



**Nemko Test Report:** 6L0136RUS1

**Applicant:** Alcatel (TX)  
3400 W. Plano Parkway  
Plano, TX 75075  
USA

**Equipment Under Test:** WBSA25-4

**In Accordance With:** **FCC PART 27, Subpart C**  
Broadband Radio Service and Educational Broadband  
Service

**Tested By:** Nemko USA Inc.  
802 N. Kealy  
Lewisville, Texas 75057-3136

**TESTED BY:**

David Light, Senior Wireless Engineer

**DATE:** 10 August 2007

**APPROVED BY:**

Harry Ward, Verifier

**DATE:** 10<sup>th</sup> August 2007

Total number of pages: 53

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## **Section 1. Summary of Test Results**

Manufacturer: Alcatel

Model No.: WBSA25-4

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 27, Subpart M.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. NONE

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This report applies only to the items tested.

**Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC. LIMIT	RESULT
RF Power Output	2.1046	33 dBW + 10log(X/Y) dBW	Complies
Occupied Bandwidth	2.1049	5.5 MHz	Complies
Spurious Emissions @ Antenna Terminals	2.1051	-13 dBm	Complies
Field Strength of Spurious Radiation	2.1053	-13 dBm	Complies
Frequency Stability	2.1055	Must remain within authorized bandwidth	Complies

**Section 2. General Equipment Specification**

<b>Power Supply</b>	120 Vac
<b>Frequency Range</b>	2500 – 2690 MHz
<b>Type(s) of Modulation:</b>	<b>F3E (Voice)</b> <b>F1D</b> <b>F2D</b> <b>D7W</b> <b>F9W</b>
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
<b>Emission Designator</b>	5M00D7W AND 10M0D7W
<b>Type(s) of Emission:</b>	QPSK - 16QAM – 64QAM
<b>Output Impedance:</b>	50 ohms
<b>RF Power Output Rated:</b>	35 dBm Average Conducted
<b>Selection Of Operating Frequency:</b>	Not selectable by operator
<b>Power Output Adjustment Capability:</b>	Not selectable by operator

**Nemko USA, Inc.**

FCC PART 27, SUBPART C

Broadband Radio Service and Educational Broadband Service

EQUIPMENT: WBSA25-4

PROJECT NO.:6L0136RUS1

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**Description of EUT**

2.5 GHz Point to Multipoint BTS.

**System Diagram**

Refer to separate exhibit.

**Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE: 20 July 2007

**Test Results:** Complies

**Measurement Data:** See Tables.

**Test Equipment:** 1483-1604-1469-1036

**Average RF Power Output**

Frequency (MHz)	Modulation	Carrier (MHz)	Power (dBm)	Power (Watts)
2502.75	QPSK	5	35.4	3.5
2590.00	QPSK	5	35.2	3.3
2687.25	QPSK	5	34.5	2.8
2502.75	16QAM	5	35.2	3.3
2590.00	16QAM	5	34.5	2.8
2687.25	16QAM	5	34.9	3.1
2502.75	64QAM	5	35.3	3.4
2590.00	64QAM	5	34.6	2.9
2687.25	64QAM	5	34.5	2.8
2505.25	QPSK	10	34.9	3.1
2590.00	QPSK	10	34.3	2.7
2684.75	QPSK	10	34.0	2.5
2505.25	16QAM	10	34.9	3.1
2590.00	16QAM	10	34.4	2.8
2684.75	16QAM	10	34.1	2.6
2505.25	64QAM	10	34.9	3.1
2590.00	64QAM	10	34.4	2.8
2684.75	64QAM	10	34.0	2.5

**Analyzer Settings:** RBW=VBW=5 MHz for 5 MHz Carrier  
 RBW=VBW=10 MHz for 10 MHz Carrier  
 Average Detector  
 Sweep Time=100mS

**Nemko USA, Inc.**

FCC PART 27, SUBPART C

Broadband Radio Service and Educational Broadband Service

EQUIPMENT: WBSA25-4

PROJECT NO.:6L0136RUS1

#### **Section 4. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: DAVID LIGHT	DATE: 20 July 2007

**Test Results:** Complies

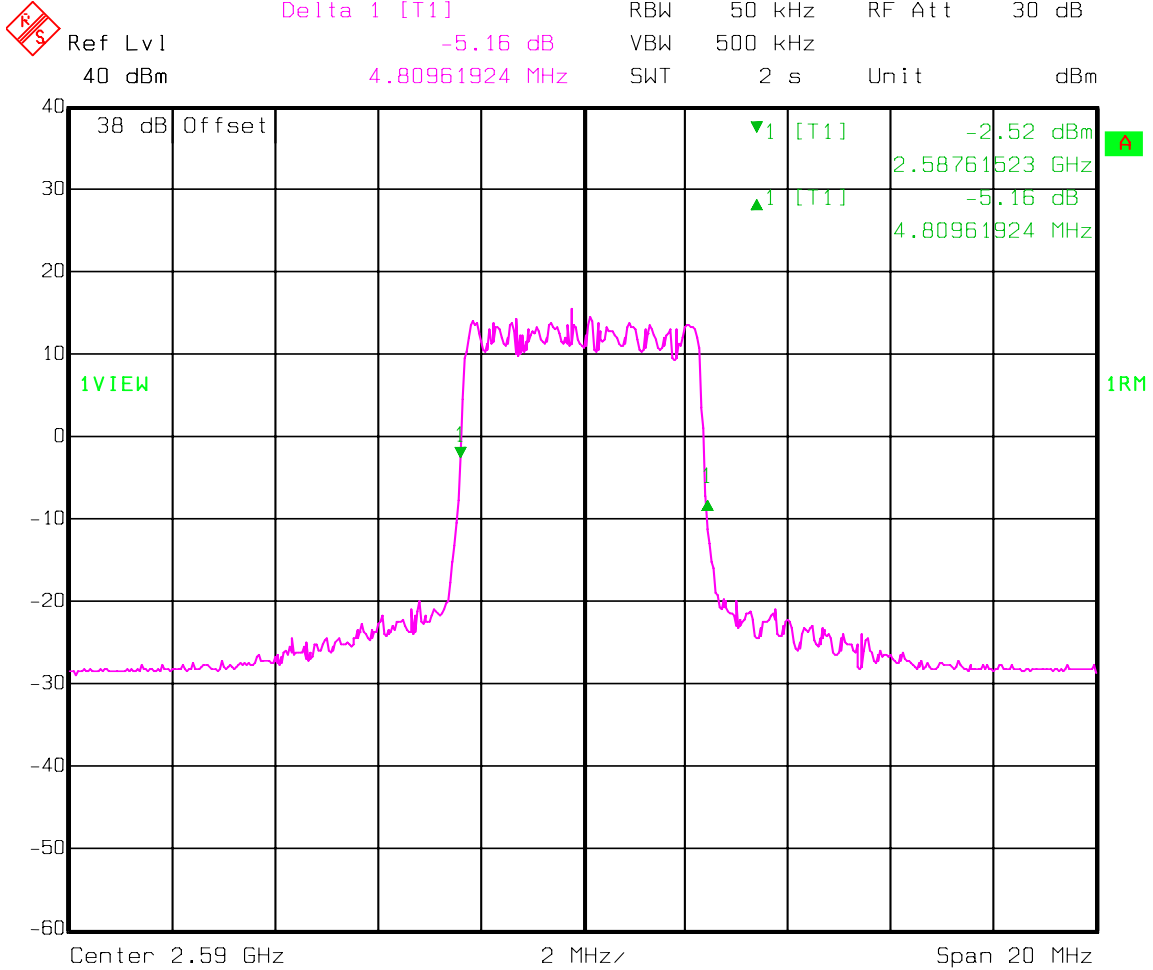
**Measurement Data:** See attached plots.

