

Test Report

Report Number: 3117782MPK-002

Project Number: 3117782

Report Date: April 20, 2007

**Testing performed on the
Video/Audio Transmitter**

Model Number: VT30SC

FCC ID: U8KVT30SC

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:

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Date: April 20, 2007

David Chernomordik, EMC Technical Manager

Reviewed by:

Ollie Moyrong

Date: April 20, 2007

Ollie Moyrong, Operations Manager

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Report No. 3117782MPK-002

Equipment Under Test: Video/audio transmitter
Trade Name: Advanced Microwave Products
Model No.: VT30SC
Serial No.: Not Labeled
FCC ID: U8KVT30SC

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

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1.0 Introduction

1.1 Product Description

The Equipment under Test (EUT), model: VT30SC is a Video/Audio Transmitter

For more information about the radios, refer to the attached product description.

| | |
|------------------------------|---|
| Use of Product | surveillance |
| Rated RF Output Power | high power mode - 2 W low power mode - 0.5 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

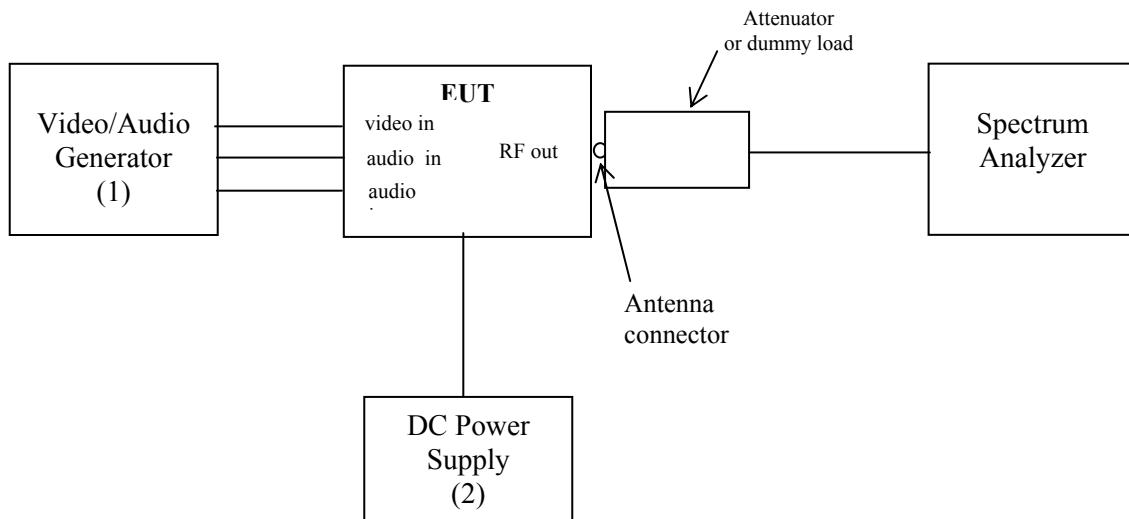
| FCC Rule | Description of Test | Result |
|-------------------|---|----------------|
| 2.1046, 90.205(n) | RF Power Output | Complies |
| 2.1047 | Modulation characteristics | Not Applicable |
| 2.1049, 90.209 | Occupied Bandwidth | Complies |
| 90.210 | Emission mask | Complies |
| 2.1051, 90.210 | 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 20, 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: 32.9 Low power mode: 27.2 | 1.95 0.52 |

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

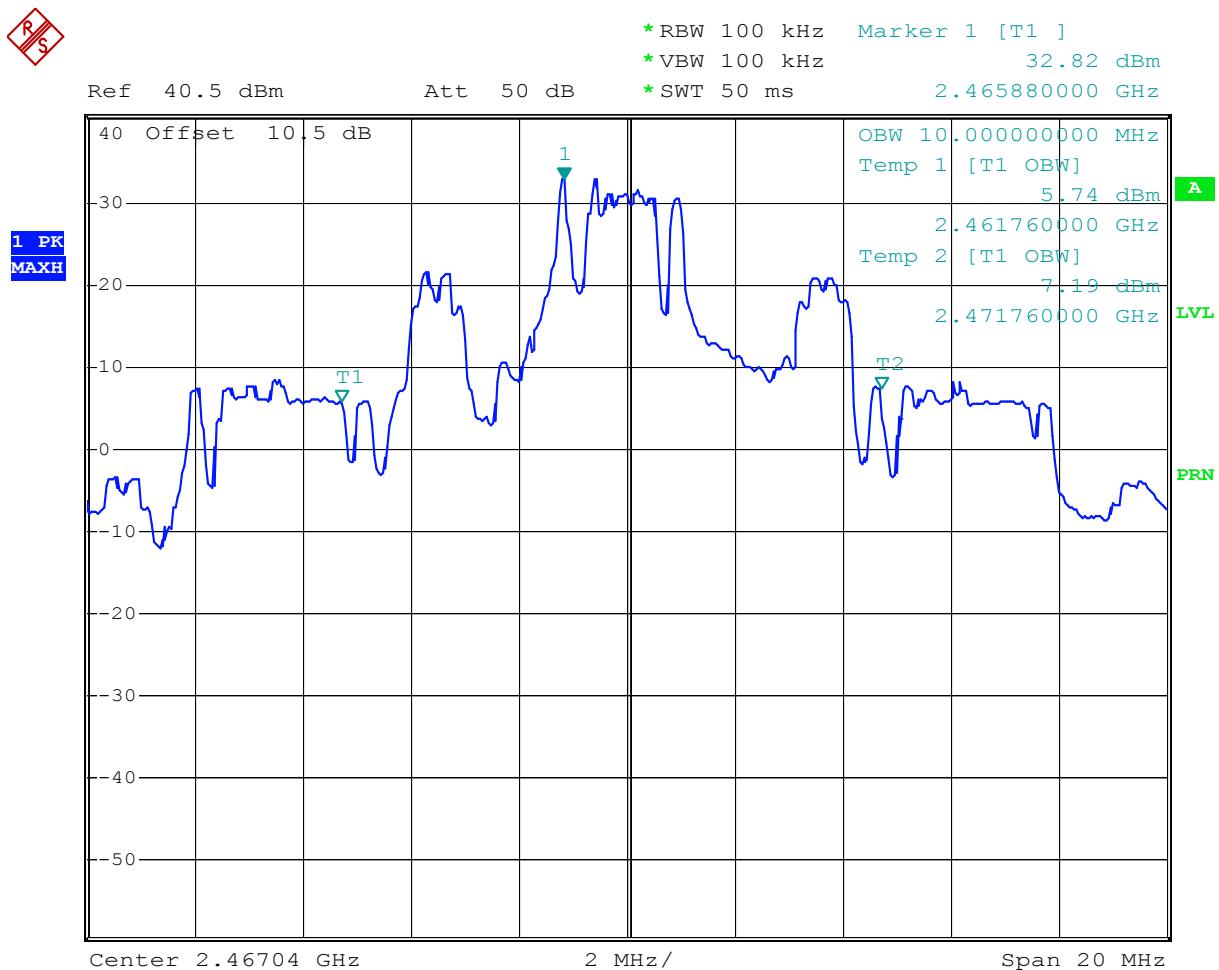
3.3 Test Results

| | |
|-------------------|--------------------|
| Tested By: | David Chernomordik |
| Test Date: | March 20, 2007 |

| Frequency (MHz) | Measured Occupied Bandwidth | Measured 26-dB Bandwidth | Emission Designator | Plot |
|----------------------------|--|-------------------------------------|----------------------------|-------------|
| 2467 | 10.0 MHz | 14.4 MHz | 10M0F8W | 3.1, 3.2 |

