POWERWAVE TECHNOLOGIES, INC. TEST REPORT

FOR THE

NEXUS RT DIGITAL REPEATER, NP50B0-22311

FCC PART 24 AND RSS 131 ISSUE 2 (2003)

TESTING

DATE OF ISSUE: OCTOBER 7, 2008

PREPARED FOR:

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

P.O. No.: 123037
W.O. No.: 88231

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Date of test: September 15-26, 2008

Report No.: FC08-094

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ADMINISTRATIVE INFORMATION

DATE OF TEST: September 15-26, 2008

DATE OF RECEIPT: September 15, 2008

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 24, RSS 131 Issue 2 (2003) and RSS GEN Issue 2

PURPOSE OF TEST: To perform the testing of the Nexus RT Digital Repeater, NP50B0-22311 with the requirements for FCC Part 24 and RSS 131 devices.

APPROVALS

QUALITY ASSURANCE:

Steve Behm, Director of Engineering Services

TEST PERSONNEL:

Eddie Wong, Senior EMC Engineer

SUMMARY OF RESULTS

Test	Specification	Results
RF Power Output	FCC 24.232(a) RSS 131 Issue 2 (2003) Section 6.2	Pass
Input Plots	FCC 2.1049(i)	Pass
Output Plots	FCC 2.1049(i)	Pass
Spurious Emissions at Antenna Terminal	FCC 24.238(a)	Pass
Field Strength of Spurious Radiation	FCC 24.238(a)	Pass
Blockedge		Pass
Intermodulation		Pass
Out of Band Rejection		Pass
99% Bandwidth	RSS 133 Section 5.6	Pass
Passband Gain and Bandwidth	RSS 131 Issue 2 (2003) Section 6.1	Pass
Site File No.	FCC 90473 RSS 131 IC 3172-A	

CONDITIONS DURING TESTING

No modifications to the EUT were necessary during testing.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The customer declares the EUT tested by CKC Laboratories was representative of a production unit. The Nexus RT Digital Repeater increases the coverage and capacity of existing wireless networks. It simultaneously supports 3G and 4G communications protocols and multiple RF carriers using advanced processing. The repeaters are designed to increase the coverage and capacity of existing wireless networks for both indoor and outdoor use. GSM, EDGE and WCDMA protocols can operate simultaneously on the same unit. Key features include support for multiple GSM/EDGE carriers and WCDMA support in 850MHz and 1900MHz operating bands. The Nexus RT Digital Repeater also provides feedback cancellation to effectively increase antenna isolation and enable greater operating gain without oscillation. Remote control and supervision is supported through either a direct IP connection or a wireless modem supporting the Simple Network Management Protocol (SNMP).

The following model has been tested by CKC Laboratories: **NP50B0-22311 (tested 1900 band of the 1900/850 dual band with Modem)**

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.
NPB0-11111 (1900 band without Modem)
NPB0-11311 (1900 band with Modem)
NP50B0-22111 (1900 band of the 1900/850 dual band without Modem)

EQUIPMENT UNDER TEST

Nexus RT Digital Repeater
Manuf: Powerwave Technologies, Inc.
Model: NP50B0-22311
Serial: NA
FCC ID: E675JS00106

PERIPHERAL DEVICES

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

Laptop
Manuf: HP
Model: HSTNNC18C
Serial: CND63661JIC7
FCC ID: NA

Ethernet Switch
Manuf: Linksys
Model: SD205
Serial: REF003600624
FCC ID: NA

ESG
Manuf: Agilent
Model: E4433B
Serial: US40052191
FCC ID: NA

Powermeter
Manuf: HP
Model: E4419B
Serial: MY40510694
FCC ID: NA

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
G7W, GXW, F9W

FCC 2.1033 (c)(5) FREQUENCY RANGE
1820-1910MHz Uplink, 1930-1990MHz Downlink

FCC 2.1033 (c)(6) OPERATING POWER
0.63 watts

FCC 2.1033 (c)(7) MAXIMUM POWER RATING
100 watts peak

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.

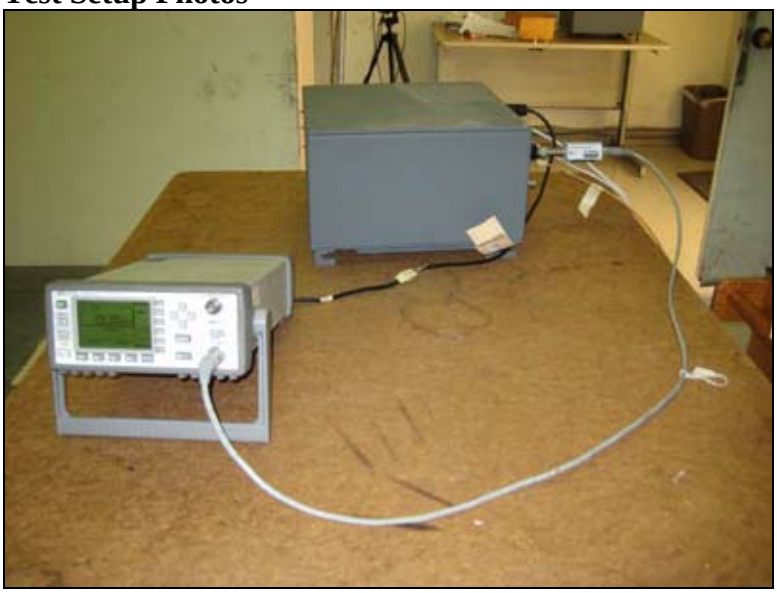
FCC 2.1033 (c)(13) MODULATION INFORMATION
EDGE, GSM, WCDMA

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

Test Setup Photos



Test Conditions

Base stations are limited to 1640 watts EIRP with antenna up to 300 meters HAAT In no case may the peak output power of a base station transmitter exceed 100 watts.

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 end user of this product is to exercise proper engineering judgment to select the appropriate antenna to comply with the EIRP limitation set forth by 24.232(a)**.**

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 rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a remote power meter. For uplink configuration, 1900MHz Donor antenna port is connected to remote Power meter and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet switch. RF signal measured at the output antenna port

Test Data

Uplink EDGE, GSM, WCDMA

	dBm	Watts
1850MHz	28	0.63
1880MHz	28	0.63
1910MHz	28	0.63

Downlink EDGE, GSM, WCDMA

	dBm	Watts
1930MHz	28	0.63
1960MHz	28	0.63
1990MHz	28	0.63

Conclusion
As indicated above, each single channel does not exceed the 100 Watt peak power limit.

RSS-131 SECTION 6.2 RF POWER OUTPUT

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02869	Agilent	E4440A	MY46186290	021207	021209
Hi-Freq 3' 40 GHz cable	02945	Astrolab	NA	NA	091807	091809

Test Conditions

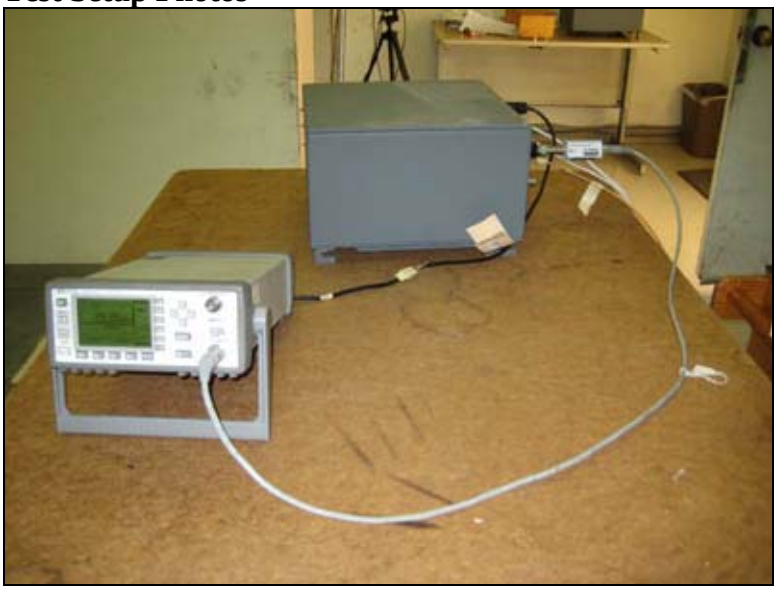
4.3 Mean Output power.

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.

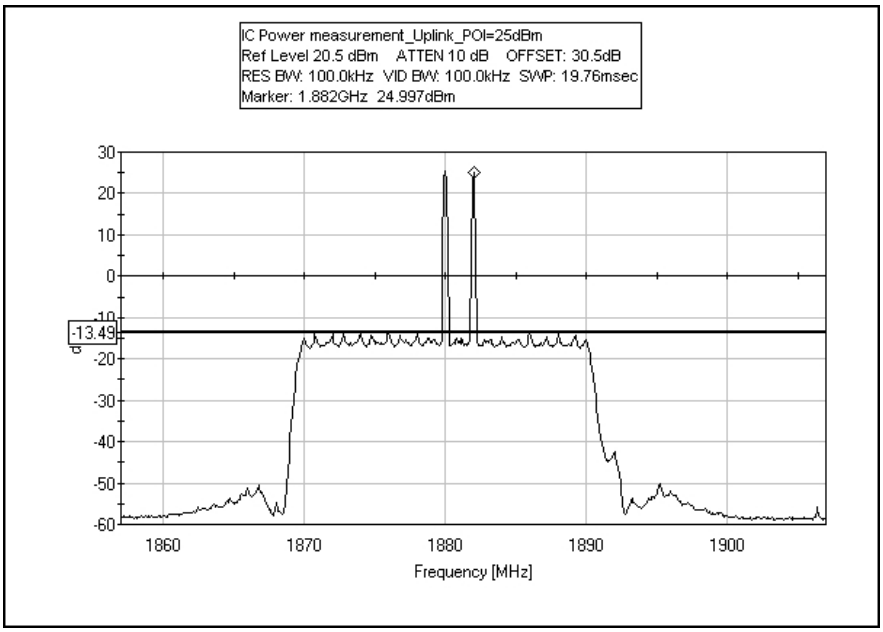
The rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a remote power meter. For uplink configuration, 1900MHz Donor antenna port is connected to remote Power meter and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet

The RF power of the EUT was measured at the antenna port in accordance with RSS 131, 4.3.1 requirement.

