Test Report Summary
FCC CFR 47, Part 27
Wireless Communications Service

Manufacturer: ADC Telecommunications

Name of Equipment: Digivance® WIMAX Remote

Model Number(s): DGVL-W08000RU

Manufacturer's Address: P.O. Box 1101
Minneapolis, MN 55440-1101

Test Report Number: MN080212

Test Date(s): 29, 30 January, 2008 (ETL)
8 February, 2008 (ADC)

According to testing performed at Intertek, the above-mentioned unit is in accordance with the applicable electromagnetic compatibility (EMC) portions of the requirements defined in FCC Part 27.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

All testing was done in accordance with the Federal Communications Commission's CFR 47 Part 27 and the EUT fulfills the requirements of the Federal Communications Commission's CFR 47 Part 27.

Date: 8 January, 2008

Location:

Intertek Testing Services (ETL)
7250 Hudson Blvd., Suite 100
Oakdale, MN 55128
Phone: (651) 730-1188
Fax: (651) 730-1282

ADC Telecommunications
5341 12th Ave E
Shakopee, MN 55379
Phone: (952) 403-8340
Fax: (952) 403-8858

Testing Conducted by (ADC):
And Report Written by:

Mark F. Miska
Compliance Engineer

EMC Emission – T E S T R E P O R T

Test Report File Number: MN080212 **Date of Issue:** 8 January, 2007

Model Number(s): DGVL-W08000RU

Product Name: Digivance® WIMAX Remote

Product Type: Repeater

Applicant: ADC Telecommunications

Manufacturer: ADC Telecommunications

License Holder: ADC Telecommunications

Address: P.O. Box 1101
Minneapolis, MN 55440-1101

Test Result: ■ **Positive** □ Negative

Test Project Number: 3143419MIN-001
Reference(s)

Total pages including Appendices: 64

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1.0 REVISION DESCRIPTION

Rev	Total Pages	Date	Description
A	64	12 February, 2008	Original Release

2.0 DOCUMENTATION

2.1 Test Regulations

27.50 Power limits
27.53 Emission limits
27.54 Frequency stability

The emissions tests were performed according to the following regulations:

☐ FCC Part 22

☐ FCC Part 24

■ **FCC Part 27**

☐ FCC Part 90

☐ IC RSS-131 Issue 2

Environmental Conditions in the lab:

ADC	**ETL**
Temperature: 24º C	15-35º C
Relative Humidity: 22%	30-60%
Atmospheric Pressure: 97.7 kPa	86-106 kPa

Power Supply Utilized:
Power Supply System : 1 phase, 60 Hz, 120 VAC

2.2 Test Operation Mode

☐ Standby

☐ Test Program

☐ Practice Operation

■ **Max composite in and out**

2.3 Configuration of the device under test:

Normal Operation – BRS (Broadband Radio Service) – 2640.5 to 2673.5 MHz

2.4 Product Options:

None

2.5 EUT Specifications and Requirements:

Length: 24.0”
Width: 16.75”
Height: 5.5”
Weight: 56 pounds

2.6 Cables:

Cable Type	Length	From	To
RF	> 3M	Ancillary Equip	EUT
RF	< 3M	EUT	50 Ohm Load
Power	< 3M	Power	Input Power
Fiber	> 3M	Ancillary Equip	EUT

2.7 Power Requirements:

Voltage: 120 VAC
Amps: 1.9 A

2.8 Typical Installation and/or Operating Environment:

Outdoor/Indoor. System is typically employed as an outdoor repeater.

2.9 Other Special Requirements:

None

2.10 EUT Software:

Revision Level: Version 6.3.99
Description: Celletra Control and Monitoring System

2.11 EUT System Components

Description	Model #	Serial #	FCC ID #
WIMAX Remote	DGVL-W08000RU	None	

2.12 Support Equipment

Description	Manufacturer	Model #	FCC ID #
Power Meter	HP	EPM-441A	
Signal Generator	Agilent	E4438C	
Attenuator	Aeroflex	86-30-12	

2.13 Deviations from standard:

Modifications required to pass:

☐ As indicated on the data sheet(s)

■ **None**

Test Specification Deviations; Additions to or Exclusions from:

☐ As indicated in the Test Plan

■ **None**

2.14 General Remarks:

None.

2.15 Summary:

The requirements according to the technical regulations are

■ **met**

☐ not Met

The equipment under test does

■ **fulfill the general approval requirements mentioned on page 4.**

☐ not fulfill the general approval requirements mentioned on page 4.

3.0 TEST SET-UP DRAWINGS AND PHOTOS

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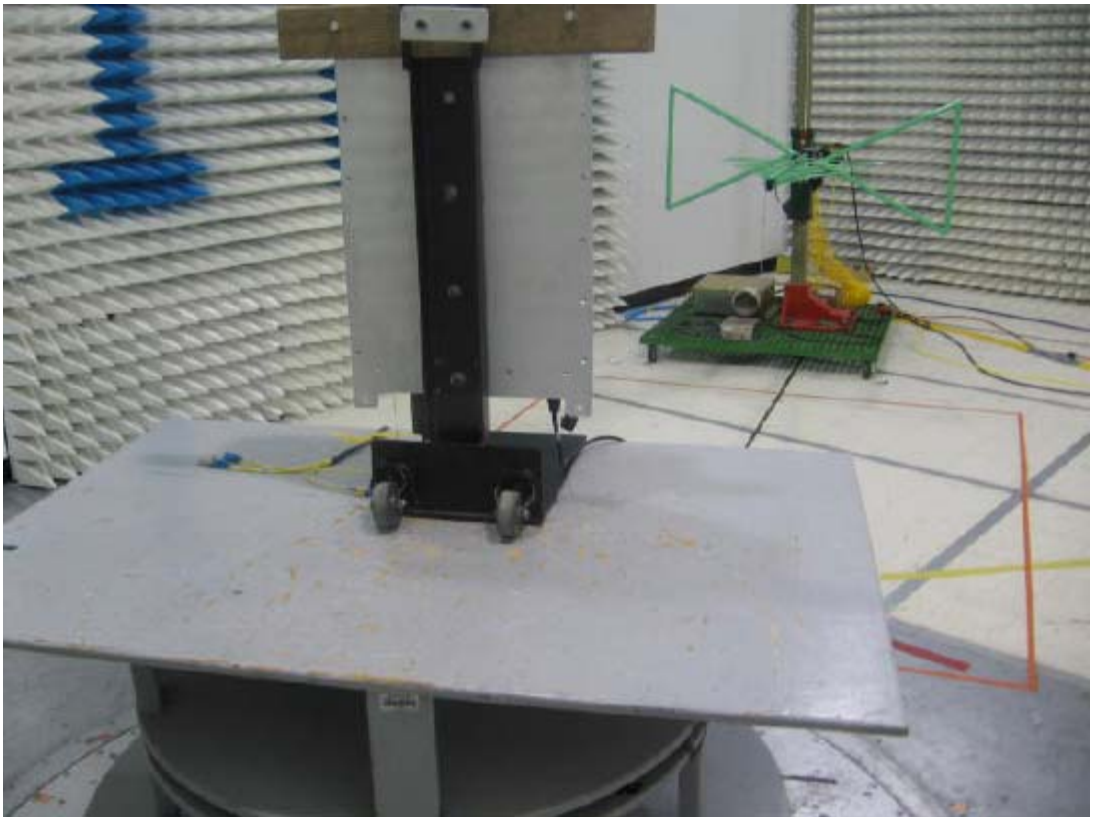
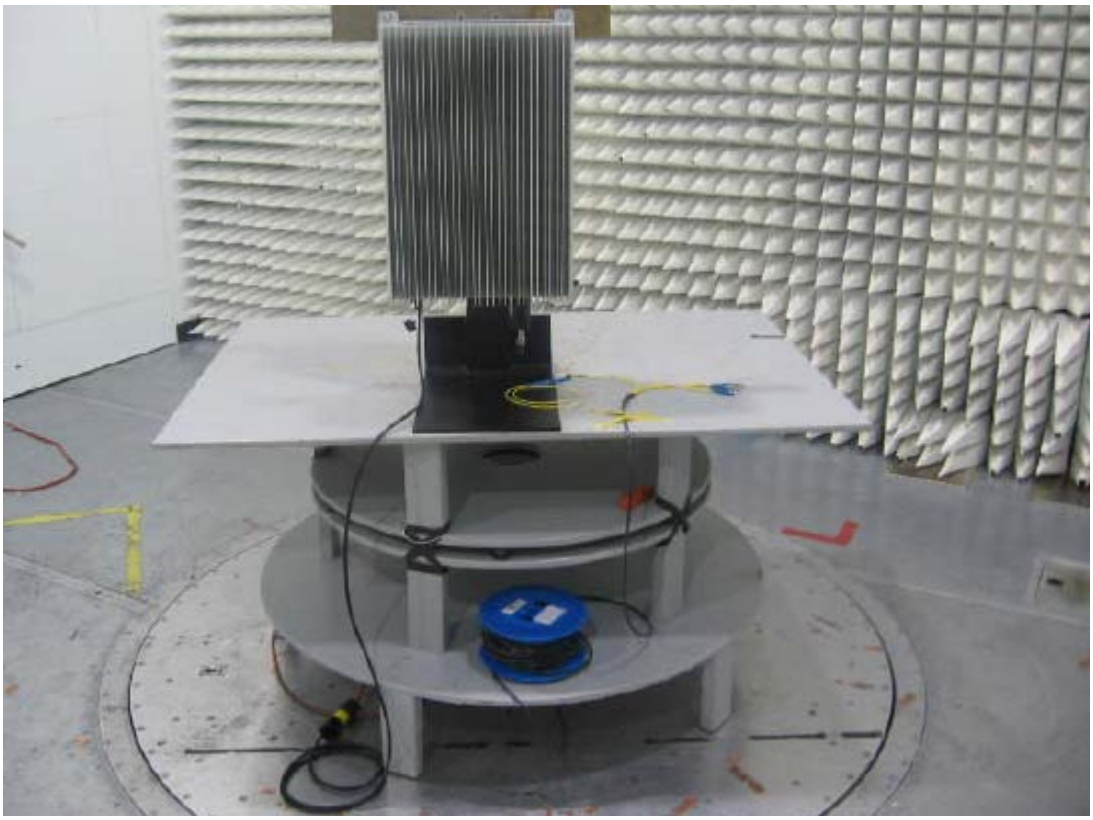
3.1 Test set-up photo, radiated emissions



3.2 Test set-up photo, radiated emissions



3.3 Test Set-up Drawings

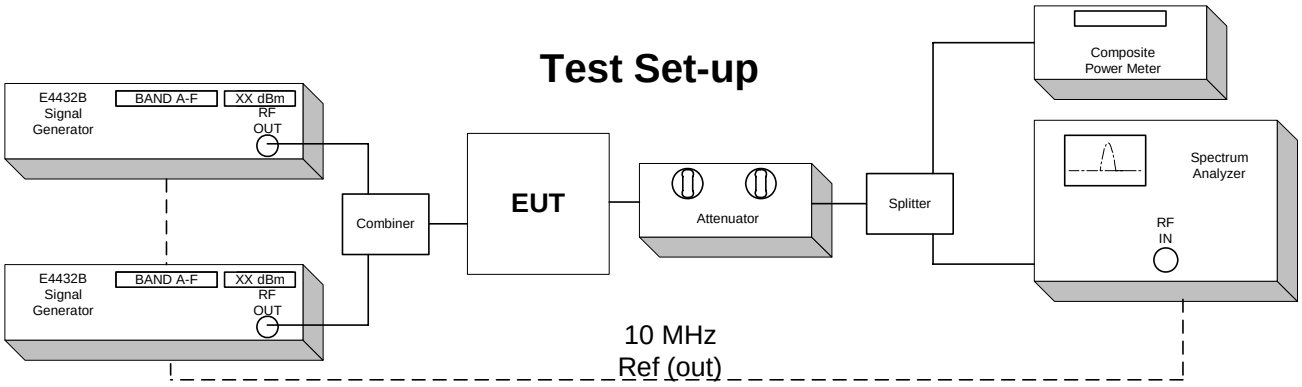
Conducted and Radiated Emission Limits Test for ADC Inc

Conducted Output Power Test for ADC Inc

Inter-Modulation Test for ADC Inc

Occupied Bandwidth Modulation Test for ADC Inc

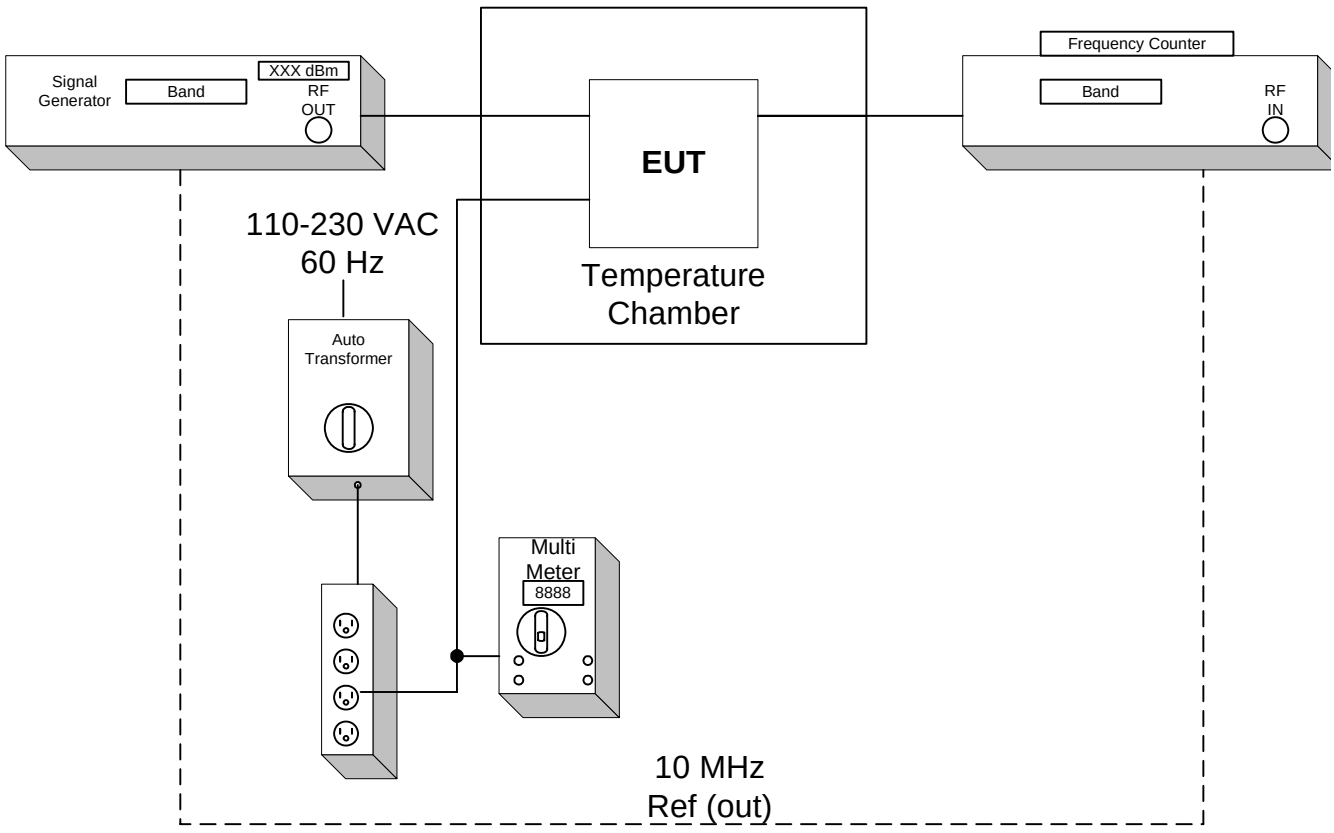
Digivance® WIMAX Remote
Model Number DGVL-W08000RU



Frequency Tolerance Test for ADC Inc.
Digivance® WIMAX Remote
Model Number DGVL-W08000RU

EUT is specified for outdoor use with temperature range of -30° to +55° C, and was tested with its range.

Test Set-up



4.0 TEST RESULTS

4.1.1 27.50 RF Power Limits

Test Summary:

- The requirements are: ■ **MET** □ NOT MET
- Minimum margin of compliance is 6.83 dB at 2657.0 MHz (10M)

Test Location:

□ ETL (Oakdale, MN)

■ **ADC facility (Shakopee, MN)**

Test Distance:

□ 3 Meters

□ 10 Meters

■ **Conducted measurement**

Test Equipment (ADC):
1, 2, 6, 7, 13

Test Limit:
100 Watts or 50 dBm Limit

Test Data:
See page 26

Test Engineer: Mark F. Miska
Date: 8 February, 2008

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4.1.2 27.54 Frequency Stability

Test Summary:

- The requirements are: ■ **MET** □ NOT MET
- The fundamental emission stays within the authorized frequency block.
- Frequency measured over a temperature range of –30 to 55º C and an input voltage range of 110 to 230 VAC.

Test Location:

□ ETL (Oakdale, MN)

■ **ADC facility (Shakopee, MN)**

Test Equipment (ADC):
3, 4, 5, 6, 9, 13

Test Limit:
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Data:
See page 43

Test Engineer: Mark F. Miska
Date: 8 February, 2008

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4.1.3 27.53 Emission Limitations

Test Summary:

- The requirements are: ■ **MET** □ NOT MET
- Out of band emissions were less than –13 dBm.
- Outside the emission bandwidth of the carrier, all emissions are attenuated at least 26 dB below the transmitter power.

Test Location:

□ ETL (Oakdale, MN)

■ **ADC facility (Shakopee, MN)**

Test Equipment (ADC):
1, 2, 6, 7, 13

Test Limit:
Out of band emissions:
Attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) dB, or –13 dBm.

Outside of the carrier emissions bandwidth:
26 dB below the transmitter power

Test Data:
Conducted Emissions, pages 16 – 25
Intermodulation Test, pages 27 – 39
Occupied Bandwidth, pages 40 – 42
Radiated Emissions, pages 44 – 62 (Appendix B)

Test Engineer: Mark F. Miska
Date: 8 February, 2008
Date: 8 February, 2008
Date: 8 February, 2008

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5.0 TEST EQUIPMENT

Number	Description	Manufacturer	Model	ADC Serial Number	Cal Due	Used
1	Spectrum Analyzer	HP	8563E	MC27690	7-18-08	☒
2	Power Meter	HP	EPM-441A	MC27670	10-9-08	☒
3	Multimeter	Fluke	87	MC17932	8-1-08	☒
4	Frequency Counter	HP	5347A	MC27548	1-16-09	☒
5	Temperature Chamber	Thermotron	SM-32C	MC18966	4-9-08	☒
6	Signal Generator	Agilent	E4437B	967974	1-15-10	☒
7	Signal Generator	Agilent	E4438C	1013210	2-9-09	☒
8	Attenuator	Huber Suhner	6810.17.A	N/A	CNR	☐
9	Variable Auto Transformer	Staco	1520CT	MC44655	CNR	☒
10	Digital Barometer	Fisher Scientific	02-403	MC50719	10-28-09	☒
11	Data Acquisition Unit	Fluke	Hydra	MC27549	10-8-08	☐
12	Attenuator	Aeroflex	49-30-33	N/A	CNR	☐
13	Attenuator	Aeroflex	86-30-12	N/A	CNR	☒
14	LNA	Lucix Corp	C020200L 1603	N/A	CNR	☐

Equipment with a Calibration Not Required (CNR) listing is verified and compensated for with NIST traceable calibrated equipment.

6.0 APPENDIX A

Test Data

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Test Engineer: Mark F. Miska

Conducted Emission Limits Test for ADC Inc
Digivance® WIMAX Remote
Model Number DGVL-W08000RU

Back

The out of band emissions were measured directly from the EUT antenna output with a spectrum analyzer from 30 MHz to the 10th harmonic of the highest carrier frequency. Test signals used are 5 MHz and 10 MHz WiMax signals. The different signals were input one at a time to the EUT. In all cases, the out of band emissions were less than –13 dBm from the equation

$$(19\text{dBm} - [43 + 10\log(0.08\text{W})])$$

Band edge compliance is also demonstrated using a 5 MHz and 10 MHz WiMax signal at the upper and lower limits of the band.

The Host unit connects directly to the BTS via coax. The Host unit does not connect to an antenna or amplifier, thus it is a Part 15 device and has been tested and is compliant as such. No FCC ID is necessary.

Industry practice has generally set the input signal power level. Test signal used was ≈ -30 dBm input to the WiMax Host.
Industry practice has generally set the output signal power level.

WiMax Remote:
Range: 110 - 230 VAC
Tested @: 120 VAC
Tested @: 1.9 A

WiMax Host:
Range: 110-230 VAC
Tested @: 120 VAC
Tested @: 0.8 A

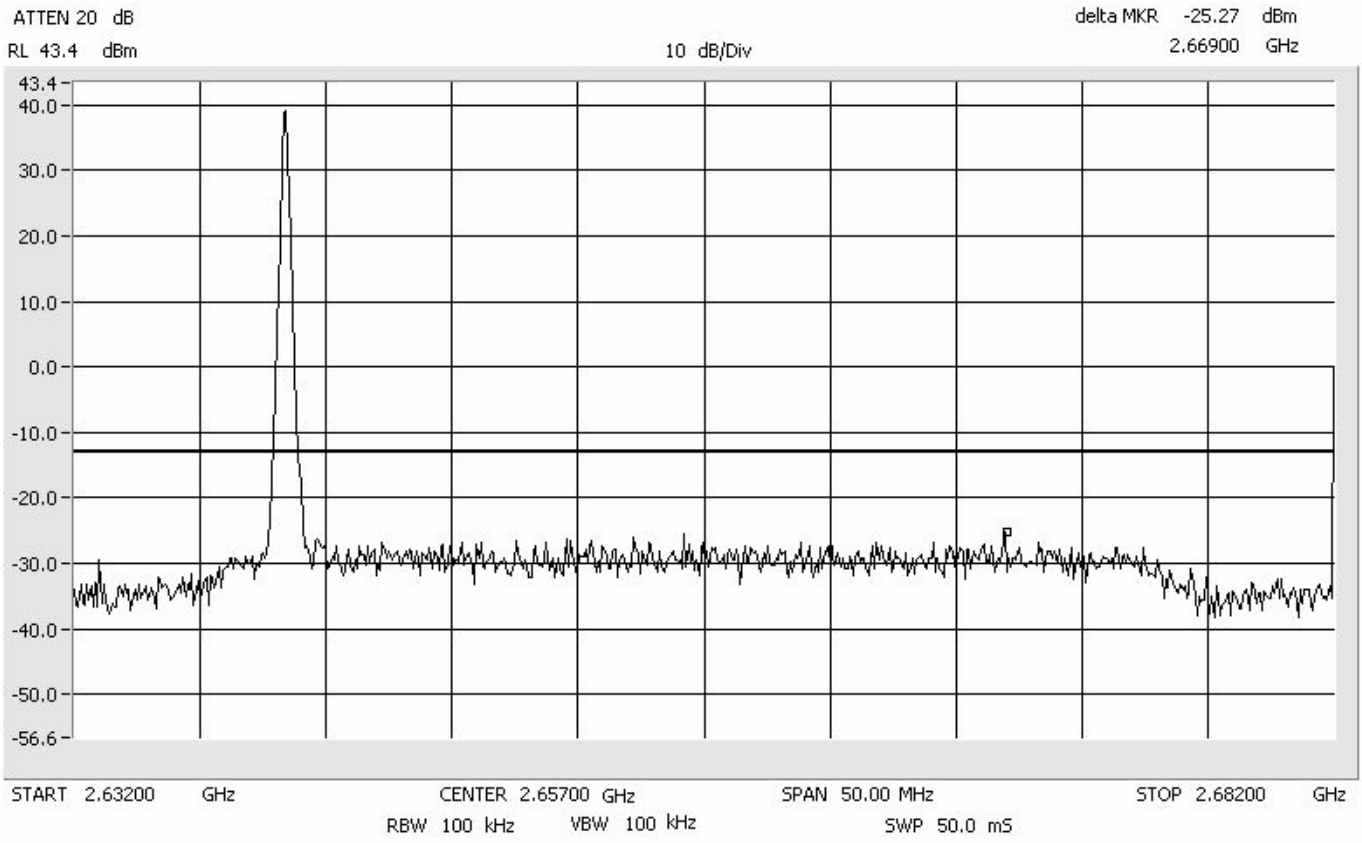
This equipment does not modulate the RF, so there is no modulation limiter. This equipment does not change the modulation of the RF or the occupied bandwidth of any channel. It transports the signal, as is, over an optical link. The RF input is not changed in the RF output.

This is a constant gain device, so the setup controls the output. There is an overdrive and overpower limit control that prevents excess power.

Results:
Pass (See plots)

