



Nemko Test Report: 1026738RUS2

Applicant: Nokia Siemens Networks
6000 Connection Drive
Irving, TX 75039
USA

**Equipment Under Test:
(E.U.T.)** FXCA

FCC ID: VBNFXCA-01

In Accordance With: **CFR 47, Part 22, Subpart H and RSS 132, Issue 2**
Cellular Base Stations

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

TESTED BY:

A handwritten signature in black ink, appearing to read 'David Light'.

David Light, Senior Wireless Engineer

DATE: 4-May-2011

APPROVED BY:

A handwritten signature in black ink, appearing to read 'Tom Tidwell'.

Tom Tidwell, Director Nemko Direct for Telecom

DATE: 7-Jul-2011

Number of Pages: 49

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Section 1. Summary of Test Results

Manufacturer: Nokia Siemens Networks

Model No.: FXCA

Serial No.: L9111300673

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 22, Subpart H and RSS 132, Issue 2.



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	PART 22 PARA. NO.	RSS 312 PARA. NO.	SPEC.	RESULT
RF Power Output	22.913(a)	4.4	1640 W	Complies
Occupied Bandwidth	22.917	4.5.1	Not defined	Complies
Spurious Emissions at Antenna Terminals	22.917	4.5.1	-13 dBm	Complies
Field Strength of Spurious Emissions	22.917	-	-13 dBm E.R.P.	Complies
Frequency Stability	22.355	4.3	1.5 ppm	Complies
Receiver Spurious Emissions	-	RSS-Gen Issue 3	Para. 6.1 Table 1	Complies

Footnotes: None

Section 2. General Equipment Specification

Supply Voltage Input:	-48 Vdc nominal		
Frequency Band:	869 to 894 MHz		
Type of Modulation and Designator:	GSM 300KGXW	EDGE 300KG7W	QPSK 5M00D7W
			16QAM 5M00D7W
Maximum No. of Carriers:	6		
Output Impedance:	50 ohms		
RF Output (Rated):	60 W +47.8 dBm	The rf power is lowered to 2 watts on the first and last channels of each band.	
Band Selection:	Software <input checked="" type="checkbox"/>	Duplexer <input type="checkbox"/>	Fullband <input type="checkbox"/>

System Description

The FXCA is a 850 MHz multistandard multicarrier radio module that consists of three individual transceivers designed to support GSM/EDGE, WCDMA and LTE in dedicated or concurrent mode. Each module supports upto six GSM/EDGE carriers in GSM/EDGE dedicated mode, upto four WCDMA carriers in WCDMA dedicated mode and upto four 5 MHz LTE carriers in LTE dedicated mode with one radio branch. In concurrent mode, a combination of all three radio technologies is supported with a single radio branch. Each module is capable to serve three radio branches with multiradio multicarrier radios of upto 60 Watts output power per branch. The LTE modulation and concurrent mode operation were not tested under this effort.

The transmitter test setup for GSM/EDGE dedicated mode provided GMSK and 8PSK modulation types for both single and multicarrier operation. The transmitter WCDMA dedicated mode provided QPSK and 16QAM modulation types for both single and multicarrier operation.

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
	RSS 132 PARA. 4.4
TESTED BY: David Light	DATE: 21 April 2011

Test Results: Complies.

Measurement Data: Refer to table on next page.

Equipment Used: 2071-2072-1082-1054-1064-1065

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 35 %

Test Data – RF Power Output

Modulation Type	Frequency (MHz)	Measured Output Power		Deviation from rated (dB)
		(dBm)	(W)	
GMSK	869.2	32.5	1.8	-0.5
GMSK	869.4	47.9	61.7	0.1
GMSK	881.6	48.6	72.4	0.8
GMSK	893.6	48.3	67.6	0.5
GMSK	893.8	32.3	1.7	-0.7
8PSK	869.2	34.5	2.8	1.5
8PSK	869.4	48	63.1	0.2
8PSK	881.6	48.6	72.4	0.8
8PSK	893.6	48.3	67.6	0.5
8PSK	893.8	34.3	2.7	1.3
QPSK	871.4	33.9	2.5	0.9
QPSK	871.6	48.4	69.2	0.6
QPSK	881.6	48.6	72.4	0.8
QPSK	891.4	48.3	67.6	0.5
QPSK	891.6	33.9	2.5	0.9
16QAM	871.4	33.7	2.3	0.7
16QAM	871.6	48.3	67.6	0.5
16QAM	881.6	48.5	70.8	0.7
16QAM	891.4	48.3	67.6	0.5
16QAM	891.6	33.8	2.4	0.8

Note: The power needs to be lowered at the lowest and highest frequencies per above to ensure compliance at the band edges.

The FXCA is compliant at the other frequencies operating at full power.

Supply voltage was varied +/- 15%. No fluctuation in output power resulted.

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
	RSS 132 PARA. 4.5.1
TESTED BY: David Light	DATE: 21 April 2011

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1767-1054-1082-1065-1064

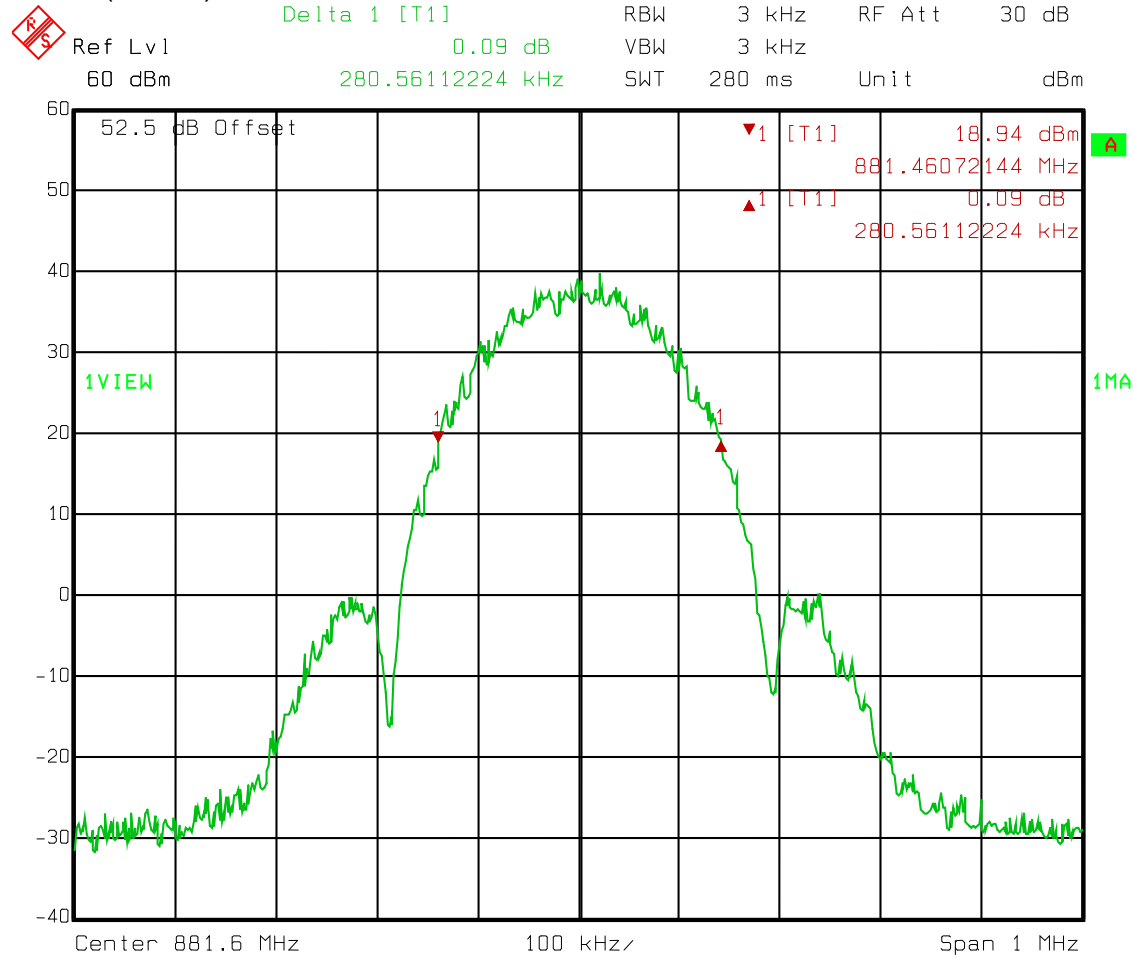
Measurement Uncertainty: +/- 1.6 dB

Temperature: 22 °C

Relative Humidity: 35 %

Test Data – Occupied Bandwidth

8PSK (EDGE)



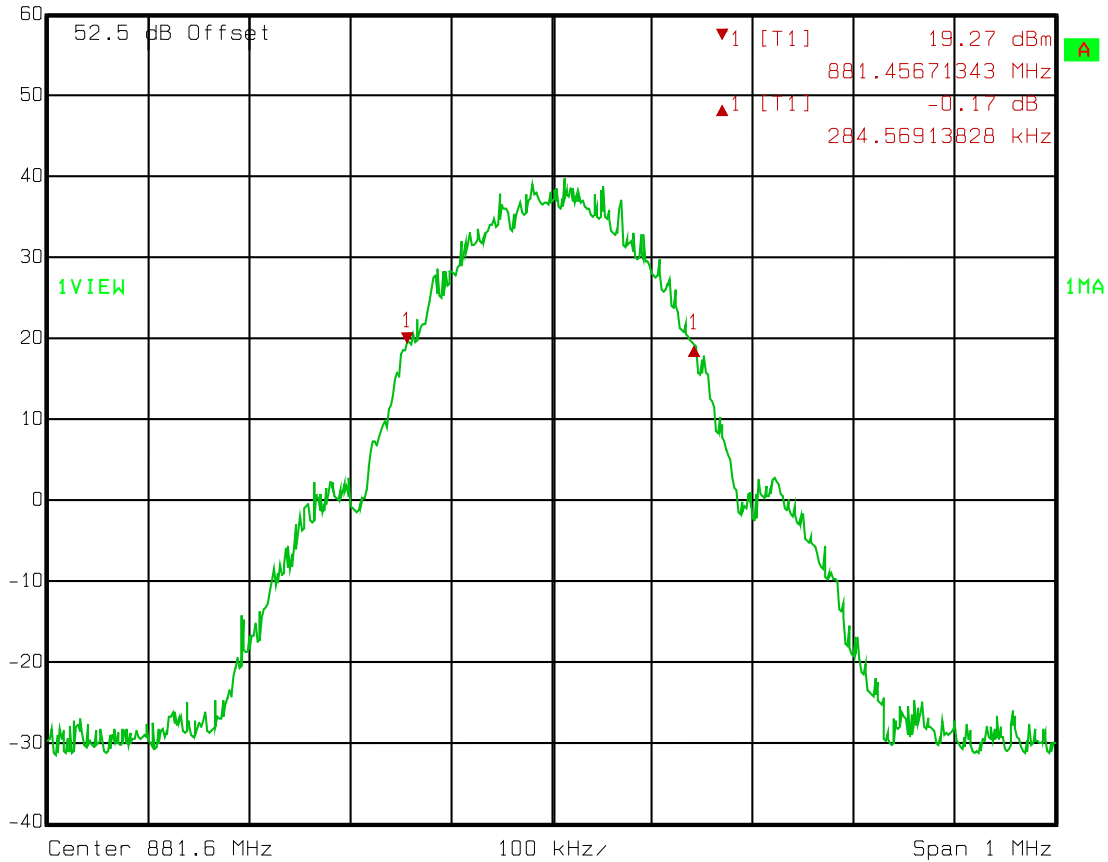
Date: 21.APR.2011 10:19:08

Test Data – Occupied Bandwidth

GMSK (GSM)



