

## Test Report

**Report Number: 3117782MPK-001**

**Project Number: 3117782**

**Report Date: April 20, 2007**

**Testing performed on the  
Video Transmitter**

**Model Number: VT50SC**

**FCC ID: U8KVT50SC**

**to**

**FCC Part 90**

**for**

**Advanced Microwave Products**



A2LA Certificate Number: 1755-01

**Test Performed by:**

Intertek Testing Services NA, Inc  
1365 Adams Court  
Menlo Park, CA 94025

**Test Authorized by:**

Advanced Microwave Products  
2705 Old Hwy 40W, Suite C  
Verdi, NV, 89439

**Prepared by:**

David Chernomordik  
David Chernomordik, EMC Technical Manager

**Date:** April 20, 2007

**Reviewed by:**

Ollie Moyrong  
Ollie Moyrong, Operations Manager

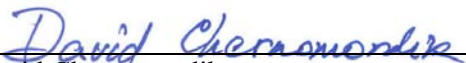
**Date:** April 20, 2007

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**Report No. 3117782MPK-001**

<b>Equipment Under Test:</b>	Video/audio transmitter
<b>Trade Name:</b>	Advanced Microwave Products
<b>Model No.:</b>	VT50SC
<b>Serial No.:</b>	Not Labeled
<b>FCC ID:</b>	U8KVT50SC
<b>Applicant:</b>	Advanced Microwave Products
<b>Contact:</b>	Mr. Barry Lautzenhiser
<b>Address:</b>	2705 Old Hwy 40W, Suite C Verdi, NV, 89439
<b>Country</b>	USA
<b>Tel. number:</b>	775-345 9933
<b>Fax number:</b>	
<b>Applicable Regulation:</b>	FCC Part 90
<b>Test Site Location:</b>	ITS - Site 1 1365 Adams Drive Menlo Park, CA 94025
<b>Date of Test:</b>	March 10 - 31, 2007

*We attest to the accuracy of this report:*

  
\_\_\_\_\_  
David Chernomordik  
EMC Technical Manager

  
\_\_\_\_\_  
Ollie Moyrong  
Operations Manager

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## 1.0 Introduction

### 1.1 Product Description

The Equipment under Test (EUT), model: VT50 is a Video/Audio Transmitter

<b>Use of Product</b>	surveillance
<b>Rated RF Output Power</b>	high power mode - 5 W low power mode - 2 W
<b>Frequency Ranges, MHz</b>	2450 – 2483.5 MHz
<b>Type of modulation</b>	Analog FM
<b>Channel spacing</b>	250 kHz
<b>Antenna &amp; Gain</b>	Typical - whip, 3 dBi
<b>Detachable antenna?</b>	yes
<b>External input</b>	Analog Video/Audio
<b>Operating temperature</b>	From $-30^{\circ}\text{C}$ to $+50^{\circ}\text{C}$

**EUT receive date:** March 10, 2007

**EUT receive condition:** The prototype version of the EUT was received in good condition with no apparent damage. As declared by the Applicant it is identical to the production units.

**Test start date:** March 10, 2007

**Test completion date:** March 31, 2007

## 1.2 Summary of Test Results

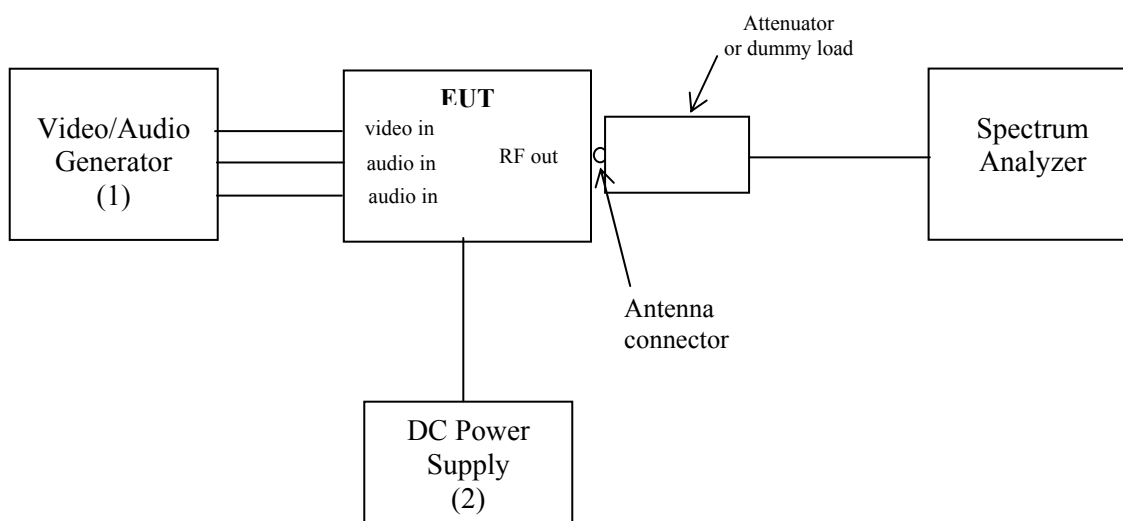
FCC Rule	Description of Test	Result
2.1046, 90.205(n)	RF Power Output	Complies
2.1047	Modulation characteristics	Not Applicable
2.1049, 90.209	Occupied Bandwidth	Complies
90.210	Emission mask	Complies
2.1051, 90.210	Out of Band Emissions at Antenna Terminal	Complies
2.1053, 90.210	Spurious Radiation	Complies
2.1055, 90.213	Frequency Stability vs. Temperature and Voltage	Complies

### 1.3 Test Configuration

#### 1.3.1 Support Equipment

Item #	Description	Manufacturer	Model No.	S/N
1	TV Signal Generator	Fluke	54200	688004
2	DC Power Supply	GW	GPR-6030	Not labeled

#### 1.3.2 Block diagram of Test Setup



<b>S</b> = Shielded	<b>F</b> = With Ferrite
<b>U</b> = Unshielded	<b>m</b> = Length in Meters

#### 1.4 Related Submittal(s) Grants

None

## 2.0 RF Power Output

FCC 2.1046, 90.205(n)

### 2.1 Requirement

The maximum transmitter power is 5 Watts

### 2.2 Test Procedure

The EUT RF output was connected as shown on the diagram in sec.1.3.2. The EUT was setup to transmit continuously the maximum power.

The spectrum analyzer was setup to measure a peak power. The attenuation and cable loss were added to the spectrum analyzer reading by using OFFSET function.

Measurements were performed at the middle frequency - 2467 MHz.

### 2.3 Test Equipment

Rohde & Schwarz FSP40 Spectrum Analyzer

### 2.4 Test Results

<b>Tested By:</b>	David Chernomordik
<b>Test Date:</b>	March 21, 2007

Frequency (MHz)	Input	Measured Output Power (dBm)	Measured Output Power (Watt)
2467	NTSC: color bars. standard audio on subcarriers 1 & 2	High power mode: 36.4 Low power mode: 32.4	4.4 1.7



### 3.0 Occupied Bandwidth, 26-dB bandwidth

FCC 2.1049, 90.209(b)(5)

#### 3.1 Test Procedure

The EUT RF output was connected as shown on the diagram in sec.1.3.2. The EUT was setup to transmit the maximum power.

The spectrum analyzer was setup to measure the Occupied Bandwidth (defined as the 99% Power Bandwidth) and the 26-dB bandwidth. The Bandwidth was measured at the middle channel.

#### 3.2 Test Equipment

Rohde & Schwarz FSP40 Spectrum Analyzer

#### 3.3 Test Results

<b>Tested By:</b>	David Chernomordik
<b>Test Date:</b>	March 21, 2007

<b>Frequency (MHz)</b>	<b>Measured Occupied Bandwidth</b>	<b>Measured 26-dB Bandwidth</b>	<b>Emission Designator</b>	<b>Plot</b>
2467	9.9 MHz	15.7 MHz	9M90F8W	3.1, 3.2

For more details refer to the attached plots.

