



**Nemko Test Report:** 1028403RUS3

**Applicant:** Andrew Corporation  
620 N. Greenfield Parkway  
Garner, NC 27529  
USA

**Equipment Under Test:** TFAH-US4B  
**(E.U.T.)**

**FCC Identifier:** BCR-TFAHUS4B

**In Accordance With:** **CFR 47, Part 27, Subpart C**  
Miscellaneous Wireless Communication Services

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

TESTED BY:

David Light, Senior Wireless Engineer

DATE: 01 June 2011

APPROVED BY:

Mike Cantwell, GM

DATE: 03 June 2011

**Number of Pages: 50**

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**Section 1. Summary of Test Results**

Manufacturer: Andrew Corporation

Model No.: TFAH-US4B

Serial No.: 10

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 CFR 47, Part 27, Subpart C.



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.**

See "Summary of Test Data".



NVLAP Lab Code 100426-0

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**Summary Of Test Data**

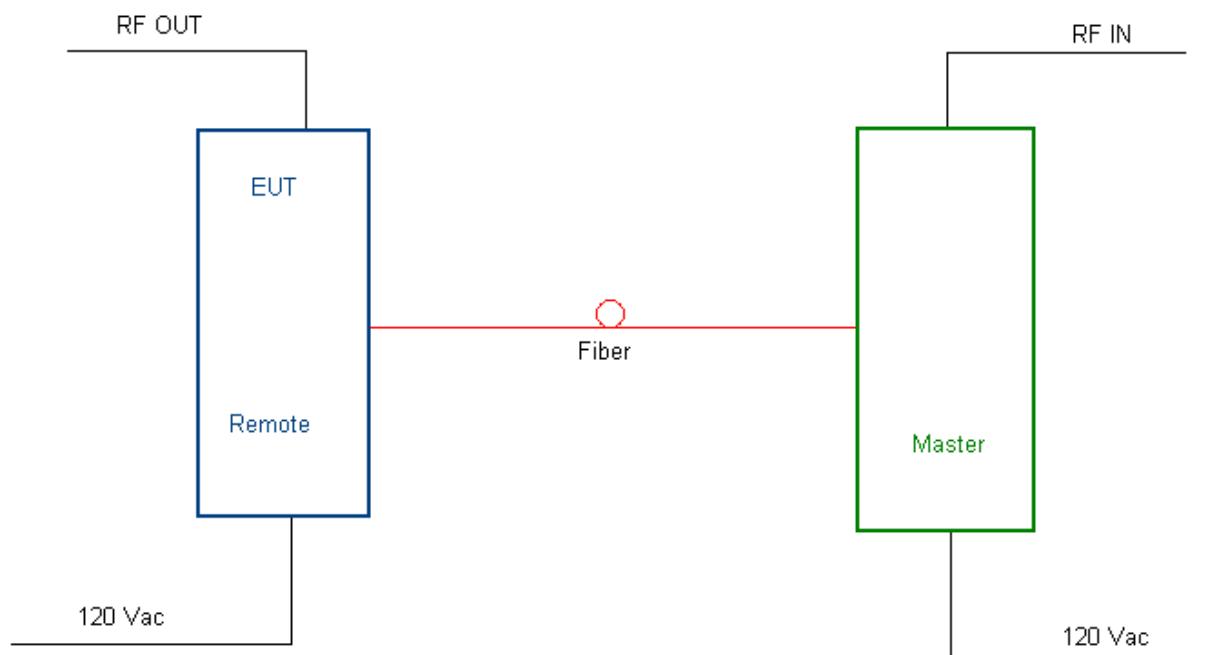
NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	27.50(d)	1640 Watts	Complies
Occupied Bandwidth	2.1049	Input/Output	Complies
Spurious Emissions at Antenna Terminals	27.53(g)	-13 dBm	Complies
Field Strength of Spurious Emissions	27.53(g)	-13 dBm E.I.R.P.	Complies
Frequency Stability	27.54	Must stay in band	NA

**Section 2. General Equipment Specification**

<b>Supply Voltage Input:</b>	120 Vac				
<b>Frequency Bands:</b>	<b>Downlink:</b>	728 to 757 MHz			
		2110 to 2155 MHz			
<b>Frequency Bands:</b>	<b>Uplink:</b>	NA			
<b>Emission Designator(s):</b>	F9W				
<b>Output Impedance:</b>	50 ohms				
<b>RF Output (Rated):</b>	<b>Downlink</b>	<u>1.25</u> W (2100 MHz band) <u>31.0</u> dBm			
<b>RF Output (Rated):</b>	<b>Uplink</b>	<u>NA</u> W <u>NA</u> dBm			
<b>Frequency Translation:</b>	<b>F1-F1</b> <input checked="" type="checkbox"/>	<b>F1-F2</b> <input type="checkbox"/>	<b>N/A</b> <input type="checkbox"/>		
<b>Band Selection:</b>	<b>Software</b> <input type="checkbox"/>	<b>Duplexer</b> <input type="checkbox"/>	<b>Fullband</b> <input checked="" type="checkbox"/>		

**Description of EUT**

The TFAH-US4B is a four band high power remote unit designed to distribute Cell700, Cell850, AWS, and Extended PCS1900 band signals along the same fiber.

**System Diagram**

**Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 27.50
TESTED BY: David Light	DATE: 23 May 2011

**Test Results:** Complies.**Measurement Data:**

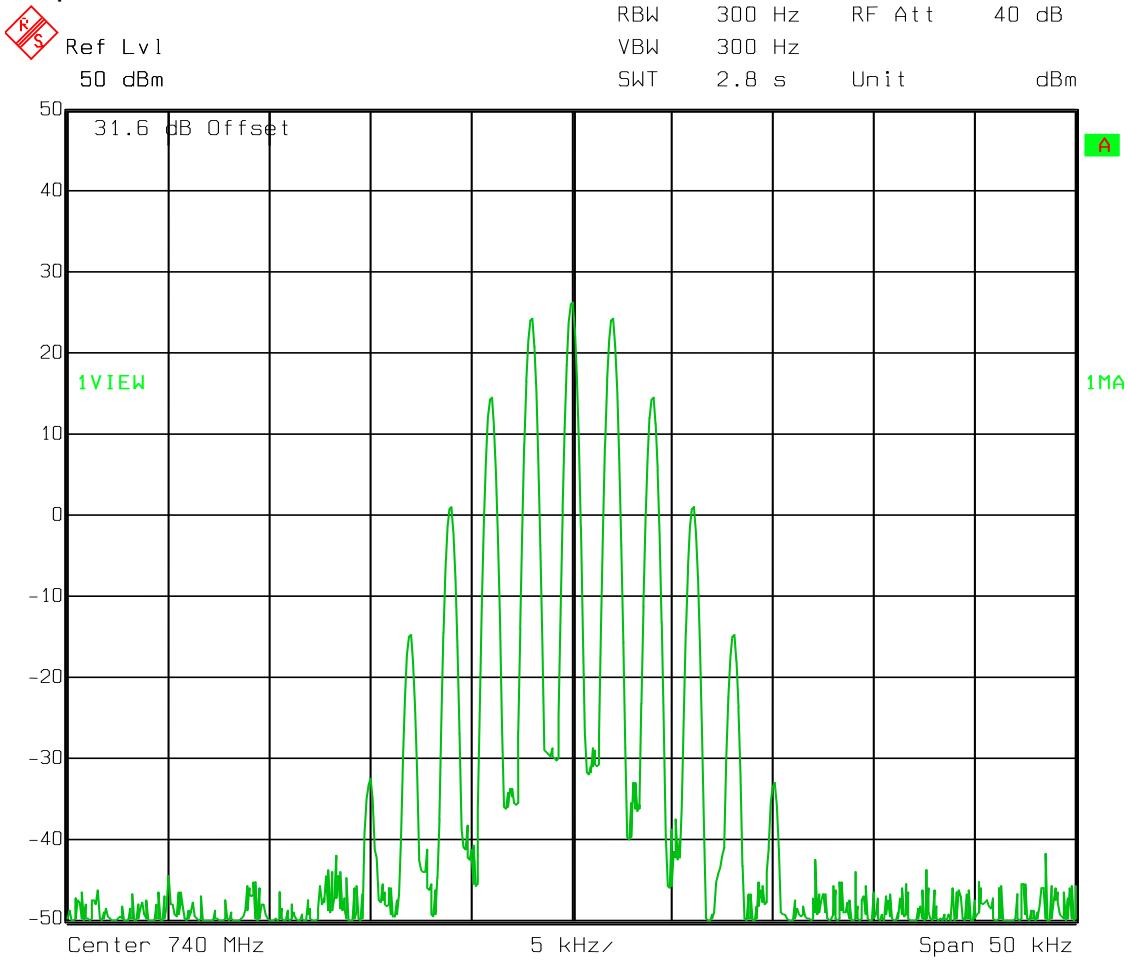
Band	Modulation	Output per Channel (dBm)	Composite Power (dBm)	Composite Power (W)
700	Analog	28.0	31.0	1.25
700	LTE	28.0	31.0	1.25
700	GSM	28.0	31.0	1.25
2100	CDMA	28.0	31.0	1.25
2100	WCDMA	28.0	31.0	1.25
2100	LTE	28.0	31.0	1.25

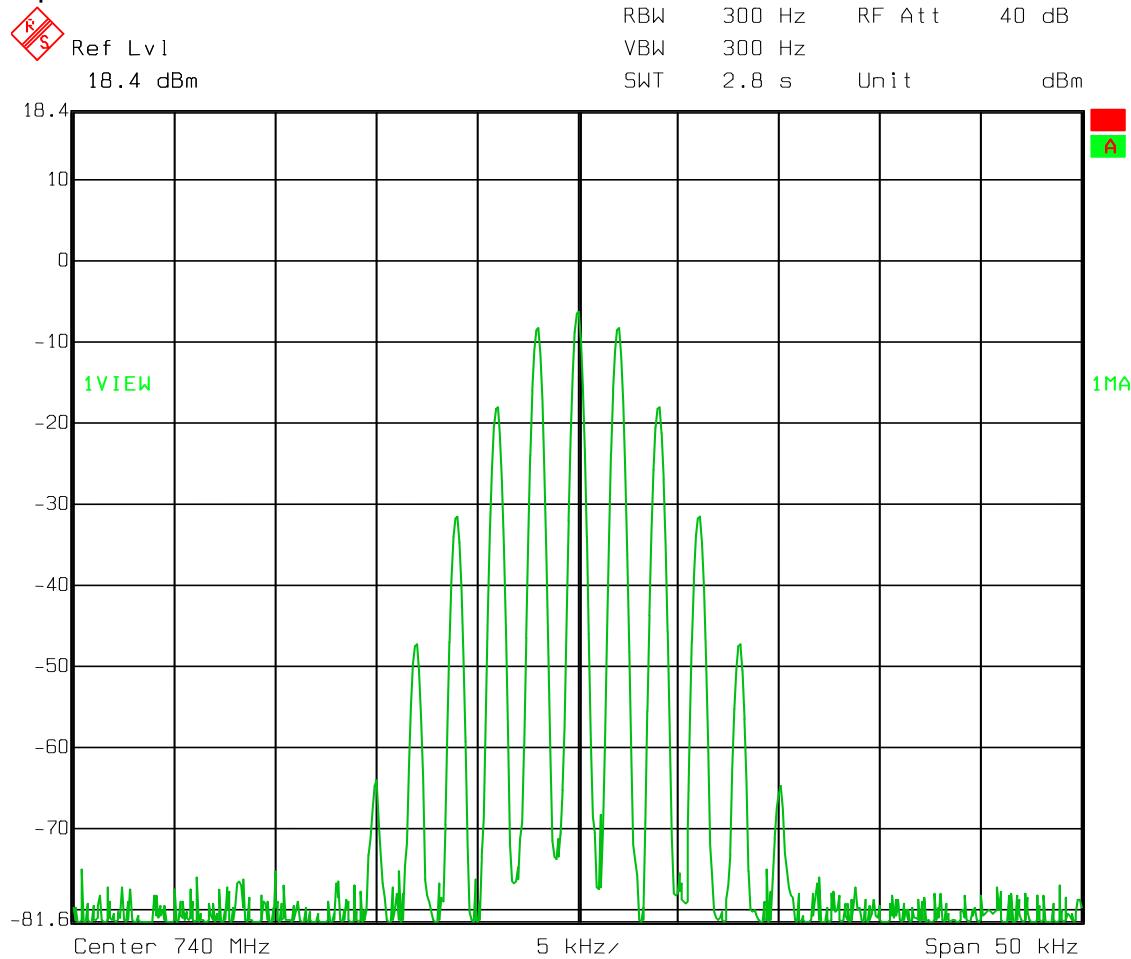
**Equipment Used:** 1767-1082-1472-1469**Measurement Uncertainty:**  +/- 1.7 dB**Temperature:**  22  °C**Relative Humidity:**  45  %

