TESTING
CERT #803.01, 803.02, 803.05, 803.06

ADDENDUM TO POWERWAVE TECHNOLOGIES, INC. TEST REPORT FC07-001C

FOR THE

NEXUS FT 1900+G REPEATER, RH330020/101 & RH330020/102

FCC PART 24E AND RSS-131 ISSUE 2 (2003)

TESTING

DATE OF ISSUE: OCTOBER 22, 2009

PREPARED FOR:

Powerwave Technologies, Inc.
1801 E. St. Andrew Place
Santa Ana, CA 92705

P.O. No.: 131345
W.O. No.: 89952

PREPARED BY:

Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Date of test: October 14 - 19, 2009

Report No.: FC07-001E

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ADMINISTRATIVE INFORMATION

DATE OF TEST:
October 14 - 19, 2009

DATE OF RECEIPT:
October 1, 2009

REPRESENTATIVE:
Charlotte Yu

MANUFACTURER:
Powerwave Technologies, Inc.
1801 E. St. Andrew Place
Santa Ana, CA 92705

TEST LOCATION:
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

FREQUENCY RANGE TESTED: 9 kHz - 20 GHz

TEST METHOD: FCC Part 24E, RSS-131 Issue 2 (2003) and RSS GEN Issue 2 (2007)

PURPOSE OF TEST:
Original Report: To demonstrate the compliance of the Repeater, RH300020/110 with the requirements for FCC Part 24 and RSS-131 devices.
Addendum A: To change the model number to RH300020/211 with no new testing.
Addendum B: To add data for testing of the RH300020/100 with the requirements for FCC Part 24 and RSS-131.
Addendum C: To add additional model numbers with no new testing.
Addendum D: To add 15.107, 15.109 and 15.111 data with new testing.
Addendum E: To add verification testing data for new model numbers Nexus FT 1900+G Repeater, RH330020/101 & RH330020/102 with the requirements for FCC Part 24E and RSS-131 devices.

APPROVALS

Steve Behm, Director of Engineering Services

TEST PERSONNEL:

Eddie Wong, Senior EMC Engineer

SITE FILE REGISTRATION NUMBERS

Location	Japan	Canada	FCC
Brea A	R-301, C-314 & T-266	3082D-1	90473

SUMMARY OF RESULTS

Test	Specification/Method	Results
RF Output Power	FCC 24.232 (a)	Pass
OBW Input/Output Power	FCC 2.1049 (I)	Pass
Spurious Emissons at Ant Terminal	FCC 24.238 (a)	Pass
Field Strength of Spurious Radiation	FCC 24.238 (a)	Pass
FCC Bandedge		Pass
Intermodulation		Pass
Out of Band Rejection		Pass
99% Bandwidth	RSS-131 Issue 2 (2003)	Pass
Amplifier Gain and Bandwidth	RSS-131Sec. 6.1 Issue 2 (2003)	Pass
Mean Output Power	RSS-131 Sec. 6.3.1 Issue 2 (2003)	Pass

CONDITIONS DURING TESTING

No modifications to the EUT were necessary during testing.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The following model has been tested by CKC Laboratories:
Nexus FT 1900+G Repeater, RH330020/101

The manufacturer states that the following additional models are identical electrically to the one which was tested, or any differences between them do not affect their EMC characteristics, and therefore they meet the level of testing equivalent to the tested models.
Nexus FT 1900+G Repeater, RH330020/102

EQUIPMENT UNDER TEST

Nexus FT 1900+G Repeater
Manuf: Powerwave Technologies
Model: RH330020/101
Serial: NA

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Power Meter
Manuf: Agilent
Model: E4419B
Serial: GB402019/12

Pre Amp
Manuf: Mini Circuit
Model: ZHL-4240
Serial: D040405

Optical Converter
Manuf: Powerwave
Model: NA
Serial: NA

ESG
Manuf: Agilent
Model: E4438C
Serial: MY42082180

TEMPERATURE AND HUMIDITY DURING TESTING
The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

FCC 2.1033(c)(3) USER'S MANUAL
The necessary information is contained in a separate document.

FCC 2.1033 (c)(4) TYPE OF EMISSIONS
GXW, G7W, F9W, D9W

FCC 2.1033(c)(5) FREQUENCY RANGE
1930 to 1995 MHz

FCC 2.1033(c)(6) OPERATING POWER
20 Watts

FCC 2.1033(c)(7) MAXIMUM POWER RATING
100 Watts

FCC 2.1033(c)(8) DC VOLTAGES
The necessary information is contained in a separate document.

FCC 2.1033(c)(9) TUNE-UP PROCEDURE
The necessary information is contained in a separate document.

FCC 2.1033(c)(10) SCHEMATICS AND CIRCUITRY DESCRIPTION
The necessary information is contained in a separate document.

FCC 2.1033(c)(11) LABEL AND PLACEMENT
The necessary information is contained in a separate document.

FCC 2.1033(c)(12) SUBMITTAL PHOTOS
The necessary information is contained in a separate document.

FCC 2.1033(c)(13) MODULATION INFORMATION
GSM, EDGE,CDMA2000, WDCMA, LTE

MEASUREMENT UNCERTAINTIES

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

FCC 2.1033(c)(14)/2.1046/24.232 (a) - RF POWER OUTPUT

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
RF Power meter	02778	HP	EPM-441A	GB37170458	021508	021510
Power Sensor	02777	HP	E4412A	MY41499662	021508	021510
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	072308	072310
36" 37GHz cable	02945	Strolab	NA	NA	092109	092111

Test Set up

The EUT is an Optical to RF repeater. The manufacturer does not provide an antenna for sale with the product, hence EIRP is not measured nor calculated.

The RF power of the EUT was measured at the antenna port. The measurement satisfies the above requirement by demonstrating the measured power is below 100 watts.

The EUT is placed on the wooden table. The RF output port is connected to a load string. An optical in port is connected to a support optical converter.

The support optical converter receives RF signal; converts the signal to optic and sends it to the EUT. The EUT decodes the optical signal and generates an RF signal. RF Output power is measured at the antenna port of the EUT.

In addition, the Peak to Power Ratio (PAR) was measured with a spectrum analyzer with CCDF function to meet the requirement for Amplifiers as required.

Conclusion: Each single channel does not exceed the 100 Watt peak power limit.

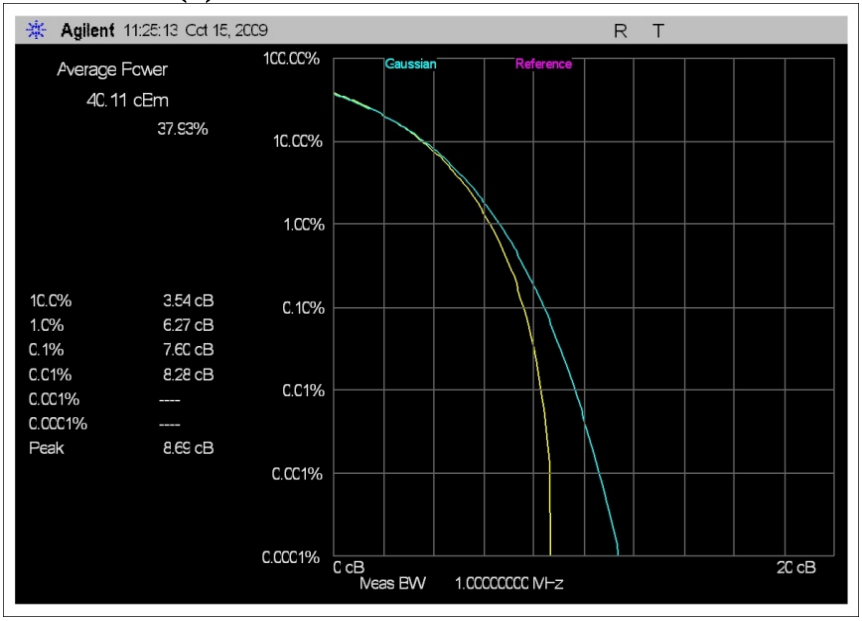
Test Setup Photos

Test Data

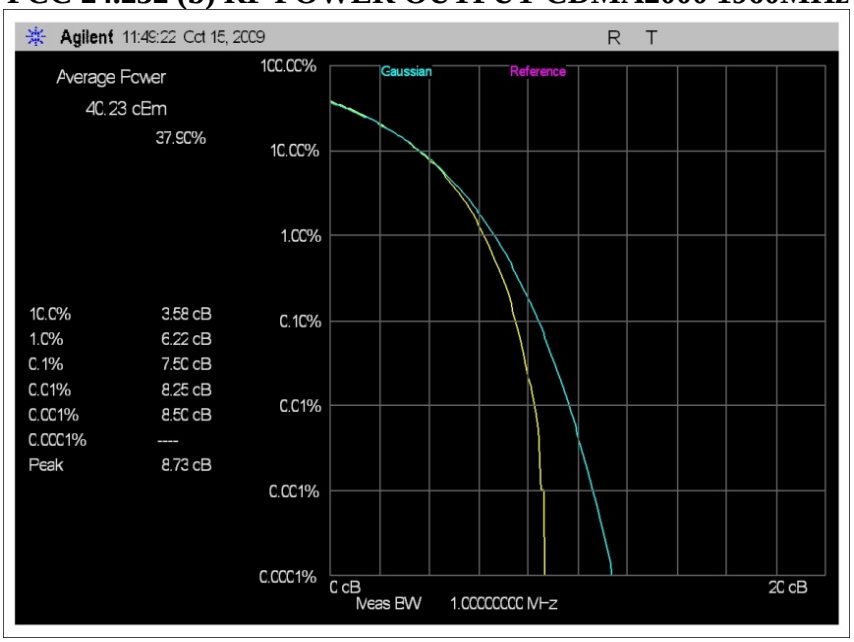
Tested By: E. Wong

GSM	1930.2MHz	1962.5MHz	1994.8MHz
	20.0W	**20.0W**	**20.0W**
EDGE	1930.2MHz	1962.5MHz	1994.8MHz
	20.0W	**20.0W**	**20.0W**
CDMA2000	1931.0MHz	1962.5MHz	1994.0MHz
	20.0W	**20.0W**	**20.0W**
WCDMA	1932.5MHz	1962.5MHz	1992.5MHz
	20.0W	**20.0W**	**20.0W**
LTE	1932.5MHz	1962.5MHz	1992.5MHz
	20.0W	**20.0W**	**20.0W**

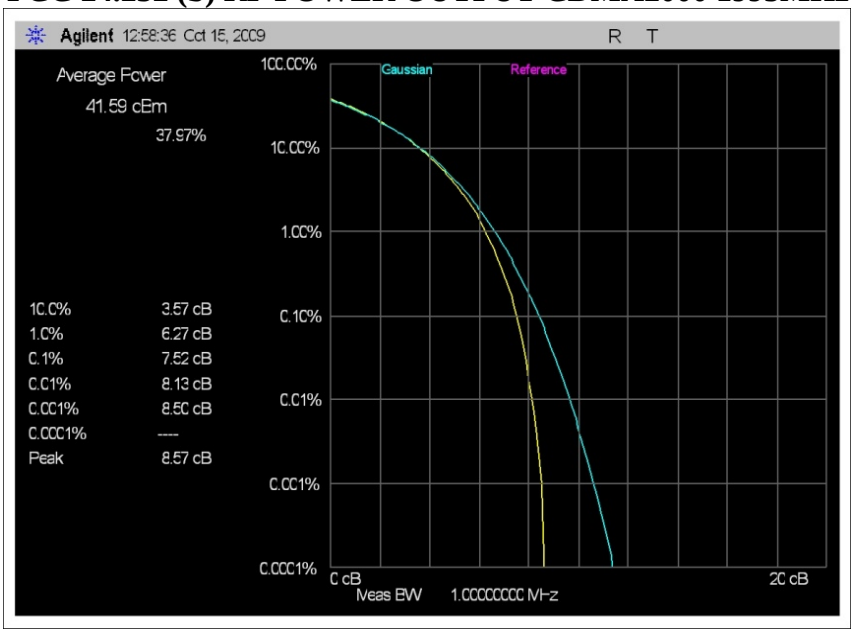
FCC 24.232 (b) RF POWER OUTPUT CDMA2000 1930MHz



FCC 24.232 (b) RF POWER OUTPUT CDMA2000 1960MHz

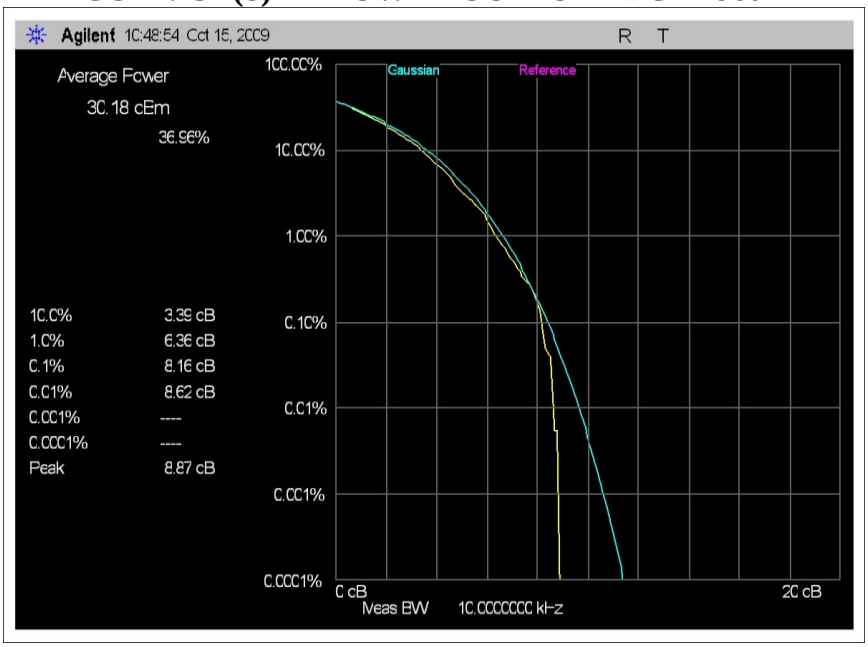


FCC 24.232 (b) RF POWER OUTPUT CDMA2000 1995MHz

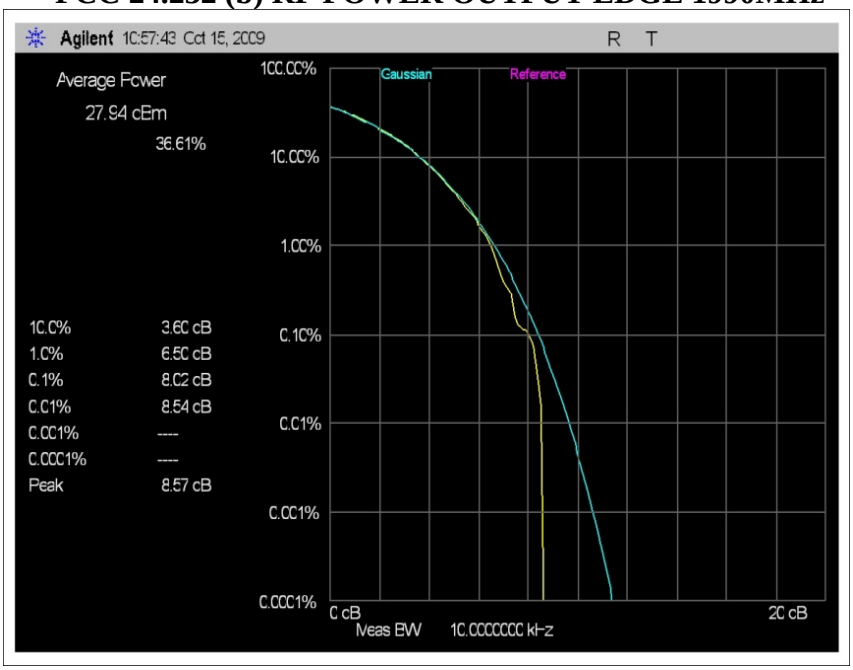


FCC 24.232 (b) RF POWER OUTPUT EDGE 1930MHz

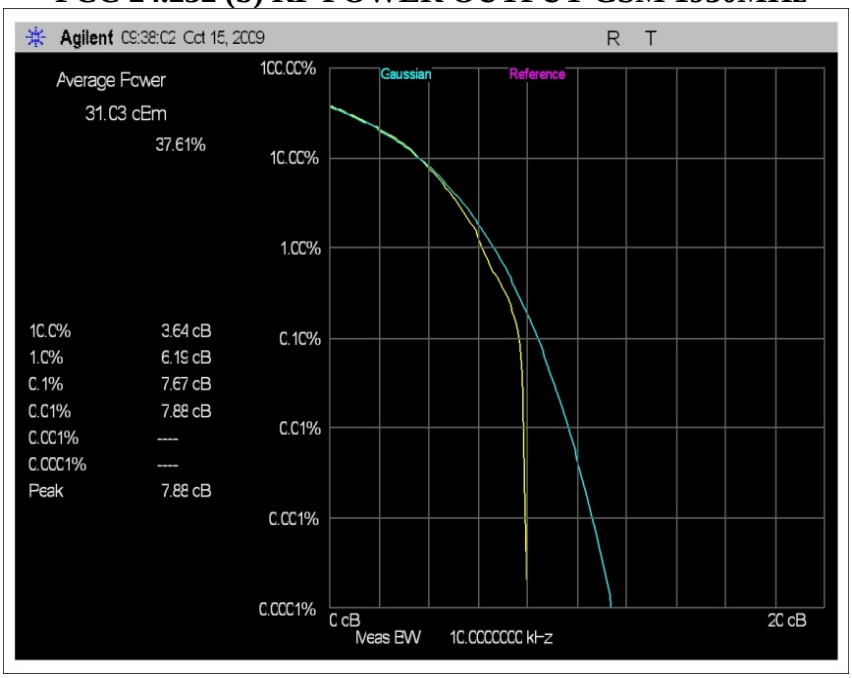
FCC 24.232 (b) RF POWER OUTPUT EDGE 1960MHz



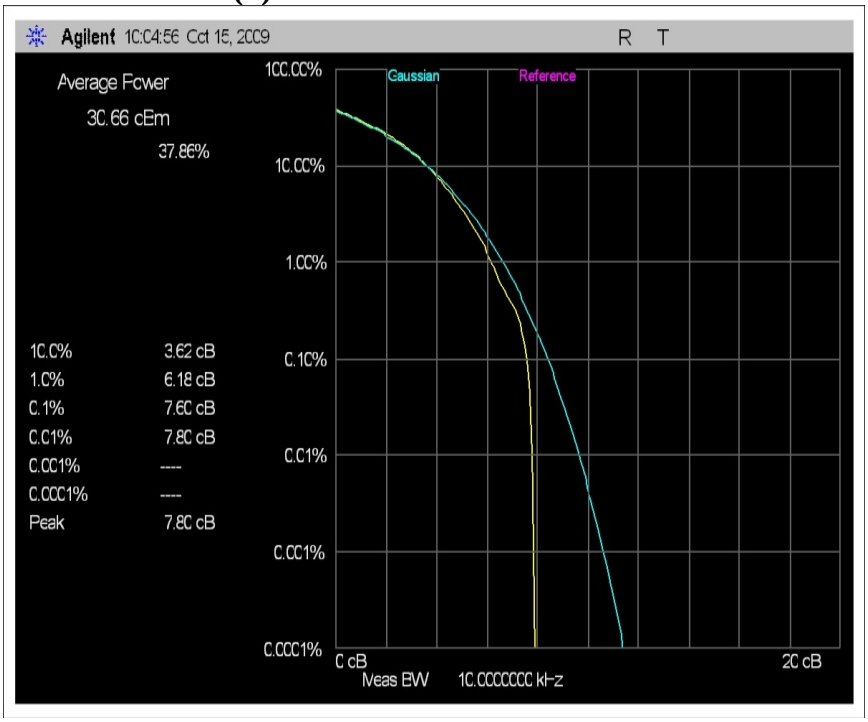
FCC 24.232 (b) RF POWER OUTPUT EDGE 1990MHz



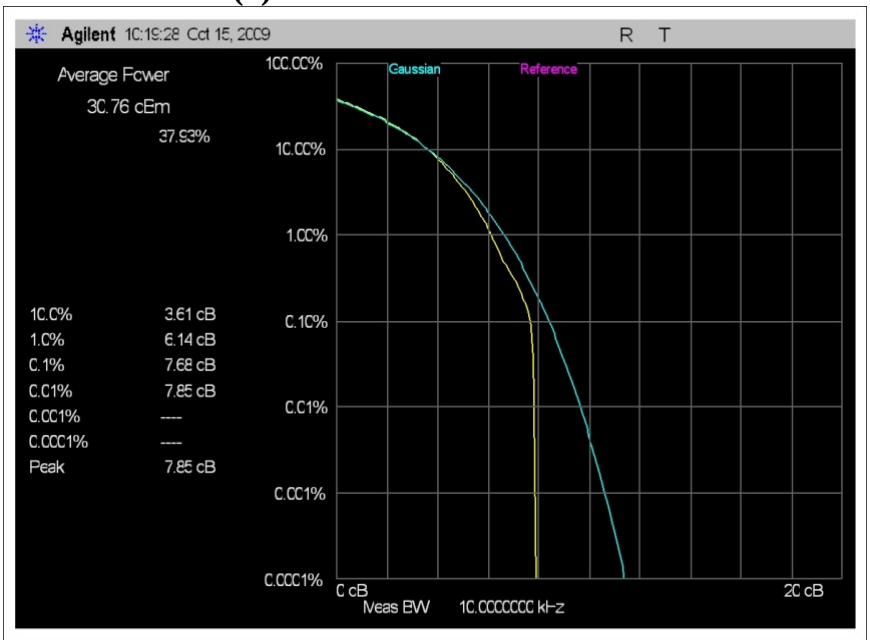
FCC 24.232 (b) RF POWER OUTPUT GSM 1930MHz



FCC 24.232 (b) RF POWER OUTPUT GSM 1962MHz

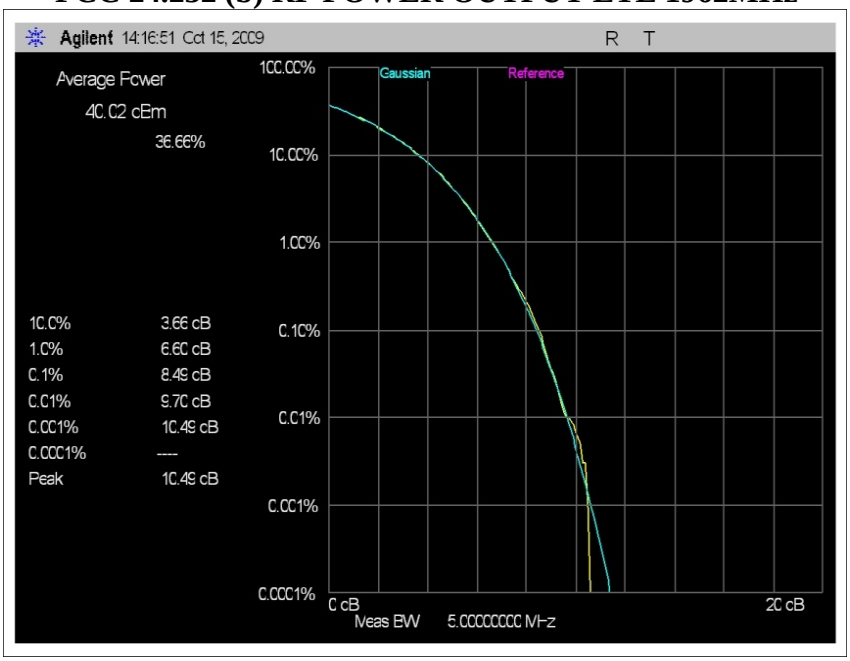


FCC 24.232 (b) RF POWER OUTPUT GSM 1990MHz



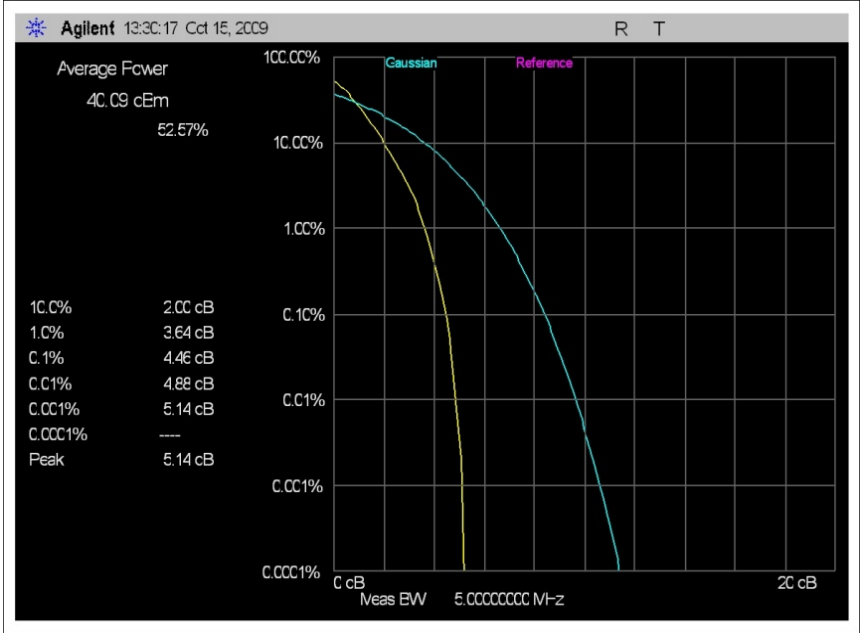
FCC 24.232 (b) RF POWER OUTPUT LTE 1930MHz

FCC 24.232 (b) RF POWER OUTPUT LTE 1962MHz

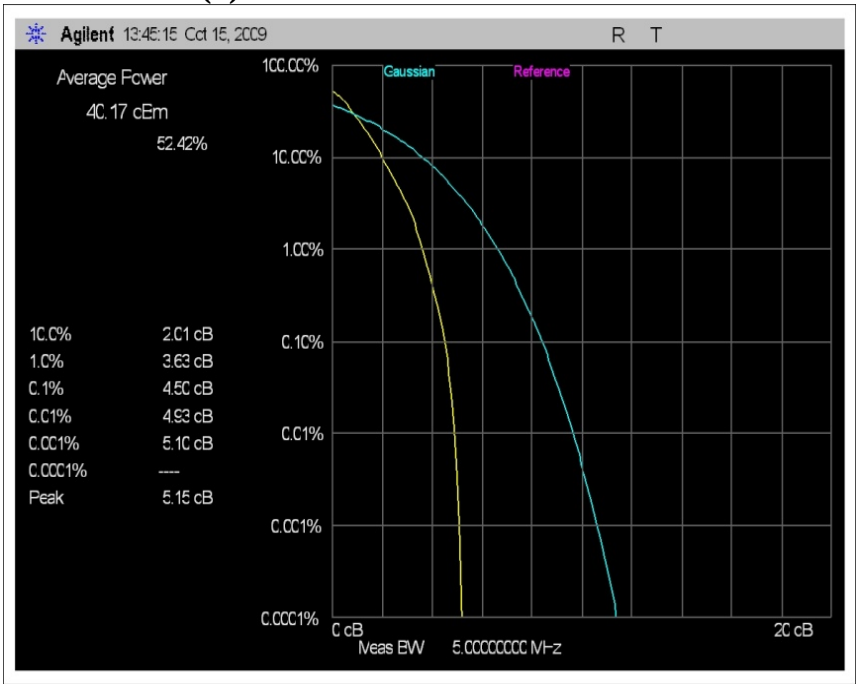


FCC 24.232 (b) RF POWER OUTPUT LTE 1995MHz

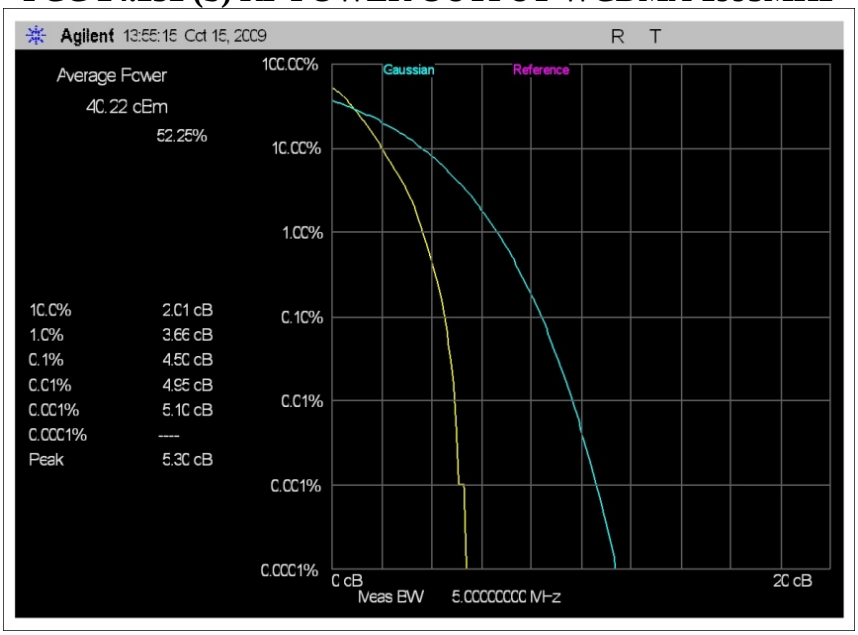
FCC 24.232 (b) RF POWER OUTPUT WCDMA 1930MHz



FCC 24.232 (b) RF POWER OUTPUT WCDMA 1962MHz



FCC 24.232 (b) RF POWER OUTPUT WCDMA 1995MHz



FCC 2.1033(c)(14)/2.1049(i) OCCUPIED BANDWIDTH

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	072308	072310
36" 37GHz cable	02945	Strolab	NA	NA	092100	092111

Test Set up

The EUT is placed on the wooden table. The RF output port is connected to a load string. An optical in port is connected to a support optical converter.