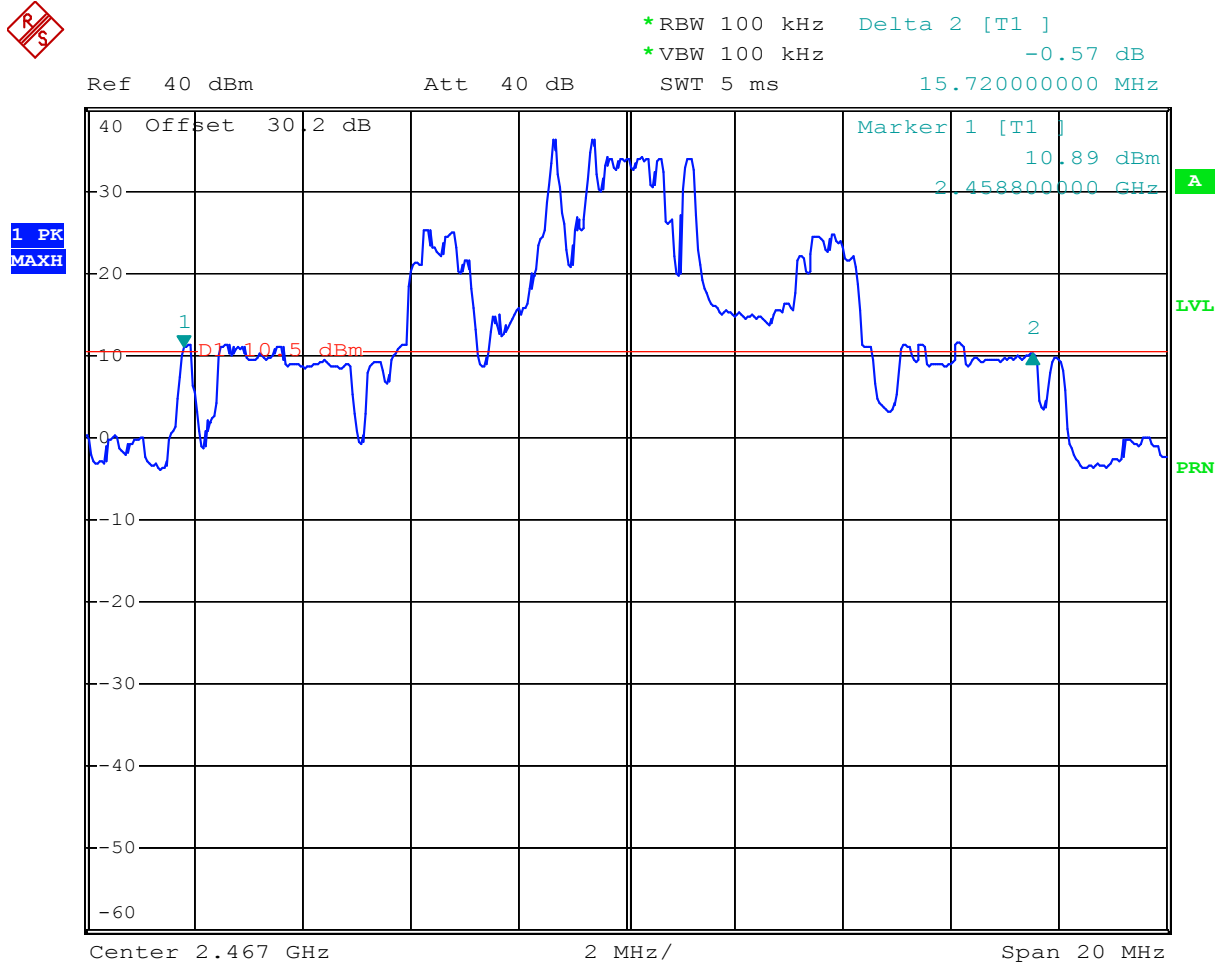
Plot 4.1



Comment: Occupied bandwidth

Date: 21.MAR.2007 11:03:32

Plot 4.2



Comment: 26-dB bandwidth  
Date: 21.MAR.2007 11:00:35

#### **4.0 Emission Mask** FCC 90.210

##### **4.1 Test Procedure**

The EUT RF output was connected as shown on the diagram in sec.1.3.2. The EUT was setup to transmit the maximum power.

The spectrum analyzer was setup to verify the compliance with the Emission “Mask B”. Since the authorized bandwidth is not specified for the frequency range 2450 - 2483.5 MHz, the 26-dB bandwidth is used as an authorized bandwidth.

