Nemko Test Report: 6L0136RUS1rev2

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

Equipment Under Test: C-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: _____ **DATE:** **10 August 2007**
David Light, Senior Wireless Engineer

APPROVED BY: _____ **DATE:** **10th August 2007**
Mike Cantwell, Verifier

Total number of pages: 53

Table of Contents

Section 1. Summary of Test Results

Manufacturer: Alcatel

Model No.: C-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

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

Power Supply	120 Vac
Frequency Range	2496 – 2690 MHz

Type(s) of Modulation:

F3E (Voice)	F1D	F2D	D7W	F9W
☐	☐	☐	☒	☐

Emission Designator	5M00D7W AND 10M0D7W
Type(s) of Emission:	QPSK - 16QAM – 64QAM
Output Impedance:	50 ohms
RF Power Output Rated:	35 dBm Average Conducted
Selection Of Operating Frequency:	Not selectable by operator
Power Output Adjustment Capability:	Not selectable by operator

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

Section 4. Occupied Bandwidth

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

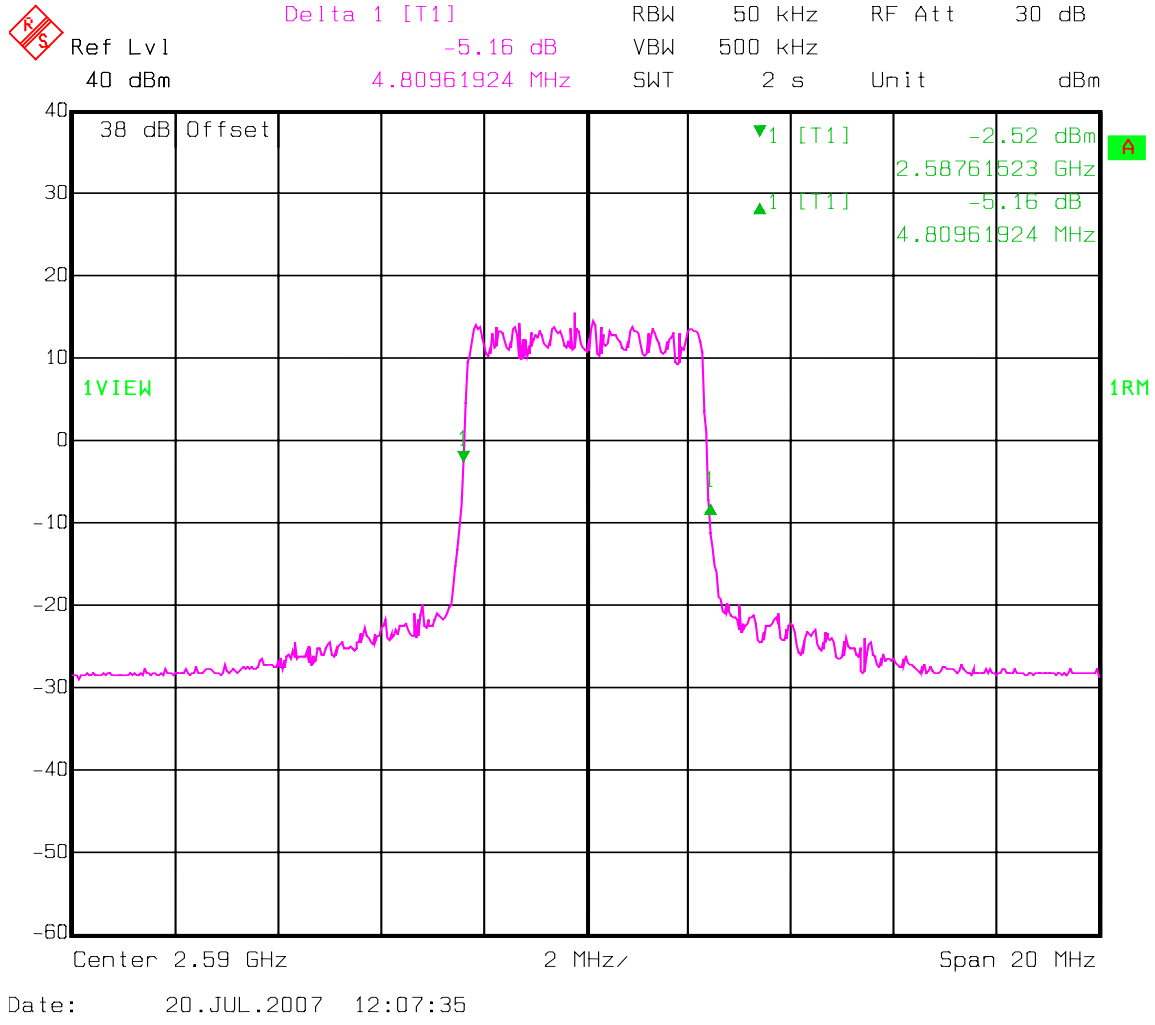
Test Results: Complies

Measurement Data: See attached plots.

Test Equipment: 1483-1604-1469-1036

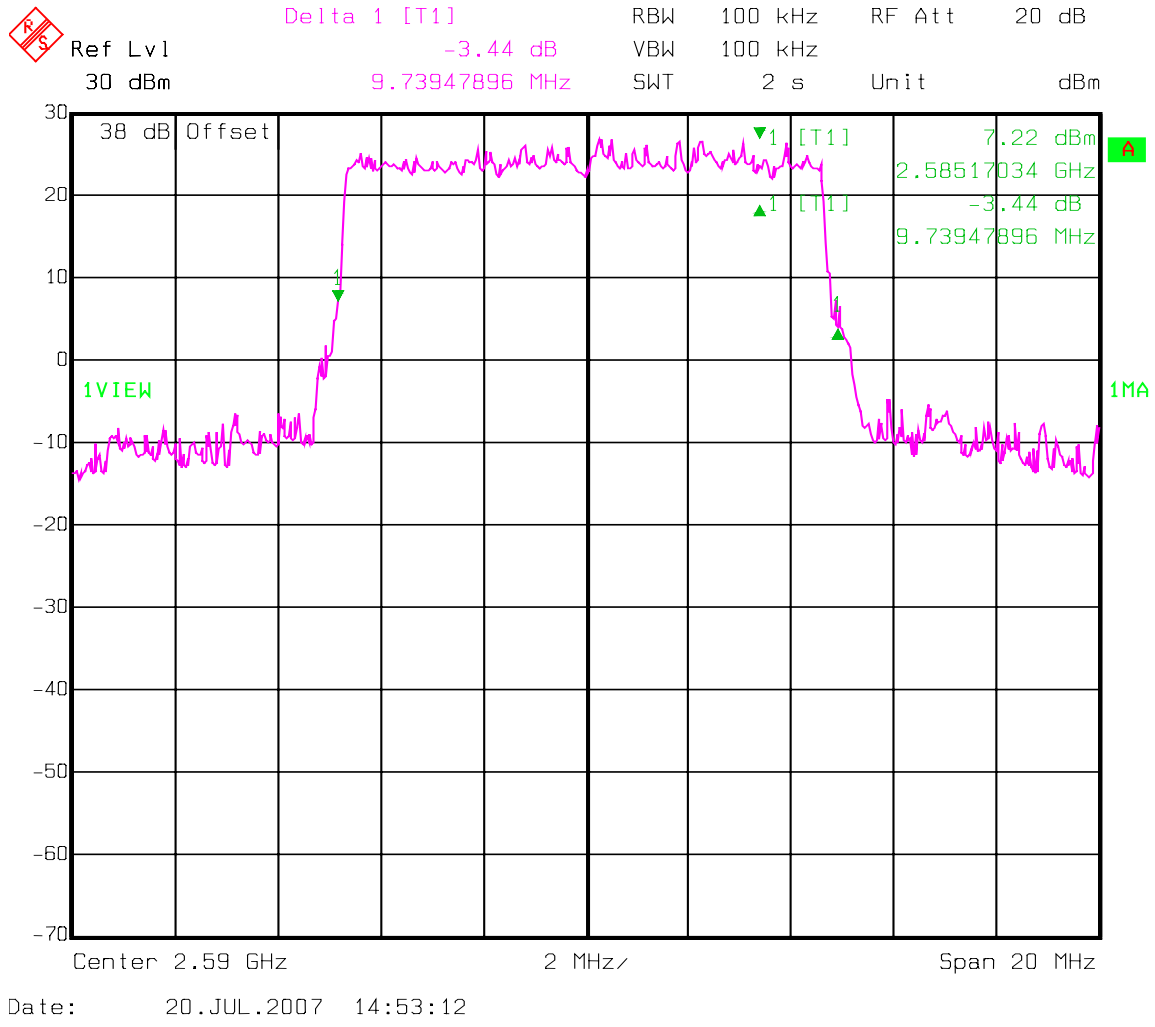
Test Data – Occupied Bandwidth

99% Bandwidth – 5 MHz Channel



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

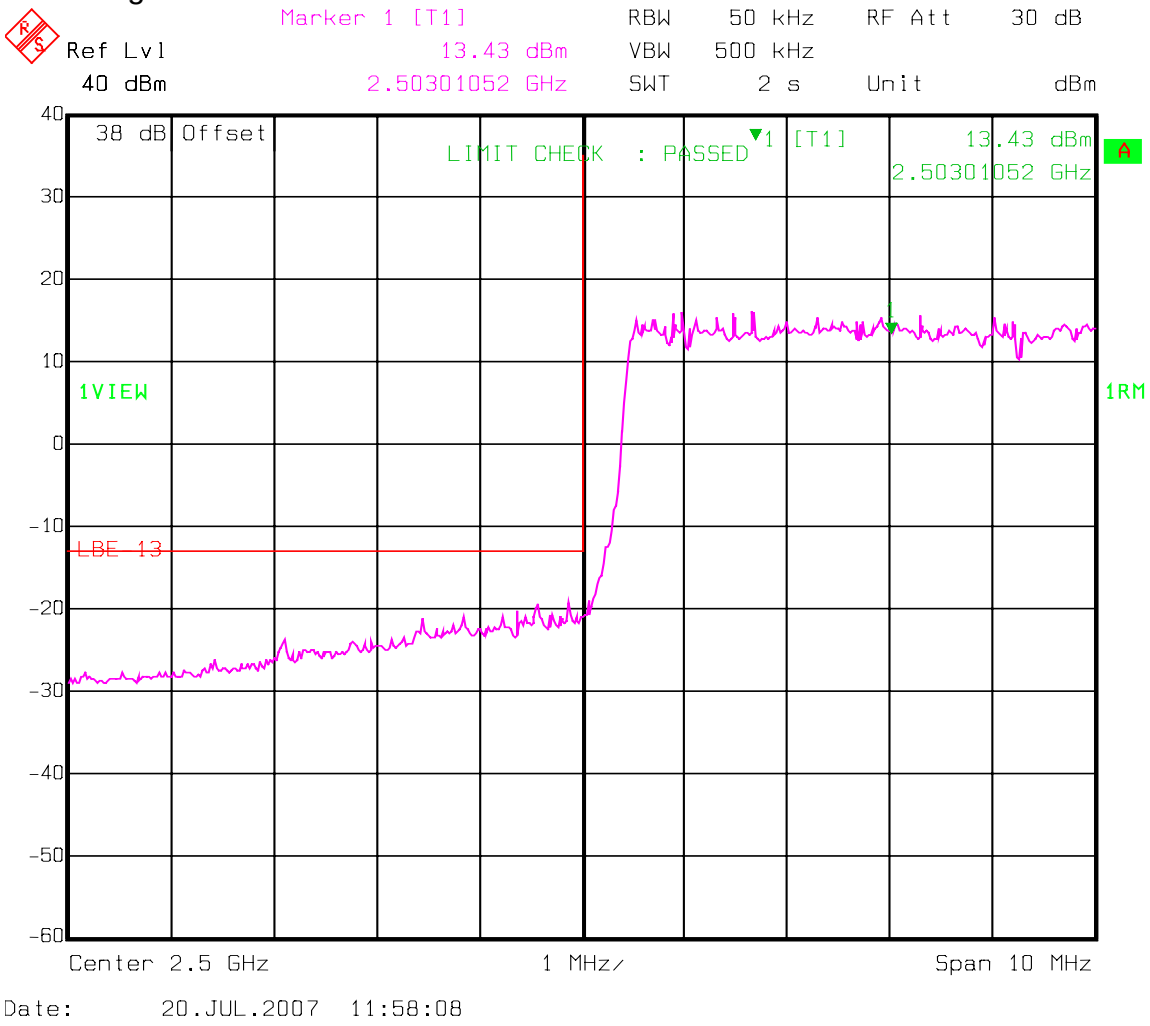
Test Results: Complies

Measurement Data: See attached plots.

Test Equipment: 1483-1604-1469-1036

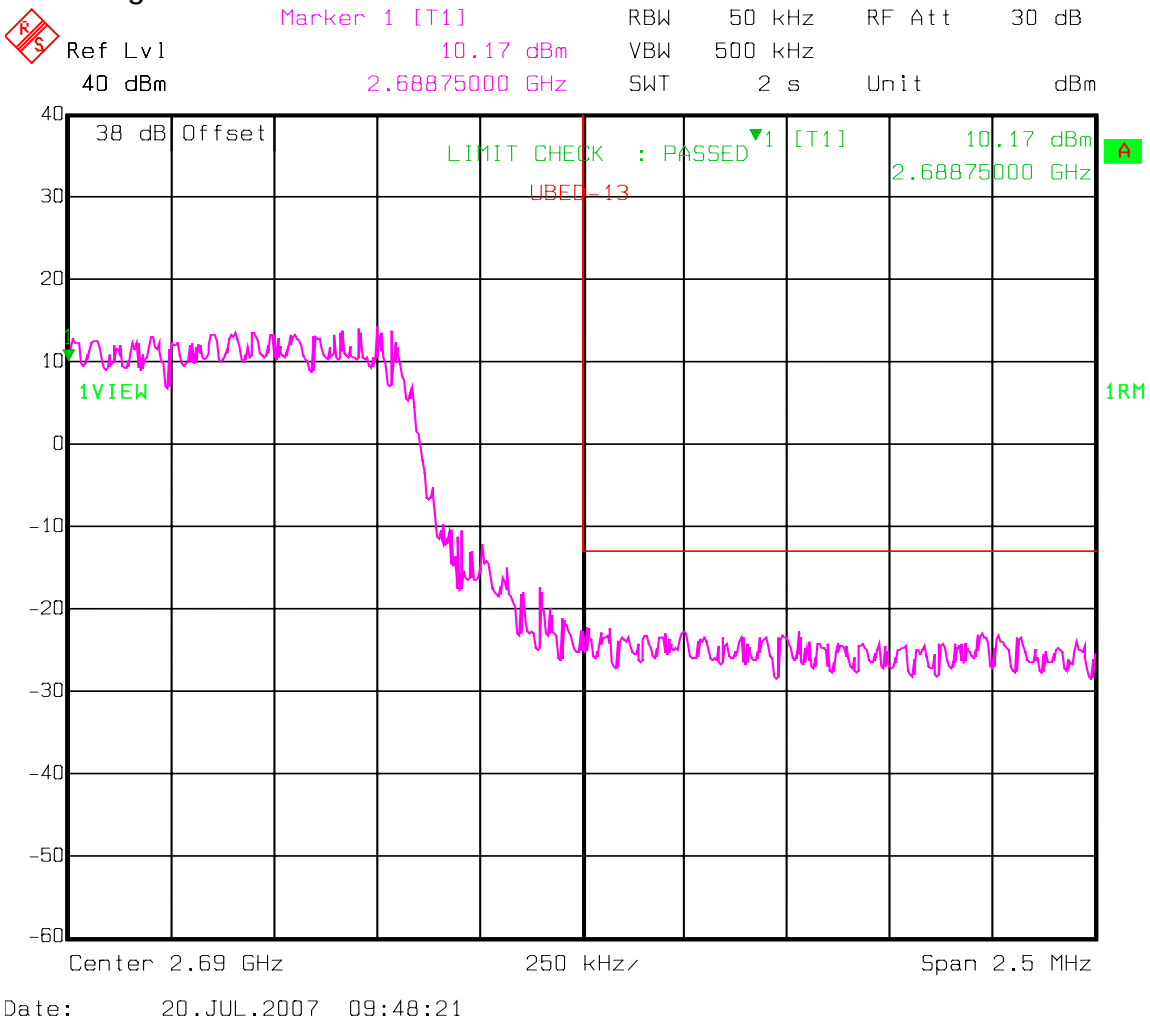
Test Data – Spurious Emissions at Antenna Terminals