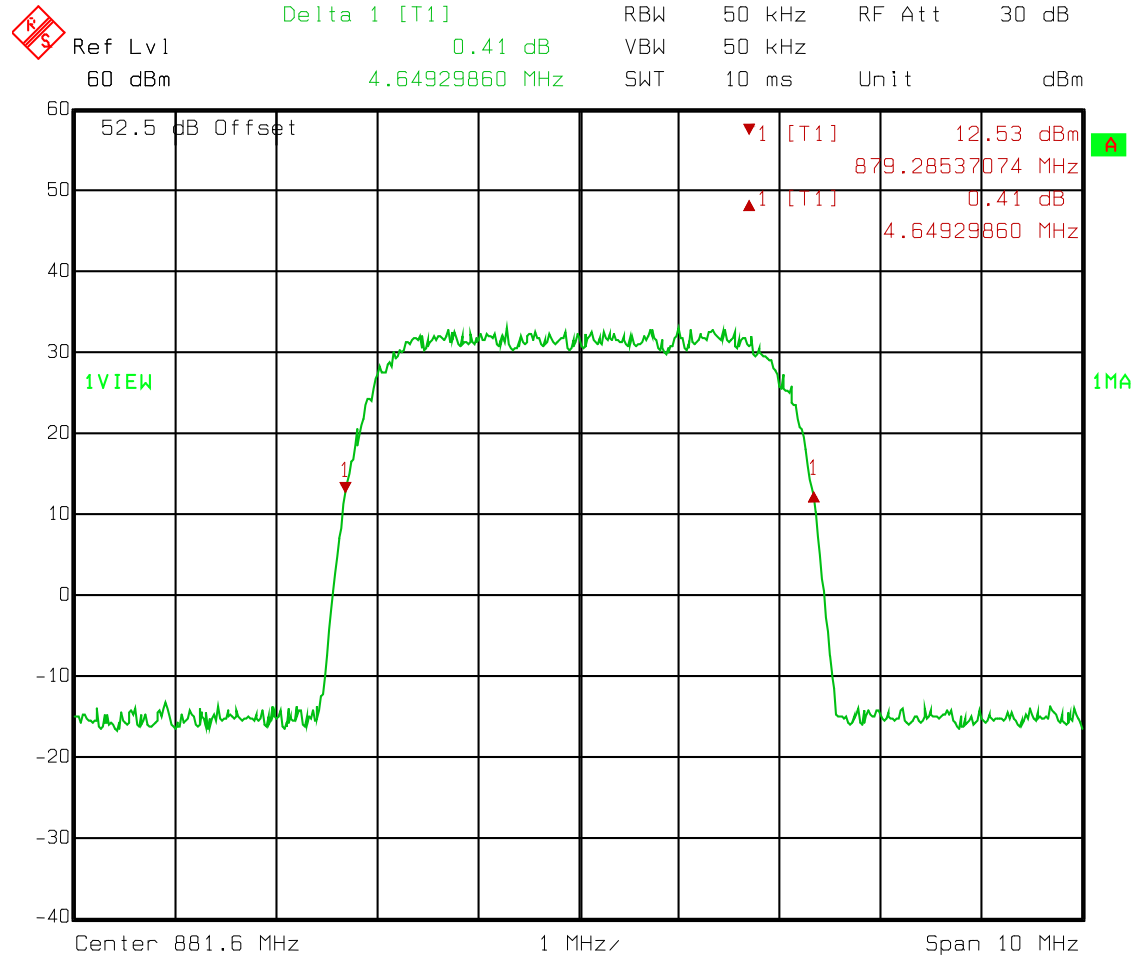
Delta 1 [T1] RBW 3 kHz RF Att 30 dB
Ref Lvl -0.17 dB VBW 3 kHz
60 dBm 284.56913828 kHz SWT 280 ms Unit dBm



Date: 21.APR.2011 10:12:17

Test Data – Occupied Bandwidth

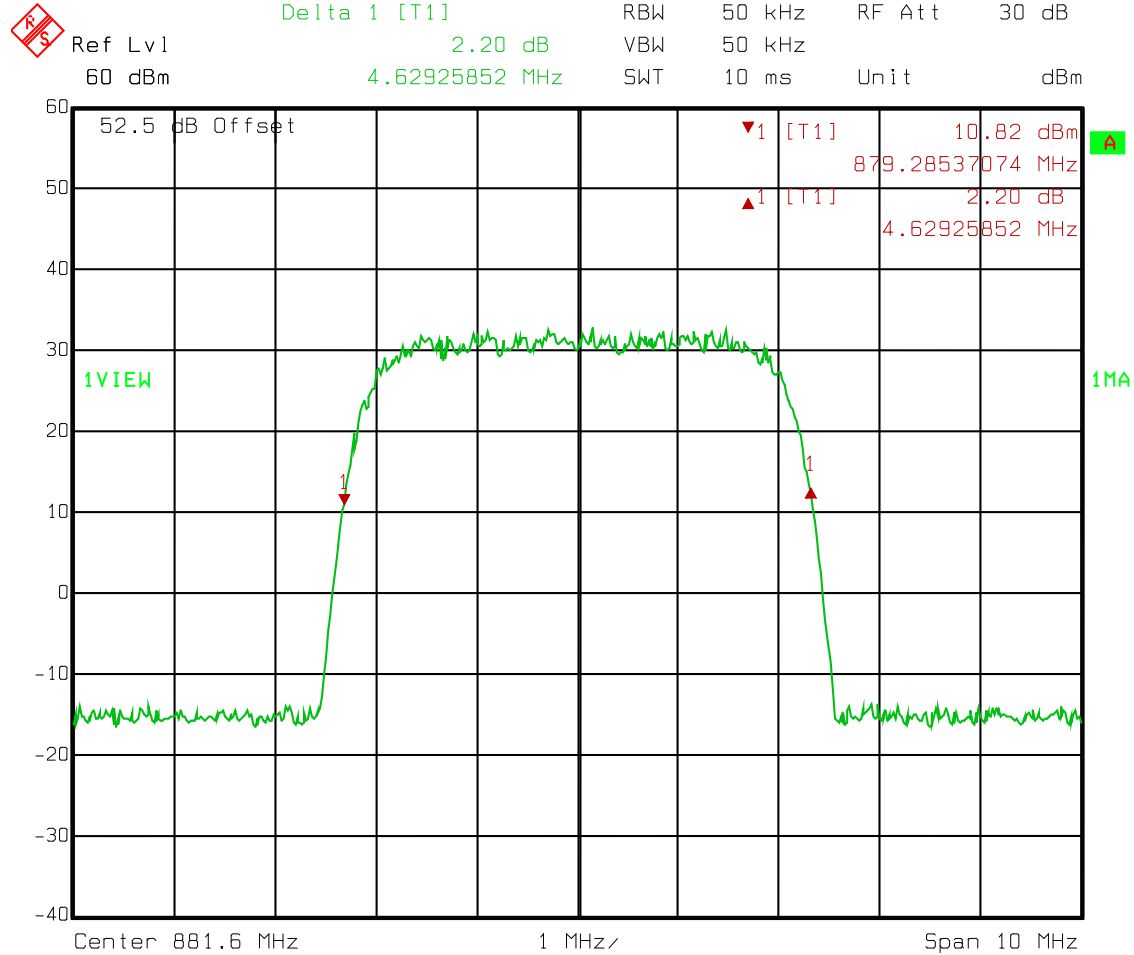
QPSK



Date: 21.APR.2011 13:41:51

Test Data – Occupied Bandwidth

16QAM



Date: 21.APR.2011 13:50:44

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051 RSS 132 PARA 4.5.1
TESTED BY: David Light	DATE: 21 April 2011

Test Results: Complies.

Test Data: Refer to plots below

Equipment Used: 1767-1082-1064-1065-1054-1054-1058

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 35 %

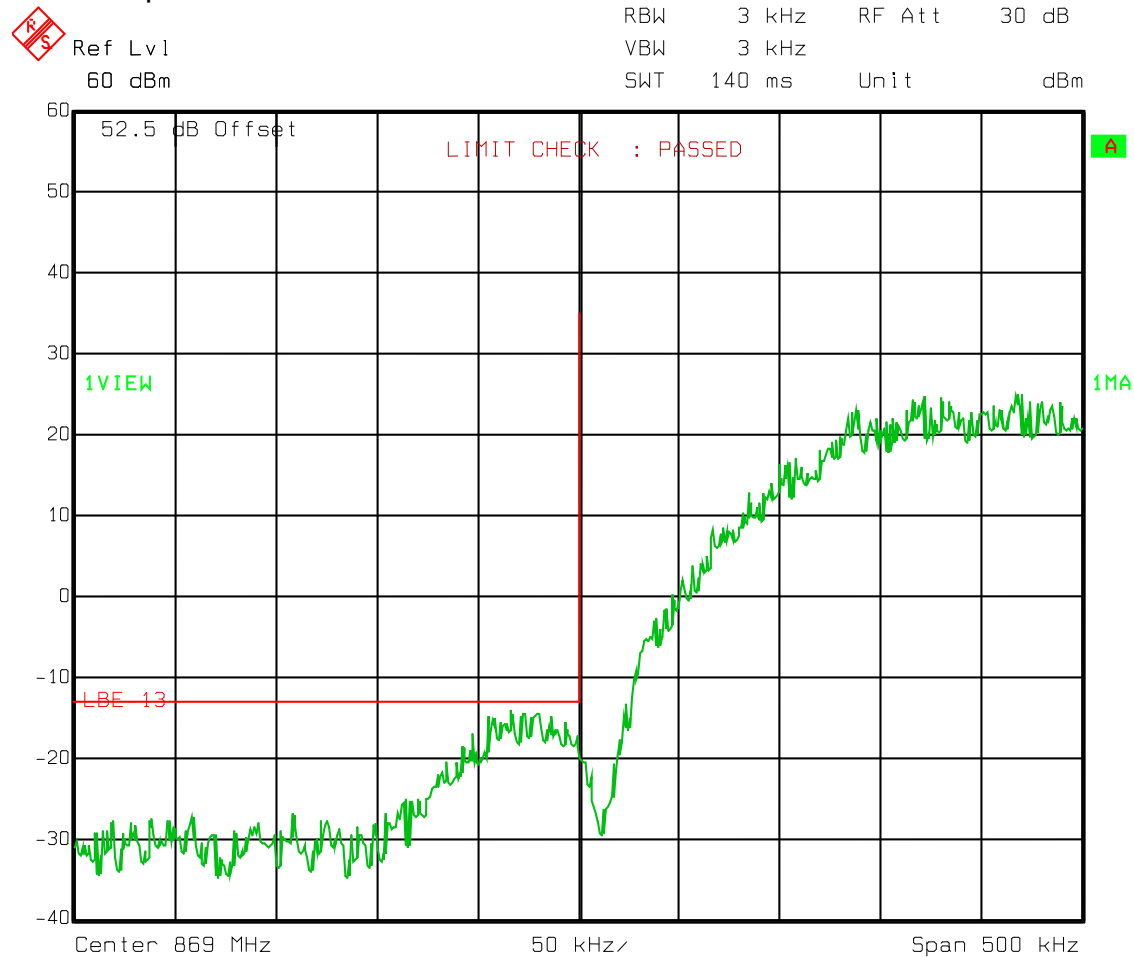
Test Data – Spurious Emissions

Low Band Edge

8PSK (EDGE)

Transmit Frequency: 869.2 MHz

Transmit power reduced



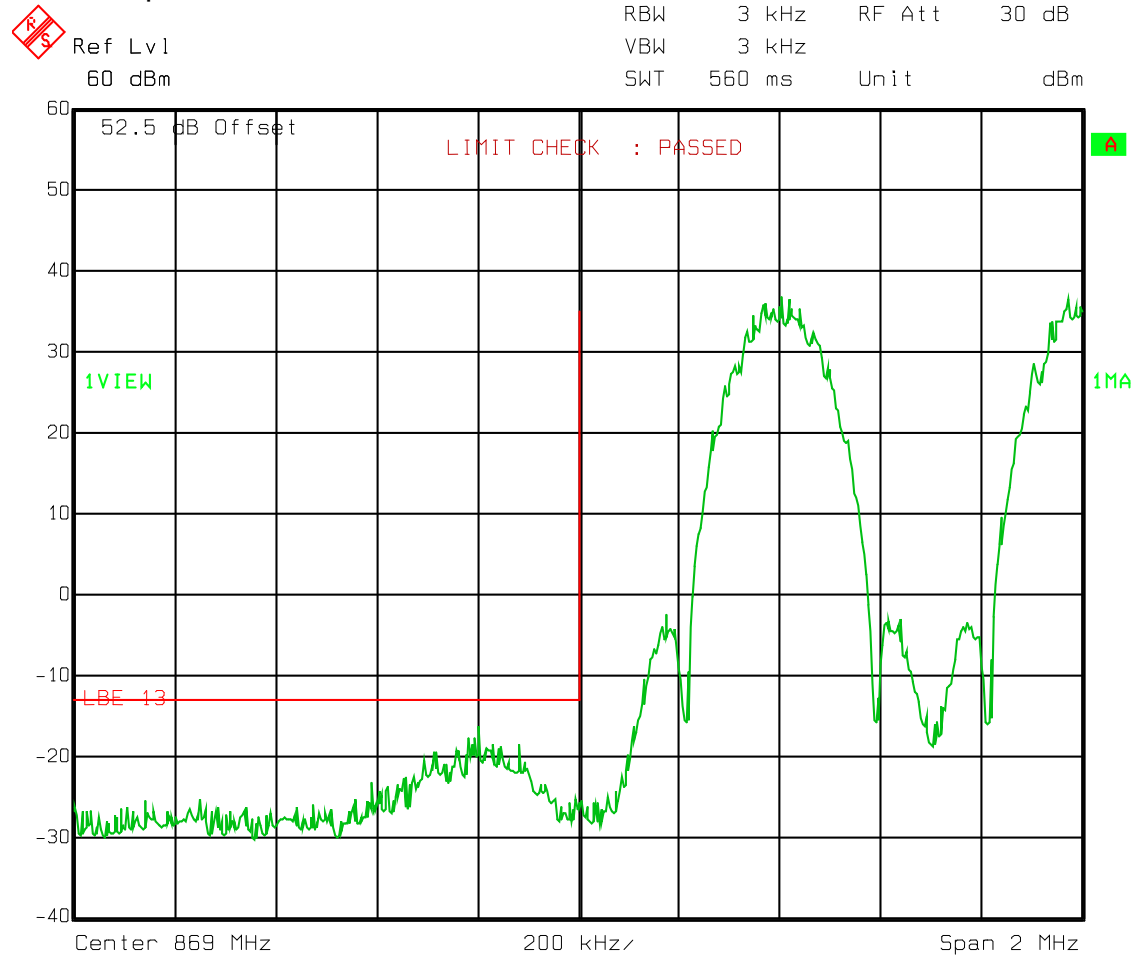
Date: 21.APR.2011 12:49:56

Test Data – Spurious Emissions

Low Band Edge Intermodulation

8PSK (EDGE)