**Test Equipment:** 1483-1604-1469-1036

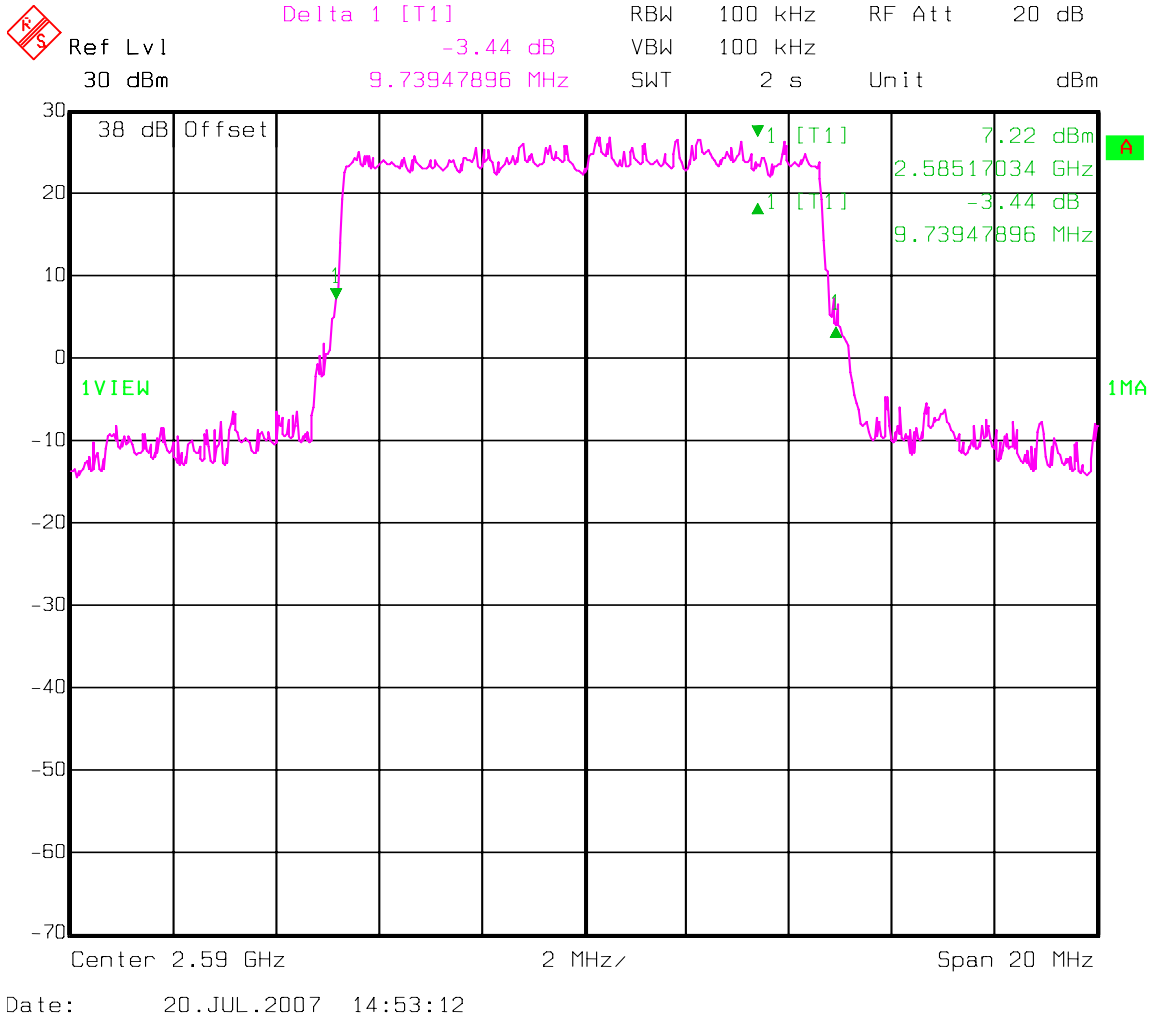


# Test Data – Occupied Bandwidth

## 99% Bandwidth – 5 MHz Channel



Date: 20.JUL.2007 12:07:35

**Test Data – Occupied Bandwidth****99% Bandwidth – 10 MHz Channel**

**Occupied bandwidth was identical for all frequencies and modulation types.**

## **Section 5. Spurious Emissions at Antenna Terminals**

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 20 July 2007

**Test Results:** Complies

**Measurement Data:** See attached plots.

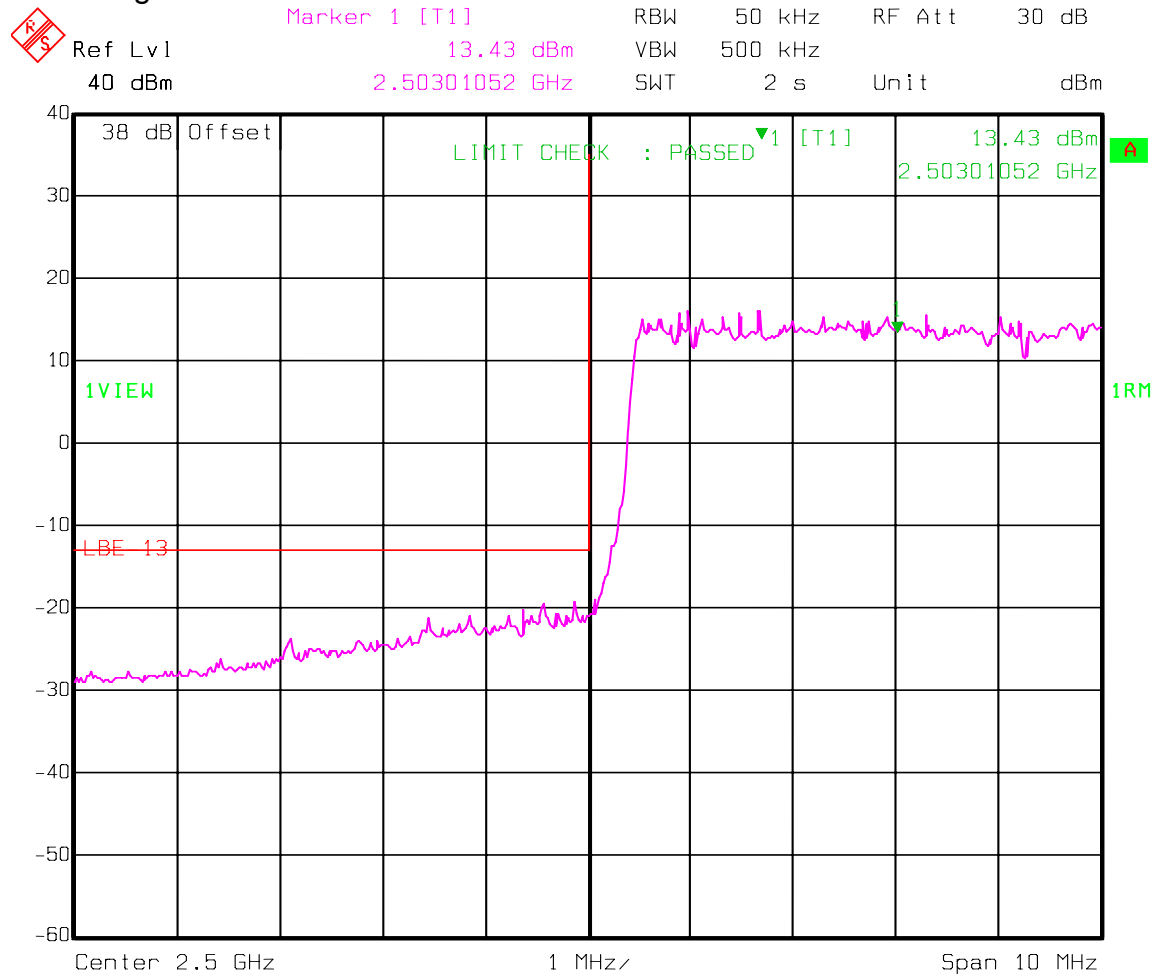
**Test Equipment:** 1483-1604-1469-1036

**Test Data – Spurious Emissions at Antenna Terminals**

5 MHz Carrier

Low Channel

Band Edge



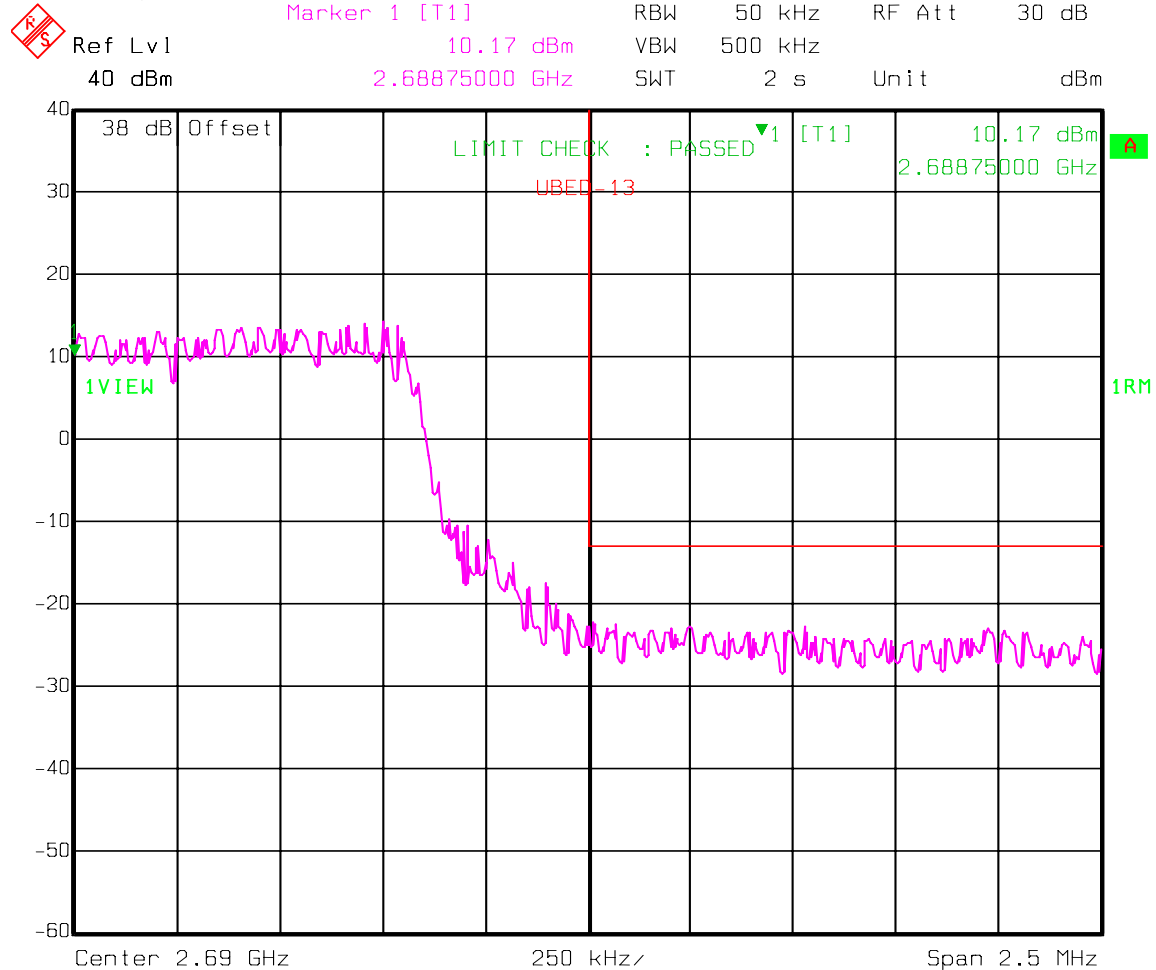
Date: 20.JUL.2007 11:58:08

# Test Data – Spurious Emissions at Antenna Terminals

5 MHz Carrier

High Channel

Band Edge



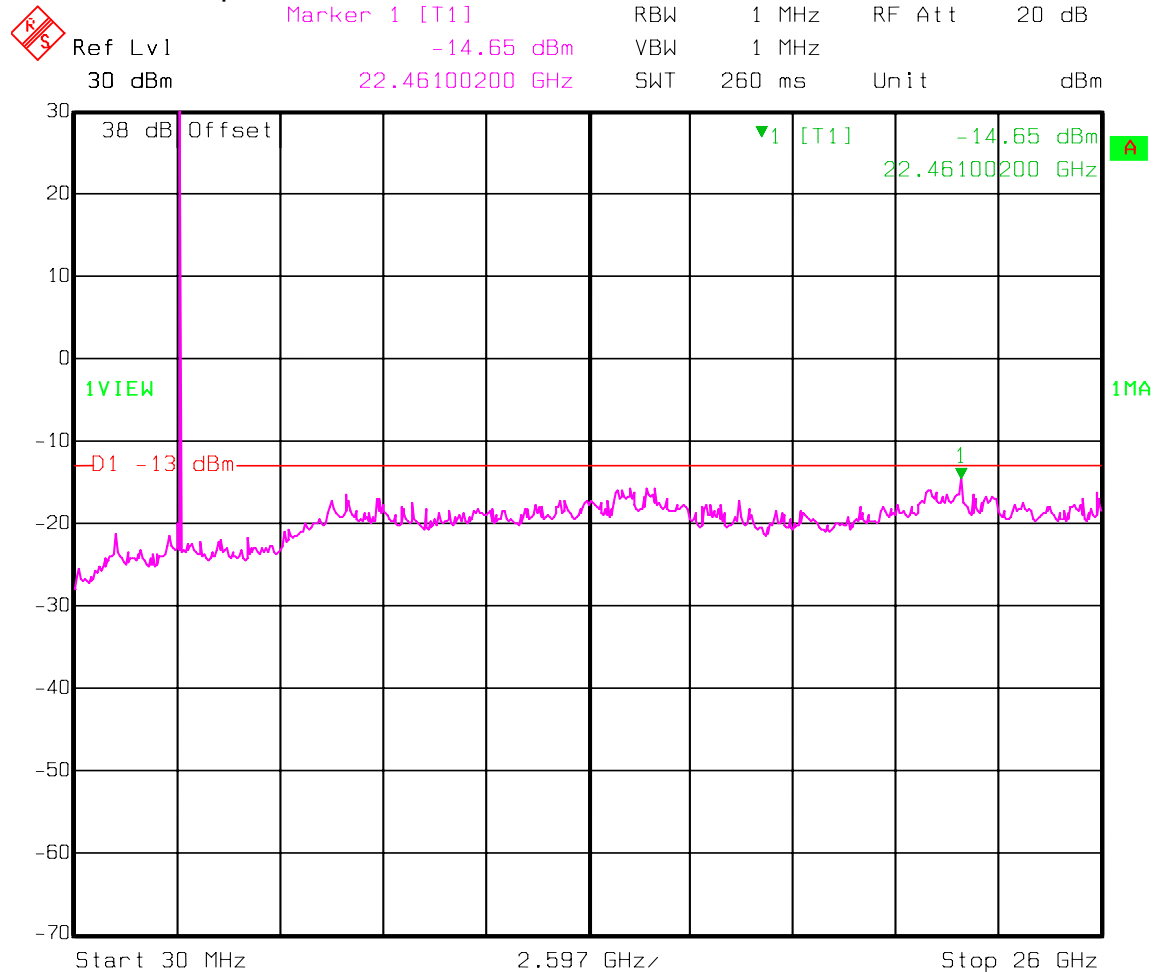
Date: 20.JUL.2007 09:48:21

Test Data – Spurious Emissions at Antenna Terminals

QPSK

5 MHz Carrier

Mid Channel Spurs



Date: 20.JUL.2007 10:08:59

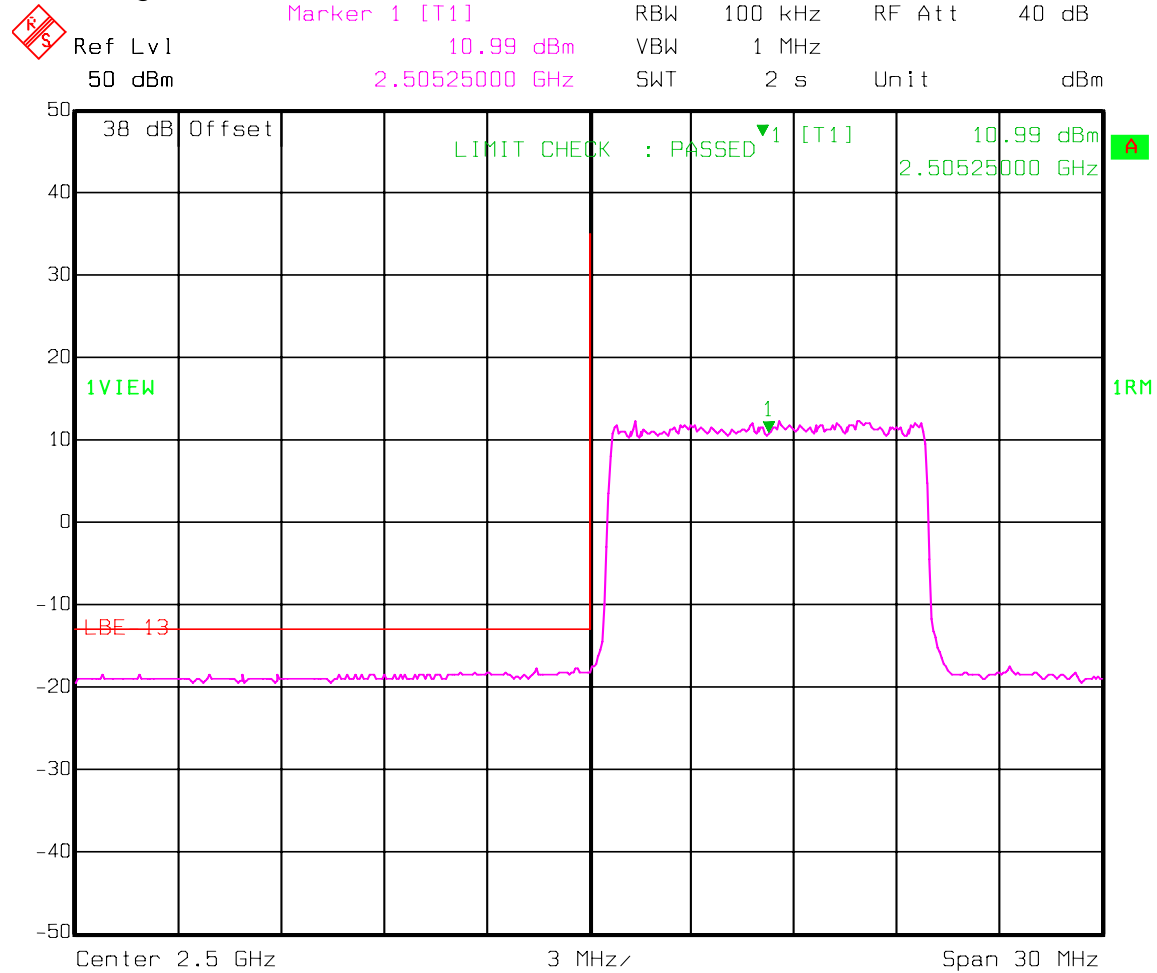
**Test Data – Spurious Emissions at Antenna Terminals**

QPSK

10 MHz Carrier

Low Channel

Band Edge



Date: 20.JUL.2007 15:32:41

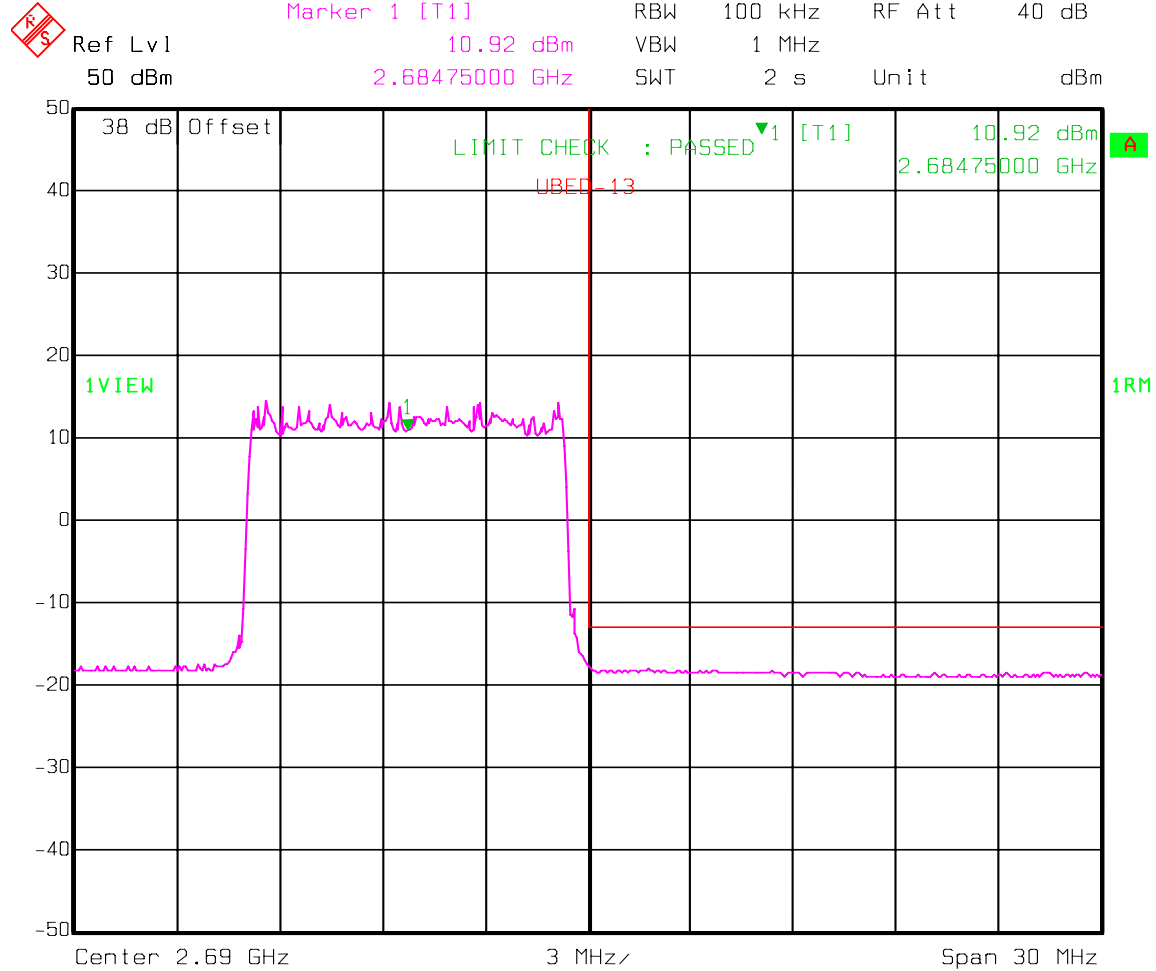
# Test Data – Spurious Emissions at Antenna Terminals