5 MHz Carrier
Low Channel
Band Edge



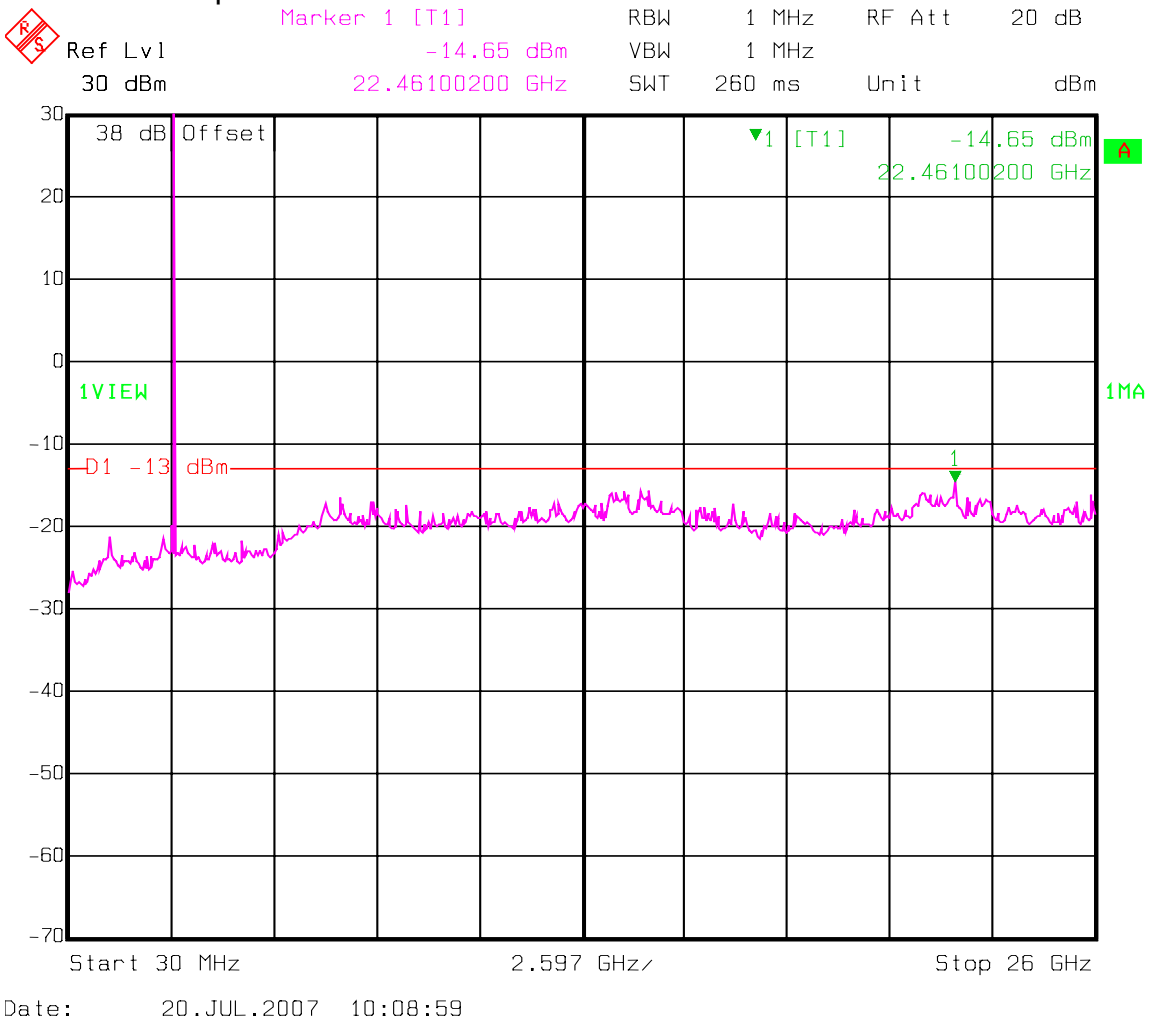
Test Data – Spurious Emissions at Antenna Terminals

5 MHz Carrier
High Channel
Band Edge



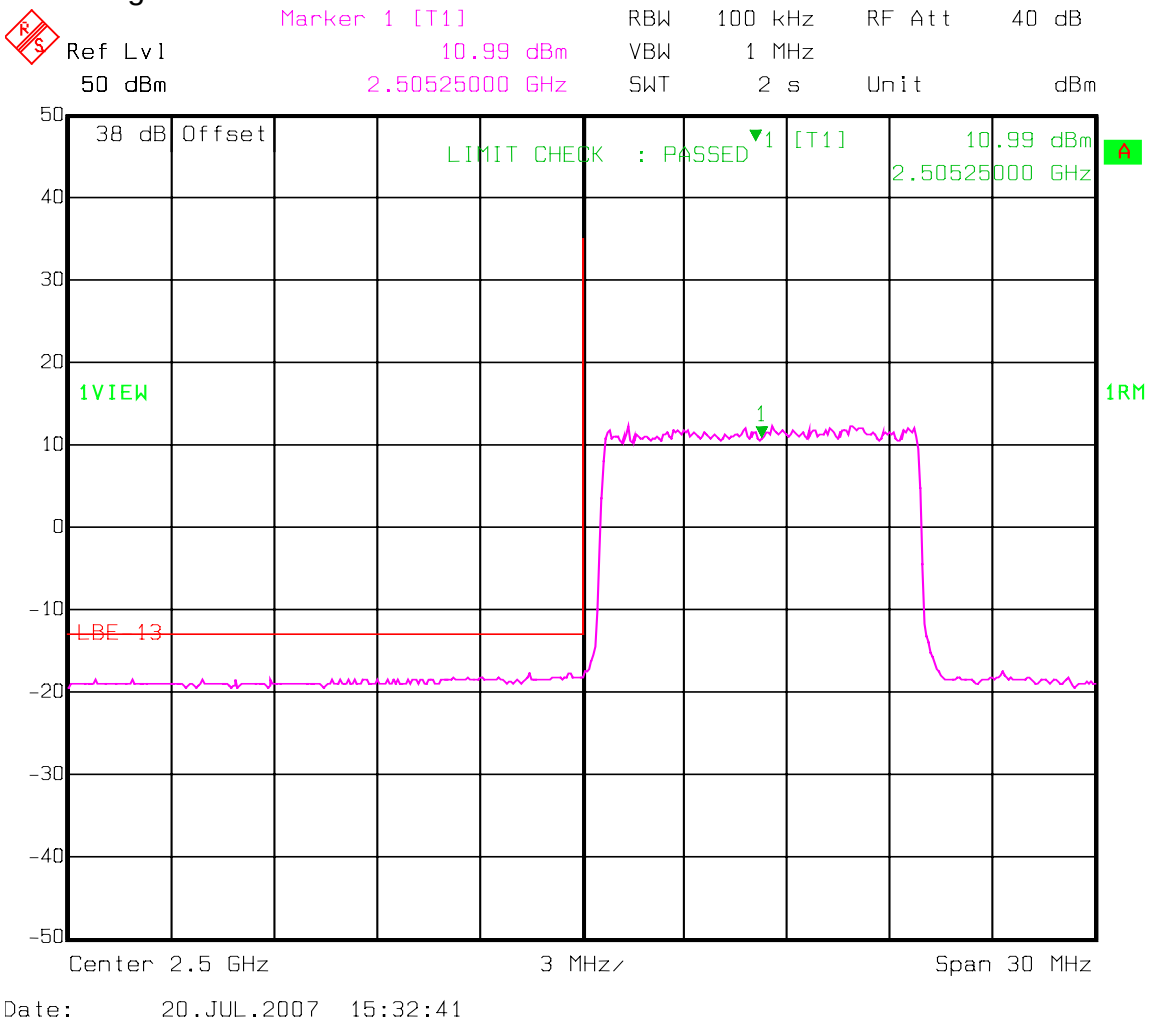
Test Data – Spurious Emissions at Antenna Terminals

QPSK
5 MHz Carrier
Mid Channel Spurs



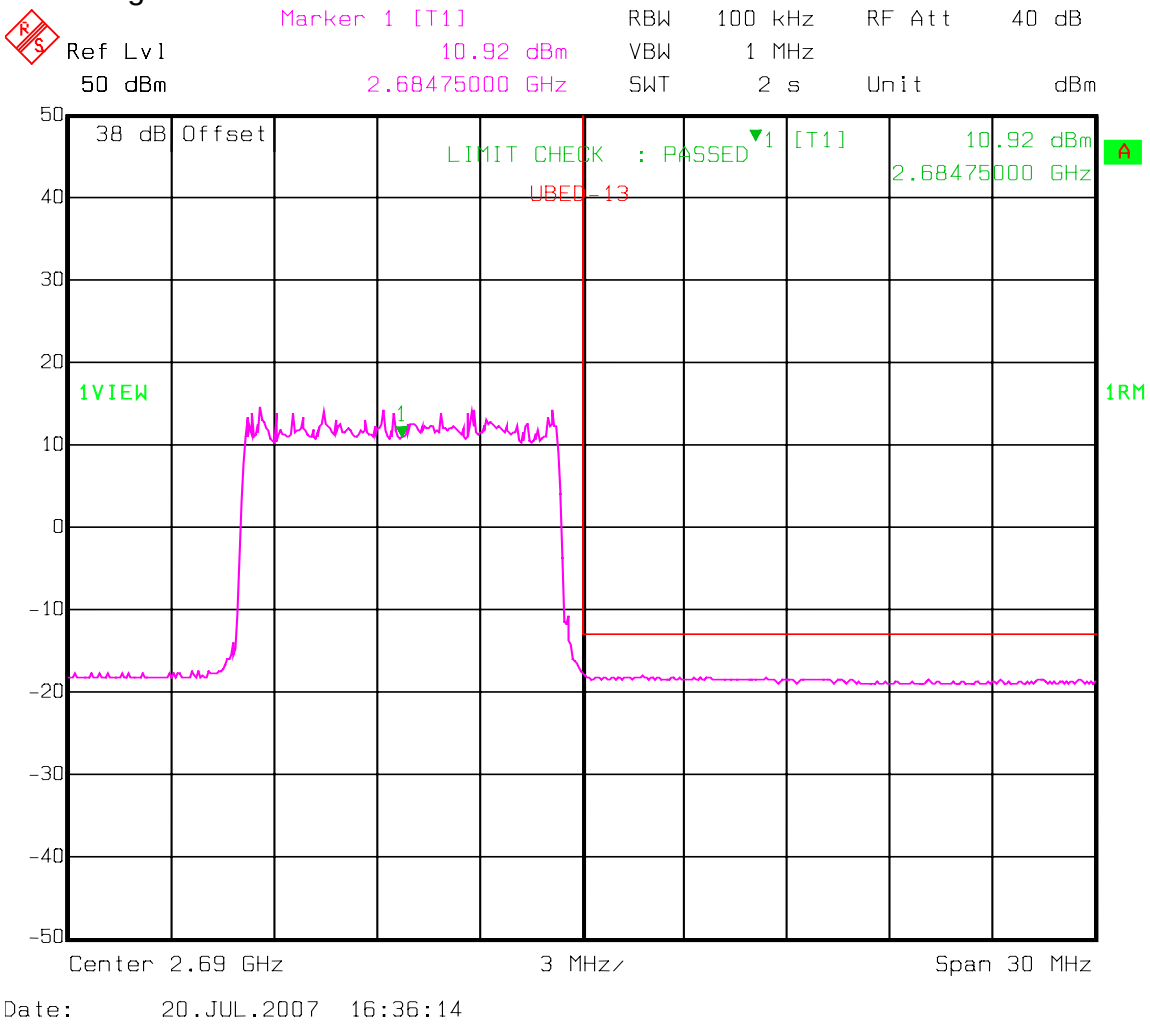
Test Data – Spurious Emissions at Antenna Terminals

QPSK
10 MHz Carrier
Low Channel
Band Edge



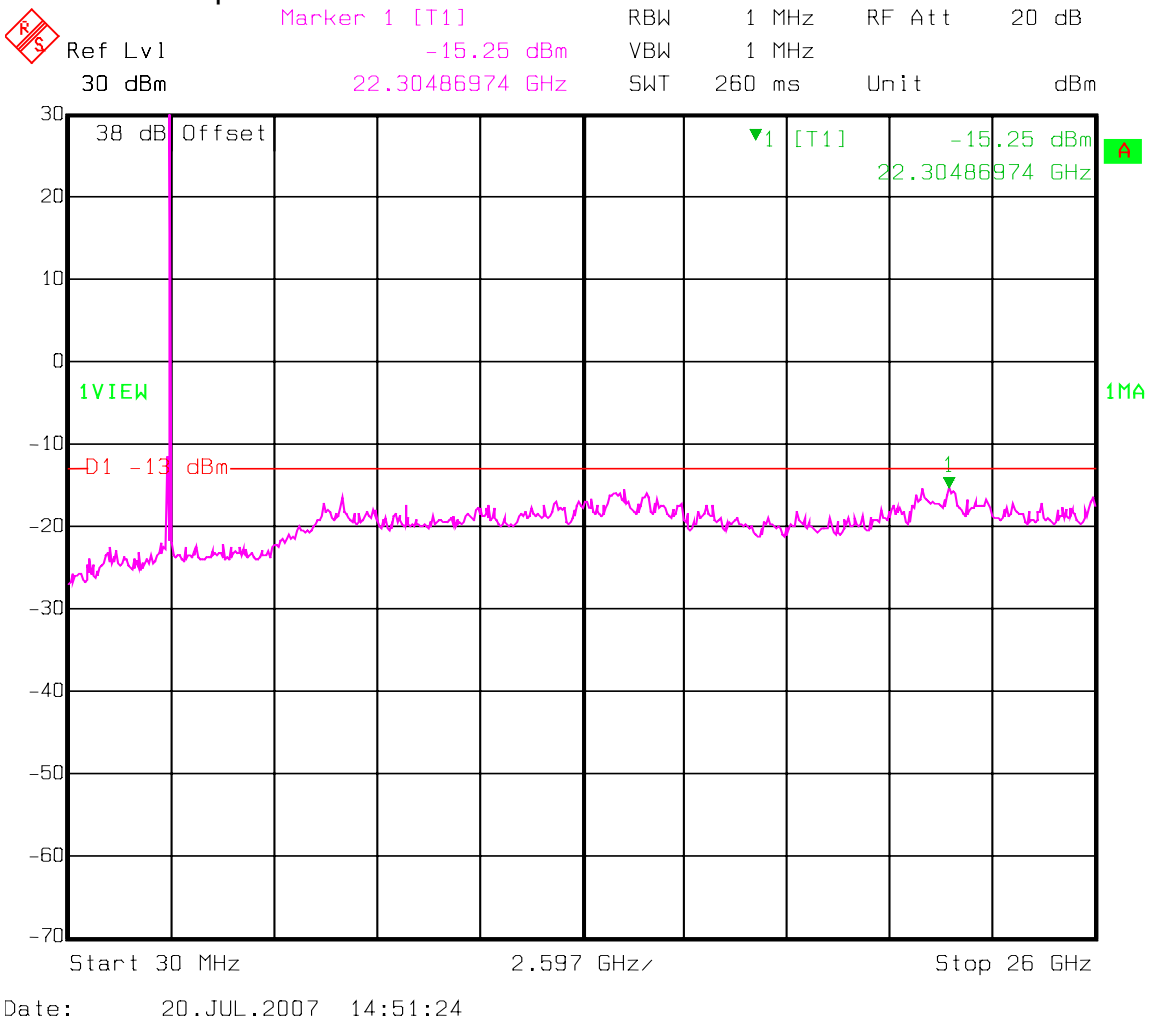
Test Data – Spurious Emissions at Antenna Terminals