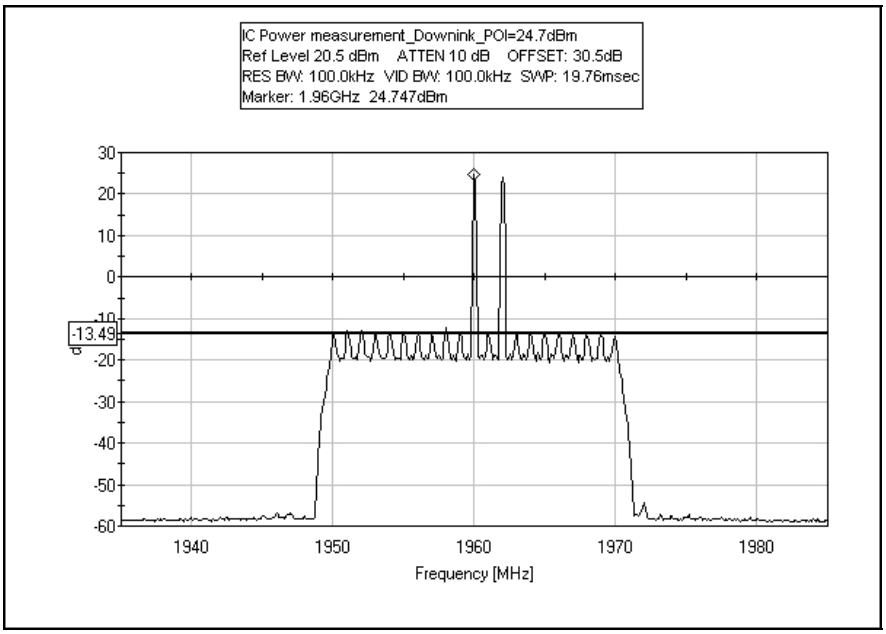
Test Setup Photos



Test Plots



Uplink 1850-1910MHz



Downlink 1930-1990MHz

Highest Measured Po1 =+ 25 dBm
P mean = Po1 + 3 dB = 25 + 3 dBm = 28 dBm = 0.6309W=**0.6Watt**

FCC 2.1033(c)(14)/2.1049(i)- INPUT PLOTS

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02869	Agilent	E4440A	MY46186290	021207	021209
36" 40GHz cable	02945	Strolab	NA	NA	091807	091809

Test Conditions

The rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a spectrum analyzer. For uplink configuration, 1900MHz Donor antenna port is connected to spectrum analyzer and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet switch.

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.

Uplink: 1850 to 1910MHz
Downlink: 1930 to 1990MHz

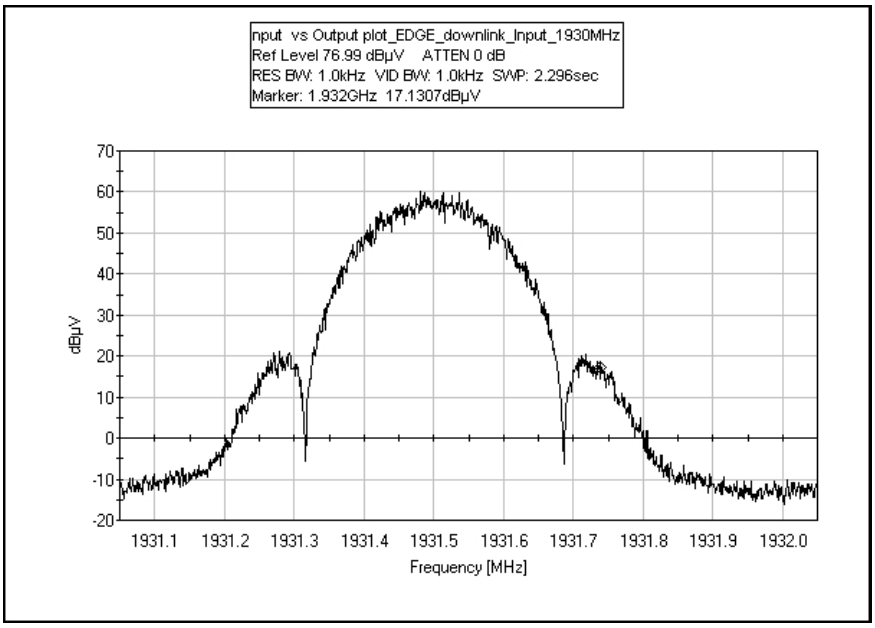
Uplink
Modulation: EDGE
TX = 1850.5MHz, 1880MHz, 1909.5MHz
Power = 28dBm = 0.63W

Downlink:
Modulation: EDGE
TX = 1930.5MHz, 1960MHz, 1989.5MHz
Power = 28dBm = 0.63W