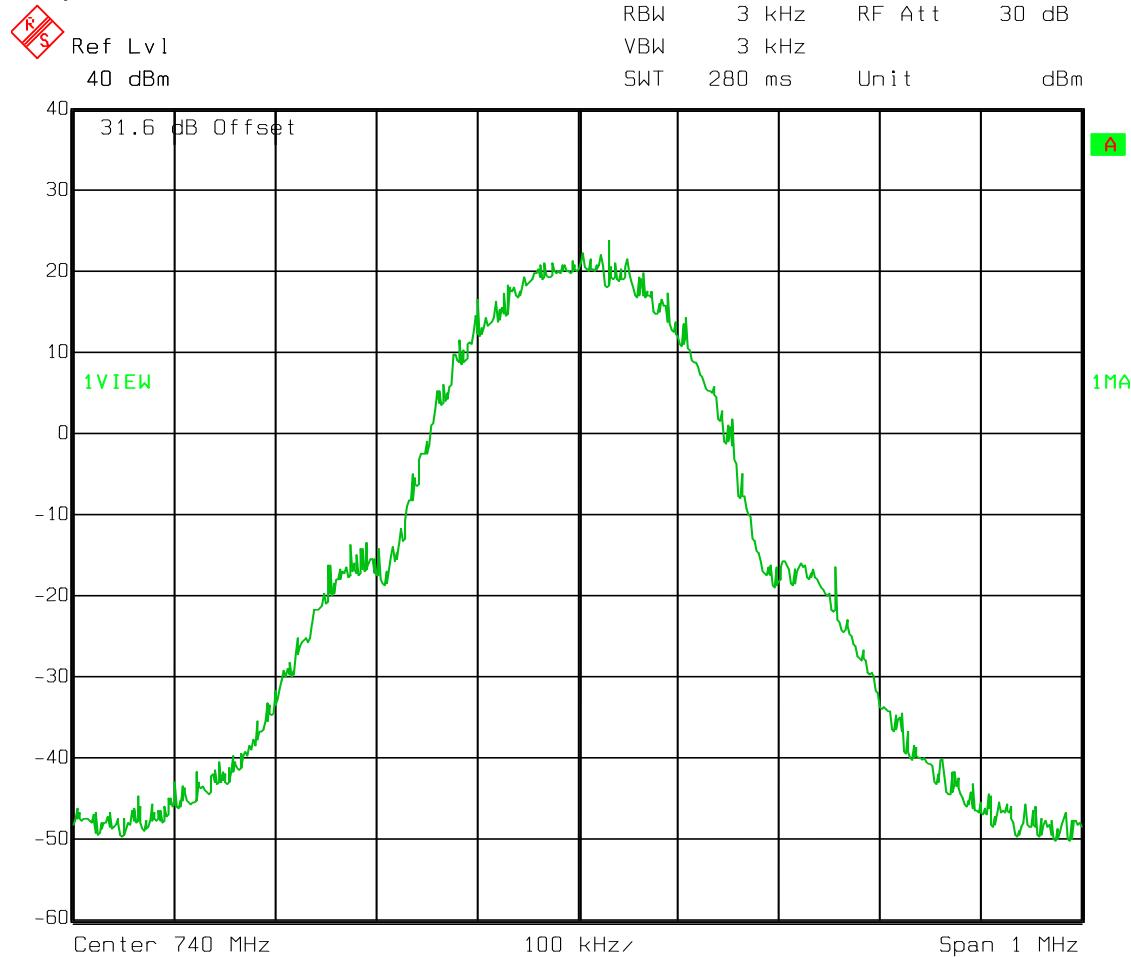
**Section 4. Occupied Bandwidth**

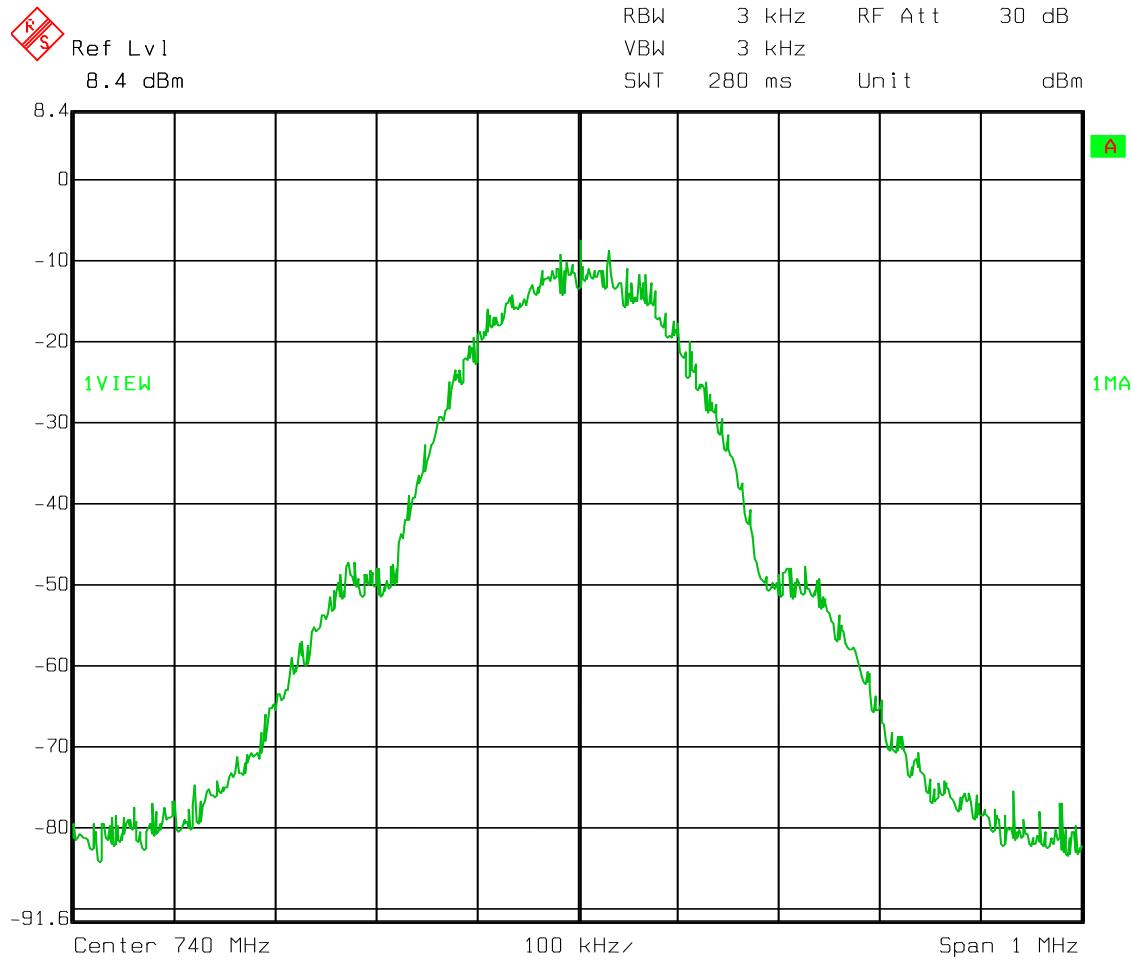
NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 23 May 2011

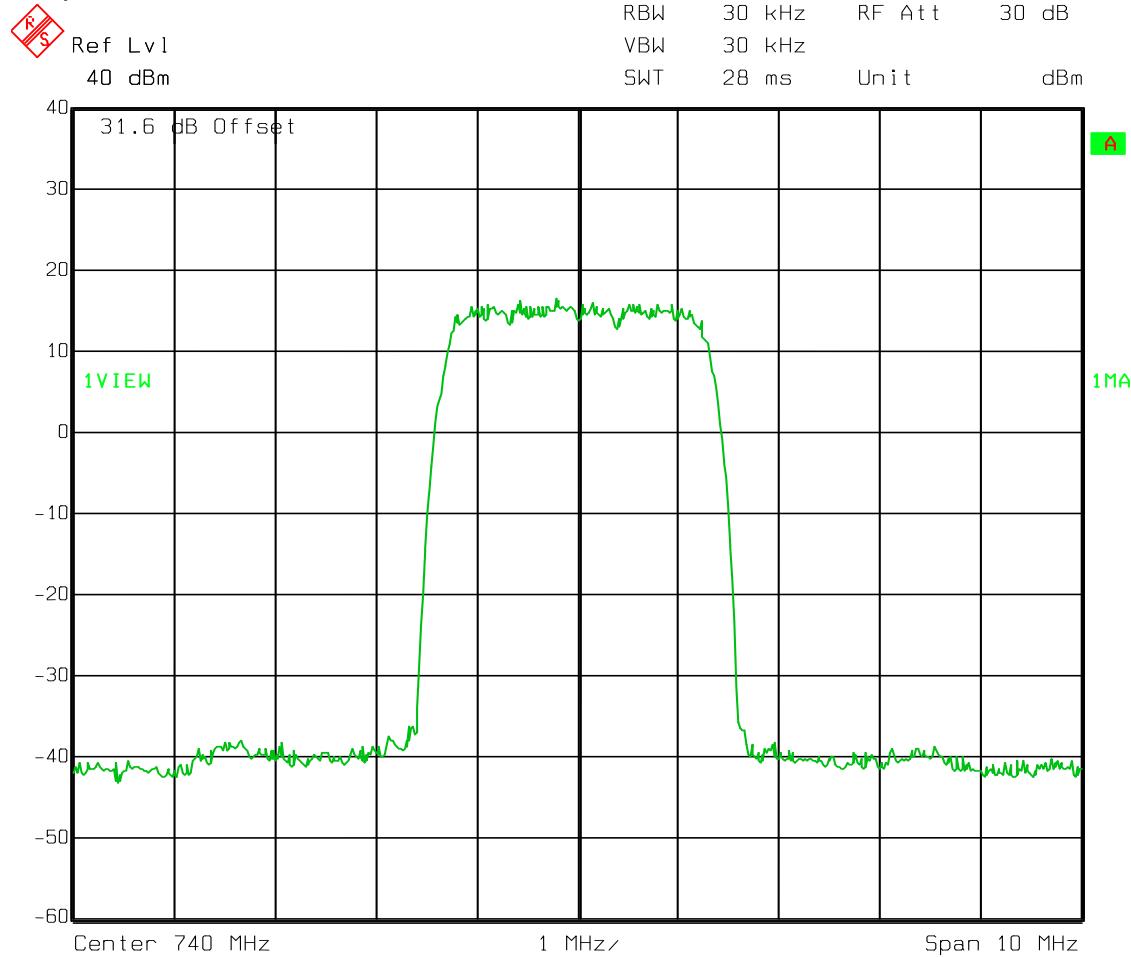
**Test Results:** Complies.**Test Data:** See attached plot(s).**Equipment Used:** 1767-1082-1472-1469**Measurement Uncertainty:** 1X10<sup>-7</sup> ppm**Temperature:** 22 °C**Relative Humidity:** 45 %

**Test Data – Occupied Bandwidth****Analog****2 kHz tone / 2.5 kHz deviation****Output**

**Test Data – Occupied Bandwidth**Analog  
Input

**Test Data – Occupied Bandwidth****GSM**  
Output

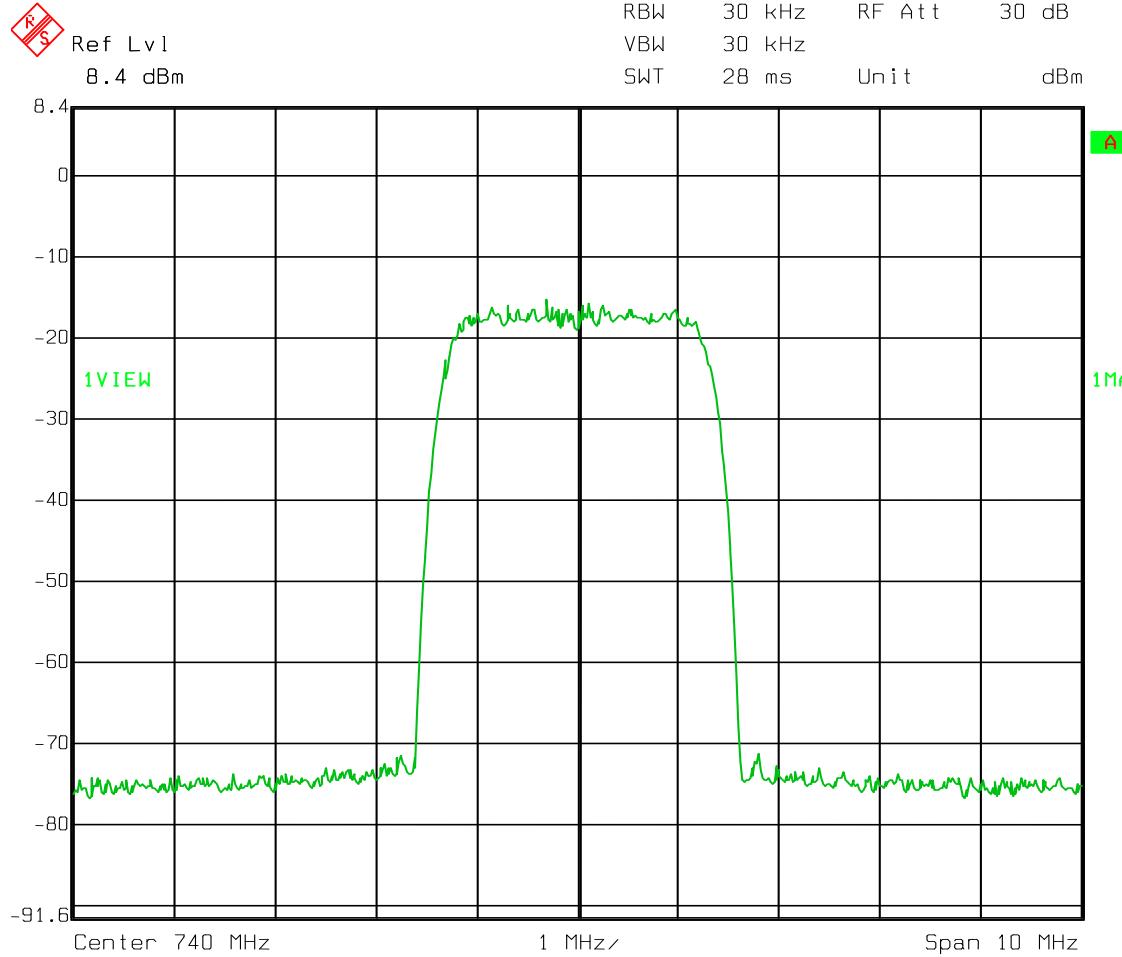
**Test Data – Occupied Bandwidth**Input  
GSM