QPSK
10 MHz Carrier
High Channel
Band Edge



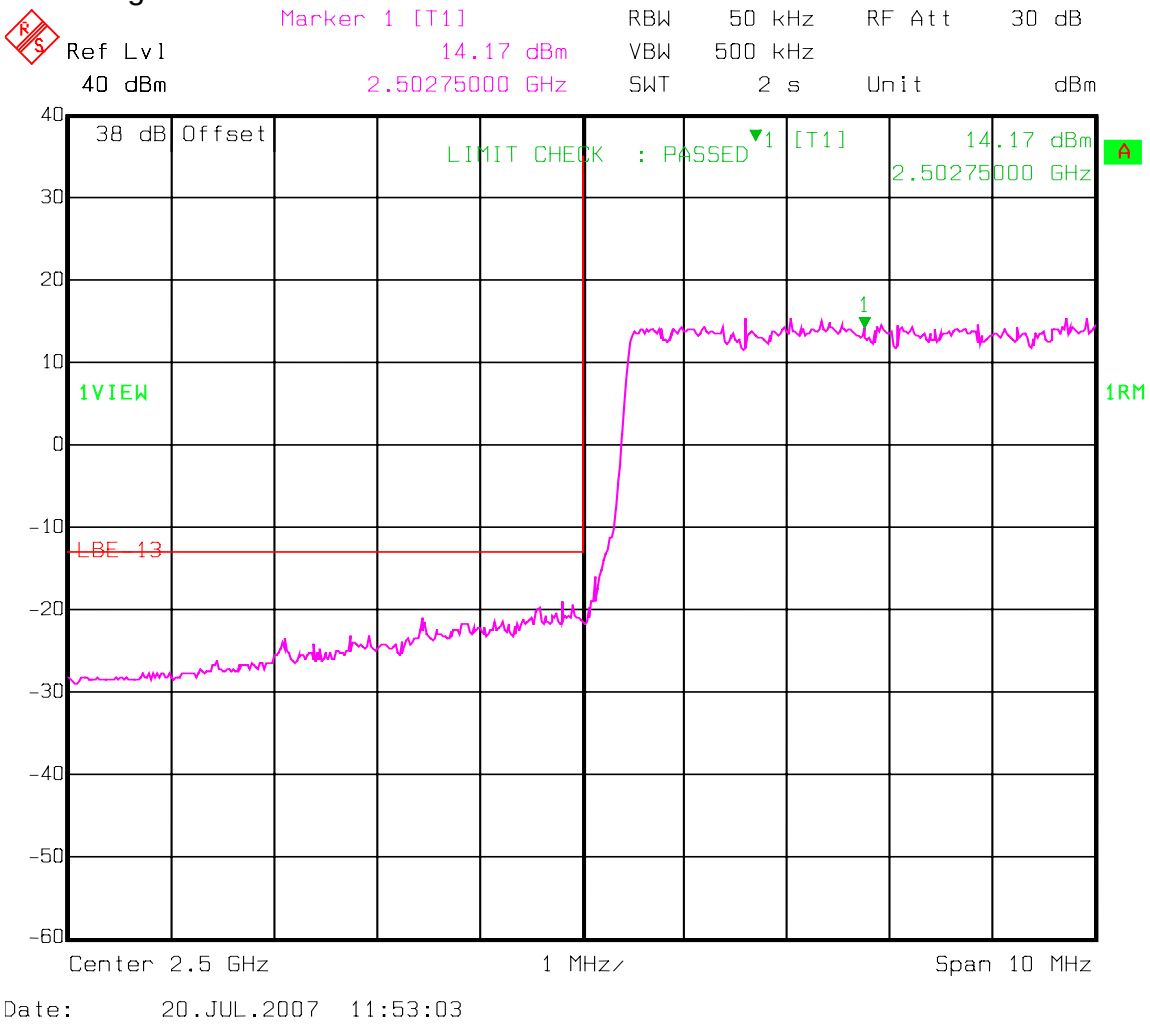
Test Data – Spurious Emissions at Antenna Terminals

QPSK
10 MHz Carrier
Mid Channel Spurs



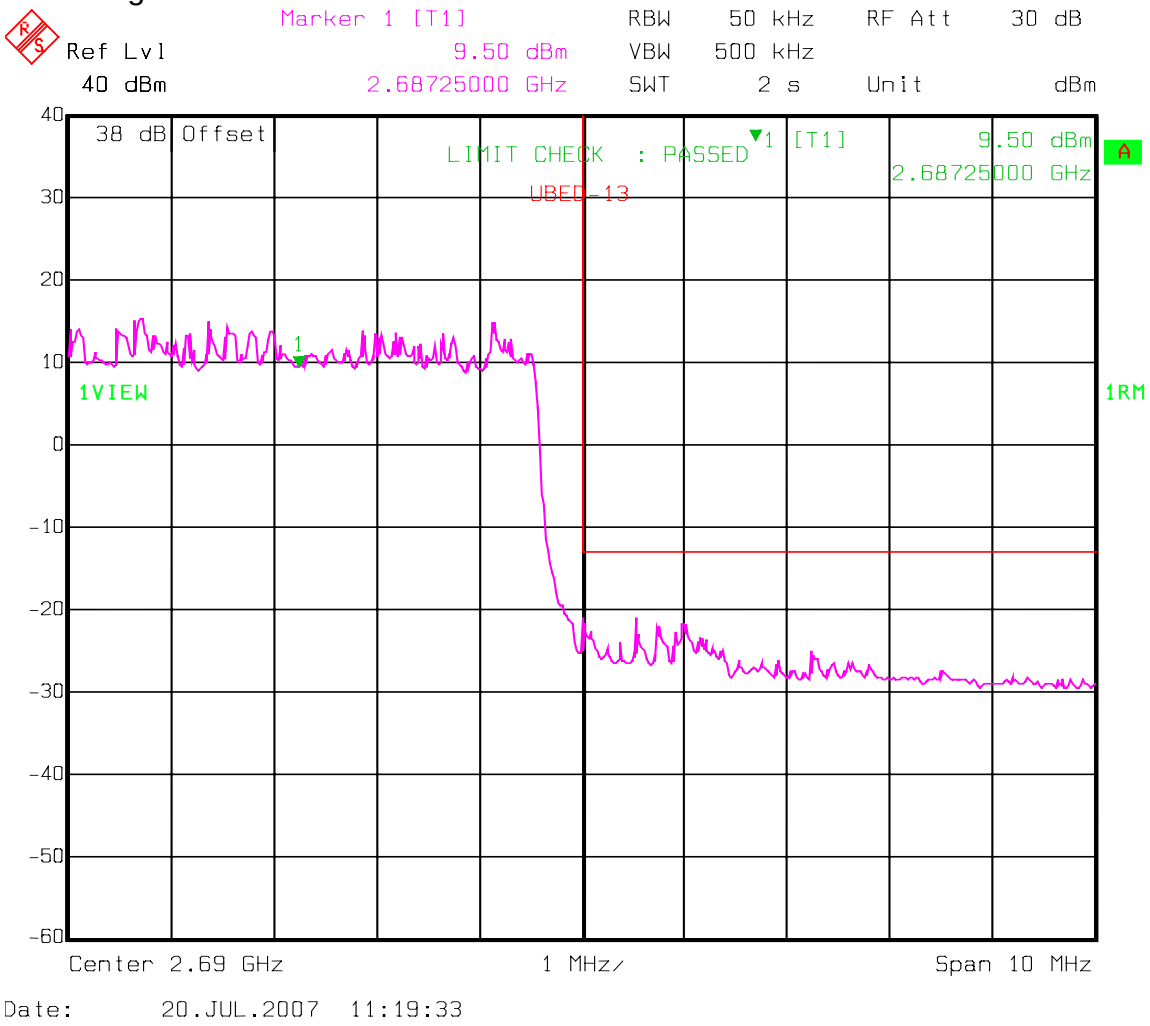
Test Data – Spurious Emissions at Antenna Terminals

16 QAM
5 MHz Carrier
Low Channel
Band Edge



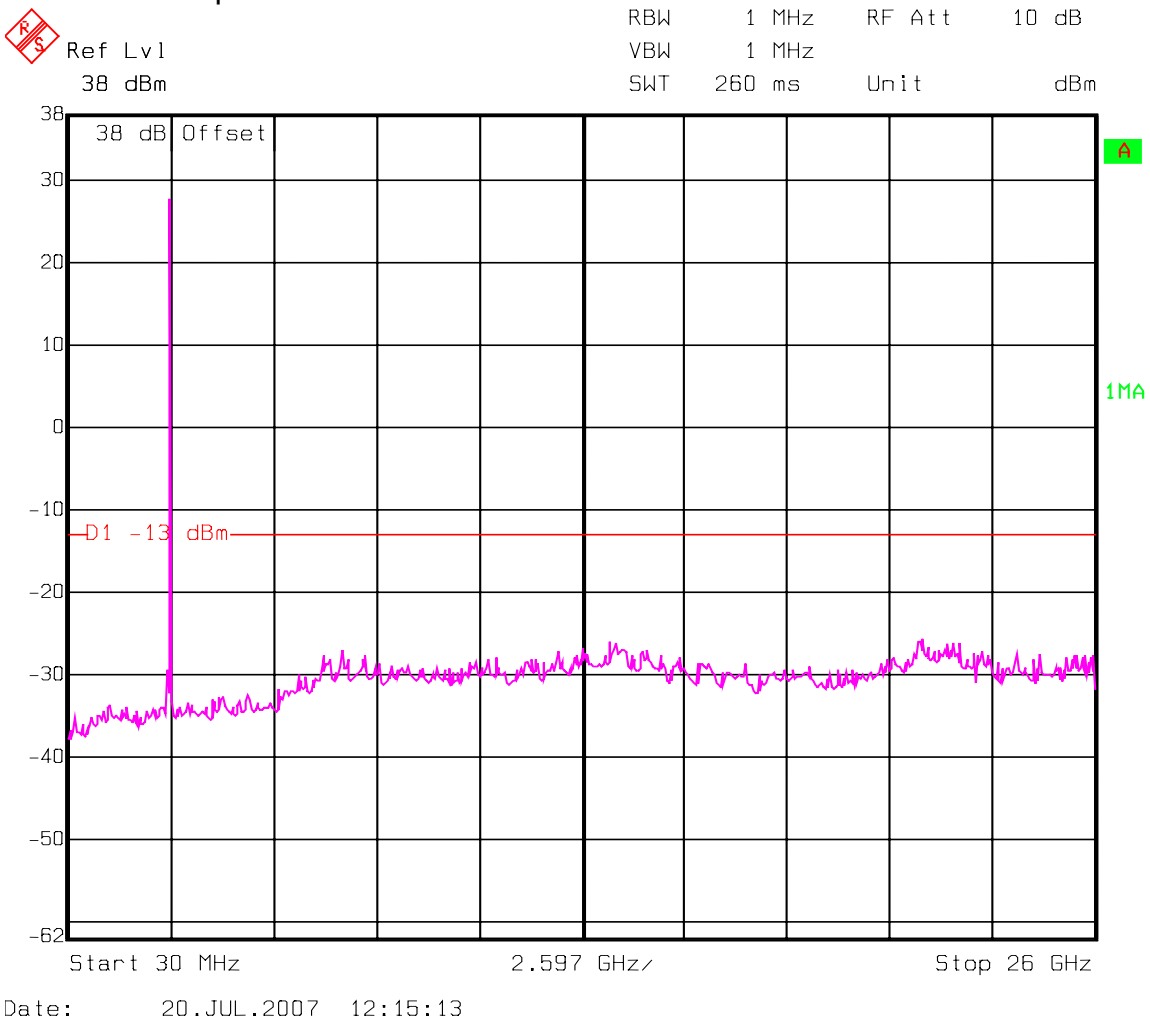
Test Data – Spurious Emissions at Antenna Terminals

16 QAM
5 MHz Carrier
High Channel
Band Edge



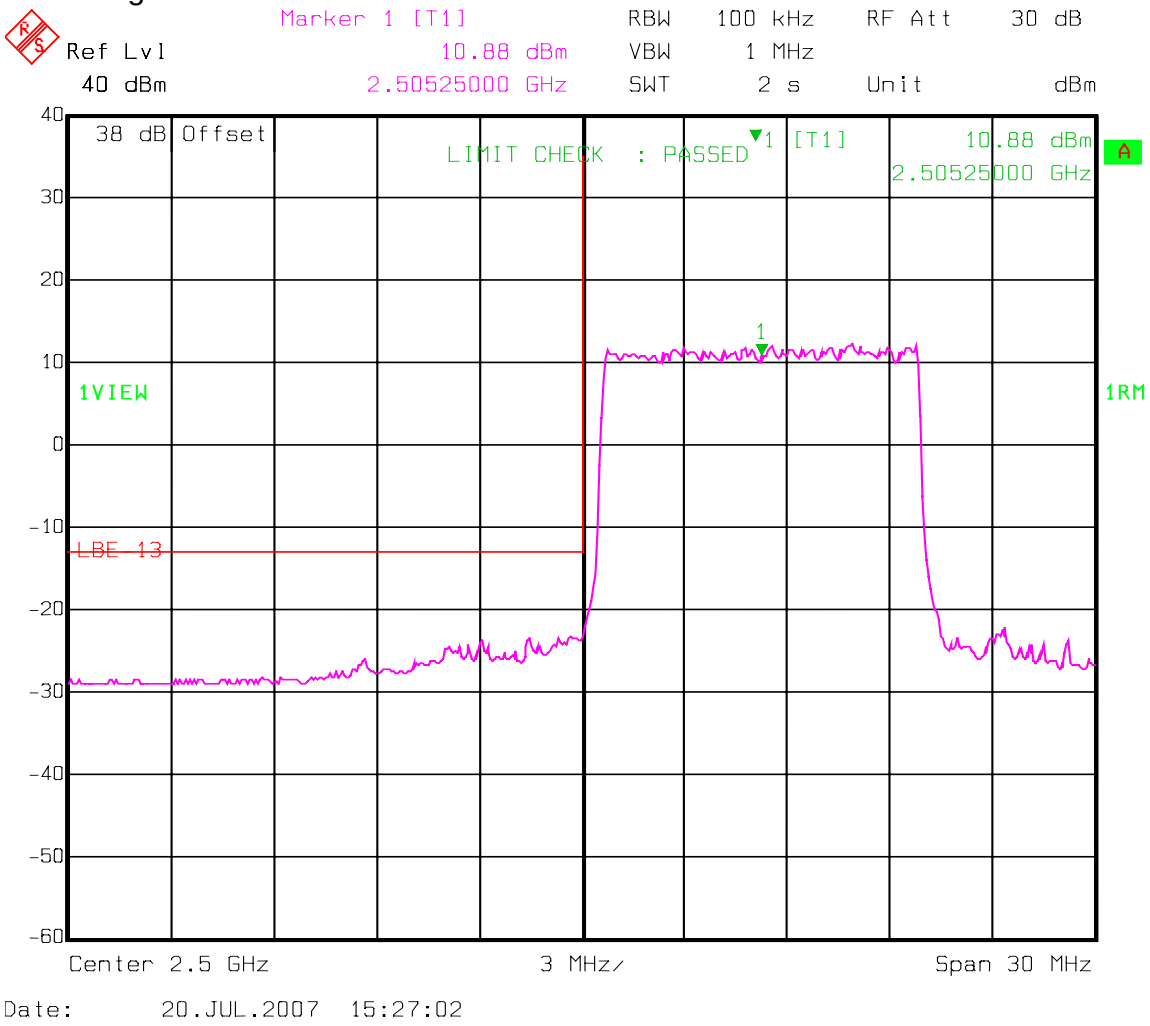
Test Data – Spurious Emissions at Antenna Terminals