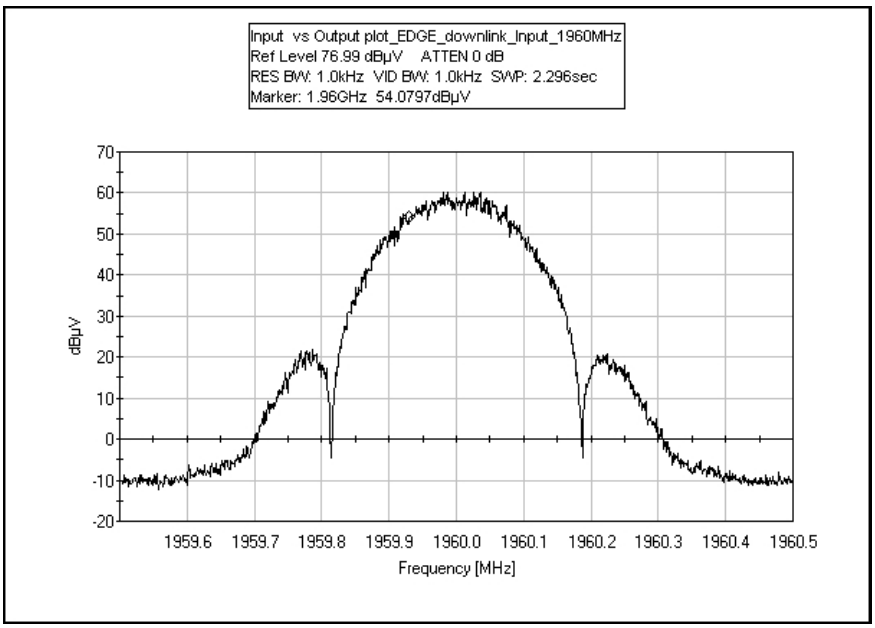
Test Setup Photos

Test Plots

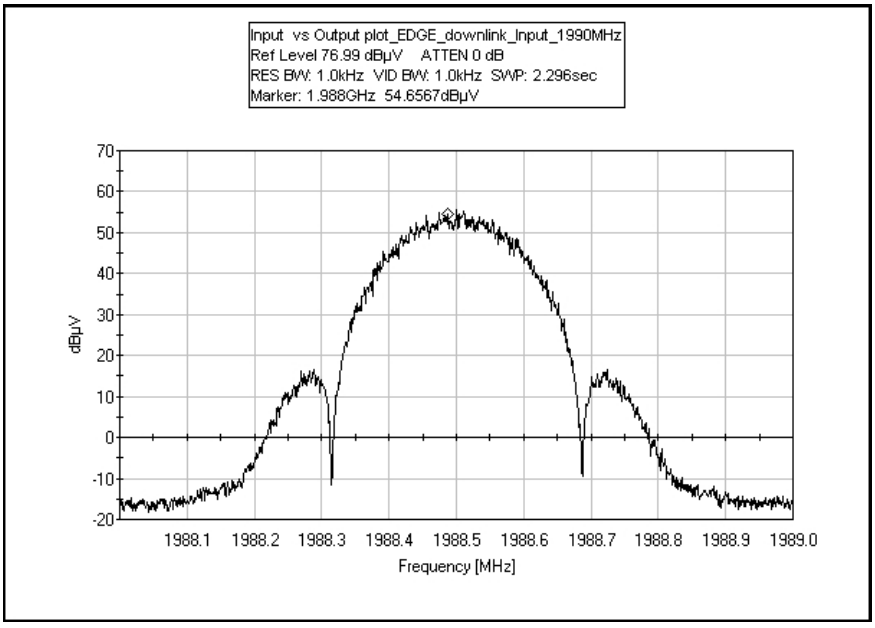
INPUT PLOT DOWNLINK - EDGE 1930MHz



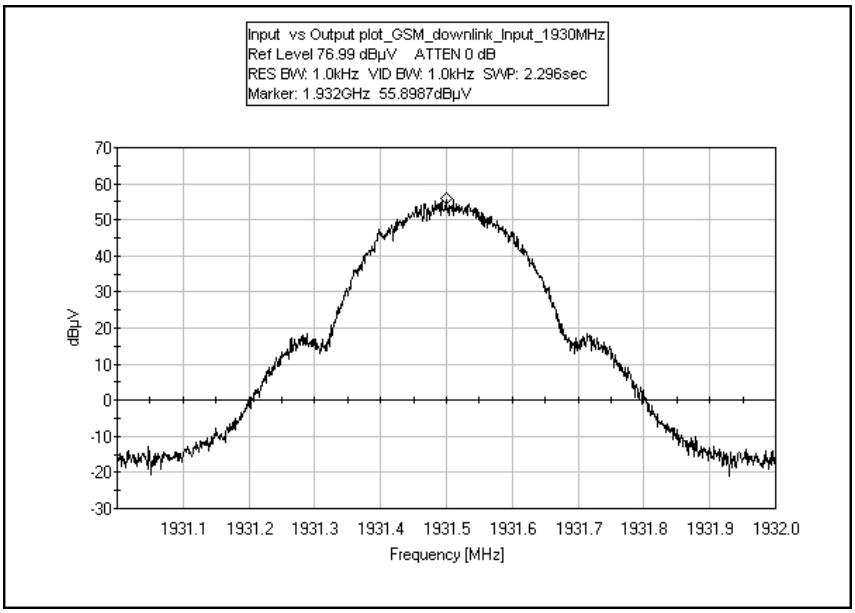
INPUT PLOT DOWNLINK - EDGE 1960MHz



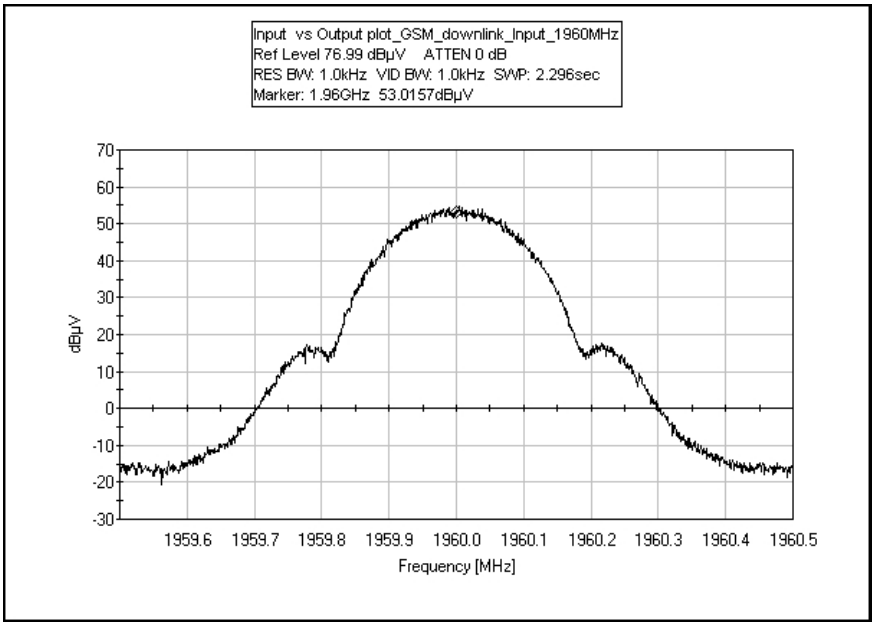
INPUT PLOT DOWNLINK - EDGE 1990MHz



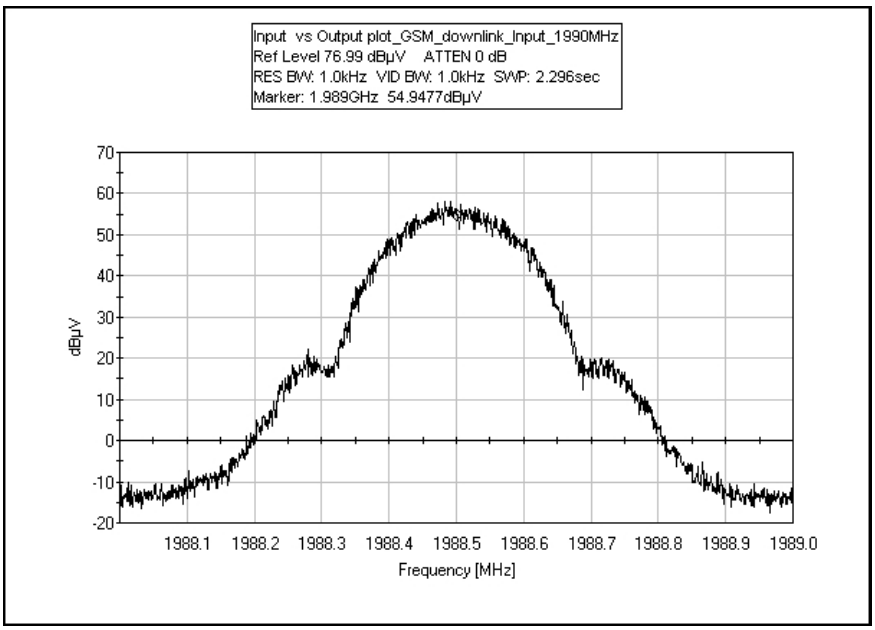
INPUT PLOT DOWNLINK - GSM 1930MHz



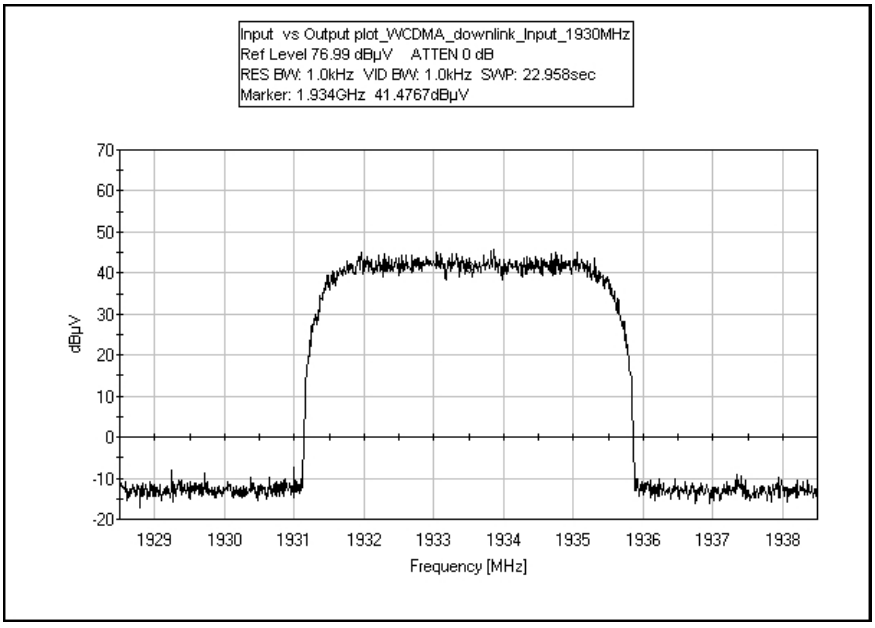
INPUT PLOT DOWNLINK - GSM 1960MHz



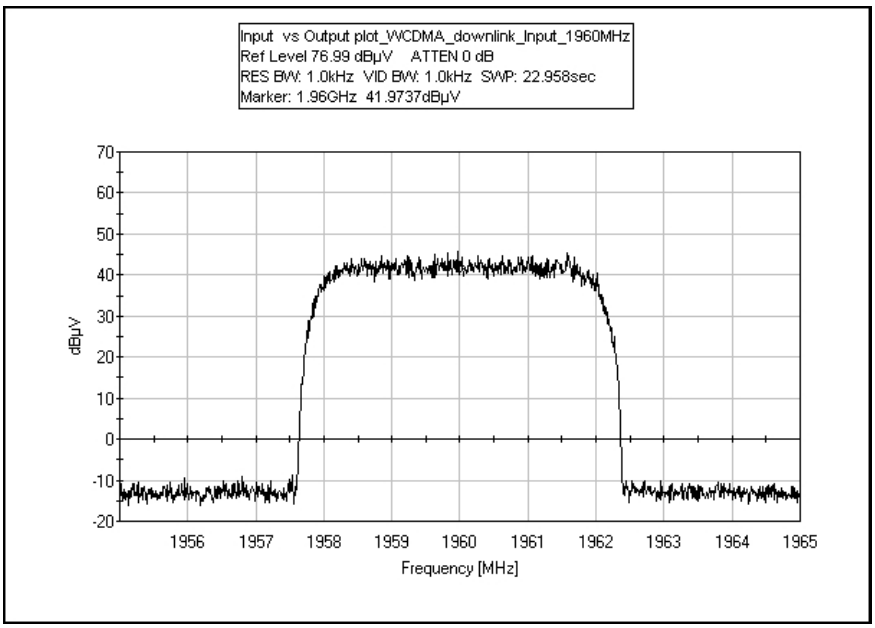
INPUT PLOT DOWNLINK - GSM 1990MHz



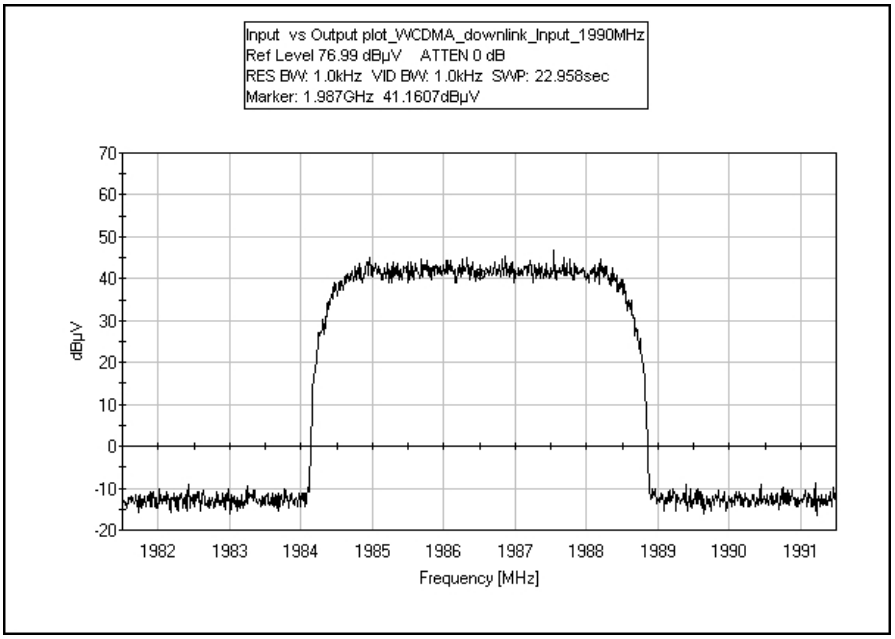
INPUT PLOT DOWNLINK - WCDMA 1930MHz



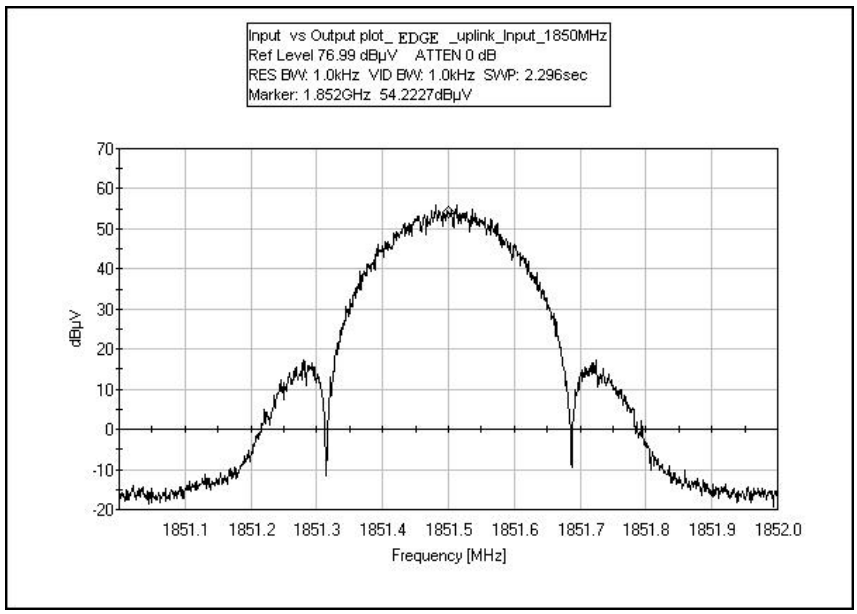
INPUT PLOT DOWNLINK - WCDMA 1960MHz