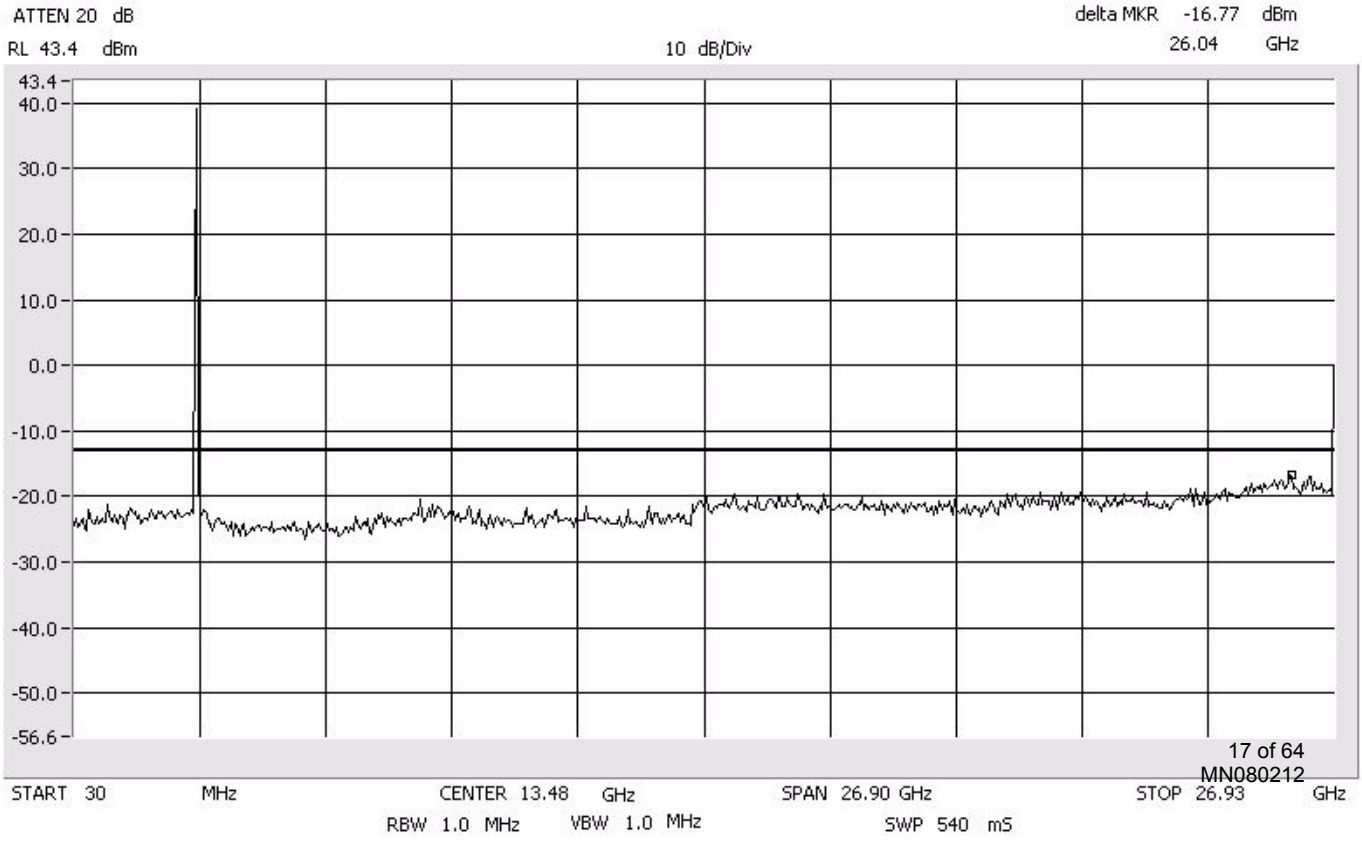
Conducted Emissions
Low
WiMax

Center: 2657.0 MHz
Span: 50 MHz
RBW/VBW: 100 kHz



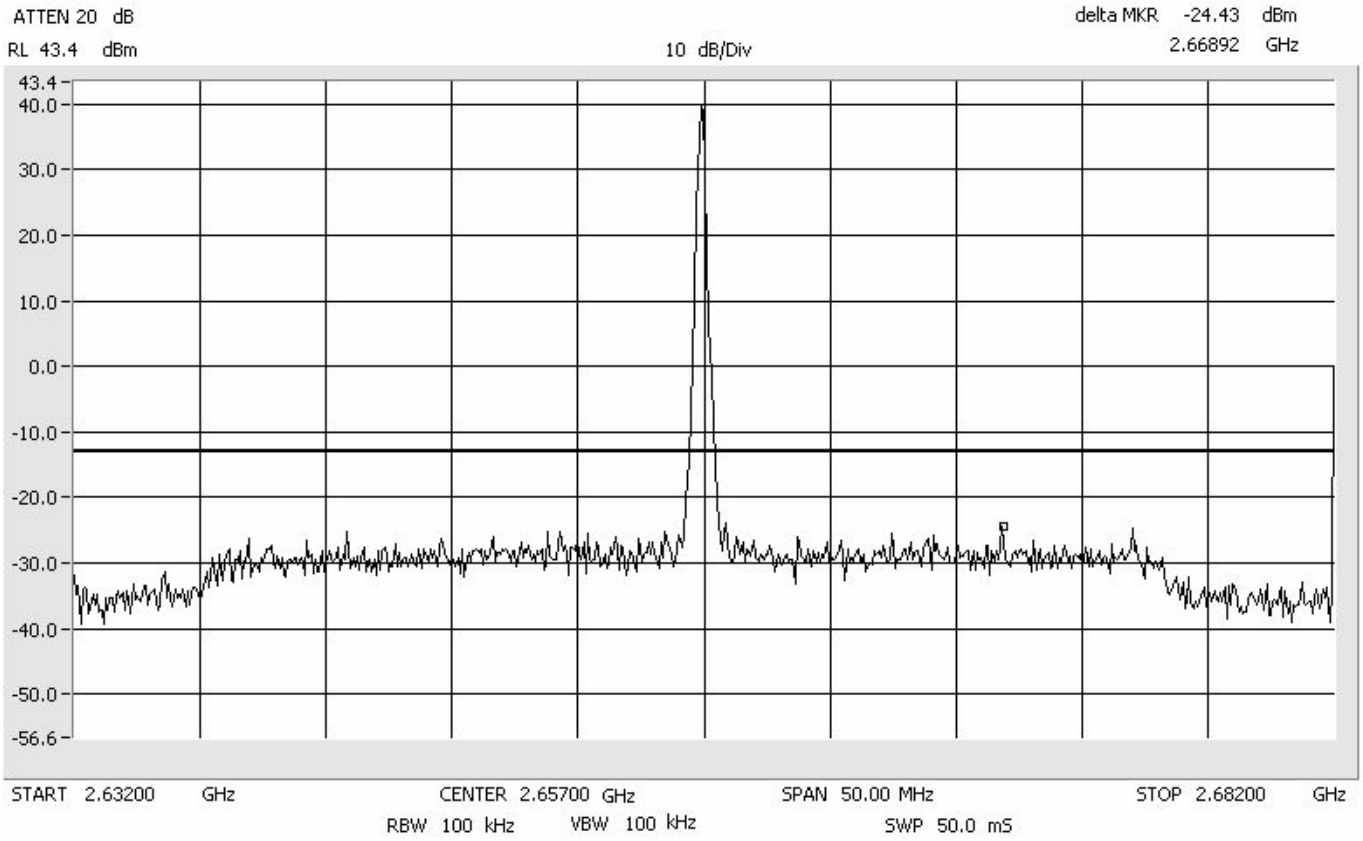
Conducted Emissions
Low
WiMax

Span: 30 MHz to 26.9 GHz
RBW/VBW: 1 MHz



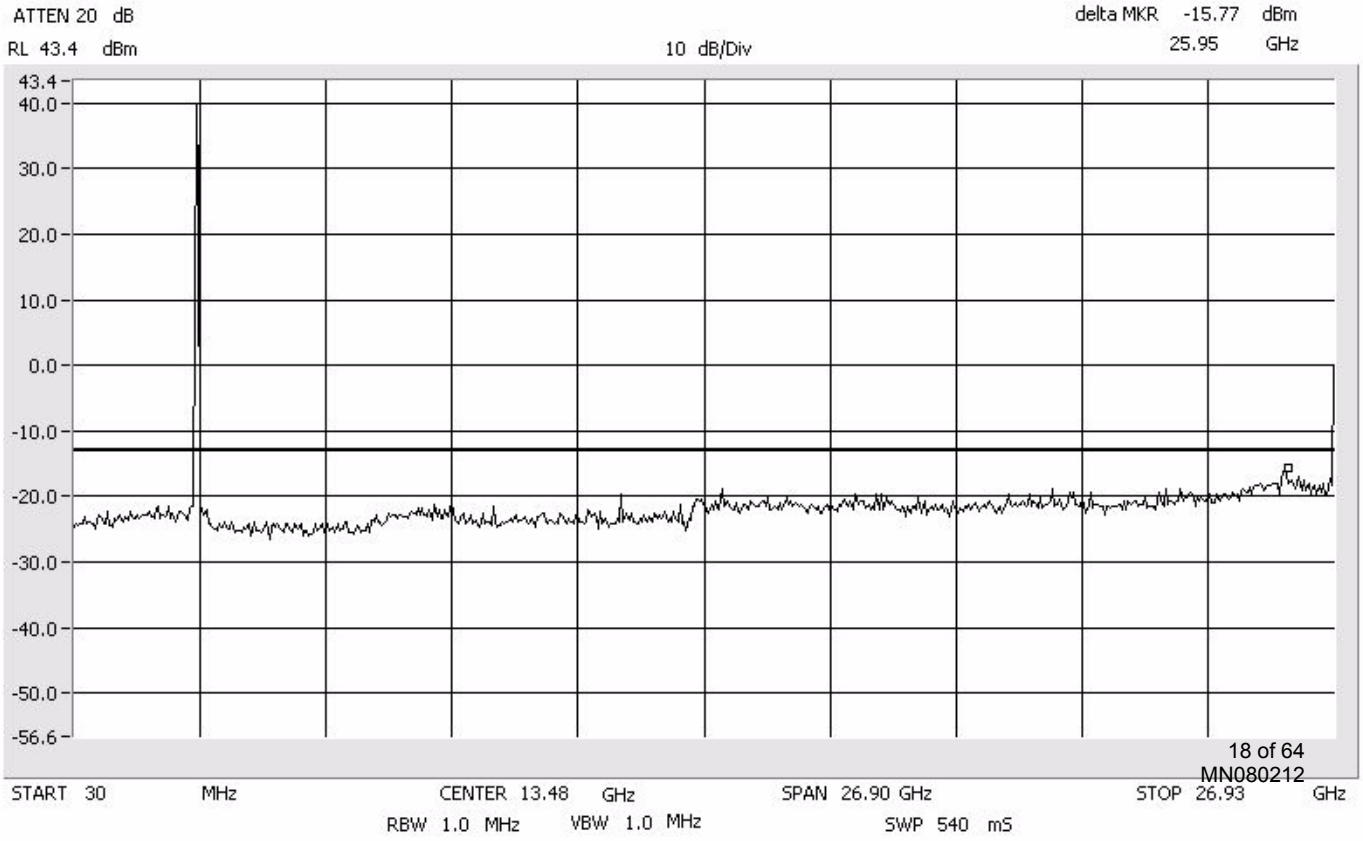
Conducted Emissions
Mid
WiMax

Center: 2657.0 MHz
Span: 50 MHz
RBW/VBW: 100 kHz



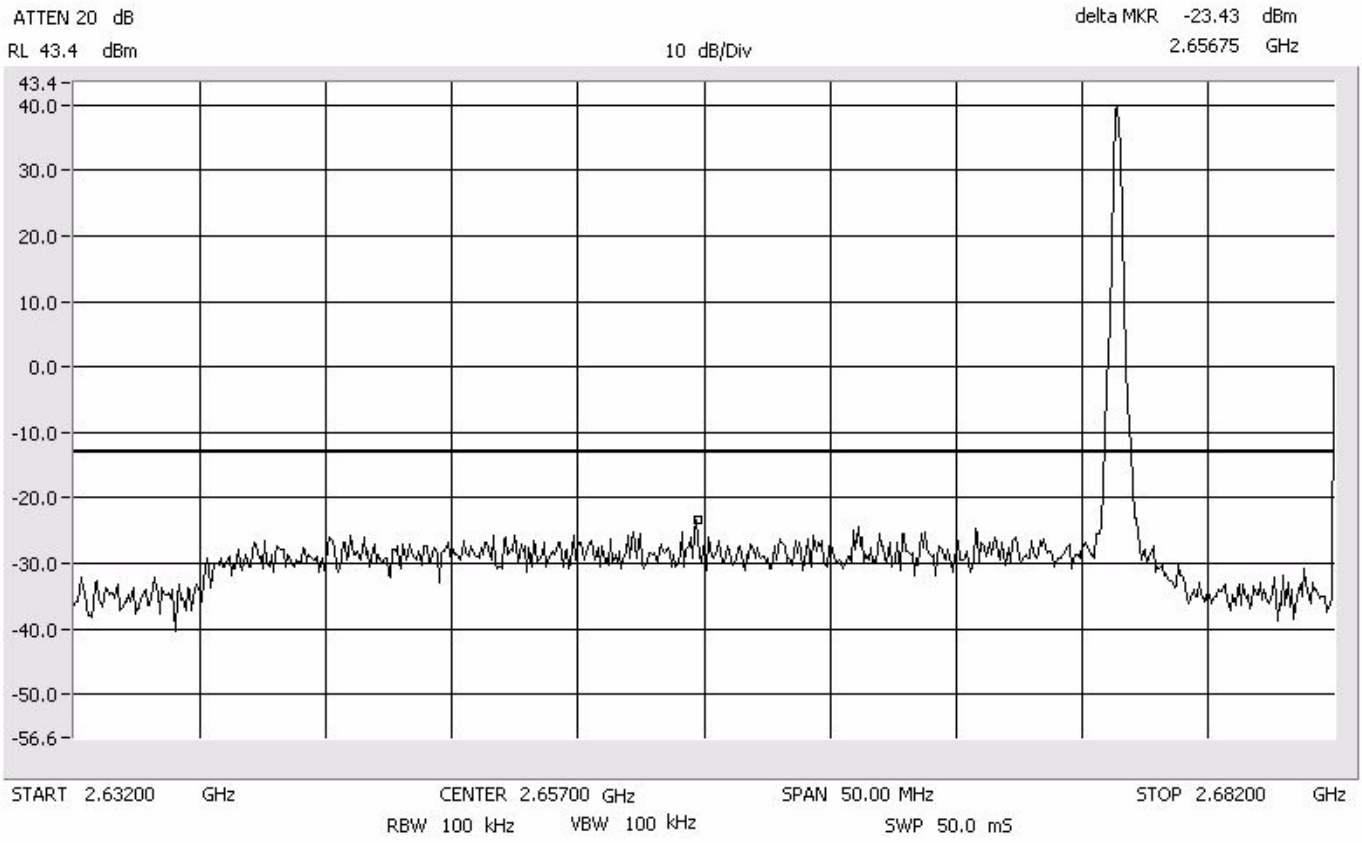
Conducted Emissions
Mid
WiMax

Span: 30 MHz to 26.9 GHz
RBW/VBW: 1 MHz



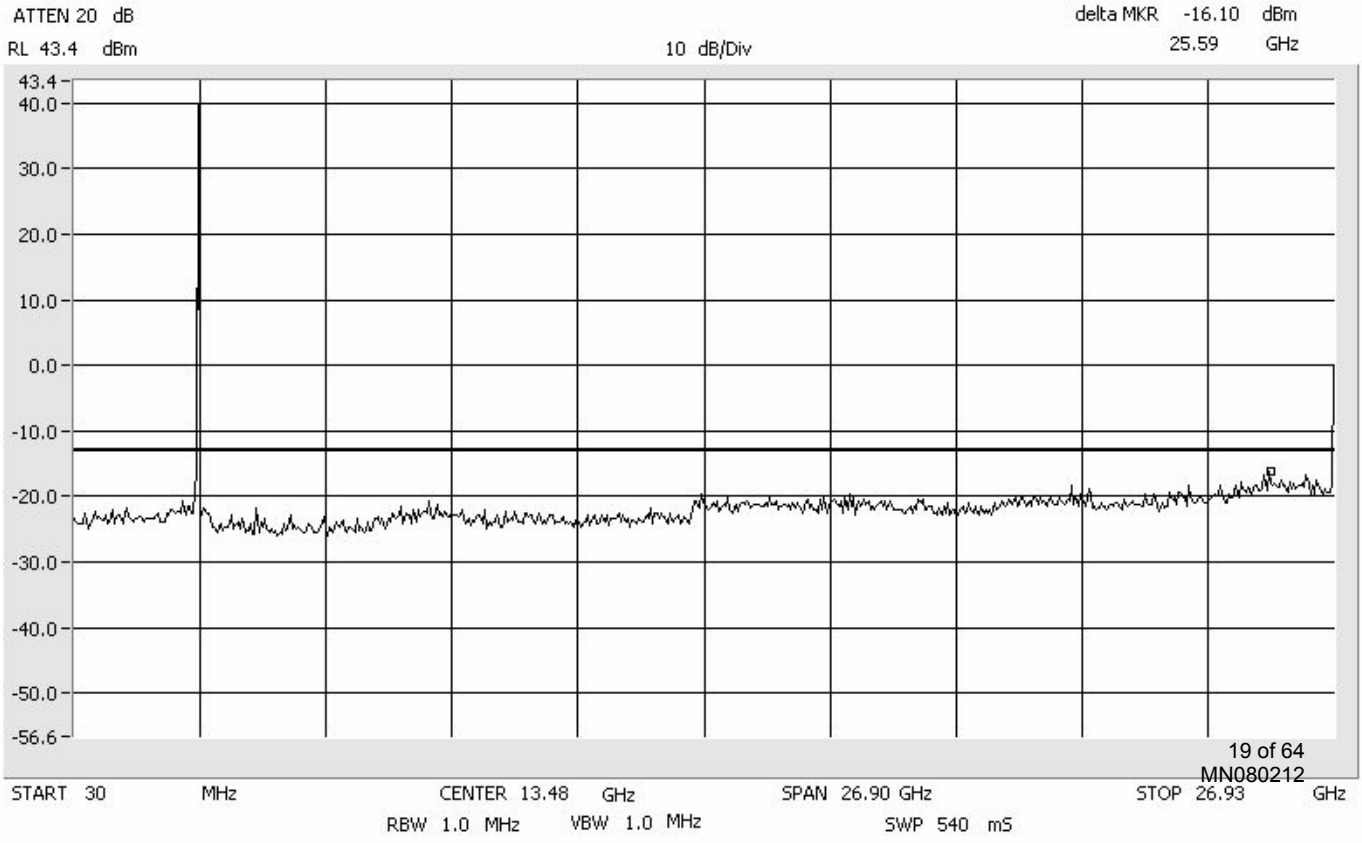
Conducted Emissions
High
WiMax

Center: 2657.0 MHz
Span: 50 MHz
RBW/VBW: 100 kHz



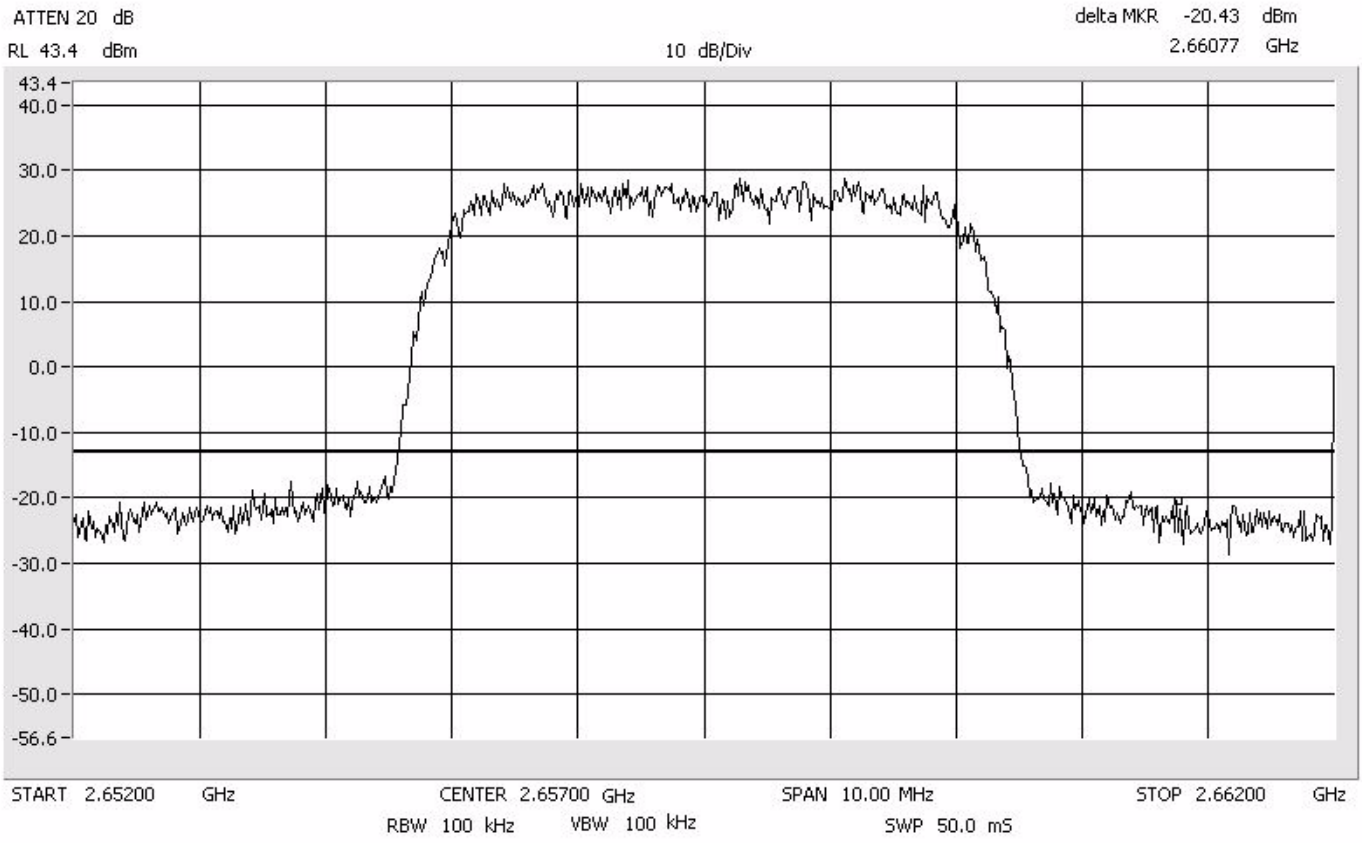
Conducted Emissions
High
WiMax

Span: 30 MHz to 26.9 GHz
RBW/VBW: 1 MHz



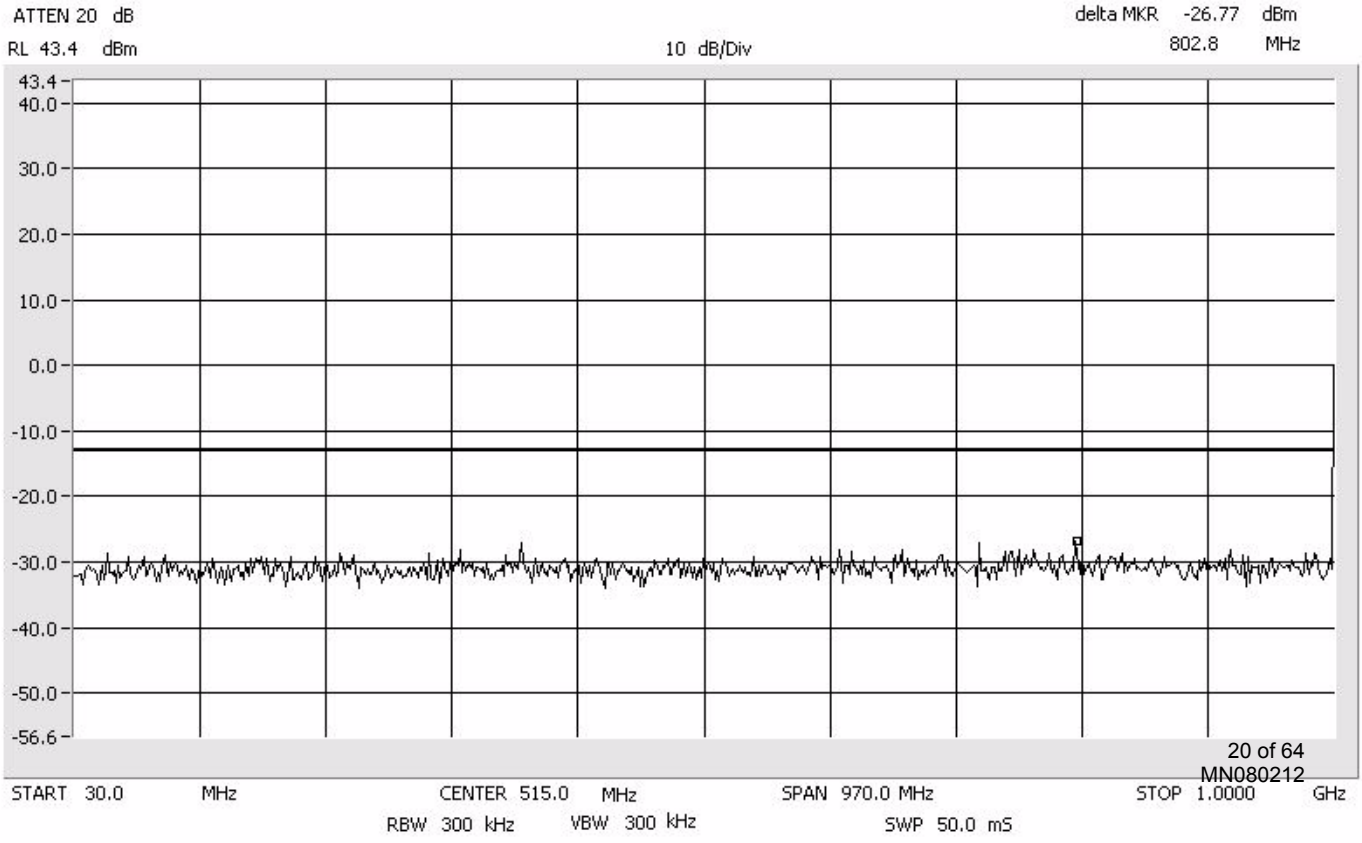
Conducted Emissions
5M
WiMax

Center: 2657.0 MHz
Span: 10 MHz
RBW/VBW: 100 kHz



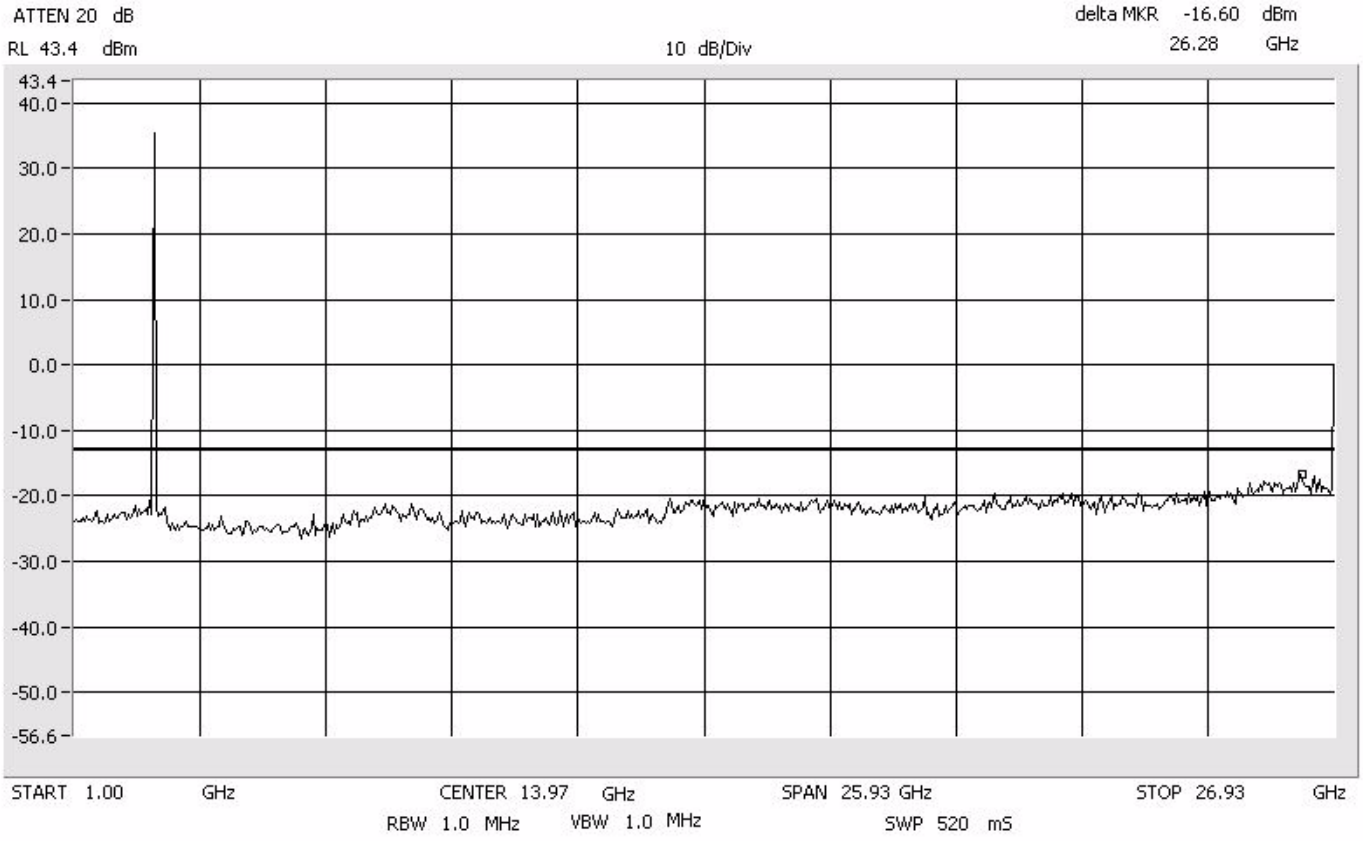
Conducted Emissions
5M
WiMax

Span: 30 MHz to 1 GHz
RBW/VBW: 300 kHz



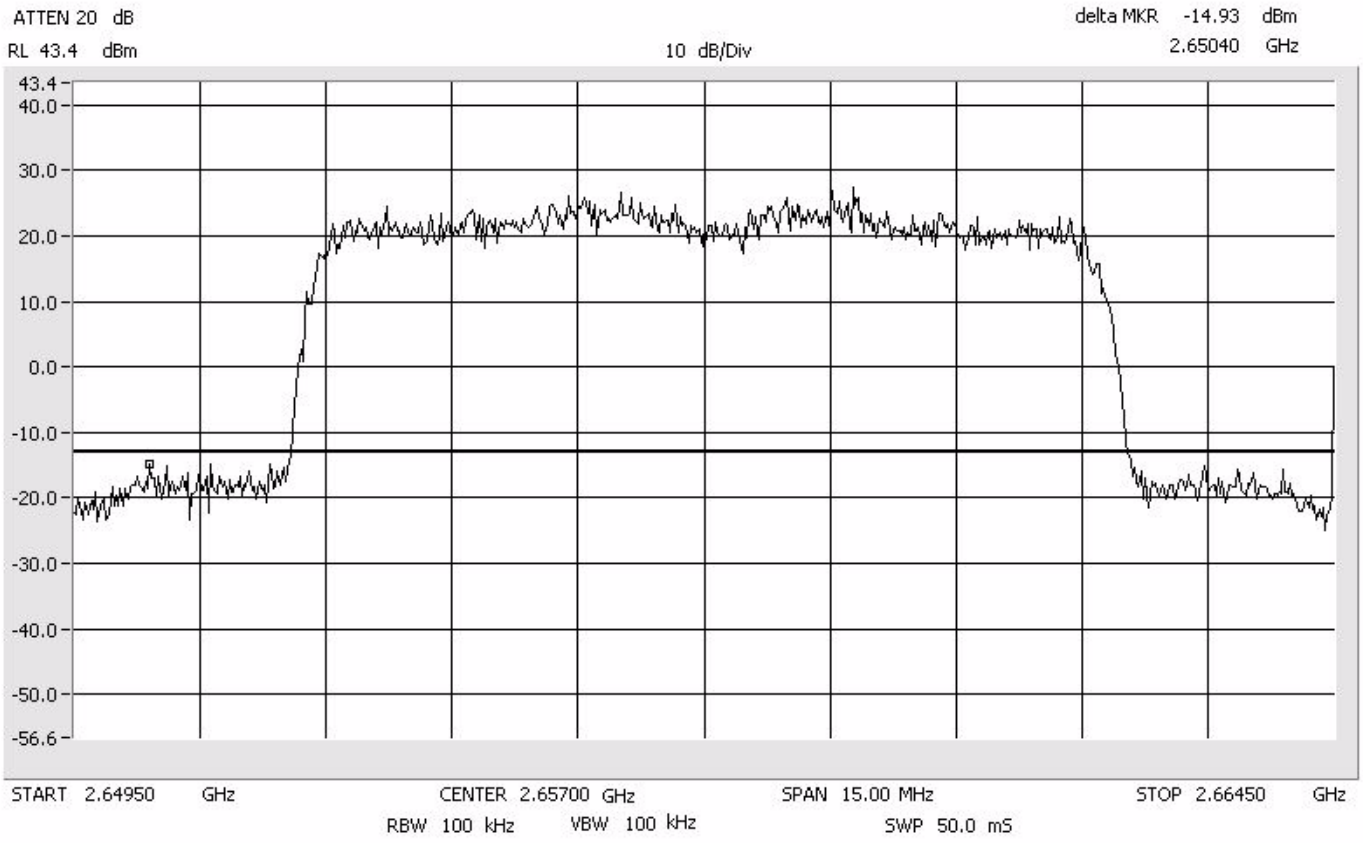
Conducted Emissions
5M
WiMax

Span: 1 GHz to 25.93 GHz
RBW/VBW: 1 MHz



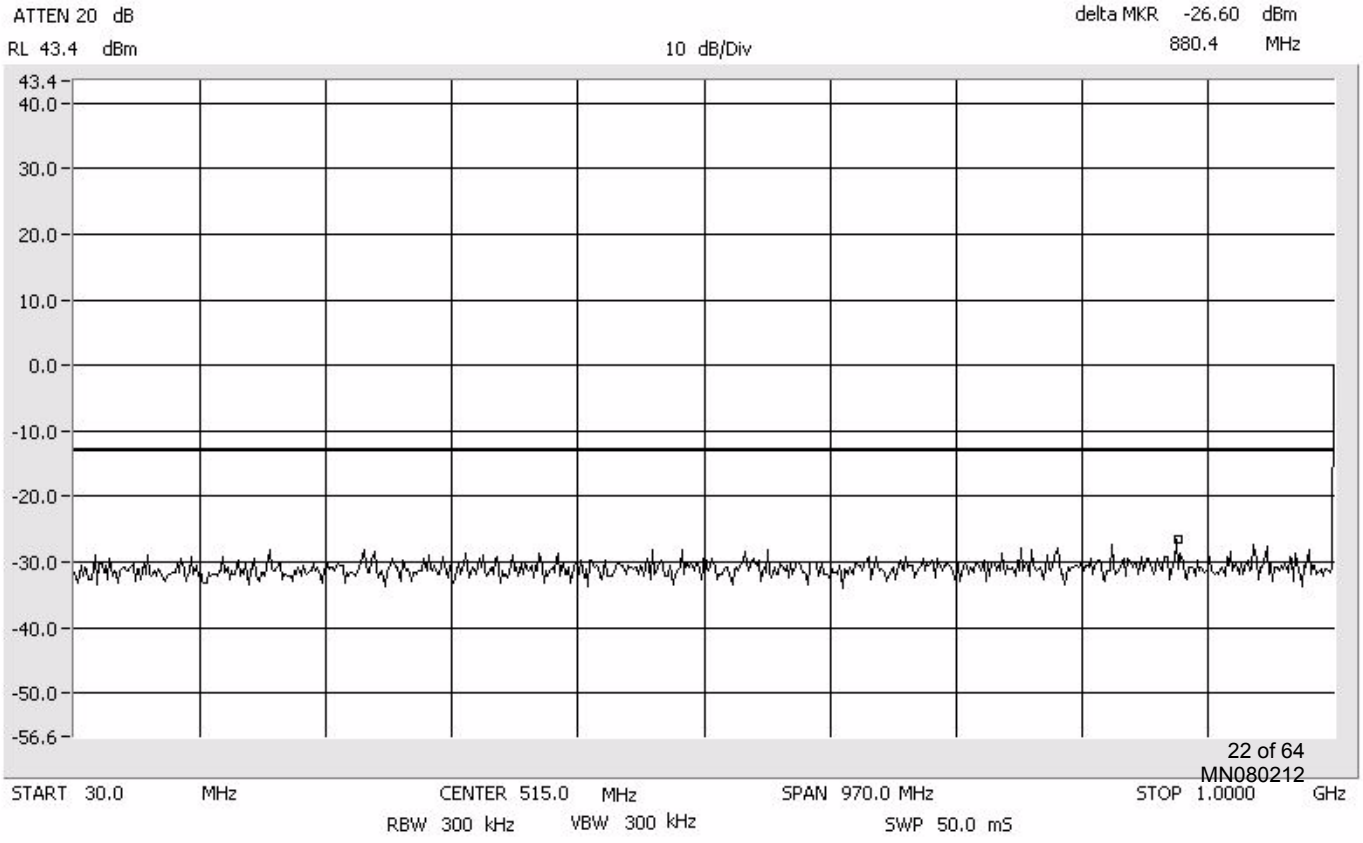
Conducted Emissions
10M
WiMax

Center: 2657.0 MHz
Span: 15 MHz
RBW/VBW: 100 kHz



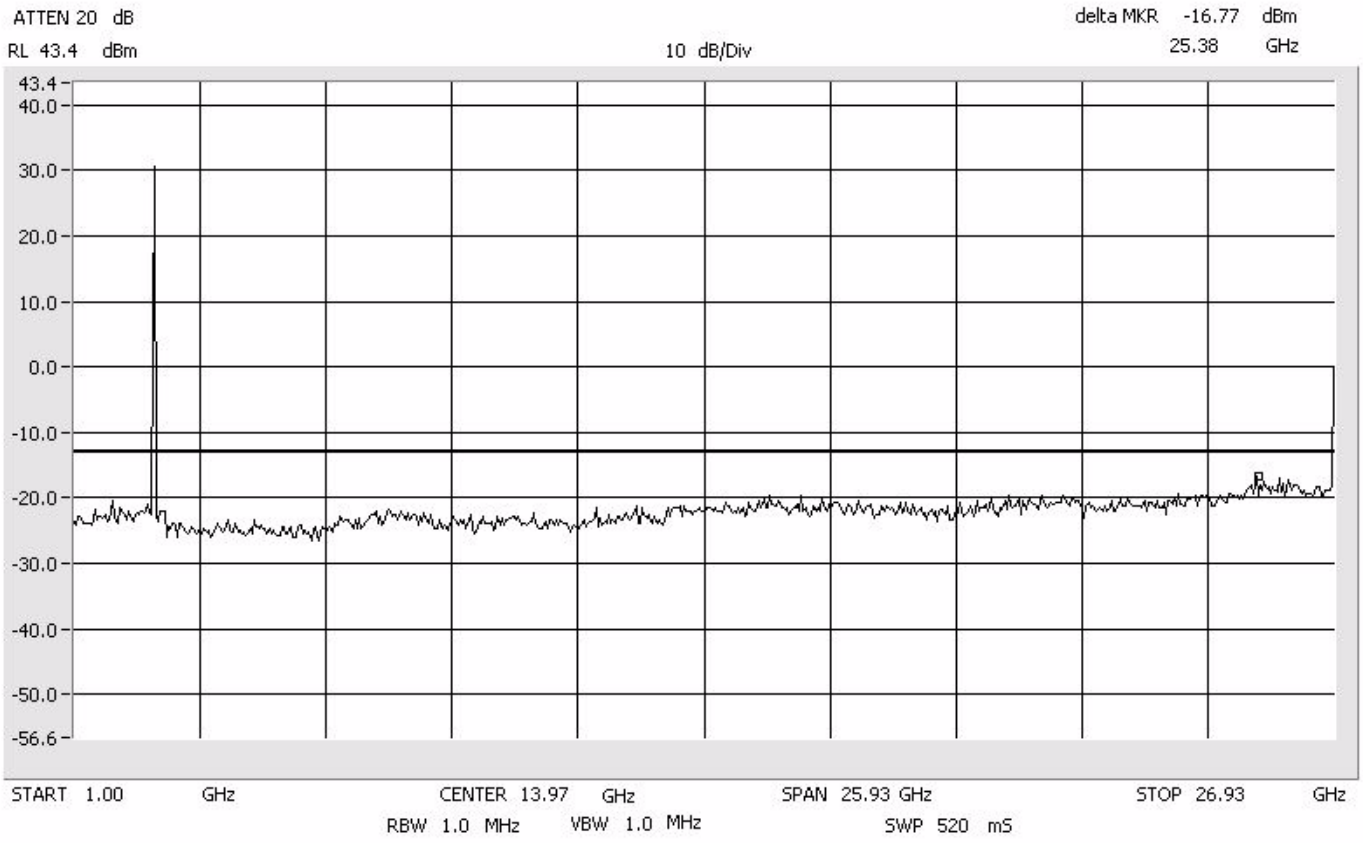
Conducted Emissions
10M
WiMax

Span: 30 MHz to 1 GHz
RBW/VBW: 300 kHz



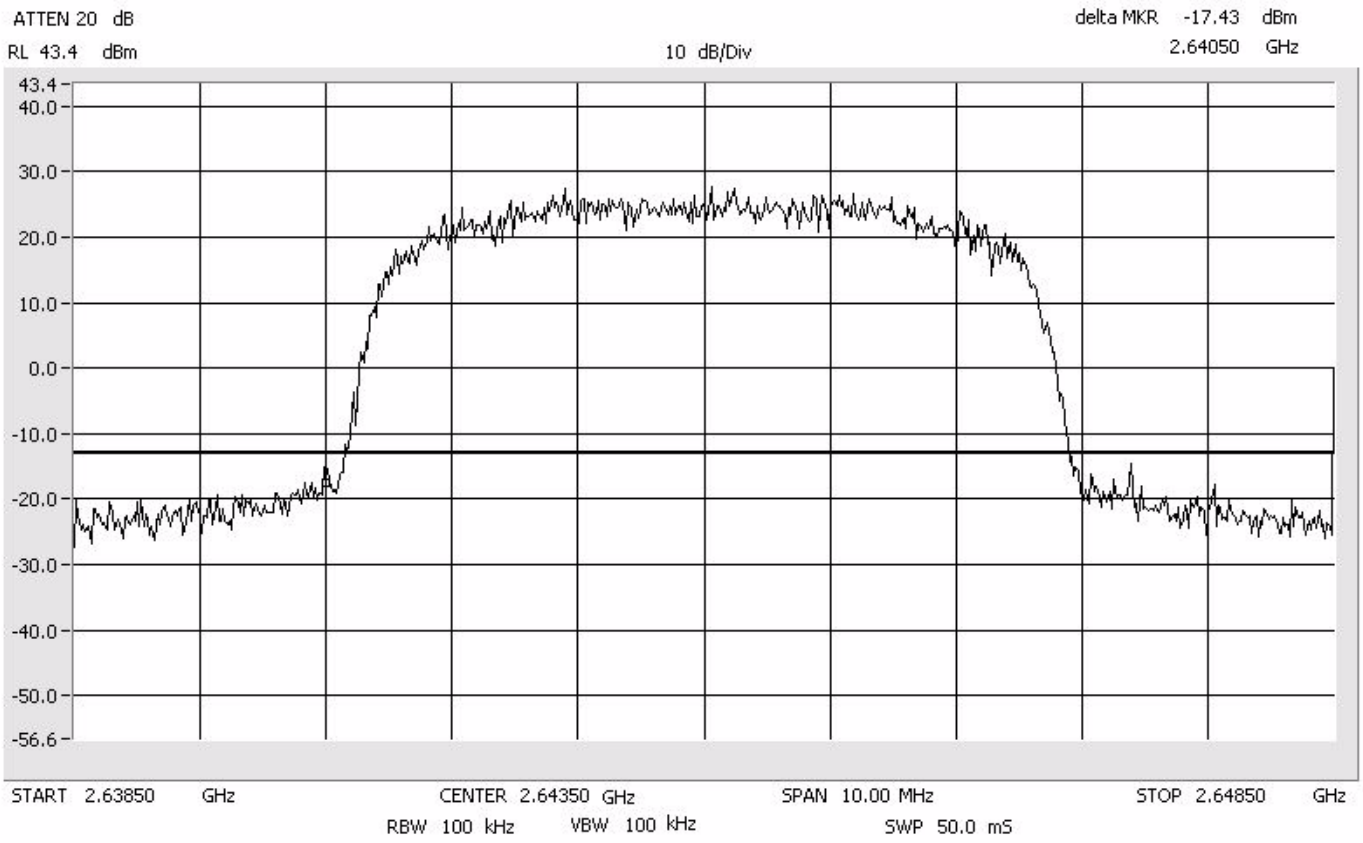
Conducted Emissions
10M
WiMax

Span: 1 GHz to 25.93 GHz
RBW/VBW: 1 MHz



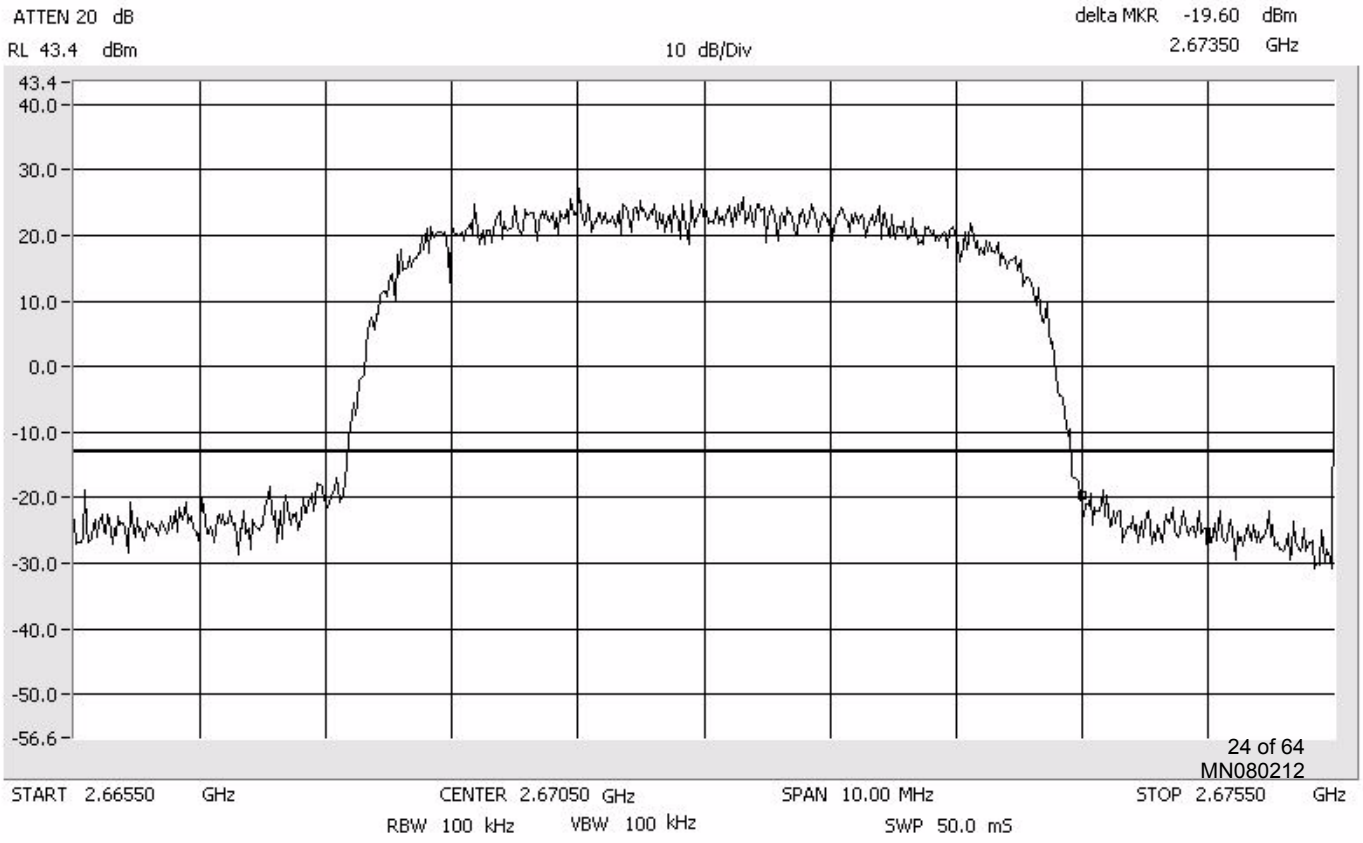
Band Edge
5M

Center: 2643.5 MHz
Span: 10 MHz
RBW: 100 kHz
VBW: 100 kHz



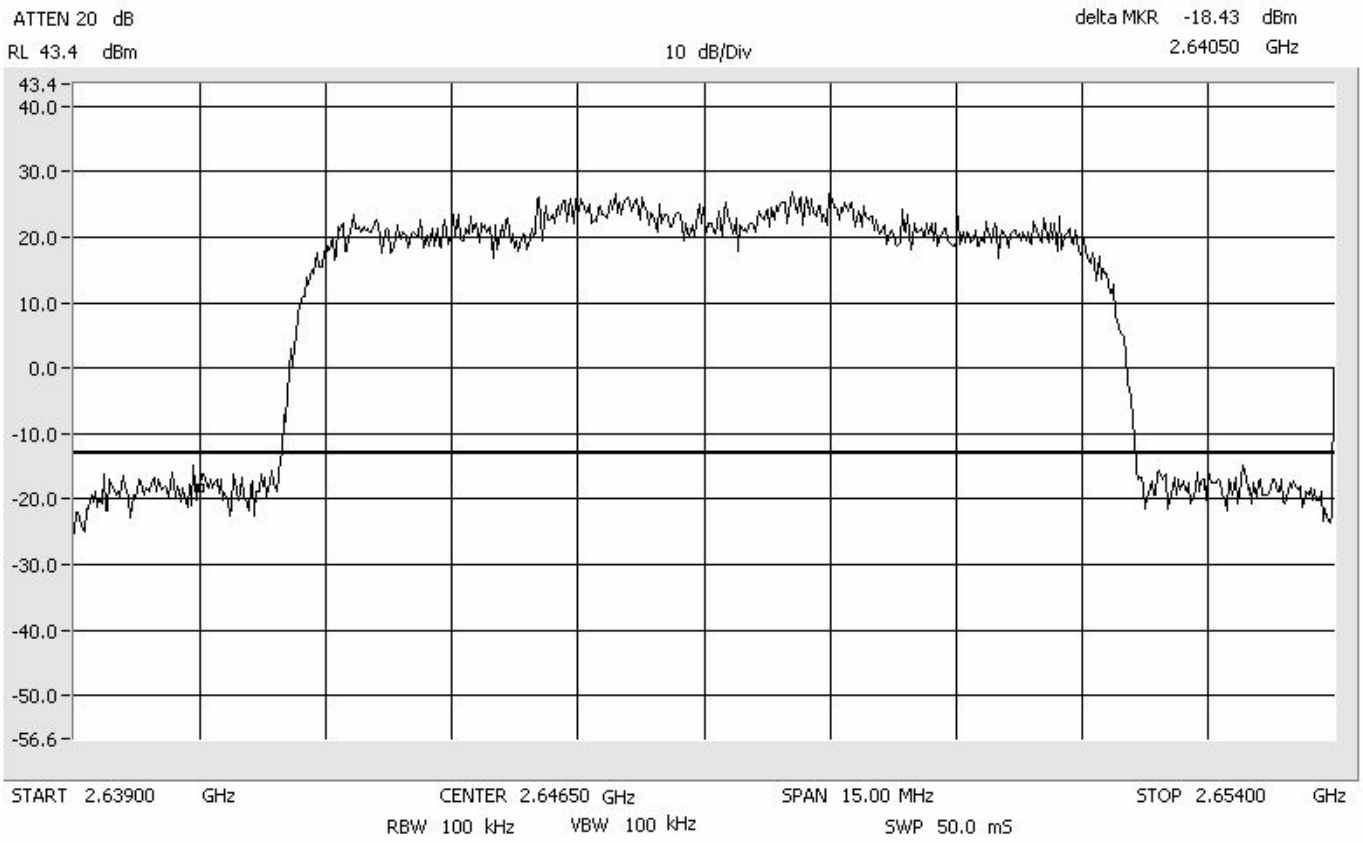
Band Edge
5M

Center: 2670.5 MHz
Span: 10 MHz
RBW: 100 kHz
VBW: 100 kHz



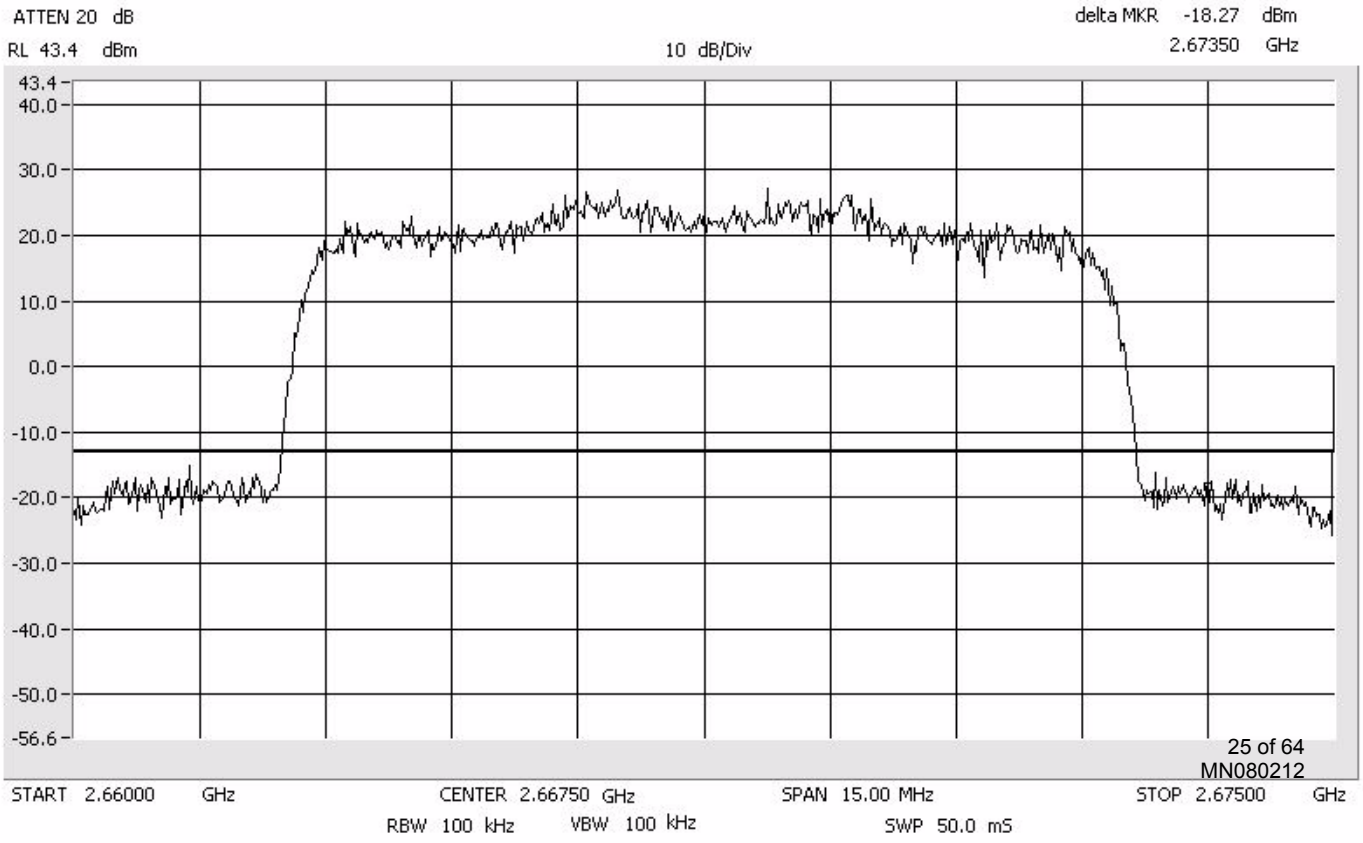
Band Edge
10M

Center: 2646.5 MHz