**Test Data – Occupied Bandwidth LTE  
Output**

**Test Data – Occupied Bandwidth**

LTE

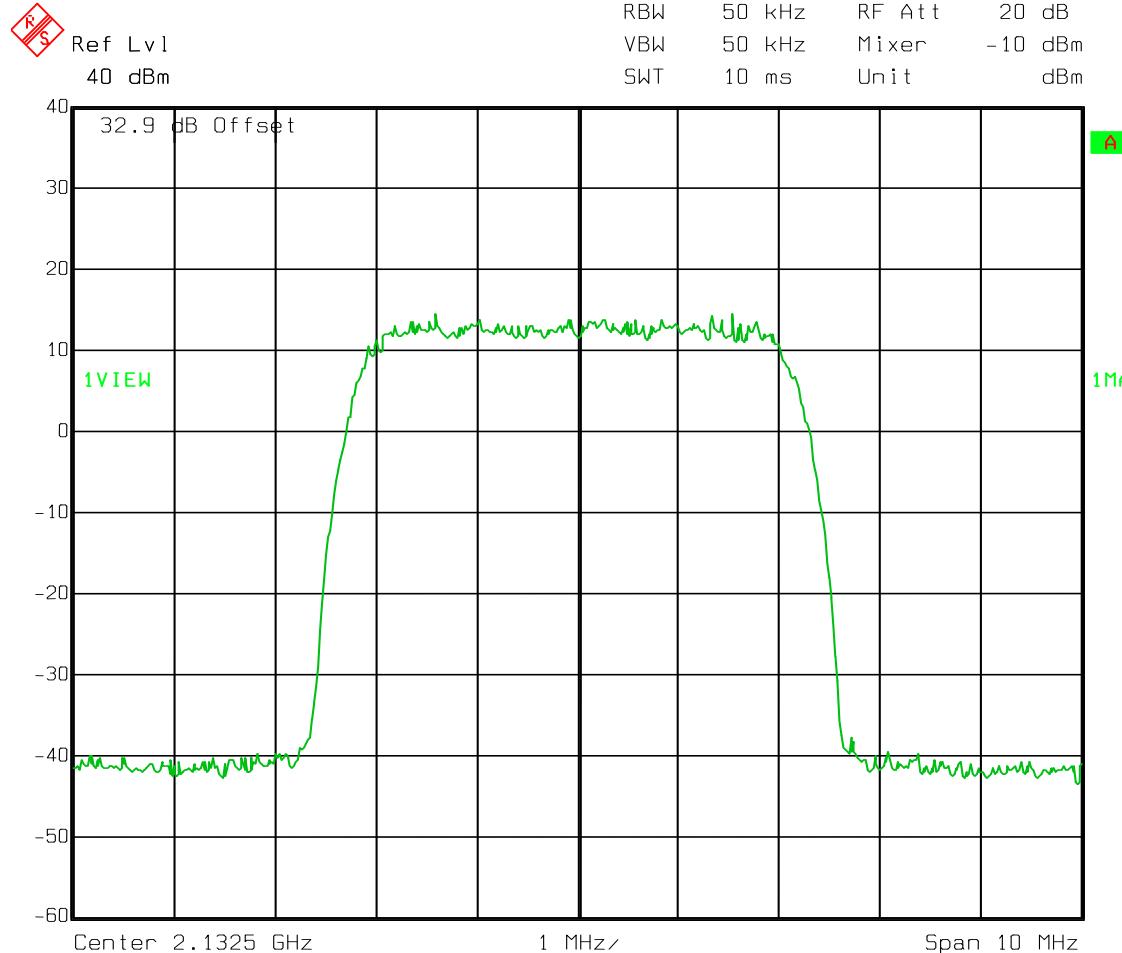
Input



**Test Data – Occupied Bandwidth**

WCDMA

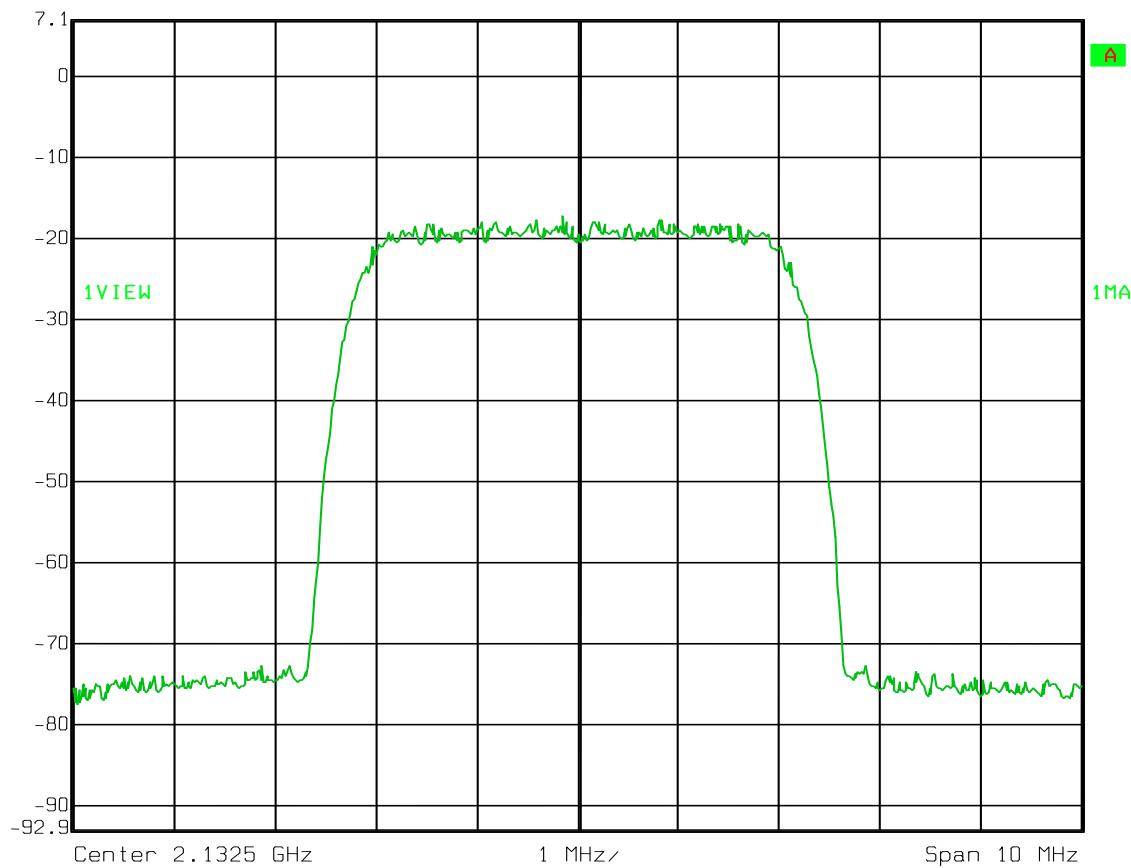
Output

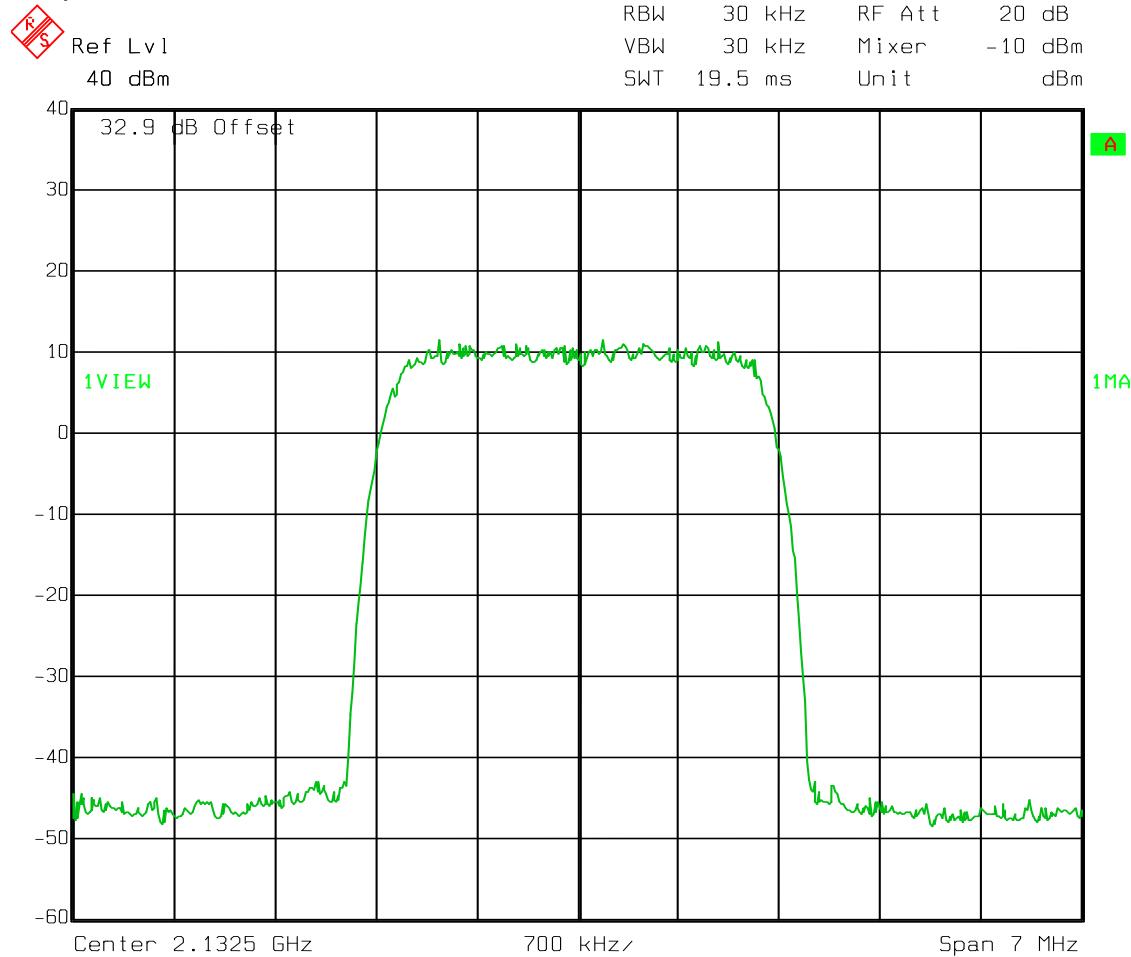


**Test Data – Occupied Bandwidth**

WCDMA

Input

Ref Lvl  
7.1 dBmRBW 50 kHz RF Att 20 dB  
VBW 50 kHz Mixer -10 dBm  
SWT 10 ms Unit dBm

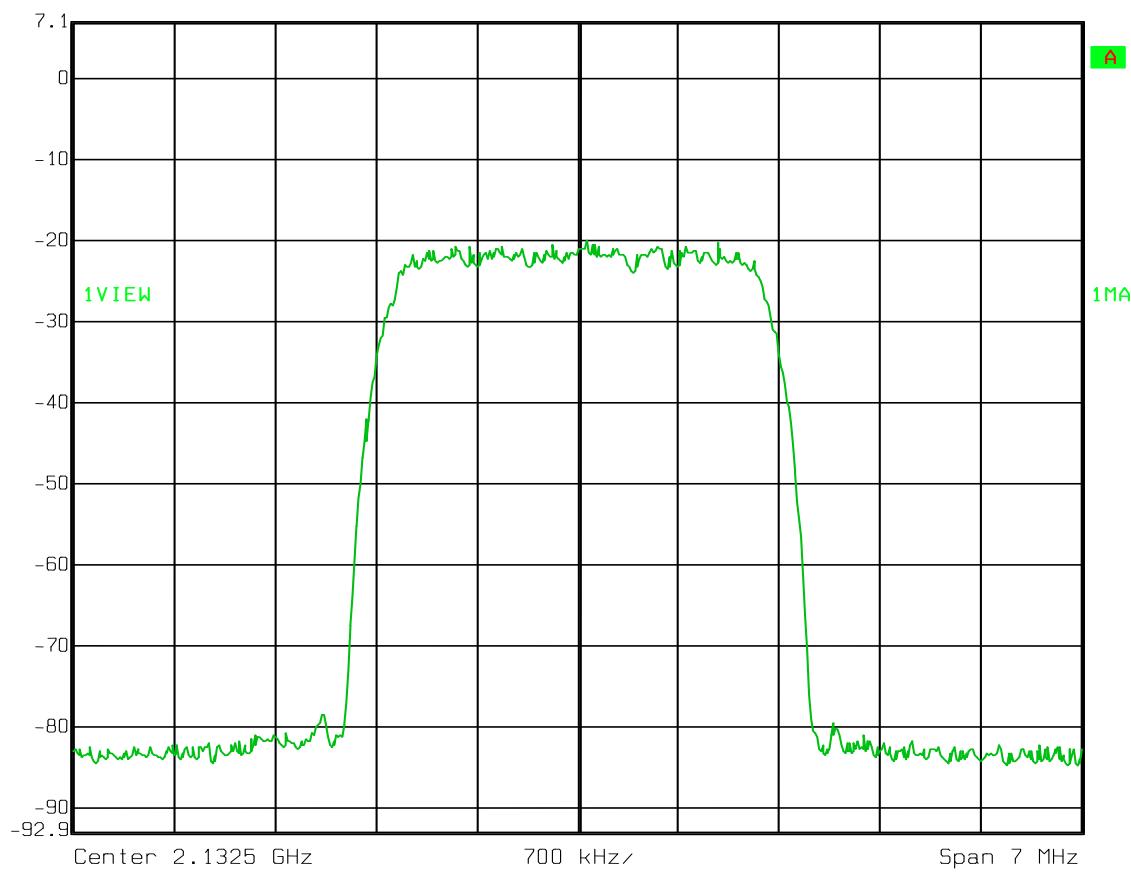
**Test Data – Occupied Bandwidth****LTE  
Output**

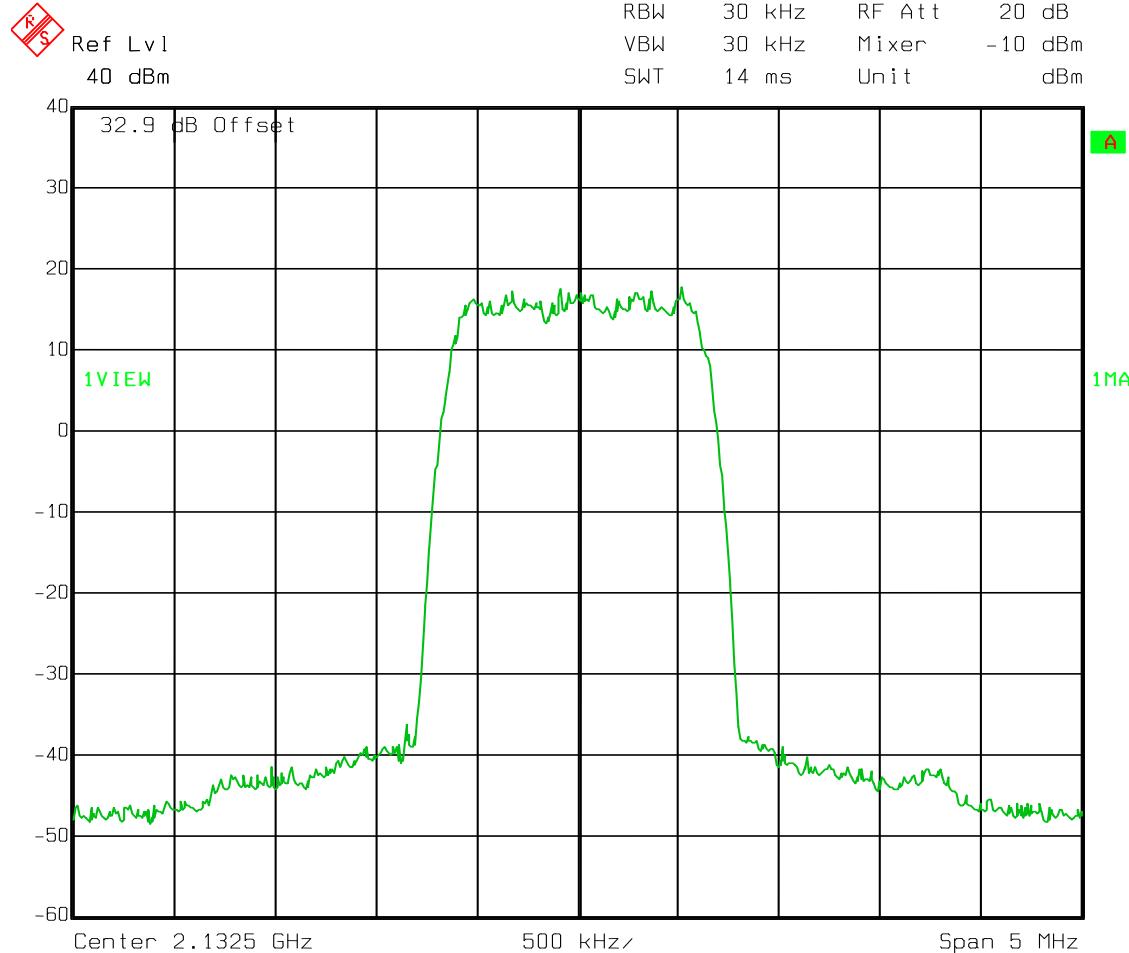
**Test Data – Occupied Bandwidth****Input****LTE**