##### **4.2 Test Equipment**

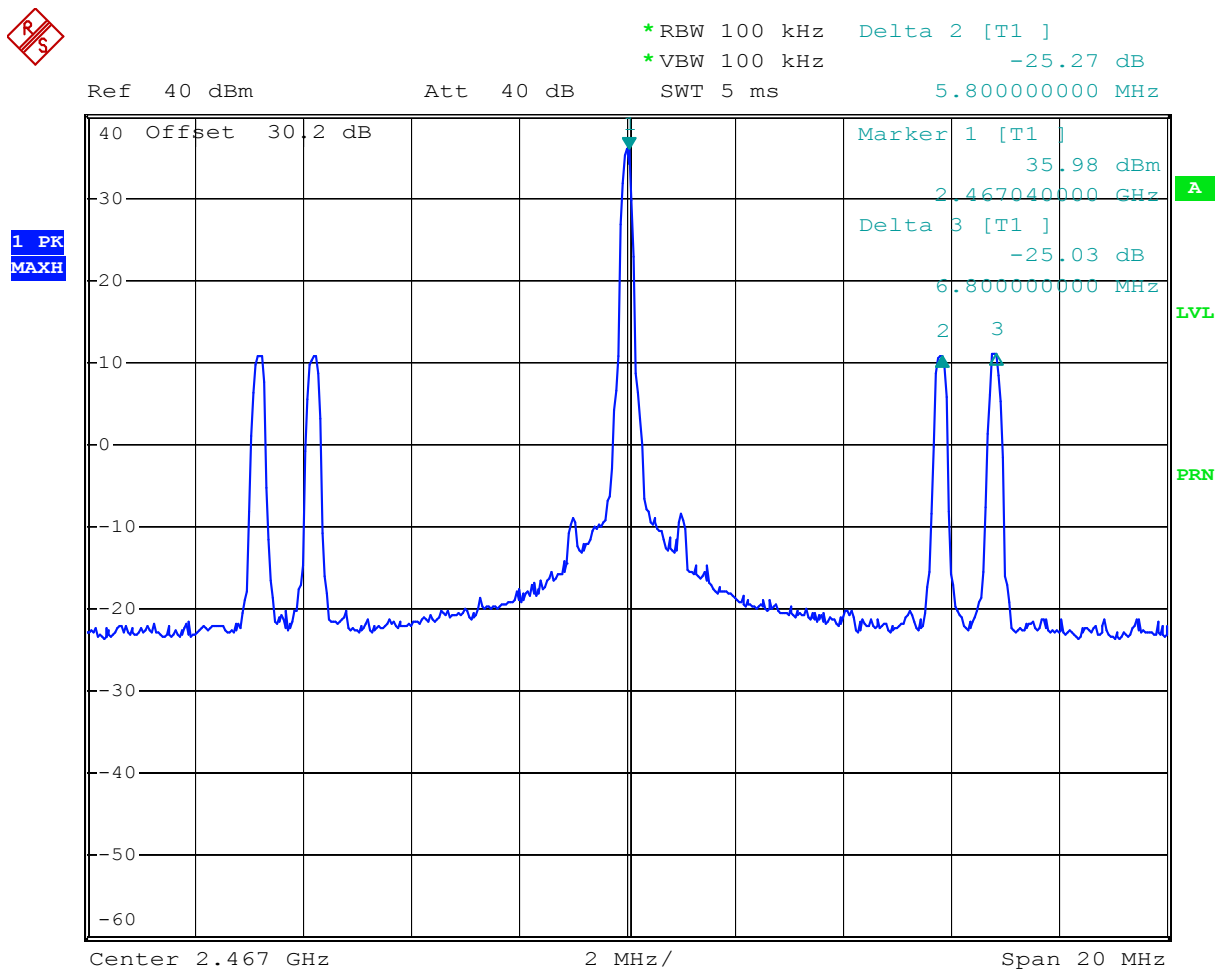
Rohde & Schwarz FSP40 Spectrum Analyzer

##### **4.3 Test Results**

<b>Tested By:</b>	David Chernomordik
<b>Test Date:</b>	March 21, 2007

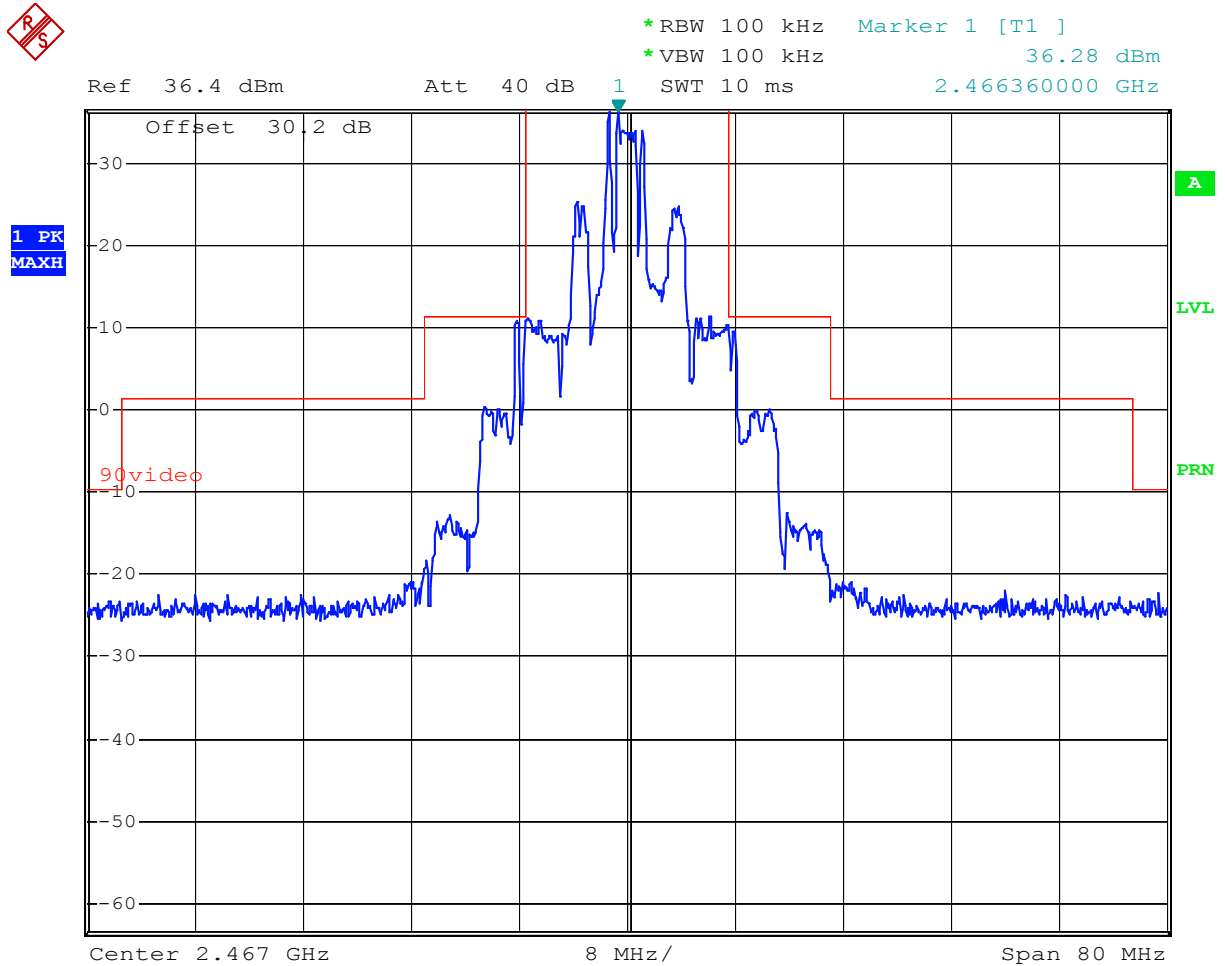
For details refer to the attached plots: 4.1 – 4.4.

