Nemko Test Report: 25967RUS1

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

Equipment Under Test: (E.U.T.) ION-M19HP

In Accordance With: **CFR 47, Part 24, Subpart E**
Broadband PCS Repeaters

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

TESTED BY: _____ **DATE:** **16 February, 2009**
David Light, Senior Wireless Engineer

APPROVED BY: _____ **DATE:** **24 February, 2009**
Tom Tidwell, Telecom Direct

Number of Pages: 41

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Section 1. Summary of Test Results

Manufacturer: Andrew Corporation

Model No.: ION-M19HP

Serial No.: 11

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.
See " Summary of Test Data".

NVLAP®
LAB CODE: 100426-0

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	24.232	100W	Complies
Occupied Bandwidth	2.1049	Input/Output	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	Complies
Frequency Stability	24.235		NA

Footnotes:

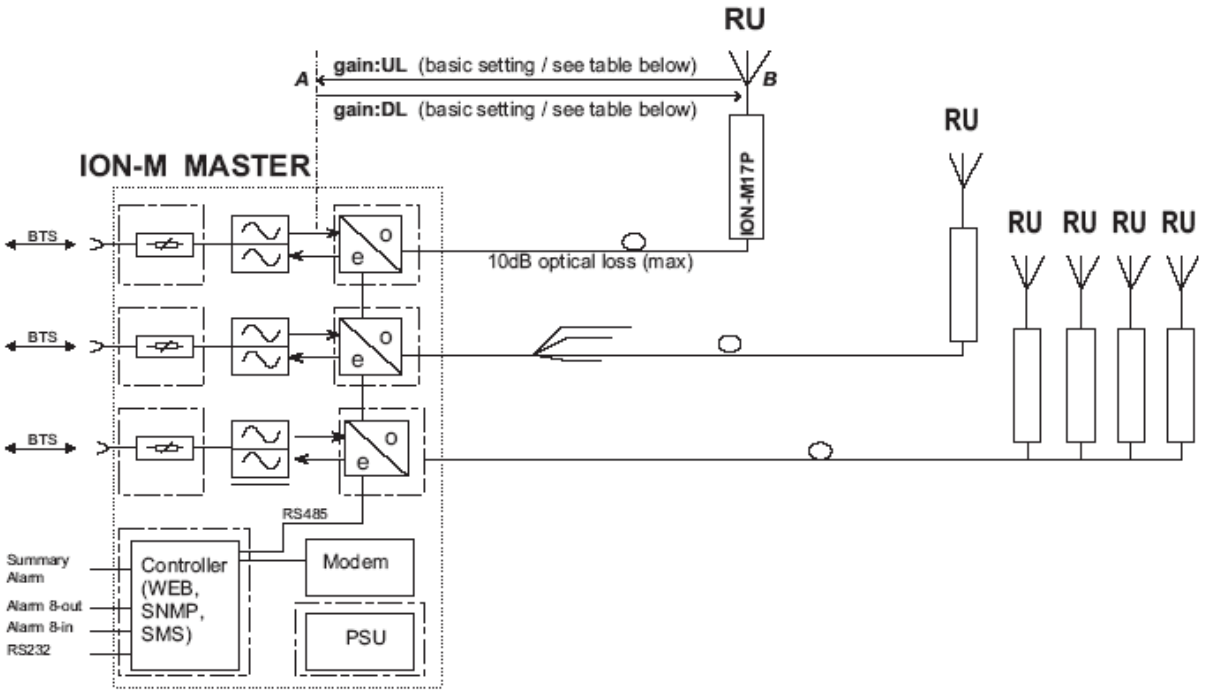
Section 2. General Equipment Specification

Supply Voltage Input:		120 Vac			
Frequency Range:	**Downlink:**	1930 to 1995 MHz			
Frequency Range:	**Uplink:**	NA			
Type of Modulation and Designator:		CDMA (G7W)	GSM (GXW)	EDGE (G7W)	W-CDMA (G7W)
Output Impedance:		50 ohms			
RF Output (Rated):	**Downlink**	46 dBm (39.8Watts)			
RF Output (Rated):	**Uplink**	NA			
Frequency Translation:		**F1-F1** ☐	**F1-F2** ☐	**N/A** ☒	
Band Selection:		**Software** ☐	**Duplexer Change** ☐	**Fullband Coverage** ☒	

Description of EUT

ION-M19HP is a high-power multi-operator remote unit with various extension units. It is used in conjunction with a master unit in the ION optical distribution system. The ION system is able to transport a wide frequency range simultaneously (1700/2100 MHz, and 1900 MHz), providing a cost-effective solution for distributing capacity from one or more base stations.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 24.232
TESTED BY: David Light	DATE: 16 February 2009

Test Results: Complies.

Measurement Data:

	Modulation	Output per Channel (dBm)	Composite Power (dBm)	Composite Power (W)
	CDMA	43	46	39.8
	EDGE	43	46	39.8
	GSM	43	46	39.8
	W-CDMA	43	46	39.8

Equipment Used: 1036-1604-1064-1082

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 32 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 24.238
TESTED BY: David Light	DATE: 16 February 2009

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1604-1064-1082

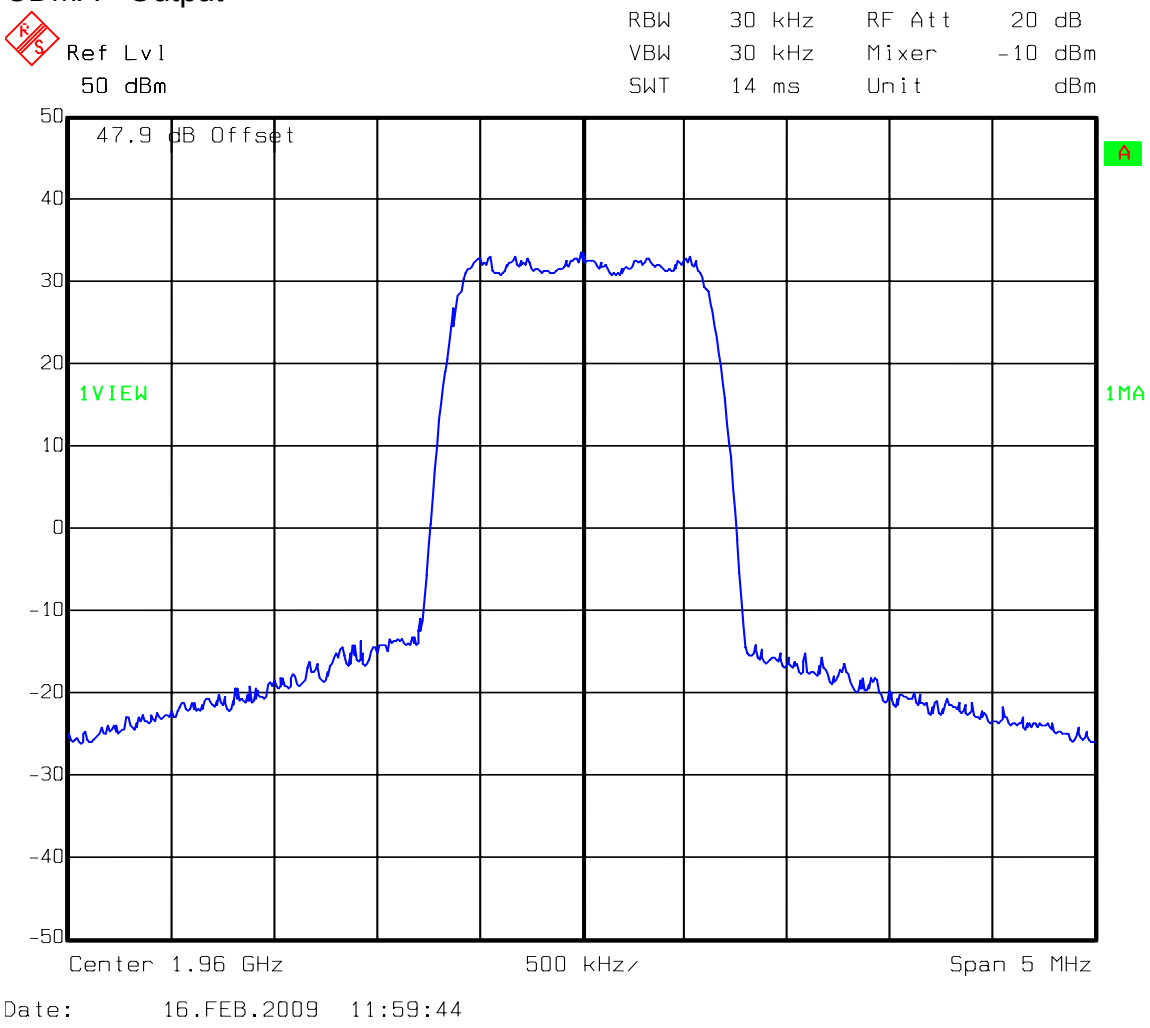
Measurement Uncertainty: $1X10^{-7}$ ppm

