



Nemko Test Report: 5159RUS1

Applicant: Andrew Corporation
108 Rand Park Drive
Garner, NC 27529
USA

**Equipment Under Test:
(E.U.T.)** Node G 840 RF Enhancer

In Accordance With: **CFR 47, Part 22, Subpart H**
Cellular Band Repeaters

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

TESTED BY:

David Light, Senior Wireless Engineer

DATE
:

29 May 2007

APPROVED BY:

Harry Ward, Verificator

DATE
:

30th May 2007

Number of Pages: 40

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EQUIPMENT: **Node G 840**

Section 1. Summary of Test Results

Manufacturer Andrew Corporation

Model No.: Node G 840

Serial No.: 123

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 24, Subpart E.



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
See "Summary of Test Data".



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EQUIPMENT: Node G 840

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	22.913(a)	500W ERP	Complies
Occupied Bandwidth	Not defined	Input/Output	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	Complies
Frequency Stability	22.355	1.5 ppm	NA

Footnotes:

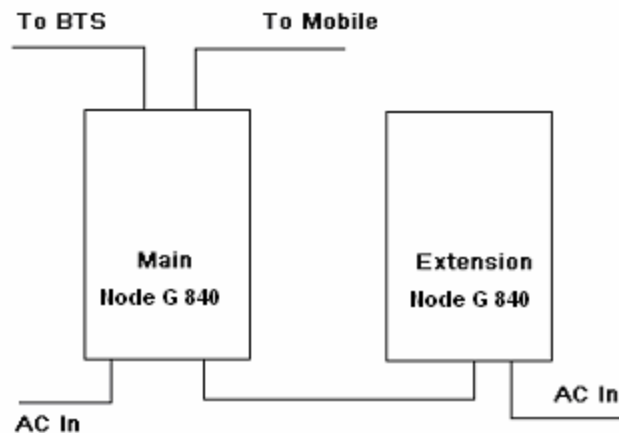
- (1) Modulation characteristics were not tested since the E.U.T. processes but does not produce a modulated waveform.
- (2) Frequency stability was not tested since the enhancer does not perform any frequency translation.

EQUIPMENT: **Node G 840****Section 2. General Equipment Specification**

Supply Voltage Input:				
Frequency Range:	Downlink:	869 TO 894 MHz		
Frequency Range:	Uplink:	824 to 849 MHz		
Type of Modulation and Designator:		CDMA (F9W) ☐	GSM (GXW) ☒	TDMA (DXW) ☐
			EDGE (G7W) ☒	W-CDMA (F9W) ☐
Output Impedance:	50 ohms			
RF Output (Rated):	Downlink:	20 W 43 dBm		
	Uplink:	3.5 W 34 dBm		
Frequency Translation:	F1-F1 ☒	F1-F2 ☐	N/A ☐	
Band Selection:	Software ☒	Duplexer Change ☐	Fullband Coverage ☐	

Description of EUT

The Andrew Node G 840 is an RF enhancer for GSM systems. It is capable of filtering and amplifying from 1 to 6 GSM & EDGE channels across the entire band.

System Diagram

EQUIPMENT: **Node G 840****Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 22.913
TESTED BY: David Light	DATE: 29 May 2007

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

Direction	Modulation	Output per Channel (dBm)	Composite Power (dBm)	Composite Power (W)
Uplink	EDGE	27.7	30.7	1.2
Downlink	EDGE	36.6	39.6	9.1
Uplink	GSM	30.9	33.9	2.5
Downlink	GSM	40.5	43.5	22.4

Equipment Used: 1082-1036-1064-1064**Measurement Uncertainty:** +/- 1.7 dB**Temperature:** 22 °C**Relative Humidity:** 48 %

EQUIPMENT: **Node G 840**

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 29 May 2007

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1082-1604-1064

Measurement Uncertainty: 1X10⁻⁷ ppm

Temperature: 22 °C

Relative Humidity: 48 %

EQUIPMENT: **Node G 840**

Test Data – Occupied Bandwidth

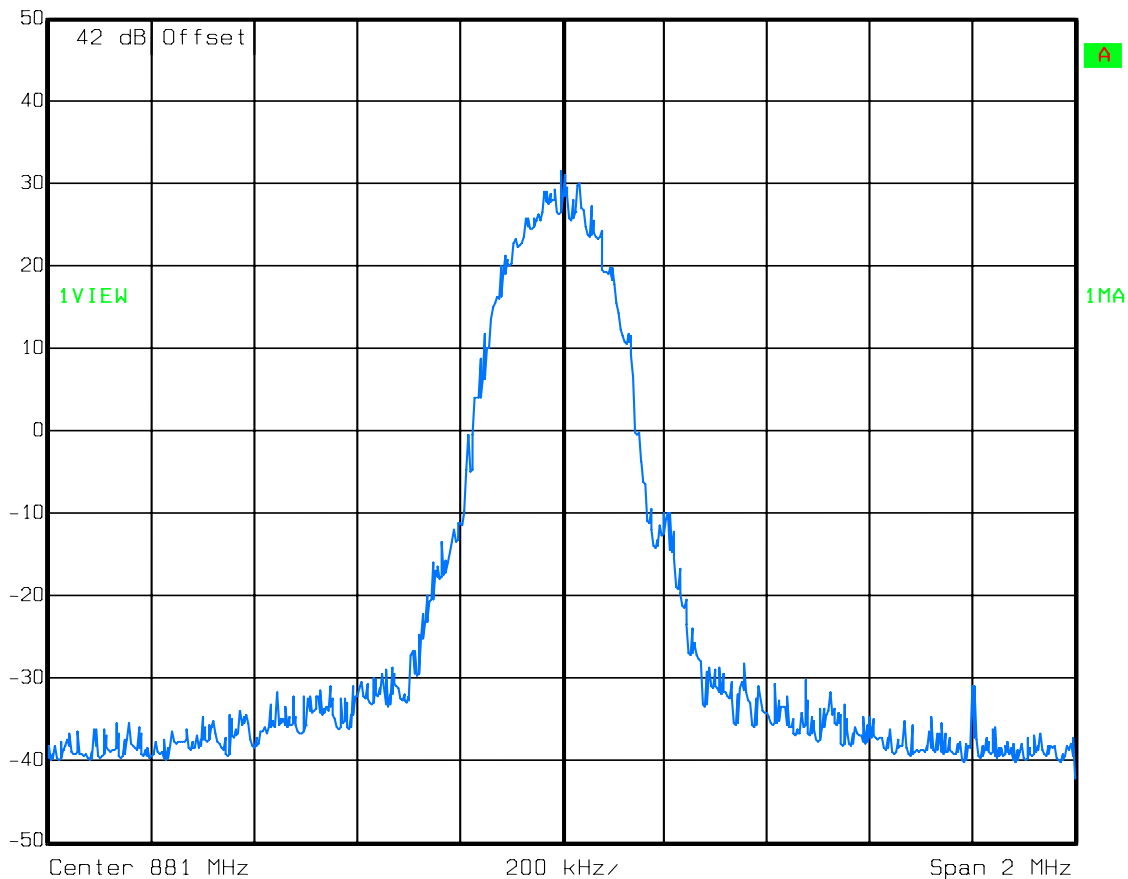
GSM - Output

Downlink



Ref Lvl
50 dBm

RBW	3 kHz	RF Att	30 dB
VBW	3 kHz		
SWT	560 ms	Unit	dBm



Date: 29.MAY 2007 09:12:45

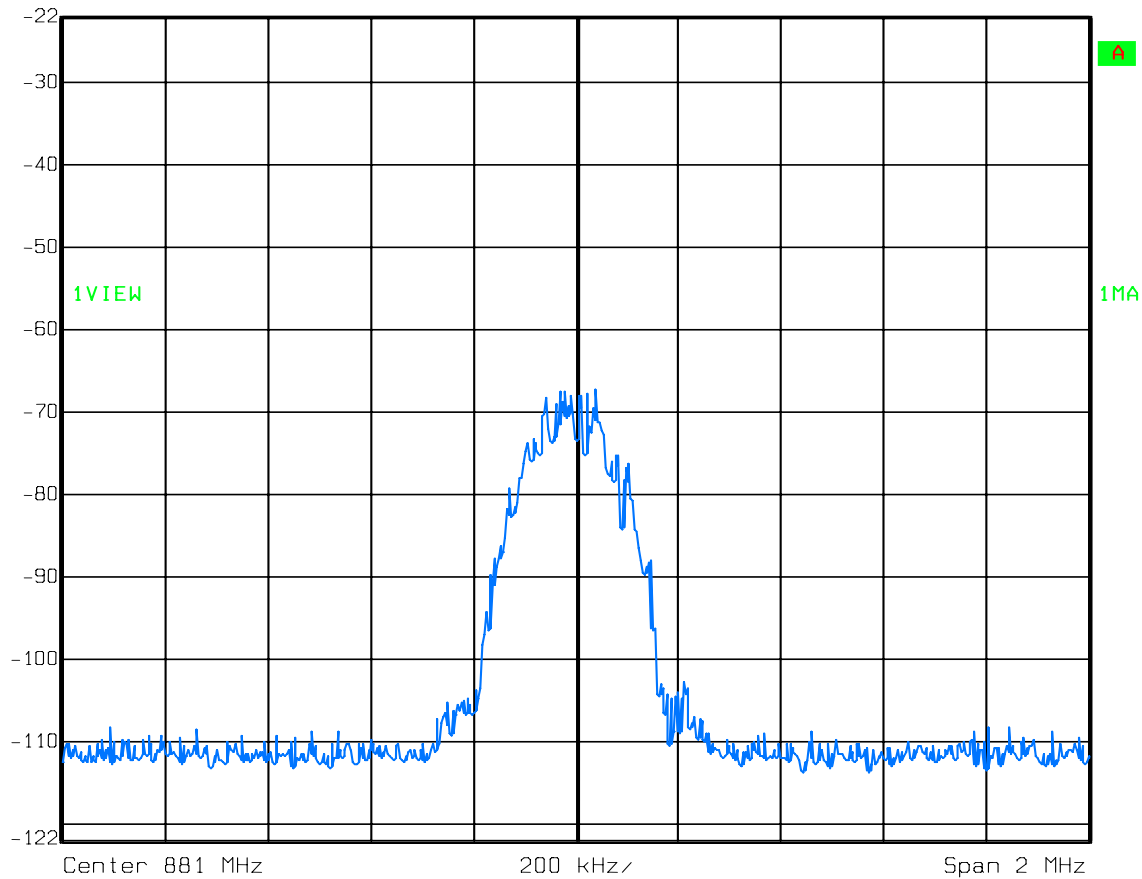
EQUIPMENT: **Node G 840****Test Data – Occupied Bandwidth**

