



Nemko Test Report: 10213334RUS1

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

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

FCC ID: VBNFXFA-01

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

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

TESTED BY:

David Light, Senior Wireless Engineer

DATE: 25 August 2011

APPROVED BY:

Tom Tidwell, Director Nemko Direct for
Telecom

DATE: 30 August 2011

Number of Pages: 59

Table of Contents

Section 1. Summary of Test Results	3
Section 2. General Equipment Specification	5
Section 3. RF Power Output.....	6
Section 4. Occupied Bandwidth	8
Section 5. Spurious Emissions at Antenna Terminals	21
Section 6. Test Equipment List.....	49
ANNEX A - TEST DETAILS	50
ANNEX B - TEST DIAGRAMS	56

EQUIPMENT: FXFA

Section 1. Summary of Test Results

Manufacturer: Nokia Siemens Networks

Model No.: FXFA

Serial No.: L9111201162

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 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

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Summary Of Test Data

NAME OF TEST	PART 24 PARA. NO.	SPEC.	RESULT
RF Power Output	24.232	1640 W	Complies
Occupied Bandwidth	24.238	6.5.1	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.	NT
Frequency Stability	24.235	+/-1%	NT

Footnotes:

NT: Not tested. These measurements were made prior and were found to comply.
Please reference Nemko USA test report 1026738RUS1.

EQUIPMENT: FXFA

Section 2. General Equipment Specification

Supply Voltage Input:	-48 Vdc nominal		
Frequency Band:	1930 to 1990 MHz		
Type of Modulation and Designator:	LTE 5M0F9W 10M0F9W 15M0F9W		
Maximum No. of Carriers:	6		
Output Impedance:	50 ohms		
RF Output (Rated):	60 W +47.8 dBm		
Band Selection:	Software <input checked="" type="checkbox"/>	Duplexer <input type="checkbox"/>	Fullband <input type="checkbox"/>

System Description

The FXFA is a 1900 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 up to six GSM/EDGE carriers in GSM/EDGE dedicated mode, up to four WCDMA carriers in WCDMA dedicated mode and up to 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 up to 60 Watts output power per branch. The LTE modulation was the only function tested under this effort.

The transmitter test setup for LTE dedicated mode provided QPSK, 16 QAM and 64 QAM modulation types for single carrier operation only.

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE: 23 August 2011

Test Results: Complies.

Measurement Data: Refer to table on next page.

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

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 35 %

EQUIPMENT: FXFA

Test Data – RF Power Output

Modulation Type	Channel Bandwidth (MHz)	Frequency (MHz)	Measured Output Power		Deviation from rated (dB)
			(dBm)	(W)	
QPSK	5	1932.5	48.3	67.6	0.5
QPSK	5	1960.0	47.6	57.5	-0.2
QPSK	5	1987.4	47.7	58.9	-0.1
16 QAM	5	1932.5	48.0	63.1	0.2
16 QAM	5	1960.0	47.5	56.2	-0.3
16 QAM	5	1987.4	47.8	60.0	0
64QAM	5	1932.5	47.9	61.7	0.1
64QAM	5	1960.0	47.8	60.0	0
64QAM	5	1987.4	47.7	58.9	-0.1
QPSK	10	1935.0	47.8	60.0	0
QPSK	10	1960.0	48.2	66.1	0.4
QPSK	10	1984.9	48.4	69.2	0.6
16 QAM	10	1935.0	48.0	63.1	0.2
16 QAM	10	1960.0	48.1	64.6	0.3
16 QAM	10	1984.9	48.5	70.8	0.7
64QAM	10	1935.0	48.3	67.6	0.5
64QAM	10	1960.0	48.2	66.1	0.4
64QAM	10	1984.9	48.4	69.2	0.6
QPSK	15	1937.5	48.2	66.1	0.4
QPSK	15	1960.0	48.0	63.1	0.2
QPSK	15	1982.4	48.2	66.1	0.4
16 QAM	15	1937.5	48.3	67.6	0.5
16 QAM	15	1960.0	47.9	61.7	0.1
16 QAM	15	1982.4	48.2	66.1	0.4
64QAM	15	1937.5	48.3	67.6	0.5
64QAM	15	1960.0	48.0	63.1	0.2
64QAM	15	1982.4	48.2	66.1	0.4
QPSK	20	1940.0	48.2	66.1	0.4
QPSK	20	1960.0	47.9	61.7	0.1
QPSK	20	1979.9	48.1	64.6	0.3
16 QAM	20	1940.0	48.1	64.6	0.3
16 QAM	20	1960.0	47.8	60.0	0
16 QAM	20	1979.9	48.0	63.1	0.2
64QAM	20	1940.0	48.2	66.1	0.4
64QAM	20	1960.0	47.9	61.7	0.1
64QAM	20	1979.9	48.1	64.6	0.3

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

Section 4. Occupied Bandwidth

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

PROJECT NO.: 10213334RUS1

20 dB BW



EQUIPMENT: FXFA

Test Data – Occupied Bandwidth

5 MHz Channel

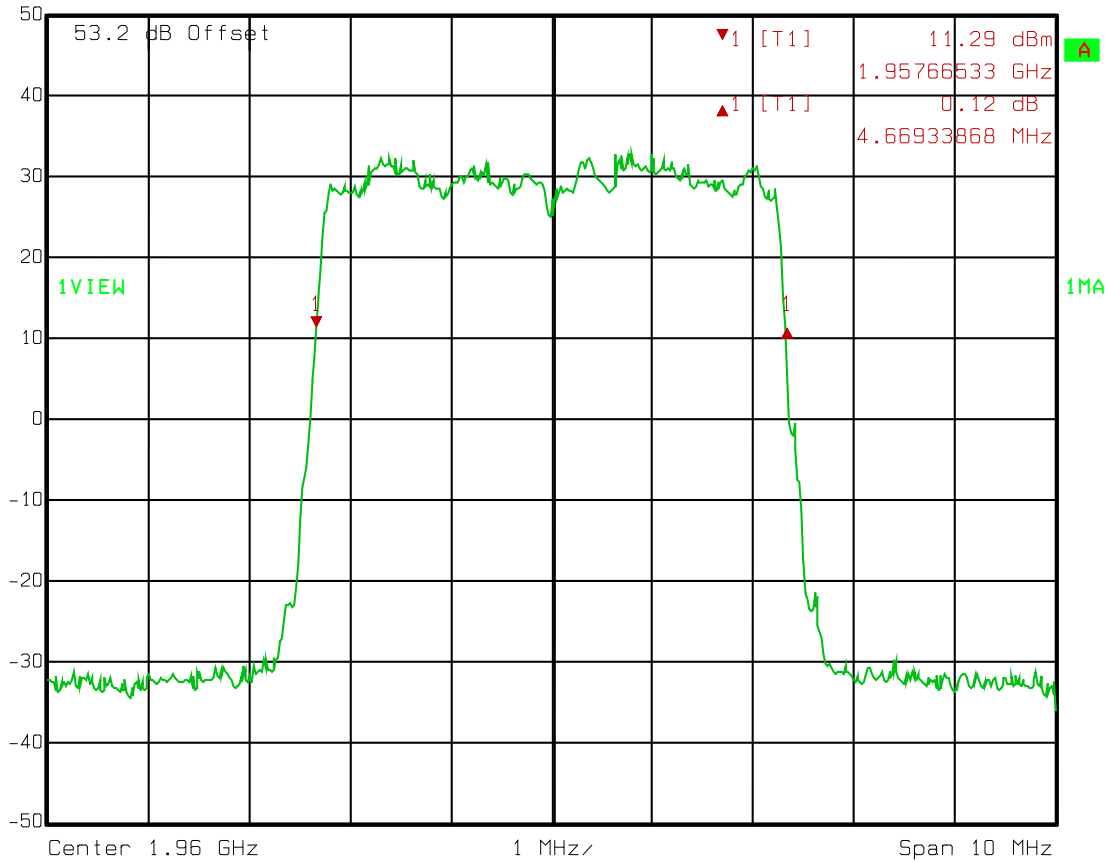
Center Channel

16 QAM

20 dB BW



Ref Lvl	Delta 1 [T1]	RBW	50 kHz	RF Att	10 dB
50 dBm	0.12 dB	VBW	50 kHz		
	4.66933868 MHz	SWT	10 ms	Unit	dBm



Date: 23.AUG.2011 14:05:31

EQUIPMENT: FXFA

Test Data – Occupied Bandwidth

5 MHz Channel

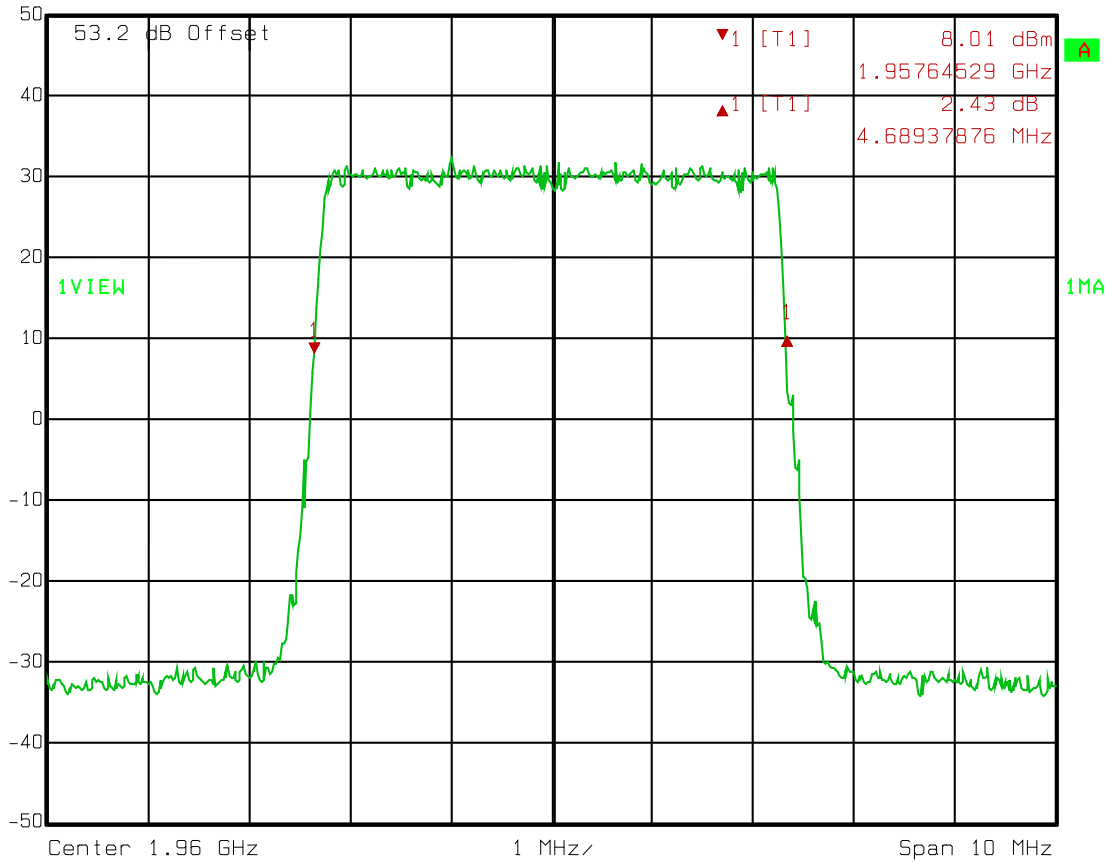
64 QAM

Center Channel

20 dB BW



Ref Lvl	Delta 1 [T1]	RBW	50 kHz	RF Att	10 dB
50 dBm	2.43 dB	VBW	50 kHz		
	4.68937876 MHz	SWT	10 ms	Unit	dBm



Date: 23.AUG.2011 14:07:41

EQUIPMENT: FXFA

Test Data – Occupied Bandwidth

10 MHz Channel

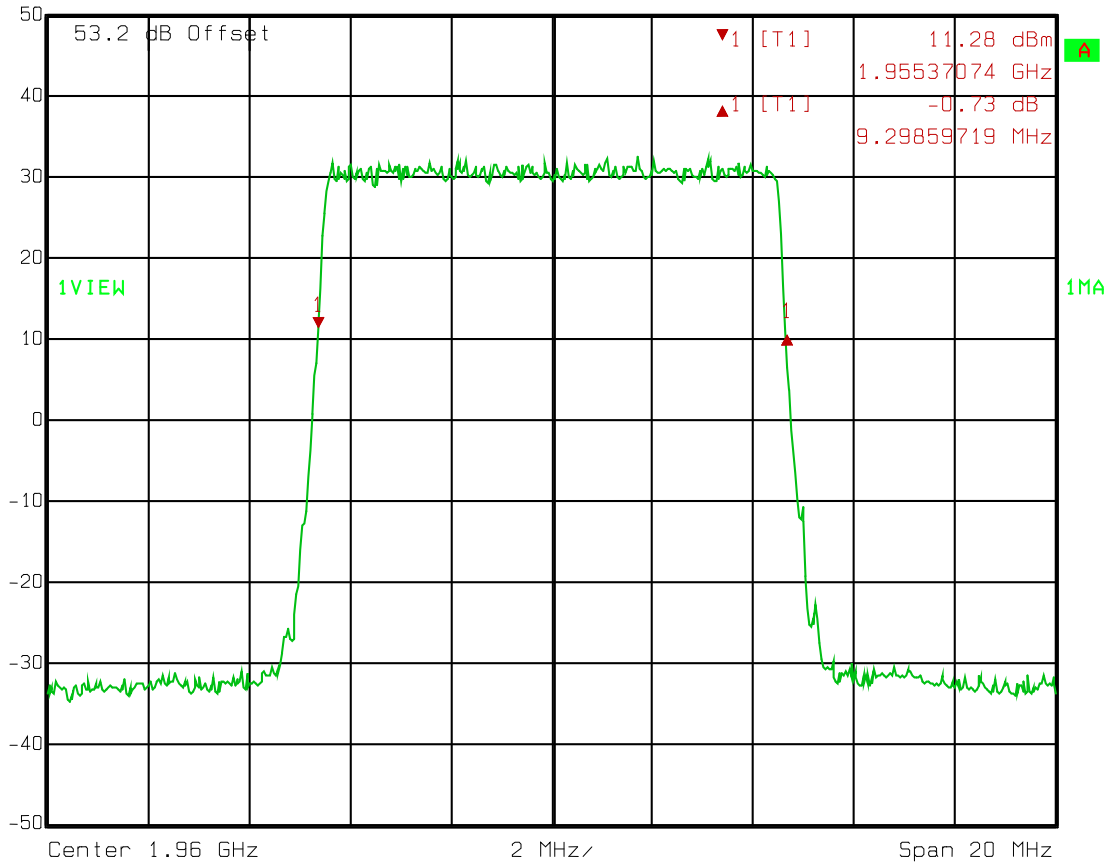
QPSK

Center Channel

20 dB BW



Delta 1 [T1] RBW 100 kHz RF Att 10 dB
Ref Lvl -0.73 dB VBW 100 kHz
50 dBm 9.29859719 MHz SWT 5 ms Unit dBm