Span: 15 MHz
RBW: 100 kHz
VBW: 100 kHz



Band Edge
10M

Center: 2667.5 MHz
Span: 15 MHz
RBW: 100 kHz
VBW: 100 kHz



Conducted Output Power Test for ADC Inc
Digivance® WIMAX Remote
Model Number DGVL-W08000RU

Back

*Note: The EUT is a fixed repeater and not a base station.

This measurement was made as a direct conducted emission measurement. The output from the EUT antenna connector was connected to the power meter. The carrier output, below, was conducted using a single 5 MHz and 10 MHz WiMax signal generator. The power meter level was offset to compensate for attenuators and cable loss between the EUT and the power meter.

A signal was used at the low, mid and high parts of the selected band. The power meter level was offset by 43.4 dB to compensate for attenuators and cable loss between the EUT and the power meter.

5M	**20.28 Watts**
Carrier Frequency	Carrier Output
2643.5 MHz	42.15 dBm
2657.0 MHz	42.37 dBm
2670.5 MHz	43.07 dBm

10M	**20.75 Watts**
Carrier Frequency	Carrier Output
2646.5 MHz	42.50 dBm
2657.0 MHz	43.17 dBm
2667.5 MHz	42.87 dBm

Intermodulation Test for ADC Inc
Digivance® WIMAX Remote
Model Number DGVL-W08000RU

Back

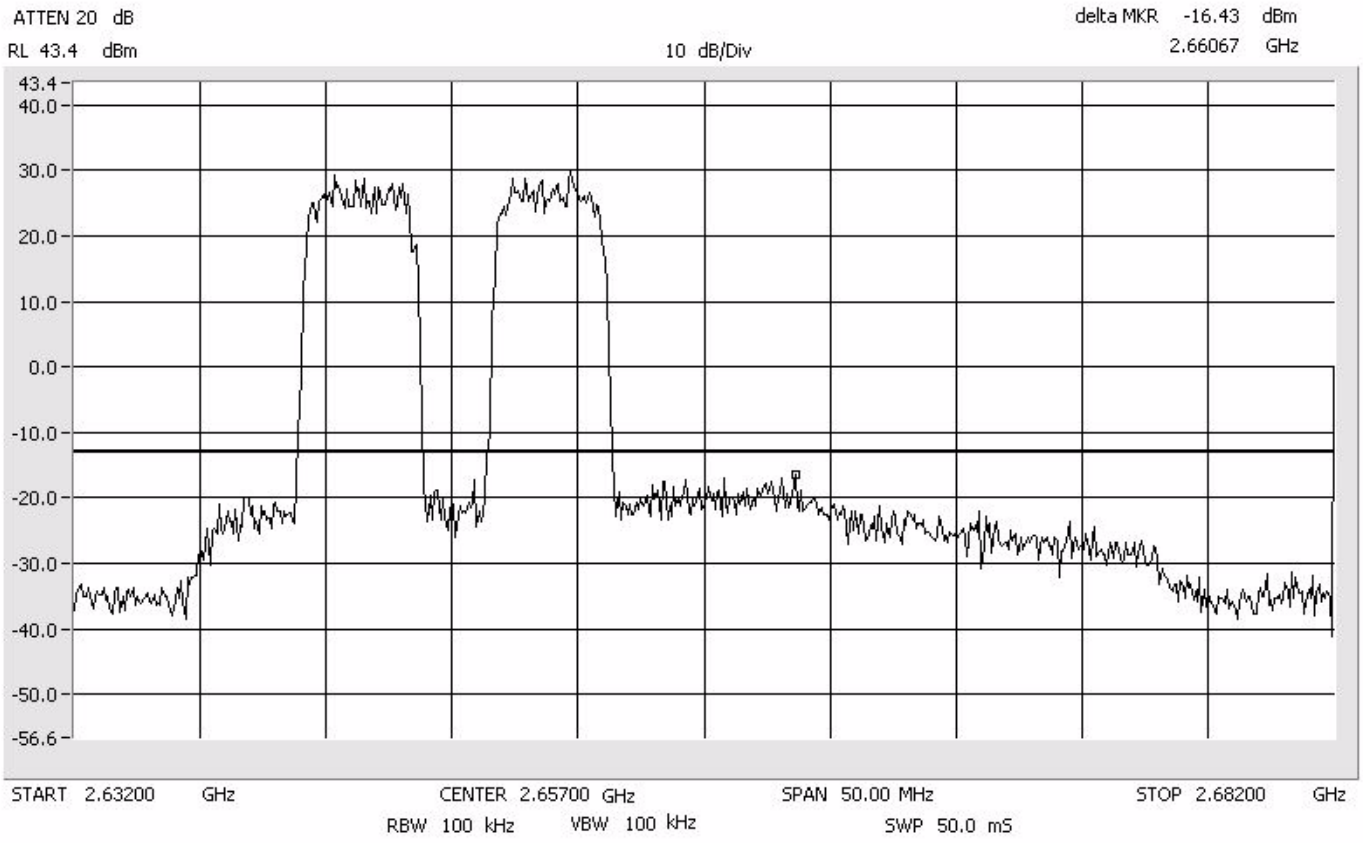
The inter-modulation products test was performed for the EUT. Three tests were preformed with the modulation type. Test 1 was with 2 signals input to the EUT at lower end channels. Test 2 was with 2 signals input to the EUT at upper end channels. Test 3 was with 2 signals input to the EUT at upper and lower end channels. The modulation types tested were 5 MHz and 10 MHz WiMax. An investigation was made from 30 MHz to the 10th Harmonic of the highest fundamental frequency (~27 GHz). The following plots show the results.

