

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

Date: April 20, 2007

David Chernomordik, EMC Technical Manager

Reviewed by:

Ollie Moyrong

Date: April 20, 2007

Ollie Moyrong, Operations Manager

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. This report must not be used to claim product endorsement by A2LA, NIST nor any other agency of the U.S. Government.

Report No. 3117782MPK-001

Equipment Under Test: Video/audio transmitter
Trade Name: Advanced Microwave Products
Model No.: VT50SC
Serial No.: Not Labeled
FCC ID: U8KVT50SC

Applicant: Advanced Microwave Products
Contact: Mr. Barry Lautzenhiser
Address: 2705 Old Hwy 40W, Suite C
Verdi, NV, 89439

Country USA

Tel. number: 775-345 9933
Fax number:

Applicable Regulation: FCC Part 90

Test Site Location: ITS - Site 1
1365 Adams Drive
Menlo Park, CA 94025

Date of Test: March 10 - 31, 2007

We attest to the accuracy of this report:

David Chernomordik
David Chernomordik
EMC Technical Manager

Ollie Moyrong
Ollie Moyrong
Operations Manager

TABLE OF CONTENTS

1.0	Introduction	5
1.1	Product Description	5
1.2	Summary of Test Results	6
1.3	Test Configuration	7
1.3.1	Support Equipment	7
1.3.2	Block diagram of Test Setup.....	7
1.4	Related Submittal(s) Grants	7
2.0	RF Power Output.....	8
2.1	Requirement.....	8
2.2	Test Procedure	8
2.3	Test Equipment.....	8
2.4	Test Results.....	8
3.0	Occupied Bandwidth, 26-dB bandwidth.....	9
3.1	Test Procedure	9
3.2	Test Equipment.....	9
3.3	Test Results.....	9
4.0	Emission Mask	12
4.1	Test Procedure	12
4.2	Test Equipment.....	12
4.3	Test Results.....	12
5.0	Out of Band Emissions at Antenna Terminal	17
5.1	Requirement.....	17
5.2	Test Procedure	17
5.3	Test Equipment.....	17
5.4	Test Results.....	17
6.0	Spurious Radiation	26
6.1	Requirement.....	26
6.2	Test Procedure	26
6.3	Test Equipment.....	26
6.4	Test Results.....	27
7.0	Frequency Stability vs Temperature and Voltage	28
7.1	Requirement.....	28
7.2	Test Procedure	28
7.3	Test Equipment.....	28
7.4	Test Results.....	29
8.0	List of Test Equipment	30

9.0 Document History	31
-----------------------------------	-----------

1.0 Introduction

1.1 Product Description

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

Use of Product	surveillance
Rated RF Output Power	high power mode - 5 W low power mode - 2 W
Frequency Ranges, MHz	2450 – 2483.5 MHz
Type of modulation	Analog FM
Channel spacing	250 kHz
Antenna & Gain	Typical - whip, 3 dBi
Detachable antenna?	yes
External input	Analog Video/Audio
Operating temperature	From -30 ⁰ C to +50 ⁰ 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

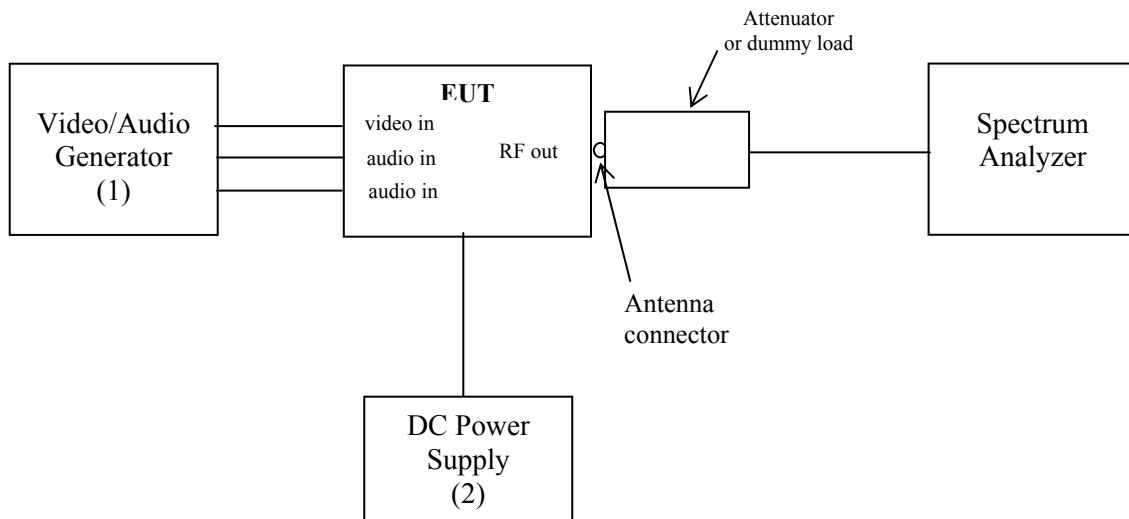
FCC Rule	Description of Test	Result
2.1046, 90.205(n)	RF Power Output	Complies
2.1047	Modulation characteristics	Not Applicable
2.1049, 90.209	Occupied Bandwidth	Complies
90.210	Emission mask	Complies
2.1051, 90.210	Out of Band Emissions at Antenna Terminal	Complies
2.1053, 90.210	Spurious Radiation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



S = Shielded
U = Unshielded

F = With Ferrite
m = 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

Tested By:	David Chernomordik
Test Date:	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