Date: 23.AUG.2011 14:47:28

EQUIPMENT: FXFA

Test Data – Occupied Bandwidth

10 MHz Channel

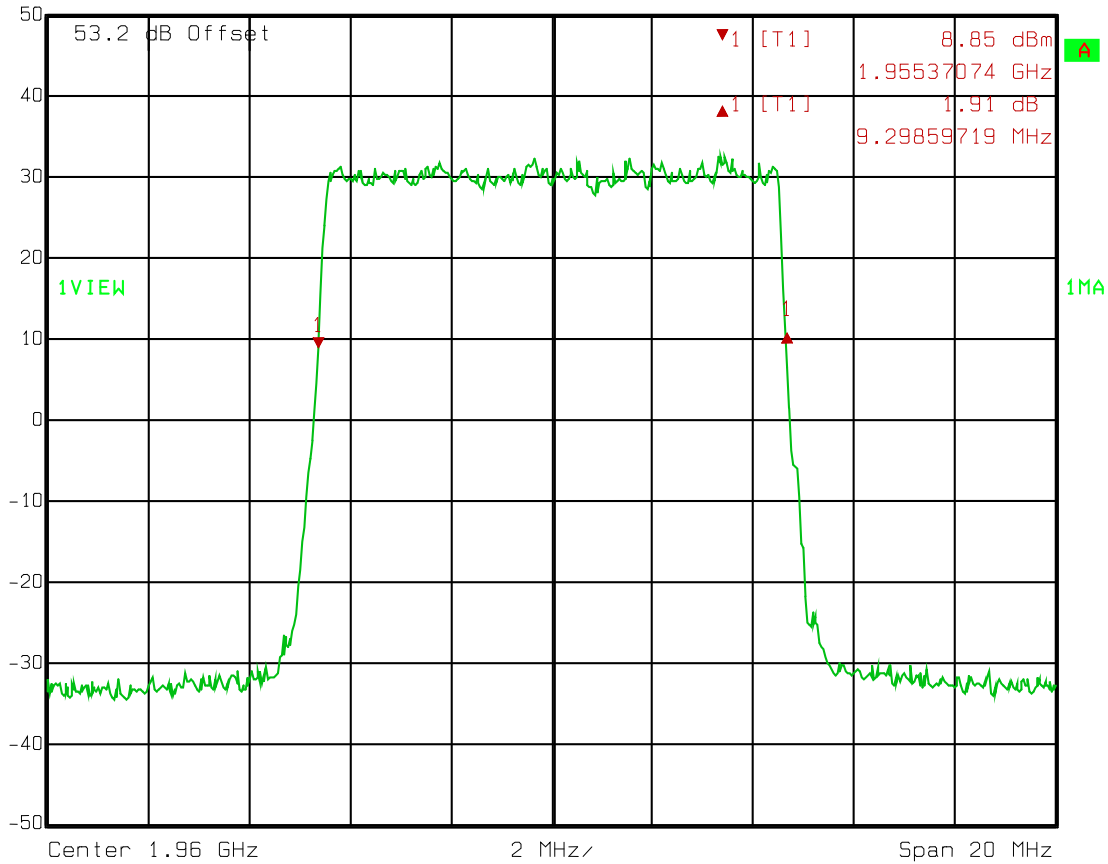
Center Channel

16 QAM

20 dB BW



Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	10 dB
50 dBm	1.91 dB	VBW	100 kHz		
	9.29859719 MHz	SWT	5 ms	Unit	dBm



Date: 23.AUG.2011 14:48:28

EQUIPMENT: FXFA

Test Data – Occupied Bandwidth

10 MHz Channel

64 QAM

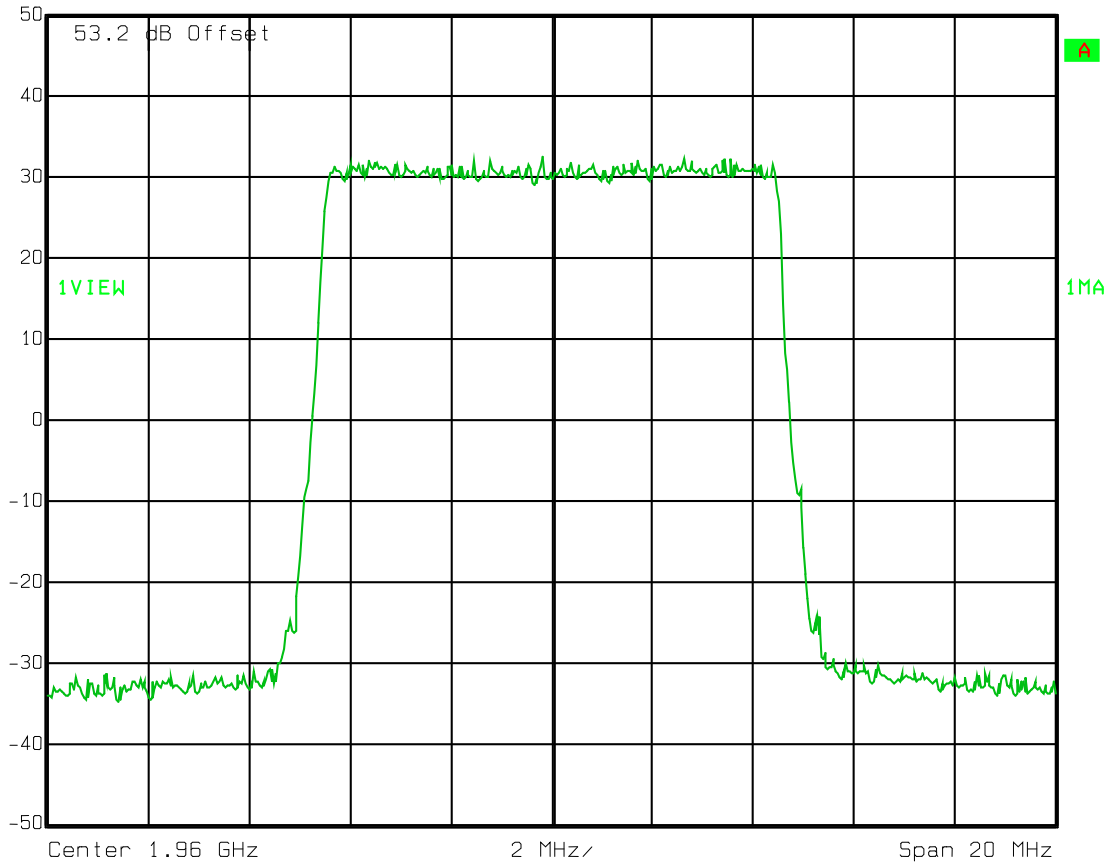
Center Channel

20 dB BW



Ref Lvl
50 dBm

RBW 100 kHz RF Att 10 dB
VBW 100 kHz
SWT 5 ms Unit dBm



Date: 23.AUG.2011 14:50:48

PROJECT NO.: 10213334RUS1

20 dB BW



PROJECT NO.: 10213334RUS1

20 dB BW



PROJECT NO.: 10213334RUS1

20 dB BW



EQUIPMENT: FXFA

Test Data – Occupied Bandwidth

20 MHz Channel

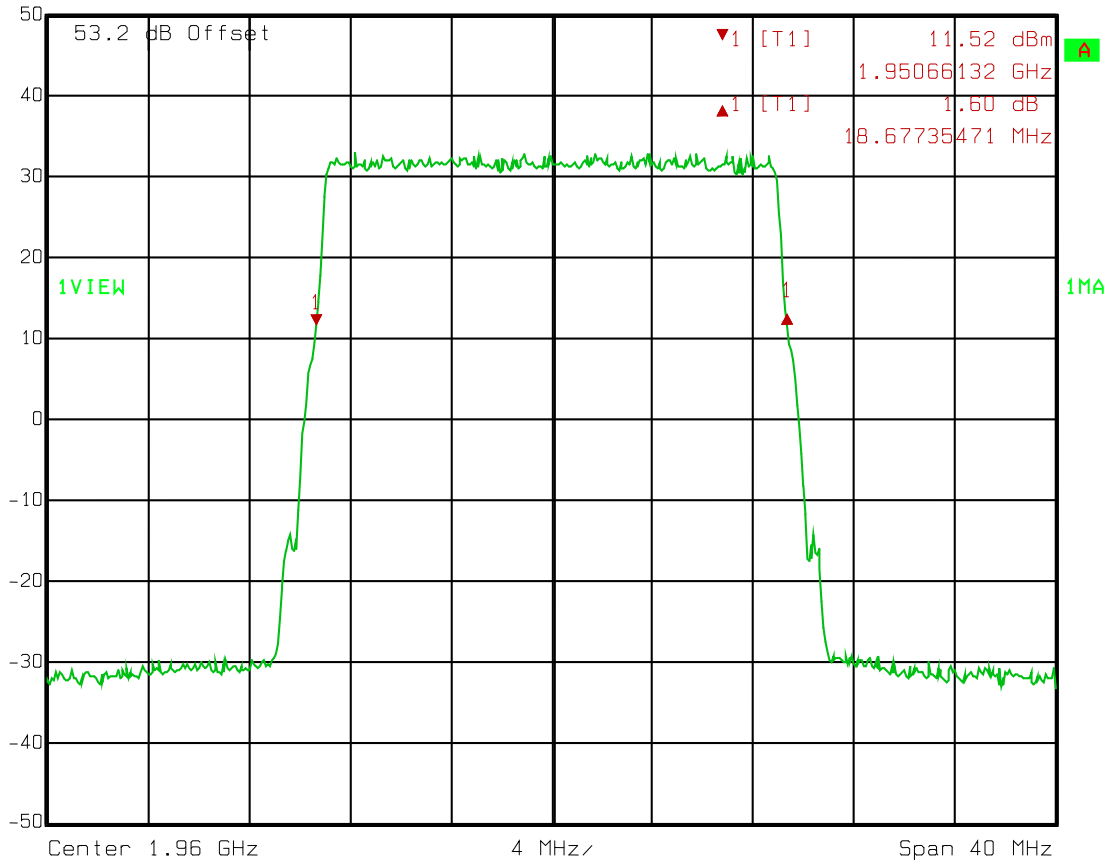
QPSK

Center Channel

20 dB BW



Delta 1 [T1] RBW 200 kHz RF Att 10 dB
Ref Lvl 1.60 dB VBW 200 kHz
50 dBm 18.67735471 MHz SWT 5 ms Unit dBm



Date: 24.AUG.2011 07:41:36

PROJECT NO.: 10213334RUS1

20 dB BW



PROJECT NO.: 10213334RUS1

20 dB BW



Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 23 August 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 %