GSM - Input

Downlink

Ref Lvl
-22 dBm

RBW	3 kHz	RF Att	0 dB
VBW	3 kHz		
SWT	560 ms	Unit	dBm



Date: 29.MAY 2007 09:14:32

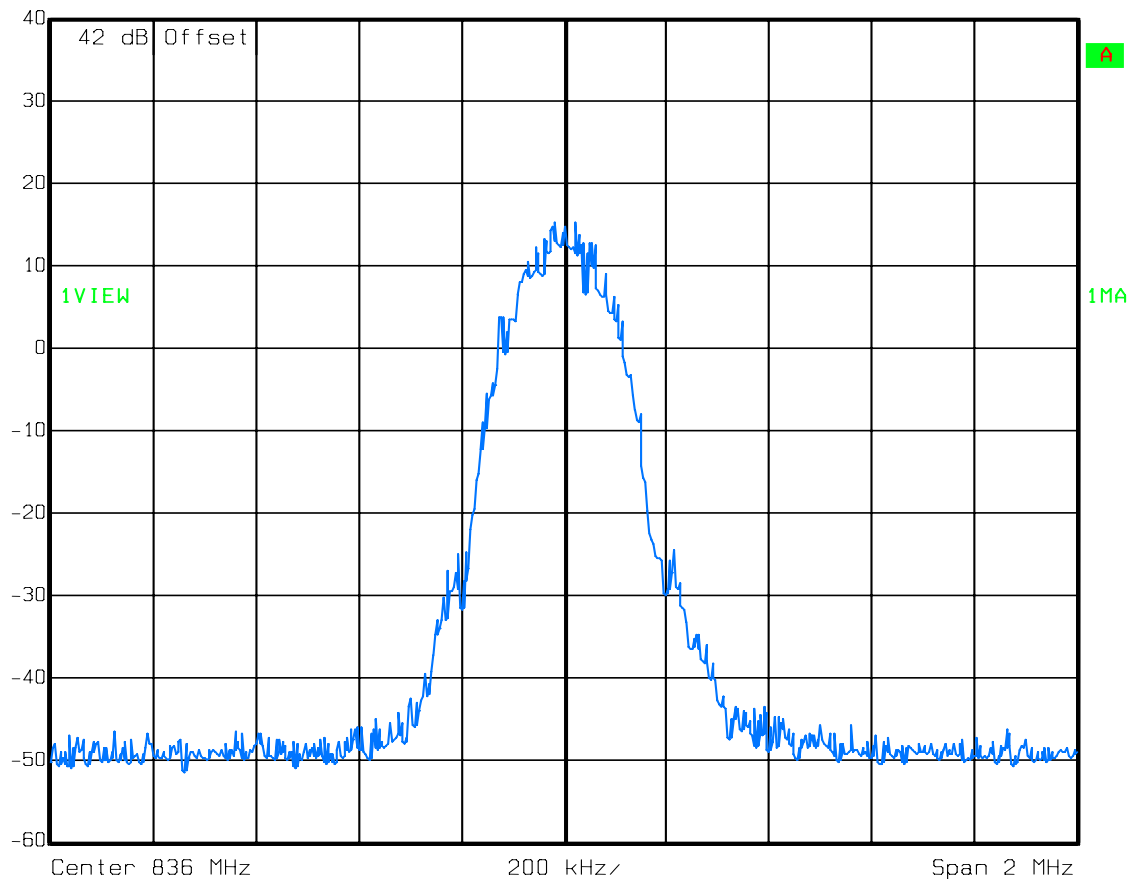
EQUIPMENT: **Node G 840****Test Data – Occupied Bandwidth**

GSM - Output

Uplink

Ref Lvl
40 dBm

RBW	3 kHz	RF Att	20 dB
VBW	3 kHz		
SWT	560 ms	Unit	dBm



Date: 29.MAY 2007 09:31:56

EQUIPMENT: **Node G 840**

Test Data – Occupied Bandwidth

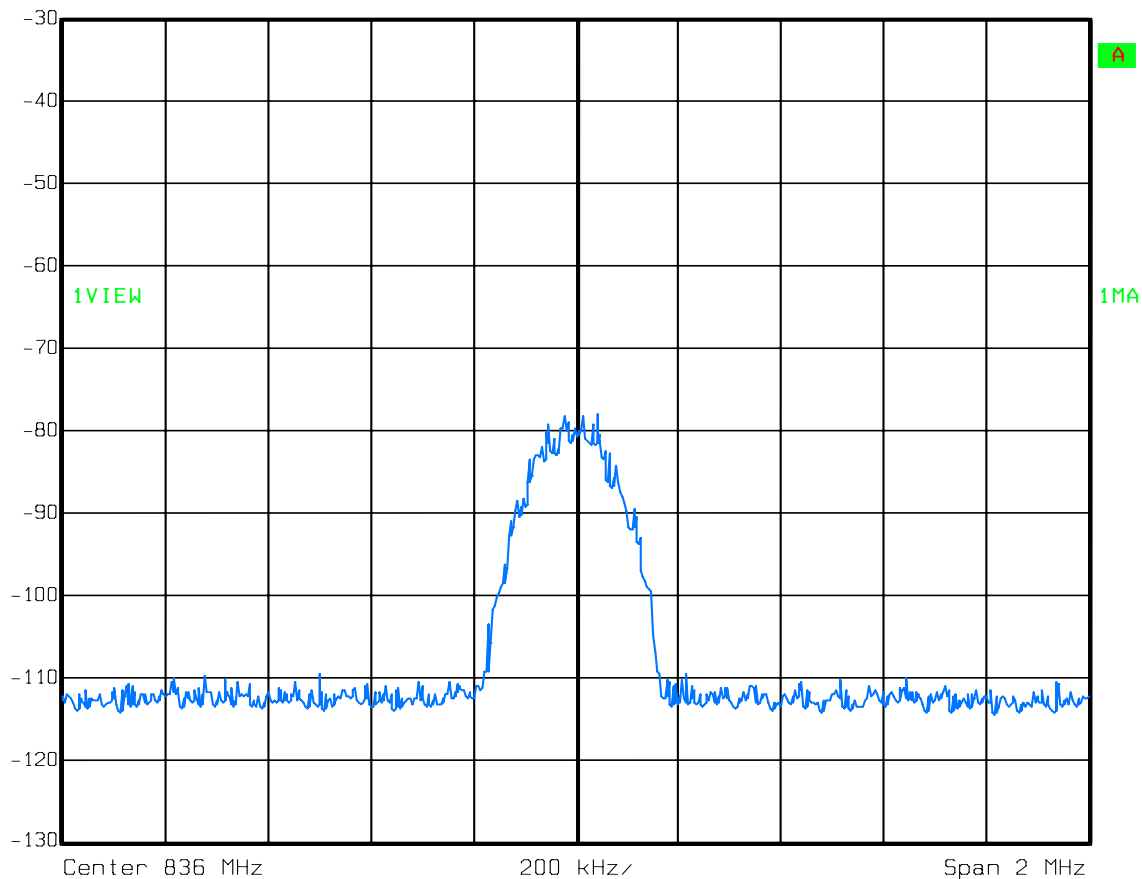
GSM - Input

Uplink



Ref Lvl
-30 dBm

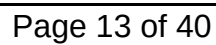
RBW	3 kHz	RF Att	0 dB
VBW	3 kHz		
SWT	560 ms	Unit	dBm



Date: 29.MAY 2007 09:33:10

PROJECT NO.: **5159RUS1**

EDGE - Output Downlink



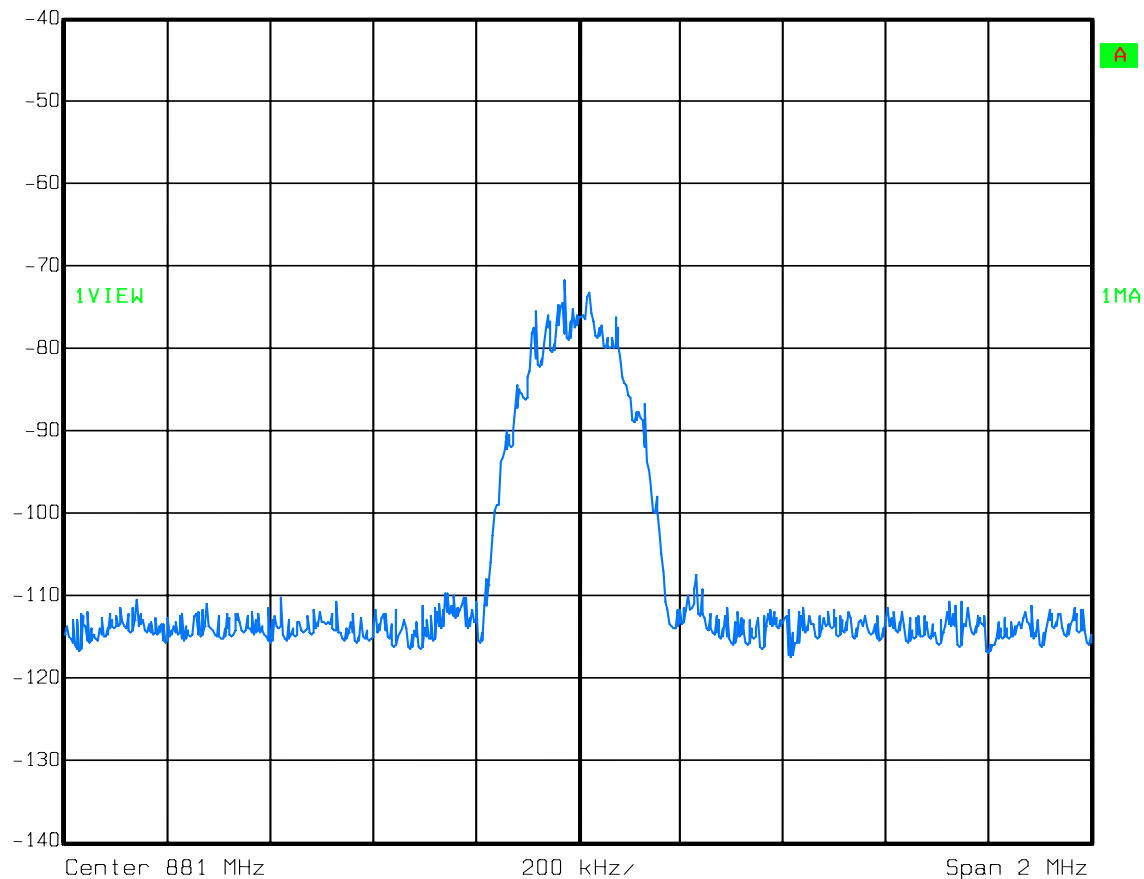
EQUIPMENT: **Node G 840****Test Data – Occupied Bandwidth**