Plot 4.1



Comment: Unmodulated video/audio, high power  
 Date: 21.MAR.2007 15:32:58

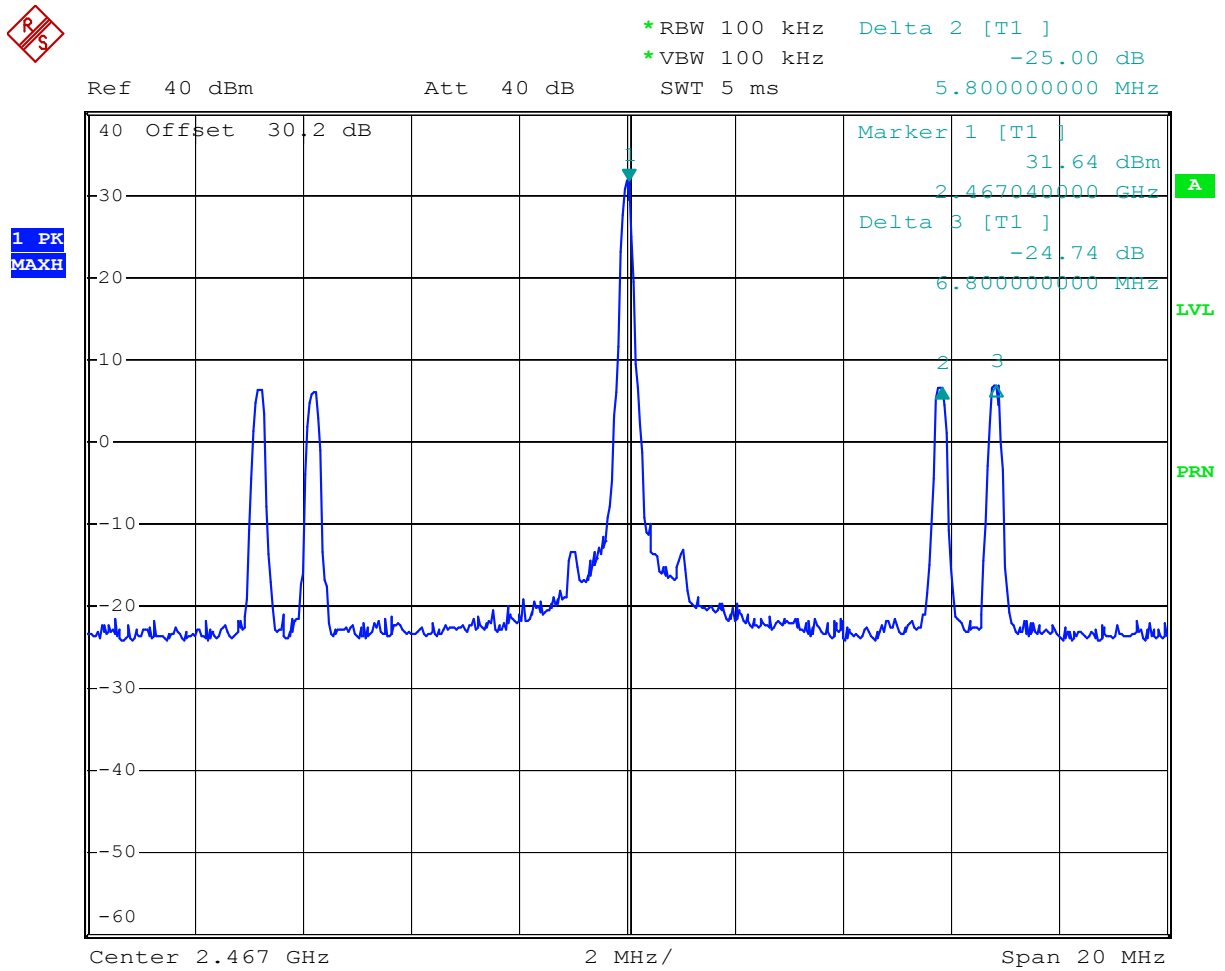
Plot 4.2



Comment: Emission Mask

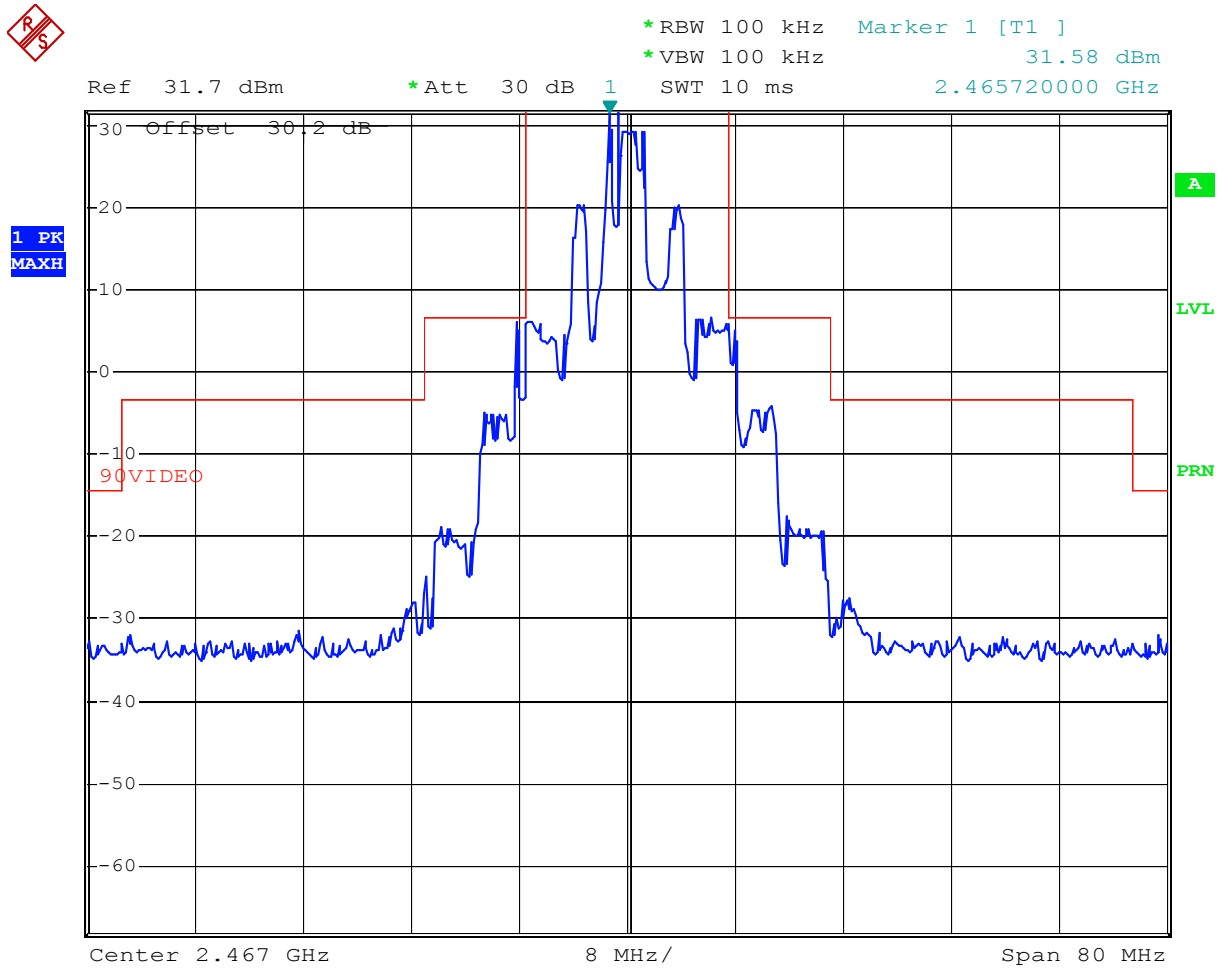
Date: 21.MAR.2007 11:10:51

Plot 4.3



Comment: Unmodulated video/audio, low power  
Date: 21.MAR.2007 15:34:43

Plot 4.4



Comment: Emission Mask, low power  
 Date: 21.MAR.2007 15:48:54



## 5.0 Out of Band Emissions at Antenna Terminal

FCC 2.1051, 90.210

### 5.1 Requirement

The power of any emissions must be attenuated below the unmodulated carrier output power (P) on any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: at least  $(43 + 10 \log P)$  dB.

Note: That corresponds to the level of -13 dBm for any out-of-band and spurious emissions.

### 5.2 Test Procedure

The EUT RF output was connected as shown on the diagram in sec.1.3.2. The EUT was setup to transmit the maximum power.

For measurements at frequencies below 1 GHz, the spectrum analyzer resolution bandwidth was set to 100 kHz. For measurements at frequencies above 1 GHz, the spectrum analyzer resolution bandwidth was set to 1 MHz

Measurements were performed at the middle frequency.

Sufficient scans were taken to show the out-of-band emissions up to 10th harmonic.