Ref Lvl

7.1 dBm

RBW	30 kHz	RF Att	20 dB
VBW	30 kHz	Mixer	-10 dBm
SWT	19.5 ms	Unit	dBm

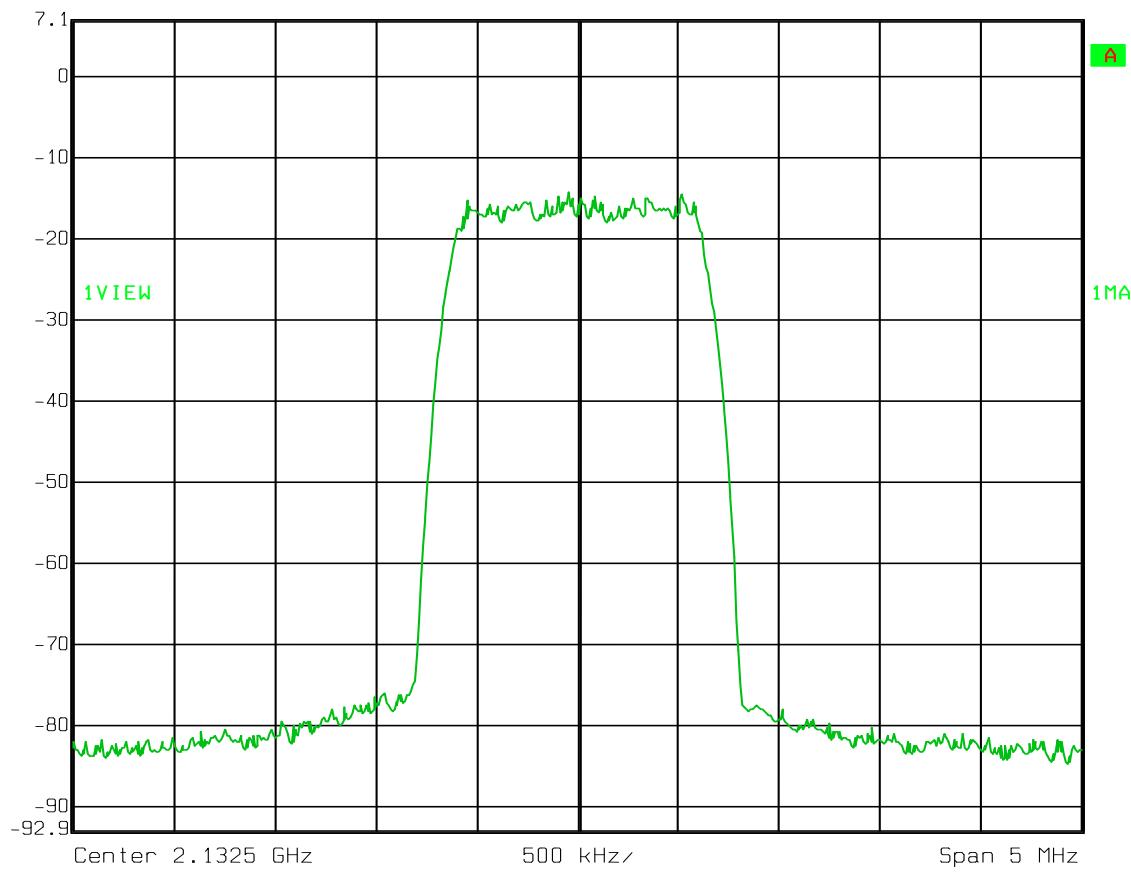


**Test Data – Occupied Bandwidth****CDMA**  
**Output**

**Test Data – Occupied Bandwidth**

CDMA

Input

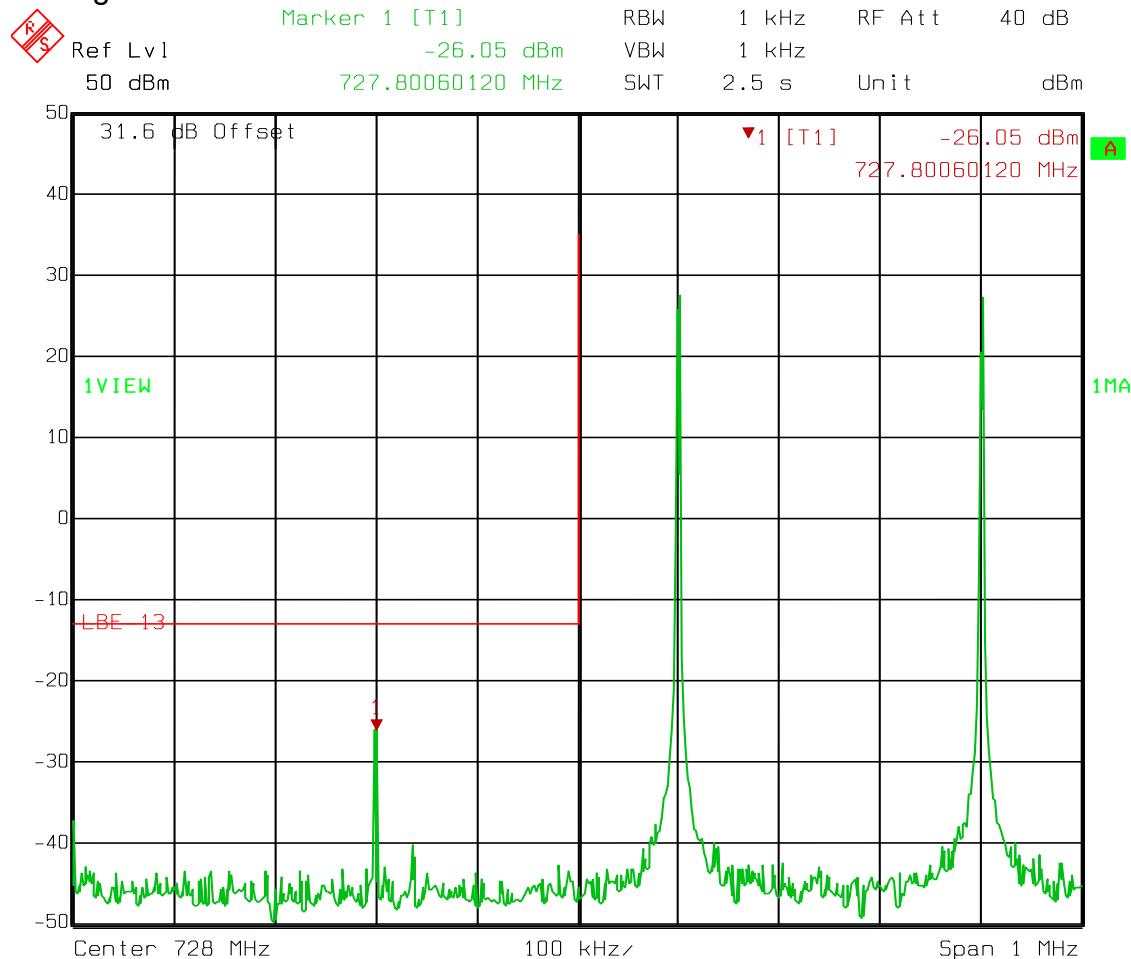
Ref Lvl  
7.1 dBmRBW 30 kHz RF Att 20 dB  
VBW 30 kHz Mixer -10 dBm  
SWT 14 ms Unit dBm

Date: 18.MAY 2011 09:32:20

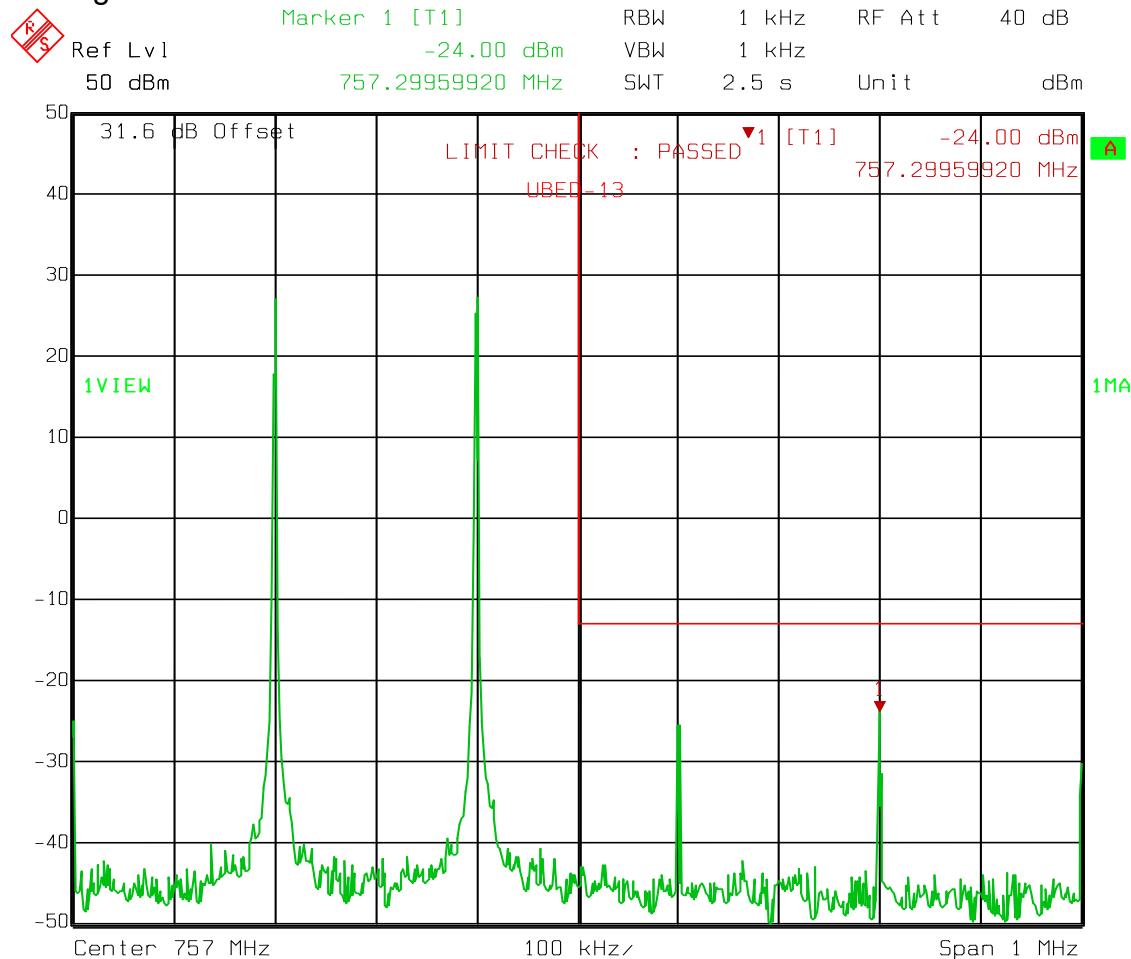
**Section 5.      Conducted Spurious Emissions**

NAME OF TEST: Conducted Spurious Emissions	PARA. NO.: 27.53
TESTED BY: David Light	DATE: 23 May 2011

**Test Results:** Complies.**Test Data:** See attached plot(s).**Equipment Used:** 1767-1082-1472-1469**Measurement Uncertainty:** +/- 1.7 dB**Temperature:** 22 °C**Relative Humidity:** 48 %

**Test Data – Spurious Emissions at Antenna Terminals**Low Edge  
Analog

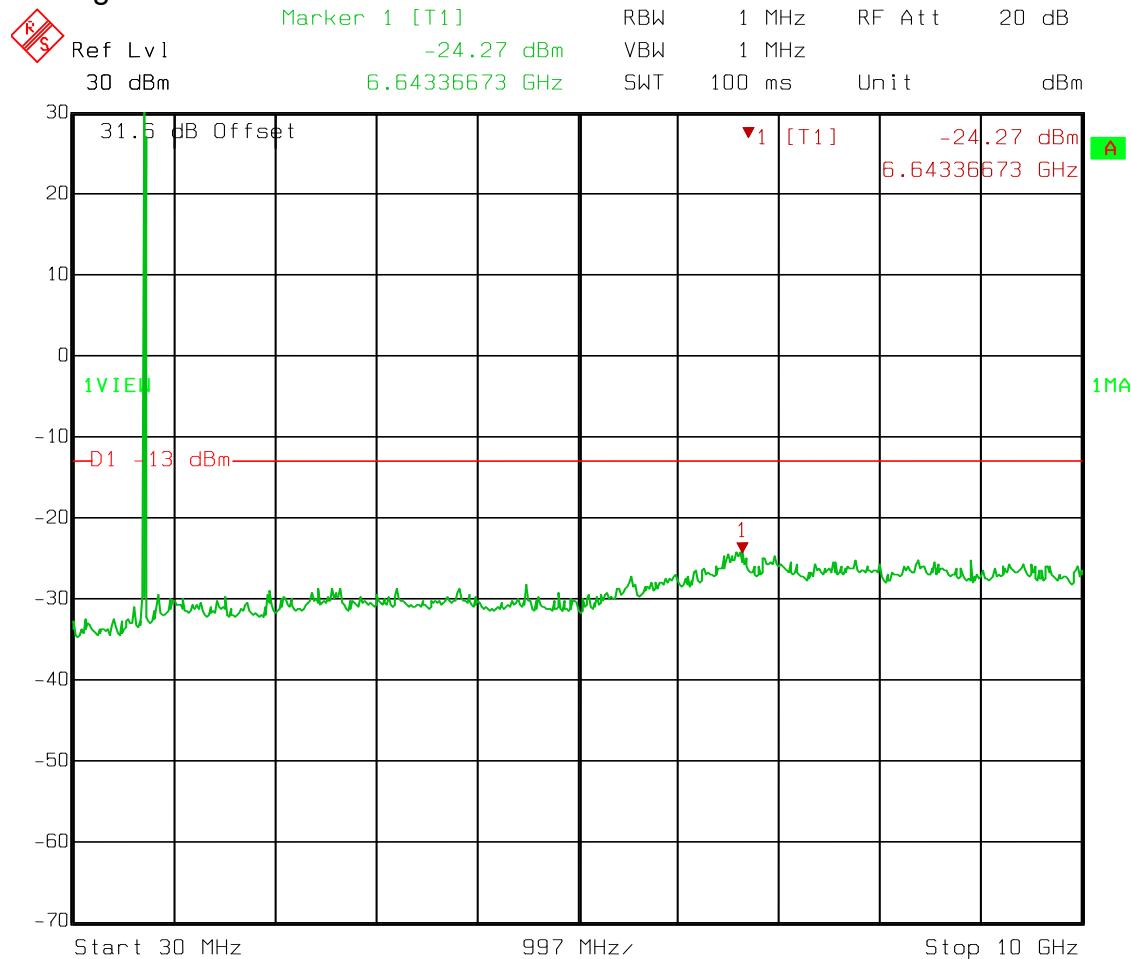
## Test Data – Spurious Emissions at Antenna Terminals

