TEST REPORT

FCC Part 90
FCC Part 15 Subpart B
Industry Canada RSS-119, Issue 11
RSS-Gen, Issue 3

MANUFACTURER	Meteorcomm LLC 1201 SW 7th Street Renton WA 98057
MODEL NUMBER(S)	63030-48
EUT DESCRIPTION	Base Radio 48 V
SERIAL NUMBER(S) TESTED	BF2A071100062
TEST REPORT NUMBER	WC1104224.3B

TÜV SÜD America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable requirements of FCC Part 90, FCC Part 15 Subpart B, and RSS-119, Issue 11 – "Land Mobile and Fixed Radio Transmitters and Receivers Operating in the Frequency Range 27.41-960 MHz", and RSS-Gen, Issue 3 – "General Requirements and Information for the Certification of Radio Apparatus."

TÜV SÜD America, Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NARTE, and VCCI.

Not Transferable

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1.0 TEST RESULT SUMMARY

Tables 1 and 2 summarize the results for the tested EUT with respect to the essential requirements defined in FCC Parts 90, 15 and RSS-119, Issue 11 and RSS-Gen, Issue 3.

1.1. Transmitter

Table 1: Transmitter results summary - mobile

FCC Section	Test	Measured	Limit	Result
§2.1033(c)(5) §90.35, §90.715	Frequency ranges		217-220 MHz – N/A 220-222 MHz	Complies
§2.1033(c)(6), (7) §2.1046, §90.205 §90.259, §90.729	Power		2 W 217-220 MHz – N/A 250 W 220-221 MHz 50 W 221-222 MHz	Complies
§2.1033(c)(4) §2.1047, §90.210	Emission types		Information only	
§2.1033(c)(4) §2.1047, §90.210	Emission mask		F – 220-222 MHz B – 217-220 MHz – N/A	Complies
§2.1049, §90.209 §90.259, 90.733(d)	Bandwidth		50/25/12.5/6.25 kHz – 217-220 MHz – N/A 4 kHz – 220-222 MHz[4]	Complies
§2.1051, §2.1057 §90.210	Spurious emissions Case radiation		Mask B - -13 dBm – N/A Mask F - -25 dBm	Complies
§2.1055, §90.213	Frequency stability		1 ppm – 217-220 MHz – N/A 0.1 ppm – 220-222 MHz	Complies
§15.109	Receiver emissions			Complies

RSS-119 Clause	Test	Measured	Limit	Result
RSS-119	Frequency ranges		217-220 MHz – N/A 220-222 MHz[1]	Complies
5.4.4 SRSP-512	Power		5 W 217-218 MHz – N/A 5 W 219-220 MHz – N/A 125 W 220-221 MHz[2] 50 W 221-222 MHz	Complies
5.5 Table 3	Emission mask		D or J – 217-218 MHz[3] – N/A D or J – 219-220 MHz[3] – N/A F – 220-222 MHz	Complies
5.5 Table 3	Emission types		Information only	
5.5 Table 3	Bandwidth		11.25 kHz – 217-218 MHz – N/A 11.25 kHz – 219-220 MHz – N/A 4 kHz – 220-222 MHz	Complies
5.8	Spurious emissions		Mask D/J - -20 dBm – N/A Mask F - -25 dBm	Complies
5.3	Frequency stability		5 ppm – 217-218 MHz – N/A 5 ppm – 219-220 MHz – N/A 0.1 ppm – 220-222 MHz	Complies
RSS-Gen Issue 3	Receiver emissions			Complies

[1]RSS-119 limits operation to 217-218 MHz and 219-222 MHz.
[2]See SRSP-512
[3]D or I if device has audio filter
[4] Licensees, except for licensees authorized on Channels 161 through 170 and 181 through 185, may combine any number of their authorized, contiguous channels (including channels derived from multiple authorizations) to form channels wider than 5 kHz.
NOTE: Antenna gain = per license.

REVISION RECORD

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
	122	12 July 2011	Initial Release

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List of contents **Page**

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2. Introduction

This testing is intended to verify the Meteorcomm 63030-48 48V Base Radio is performing in accordance with the requirements of FCC Part 90, RSS-Gen and RSS-119.

This test report consists of:

- Test result summary
- List of contents
- Introduction and further information
- Equipment application data
- Detailed test information
- List of measurement equipment with calibration validity
- Photographs and further test results (plots, graphs, etc.)

All pages have been numbered consecutively and bear TÜV SÜD America, the test report number, the date, the test specification in its current version as well as the type designation of the EUT. The total number of pages in this report is 122.

The tests were carried out on a representative assembly and in accordance with the test methods stated in:

ANSI C63.4-2003; ANSI TIA-603-C, 2004.

The sample(s) of the product was received on:

09 May 2011

The tests were carried out in the following period of time:

13 - 29 May 2011

3. Testing laboratory

The tests were carried out at TÜV SÜD America:

Wild River Lab
19333 Wild Mountain Road
Taylors Falls MN 55084
Large Test Site Open Area Test Site ☐
Small Test Site Open Area Test Site ☐
Accredited by:
NVLAP
Accreditation number 200696-0

Oakwood Lab ■
Oakwood Town Road
Millville MN 55957-0255

Accredited by:
NVLAP
Accreditation number 200695-0

New Brighton Environmental Testing Lab ☐
1775 Old Highway 8 NW
New Brighton MN 55112

The conducted measurements were provided by:
NextGen RF Design, Inc.
299 Johnson Ave. Suite 170
Waseca, MN 56093

4. Applicant

Company name	: Meteorcomm LLC
Address	: 1201 SW 7th Street, Renton WA 98057
Country	: USA
Contact	: Fred Cleveland
Telephone	: 253 872 2521
Fax	: 253 872 7662
Email	: fcleveland@meteorcomm.com

5. Product and product documentation

Samples of the following apparatus were submitted for testing:

Manufacturer	: CalAmp Corp
Trademark	: Base Radio
Type designation	: 63030-48
Serial number	: BF2A071100062
Software release	: Sprint v16.01
Type of equipment	: Base Radio 48 V

For issuing this report the following product documentation was used:

Test Plan-CDF Base 48-r1

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6. Conclusions, observations and comments

The test report will be filed at TÜV SÜD America for a period of 10 years following the issue of this report. It may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval from TÜV SÜD America.

TÜV SÜD America Inc reports apply only to the specific samples tested under stated test conditions. TÜV SÜD America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America Inc issued reports.

TÜV SÜD America assumes the sample to comply with the requirements of FCC Section 1.1307 (b)(1) and IC RSS-102 for the respective test sector, if the test results turn out positive.

Comments: ---

Reviewed By	Tested By
Joel T Schneider	Robert J Behringer
Senior EMC Engineer	EMC Engineer

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7.0 ENVIRONMENTAL CONDITIONS IN THE LAB

	Actual
Temperature:	: 23.6-27.6°C
Relative Humidity	: 15-48%
Atmospheric pressure	: 94.3-98kPa

POWER SUPPLY UTILIZED

Power supply system : 120VAC / 48VDC

MEASUREMENT UNCERTAINTY

Table 3: Measurement uncertainties

Parameter	Maximum Measurement Uncertainty	Actual
Radio Frequency	±1 × 10^{-7}	±3 × 10^{-9}
Radiated emission of transmitter	valid up to 4 GHz ±6 dB	±4.8 dB
Radiated emission of receiver	valid up to 4 GHz ±6 dB	±4.8 dB
Temperature	±1 °C	±0.8 °C
Humidity	±5 %	±4.6 %

The equipment comprising the test systems is calibrated on an annual basis.

SIGN EXPLANATIONS

☐ - not applicable

■ - applicable

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8. Transmitter parameters

8.1 Frequency ranges

Test summary
The requirements are: ■ - MET ☐ - NOT MET
The transmitter is designed to operate in the 220-222 MHz band. The low channel was measured to be 220.0125 MHz. The high channel was measured to be 221.9875 MHz.

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - NextGen RF Design

Test equipment

	Vendor	Model	Serial Number	Cal Date / Cal Due Date
Spectrum Analyzer	Agilent	PSA N9030A	US4S230321	03-03-2011 / 04-21-2012
Power Supply	HP/Agilent	6030A	2934A-01826	12-16-2010 / 07-07-2011
Computer	Dell	XPS M170	36134745733	N/A
30 dB power attenuator	Weinschel	5009	MA907	Cal by user
Multimeter	Fluke	87V	86670404	04/21/2011 – 04/21/2012
Rx1 Load	Weinschel	2-40	T1328	Cal by user
Rx2 Load	Systron Doner	108328	N/A	Cal by ser
DC Block	PE8210		N/A	Cal by user
50 ohm load	Inmet 3016		N/A	Cal by user
Temperature Chamber	Thermotron	S1.2 MiniMax	NGRF16	N/A

Test limits
FCC 90.35
217 - 220 MHz – N/A
220 - 222 MHz

RSS-119
217-218 – N/A
219-220 MHz – N/A
220 - 222 MHz

8.2 Power

Test summary
The requirements are: ■ - MET ☐ - NOT MET

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - NextGen RF Design

Test equipment

	Vendor	Model	Serial Number	Cal Date / Cal Due Date
Spectrum Analyzer	Agilent	PSA N9030A	US4S230321	03-03-2011 / 04-21-2012
Power Supply	HP/Agilent	6030A	2934A-01826	12-16-2010 / 07-07-2011
Computer	Dell	XPS M170	36134745733	N/A
30 dB power attenuator	Weinschel	5009	MA907	Cal by user
Multimeter	Fluke	87V	86670404	04/21/2011 / 04/21/2012
Rx1 Load	Weinschel	2-40	T1328	Cal by user
Rx2 Load	Systron Doner	108328	N/A	Cal by ser
DC Block	PE8210		N/A	Cal by user
50 ohm load	Inmet 3016		N/A	Cal by user

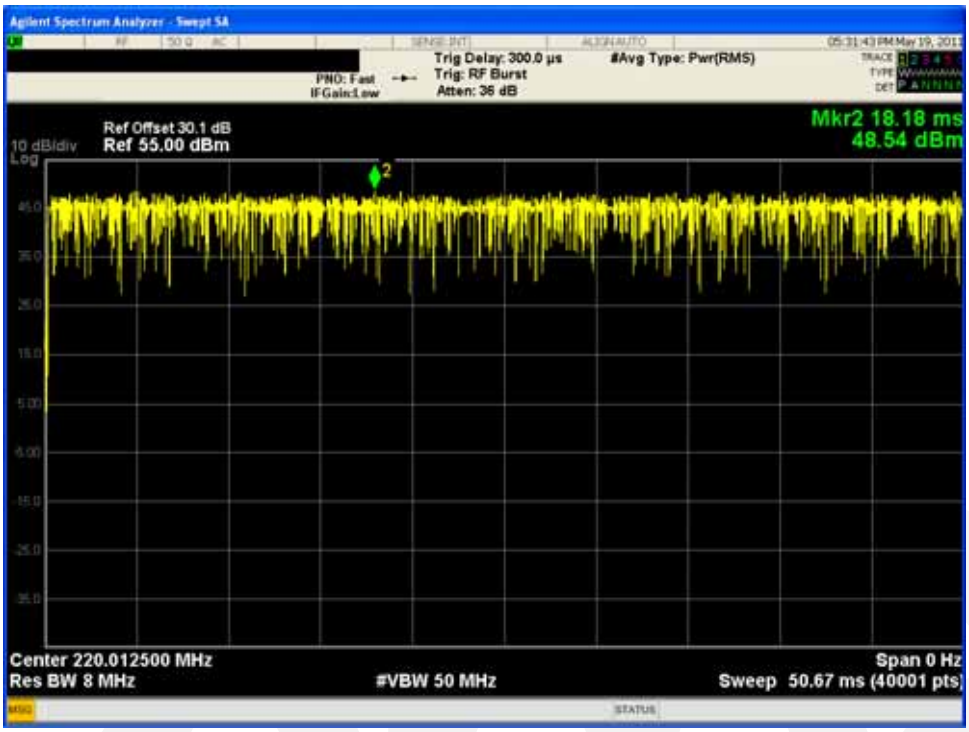
Test limits, 220-221 MHz

Antenna height above average terrain (HAAT) (meters)	FCC 90.729(a) ERP (Watts)	SRSP-512 6.3.1.1 ERP (Watts)
Up to 150	500	125
150-225	250	125
225-300	125	125
300-450	60	60
450-600	30	30
600-750	20	20
750-900	15	15
900-1050	10	10
Above 1050	5	5

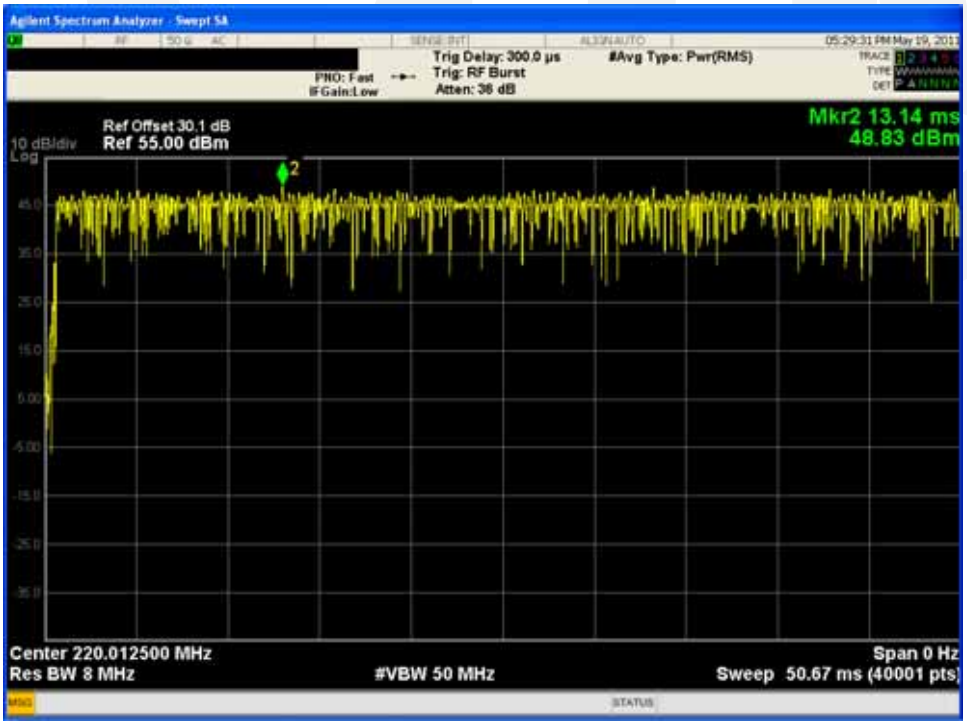
Test limits, 221-222 MHz
FCC 90.729(b) & SRSP-512 6.3.1.4
50 Watts ERP

Test data

		High power		Low power	
Frequency (MHz)	Modulation	dBm	Watts	dBm	Watts
220.0125	DQPSK	48.54	71.45	39.76	9.46
221.9875	DQPSK	48.5	70.79	39.71	9.35
220.0125	DQPSK_Half	48.83	76.38	40.03	10.07
221.9875	DQPSK_Half	48.78	75.51	40.02	10.05



Tx port-Transmit mode-Low Channel: 220.0125 MHz-Modulation: DQPSK
48.54 dBm = 71.45 watts



Tx port-Transmit mode-Low Channel: 220.0125 MHz-Modulation: DQPSK_HALF
48.83 dBm = 76.38 watts

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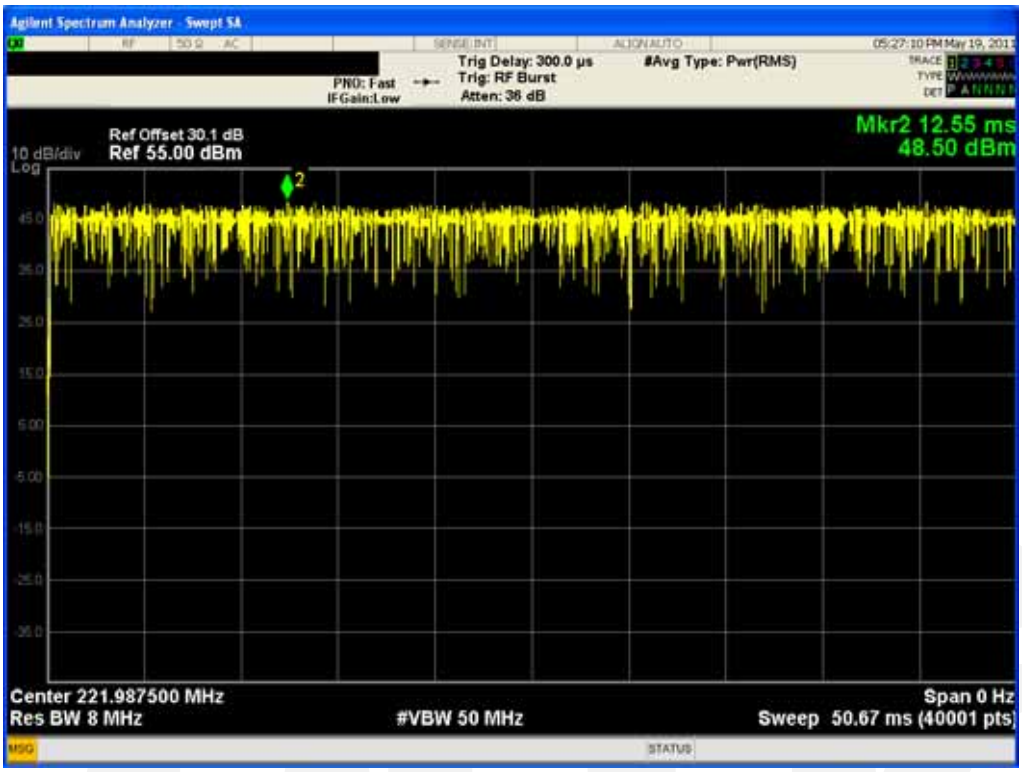
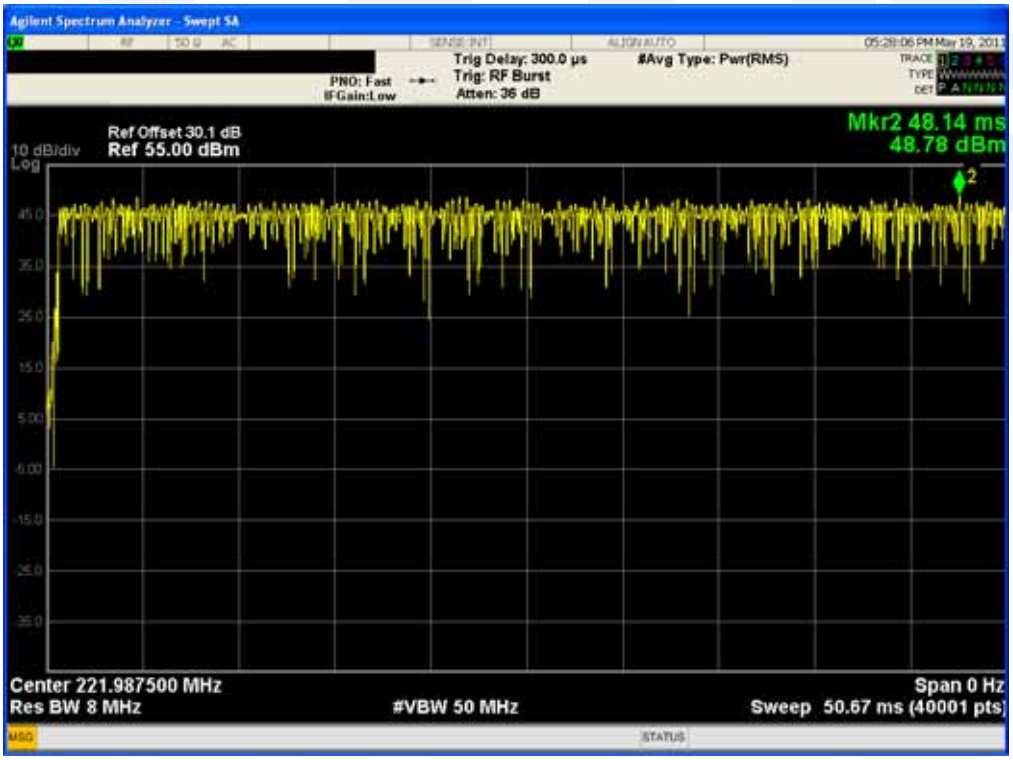


Tx port-Transmit mode-High Channel: 221.9875 MHz-Modulation: DQPSK
48.50 dBm = 70.79 watts



Tx port-Transmit mode-High Channel: 221.9875 MHz-Modulation: DQPSK_HALF
48.78 dBm = 75.51 watts

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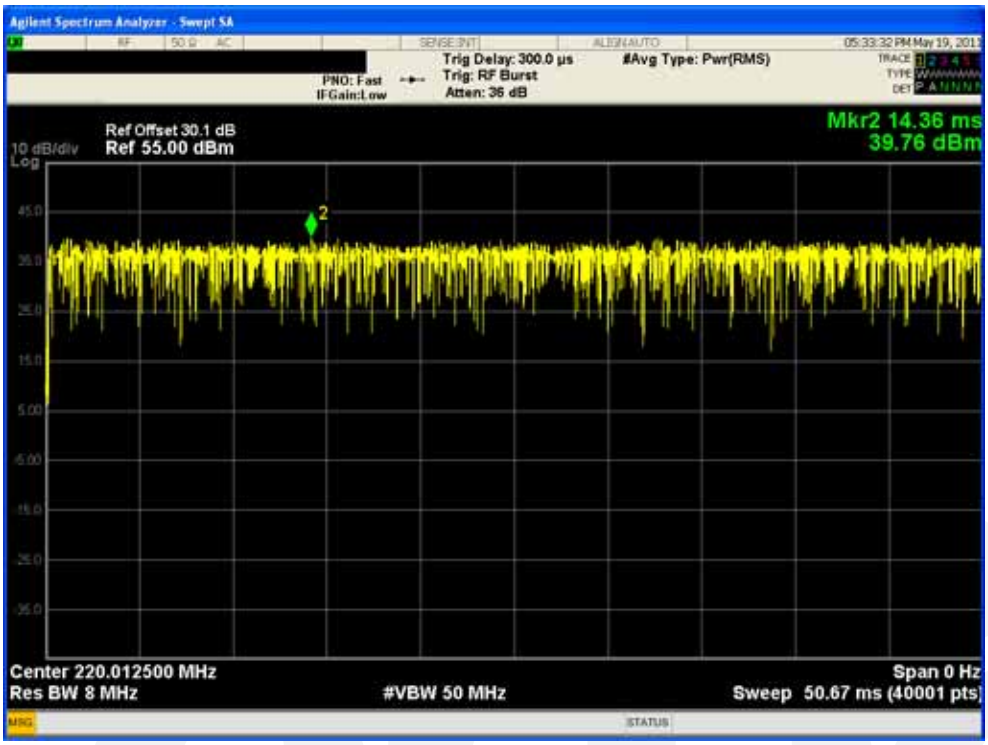
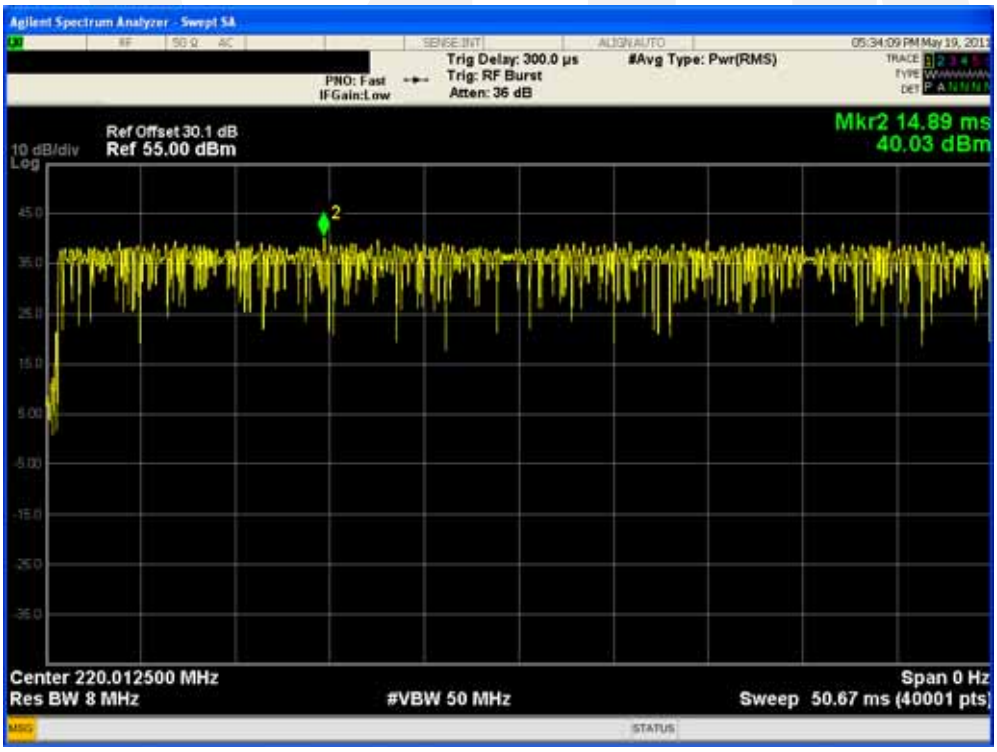


Tx port-Transmit mode-Low Channel: 220.0125 MHz-Modulation: DQPSK
39.76 dBm = 9.46 watts



Tx port-Transmit mode-Low Channel: 220.0125 MHz-Modulation: DQPSK_HALF
40.03 dBm = 10.07 watts

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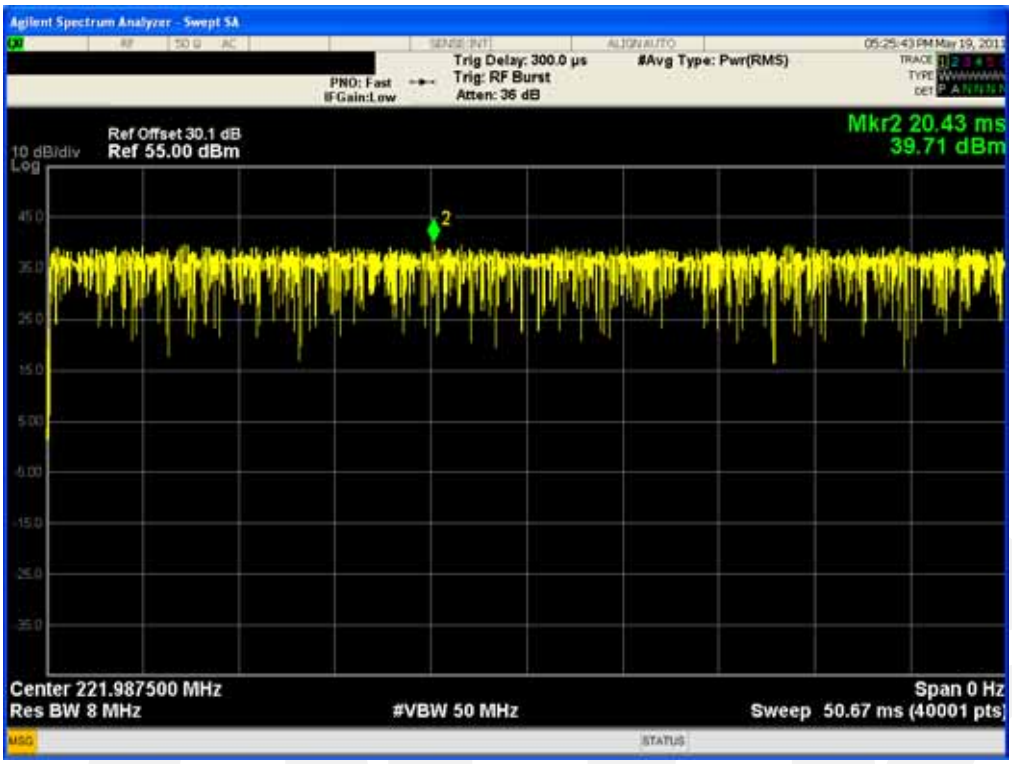
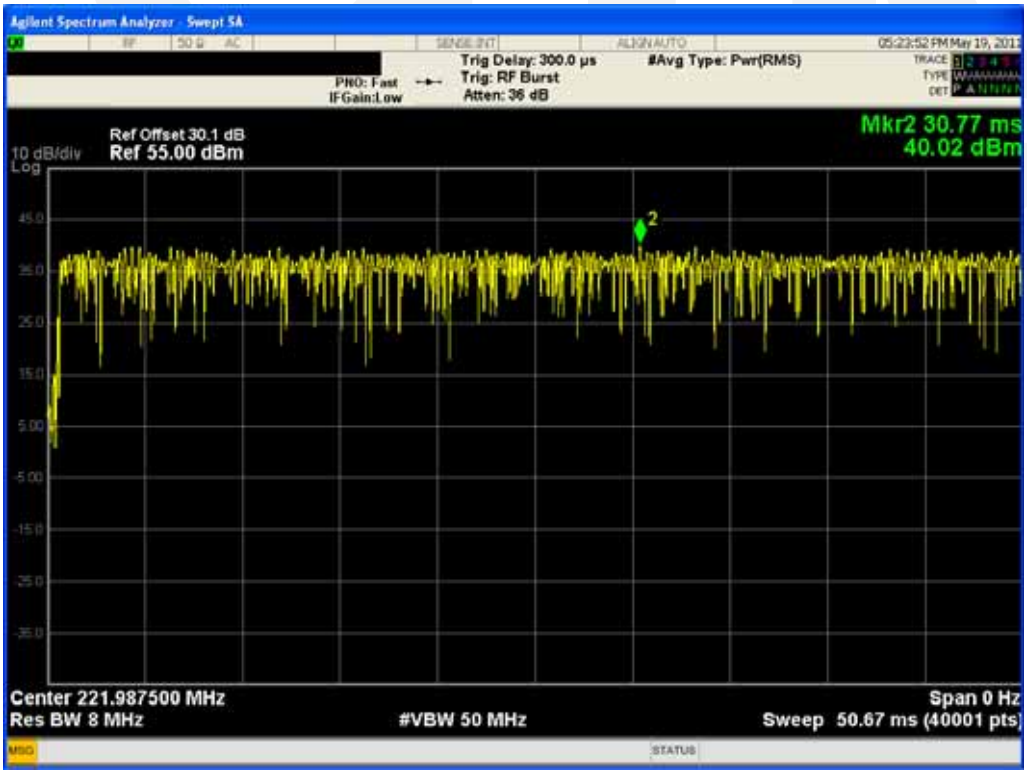


Tx port-Transmit mode-High Channel: 221.9875 MHz-Modulation: DQPSK
39.71 dBm = 9.35 watts



Tx port-Transmit mode-High Channel: 221.9875 MHz-Modulation: DQPSK_HALF
40.02 dBm = 10.05 watts

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8.3 Emission mask

Test summary
The requirements are: ■ - MET ☐ - NOT MET

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - NextGen RF Design

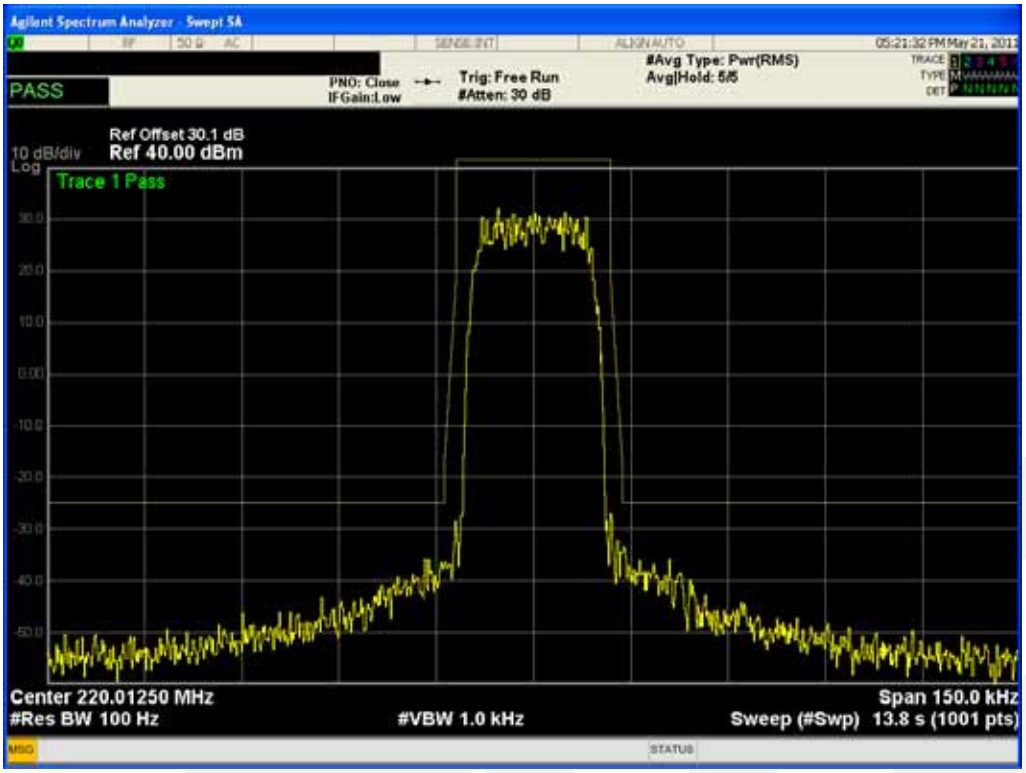
Test equipment

	Vendor	Model	Serial Number	Cal Date / Cal Due Date
Spectrum Analyzer	Agilent	PSA N9030A	US4S230321	03-03-2011 / 04-21-2012
Power Supply	HP/Agilent	6030A	2934A-01826	12-16-2010 / 07-07-2011
Computer	Dell	XPS M170	36134745733	N/A
30 dB power attenuator	Weinschel	5009	MA907	Cal by user
Multimeter	Fluke	87V	86670404	04/21/2011 – 04/21/2012
Rx1 Load	Weinschel	2-40	T1328	Cal by user
Rx2 Load	Systron Doner	108328	N/A	Cal by ser
DC Block	PE8210		N/A	Cal by user
50 ohm load	Inmet 3016		N/A	Cal by user

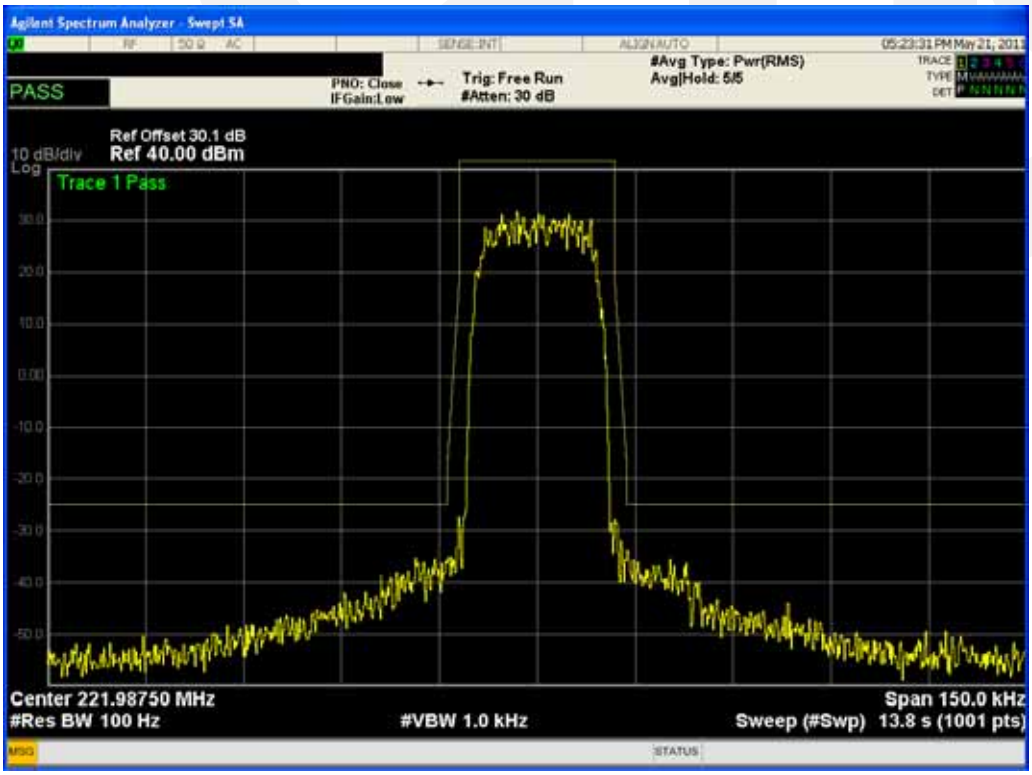
Test limits

FCC 90.210	**RSS-119 5.5**
F – 220-222 MHz	F – 220-222 MHz
B – 217-220 MHz - N/A	D or J – 217-218 MHz and 219-220 MHz[3] – N/A

Test data
See following pages



Tx port-Transmit mode-Low Channel: 220.0125 MHz-Modulation: DQPSK



Tx port-Transmit mode-High Channel: 221.9875 MHz-Modulation: DQPSK

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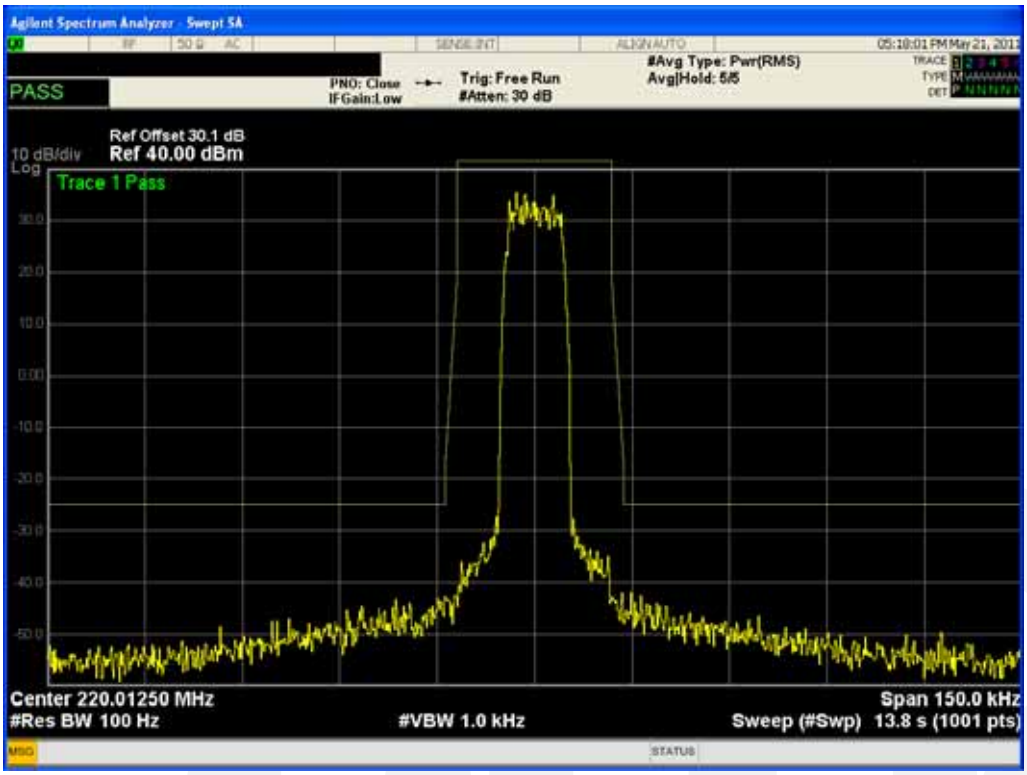
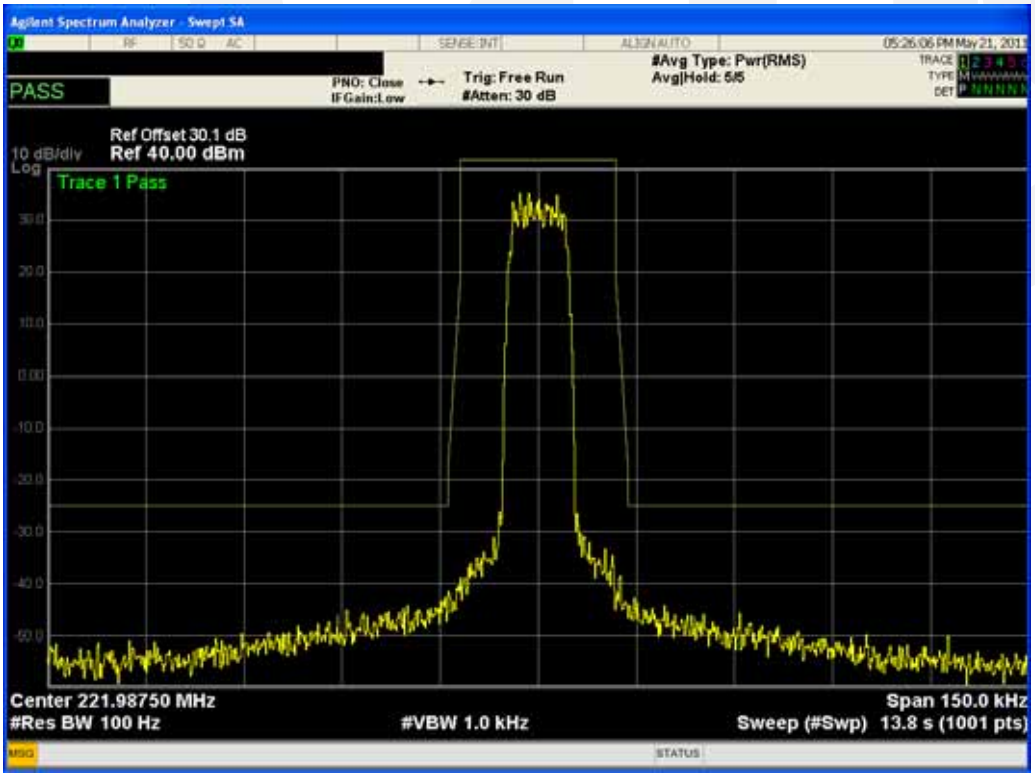


Tx port-Transmit mode-Low Channel: 220.0125 MHz-Modulation: DQPSK_HALF



Tx port-Transmit mode-High Channel: 221.9875 MHz-Modulation: DQPSK_HALF

8.4 Bandwidth

Test summary
The requirements are: ■ - MET ☐ - NOT MET

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
■ - NextGen RF Design

Test equipment

	Vendor	Model	Serial Number	Cal Date / Cal Due Date
Spectrum Analyzer	Agilent	PSA N9030A	US4S230321	03-03-2011 / 04-21-2012
Power Supply	HP/Agilent	6030A	2934A-01826	12-16-2010 / 07-07-2011
Computer	Dell	XPS M170	36134745733	N/A
30 dB power attenuator	Weinschel	5009	MA907	Cal by user
Multimeter	Fluke	87V	86670404	04/21/2011 – 04/21/2012
Rx1 Load	Weinschel	2-40	T1328	Cal by user
Rx2 Load	Systron Doner	108328	N/A	Cal by ser
DC Block	PE8210		N/A	Cal by user
50 ohm load	Inmet 3016		N/A	Cal by user