QPSK

10 MHz Carrier

High Channel

Band Edge



Date: 20.JUL.2007 16:36:14

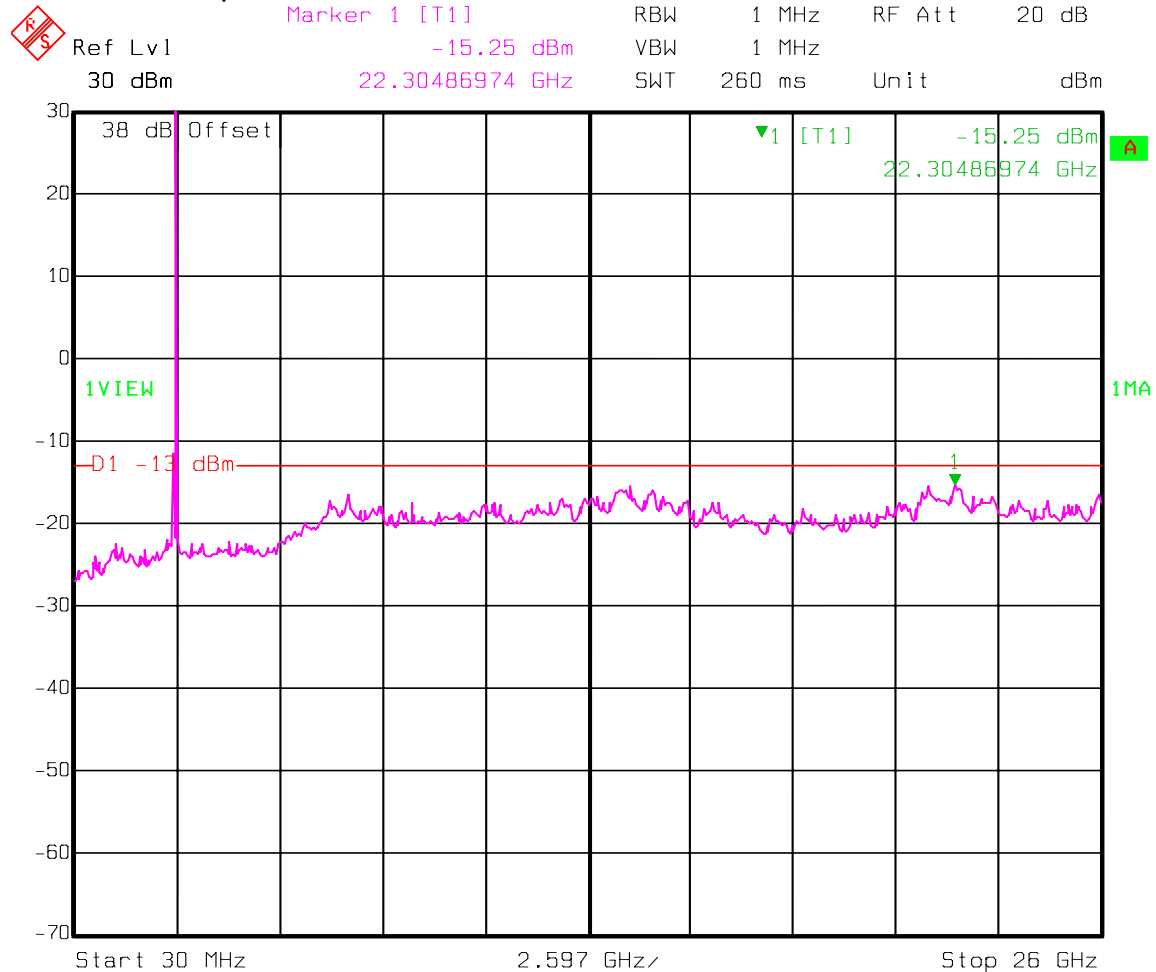


# Test Data – Spurious Emissions at Antenna Terminals

QPSK

10 MHz Carrier

Mid Channel Spurs



Date: 20.JUL.2007 14:51:24

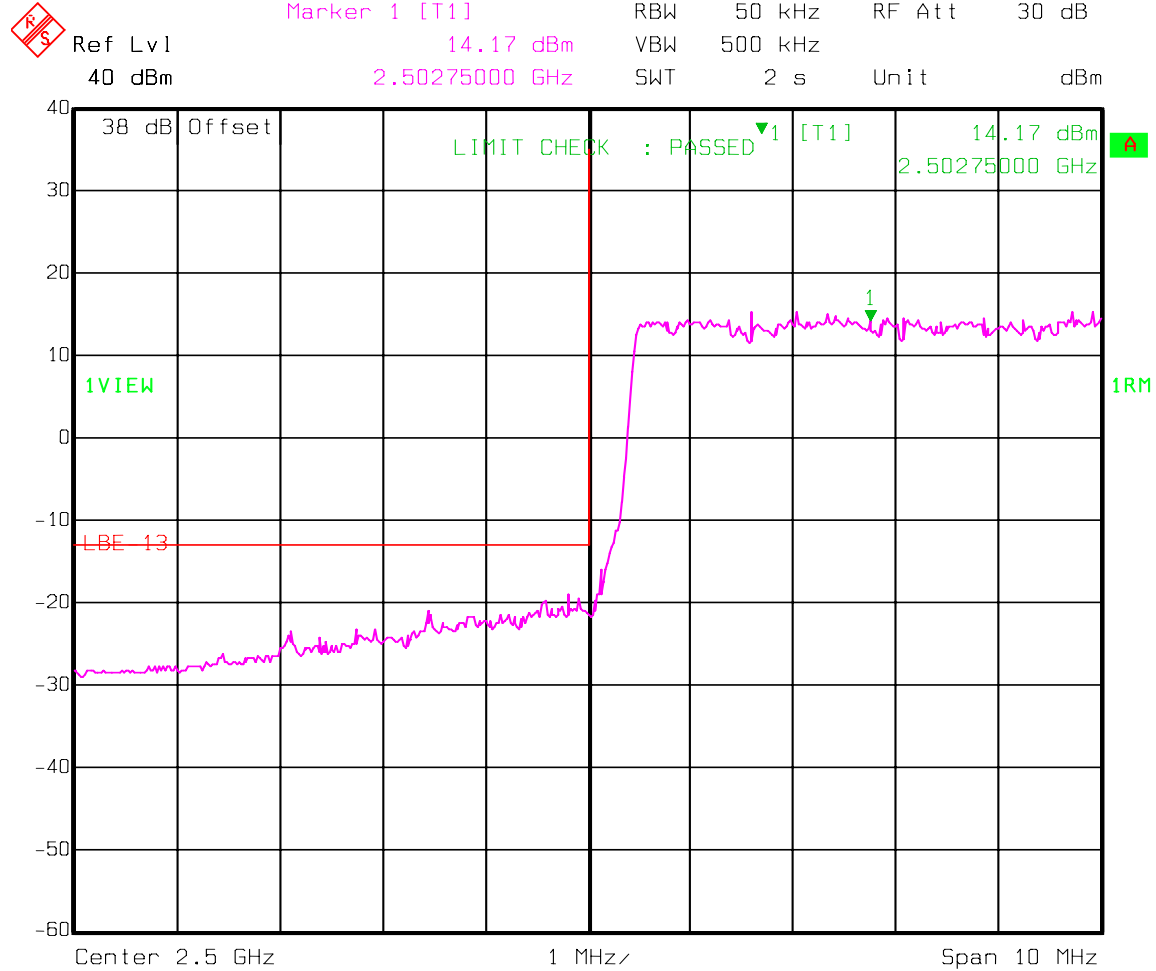
**Test Data – Spurious Emissions at Antenna Terminals**

16 QAM

5 MHz Carrier

Low Channel

Band Edge



Date: 20.JUL.2007 11:53:03

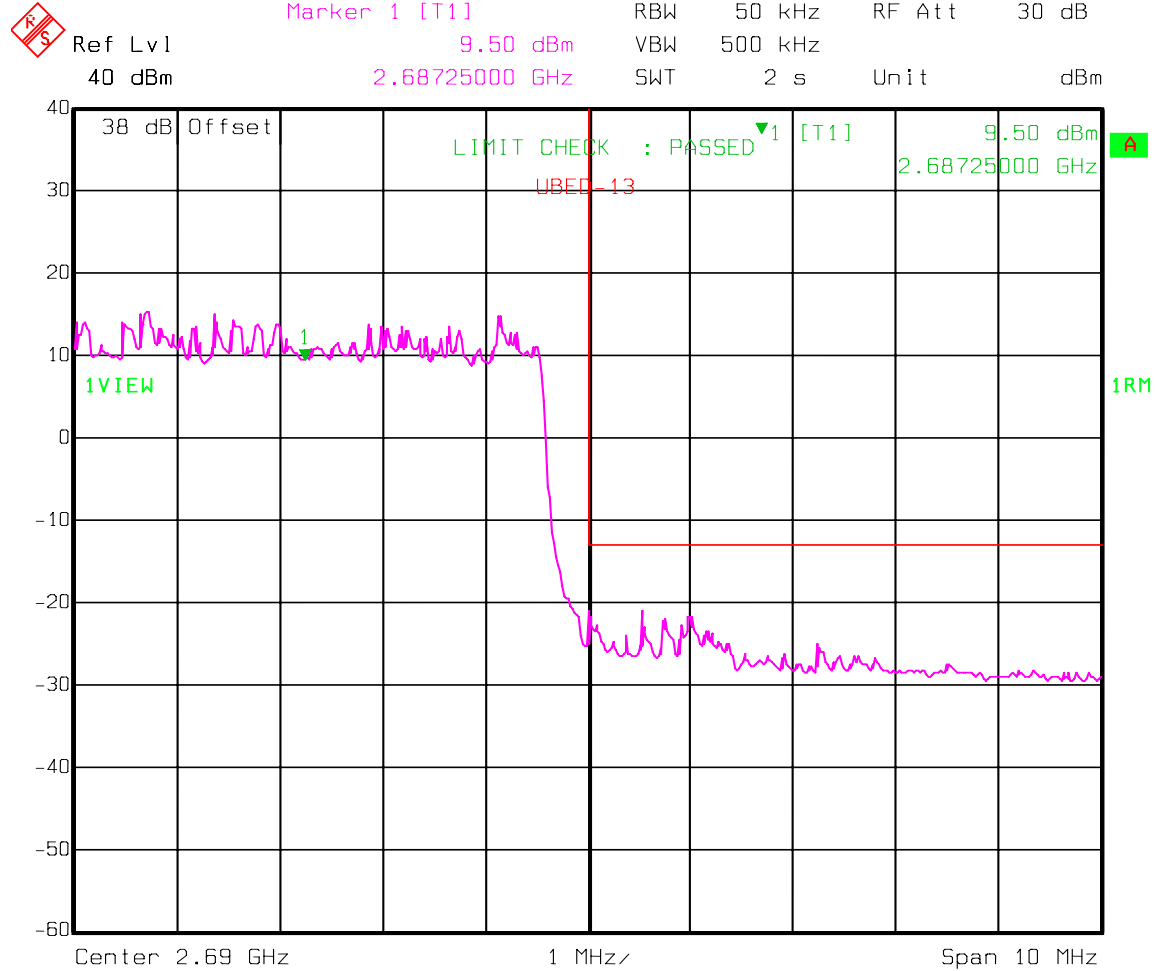
Test Data – Spurious Emissions at Antenna Terminals

16 QAM

5 MHz Carrier

High Channel

Band Edge



Date: 20.JUL.2007 11:19:33

# Test Data – Spurious Emissions at Antenna Terminals

16 QAM

5 MHz Carrier

Mid Channel Spurs



Ref Lvl

38 dBm

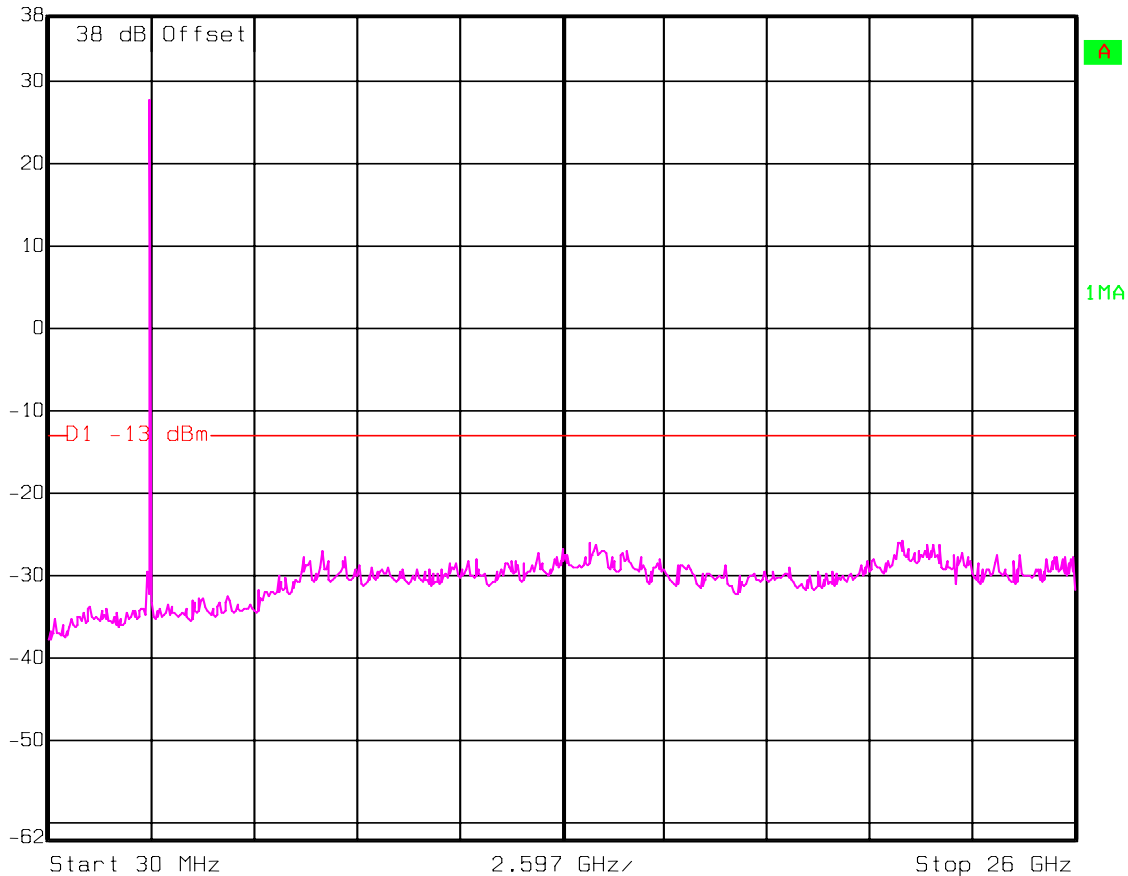
RBW 1 MHz

RF Att 10 dB

VBW 1 MHz

SWT 260 ms

Unit dBm



Date: 20.JUL.2007 12:15:13

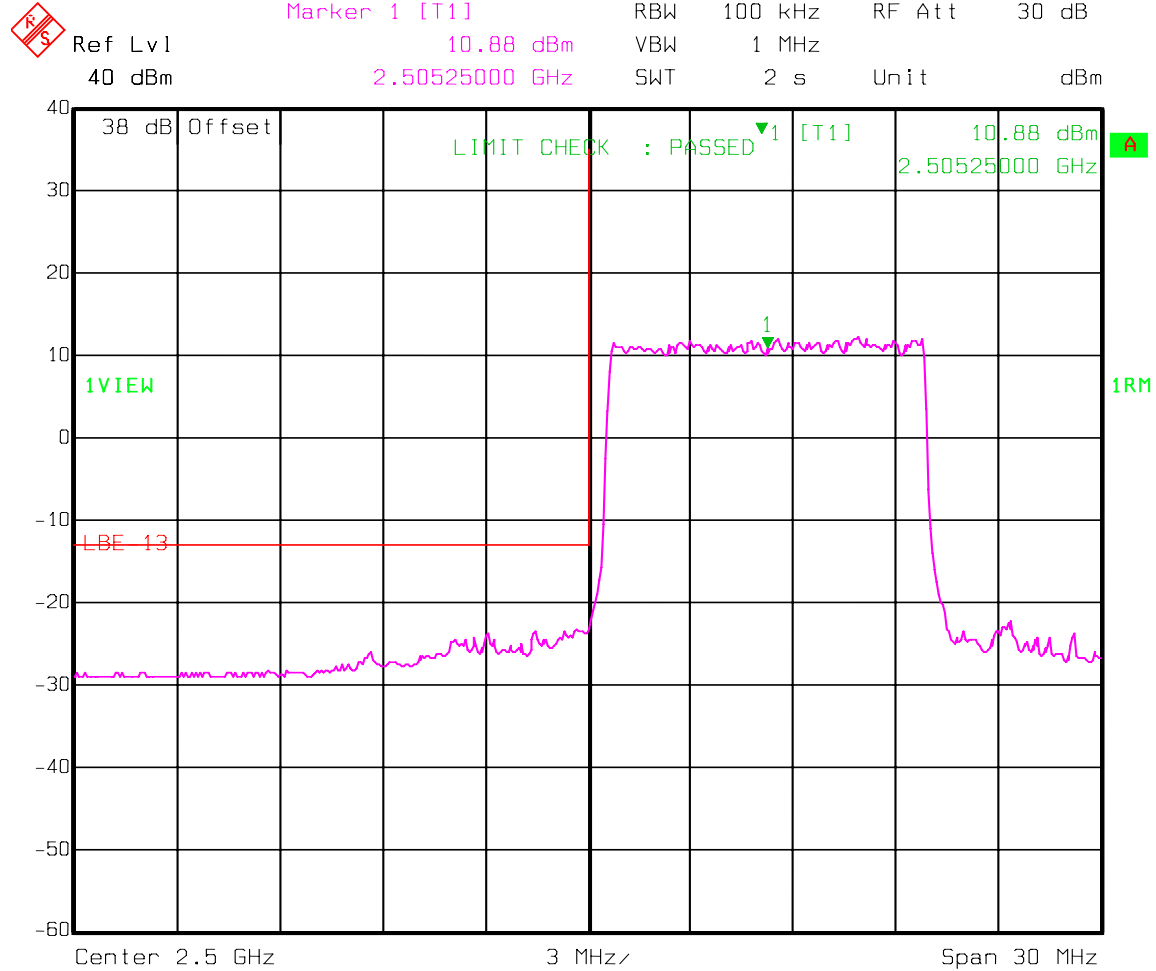
Test Data – Spurious Emissions at Antenna Terminals