High Edge  
Analog

## Test Data – Spurious Emissions at Antenna Terminals

## Spurs

## Analog

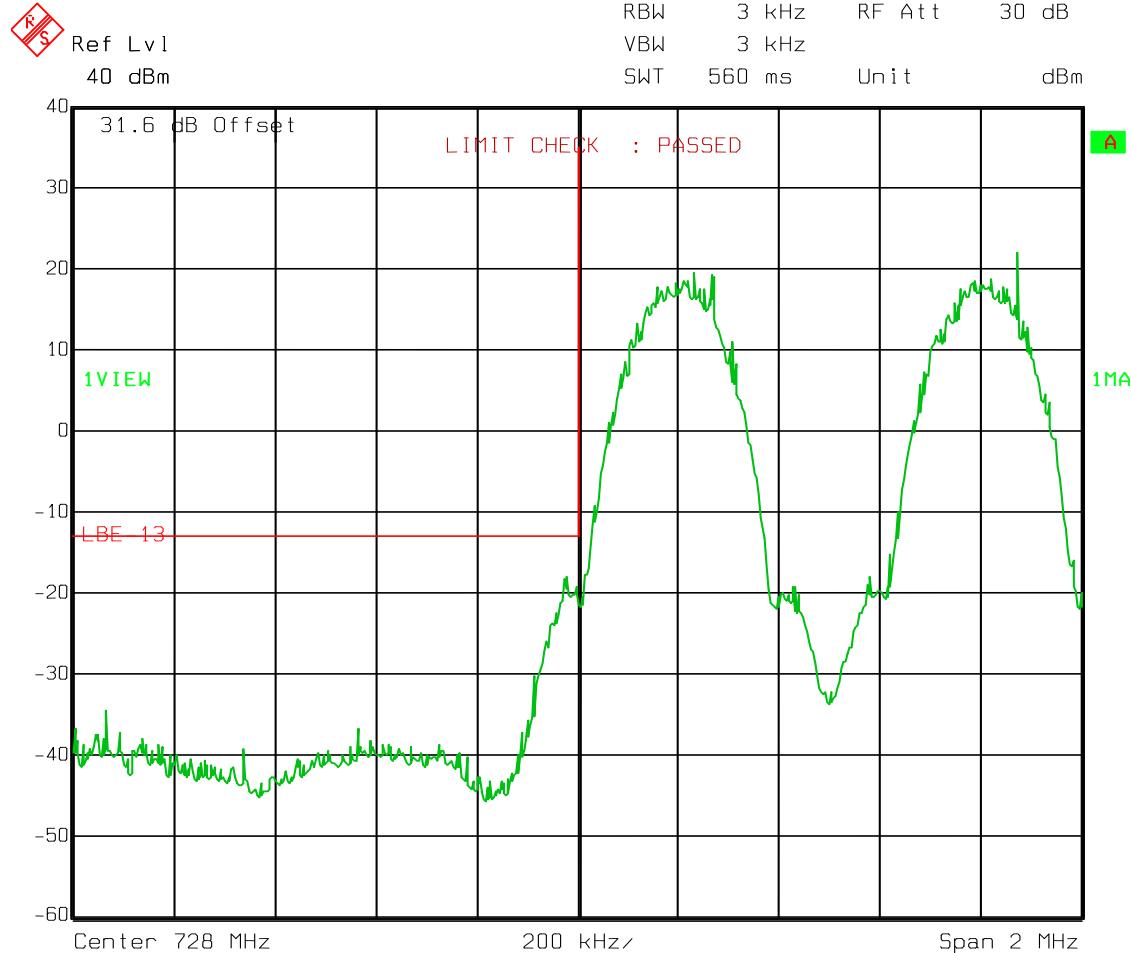


Date: 17.MAY 2011 12:56:21

## Test Data – Spurious Emissions at Antenna Terminals

GSM

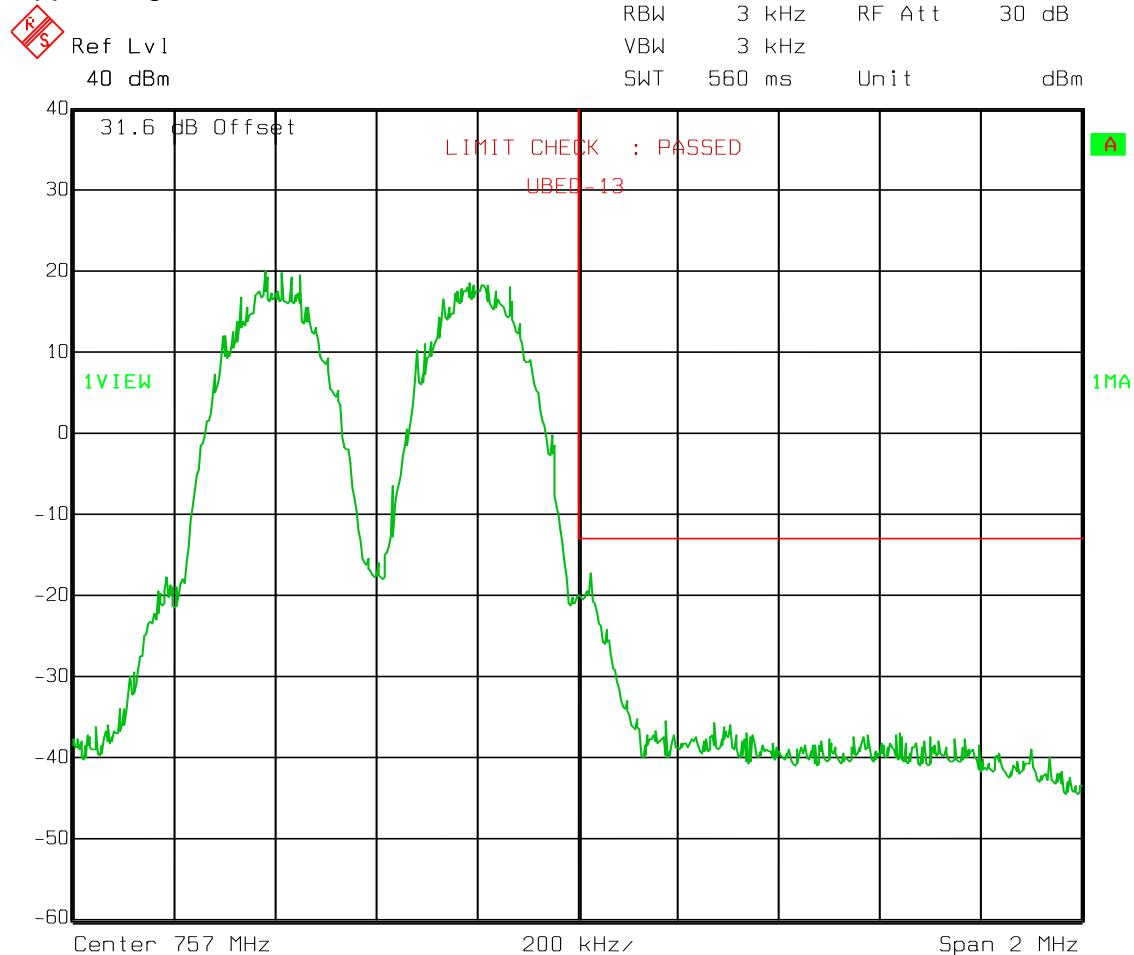
Lower Edge



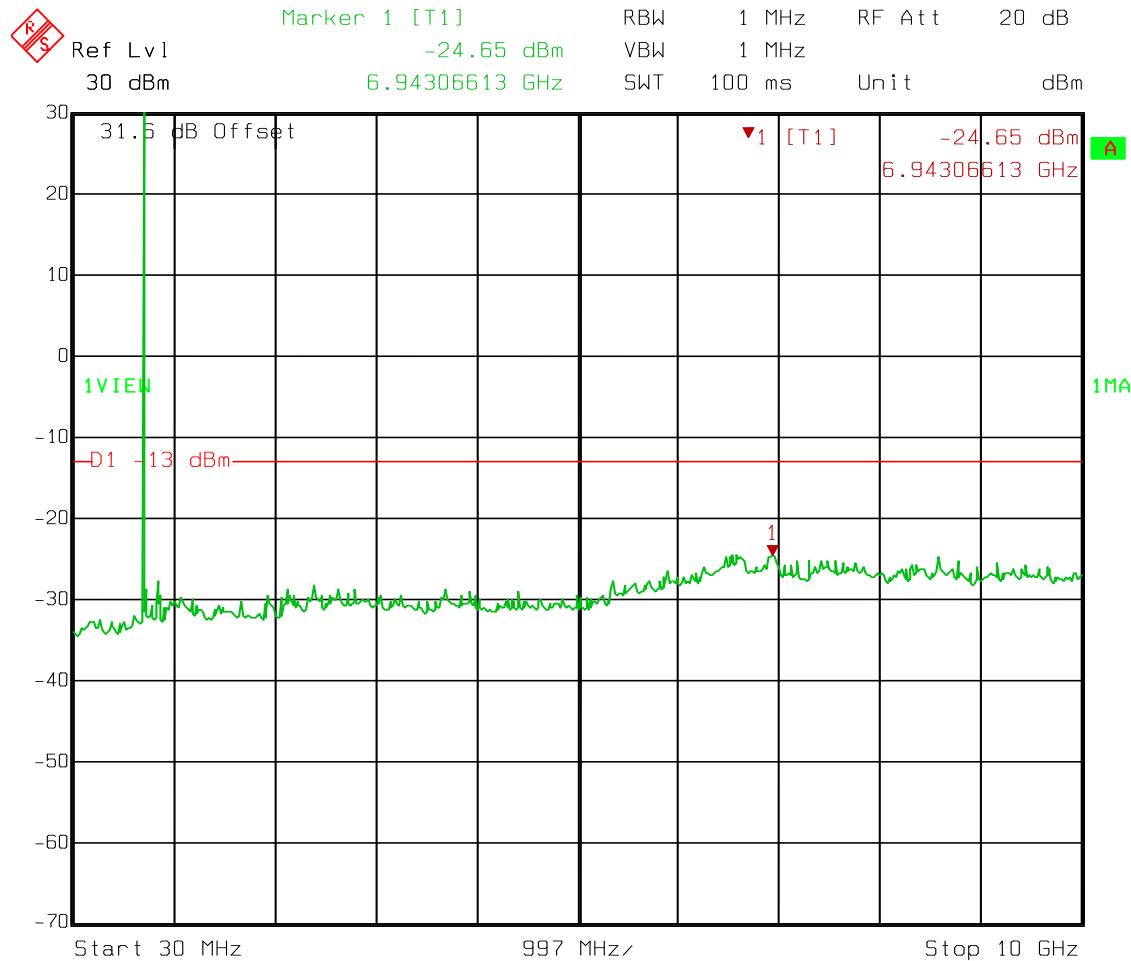
## Test Data – Spurious Emissions at Antenna Terminals

GSM

Upper Edge



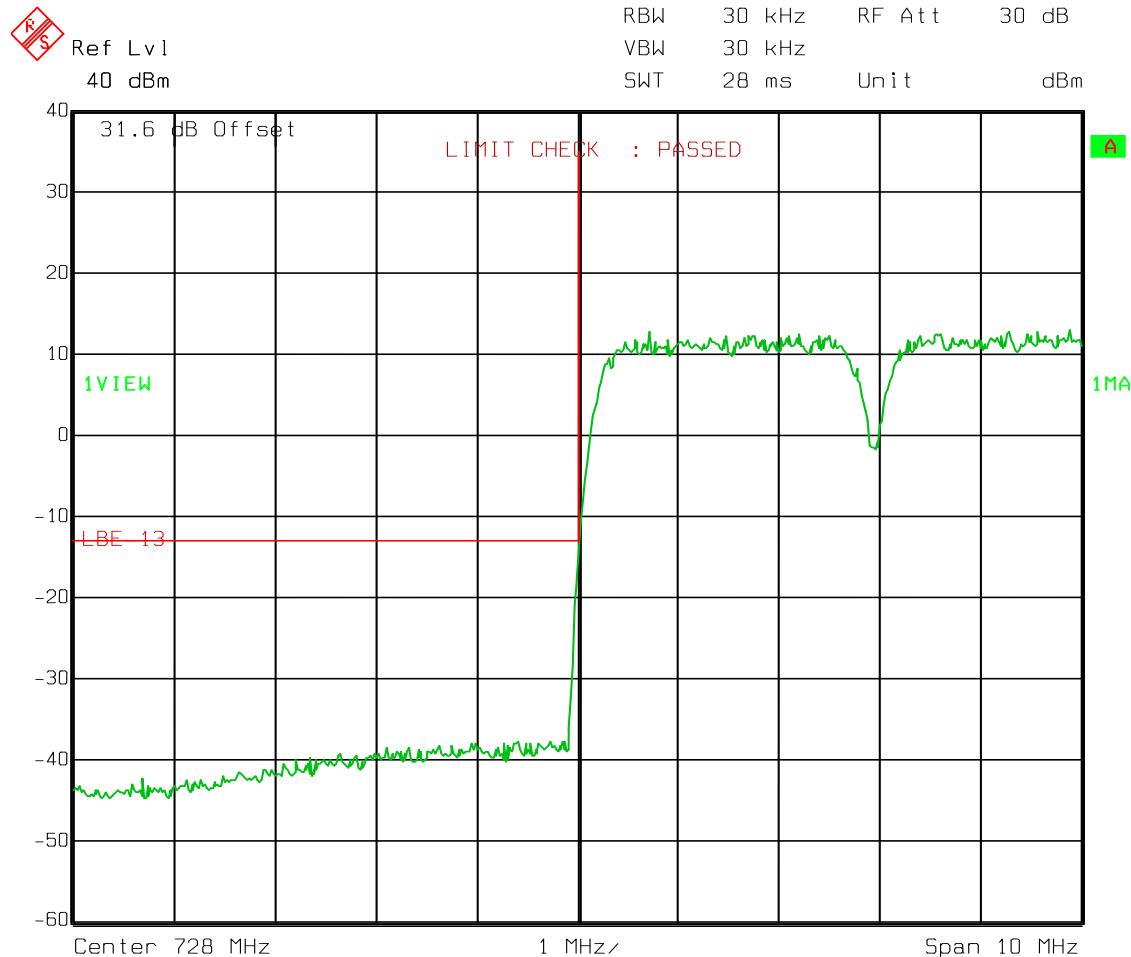
## Test Data – Spurious Emissions at Antenna Terminals