EQUIPMENT: FXFA

Test Data – Spurious Emissions

5 MHz Channel

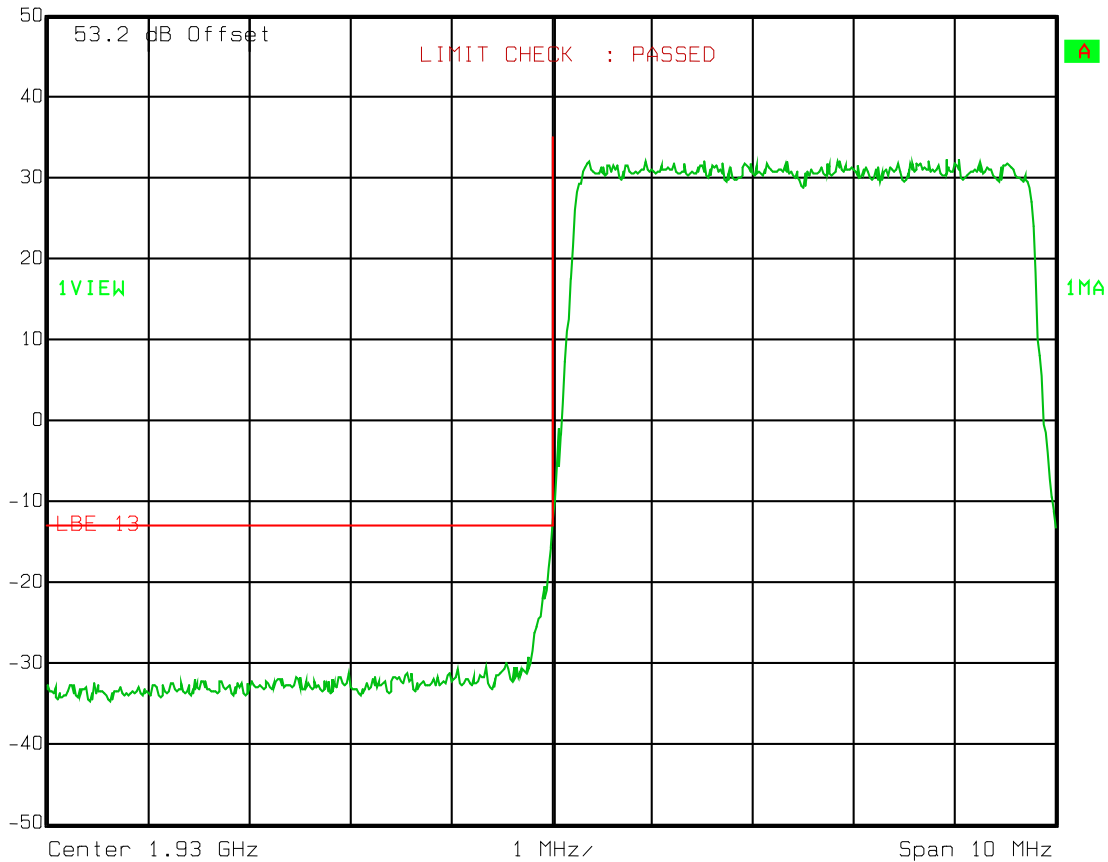
QPSK

Low Band Edge



Ref Lvl
50 dBm

RBW 50 kHz RF Att 10 dB
VBW 50 kHz
SWT 10 ms Unit dBm



Date: 23.AUG.2011 13:42:58

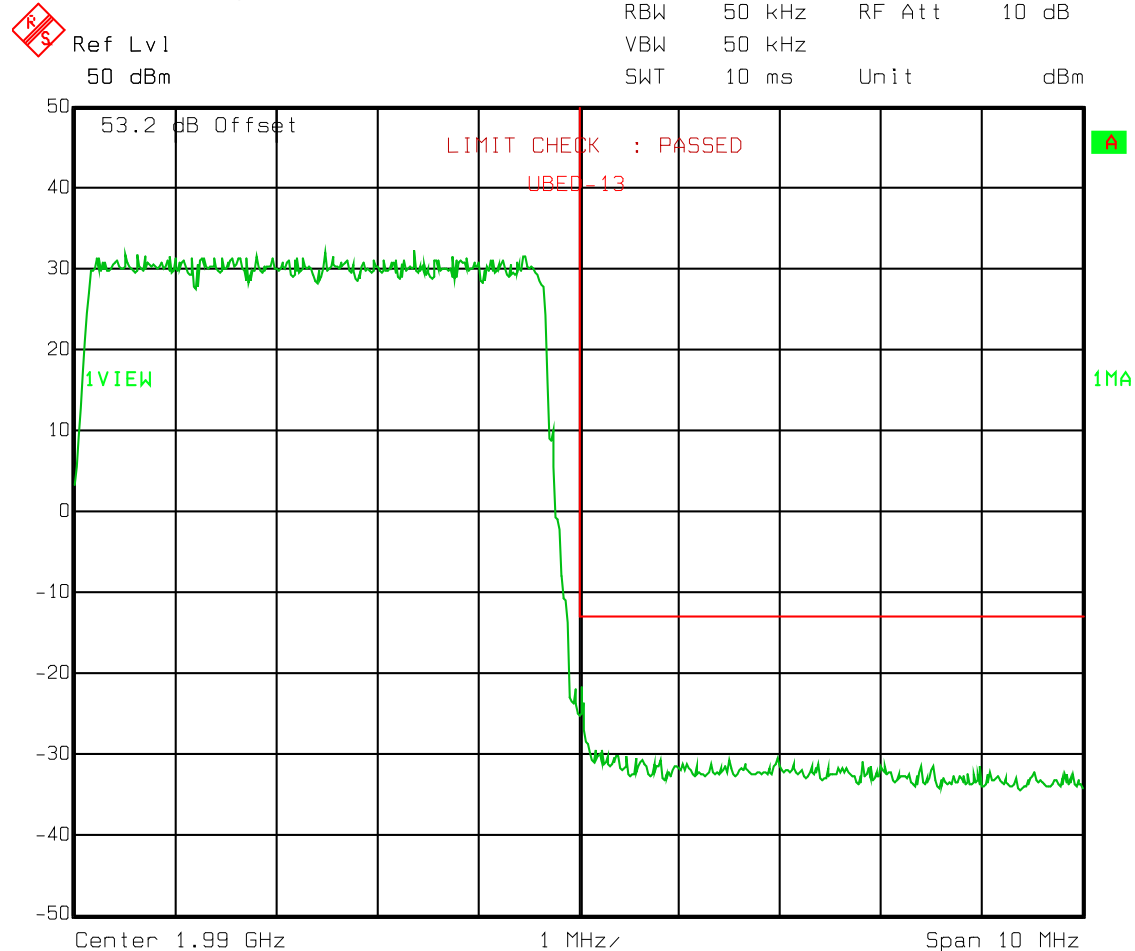
EQUIPMENT: FXFA

Test Data – Spurious Emissions

5 MHz Channel

QPSK

Upper Band Edge



Date: 23.AUG.2011 14:12:53

EQUIPMENT: FXFA

Test Data – Spurious Emissions

5 MHz Channel

16 QAM

Low Band Edge



Ref Lvl
50 dBm

RBW 50 kHz RF Att 10 dB
VBW 50 kHz
SWT 10 ms Unit dBm



Date: 23.AUG.2011 13:56:41

EQUIPMENT: FXFA

Test Data – Spurious Emissions

5 MHz Channel

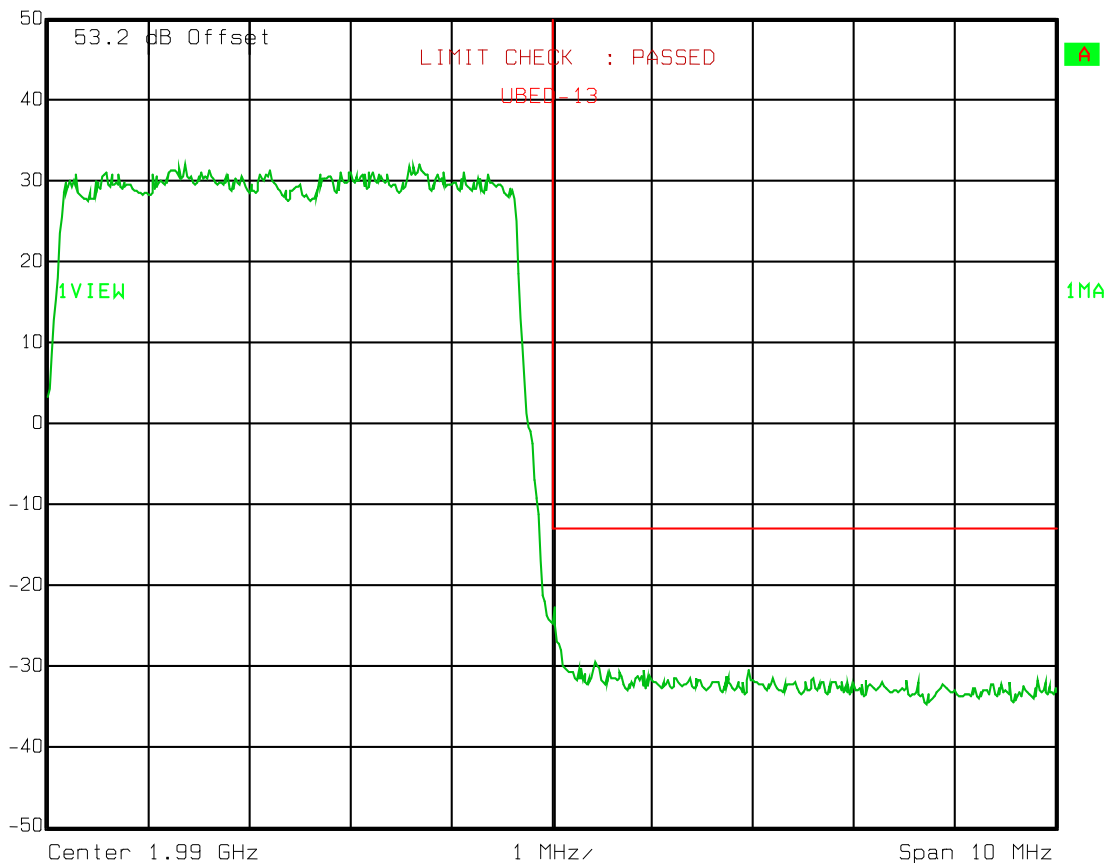
16 QAM

Upper Band Edge



Ref Lvl
50 dBm

RBW	50 kHz	RF Att	10 dB
VBW	50 kHz		
SWT	10 ms	Unit	dBm



Date: 23.AUG.2011 14:15:28

EQUIPMENT: FXFA

Test Data – Spurious Emissions

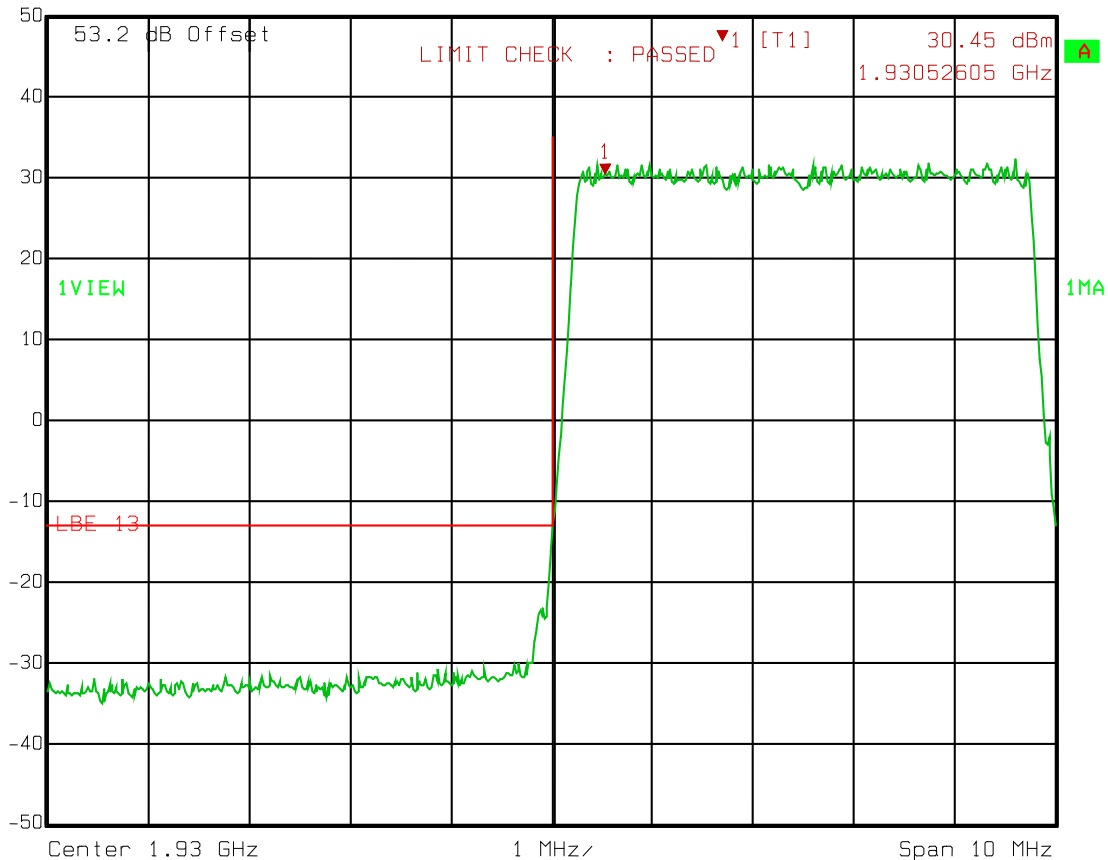
5 MHz Channel

64 QAM

Low Band Edge



Marker 1 [T1] RBW 50 kHz RF Att 10 dB
Ref Lvl 30.45 dBm VBW 50 kHz
50 dBm 1.93052605 GHz SWT 10 ms Unit dBm



Date: 23.AUG.2011 13:59:21

EQUIPMENT: FXFA

Test Data – Spurious Emissions

5 MHz Channel

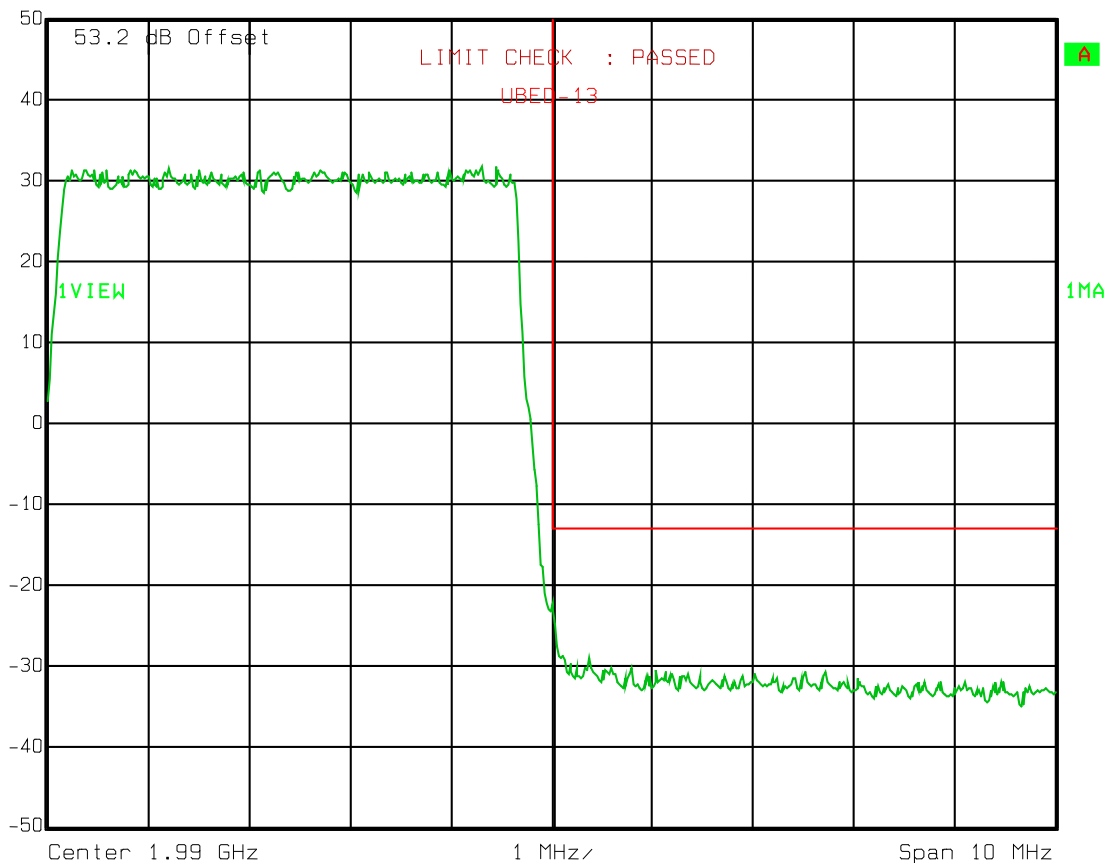
64 QAM

Upper Band Edge



Ref Lvl
50 dBm

RBW 50 kHz RF Att 10 dB
VBW 50 kHz
SWT 10 ms Unit dBm



Date: 23.AUG.2011 14:19:12

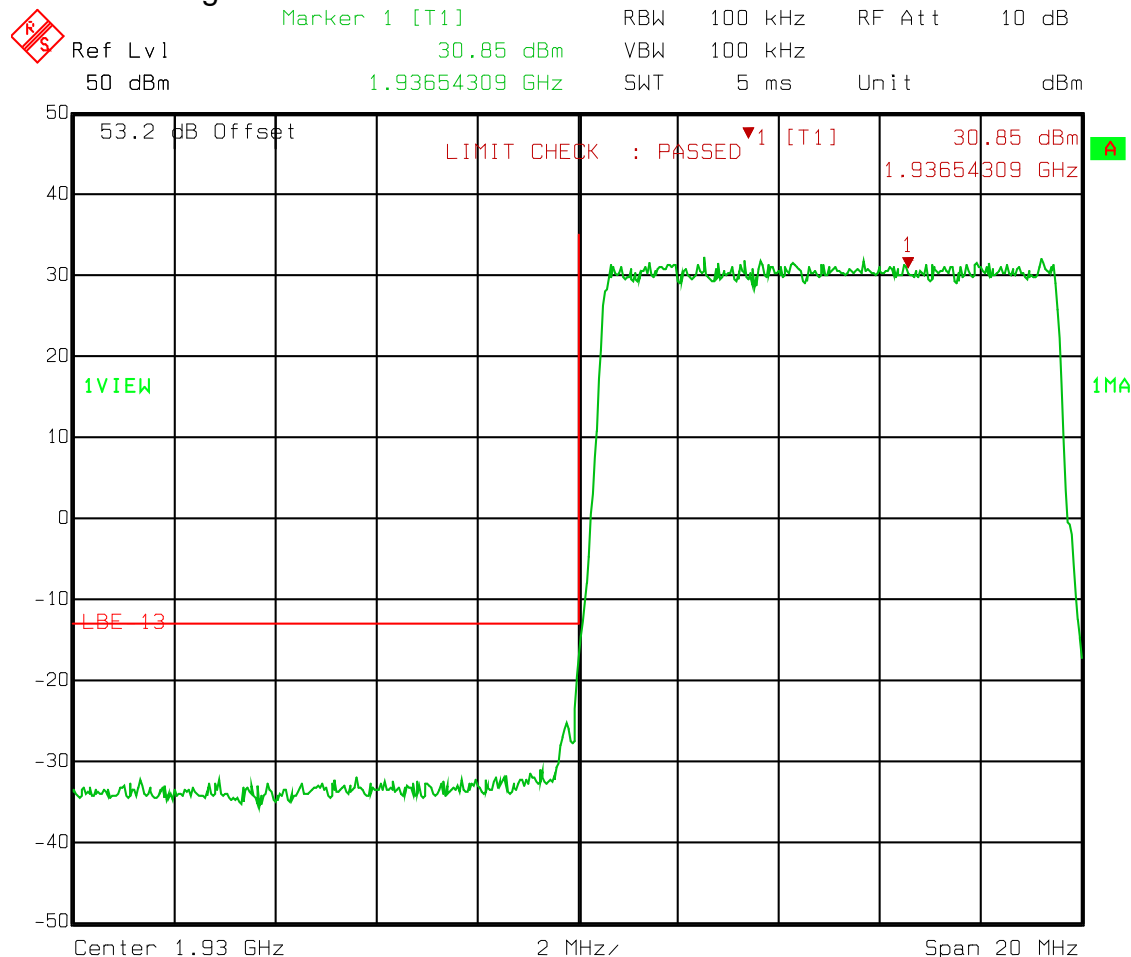
EQUIPMENT: FXFA

Test Data – Spurious Emissions

10 MHz Channel

QPSK

Low Band Edge



Date: 23.AUG.2011 14:37:57

EQUIPMENT: FXFA

Test Data – Spurious Emissions

10 MHz Channel

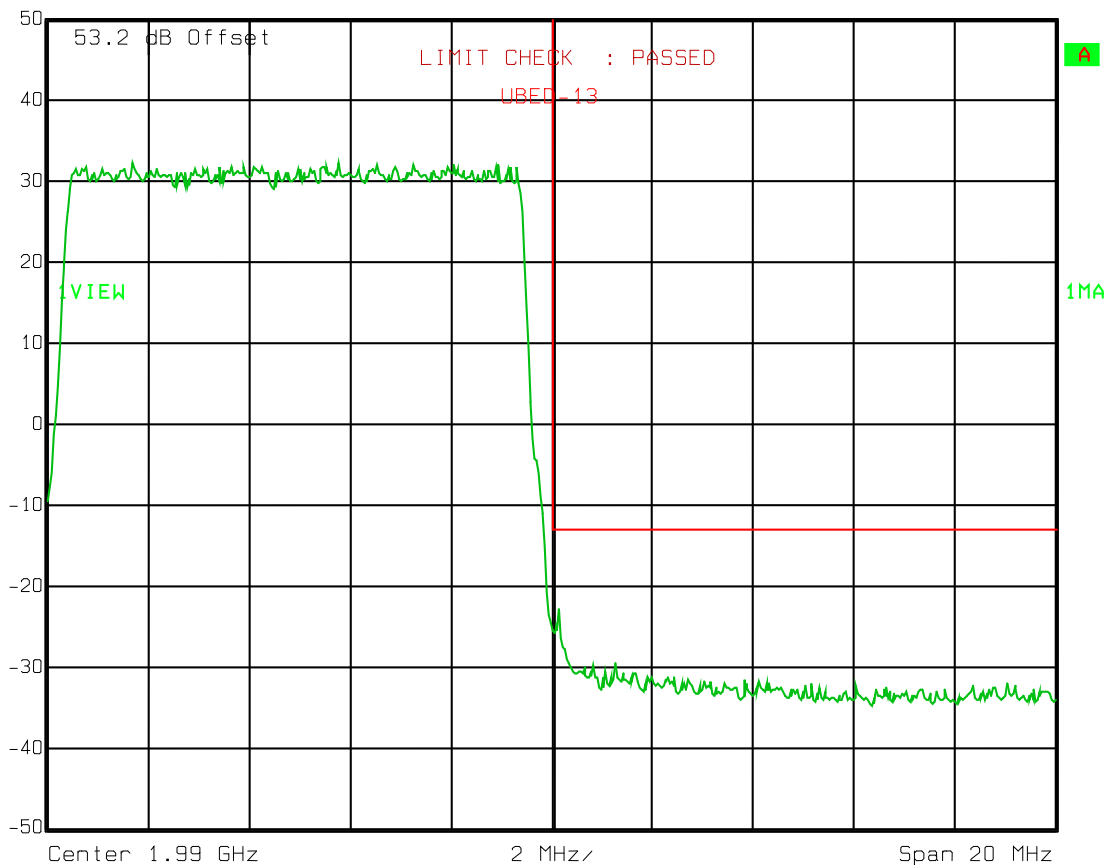
QPSK

Upper Band Edge



Ref Lvl
50 dBm

RBW 100 kHz RF Att 10 dB
VBW 100 kHz
SWT 5 ms Unit dBm



Date: 23.AUG.2011 14:53:56

EQUIPMENT: FXFA

Test Data – Spurious Emissions

10 MHz Channel

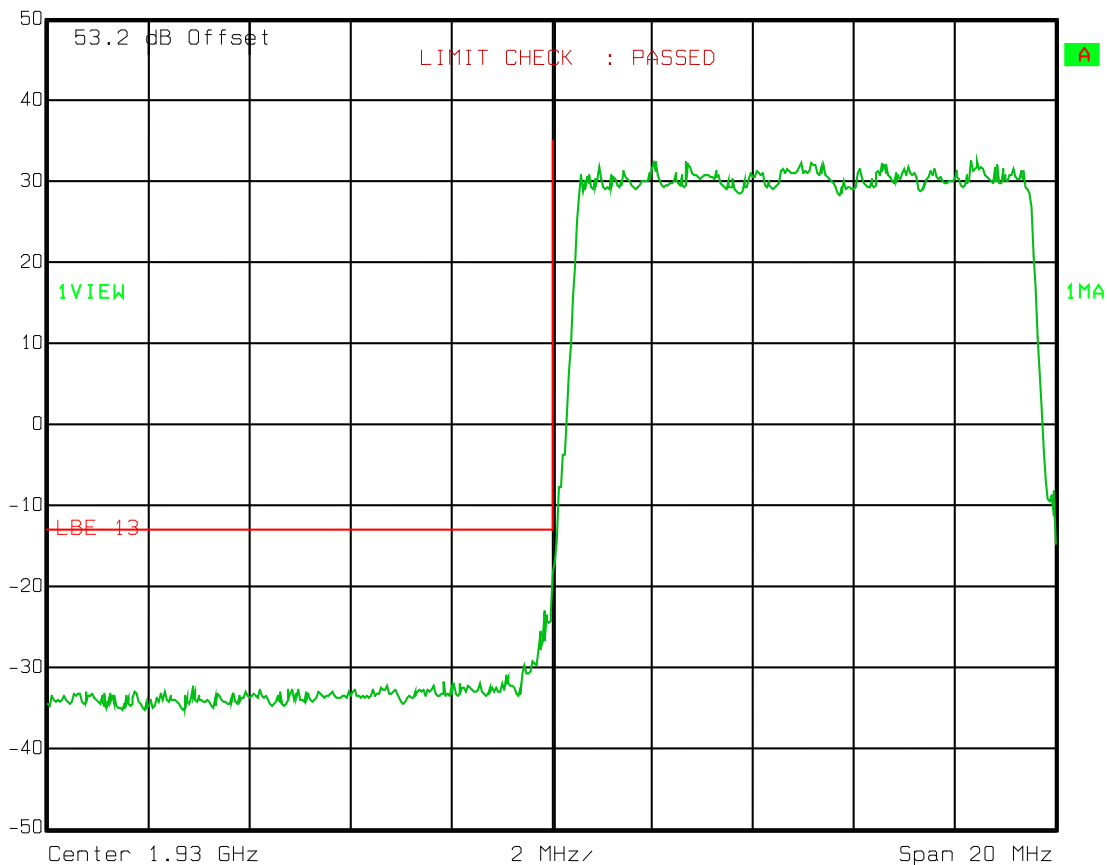
16 QAM

Low Band Edge



Ref Lvl
50 dBm

RBW 100 kHz RF Att 10 dB
VBW 100 kHz
SWT 5 ms Unit dBm



Date: 23.AUG.2011 14:42:30

EQUIPMENT: FXFA

Test Data – Spurious Emissions

10 MHz Channel

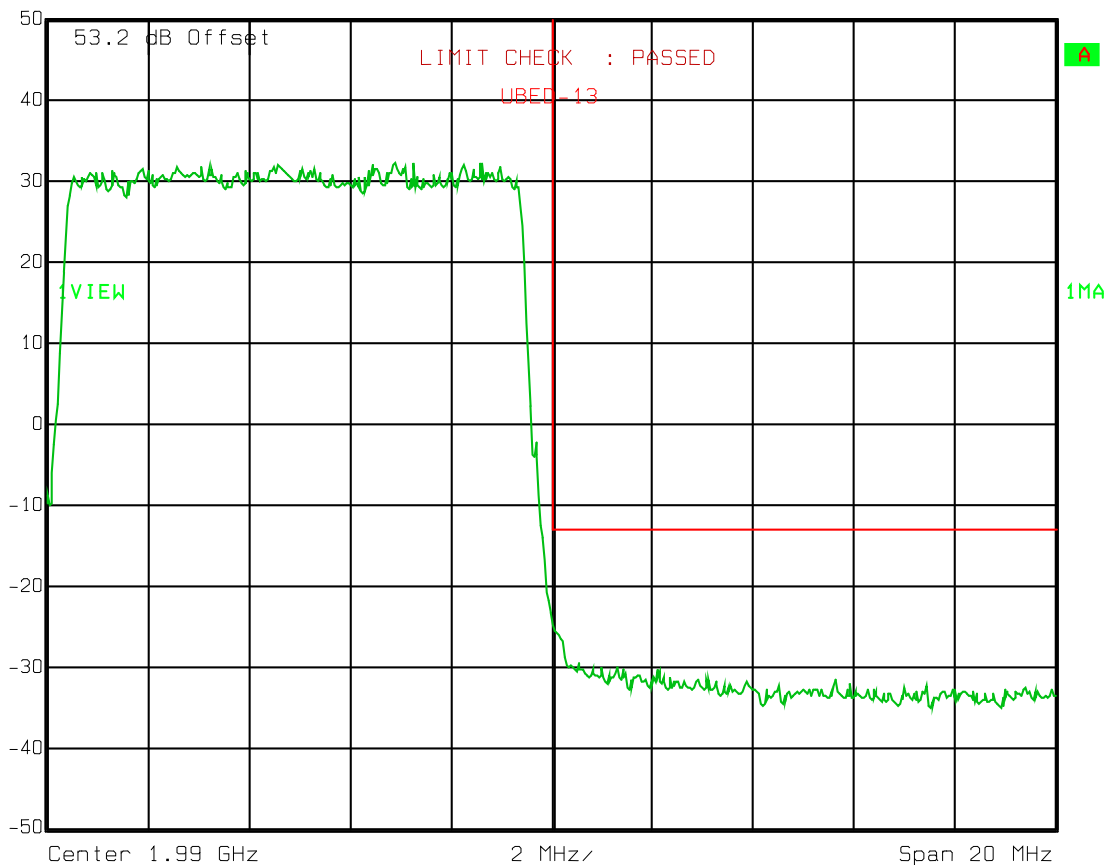
16 QAM

Upper Band Edge



Ref Lvl
50 dBm

RBW 100 kHz RF Att 10 dB
VBW 100 kHz
SWT 5 ms Unit dBm



Date: 23.AUG.2011 14:57:05

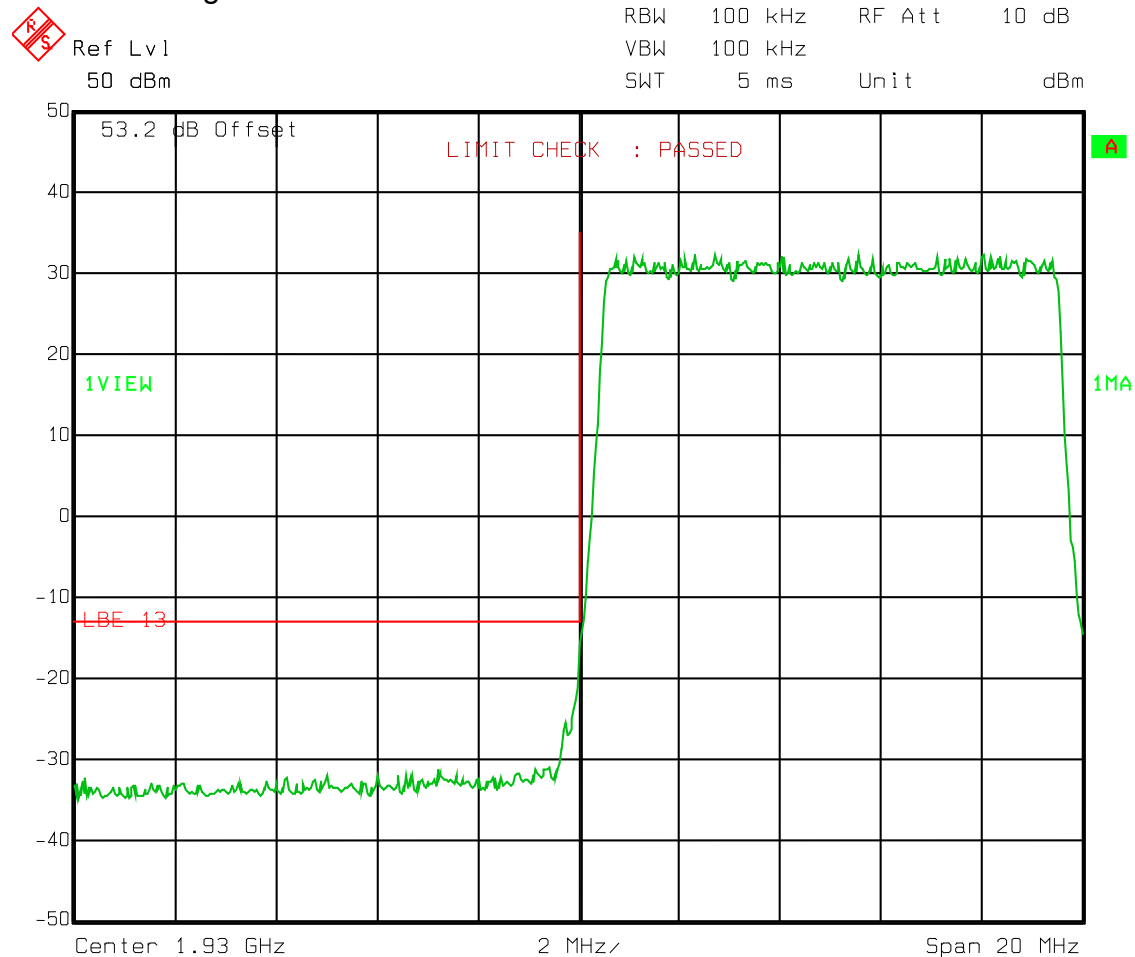
EQUIPMENT: FXFA

Test Data – Spurious Emissions

10 MHz Channel

64 QAM

Low Band Edge



Date: 23.AUG.2011 14:43:00