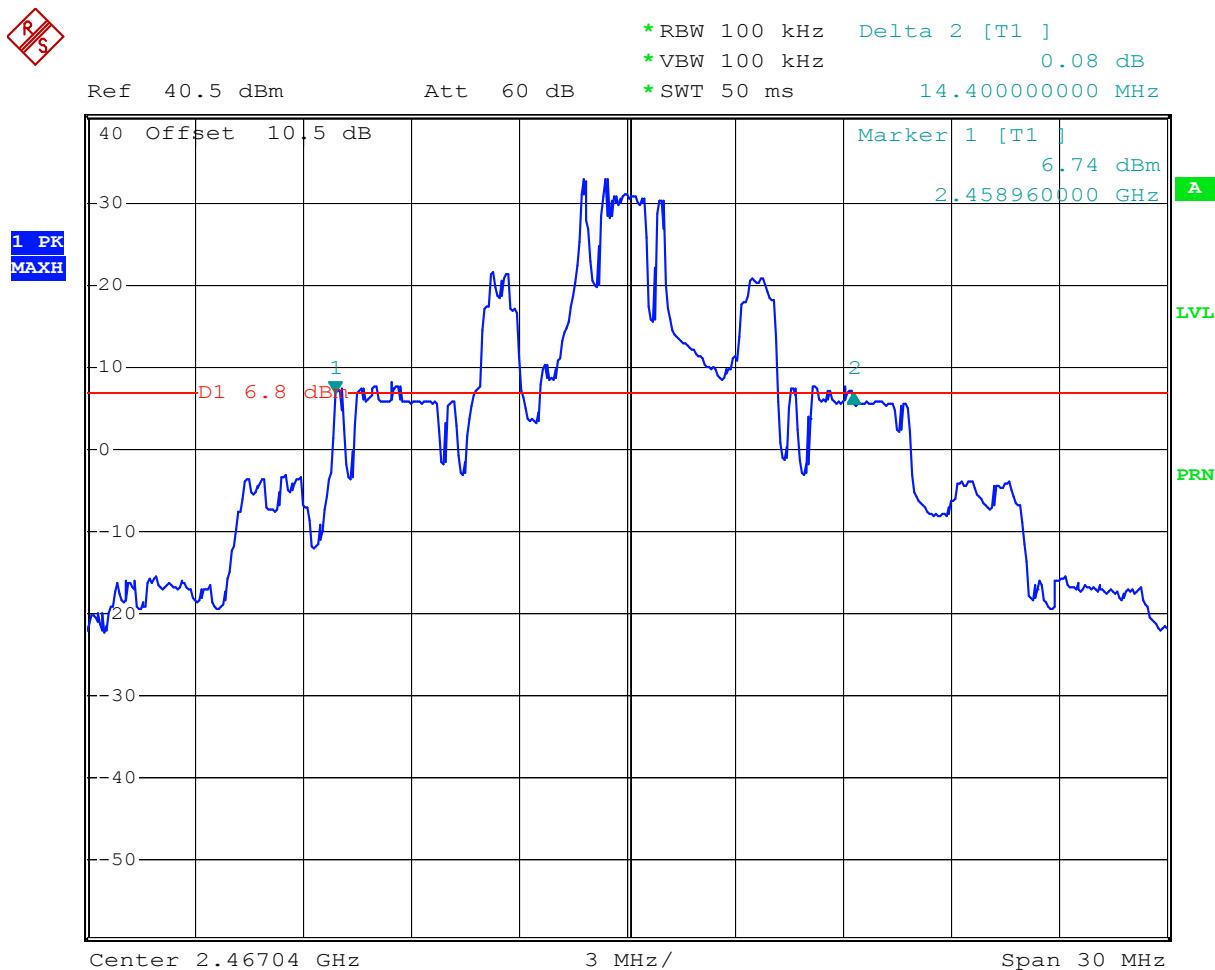
For more details refer to the attached plots 3.1, 3.2.

Plot 3.1



Comment: Occupied bandwidth
 Date: 20.MAR.2007 12:03:44

Plot 3.2



Comment: 26-dB bandwidth
 Date: 20.MAR.2007 12:09:20

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 authorized bandwidth.