Transmit power maximum



Date: 21.APR.2011 11:57:57

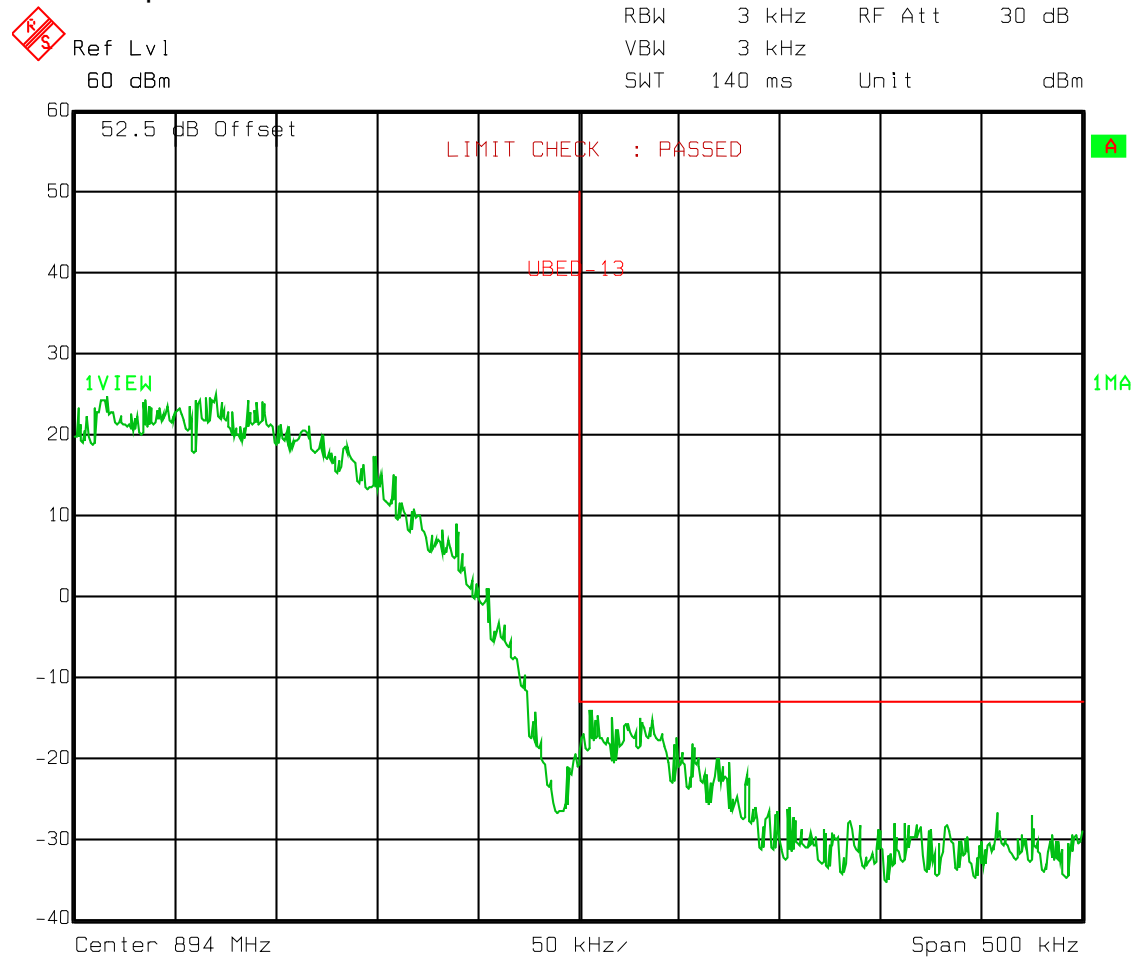
Test Data – Spurious Emissions

Upper Band Edge

8PSK (EDGE)

Transmit Frequency: 893.8 MHz

Transmit power reduced



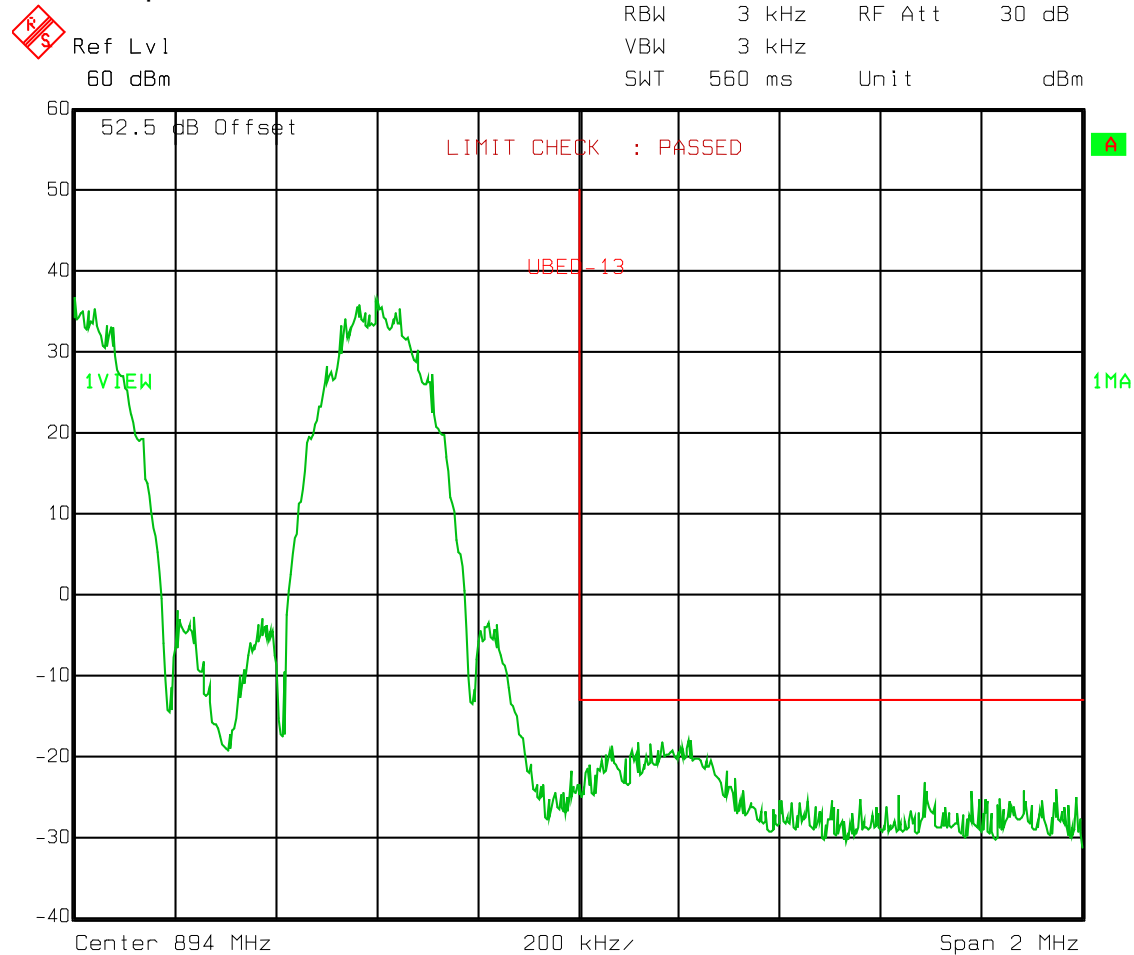
Date: 21.APR.2011 12:53:56

Test Data – Spurious Emissions

Upper Band Edge Intermodulation

8PSK (EDGE)

Transmit power maximum

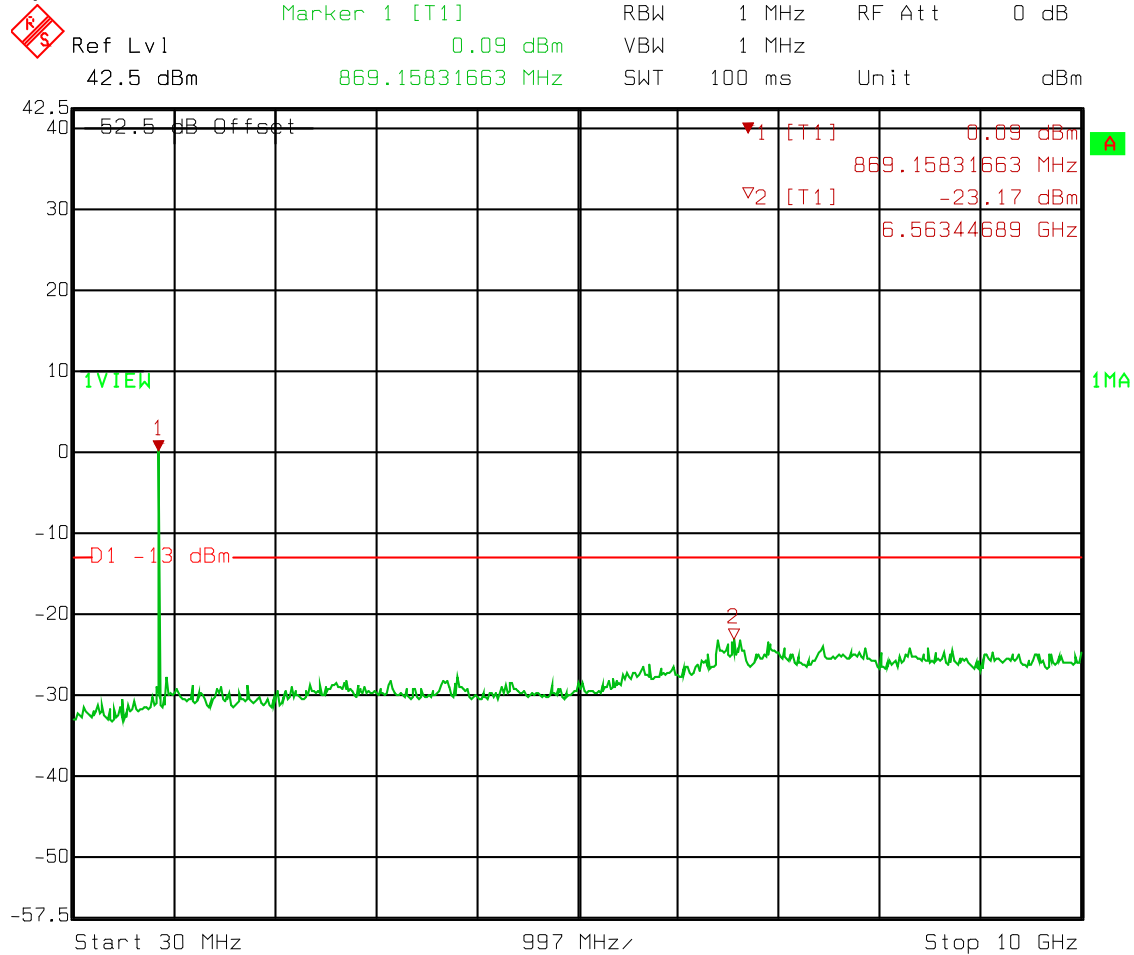


Date: 21.APR.2011 12:03:10

Test Data – Spurious Emissions

8PSK (EDGE)