EQUIPMENT: FXFA

Test Data – Spurious Emissions

10 MHz Channel

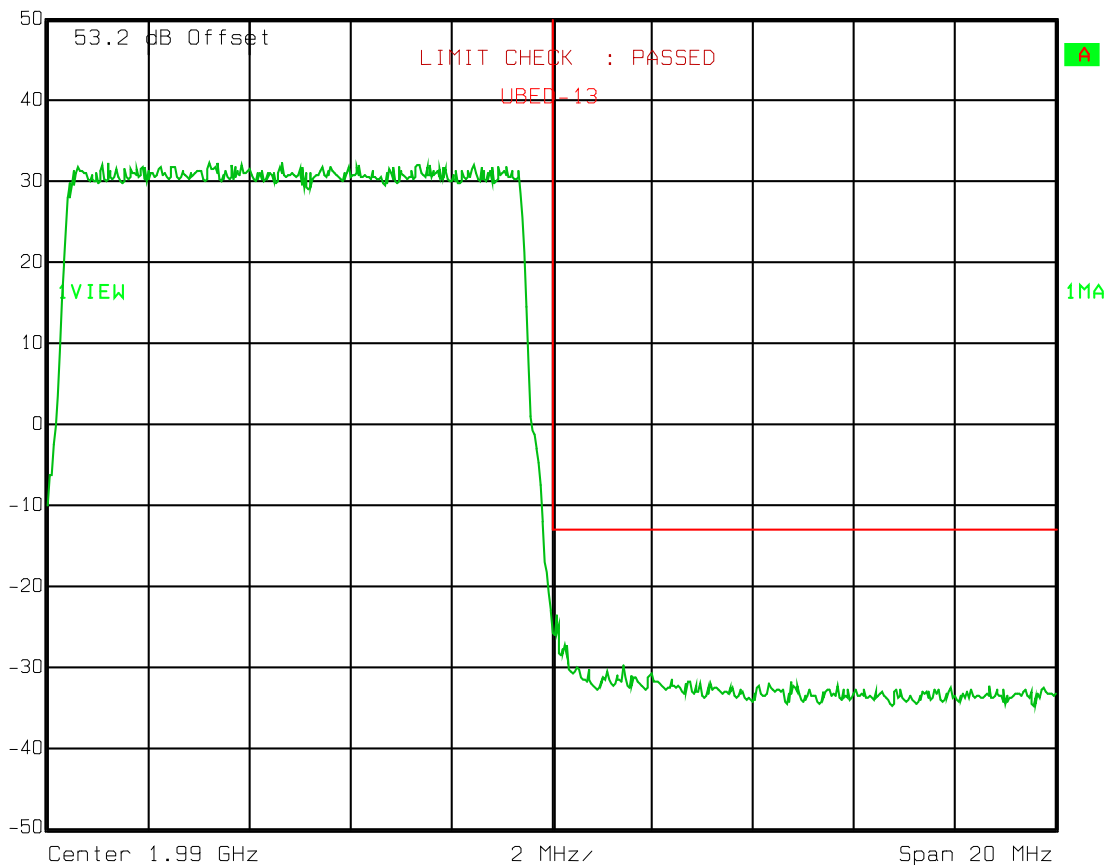
64 QAM

Upper Band Edge



Ref Lvl
50 dBm

RBW 100 kHz RF Att 10 dB
VBW 100 kHz
SWT 5 ms Unit dBm



Date: 23.AUG.2011 14:58:02

EQUIPMENT: FXFA

Test Data – Spurious Emissions

15 MHz Channel

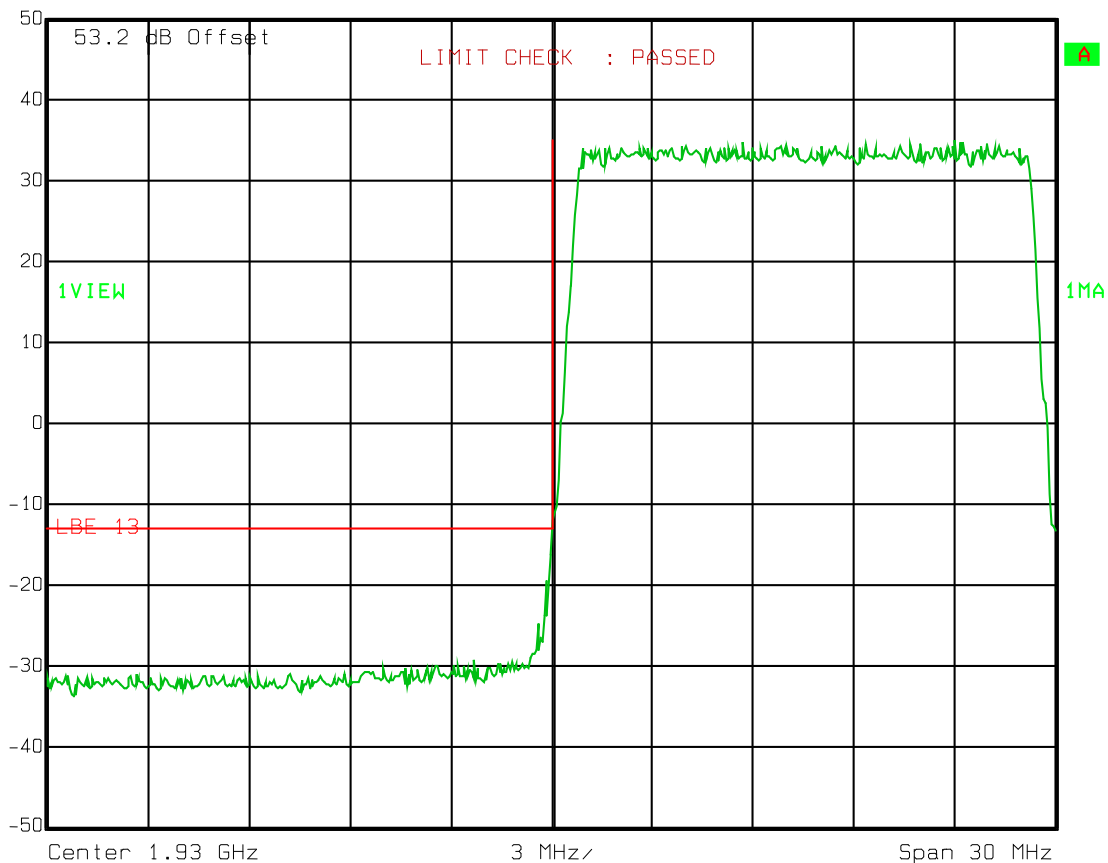
QPSK

Low Band Edge



Ref Lvl
50 dBm

RBW 200 kHz RF Att 10 dB
VBW 200 kHz
SWT 5 ms Unit dBm



Date: 24.AUG.2011 07:12:31

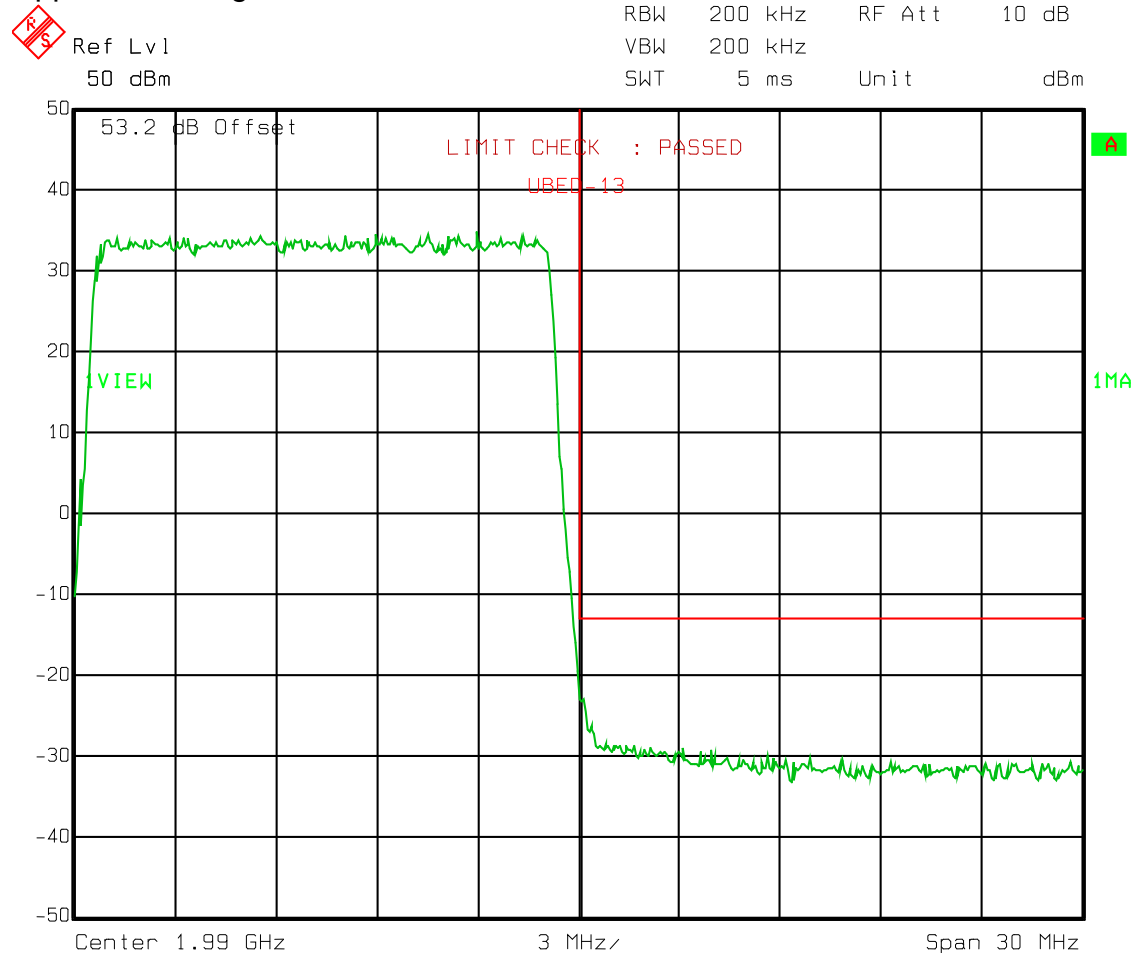
EQUIPMENT: FXFA

Test Data – Spurious Emissions

15 MHz Channel

QPSK

Upper Band Edge



Date: 24.AUG.2011 07:22:56

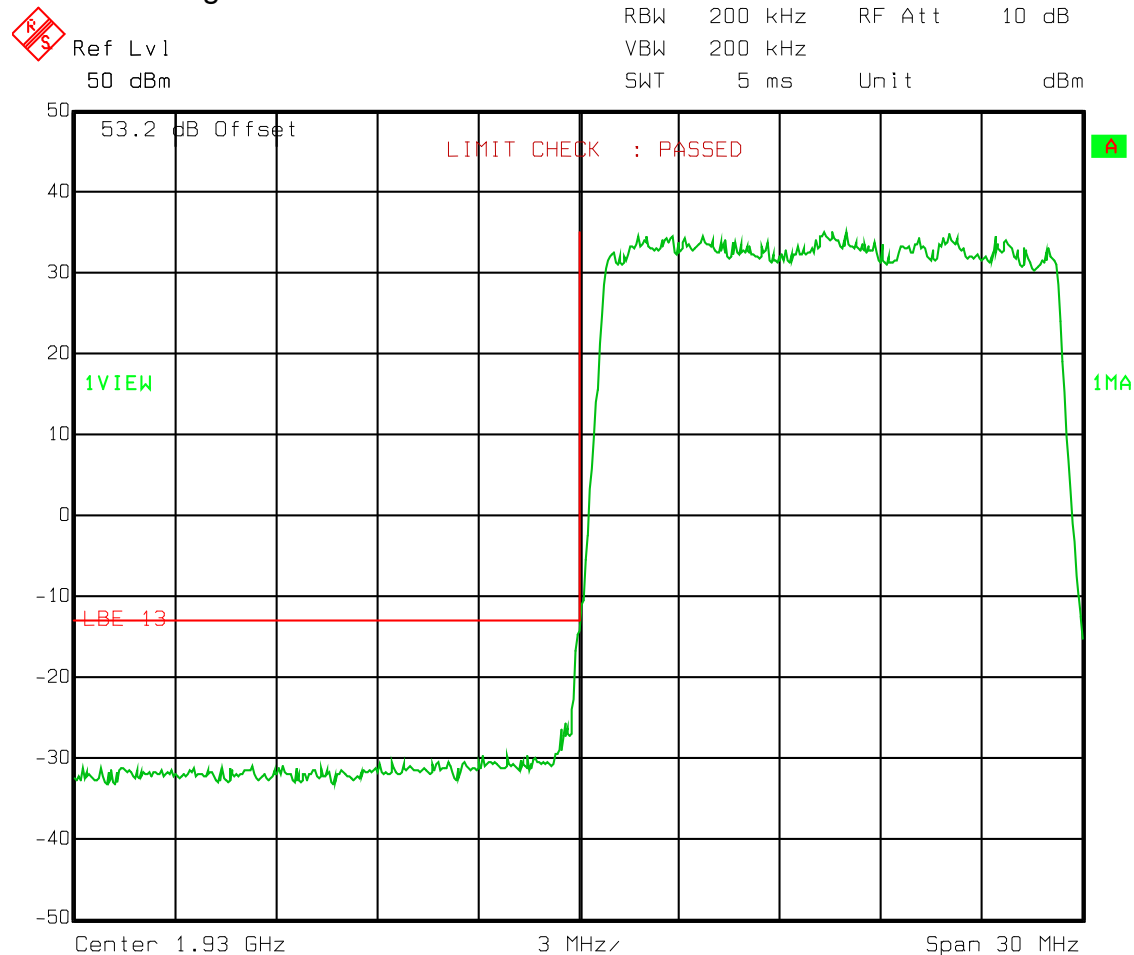
EQUIPMENT: FXFA

Test Data – Spurious Emissions

15 MHz Channel

16 QAM

Low Band Edge



Date: 24.AUG.2011 07:13:06

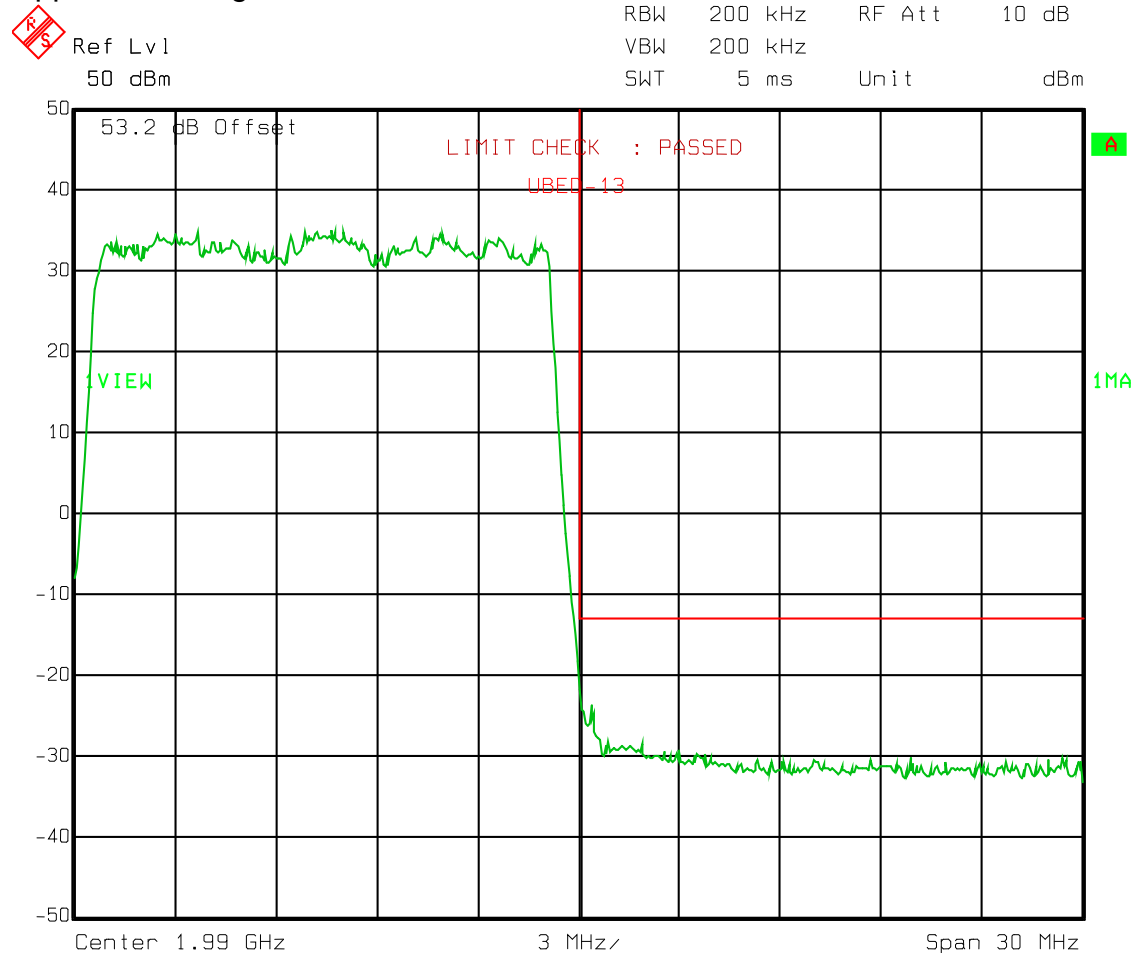
EQUIPMENT: FXFA

Test Data – Spurious Emissions

15 MHz Channel

16 QAM

Upper Band Edge



Date: 24.AUG.2011 07:23:18

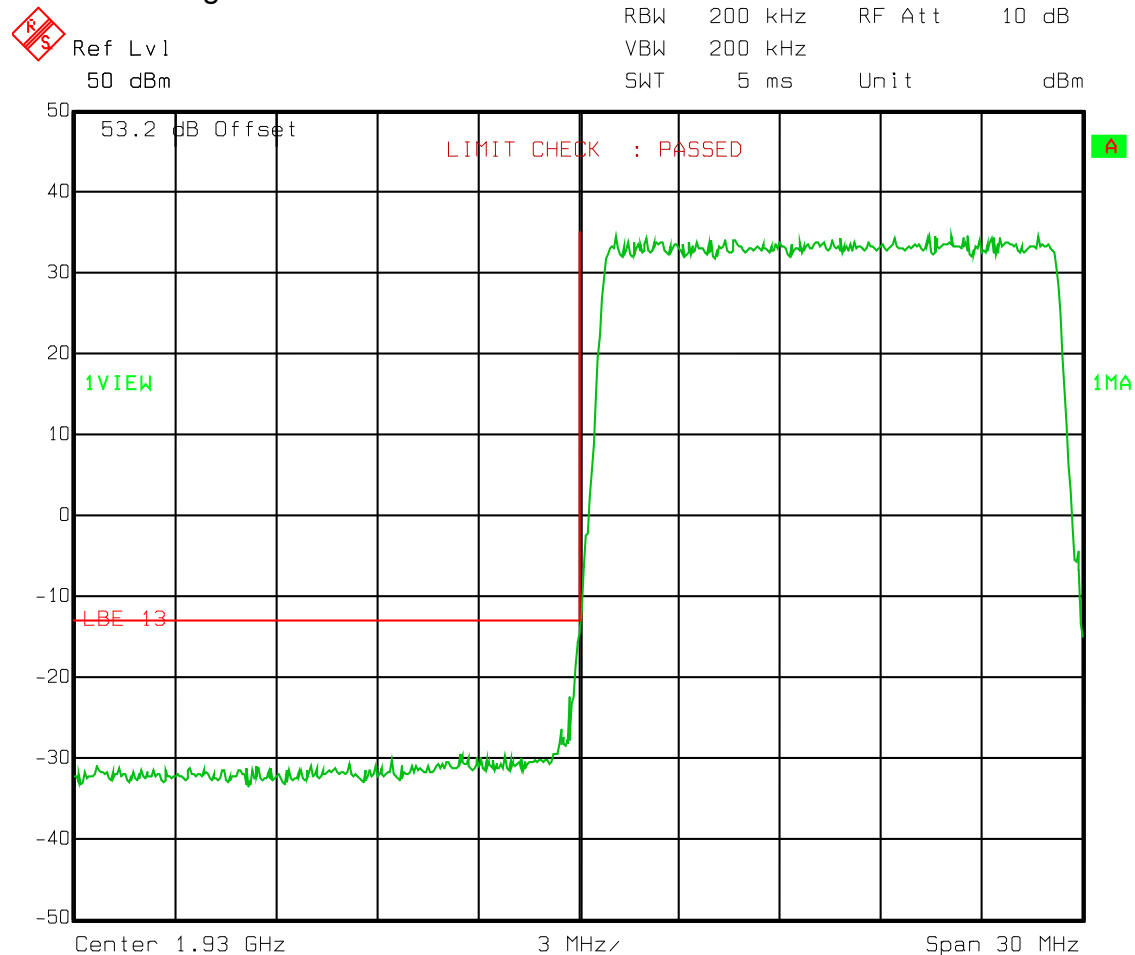
EQUIPMENT: FXFA

Test Data – Spurious Emissions

15 MHz Channel

64 QAM

Low Band Edge



Date: 24.AUG.2011 07:16:31

EQUIPMENT: FXFA

Test Data – Spurious Emissions

15 MHz Channel

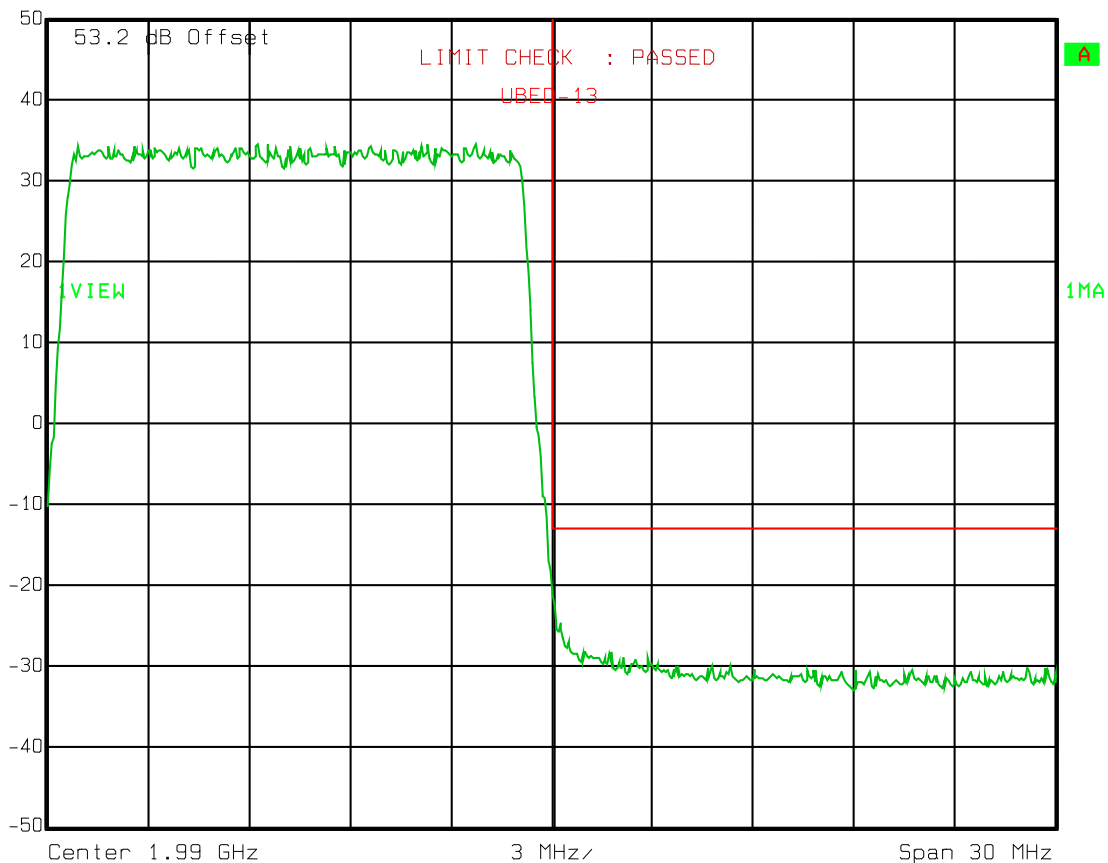
64 QAM

Upper Band Edge



Ref Lvl
50 dBm

RBW 200 kHz RF Att 10 dB