4.2 Test Equipment

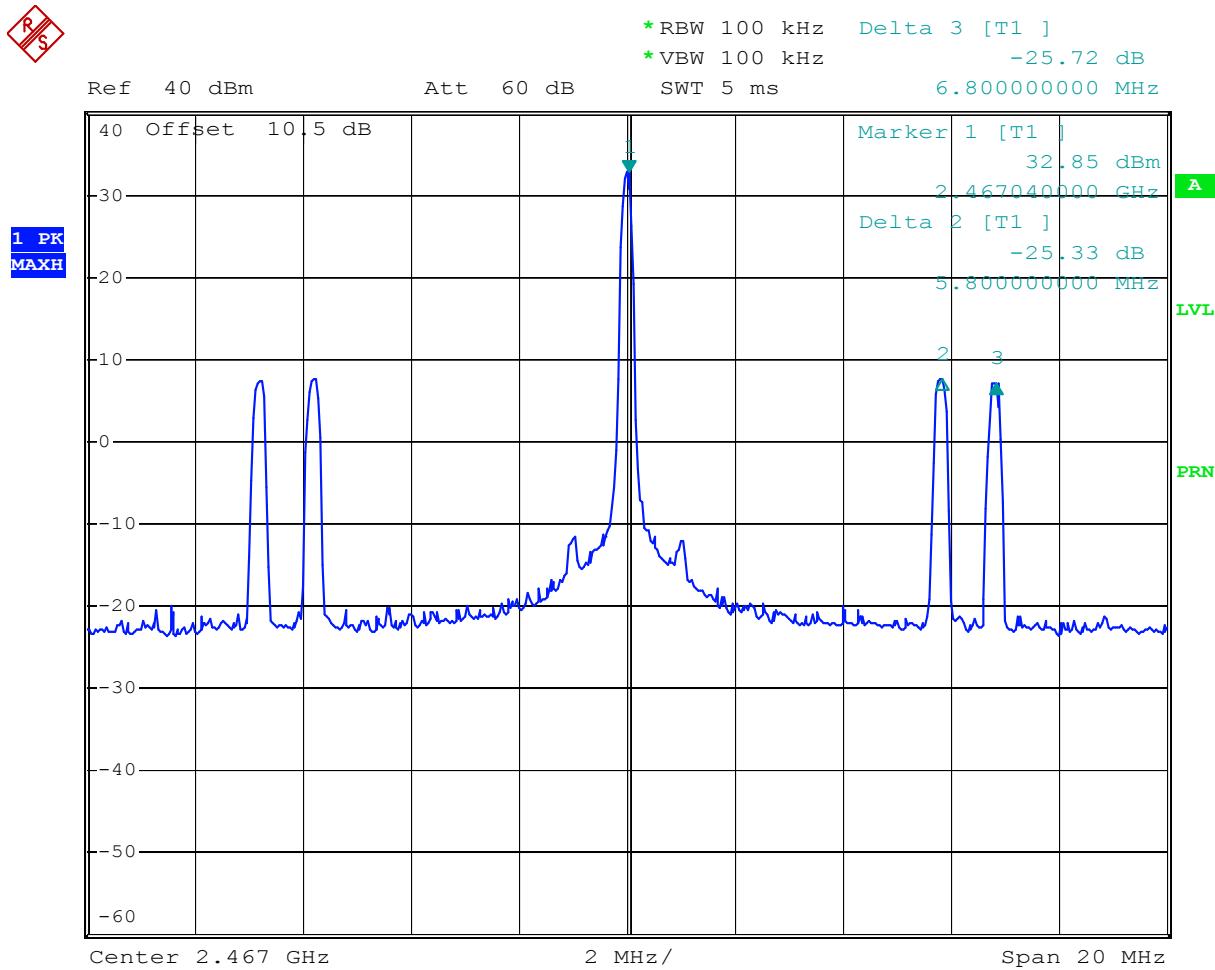
Rohde & Schwarz FSP40 Spectrum Analyzer

4.3 Test Results

| | |
|-------------------|---------------------|
| Tested By: | David Chernomordik |
| Test Date: | March 20 - 21, 2007 |

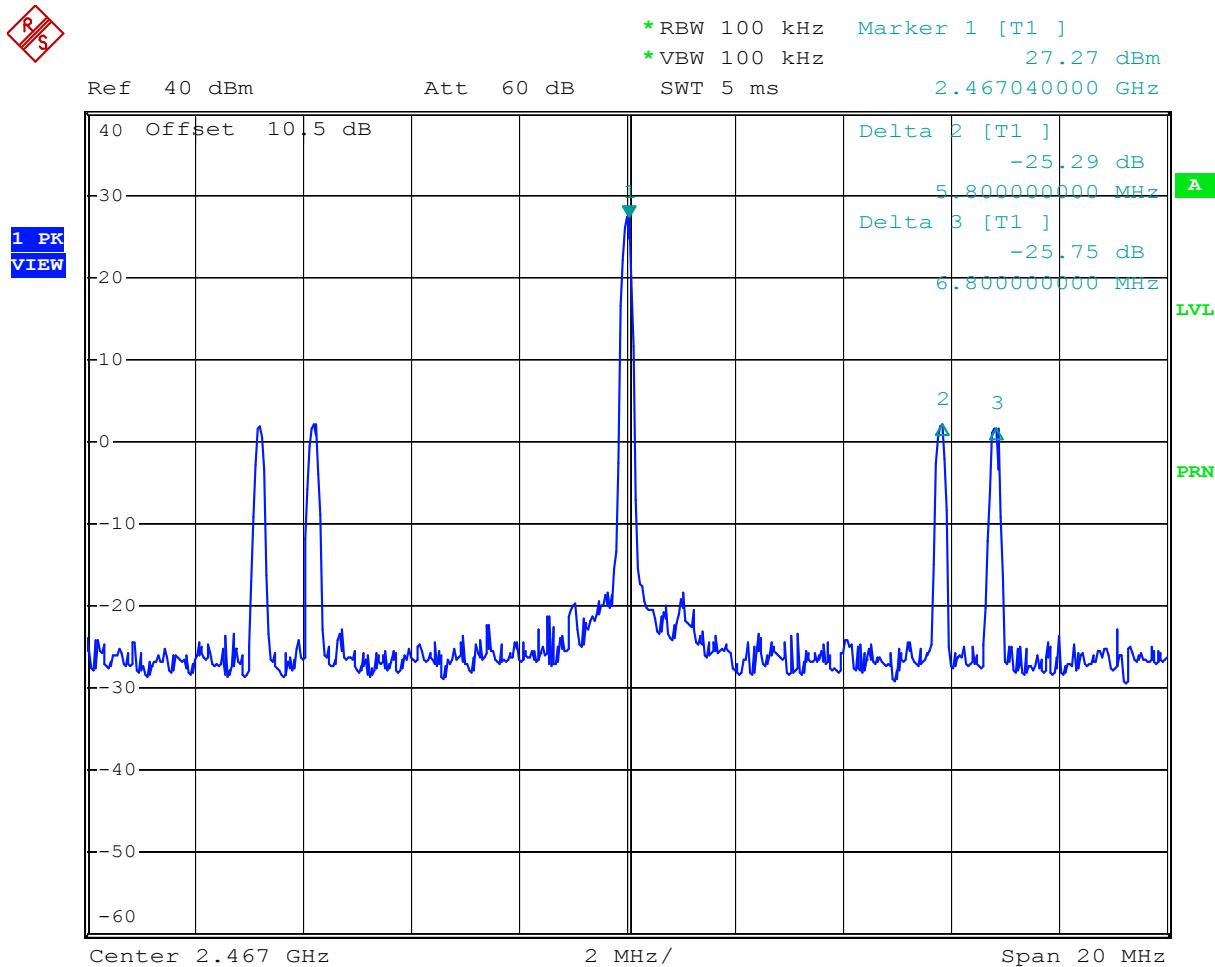
For details refer to the attached plots: 4.1 – 4.4.

Plot 4.1



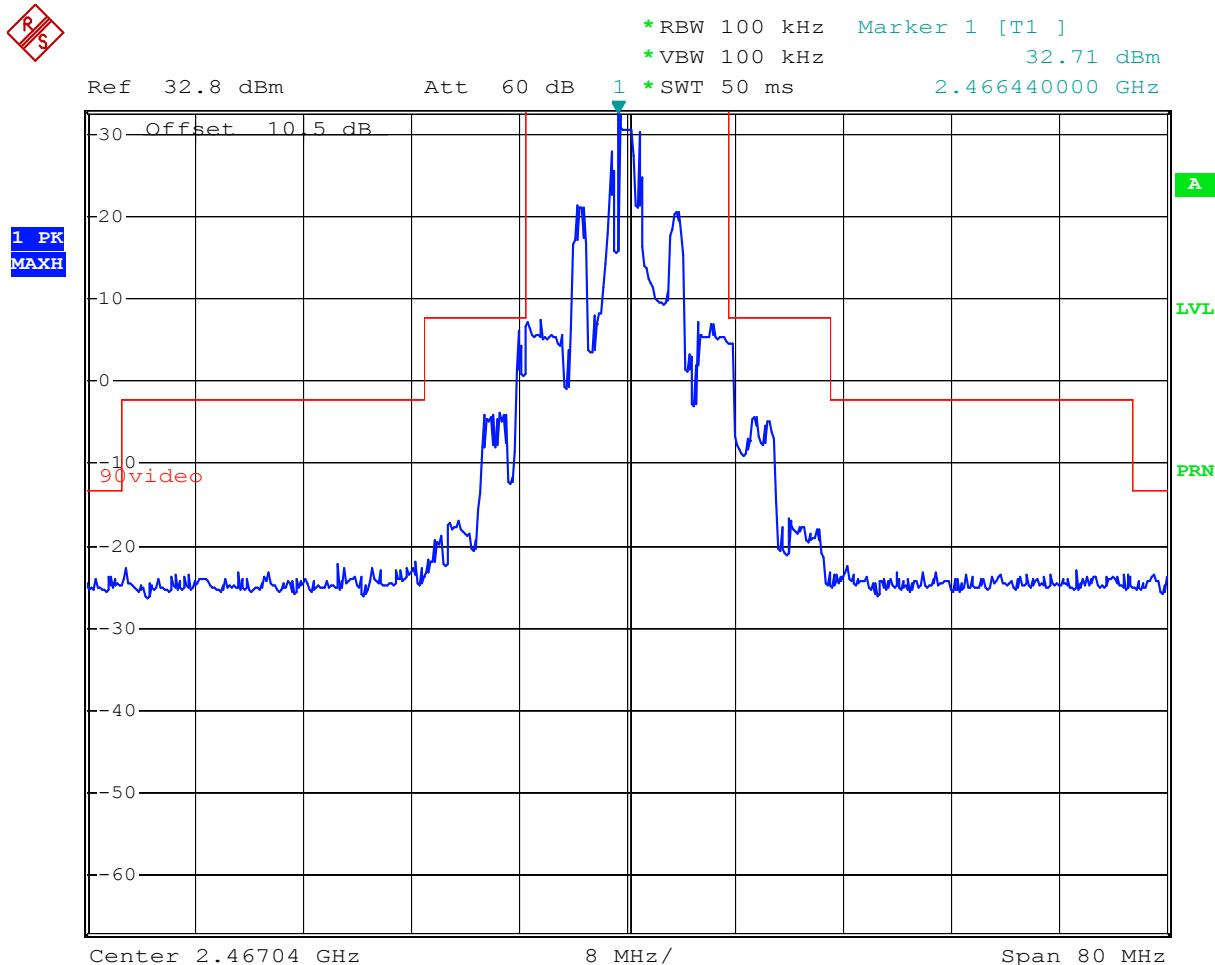
Comment: Unmodulated, high power
 Date: 21.MAR.2007 16:13:40

Plot 4.2



Comment: Unmodulated, low power
 Date: 21.MAR.2007 16:16:19

Plot 4.3



Comment: Emission Mask
 Date: 20.MAR.2007 18:03:18

Plot 4.4



Comment: Emission Mask, low power
 Date: 20.MAR.2007 18:32:12

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

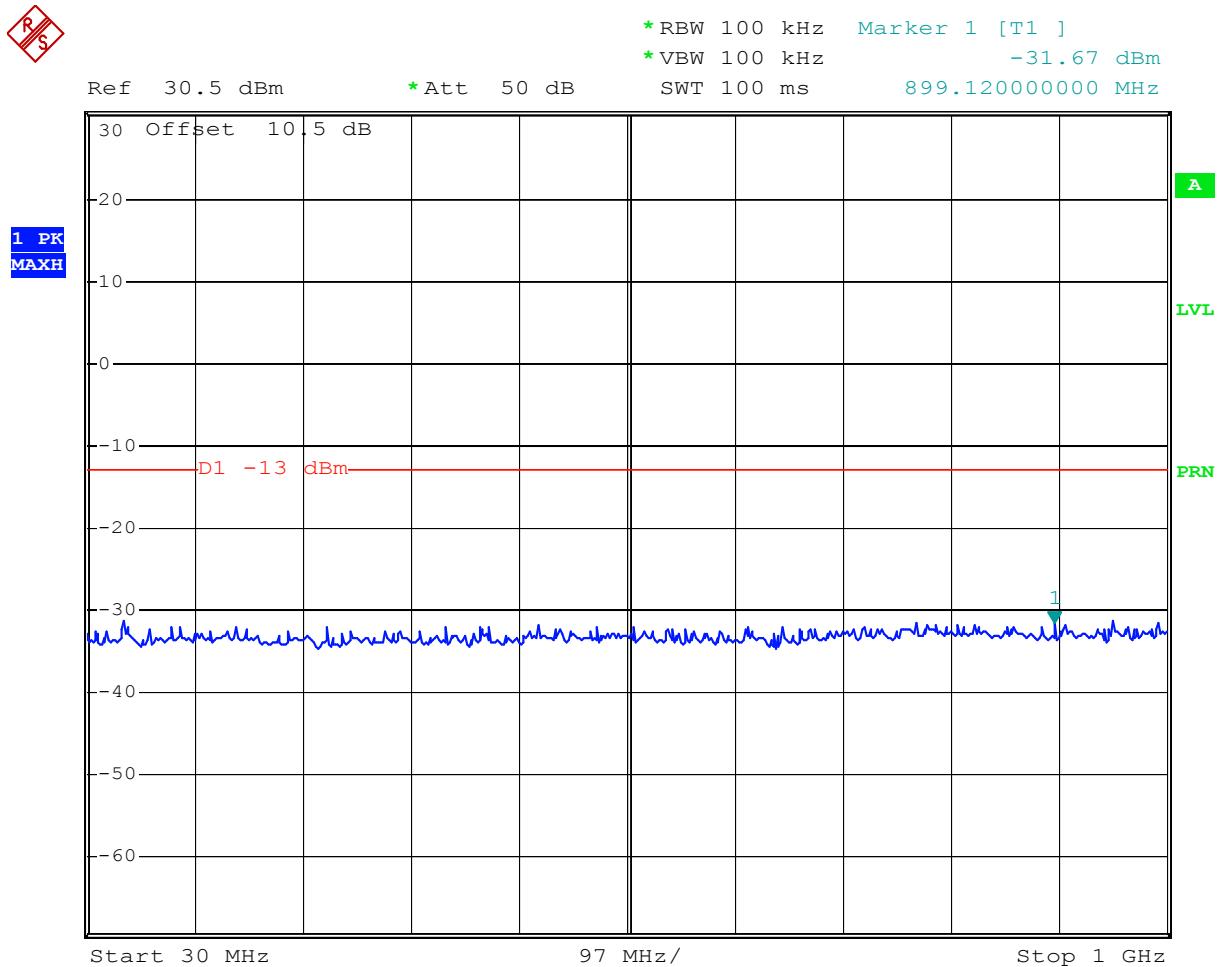
5.4 Test Results

| | |
|-------------------|---------------------|
| Tested By: | David Chernomordik |
| Test Date: | March 20 - 22, 2007 |