Results:
(See Plots)

5M

Intermodulation
Close - Lower
WiMax

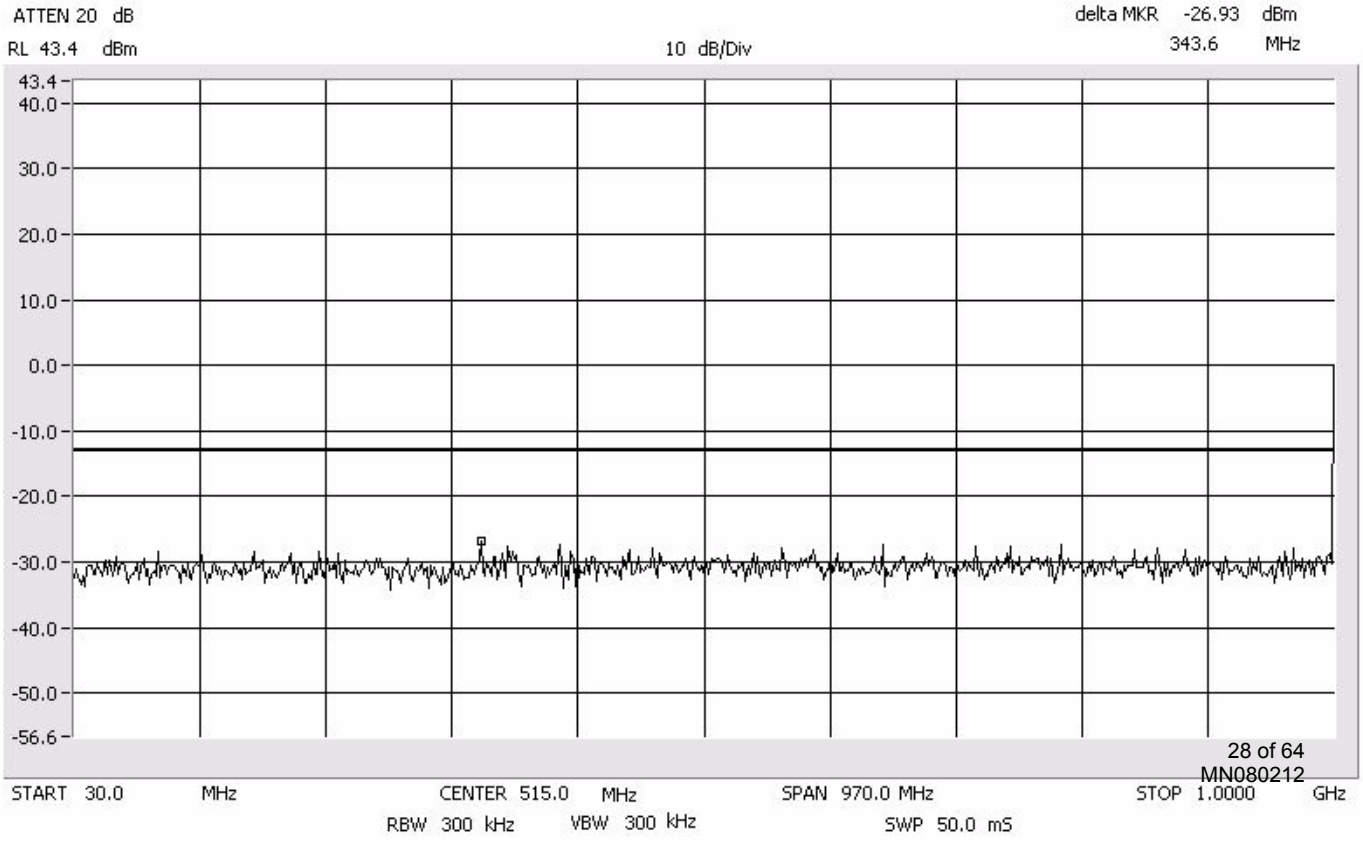
Center: 2657.0 MHz
Span: 50 MHz
RBW/VBW: 100 kHz



5M

Intermodulation
Close - Lower
WiMax

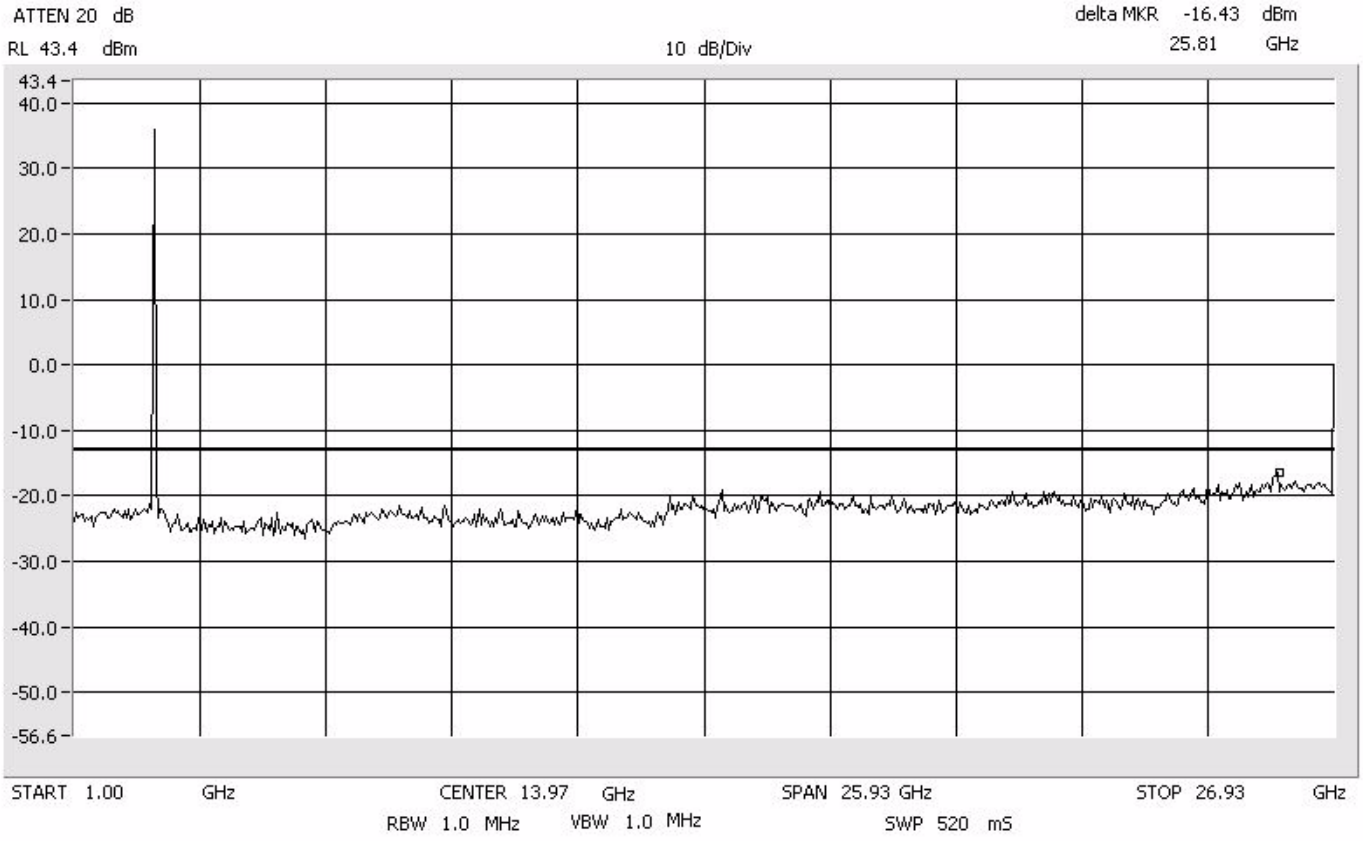
Span: 30 MHz to 1 GHz
RBW/VBW: 300 kHz



5M

Intermodulation
Close - Lower
WiMax

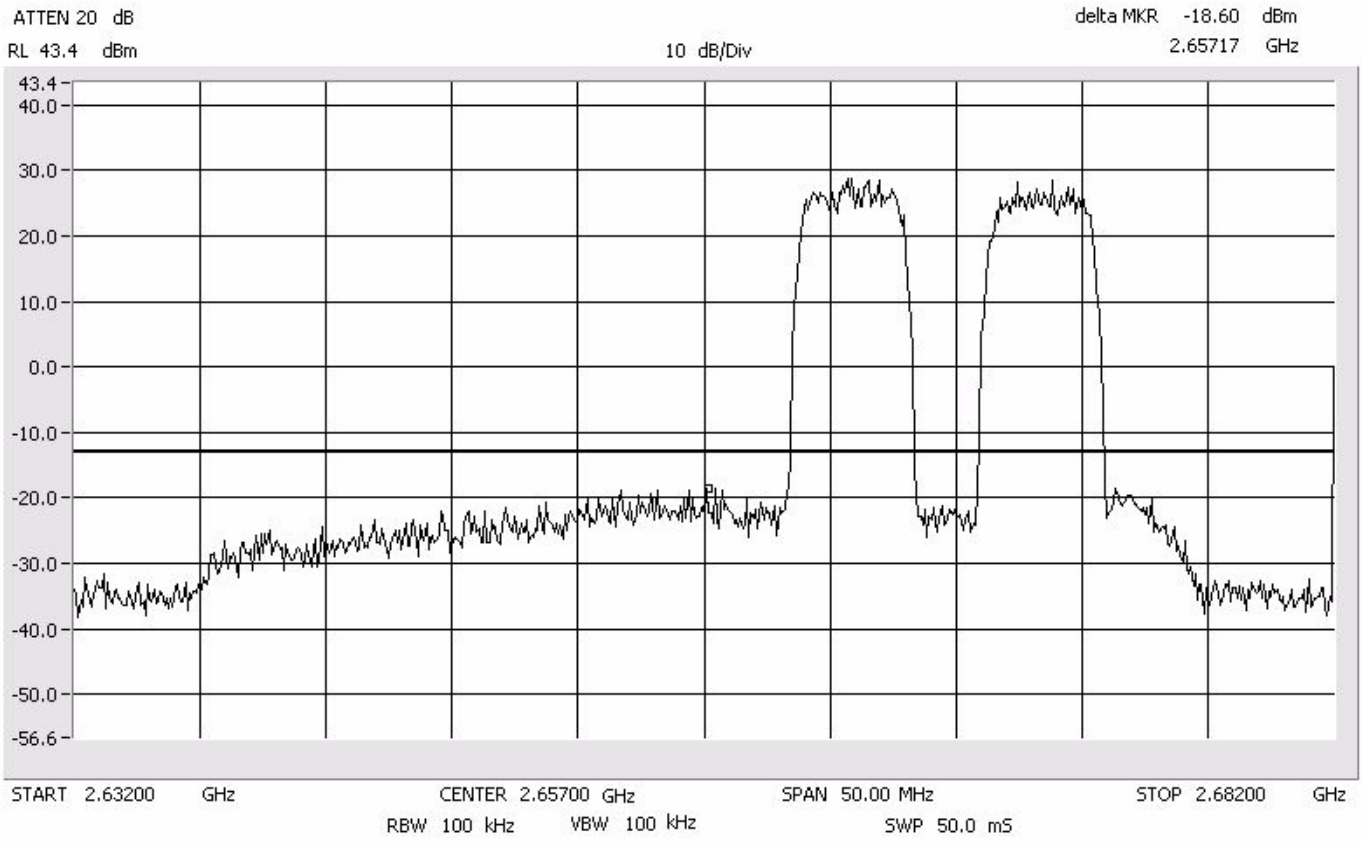
Span: 1 GHz to 25.93 GHz
RBW/VBW: 1 MHz



5M

Intermodulation
Close - Upper
WiMax

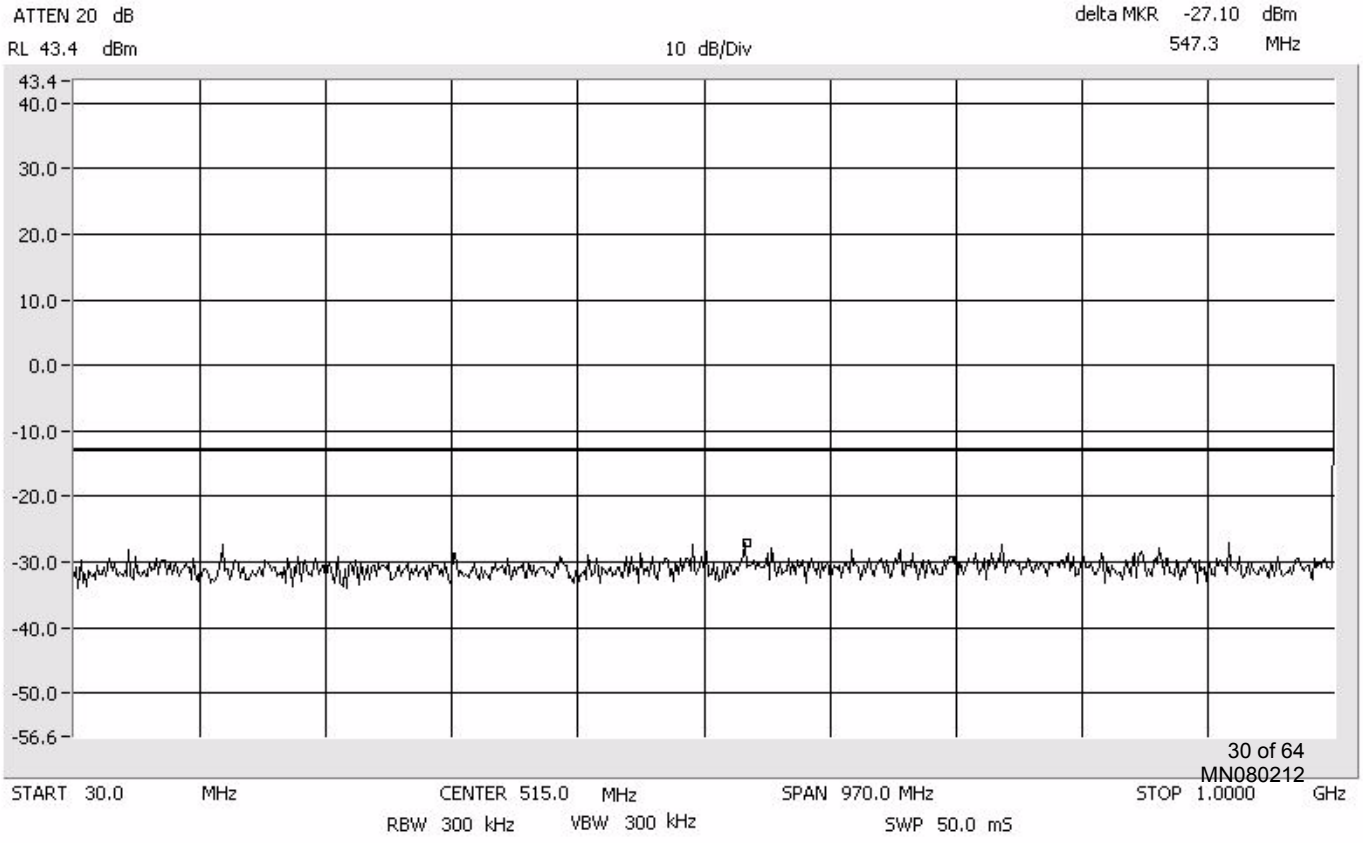
Center: 2657.0 MHz
Span: 50 MHz
RBW/VBW: 100 kHz



5M

Intermodulation
Close - Upper
WiMax

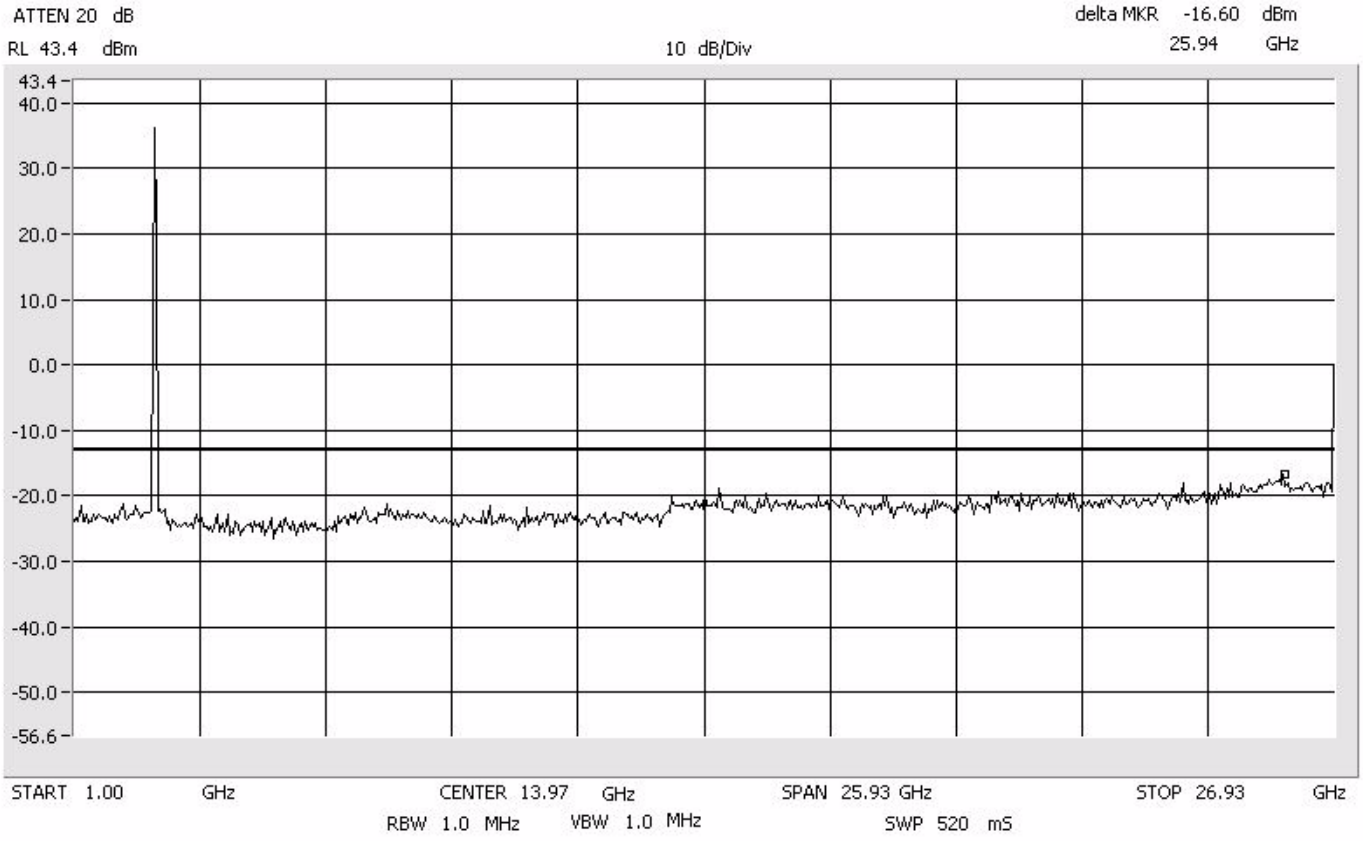
Span: 30 MHz to 1 GHz
RBW/VBW: 300 kHz



5M

Intermodulation
Close - Upper
WiMax

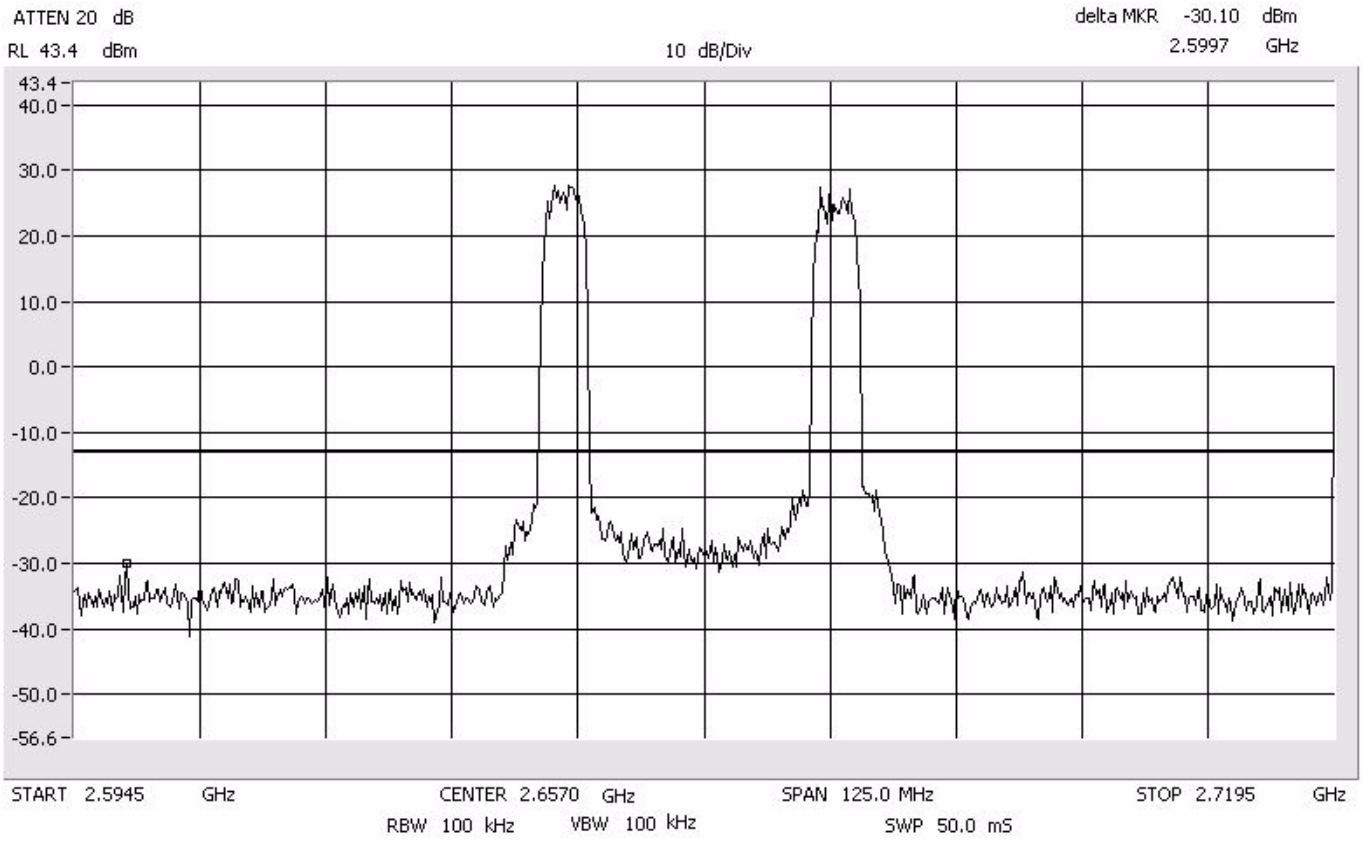
Span: 1 GHz to 25.93 GHz
RBW/VBW: 1 MHz



5M

Intermodulation
Apart
WiMax

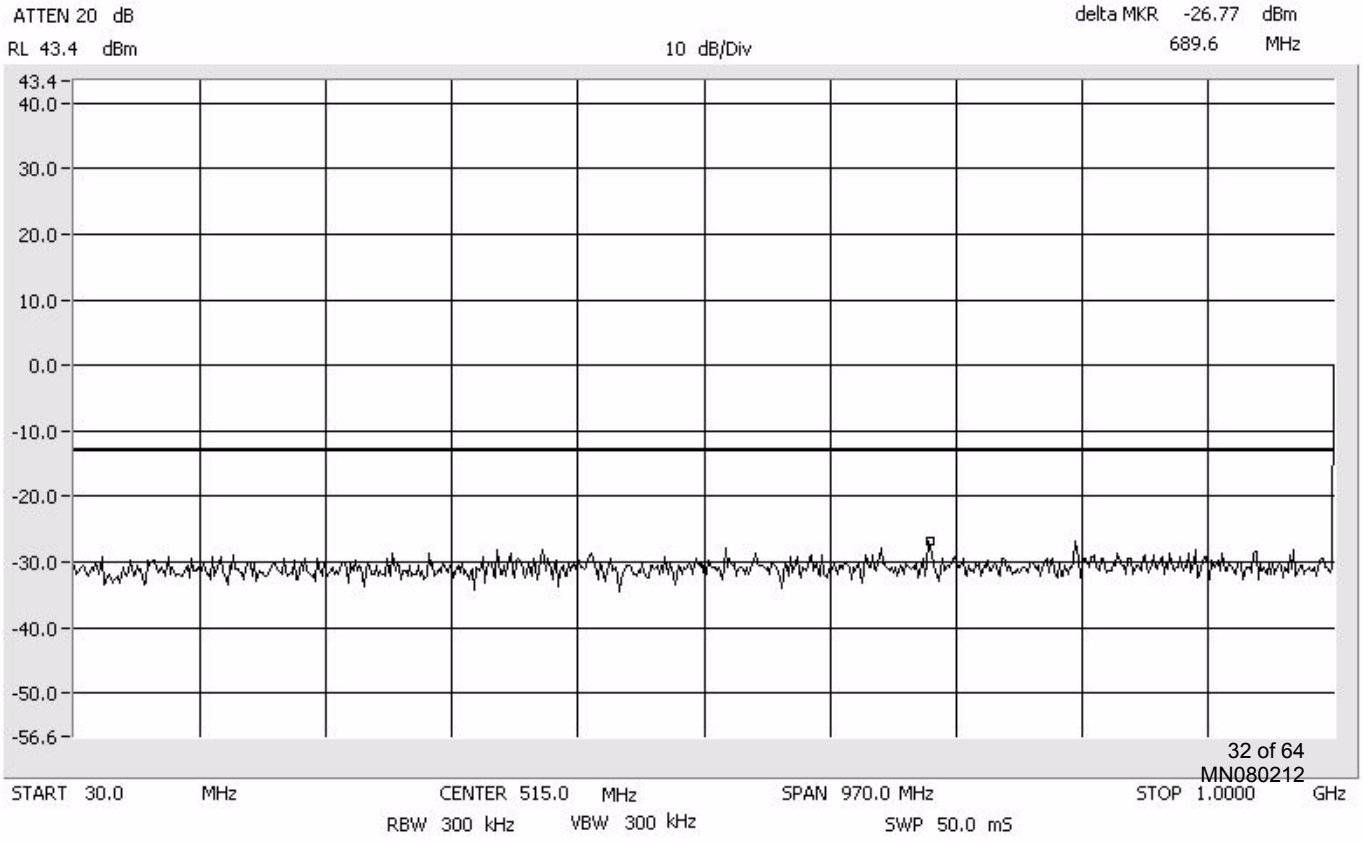
Center: 2657.0 MHz
Span: 125 MHz
RBW/VBW: 100 kHz