16 QAM

10 MHz Carrier

Low Channel

Band Edge



Date: 20.JUL.2007 15:27:02

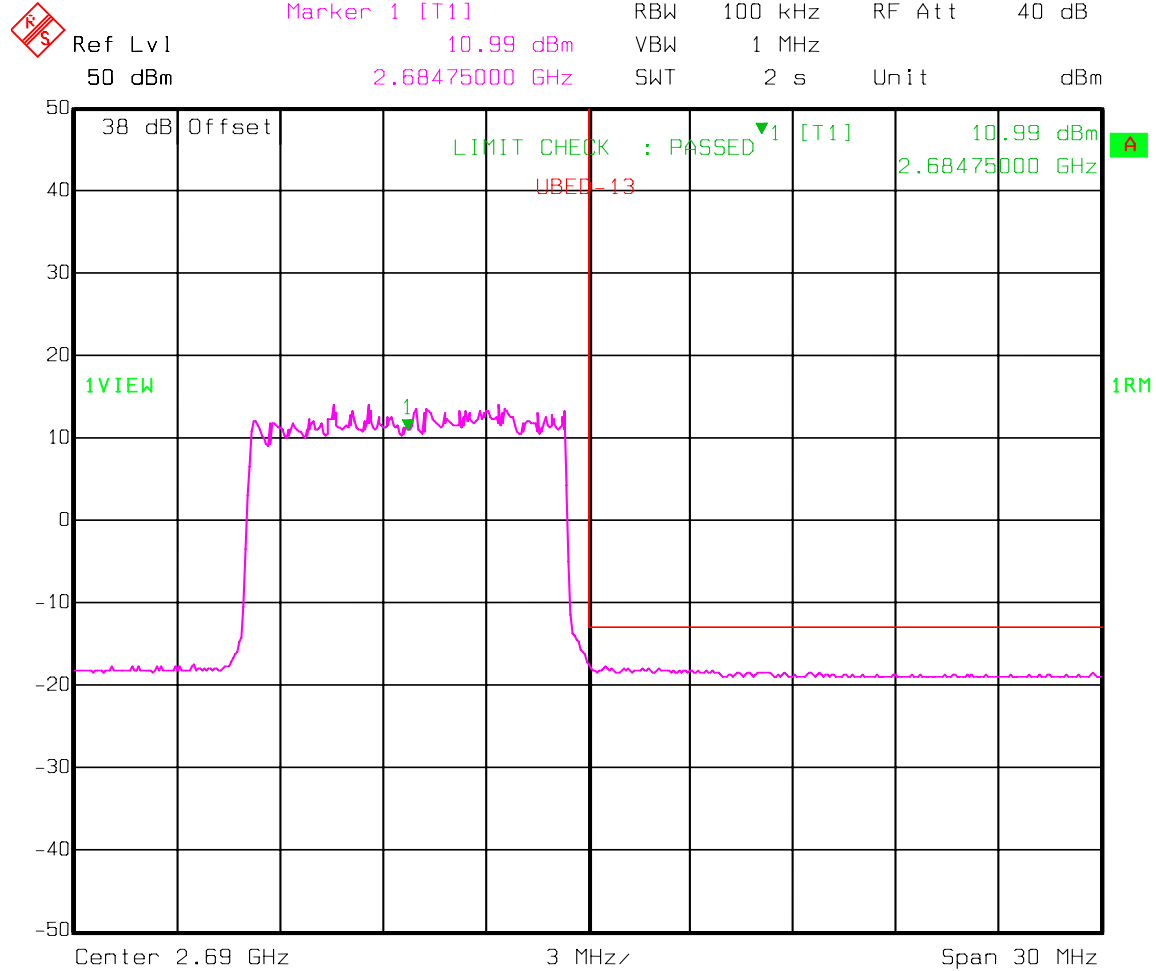
Test Data – Spurious Emissions at Antenna Terminals

16 QAM

10 MHz Carrier

High Channel

Band Edge



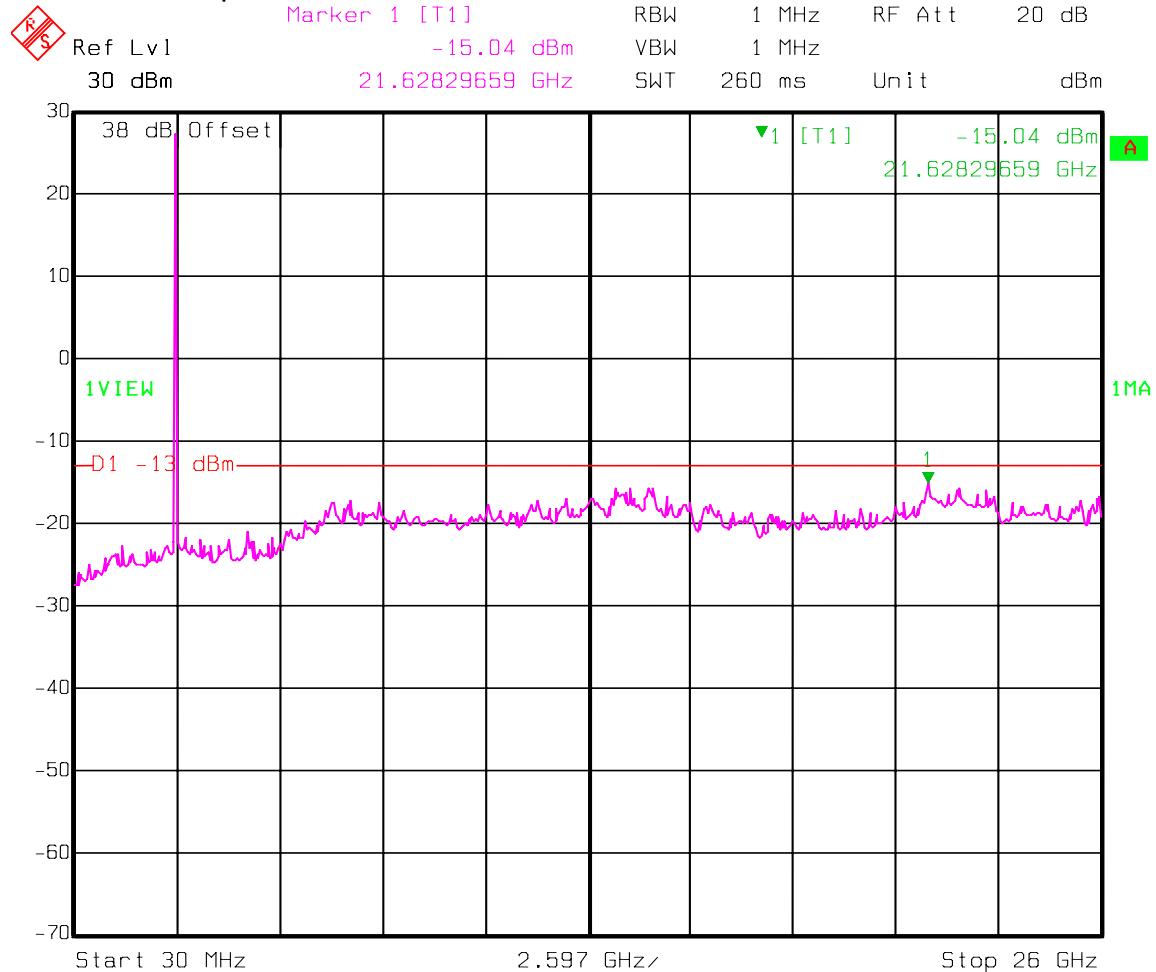
Date: 20.JUL.2007 16:29:57

Test Data – Spurious Emissions at Antenna Terminals

16 QAM

10 MHz Carrier

Mid Channel Spurs



Date: 20.JUL.2007 15:00:58

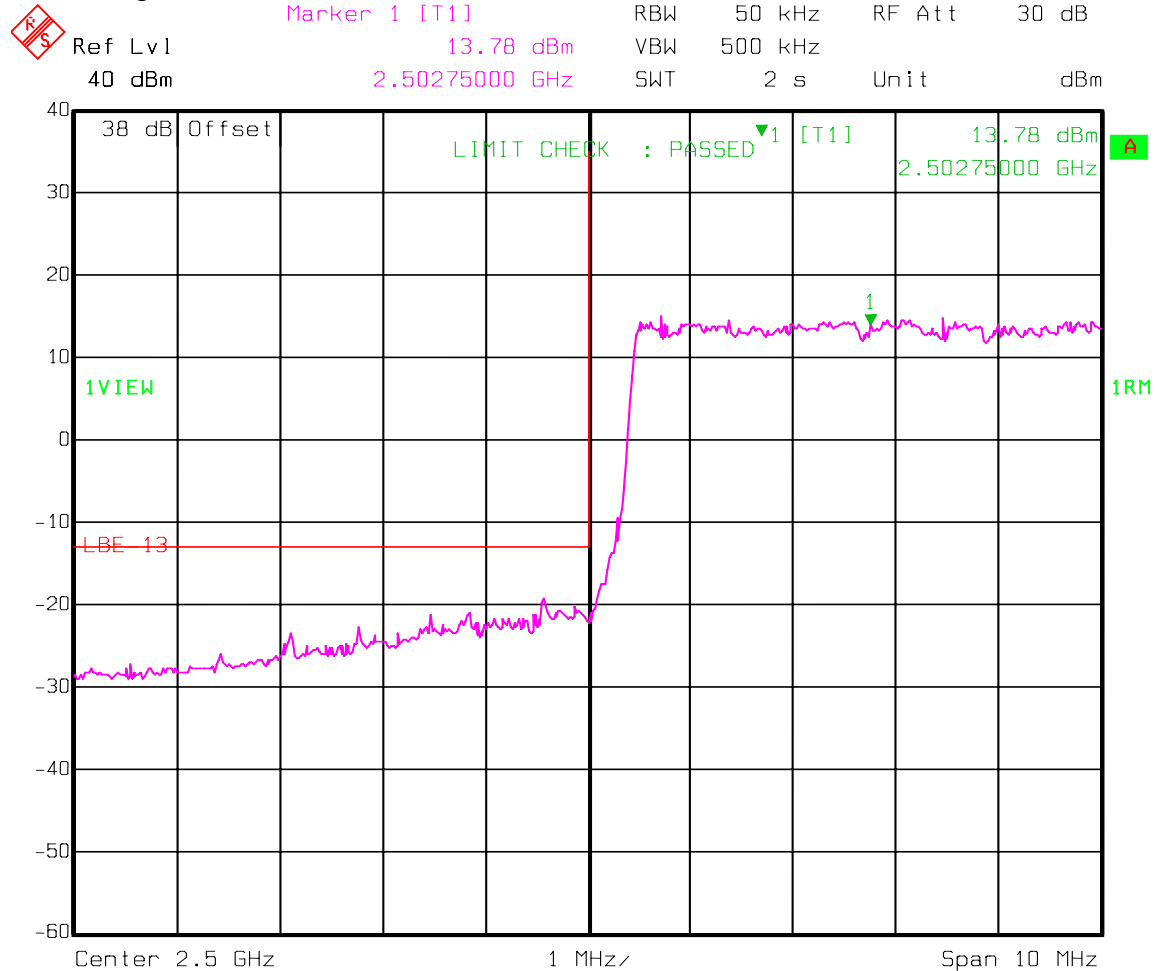
**Test Data – Spurious Emissions at Antenna Terminals**

64 QAM

5 MHz Carrier

Low Channel

Band Edge



Date: 20.JUL.2007 11:45:29



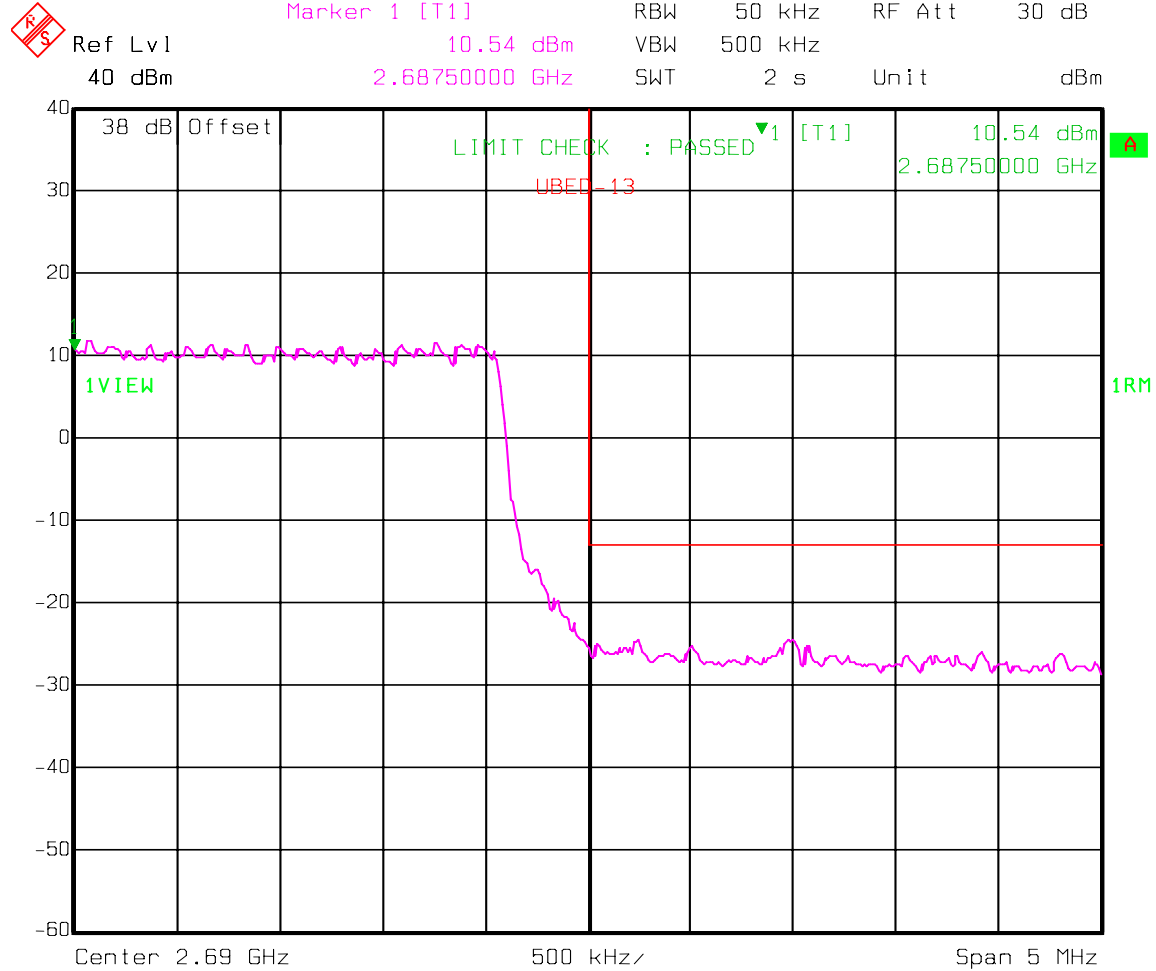
# Test Data – Spurious Emissions at Antenna Terminals

