



Test Report Summary

FCC CFR 47, Part 24

Subpart E Broadband PCS

Manufacturer: ADC Telecommunications

Name of Equipment: FlexWave™ URH SMR G

Model Number(s): FWU-G40000002110RU

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

Test Report Number: MN080207

Test Date(s): 31 January, 2008 (ETL)
24 January, 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 24.

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 24 and the EUT fulfills the requirements of the Federal Communications Commission's CFR 47 Part 24.

Date: 7 February, 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: MN080207 **Date of Issue:** 7 February, 2008

Model Number(s): FWU-G40000002110RU

Product Name: FlexWave™ URH SMR G

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: 3143524MIN-001
Reference(s)

Total pages including Appendices: 64



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1.0 REVISION DESCRIPTION

Rev	Total Pages	Date	Description
A	64	7 February, 2008	Original Release

2.0 DOCUMENTATION

2.1 Test Regulations

- 24.232 Power and antenna height limits
- 24.235 Frequency stability
- 24.238 Emission limits for Broadband PCS equipment

The emissions tests were performed according to the following regulations:

- FCC Part 22
- FCC Part 24**
- FCC Part 90
- IC RSS-131 Issue 2

Environmental Conditions in the lab:

ADC

Temperature: 24° C
Relative Humidity: 21%
Atmospheric Pressure: 97.7 kPa

ETL

15-35° C
30-60%
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 – SMR G - 1990 to 1995 MHz

2.4 Product Options:

None

2.5 EUT Specifications and Requirements:

Length: 16.0"
Width: 17.0"
Height: 29.0"
Weight: 190 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: 5.8 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 V.6 or greater
Description: Internet Explorer

2.11 EUT System Components

Description	Model #	Serial #	FCC ID #
URH	FWU-G40000002110RU	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

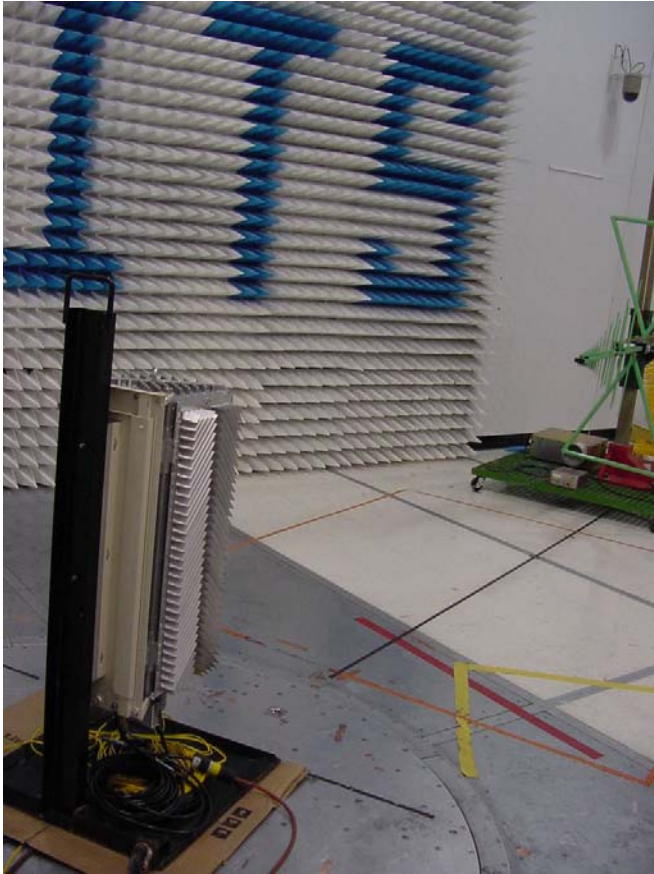
- fulfill the general approval requirements mentioned on page 4.**

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

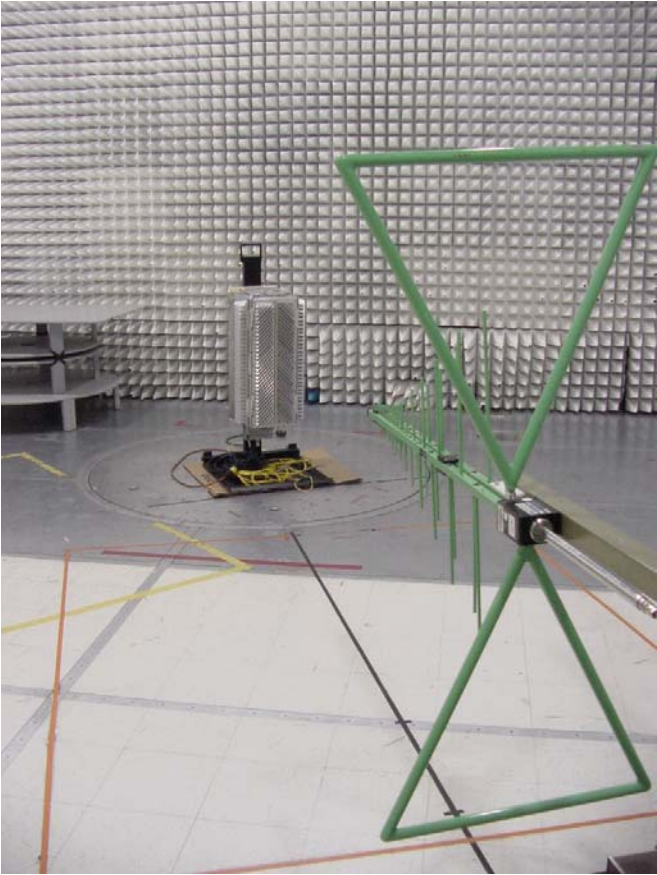
3.0 TEST SET-UP DRAWINGS AND PHOTOS

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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

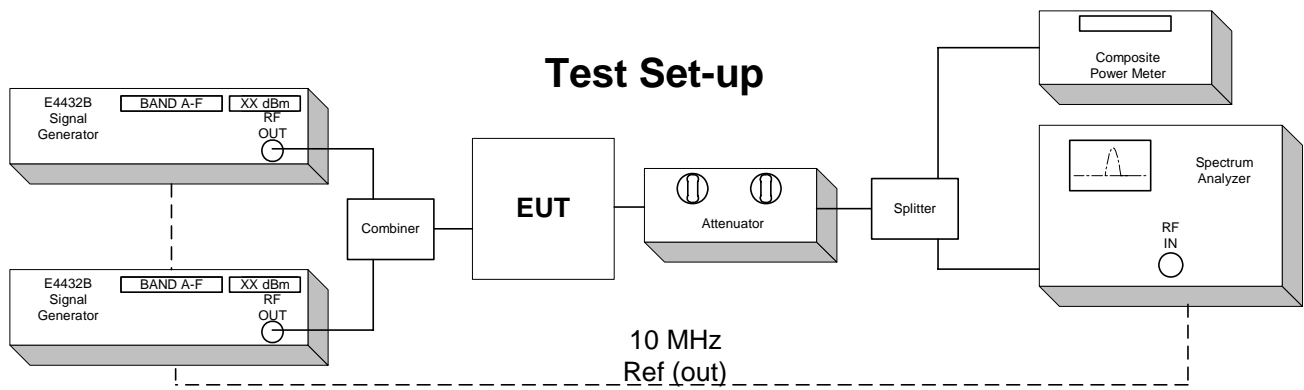
Conducted and Radiated Emission Limits Test for ADC Inc

Conducted Output Power Test for ADC Inc

Inter-Modulation Test for ADC Inc

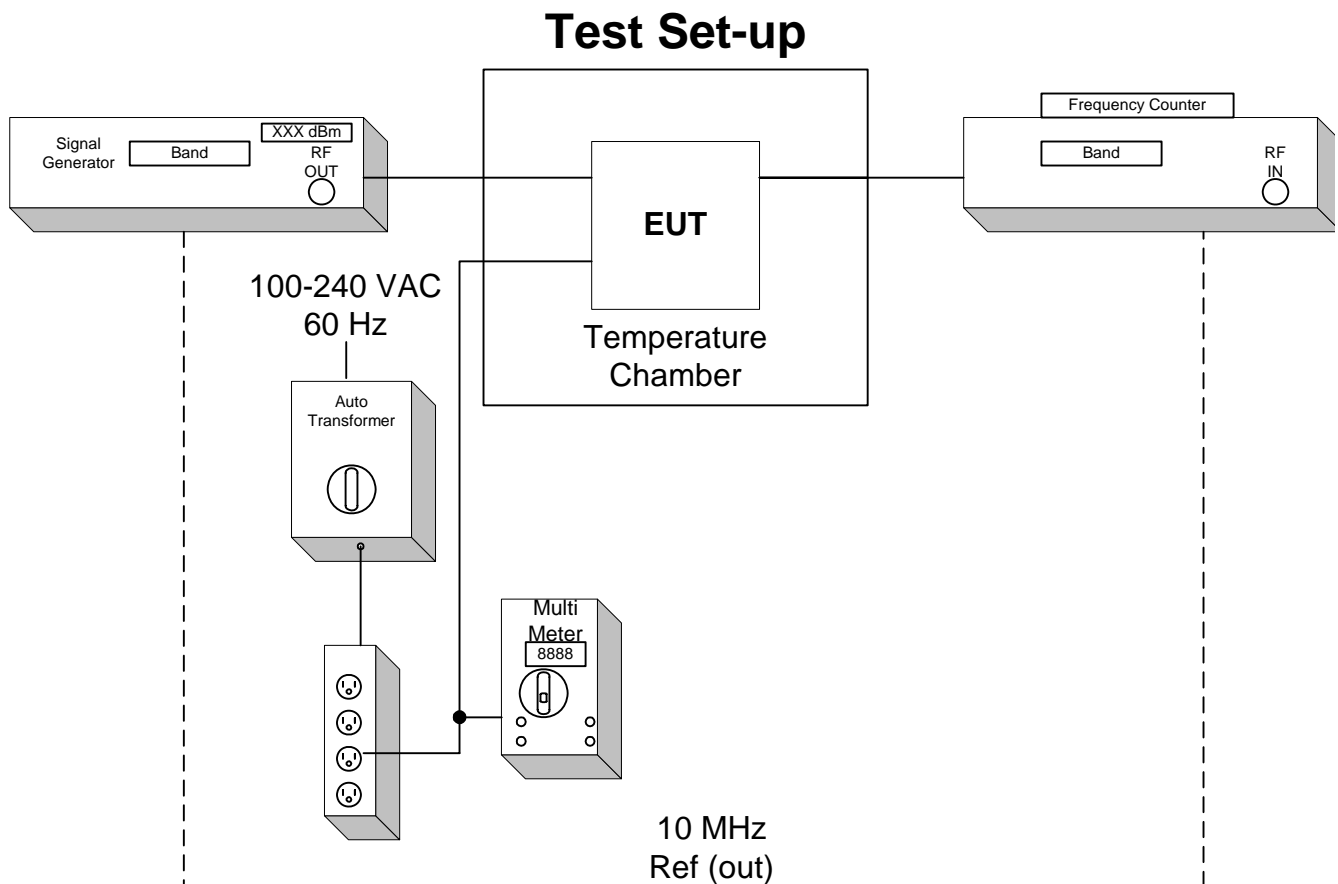
Occupied Bandwidth Modulation Test for ADC Inc

FlexWave™ URH SMR G Model Number FWU-G4000002110RU



Frequency Tolerance Test for ADC Inc. FlexWave™ URH SMR G Model Number FWU-G4000002110RU

EUT is specified for outdoor use with temperature range of -30° to +50° C, and was tested with its range.



4.0 TEST RESULTS

4.1.1 24.232 Power and antenna height limits

Test Summary:

- The requirements are: **MET** NOT MET
- Minimum margin of compliance is 6.73 dB at 1992.5 MHz (CDMA)

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: 24 January, 2008

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4.1.2 24.235 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 50° C and an input voltage range of 100 to 240 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: 24 January, 2008

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4.1.3 24.238 Emission limitations for broadband PCS equipment

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 $43 + 10\log(P)$ 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: 24 January, 2008

Date: 24 January, 2008

Date: 24 January, 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	<input checked="" type="checkbox"/>
2	Power Meter	HP	EPM-441A	MC27670	10-9-08	<input checked="" type="checkbox"/>
3	Multimeter	Fluke	87	MC17932	8-1-08	<input checked="" type="checkbox"/>
4	Frequency Counter	HP	5347A	MC27548	1-16-09	<input checked="" type="checkbox"/>
5	Temperature Chamber	Thermotron	SM-32C	MC18966	4-9-08	<input checked="" type="checkbox"/>
6	Signal Generator	Agilent	E4437B	967974	1-15-10	<input checked="" type="checkbox"/>
7	Signal Generator	Agilent	E4438C	1013210	2-9-09	<input checked="" type="checkbox"/>
8	Attenuator	Huber Suhner	6810.17.A	N/A	CNR	<input type="checkbox"/>
9	Variable Auto Transformer	Staco	1520CT	MC44655	CNR	<input checked="" type="checkbox"/>
10	Digital Barometer	Fisher Scientific	02-403	MC50719	10-28-09	<input checked="" type="checkbox"/>
11	Data Acquisition Unit	Fluke	Hydra	MC27549	10-8-08	<input type="checkbox"/>
12	Attenuator	Aeroflex	49-30-33	N/A	CNR	<input type="checkbox"/>
13	Attenuator	Aeroflex	86-30-12	N/A	CNR	<input checked="" type="checkbox"/>
14	LNA	Lucix Corp	C020200L 1603	N/A	CNR	<input type="checkbox"/>

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

FlexWave™ URH SMR G

Model Number FWU-G4000002110RU

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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 iDEN and CDMA. 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
(19dBm - [43 + 10log(0.08W)])

Band edge compliance is also demonstrated using a iDEN and CDMA 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 \approx -25 dBm input to DHU.
Industry practice has generally set the output signal power level.

Universal Radio Head (URH):

Range: 100 - 240 VAC

Tested @: 120 VAC

Tested @: 5.8 A

Digital Host Unit (DHU):

Range: 21-60 VDC

Tested @: 48 VDC

Tested @: 4.55 A

Application details for 2.1033(c)(10), and 2.1033(c)(13):

The input to the host unit has a digital attenuation chip (ALC) to provide protection from overdrive with 5-10 millisecond attack time / 100 millisecond decay time and 31 dB of head room, such that single channel operation, or multi-channel operation will not exceed nominal gain of the system.

The frequency stability is derived by the BTS, base transceiver station. This product uses internal frequency stability to keep the signal inside our filter bandwidths. This means that the frequency can change, but the frequency that transmits is still at the original frequency. The remote system uses the data over the fiber optic path to phase/frequency lock to the host. The purpose is to frequency lock the up- and down-conversion local oscillators, and thereby eliminate any end-to-end frequency shift.

The spurious limitation is completed with the duplexer. The ALC also suppresses in-band spurious by preventing PA overdrive, while the duplexer suppresses out-of-band spurious. Internal to the electronics, the use of SAW filters provides for higher Q roll-off at band edges.

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)

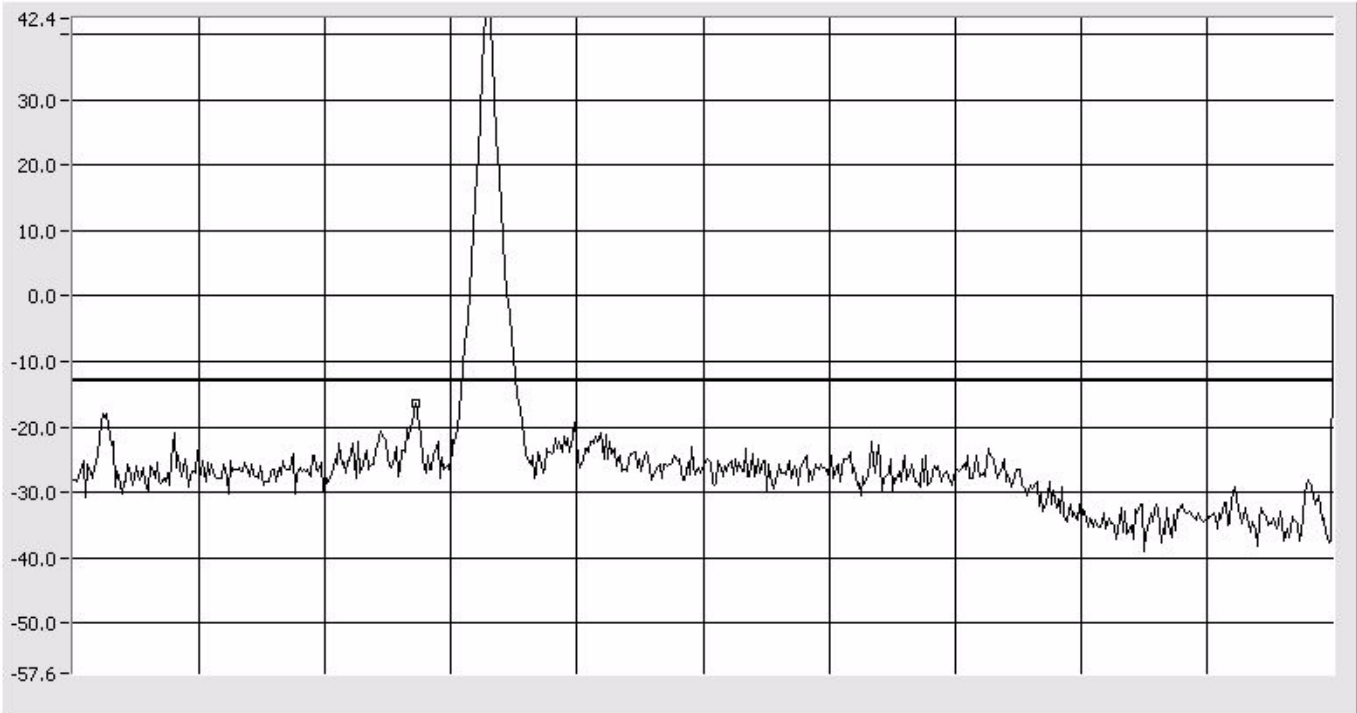
Conducted Emissions Low SMR G - 1900 MHz

Center: 1992.5 MHz
Span: 25 MHz
RBW/VBW: 100 kHz

ATTEN 20 dB
RL 42.4 dBm

delta MKR -16.43 dBm
1.98848 GHz

10 dB/Div



START 1.98169 GHz CENTER 1.99419 GHz SPAN 25.00 MHz STOP 2.00669 GHz
RBW 100 kHz VBW 100 kHz SWP 50.0 mS

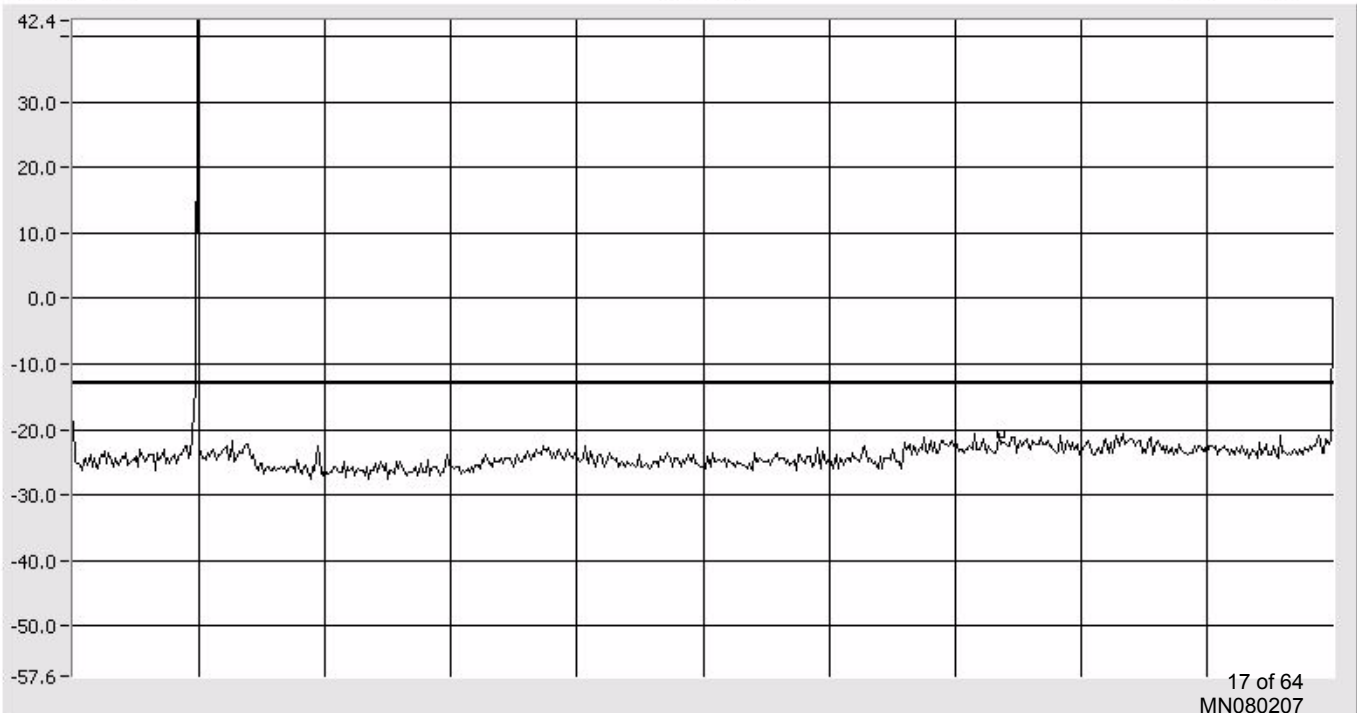
Conducted Emissions Low SMR G - 1900 MHz

Span: 30 MHz to 20 GHz
RBW/VBW: 1 MHz

ATTEN 20 dB
RL 42.4 dBm

delta MKR -20.60 dBm
14.74 GHz

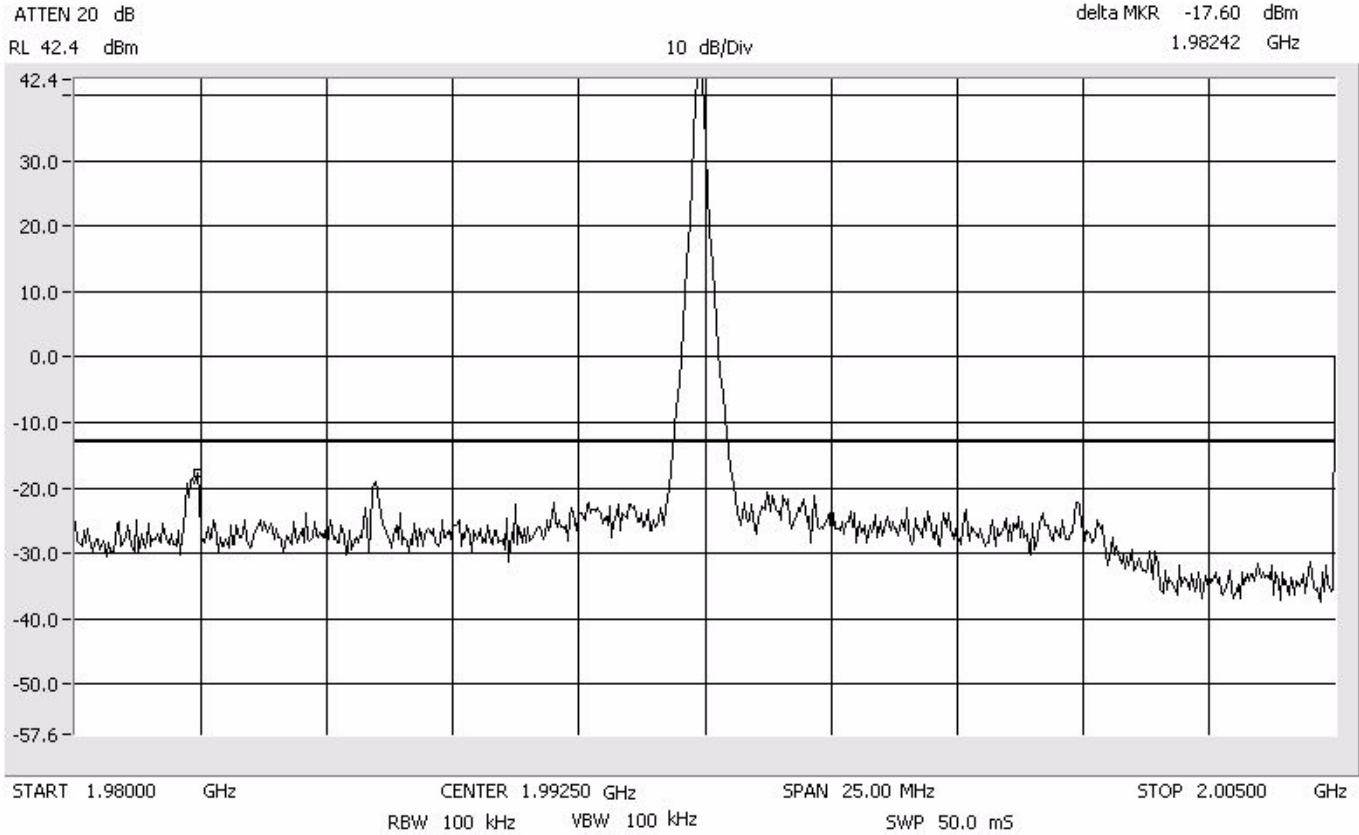
10 dB/Div



START 30 MHz CENTER 10.02 GHz SPAN 19.97 GHz STOP 20.00 GHz
RBW 1.0 MHz VBW 1.0 MHz SWP 400 mS

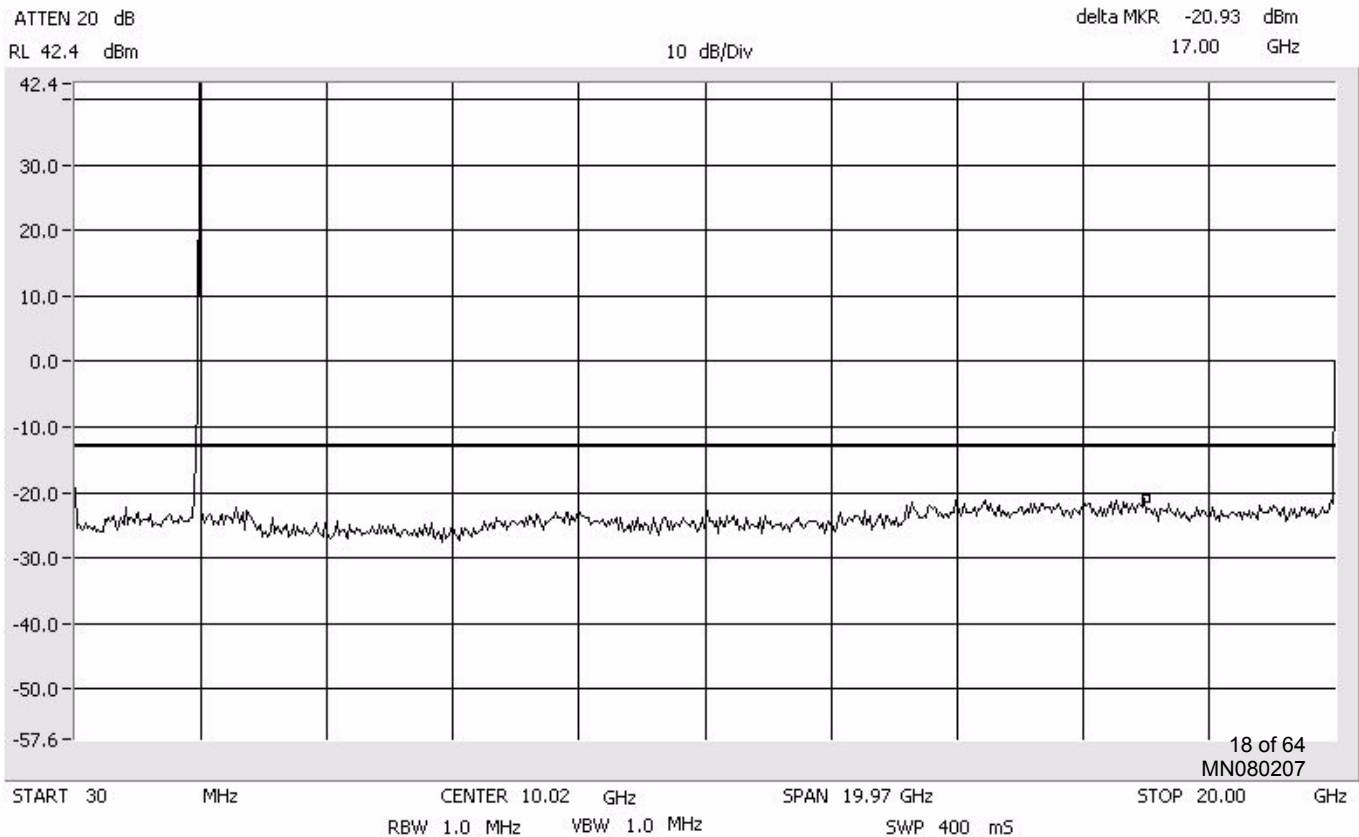
Conducted Emissions Mid SMR G - 1900 MHz

