

Nemko Test Report: 114206-1TRFWL

Applicant: Redline Communications
302 Town Centre Blvd.
Markham, Ontario
L3R 0E8

Apparatus: RedMax 4C RRH (2.5-2.7GHz) radio

FCC ID: QC8-SC1000E

In Accordance With: FCC Part 27 Miscellaneous Wireless
Communications Services

Authorized By:

A handwritten signature in blue ink, appearing to read 'Andrey Adelberg', is written over a faint, large 'NEMKO' watermark.

Andrey Adelberg, EMC/Wireless Specialist

Date: January 22, 2009

Total Number of Pages: 40

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Section 1 : Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 27. Conducted measurements were performed in accordance with TIA-603-B-2002. Radiated tests were conducted in accordance with ANSI C63.4-2003.

The assessment summary is as follows:

Apparatus Assessed:	RedMax 4C RRH (2.5-2.7GHz) radio
Specification:	FCC Part 27
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release
Test Location:	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
Registration Number:	176392 (3m Semi-Anechoic Chamber)
Tests Performed By:	Jason Nixon, Wireless/Telecom Specialist
Test Dates:	December 3 to 5, 2008

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 2 : Equipment Under Test

2.1 Identification of Equipment Under Test (EUT)

The following information identifies the EUT under test:

Type of Equipment:	Broadband Data Transmission Radio
Brand Name:	RedMAX 4C (outdoor)
Model Name or Number:	RRH (2.5-2.7GHz)
Serial Number:	068ER08310042
Nemko Sample Number:	6
FCC ID:	QC8-SC1000E
Date of Receipt:	December 1, 2008

2.2 System components

The following information identifies system components used to exercise the EUT during testing:

Description:	Broadband Data Transmission Base Station
Brand Name:	RedMAX 4C (indoor)
Model Name or Number:	SC-1000
Serial Number:	Proto
Nemko Sample Number:	2

Description:	CPE
Brand Name:	RedMAX 4C
Model Name or Number:	RPM2500M
Serial Number:	040GT08130034
Nemko Sample Number:	4

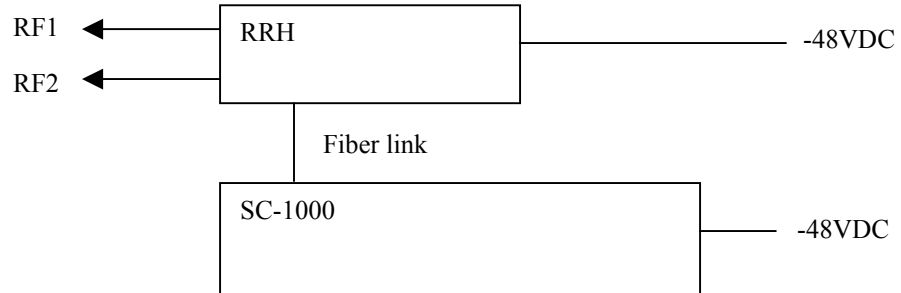
2.3 EUT Description

The EUT is a broadband data radio. The RedMAX 4C is composed of two units, the indoor and the outdoor. The outdoor radio uses OFDM Modulation in a Point-to-Multipoint application.

2.4 Technical Specifications of the EUT

Operating Band:	2496-2690MHz
Operating Frequency:	2498.5-2687.25MHz
Modulation:	OFDM using QPSK, 16QAM, 64QAM
Channel Spacing:	5MHz
Emission Designator:	W7D
Recommended Antenna Data:	17 dBi Sector Antenna with a worst-case 120° beam width
Power Supply Requirements:	-48VDC

2.5 EUT Setup diagram



2.6 Operation of the EUT during testing

The EUT was configured to communicate with a CPE at full data load to achieve full output power.

2.7 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

Section 3 : Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures
FCC Part 27 Miscellaneous Wireless Communications Services

3.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 °C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

3.4 Measurement Uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95% and can be found in Nemko Canada document MU-003.

3.5 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Cal. Date	Next Cal.
Signal Generator	Rohde & Schwarz	SMR40	FA001879	Aug 13/08	Aug 13/09
Spectrum Analyzer	Rohde & Schwarz	FSU46	FA001877	Aug 28/08	Aug 28/09
Combiner	Mini-circuits	ZA3PD-2	FA001155	COU	COU
Attenuator	Narda	769-20	FA001394	COU	COU
Attenuator	Areoflex	BY3642	Customer	COU	COU
3m EMI Test Chamber	TDK	SAC-3	FA002047	May 06/08	May 06/09
Bilog	Sunol	JB3	FA002108	Jan. 21/08	Jan. 21/09
Flush Mount Turntable	Sunol	FM2022	FA002082	NCR	NCR
Controller	Sunol	SC104V	FA002060	NCR	NCR
Mast	Sunol	TLT2	FA002061	NCR	NCR
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 26	FA002043	Dec. 07/07	Dec. 07/08
50 Coax cable	HUBER + SUHNER	None	FA002022	July 07/08	July 07/09
50 Coax cable	HUBER + SUHNER	None	FA002074	July 07/08	July 07/09
Horn Antenna #2	EMCO	3115	FA000825	Jan. 15/08	Jan. 15/09
18.0 – 40.0GHz Horn Antenna	EMCO	3116	FA001847	May 12/08	May 12/09
1 – 18 GHz Amplifier	JCA	JCA118-503	FA002091	Oct 2/08	Oct 2/09
18.0 – 26.0 GHz Amplifier	NARDA	BBS-1826N612	FA001550	COU	COU

COU – Calibrate on Use

NCR – No Calibration Required

Section 4 : Results Summary

This section contains the following:

FCC Part 27 : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No : not applicable / not relevant.

Y Yes : Mandatory i.e. the apparatus shall conform to these tests.

N/T Not Tested, mandatory but not assessed. (See Report Summary)

4.1 FCC Part 27 : Test Results

Clause	Test Method	Test Description	Required	Result
27.50(h)	2.1046	Equivalent isotropically radiated power	Y	PASS
27.53(m)	2.1049	Occupied bandwidth	Y	PASS
27.53(m)	2.1051	Spurious emissions at the antenna terminal	Y	PASS
27.53(m)	2.1053	Field strength of spurious radiation	Y	PASS
27.54	2.1055	Frequency stability	Y	PASS

Notes:

Appendix A : Test Results

Clause 27.50(h) Equivalent Isotropically Radiated Power

(h) The following power limits shall apply in the BRS and EBS:

(1) Main, booster and base stations.

(i) The maximum EIRP of a main, booster or base station shall not exceed 33 dBW + 10log(X/Y) dBW, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.

(ii) If a main or booster station sectorizes or otherwise uses one or more transmitting antennas with a non-omnidirectional horizontal plane radiation pattern, the maximum EIRP in dBW in a given direction shall be determined by the following formula: $EIRP = 33 \text{ dBW} + 10 \log(X/Y) \text{ dBW} + 10 \log(360/\text{beamwidth}) \text{ dBW}$, where X is the actual channel width in MHz, Y is either (i) 6 MHz if prior to transition or the station is in the MBS following transition or (ii) 5.5 MHz if the station is in the LBS and UBS following transition, and beamwidth is the total horizontal plane beamwidth of the individual transmitting antenna for the station or any sector measured at the half-power points.

Test Results: Pass

EIRP Limit = 33dBW + 10log(5/5.5) + 10log(360/120) = 37.36dBW = 67.36dBm

Worst-case antenna beam width is 120°; therefore 120° causes the lowest limit, although higher gains with lower beamwidth are used.

Worst-case antenna gain is 17dBi.

Aggregate power calculation:

$$P[dBm] = 10 \times \log_{10} \left(10^{\frac{P_1[dBm]}{10}} + 10^{\frac{P_2[dBm]}{10}} \right)$$

Output Power – Average Detector

RF1

Frequency (MHz)	Measured Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)
2498.5	38.04	17	55.04
2593	38.03	17	55.03
2687.25	37.83	17	54.83

RF2

Frequency (MHz)	Measured Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)
2498.5	38.21	17	55.21
2593	37.71	17	54.71
2687.25	38.54	17	55.54

Aggregate

Frequency (MHz)	EIRP (dBm)	EIRP (dBW)	Limit (dBW)
2498.5	58.14	28.14	37.36
2593	57.88	27.88	37.36
2687.25	58.21	28.21	37.36

Output Power – Peak Detector

RF1

Frequency (MHz)	Measured Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)
2498.5	40.00	17	57.00
2593	39.96	17	56.96
2687.25	39.74	17	56.74

RF2

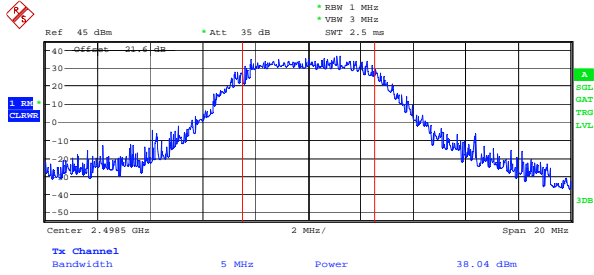
Frequency (MHz)	Measured Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)
2498.5	39.72	17	56.72
2593	39.82	17	56.82
2687.25	40.77	17	57.77

Aggregate

Frequency (MHz)	EIRP (dBm)	EIRP (dBW)	Limit (dBW)
2498.5	59.87	29.87	37.36
2593	59.90	29.90	37.36
2687.25	60.29	30.29	37.36

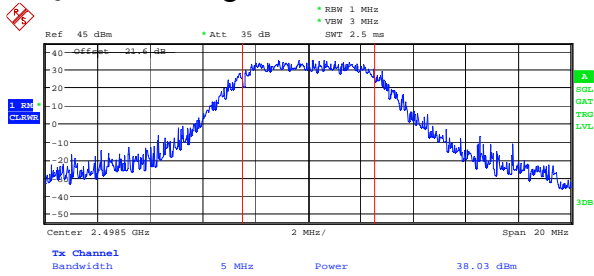
Output power was assessed using QPSK, 16QAM and 64QAM. The above tables only include the worst-case for each channel frequency.

RF1 – 2498.5MHz
 QPSK - Average



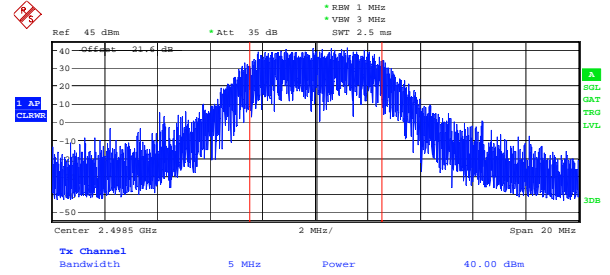
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16QAM – Average



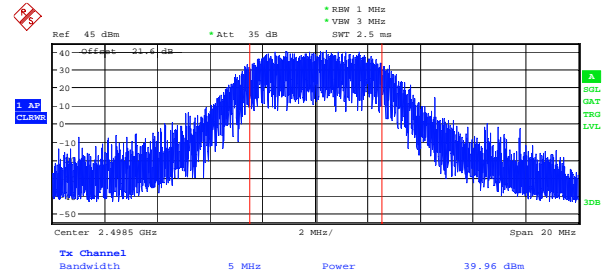
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Peak



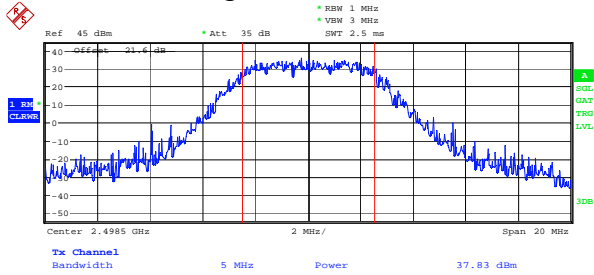
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Peak



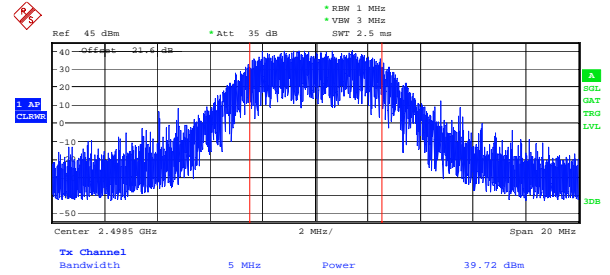
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64QAM – Average



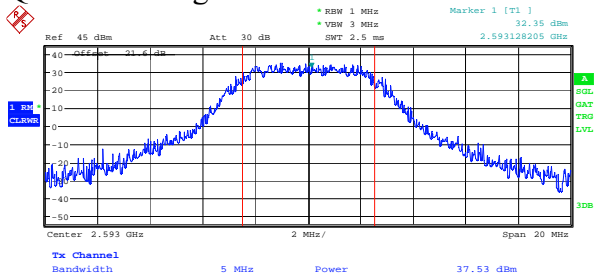
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Peak



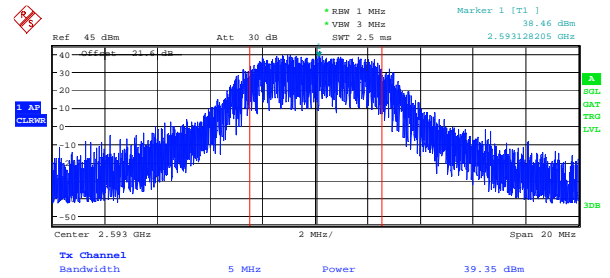
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RF1 – 2593MHz
 QPSK - Average



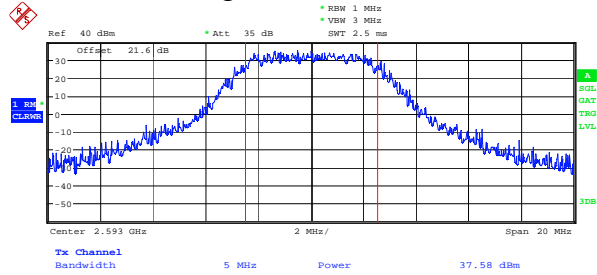
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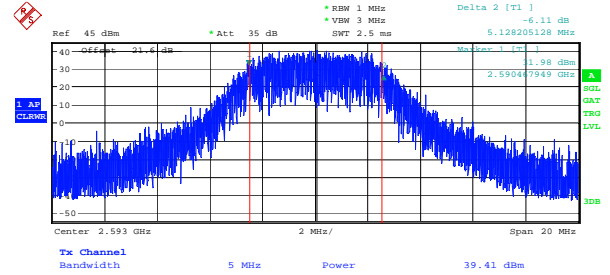


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16QAM - Average

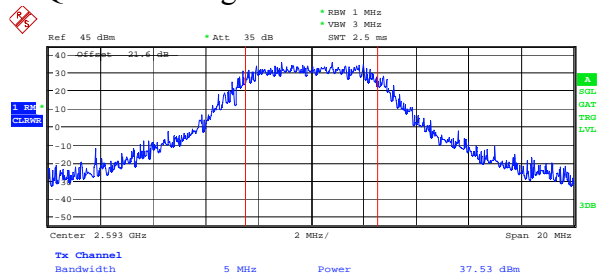


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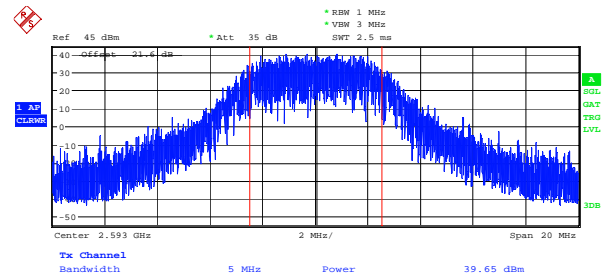
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64QAM - Average



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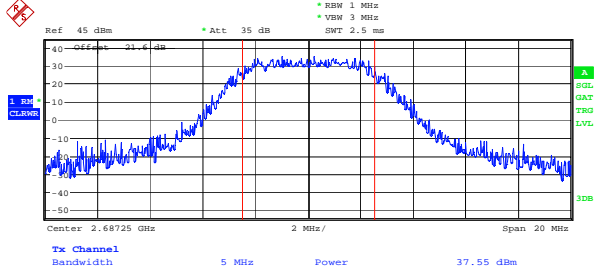
Peak



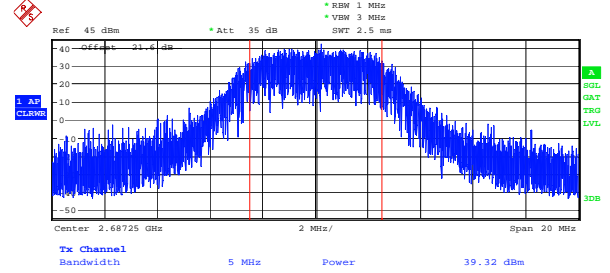
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Date: 3.DEC.2008 13:22:43

RF1 – 2687.25MHz
 QPSK - Average

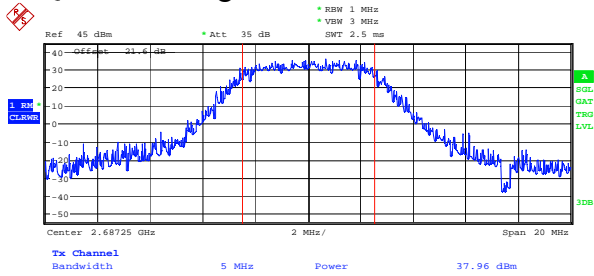


Peak



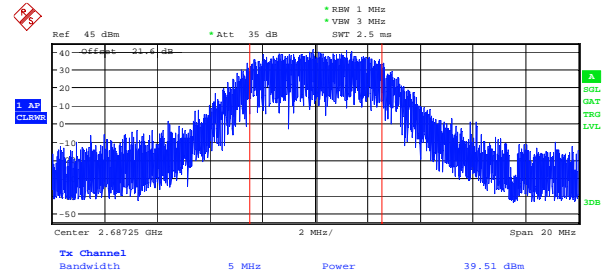
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16QAM - Average



Date: 3.DEC.2008 11:51:49

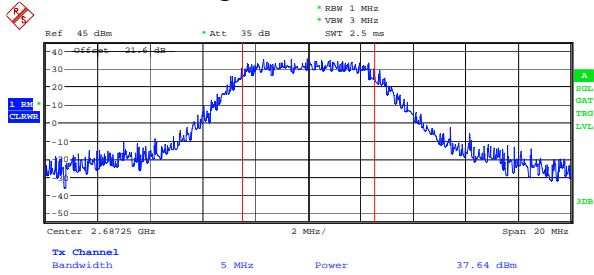
Peak



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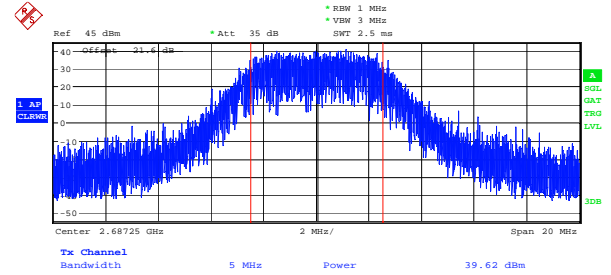
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64QAM - Average



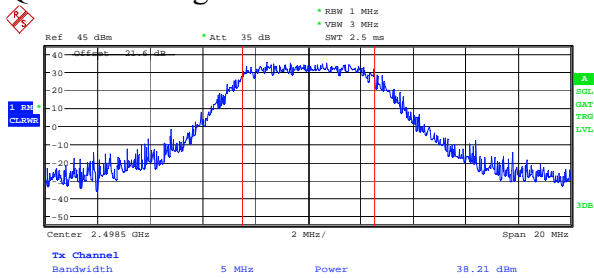
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Peak



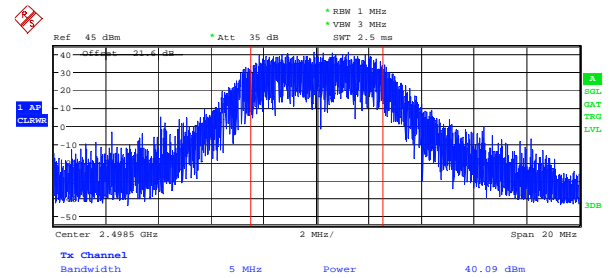
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RF2 - 2498.5MHz
 QPSK - Average



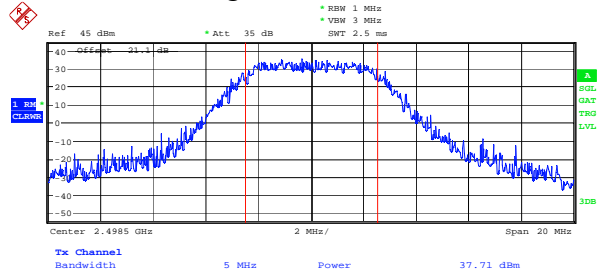
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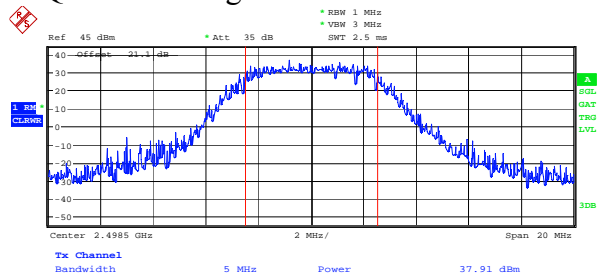
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16QAM – Average



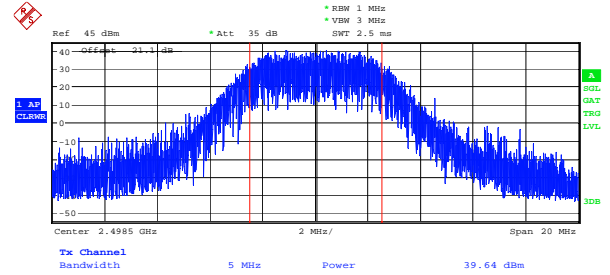
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64QAM – Average



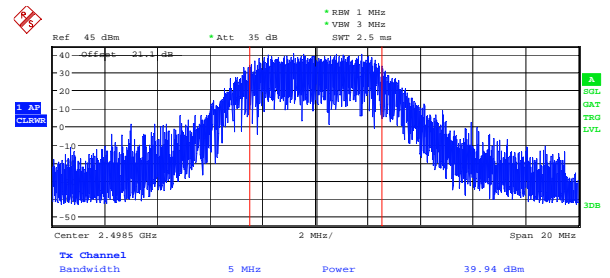
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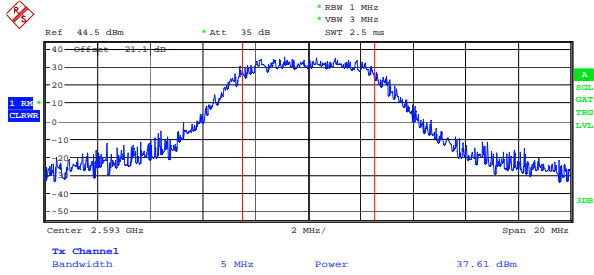
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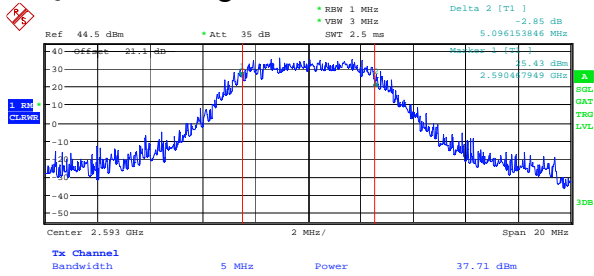
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RF2 – 2593MHz
 QPSK - Average



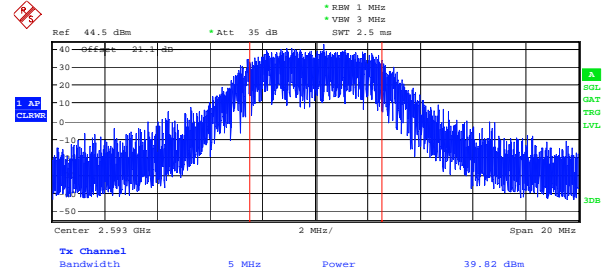
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16QAM - Average



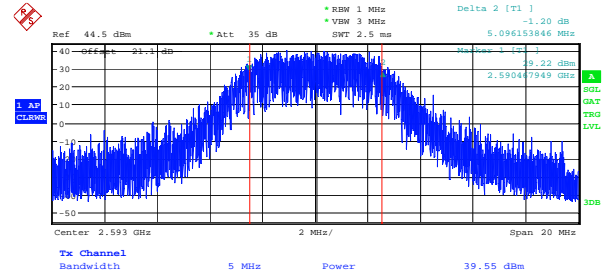
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Peak



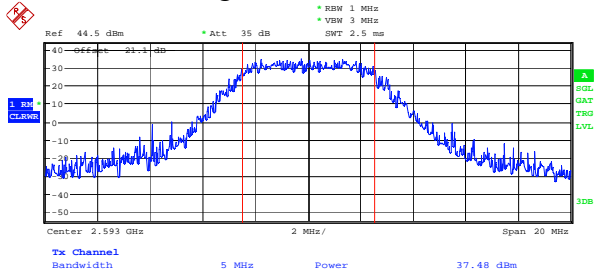
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Peak



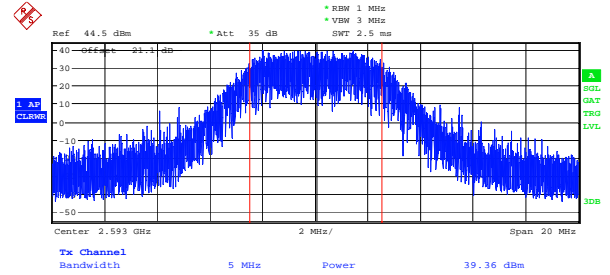
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64QAM - Average



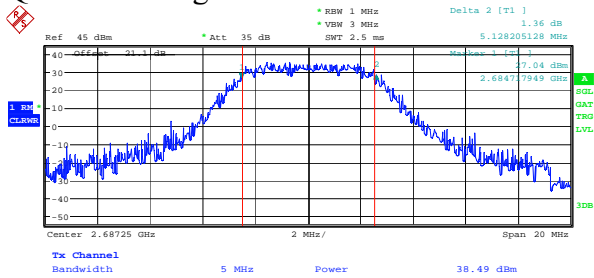
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Peak



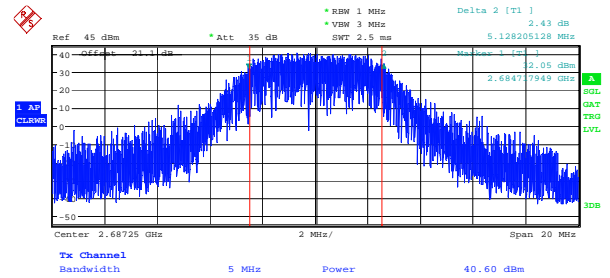
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RF2 - 2687.25MHz
 QPSK - Average



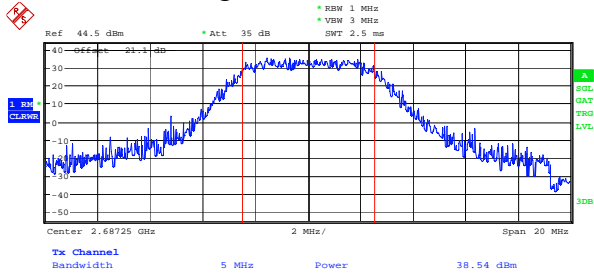
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Peak



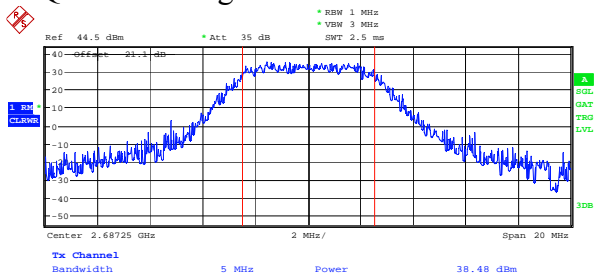
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16QAM - Average



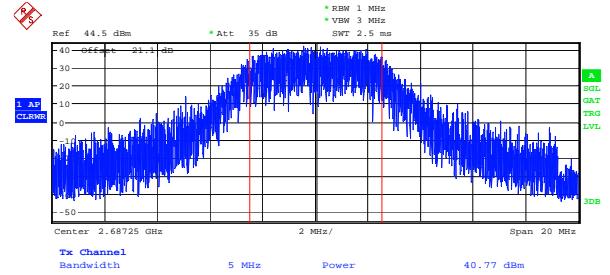
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64QAM - Average



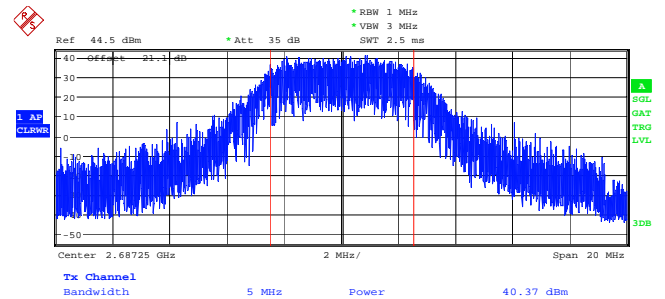
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Peak



Date: 3.DEC.2008 16:37:45

Peak



Date: 3.DEC.2008 16:34:36

Clause 27.53(m)(6) Occupied Bandwidth

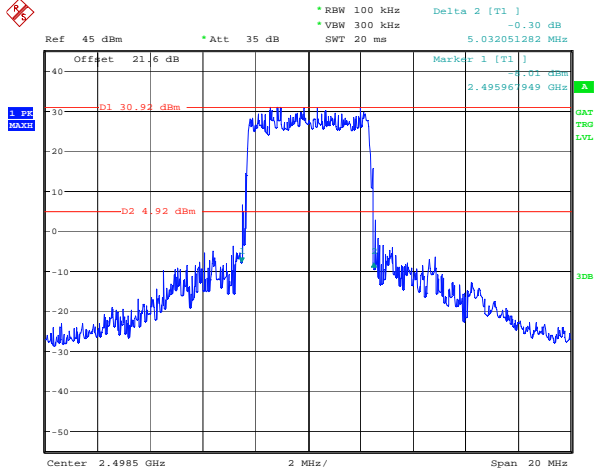
(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). 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 below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

Test Results: Pass

26dB Bandwidth

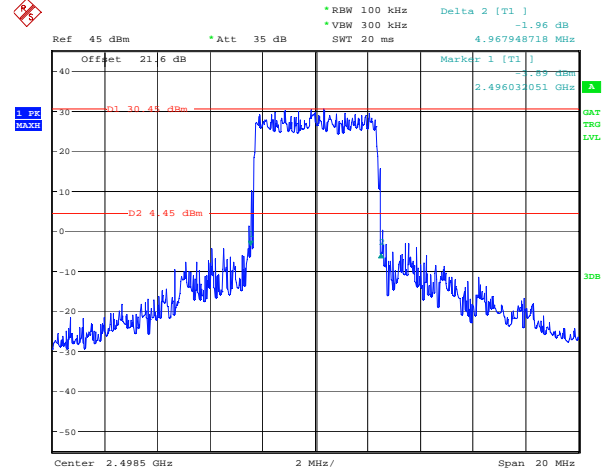
Frequency (MHz)	Occupied Bandwidth (MHz)		
	QPSK	16QAM	64QAM
2498.5	5.0321	5.0641	4.9679
2593	5.0641	5.1282	5.0962
2687.25	5.0641	5.0641	5.0962

2498.5MHz
 QPSK



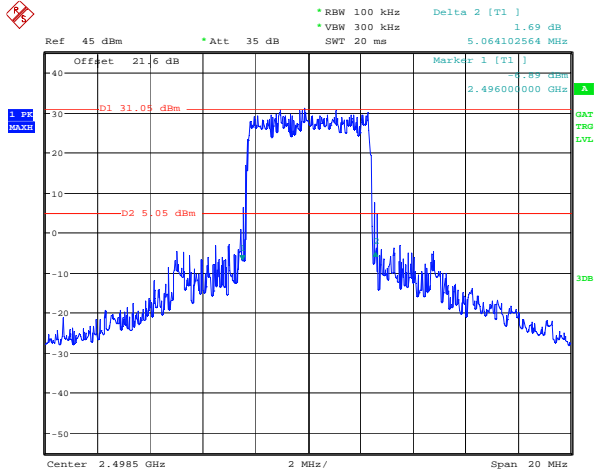
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64QAM



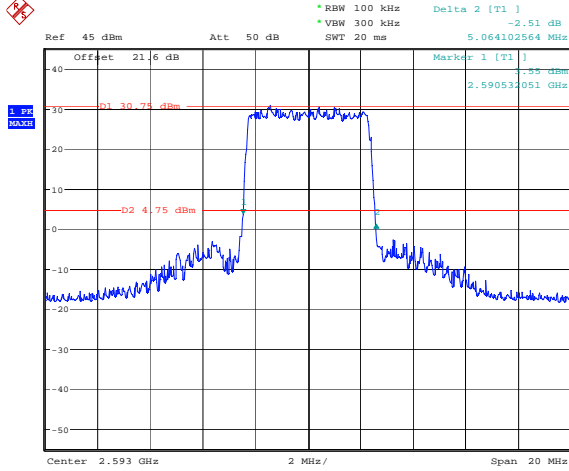
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16QAM



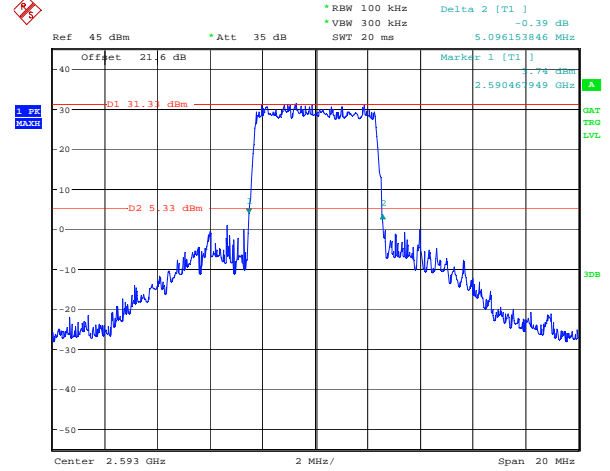
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2593MHz
 QPSK



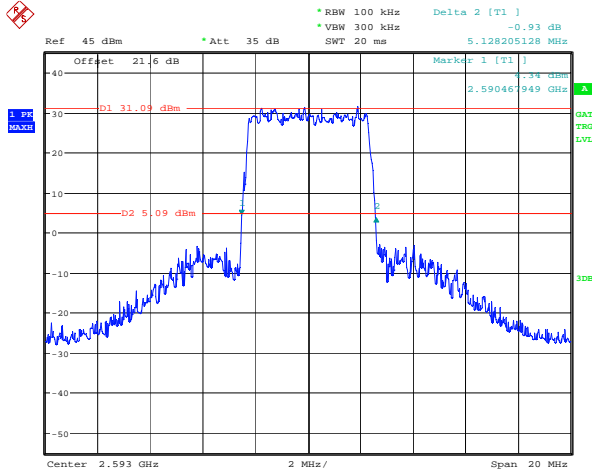
Date: 3.DEC.2008 12:36:35

64QAM



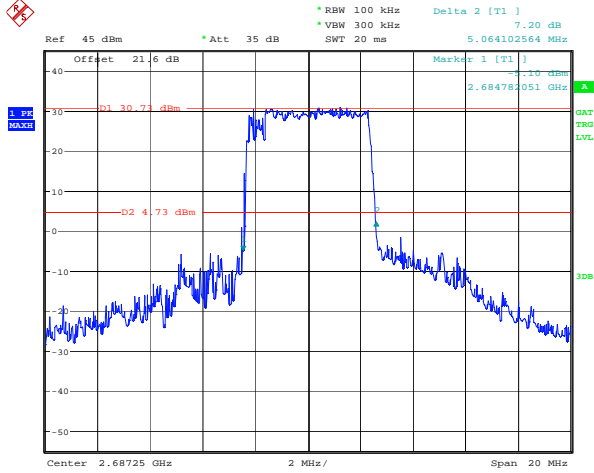
Date: 3.DEC.2008 13:24:09

16QAM



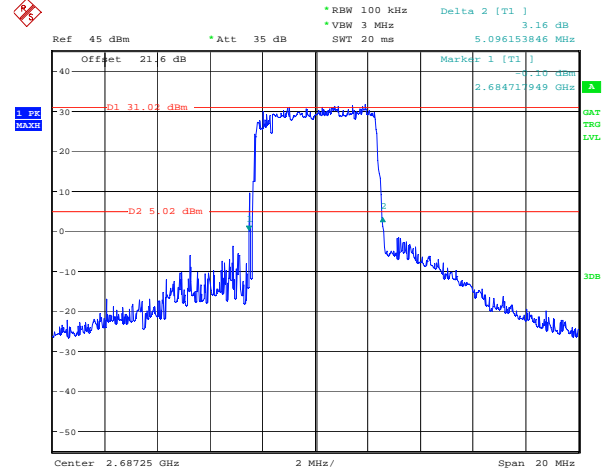
Date: 3.DEC.2008 12:58:40

2687.25MHz
 QPSK



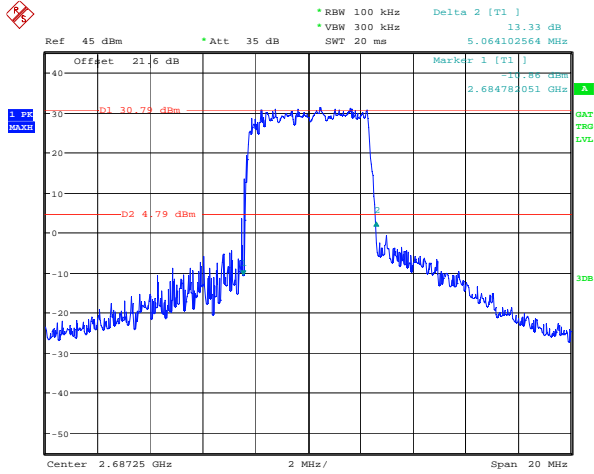
Date: 3.DEC.2008 11:52:55

64QAM



Date: 3.DEC.2008 11:46:10

16QAM



Date: 3.DEC.2008 11:40:36

Clause 27.53(m) spurious emissions at the antenna terminal

For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

(1) Prior to the transition, and thereafter, solely within the MBS, for analog operations with an EIRP in excess of -9 dBW, the signal shall be attenuated at the channel edges by at least 38 dB relative to the peak visual carrier, then linearly sloping from that level to at least 60 dB of attenuation at 1 MHz below the lower band edge and 0.5 MHz above the upper band edge, and attenuated at least 60 dB at all other frequencies.

(2) For digital base stations, the attenuation shall be not less than $43 + 10 \log (P)$ dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Provided that a documented interference complaint cannot be mutually resolved between the parties prior to the applicable deadline, then the following additional attenuation requirements shall apply:

(i) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located 1.5 km or more away, within 24 hours of the receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least $67 + 10 \log (P)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block and shall immediately notify the complaining licensee upon implementation of the additional attenuation. No later than 60 days after the implementation of such additional attenuation, the licensee of the complaining base station must attenuate its base station emissions by at least $67 + 10 \log (P)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(ii) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located less than 1.5 km away, within 24 hours of receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least $67 + 10 \log (P) - 20 \log (D_{\text{km}}/1.5)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the complaining licensee, or if both base stations are co-located, limit its undesired signal level at the pre-existing base station receiver(s) to no more than -107 dBm measured in a 5.5 megahertz bandwidth and shall immediately notify the complaining licensee upon such reduction in the undesired signal level. No later than 60 days after such reduction in the undesired signal level, the complaining licensee must attenuate its base station emissions by at least $67 + 10 \log (P)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(iii) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located 1.5 km or more away, within 60 days of receipt of a documented interference complaint the licensee of each base station must attenuate its base station emissions by at least $67 + 10 \log (P)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the other licensee.

(iv) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located less than 1.5 km away, within 60 days of receipt of a documented interference complaint: (a) The licensee of the new or modified base station must attenuate its OOB by at least $67 + 10 \log (P) - 20 \log (D_{km}/1.5)$ measured 3 megahertz above or below, from the channel edge of its frequency block of the other licensee, or if the base stations are co-located, limit its undesired signal level at the other base station receiver(s) to no more than -107 dBm measured in a 5.5-megahertz bandwidth; and (b) the licensee causing the interference must attenuate its emissions by at least $67 + 10 \log (P)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(v) For all fixed digital user stations, the attenuation factor shall be not less than $43 + 10 \log (P)$ dB at the channel edge.

(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). 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 below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

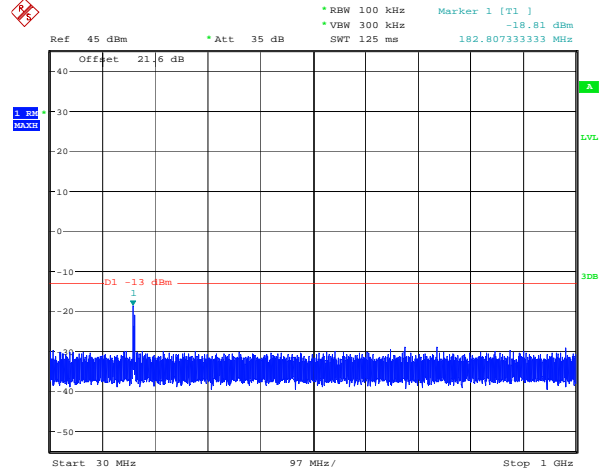
Test Results: Pass

Additional Observations:

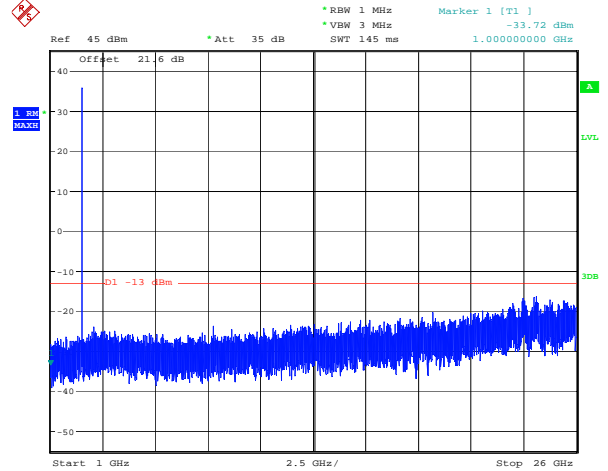
Measurements were performed on QPSK, 16QAM and 64QAM. Only worst-case measurements are presented.

Conducted Emissions

RF1 – 2498.5MHz

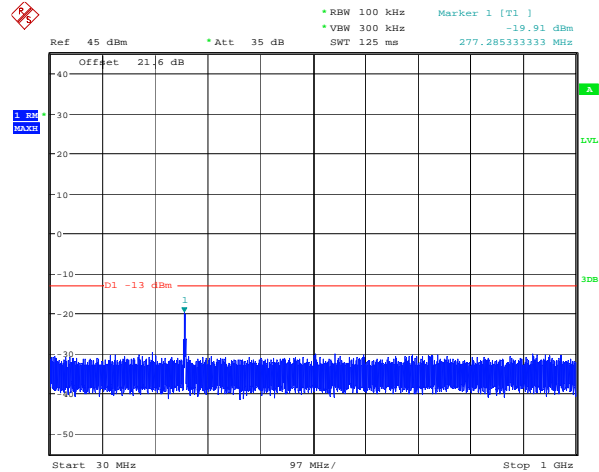


Date: 4.DEC.2008 08:58:09

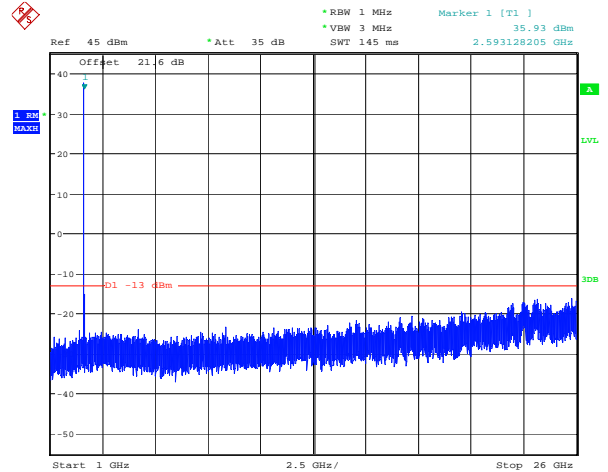


Date: 4.DEC.2008 09:44:32

RF1 – 2593MHz

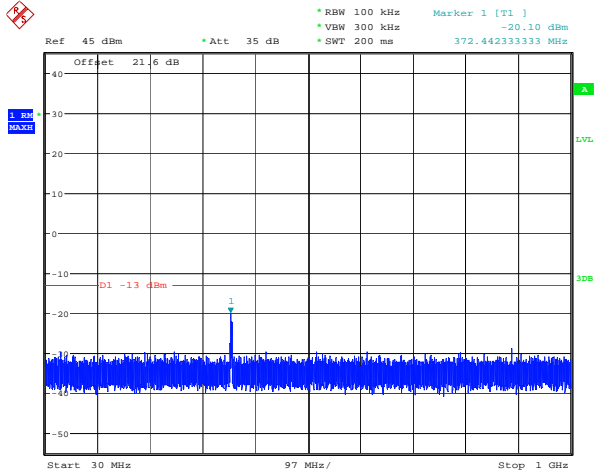


Date: 3.DEC.2008 12:39:37

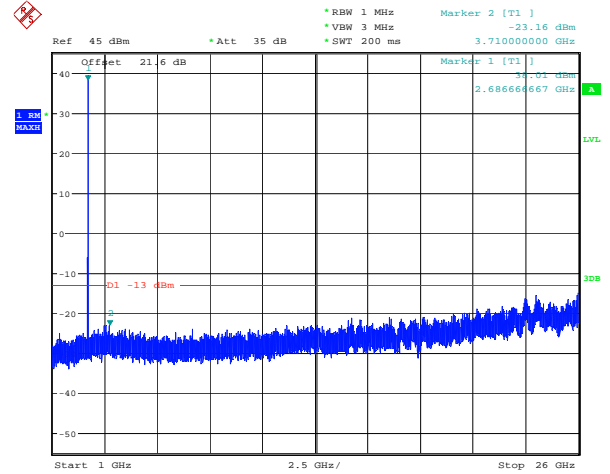


Date: 3.DEC.2008 12:39:09

RF1 – 2687.25MHz

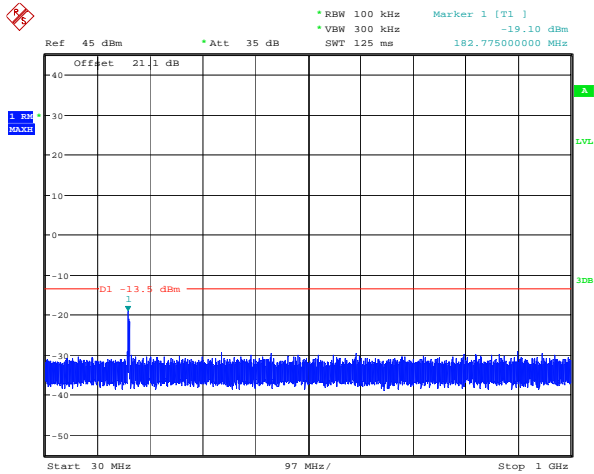


Date: 3.DEC.2008 11:37:51

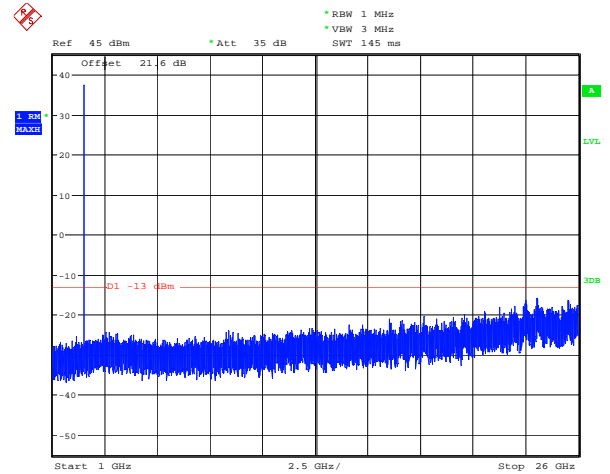


Date: 3.DEC.2008 11:37:18

RF2 – 2498.5MHz

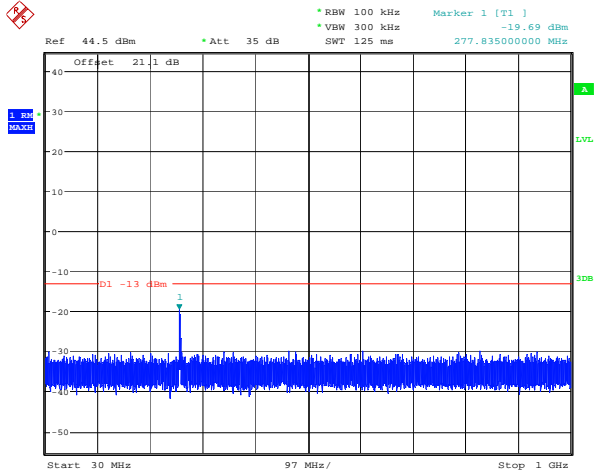


Date: 4.DEC.2008 09:00:10

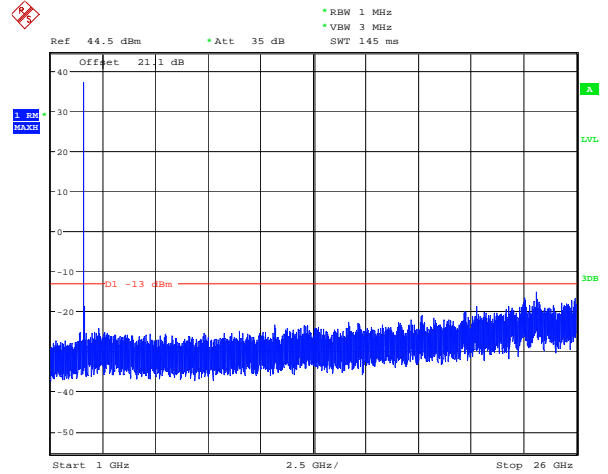


Date: 4.DEC.2008 10:00:01

RF2 – 2593MHz

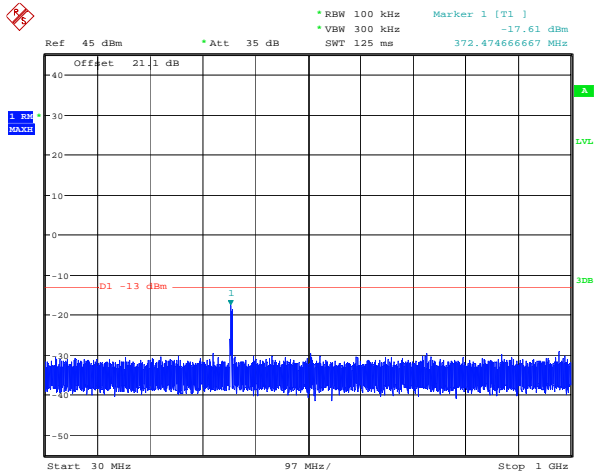


Date: 3.DEC.2008 15:06:27

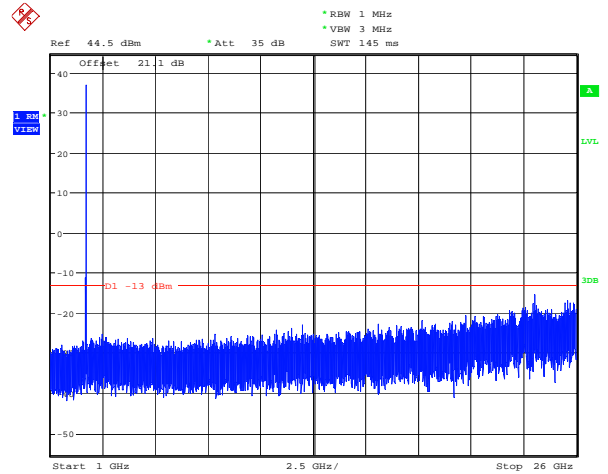


Date: 3.DEC.2008 14:50:08

RF2 – 2687.25MHz

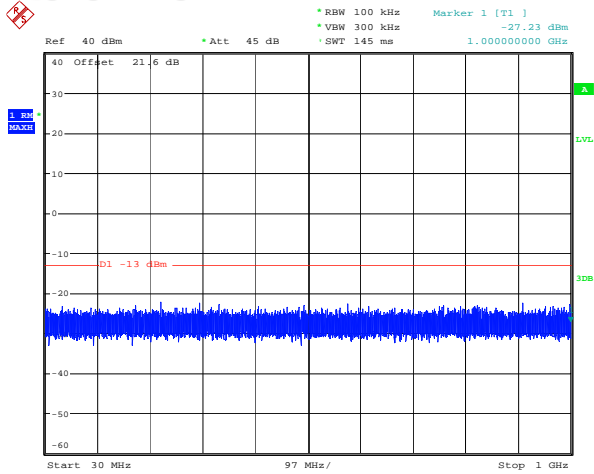


Date: 3.DEC.2008 16:47:12

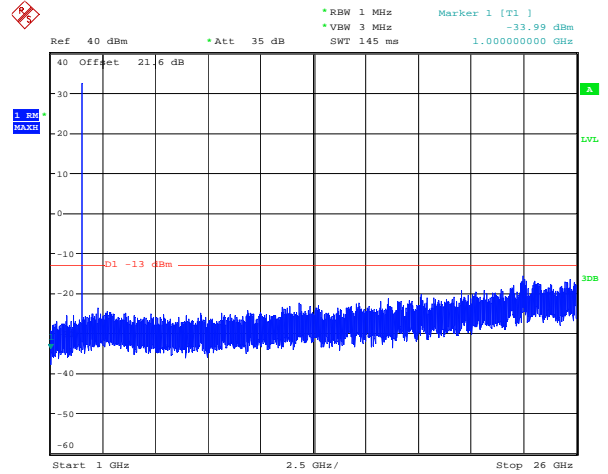


Date: 3.DEC.2008 16:20:41

Aggregate Signal – 2498.5MHz

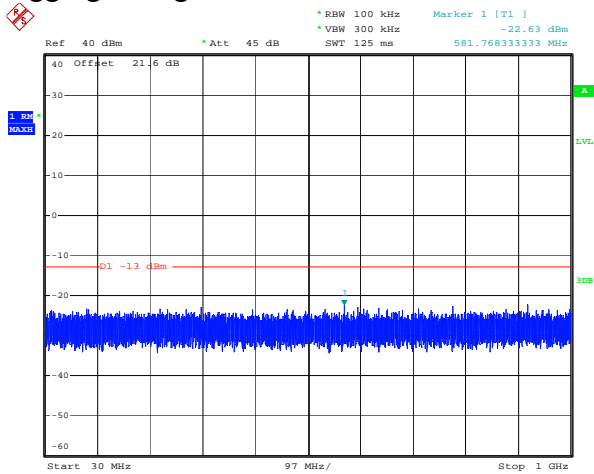


Date: 4.DEC.2008 10:29:25

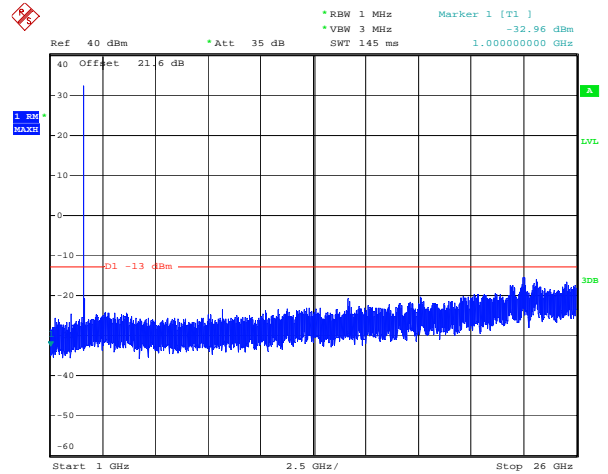


Date: 4.DEC.2008 10:30:16

Aggregate Signal – 2593MHz

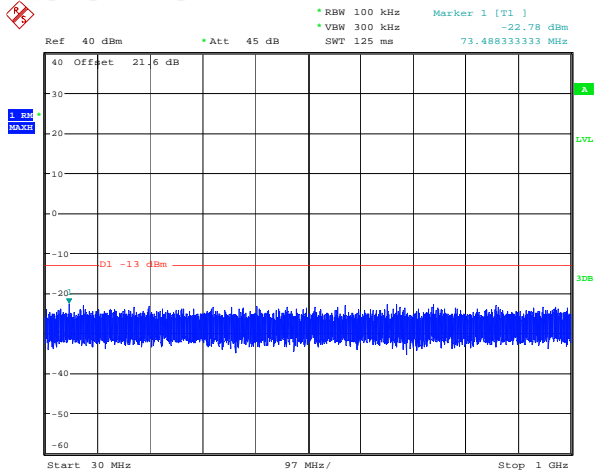


Date: 4.DEC.2008 10:41:34

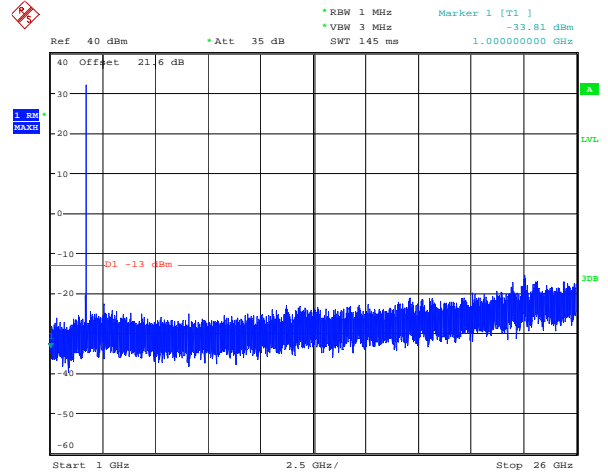


Date: 4.DEC.2008 10:41:08

Aggregate Signal – 2687.25MHz

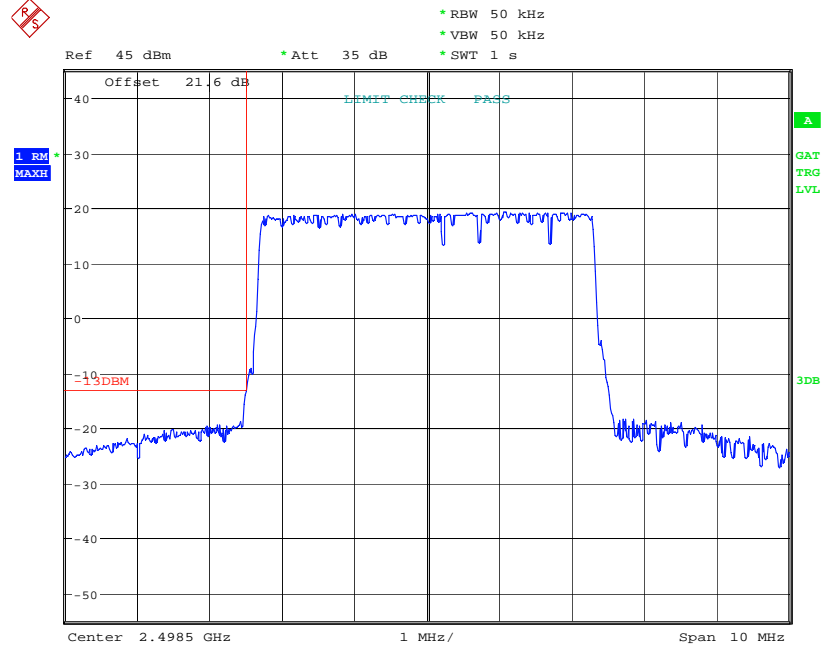


Date: 4.DEC.2008 11:01:12



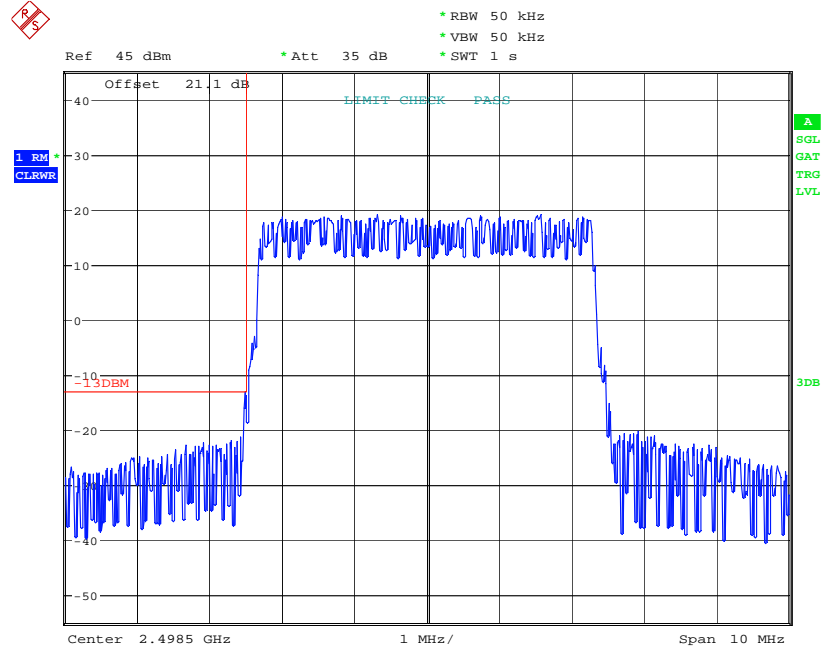
Date: 4.DEC.2008 11:01:43

Lower Bandedge – RF1



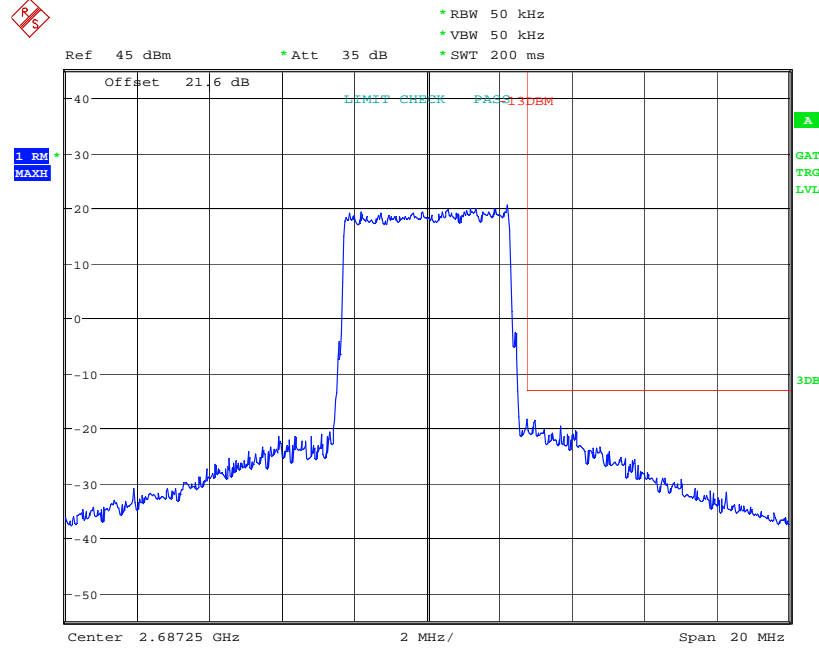
Date: 4.DEC.2008 09:46:59

Lower Bandedge – RF2



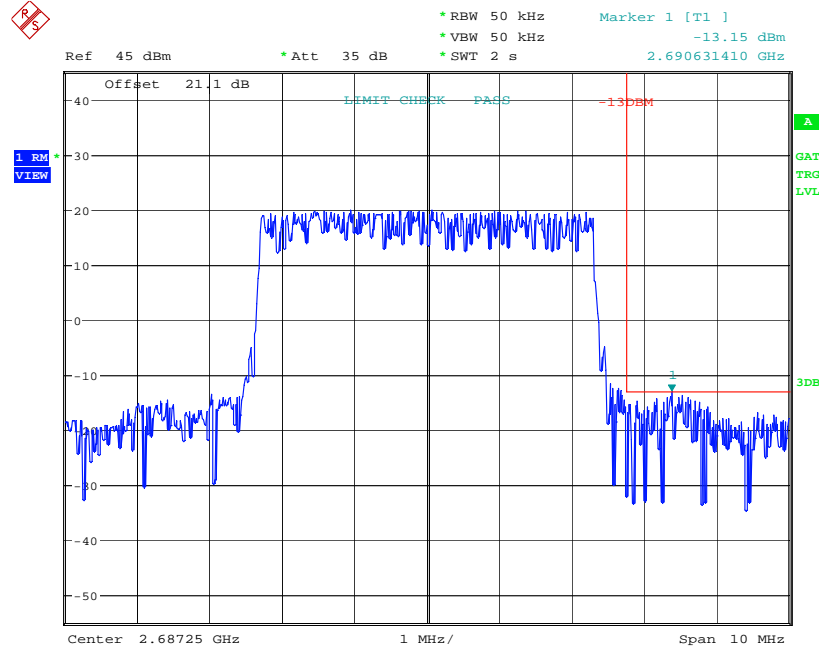
Date: 4.DEC.2008 09:11:40

Upper Bandedge – RF1



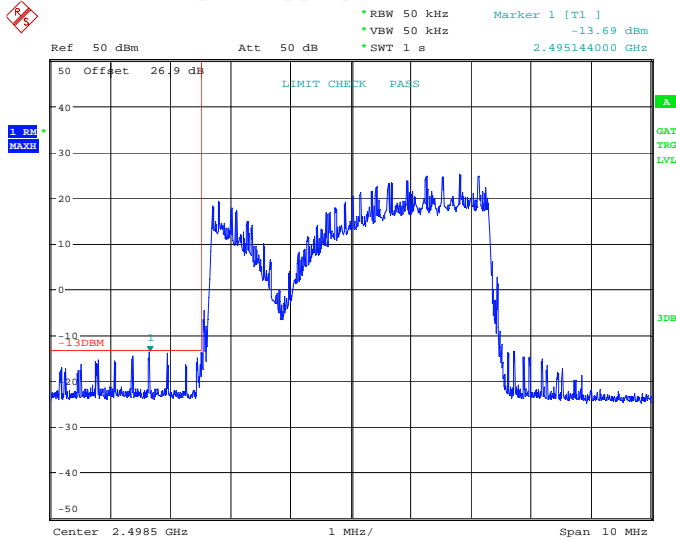
Date: 3.DEC.2008 11:34:49

Upper Bandedge – RF2



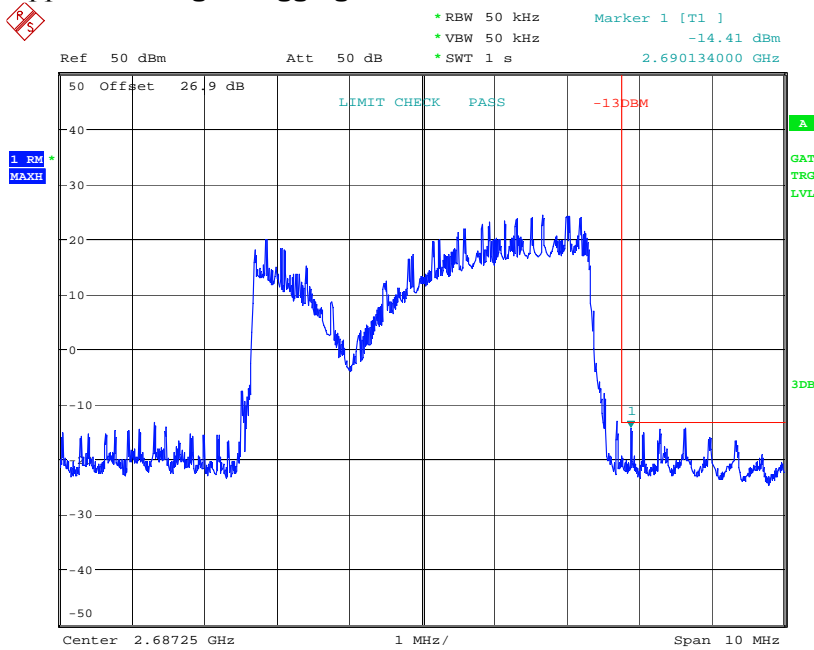
Date: 3.DEC.2008 16:50:46

Lower Bandedge – Aggregate



Date: 22.JAN.2009 11:13:18

Upper Bandedge – Aggregate



Date: 22.JAN.2009 11:06:40

Clause 27.53(m) Field Strength of Spurious emissions

For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

(1) Prior to the transition, and thereafter, solely within the MBS, for analog operations with an EIRP in excess of -9 dBW, the signal shall be attenuated at the channel edges by at least 38 dB relative to the peak visual carrier, then linearly sloping from that level to at least 60 dB of attenuation at 1 MHz below the lower band edge and 0.5 MHz above the upper band edge, and attenuated at least 60 dB at all other frequencies.

(2) For digital base stations, the attenuation shall be not less than $43 + 10 \log (P)$ dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Provided that a documented interference complaint cannot be mutually resolved between the parties prior to the applicable deadline, then the following additional attenuation requirements shall apply:

(i) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located 1.5 km or more away, within 24 hours of the receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least $67 + 10 \log (P)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block and shall immediately notify the complaining licensee upon implementation of the additional attenuation. No later than 60 days after the implementation of such additional attenuation, the licensee of the complaining base station must attenuate its base station emissions by at least $67 + 10 \log (P)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(ii) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located less than 1.5 km away, within 24 hours of receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least $67 + 10 \log (P) - 20 \log (D_{km}/1.5)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the complaining licensee, or if both base stations are co-located, limit its undesired signal level at the pre-existing base station receiver(s) to no more than -107 dBm measured in a 5.5 megahertz bandwidth and shall immediately notify the complaining licensee upon such reduction in the undesired signal level. No later than 60 days after such reduction in the undesired signal level, the complaining licensee must attenuate its base station emissions by at least $67 + 10 \log (P)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(iii) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located 1.5 km or more away, within 60 days of receipt of a documented interference complaint the licensee of each base station must attenuate its base station emissions by at least $67 + 10 \log (P)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the other licensee.

(iv) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located less than 1.5 km away, within 60 days of receipt of a documented interference complaint: (a) The licensee of the new or modified base station must attenuate its OOB by at least $67 + 10 \log (P) - 20 \log (D \text{ km} / 1.5)$ measured 3 megahertz above or below, from the channel edge of its frequency block of the other licensee, or if the base stations are co-located, limit its undesired signal level at the other base station receiver(s) to no more than -107 dBm measured in a 5.5-megahertz bandwidth; and (b) the licensee causing the interference must attenuate its emissions by at least $67 + 10 \log (P)$ dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(v) For all fixed digital user stations, the attenuation factor shall be not less than $43 + 10 \log (P)$ dB at the channel edge.

(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). 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 below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

Test Results: Pass

Additional Observations:

The Spectrum was searched from 30MHz to the 10th Harmonic.

All measurements were performed using a Peak Detector with 100kHz RBW below 1GHz and a 1MHz RBW above 1GHz at a distance of 3 meters.



Frequency (MHz)	Pol (V/H)	Rcvd Level (dBUV/m)	Sig sub Factor (dB)	Amplifier gain (dB)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
4997	V	66.47	-58.3	-44.6	-36.43	-13	23.43
4997	H	69.3	-57.9	-44.6	-33.2	-13	20.2
7495.5	V	58.02	-55	-43.6	-40.58	-13	27.58
7495.5	H	66.36	-53.7	-43.6	-30.94	-13	17.94
9994	V	57.07	-52.6	-42	-37.53	-13	24.53
9994	H	59.87	-50.8	-42	-32.93	-13	19.93
5186	V	63.17	-58.3	-44.6	-39.73	-13	26.73
5186	H	67.6	-57.9	-44.6	-34.9	-13	21.9
7779	V	53.64	-55	-43.6	-44.96	-13	31.96
7779	H	55.89	-53.7	-43.6	-41.41	-13	28.41
10372	V	57.32	-52.6	-42	-37.28	-13	24.28
10372	H	61.29	-50.8	-42	-31.51	-13	18.51
5374.5	V	62.7	-58.3	-44.6	-40.2	-13	27.2
5374.5	H	63.73	-57.9	-44.6	-38.77	-13	25.77
8061.75	V	67.12	-55	-43.6	-31.48	-13	18.48
8061.75	H	66.13	-53.7	-43.6	-31.17	-13	18.17
10749	V	63.22	-52.6	-42	-31.38	-13	18.38
10749	H	68.31	-50.8	-42	-24.49	-13	11.49

Signal Substitution Factor = Reference signal level from signal generator
 -Reference signal level received from spectrum analyzer reading
 +Antenna gain
 -Cable loss

Clause 27.54 Frequency Stability

§27.54 Frequency stability. - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

FCC Clause 2.1055 Frequency Stability

§2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a)(2) and (3) of this section

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

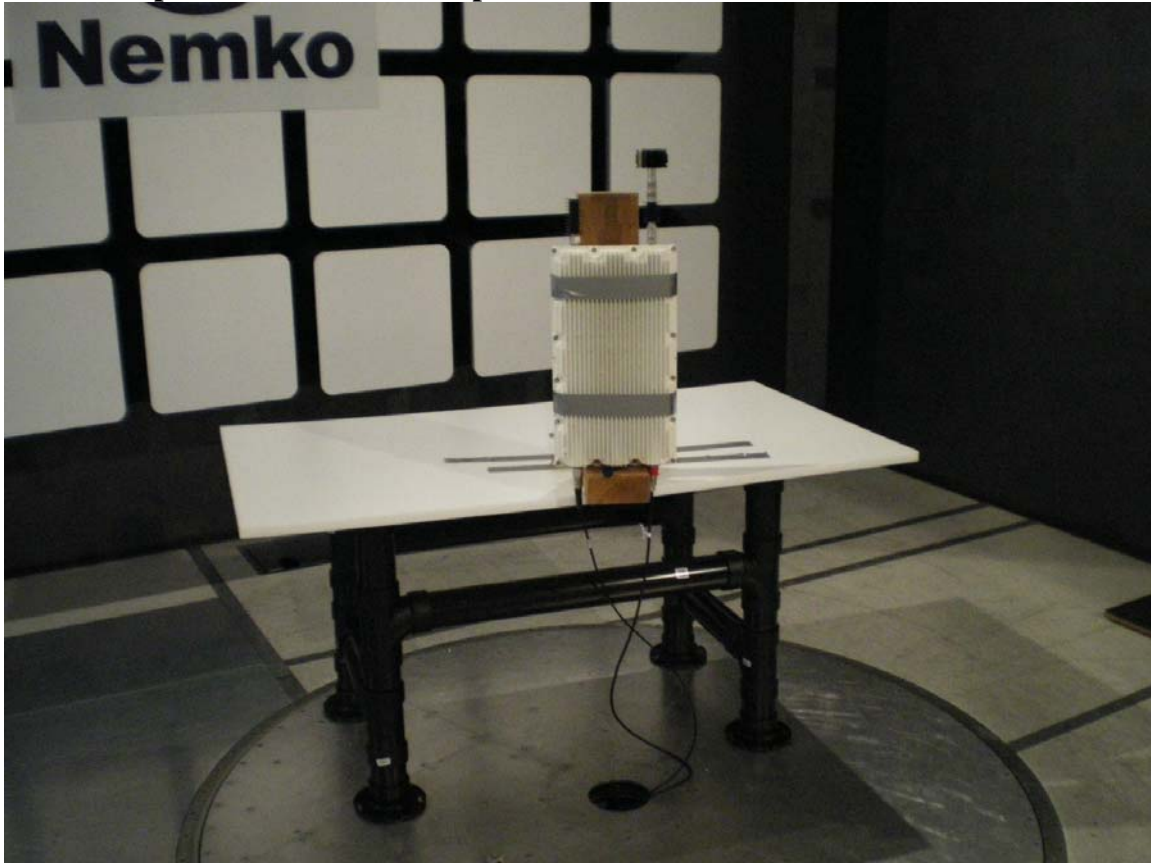
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

Test Results: Pass

Condition	Frequency (Hz)	Offset (ppm)
+50°C	2687250197	0.01
+40°C	2687250242	0.03
+30°C	2687250210	0.02
+20°C, +15% voltage	2687250230	0.02
+20°C	2687250168	—
+20°C, -15% voltage	2687250177	0.00
+10°C	2687250222	0.02
0°C	2687250162	0.00
-10°C	2687250235	0.02
-20°C	2687250210	0.02
-30°C	2687250193	0.01

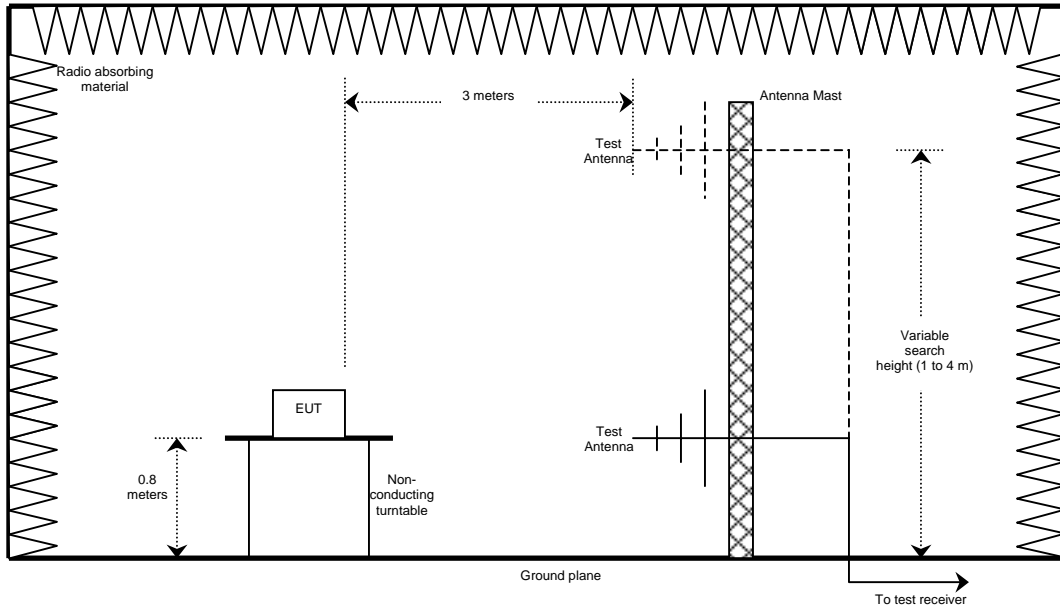
Appendix B : Setup Photographs

Radiated Spurious Emissions Setup:

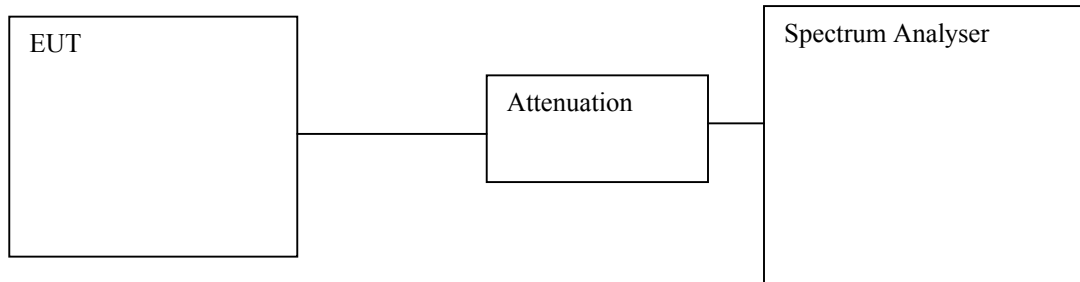


Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions



Conducted Emissions, Output power, Occupied Bandwidth



Frequency Stability

