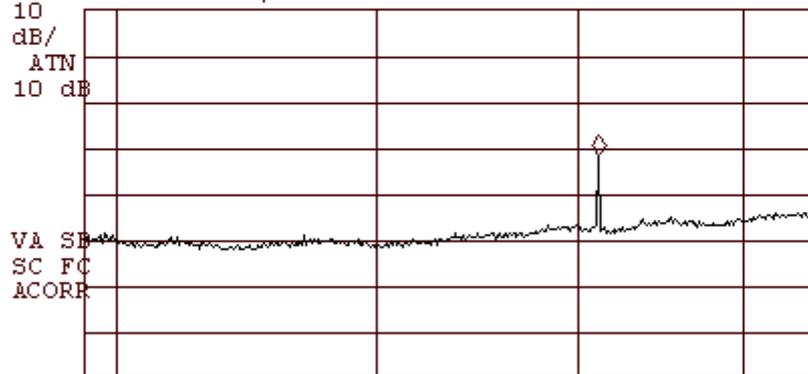


**Horizontal & Vertical Polarization**  
**Plot 4.5.39**

*per* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.212 GHz  
63.31 dB<sub>μ</sub>V/m

LOG REF 95.0 dB<sub>μ</sub>V/m



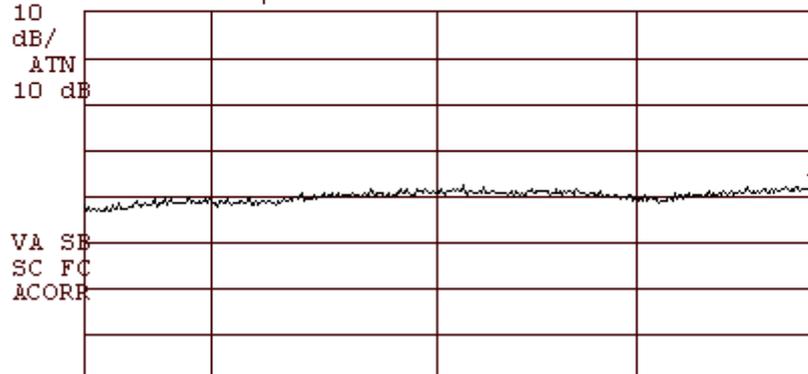
START 2.900 GHz STOP 6.500 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 72.0 msec

**Horizontal & Vertical Polarization**  
**Plot 4.40**

*per* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 9.991 GHz  
57.00 dB<sub>μ</sub>V/m

LOG REF 95.0 dB<sub>μ</sub>V/m

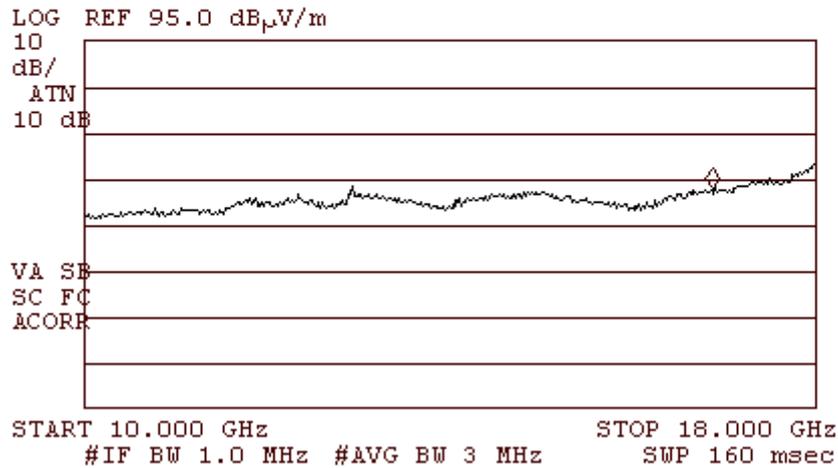


START 6.500 GHz STOP 10.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 89.8 msec

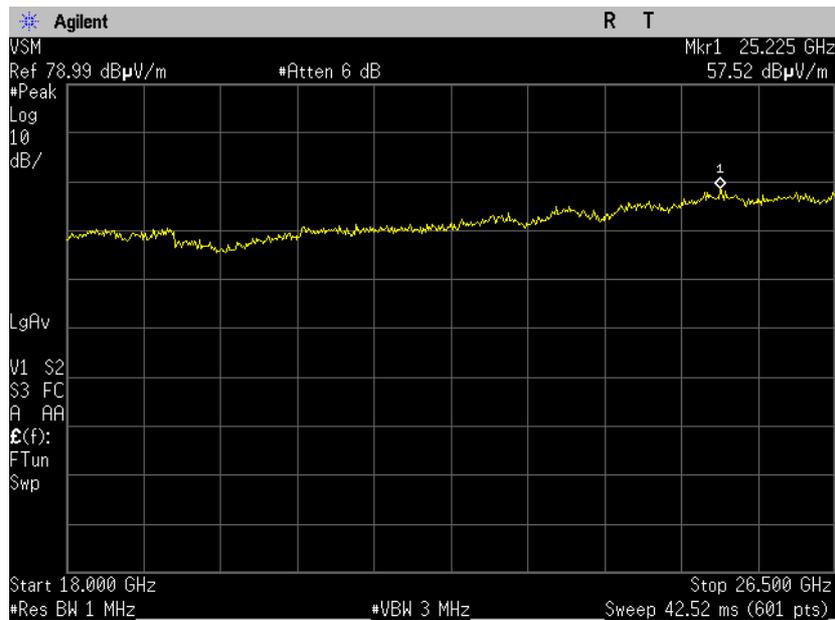
**Horizontal & Vertical Polarization**  
**Plot 4.5.41**

VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 16.861 GHz  
62.87 dB $\mu$ V/m