VBW 200 kHz
SWT 5 ms Unit dBm



Date: 24.AUG.2011 07:26:13

EQUIPMENT: FXFA

Test Data – Spurious Emissions

20 MHz Channel

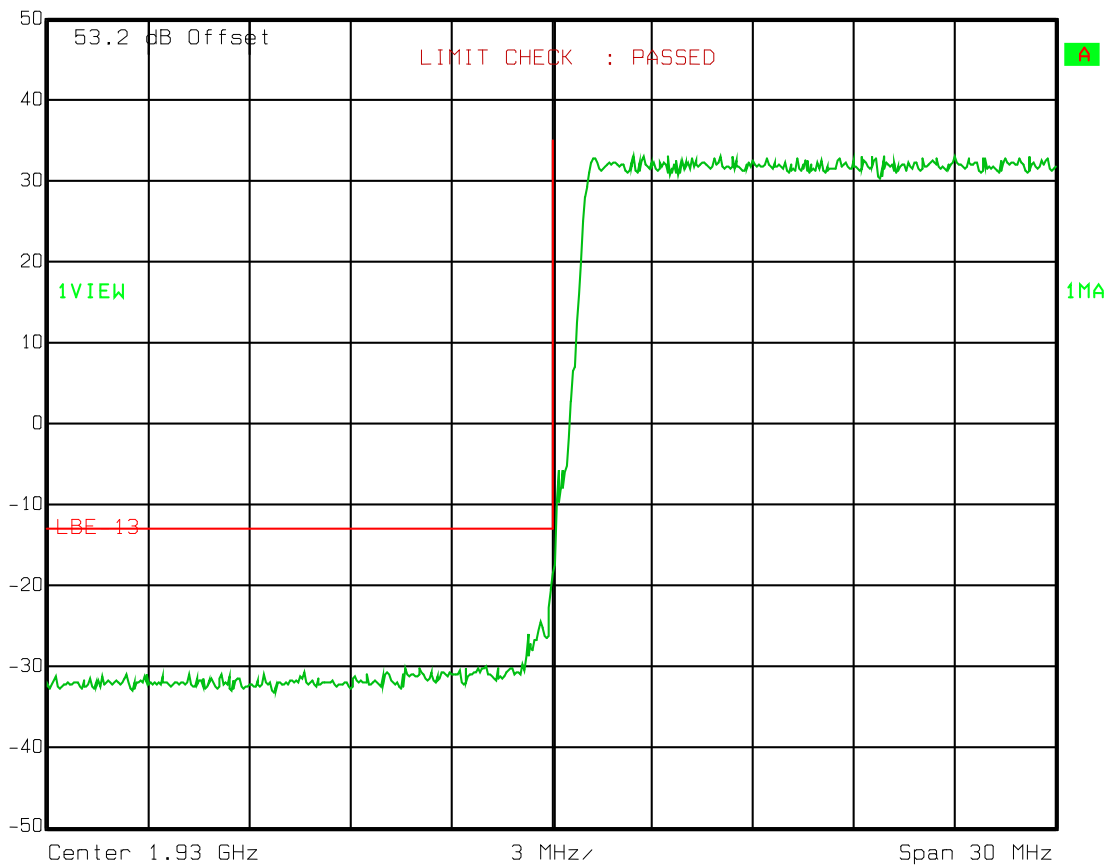
QPSK

Low Band Edge



Ref Lvl
50 dBm

RBW 200 kHz RF Att 10 dB
VBW 200 kHz
SWT 5 ms Unit dBm



Date: 24.AUG.2011 07:34:36

EQUIPMENT: FXFA

Test Data – Spurious Emissions

20 MHz Channel

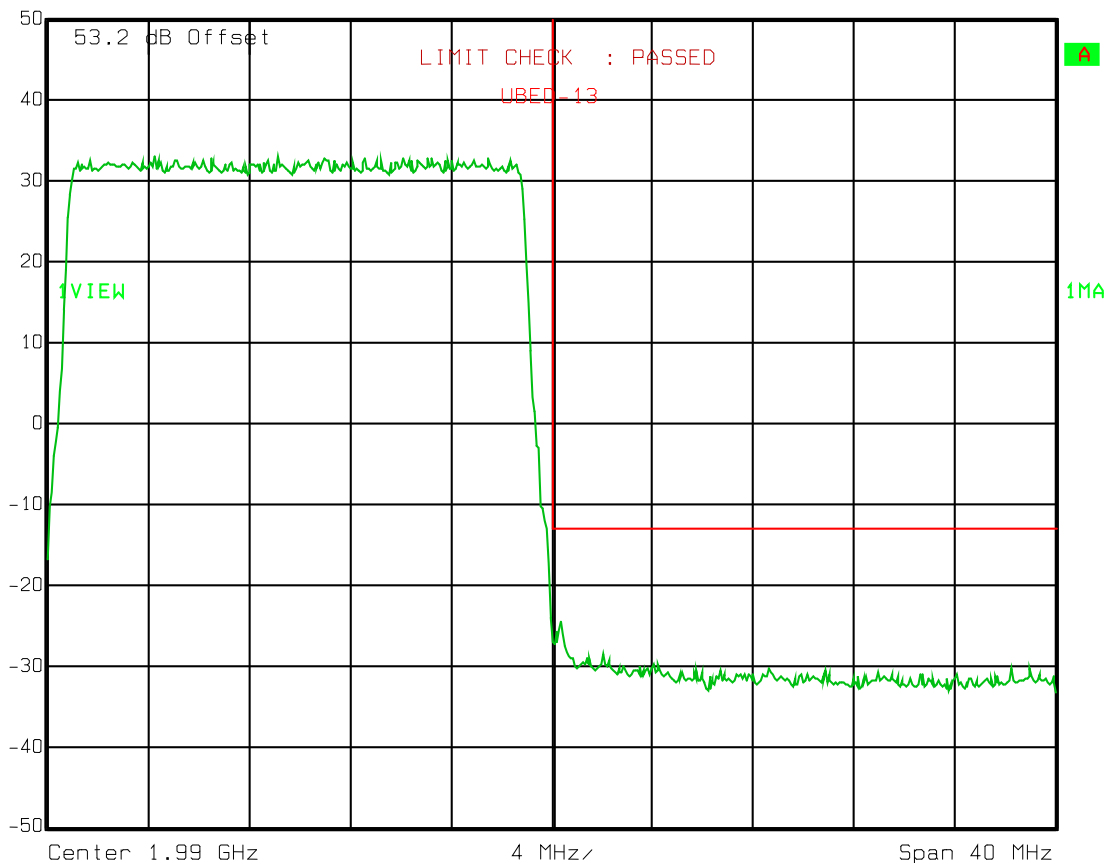
QPSK

Upper Band Edge



Ref Lvl
50 dBm

RBW 200 kHz RF Att 10 dB
VBW 200 kHz
SWT 5 ms Unit dBm



Date: 24.AUG.2011 07:45:48

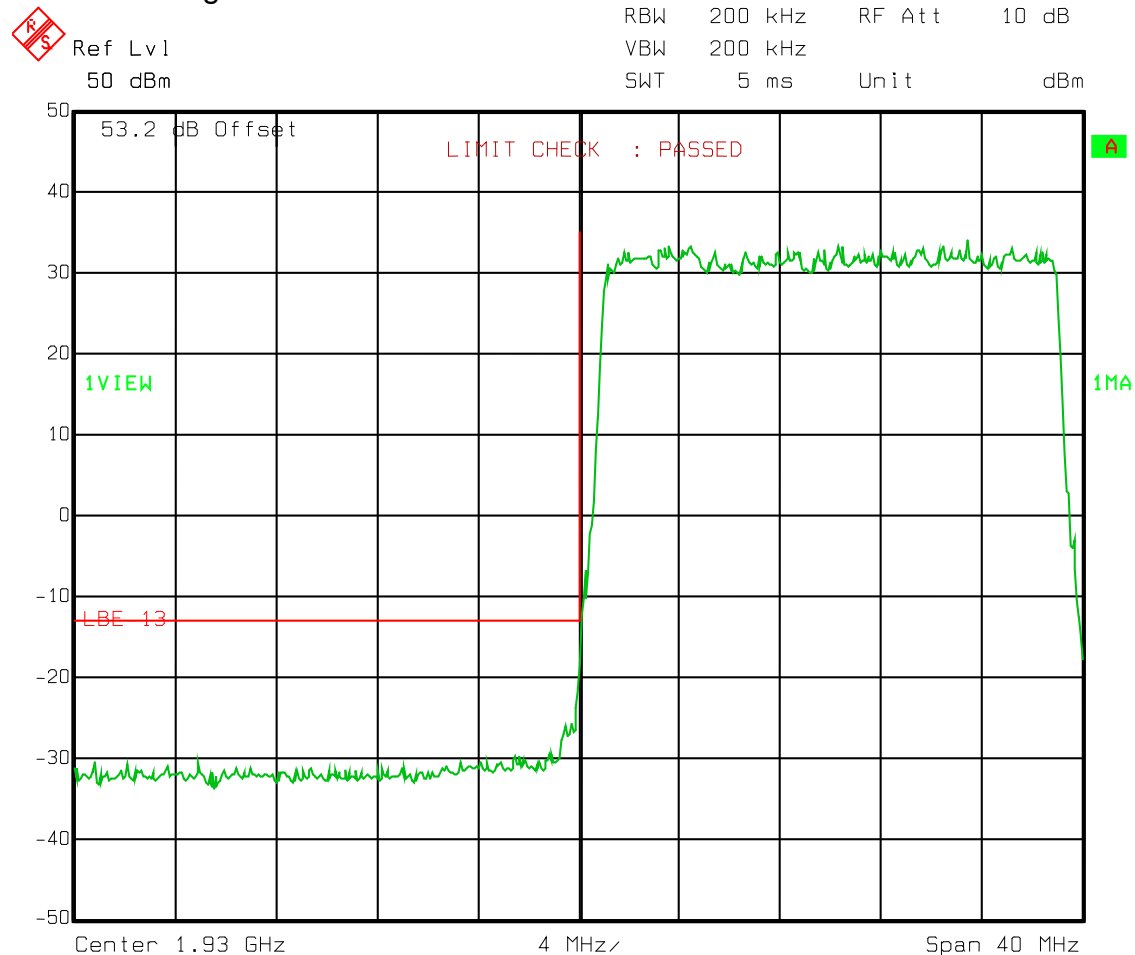
EQUIPMENT: FXFA

Test Data – Spurious Emissions

20 MHz Channel

16 QAM

Low Band Edge



Date: 24.AUG.2011 07:38:20

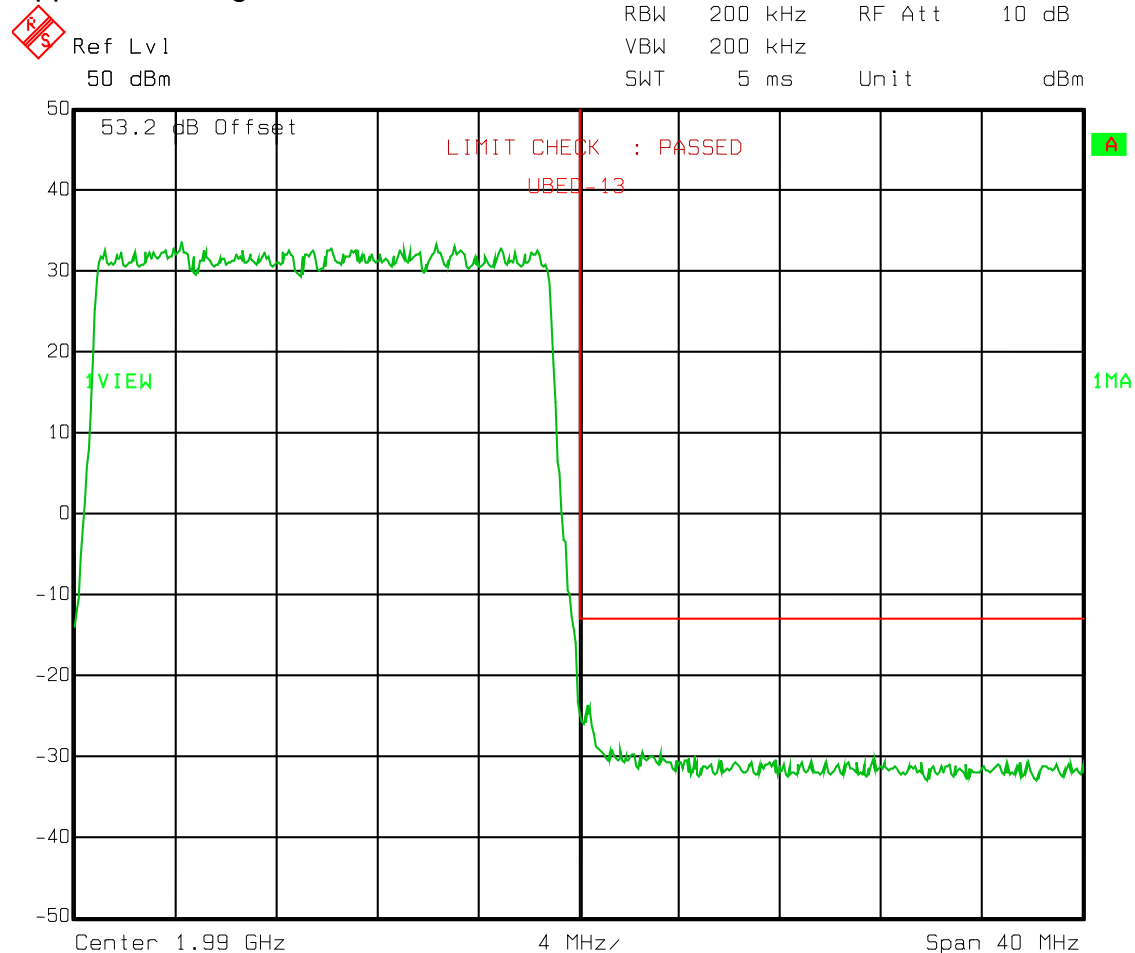
EQUIPMENT: FXFA

Test Data – Spurious Emissions

20 MHz Channel

16 QAM

Upper Band Edge



Date: 24.AUG.2011 07:47:57

EQUIPMENT: FXFA

Test Data – Spurious Emissions

20 MHz Channel

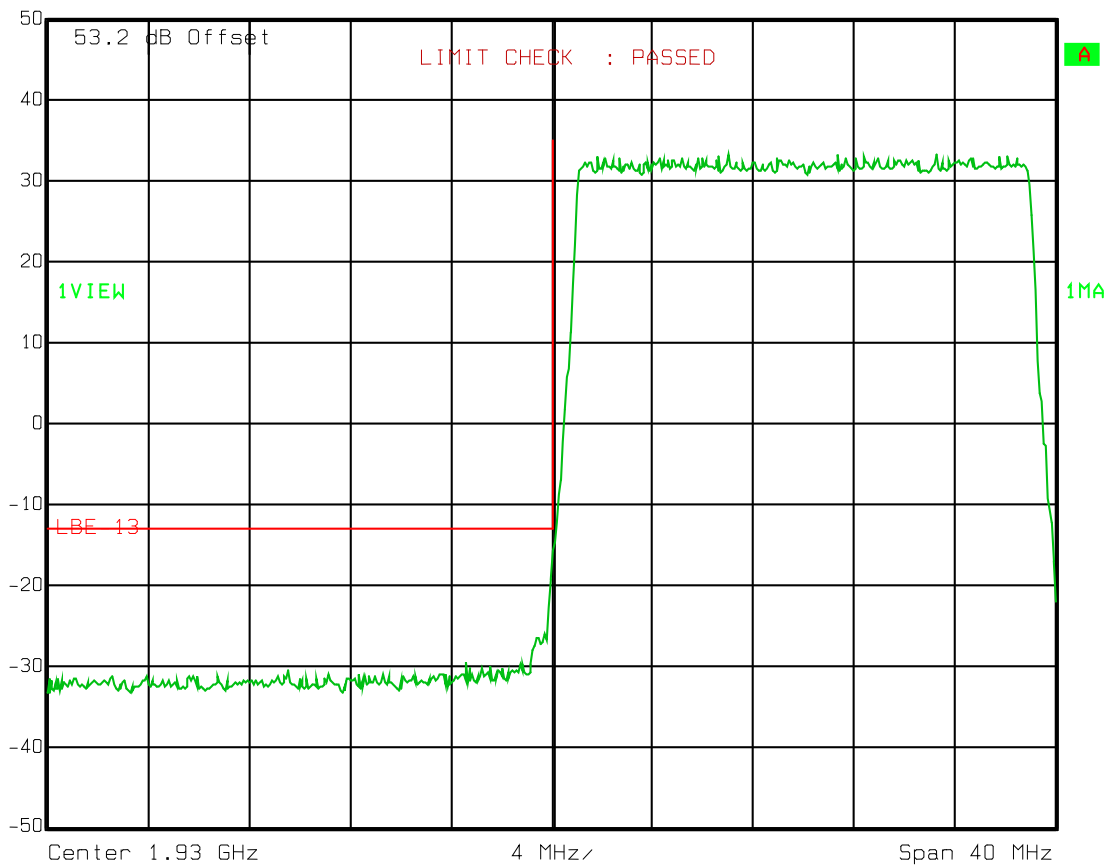
64 QAM

Low Band Edge



Ref Lvl
50 dBm

RBW 200 kHz RF Att 10 dB
VBW 200 kHz
SWT 5 ms Unit dBm



Date: 24.AUG.2011 07:38:43

EQUIPMENT: FXFA

Test Data – Spurious Emissions

20 MHz Channel

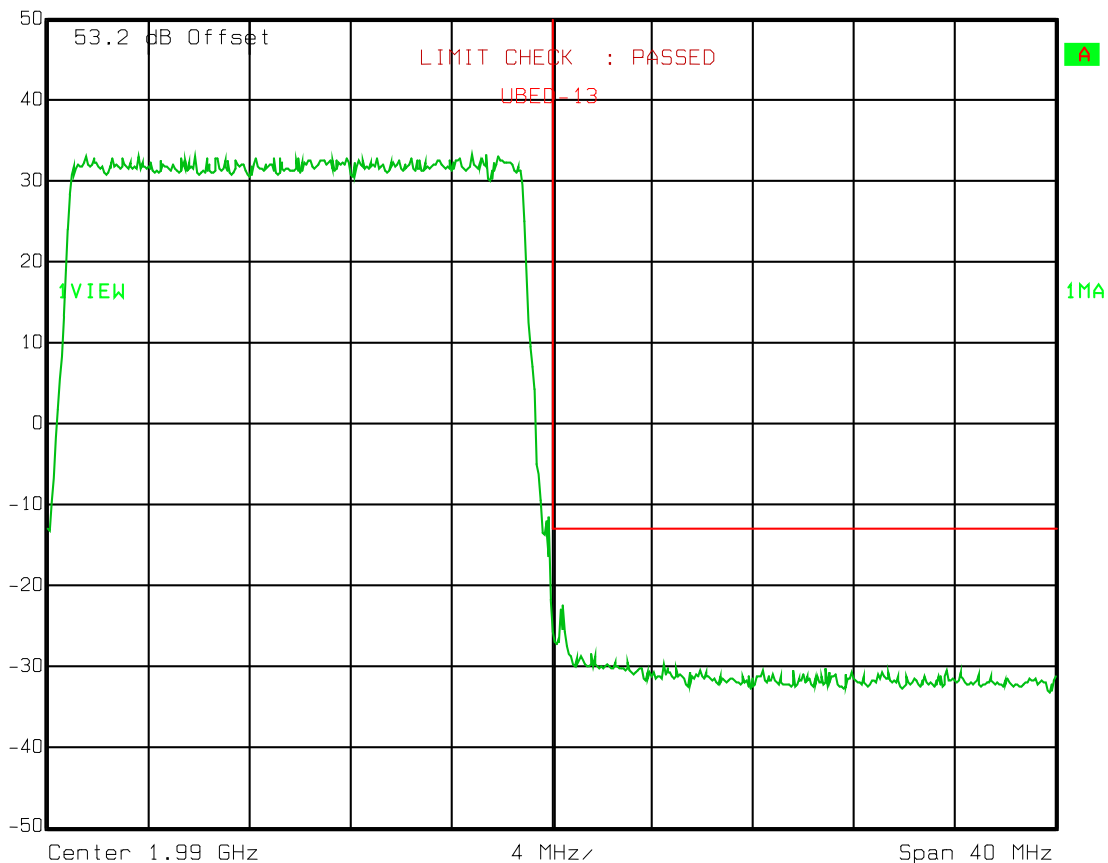
64 QAM

Upper Band Edge



Ref Lvl
50 dBm

RBW 200 kHz RF Att 10 dB
VBW 200 kHz
SWT 5 ms Unit dBm



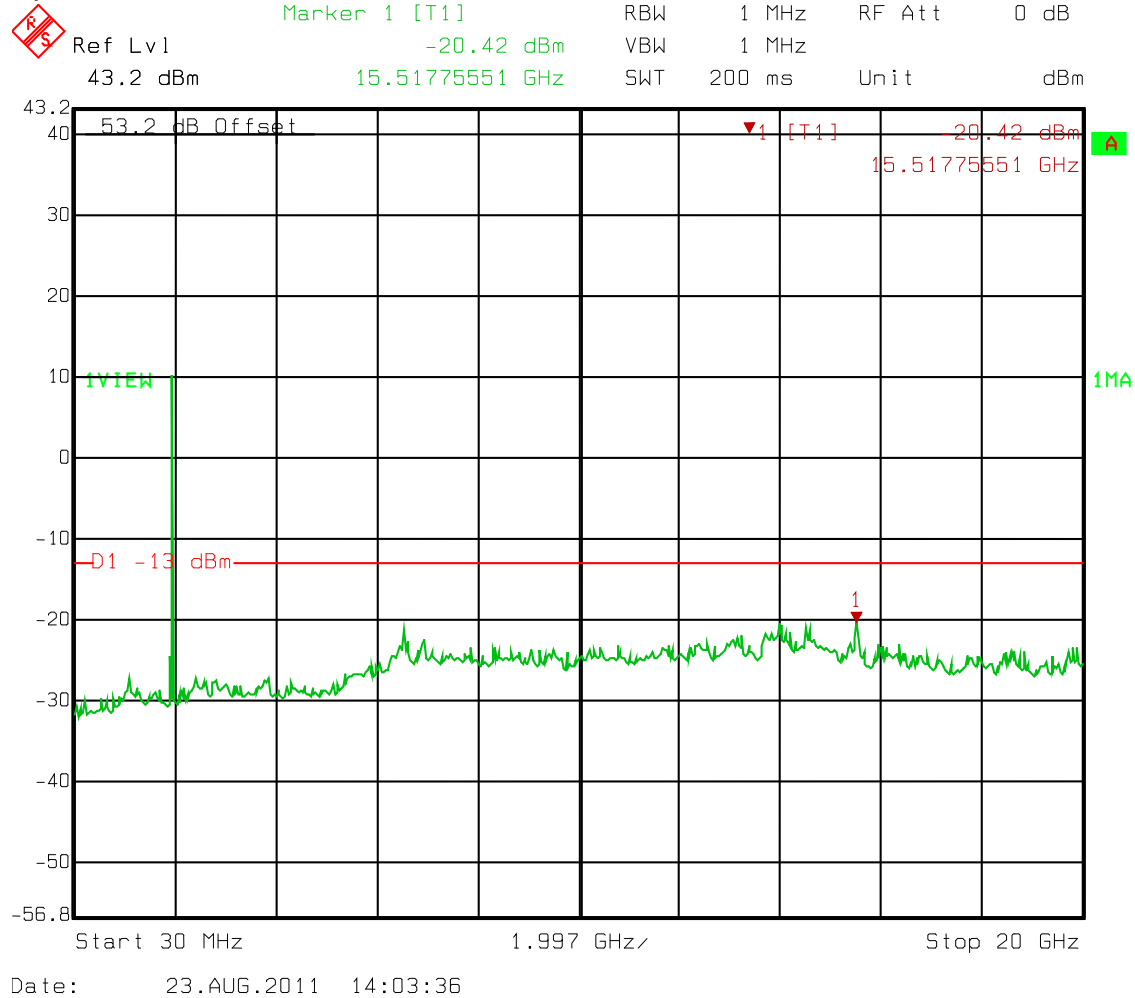
Date: 24.AUG.2011 07:48:19

EQUIPMENT: FXFA

Test Data – Spurious Emissions

QPSK

Spurs



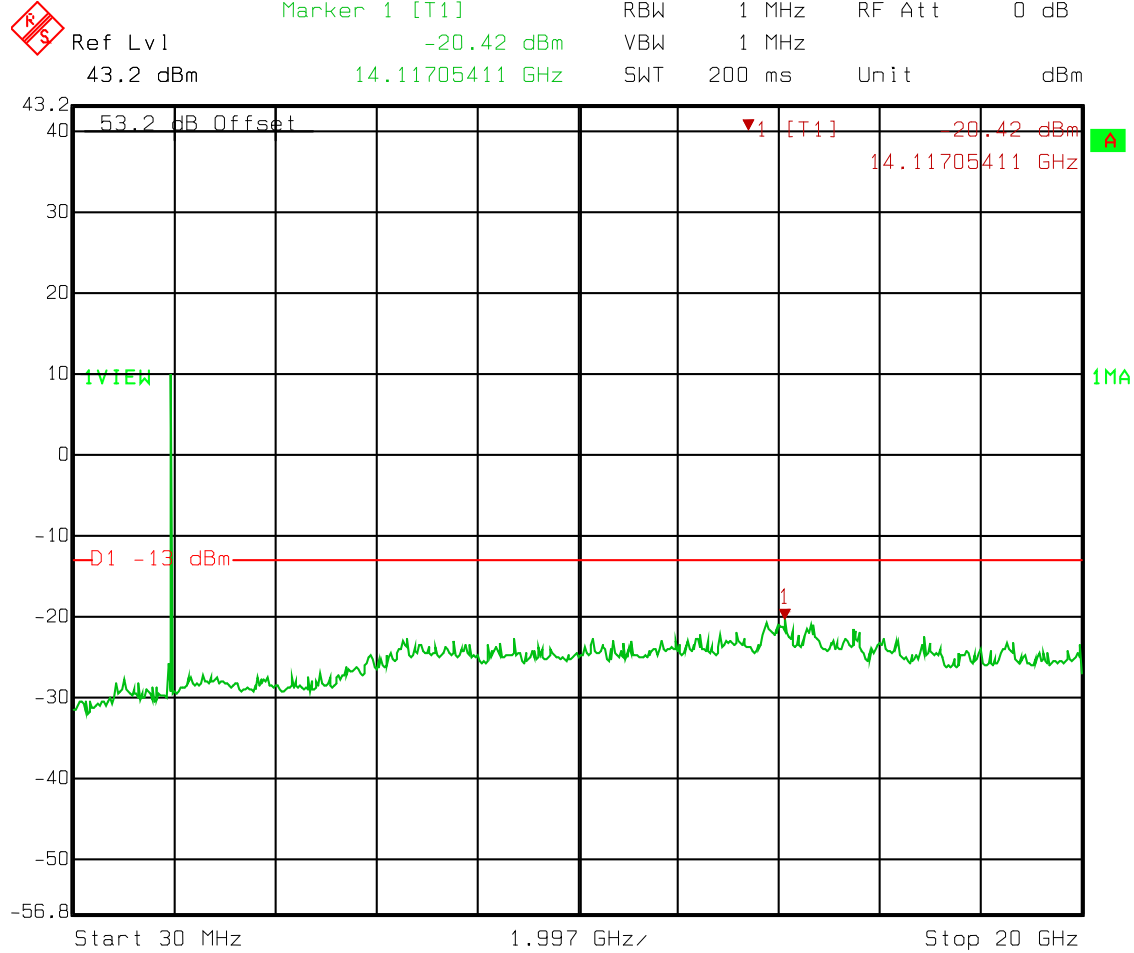
Carrier notched.

EQUIPMENT: FXFA

Test Data – Spurious Emissions

16 QAM

Spurs



Date: 23.AUG.2011 14:04:10

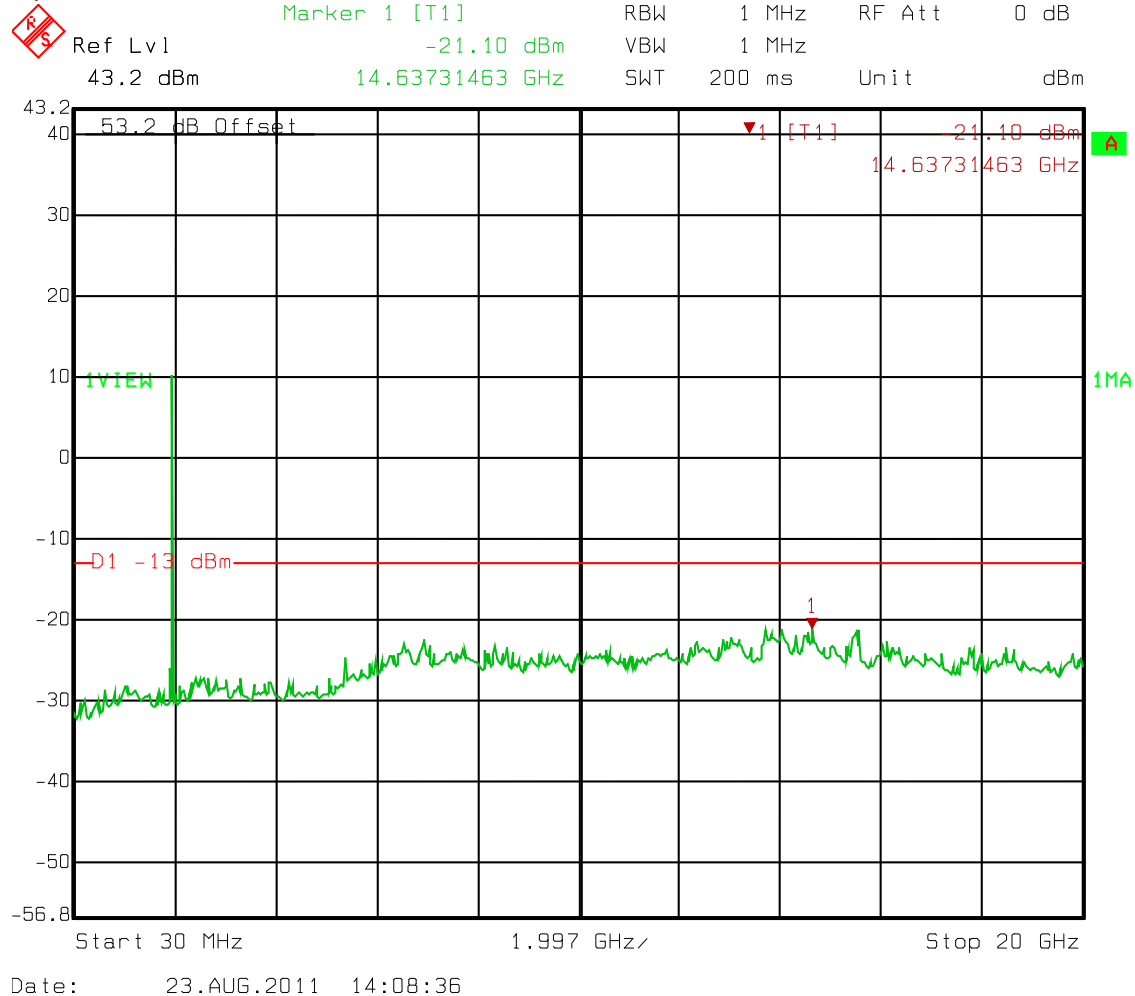
Carrier notched.

EQUIPMENT: FXFA

Test Data – Spurious Emissions

64 QAM

Spurs



Carrier notched.

EQUIPMENT: FXFA**Section 6. Test Equipment List**

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal	Next Cal
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

ANNEX A - TEST DETAILS

EQUIPMENT: FXFA

NAME OF TEST: RF Power Output

PARA. NO.: 2.1046

Minimum Standard: Para. No.24.232. Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

Method Of Measurement:

Detachable Antenna:

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

EQUIPMENT: FXFA

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 2.1049

Minimum Standard: Para. No. 24.238(b). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB.

Method Of Measurement:

CDMA Per ANSI/J-STD-014

Spectrum analyzer settings:

RBW: 30 kHz

VBW: \geq RBW

Span: 5 MHz

Sweep: Auto

GSM Per ANSI/J-STD-010

RBW: 3 kHz

VBW: \geq RBW

Span: 2 MHz

Sweep: Auto

NADC Per IS-136

RBW: 1 kHz

VBW: \geq RBW

Span: 1 MHz

Sweep: Auto

EQUIPMENT: FXFA**NAME OF TEST: Spurious Emission at Antenna
Terminals****PARA. NO.: 2.1051****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 Per ANSI/J-STD-014

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 Per ANSI/J-STD-010

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

NADC Per IS-136

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

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.

Nemko USA, Inc.

CFR 47, PART 24, SUBPART E
BROADBAND PCS BASE STATIONS
PROJECT NO.: 10213334RUS1

EQUIPMENT: FXFA

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

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. 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.

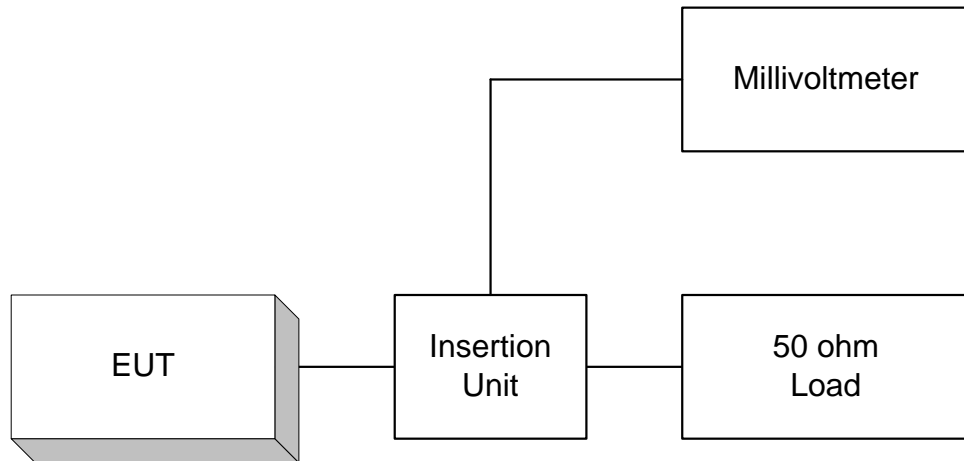
Frequency Stability With Temperature Variation

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.

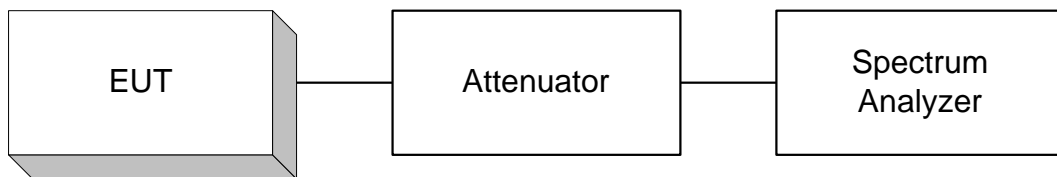
ANNEX B - TEST DIAGRAMS

EQUIPMENT: FXFA

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

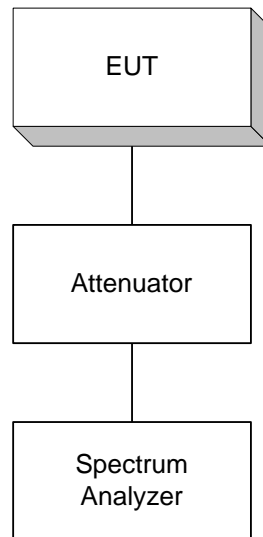


Para. No. 2.989 - Occupied Bandwidth

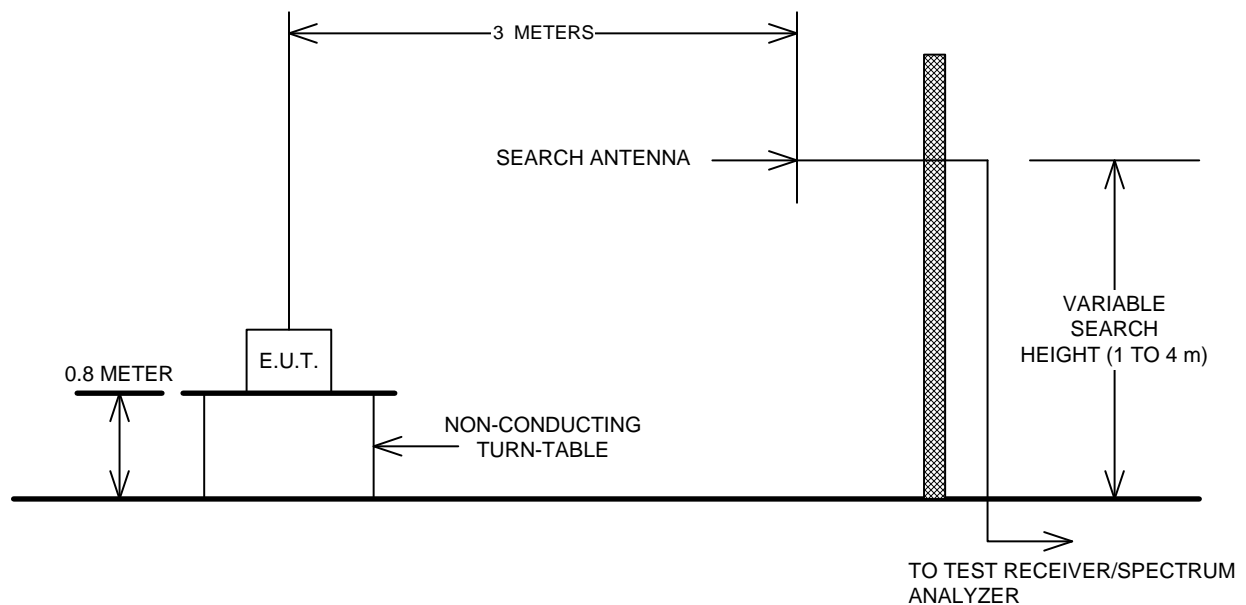


EQUIPMENT: FXFA

Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