EDGE - Input

Downlink

Ref Lvl
-40 dBm

RBW	3 kHz	RF Att	0 dB
VBW	3 kHz		
SWT	560 ms	Unit	dBm

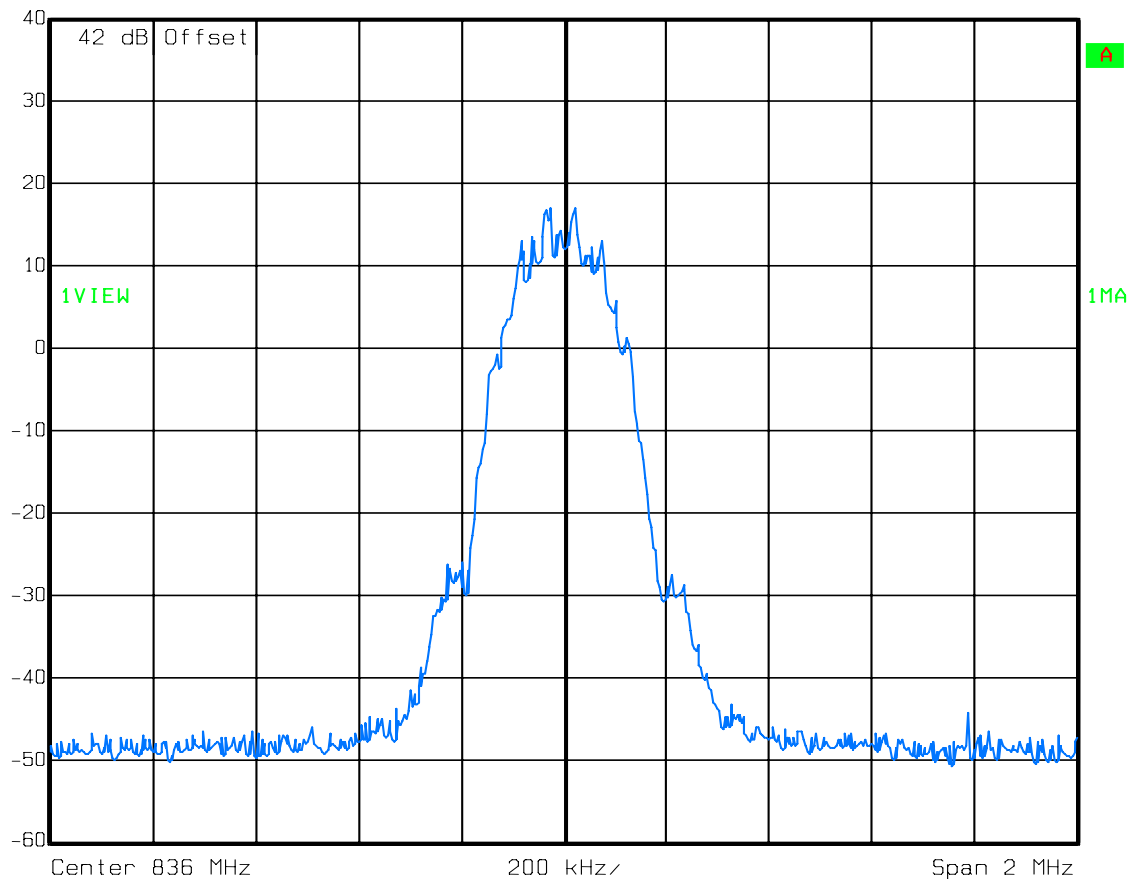


Date: 29.MAY 2007 10:27:31

EQUIPMENT: **Node G 840****Test Data – Occupied Bandwidth**

EDGE - Output

Uplink

Ref Lvl
40 dBmRBW 3 kHz RF Att 20 dB
VBW 3 kHz
SWT 560 ms Unit dBm

Date: 29.MAY 2007 10:10:43

EQUIPMENT: **Node G 840**

Test Data – Occupied Bandwidth

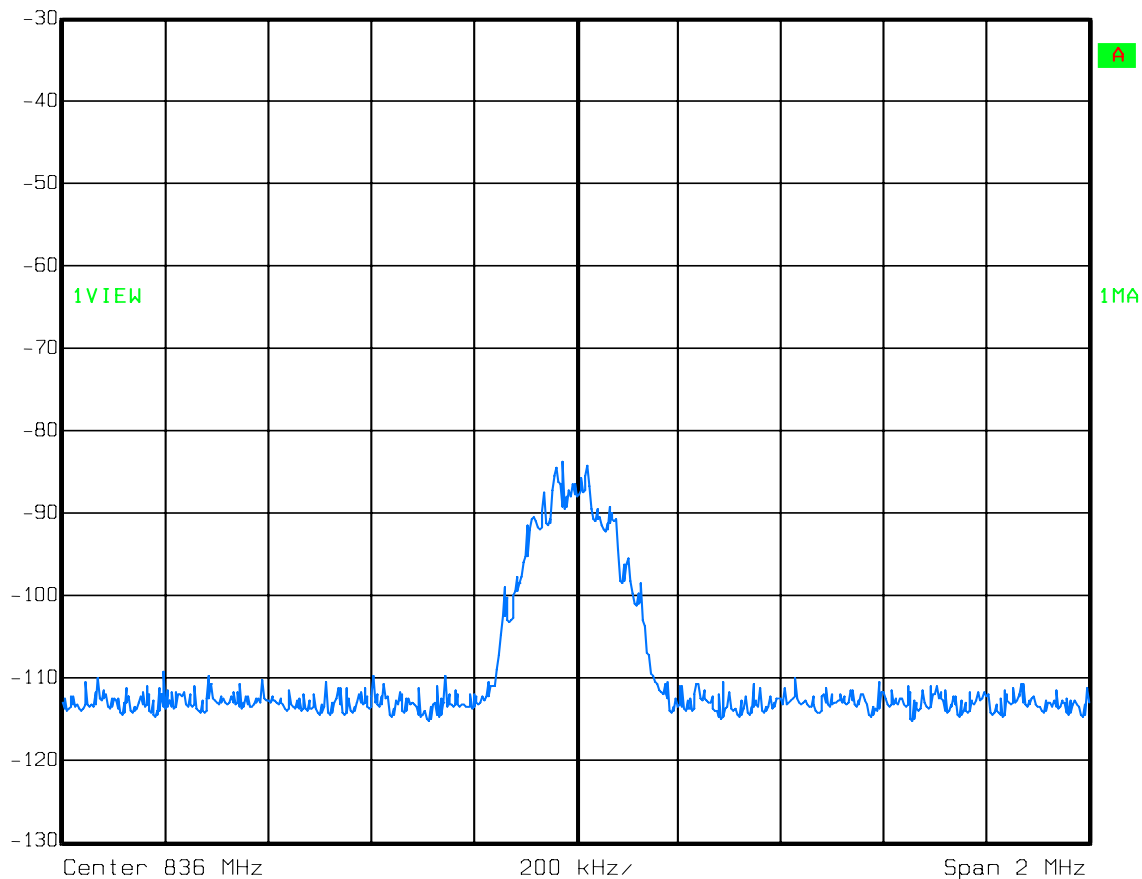
EDGE - Input

Uplink



Ref Lvl
-30 dBm

RBW	3 kHz	RF Att	0 dB
VBW	3 kHz		
SWT	560 ms	Unit	dBm



Date: 29.MAY 2007 10:12:23

EQUIPMENT: **Node G 840**

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 22.917
TESTED BY: David Light	DATE: 29 May 2007

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1082-1036-1604-1065

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 48 %

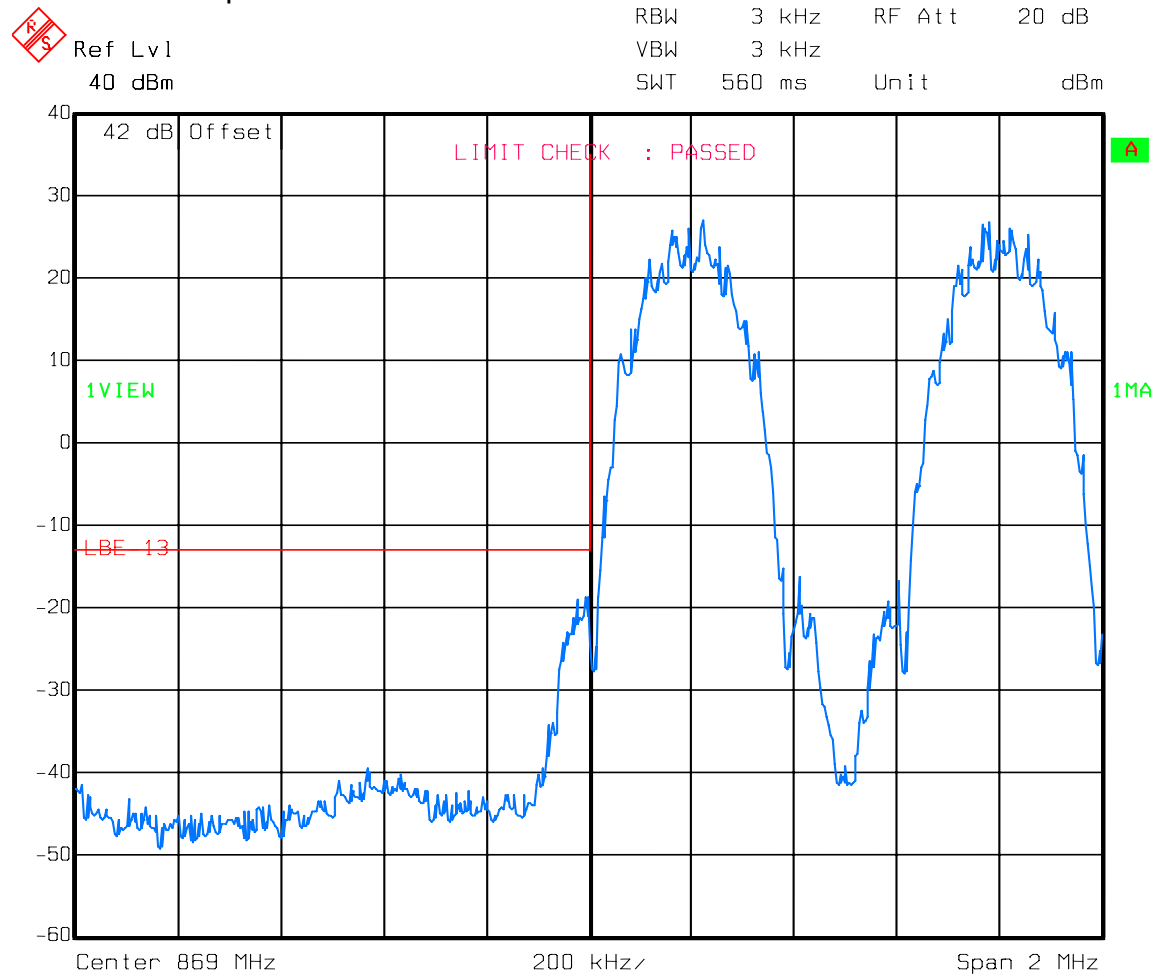
EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals**