16 QAM
5 MHz Carrier
Mid Channel Spurs



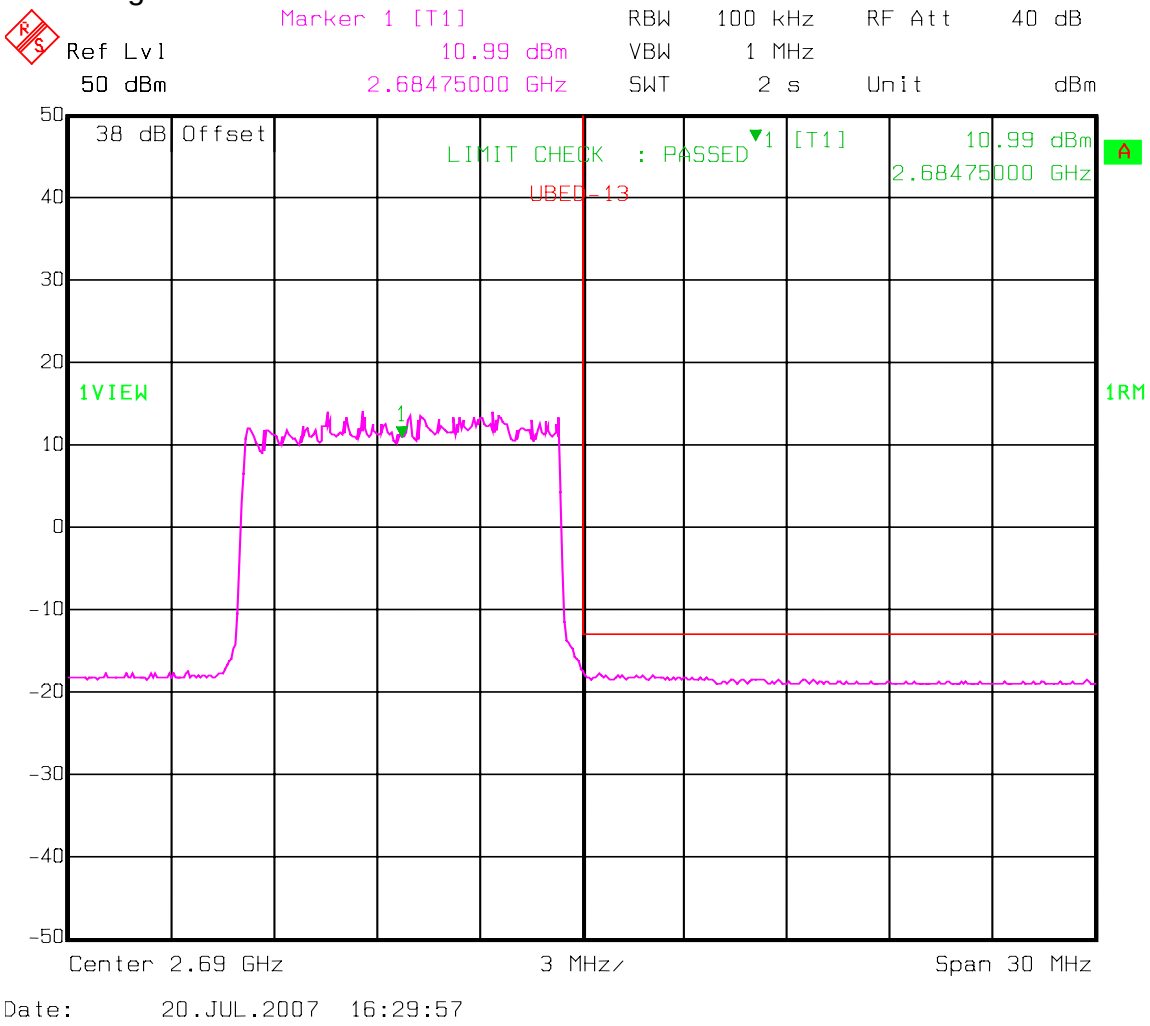
Test Data – Spurious Emissions at Antenna Terminals

16 QAM
10 MHz Carrier
Low Channel
Band Edge



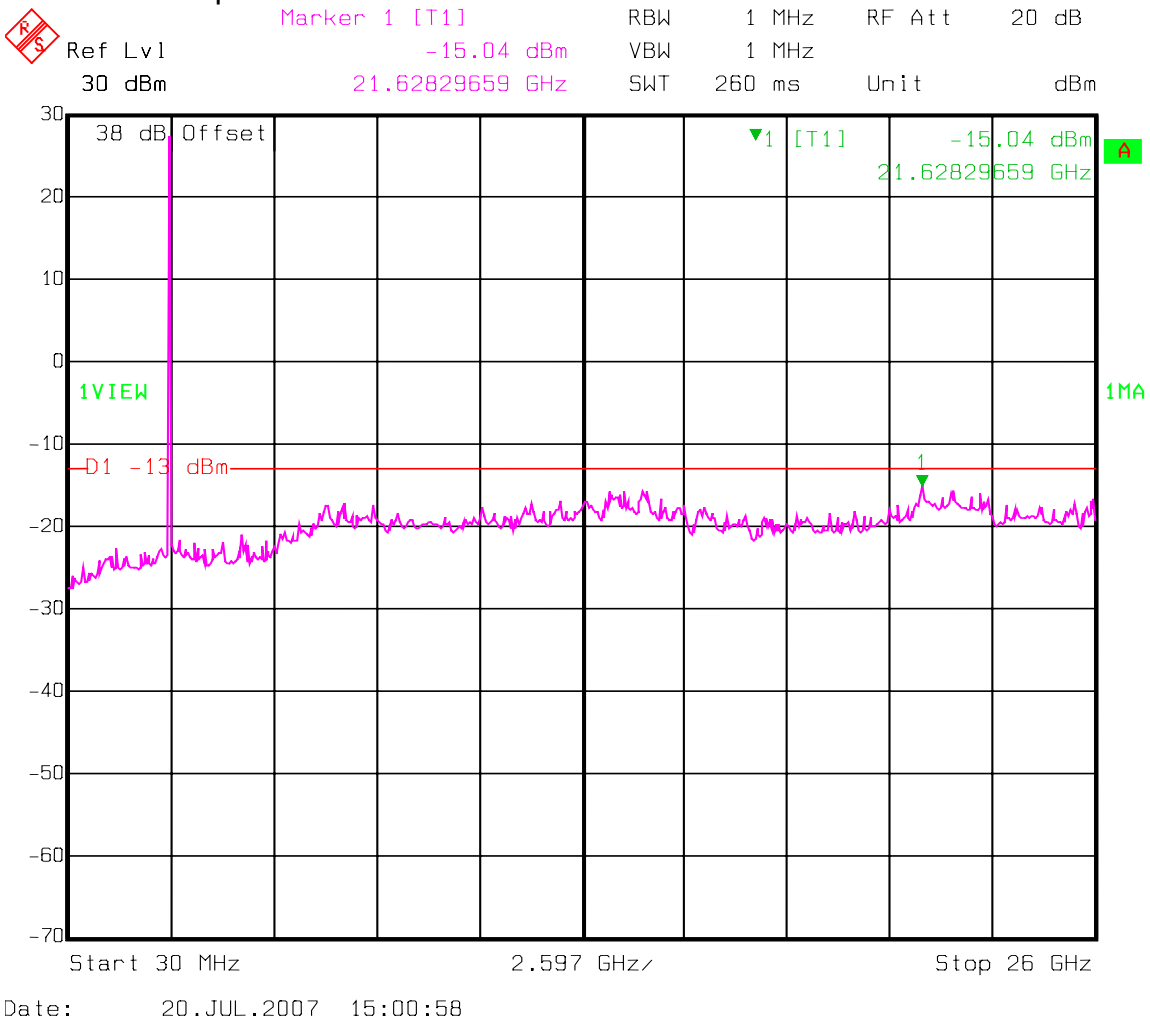
Test Data – Spurious Emissions at Antenna Terminals

16 QAM
10 MHz Carrier
High Channel
Band Edge



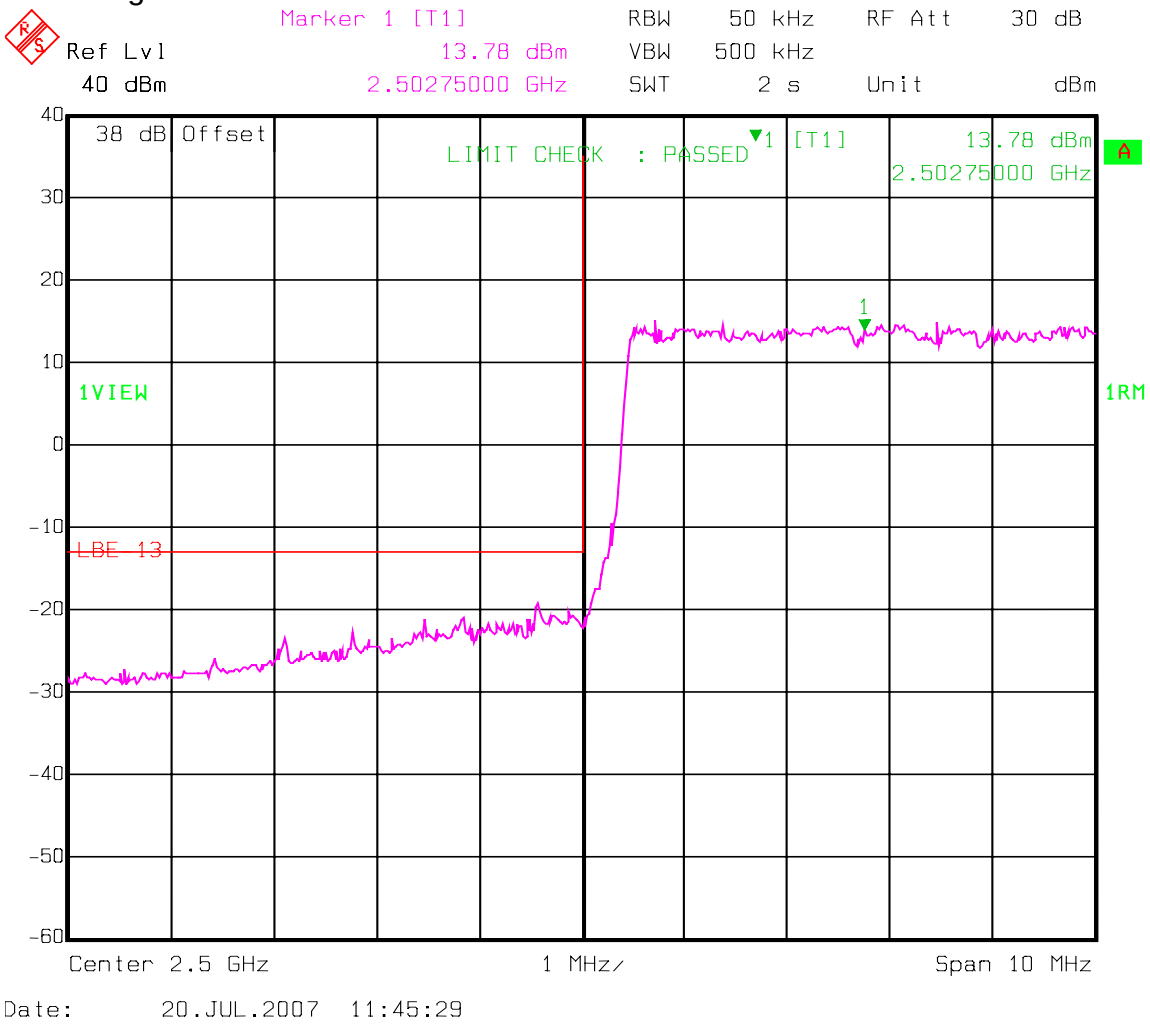
Test Data – Spurious Emissions at Antenna Terminals

16 QAM
10 MHz Carrier
Mid Channel Spurs



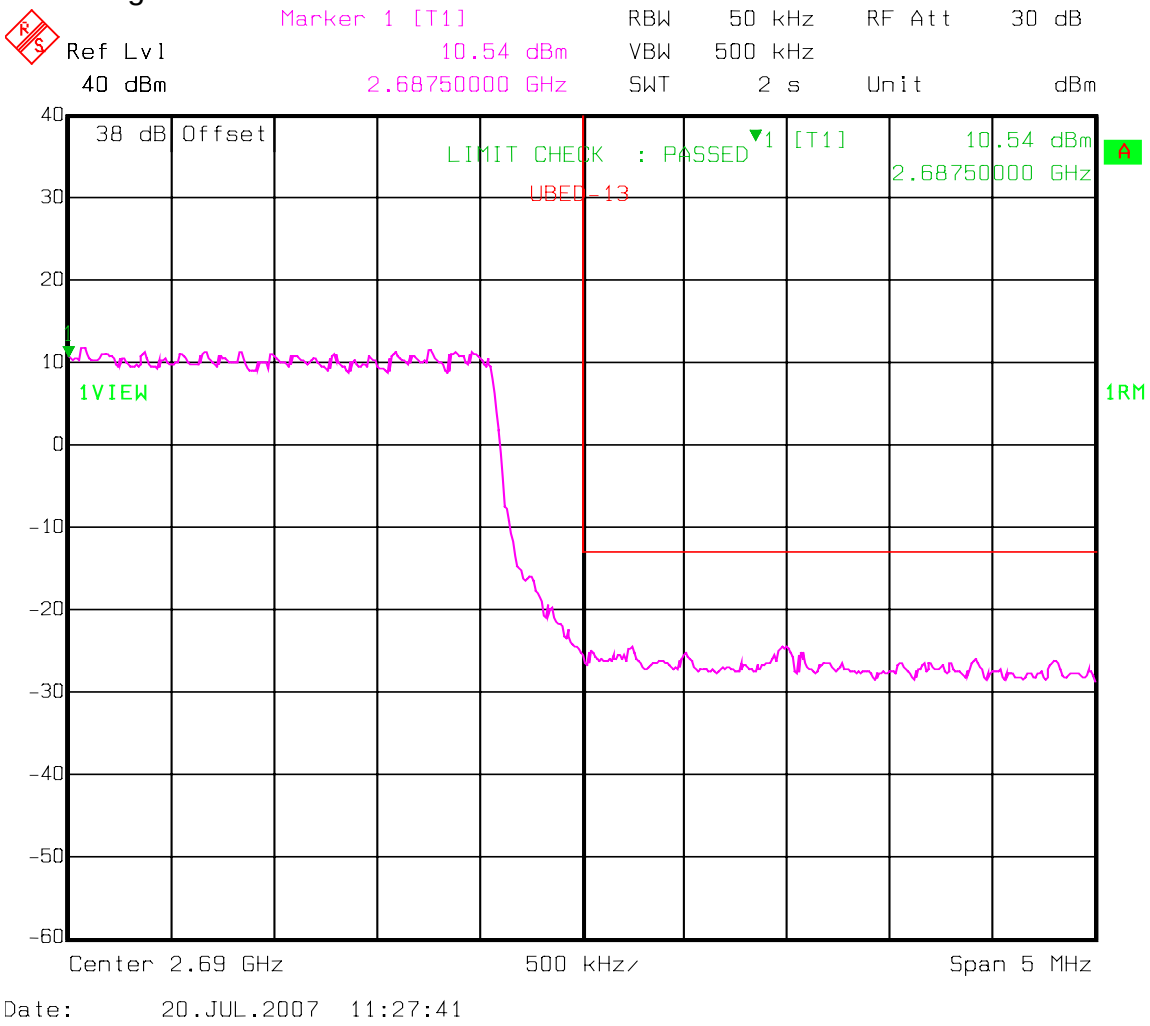
Test Data – Spurious Emissions at Antenna Terminals