Tested By:	David Chernomordik
Test Date:	March 21, 2007

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

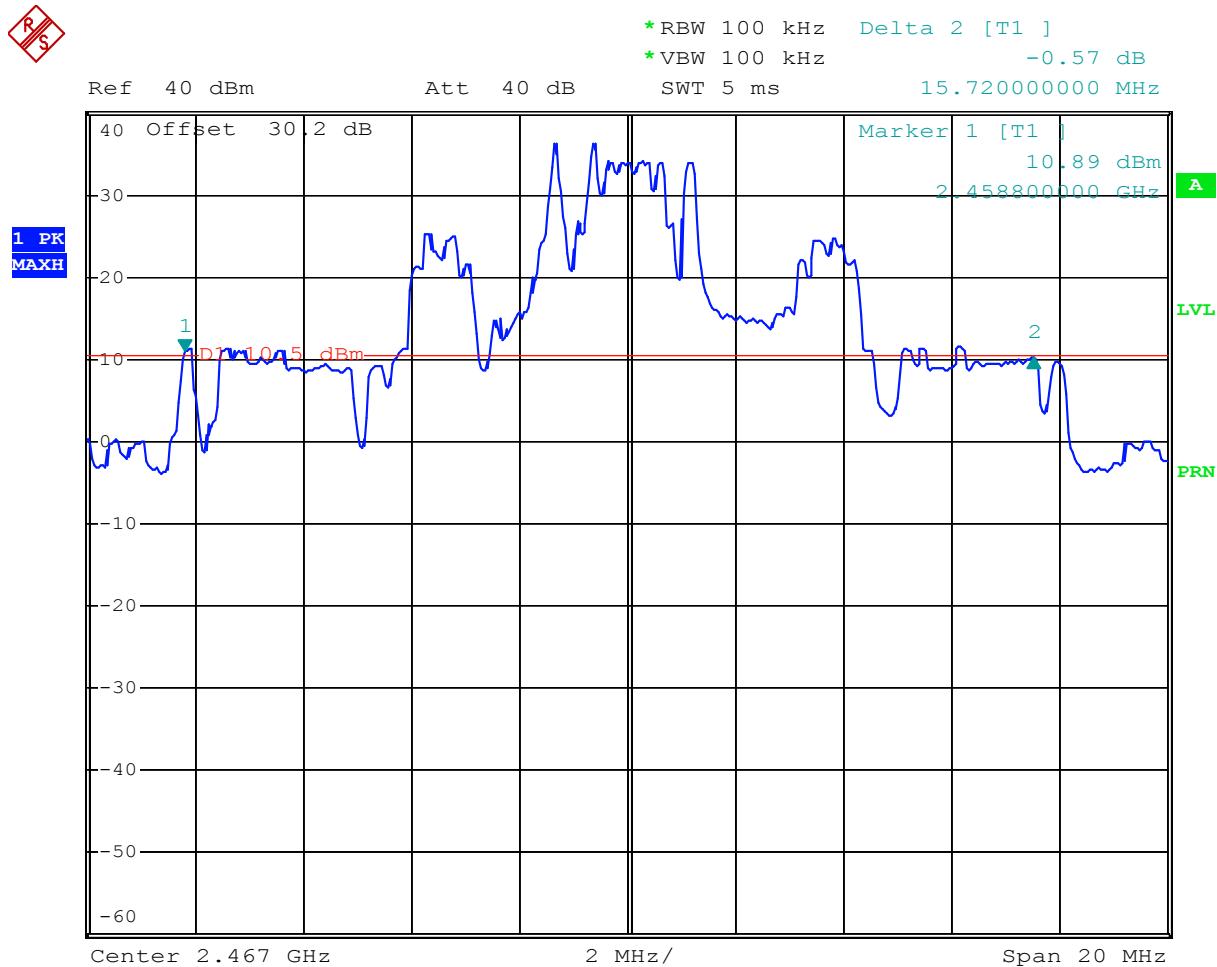
For more details refer to the attached plots.