Temperature: 22 °C

Relative Humidity: 32 %

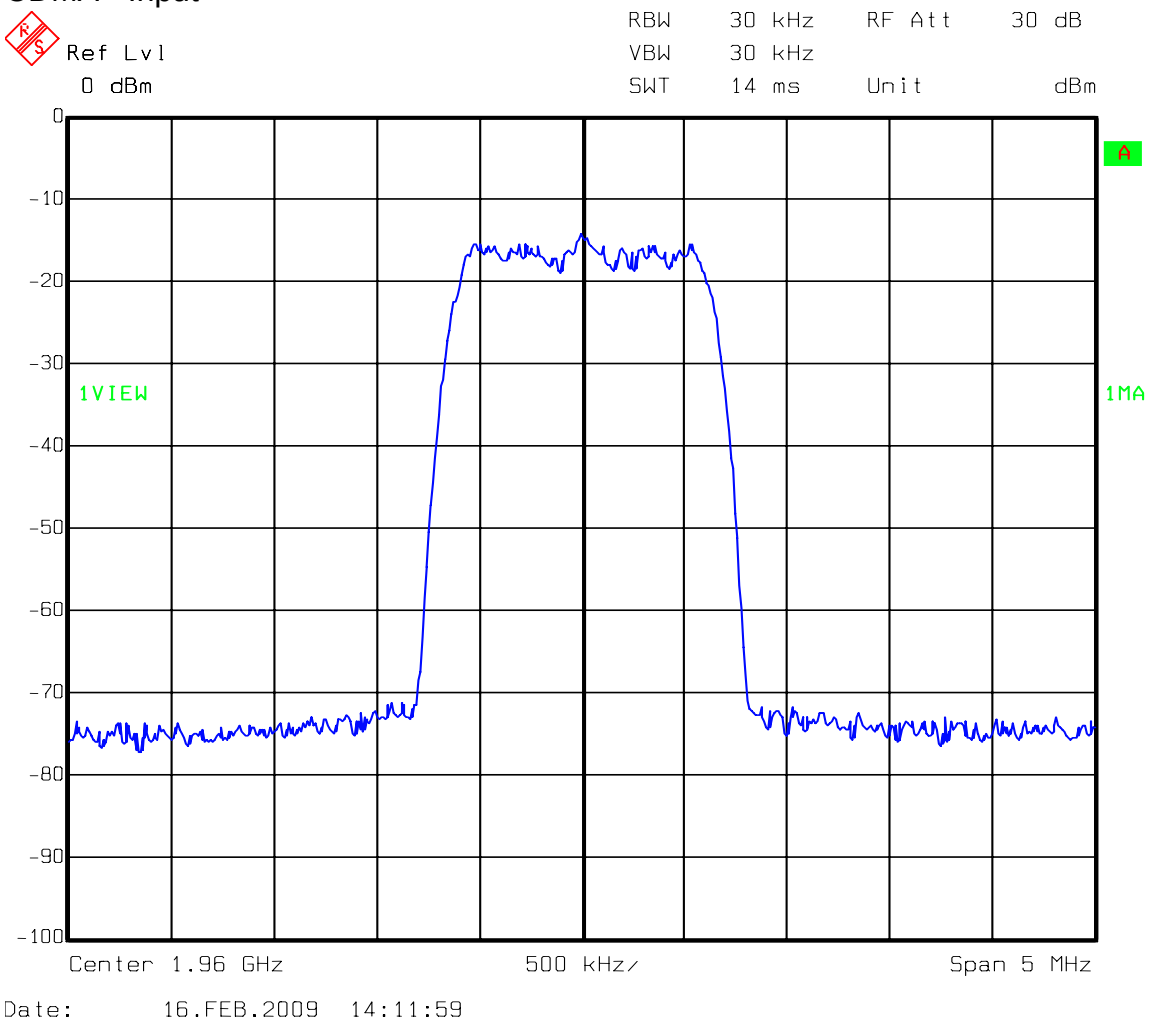
Test Data – Occupied Bandwidth

CDMA - Output



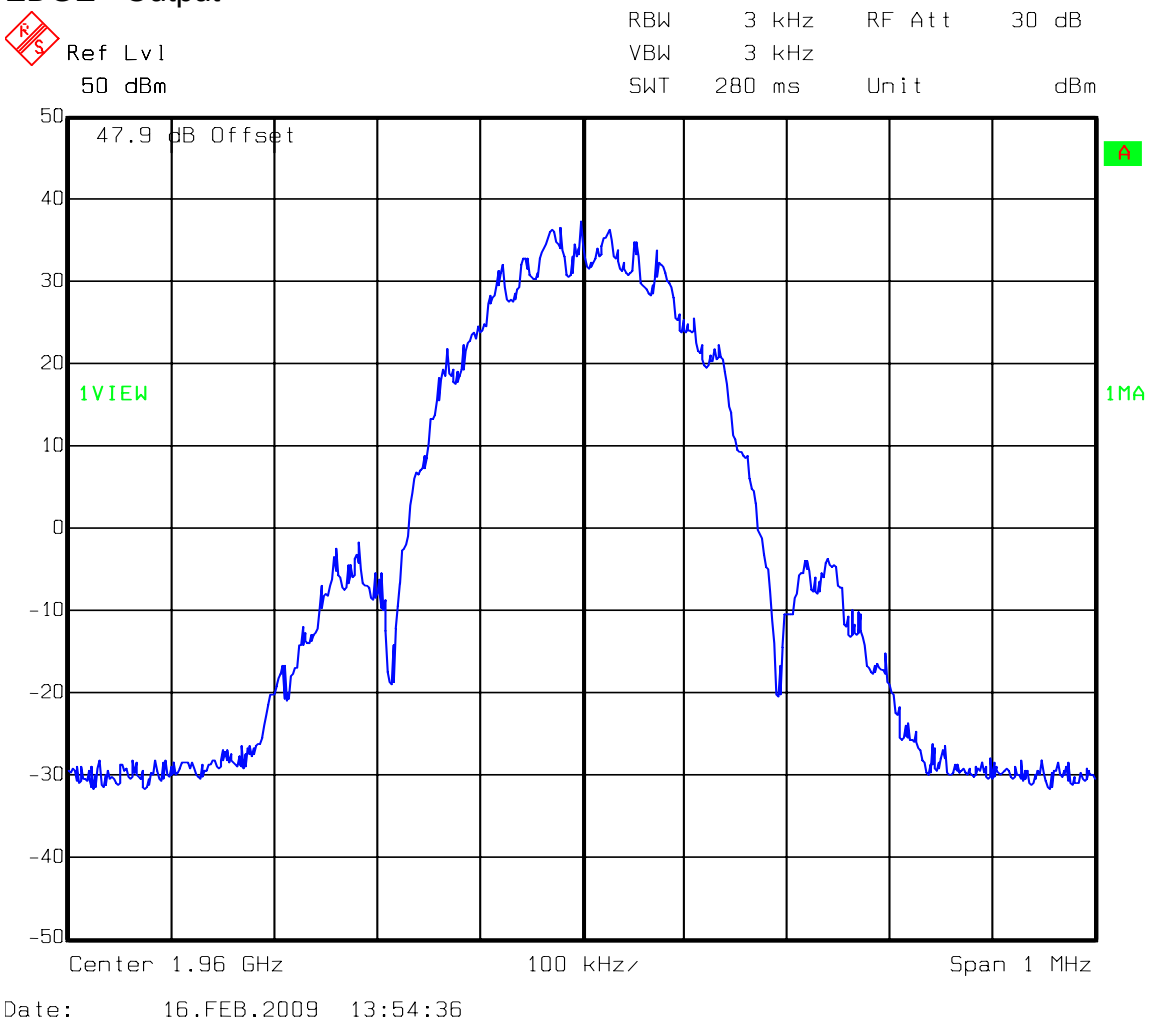
Test Data – Occupied Bandwidth

CDMA - Input



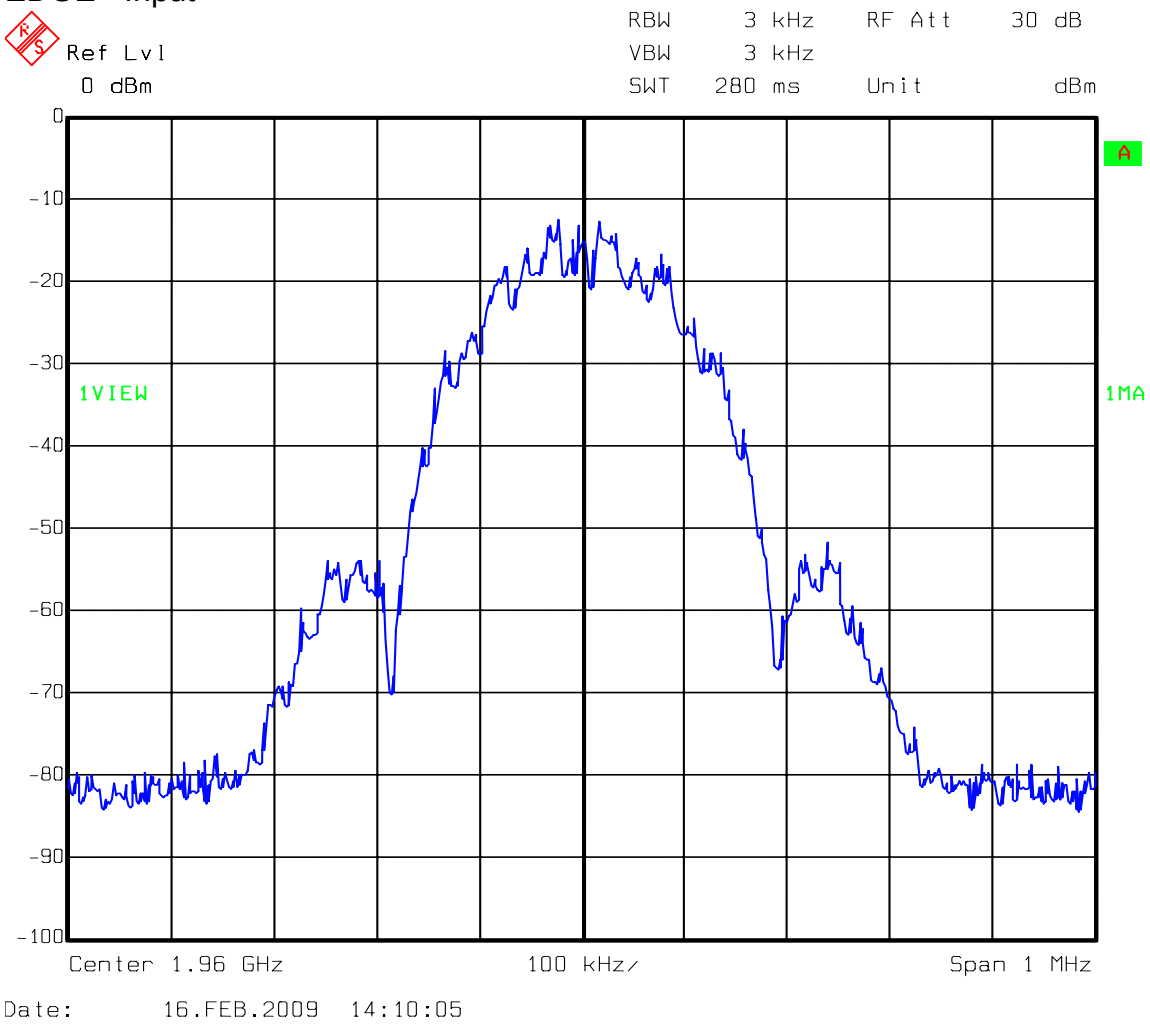
Test Data – Occupied Bandwidth

EDGE - Output



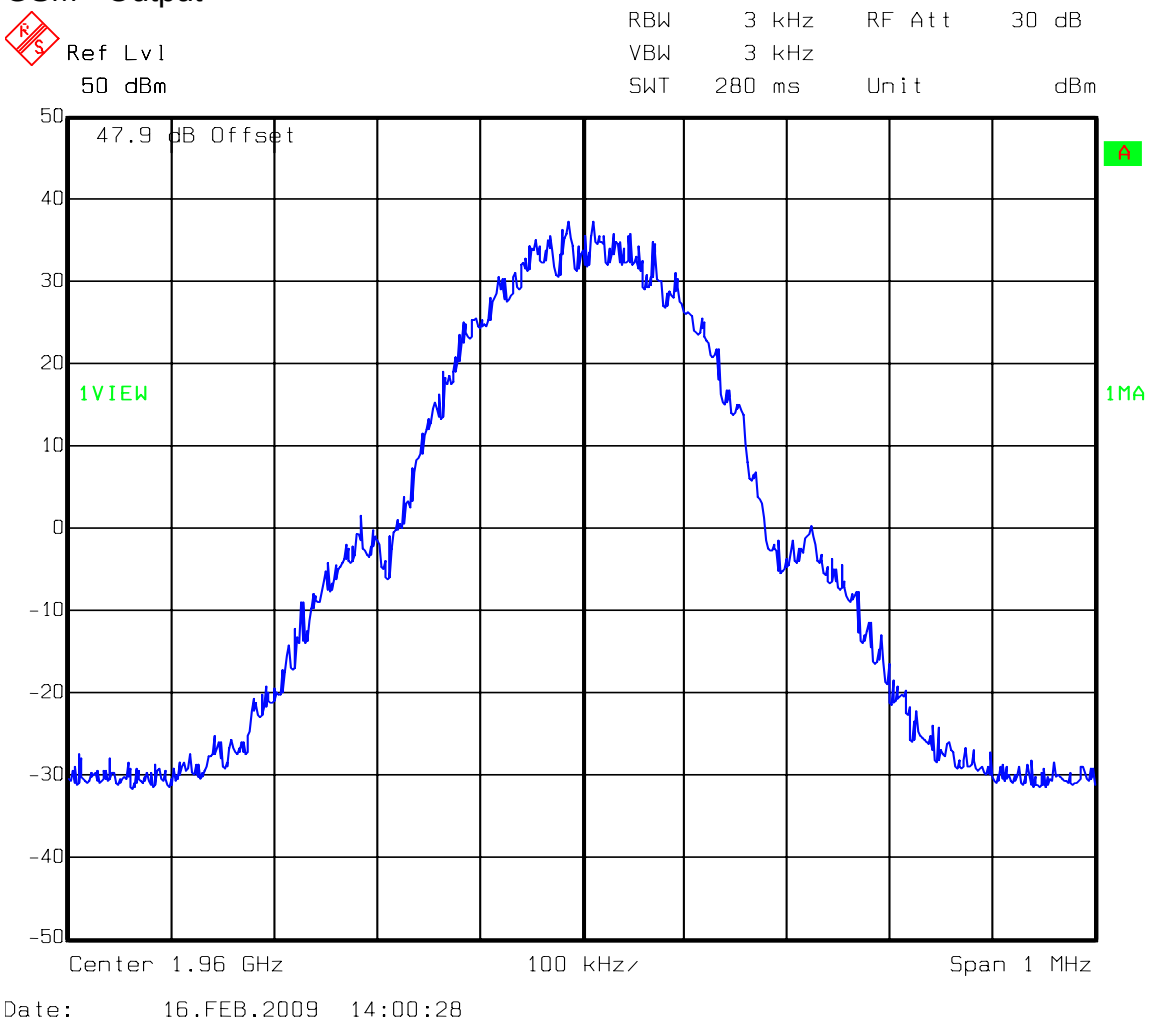
Test Data – Occupied Bandwidth

EDGE - Input