Test limits

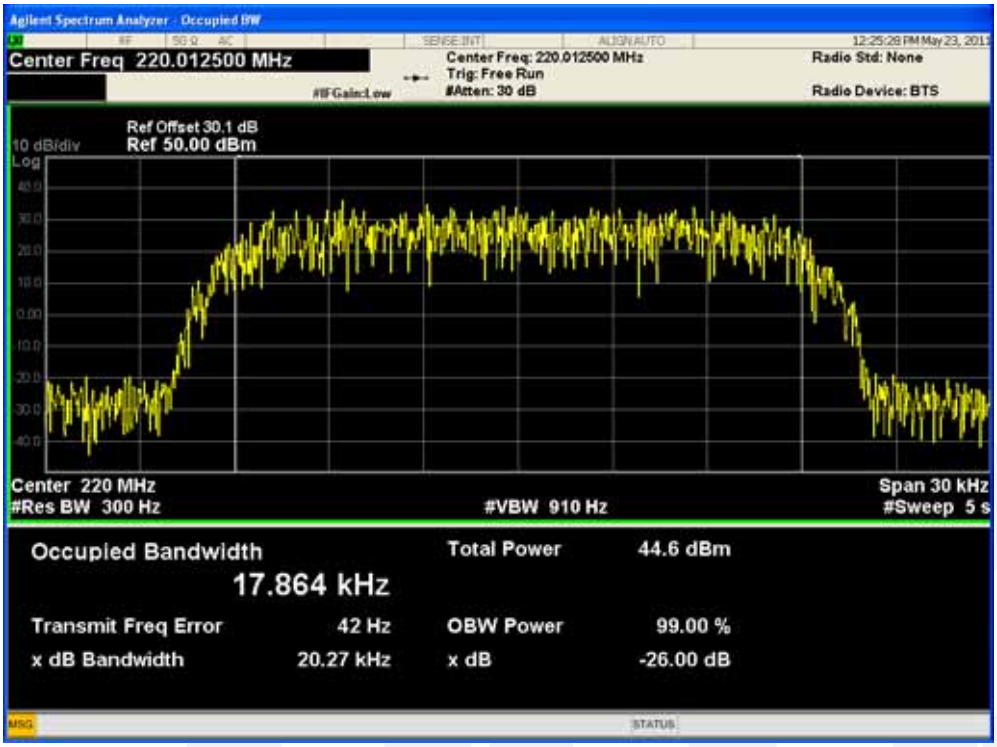
FCC 90.209 / 90.733(d)
50/25/12.5/6.25 kHz – 217-220 MHz – N/A
20 kHz – 220-222 MHz

RSS-119 5.5 / SRSP-512 (4.1.5)
11.25 kHz – 217-218 MHz – N/A
11.25 kHz – 219-220 MHz – N/A
20 kHz – 220-222 MHz

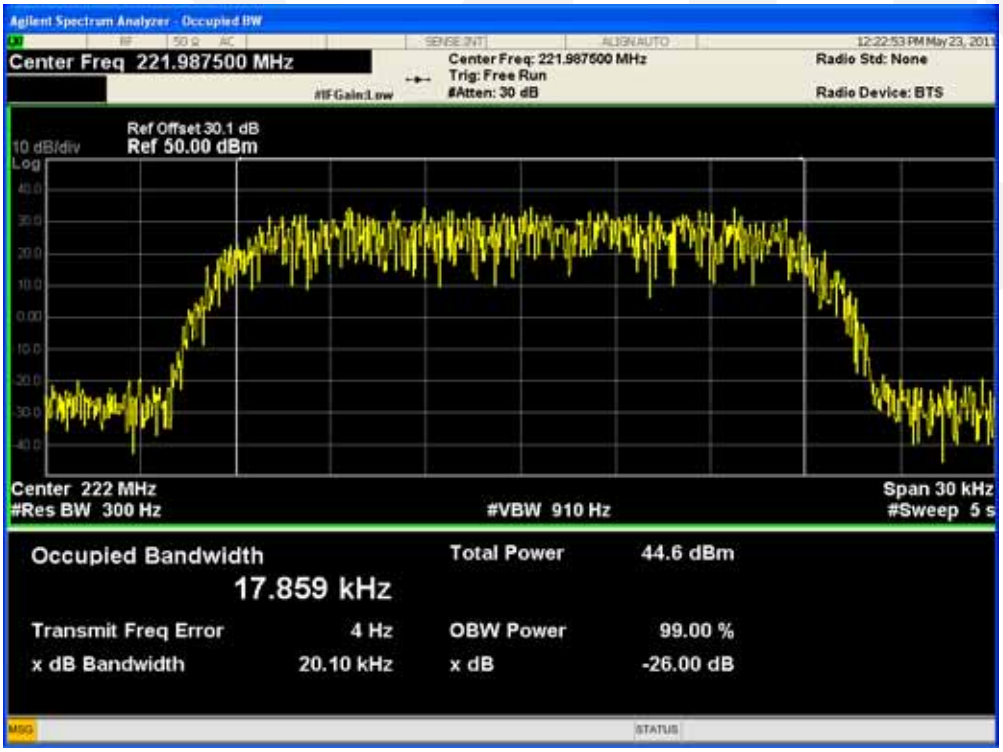
Test Data
Measurement Summary: Occupied Bandwidth

Frequency (MHz)	DQPSK (kHz)	DQPSK_HALF (kHz)
220.0125	17.864	8.920
221.9875	17.859	8.860

See following pages



Tx port-Transmit mode-Low Channel: 220.0125 MHz-Modulation: DQPSK



Tx port-Transmit mode-High Channel: 221.9875 MHz-Modulation: DQPSK

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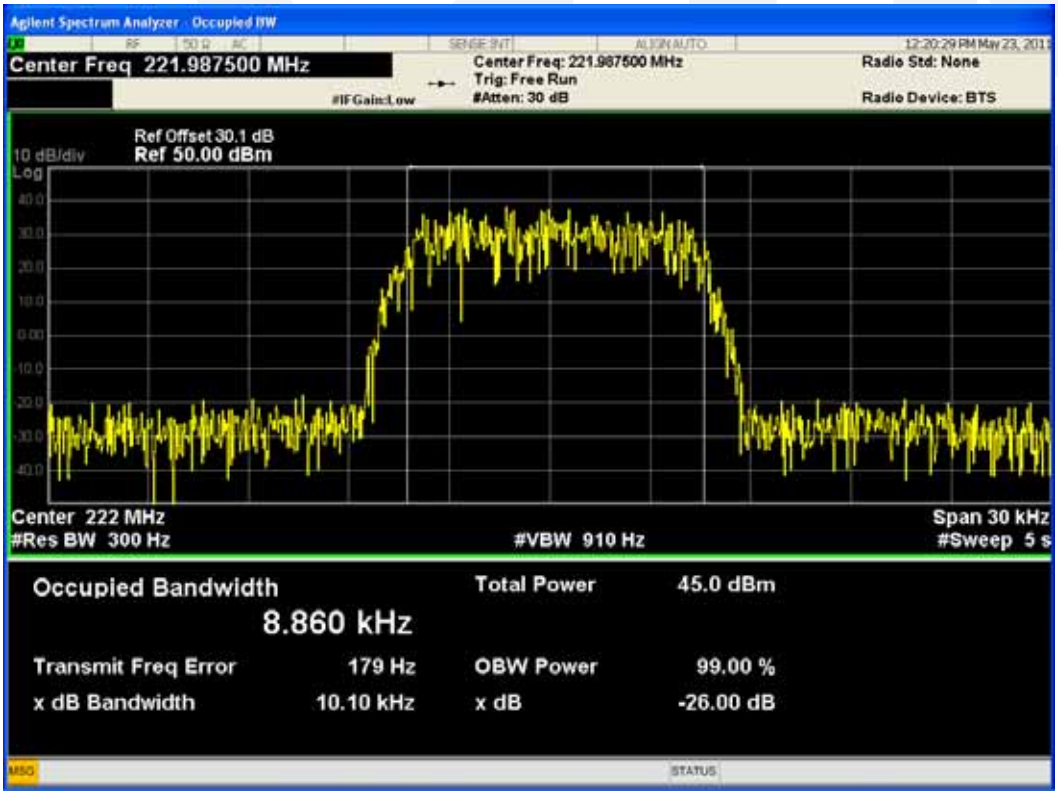
Tx port-Transmit mode-Low Channel: 220.0125 MHz-Modulation: DQPSK_HALF



Tx port-Transmit mode-High Channel: 221.9875 MHz-Modulation: DQPSK_HALF

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8.5 Spurious emissions

Test summary
The requirements are: ■ - MET ☐ - NOT MET

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
■ - Oakwood Lab (Open Area Test Site) (radiated)
■ - NextGen RF Design (conducted)

Test equipment (radiated)

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
OWLE02074	3115	Electro-Mechanics	Ridge Guide Antenna	2504	24-Feb-12
WRLE02075	3115	Electro-Mechanics	Ridge Guide Antenna	9001-3275	14-Jan-12
WRLE02674	85662A	Hewlett-Packard	Analyzer Display	2050A02007	05-Nov-11
WRLE02690	8568B	Hewlett-Packard	Spectrum Analyzer	2430A00930	05-Nov-11
WRLE02680	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00343	15-Jun-11
OWLE02671	8447D	Hewlett-Packard	Preamplifier	2648A04942	Code B 05-Jan-12
WRLE03958	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0002	Code B 05-Jan-12
WRLE03204	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	21-Apr-12
WRLE03333	SME03	Rohde & Schwarz	Signal Generator	100003	18-Oct-11

Schwarzbeck VHAP/UHAP precision dipoles

Test equipment (conducted)

	Vendor	Model	Serial Number	Cal Date / Cal Due Date
Spectrum Analyzer	Agilent	PSA N9030A	US4S230321	03-03-2011 / 04-21-2012
Power Supply	HP/Agilent	6030A	2934A-01826	12-16-2010 / 07-07-2011
Computer	Dell	XPS M170	36134745733	N/A
30 dB power attenuator	Weinschel	5009	MA907	Cal by user
Multimeter	Fluke	87V	86670404	04/21/2011 – 04/21/2012
Rx1 Load	Weinschel	2-40	T1328	Cal by user
Rx2 Load	Systron Doner	108328	N/A	Cal by ser
DC Block	PE8210		N/A	Cal by user
50 ohm load	Inmet 3016		N/A	Cal by user
100 MHz Lowpass Filter	Microlab	LC-01N 100 Mc	NGRF-F01	Cal by user

Test limits

FCC 90.210
Mask B, -13 dBm – N/A
Mask F, -25 dBm

RSS-119 5.8
Mask D/J, -20 dBm – N/A
Mask F, -25 dBm

Test Data
See following pages

Radiated – case radiation per 2.1053

Below 1 GHz

Measurement summary for limit2: 47CFR 90.210 RE (Pk)					
FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	FINAL (dBm)
443.909 MHz	76.25 Pk	2.25 / 16.46 / 24.79 / 0.0	70.17	H / 1.00 / 75	-27
435.157 MHz	76.2 Pk	2.23 / 16.3 / 24.87 / 0.0	69.86	H / 1.00 / 70	-27
652.772 MHz	56.35 Pk	2.95 / 19.54 / 24.73 / 0.0	54.11	V / 1.20 / 100	-43
887.864 MHz	52.45 Pk	3.45 / 22.48 / 24.67 / 0.0	53.71	V / 1.60 / 205	-43
870.393 MHz	43.1 Pk	3.42 / 22.31 / 24.64 / 0.0	44.19	V / 1.20 / 275	-53
665.896 MHz	45.65 Pk	2.98 / 19.72 / 24.76 / 0.0	43.59	V / 1.00 / 350	-53

≥ 1 GHz

Measurement summary for limit2: FCC B >1G 3 M peak (Pk)					
FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	FINAL (dBm)
1.11 GHz	80.0 Pk	3.77 / 25.08 / 51.12 / 0.0	57.73	V / 1.00 / 175	-39
2.494 GHz	64.2 Pk	6.73 / 28.57 / 49.21 / 0.0	50.3	V / 1.00 / 205	-47
1.554 GHz	69.1 Pk	4.48 / 26.24 / 51.18 / 0.0	48.64	V / 1.00 / 0	-48
1.11 GHz	70.75 Pk	3.77 / 25.08 / 51.12 / 0.0	48.48	H / 1.00 / 90	-48
4.0 GHz	53.25 Pk	9.41 / 32.25 / 48.27 / 0.0	46.64	V / 1.00 / 230	-50

Testing was performed in accordance with the test procedure of ANSI TIA-603-C, clause 2.2.13 and 2.2.17

The radiated case spurious emissions were measured using a substitution method. A sample calculation is given below:

70.17 dBuV/m @ 3 m @ 443.9 MHz= -27 dBm erp
(signal generator – cable attenuation = -18.64 dBm + antenna gain of -8.36 dBd)

The Schwarzbeck VHAP/UHAP-E precision dipoles come with built in attenuators to provide a height impedance matching of the dipoles. The ideal, lossless half-wave dipole has a gain of 2.15 dBi, VHAP-E and UHAP-E have 2.15 dBi – 10 dB + 1.64 dB = -6.21 dBi, or -8.36 dBd.

The spectrum analyzer uses a peak detector. Bandwidths used are equal to or greater than 100 Hz from 9 kHz to 150 kHz, 9 kHz from 150 kHz to 30 MHz, 100 kHz from 30 MHz to 1000 MHz, and 1 MHz from 1 GHz to 40 GHz. Video bandwidths are at least three times greater than the IF bandwidth.

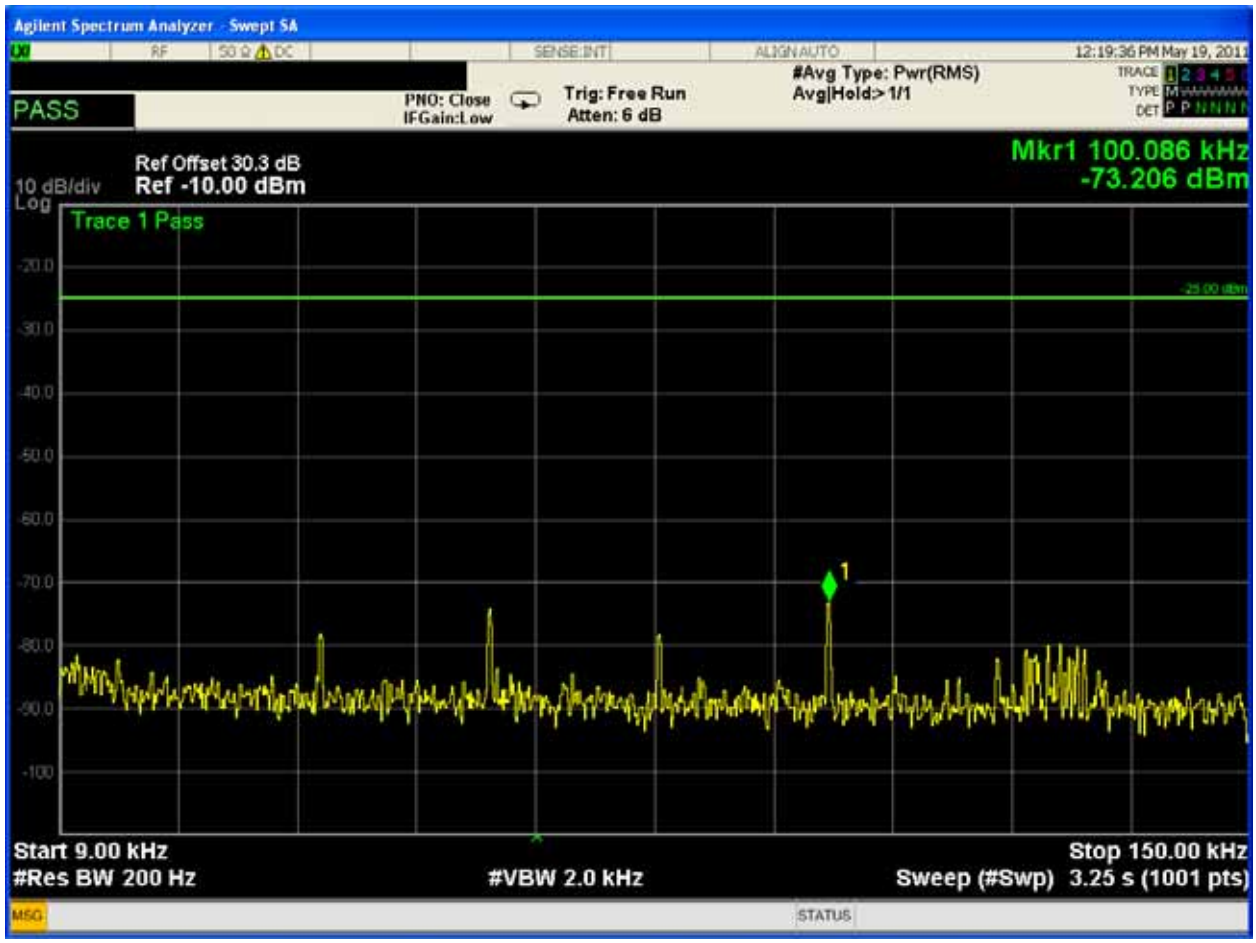
Conducted

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

Measured with 100 MHz lowpass filter in RF path

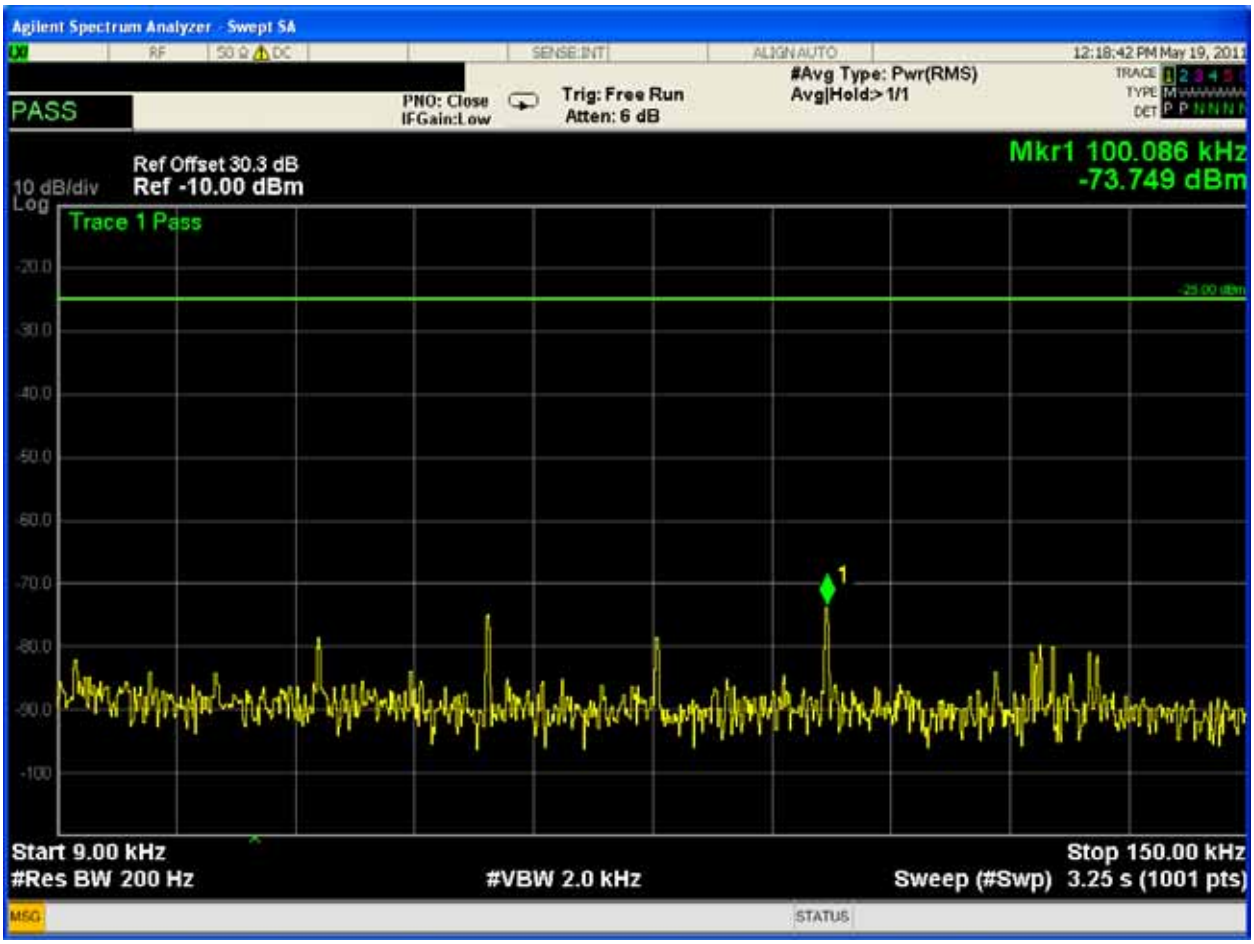
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

Measured with 100 MHz lowpass filter in RF path

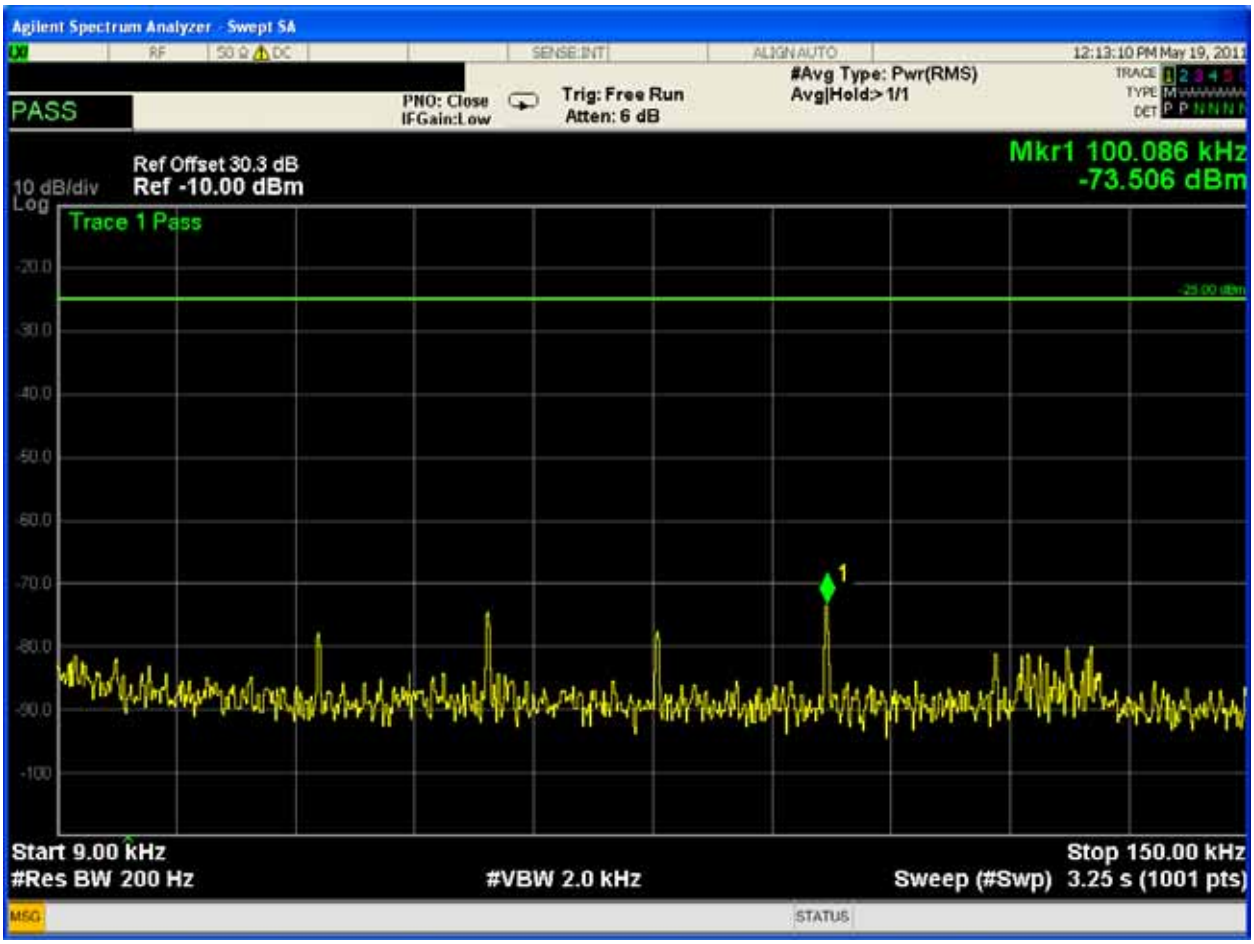
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

Measured with 100 MHz lowpass filter in RF path

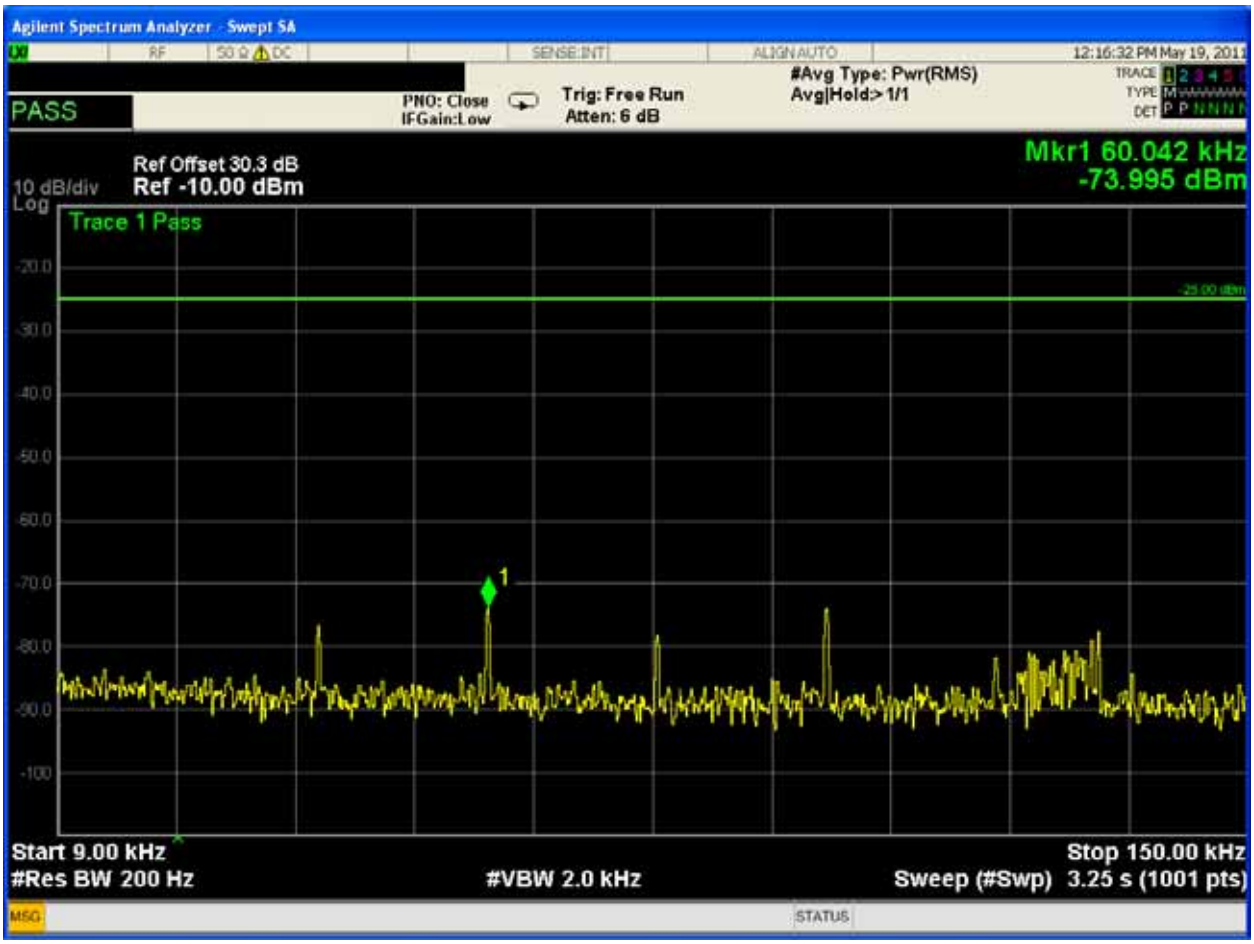
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

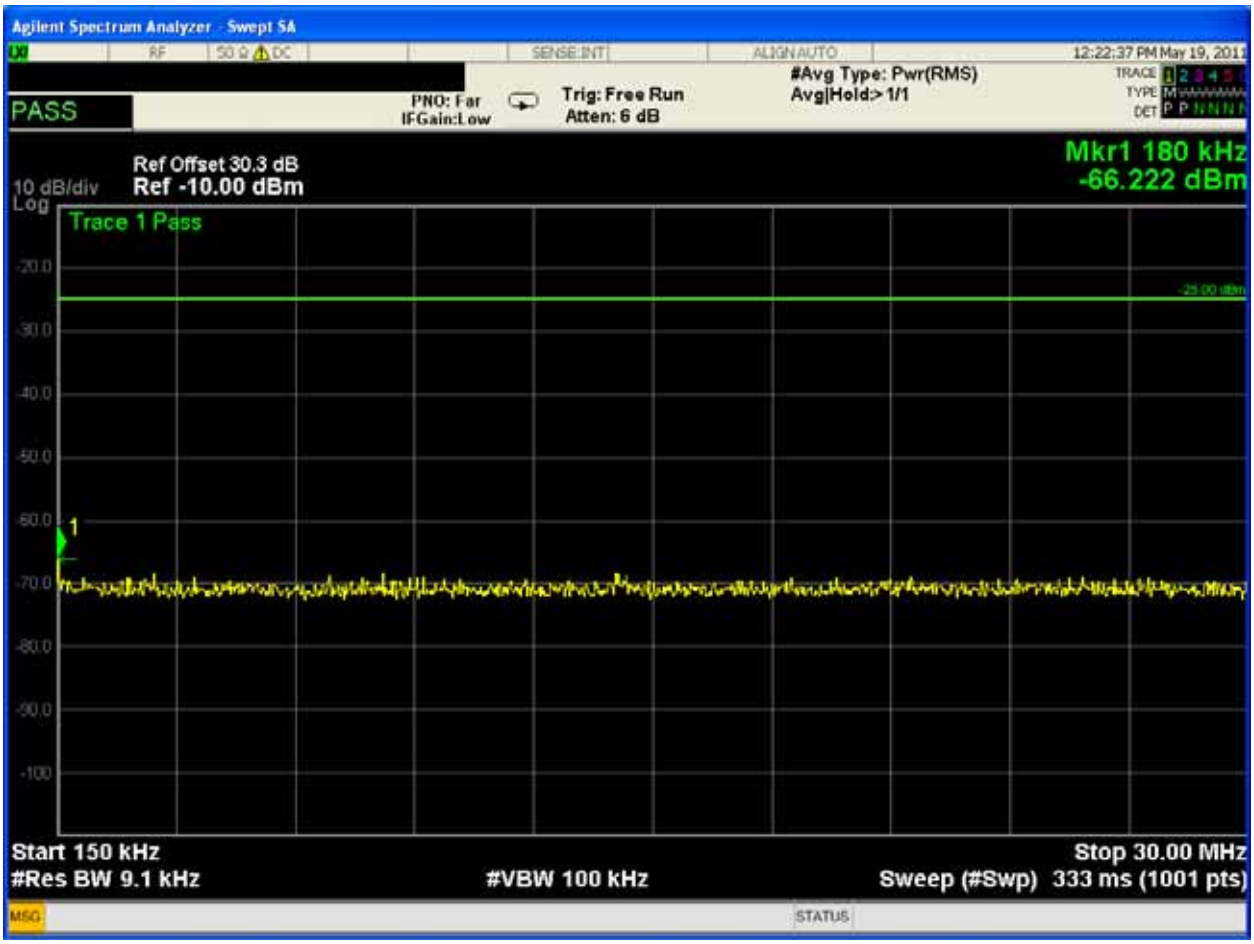
Measured with 100 MHz lowpass filter in RF path

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

Measured with 100 MHz lowpass filter in RF path

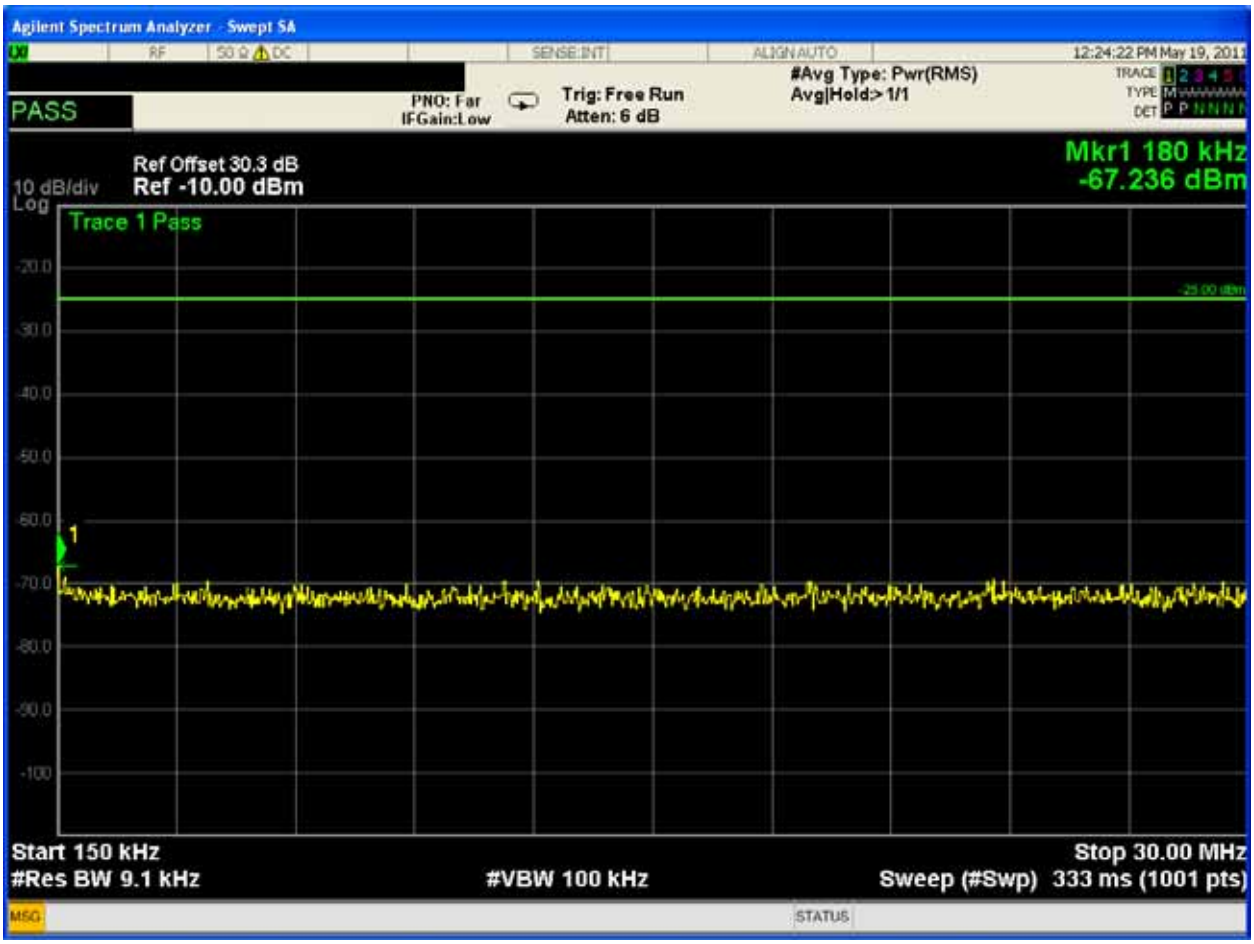
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

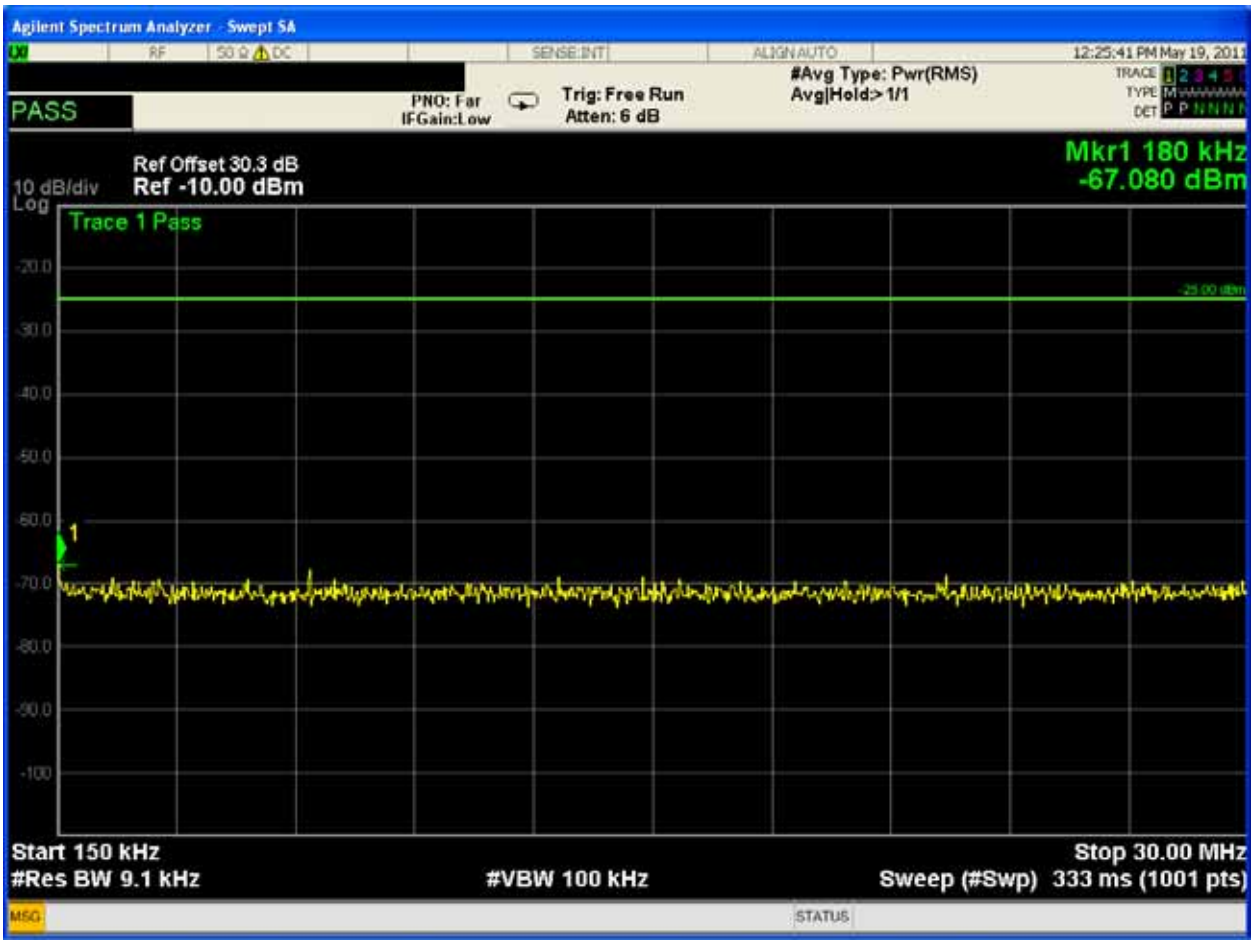
Measured with 100 MHz lowpass filter in RF path

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

Measured with 100 MHz lowpass filter in RF path

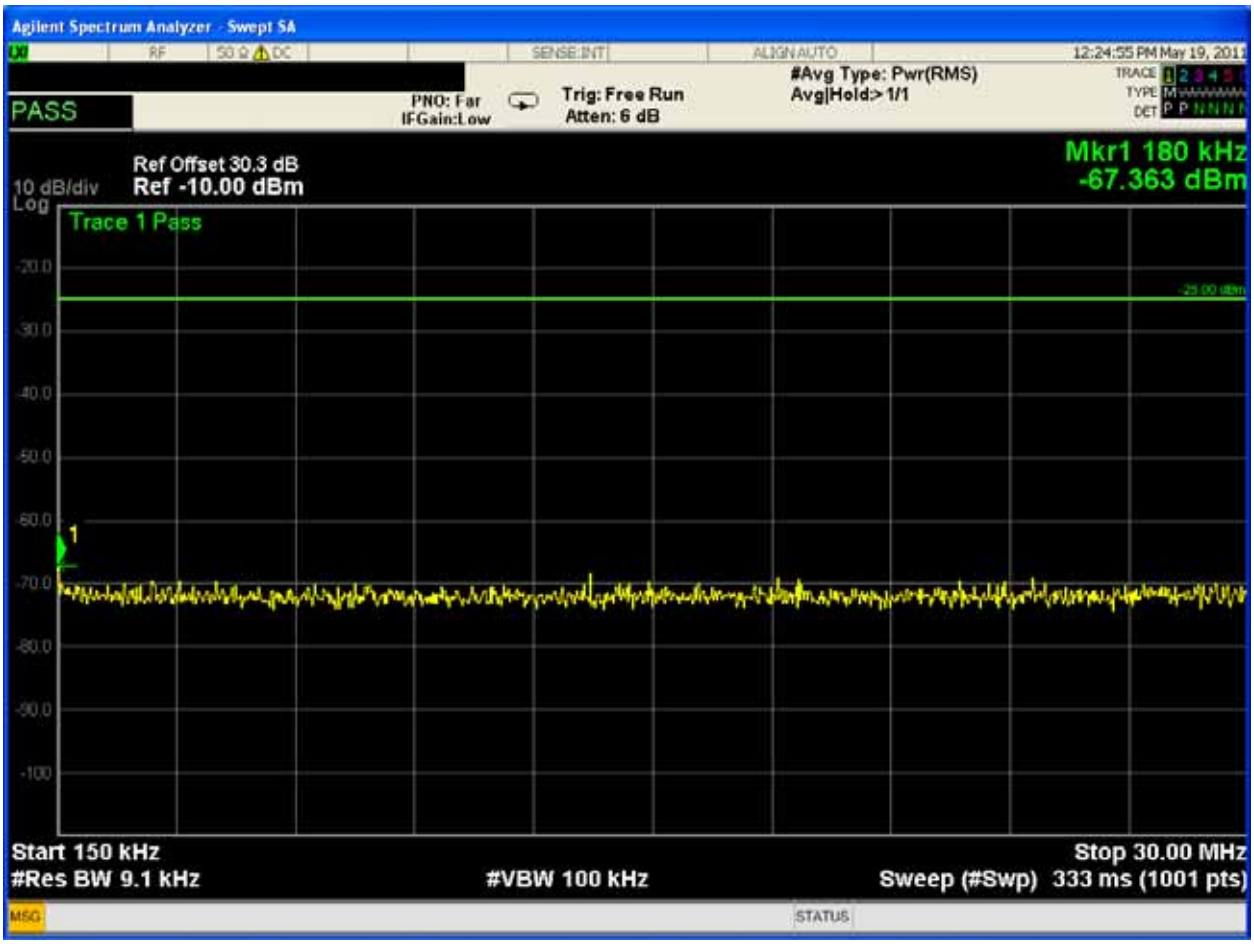
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