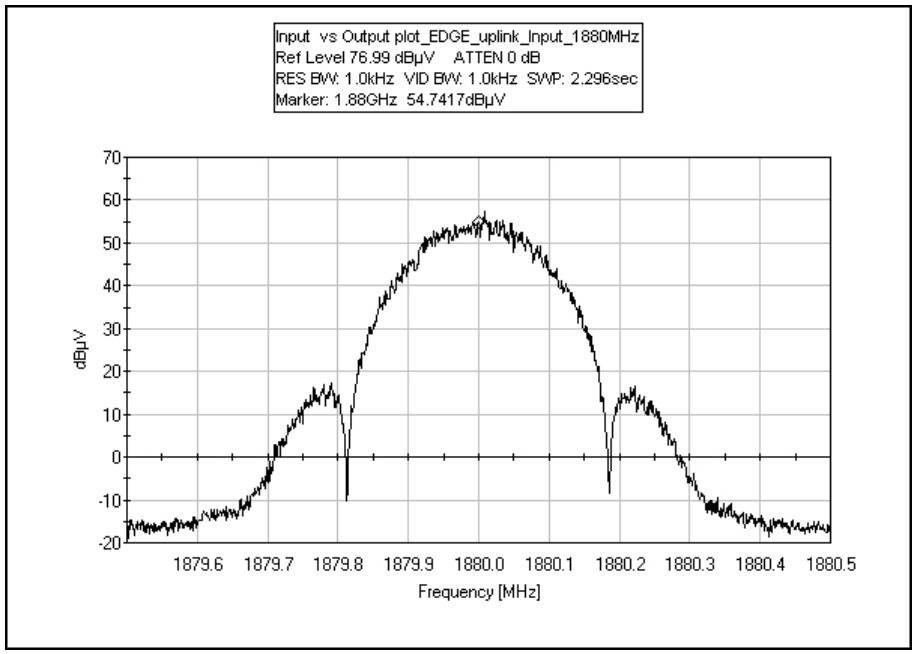
INPUT PLOT DOWNLINK - WCDMA 1990MHz



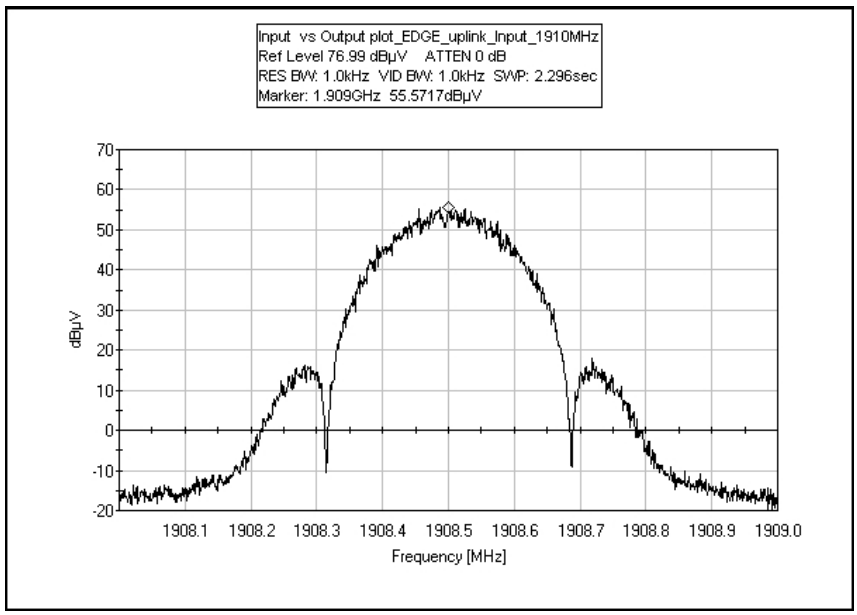
INPUT PLOT UPLINK – EDGE 1850MHz



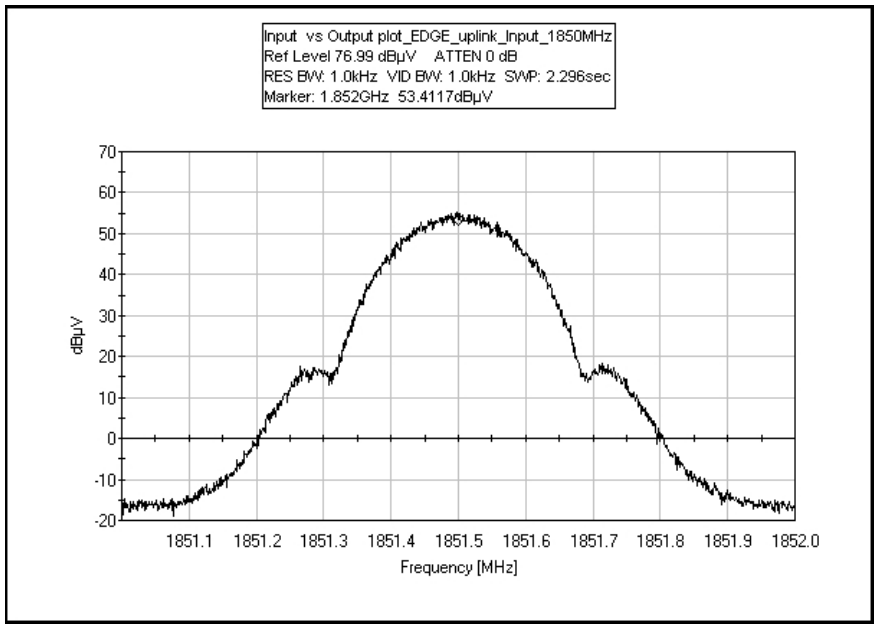
INPUT PLOT UPLINK - EDGE 1880MHz



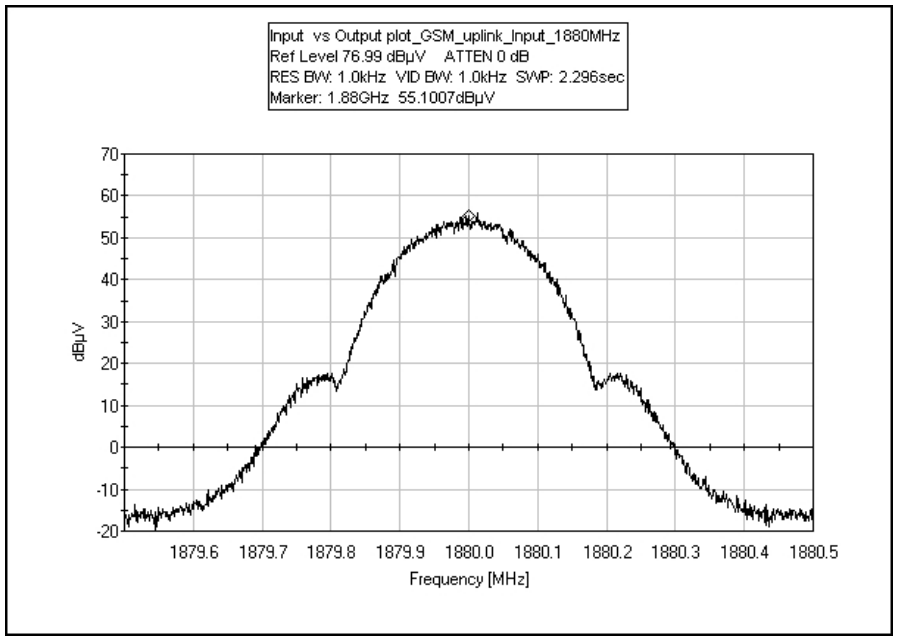
INPUT PLOT UPLINK - EDGE 1910MHz



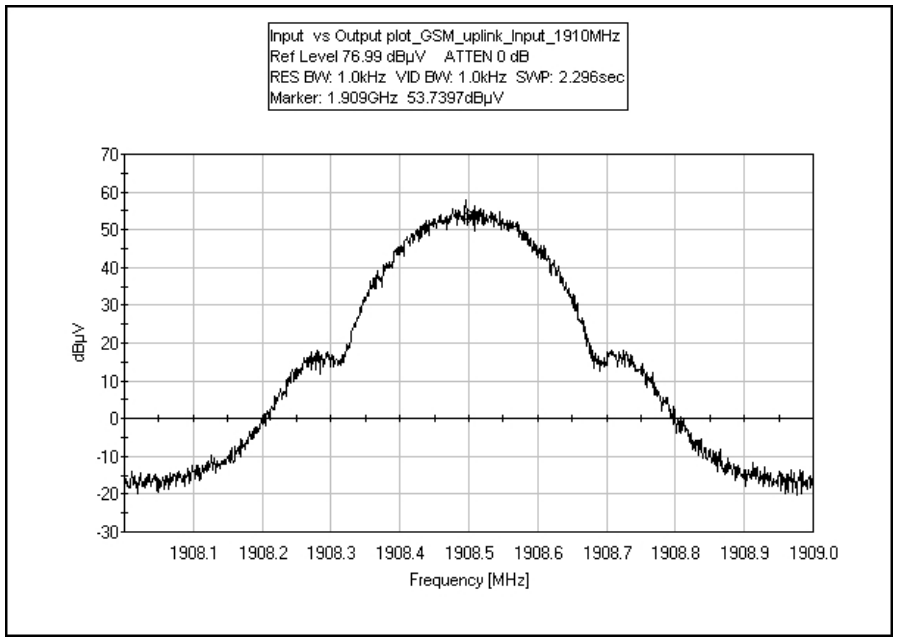
INPUT PLOT UPLINK - GSM 1850MHz



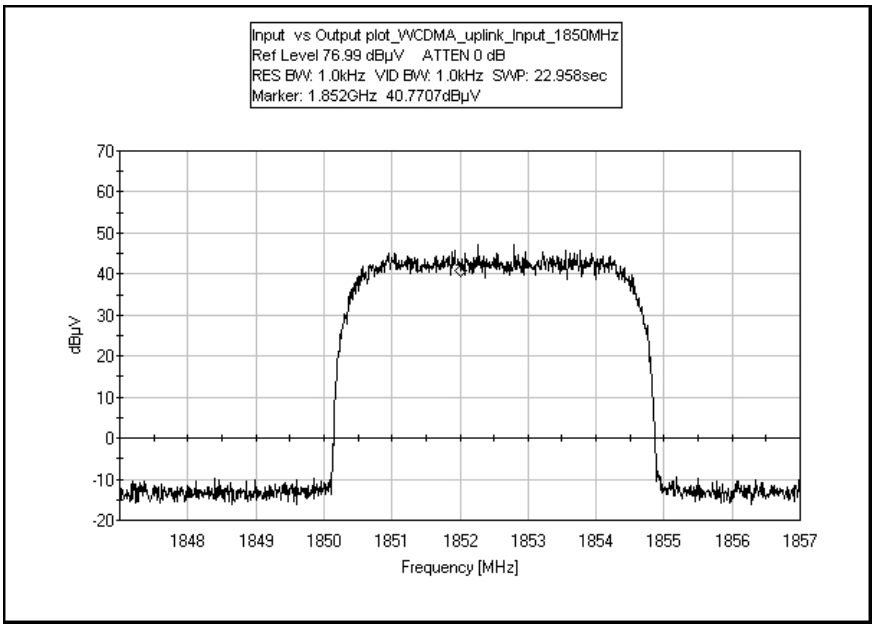
INPUT PLOT UPLINK - GSM 1880MHz



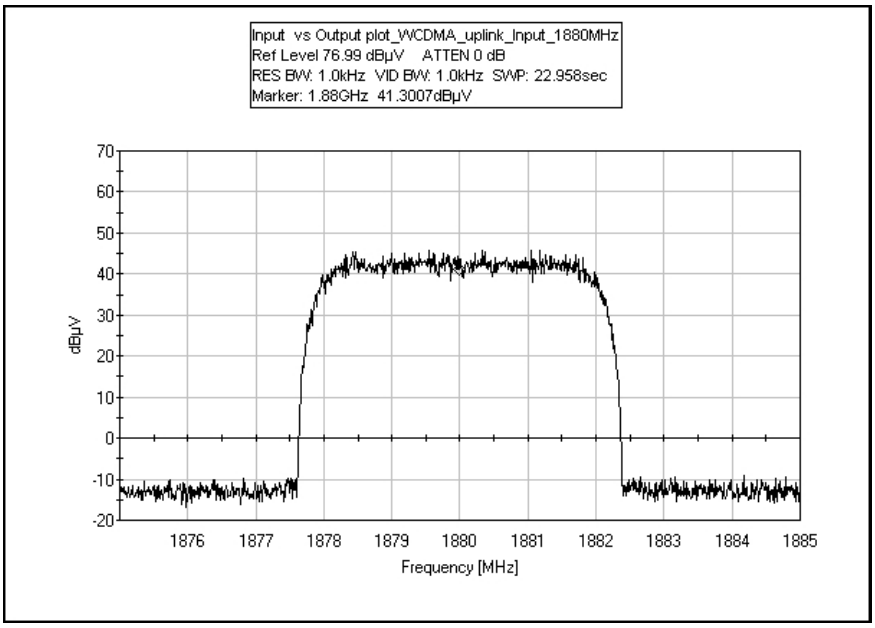
INPUT PLOT UPLINK - GSM 1910MHz



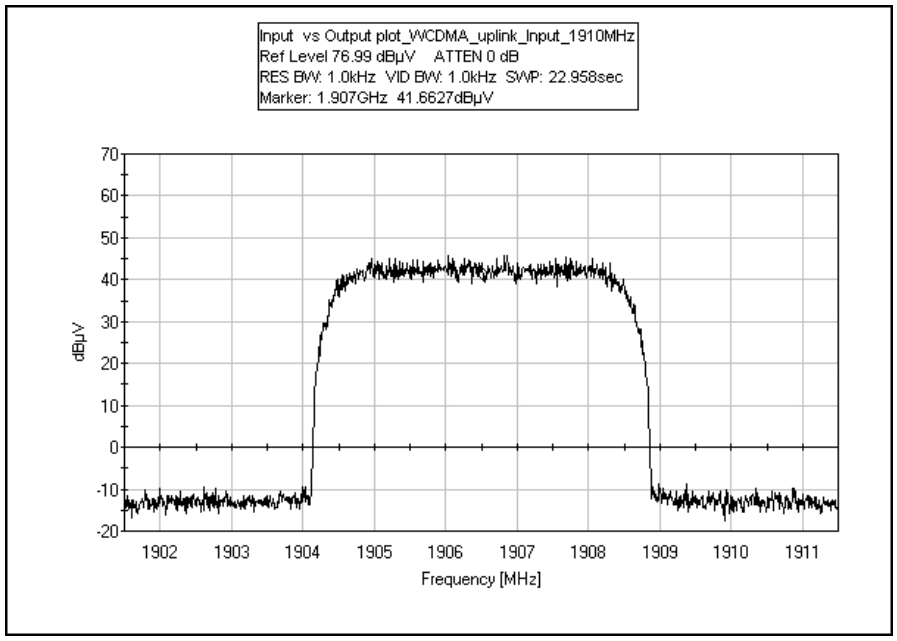
INPUT PLOT UPLINK - WCDMA 1850MHz



INPUT PLOT UPLINK - WCDMA 1880MHz



INPUT PLOT UPLINK - WCDMA 1910MHz



FCC 2.1033(c)(14)/2.1049(i)- OUTPUT PLOTS

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02869	Agilent	E4440A	MY46186290	021207	021209
36" 40GHz cable	02945	Strolab	NA	NA	091807	091809

Test Conditions

The rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a spectrum analyzer. For uplink configuration, 1900MHz Donor antenna port is connected to spectrum analyzer and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet switch.

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.

Uplink: 1850 to 1910MHz
Downlink: 1930 to 1990MHz

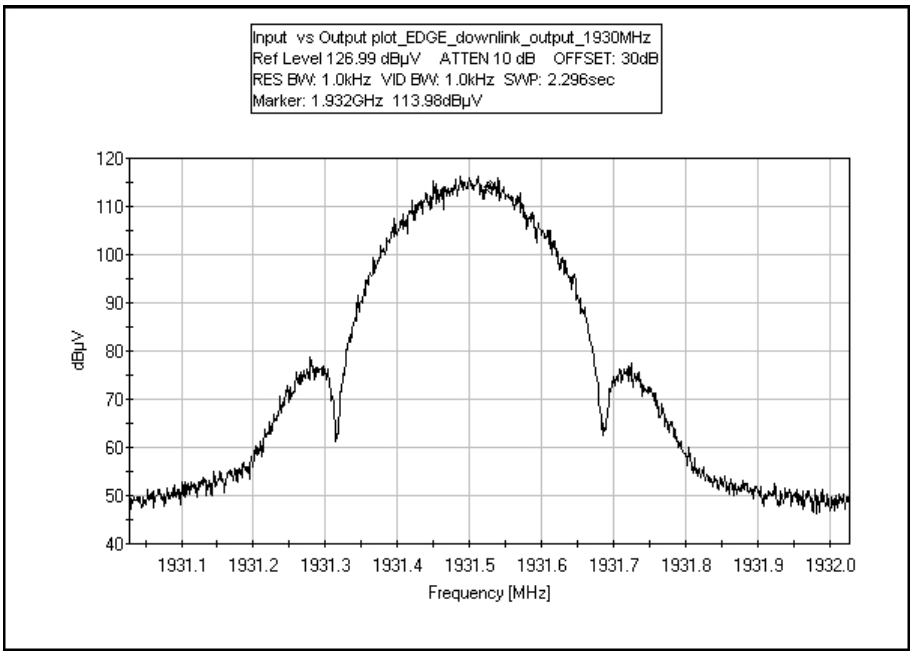
Uplink
Modulation: EDGE
TX = 1850.5MHz, 1880MHz, 1909.5MHz
Power = 28dBm = 0.63W

Downlink:
Modulation: EDGE
TX = 1930.5MHz, 1960MHz, 1989.5MHz
Power = 28dBm = 0.63W