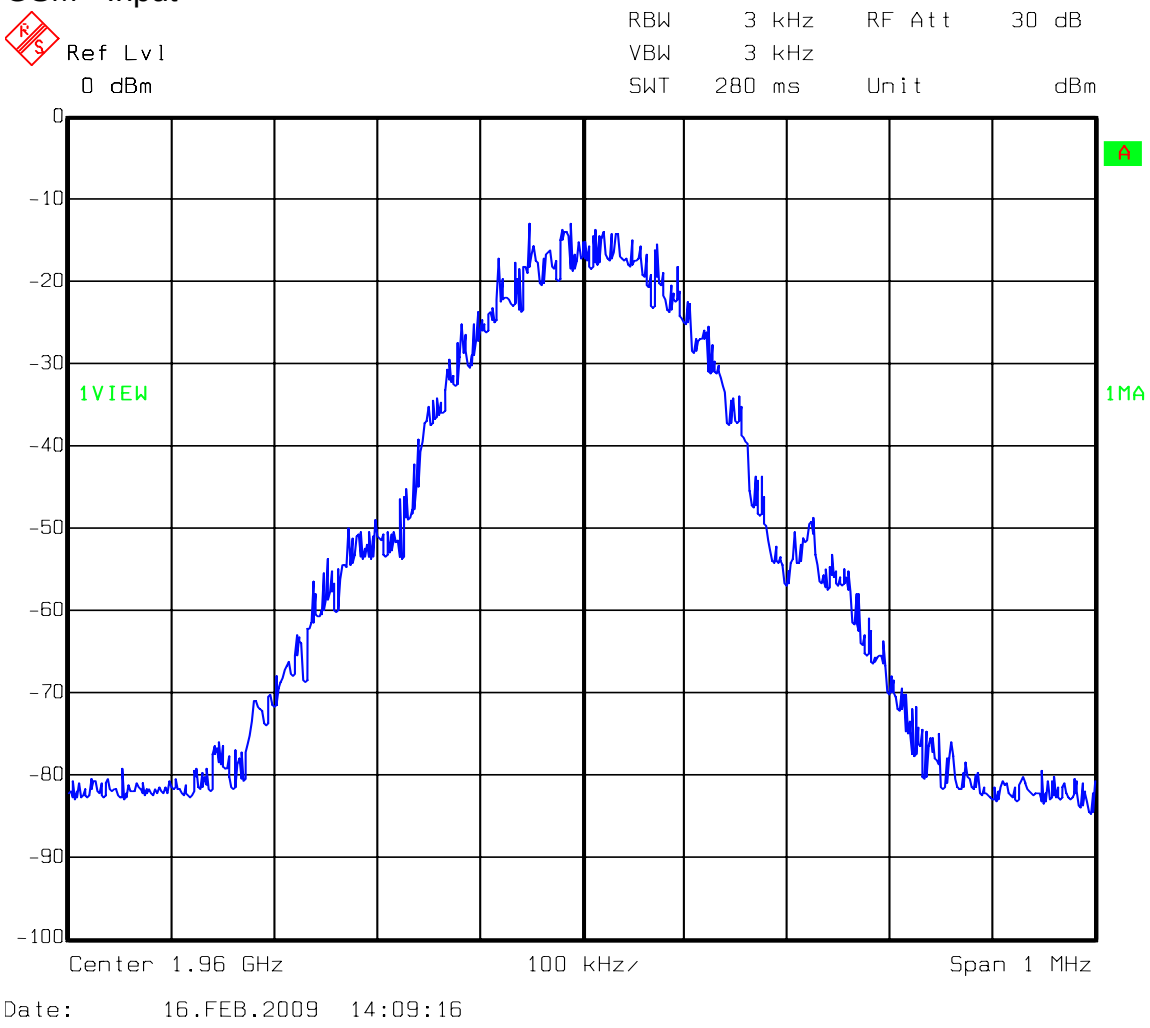
Test Data – Occupied Bandwidth

GSM - Output



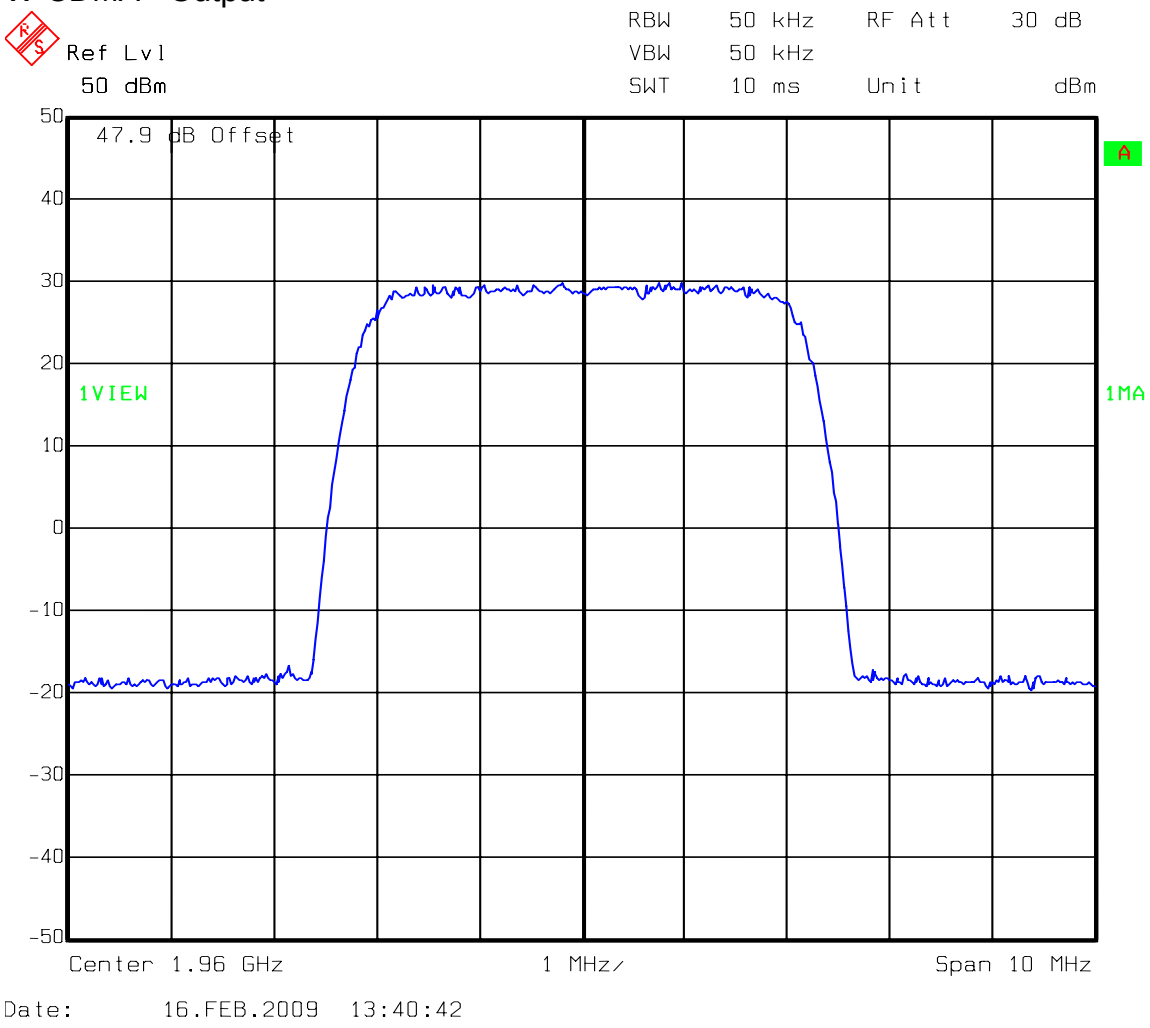
Test Data – Occupied Bandwidth

GSM - Input



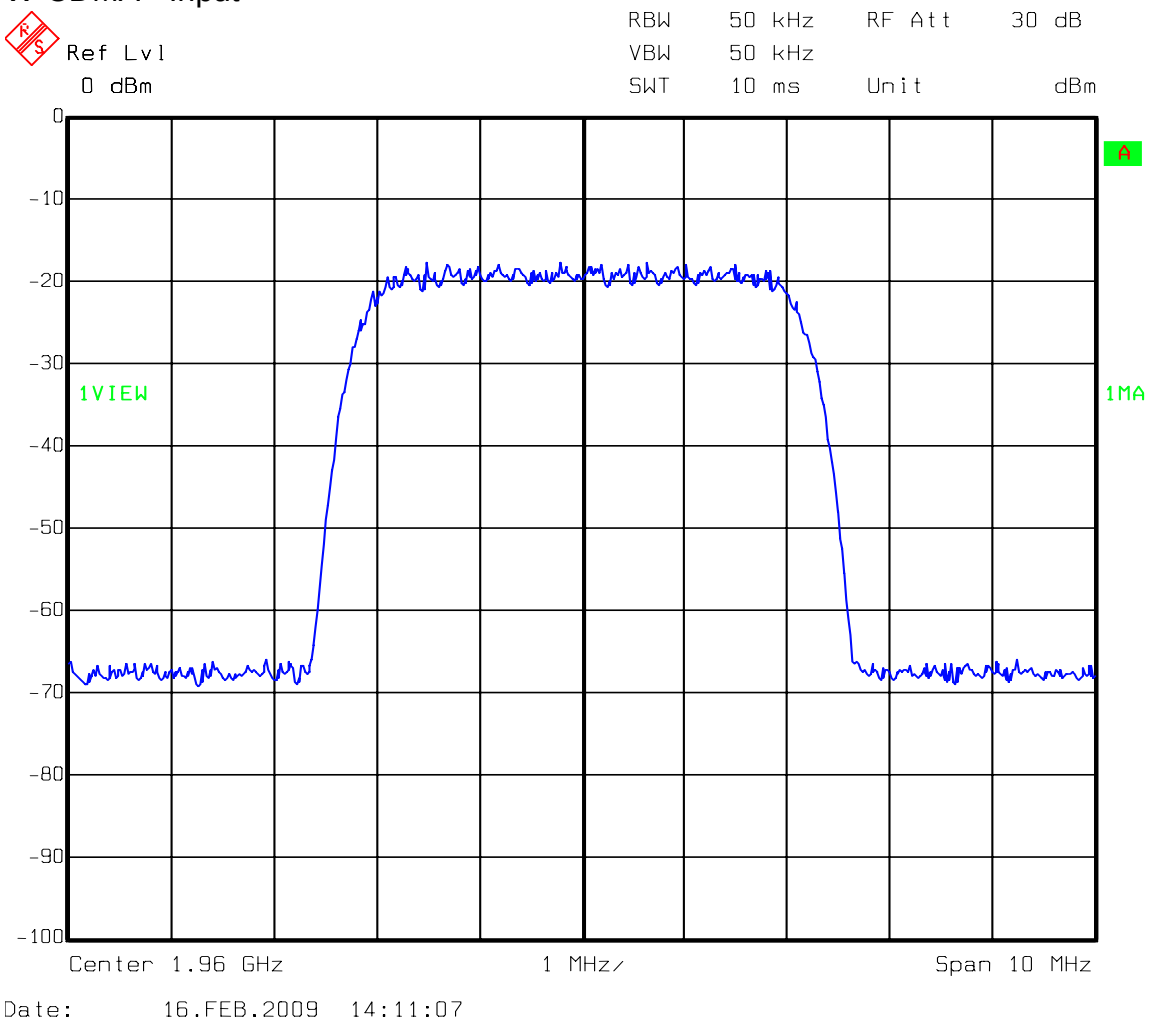
Test Data – Occupied Bandwidth

W-CDMA - Output



Test Data – Occupied Bandwidth

W-CDMA - Input



Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 24.238
TESTED BY: David Light	DATE: 16 February 09