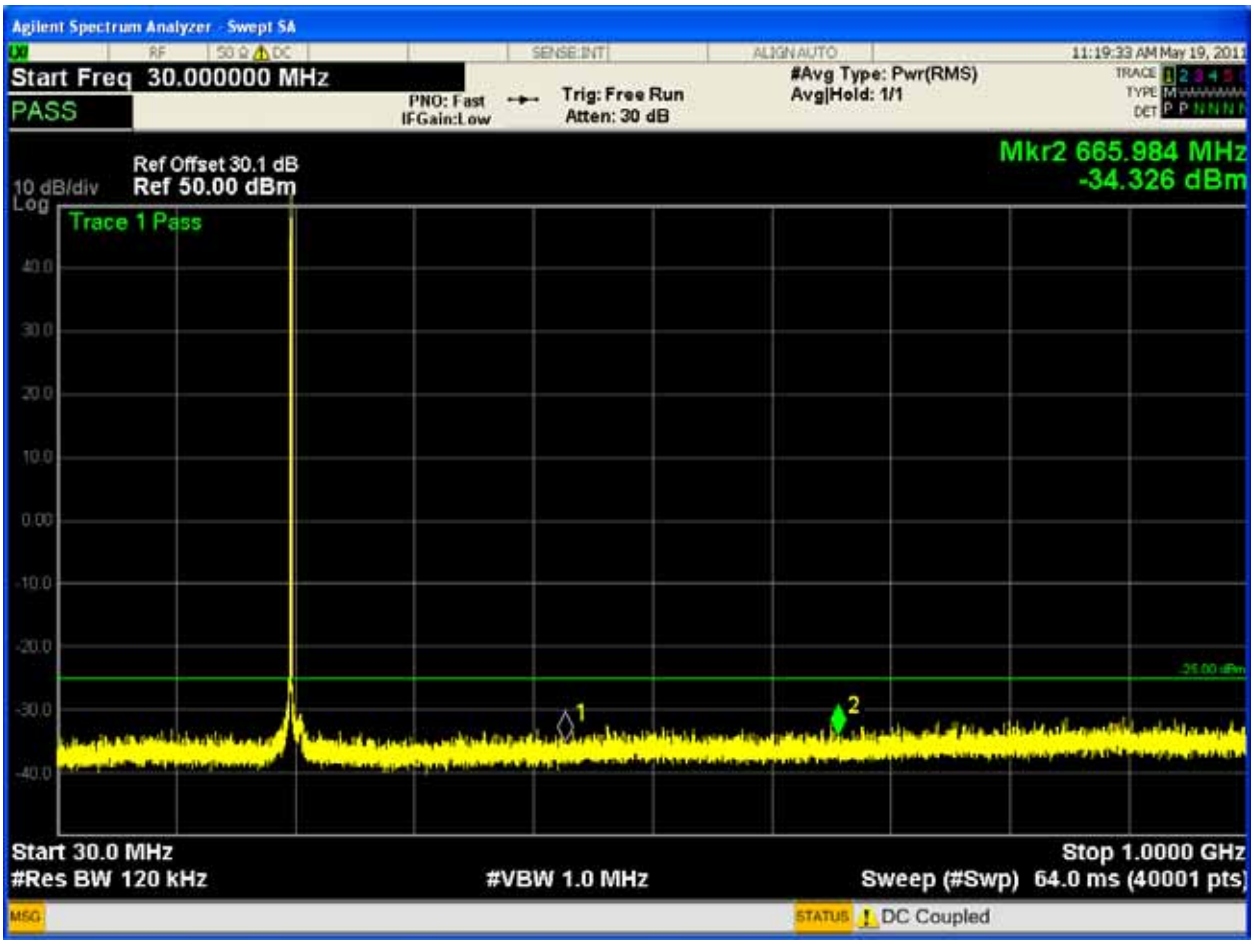
Measured with 100 MHz lowpass filter in RF path

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

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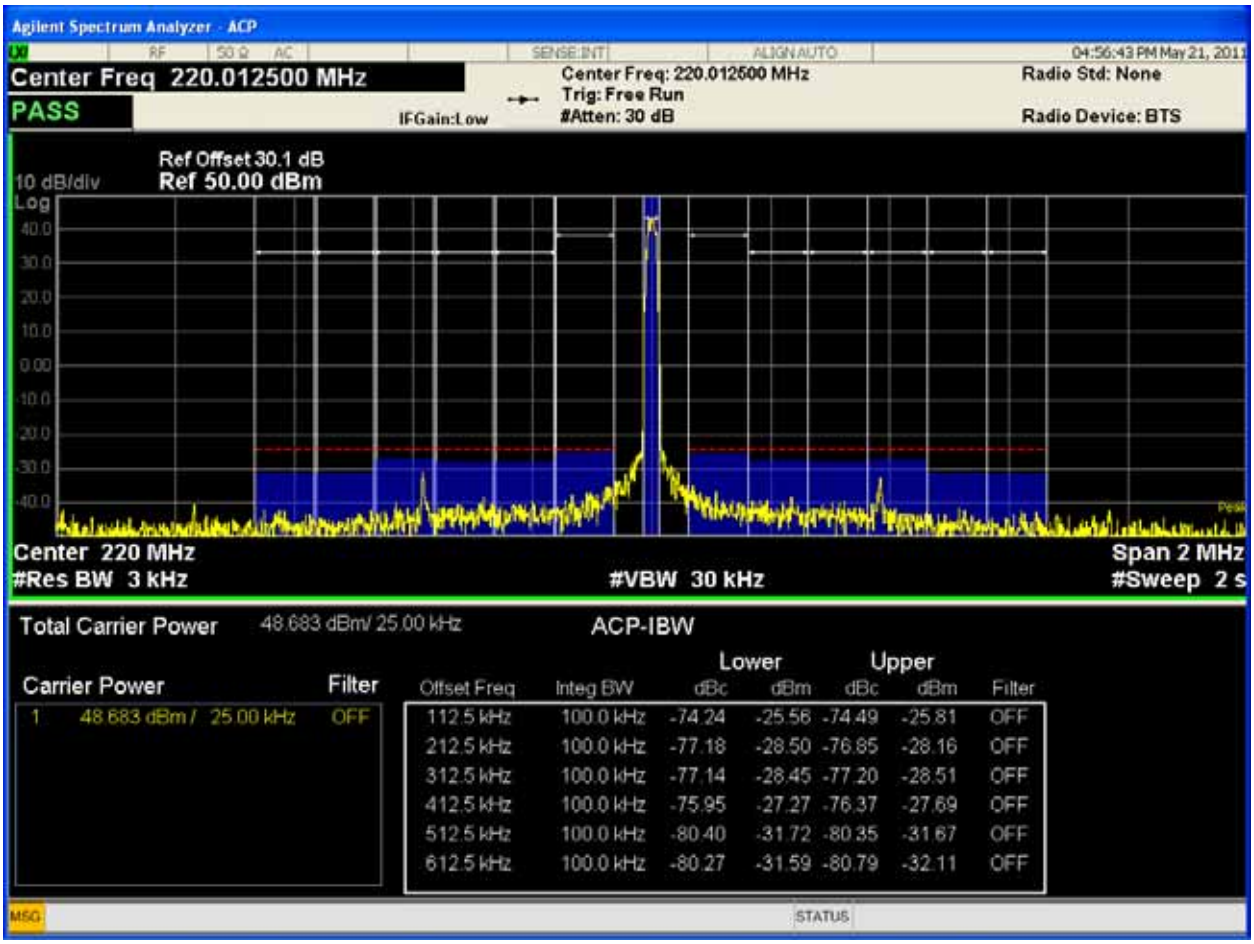
Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

Close in emissions

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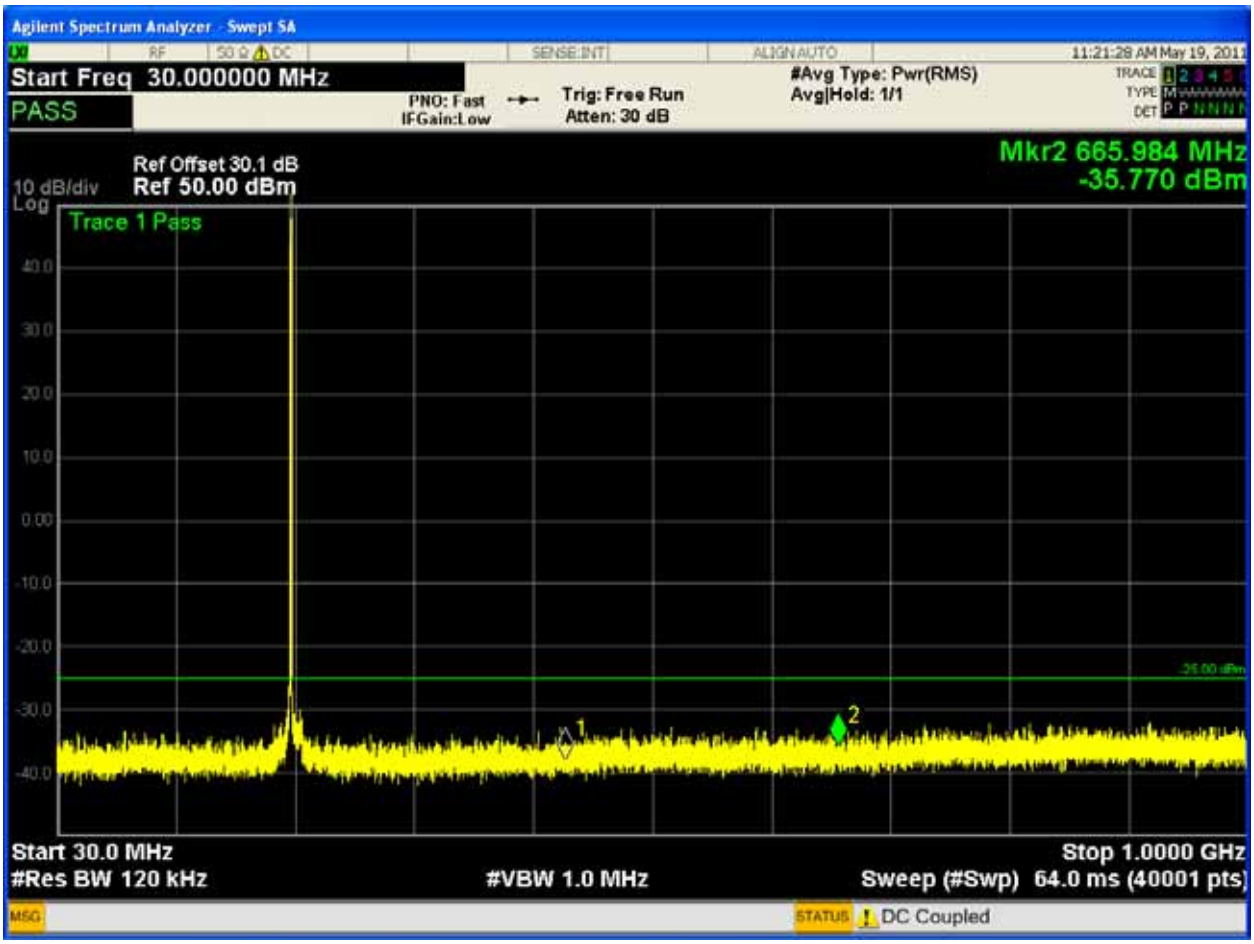
Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

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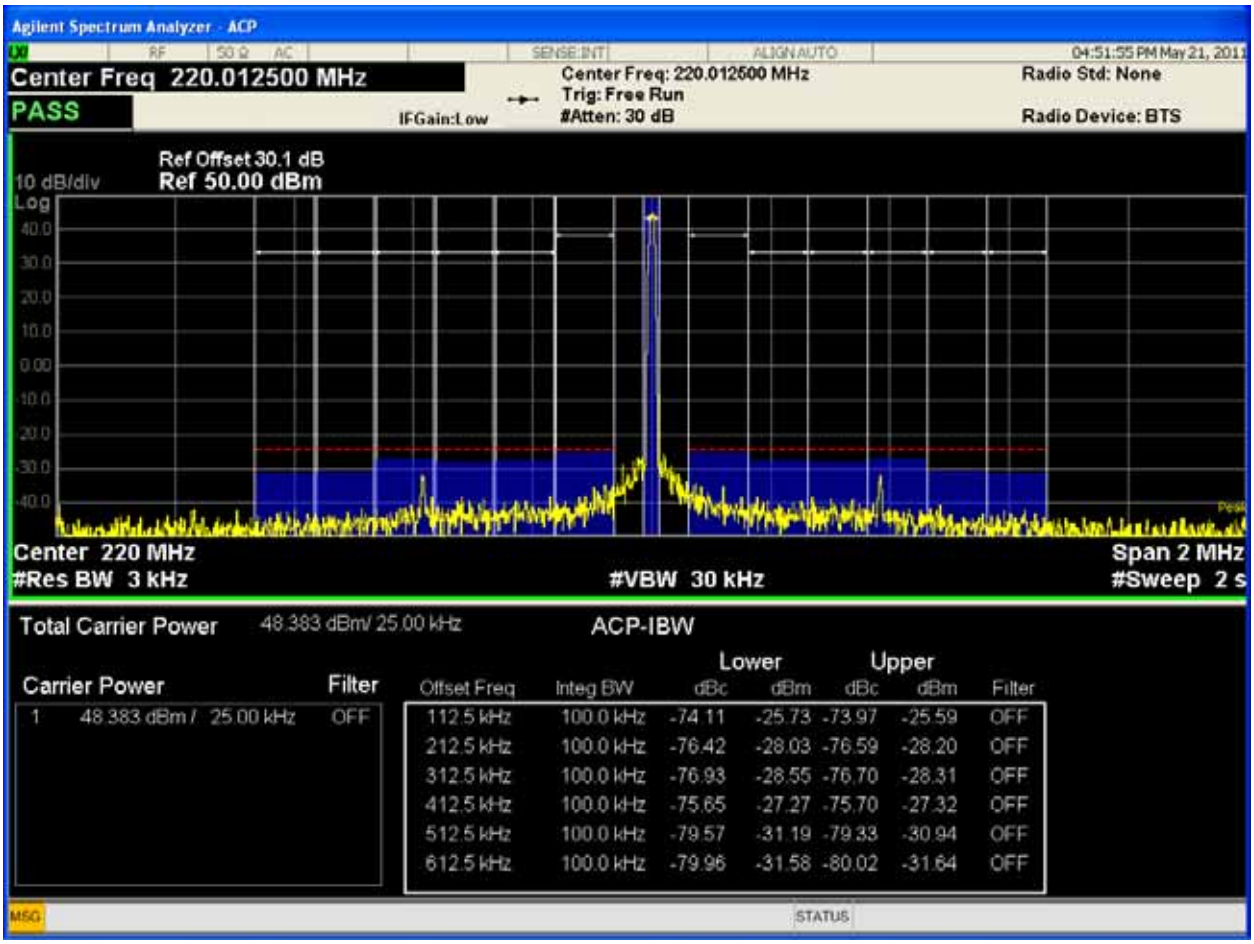
Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

Close in emissions

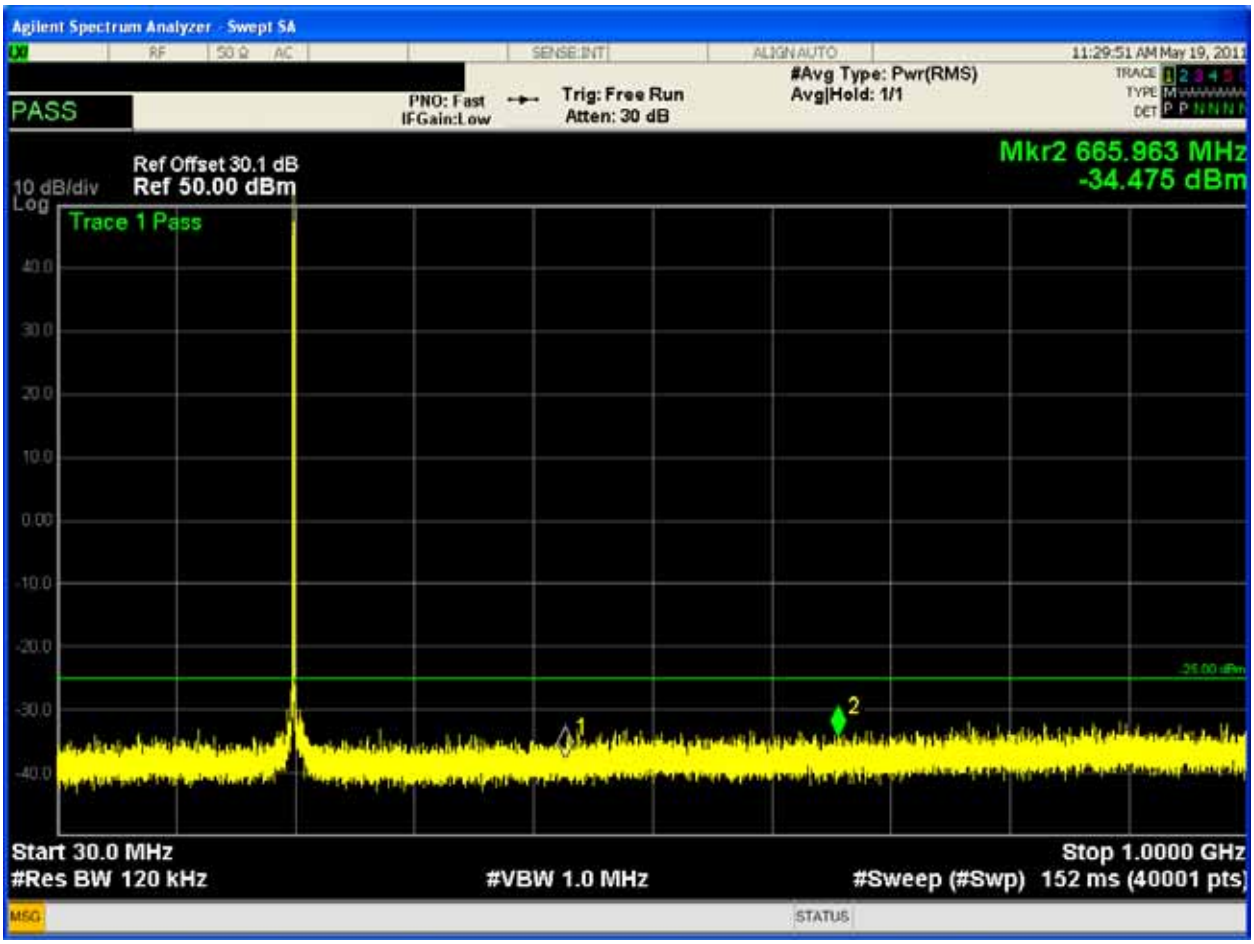
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

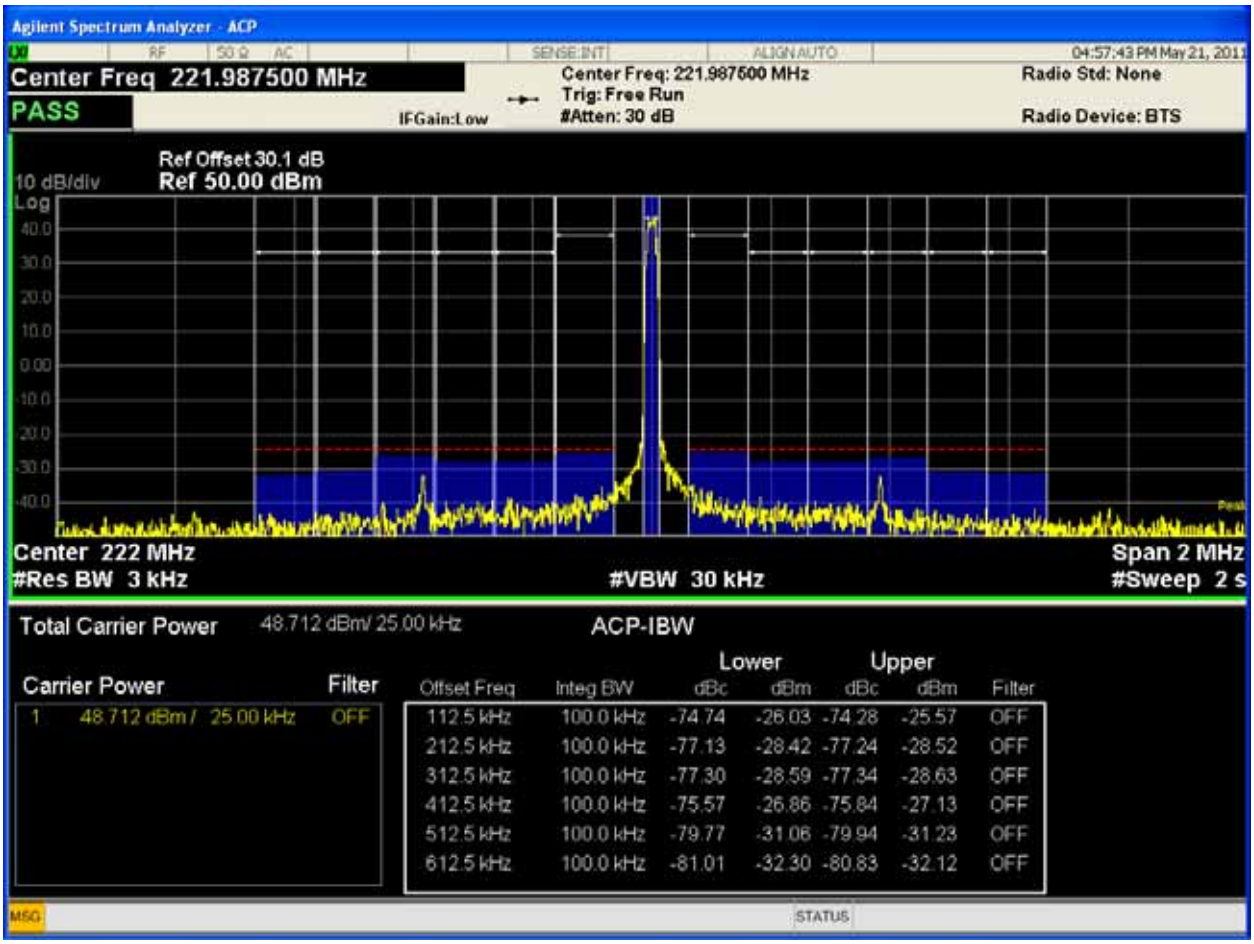
High channel: 221.9875 MHz

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

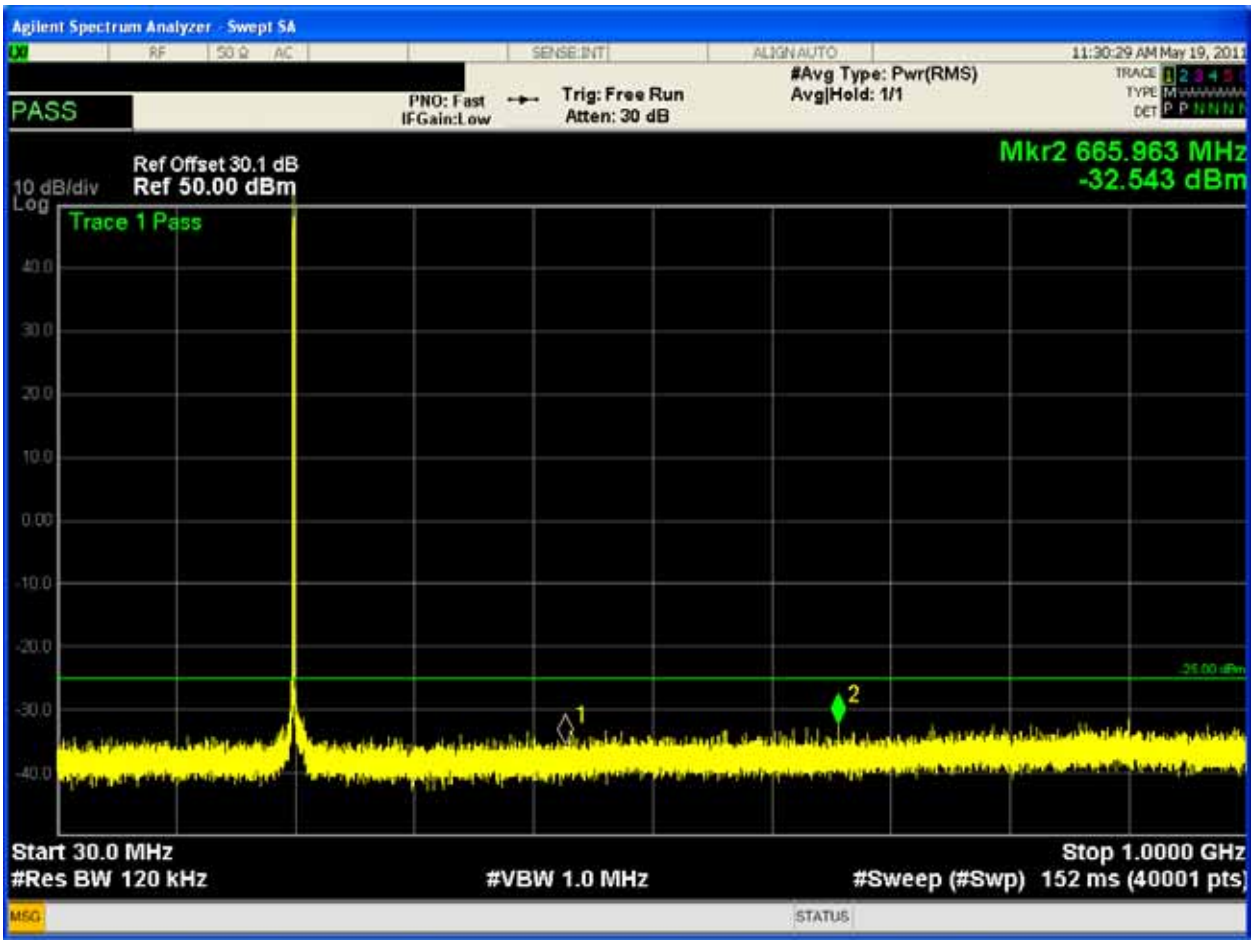
Close in emissions

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

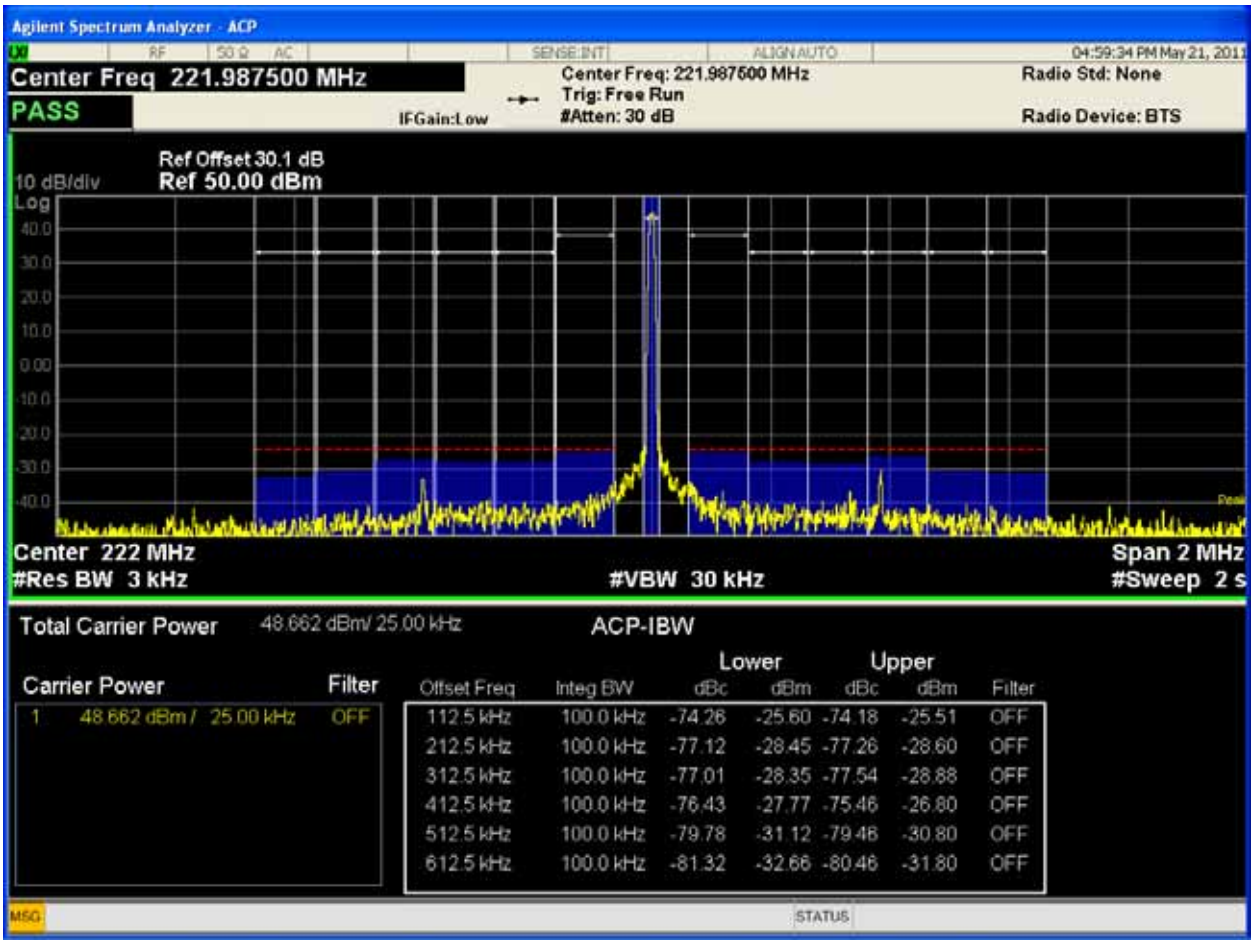
High channel: 221.9875 MHz

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

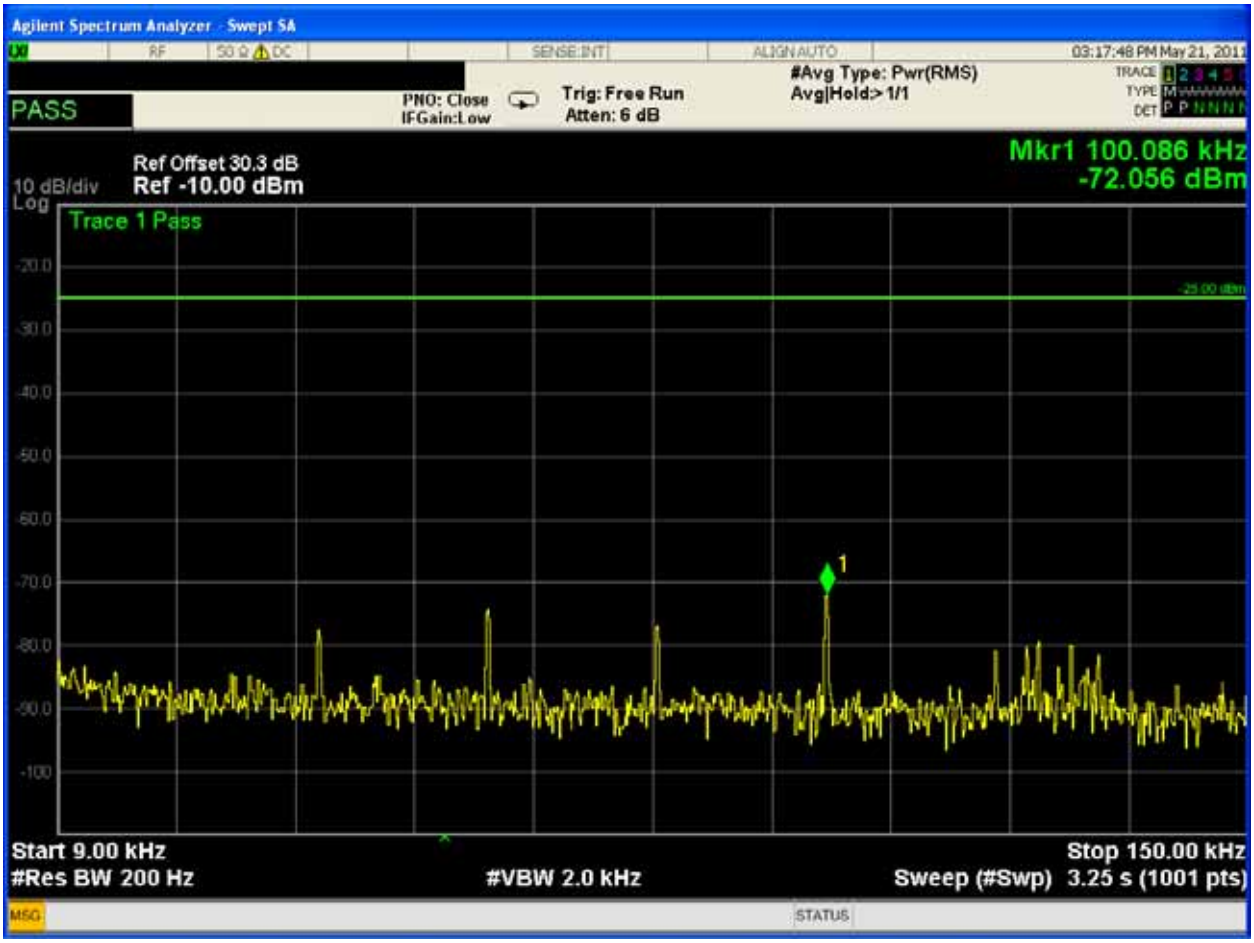
Close in emissions

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

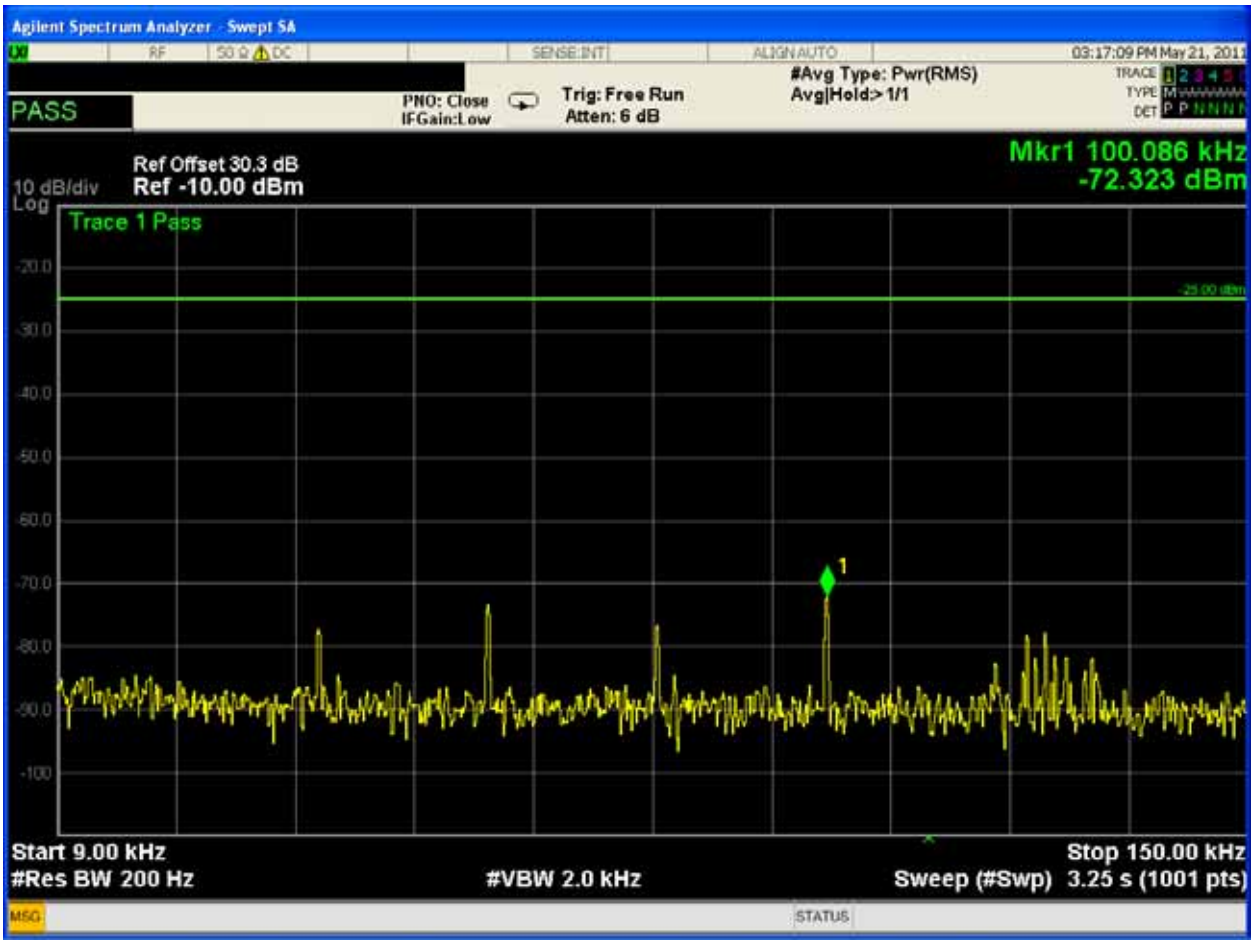
Measured with 100 MHz lowpass filter in RF path

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

Measured with 100 MHz lowpass filter in RF path

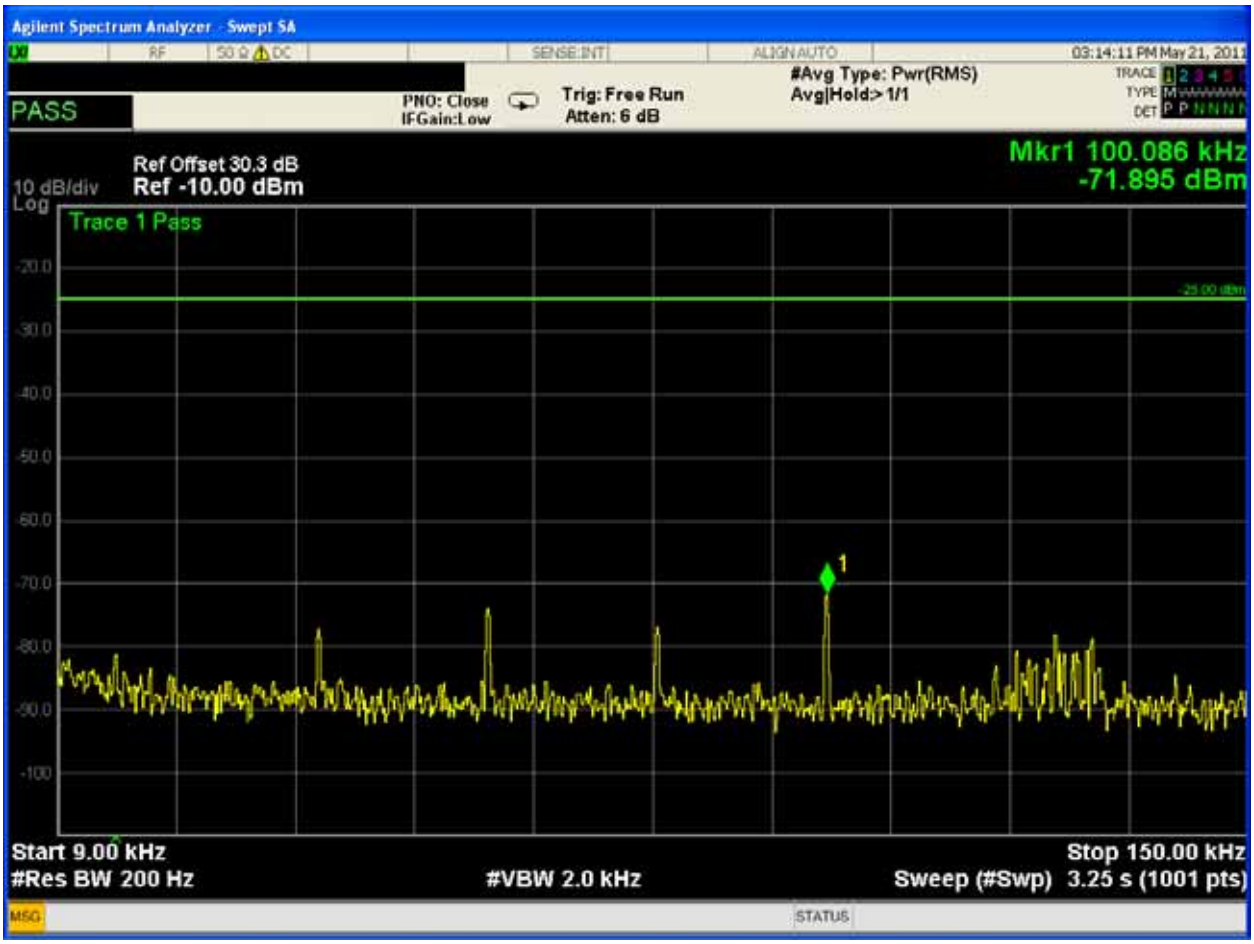
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

Measured with 100 MHz lowpass filter in RF path

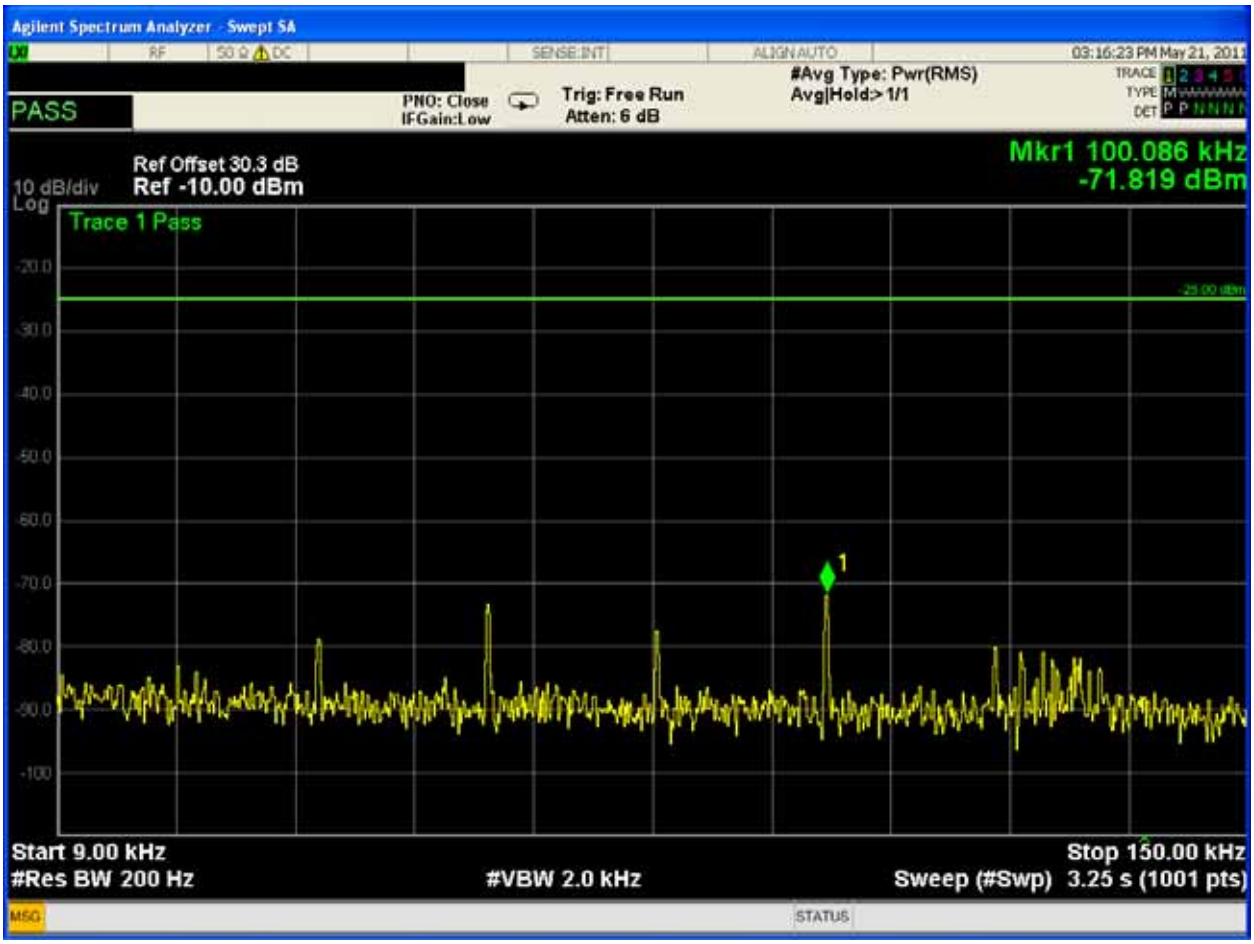
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

Measured with 100 MHz lowpass filter in RF path

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power

Modulation: DQPSK

Low channel: 220.0125 MHz

Measured with 100 MHz lowpass filter in RF path

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Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power

Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

Measured with 100 MHz lowpass filter in RF path

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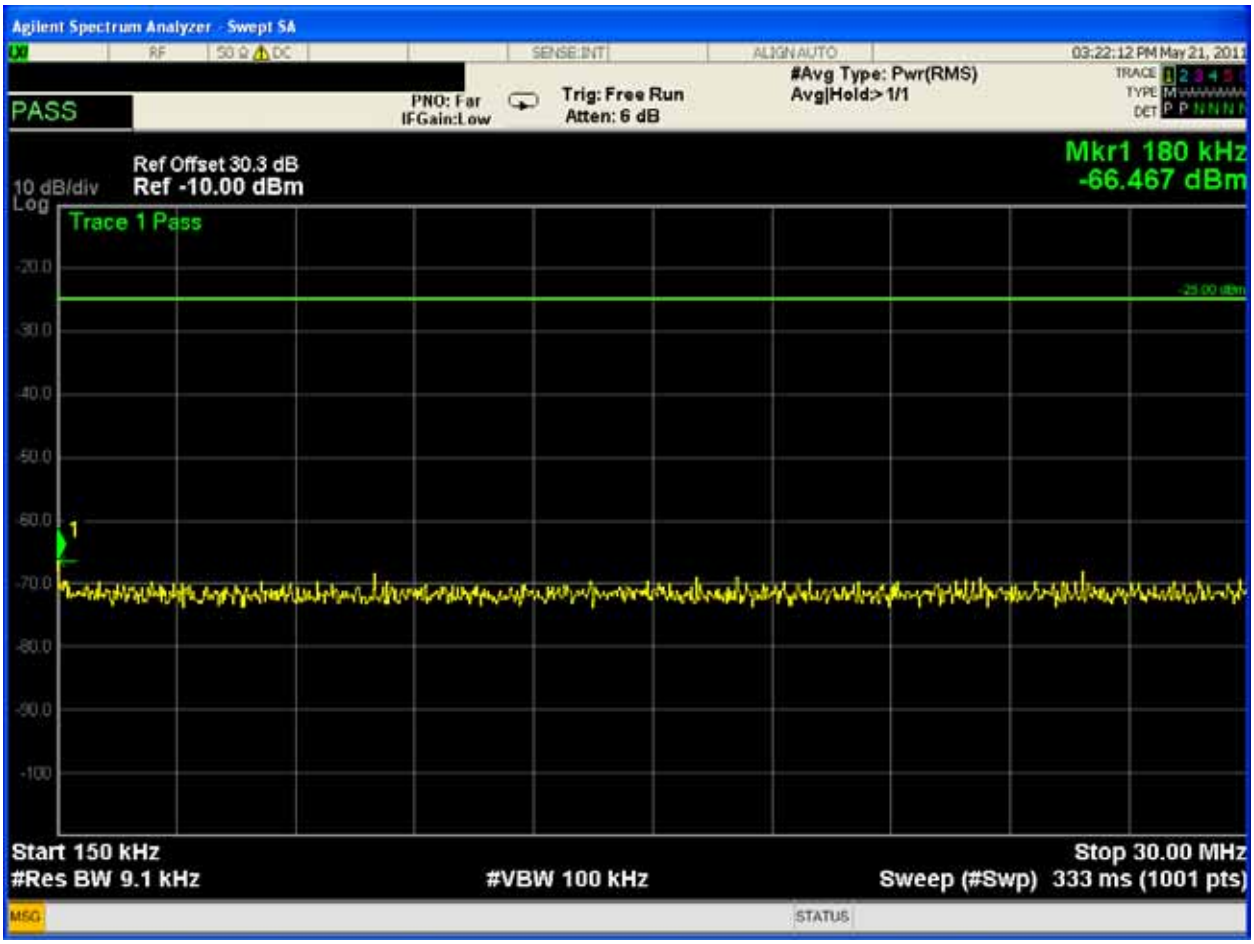
Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

Measured with 100 MHz lowpass filter in RF path

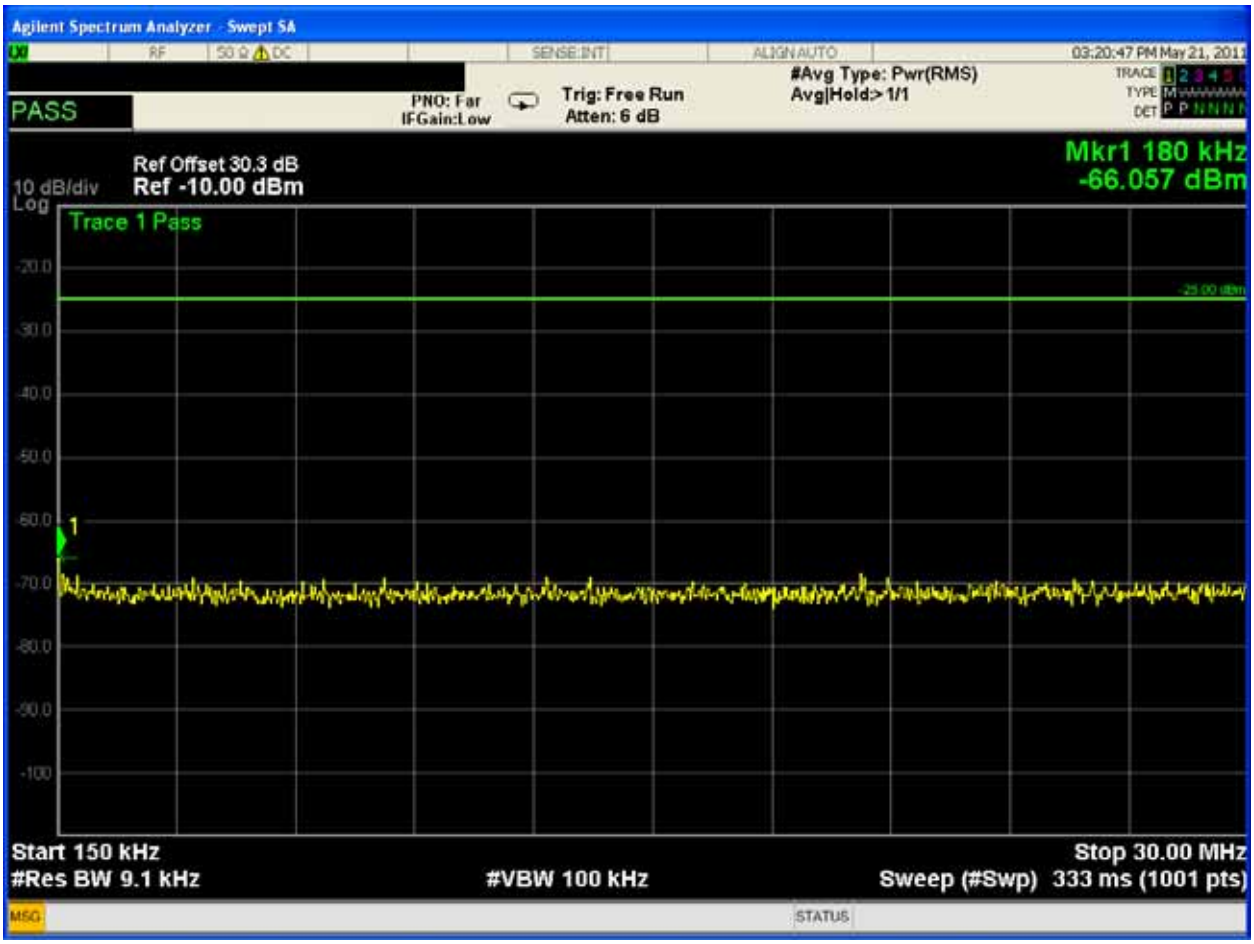
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

Measured with 100 MHz lowpass filter in RF path

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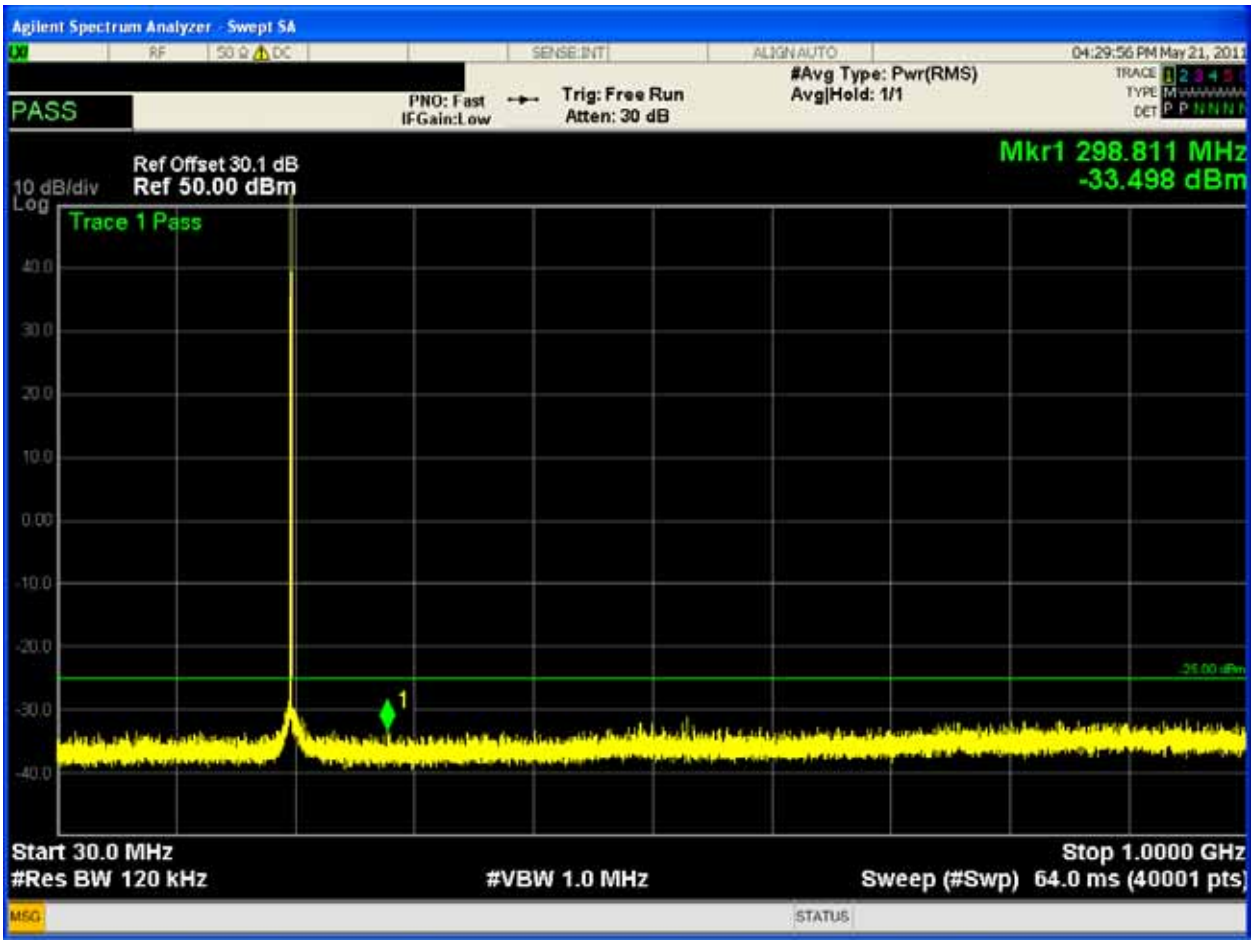
Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

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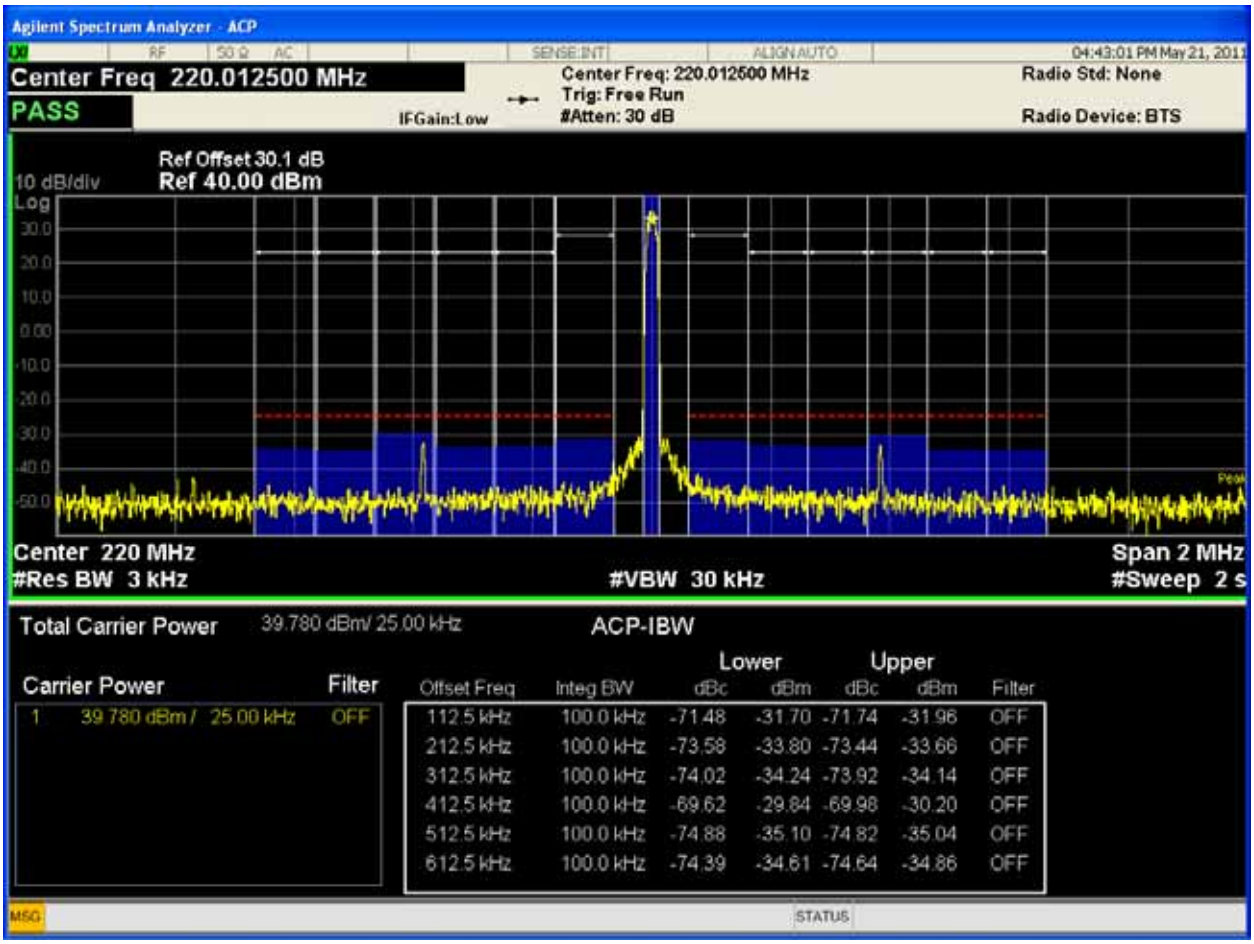
Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

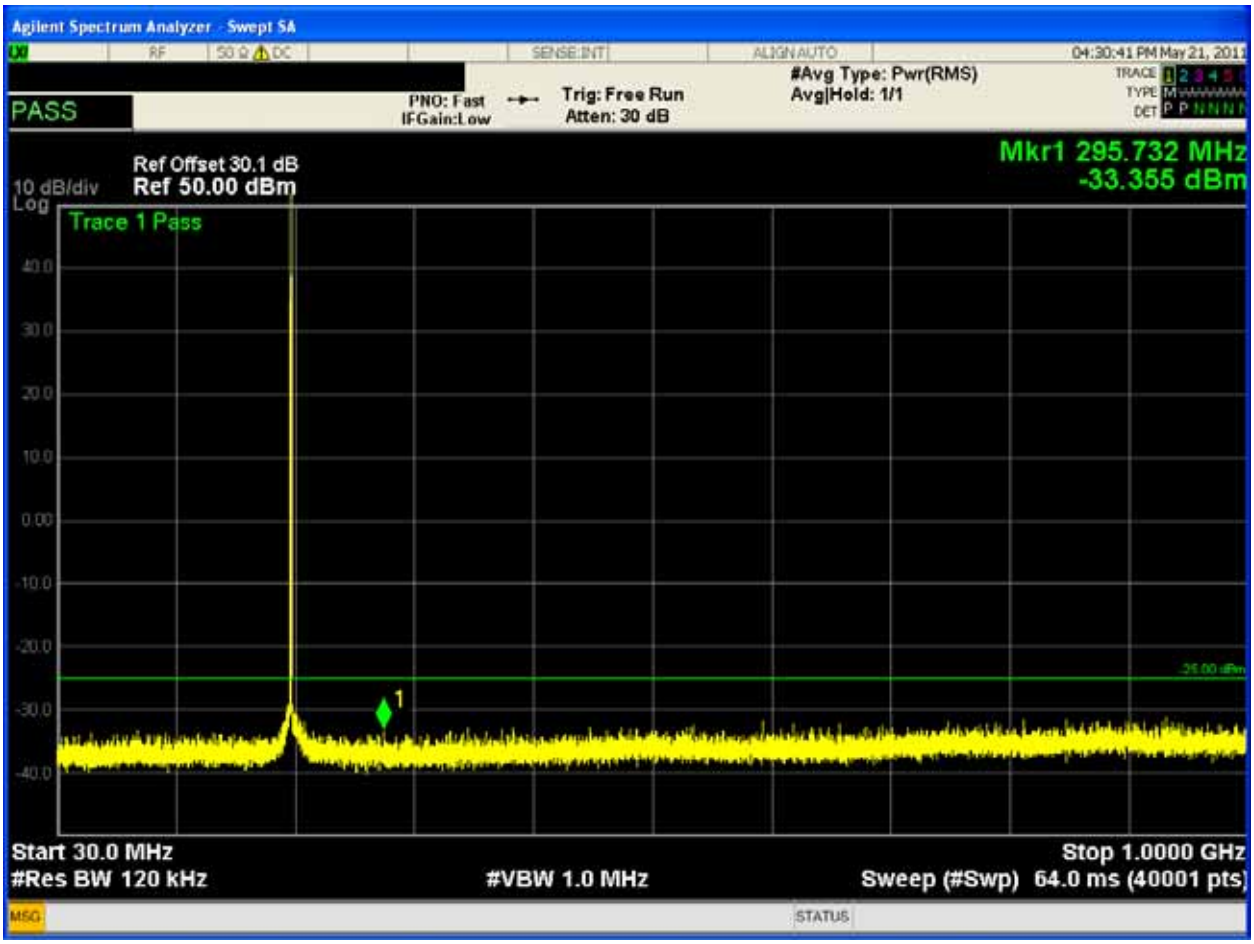
Close in emissions

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

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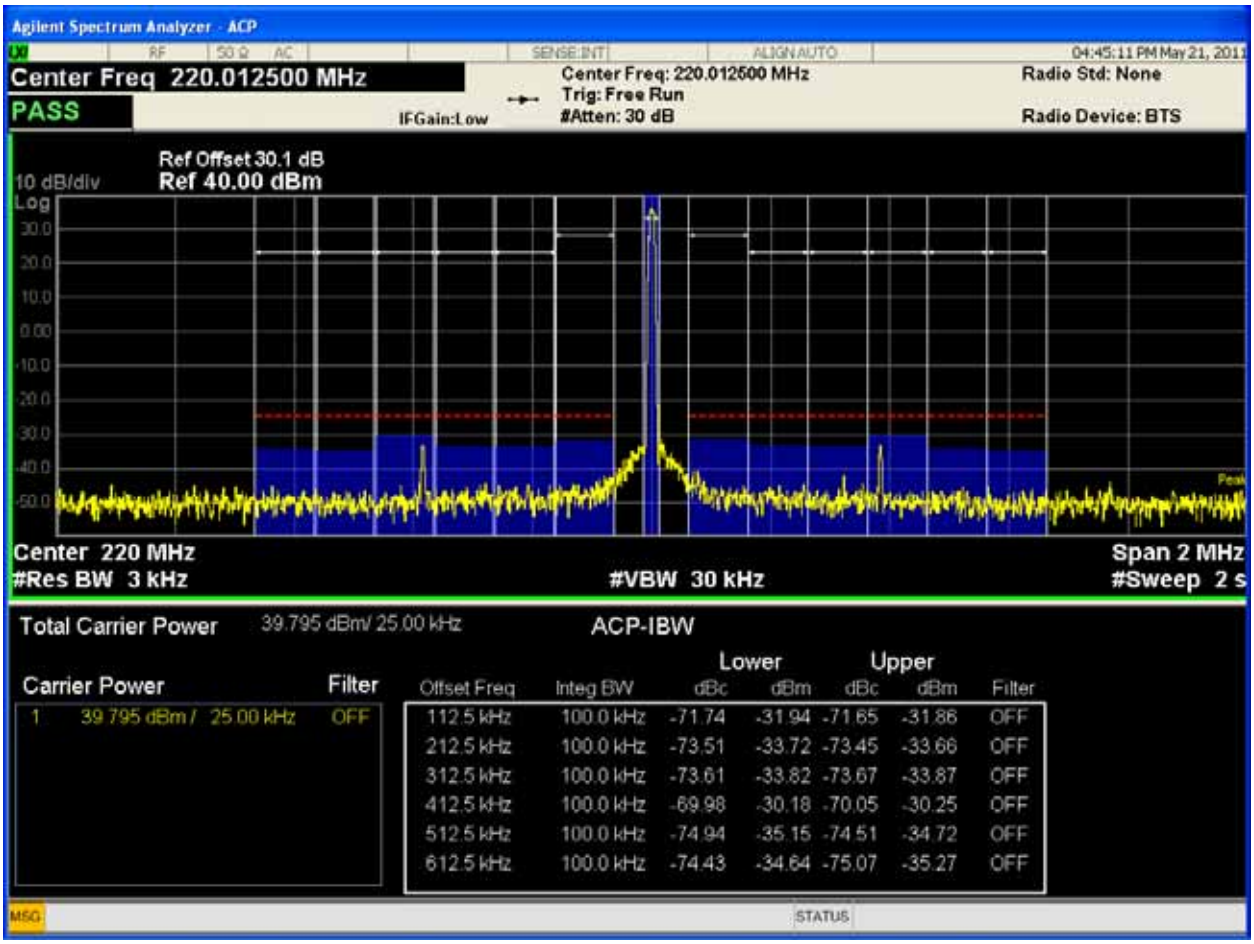
Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

Close in emissions

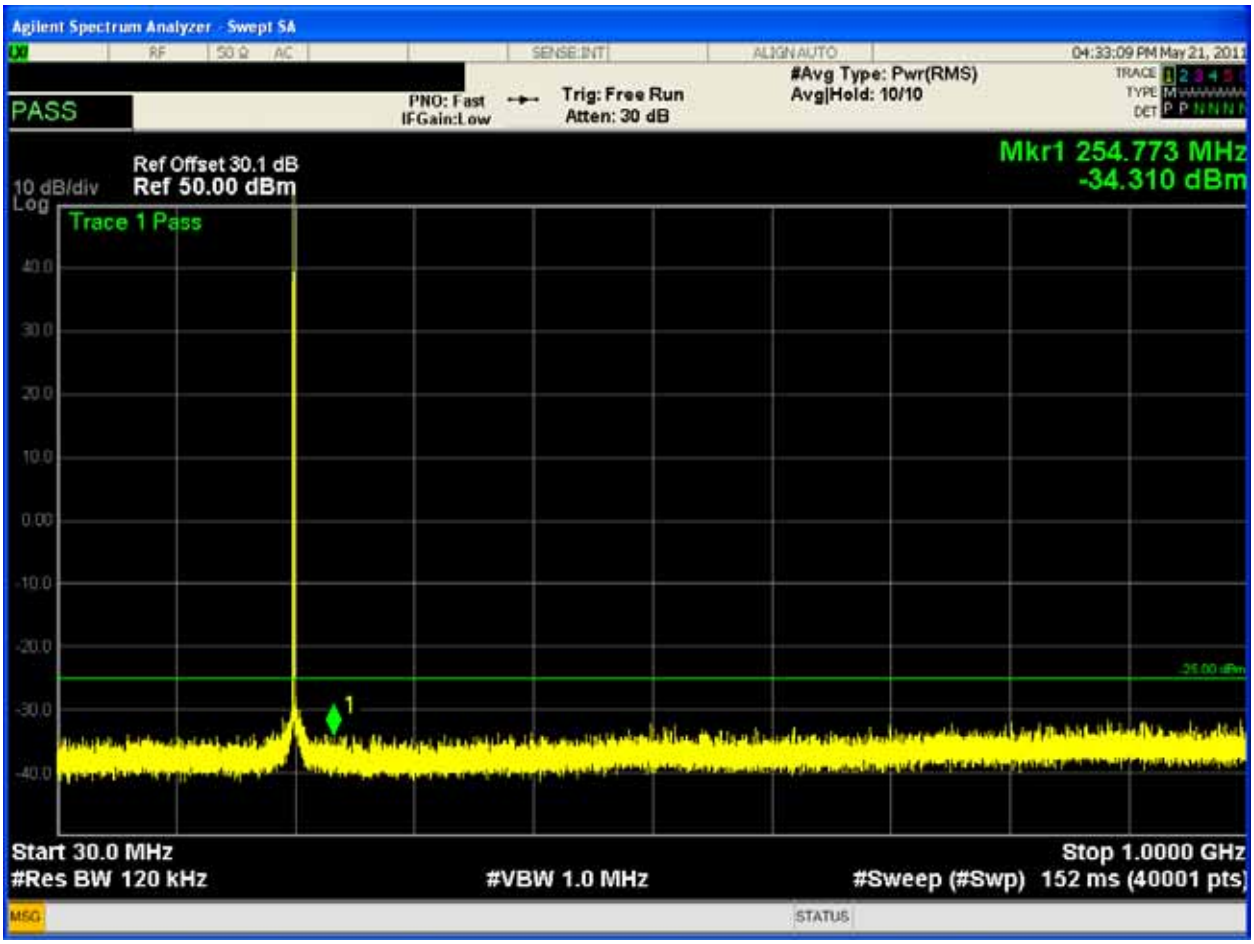
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

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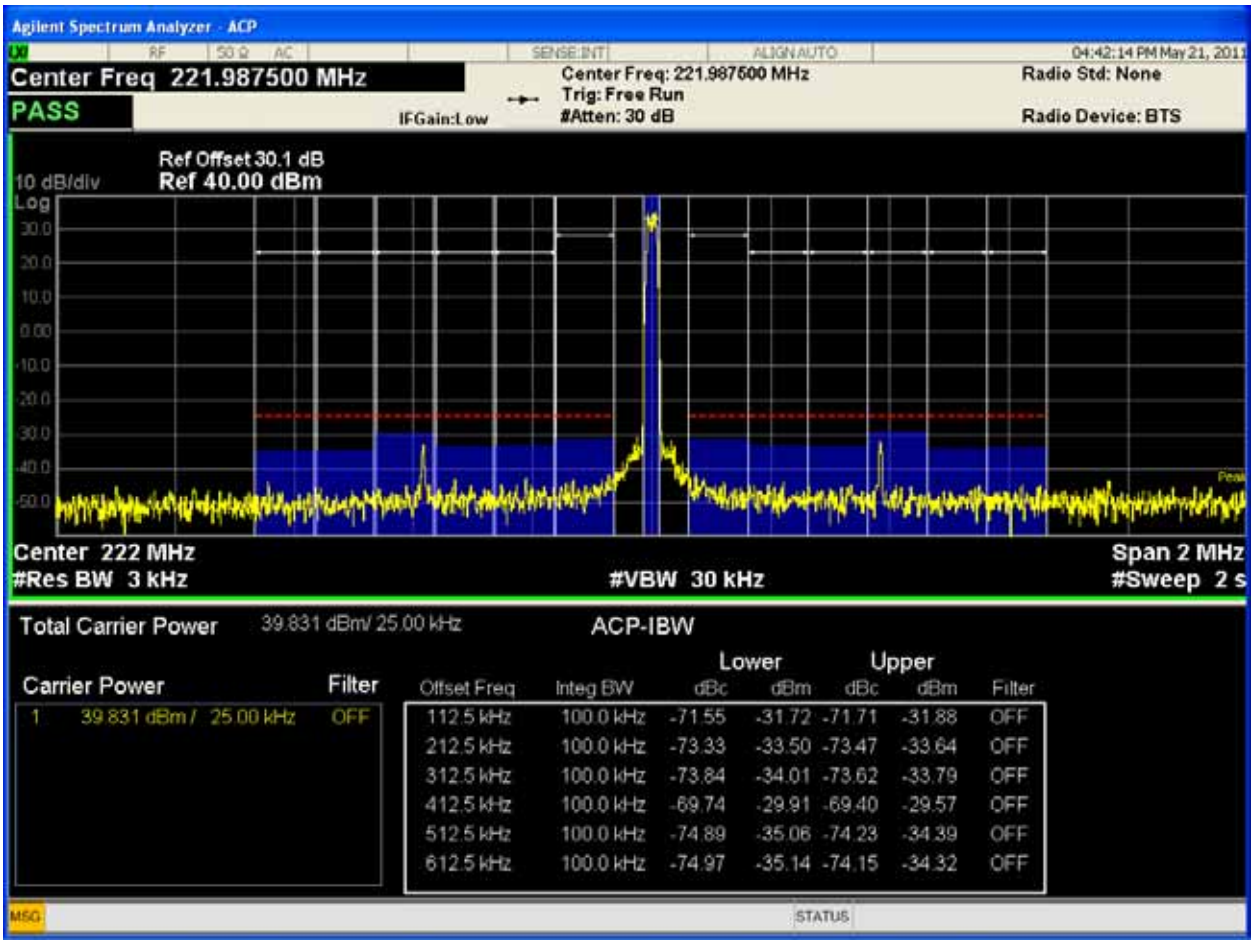
Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

Close in emissions

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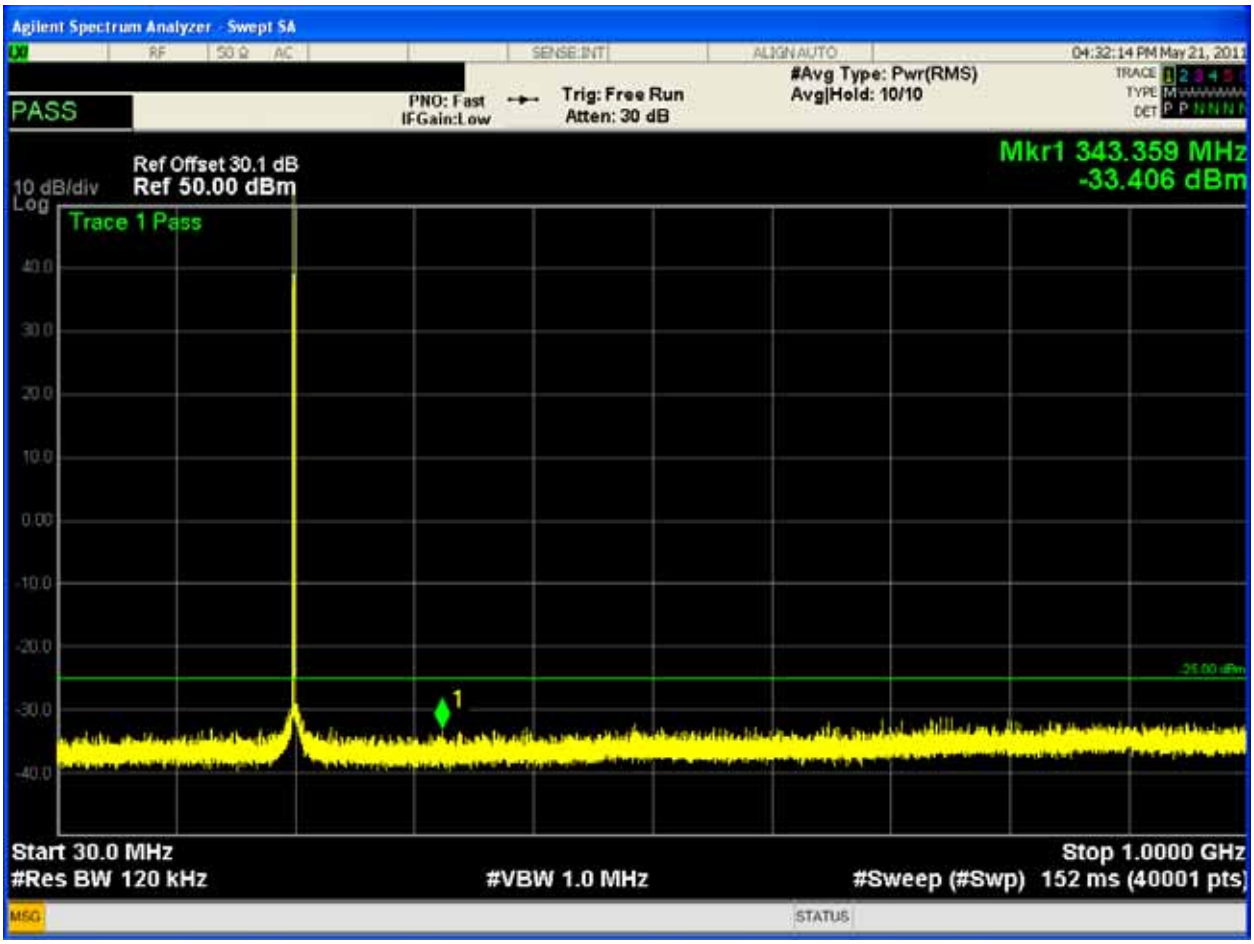
Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

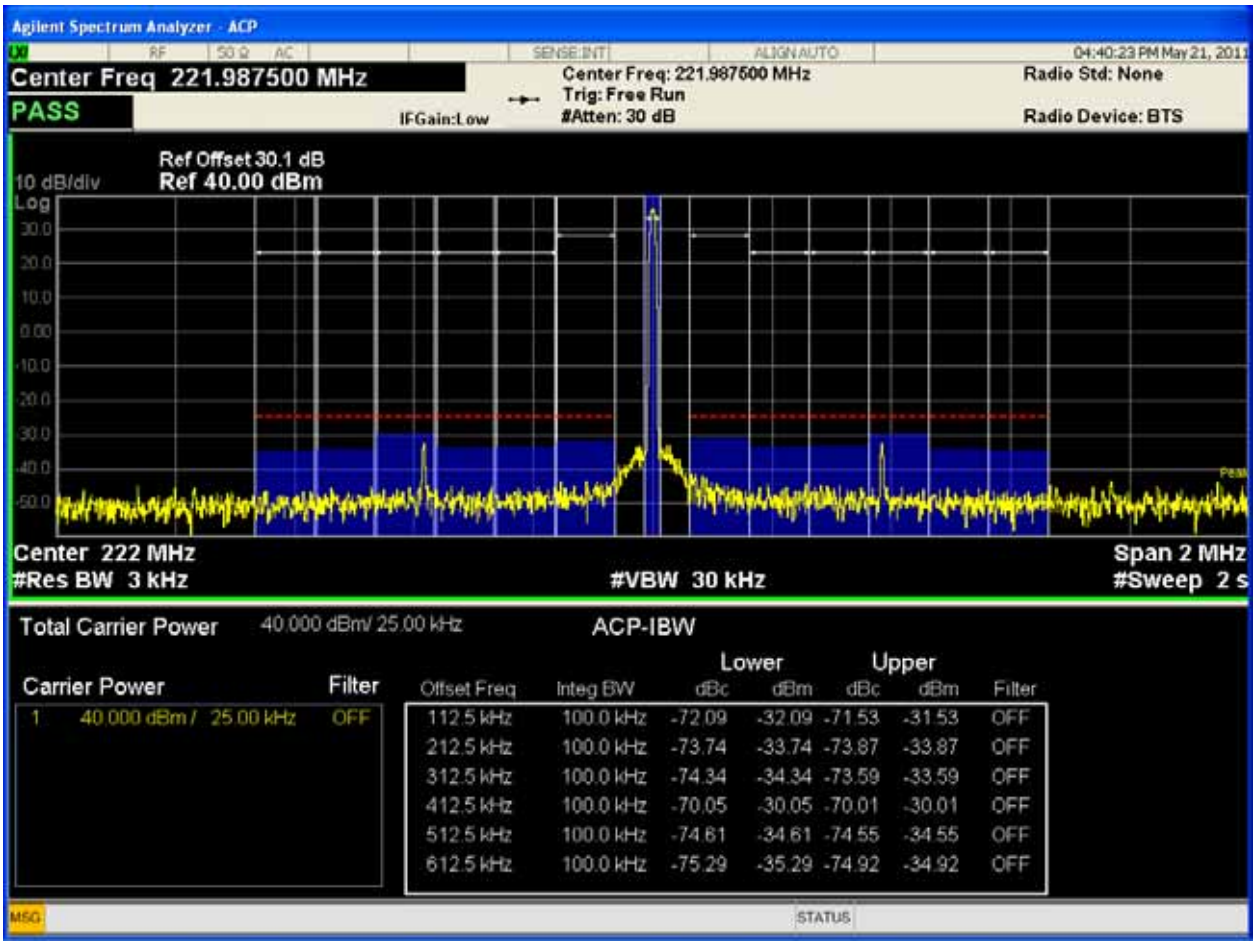
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Industry Canada Transmitter Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

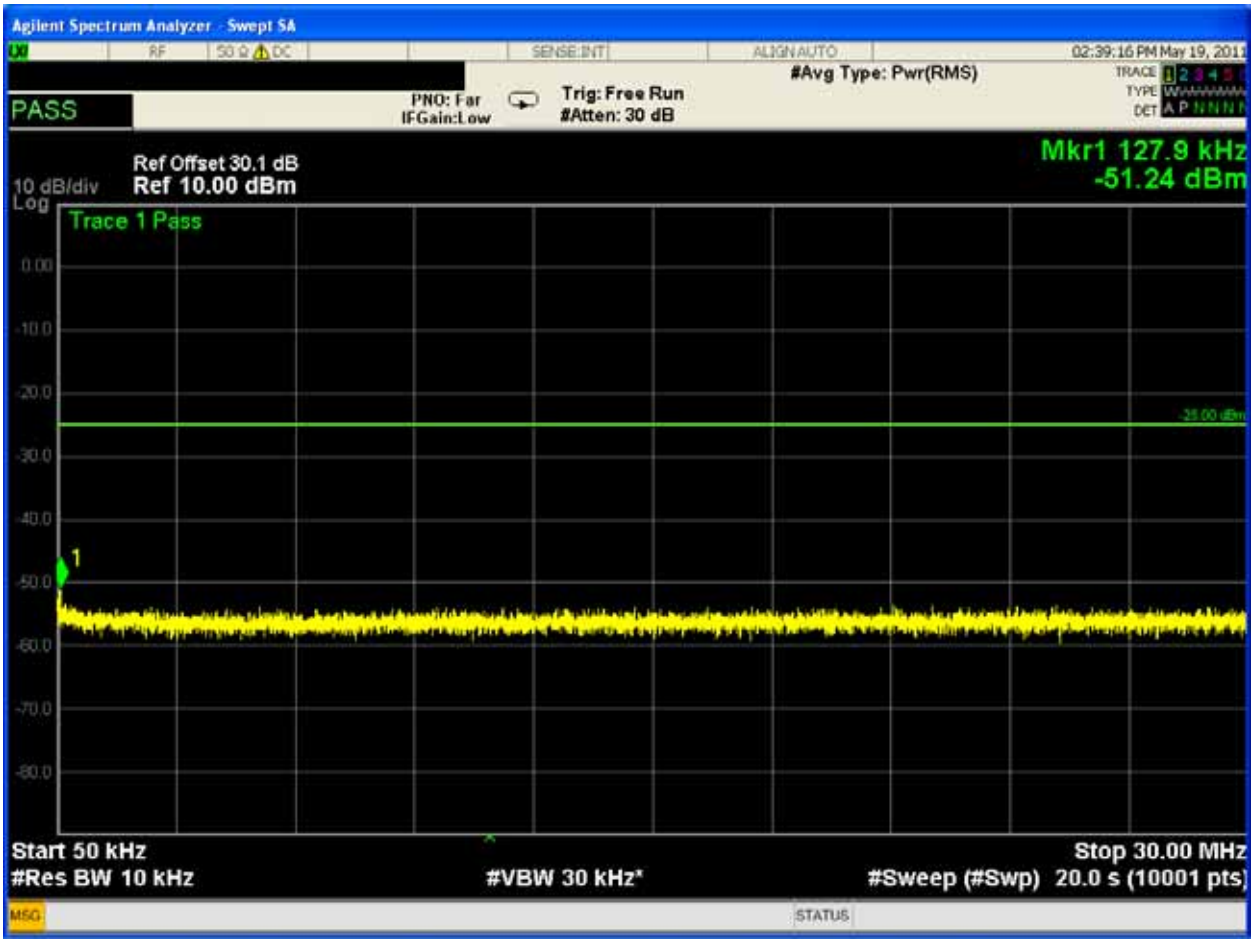
Close in emissions

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

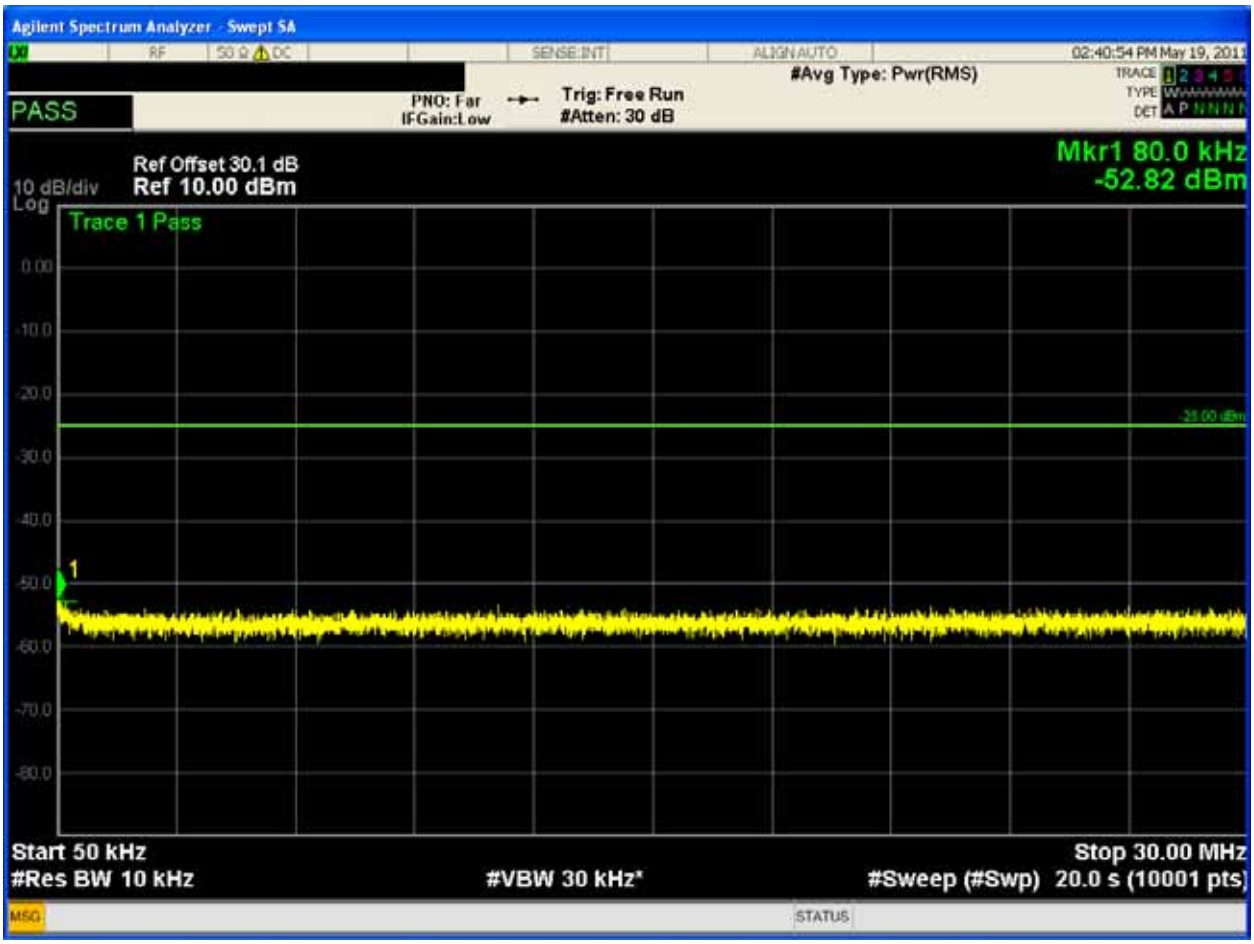
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