64 QAM

5 MHz Carrier

High Channel

Band Edge



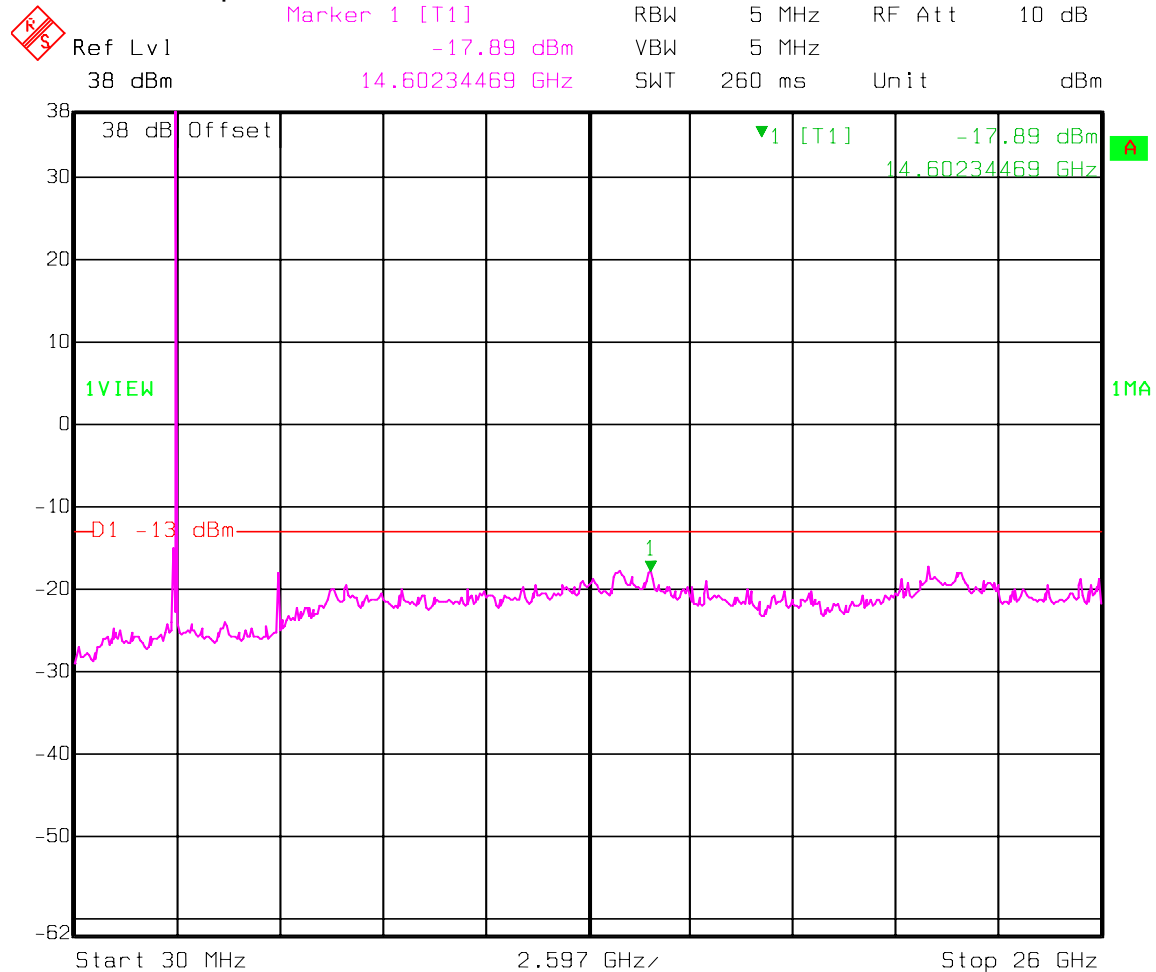
Date: 20.JUL.2007 11:27:41

# Test Data – Spurious Emissions at Antenna Terminals

64 QAM

5 MHz Carrier

Mid Channel Spurs



Date: 20.JUL.2007 12:21:27

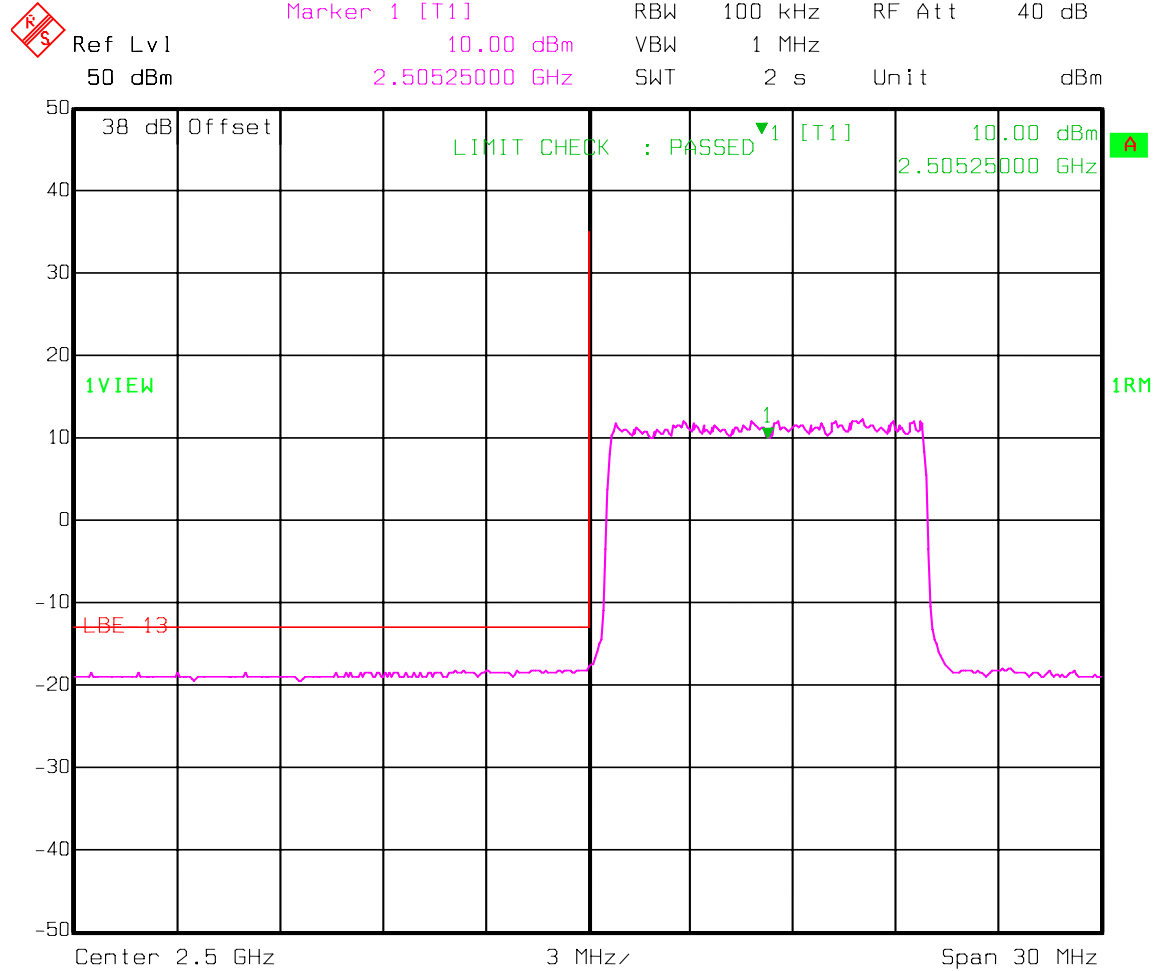
Test Data – Spurious Emissions at Antenna Terminals

64 QAM

10 MHz Carrier

Low Channel

Band Edge



Date: 20.JUL.2007 15:37:56

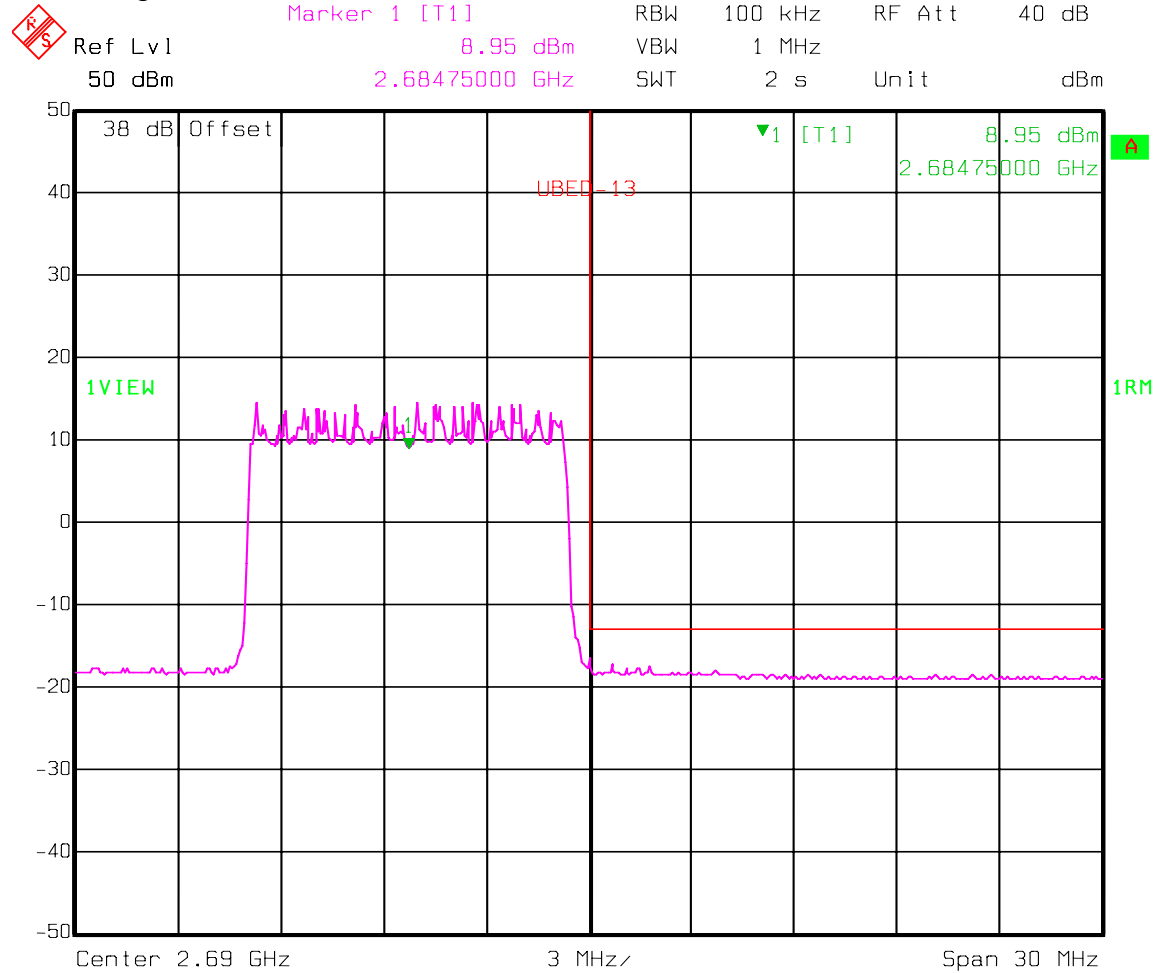
**Test Data – Spurious Emissions at Antenna Terminals**

64 QAM

10 MHz Carrier

High Channel

Band Edge



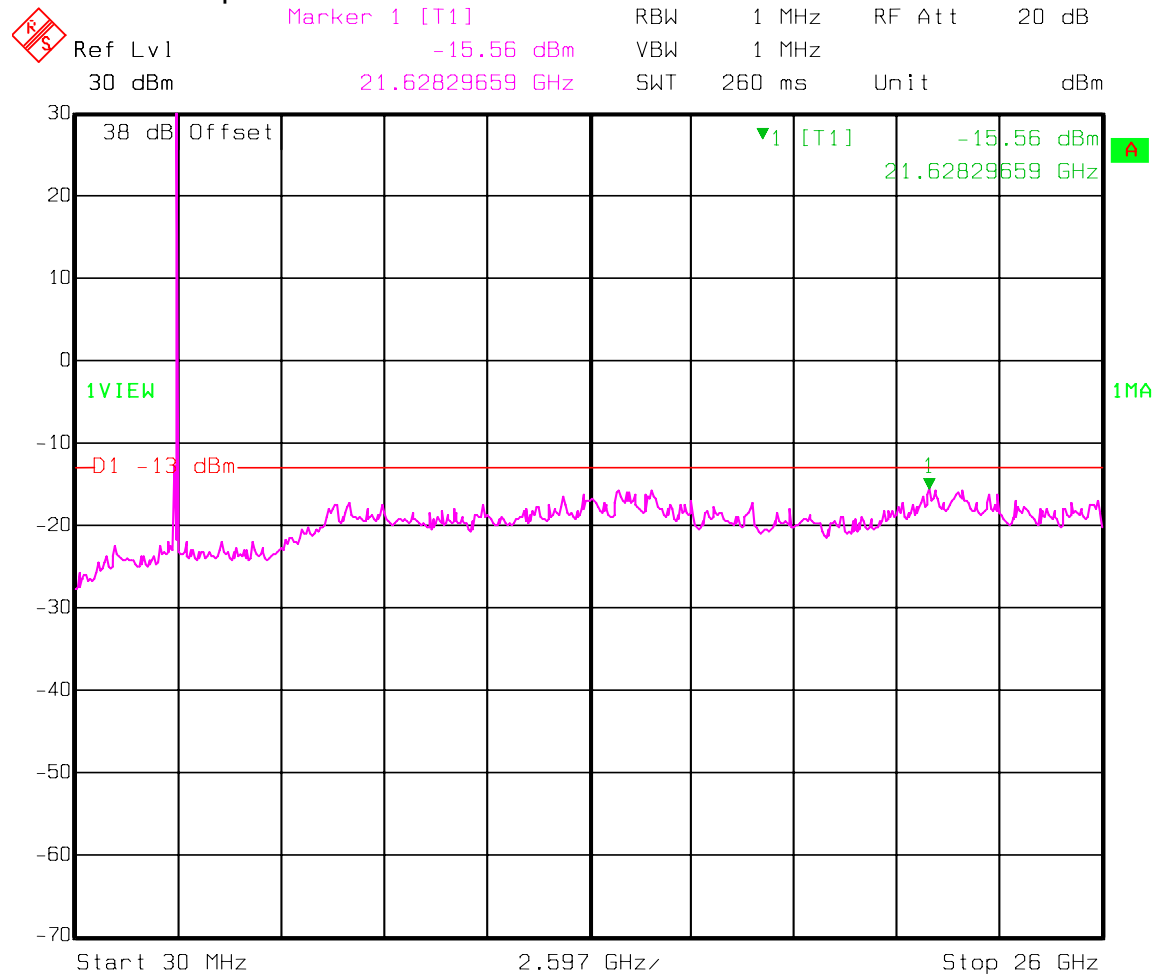
Date: 20.JUL.2007 16:21:40

## Test Data – Spurious Emissions at Antenna Terminals

## 64 QAM

10 MHz Carrier

## Mid Channel Spurs



Date: 20.JUL.2007 15:04:55

**Section 6. Field Strength of Spurious**

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1053
TESTED BY: David Light	DATE: 22 July 2007

**Test Results:** Complies

**Measurement Data:** See attached table.

**Test Equipment:** 1464,1016,993,760,1311,791,1484,1485..

The spectrum was searched from 30 MHz to the 10<sup>th</sup> harmonic of the carrier.