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1604-1064-1082

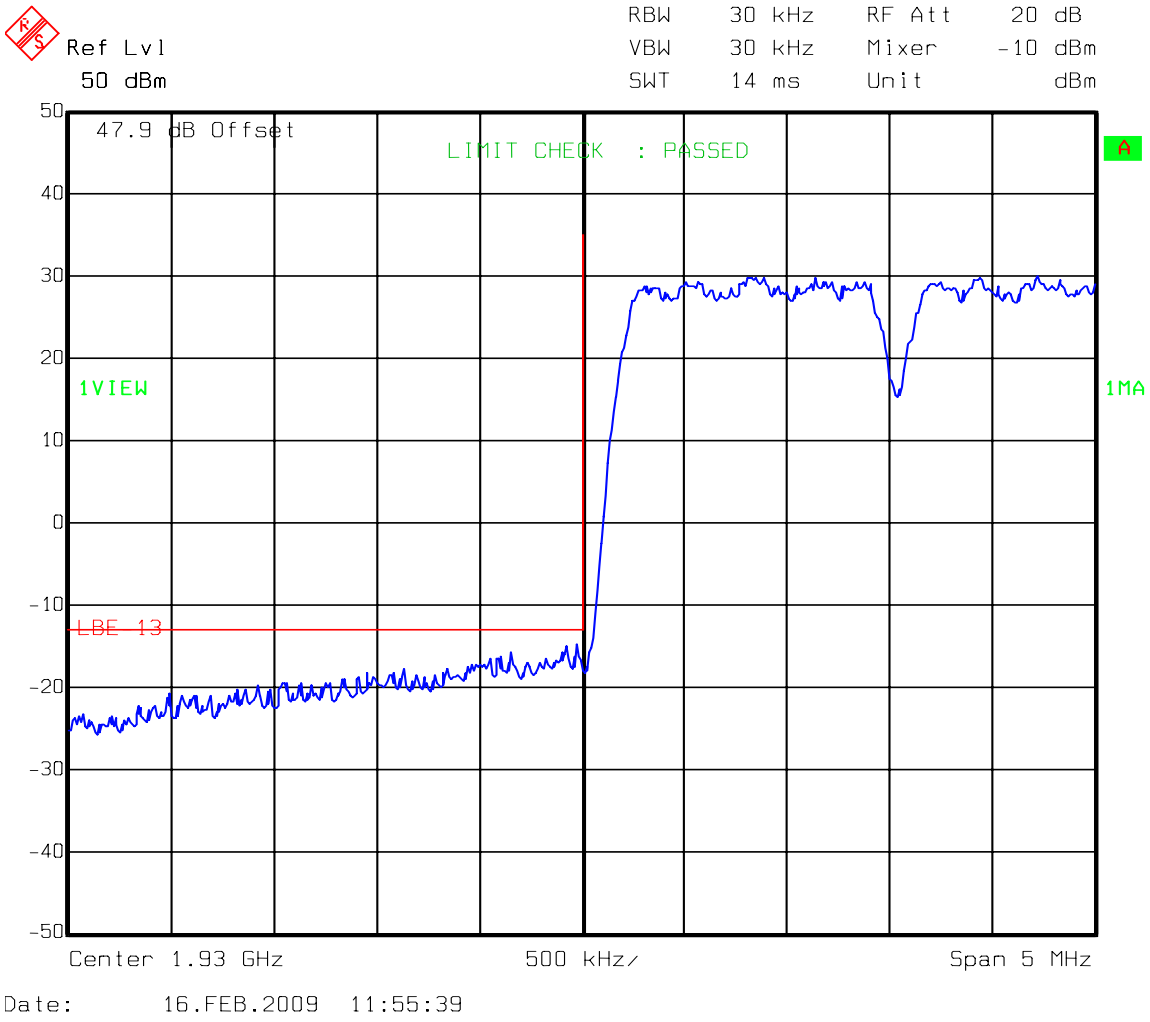
Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 32 %

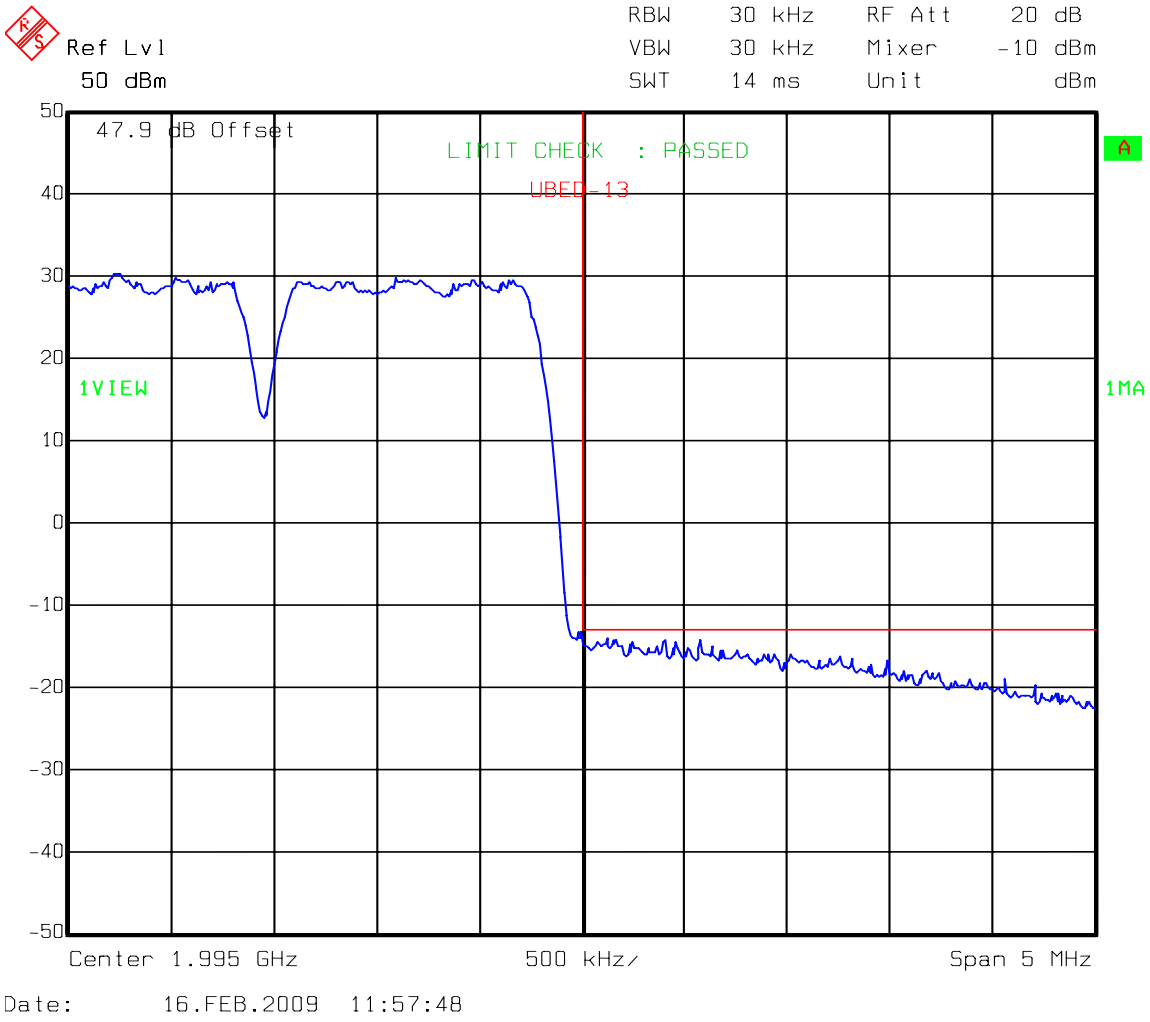
Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation
CDMA



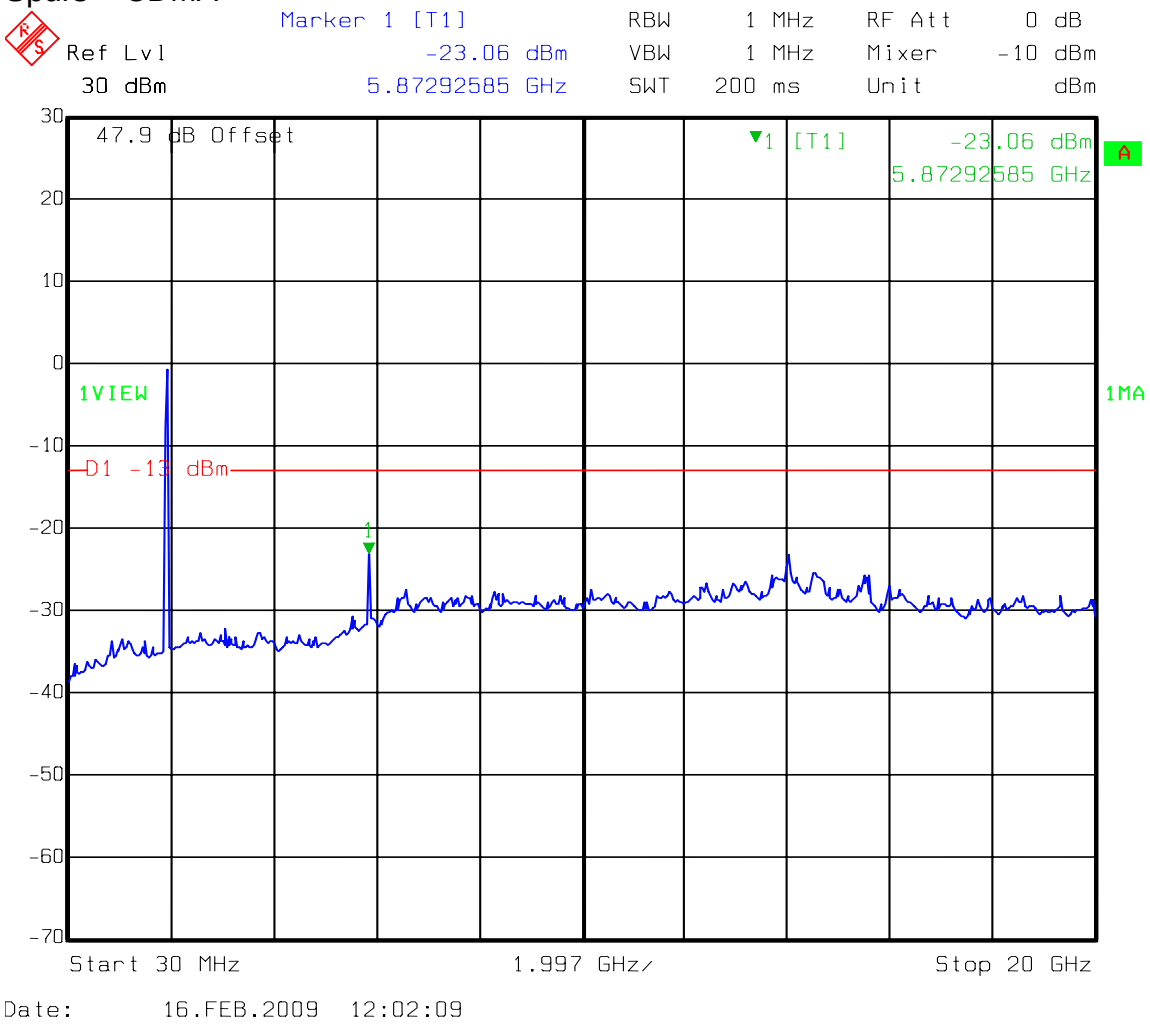
Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation
CDMA