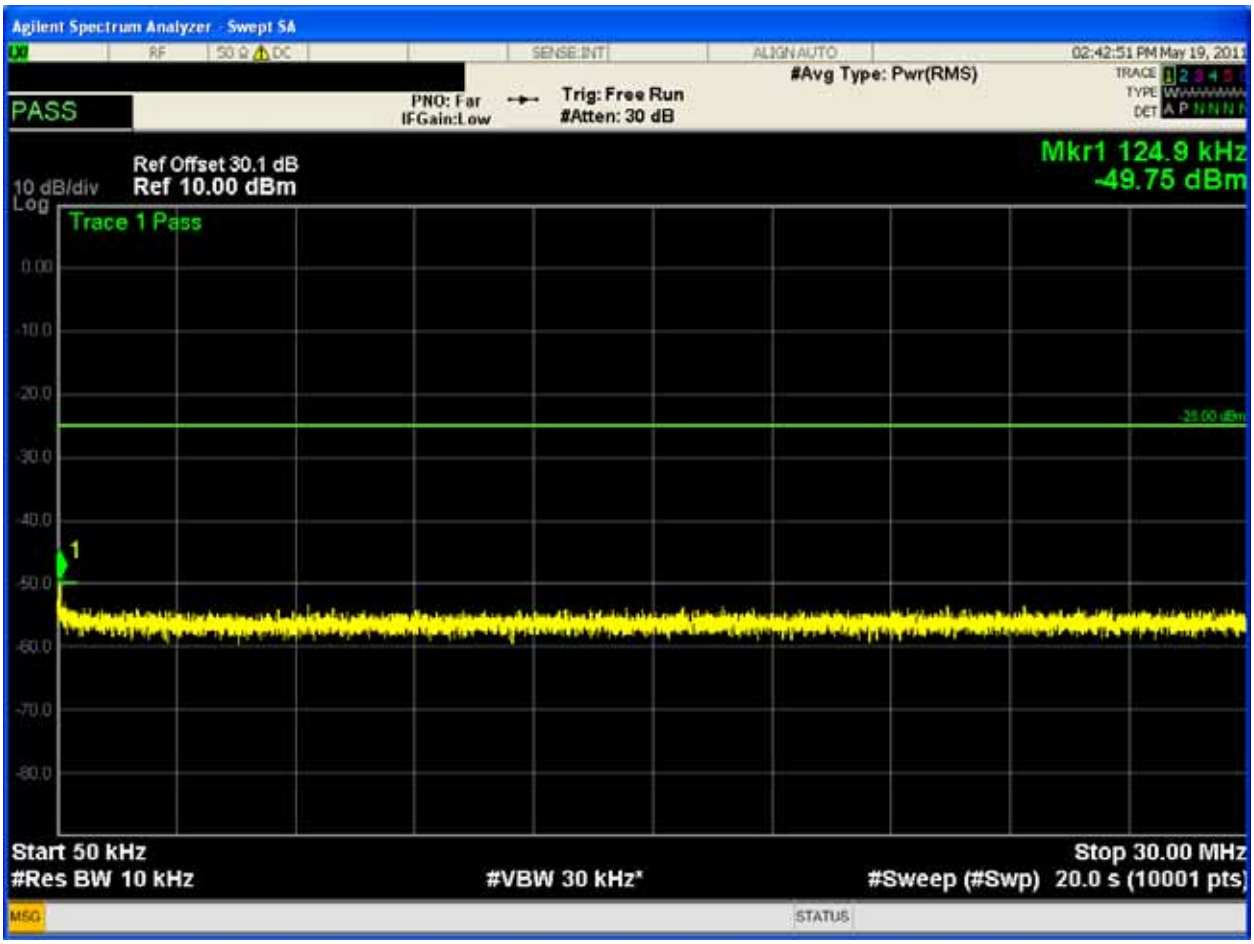
Low channel: 220.0125 MHz

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

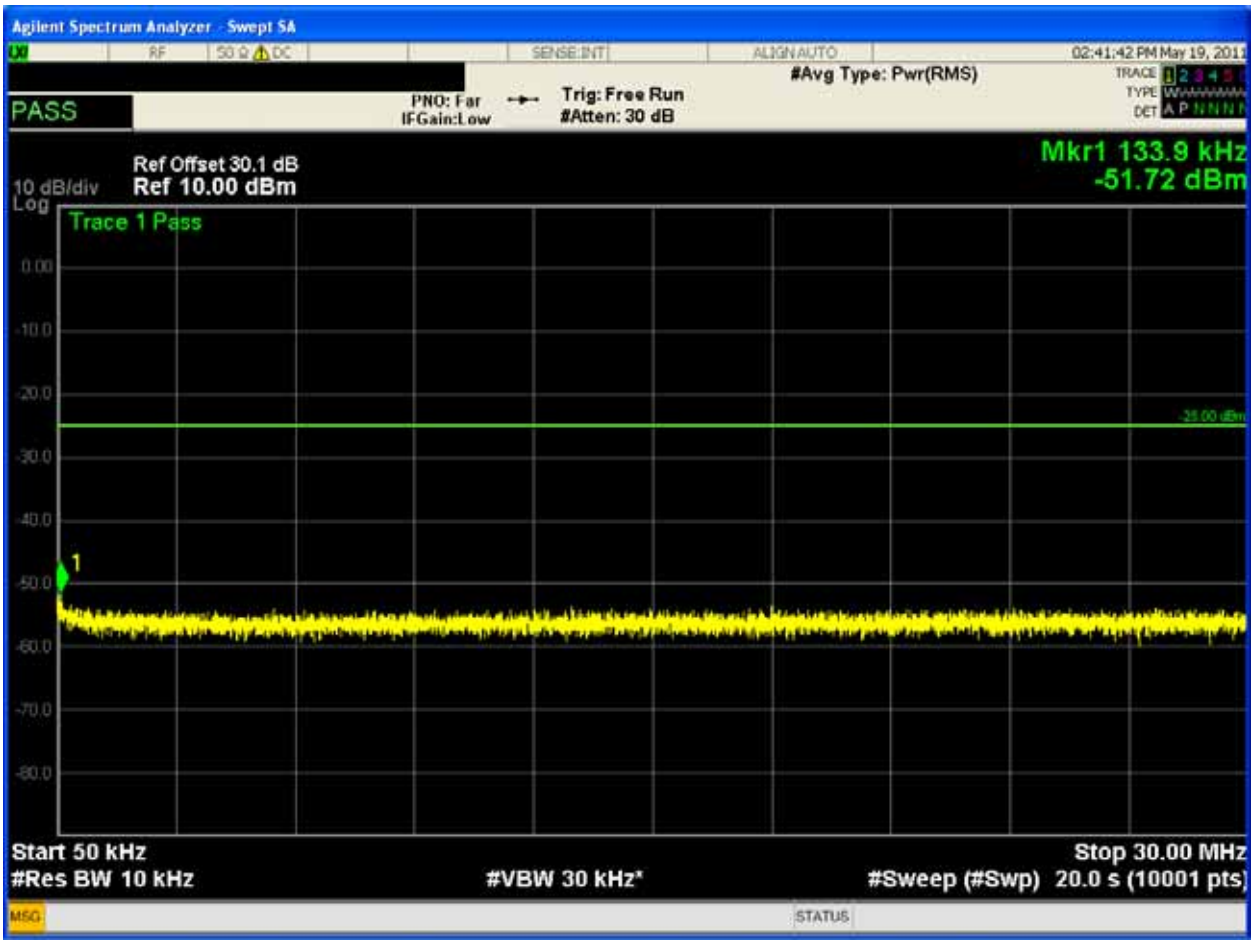
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

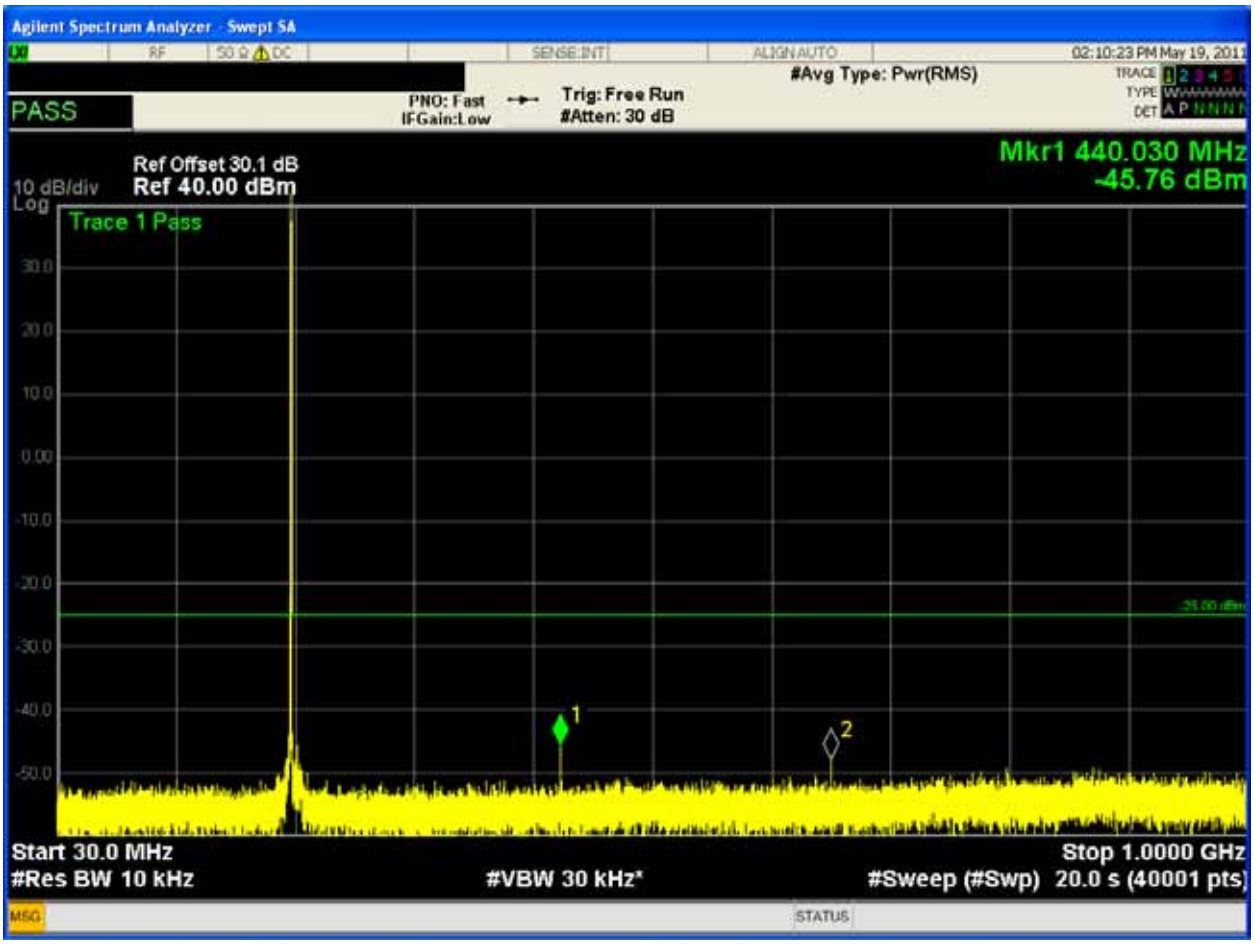
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

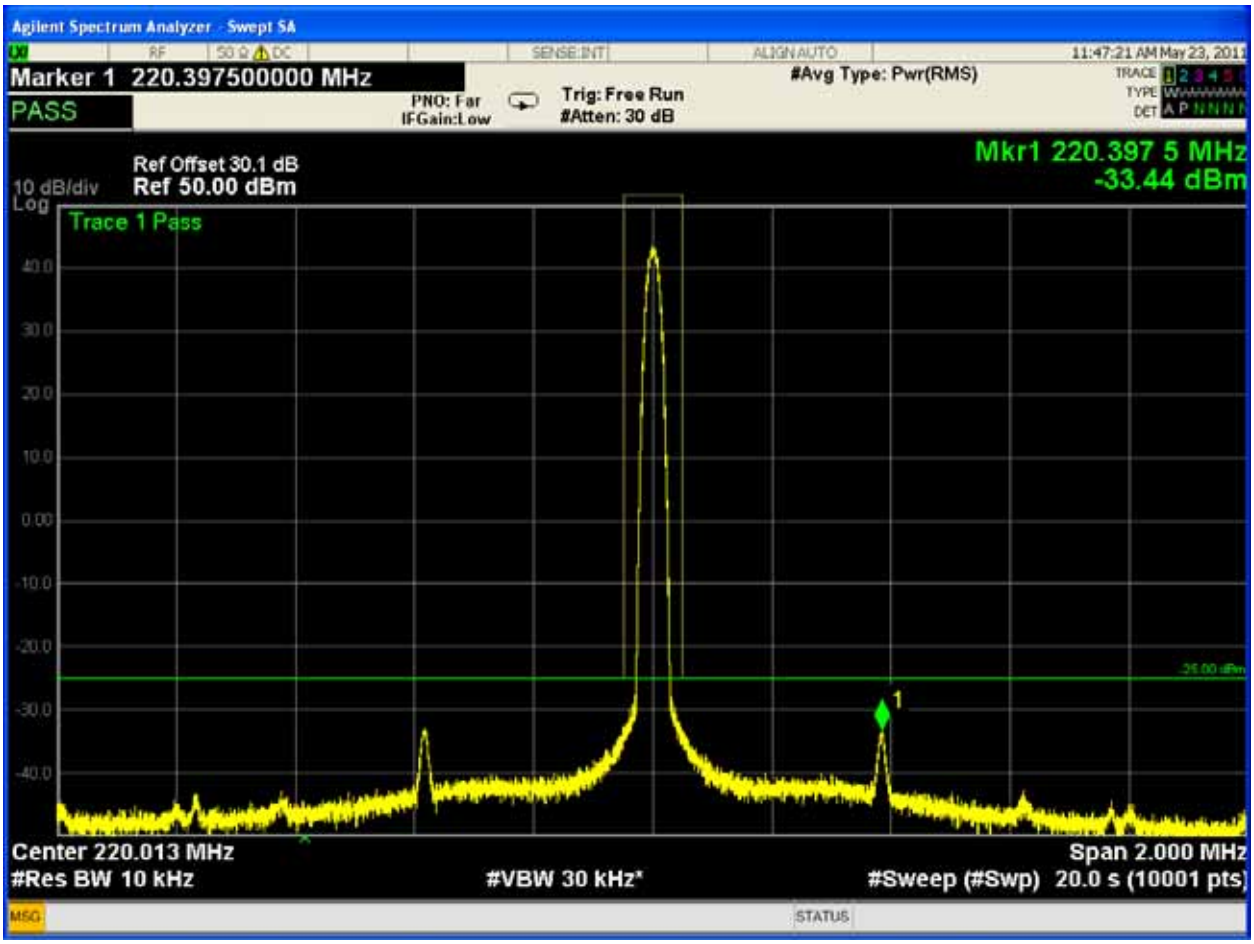
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

Close in emissions

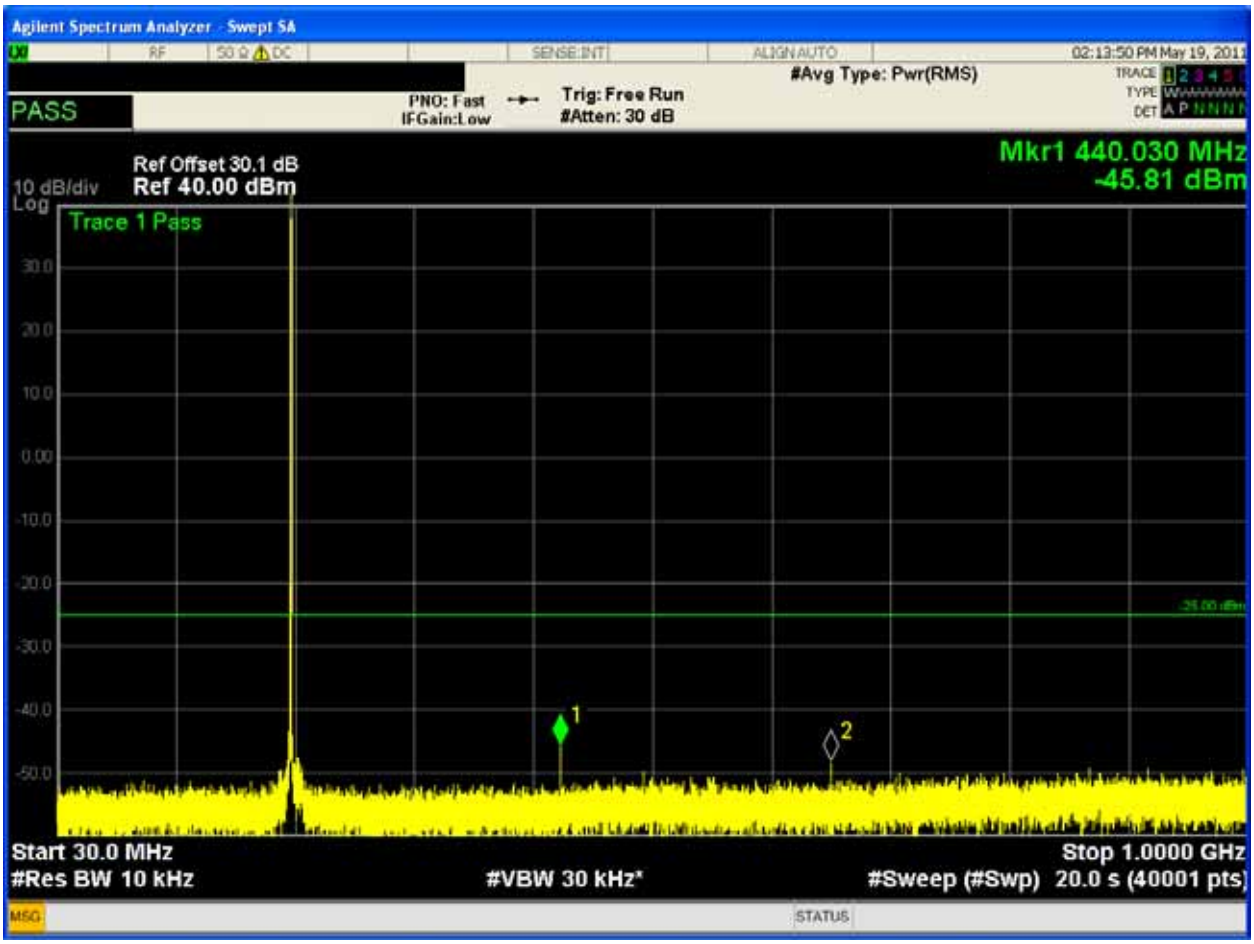
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

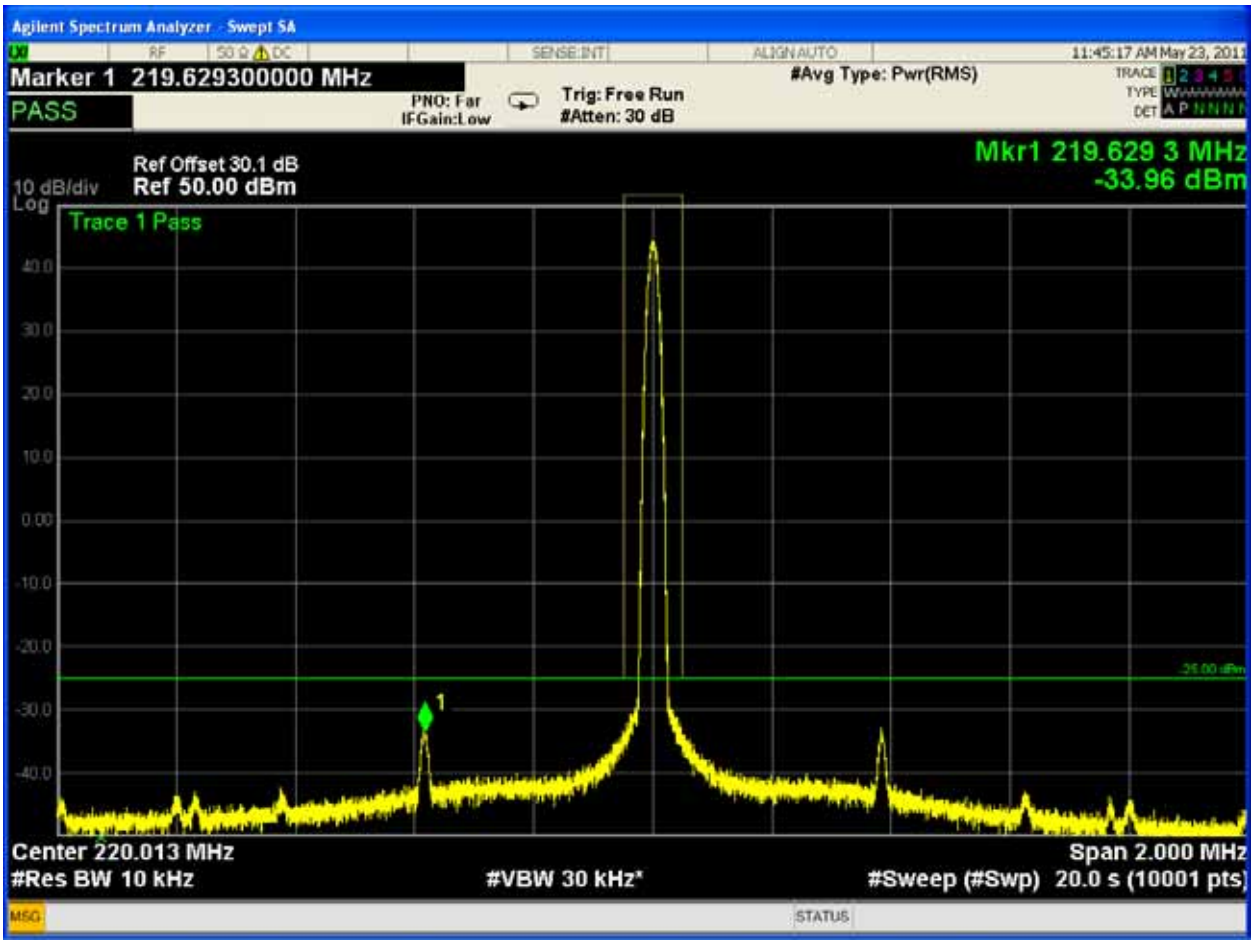
Low channel: 220.0125 MHz

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

Close in emissions

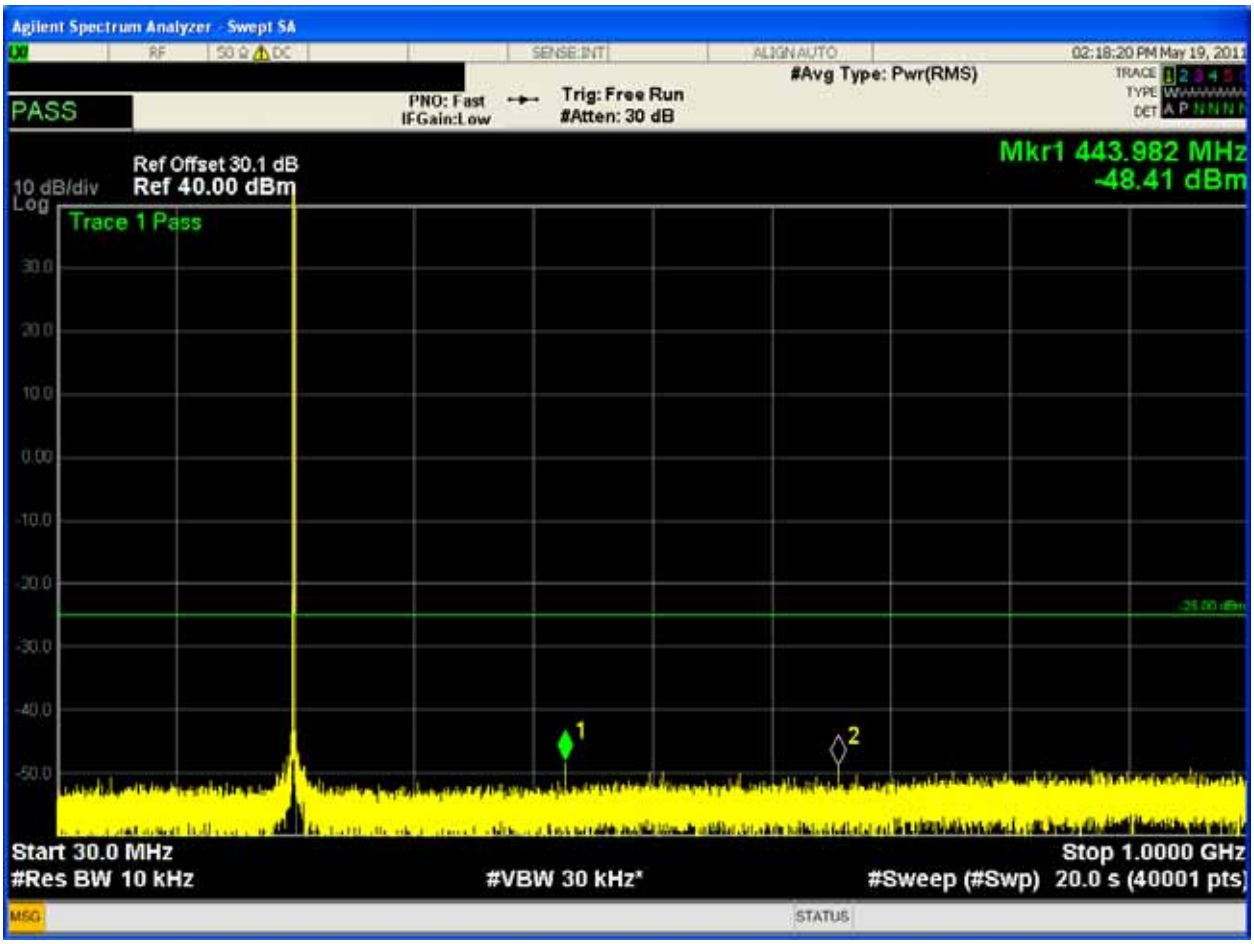
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

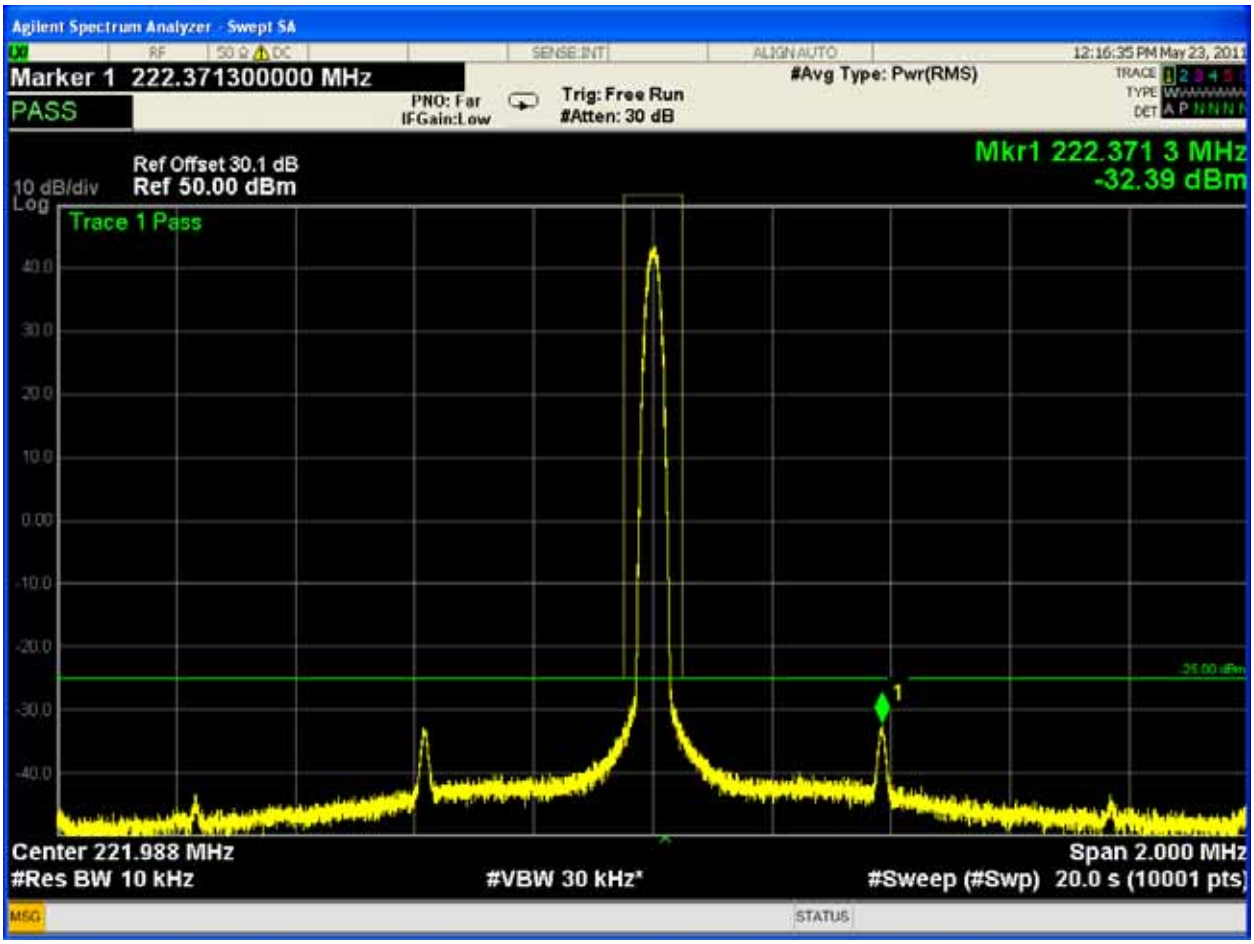
High channel: 221.9875 MHz

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

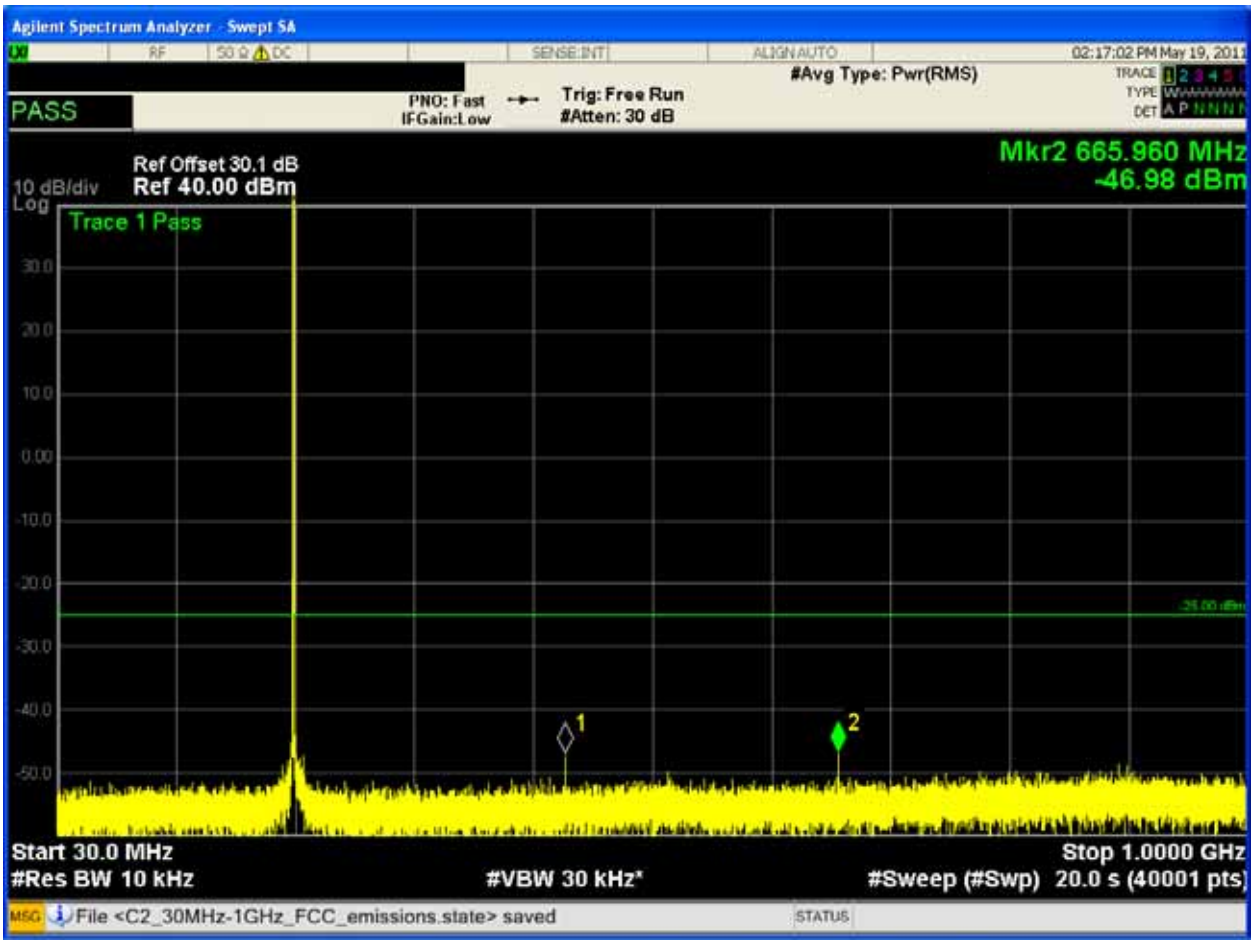
Close in emissions

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

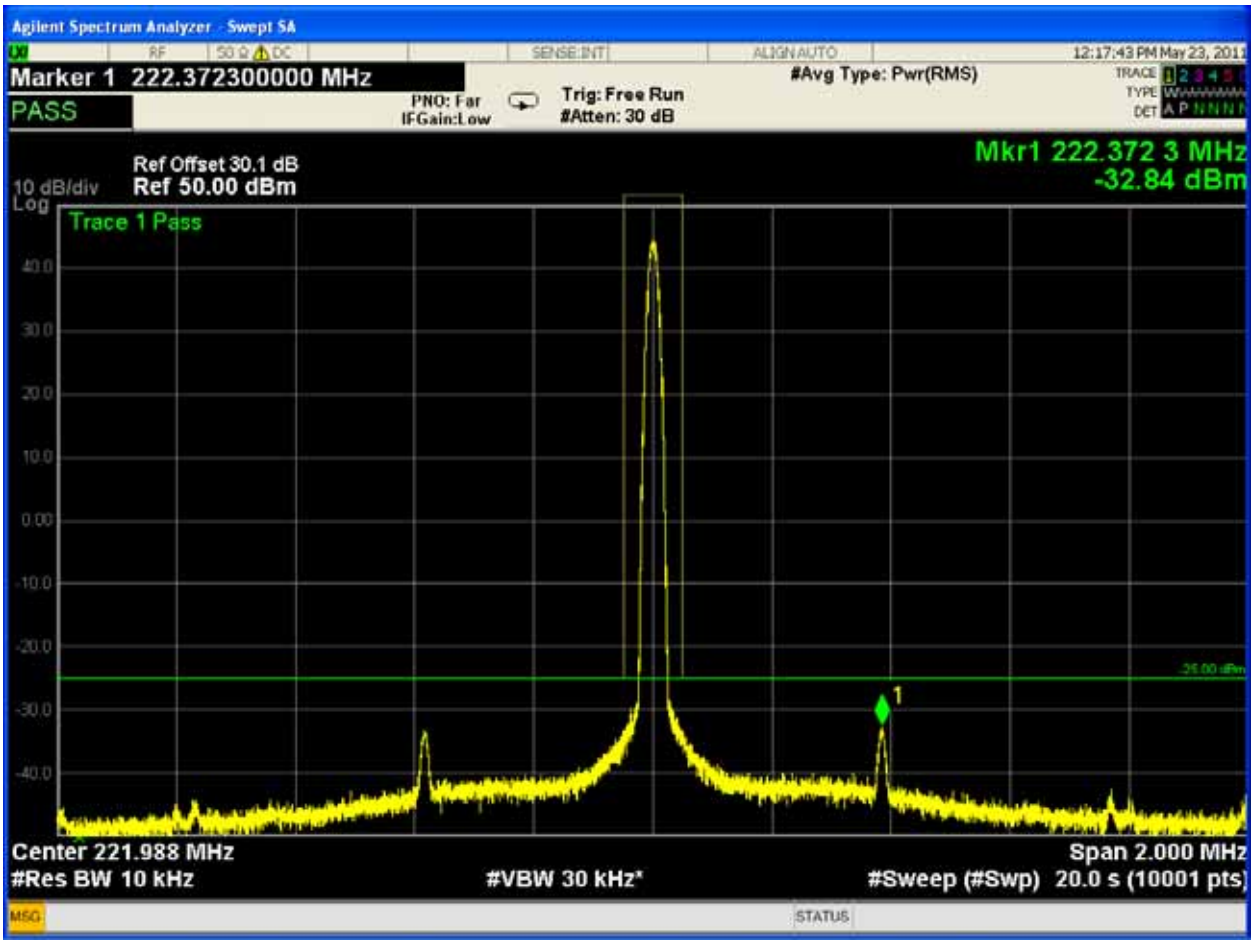
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

Close in emissions

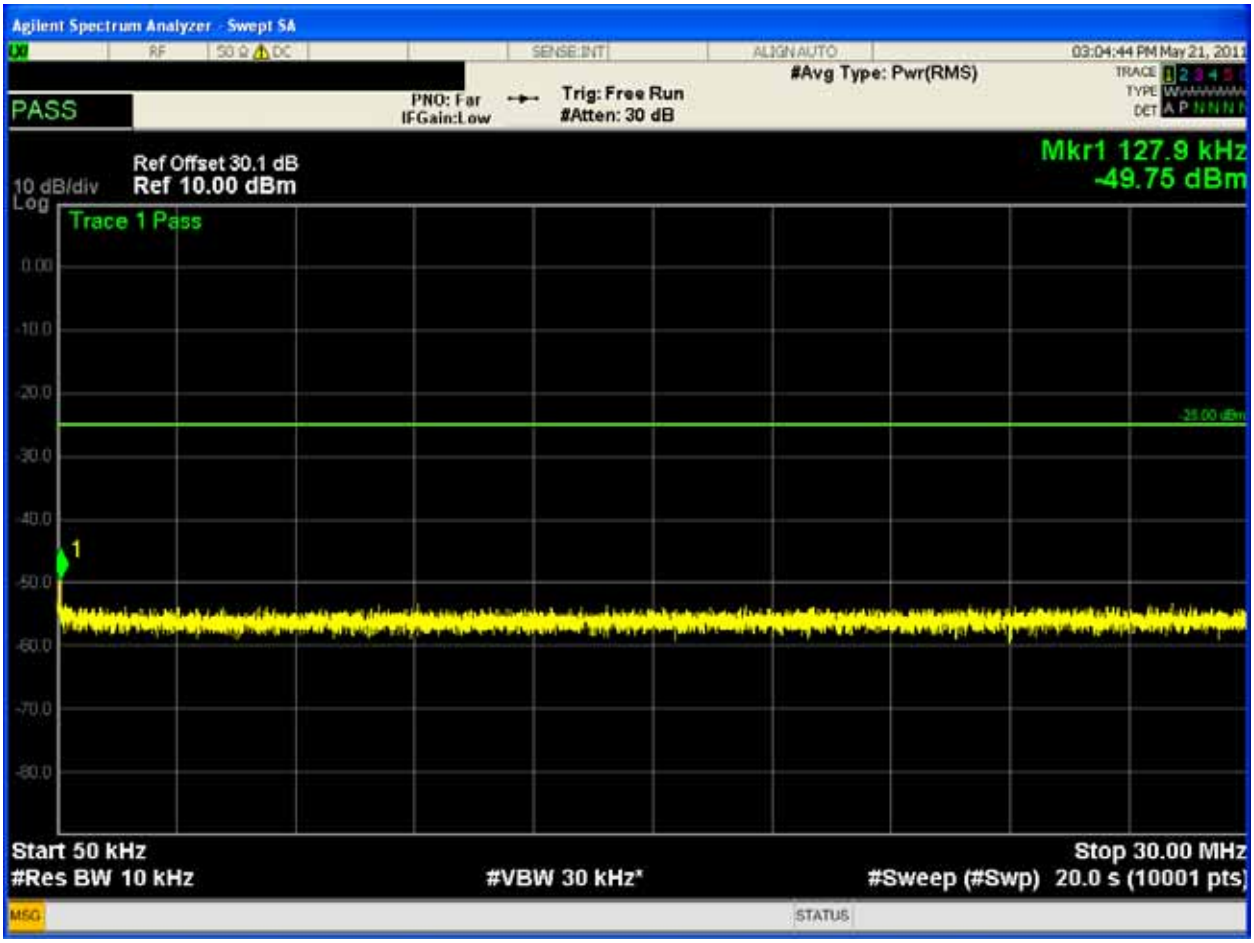
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

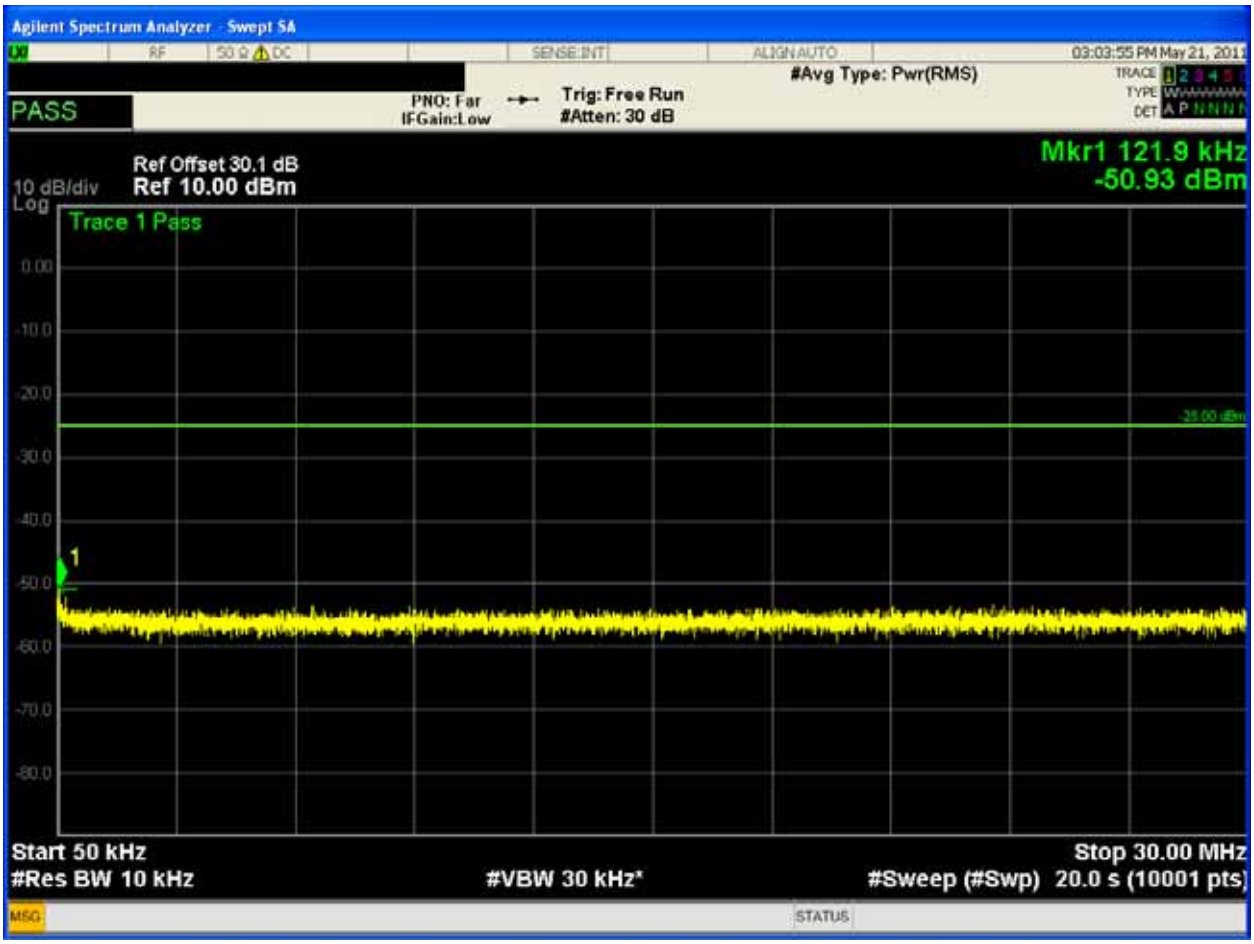
Low channel: 220.0125 MHz

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

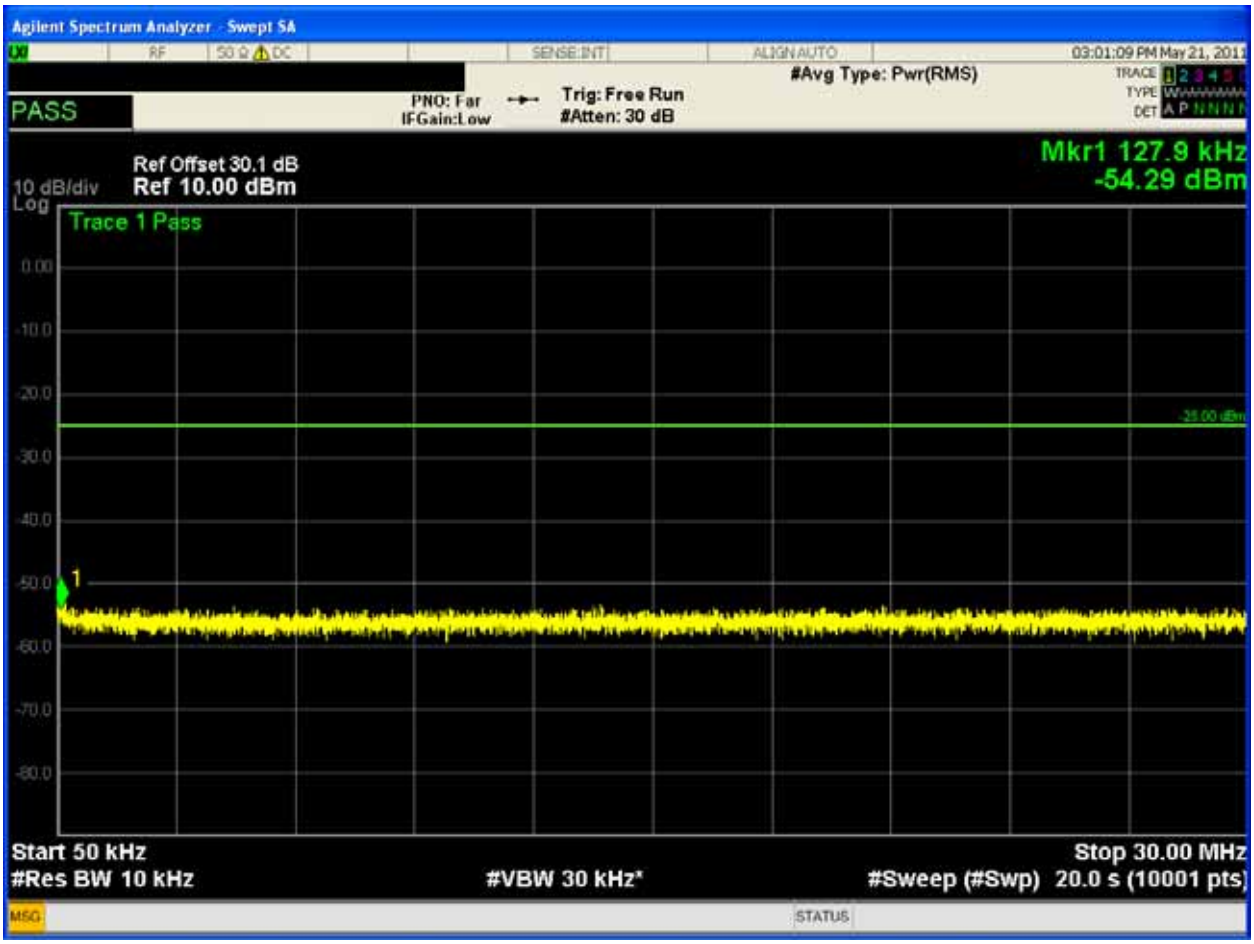
Low channel: 220.0125 MHz

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

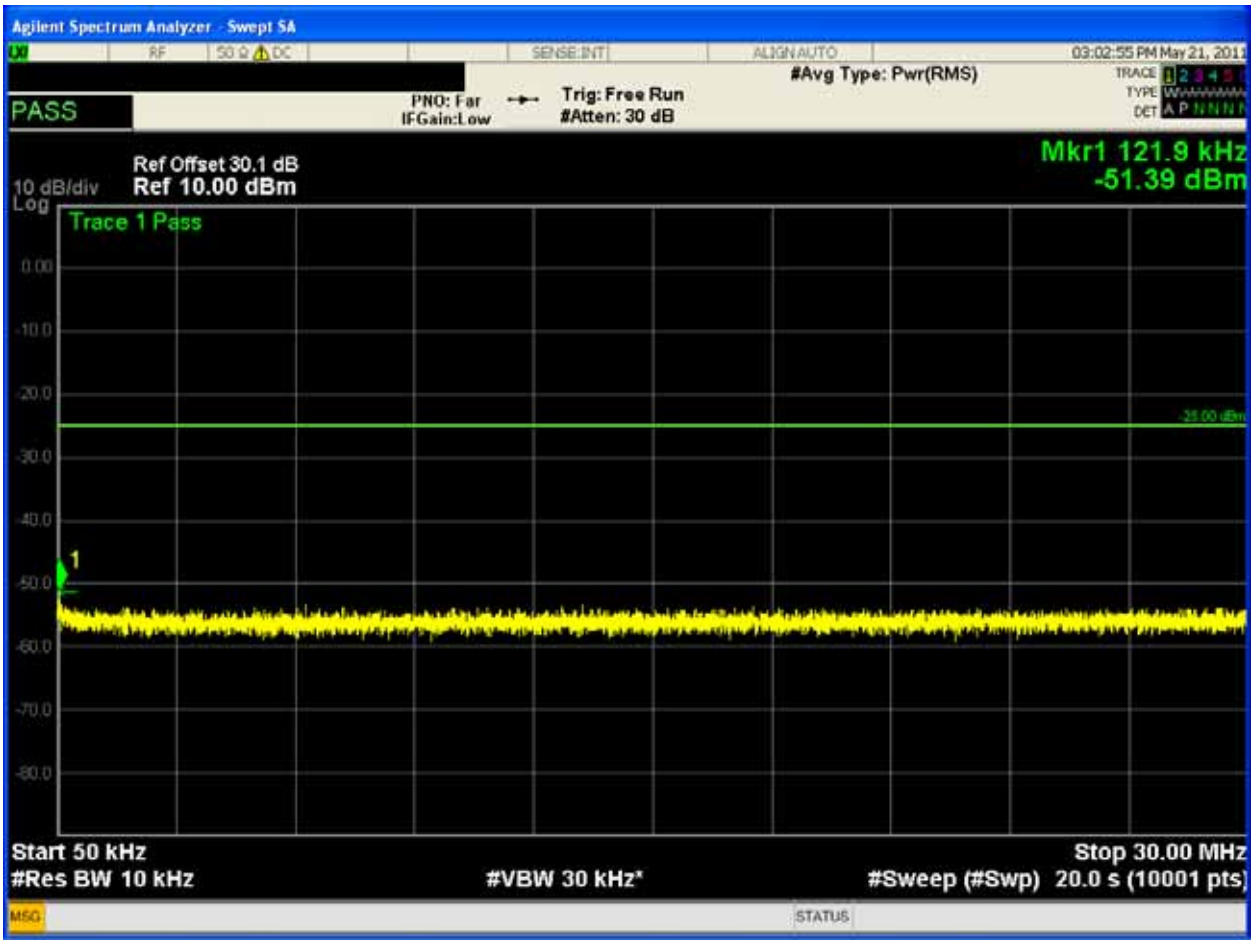
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

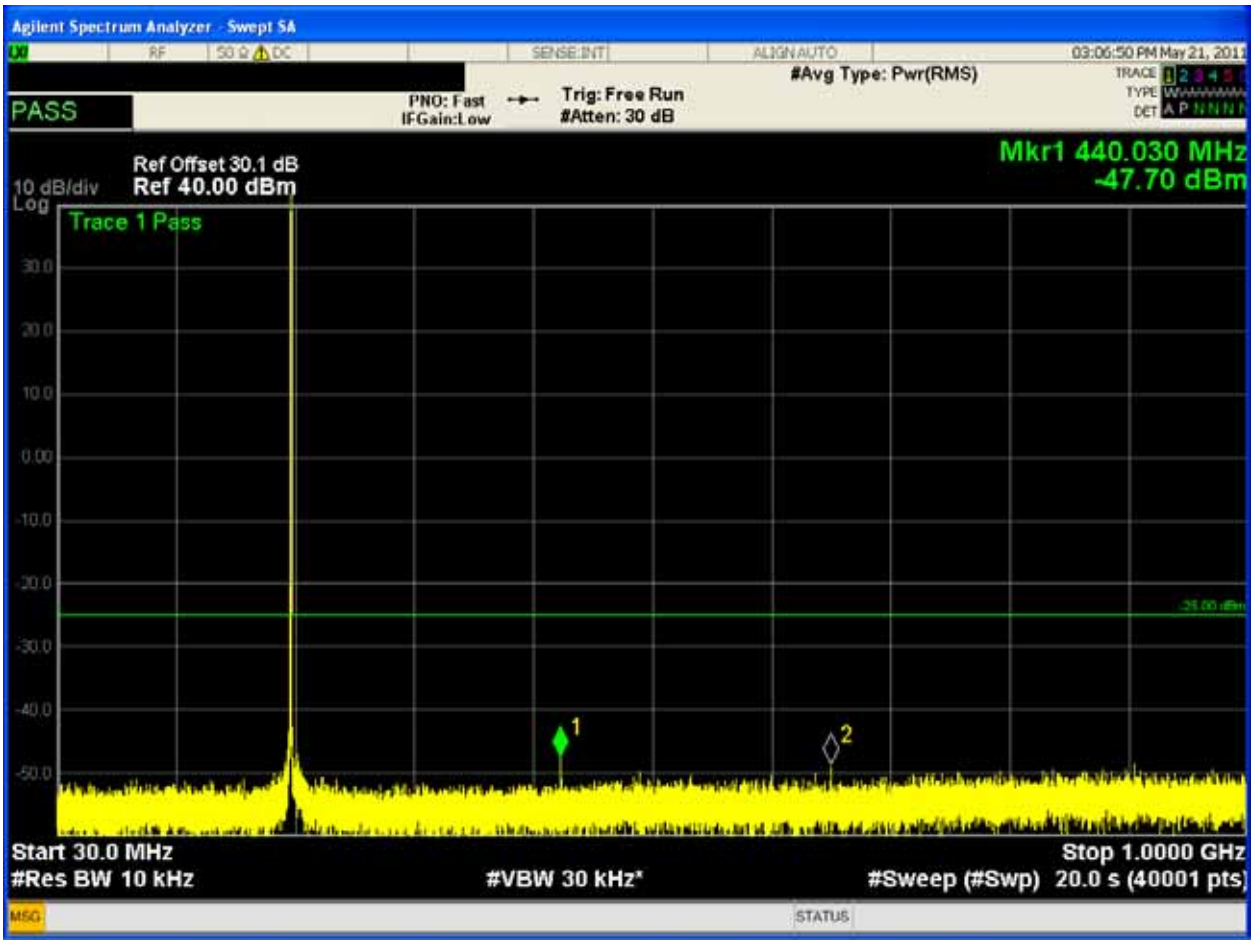
High channel: 221.9875 MHz

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

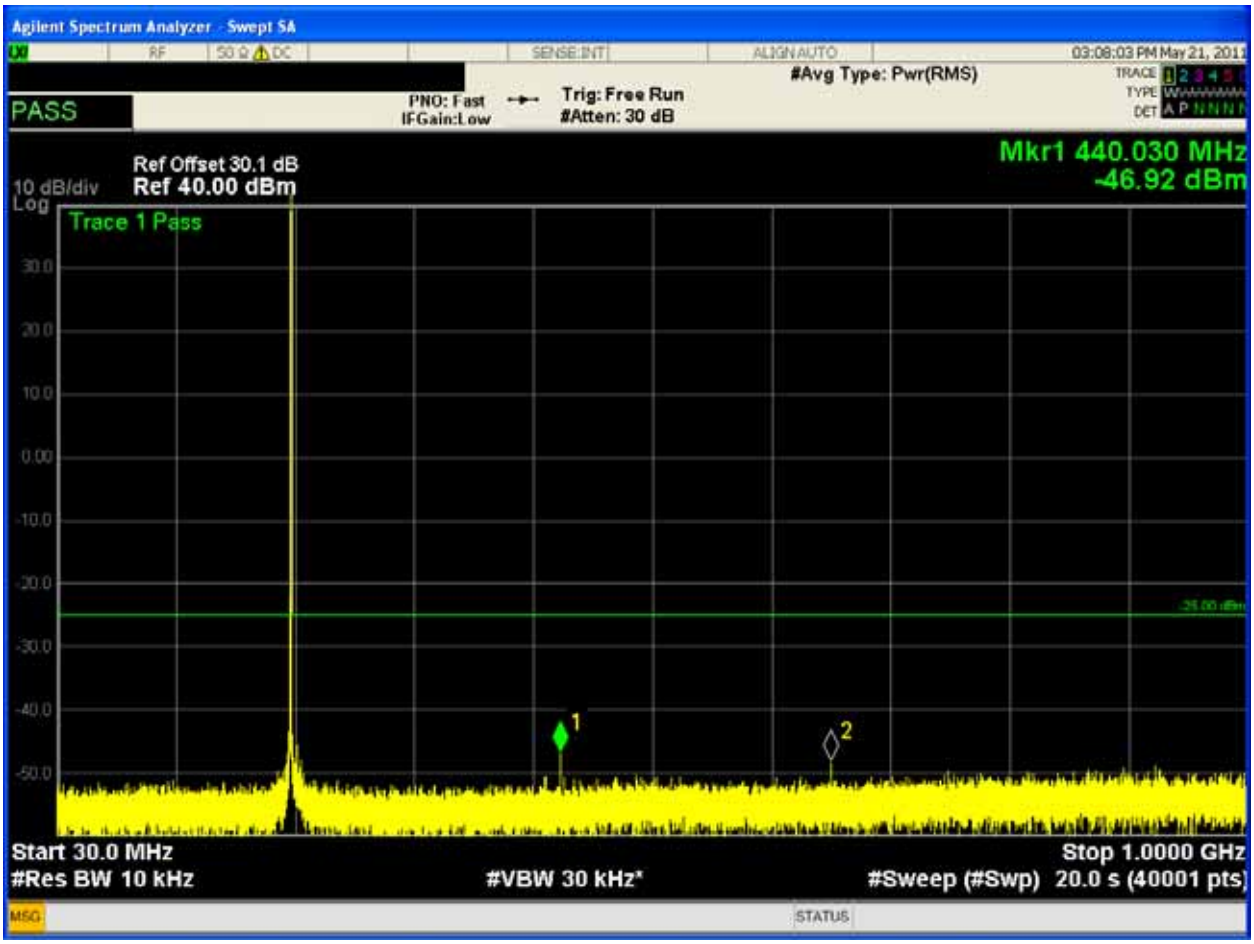
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

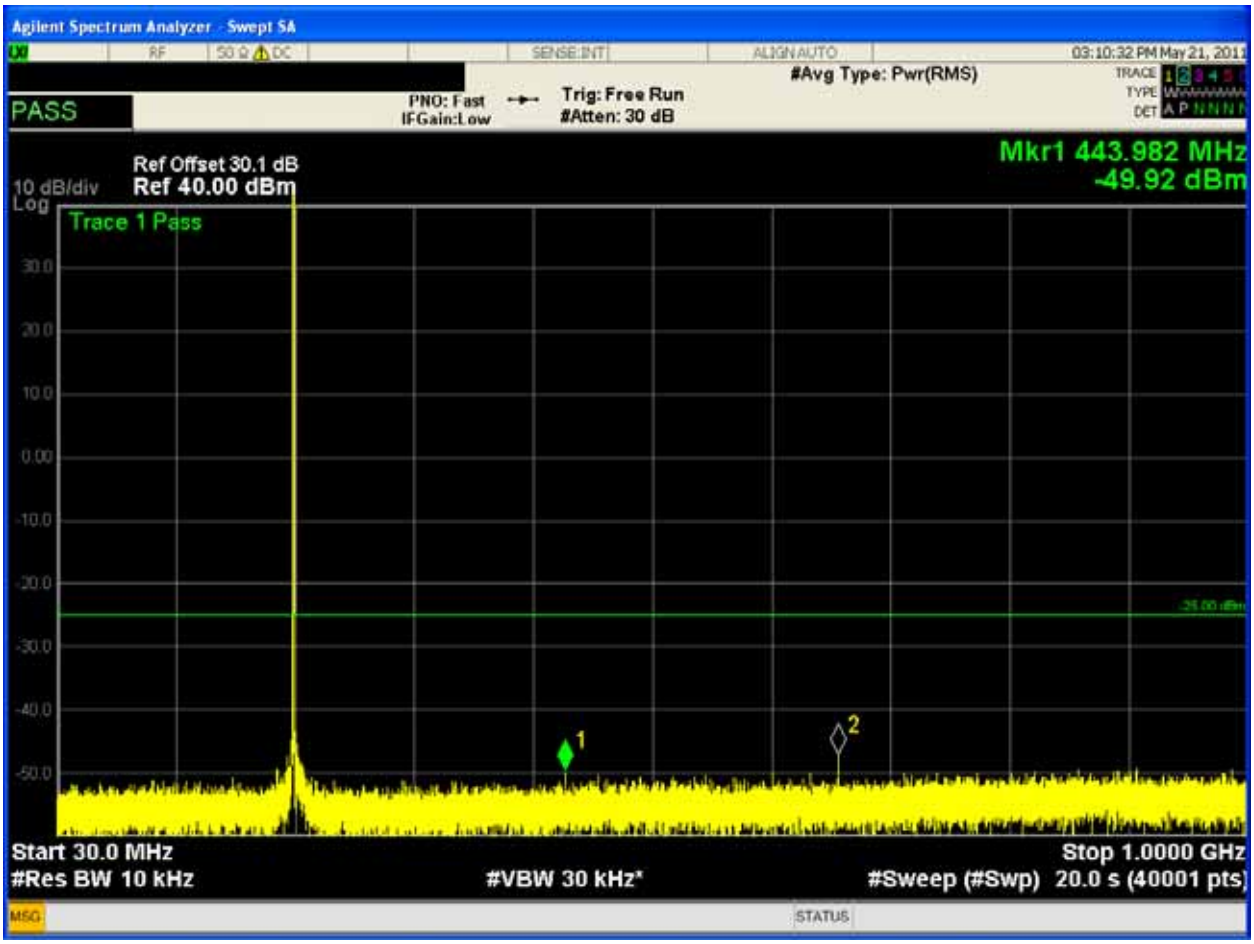
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

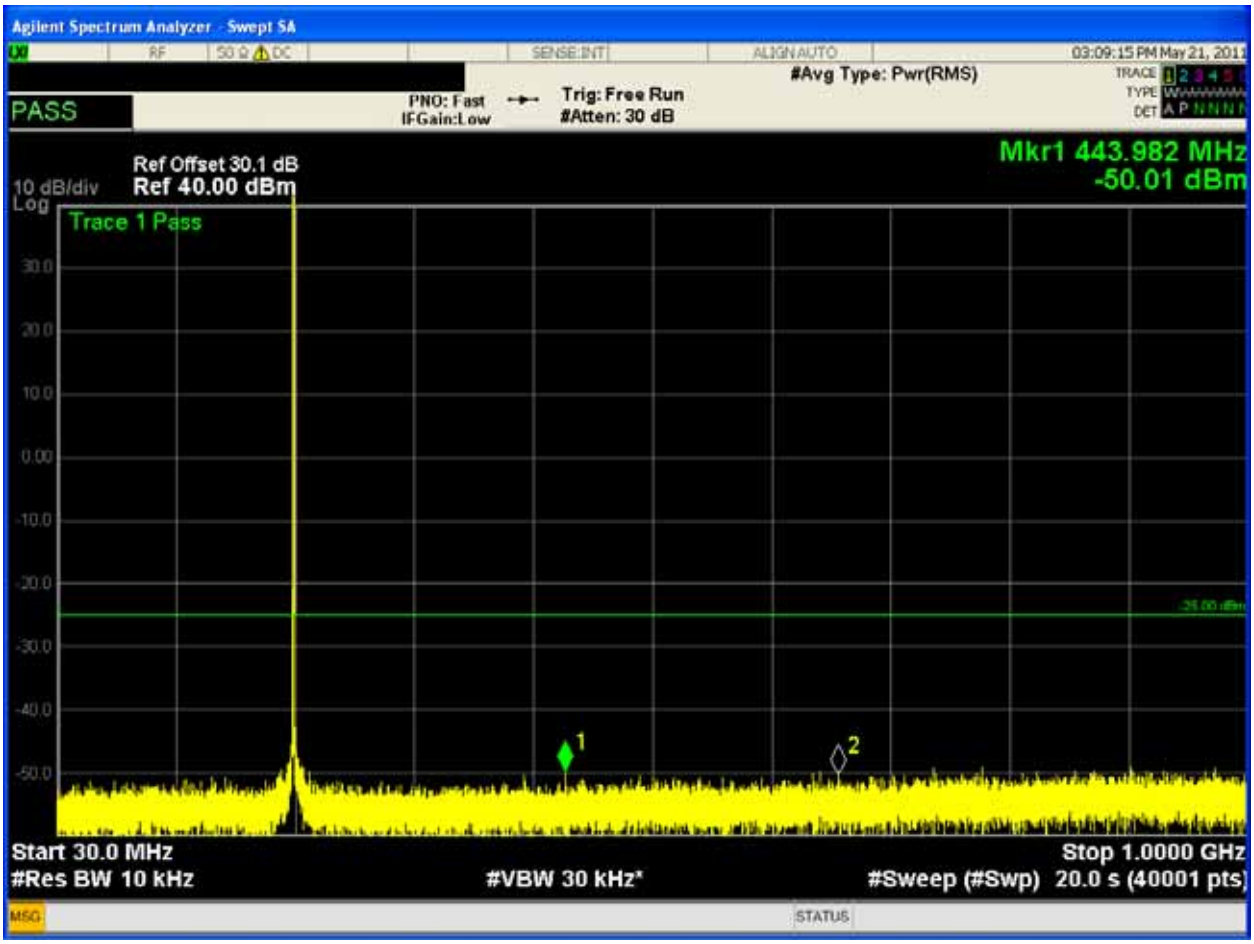
High channel: 221.9875 MHz

FCC Conducted Emissions below 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC / Industry Canada Conducted Emissions above 1 GHz

Tx port

Transmit mode

75 watt peak power

Modulation: DQPSK

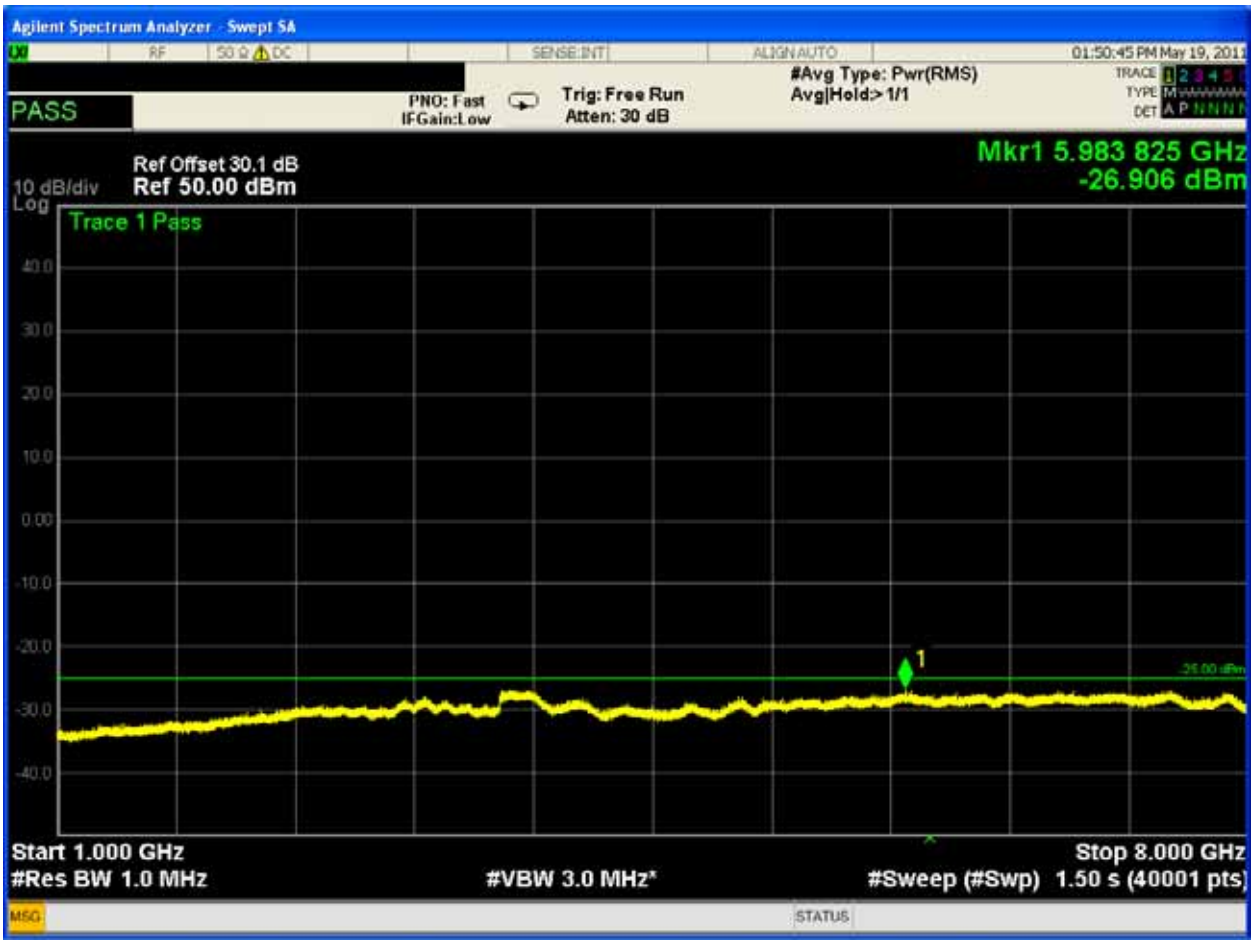
Low channel: 220.0125 MHz

FCC / Industry Canada Conducted Emissions above 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

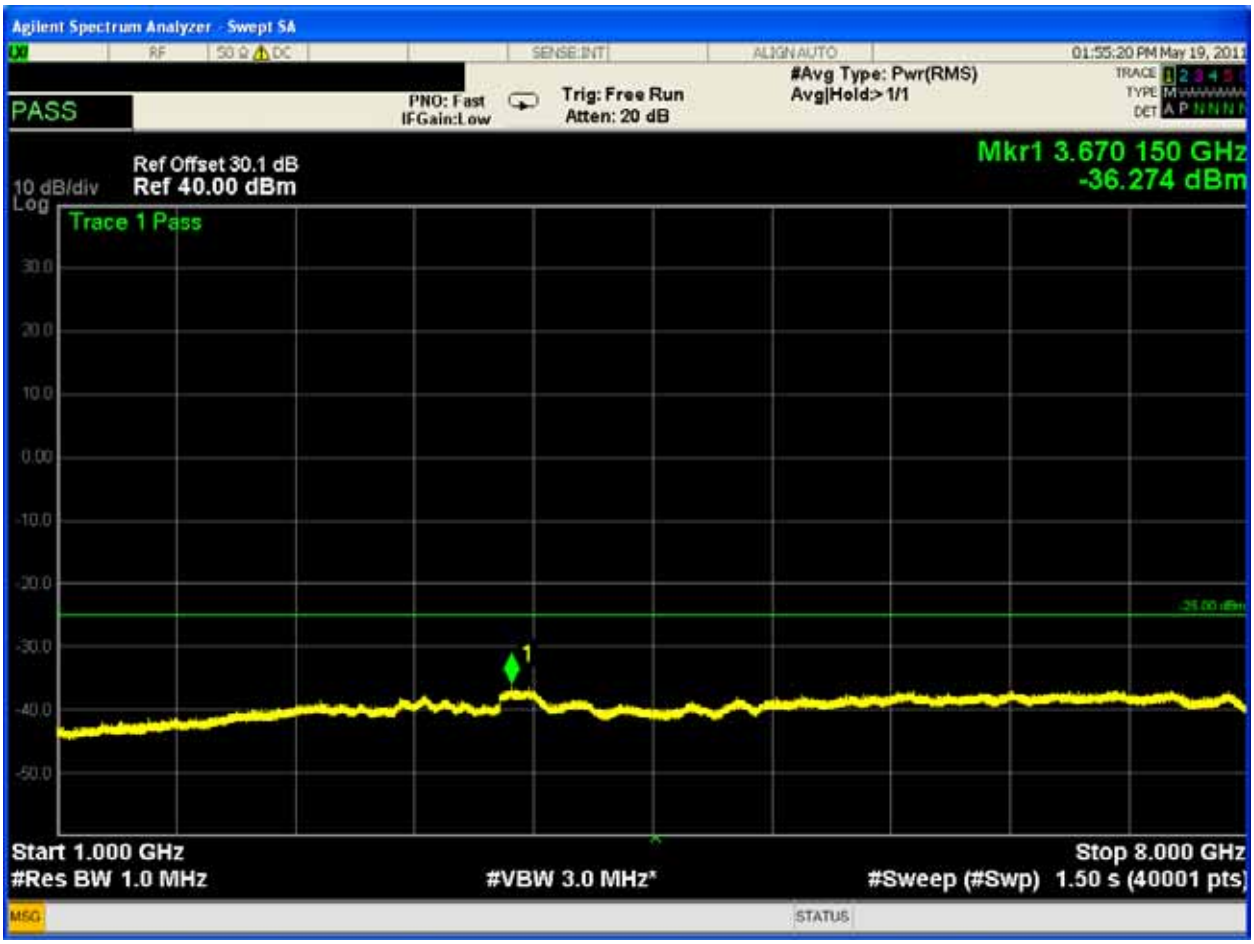
Low channel: 220.0125 MHz

FCC / Industry Canada Conducted Emissions above 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

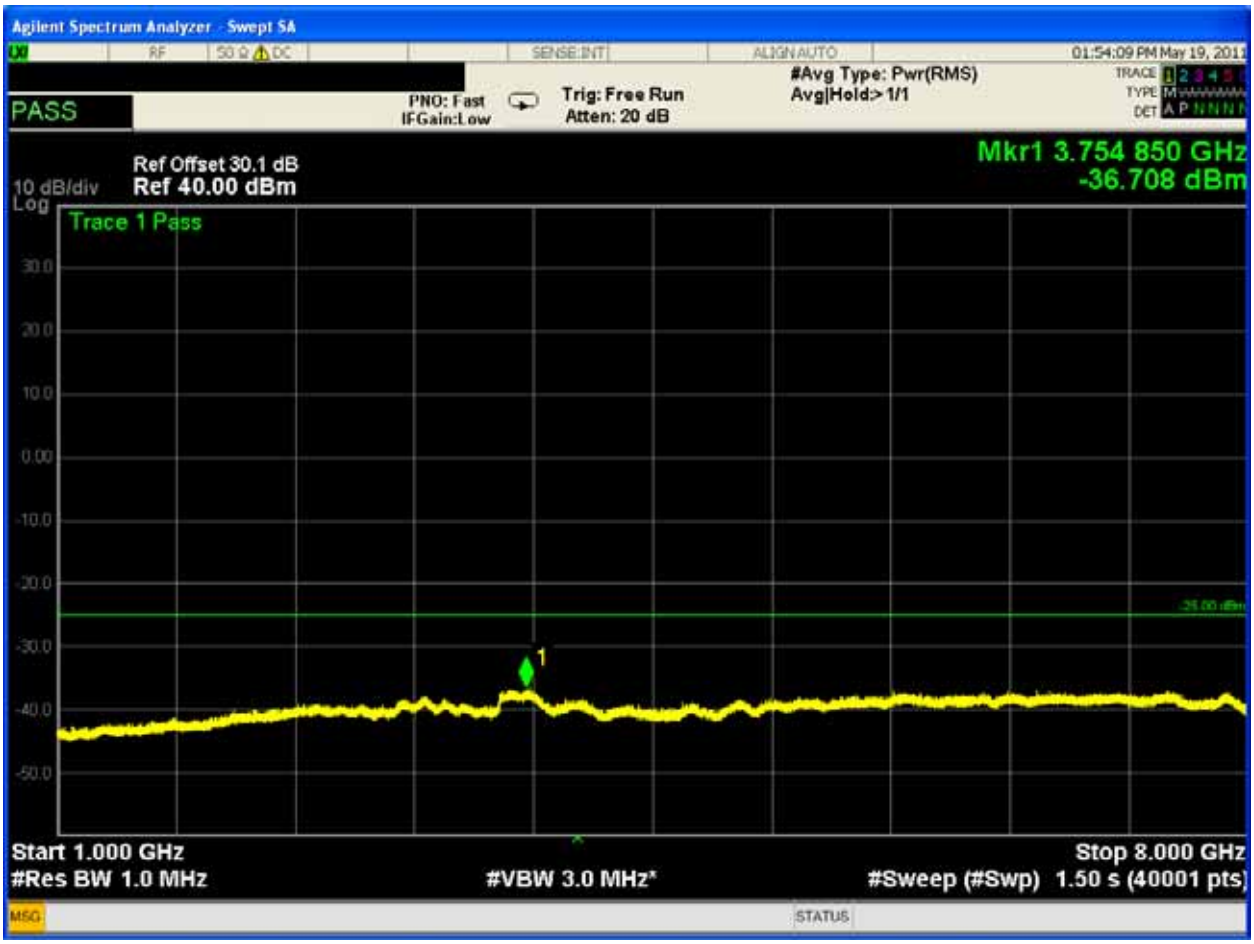
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC / Industry Canada Conducted Emissions above 1 GHz

Tx port

Transmit mode

75 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

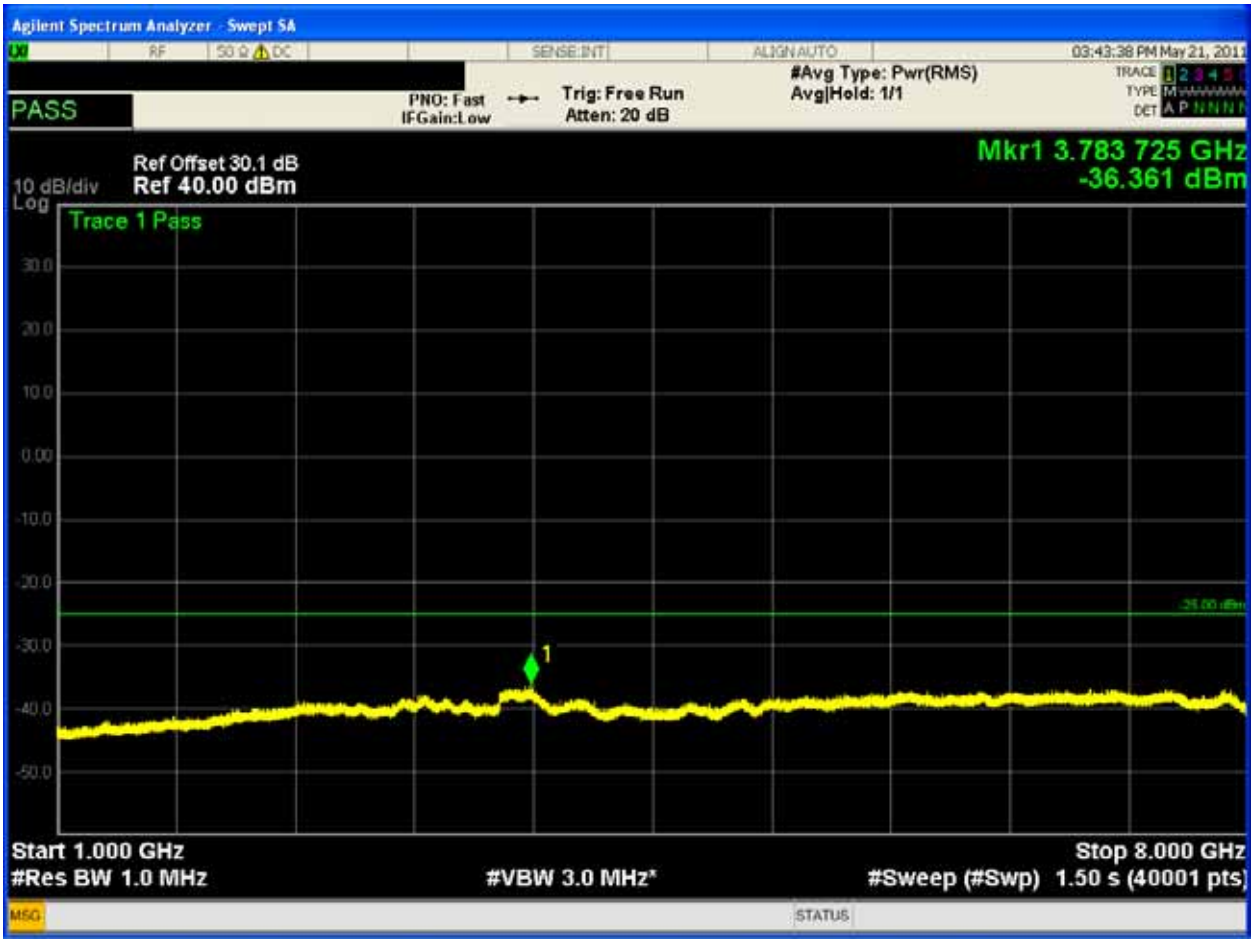
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC / Industry Canada Conducted Emissions above 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

Low channel: 220.0125 MHz

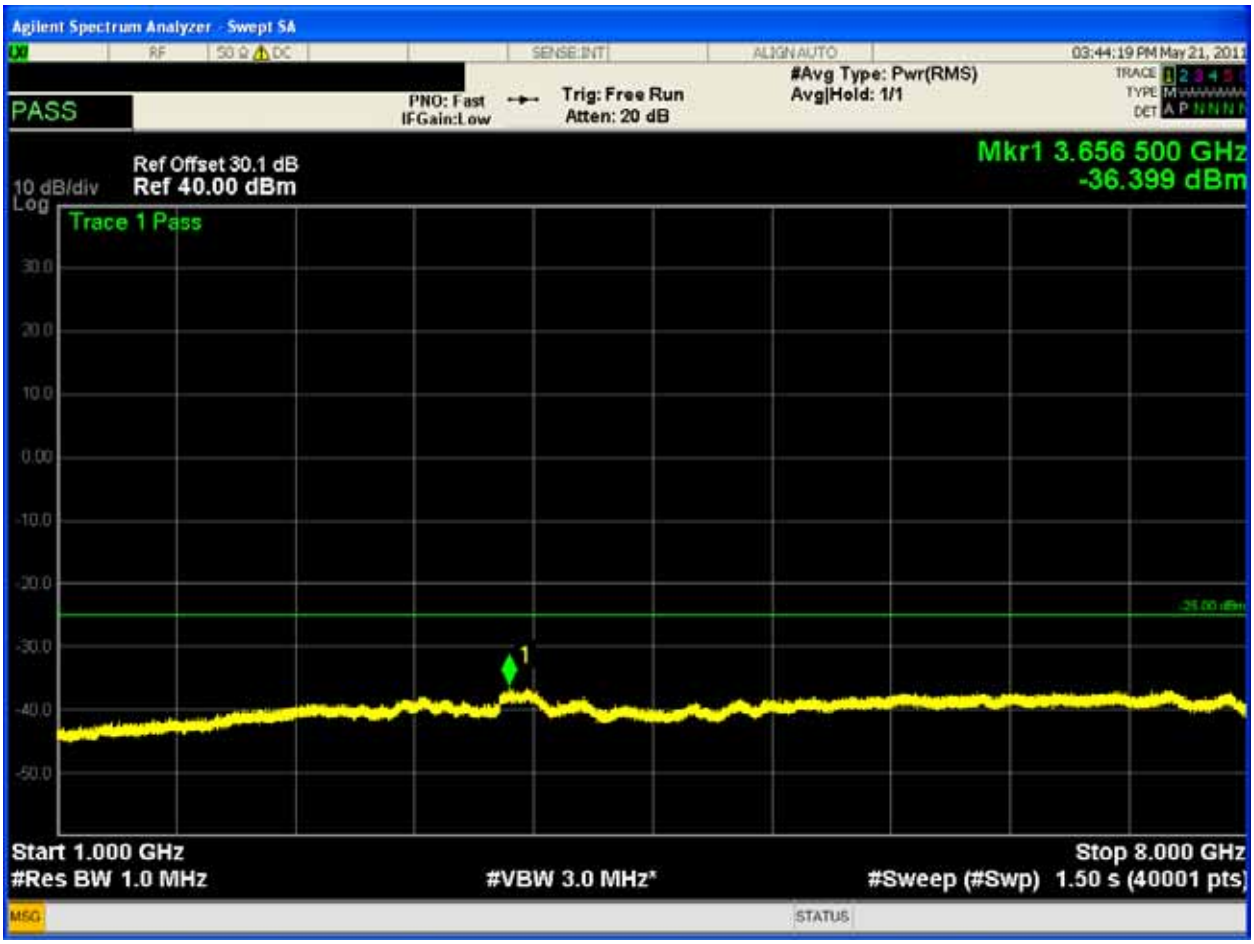
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC / Industry Canada Conducted Emissions above 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