### 5.3 Test Equipment

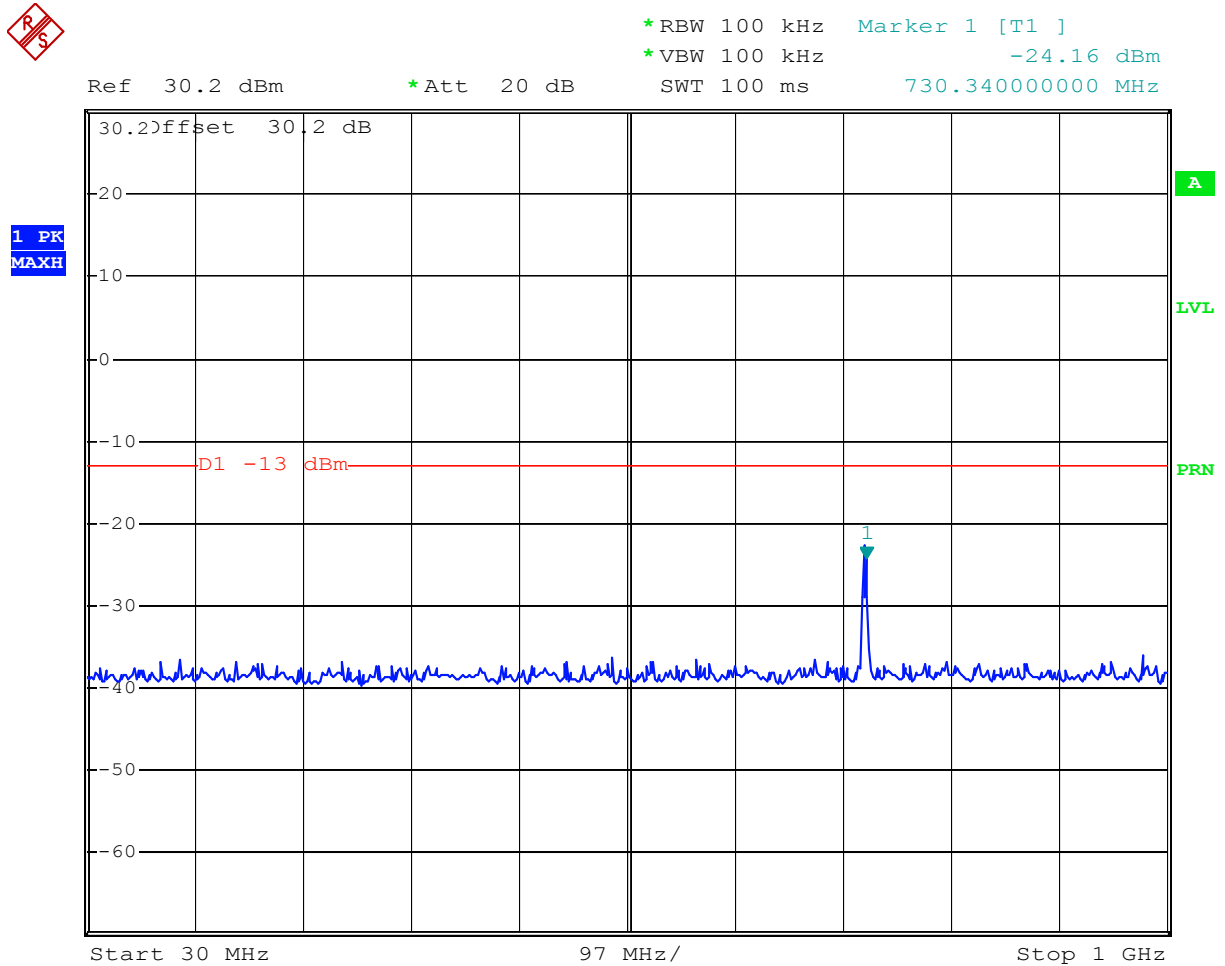
Rohde & Schwarz FSP40 Spectrum Analyzer

### 5.4 Test Results

<b>Tested By:</b>	David Chernomordik
<b>Test Date:</b>	March 21& April 5, 2007

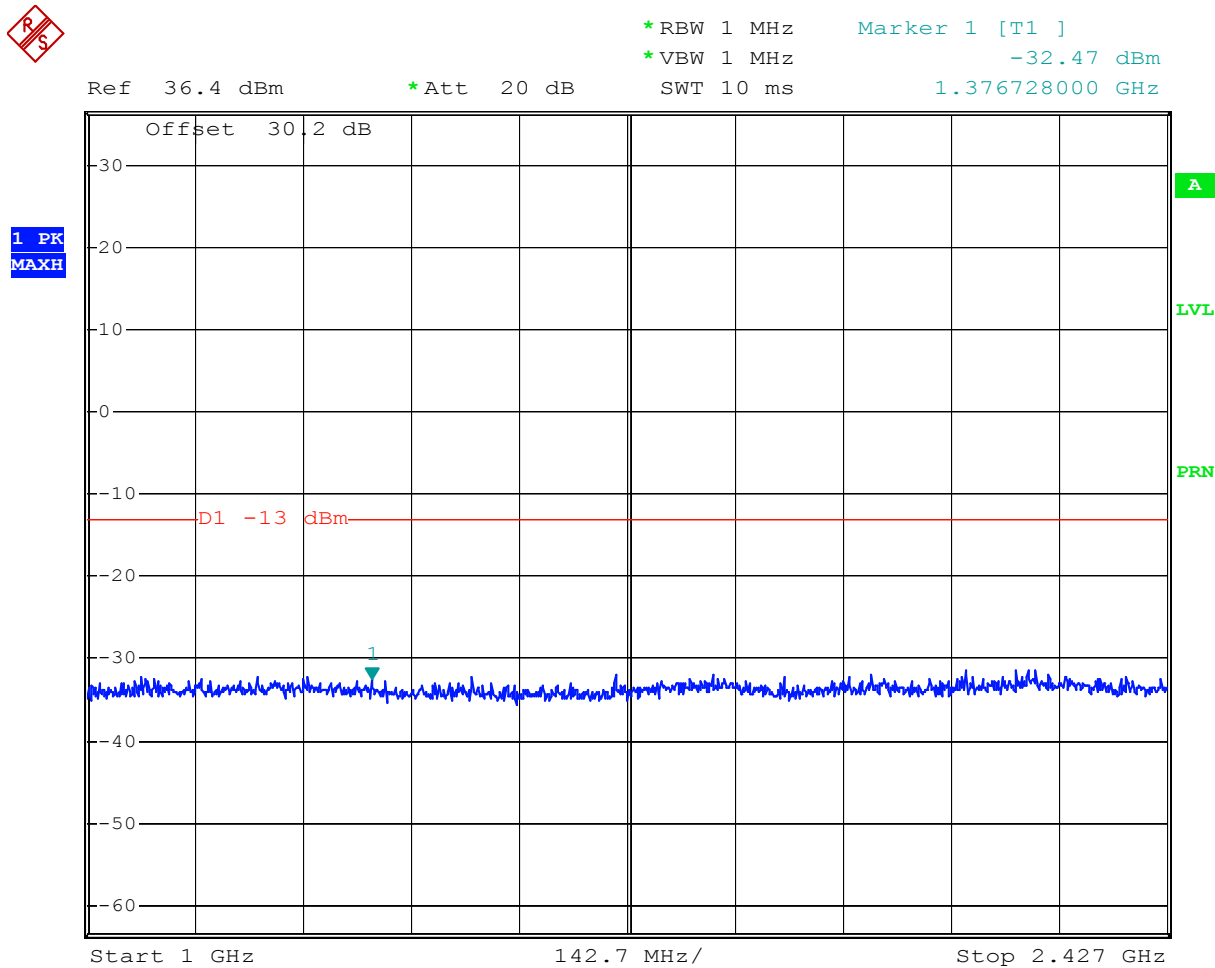
<b>Complies</b>	Refer to the following plots 5.1 –5.8
-----------------	---------------------------------------

Plot 5.1



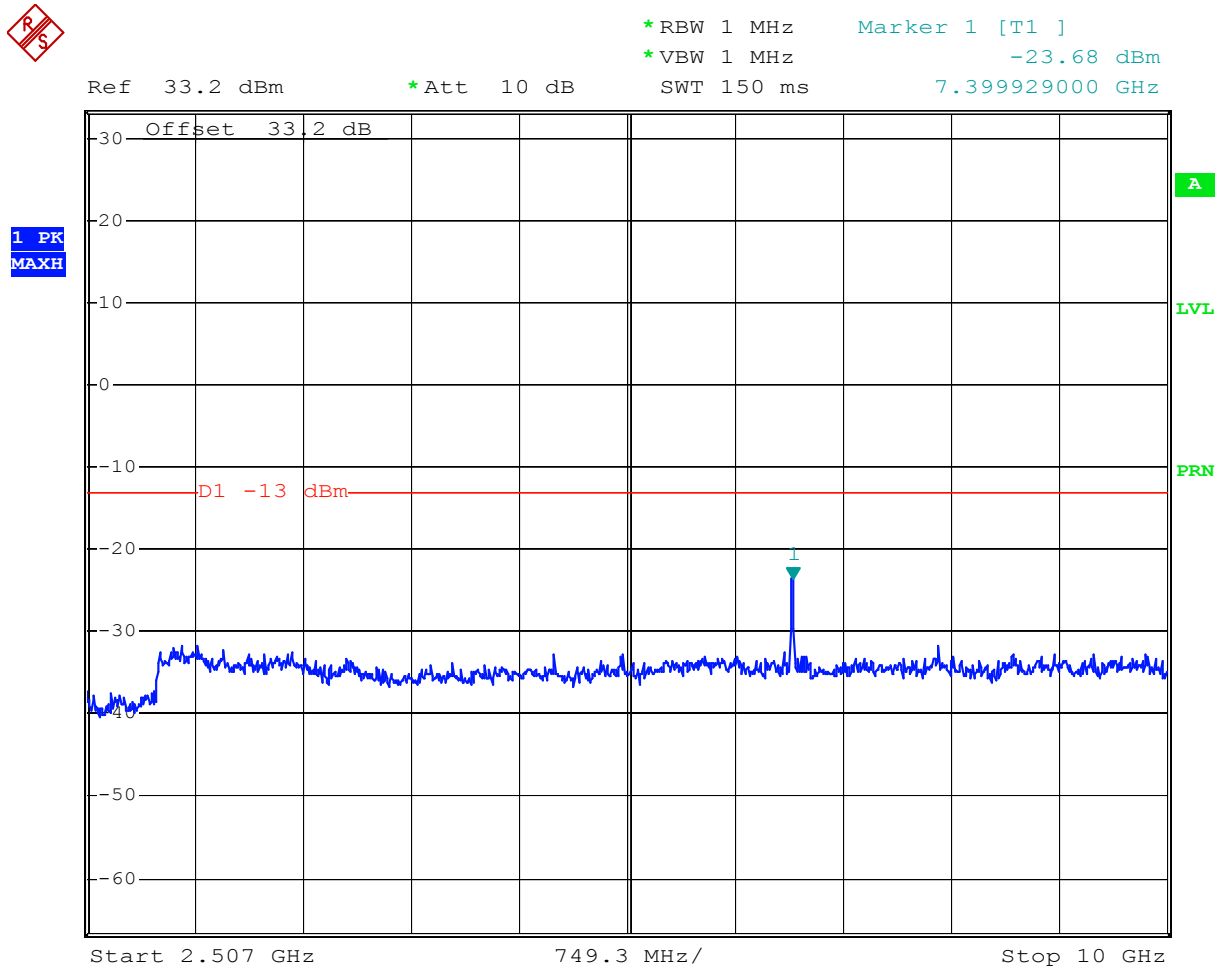
Comment: Conducted spurious emissions  
 Date: 21.MAR.2007 15:20:26