Test Data – Spurious Emissions at Antenna Terminals

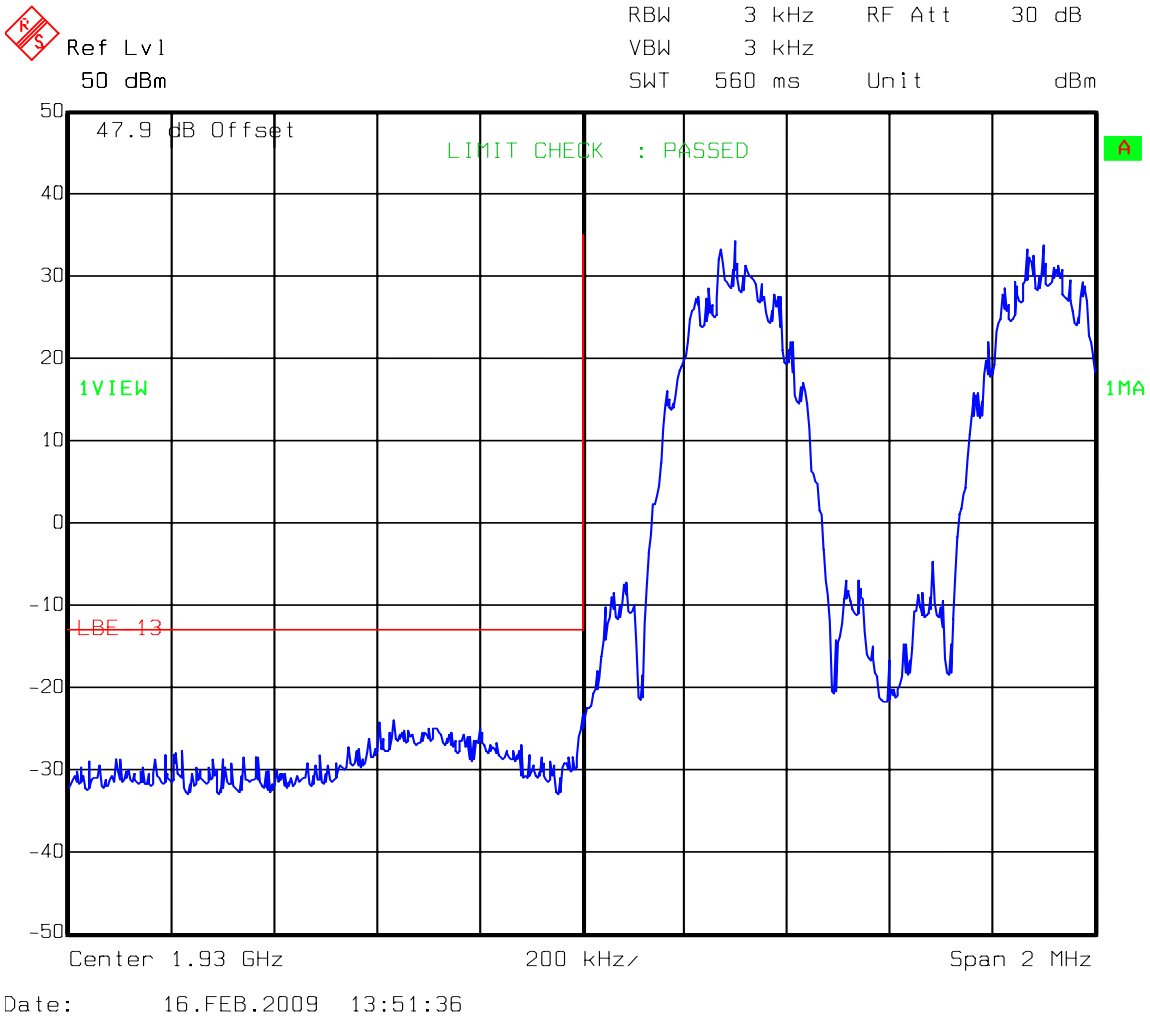
Spurs – CDMA



Carrier notched

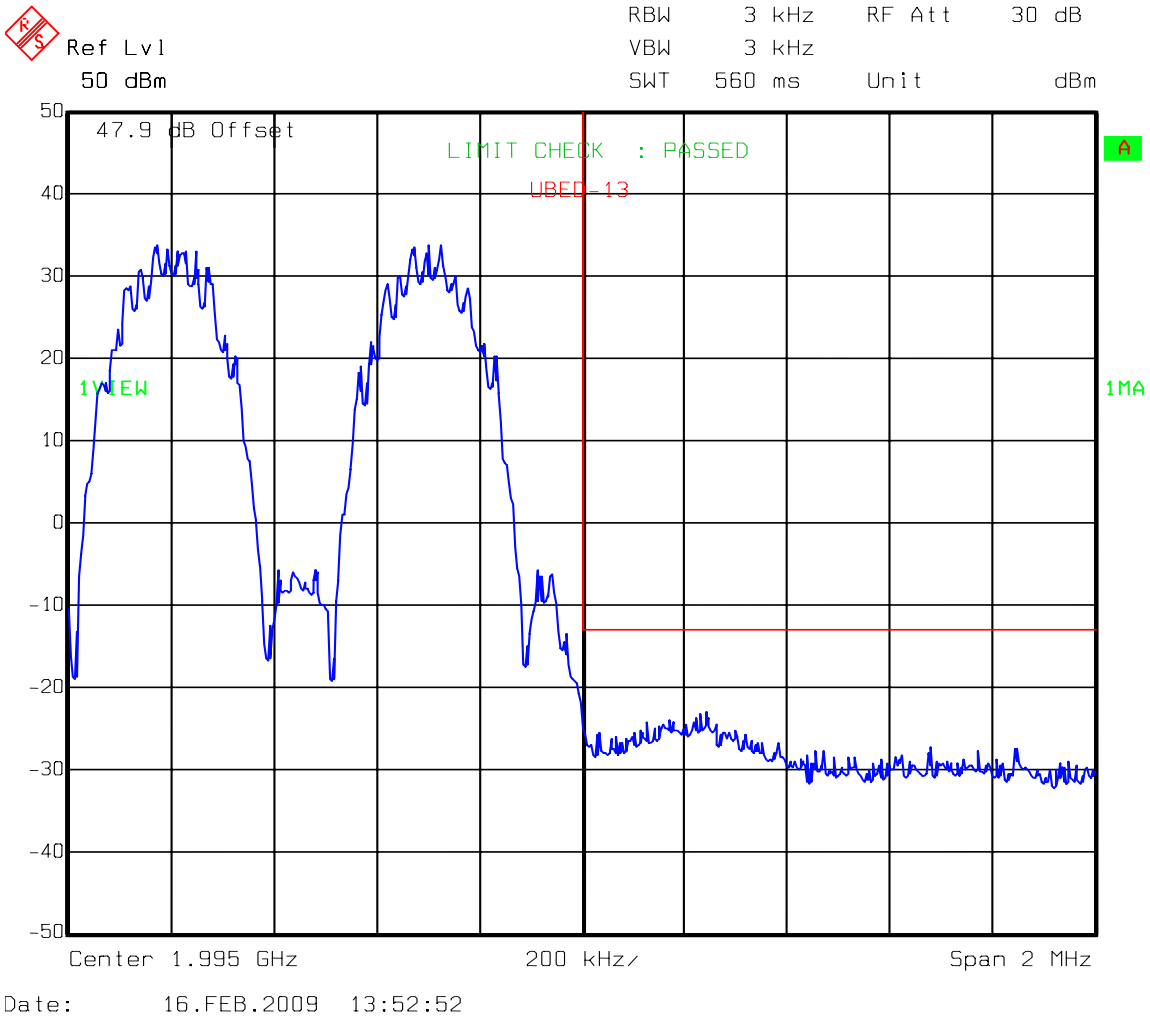
Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation
EDGE



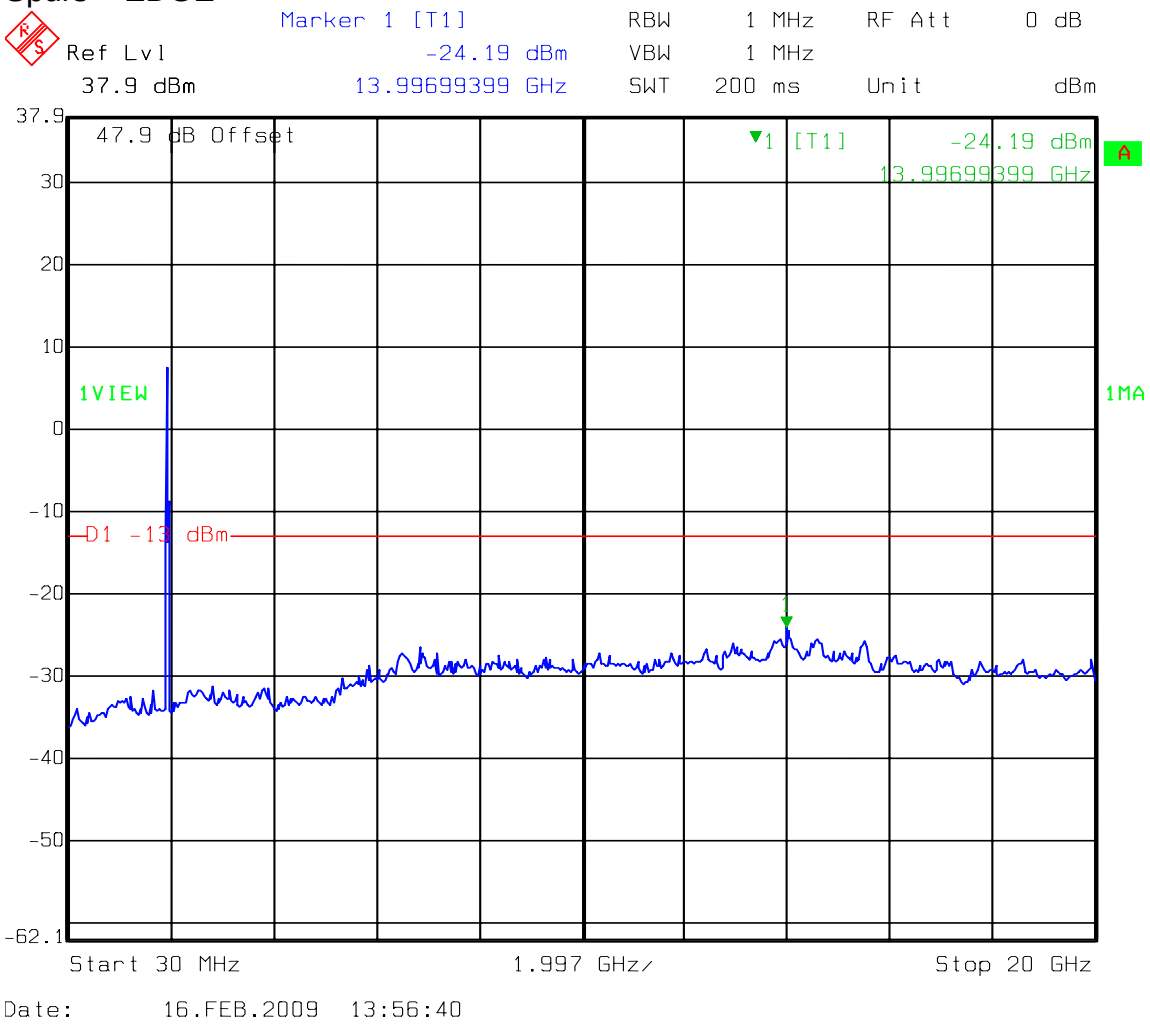
Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation
EDGE