Spurs



Date: 21.APR.2011 10:20:49

Test Data – Spurious Emissions

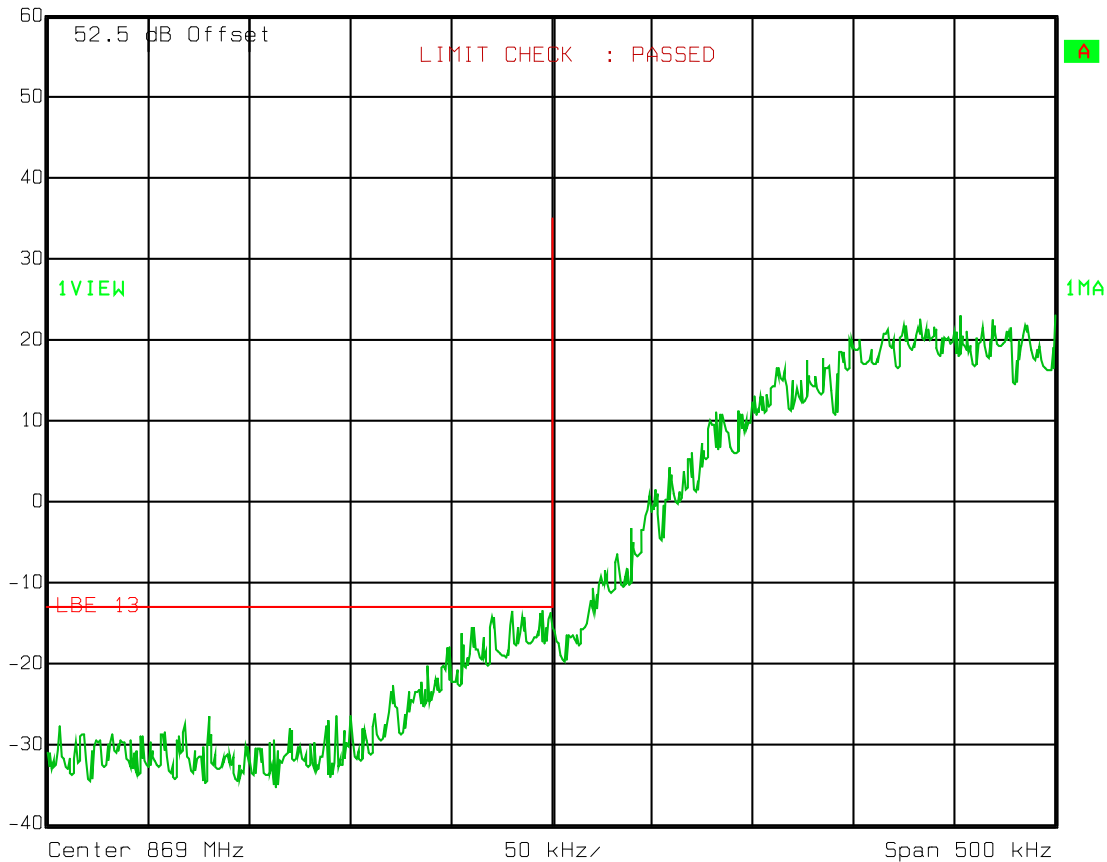
GMSK (GSM)

Lower Edge

Transmit 869.2 MHz reduced power

Ref Lvl
60 dBm

RBW	3 kHz	RF Att	30 dB
VBW	3 kHz		
SWT	140 ms	Unit	dBm



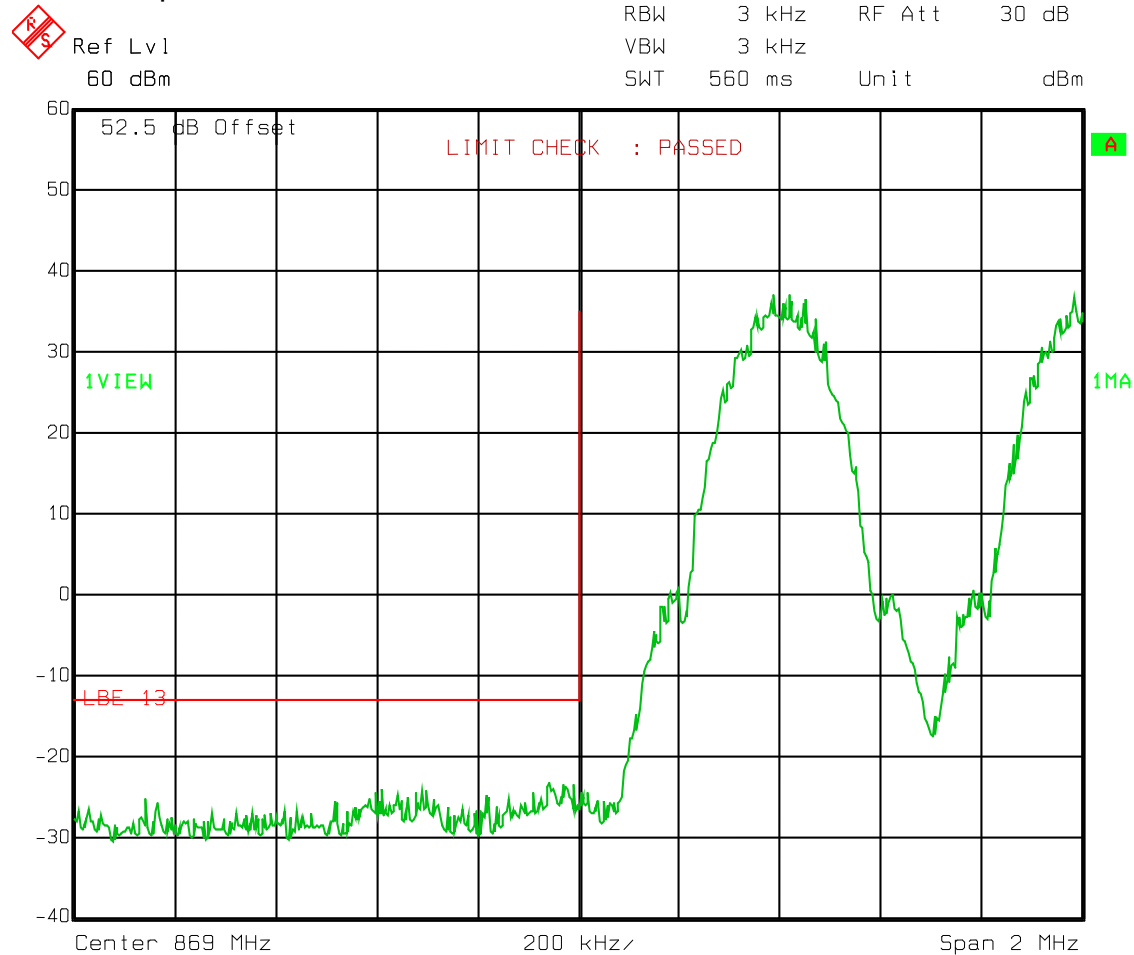
Date: 21.APR.2011 12:48:04

Test Data – Spurious Emissions

GMSK (GSM)

Lower band edge Intermodulation

Maximum power



Date: 21.APR.2011 11:55:47

Test Data – Spurious Emissions

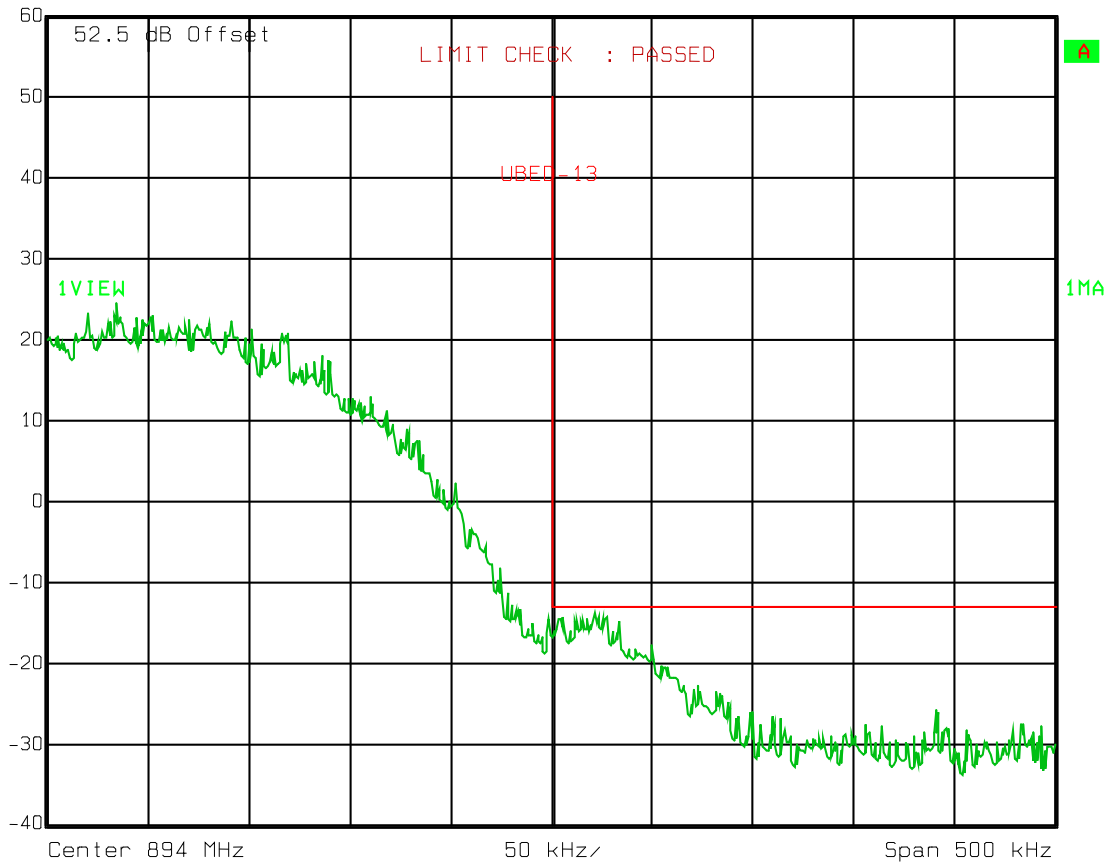
GMSK (GSM)

Upper band edge

Transmit 893.8 MHz reduced power

Ref Lvl
60 dBm

RBW	3 kHz	RF Att	30 dB
VBW	3 kHz		
SWT	140 ms	Unit	dBm



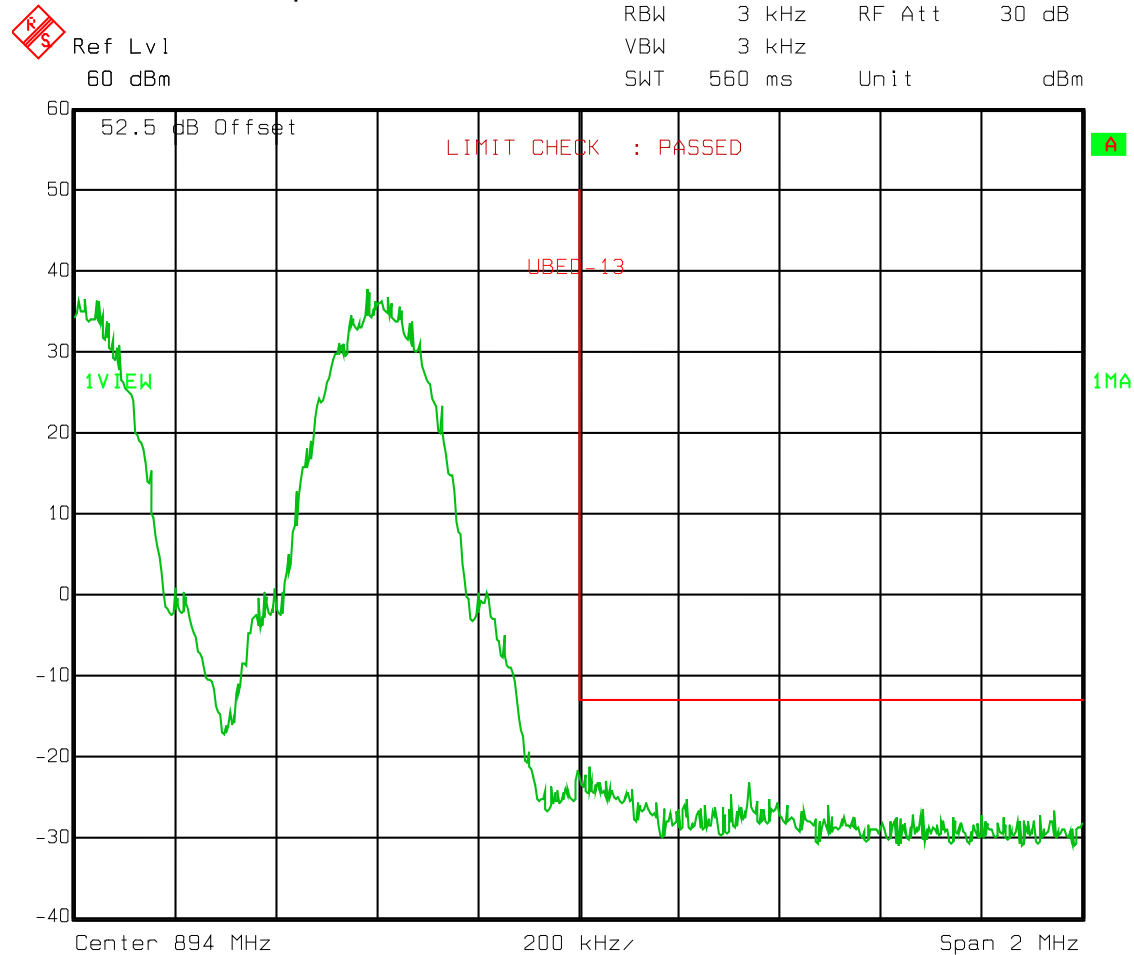
Date: 21.APR.2011 12:52:12

Test Data – Spurious Emissions

GMSK (GSM)