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

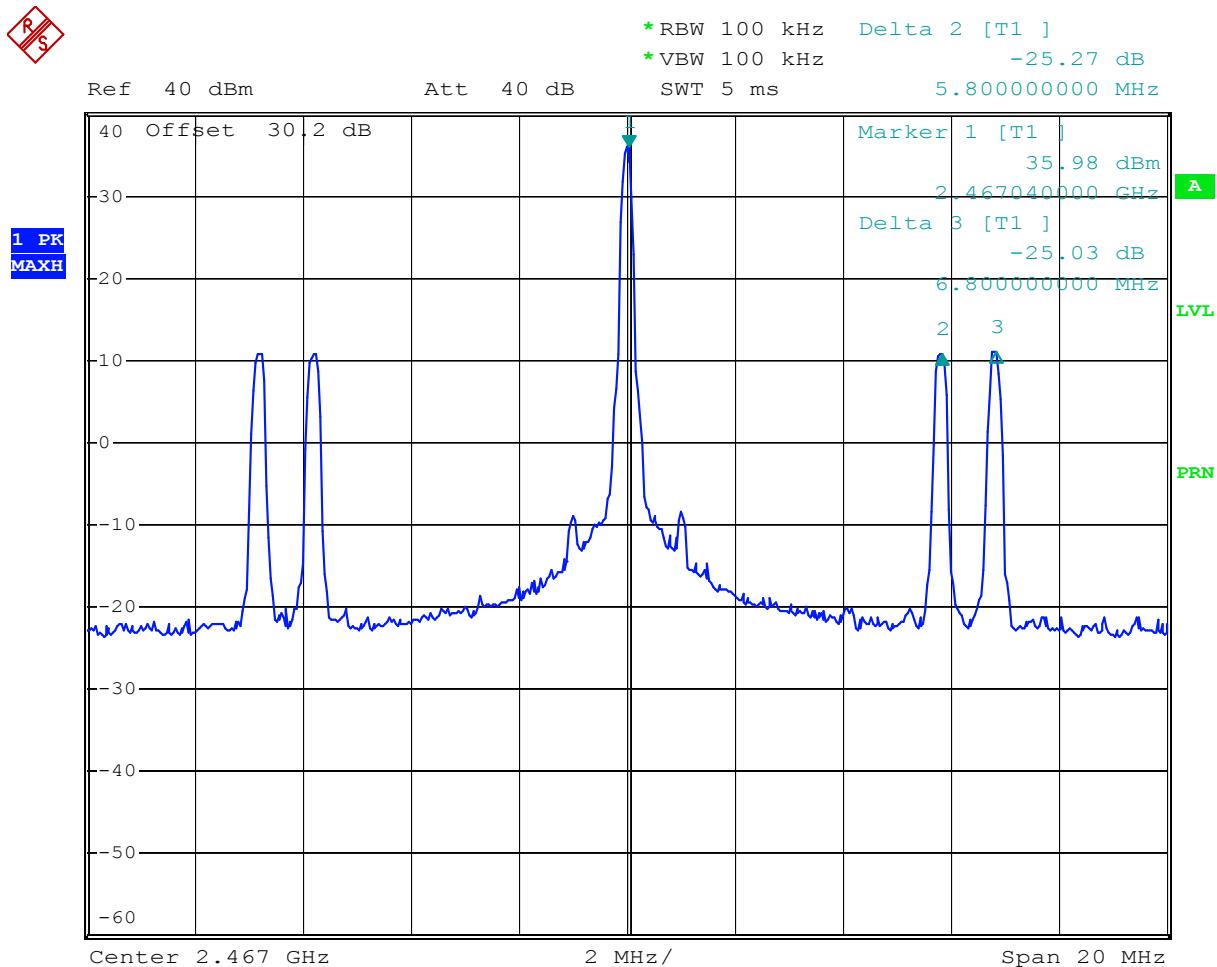
Rohde & Schwarz FSP40 Spectrum Analyzer

4.3 Test Results

Tested By:	David Chernomordik
Test Date:	March 21, 2007

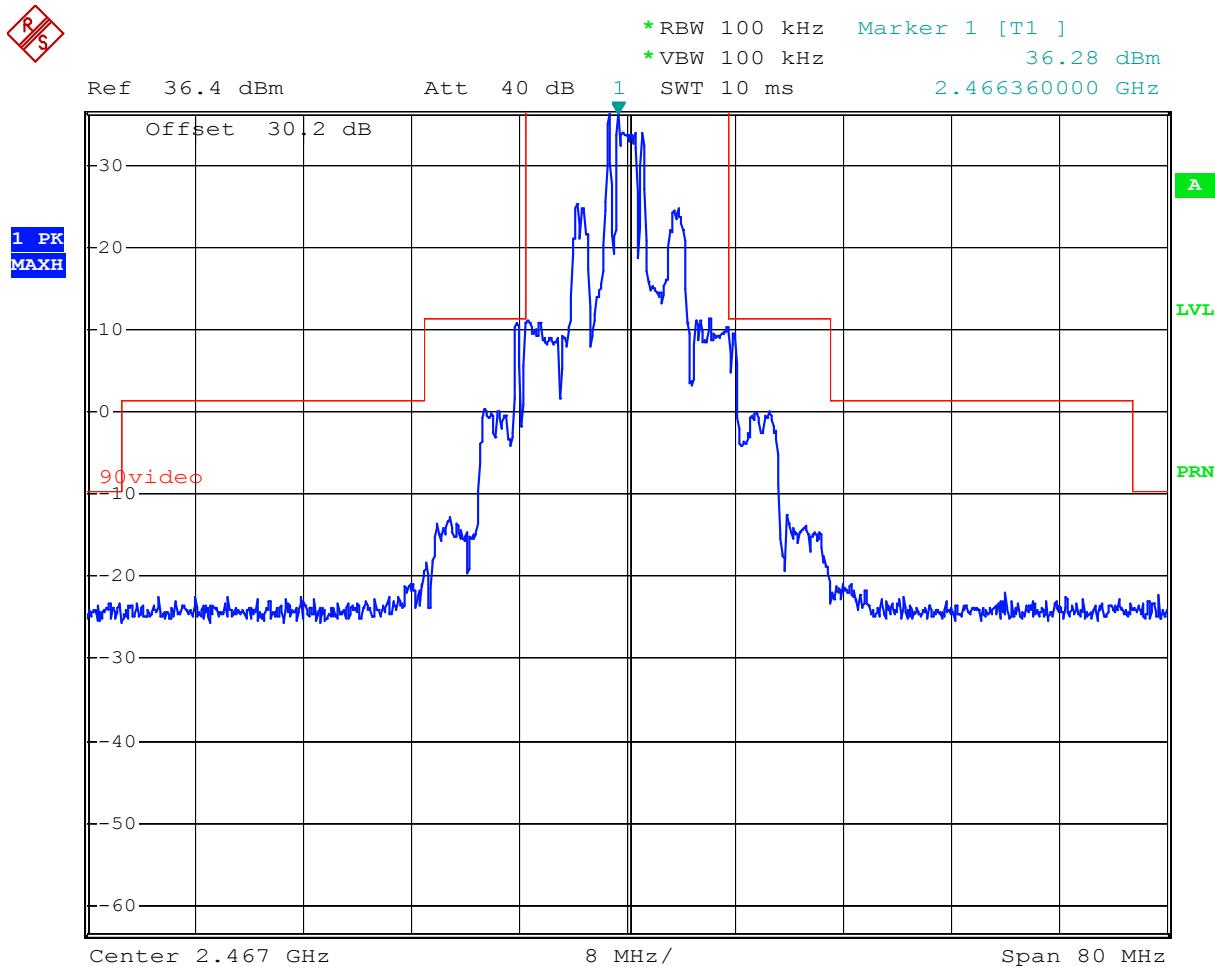
For details refer to the attached plots: 4.1 – 4.4.

Plot 4.1



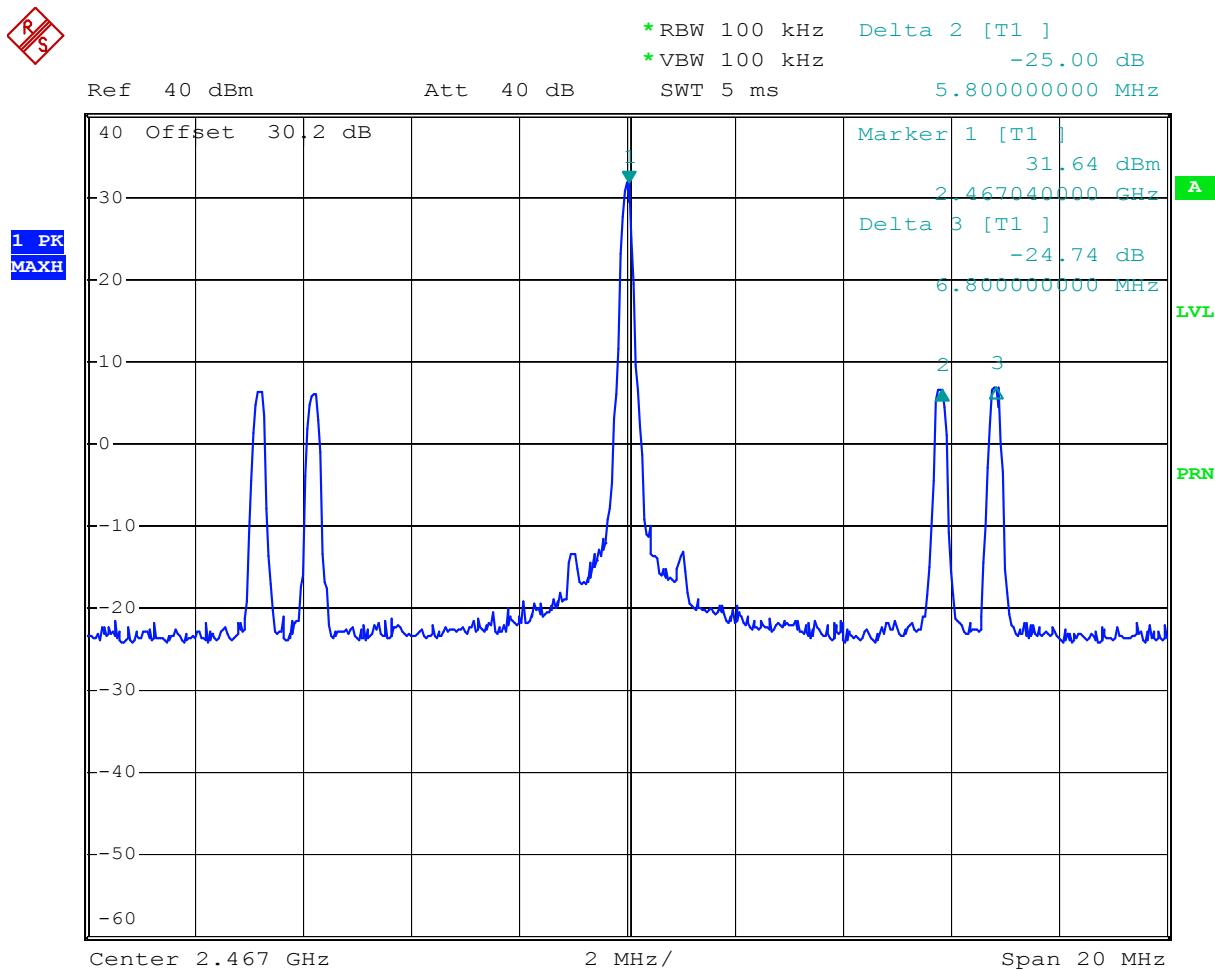
Comment: Unmodulated video/audio, high power
 Date: 21.MAR.2007 15:32:58