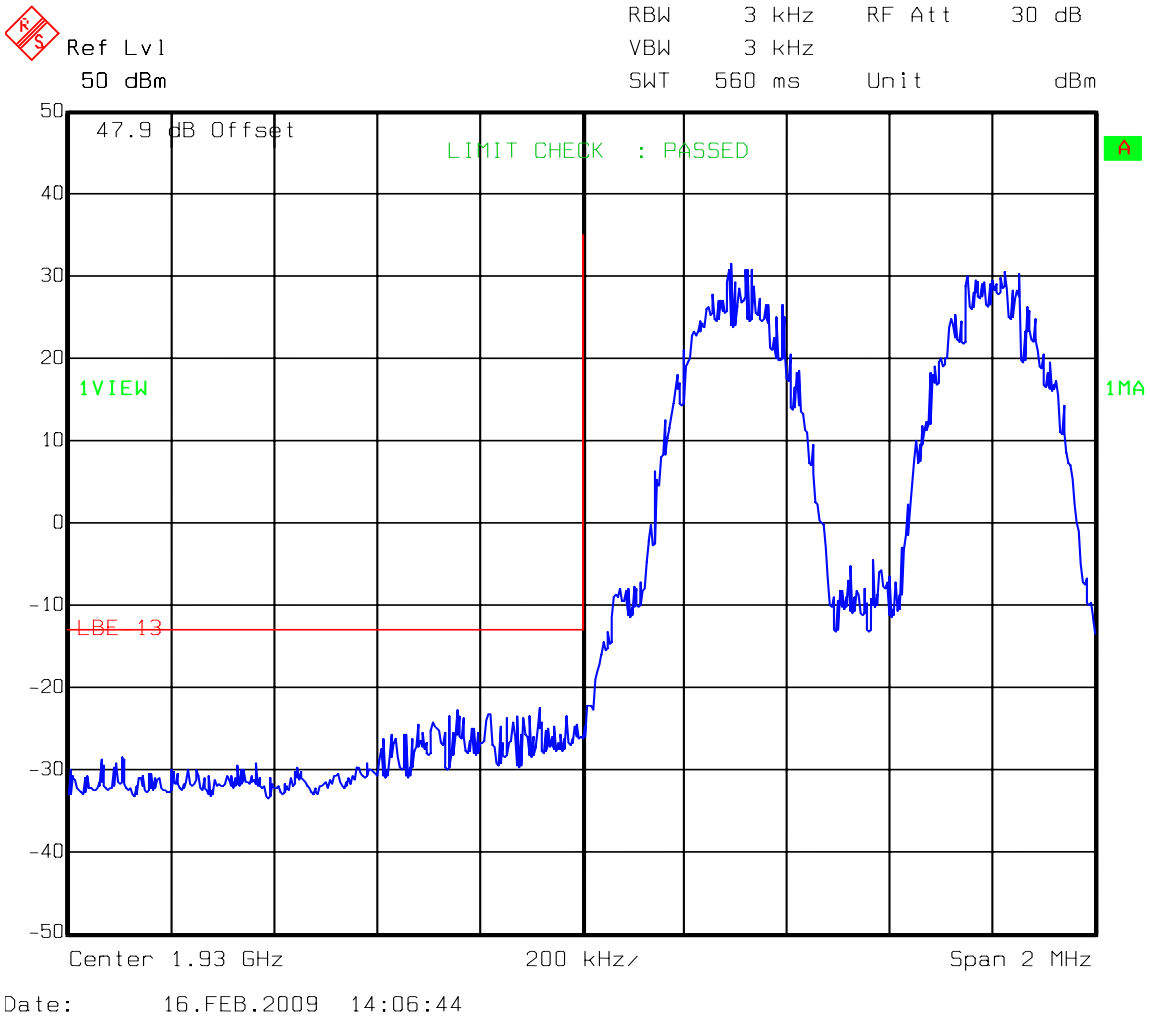
Test Data – Spurious Emissions at Antenna Terminals

Spurs – EDGE



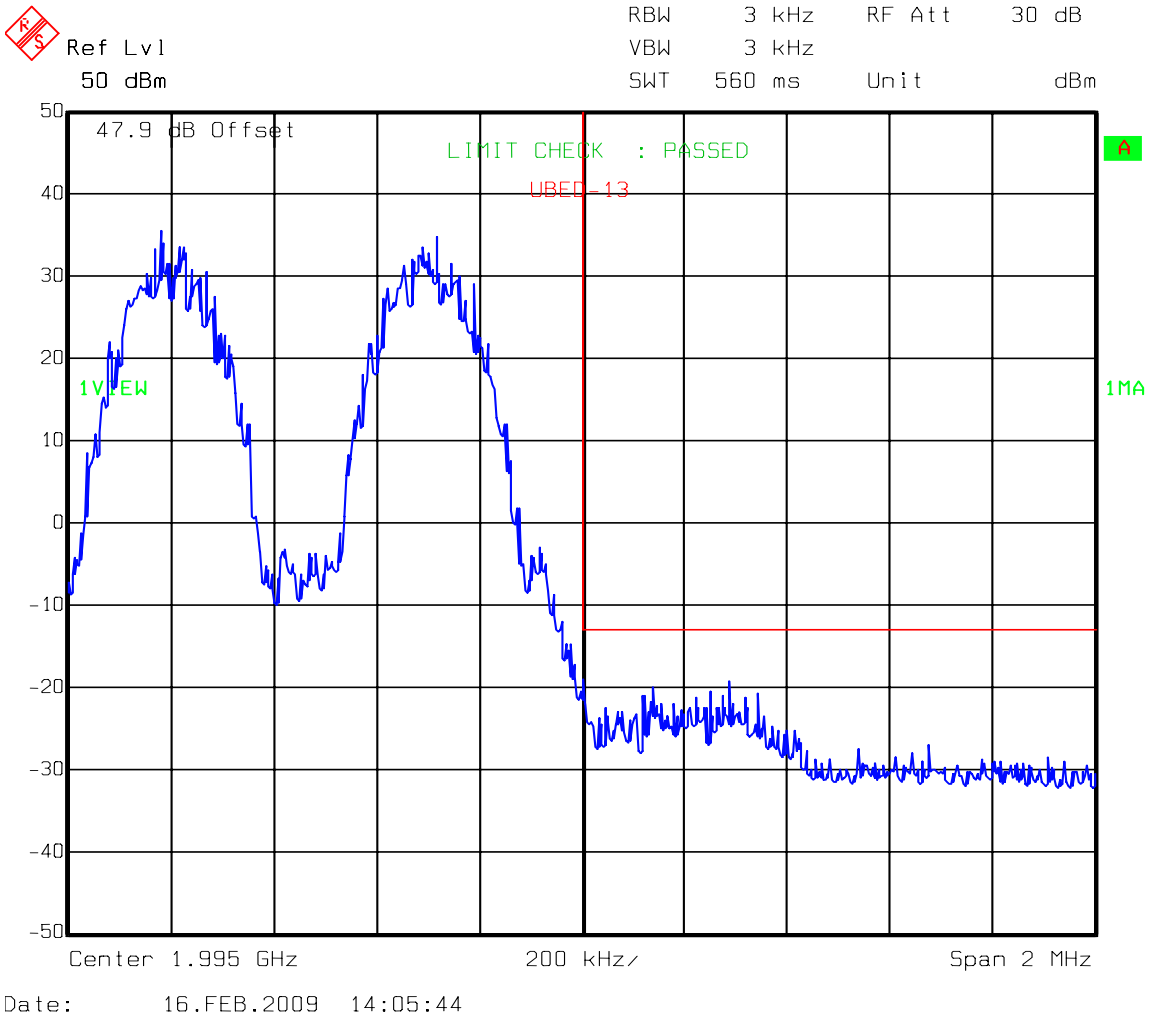
Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation
GSM



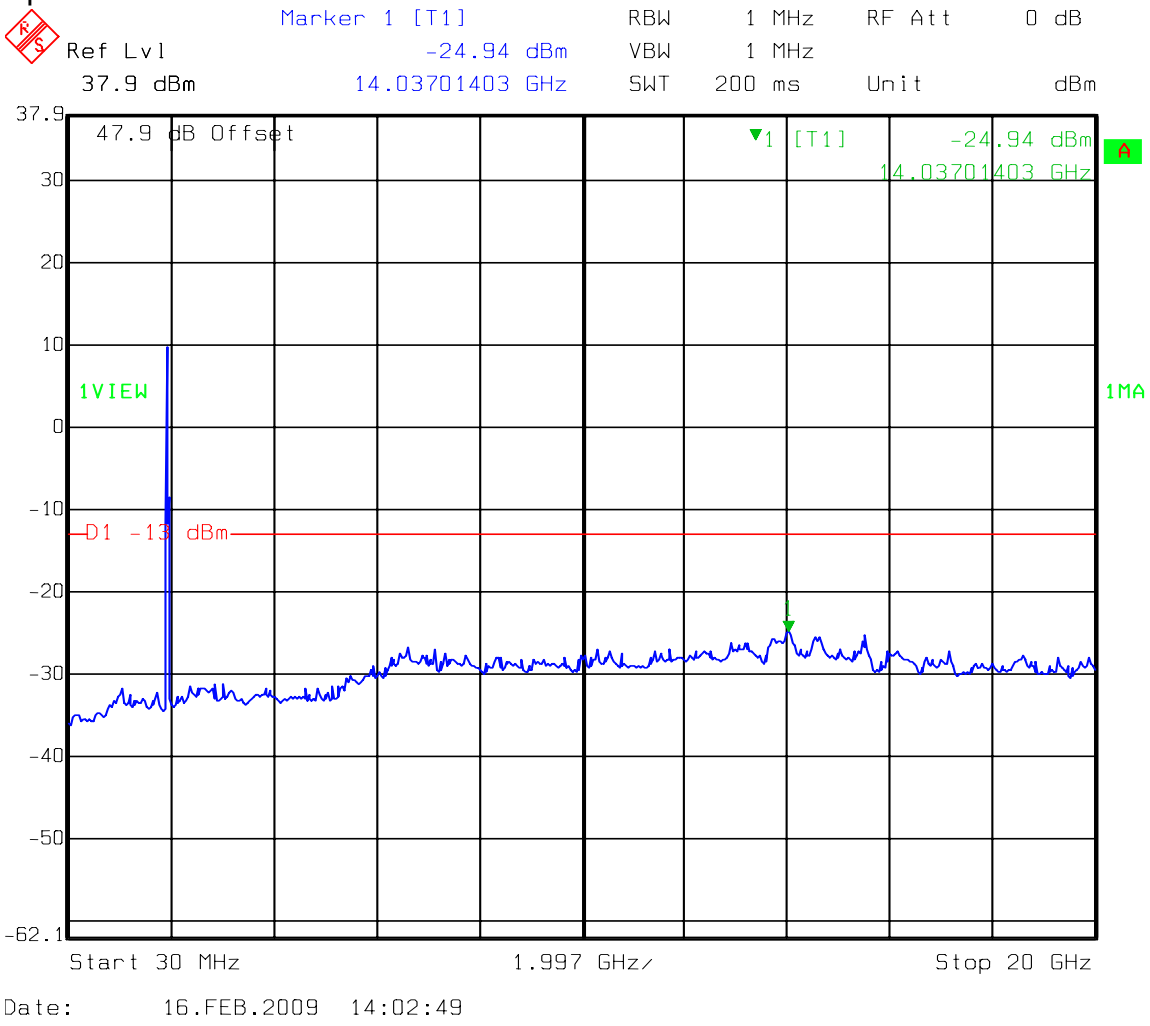
Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation
GSM