Plot 5.2



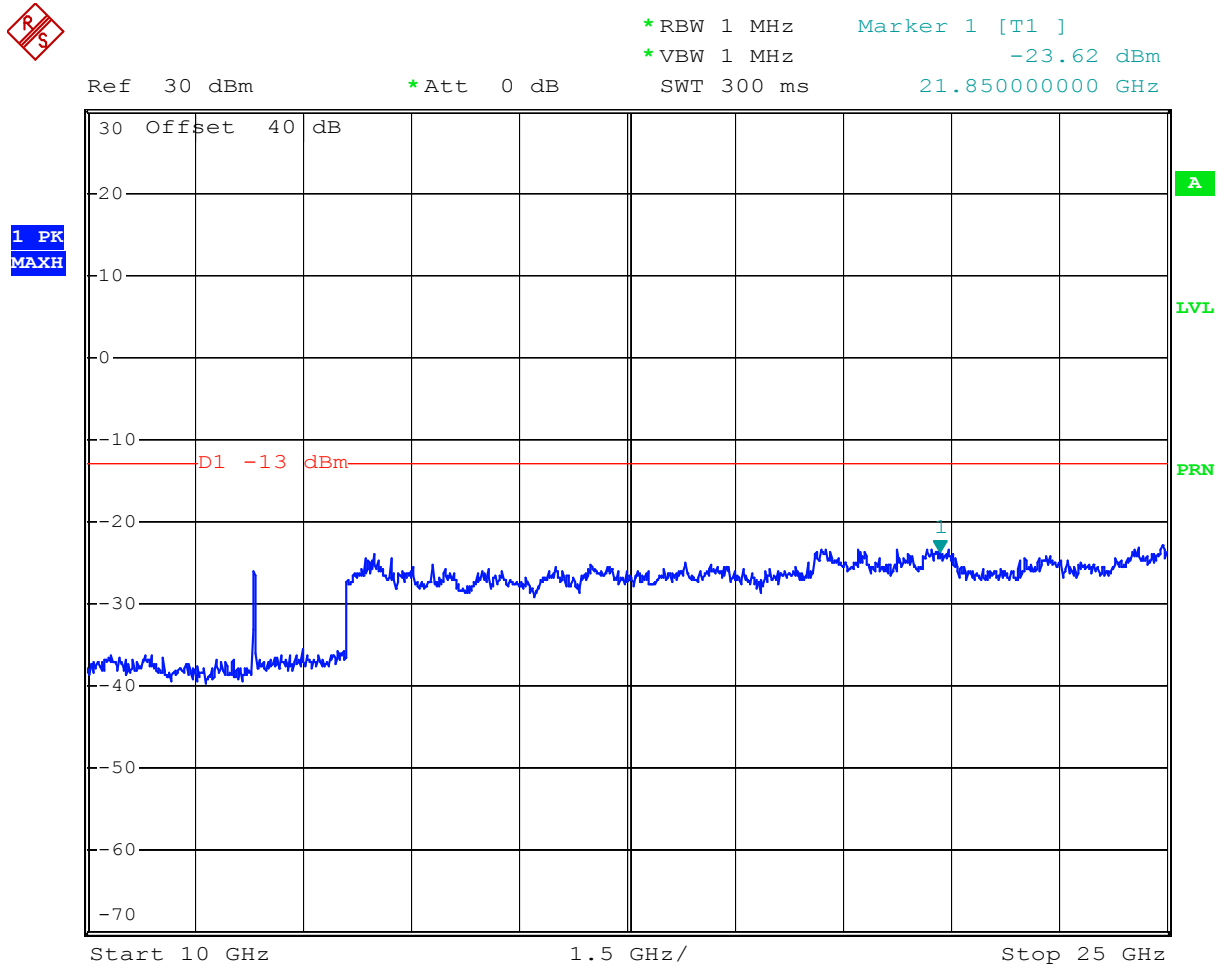
Comment: Conducted spurious emissions  
 Date: 21.MAR.2007 11:13:46

Plot 5.3



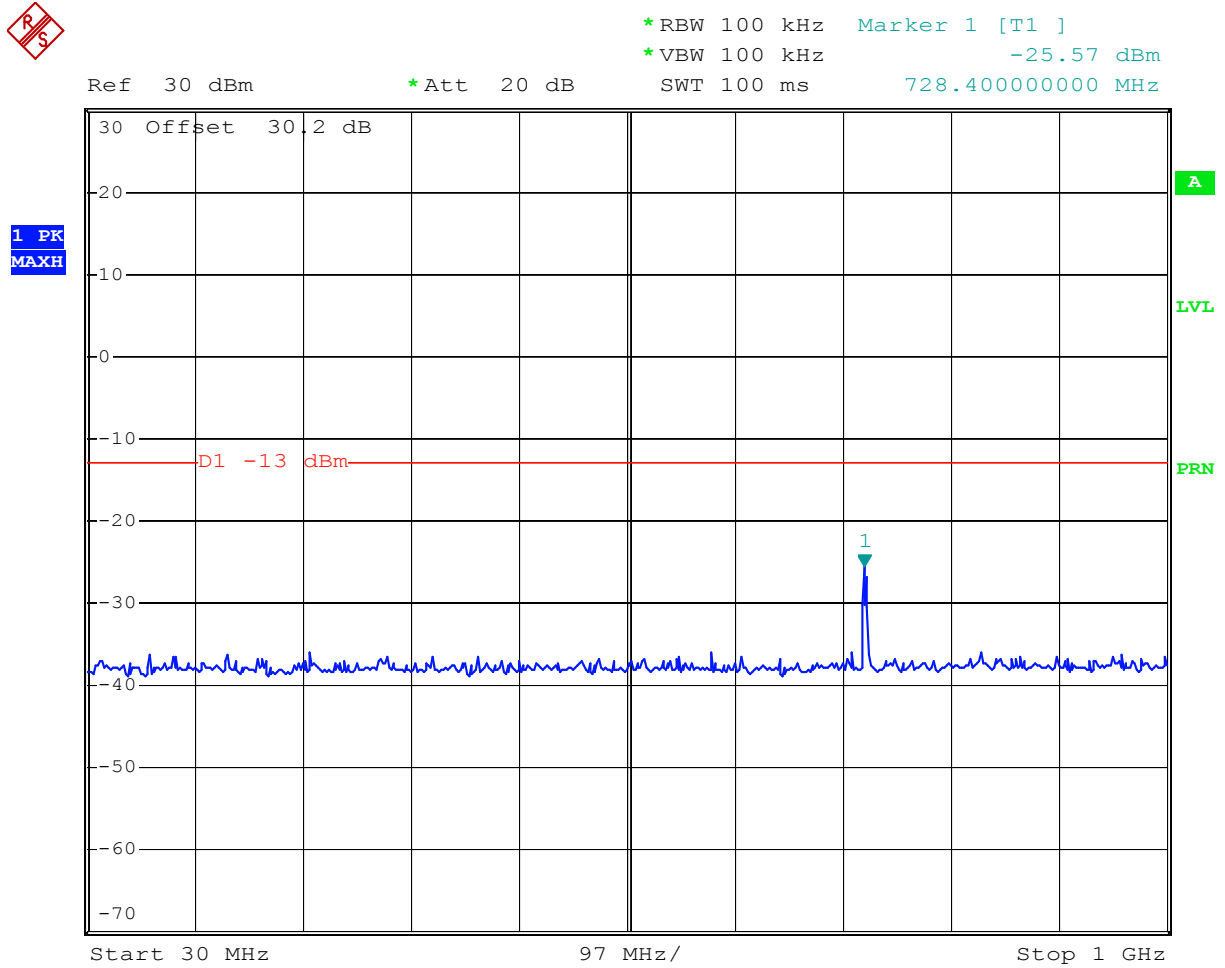
Comment: Conducted spurious emissions  
Date: 21.MAR.2007 11:16:30