Plot 4.2



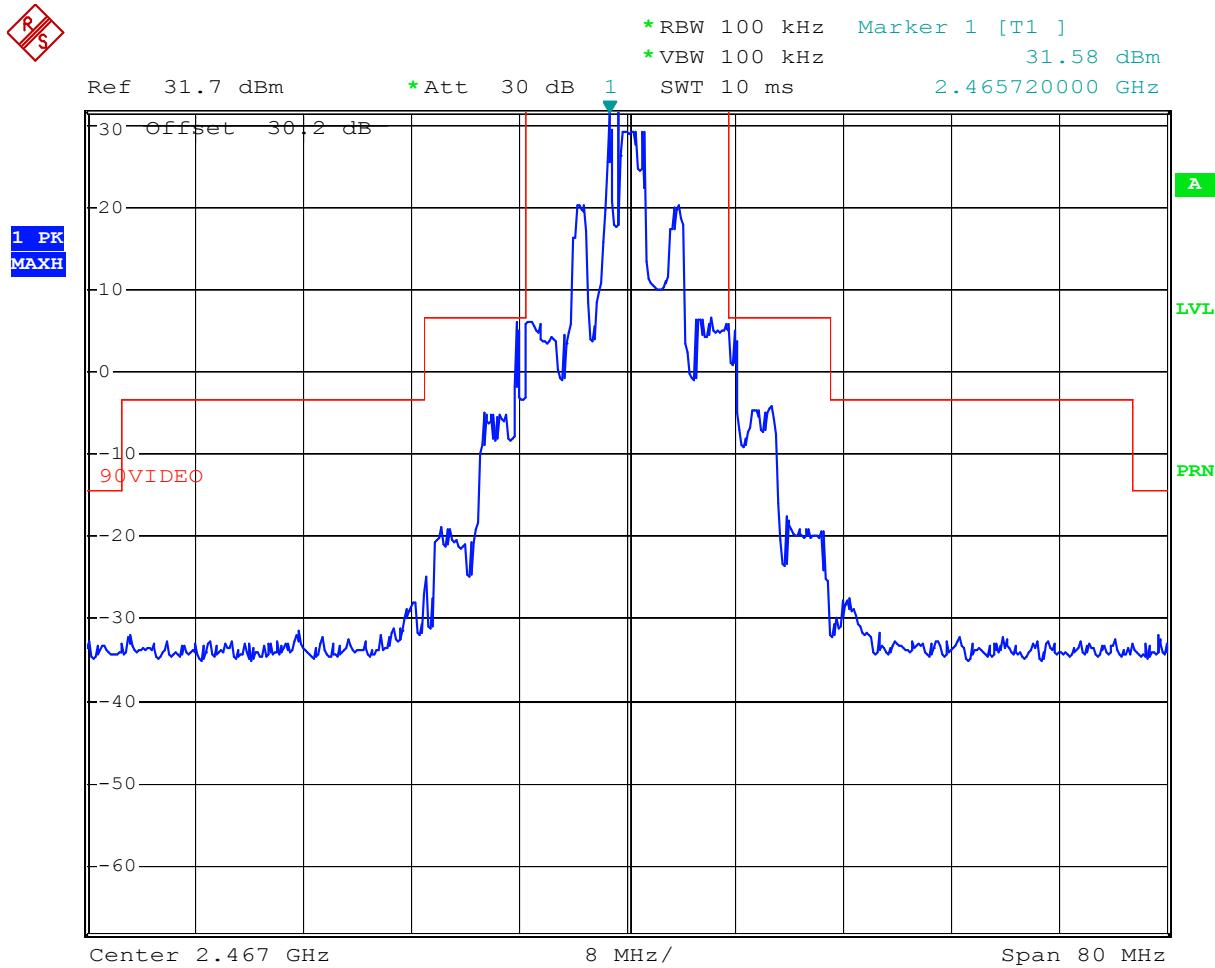
Comment: Emission Mask
 Date: 21.MAR.2007 11:10:51