Lower Bandedge Intermodulation

EDGE

Downlink

39.5 dBm Composite Power



Date: 29.MAY 2007 10:23:15

EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals**

Upper Bandedge Intermodulation

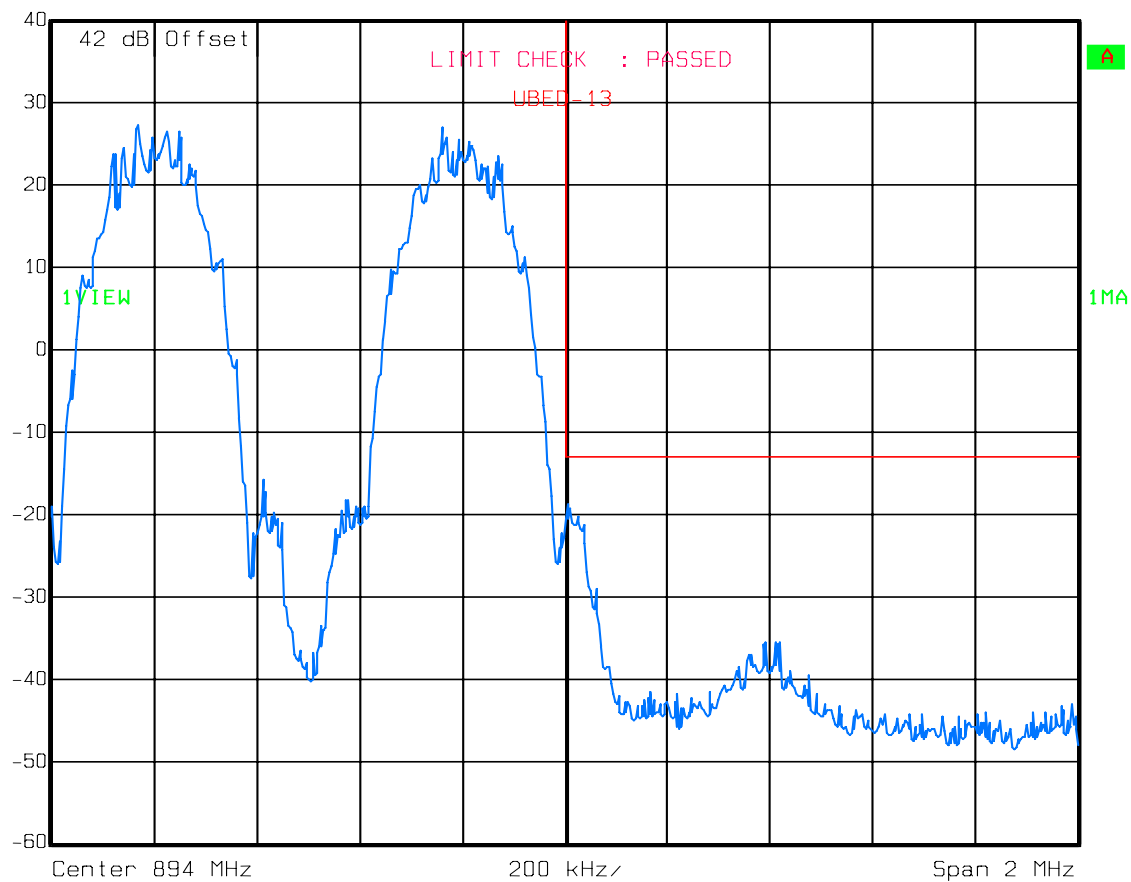
EDGE

Downlink

39.6 dBm Composite Power



Ref Lvl	RBW	3 kHz	RF Att	20 dB
40 dBm	VBW	3 kHz		
	SWT	560 ms	Unit	dBm



Date: 29.MAY 2007 10:32:05

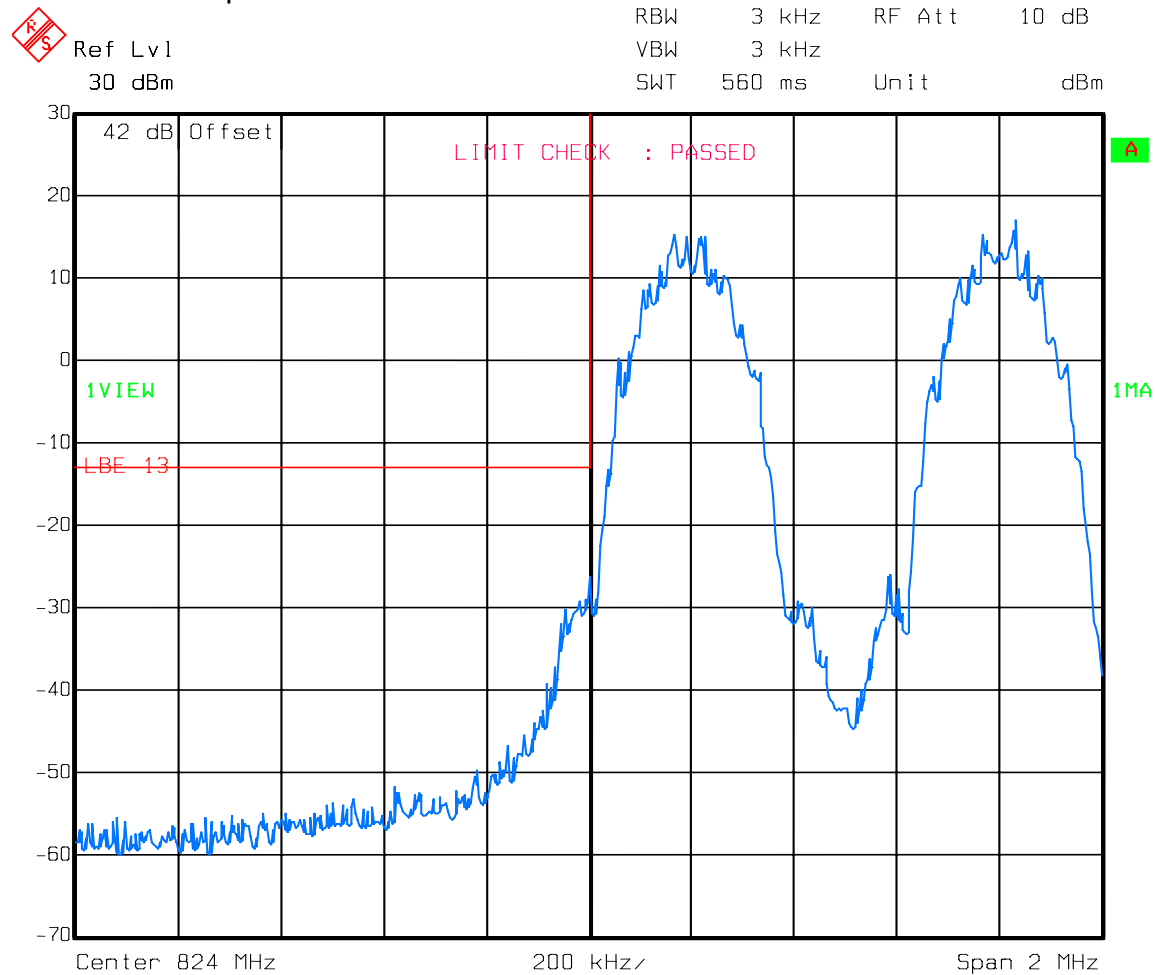
EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals**