Complies

Refer to the following plots 5.1 – 5.8

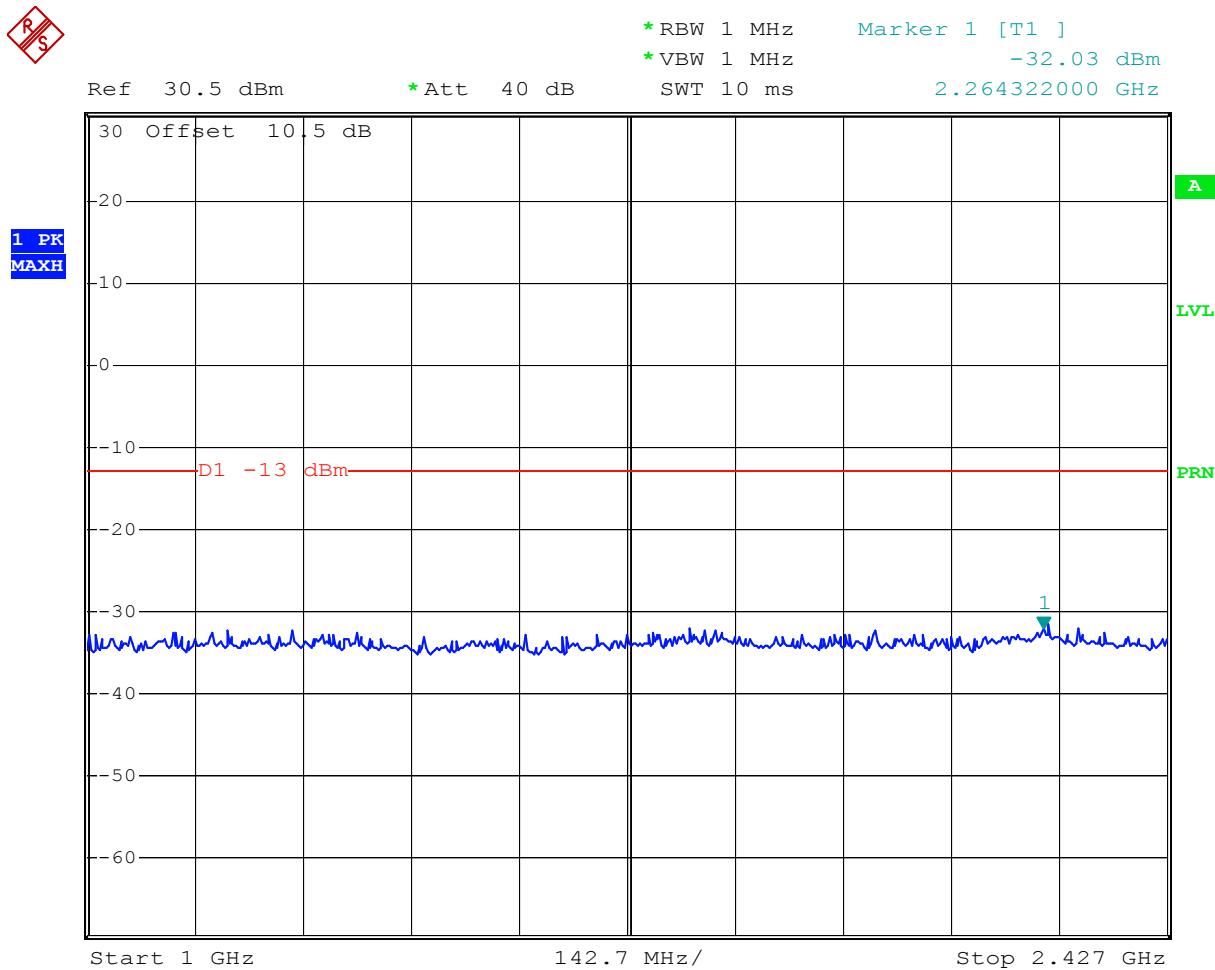
Plot 5.1



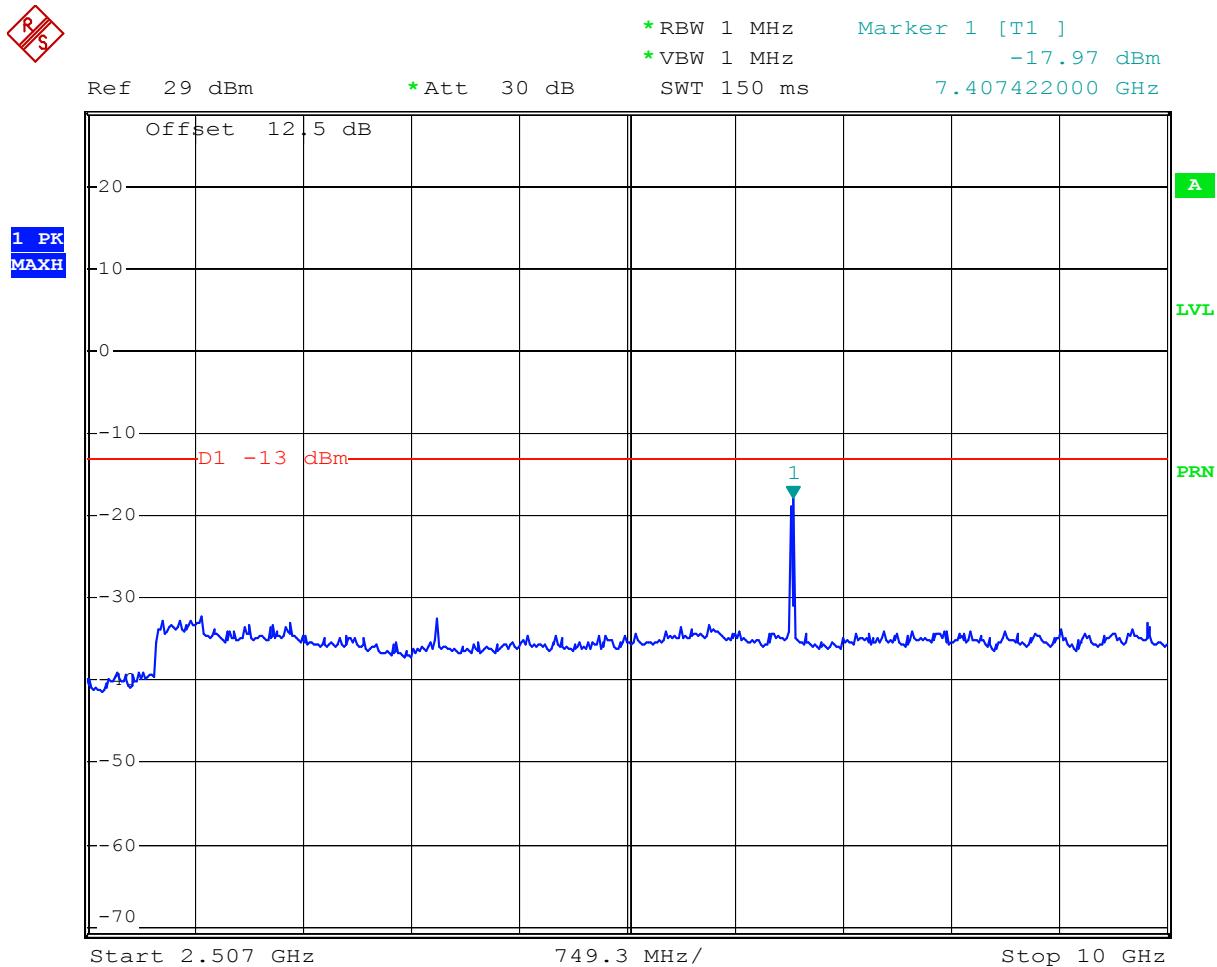
Comment: Conducted spurious emissions