Upper band edge intermodulation

Transmit maximum power

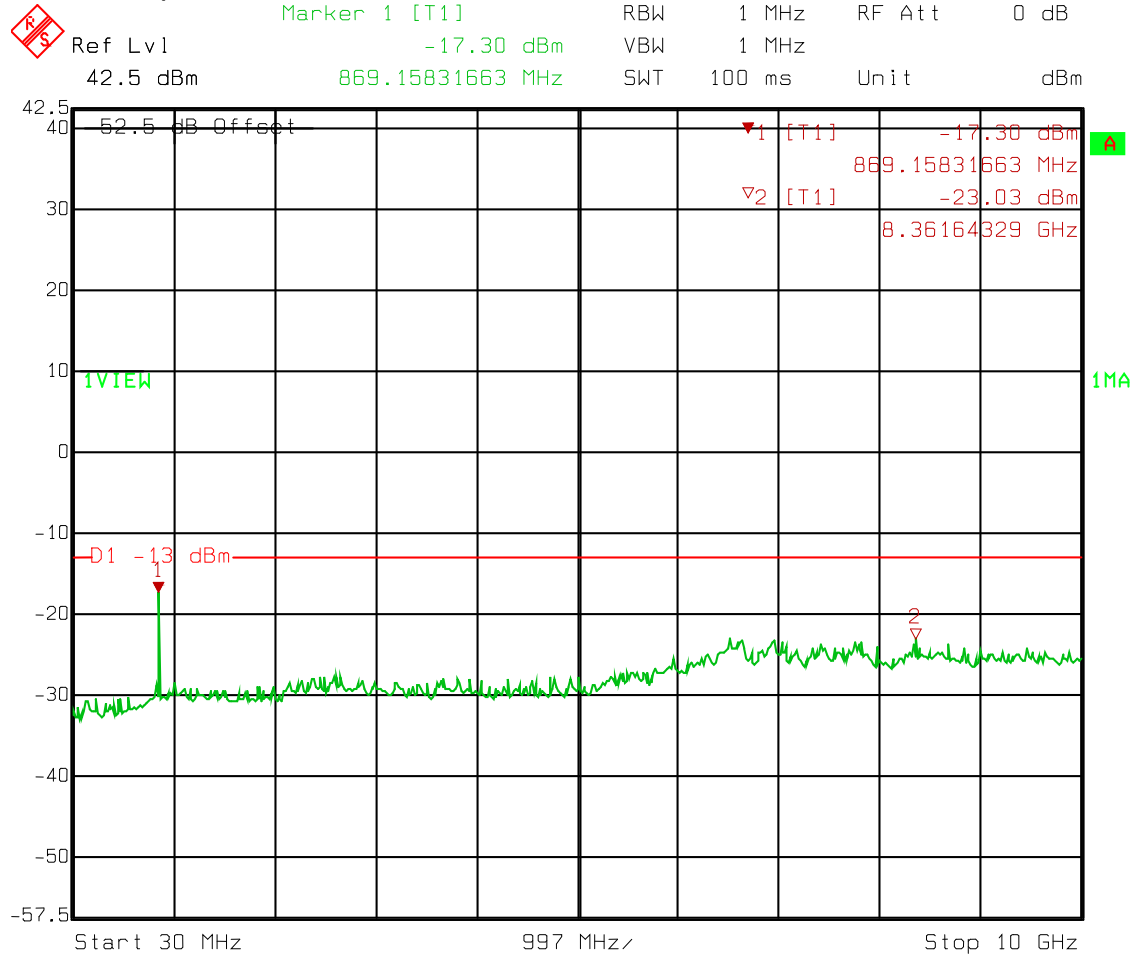


Date: 21.APR.2011 12:01:01

Test Data – Spurious Emissions

GMSK (GSM)

Transmit spurs



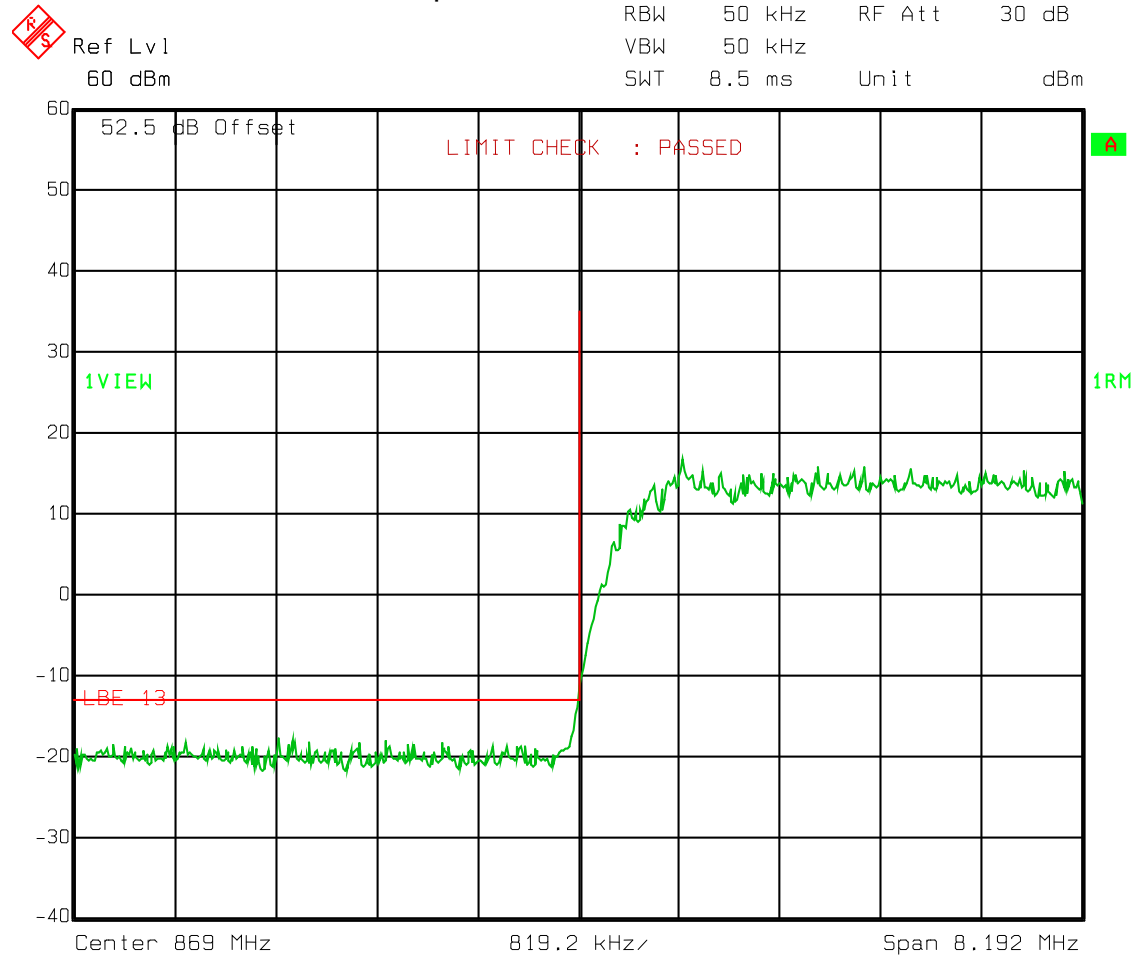
Date: 21.APR.2011 10:13:31

Test Data – Spurious Emissions

QPSK (WCDMA)

Lower band edge

Transmit 871.4 MHz reduced power



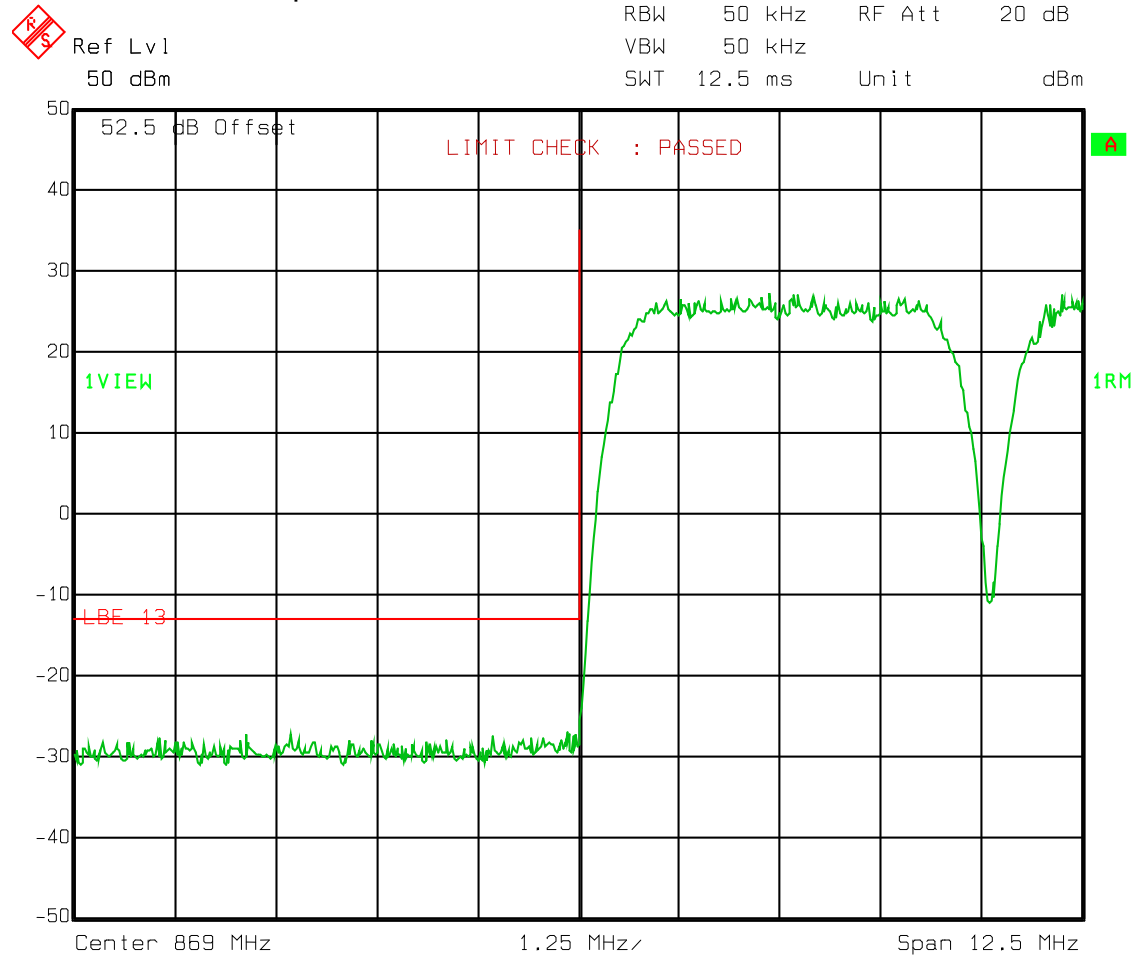
Date: 26.APR.2011 09:05:17

Test Data – Spurious Emissions

QPSK (WCDMA)