64 QAM
5 MHz Carrier
Low Channel
Band Edge



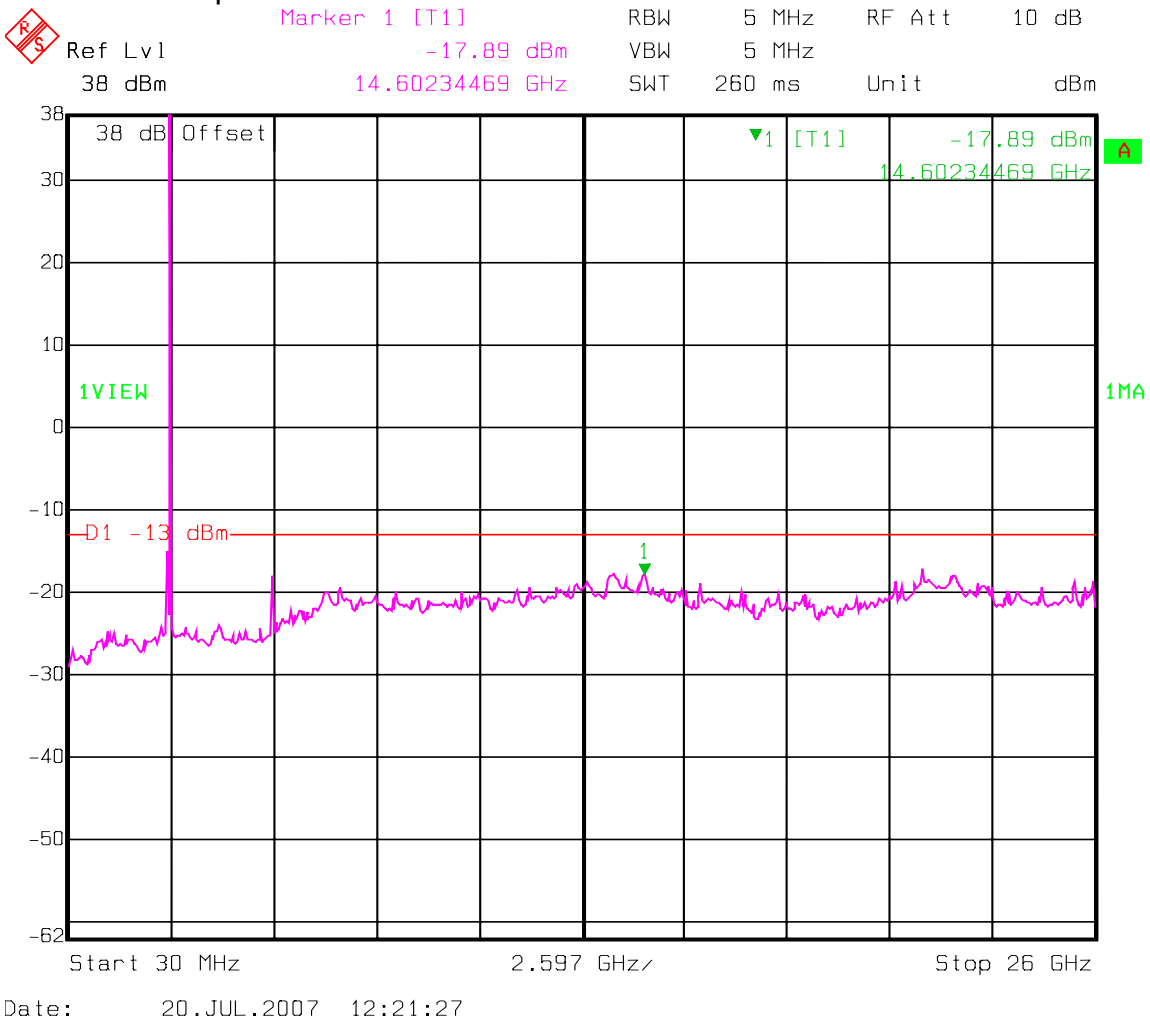
Test Data – Spurious Emissions at Antenna Terminals

64 QAM
5 MHz Carrier
High Channel
Band Edge



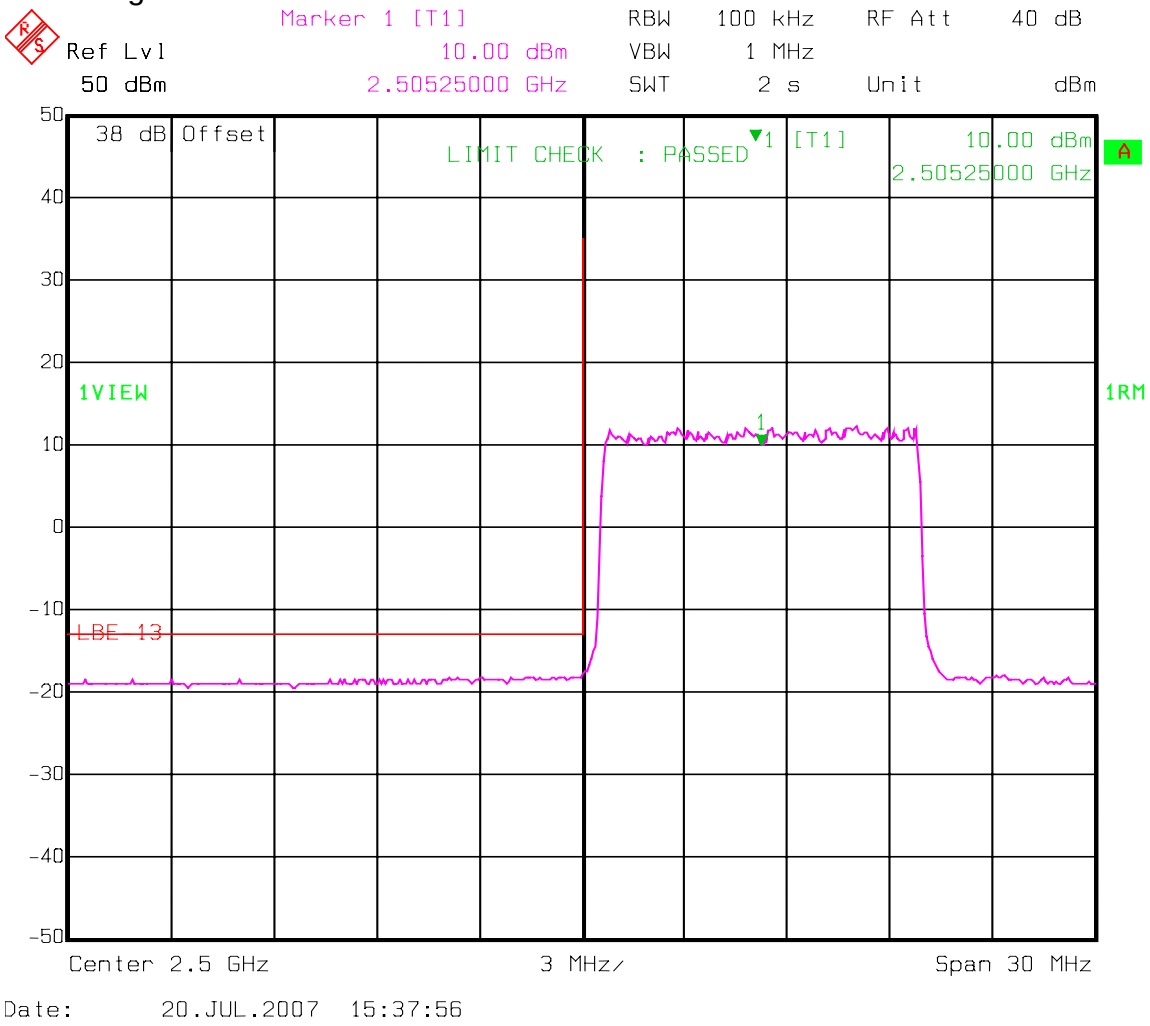
Test Data – Spurious Emissions at Antenna Terminals

64 QAM
5 MHz Carrier
Mid Channel Spurs



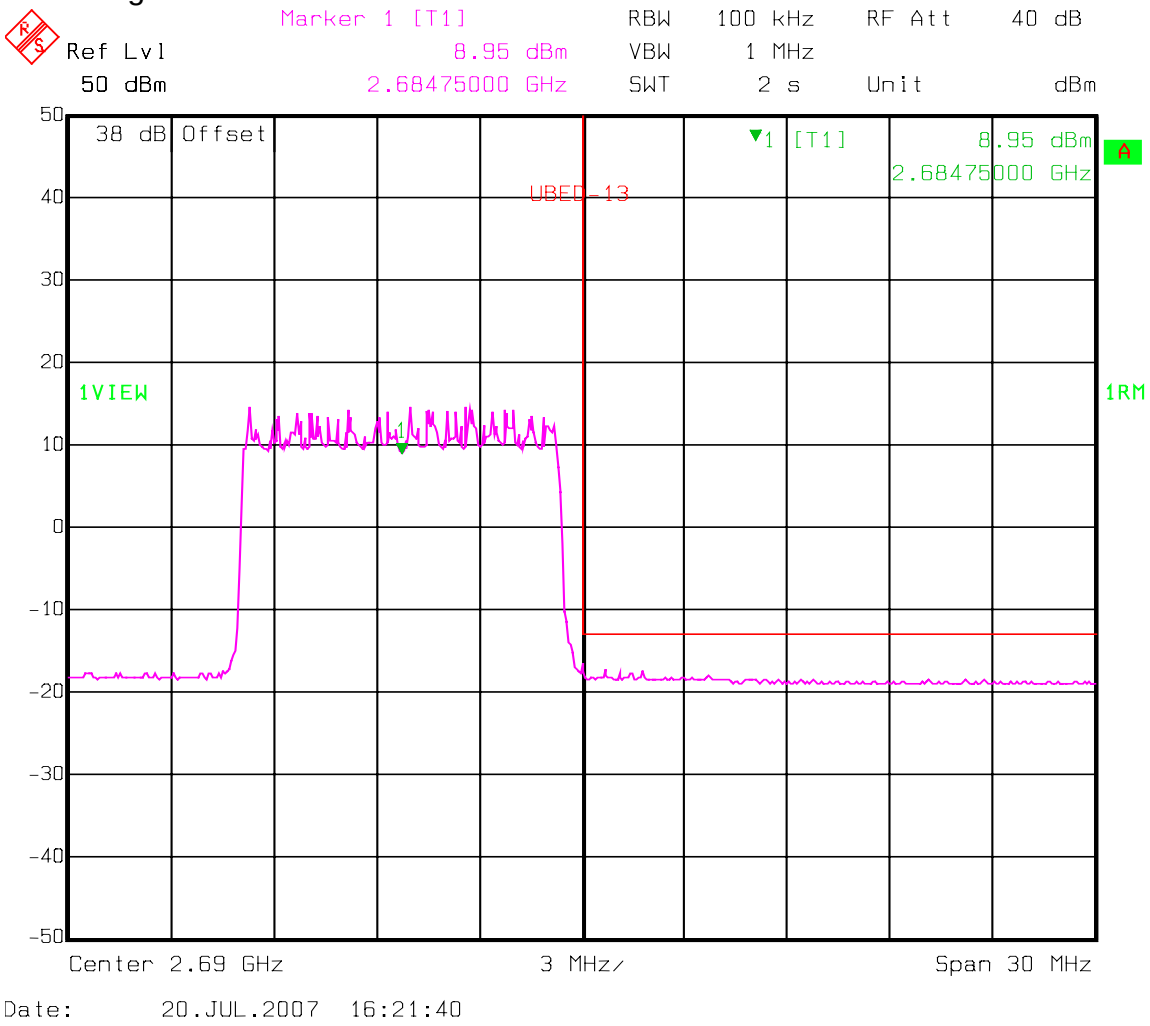
Test Data – Spurious Emissions at Antenna Terminals

64 QAM
10 MHz Carrier
Low Channel
Band Edge



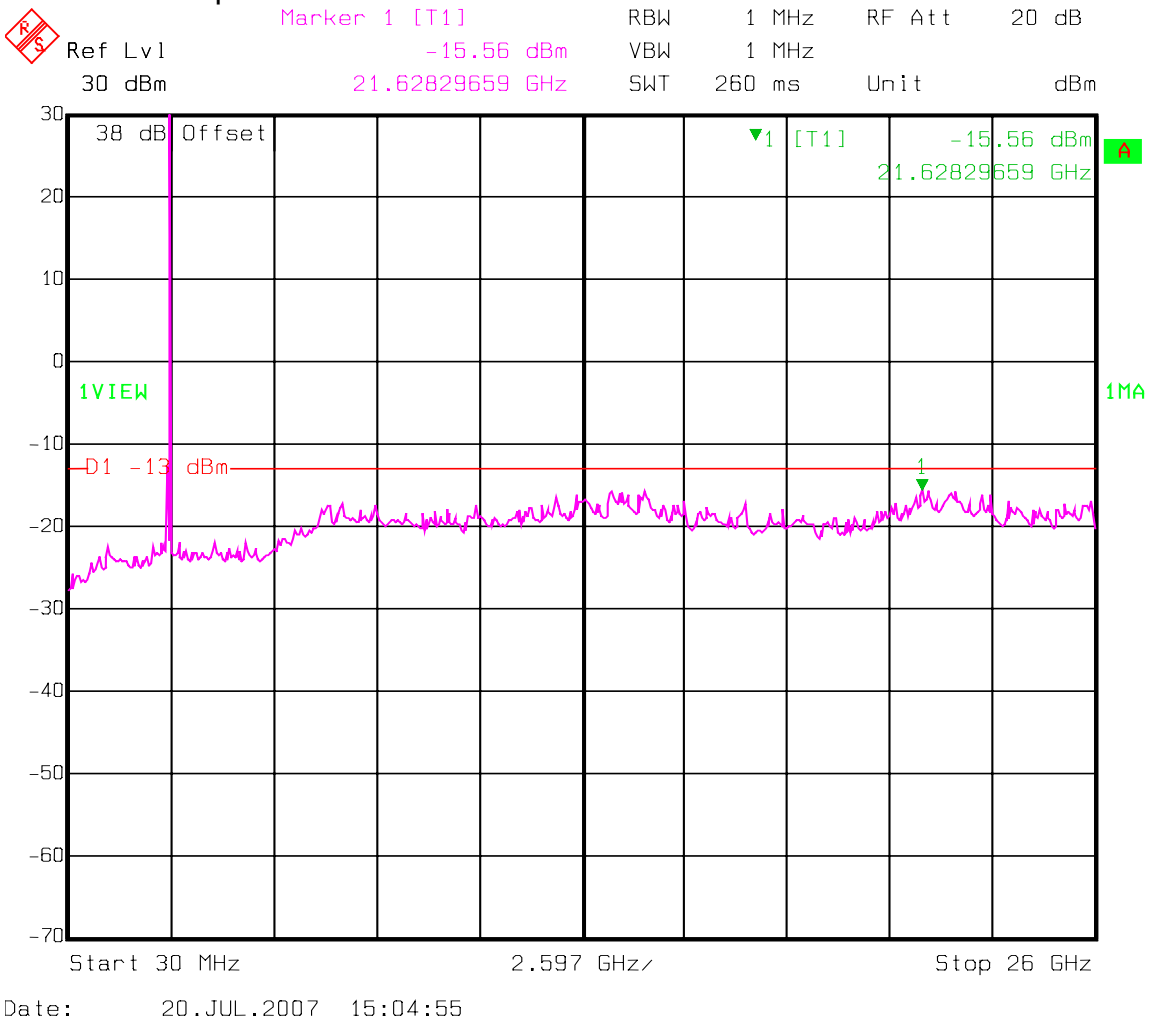
Test Data – Spurious Emissions at Antenna Terminals

64 QAM
10 MHz Carrier
High Channel
Band Edge



Test Data – Spurious Emissions at Antenna Terminals

64 QAM
10 MHz Carrier
Mid Channel Spurs



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 10th 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.