Lower Bandedge Intermodulation

EDGE

Uplink

29.9 dBm Composite Power



Date: 29.MAY 2007 10:17:32

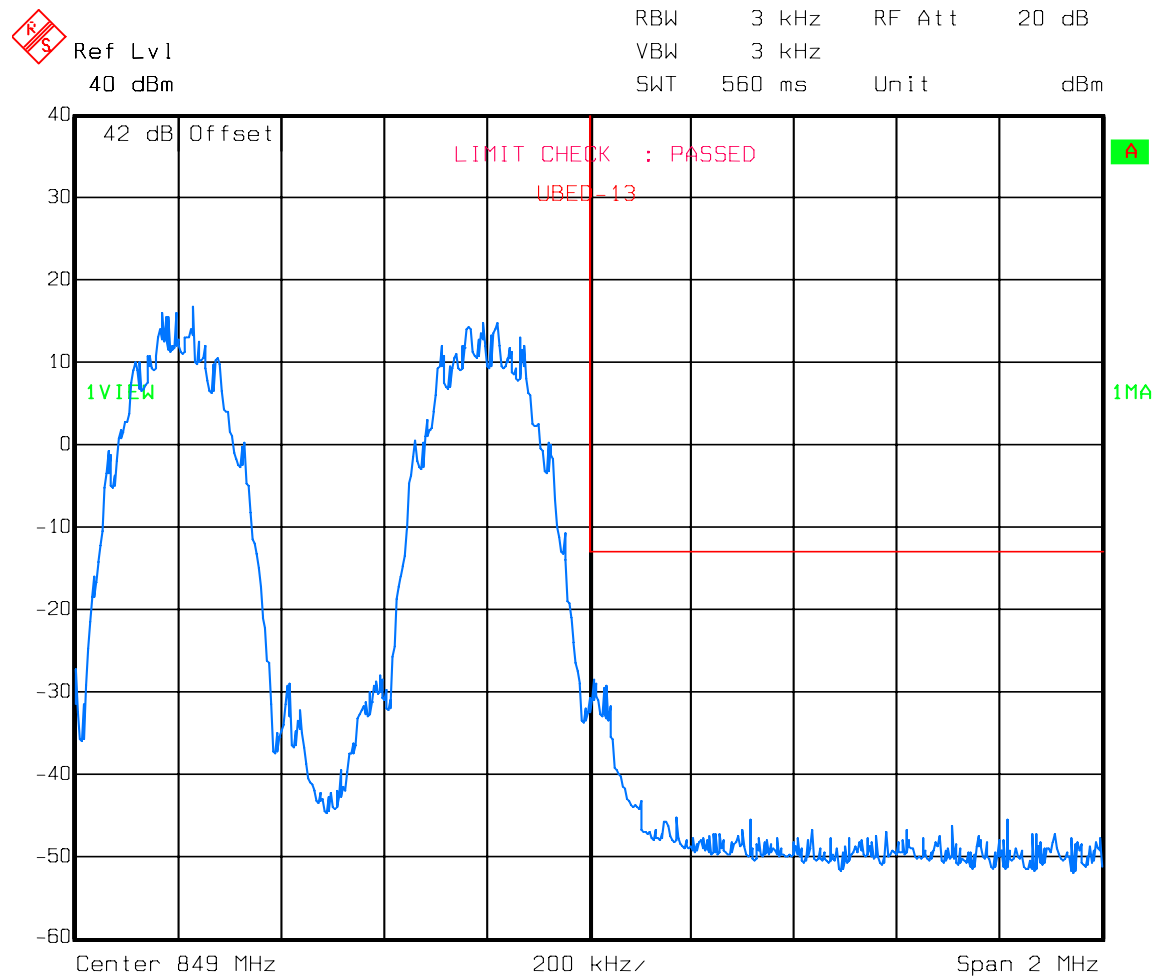
EQUIPMENT: Node G 840**Test Data – Spurious Emissions at Antenna Terminals**

Upper Bandedge Intermodulation

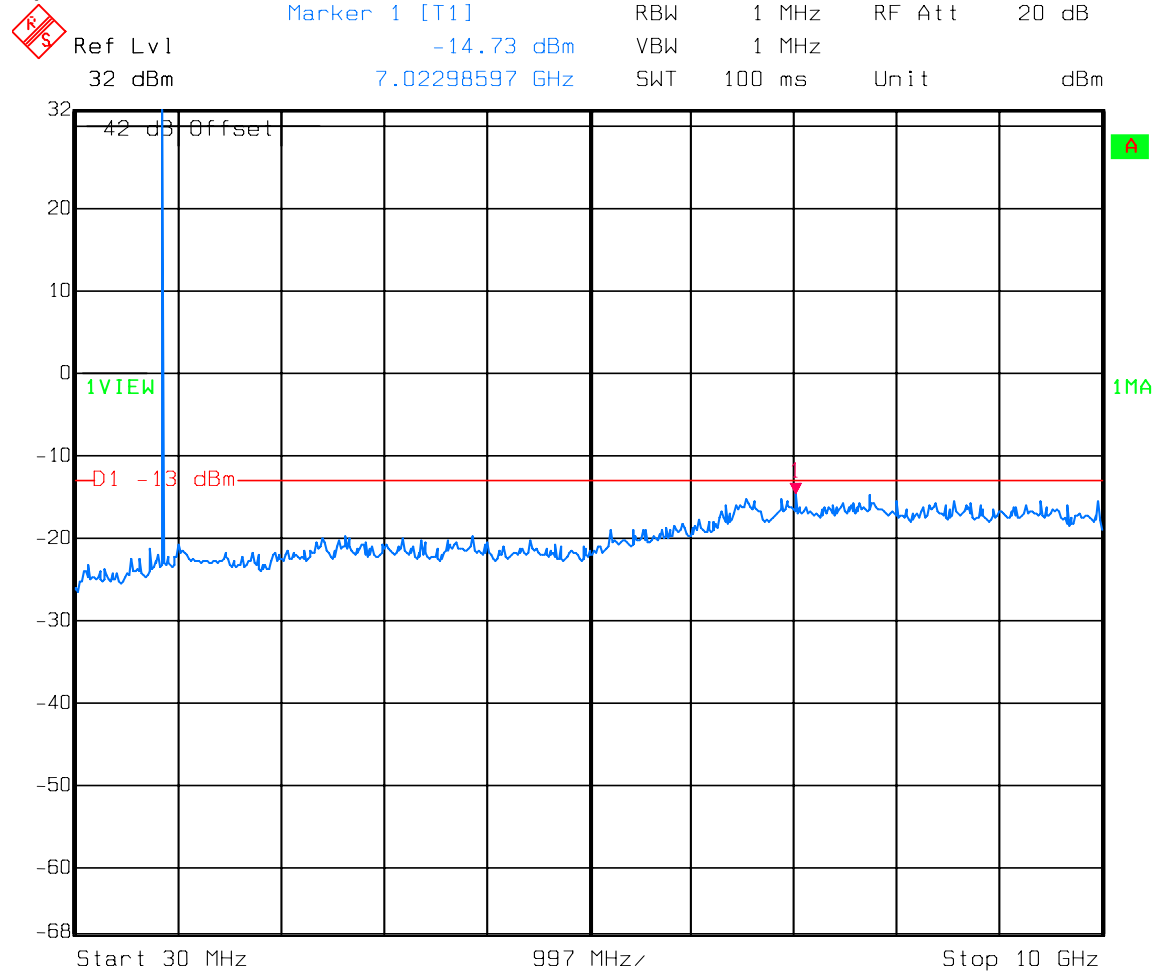
EDGE

Uplink

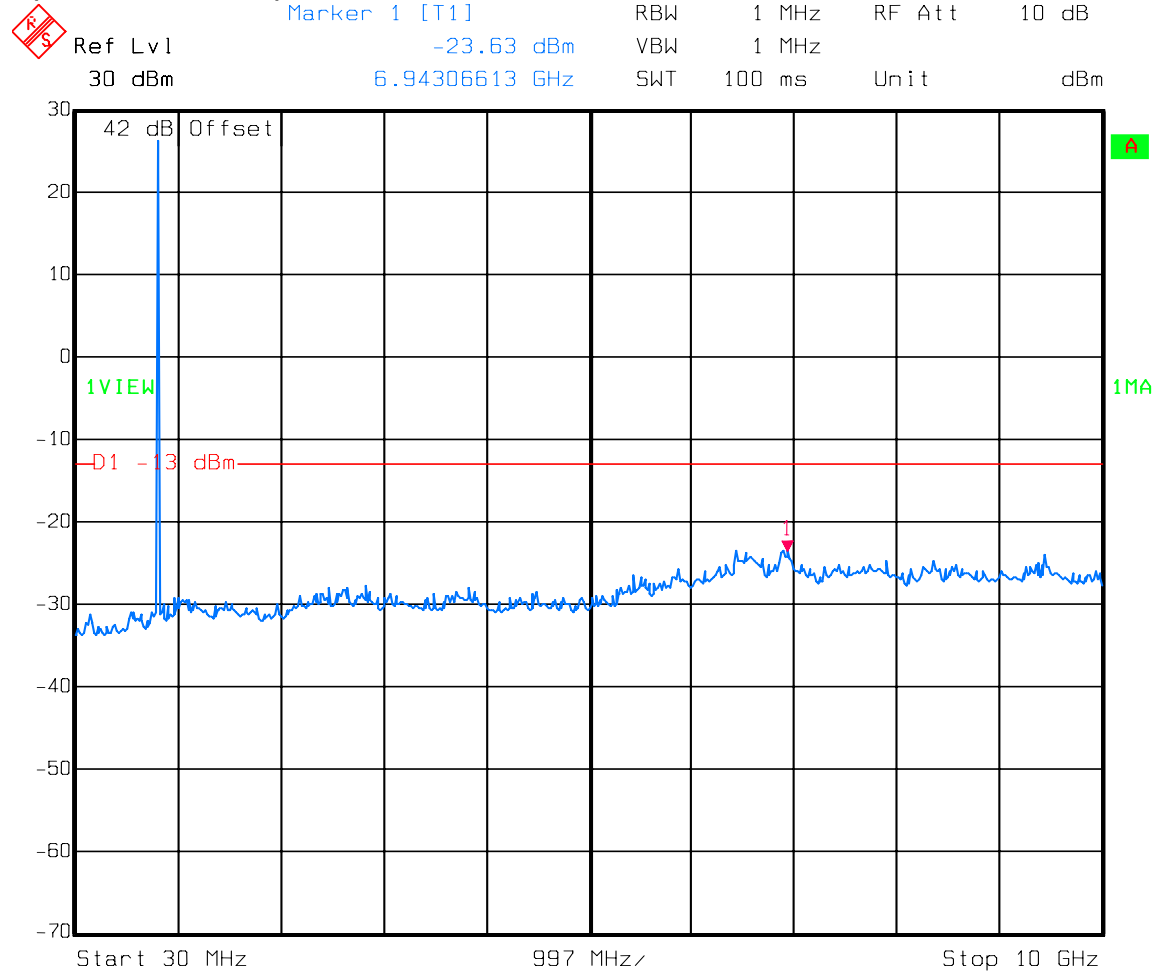
30.2 dBm Composite Power



Date: 29.MAY 2007 09:43:33

EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals****Spurs – EDGE - Downlink**

Date: 29.MAY 2007 10:29:05

EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals****Spurs – EDGE - Uplink**