5M

Intermodulation
Apart
WiMax

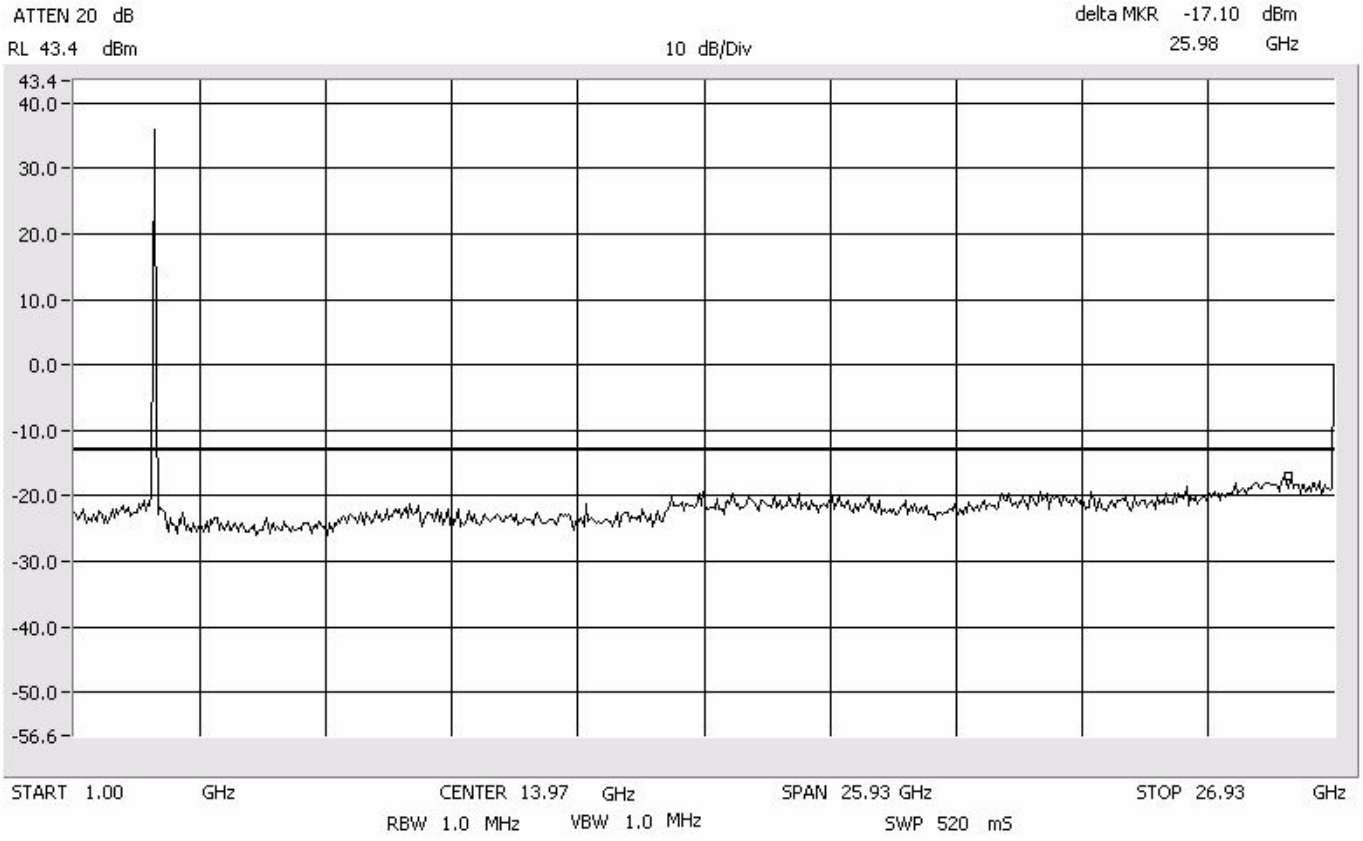
Span: 30 MHz to 1 GHz
RBW/VBW: 300 kHz



5M

Intermodulation
Apart
WiMax

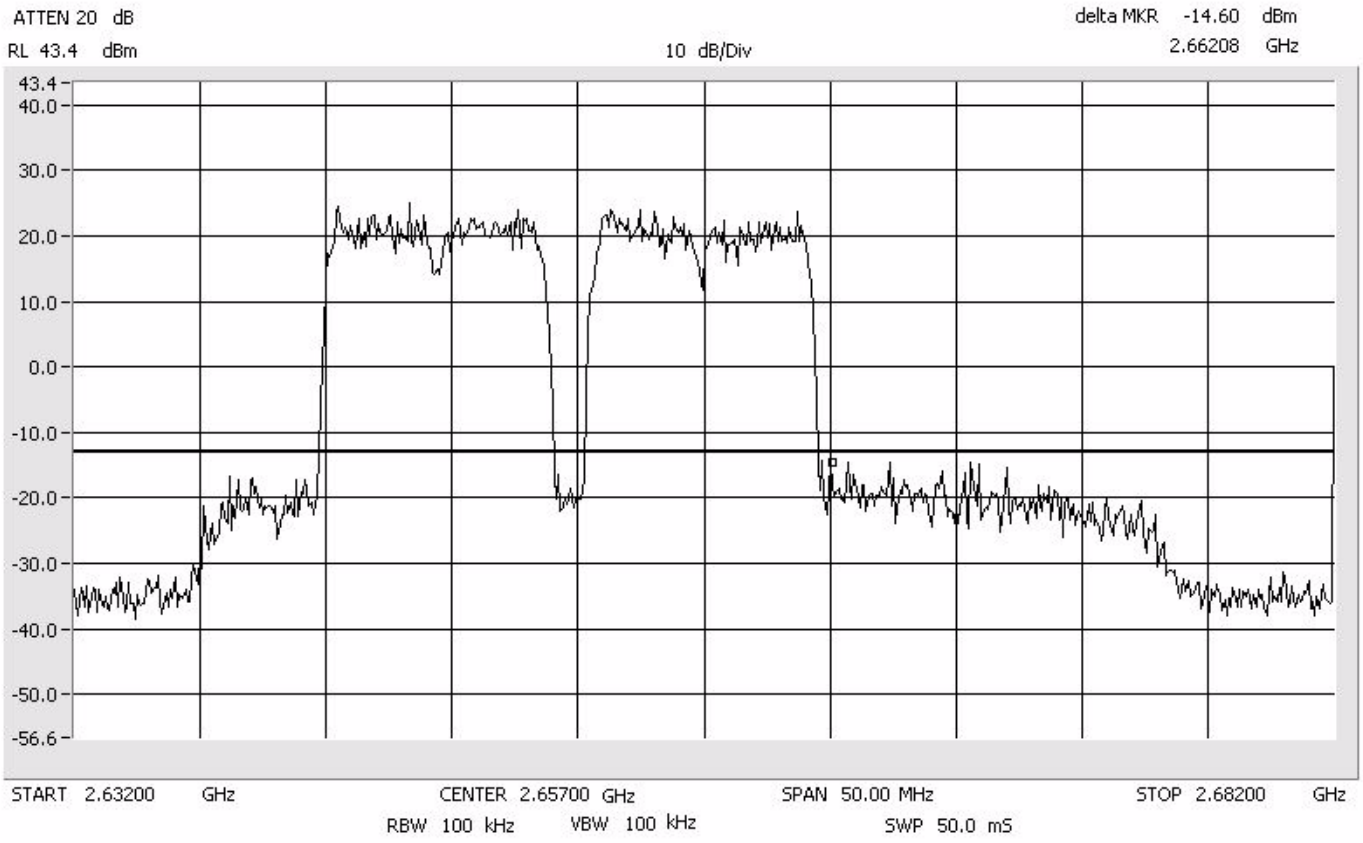
Span: 1 GHz to 25.93 GHz
RBW/VBW: 1 MHz



10M

Intermodulation
Close - Lower
WiMax

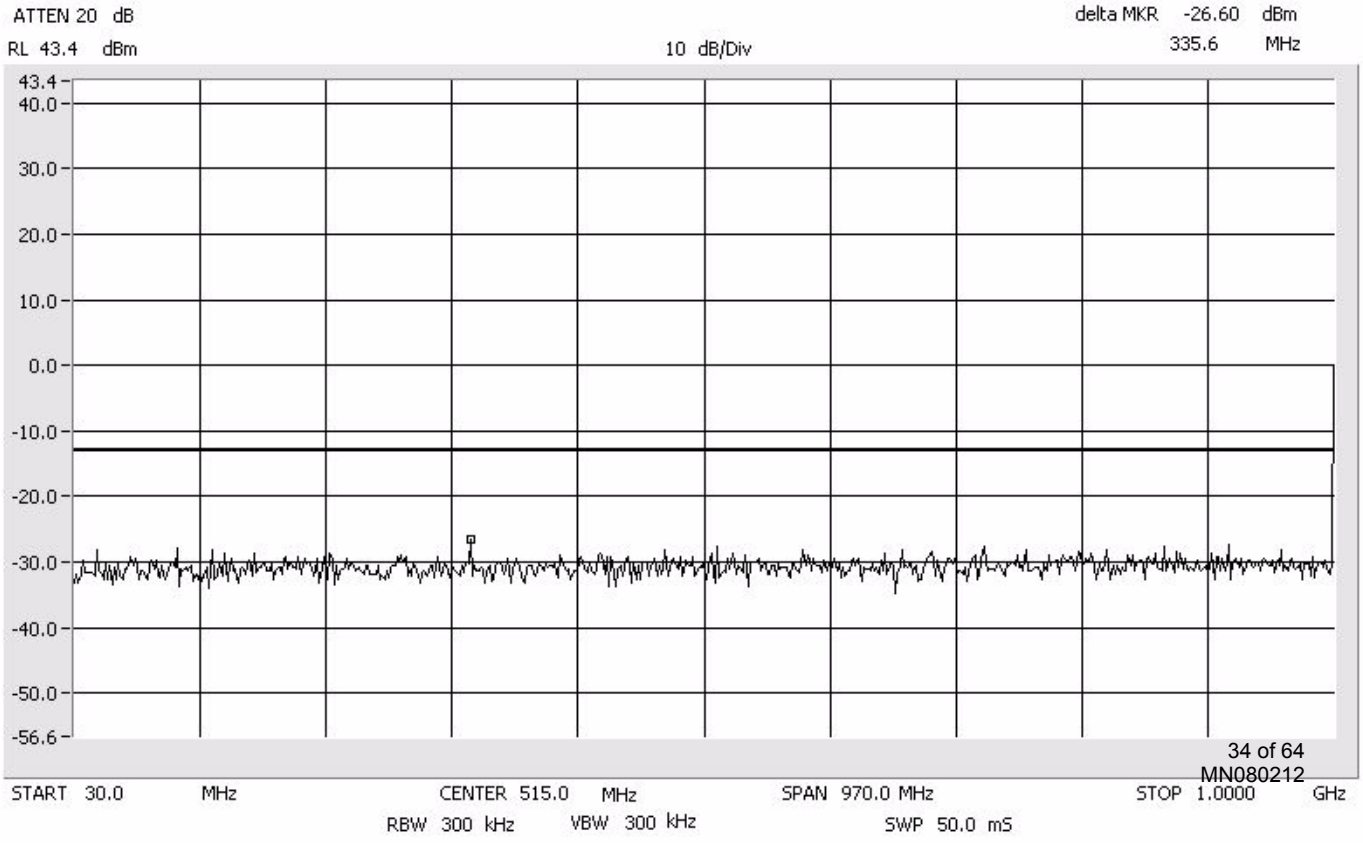
Center: 2657.0 MHz
Span: 50 MHz
RBW/VBW: 100 kHz



10M

Intermodulation
Close - Lower
WiMax

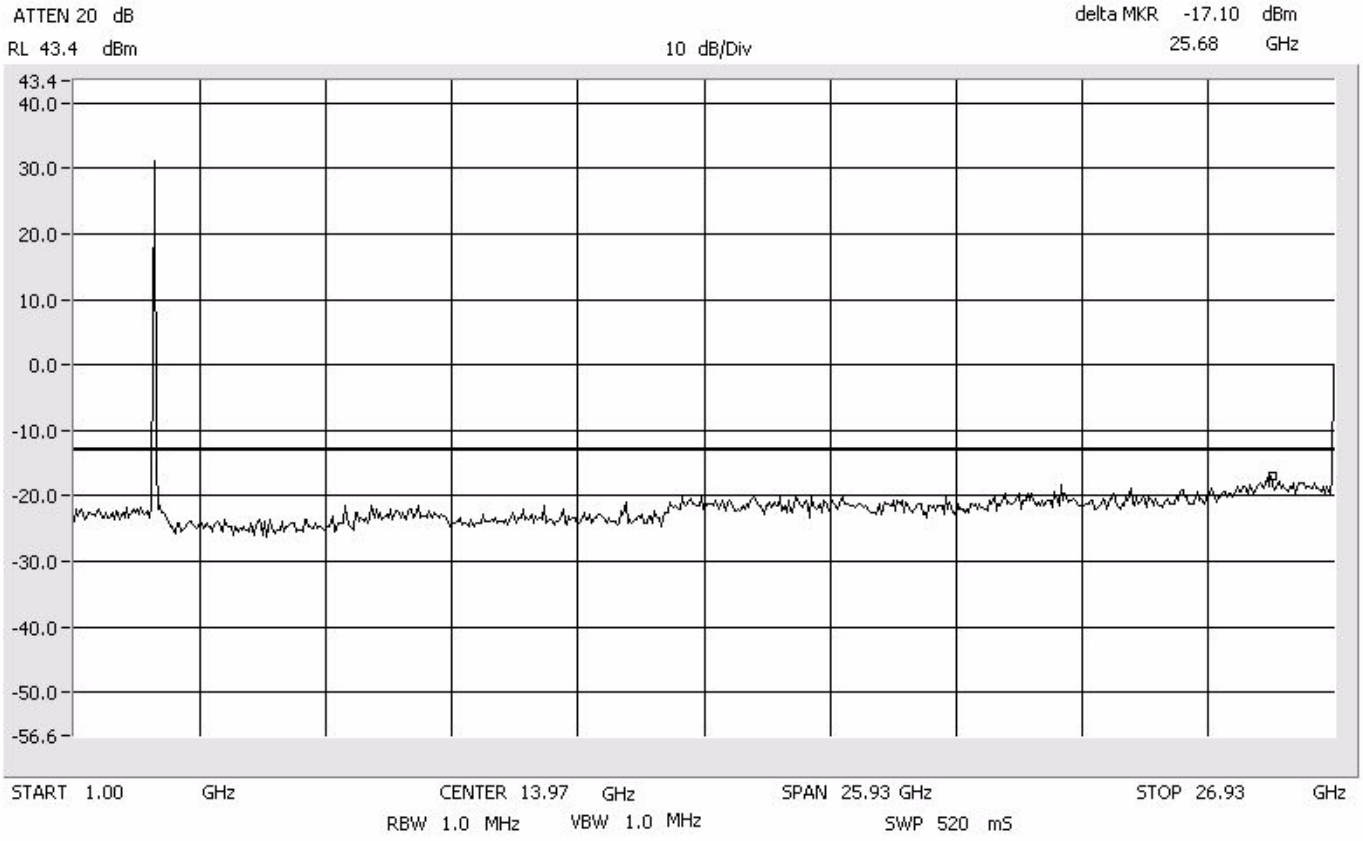
Span: 30 MHz to 1 GHz
RBW/VBW: 300 kHz



10M

Intermodulation
Close - Lower
WiMax

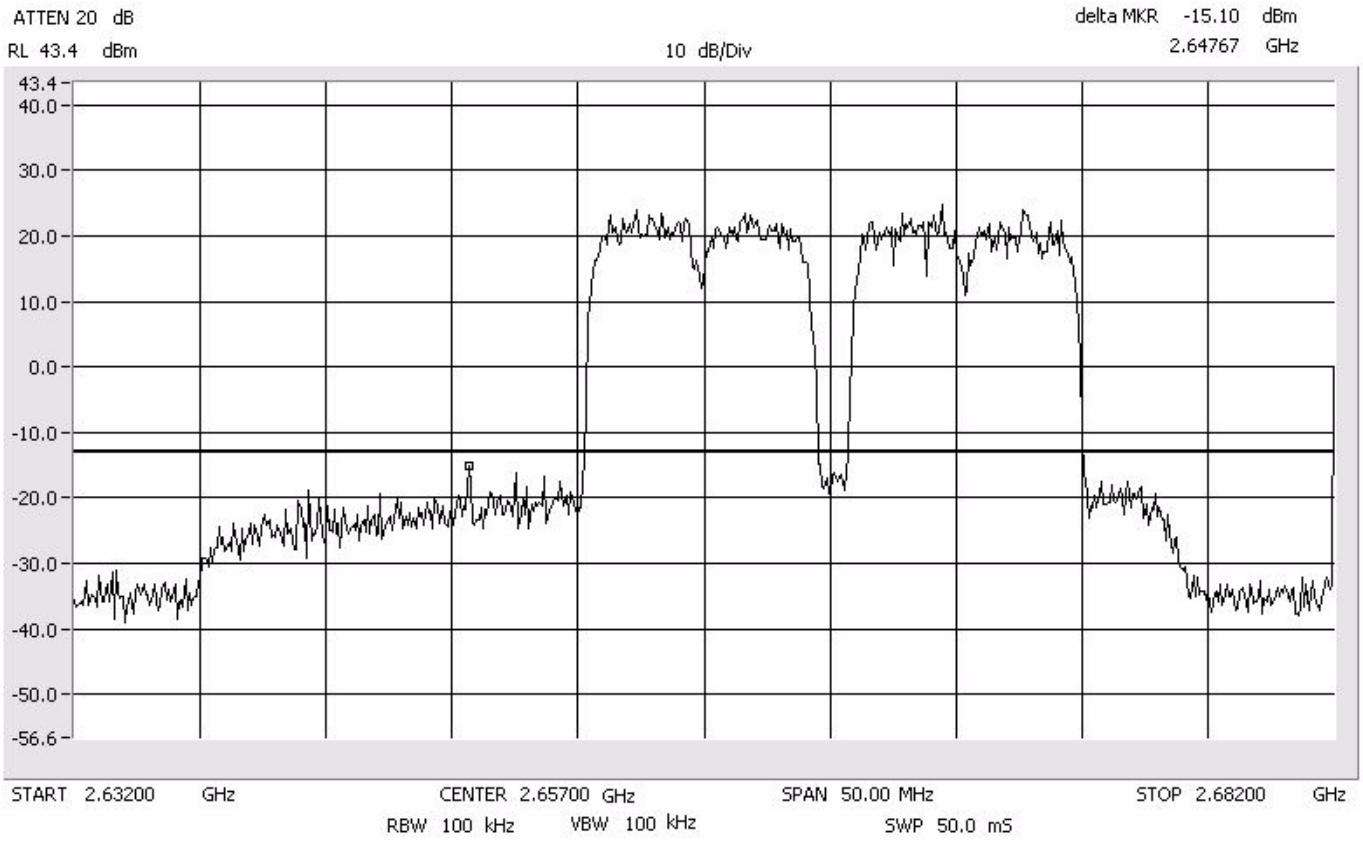
Span: 1 GHz to 25.93 GHz
RBW/VBW: 1 MHz



10M

Intermodulation
Close - Upper
WiMax

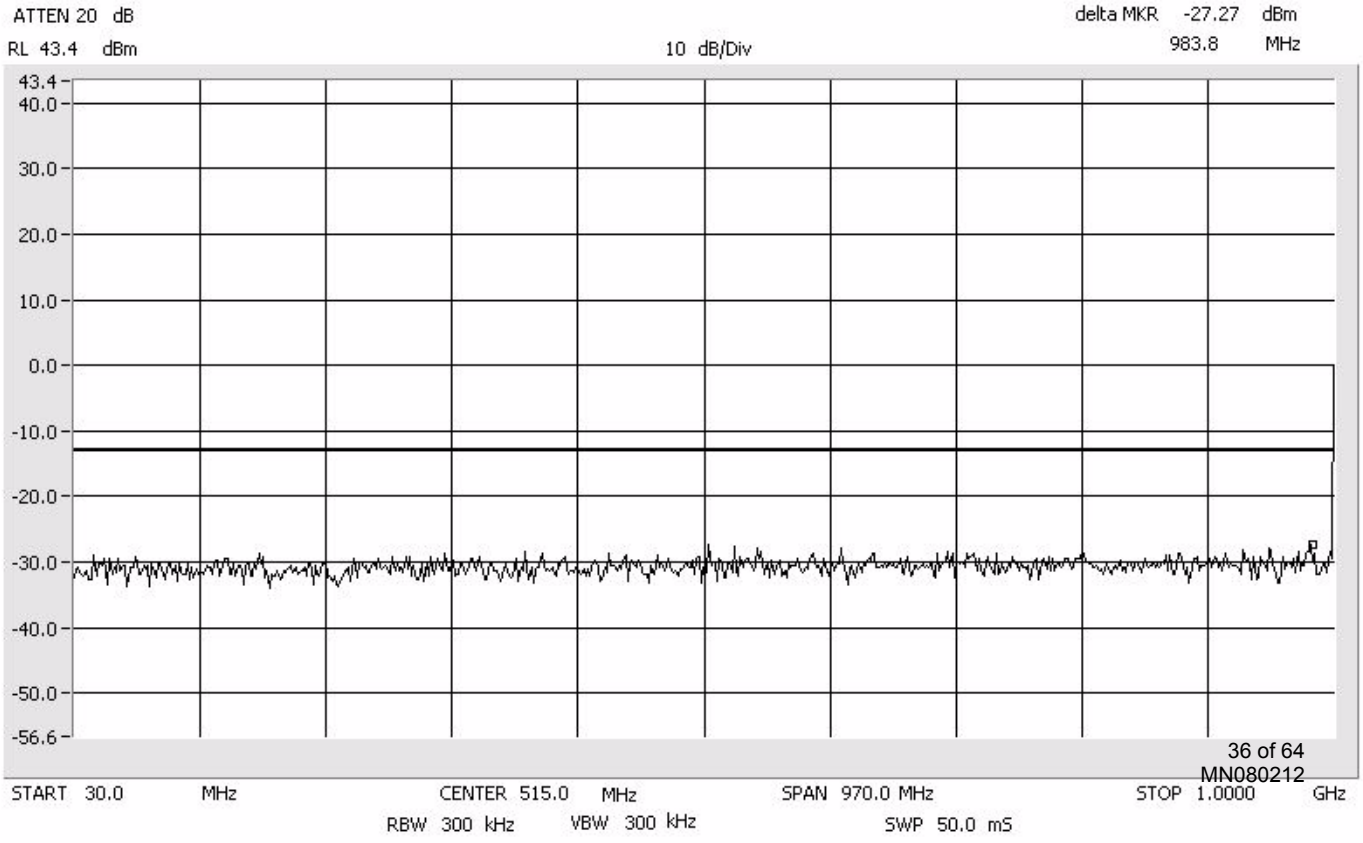
Center: 2657.0 MHz
Span: 50 MHz
RBW/VBW: 100 kHz



10M

Intermodulation
Close - Upper
WiMax

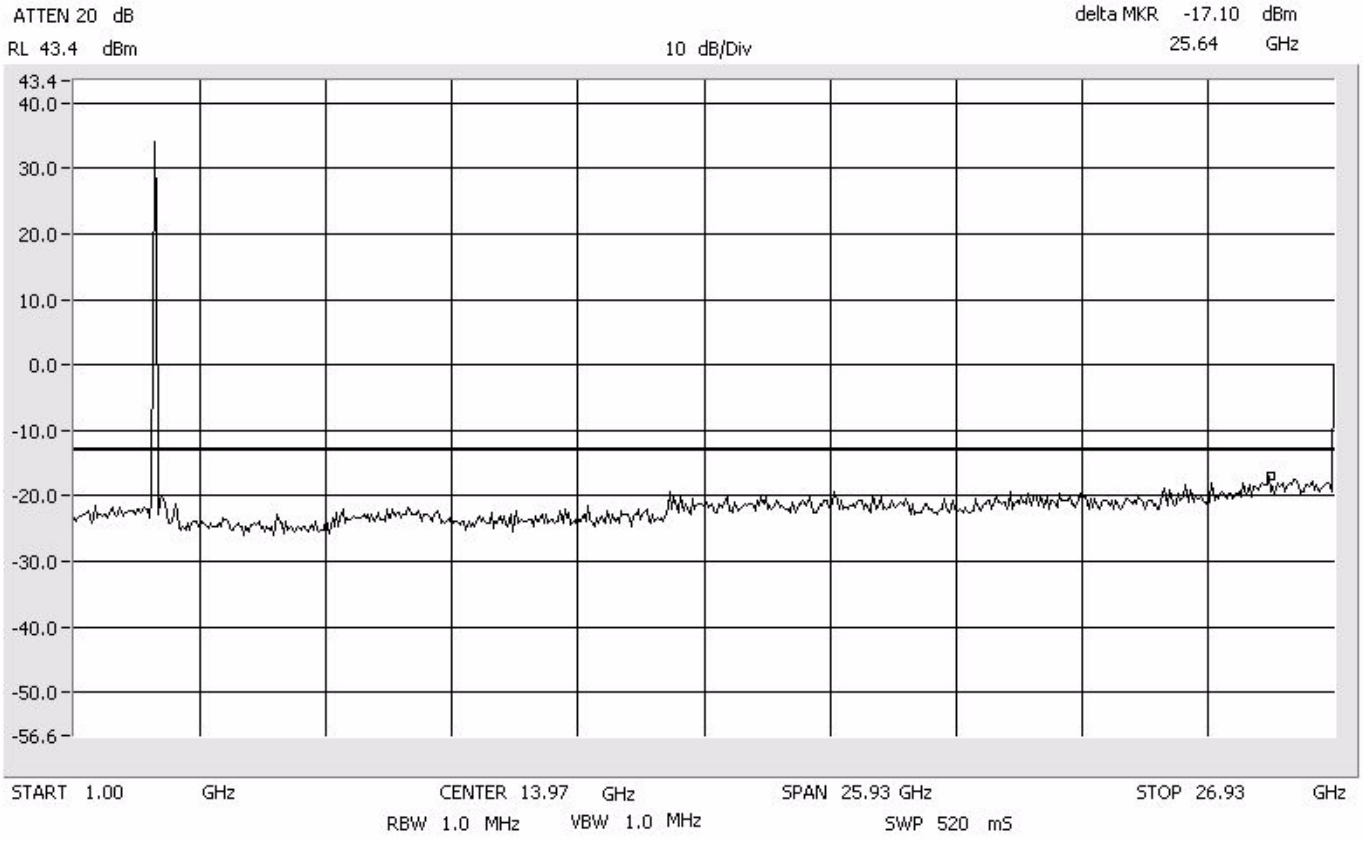
Span: 30 MHz to 1 GHz
RBW/VBW: 300 kHz



10M

Intermodulation
Close - Upper
WiMax

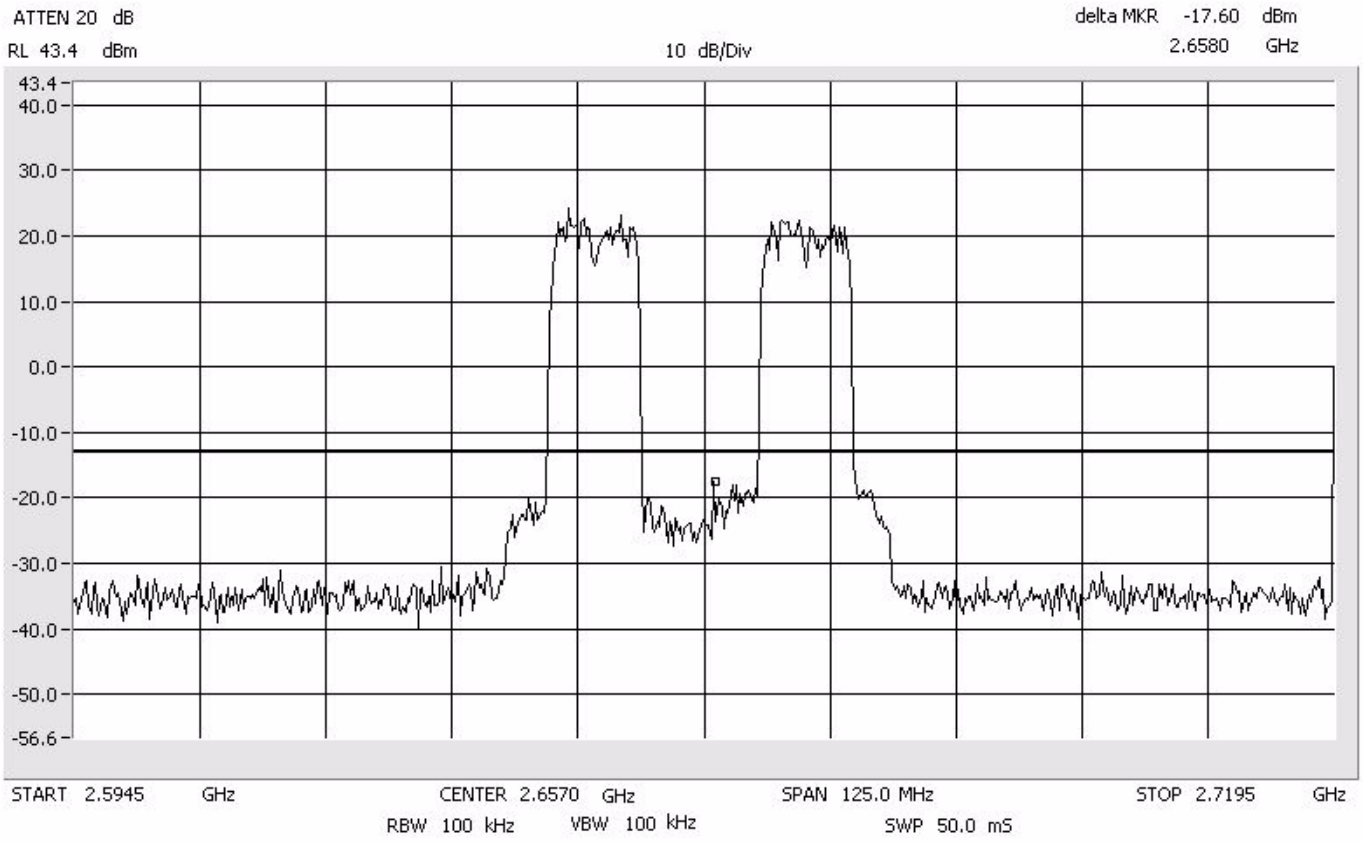
Span: 1 GHz to 25.93 GHz
RBW/VBW: 1 MHz



10M

Intermodulation
Apart
WiMax

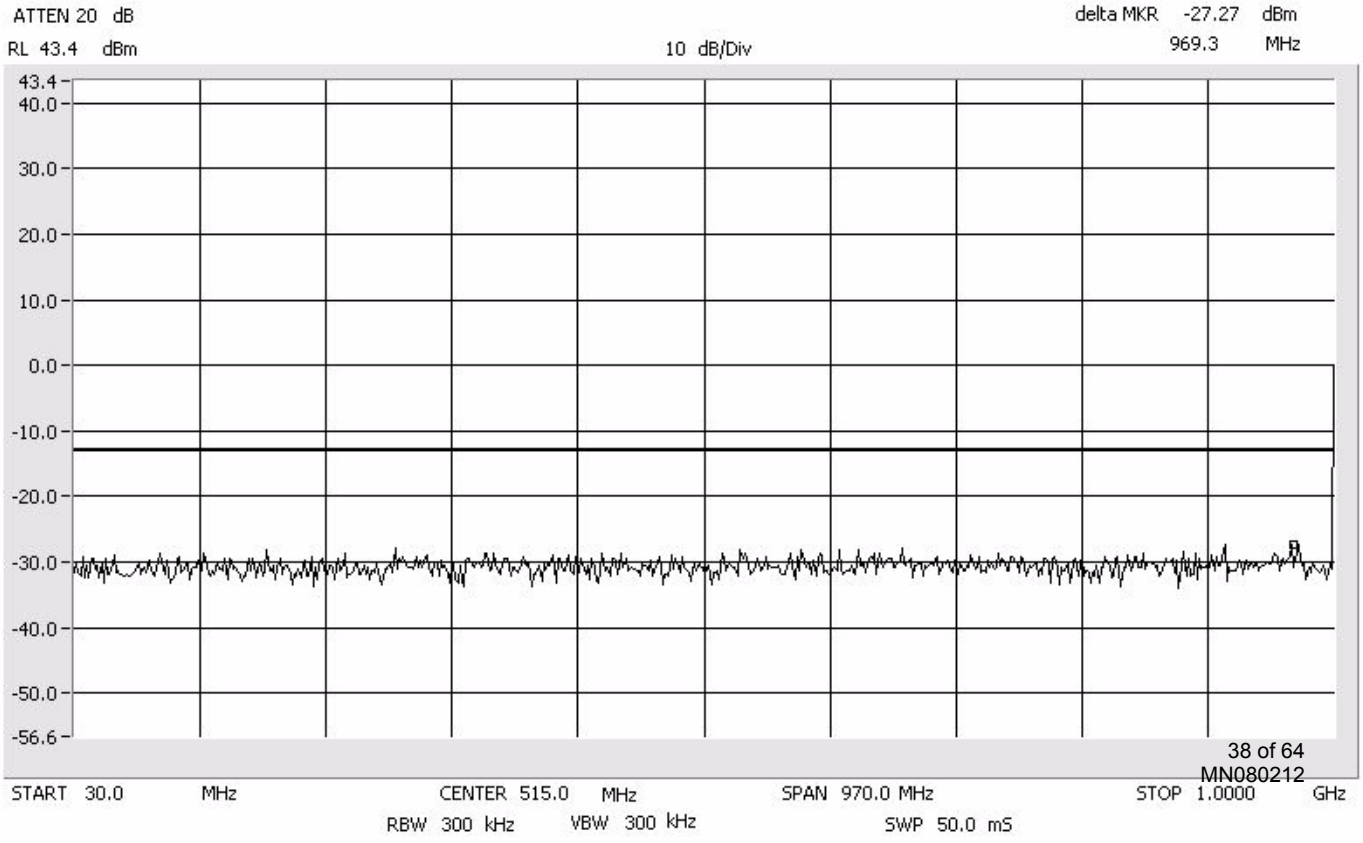
Center: 2657.0 MHz
Span: 125 MHz
RBW/VBW: 100 kHz



10M

Intermodulation
Apart
WiMax

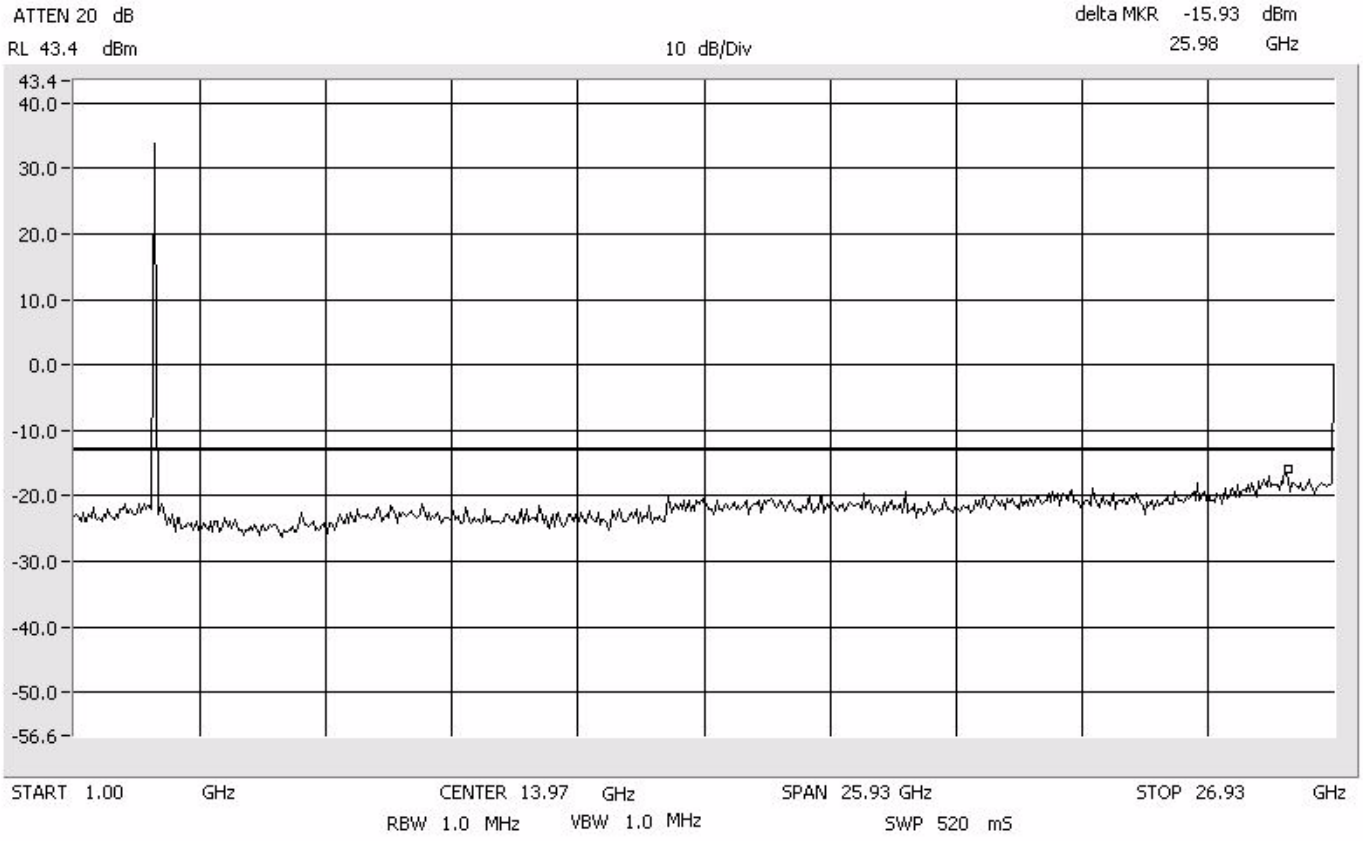
Span: 30 MHz to 1 GHz
RBW/VBW: 300 kHz



10M

Intermodulation
Apart
WiMax

Span: 1 GHz to 25.93 GHz
RBW/VBW: 1 MHz



Occupied Bandwidth Modulation Test for ADC Inc
Digivance® WIMAX Remote
Model Number DGVL-W08000RU

Back

An input/output Occupied Bandwidth test was done with modulation types: 5 MHz and 10 MHz WiMax. The purpose was to determine the amount of distortion added to different types of modulation schemes by the EUT. The following plots show input signals vs. output signals.