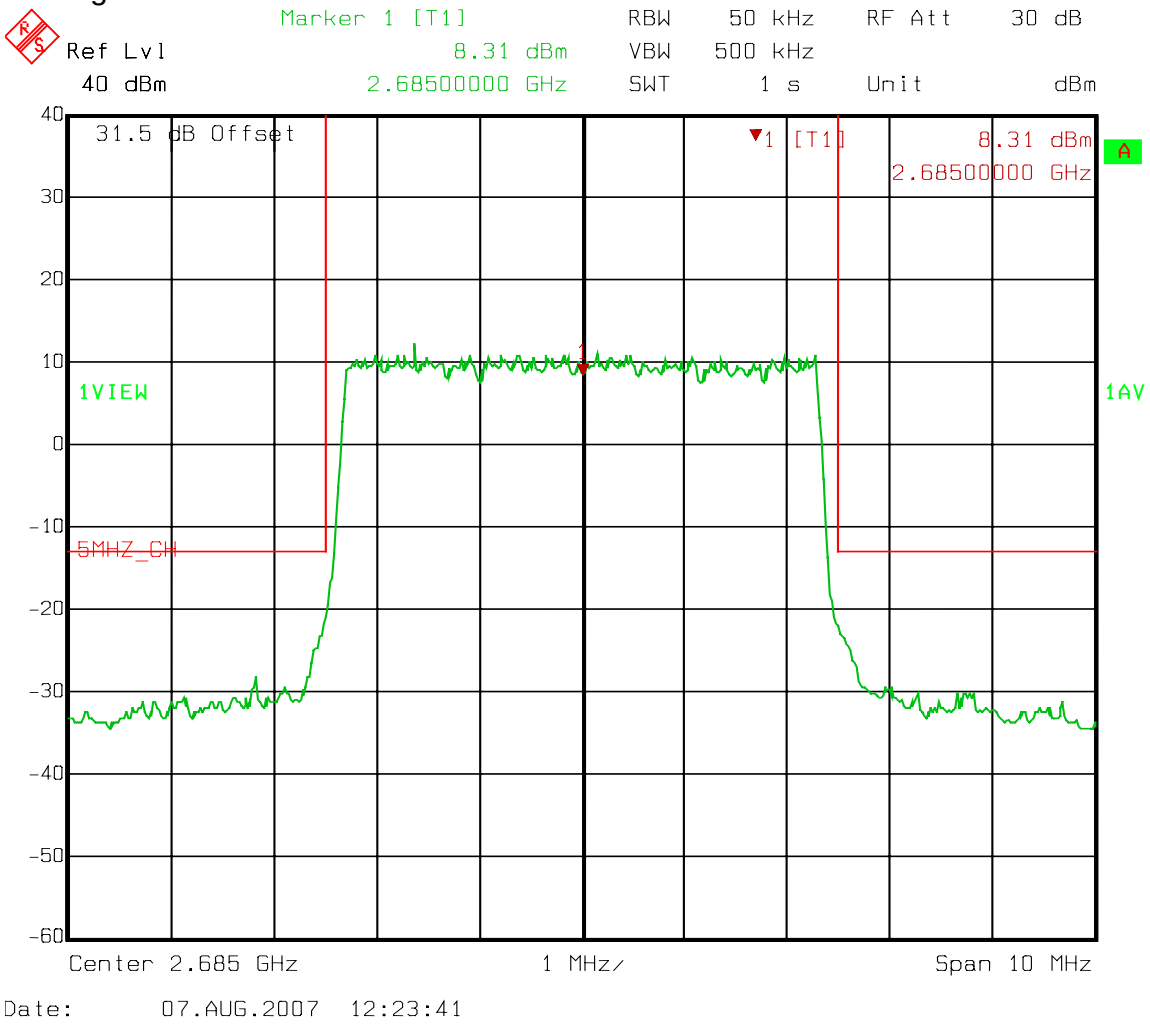
Test Equipment: 1036, 1483, 1064, 1065, 283, 619