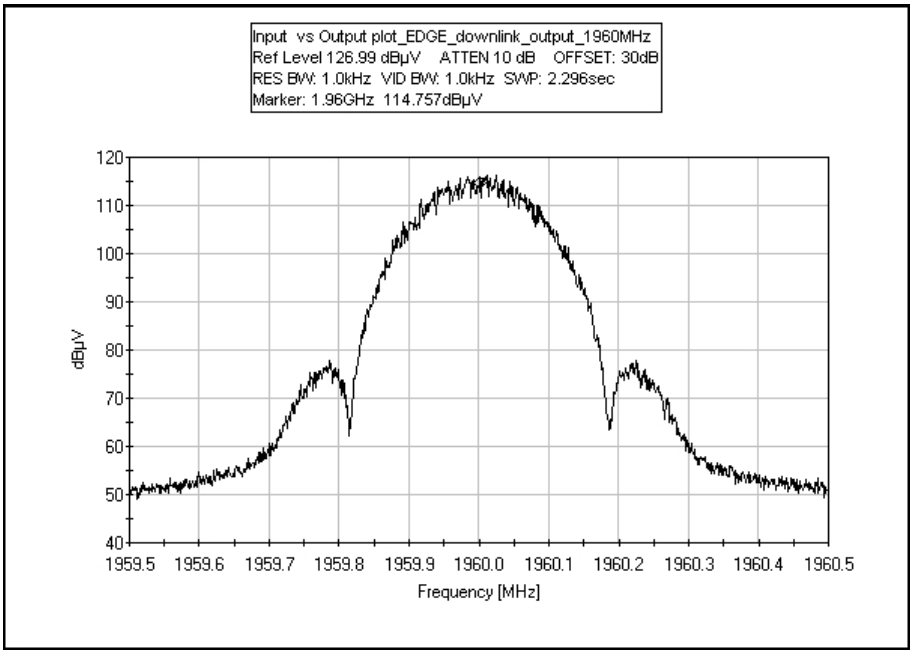
Test Setup Photos

Test Plots

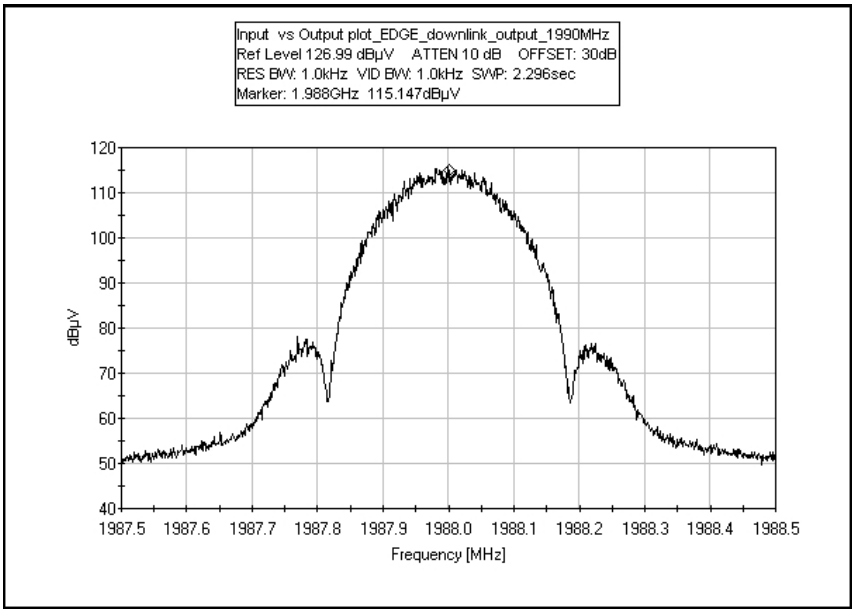
OUTPUT PLOT DOWNLINK - EDGE 1930MHz



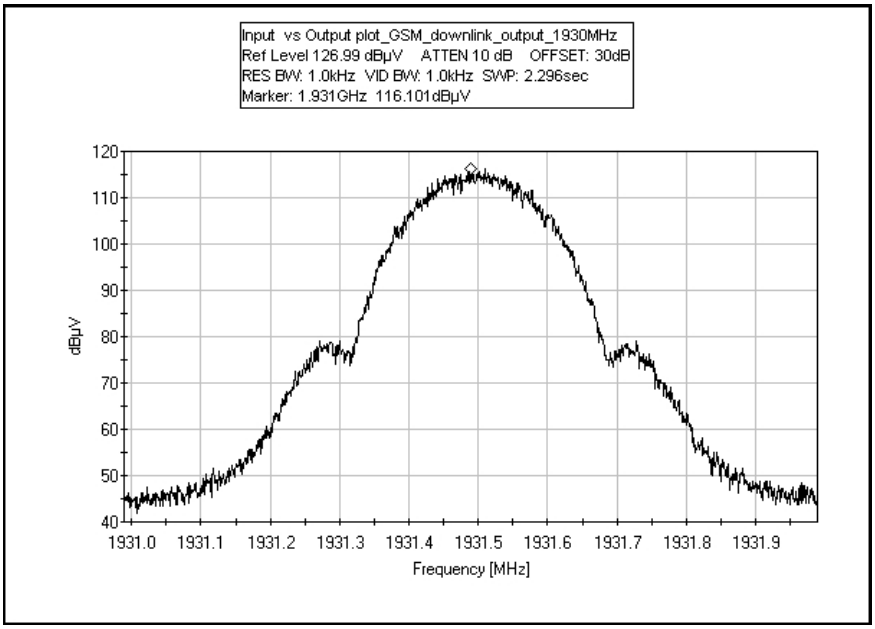
OUTPUT PLOT DOWNLINK - EDGE 1960MHz



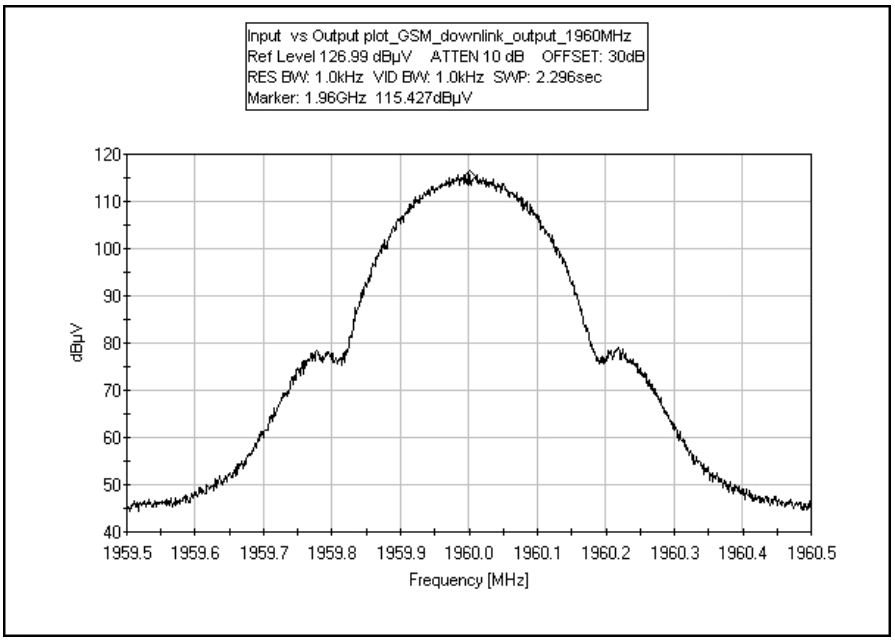
OUTPUT PLOT DOWNLINK - EDGE 1990MHz



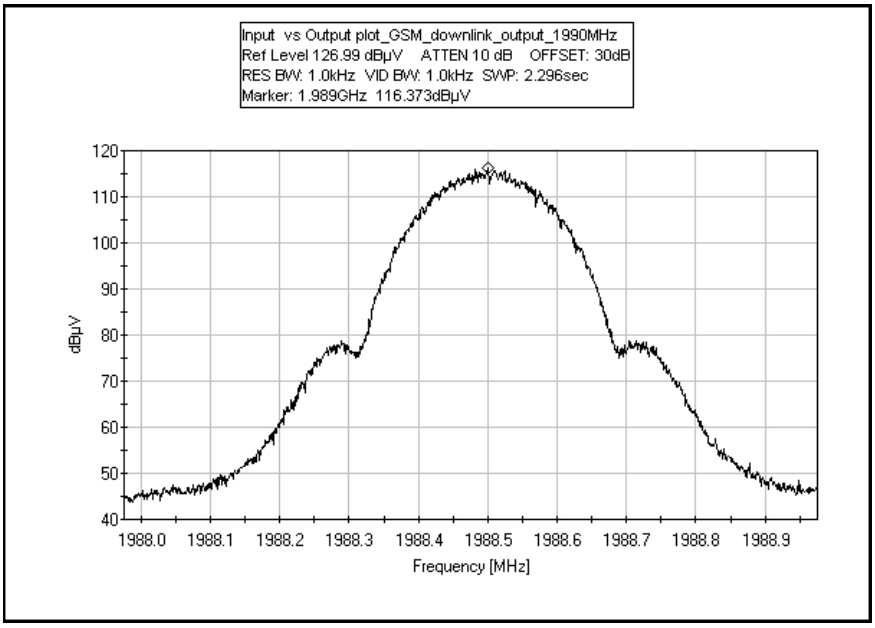
OUTPUT PLOT DOWNLINK - GSM 1930MHz



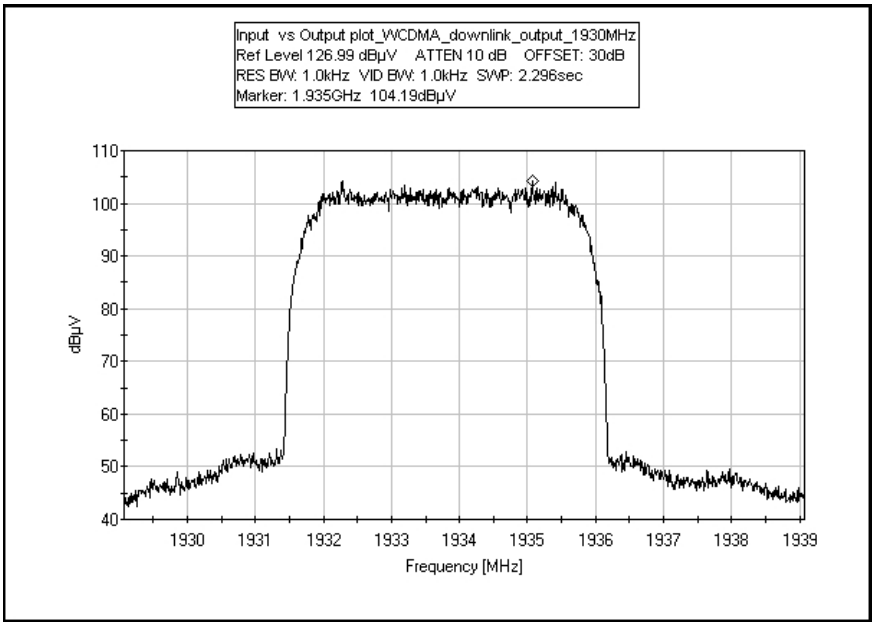
OUTPUT PLOT DOWNLINK - GSM 1960MHz



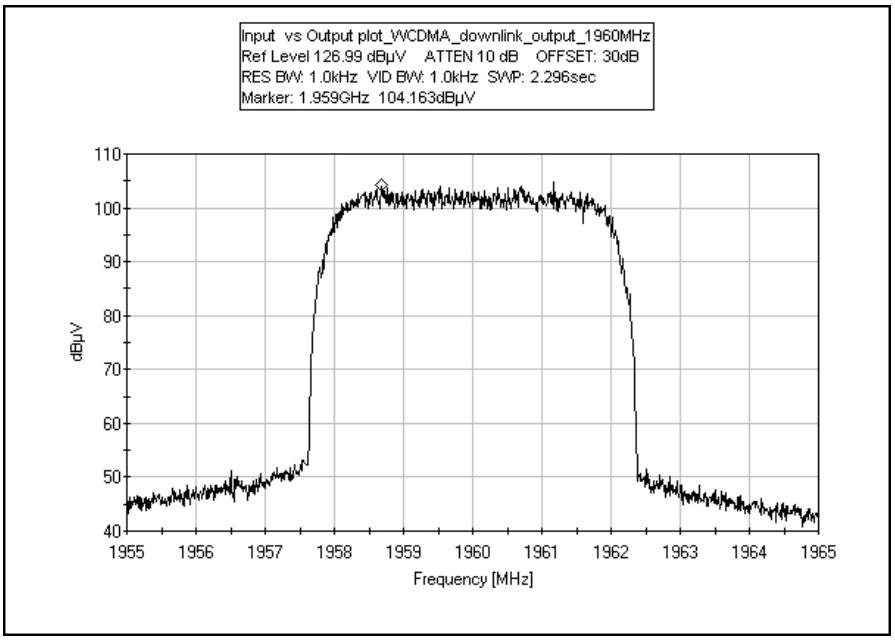
OUTPUT PLOT DOWNLINK - GSM 1990MHz



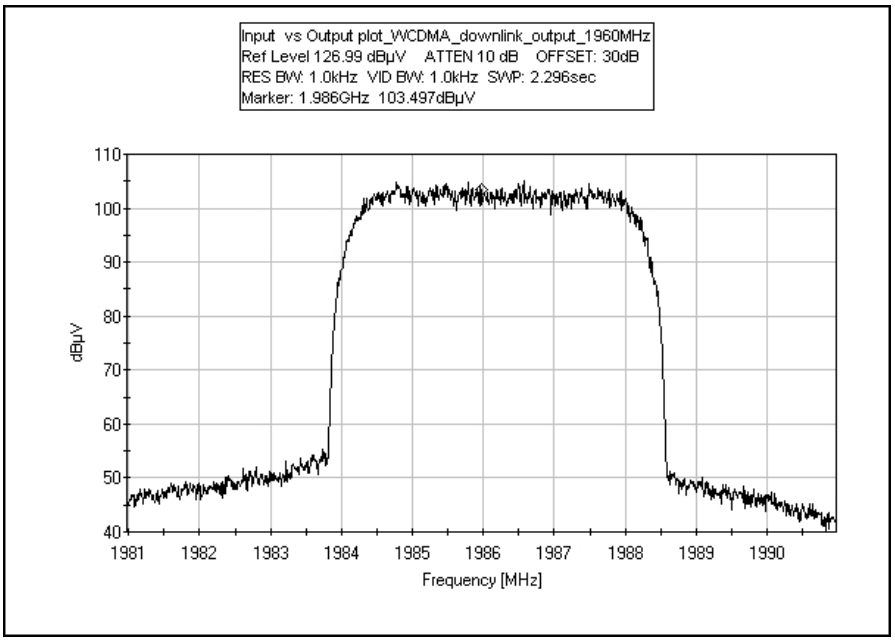
OUTPUT PLOT DOWNLINK - WCDMA 1930MHz



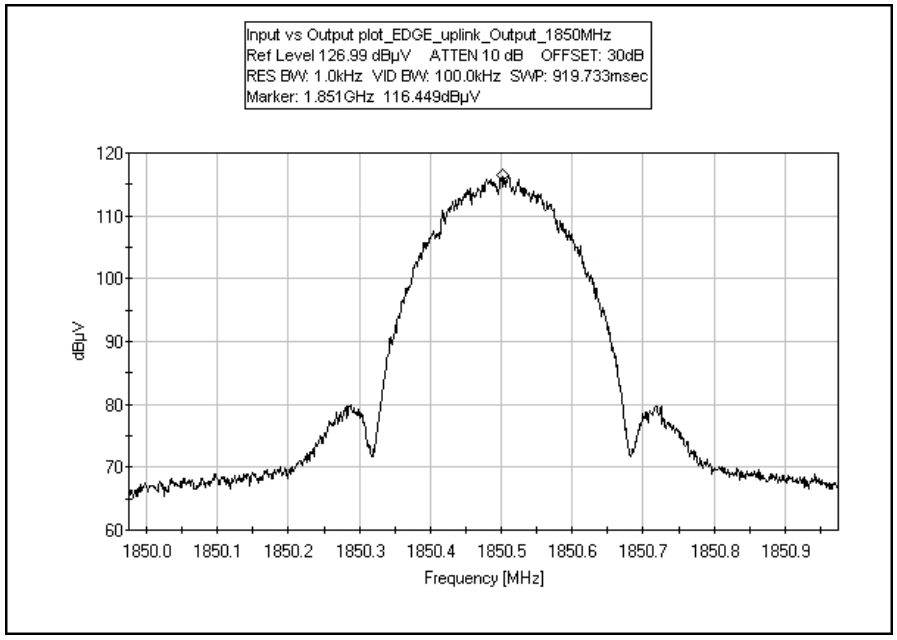
OUTPUT PLOT DOWNLINK - WCDMA 1960MHz



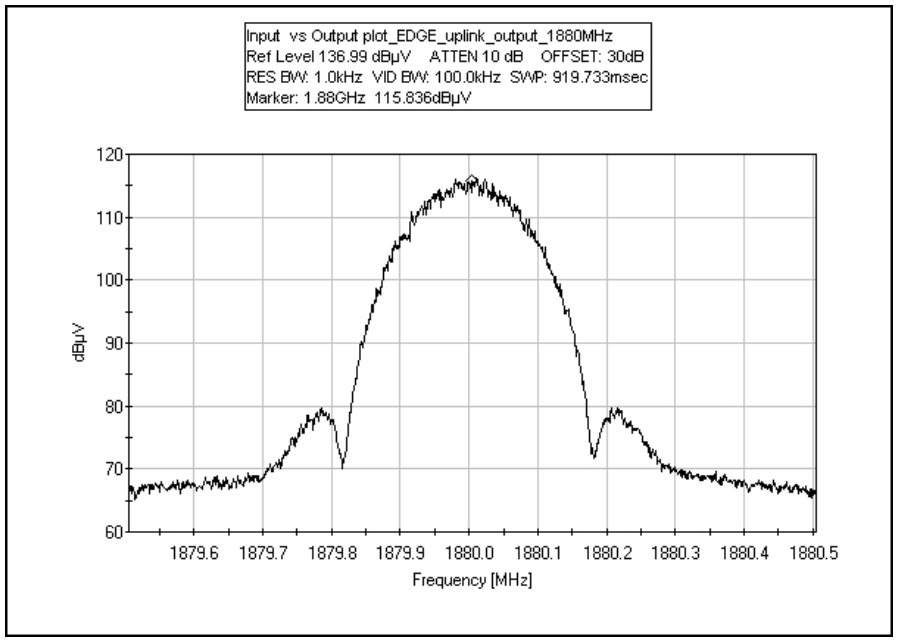
OUTPUT PLOT DOWNLINK - WCDMA 1960MHz



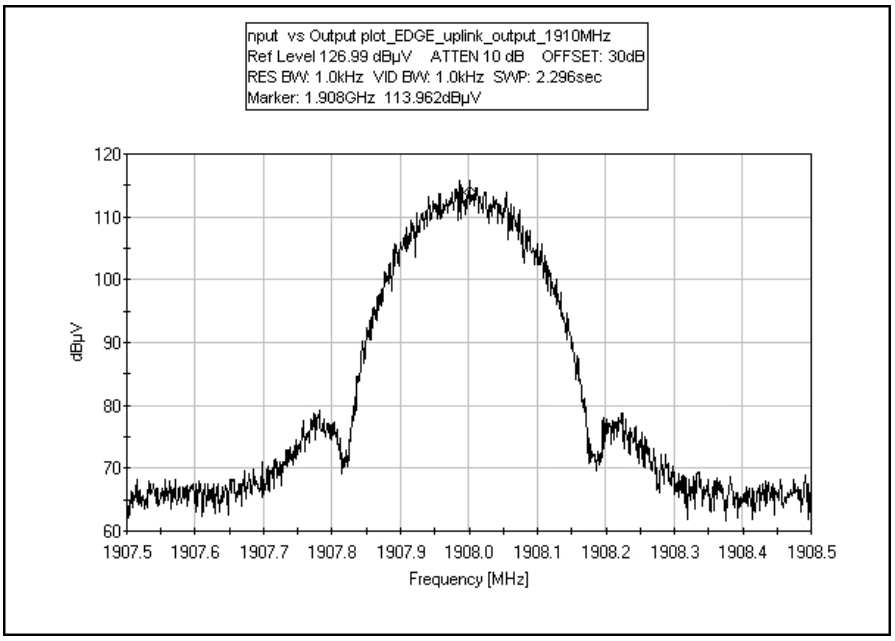
OUTPUT PLOT UPLINK - EDGE 1850MHz



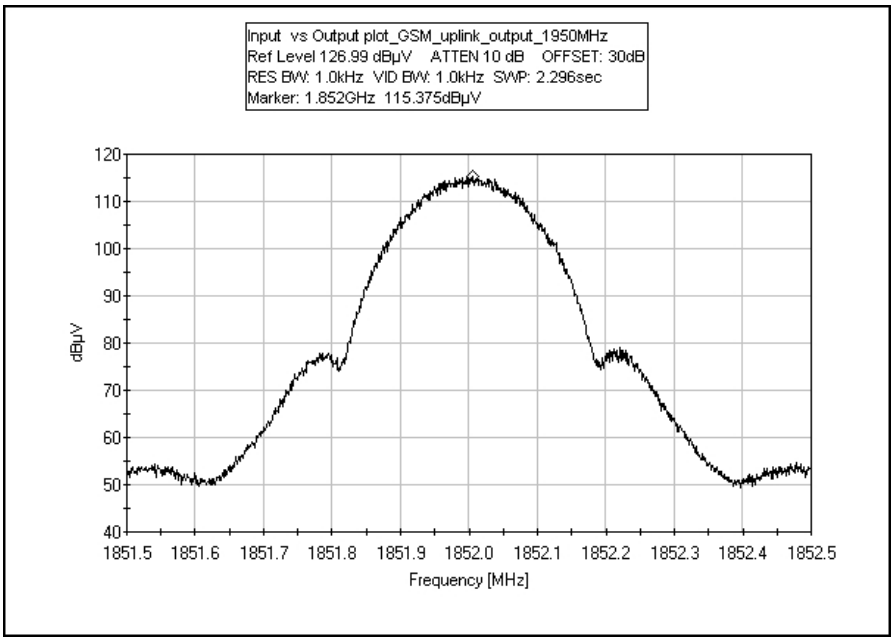
OUTPUT PLOT UPLINK - EDGE 1880MHz



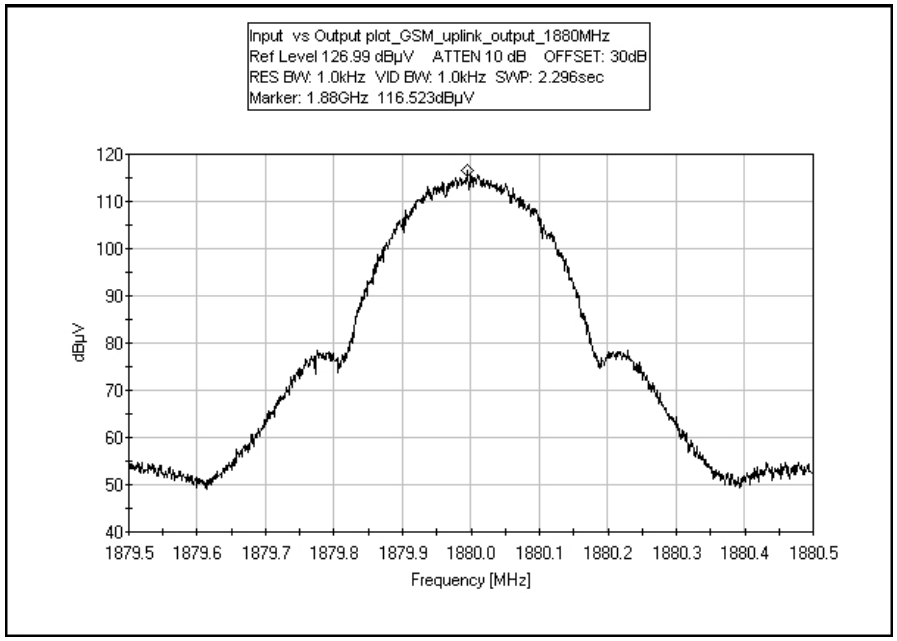
OUTPUT PLOT UPLINK - EDGE 1910MHz



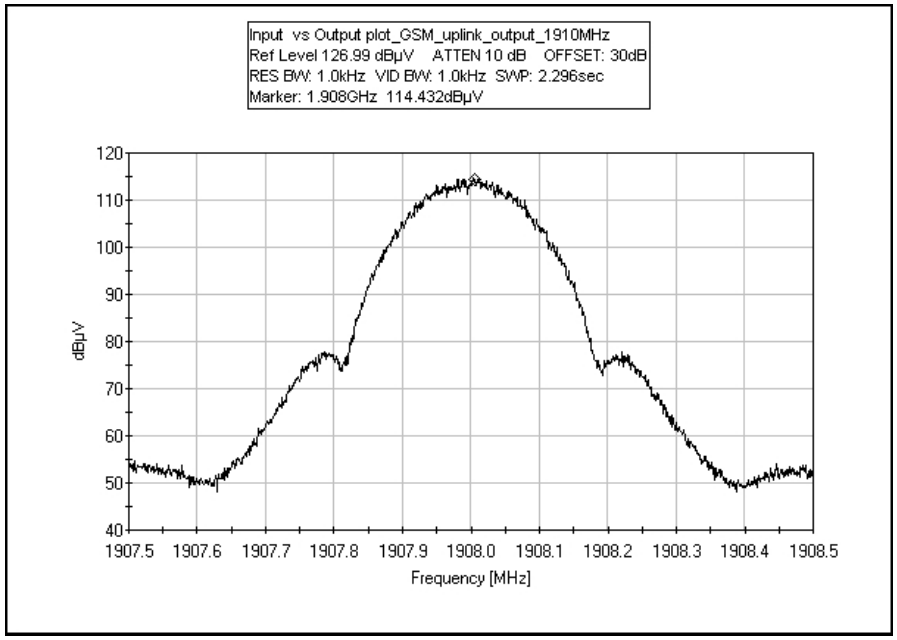
OUTPUT PLOT UPLINK - GSM 1850MHz



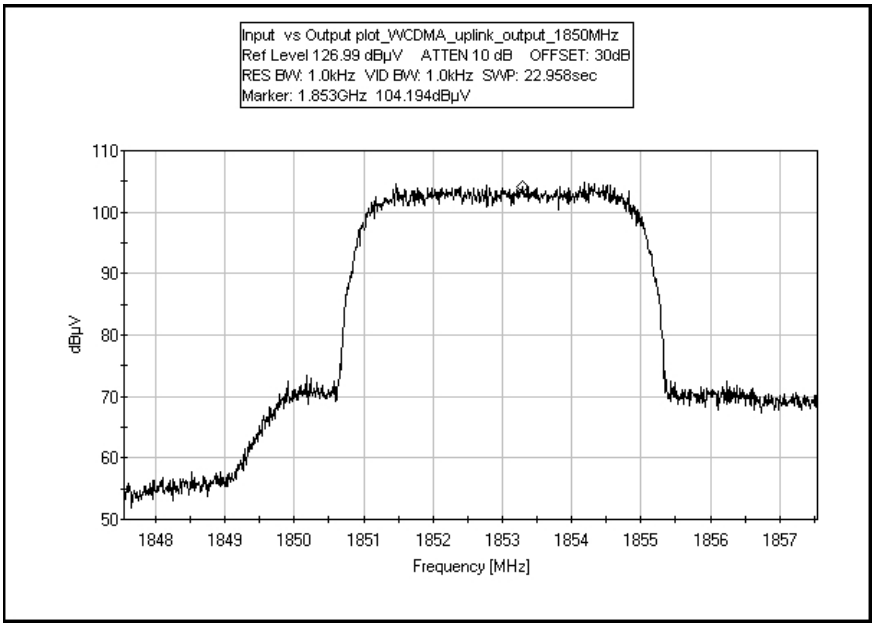
OUTPUT PLOT UPLINK - GSM 1880MHz



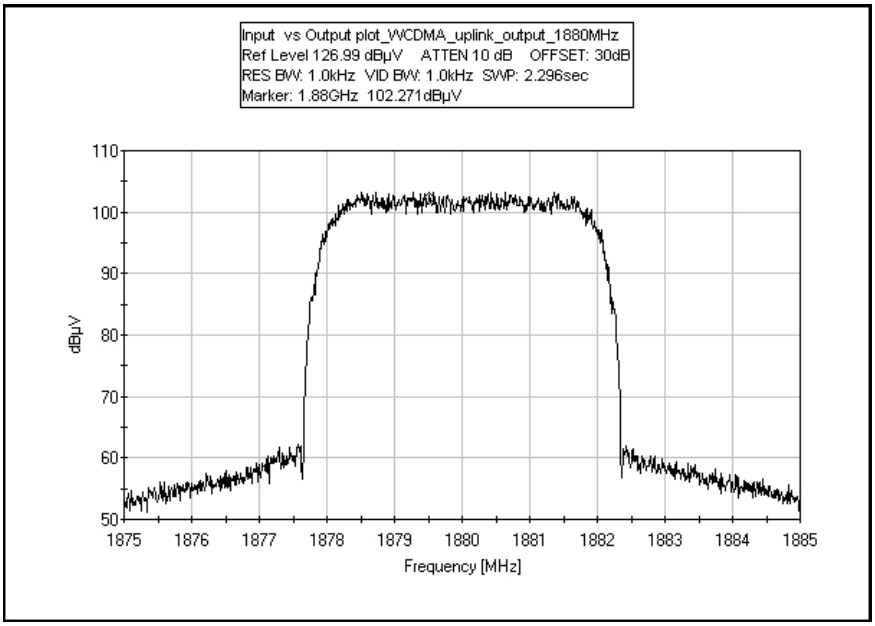
OUTPUT PLOT UPLINK - GSM 1910MHz



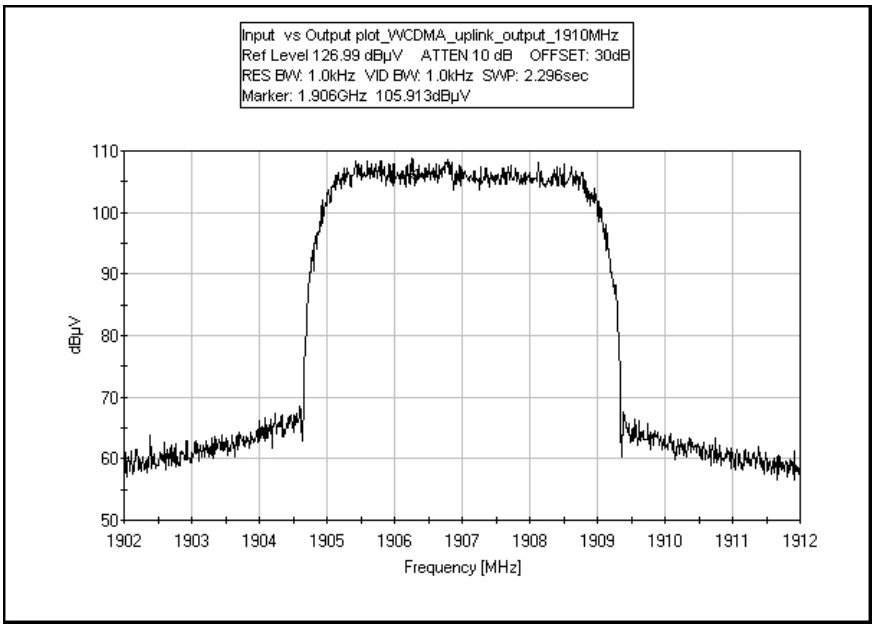
OUTPUT PLOT UPLINK - WCDMA 1850MHz



OUTPUT PLOT UPLINK - WCDMA 1880MHz



OUTPUT PLOT UPLINK - WCDMA 1910MHz



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

Test Setup Photos

Test Data

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

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

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

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

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

Limit line = V_{dBuv} - Attenuation

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

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

= 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

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

Customer:	**Powerwave Technologies, Inc.**		
Specification:	**FCC 24.238 (a) Conducted Spurious Emission**		
Work Order #:	**88230**	Date:	9/15/2008
Test Type:	**Conducted Emissions**	Time:	15:06:43
Equipment:	**Nexus RT Digital Repeater**	Sequence#:	1
Manufacturer:	Powerwave Technologies	Tested By:	E. Wong
Model:	NP50B0-22311		110V 60Hz
S/N:	NA		

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer	MY46186290	02/12/2007	02/12/2009	02869
3'-40GHz cable	NA	09/18/2007	09/18/2009	P02945
3.0 GHz HPF	1	03/25/2008	03/25/2010	02744

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

Function	Manufacturer	Model #	S/N
Nexus RT Digital Repeater*	Powerwave Technologies	NP50B0-22311	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	HP	HSTNNC18C	CND63661JIC7
Ethernet Switch	Linksys	SD205	REF003600624
ESG	Agilent	E4433B	US40052191
Powermeter	HP	E4419B	MY40510694

Test Conditions / Notes:

FCC Part 24. The rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a remote power meter. For uplink configuration, 1900MHz Donor antenna port is connected to remote Power meter and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet switch. All other ports are service ports hence unpopulated. Operation in the 850MHz band