Center: 1992.5 MHz
Span: 25 MHz
RBW/VBW: 100 kHz



Conducted Emissions Mid SMR G - 1900 MHz

Span: 30 MHz to 20 GHz
RBW/VBW: 1 MHz



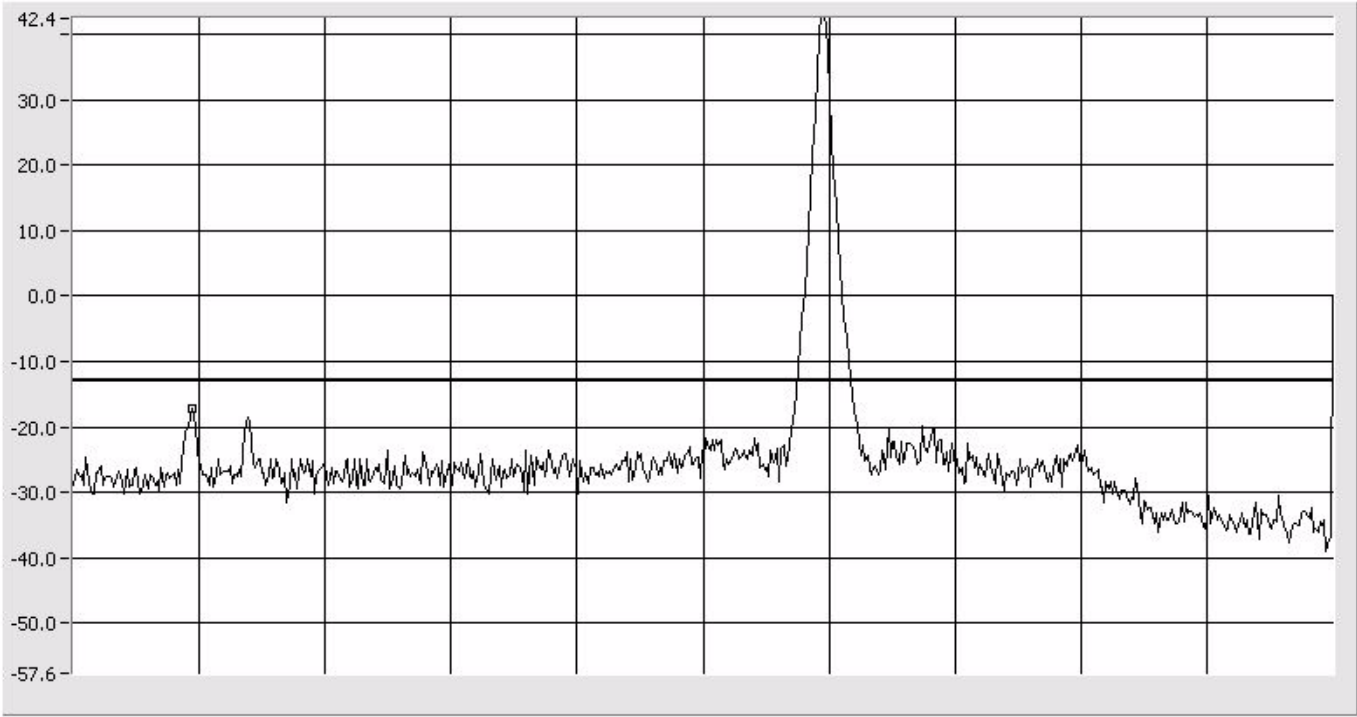
Conducted Emissions High SMR G - 1900 MHz

Center: 1992.5 MHz
Span: 25 MHz
RBW/VBW: 100 kHz

ATTEN 20 dB
RL 42.4 dBm

delta MKR -17.27 dBm
1.98237 GHz

10 dB/Div



START 1.98000 GHz CENTER 1.99250 GHz SPAN 25.00 MHz STOP 2.00500 GHz
RBW 100 kHz VBW 100 kHz SWP 50.0 mS

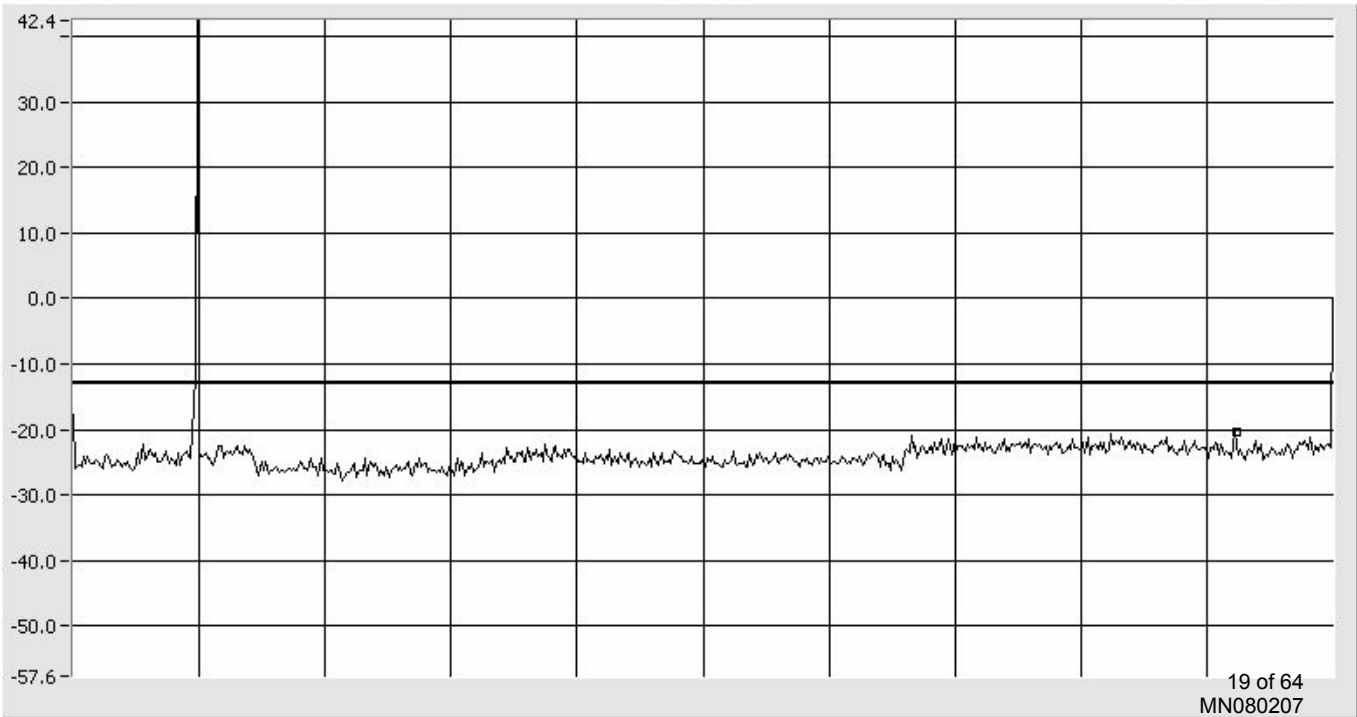
Conducted Emissions High SMR G - 1900 MHz

Span: 30 MHz to 20 GHz
RBW/VBW: 1 MHz

ATTEN 20 dB
RL 42.4 dBm

delta MKR -20.43 dBm
18.47 GHz

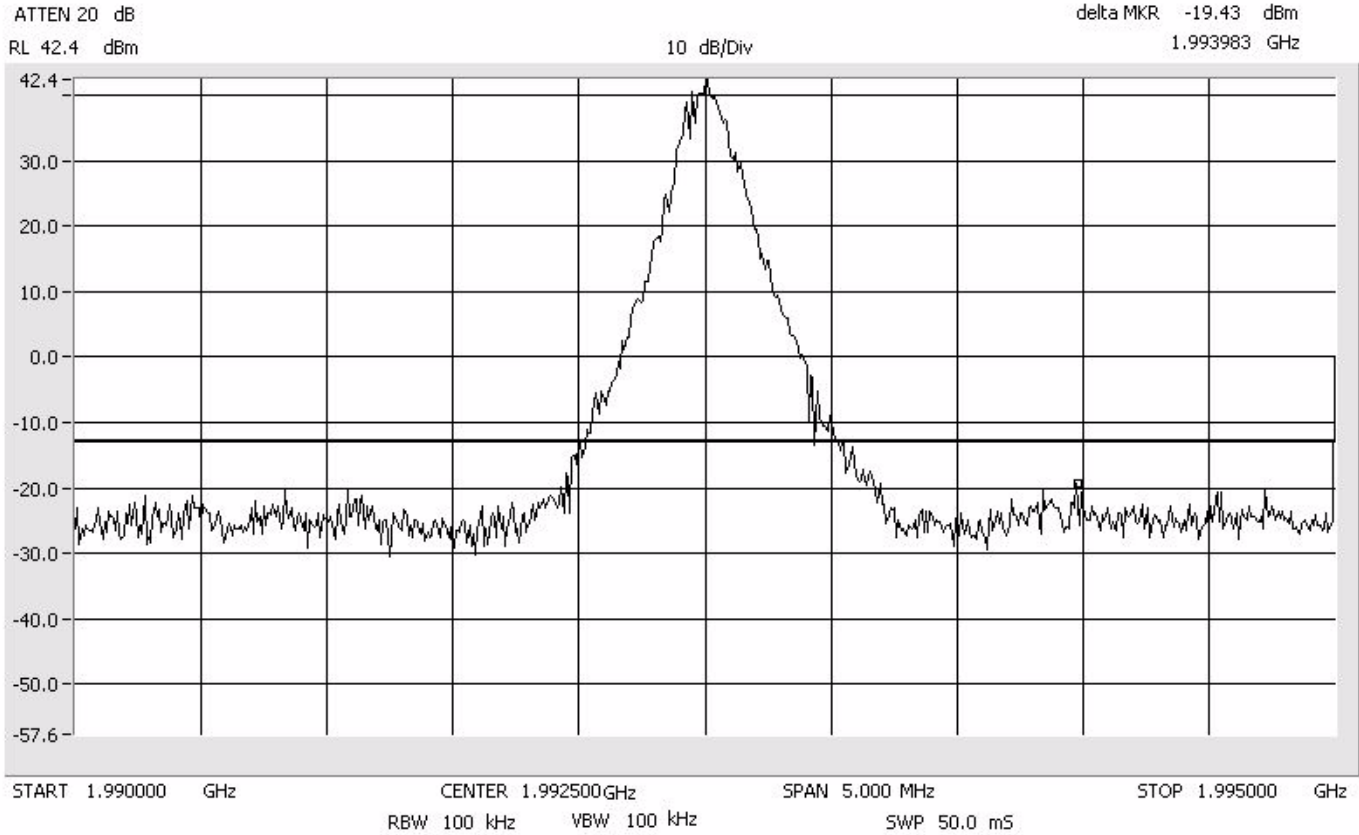
10 dB/Div



START 30 MHz CENTER 10.02 GHz SPAN 19.97 GHz STOP 20.00 GHz
RBW 1.0 MHz VBW 1.0 MHz SWP 400 mS

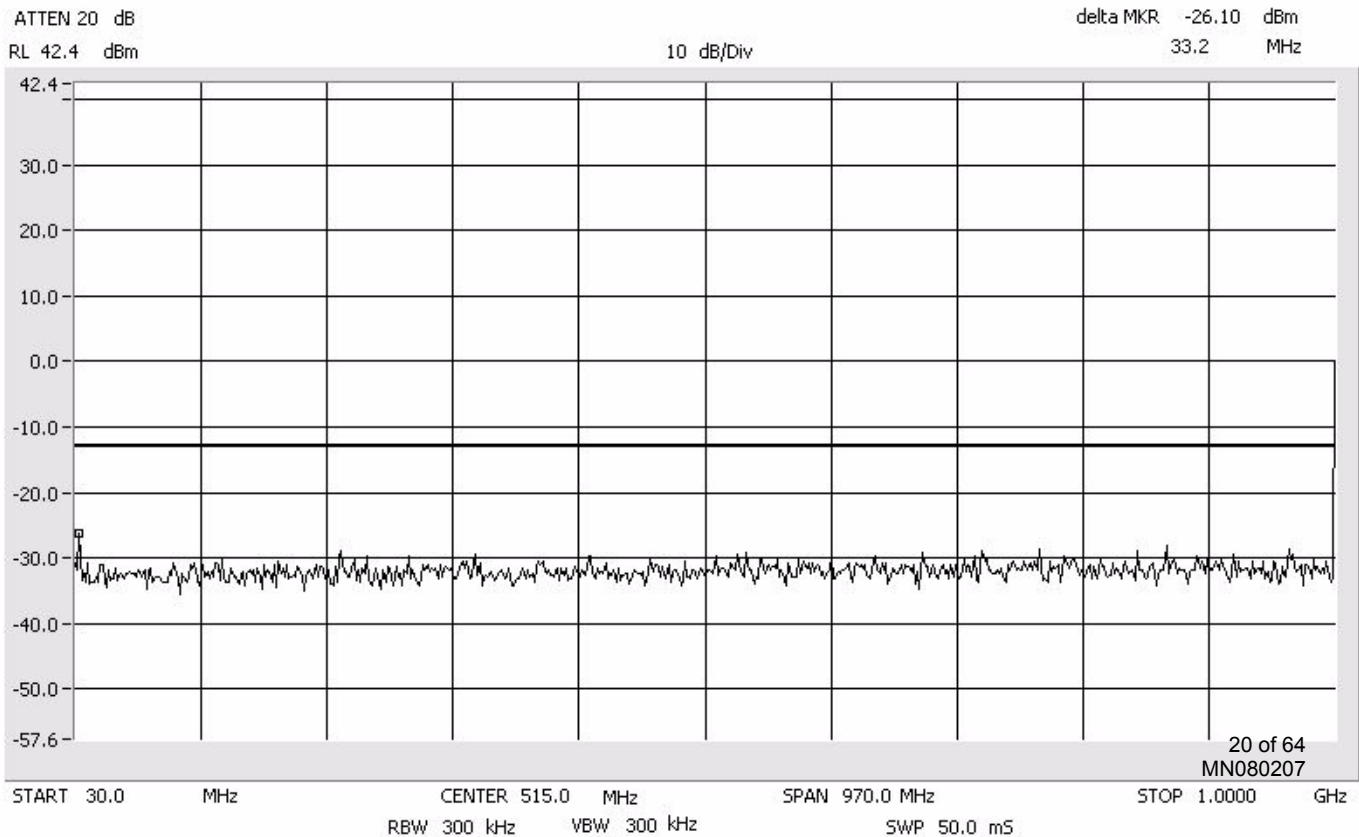
Conducted Emissions iDEN SMR G - 1900 MHz

Center: 1992.5 MHz
Span: 5 MHz
RBW/VBW: 100 kHz



Conducted Emissions iDEN SMR G - 1900 MHz

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



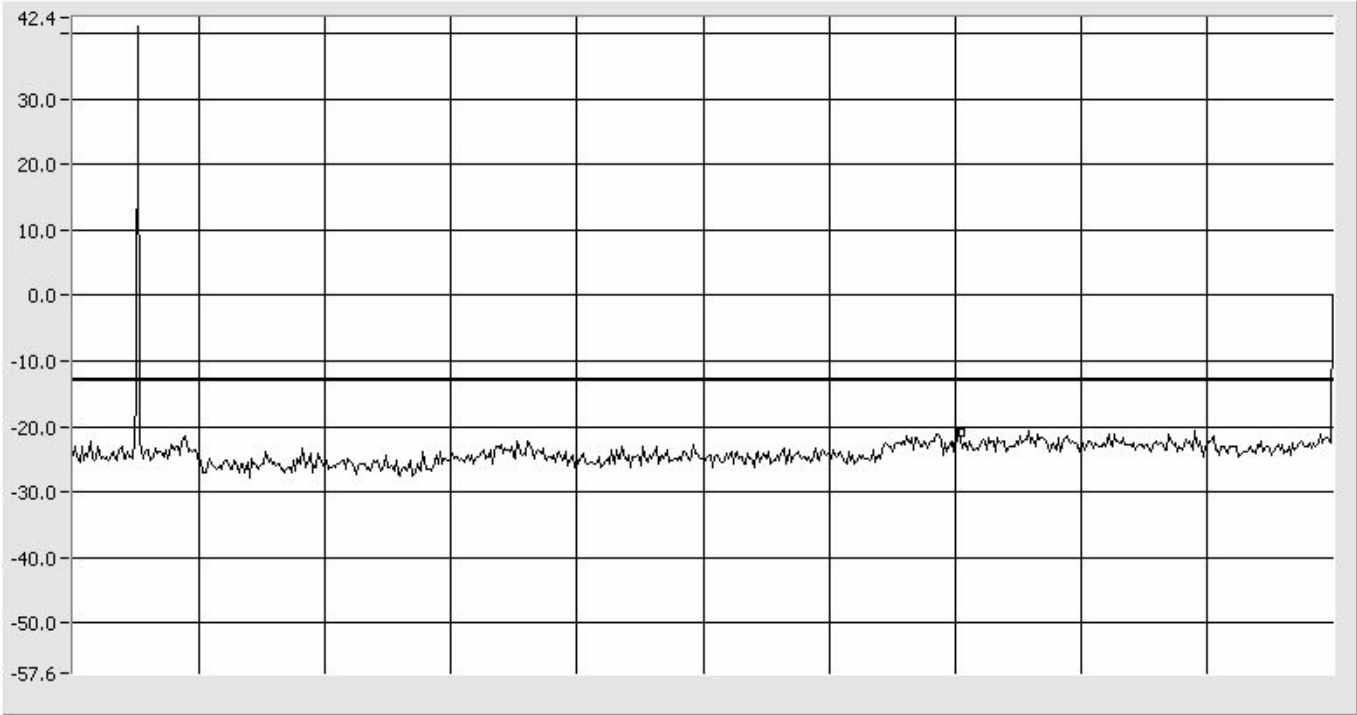
Conducted Emissions iDEN SMR G - 1900 MHz

1 GHz to 20 GHz
RBW/VBW: 1 MHz

ATTEN 20 dB
RL 42.4 dBm

delta MKR -20.77 dBm
14.39 GHz

10 dB/Div



START 1.00 GHz CENTER 10.50 GHz SPAN 19.00 GHz STOP 20.00 GHz
RBW 1.0 MHz VBW 1.0 MHz SWP 380 mS

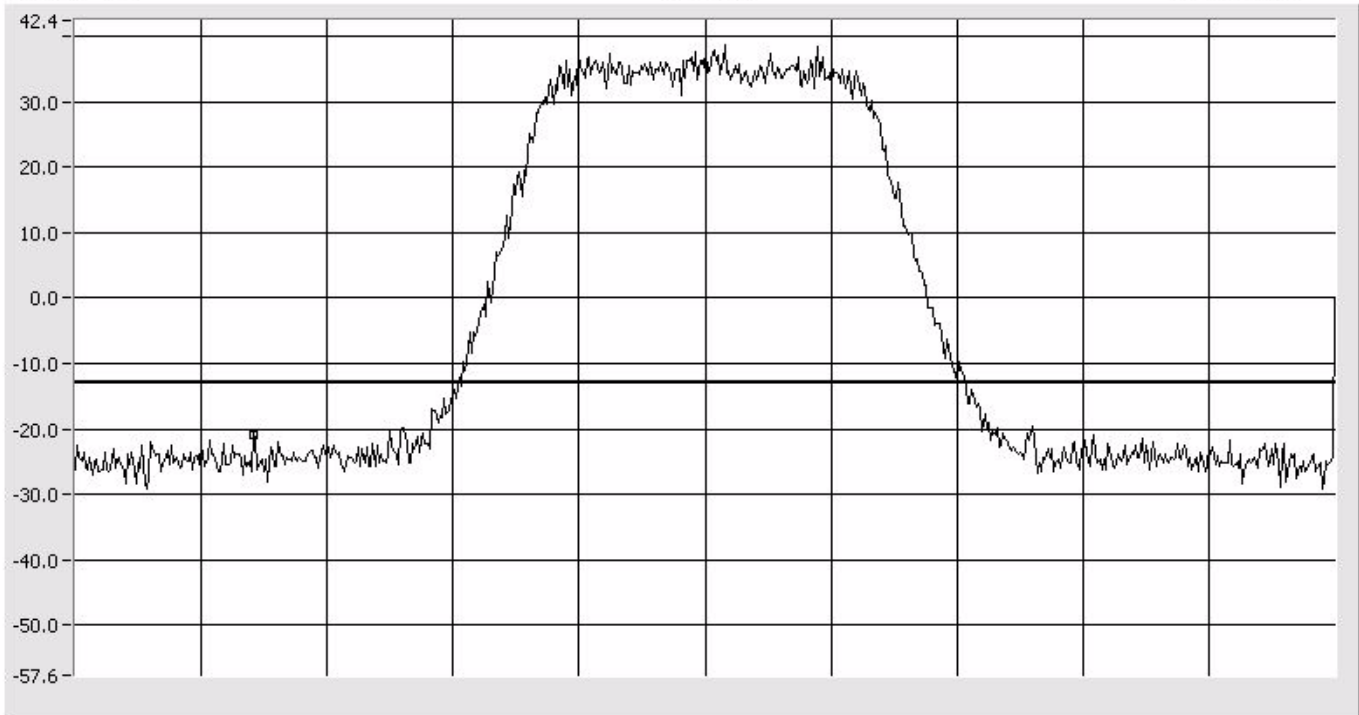
Conducted Emissions CDMA SMR G - 1900 MHz

Center: 1992.5 MHz
Span: 5 MHz
RBW/VBW: 100 kHz

ATTEN 20 dB
RL 42.4 dBm

delta MKR -20.77 dBm
1.990708 GHz

10 dB/Div



START 1.990000 GHz CENTER 1.992500GHz SPAN 5.000 MHz STOP 1.995000 GHz
RBW 100 kHz VBW 100 kHz SWP 50.0 mS

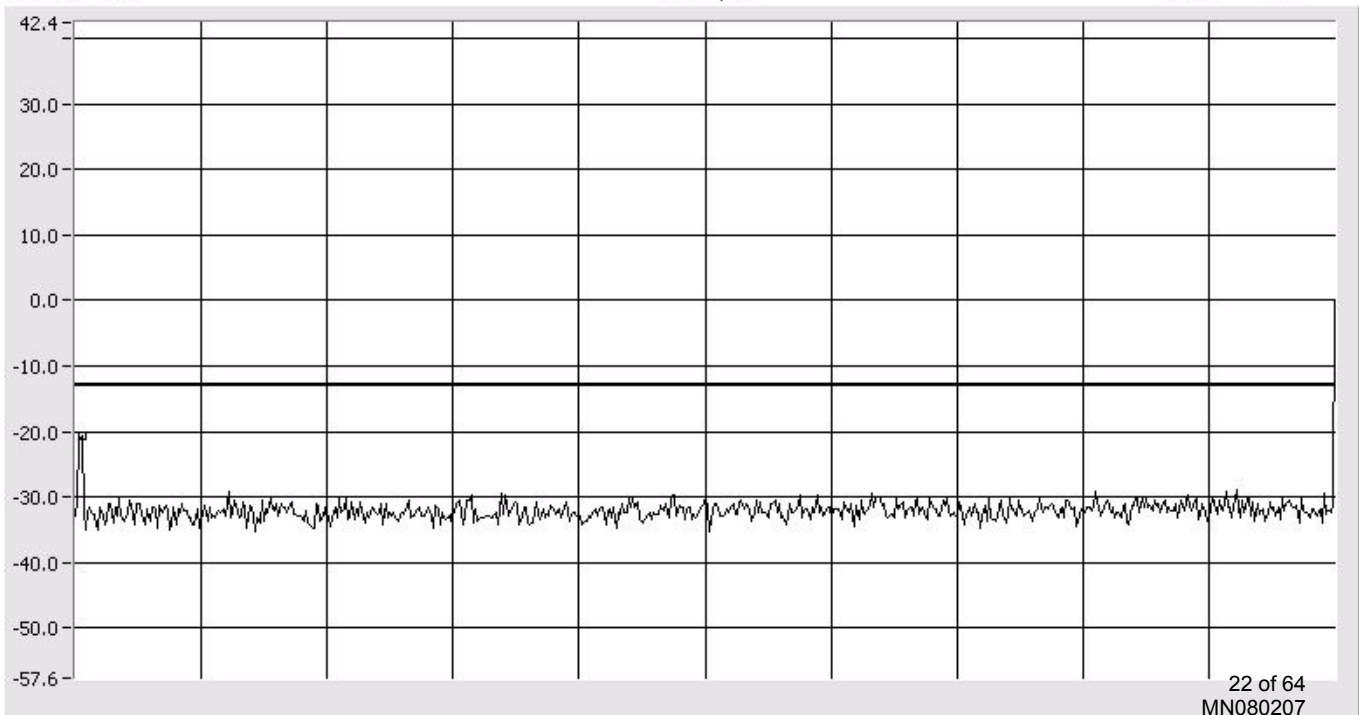
Conducted Emissions CDMA SMR G - 1900 MHz

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

ATTEN 20 dB
RL 42.4 dBm

delta MKR -20.60 dBm
34.9 MHz

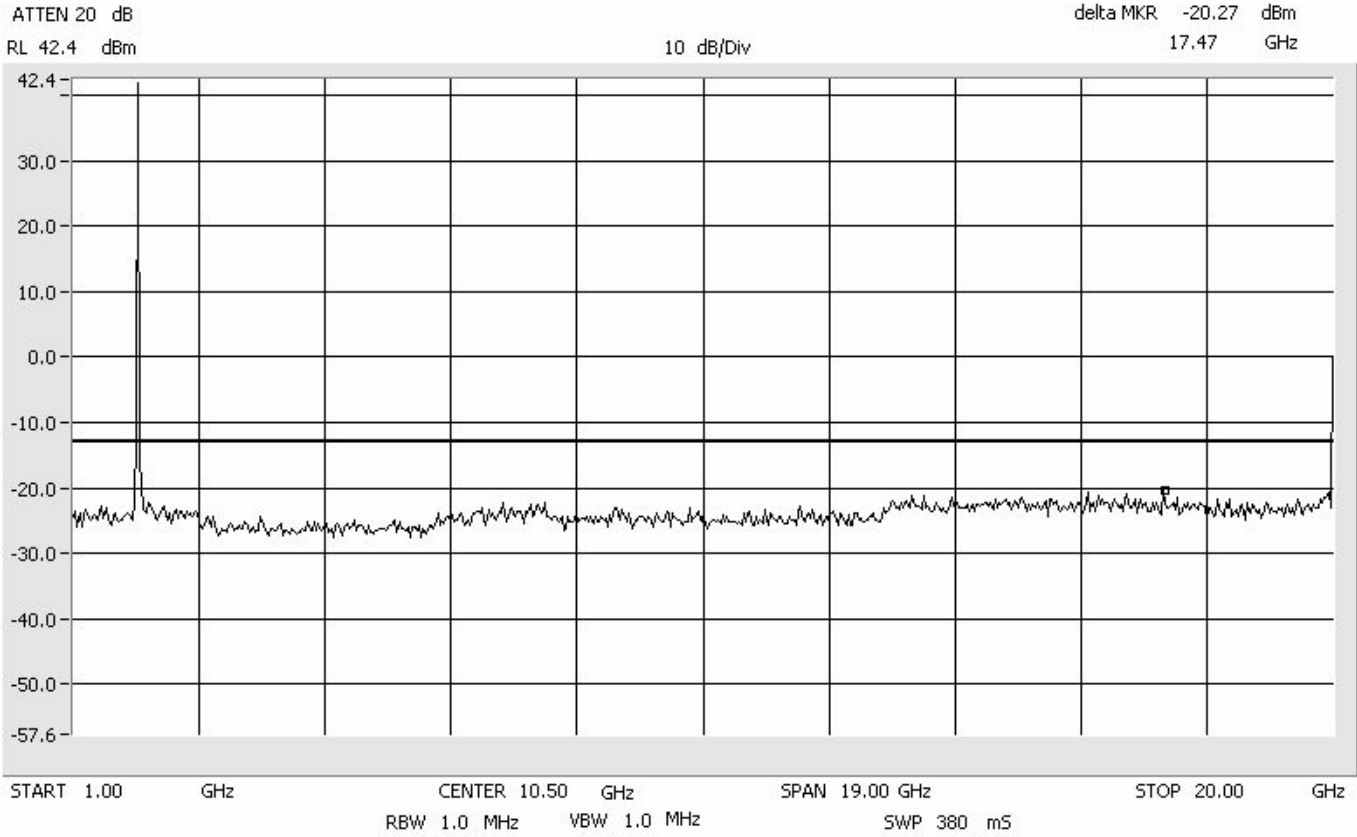
10 dB/Div



START 30.0 MHz CENTER 515.0 MHz SPAN 970.0 MHz STOP 1.0000 GHz
RBW 300 kHz VBW 300 kHz SWP 50.0 mS

Conducted Emissions CDMA SMR G - 1900 MHz

1 GHz to 20 GHz
RBW/VBW: 1 MHz



Band Edge iDEN

Center: 1990.04
Span: 200 kHz
RBW: 300 Hz
VBW: 1 kHz

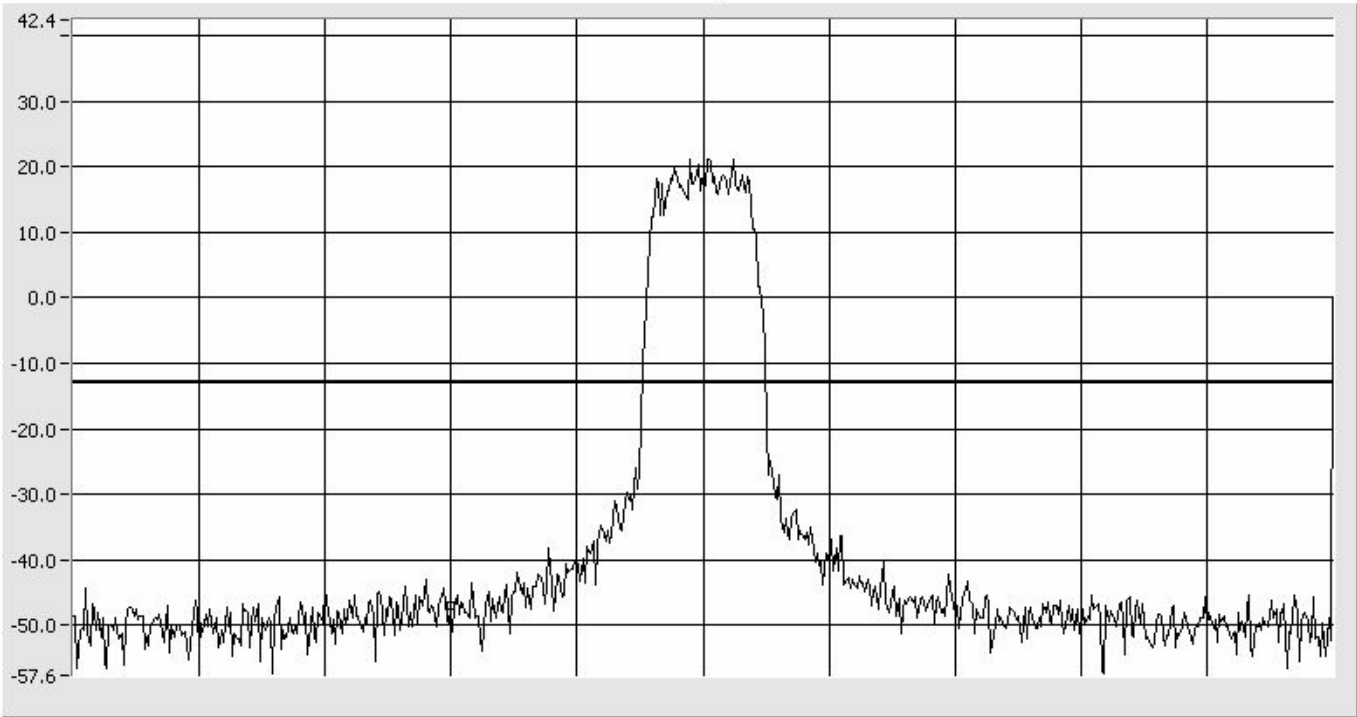
ATTEN 20 dB

delta MKR -46.93 dBm

RL 42.4 dBm

10 dB/Div

1.990000 GHz



START 1.9899400 GHz

CENTER 1.990040GHz

SPAN 200.0 kHz

STOP 1.9901400 GHz

RBW 300 Hz

VBW 1.0 kHz

SWP 5.60 Sec

Band Edge iDEN

Center: 1994.92 MHz
Span: 200 kHz
RBW: 300 Hz
VBW: 1 kHz

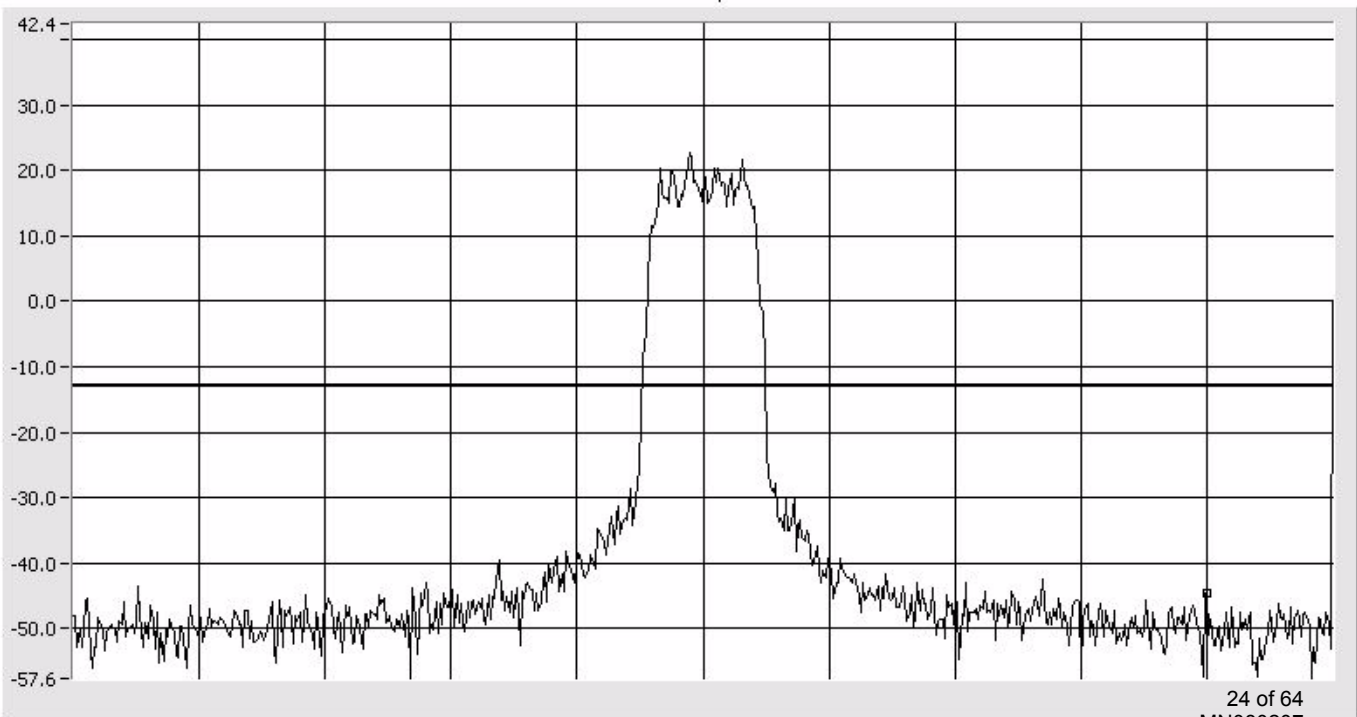
ATTEN 20 dB

delta MKR -44.60 dBm

RL 42.4 dBm

10 dB/Div

1.995000 GHz



START 1.9948200 GHz

CENTER 1.994920GHz

SPAN 200.0 kHz

STOP 1.9950200 GHz

RBW 300 Hz

VBW 1.0 kHz

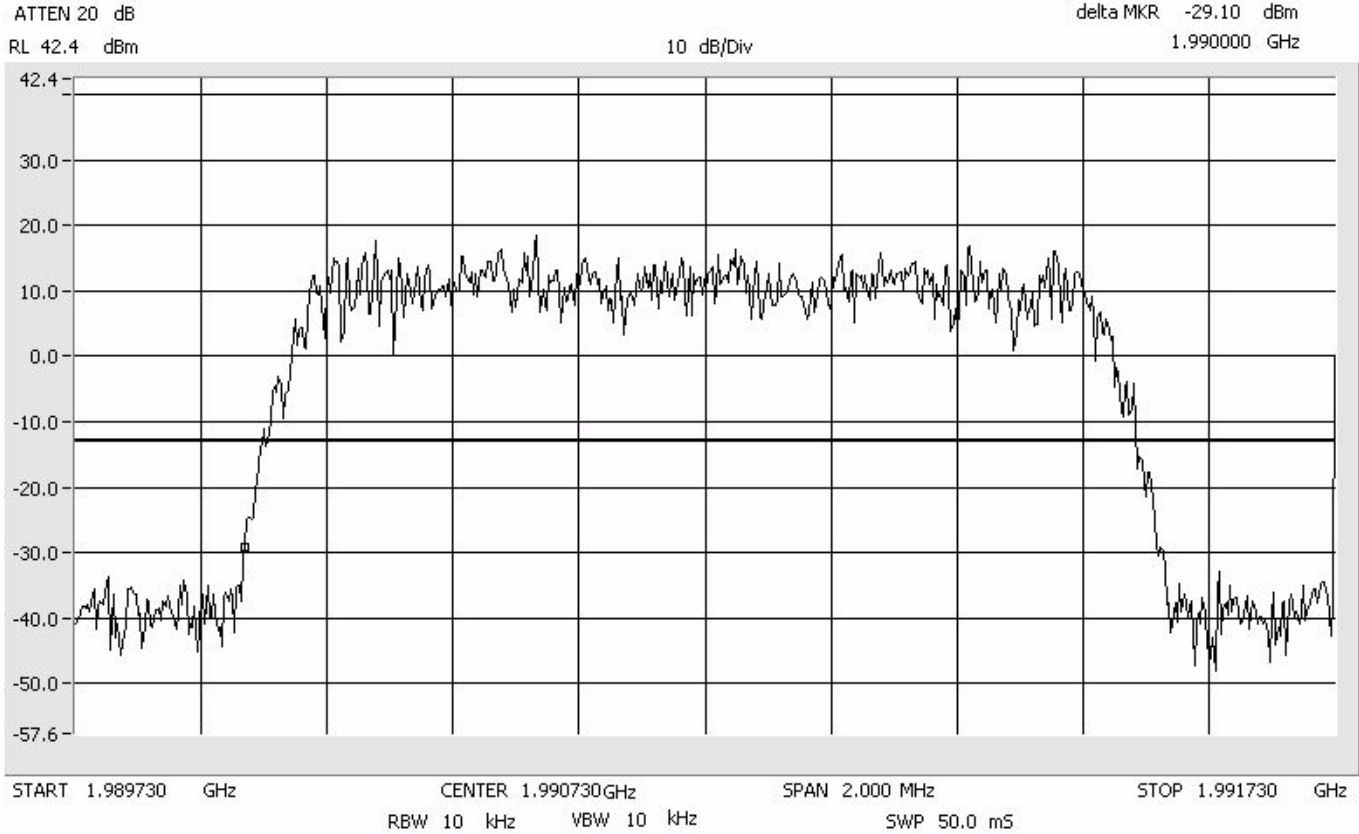
SWP 5.60 Sec

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MN080207

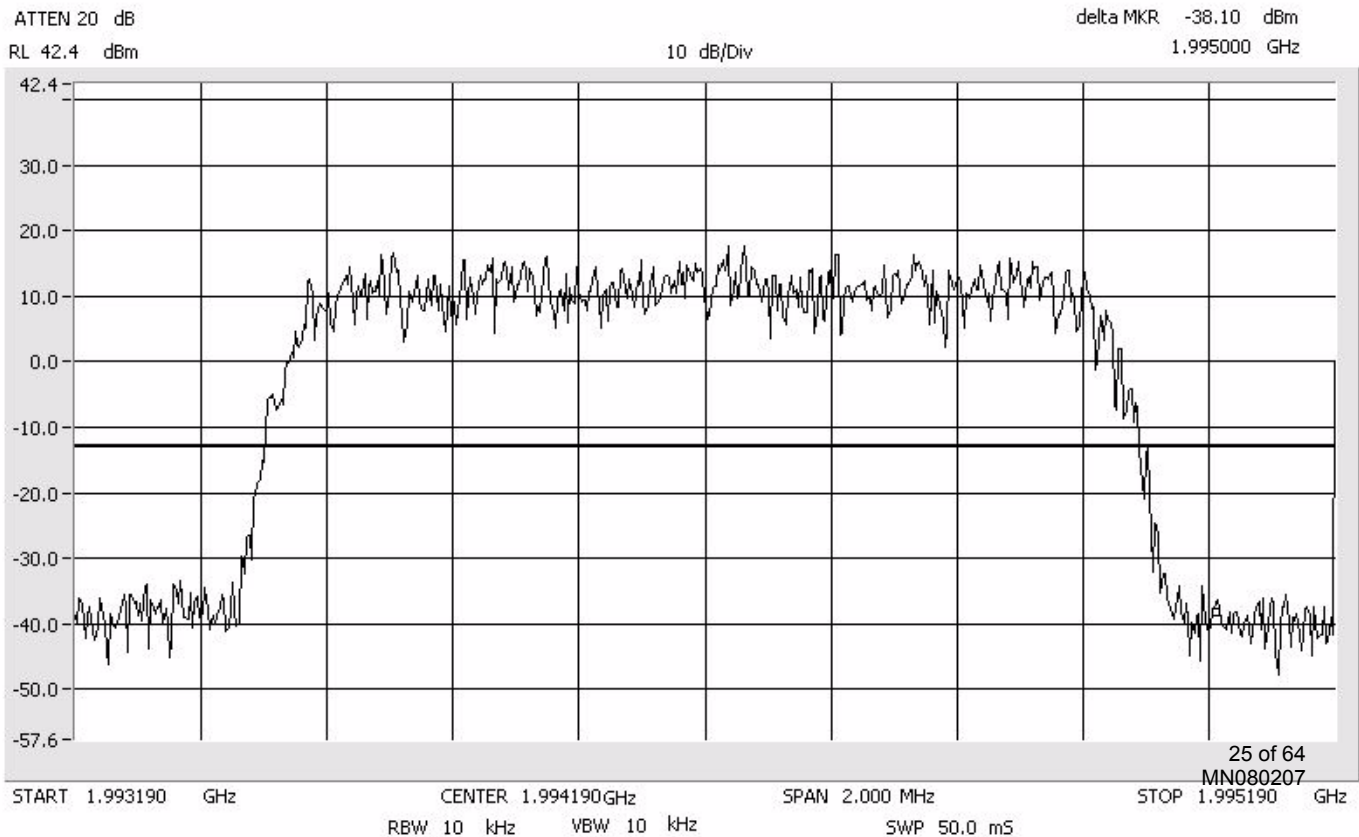
Band Edge CDMA

Center: 1990.73
Span: 2 MHz
RBW: 10 kHz
VBW: 10 kHz



Band Edge CDMA

Center: 1994.19 MHz
Span: 2 MHz
RBW: 10 kHz
VBW: 10 kHz



Conducted Output Power Test for ADC Inc FlexWave™ URH SMR G Model Number FWU-G4000002110RU

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*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 iDEN and CDMA 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 42.4 dB to compensate for attenuators and cable loss between the EUT and the power meter.

<u>iDEN</u>	<u>19.63 Watts</u>
Carrier Frequency	Carrier Output
1990.2 MHz	<u>42.87</u> dBm
1992.5 MHz	<u>42.58</u> dBm
1994.8 MHz	<u>42.93</u> dBm

<u>CDMA</u>	<u>21.23 Watts</u>
Carrier Frequency	Carrier Output
1990.8 MHz	<u>42.80</u> dBm
1992.5 MHz	<u>43.27</u> dBm
1994.2 MHz	<u>43.25</u> dBm

Intermodulation Test for ADC Inc
FlexWave™ URH SMR G
Model Number FWU-G4000002110RU

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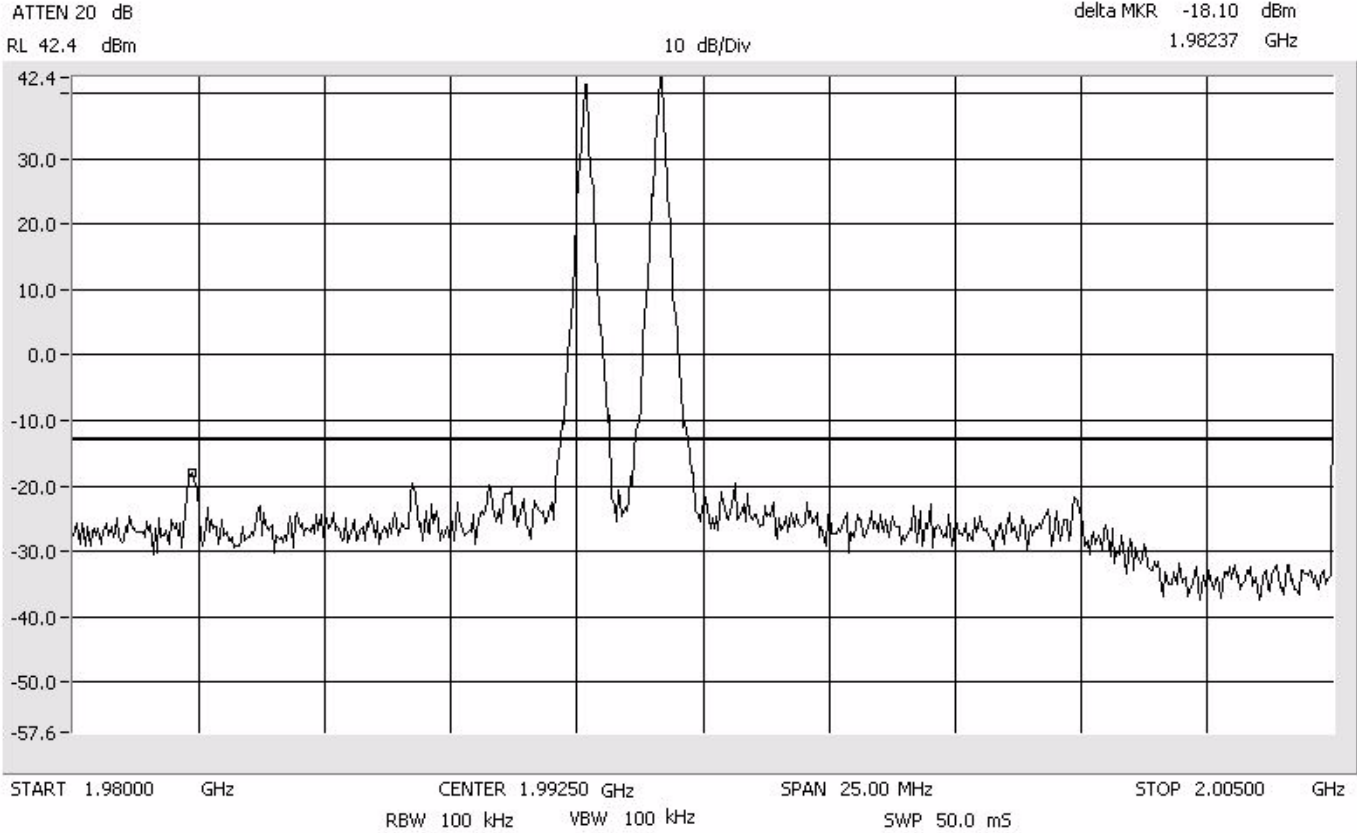
The inter-modulation products test was performed for the EUT. Three tests were performed with the modulation type. Test 1 was with 2 signals input to the EUT at lower end channels. Test 2 was with 2 signals input to the EUT at upper end channels. Test 3 was with 2 signals input to the EUT at upper and lower end channels. The modulation types tested were iDEN and CDMA. An investigation was made from 30 MHz to the 10th Harmonic of the highest fundamental frequency (~20 GHz). The following plots show the results.

Results:
(See Plots)

iDEN

Intermodulation Close - Lower SMR G - 1900 MHz

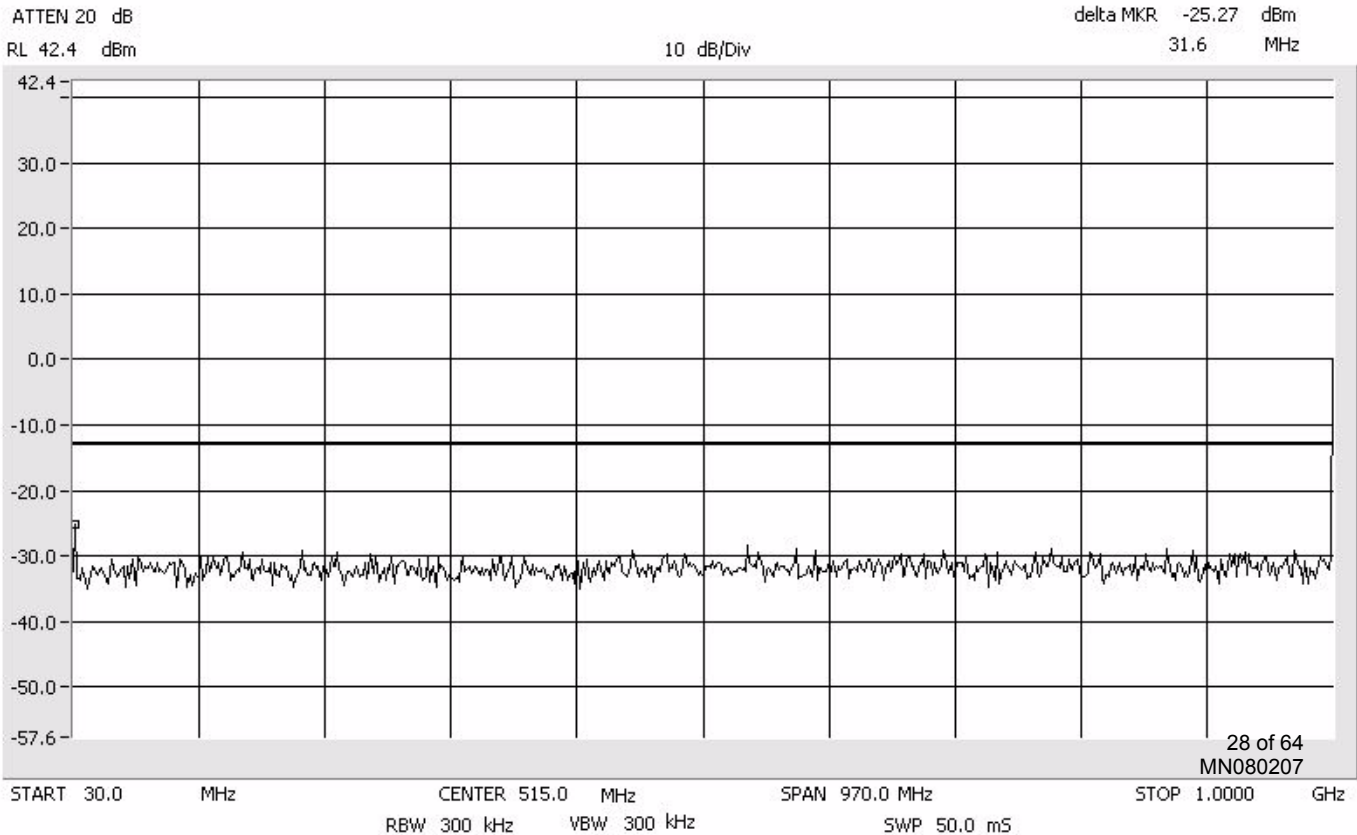
Center: 1992.5 MHz
Span: 25 MHz
RBW/VBW: 100 kHz



iDEN

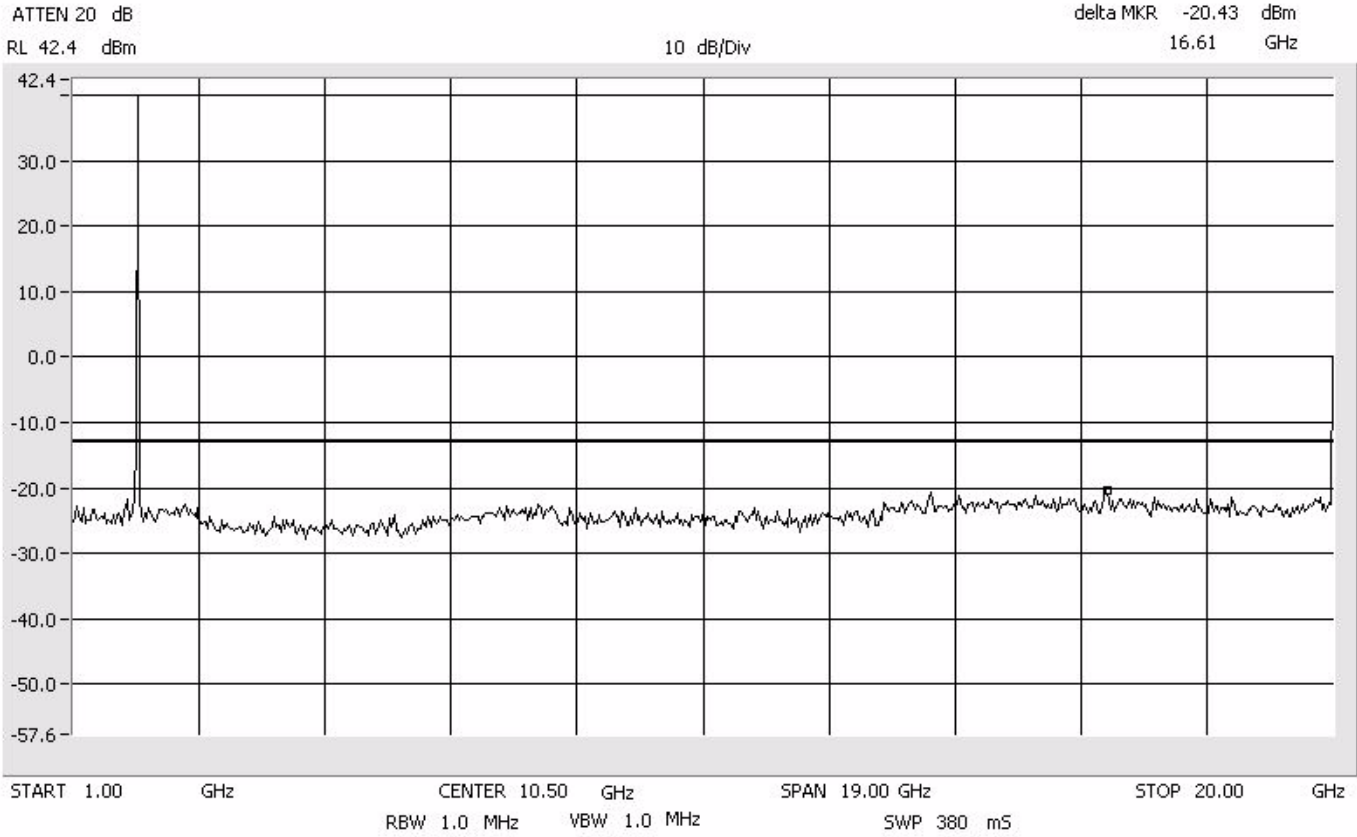
Intermodulation Close - Lower SMR G - 1900 MHz

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



Intermodulation Close - Lower SMR G - 1900 MHz

Span: 1 GHz to 20 GHz
RBW/VBW: 1 MHz



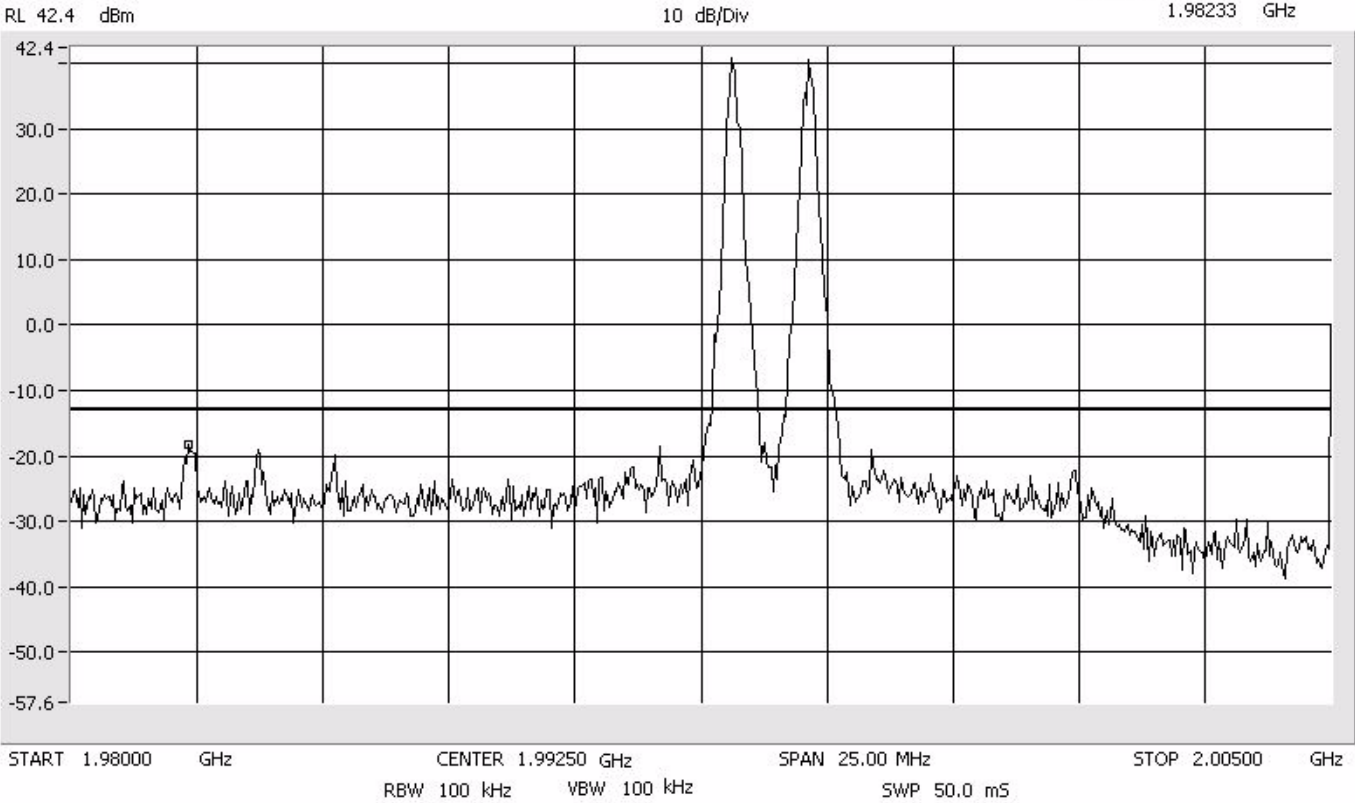
iDEN

Intermodulation Close - Upper SMR G - 1900 MHz

Center: 1992.5 MHz
Span: 25 MHz
RBW/VBW: 100 kHz

ATTEN 20 dB
RL 42.4 dBm

delta MKR -18.27 dBm
1.98233 GHz



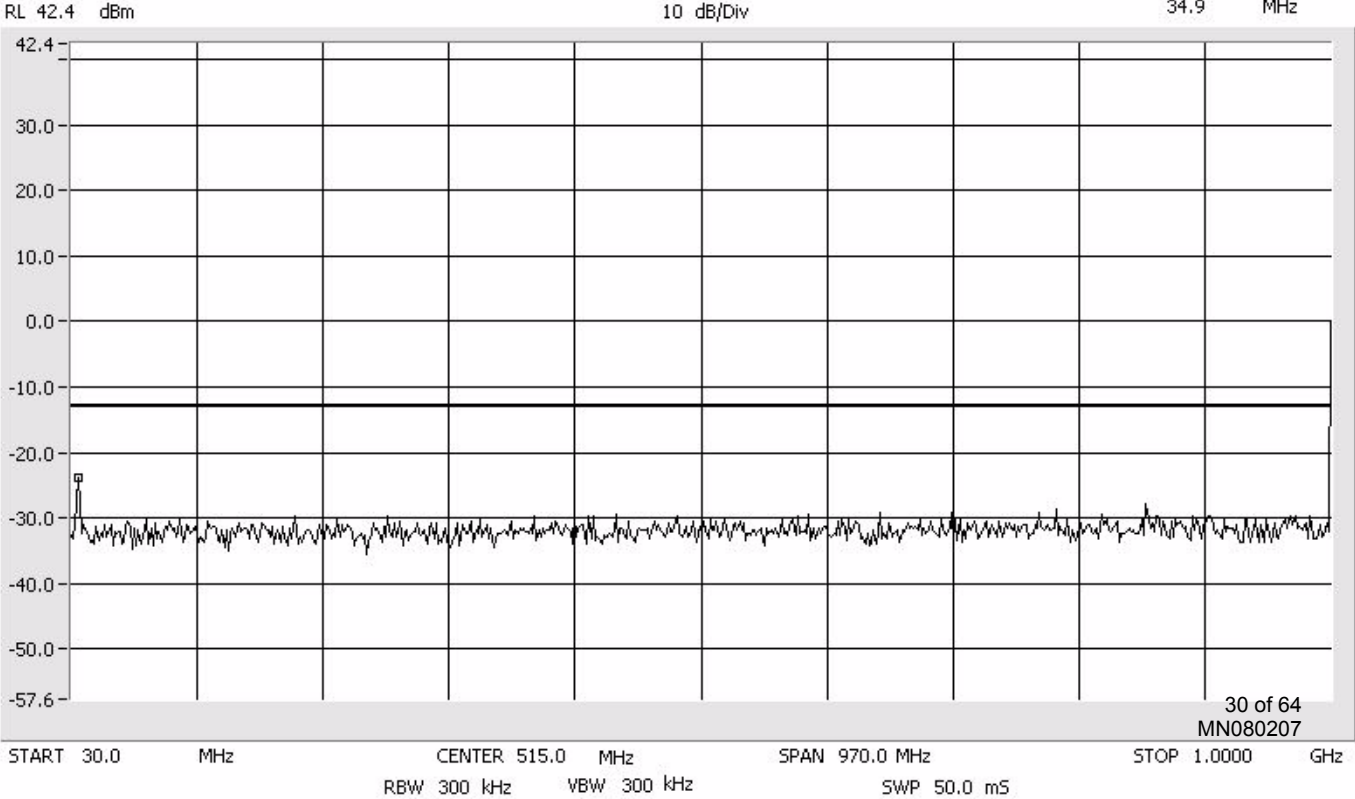
iDEN

Intermodulation Close - Upper SMR G - 1900 MHz

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

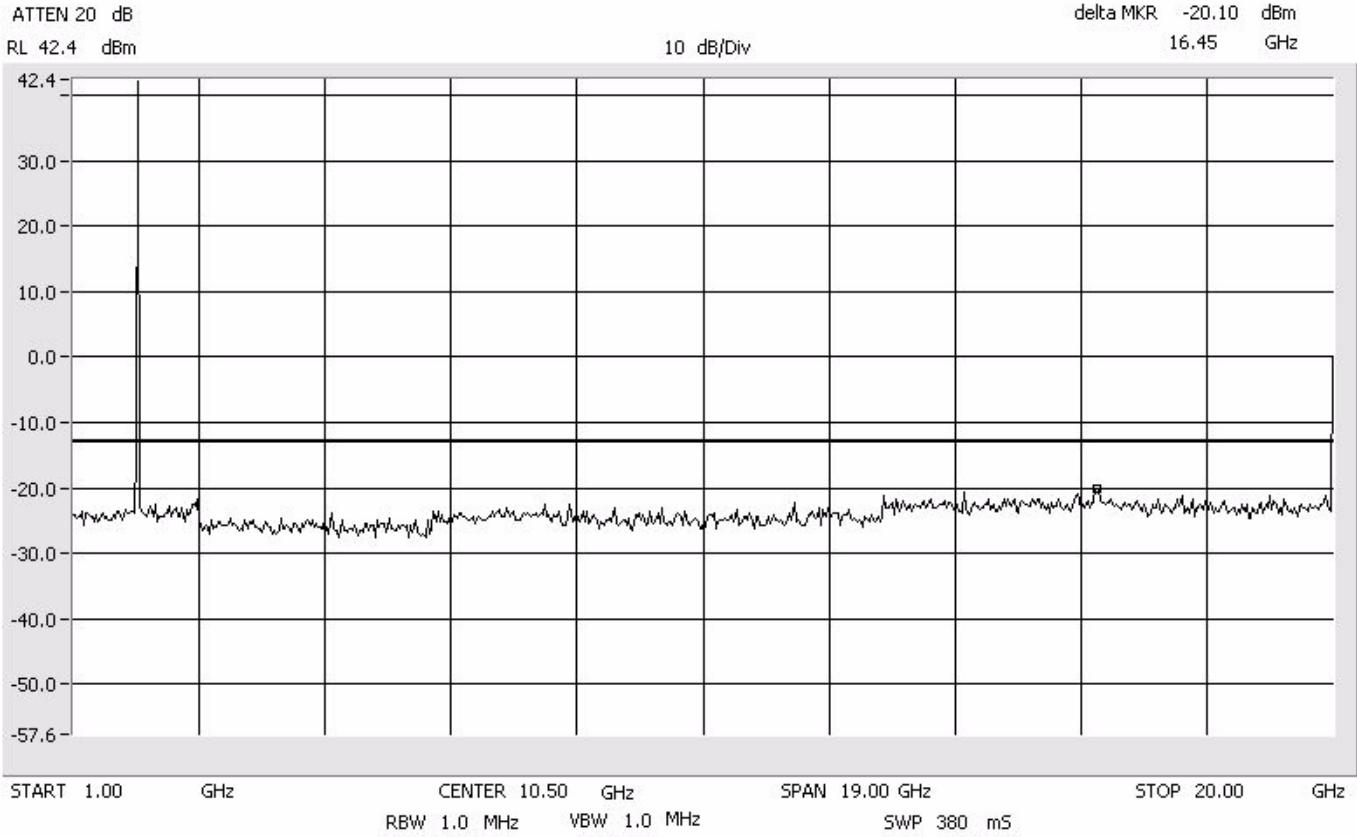
ATTEN 20 dB
RL 42.4 dBm

delta MKR -23.93 dBm
34.9 MHz



Intermodulation Close - Upper SMR G - 1900 MHz

Span: 1 GHz to 20 GHz
RBW/VBW: 1 MHz



iDEN

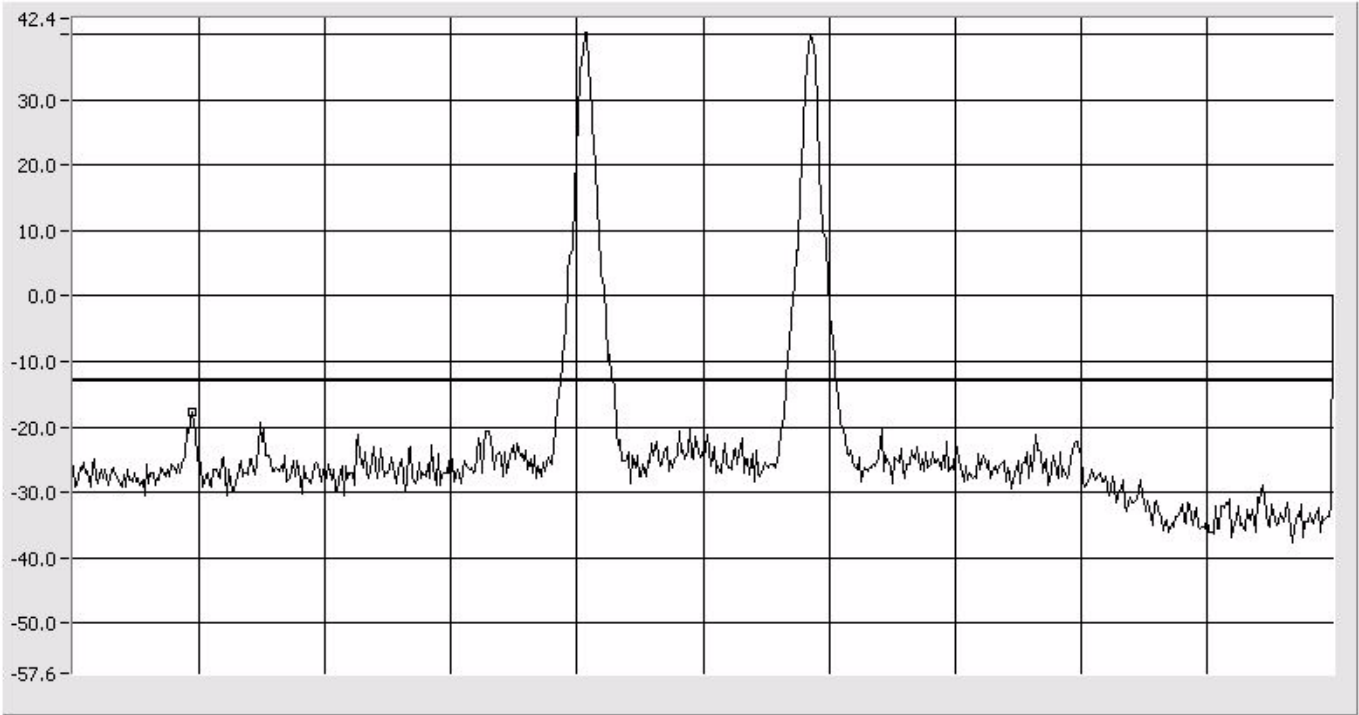
Intermodulation Apart SMR G - 1900 MHz

Center: 1992.5 MHz
Span: 25 MHz
RBW/VBW: 100 kHz

ATTEN 20 dB
RL 42.4 dBm

delta MKR -17.77 dBm
1.98237 GHz

10 dB/Div



RBW 100 kHz VBW 100 kHz SWP 50.0 mS

iDEN

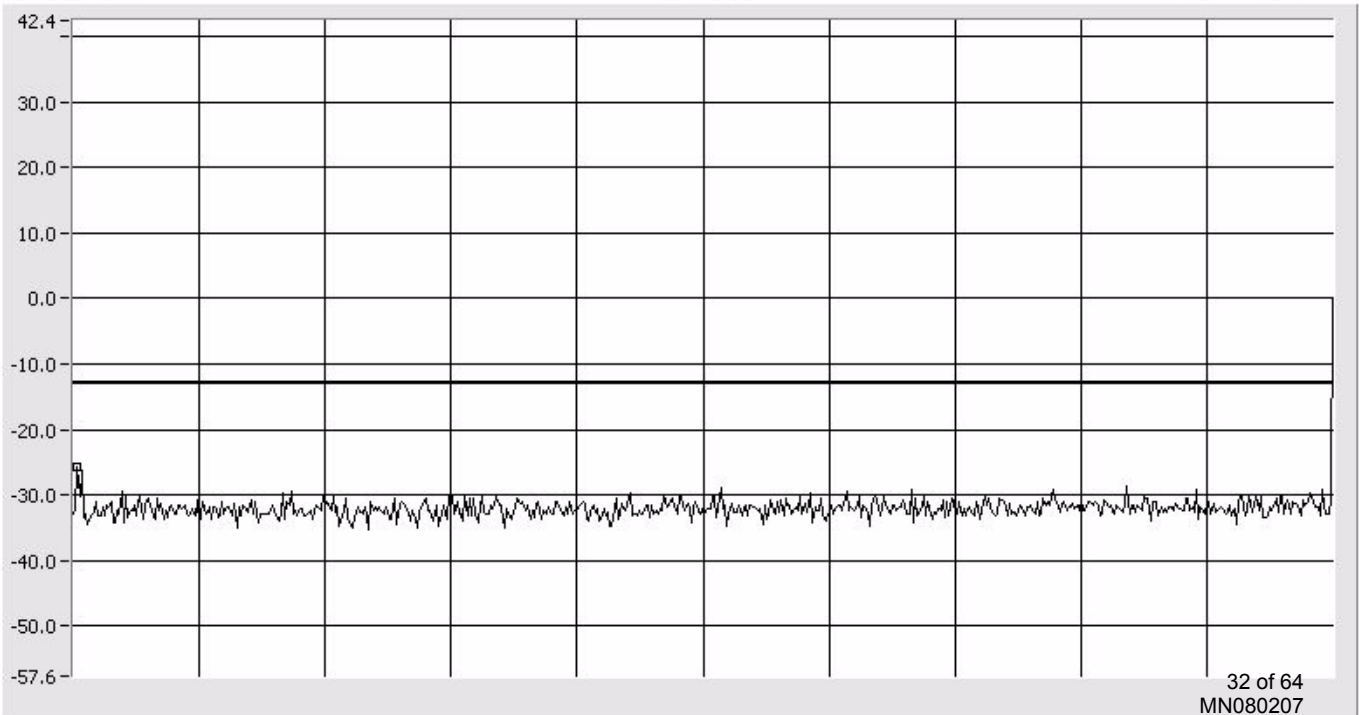
Intermodulation Apart SMR G - 1900 MHz

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

ATTEN 20 dB
RL 42.4 dBm

delta MKR -25.60 dBm
33.2 MHz

10 dB/Div



RBW 300 kHz VBW 300 kHz SWP 50.0 mS

32 of 64
MN080207

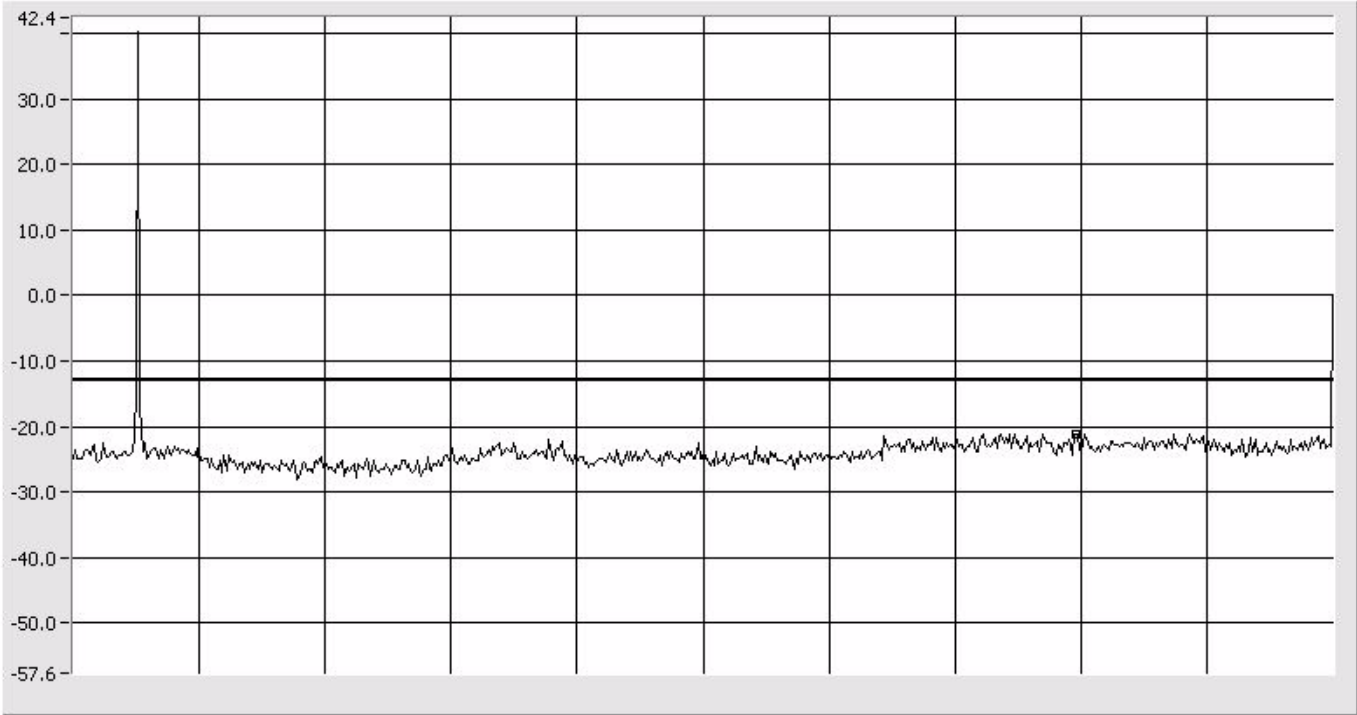
Intermodulation Apart SMR G - 1900 MHz

Span: 1 GHz to 20 GHz
RBW/VBW: 1 MHz

ATTEN 20 dB
RL 42.4 dBm

delta MKR -21.10 dBm
16.14 GHz

10 dB/Div

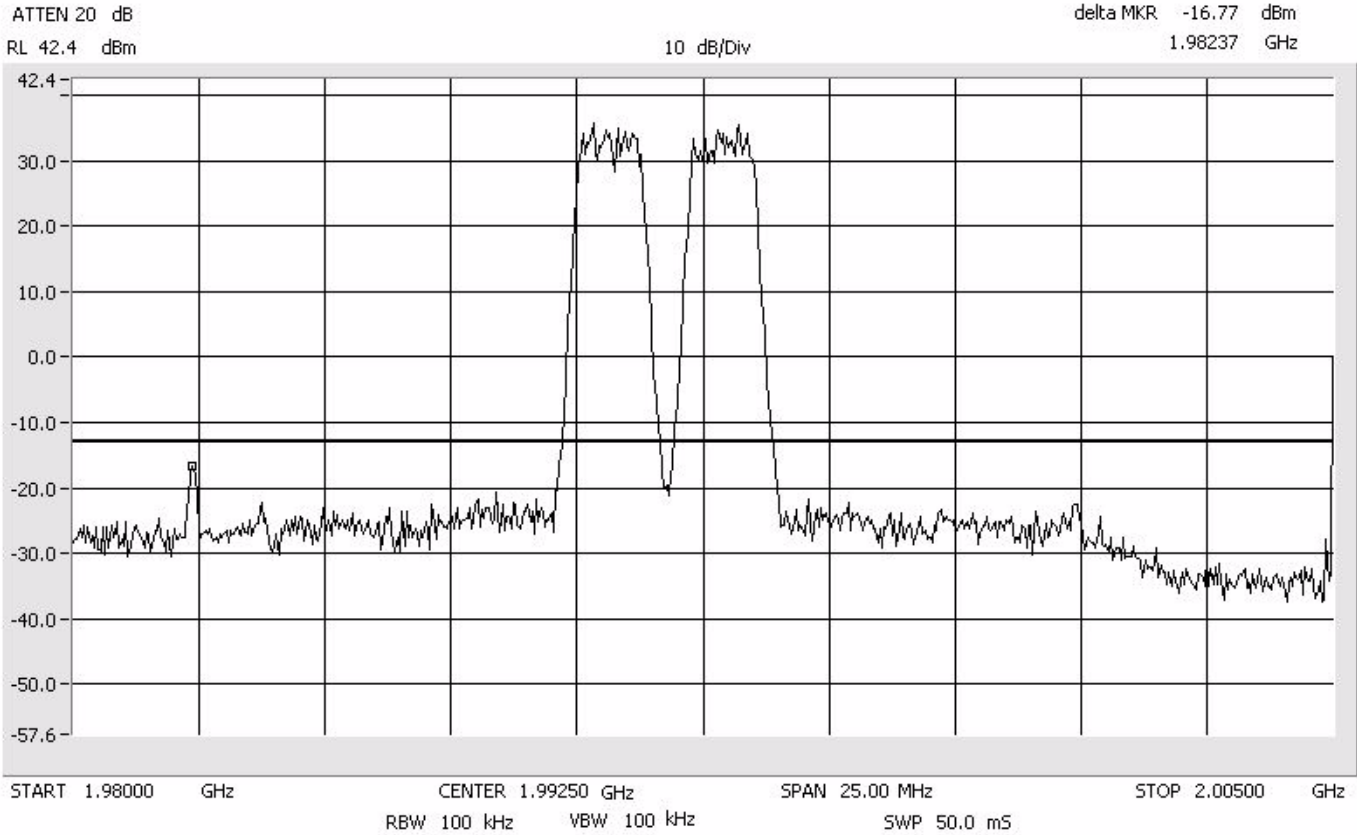


START 1.00 GHz CENTER 10.50 GHz SPAN 19.00 GHz STOP 20.00 GHz
RBW 1.0 MHz VBW 1.0 MHz SWP 380 mS

CDMA

Intermodulation Close - Lower SMR G - 1900 MHz

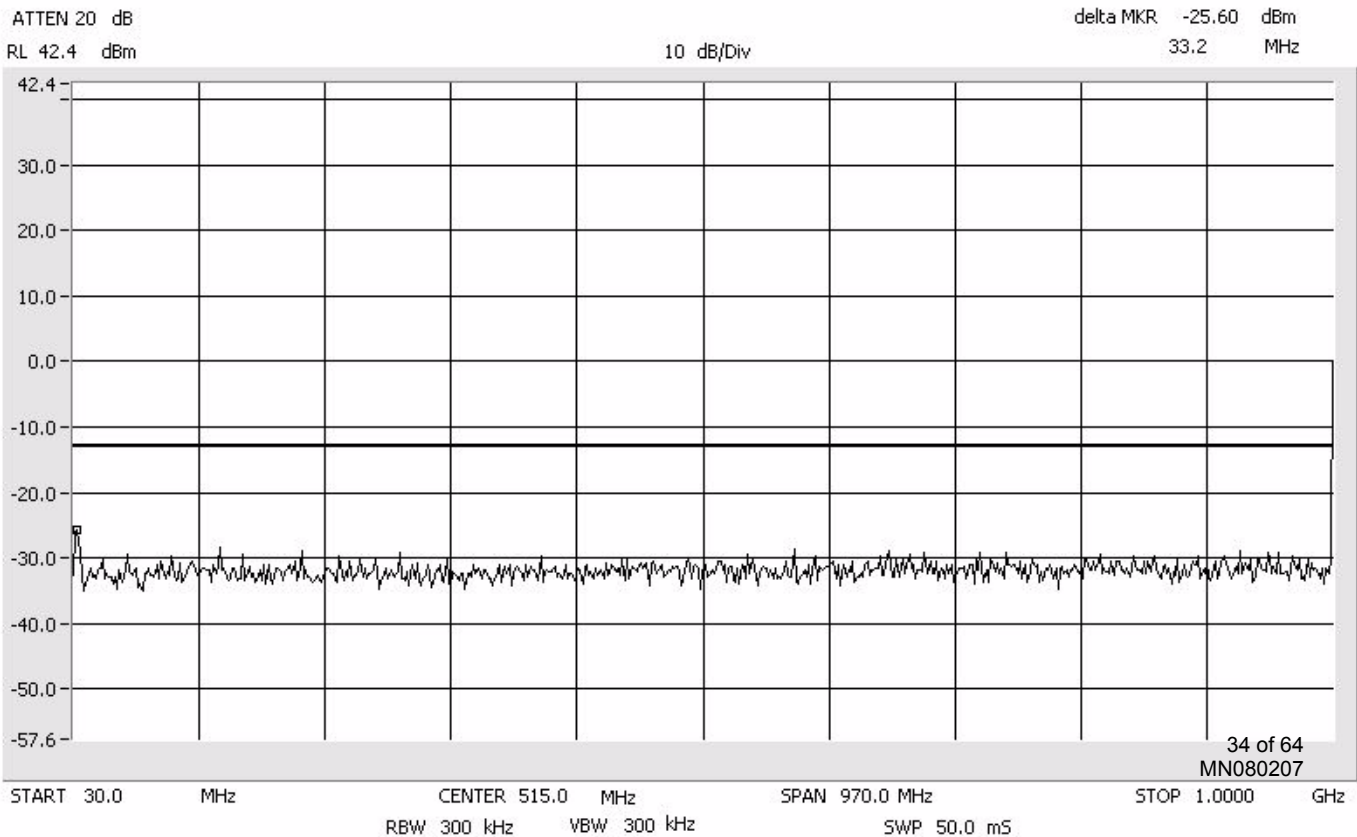
Center: 1992.5 MHz
Span: 25 MHz
RBW/VBW: 100 kHz



CDMA

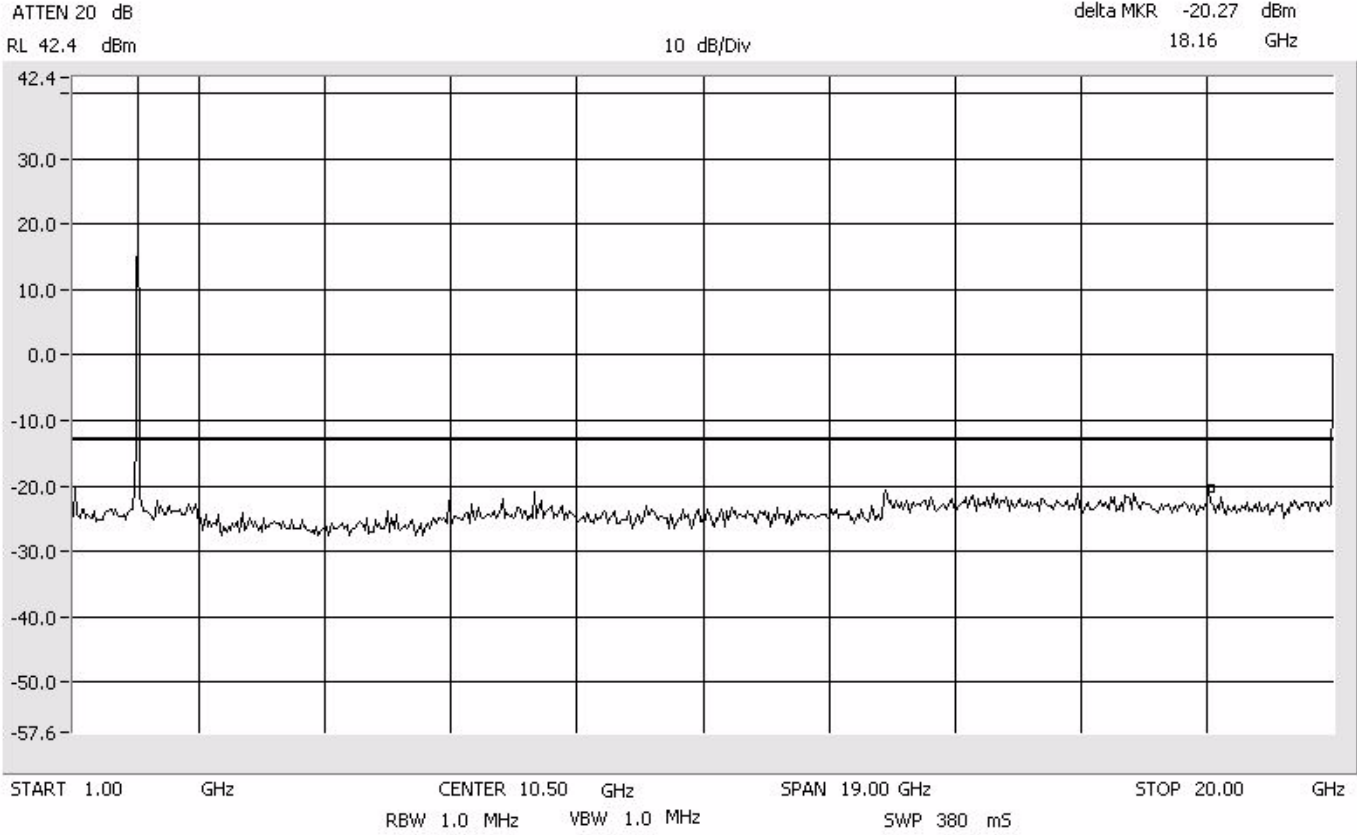
Intermodulation Close - Lower SMR G - 1900 MHz

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



Intermodulation Close - Lower SMR G - 1900 MHz

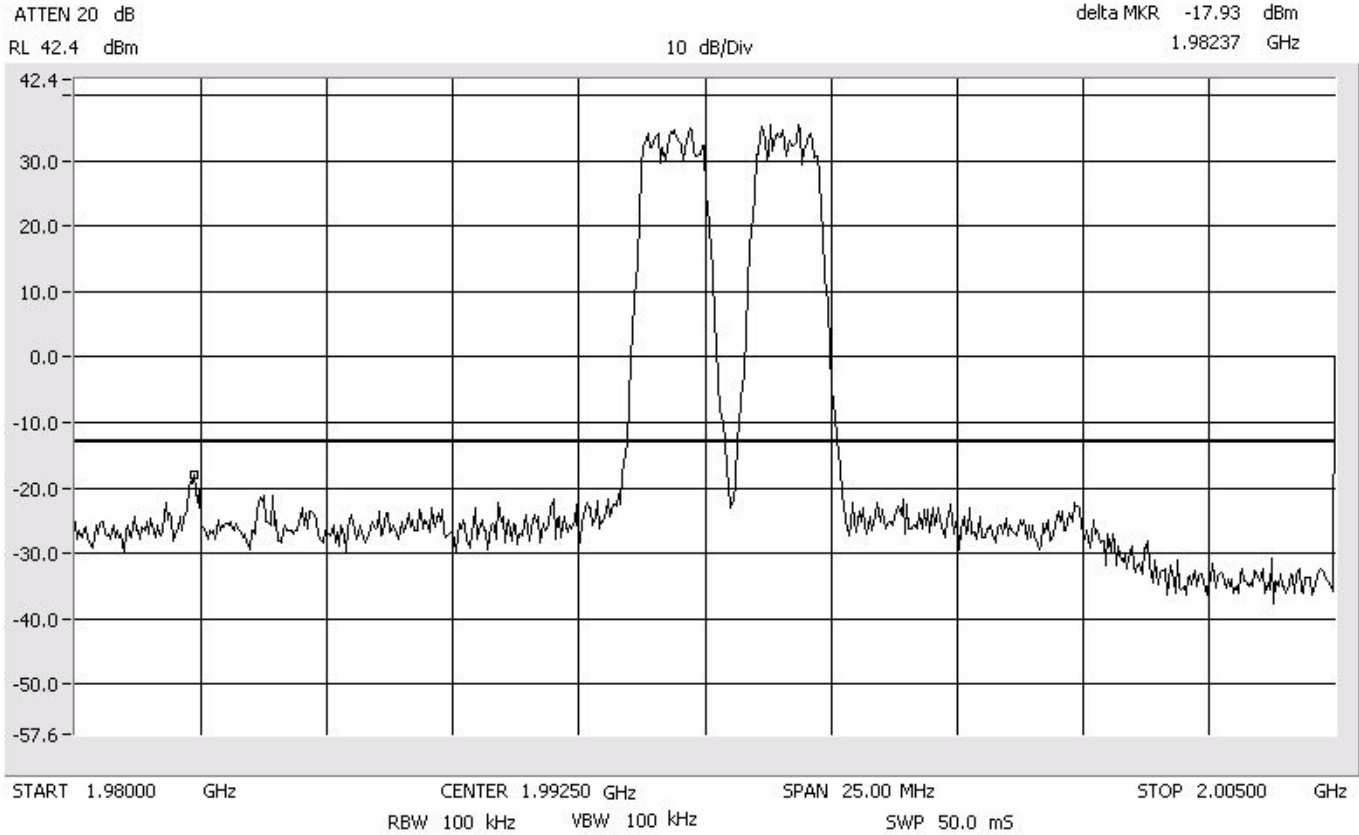
Span: 1 GHz to 20 GHz
RBW/VBW: 1 MHz



CDMA

Intermodulation Close - Upper SMR G - 1900 MHz

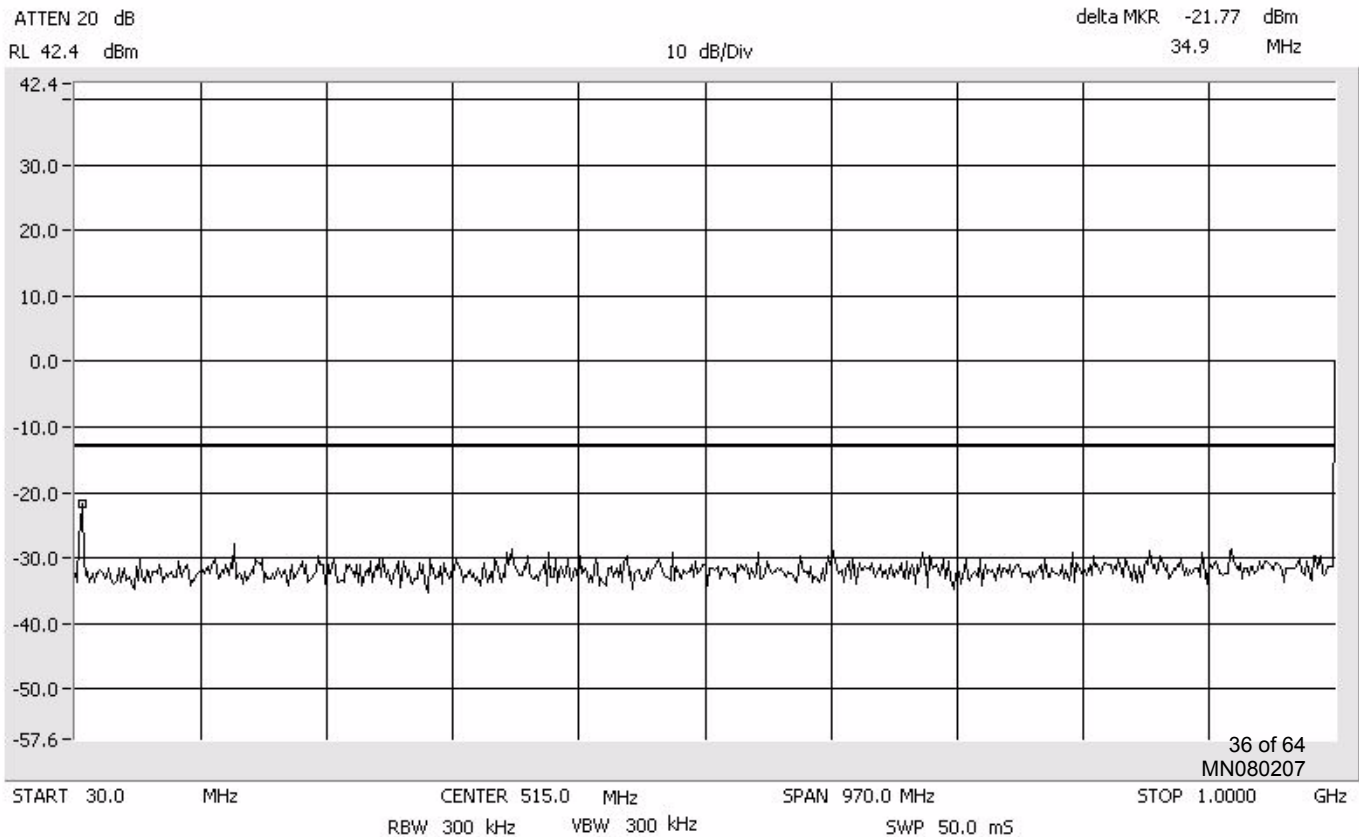
Center: 1992.5 MHz
Span: 25 MHz
RBW/VBW: 100 kHz



CDMA

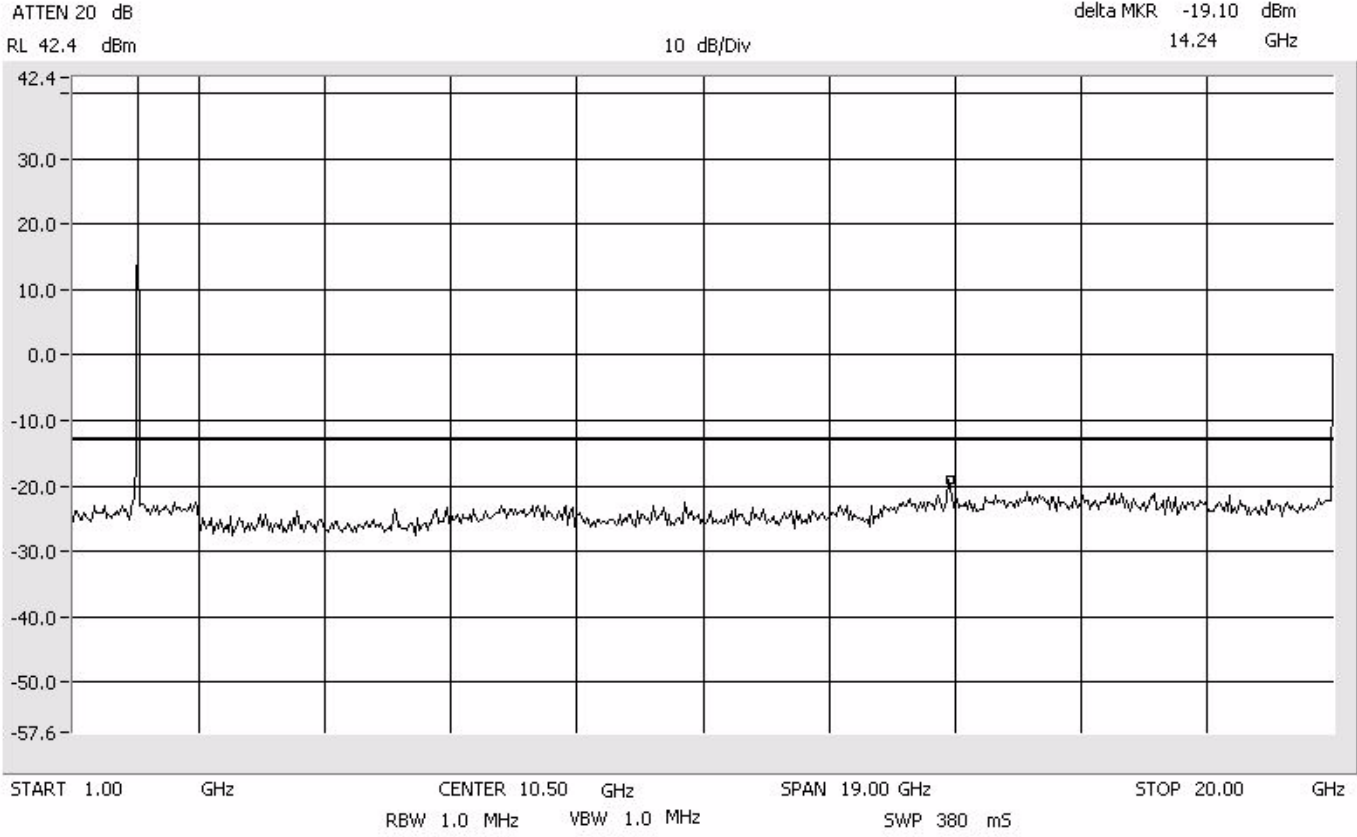
Intermodulation Close - Upper SMR G - 1900 MHz

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



Intermodulation Close - Upper SMR G - 1900 MHz

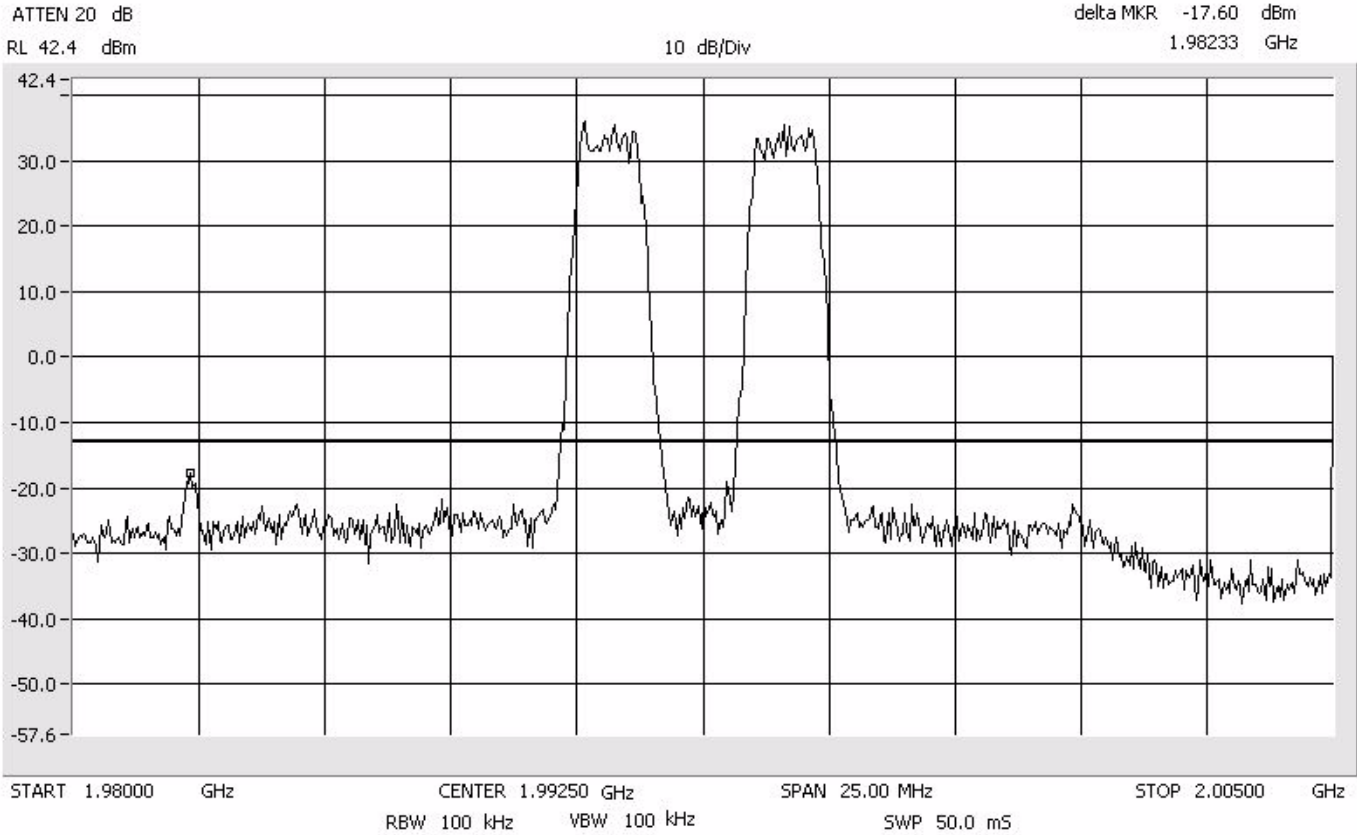
Span: 1 GHz to 20 GHz
RBW/VBW: 1 MHz



CDMA

Intermodulation Apart SMR G - 1900 MHz

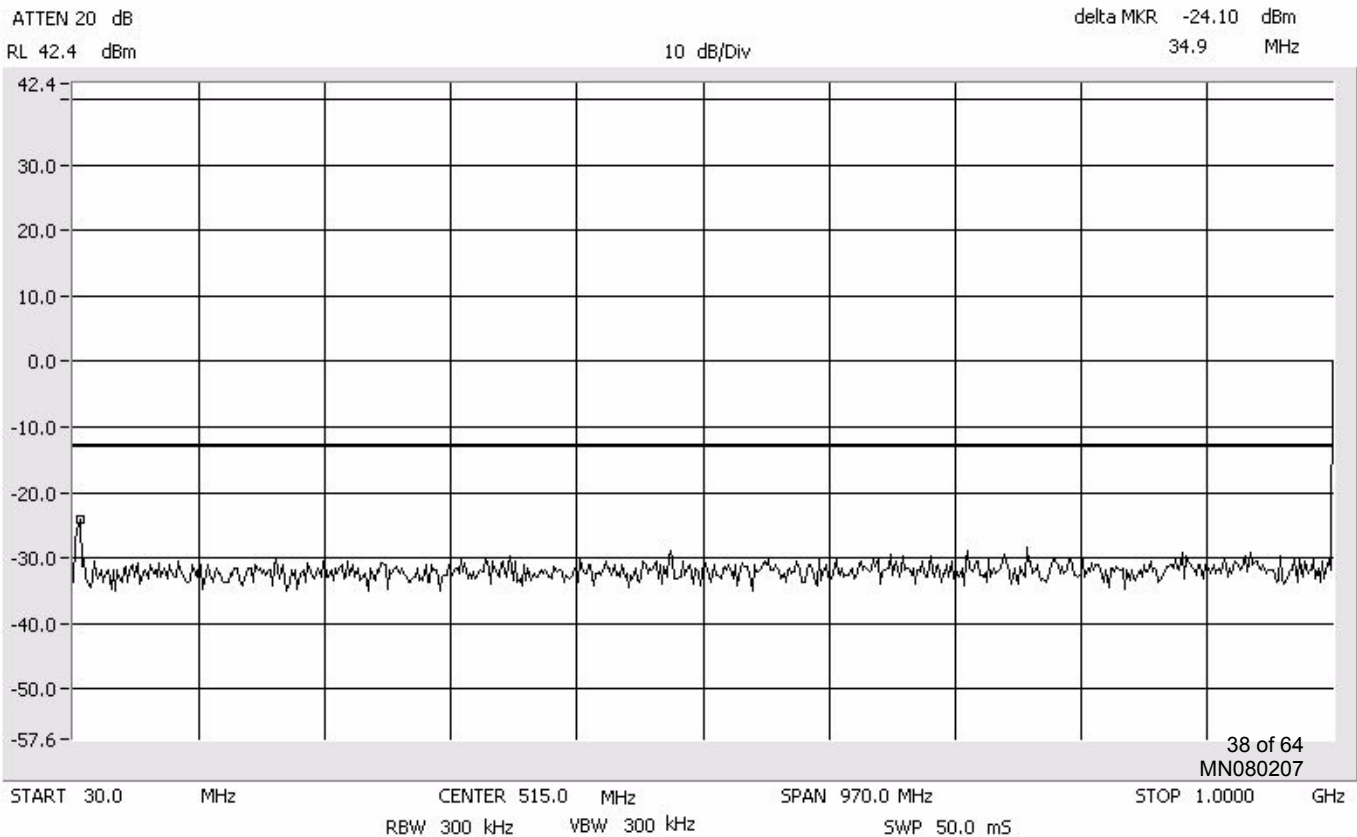
Center: 1992.5 MHz
Span: 25 MHz
RBW/VBW: 100 kHz



CDMA

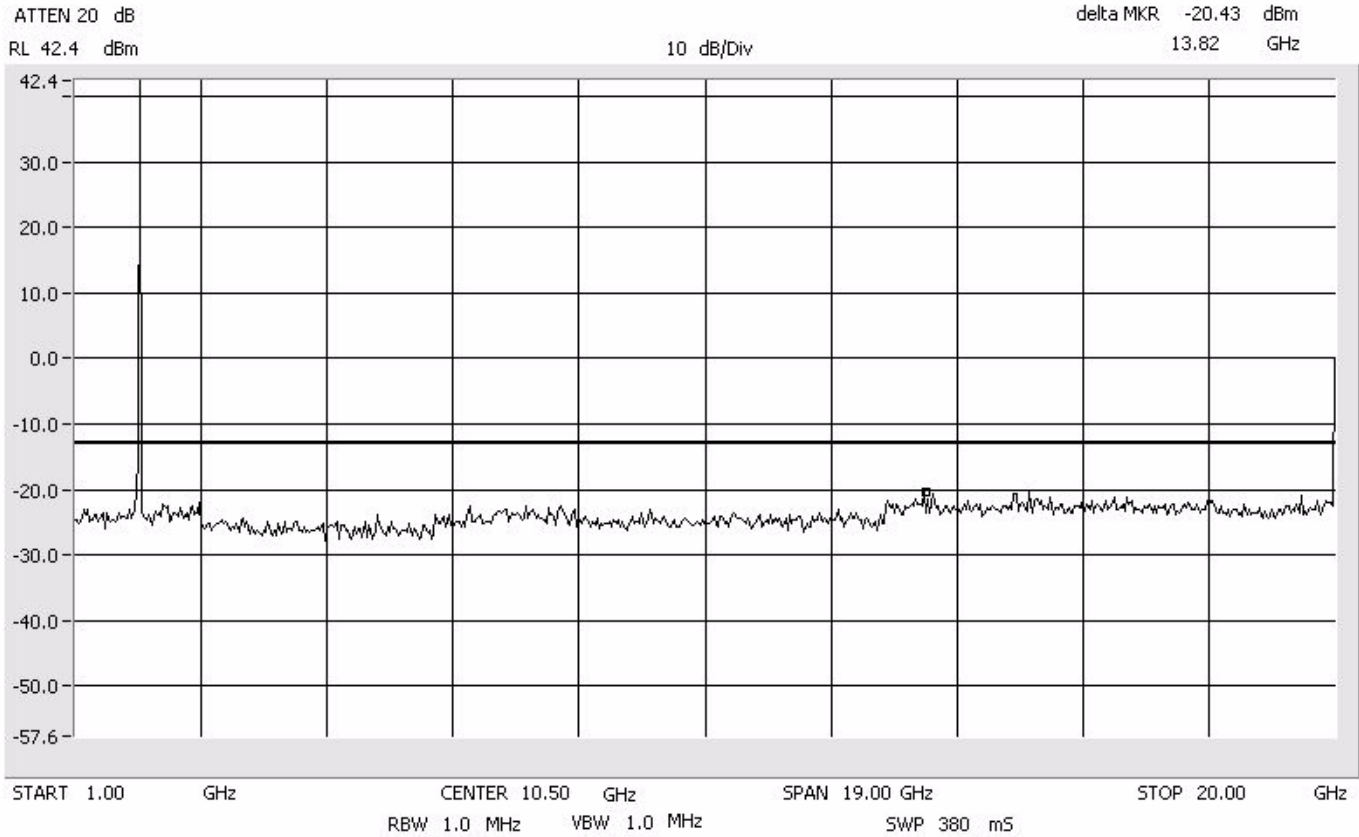
Intermodulation Apart SMR G - 1900 MHz

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



Intermodulation Apart SMR G - 1900 MHz

Span: 1 GHz to 20 GHz
RBW/VBW: 1 MHz



Occupied Bandwidth Modulation Test for ADC Inc
FlexWave™ URH SMR G
Model Number FWU-G4000002110RU

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An input/output Occupied Bandwidth test was done with modulation types: IDEN and CDMA. 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.

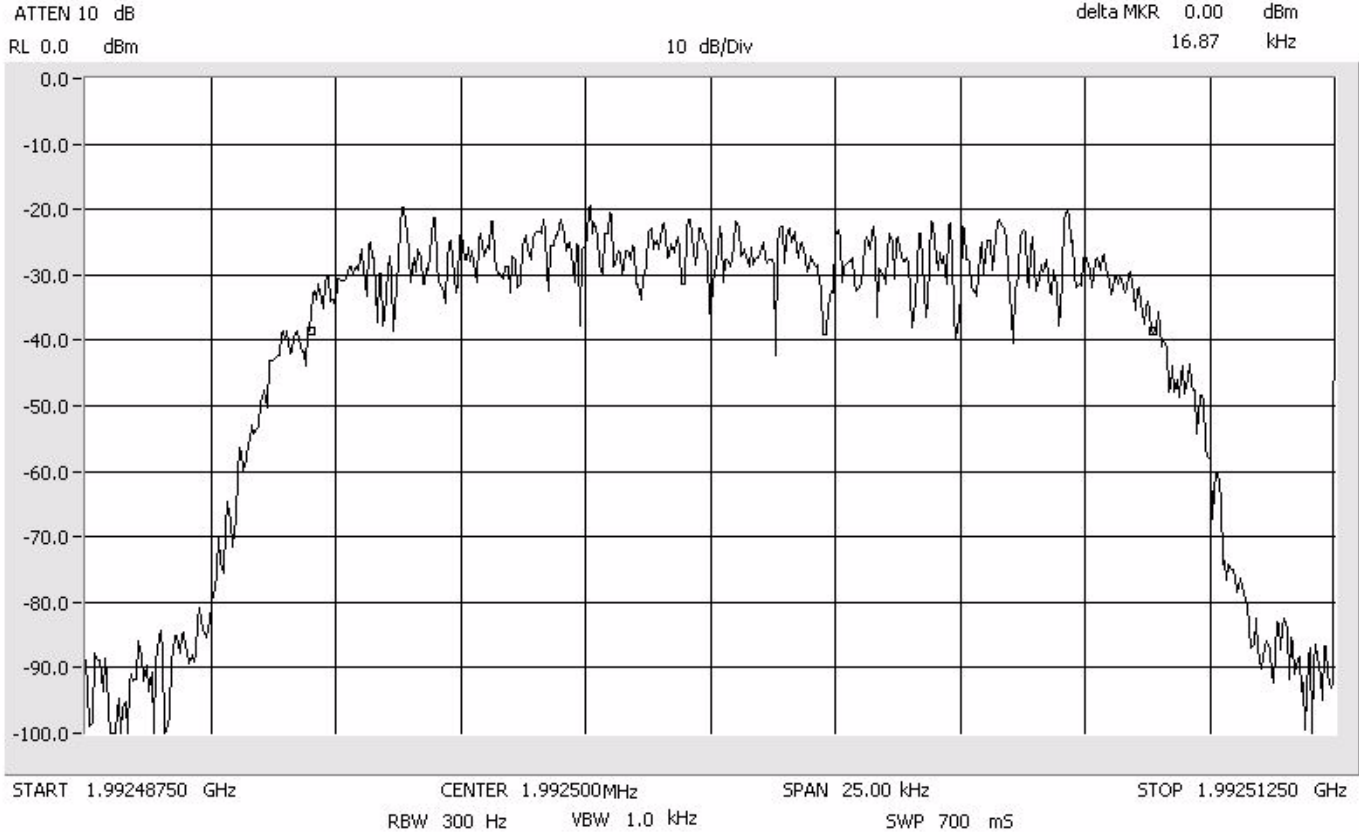
The resolution bandwidth is reduced to 1% of the estimated emission bandwidth and the video bandwidth is set to 3 times the resolution bandwidth. The markers are moved to the -20 dB points (from the previously established center frequency level) on either side of center frequency.

Results:

Pass (see plots)

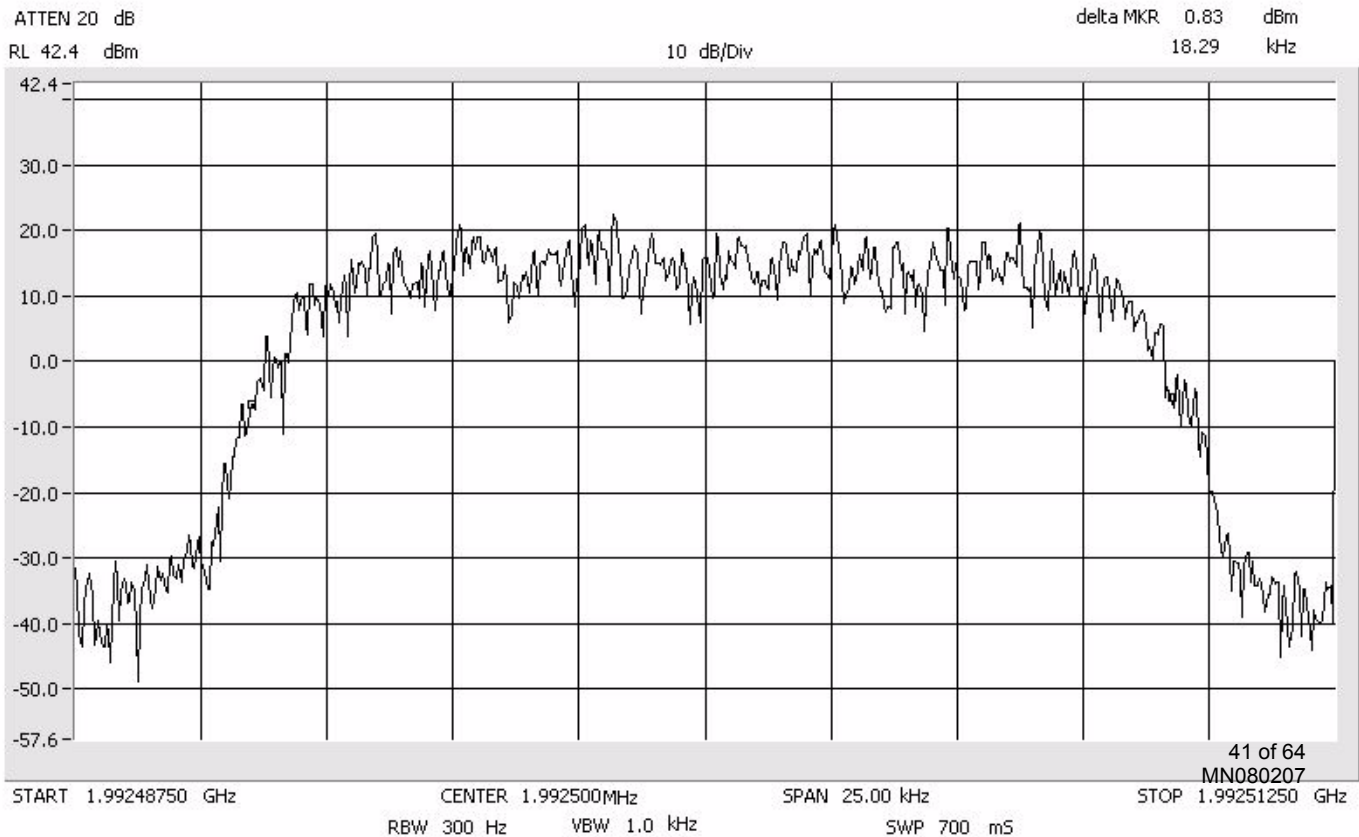
Occupied Bandwidth iDEN Signal In

Span: 25 kHz
RBW: 300 kHz
VBW: 1.0 kHz



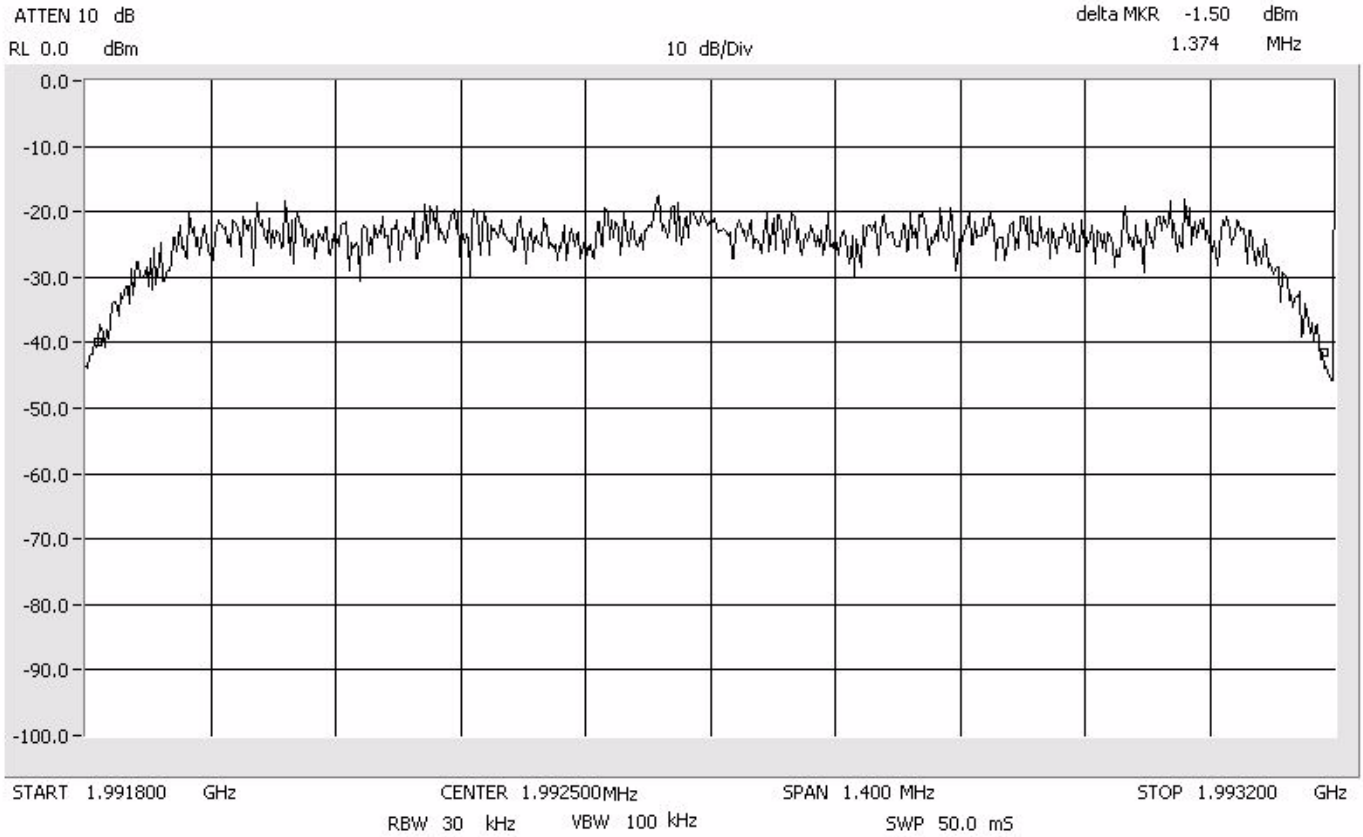
Occupied Bandwidth iDEN Signal Out

Span: 25 kHz
RBW: 300 kHz
VBW: 1.0 kHz



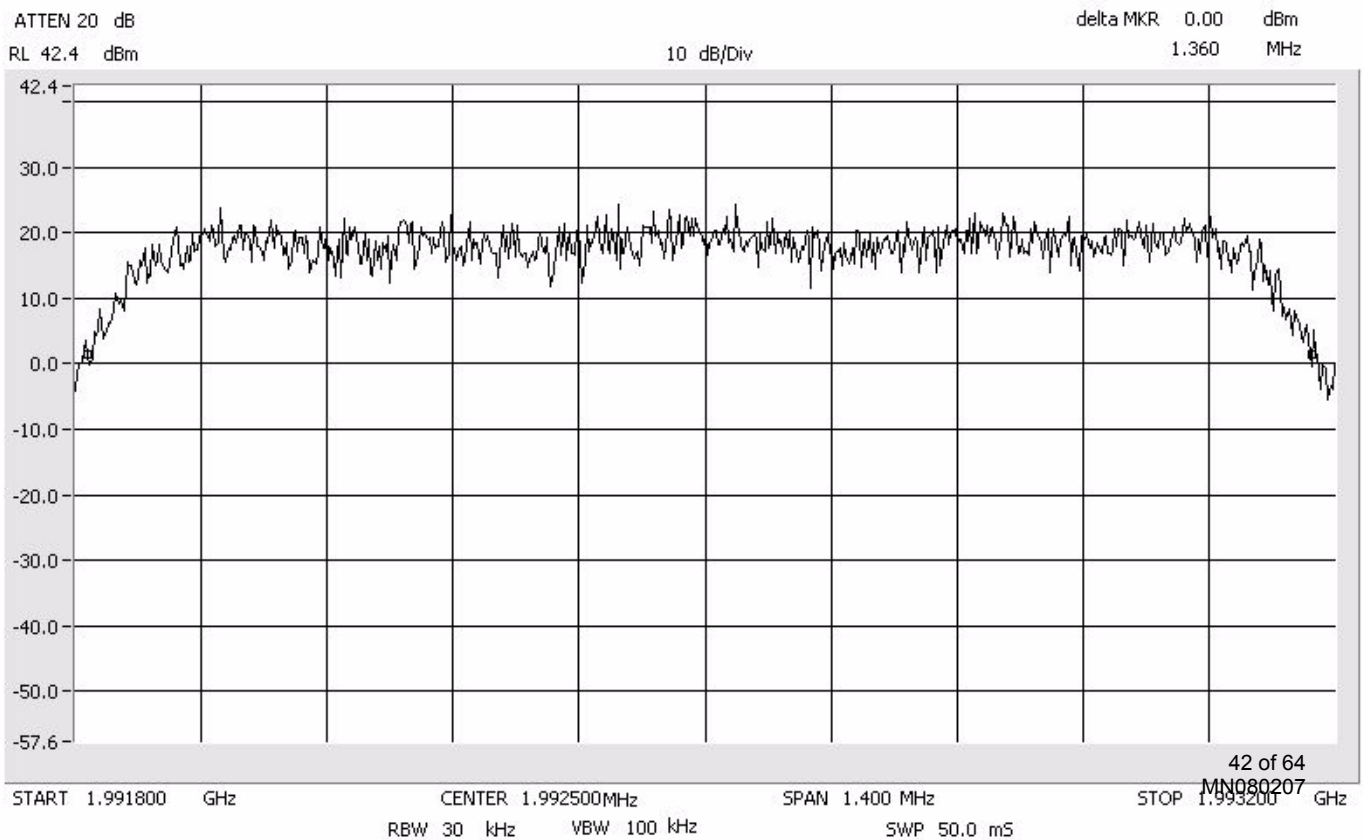
Occupied Bandwidth CDMA Signal In

Span: 1.4 MHz
RBW: 30 kHz
VBW: 100 kHz



Occupied Bandwidth CDMA Signal Out

Span: 1.4 MHz
RBW: 30 kHz
VBW: 100 kHz



**Frequency Tolerance Test for ADC Inc
FlexWave™ URH SMR G
Model Number FWU-G4000002110RU**

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EUT SMR G (1900 MHz)

HOST	REMOTE			
Input Voltage	Input Voltage	Carrier Frequency	Measured Frequency	Meets Requirements?
21 VDC	100 VAC	1990.200 MHz	1990.200 MHz	Yes
48 VDC	170 VAC	1990.200 MHz	1990.200 MHz	Yes
60 VDC	240 VAC	1990.200 MHz	1990.200 MHz	Yes
21 VDC	100 VAC	1992.500 MHz	1992.500 MHz	Yes
48 VDC	170 VAC	1992.500 MHz	1992.500 MHz	Yes
60 VDC	240 VAC	1992.500 MHz	1992.500 MHz	Yes
21 VDC	100 VAC	1994.800 MHz	1994.800 MHz	Yes
48 VDC	170 VAC	1994.800 MHz	1994.800 MHz	Yes
60 VDC	240 VAC	1994.800 MHz	1994.800 MHz	Yes
Temperature		Carrier Frequency	Measured Frequency	Meets Requirements?
-30 Deg. C		1990.200 MHz	1990.200 MHz	Yes
-20 Deg. C		1990.200 MHz	1990.200 MHz	Yes
-10 Deg. C		1990.200 MHz	1990.200 MHz	Yes
0 Deg. C		1990.200 MHz	1990.200 MHz	Yes
10 Deg. C		1990.200 MHz	1990.200 MHz	Yes
20 Deg. C		1990.200 MHz	1990.200 MHz	Yes
30 Deg. C		1990.200 MHz	1990.200 MHz	Yes
40 Deg. C		1990.200 MHz	1990.200 MHz	Yes
50 Deg. C		1990.200 MHz	1990.200 MHz	Yes
-30 Deg. C		1992.500 MHz	1992.500 MHz	Yes
-20 Deg. C		1992.500 MHz	1992.500 MHz	Yes
-10 Deg. C		1992.500 MHz	1992.500 MHz	Yes
0 Deg. C		1992.500 MHz	1992.500 MHz	Yes
10 Deg. C		1992.500 MHz	1992.500 MHz	Yes
20 Deg. C		1992.500 MHz	1992.500 MHz	Yes
30 Deg. C		1992.500 MHz	1992.500 MHz	Yes
40 Deg. C		1992.500 MHz	1992.500 MHz	Yes
50 Deg. C		1992.500 MHz	1992.500 MHz	Yes
-30 Deg. C		1994.800 MHz	1994.800 MHz	Yes
-20 Deg. C		1994.800 MHz	1994.800 MHz	Yes
-10 Deg. C		1994.800 MHz	1994.800 MHz	Yes
0 Deg. C		1994.800 MHz	1994.800 MHz	Yes
10 Deg. C		1994.800 MHz	1994.800 MHz	Yes
20 Deg. C		1994.800 MHz	1994.800 MHz	Yes
30 Deg. C		1994.800 MHz	1994.800 MHz	Yes
40 Deg. C		1994.800 MHz	1994.800 MHz	Yes
50 Deg. C		1994.800 MHz	1994.800 MHz	Yes

Intertek Test Data

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Test Engineer: Norman Shpilsher

Date: 31 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: 3143524MIN-001
Project Number: 3143524


Testing performed on the
URH-SMR G

to
47 CFR, Part 24:2007


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: 
Norman Shpilsher

Date: February 4, 2008

Reviewed by: 
Simon Khazon

Date: February 4, 2008



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3.0	TEST RESULTS	5
3.1	Environmental conditions	14
5.0	TEST EQUIPMENT	18



1.0 DESCRIPTION OF THE SAMPLE (EUT)

Model:	URH-SMR G
Type of EUT:	Optical 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:	<input type="checkbox"/> EN 55022:2006, Class [redacted] <input type="checkbox"/> EN 55011:1998 + A1:1999 + A2:2002, Group [redacted], Class [redacted] <input checked="" type="checkbox"/> 47 CFR, Part 24:2007 <input type="checkbox"/> 47 CFR, Part 15:2007, §15.107 and §15.109, Class [redacted] <input type="checkbox"/> EN 55014-1:2000 + A1:2001 + A2:2002 <input type="checkbox"/> EN 61326-1:2006 <input type="checkbox"/> Class [redacted] for Radiated and Conducted Emissions <input type="checkbox"/> EN 60601-1-2:2001 +A1:2006 <input type="checkbox"/> Class [redacted] Radiated and Conducted Emissions <input type="checkbox"/> EN 61000-6-3:2007 <input type="checkbox"/> EN 61000-6-4:2007 <input type="checkbox"/> EN 61000-3-2:2006 <input type="checkbox"/> EN 61000-3-3:1995 +A1:2001 +A2:2006 <input type="checkbox"/> Other [redacted]



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 24	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 (1990MHz) and upper frequency (1995MHz) of the operating band.
Testing was performed in frequency range from 30MHz to 20GHz.
2. The EUT Antenna Port was terminated with 50Ohm terminator.
The EUT was connected to the Support Equipment via the fiber optic cable.
The Support Equipment (XXXXXXXXX-HU, Signal Generator, D-Link Router, 48VDC Power Supply) was located outside of the test site.
3. The Spurious Radiated Power limits of -13dBm was correlated with field strength reference level of 82.2dB μ V/m during field strength measurements at 3m measurement distance.



3.0 TEST RESULTS

Radiated Emissions from 30MHz to 1GHz

Date: 01-31-2008

Company: ADC Telecommunications
Model: URH-SMR G
Test Engineer: Norman Shpilsher
Special Info:
Standard: FCC Part 24
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
 All measurements were taken using a Peak detector

Table # 1

Frequency MHz	Antenna Polarity	Peak Reading dBµV	Total C.F. dB1/m	Total at 3m dBµV/m	QP Limit dBµV/m	Margin dB
Channel 1990MHz						
35.159 MHz	V	48.5	17.8	66.3	82.2	-15.9
38.738 MHz	V	51.8	15.9	67.7	82.2	-14.5
42.809 MHz	V	53.6	13.7	67.4	82.2	-14.9
81.968 MHz	V	48.4	9.1	57.5	82.2	-24.7
87.521 MHz	V	45.9	9.7	55.6	82.2	-26.6
109.29 MHz	V	49.0	13.1	62.1	82.2	-20.1
157.71 MHz	V	46.6	12.2	58.8	82.2	-23.4
Channel 1995MHz						
34.281 MHz	H	36.2	18.3	54.5	82.2	-27.7
437.57 MHz	H	44.8	19.4	64.2	82.2	-18.0
450.2 MHz	H	33.1	19.3	52.4	82.2	-29.8
499.94 MHz	H	35.5	20.2	55.7	82.2	-26.5
Channel 1995MHz						
35.264 MHz	V	46.6	17.8	64.4	82.2	-17.9
39.054 MHz	V	51.4	15.7	67.1	82.2	-15.1
42.283 MHz	V	53.1	14.0	67.1	82.2	-15.1
81.88 MHz	V	47.6	9.1	56.7	82.2	-25.5
105.06 MHz	V	49.4	12.7	62.1	82.2	-20.2
156.87 MHz	V	46.8	12.3	59.1	82.2	-23.2
34.492 MHz	H	36.1	18.2	54.3	82.2	-28.0
276.53 MHz	H	45.0	15.1	60.1	82.2	-22.1
334.04 MHz	H	37.8	16.4	54.2	82.2	-28.0
425.28 MHz	H	34.0	19.5	53.5	82.2	-28.7
437.57 MHz	H	44.7	19.4	64.1	82.2	-18.1
499.94 MHz	H	36.0	20.2	56.2	82.2	-26.0



Radiated Emissions from 1 to 20GHz

Date: 01-31-2008

Company: ADC Telecommunications
Model: URH-SMR G
Test Engineer: Norman Shpilsher
Special Info:
Standard: FCC Part 24
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
 Measurements were taken using a Peak detector

Table # 2

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 1990MHz							
1.1062 GHz	V	46.9	27.7	39.7	34.9	82.2	-47.3
1.7522 GHz	V	46.7	30.2	39.0	37.9	82.2	-44.3
1.8457 GHz	V	47.2	30.6	38.9	38.9	82.2	-43.3
2.5002 GHz	V	41.9	32.6	37.8	36.7	82.2	-45.5
Channel 1995MHz							
1.1054 GHz	H	52.4	27.7	39.7	40.3	82.2	-41.9
1.2482 GHz	H	50.7	28.1	39.6	39.2	82.2	-43.0
1.8432 GHz	H	51.0	30.6	38.9	42.8	82.2	-39.4
4.1076 GHz	H	41.5	37.2	37.7	41.1	82.2	-41.1
Channel 1995MHz							
1.1062 GHz	V	48.3	27.7	39.7	36.3	82.2	-45.9
1.7522 GHz	V	48.0	30.2	39.0	39.2	82.2	-43.0
1.8457 GHz	V	48.3	30.6	38.9	40.1	82.2	-42.2
1.9987 GHz	V	44.7	31.4	38.6	37.5	82.2	-44.7
1.1054 GHz	H	52.1	27.7	39.7	40.0	82.2	-42.2
1.2482 GHz	H	49.9	28.1	39.6	38.4	82.2	-43.8
1.4998 GHz	H	48.8	28.9	39.4	38.3	82.2	-43.9
1.7514 GHz	H	48.1	30.2	39.0	39.3	82.2	-42.9
1.8432 GHz	H	51.9	30.6	38.9	43.7	82.2	-38.5
3.8526 GHz	H	40.9	36.5	37.7	39.7	82.2	-42.5
4.1076 GHz	H	40.0	37.2	37.7	39.5	82.2	-42.7
4.3218 GHz	H	39.6	38.0	37.6	40.0	82.2	-42.2



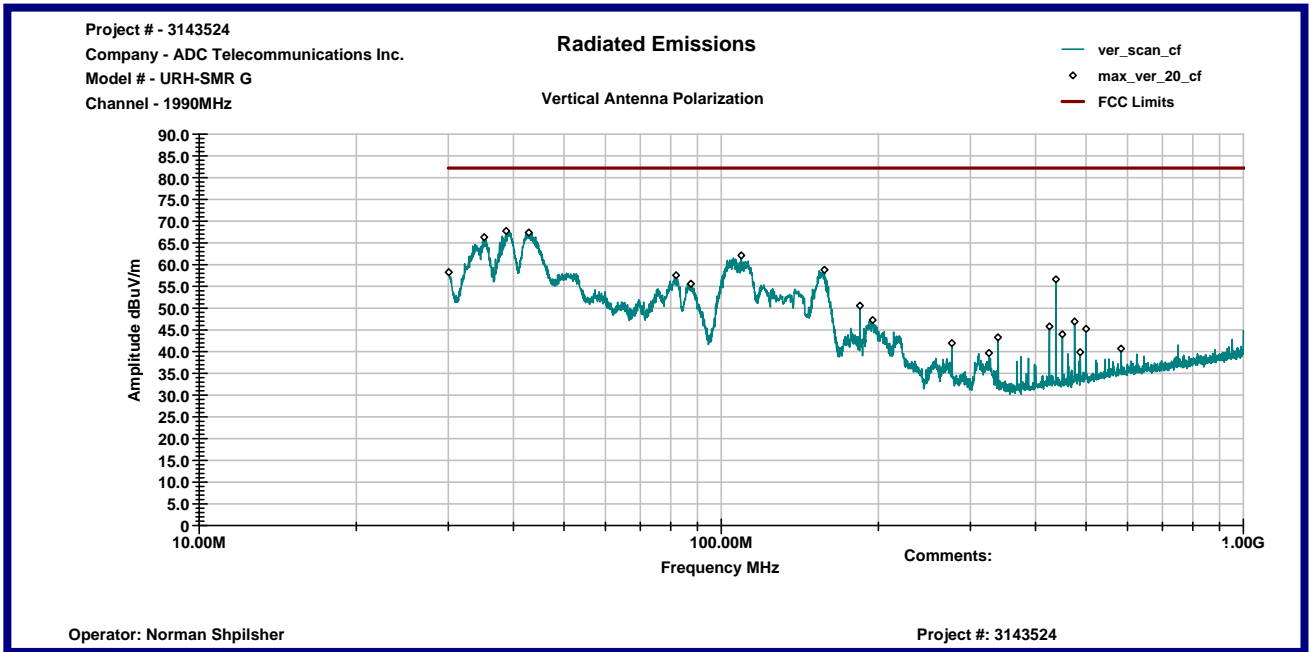
Spurious Enclosure Emissions

Date: 01-31-2008

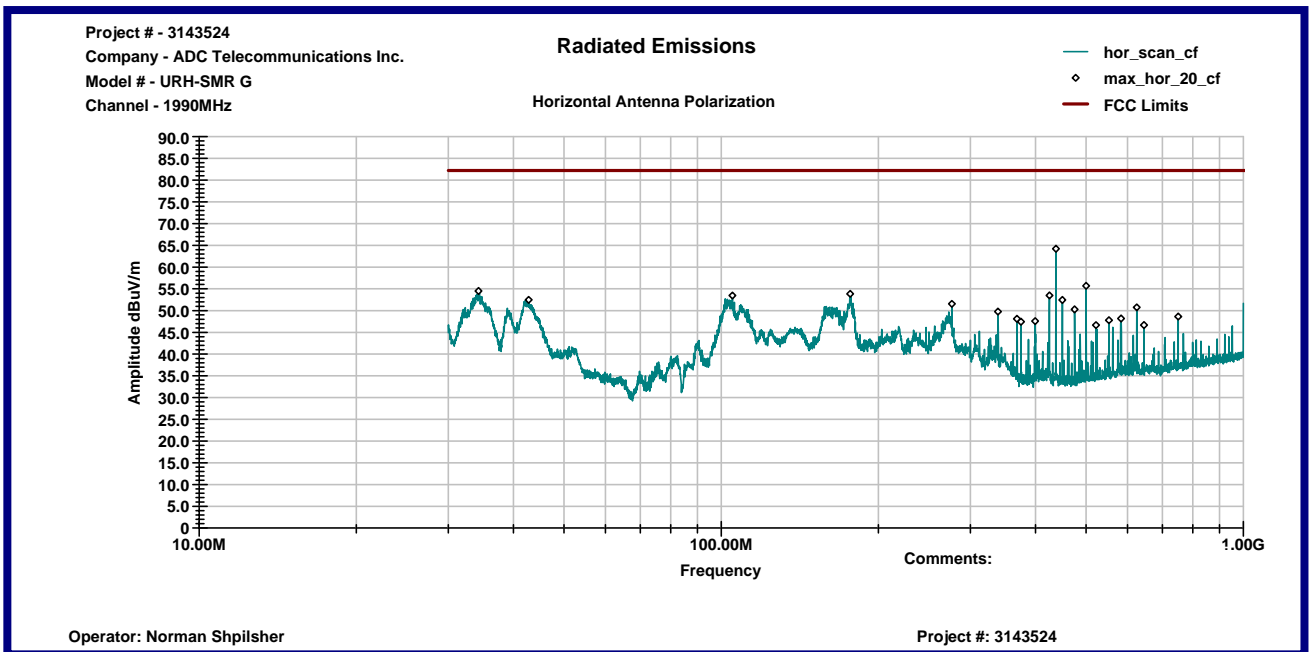
Company: ADC Telecommunications Inc.
Model: URH-SMR G
Test Engineer: Norman Shpilsher
Special Config. Info: Substitution Measurements
Limits: FCC Part 24
Frequency Range: 30MHz - 20GHz
Test Site: 3m Anechoic Chamber
Note: The table shows radiated emissions with margin less than 20dB below straight measurements limits

Table # 3

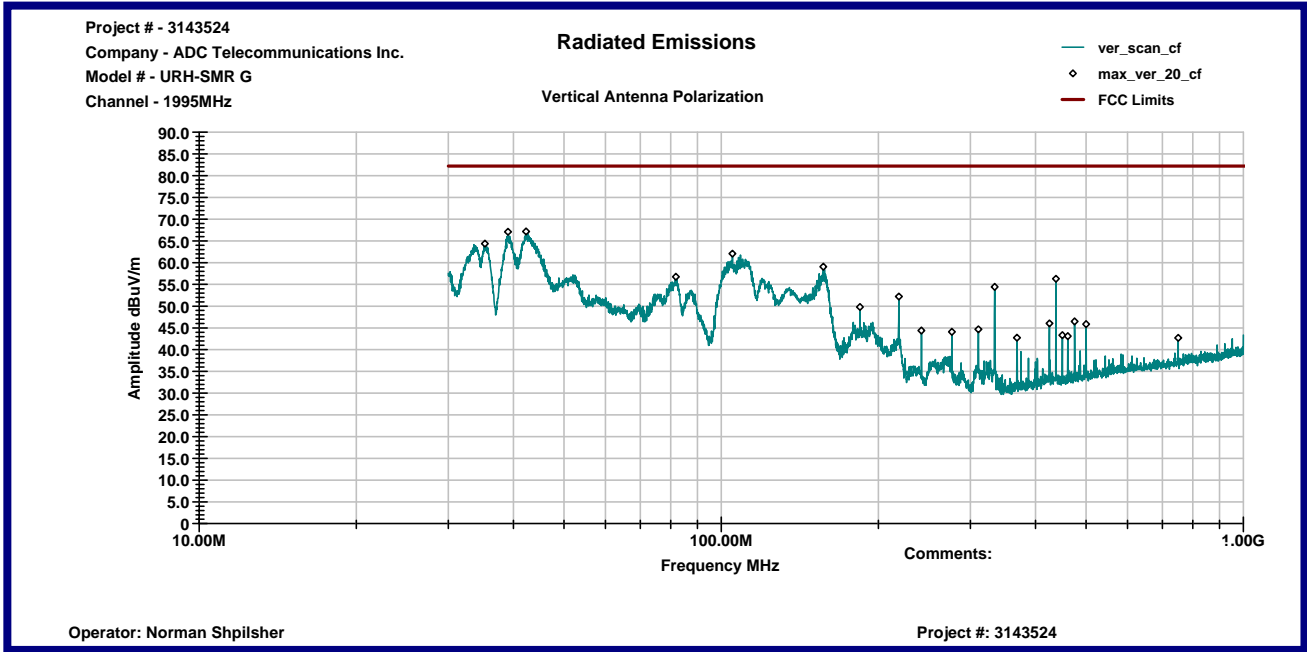
Frequency MHz	Antenna Polarity	Measured Emissions dBµV	Substitution Antenna Power dBm	Substitution Antenna Gain dBi	Cable Loss dB	ERP Spur. Emissions dBm	Limit dBm	Margin dB
Channel 1990MHz								
35.16	V	48.50	-25.9	-12.3	0.1	-38.3	-13.0	-25.3
38.74	V	51.80	-22.4	-10.5	0.1	-33.0	-13.0	-20.0
42.81	V	53.60	-20.5	-8.9	0.1	-29.5	-13.0	-16.5
437.57	H	44.80	-34.2	0.0	0.2	-34.4	-13.0	-21.4
Channel 1995MHz								
35.26	V	46.60	-27.8	-12.3	0.1	-40.2	-13.0	-27.2
39.05	V	51.40	-22.8	-10.4	0.1	-33.3	-13.0	-20.3
42.28	V	53.10	-21.0	-9.1	0.1	-30.2	-13.0	-17.2
437.57	H	44.70	-34.3	0.0	0.2	-34.5	-13.0	-21.5



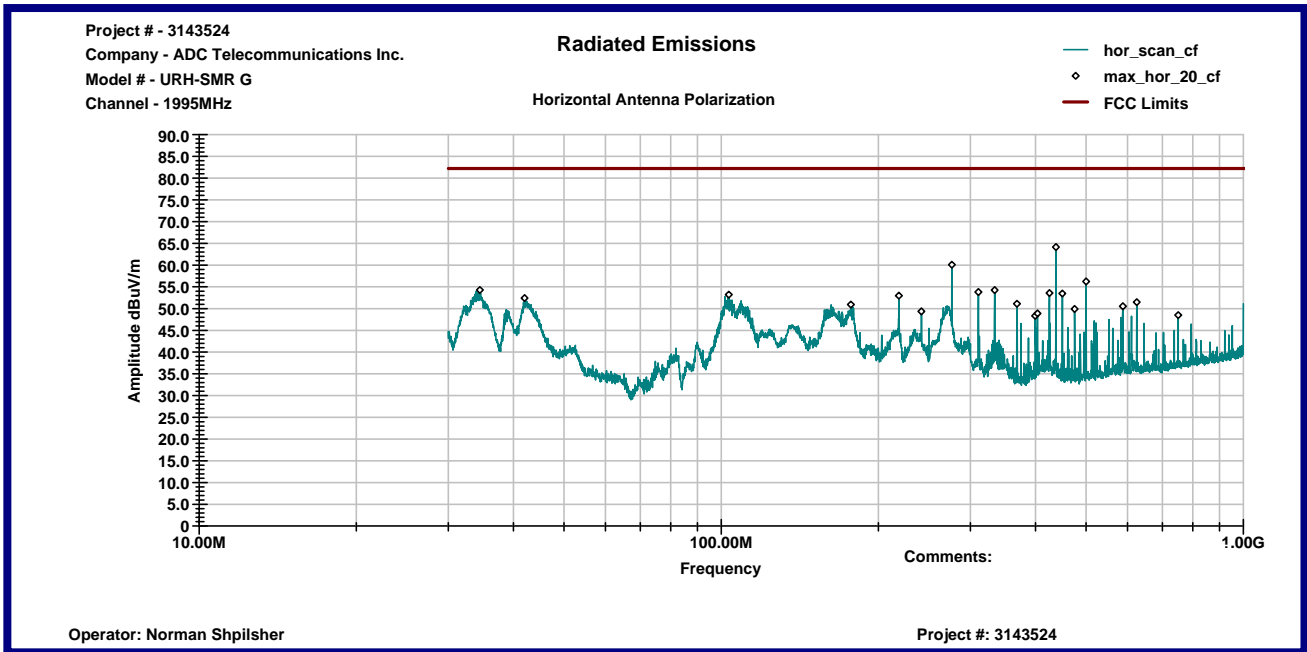
Graph 1



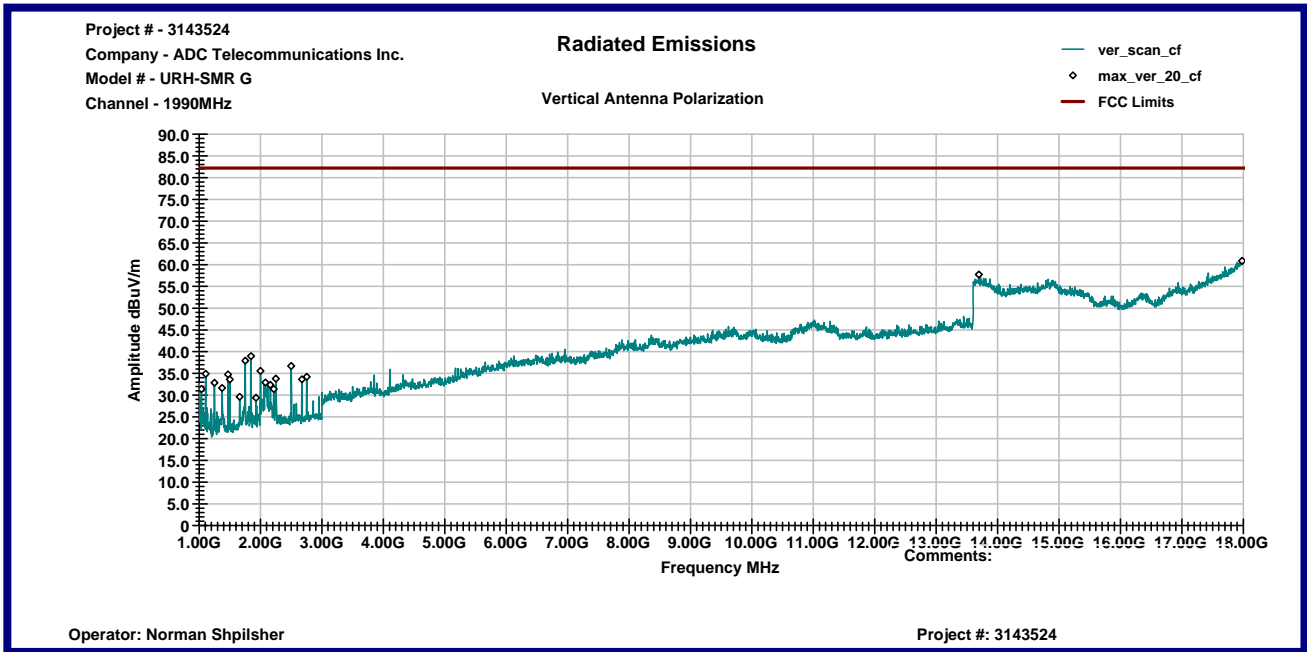
Graph 2



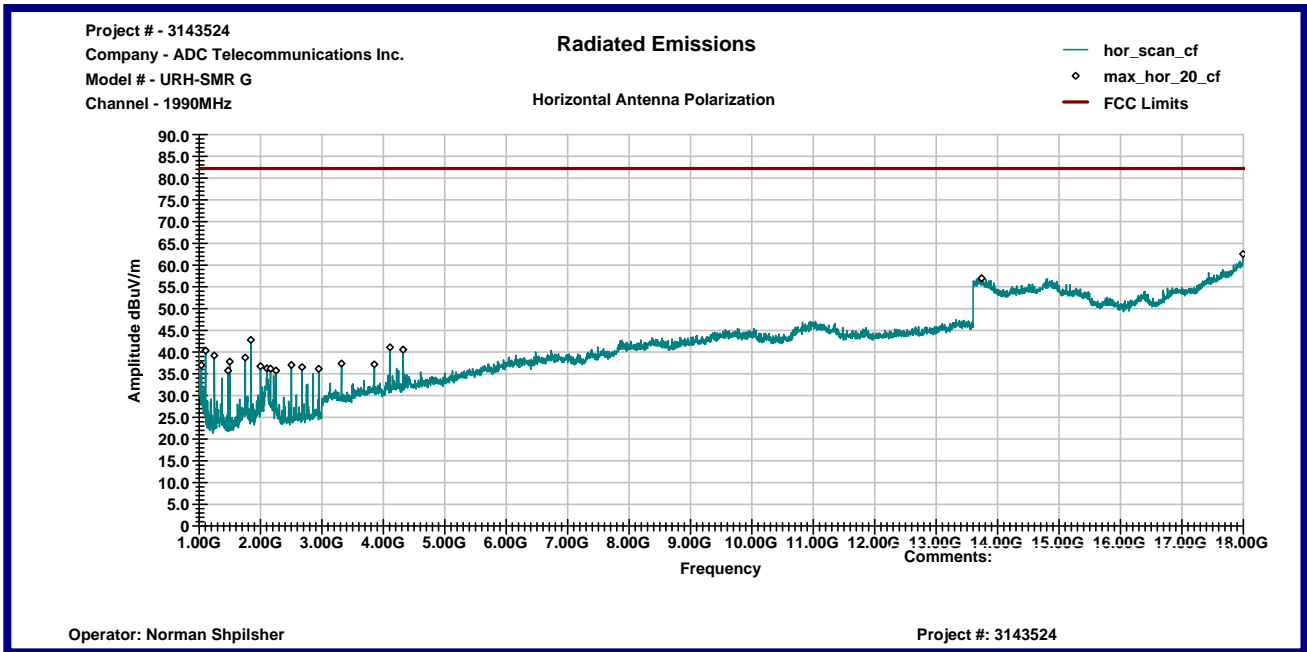
Graph 3



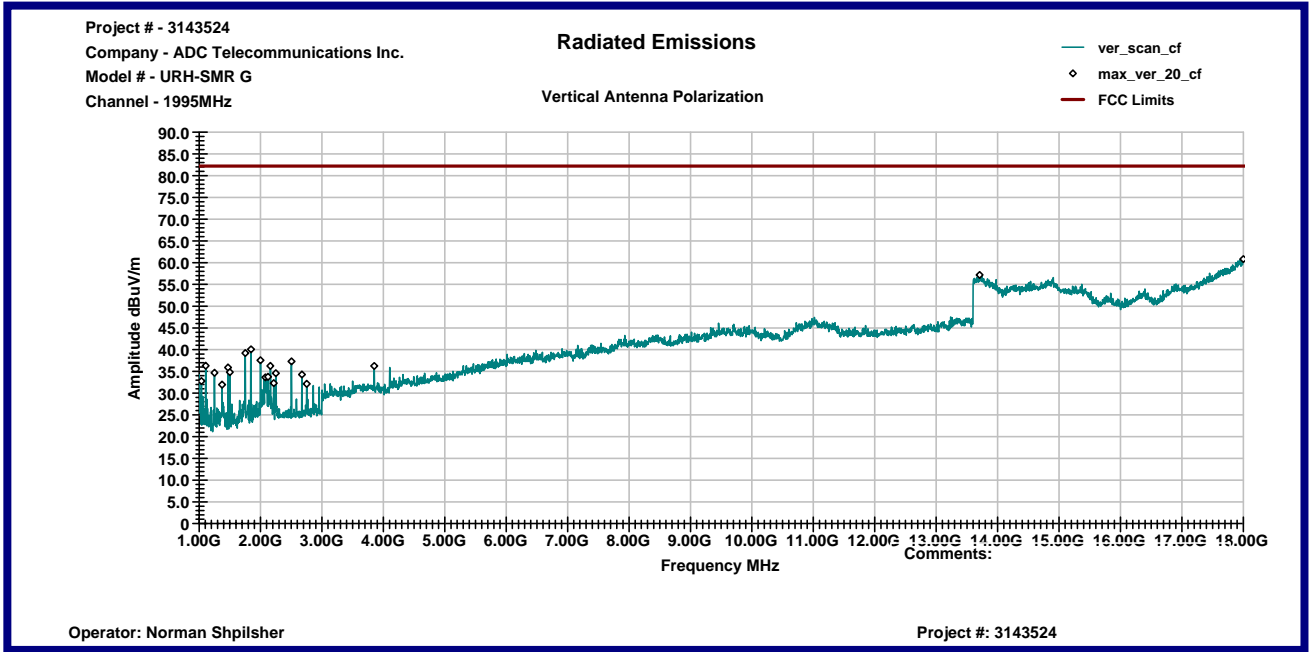
Graph 4



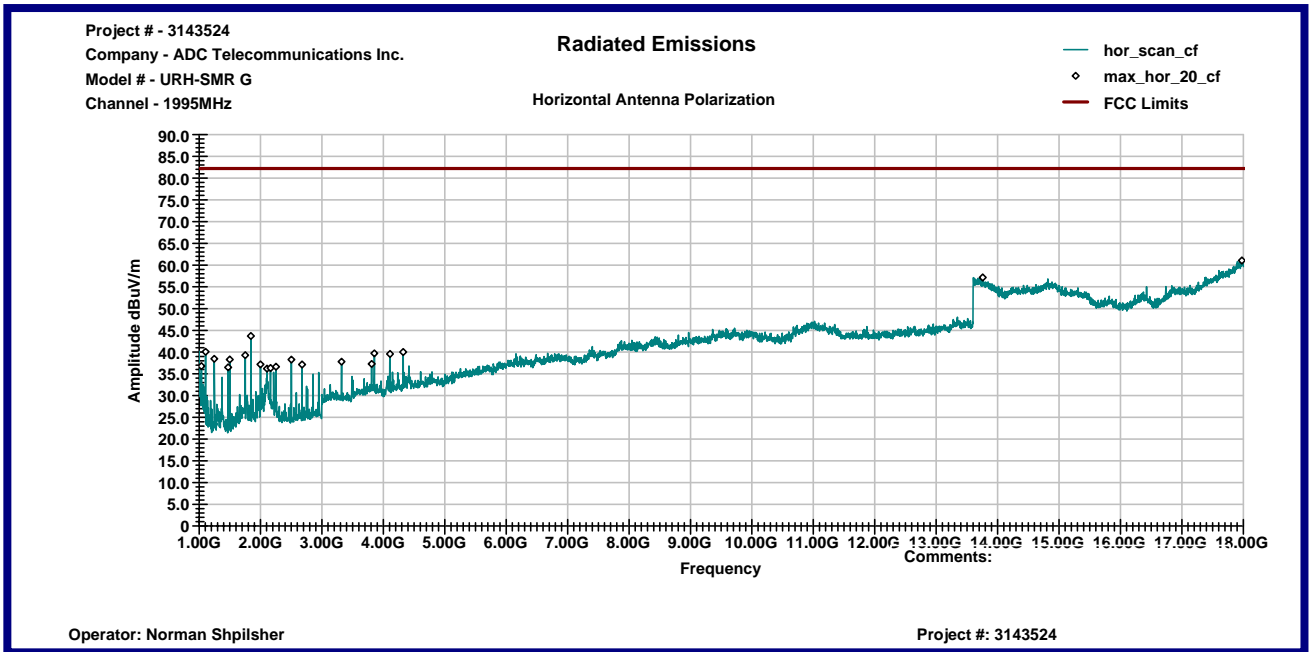
Graph 5



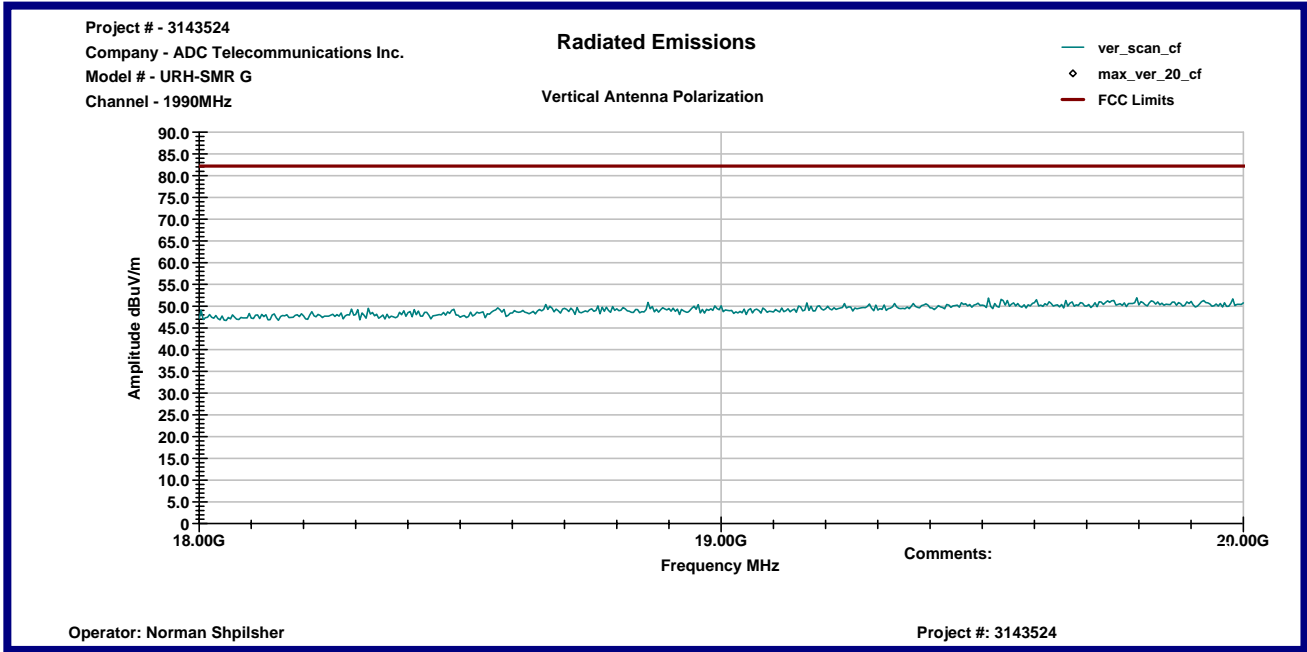
Graph 6



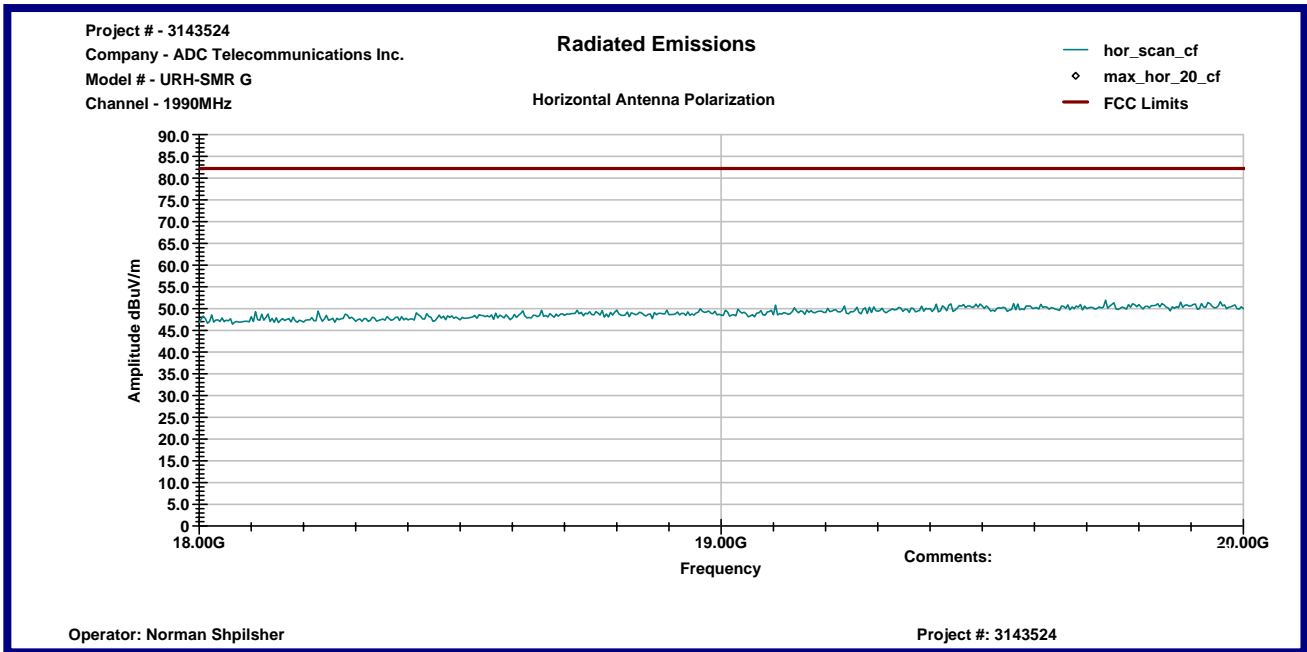
Graph 7



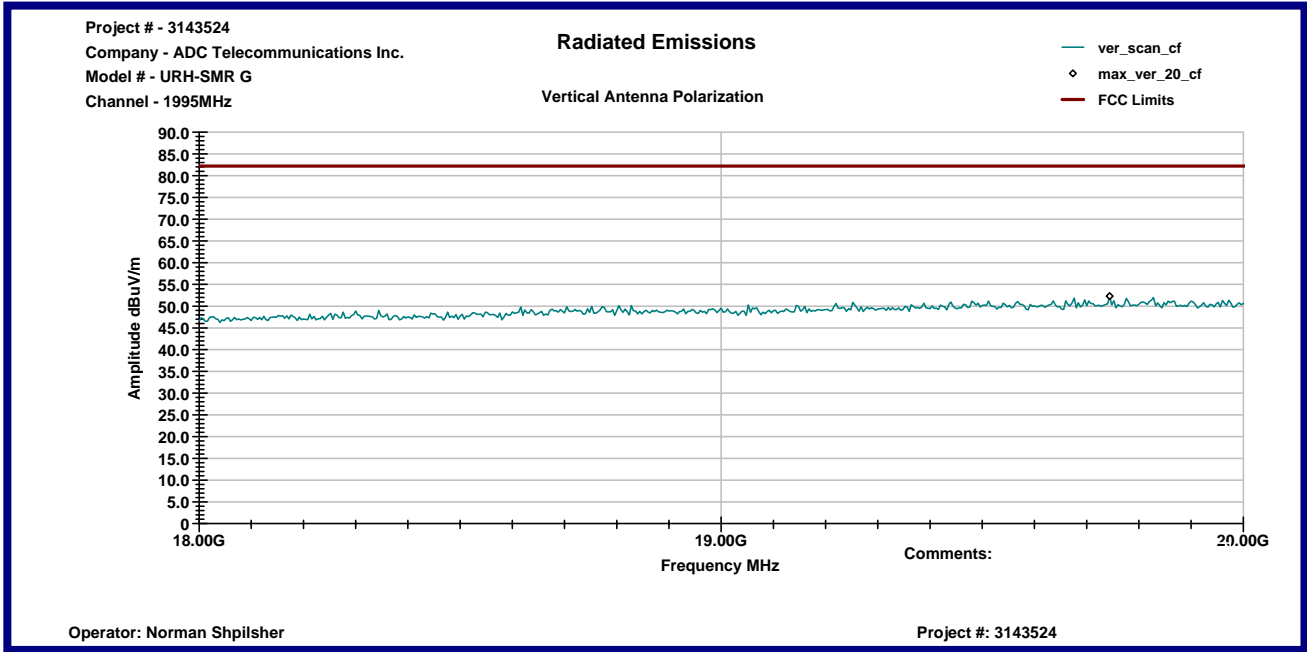
Graph 8



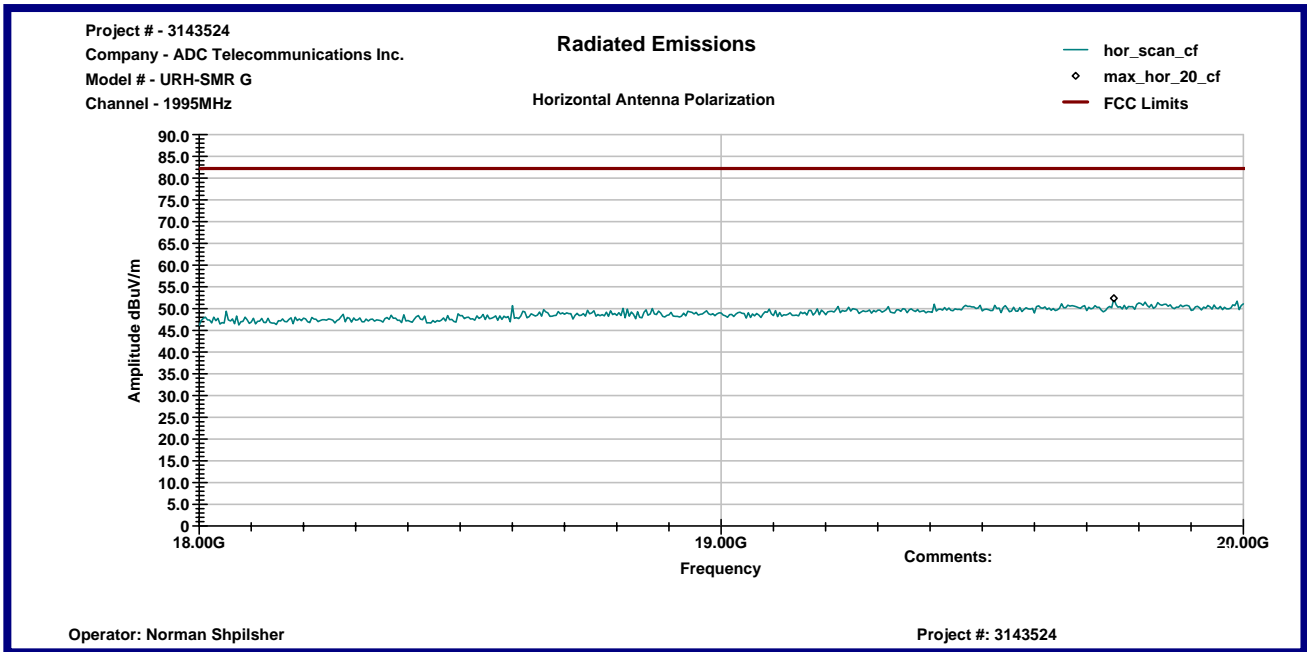
Graph 9



Graph 10



Graph 11



Graph 12



3.1 Environmental conditions

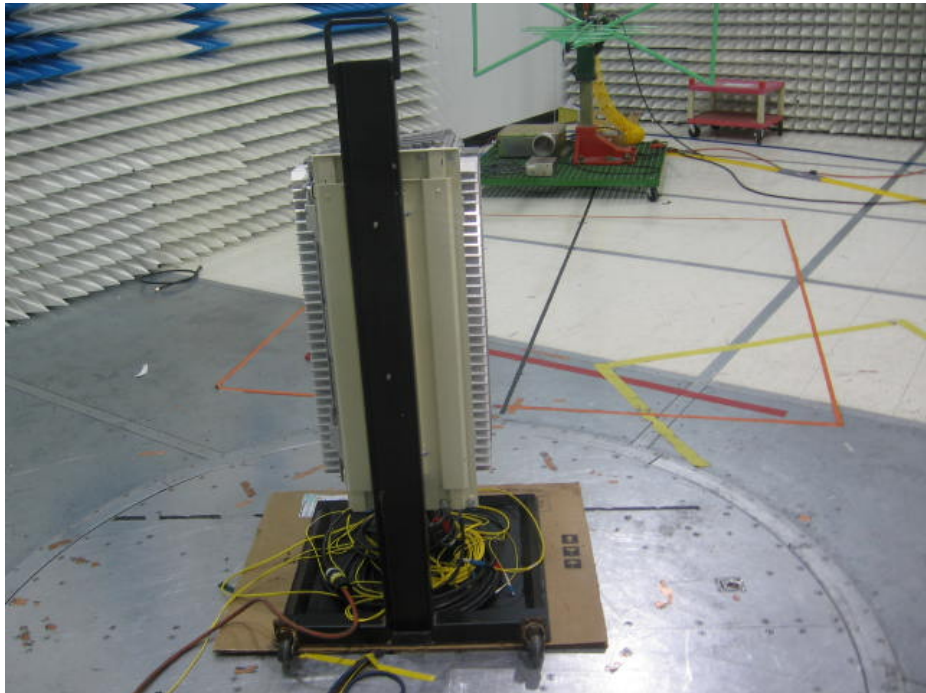
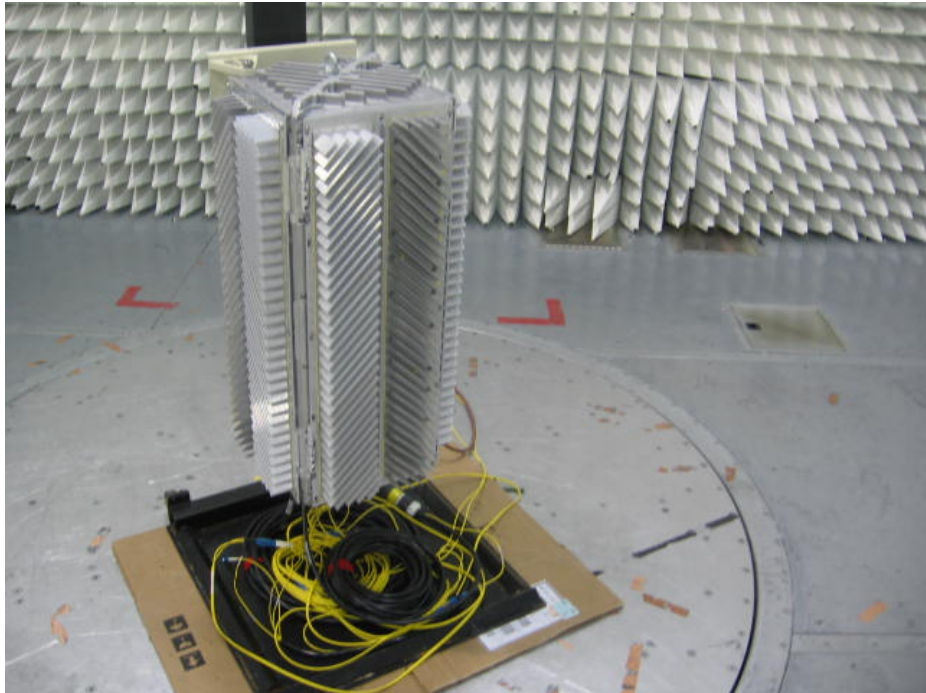
During the measurement the environmental conditions were within the listed ranges:

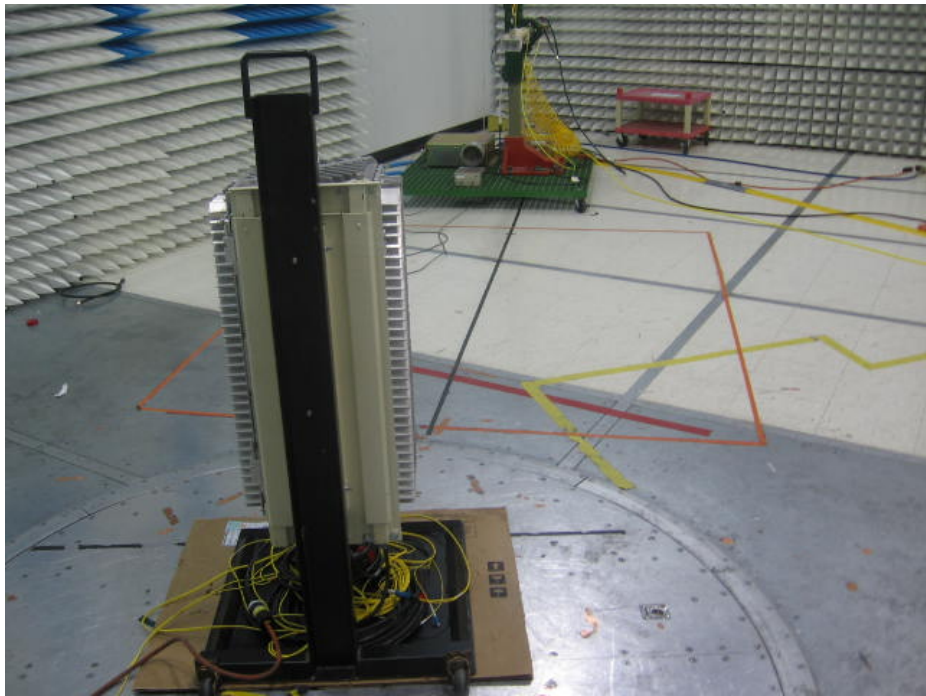
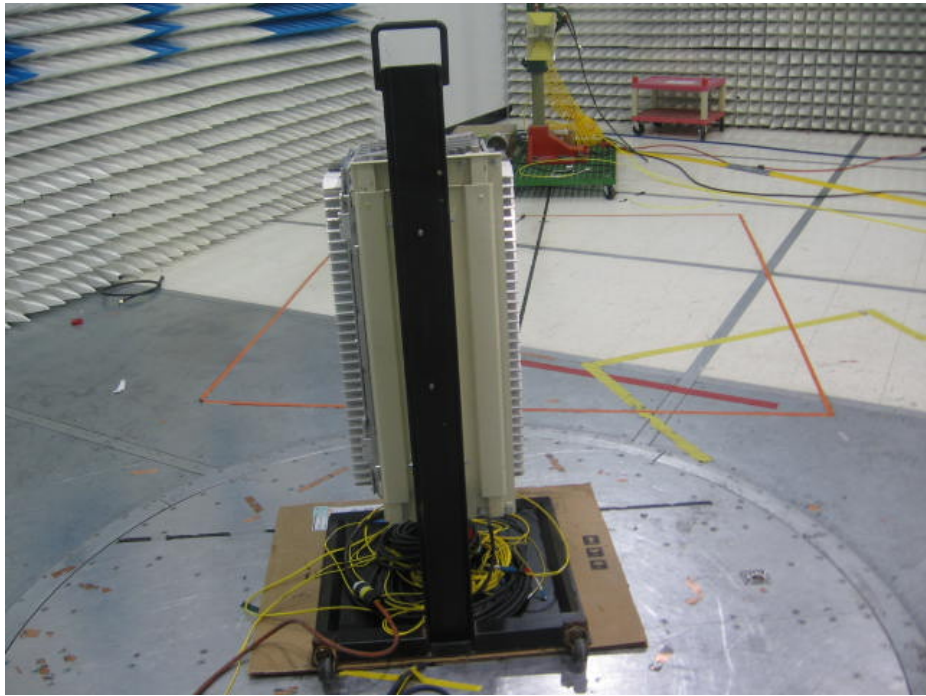
Temperature: 15-35 ° C

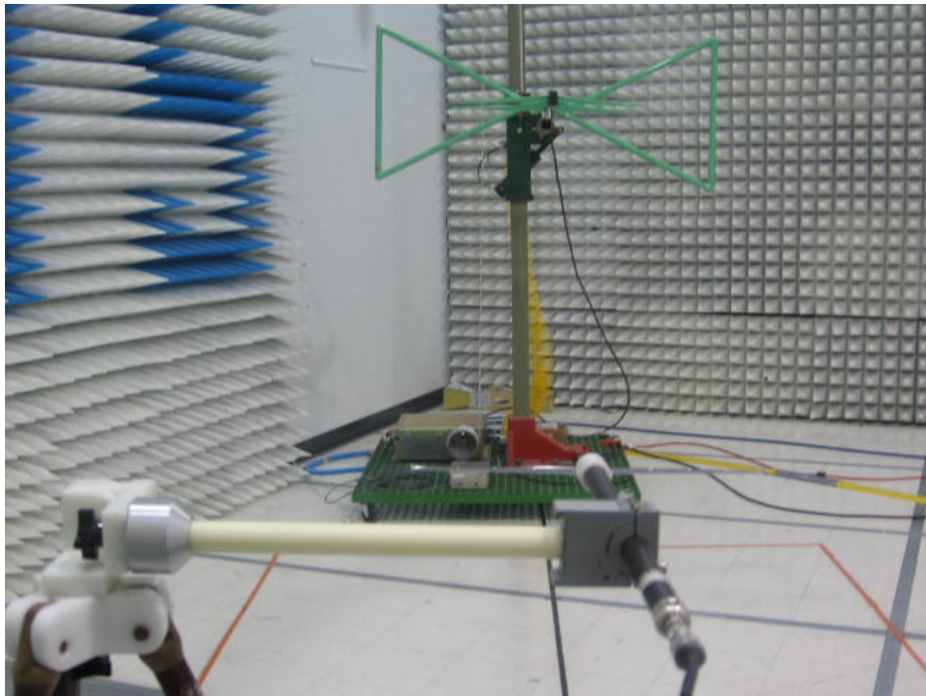
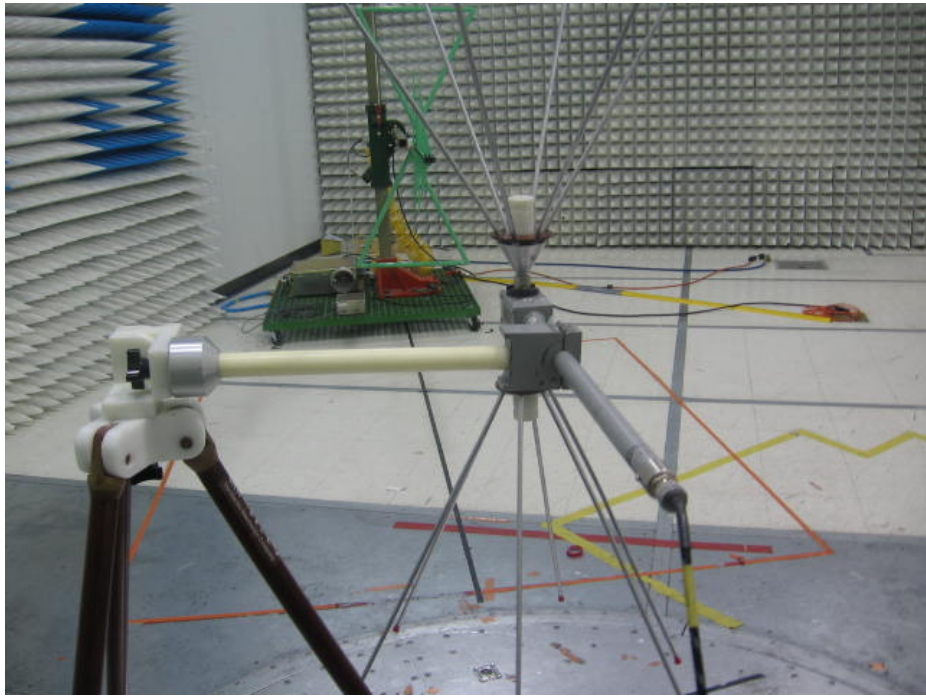
Humidity: 30-60 %

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	<input type="checkbox"/>
RF Filter Section	HP	85460A	3448A00276	02/27/2008	<input type="checkbox"/>
Spectrum Analyzer	R & S	FSP 40	100024	08/23/2008	<input checked="" type="checkbox"/>
Spectrum Analyzer	R & S	ESCI	100358	04/27/2008	<input checked="" type="checkbox"/>
Spectrum Analyzer	Agilent	E7402A	MY44212200	10/22/2008	<input type="checkbox"/>
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	07/30/2008	<input checked="" type="checkbox"/>
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2630	09/07/2008	<input type="checkbox"/>
Horn Antenna	EMCO	3115	6579	03/06/2008	<input checked="" type="checkbox"/>
Waveguide Horn Antenna	EMCO	3116	9904-2423	07/20/2008	<input checked="" type="checkbox"/>
Loop Antenna	A.H.Systems	SAS-200/562	215	05/04/2008	<input type="checkbox"/>
Monopole Antenna	A.H.Systems	SAS-200/550-1	692	05/09/2008	<input type="checkbox"/>
Biconical Antenna	EMCO	3110B	9605-2482	03/04/2008	<input checked="" type="checkbox"/>
Tuned Dipole	CDI	Roberts Antenna 4	00599	VBU	<input checked="" type="checkbox"/>
LISN	Fischer Custom Communications	FCC-LISN-2	316	09/24/2008	<input type="checkbox"/>
LISN	Fischer Custom Communications	FCC-LISN-50-25-2	2014	10/22/2008	<input type="checkbox"/>
Field Monitor	NARDA	ELT-400	J-0039	02/06/2008	<input type="checkbox"/>
B-Field Sensor	NARDA	BN 2300	J-0049	02/06/2008	<input type="checkbox"/>
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	04/24/2008	<input checked="" type="checkbox"/>
Pre-Amplifier	MITEQ	AMF-6F-16002600-25-10P	1222383	01/17/2009	<input checked="" type="checkbox"/>
Pre-Amplifier	MITEQ	AMF-6F-26004000-40-8P	13224444	11/05/2008	<input type="checkbox"/>
Pre-Amplifier	HP	8447F OPT H64	3113A04974	03/07/2008	<input type="checkbox"/>
System	TILE! Instrument Control		Ver. 3.4.K.29	VBU	<input checked="" type="checkbox"/>
5001ix	California Instruments System	5001	55864, 55863, 55862, 72277	11/08/2008	<input type="checkbox"/>
CTS 3.0.19	California Instruments Harmonic/Flicker Software	632		11/08/2008	<input type="checkbox"/>

8.0

APPENDIX C

Measurement Protocol

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Measurement Protocol

Environmental conditions of the lab, (ADC)

Temperature: 21 - 26° 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 (dB) (dB/m) (dB)	FINAL (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 placed directly on the turntable/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 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.