Date: 22.MAR.2007 20:03:50

Plot 5.2

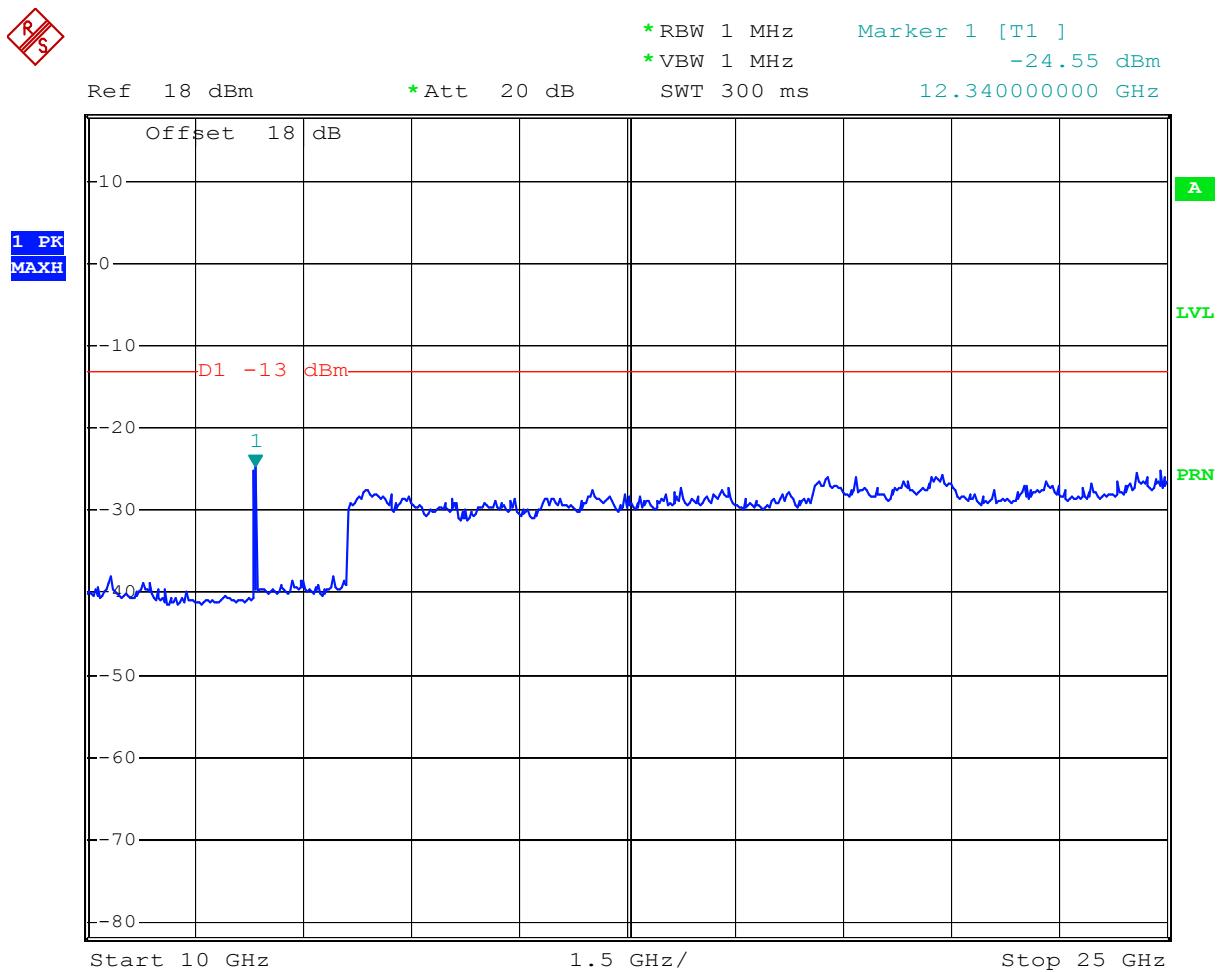


Plot 5.3



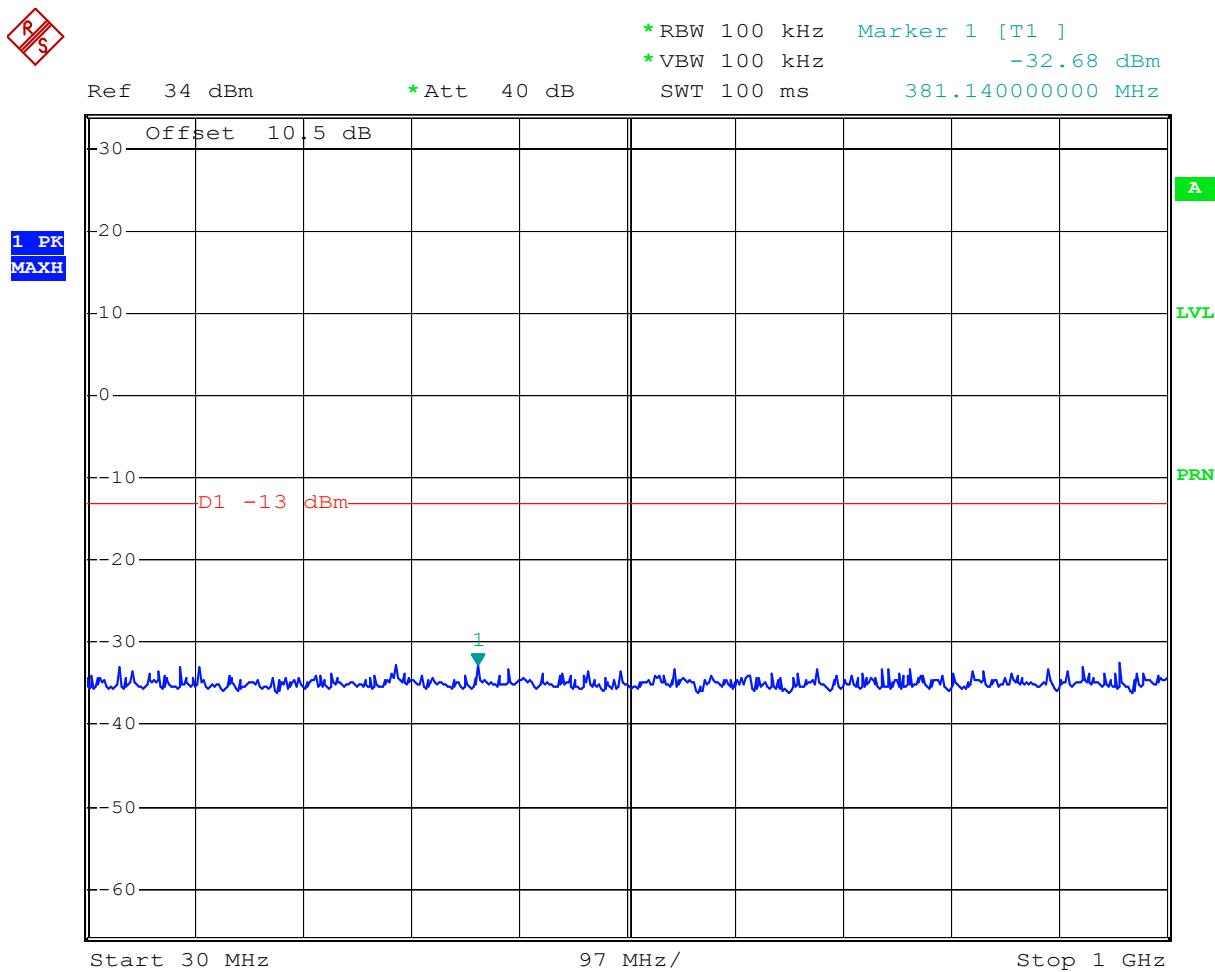
Comment: Conducted spurious emissions
 Date: 22.MAR.2007 20:22:08