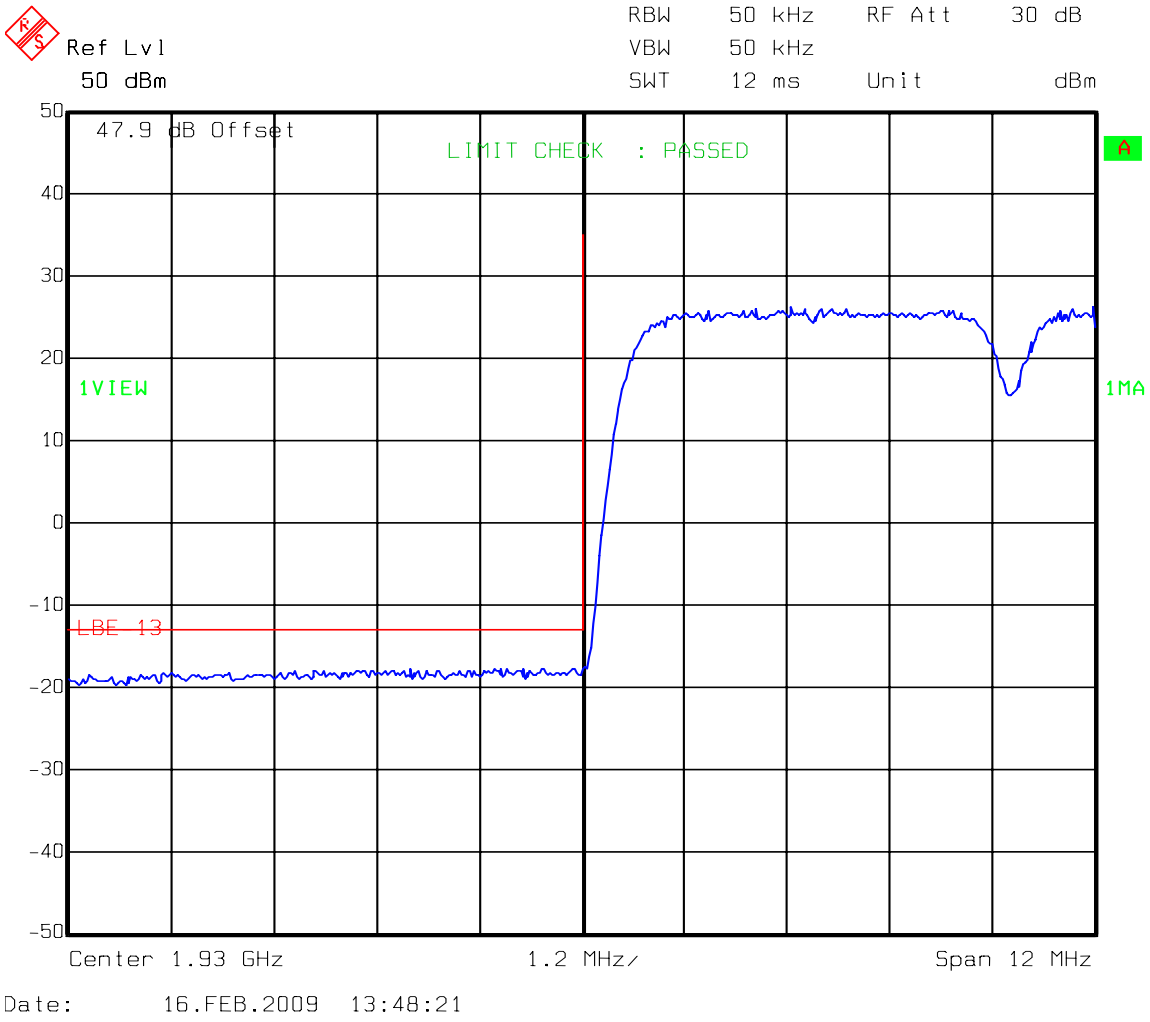
Test Data – Spurious Emissions at Antenna Terminals

Spurs – GSM



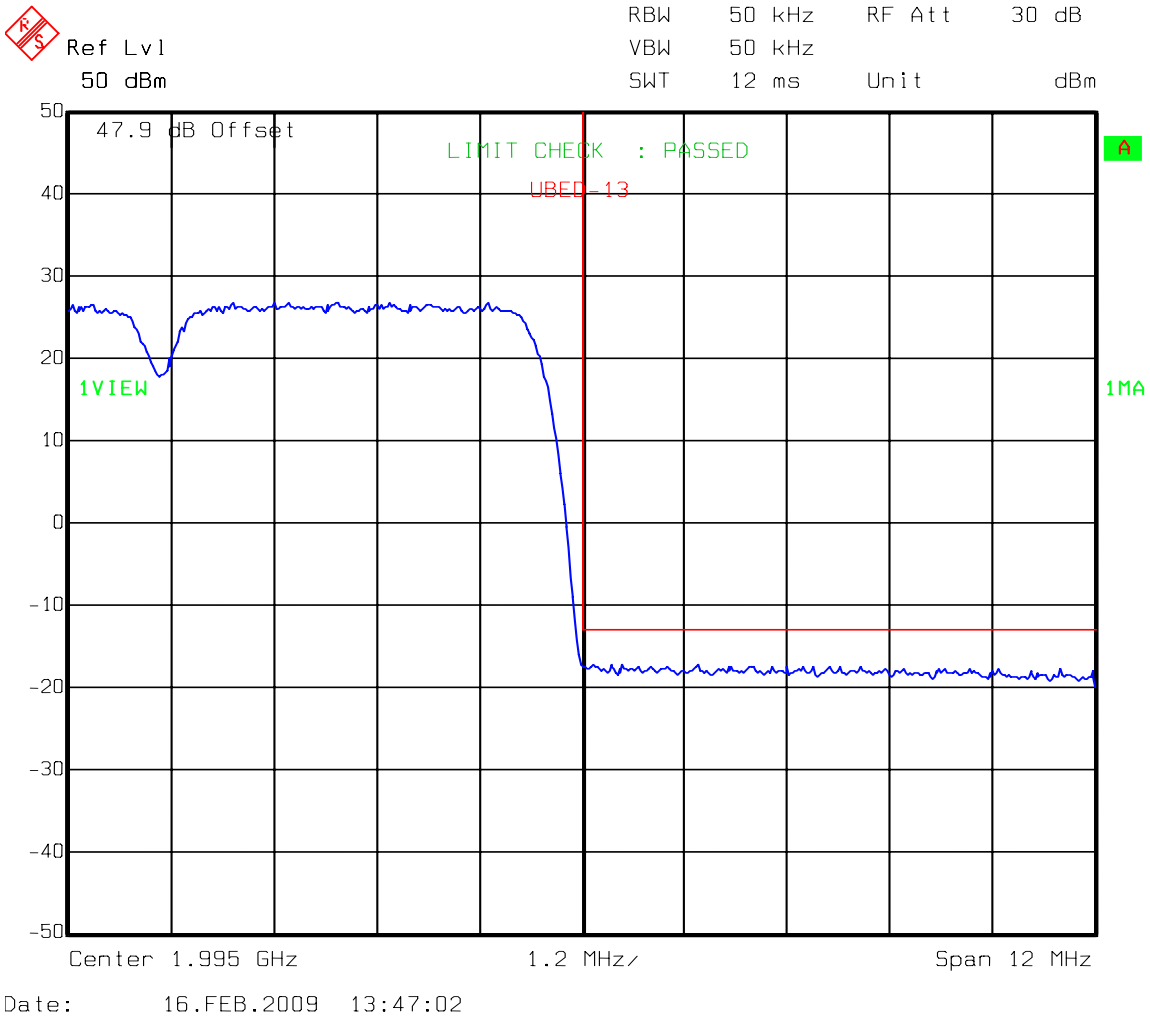
Test Data – Spurious Emissions at Antenna Terminals

Lower Bandedge Intermodulation
W-CDMA



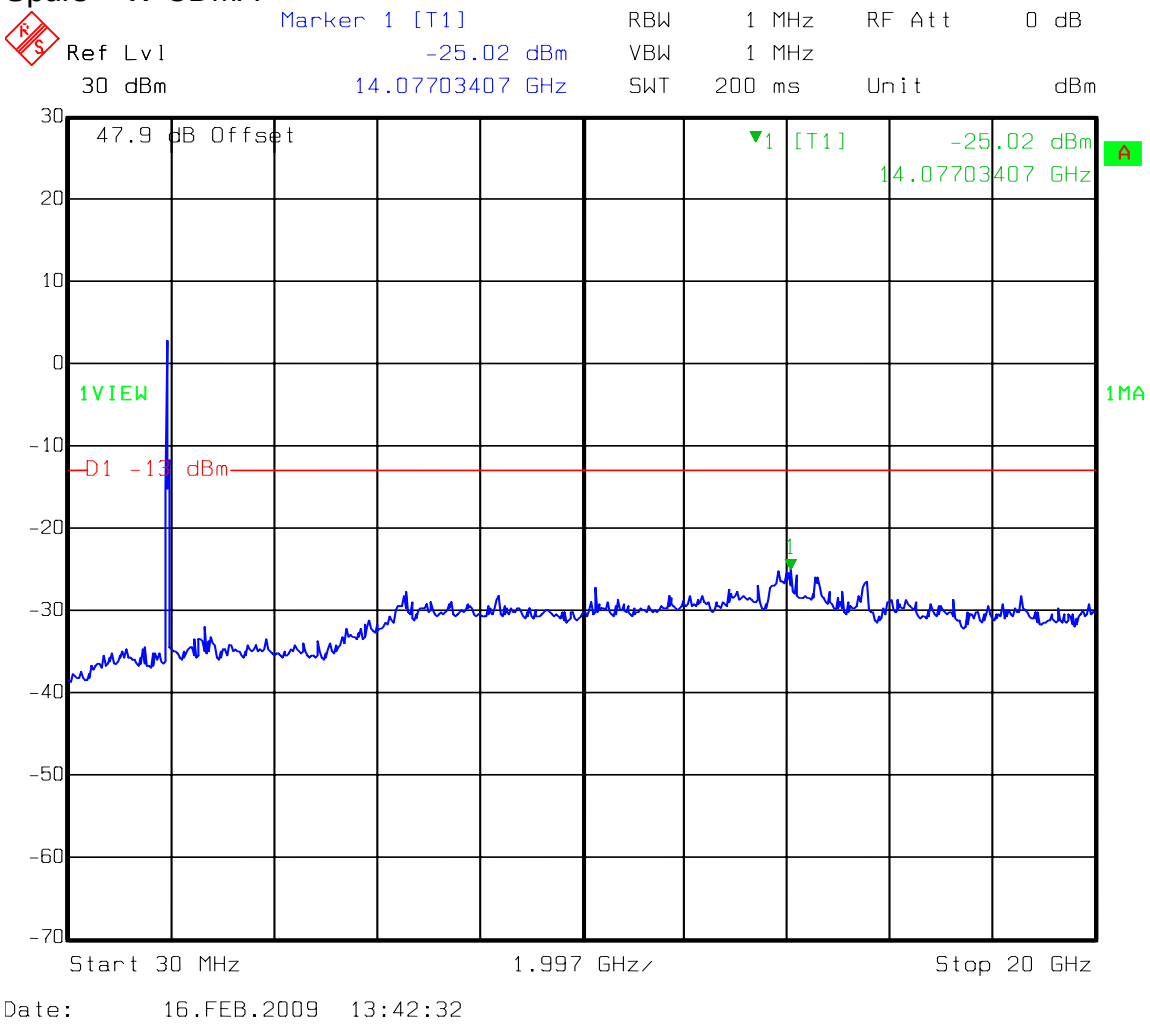
Test Data – Spurious Emissions at Antenna Terminals

Upper Bandedge Intermodulation
W-CDMA



Test Data – Spurious Emissions at Antenna Terminals

Spurs – W-CDMA -



Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 24.238
TESTED BY: David Light	DATE: 16 February 2009

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.