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

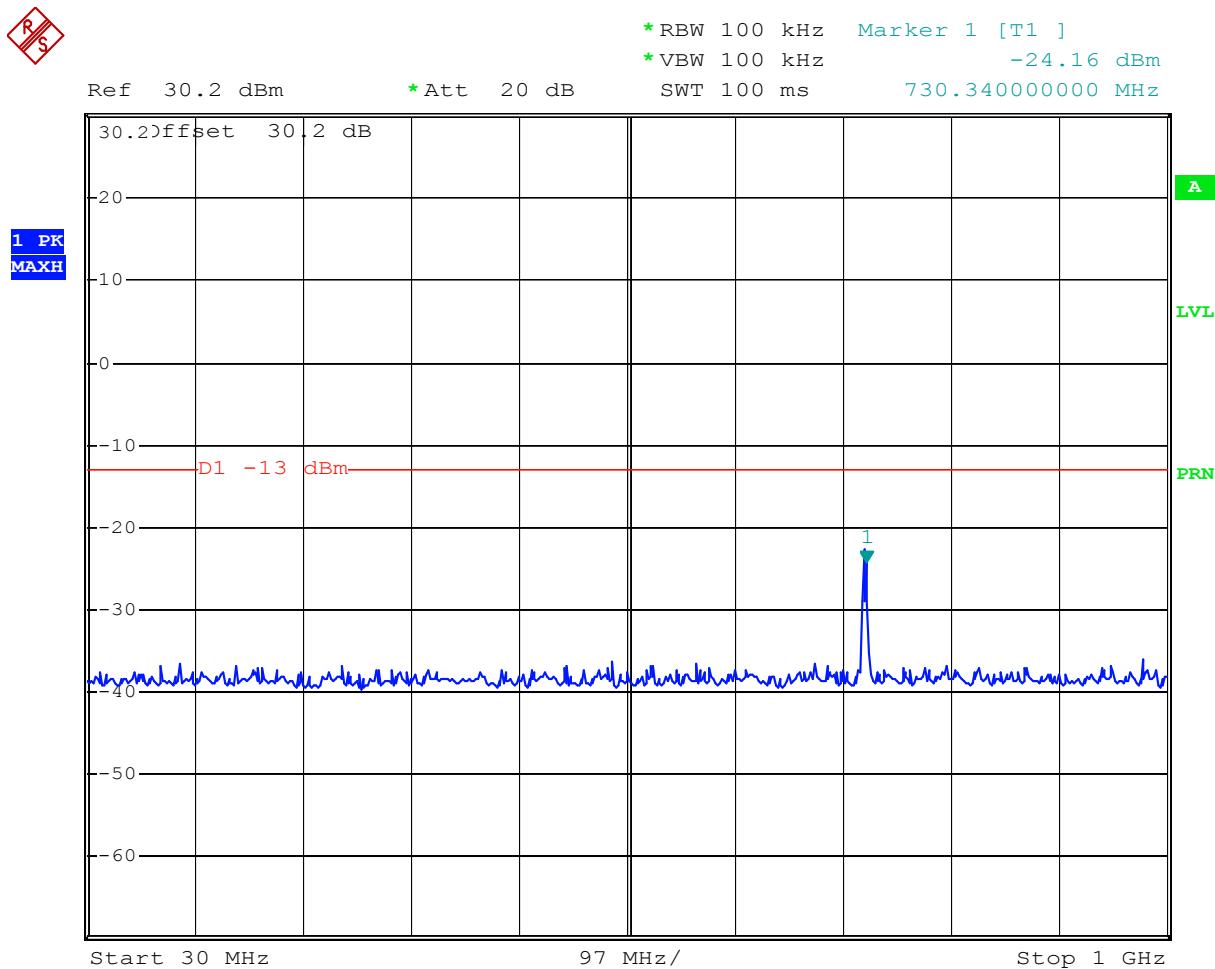
Rohde & Schwarz FSP40 Spectrum Analyzer

5.4 Test Results

Tested By:	David Chernomordik
Test Date:	March 21& April 5, 2007

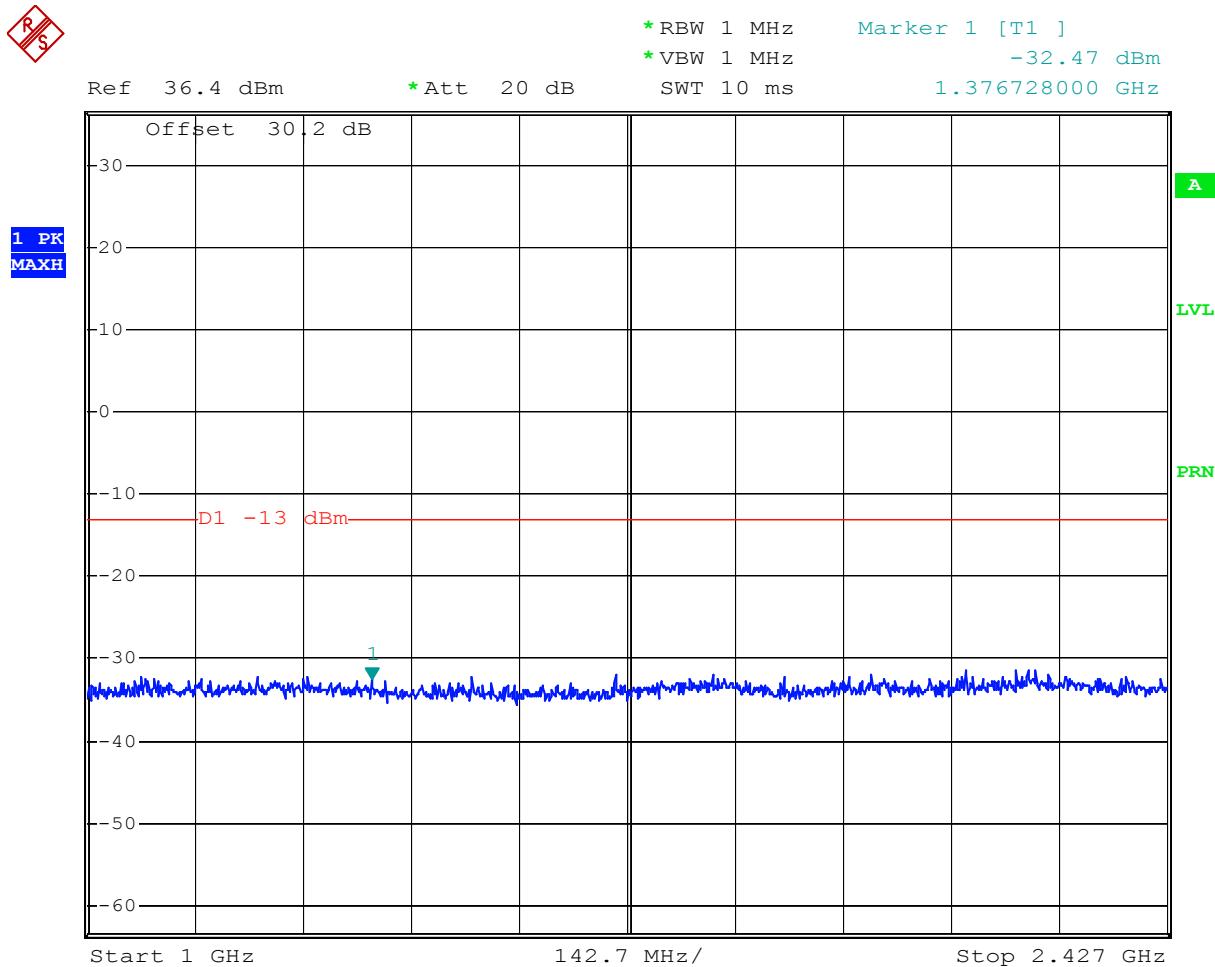
Complies Refer to the following plots 5.1 –5.8