Spurs  
GSM

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

Lower Edge

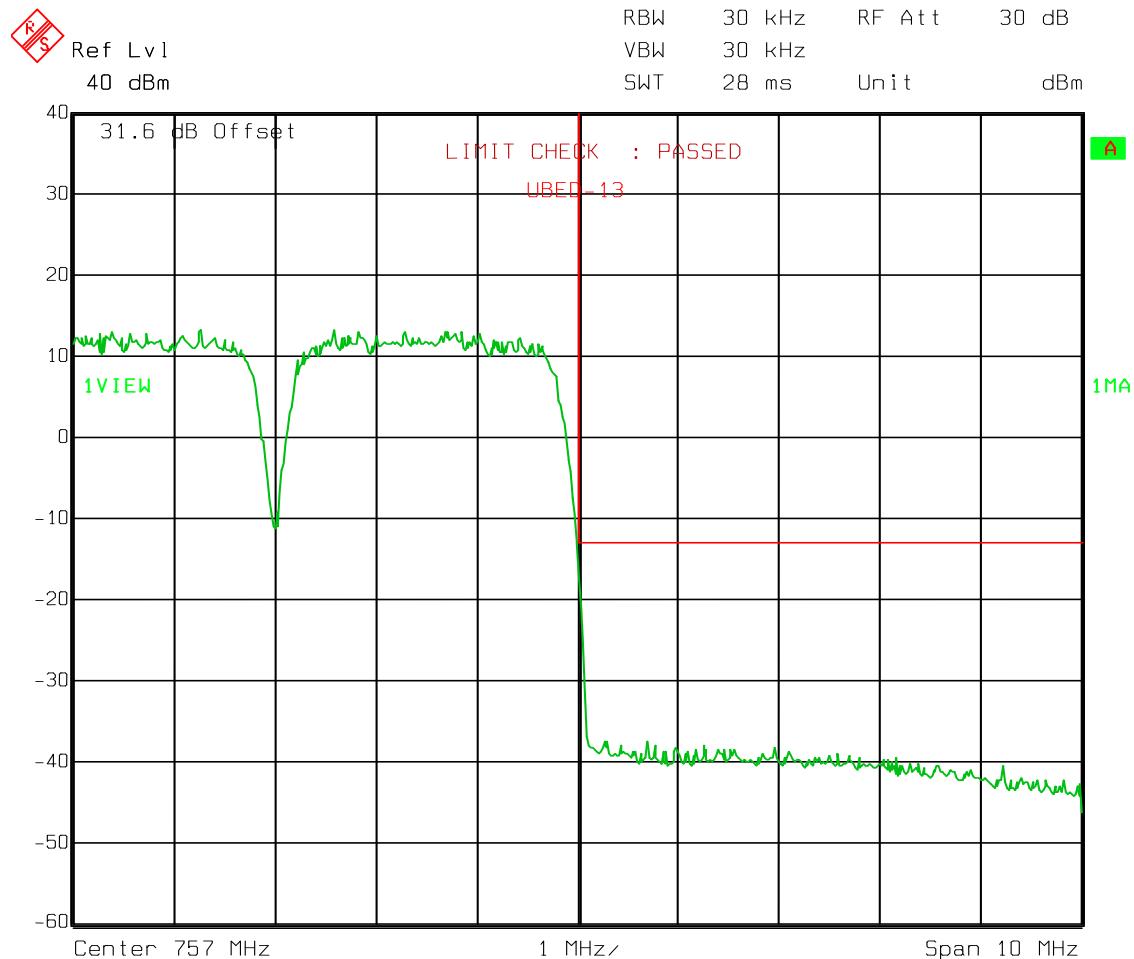
LTE



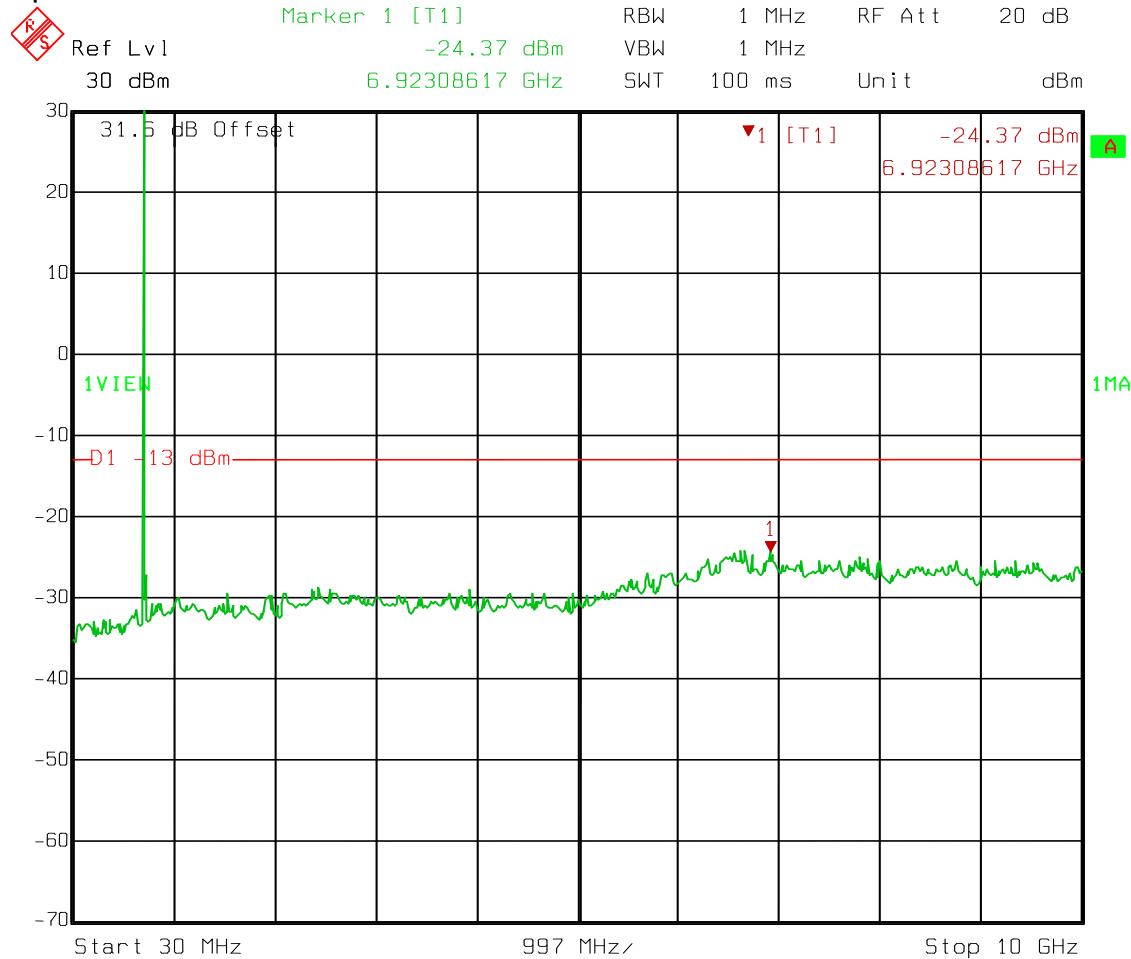
## Test Data – Spurious Emissions at Antenna Terminals

Upper Edge

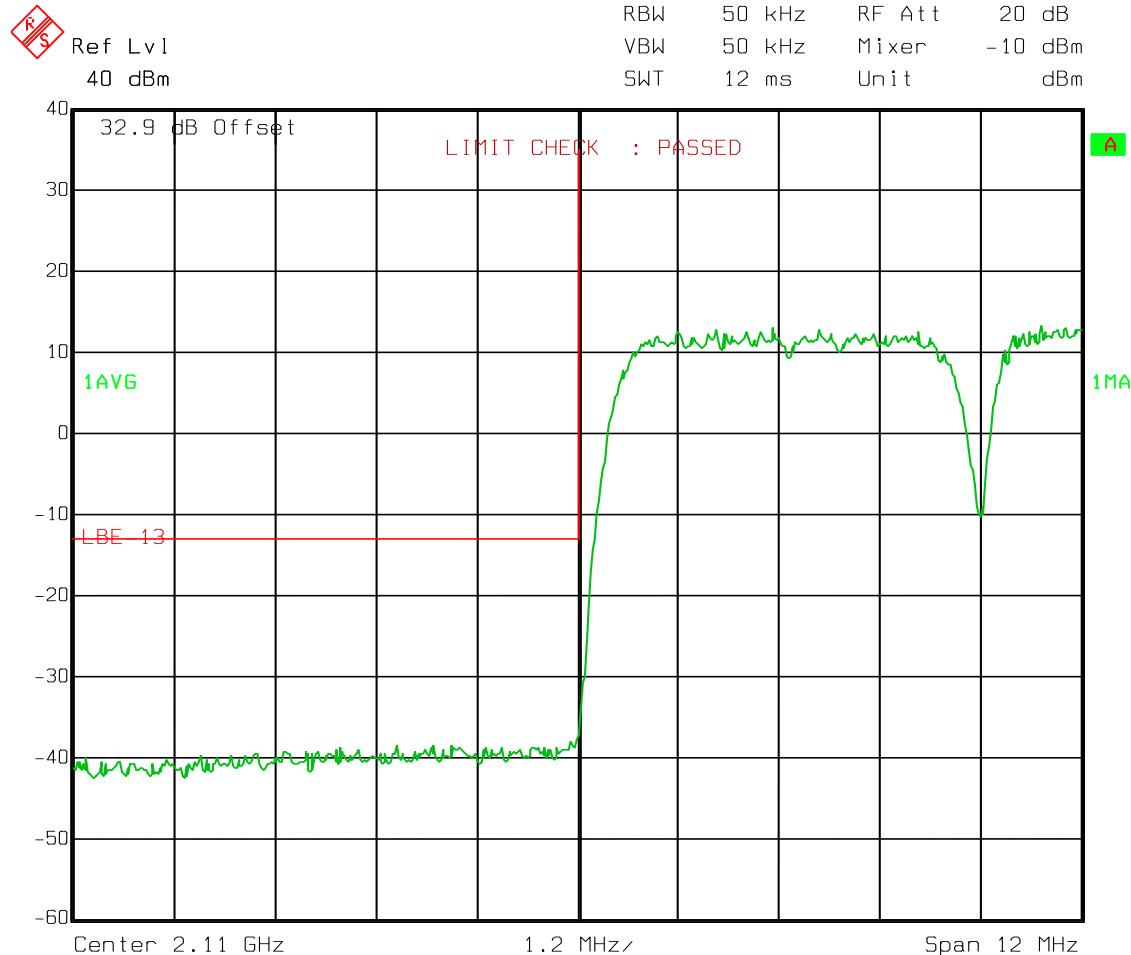
LTE



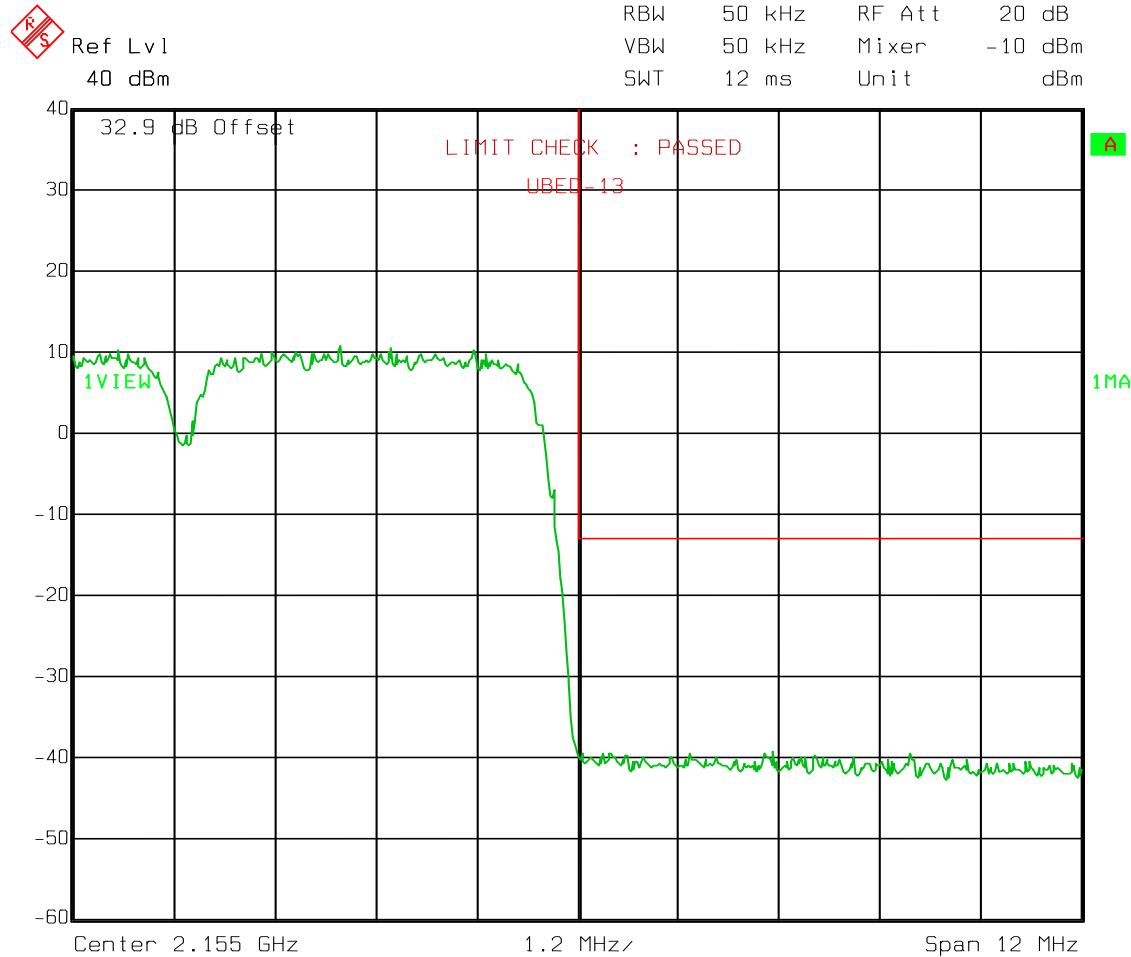
## Test Data – Spurious Emissions at Antenna Terminals

LTE  
Spurs

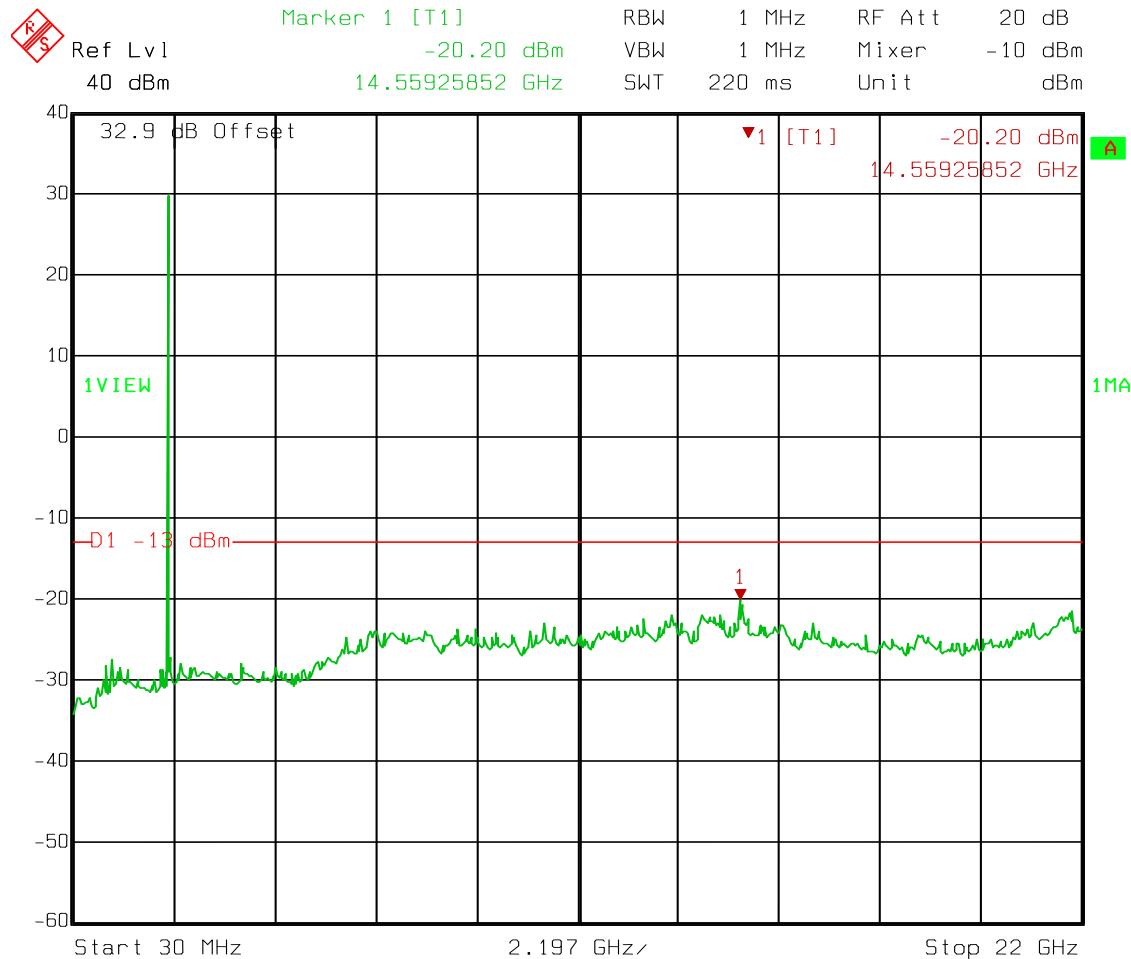
## Test Data – Spurious Emissions at Antenna Terminals