Note: No Emissions were detected within 20 db of the specification limit

**Analyzer Settings:** 30 to 1000 MHz - RBW/VBW =100 kHz  
1000 to 26000 MHz – RBW/VBW = 1 MHz  
Peak detector used on all measurements  
Sweep Time = Auto

## **Section 7. Frequency Stability**

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: David Light	DATE: 08 August 2007

**Test Results:** Complies

**Measurement Data:** See attached plots.

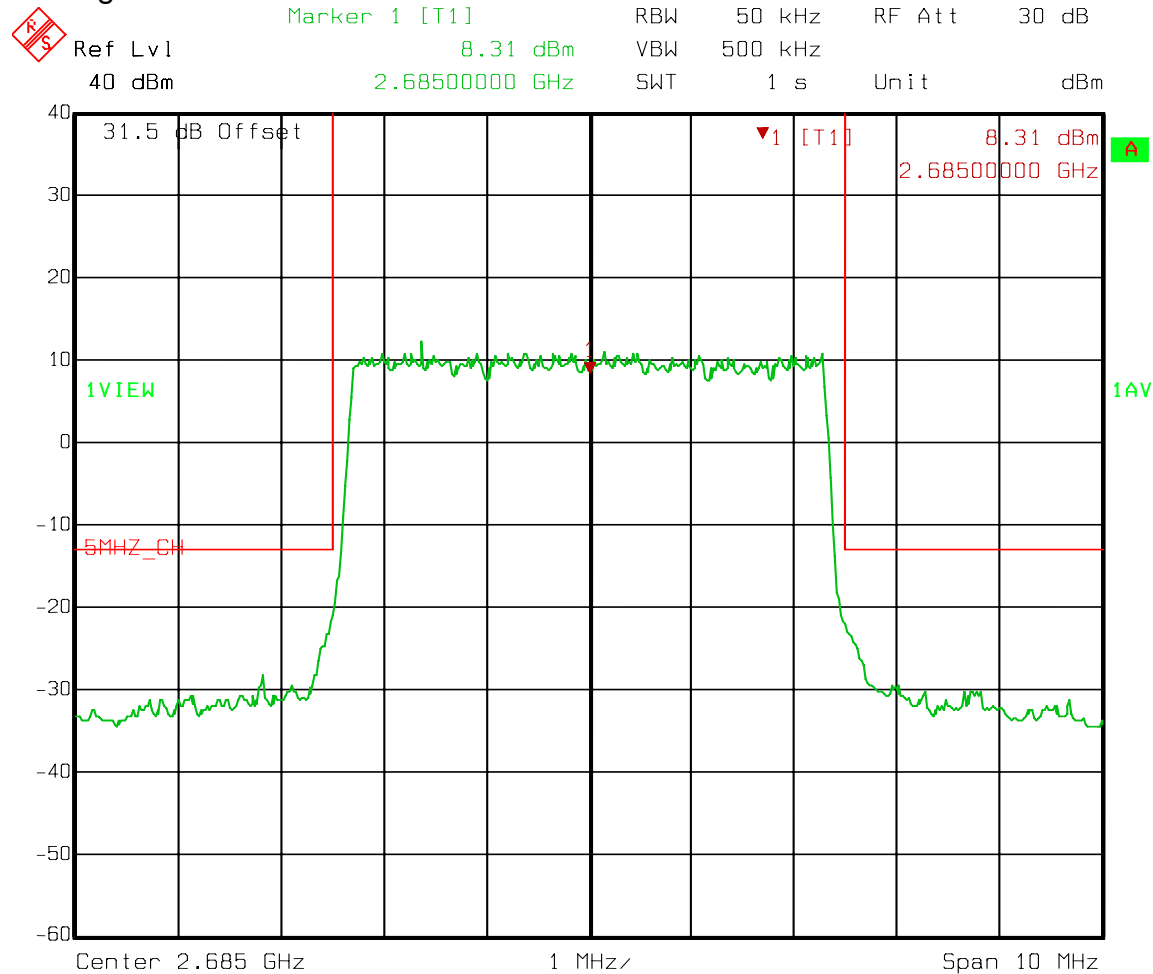
**Test Equipment:** 1036, 1483, 1064, 1065, 283, 619