Plot 5.1



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

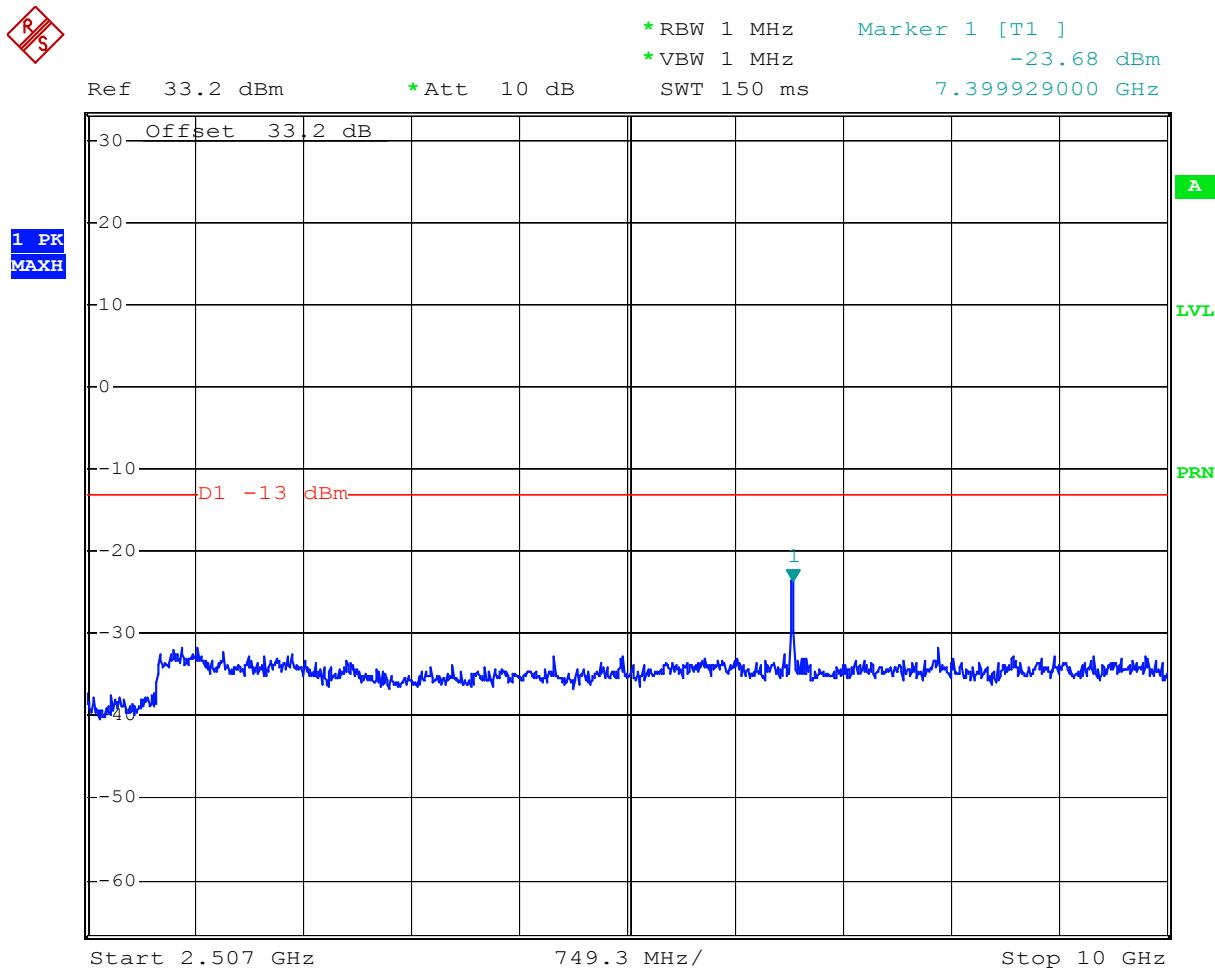
Plot 5.2



Comment: Conducted spurious emissions

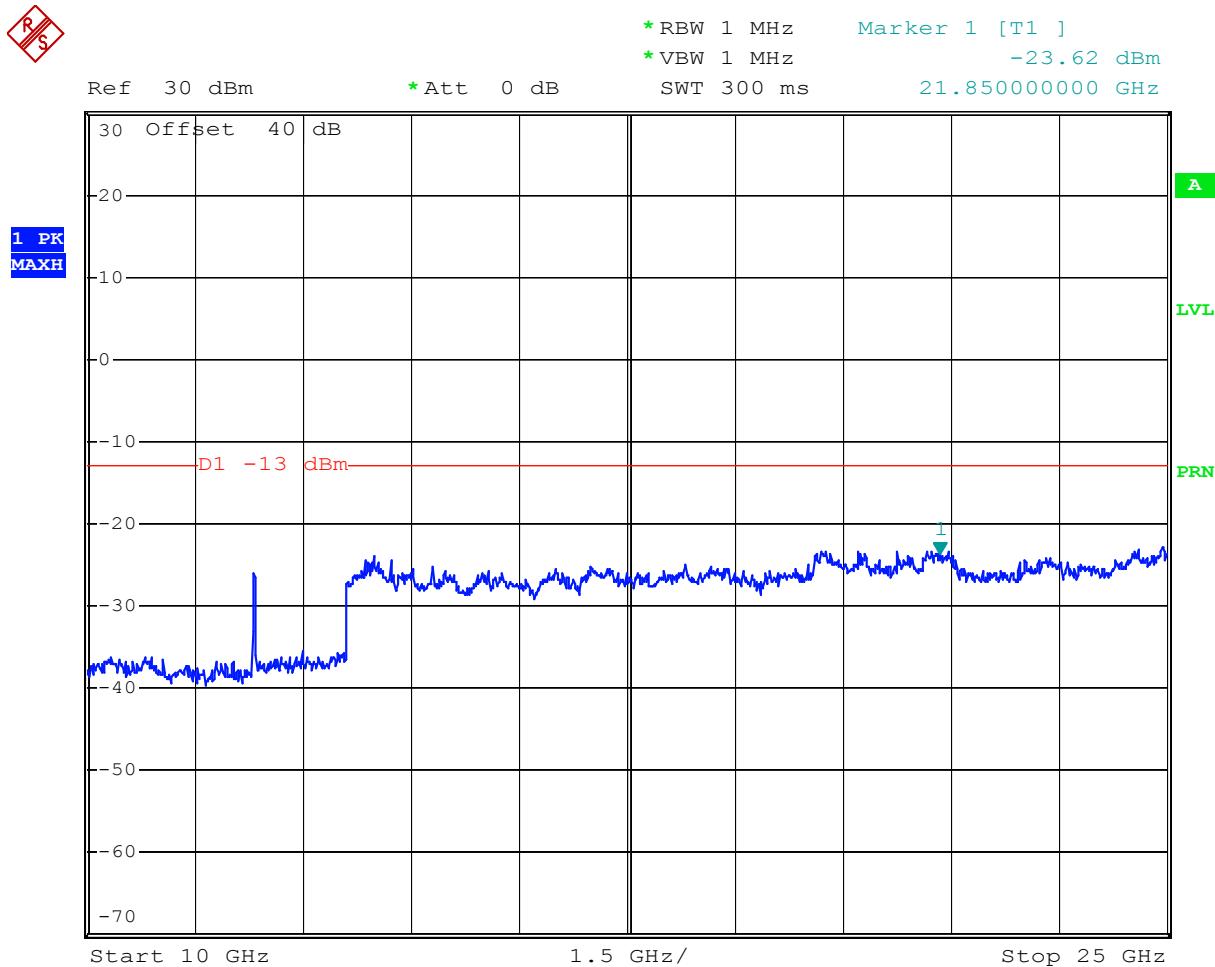
Date: 21.MAR.2007 11:13:46

Plot 5.3



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

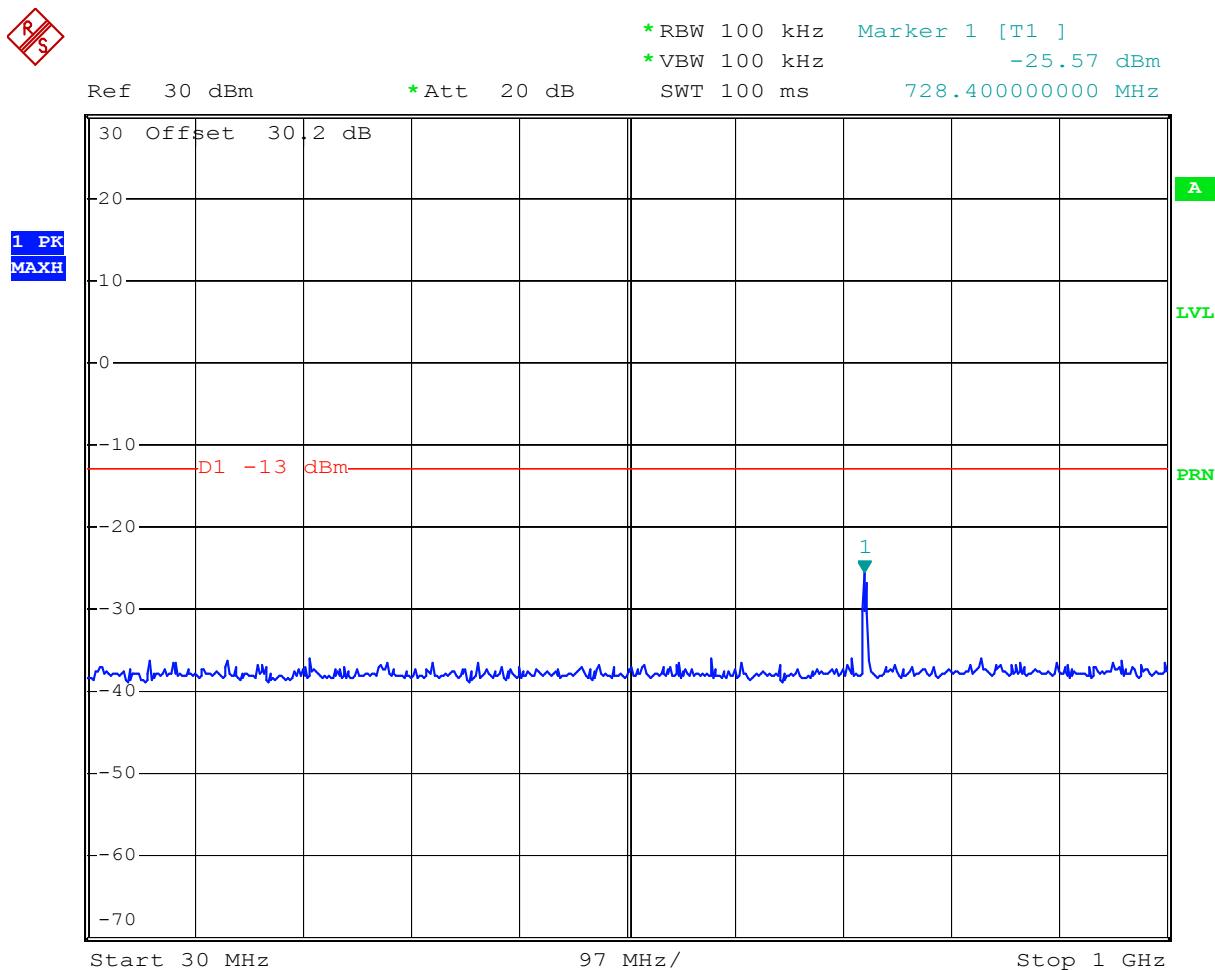
Plot 5.4



Comment: Conducted spurious emissions

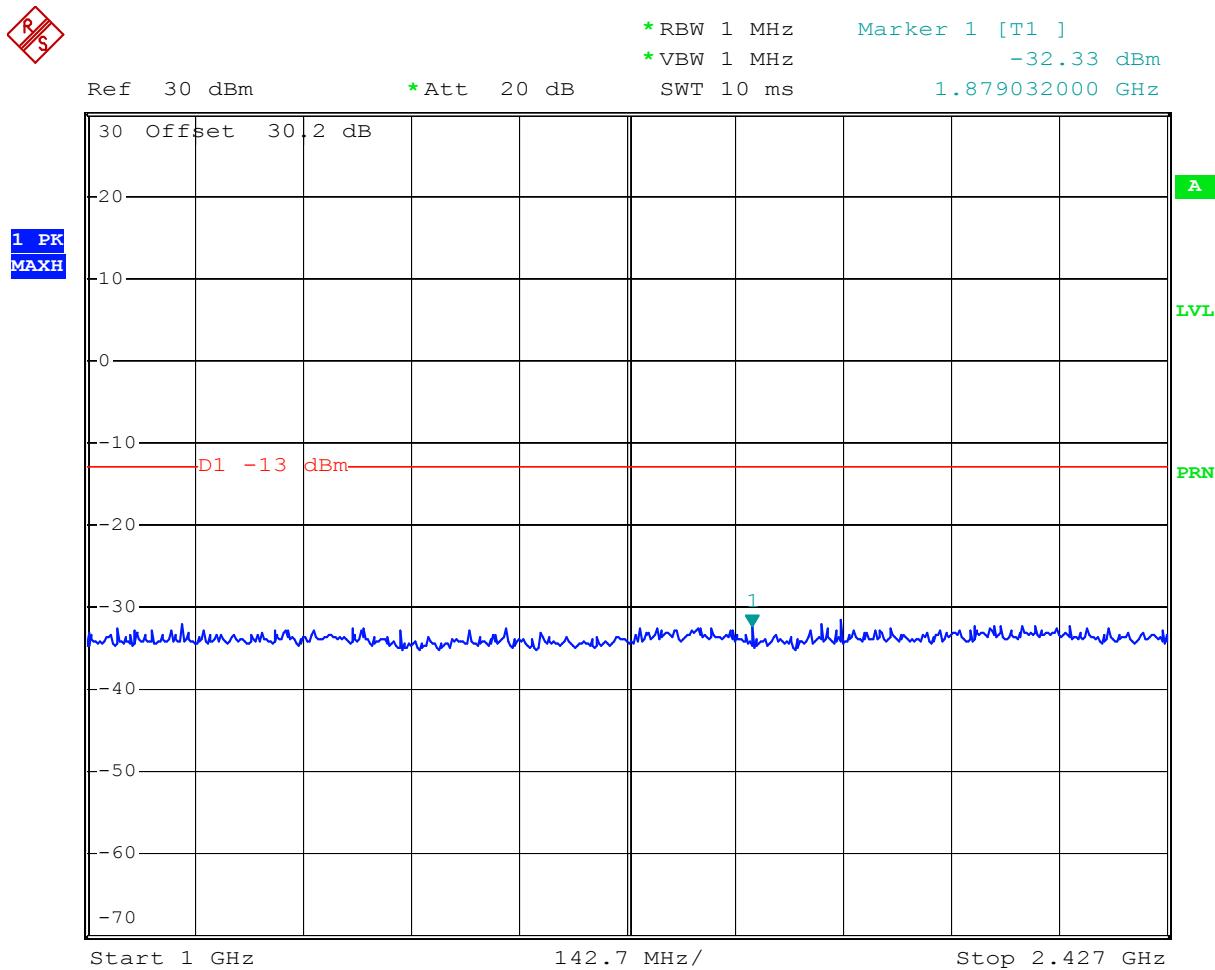
Date: 21.MAR.2007 11:18:43

