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: _____ **DATE:** **25 August 2011**

David Light, Senior Wireless Engineer

APPROVED BY: _____ **DATE:** **30 August 2011**

Tom Tidwell, Director Nemko Direct for Telecom

Number of Pages: 59

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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

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.

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** ☒ **Duplexer** ☐ **Fullband** ☐

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 %

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

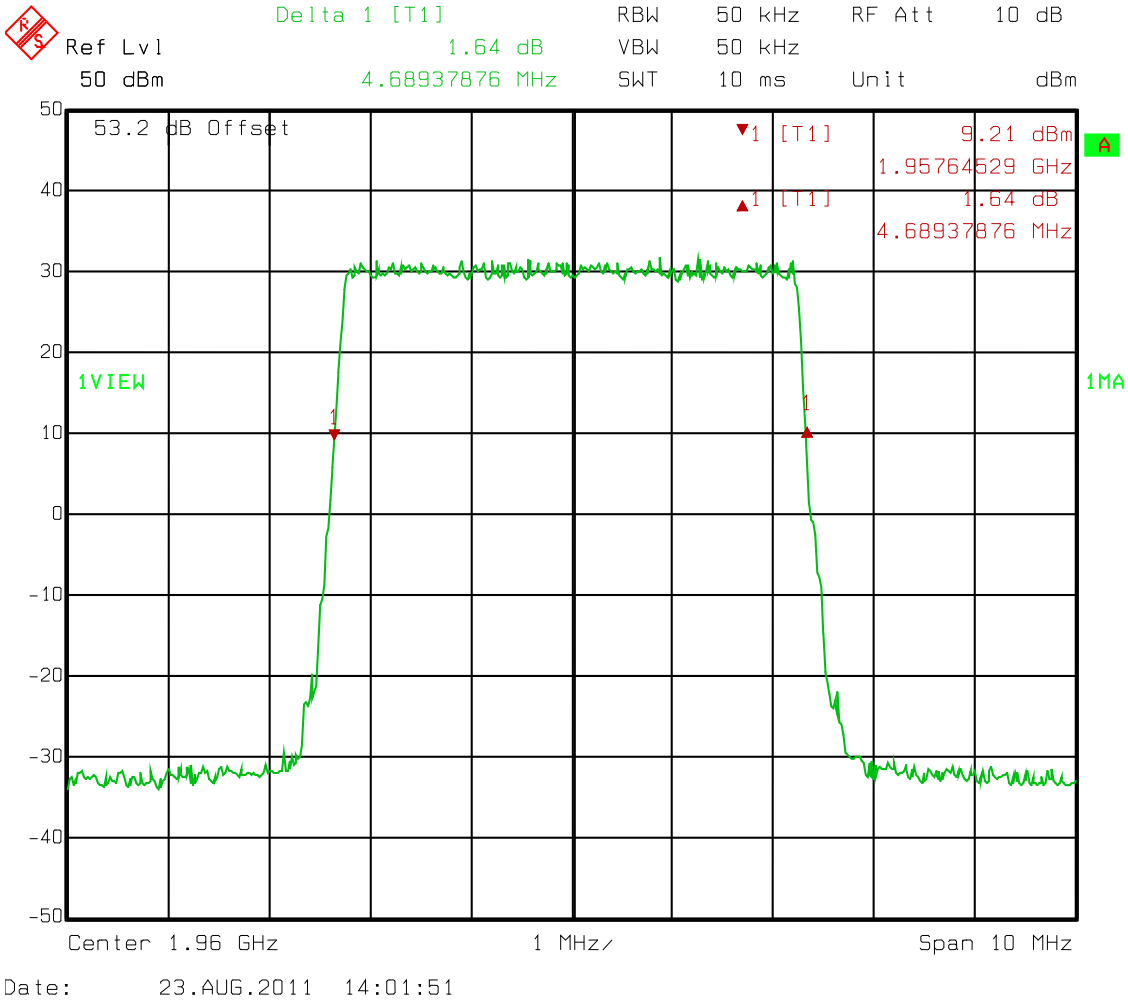
Measurement Uncertainty: +/- 1.6 dB

Temperature: 22 °C

Relative Humidity: 35 %

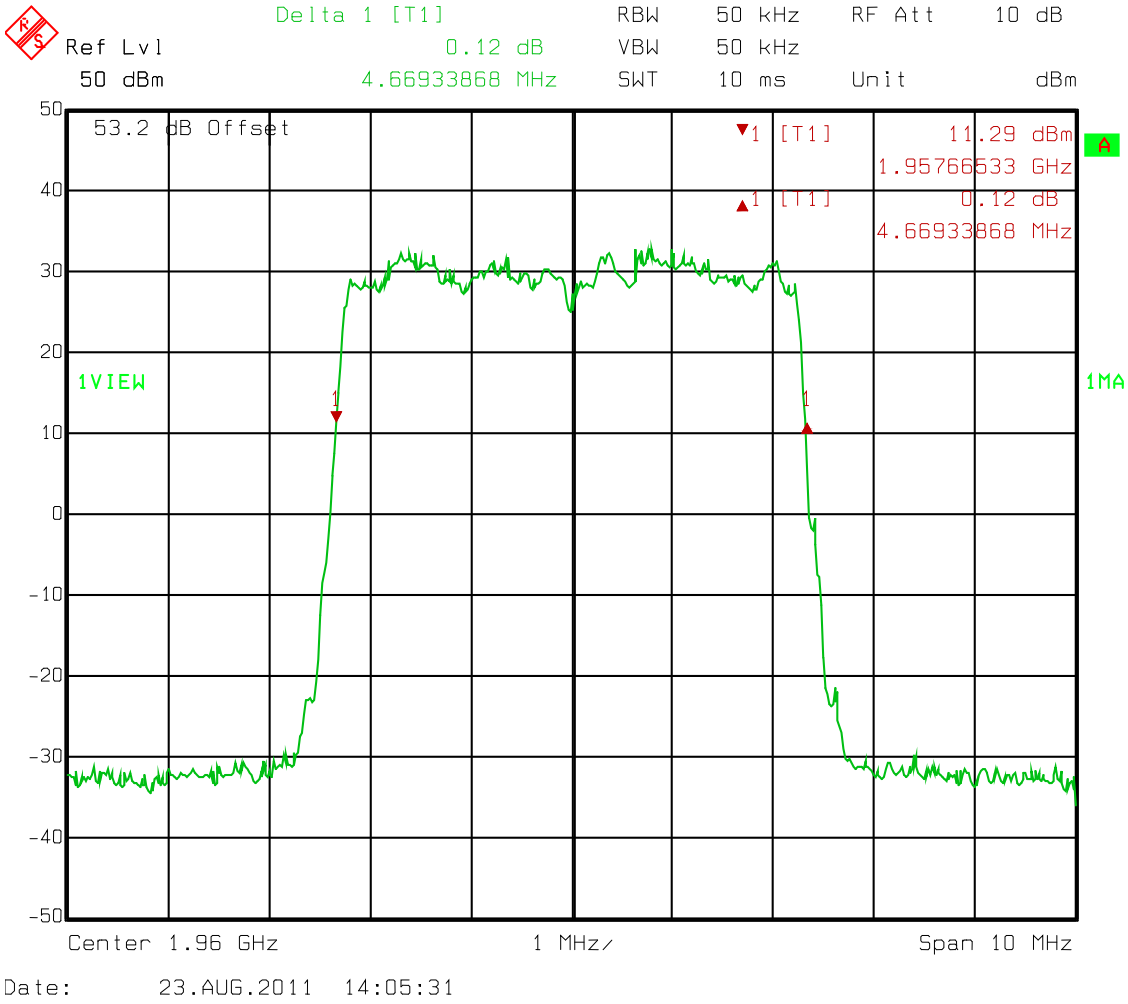
Test Data – Occupied Bandwidth

5 MHz Channel
QPSK
Center Channel
20 dB BW



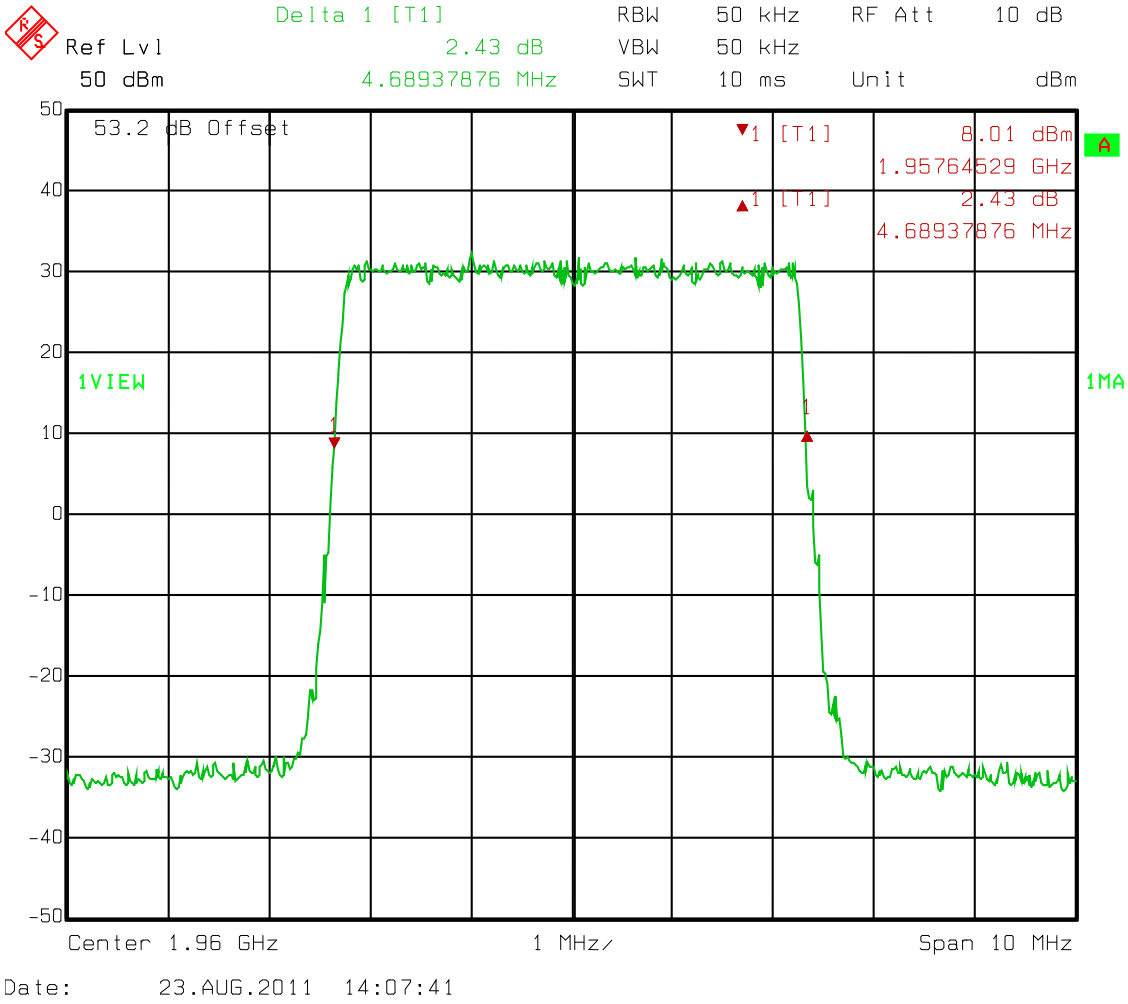
Test Data – Occupied Bandwidth

5 MHz Channe
Center Channel
16 QAM
20 dB BW



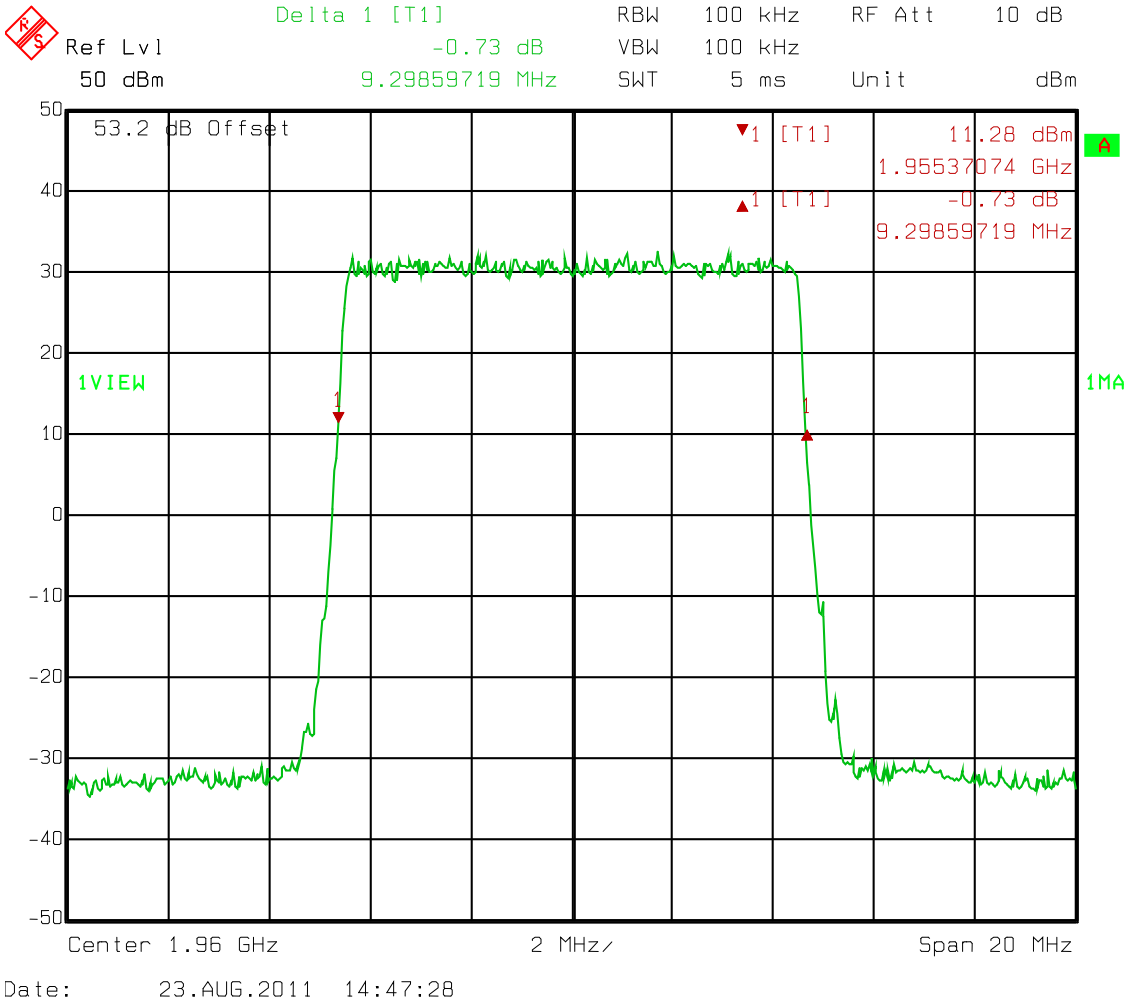
Test Data – Occupied Bandwidth

5 MHz Channel
64 QAM
Center Channel
20 dB BW



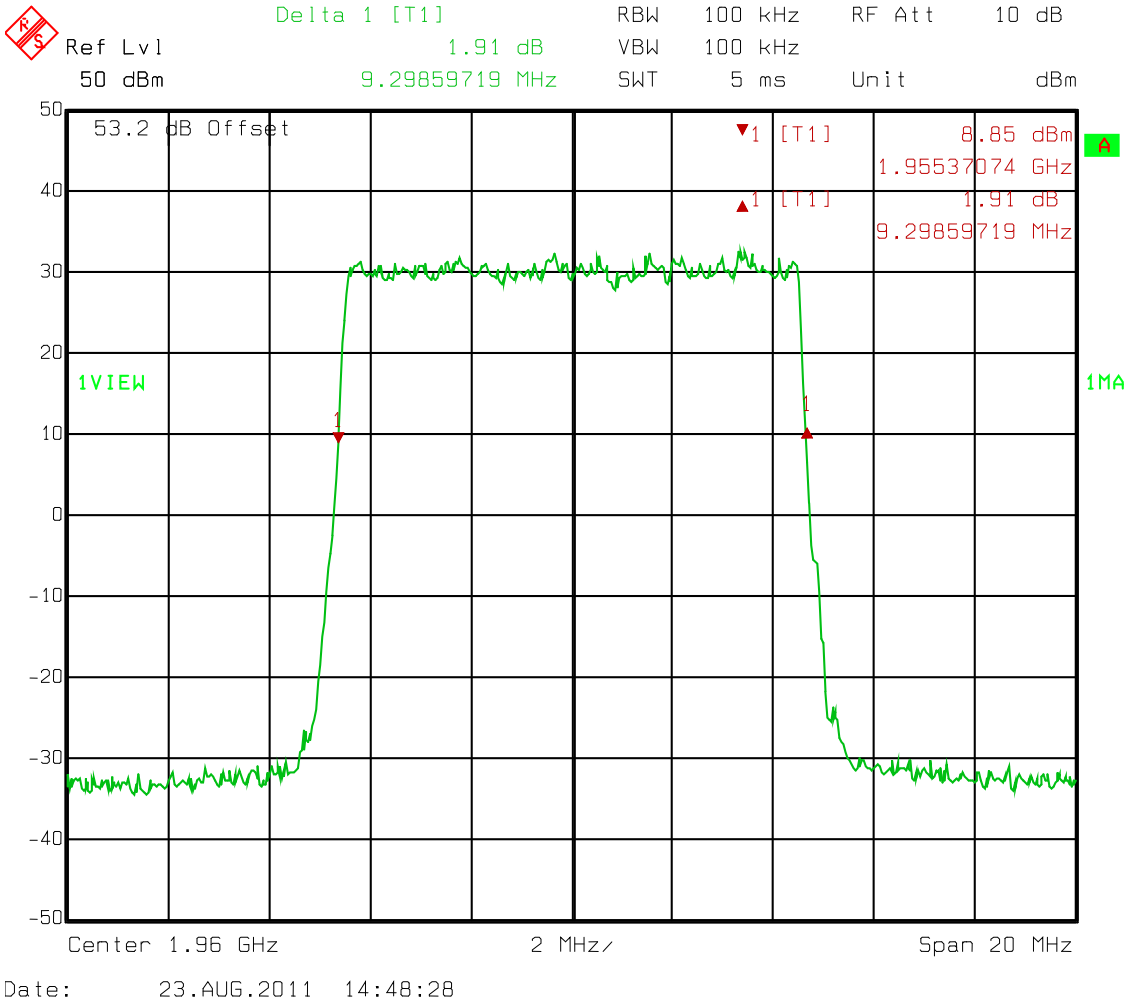
Test Data – Occupied Bandwidth

10 MHz Channel
QPSK
Center Channel
20 dB BW

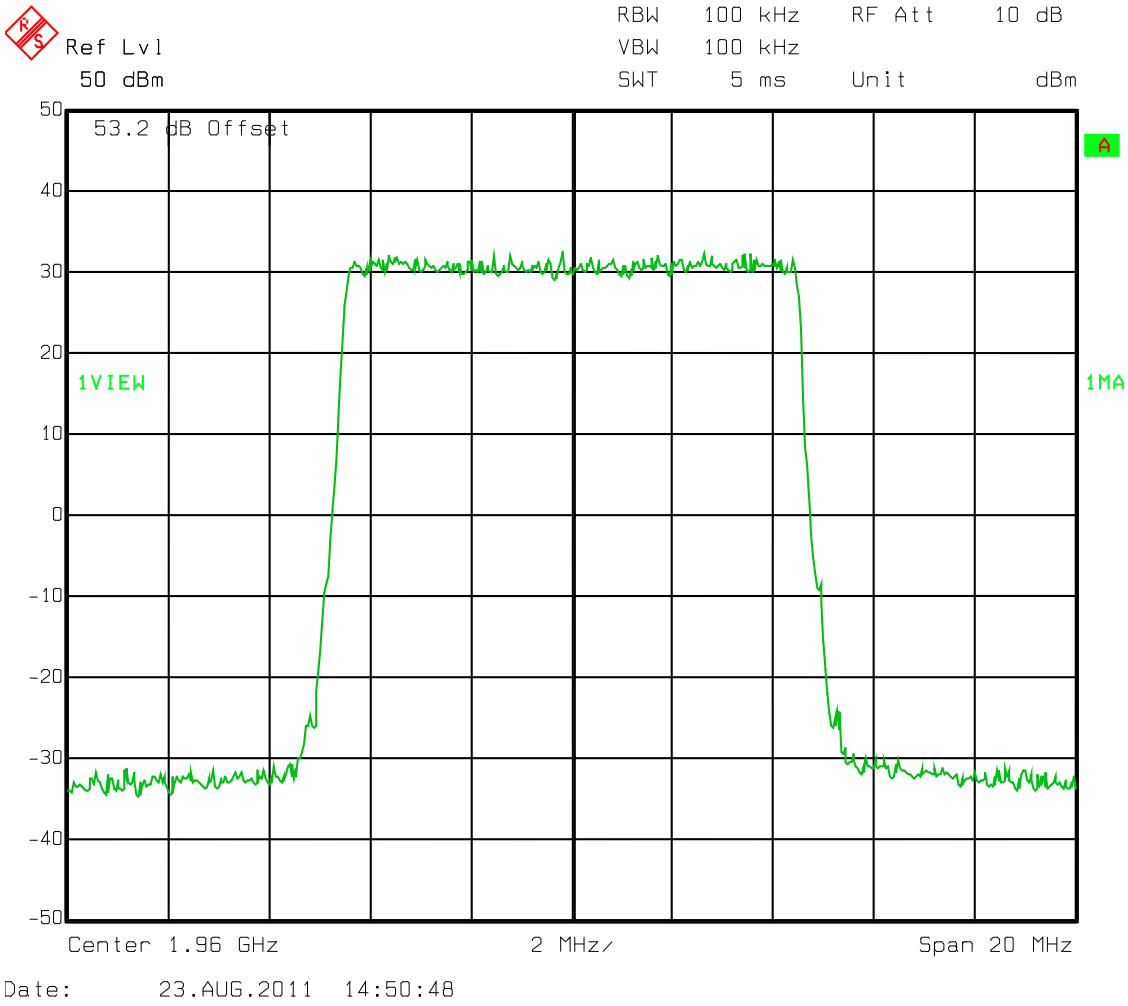


Test Data – Occupied Bandwidth

10 MHz Channel
Center Channel
16 QAM
20 dB BW

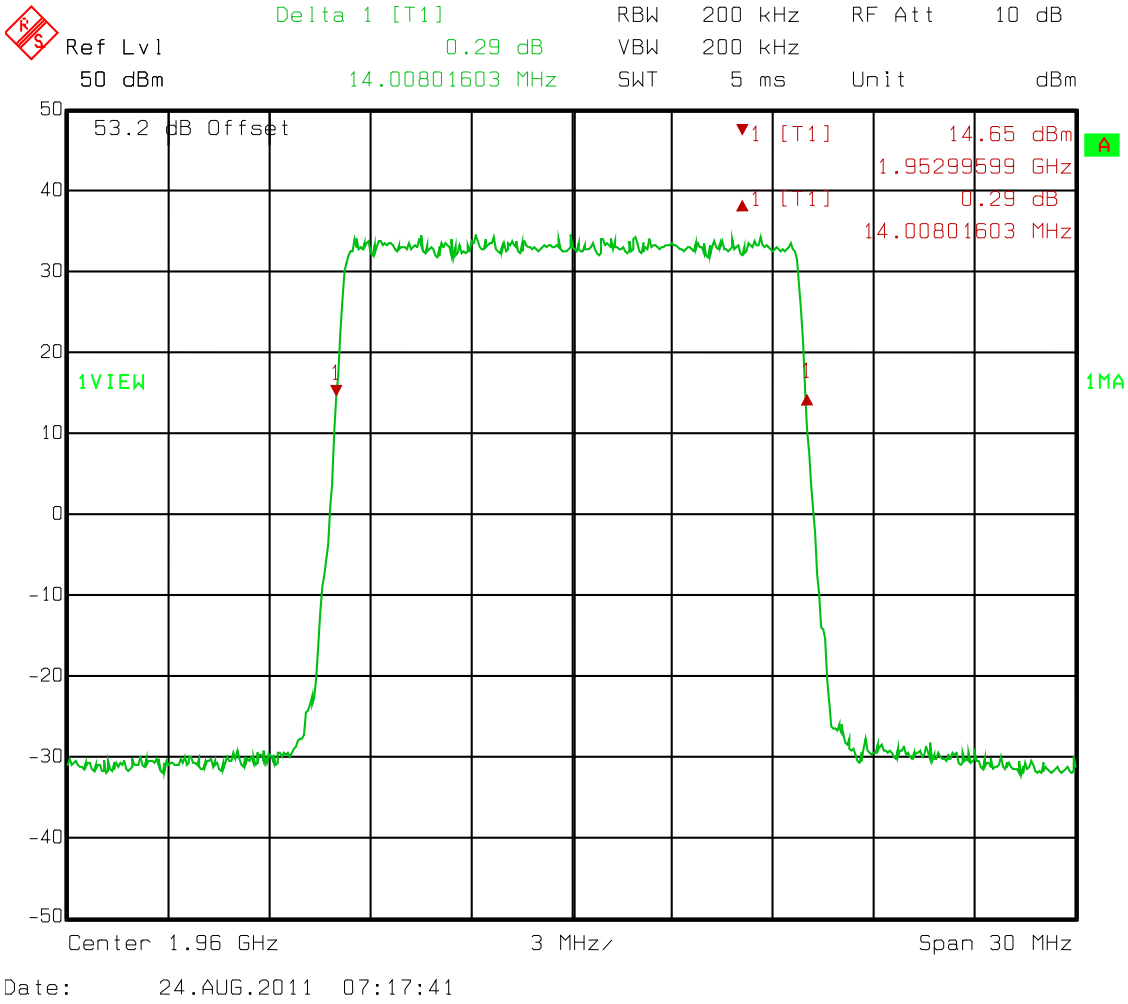


Test Data – Occupied Bandwidth
10 MHz Channel
64 QAM
Center Channel
20 dB BW



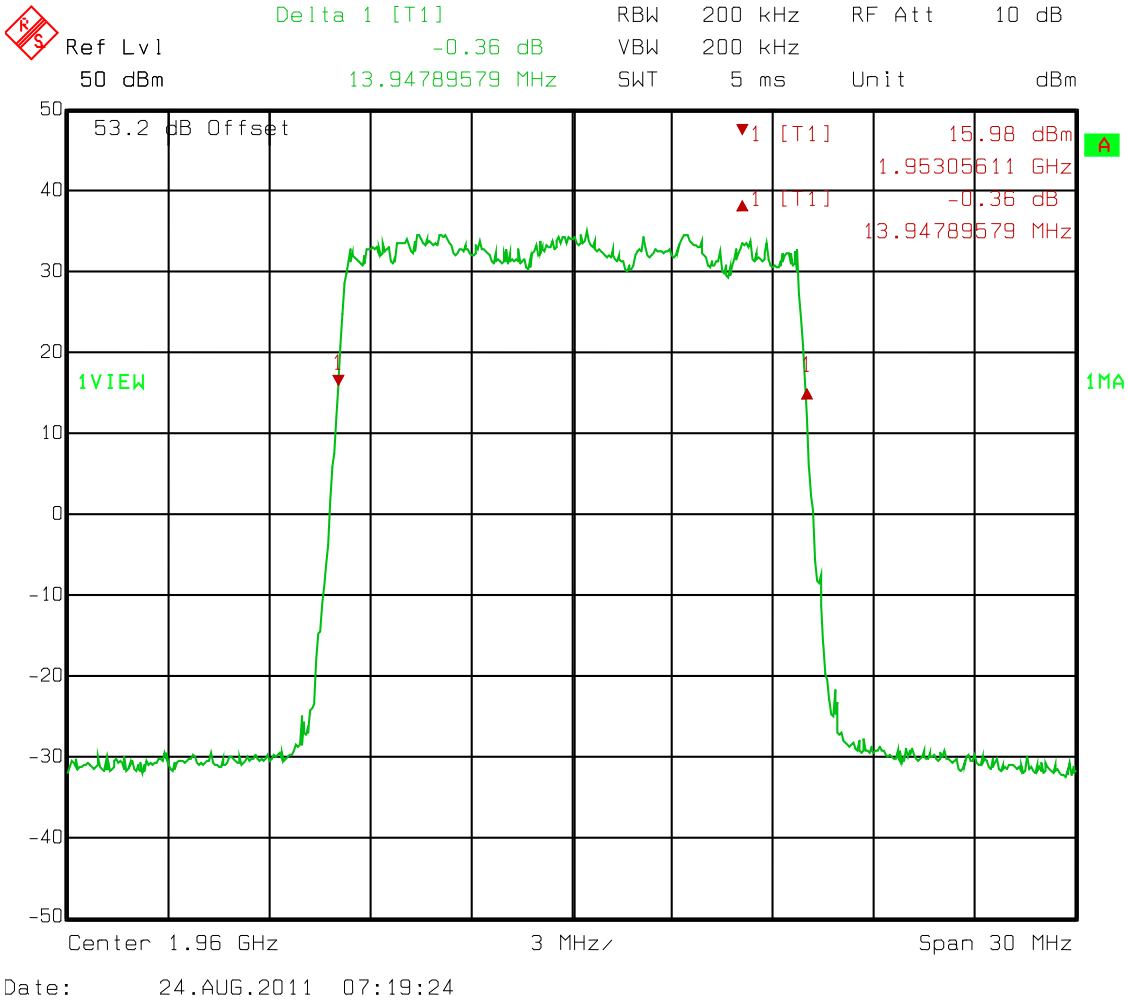
Test Data – Occupied Bandwidth

15 MHz Channel
QPSK
Center Channel
20 dB BW



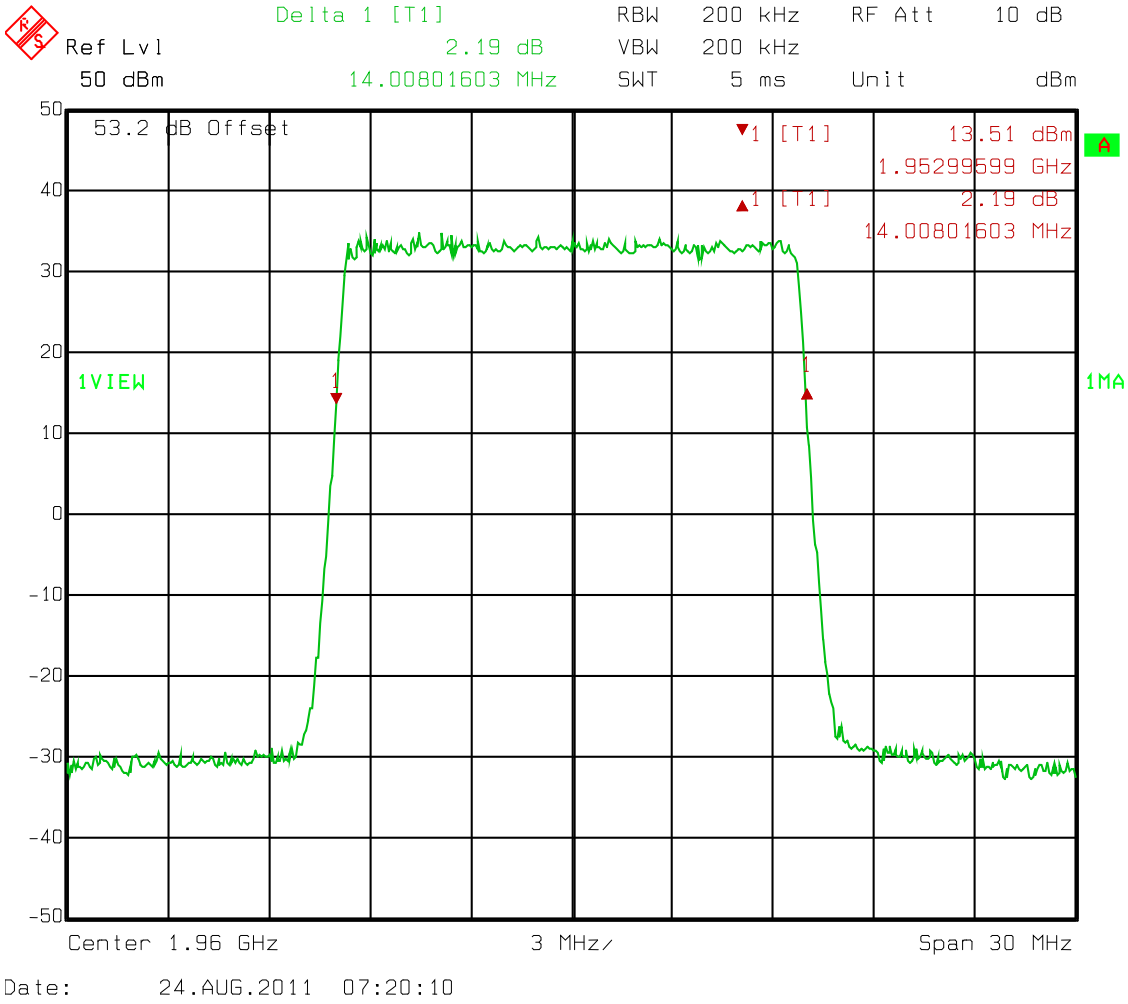
Test Data – Occupied Bandwidth

15 MHz Channel
Center Channel
16 QAM
20 dB BW



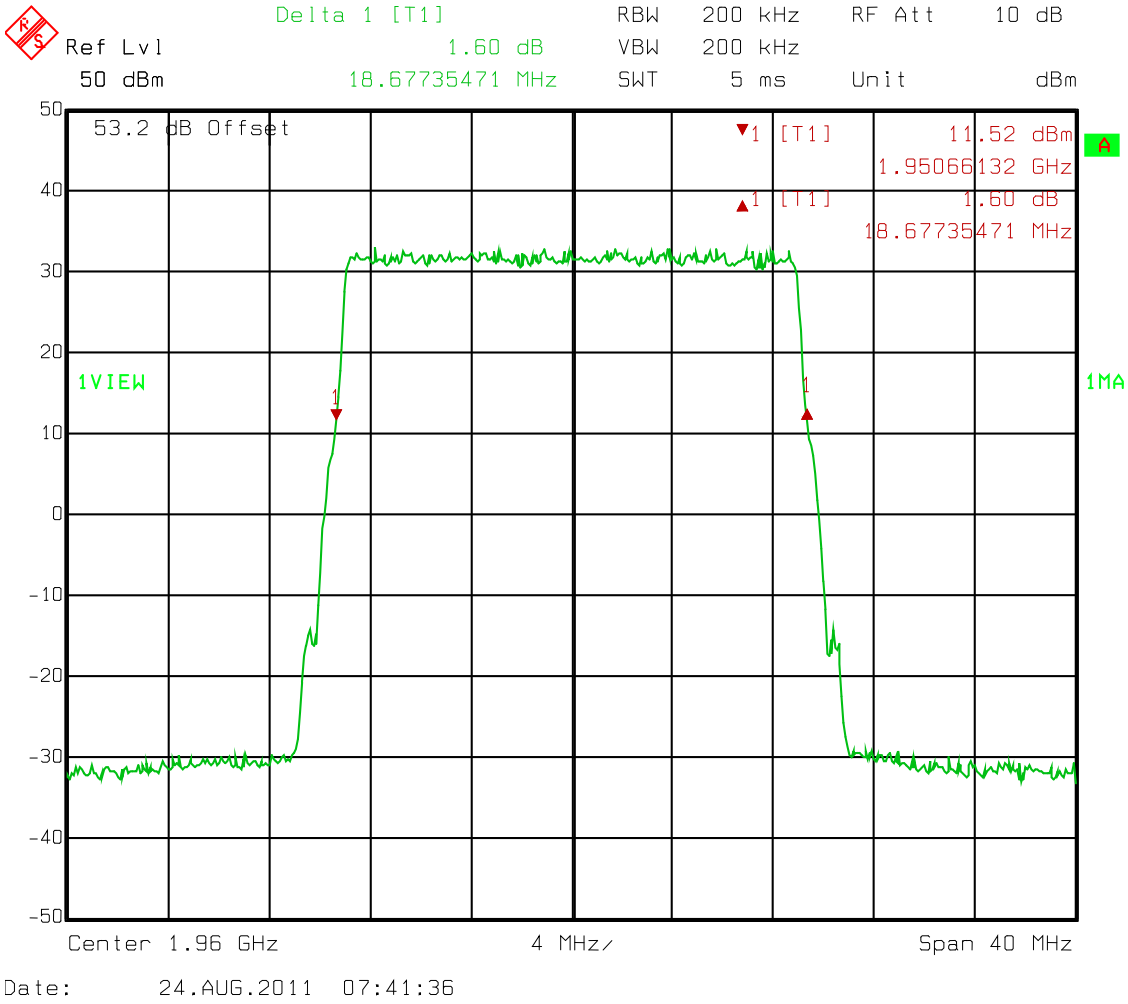
Test Data – Occupied Bandwidth

15 MHz Channel
64 QAM
Center Channel
20 dB BW



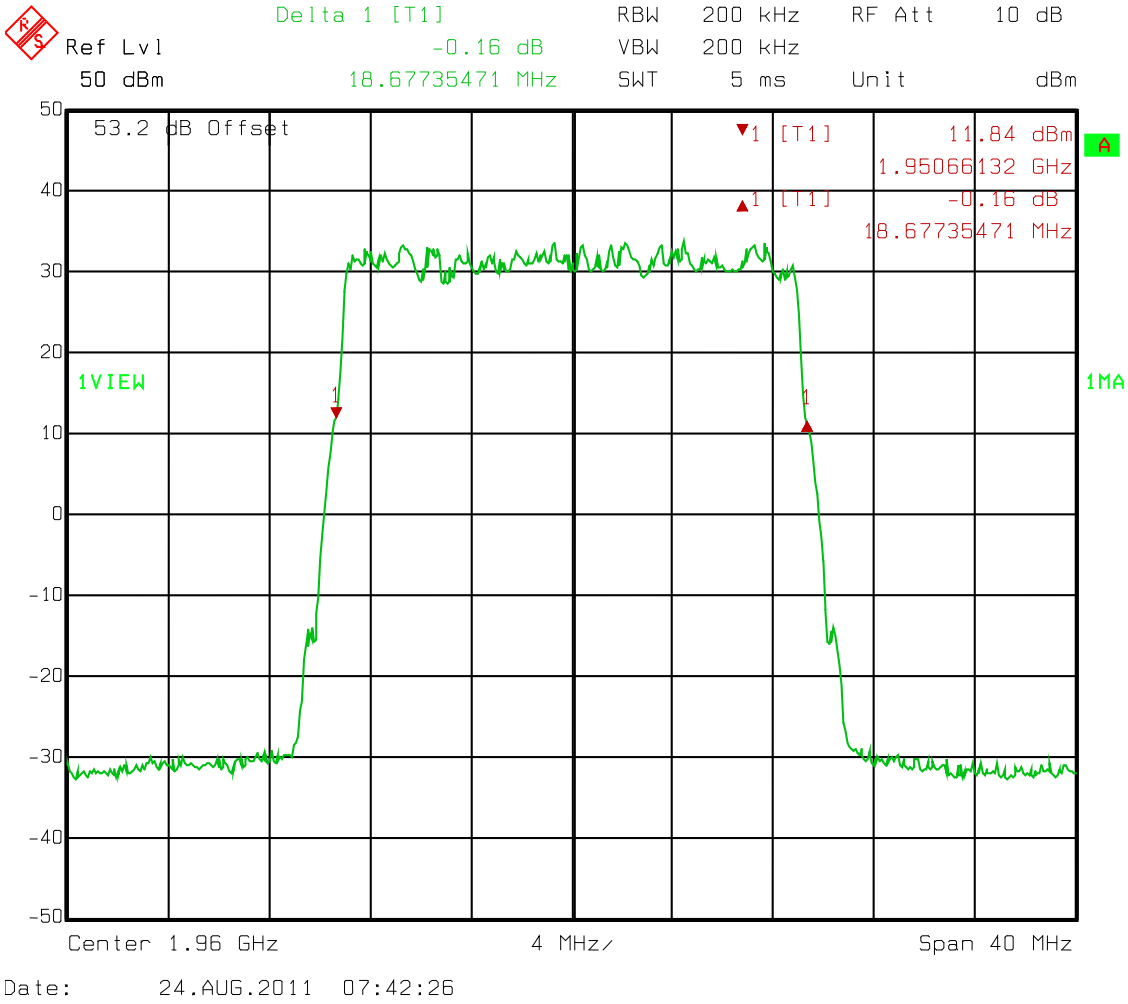
Test Data – Occupied Bandwidth

20 MHz Channel
QPSK
Center Channel
20 dB BW



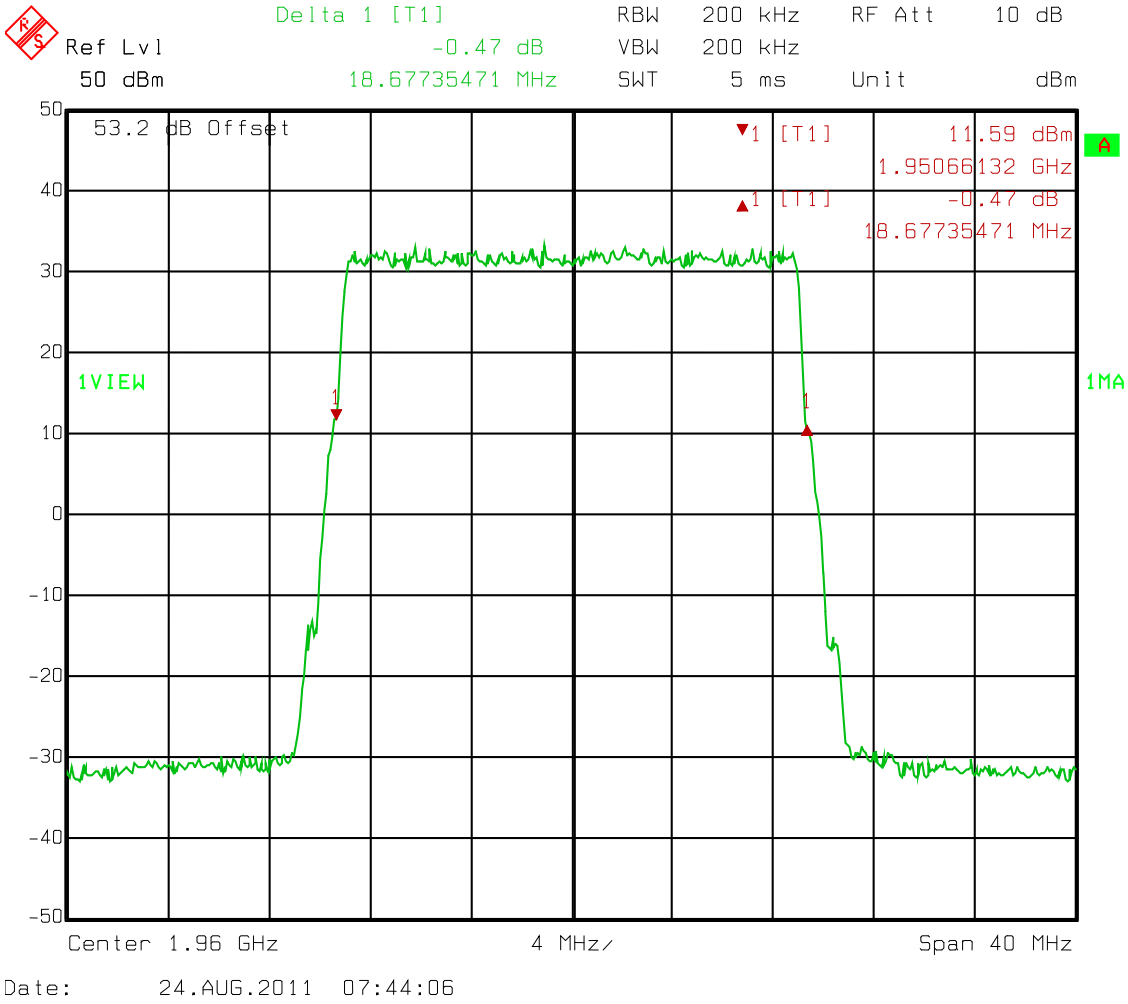
Test Data – Occupied Bandwidth

20 MHz Channel
Center Channel
16 QAM
20 dB BW



Test Data – Occupied Bandwidth

20 MHz Channel
64 QAM
Center Channel
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

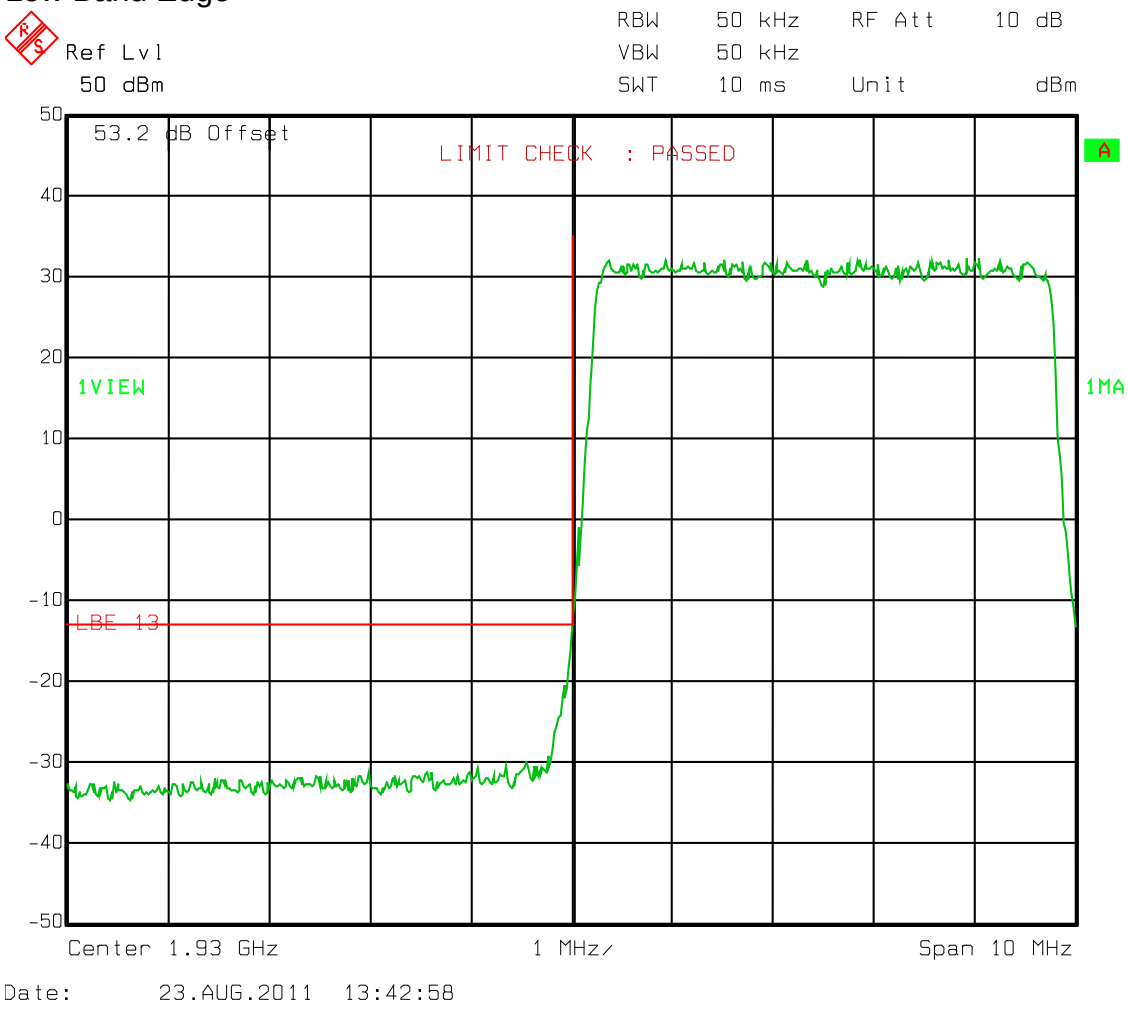
Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 35 %

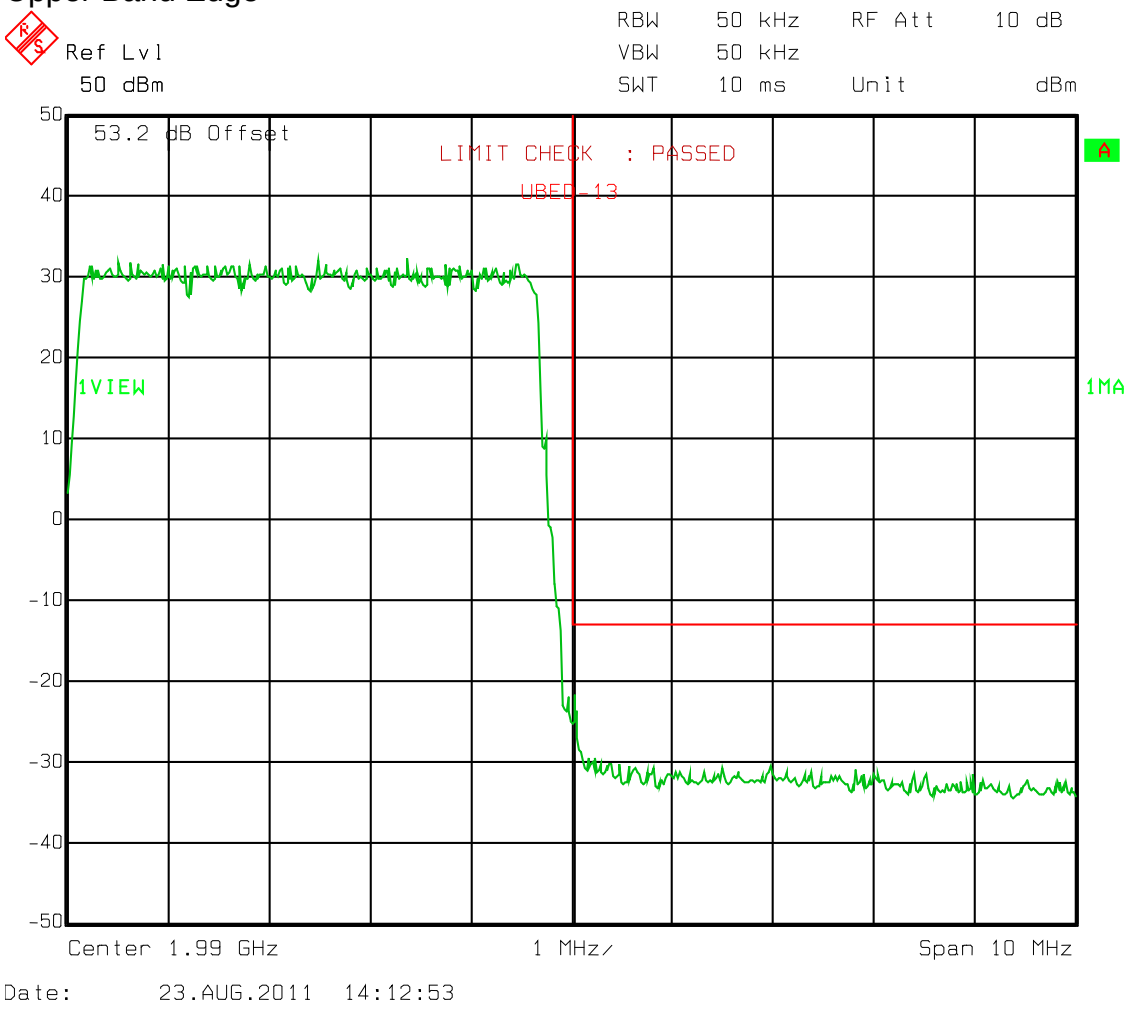
Test Data – Spurious Emissions

5 MHz Channel
QPSK
Low Band Edge



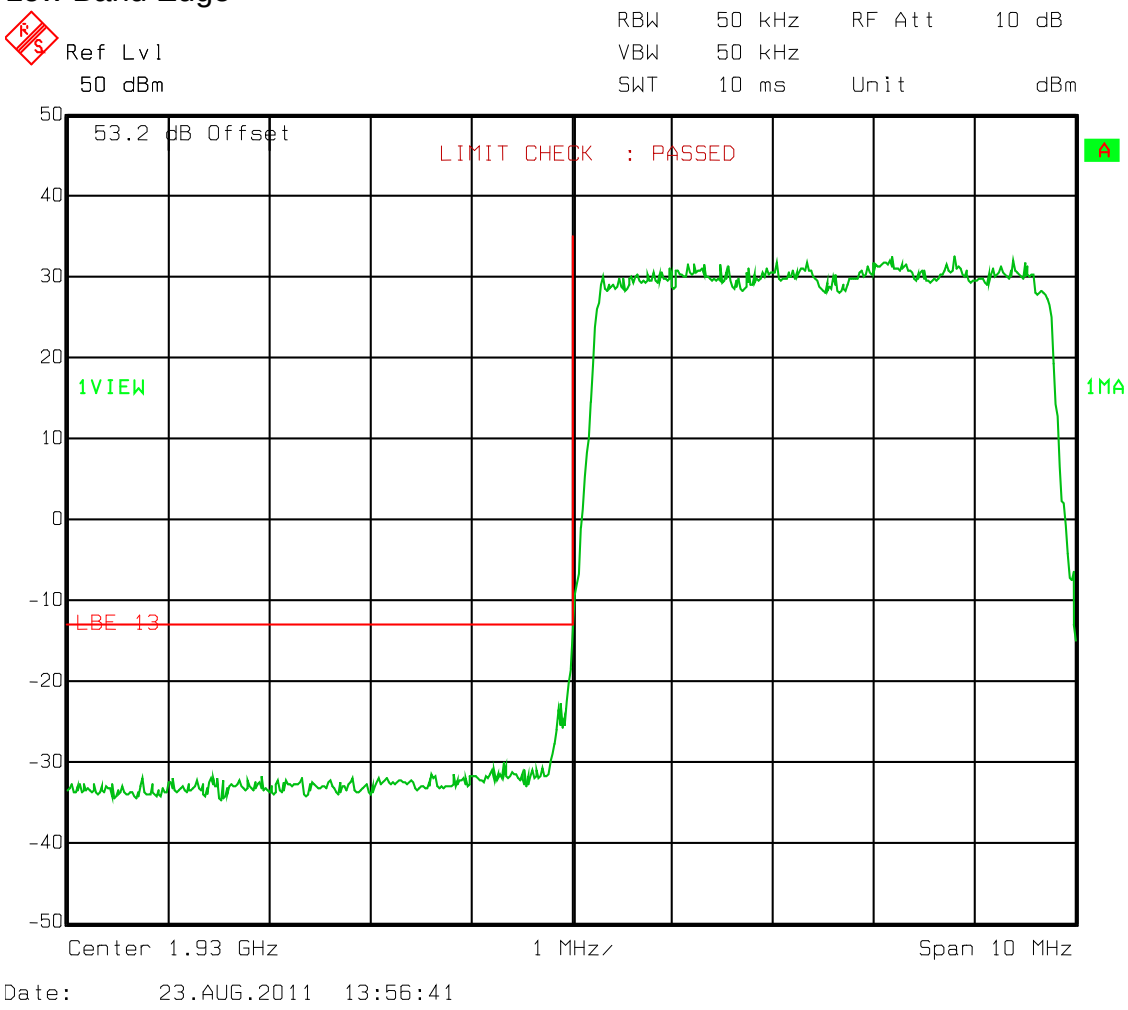
Test Data – Spurious Emissions

5 MHz Channel
QPSK
Upper Band Edge



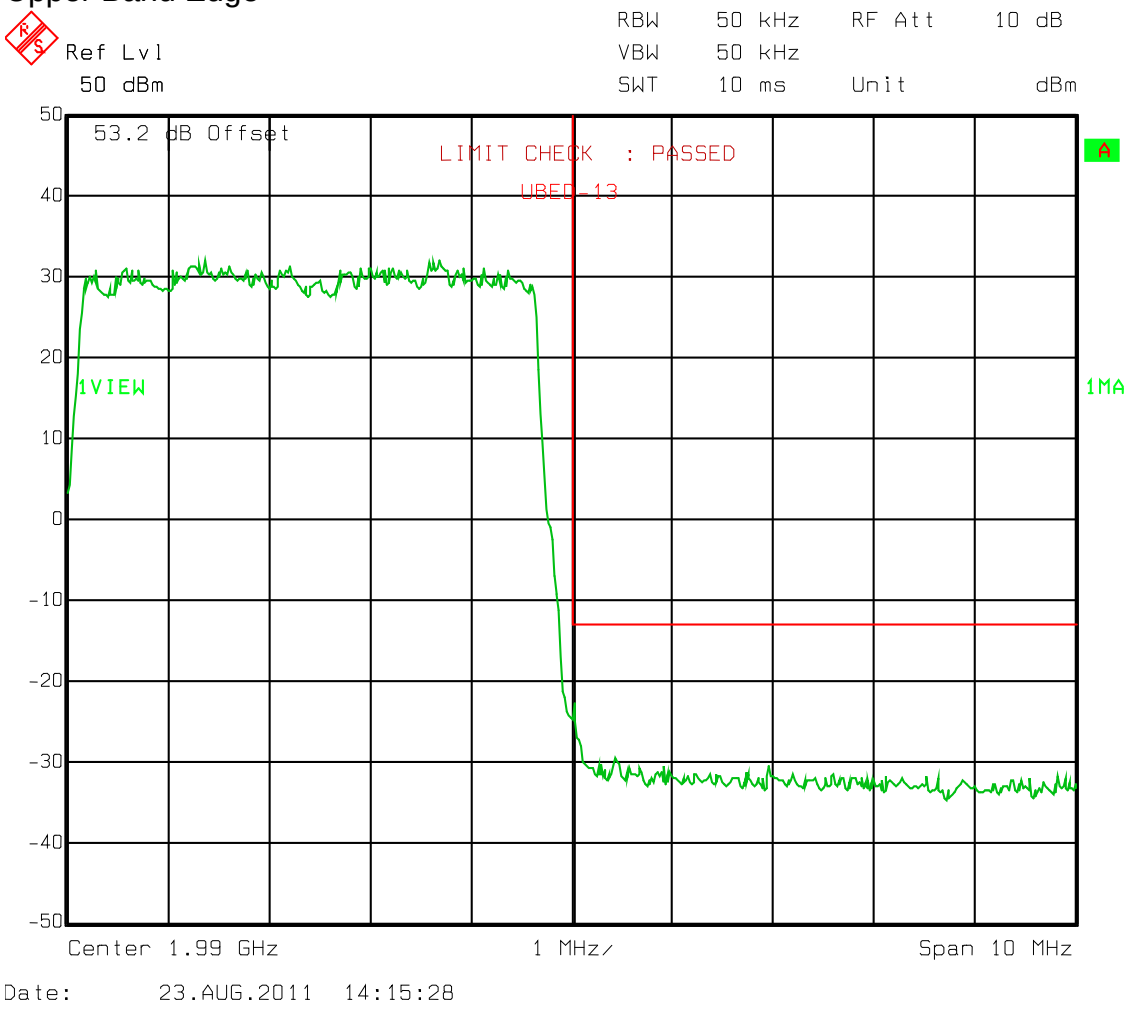
Test Data – Spurious Emissions

5 MHz Channel
16 QAM
Low Band Edge



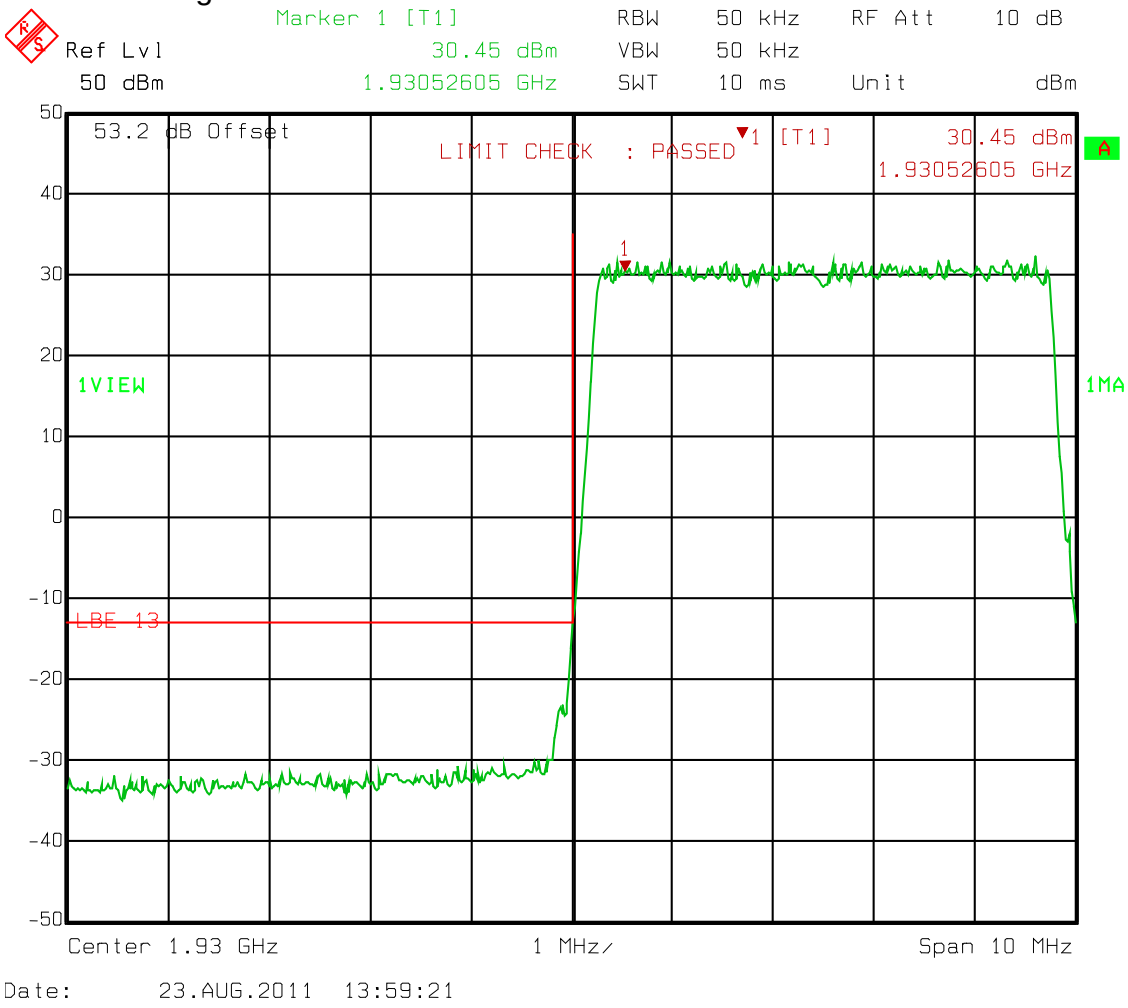
Test Data – Spurious Emissions

5 MHz Channel
16 QAM
Upper Band Edge



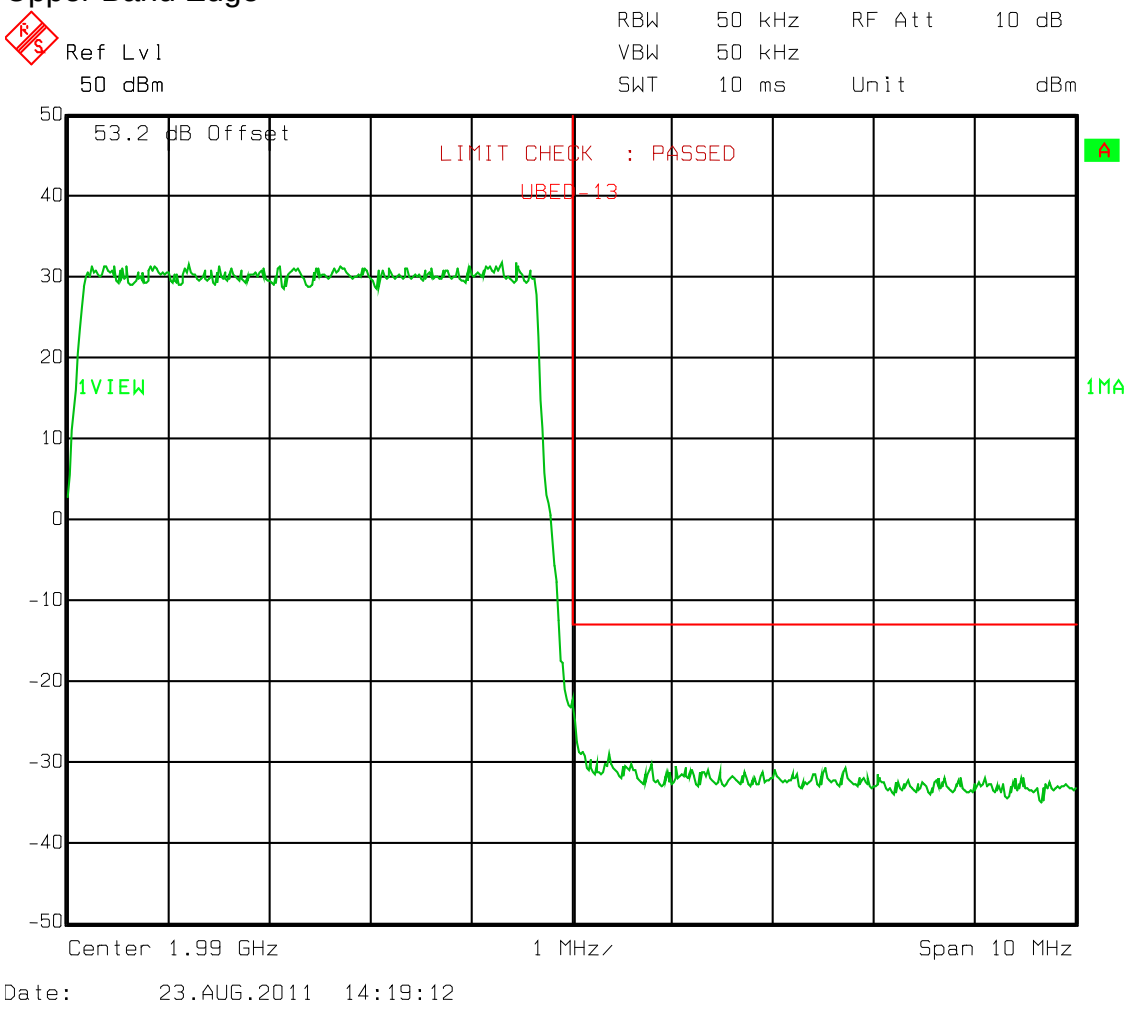
Test Data – Spurious Emissions

5 MHz Channel
64 QAM
Low Band Edge



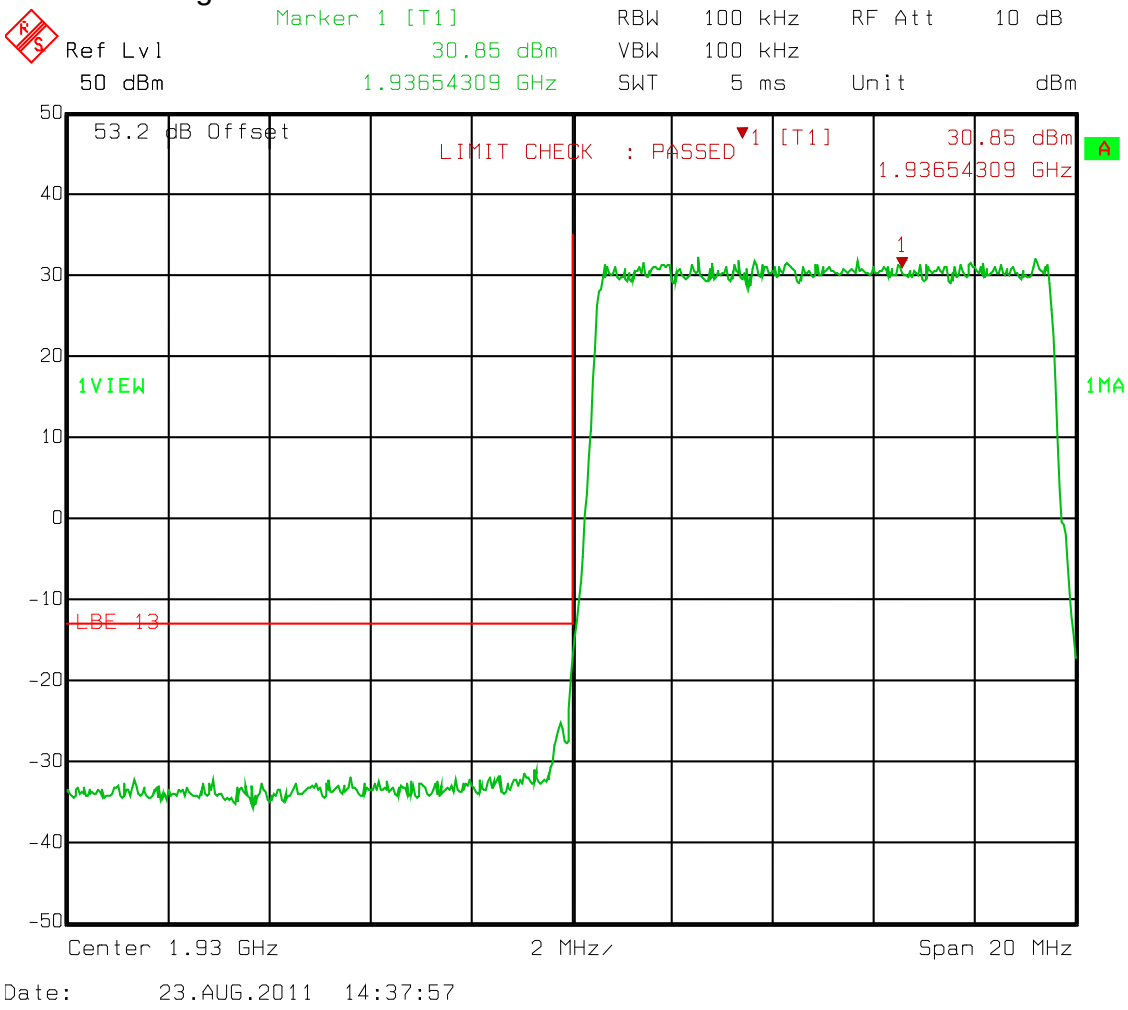
Test Data – Spurious Emissions

5 MHz Channel
64 QAM
Upper Band Edge



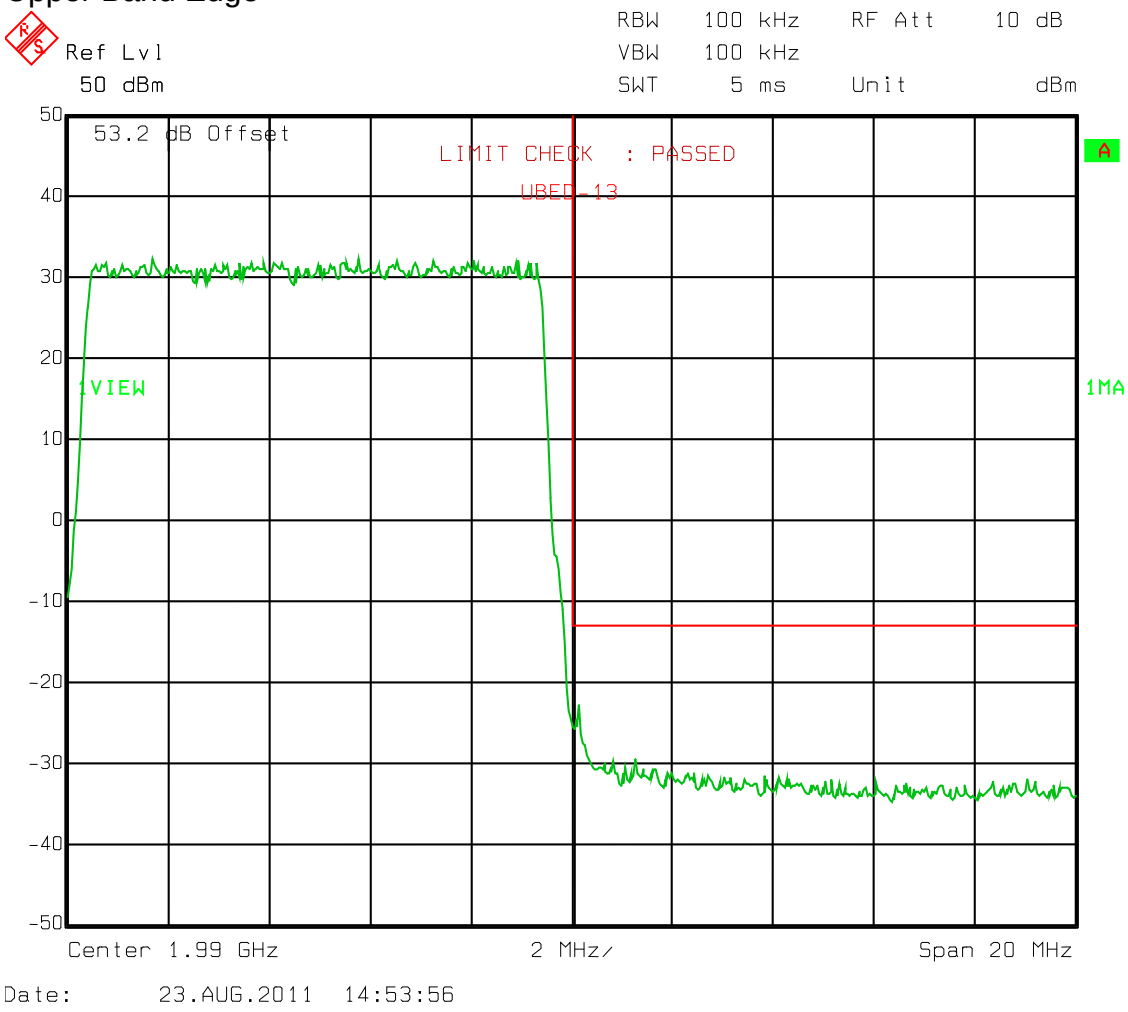
Test Data – Spurious Emissions

10 MHz Channel
QPSK
Low Band Edge



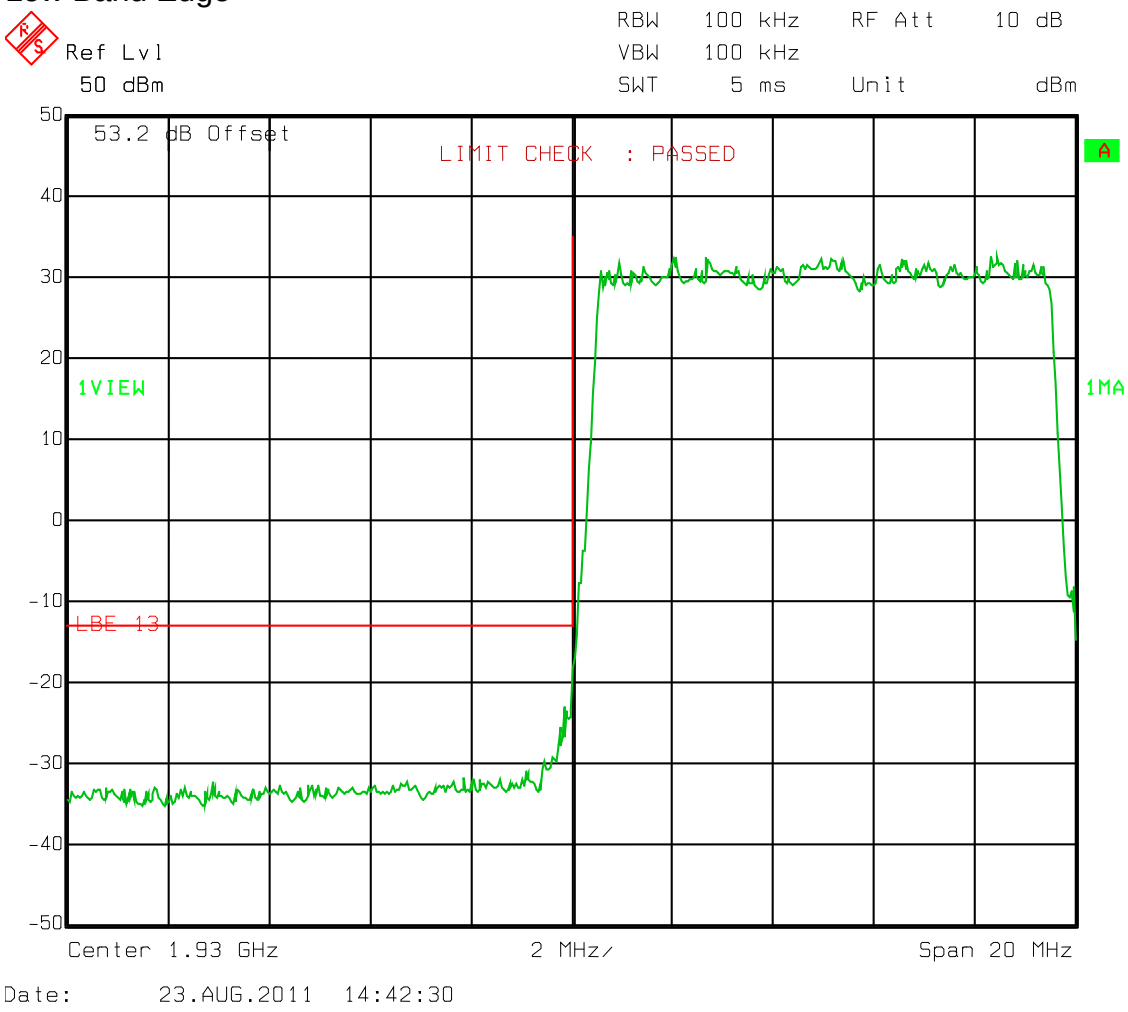
Test Data – Spurious Emissions

10 MHz Channel
QPSK
Upper Band Edge



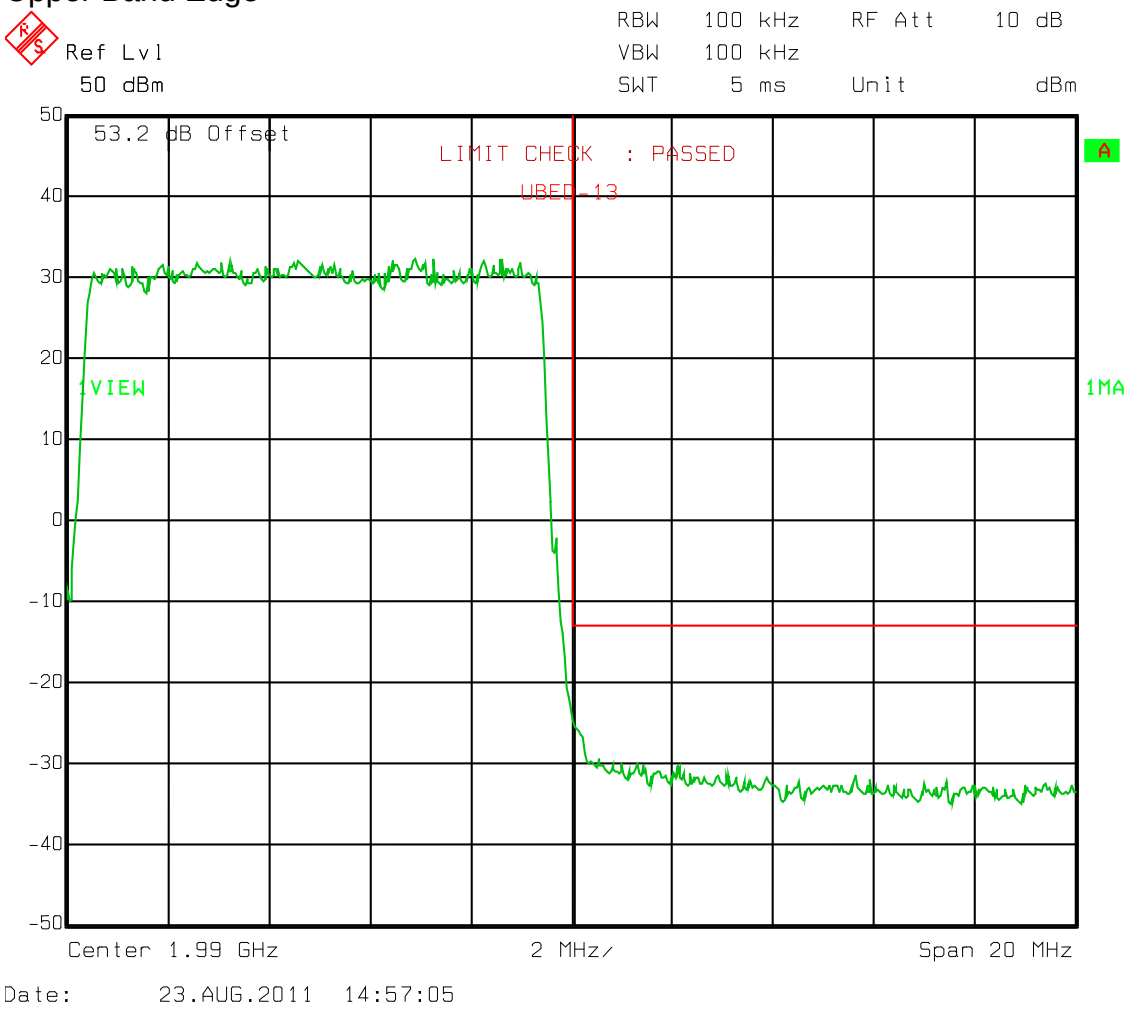
Test Data – Spurious Emissions

10 MHz Channel
16 QAM
Low Band Edge



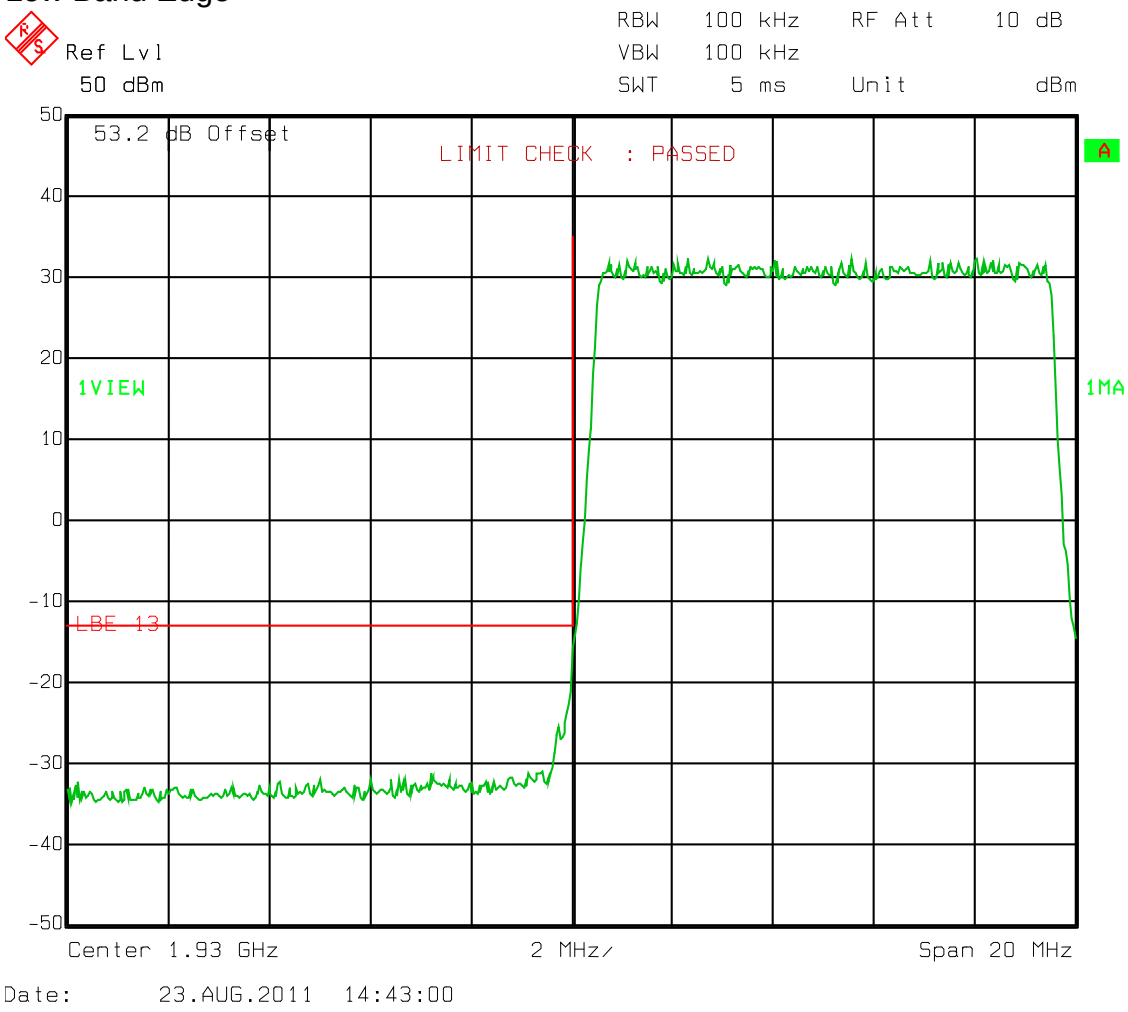
Test Data – Spurious Emissions

10 MHz Channel
16 QAM
Upper Band Edge



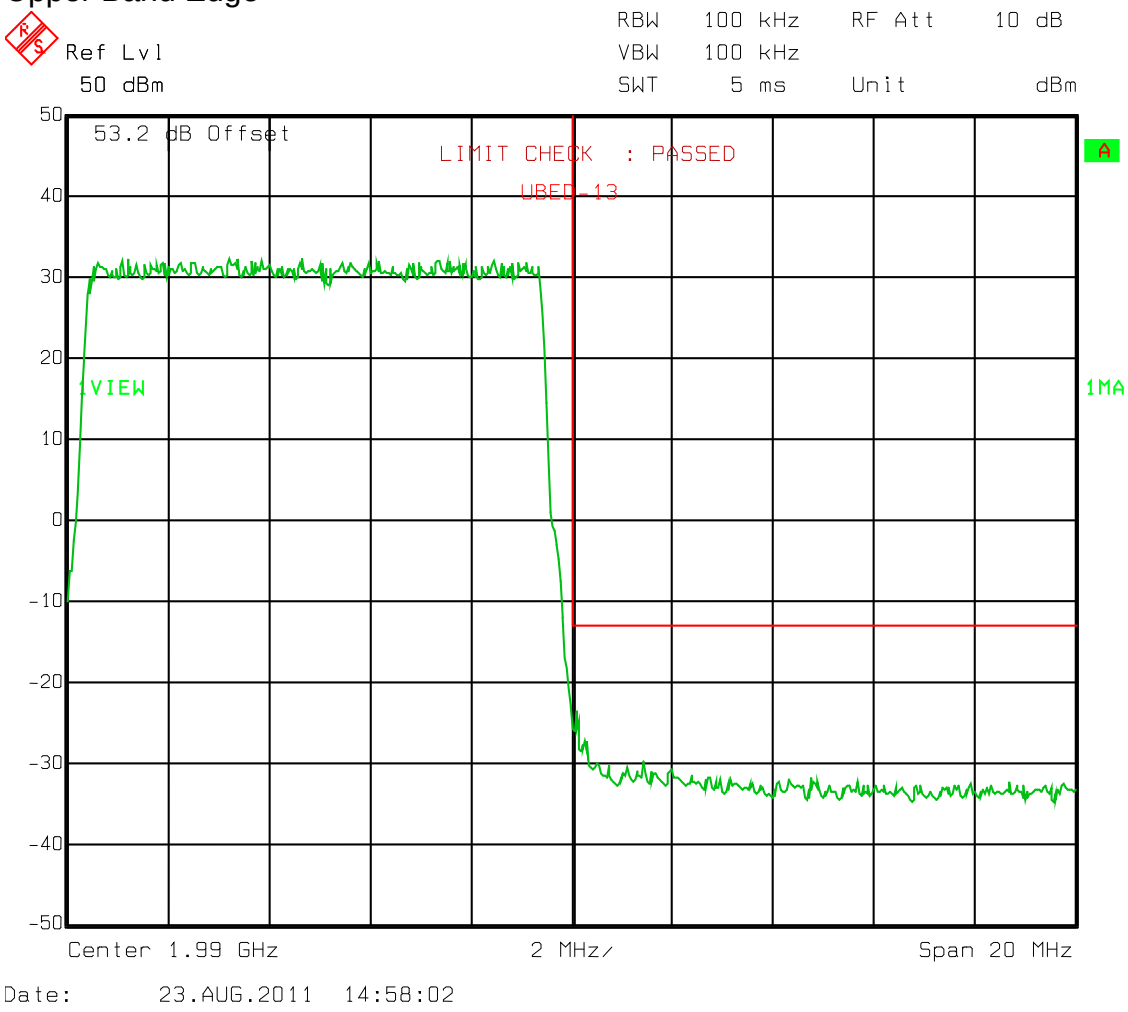
Test Data – Spurious Emissions

10 MHz Channel
64 QAM
Low Band Edge



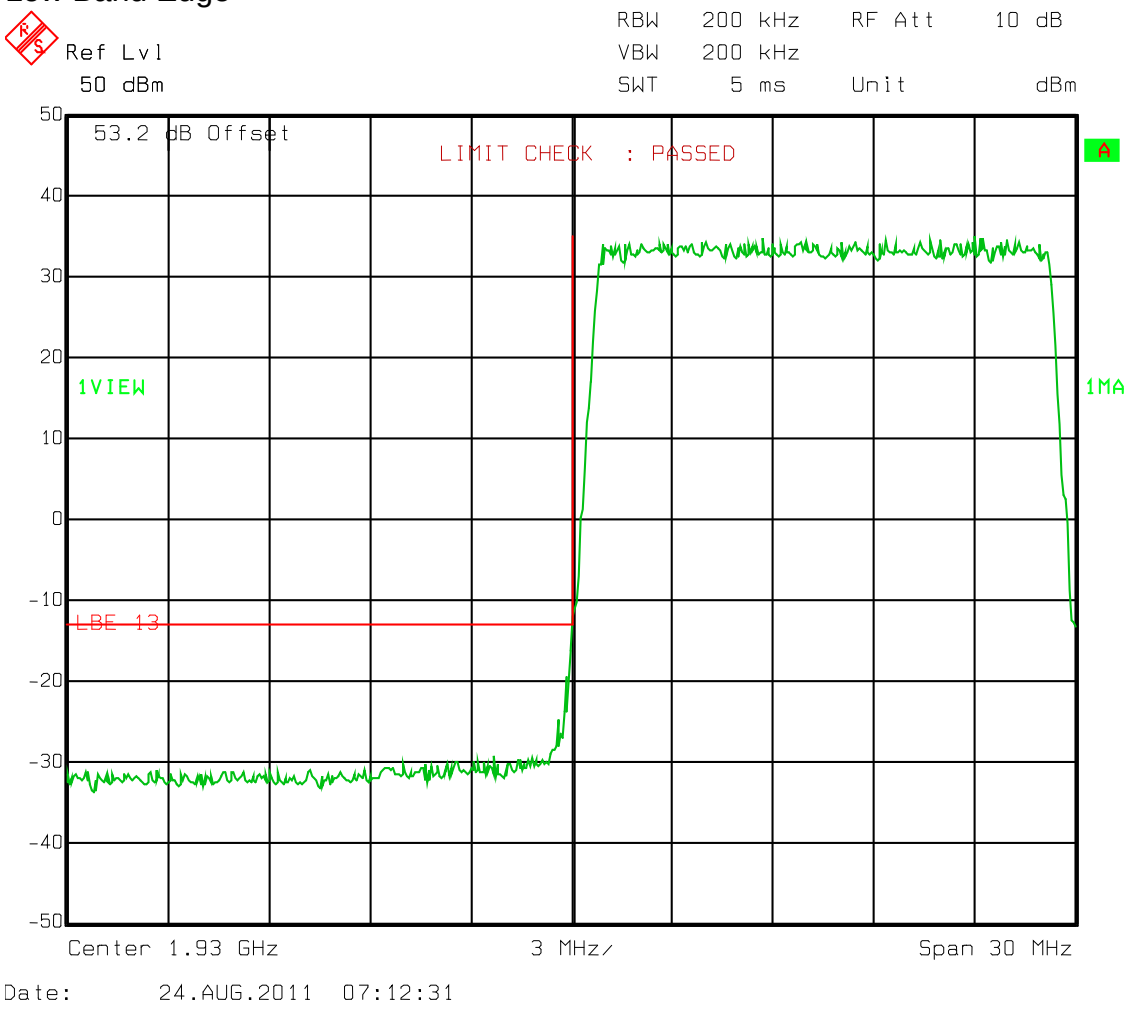
Test Data – Spurious Emissions

10 MHz Channel
64 QAM
Upper Band Edge



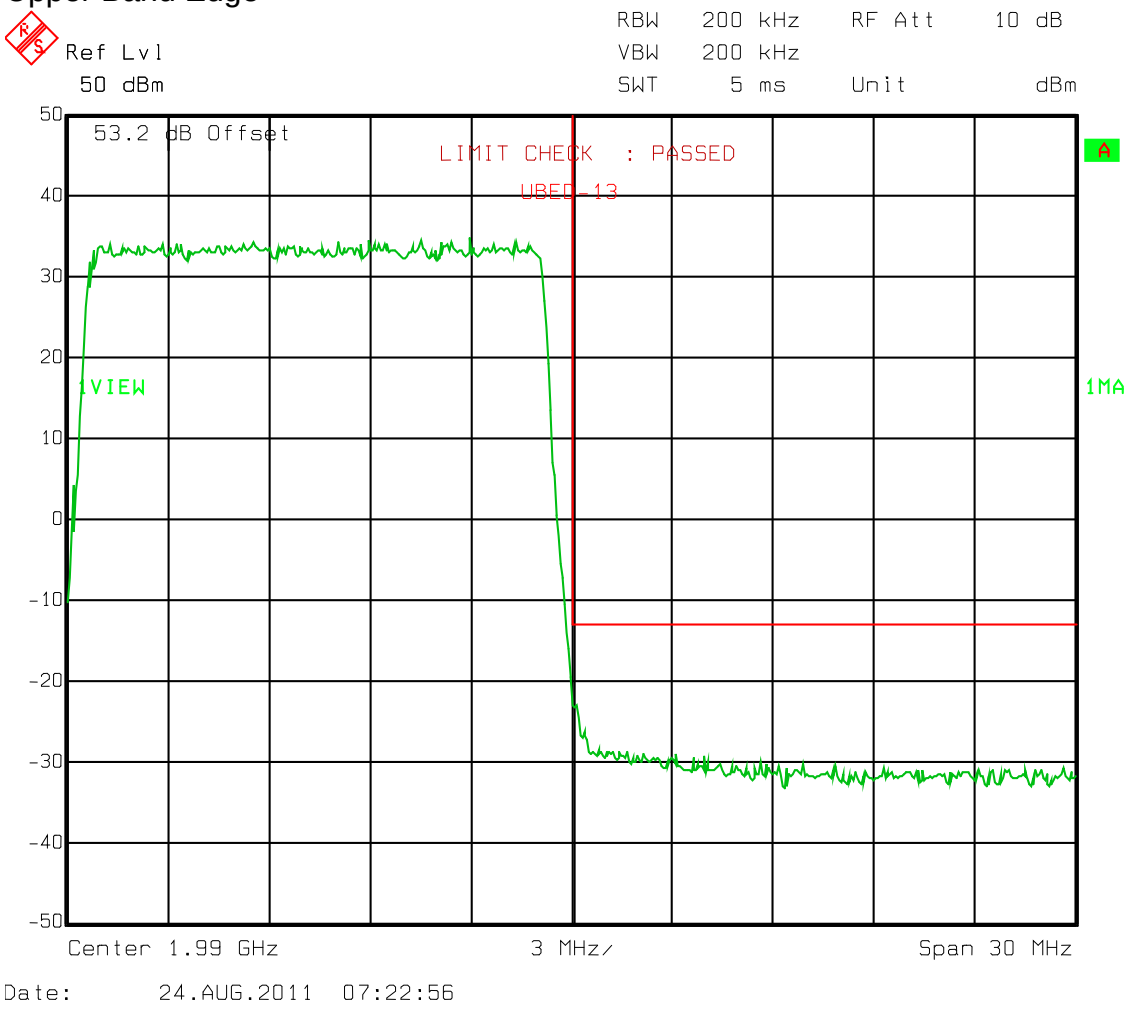
Test Data – Spurious Emissions

15 MHz Channel
QPSK
Low Band Edge



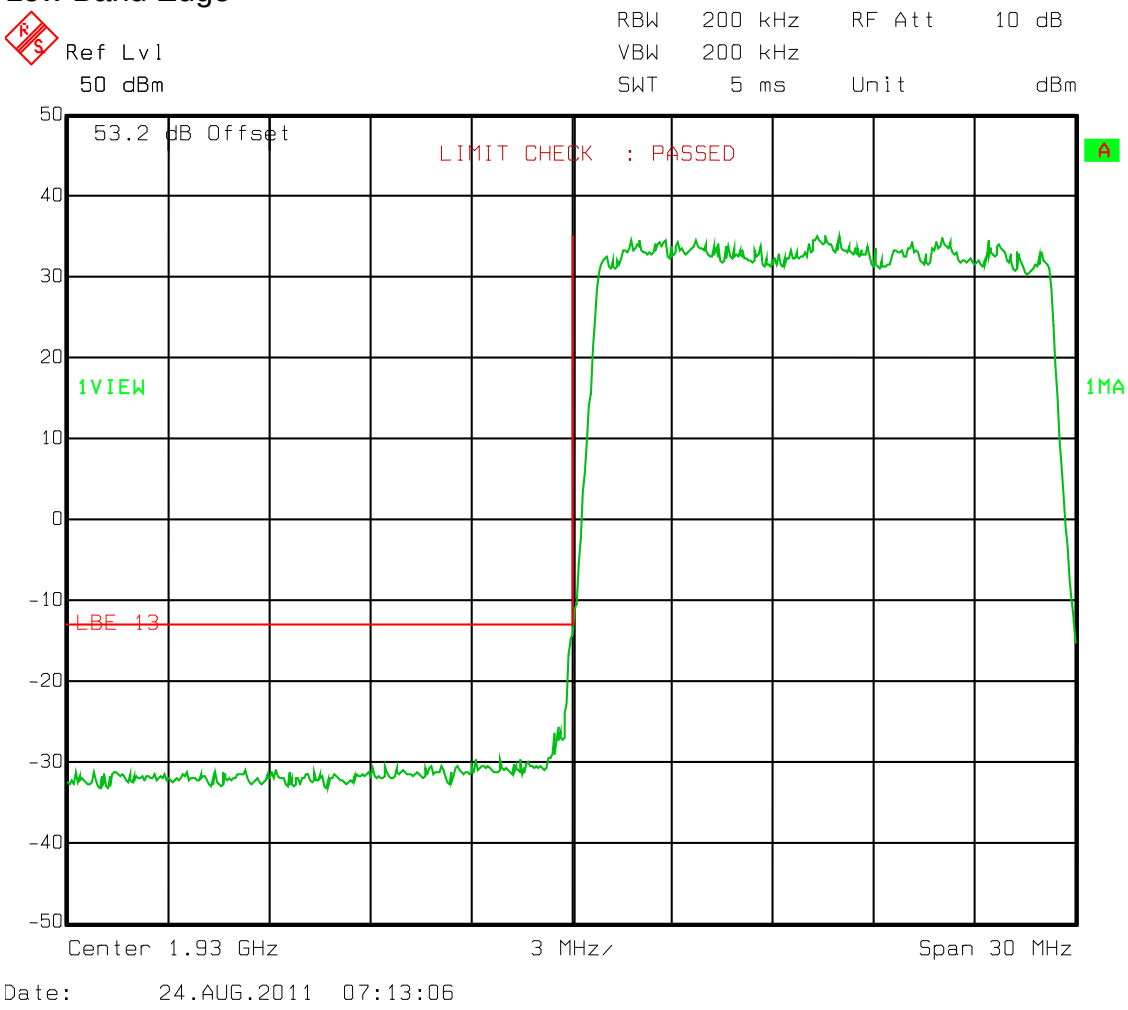
Test Data – Spurious Emissions

15 MHz Channel
QPSK
Upper Band Edge



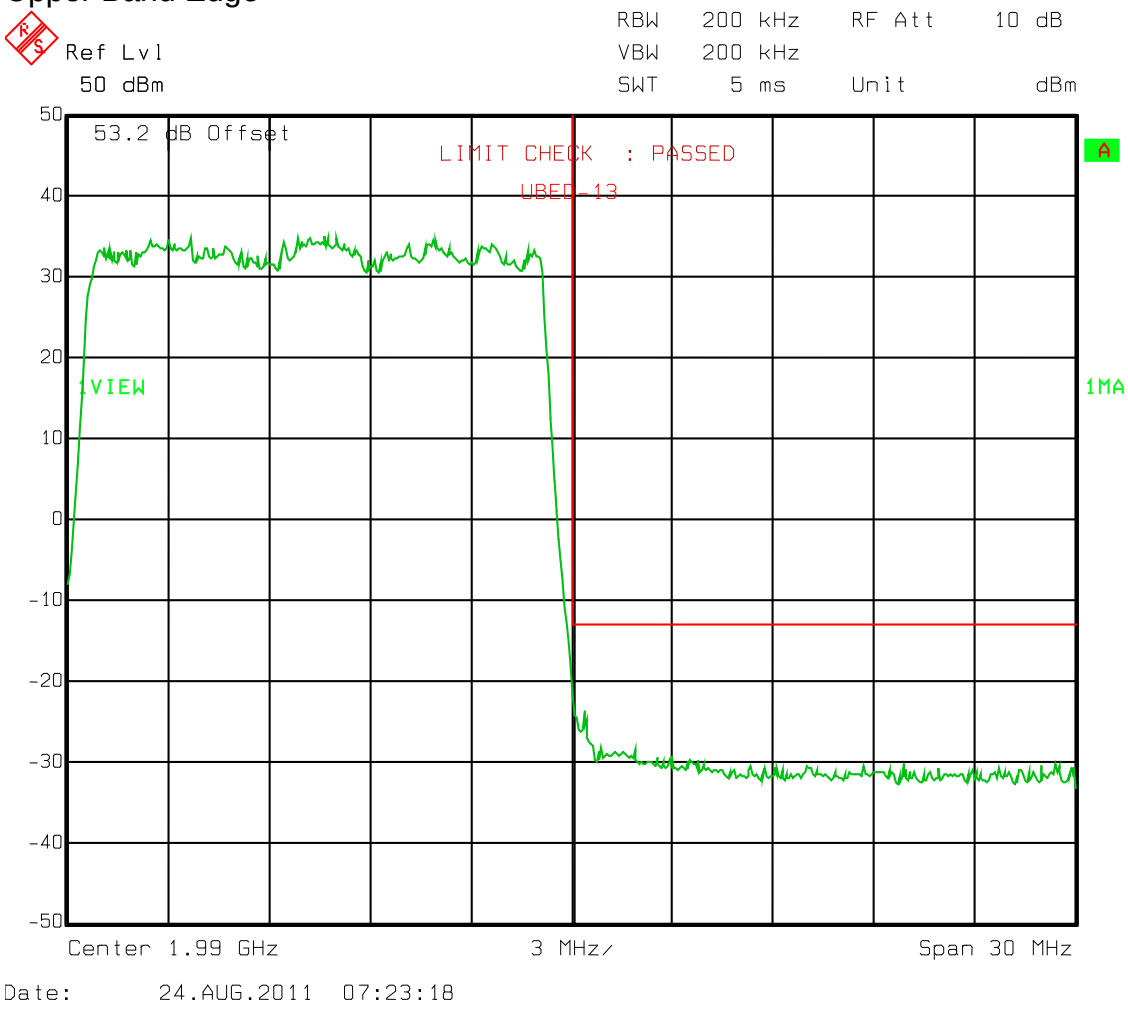
Test Data – Spurious Emissions

15 MHz Channel
16 QAM
Low Band Edge



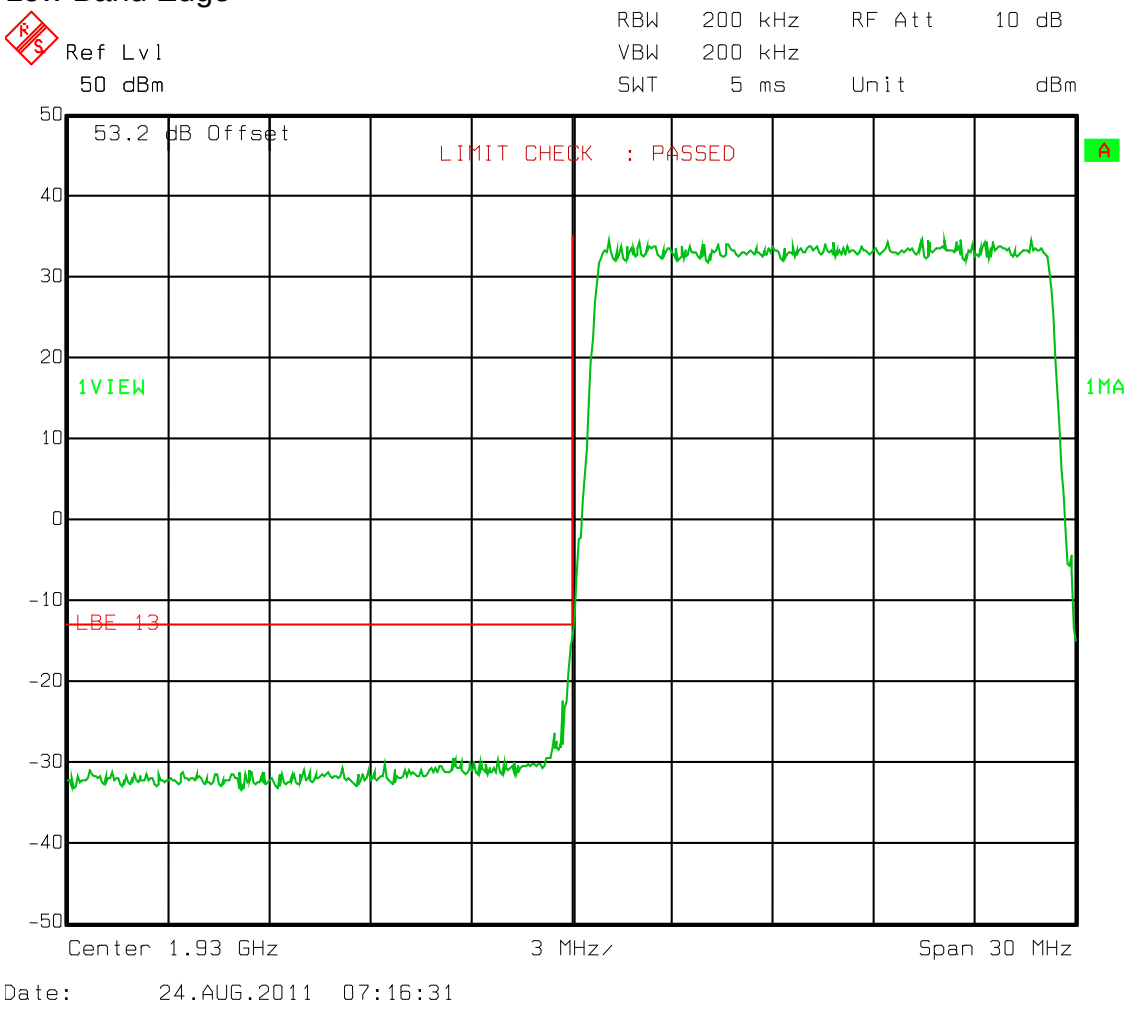
Test Data – Spurious Emissions

15 MHz Channel
16 QAM
Upper Band Edge



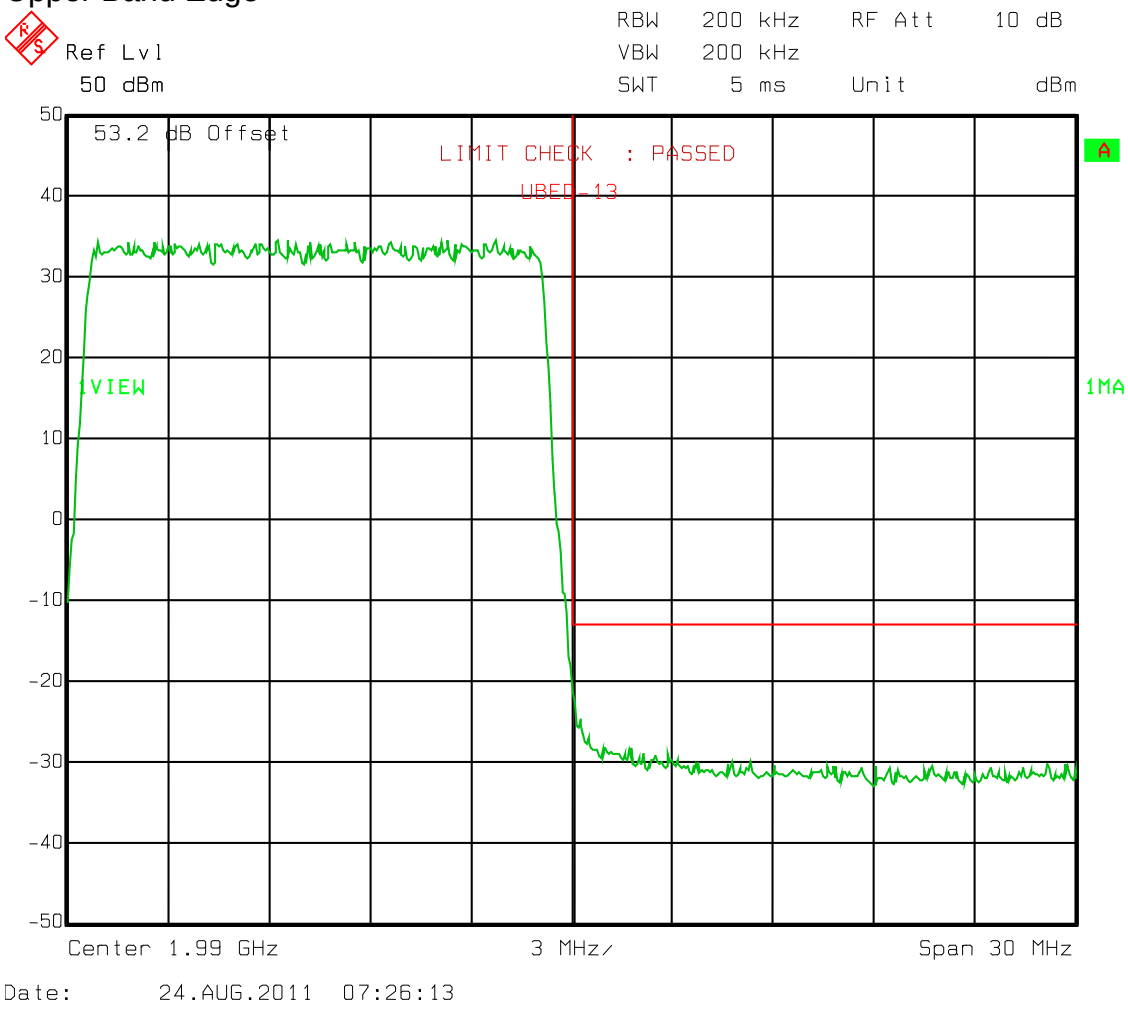
Test Data – Spurious Emissions

15 MHz Channel
64 QAM
Low Band Edge



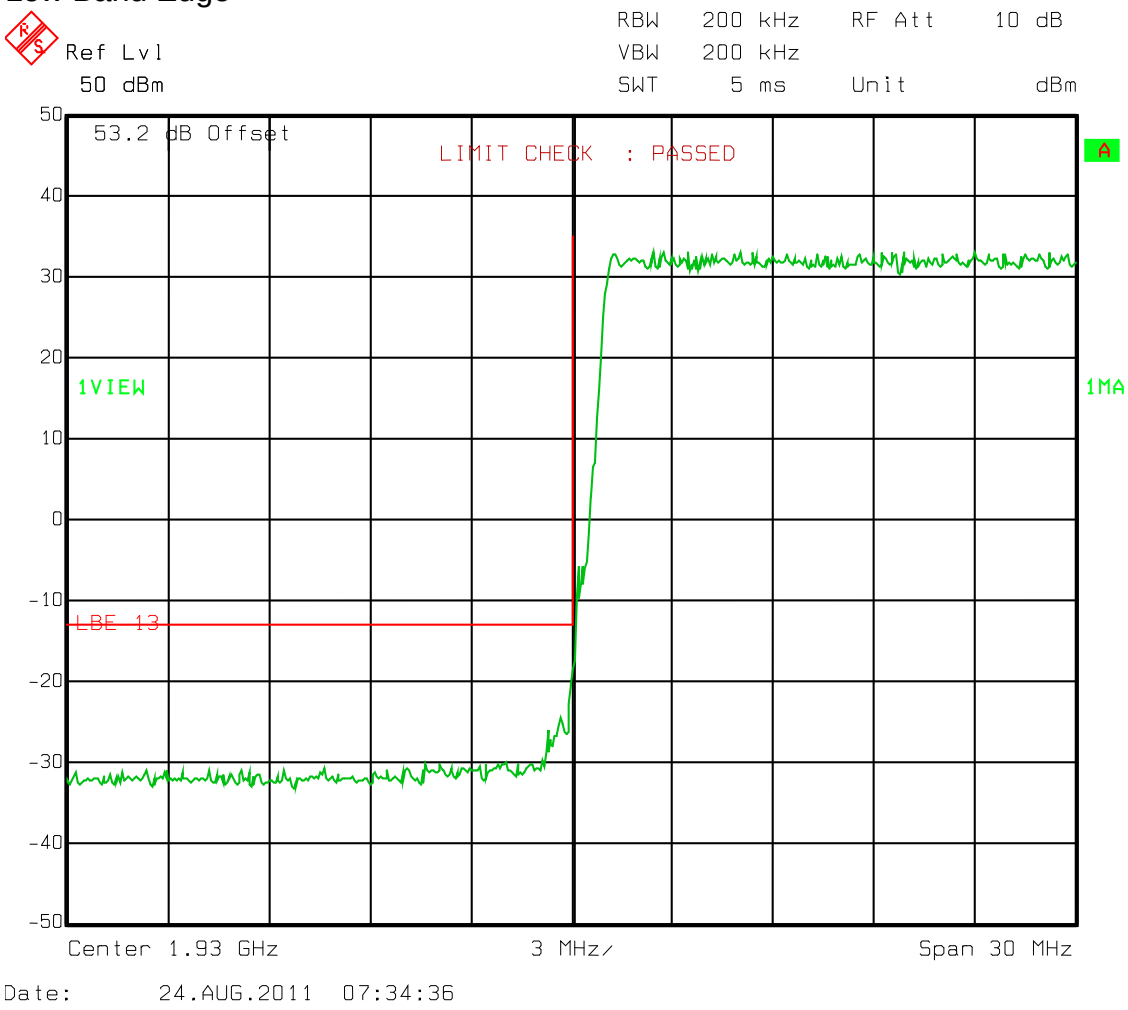
Test Data – Spurious Emissions

15 MHz Channel
64 QAM
Upper Band Edge



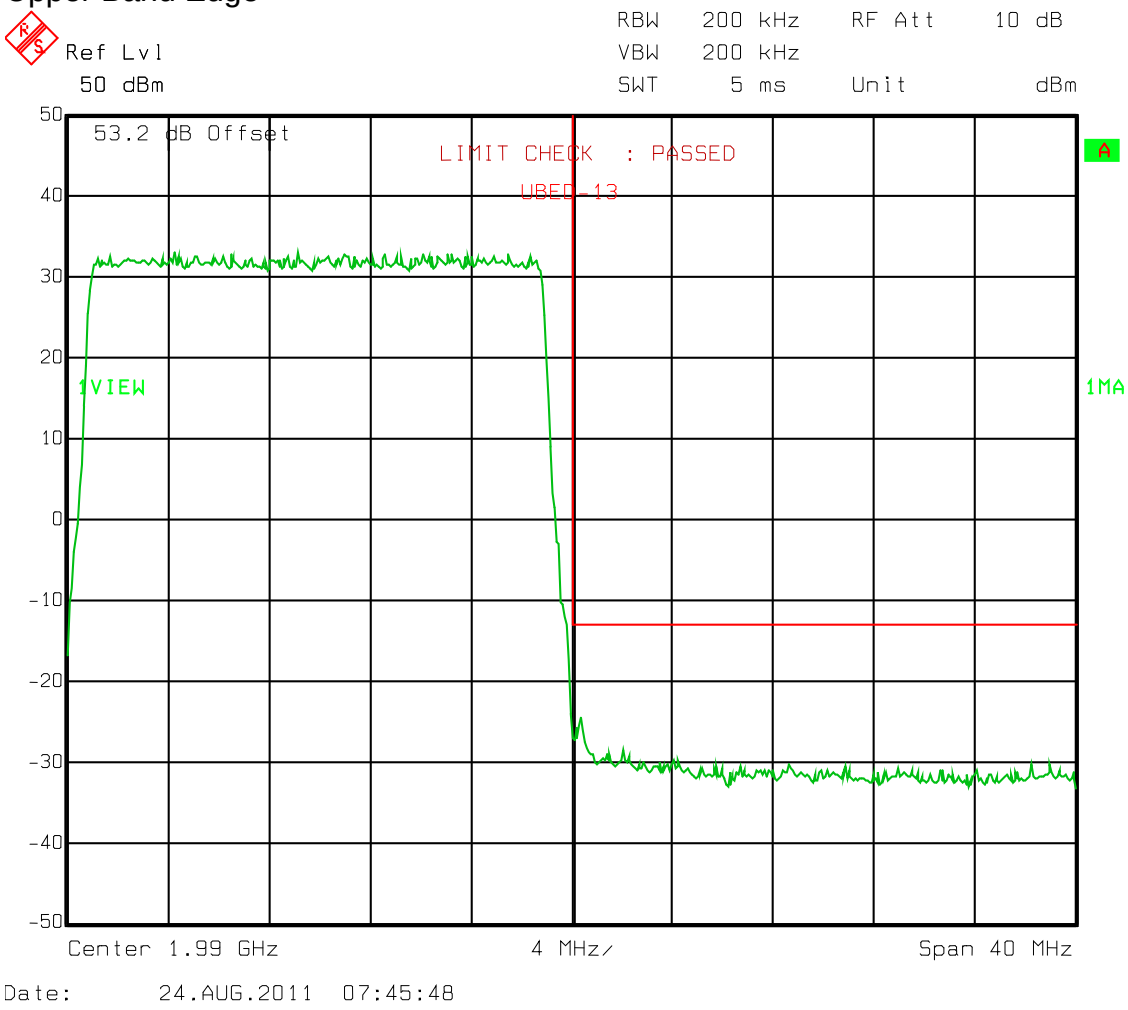
Test Data – Spurious Emissions

20 MHz Channel
QPSK
Low Band Edge



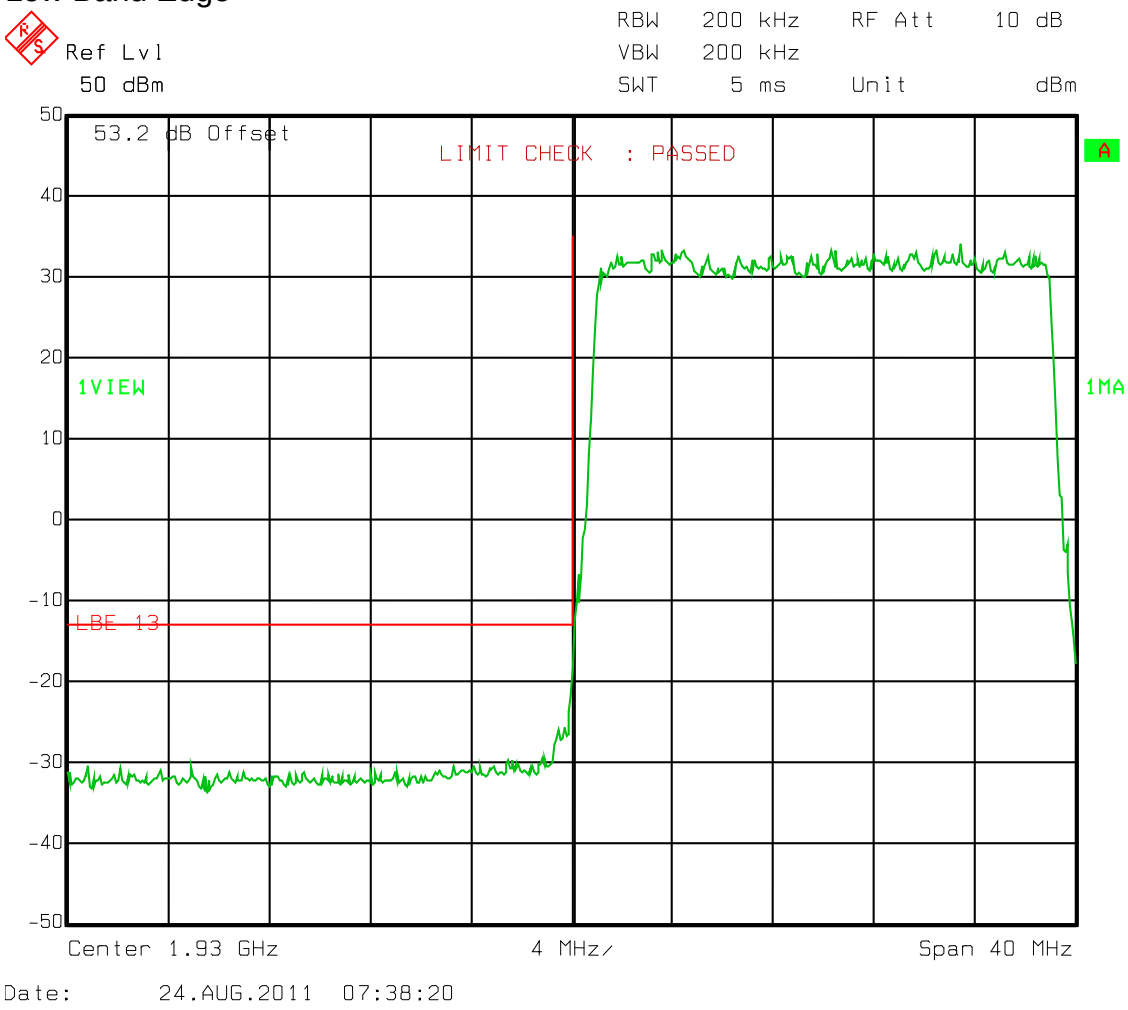
Test Data – Spurious Emissions

20 MHz Channel
QPSK
Upper Band Edge



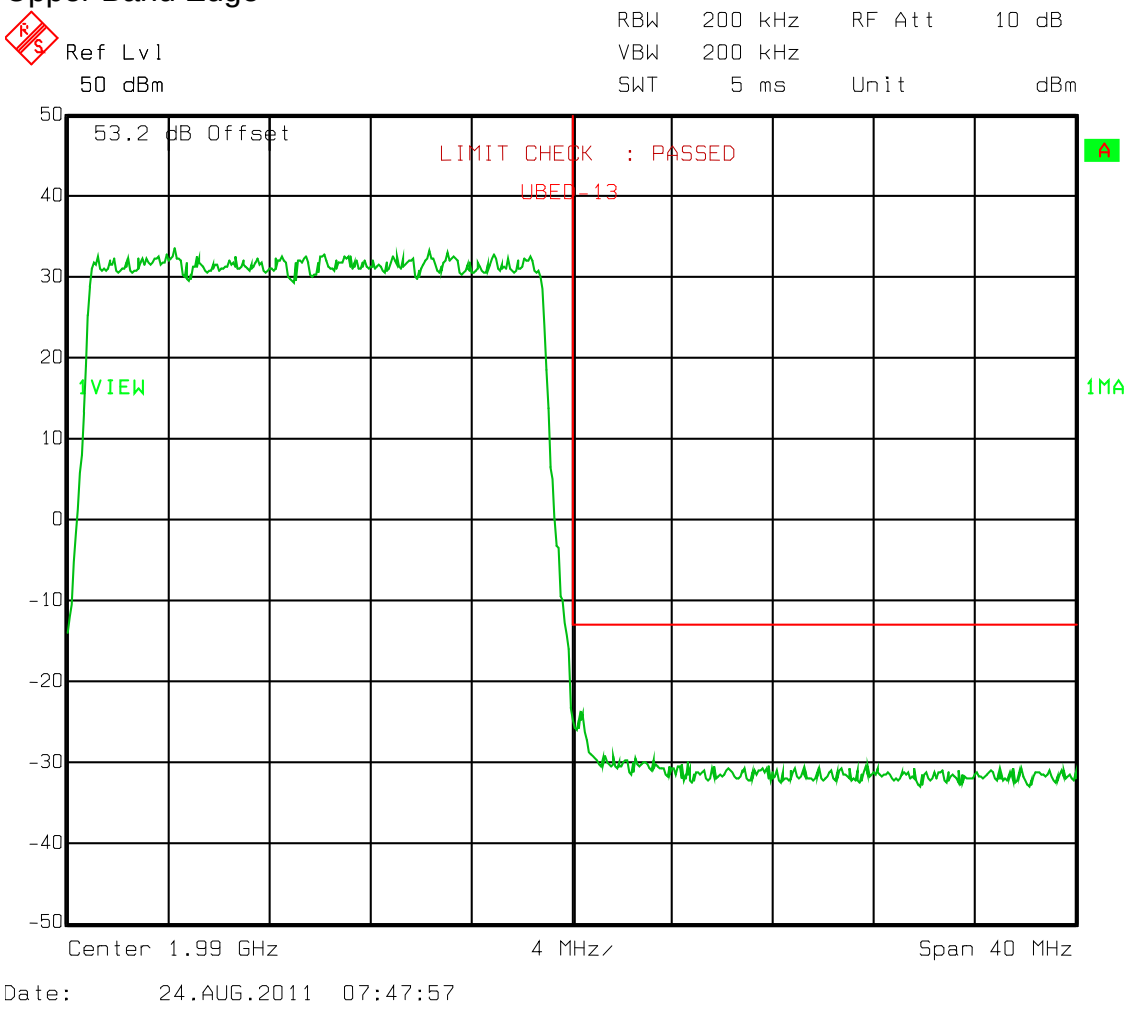
Test Data – Spurious Emissions

20 MHz Channel
16 QAM
Low Band Edge



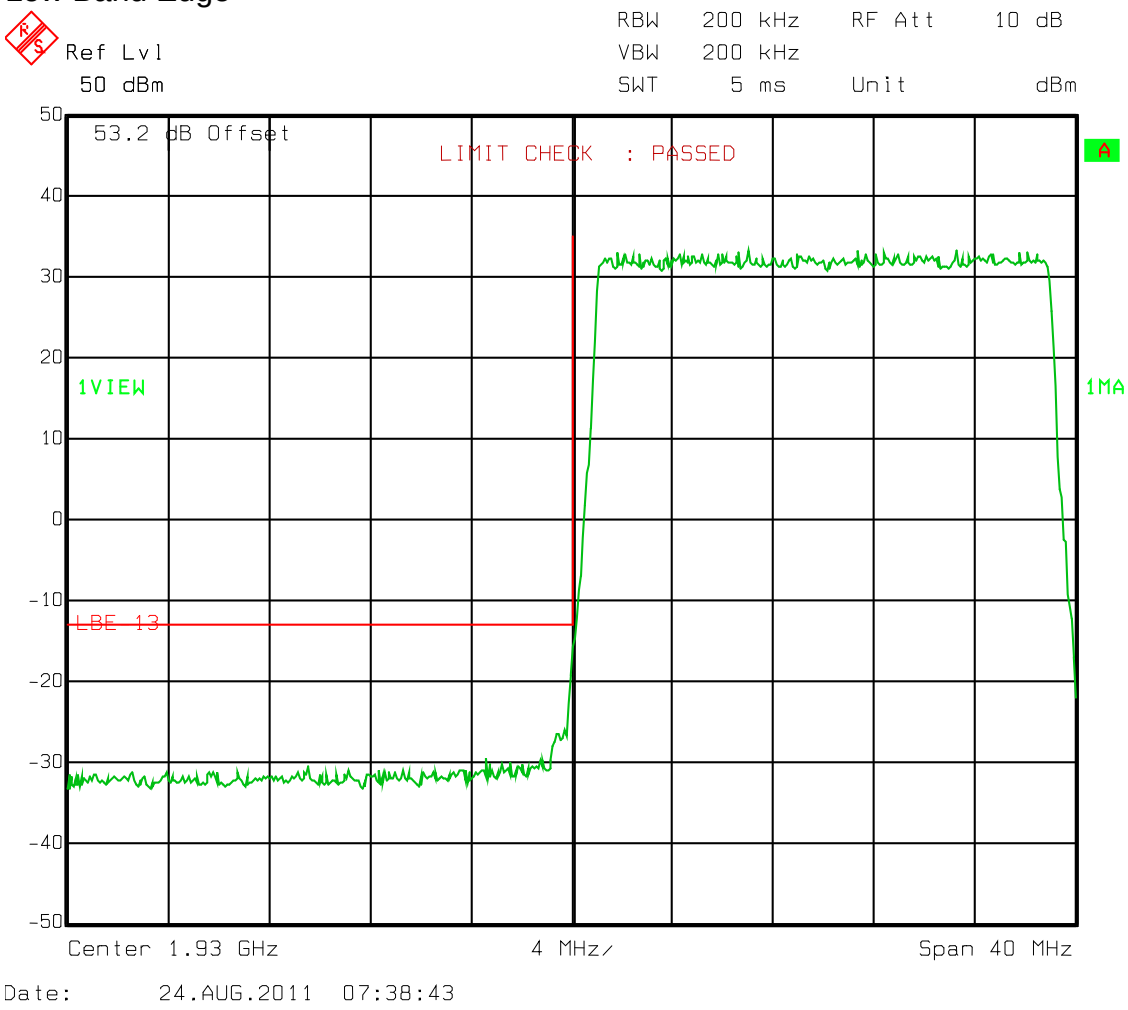
Test Data – Spurious Emissions

20 MHz Channel
16 QAM
Upper Band Edge



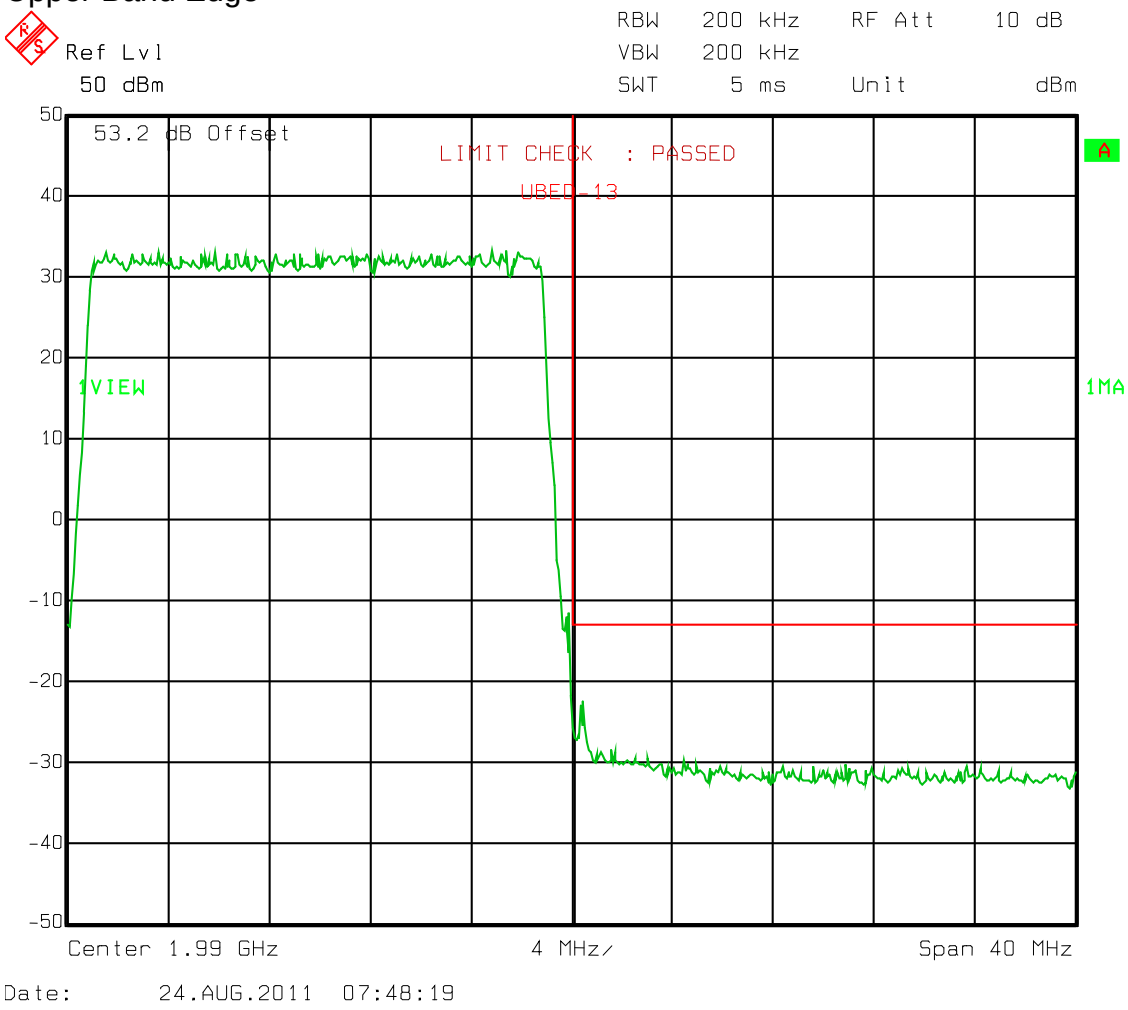
Test Data – Spurious Emissions

20 MHz Channel
64 QAM
Low Band Edge



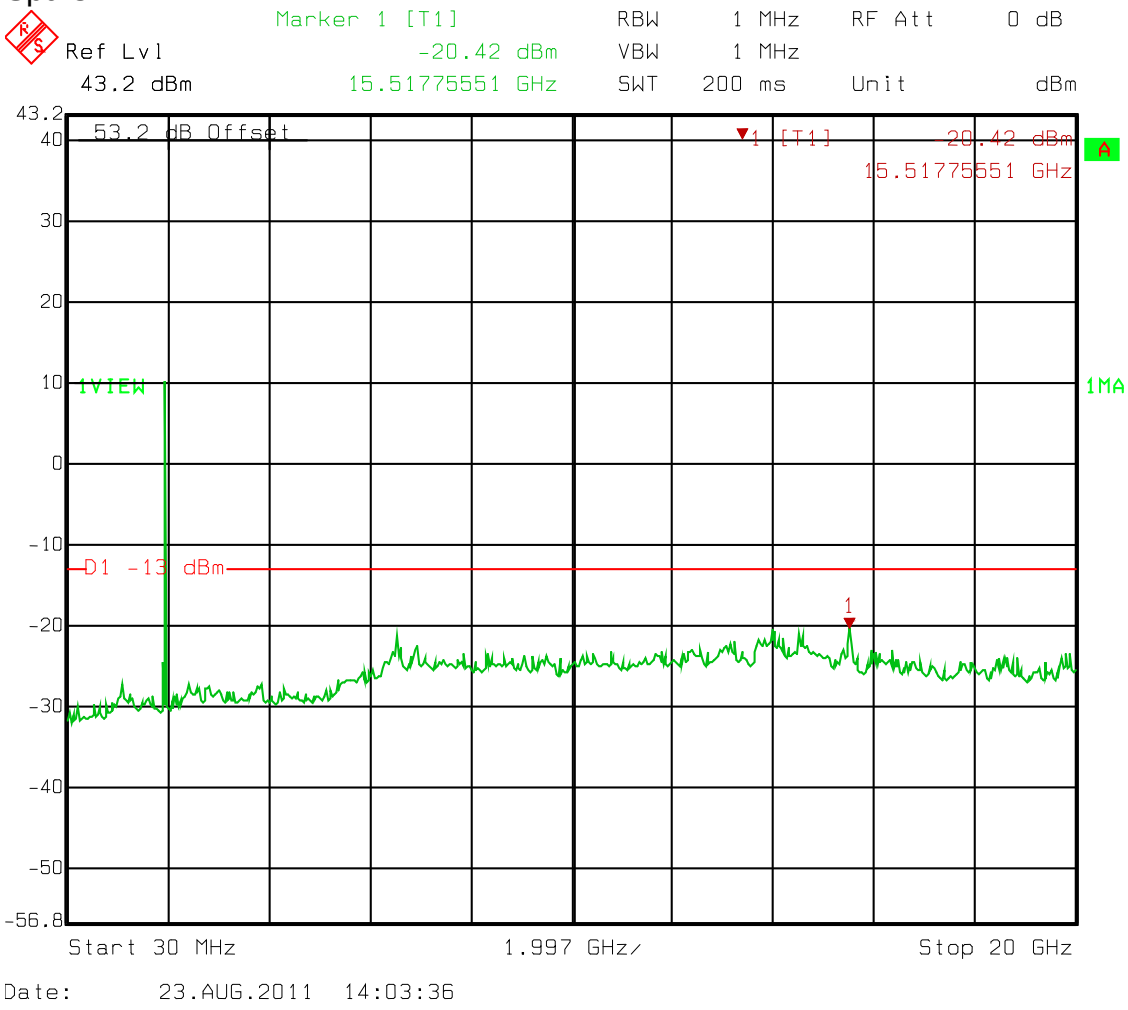
Test Data – Spurious Emissions

20 MHz Channel
64 QAM
Upper Band Edge



Test Data – Spurious Emissions

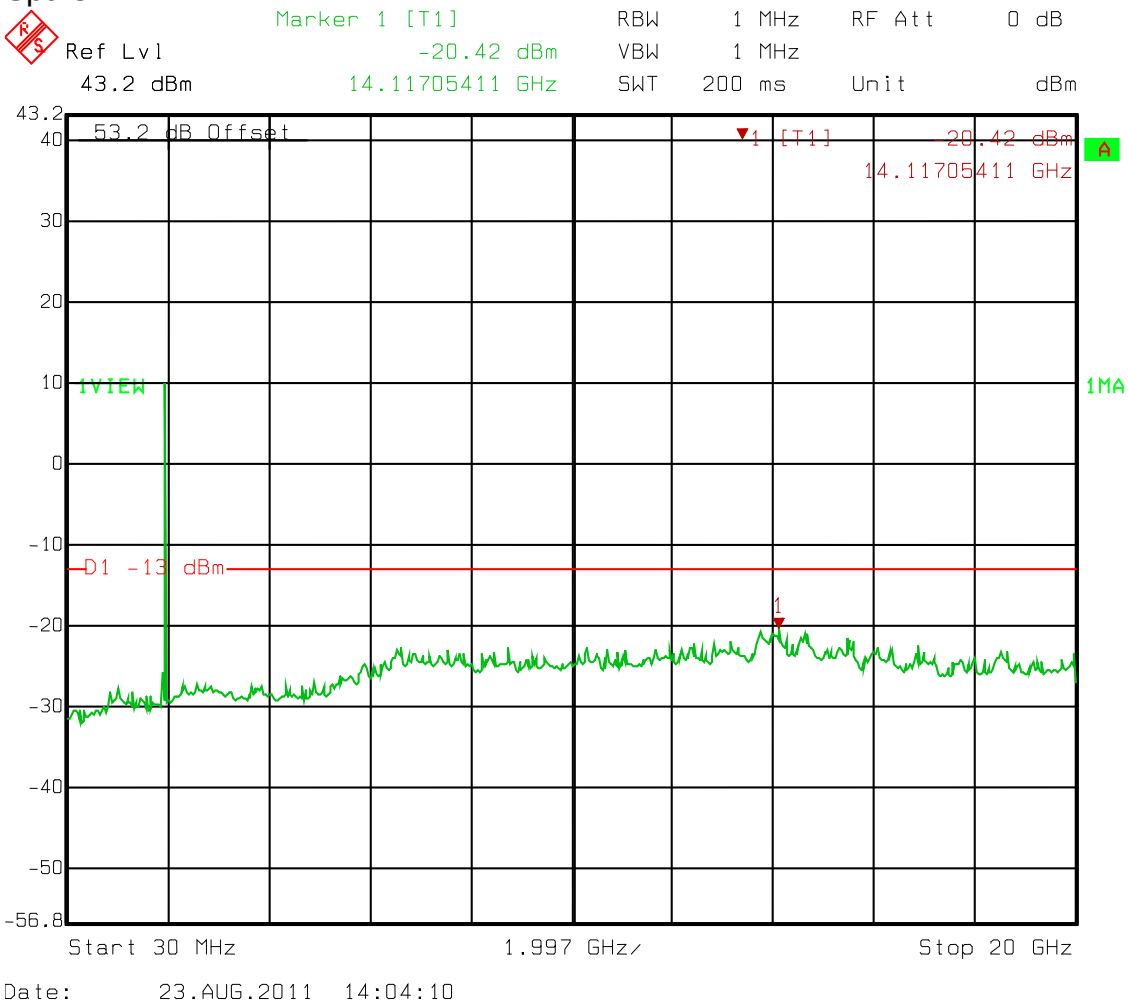
QPSK
Spurs



Carrier notched.

Test Data – Spurious Emissions

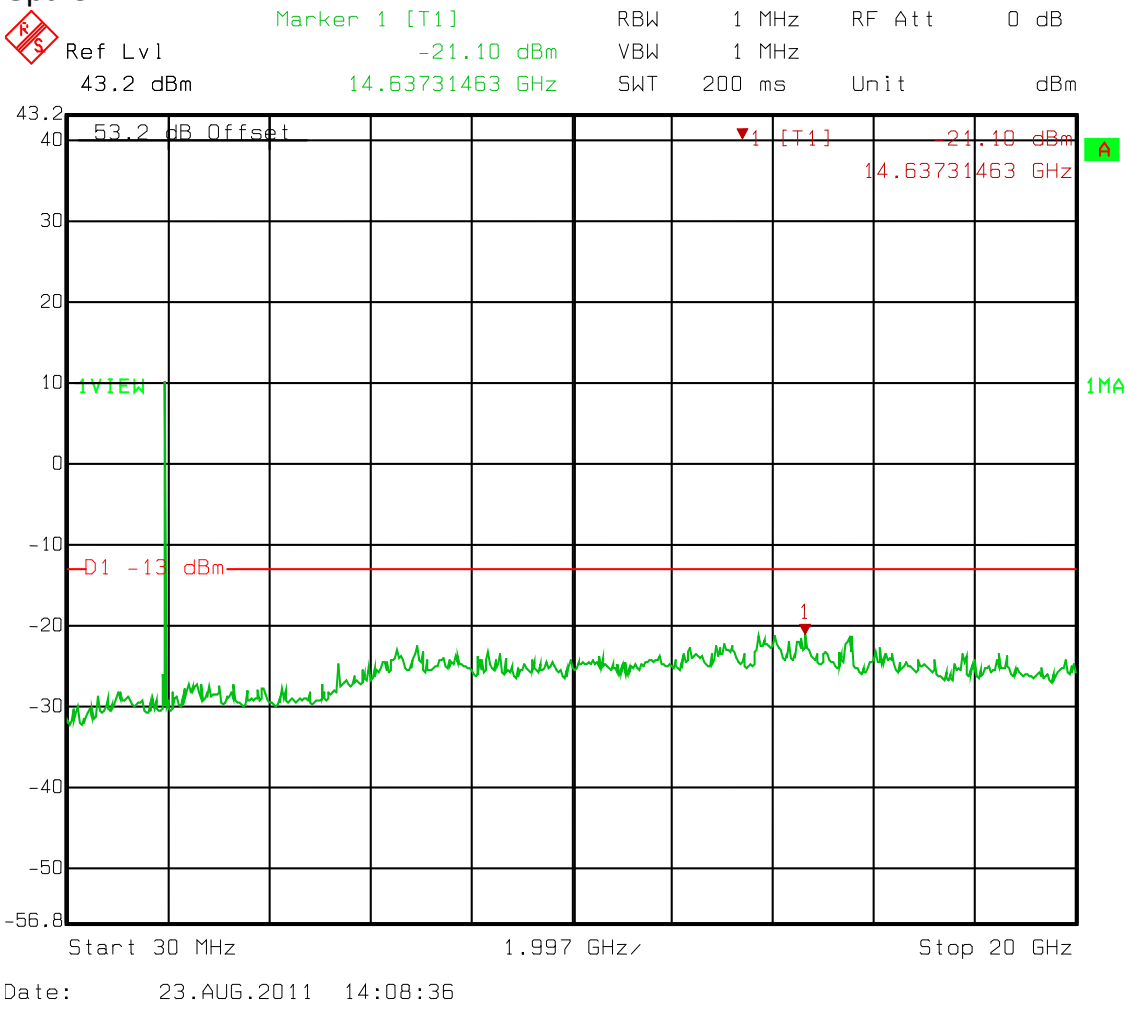
16 QAM
Spurs



Carrier notched.

Test Data – Spurious Emissions

64 QAM
Spurs



Carrier notched.

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

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.

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: ≥ RBW
Span: 5 MHz
Sweep: Auto

GSM Per ANSI/J-STD-010

RBW: 3 kHz
VBW: ≥ RBW
Span: 2 MHz
Sweep: Auto

NADC Per IS-136

RBW: 1 kHz
VBW: ≥ RBW
Span: 1 MHz
Sweep: Auto

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: ≥ 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: ≥ 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: ≥ 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.

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

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

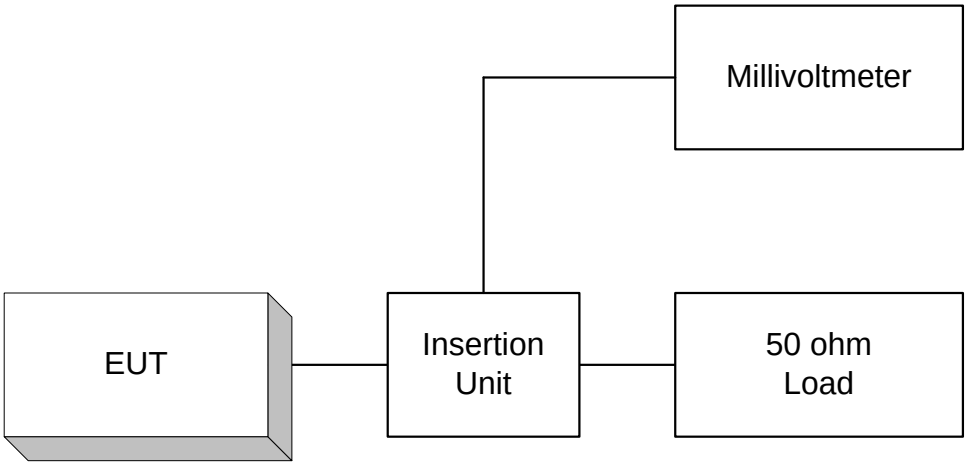
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

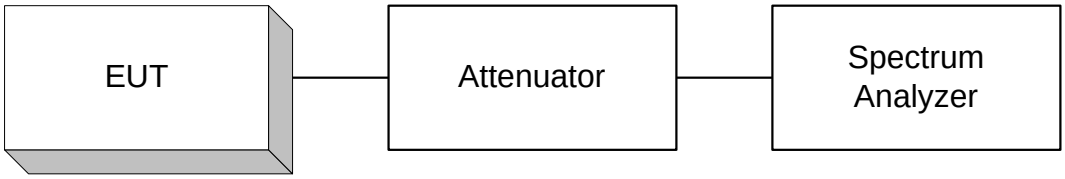
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

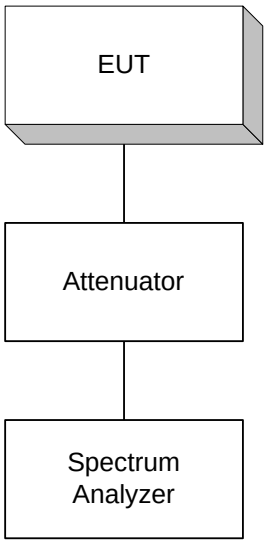
Para. No. 2.985 - R.F. Power Output



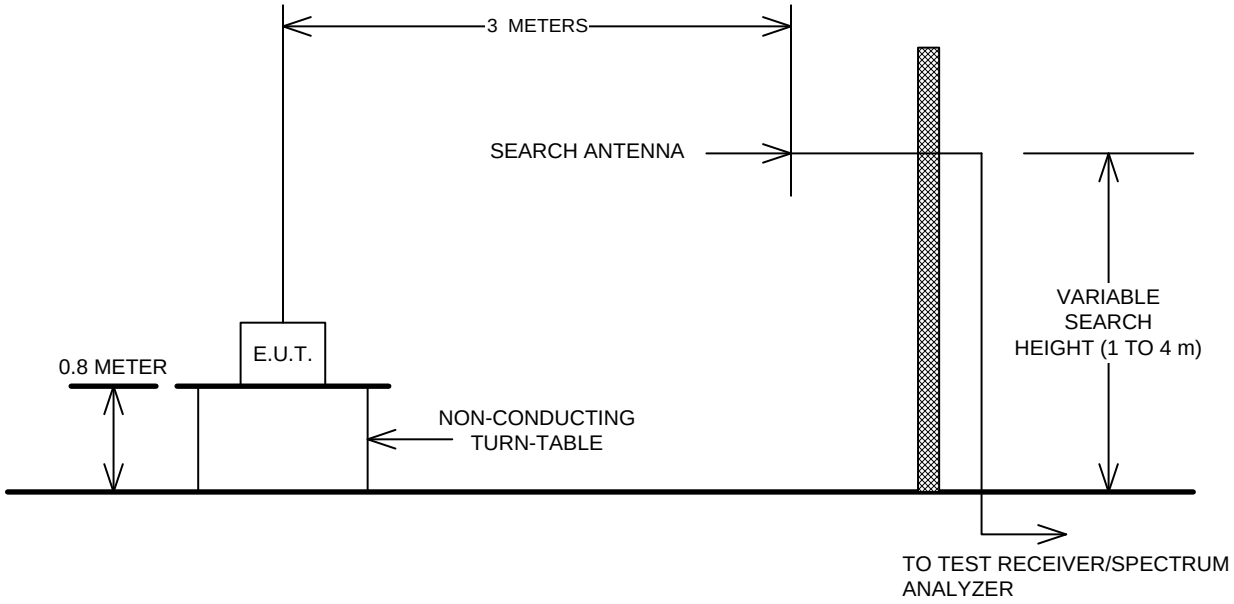
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability