

Report on the Radio Testing
For
Cambium Networks Ltd
on
4.9 GHz PMP 450m
Report no. TRA-047387-47-00C
2019-12-06

Report Number: TRA-047387-47-00C
Issue: A

REPORT ON THE RADIO TESTING OF A
Cambium Networks Ltd
4.9 GHz PMP 450m
WITH RESPECT TO SPECIFICATION
FCC Part 90 Subpart Y

TEST DATE: 2019-10-28 to 2019-11-05

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Date: 2019-12-06

Disclaimers:

- [1] THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE
[2] THE RESULTS CONTAINED IN THIS DOCUMENT RELATE ONLY TO THE ITEM(S) TESTED

RF915 6.0

1 Revision Record

<i>Issue Number</i>	<i>Issue Date</i>	<i>Revision History</i>
A	2019-11-13	Original
B	2019-11-19	Modified and added some characteristics of the EUT
C	2019-12-06	Updated as TCB request

2 Summary

TEST REPORT NUMBER:	TRA-047387-47-00C
WORKS ORDER NUMBER:	TRA-047387-01
PURPOSE OF TEST:	Testing of radio frequency equipment per the relevant authorization procedure of chapter 47 of CFR (code of federal regulations) Part 2, subpart J.
TEST SPECIFICATION(S):	Part 90 Subpart Y
EQUIPMENT UNDER TEST (EUT):	4.9 GHz PMP 450m
MODEL NUMBER:	5083HH
FCC IDENTIFIER:	QWP-50450M
MAC ADDRESS:	0a-00-3e-60-60-36
MANUFACTURER/AGENT:	Cambium Networks Ltd
ADDRESS:	Unit B2 Linhay Business Park Eastern Road Ashburton Devon TQ13 7UP United Kingdom
CLIENT CONTACT:	Don Reid ☎ 01364 655667 ✉ Don.Reid@Cambiumnetworks.com
ORDER NUMBER:	47-044-084
TEST DATE:	2019-10-28 to 2019-11-05
TESTED BY:	D Moncayola Element

2.1 Test Summary

<i>Test Method and Description</i>	<i>Requirement Clause Part 90</i>	<i>Applicable to this equipment</i>	<i>Result / Note</i>
Transmitter Unwanted Emissions	90.210	☒	Pass
Occupied bandwidth	90.209	☒	Pass
Emission Mask	90.210	☒	Pass
Frequency Stability	90.213	☒	Pass
Equivalent Isotropically Radiated Power (e.i.r.p)	90.1215	☒	Pass
Peak EIRP Density	90.1215	☒	Pass
Peak-to-average power ratio (PAPR)	90.1215	☒	Pass

Notes:

The results contained in this report relate only to the items tested, in the condition at time of test, and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only. Any modifications made are identified in Section 8 of this report.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 5.2 of this test report (Deviations from Test Standards).

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4 Introduction

This report TRA-047387-47-00C presents the results of the Radio testing on a Cambium Networks Ltd, 4.9 GHz PMP 450m testing to part 90 Y of radio frequency equipment per the relevant authorization procedure of chapter 47 of CFR (code of federal regulations) Part 2, subpart J.

The testing was carried out for Cambium Networks Ltd by Element, at the address(es) detailed below.

☒	30 Meter Open Area Test Site Persore Airfield, Long Lane, Throckmorton, Worcs, WR10 2JH UK	☒	Element Skelmersdale Unit 1 Pendle Place Skelmersdale West Lancashire WN8 9PN UK
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This report details the configuration of the equipment, the test methods used and any relevant modifications where appropriate.

All test and measurement equipment under the control of the laboratory and requiring calibration is subject to an established programme and procedures to control and maintain measurement standards. The quality management system meets the principles of ISO 9001, and has quality control procedures for monitoring the validity of tests undertaken. Records and sufficient detail are retained to establish an audit trail of calibration records relating to its test results for a defined period. Under control of the established calibration programme, key quantities or values of the test & measurement instrumentation are within specification and comply with the relevant traceable internationally recognised and appropriate standard specifications, which are UKAS calibrated as such where these properties have a significant effect on results. Participation in inter-laboratory comparisons and proficiency testing ensures satisfactory correlation of results conform to Elements own procedures, as well as statistical techniques for analysis of test data providing the appropriate confidence in measurements.

Throughout this report EUT denotes equipment under test.

FCC Site Listing:

Element is accredited for the above sites under the US-EU MRA, Designation number UK0009.

IC Registration Number(s):

Element Hull	3483A
Element North West	3930B

The test site requirements of ANSI C63.4-2014 are met up to 1GHz.

The test site SVSWR requirements of CISPR 16-1-4:2010 are met over the frequency range 1 GHz to 18 GHz.

5 Test Specifications

5.1 Normative References

- FCC 47 CFR Ch. I – Part 90 – Private Land Mobile Radio Services
- ANSI C63.26-2015 – American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.
- ANSI C63.4-2014 – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

5.2 Deviations from Test Standards

Maximum conducted output power

Due to the nature of the equipment it is not possible to measure the power conducted so a radiated measurement was performed. This measurement was performed at 30m to ensure the measurement was made in the antenna far field.

Spectral Power Density

Due to the nature of the equipment it is not possible to measure the power conducted so a radiated measurement was performed. This measurement was performed at 30m to ensure the measurement was made in the antenna far field.

5.3 Minimisation of reflections

Due to the use of a 30 meter open area test site with no RF absorbing material for the measurement of the fundamental attempts were made to minimise the influence of reflections.

To minimise the reflections the following precautions were taken.

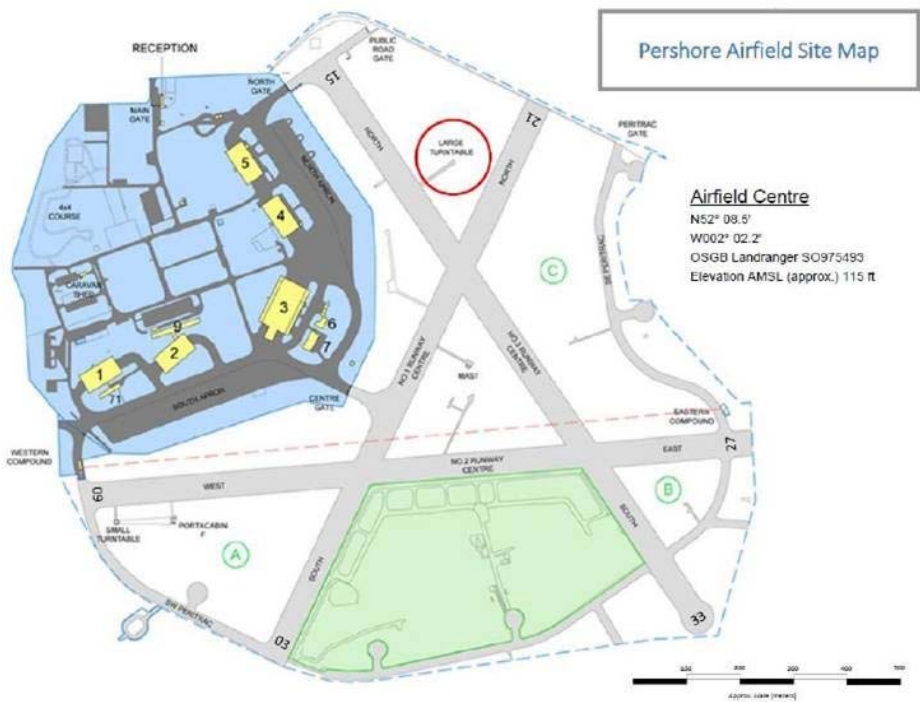
Test performed over a grassed area to try and ensure no sub surface artefacts produce reflections.

The EUT was raised to a height of 4 meters above the ground plane to help reduce the effects of any reflected paths at 30 meters

The EUTs antennas are set with a 2 degree down tilt, and an 8 degree beam width, to negate this down tilt the EUT was rotated 180 degrees though the vertical plane (ie turned upside down to normal operation) and the EUT was angled so the bore sight was parallel to the grassed area.

Due to the increased height of the EUT the measurement antenna was varied between 1 and 6 meters to encompass the height of the EUT and its potential bandwidth

5.4 Open area test site information



6 Glossary of Terms

§	denotes a section reference from the standard, not this document
AC	Alternating Current
ANSI	American National Standards Institute
BW	bandwidth
C	Celsius
CFR	Code of Federal Regulations
CW	Continuous Wave
dB	decibel
dBm	dB relative to 1 milliwatt
DC	Direct Current
DSSS	Direct Sequence Spread Spectrum
EIRP	Equivalent Isotropically Radiated Power
ERP	Effective Radiated Power
EUT	Equipment Under Test
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
Hz	hertz
IC	Industry Canada
ITU	International Telecommunication Union
LBT	Listen Before Talk
m	metre
max	maximum
MIMO	Multiple Input and Multiple Output
min	minimum
MRA	Mutual Recognition Agreement
N/A	Not Applicable
PCB	Printed Circuit Board
PDF	Portable Document Format
Pt-mpt	Point-to-multipoint
Pt-pt	Point-to-point
RF	Radio Frequency
RH	Relative Humidity
RMS	Root Mean Square
Rx	receiver
s	second
SVSWR	Site Voltage Standing Wave Ratio
Tx	transmitter
UKAS	United Kingdom Accreditation Service
V	volt
W	watt
Ω	ohm

7 Equipment Under Test

7.1 EUT Identification

- Name: 4.9 GHz PMP 450m
- MAC Address: 0a-00-3e-60-60-36
- Model Number: 5083HH
- Software Revision: CANOPY 16.0.1.1 Build DEV-40
- Build Level / Revision Number: P7

7.2 System Equipment

Equipment listed below forms part of the overall test setup and is required for equipment functionality and/or monitoring during testing. The compliance levels achieved in this report relate only to the EUT and not items given in the following list.

- Name: Netgear 5 port 10/100/1000M switch
- Serial Number: 2N211B3D00F3C
- Model Number: GS605 v4
- Name: Dell Latitude Laptop PC
- Serial Number:
- Model Number: E6440

7.3 EUT Mode of Operation

7.3.1 Transmission

The mode of operation for Transmit tests was as follows:

The unit was transmitting modulated or unmodulated signals with 100 % duty cycle.

Operating Frequencies

Operating frequency band tested 4940 MHz - 4990 MHz.

Operating modes

There are three unique operating modes. These only affect the antenna radiation pattern.

Sector Mode

This mode produces a broad antenna radiation beam.

Beamforming Mode

This produces a narrow, focused antenna beam.

MU-MIMO mode

This produces several narrow, focused antenna beams.

Modulation Modes

Supported modulation modes are QPSK, 16QAM, 64QAM and 256QAM. Each of these four modulation mode can be configured to be MIMO A or MIMO B. The differences between these MIMO modes are described below.

MIMO A

The data streams transmitted in both horizontal and vertical antenna polarisations are identical.

MIMO B

The data streams transmitted in the horizontal and vertical polarisations are independent.

7.4 EUT Radio Parameters

7.4.1 General

Frequency of operation:	4.94 GHz – 4.99 GHz band
Modulation type(s):	QPSK; 16QAM; 64QAM and 256QAM
Occupied channel bandwidth(s):	5 MHz; 10 MHz, 15 MHz and 20 MHz
Channel spacing:	5 MHz; 10 MHz, 15 MHz and 20 MHz
Declared output power(s):	52 dBm (e.i.r.p)
Nominal Supply Voltage:	48 V dc
Location of notice for license exempt use:	Not applicable, license device
Method of prevention of use on non-US / non-Canadian frequencies:	Not stated
Duty cycle:	100 % for testing only

7.4.2 Antennas

Type:	Integral antenna
Frequency range:	4.94 GHz – 4.99 GHz
Impedance:	50 Ω
Gain:	15 dBi
Connector type:	Not applicable, integral antenna
Length:	500 × 650 × 120
Weight:	14.2 kg
Mounting:	Professionally installed

7.4.3 Product specific declarations

Multiple antenna configuration(s), e.g. MIMO:	Sector, Beamforming and MU-MIMO
Fixed pt-pt operations (yes/no):	Yes
Installation manual advice on pt-pt operational restrictions (yes/no):	N/A Professionally installed
Fixed pt-mpt operations (yes/no):	Yes
Simultaneous tx (yes/no):	Yes

7.5 EUT Description

The EUT is a point-to-multipoint (PMP) wireless broadband platform working in the band 4.94 GHz – 4.99 GHz.

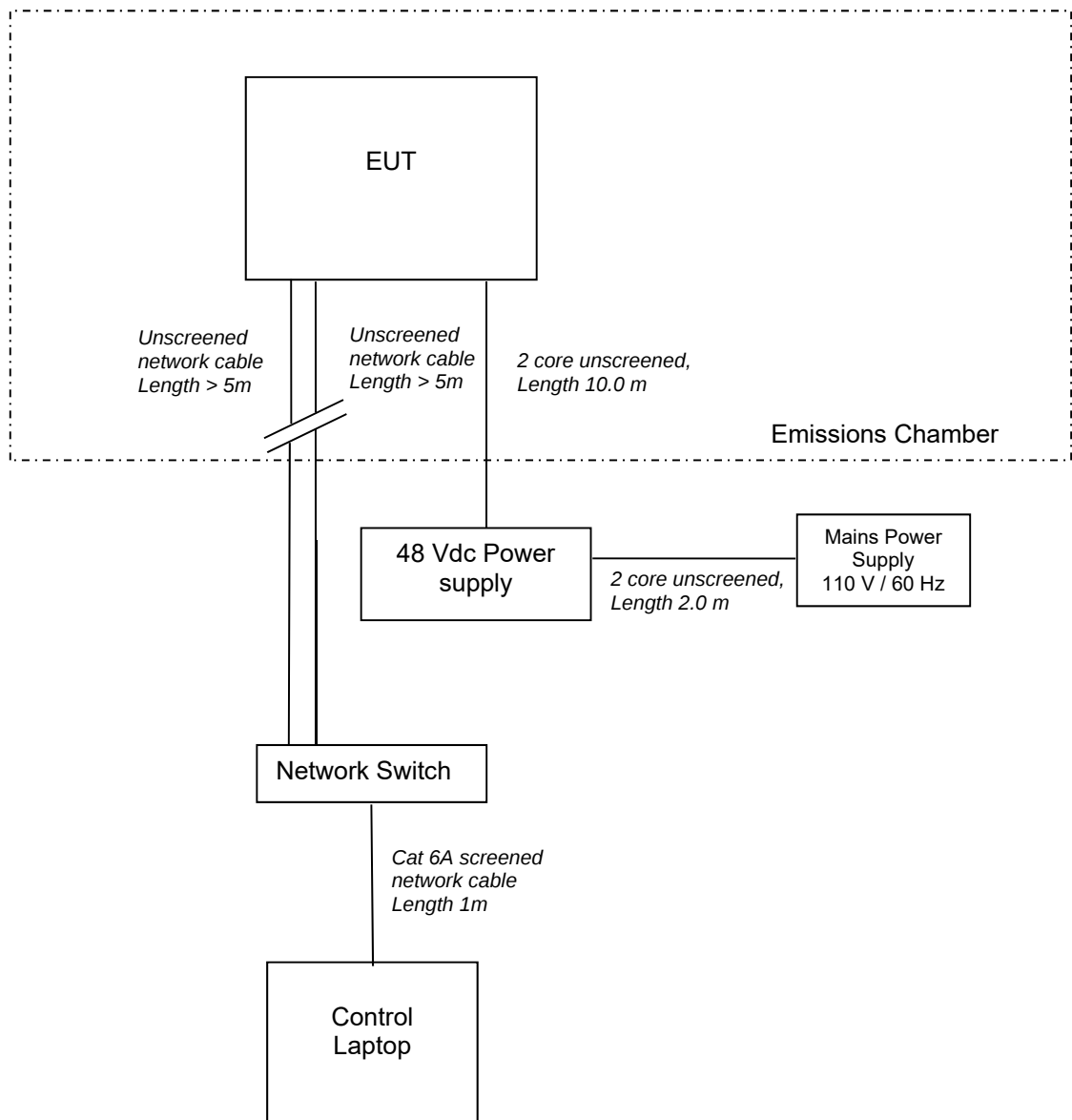
8 Modifications

No modifications were performed during this assessment.

9 EUT Test Setup

9.1 Block Diagram

The following diagram shows basic EUT interconnections with cable type and cable lengths identified:



9.2 General Set-up Photograph

The following photograph shows basic EUT set-up:



10 General Technical Parameters

10.1 Normal Conditions

The E U T was tested under the normal environmental conditions of the test laboratory, except where otherwise stated. The normal power source applied was 48 V dc from the adaptor.

10.2 Varying Test Conditions

There are no specific frequency stability requirements for the type of device. The results contained in this report demonstrate that the occupied bandwidth is contained within the authorised band and the manufacturer has declared sufficient frequency stability (refer to section 7.4).

Variation of supply voltage is required to ensure stability of the declared output power. During carrier power testing the following variations were made:

	Category	Nominal	Variation
☐	Mains	110 V ac +/-2 %	85 % and 115 %
☐	Battery	New battery	N/A
☒	Power supply	48 V dc	85 % and 115 %

11 Radiated emissions

11.1 Definitions

Spurious emissions

Emissions on a frequency or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

11.2 Test Parameters

Test Location:	Element Skelmersdale
Test Chamber:	Radio Chamber
Test Standard and Clause:	ANSI C63.26-2015, Clause 5.5
EUT Channels / Frequencies Measured:	4950 MHz, 4965 MHz and 4980 MHz
EUT Channel Bandwidths:	20 MHz Beamforming
Deviations From Standard:	None
Measurement BW:	30 MHz to 1 GHz: 120 kHz Above 1 GHz: 1 MHz
Measurement Detector:	Up to 1 GHz: QPK Above 1 GHz: RMS

Environmental Conditions (Normal Environment)

Temperature: 24 °C	+15 °C to +35 °C (as declared)
Humidity: 60 % RH	20 % RH to 75 % RH (as declared)
Supply: 48 V dc	48 V dc (as declared)

11.3 Test Limit

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.

11.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure i, the emissions from the EUT were measured on a spectrum analyzer / EMI receiver.

Radiated electromagnetic emissions from the EUT are checked first by preview scans. Preview scans for all spectrum and modulation characteristics are checked, using a peak detector and where applicable worst-case determined for function, operation, orientation, etc. for both vertical and horizontal polarisations. Pre-scan plots are shown with a peak detector and 100 kHz RBW.

If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.26 are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed, (see EUT setup photographs for more detail).

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. Emissions above 1 GHz are characterized using standard gain horn antennas. Pre-amplifiers and filters are used where required. Care is taken to ensure that test receiver resolution bandwidth, video bandwidth and detector type(s) meet the regulatory requirements.

For both horizontal and vertical polarizations, the EUT is then rotated through 360 degrees in azimuth until the highest emission is detected. At the previously determined azimuth the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected, this maximum value is recorded.

Power values measured on the test receiver / analyzer are converted to field strength, FS, in dBμV/m at the regulatory distance, using:

$$FS = PR + CL + AF - PA + DC - CF$$

Where,

PR is the power recorded on the receiver / spectrum analyzer in dBμV;

CL is the cable loss in dB;

AF is the test antenna factor in dB/m;

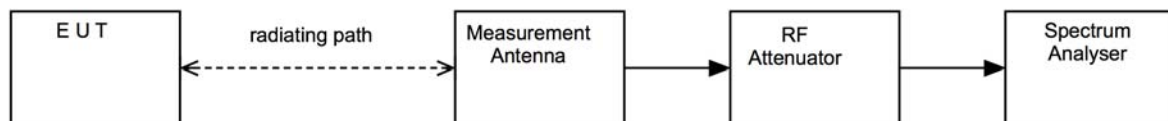
PA is the pre-amplifier gain in dB (where used);

DC is the duty correction factor in dB (where used, e.g. harmonics of pulsed fundamental);

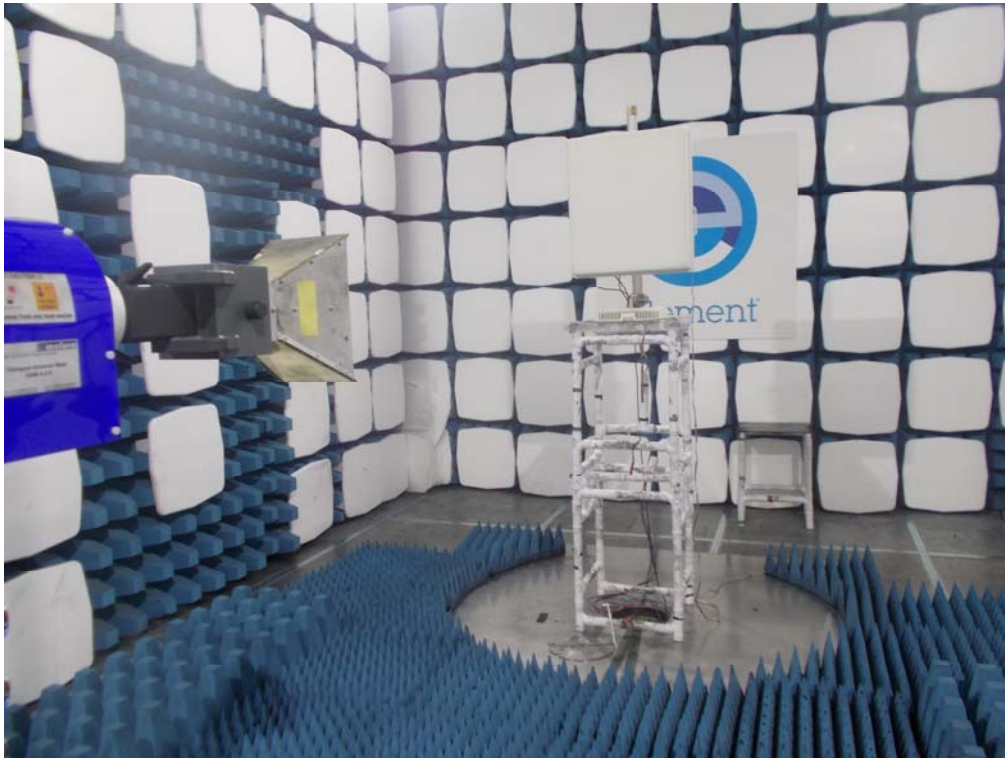
CF is the distance factor in dB (where measurement distance different to limit distance);

This field strength value is then compared with the regulatory limit.

Figure i Test Setup



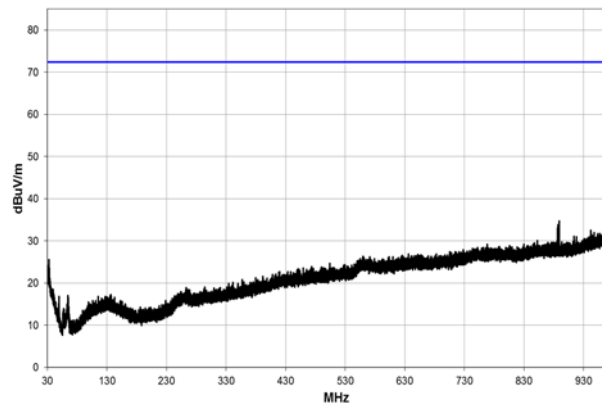
11.5 Test Set-up Photograph



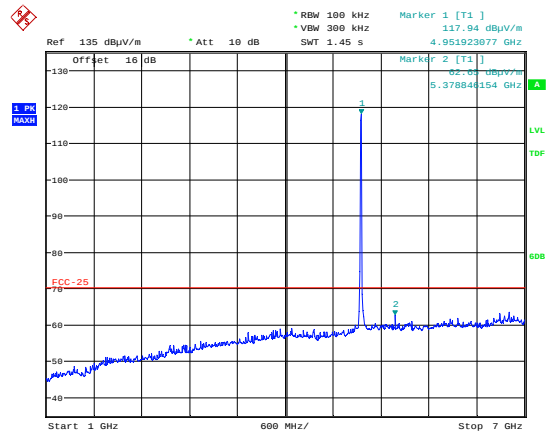
11.6 Test Equipment

Equipment Type	Manufacturer	Equipment Description	Element No	Due For Calibration
CBL611/A	Chase	Bilog	U573	2021-09-19
8449B	Agilent	PreAmp	L572	2020-10-15
6201-69	Watkins Johnson	PreAmp	U372	2020-02-25
3115	EMCO	1-18GHz Horn	L139	2021-07-16
FSU46	R&S	Spectrum Analyser	U281	2020-10-01
20240-20	Flann	Horn 18-26GHz (&U330)	L300	2020-04-24
22240-20	Flann	Standard Gain Horn 26-40	L301	2020-08-10

11.7 Test Results

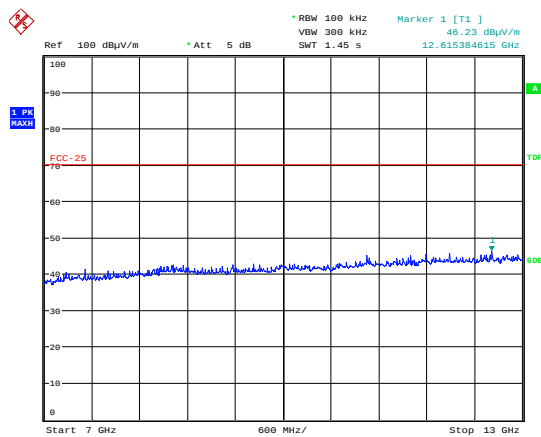


30 MHz to 1 GHz

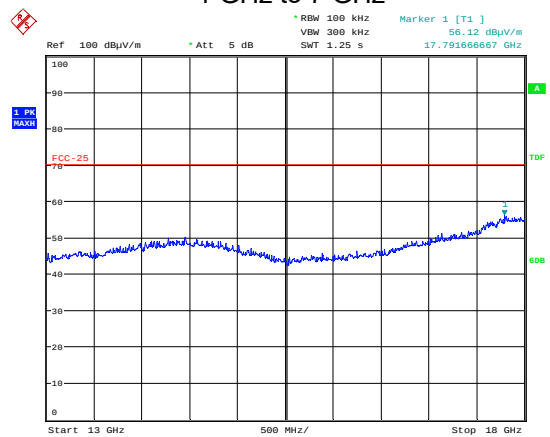


Date: 28.OCT.2019 16:49:11

1 GHz to 7 GHz

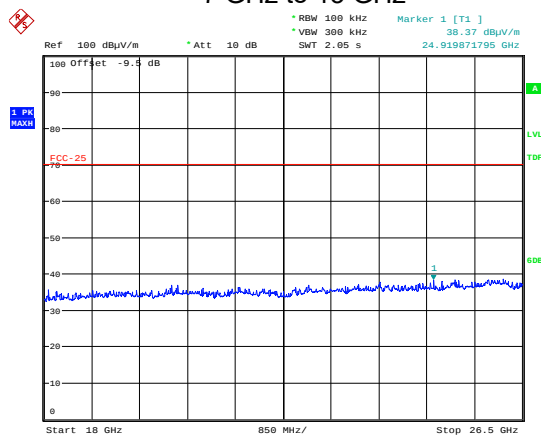


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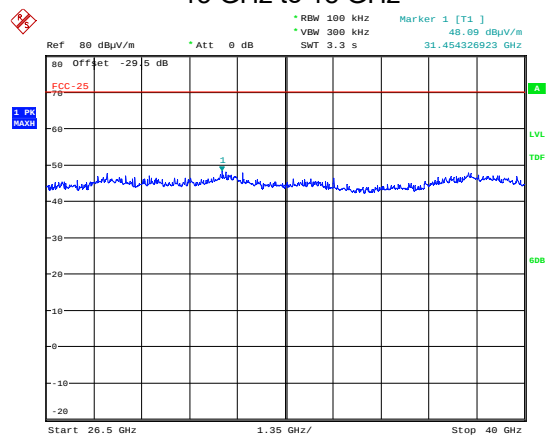
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7 GHz to 13 GHz



Date: 28.OCT.2019 18:12:37

13 GHz to 18 GHz



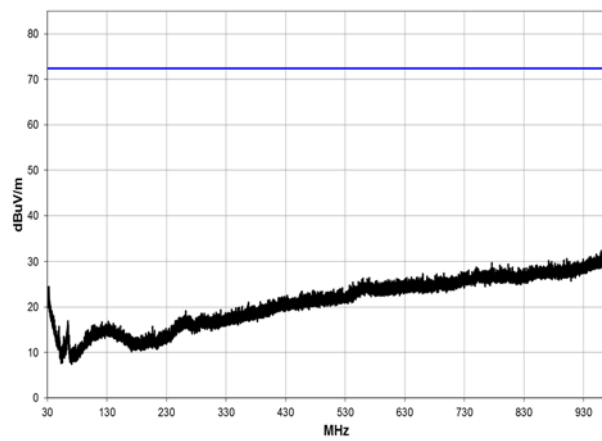
Date: 28.OCT.2019 19:12:21

18 GHz to 26.5 GHz

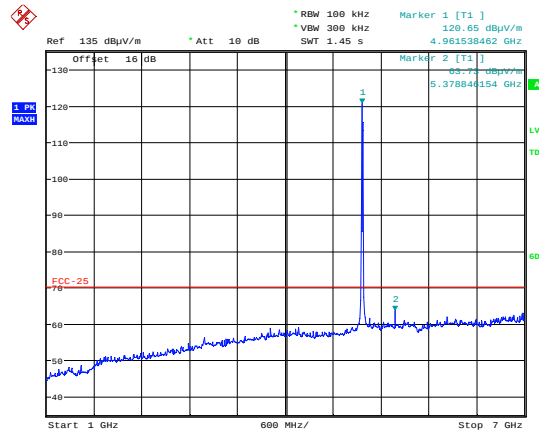
26.5 GHz to 40 GHz

Beamform; Power setting: 45.5; QPSK MIMO; Channel: 4950 MHz

Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
RMS	5375.00	63.45	4.60	33.70	36.29	0.00	0.00	65.46	1874.99	3251

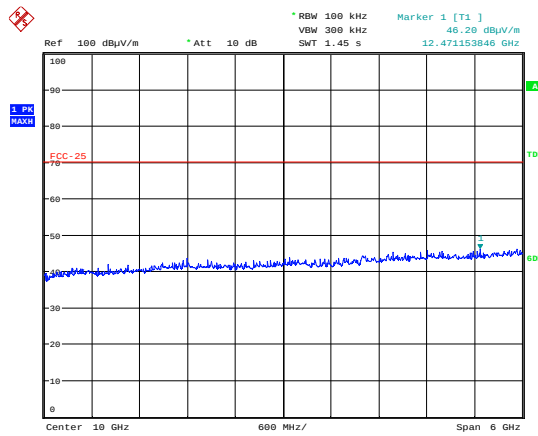


30 MHz to 1 GHz



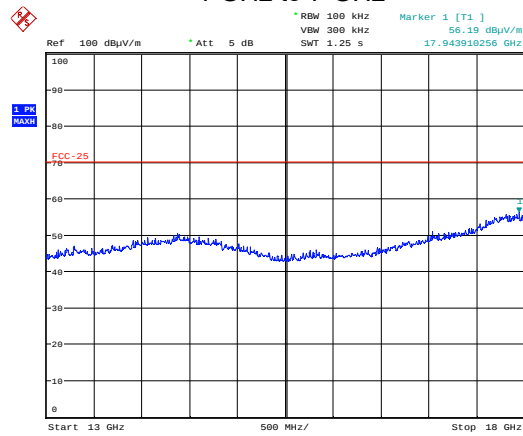
Date: 28.OCT.2019 16:37:18

1 GHz to 7 GHz



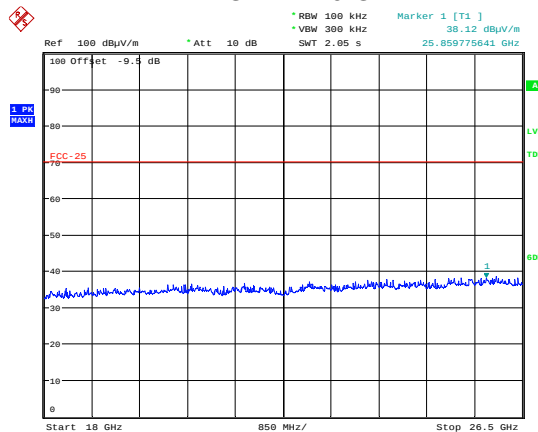
Date: 28.OCT.2019 12:18:06

7 GHz to 13 GHz



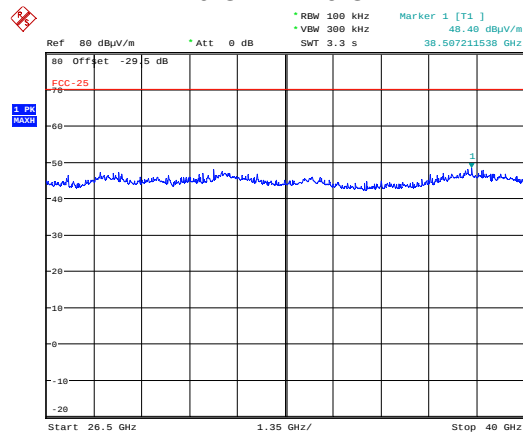
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13 GHz to 18 GHz



Date: 28.OCT.2019 18:16:26

18 GHz to 26.5 GHz

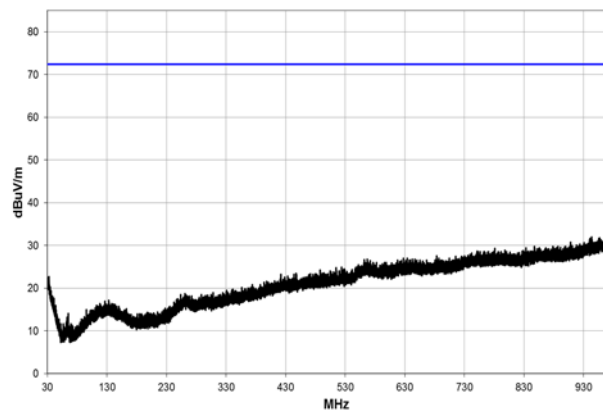


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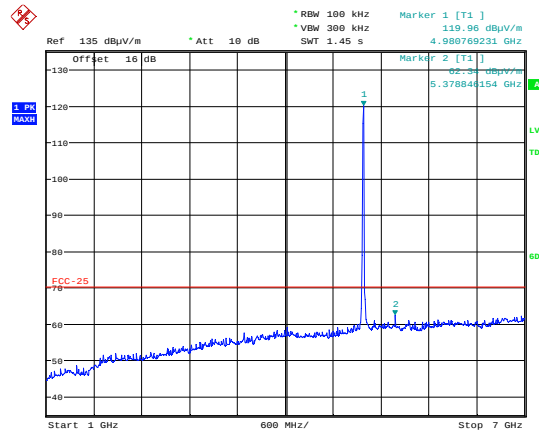
26.5 GHz to 40 GHz

Beamform; Power setting: 45.5; QPSK MIMO; Channel: 4965 MHz

Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
RMS	5375.00	61.10	4.60	33.70	36.29	0.00	0.00	63.11	1430.54	3251

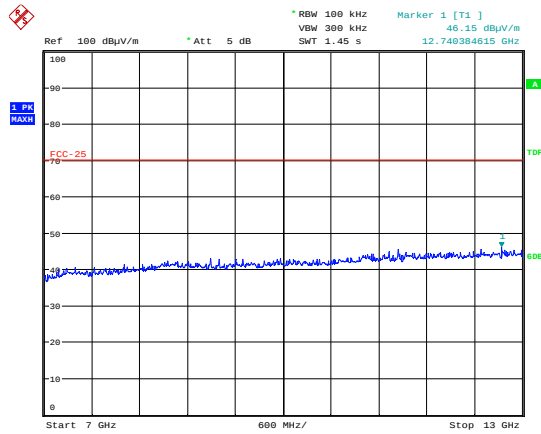


30 MHz to 1 GHz



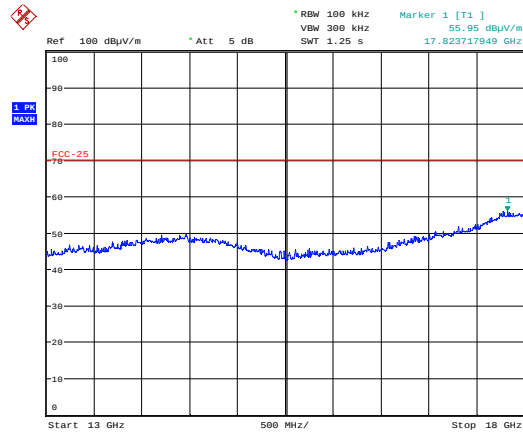
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1 GHz to 7 GHz



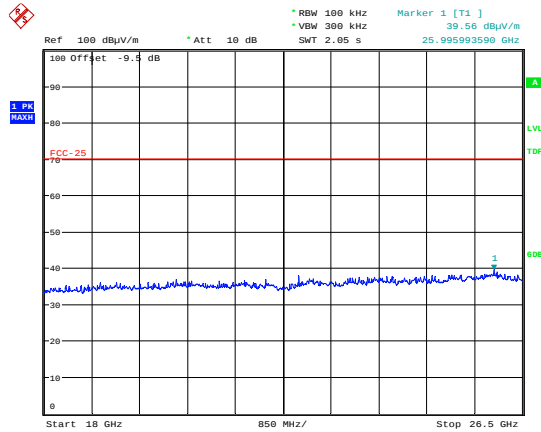
Date: 28.OCT.2019 12:41:27

7 GHz to 13 GHz



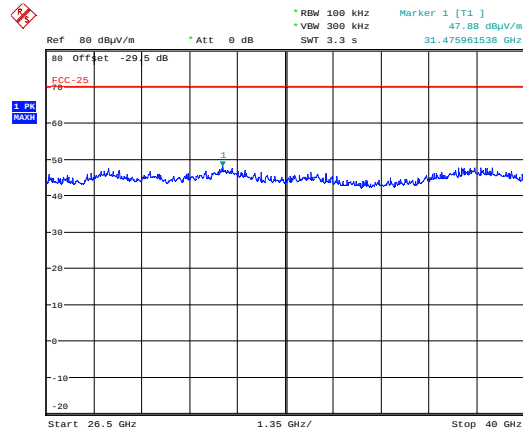
Date: 28.OCT.2019 12:42:24

13 GHz to 18 GHz



Date: 28.OCT.2019 18:18:02

18 GHz to 26.5 GHz



Date: 28.OCT.2019 19:17:22

26.5 GHz to 40 GHz

Beamform; Power setting: 45.5; QPSK MIMO; Channel: 4980 MHz

Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
RMS	5375.00	61.11	4.60	33.70	36.29	0.00	0.00	63.12	1432.19	3251

12 Occupied Bandwidth

12.1 Definition

The OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

12.2 Test Parameters

Test Location:	Element Skelmersdale
Test Chamber:	Radio Chamber
Test Standard and Clause:	FCC: ANSI C63.26-2015, Clause 5.4.4
EUT Channels / Frequencies Measured:	Low / Mid / High
EUT Channel Bandwidths:	5 MHz, 10MHz, 15 MHz and 20 MHz
EUT Test Modulations:	QPSK MIMO A & B, 16 QAM MIMO A & B, 64 QAM MIMO A & B and 256 QAM MIMO A & B
Deviations From Standard:	None
Measurement BW: (Requirement: 1% to 5% OBW)	100 kHz and 300 kHz
Spectrum Analyzer Video BW: (requirement at least 3x RBW)	300 kHz and 1 MHz
Measurement Span: (requirement 2 to 5 times OBW)	7.5 MHz, 20MHz, 30 MHz and 60 MHz
Measurement Detector:	Peak

Environmental Conditions (Normal Environment)

Temperature: 24 °C	+15 °C to +35 °C (as declared)
Humidity: 60 % RH	20 % RH to 75 % RH (as declared)
Supply: 48 V dc	48 V dc (as declared)

12.3 Test Limit

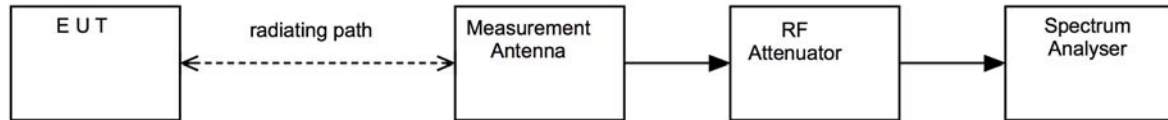
The equipment's occupied bandwidth shall not exceed its channel bandwidth.

12.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure iii, the bandwidth of the EUT was measured on a spectrum analyser.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst-case configuration in each bandwidth.

Figure iii Test Setup

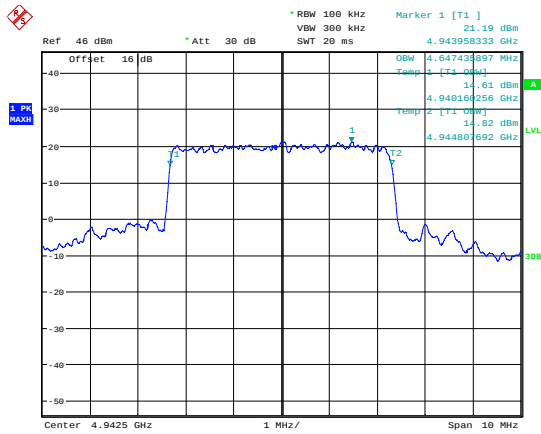


12.5 Test Equipment

Equipment Type	Manufacturer	Equipment Description	Element No	Due For Calibration
8449B	Agilent	PreAmp	L572	2020-10-15
3115	EMCO	1-18GHz Horn	L139	2021-07-16
FSU26	R&S	Spectrum Analyser	REF909	2020-06-21

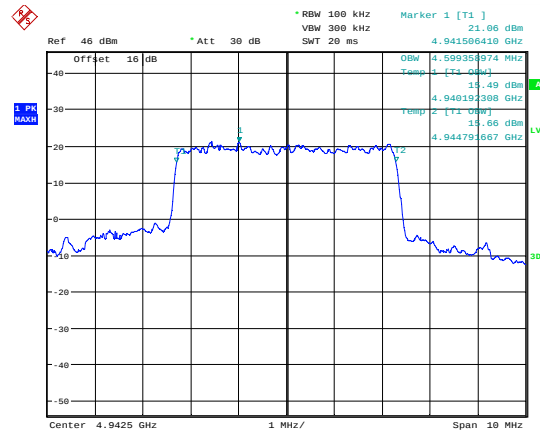
12.6 Test Results

5 MHz Bandwidth Sector



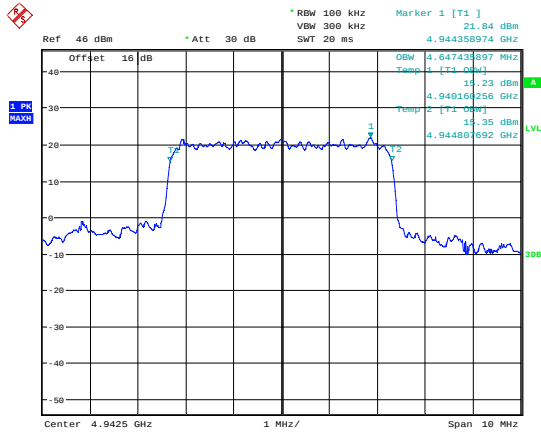
Date: 1.JAN.2003 14:07:32

99 % Bandwidth QPSK; 4942.5 MHz; MIMO A.



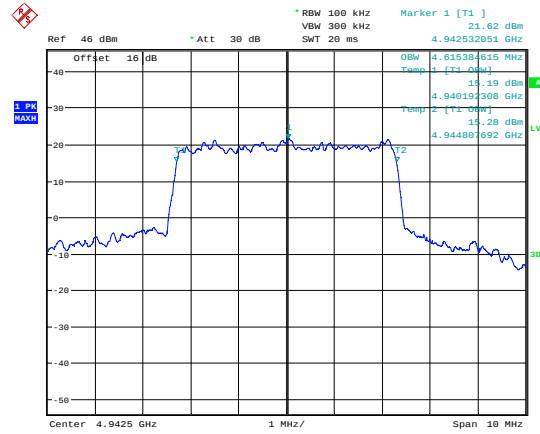
Date: 1.JAN.2003 14:10:11

99 % Bandwidth QPSK; 4942.5 MHz; MIMO B.



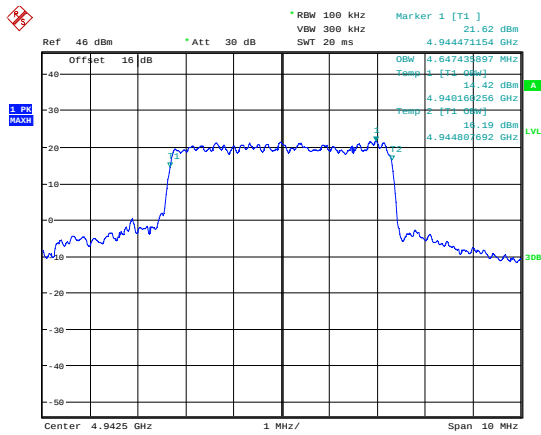
Date: 1.JAN.2003 14:08:16

99 % Bandwidth 16 QAM; 4942.5 MHz; MIMO A.



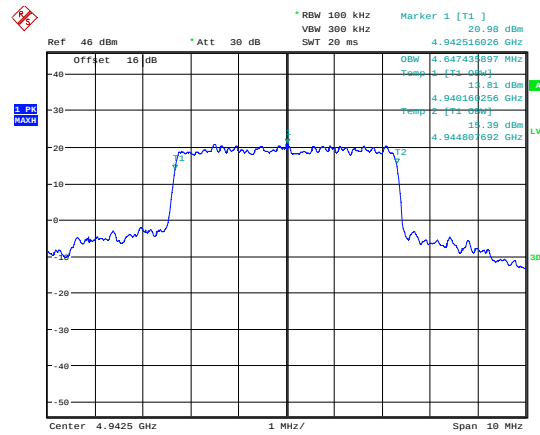
Date: 1.JAN.2003 14:11:03

99 % Bandwidth 16 QAM; 4942.5 MHz; MIMO B.



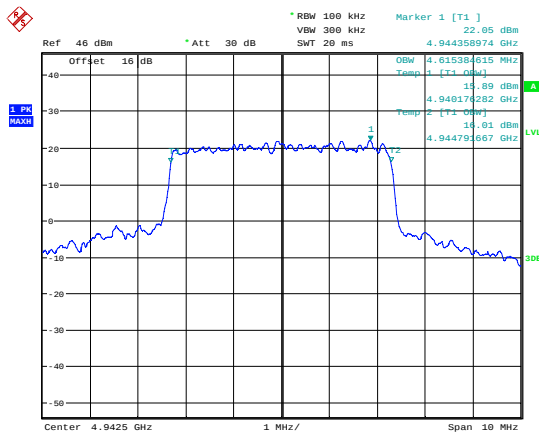
Date: 1.JAN.2003 14:08:57

99 % Bandwidth 64 QAM; 4942.5 MHz; MIMO A.



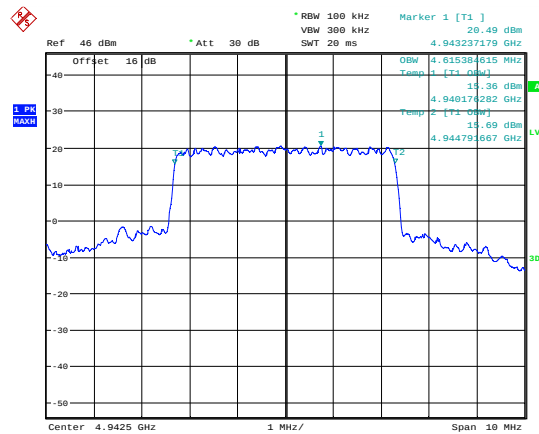
Date: 1.JAN.2003 14:12:07

99 % Bandwidth 64 QAM; 4942.5 MHz; MIMO B.



Date: 1.JAN.2003 14:06:44

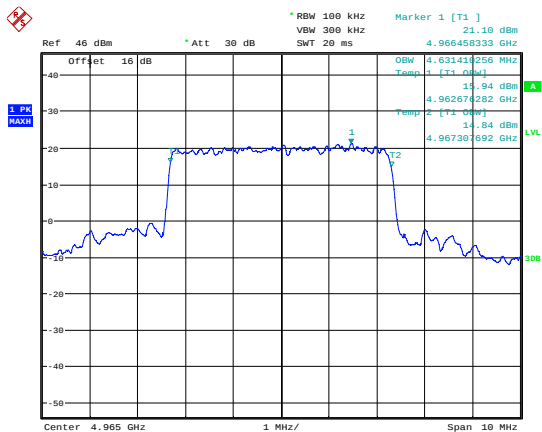
99 % Bandwidth 256 QAM; 4942.5 MHz; MIMO A.



Date: 1.JAN.2003 14:13:00

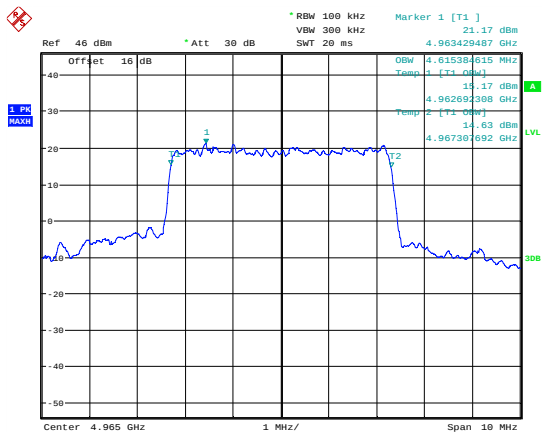
99 % Bandwidth 256 QAM; 4942.5 MHz; MIMO B.

Bottom Channel 5 MHz bandwidth						
Frequency (MHz)	Modulation Mode	MIMO	FL (MHz)	FH (MHz)	99 % Bandwidth (kHz)	Result
4942.5	QPSK	A	4940.160256	4944.807692	4647.436	Pass
4942.5	QPSK	B	4940.192308	4944.791667	4599.359	Pass
4942.5	16 QAM	A	4940.160256	4944.807692	4647.436	Pass
4942.5	16 QAM	B	4940.192308	4944.807692	4615.384	Pass
4942.5	64 QAM	A	4940.160256	4944.807692	4647.436	Pass
4942.5	64 QAM	B	4940.160256	4944.807692	4647.436	Pass
4942.5	256 QAM	A	4940.176282	4944.791667	4615.385	Pass
4942.5	256 QAM	B	4940.176282	4944.791667	4615.385	Pass



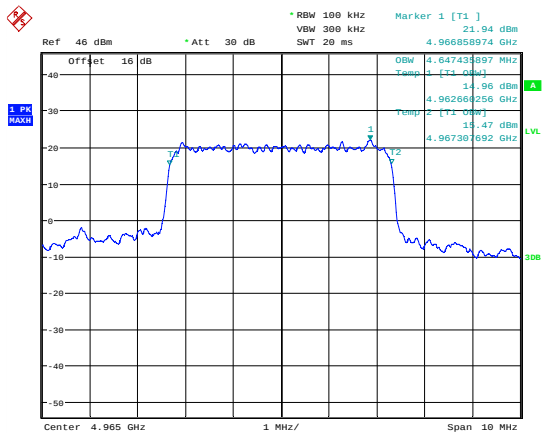
Date: 1.JAN.2003 14:18:10

99 % Bandwidth QPSK; 4965 MHz; MIMO A.



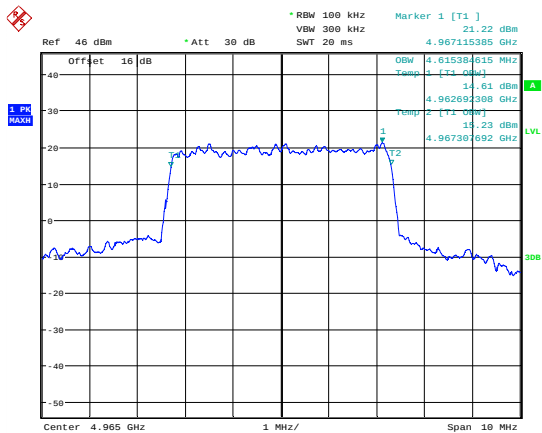
Date: 1.JAN.2003 14:17:26

99 % Bandwidth QPSK; 4965 MHz; MIMO B.



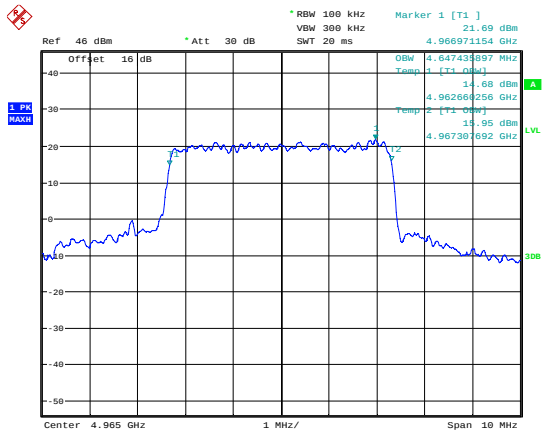
Date: 1.JAN.2003 14:19:12

99 % Bandwidth 16 QAM; 4965 MHz; MIMO A.



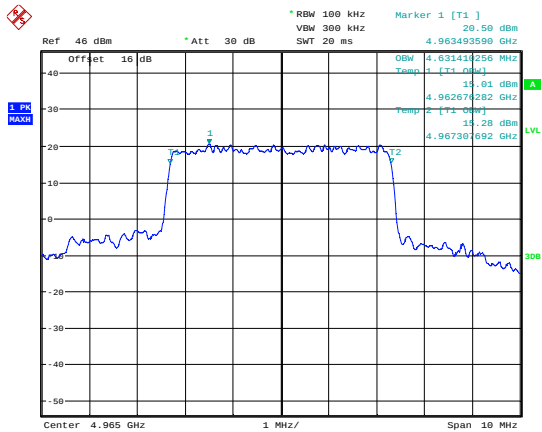
Date: 1.JAN.2003 14:16:34

99 % Bandwidth 16 QAM; 4965 MHz; MIMO B.



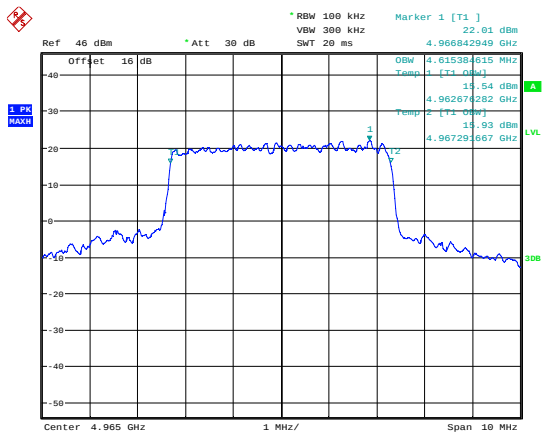
Date: 1.JAN.2003 14:20:01

99 % Bandwidth 64 QAM; 4965 MHz; MIMO A.



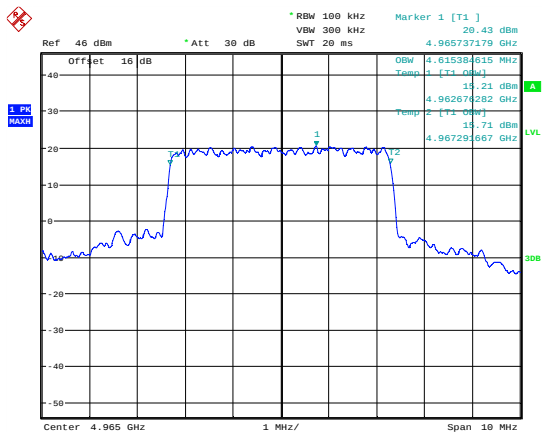
Date: 1.JAN.2003 14:15:50

99 % Bandwidth 64 QAM; 4965 MHz; MIMO B.



Date: 1.JAN.2003 14:20:47

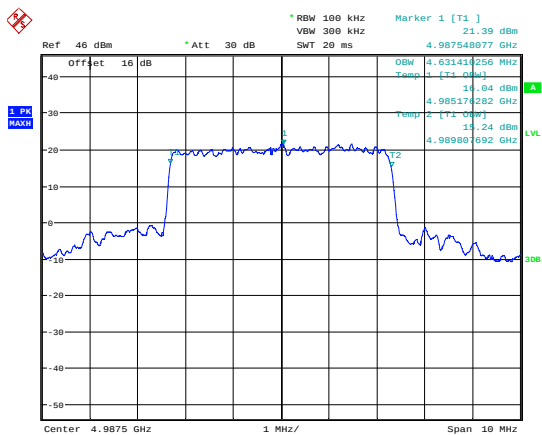
99 % Bandwidth 256 QAM; 4965 MHz;
MIMO.A.



Date: 1.JAN.2003 14:15:11

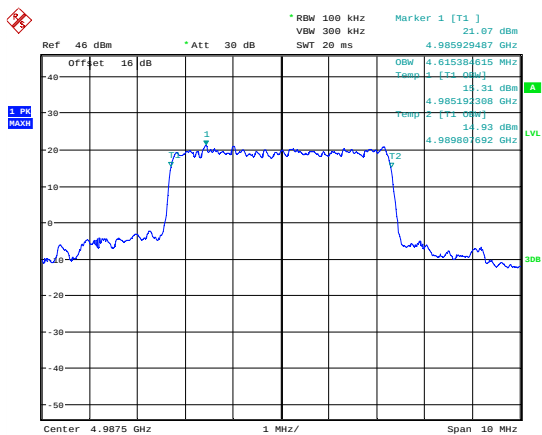
99 % Bandwidth 256 QAM; 4965 MHz;
MIMO.B.

Middle Channel 5 MHz bandwidth						
Frequency (MHz)	Modulation Mode	MIMO	FL (MHz)	FH (MHz)	99 % Bandwidth (kHz)	Result
4965	QPSK	A	4962.676282	4967.307692	4631.41	Pass
4965	QPSK	B	4962.692308	4967.307692	4615.384	Pass
4965	16 QAM	A	4962.660256	4967.307692	4647.436	Pass
4965	16 QAM	B	4962.692308	4967.307692	4615.384	Pass
4965	64 QAM	A	4962.660256	4967.307692	4647.436	Pass
4965	64 QAM	B	4962.676282	4967.307692	4631.41	Pass
4965	256 QAM	A	4962.676282	4967.291667	4615.385	Pass
4965	256 QAM	B	4962.676282	4967.291667	4615.385	Pass



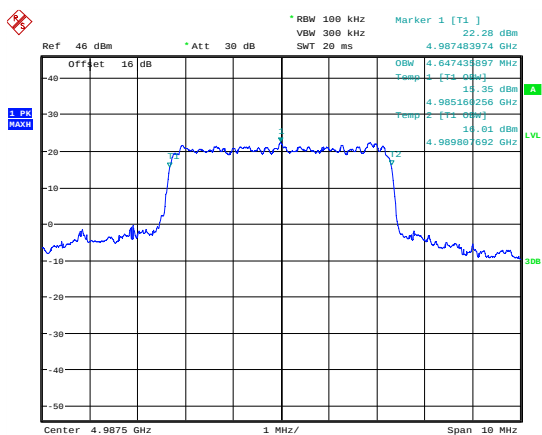
Date: 1.JAN.2003 14:53:00

99 % Bandwidth QPSK; 4987.5 MHz; MIMO A.



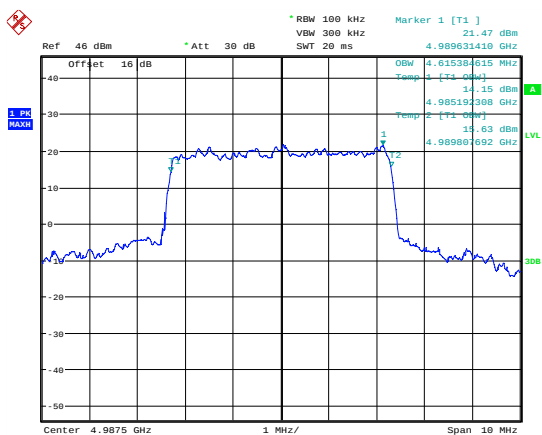
Date: 1.JAN.2003 14:53:34

99 % Bandwidth QPSK; 4987.5 MHz; MIMO B.



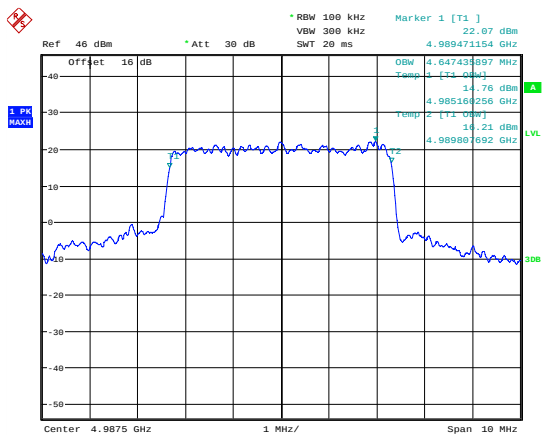
Date: 1.JAN.2003 14:52:03

99 % Bandwidth 16 QAM; 4987.5 MHz; MIMO A.



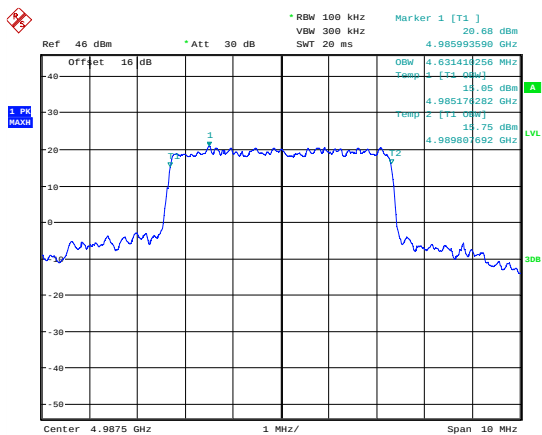
Date: 1.JAN.2003 14:54:35

99 % Bandwidth 16 QAM; 4987.5 MHz; MIMO B.



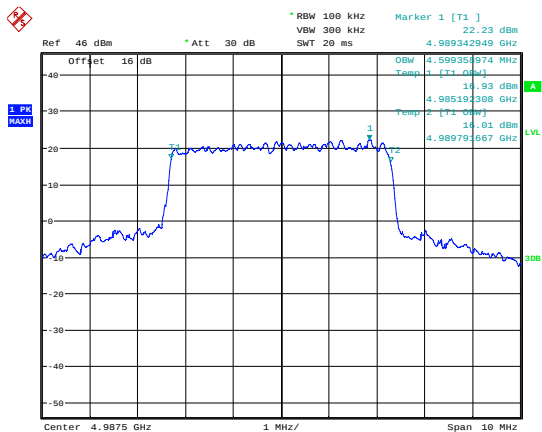
Date: 1.JAN.2003 14:51:34

99 % Bandwidth 64 QAM; 4987.5 MHz; MIMO A.



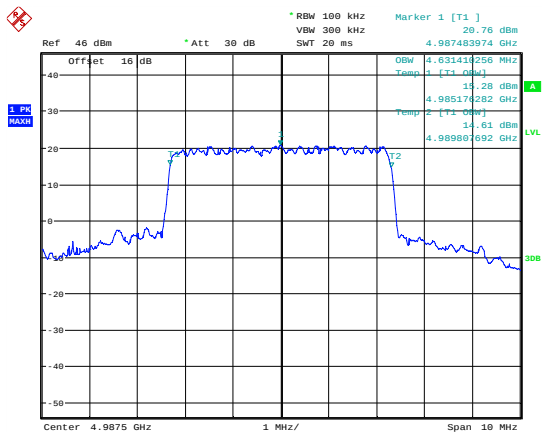
Date: 1.JAN.2003 14:55:25

99 % Bandwidth 64 QAM; 4987.5 MHz; MIMO B.



Date: 1.JAN.2003 14:50:59

99 % Bandwidth 256 QAM; 4987.5 MHz;
MIMO A.

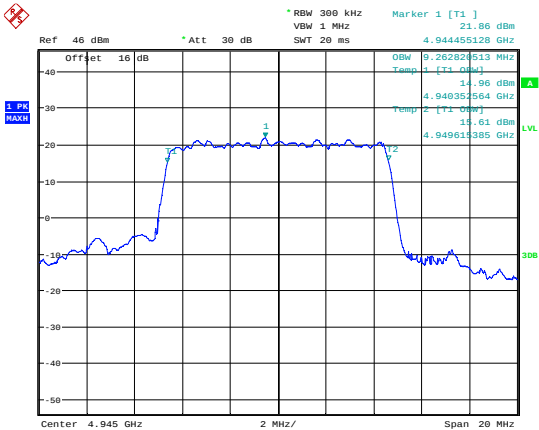


Date: 1.JAN.2003 14:56:14

99 % Bandwidth 256 QAM; 4987.5 MHz;
MIMO B.

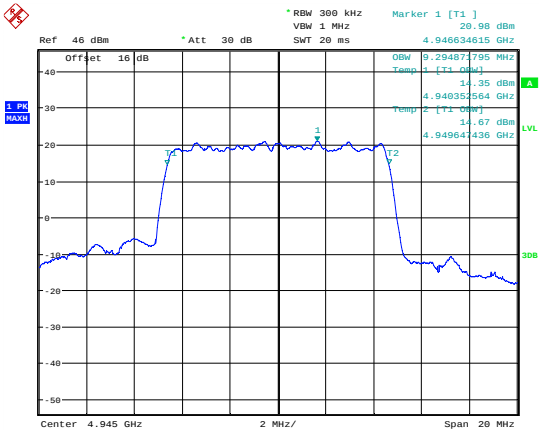
Top Channel 5 MHz bandwidth						
Frequency (MHz)	Modulation Mode	MIMO	FL (MHz)	FH (MHz)	99 % Bandwidth (kHz)	Result
4987.5	QPSK	A	4985.176282	4989.807692	4631.41	Pass
4987.5	QPSK	B	4985.192308	4989.807692	4615.384	Pass
4987.5	16 QAM	A	4985.160256	4989.807692	4647.436	Pass
4987.5	16 QAM	B	4985.192308	4989.807692	4615.384	Pass
4987.5	64 QAM	A	4985.160256	4989.807692	4647.436	Pass
4987.5	64 QAM	B	4985.176282	4989.807692	4631.41	Pass
4987.5	256 QAM	A	4985.192308	4989.791667	4599.359	Pass
4987.5	256 QAM	B	4985.176282	4989.807692	4631.41	Pass

10 MHz Bandwidth Sector



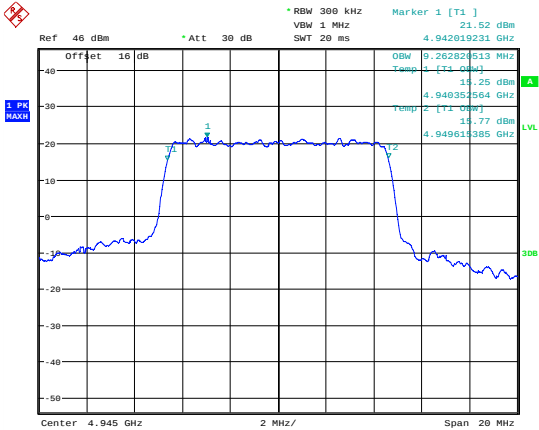
Date: 1.JAN.2003 16:01:33

99 % Bandwidth QPSK; 4945 MHz; MIMO A.



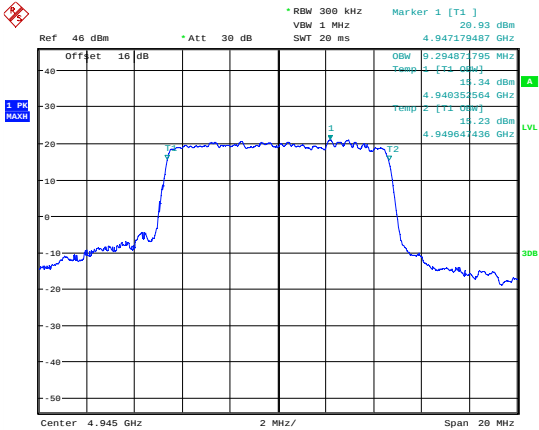
Date: 1.JAN.2003 16:11:56

99 % Bandwidth QPSK; 4945 MHz; MIMO B.



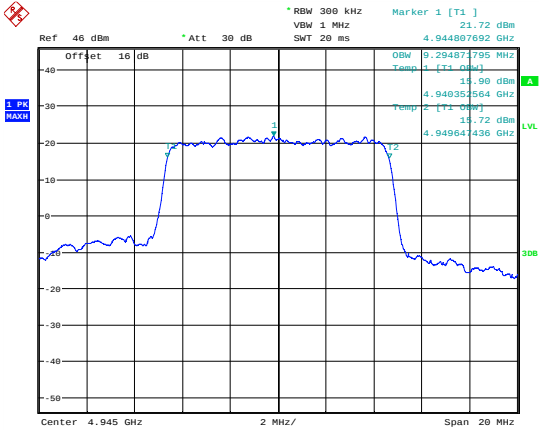
Date: 1.JAN.2003 16:02:41

99 % Bandwidth 16 QAM; 4945 MHz; MIMO A.



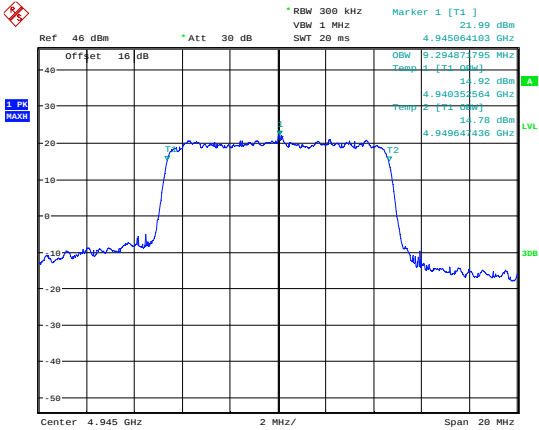
Date: 1.JAN.2003 16:12:34

99 % Bandwidth 16 QAM; 4945 MHz; MIMO B.



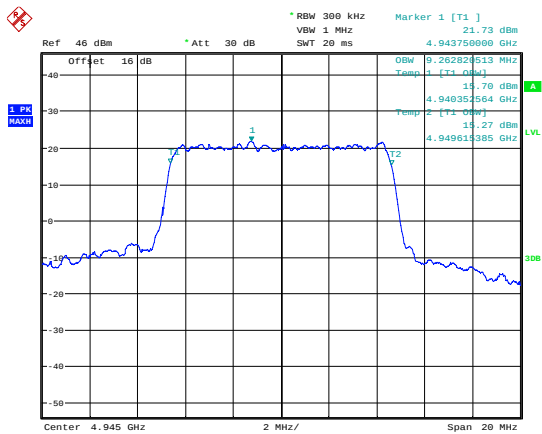
Date: 1.JAN.2003 16:04:08

99 % Bandwidth 64 QAM; 4945 MHz; MIMO A.



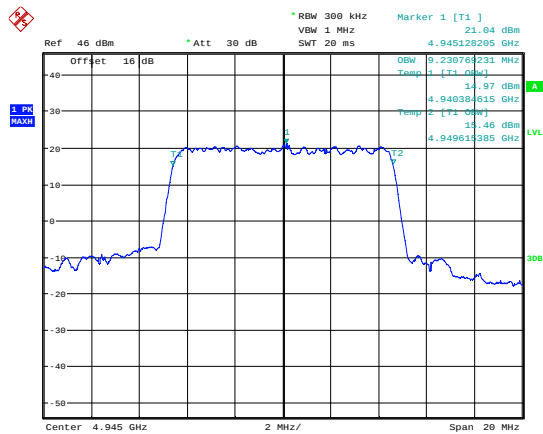
Date: 1.JAN.2003 16:13:04

99 % Bandwidth 64 QAM; 4945 MHz; MIMO B.



Date: 1.JAN.2003 16:04:51

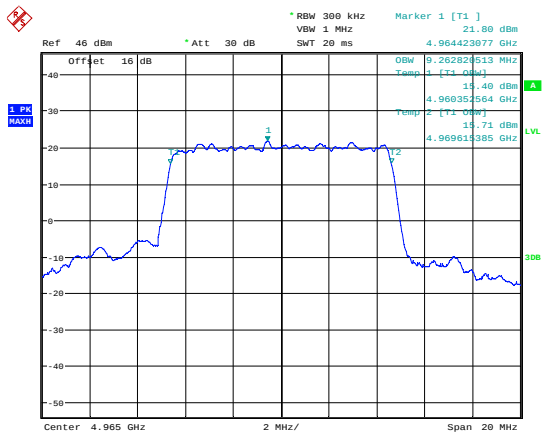
99 % Bandwidth 256 QAM; 4945 MHz;
MIMO A.



Date: 1.JAN.2003 16:13:39

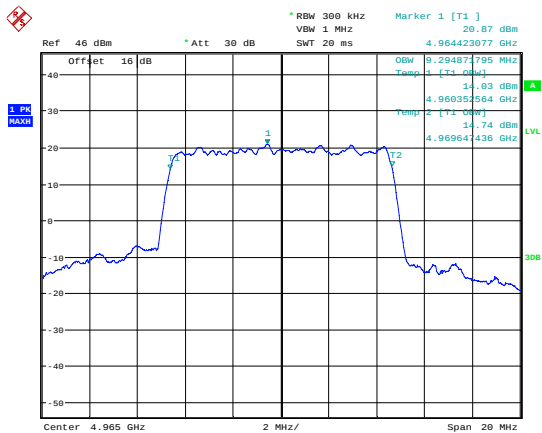
99 % Bandwidth 256 QAM; 4945 MHz;
MIMO B.

Bottom Channel 10 MHz bandwidth						
Frequency (MHz)	Modulation Mode	MIMO	FL (MHz)	FH (MHz)	99 % Bandwidth (kHz)	Result
4945	QPSK	A	4940.352564	4949.615385	9262.821	Pass
4945	QPSK	B	4940.352464	4949.647436	9294.972	Pass
4945	16 QAM	A	4940.352564	4949.615385	9262.821	Pass
4945	16 QAM	B	4940.352564	4949.647436	9294.872	Pass
4945	64 QAM	A	4940.352564	4949.647436	9294.872	Pass
4945	64 QAM	B	4940.352564	4949.647436	9294.872	Pass
4945	256 QAM	A	4940.352564	4949.615385	9262.821	Pass
4945	256 QAM	B	4940.384615	4949.615385	9230.77	Pass



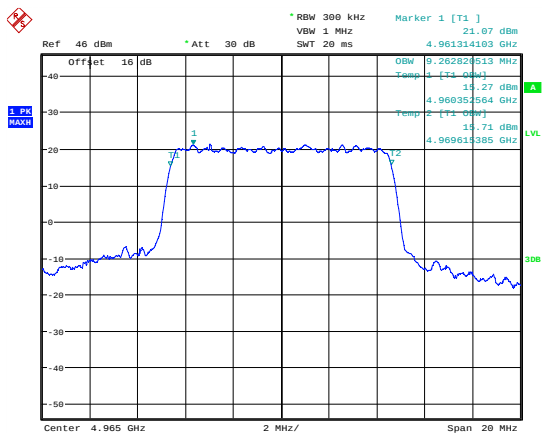
Date: 1.JAN.2003 16:18:17

99 % Bandwidth QPSK; 4965 MHz; MIMO A.



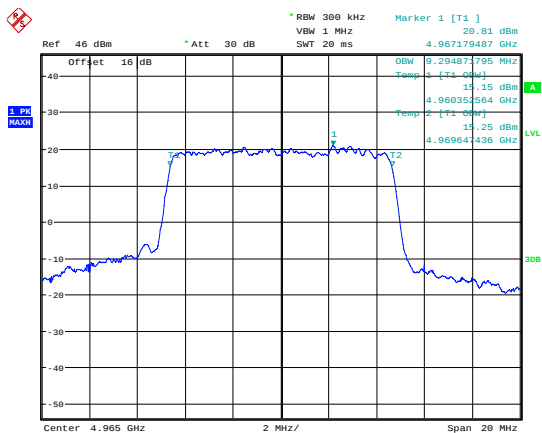
Date: 1.JAN.2003 16:17:28

99 % Bandwidth QPSK; 4965 MHz; MIMO B.



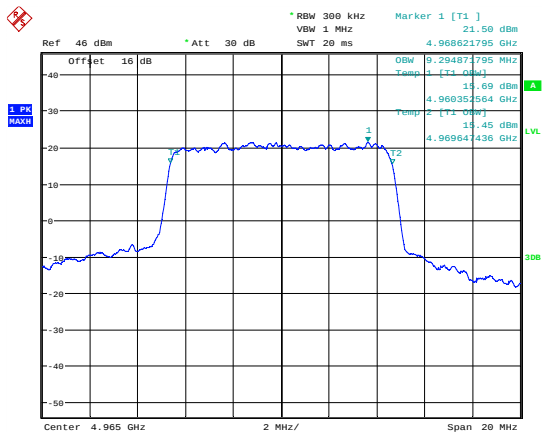
Date: 1.JAN.2003 16:18:53

99 % Bandwidth 16 QAM; 4965 MHz; MIMO A.



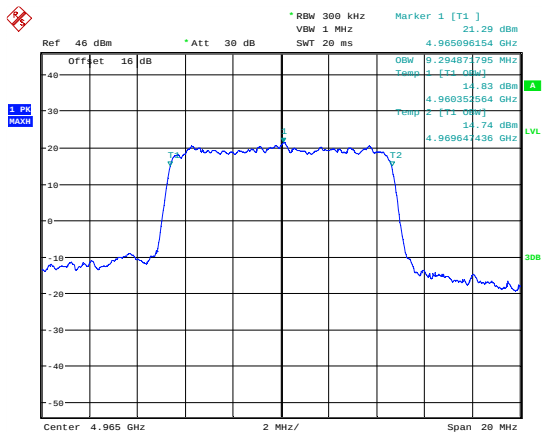
Date: 1.JAN.2003 16:16:36

99 % Bandwidth 16 QAM; 4965 MHz; MIMO B.



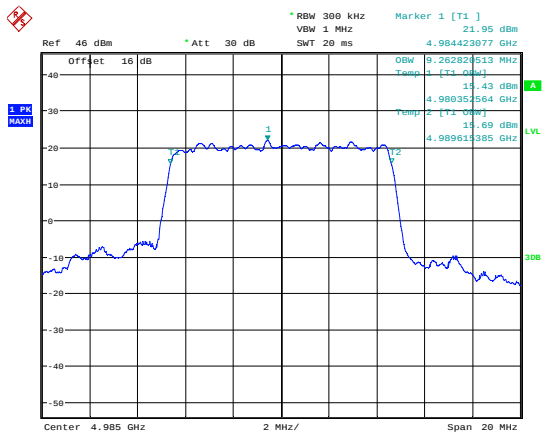
Date: 1.JAN.2003 16:19:30

99 % Bandwidth 64 QAM; 4965 MHz; MIMO A.



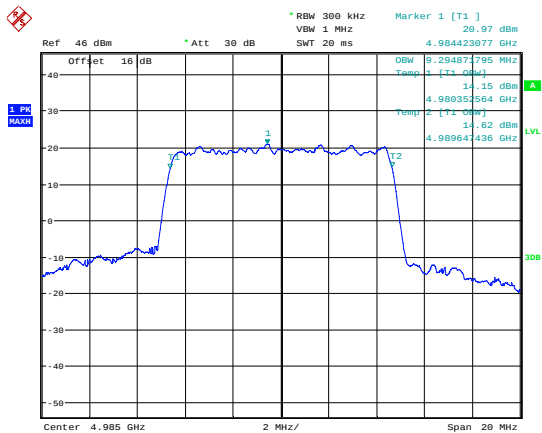
Date: 1.JAN.2003 16:15:59

99 % Bandwidth 64 QAM; 4965 MHz; MIMO B.



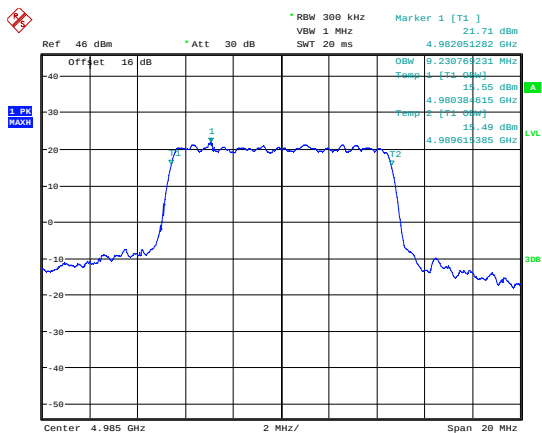
Date: 1.JAN.2003 16:23:47

99 % Bandwidth QPSK; 4985 MHz; MIMO A.



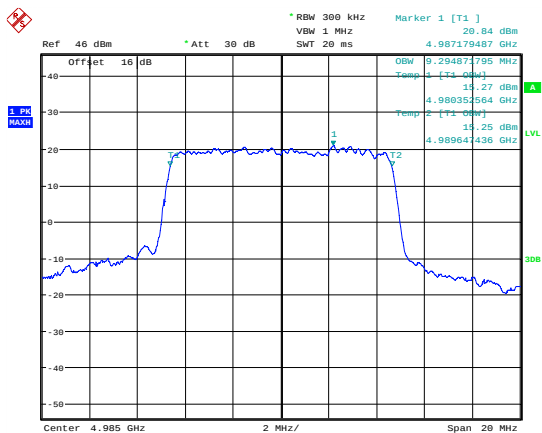
Date: 1.JAN.2003 16:24:36

99 % Bandwidth QPSK; 4985 MHz; MIMO B.



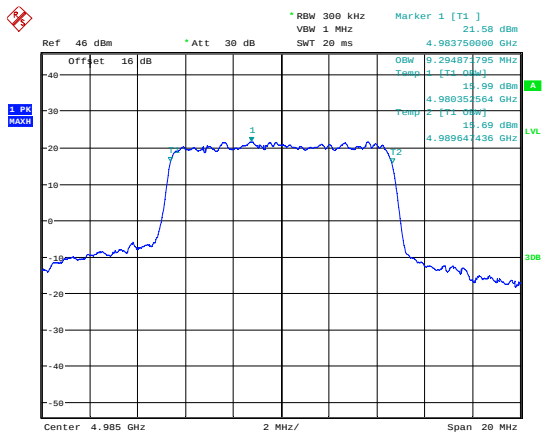
Date: 1.JAN.2003 16:23:06

99 % Bandwidth 16 QAM; 4985 MHz; MIMO A.



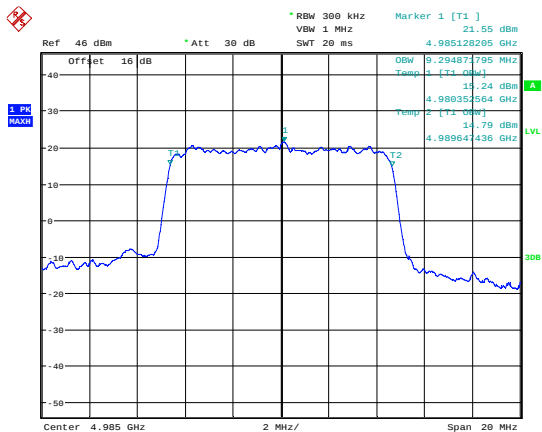
Date: 1.JAN.2003 16:25:27

99 % Bandwidth 16 QAM; 4985 MHz; MIMO B.



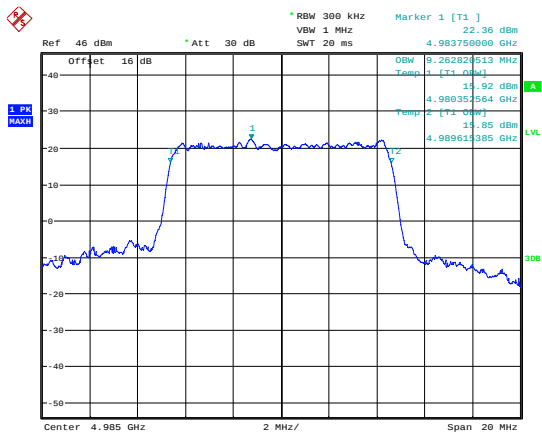
Date: 1.JAN.2003 16:22:23

99 % Bandwidth 64 QAM; 4985 MHz; MIMO A.



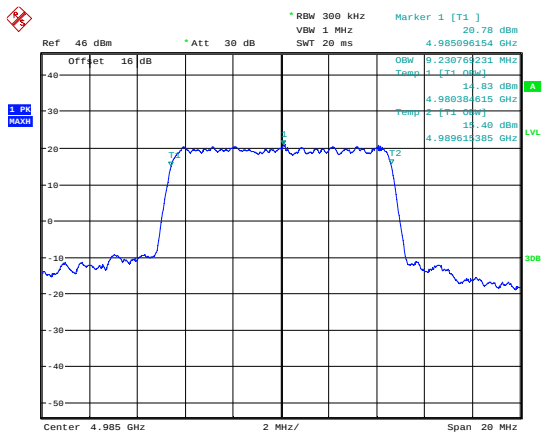
Date: 1.JAN.2003 16:26:13

99 % Bandwidth 64 QAM; 4985 MHz; MIMO B.



Date: 1.JAN.2003 16:21:42

99 % Bandwidth 256 QAM; 4985 MHz;
MIMO A.

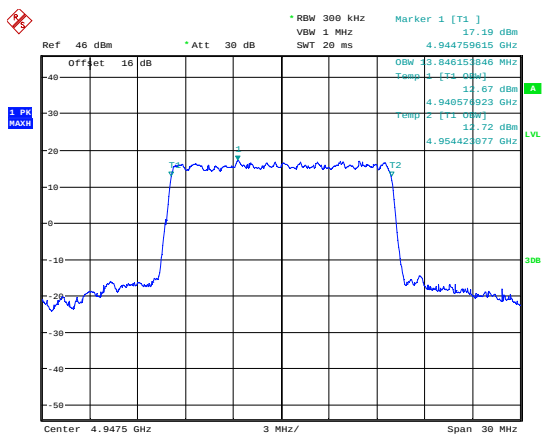


Date: 1.JAN.2003 16:26:54

99 % Bandwidth 256 QAM; 4985 MHz;
MIMO B.

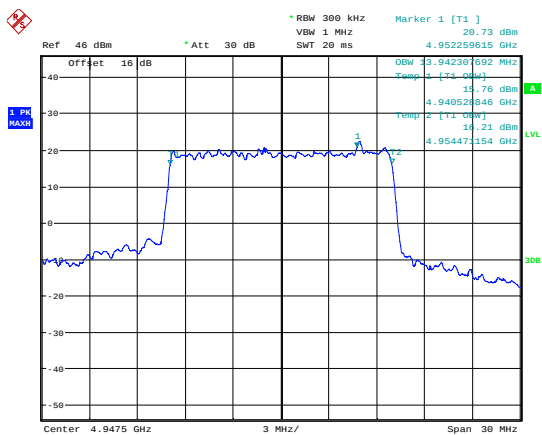
Top Channel 10 MHz bandwidth						
Frequency (MHz)	Modulation Mode	MIMO	FL (MHz)	FH (MHz)	99 % Bandwidth (kHz)	Result
4985	QPSK	A	4980.352564	4989.615385	9262.821	Pass
4985	QPSK	B	4980.352564	4989.647436	9294.872	Pass
4985	16 QAM	A	4980.384615	4989.615385	9230.77	Pass
4985	16 QAM	B	4980.352564	4989.647436	9294.872	Pass
4985	64 QAM	A	4980.352564	4989.647436	9294.872	Pass
4985	64 QAM	B	4980.352564	4989.647436	9294.872	Pass
4985	256 QAM	A	4980.352564	4989.615385	9262.821	Pass
4985	256 QAM	B	4980.384615	4989.615385	9230.77	Pass

15 MHz Bandwidth MuMIMO



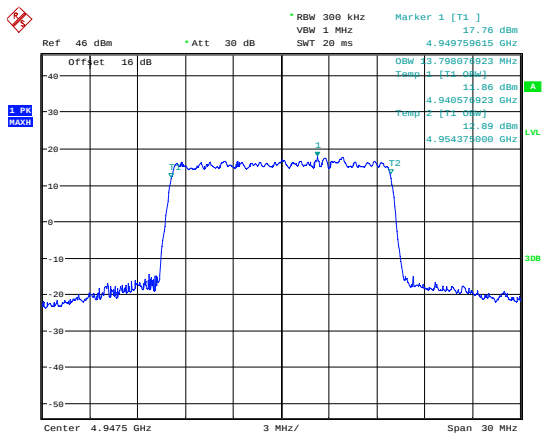
Date: 1.JAN.2003 13:25:21

99 % Bandwidth QPSK; 4947.5 MHz; MIMO A.



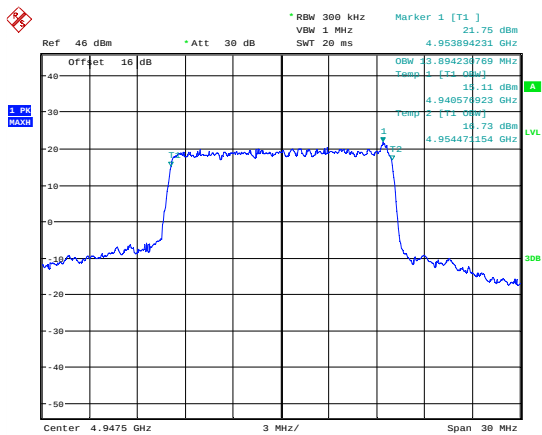
Date: 1.JAN.2003 13:24:33

99 % Bandwidth QPSK; 4947.5 MHz; MIMO B.



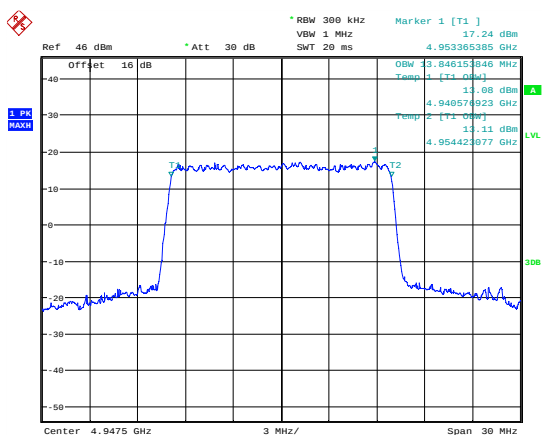
Date: 1.JAN.2003 13:26:01

99 % Bandwidth 16 QAM; 4947.5 MHz; MIMO A.



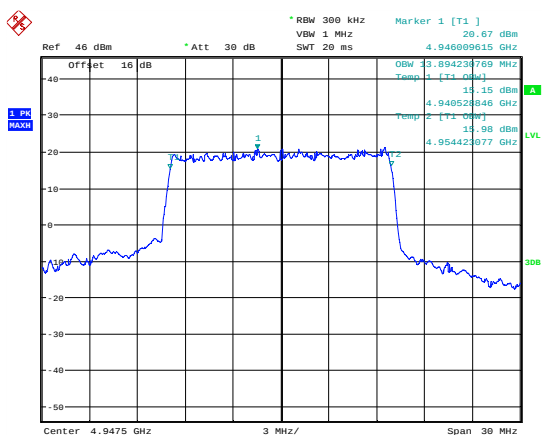
Date: 1.JAN.2003 13:22:45

99 % Bandwidth 16 QAM; 4947.5 MHz; MIMO B.



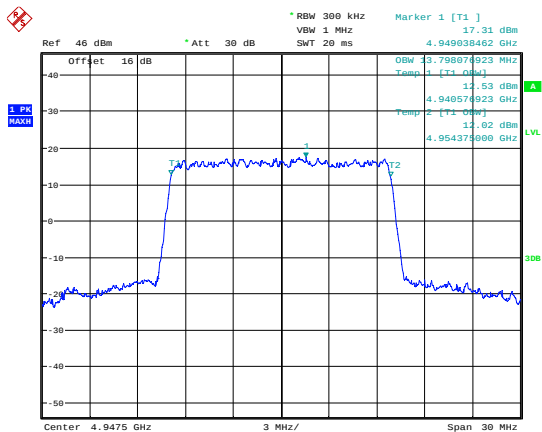
Date: 1.JAN.2003 13:26:40

99 % Bandwidth 64 QAM; 4947.5 MHz; MIMO A.



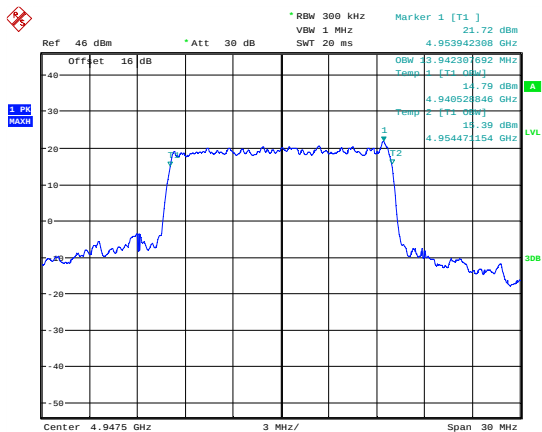
Date: 1.JAN.2003 13:21:59

99 % Bandwidth 64 QAM; 4947.5 MHz; MIMO B.



Date: 1.JAN.2003 13:27:17

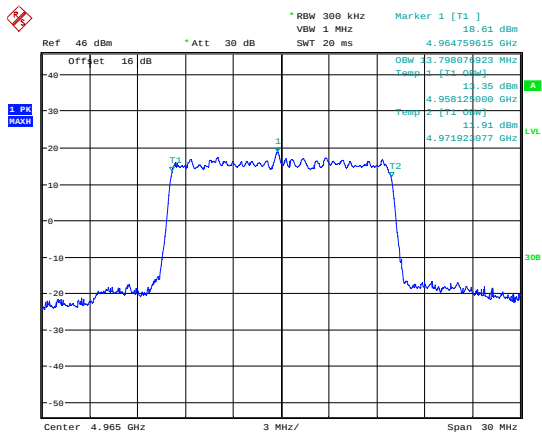
99 % Bandwidth 256 QAM; 4947.5 MHz;
MIMO A.



Date: 1.JAN.2003 13:28:01

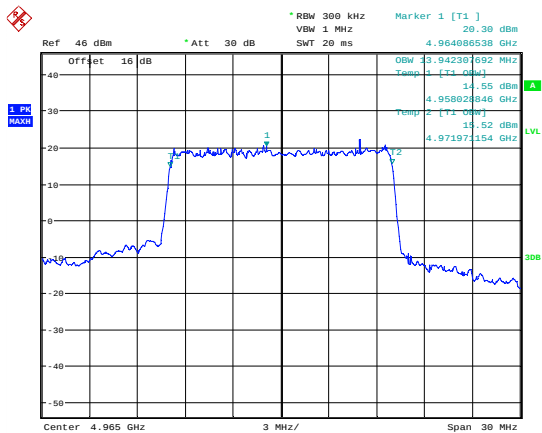
99 % Bandwidth 256 QAM; 4947.5 MHz;
MIMO B.

Bottom Channel 15 MHz bandwidth						
Frequency (MHz)	Modulation Mode	MIMO	FL (MHz)	FH (MHz)	99 % Bandwidth (kHz)	Result
4947.5	QPSK	A	4940.576923	4954.423077	13846.154	Pass
4947.5	QPSK	B	4940.528846	4954.471154	13942.308	Pass
4947.5	16 QAM	A	4940.576923	4954.375	13798.077	Pass
4947.5	16 QAM	B	4940.576923	4954.471154	13894.231	Pass
4947.5	64 QAM	A	4940.576923	4954.423077	13846.154	Pass
4947.5	64 QAM	B	4940.528846	4954.423077	13894.231	Pass
4947.5	256 QAM	A	4940.576923	4954.375	13798.077	Pass
4947.5	256 QAM	B	4940.528846	4954.471154	13942.308	Pass



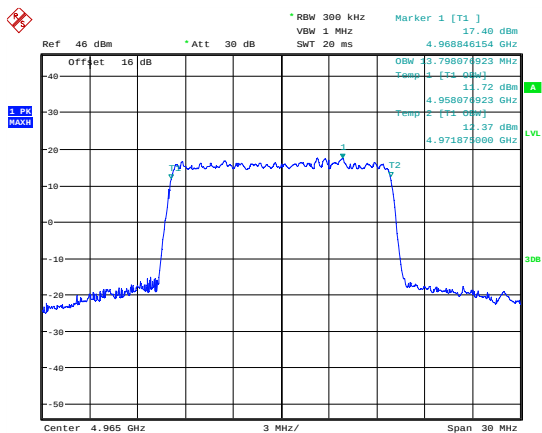
Date: 1.JAN.2003 13:31:46

99 % Bandwidth QPSK; 4965 MHz; MIMO A.



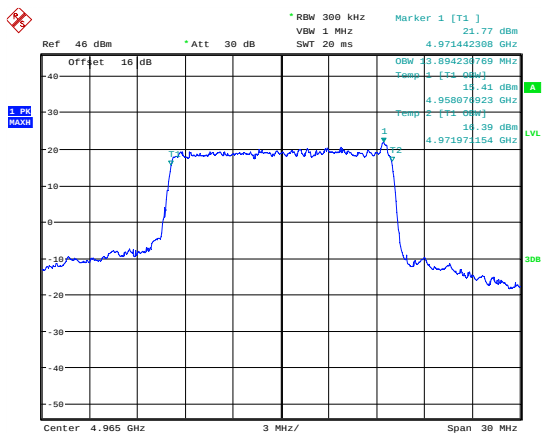
Date: 1.JAN.2003 13:32:30

99 % Bandwidth QPSK; 4965 MHz; MIMO B.



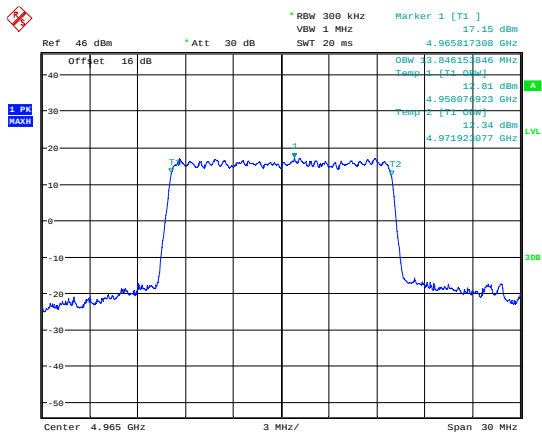
Date: 1.JAN.2003 13:31:04

99 % Bandwidth 16 QAM; 4965 MHz; MIMO A.



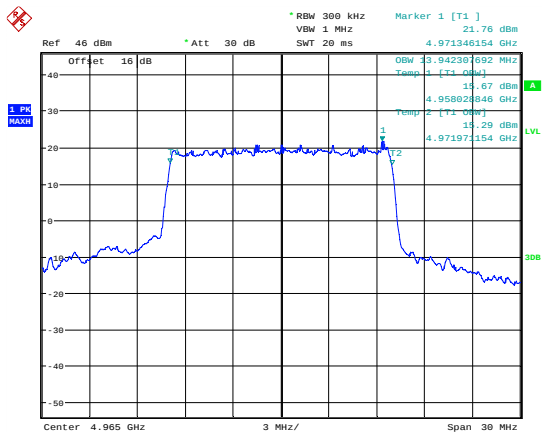
Date: 1.JAN.2003 13:33:15

99 % Bandwidth 16 QAM; 4965 MHz; MIMO B.



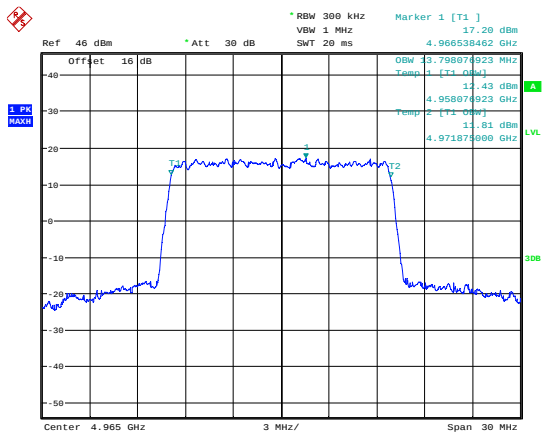
Date: 1.JAN.2003 13:30:20

99 % Bandwidth 64 QAM; 4965 MHz; MIMO A.



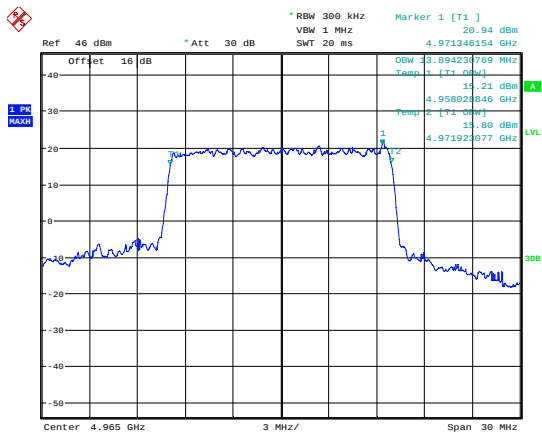
Date: 1.JAN.2003 13:34:03

99 % Bandwidth 64 QAM; 4965 MHz; MIMO B.



Date: 1.JAN.2003 13:29:17

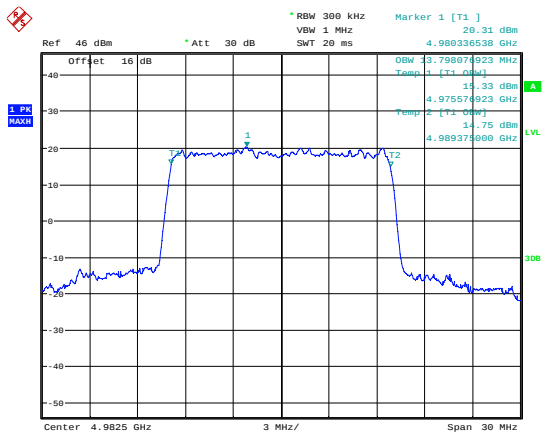
99 % Bandwidth 256 QAM; 4965 MHz;
MIMO A.



Date: 1.JAN.2003 13:34:53

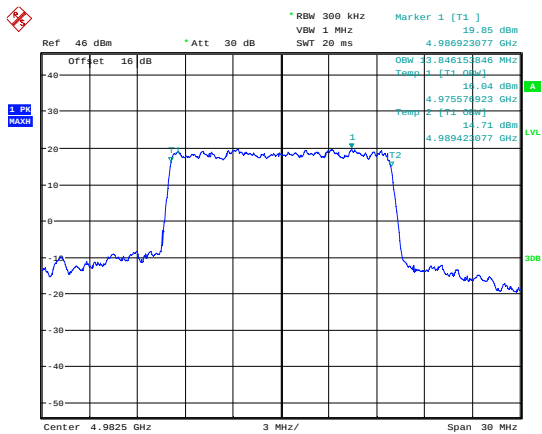
99 % Bandwidth 256 QAM; 4965 MHz;
MIMO B.

Middle Channel 15 MHz bandwidth						
Frequency (MHz)	Modulation Mode	MIMO	FL (MHz)	FH (MHz)	99 % Bandwidth (kHz)	Result
4965	QPSK	A	4958.125	4971.923077	13798.077	Pass
4965	QPSK	B	4958.028846	4971.971154	13942.308	Pass
4965	16 QAM	A	4958.076923	4971.875	13798.077	Pass
4965	16 QAM	B	4958.076923	4971.971154	13894.231	Pass
4965	64 QAM	A	4958.076923	4971.923077	13846.154	Pass
4965	64 QAM	B	4958.028846	4971.971154	13942.308	Pass
4965	256 QAM	A	4958.076923	4971.875	13798.077	Pass
4965	256 QAM	B	4958.028846	4971.923077	13894.231	Pass



Date: 1.JAN.2003 03:07:56

99 % Bandwidth 256 QAM; 4982.5 MHz;
MIMO A.

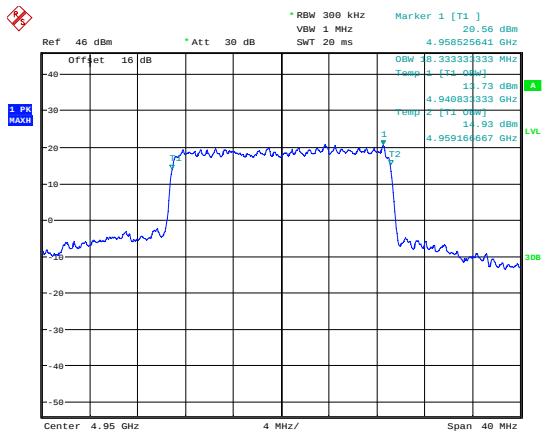


Date: 1.JAN.2003 03:18:32

99 % Bandwidth 256 QAM; 4982.5 MHz;
MIMO B.

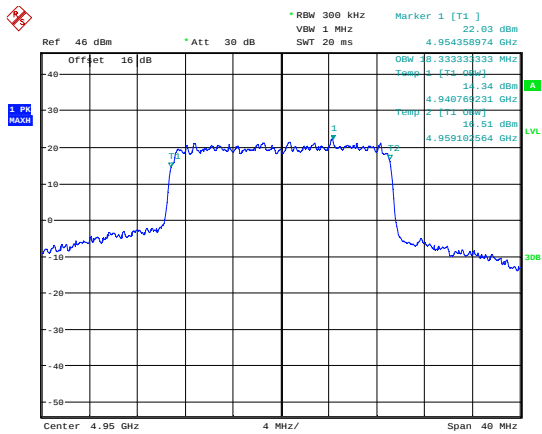
Top Channel 15 MHz bandwidth						
Frequency (MHz)	Modulation Mode	MIMO	FL (MHz)	FH (MHz)	99 % Bandwidth (kHz)	Result
4982.5	QPSK	A	4975.625	4989.375	13750	Pass
4982.5	QPSK	B	4975.528846	4989.471154	13942.308	Pass
4982.5	16 QAM	A	4975.625	4989.375	13750	Pass
4982.5	16 QAM	B	4975.528846	4989.471154	13942.308	Pass
4982.5	64 QAM	A	4975.576923	4989.375	13798.077	Pass
4982.5	64 QAM	B	4975.528846	4989.423077	13894.231	Pass
4982.5	256 QAM	A	4975.576923	4989.375	13798.077	Pass
4982.5	256 QAM	B	4975.576923	4989.423077	13846.154	Pass

20 MHz Bandwidth Beamform



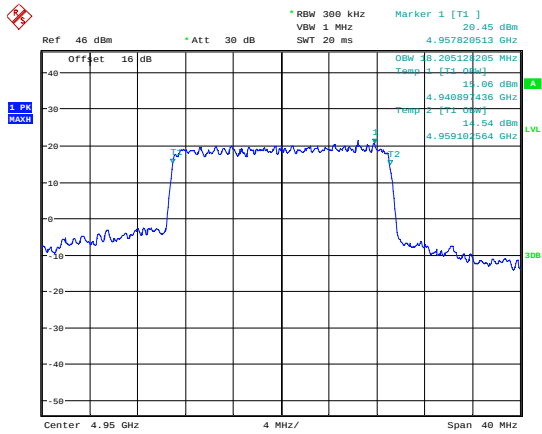
Date: 1.JAN.2003 13:09:41

99 % Bandwidth QPSK; 4950 MHz; MIMO A.



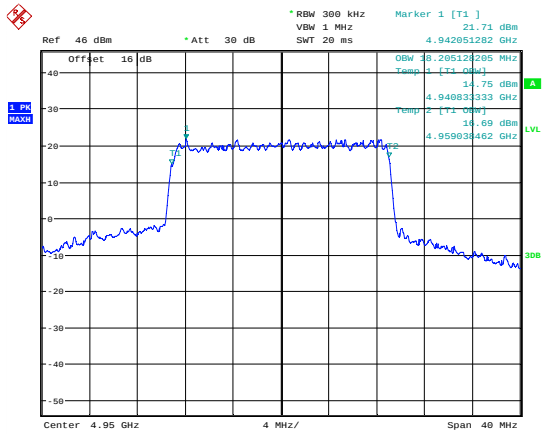
Date: 1.JAN.2003 12:59:40

99 % Bandwidth QPSK; 4950 MHz; MIMO B.



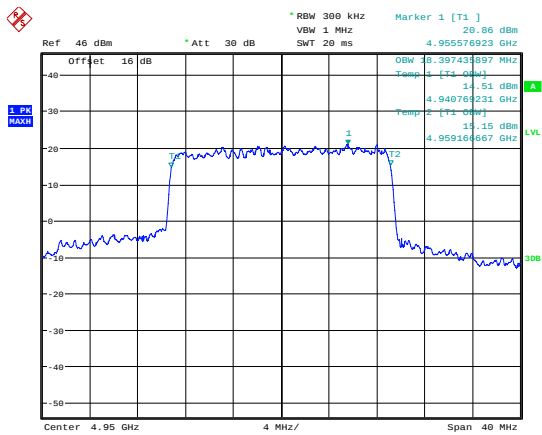
Date: 1.JAN.2003 13:01:43

99 % Bandwidth 16 QAM; 4950 MHz; MIMO A.



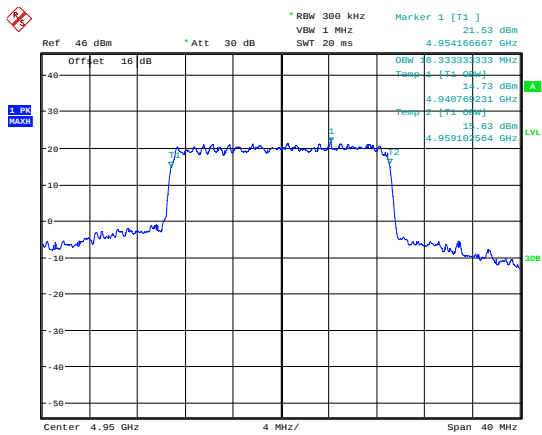
Date: 1.JAN.2003 12:58:18

99 % Bandwidth 16 QAM; 4950 MHz; MIMO B.



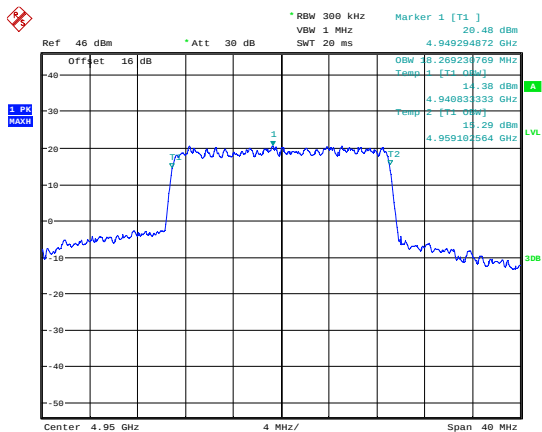
Date: 1.JAN.2003 13:02:43

99 % Bandwidth 64 QAM; 4950 MHz; MIMO A.



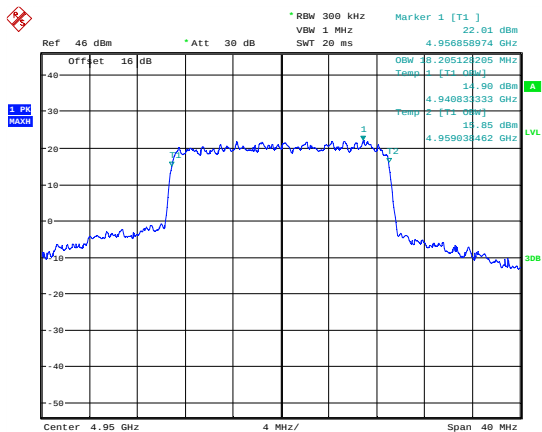
Date: 1.JAN.2003 12:57:17

99 % Bandwidth 64 QAM; 4950 MHz; MIMO B.



Date: 1.JAN.2003 13:03:42

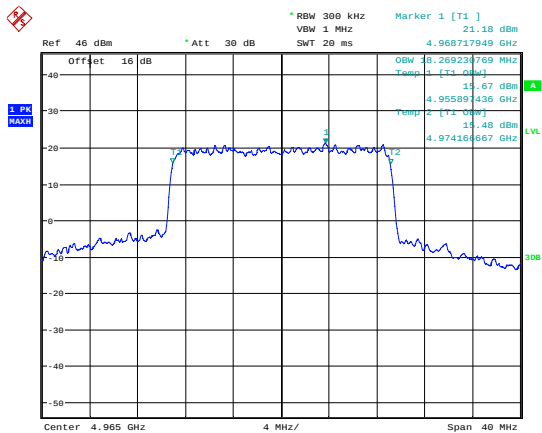
99 % Bandwidth 256 QAM; 4950 MHz;
MIMO A.



Date: 1.JAN.2003 12:56:10

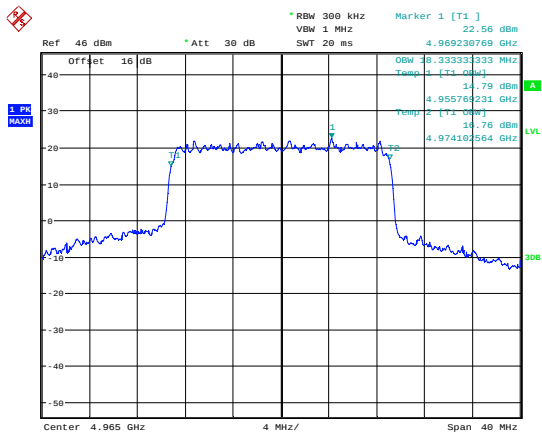
99 % Bandwidth 256 QAM; 4950 MHz;
MIMO B.

Bottom Channel 20 MHz bandwidth						
Frequency (MHz)	Modulation Mode	MIMO	FL (MHz)	FH (MHz)	99 % Bandwidth (kHz)	Result
4950	QPSK	A	4940.833333	4959.166667	18333.334	Pass
4950	QPSK	B	4940.769231	4959.102564	18333.333	Pass
4950	16 QAM	A	4940.897436	4959.102564	18205.128	Pass
4950	16 QAM	B	4940.833333	4959.038462	18205.129	Pass
4950	64 QAM	A	4940.769231	4959.166667	18397.436	Pass
4950	64 QAM	B	4940.769231	4959.102564	18333.333	Pass
4950	256 QAM	A	4940.833333	4959.102564	18269.231	Pass
4950	256 QAM	B	4940.833333	4959.038462	18205.129	Pass



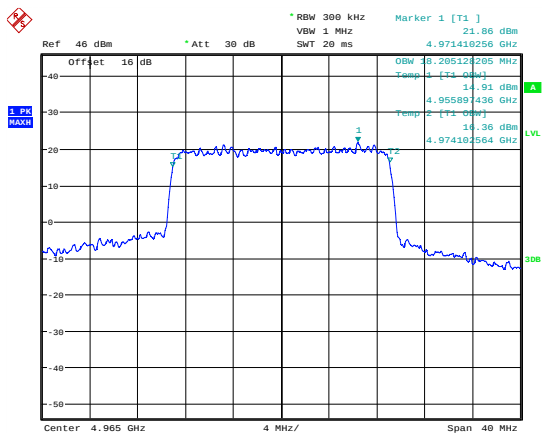
Date: 1.JAN.2003 12:21:41

99 % Bandwidth QPSK; 4965 MHz; MIMO A.



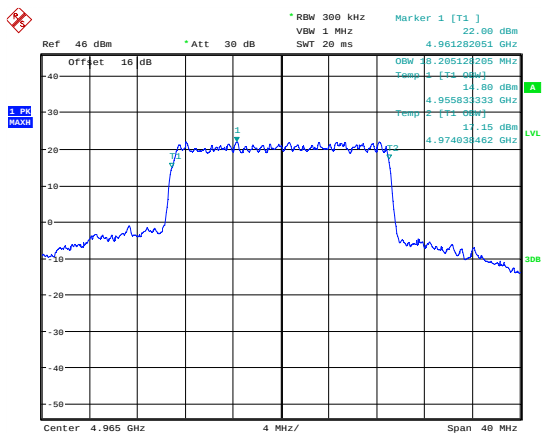
Date: 1.JAN.2003 12:35:24

99 % Bandwidth QPSK; 4965 MHz; MIMO B.



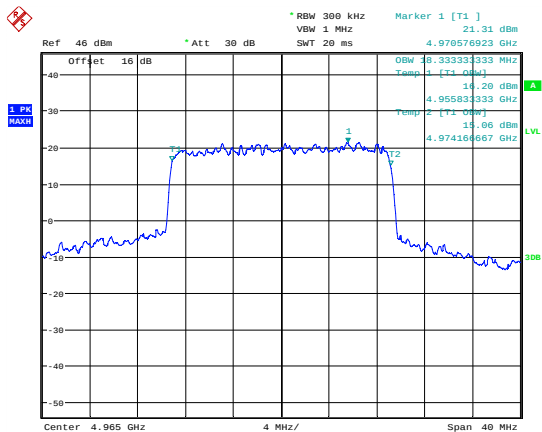
Date: 1.JAN.2003 12:26:45

99 % Bandwidth 16 QAM; 4965 MHz; MIMO A.



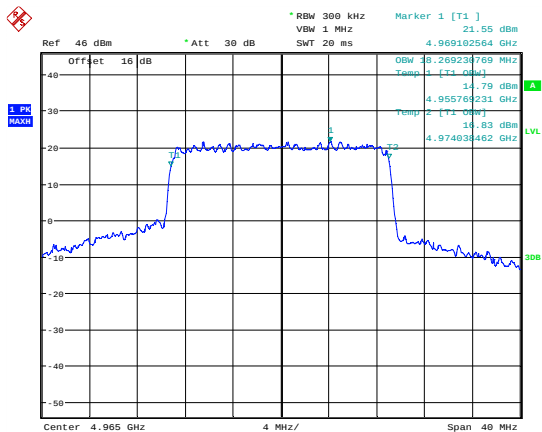
Date: 1.JAN.2003 12:36:35

99 % Bandwidth 16 QAM; 4965 MHz; MIMO B.



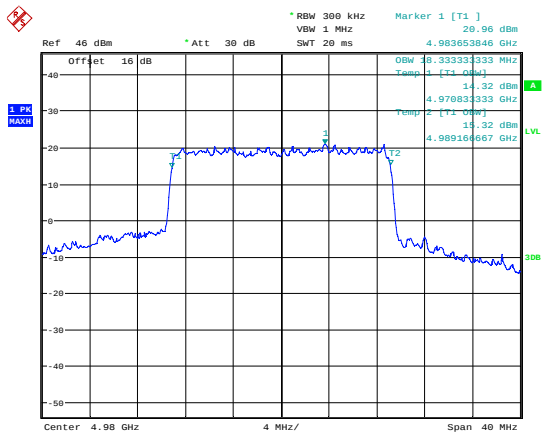
Date: 1.JAN.2003 12:28:20

99 % Bandwidth 64 QAM; 4965 MHz; MIMO A.



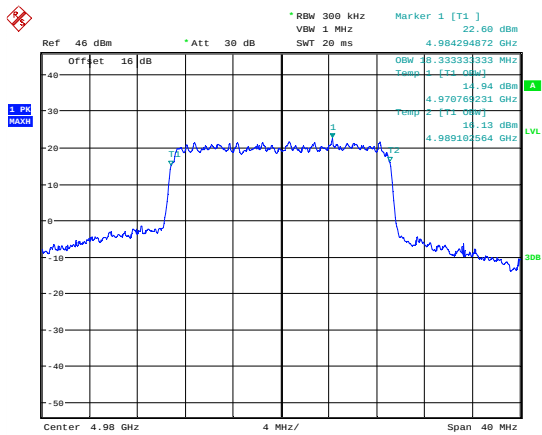
Date: 1.JAN.2003 12:37:38

99 % Bandwidth 64 QAM; 4965 MHz; MIMO B.



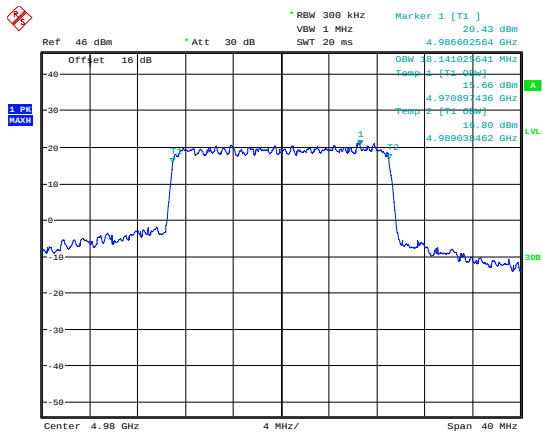
Date: 1.JAN.2003 13:08:07

99 % Bandwidth QPSK; 4980 MHz; MIMO A.



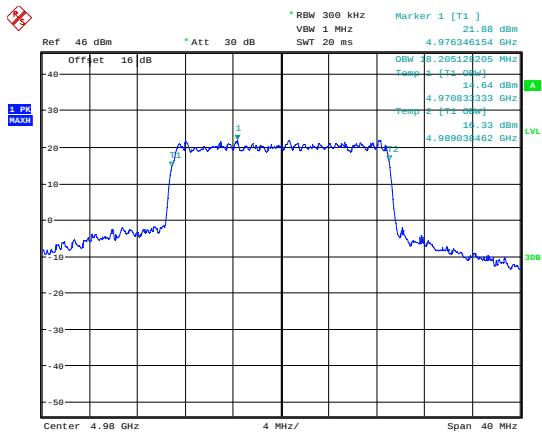
Date: 1.JAN.2003 13:09:02

99 % Bandwidth QPSK; 4980 MHz; MIMO B.



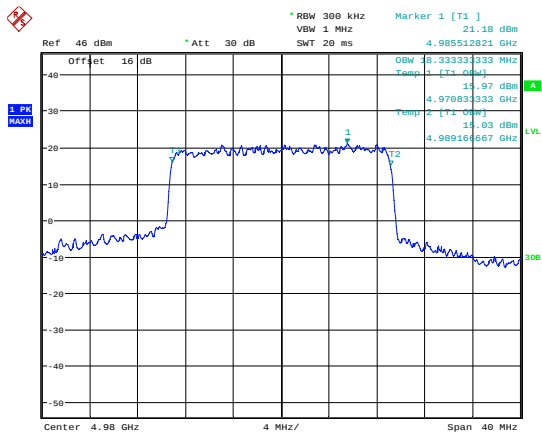
Date: 1.JAN.2003 13:07:18

99 % Bandwidth 16 QAM; 4980 MHz; MIMO A.



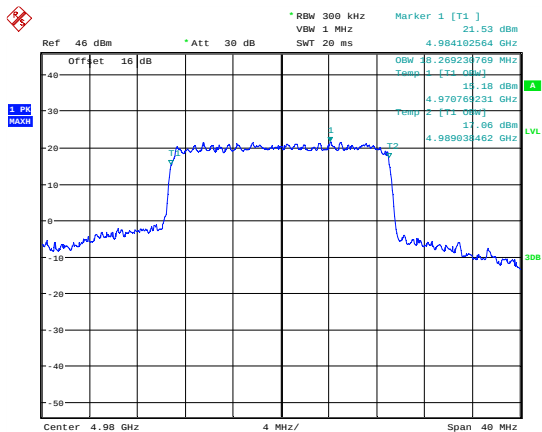
Date: 1.JAN.2003 13:09:52

99 % Bandwidth 16 QAM; 4980 MHz; MIMO B.



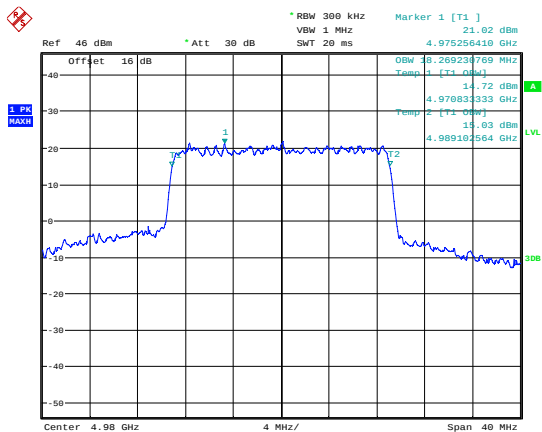
Date: 1.JAN.2003 13:06:30

99 % Bandwidth 64 QAM; 4980 MHz; MIMO A.



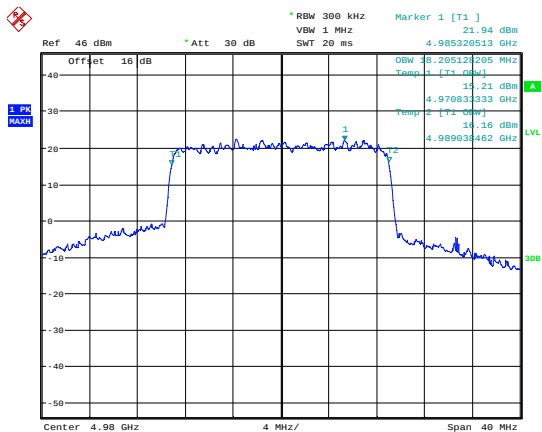
Date: 1.JAN.2003 13:10:52

99 % Bandwidth 64 QAM; 4980 MHz; MIMO B.



Date: 1.JAN.2003 13:05:43

99 % Bandwidth 256 QAM; 4980 MHz;
MIMO A.



Date: 1.JAN.2003 13:11:54

99 % Bandwidth 256 QAM; 4980 MHz;
MIMO B.

Top Channel 20 MHz bandwidth						
Frequency (MHz)	Modulation Mode	MIMO	FL (MHz)	FH (MHz)	99 % Bandwidth (kHz)	Result
4980	QPSK	A	4970.833333	4989.166667	18333.334	Pass
4980	QPSK	B	4970.769231	4989.102564	18333.333	Pass
4980	16 QAM	A	4970.897436	4989.038462	18141.026	Pass
4980	16 QAM	B	4970.833333	4989.038462	18205.129	Pass
4980	64 QAM	A	4970.833333	4989.166667	18333.334	Pass
4980	64 QAM	B	4970.769231	4989.038462	18269.231	Pass
4980	256 QAM	A	4970.833333	4989.102564	18269.231	Pass
4980	256 QAM	B	4970.833333	4989.038462	18205.129	Pass

13 Emission Mask

13.1 Definition

Out-of-band emission.

Emission on a frequency or frequencies immediately outside the necessary bandwidth that results from the modulation process but excluding spurious emissions.

Spurious emission.

Emission on a frequency or frequencies that are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products, and frequency conversion products, but exclude out-of-band emissions.

13.2 Test Parameters

Test Location:	Element Skelmersdale
Test Chamber:	Radio Chamber
Test Standard and Clause:	Part 90.210
EUT Channels / Frequencies Measured:	Bottom / Mid / High
EUT Channel Bandwidths:	5 MHz, 10 MHz, 15 MHz and 20 MHz
Deviations From Standard:	None
Measurement BW:	50 kHz, 100 kHz and 200 kHz
Spectrum Analyzer Video BW: (requirement at least 3x RBW)	30 kHz
Measurement Detector:	RMS

Environmental Conditions (Normal Environment)

Temperature: 24 °C	+15 °C to +35 °C (as declared)
Humidity: 60 % RH	20 % RH to 75 % RH (as declared)
Supply: 48 V dc	48 V dc (as declared)

13.3 Test Limit

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.

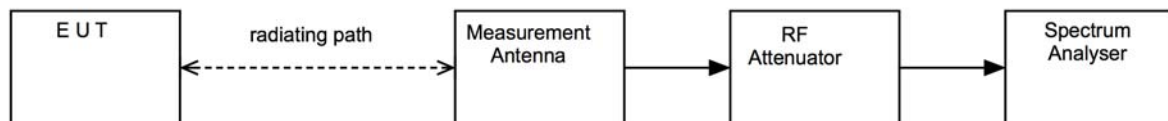
(7) The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth using a resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 kHz. The power spectral density is the power measured within the resolution bandwidth of the measurement device divided by the resolution bandwidth of the measurement device. Emission levels are also based on the use of measurement instrumentation employing a resolution bandwidth of at least one percent of the occupied bandwidth.

13.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure v, the emissions from the EUT were measured on a spectrum analyser.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst case configuration in each bandwidth.

Figure v Test Setup

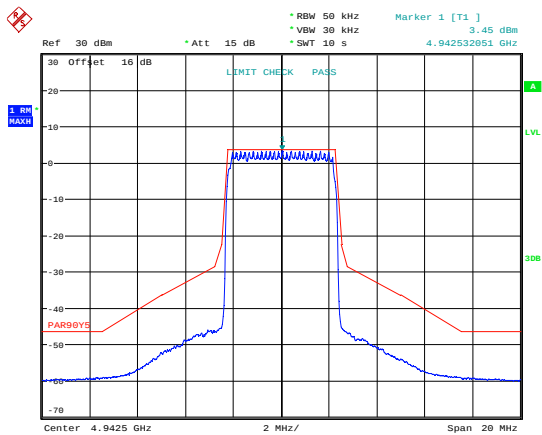


13.5 Test Equipment

Equipment Type	Manufacturer	Equipment Description	Element No	Due For Calibration
8449B	Agilent	PreAmp	L572	2020-10-15
3115	EMCO	1-18GHz Horn	L139	2021-07-16
FSU26	R&S	Spectrum Analyser	REF909	2020-06-21

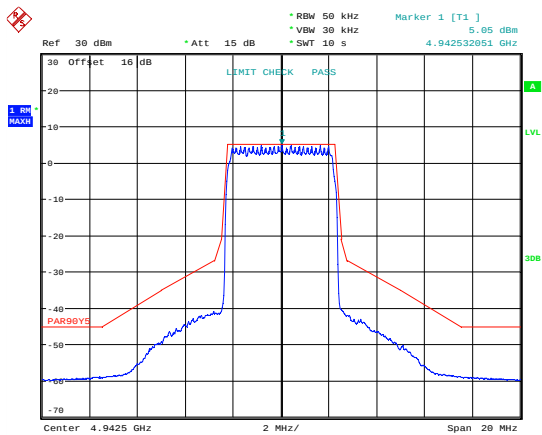
13.6 Test Results

Beamforming 5 MHz Emission Mask



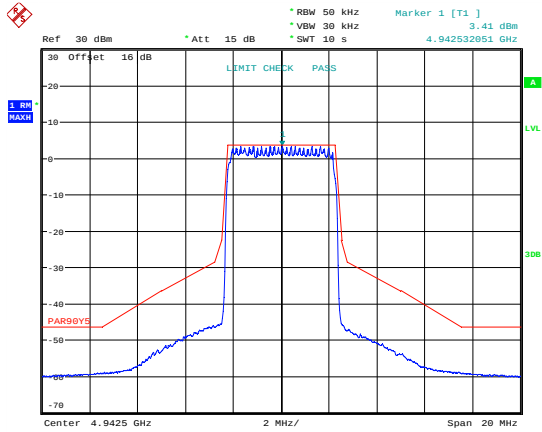
Date: 1.JAN.2003 01:14:42

Emission Mask QPSK; MIMO A; 4942.5 MHz.



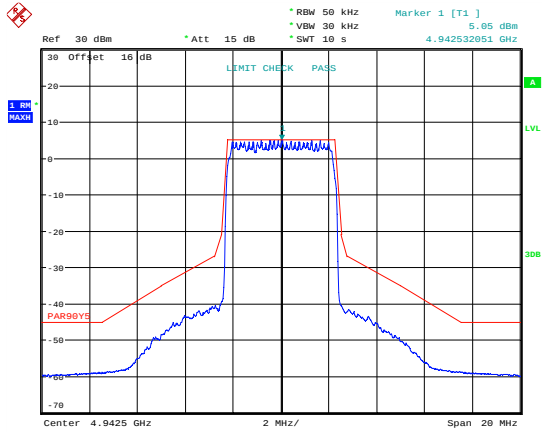
Date: 1.JAN.2003 01:09:04

Emission Mask QPSK; MIMO B; 4942.5 MHz.



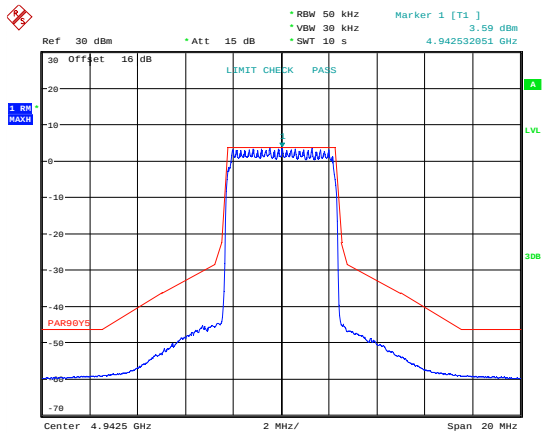
Date: 1.JAN.2003 01:14:00

Emission Mask 16 QAM; MIMO A; 4942.5 MHz.



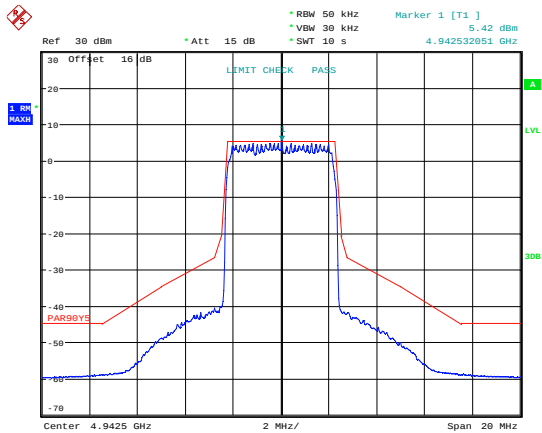
Date: 1.JAN.2003 01:07:45

Emission Mask 16 QAM; MIMO B; 4942.5 MHz.



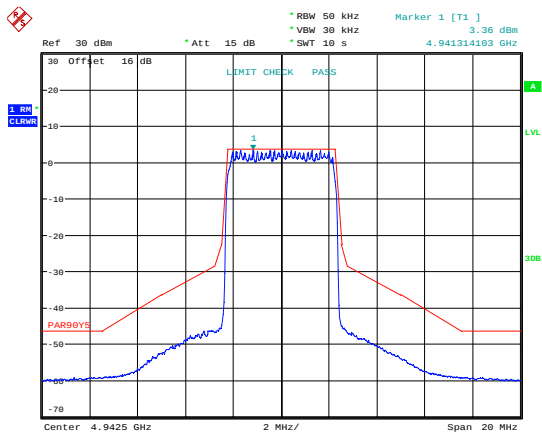
Date: 1.JAN.2003 01:13:15

Emission Mask 64 QAM; MIMO A; 4942.5 MHz.



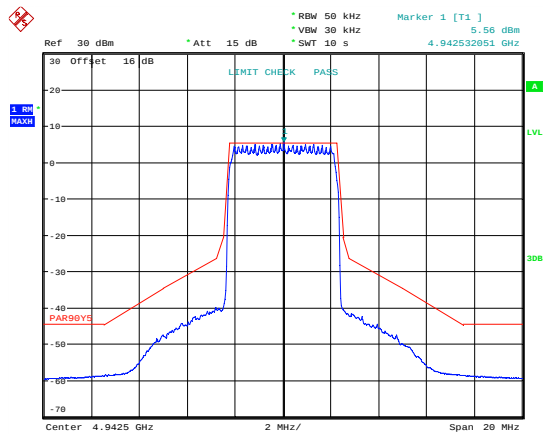
Date: 1.JAN.2003 01:04:35

Emission Mask 64 QAM; MIMO B; 4942.5 MHz.



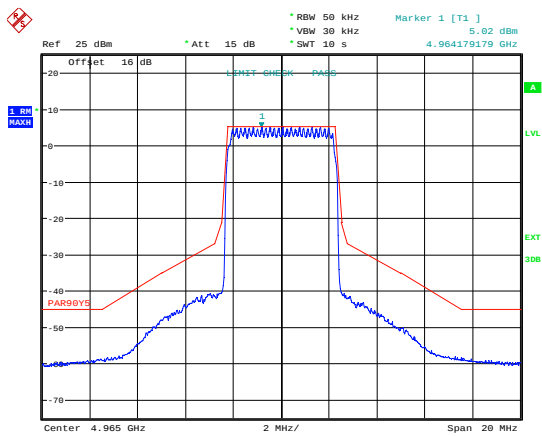
Date: 1.JAN.2003 01:12:12

Emission Mask 256 QAM; MIMO A; 4942.5 MHz.



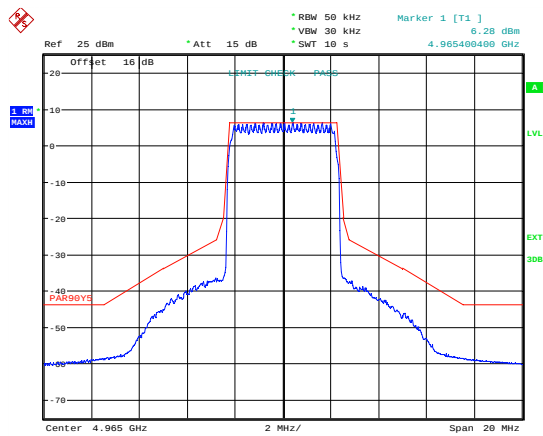
Date: 1.JAN.2003 01:00:51

Emission Mask 256 QAM; MIMO B; 4942.5 MHz.



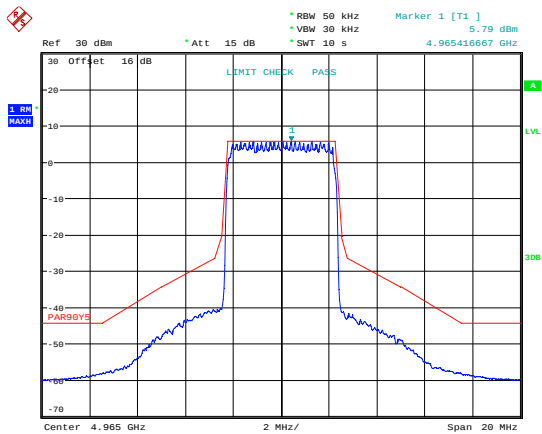
Date: 2.JAN.2003 02:00:38

Emission Mask QPSK; MIMO A; 4965 MHz.



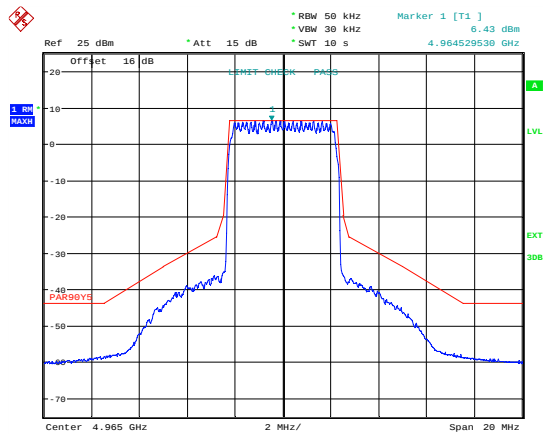
Date: 2.JAN.2003 02:07:55

Emission Mask QPSK; MIMO B; 4965 MHz.



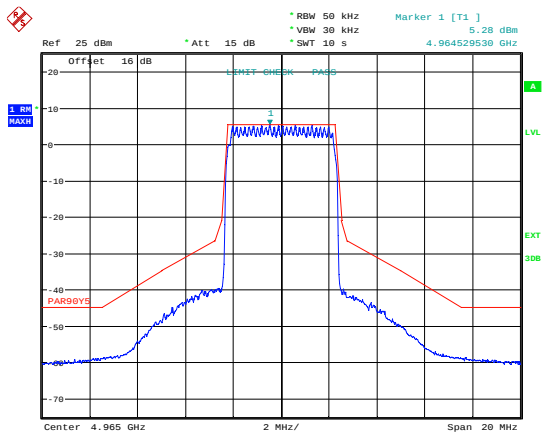
Date: 1.JAN.2003 01:23:07

Emission Mask 16 QAM; MIMO A; 4965 MHz.



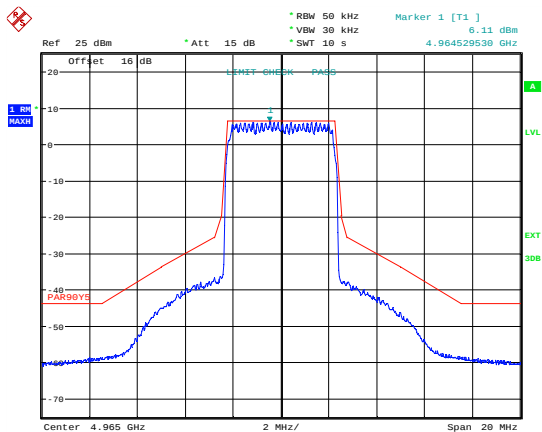
Date: 2.JAN.2003 02:09:35

Emission Mask 16 QAM; MIMO B; 4965 MHz.



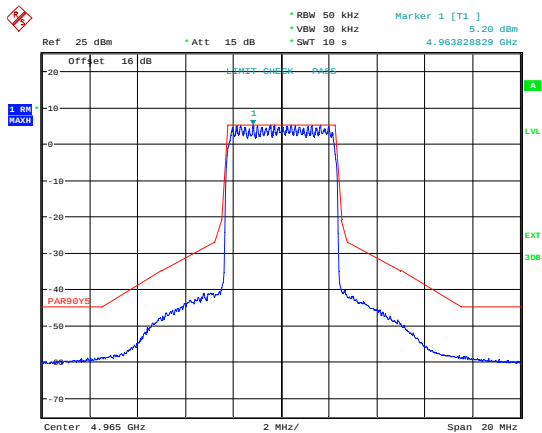
Date: 2.JAN.2003 02:03:14

Emission Mask 64 QAM; MIMO A; 4965 MHz.



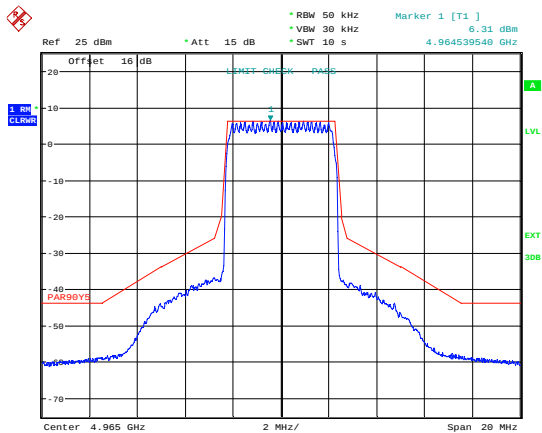
Date: 2.JAN.2003 02:10:15

Emission Mask 64 QAM; MIMO B; 4965 MHz.



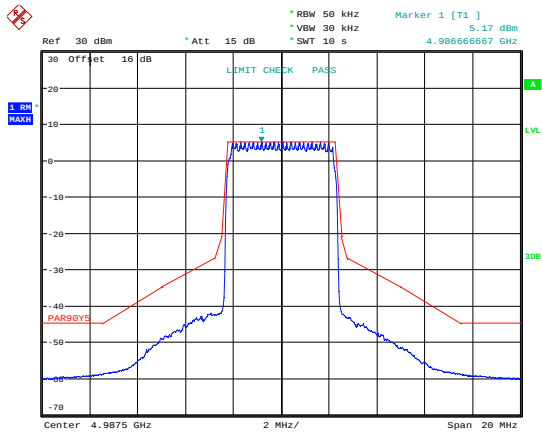
Date: 2.JAN.2003 02:05:46

Emission Mask 256 QAM; MIMO A; 4965 MHz.



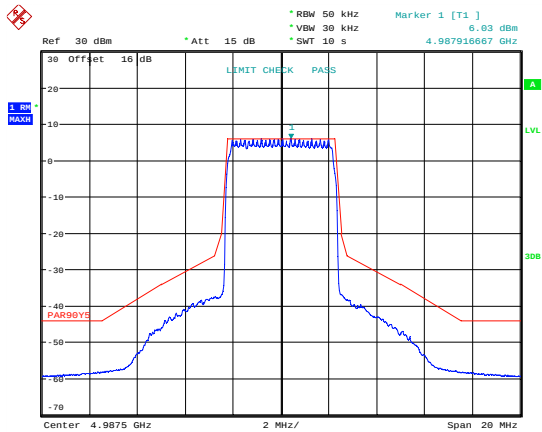
Date: 2.JAN.2003 02:11:03

Emission Mask 256 QAM; MIMO B; 4965 MHz.



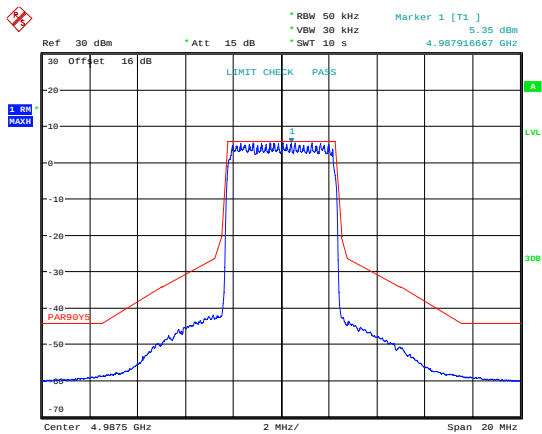
Date: 1.JAN.2003 01:26:47

Emission Mask QPSK; MIMO A; 4987.5 MHz.



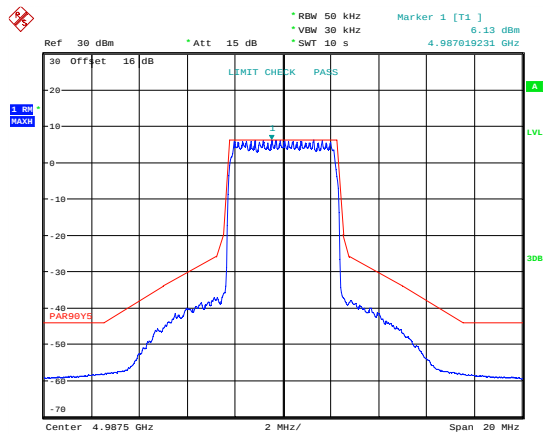
Date: 1.JAN.2003 01:31:24

Emission Mask QPSK; MIMO B; 4987.5 MHz.



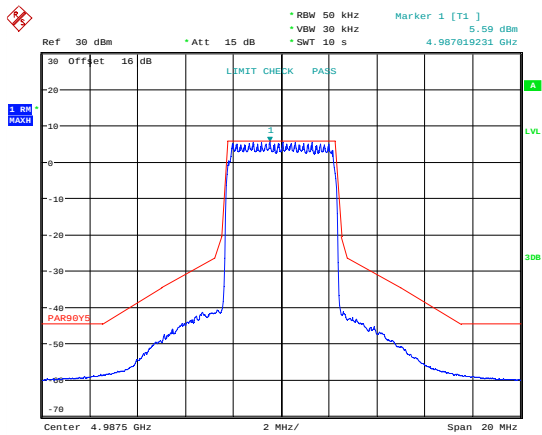
Date: 1.JAN.2003 01:25:13

Emission Mask 16 QAM; MIMO A; 4987.5 MHz.



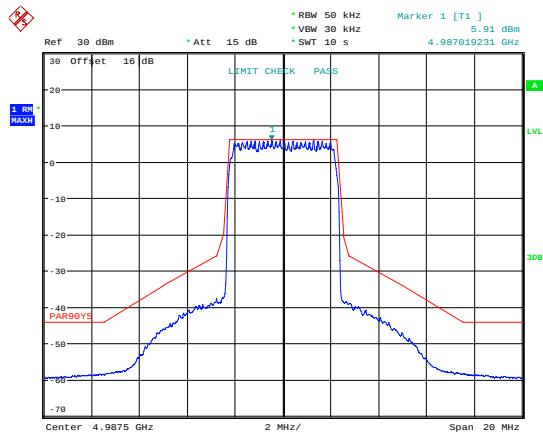
Date: 1.JAN.2003 01:32:19

Emission Mask 16 QAM; MIMO B; 4987.5 MHz.



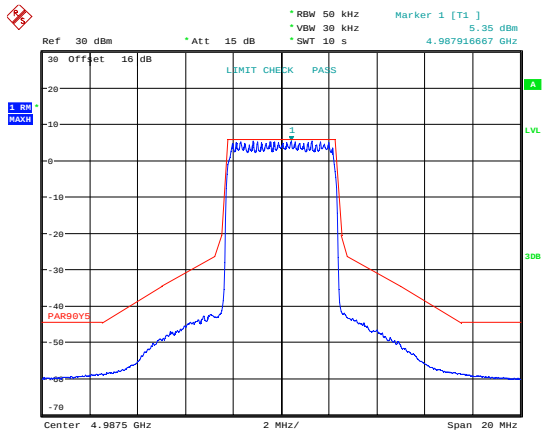
Date: 1.JAN.2003 01:28:32

Emission Mask 64 QAM; MIMO A; 4987.5 MHz.



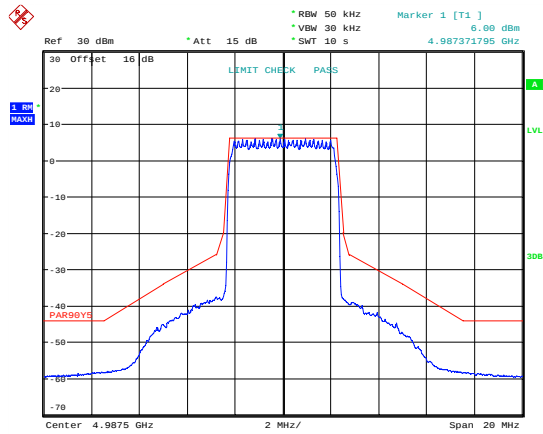
Date: 1.JAN.2003 01:33:07

Emission Mask 64 QAM; MIMO B; 4987.5 MHz.



Date: 1.JAN.2003 01:29:52

Emission Mask 256 QAM; MIMO A; 4987.5 MHz.

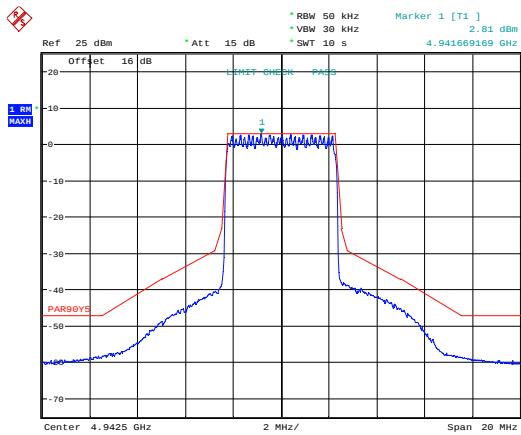


Date: 1.JAN.2003 01:33:58

Emission Mask 256 QAM; MIMO B; 4987.5 MHz.

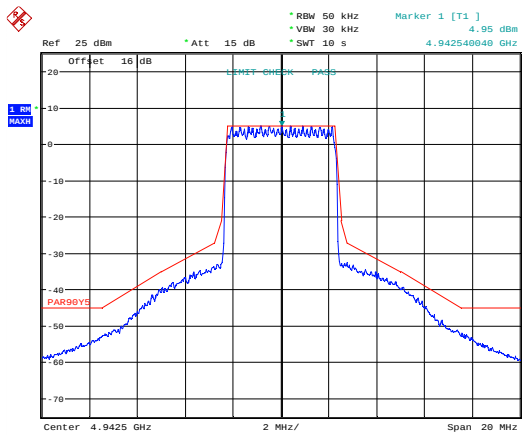
GUI Power settings 5 MHz Bandwidth Beamform				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	44.5	46	46
16QAM		44.5	46	46
64QAM		44.5	46	46
256QAM		44.5	46	46
QPSK	B	44.5	46	46
16QAM		44.5	46	46
64QAM		44.5	46	46
256QAM		44.5	46	46

MuMIMO 5 MHz Emission Mask



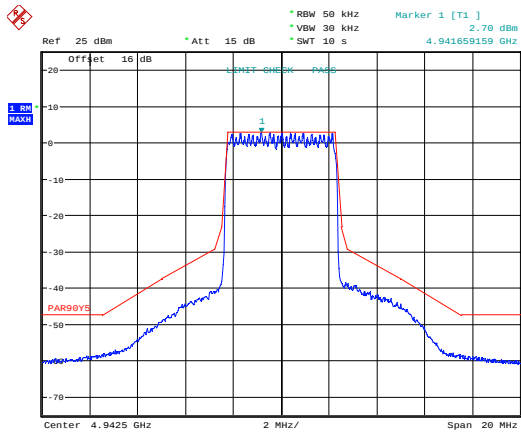
Date: 1.JAN.2003 21:52:56

Emission Mask QPSK; MIMO A; 4942.5 MHz.



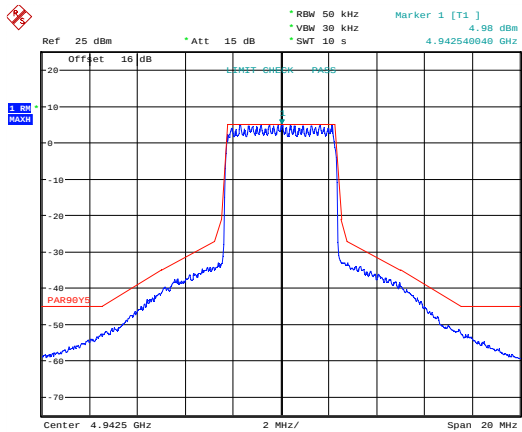
Date: 1.JAN.2003 21:43:39

Emission Mask QPSK; MIMO B; 4942.5 MHz.



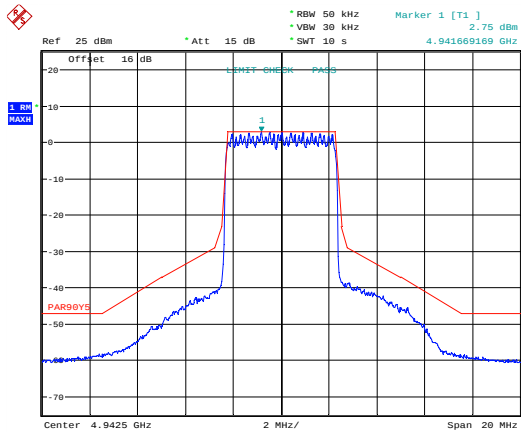
Date: 1.JAN.2003 21:54:24

Emission Mask 16 QAM; MIMO A; 4942.5 MHz.



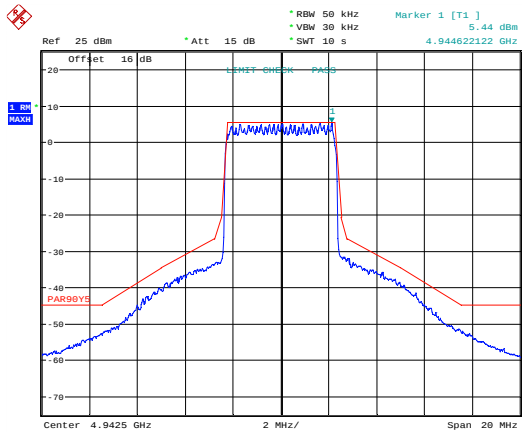
Date: 1.JAN.2003 21:45:19

Emission Mask 16 QAM; MIMO B; 4942.5 MHz.



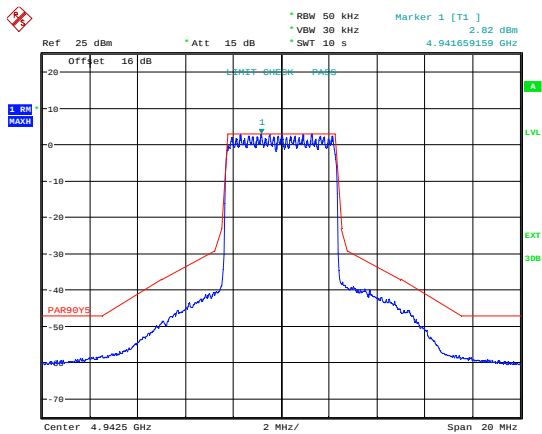
Date: 1.JAN.2003 21:55:21

Emission Mask 64 QAM; MIMO A; 4942.5 MHz.



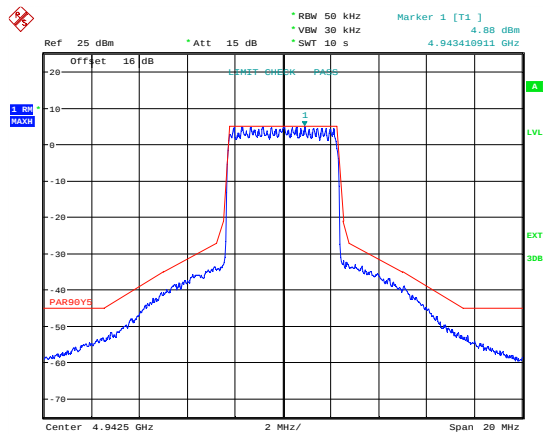
Date: 1.JAN.2003 21:46:45

Emission Mask 64 QAM; MIMO B; 4942.5 MHz.



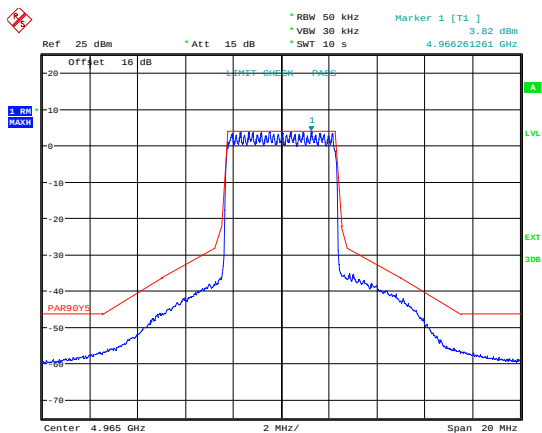
Date: 1.JAN.2003 21:58:18

Emission Mask 256 QAM; MIMO A; 4942.5 MHz.



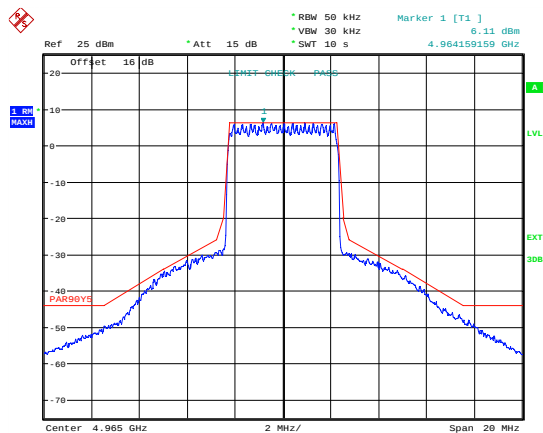
Date: 1.JAN.2003 21:49:59

Emission Mask 256 QAM; MIMO B; 4942.5 MHz.



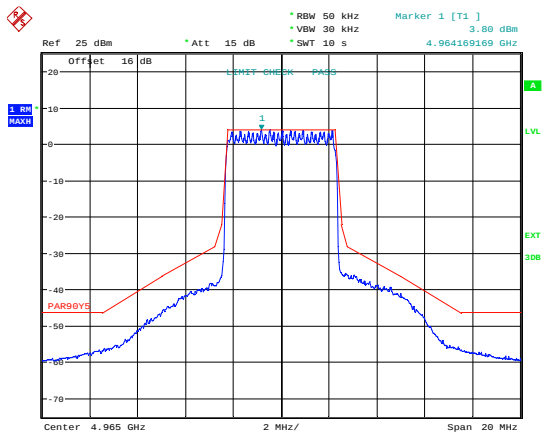
Date: 1.JAN.2003 22:02:15

Emission Mask QPSK; MIMO A; 4965 MHz.



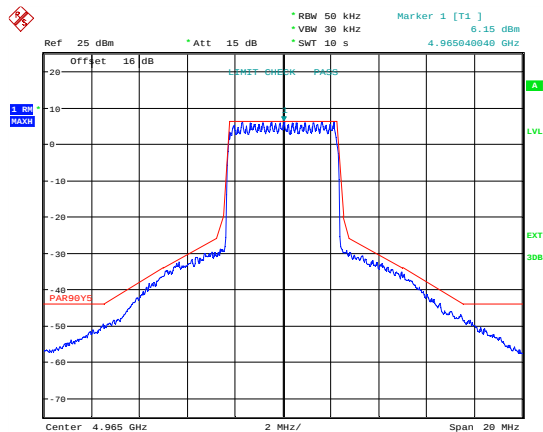
Date: 1.JAN.2003 22:08:25

Emission Mask QPSK; MIMO B; 4965 MHz.



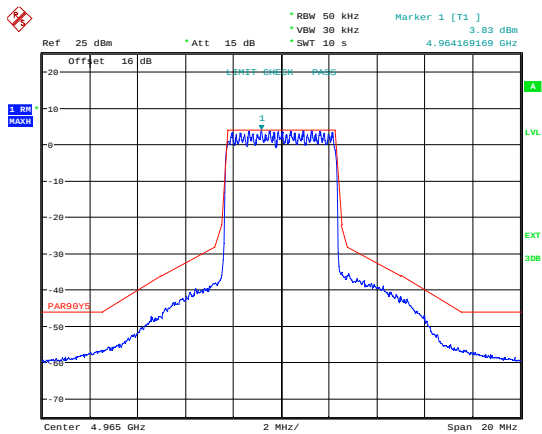
Date: 1.JAN.2003 22:03:26

Emission Mask 16 QAM; MIMO A; 4965 MHz.



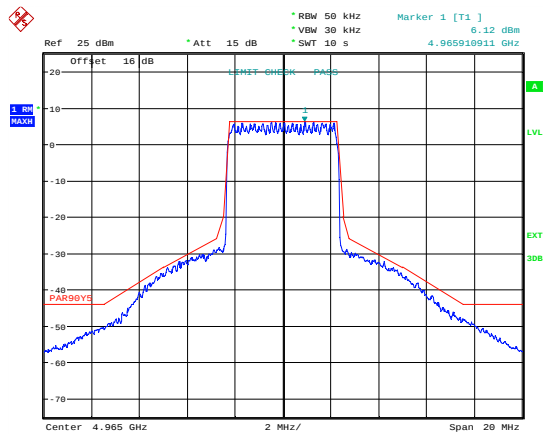
Date: 1.JAN.2003 22:09:51

Emission Mask 16 QAM; MIMO B; 4965 MHz.



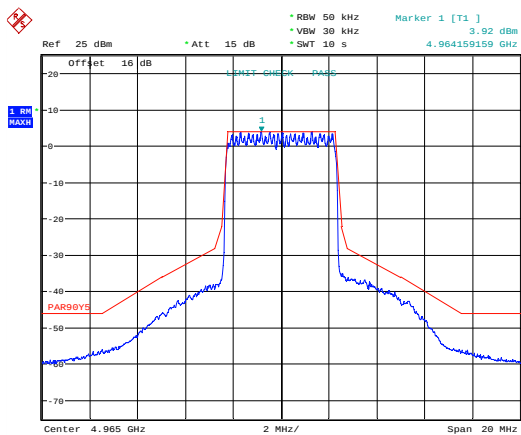
Date: 1.JAN.2003 22:04:34

Emission Mask 64 QAM; MIMO A; 4965 MHz.



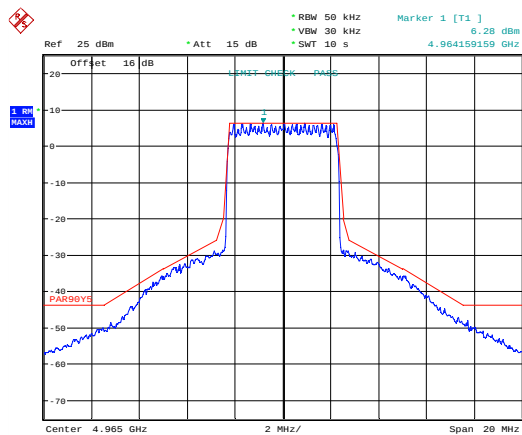
Date: 1.JAN.2003 22:11:22

Emission Mask 64 QAM; MIMO B; 4965 MHz.



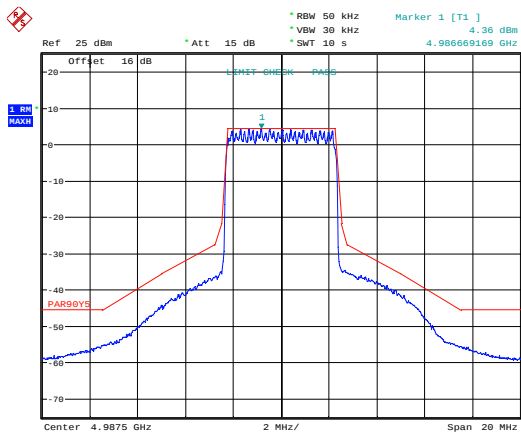
Date: 1.JAN.2003 22:05:49

Emission Mask 256 QAM; MIMO A; 4965 MHz.



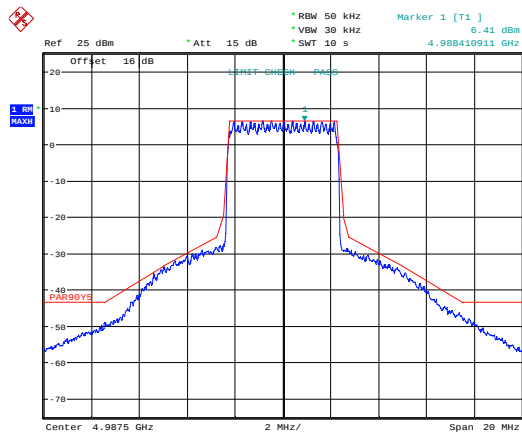
Date: 1.JAN.2003 22:12:53

Emission Mask 256 QAM; MIMO B; 4965 MHz.



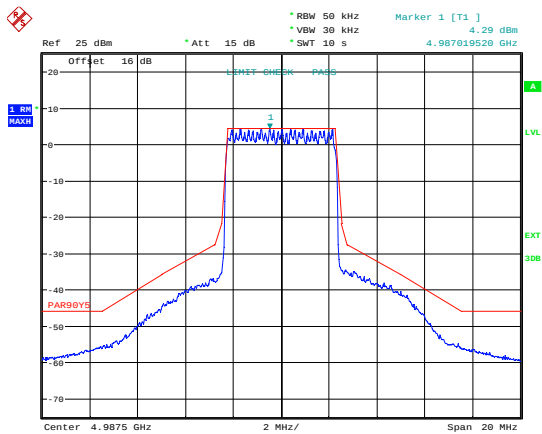
Date: 1.JAN.2003 22:18:35

Emission Mask QPSK; MIMO A; 4987.5 MHz.



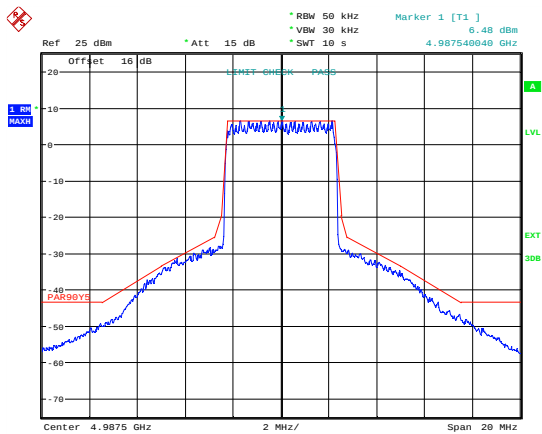
Date: 1.JAN.2003 22:31:05

Emission Mask QPSK; MIMO B; 4987.5 MHz.



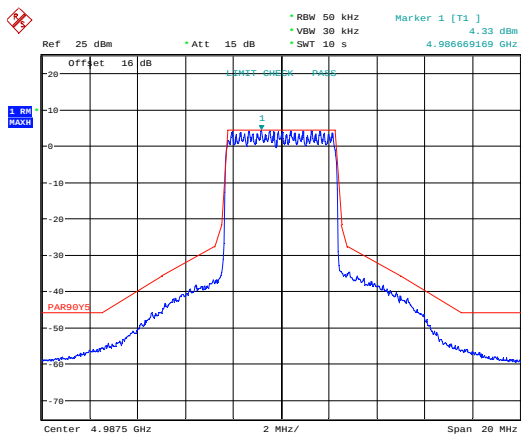
Date: 1.JAN.2003 22:21:09

Emission Mask 16 QAM; MIMO A; 4987.5 MHz.



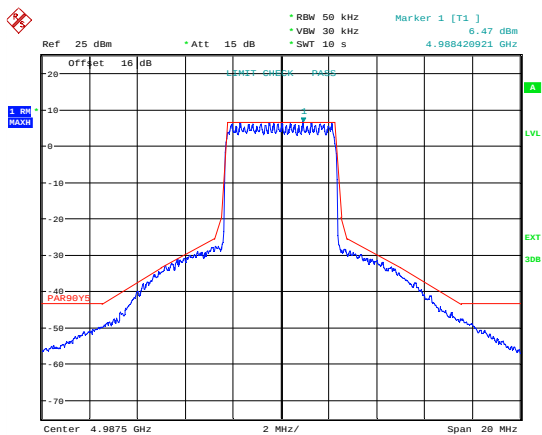
Date: 1.JAN.2003 22:35:40

Emission Mask 16 QAM; MIMO B; 4987.5 MHz.



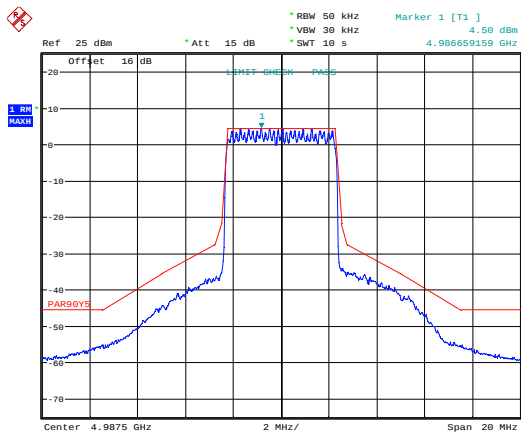
Date: 1.JAN.2003 22:23:13

Emission Mask 64 QAM; MIMO A; 4987.5 MHz.



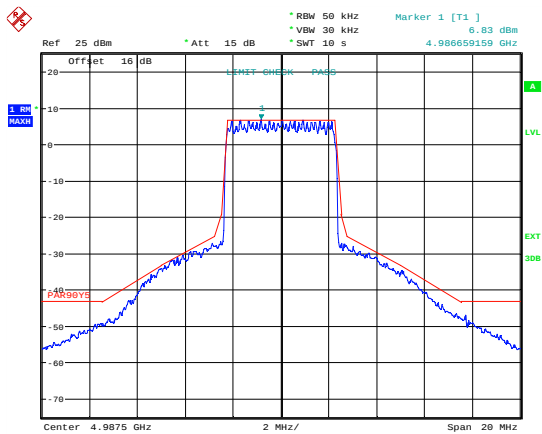
Date: 1.JAN.2003 22:36:33

Emission Mask 64 QAM; MIMO B; 4987.5 MHz.



Date: 1.JAN.2003 22:24:20

Emission Mask 256 QAM; MIMO A; 4987.5 MHz.

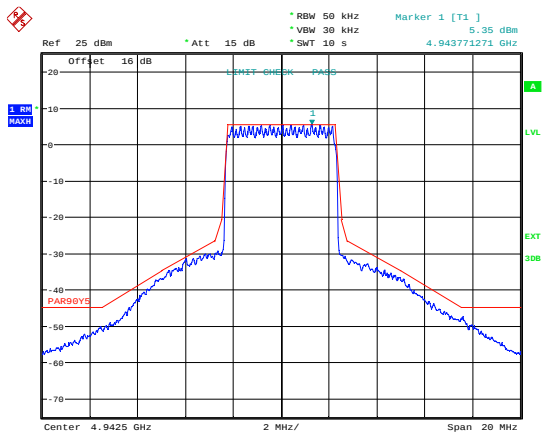


Date: 1.JAN.2003 22:41:15

Emission Mask 256 QAM; MIMO B; 4987.5 MHz.

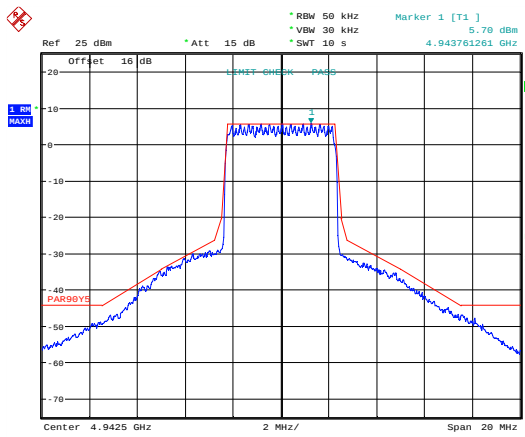
GUI Power settings 5 MHz Bandwidth MuMIMO				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	44.5	46	46
16QAM		44.5	46	46
64QAM		44.5	46	46
256QAM		44.5	46	46
QPSK	B	44.5	46	45.8
16QAM		44.5	46	45.8
64QAM		44.5	46	45.8
256QAM		44.5	46	46

Sector 5 MHz Emission Mask



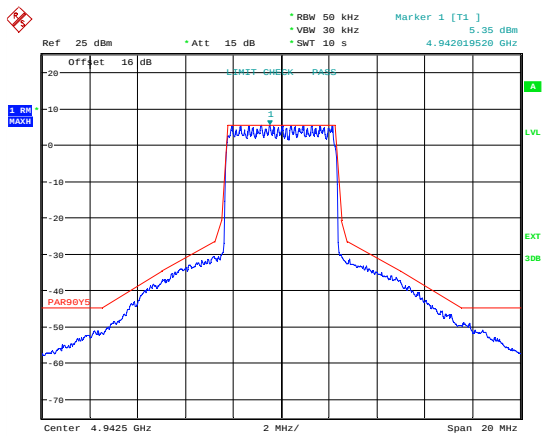
Date: 1.JAN.2003 20:53:15

Emission Mask QPSK; MIMO A; 4942.5 MHz.



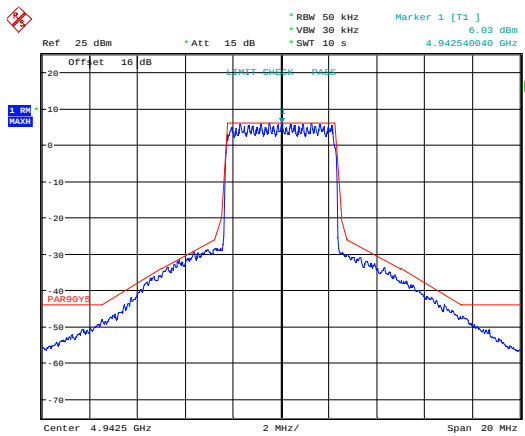
Date: 1.JAN.2003 20:38:59

Emission Mask QPSK; MIMO B; 4942.5 MHz.



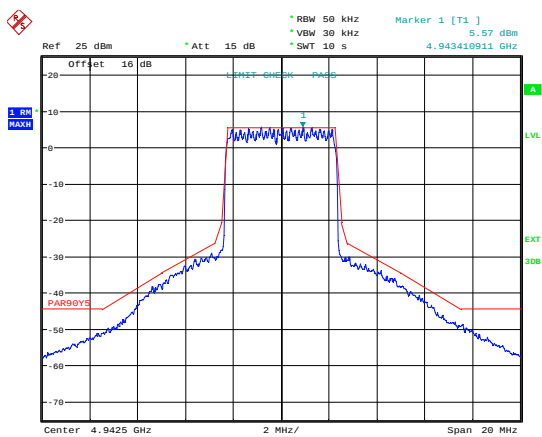
Date: 1.JAN.2003 20:51:54

Emission Mask 16 QAM; MIMO A; 4942.5 MHz.



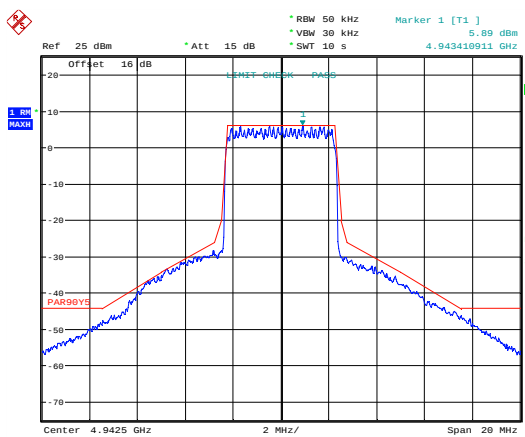
Date: 1.JAN.2003 20:34:13

Emission Mask 16 QAM; MIMO B; 4942.5 MHz.



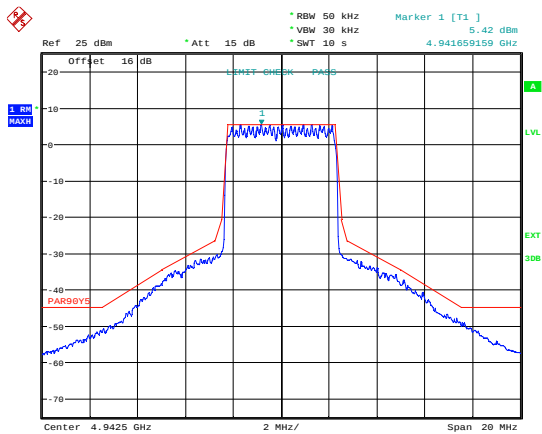
Date: 1.JAN.2003 20:50:22

Emission Mask 64 QAM; MIMO A; 4942.5 MHz.



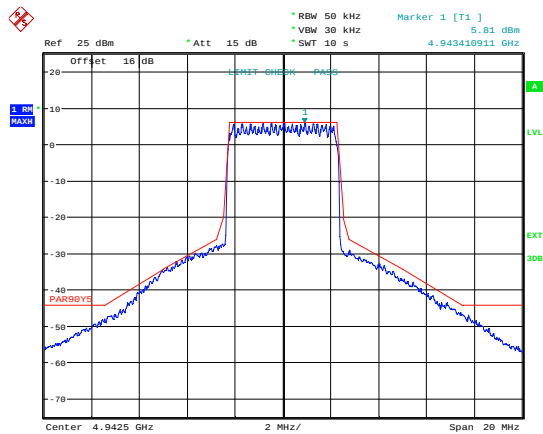
Date: 1.JAN.2003 20:31:03

Emission Mask 64 QAM; MIMO B; 4942.5 MHz.



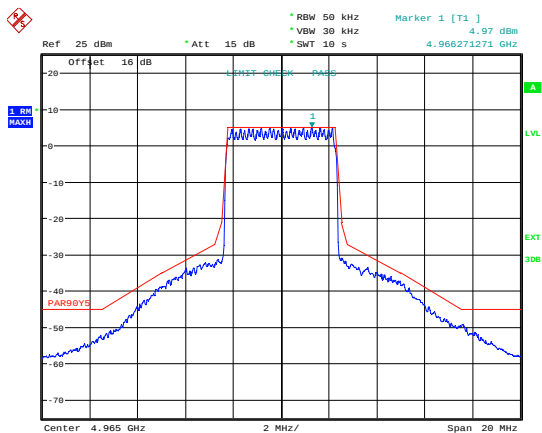
Date: 1.JAN.2003 20:48:42

Emission Mask 256 QAM; MIMO A; 4942.5 MHz.



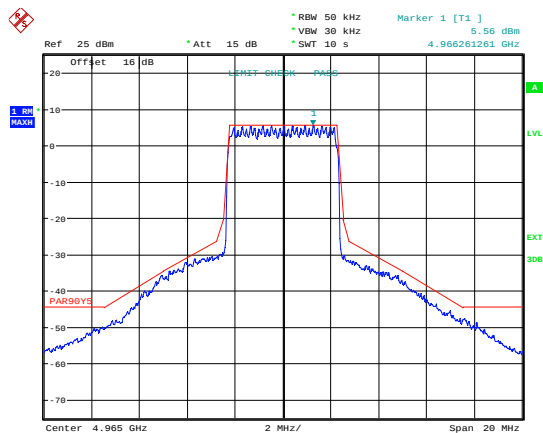
Date: 1.JAN.2003 20:18:44

Emission Mask 256 QAM; MIMO B; 4942.5 MHz.



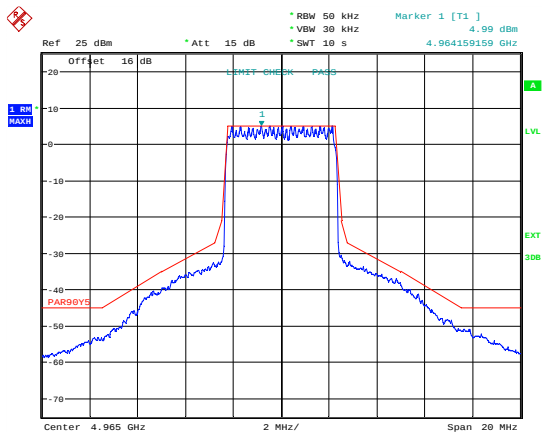
Date: 1.JAN.2003 19:48:42

Emission Mask QPSK; MIMO A; 4965 MHz.



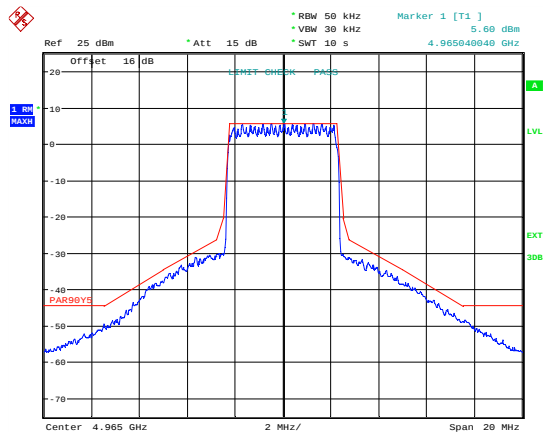
Date: 1.JAN.2003 19:57:34

Emission Mask QPSK; MIMO B; 4965 MHz.



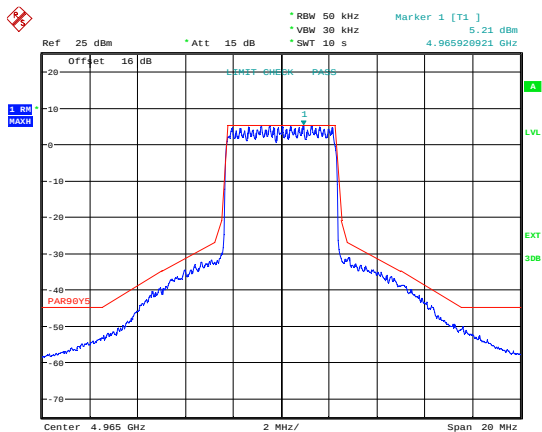
Date: 1.JAN.2003 19:50:59

Emission Mask 16 QAM; MIMO A; 4965 MHz.



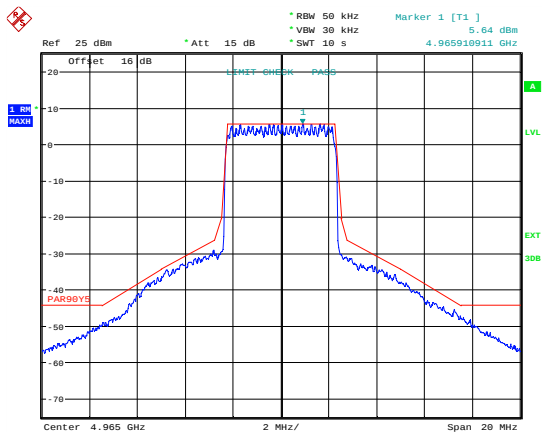
Date: 1.JAN.2003 20:05:01

Emission Mask 16 QAM; MIMO B; 4965 MHz.



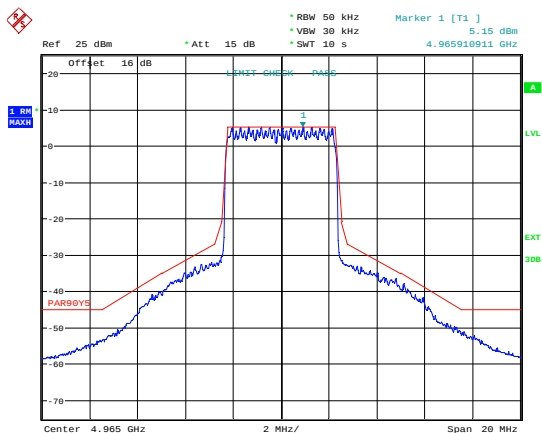
Date: 1.JAN.2003 19:54:09

Emission Mask 64 QAM; MIMO A; 4965 MHz.



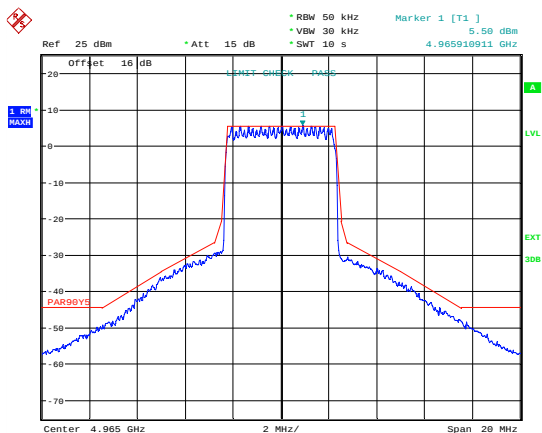
Date: 1.JAN.2003 20:08:10

Emission Mask 64 QAM; MIMO B; 4965 MHz.



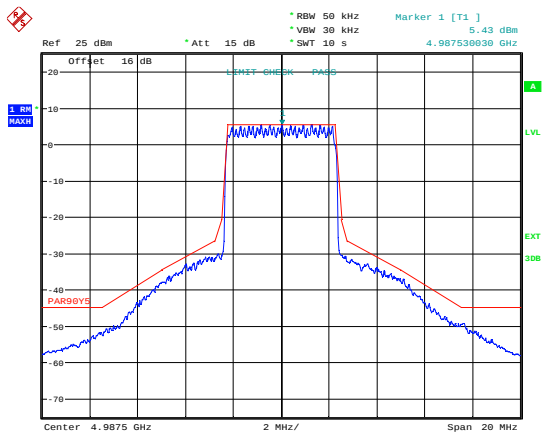
Date: 1.JAN.2003 19:55:10

Emission Mask 256 QAM; MIMO A; 4965 MHz.



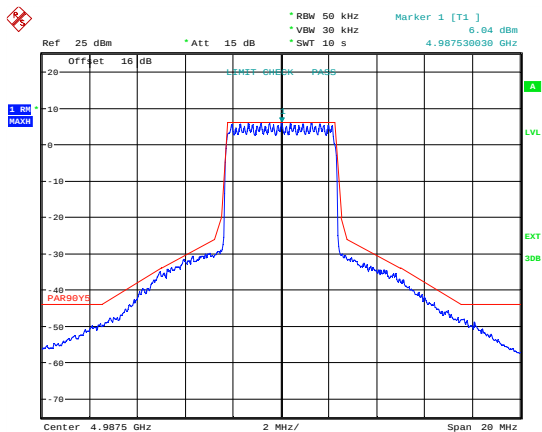
Date: 1.JAN.2003 20:09:50

Emission Mask 256 QAM; MIMO B; 4965 MHz.



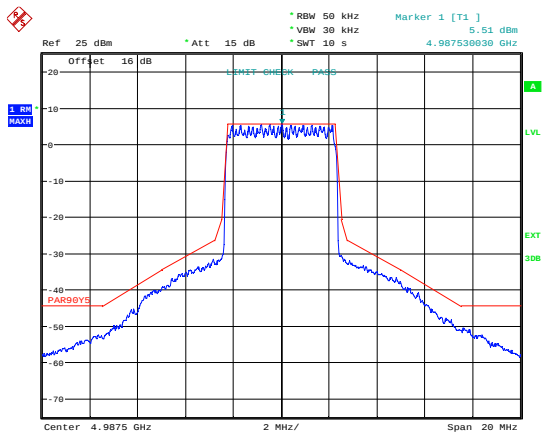
Date: 1.JAN.2003 20:57:31

Emission Mask QPSK; MIMO A; 4987.5 MHz.



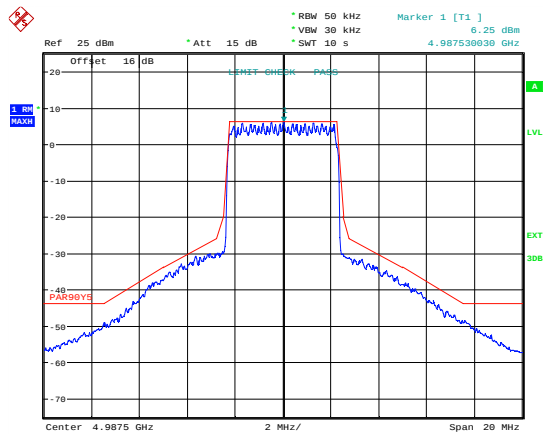
Date: 1.JAN.2003 21:06:28

Emission Mask QPSK; MIMO B; 4987.5 MHz.



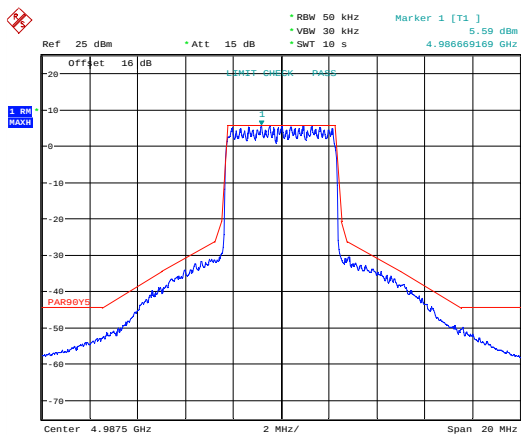
Date: 1.JAN.2003 20:59:53

Emission Mask 16 QAM; MIMO A; 4987.5 MHz.



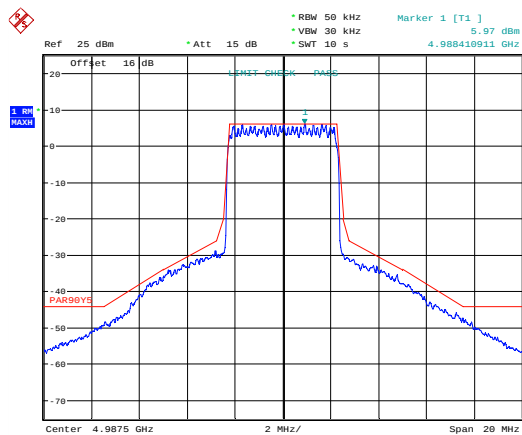
Date: 1.JAN.2003 21:08:09

Emission Mask 16 QAM; MIMO B; 4987.5 MHz.



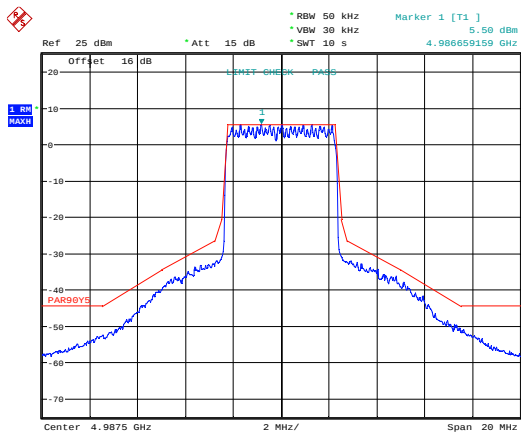
Date: 1.JAN.2003 21:00:49

Emission Mask 64 QAM; MIMO A; 4987.5 MHz.



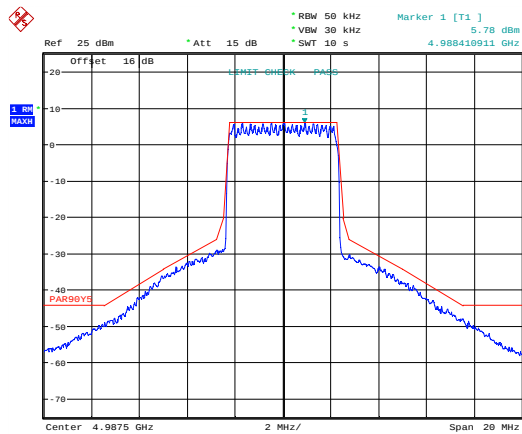
Date: 1.JAN.2003 21:09:30

Emission Mask 64 QAM; MIMO B; 4987.5 MHz.



Date: 1.JAN.2003 21:03:27

Emission Mask 256 QAM; MIMO A; 4987.5 MHz.

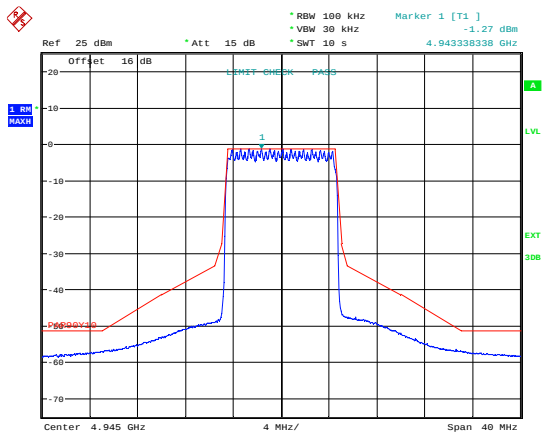


Date: 1.JAN.2003 21:11:19

Emission Mask 256 QAM; MIMO B; 4987.5 MHz.

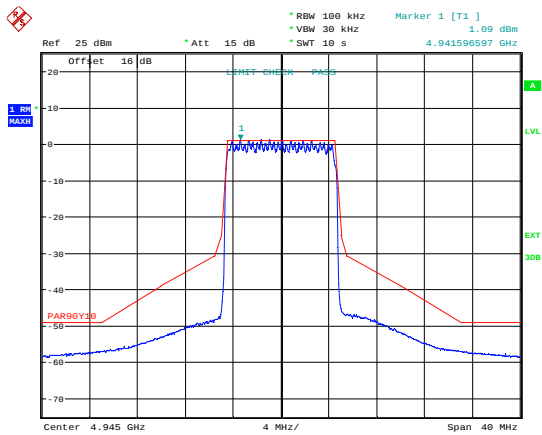
GUI Power settings 5 MHz Bandwidth Sector				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	44	44	44
16QAM		44	44	44
64QAM		44	44	44
256QAM		44	44	44
QPSK	B	43.8	44	44
16QAM		44	44	44
64QAM		43.9	44	44
256QAM		44	44	44

Beamforming 10 MHz Emission Mask



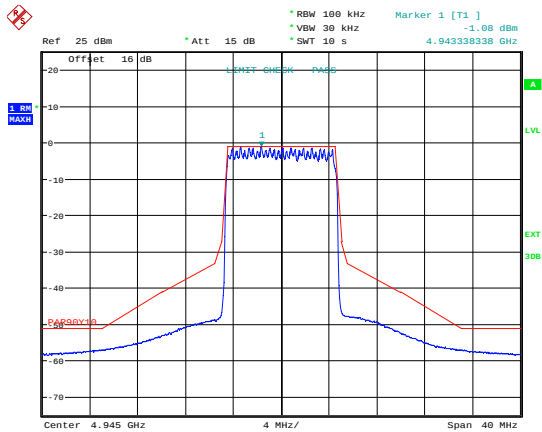
Date: 1.JAN.2003 23:58:35

Emission Mask QPSK; MIMO A; 4945 MHz.



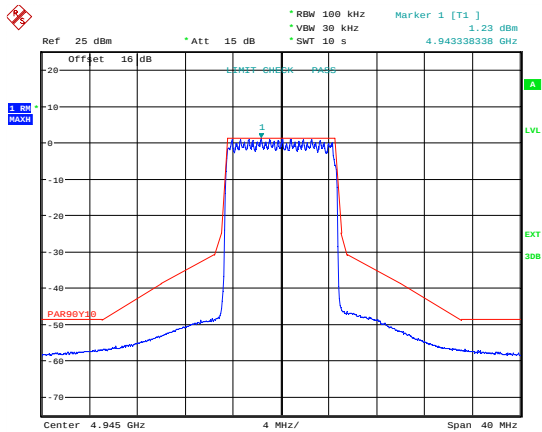
Date: 1.JAN.2003 23:52:26

Emission Mask QPSK; MIMO B; 4945 MHz.



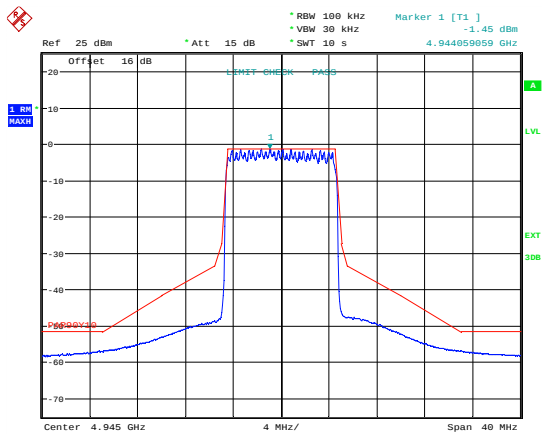
Date: 1.JAN.2003 23:46:56

Emission Mask 16 QAM; MIMO A; 4945 MHz.



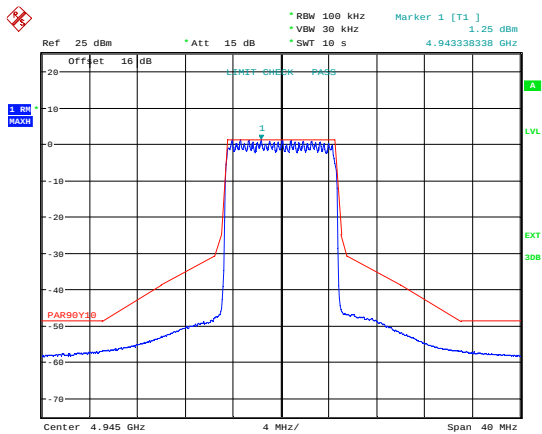
Date: 1.JAN.2003 23:53:55

Emission Mask 16 QAM; MIMO B; 4945 MHz.



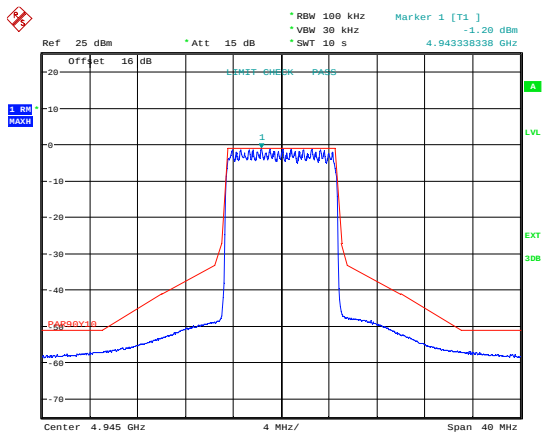
Date: 1.JAN.2003 23:45:47

Emission Mask 64 QAM; MIMO A; 4945 MHz.



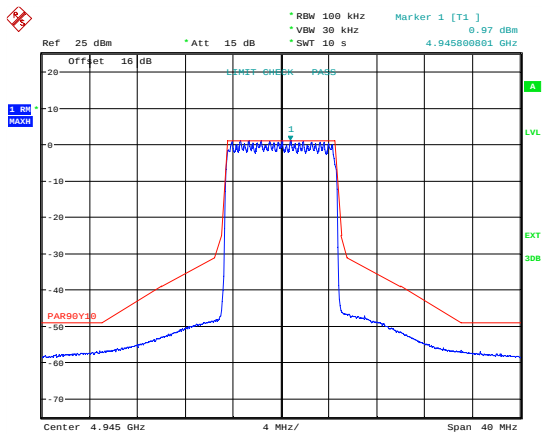
Date: 1.JAN.2003 23:54:45

Emission Mask 64 QAM; MIMO B; 4945 MHz.



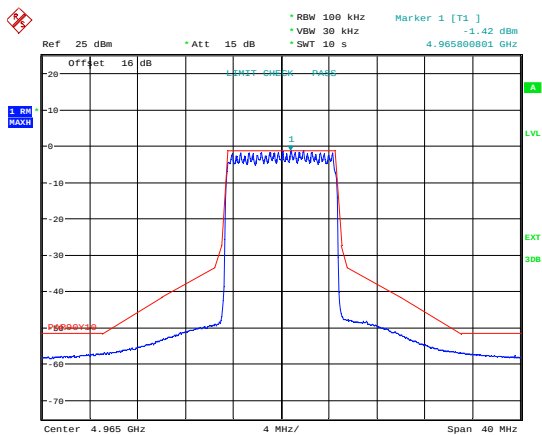
Date: 1.JAN.2003 23:49:01

Emission Mask 256 QAM; MIMO A; 4945 MHz.



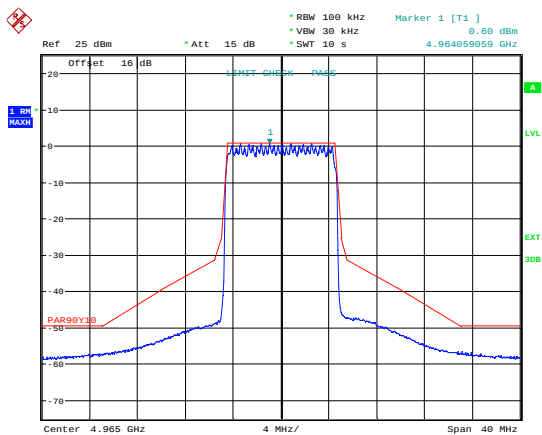
Date: 1.JAN.2003 23:56:07

Emission Mask 256 QAM; MIMO B; 4945 MHz.



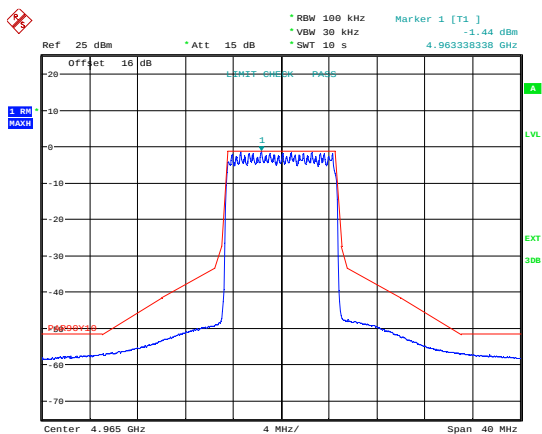
Date: 2.JAN.2003 00:00:13

Emission Mask QPSK; MIMO A; 4965 MHz.



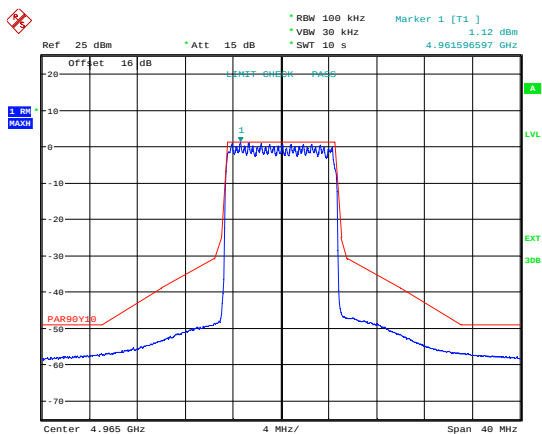
Date: 2.JAN.2003 00:07:20

Emission Mask QPSK; MIMO B; 4965 MHz.



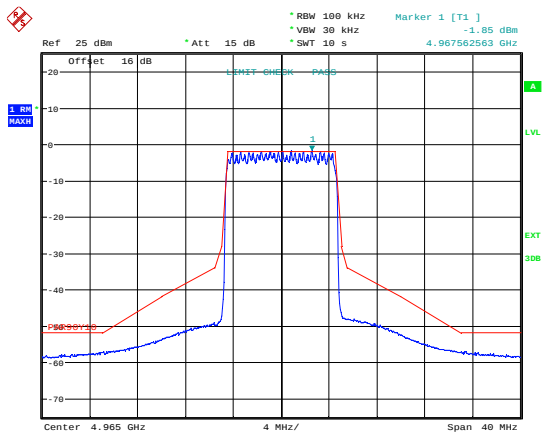
Date: 2.JAN.2003 00:01:27

Emission Mask 16 QAM; MIMO A; 4965 MHz.



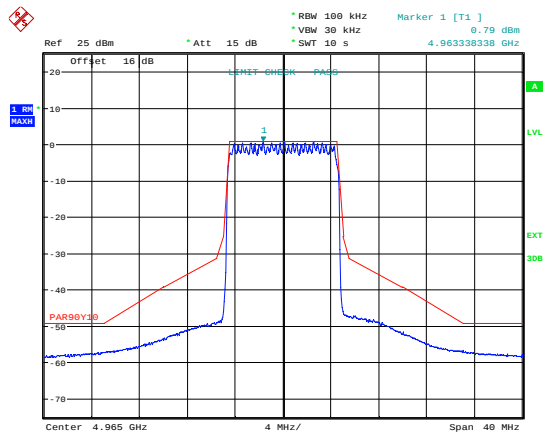
Date: 2.JAN.2003 00:08:16

Emission Mask 16 QAM; MIMO B; 4965 MHz.



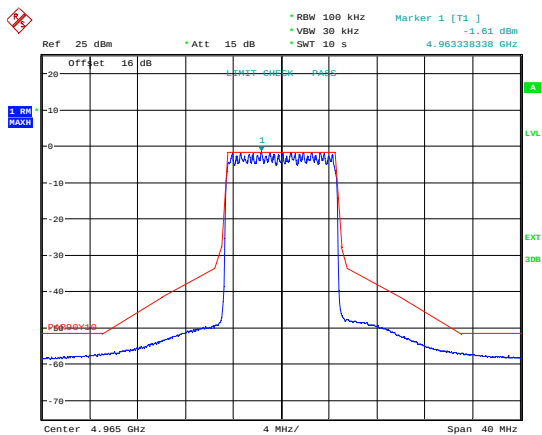
Date: 2.JAN.2003 00:02:33

Emission Mask 64 QAM; MIMO A; 4965 MHz.



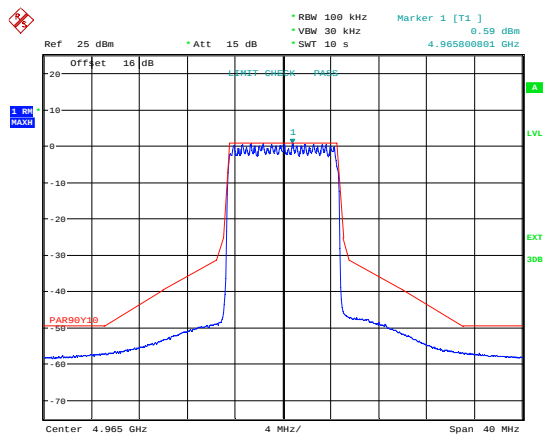
Date: 2.JAN.2003 00:09:11

Emission Mask 64 QAM; MIMO B; 4965 MHz.



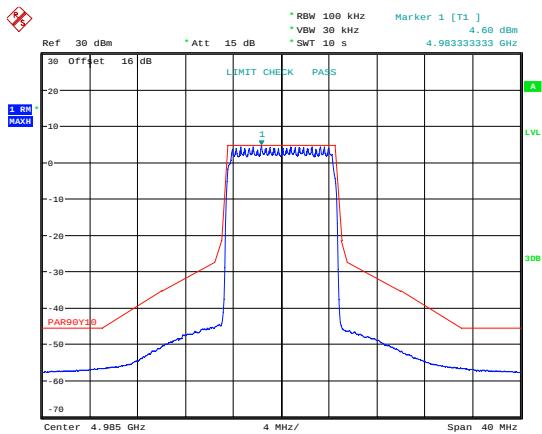
Date: 2.JAN.2003 00:03:26

Emission Mask 256 QAM; MIMO A; 4965 MHz.



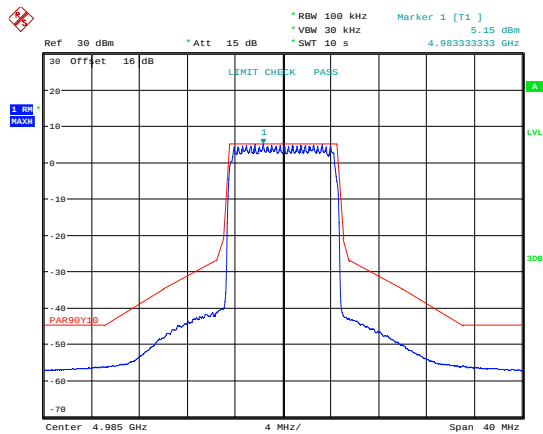
Date: 2.JAN.2003 00:10:21

Emission Mask 256 QAM; MIMO B; 4965 MHz.



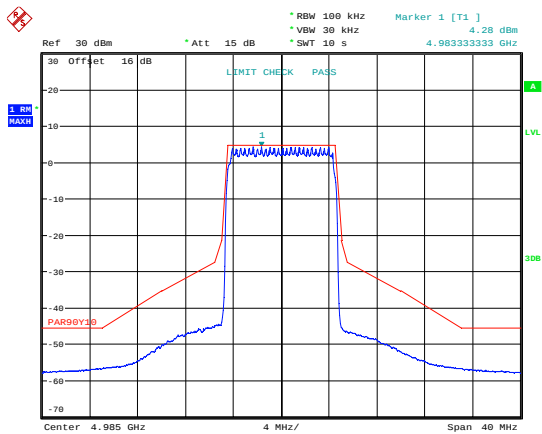
Date: 1.JAN.2003 01:54:43

Emission Mask QPSK; MIMO A; 4985 MHz.



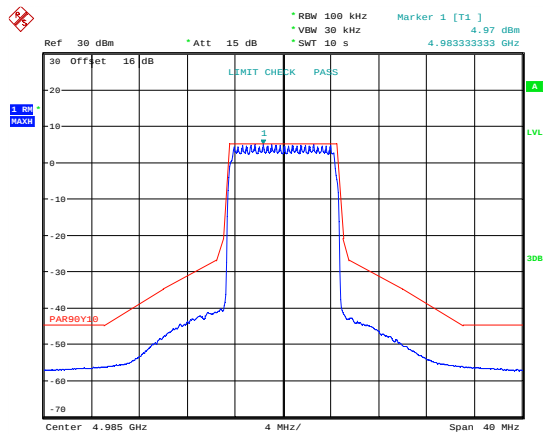
Date: 1.JAN.2003 01:48:50

Emission Mask QPSK; MIMO B; 4985 MHz.



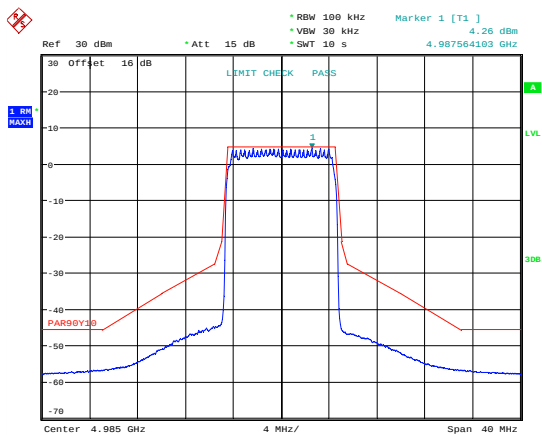
Date: 1.JAN.2003 01:55:22

Emission Mask 16 QAM; MIMO A; 4985 MHz.



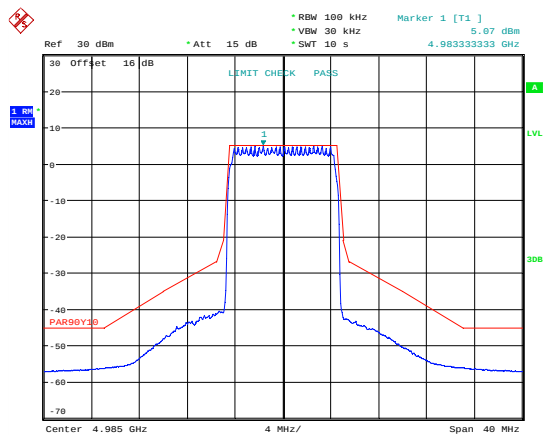
Date: 1.JAN.2003 01:49:41

Emission Mask 16 QAM; MIMO B; 4985 MHz.



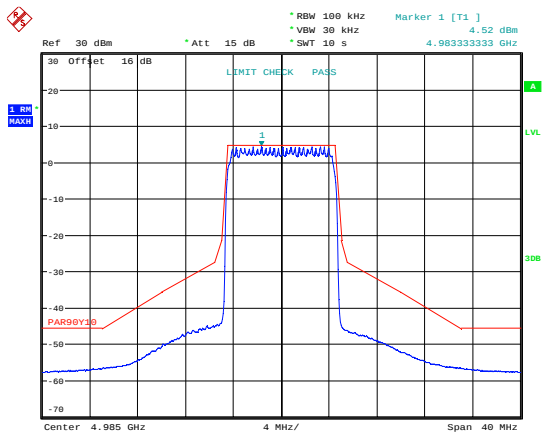
Date: 1.JAN.2003 01:53:34

Emission Mask 64 QAM; MIMO A; 4985 MHz.



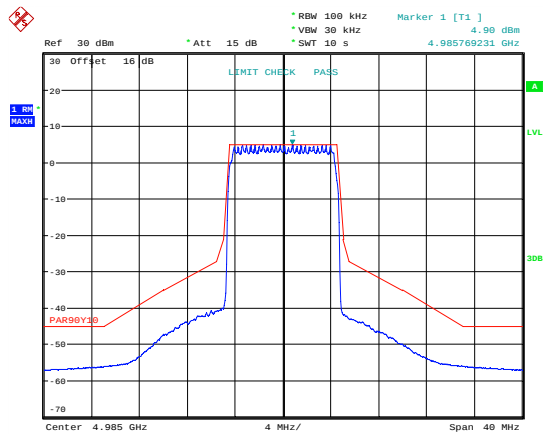
Date: 1.JAN.2003 01:47:57

Emission Mask 64 QAM; MIMO B; 4985 MHz.



Date: 1.JAN.2003 01:52:53

Emission Mask 256 QAM; MIMO A; 4985 MHz.

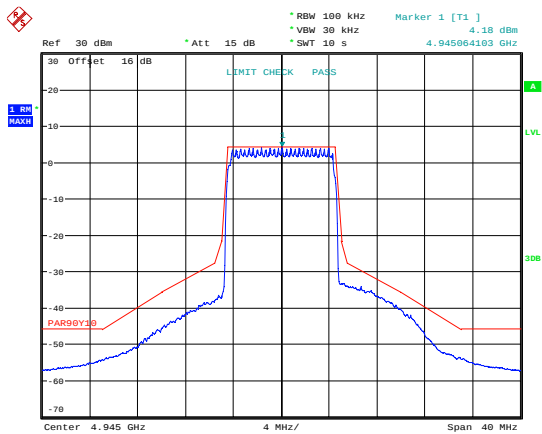


Date: 1.JAN.2003 01:46:57

Emission Mask 256 QAM; MIMO B; 4985 MHz.

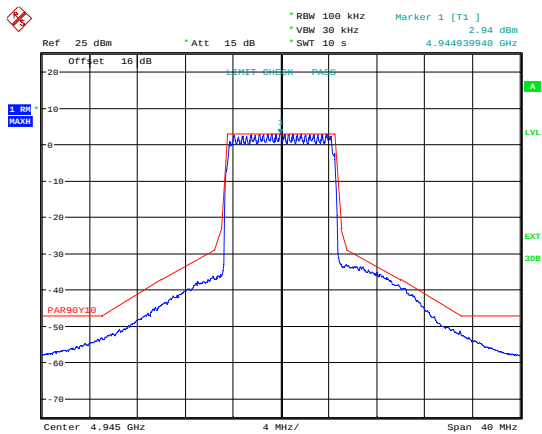
GUI Power settings 10 MHz Bandwidth Beamforming				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	45	45	45
16QAM		45	45	45
64QAM		45	45	45
256QAM		45	45	45
QPSK	B	45	45	45
16QAM		45	45	45
64QAM		45	45	45
256QAM		45	45	45

MuMIMO 10 MHz Emission Mask



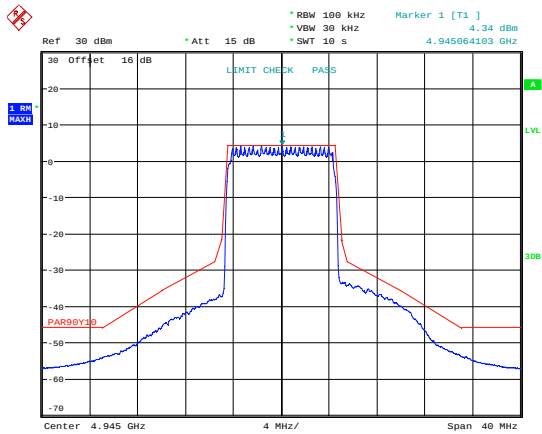
Date: 1.JAN.2003 02:06:20

Emission Mask QPSK; MIMO A; 4945 MHz.



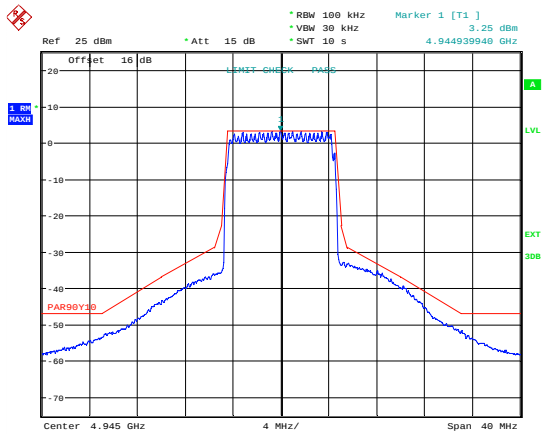
Date: 2.JAN.2003 21:12:03

Emission Mask QPSK; MIMO B; 4945 MHz.



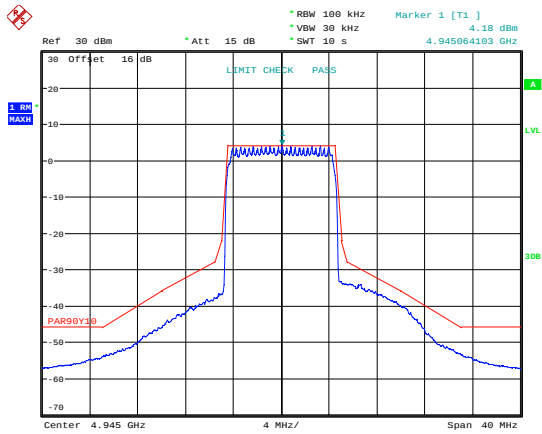
Date: 1.JAN.2003 02:05:43

Emission Mask 16 QAM; MIMO A; 4945 MHz.



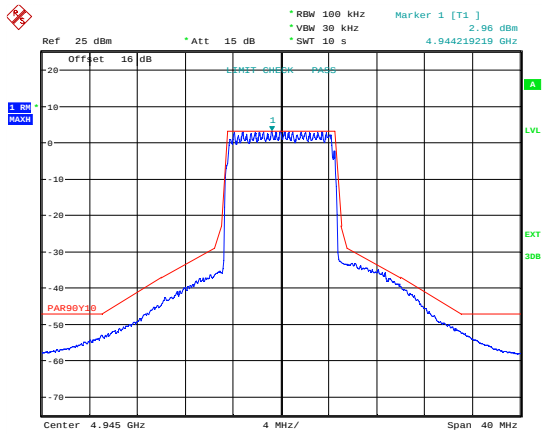
Date: 2.JAN.2003 21:12:52

Emission Mask 16 QAM; MIMO B; 4945 MHz.



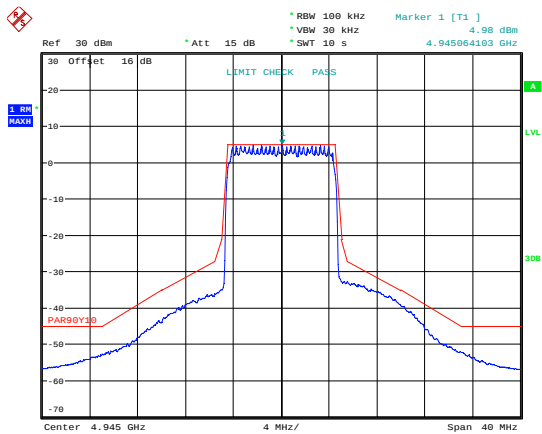
Date: 1.JAN.2003 02:04:20

Emission Mask 64 QAM; MIMO A; 4945 MHz.



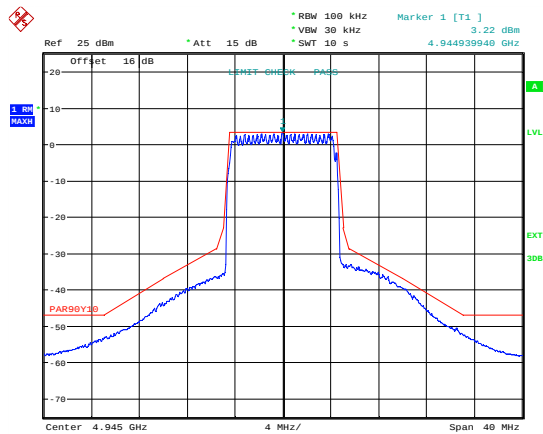
Date: 2.JAN.2003 21:13:44

Emission Mask 64 QAM; MIMO B; 4945 MHz.



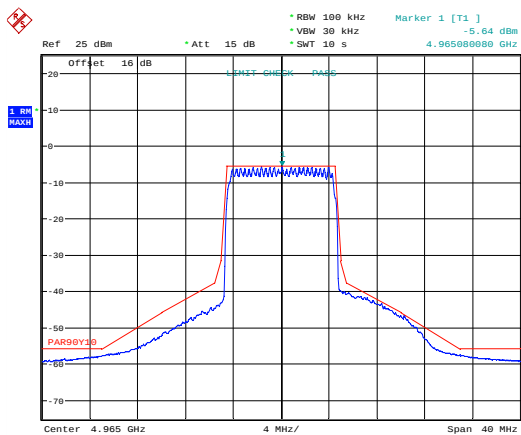
Date: 1.JAN.2003 02:02:34

Emission Mask 256 QAM; MIMO A; 4945 MHz.



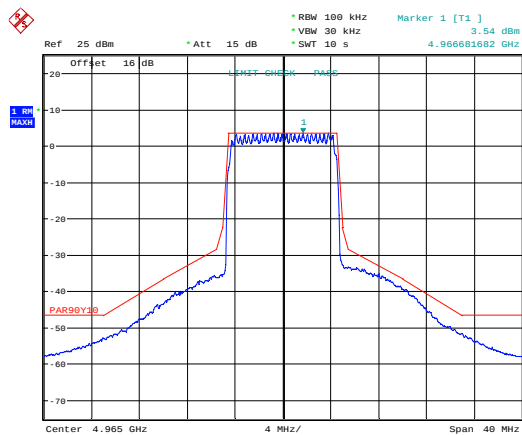
Date: 2.JAN.2003 21:14:40

Emission Mask 256 QAM; MIMO B; 4945 MHz.



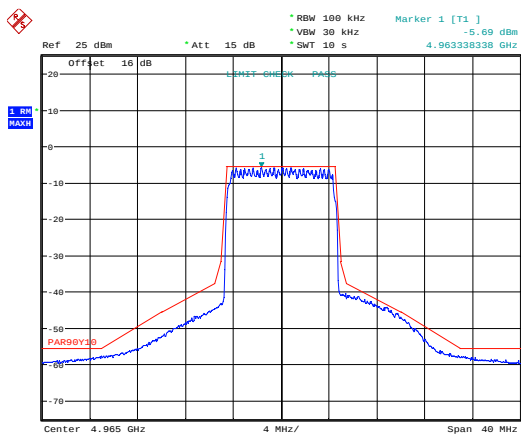
Date: 2.JAN.2003 21:54:54

Emission Mask QPSK; MIMO A; 4965 MHz.



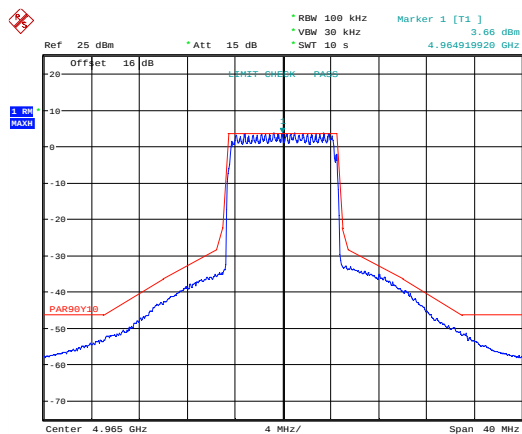
Date: 2.JAN.2003 22:06:45

Emission Mask QPSK; MIMO B; 4965 MHz.



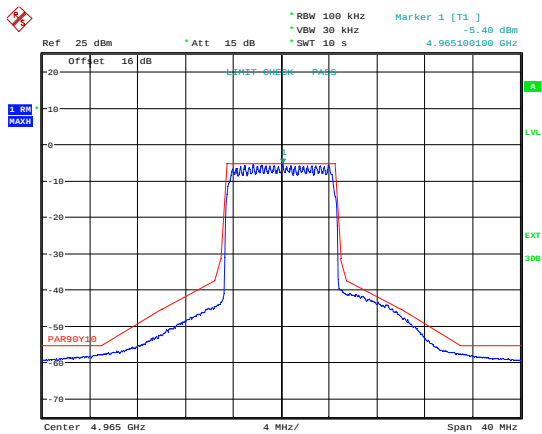
Date: 2.JAN.2003 21:58:18

Emission Mask 16 QAM; MIMO A; 4965 MHz.



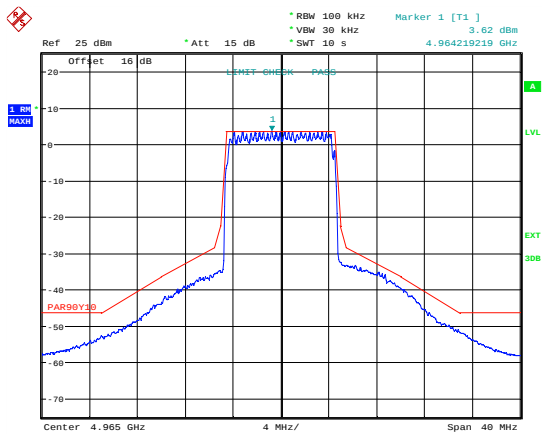
Date: 2.JAN.2003 22:07:40

Emission Mask 16 QAM; MIMO B; 4965 MHz.



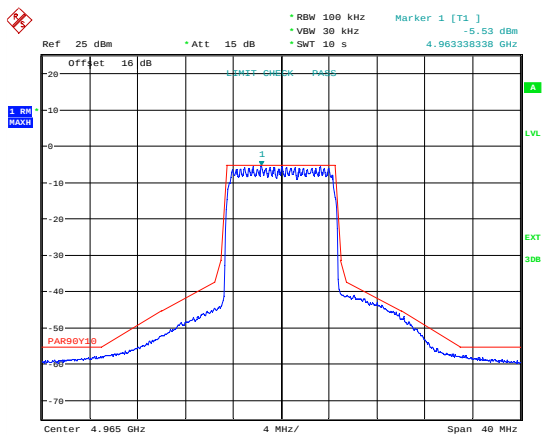
Date: 2.JAN.2003 21:59:31

Emission Mask 64 QAM; MIMO A; 4965 MHz.



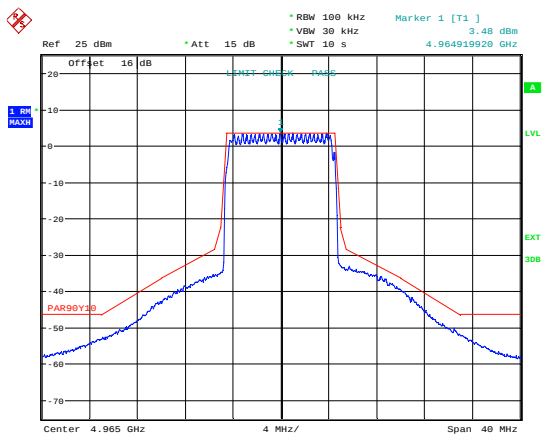
Date: 2.JAN.2003 22:08:22

Emission Mask 64 QAM; MIMO B; 4965 MHz.



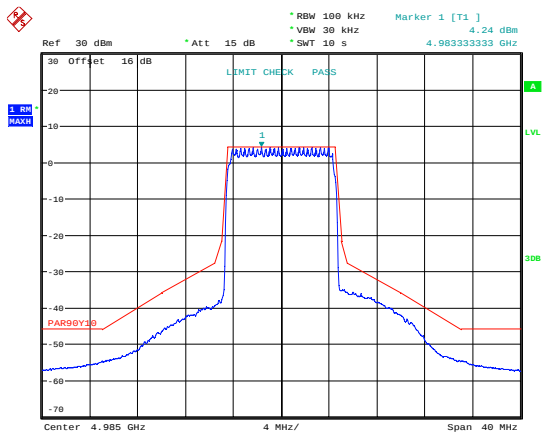
Date: 2.JAN.2003 22:02:49

Emission Mask 256 QAM; MIMO A; 4965 MHz.



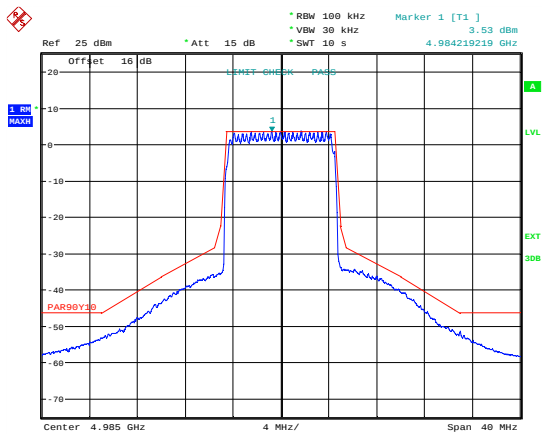
Date: 2.JAN.2003 22:08:57

Emission Mask 256 QAM; MIMO B; 4965 MHz.



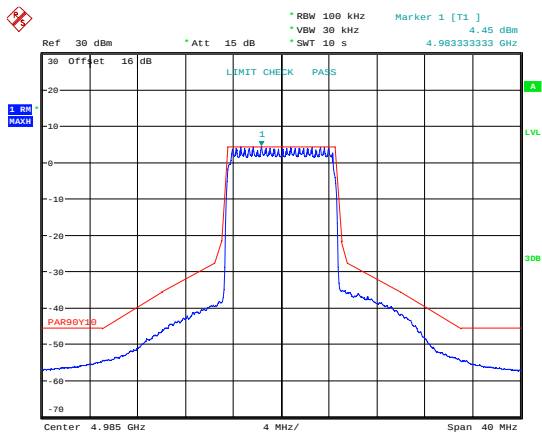
Date: 1.JAN.2003 01:58:16

Emission Mask QPSK; MIMO A; 4985 MHz.



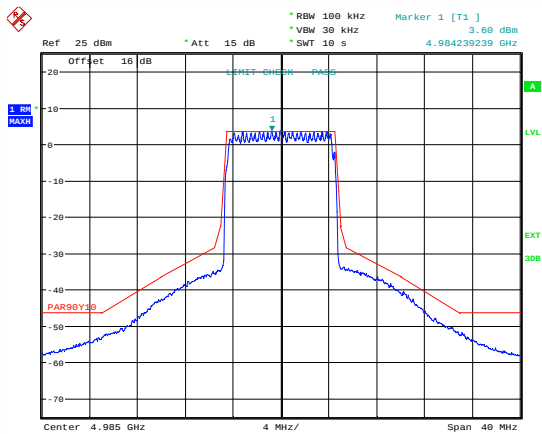
Date: 2.JAN.2003 22:15:53

Emission Mask QPSK; MIMO B; 4985 MHz.



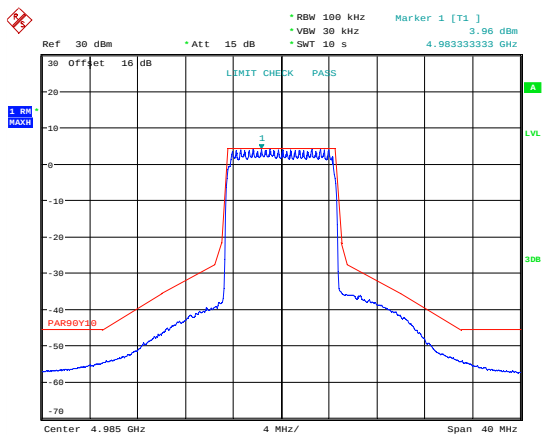
Date: 1.JAN.2003 01:59:11

Emission Mask 16 QAM; MIMO A; 4985 MHz.



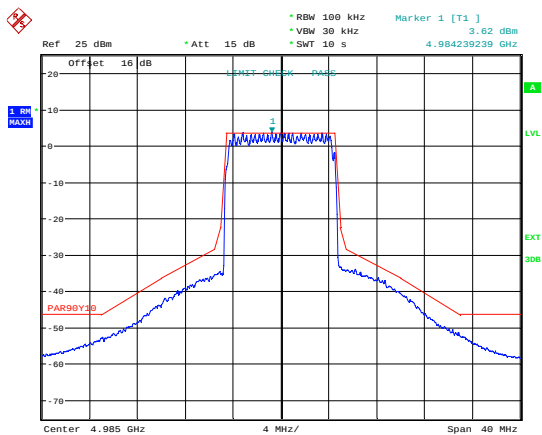
Date: 2.JAN.2003 22:15:13

Emission Mask 16 QAM; MIMO B; 4985 MHz.



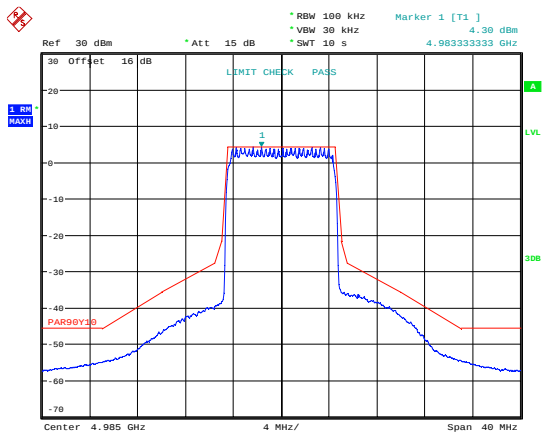
Date: 1.JAN.2003 01:59:46

Emission Mask 64 QAM; MIMO A; 4985 MHz.



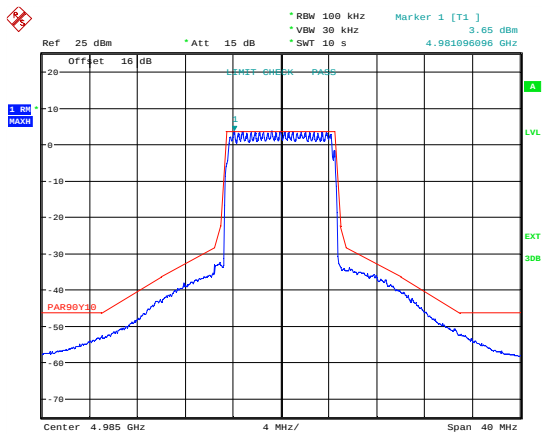
Date: 2.JAN.2003 22:14:20

Emission Mask 64 QAM; MIMO B; 4985 MHz.



Date: 1.JAN.2003 02:00:49

Emission Mask 256 QAM; MIMO A; 4985 MHz.

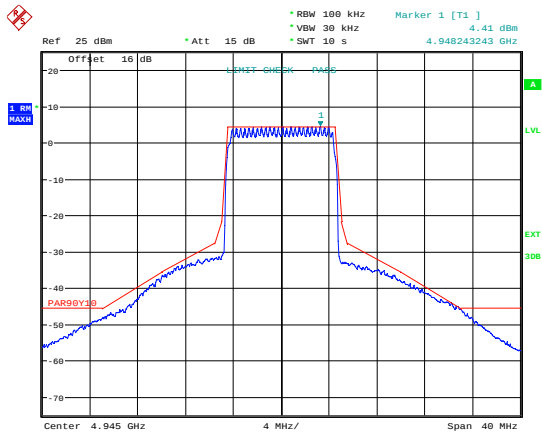


Date: 2.JAN.2003 22:13:28

Emission Mask 256 QAM; MIMO B; 4985 MHz.

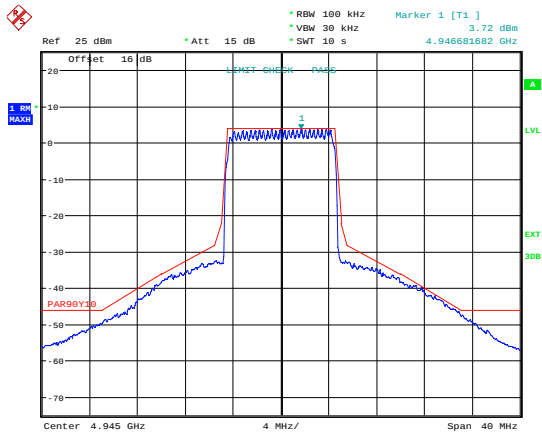
GUI Power settings 10 MHz Bandwidth MuMIMO				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	44.5	43	45
16QAM		44.5	43	45
64QAM		44.5	43	45
256QAM		44.5	43	45
QPSK	B	44.5	45	45
16QAM		44.5	45	45
64QAM		44.5	45	45
256QAM		44.5	45	45

Sector 10 MHz Emission Mask



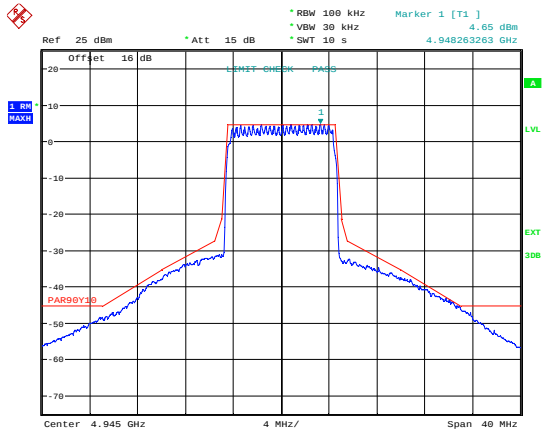
Date: 2.JAN.2003 21:21:39

Emission Mask QPSK; MIMO A; 4945 MHz.



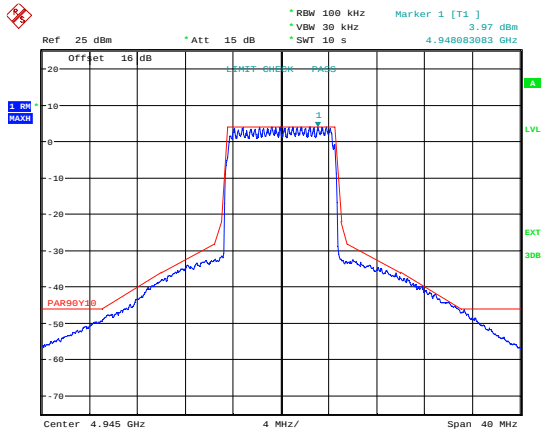
Date: 2.JAN.2003 21:38:25

Emission Mask QPSK; MIMO B; 4945 MHz.



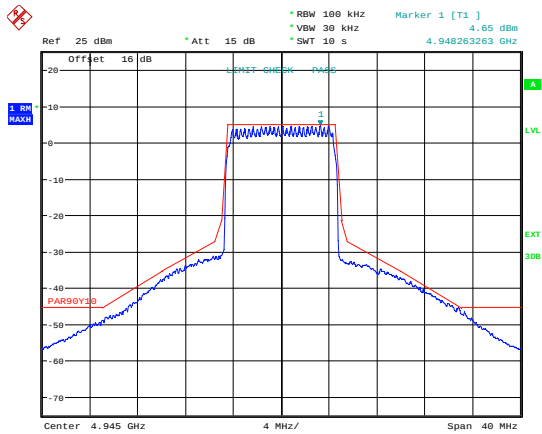
Date: 2.JAN.2003 21:23:17

Emission Mask 16 QAM; MIMO A; 4945 MHz.



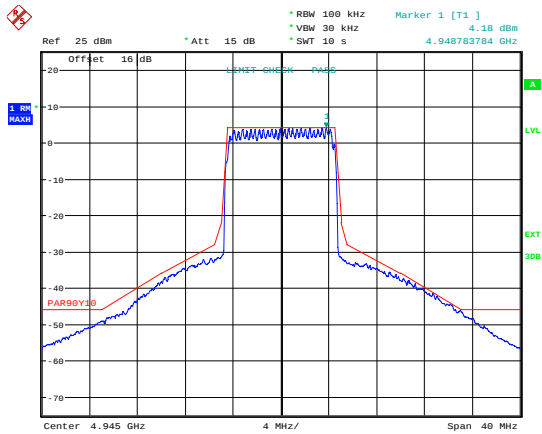
Date: 2.JAN.2003 21:33:18

Emission Mask 16 QAM; MIMO B; 4945 MHz.



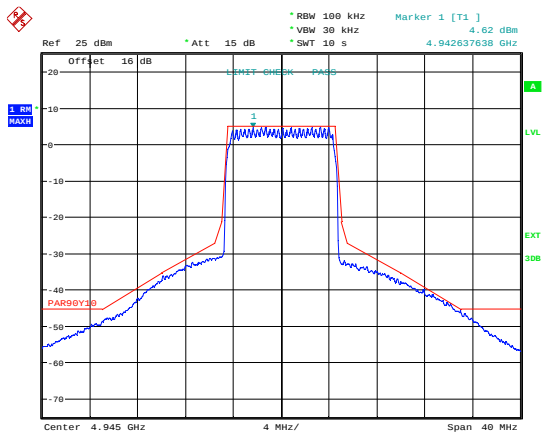
Date: 2.JAN.2003 21:25:18

Emission Mask 64 QAM; MIMO A; 4945 MHz.



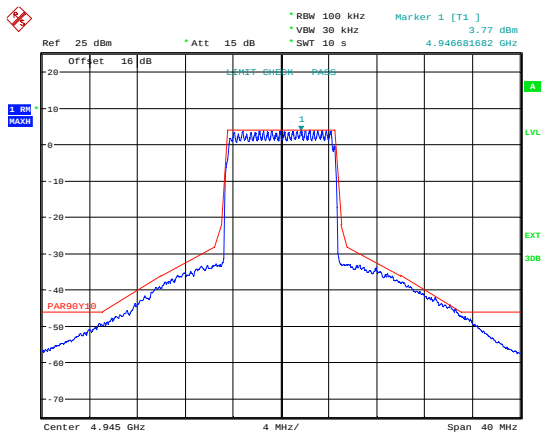
Date: 2.JAN.2003 21:35:41

Emission Mask 64 QAM; MIMO B; 4945 MHz.



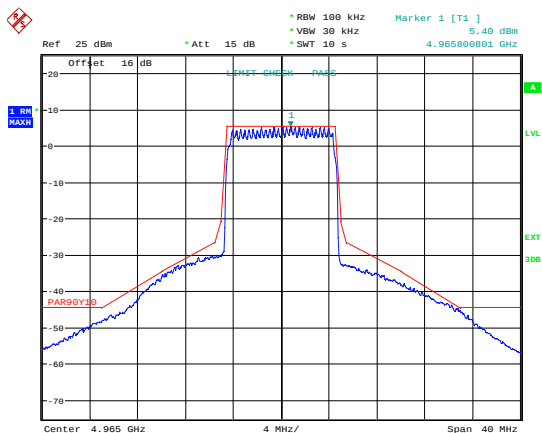
Date: 2.JAN.2003 21:25:52

Emission Mask 256 QAM; MIMO A; 4945 MHz.



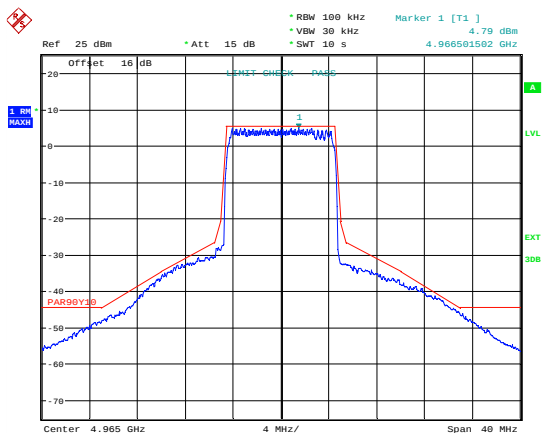
Date: 2.JAN.2003 21:37:03

Emission Mask 256 QAM; MIMO B; 4945 MHz.



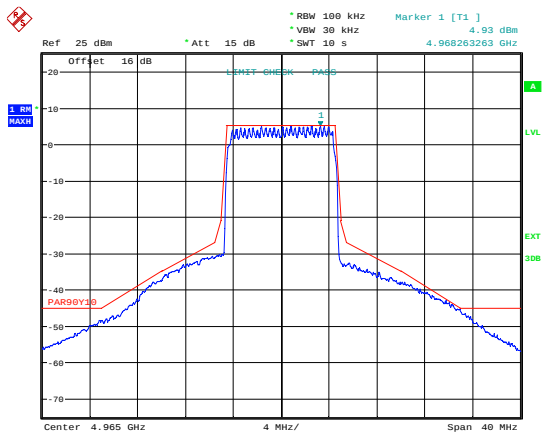
Date: 2.JAN.2003 22:32:49

Emission Mask QPSK; MIMO A; 4965 MHz.



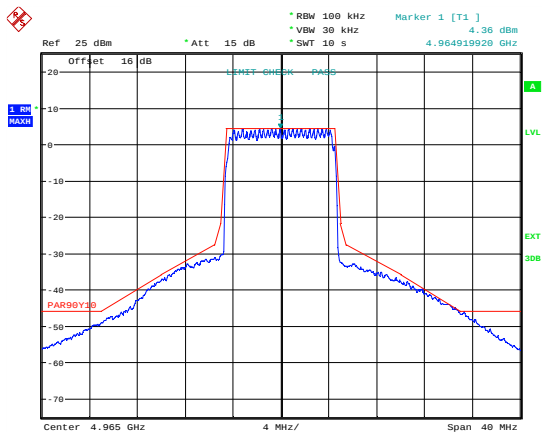
Date: 2.JAN.2003 22:33:18

Emission Mask QPSK; MIMO B; 4965 MHz.



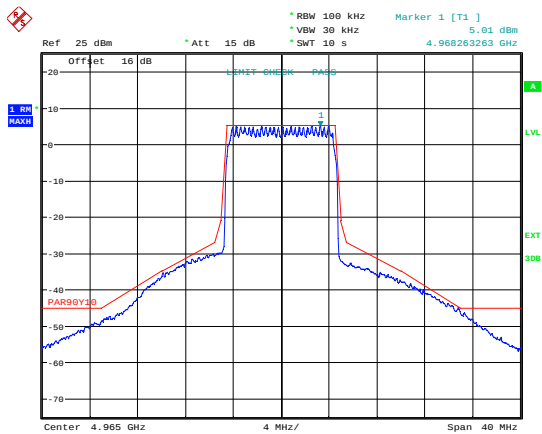
Date: 2.JAN.2003 22:32:15

Emission Mask 16 QAM; MIMO A; 4965 MHz.



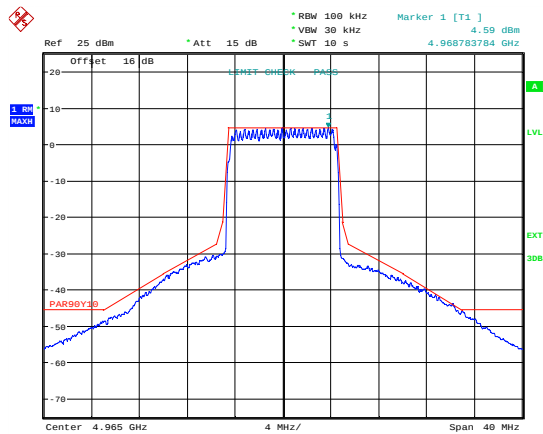
Date: 2.JAN.2003 22:34:04

Emission Mask 16 QAM; MIMO B; 4965 MHz.



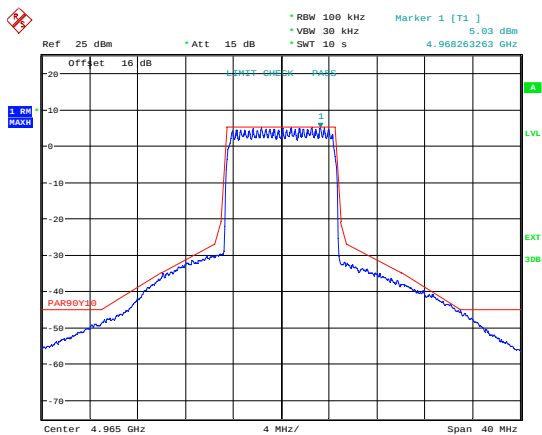
Date: 2.JAN.2003 22:31:35

Emission Mask 64 QAM; MIMO A; 4965 MHz.



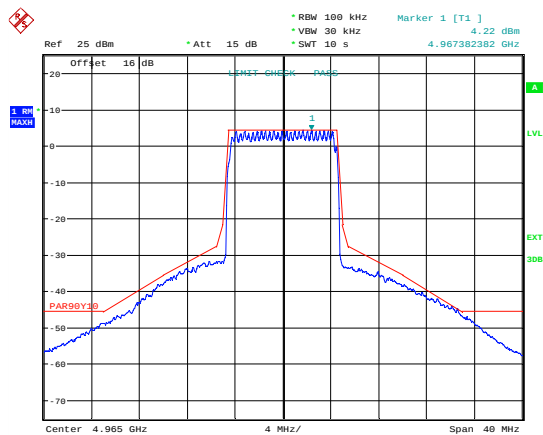
Date: 2.JAN.2003 22:35:14

Emission Mask 64 QAM; MIMO B; 4965 MHz.



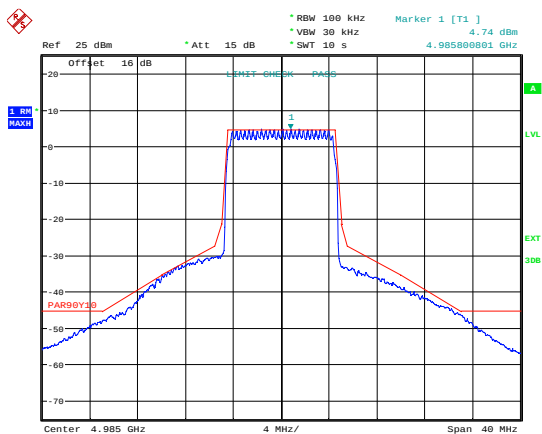
Date: 2.JAN.2003 22:30:52

Emission Mask 256 QAM; MIMO A; 4965 MHz.



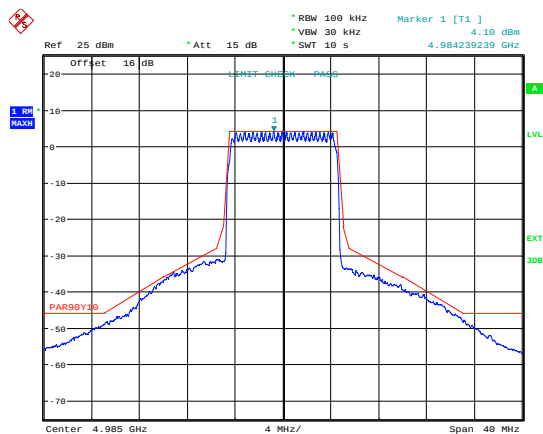
Date: 2.JAN.2003 22:37:35

Emission Mask 256 QAM; MIMO B; 4965 MHz.



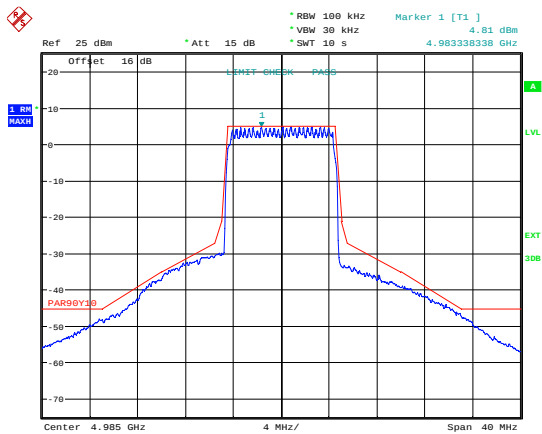
Date: 2.JAN.2003 20:24:43

Emission Mask QPSK; MIMO A; 4985 MHz.



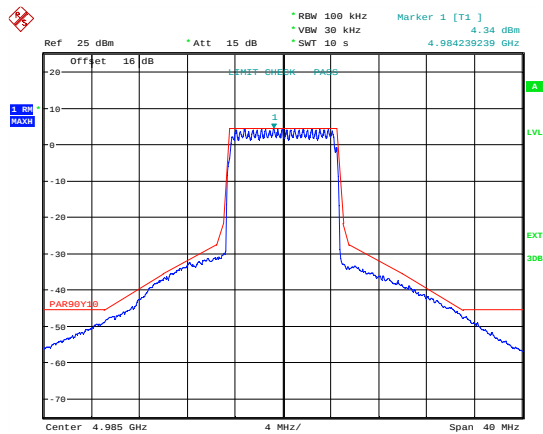
Date: 2.JAN.2003 20:40:39

Emission Mask QPSK; MIMO B; 4985 MHz.



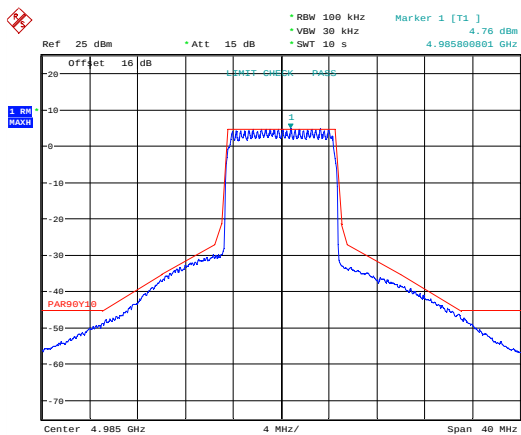
Date: 2.JAN.2003 20:25:55

Emission Mask 16 QAM; MIMO A; 4985 MHz.



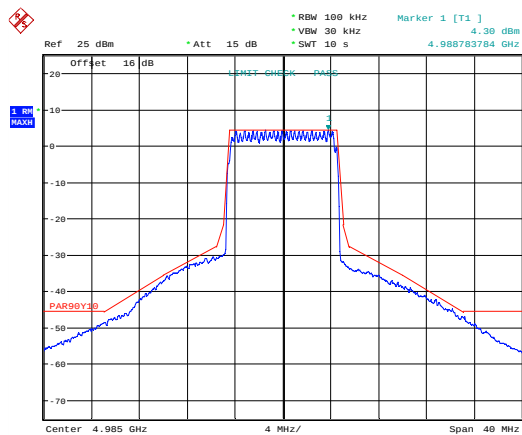
Date: 2.JAN.2003 20:34:09

Emission Mask 16 QAM; MIMO B; 4985 MHz.



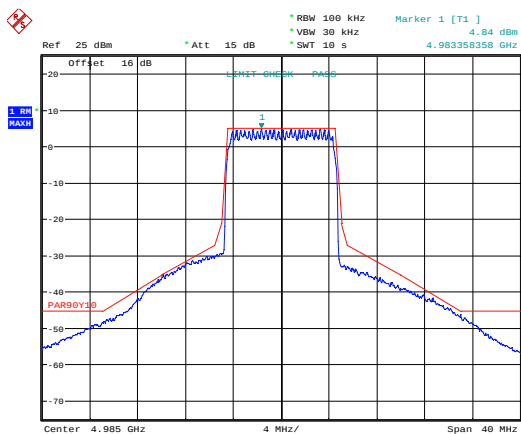
Date: 2.JAN.2003 20:26:54

Emission Mask 64 QAM; MIMO A; 4985 MHz.



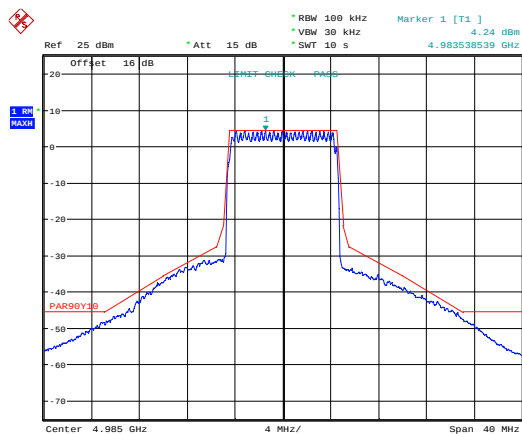
Date: 2.JAN.2003 20:36:38

Emission Mask 64 QAM; MIMO B; 4985 MHz.



Date: 2.JAN.2003 20:28:17

Emission Mask 256 QAM; MIMO A; 4985 MHz.

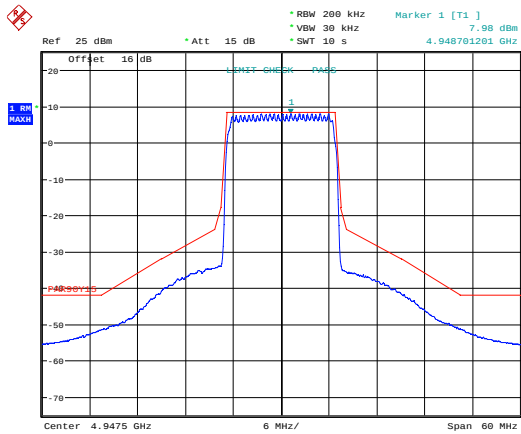


Date: 2.JAN.2003 20:37:23

Emission Mask 256 QAM; MIMO B; 4985 MHz.

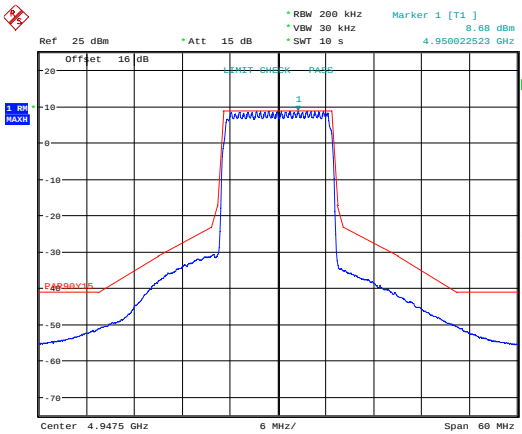
GUI Power settings 10 MHz Bandwidth Sector				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	42.6	43	43
16QAM		42.6	43	43
64QAM		42.6	43	43
256QAM		42.6	43	43
QPSK	B	42.4	43	43
16QAM		42.6	43	43
64QAM		42.6	43	43
256QAM		42.5	42.9	42.8

Beamforming 15 MHz Emission Mask



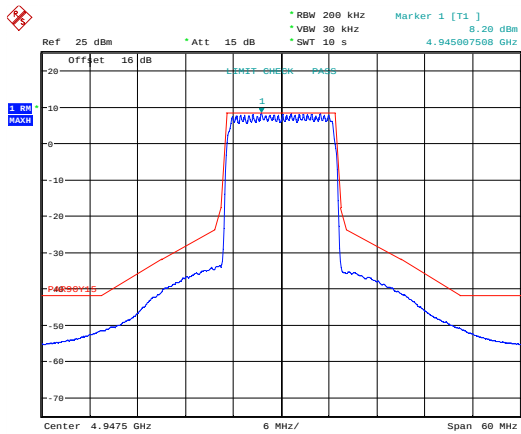
Date: 3.JAN.2003 01:14:45

Emission Mask QPSK; MIMO A; 4947.5 MHz.



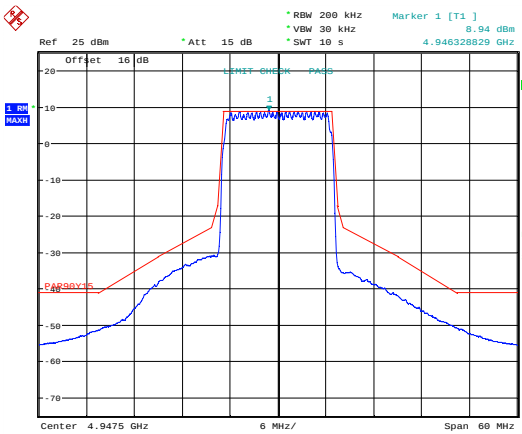
Date: 3.JAN.2003 01:08:59

Emission Mask QPSK; MIMO B; 4947.5 MHz.



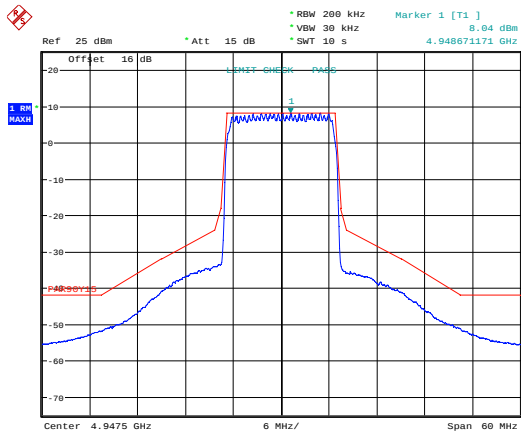
Date: 3.JAN.2003 01:14:08

Emission Mask 16 QAM; MIMO A; 4947.5 MHz.



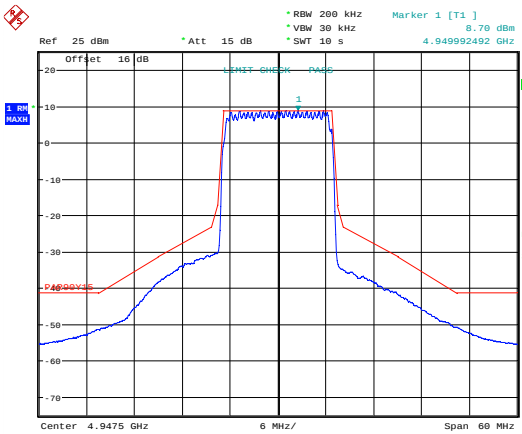
Date: 3.JAN.2003 01:08:23

Emission Mask 16 QAM; MIMO B; 4947.5 MHz.



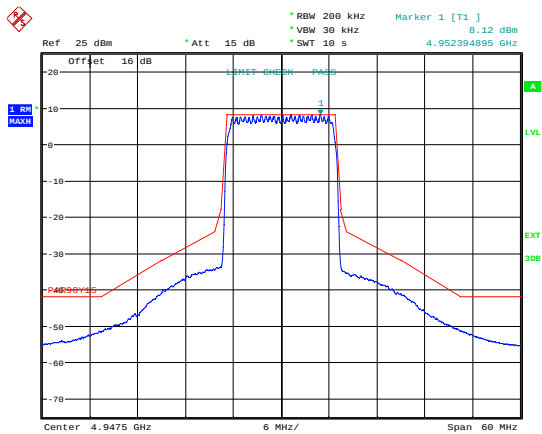
Date: 3.JAN.2003 01:12:23

Emission Mask 64 QAM; MIMO A; 4947.5 MHz.



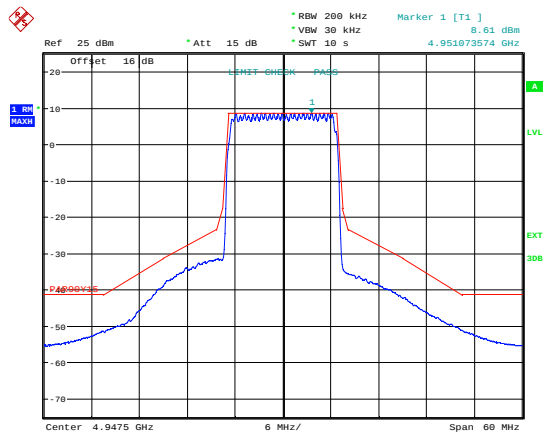
Date: 3.JAN.2003 01:07:31

Emission Mask 64 QAM; MIMO B; 4947.5 MHz.



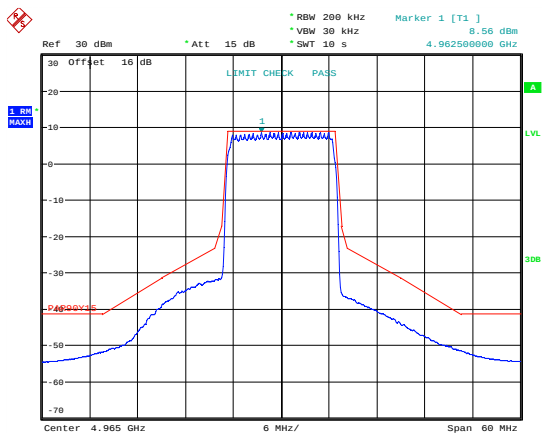
Date: 3.JAN.2003 01:11:10

Emission Mask 256 QAM; MIMO A; 4947.5 MHz.



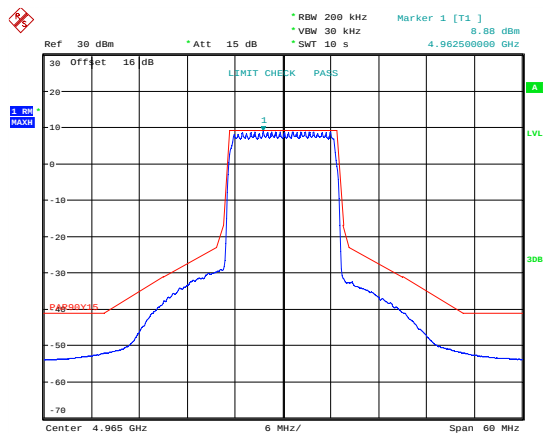
Date: 3.JAN.2003 01:06:13

Emission Mask 256 QAM; MIMO B; 4947.5 MHz.



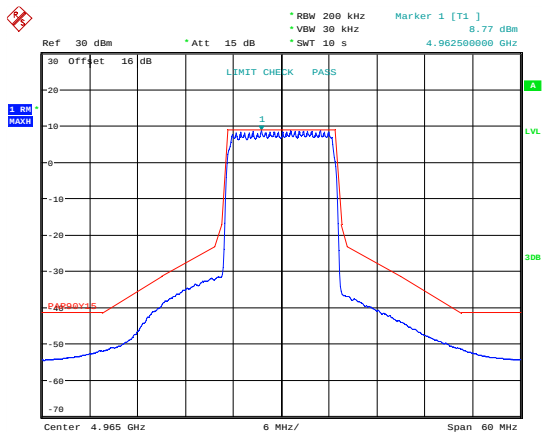
Date: 1.JAN.2003 02:56:42

Emission Mask QPSK; MIMO A; 4965 MHz.



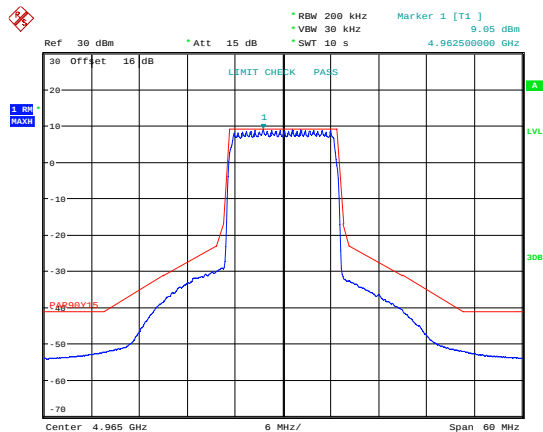
Date: 1.JAN.2003 02:50:00

Emission Mask QPSK; MIMO B; 4965 MHz.



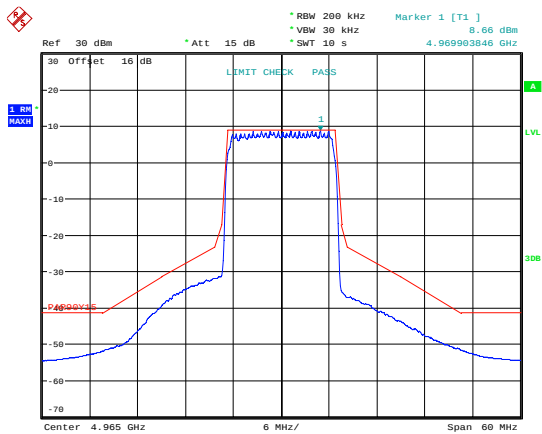
Date: 1.JAN.2003 02:55:32

Emission Mask 16 QAM; MIMO A; 4965 MHz.



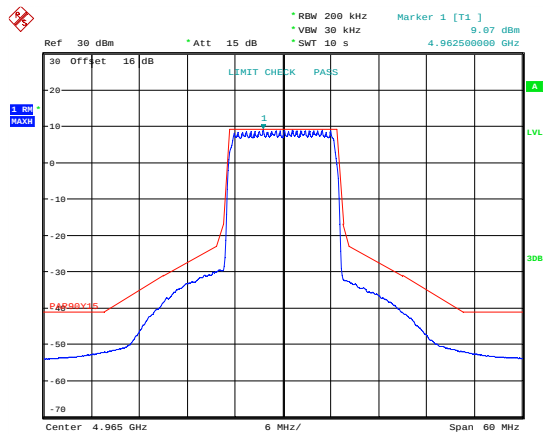
Date: 1.JAN.2003 02:48:49

Emission Mask 16 QAM; MIMO B; 4965 MHz.



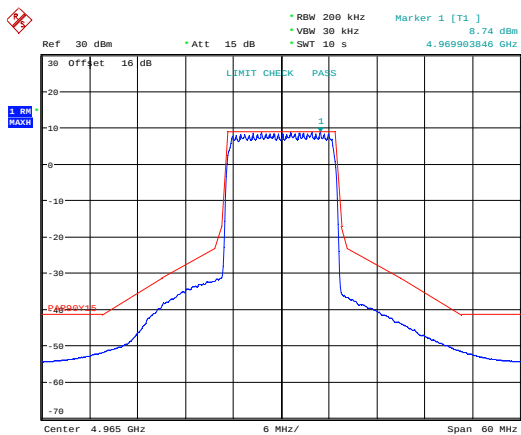
Date: 1.JAN.2003 02:53:48

Emission Mask 64 QAM; MIMO A; 4965 MHz.



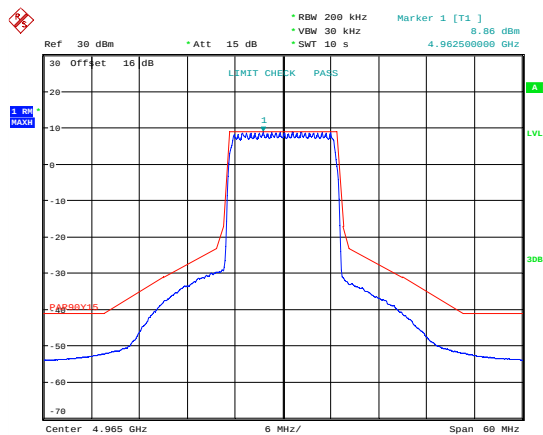
Date: 1.JAN.2003 02:48:11

Emission Mask 64 QAM; MIMO B; 4965 MHz.



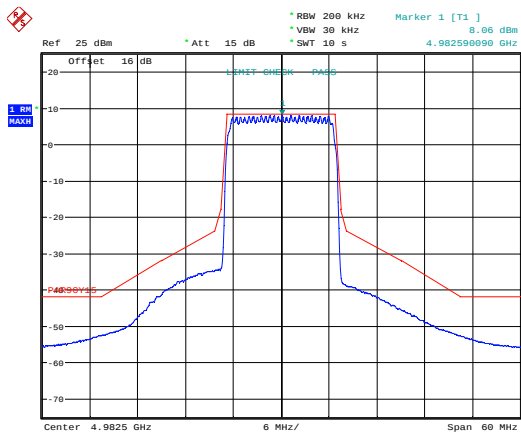
Date: 1.JAN.2003 02:52:24

Emission Mask 256 QAM; MIMO A; 4965 MHz.



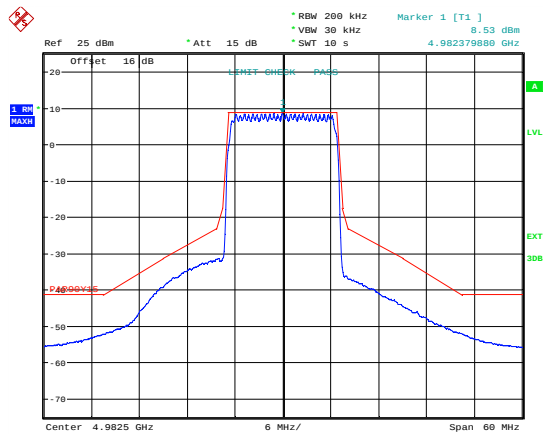
Date: 1.JAN.2003 02:47:20

Emission Mask 256 QAM; MIMO B; 4965 MHz.



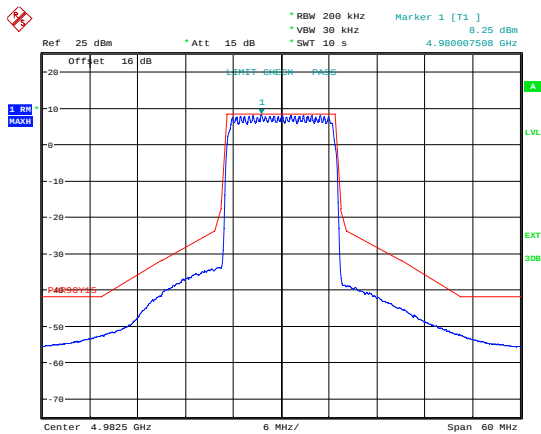
Date: 3.JAN.2003 01:41:06

Emission Mask QPSK; MIMO A; 4982.5 MHz.



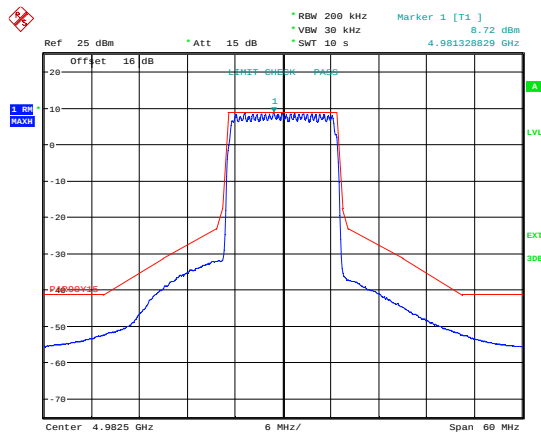
Date: 3.JAN.2003 01:35:44

Emission Mask QPSK; MIMO B; 4982.5 MHz.



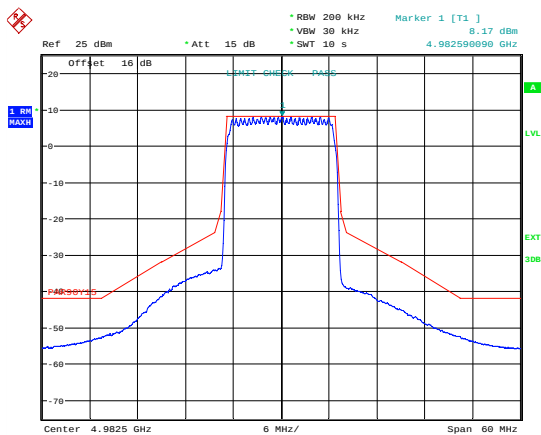
Date: 3.JAN.2003 01:40:27

Emission Mask 16 QAM; MIMO A; 4982.5 MHz.



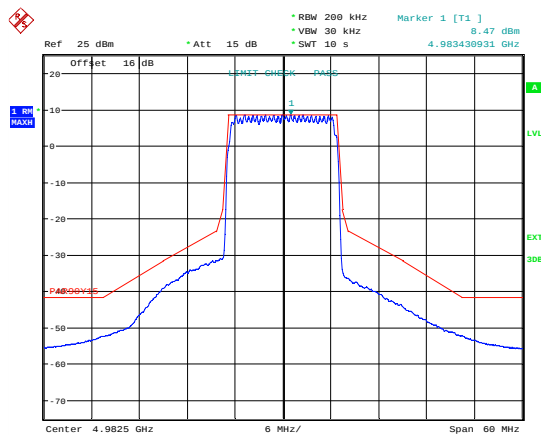
Date: 3.JAN.2003 01:35:07

Emission Mask 16 QAM; MIMO B; 4982.5 MHz.



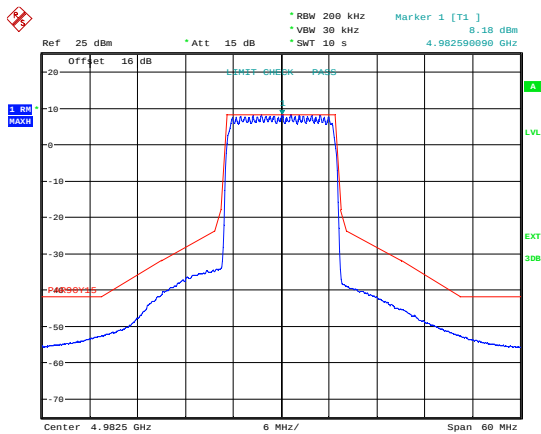
Date: 3.JAN.2003 01:39:27

Emission Mask 64 QAM; MIMO A; 4982.5 MHz.



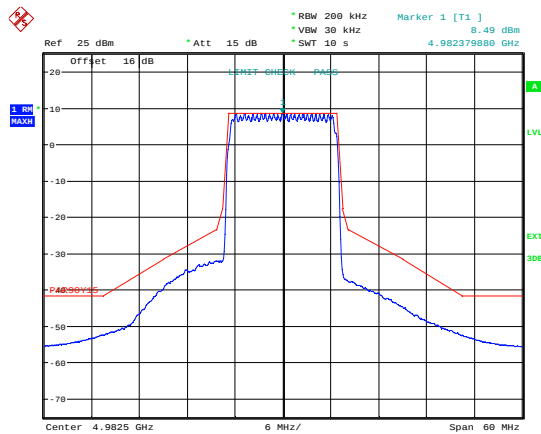
Date: 3.JAN.2003 01:34:00

Emission Mask 64 QAM; MIMO B; 4982.5 MHz.



Date: 3.JAN.2003 01:38:47

Emission Mask 256 QAM; MIMO A; 4982.5 MHz.

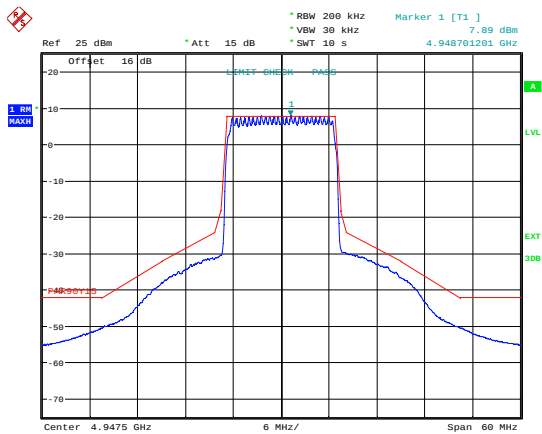


Date: 3.JAN.2003 01:33:16

Emission Mask 256 QAM; MIMO B; 4982.5 MHz.

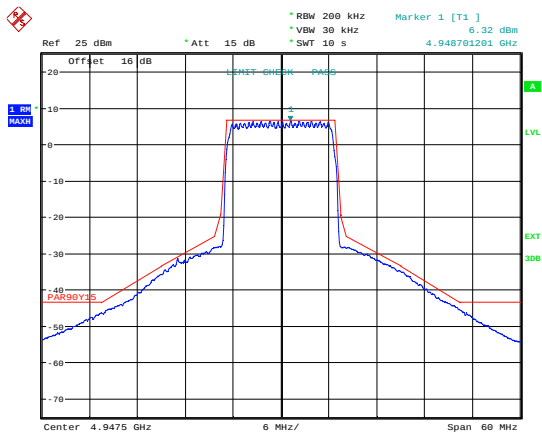
GUI Power settings 15 MHz Bandwidth Beamforming				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	48	48	48
16QAM		48	48	48
64QAM		48	48	48
256QAM		48	48	48
QPSK	B	48	48	48
16QAM		48	48	48
64QAM		48	48	48
256QAM		48	48	48

MuMIMO 15 MHz Emission Mask



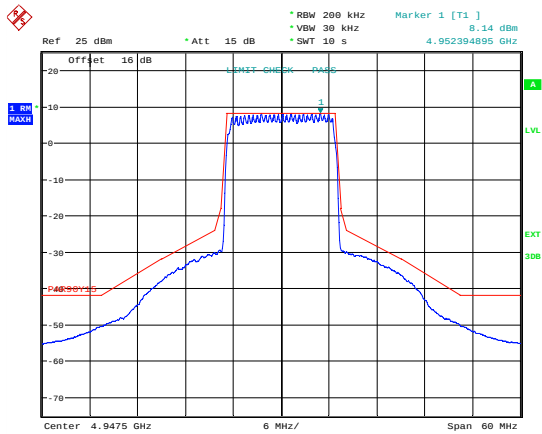
Date: 3.JAN.2003 00:18:14

Emission Mask QPSK; MIMO A; 4947.5 MHz.



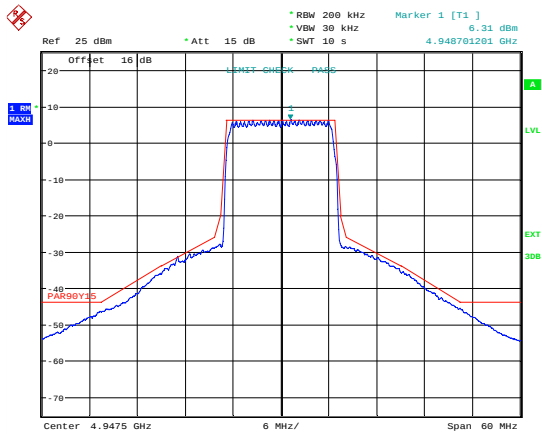
Date: 3.JAN.2003 00:26:10

Emission Mask QPSK; MIMO B; 4947.5 MHz.



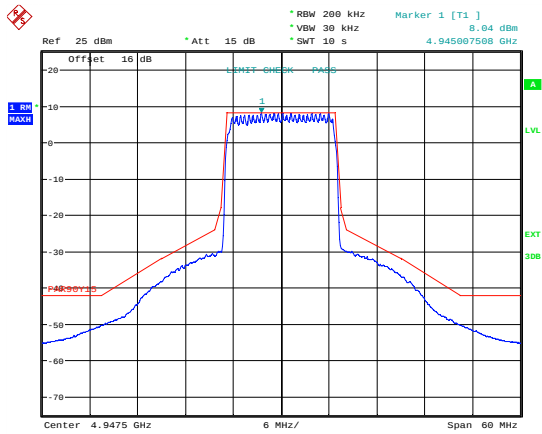
Date: 3.JAN.2003 00:19:35

Emission Mask 16 QAM; MIMO A; 4947.5 MHz.



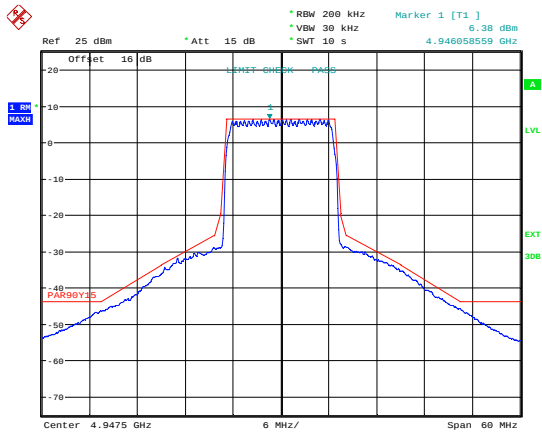
Date: 3.JAN.2003 00:28:02

Emission Mask 16 QAM; MIMO B; 4947.5 MHz.



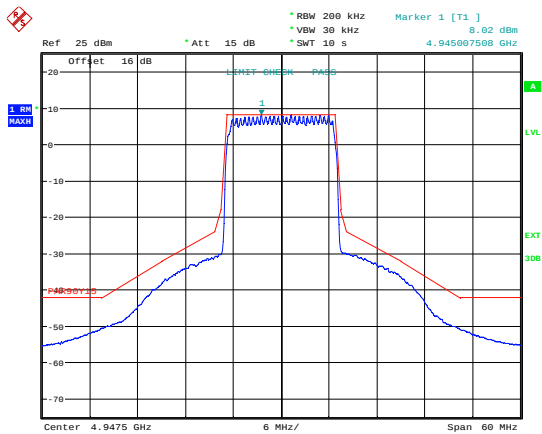
Date: 3.JAN.2003 00:20:58

Emission Mask 64 QAM; MIMO A; 4947.5 MHz.



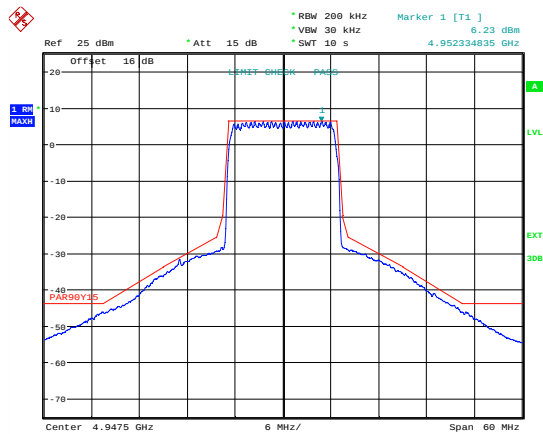
Date: 3.JAN.2003 00:28:59

Emission Mask 64 QAM; MIMO B; 4947.5 MHz.



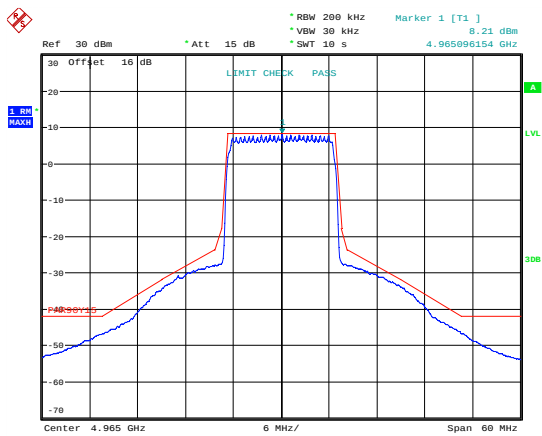
Date: 3.JAN.2003 00:21:53

Emission Mask 256 QAM; MIMO A; 4947.5 MHz.



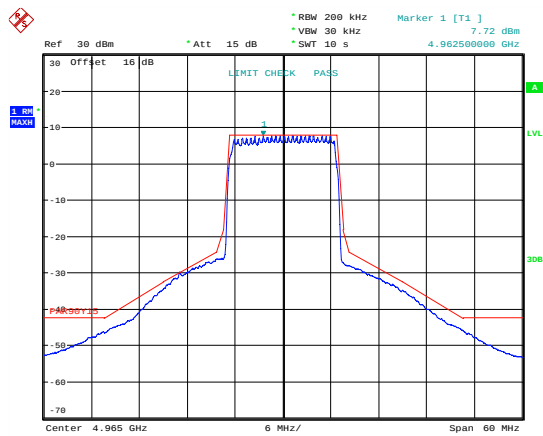
Date: 3.JAN.2003 00:29:40

Emission Mask 256 QAM; MIMO B; 4947.5 MHz.



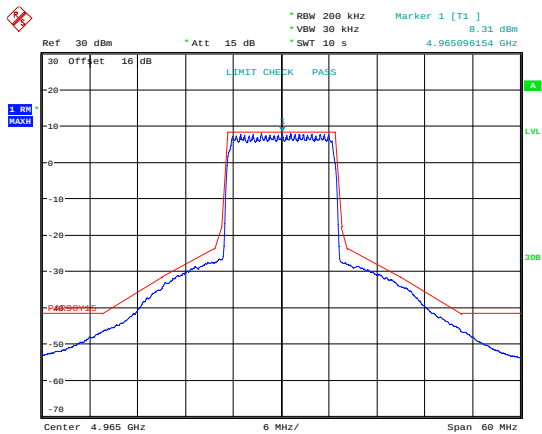
Date: 1.JAN.2003 02:24:31

Emission Mask QPSK; MIMO A; 4965 MHz.



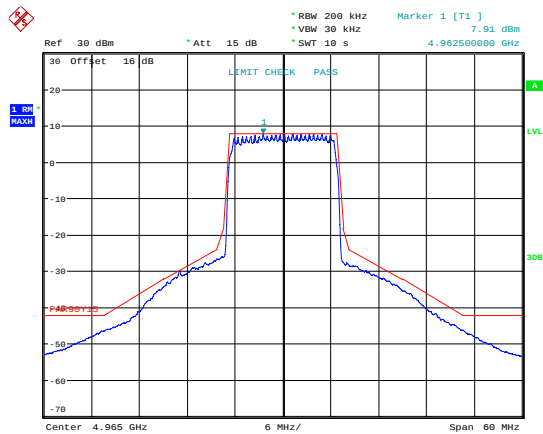
Date: 1.JAN.2003 02:40:33

Emission Mask QPSK; MIMO B; 4965 MHz.



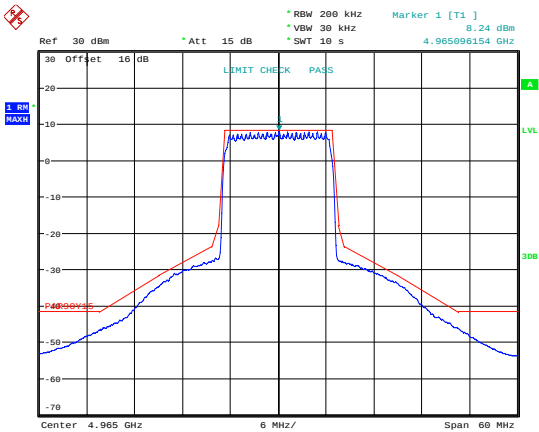
Date: 1.JAN.2003 02:25:39

Emission Mask 16 QAM; MIMO A; 4965 MHz.



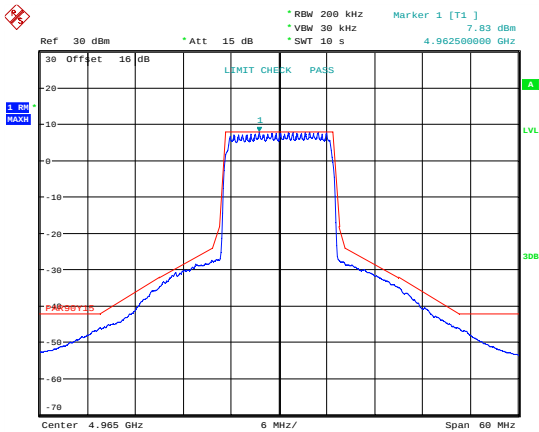
Date: 1.JAN.2003 02:42:28

Emission Mask 16 QAM; MIMO B; 4965 MHz.



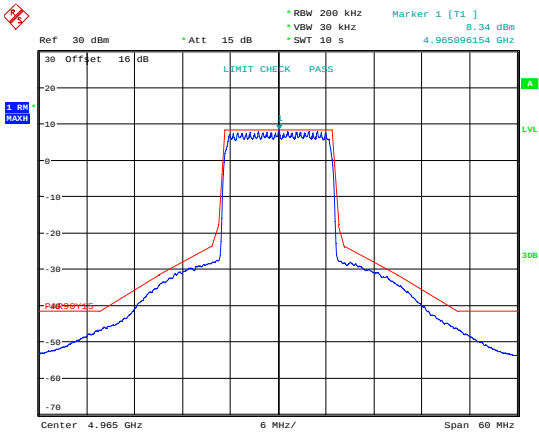
Date: 1.JAN.2003 02:27:35

Emission Mask 64 QAM; MIMO A; 4965 MHz.



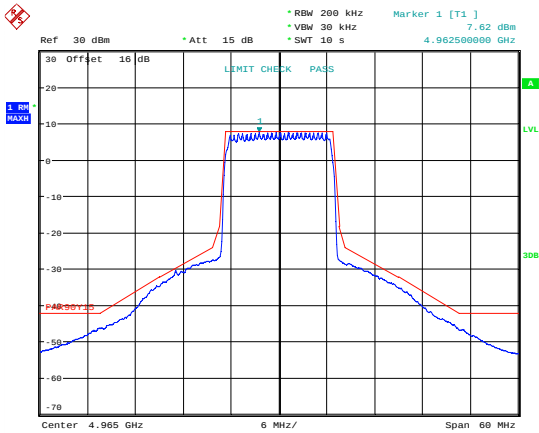
Date: 1.JAN.2003 02:43:21

Emission Mask 64 QAM; MIMO B; 4965 MHz.



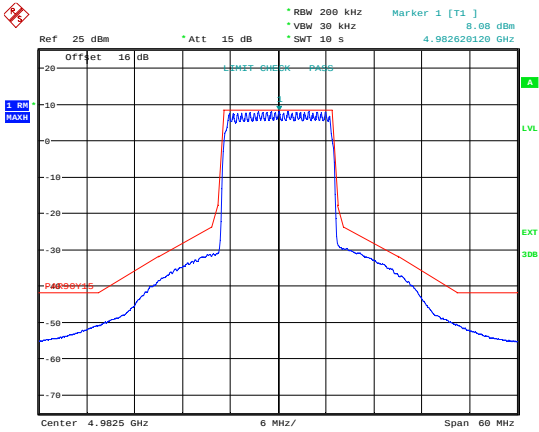
Date: 1.JAN.2003 02:28:11

Emission Mask 256 QAM; MIMO A; 4965 MHz.



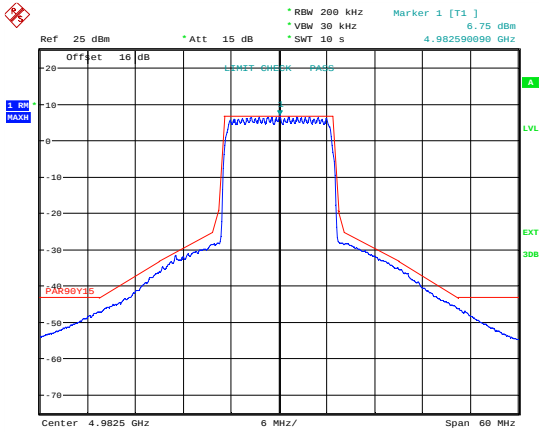
Date: 1.JAN.2003 02:44:09

Emission Mask 256 QAM; MIMO B; 4965 MHz.



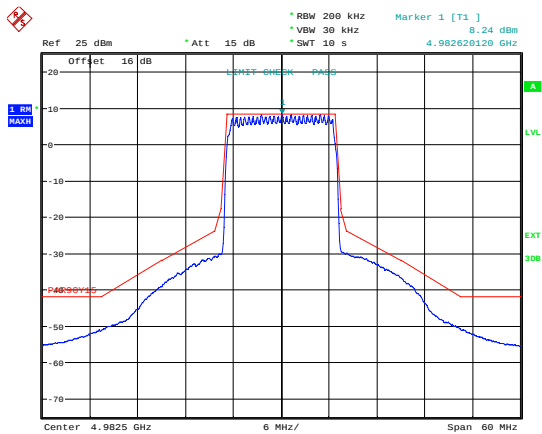
Date: 3.JAN.2003 00:49:01

Emission Mask QPSK; MIMO A; 4982.5 MHz.



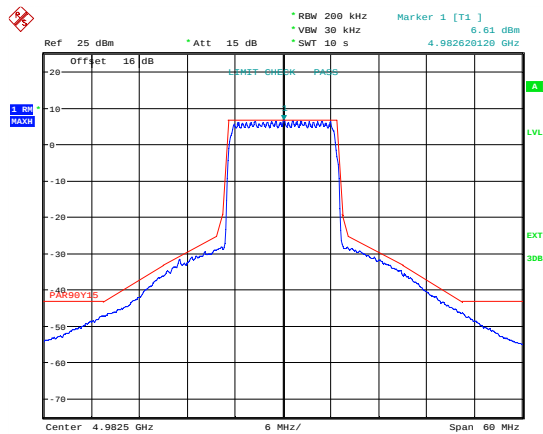
Date: 3.JAN.2003 00:55:59

Emission Mask QPSK; MIMO B; 4982.5 MHz.



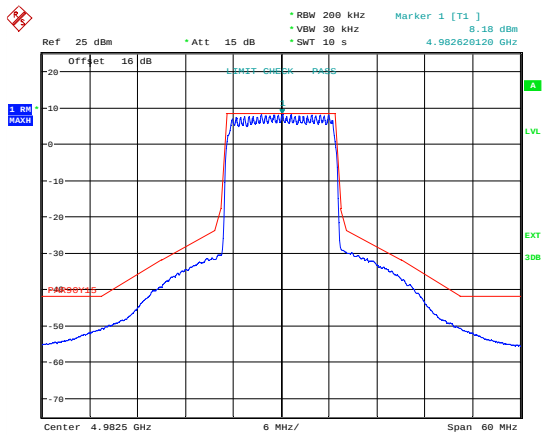
Date: 3.JAN.2003 00:49:48

Emission Mask 16 QAM; MIMO A; 4982.5 MHz.



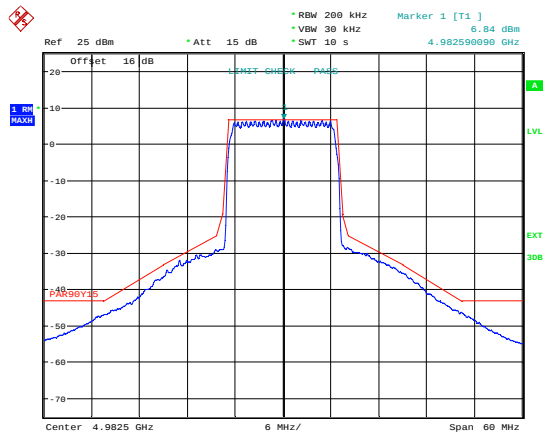
Date: 3.JAN.2003 00:56:50

Emission Mask 16 QAM; MIMO B; 4982.5 MHz.



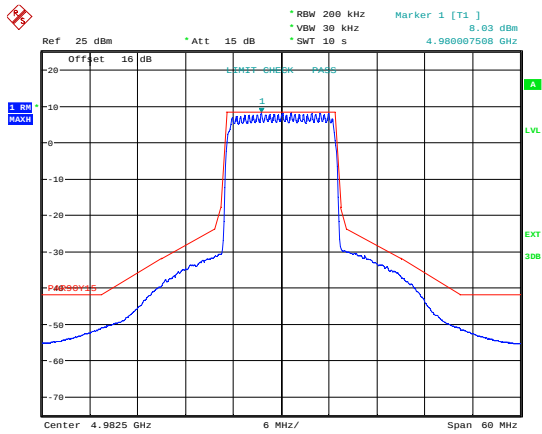
Date: 3.JAN.2003 00:51:52

Emission Mask 64 QAM; MIMO A; 4982.5 MHz.



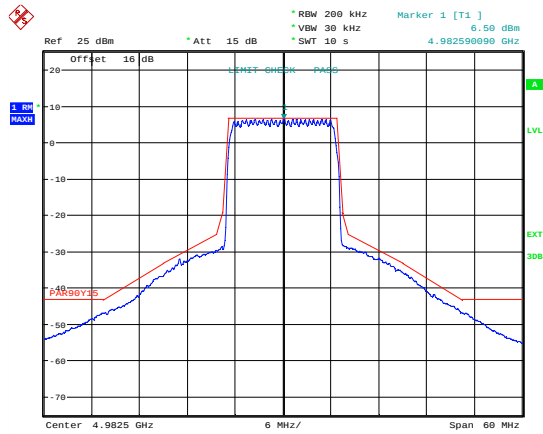
Date: 3.JAN.2003 00:57:52

Emission Mask 64 QAM; MIMO B; 4982.5 MHz.



Date: 3.JAN.2003 00:51:11

Emission Mask 256 QAM; MIMO A; 4982.5 MHz.

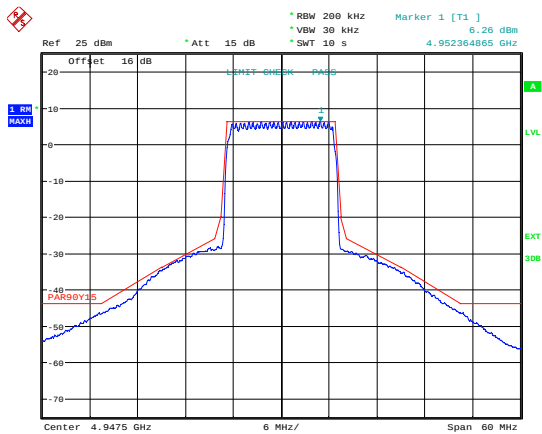


Date: 3.JAN.2003 00:58:32

Emission Mask 256 QAM; MIMO B; 4982.5 MHz.

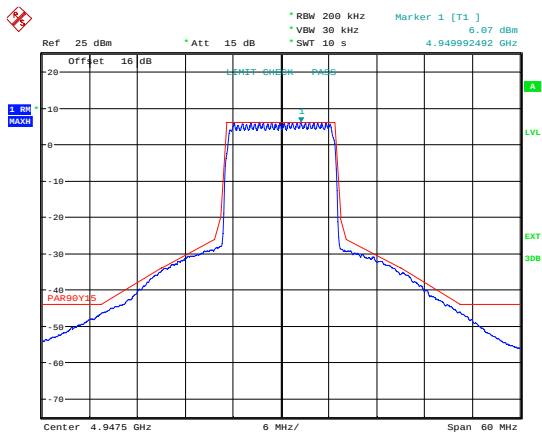
GUI Power settings 15 MHz Bandwidth MuMIMO				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	47.5	47.5	47.5
16QAM		47.5	47.5	47.5
64QAM		47.5	47.5	47.5
256QAM		47.5	47.5	47.5
QPSK	B	46	46.4	46
16QAM		46	46.4	46
64QAM		46	46.4	46
256QAM		46	46.4	46

Sector 15 MHz Emission Mask



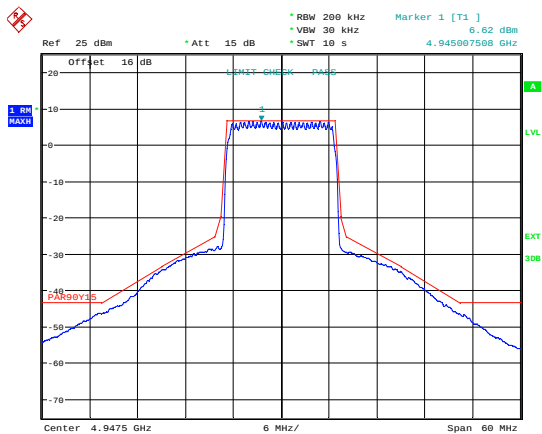
Date: 2.JAN.2003 23:15:19

Emission Mask QPSK; MIMO A; 4947.5 MHz.



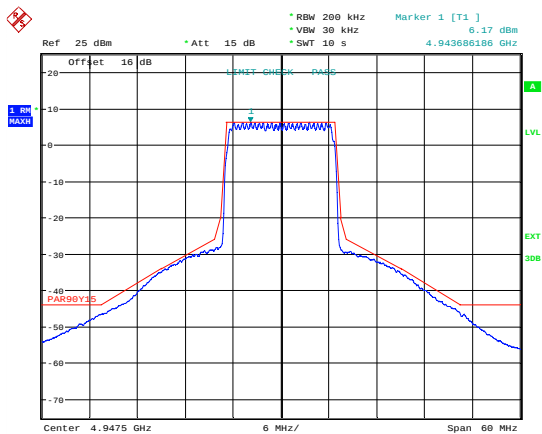
Date: 2.JAN.2003 23:21:49

Emission Mask QPSK; MIMO B; 4947.5 MHz.



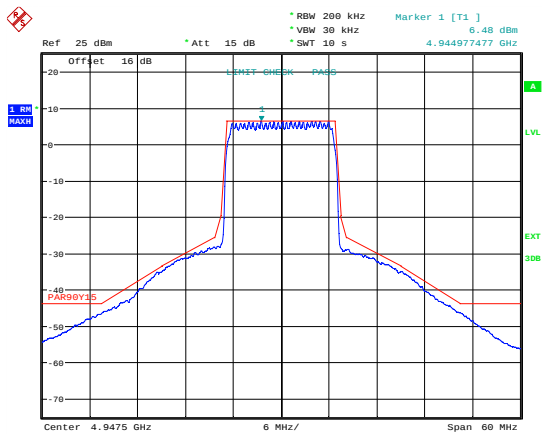
Date: 2.JAN.2003 23:16:16

Emission Mask 16 QAM; MIMO A; 4947.5 MHz.



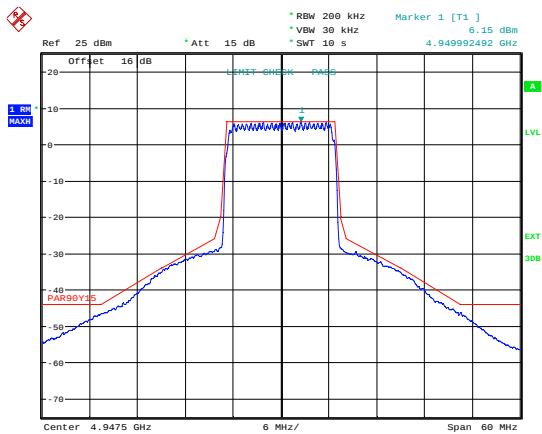
Date: 2.JAN.2003 23:22:23

Emission Mask 16 QAM; MIMO B; 4947.5 MHz.



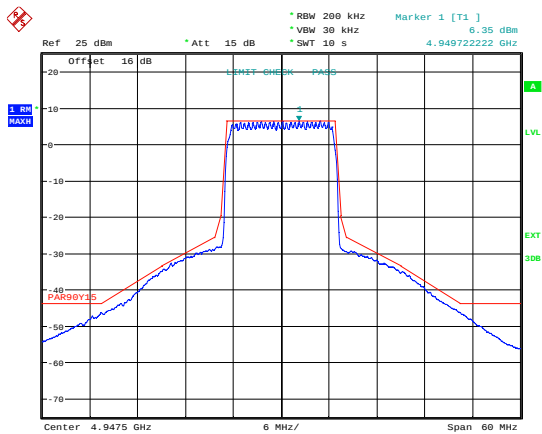
Date: 2.JAN.2003 23:17:36

Emission Mask 64 QAM; MIMO A; 4947.5 MHz.

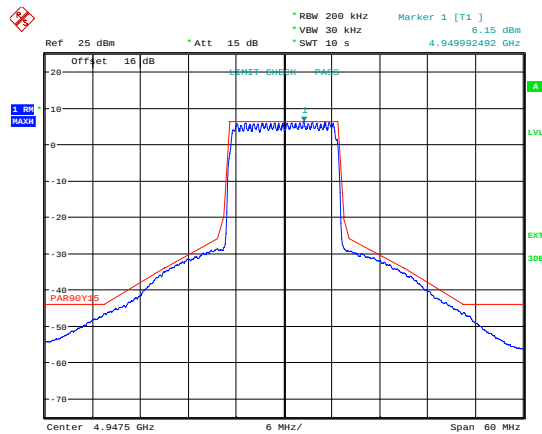


Date: 2.JAN.2003 23:23:02

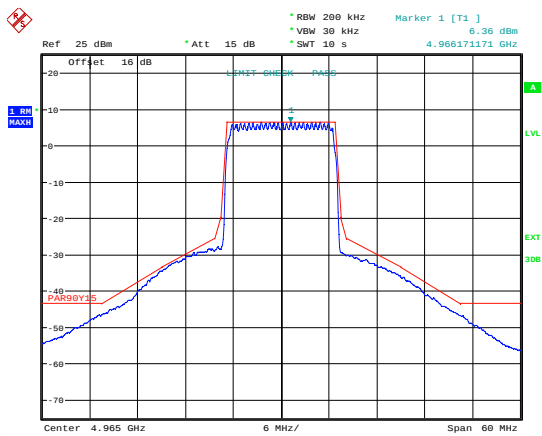
Emission Mask 64 QAM; MIMO B; 4947.5 MHz.



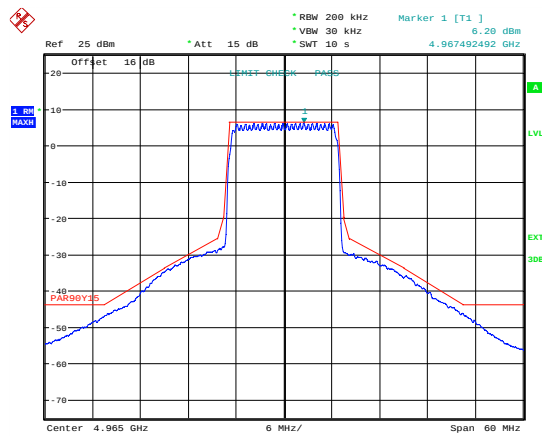
Emission Mask 256 QAM; MIMO A; 4947.5 MHz.



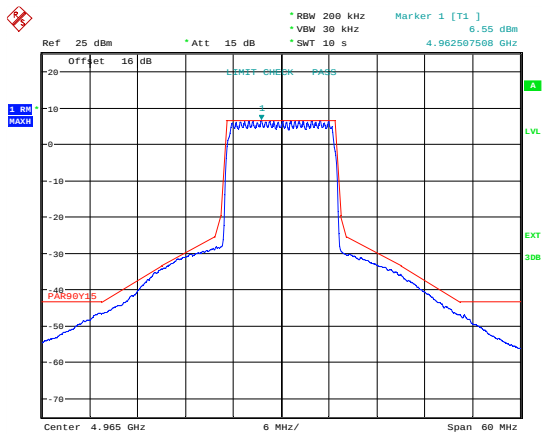
Emission Mask 256 QAM; MIMO B; 4947.5 MHz.



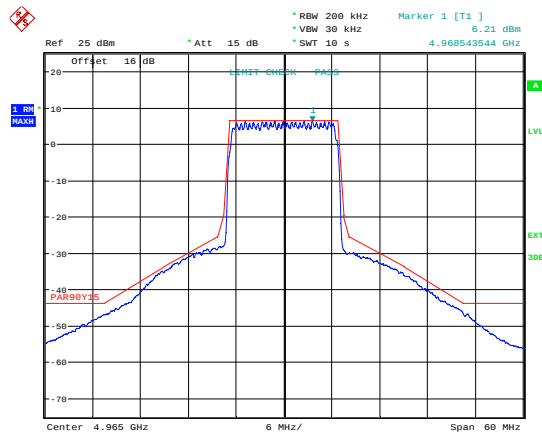
Emission Mask QPSK; MIMO A; 4965 MHz.



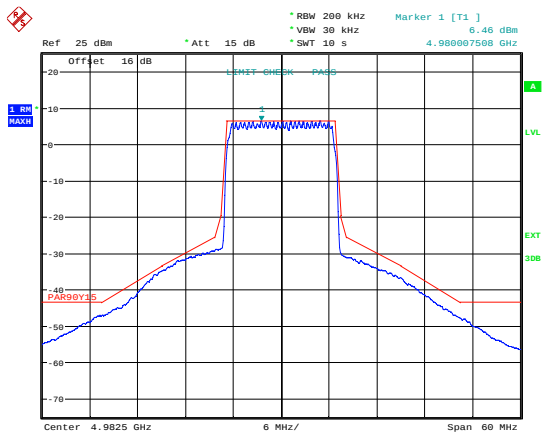
Emission Mask QPSK; MIMO B; 4965 MHz.



Emission Mask 16 QAM; MIMO A; 4965 MHz.

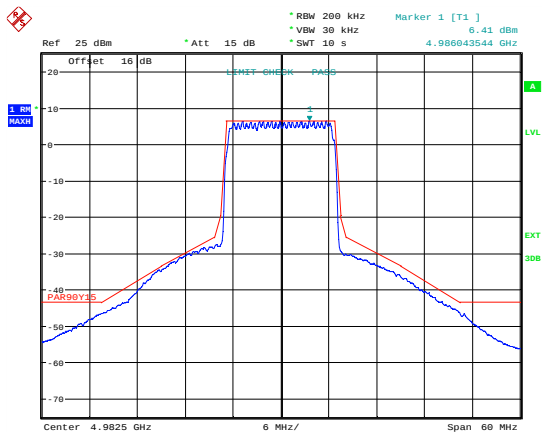


Emission Mask 16 QAM; MIMO B; 4965 MHz.



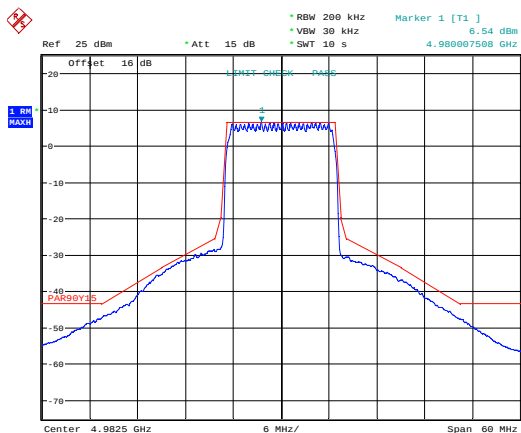
Date: 2.JAN.2003 23:44:47

Emission Mask 16 QAM; MIMO A; 4982.5 MHz.



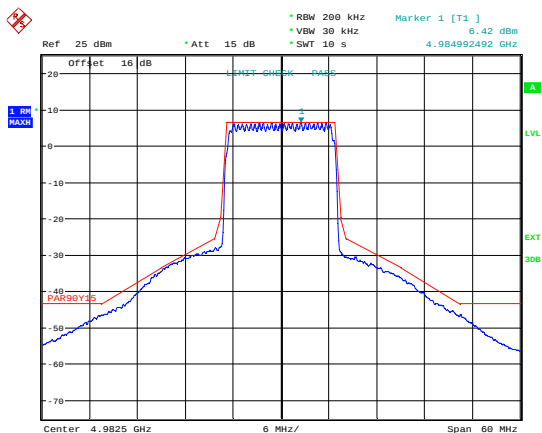
Date: 2.JAN.2003 23:50:38

Emission Mask 16 QAM; MIMO B; 4982.5 MHz.



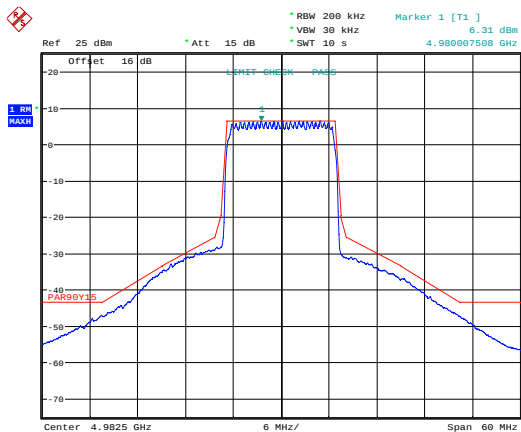
Date: 2.JAN.2003 23:45:33

Emission Mask 64 QAM; MIMO A; 4982.5 MHz.



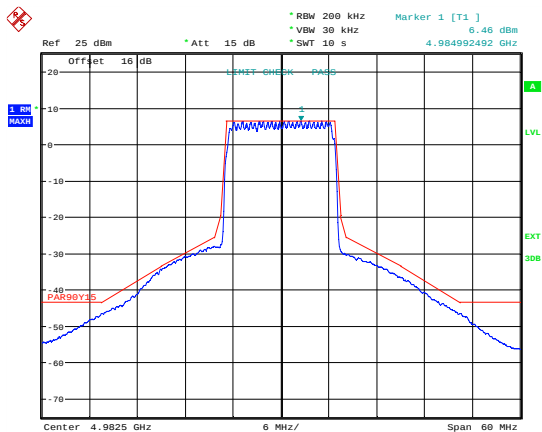
Date: 2.JAN.2003 23:51:31

Emission Mask 64 QAM; MIMO B; 4982.5 MHz.



Date: 2.JAN.2003 23:46:14

Emission Mask 256 QAM; MIMO A; 4982.5 MHz.

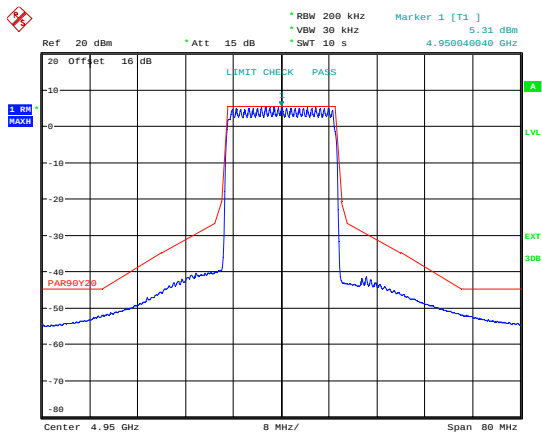


Date: 2.JAN.2003 23:52:13

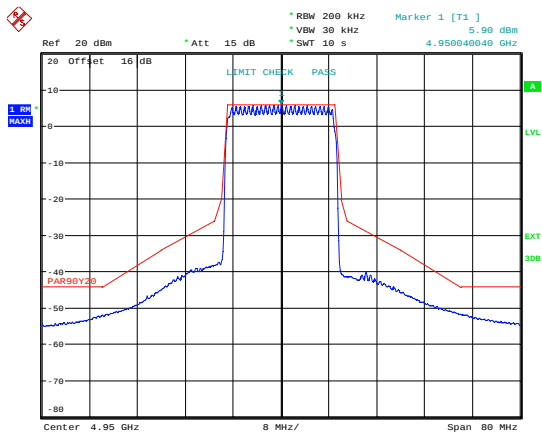
Emission Mask 256 QAM; MIMO B; 4982.5 MHz.

GUI Power settings 15 MHz Bandwidth Sector				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	41.4	41.6	41.6
16QAM		41.4	41.6	41.6
64QAM		41.4	41.6	41.6
256QAM		41.4	41.6	41.6
QPSK	B	41.4	41.6	41.8
16QAM		41.4	41.6	41.8
64QAM		41.4	41.6	41.8
256QAM		41.4	41.6	41.8

Beamforming 20 MHz Emission Mask

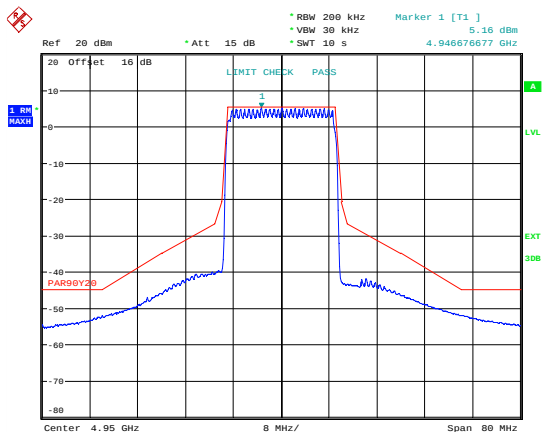


Date: 3.JAN.2003 15:26:47

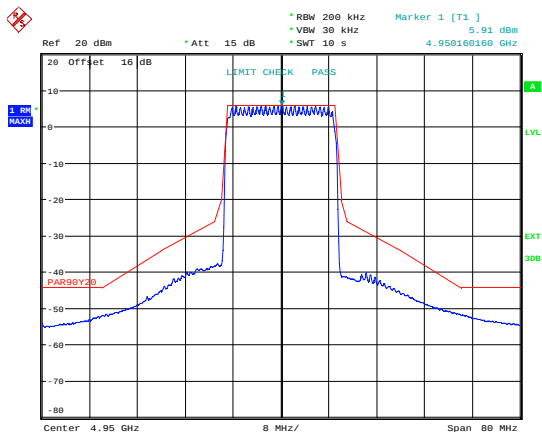


Date: 3.JAN.2003 15:24:49

Emission Mask QPSK; MIMO A; 4950 MHz.

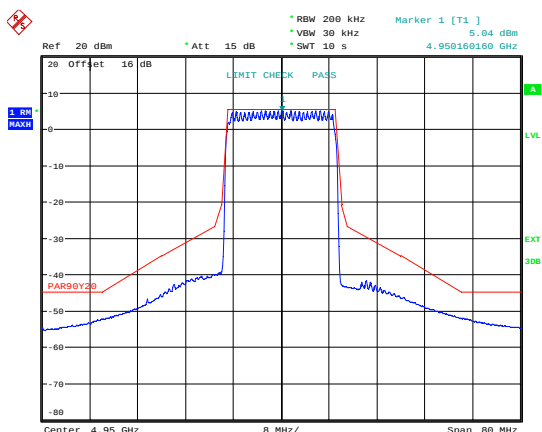


Date: 3.JAN.2003 15:27:37

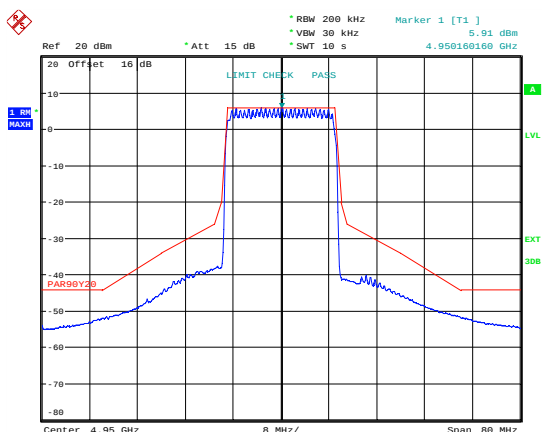


Date: 3.JAN.2003 15:22:50

Emission Mask 16 QAM; MIMO A; 4950 MHz.

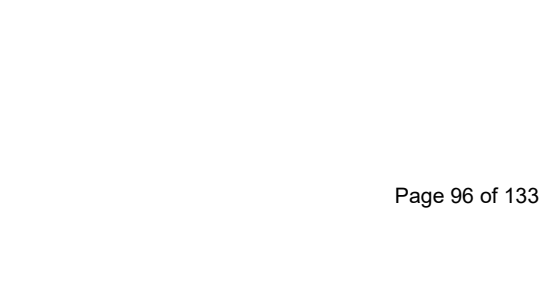


Date: 3.JAN.2003 15:28:24

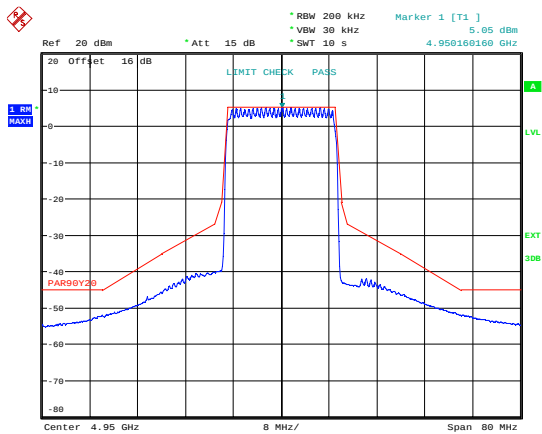


Date: 3.JAN.2003 15:22:50

Emission Mask 64 QAM; MIMO A; 4950 MHz.

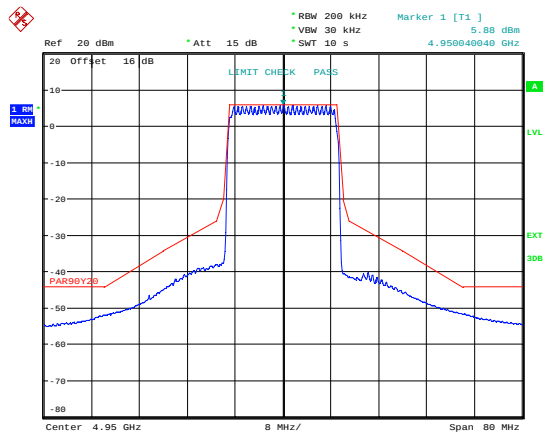


Date: 3.JAN.2003 15:22:50



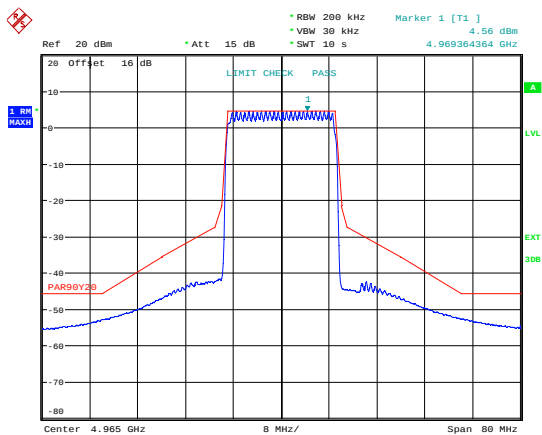
Date: 3.JAN.2003 15:29:23

Emission Mask 256 QAM; MIMO A; 4950 MHz.



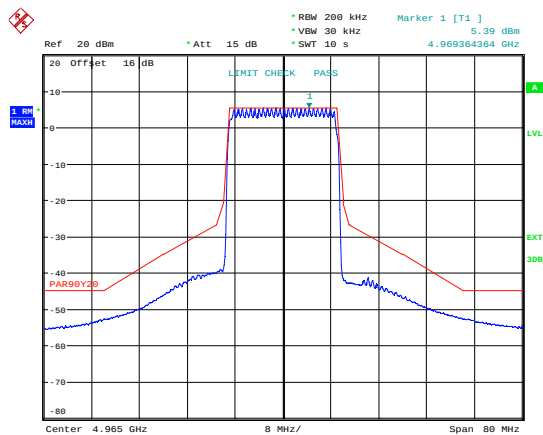
Date: 3.JAN.2003 15:21:48

Emission Mask 256 QAM; MIMO B; 4950 MHz.



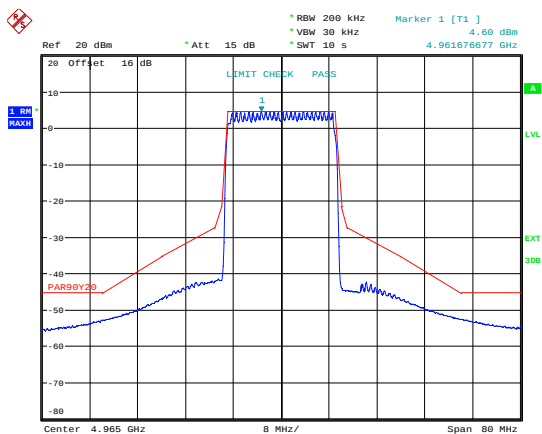
Date: 3.JAN.2003 15:09:56

Emission Mask QPSK; MIMO A; 4965 MHz.



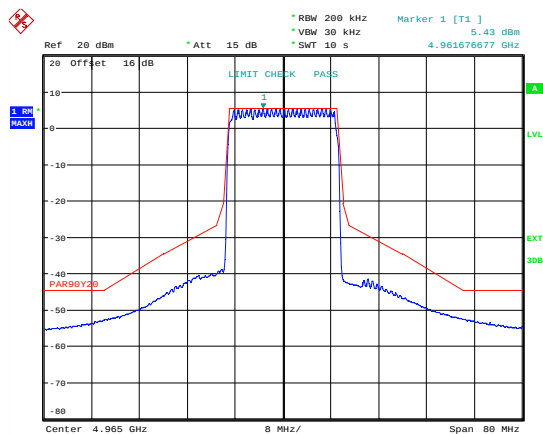
Date: 3.JAN.2003 15:14:09

Emission Mask QPSK; MIMO B; 4965 MHz.



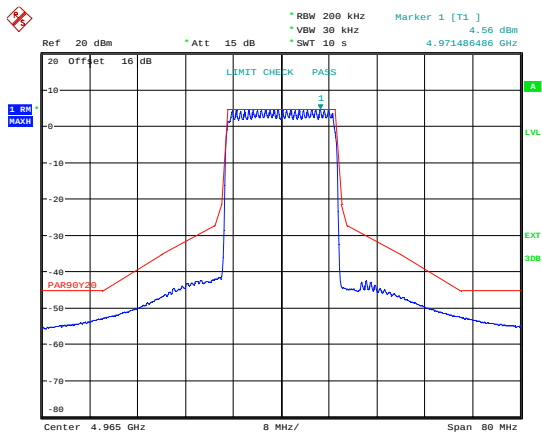
Date: 3.JAN.2003 15:11:05

Emission Mask 16 QAM; MIMO A; 4965 MHz.



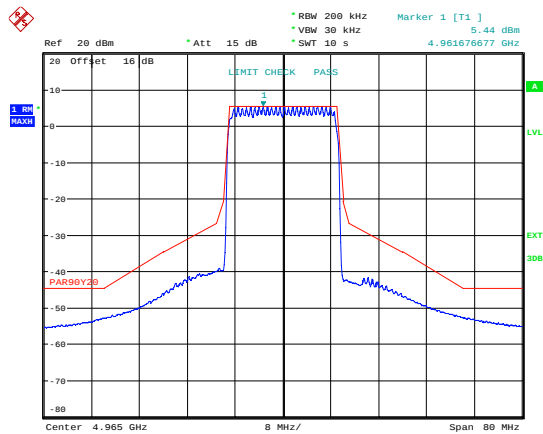
Date: 3.JAN.2003 15:15:37

Emission Mask 16 QAM; MIMO B; 4965 MHz.



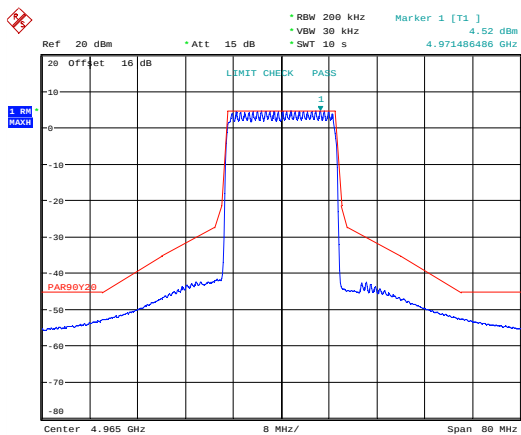
Date: 3.JAN.2003 15:11:58

Emission Mask 64 QAM; MIMO A; 4965 MHz.



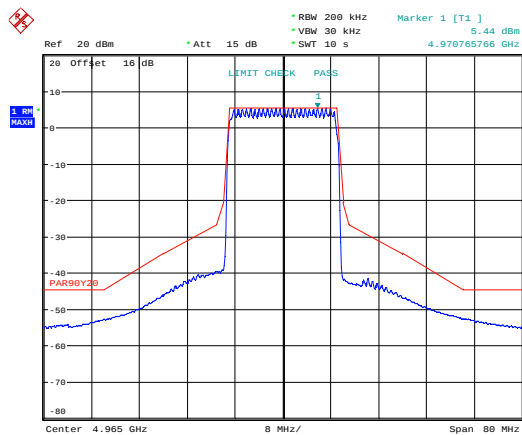
Date: 3.JAN.2003 15:17:49

Emission Mask 64 QAM; MIMO B; 4965 MHz.



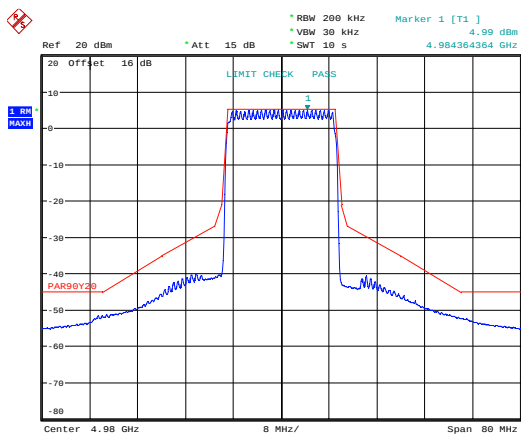
Date: 3.JAN.2003 15:12:49

Emission Mask 256 QAM; MIMO A; 4965 MHz.



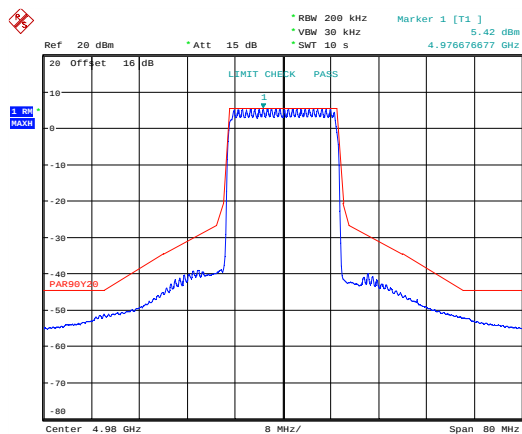
Date: 3.JAN.2003 15:18:52

Emission Mask 256 QAM; MIMO B; 4965 MHz.



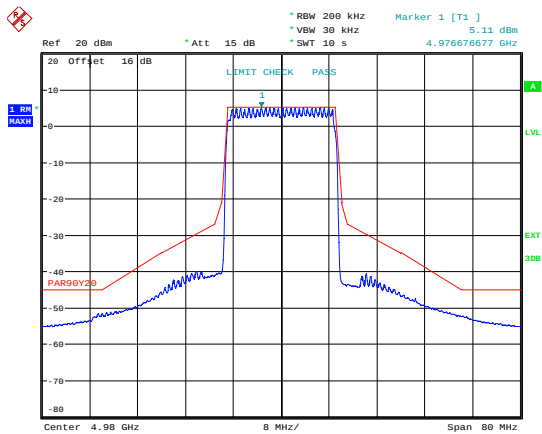
Date: 3.JAN.2003 14:50:12

Emission Mask QPSK; MIMO A; 4980 MHz.



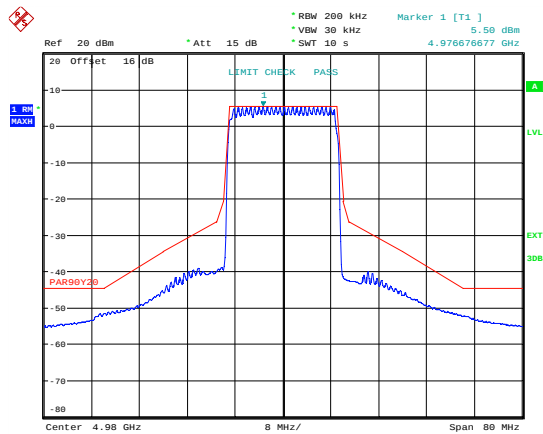
Date: 3.JAN.2003 14:54:42

Emission Mask QPSK; MIMO B; 4980 MHz.



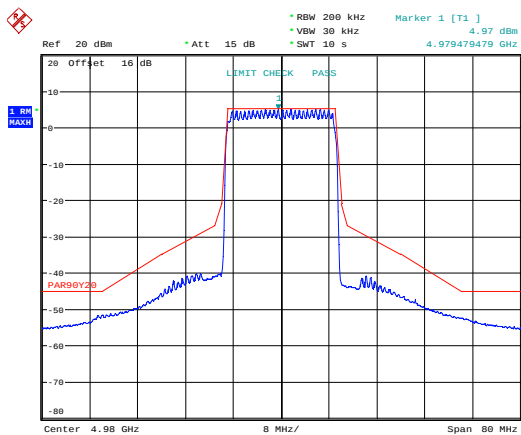
Date: 3.JAN.2003 14:51:11

Emission Mask 16 QAM; MIMO A; 4980 MHz.



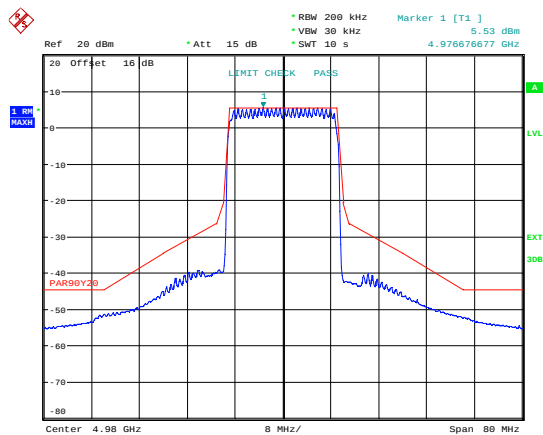
Date: 3.JAN.2003 14:56:54

Emission Mask 16 QAM; MIMO B; 4980 MHz.



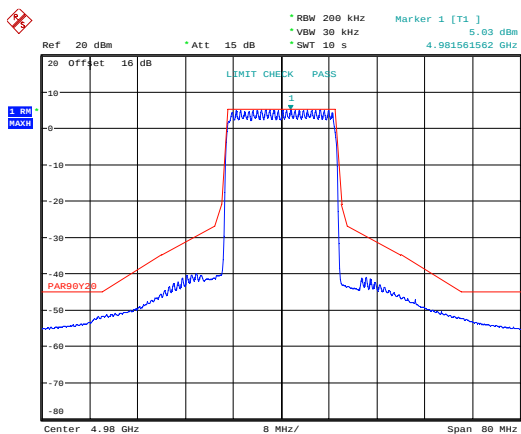
Date: 3.JAN.2003 14:52:24

Emission Mask 64 QAM; MIMO A; 4980 MHz.



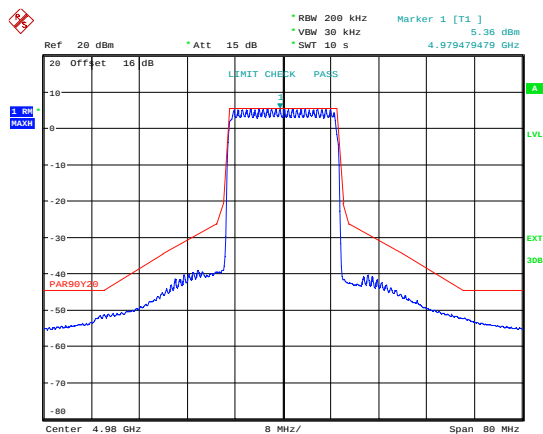
Date: 3.JAN.2003 14:58:01

Emission Mask 64 QAM; MIMO B; 4980 MHz.



Date: 3.JAN.2003 14:53:17

Emission Mask 256 QAM; MIMO A; 4980 MHz.

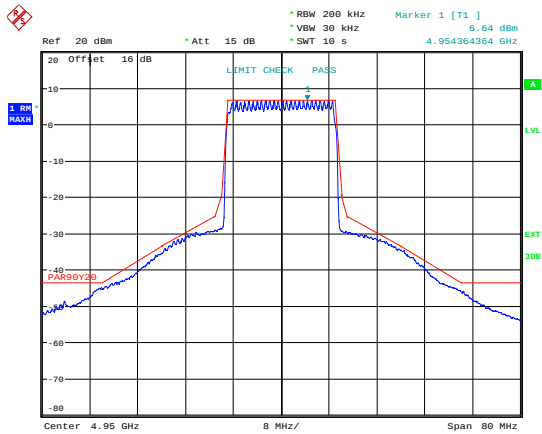


Date: 3.JAN.2003 14:58:52

Emission Mask 256 QAM; MIMO B; 4980 MHz.

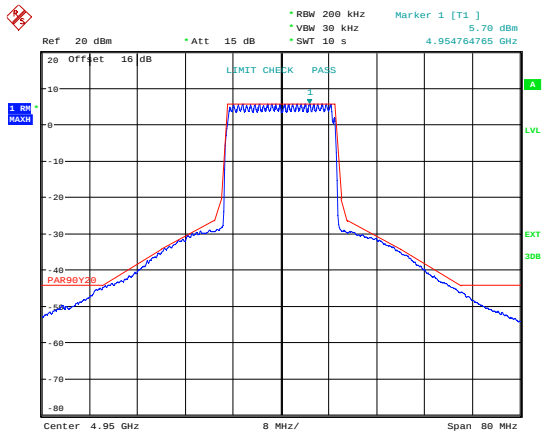
GUI Power settings 20 MHz Bandwidth Beamforming				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	45.5	45.5	45.5
16QAM		45.5	45.5	45.5
64QAM		45.5	45.5	45.5
256QAM		45.5	45.5	45.5
QPSK	B	45.5	45.5	45.5
16QAM		45.5	45.5	45.5
64QAM		45.5	45.5	45.5
256QAM		45.5	45.5	45.5

MuMIMO 20 MHz Emission Mask



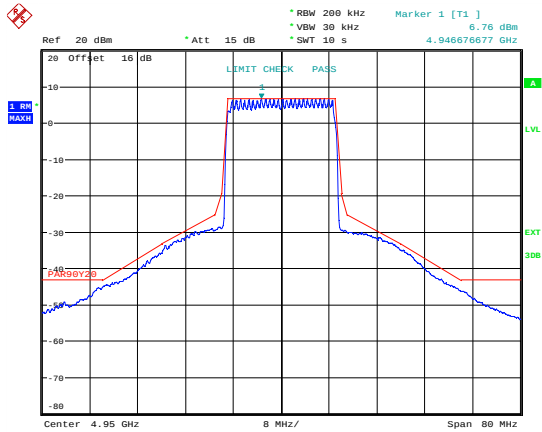
Date: 3.JAN.2003 15:44:33

Emission Mask QPSK; MIMO A; 4950 MHz.



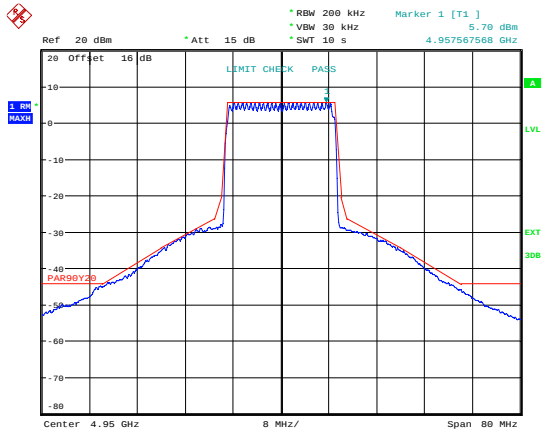
Date: 3.JAN.2003 15:54:48

Emission Mask QPSK; MIMO B; 4950 MHz.



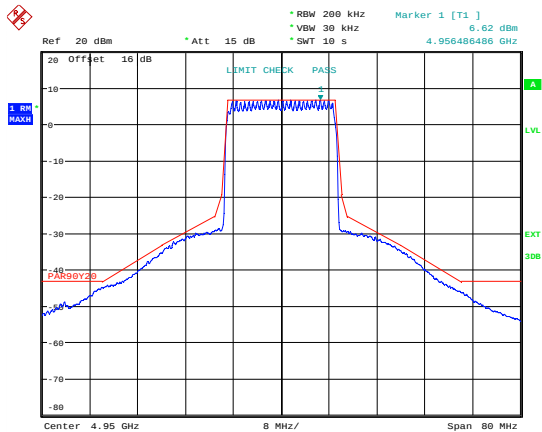
Date: 3.JAN.2003 15:45:43

Emission Mask 16 QAM; MIMO A; 4950 MHz.



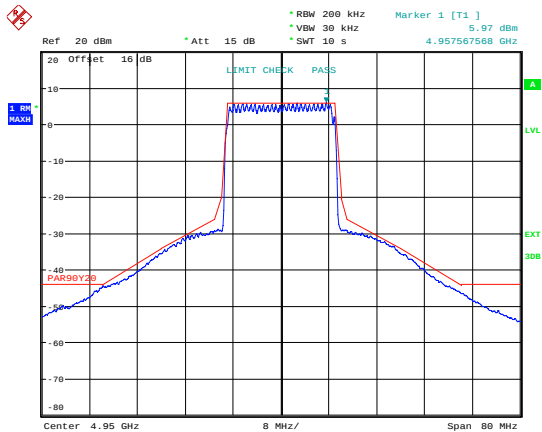
Date: 3.JAN.2003 15:51:22

Emission Mask 16 QAM; MIMO B; 4950 MHz.



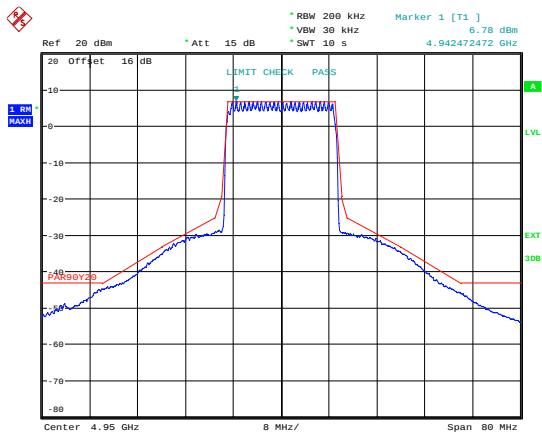
Date: 3.JAN.2003 15:46:25

Emission Mask 64 QAM; MIMO A; 4950 MHz.



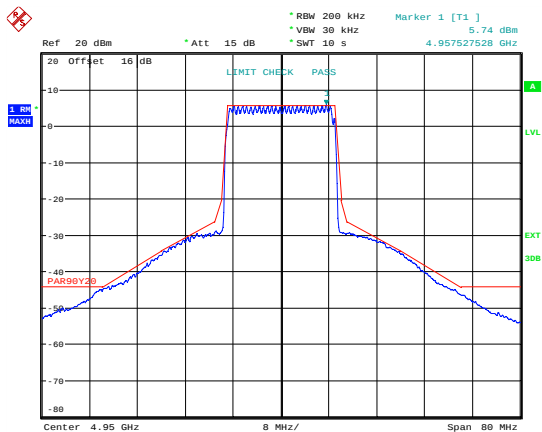
Date: 3.JAN.2003 15:56:39

Emission Mask 64 QAM; MIMO B; 4950 MHz.



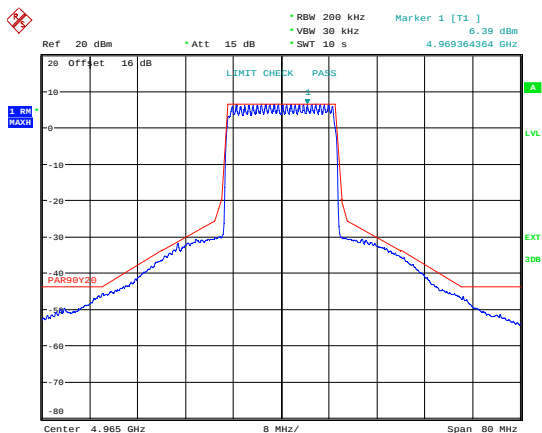
Date: 3.JAN.2003 15:48:43

Emission Mask 256 QAM; MIMO A; 4950 MHz.



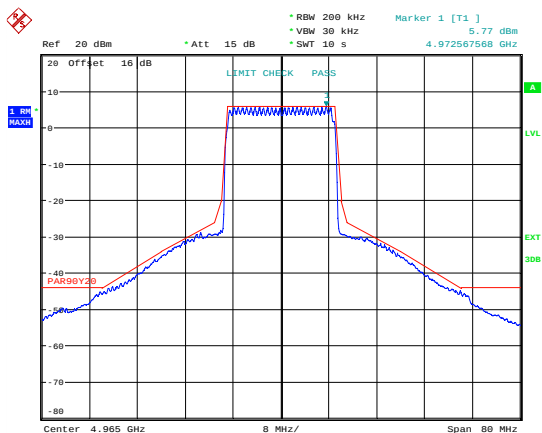
Date: 3.JAN.2003 15:58:33

Emission Mask 256 QAM; MIMO B; 4950 MHz.



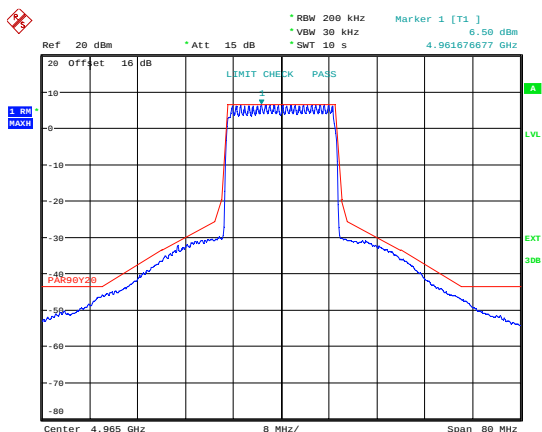
Date: 3.JAN.2003 16:12:59

Emission Mask QPSK; MIMO A; 4965 MHz.



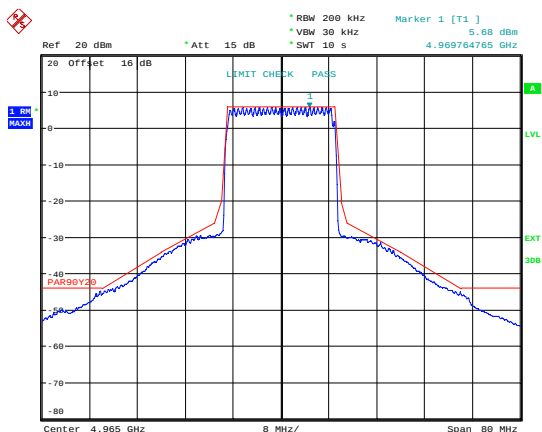
Date: 3.JAN.2003 16:11:35

Emission Mask QPSK; MIMO B; 4965 MHz.



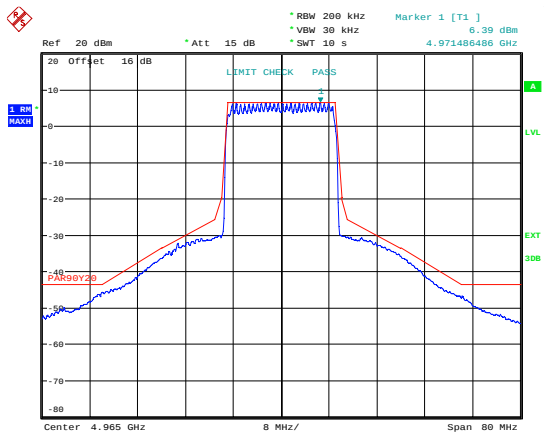
Date: 3.JAN.2003 16:18:47

Emission Mask 16 QAM; MIMO A; 4965 MHz.



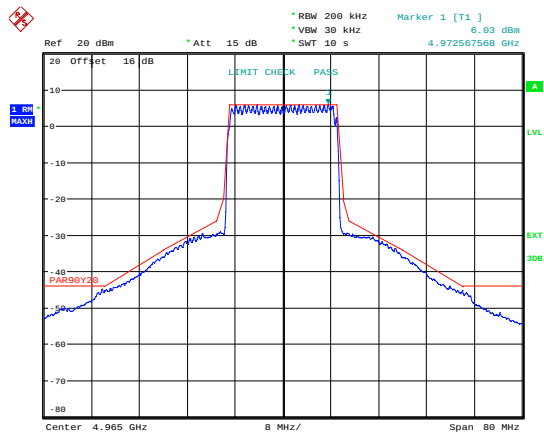
Date: 3.JAN.2003 16:10:38

Emission Mask 16 QAM; MIMO B; 4965 MHz.



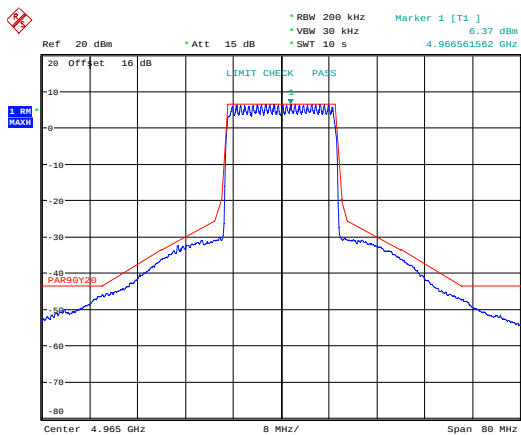
Date: 3.JAN.2003 16:19:38

Emission Mask 64 QAM; MIMO A; 4965 MHz.



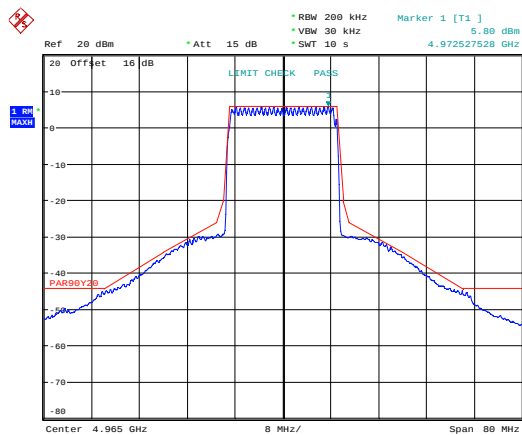
Date: 3.JAN.2003 16:09:46

Emission Mask 64 QAM; MIMO B; 4965 MHz.



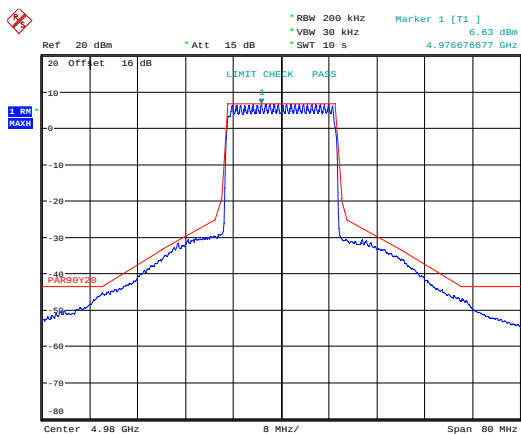
Date: 3.JAN.2003 16:20:35

Emission Mask 256 QAM; MIMO A; 4965 MHz.



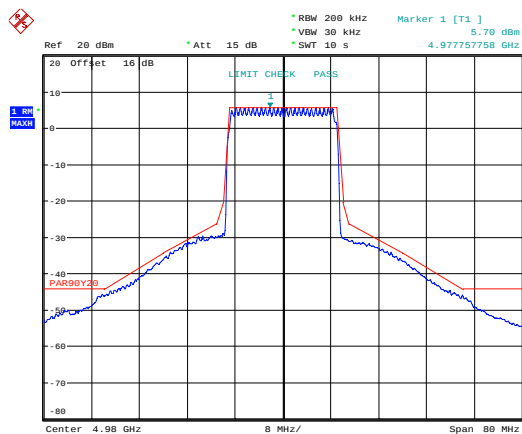
Date: 3.JAN.2003 16:08:12

Emission Mask 256 QAM; MIMO B; 4965 MHz.



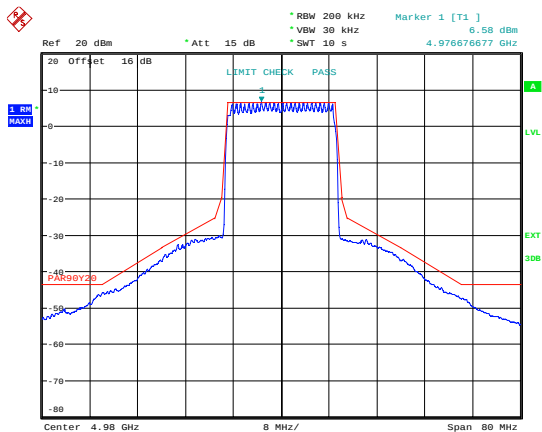
Date: 3.JAN.2003 16:33:16

Emission Mask QPSK; MIMO A; 4980 MHz.



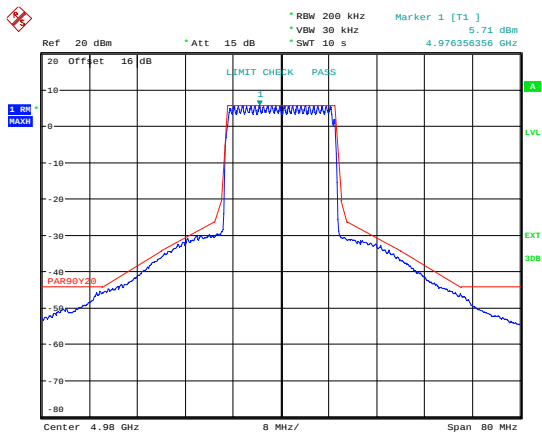
Date: 3.JAN.2003 16:39:45

Emission Mask QPSK; MIMO B; 4980 MHz.



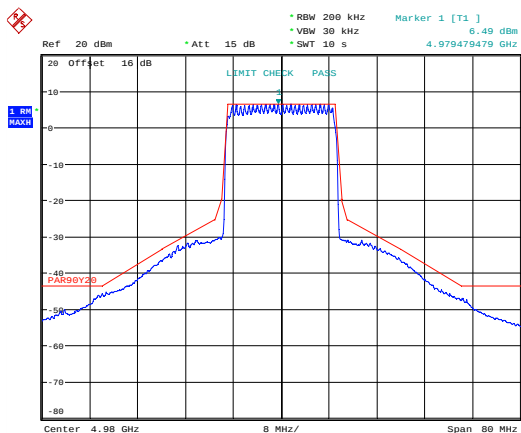
Date: 3.JAN.2003 16:34:23

Emission Mask 16 QAM; MIMO A; 4980 MHz.



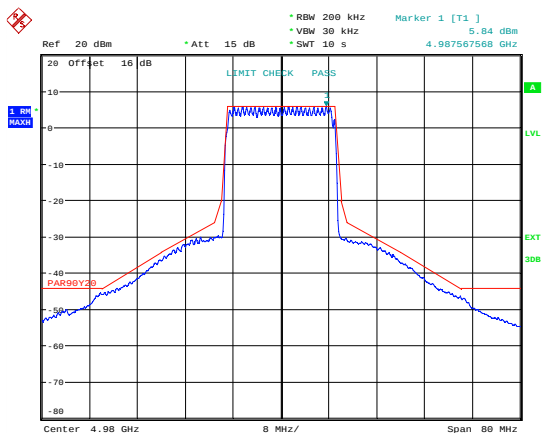
Date: 3.JAN.2003 16:40:55

Emission Mask 16 QAM; MIMO B; 4980 MHz.



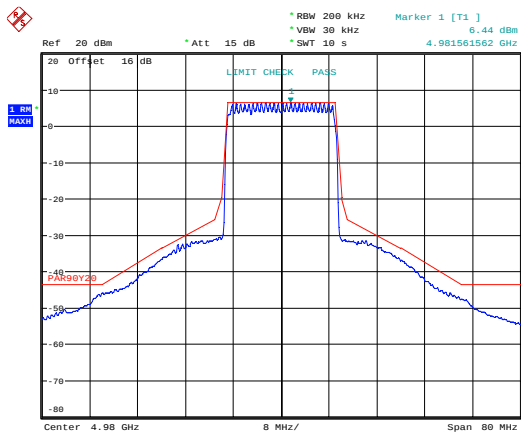
Date: 3.JAN.2003 16:35:11

Emission Mask 64 QAM; MIMO A; 4980 MHz.



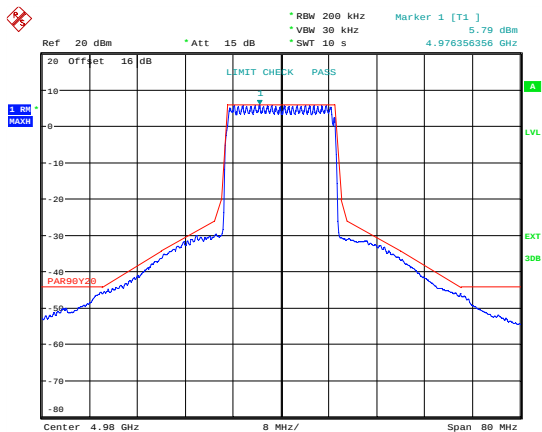
Date: 3.JAN.2003 16:41:55

Emission Mask 64 QAM; MIMO B; 4980 MHz.



Date: 3.JAN.2003 16:36:04

Emission Mask 256 QAM; MIMO A; 4980 MHz.

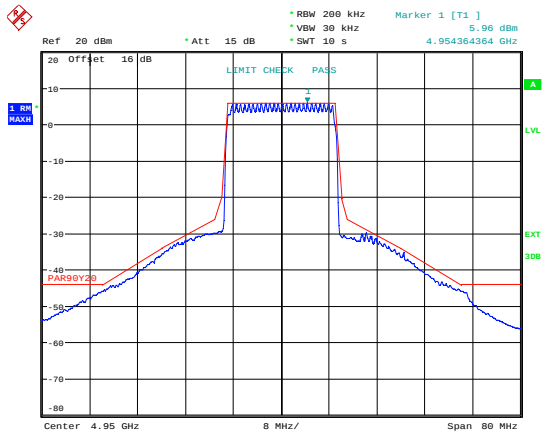


Date: 3.JAN.2003 16:43:08

Emission Mask 256 QAM; MIMO B; 4980 MHz.

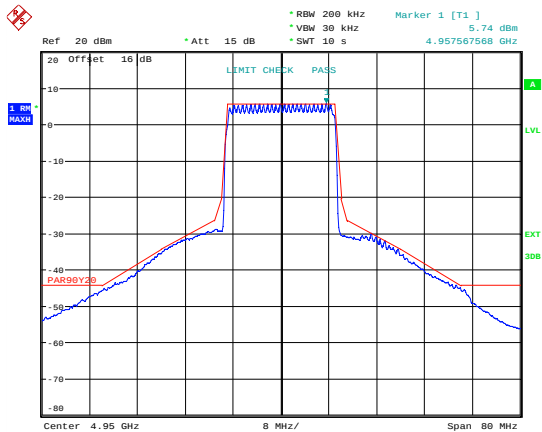
GUI Power settings 20 MHz Bandwidth MuMIMO				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	47	47	47
16QAM		47	47	47
64QAM		47	47	47
256QAM		47	47	47
QPSK	B	46	46	46
16QAM		46	46	46
64QAM		46	46	46
256QAM		46	46	46

Sector 20 MHz Emission Mask



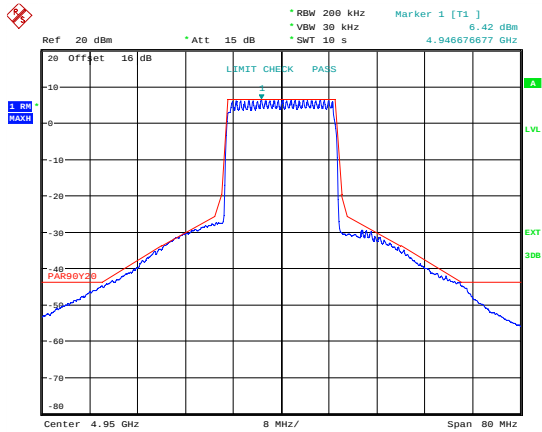
Date: 3.JAN.2003 12:11:47

Emission Mask QPSK; MIMO A; 4950 MHz.



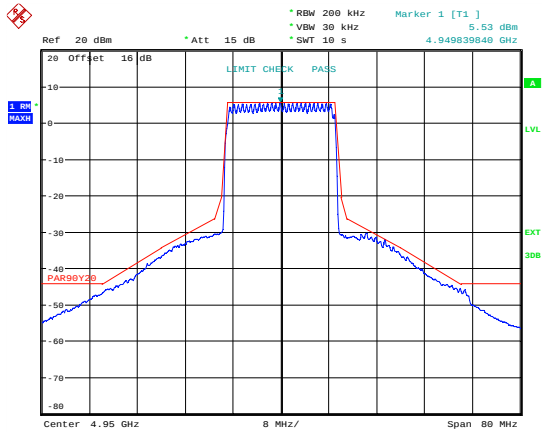
Date: 3.JAN.2003 12:23:23

Emission Mask QPSK; MIMO B; 4950 MHz.



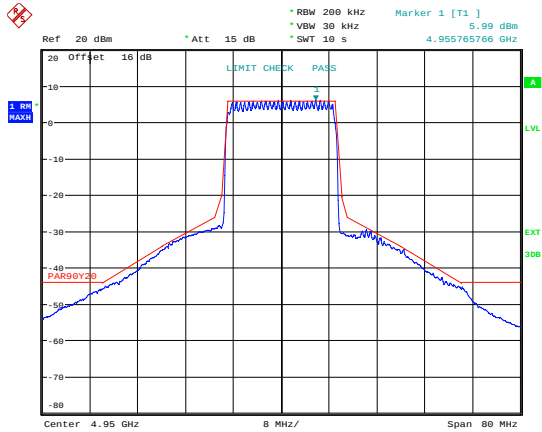
Date: 3.JAN.2003 12:18:39

Emission Mask 16 QAM; MIMO A; 4950 MHz.



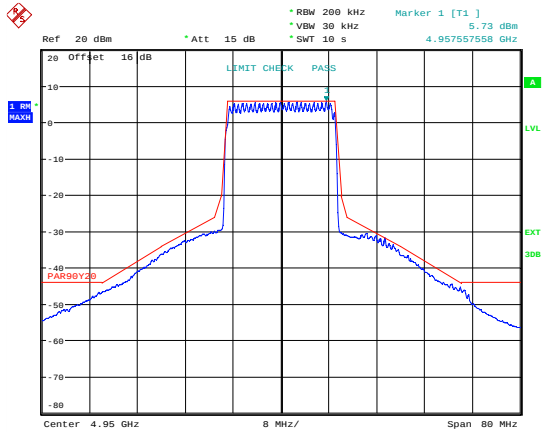
Date: 3.JAN.2003 12:26:26

Emission Mask 16 QAM; MIMO B; 4950 MHz.



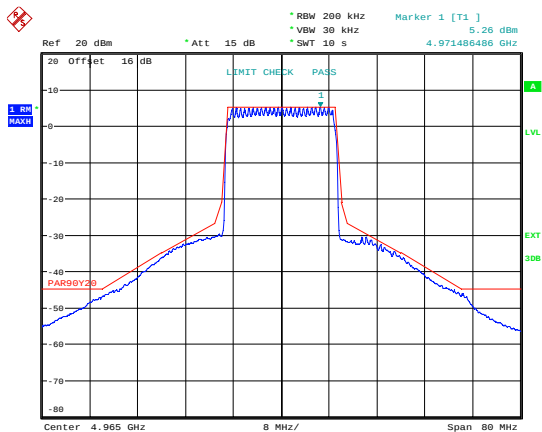
Date: 3.JAN.2003 12:20:40

Emission Mask 64 QAM; MIMO A; 4950 MHz.



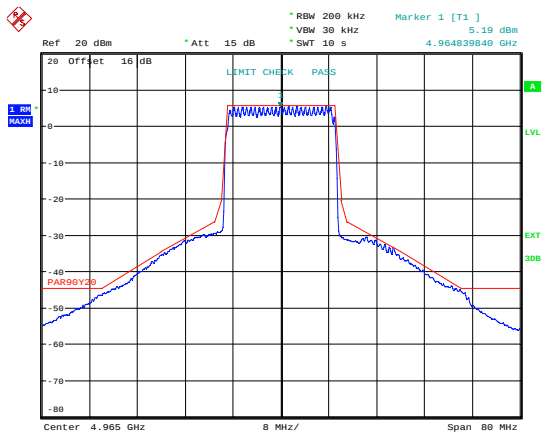
Date: 3.JAN.2003 12:28:55

Emission Mask 64 QAM; MIMO B; 4950 MHz.



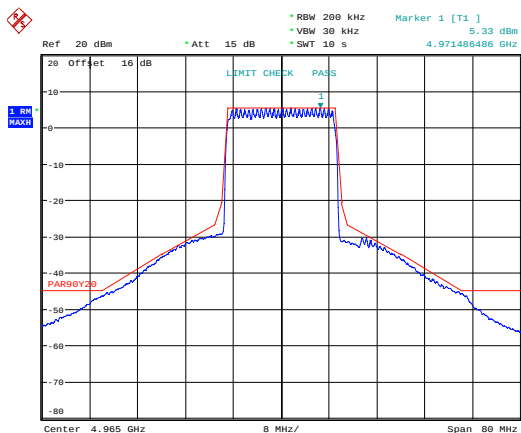
Date: 3.JAN.2003 13:29:40

Emission Mask 64 QAM; MIMO A; 4965 MHz.



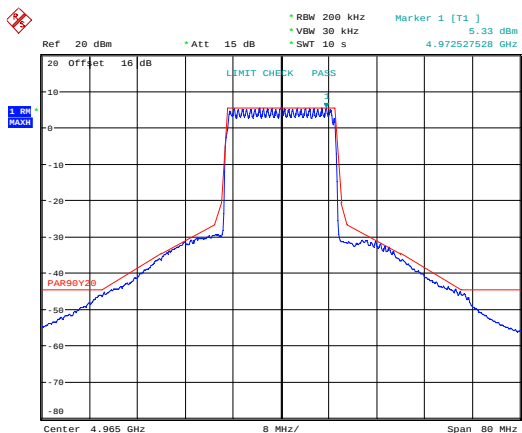
Date: 3.JAN.2003 13:37:26

Emission Mask 64 QAM; MIMO B; 4965 MHz.



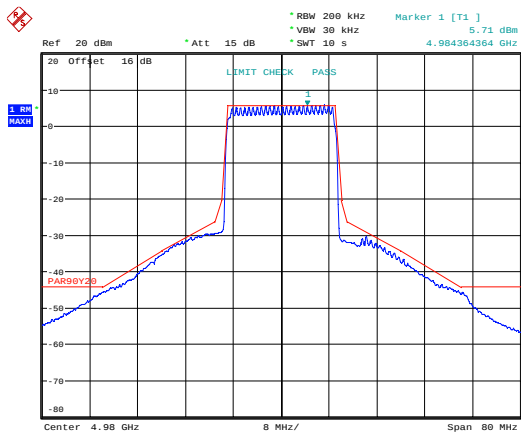
Date: 3.JAN.2003 13:33:05

Emission Mask 256 QAM; MIMO A; 4965 MHz.



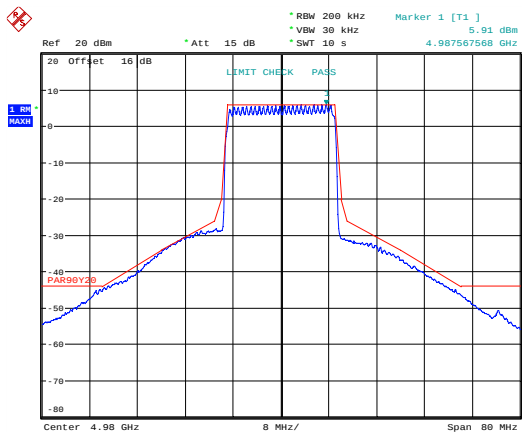
Date: 3.JAN.2003 13:42:28

Emission Mask 256 QAM; MIMO B; 4965 MHz.



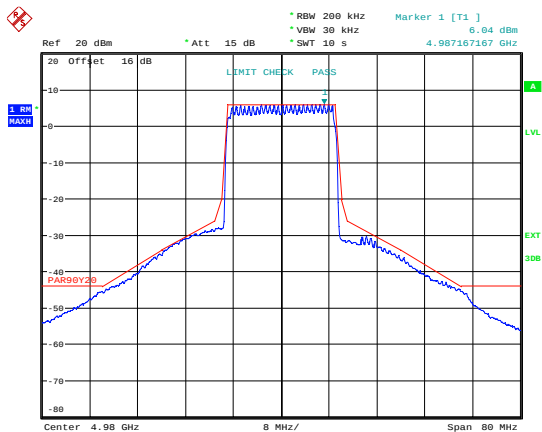
Date: 3.JAN.2003 13:47:40

Emission Mask QPSK; MIMO A; 4980 MHz.



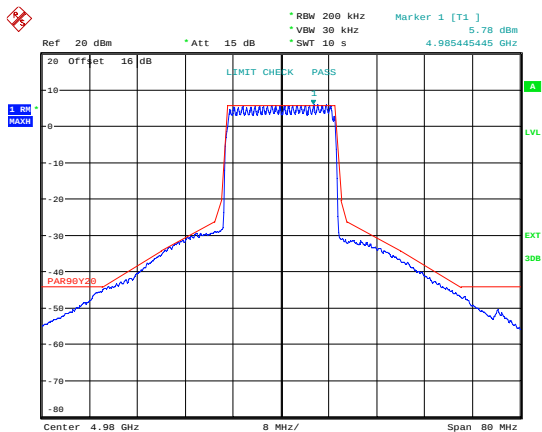
Date: 3.JAN.2003 14:14:05

Emission Mask QPSK; MIMO B; 4980 MHz.



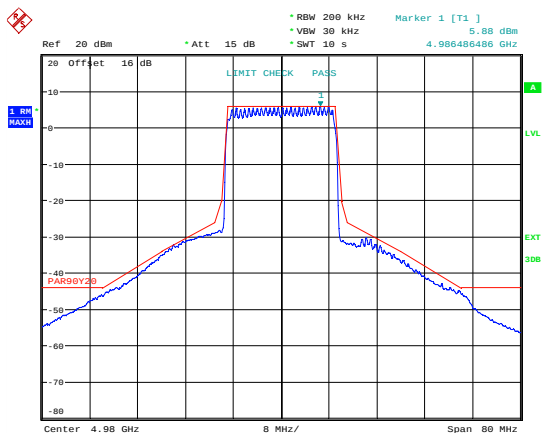
Date: 3.JAN.2003 13:51:31

Emission Mask 16 QAM; MIMO A; 4980 MHz.



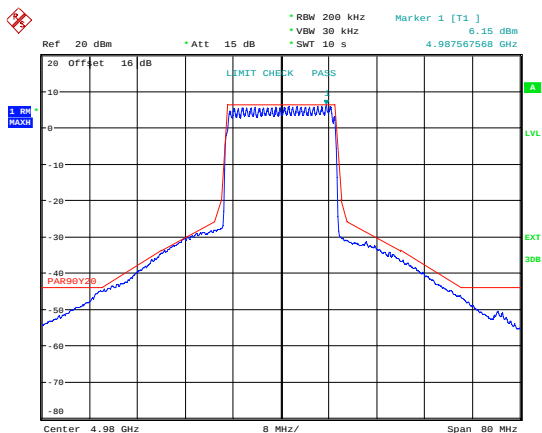
Date: 3.JAN.2003 14:18:57

Emission Mask 16 QAM; MIMO B; 4980 MHz.



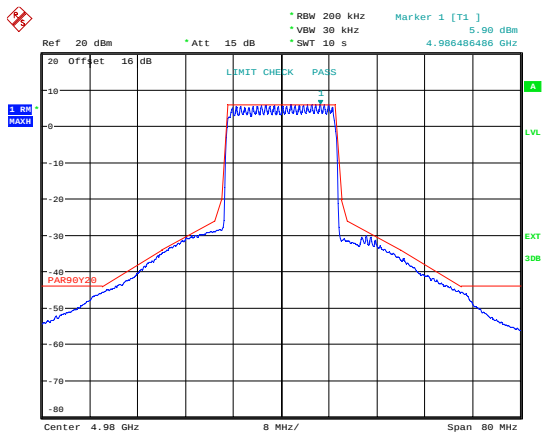
Date: 3.JAN.2003 13:53:40

Emission Mask 64 QAM; MIMO A; 4980 MHz.



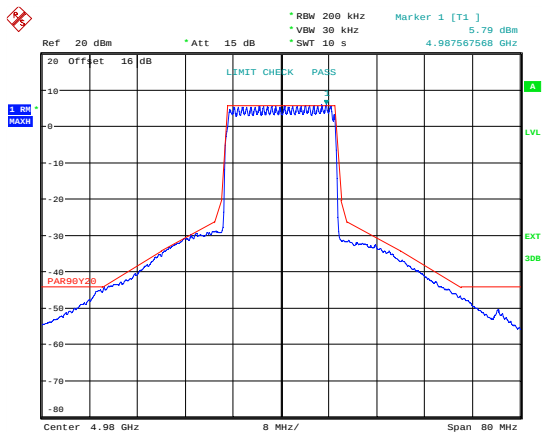
Date: 3.JAN.2003 14:22:14

Emission Mask 64 QAM; MIMO B; 4980 MHz.



Date: 3.JAN.2003 13:57:18

Emission Mask 256 QAM; MIMO A; 4980 MHz.



Date: 3.JAN.2003 14:25:55

Emission Mask 256 QAM; MIMO B; 4980 MHz.

GUI Power settings 20 MHz Bandwidth Sector				
Mod Mode	MIMO	Bottom Channel	Middle Channel	Top Channel
QPSK	A	41	41.2	41.4
16QAM		41.5	41.5	41.6
64QAM		41.2	41.2	41.5
256QAM		41.2	41.3	41.5
QPSK	B	41	41.3	41.5
16QAM		41	41.3	41.5
64QAM		41	41.3	41.6
256QAM		41	41.3	41.5

14 Frequency stability

14.1 Definition

Frequency stability is a measure of frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at an appropriate reference temperature and the rated supply voltage.

14.2 Test Parameters

Test Location:	Element Skelmersdale
Test Chamber:	Blocking Laboratory
Test Standard and Clause:	90.213
Channels / Frequencies Measured:	4942.5 MHz, 4965 MHz and 4987.5 MHz
Modulation:	Off
Deviations From Standard:	None
Temperature Extreme Environment Test Range:	-30 to +50 C
Voltage Extreme Environment Test Range:	Power = $\pm 15\%$ of Nominal;

Environmental Conditions (Normal Environment)

Temperature: 24 °C	Standard Requirement: +20 °C
Humidity: 60 %RH	20 % RH to 75 % RH (as declared)

14.3 Test Limit

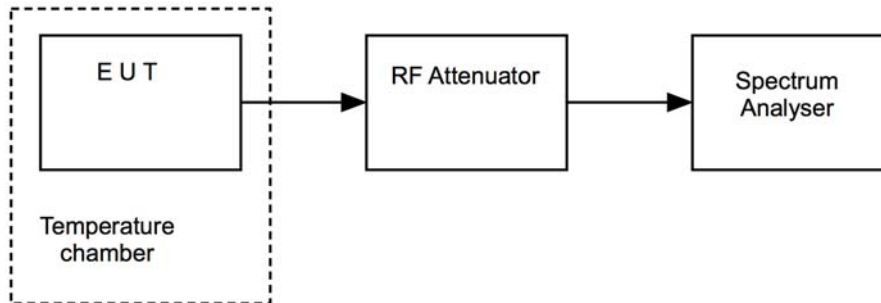
The applicant shall ensure frequency stability by showing that the occupied bandwidth is maintained within the band of operation when tested at the temperature and supply voltage variations.

14.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure v, the frequency was measured under varying conditions of temperature and supply voltage.

The measurements were performed with EUT set in a CW mode of operation.

Figure v Test Setup



14.5 Test Equipment

Equipment Type	Manufacturer	Equipment Description	Element No	Due For Calibration
FSU26	R&S	Spectrum Analyser	REF909	2020-06-21
34405a	Agilent	Multimeter	REF976	2019-11-19
52 Series II	Fluke	Temperature Indicator	L426	2020-06-28

14.6 Test Results

EUT Frequency: 4942.5 MHz				
Test Environment		Measured Frequency (MHz)	Frequency error (kHz)	Drift (ppm)
-30 C	V _{nominal}	4942.512356	16.23	3.28
-20 C	V _{nominal}	4942.505321	9.20	1.86
-10 C	V _{nominal}	4942.503109	6.99	1.41
0 C	V _{nominal}	4942.501122	5.00	1.01
+10 C	V _{nominal}	4942.498397	2.28	0.46
+20 C	V _{maximum}	4942.495929	-0.19	-0.04
	V _{minimum}	4942.495978	-0.14	-0.03
	V _{nominal}	4942.49612	0.00	0.00
+30 C	V _{nominal}	4942.495423	-0.70	-0.14
+40 C	V _{nominal}	4942.496154	0.03	0.01
+50 C	V _{nominal}	4942.497532	1.41	0.29

EUT Frequency: 4965 MHz				
Test Environment		Measured Frequency (MHz)	Frequency error (kHz)	Drift (ppm)
-30 C	V _{nominal}	4965.010962	15.21	3.06
-20 C	V _{nominal}	4965.004696	8.94	1.80
-10 C	V _{nominal}	4965.002548	6.80	1.37
0 C	V _{nominal}	4965.000641	4.89	0.98
+10 C	V _{nominal}	4964.997949	2.20	0.44
+20 C	V _{maximum}	4964.995801	0.05	0.01
	V _{minimum}	4964.995657	-0.10	-0.02
	V _{nominal}	4964.99575	0.00	0.00
+30 C	V _{nominal}	4964.995337	-0.42	-0.08
+40 C	V _{nominal}	4964.995767	0.01	0.00
+50 C	V _{nominal}	4964.996619	0.87	0.17

EUT Frequency: 4987.5 MHz				
Test Environment		Measured Frequency (MHz)	Frequency error (kHz)	Drift (ppm)
-30 C	V _{nominal}	4987.510385	14.79	2.97
-20 C	V _{nominal}	4987.504471	8.88	1.78
-10 C	V _{nominal}	4987.502212	6.62	1.33
0 C	V _{nominal}	4987.500385	4.79	0.96
+10 C	V _{nominal}	4987.497596	2.00	0.40
+20 C	V _{maximum}	4987.495561	-0.03	-0.01
	V _{minimum}	4987.495625	0.03	0.01
	V _{nominal}	4987.49559	0.00	0.00
+30 C	V _{nominal}	4987.495304	-0.29	-0.06
+40 C	V _{nominal}	4987.495353	-0.24	-0.05
+50 C	V _{nominal}	4987.497821	2.23	0.45

In band checking			
Fl total 5 MHz	4940.160256	4989.807692	Fh total 5 MHz
Fl total 10 MHz	4940.352464	4989.647436	Fh total 10 MHz
Fl total 15 MHz	4940.528846	4989.471154	Fh total 15 MHz
Fl total 20 MHz	4940.769231	4989.166667	Fh total 20 MHz
Fl total all bandwidths (MHz)	4940.160256	4989.807692	Fh total all bandwidths (MHz)
Flow including drift (MHz)	4940.16	4989.822484	Fhigh including drift (MHz)
Verdict	PASS	PASS	Verdict

15 Transmit Output Power - Equivalent Isotropically Radiated Power (e.i.r.p)

15.1 Definition

The RF output power is defined as the mean equivalent isotropic radiated power (e.i.r.p.) of the equipment during a transmission burst.

15.2 Test Parameters

Test Location:	Pershore Airfield
Test Chamber:	Air field
Test Standard and Clause:	FCC CFR 47 Part 90Y, Clause 90.1215
EUT Channels Measured:	Low / Mid / High
EUT Channel Bandwidths:	5 MHz, 10 MHz, 15 MHz and 20 MHz
Deviations From Standard:	None
Measurement BW:	1 MHz
Spectrum Analyzer Video BW: (requirement at least 3x RBW)	3 MHz

Environmental Conditions (Normal Environment)

Temperature: 15 °C	+15 °C to +35 °C (as declared)
Humidity: 50 % RH	20 % RH to 75 % RH (as declared)
Supply: 48 V dc	48 V dc (as declared)

15.3 Test Limit

For systems employing digital modulation techniques operating in the band 4940 to 4990 MHz, the maximum peak conducted output power shall not exceed the values listed the table below.

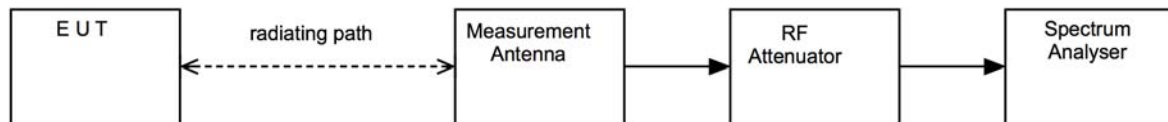
Channel Bandwidth (MHz)	Transmitter Power, P (dBm)	
	Low-power Device	High-power Device
1	$P \leq 7$	$7 < P \leq 20$
5	$P \leq 14$	$14 < P \leq 27$
10	$P \leq 17$	$17 < P \leq 30$
15	$P \leq 18.8$	$18.8 < P \leq 31.8$
20	$P \leq 20$	$20 < P \leq 33$

15.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure iv, the resolution bandwidth of the spectrum analyser was increased above the EUT occupied bandwidth and the peak emission data noted.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst-case configuration in each bandwidth.

Figure iv Test Setup



15.5 Test Equipment

Equipment Type	Manufacturer	Equipment Description	Element No	Due For Calibration
PXA Signal Analyser	Agilent	Spectrum Analyser	-	2020-05-20
LB-10180-NF	A Info Inc	Horn Antenna	REF2242	2020-07-13
SMBV100A	R&S	Signal Generator	U674	2020-01-04
3161-02	Octave Bandwidth	4-8GHz Horn	-	2020-03-21

15.6 Test Results

Bottom channel; Bandwidth: 5 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4942.5	Sector	256 QAM	A	51.1	53.0	PASS
4942.5	MuMIMO		A	47.1	53.0	PASS
4942.5	Beamform		A	46.7	53.0	PASS

Middle channel; Bandwidth: 5 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4965.0	Sector	QPSK	A	51.4	53.0	PASS
4965.0			B	51.3	53.0	PASS
4965.0	MuMIMO		A	48.4	53.0	PASS
4965.0	Beamform		A	48.6	53.0	PASS
4965.0	Sector	16 QAM	A	51.3	53.0	PASS
4965.0			B	51.3	53.0	PASS
4965.0	MuMIMO		A	48.4	53.0	PASS
4965.0	Beamform		A	48.6	53.0	PASS
4965.0	Sector	64 QAM	A	51.3	53.0	PASS
4965.0			B	51.2	53.0	PASS
4965.0	MuMIMO		A	48.3	53.0	PASS
4965.0	Beamform		A	48.7	53.0	PASS
4965.0	Sector	256 QAM	A	51.3	53.0	PASS
4965.0			B	51.2	53.0	PASS
4965.0	MuMIMO		A	48.3	53.0	PASS
4965.0	Beamform		A	48.6	53.0	PASS

Top channel; Bandwidth: 5 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4987.5	Sector	256 QAM	A	50.5	53.0	PASS
4987.5	MuMIMO		A	47.9	53.0	PASS
4987.5	Beamform		A	48.5	53.0	PASS

Bottom channel; Bandwidth: 10 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4945.0	Sector	256 QAM	A	49.5	53.0	PASS
4945.0	MuMIMO		A	46.7	53.0	PASS
4945.0	Beamform		A	47.2	53.0	PASS

Middle channel; Bandwidth: 10 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4965.0	Sector	QPSK	A	49.1	53.0	PASS
4965.0			B	49.0	53.0	PASS
4965.0	MuMIMO		A	46.9	53.0	PASS
4965.0	Beamform		A	47.7	53.0	PASS
4965.0	Sector	16 QAM	A	49.1	53.0	PASS
4965.0			B	49.1	53.0	PASS
4965.0	MuMIMO		A	47.1	53.0	PASS
4965.0	Beamform		A	47.6	53.0	PASS
4965.0	Sector	64 QAM	A	49.2	53.0	PASS
4965.0			B	48.9	53.0	PASS
4965.0	MuMIMO		A	47.1	53.0	PASS
4965.0	Beamform		A	47.5	53.0	PASS
4965.0	Sector	256 QAM	A	49.0	53.0	PASS
4965.0			B	49.1	53.0	PASS
4965.0	MuMIMO		A	47.0	53.0	PASS
4965.0	Beamform		A	47.5	53.0	PASS

Top channel; Bandwidth: 10 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4985.0	Sector	256 QAM	A	48.5	53.0	PASS
4985.0	MuMIMO		A	47.4	53.0	PASS
4985.0	Beamform		A	47.2	53.0	PASS

Bottom channel; Bandwidth: 15 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4947.5	Sector	256 QAM	A	50.8	53.0	PASS
4947.5	MuMIMO		A	50.9	53.0	PASS
4947.5	Beamform		A	51.4	53.0	PASS

Middle channel; Bandwidth: 15 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4965.0	Sector	QPSK	A	50.8	53.0	PASS
4965.0			B	50.3	53.0	PASS
4965.0	MuMIMO		A	49.3	53.0	PASS
4965.0	Beamform		A	50.7	53.0	PASS
4965.0	Sector	16 QAM	A	50.5	53.0	PASS
4965.0			B	50.3	53.0	PASS
4965.0	MuMIMO		A	49.1	53.0	PASS
4965.0	Beamform		A	50.6	53.0	PASS
4965.0	Sector	64 QAM	A	50.4	53.0	PASS
4965.0			B	50.2	53.0	PASS
4965.0	MuMIMO		A	48.9	53.0	PASS
4965.0	Beamform		A	50.6	53.0	PASS
4965.0	Sector	256 QAM	A	50.4	53.0	PASS
4965.0			B	50.2	53.0	PASS
4965.0	MuMIMO		A	49.0	53.0	PASS
4965.0	Beamform		A	50.6	53.0	PASS

Top channel; Bandwidth: 15 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4982.5	Sector	256 QAM	A	50.0	53.0	PASS
4982.5	MuMIMO		A	49.4	53.0	PASS
4982.5	Beamform		A	50.1	53.0	PASS

Bottom channel; Bandwidth: 20 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4950.0	Sector	256 QAM	A	51.6	53.0	PASS
4950.0	MuMIMO		A	51.6	53.0	PASS
4950.0	Beamform		A	52.4	53.0	PASS

Middle channel; Bandwidth: 20 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4965.0	Sector	QPSK	A	52.0	53.0	PASS
4965.0			B	51.9	53.0	PASS
4965.0	MuMIMO		A	51.1	53.0	PASS
4965.0	Beamform		A	52.3	53.0	PASS
4965.0	Sector	16 QAM	A	52.0	53.0	PASS
4965.0			B	52.0	53.0	PASS
4965.0	MuMIMO		A	50.4	53.0	PASS
4965.0	Beamform		A	51.8	53.0	PASS
4965.0	Sector	64 QAM	A	52.0	53.0	PASS
4965.0			B	51.9	53.0	PASS
4965.0	MuMIMO		A	50.4	53.0	PASS
4965.0	Beamform		A	51.6	53.0	PASS
4965.0	Sector	256 QAM	A	52.1	53.0	PASS
4965.0			B	51.8	53.0	PASS
4965.0	MuMIMO		A	50.3	53.0	PASS
4965.0	Beamform		A	51.9	53.0	PASS

Top channel; Bandwidth: 20 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. Power (dBm)	EIRP Limit (dBm)	Result
4980.0	Sector	256 QAM	A	51.0	53.0	PASS
4980.0	MuMIMO		A	51.6	53.0	PASS
4980.0	Beamform		A	50.0	53.0	PASS

16 Transmit Output Power - Power spectral density

16.1 Definition

The Power Spectral Density is the mean equivalent isotropically radiated power (e.i.r.p.) spectral density in a 1 MHz bandwidth during a transmission burst.

16.2 Test Parameters

Test Location:	Pershore Airfield
Test Chamber:	Air field
Test Standard and Clause:	FCC CFR 47 Part 90Y, Clause 90.1215
EUT Channels Measured:	Low / Mid / High
EUT Channel Bandwidths:	5 MHz, 10 MHz, 15 MHz and 20 MHz
Deviations From Standard:	None
Measurement BW:	1 MHz
Spectrum Analyzer Video BW: (requirement at least 3x RBW)	3 MHz

Environmental Conditions (Normal Environment)

Temperature: 15 °C	+15 °C to +35 °C (as declared)
Humidity: 50 % RH	20 % RH to 75 % RH (as declared)
Supply: 48 V dc	48 V dc (as declared)

16.3 Test Limit

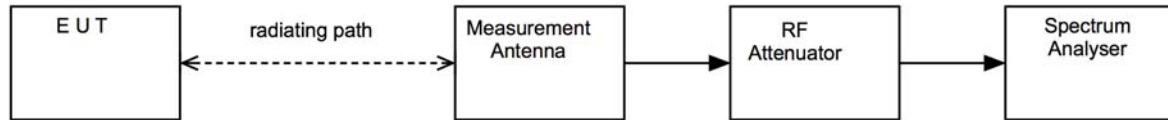
For systems employing digital modulation techniques operating in the band 4940 to 4990 MHz, the maximum Power Spectral Density is limited to 21 dBm per MHz for high-power devices and 8 dBm per MHz for low-power.

16.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure vi, the power density of the EUT was measured on a spectrum analyser, with path losses taken into account.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst case configuration in each bandwidth.

Figure vi Test Setup



16.5 Test Equipment

Equipment Type	Manufacturer	Equipment Description	Element No	Due For Calibration
PXA Signal Analyser	Agilent	Spectrum Analyser	-	2020-05-20
LB-10180-NF	A Info Inc	Horn Antenna	REF2242	2020-07-13
SMBV100A	R&S	Signal Generator	U674	2020-01-04
3161-02	Octave Bandwidth	4-8GHz Horn	-	2020-03-21

16.6 Test Results

Bottom channel; Bandwidth: 5 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4942.5	Sector	256 QAM	A	46.7	47	PASS
4942.5	MuMIMO		A	46.4	47	PASS
4942.5	Beamform		A	46.7	47	PASS

Middle channel; Bandwidth: 5 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4965.0	Sector	QPSK	A	46.8	47	PASS
4965.0			B	46.9	47	PASS
4965.0	MuMIMO		A	46.8	47	PASS
4965.0	Beamform		A	46.8	47	PASS
4965.0	Sector	16 QAM	A	46.9	47	PASS
4965.0			B	46.9	47	PASS
4965.0	MuMIMO		A	46.8	47	PASS
4965.0	Beamform		A	46.8	47	PASS
4965.0	Sector	64 QAM	A	46.8	47	PASS
4965.0			B	46.8	47	PASS
4965.0	MuMIMO		A	46.9	47	PASS
4965.0	Beamform		A	46.8	47	PASS
4965.0	Sector	256 QAM	A	46.9	47	PASS
4965.0			B	46.8	47	PASS
4965.0	MuMIMO		A	46.9	47	PASS
4965.0	Beamform		A	46.6	47	PASS

Top channel; Bandwidth: 5 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4987.5	Sector	256 QAM	A	46.7	47	PASS
4987.5	MuMIMO		A	47.0	47	PASS
4987.5	Beamform		A	46.9	47	PASS

Bottom channel; Bandwidth: 10 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4945.0	Sector	256 QAM	A	46.8	47	PASS
4945.0	MuMIMO		A	47.0	47	PASS
4945.0	Beamform		A	46.7	47	PASS

Middle channel; Bandwidth: 10 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4965.0	Sector	QPSK	A	46.9	47	PASS
4965.0			B	46.4	47	PASS
4965.0	MuMIMO		A	46.9	47	PASS
4965.0	Beamform		A	46.9	47	PASS
4965.0	Sector	16 QAM	A	46.8	47	PASS
4965.0			B	46.8	47	PASS
4965.0	MuMIMO		A	46.9	47	PASS
4965.0	Beamform		A	46.9	47	PASS
4965.0	Sector	64 QAM	A	46.9	47	PASS
4965.0			B	46.5	47	PASS
4965.0	MuMIMO		A	46.9	47	PASS
4965.0	Beamform		A	46.8	47	PASS
4965.0	Sector	256 QAM	A	46.6	47	PASS
4965.0			B	46.5	47	PASS
4965.0	MuMIMO		A	47.0	47	PASS
4965.0	Beamform		A	46.6	47	PASS

Top channel; Bandwidth: 10 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4985.0	Sector	256 QAM	A	46.4	47	PASS
4985.0	MuMIMO		A	46.9	47	PASS
4985.0	Beamform		A	46.3	47	PASS

Bottom channel; Bandwidth: 15 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4947.5	Sector	256 QAM	A	46.9	47	PASS
4947.5	MuMIMO		A	46.7	47	PASS
4947.5	Beamform		A	47.0	47	PASS

Middle channel; Bandwidth: 15 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4965.0	Sector	QPSK	A	46.7	47	PASS
4965.0			B	46.0	47	PASS
4965.0	MuMIMO		A	46.7	47	PASS
4965.0	Beamform		A	46.9	47	PASS
4965.0	Sector	16 QAM	A	46.0	47	PASS
4965.0			B	46.5	47	PASS
4965.0	MuMIMO		A	46.7	47	PASS
4965.0	Beamform		A	46.9	47	PASS
4965.0	Sector	64 QAM	A	46.7	47	PASS
4965.0			B	46.3	47	PASS
4965.0	MuMIMO		A	46.8	47	PASS
4965.0	Beamform		A	46.9	47	PASS
4965.0	Sector	256 QAM	A	46.6	47	PASS
4965.0			B	46.6	47	PASS
4965.0	MuMIMO		A	46.6	47	PASS
4965.0	Beamform		A	46.5	47	PASS

Top channel; Bandwidth: 15 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4982.5	Sector	256 QAM	A	46.6	47	PASS
4982.5	MuMIMO		A	46.8	47	PASS
4982.5	Beamform		A	46.2	47	PASS

Bottom channel; Bandwidth: 20 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4950.0	Sector	256 QAM	A	46.6	47	PASS
4950.0	MuMIMO		A	47.0	47	PASS
4950.0	Beamform		A	47.0	47	PASS

Middle channel; Bandwidth: 20 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4965.0	Sector	QPSK	A	46.9	47	PASS
4965.0			B	46.9	47	PASS
4965.0	MuMIMO		A	46.6	47	PASS
4965.0	Beamform		A	46.9	47	PASS
4965.0	Sector	16 QAM	A	47.0	47	PASS
4965.0			B	46.6	47	PASS
4965.0	MuMIMO		A	46.9	47	PASS
4965.0	Beamform		A	47.0	47	PASS
4965.0	Sector	64 QAM	A	47.0	47	PASS
4965.0			B	46.9	47	PASS
4965.0	MuMIMO		A	46.6	47	PASS
4965.0	Beamform		A	46.9	47	PASS
4965.0	Sector	256 QAM	A	46.9	47	PASS
4965.0			B	47.0	47	PASS
4965.0	MuMIMO		A	46.8	47	PASS
4965.0	Beamform		A	47.0	47	PASS

Top channel; Bandwidth: 20 MHz						
Channel Frequency (MHz)	Transition Mode	Modulation	MIMO	Max. PSD (dBm/MHz)	PSD Limit (dBm/MHz)	Result
4980.0	Sector	256 QAM	A	46.7	47	PASS
4980.0	MuMIMO		A	46.7	47	PASS
4980.0	Beamform		A	46.9	47	PASS

17 Peak-to-average power ratio (PAPR)

17.1 Definition

Peak to average power ratio is define as the difference between peak power (or PSD) and the average power (or PSD).

17.2 Test Parameters

Test Location:	Element Skelmersdale
Test Chamber:	Radio Chamber
Test Standard and Clause:	90.1215 (e)
Channels / Frequencies Measured:	Low/ Middle / Top
Resolution Bandwidth: (Requirement 1 % of the Occupied Channel Bandwidth):	1 MHz
Modulation:	QPSK, 16 QAM, 64 QAM and 256 QAM
Deviations From Standard:	None
Temperature Extreme Environment Test Range:	N/A
Voltage Extreme Environment Test Range:	N/A

Environmental Conditions (Normal Environment)

Temperature: 24 °C	Standard Requirement: +20 °C
Humidity: 60 %RH	20 % RH to 75 % RH (as declared)

17.3 Test Limit

FCC

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.

ISED

The PAPR of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.

17.4 Test Method

The following formula was use:

$$\text{PAPR (dB)} = \text{PPk (dBm or dBW)} - \text{PAvg (dBm or dBW)}$$

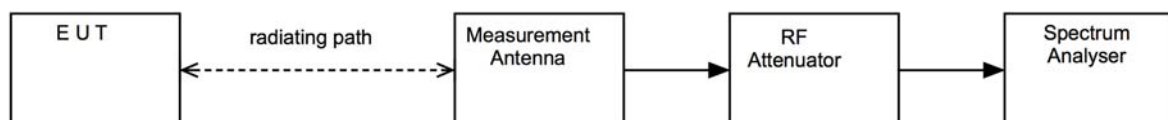
Where:

PAPR peak-to-average power ratio, in dB

PPk measured peak power or peak PSD level, in dBm or dBW

PAvg measured average power or average PSD level, in dBm or dBW

Figure v Test Setup



17.5 Test Equipment

Equipment Type	Manufacturer	Equipment Description	Element No	Due For Calibration
8449B	Agilent	PreAmp	L572	2020-10-15
N1911A	Agilent	Power Meter	REF836	2019-08-28
3115	EMCO	1-18GHz Horn	L139	2021-07-16
FSU26	R&S	Spectrum Analyser	REF909	2020-06-21

17.6 Test Results

5 MHz Bandwidth Sector

Bottom Channel

<i>Frequency 4942.5 MHz; Sector Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.75	13	0	PASS
	16 QAM	5.76	13	0	PASS
	64 QAM	5.73	13	0	PASS
	256 QAM	5.74	13	0	PASS
B	QPSK	5.74	13	0	PASS
	16 QAM	5.77	13	0	PASS
	64 QAM	5.77	13	0	PASS
	256 QAM	5.76	13	0	PASS

Middle Channel

<i>Frequency 4965 MHz; Sector Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.73	13	0	PASS
	16 QAM	5.74	13	0	PASS
	64 QAM	5.74	13	0	PASS
	256 QAM	5.75	13	0	PASS
B	QPSK	5.76	13	0	PASS
	16 QAM	5.75	13	0	PASS
	64 QAM	5.73	13	0	PASS
	256 QAM	5.75	13	0	PASS

Top Channel

<i>Frequency 4987.5 MHz; Sector Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.74	13	0	PASS
	16 QAM	5.73	13	0	PASS
	64 QAM	5.76	13	0	PASS
	256 QAM	5.75	13	0	PASS
B	QPSK	5.73	13	0	PASS
	16 QAM	5.73	13	0	PASS
	64 QAM	5.74	13	0	PASS
	256 QAM	5.75	13	0	PASS

10 MHz Bandwidth Sector**Bottom Channel**

<i>Frequency 4945 MHz; Sector Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.73	13	0	PASS
	16 QAM	5.7	13	0	PASS
	64 QAM	5.69	13	0	PASS
	256 QAM	5.73	13	0	PASS
B	QPSK	5.73	13	0	PASS
	16 QAM	5.71	13	0	PASS
	64 QAM	5.71	13	0	PASS
	256 QAM	5.72	13	0	PASS

Middle Channel

<i>Frequency 4965 MHz; Sector Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.71	13	0	PASS
	16 QAM	5.72	13	0	PASS
	64 QAM	5.74	13	0	PASS
	256 QAM	5.71	13	0	PASS
B	QPSK	5.71	13	0	PASS
	16 QAM	5.74	13	0	PASS
	64 QAM	5.72	13	0	PASS
	256 QAM	5.73	13	0	PASS

Top Channel

<i>Frequency 4985 MHz; Sector Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.73	13	0	PASS
	16 QAM	5.74	13	0	PASS
	64 QAM	5.74	13	0	PASS
	256 QAM	5.74	13	0	PASS
B	QPSK	5.73	13	0	PASS
	16 QAM	5.73	13	0	PASS
	64 QAM	5.76	13	0	PASS
	256 QAM	5.74	13	0	PASS

15 MHz Bandwidth MuMIMO**Bottom Channel**

<i>Frequency 4947.5 MHz; MuMIMO Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.75	13	0	PASS
	16 QAM	5.73	13	0	PASS
	64 QAM	5.75	13	0	PASS
	256 QAM	5.72	13	0	PASS
B	QPSK	5.73	13	0	PASS
	16 QAM	5.75	13	0	PASS
	64 QAM	5.72	13	0	PASS
	256 QAM	5.71	13	0	PASS

Middle Channel

<i>Frequency 4965 MHz; MuMIMO Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.74	13	0	PASS
	16 QAM	5.73	13	0	PASS
	64 QAM	5.72	13	0	PASS
	256 QAM	5.7	13	0	PASS
B	QPSK	5.71	13	0	PASS
	16 QAM	5.72	13	0	PASS
	64 QAM	5.72	13	0	PASS
	256 QAM	5.74	13	0	PASS

Top Channel

<i>Frequency 4982.5 MHz; MuMIMO Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.72	13	0	PASS
	16 QAM	5.72	13	0	PASS
	64 QAM	5.71	13	0	PASS
	256 QAM	5.73	13	0	PASS
B	QPSK	5.69	13	0	PASS
	16 QAM	5.73	13	0	PASS
	64 QAM	5.74	13	0	PASS
	256 QAM	5.72	13	0	PASS

20 MHz Bandwidth Beamforming**Bottom Channel**

<i>Frequency 4950 MHz; Beamforming Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.71	13	0	PASS
	16 QAM	5.72	13	0	PASS
	64 QAM	5.71	13	0	PASS
	256 QAM	5.72	13	0	PASS
B	QPSK	5.75	13	0	PASS
	16 QAM	5.71	13	0	PASS
	64 QAM	5.73	13	0	PASS
	256 QAM	5.72	13	0	PASS

Middle Channel

<i>Frequency 4965 MHz; Beamforming Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.71	13	0	PASS
	16 QAM	5.72	13	0	PASS
	64 QAM	5.71	13	0	PASS
	256 QAM	5.71	13	0	PASS
B	QPSK	5.73	13	0	PASS
	16 QAM	5.72	13	0	PASS
	64 QAM	5.72	13	0	PASS
	256 QAM	5.73	13	0	PASS

Top Channel

<i>Frequency 4980 MHz; Beamforming Mode</i>					
<i>MIMO</i>	<i>Mod Mode</i>	<i>Peak to average Difference (dB)</i>	<i>Limit (dB)</i>	<i>Probability (%)</i>	<i>Verdict</i>
A	QPSK	5.72	13	0	PASS
	16 QAM	5.72	13	0	PASS
	64 QAM	5.72	13	0	PASS
	256 QAM	5.74	13	0	PASS
B	QPSK	5.72	13	0	PASS
	16 QAM	5.73	13	0	PASS
	64 QAM	5.71	13	0	PASS
	256 QAM	5.72	13	0	PASS

18 Measurement Uncertainty

Calculated Measurement Uncertainties

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95 % confidence:

[1] Radiated spurious emissions

Uncertainty in test result (30 MHz to 1 GHz) = **4.75 dB**

Uncertainty in test result (1 GHz to 18 GHz) = **4.46 dB**

[2] AC power line conducted emissions

Uncertainty in test result = **3.2 dB**

[3] Occupied bandwidth

Uncertainty in test result = **15.58 %**

[4] Conducted carrier power

Uncertainty in test result (Power Meter) = **0.93 dB**

[5] Conducted RF power out-of-band

Uncertainty in test result – up to 8.1 GHz = **3.31 dB**

Uncertainty in test result – 8.1 GHz to 15.3 GHz = **4.43 dB**

[6] Radiated RF power out-of-band

Uncertainty in test result (30 MHz to 1 GHz) = **4.75 dB**

Uncertainty in test result (1 GHz to 18 GHz) = **4.46 dB**

[7] Power spectral density

Uncertainty in test result (Spectrum Analyser) = **3.11 dB**

[8] ERP / EIRP

Uncertainty in test result (Laboratory) = **4.71 dB**

Uncertainty in test result (Persore OATS) = **4.26 dB**