**Standard Supply Voltage:** 120 Vac

**Environmental Conditions:** 21 °Celsius  
41 % RH

## Test Data – Frequency Stability

20 Degrees C 120VAC

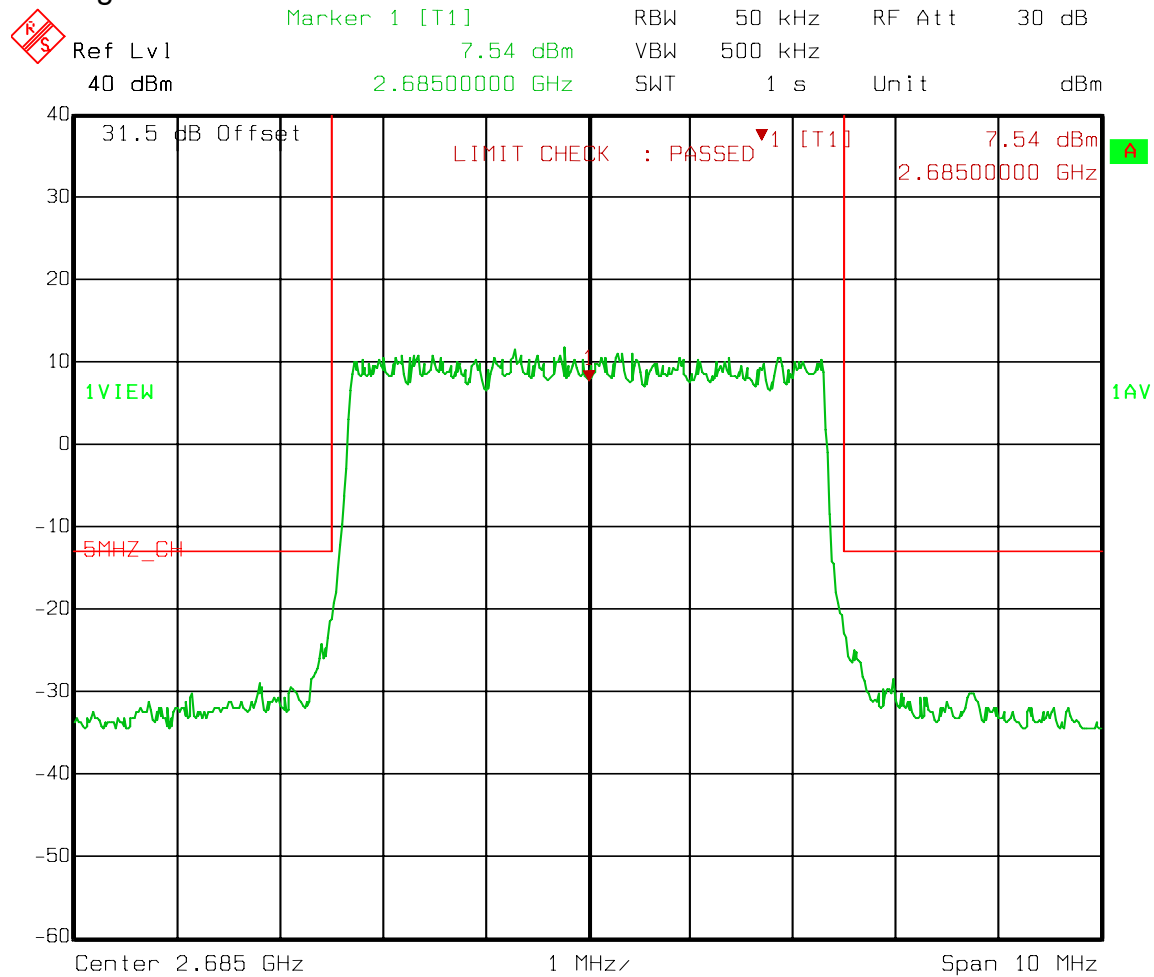


Date: 07.AUG.2007 12:23:41



## Test Data – Frequency Stability

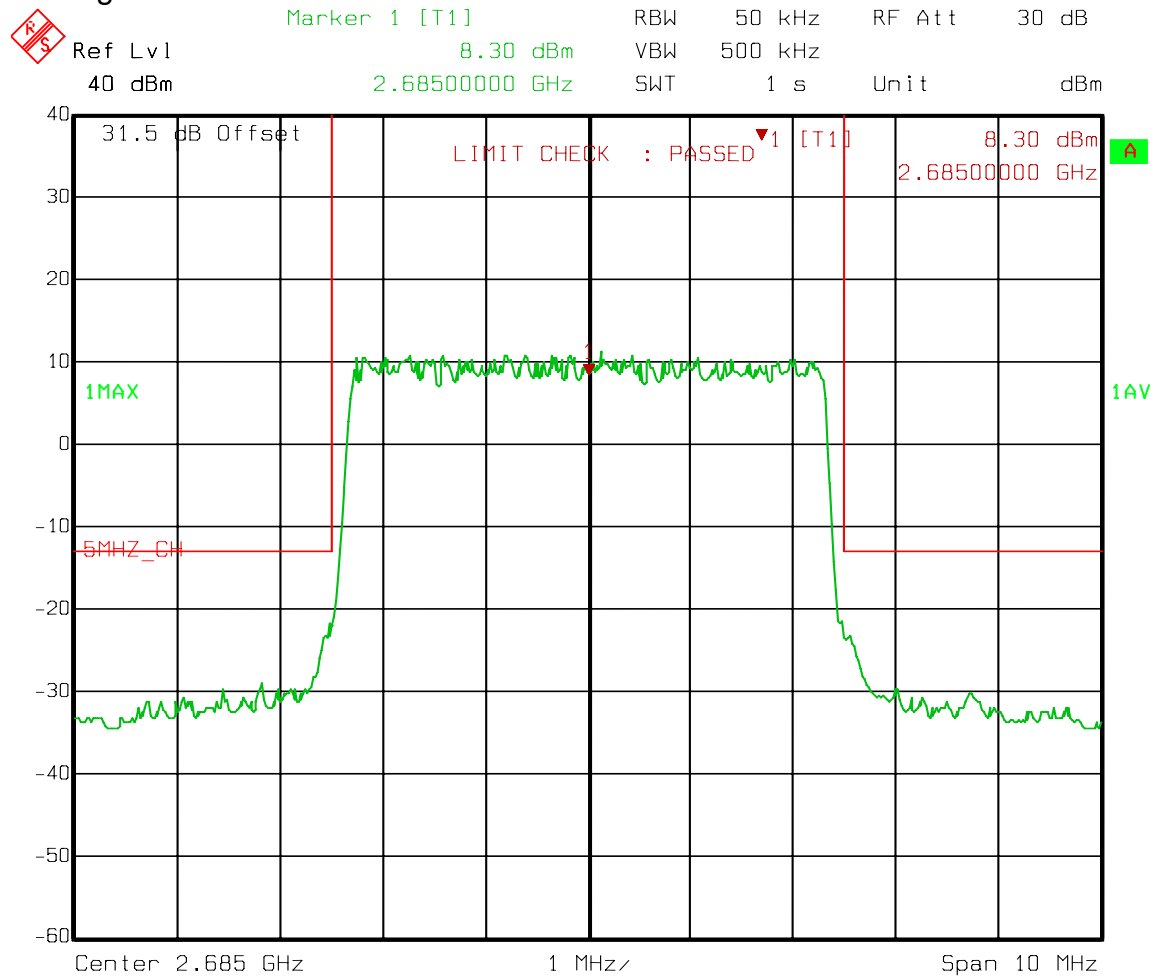
20 Degrees C 102VAC



Date: 07.AUG.2007 12:24:40

## Test Data – Frequency Stability

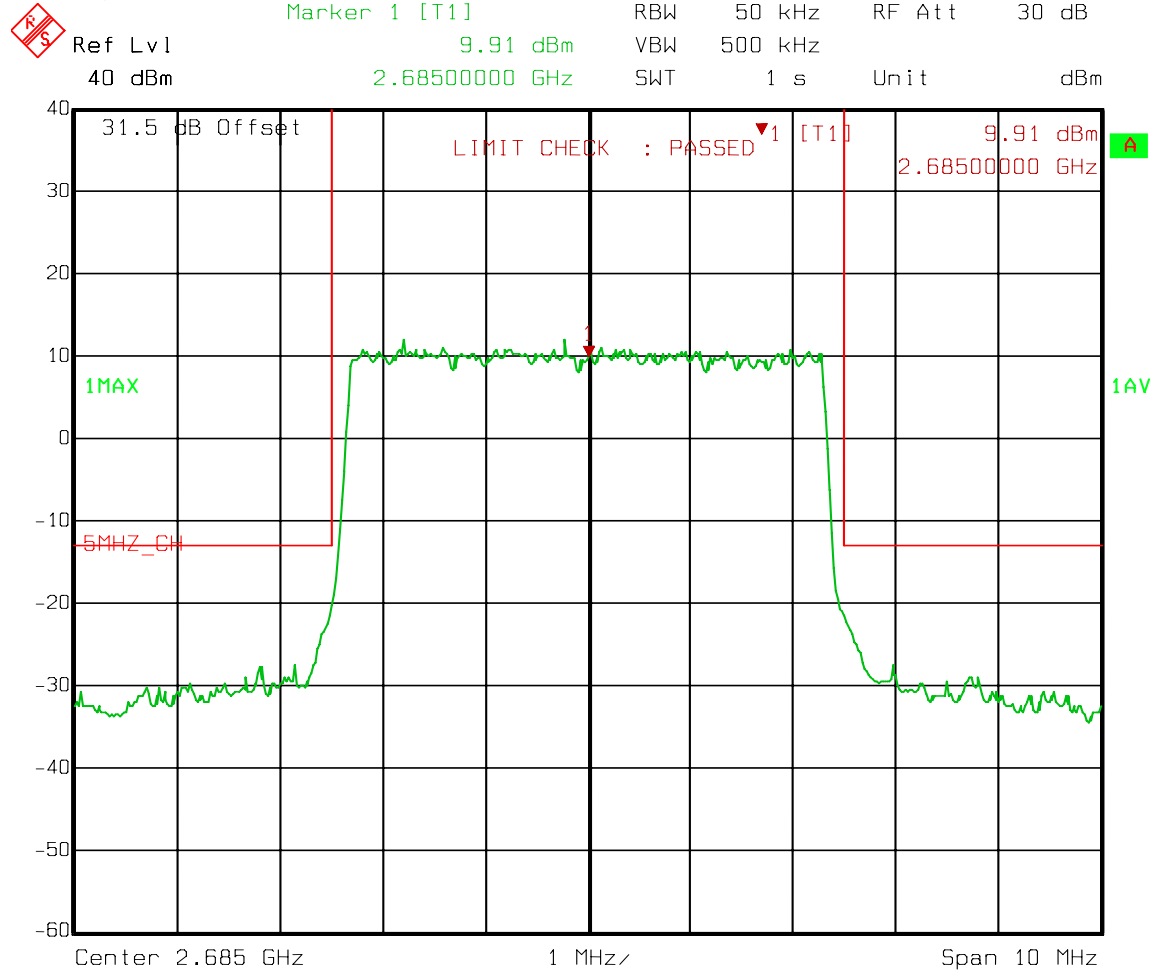
20 Degrees C 138VAC



Date: 07.AUG.2007 12:25:19

# Test Data – Frequency Stability

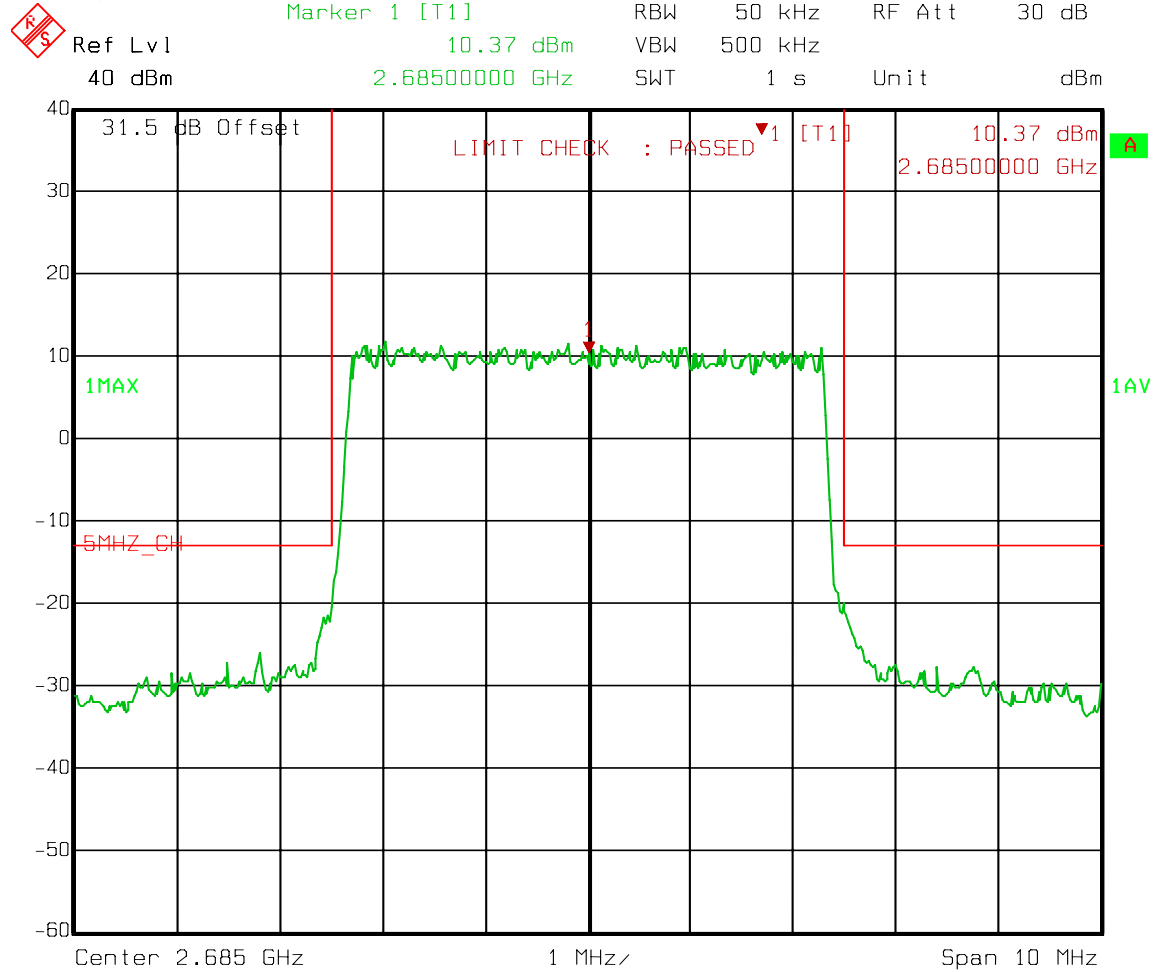
50 Degrees



Date: 07.AUG.2007 13:22:56

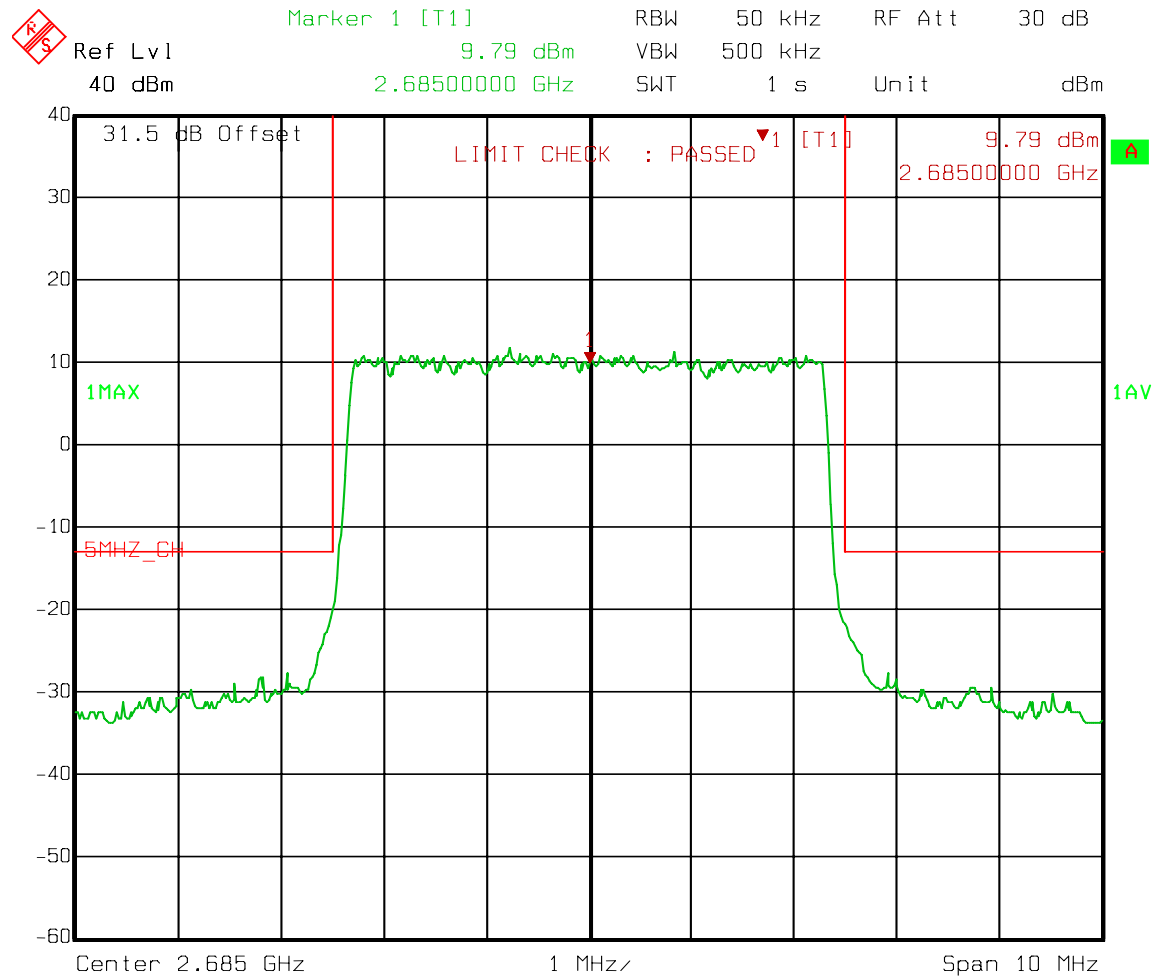
# Test Data – Frequency Stability

40 degrees



Date: 07.AUG.2007 13:55:34

## Test Data – Frequency Stability

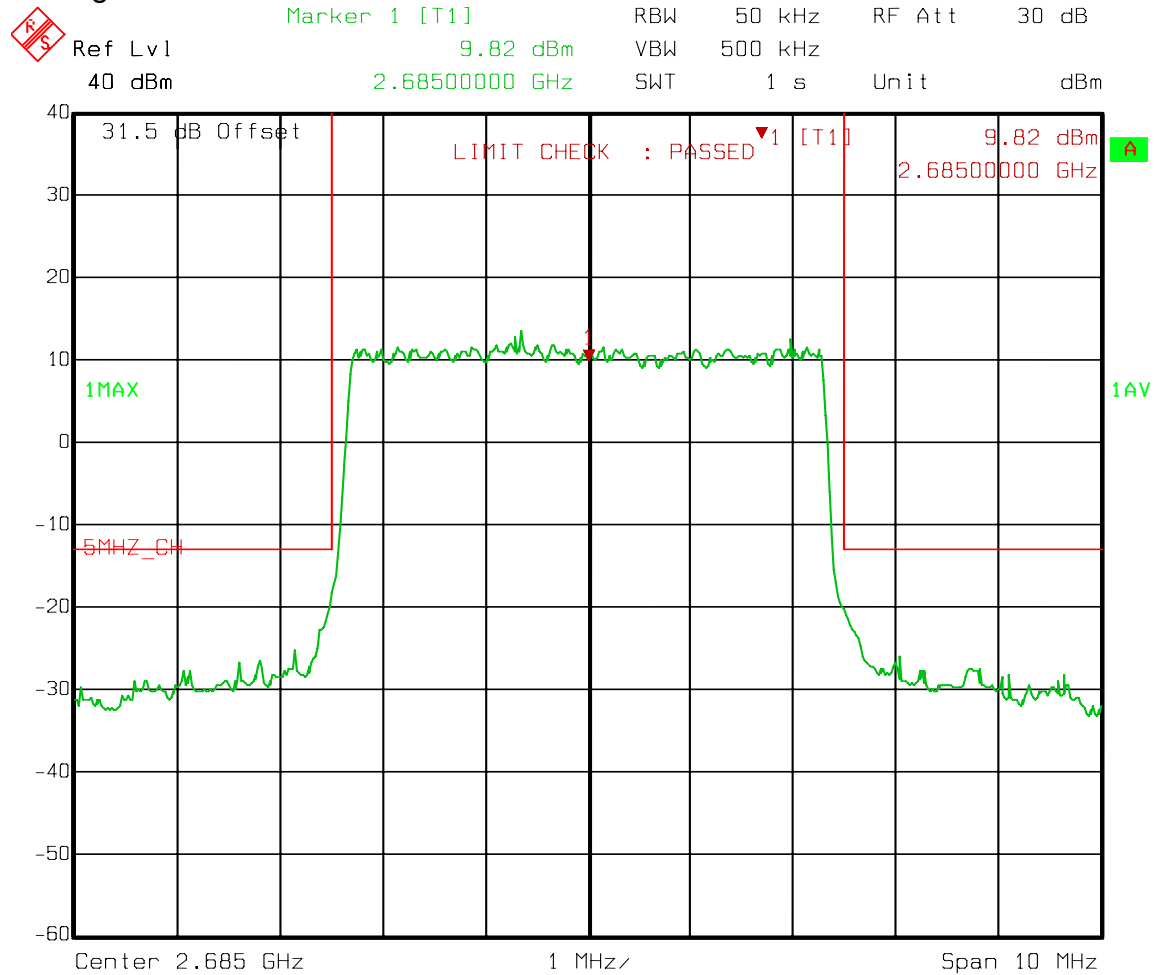


Date: 07.AUG.2007 14:31:39

30 degrees

# Test Data – Frequency Stability

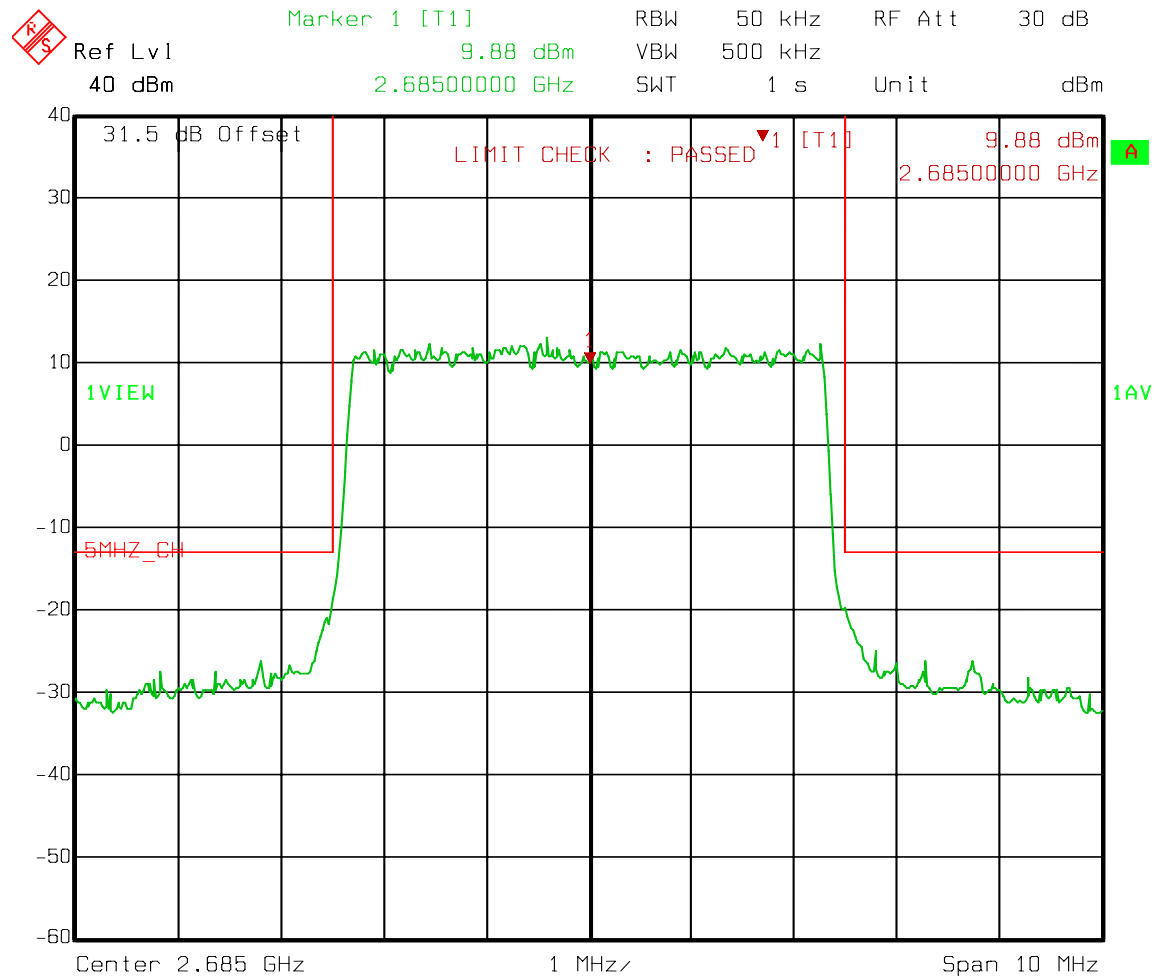
10 degrees



Date: 07.AUG.2007 15:06:25

## Test Data – Frequency Stability

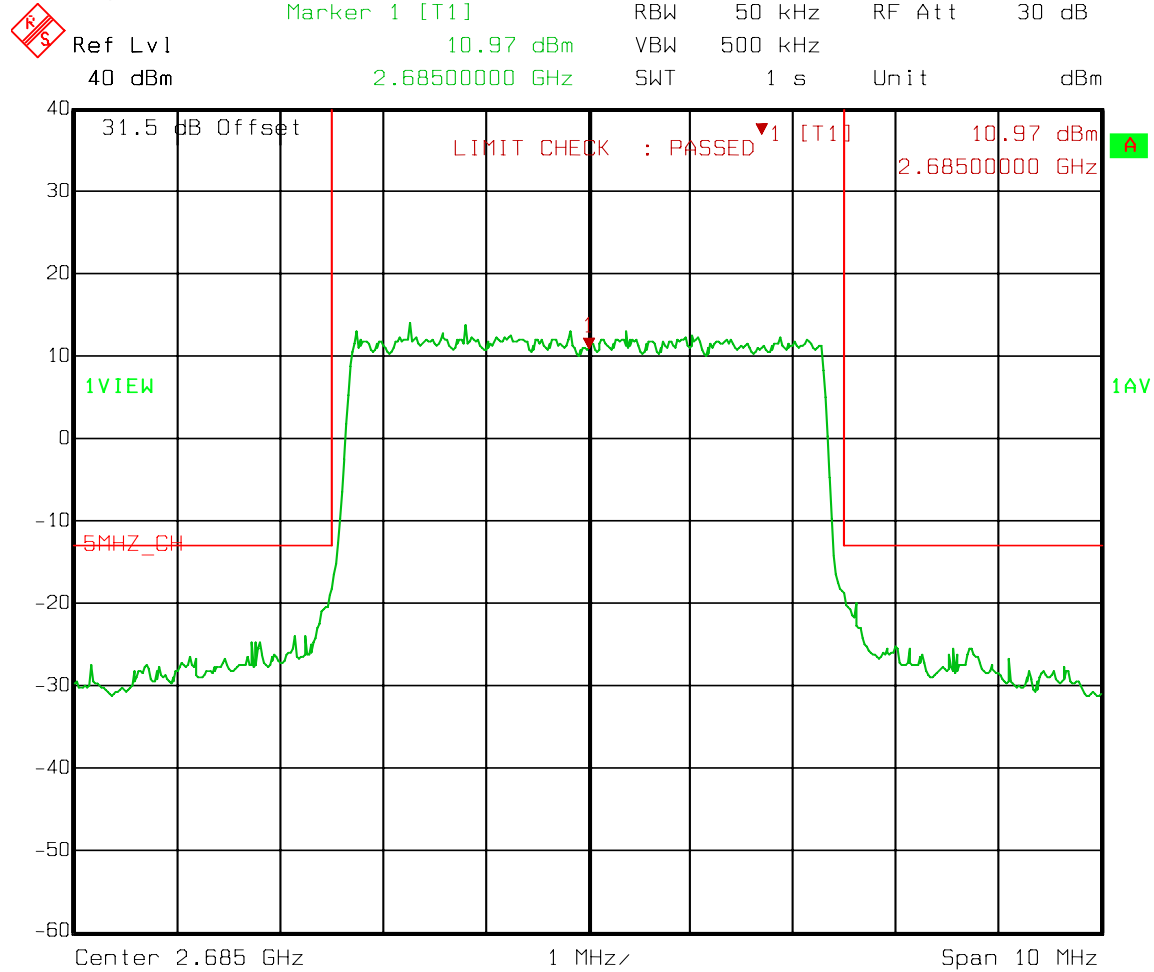
0 degrees



Date: 07.AUG.2007 15:30:36

# Test Data – Frequency Stability

-10 degrees

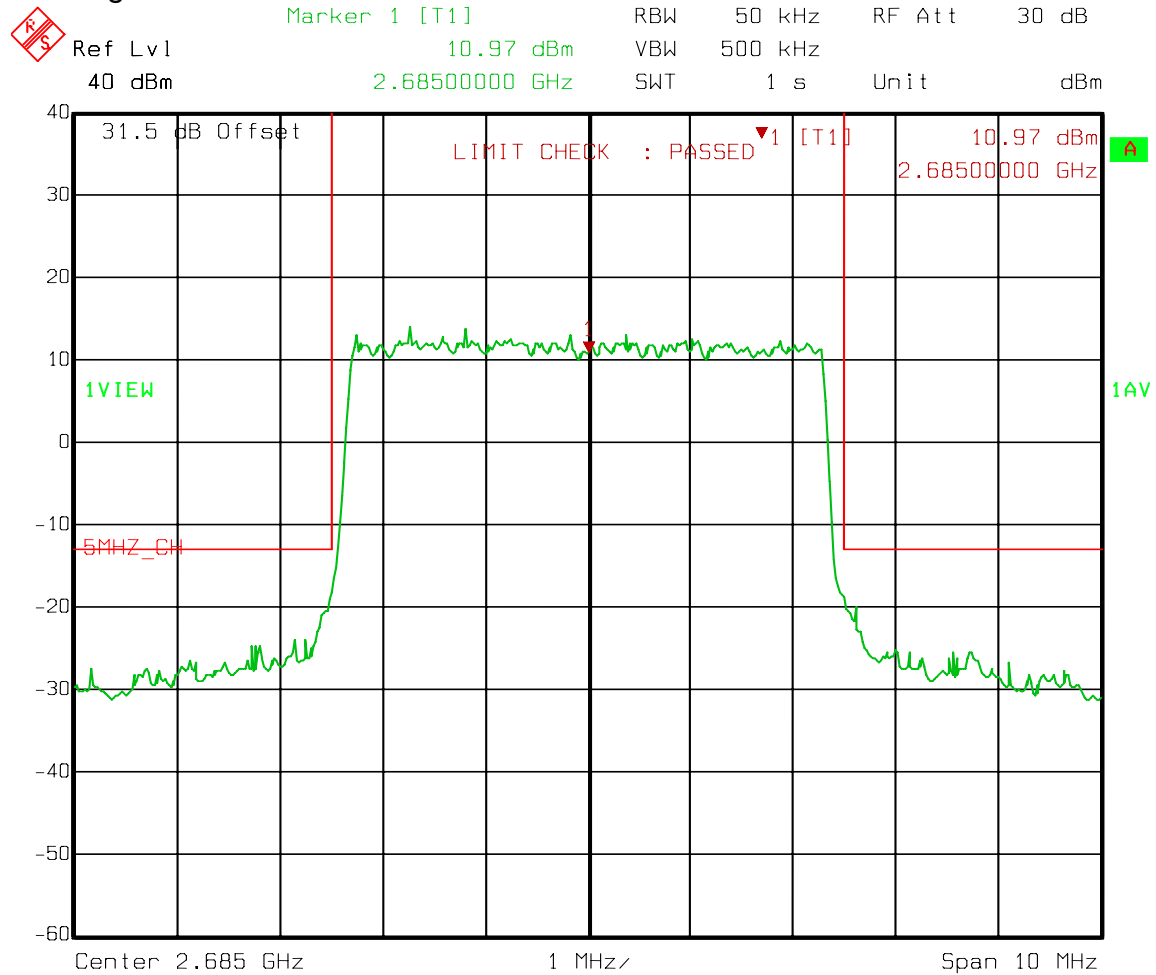


Date: 07.AUG.2007 16:20:00



# Test Data – Frequency Stability

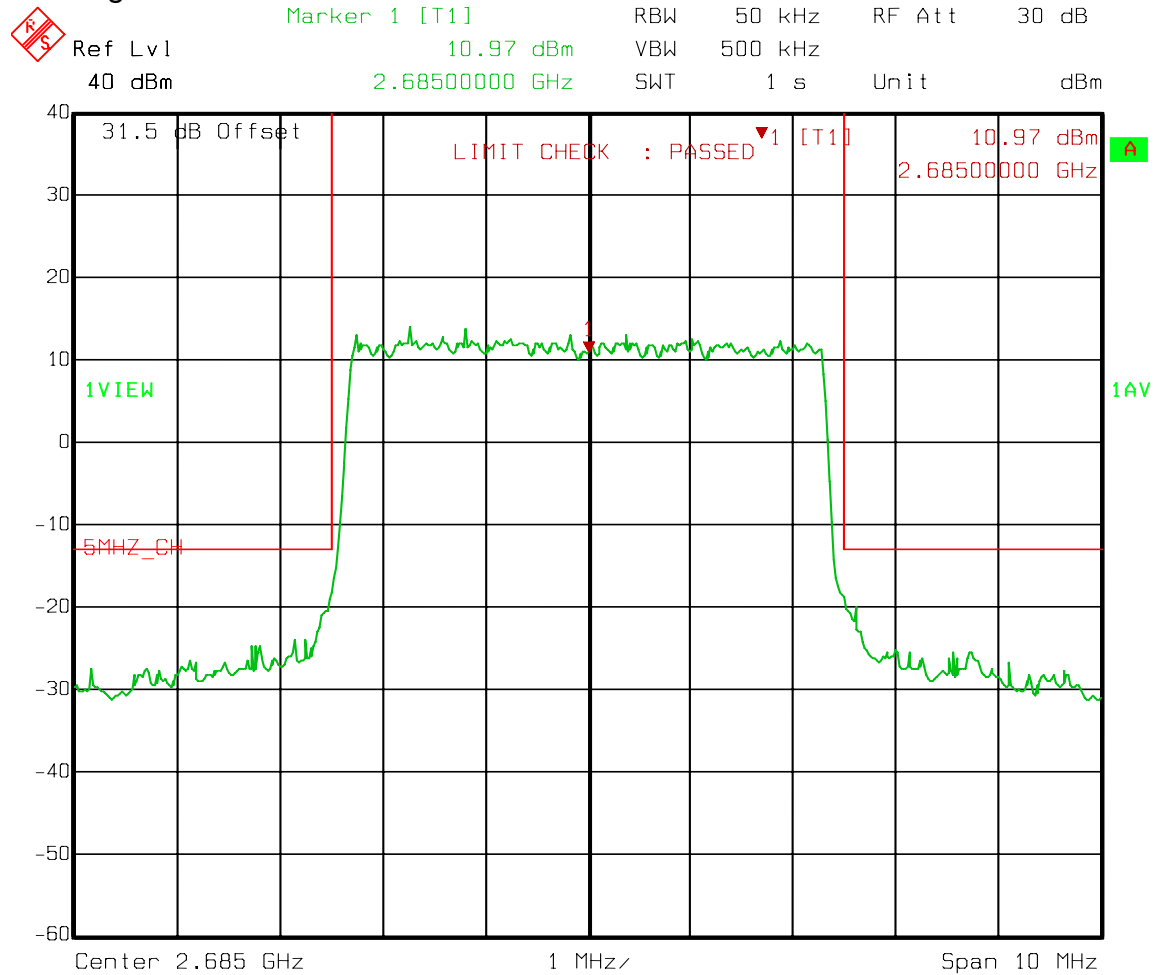
-20 Degrees C



Date: 08.AUG.2007 08:51:11

# Test Data – Frequency Stability

-30 Degrees C



Date: 08.AUG.2007 08:20:31

## Section 8. Test Equipment List

Nemko	Description	Manufacturer Model Number	Serial Number	Calibration Dat	Calibration Du
148	Cable	Stor PR90-010-144	N/	10/02/06	10/02/07
160	ATTENUATOR	NARDA 776B-	NON	CBU	N/
146	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NON	CBU	N/
103	SPECTRUM	ROHDE & SCHWARZ FSEK3	830844/006	05/26/06	05/26/08
146	Spectrum analyzer	Hewlett Packard 8563	3551A04428	01/24/07	01/24/09
101	Pre-	HEWLETT PACKARD 8449	2749A00159	05/01/07	04/30/08
99	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07
76	Antenna biconical	Electro Metrics MFC-25	47	01/19/07	01/19/08
131	ANTENNA, LOG PERIODIC	EMC 314	175	01/18/07	01/18/08
79	PREAMP, 25dB	Nemko USA, Inc. LNA25	39	05/01/07	04/30/07
148	Cabl	Stor PR90-010-072	N/	10/02/06	10/02/07
148	Cabl	Stor PR90-010-216	N/	10/02/06	10/02/07
148	Cable	Stor PR90-010-144	N/	10/02/06	10/02/07
106	ATTENUATOR	NARDA 776B-	NON	CBU	N/
106	ATTENUATOR	NARDA 776B-	NON	CBU	N/
28	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	CNR	CNR