Date: 29.MAY 2007 10:13:31

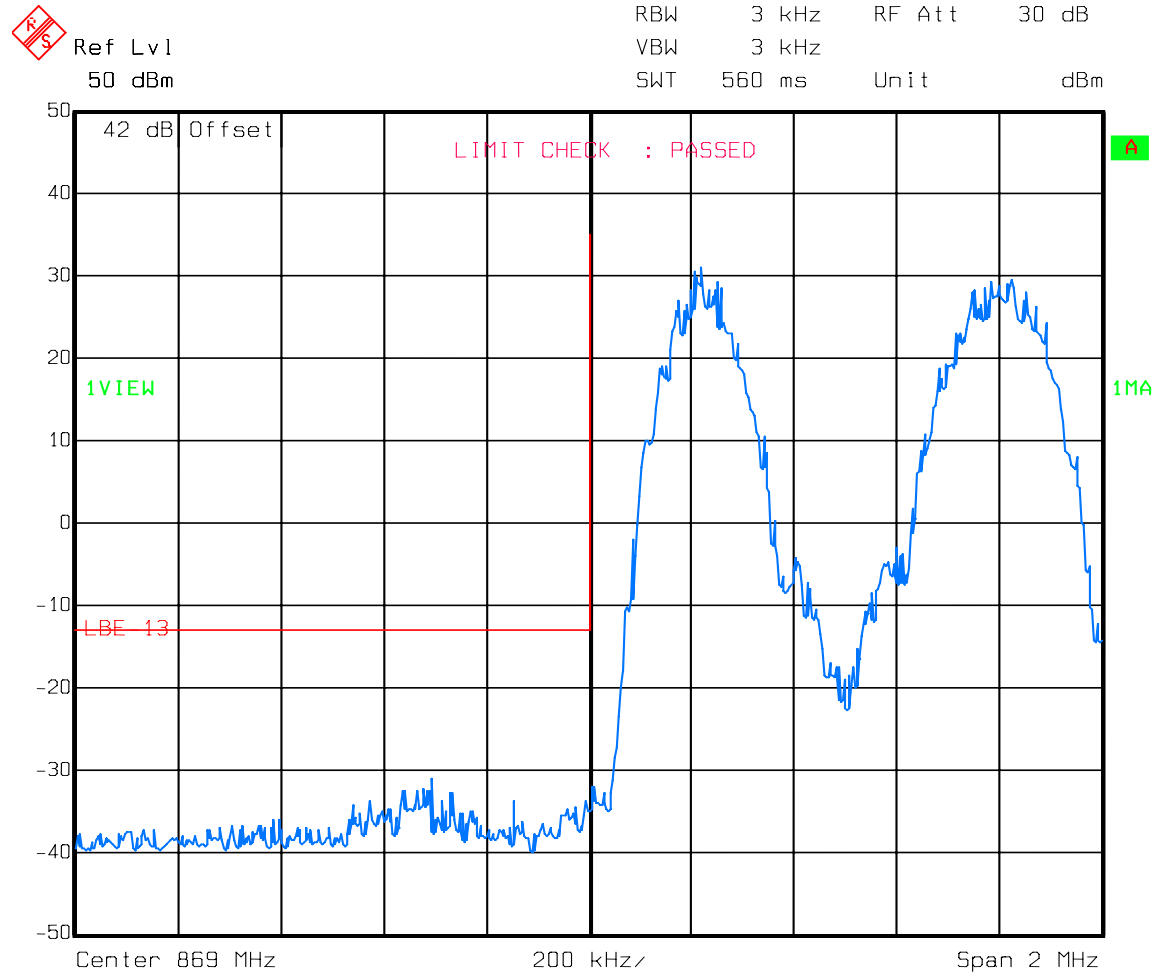
EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals**

Lower Bandedge Intermodulation

GSM

Downlink

43.1 dBm Composite Power



Date: 29.MAY 2007 09:22:09

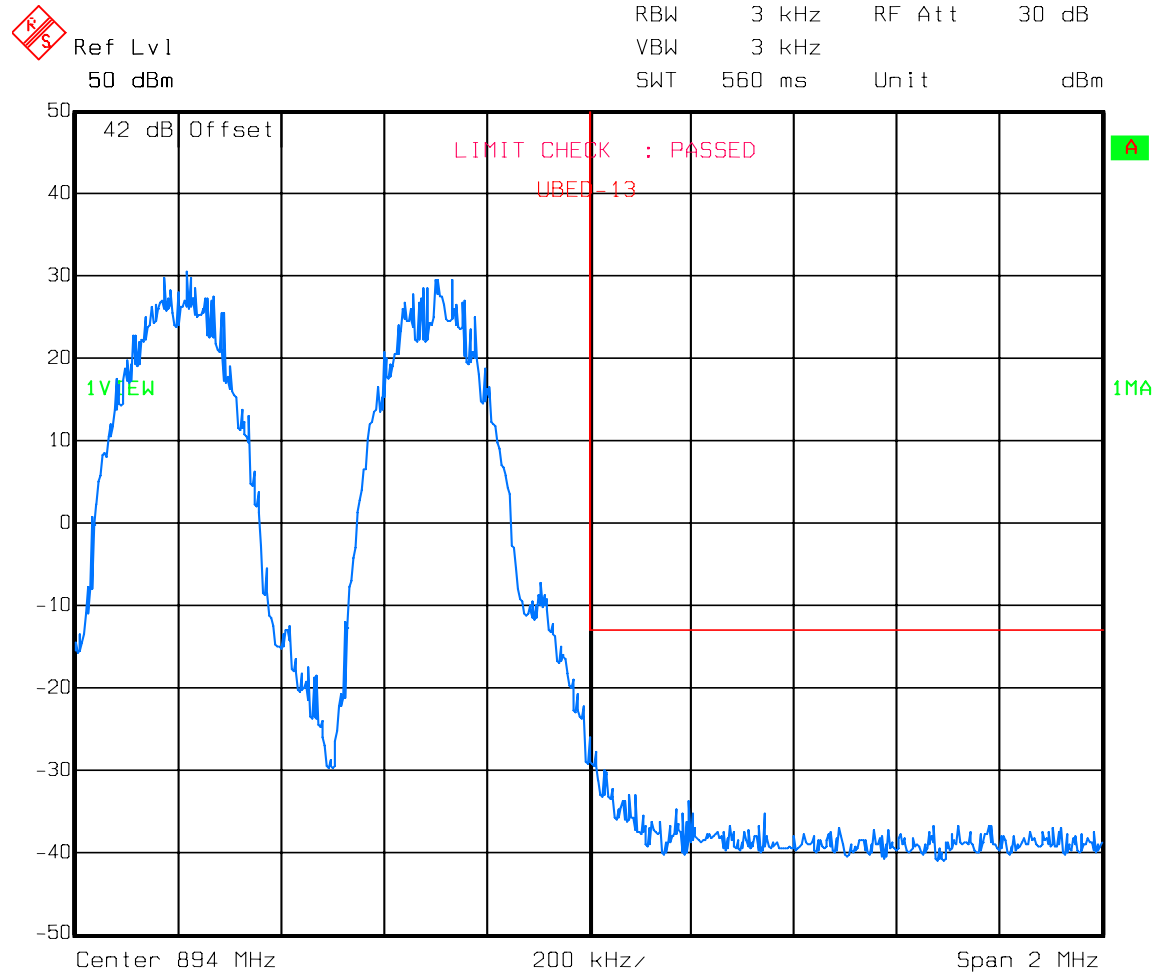
EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals**

Upper Bandedge Intermodulation

GSM

Downlink

43.3 dBm Composite Power



Date: 29.MAY 2007 09:02:21

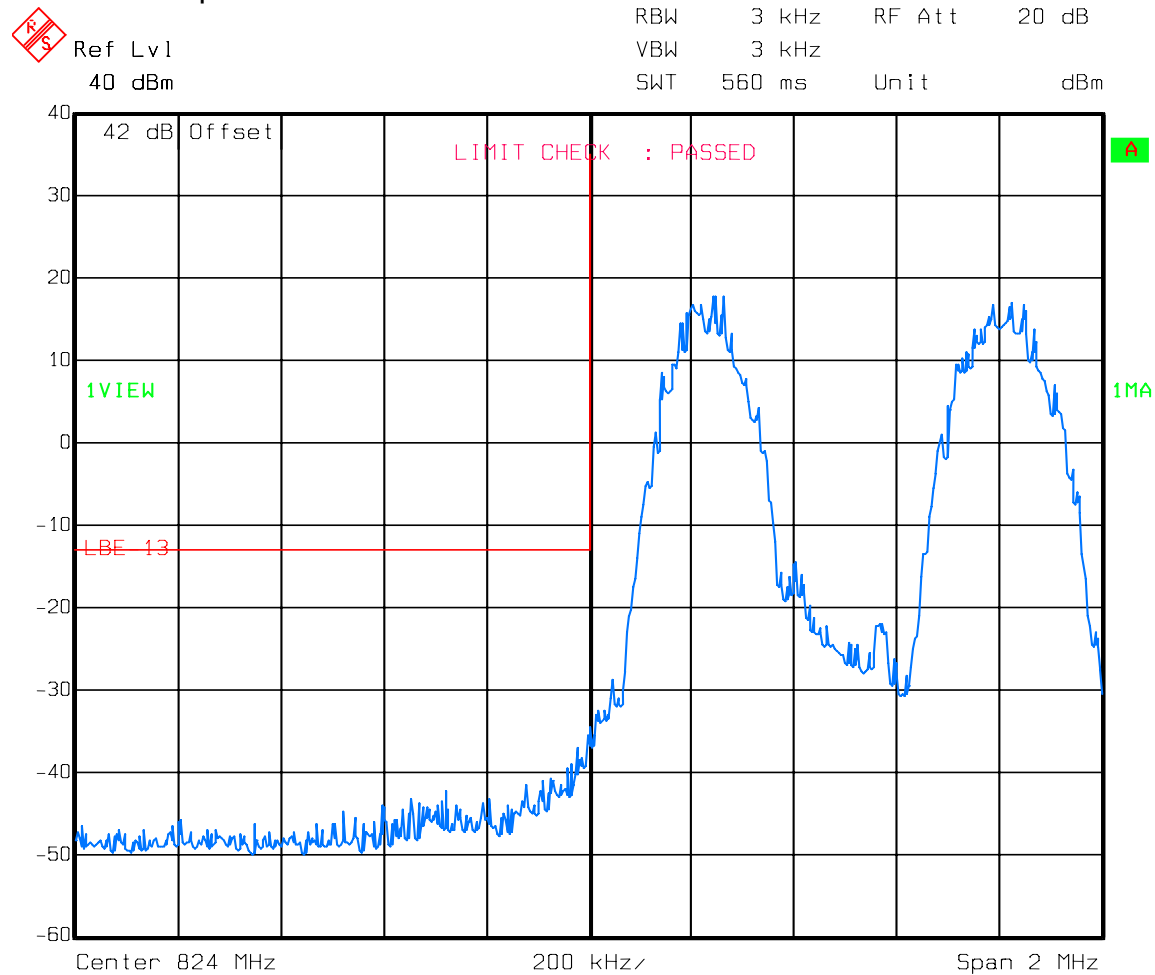
EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals**