Plot 5.4

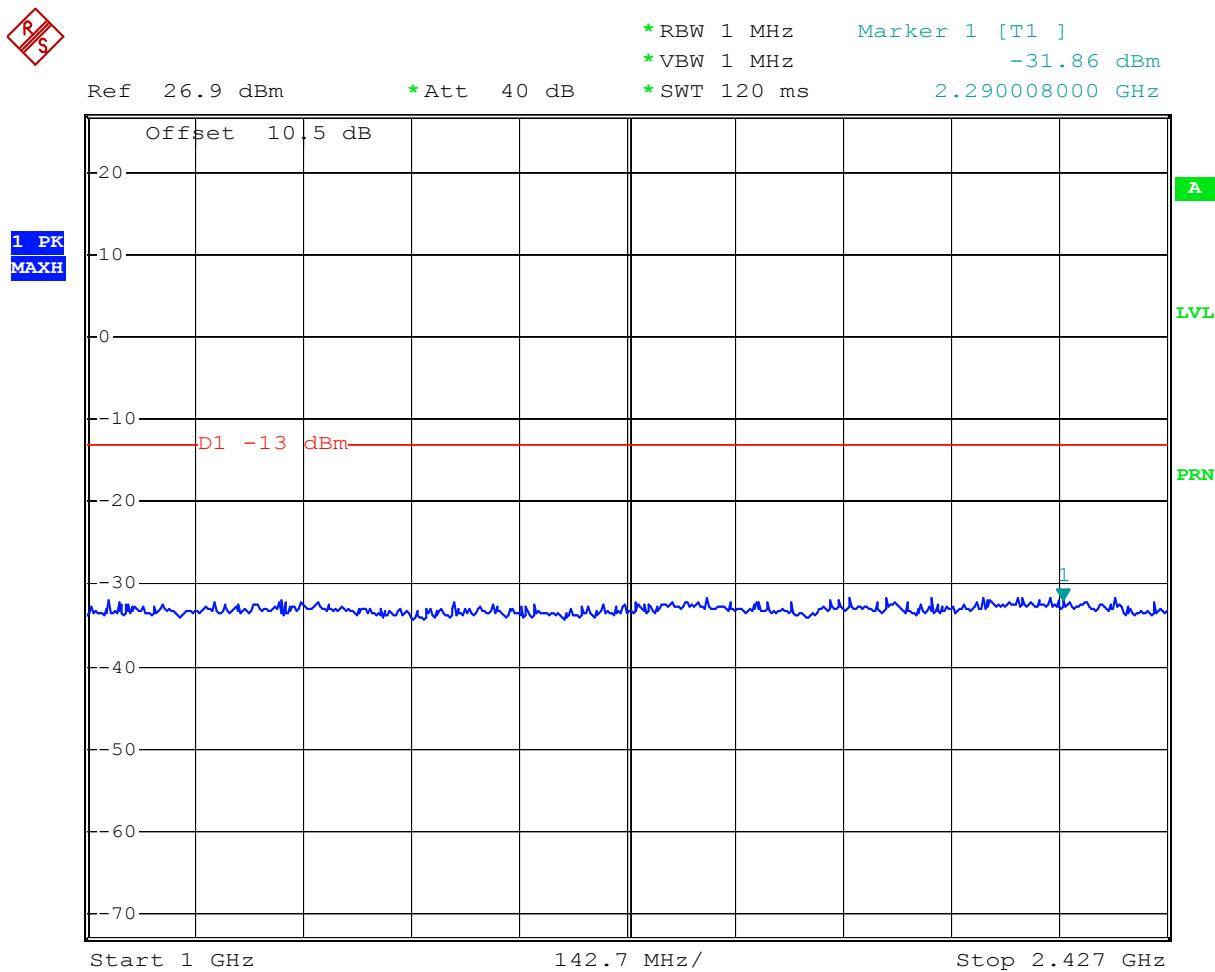


Comment: Conducted spurious emissions
 Date: 22.MAR.2007 20:24:07

Plot 5.5

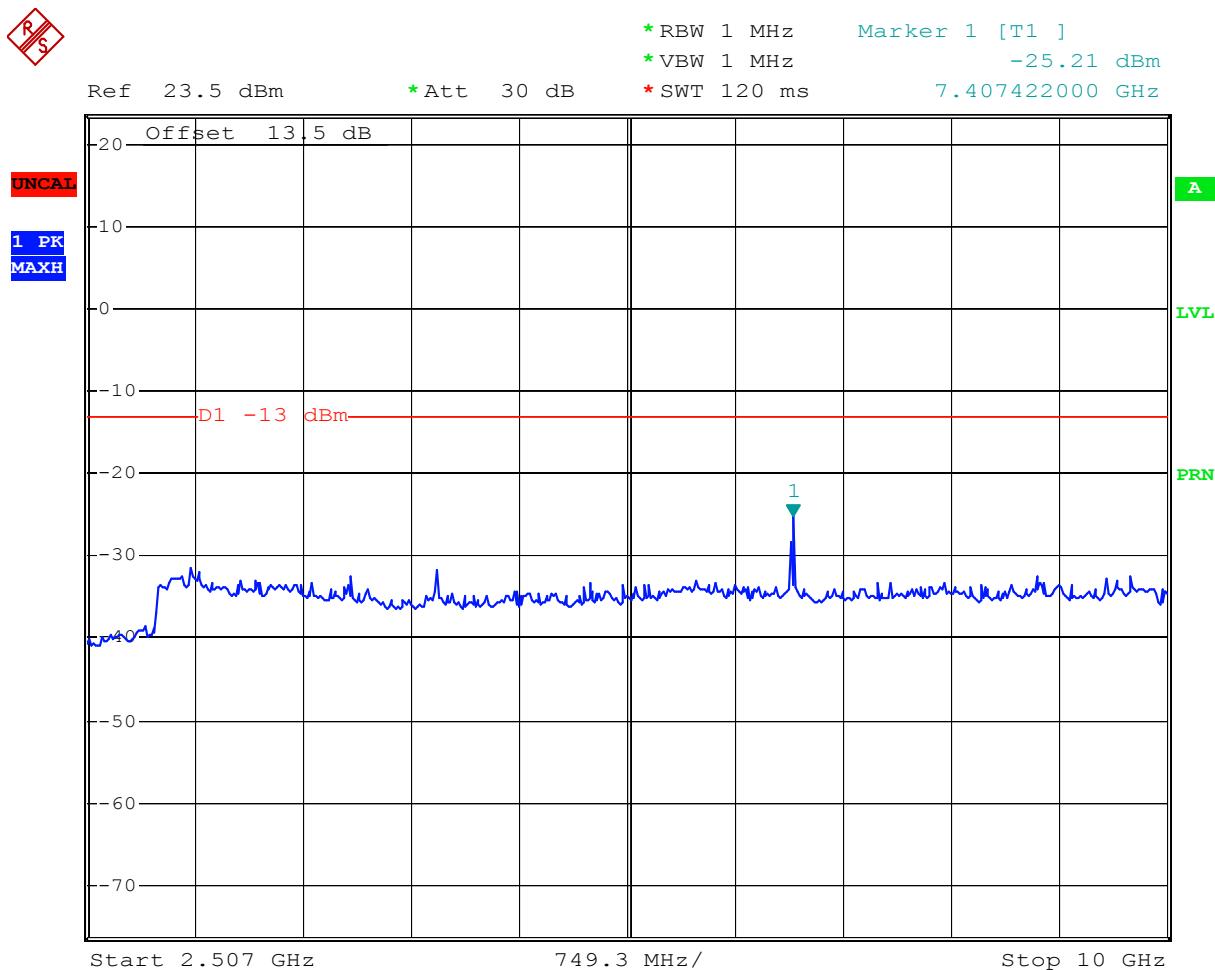


Plot 5.6



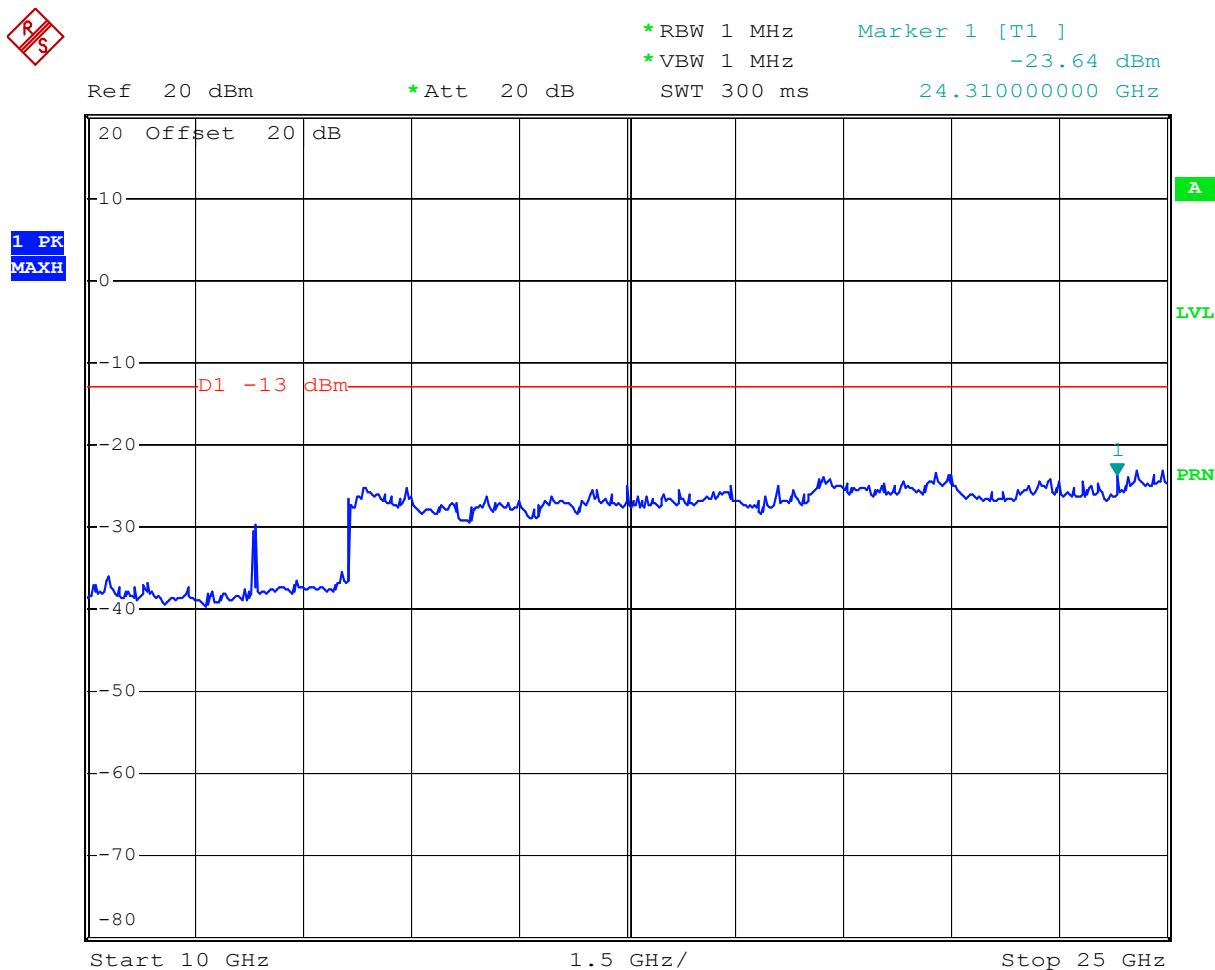
Comment: Conducted Spurious Emissions, low power
 Date: 20.MAR.2007 18:34:24

Plot 5.7



Comment: Conducted Spurious Emissions, low power
 Date: 20.MAR.2007 18:36:33

Plot 5.8



Comment: Conducted Spurious Emissions, low power
 Date: 20.MAR.2007 18:38:27

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 | 47.3 | -56.5 | -46.4 | -13 | -33.4 |
| 7401 | 64.4 | -38.6 | -27.6 | -13 | -14.6 |
| 9868 | 52.5 | -47.8 | -36.2 | -13 | -23.2 |
| 12335 | 44.9 | -47.5 | -34.9 | -13 | -21.9 |
| 14802 | 47.8 | -48.1 | -35.3 | -13 | -22.3 |

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 | 47.2 | -56.6 | -46.5 | -13 | -33.5 |
| 7401 | 56.4 | -46.6 | -35.6 | -13 | -22.6 |
| 9868 | 49.6 | -50.7 | -39.1 | -13 | -26.1 |
| 12335 | 37.9 | -54.5 | -41.9 | -13 | -28.9 |

* 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 14.6 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 | 2466.9588 | -41.2 | -16.7 |
| -20 | 2466.9788 | -21.2 | -8.6 |
| -10 | 2466.9884 | -11.6 | -4.7 |
| 0 | 2466.9944 | -5.6 | -2.3 |
| 10 | 2466.9958 | -4.2 | -1.7 |
| 20 | 2466.9968 | -3.2 | -1.3 |
| 30 | 2466.9976 | -2.4 | -1.0 |
| 40 | 2466.9996 | -0.4 | -0.2 |
| 50 | 2467.0028 | 2.8 | 1.1 |

| DC Voltage, V | Measured frequency, MHz | Maximum deviation from nominal, kHz | Maximum deviation from nominal, ppm |
|--------------------------|--|--|--|
| 9 | 2466.9968 | -3.2 | -1.3 |
| 12 | 2466.9968 | -3.2 | -1.3 |
| 16 | 2466.9968 | -3.2 | -1.3 |

| | |
|---------------|----------|
| 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 |
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