Low Edge  
WCDMA

## Test Data – Spurious Emissions at Antenna Terminals

High Edge  
WCDMA

## Test Data – Spurious Emissions at Antenna Terminals

Spurs  
WCDMA

## Test Data – Spurious Emissions at Antenna Terminals

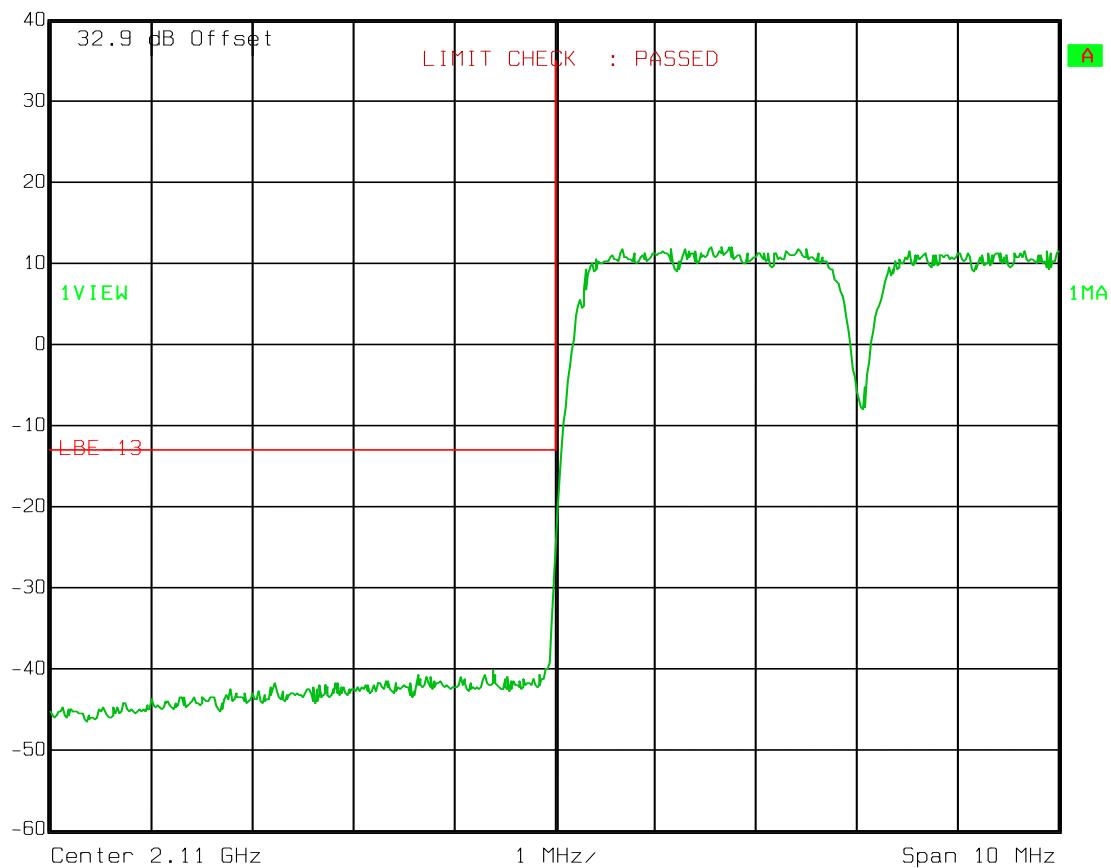
LTE

Lower Edge



Ref Lvl

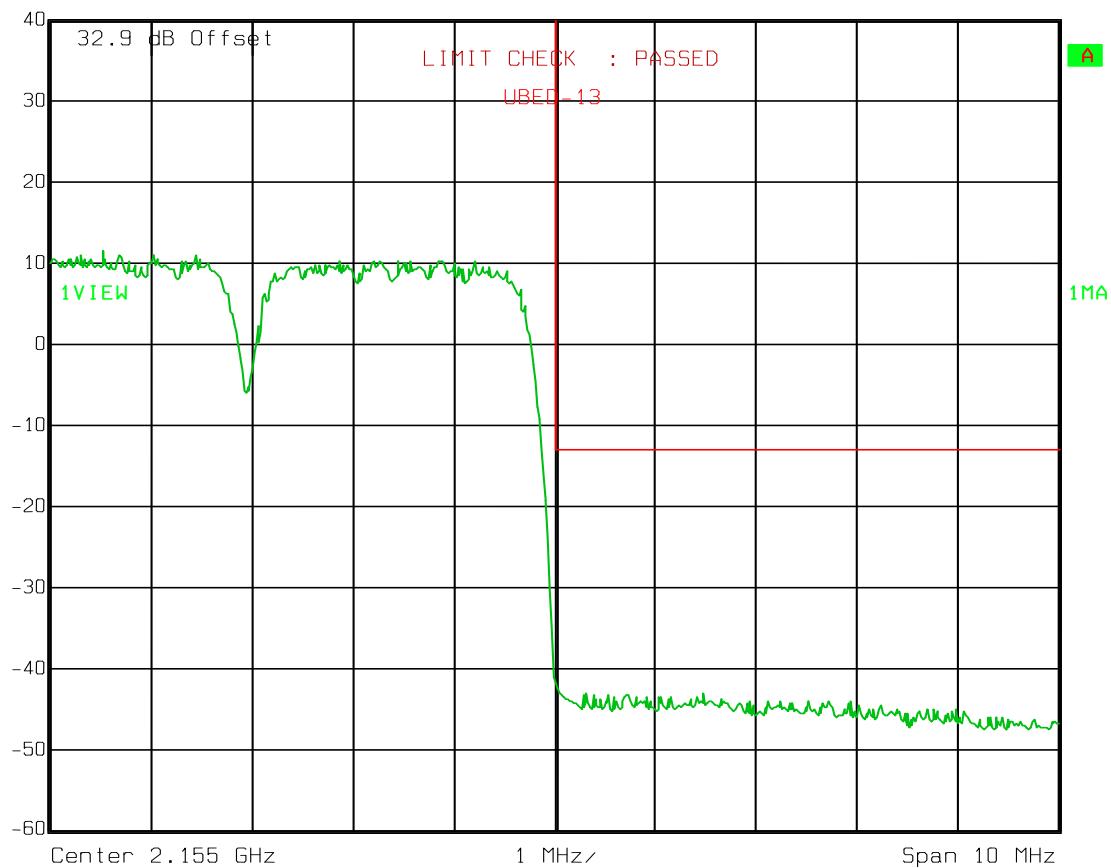
40 dBm

RBW 30 kHz RF Att 20 dB  
VBW 30 kHz Mixer -10 dBm  
SWT 28 ms Unit dBm

## Test Data – Spurious Emissions at Antenna Terminals

LTE

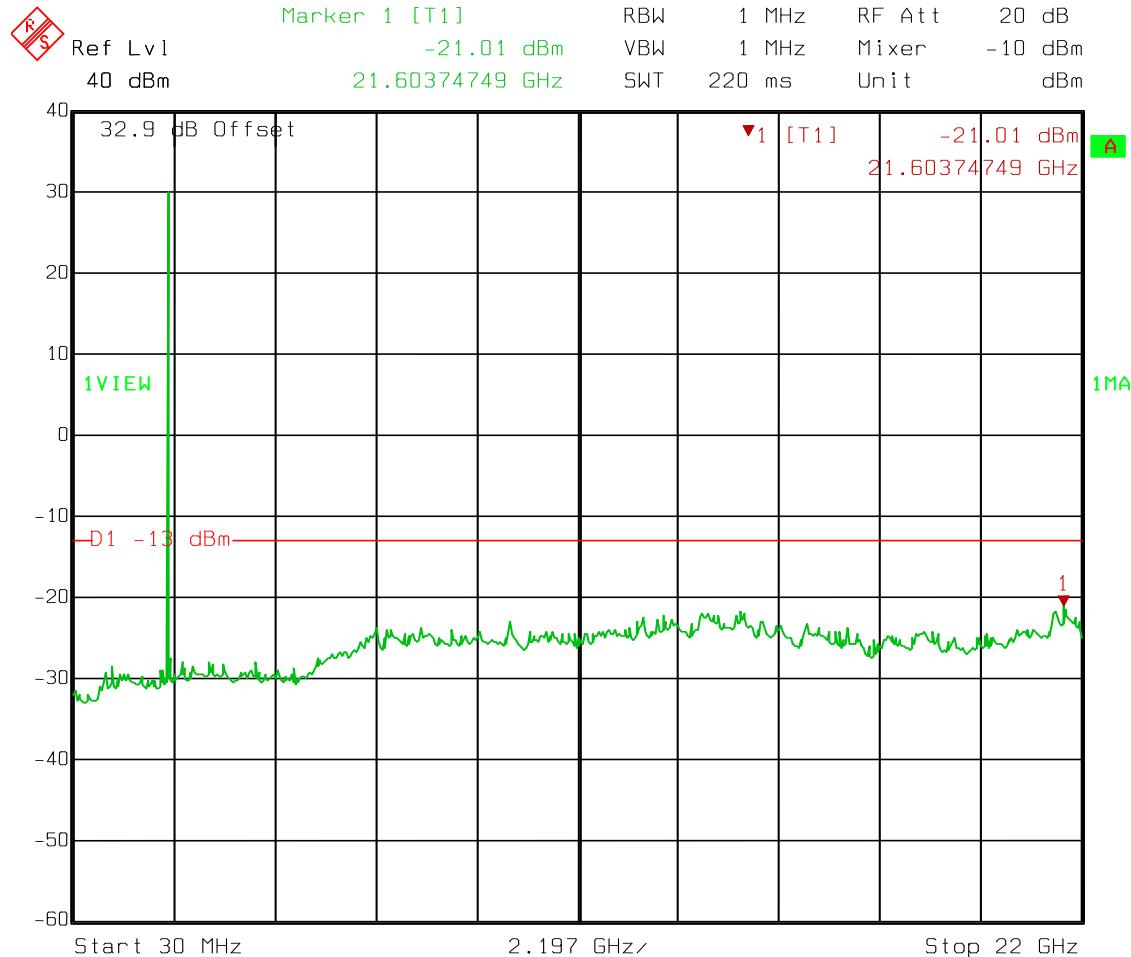
Upper Edge

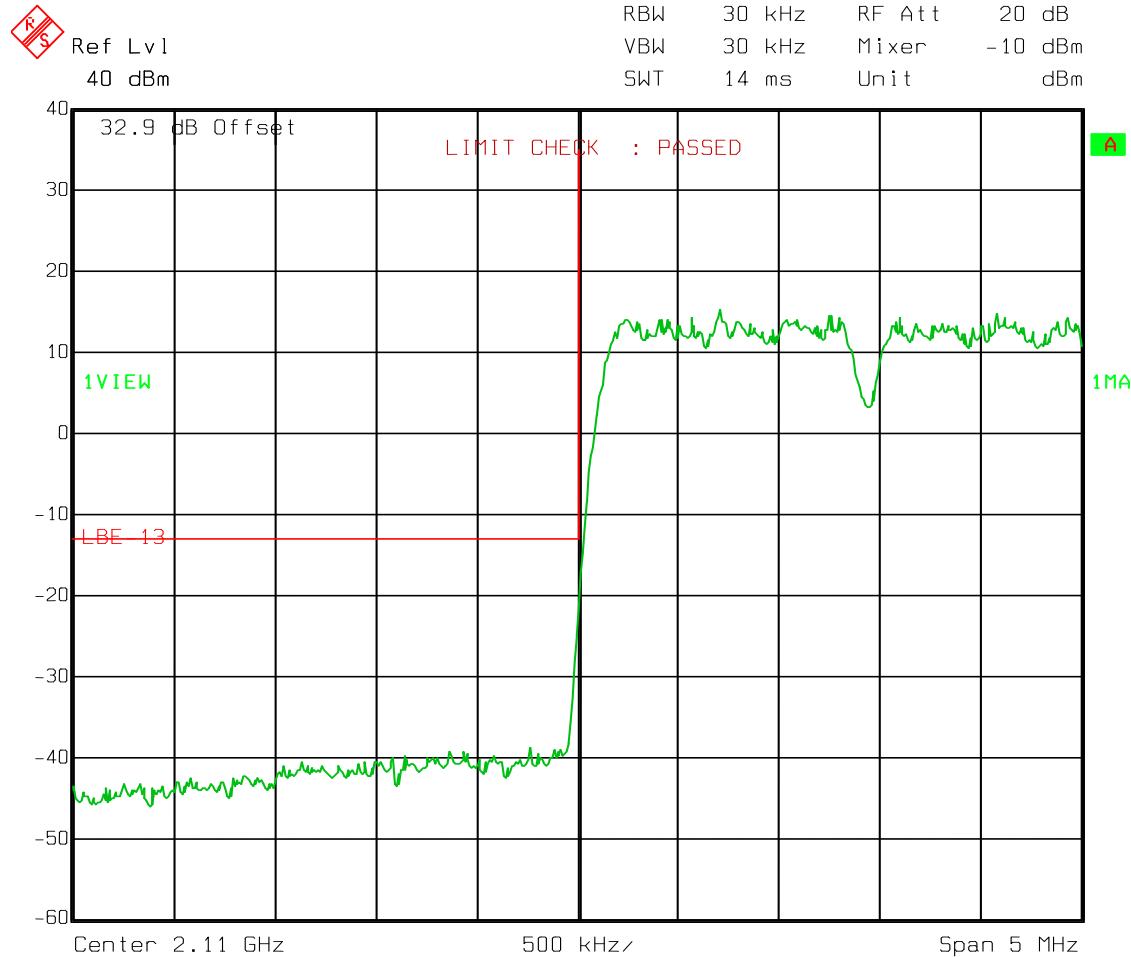
Ref Lvl  
40 dBmRBW 30 kHz RF Att 20 dB  
VBW 30 kHz Mixer -10 dBm  
SWT 28 ms Unit dBm