Lower Bandedge Intermodulation

GSM

Uplink

34 dBm Composite Power



Date: 29.MAY 2007 09:29:36

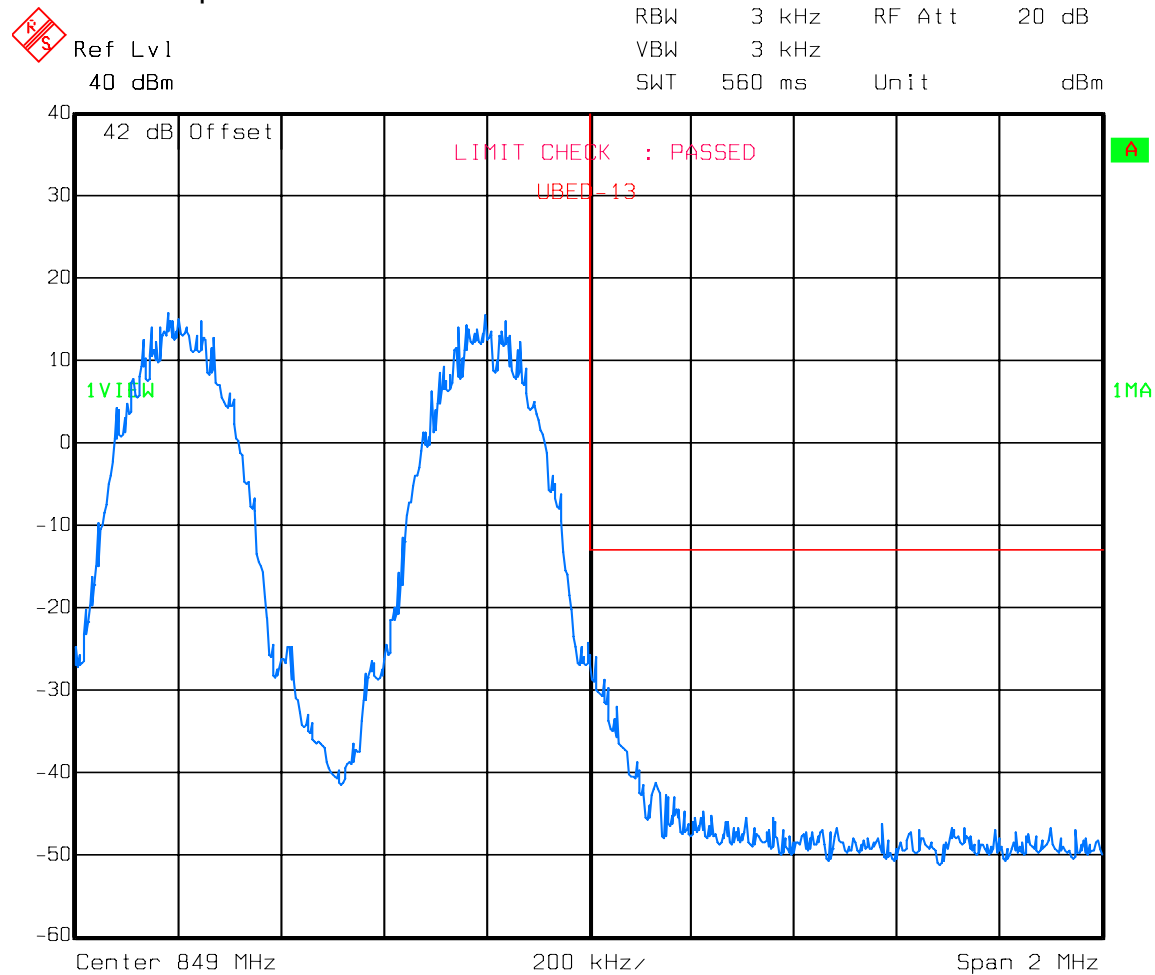
EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals**