Lower band edge intermodulation

Transmit maximum power



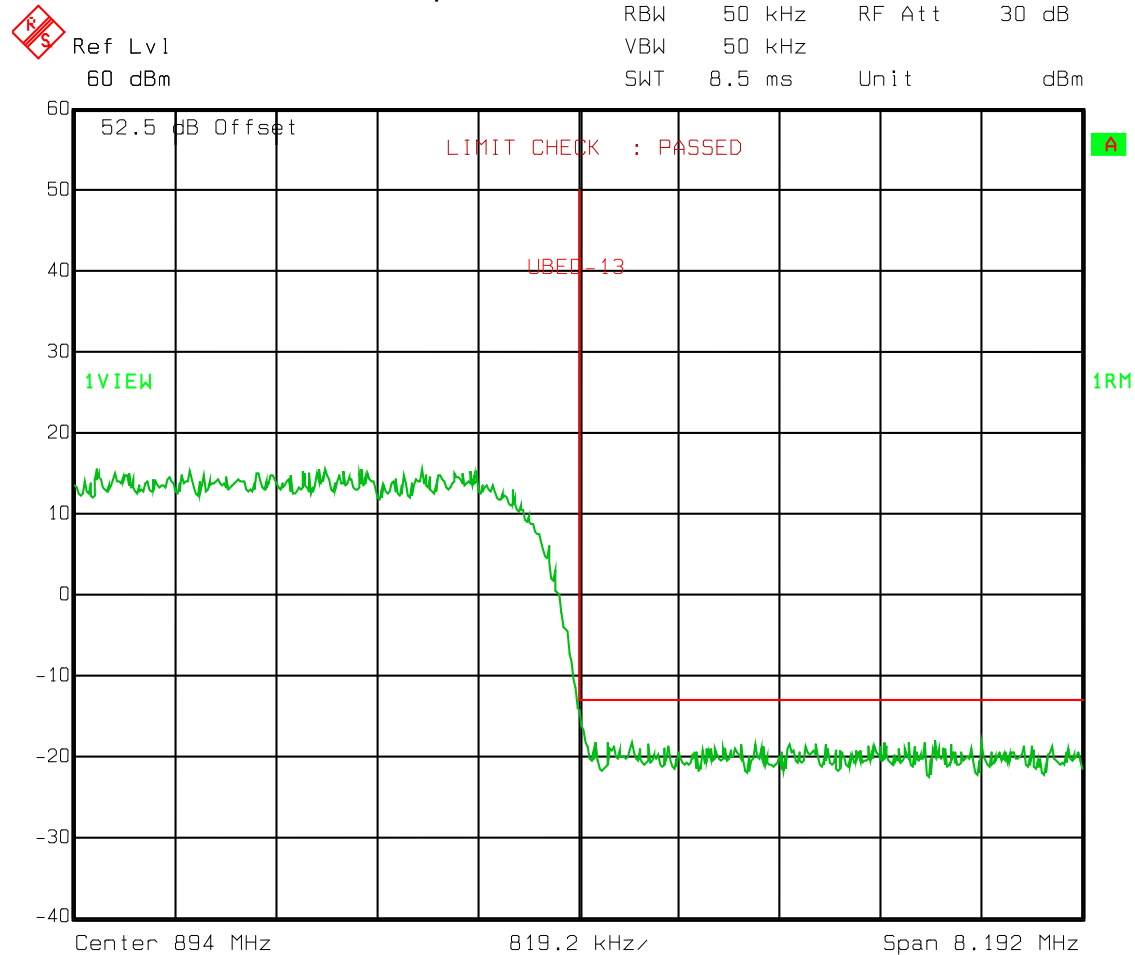
Date: 26.APR.2011 12:52:26

Test Data – Spurious Emissions

QPSK (WCDMA)

Upper band edge

Transmit 891.6 MHz reduced power



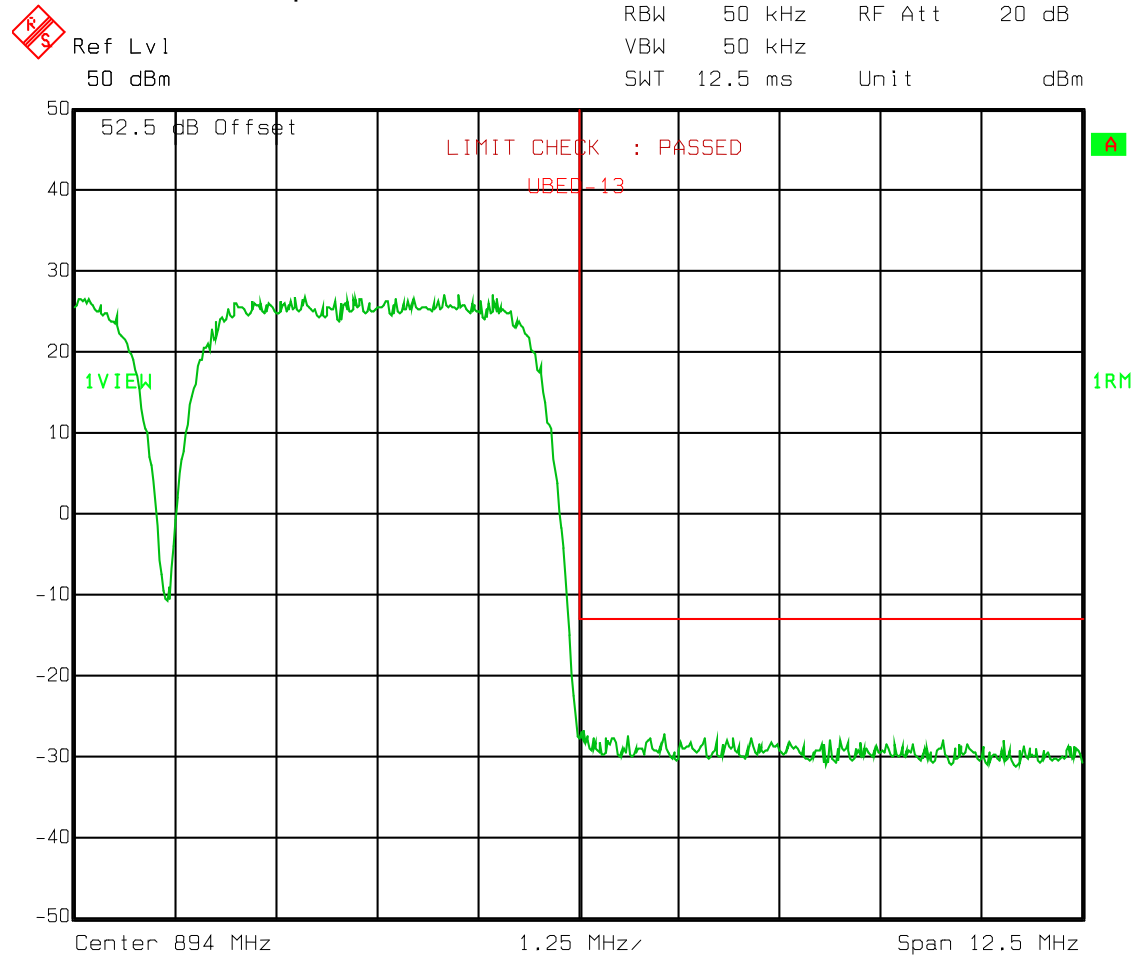
Date: 26.APR.2011 09:06:43

Test Data – Spurious Emissions

QPSK (WCDMA)

Upper band edge Intermodulation

Transmit maximum power



Date: 26.APR.2011 12:53:29

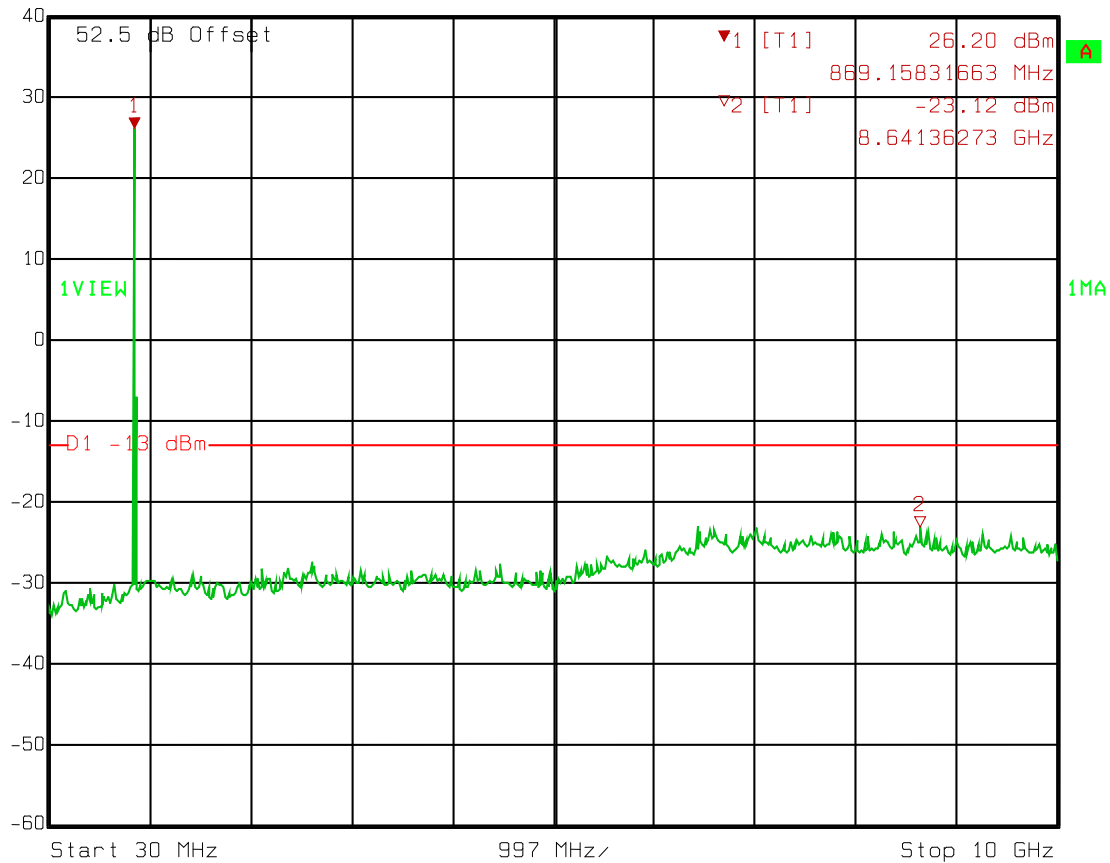
Test Data – Spurious Emissions

QPSK (WCDMA)

Transmit Spurs



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl 26.20 dBm VBW 1 MHz
40 dBm 869.15831663 MHz SWT 100 ms Unit dBm



Date: 21.APR.2011 13:45:02

Test Data – Spurious Emissions

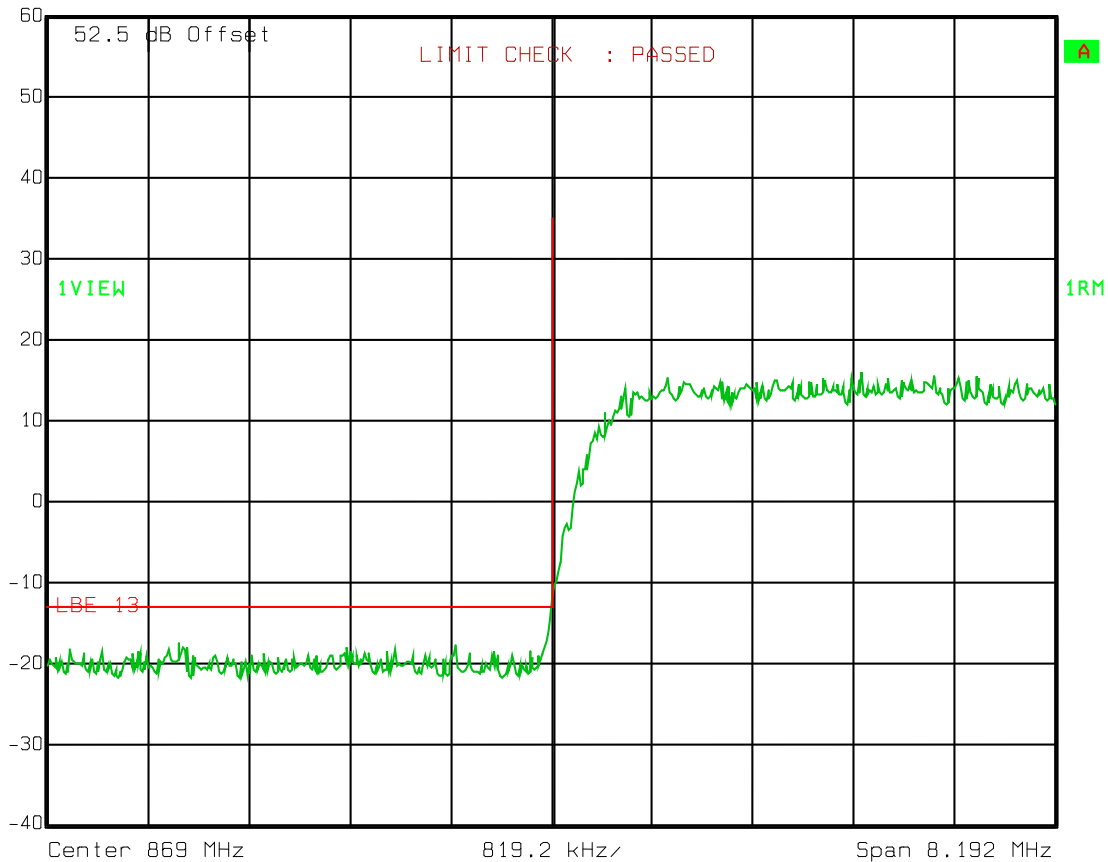
16QAM (WCDMA)