Low channel: 220.0125 MHz

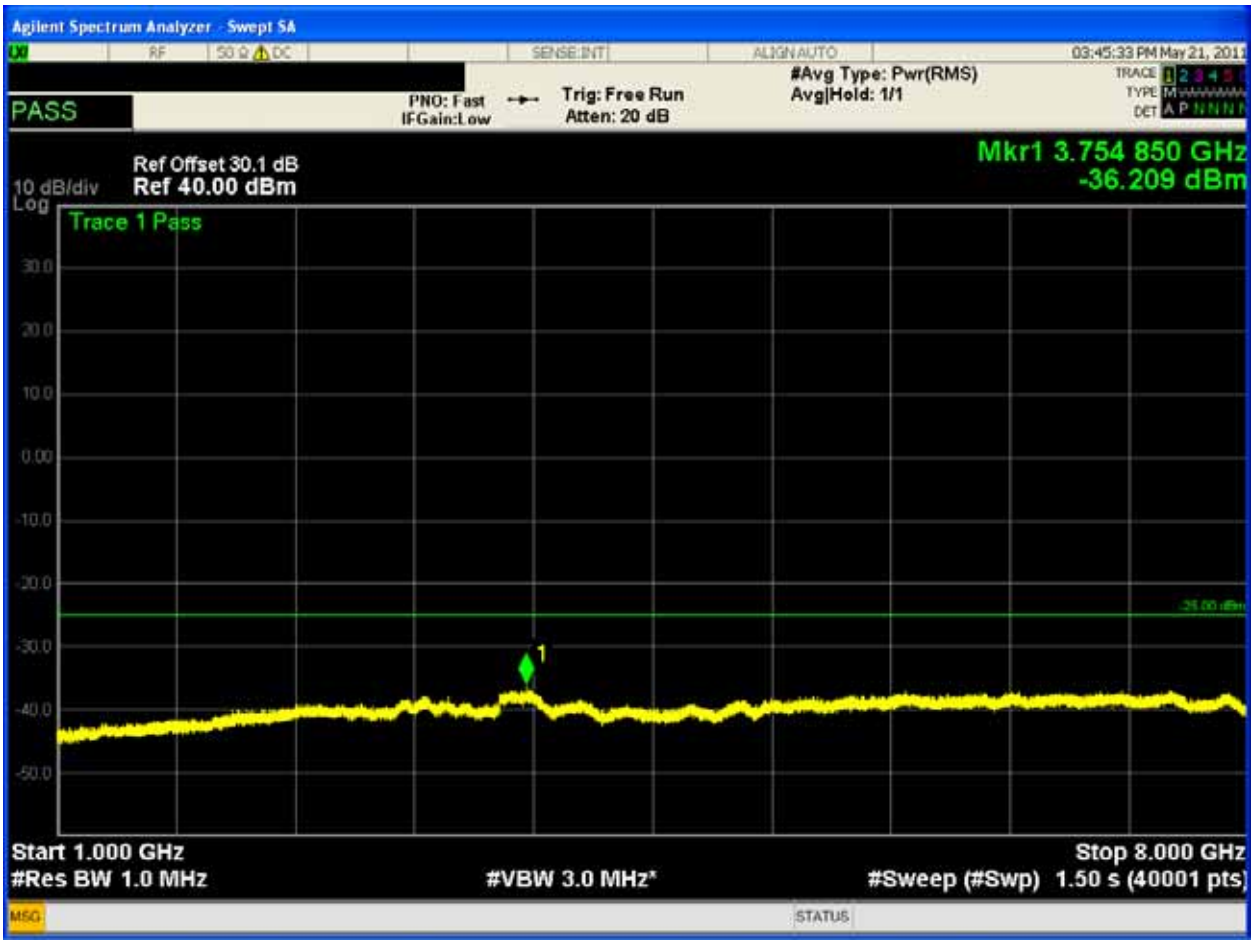
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC / Industry Canada Conducted Emissions above 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK

High channel: 221.9875 MHz

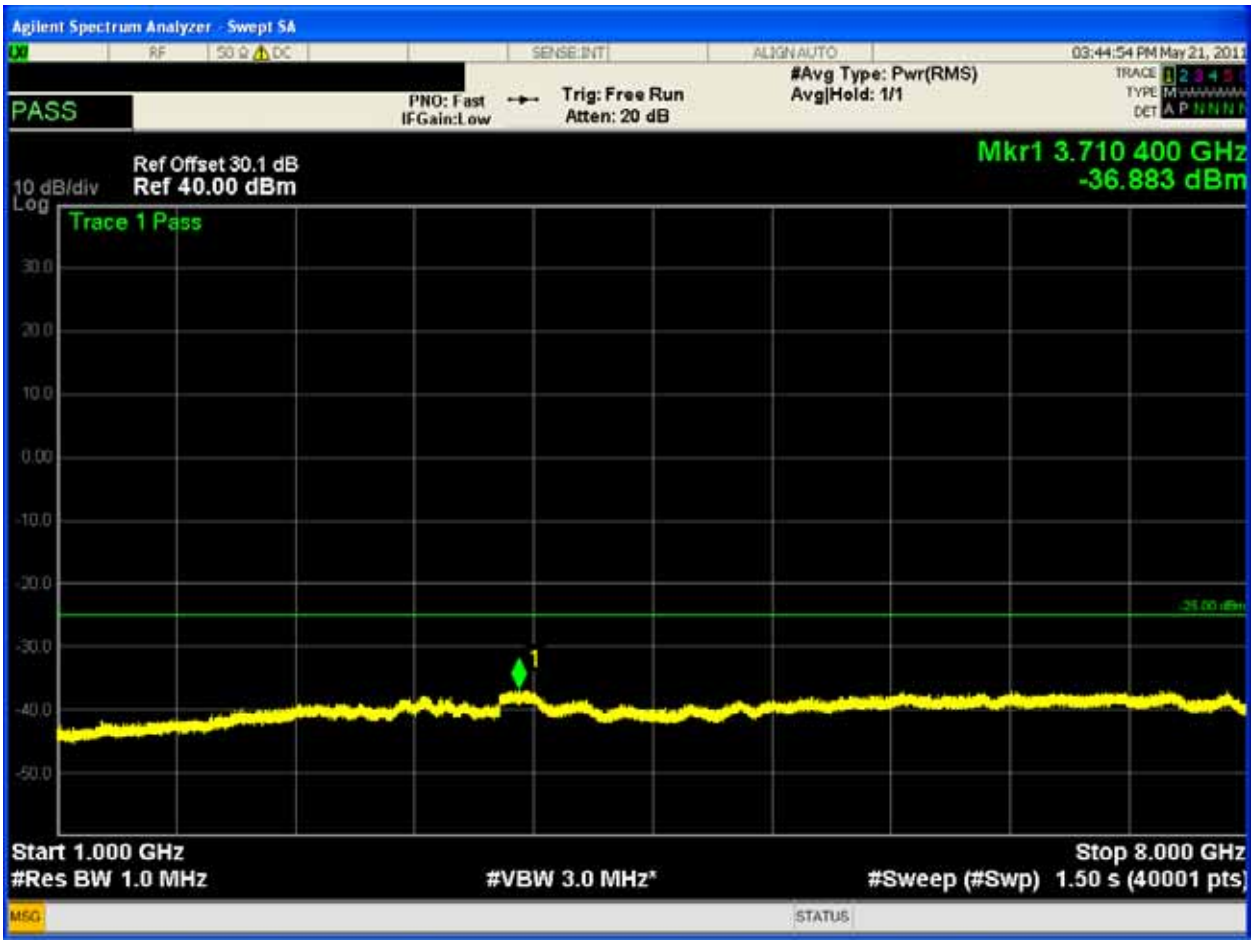
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

FCC / Industry Canada Conducted Emissions above 1 GHz

Tx port

Transmit mode

10 watt peak power



Modulation: DQPSK_HALF

High channel: 221.9875 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

8.6 Frequency stability

Test summary
The requirements are: ■ - MET ☐ - NOT MET

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
■ - NextGen RF Design

Test equipment

	Vendor	Model	Serial Number	Cal Date / Cal Due Date
Spectrum Analyzer	Agilent	PSA N9030A	US4S230321	03-03-2011 / 04-21-2012
Power Supply	HP/Agilent	6030A	2934A-01826	12-16-2010 / 07-07-2011
Computer	Dell	XPS M170	36134745733	N/A
30 dB power attenuator	Weinschel	5009	MA907	Cal by user
Multimeter	Fluke	87V	86670404	04/21/2011 – 04/21/2012
Rx1 Load	Weinschel	2-40	T1328	Cal by user
Rx2 Load	Systron Doner	108328	N/A	Cal by ser
DC Block	PE8210		N/A	Cal by user
50 ohm load	Inmet 3016		N/A	Cal by user
Temperature Chamber	Thermotron	S1.2 MiniMax	NGRF16	N/A

Test limits

FCC 90.213
0.1 ppm – 220-222 MHz
1 ppm – 217-220 MHz – N/A

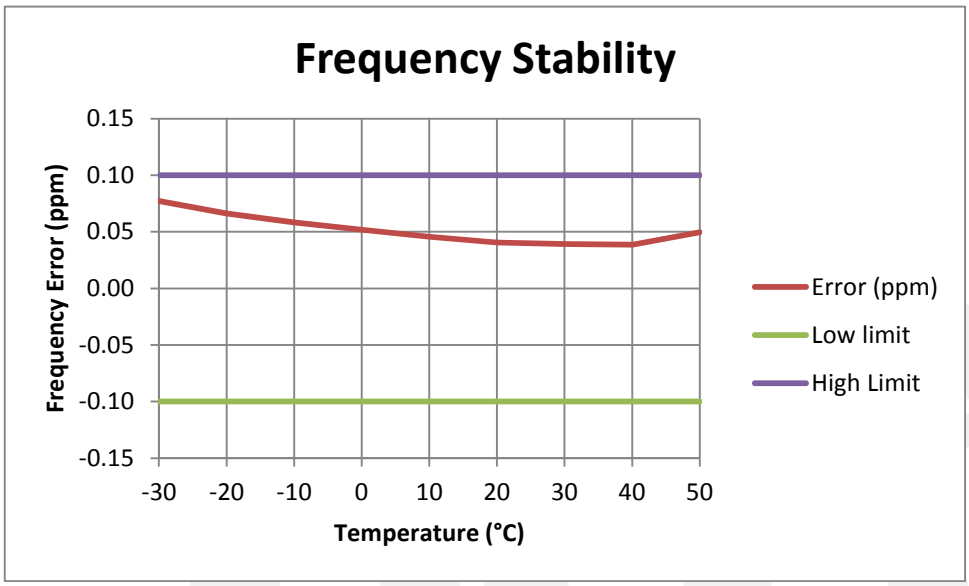
RSS-119 5.3
0.1 ppm – 220-222 MHz
5 ppm – 217-218 MHz 5 ppm – 219-220 MHz – N/A

Test Data
See following pages

Frequency error data has been collected by recording the frequency error information as reported from the vector signal analyzer digital demodulation measurement function contained within the N9030A spectrum analyzer. Knowing the data rate, modulation format, and filter parameters, the digital demodulator is configured to decode the transmission data. The demodulated data is then processed by the vector signal analyzer and is then able to determine the fundamental frequency error result referenced to the center frequency of the spectrum analyzer. This method of frequency error measurement is used on digital transmissions when a suitable unmodulated RF signal is not available.

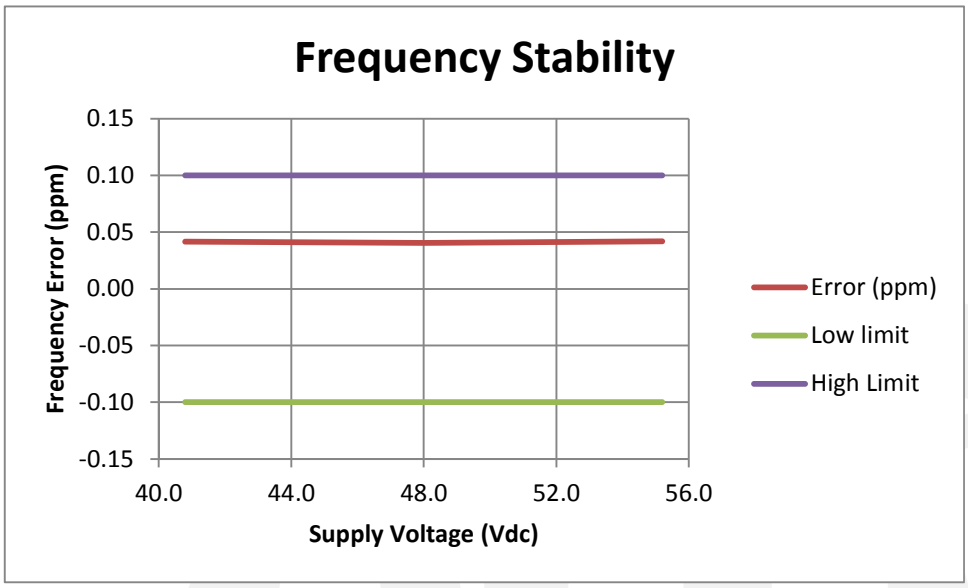
For each data point, the product was unpowered at the test temperature for a sufficient time to ensure that the frequency determining circuitry was also at the test temperature. Power was then applied to the product and a frequency error measurement was performed as soon as data communications with the test computer allowed, typically around 2 minutes after power was applied.

Frequency Stability versus temperature
Frequency: 221.0000 MHz
Modulation: DQPSK
Supply Voltage: 48.0 Vdc



Frequency (MHz)	221.000000	
Temperature °C	Freq Error (Hz)	Error (ppm)
-30	17.033	0.0771
-20	14.619	0.0661
-10	12.895	0.0583
0	11.411	0.0516
10	10.066	0.0455
20	8.9555	0.0405
30	8.6417	0.0391
40	8.5128	0.0385
50	10.951	0.0496

Frequency Stability versus supply voltage
Frequency: 221.0000 MHz
Modulation: DQPSK
Temperature: 20°C



Frequency (MHz)	221.000000	
Voltage	Freq Error (Hz)	Error (ppm)
40.8	9.1780	0.0415
48.0	8.9555	0.0405
55.2	9.2670	0.0419

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

8.7 Receiver emissions

Test summary
The requirements are: ■ - MET ☐ - NOT MET

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
■ - Oakwood Lab (Open Area Test Site)
■ - NextGen RF Design

Test equipment (conducted)

	Vendor	Model	Serial Number	Cal Date / Cal Due Date
Spectrum Analyzer	Agilent	PSA N9030A	US4S230321	03-03-2011 / 04-21-2012
Power Supply	HP/Agilent	6030A	2934A-01826	12-16-2010 / 07-07-2011
Computer	Dell	XPS M170	36134745733	N/A
30 dB power attenuator	Weinschel	5009	MA907	Cal by user
Multimeter	Fluke	87V	86670404	04/21/2011 – 04/21/2012
Rx1 Load	Weinschel	2-40	T1328	Cal by user
Rx2 Load	Systron Doner	108328	N/A	Cal by ser
DC Block	PE8210		N/A	Cal by user
50 ohm load	Inmet 3016		N/A	Cal by user

Test equipment (radiated)

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
OWLE02074	3115	Electro-Mechanics	Ridge Guide Antenna	2504	24-Feb-12
WRLE02674	85662A	Hewlett-Packard	Analyzer Display	2050A02007	05-Nov-11
WRLE02690	8568B	Hewlett-Packard	Spectrum Analyzer	2430A00930	05-Nov-11
WRLE02680	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00343	15-Jun-11
OWLE02671	8447D	Hewlett-Packard	Preamplifier	2648A04942	Code B 05-Jan-12
WRLE03958	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0002	Code B 05-Jan-12
WRLE03204	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	21-Apr-12

Test limits
Radiated, FCC 15.109, RSS-Gen

Frequncy (MHz)	Field strength (μV/meter)	Field strength (dBμV/meter)
30 - 88	100, QP	40.0
88 - 216	150, QP	43.5
216 - 960	200, QP	46.0
Above 960	500, QP	54.0
> 1000	500, AV 5000, PK	54.0 74.0

FCC 15.111
2.0 nwatts (-57dBm)

RSS-Gen 6.2
2.0 nwatts (-57 dBm) 30-1000 MHz
5.0 nwatts (-53 dBm) > 1000 MHz

Test Data
See following pages

Radiated emissions

Below 1 GHz

Measurement summary for limit1: FCC-B <1GHz 3m (Qp)					
FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 3m
200.01 MHz	52.41 Qp	1.61 / 10.63 / 24.68 / 0.0	39.98	H / 3.00 / 260	-3.52
499.99 MHz	47.4 Qp	2.37 / 17.3 / 24.75 / 0.0	42.32	V / 1.20 / 170	-3.68
225.005 MHz	52.11 Qp	1.69 / 11.3 / 25.18 / 0.0	39.92	V / 1.20 / 45	-6.08
874.966 MHz	38.17 Qp	3.43 / 22.45 / 24.65 / 0.0	39.4	V / 1.60 / 160	-6.6
749.978 MHz	39.15 Qp	3.2 / 20.7 / 24.59 / 0.0	38.47	H / 3.00 / 195	-7.53

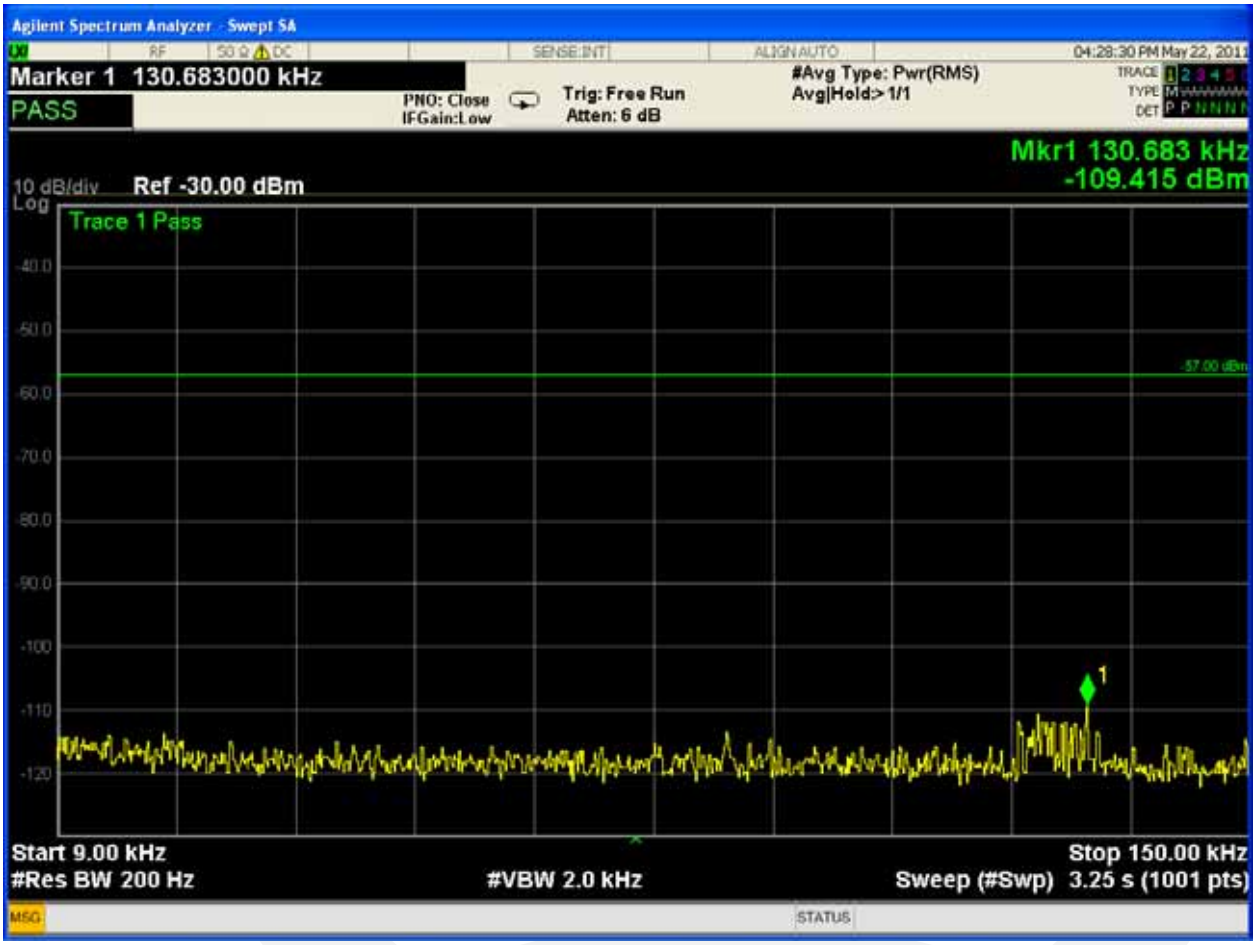
≥ 1 GHz

Measurement summary for limit1: FCC B >1GHz 3m av (Av)					
FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC B >1GHz 3m av
3.672 GHz	46.51 Av	8.83 / 31.79 / 48.86 / 0.0	38.28	V / 1.00 / 140	-15.72
2.0 GHz	55.48 Av	5.46 / 27.9 / 50.86 / 0.0	37.97	V / 1.40 / 155	-16.03
1.5 GHz	57.56 Av	4.36 / 26.05 / 51.23 / 0.0	36.75	V / 1.30 / 195	-17.25
2.495 GHz	50.33 Av	6.73 / 28.57 / 49.2 / 0.0	36.44	V / 1.00 / 0	-17.56
2.495 GHz	50.31 Av	6.73 / 28.57 / 49.2 / 0.0	36.41	V / 1.00 / 0	-17.59

Measurement summary for limit2: FCC B >1G 3 M peak (Pk)					
FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC B >1G 3 M peak
1.1 GHz	71.15 Pk	3.76 / 25.03 / 51.07 / 0.0	48.87	V / 1.00 / 0	-25.13
2.0 GHz	66.15 Pk	5.46 / 27.9 / 50.86 / 0.0	48.64	V / 1.00 / 180	-25.36
2.495 GHz	62.1 Pk	6.73 / 28.57 / 49.2 / 0.0	48.21	V / 1.00 / 0	-25.79
2.495 GHz	61.95 Pk	6.73 / 28.57 / 49.2 / 0.0	48.05	V / 1.00 / 0	-25.95
3.672 GHz	55.05 Pk	8.83 / 31.79 / 48.86 / 0.0	46.82	V / 1.00 / 90	-27.18

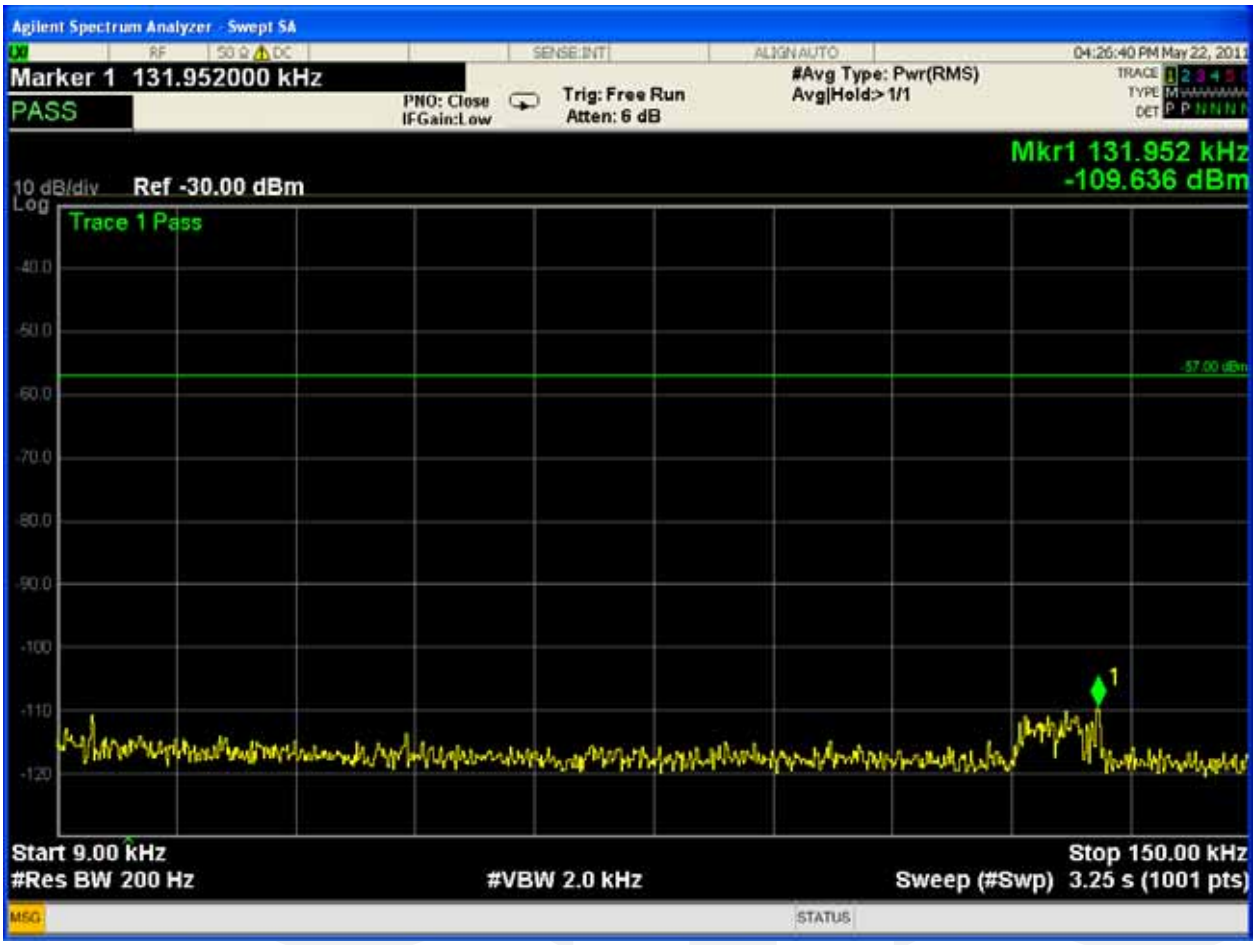
The emission limits shown in the above tables are based on measurements employing a CISPR quasi-peak detector except for the frequency bands above 1000 MHz. Radiated emission limits above 1000 MHz are based on measurements employing an average detector. When average radiated emission measurements are specified in this part, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, *e.g.*, see §§ 15.250, 15.252, 15.255, and 15.509–15.519, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. Radiated emissions from the EUT are measured in the frequency range of 30 to 1000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with a 120 kHz / 6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz RBW/VBW / 6 dB bandwidth and peak detection, 1 MHz RBW/ 10 Hz VBW for average detection. Table top equipment is placed on a non-conductive support 80 cm above the ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT is rotated 360 degrees. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB / decade (inverse linear-distance for field strength measurements).

Conducted emissions



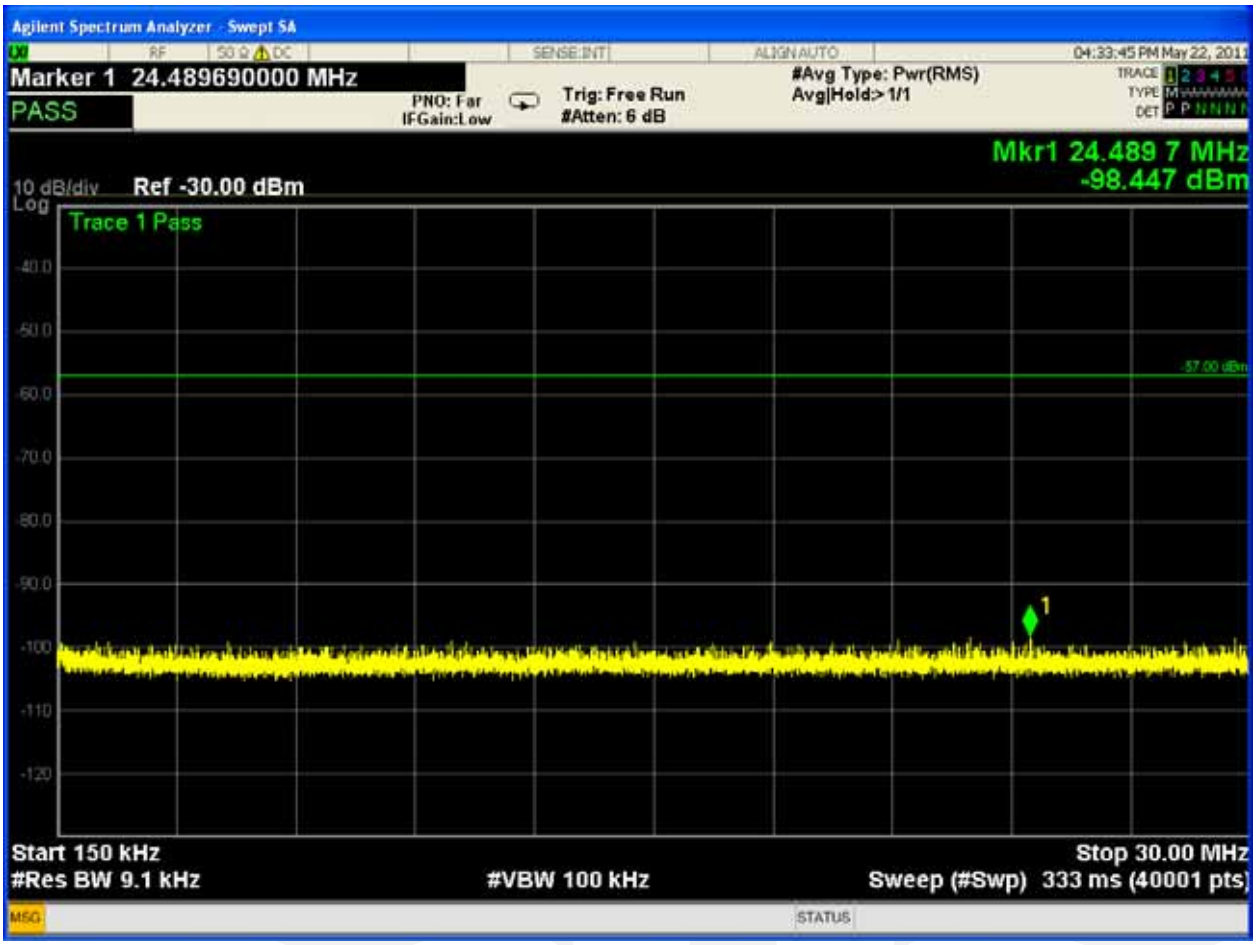
Rx1 Port
Receive mode
Low channel: 220.0125 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



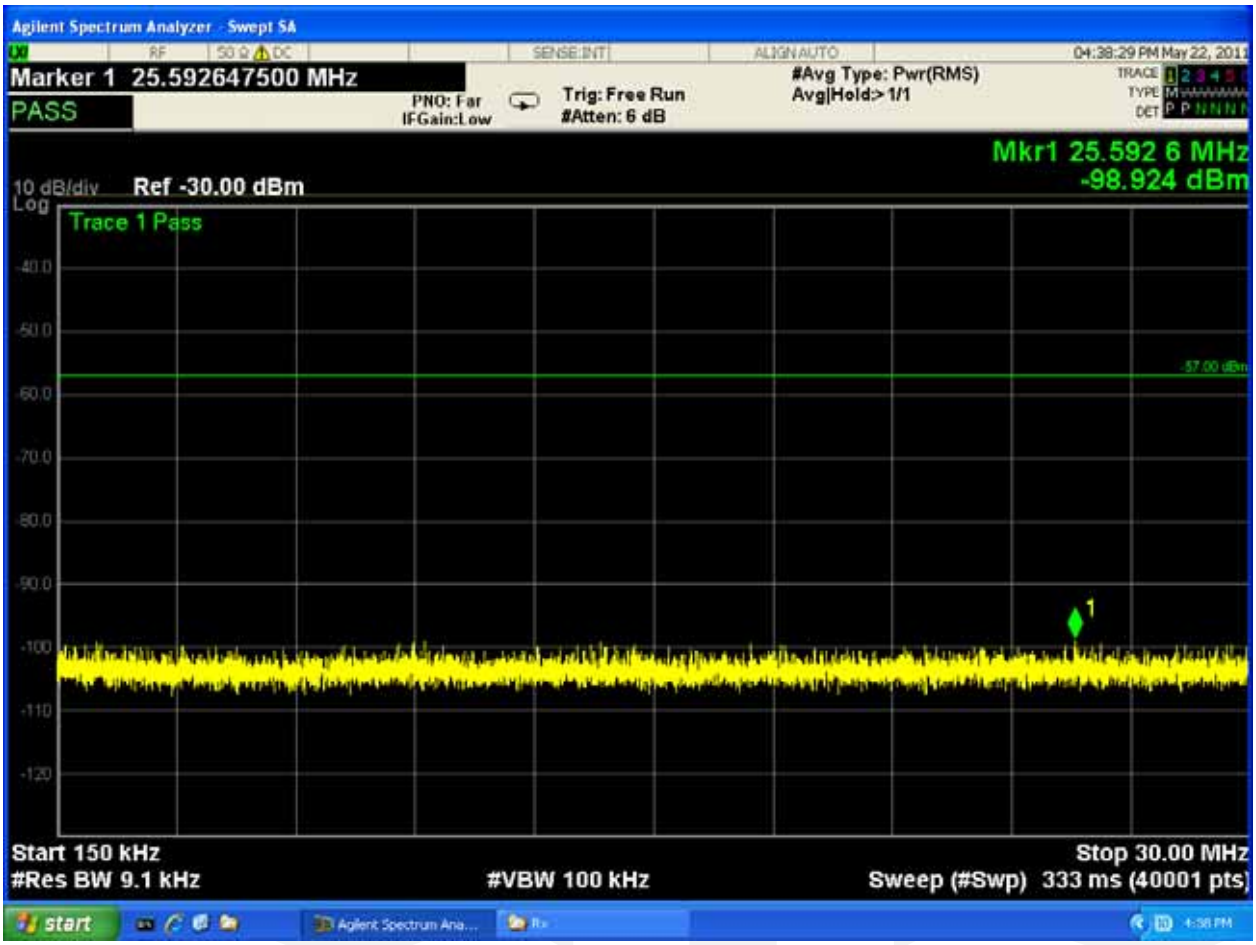
Rx2 port
Receive mode
Low channel: 220.0125 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



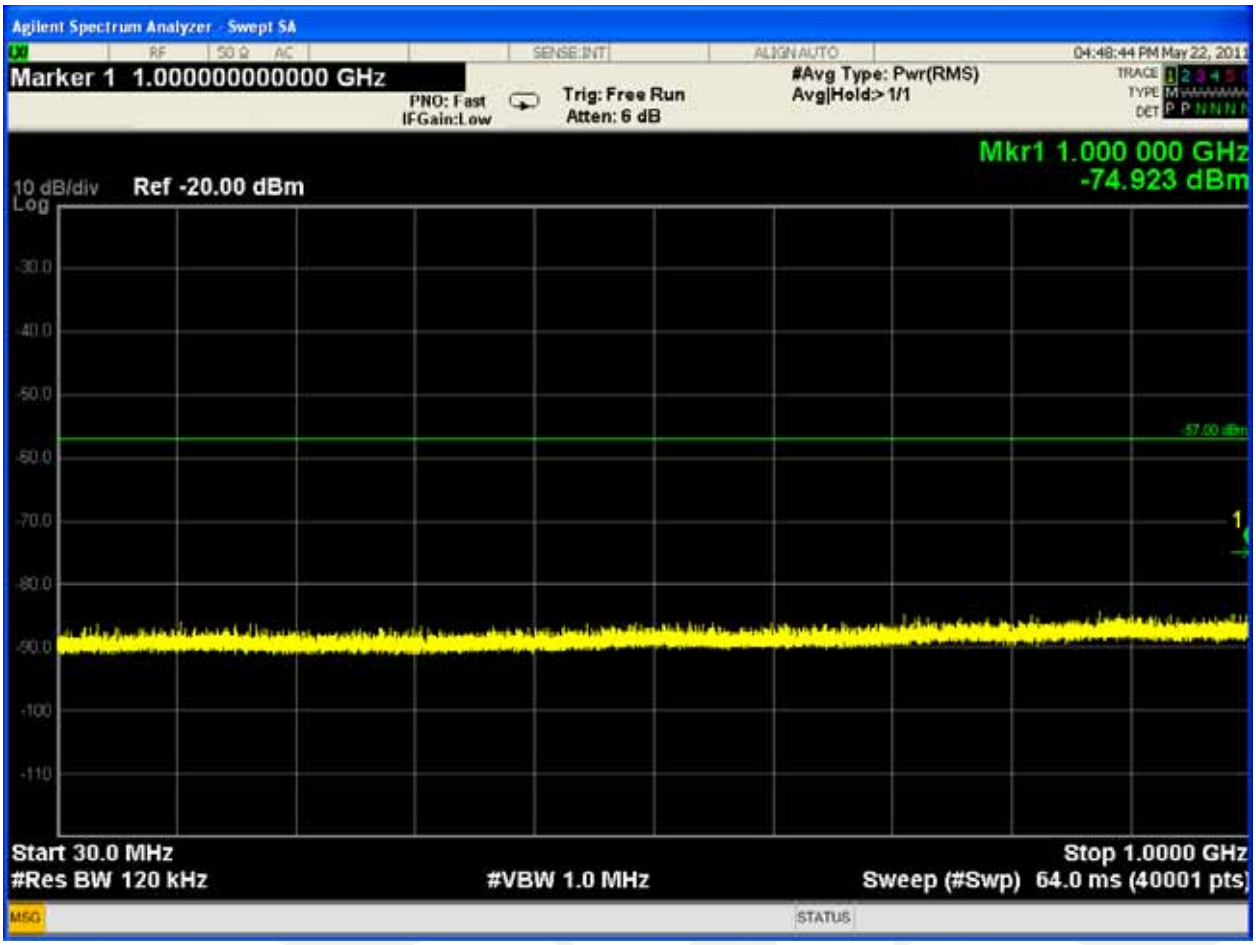
Rx1 Port
Receive mode
Low channel: 220.0125 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



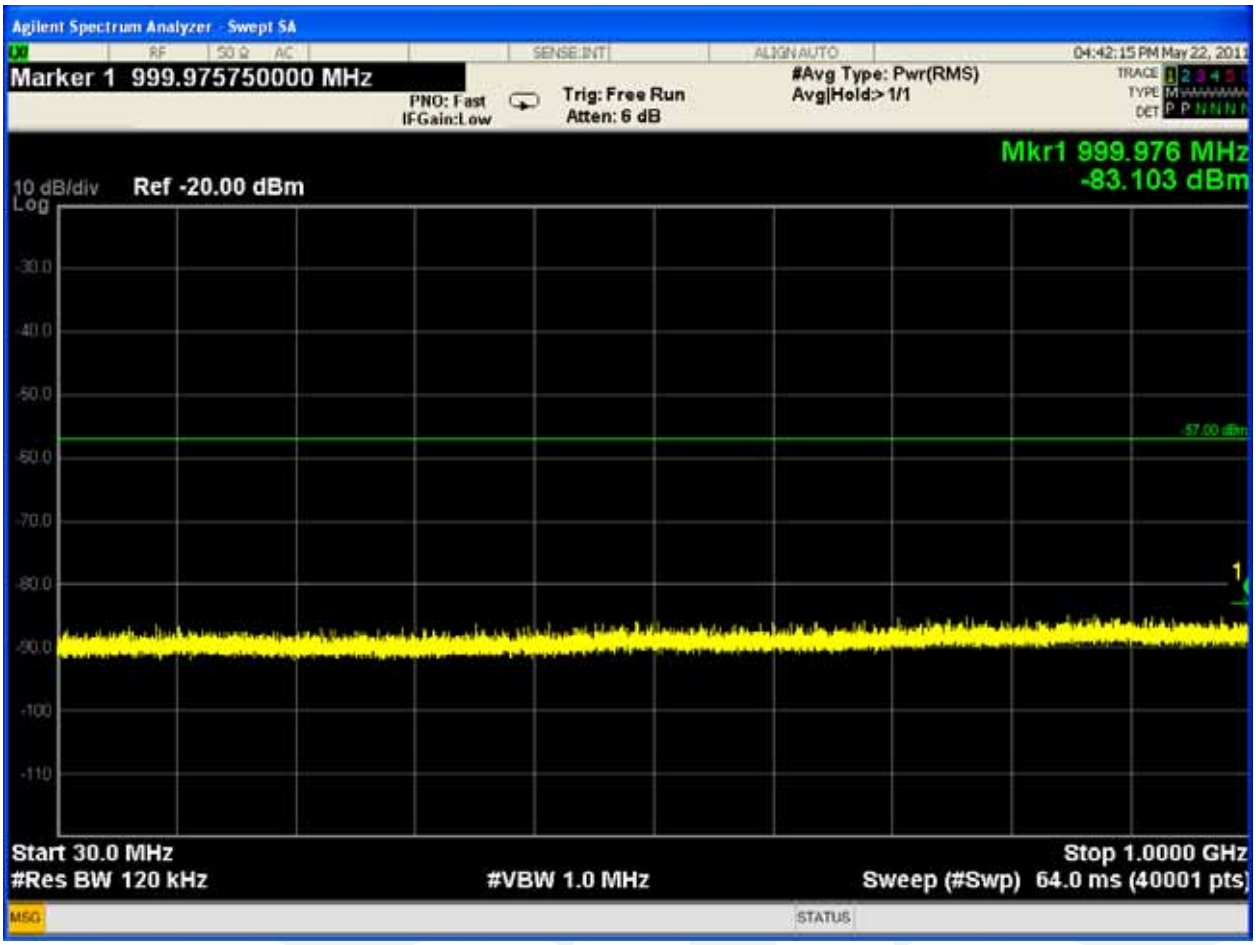
Rx2 port
Receive mode
Low channel: 220.0125 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



Rx1 Port
Receive mode
Low channel: 220.0125 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



Rx2 port
Receive mode
Low channel: 220.0125 MHz

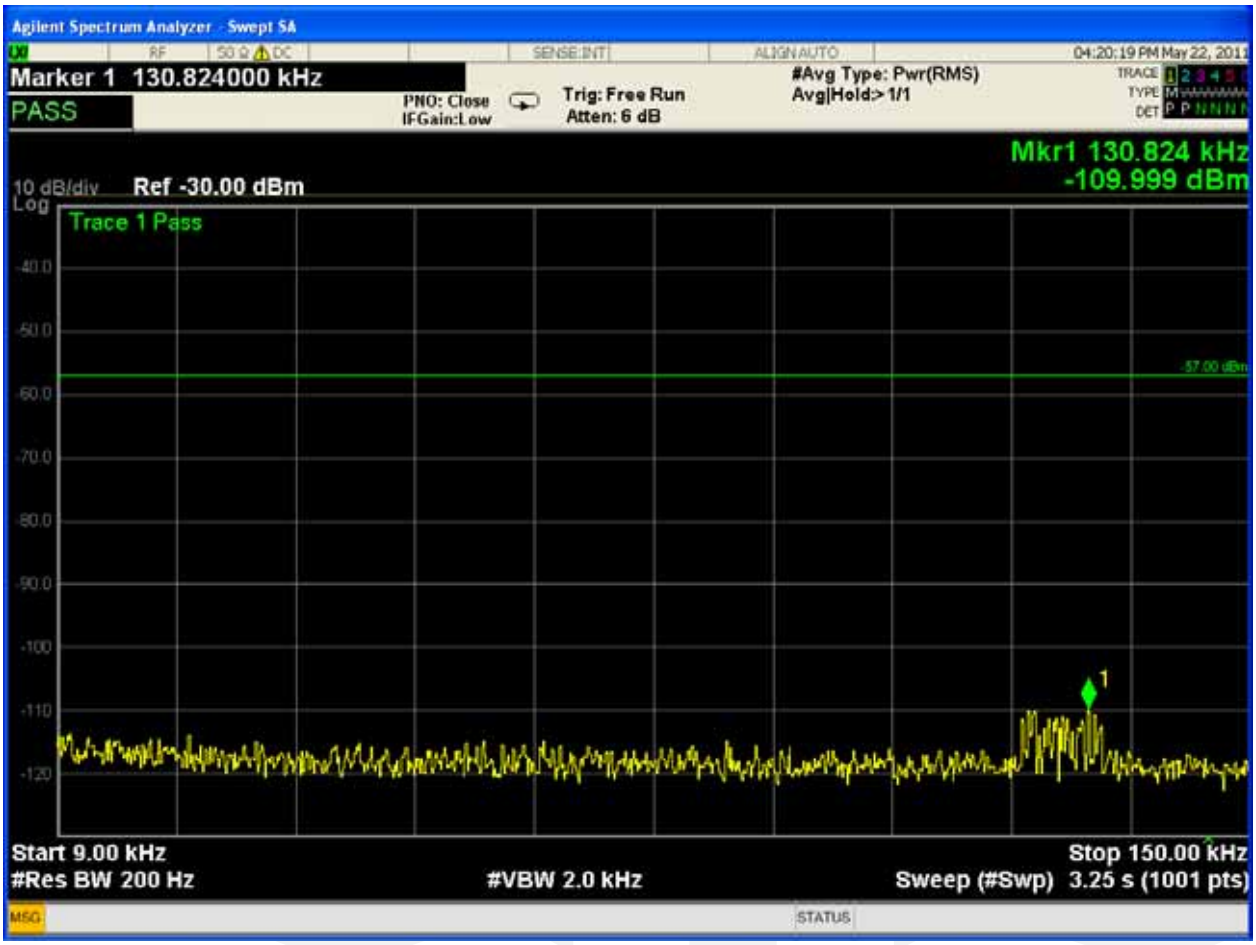
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Rx1 Port
Receive mode
Low channel: 220.0125 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

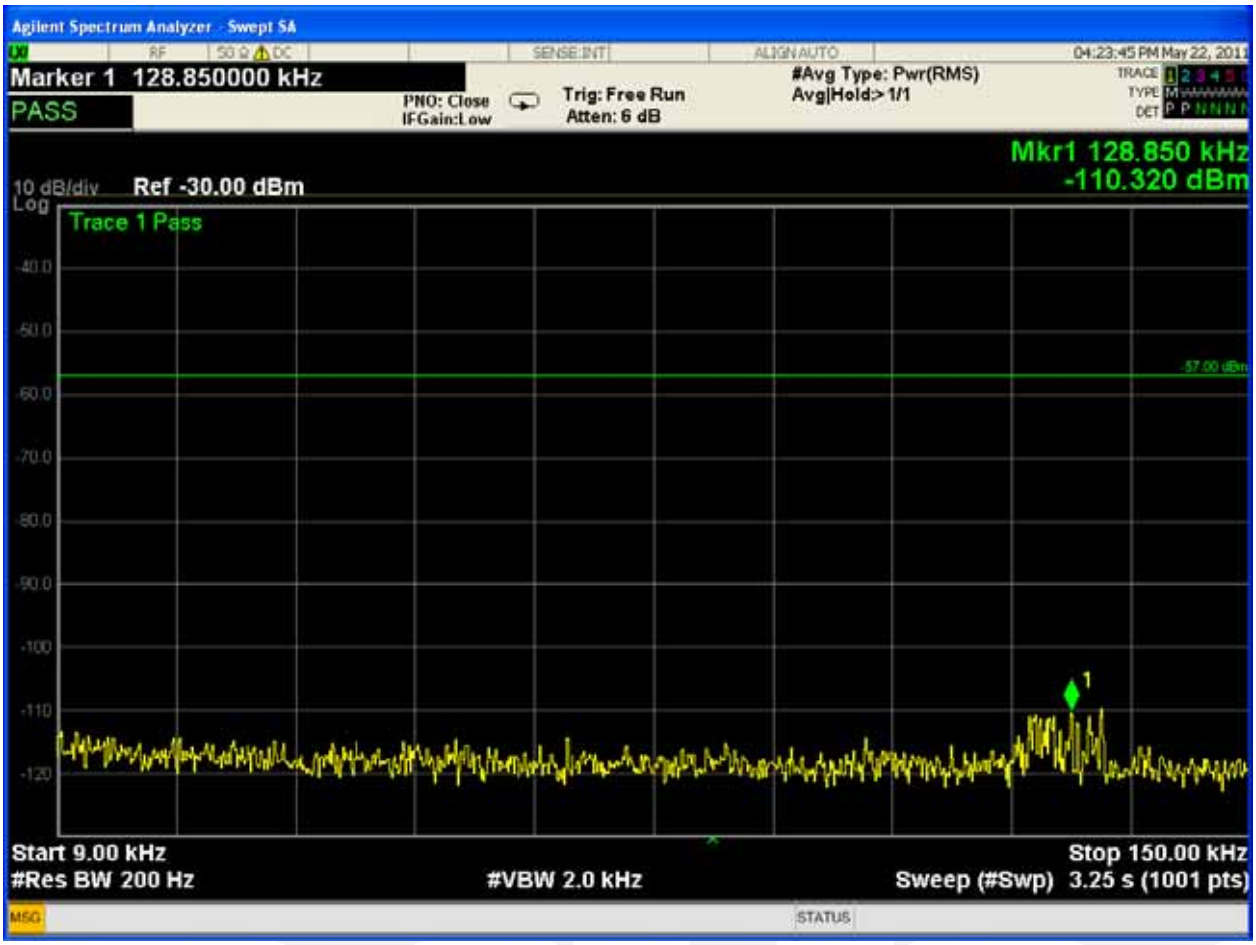
Rx2 port
Receive mode
Low channel: 220.0125 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



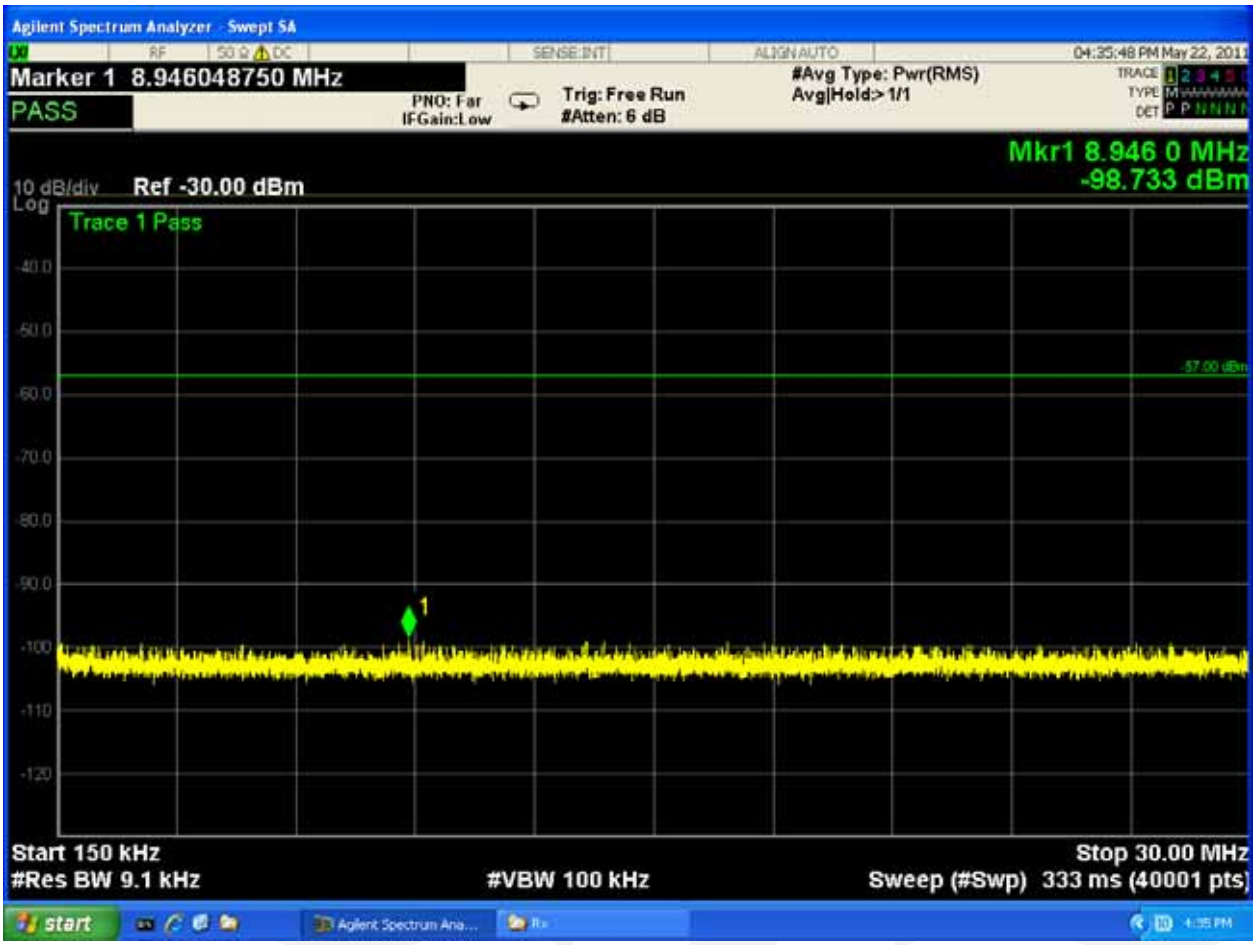
Rx1 Port
Receive mode
High channel: 221.9875 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



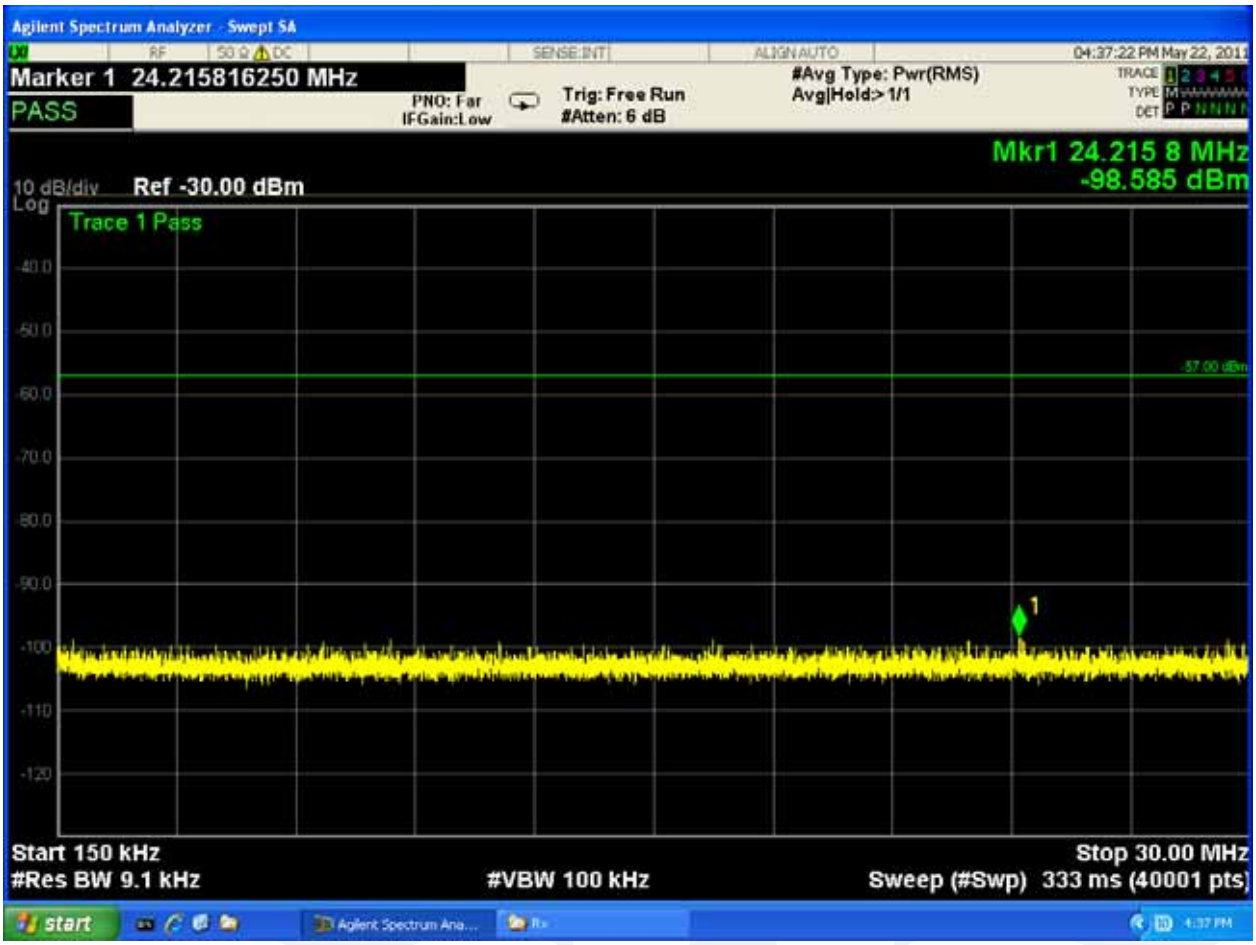
Rx2 port
Receive mode
High channel: 221.9875 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

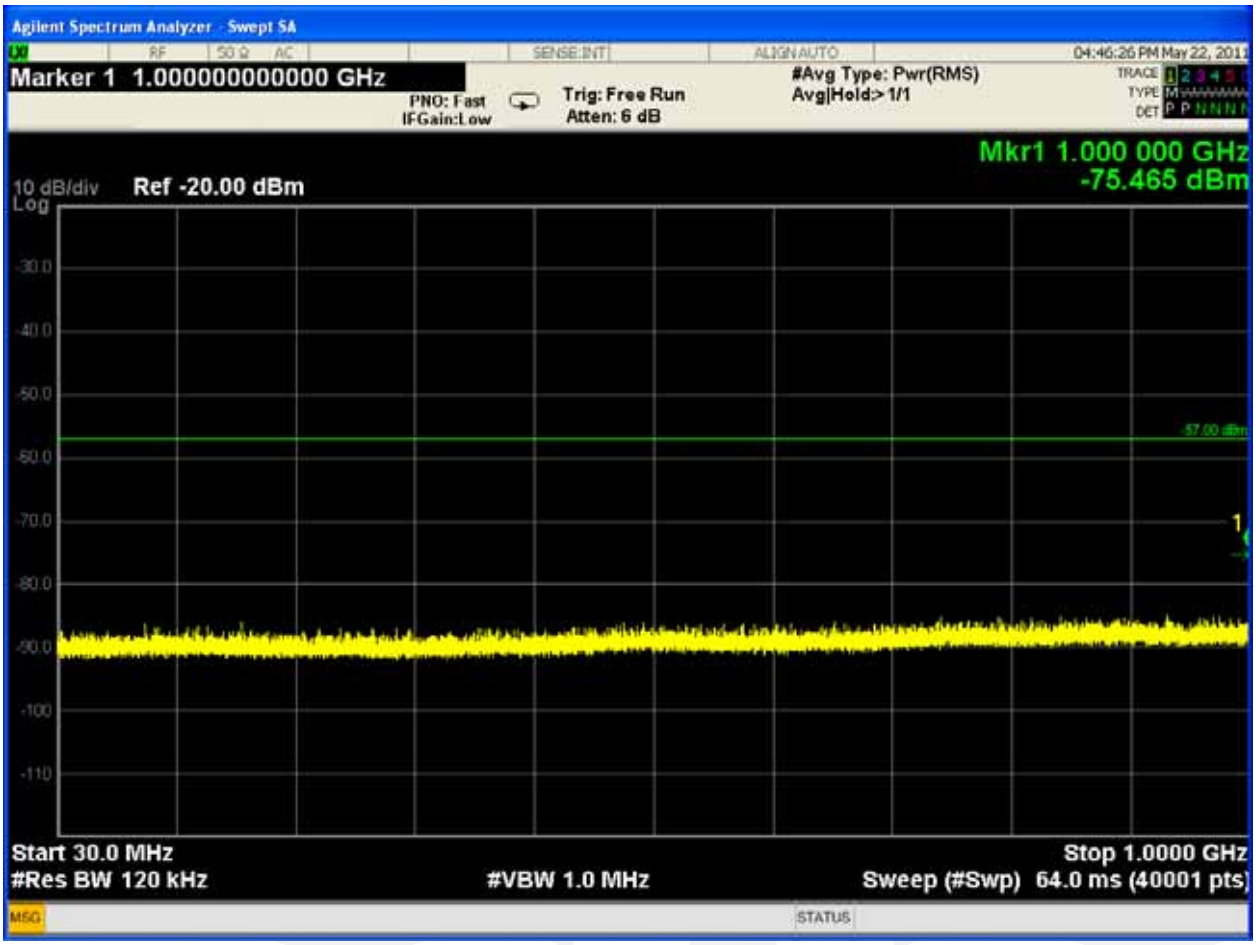


Rx1 Port
Receive mode
High channel: 221.9875 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

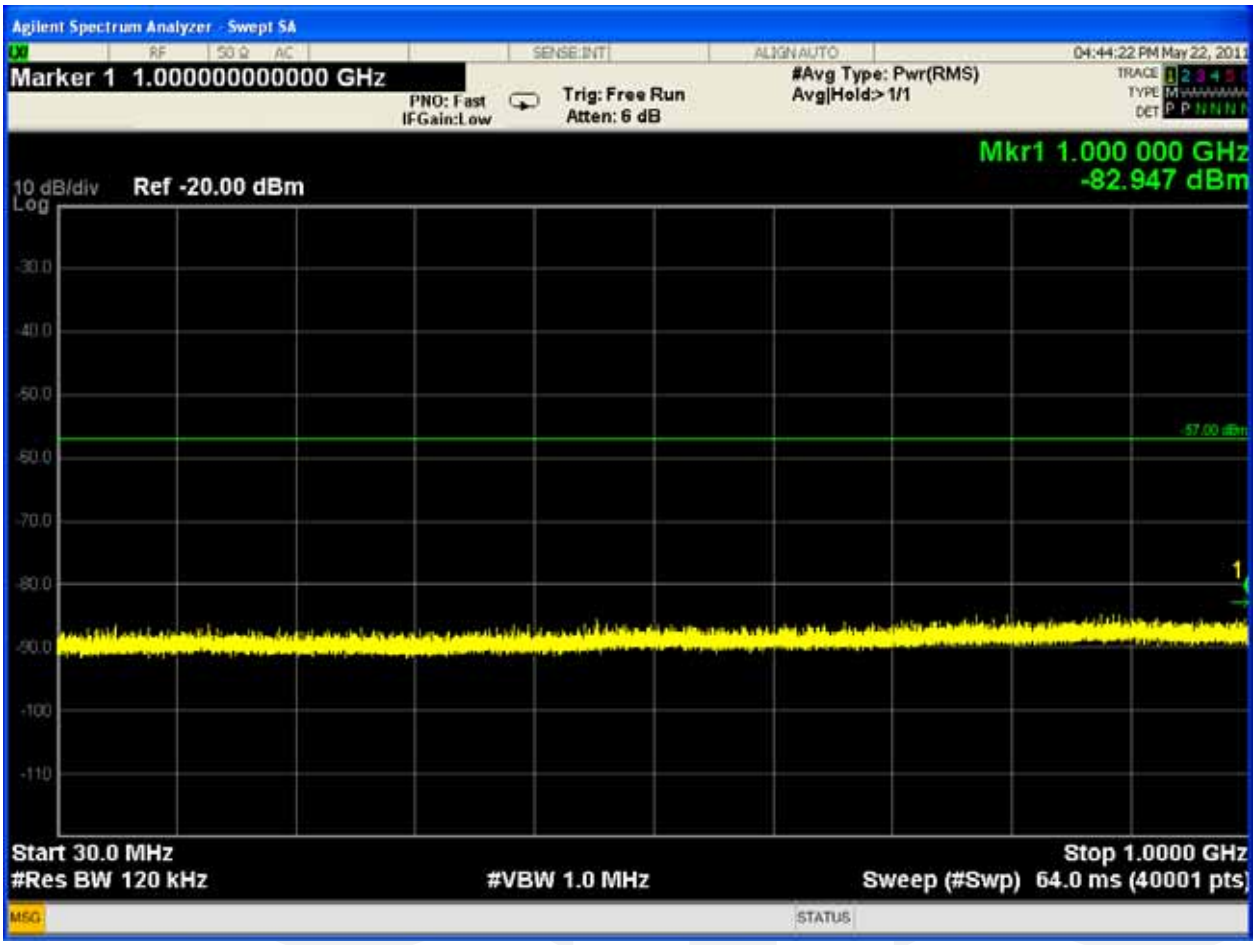


Rx2 port
Receive mode
High channel: 221.9875 MHz



Rx1 Port
Receive mode
High channel: 221.9875 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



Rx2 port
Receive mode
High channel: 221.9875 MHz

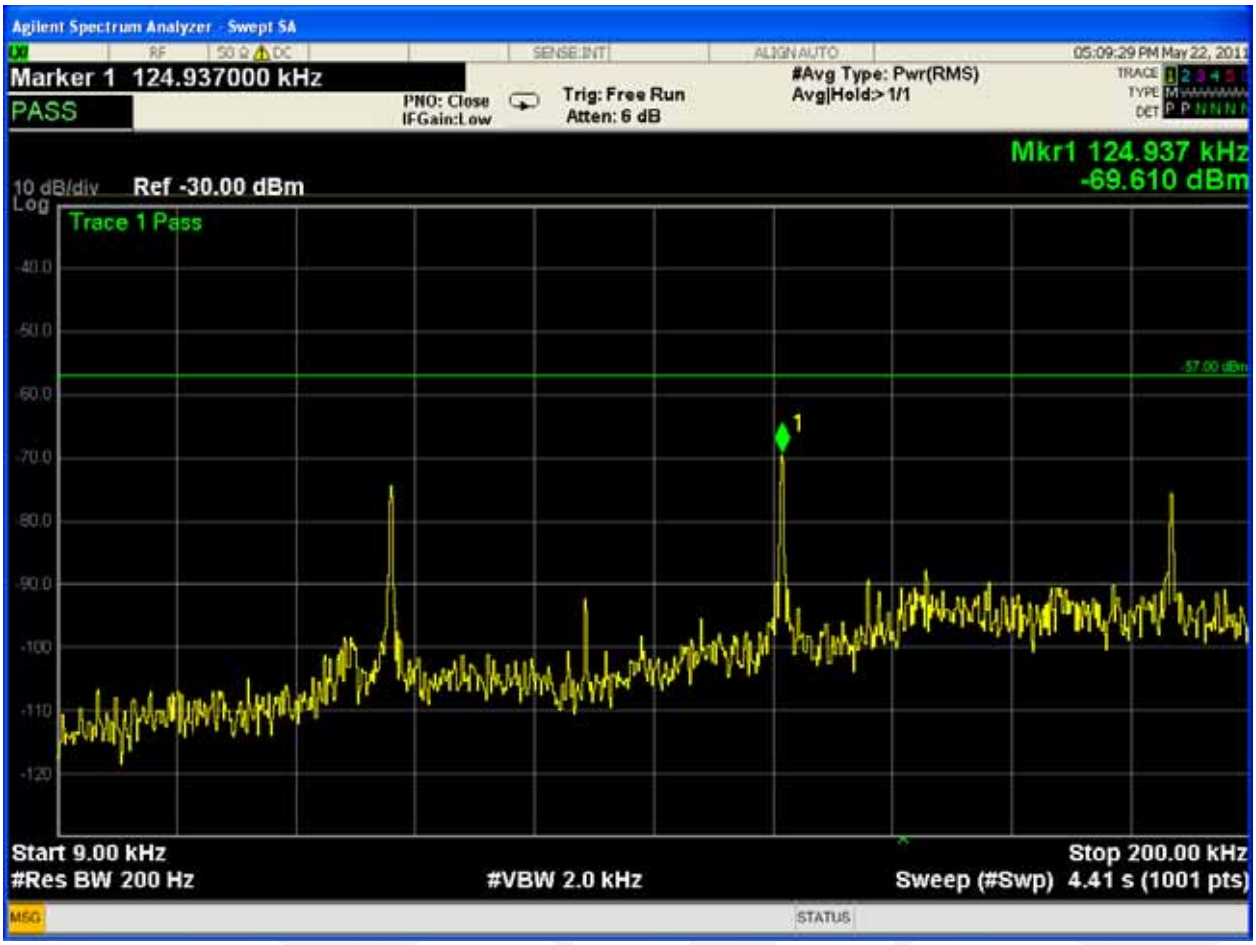
TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Rx1 Port
Receive mode
High channel: 221.9875 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

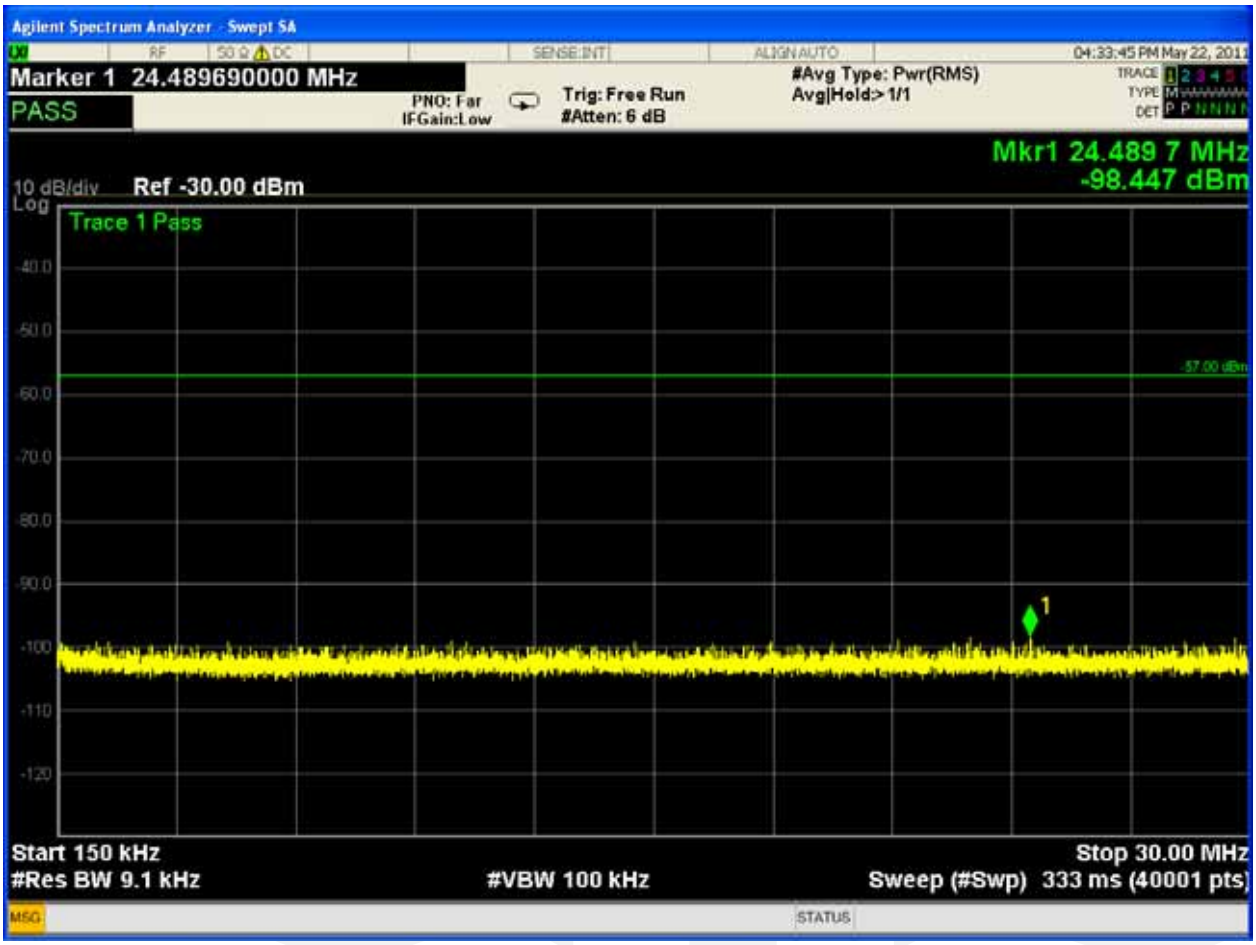
Rx2 port
Receive mode
High channel: 221.9875 MHz

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



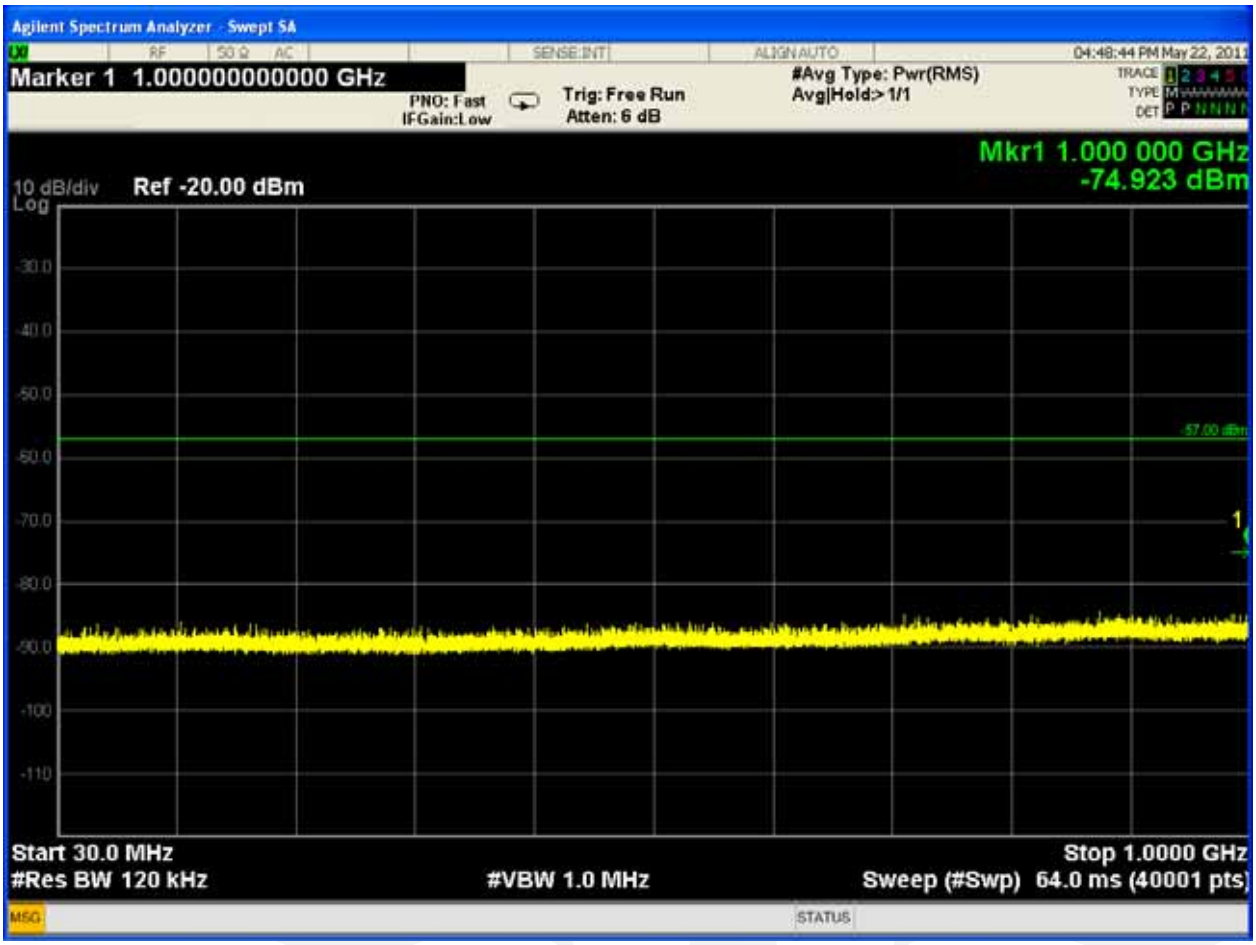
GPS Port

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



GPS Port

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298



GPS Port

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

GPS Port

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

9. Test-setup photo(s):

Radiated emissions

Radiated emissions

Radiated emissions

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Radiated emissions

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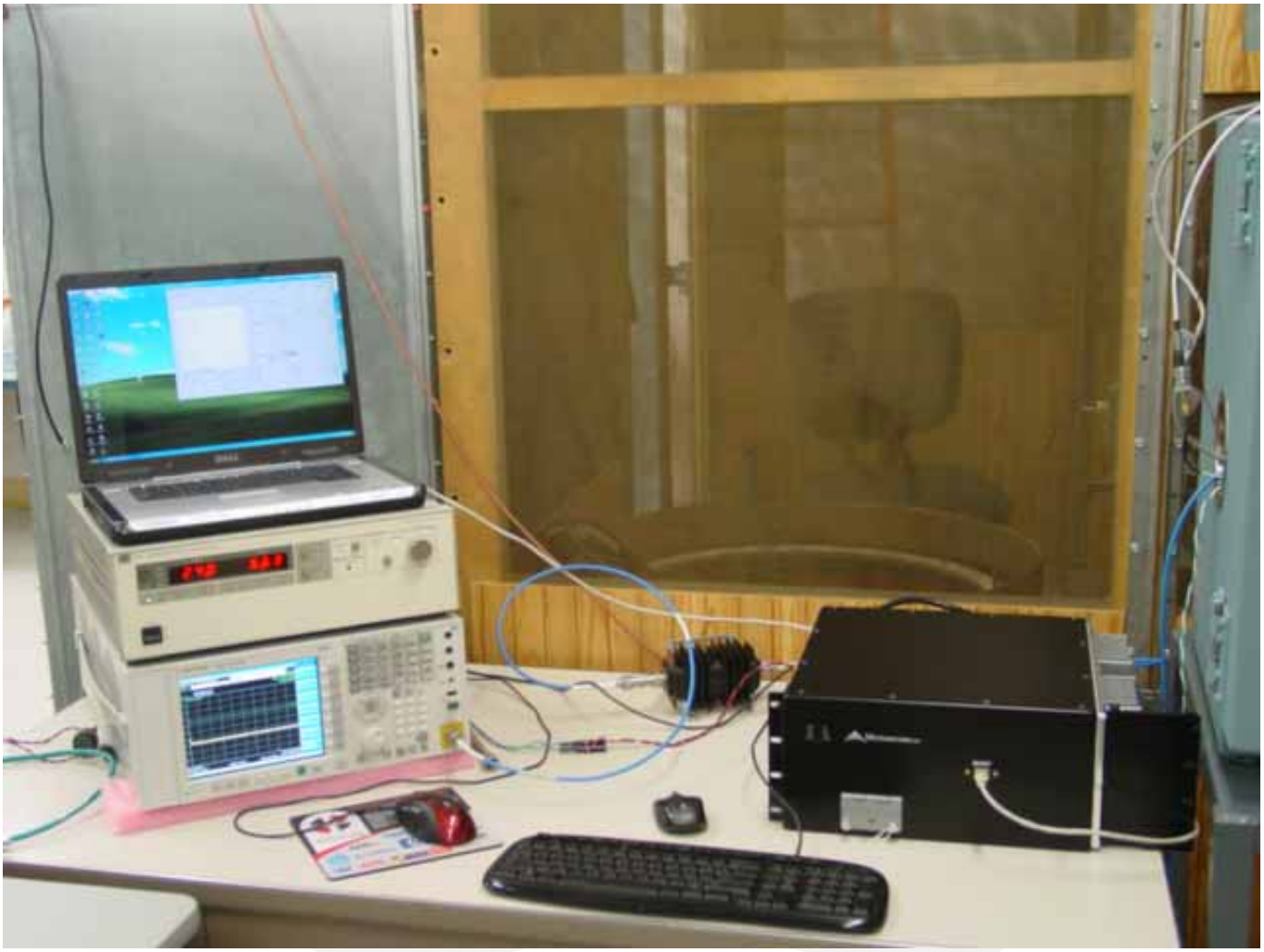
Conducted emissions



TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

Conducted emissions, frequency stability

TÜV SÜD AMERICA INC 19333 Wild Mountain Road Taylors Falls MN USA 55084-1786 Tel: 651 638 0297 Fax: 651 638 0298

10. EUT information

EMC Test Plan and Constructional Data Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.
NOTE: This information will be input into your test report as shown below. Press the F1 key at any time to get HELP for the current field selected.

Company:	Meteorcomm LLC		
Address:	1201 SW 7th St		
	Renton, WA 98057		
Contact:	Fred Cleveland	Position:	Principal RF Design Engineer
Phone:	253-872-2521 x128	Fax:	253-872-7662
E-mail Address:	fcleveland@meteorcomm.com		

General Equipment Description -- ***NOTE: This information will be input into your test report as shown below.***

EUT Description	Base Radio 48 V		
EUT Name	Base Radio		
Model No.:	63030-48	Serial No.:	BF2A071100062
Product Options:	GPS, LAN		
Configurations to be tested:	GPS, LAN		

Equipment Modification (*If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.)*

Modifications since last test:

Modifications made during test:

Test Objective(s): ***Please indicate the tests to be performed, entering the applicable standard(s) where noted.***

☐ EMC Directive 2004/108/EC (EMC)	☒ FCC: Class ☐ A ☒ B Part 15
Std:	☐ VCCI: Class ☐ A ☐ B
☐ Machinery Directive 89/392/EEC (EMC)	☐ BSMI: Class ☐ A ☐ B (Separate Report)
Std:	☒ Canada: Class ☐ A ☒ B
☐ Medical Device Directive 93/42/EEC (EMC)	☐ Australia: Class ☐ A ☐ B
Std:	☒ Other: FCC 90 / IC RSS-119
☐ Vehicle Directive - 2004/104/EC (EMC)	☐ Ag Directive *2009/64/EC (EMC)
☐ Other Vehicle Std:	
☐ FDA Reviewers Guidance for Premarket Notification Submissions (EMC)	

Third Party Certification (contact TÜV for quote), if applicable (*Signature on last page required).

☐ Attestation of Compliance (AoC)*	☐ EMC Certification (used with Octagon Mark)*
☐ Statement of Compliance (SoC, previously CoC)* - All aspects of the essential requirements were assessed	
Protection Class (Req'd for AoC, SoC, EMC Cert. N/A for vehicles) ☐ Class I ☐ Class II ☐ Class III (Press **F1** when field is selected to show additional information on Protection Class.)	
☒ FCC / TCB Certification	☐ Taiwan Certification
☒ Industry Canada / FCB Certification	☐ Korean Certification
☐ e-Mark Certification	

EMC Test Plan and Constructional Data Form

Attendance

Test will be: ☒ Attended by the customer ☐ Unattended by the customer

Failure - *Complete this section if testing will not be attended by the customer.*

If a failure occurs, TÜV SÜD America should:

☐ Call contact listed above, if not available then stop testing. (After hrs phone): _____

☐ Continue testing to complete test series.

☒ Continue testing to define corrective action.

☐ Stop testing.

EUT Specifications and Requirements

Length: 17 Width: 19 Height: 7 Weight: 24

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 120Vac/48Vdc (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: 1

Current (Amps/phase(max)): 5ac/9dc Current (Amps/phase(nominal)): 3ac/4dc

Other _____

Other Special Requirements

none

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Industrial

EUT Power Cable

☐ Permanent OR ☒ Removable Length (in meters): 1.7

☐ Shielded OR ☒ Unshielded

☐ Not Applicable

EMC Test Plan and Constructional Data Form

EUT Interface Ports and Cables

Type	During Test: Analog	During Test: Digital	During Test: Active	During Test: Passive	Qty	Shielding: Yes	Shielding: No	Shielding: Type	Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent
EXAMPLE:										*Metallized 9-pin D-Sub*	*Characteristic Impedance*			
RS232	☐	☒	☒	☐	*2*	☒	☐	*Foil over braid*	*Coaxial*			*6*	☒	☐
LAN	☐	☒	☒	☐	1	☐	☒	twisted pair	100 ohm differential	RJ45	100	1	☒	☐
MAINT	☐	☒	☐	☒	1	☐	☒	twisted pair	open	RJ45	100	n/a	☒	☐
GPS	☒	☐	☐	☒	1	☒	☐	foil over braid	coaxial	TNC	50	0	☒	☐
Rx1/Rx2	☒	☐	☒	☐	2	☒	☐	foil over braid	coaxial	type N	50	0	☒	☐
dc +/-	☒	☐	☒	☐	1	☐	☒	twisted pair	lug	screw lug	dc	1.7	☒	☐
Tx	☒	☐	☒	☐	1	☒	☐	foil over braid	coaxial	type N	50	.5	☒	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐

EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level: Sprint v16.01

Description: ITC Application Software Image

Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Transmitter radiated emissions 30 Mhz - 2200 MHz
   with internal GPS upper limit = 7900 MHz
   Flow = 217.6125 MHz / Modulation = DQPSK
   Fhigh = 221.9875 MHz / modulation = DQPSK_HALF
2. Receiver radiated emissions 30 MHz - 2200 MHz
   with internal GPS upper limit = 7900 MHz
   Flow = 217.6125 MHz / Modulation = DQPSK
   Fhigh = 221.9875 MHz / modulation = DQPSK_HALF
3. Power line conducted emissions

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc)

Description	Model #	Serial #	FCC ID #
Master processor	custom	N/A	N/A
RF/DC Power	custom	N/A	N/A
Rx - Tx LPF	custom	N/A	N/A
Modulator	custom	N/A	N/A
Driver	custom	N/A	N/A
PA Final	custom	N/A	N/A
DC Converter	custom	N/A	N/A

EMC Test Plan and Constructional Data Form

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc) This information is required for FCC & Taiwan testing.

Description	*Model #*	*Serial #*	*FCC ID #*
Computer	Dell XPS M170	36134745733	E2K24BNHM
System Power Supply	HP 6030A	2934A-01826	N/A
Tx Load1 - Weinschel Electronics	45-3-33	KF636	N/A
GPS antenna	AR-10S	N/A	N/A
Tx Load2 - Weinschel Electronics	5009	MA907	N/A
Rx loads	40 dB attenuators		N/A
Systron Donor Corp	108328	N/A	
Weinschel Eng	N/A	T1328	

Oscillator Frequencies

Manufacturer	*Frequency*	*Derived Frequency*	*Component # / Location*	*Description of Use*

Power Supply

Manufacturer	*Model #*	*Serial #*	*Type*
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____

Power Line Filters

Manufacturer	*Model #*	*Location in EUT*

EMC Test Plan and Constructional Data Form

Critical EMI Components (Capacitors, ferrites, etc.)

Description	*Manufacturer*	*Part # or Value*	*Qty*	*Component # / Location*

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

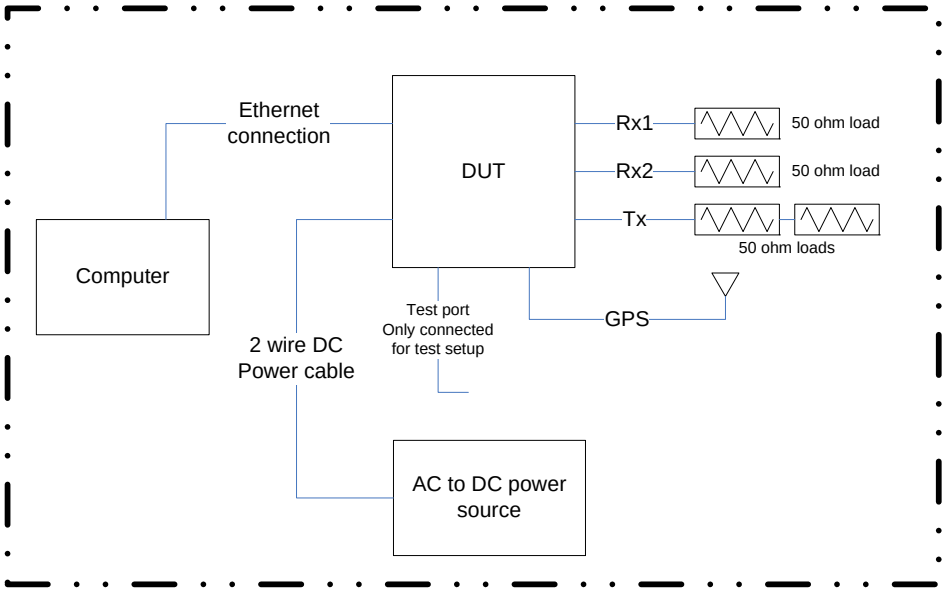
PLEASE ENTER NAMES BELOW (INSERT ELECTRONIC SIGNATURE IF POSSIBLE)

Authorization (Signature Required if a Third Party Certification is checked on pg 1)

Customer authorization to perform tests according to this test plan.	Date
Tim Blom	5 May 2011
Test Plan/CDF Prepared By (please print)	Date

EMC Block Diagram Form

System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.



Authorization Signatures

Customer authorization to perform tests according to this test plan.	Date
Tim Blom	5/6/2011
Test Plan/CDF Prepared By (please print)	Date