61	THERMOMETE	FLUK 5	4520028	03/01/07	02/29/08

## **ANNEX A - TEST DETAILS**

**NAME OF TEST: RF Power Output****PARA. NO.: 2.1046****Method Of Measurement:****Antenna Conducted:**

The peak power at antenna terminals is measured using a Spectrum Analyzer or Power Meter. Power output is measured with the maximum rated input level.

**E.I.R.P.:**

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation  $GP/4\pi R^2 = E^2/120\pi$  and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

<b>NAME OF TEST: Occupied Bandwidth</b>	<b>PARA. NO.: 2.1049</b>
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**Method Of Measurement:**

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1% of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform.

The appropriate bandwidth mask is applied to the output waveform to verify compliance.

**NAME OF TEST: Spurious Emission at Antenna  
Terminals****PARA. NO.: 2.1051****Antenna Conducted:**

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of 1 MHz for emissions above 1 GHz. Below 1 GHz the resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform.

The appropriate limit line is applied to the output waveform to verify compliance.

<b>NAME OF TEST: Field Strength of Spurious Radiation</b>	<b>PARA. NO.: 2.1053</b>
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**Test Method:**

TIA/EIA-603-1992

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.



<b>NAME OF TEST: Frequency Stability</b>	<b>2.1055</b>
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**Method Of Measurement:****Frequency Stability With Voltage Variation:**

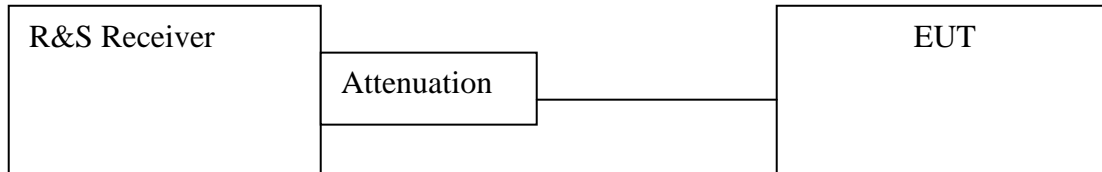
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius. This procedure is repeated at 100% S.T.V, 115% S.T.V. and 85% S.T.V

**Frequency Stability With Temperature Variation:**

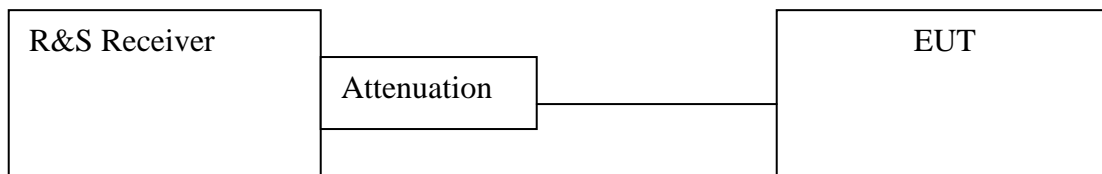
The input voltage to the E.U.T. is set to 100%S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature.

## **ANNEX B - TEST DIAGRAMS**

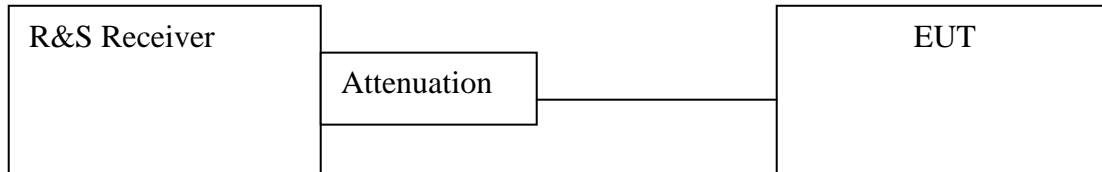
**Para. No. 2.1046 - R.F. Power Output**



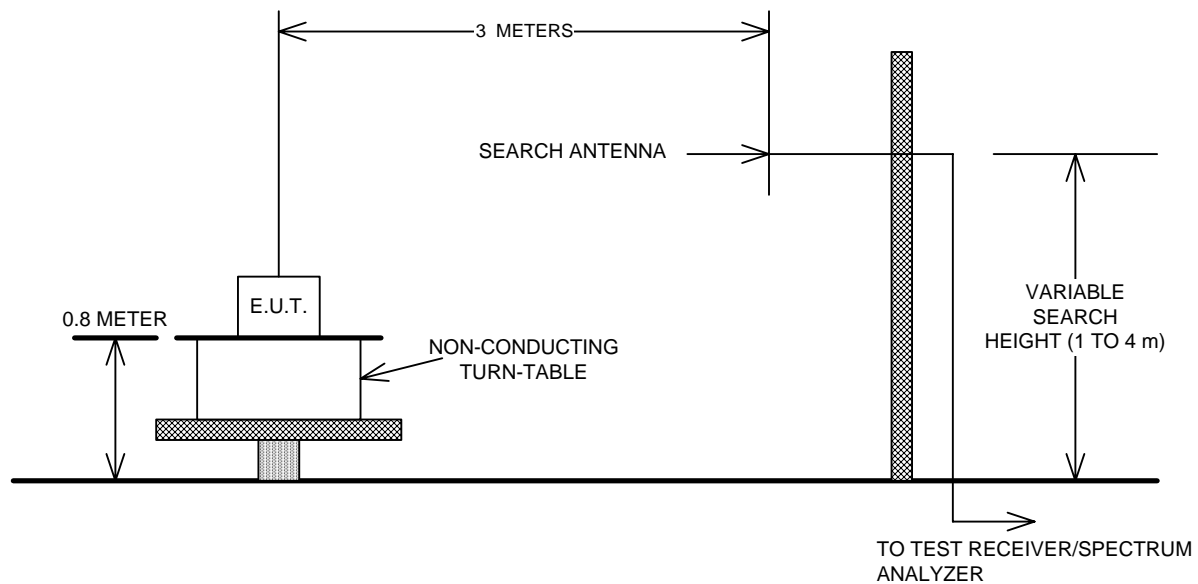
**Para. No. 2.1049 - Occupied Bandwidth**



**Para. No. 2.1051 - Spurious Emissions at Antenna Terminals**



**Para. No. 2.1053 - Field Strength of Radiation**



**Para. No. 2.1055 - Frequency Stability**