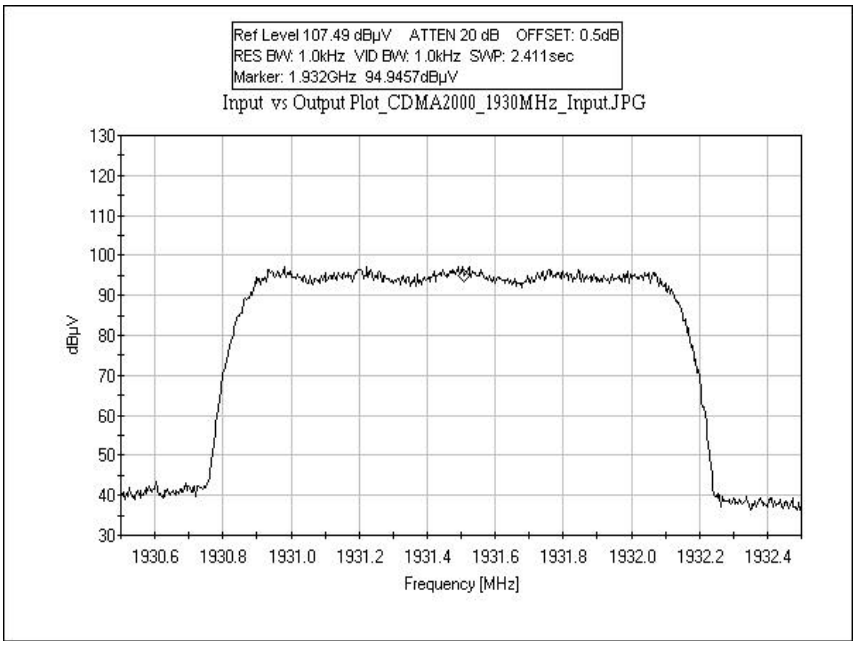
The support optical converter receives RF signal converts the signal to optic and sends it to the EUT. The EUT decodes the optical signal, and generates an RF signal.

Output waveform is recorded with a spectrum analyzer at the Antenna port of the device.
Input waveform is recorded with a spectrum analyzer at the RF out of the support ESG.

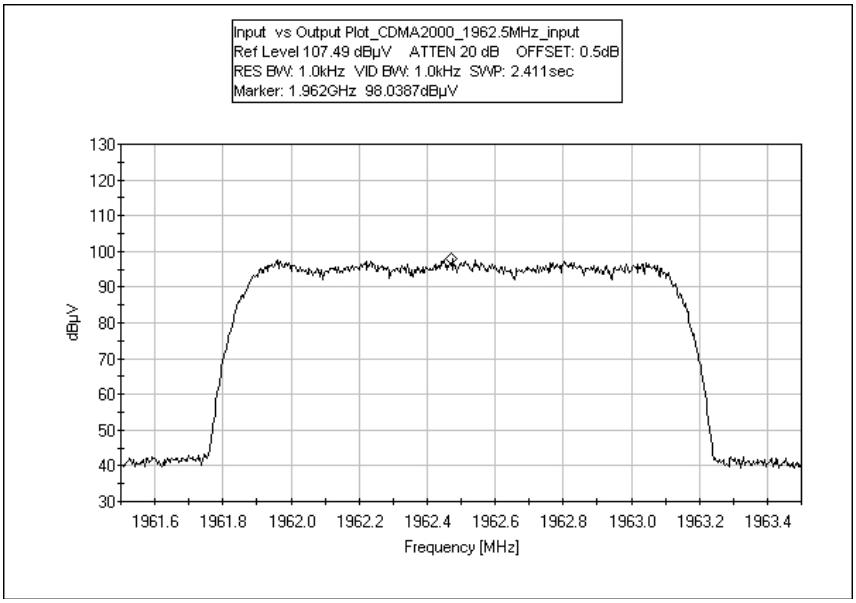
Test Setup Photo

Test Data
Tested By: E. Wong

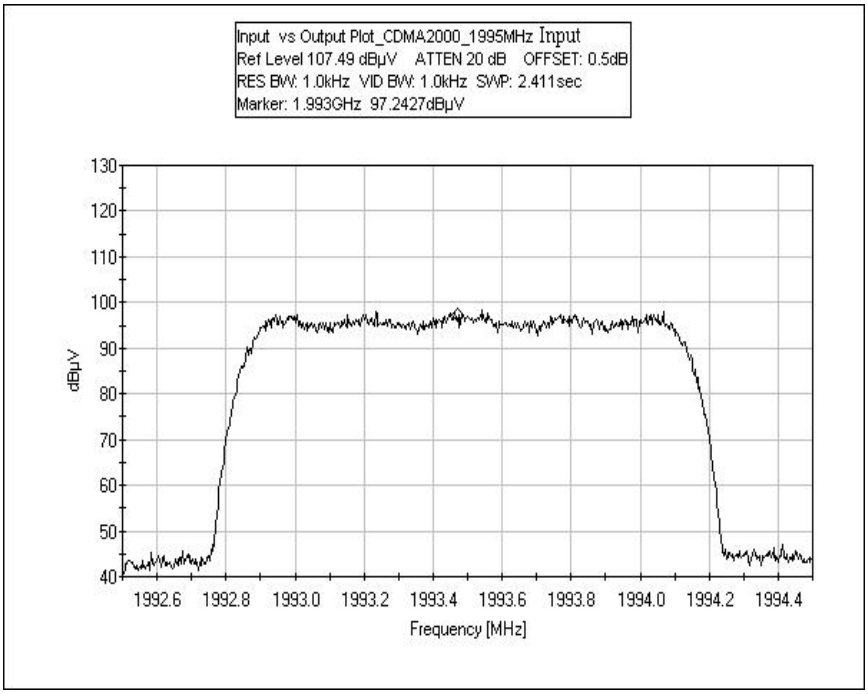
CDMA2000 1930MHz INPUT



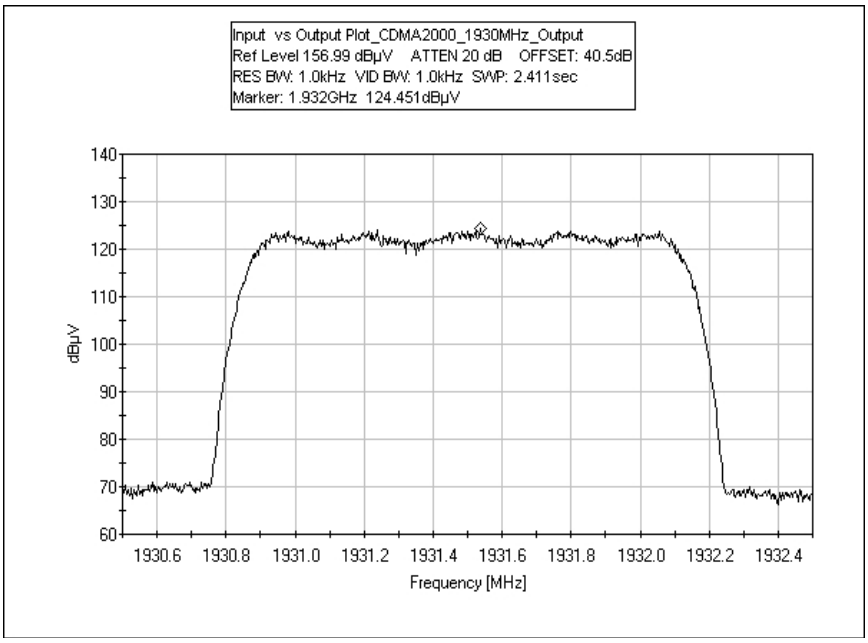
CDMA2000 1962MHz INPUT



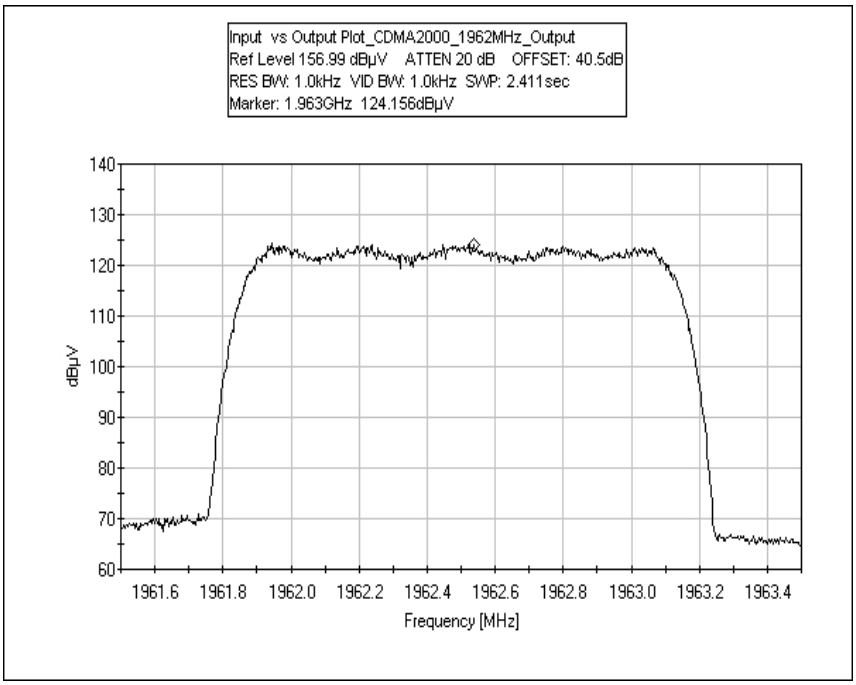
CDMA2000 1995MHz INPUT



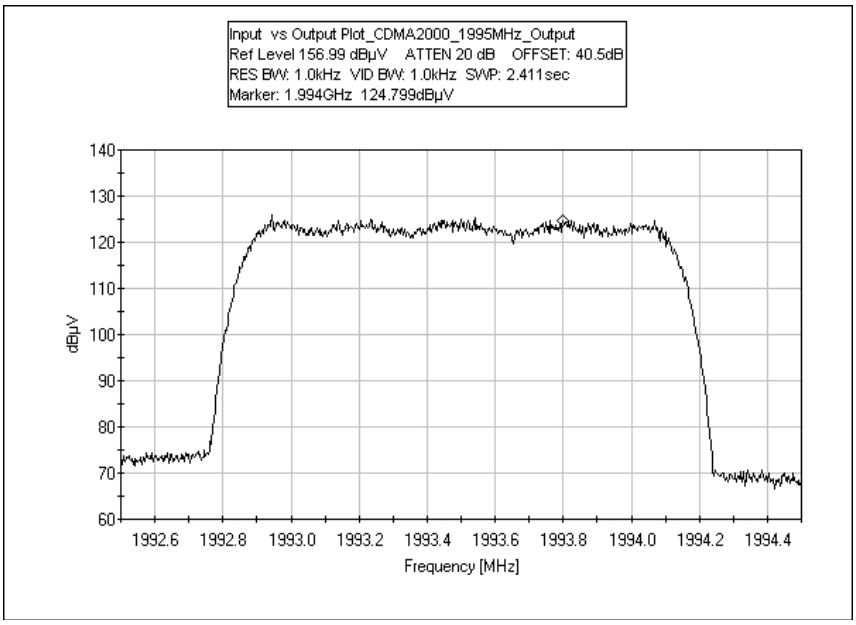
CDMA2000 1930MHz OUTPUT



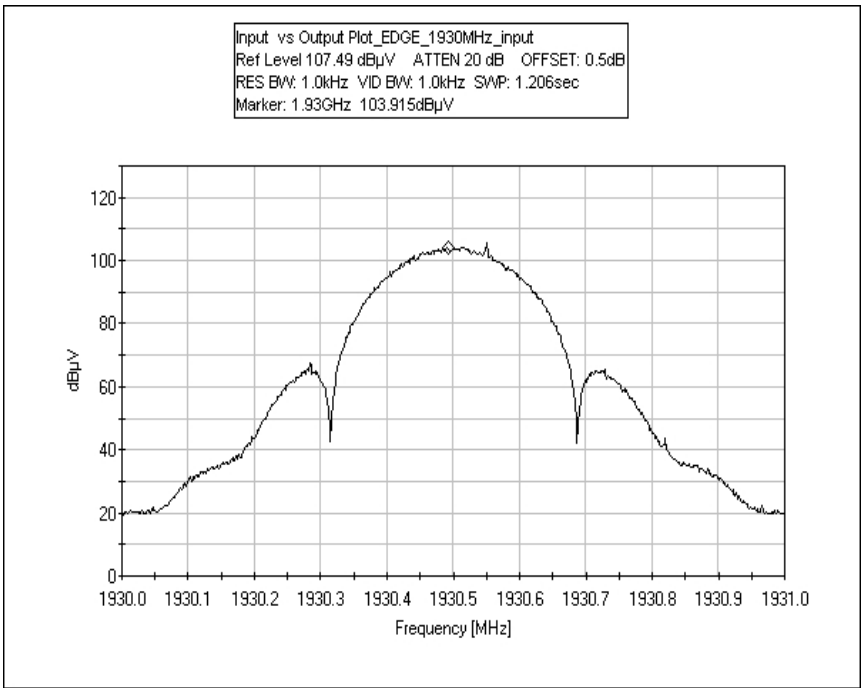
CDMA2000 1962MHz OUTPUT



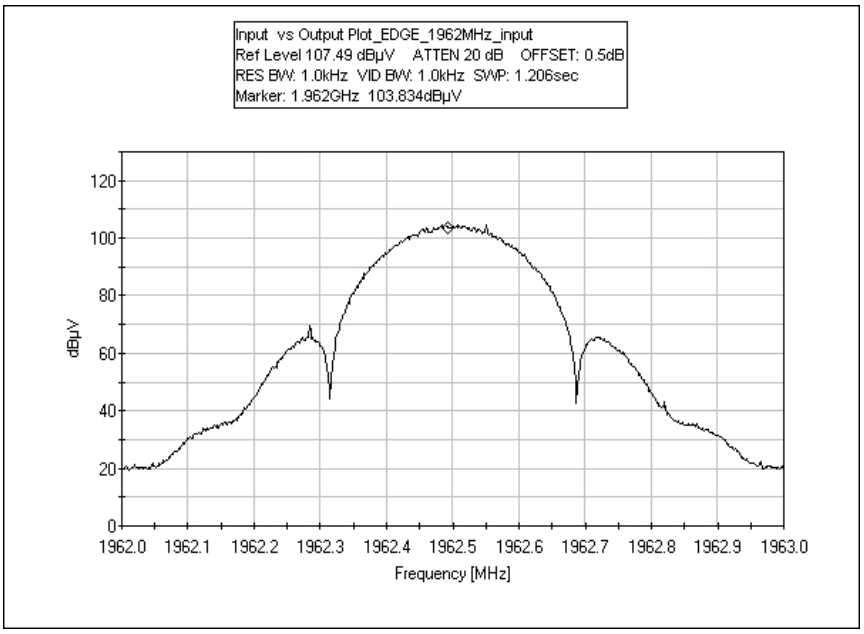
CDMA2000 1995MHz OUTPUT



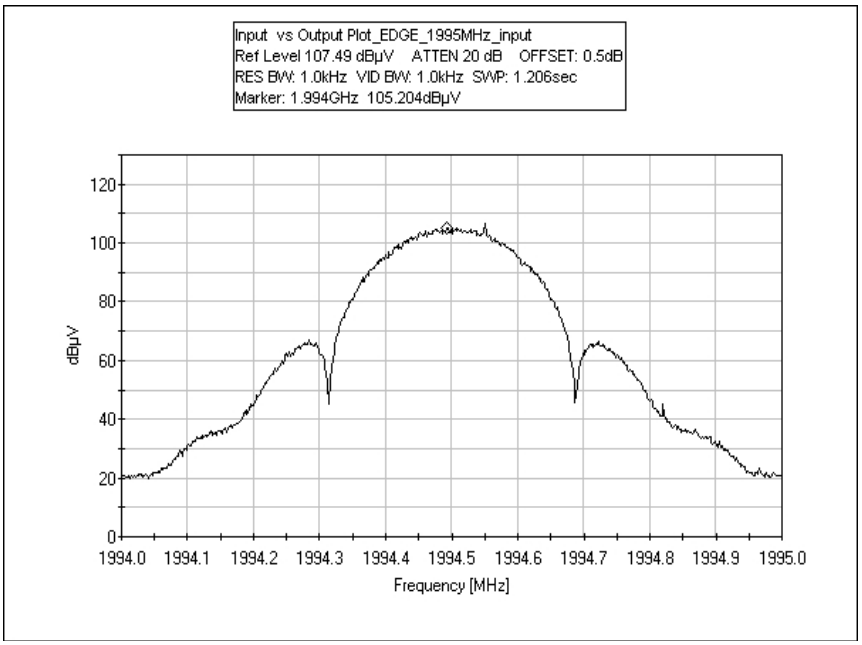
EDGE 1930MHz INPUT



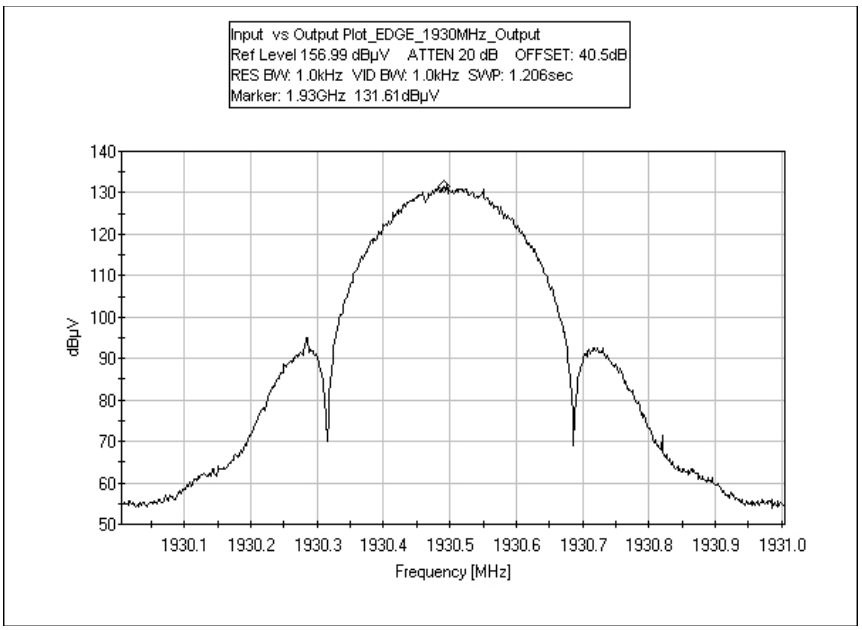
EDGE 1962MHz INPUT



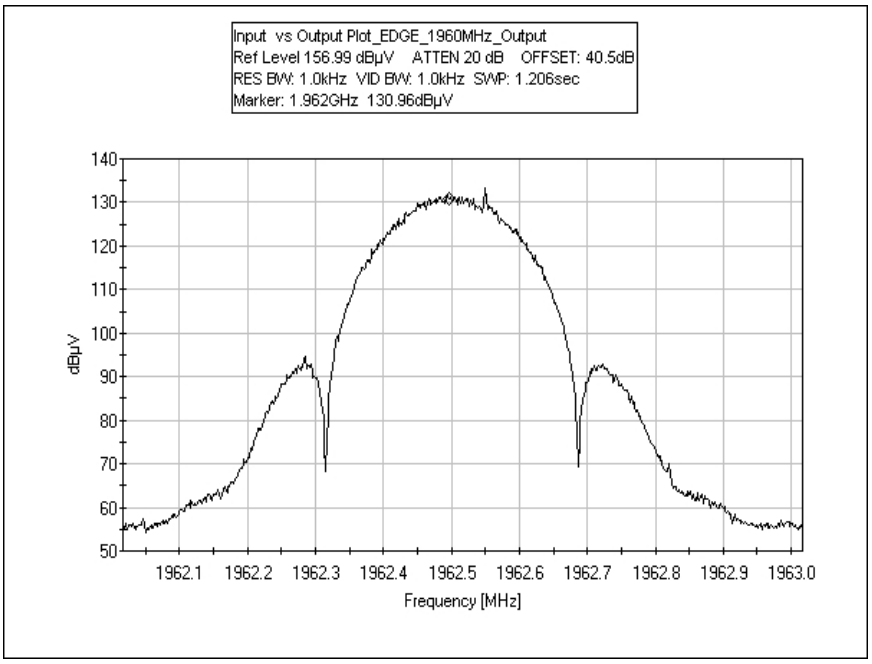
EDGE 1995MHz OUTPUT



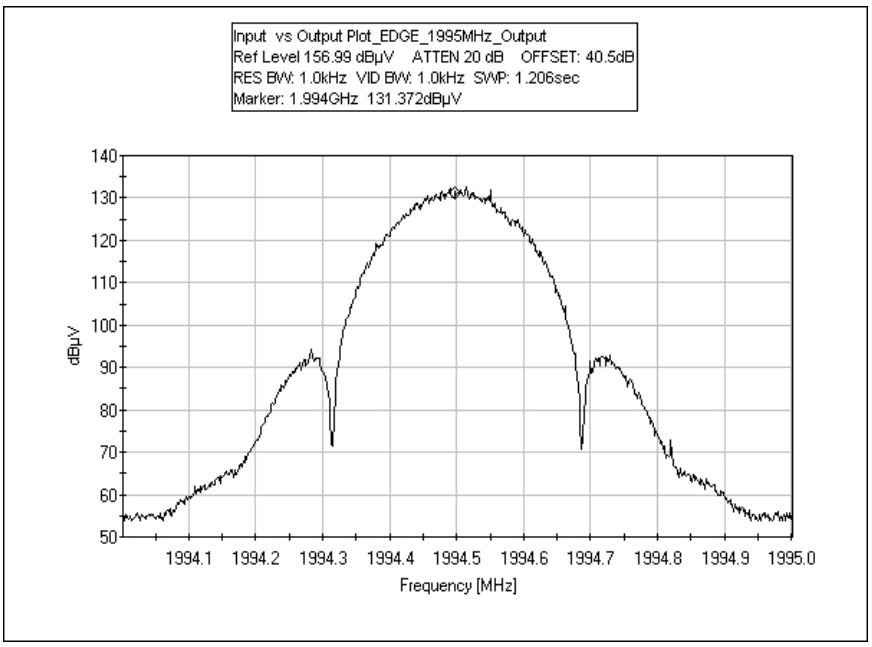
EDGE 1930MHz OUTPUT



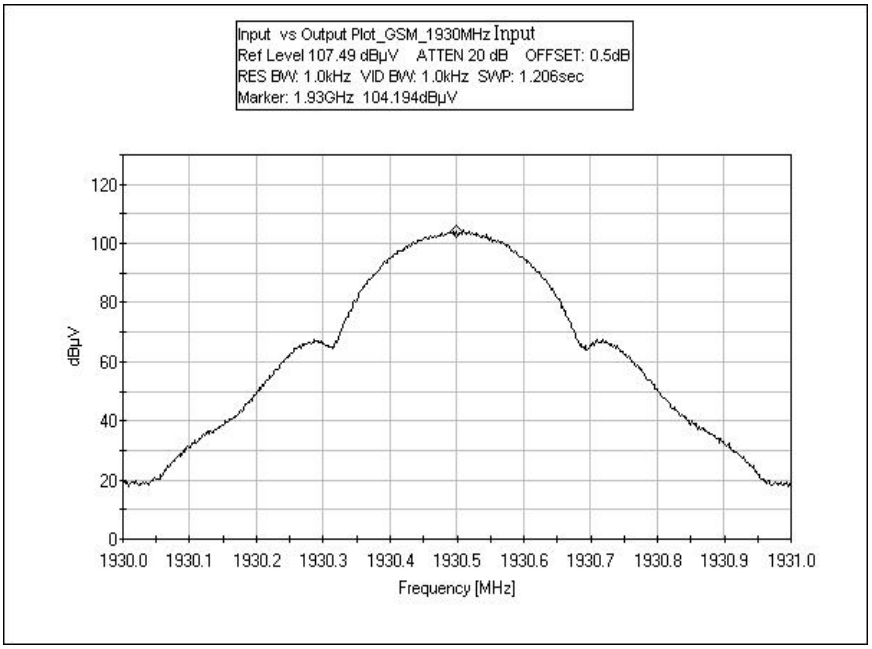
EDGE 1960MHz OUTPUT



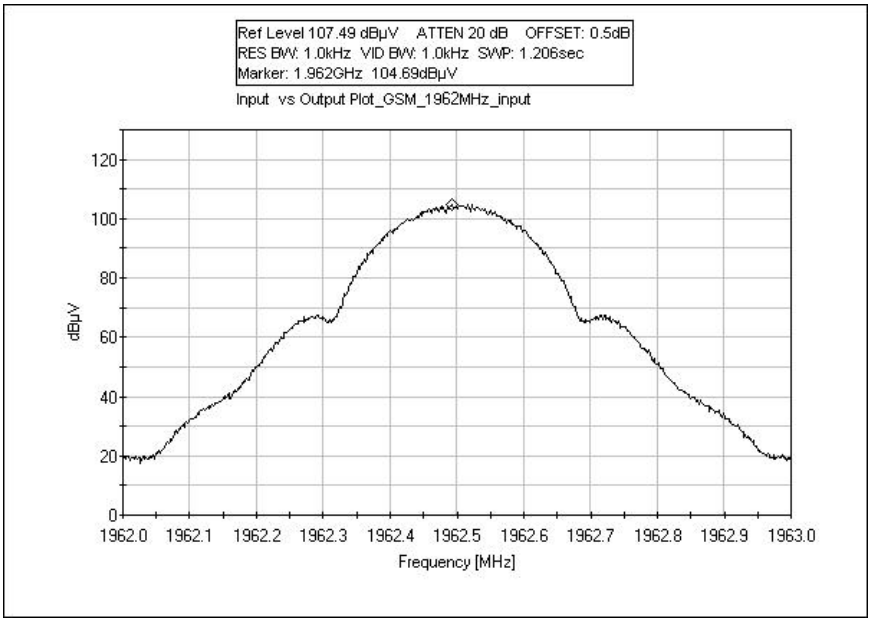
EDGE 1995MHz OUTPUT



GSM 1930MHz INPUT



GSM 1962MHz INPUT



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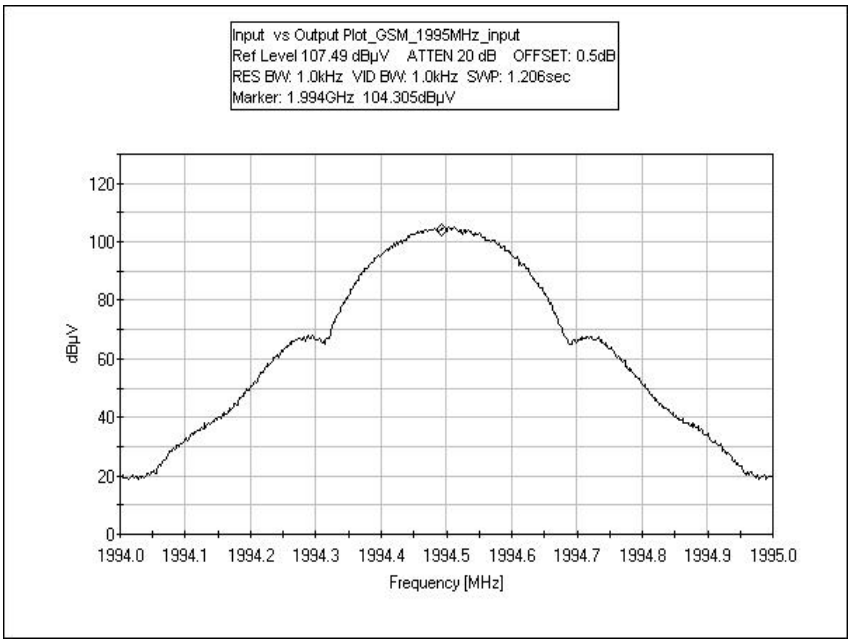

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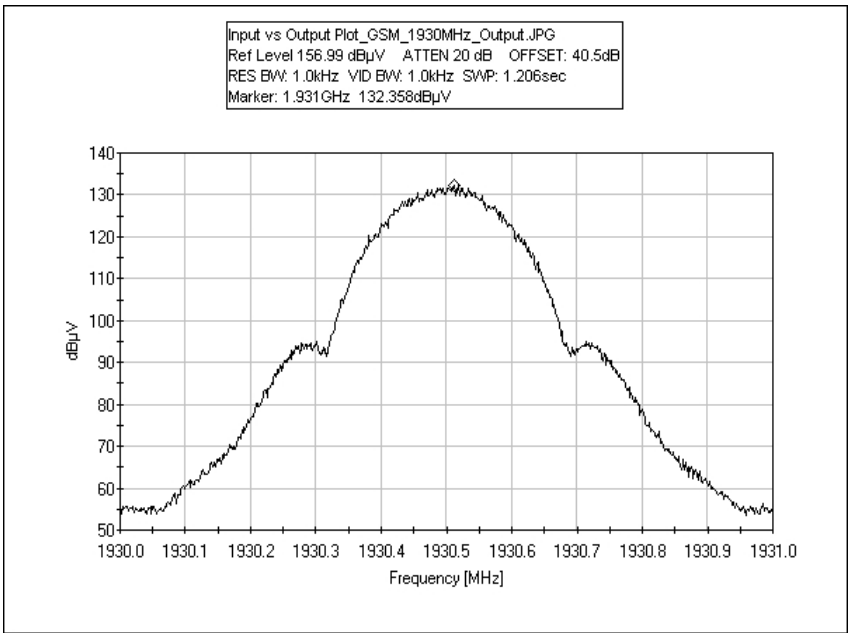
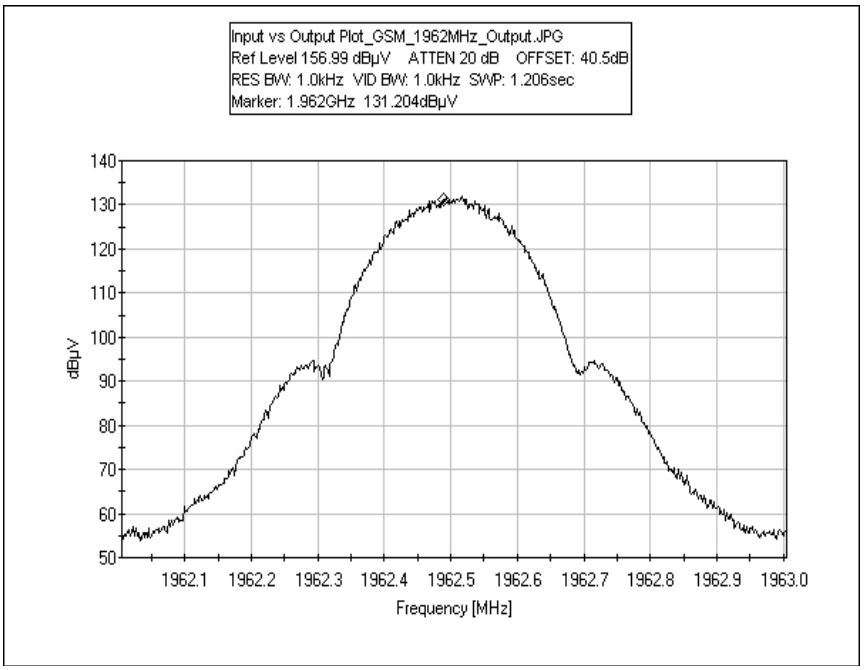
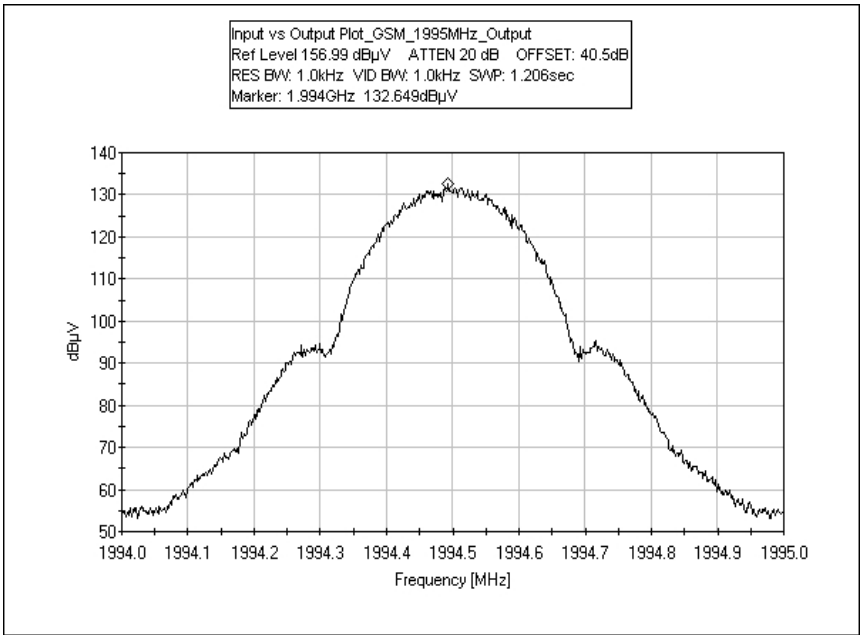


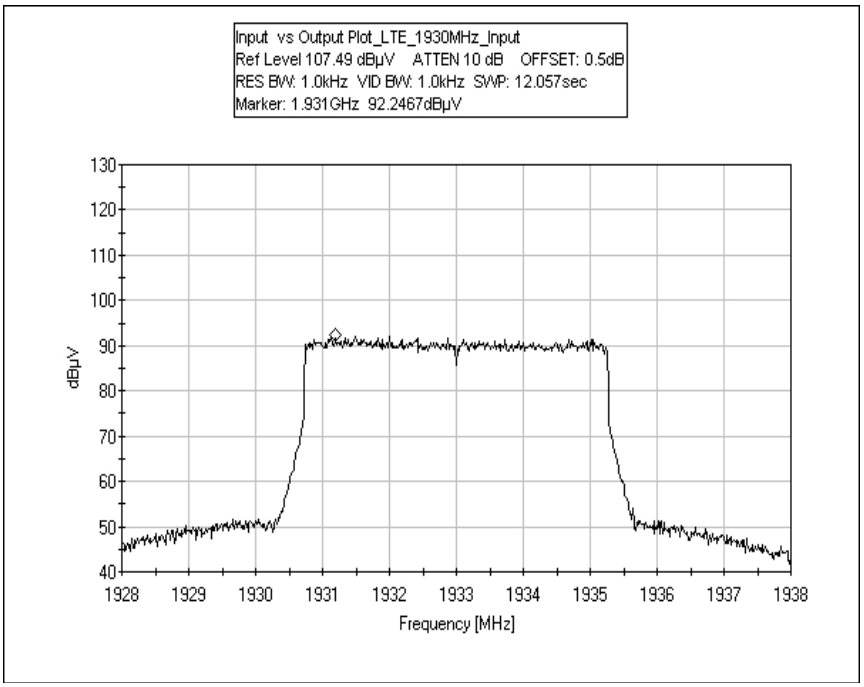
GSM 1962MHz OUTPUT



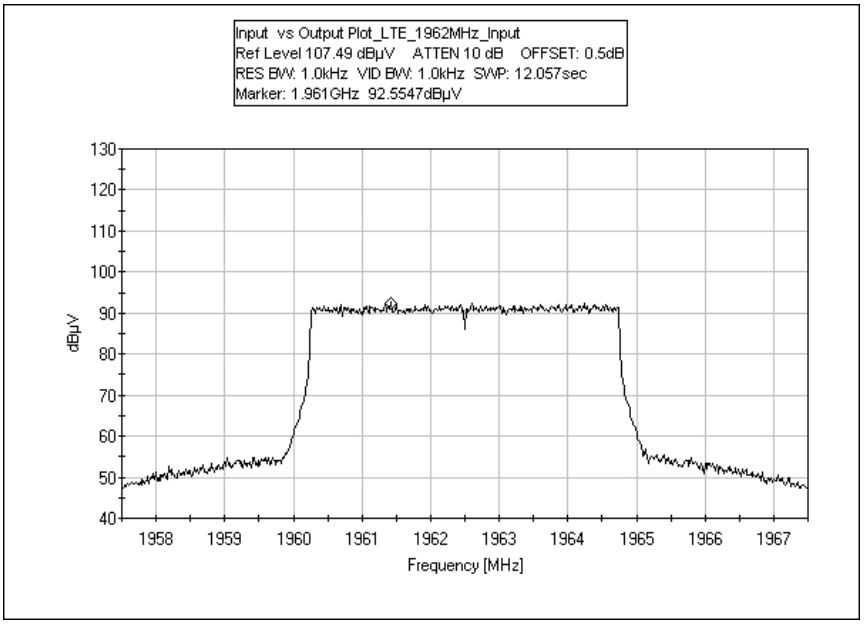
GSM 1995MHz OUTPUT



LTE 1930MHz INPUT



LTE 1962MHz INPUT



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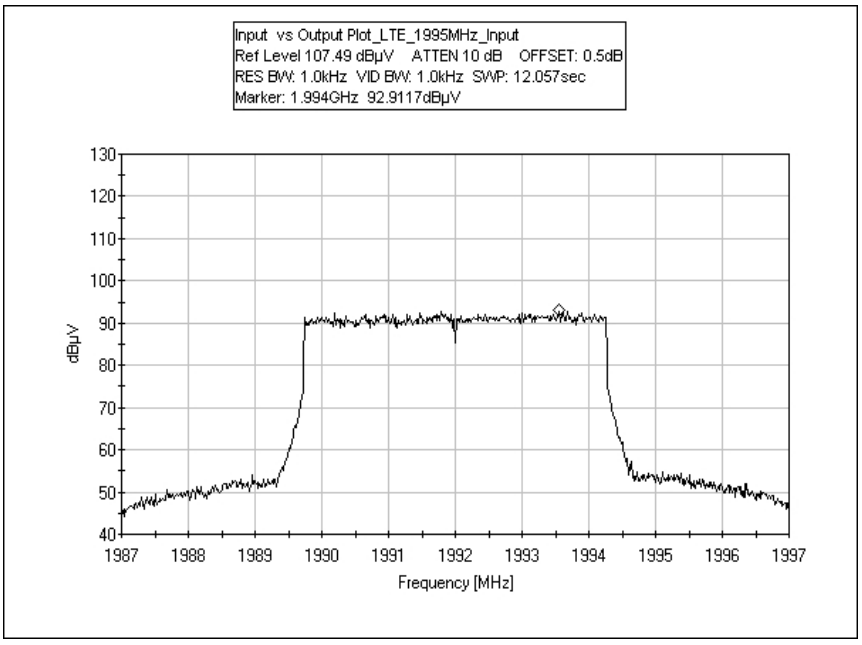
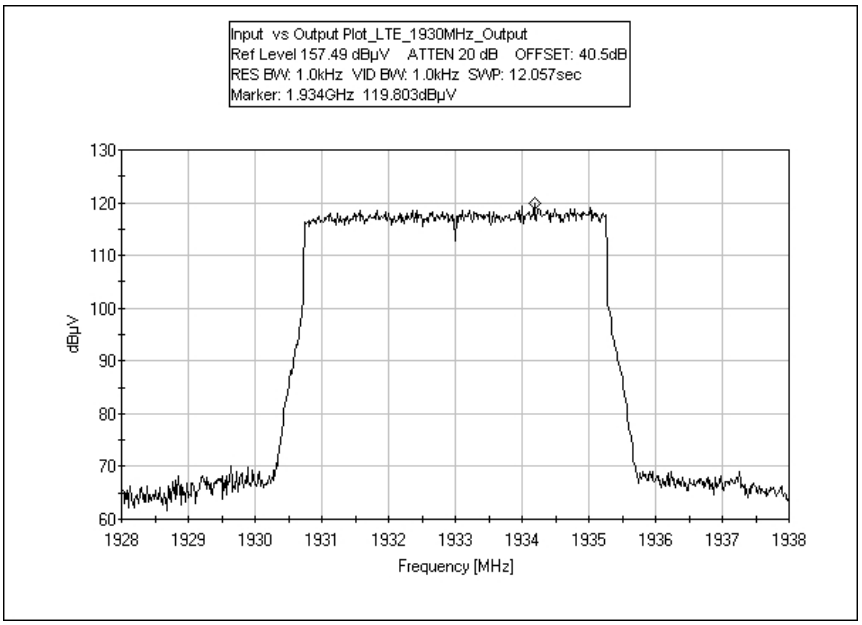
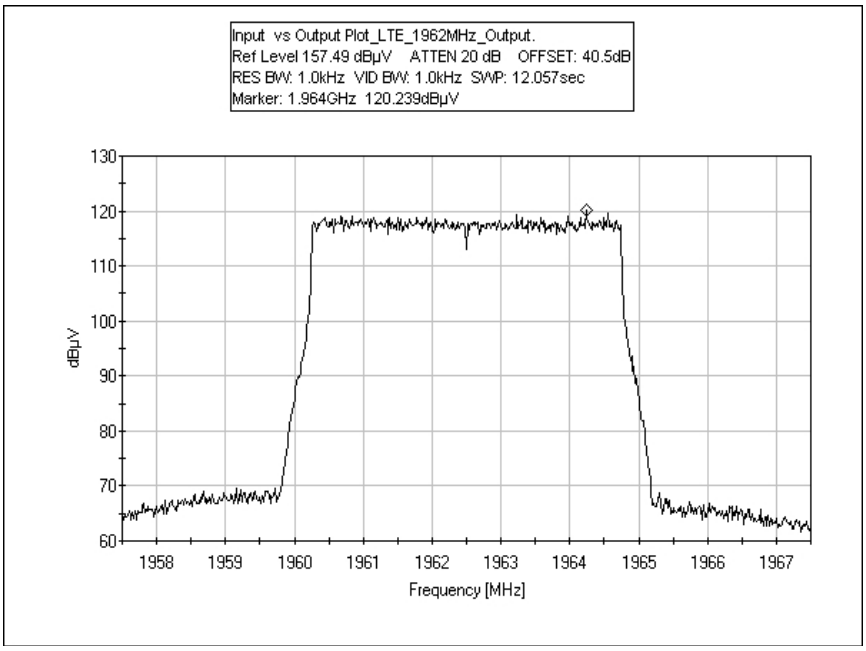


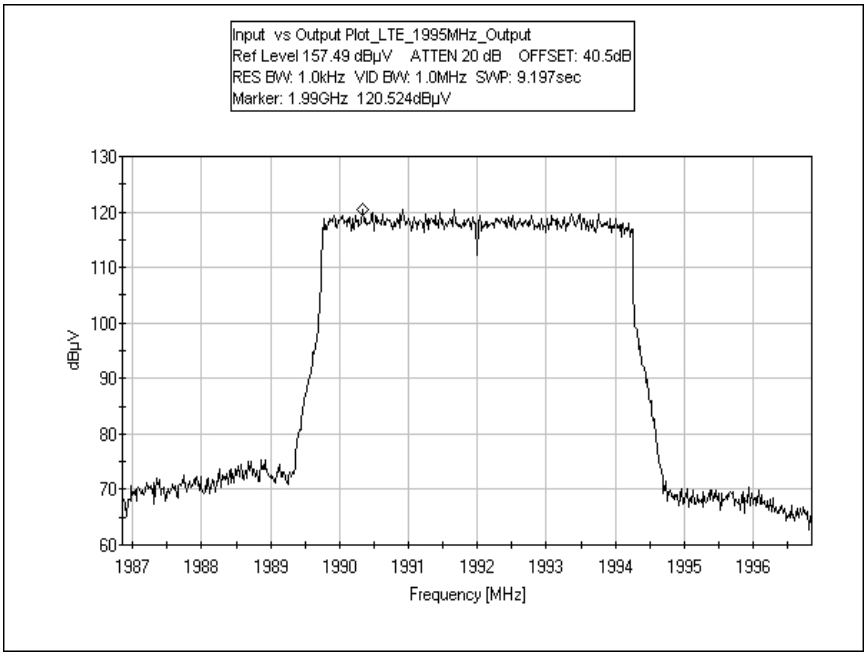
LTE 1930MHz OUTPUT



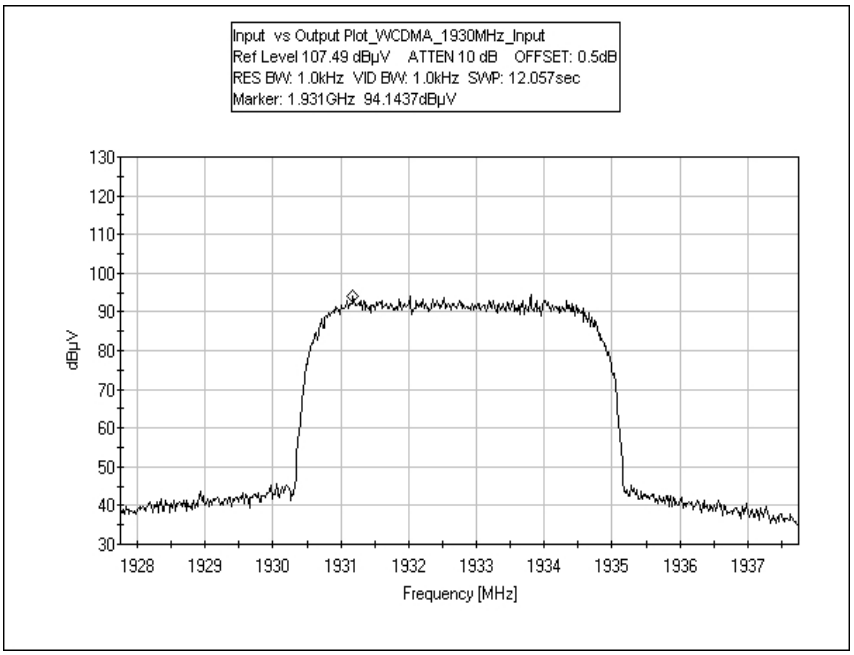
LTE 1930MHz OUTPUT



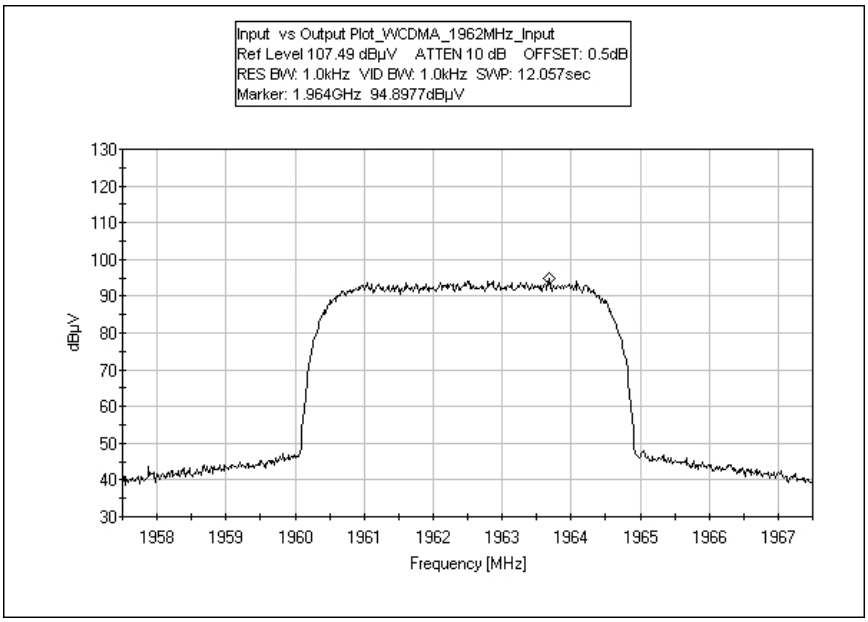
LTE 1995MHz OUTPUT



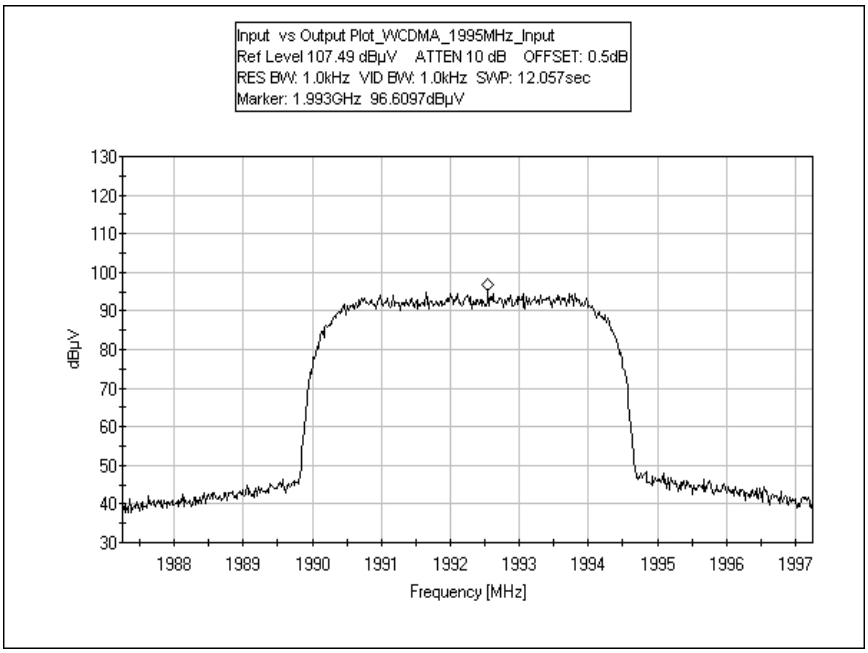
WCDMA 1930 MHz INPUT



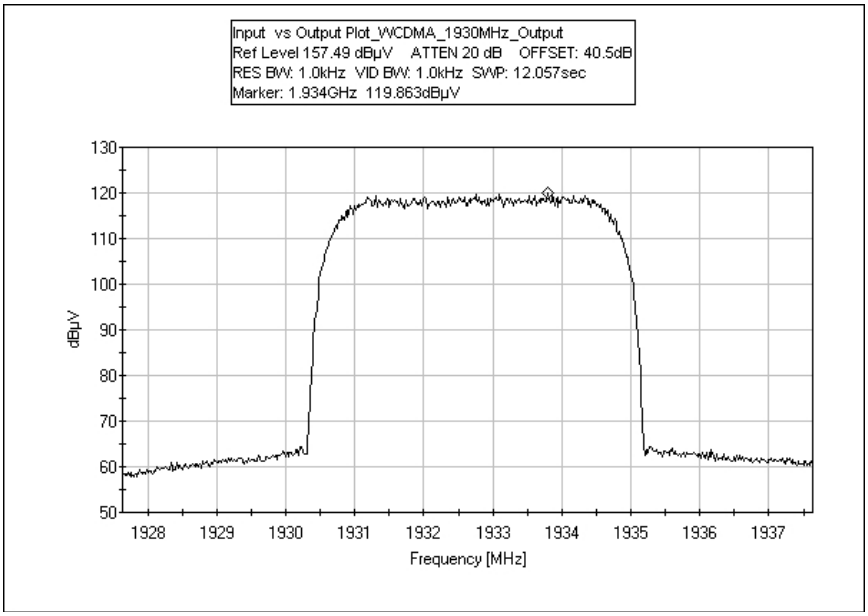
WCDMA 1962 MHz INPUT



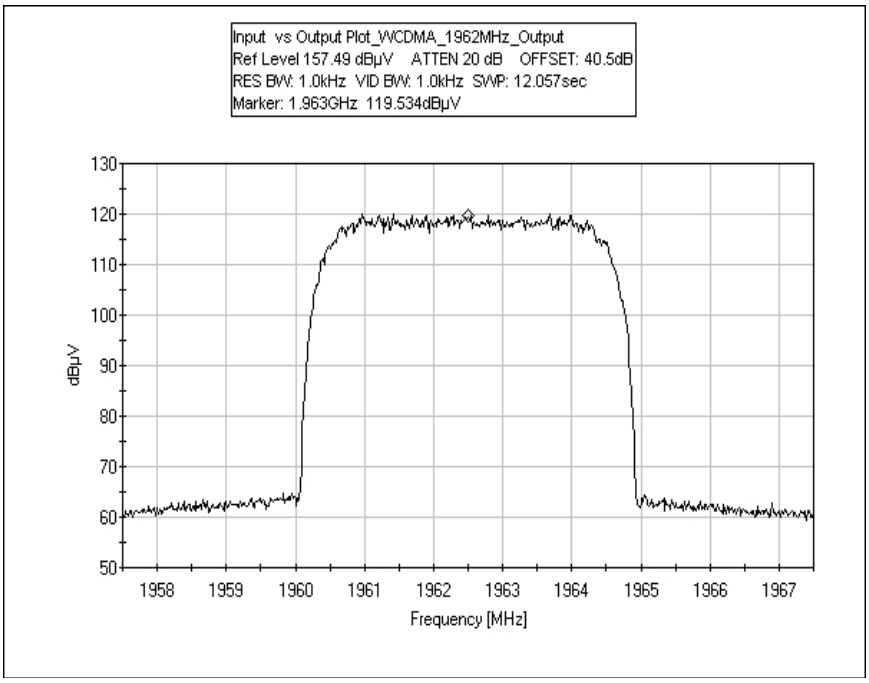
WCDMA 1995 MHz INPUT



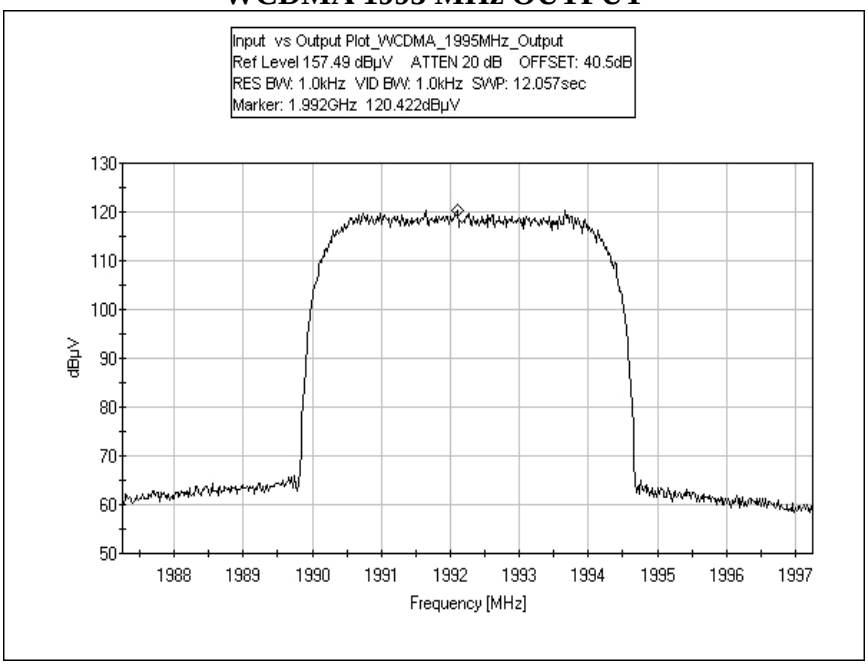
WCDMA 1930 MHz OUTPUT



WCDMA 1962 MHz OUTPUT



WCDMA 1995 MHz OUTPUT



FCC 2.1033(c)(14)/2.1051/ 24.238 (a) SPURIOUS EMISSIONS AT ANTENNA TERMINAL

Test Setup Photo

Test Data

Test Location: CKC Laboratories, Inc. •110. N. Olinda Place. • Brea, CA 92821 • (714) 993-6112

Customer:	**Powerwave Technologies, Inc.**		
Specification:	**Part 24 intermodulation Plot**		
Work Order #:	**89952**	Date:	10/15/2009
Test Type:	**Conducted Emissions**	Time:	15:47:56
Equipment:	**Nexus FT 1900+G Repeater**	Sequence#:	3
Manufacturer:	Powerwave Technologies	Tested By:	E. Wong
Model:	RH330020/101		110V 60Hz
S/N:	NA		

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer	US44300438	07/23/2008	07/23/2010	02672
3.0 GHz HPF	1	03/25/2008	03/25/2010	02744
3'-37GHz cable	NA	09/21/2009	09/21/2011	P02945

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Nexus FT 1900+G Repeater*	Powerwave Technologies	RH330020/101	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	Agilent	E4419B	GB402019/12
Pre Amp	Mini Circuit	ZHL-4240	D040405
Optical Converter	Powerwave	NA	NA
ESG	Agilent	E4438C	MY42082180

Test Conditions / Notes:

The EUT is placed on the wooden table. The RF Output port is connected to a load string. Optical inport is connected to a support Optical converter.
Support optical converter receives RF signal converts the signal to optic and sends it to the EUT.
The EUT decodes the optical signal, and generates an RF signal.
Operating range: 1930- 1995MHz.
Power = 43dBm=20 watt
Modulation: GSM
Freq = 1930.5 MHz, 1962.5 MHz, 1994.5MHz
Modulation: EDGE
Freq = 1930.5 MHz, 1962.5 MHz, 1994.5MHz
Modulation: CDMA 2000
Freq= 1932.5MHz, 1962.5MHz, 1992.5MHz
Modulation: WCDMA
Freq= 1932.75MHz, 1962.5MHz, 1992.25MHz
Modulation: LTE
Freq= 1933.0 MHz, 1962.5MHz, 1992.0MHz
17 º C, 89% Relative Humidity
Frequency range of measurement = 9 kHz- 20 GHz.
Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-20,000 MHz RBW=1 MHz, VBW=1 MHz.
No Emission was found.

Limit line for Spurious Conducted Emission

Required Attenuation = 43+10 Log P dB

Limit line (dBuV) = V_{dBuv} - Attenuation

V_{dBuV} = $20 \text{ Log } \frac{V}{1 \text{ x } 10^{-6}}$

= $20\left(\text{Log } V - \text{Log } 1 \text{ x } 10^{-6}\right)$

= $20 \text{ Log } V - 20 \text{ Log} 1 \text{ x } 10^{-6}$

= $20 \text{ Log } V - 20(-6)$

= $20 \text{ Log } V + 120$

Attenuation = $43 + 10 \text{ Log } P$

= $43 + 10 \text{ Log } \frac{V^2}{R}$

= $43 + 10\left(\text{Log } V^2 - \text{Log } R\right)$

= $43 + 10\left(2 \text{ Log } V - \text{Log } R\right)$

= $43 + 20 \text{ Log } V - 10 \text{ Log } R$

Limit line = V_{dBuv} - Attenuation

= 20 Log V + 120 – (43 + 20 Log V – 10Log R)

= 20 Log V + 120 – 43 – 20 Log V + 10Log

20 Log V + 120 – 43 – 20 Log V + 10Log R

= 120 – 43 + 10 Log 50 Note : R = 50 Ω

= 120 –43 + 16.897

= 94 dBuV at any power level

FCC 2.1033(c)(14)/2.1053/24.238 (a) FIELD STRENGTH OF SPURIOUS RADIATION

Test Setup Photos

Test Data

Test Location: CKC Laboratories, Inc. •110. N. Olinda Place. • Brea, CA 92821 • (714) 993-6112

Customer:	**Powerwave Technologies, Inc.**		
Specification:	**FCC 24.238 Radiated Spurious Emission**		
Work Order #:	**89952**	Date:	10/14/2009
Test Type:	**Radiated Scan**	Time:	14:50:38
Equipment:	**Nexus FT 1900+G Repeater**	Sequence#:	1
Manufacturer:	Powerwave Technologies	Tested By:	E. Wong
Model:	RH330020/101		
S/N:	NA		

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer	US44300438	07/23/2008	07/23/2010	02672
Bilog Antenna	2451	01/21/2008	01/21/2010	01995
Pre amp to SA Cable	Cable #10	04/16/2009	04/16/2011	P05050
Pre Amp	1937A02548	05/02/2008	05/02/2010	00309
Horn Antenna	6246	06/06/2008	06/06/2010	00849
Microwave Pre-amp	3123A00281	07/28/2008	07/28/2010	00786
2'-40GHz cable	NA	09/21/2009	09/21/2011	P2948
Heliax Antenna Cable	P5565	09/04/2008	09/04/2010	P05565
18-26GHz Horn	942126-003	11/12/2008	11/12/2010	01413
Loop Antenna	2014	06/16/2008	06/16/2010	00314
3.0 GHz HPF	1	03/25/2008	03/25/2010	02744

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Nexus FT 1900+G Repeater*	Powerwave Technologies	RH330020/101	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	Agilent	E4419B	GB402019/12
Pre Amp	Mini Circuit	ZHL-4240	D040405
Optical Converter	Powerwave	NA	NA
ESG	Agilent	E4438C	MY42082180

Test Conditions / Notes:

The EUT is placed on the wooden table. The RF Output port is connected to a load string.
The Optical in port is connected to a support Optical converter.
Support optical converter receives RF signal; converts the signal to optic and sends it to the EUT. The EUT decodes the optical signal, and generates an RF signal.
Operating range: 1930- 1995MHz
Power = 43dBm=20 watt
Modulation: EDGE
Freq = 1930.5 MHz, 1962.5 MHz, 1994.5MHz
Modulation: WCDMA
Freq= 1932.75MHz, 1962.5MHz, 1992.25MHz
Modulation: LTE
Freq= 1933.0 MHz, 1962.5MHz, 1992.0MH
17 º C, 89% Relative Humidity
Frequency range of measurement = 9 kHz- 20 GHz
Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-20,000 MHz RBW=1 MHz, VBW=1 MHz.

Operating Frequency: 1930 MHz - 1995 MHz
Channels: Low, Mid and High
Highest Measured Output Power: 43.01 ERP(dBm)= 20 ERP(Watts)
Distance: 3 meters
Limit: 43+10Log(P) 56.01 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
5,984.27	-37.8	Horiz	80.81
5,977.00	-39.1	Horiz	82.11
5,984.40	-40.9	Vert	83.91
7,720.15	-41.8	Horiz	84.81
7,719.85	-42.4	Vert	85.41
5,977.50	-44.3	Horiz	87.31
5,977.50	-44.8	Vert	87.81
5,790.12	-45.7	Vert	88.71
5,887.48	-45.9	Vert	88.91
7,850.13	-46.1	Horiz	89.11
5,887.60	-46.7	Horiz	89.71
5,790.17	-46.8	Horiz	89.81
7,730.50	-46.9	Horiz	89.91
7,730.00	-47.3	Horiz	90.31
7,855.00	-47.6	Horiz	90.61
7,730.00	-47.6	Vert	90.61
5,977.50	-47.7	Vert	90.71
7,850.00	-47.7	Horiz	90.71
7,852.50	-47.8	Vert	90.81
7,850.02	-47.9	Vert	90.91
7,850.00	-48.3	Vert	91.31
7,979.20	-48.7	Vert	91.71
7,979.07	-48.8	Horiz	91.81
7,969.50	-49.2	Horiz	92.21
7,970.00	-49.2	Vert	92.21
5,887.50	-49.2	Horiz	92.21
7,970.00	-49.3	Vert	92.31
5,798.00	-49.6	Horiz	92.61
7,970.00	-49.7	Horiz	92.71
5,890.00	-50	Vert	93.01
5,887.50	-50.2	Vert	93.21
5,797.50	-50.6	Horiz	93.61
5,892.50	-50.7	Horiz	93.71
7,730.50	-51.1	Vert	94.11
5,798.00	-51.1	Vert	94.11
5,797.50	-51.2	Vert	94.21

Limit line for Spurious Radiated Emission

Required Attenuation = 43+10 Log P (dB)

For radiated spurious emission measured at 3 meter test distance,

Required attenuation = 43+10 Log $P_{t\ at\ 3\ meter}$ dB
Limit line (dBuV) = E_{dBuv} - Attenuation

E_{dBuv} = Measured field strength at 3 meter in dBuV/m

Power Density (Isotropic)

$$P_D = \frac{P_t}{4\pi r^2}$$

P_D = Power Density in Watts /m^2
Pt = Average Transmit Power
r = Test distance

Field Intensity E (V/m)

$$E = \sqrt{P_D \times 377}$$

$$E = \frac{\sqrt{P_t \times 377}}{4\pi r^2}$$

$$E = \sqrt{\frac{P_t \times 30}{r^2}}$$

$$P_t = \left(\frac{E^2 \times r^2}{30} \right)$$

$$10 \text{ Log } P_t = 10 \text{ Log } E^2 \text{ (V/m)} + 10 \text{ Log } r^2 - 10 \text{ Log } 30$$

$10 \text{ Log } P_t = 20 \text{ Log E (V/m)} + 20 \text{ Log r} - 10 \text{ Log } 30$

At 3 meter, r = 3 m

$10 \text{ Log } P_t = 20 \text{ Log E (V/m)} + 20 \text{ Log } 3 - 10 \text{ Log } 30$

$10 \text{ Log } P_t = 20 \text{ Log E (V/m)} + 9.54 - 14.77$

$10 \text{ Log } P_t = 20 \text{ Log E (V/m)} - 5.23$

Since 20 Log E (V/m) = 20 Log E (**u**V/m) –120

$10 \text{ Log } P_t = 20 \text{ Log E (uV/m)} - 120 - 5.23$

$10 \text{ Log } P_t = 20 \text{ Log E (uV/m)} - 125.23$

Limit line (dBuV) at 3 meter = E_{dBuv} – Attenuation

= E_{dBuv} - (43+10 Log $P_{t \text{ at 3 meter}}$)

= E_{dBuv} - 43 - 10 Log $P_{t \text{ at 3 meter}}$

= E_{dBuv} - 43 – (20 Log E (uV/m) –125.23)

= E_{dBuv} - 43 - 20 Log E (uV/m) + 125.23

= E_{dBuv} - 20 Log E (uV/m) + 82.23

Since 20 Log E (uV/m) = E in dBuV/m

= ~~E_{dBuv}~~ - ~~E_{dBuv}~~ + 82.23

Radiated Emission limit $_{3 \text{ meter}}$ = 82.23 dBuV at any power level measured in dBuV

FCC BANDEDGE

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	072308	072310
36" 37GHz cable	02945	Strolab	NA	NA	092100	092111

Test Set up

The EUT is placed on the wooden table. The RF output port is connected to a load string. An optical in port is connected to a support optical converter.

The support optical converter receives RF signal, converts the signal to optic and sends it to the EUT. The EUT decodes the optical signal, and generates an RF signal.

Blockedge plot is recorded with a spectrum analyzer at the Antenna port of the device.

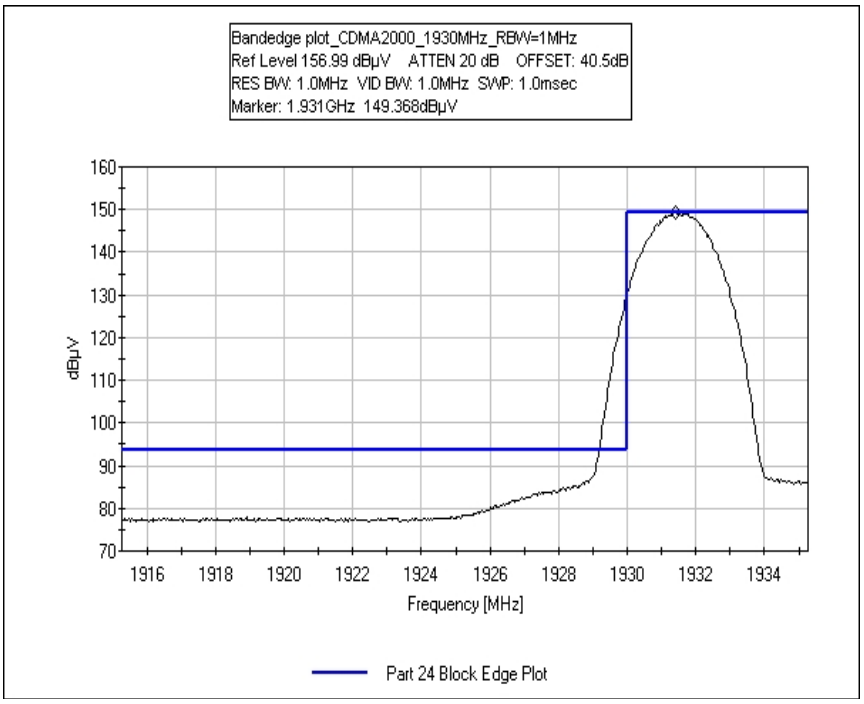
Two plots are presented, one at the standard RBW =1 MHz, the other with RBW=100kHz.

Lowered resolution bandwidth was employed to demonstrate bandedge compliance within two standard bandwidth away from the bandedge. The difference in emission amplitude as a result of lowered RBW used was measured and compensated for.

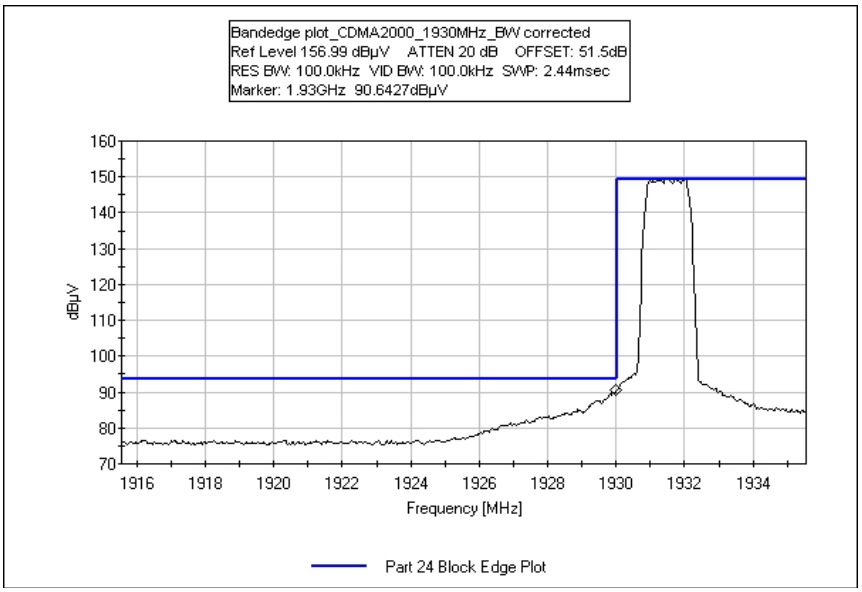
Test Setup Photo

Test Data
Tested By: E. Wong

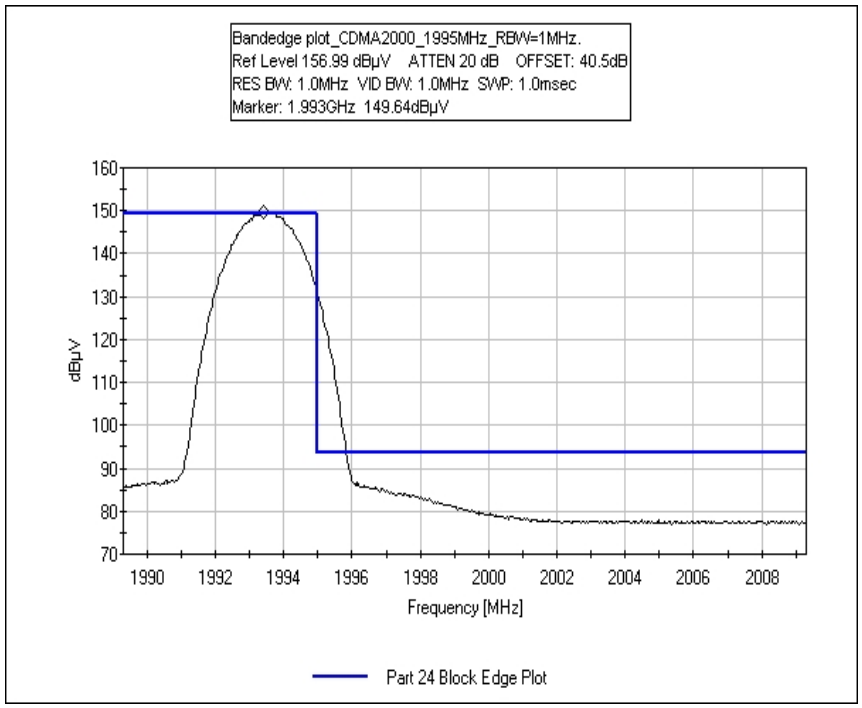
FCC BANDEDGE CDMA2000 1930 MHz RBW = 1MHz



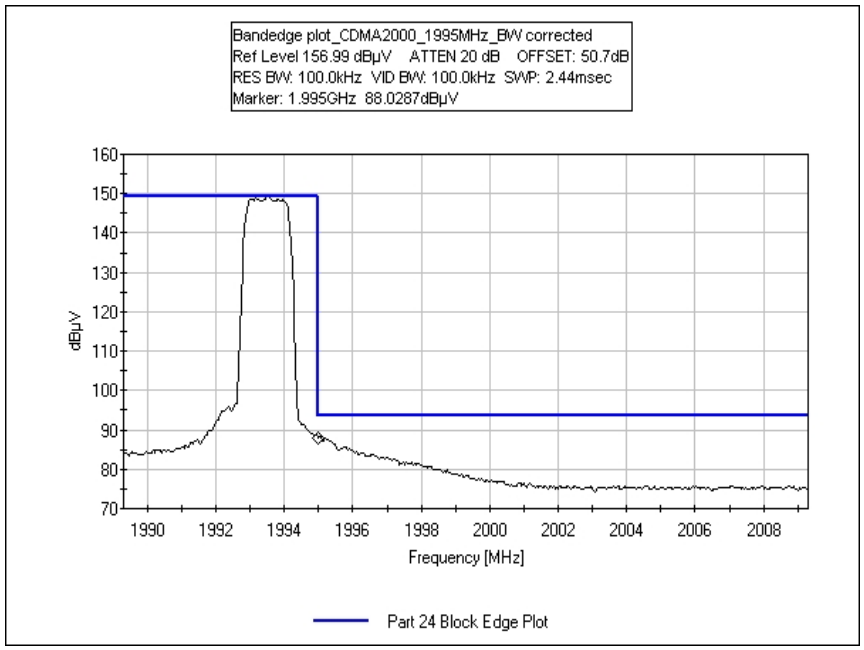
FCC BANDEDGE CDMA2000 1930 MHz BW CORRECTED



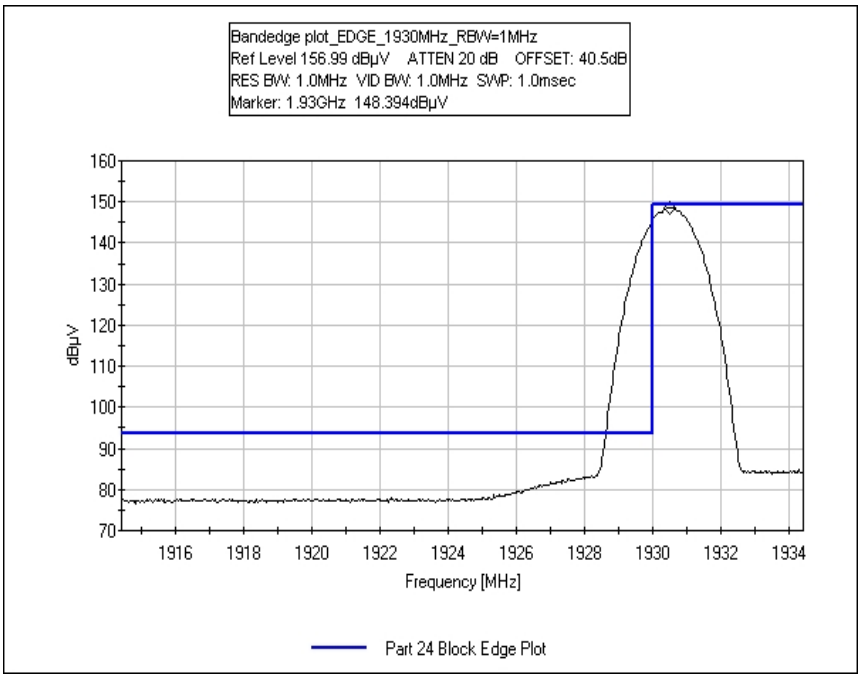
FCC BANDEDGE CDMA2000 1995 MHz RBW = 1MHz



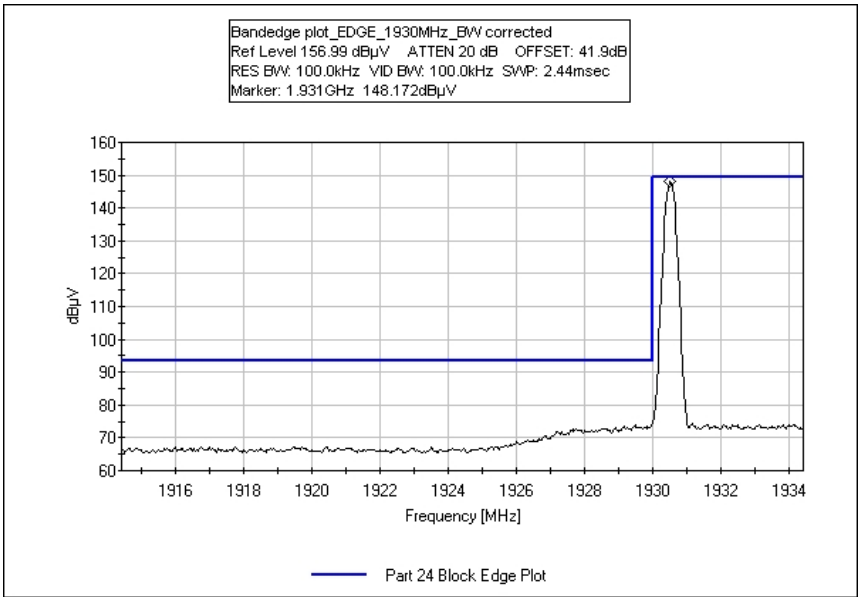
FCC BANDEDGE CDMA2000 1930 MHz BW CORRECTED



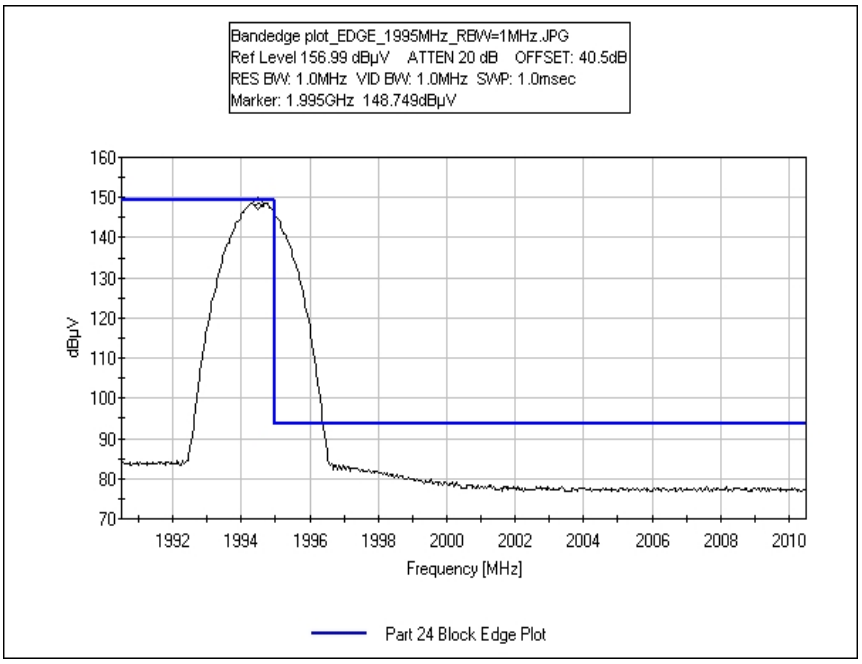
FCC BANDEDGE EDGE 1930 MHz RBW = 1MHz



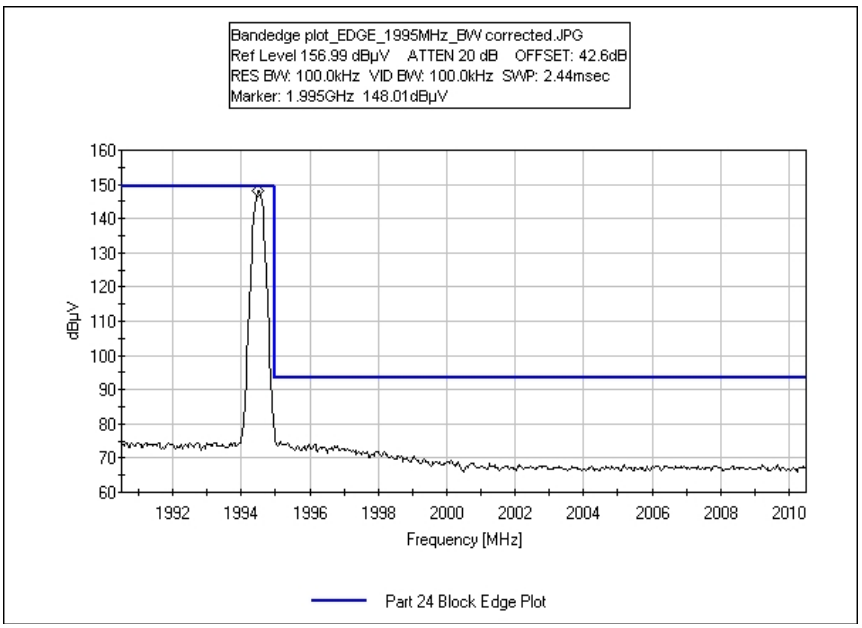
FCC BANDEDGE EDGE 1930 MHz BW CORRECTED



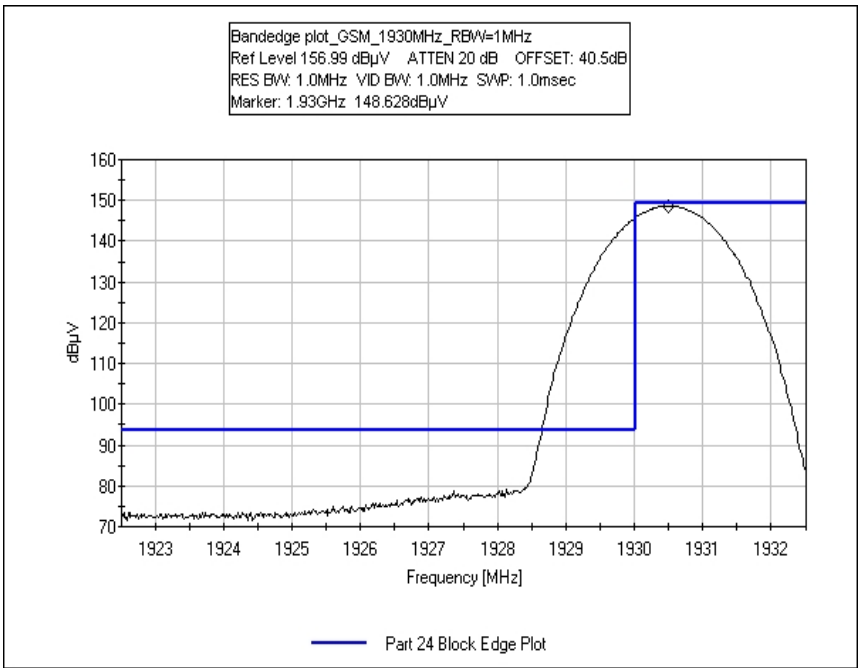
FCC BANDEDGE EDGE 1995 MHz RBW = 1MHz



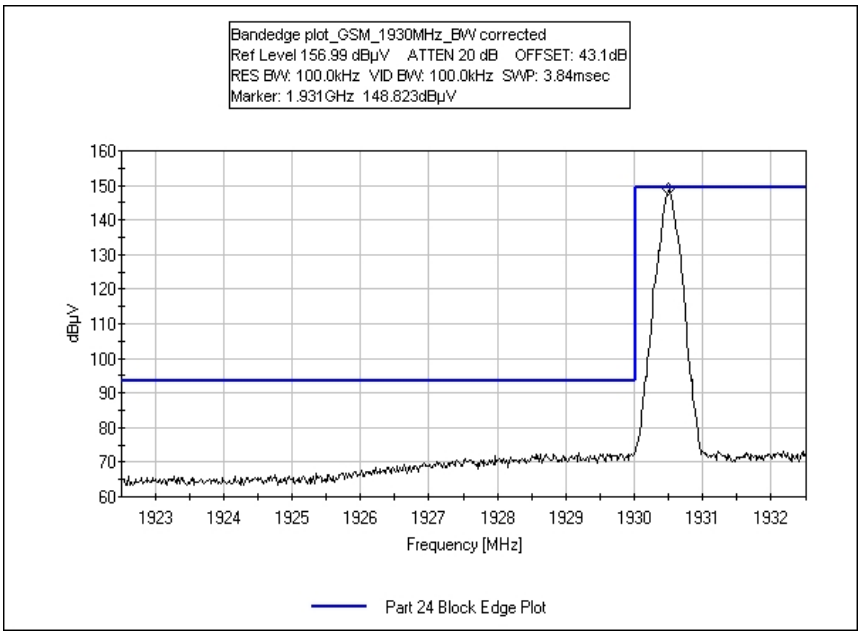
FCC BANDEDGE EDGE 1995 MHz BW CORRECTED



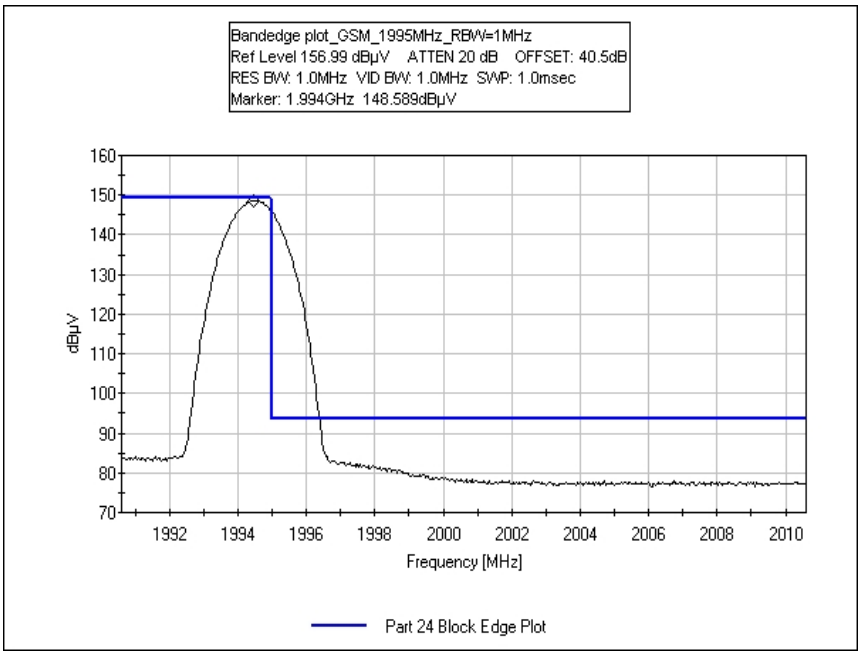
FCC BANDEDGE GSM 1930 MHz RBW = 1MHz



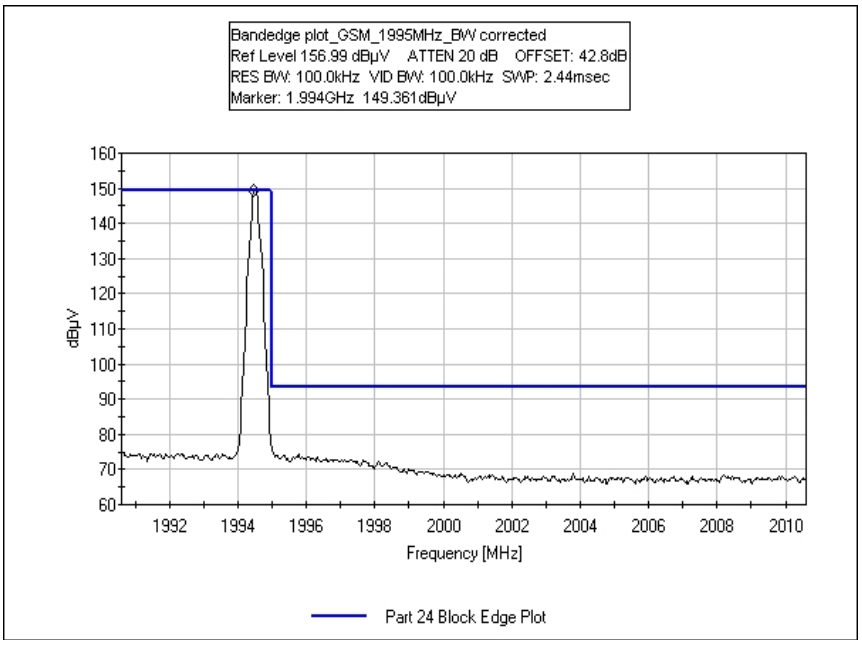
FCC BANDEDGE GSM 1930 MHz BW CORRECTED



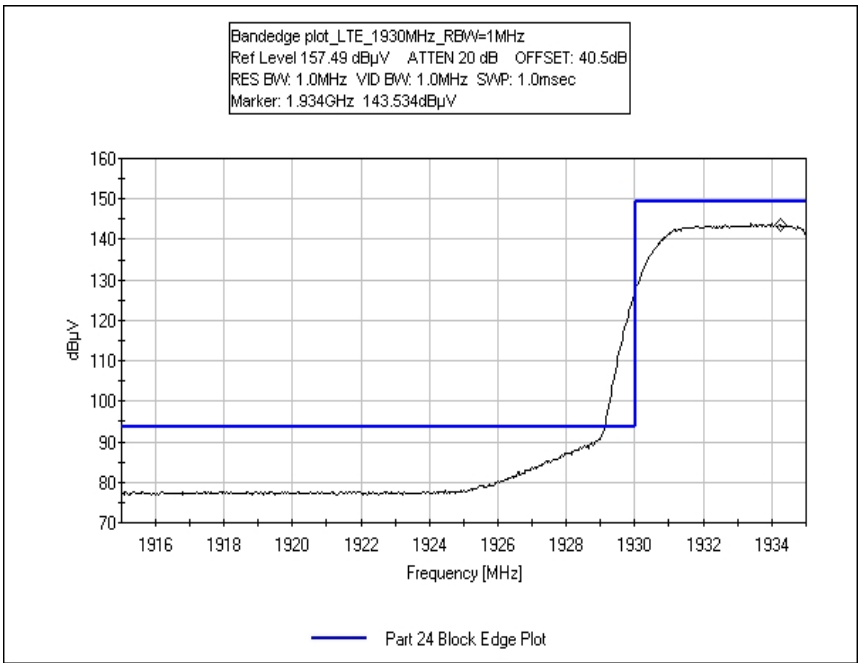
FCC BANDEDGE GSM 1995 MHz RBW = 1MHz



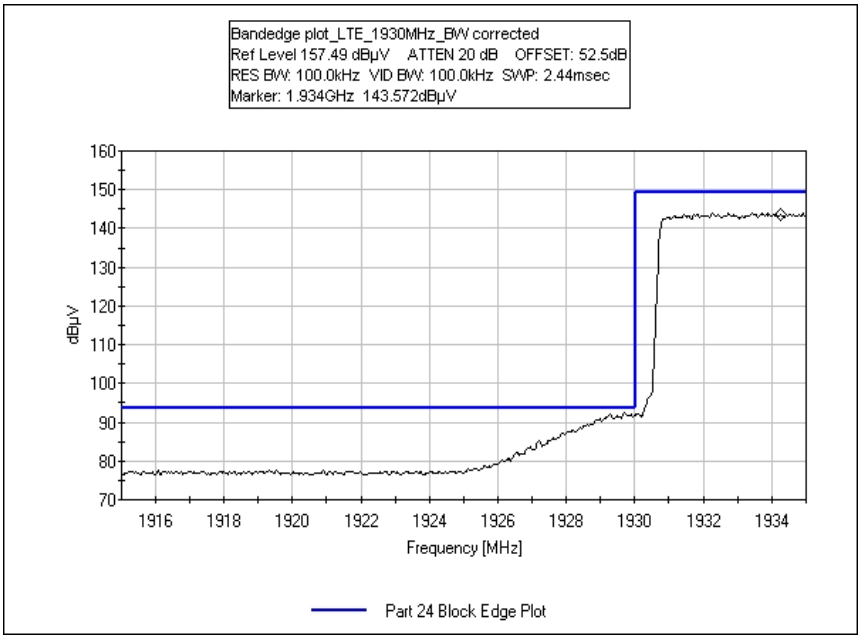
FCC BANDEDGE GSM 1995MHz BW CORRECTED



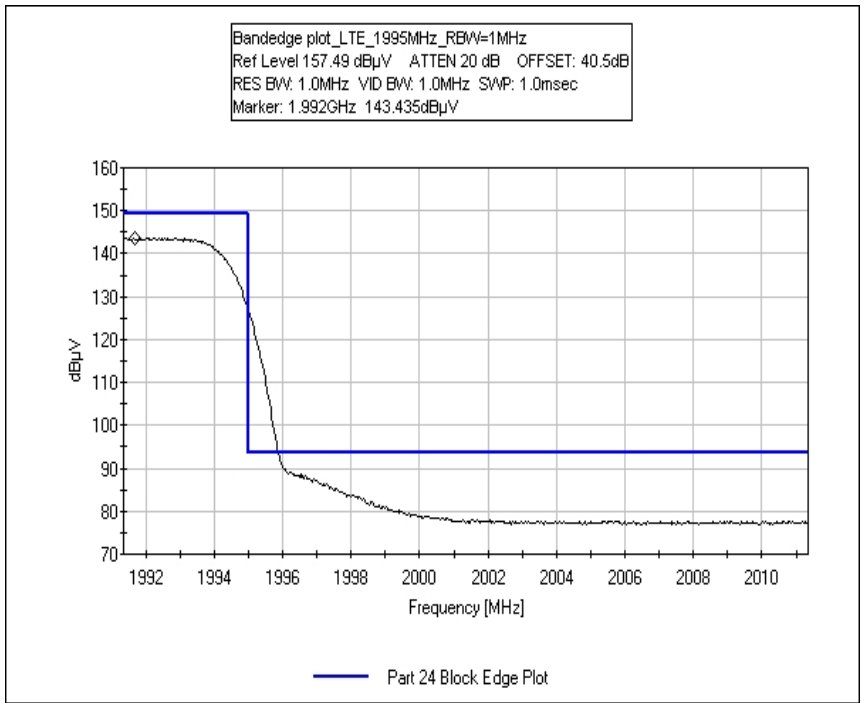
FCC BANDEDGE LTE 1930 MHz RBW = 1MHz



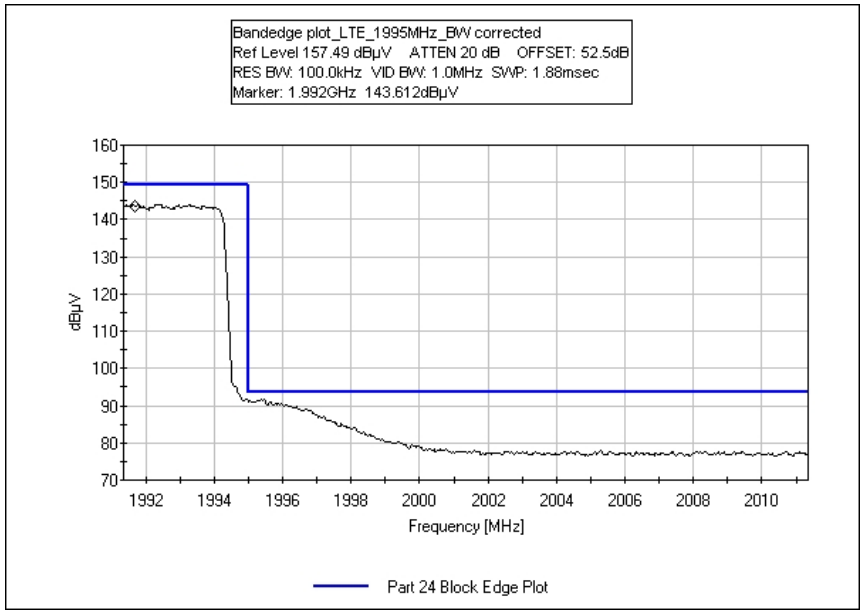
FCC BANDEDGE LTE 1930 MHz BW CORRECTED



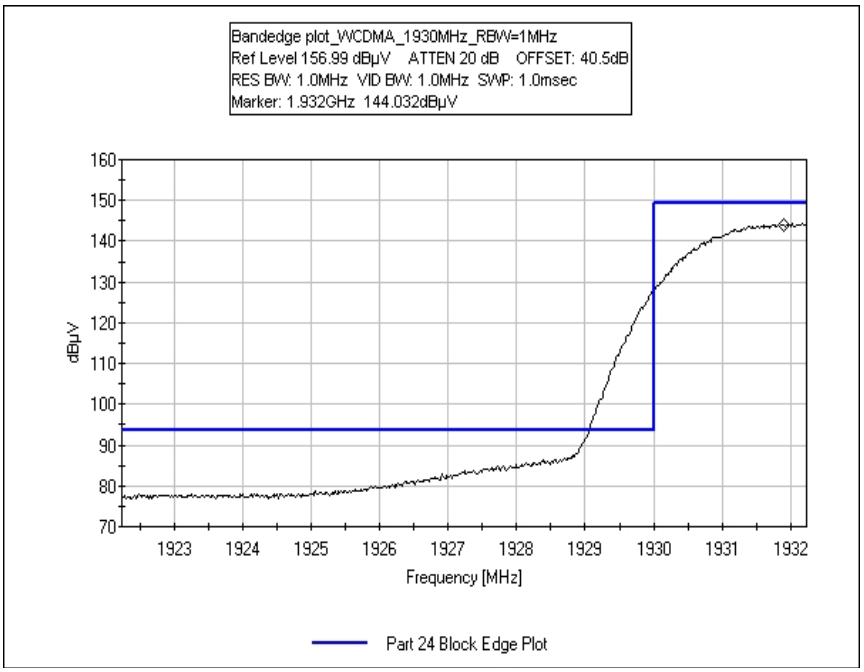
FCC BANDEDGE LTE 1995 MHz RBW = 1MHz



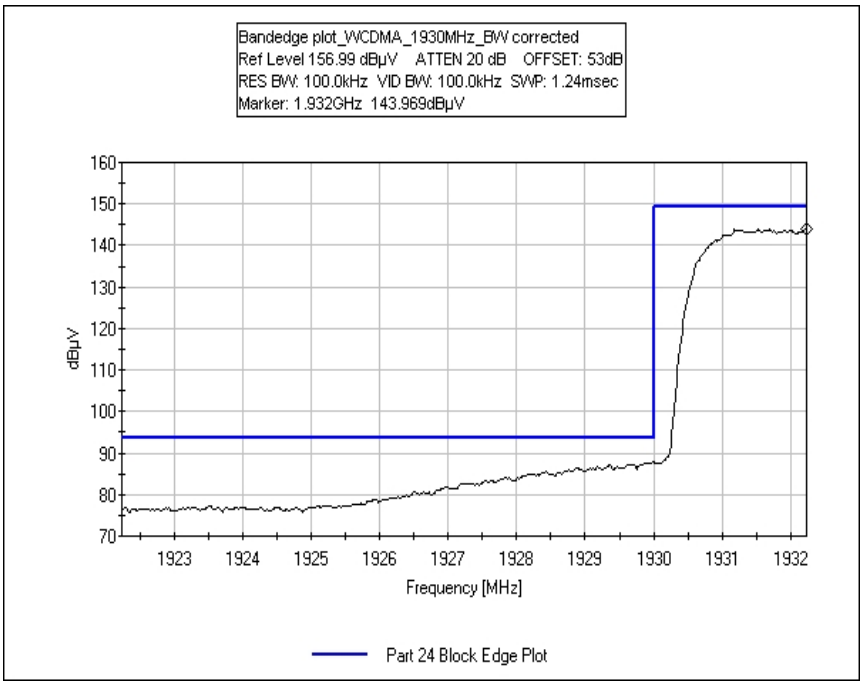
FCC BANDEDGE LTE 1995 MHz BW CORRECTED



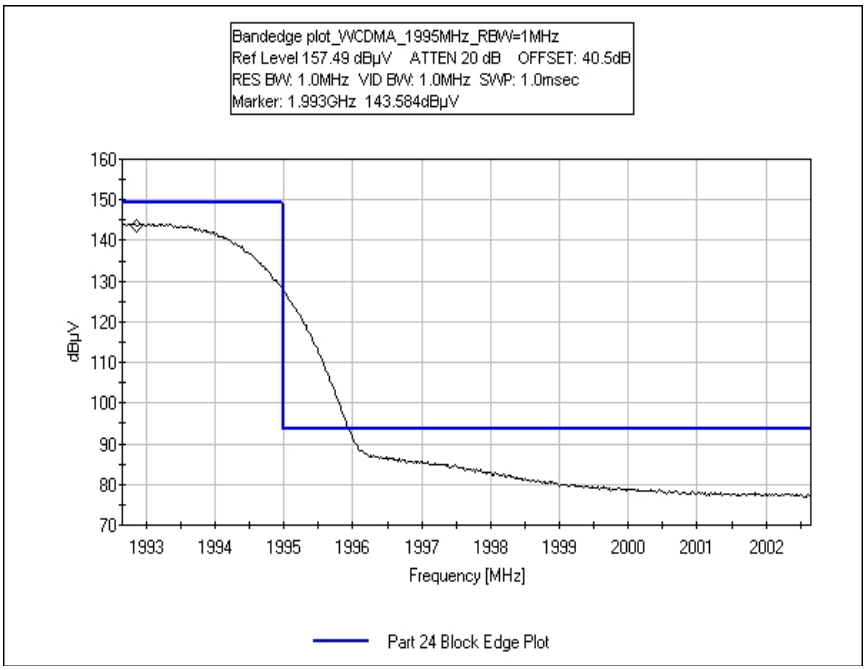
FCC BANDEDGE WCDMA 1930 MHz RBW = 1MHz



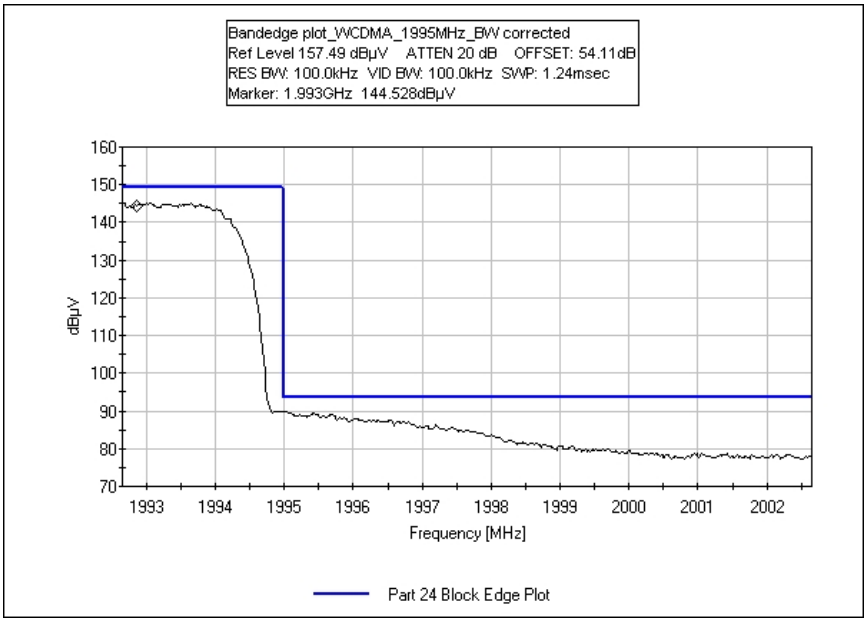
FCC BANDEDGE WCDMA 1930 MHz BW CORRECTED



FCC BANDEDGE WCDMA 1995 MHz RBW = 1MHz



FCC BANDEDGE WCDMA 1995 MHz BW CORRECTED



FCC INTERMODULATION

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	072308	072310
36" 37GHz cable	02945	Strolab	NA	NA	092109	092111

Test Set up

The EUT is placed on the wooden table. The RF output port is connected to a load string. An optical in port is connected to a support optical converter.

The support optical converter receives RF signal; converts the signal to optic and sends it to the EUT. The EUT decodes the optical signal, and generates an RF signal.

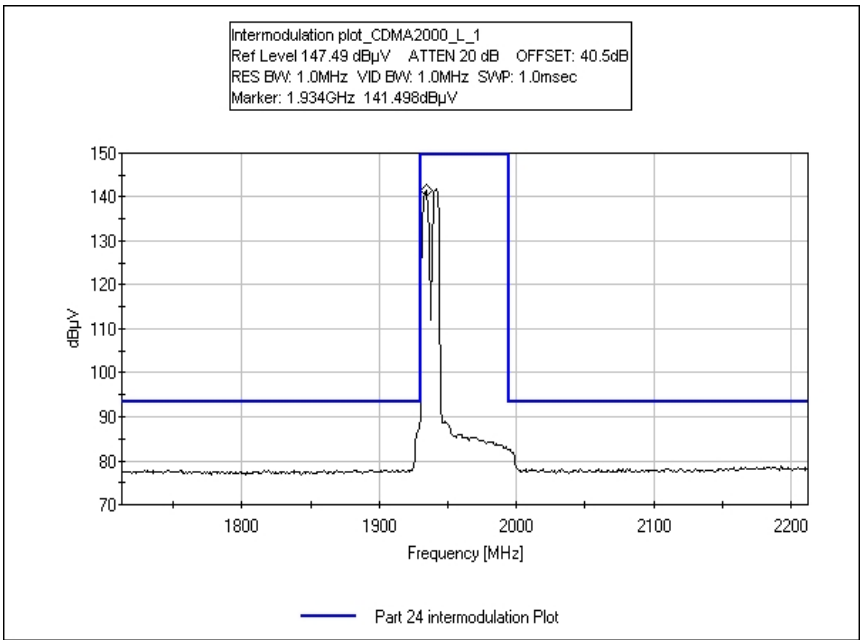
Two modulated signal from the support ESG are injected into the device and the intermodulation product is measured at the RF antenna port under investigation.

Two plots per modulation were captured, with the second plot expanded to demonstrate detailed intermodulation product. For detection purposes, reduced RBW was employed when necessary to detect any intermodulation product.

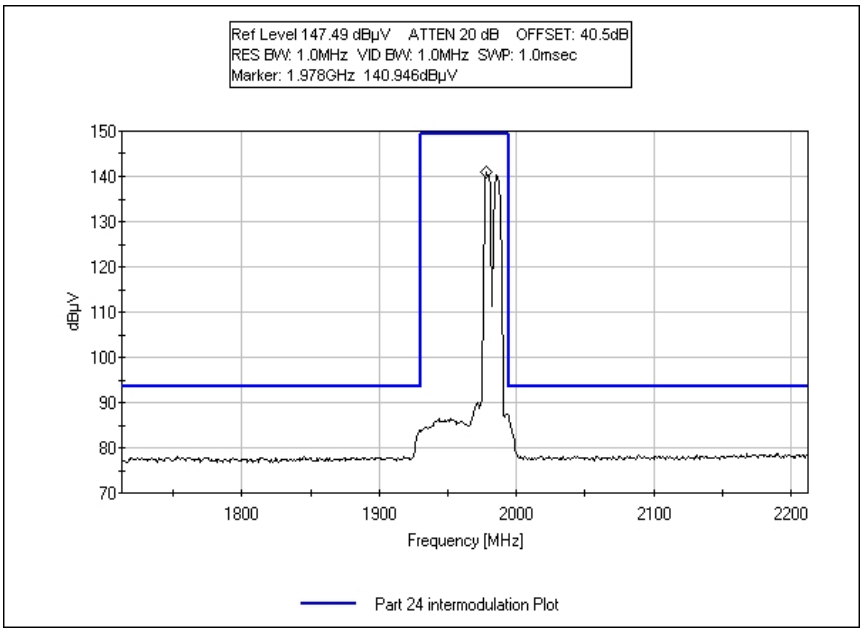
Test Setup Photo

Test Data
Tested By: E. Wong

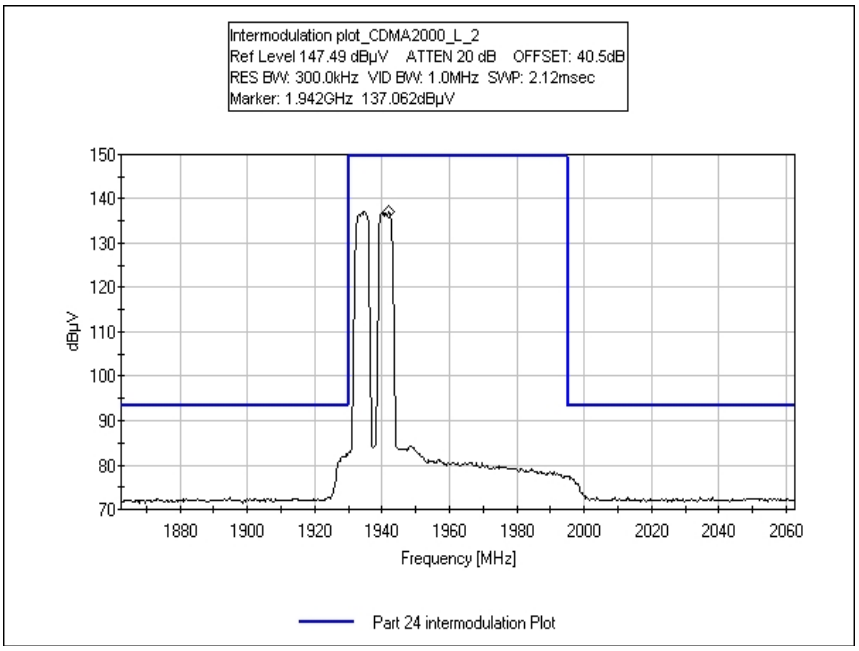
INTERMODULATION CDMA2000 LOW CHANNEL 1



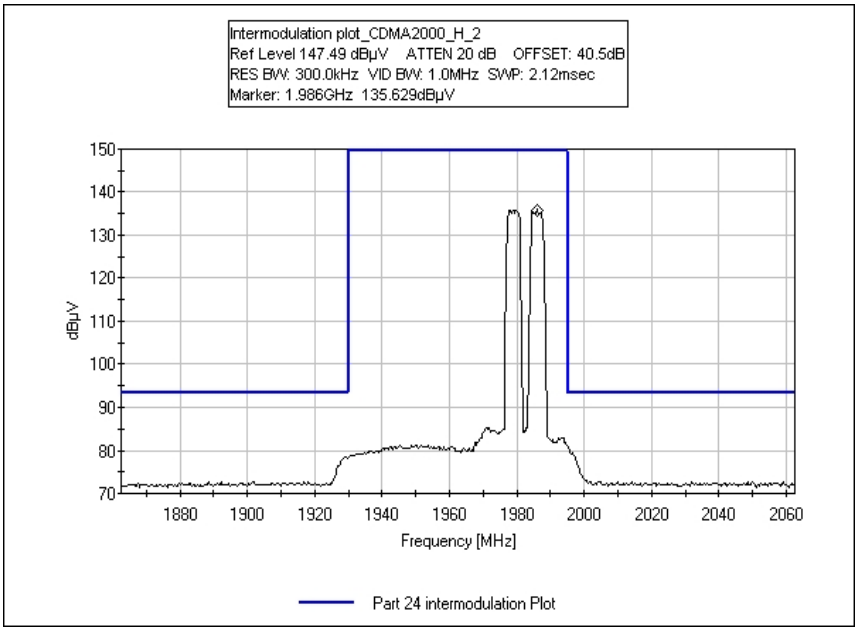
INTERMODULATION CDMA2000 HIGH CHANNEL 1



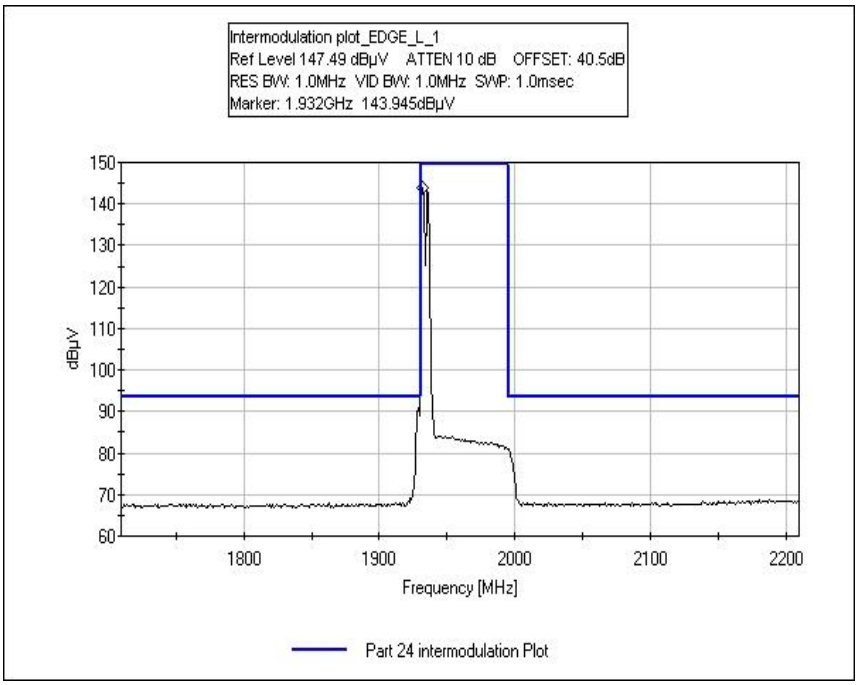
INTERMODULATION CDMA2000 LOW CHANNEL 2



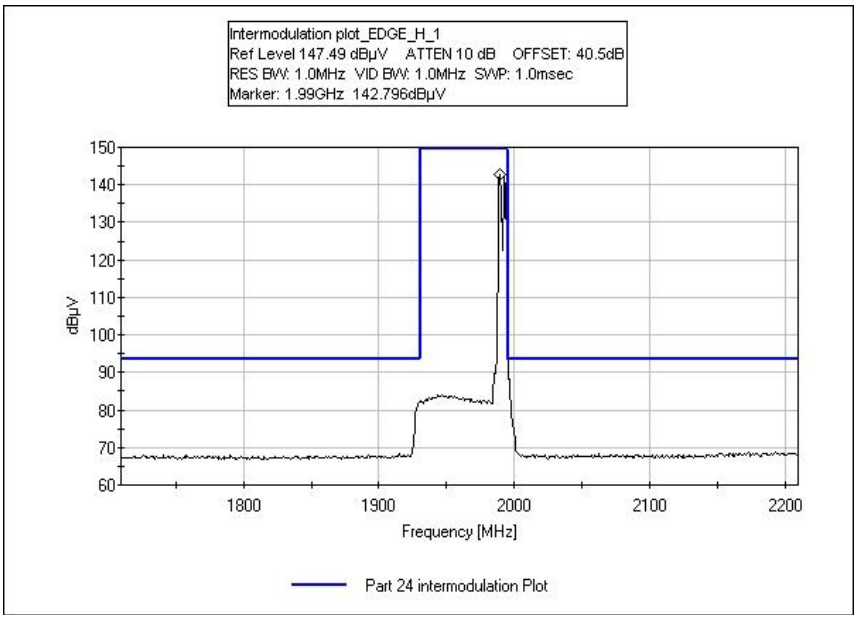
INTERMODULATION CDMA2000 HIGH CHANNEL 2



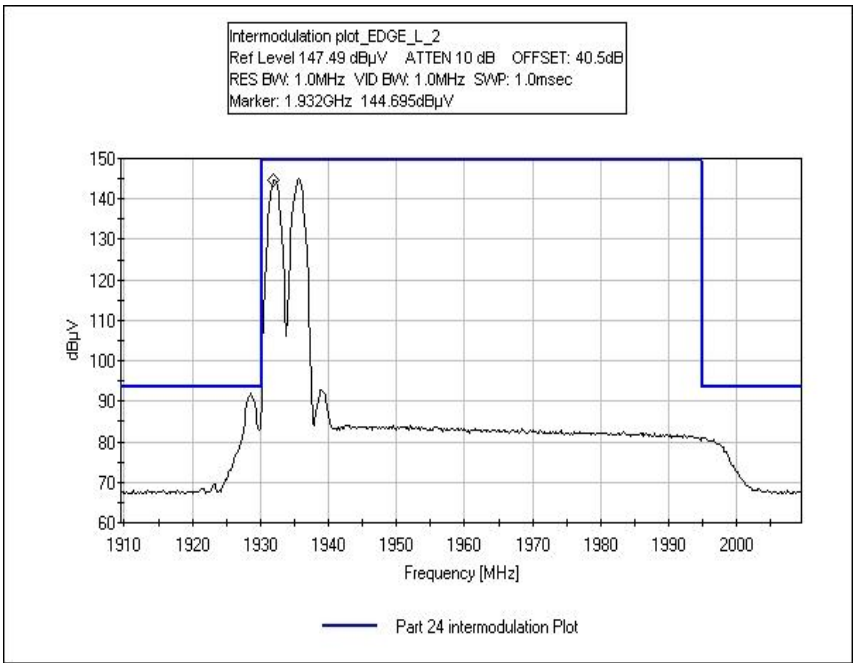
INTERMODULATION EDGE LOW CHANNEL 1



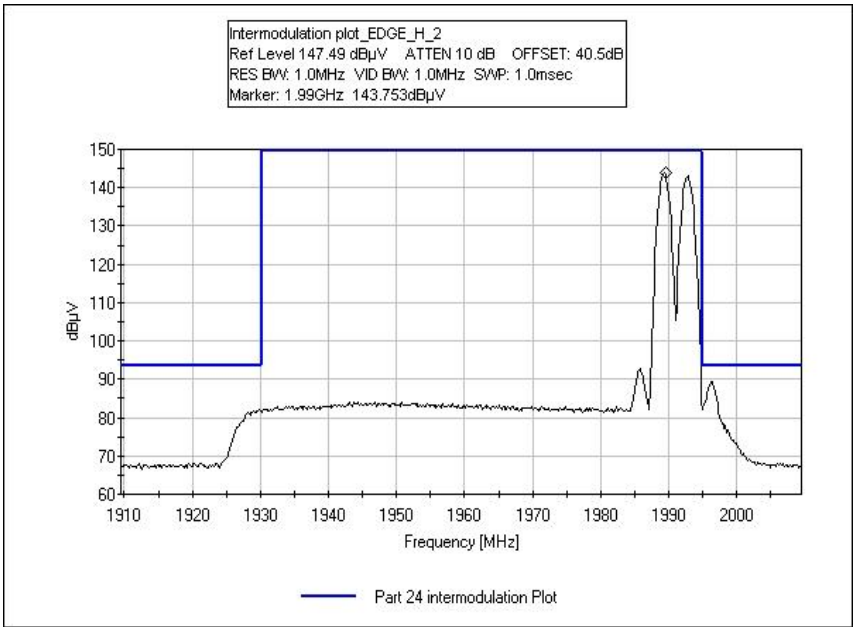
INTERMODULATION EDGE HIGH CHANNEL 1



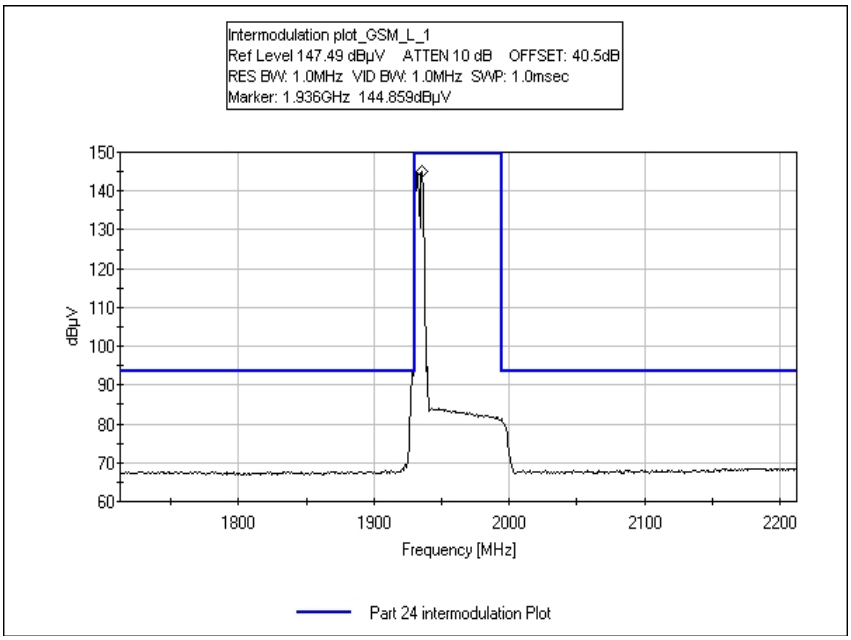
INTERMODULATION EDGE LOW CHANNEL 2



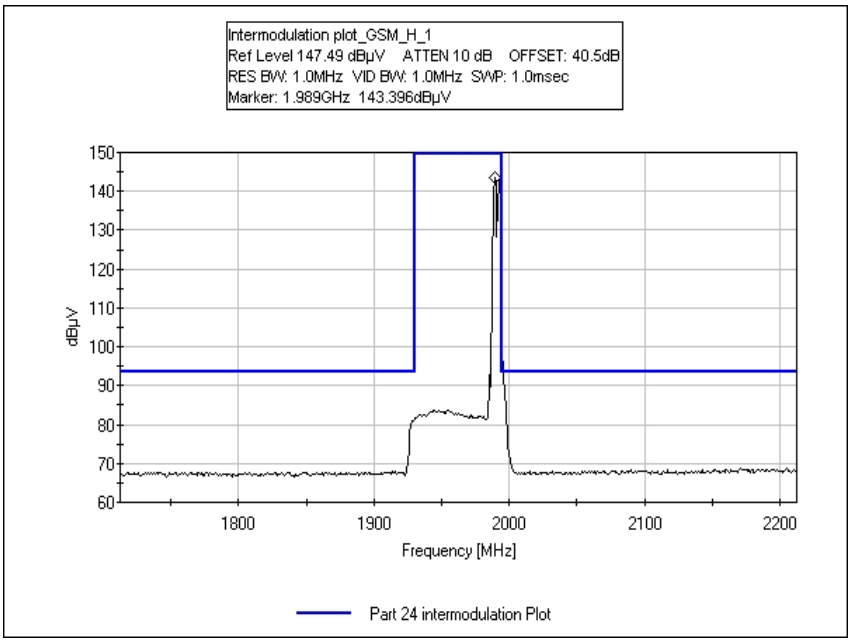
INTERMODULATION EDGE HIGH CHANNEL 2



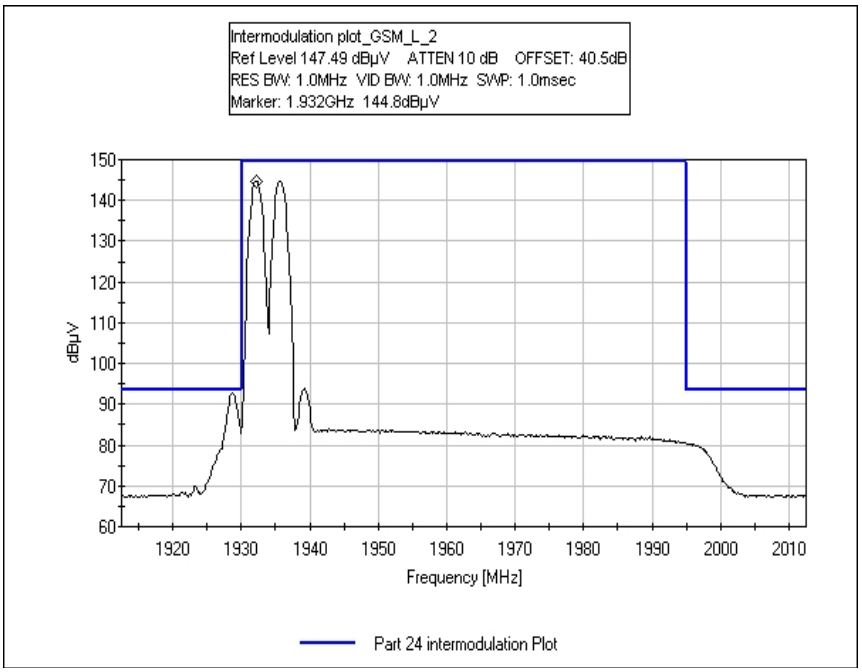
INTERMODULATION GSM LOW CHANNEL 1



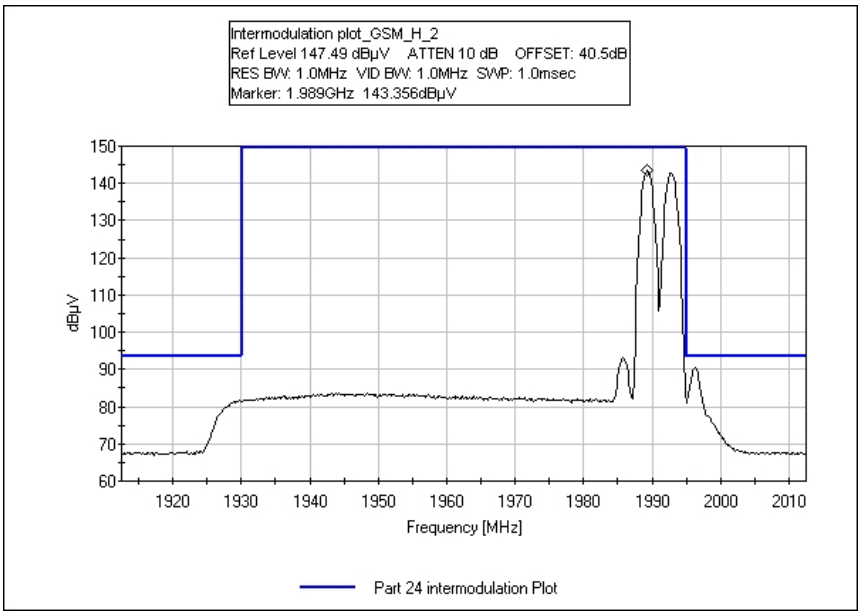
INTERMODULATION GSM HIGH CHANNEL 1



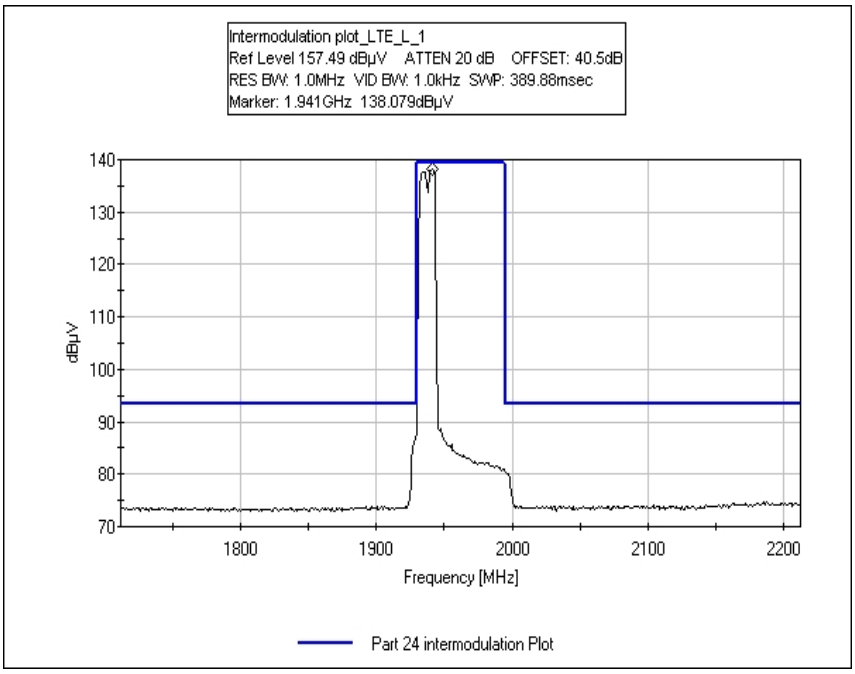
INTERMODULATION GSM LOW CHANNEL 2



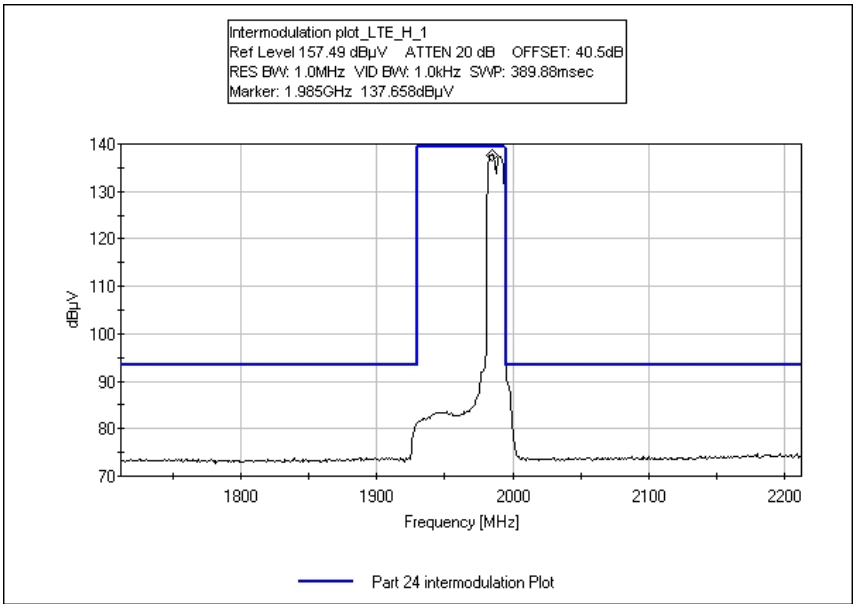
INTERMODULATION GSM HIGHCHANNEL 2



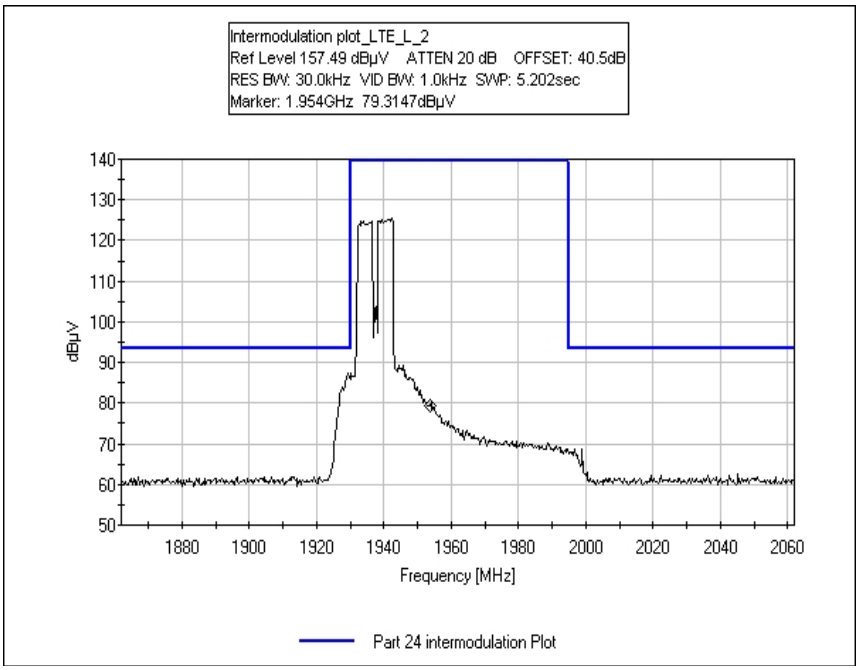
INTERMODULATION LTE LOW CHANNEL 1



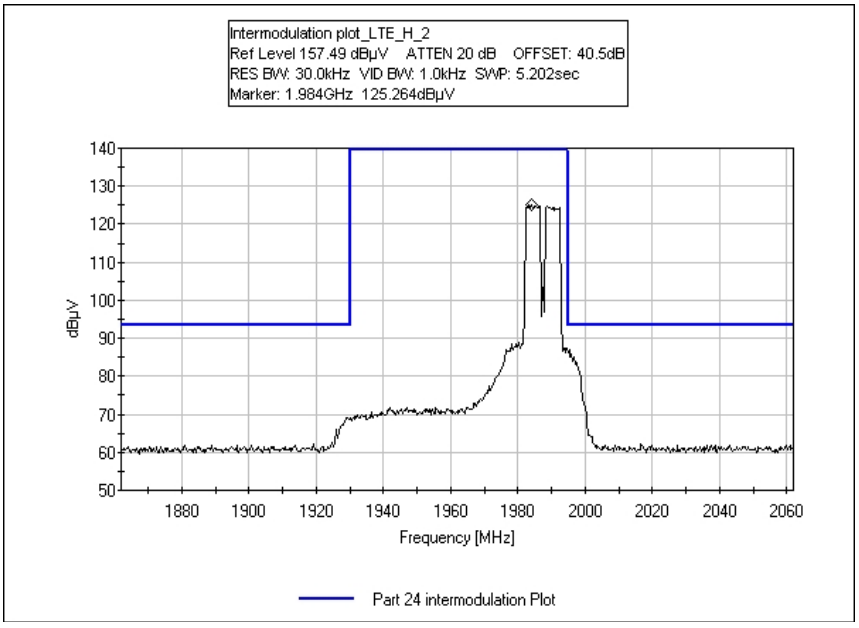
INTERMODULATION LTE HIGH CHANNEL 1



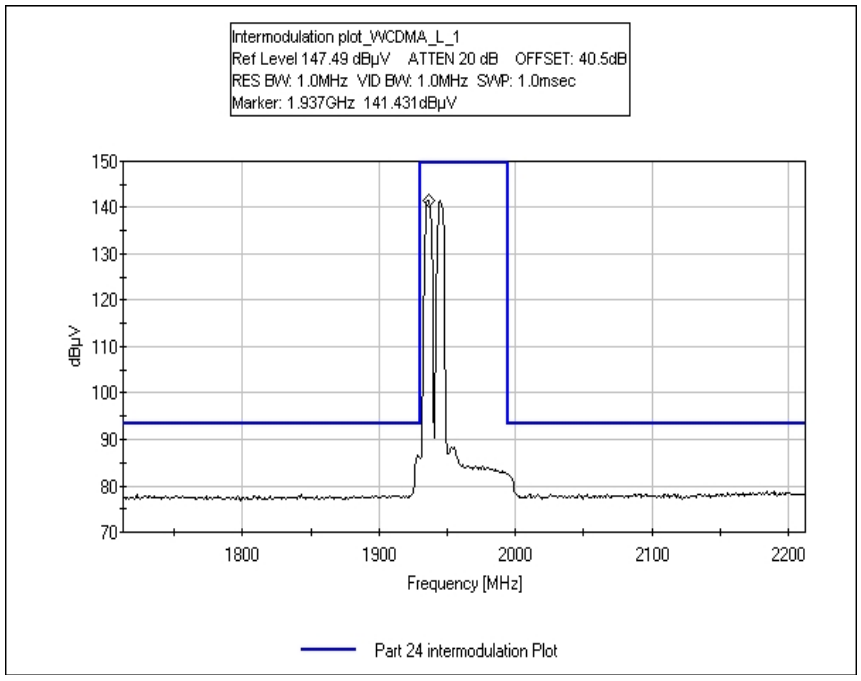
INTERMODULATION LTE LOW CHANNEL 2



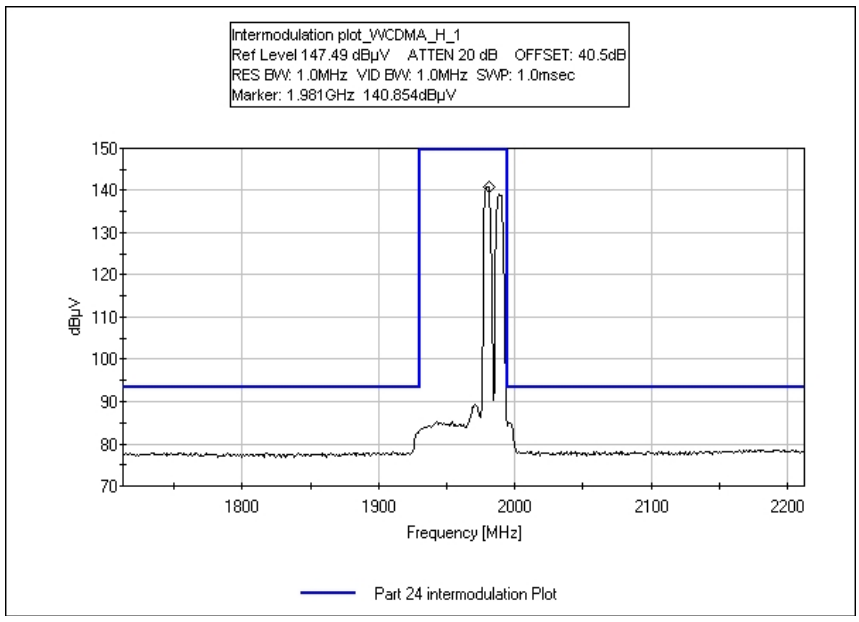
INTERMODULATION LTE HIGH CHANNEL 2



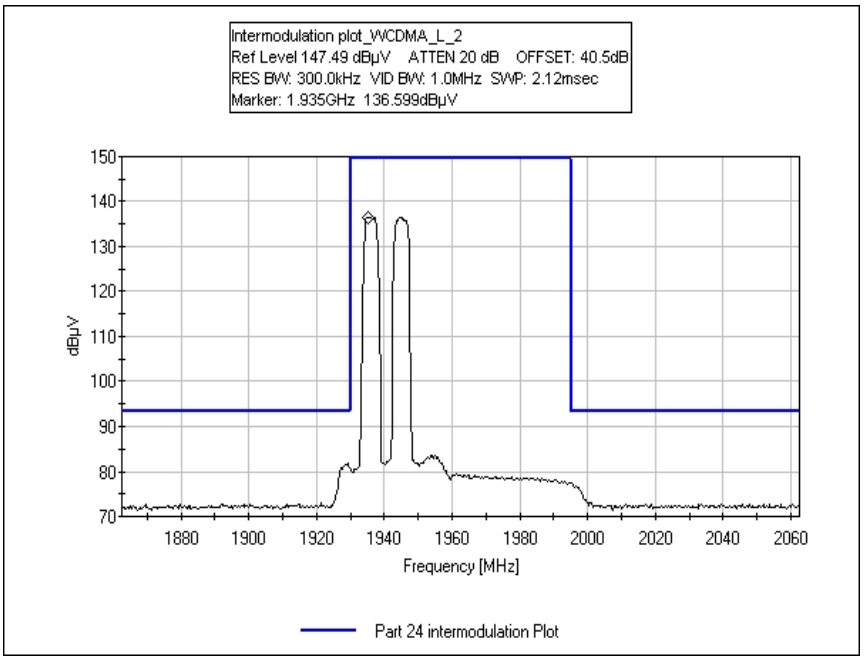
INTERMODULATION WDCMA LOW CHANNEL 1



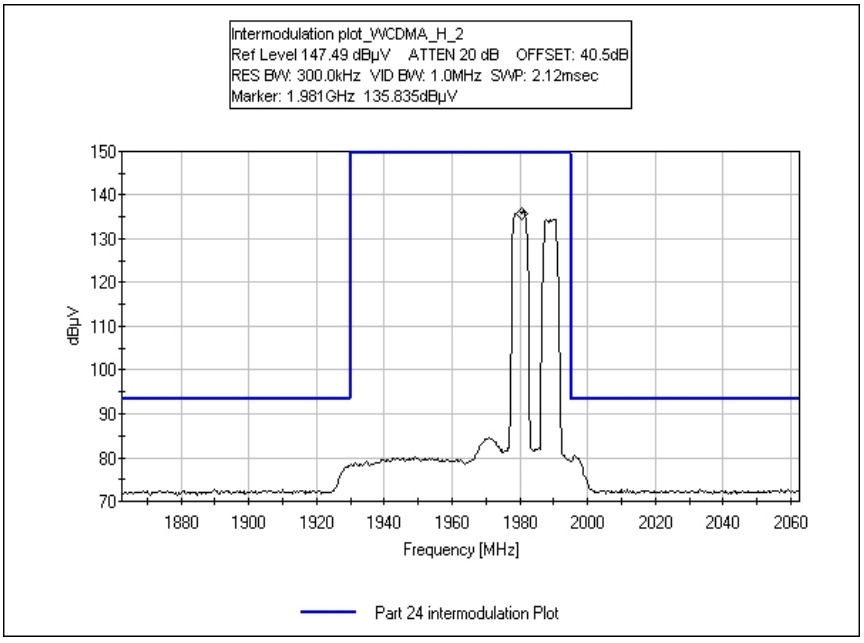
INTERMODULATION WDCMA HIGH CHANNEL 1



INTERMODULATION WDCMA LOW CHANNEL 2



INTERMODULATION WDCMA HIGH CHANNEL 2



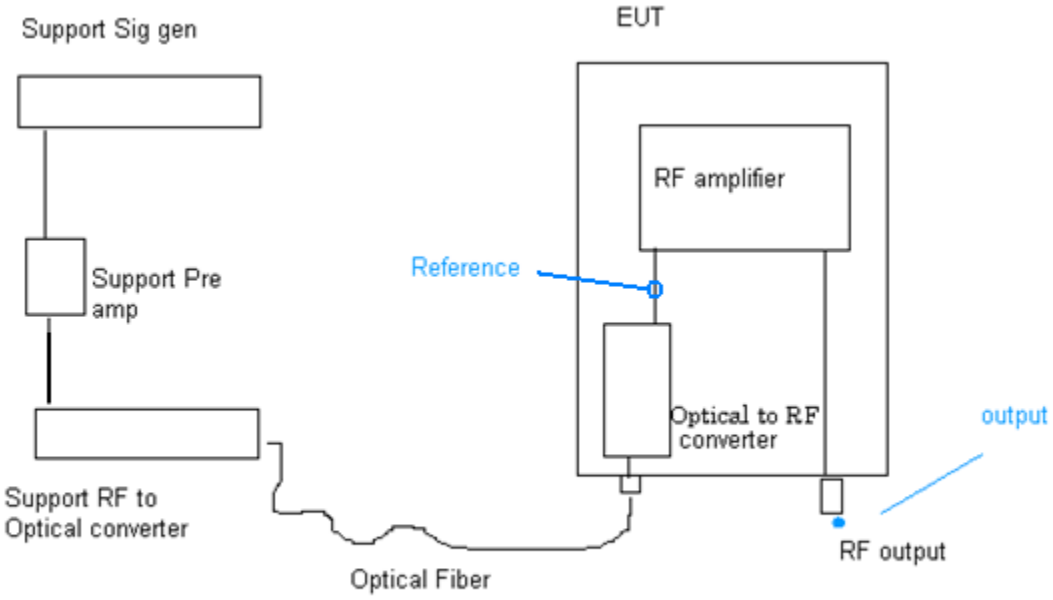
FCC OUT OF BAND REJECTION

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Network analyzer	C00012	HP	8753E	Us38432770	091208	091210

OUT OF BAND REJECTION

Test Set up



The EUT is placed on the wooden table. The RF output port is connected to a load string. An optical port is connected to a optical Converter. The support optical converter receives the RF signal, converts the signal to optic and sends it to the EUT. The EUT decodes the optical signal and generated a RF signal.

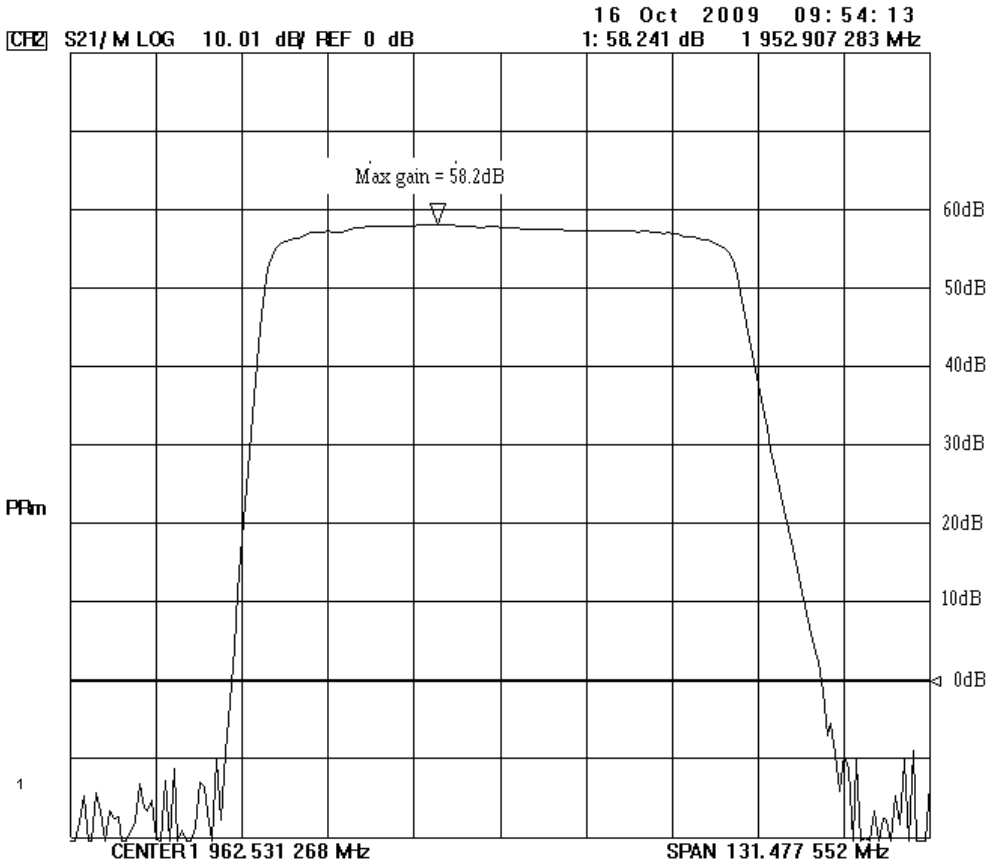
To measure the System RF gain, the reference was established at the input of the RF amplifier section, by passing the optical convertor. The manufacturer declared gain is system RF gain.

The system RF gain is measured with a Network Analyzer.

Test Setup Photo

Test Data
Tested By E. Wong

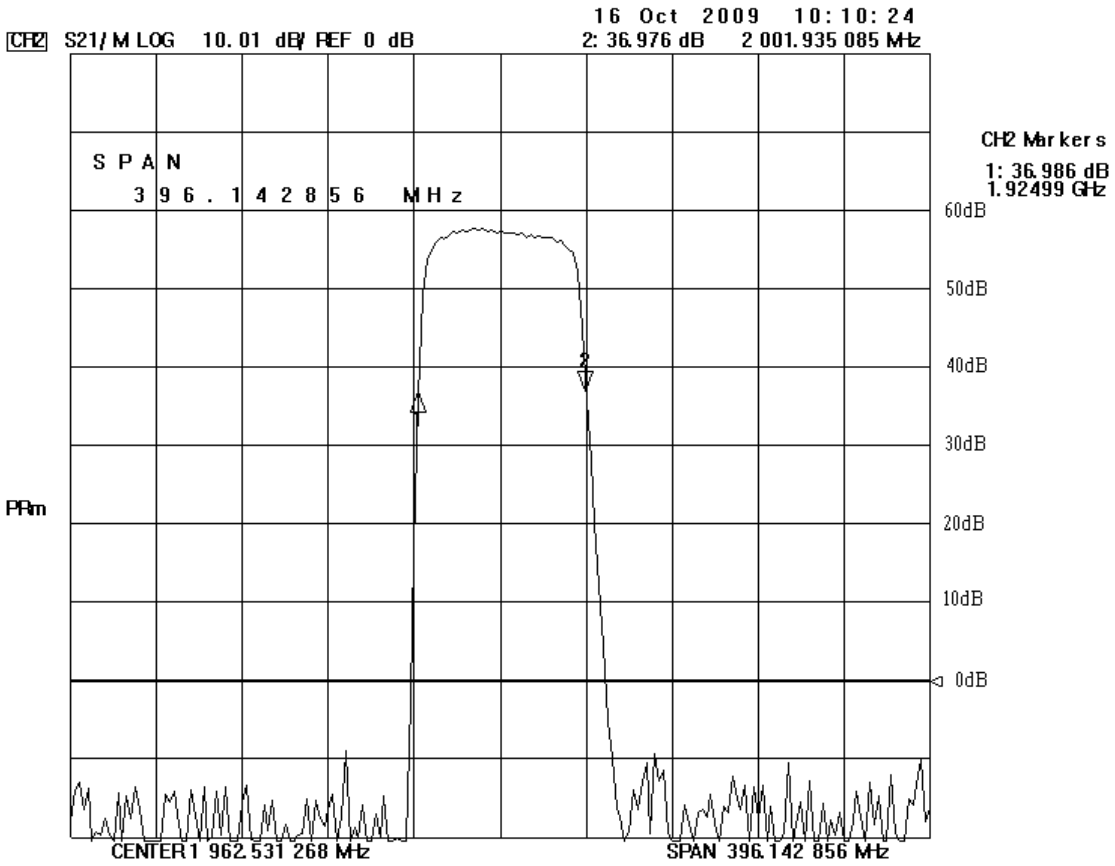
MEASURED GAIN = OUTPUT – REFERENCE (DB)



The internal control is adjusted to the nominal gain for which equipment certification is sought.
Maximum measured gain = 58.2 dB
With the aid of a Vector Network analyzer, the Out of band rejection ratio of the device was measured.

The manufacturer declares: 1930 to 1995 MHz is actually the operating frequency of the product. The nominal bandwidth of the product is about 80 MHz, which is greater than 77.4MHz. Our product meets the requirement that The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer.

OUT OF BAND REJECTION PLOT (WIDE SPAN)



RSS-131 99% BANDWIDTH

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	072308	072310
36" 37GHz cable	02945	Strolab	NA	NA	092100	092111

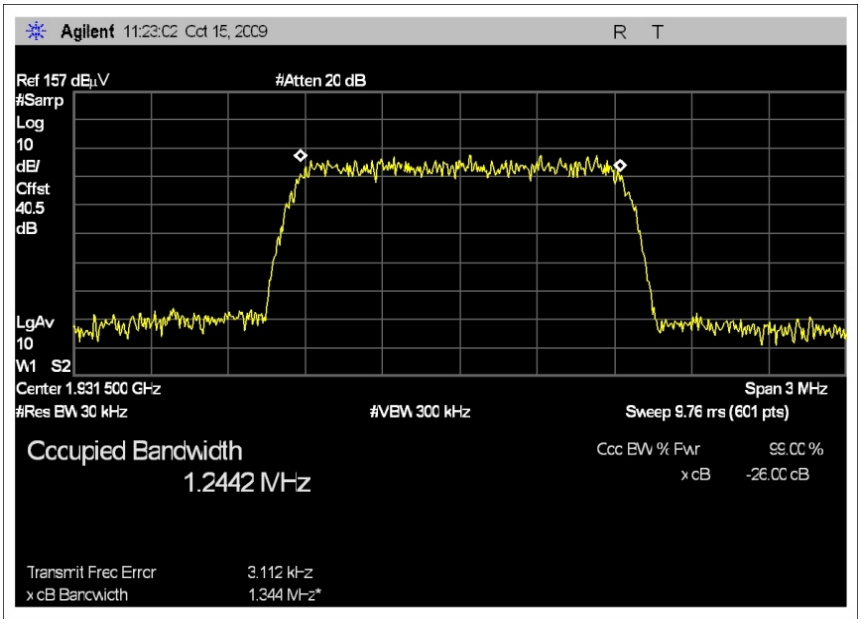
Test Set up

The EUT is placed on the wooden table. The RF output port is connected to a load string. An optical in port is connected to a support optical converter.
The support optical converter receives RF signal converts the signal to optic and sends it to the EUT. The EUT decodes the optical signal, and generates an RF signal.
99% BW waveform is recorded with a spectrum analyzer at the Antenna port of the device.

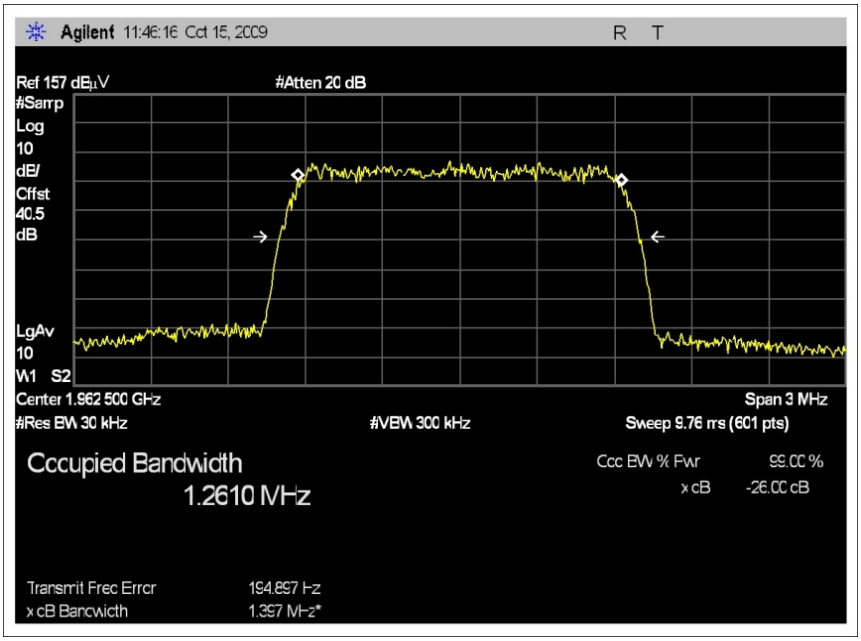
Test Set up Photo

Test Data
Tested By: E. Wong

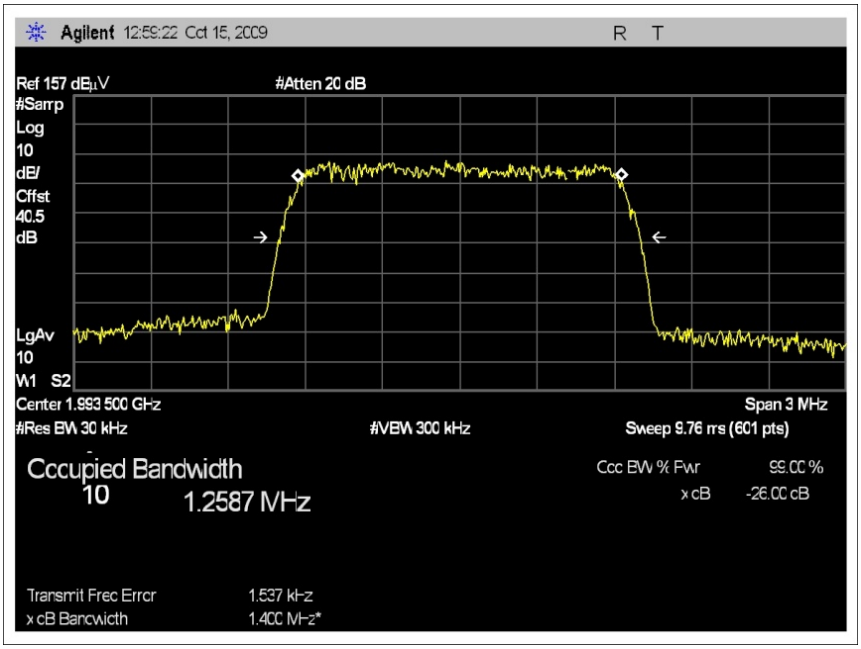
RSS131 99% BANDWIDTH= 1.24MHz CDMA 2000 1930 MHz



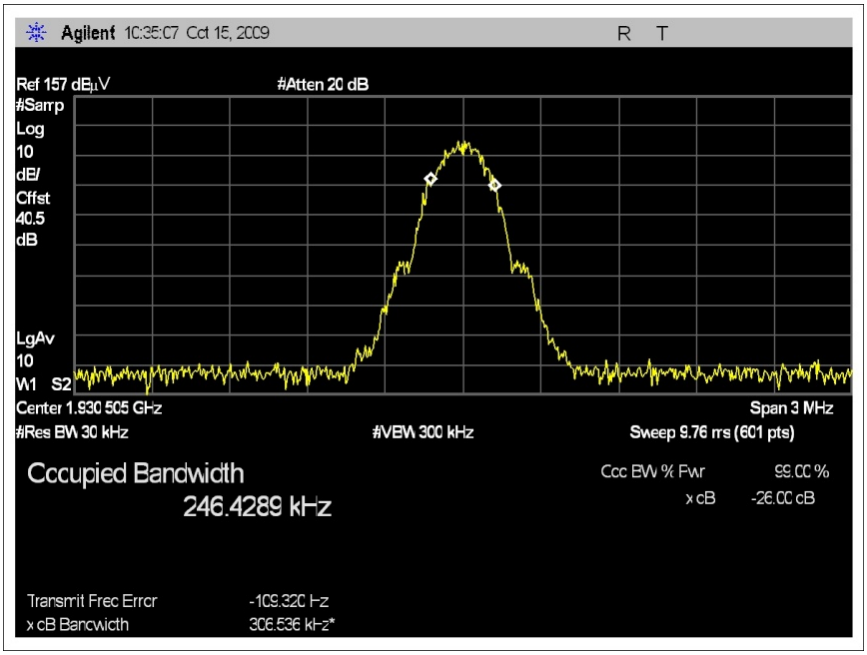
RSS131 99% BANDWIDTH= 1.26MHz CDMA 2000 1962 MHz



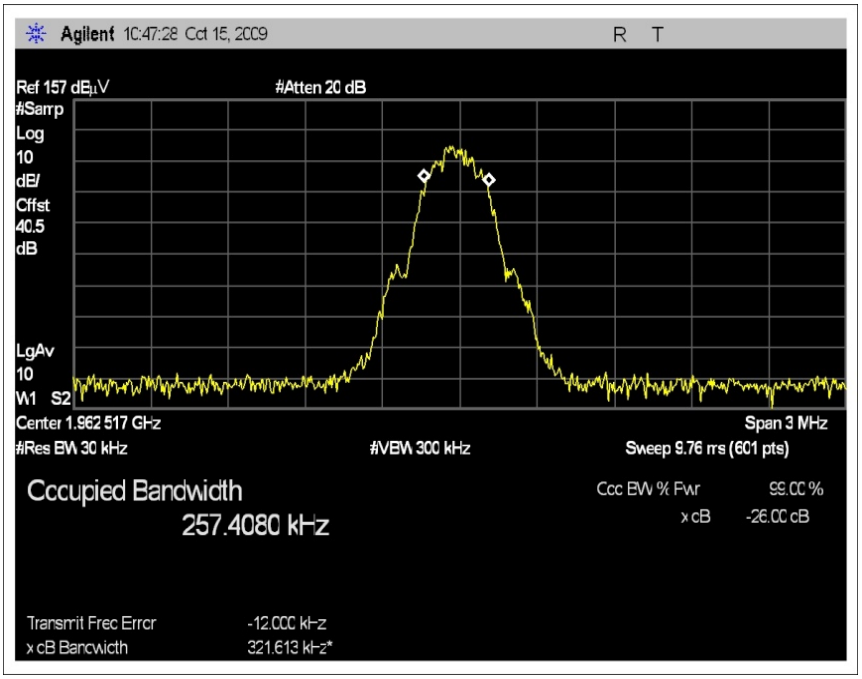
RSS131 99% BANDWIDTH= 1.26MHz CDMA 2000 1995 MHz



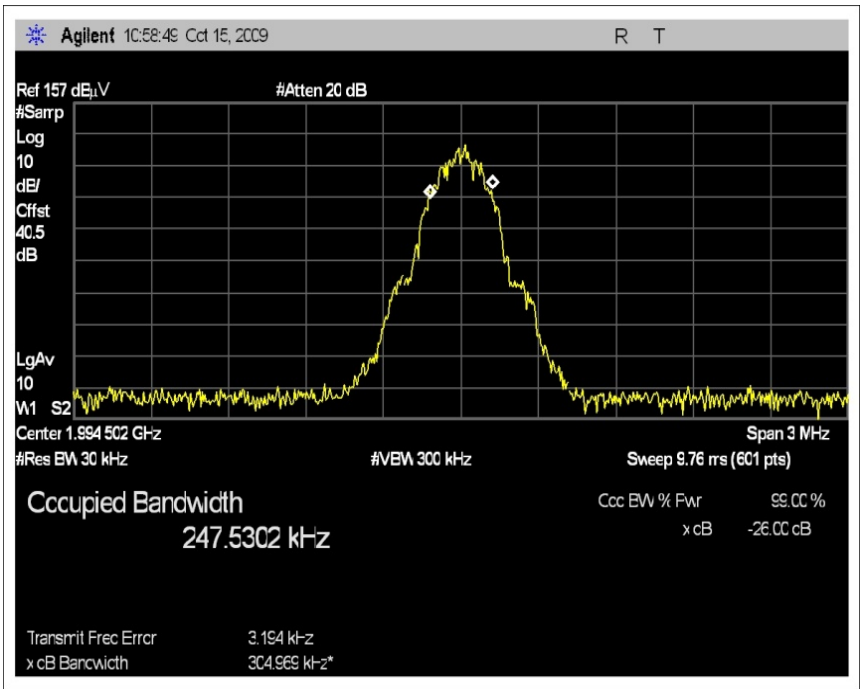
RSS131 99% BANDWIDTH= 246.4kHz EDGE 1930 MHz



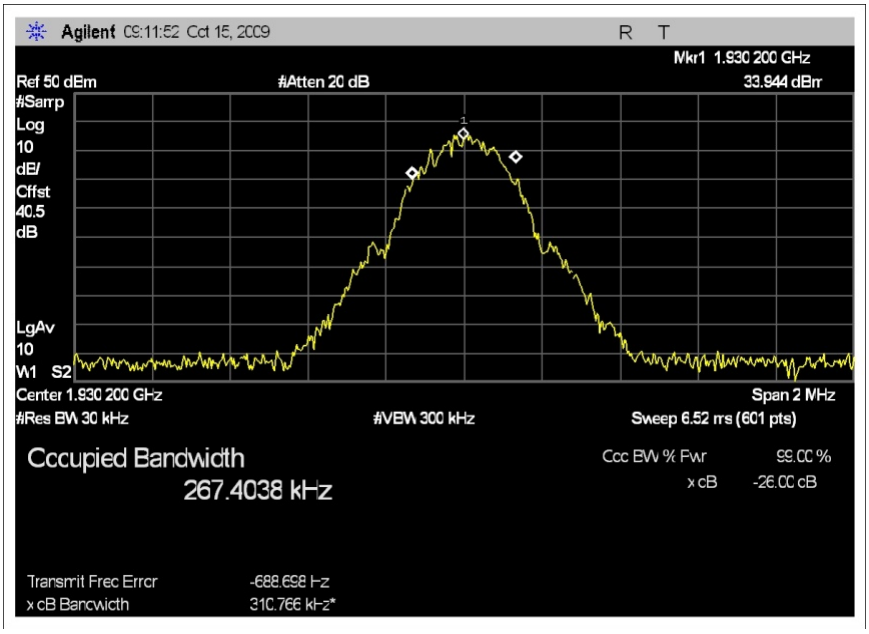
RSS131 99% BANDWIDTH= 257.4kHz EDGE 1962MHz



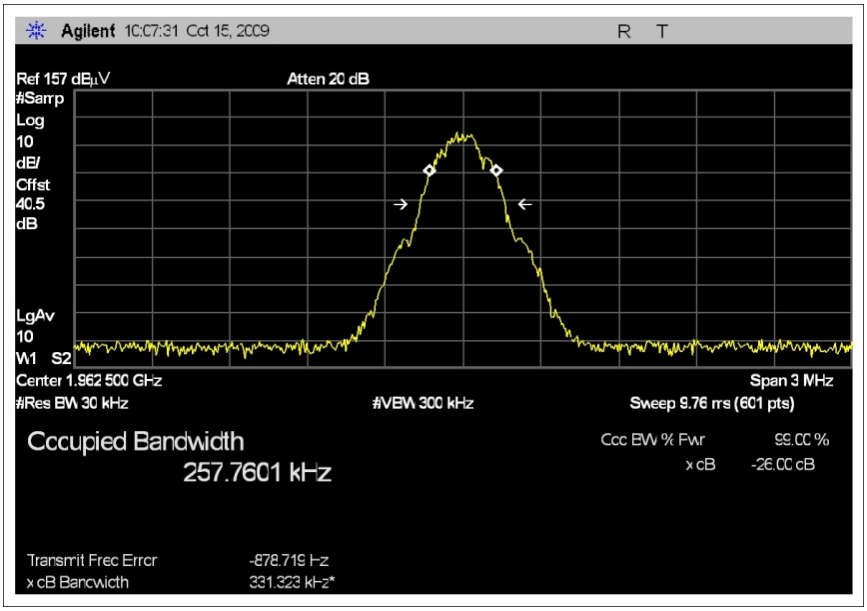
RSS131 99% BANDWIDTH= 247.5kHz EDGE 1995 MHz



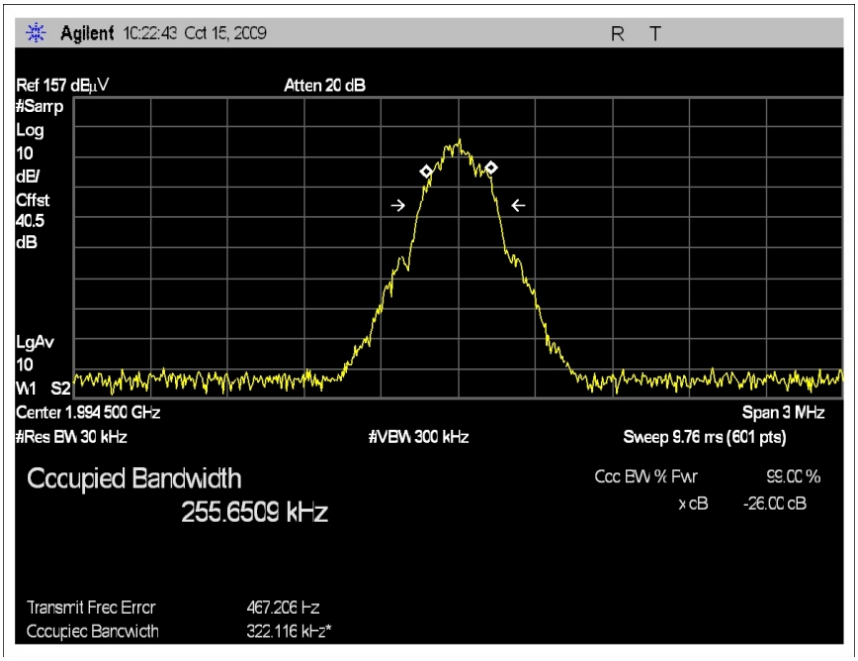
RSS131 99% BANDWIDTH= 267.4kHz GSM 1930 MHz



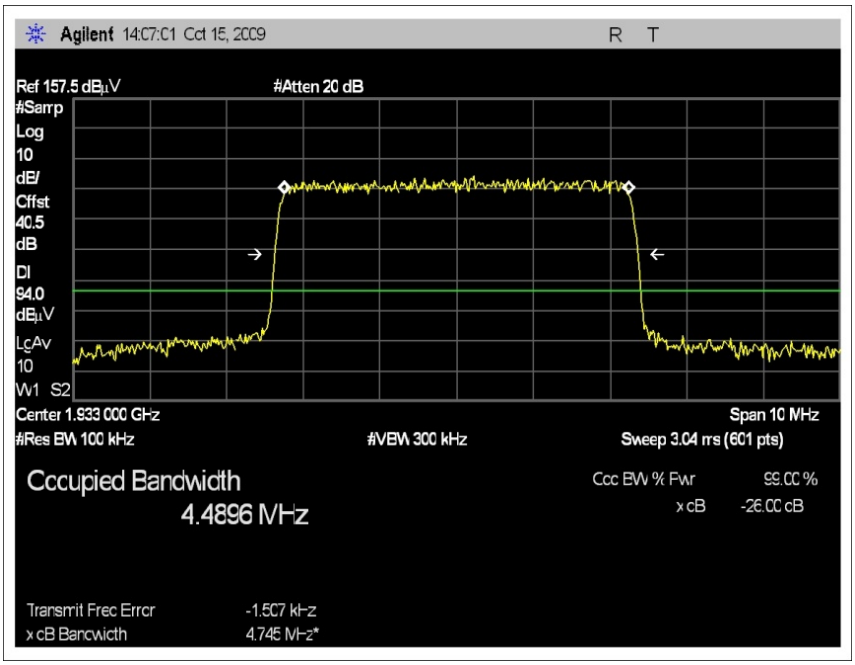
RSS131 99% BANDWIDTH= 267.4kHz GSM 1962 MHz



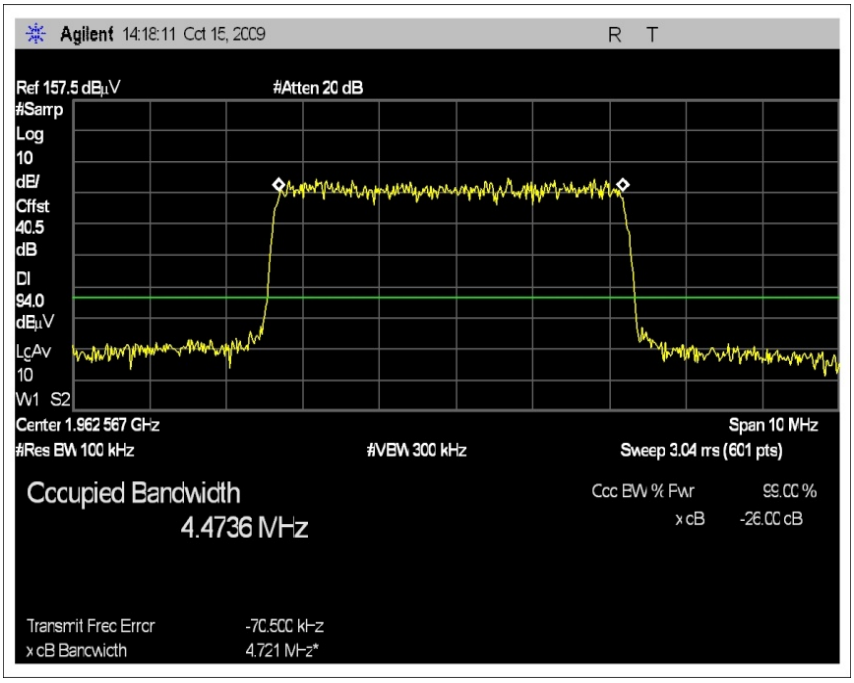
RSS131 99% BANDWIDTH= 255.6kHz GSM 1995 MHz



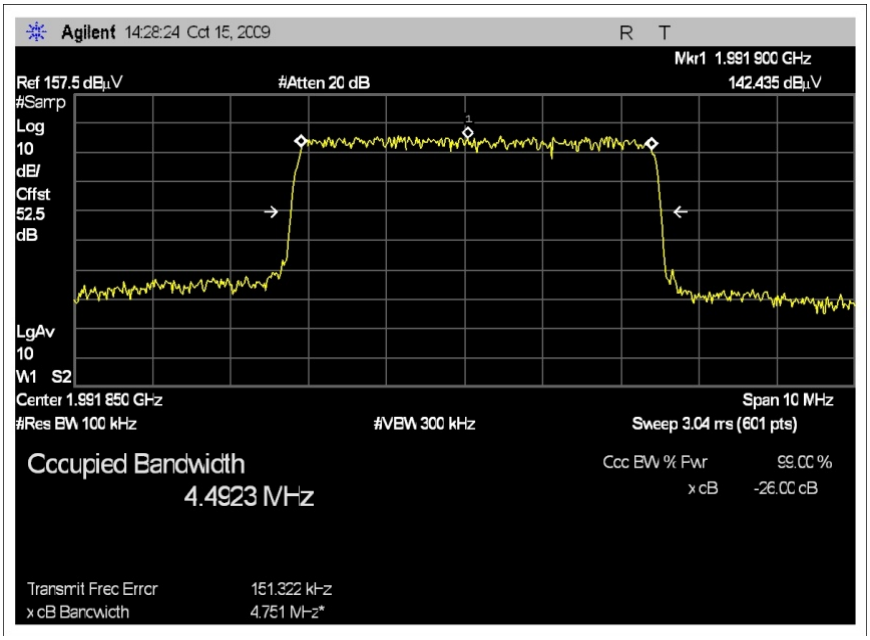
RSS131 99% BANDWIDTH= 4.49MHz LTE 1930 MHz



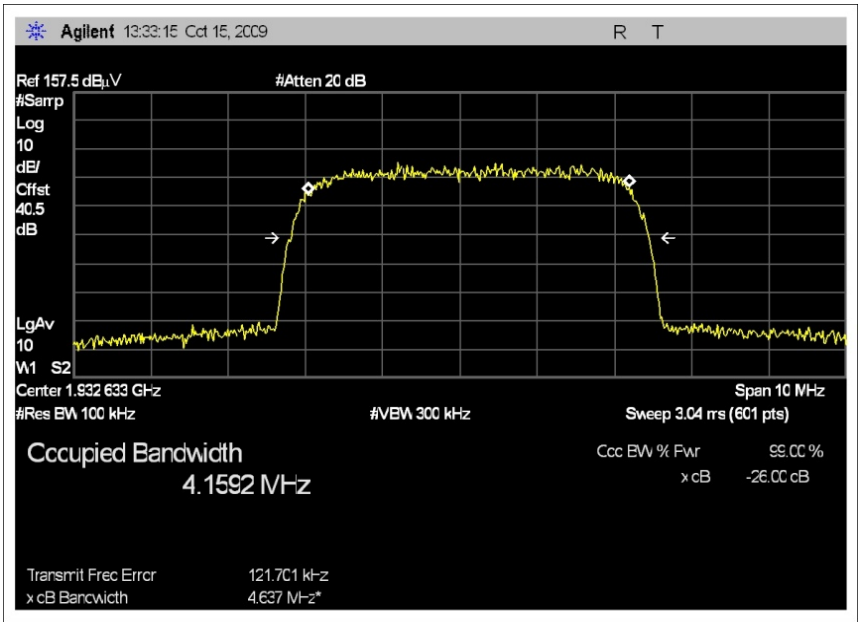
RSS131 99% BANDWIDTH= 4.47MHz LTE 1962 MHz



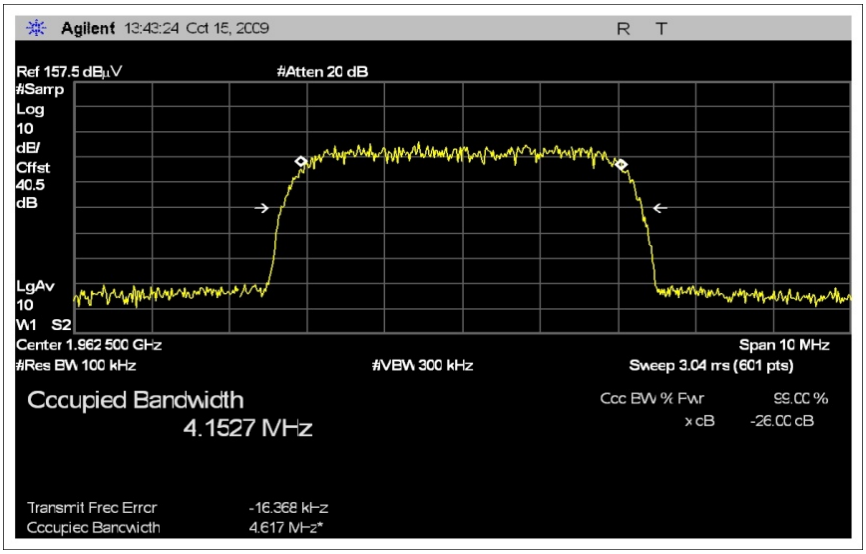
RSS131 99% BANDWIDTH= 4.49MHz LTE 1995 MHz



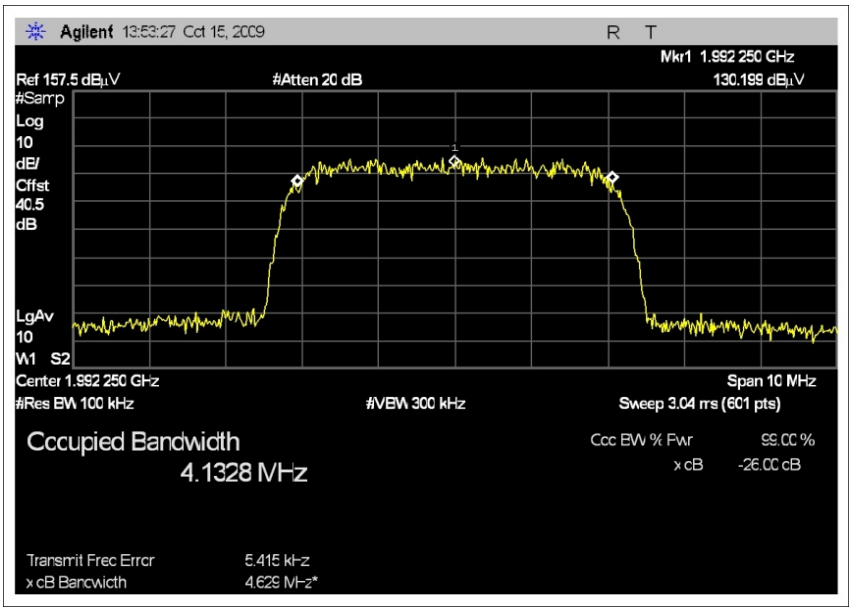
RSS131 99% BANDWIDTH= 4.16MHz WCDMA 1930 MHz



RSS131 99% BANDWIDTH= 4.15MHz WCDMA 1962 MHz



RSS131 99% BANDWIDTH= 4.13MHz WCDMA 1995 MHz

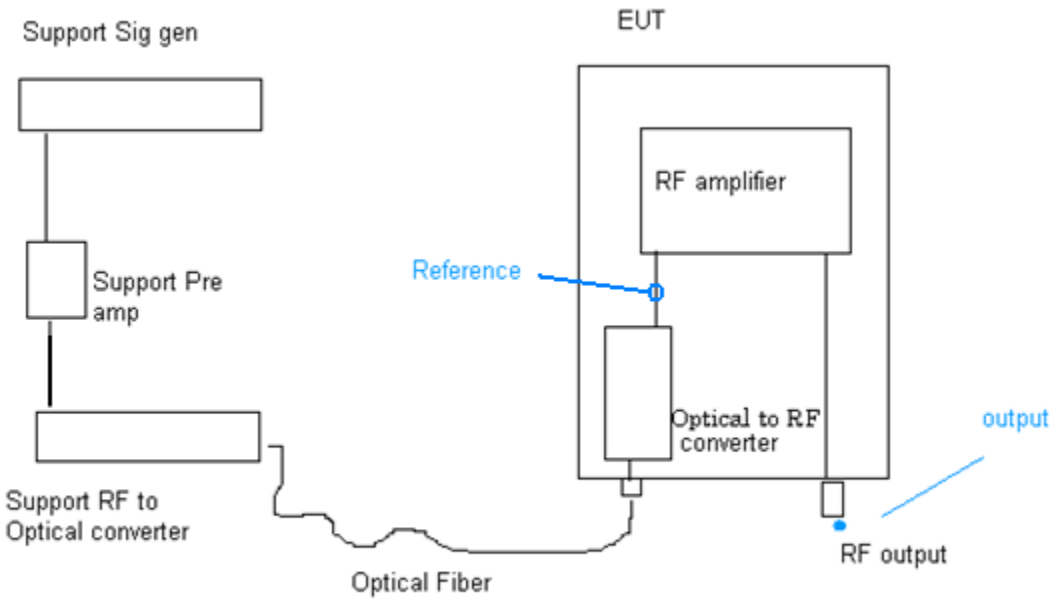


RSS 131 6.1 Amplifier Gain and Bandwidth

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Network Analyzer	C00012	HP	8753E	Us38432770	091208	091210

Test Set up

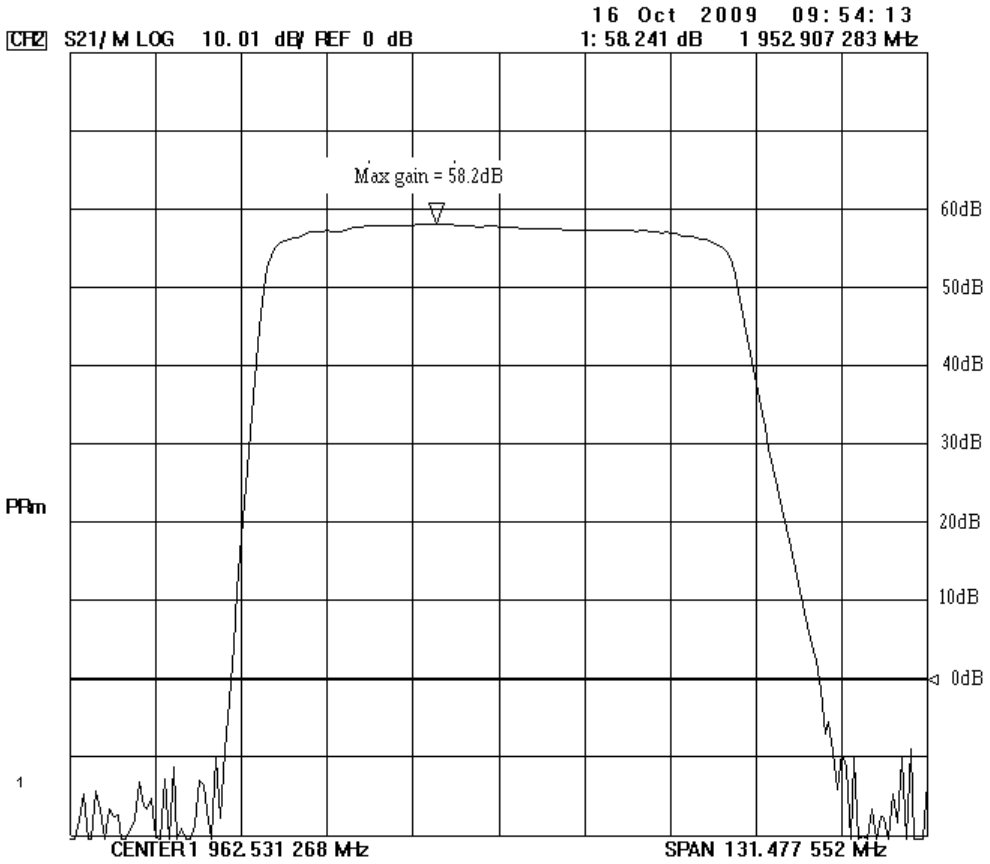


The EUT is placed on the wooden table. The RF output port is connected to a load string. An optical port is connected to a optical Converter. The support optical converter receives the RF signal, converts the signal to optic and sends it to the EUT. The EUT decodes the optical signal and generates a RF signal.
To measure the System RF gain, the reference was established at the input of the RF amplifier section, by passing the optical convertor. The manufacturer declared gain is system RF gain.
The system RF gain is measured with a Network Analyzer.

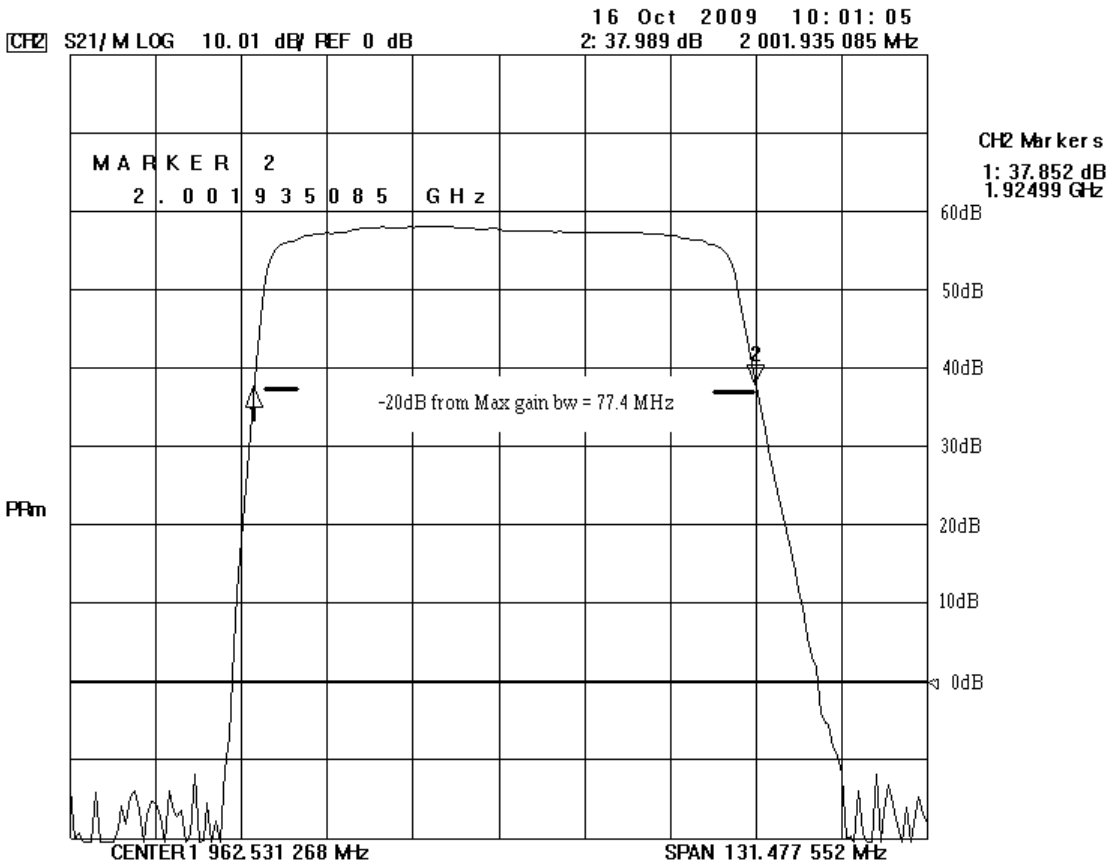
The manufacturer declares: 1930 to 1995 MHz is actually the operating frequency of the product. The nominal bandwidth of the product is about 80 MHz, which is greater than 77.4MHz. Our product meets the requirement that The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer.

Test Data

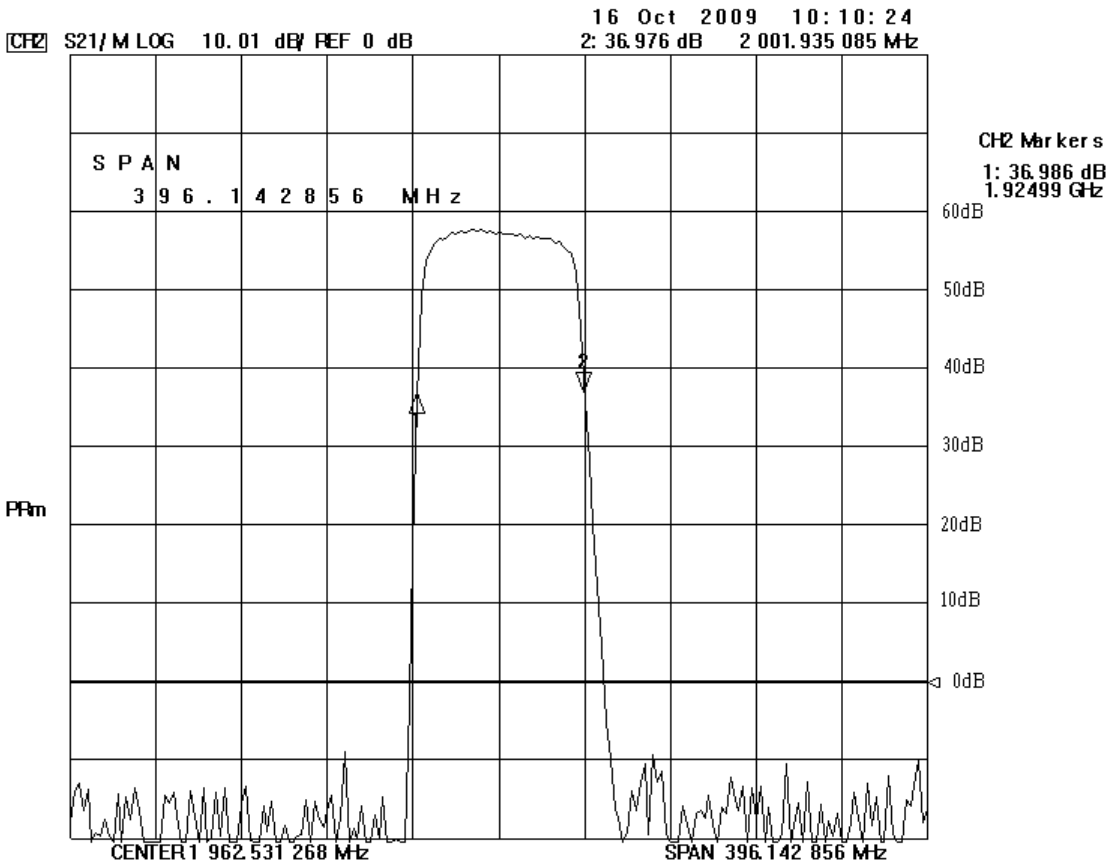
Tested By: E. Wong



The internal control is adjusted to the nominal gain for which equipment certification is sought.



With the aid of a signal generator and a spectrum analyzer, the 20 dB Bandwidth is measured.



The gain-versus-frequency response of the amplifier from the mid band Fo of the pass band up to at least fo + - 250% of the 220dB Bandwidth.

Minimum standard:
The pass band gain response shall not exceed the nominal gain by more than 1 dB. The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer.

Outside of the 20dB bandwidth the gain shall not exceed that at the 20dB point.

RSS 131 6.3.1 Mean Output Power

The EUT is a RF amplifier. The manufacturer does not provide an antenna for sale with the product, hence EIRP is not measured nor calculated.

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	072308	072310
36" 37GHz cable	02945	Strolab	NA	NA	092100	092111

Test Set up

The EUT is a RF amplifier. The manufacturer does not provide an antenna for sale with the product, hence EIRP is not measured nor calculated.

The EUT is placed on the wooden table. The RF Output port is connected to a load string. An Optical port is connected to a Optical Converter. The support optical converter receives the RF signal, converts the signal to optic and sends it to the EUT. The EUT decodes the optical signal and generates a RF signal.

Operating range: 1930-1995MHz

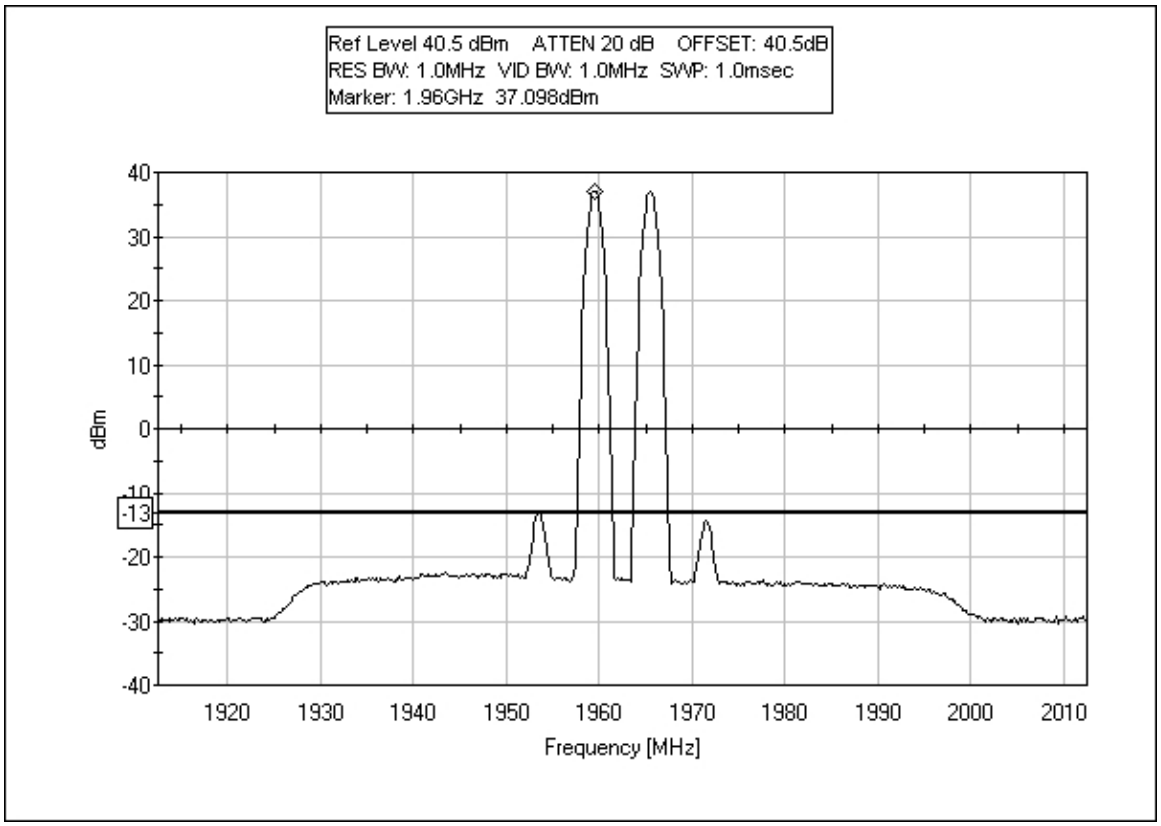
Two signals from the support ESG are injected into the device and the intermodulation product is measured at the RF antenna port under investigation.

The RF power of the EUT was measured at the antenna port IAW **RSS 131, 6.3.1** requirement.

Test Set up Photo

Test Data
Tested By: E. Wong

MEAN OUTPUT POWER.



Measured Po1 = + 37 dBm
P mean = Po1 + 3 dB = 37 + 3 dBm = 40 dBm = 10 W