Plot 5.4



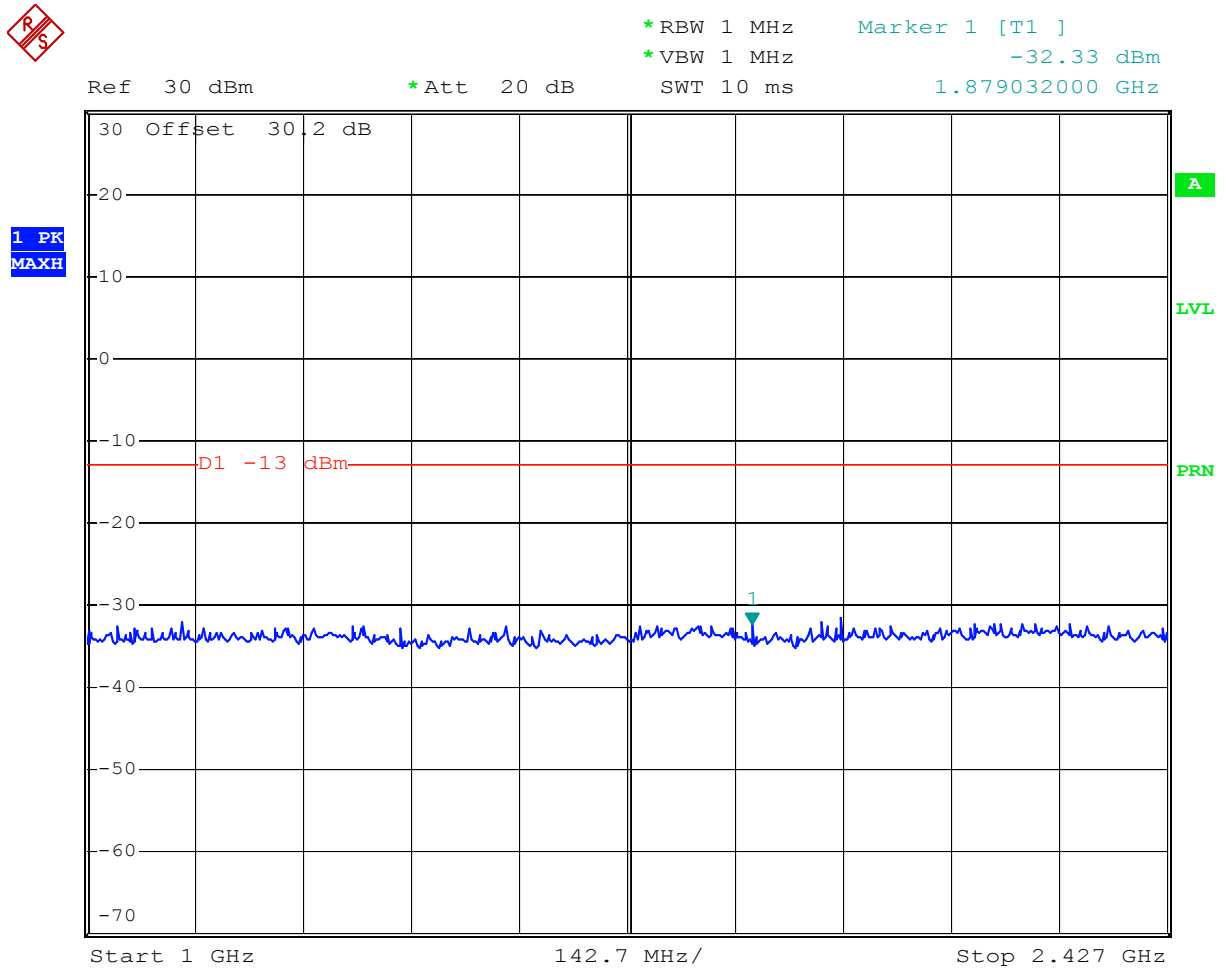
Comment: Conducted spurious emissions  
 Date: 21.MAR.2007 11:18:43

Plot 5.5



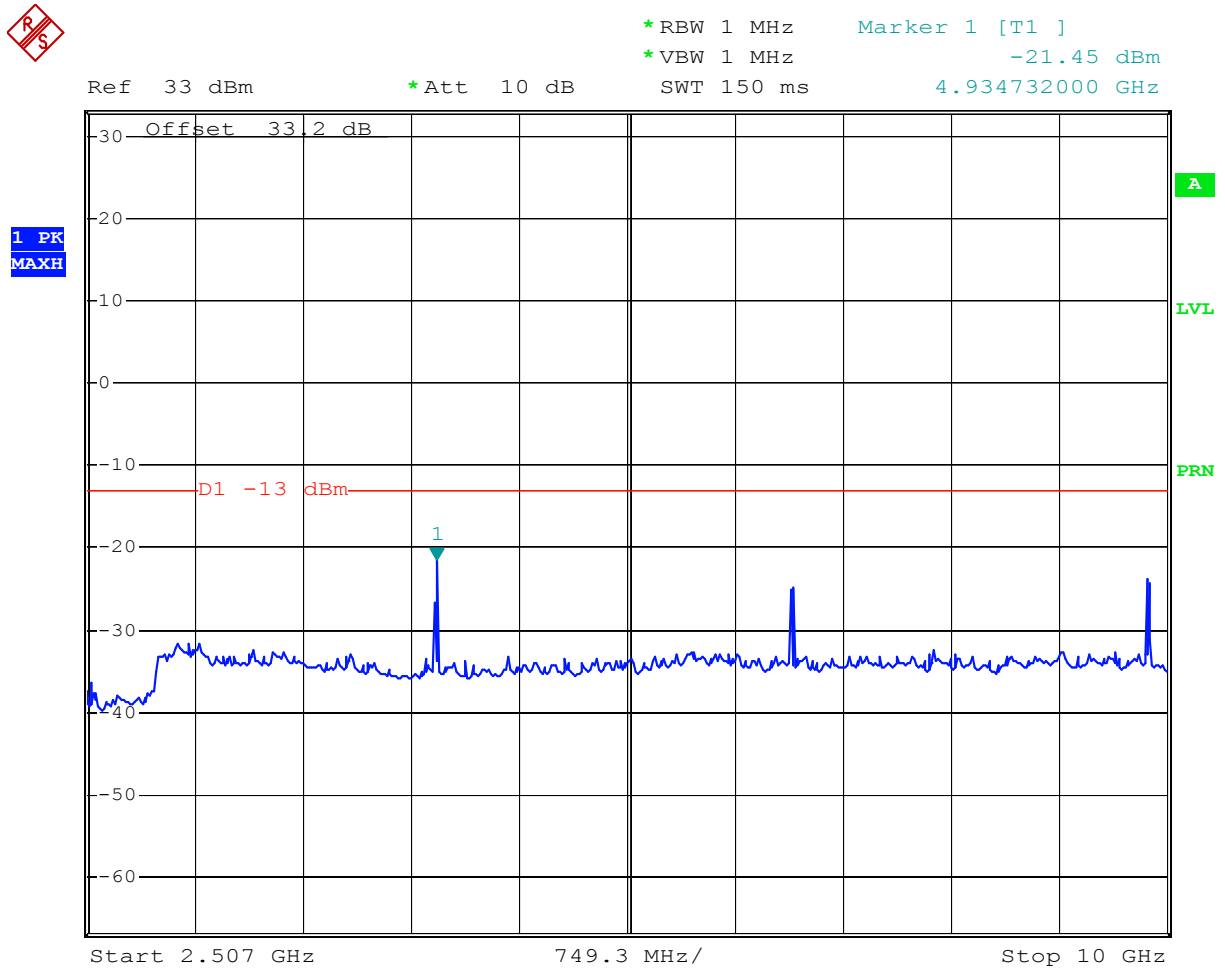
Comment: Conducted spurious emissions, low power  
 Date: 5.APR.2007 17:43:52