Upper Bandedge Intermodulation

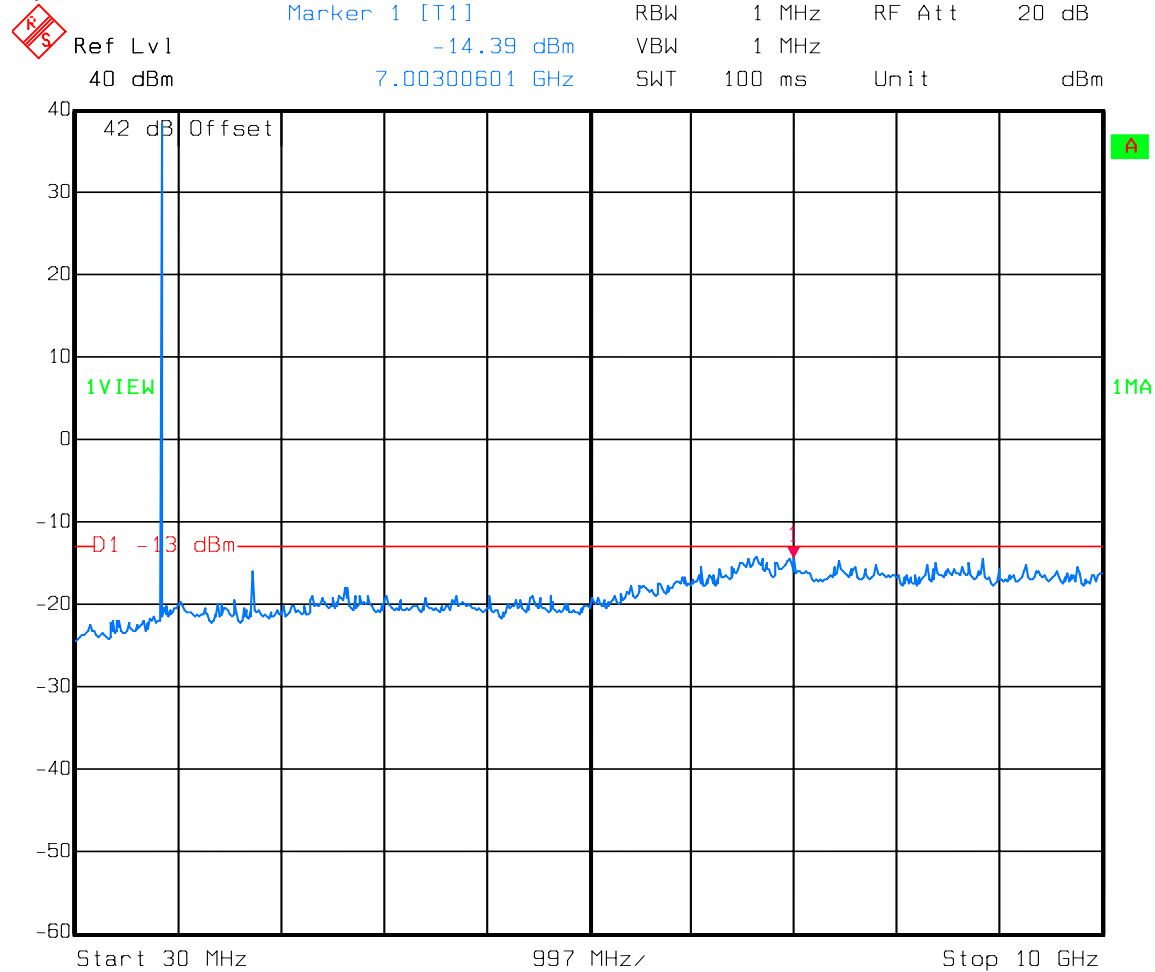
GSM

Uplink

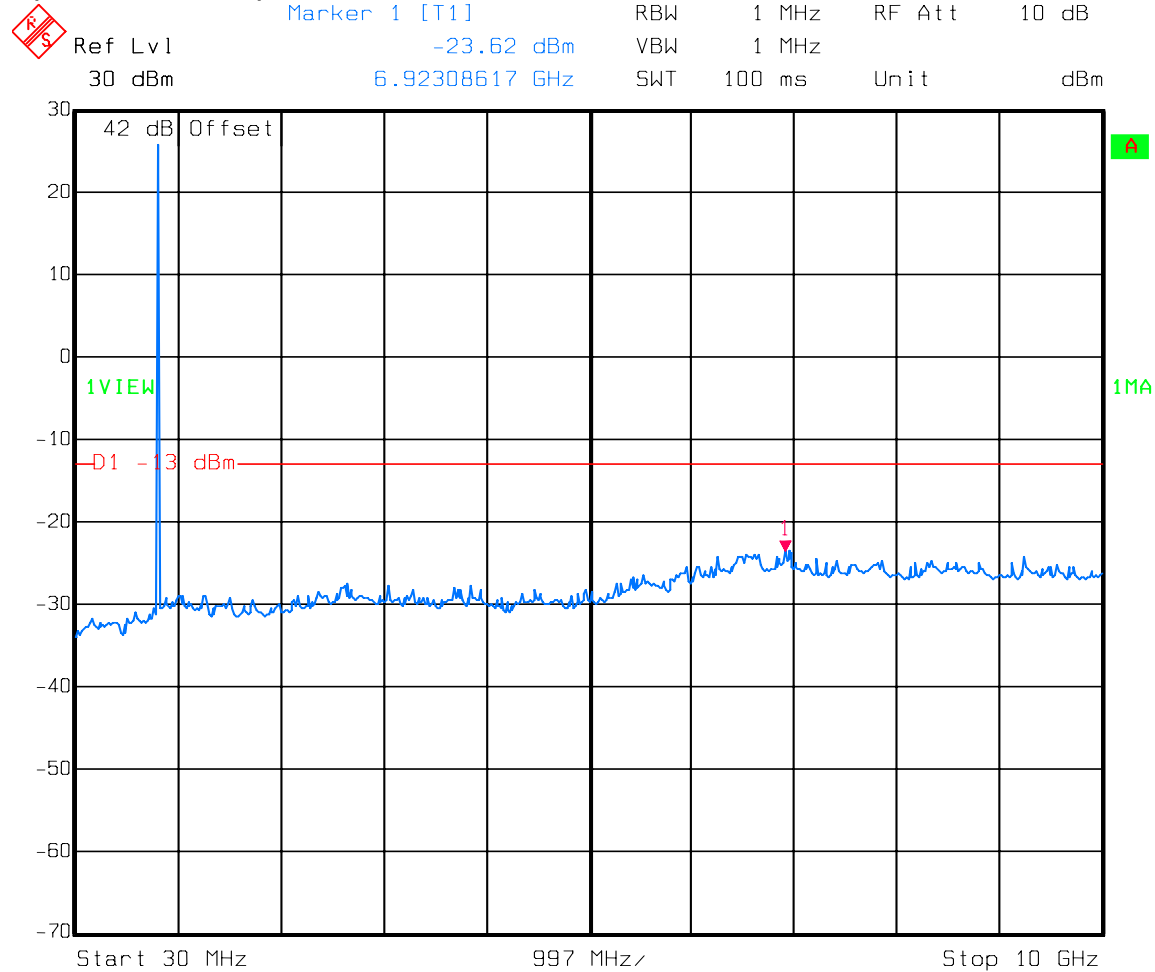
31 dBm Composite Power



Date: 29.MAY 2007 09:38:20

EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals****Spurs – GSM - Downlink**

Date: 29.MAY 2007 09:16:56

EQUIPMENT: **Node G 840****Test Data – Spurious Emissions at Antenna Terminals****Spurs – GSM - Uplink**

Date: 29.MAY 2007 09:34:55

EQUIPMENT: **Node G 840**

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 22.917
TESTED BY: David Light	DATE: 30 May 2007

Test Results: Complies.

Equipment Used: 1464-1484-1485-1019-791-759-790-993

Measurement Uncertainty: +/-1.7 dB

Temperature: 22 °C

Relative Humidity: 48 %

Test Data

All emissions were below the noise floor which was at least 20 dB below the specification limit.

Analyzer settings: RBW=VBW=1 MHz / Peak detector.

EQUIPMENT: **Node G 840****Section 7. Test Equipment List**

Nemko	Description	Manufacturer Model Number	Serial Number	Calibration Dat	Calibration Du
146	Spectrum analyzer	Hewlett Packard 8563	3551A04428	01/24/07	01/24/09
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
101	Pre-	HEWLETT PACKARD 8449	2749A00159	5/1/0	5/1/0
79	PREAMP, 25dB	Nemko USA, Inc. LNA2	39	5/1/0	5/1/0
103	SPECTRUM	ROHDE & SCHWARZ FSEK3	830844/006	05/26/06	05/26/08
99	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07
75	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	55	03/30/07	03/29/08
76	Antenna biconical	Electro Metrics MFC-25	47	01/19/07	01/19/08
108	CABLE	Astrola 32027-2-29094-72TC	N/	CBU	N/
106	ATTENUATOR	NARDA 776B-	NON	CBU	N/
106	ATTENUATOR	NARDA 776B-	NON	CBU	N/
160	ATTENUATOR	NARDA 776B-	NON	N/	N/

ANNEX A - TEST DETAILS

NAME OF TEST: RF Power Output

PARA. NO.: 2.1046

Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 watts.

Method Of Measurement:

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter or 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.

EQUIPMENT: Node G 840

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= 100 kHz

Span: 10 MHz

Sweep: Auto

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

Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43 + 10 \log P$. This is equivalent to -13 dBm absolute power.

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

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

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

W-CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 100 kHz (< 1MHz from Band Edge)
VBW: $\geq$ RBW
Sweep: Auto
Video Avg: 6 Sweeps

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

Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43 + 10 \log P$. This is equivalent to -13 dBm absolute power.

Method of Measurement

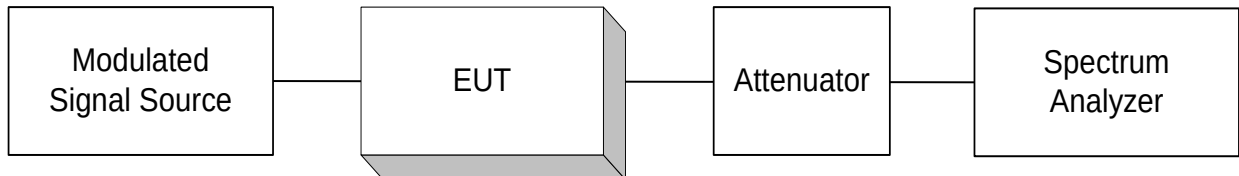
TIA/EIA-603-1992

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.

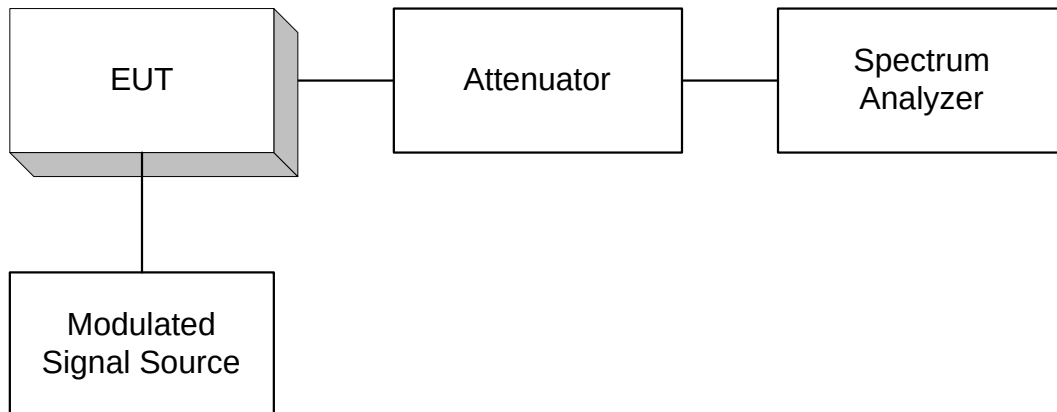
ANNEX B - TEST DIAGRAMS

EQUIPMENT: **Node G 840**

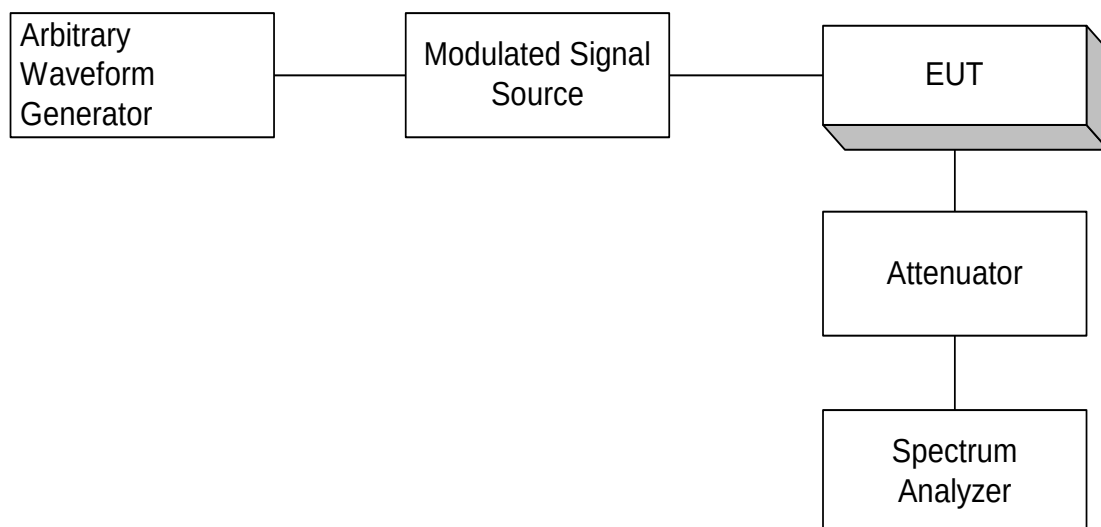
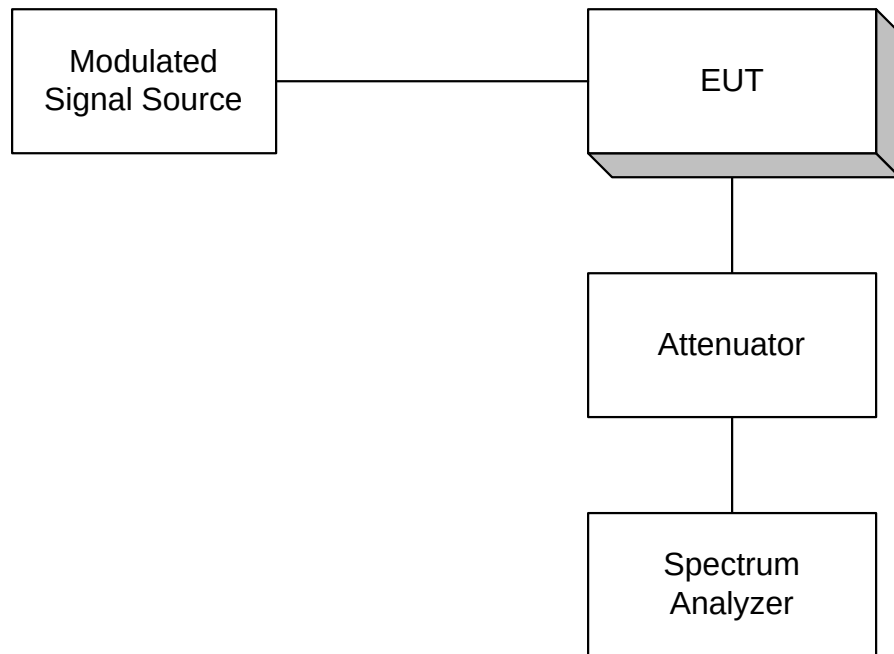
Para. No. 2.985 - R.F. Power Output



Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



EQUIPMENT: **Node G 840**

Para. No. 2.993 - Field Strength of Spurious Radiation