Lower band edge

Transmit 871.4 MHz reduced power

Ref Lvl
60 dBm

RBW	50 kHz	RF Att	30 dB
VBW	50 kHz		
SWT	8.5 ms	Unit	dBm



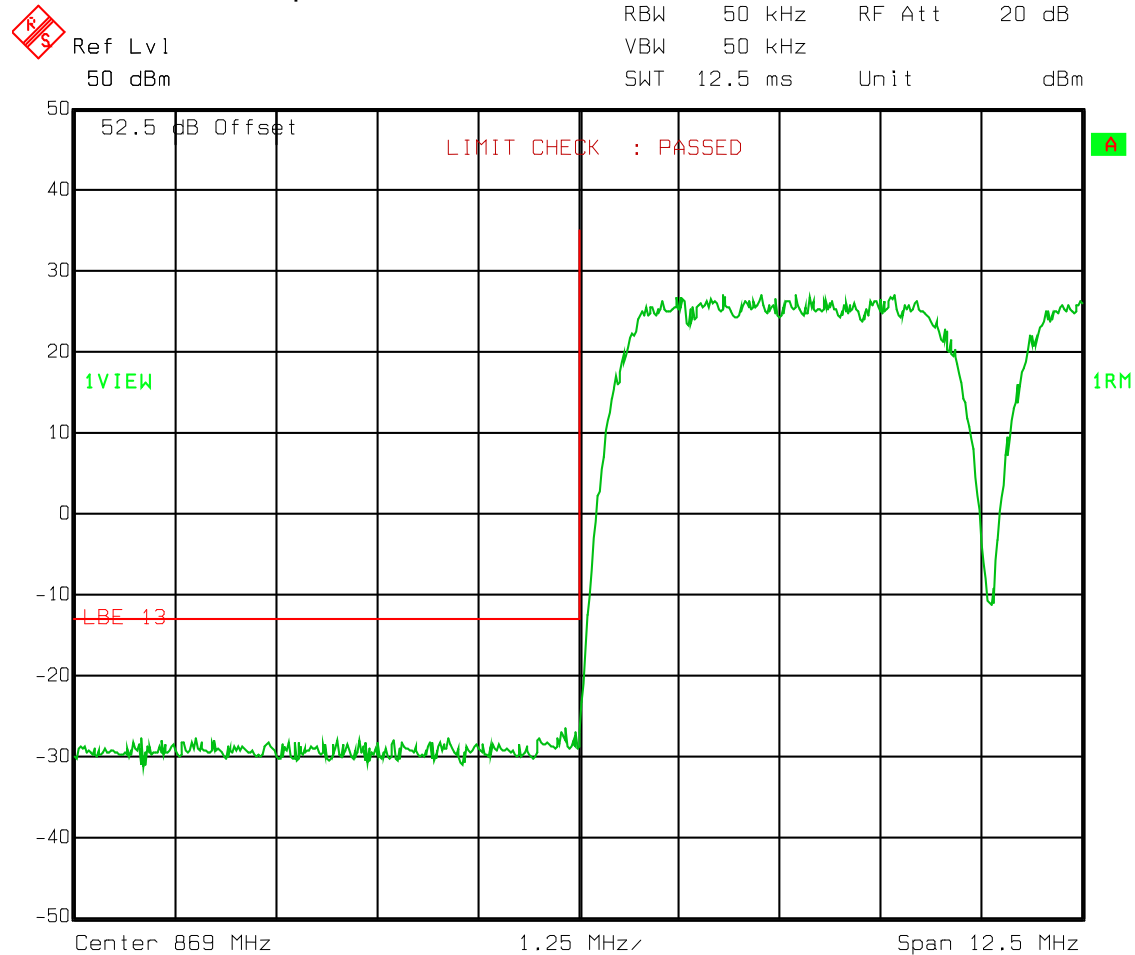
Date: 26.APR.2011 09:12:24

Test Data – Spurious Emissions

16QAM (WCDMA)

Lower band edge intermodulation

Transmit maximum power



Date: 26.APR.2011 12:50:50

Test Data – Spurious Emissions

16QAM (WCDMA)

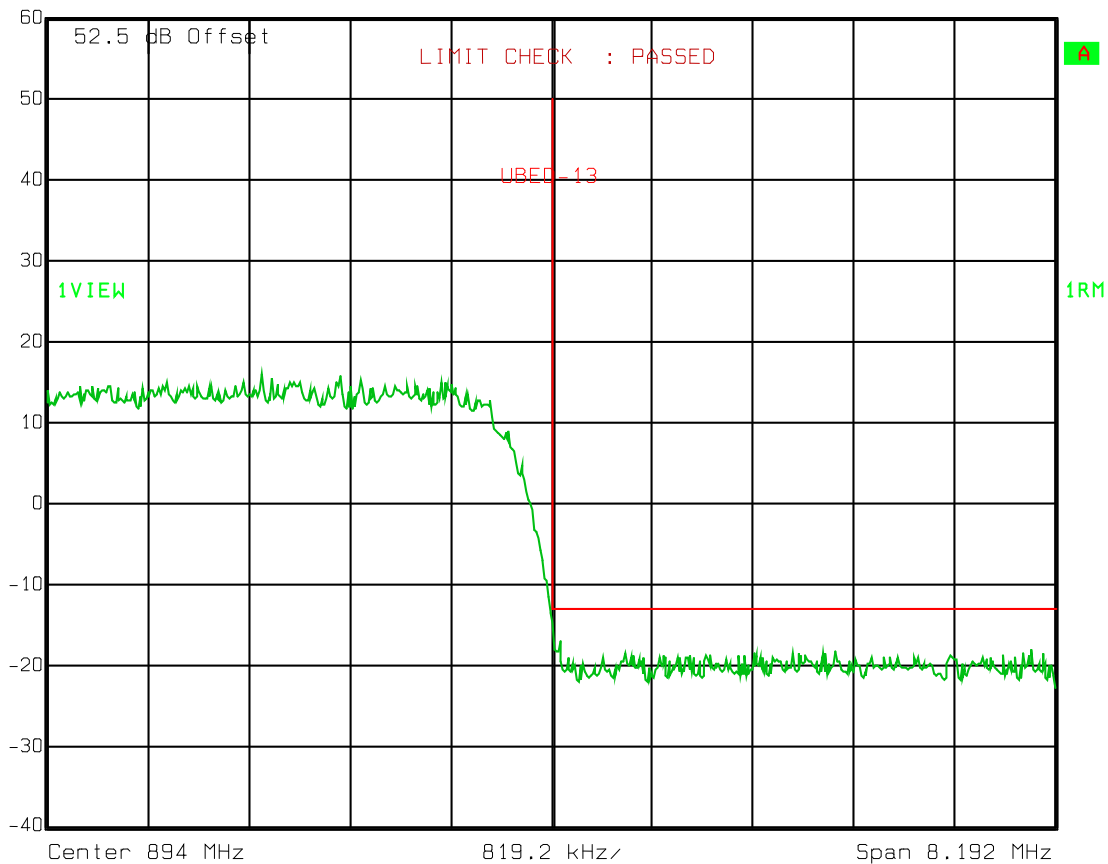
Upper band edge

Transmit 891.6 MHz reduced power



Ref Lvl
60 dBm

RBW 50 kHz RF Att 30 dB
VBW 50 kHz
SWT 8.5 ms Unit dBm



Date: 26.APR.2011 09:09:33

Test Data – Spurious Emissions

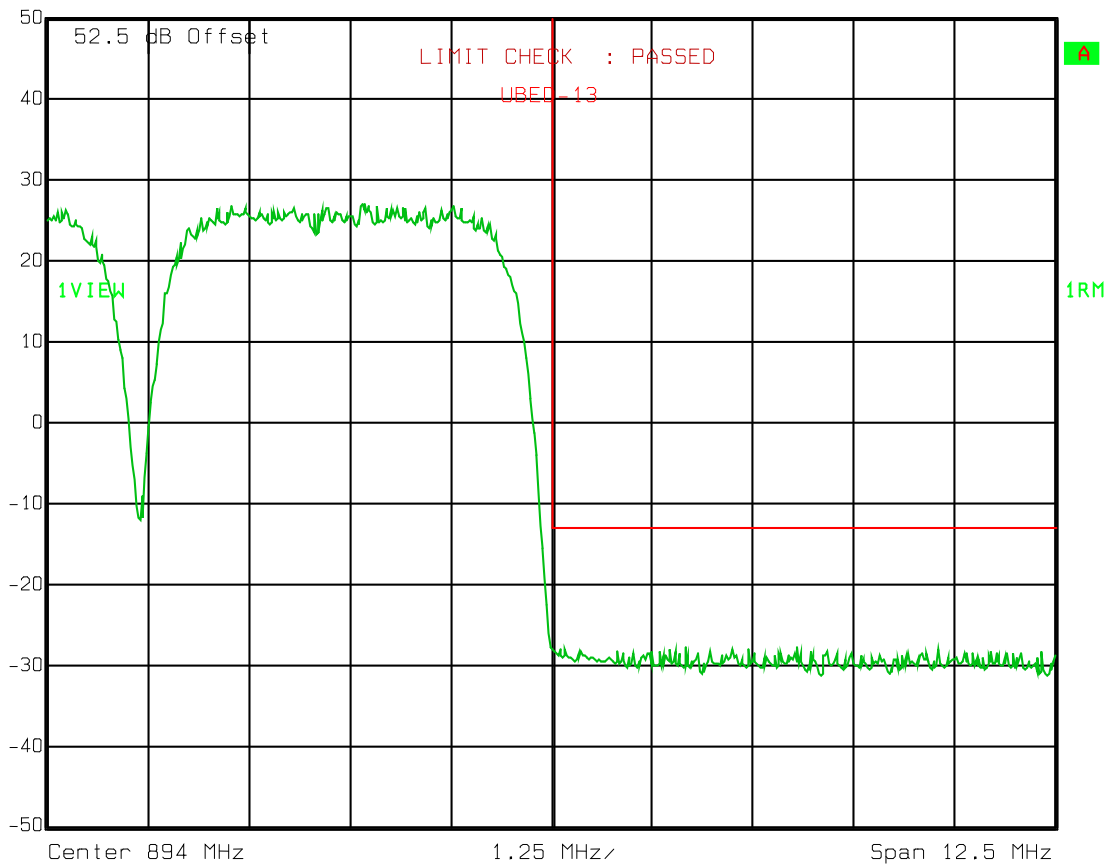
16QAM (WCDMA)