Plot 5.6



Comment: Conducted spurious emissions, low power  
 Date: 5.APR.2007 17:45:20

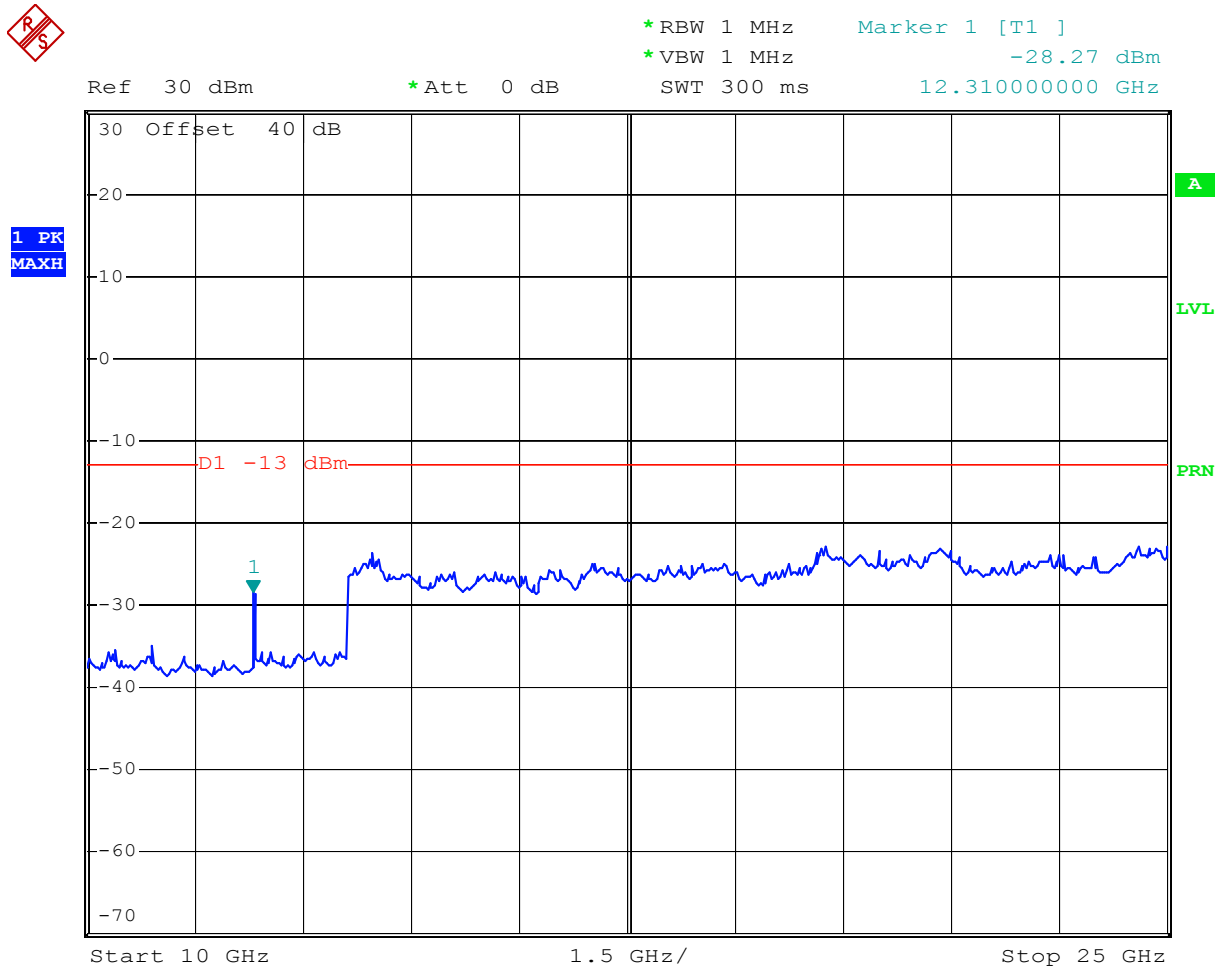
Plot 5.7



Comment: Conducted spurious emissions, low power  
 Date: 5.APR.2007 17:49:40



Plot 5.8



Comment: Conducted spurious emissions, low power  
 Date: 5.APR.2007 17:51:39

## 6.0 **Spurious Radiation** FCC 2.1053, 90.210

### 6.1 Requirement

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency outside the frequency band by at least  $(40 + 10 \log P)$  dB.

Note: That corresponds to the level of -13 dBm for any out-of-band and spurious emissions.

### 6.2 Test Procedure

A 50Ω dummy load was connected to the output.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to 10th harmonic was investigated. The worst case of emissions was reported.

For spurious emissions attenuation, the substitution method was used. The EUT was substituted by a reference antenna (half-wave dipole - below 1 GHz, or Horn antenna - above 1GHz), connected to a signal generator. The signal generator output level ( $V_g$  in dBm) was adjusted to obtain the same reading as from EUT. The ERP at the spurious emissions frequency was calculated as follows.

$$EIRP_{(dBm)} = V_g + G_{(dBi)}$$

The spurious emissions attenuation is the difference between EIRP at the fundamental frequency (see section 3) and at the spurious emissions frequency.

### 6.3 Test Equipment

Roberts Antenna  
EMCO 3115 Horn Antennas  
Rohde & Schwarz FSP40 Spectrum Analyzer  
Low Pass Filter  
Preamplifiers

## 6.4 Test Results

<b>Tested By:</b>	Bruce Gordon
<b>Test Date:</b>	March 25, 2007

### Spurious Radiated Emissions

#### Transmit Frequency = 2467 MHz; high power mode

Frequency	SA Reading (from EUT)	Signal Generator Output required to have the same SA Reading as from EUT	EIRP*	EIRP Limit	Margin
MHz	dB(μV)	V <sub>g</sub> dBm	dBm	dBm	dB
4934	47.5	-56.3	-46.2	-13	-33.2
7401	56.2	-46.8	-35.8	-13	-22.8
9868	48.0	-52.3	-40.7	-13	-27.7
12335	40.3	-52.1	-39.5	-13	-26.5

#### Transmit Frequency = 2467 MHz; low power mode

Frequency	SA Reading (from EUT)	Signal Generator Output required to have the same SA Reading as from EUT	EIRP*	EIRP Limit	Margin
MHz	dB(μV)	V <sub>g</sub> dBm	dBm	dBm	dB
4934	44.6	-59.2	-49.1	-13	-36.1
7401	55.4	-47.6	-36.6	-13	-23.6
9868	43.4	-56.9	-45.3	-13	-32.3
12335	38.6	-53.8	-41.2	-13	-28.2

\* EIRP is calculated as:  $EIRP_{(dBm)} = V_{g(dBm)} + G_{(dBi)}$

All other emissions not reported are more than 20 dB below the limit.

Result	Complies by 22.8 dB
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## **7.0 Frequency Stability vs Temperature and Voltage**

FCC 2.1055, 90.213

### **7.1 Requirement**

Frequency stability is to be specified in the station authorization.

### **7.2 Test Procedure**

The EUT was placed inside the temperature chamber. The RF power output was connected to the spectrum analyzer. The EUT was setup to transmit the maximum power.

After the temperature stabilized for approximately 20 minutes, the transmitting frequency was measured by the spectrum analyzer and recorded.

At the room temperature, the frequency was measured when the EUT was powered with the nominal voltage (12 VDC) and with the minimum (9 VDC) and maximum (16 VDC) according to the specification.

### **7.3 Test Equipment**

Temperature Chamber

Spectrum analyzer

#### 7.4 Test Results

<b>Tested By:</b>	David Chernomordik
<b>Test Date:</b>	March 30, 2007

Nominal frequency: 2467 MHz

Temperature (°C)	Measured frequency, MHz	Maximum deviation from nominal, kHz	Maximum deviation from nominal, ppm
-30	2467.0156	15.6	6.3
-20	2467.0148	14.8	6.0
-10	2467.0136	13.6	5.5
0	2467.0126	12.6	5.1
10	2467.0108	10.8	4.4
20	2467.0022	2.2	0.9
30	2466.9972	-2.8	-1.1
40	2466.9936	-6.4	-2.6
50	2466.9903	-9.7	-3.9

DC Voltage, V	Measured frequency, MHz	Maximum deviation from nominal, kHz	Maximum deviation from nominal, ppm
9	2467.0022	2.2	0.9
12	2467.0022	2.2	0.9
16	2467.0022	2.2	0.9

Result	Complies
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## 8.0 List of Test Equipment

Measurement equipment used for compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	9/11/07
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	9/11/07
EMI Receiver	Rhode-Schwarz	FSP-40	100030	12	9/12/07
BI-Log Antenna	Antenna Research	LPB-2513/A	1154	12	8/29/07
Horn Antenna	EMCO	3115	9170-3712	12	7/26/07
Horn Antenna	EMCO	3115	8812-3049	12	5/10/07
Horn Antenna	EMCO	3160-09	Not Labeled	#	#
Pre-Amplifier	Sonoma Inst.	310	185634	12	8/11/07
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	6/20/07
Signal Generator	Hewlett Packard	83732A	322A00119	12	3/30/07

# No Calibration required

## 9.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 3117782	DC	April 20, 2007	Original document