## Test Data – Spurious Emissions at Antenna Terminals

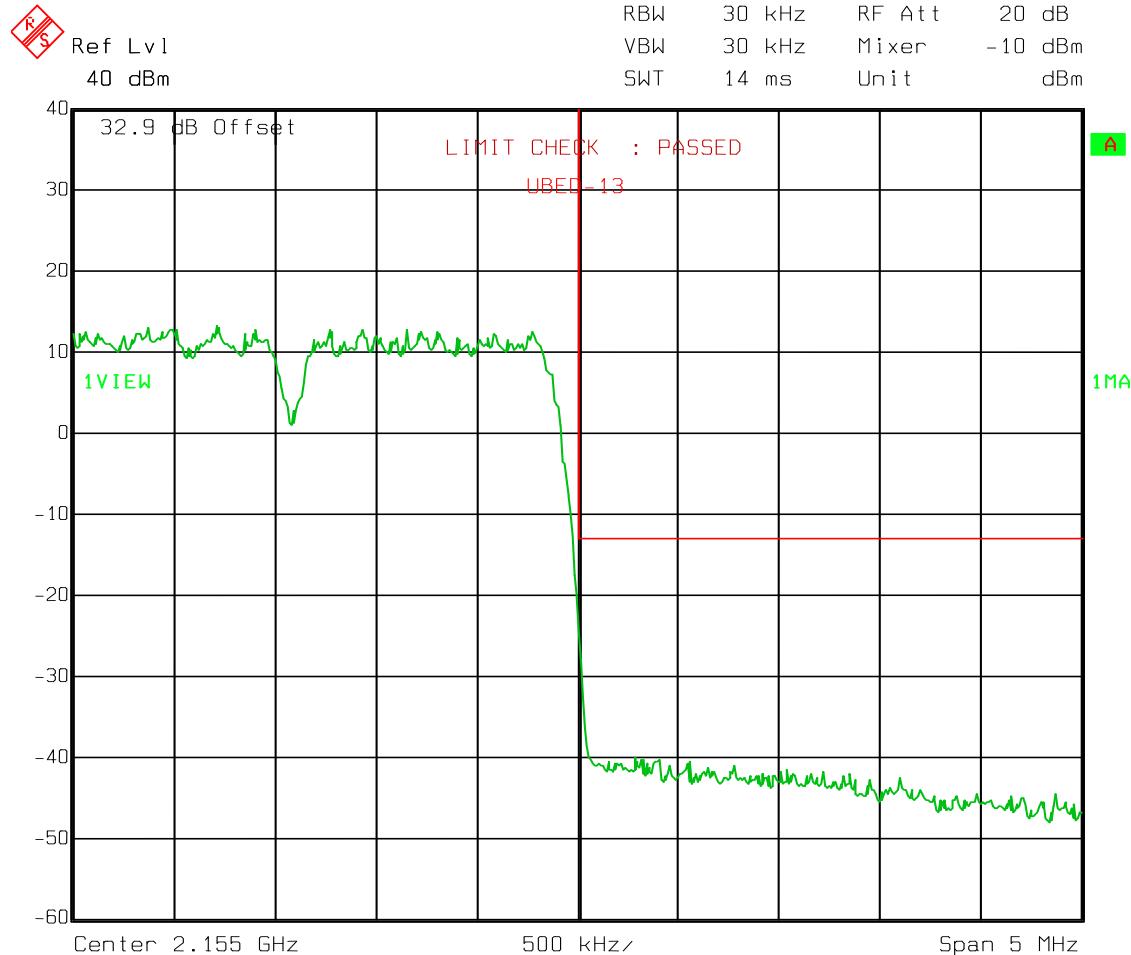
Spurs

LTE



**Test Data – Spurious Emissions at Antenna Terminals****Lower Edge**  
**CDMA**

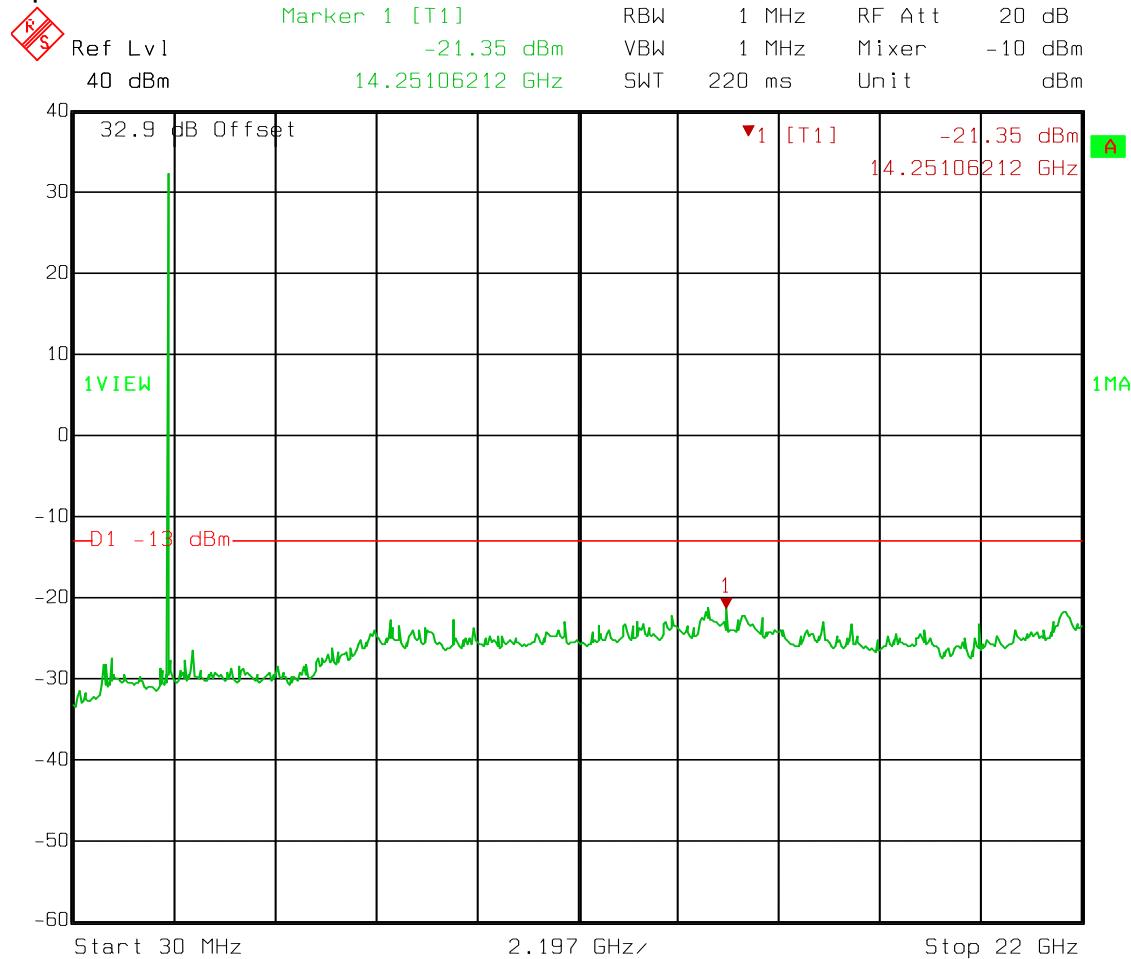
## Test Data – Spurious Emissions at Antenna Terminals

Upper Edge  
CDMA

## Test Data – Spurious Emissions at Antenna Terminals

CDMA

Spurs



**Section 6. Field Strength of Spurious**

NAME OF TEST: Field Strength of Spurious Emissions PARA. NO.: 27.53

TESTED BY: David Light DATE: 24 May 2011

**Test Results:** Complies.**Test Data:** The spectrum was searched from 30 MHz to the tenth harmonic of the carrier. There were no emissions detected above the noise floor which was at least 20 dB below the specification limit.

RBW=VBW=100 kHz below 1000 MHz

RBW=VBW=1 MHz above 1000 MHz

Peak detector

**Equipment Used:** 1767-1484-1485-1016-993-791-1763**Measurement Uncertainty:** +/-1.7 dB**Temperature:** 24 °C**Relative Humidity:** 49 %

**Section 7. Test Equipment List**

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal	Next Cal
993	Antenna, Horn	A.H. Systems	SAS-200/571	162	09-Sep-2009	09-Sep-2011
1016	Preamplifier	Hewlett Packard	8449A	2749A00159	19-Jun-2010	19-Jun-2011
1082	Cable	Astrolab	32027-2-29094-72TC		N/R	
1469	Attenuator,	MCL Inc.	BW-S10W2 10db-2WDC		N/R	
1472	Attenuator,	Omni Spectra	20600-20db		N/R	
1484	Cable	Storm	PR90-010-072		19-Jun-2010	19-Jun-2011
1485	Cable	Storm	PR90-010-216		19-Jun-2010	19-Jun-2011
1763	Antenna, Bilog	Schaffner	CBL 6111D	22926	11-Feb-2011	11-Feb-2012
1767	Receiver	Rohde & Schwartz	ESIB26	837491/0002	01-Dec-2010	01-Dec-2011
791	Pre Amplifier	Nemko, USA	CRA69 321003 9605	119	19-May-2011	19-May-2012

**Nemko USA, Inc.**

*EQUIPMENT:* TFAH-US4B

CFR 47, PART 27, SUBPART C  
Miscellaneous Wireless Communication Services  
PROJECT NO.: 1028403RUS3

**ANNEX A - TEST DETAILS**

**NAME OF TEST: RF Power Output****PARA. NO.: 2.1046**

**Minimum Standard:** Para. No.27.53(d)(1). The power of each fixed or base station transmitting in the 2110-2155 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to a peak equivalent isotropically radiated power (EIRP) of 3280 watts. The power of each fixed or base station transmitting in the 2110-2155 MHz band from any other location is limited to a peak EIRP of 1640 watts. A licensee operating a base or fixed station utilizing a power of more than 1640 watts EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025-2110 MHz band. Operations above 1640 watts EIRP must also be coordinated in advance with the following licensees within 120 kilometers (75 miles) of the base or fixed station: all Broadband Radio Service (BRS) licensees authorized under Part 27 in the 2155-2160 MHz band and all AWS licensees in the 2110-2155 MHz band.

**Method Of Measurement:**Detachable Antenna:

The channel power integrated across the carrier's bandwidth at antenna terminals is measured using a spectrum analyzer. Power output is measured with the maximum rated input level.

Integral Antenna:

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

**NAME OF TEST: Occupied Bandwidth****PARA. NO.: 2.1049****Minimum Standard:** Input/Output**Method Of Measurement:****CDMA**

Spectrum analyzer settings:

RBW=VBW=30 kHz

Span: 5 MHz

Sweep: Auto

**GSM / EDGE**

RBW=VBW= 3 kHz

Span: 1 MHz

Sweep: Auto

**TDMA**

RBW=VBW= 1 kHz

Span: 1 MHz

Sweep: Auto

**W-CDMA**

RBW=VBW= 50 kHz

Span: 10 MHz

Sweep: Auto

**NAME OF TEST: Spurious Emission at Antenna Terminals PARA. NO.: 27.53**

**Minimum Standard:** Para. No.27.53(g) For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10} (P)$  dB.

**Method Of Measurement:**

Spectrum analyzer settings:

CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 30 kHz (< 1MHz from Band Edge)  
VBW:  $\geq$  RBW  
Sweep: Auto  
Video Avg: 6 Sweeps

GSM / EDGE

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 3 kHz (< 1 MHz from Band Edge)  
VBW:  $\geq$  RBW  
Sweep: Auto  
Video Avg: Disabled

TDMA

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 3 kHz (< 1 MHz from Band Edge)  
VBW:  $\geq$  RBW  
Sweep: Auto  
Video Avg: Disabled

W-CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 50 kHz (< 1MHz from Band Edge)  
VBW:  $\geq$  RBW  
Sweep: Auto  
Video Avg: 6 Sweeps

To demonstrate compliance at band edges the frequency of the input signal is set to the lowest and highest assigned channel and the center frequency of the spectrum analyzer is set to the upper and lower edges of the appropriate frequency block.

**NAME OF TEST: Field Strength of Spurious Radiation      PARA. NO.: 27.53**

**Minimum Standard:** Para. No.27.53(g) For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10} (P)$  dB.

**Method of Measurement**      ANSI/TIA -603-C-2004

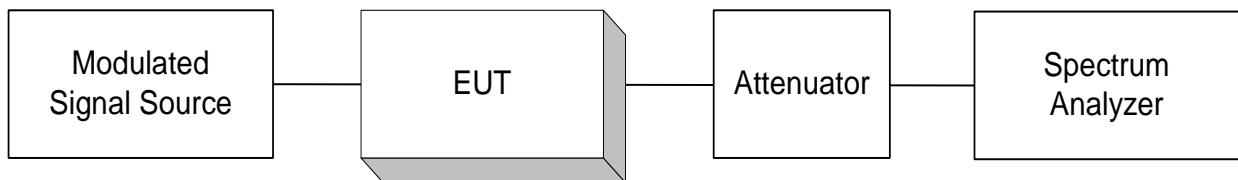
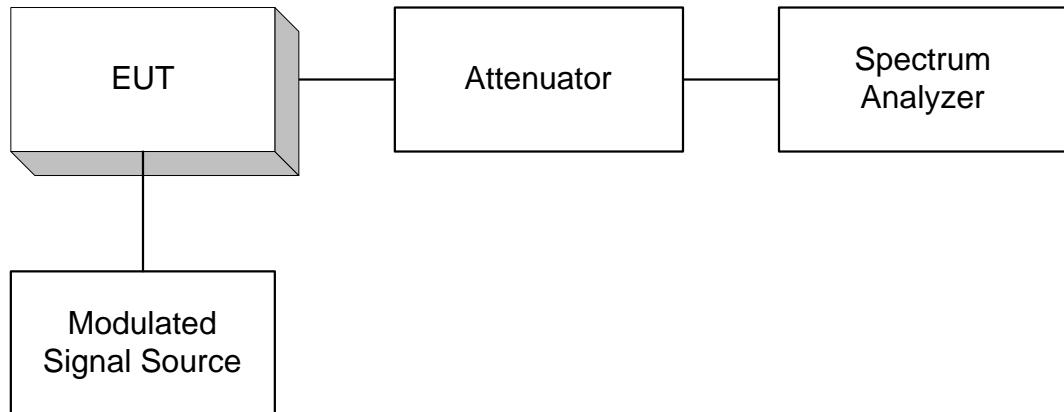
The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator. This antenna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

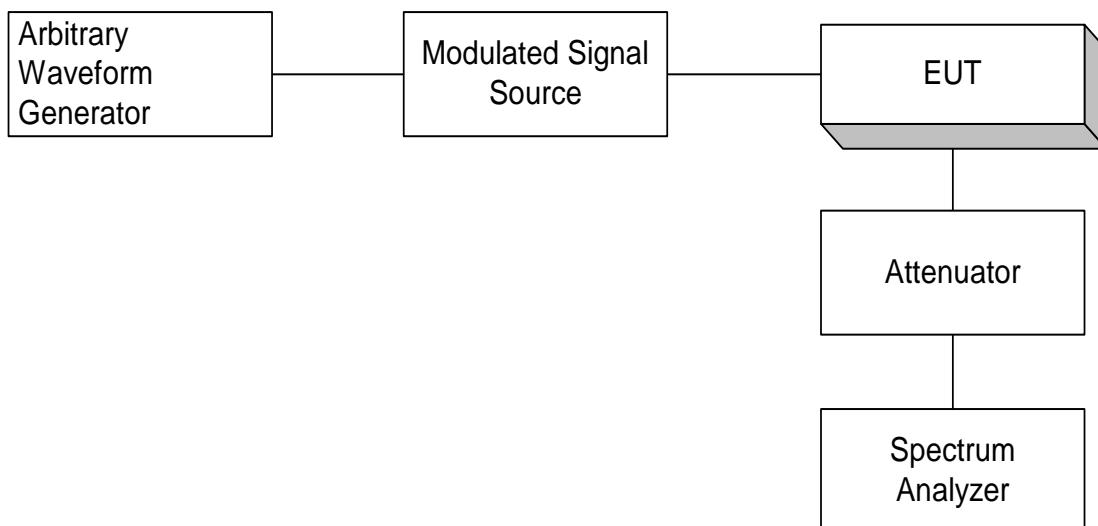
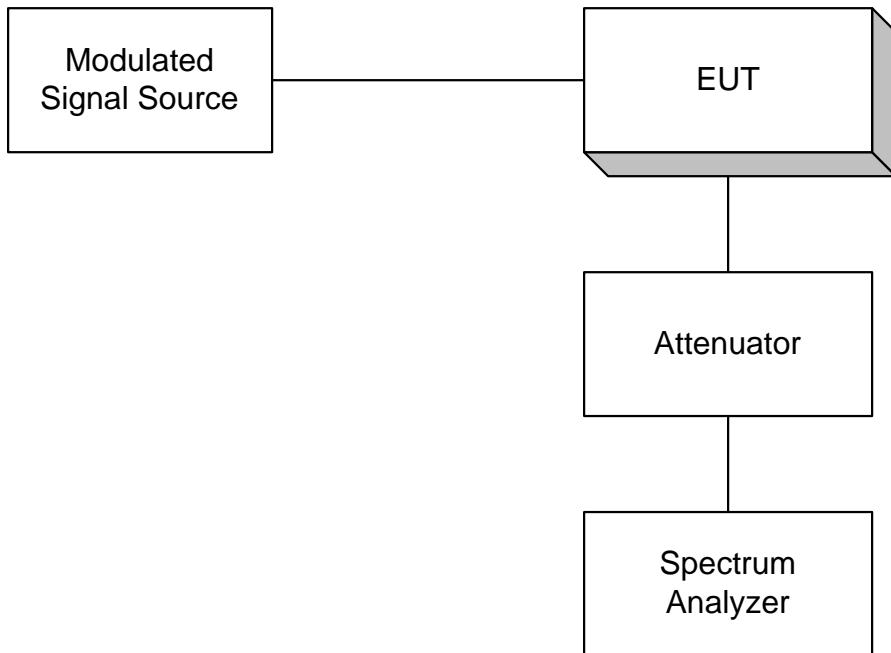
**Nemko USA, Inc.**

*EQUIPMENT:* TFAH-US4B

CFR 47, PART 27, SUBPART C  
Miscellaneous Wireless Communication Services  
PROJECT NO.: 1028403RUS3

**ANNEX B - TEST DIAGRAMS**

**Para. No. 2.985 - R.F. Power Output****Para. No. 2.989 - Occupied Bandwidth**

**Para. No. 2.991 Spurious Emissions at Antenna Terminals**

**Para. No. 2.993 - Field Strength of Spurious Radiation**