Upper band edge intermodulation

Transmit maximum power

Ref Lvl
50 dBm

RBW	50 kHz	RF Att	20 dB
VBW	50 kHz		
SWT	12.5 ms	Unit	dBm

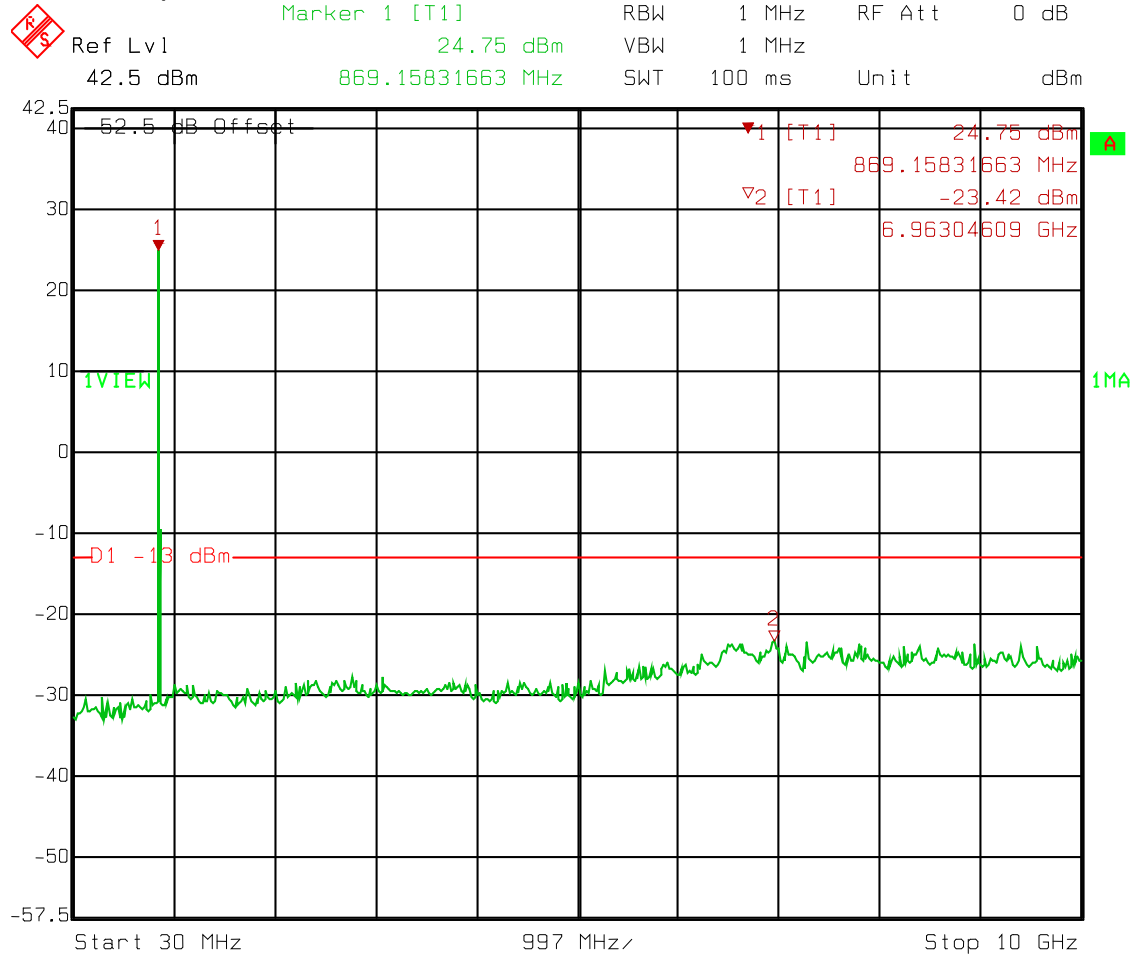


Date: 26.APR.2011 12:49:41

Test Data – Spurious Emissions

16QAM (WCDMA)

Transmit spurs



Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 21 April 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=1 MHz

Detector = Peak

Sweep Time = Auto

.

Equipment Used: 1783-1763-1025-1016-993-1767**Measurement Uncertainty:** +/- 1.7 dB**Temperature:** 23 °C**Relative Humidity:** 40 %

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
	RSS 132 PARA 4.3
TESTED BY: David Light	DATE: 25 April 2011

Test Results: Complies

Measurement Data: Standard Test Frequency: 881.6 MHz
Standard Test Voltage: -48 Vdc

Equipment Used: 1767-1082-1064-1065

Measurement Uncertainty: +/- 1.7 dB

Temperature: 23 °C

Relative Humidity: 40 %

Test Data – Frequency Stability

Temp (°C)	Measured Frequency (MHz)	Rho	Test Voltage	Frequency Error (Hz)	Limit (+/-Hz)	Error (ppm)	Comment
20	881.60006	0.9999	-	67	1322.4	0.1	
20	881.60006	0.9999	-55.2	67	1322.4	0.1	
20	881.60006	0.9999	-40.8	66	1322.4	0.1	
50	881.60004	0.9999	-	46	1322.4	0.1	
40	881.60005	0.9999	-	50	1322.4	0.1	
30	881.60005	0.9999	-	55	1322.4	0.1	
10	881.60004	0.9999	-48.0	45	1322.4	0.1	
0	881.60004	0.9999	-48.0	46	1322.4	0.1	
-	881.60004	0.9999	-48.0	45	1322.4	0.1	
-	881.60004	0.9999	-	48	1322.4	0.1	
-	881.60004	0.9999	-48	46	1322.4	0.1	
Notes:							

Section 7. Receiver Spurious Emissions

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: Art Ruvalcaba	RSS 132 PARA 4.3
	DATE: 25 April 2011

Test Results: Complies

Measurement Data: See following table

Measurement Uncertainty: +/- 1.7 dB

Temperature: 23 °C

Relative Humidity: 40 %

Radiated E-Field Detailed List of Test Equipment

Asset Number	Description	Manufacturer	Model Number	Serial Number	Last Cal	Cal Due
1	3m Semi-Anechoic Chamber	Nemko USA, Inc.	Chamber	1	4-Oct-2010	4-Oct-2011
1016	Preamplifier	Hewlett Packard	8449A	2749A00159	19-Jun-2010	19-Jun-2011
1025	Preamplifier, 25dB	Nemko USA, Inc.	LNA25	399	23-Feb-2011	23-Feb-2012
1304	Antenna, Horn	Electro Metrics	RGA-60	6151	24-Nov-2010	24-Nov-2012
1763	Antenna, Bilog	Schaffner	CBL 6111D	22926	11-Feb-2011	11-Feb-2012
1767	Receiver, EMI Test 20Hz - 26.5 GHz - 150 - +30 dBm LCD	Rohde & Schwartz	ESIB26	837491/0002	01-Dec-2010	01-Dec-2011
1783	Cable Assy, 3m Chamber	Nemko	Chamber		04-Oct-2010	04-Oct-2011

Operator: Art Ruvalcaba

Thursday May 05, 2011

Frequency (MHz)	Vert/Hor	Measured Level (dBuV)	AF (dB/m)	System Loss (dB)	Corrected Meas. (dBuV/m@3m)	Limit	Margin
236.733	V	42.8	11.5	-26.0	28.3	46.0	-17.7
237.231	H	43.7	11.5	-26.0	29.2	46.0	-16.8
304.656	V	40.1	14.1	-25.7	28.5	46.0	-17.5
499.996	V	45.5	18.2	-25.3	38.4	46.0	-7.6
499.996	H	45.8	18.2	-25.3	38.7	46.0	-7.3
629.988	H	35.1	20.1	-24.7	30.5	46.0	-15.5
687.517	H	32.7	20.6	-24.5	28.8	46.0	-17.2
749.987	H	37.7	21.8	-24.5	34.9	46.0	-11.1
750.047	V	32.9	21.8	-24.5	30.2	46.0	-15.8
840.038	V	25.5	22.7	-24.4	23.8	46.0	-22.2

System Loss = Cable loss – preamplifier gain

Corrected Measurement = Measured Level + AF + System Loss

Detector: QPk 30 MHz – 1 GHz

Detector: AVG Above 1 GHz

RBW = 120kHz , 30 MHz - 1 GHz

RBW = 1 MHz, Above 1 GHz

Measurement was made from 30 MHz to 10 GHz. All emissions within 20 dB of the specification limit are reported.

Section 8. 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
1025	Preamplifier, 25dB	Nemko USA, Inc.	LNA25	399	23-Feb-2011	23-Feb-2012
1054	Directional Coupler, Dual	Narda	3020A	34366	N/R	
1064	Attenuator	Narda	776B-20		N/R	
1065	Attenuator	Narda	776B-10		N/R	
1082	Cable, 2m	Astrolab	32027-2- 29094-72TC		N/R	
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
1783	Cable Assy, 3m Chamber	Nemko	Chanmber		04-Oct-2010	04-Oct-2011
2071	Power Sensor	Agilent	E9304A	MY41495174	12-Oct-2010	12-Oct-2011
2072	Power Meter	Hewlett Packard	E4418B	GB39401848	23-Sep-2010	23-Sep-2011

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. 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 a dipole. 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 erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

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

Not defined

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:**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: 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

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 a dipole. 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 erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

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

Para. No. 22.355. The transmitter carrier frequency shall remain within the tolerances given in Table C-1.

Table C-1

Freq. Range (MHz)	Base, fixed	Mobile > 3 W	Mobile \leq 3 W
821 to 896	1.5	2.5	2.5

Method Of Measurement:Frequency Stability With Voltage Variation:

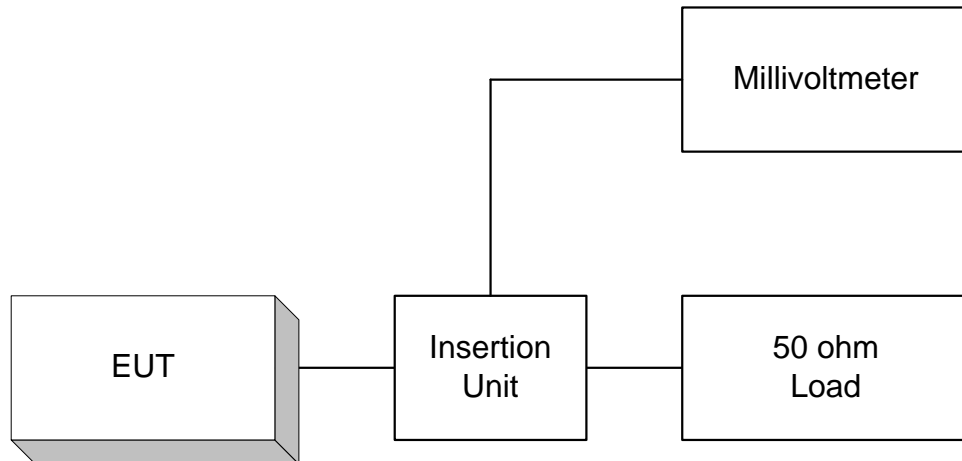
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the 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:

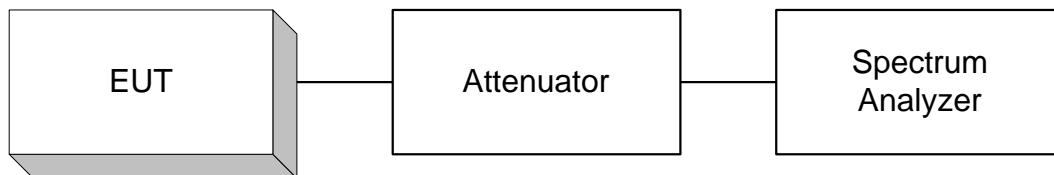
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

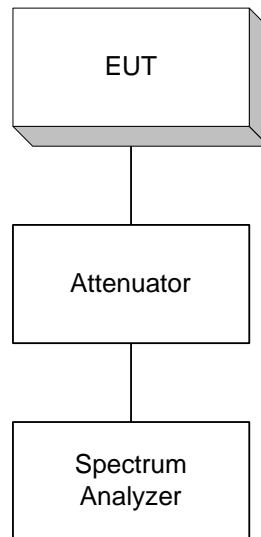
Para. No. 2.985 - R.F. Power Output



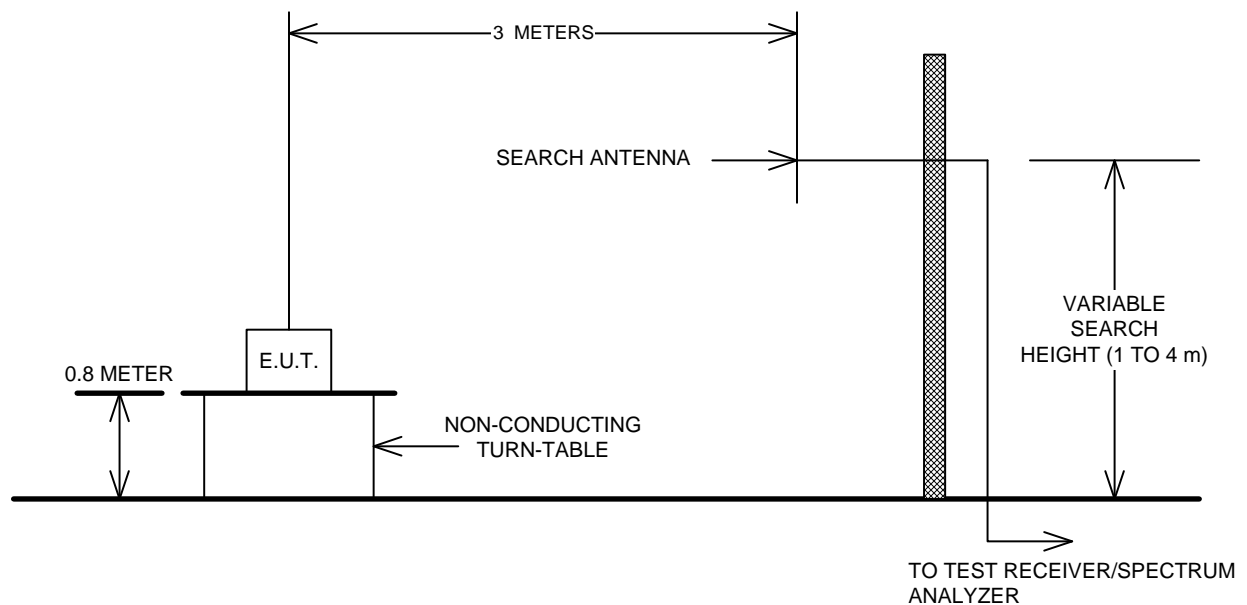
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