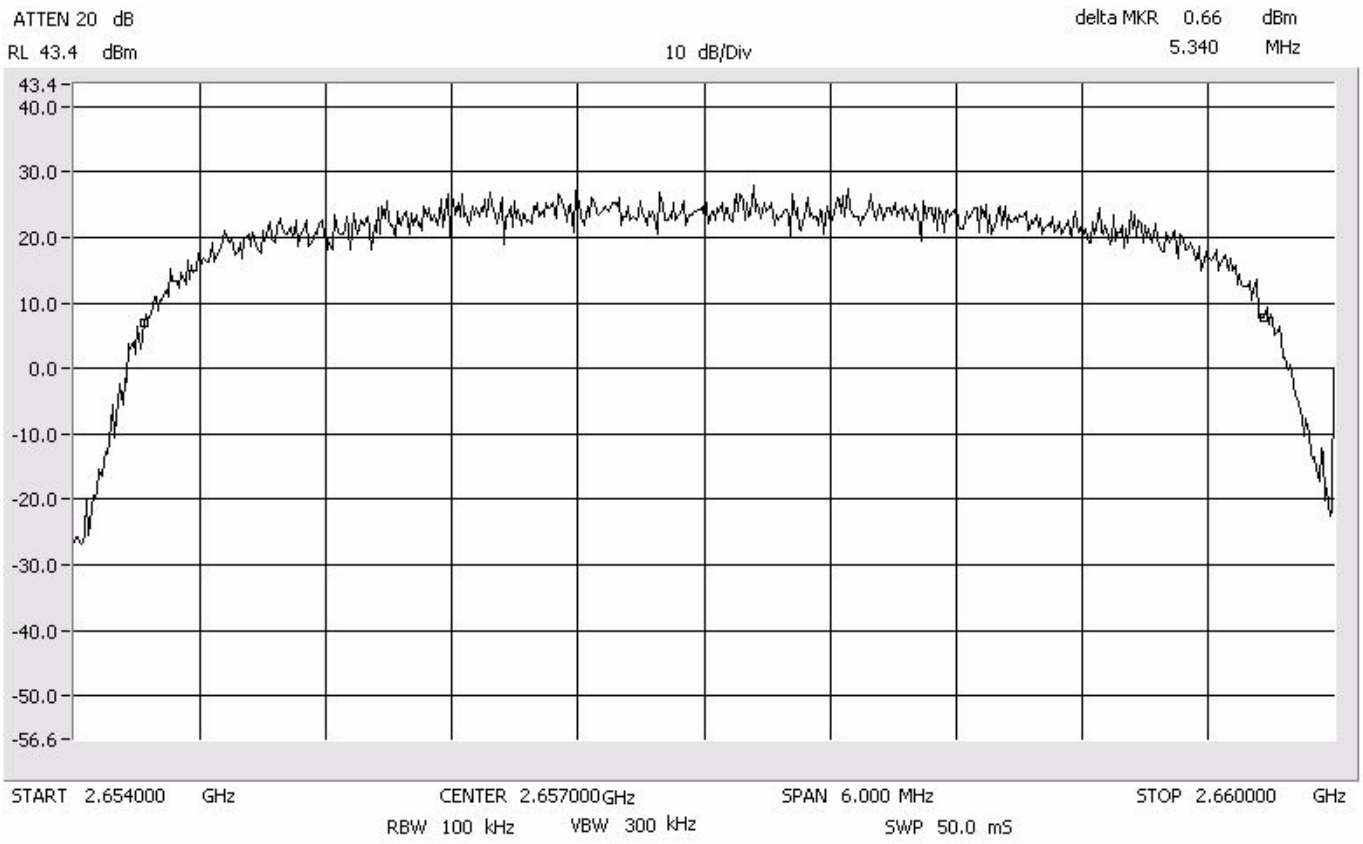
The resolution bandwidth is reduced to 1% of the estimated emission bandwidth and the video bandwidth is set to 3 times the resolution bandwidth. The markers are moved to the -20 dB points (from the previously established center frequency level) on either side of center frequency.

Results:

Pass (see plots)

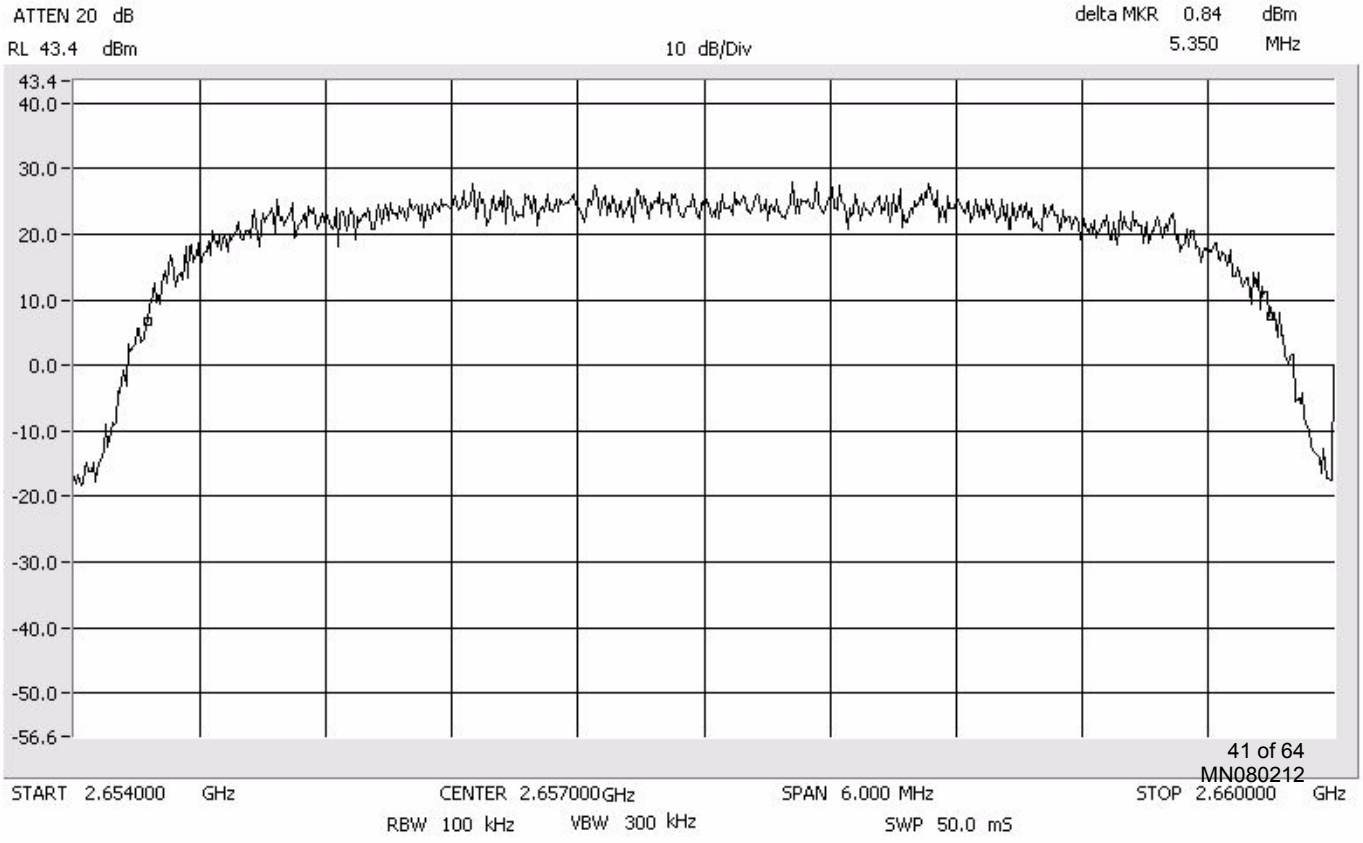
Occupied Bandwidth
5 M
Signal In

Span: 6.0 MHz
RBW: 100 kHz
VBW: 300 kHz



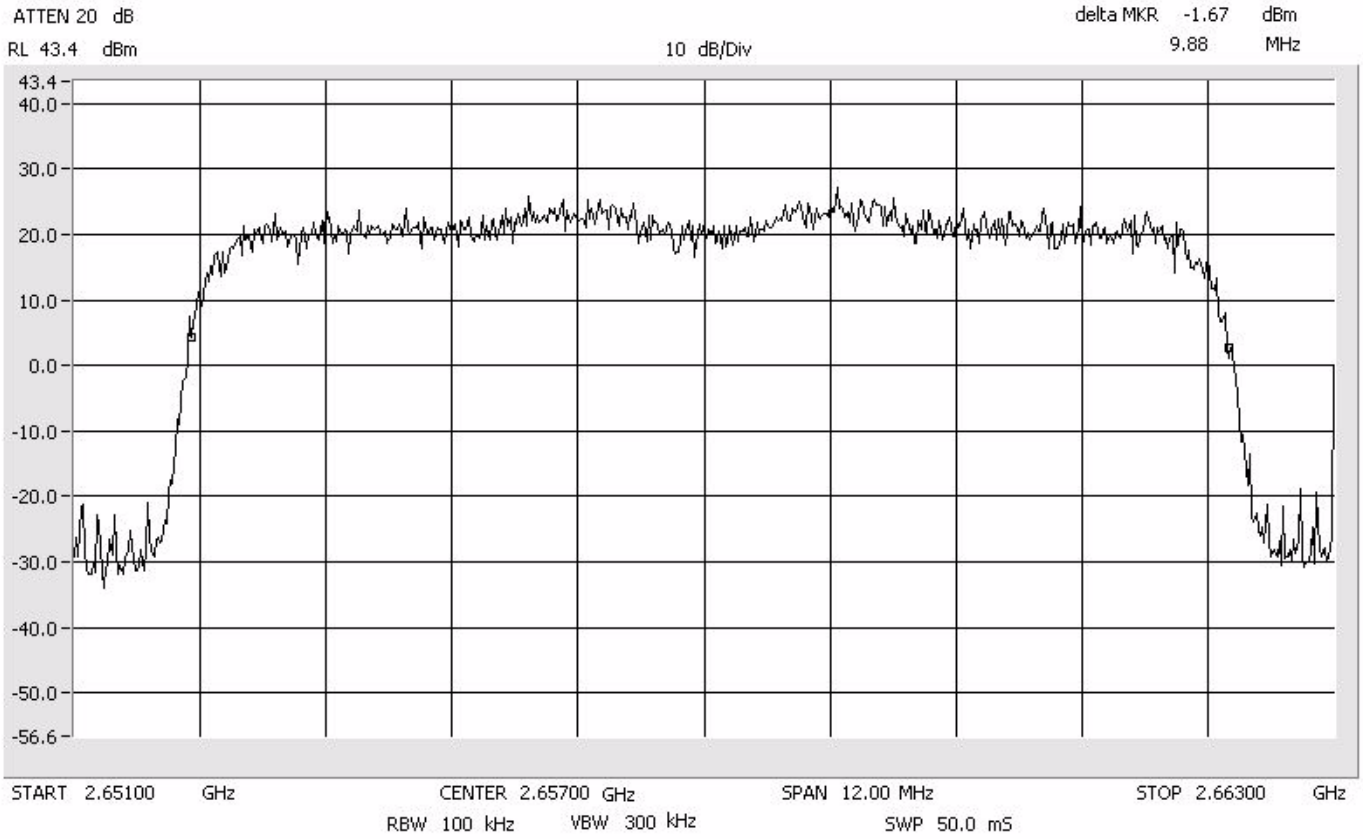
Occupied Bandwidth
5 M
Signal Out

Span: 6.0 MHz
RBW: 100 kHz
VBW: 300 kHz



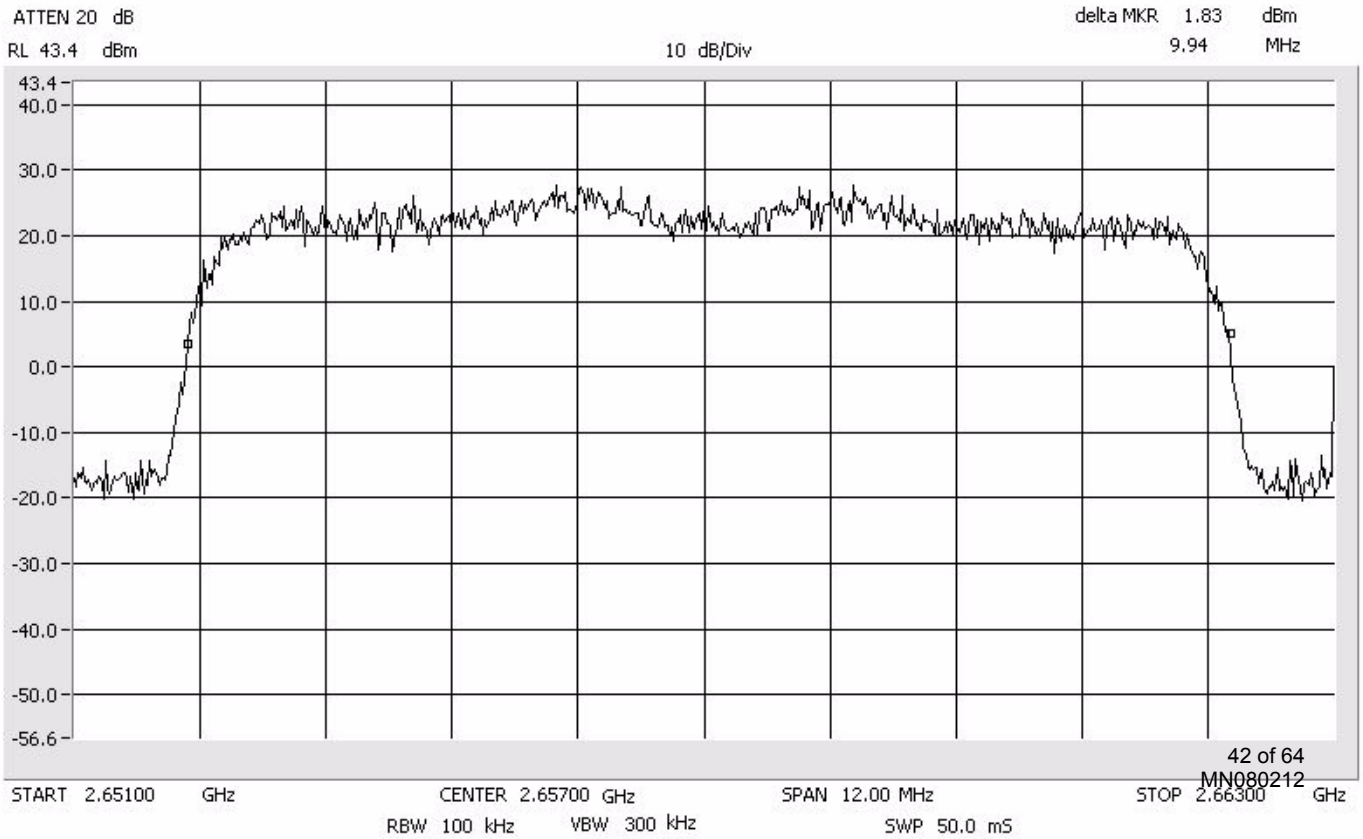
Occupied Bandwidth
10 M
Signal In

Span: 12.0 MHz
RBW: 100 kHz
VBW: 300 kHz



Occupied Bandwidth
10 M
Signal Out

Span: 12.0 MHz
RBW: 100 kHz
VBW: 300 kHz



Frequency Tolerance Test for ADC Inc
Digivance® WIMAX Remote
Model Number DGVL-W08000RU

Back

EUT WIMAX (2.5 GHz)

HOST	REMOTE			
Input Voltage	**Input Voltage**	**Carrier Frequency**	**Measured Frequency**	**Meets Requirements?**
110 VAC	110 VAC	2640.700 MHz	2640.700 MHz	Yes
170 VAC	170 VAC	2640.700 MHz	2640.700 MHz	Yes
230 VAC	230 VAC	2640.700 MHz	2640.700 MHz	Yes
110 VAC	110 VAC	2657.000 MHz	2657.000 MHz	Yes
170 VAC	170 VAC	2657.000 MHz	2657.000 MHz	Yes
230 VAC	230 VAC	2657.000 MHz	2657.000 MHz	Yes
110 VAC	110 VAC	2673.300 MHz	2673.300 MHz	Yes
170 VAC	170 VAC	2673.300 MHz	2673.300 MHz	Yes
230 VAC	230 VAC	2673.300 MHz	2673.300 MHz	Yes
Temperature		**Carrier Frequency**	**Measured Frequency**	**Meets Requirements?**
-30 Deg. C		2640.700 MHz	2640.700 MHz	Yes
-20 Deg. C		2640.700 MHz	2640.700 MHz	Yes
-10 Deg. C		2640.700 MHz	2640.700 MHz	Yes
0 Deg. C		2640.700 MHz	2640.700 MHz	Yes
10 Deg. C		2640.700 MHz	2640.700 MHz	Yes
20 Deg. C		2640.700 MHz	2640.700 MHz	Yes
30 Deg. C		2640.700 MHz	2640.700 MHz	Yes
40 Deg. C		2640.700 MHz	2640.700 MHz	Yes
50 Deg. C		2640.700 MHz	2640.700 MHz	Yes
55 Deg. C		2640.700 MHz	2640.700 MHz	Yes
-30 Deg. C		2657.000 MHz	2657.000 MHz	Yes
-20 Deg. C		2657.000 MHz	2657.000 MHz	Yes
-10 Deg. C		2657.000 MHz	2657.000 MHz	Yes
0 Deg. C		2657.000 MHz	2657.000 MHz	Yes
10 Deg. C		2657.000 MHz	2657.000 MHz	Yes
20 Deg. C		2657.000 MHz	2657.000 MHz	Yes
30 Deg. C		2657.000 MHz	2657.000 MHz	Yes
40 Deg. C		2657.000 MHz	2657.000 MHz	Yes
50 Deg. C		2657.000 MHz	2657.000 MHz	Yes
55 Deg. C		2657.000 MHz	2657.000 MHz	Yes
-30 Deg. C		2673.300 MHz	2673.300 MHz	Yes
-20 Deg. C		2673.300 MHz	2673.300 MHz	Yes
-10 Deg. C		2673.300 MHz	2673.300 MHz	Yes
0 Deg. C		2673.300 MHz	2673.300 MHz	Yes
10 Deg. C		2673.300 MHz	2673.300 MHz	Yes
20 Deg. C		2673.300 MHz	2673.300 MHz	Yes
30 Deg. C		2673.300 MHz	2673.300 MHz	Yes
40 Deg. C		2673.300 MHz	2673.300 MHz	Yes
50 Deg. C		2673.300 MHz	2673.300 MHz	Yes
55 Deg. C		2673.300 MHz	2673.300 MHz	Yes

7.0 APPENDIX B

Intertek Test Data

Back to Test Data:

Back to Table of Contents:

Test Engineer: Norman Shpilsher **Date:** 29, 30 January, 2008

Test Procedure:
Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

Test Site Location:
The test site is a 3 meter Semi-Anechoic Chamber, constructed by Panashield™ Inc. and located
inside the building at 7250 Hudson Blvd. Suite 100, Oakdale, MN 55128.

Test Site Description:
The 3 meter Semi-Anechoic Chamber is constructed of Panabolt™ modular RF shielding and self-supported with structural steel designed for the local seismic zone rating. The chamber has the nominal size of 20' wide x 29' long x 18' high. All walls and ceiling of the chamber are treated with FFG-1000 Ferrite Grid absorber which was developed specifically to meet international requirements for EMC anechoic chambers for emissions and immunity measurements. To meet high frequency testing white HY-35 hybrid absorber is mounted on the ferrites in specular regions of the chamber.

The chamber has a 2 meter diameter ANSI test volume area and meets the requirements of ANSI C63.4 (1992), EN55022, and FCC Part 15 standards for testing at a 3 meter path length.

FCC Registration Number: 90706
IC Registration Number: 4359

TEST DATA

Test Data Number: 3143419MIN-001
Project Number: 3143419

Testing performed on the
WiMAX-Remote

to
47 CFR, Part 27

For
ADC Telecommunications Inc.

Test Performed by:
Intertek Testing Services NA, Inc.
7250 Hudson Blvd., Suite 100
Oakdale, MN 55128

Test Authorized by:
ADC Telecommunications Inc.
5341 12th Avenue East
Shakopee, MN 55379

Prepared by: _____ Date: January 30, 2008
Norman Shpilsher

Reviewed by: _____ Date: January 30, 2008
Uri Spector

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1.0 DESCRIPTION OF THE SAMPLE (EUT)

Model:	WiMAX-Remote
Type of EUT:	WiMAX Fiber Optic Remote Transmitter
Serial Number:	N/A
Company:	ADC Telecommunications Inc.
Customer:	Mr. Mark Miska
Address:	1187 Park Place Shakopee, MN 55379
Phone:	952-403-8340
Fax:	952-403-8858
Test Standards:	☐ EN 55022:2006, Class ☐ EN 55011:1998 + A1:1999 + A2:2002, Group , Class ☒ 47 CFR, Part 27:2007 ☐ EN 55014-1:2000 + A1:2001 + A2:2002 ☐ EN 61326-1:2006 ☐ Class for Radiated and Conducted Emissions ☐ EN 60601-1-2:2001 +A1:2006 ☐ Class Radiated and Conducted Emissions ☐ EN 61000-6-3:2007 ☐ EN 61000-6-4:2007 ☐ EN 61000-3-2:2006 ☐ EN 61000-3-3:1995 +A1:2001 +A2:2006 ☐ Other

2.0 TEST SUMMARY

Referring to the performance criteria and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards.

TEST STANDARD	TEST	RESULT
Part 27	Spurious Enclosure Radiated Emissions	Pass

2.1 Statement of the Measurement Uncertainty

Note: The measured result in this report is within the specification limits by more than the measurement uncertainty; the measured result indicates that the product tested complies with the specification limit.

The expanded uncertainty (k = 2) for radiated emissions from 30 to 1000 MHz has been determined to be: ±4 dB at 10m and ±5.4 dB at 3m

The expanded uncertainty (k = 2) for conducted emissions from 150 kHz to 30 MHz has been determined to be:
±2.6 dB

General notes:
1. Test was performed with the EUT tuned to the low frequency (2640.5MHz), middle frequency (2657MHz), and upper frequency (2673.5MHz) of the operating band.
Testing was performed in frequency range from 30MHz to 26.75GHz.
2. The EUT Antenna Port was terminated with 50Ohm terminator.
The WiMAX-Host, Fiber Optic Interface Device (Support Equipment) was located outside of the test site.
3. The Spurious Radiated Power limits of -13dBm was correlated with field strength reference level of 82.2dBµV/m during field strength measurements at 3m measurement distance.

3.0 TEST RESULTS

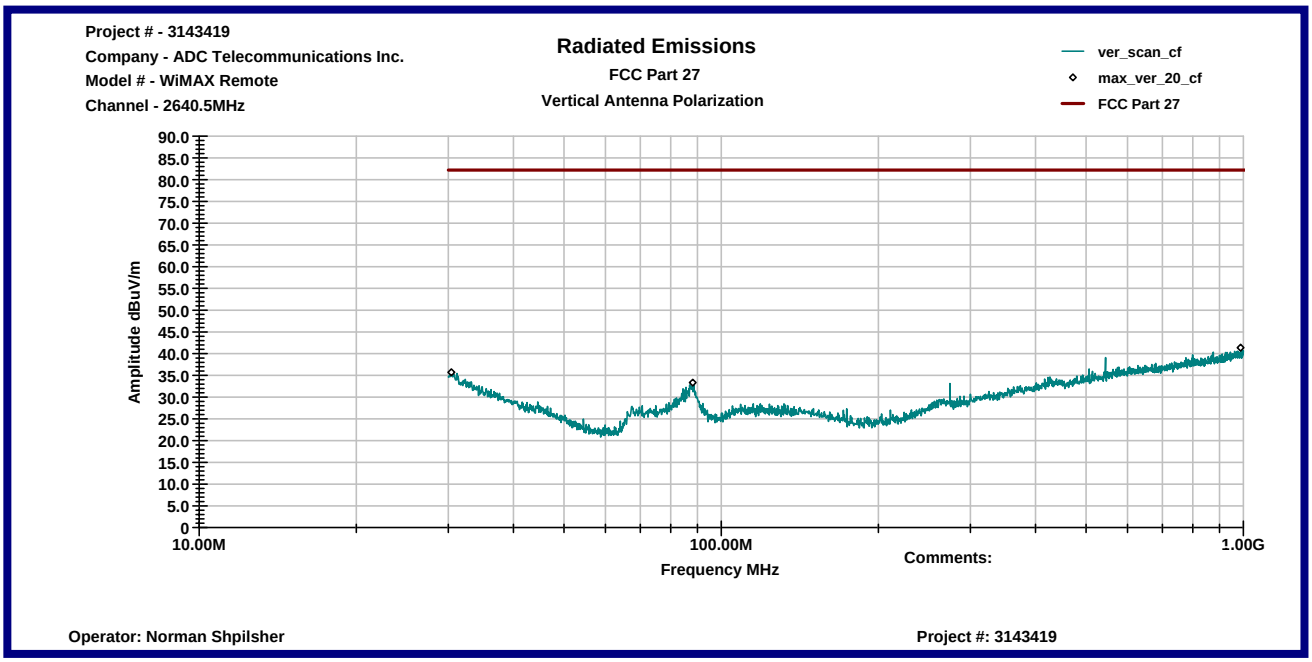
Table 1 shows detected Radiated Emissions. Emissions at fundamentals were excluded from the Table. Graphs 1 to 18 show the EUT peak Radiated Emissions for three channels in frequency ranges from 30 to 1000MHz, 1 to 18GHz, and 18 to 16.75GHz.
No emissions were chosen for substitution measurements as the maximum emissions is more than 30dB below the reference limit

Radiated Emissions from 30MHz to 26.75GHz **Date:** 01/29-30/2008

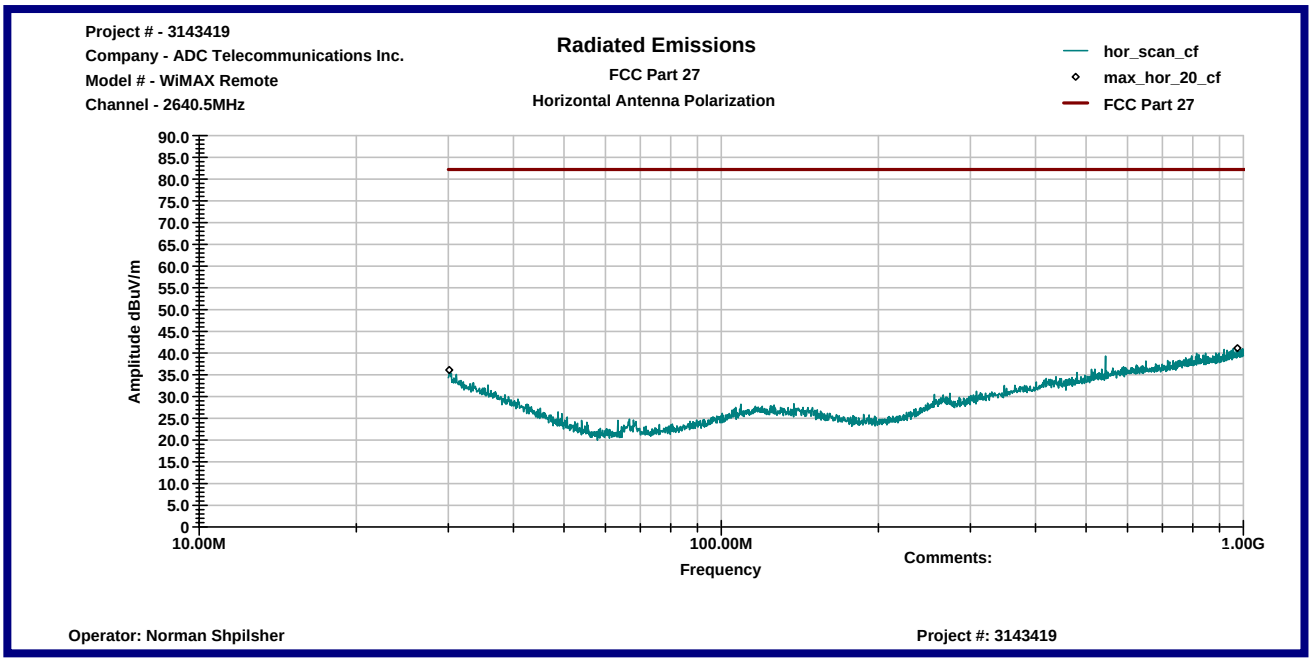
Company: ADC Telecommunications Inc.
Model: WiMAX-Remote
Test Engineer: Norman Shpilsher
Standard: FCC Part 27
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
Emissions at fundamentals were excluded from the Table
All measurements were taken using a Peak detector

Table # 1

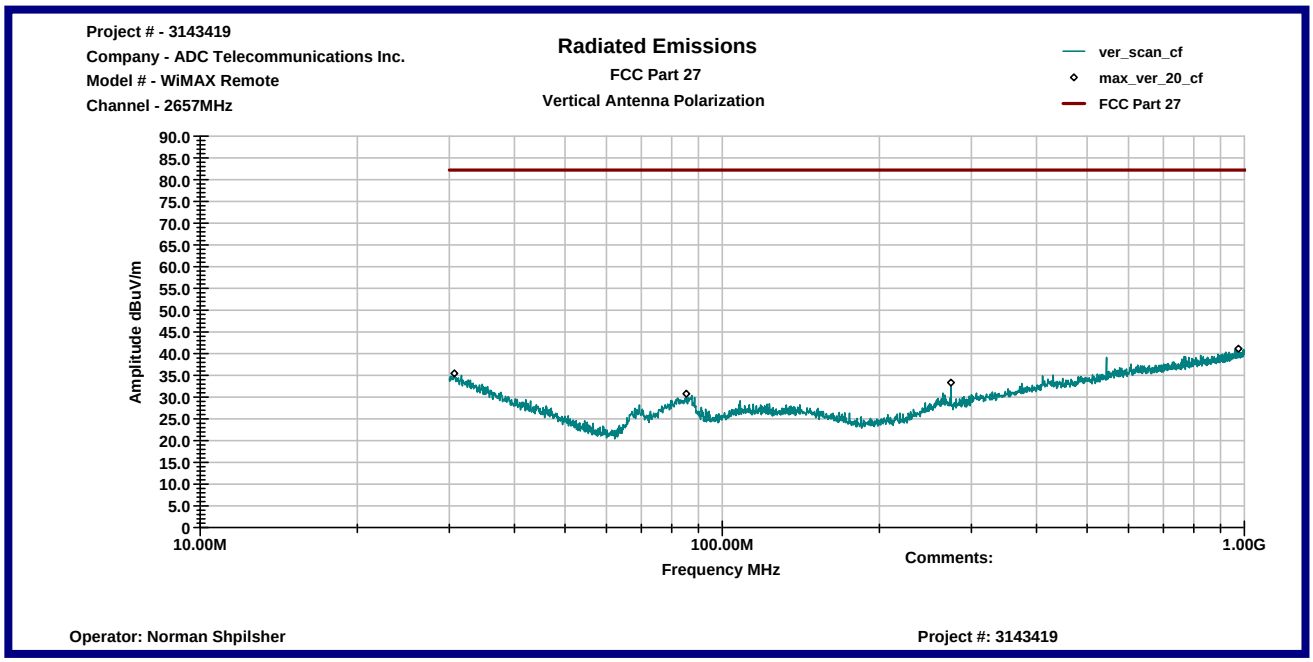
Frequency MHz	Antenna Polarity	Peak Reading dBµV	Total C.F. dB1/m	Pre-Amp. Gain (dB)	Total at 3m dBµV/m	QP Limit dBµV/m	Margin dB
		Channel 2640.5MHz					
30.416 MHz	V	15.4	20.3	0.0	35.7	82.2	-46.5
88.211 MHz	V	23.5	9.8	0.0	33.3	82.2	-48.9
987.98 MHz	V	15.5	25.8	0.0	41.3	82.2	-40.9
30.139 MHz	H	15.6	20.5	0.0	36.1	82.2	-46.1
974.54 MHz	H	15.5	25.6	0.0	41.1	82.2	-41.1
		Channel 2657MHz					
30.693 MHz	V	15.3	20.2	0.0	35.4	82.2	-46.8
85.376 MHz	V	21.3	9.5	0.0	30.7	82.2	-51.5
274.28 MHz	V	18.1	15.2	0.0	33.3	82.2	-48.9
974.54 MHz	V	15.5	25.6	0.0	41.1	82.2	-41.1
1.2346 GHz	V	40.3	28.1	39.6	28.8	82.2	-53.4
30.485 MHz	H	28.0	20.3	0.0	48.3	82.2	-33.9
939.17 MHz	H	16.1	25.2	0.0	41.2	82.2	-41.0
2.462 GHz	H	42.5	32.5	37.9	37.2	82.2	-45.0
		Channel 2673.5MHz					
30.346 MHz	V	15.3	20.4	0.0	35.7	82.2	-46.5
85.674 MHz	V	20.1	9.5	0.0	29.6	82.2	-52.6
274.28 MHz	V	19.6	15.2	0.0	34.8	82.2	-47.4
997.17 MHz	V	14.9	25.9	0.0	40.9	82.2	-41.4
1.2346 GHz	V	40.3	28.1	39.6	28.8	82.2	-53.5
30.0 MHz	H	13.9	20.5	0.0	34.4	82.2	-47.8
995.76 MHz	H	15.3	25.9	0.0	41.2	82.2	-41.0



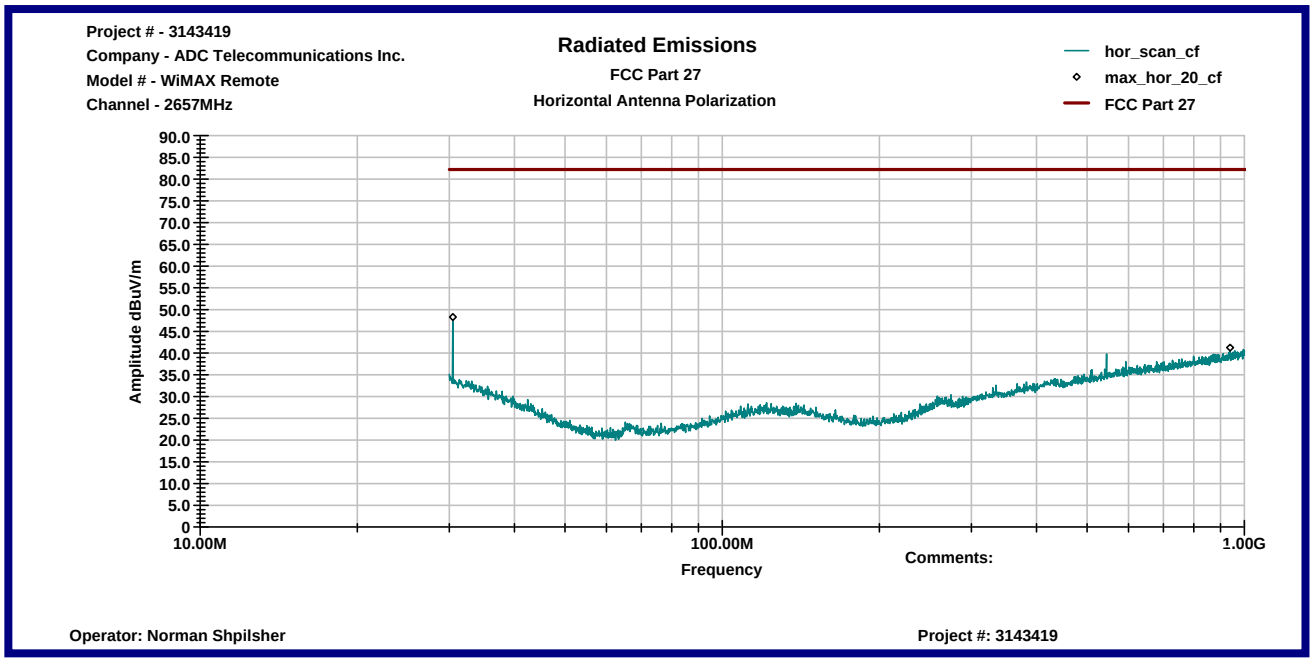
Graph 1



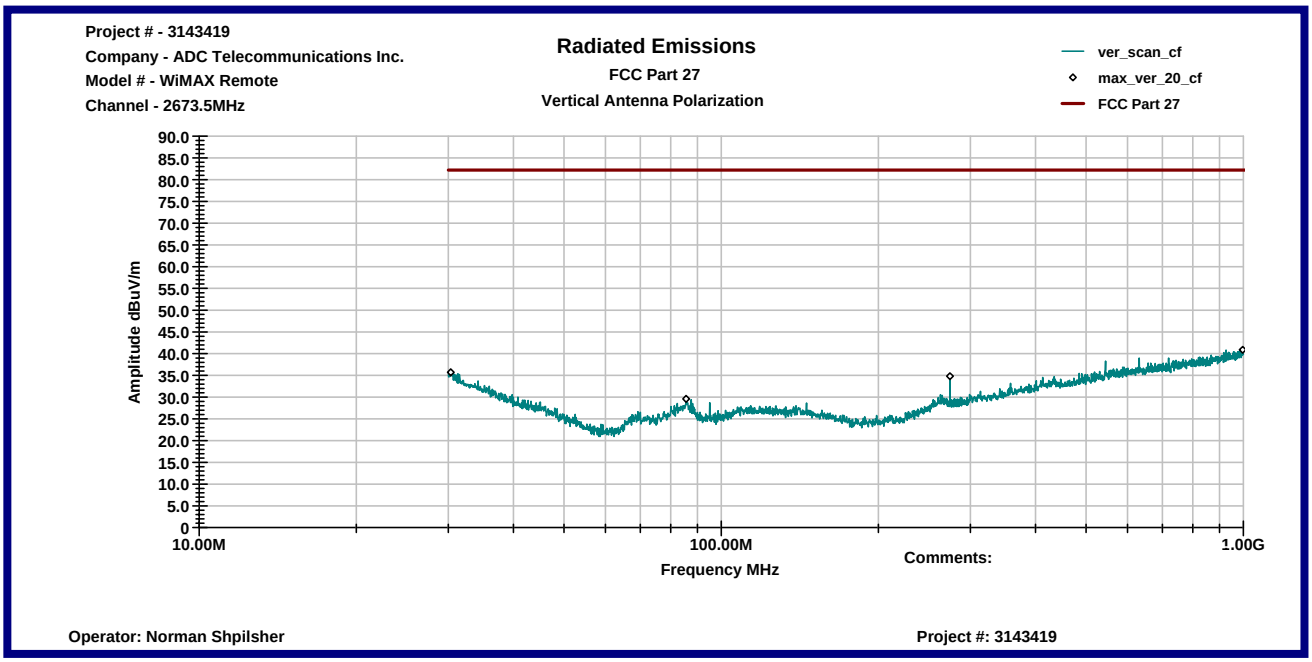
Graph 2



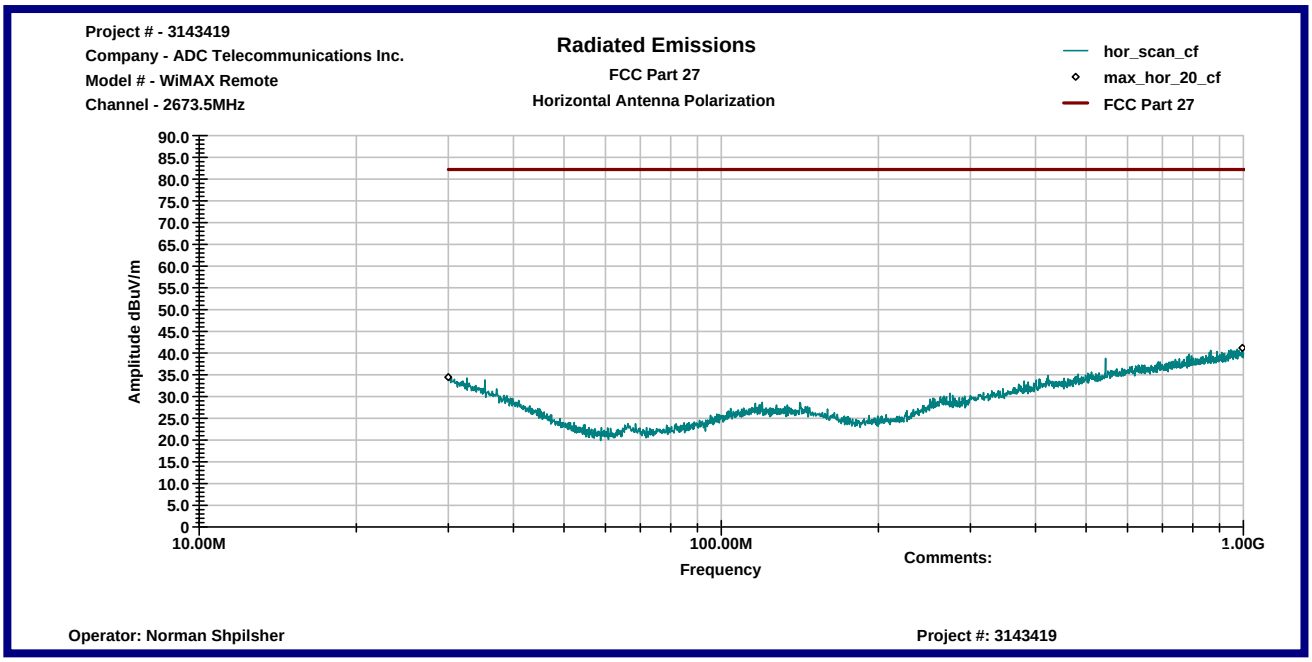
Graph 3



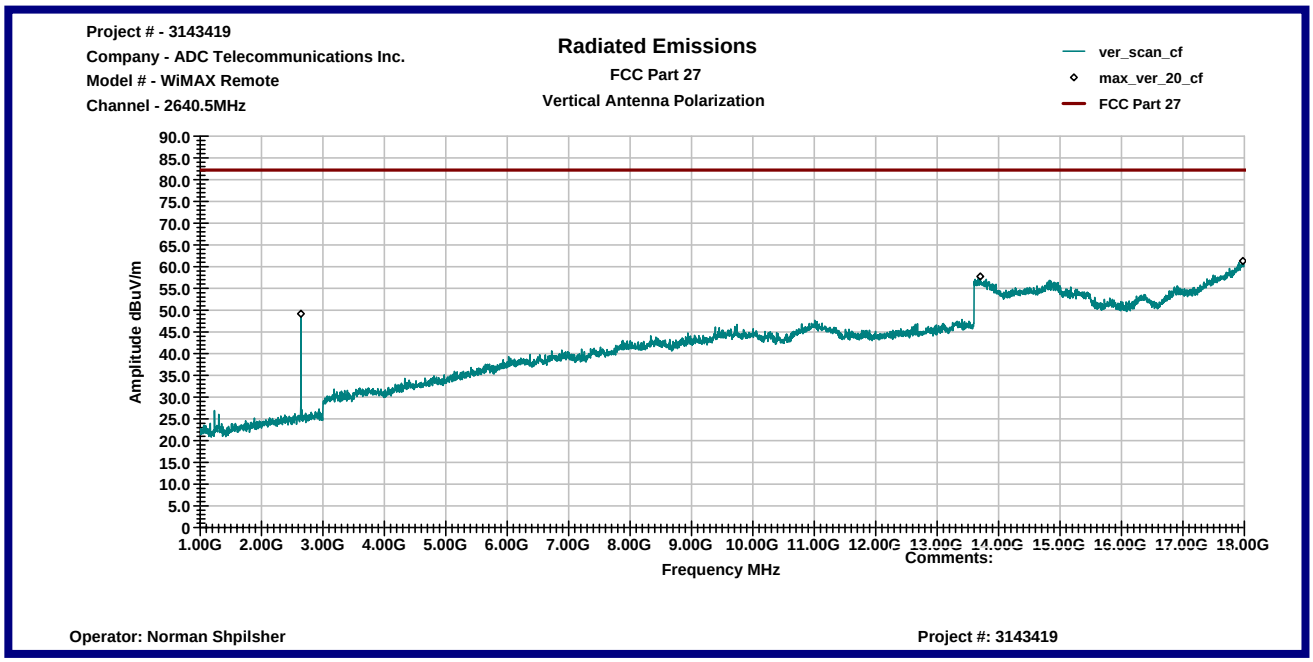
Graph 4



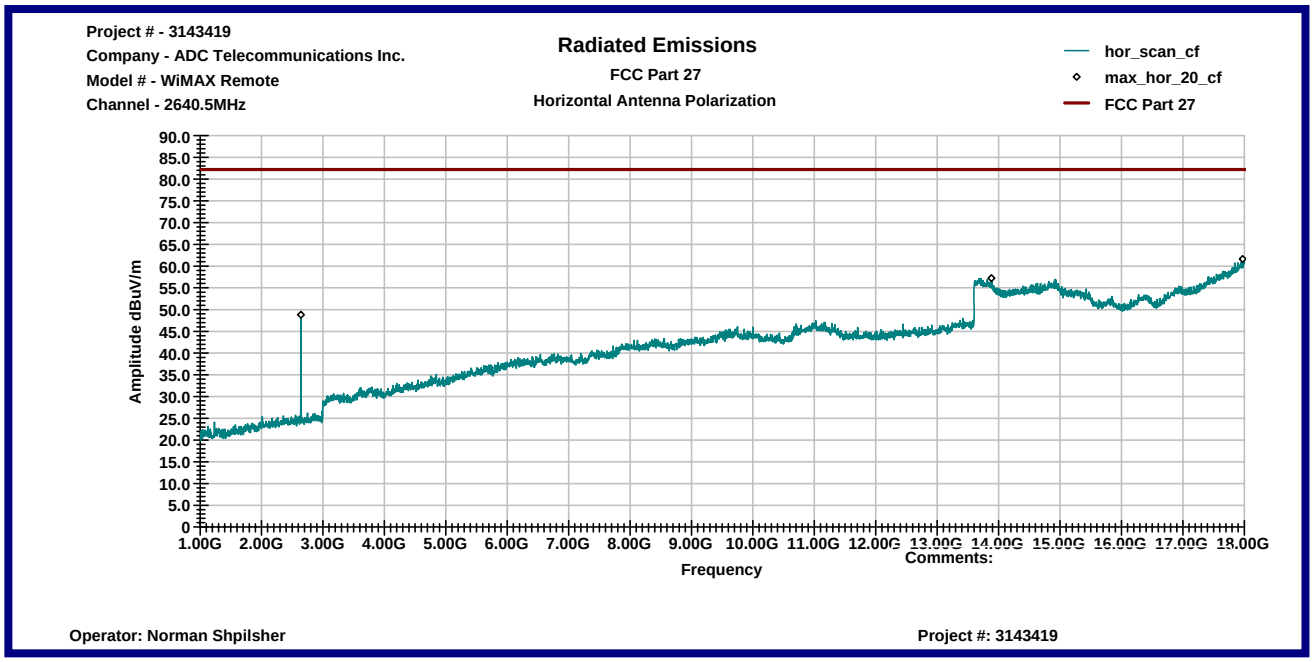
Graph 5



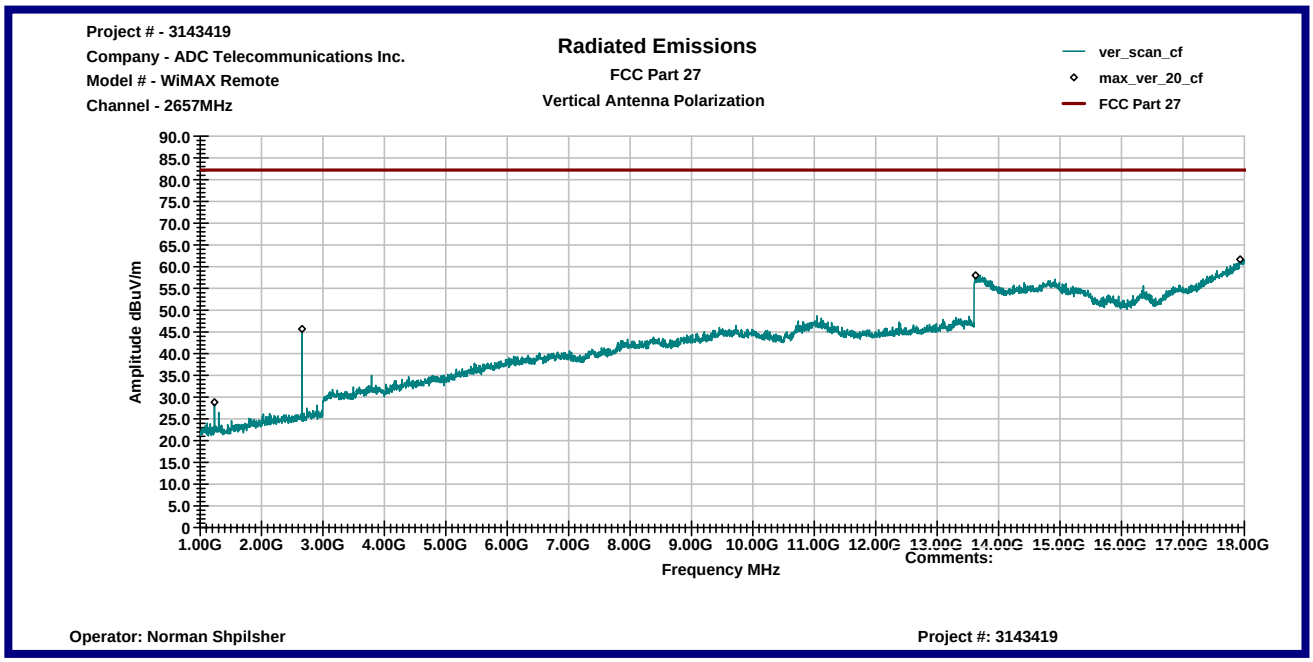
Graph 6



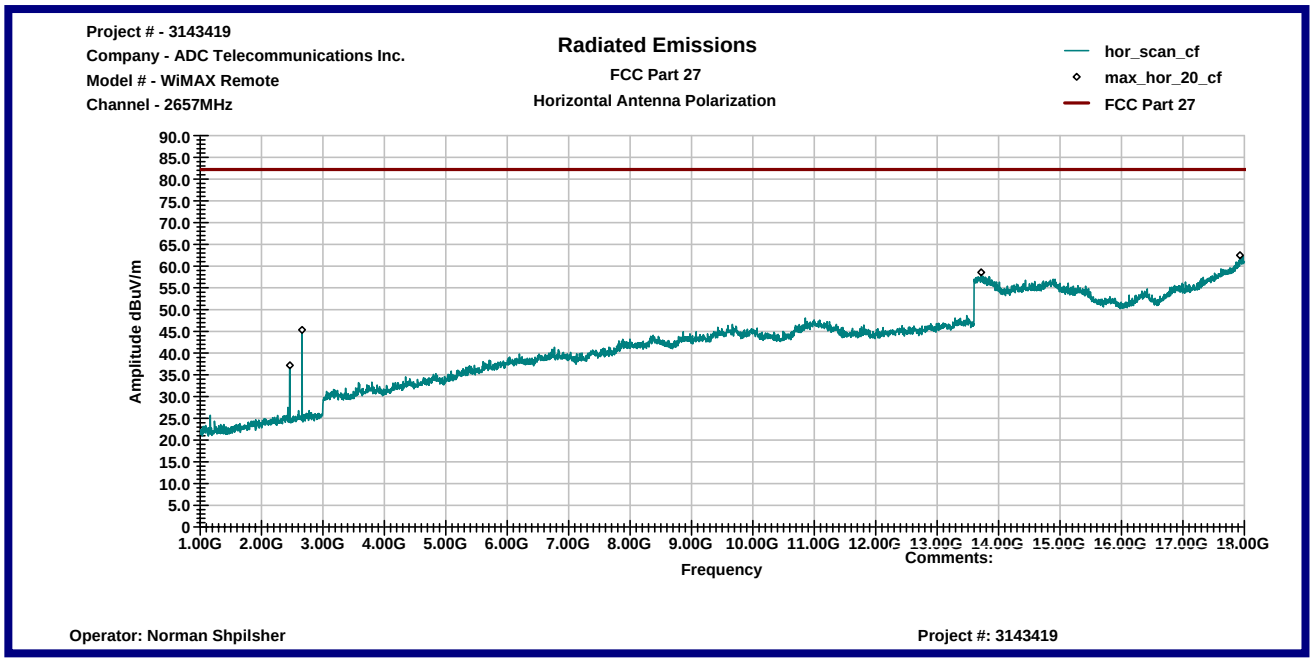
Graph 7



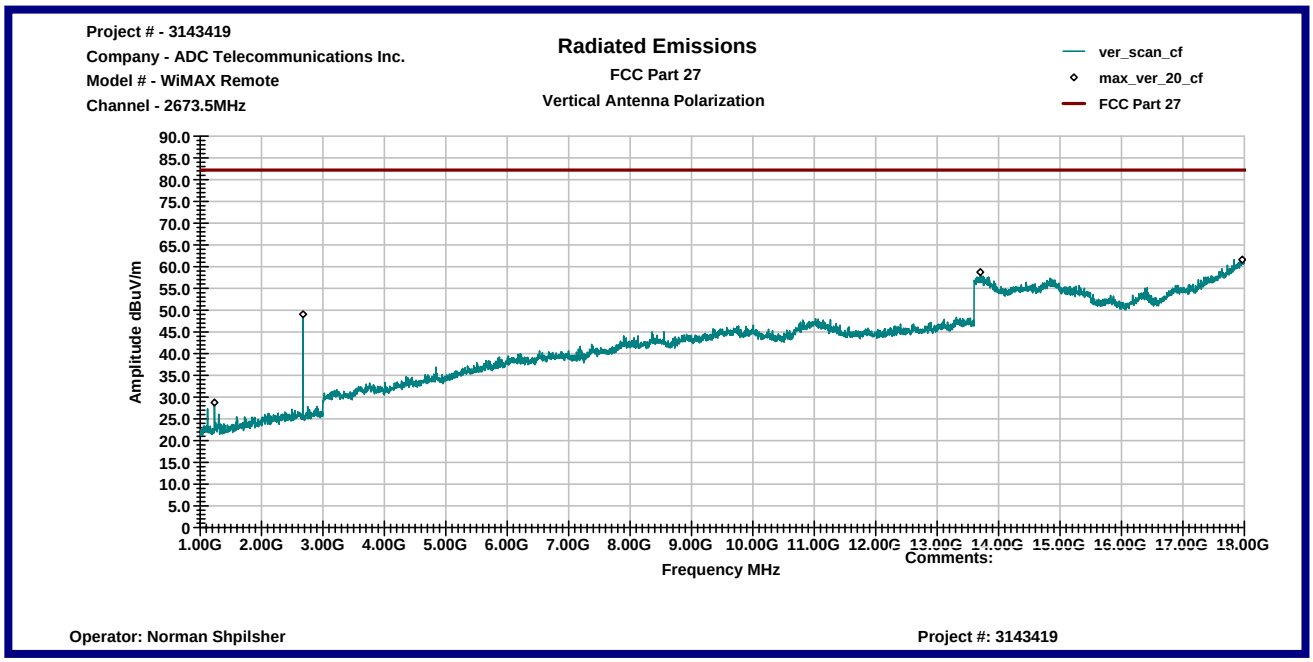
Graph 8



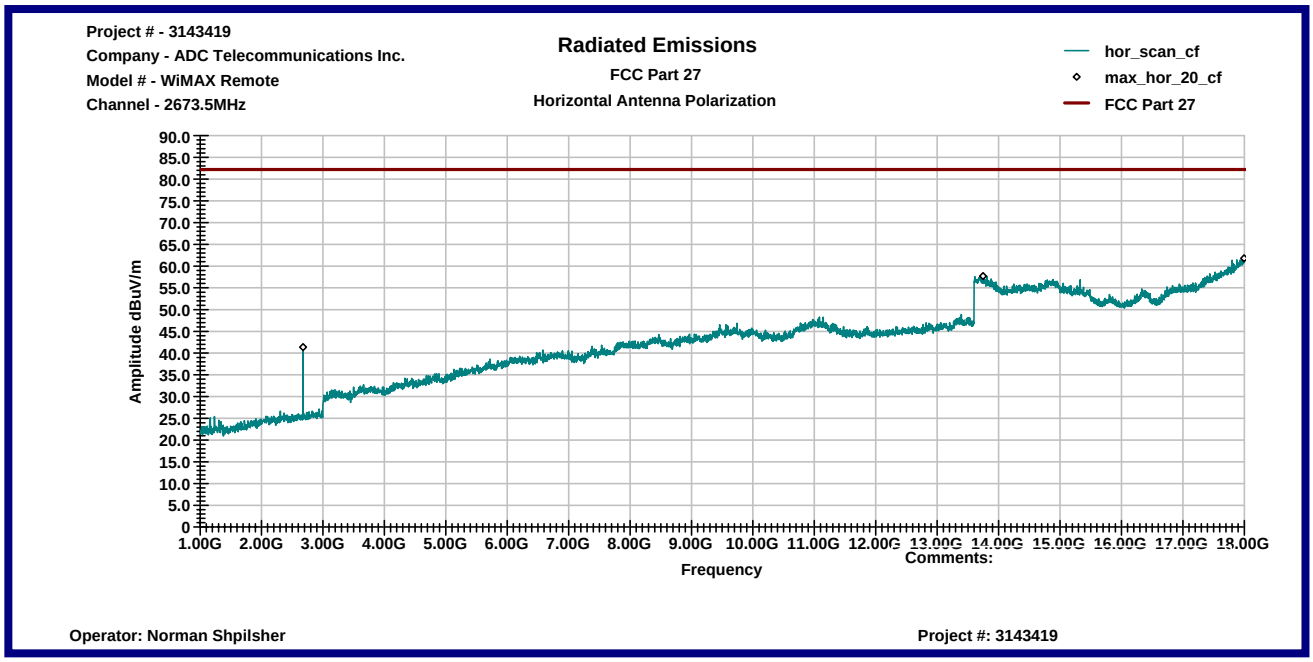
Graph 9



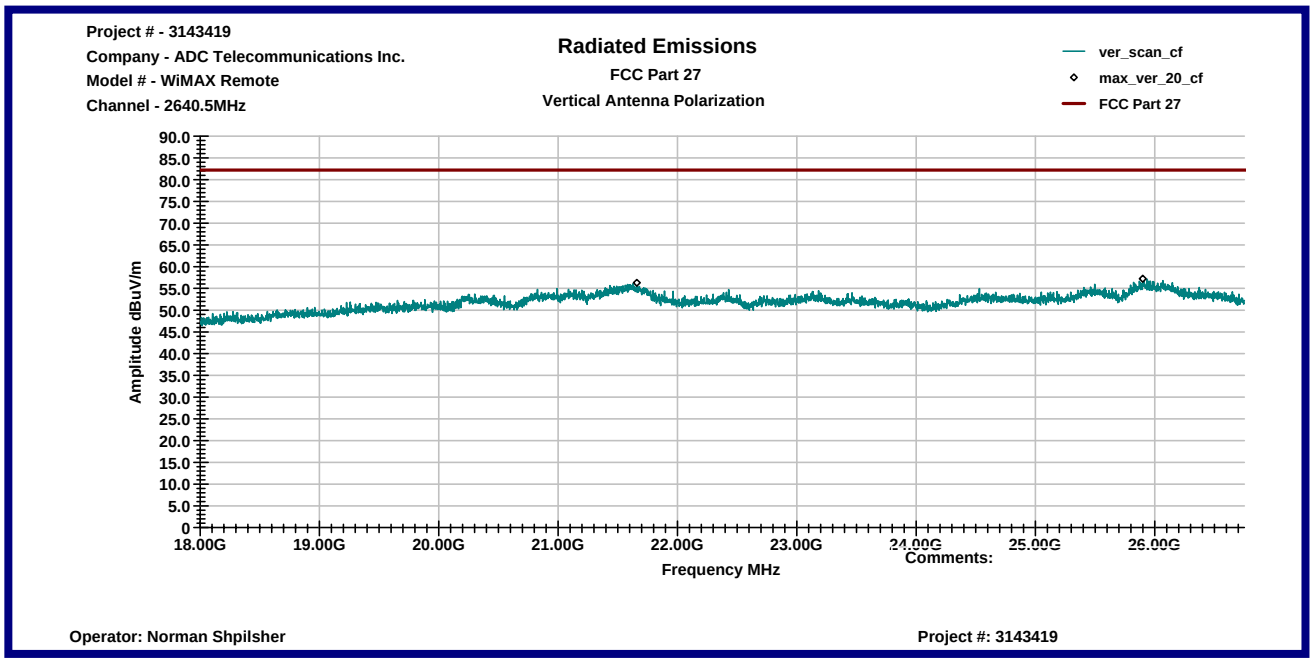
Graph 10



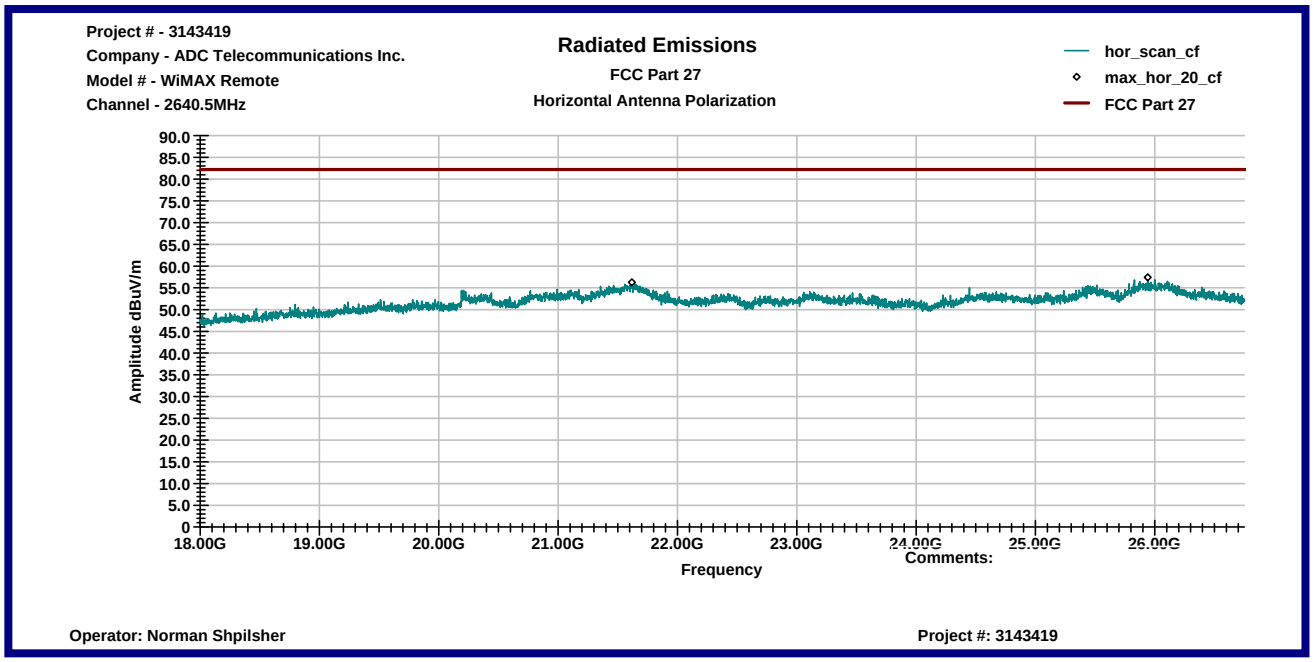
Graph 11



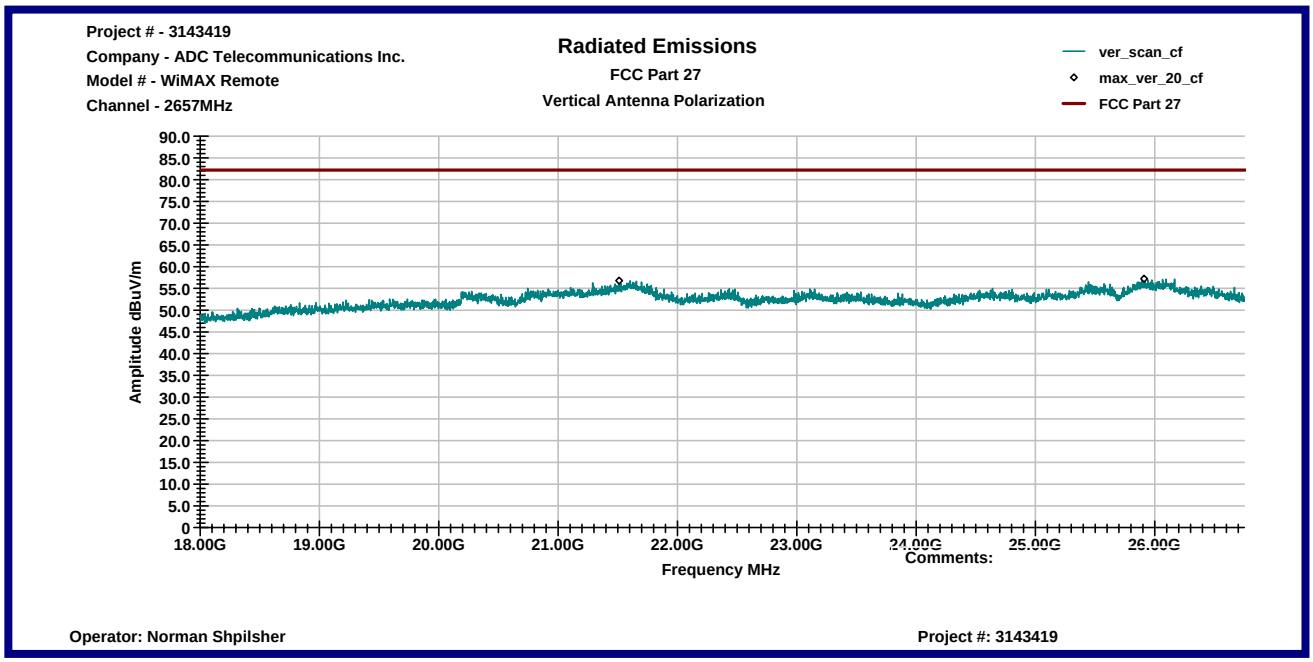
Graph 12



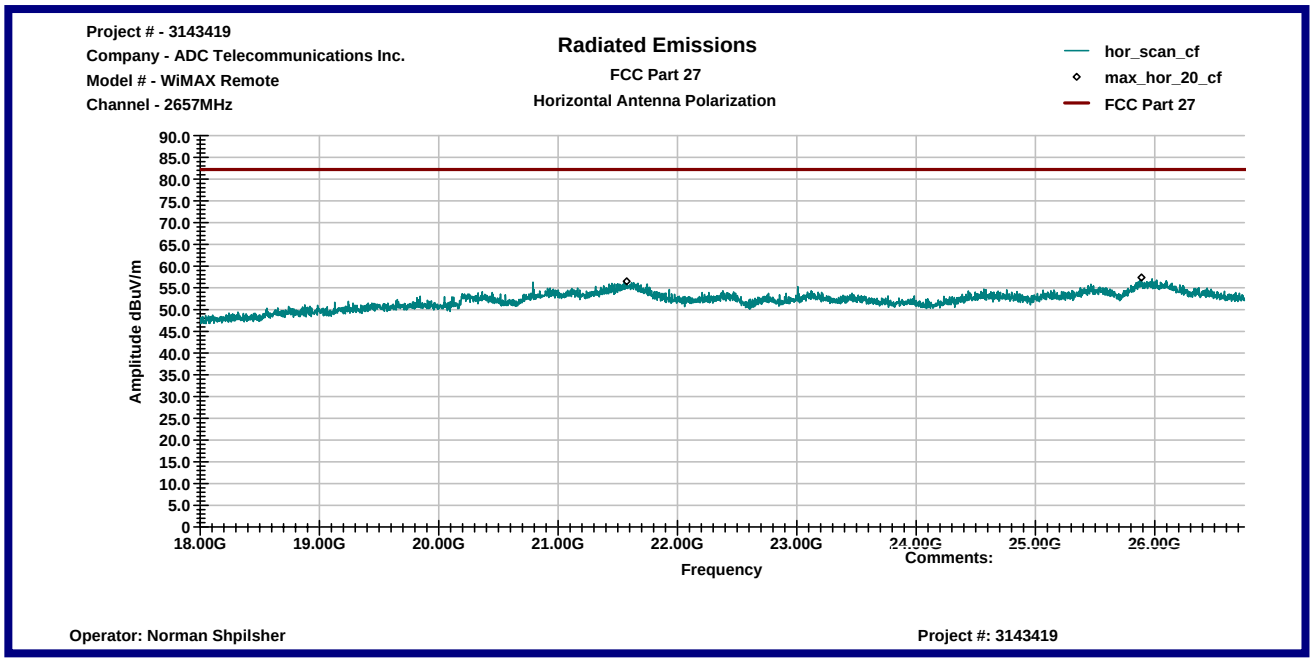
Graph 13



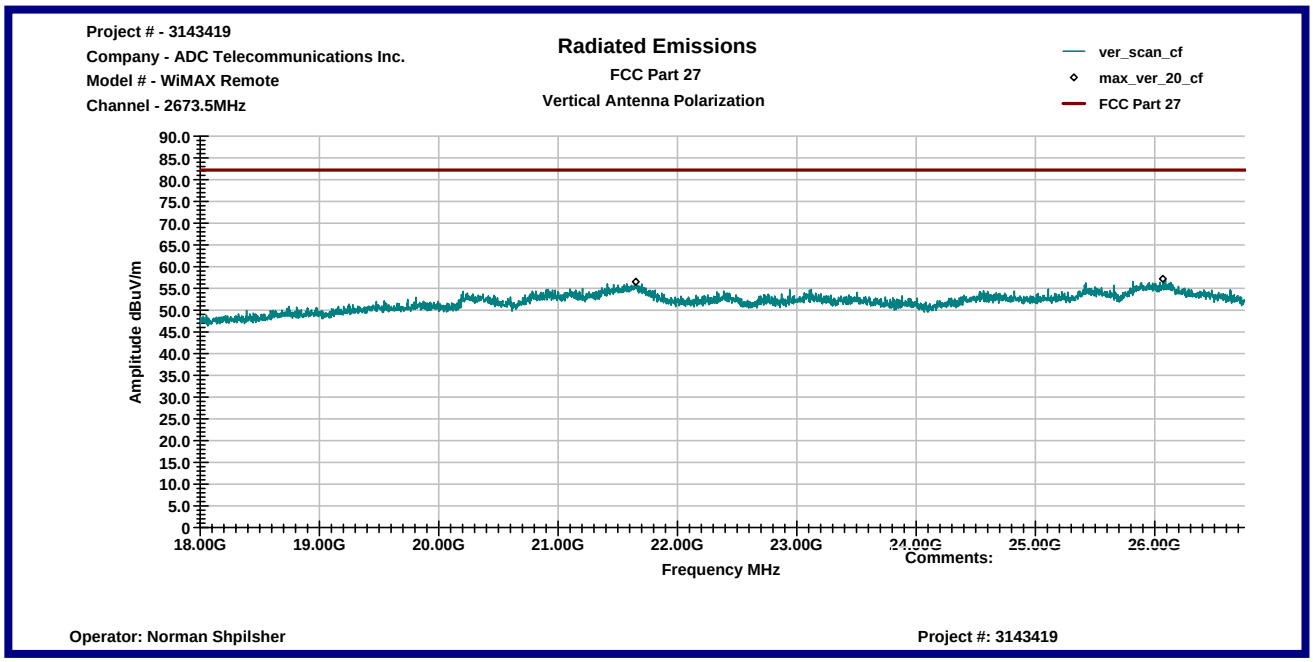
Graph 14



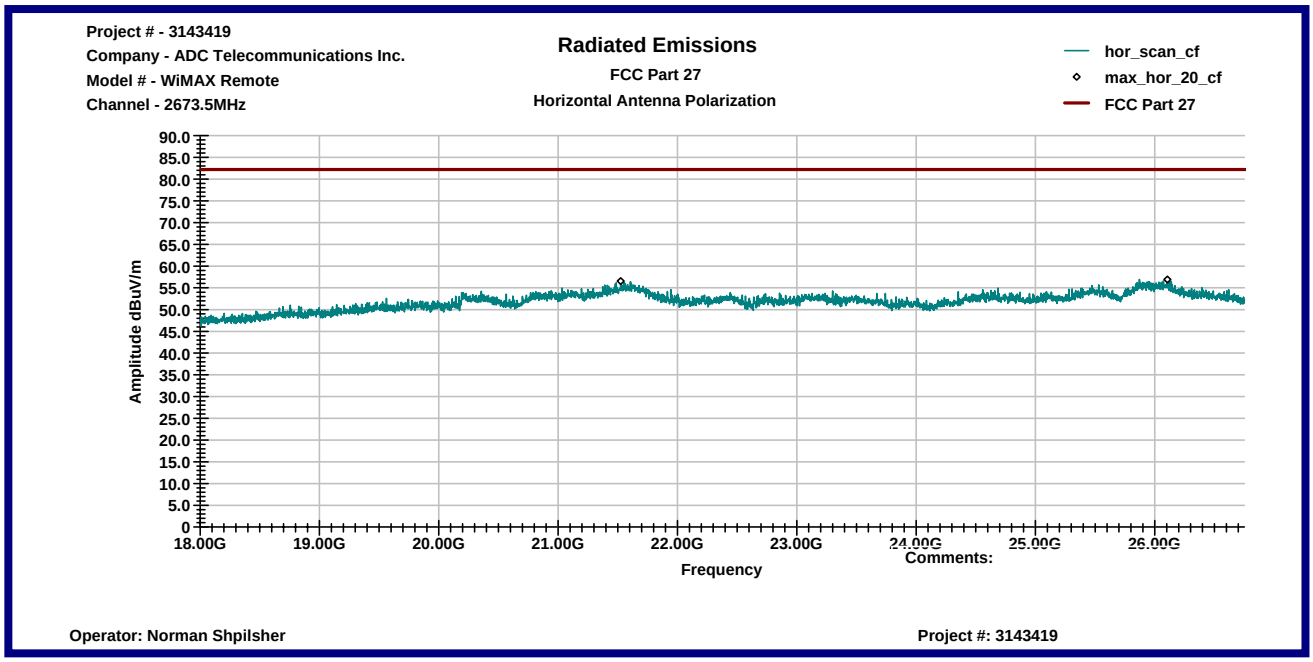
Graph 15



Graph 16



Graph 17



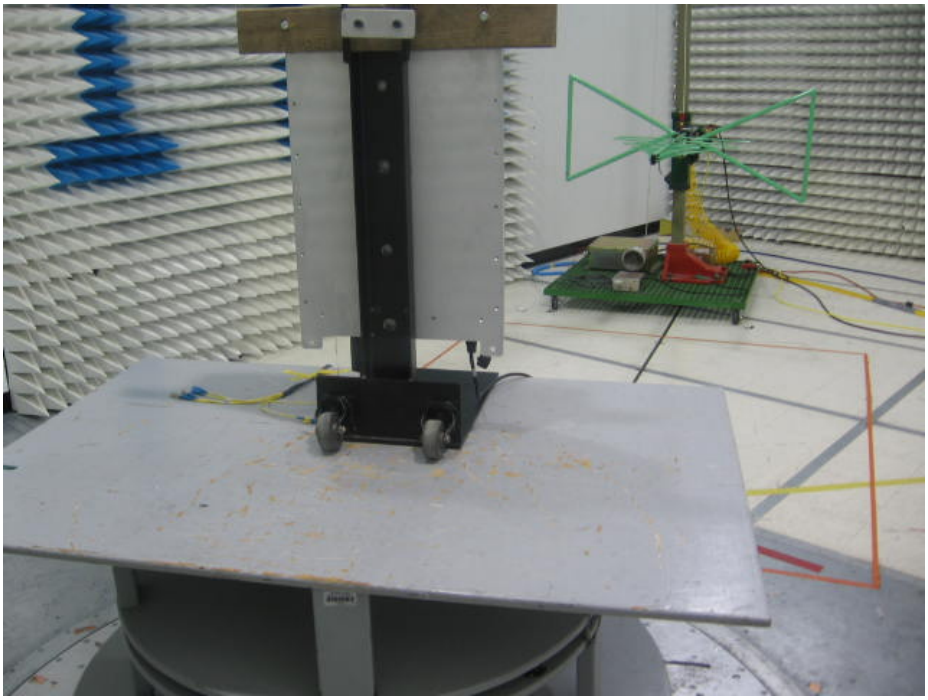
Graph 18

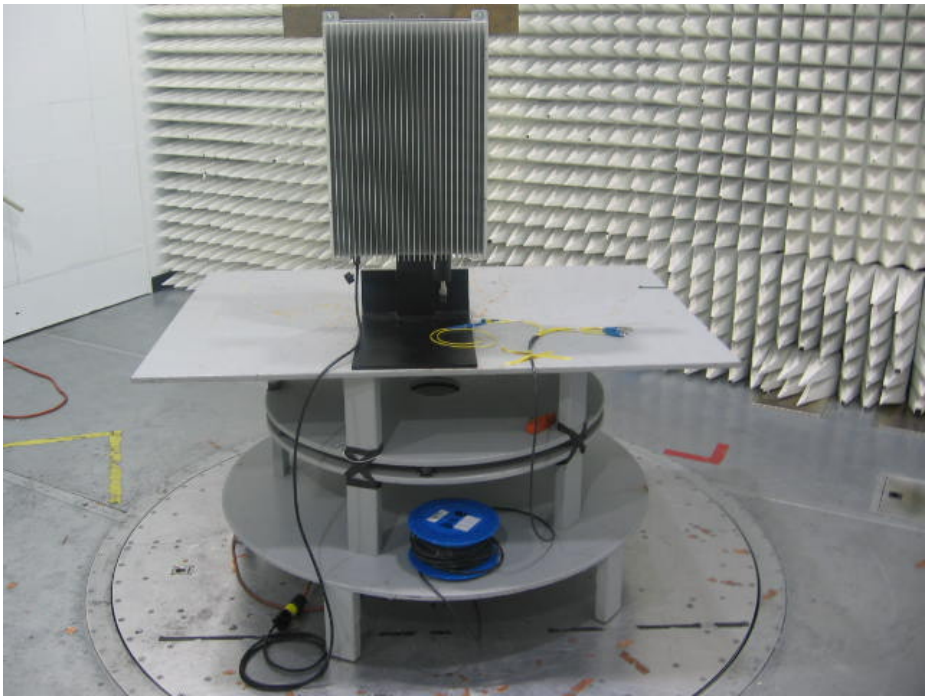
3.1 Environmental conditions

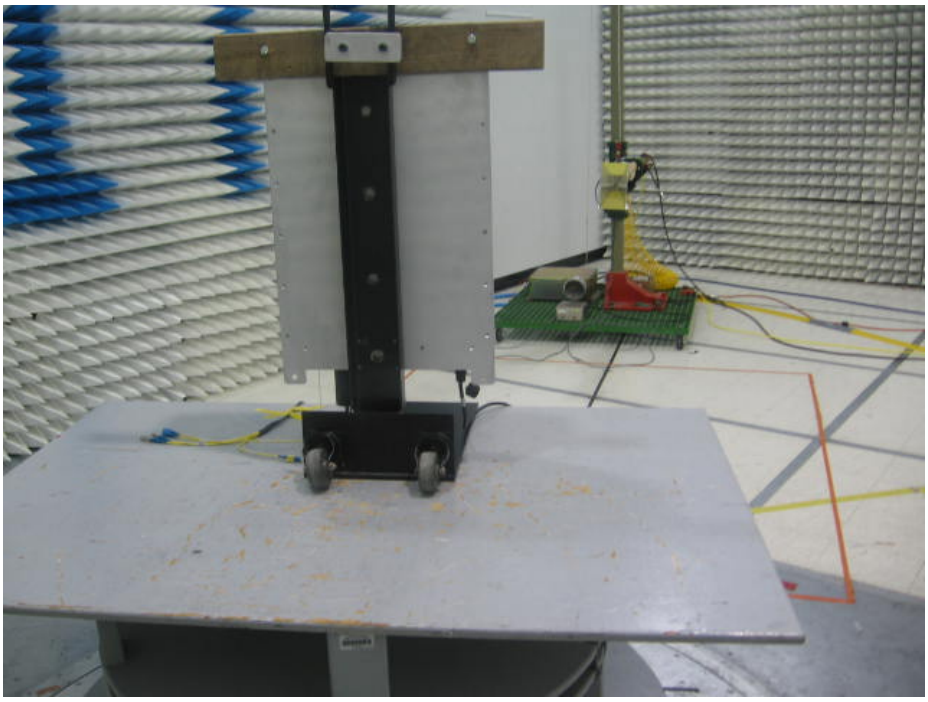
During the measurement the environmental conditions were within the listed ranges:

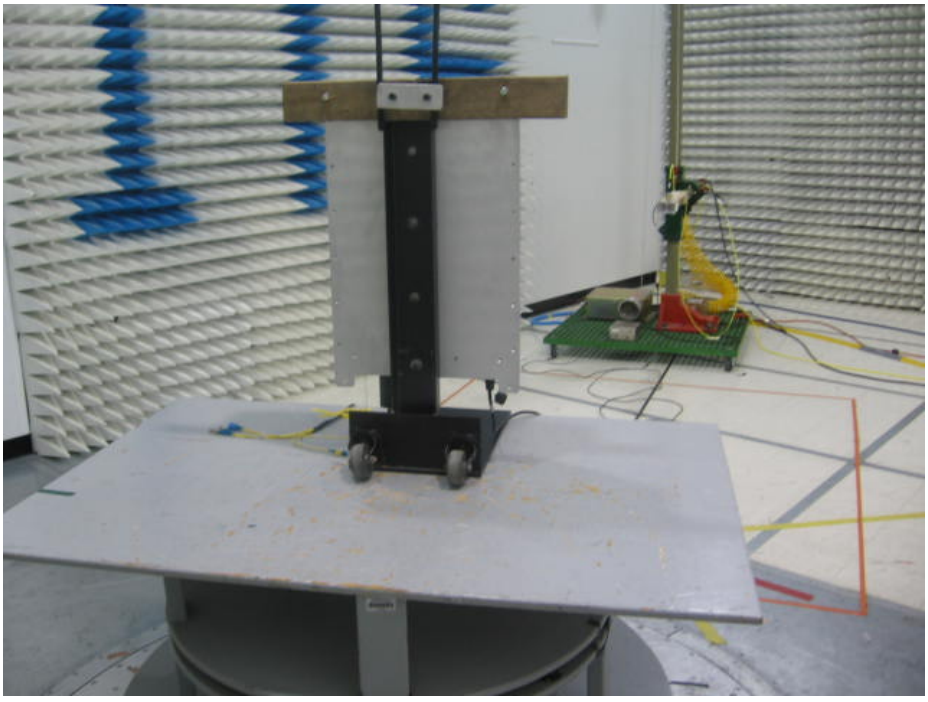
Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.0 PHOTOS









5.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	CAL DUE	USED
Receiver RF Section	HP	85462A	3549A00306	02/27/2008	☐
RF Filter Section	HP	85460A	3448A00276	02/27/2008	☐
Spectrum Analyzer	R & S	FSP 40	100024	08/23/2008	☒
Spectrum Analyzer	R & S	ESCI	100358	04/27/2008	☒
Spectrum Analyzer	Agilent	E7402A	MY44212200	10/22/2008	☐
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	07/30/2008	☒
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2630	09/07/2008	☐
Horn Antenna	EMCO	3115	6579	03/06/2008	☒
Waveguide Horn Antenna	EMCO	3116	9904-2423	07/20/2008	☒
Loop Antenna	A.H.Systems	SAS-200/562	215	05/04/2008	☐
Monopole Antenna	A.H.Systems	SAS-200/550-1	692	05/09/2008	☐
LISN	Fischer Custom Communications	FCC-LISN-2	316	09/24/2008	☐
LISN	Fischer Custom Communications	FCC-LISN-50-25-2	2014	10/22/2008	☐
Field Monitor	NARDA	ELT-400	J-0039	02/06/2008	☐
B-Field Sensor	NARDA	BN 2300	J-0049	02/06/2008	☐
RF Current Probe	Fischer Custom Communications	F-33-2	330	03/07/2008	☐
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	04/24/2008	☒
Pre-Amplifier	MITEQ	AMF-6F-16002600-25-10P	1222383	01/17/2009	☒
Pre-Amplifier	MITEQ	AMF-6F-26004000-40-8P	13224444	11/05/2008	☐
Pre-Amplifier	HP	8447F OPT H64	3113A04974	03/07/2008	☐
System	TILE! Instrument Control		Ver. 3.4.K.29	VBU	☒
5001ix	California Instruments System	5001	55864, 55863, 55862, 72277	11/08/2008	☐
CTS 3.0.19	California Instruments Harmonic/Flicker Software	632		11/08/2008	☐

8.0 APPENDIX C

Measurement Protocol

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Measurement Protocol

Environmental conditions of the lab, (ADC)
Temperature: 21 - 26º C
Relative Humidity: 21 - 24 %
Atmospheric Pressure: 97.8 - 100.0 kPa

Test Methodology:
Emission testing is performed according to the procedures in ANSI C63.4-2003.

Measurement Uncertainty
The test system for conducted emissions is defined as the signal generator(s), the power meter, the spectrum analyzer and the coaxial cable. The equipment comprising the test systems is calibrated prior to testing the EUT.

Justification
The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left un-terminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

Radiated Emissions
The final level, in dBuV/m, equals the reading from the spectrum analyzer (Level dBuV), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data sheets in Appendix B.

Example:

FREQ (MHz)	LEVEL (dBuV)	CABLE/ANT/PREAMP FINAL (dB) (dB/m) (dB) (dBuV/m)	POL/HGT/AZ (m) (deg)	DELTA1
60.80	42.5Qp +	1.2 + 10.9 - 25.5 = 29.1	V 1.0 0.0	-10.9

Substitution Method
A cabinet (or enclosure) radiated emission scan was also made, at Intertek, with the EUT's antenna replaced with a termination to demonstrate case radiation compliance to the –13 dBm requirement. Radiated emissions from the EUT are measured in the frequency range of 30 to 20,000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is place directly on the turntable/ground plane. Interface cable 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 are rotated 360 degrees. The field strength levels were measured per ANSI C63.4. The EUT is then replaced with a tuned dipole antenna (below 1GHz) or horn antenna (above 1 GHz). The substitute antenna was placed in the same polarization as the test antenna. A signal generator was used to generate a signal level that matched the highest level measured from the EUT. The signal generator level minus the cable loss from the signal generator to the substitute antenna plus the substitute antenna gain equals the spurious power level.

Test Equipment
All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.