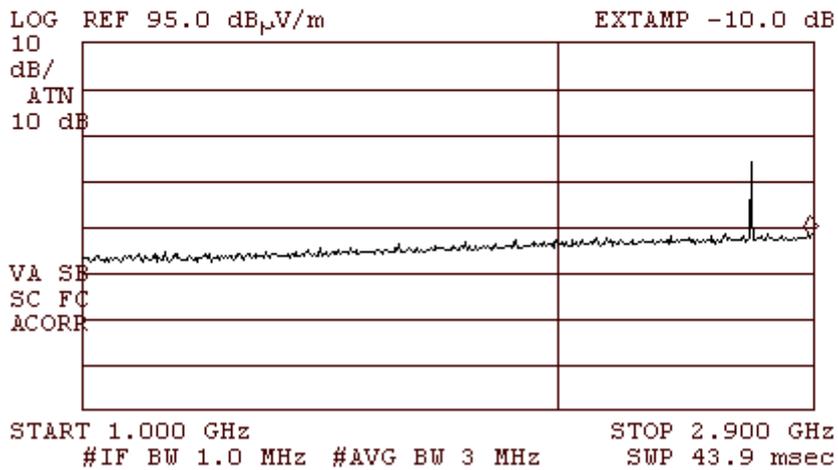
**Horizontal & Vertical Polarization**  
**Plot 4.5.42**



**WiMAX 802.16e (5MHz), OFDMA, 16 QAM, Duty Cycle 32%**  
**Output ANT 2**  
**High Frequency 2687.5 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.43**

*/p* VSM

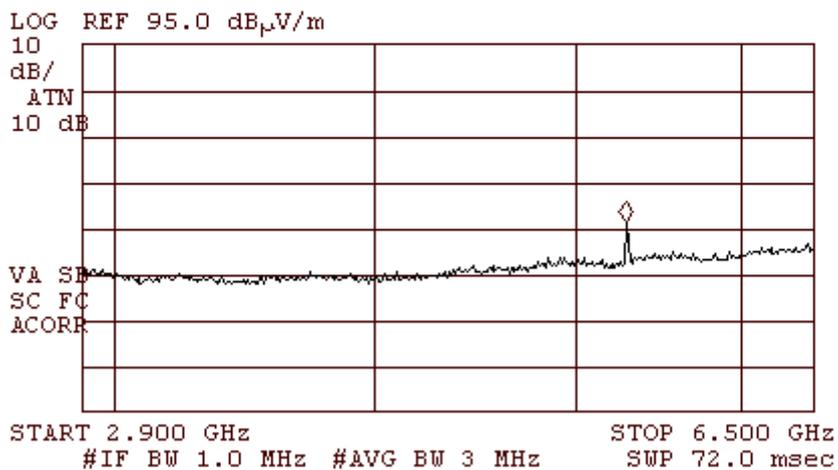
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.888 GHz  
53.00 dB $\mu$ V/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.44**

*/p* VSM

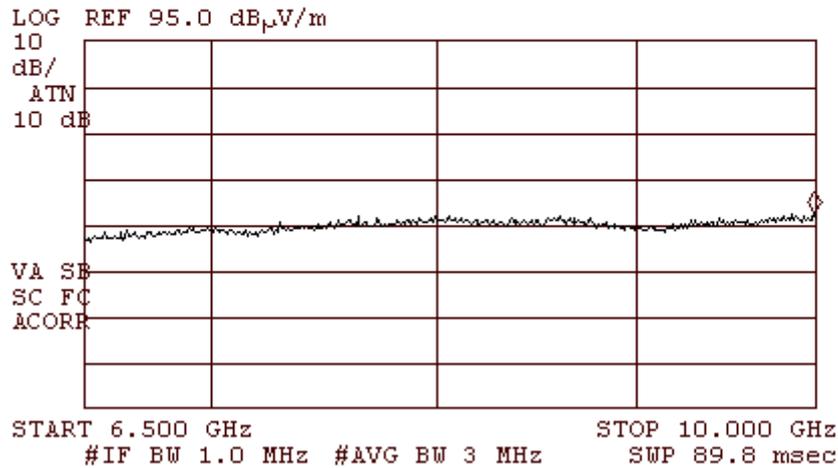
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.385 GHz  
56.16 dB $\mu$ V/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.45**

*/p* VSM

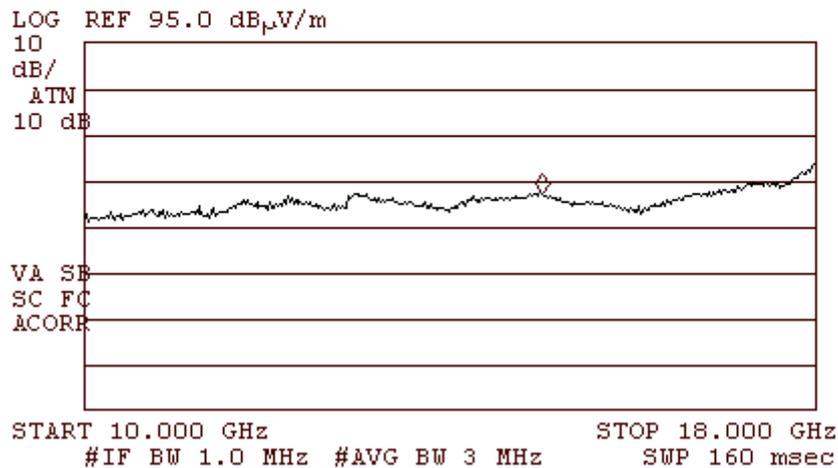
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 9.991 GHz  
57.64 dB<sub>μ</sub>V/m



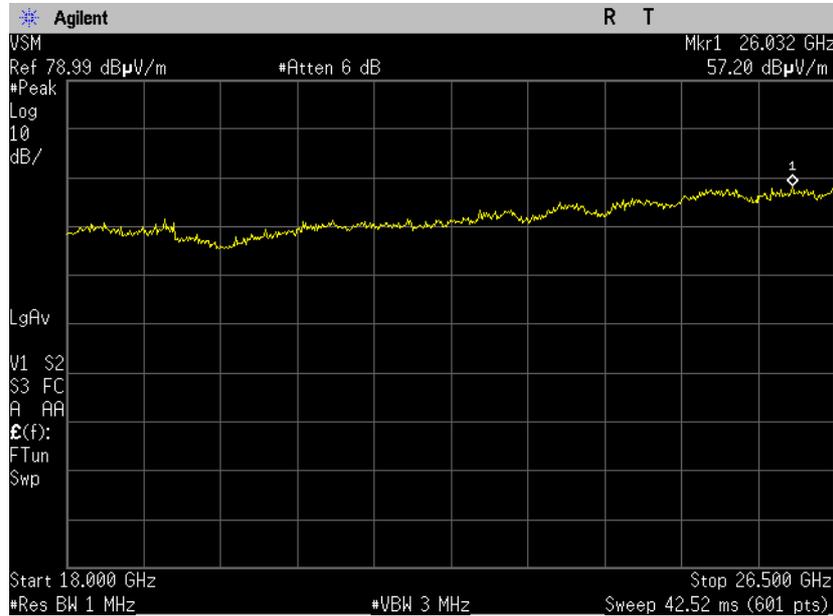
**Horizontal & Vertical Polarization**  
**Plot 4.5.46**

*/p* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 15.003 GHz  
61.81 dB<sub>μ</sub>V/m



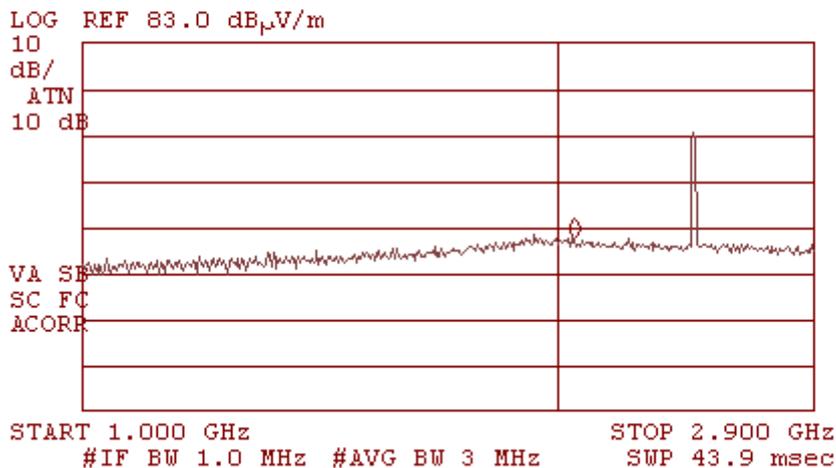
**Horizontal & Vertical Polarization**  
**Plot 4.5.47**



**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 2**  
**Low Frequency 2501 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.48**

hp

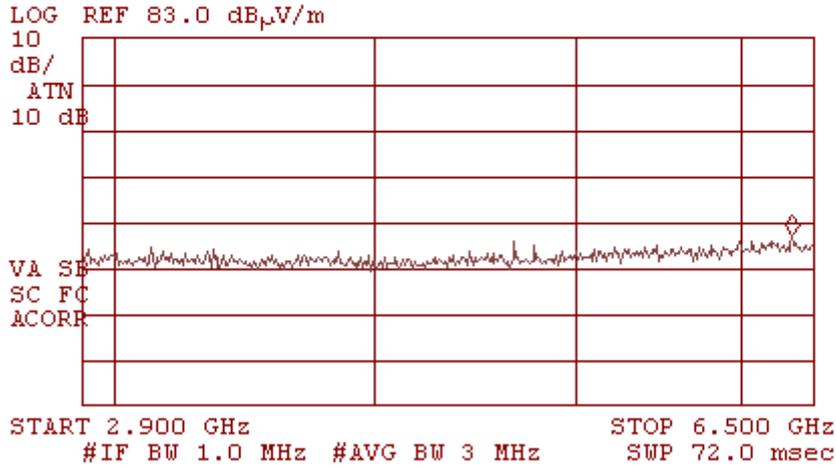
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.113 GHz  
40.25 dBµV/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.49**

*hp*

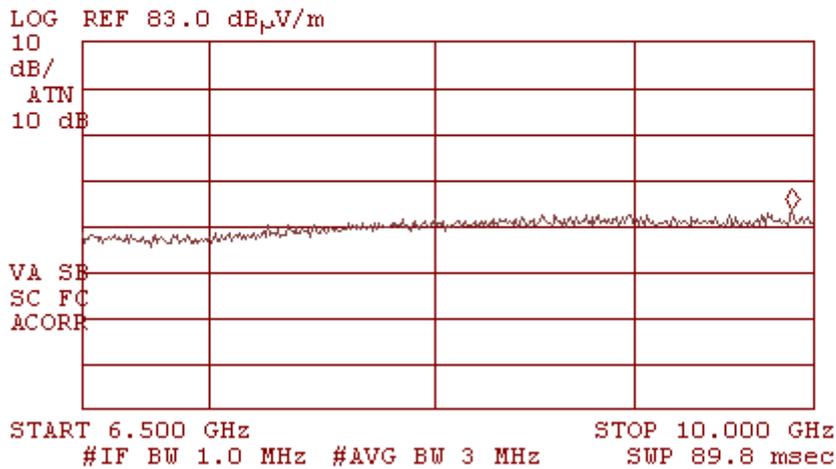
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 6.370 GHz  
39.94 dB $\mu$ V/m



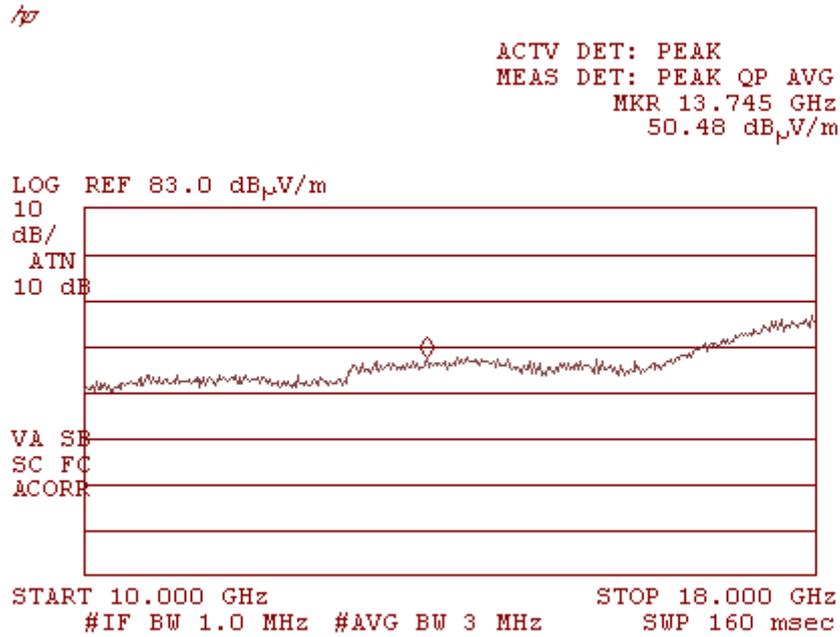
**Horizontal & Vertical Polarization**  
**Plot 4.5.50**

*hp*

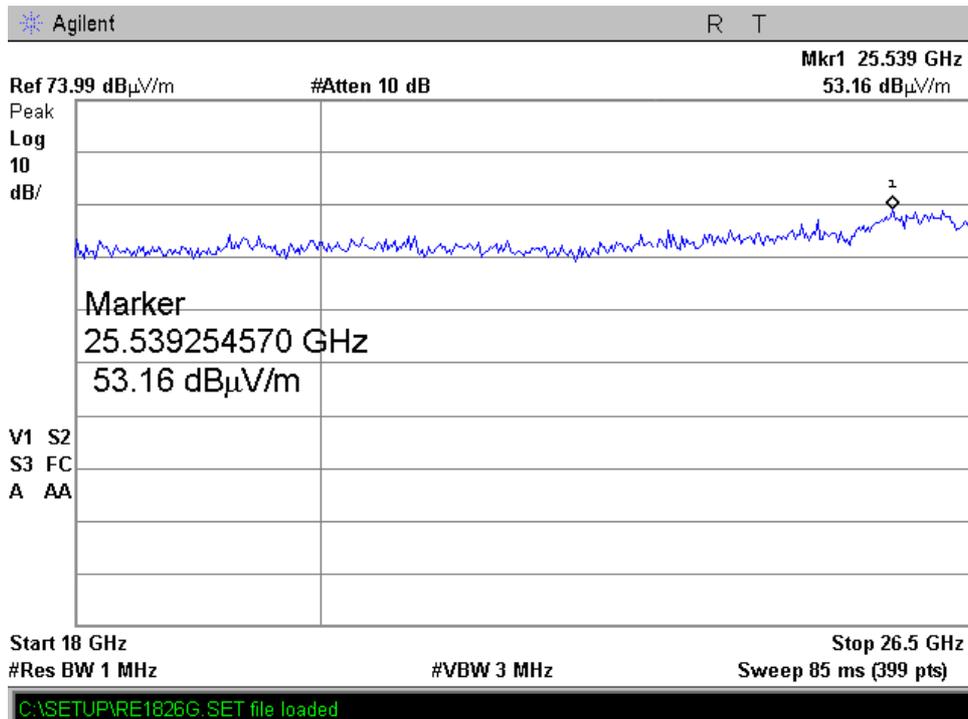
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 9.895 GHz  
46.37 dB $\mu$ V/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.51**



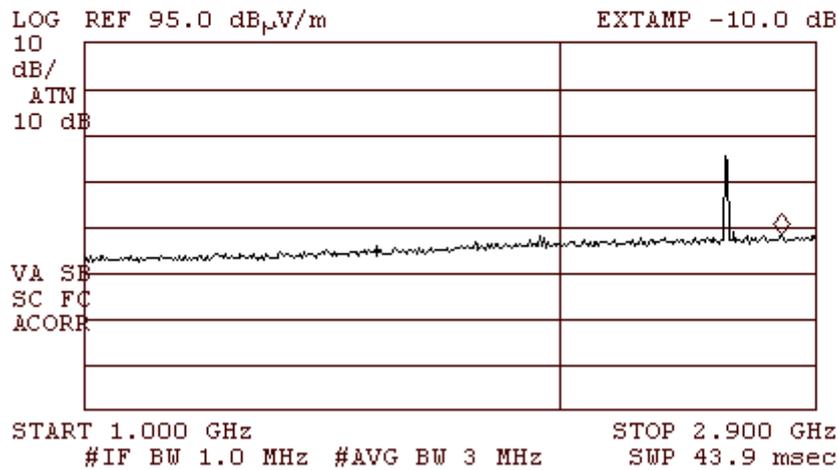
**Horizontal & Vertical Polarization**  
**Plot 4.5.52**



**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 2**  
**Middle Frequency 2600 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.53**

*/p* VSM

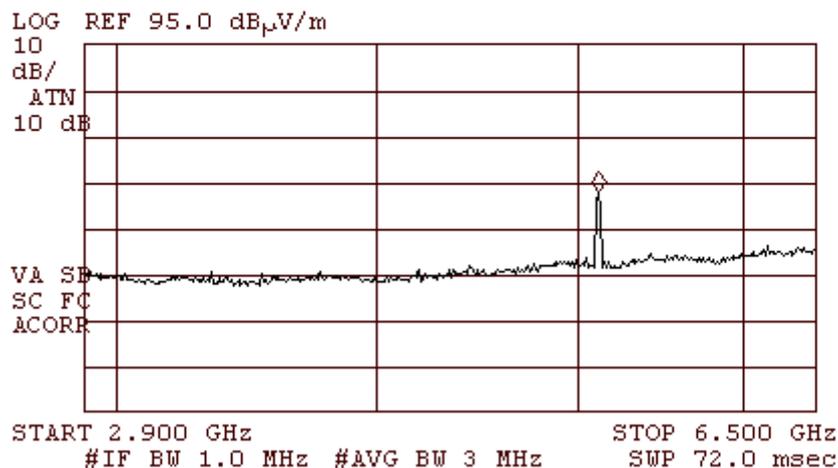
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.786 GHz  
53.23 dB<sub>μ</sub>V/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.54**

*/p* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.212 GHz  
62.66 dB<sub>μ</sub>V/m

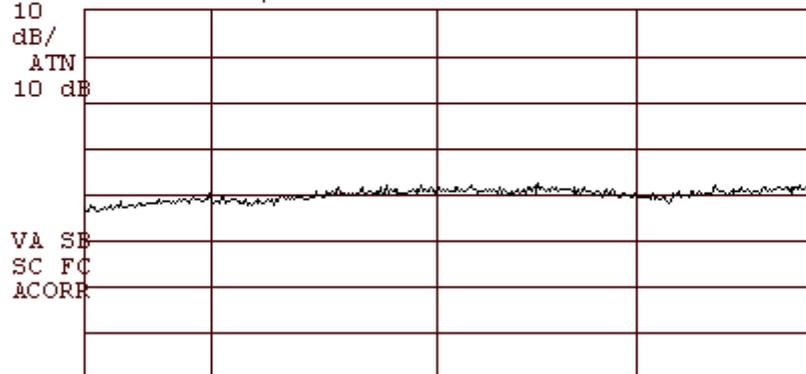


**Horizontal & Vertical Polarization**  
**Plot 4.5.55**

*/p* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 9.991 GHz  
57.43 dB $\mu$ V/m

LOG REF 95.0 dB $\mu$ V/m



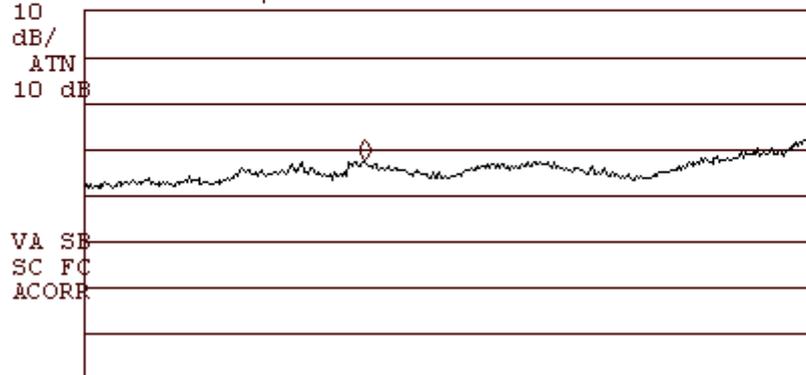
START 6.500 GHz STOP 10.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 89.8 msec

**Horizontal & Vertical Polarization**  
**Plot 4.5.56**

*/p* VSM

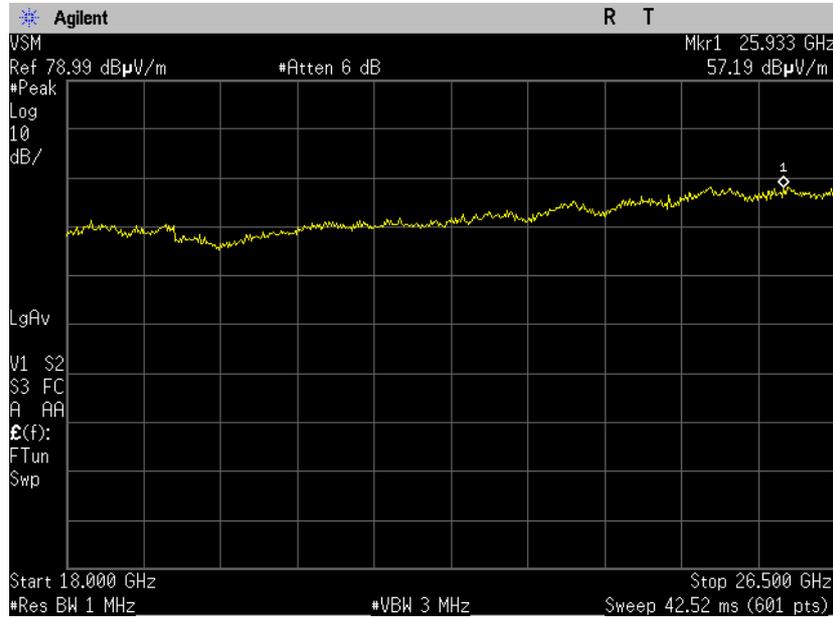
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 13.066 GHz  
62.33 dB $\mu$ V/m

LOG REF 95.0 dB $\mu$ V/m



START 10.000 GHz STOP 18.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 160 msec

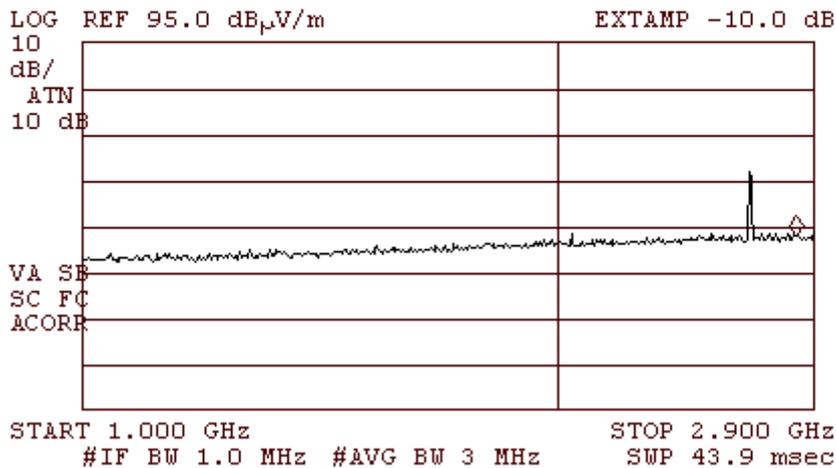
**Horizontal & Vertical Polarization**  
**Plot 4.5.57**



**WiMAX 802.16e (10MHz), OFDMA, 16 QAM, Duty Cycle 27%**  
**Output ANT 2**  
**High Frequency 2685 MHz**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.58**

VSM

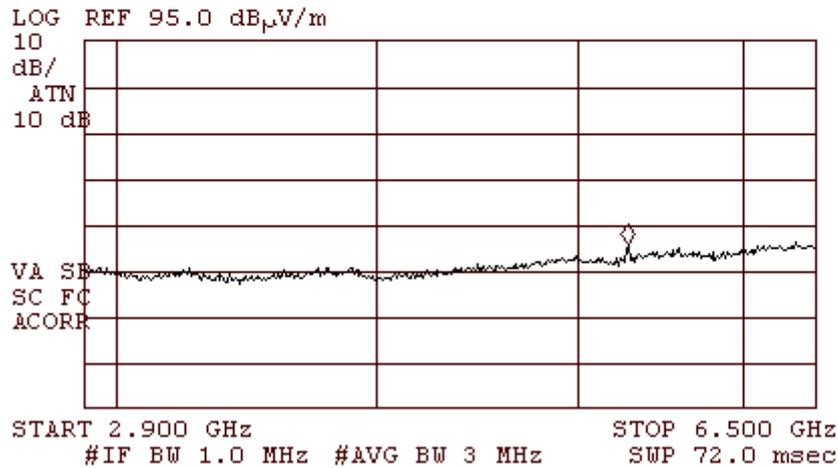
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.840 GHz  
52.88 dBµV/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.59**

*/p* VSM

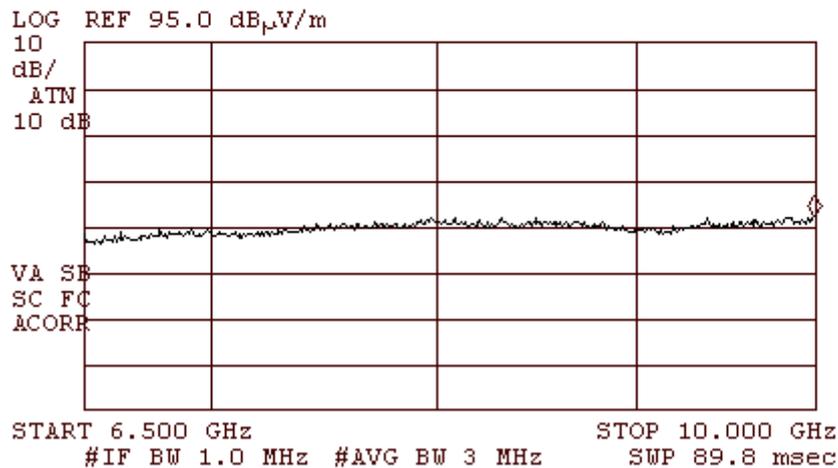
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 5.385 GHz  
50.67 dB<sub>μ</sub>V/m



**Horizontal & Vertical Polarization**  
**Plot 4.5.60**

*/p* VSM

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 9.991 GHz  
57.16 dB<sub>μ</sub>V/m

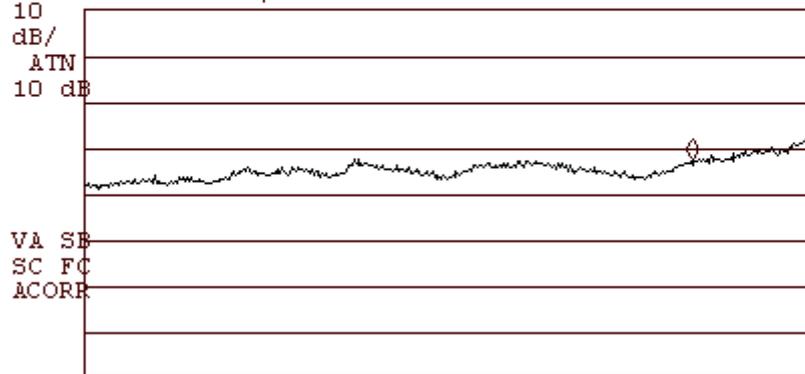


**Horizontal & Vertical Polarization**  
**Plot 4.5.61**

VSM

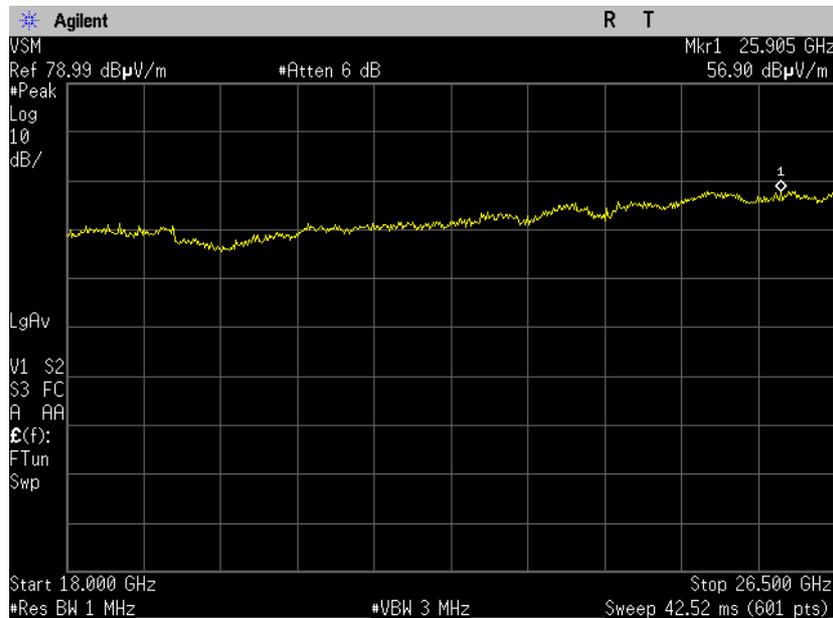
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 16.642 GHz  
62.53 dB $\mu$ V/m

LOG REF 95.0 dB $\mu$ V/m

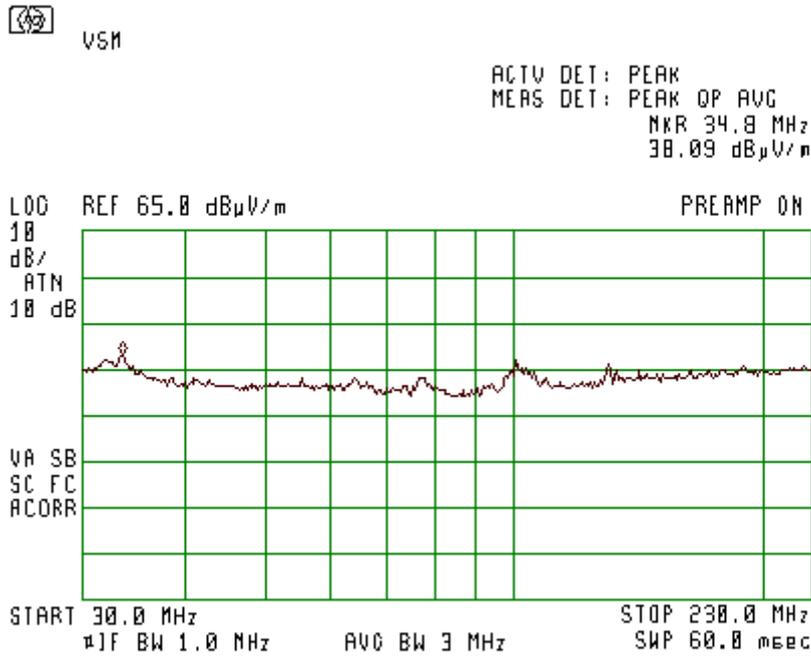


START 10.000 GHz STOP 18.000 GHz  
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 160 msec

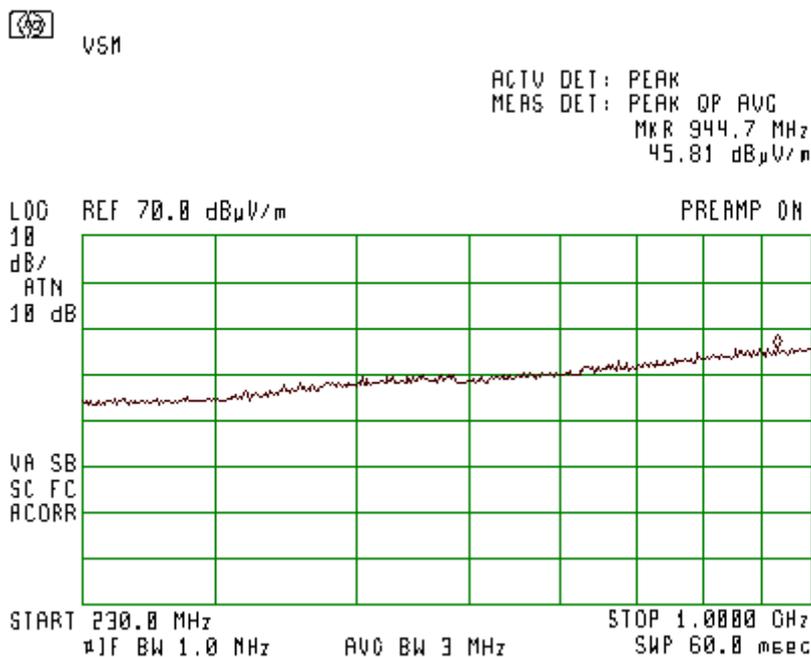
**Horizontal & Vertical Polarization**  
**Plot 4.5.62**



**Below 1 GHz**  
**Worst case for all frequencies**  
**Output ANT 2**  
**Horizontal & Vertical Polarization**  
**Plot 4.5.63**



**Horizontal & Vertical Polarization**  
**Plot 4.5.64**



#### 4.6. Frequency stability

Reference document:	47 CFR §27.54 §2.1055		
Test Requirements:	The frequency stability shall be sufficient to ensure that the fundamental Emissions stay within the authorized bands of operation.		
Test setup:	See Sec. 3.3	<b>Pass</b>	
Method of testing:	Conducted		
Operating conditions:	Under normal & extreme test conditions		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48.3%	Atmospheric Pressure: 1011.4 hPa
Test Result:	Maximum frequency deviation ~1 kHz, while the distance of the -26dB point of the lowest/highest carrier from the band edge >137 kHz.		

#### Test results:

##### Frequency Stability vs. Input Voltage:

Frequency Stability vs. Input Voltage								
Voltage [V]	Carrier frequency at 22°C (13.8 VDC): 2497.499283 MHz							
	Start up		2 minutes		5 minutes		10 minutes	
	Frequency Error [Hz]	Frequency Error [ppm]	Frequency Error [Hz]	Frequency Error [ppm]	Frequency Error [Hz]	Frequency Error [ppm]	Frequency Error [Hz]	Frequency Error [ppm]
11.7	9	0.003603605	9	0.003603605	9	0.003603605	0	0
13.8	0	0	0	0	17	0.006806809	17	0.006806809
15.9	-16	-0.006406408	-16	-0.006406408	-25	-0.010010013	-33	-0.013213217

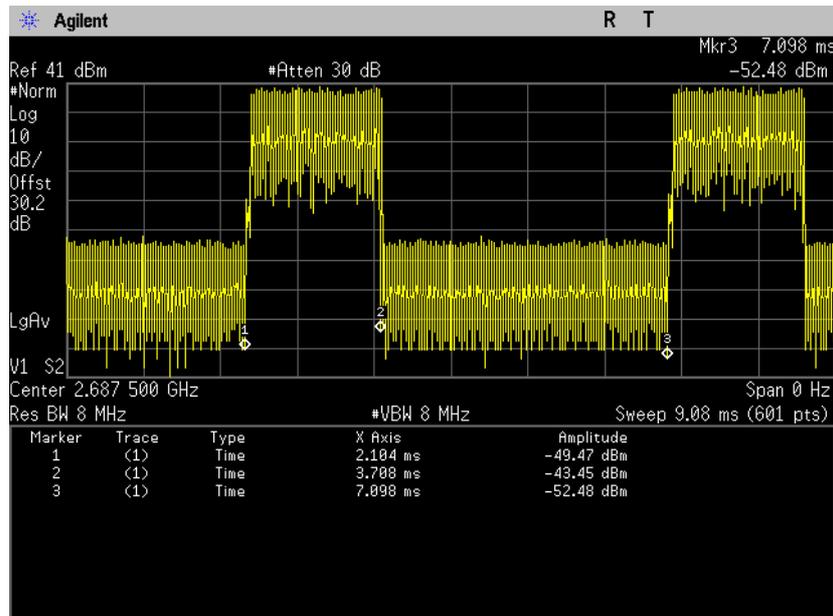
##### Frequency Stability vs. Temperature:

Frequency Stability vs. Temperature								
Temp. [°C]	Carrier frequency at 22°C (13.8 VDC): 2497.499420 MHz							
	Start up		2 minutes		5 minutes		10 minutes	
	Frequency Error [Hz]	Frequency Error [ppm]	Frequency Error [Hz]	Frequency Error [ppm]	Frequency Error [Hz]	Frequency Error [ppm]	Frequency Error [Hz]	Frequency Error [ppm]
-30	-1045	-0.418418516	-1041	-0.416816914	-1036	-0.414814911	-1011	-0.404804899
-20	-870	-0.348348429	-853	-0.341541621	-786	-0.314714788	-695	-0.278278343
-10	-345	-0.13813817	-336	-0.134534566	-295	-0.118118146	-245	-0.098098121
0	-161	-0.064464479	-145	-0.058058072	-111	-0.044444455	-70	-0.028028035
10	88	0.035235243	97	0.038838848	113	0.045245256	147	0.058858873
20	163	0.06526528	172	0.068868885	163	0.06526528	138	0.055255268
30	55	0.022022027	47	0.018818823	30	0.012012015	-12	-0.004804806
40	-137	-0.054854868	-145	-0.058058072	-170	-0.068068084	-245	-0.098098121
50	-437	-0.174975016	-478	-0.191391436	-553	-0.221421473	-653	-0.261461522

**5. Appendix**

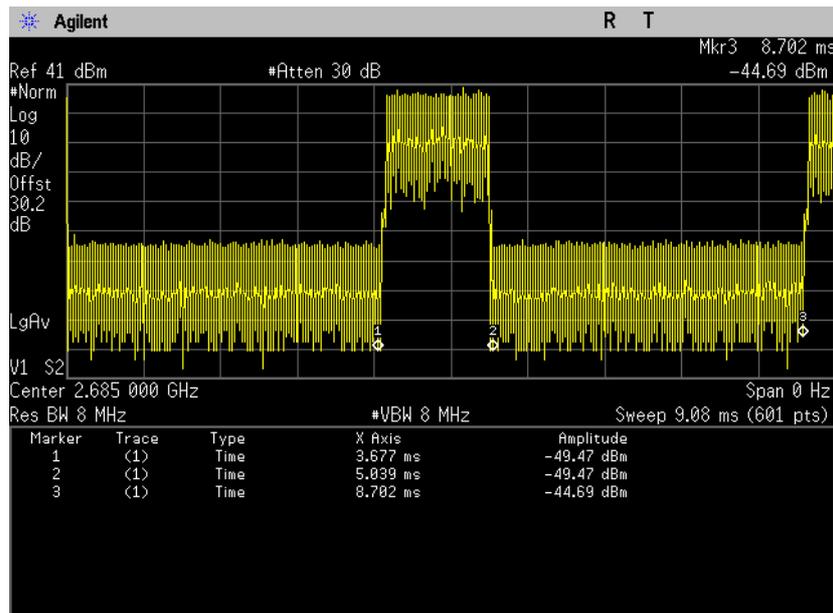
**Appendix A: UL/DL Ratio for test**

**For reference (5MHz):**



The ratio is approximately 32.1%

**For reference (10MHz):**



The ratio is approximately 27.1%

**Appendix B: List of Measuring Equipment used:**

Equipment	Manufacturer/ Model	Serial Number	Due date
CISPR16 EMI Receiver	HP8546A	3710A00392	30-06-10
Spectrum Analyzer 9kHz ÷ 22 GHz	HP 8593EM	3536A00131	30-06-10
Spectrum Analyzer 3 Hz ÷ 44 GHz	Agilent E4446A	MY46180602	30-06-10
Spectrum Analyzer 100 Hz ÷ 26.5 GHz	Agilent E7405A	US41160436	30-06-10
LNA Amplifier 1 GHz ÷ 18 GHz	MiTeq ,AMP – 5D-010180-30-10P-GW	618653	30-06-10
Power meter	Agilent N1911A	MY45100784	23-02-11
Dual Ridged Guide Ant.1-18 GHz	EMCO 3115	9602-4677	30-06-10
Antenna 18 GHz ÷ 26.5 GHz	Alpha Industry 861A/599	505	30-06-10
Turn table	HD100	100/693	-
Antenna Mast	HD 100	100/693	-
Biconical 20 –200 MHz	Schwarzbeck VHBB9124	9124/0255	16-05-11
Log-Periodic 200 – 1000 MHz	Schwarzbeck VUSLP9111	VUSLP9111184	16-05-11
LNA Amplifier 18 GHz ÷ 26.5 GHz	MiTeq, AMF-5F-18002650-30-10P	945372	30-06-10
LISN	Fischer 50/250-25-2	-	30-06-10
Transient Limiter	HP11947A	-	30-06-10
Notch Filter	Micro-Tronics BRM50702-05	0001	30-06-10

**Appendix C: Accreditation Certificate**



The American Association for Laboratory Accreditation  
World Class Accreditation

**Accredited Laboratory**  
A2LA has accredited  
**QUALITECH (ECI TELECOM)**  
*Petach-Tikva, Israel*  
for technical competence in the field of  
**Electrical Testing**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Presented this 27<sup>th</sup> day of May 2009.



*Peter Meyer*  
President & CEO  
For the Accreditation Council  
Certificate Number 1633.01  
Valid to September 30, 2010

*For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

***End of the Test Report***