Equipment Used: 1036-1484-1485-1016-993-791-1763

Measurement Uncertainty: +/-1.7 dB

Temperature: 20 °C

Relative Humidity: 30 %

RBW=VBW=100 kHz below 1000 MHz
RBW=VBW=1 MHz above 1000 MHz
Peak detector

Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/08	12/19/10
1484	Cable	Storm PR90-010-072	N/A	05/07/08	05/07/09
1485	Cable	Storm PR90-010-216	N/A	05/07/08	05/07/09
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/07/08	05/07/09
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/31/07	08/31/09
1763	Bilog Antenna	Schaffner CBL 6111D	22926	11/04/08	11/04/09
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/07/08	05/07/09
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1604	ATTENUATOR	NARDA 776B-20	NONE	N/A	N/A
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	CBU	N/A

ANNEX A - TEST DETAILS

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

Minimum Standard: Para. No.24.232. Base stations are limited to 1640 watts peak E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed 100 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.

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.: 24.238

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (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: ≥ 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: ≥ RBW
Sweep: Auto
Video Avg: Disabled

TDMA

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

W-CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 100 kHz (< 1MHz from Band Edge)
VBW: ≥ 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.: 24.238

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (P) dB.

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.

NAME OF TEST: Frequency Stability **PARA. NO.: 2.1055**

Minimum Standard: Para. No. 24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Method Of Measurement:

Frequency Stability With Voltage Variation

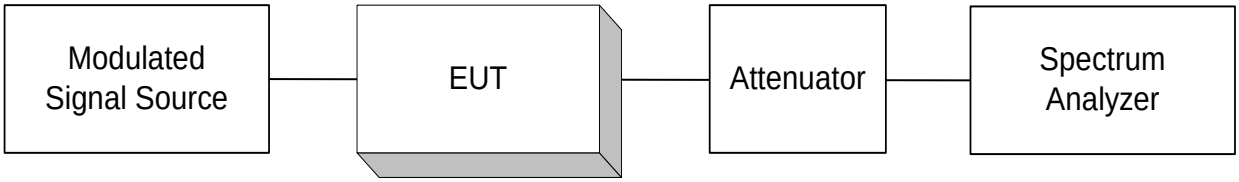
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

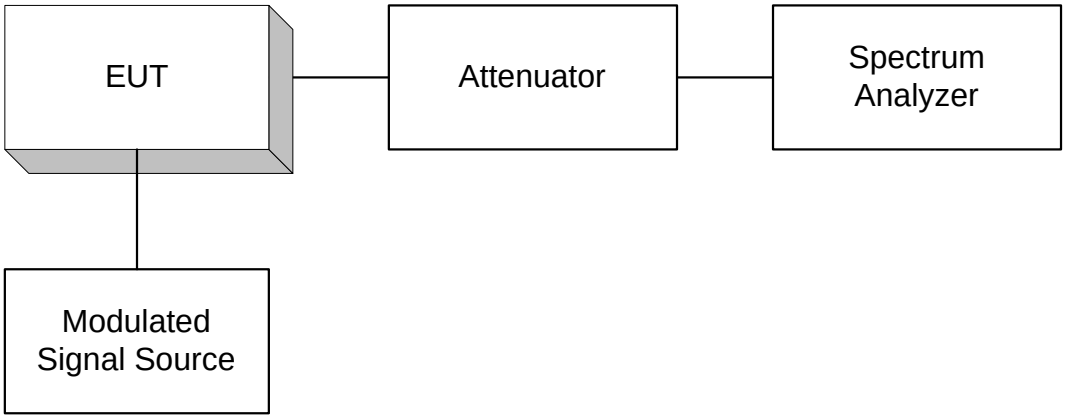
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

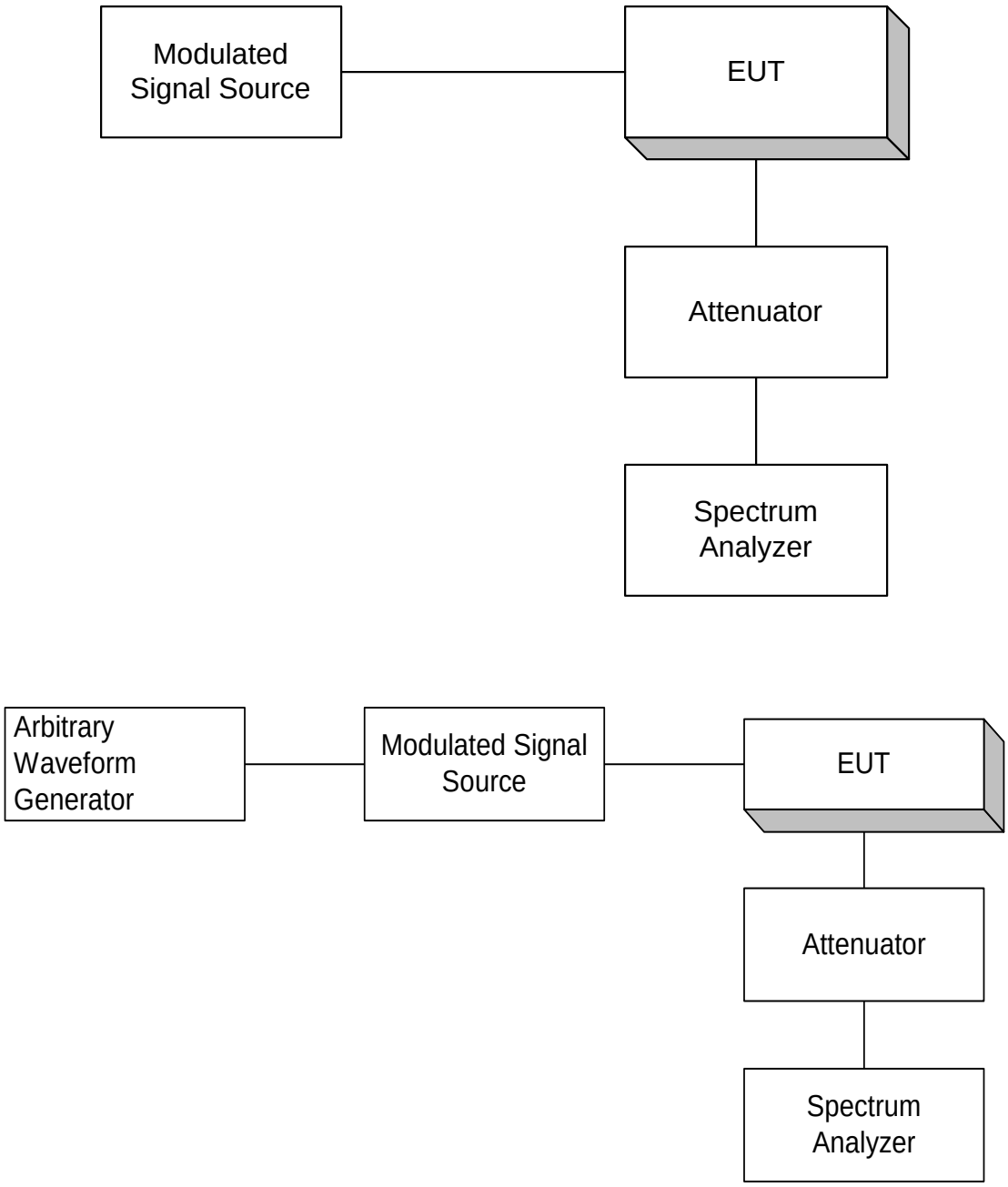
Para. No. 2.985 - R.F. Power Output



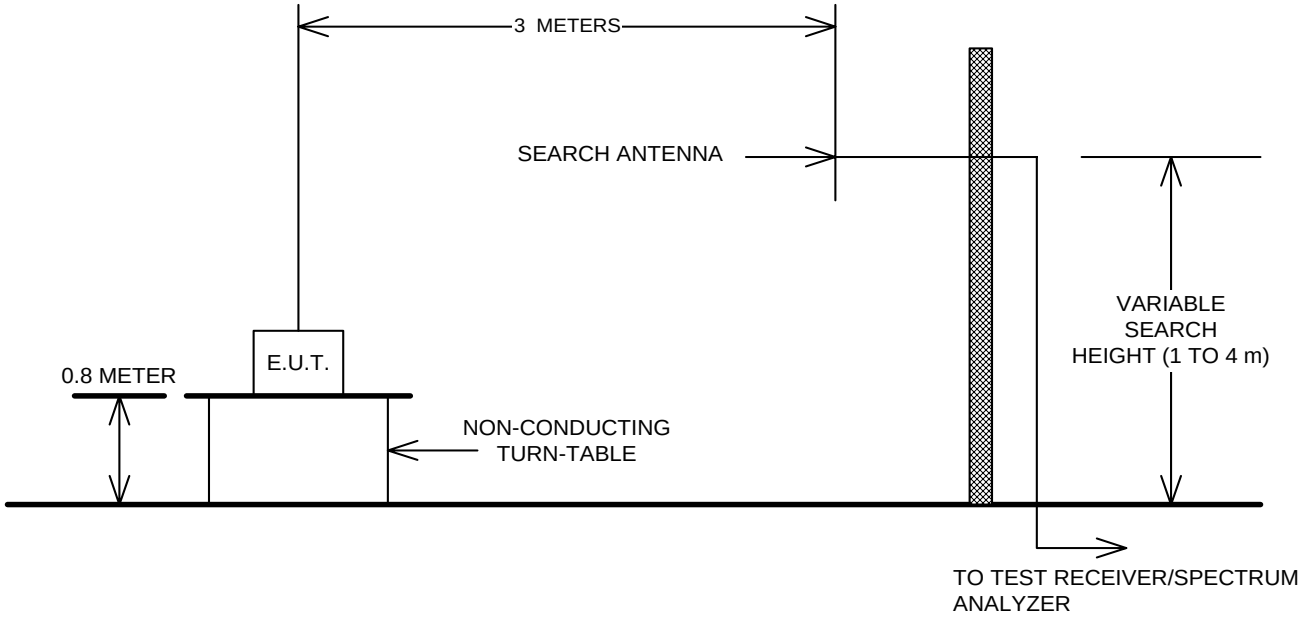
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability