

Nemko Test Report: 153666-1TRFWL

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

Apparatus: RDL-3000

FCC ID: QC8-RDL3000A

In Accordance With: FCC Part 90
Private Land Mobile Radio Services

Authorized By: 
Laboratory Manager

Date: November 4, 2010

Total Number of Pages: 80

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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 90. Conducted measurements were performed in accordance with ANSI TIA-603-B-2002. Radiated tests were conducted in accordance with ANSI C63.4-2003.

The assessment summary is as follows:

Apparatus Assessed:	RDL-3000
Specification:	FCC Part 90
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:	Kevin Ma, Technical Assessor
Test Dates:	September, 2010

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 contained 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:	Broad-band wireless infrastructure product
Brand Name:	Redline
Model Name or Number:	RDL-3000
Serial Number:	NA
Nemko Sample Number:	2
FCC ID:	QC8-RDL3000A
Date of Receipt:	July 23, 2010

2.2 Accessories

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

Description:	POE Power Adapter
Brand Name:	Cincon Electronics Co., Ltd.
Model Name or Number:	TR60A-POE-L
Serial Number:	002179
Nemko Sample Number:	2
Connection Port:	Shielded Ethernet
Cable Length and Type:	LAN cable

Description:	14 dBi sector flat panel antenna
Brand Name:	Redline
Model Name or Number:	A9014MTD
Serial Number:	00103
Nemko Sample Number:	3
Connection Port:	RF antenna port
Cable Length and Type:	RF cable

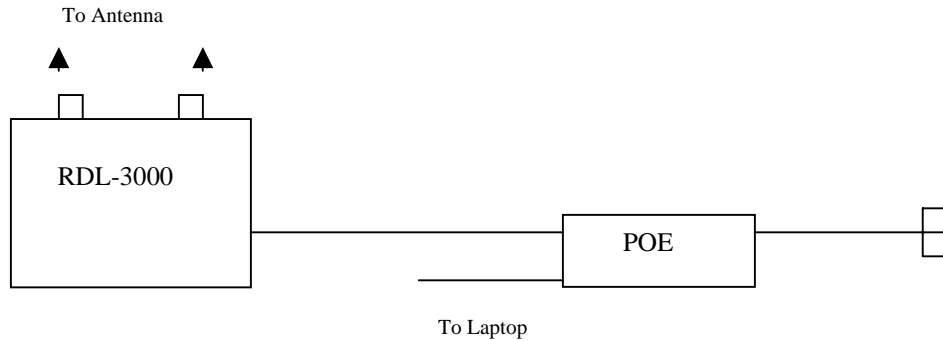
2.3 EUT Description

The EUT is a 2×2 MIMO point-to-point (PTP) carrier grade broadband wireless infrastructure product, designed to operate in the 4940–4990 MHz bands.

2.4 Technical Specifications of the EUT

Operating Band:	4940-4990 MHz
Operating Frequency:	5 MHz Channel: 4942.5–4987.5 MHz 10 MHz Channel: 4945–4985 MHz 20 MHz Channel: 4950–4980 MHz
Modulation:	OFDM using 64-QAM, 16-QAM, QPSK and BPSK modulation for sub-carriers
Occupied Bandwidth:	5 MHz Channel: 4.935 MHz 10 MHz Channel: 9.576 MHz 20 MHz Channel: 19.150 MHz
Emission Designator:	W7D
Antenna Data:	A2308MFD, 14-inch, 8 degree, 23 dBi flat panel antenna, 4.9–5.8 GHz, dual-polarization A2FT2906LTPD, 2 foot, 6 degree, 29 dBi parabolic antenna, 4.9–5.8 GHz, dual-polarization A3FT3204LTPD, 3 foot, 4 degree, 32 dBi parabolic antenna, 4.9–5.8 GHz, dual-polarization A9014MTD, 90 degree, 14 dBi sector flat panel, 4.9–5.95 GHz, dual polarization A6015MTD, 60 degree, 15.5 dBi sector flat panel, 4.9–5.95 GHz, dual polarization
Power Supply Requirements:	–48VDC PoE

2.5 EUT Setup diagram



2.6 Operation of the EUT during testing

The EUT was in a continuous transmitting mode with random data frames. The modulation, channel bandwidth and channel frequency was changed using a Web-base interface of the Ethernet port.

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 90 Private Land Mobile Radio 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.
3 m EMI Test Chamber	TDK	SAC-3	FA002047	Mar. 09/10	Mar. 09/11
Flush Mount Turntable	Sunol	FM2022	FA002082	NCR	NCR
Controller	Sunol	SC104V	FA002060	NCR	NCR
Antenna Mast	Sunol	TLT2	FA002061	NCR	NCR
International Power Supply	California Inst.	3001i	FA001021	COU	COU
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 26	FA002043	Jan. 14/10	Jan. 14/11
Spectrum Analyzer	Rohde & Schwarz	FSU	FA001877	Sept. 29/09	Sept. 29/11
Bilog Antenna	Sunol	JB3	FA002108	Jan. 18/10	Jan. 18/11
Horn Antenna #2	EMCO	3115	FA000825	Jan. 18/10	Jan. 18/11
1-18 GHz Amplifier	JCA	JCA118-503	FA002091	Oct 07/09	Oct 07/10
Temperature Chamber	Thermotron	SM-16C	FA001030	NCR	NCR
Multimeter	Fluke	16	FA001831	Jan. 12/10	Jan. 12/11
Air probe	Fluke	None	FA001561	NCR	NCR
Horn 18-26.5 GHz	Electro-Metrics	SH-50/60-1	FA000479	COU	COU
18-26 GHz Amplifier	NARDA	BBS-1826N612	FA001550	COU	COU
18.0 - 40.0GHz Horn Antenna	EMCO	3116	FA001847	May 13/10	May 13/11
26 - 40.0 GHz Amplifier	NARDA	DBL-2640N610	FA001556	COU	COU
Frequency Counter	HP	5352B	FA001915	Jan 08/10	Jan 08/11
Combiner	Mini-circuits	ZA3PD-4	FA001156	COU	COU

COU – Calibrate on Use

NCR – No Calibration Required

Section 4 : Results Summary

This section contains the following:

FCC Part 90 : 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 90 Y: Test Results

Section	Clause	Test Description	Required	Result
1	90.1215	Occupied Bandwidth	Y	PASS
2	90.1215	Maximum Conducted Output Power	Y	PASS
3	90.1215	Power Spectrum Density	Y	PASS
4	90.1215	The ratio of the peak excursion	Y	PASS
5	90.210(m)	Spurious Emissions at the Antenna Terminals	Y	PASS
6	90.210(m)	Radiated Spurious Emissions	Y	PASS
7	90.213	Frequency Stability	Y	PASS

Notes: None.



Appendix A : Test Results

Clause 90.1215 Occupied Bandwidth

The peak power spectral density is measured as conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements are made over a bandwidth of one MHz or the 26 dB emission bandwidth of the device whichever is less.

Test Results: Pass

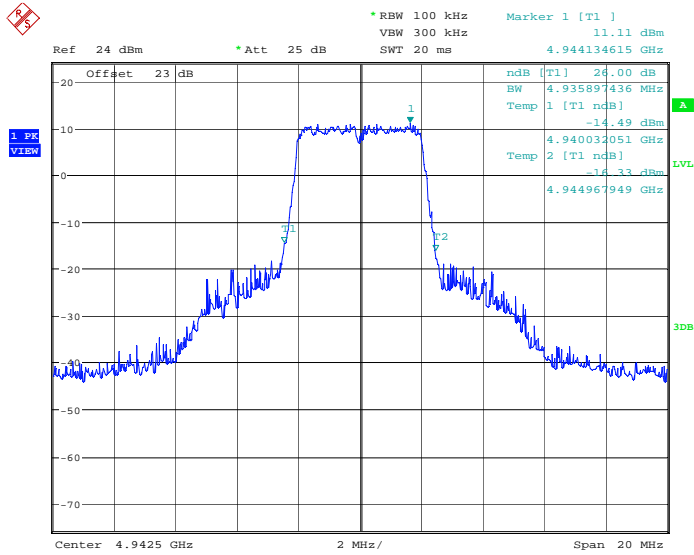
Additional Observations:

All modulations were investigated, only the worst-case results were presented.

26dB Occupied Bandwidth:

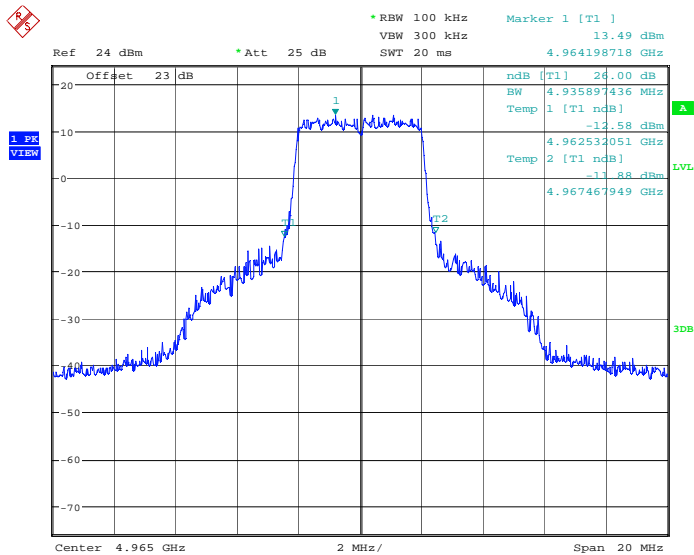
Nominal Channel Bandwidth (MHz)	Channel frequency (MHz)	Measured Occupied Bandwidth (MHz)
5	4942.5	4.935
	4965	4.935
	4987.5	4.839
10	4945	9.567
	4965	9.471
	4985	9.038
20	4950	18.830
	4965	19.150
	4980	18.830

Channel Bandwidth: 5 MHz
 Low Channel:



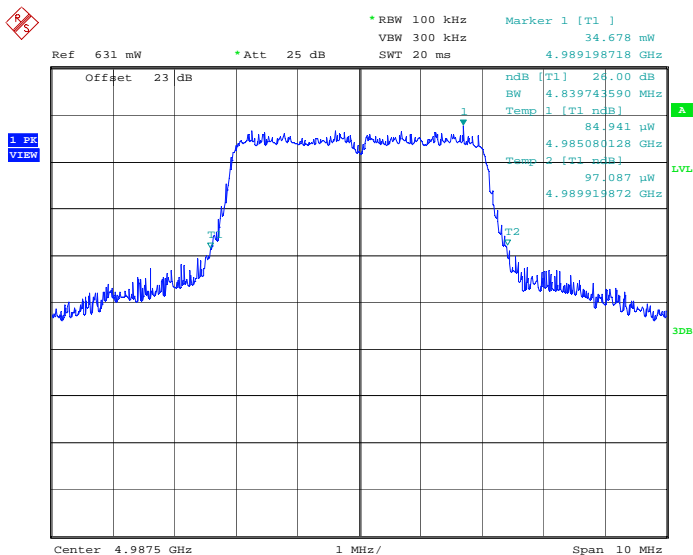
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Mid Channel:



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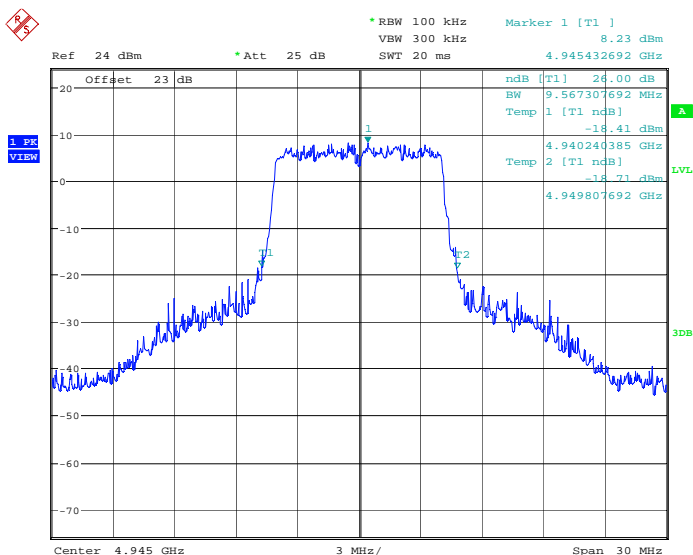
High Channel:



Date: 28.JUL.2010 10:57:55

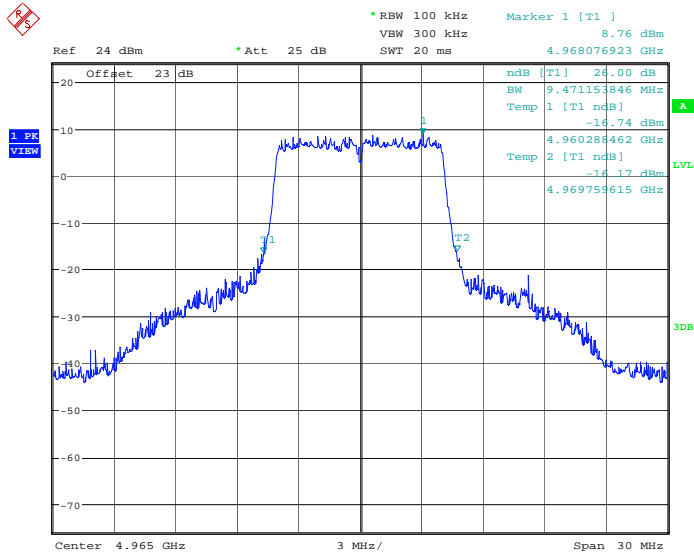
Channel Bandwidth: 10 MHz

Low Channel:



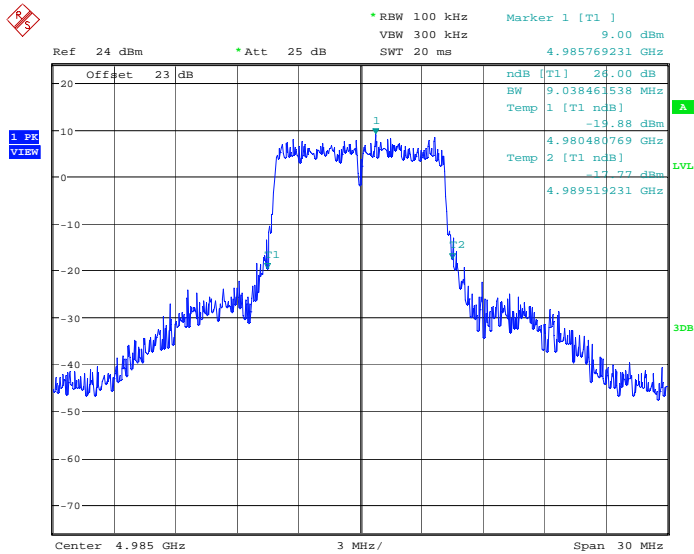
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Mid Channel:



Date: 29.JUL.2010 12:07:05

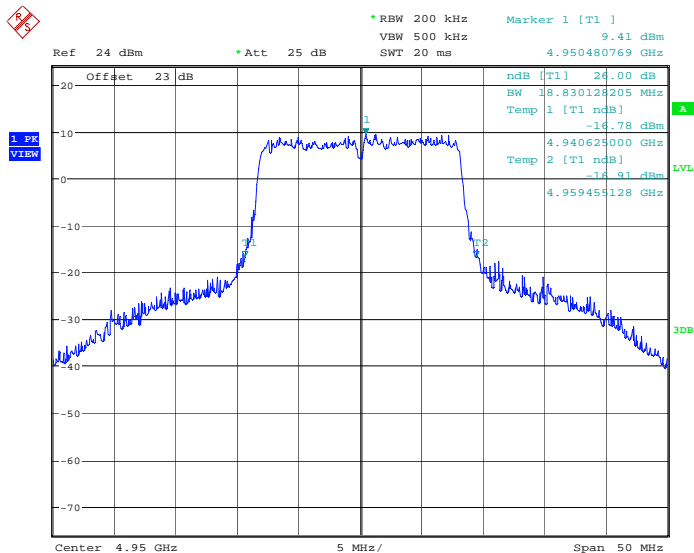
High Channel:



Date: 29.JUL.2010 13:25:20

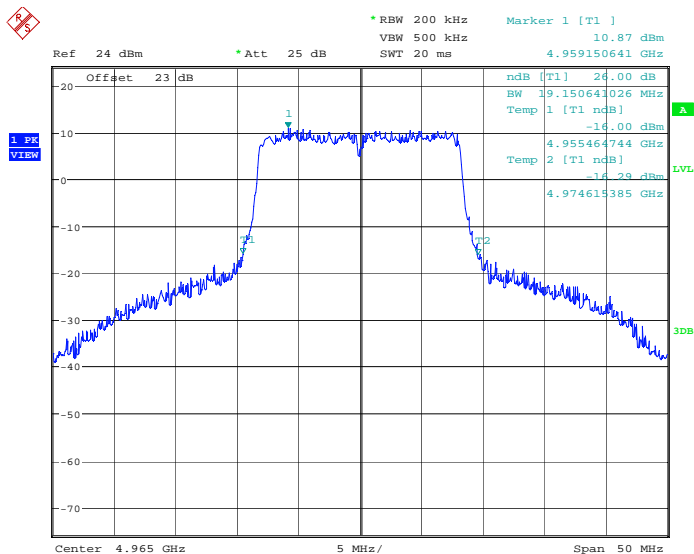
Channel Bandwidth: 20 MHz

Low Channel:



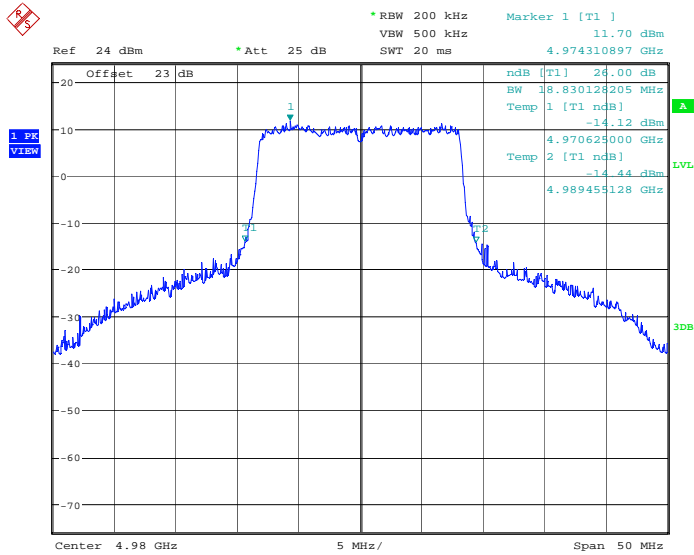
Date: 29.JUL.2010 13:36:31

Mid Channel:



Date: 29.JUL.2010 13:38:21

High Channel:



Date: 29.JUL.2010 13:58:19

Clause 90.1215 Maximum Conducted Output Power

The transmitting power of stations operating in the 4940–4990 MHz band must not exceed the maximum limits in this section.

(a)(1) The maximum conducted output power should not exceed:

Channel Bandwidth (MHz)	Low-power peak transmitter power (dBm)	High-power peak transmitter power (dBm)
1	7	20
5	14	27
10	17	30
15	18.8	31.8
20	20	33

(2) High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point and point-to-multipoint operations (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the maximum conducted output power or spectral density. Corresponding reduction in the maximum conducted output power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi.

Test Results: Pass

Additional Observations:

Two antenna ports were tested separately with MIMO mode, and the aggregate power was summed up mathematically.

RMS detector was used for maximum conducted output power measurement.

Channel Bandwidth: 5 MHz

Low Channel: Central nominal frequency: 4942.5 MHz

Modulation	Conducted Output Power		Combined power (dBm)	Power Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, (dBm)	e.i.r.p Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	104.062	106.399	23.23	27.00	3.77	14.00	37.23	53.00	15.77
QPSK	103.356	110.613	23.30	27.00	3.70	14.00	37.30	53.00	15.70
16QAM	99.259	116.718	23.34	27.00	3.66	14.00	37.34	53.00	15.66
64QAM	114.501	125.959	23.81	27.00	3.19	14.00	37.81	53.00	15.19
BPSK	104.062	106.399	23.23	27.00	3.77	15.50	38.73	53.00	14.27
QPSK	103.356	110.613	23.30	27.00	3.70	15.50	38.80	53.00	14.20
16QAM	99.259	116.718	23.34	27.00	3.66	15.50	38.84	53.00	14.16
64QAM	114.501	125.959	23.81	27.00	3.19	15.50	39.31	53.00	13.69
BPSK	104.062	106.399	23.23	27.00	3.77	23.00	46.23	53.00	6.77
QPSK	103.356	110.613	23.30	27.00	3.70	23.00	46.30	53.00	6.70
16QAM	99.259	116.718	23.34	27.00	3.66	23.00	46.34	53.00	6.66
64QAM	114.501	125.959	23.81	27.00	3.19	23.00	46.81	53.00	6.19
BPSK	73.654	72.469	21.65	24.00	2.35	29.00	50.65	53.00	2.35
QPSK	75.152	72.614	21.70	24.00	2.30	29.00	50.70	53.00	2.30
16QAM	75.454	71.926	21.68	24.00	2.32	29.00	50.68	53.00	2.32
64QAM	74.626	74.151	21.73	24.00	2.27	29.00	50.73	53.00	2.27
BPSK	33.776	33.357	18.27	21.00	2.73	32.00	50.27	53.00	2.73
QPSK	34.220	33.527	18.31	21.00	2.69	32.00	50.31	53.00	2.69
16QAM	34.477	33.549	18.33	21.00	2.67	32.00	50.33	53.00	2.67
64QAM	33.517	32.601	18.20	21.00	2.80	32.00	50.20	53.00	2.80



Mid Channel: Central nominal frequency: 4965 MHz

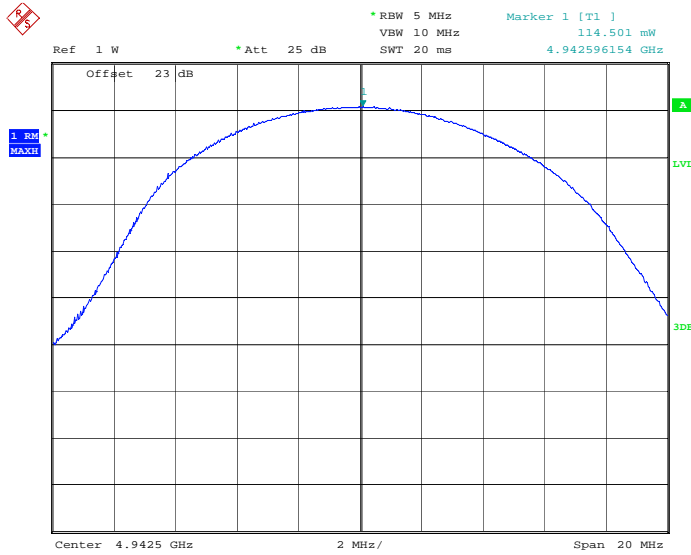
Modulation	Conducted Output Power		Combined power (dBm)	Power Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p., (dBm)	e.i.r.p Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	104.334	112.569	23.36	27.00	3.64	14.00	37.36	53.00	15.64
QPSK	102.312	112.916	23.33	27.00	3.67	14.00	37.33	53.00	15.67
16QAM	107.207	111.755	23.40	27.00	3.60	14.00	37.40	53.00	15.60
64QAM	106.379	110.171	23.36	27.00	3.64	14.00	37.36	53.00	15.64
BPSK	104.334	112.569	23.36	27.00	3.64	15.50	38.86	53.00	14.14
QPSK	102.312	112.916	23.33	27.00	3.67	15.50	38.83	53.00	14.17
16QAM	107.207	111.755	23.40	27.00	3.60	15.50	38.90	53.00	14.10
64QAM	106.379	110.171	23.36	27.00	3.64	15.50	38.86	53.00	14.14
BPSK	104.334	112.569	23.36	27.00	3.64	23.00	46.36	53.00	6.64
QPSK	102.312	112.916	23.33	27.00	3.67	23.00	46.33	53.00	6.67
16QAM	107.207	111.755	23.40	27.00	3.60	23.00	46.40	53.00	6.60
64QAM	106.379	110.171	23.36	27.00	3.64	23.00	46.36	53.00	6.64
BPSK	77.833	80.905	22.01	24.00	1.99	29.00	51.01	53.00	1.99
QPSK	78.507	83.192	22.09	24.00	1.91	29.00	51.09	53.00	1.91
16QAM	74.929	81.932	21.96	24.00	2.04	29.00	50.96	53.00	2.04
64QAM	76.112	82.236	22.00	24.00	2.00	29.00	51.00	53.00	2.00
BPSK	35.116	40.392	18.78	21.00	2.22	32.00	50.78	53.00	2.22
QPSK	36.663	41.839	18.95	21.00	2.05	32.00	50.95	53.00	2.05
16QAM	35.684	39.743	18.78	21.00	2.22	32.00	50.78	53.00	2.22
64QAM	33.890	37.721	18.55	21.00	2.45	32.00	50.55	53.00	2.45

High Channel: Central nominal frequency: 4987.5 MHz

Modulation	Conducted Output Power		Combined power (dBm)	Power Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, (dBm)	e.i.r.p Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	127.326	130.523	24.11	27.00	2.89	14.00	38.11	53.00	14.89
QPSK	117.662	127.225	23.89	27.00	3.11	14.00	37.89	53.00	15.11
16QAM	126.376	133.785	24.15	27.00	2.85	14.00	38.15	53.00	14.85
64QAM	114.519	123.394	23.76	27.00	3.24	14.00	37.76	53.00	15.24
BPSK	127.326	130.523	24.11	27.00	2.89	15.50	39.61	53.00	13.39
QPSK	117.662	127.225	23.89	27.00	3.11	15.50	39.39	53.00	13.61
16QAM	126.376	133.785	24.15	27.00	2.85	15.50	39.65	53.00	13.35
64QAM	114.519	123.394	23.76	27.00	3.24	15.50	39.26	53.00	13.74
BPSK	127.326	130.523	24.11	27.00	2.89	23.00	47.11	53.00	5.89
QPSK	117.662	127.225	23.89	27.00	3.11	23.00	46.89	53.00	6.11
16QAM	126.376	133.785	24.15	27.00	2.85	23.00	47.15	53.00	5.85
64QAM	114.519	123.394	23.76	27.00	3.24	23.00	46.76	53.00	6.24
BPSK	80.781	89.008	22.30	24.00	1.70	29.00	51.30	53.00	1.70
QPSK	78.239	92.504	22.32	24.00	1.68	29.00	51.32	53.00	1.68
16QAM	79.191	89.066	22.26	24.00	1.74	29.00	51.26	53.00	1.74
64QAM	78.119	90.345	22.27	24.00	1.73	29.00	51.27	53.00	1.73
BPSK	35.905	42.478	18.94	21.00	2.06	32.00	50.94	53.00	2.06
QPSK	35.741	42.954	18.96	21.00	2.04	32.00	50.96	53.00	2.04
16QAM	35.773	41.693	18.89	21.00	2.11	32.00	50.89	53.00	2.11
64QAM	37.058	41.438	18.95	21.00	2.05	32.00	50.95	53.00	2.05

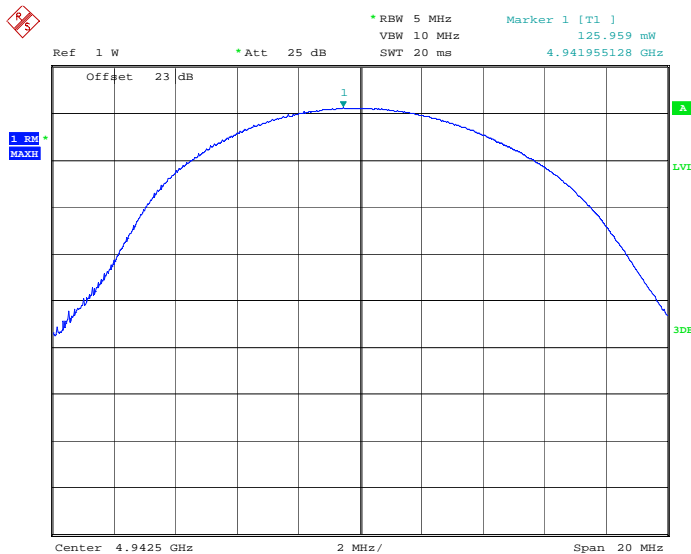
Low Channel:

Antenna Port 1



Date: 28.JUL.2010 10:27:52

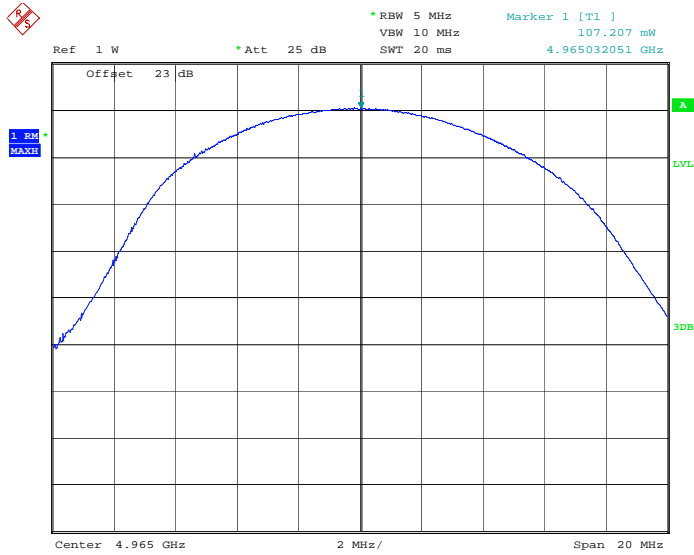
Antenna port 2



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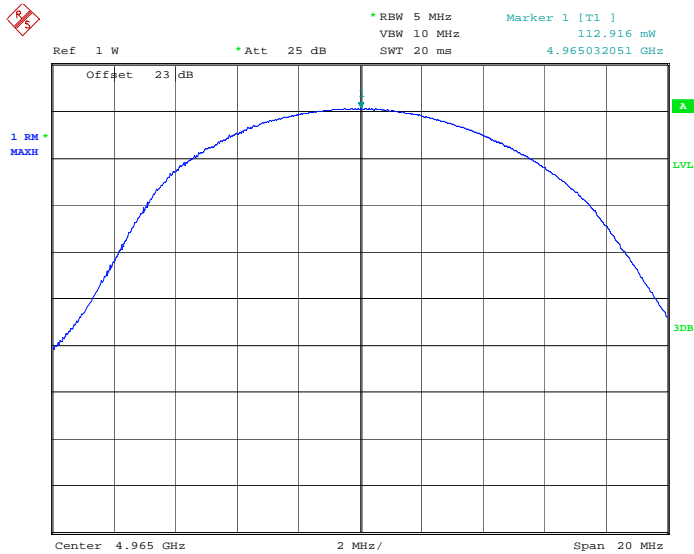
Mid Channel:

Antenna Port 1



Date: 28.JUL.2010 10:24:02

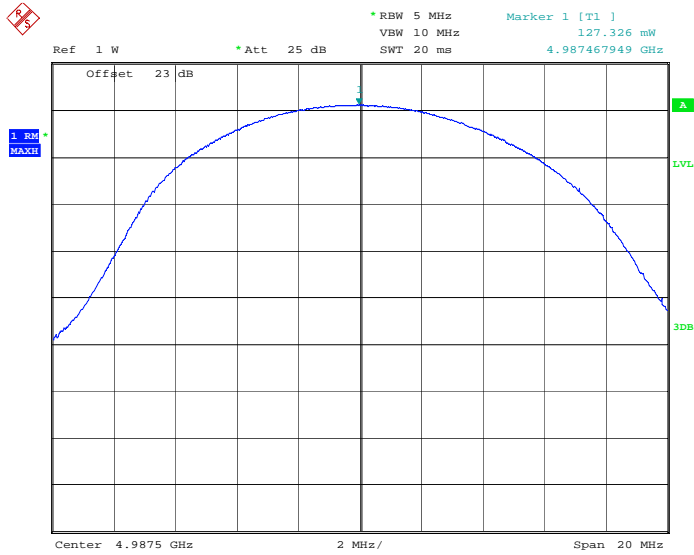
Antenna port 2



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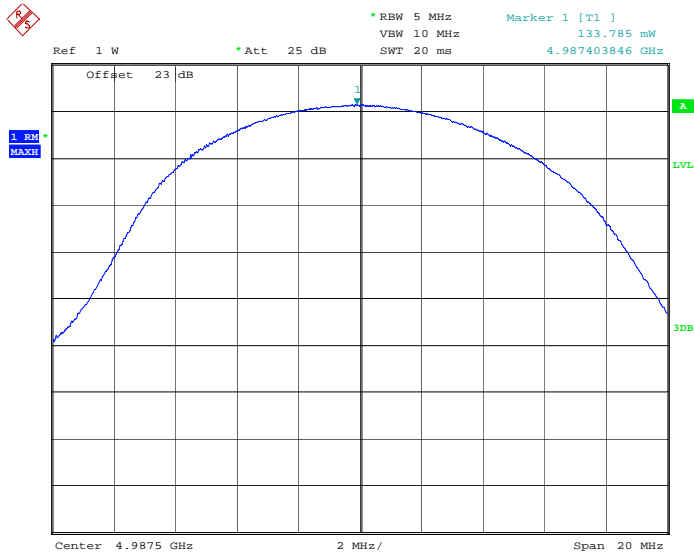
High Channel:

Antenna Port 1



Date: 28.JUL.2010 10:51:02

Antenna port 2



Date: 28.JUL.2010 10:44:32

Channel Bandwidth: 10 MHz

Low Channel: Central nominal frequency: 4945 MHz

Modulation	Conducted Output Power		Combined power (dBm)	Power Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, (dBm)	e.i.r.p Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	160.056	140.689	24.78	30.00	5.22	14.00	38.78	56.00	17.22
QPSK	155.713	134.841	24.63	30.00	5.37	14.00	38.63	56.00	17.37
16QAM	161.417	147.693	24.90	30.00	5.10	14.00	38.90	56.00	17.10
64QAM	161.917	148.130	24.91	30.00	5.09	14.00	38.91	56.00	17.09
BPSK	160.056	140.689	24.78	30.00	5.22	15.50	40.28	56.00	15.72
QPSK	155.713	134.841	24.63	30.00	5.37	15.50	40.13	56.00	15.87
16QAM	161.417	147.693	24.90	30.00	5.10	15.50	40.40	56.00	15.60
64QAM	161.917	148.130	24.91	30.00	5.09	15.50	40.41	56.00	15.59
BPSK	160.056	140.689	24.78	30.00	5.22	23.00	47.78	56.00	8.22
QPSK	155.713	134.841	24.63	30.00	5.37	23.00	47.63	56.00	8.37
16QAM	161.417	147.693	24.90	30.00	5.10	23.00	47.90	56.00	8.10
64QAM	161.917	148.130	24.91	30.00	5.09	23.00	47.91	56.00	8.09
BPSK	160.056	140.689	24.78	27.00	2.22	29.00	53.78	56.00	2.22
QPSK	155.713	134.841	24.63	27.00	2.37	29.00	53.63	56.00	2.37
16QAM	161.417	147.693	24.90	27.00	2.10	29.00	53.90	56.00	2.10
64QAM	161.917	148.130	24.91	27.00	2.09	29.00	53.91	56.00	2.09
BPSK	65.941	67.937	21.27	24.00	2.73	32.00	53.27	56.00	2.73
QPSK	67.048	67.781	21.30	24.00	2.70	32.00	53.30	56.00	2.70
16QAM	66.757	65.903	21.23	24.00	2.77	32.00	53.23	56.00	2.77
64QAM	65.821	66.186	21.21	24.00	2.79	32.00	53.21	56.00	2.79

Mid Channel: Central nominal frequency: 4965 MHz

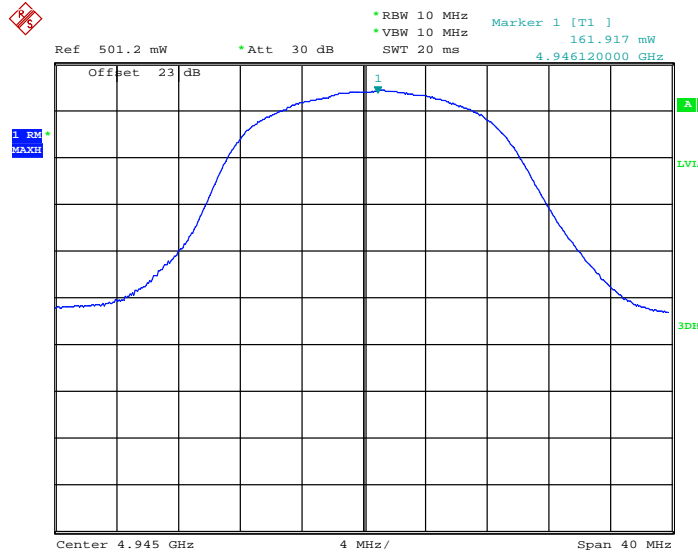
Modulation	Conducted Output Power		Combined power (dBm)	Power Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p., (dBm)	e.i.r.p Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	154.603	146.274	24.78	30.00	5.22	14.00	38.78	56.00	17.22
QPSK	155.721	145.297	24.79	30.00	5.21	14.00	38.79	56.00	17.21
16QAM	157.693	142.458	24.77	30.00	5.23	14.00	38.77	56.00	17.23
64QAM	158.235	144.739	24.81	30.00	5.19	14.00	38.81	56.00	17.19
BPSK	154.603	146.274	24.78	30.00	5.22	15.50	40.28	56.00	15.72
QPSK	155.721	145.297	24.79	30.00	5.21	15.50	40.29	56.00	15.71
16QAM	157.693	142.458	24.77	30.00	5.23	15.50	40.27	56.00	15.73
64QAM	158.235	144.739	24.81	30.00	5.19	15.50	40.31	56.00	15.69
BPSK	154.603	146.274	24.78	30.00	5.22	23.00	47.78	56.00	8.22
QPSK	155.721	145.297	24.79	30.00	5.21	23.00	47.79	56.00	8.21
16QAM	157.693	142.458	24.77	30.00	5.23	23.00	47.77	56.00	8.23
64QAM	158.235	144.739	24.81	30.00	5.19	23.00	47.81	56.00	8.19
BPSK	154.603	146.274	24.78	27.00	2.22	29.00	53.78	56.00	2.22
QPSK	155.721	145.297	24.79	27.00	2.21	29.00	53.79	56.00	2.21
16QAM	157.693	142.458	24.77	27.00	2.23	29.00	53.77	56.00	2.23
64QAM	158.235	144.739	24.81	27.00	2.19	29.00	53.81	56.00	2.19
BPSK	62.435	69.329	21.20	24.00	2.80	32.00	53.20	56.00	2.80
QPSK	60.620	70.589	21.18	24.00	2.82	32.00	53.18	56.00	2.82
16QAM	60.469	70.767	21.18	24.00	2.82	32.00	53.18	56.00	2.82
64QAM	60.758	69.974	21.16	24.00	2.84	32.00	53.16	56.00	2.84

High Channel: Central nominal frequency: 4985 MHz

Modulation	Conducted Output Power		Combined power (dBm)	Power Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p., (dBm)	e.i.r.p Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	182.957	156.277	25.30	30.00	4.70	14.00	39.30	56.00	16.70
QPSK	180.893	161.749	25.35	30.00	4.65	14.00	39.35	56.00	16.65
16QAM	182.668	154.504	25.28	30.00	4.72	14.00	39.28	56.00	16.72
64QAM	181.893	153.608	25.26	30.00	4.74	14.00	39.26	56.00	16.74
BPSK	182.957	156.277	25.30	30.00	4.70	15.50	40.80	56.00	15.20
QPSK	180.893	161.749	25.35	30.00	4.65	15.50	40.85	56.00	15.15
16QAM	182.668	154.504	25.28	30.00	4.72	15.50	40.78	56.00	15.22
64QAM	181.893	153.608	25.26	30.00	4.74	15.50	40.76	56.00	15.24
BPSK	182.957	156.277	25.30	30.00	4.70	23.00	48.30	56.00	7.70
QPSK	180.893	161.749	25.35	30.00	4.65	23.00	48.35	56.00	7.65
16QAM	182.668	154.504	25.28	30.00	4.72	23.00	48.28	56.00	7.72
64QAM	181.893	153.608	25.26	30.00	4.74	23.00	48.26	56.00	7.74
BPSK	182.957	156.277	25.30	27.00	1.70	29.00	54.30	56.00	1.70
QPSK	180.893	161.749	25.35	27.00	1.65	29.00	54.35	56.00	1.65
16QAM	182.668	154.504	25.28	27.00	1.72	29.00	54.28	56.00	1.72
64QAM	181.893	153.608	25.26	27.00	1.74	29.00	54.26	56.00	1.74
BPSK	70.894	65.954	21.36	24.00	2.64	32.00	53.36	56.00	2.64
QPSK	69.070	65.486	21.29	24.00	2.71	32.00	53.29	56.00	2.71
16QAM	68.180	65.200	21.25	24.00	2.75	32.00	53.25	56.00	2.75
64QAM	68.319	66.028	21.28	24.00	2.72	32.00	53.28	56.00	2.72

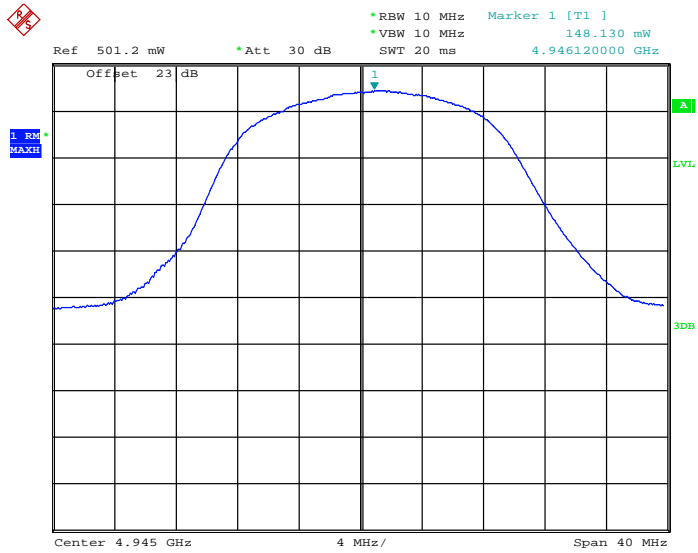
Low Channel:

Antenna Port 1



Date: 3.SEP.2010 11:57:37

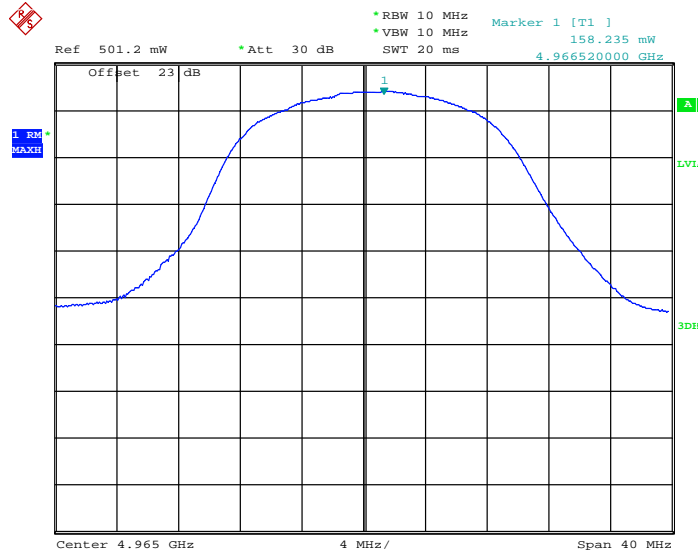
Antenna Port 2



Date: 3.SEP.2010 12:34:10

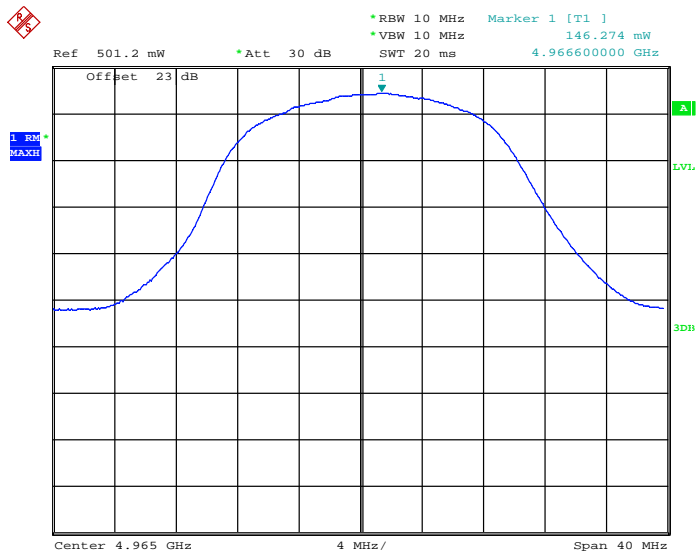
Mid Channel:

Antenna Port 1



Date: 3.SEP.2010 13:10:26

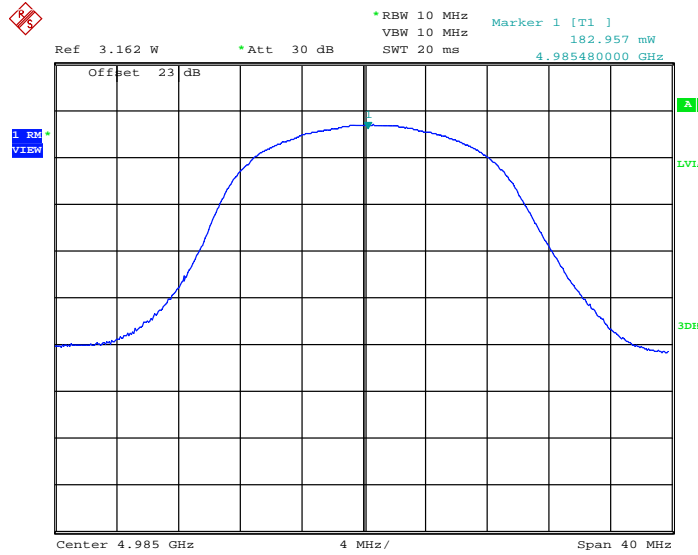
Antenna Port 2



Date: 3.SEP.2010 13:22:34

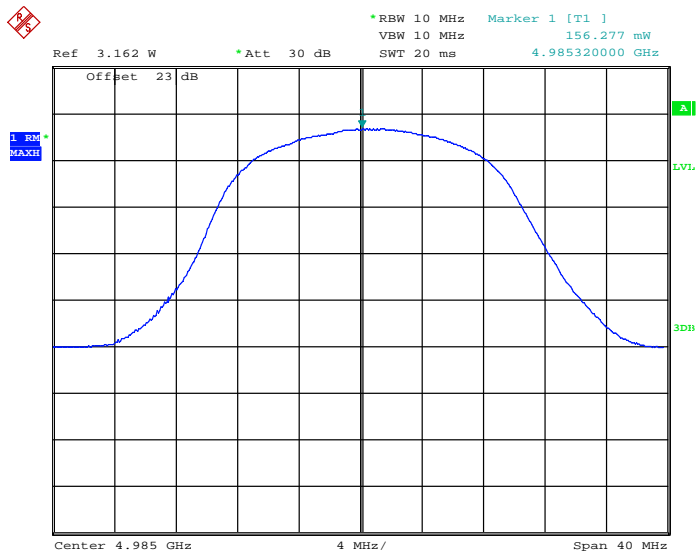
High Channel:

Antenna Port 1



Date: 7.SEP.2010 11:15:19

Antenna Port 2



Date: 7.SEP.2010 10:55:06

Channel Bandwidth: 20 MHz

Low Channel: Central nominal frequency: 4950 MHz

Modulation	Conducted Output Power		Combined power (dBm)	Power Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, (dBm)	e.i.r.p Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	176.481	155.980	25.22	33.00	7.78	14.00	39.22	59.00	19.78
QPSK	173.572	152.342	25.13	33.00	7.87	14.00	39.13	59.00	19.87
16QAM	176.002	152.732	25.17	33.00	7.83	14.00	39.17	59.00	19.83
64QAM	175.109	154.082	25.17	33.00	7.83	14.00	39.17	59.00	19.83
BPSK	176.481	155.980	25.22	33.00	7.78	15.50	40.72	59.00	18.28
QPSK	173.572	152.342	25.13	33.00	7.87	15.50	40.63	59.00	18.37
16QAM	176.002	152.732	25.17	33.00	7.83	15.50	40.67	59.00	18.33
64QAM	175.109	154.082	25.17	33.00	7.83	15.50	40.67	59.00	18.33
BPSK	176.481	155.980	25.22	33.00	7.78	23.00	48.22	59.00	10.78
QPSK	173.572	152.342	25.13	33.00	7.87	23.00	48.13	59.00	10.87
16QAM	176.002	152.732	25.17	33.00	7.83	23.00	48.17	59.00	10.83
64QAM	175.109	154.082	25.17	33.00	7.83	23.00	48.17	59.00	10.83
BPSK	176.481	155.980	25.22	30.00	4.78	29.00	54.22	59.00	4.78
QPSK	173.572	152.342	25.13	30.00	4.87	29.00	54.13	59.00	4.87
16QAM	176.002	152.732	25.17	30.00	4.83	29.00	54.17	59.00	4.83
64QAM	175.109	154.082	25.17	30.00	4.83	29.00	54.17	59.00	4.83
BPSK	176.481	155.980	25.22	27.00	1.78	32.00	57.22	59.00	1.78
QPSK	173.572	152.342	25.13	27.00	1.87	32.00	57.13	59.00	1.87
16QAM	176.002	152.732	25.17	27.00	1.83	32.00	57.17	59.00	1.83
64QAM	175.109	154.082	25.17	27.00	1.83	32.00	57.17	59.00	1.83

Mid Channel: Central nominal frequency: 4965 MHz

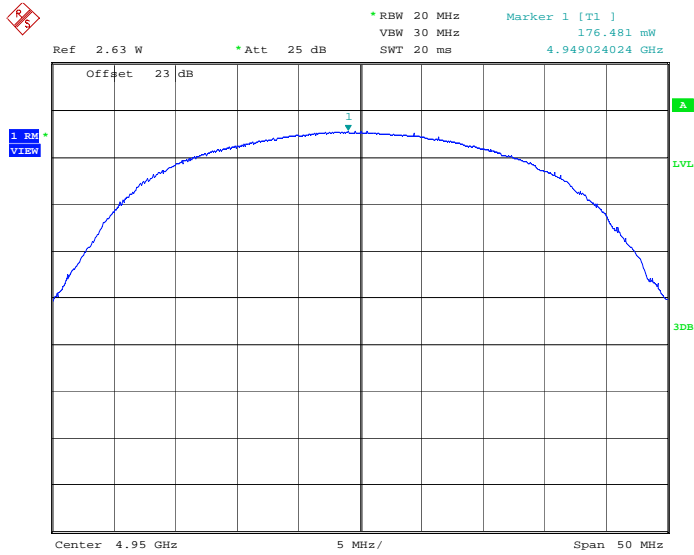
Modulation	Conducted Output Power		Combined power (dBm)	Power Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p., (dBm)	e.i.r.p Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	176.399	177.970	25.49	33.00	7.51	14.00	39.49	59.00	19.51
QPSK	179.936	179.170	25.55	33.00	7.45	14.00	39.55	59.00	19.45
16QAM	176.171	177.751	25.49	33.00	7.51	14.00	39.49	59.00	19.51
64QAM	175.762	177.102	25.48	33.00	7.52	14.00	39.48	59.00	19.52
BPSK	176.399	177.970	25.49	33.00	7.51	15.50	40.99	59.00	18.01
QPSK	179.936	179.170	25.55	33.00	7.45	15.50	41.05	59.00	17.95
16QAM	176.171	177.751	25.49	33.00	7.51	15.50	40.99	59.00	18.01
64QAM	175.762	177.102	25.48	33.00	7.52	15.50	40.98	59.00	18.02
BPSK	176.399	177.970	25.49	33.00	7.51	23.00	48.49	59.00	10.51
QPSK	179.936	179.170	25.55	33.00	7.45	23.00	48.55	59.00	10.45
16QAM	176.171	177.751	25.49	33.00	7.51	23.00	48.49	59.00	10.51
64QAM	175.762	177.102	25.48	33.00	7.52	23.00	48.48	59.00	10.52
BPSK	176.399	177.970	25.49	30.00	4.51	29.00	54.49	59.00	4.51
QPSK	179.936	179.170	25.55	30.00	4.45	29.00	54.55	59.00	4.45
16QAM	176.171	177.751	25.49	30.00	4.51	29.00	54.49	59.00	4.51
64QAM	175.762	177.102	25.48	30.00	4.52	29.00	54.48	59.00	4.52
BPSK	176.399	177.970	25.49	27.00	1.51	32.00	57.49	59.00	1.51
QPSK	179.936	179.170	25.55	27.00	1.45	32.00	57.55	59.00	1.45
16QAM	176.171	177.751	25.49	27.00	1.51	32.00	57.49	59.00	1.51
64QAM	175.762	177.102	25.48	27.00	1.52	32.00	57.48	59.00	1.52

High Channel: Central nominal frequency: 4980 MHz

Modulation	Conducted Output Power		Combined power (dBm)	Power Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p., (dBm)	e.i.r.p Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	181.611	165.715	25.41	33.00	7.59	14.00	39.41	59.00	19.59
QPSK	182.863	164.521	25.41	33.00	7.59	14.00	39.41	59.00	19.59
16QAM	184.430	164.024	25.42	33.00	7.58	14.00	39.42	59.00	19.58
64QAM	185.168	164.826	25.44	33.00	7.56	14.00	39.44	59.00	19.56
BPSK	181.611	165.715	25.41	33.00	7.59	15.50	40.91	59.00	18.09
QPSK	182.863	164.521	25.41	33.00	7.59	15.50	40.91	59.00	18.09
16QAM	184.430	164.024	25.42	33.00	7.58	15.50	40.92	59.00	18.08
64QAM	185.168	164.826	25.44	33.00	7.56	15.50	40.94	59.00	18.06
BPSK	181.611	165.715	25.41	33.00	7.59	23.00	48.41	59.00	10.59
QPSK	182.863	164.521	25.41	33.00	7.59	23.00	48.41	59.00	10.59
16QAM	184.430	164.024	25.42	33.00	7.58	23.00	48.42	59.00	10.58
64QAM	185.168	164.826	25.44	33.00	7.56	23.00	48.44	59.00	10.56
BPSK	181.611	165.715	25.41	30.00	4.59	29.00	54.41	59.00	4.59
QPSK	182.863	164.521	25.41	30.00	4.59	29.00	54.41	59.00	4.59
16QAM	184.430	164.024	25.42	30.00	4.58	29.00	54.42	59.00	4.58
64QAM	185.168	164.826	25.44	30.00	4.56	29.00	54.44	59.00	4.56
BPSK	181.611	165.715	25.41	27.00	1.59	32.00	57.41	59.00	1.59
QPSK	182.863	164.521	25.41	27.00	1.59	32.00	57.41	59.00	1.59
16QAM	184.430	164.024	25.42	27.00	1.58	32.00	57.42	59.00	1.58
64QAM	185.168	164.826	25.44	27.00	1.56	32.00	57.44	59.00	1.56

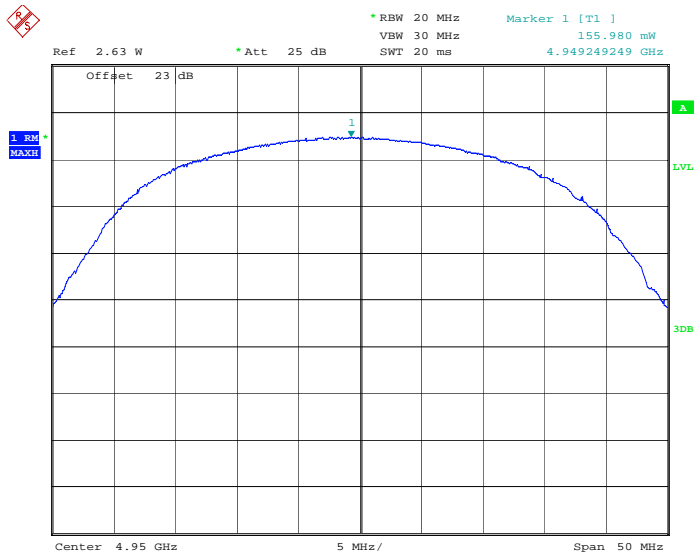
Low Channel:

Antenna Port 1



Date: 7.SEP.2010 15:04:19

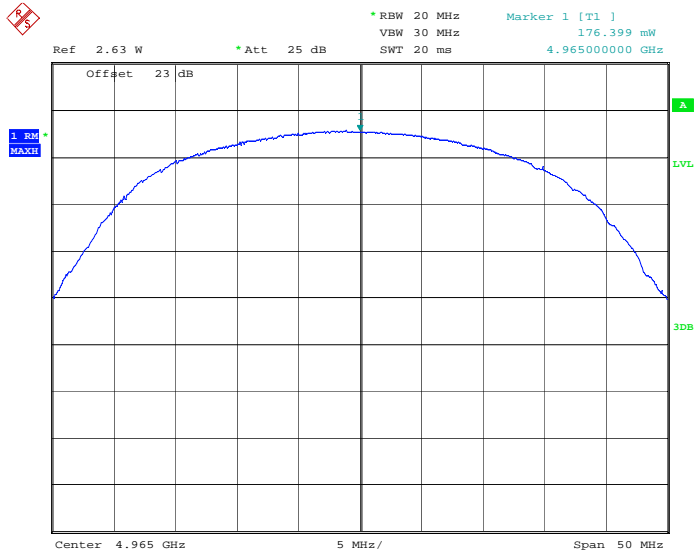
Antenna Port 2



Date: 7.SEP.2010 15:01:01

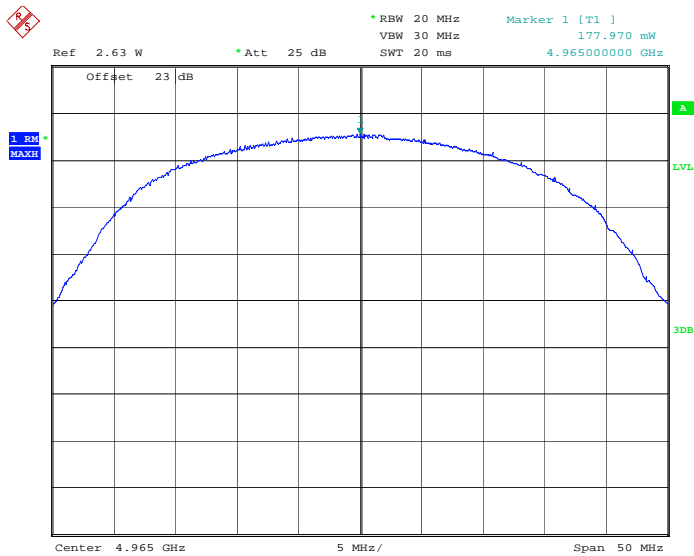
Mid Channel:

Antenna Port 1



Date: 7.SEP.2010 15:10:52

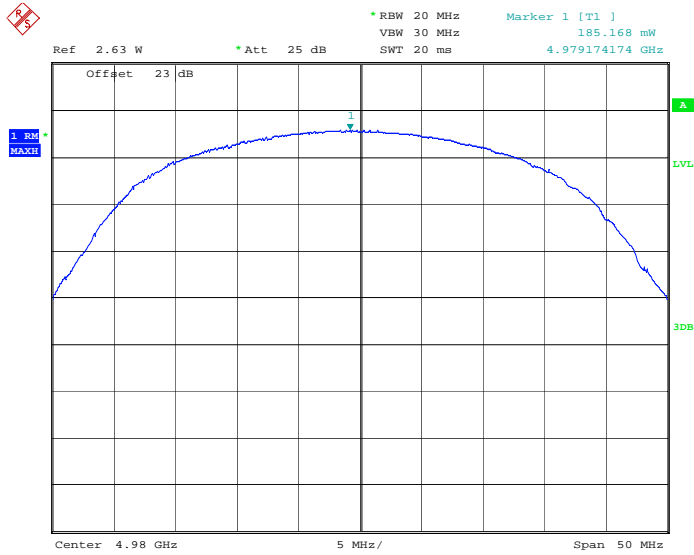
Antenna Port 2



Date: 7.SEP.2010 15:09:53

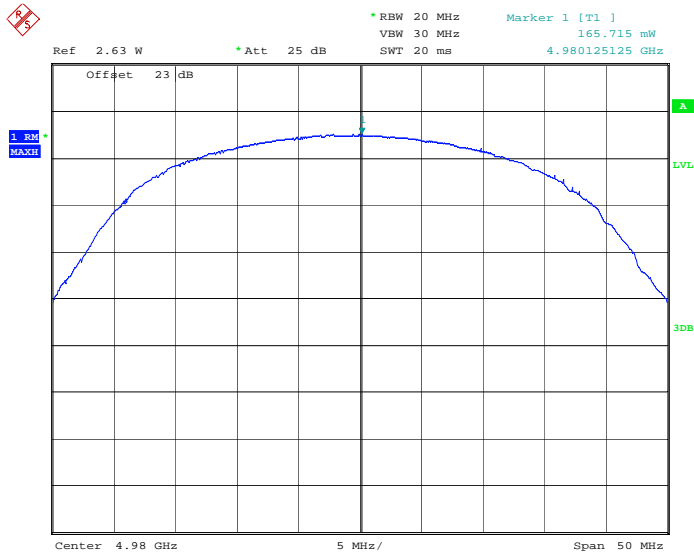
High Channel:

Antenna Port 1



Date: 7.SEP.2010 15:14:22

Antenna Port 2



Date: 7.SEP.2010 15:18:15



Nemko Canada Inc.

Clause 90.1215 Power Spectrum Density

2) High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point and point-to-multipoint operations (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the maximum conducted output power or spectral density. Corresponding reduction in the maximum conducted output power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi.

Test Results: Pass

Additional Observations:

Two antenna ports were tested separately with MIMO mode, and the aggregate PSD was summed up mathematically.

RMS detector was used for power spectrum density measurement.

Channel Bandwidth: 5 MHz

Low Channel: Central nominal frequency: 4942.5 MHz

Modulation	Conducted PSD		Combined PSD (dBm)	PSD Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, PSD (dBm)	e.i.r.p PSD Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	56.448	59.005	20.62	21.00	0.38	14.00	34.62	47.00	12.38
QPSK	57.045	58.846	20.64	21.00	0.36	14.00	34.64	47.00	12.36
16QAM	57.295	58.204	20.63	21.00	0.37	14.00	34.63	47.00	12.37
64QAM	59.516	57.873	20.70	21.00	0.30	14.00	34.70	47.00	12.30
BPSK	56.448	59.005	20.62	21.00	0.38	15.50	36.12	47.00	10.88
QPSK	57.045	58.846	20.64	21.00	0.36	15.50	36.14	47.00	10.86
16QAM	57.295	58.204	20.63	21.00	0.37	15.50	36.13	47.00	10.87
64QAM	59.516	57.873	20.70	21.00	0.30	15.50	36.20	47.00	10.80
BPSK	56.448	59.005	20.62	21.00	0.38	23.00	43.62	47.00	3.38
QPSK	57.045	58.846	20.64	21.00	0.36	23.00	43.64	47.00	3.36
16QAM	57.295	58.204	20.63	21.00	0.37	23.00	43.63	47.00	3.37
64QAM	59.516	57.873	20.70	21.00	0.30	23.00	43.70	47.00	3.30
BPSK	31.399	28.204	17.75	18.00	0.25	29.00	46.75	47.00	0.25
QPSK	31.167	28.629	17.77	18.00	0.23	29.00	46.77	47.00	0.23
16QAM	31.582	27.845	17.74	18.00	0.26	29.00	46.74	47.00	0.26
64QAM	30.817	27.696	17.67	18.00	0.33	29.00	46.67	47.00	0.33
BPSK	13.667	13.878	14.40	15.00	0.60	32.00	46.40	47.00	0.60
QPSK	13.723	14.103	14.44	15.00	0.56	32.00	46.44	47.00	0.56
16QAM	13.694	13.912	14.41	15.00	0.59	32.00	46.41	47.00	0.59
64QAM	13.787	14.128	14.46	15.00	0.54	32.00	46.46	47.00	0.54

Mid Channel: Central nominal frequency: 4965 MHz

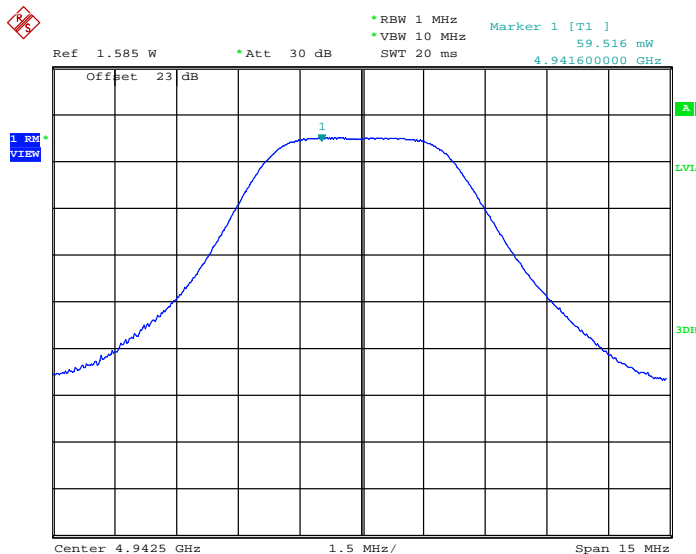
Modulation	Conducted PSD		Combined PSD (dBm)	PSD Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, PSD (dBm)	e.i.r.p PSD Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	52.457	52.549	20.21	21.00	0.79	14.00	34.21	47.00	12.79
QPSK	53.380	52.390	20.24	21.00	0.76	14.00	34.24	47.00	12.76
16QAM	52.072	51.898	20.17	21.00	0.83	14.00	34.17	47.00	12.83
64QAM	55.645	51.800	20.31	21.00	0.69	14.00	34.31	47.00	12.69
BPSK	52.457	52.549	20.21	21.00	0.79	15.50	35.71	47.00	11.29
QPSK	53.380	52.390	20.24	21.00	0.76	15.50	35.74	47.00	11.26
16QAM	52.072	51.898	20.17	21.00	0.83	15.50	35.67	47.00	11.33
64QAM	55.645	51.800	20.31	21.00	0.69	15.50	35.81	47.00	11.19
BPSK	52.457	52.549	20.21	21.00	0.79	23.00	43.21	47.00	3.79
QPSK	53.380	52.390	20.24	21.00	0.76	23.00	43.24	47.00	3.76
16QAM	52.072	51.898	20.17	21.00	0.83	23.00	43.17	47.00	3.83
64QAM	55.645	51.800	20.31	21.00	0.69	23.00	43.31	47.00	3.69
BPSK	28.156	28.751	17.55	18.00	0.45	29.00	46.55	47.00	0.45
QPSK	28.328	28.352	17.53	18.00	0.47	29.00	46.53	47.00	0.47
16QAM	28.173	28.130	17.51	18.00	0.49	29.00	46.51	47.00	0.49
64QAM	28.285	28.133	17.51	18.00	0.49	29.00	46.51	47.00	0.49
BPSK	14.266	13.192	14.39	15.00	0.61	32.00	46.39	47.00	0.61
QPSK	14.361	13.224	14.41	15.00	0.59	32.00	46.41	47.00	0.59
16QAM	14.203	13.220	14.38	15.00	0.62	32.00	46.38	47.00	0.62
64QAM	14.147	13.421	14.40	15.00	0.60	32.00	46.40	47.00	0.60

High Channel: Central nominal frequency: 4987.5 MHz

Modulation	Conducted PSD		Combined PSD (dBm)	PSD Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, PSD (dBm)	e.i.r.p PSD Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	55.977	63.397	20.77	21.00	0.23	14.00	34.77	47.00	12.23
QPSK	56.284	63.696	20.79	21.00	0.21	14.00	34.79	47.00	12.21
16QAM	56.600	64.582	20.83	21.00	0.17	14.00	34.83	47.00	12.17
64QAM	56.099	64.392	20.81	21.00	0.19	14.00	34.81	47.00	12.19
BPSK	55.977	63.397	20.77	21.00	0.23	15.50	36.27	47.00	10.73
QPSK	56.284	63.696	20.79	21.00	0.21	15.50	36.29	47.00	10.71
16QAM	56.600	64.582	20.83	21.00	0.17	15.50	36.33	47.00	10.67
64QAM	56.099	64.392	20.81	21.00	0.19	15.50	36.31	47.00	10.69
BPSK	55.977	63.397	20.77	21.00	0.23	23.00	43.77	47.00	3.23
QPSK	56.284	63.696	20.79	21.00	0.21	23.00	43.79	47.00	3.21
16QAM	56.600	64.582	20.83	21.00	0.17	23.00	43.83	47.00	3.17
64QAM	56.099	64.392	20.81	21.00	0.19	23.00	43.81	47.00	3.19
BPSK	29.683	28.968	17.68	18.00	0.32	29.00	46.68	47.00	0.32
QPSK	29.998	28.313	17.66	18.00	0.34	29.00	46.66	47.00	0.34
16QAM	29.576	28.550	17.64	18.00	0.36	29.00	46.64	47.00	0.36
64QAM	30.328	28.316	17.68	18.00	0.32	29.00	46.68	47.00	0.32
BPSK	13.623	16.955	14.85	15.00	0.15	32.00	46.85	47.00	0.15
QPSK	13.733	16.776	14.84	15.00	0.16	32.00	46.84	47.00	0.16
16QAM	13.569	16.912	14.84	15.00	0.16	32.00	46.84	47.00	0.16
64QAM	13.578	16.882	14.84	15.00	0.16	32.00	46.84	47.00	0.16

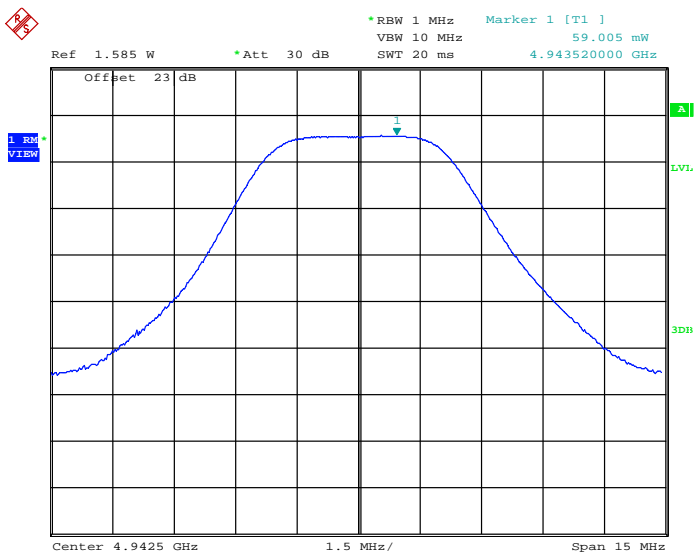
Low Channel:

Antenna Port 1



Date: 8.SEP.2010 13:18:06

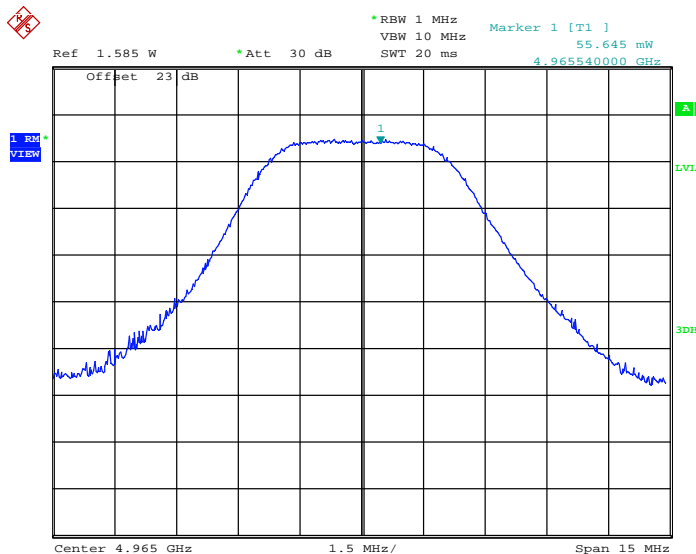
Antenna Port 2



Date: 13.SEP.2010 06:48:02

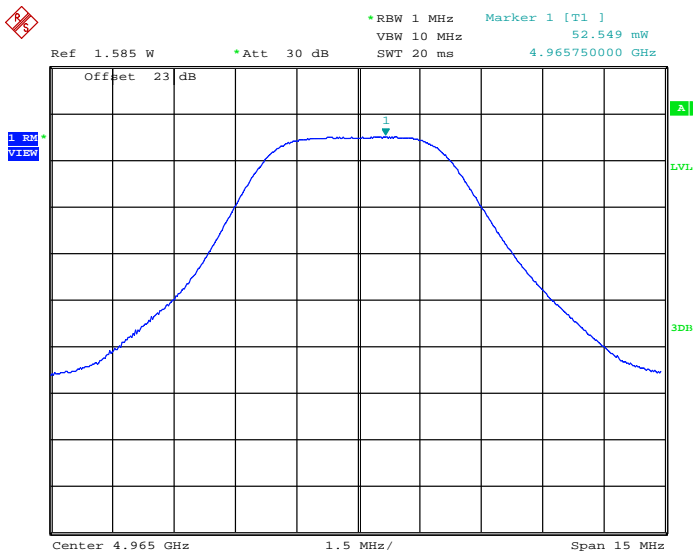
Mid Channel:

Antenna Port 1



Date: 13.SEP.2010 07:11:49

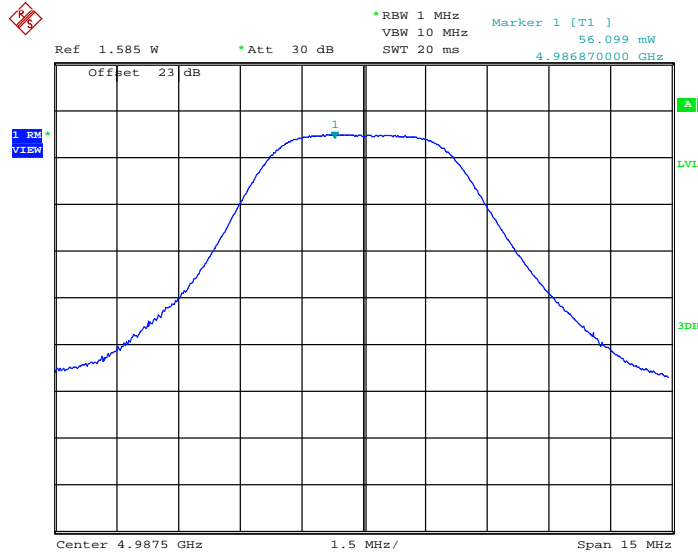
Antenna Port 2



Date: 13.SEP.2010 07:43:52

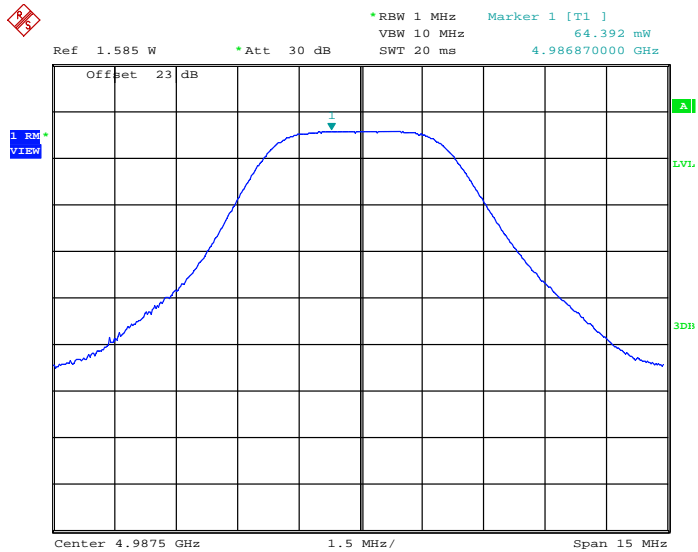
High Channel:

Antenna Port 1



Date: 13.SEP.2010 08:12:09

Antenna Port 2



Date: 13.SEP.2010 08:57:38

Channel Bandwidth: 10 MHz

Low Channel: Central nominal frequency: 4945 MHz

Modulation	Conducted PSD		Combined PSD (dBm)	PSD Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, PSD (dBm)	e.i.r.p PSD Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	27.947	30.100	17.64	21.00	3.36	14.00	31.64	47.00	15.36
QPSK	28.283	30.304	17.68	21.00	3.32	14.00	31.68	47.00	15.32
16QAM	27.541	30.316	17.62	21.00	3.38	14.00	31.62	47.00	15.38
64QAM	27.443	30.844	17.66	21.00	3.34	14.00	31.66	47.00	15.34
BPSK	27.947	30.100	17.64	21.00	3.36	15.50	33.14	47.00	13.86
QPSK	28.283	30.304	17.68	21.00	3.32	15.50	33.18	47.00	13.82
16QAM	27.541	30.316	17.62	21.00	3.38	15.50	33.12	47.00	13.88
64QAM	27.443	30.844	17.66	21.00	3.34	15.50	33.16	47.00	13.84
BPSK	27.947	30.100	17.64	21.00	3.36	23.00	40.64	47.00	6.36
QPSK	28.283	30.304	17.68	21.00	3.32	23.00	40.68	47.00	6.32
16QAM	27.541	30.316	17.62	21.00	3.38	23.00	40.62	47.00	6.38
64QAM	27.443	30.844	17.66	21.00	3.34	23.00	40.66	47.00	6.34
BPSK	27.947	30.100	17.64	18.00	0.36	29.00	46.64	47.00	0.36
QPSK	28.283	30.304	17.68	18.00	0.32	29.00	46.68	47.00	0.32
16QAM	27.541	30.316	17.62	18.00	0.38	29.00	46.62	47.00	0.38
64QAM	27.443	30.844	17.66	18.00	0.34	29.00	46.66	47.00	0.34
BPSK	14.726	16.444	14.94	15.00	0.06	32.00	46.94	47.00	0.06
QPSK	15.135	16.051	14.94	15.00	0.06	32.00	46.94	47.00	0.06
16QAM	14.964	16.101	14.92	15.00	0.08	32.00	46.92	47.00	0.08
64QAM	15.139	16.195	14.96	15.00	0.04	32.00	46.96	47.00	0.04

Mid Channel: Central nominal frequency: 4965 MHz

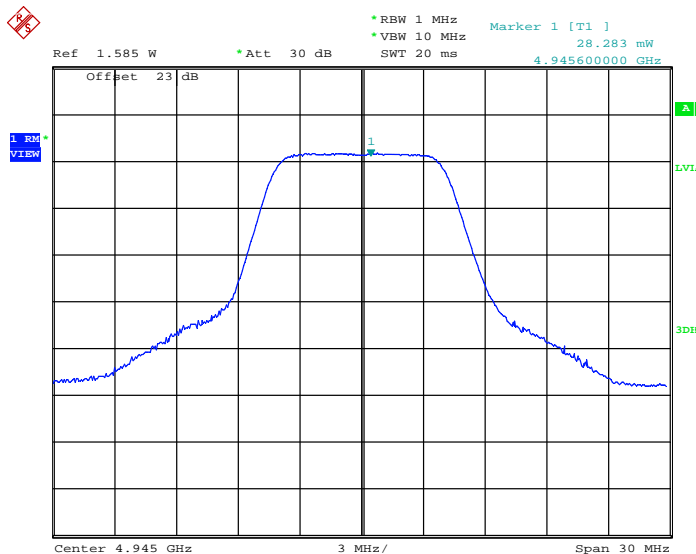
Modulation	Conducted PSD		Combined PSD (dBm)	PSD Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, PSD (dBm)	e.i.r.p PSD Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	28.130	33.049	17.87	21.00	3.13	14.00	31.87	47.00	15.13
QPSK	28.183	33.954	17.93	21.00	3.07	14.00	31.93	47.00	15.07
16QAM	28.488	32.160	17.83	21.00	3.17	14.00	31.83	47.00	15.17
64QAM	28.546	33.661	17.94	21.00	3.06	14.00	31.94	47.00	15.06
BPSK	28.130	33.049	17.87	21.00	3.13	15.50	33.37	47.00	13.63
QPSK	28.183	33.954	17.93	21.00	3.07	15.50	33.43	47.00	13.57
16QAM	28.488	32.160	17.83	21.00	3.17	15.50	33.33	47.00	13.67
64QAM	28.546	33.661	17.94	21.00	3.06	15.50	33.44	47.00	13.56
BPSK	28.130	33.049	17.87	21.00	3.13	23.00	40.87	47.00	6.13
QPSK	28.183	33.954	17.93	21.00	3.07	23.00	40.93	47.00	6.07
16QAM	28.488	32.160	17.83	21.00	3.17	23.00	40.83	47.00	6.17
64QAM	28.546	33.661	17.94	21.00	3.06	23.00	40.94	47.00	6.06
BPSK	28.130	33.049	17.87	18.00	0.13	29.00	46.87	47.00	0.13
QPSK	28.183	33.954	17.93	18.00	0.07	29.00	46.93	47.00	0.07
16QAM	28.488	32.160	17.83	18.00	0.17	29.00	46.83	47.00	0.17
64QAM	28.546	33.661	17.94	18.00	0.06	29.00	46.94	47.00	0.06
BPSK	13.452	13.580	14.32	15.00	0.68	32.00	46.32	47.00	0.68
QPSK	13.771	13.850	14.41	15.00	0.59	32.00	46.41	47.00	0.59
16QAM	13.707	13.125	14.29	15.00	0.71	32.00	46.29	47.00	0.71
64QAM	13.756	13.241	14.31	15.00	0.69	32.00	46.31	47.00	0.69

High Channel: Central nominal frequency: 4985 MHz

Modulation	Conducted PSD		Combined PSD (dBm)	PSD Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, PSD (dBm)	e.i.r.p PSD Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	29.692	29.764	17.74	21.00	3.26	14.00	31.74	47.00	15.26
QPSK	29.544	29.573	17.72	21.00	3.28	14.00	31.72	47.00	15.28
16QAM	28.679	30.240	17.70	21.00	3.30	14.00	31.70	47.00	15.30
64QAM	29.247	30.686	17.78	21.00	3.22	14.00	31.78	47.00	15.22
BPSK	29.692	29.764	17.74	21.00	3.26	15.50	33.24	47.00	13.76
QPSK	29.544	29.573	17.72	21.00	3.28	15.50	33.22	47.00	13.78
16QAM	28.679	30.240	17.70	21.00	3.30	15.50	33.20	47.00	13.80
64QAM	29.247	30.686	17.78	21.00	3.22	15.50	33.28	47.00	13.72
BPSK	29.692	29.764	17.74	21.00	3.26	23.00	40.74	47.00	6.26
QPSK	29.544	29.573	17.72	21.00	3.28	23.00	40.72	47.00	6.28
16QAM	28.679	30.240	17.70	21.00	3.30	23.00	40.70	47.00	6.30
64QAM	29.247	30.686	17.78	21.00	3.22	23.00	40.78	47.00	6.22
BPSK	29.692	29.764	17.74	18.00	0.26	29.00	46.74	47.00	0.26
QPSK	29.544	29.573	17.72	18.00	0.28	29.00	46.72	47.00	0.28
16QAM	28.679	30.240	17.70	18.00	0.30	29.00	46.70	47.00	0.30
64QAM	29.247	30.686	17.78	18.00	0.22	29.00	46.78	47.00	0.22
BPSK	13.835	14.069	14.46	15.00	0.54	32.00	46.46	47.00	0.54
QPSK	14.161	14.029	14.50	15.00	0.50	32.00	46.50	47.00	0.50
16QAM	13.761	14.238	14.47	15.00	0.53	32.00	46.47	47.00	0.53
64QAM	14.707	14.126	14.60	15.00	0.40	32.00	46.60	47.00	0.40

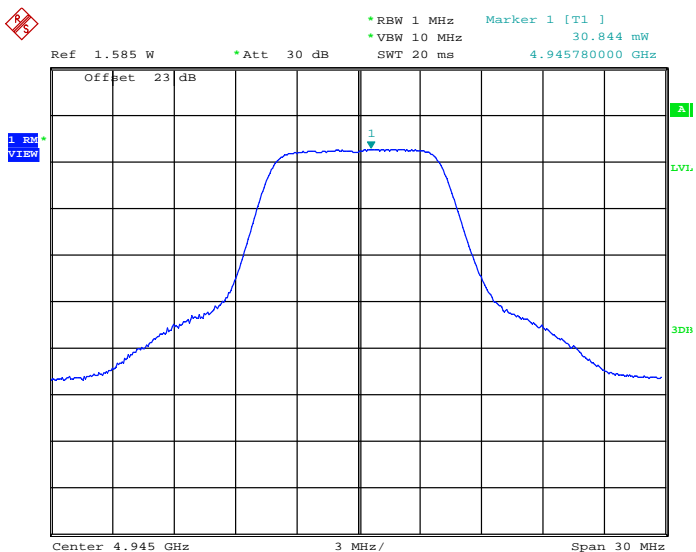
Low Channel:

Antenna Port 1



Date: 8.SEP.2010 08:45:38

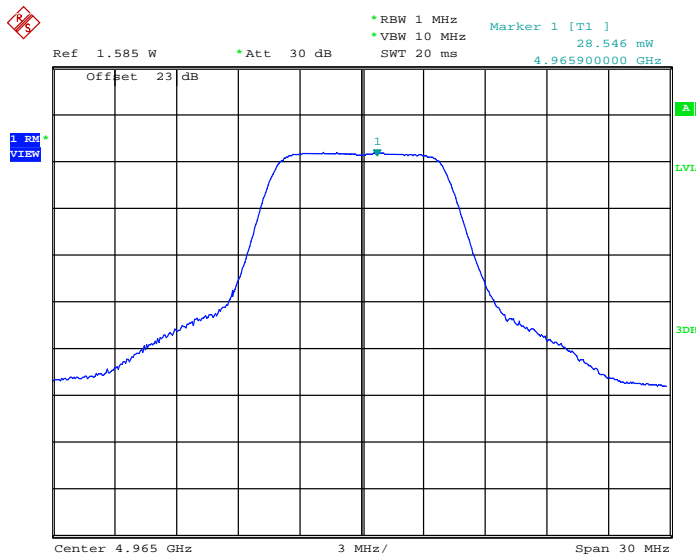
Antenna Port 2



Date: 8.SEP.2010 08:42:17

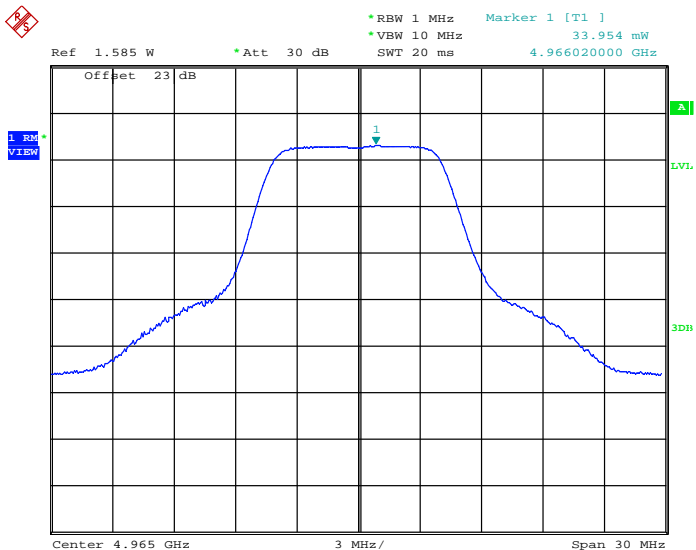
Mid Channel:

Antenna Port 1



Date: 8.SEP.2010 09:08:15

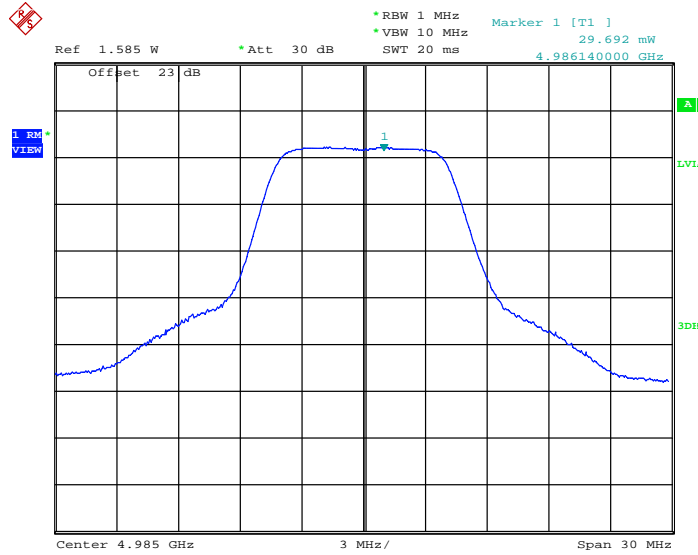
Antenna Port 2



Date: 8.SEP.2010 09:12:22

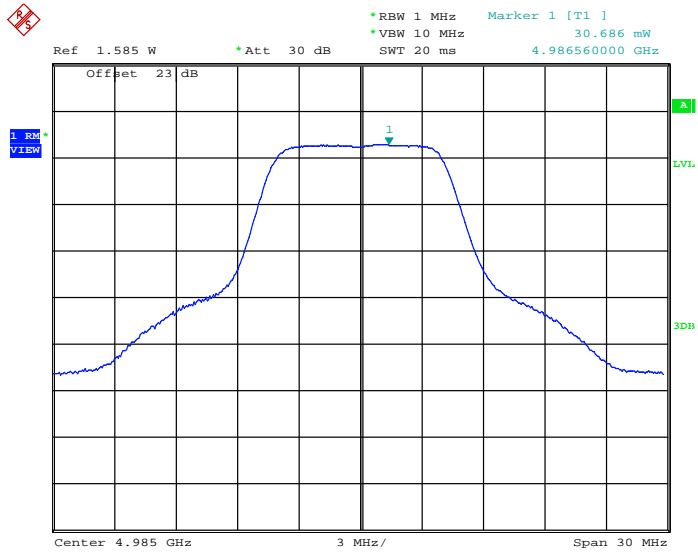
High Channel:

Antenna Port 1



Date: 8.SEP.2010 12:01:19

Antenna Port 2



Date: 8.SEP.2010 11:36:01

Channel Bandwidth: 20 MHz

Low Channel: Central nominal frequency: 4950 MHz

Modulation	Conducted PSD		Combined PSD (dBm)	PSD Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, PSD (dBm)	e.i.r.p PSD Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	15.426	15.293	14.87	21.00	6.13	14.00	28.87	47.00	18.13
QPSK	15.086	14.670	14.74	21.00	6.26	14.00	28.74	47.00	18.26
16QAM	15.152	14.738	14.76	21.00	6.24	14.00	28.76	47.00	18.24
64QAM	15.347	15.107	14.84	21.00	6.16	14.00	28.84	47.00	18.16
BPSK	15.426	15.293	14.87	21.00	6.13	15.50	30.37	47.00	16.63
QPSK	15.086	14.670	14.74	21.00	6.26	15.50	30.24	47.00	16.76
16QAM	15.152	14.738	14.76	21.00	6.24	15.50	30.26	47.00	16.74
64QAM	15.347	15.107	14.84	21.00	6.16	15.50	30.34	47.00	16.66
BPSK	15.426	15.293	14.87	21.00	6.13	23.00	37.87	47.00	9.13
QPSK	15.086	14.670	14.74	21.00	6.26	23.00	37.74	47.00	9.26
16QAM	15.152	14.738	14.76	21.00	6.24	23.00	37.76	47.00	9.24
64QAM	15.347	15.107	14.84	21.00	6.16	23.00	37.84	47.00	9.16
BPSK	15.426	15.293	14.87	18.00	3.13	29.00	43.87	47.00	3.13
QPSK	15.086	14.670	14.74	18.00	3.26	29.00	43.74	47.00	3.26
16QAM	15.152	14.738	14.76	18.00	3.24	29.00	43.76	47.00	3.24
64QAM	15.347	15.107	14.84	18.00	3.16	29.00	43.84	47.00	3.16
BPSK	15.426	15.293	14.87	15.00	0.13	32.00	46.87	47.00	0.13
QPSK	15.086	14.670	14.74	15.00	0.26	32.00	46.74	47.00	0.26
16QAM	15.152	14.738	14.76	15.00	0.24	32.00	46.76	47.00	0.24
64QAM	15.347	15.107	14.84	15.00	0.16	32.00	46.84	47.00	0.16

Mid Channel: Central nominal frequency: 4965 MHz

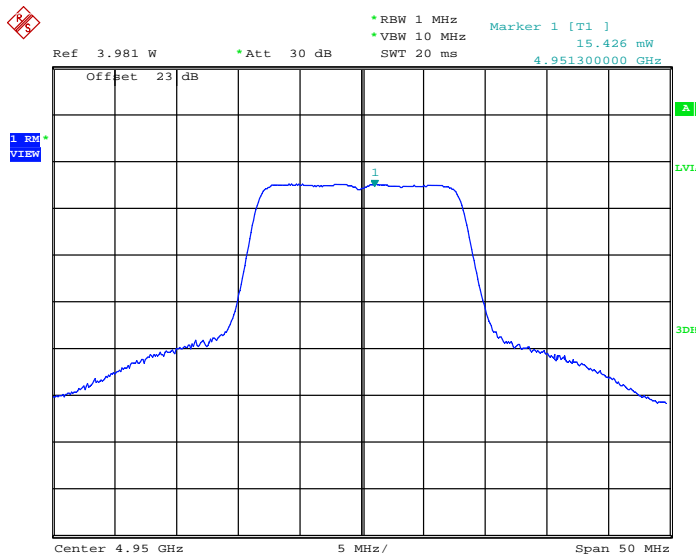
Modulation	Conducted PSD		Combined PSD (dBm)	PSD Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, PSD (dBm)	e.i.r.p PSD Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	14.892	12.102	14.31	21.00	6.69	14.00	28.31	47.00	18.69
QPSK	14.907	12.779	14.42	21.00	6.58	14.00	28.42	47.00	18.58
16QAM	14.289	12.404	14.26	21.00	6.74	14.00	28.26	47.00	18.74
64QAM	14.426	12.400	14.29	21.00	6.71	14.00	28.29	47.00	18.71
BPSK	14.892	12.102	14.31	21.00	6.69	15.50	29.81	47.00	17.19
QPSK	14.907	12.779	14.42	21.00	6.58	15.50	29.92	47.00	17.08
16QAM	14.289	12.404	14.26	21.00	6.74	15.50	29.76	47.00	17.24
64QAM	14.426	12.400	14.29	21.00	6.71	15.50	29.79	47.00	17.21
BPSK	14.892	12.102	14.31	21.00	6.69	23.00	37.31	47.00	9.69
QPSK	14.907	12.779	14.42	21.00	6.58	23.00	37.42	47.00	9.58
16QAM	14.289	12.404	14.26	21.00	6.74	23.00	37.26	47.00	9.74
64QAM	14.426	12.400	14.29	21.00	6.71	23.00	37.29	47.00	9.71
BPSK	14.892	12.102	14.31	18.00	3.69	29.00	43.31	47.00	3.69
QPSK	14.907	12.779	14.42	18.00	3.58	29.00	43.42	47.00	3.58
16QAM	14.289	12.404	14.26	18.00	3.74	29.00	43.26	47.00	3.74
64QAM	14.426	12.400	14.29	18.00	3.71	29.00	43.29	47.00	3.71
BPSK	14.892	12.102	14.31	15.00	0.69	32.00	46.31	47.00	0.69
QPSK	14.907	12.779	14.42	15.00	0.58	32.00	46.42	47.00	0.58
16QAM	14.289	12.404	14.26	15.00	0.74	32.00	46.26	47.00	0.74
64QAM	14.426	12.400	14.29	15.00	0.71	32.00	46.29	47.00	0.71

High Channel: Central nominal frequency: 4980 MHz

Modulation	Conducted PSD		Combined PSD (dBm)	PSD Limit (dB)	Margin (dB)	Antenna Gain, (dBi)	e.i.r.p, PSD (dBm)	e.i.r.p PSD Limit, (dBm)	Margin, (dB)
	Ant 1, (mW)	Ant 2, (mW)							
BPSK	14.951	13.642	14.56	21.00	6.44	14.00	28.56	47.00	18.44
QPSK	14.559	13.886	14.54	21.00	6.46	14.00	28.54	47.00	18.46
16QAM	14.322	13.672	14.47	21.00	6.53	14.00	28.47	47.00	18.53
64QAM	14.724	13.724	14.54	21.00	6.46	14.00	28.54	47.00	18.46
BPSK	14.951	13.642	14.56	21.00	6.44	15.50	30.06	47.00	16.94
QPSK	14.559	13.886	14.54	21.00	6.46	15.50	30.04	47.00	16.96
16QAM	14.322	13.672	14.47	21.00	6.53	15.50	29.97	47.00	17.03
64QAM	14.724	13.724	14.54	21.00	6.46	15.50	30.04	47.00	16.96
BPSK	14.951	13.642	14.56	21.00	6.44	23.00	37.56	47.00	9.44
QPSK	14.559	13.886	14.54	21.00	6.46	23.00	37.54	47.00	9.46
16QAM	14.322	13.672	14.47	21.00	6.53	23.00	37.47	47.00	9.53
64QAM	14.724	13.724	14.54	21.00	6.46	23.00	37.54	47.00	9.46
BPSK	14.951	13.642	14.56	18.00	3.44	29.00	43.56	47.00	3.44
QPSK	14.559	13.886	14.54	18.00	3.46	29.00	43.54	47.00	3.46
16QAM	14.322	13.672	14.47	18.00	3.53	29.00	43.47	47.00	3.53
64QAM	14.724	13.724	14.54	18.00	3.46	29.00	43.54	47.00	3.46
BPSK	14.951	13.642	14.56	15.00	0.44	32.00	46.56	47.00	0.44
QPSK	14.559	13.886	14.54	15.00	0.46	32.00	46.54	47.00	0.46
16QAM	14.322	13.672	14.47	15.00	0.53	32.00	46.47	47.00	0.53
64QAM	14.724	13.724	14.54	15.00	0.46	32.00	46.54	47.00	0.46

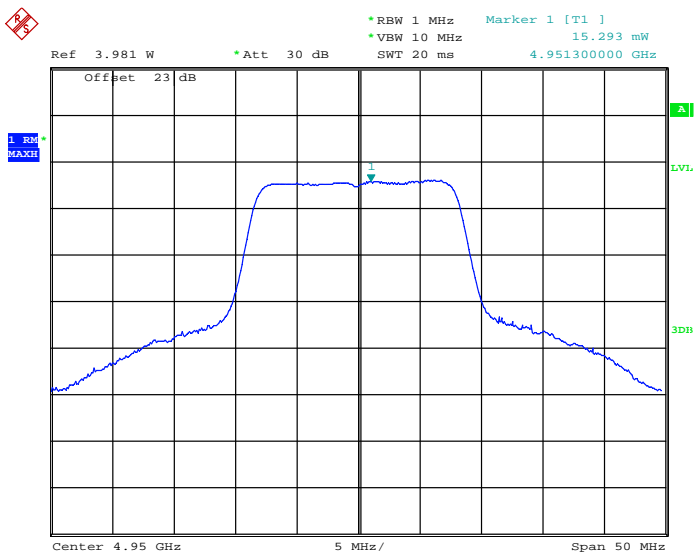
Low Channel:

Antenna Port 1



Date: 7.SEP.2010 12:54:33

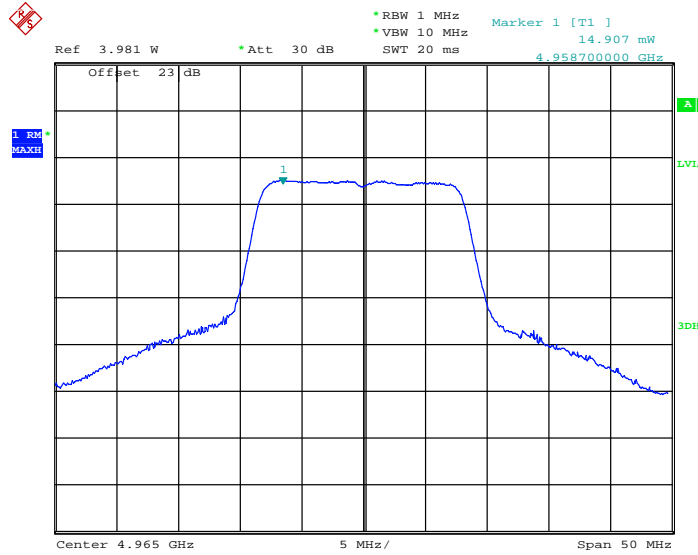
Antenna Port 2



Date: 7.SEP.2010 12:56:07

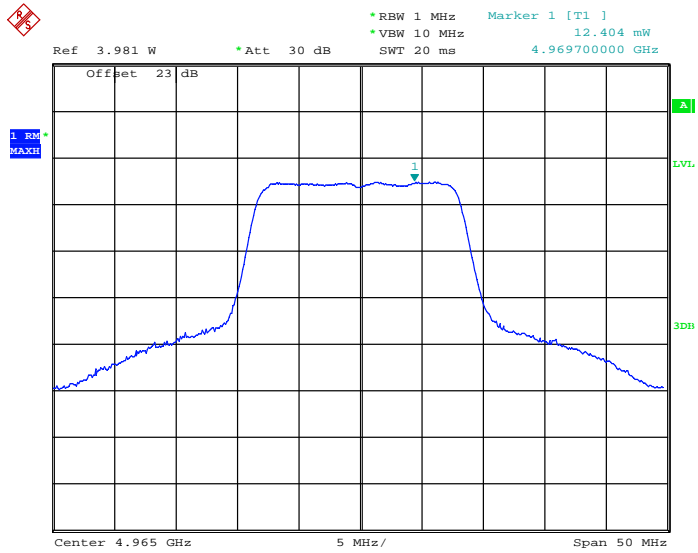
Mid Channel:

Antenna Port 1



Date: 7.SEP.2010 13:08:11

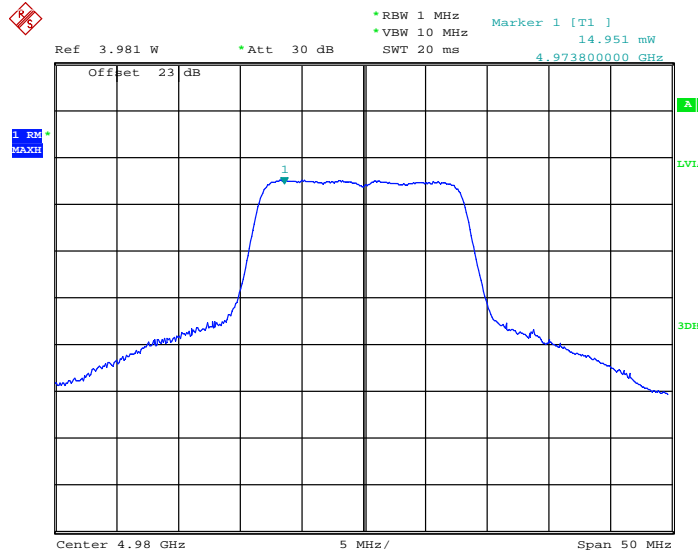
Antenna Port 2



Date: 7.SEP.2010 13:04:51

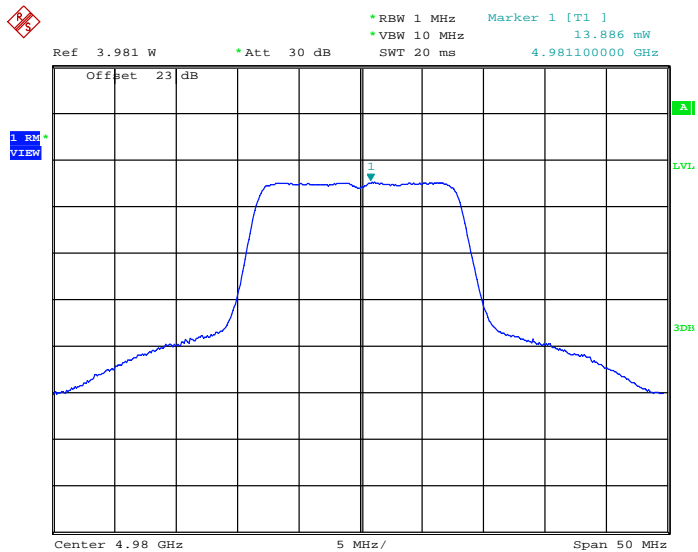
High Channel:

Antenna Port 1



Date: 7.SEP.2010 13:10:42

Antenna Port 2



Date: 7.SEP.2010 13:14:38

Clause 90.1215 The Ratio of the Peak Excursion

(e) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Test Results: Pass

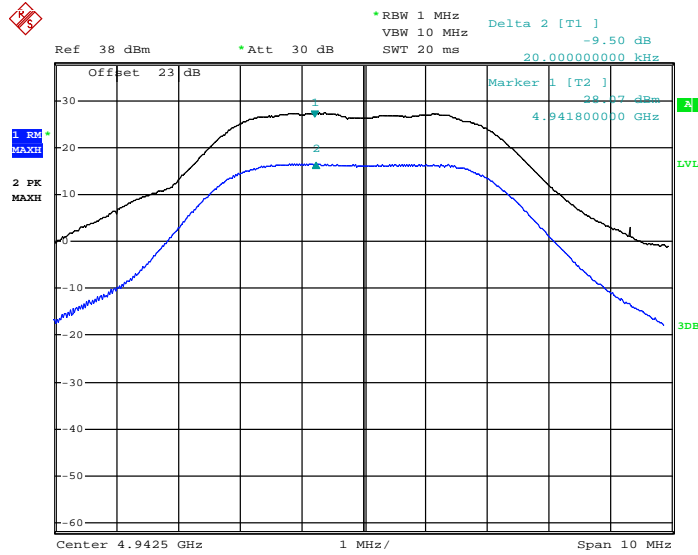
Additional Observations:

Two antenna ports were tested separately with MIMO mode, all modulations investigated, only the worst-case results were presented.

Channel Bandwidth (MHz)	Channel	Measured the Peak Excursion Ratio (dB)	Limit (dB)
5	Low	9.50	13
	Mid	7.93	13
	High	9.26	13
10	Low	10.21	13
	Mid	9.97	13
	High	9.89	13
20	Low	8.04	13
	Mid	7.82	13
	High	8.11	13

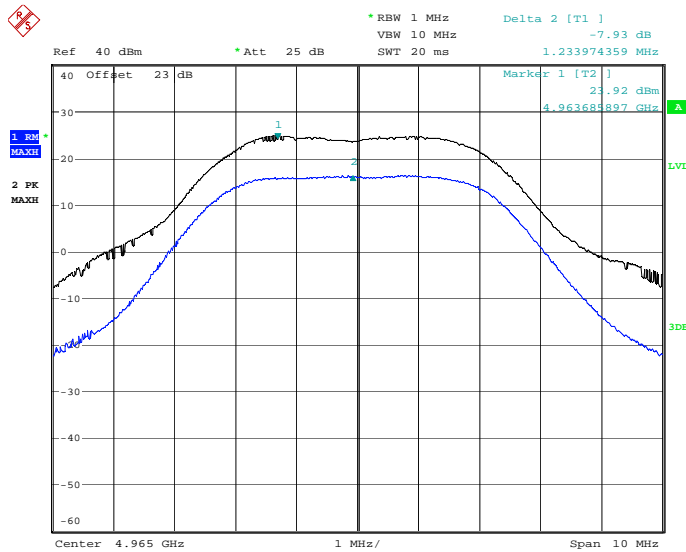
Channel Bandwidth: 5 MHz

Low Channel



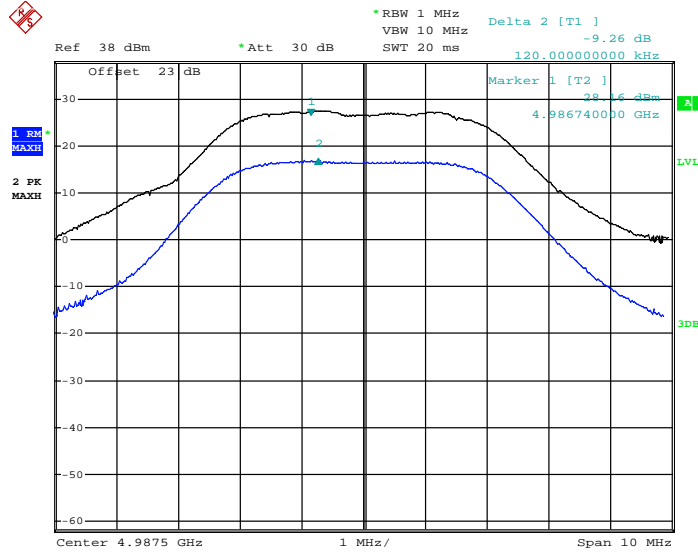
Date: 7.SEP.2010 11:28:50

Mid Channel



Date: 28.JUL.2010 10:11:22

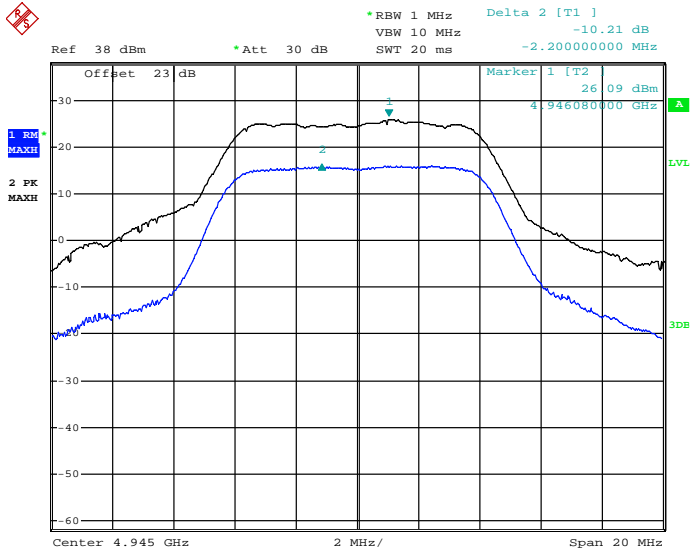
High Channel



Date: 7.SEP.2010 11:29:59

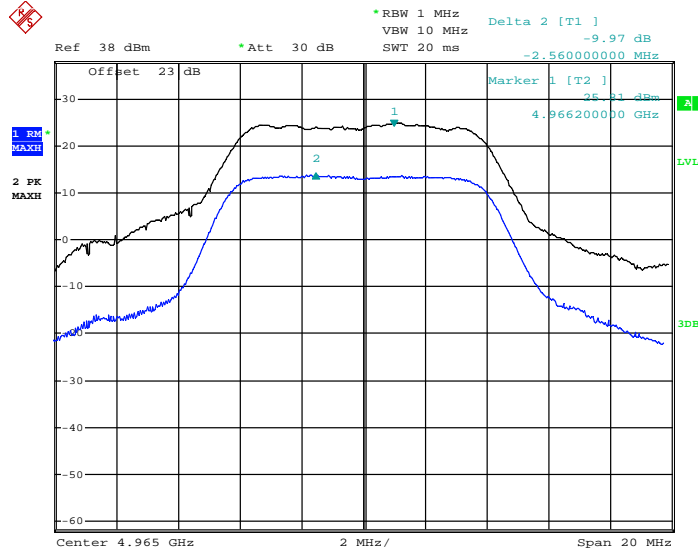
Channel Bandwidth: 10 MHz

Low Channel



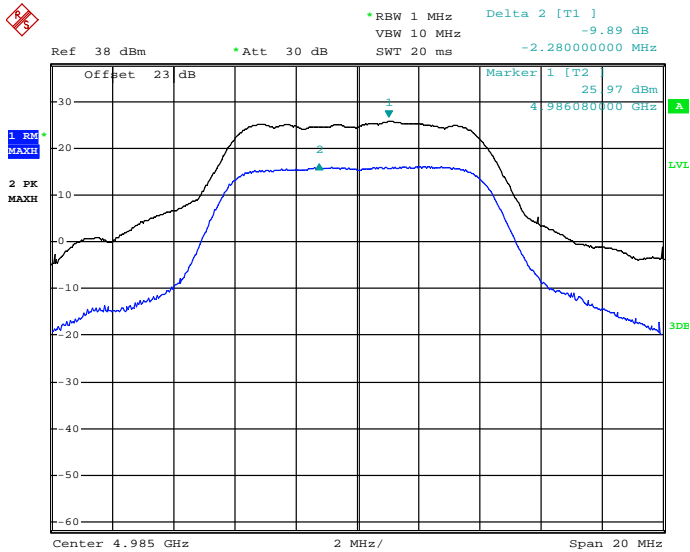
Date: 7.SEP.2010 11:25:19

Mid Channel



Date: 7.SEP.2010 11:24:07

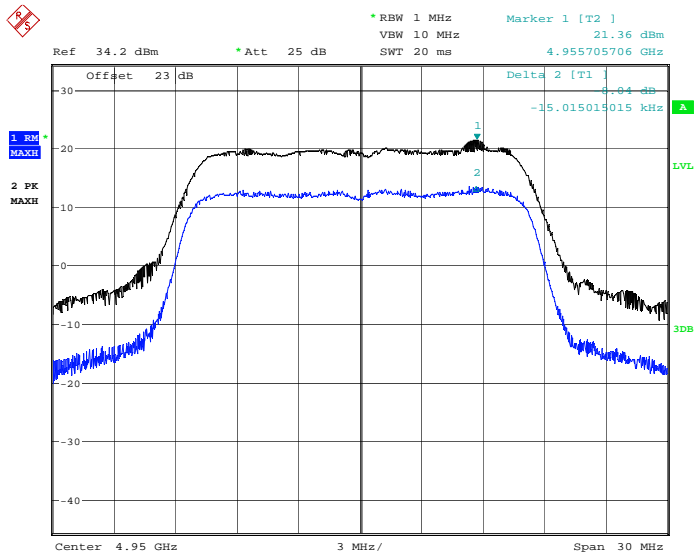
High Channel



Date: 7.SEP.2010 11:22:44

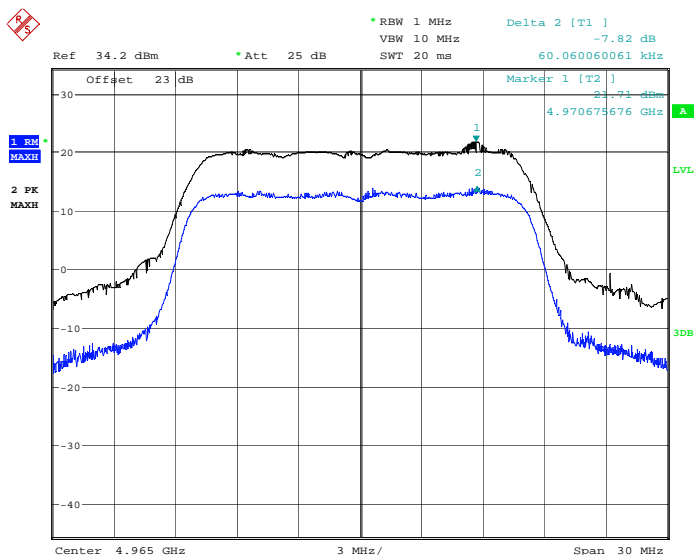
Channel Bandwidth: 20 MHz

Low Channel



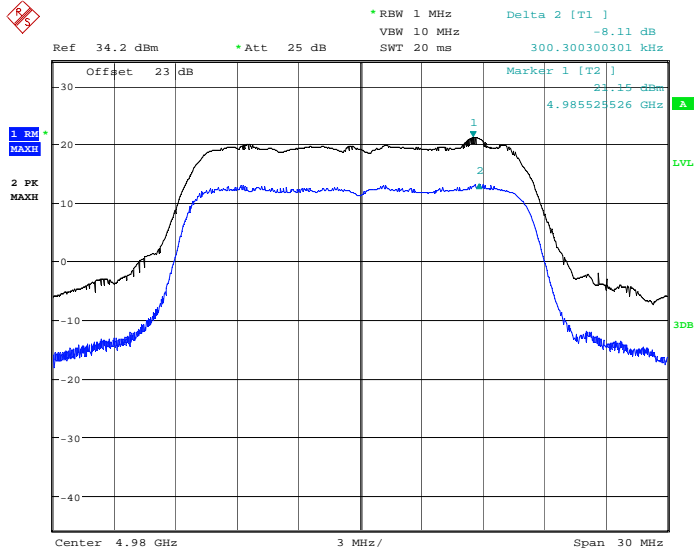
Date: 7.SEP.2010 15:26:18

Mid Channel



Date: 7.SEP.2010 15:25:15

High Channel



Date: 7.SEP.2010 15:23:35

Clause 90.210(m) Spurious Emissions at the Antenna Terminals

m) *Emission Mask M.* For high power transmitters (greater than 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

- (1) On any frequency removed from the assigned frequency between 0–45% of the authorized bandwidth (BW): 0 dB.
- (2) On any frequency removed from the assigned frequency between 45–50% of the authorized bandwidth: $56.8 \log (\% \text{ of BW}/45)$ dB.
- (3) On any frequency removed from the assigned frequency between 50–55% of the authorized bandwidth: $26 + 14.5 \log (\% \text{ of BW}/50)$ dB.
- (4) On any frequency removed from the assigned frequency between 55–100% of the authorized bandwidth: $32 + 3.1 \log (\% \text{ of BW}/55)$ dB.
- (5) On any frequency removed from the assigned frequency between 100–150% of the authorized bandwidth: $40 + 5.7 \log (\% \text{ of BW}/100)$ dB.
- (6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or $55 + 10 \log (P)$ dB, whichever is the lesser attenuation.

Test Results: Pass

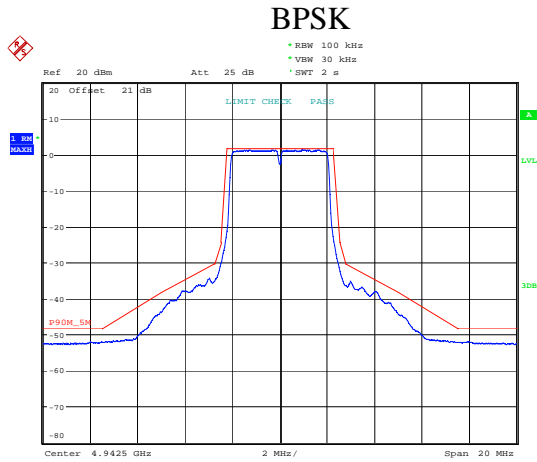
Additional Observations:

The Spectrum was searched from 30MHz to the 40 GHz.

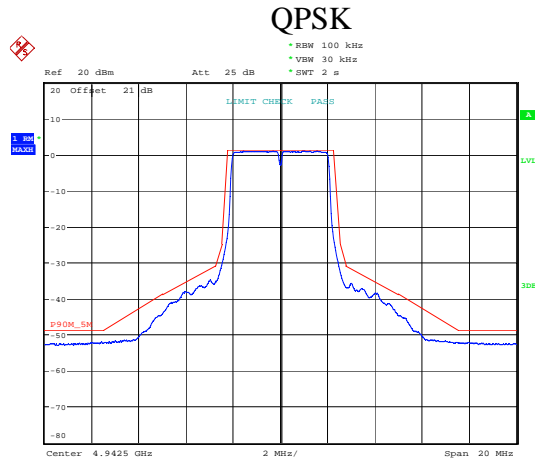
Two antenna ports and all modulations were investigated; the spurious emissions were measured individually on antenna port 1 and 2, and combined with antenna port 1 and 2 by using a RF combiner, only the worst-case results were presented.

Emission Mask

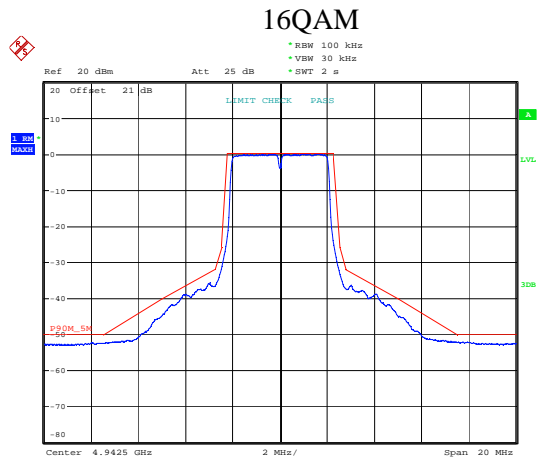
Channel Bandwidth: 5MHz
 Low Channel



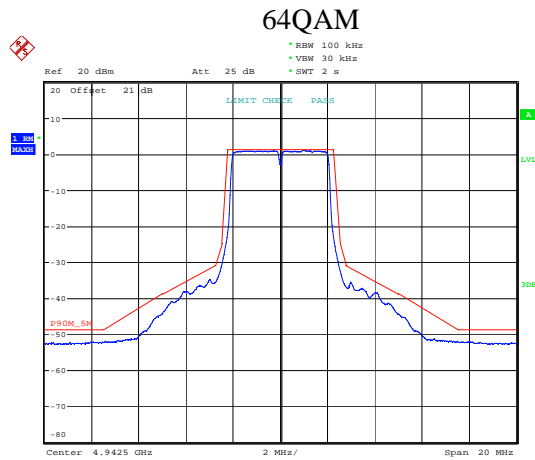
Date: 26.JUL.2010 08:44:12



Date: 26.JUL.2010 08:46:40

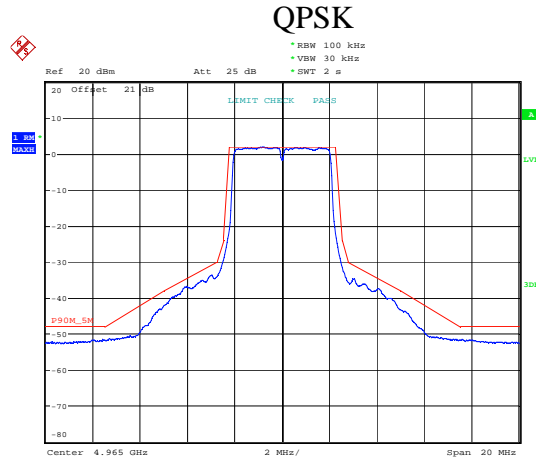
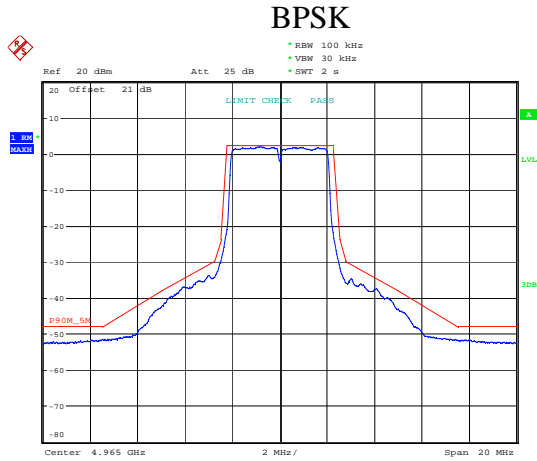


Date: 26.JUL.2010 09:11:41



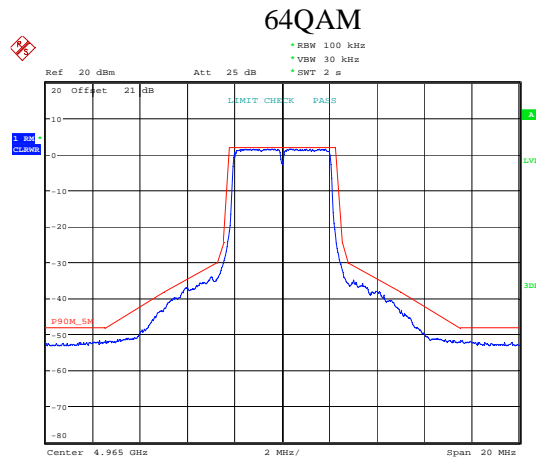
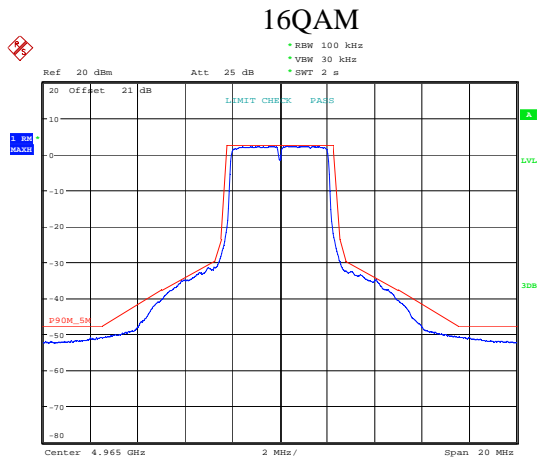
Date: 26.JUL.2010 08:49:14

Channel Bandwidth: 5MHz
 Mid Channel



Date: 26.JUL.2010 09:42:35

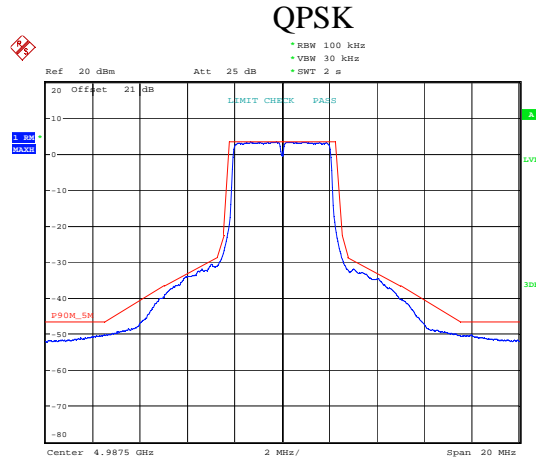
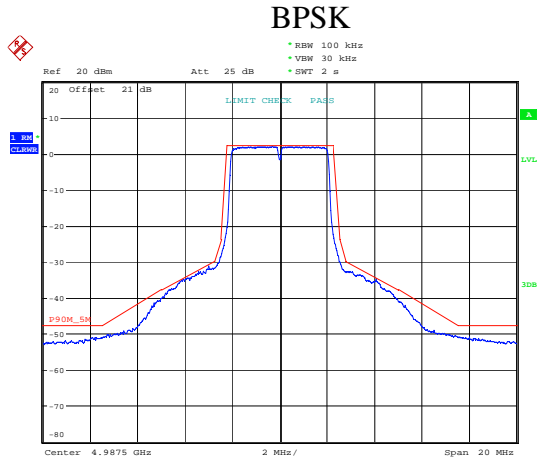
Date: 26.JUL.2010 09:42:03



Date: 26.JUL.2010 09:32:00

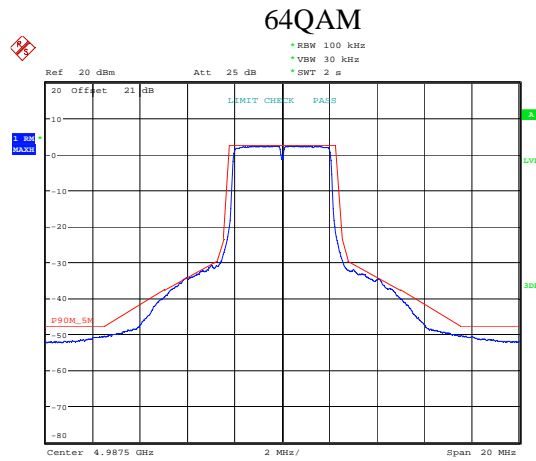
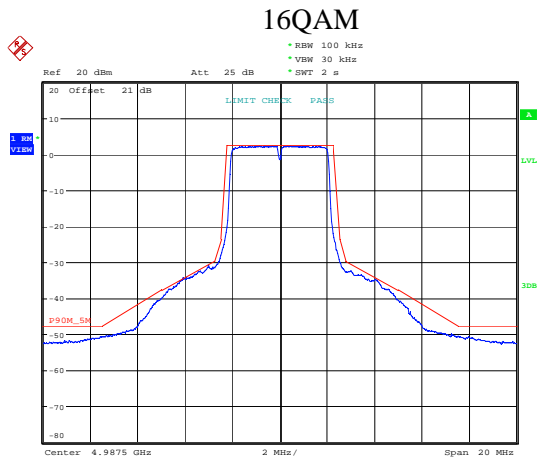
Date: 26.JUL.2010 09:37:11

Channel Bandwidth: 5MHz
 High Channel



Date: 26.JUL.2010 10:14:10

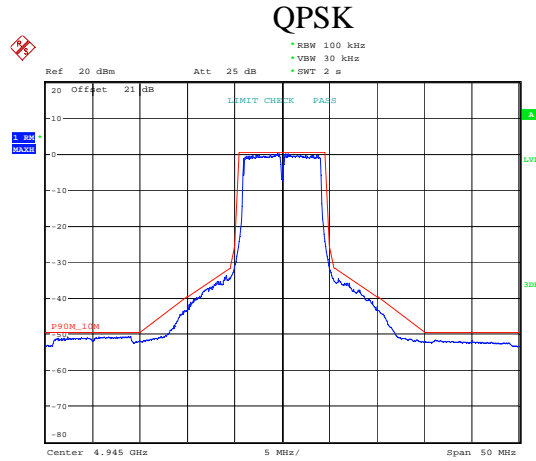
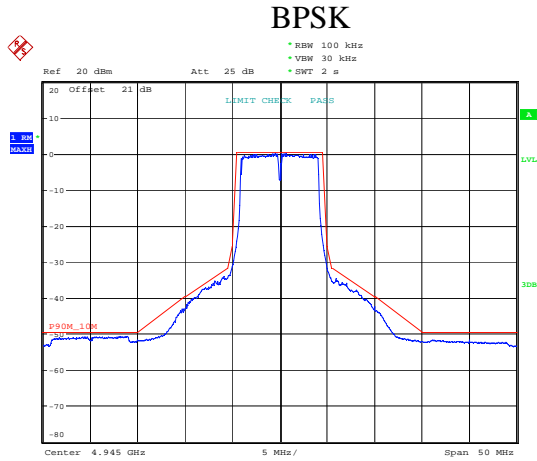
Date: 26.JUL.2010 10:07:07



Date: 26.JUL.2010 10:15:50

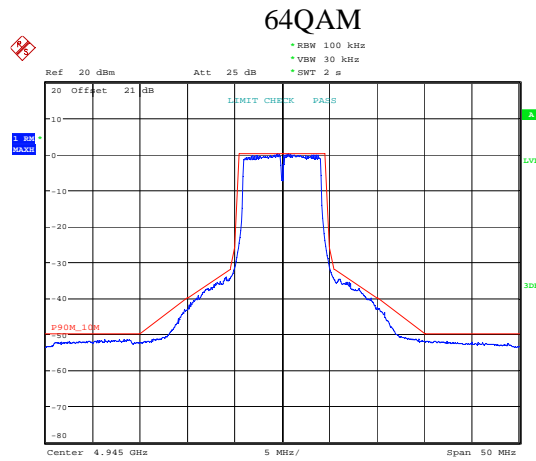
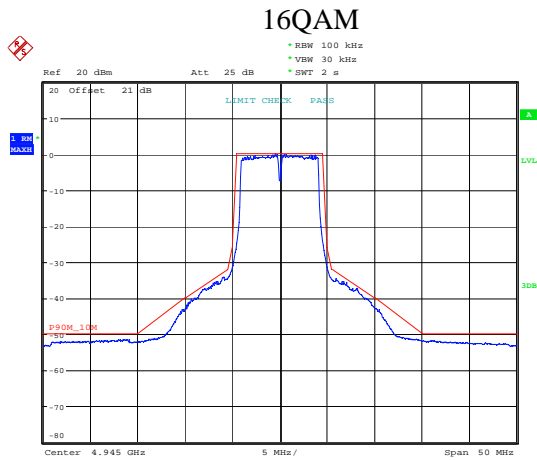
Date: 26.JUL.2010 10:16:43

Channel Bandwidth: 10 MHz
 Low Channel



Date: 26.JUL.2010 11:39:12

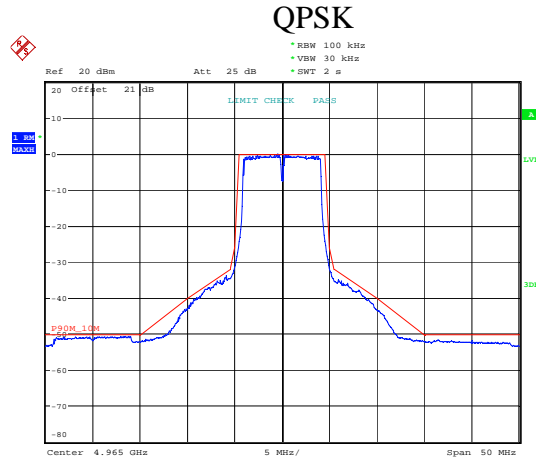
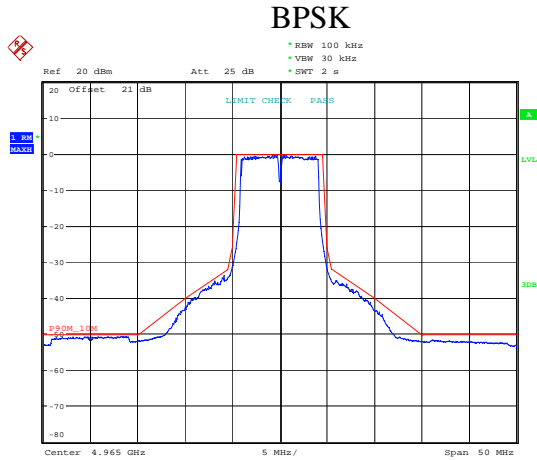
Date: 26.JUL.2010 11:38:20



Date: 26.JUL.2010 11:42:53

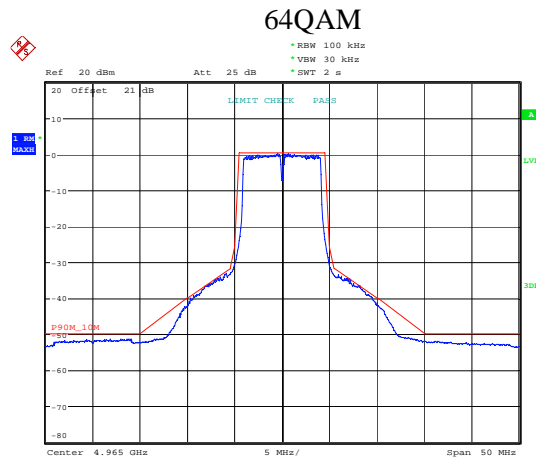
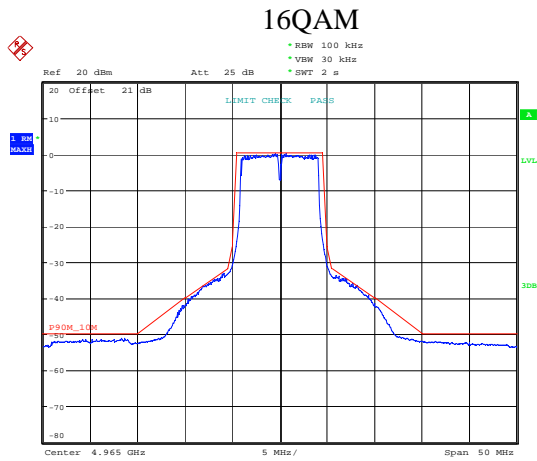
Date: 26.JUL.2010 11:43:31

Channel Bandwidth: 10 MHz
 Mid Channel



Date: 26.JUL.2010 11:30:11

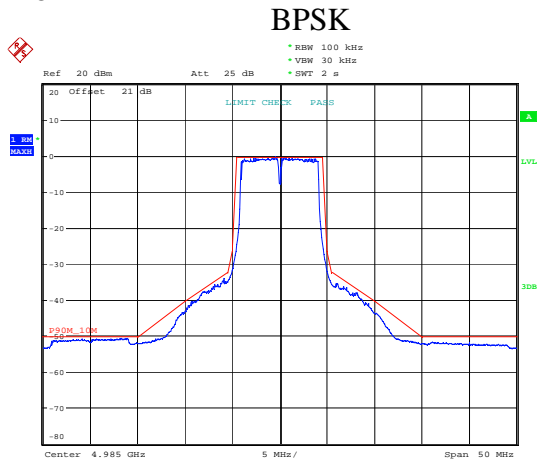
Date: 26.JUL.2010 11:31:03



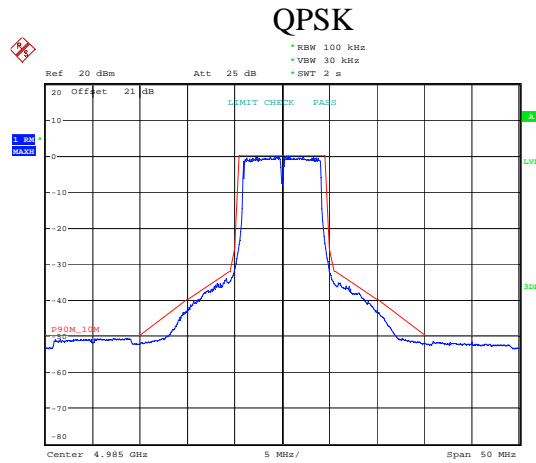
Date: 26.JUL.2010 11:26:02

Date: 26.JUL.2010 11:25:16

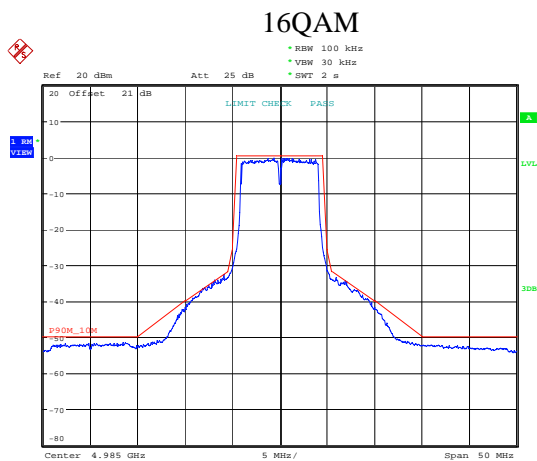
Channel Bandwidth: 10 MHz
 High Channel



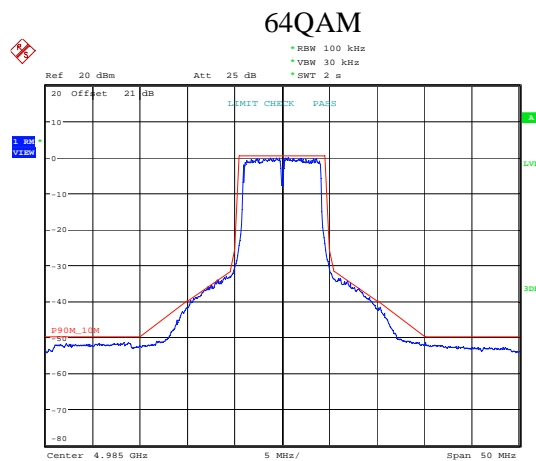
Date: 26.JUL.2010 11:56:37



Date: 26.JUL.2010 11:57:27

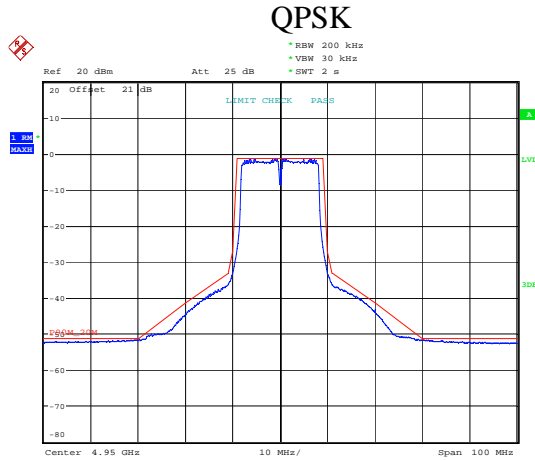
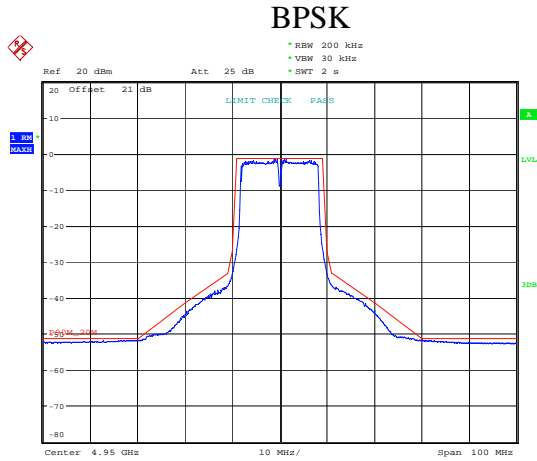


Date: 26.JUL.2010 11:53:39



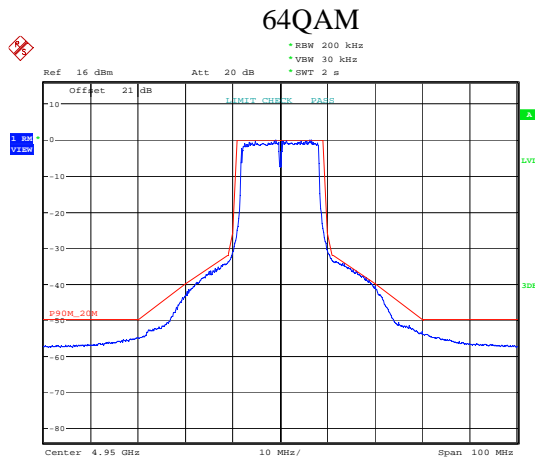
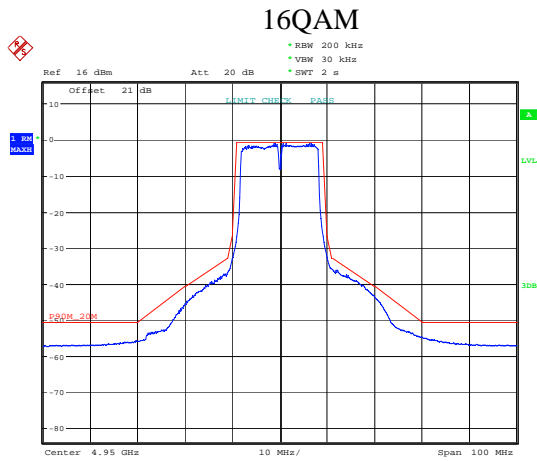
Date: 26.JUL.2010 11:52:29

Channel Bandwidth: 20 MHz
 Low Channel



Date: 26.JUL.2010 12:29:33

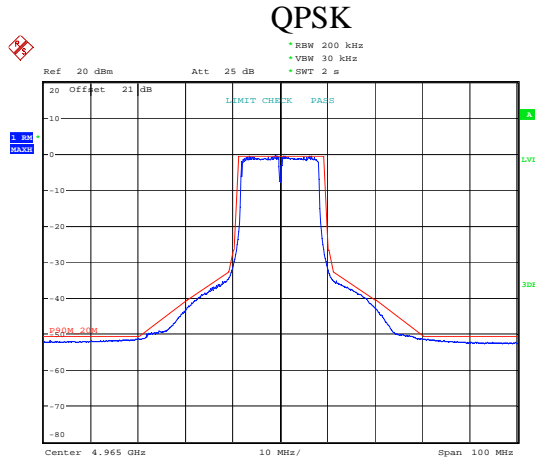
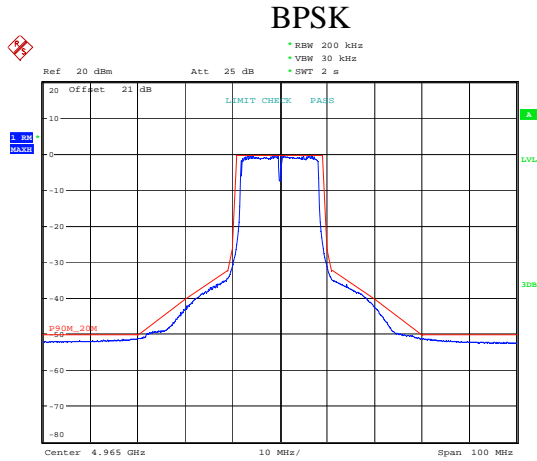
Date: 26.JUL.2010 12:28:57



Date: 26.JUL.2010 14:28:04

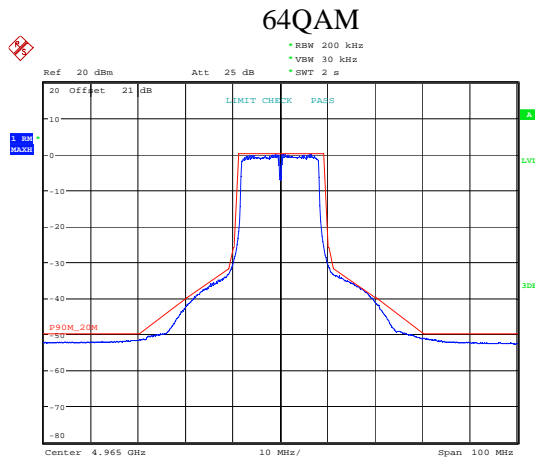
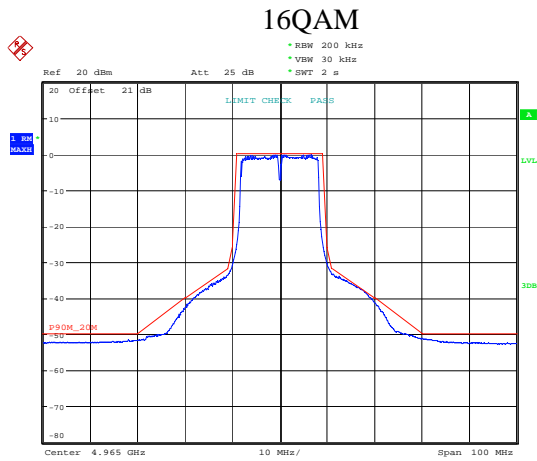
Date: 26.JUL.2010 14:29:42

Channel Bandwidth: 20 MHz
 Mid Channel



Date: 26.JUL.2010 12:43:50

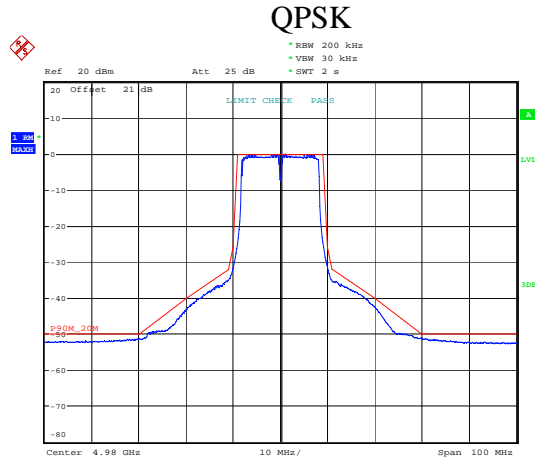
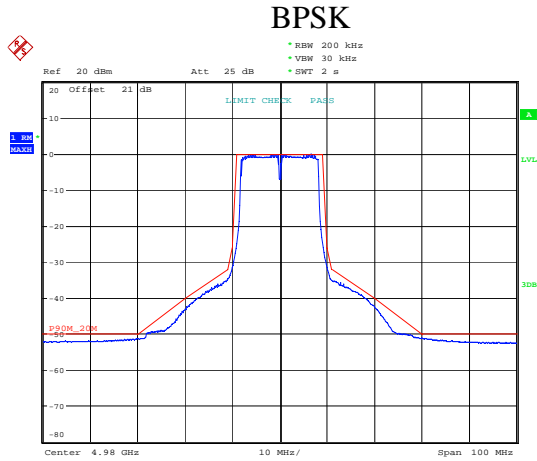
Date: 26.JUL.2010 12:42:38



Date: 26.JUL.2010 12:38:47

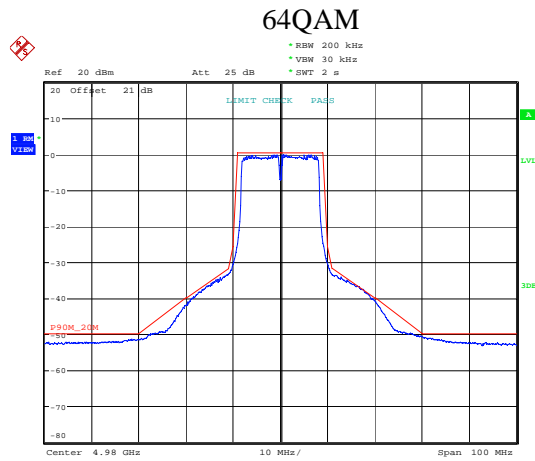
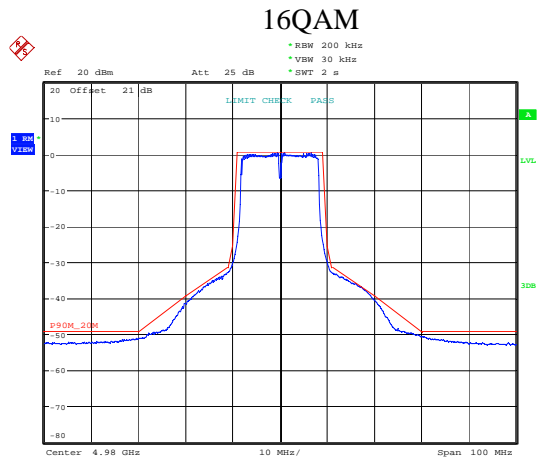
Date: 26.JUL.2010 12:40:13

Channel Bandwidth: 20 MHz
 High Channel



Date: 26.JUL.2010 13:22:47

Date: 26.JUL.2010 13:23:27



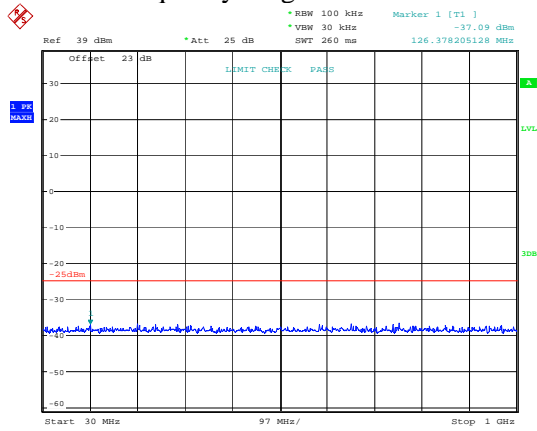
Date: 26.JUL.2010 13:28:53

Date: 26.JUL.2010 13:27:01

Spurious Emissions

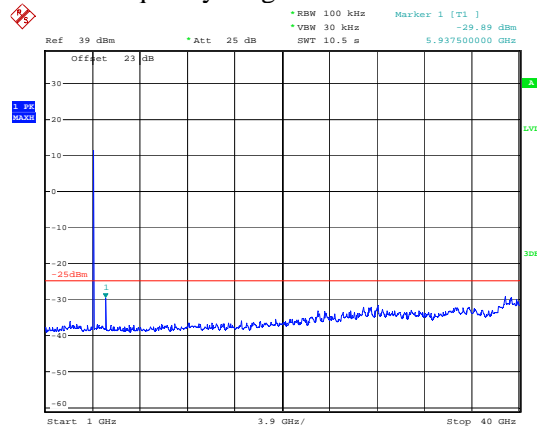
Channel Bandwidth: 5 MHz
 Low Channel

Frequency range: 30 – 1000 MHz



Date: 28.JUL.2010 11:24:53

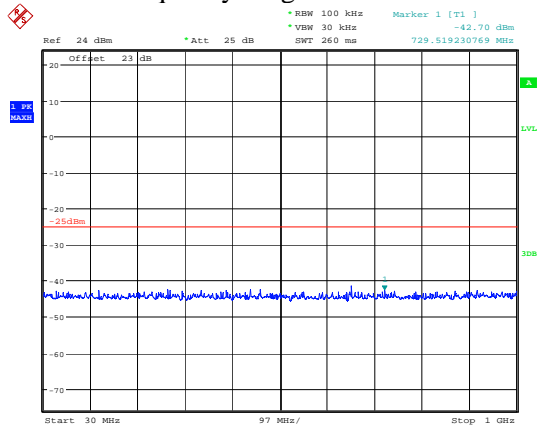
Frequency range: 1000 – 40000 MHz



Date: 28.JUL.2010 11:26:52

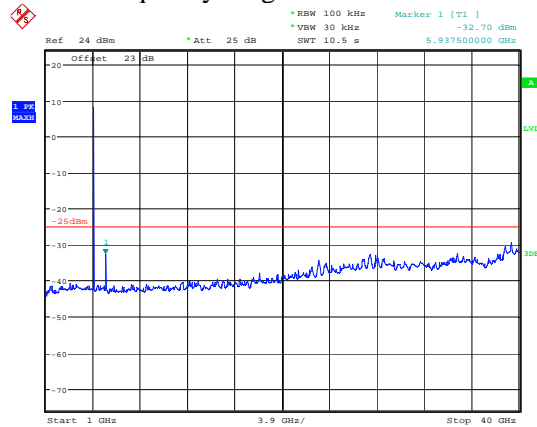
Channel Bandwidth: 5 MHz
 Mid Channel

Frequency range: 30 – 1000 MHz



Date: 29.JUL.2010 15:18:45

Frequency range: 1000 – 40000 MHz

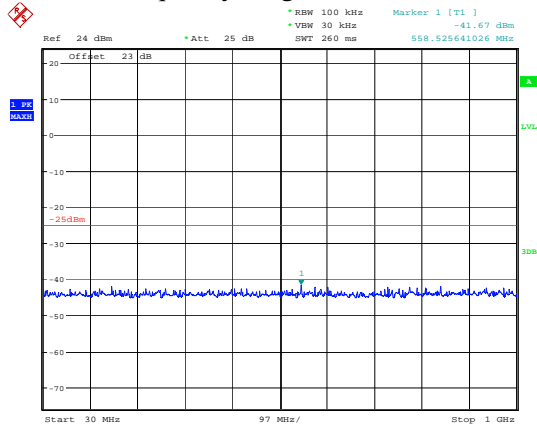


Date: 29.JUL.2010 15:18:24

Channel Bandwidth: 5 MHz

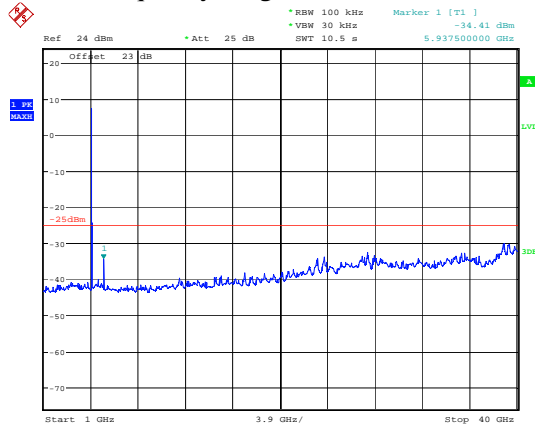
High Channel

Frequency range: 30 – 1000 MHz



Date: 29.JUL.2010 15:15:41

Frequency range: 1000 – 40000 MHz

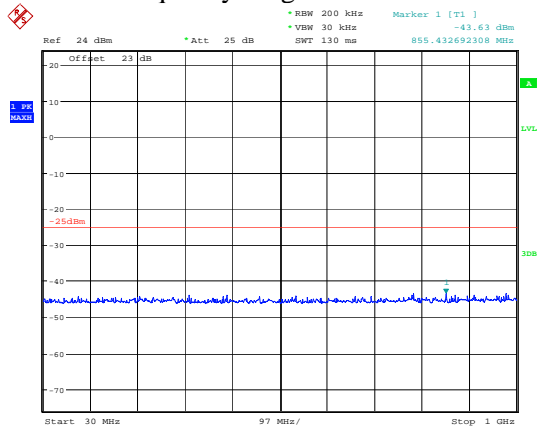


Date: 29.JUL.2010 15:16:40

Channel Bandwidth: 10 MHz

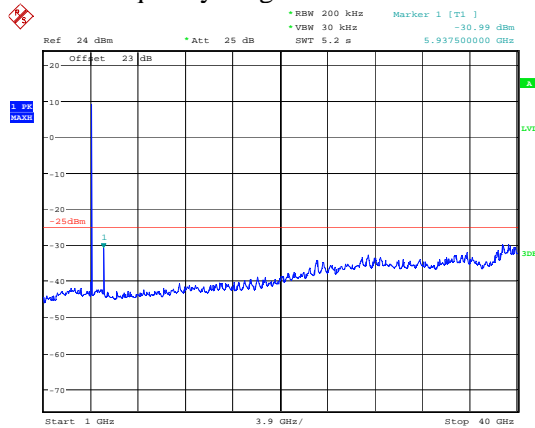
Low Channel

Frequency range: 30 – 1000 MHz



Date: 29.JUL.2010 15:21:03

Frequency range: 1000 – 40000 MHz

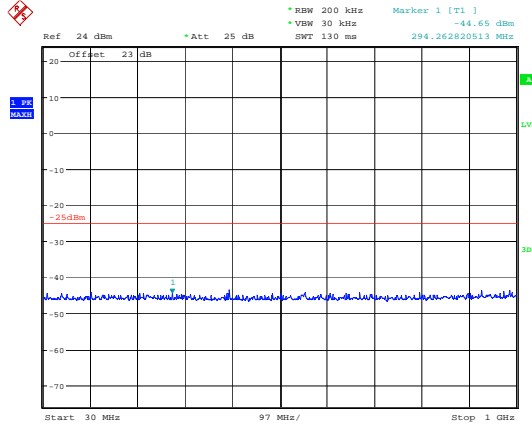


Date: 29.JUL.2010 15:21:46

Channel Bandwidth: 10 MHz

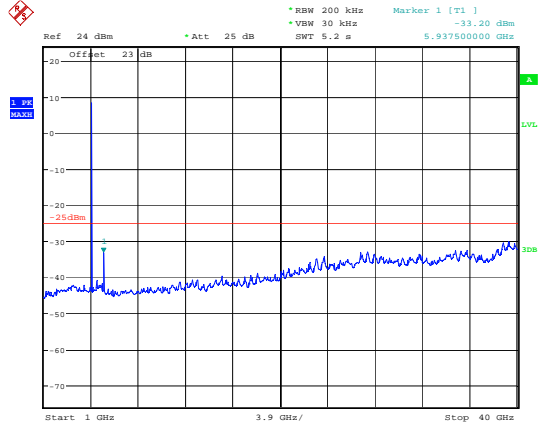
Mid Channel

Frequency range: 30 – 1000 MHz



Date: 29.JUL.2010 15:23:35

Frequency range: 1000 – 40000 MHz

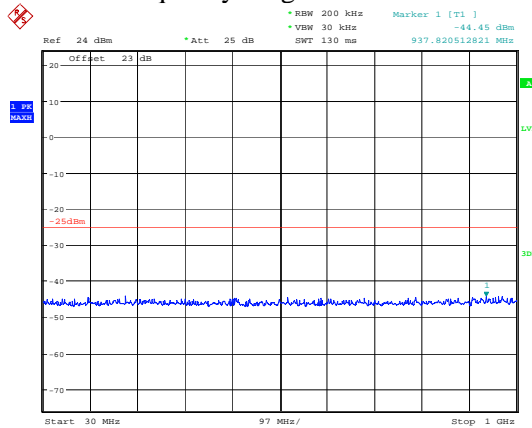


Date: 29.JUL.2010 15:22:53

Channel Bandwidth: 10 MHz

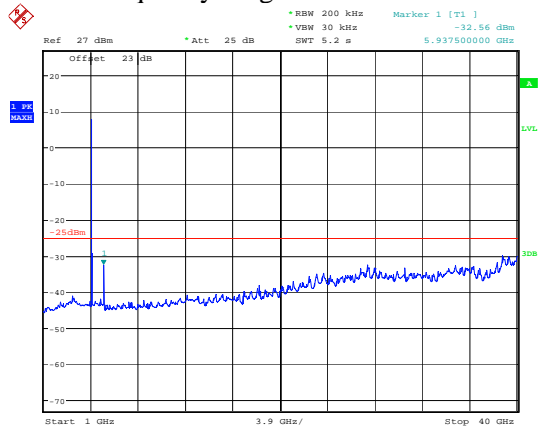
High Channel

Frequency range: 30 – 1000 MHz



Date: 29.JUL.2010 15:24:20

Frequency range: 1000 – 40000 MHz

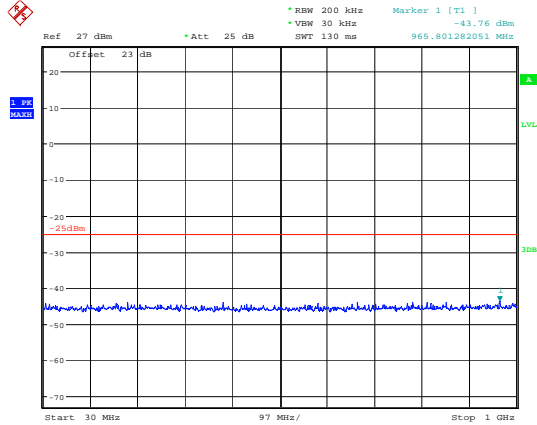


Date: 29.JUL.2010 15:25:30

Channel Bandwidth: 20 MHz

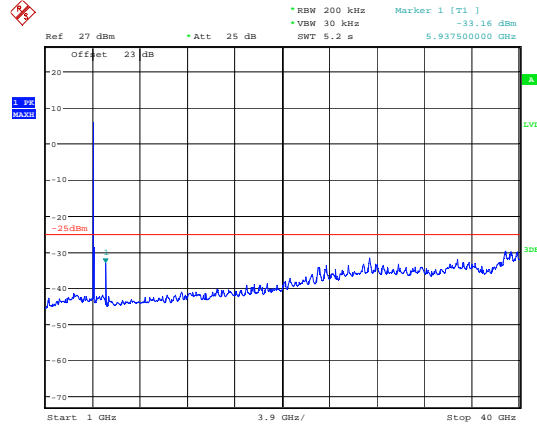
Low Channel

Frequency range: 30 – 1000 MHz



Date: 29.JUL.2010 15:31:05

Frequency range: 1000 – 40000 MHz

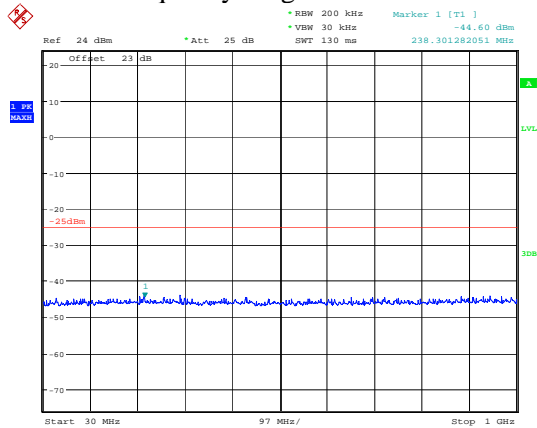


Date: 29.JUL.2010 15:30:25

Channel Bandwidth: 20 MHz

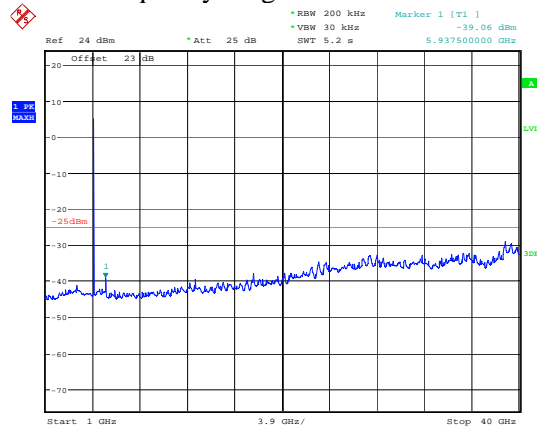
Mid Channel

Frequency range: 30 – 1000 MHz



Date: 29.JUL.2010 14:40:34

Frequency range: 1000 – 40000 MHz

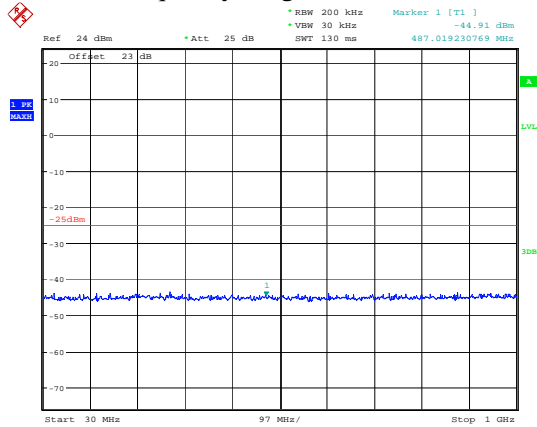


Date: 29.JUL.2010 14:40:03

Channel Bandwidth: 20 MHz

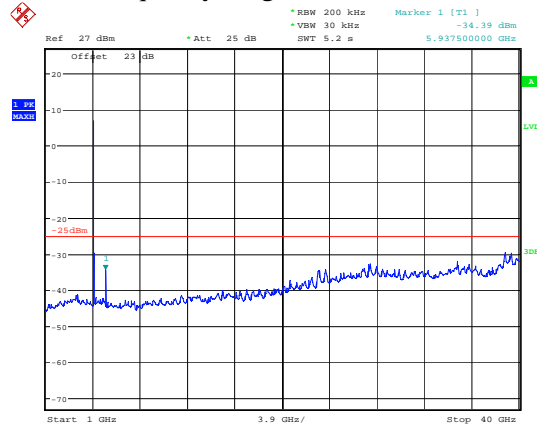
High Channel

Frequency range: 30 – 1000 MHz



Date: 29.JUL.2010 14:43:54

Frequency range: 1000 – 40000 MHz



Date: 29.JUL.2010 15:27:01

Clause 90.210(m) Radiated Spurious Emissions

m) *Emission Mask M.* For high power transmitters (greater than 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

- (1) On any frequency removed from the assigned frequency between 0–45% of the authorized bandwidth (BW): 0 dB.
- (2) On any frequency removed from the assigned frequency between 45–50% of the authorized bandwidth: $568 \log (\% \text{ of (BW)/45})$ dB.
- (3) On any frequency removed from the assigned frequency between 50–55% of the authorized bandwidth: $26 + 145 \log (\% \text{ of BW/50})$ dB.
- (4) On any frequency removed from the assigned frequency between 55–100% of the authorized bandwidth: $32 + 31 \log (\% \text{ of (BW)/55})$ dB.
- (5) On any frequency removed from the assigned frequency between 100–150% of the authorized bandwidth: $40 + 57 \log (\% \text{ of (BW)/100})$ dB.
- (6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or $55 + 10 \log (P)$ dB, whichever is the lesser attenuation.

Test Results: Pass

Additional Observations:

The Spectrum was searched from 30MHz to the 40 GHz.

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.

Radiated spurious emissions were measured by using substitution method.

Channel	Frequency (MHz)	Pol. V/H	RCVD Signal (dB μ V)	Substitution equivalent		ERP (dBm)	Limit (dBm)	Margin (dB)
				SG out, (dBm)	Ant. Gain (dBd)			
Low	3387.8	H	33.64	-35.91	7.75	-28.16	-25.00	3.16
	3414.7	V	33.21	-35.49	7.83	-27.66	-25.00	2.66
Mid	3378.0	H	34.08	-35.47	7.74	-27.73	-25.00	2.73
	3409.7	V	33.61	-35.09	7.81	-27.28	-25.00	2.28
High	3396.1	H	33.36	-36.19	7.81	-28.38	-25.00	3.38
	3443.5	V	33.58	-35.12	7.86	-27.26	-25.00	2.26

ERP calculation = Signal generator level + Antenna gain

Clause 90.213 Frequency Stability

- a) Unless noted elsewhere, transmitters used in the services governed by this part must have minimum frequency stability as specified in the following Table.

Frequency range (MHz)	Minimum Frequency Stability parts per million (ppm)		
	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	100	100	200
25-50	20	20	50
72-76	5	-	50
150-174	50	5	50
216-220	1.0	-	1.0
220-222	0.1	1.5	1.5
421-512	2.5	5	5
806-809	1.0	1.5	1.5
809-824	1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	0.1	1.5	1.5
902-928	2.5	2.5	2.5
929-930	1.5	-	-
935-940	0.1	1.5	1.5
1427-1435	300	300	300
Above 2450	-	-	-

Test Results: Pass

Additional Observations:

All modulations and channel bandwidth setting were investigated; only the worst case was presented.

Condition	F _{NOMINAL} GHz	F _{MEASURED} GHz	Offset Hz	Offset ppm
+50°C, Nominal Voltage	4.965	4.9649980	-2000	-0.40
+40°C, Nominal Voltage	4.965	4.9649990	-1000	-0.20
+30°C, Nominal Voltage	4.965	4.9649990	-1000	-0.20
+20°C, +15% Nominal Voltage	4.965	4.9650012	1200	0.24
+20°C, Nominal Voltage	4.965	4.9650000	—	—
+20°C, -15% Nominal Voltage	4.965	4.9649990	-1000	-0.20
+10°C, Nominal Voltage	4.965	4.9649975	-2500	-0.50
0°C, Nominal Voltage	4.965	4.9649980	-2000	-0.40
-10°C, Nominal Voltage	4.965	4.9649985	-1500	-0.30
-20°C, Nominal Voltage	4.965	4.9650020	2000	0.40
-30°C, Nominal Voltage	4.965	4.9650025	2500	0.50

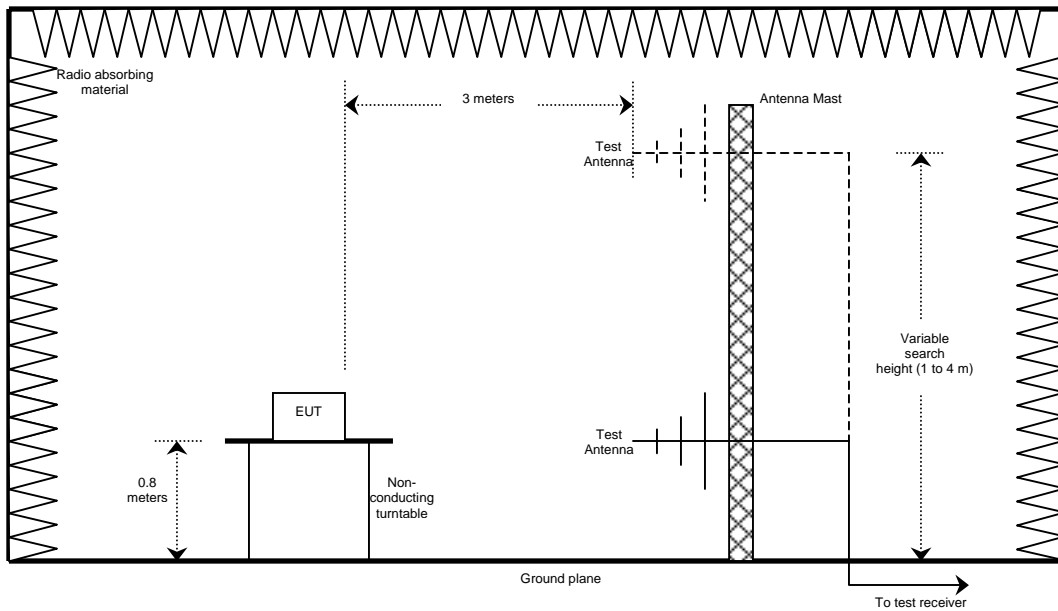
Appendix B : Setup Photographs

Radiated Spurious Emissions Setup:

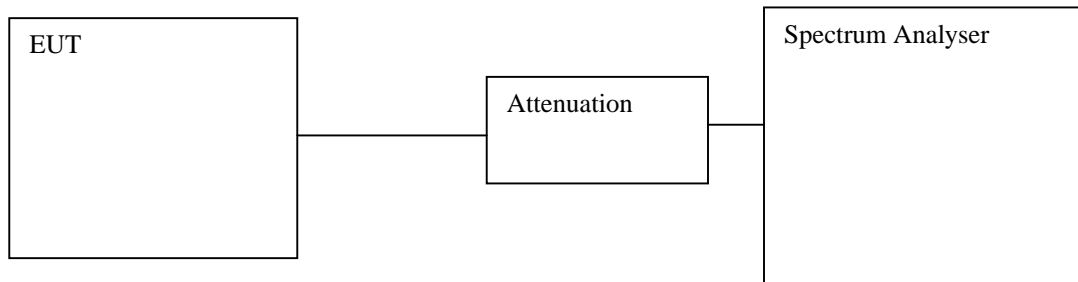


Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions



Conducted Emissions, Output power, Occupied Bandwidth



Frequency Stability