Standard Supply Voltage: 120 Vac

Environmental Conditions: 21 °Celsius
41 % RH

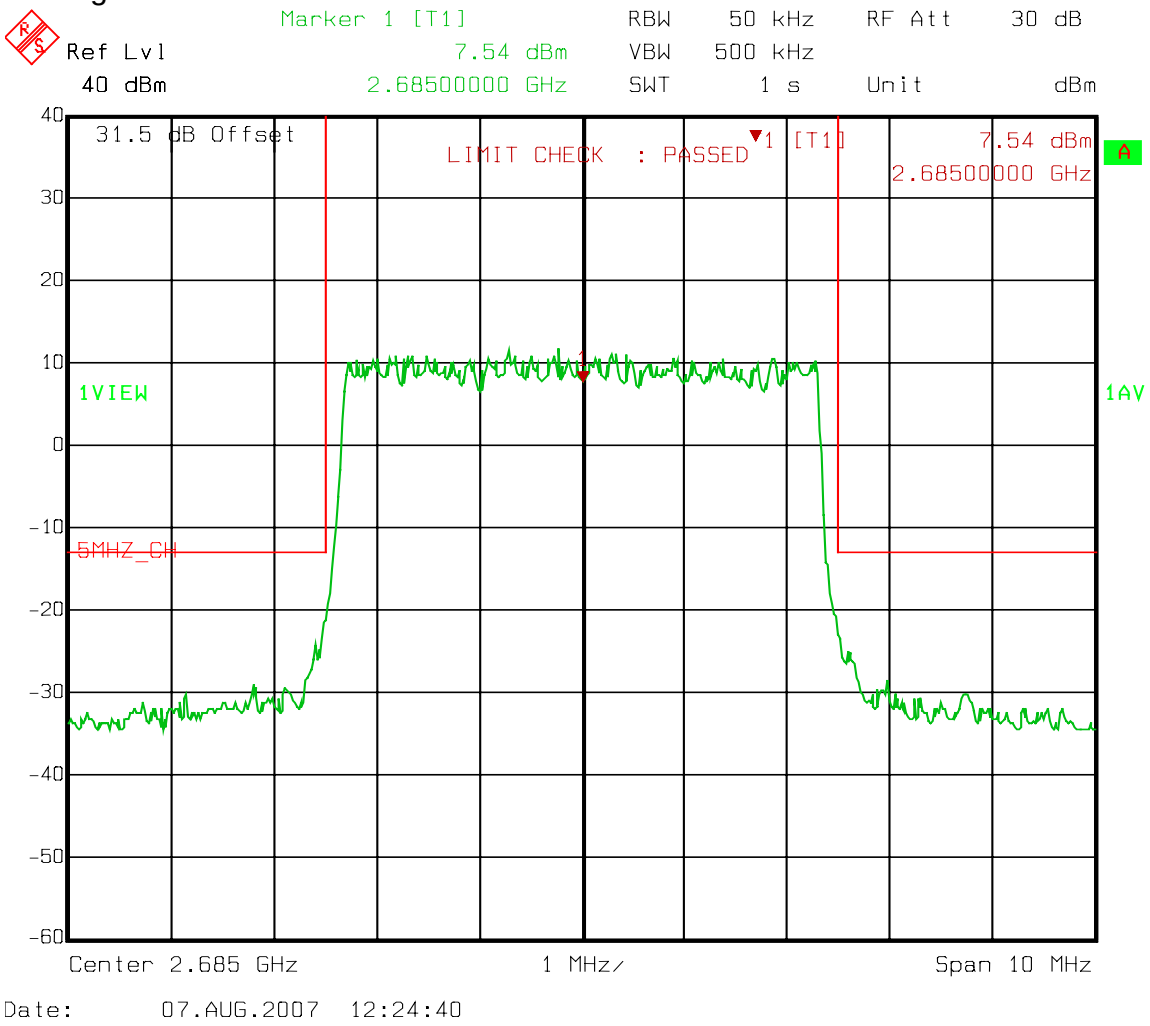
Test Data – Frequency Stability

20 Degrees C 120VAC



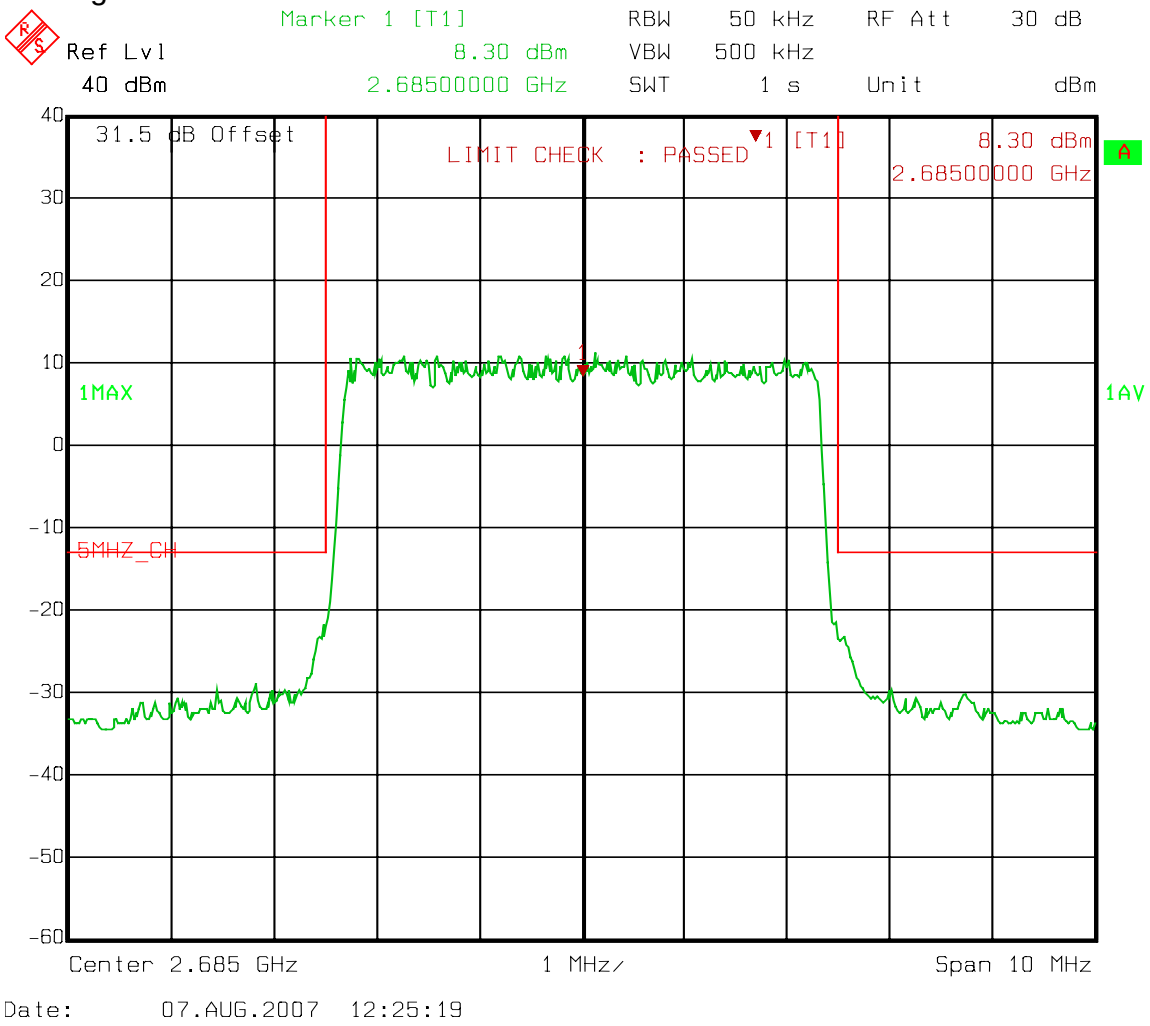
Test Data – Frequency Stability

20 Degrees C 102VAC



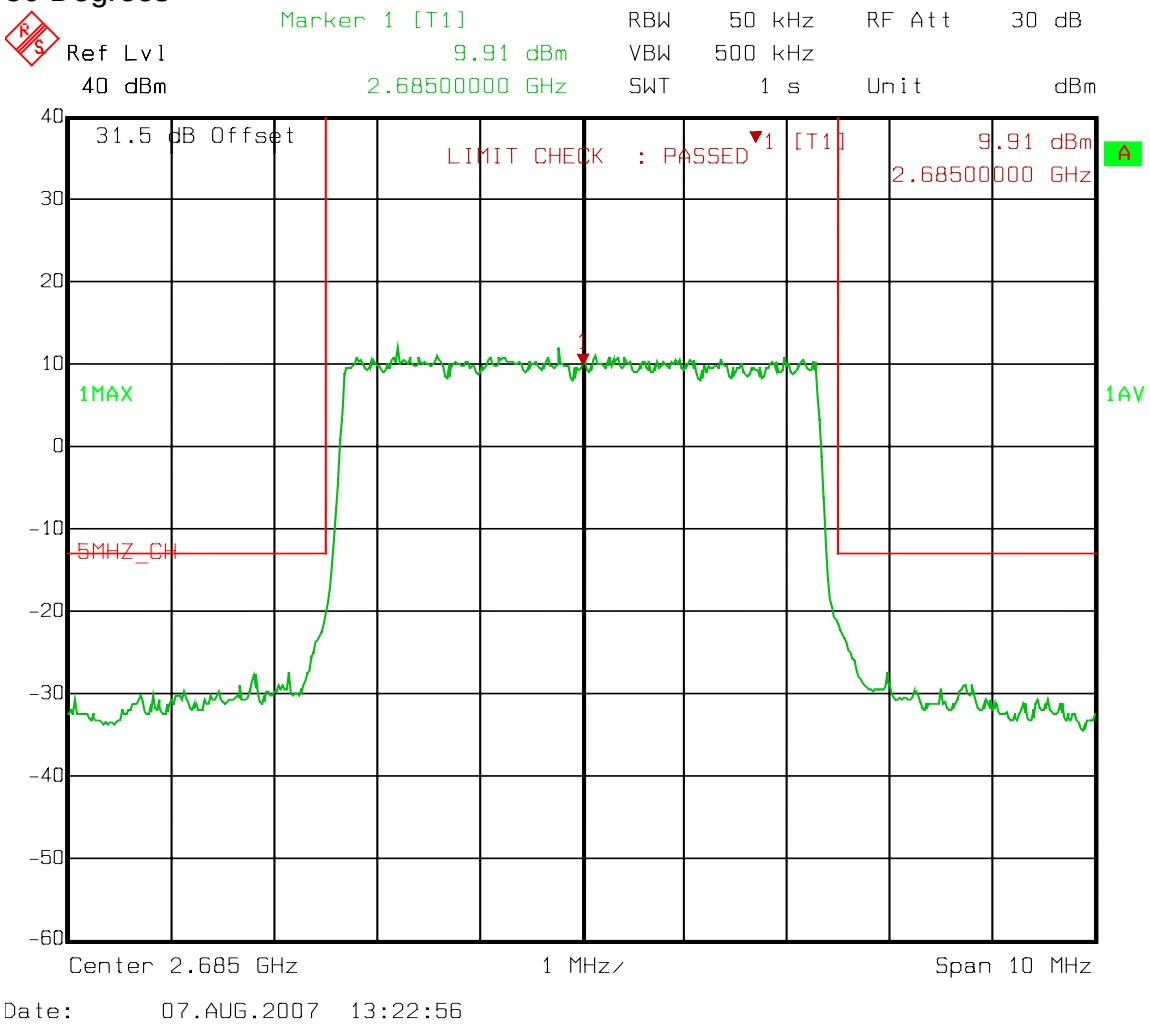
Test Data – Frequency Stability

20 Degrees C 138VAC



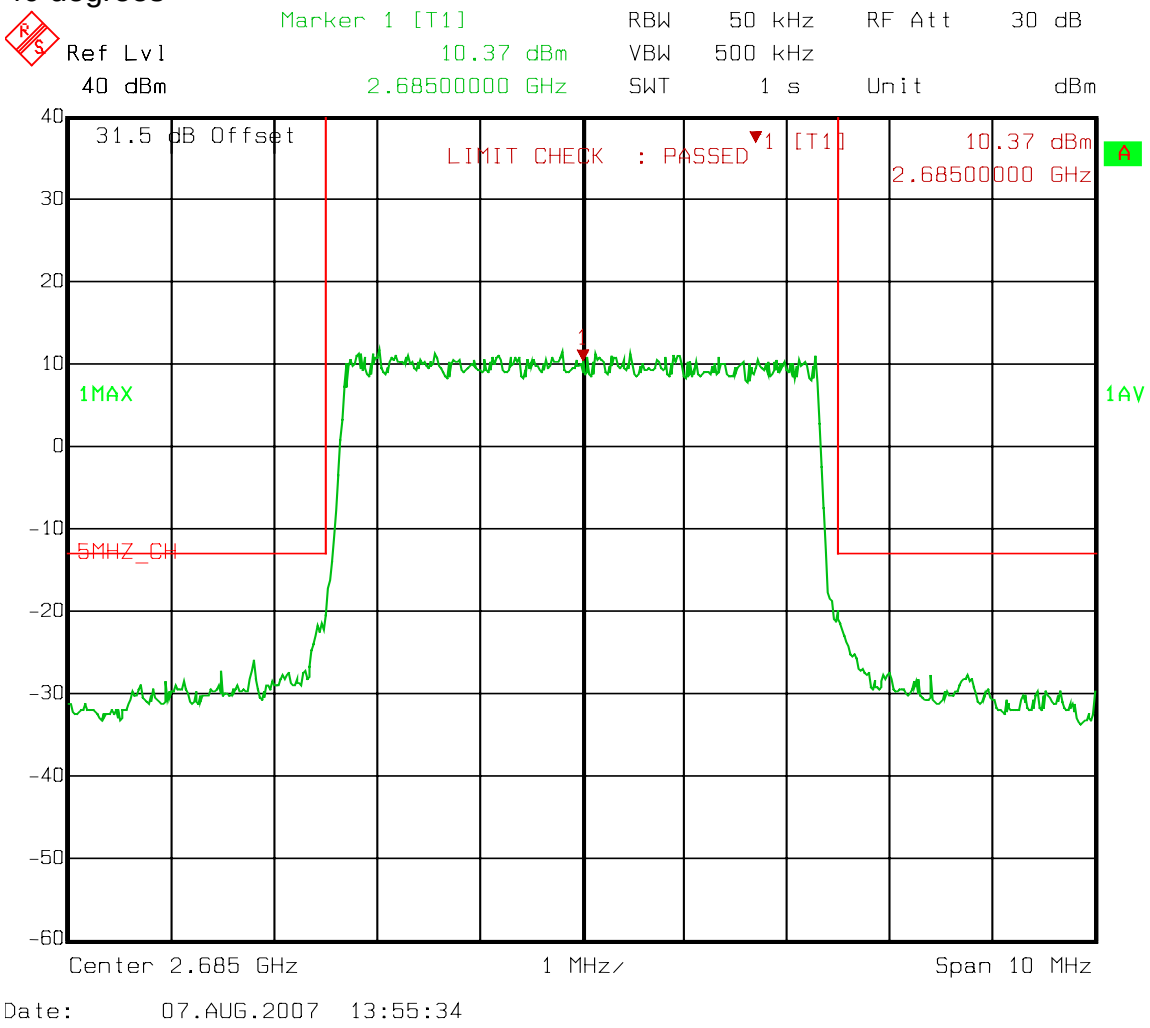
Test Data – Frequency Stability

50 Degrees

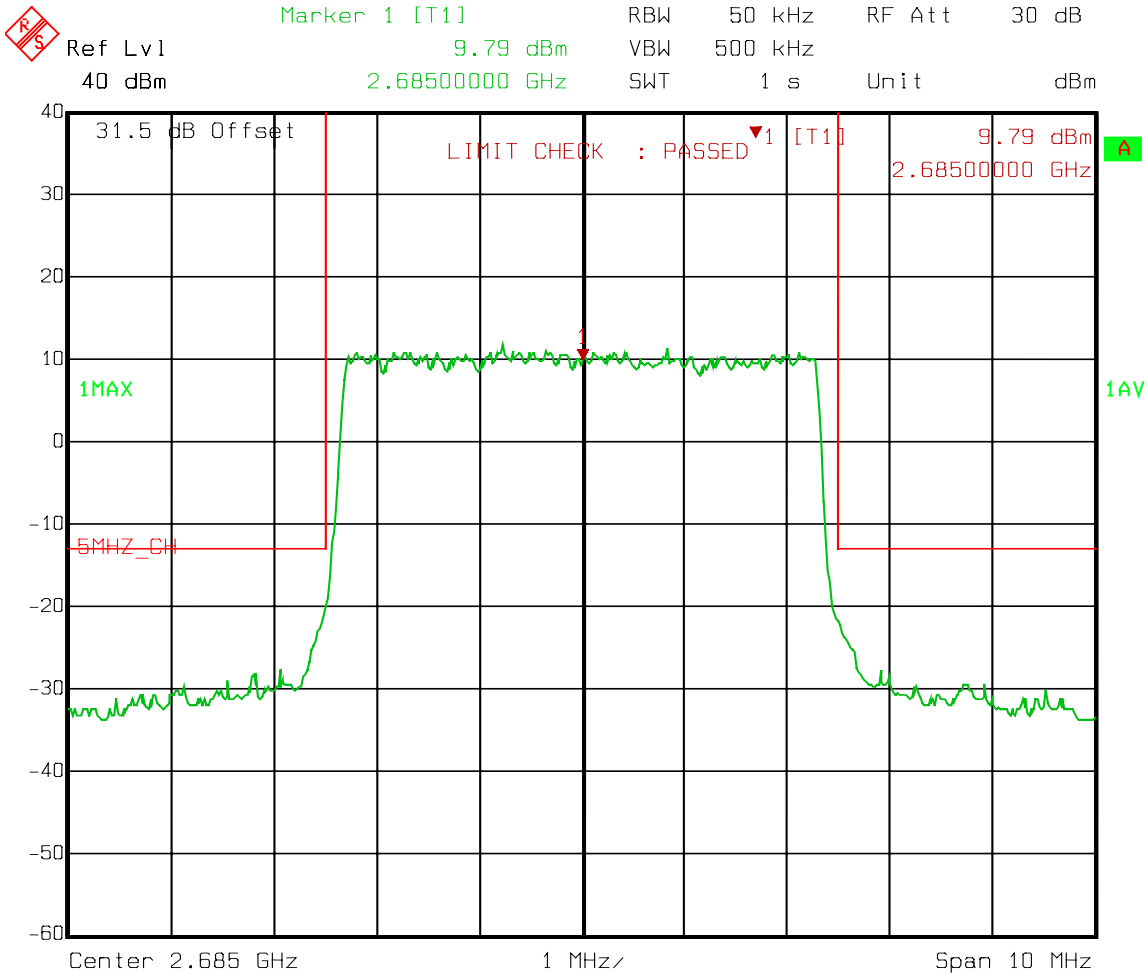


Test Data – Frequency Stability

40 degrees



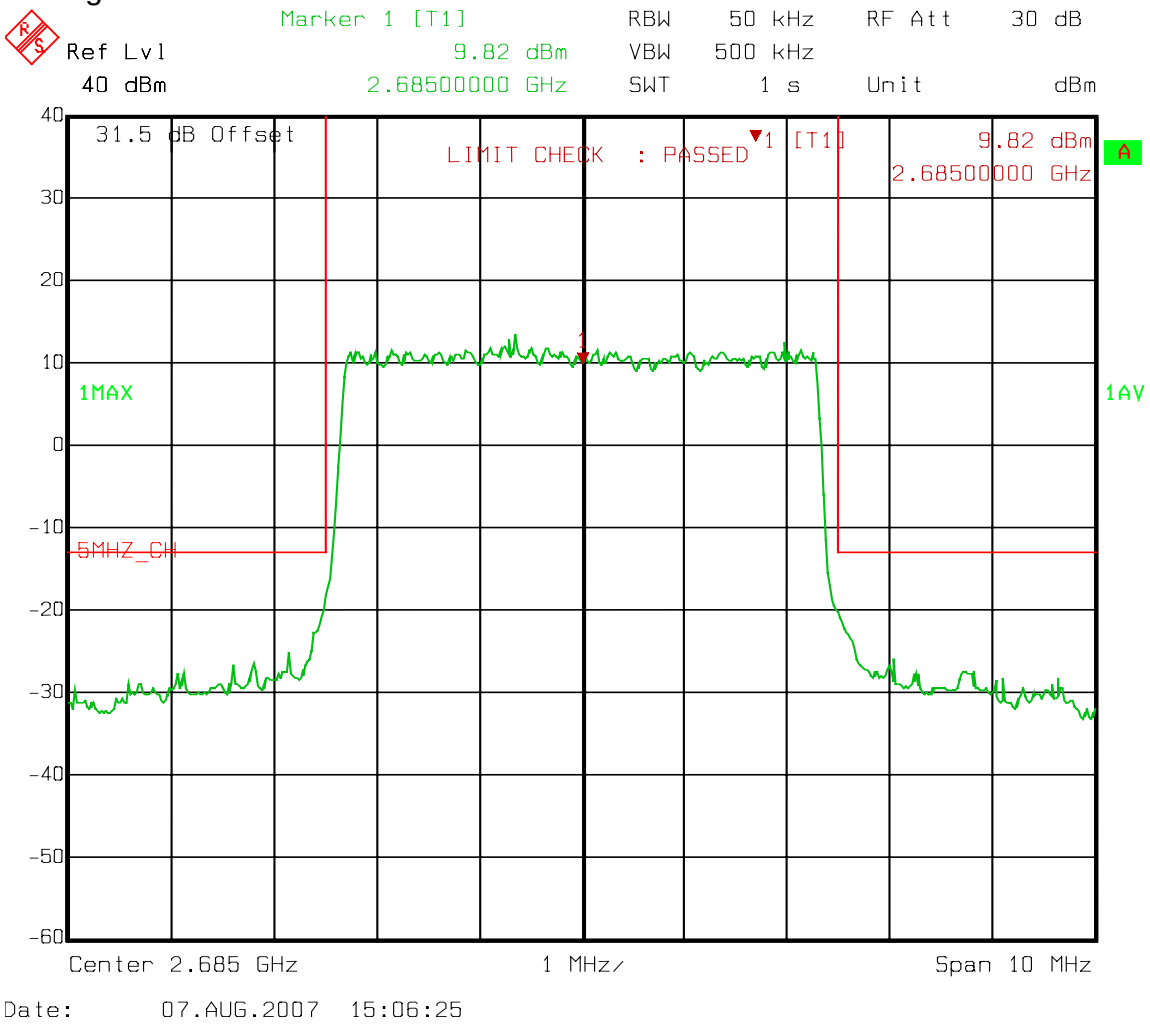
Test Data – Frequency Stability



30 degrees

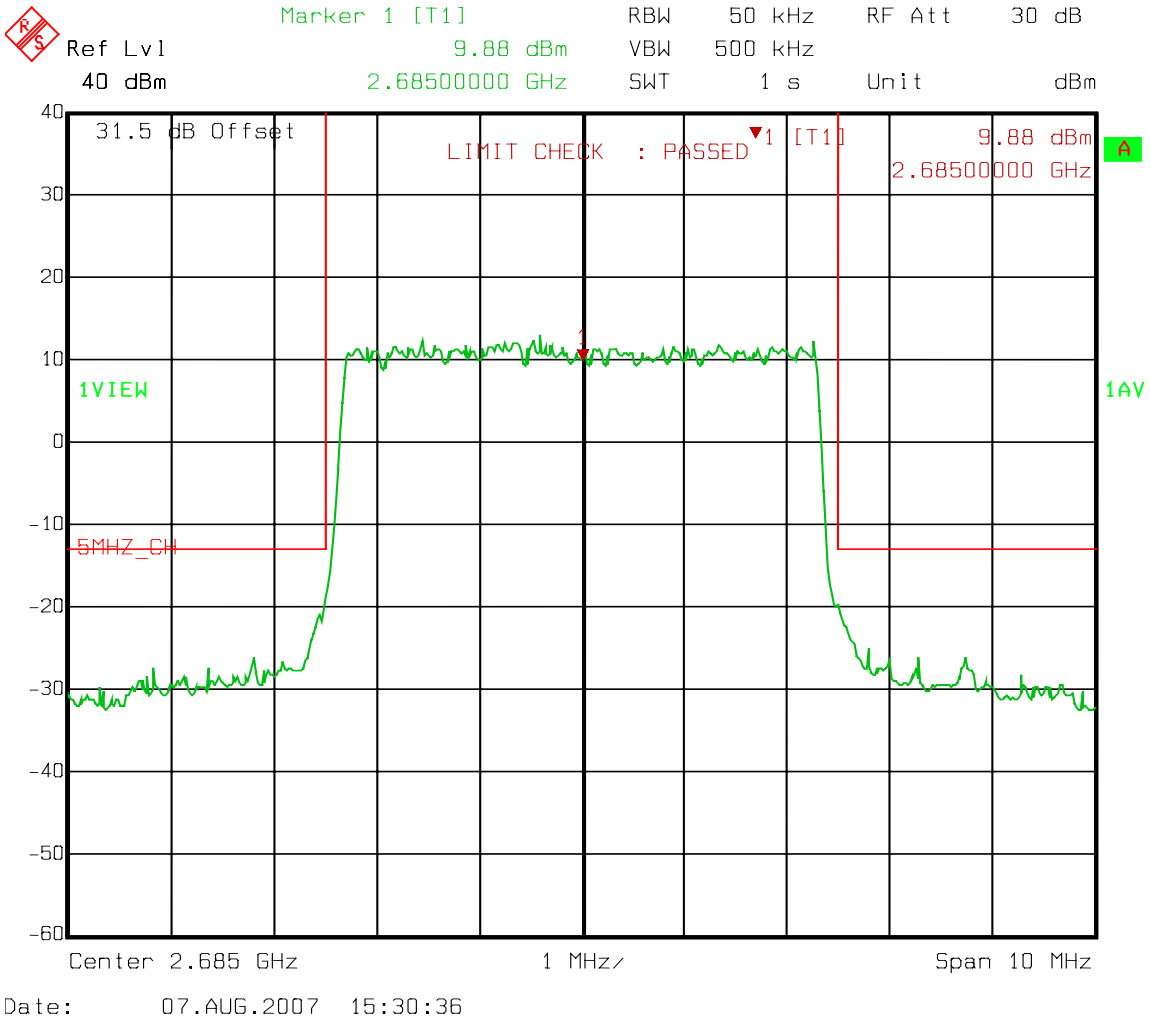
Test Data – Frequency Stability

10 degrees



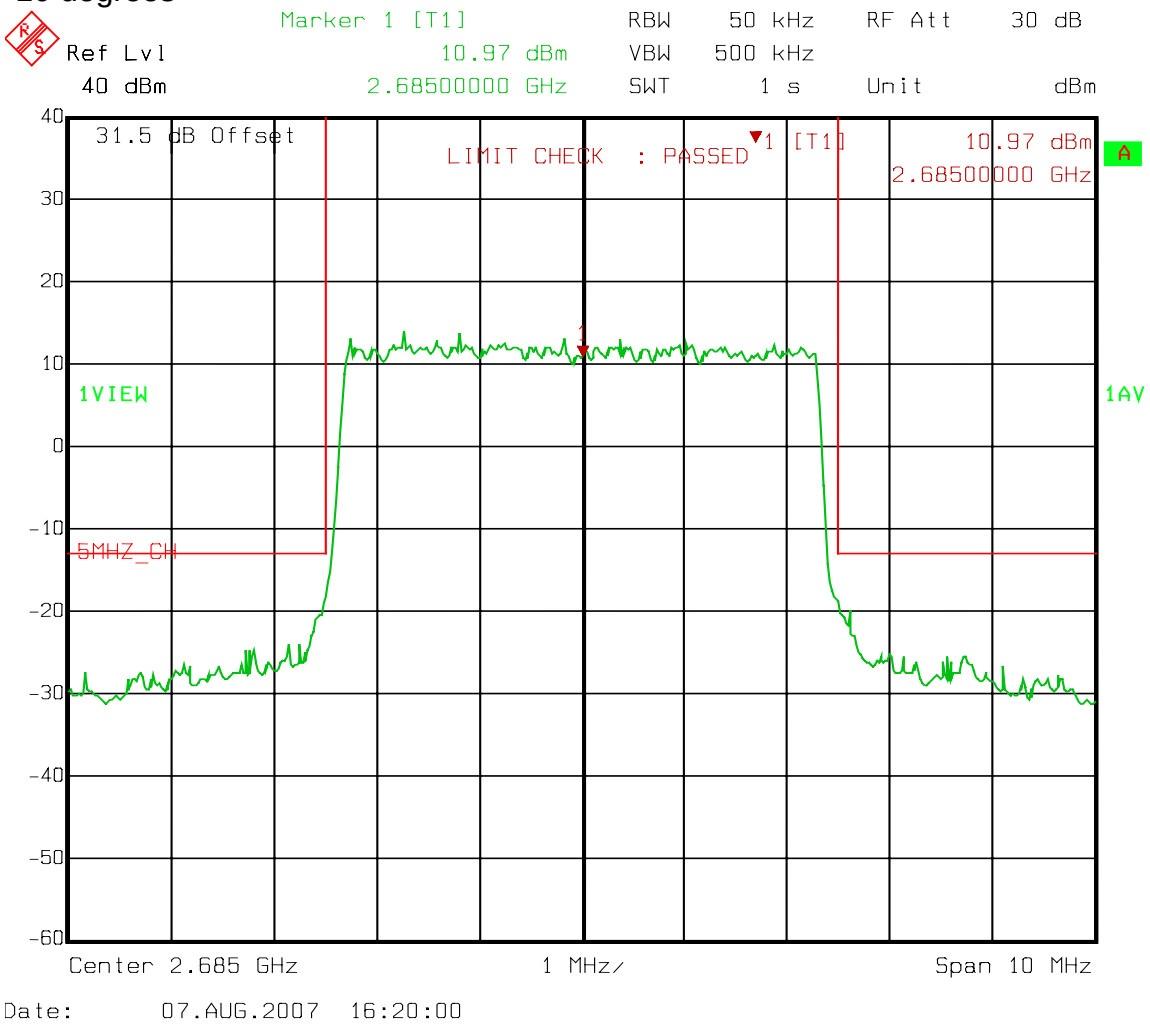
Test Data – Frequency Stability

0 degrees



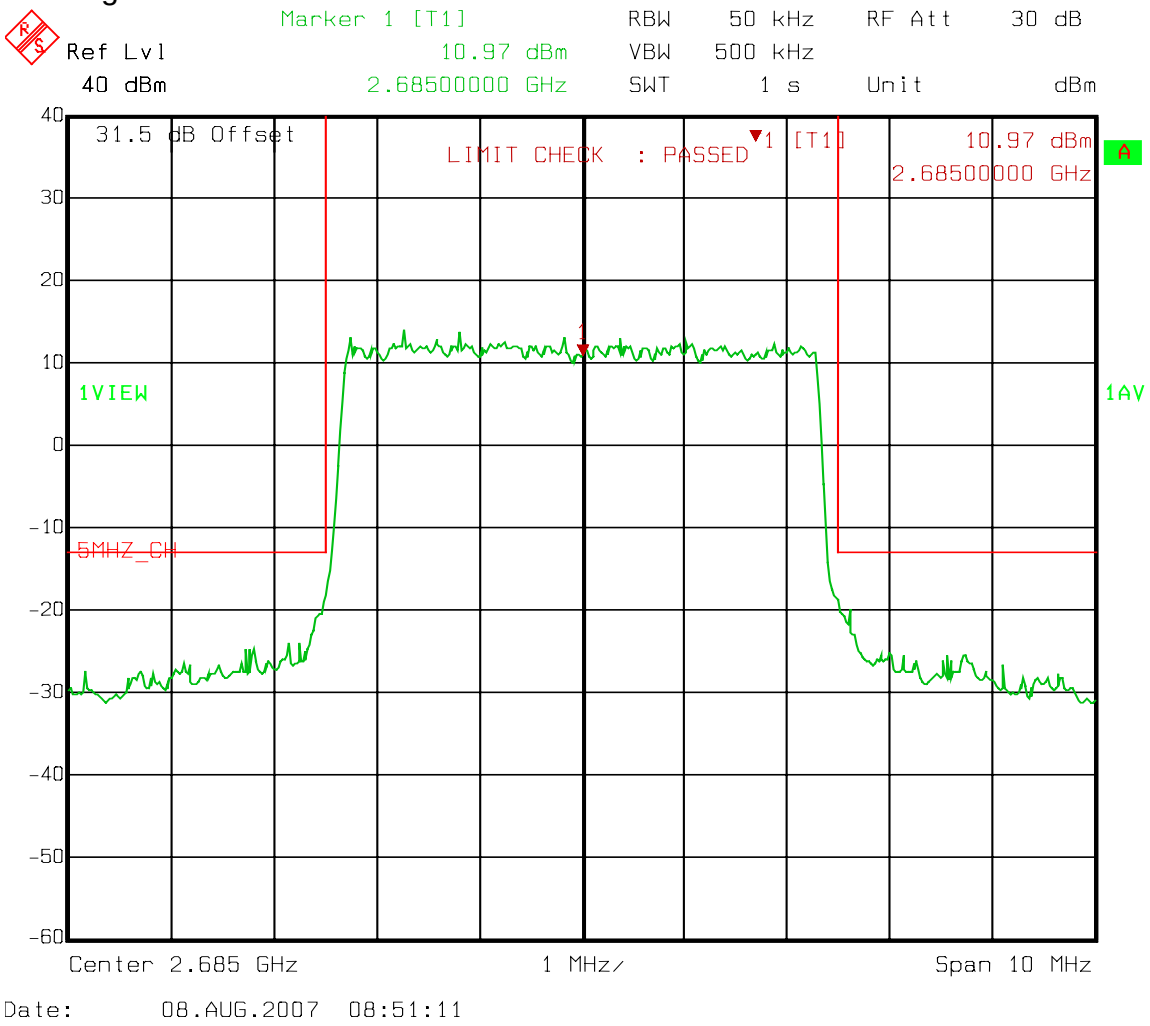
Test Data – Frequency Stability

-10 degrees



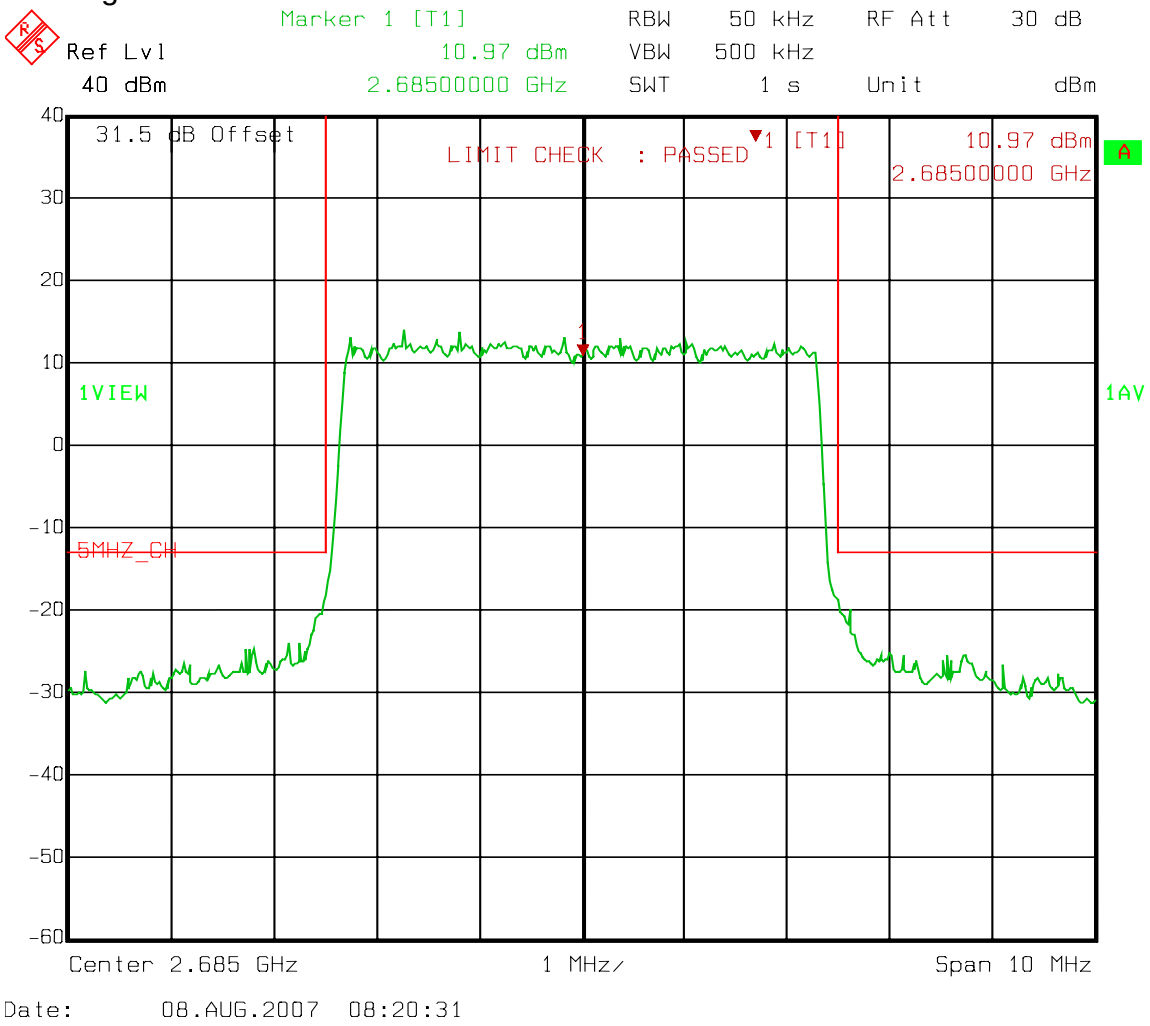
Test Data – Frequency Stability

-20 Degrees C



Test Data – Frequency Stability

-30 Degrees C



Section 8. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1483	Cable 4m	Storm PR90-010-144	N/A	10/02/06	10/02/07
1604	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1469	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	05/26/06	05/26/08
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/24/07	01/24/09
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/01/07	04/30/08
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07
760	Antenna biconical	Electro Metrics MFC-25	477	01/19/07	01/19/08
1311	ANTENNA, LOG PERIODIC	EMCO 3146	1753	01/18/07	01/18/08
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/01/07	04/30/07
1484	Cable	Storm PR90-010-072	N/A	10/02/06	10/02/07
1485	Cable	Storm PR90-010-216	N/A	10/02/06	10/02/07
1483	Cable 4m	Storm PR90-010-144	N/A	10/02/06	10/02/07
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1065	ATTENUATOR	NARDA 776B-10	NONE	CBU	N/A
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	CNR	CNR
619	THERMOMETER	FLUKE 51	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

NAME OF TEST: Occupied Bandwidth	**PARA. NO.: 2.1049**

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.

NAME OF TEST: Field Strength of Spurious Radiation PARA. NO.: 2.1053

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.

NAME OF TEST: Frequency Stability	**2.1055**

Method Of Measurement:

Frequency Stability With Voltage Variation:

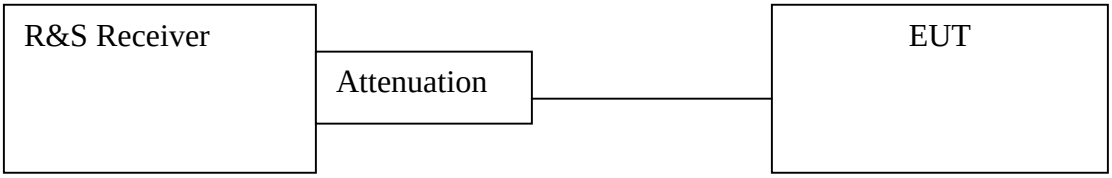
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius. This procedure is repeated at 100% S.T.V, 115% S.T.V. and 85% S.T.V

Frequency Stability With Temperature Variation:

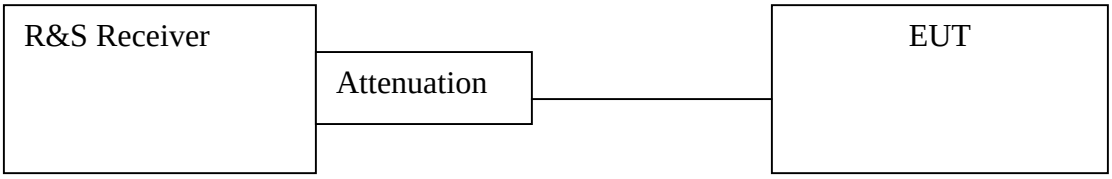
The input voltage to the E.U.T. is set to 100%S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature.

ANNEX B - TEST DIAGRAMS

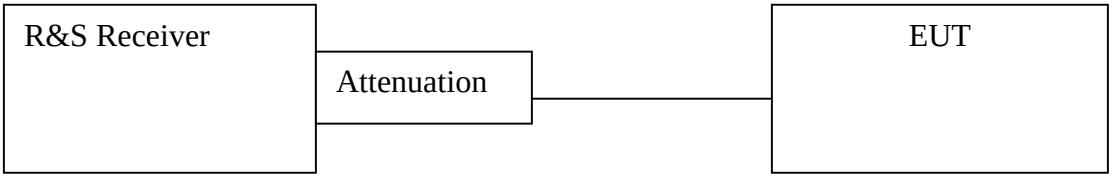
Para. No. 2.1046 - R.F. Power Output



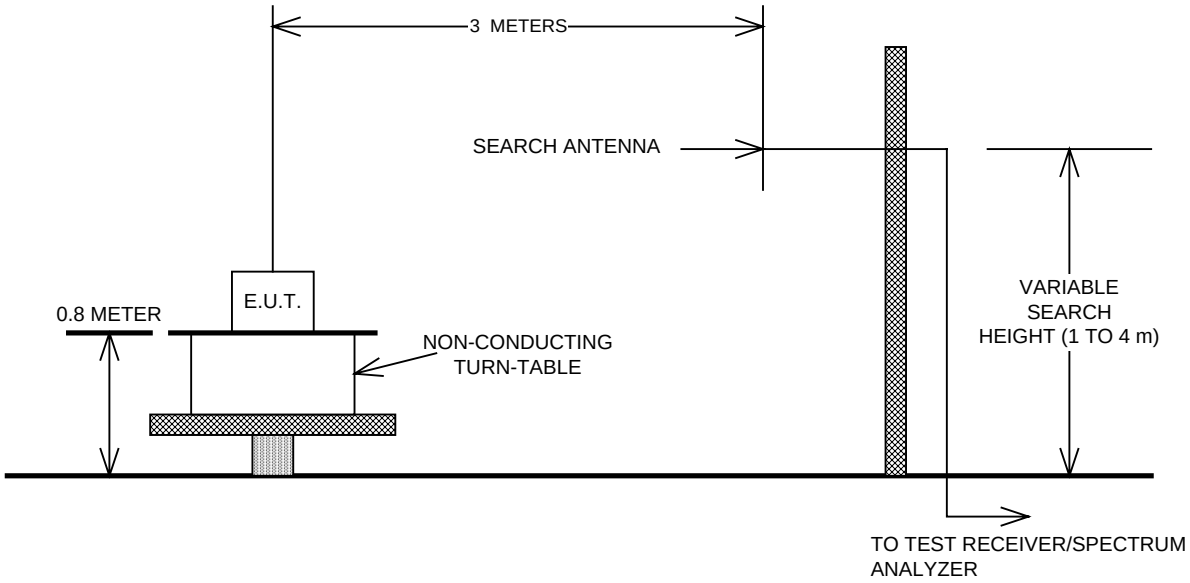
Para. No. 2.1049 - Occupied Bandwidth



Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



Para. No. 2.1053 - Field Strength of Radiation



Para. No. 2.1055 - Frequency Stability