Plot 5.5



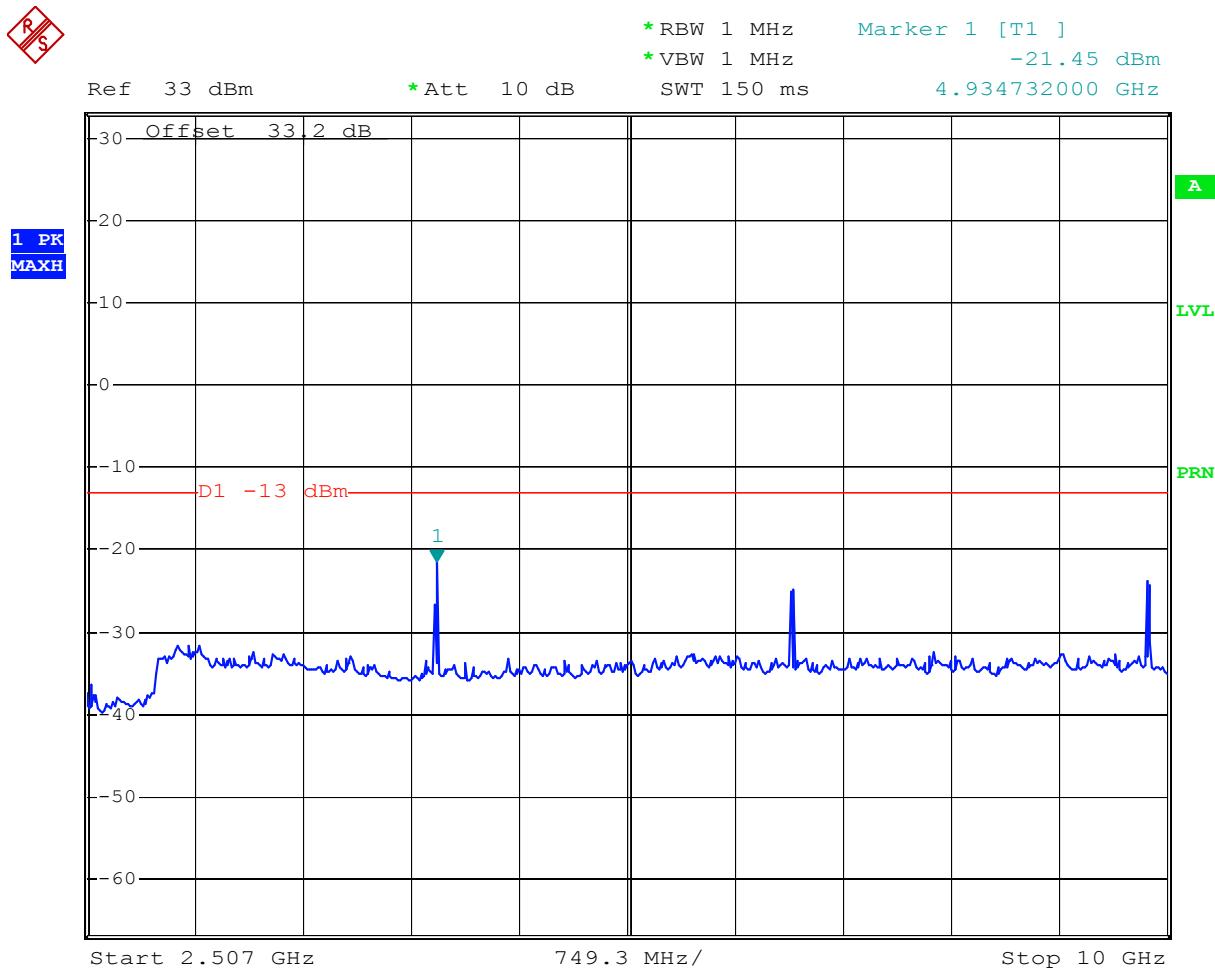
Comment: Conducted spurious emissions, low power
 Date: 5.APR.2007 17:43:52

Plot 5.6



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

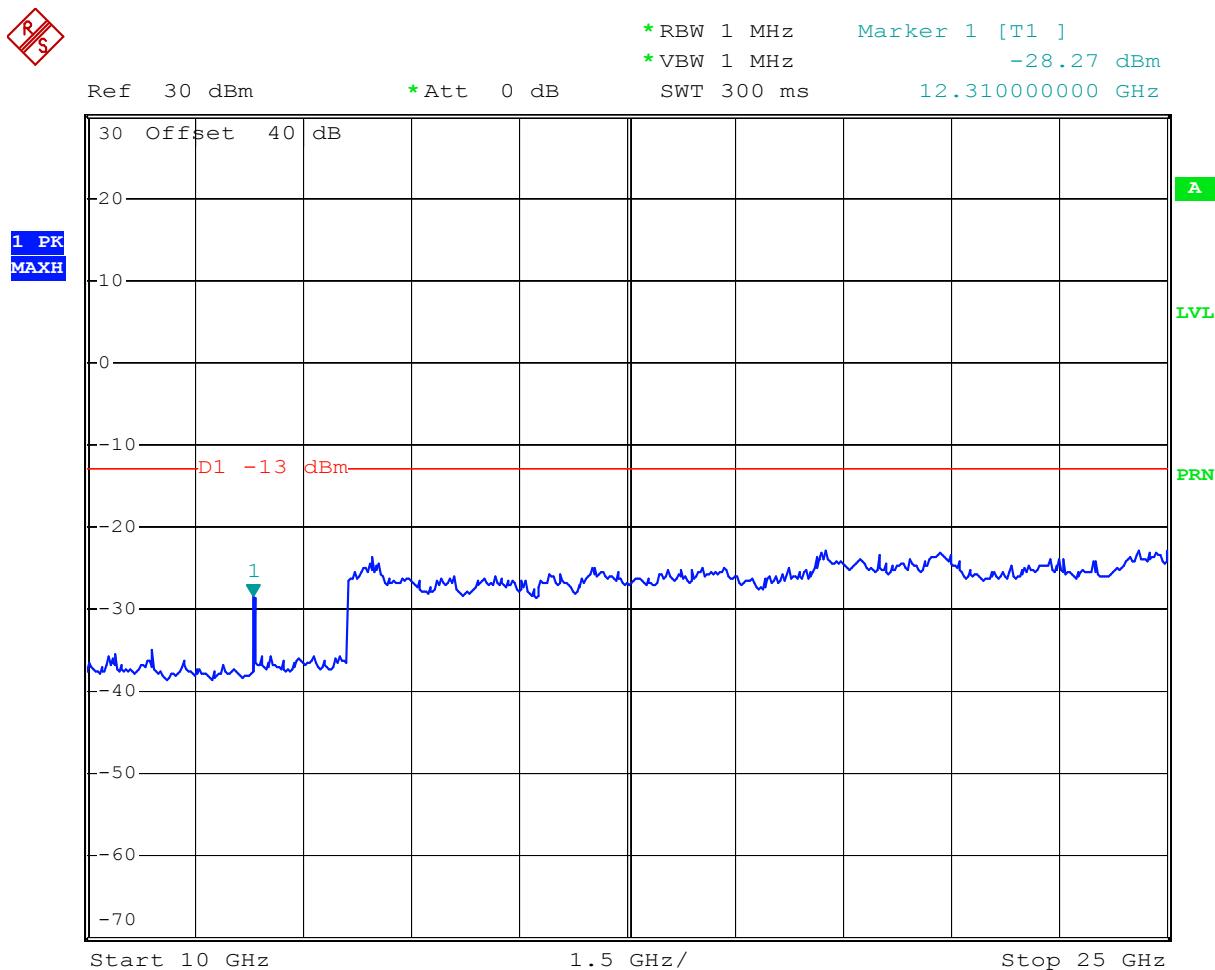
Plot 5.7



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.

$$\text{EIRP}_{(\text{dBm})} = V_g + G_{(\text{dBi})}$$

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

Tested By:	Bruce Gordon
Test Date:	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 _g 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 _g 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
--------	---------------------

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

Tested By:	David Chernomordik
Test Date:	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
---------------	----------

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