is under consideration for this test. Uplink: 1850 to 1910MHz, Downlink: 1930 to 1990MHz. Uplink Modulation: EDGE, GSM, WCDMA. TX= 1850.5MHz, 1880MHz, 1909.5MHz. Power = 28dBm = 0.63W. Downlink Modulation: EDGE, GSM, WCDMA. TX=1930.5MHz, 1960MHz, 1989.5MHz. Power = 28dBm = 0.63W. 23°C, 53% relative humidity. Frequency range of measurement = 9 kHz - 20 GHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30MHz RBW=9 kHz, VBW=9 kHz; 30MHz - 1000MHz RBW=120 kHz, VBW=120 kHz; 1000MHz - 20 GHz RBW=1MHz, VBW=1MHz. Note: No emissions found, recorded data represents noise floor level.

Transducer Legend:

T1=Hi Freq_40GHz_3ft_CAB-ANP02945-091809	T2=HPF_3GHz-AN02744-032510

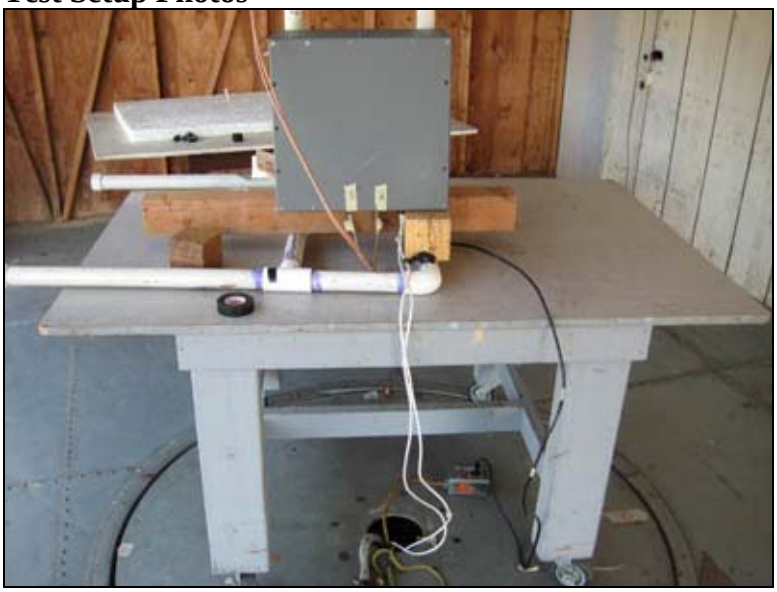
Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	3869.600M	43.1	+0.7	+0.4			+0.0	44.2	94.0 WCDMA_DL	-49.8	Anten
2	3704.480M	42.7	+0.7	+0.5			+0.0	43.9	94.0 GSM_UL	-50.1	Anten

3	3863.060M	42.7	+0.7	+0.4	+0.0	43.8	94.0 GSM_DL	-50.2	Anten
4	3815.200M	42.3	+0.7	+0.5	+0.0	43.5	94.0 WCDMA_UL	-50.5	Anten
5	3760.000M	42.2	+0.7	+0.5	+0.0	43.4	94.0 GSM_UL	-50.6	Anten
6	3760.000M	41.9	+0.7	+0.5	+0.0	43.1	94.0 WCDMA_UL	-50.9	Anten
7	3815.970M	41.5	+0.7	+0.5	+0.0	42.7	94.0 GSM_UL	-51.3	Anten
8	3816.000M	41.4	+0.7	+0.5	+0.0	42.6	94.0 EDGE_UL	-51.4	Anten
9	3759.960M	41.3	+0.7	+0.5	+0.0	42.5	94.0 EDGE_UL	-51.5	Anten
10	3948.360M	41.4	+0.7	+0.4	+0.0	42.5	94.0 GSM_DL	-51.5	Anten
11	3706.000M	41.2	+0.7	+0.5	+0.0	42.4	94.0 WCDMA_UL	-51.6	Anten
12	3863.000M	40.9	+0.7	+0.4	+0.0	42.0	94.0 EDGE_DL	-52.0	Anten
13	3973.850M	40.8	+0.7	+0.4	+0.0	41.9	94.0 WCDMA_DL	-52.1	Anten
14	3920.000M	40.8	+0.7	+0.4	+0.0	41.9	94.0 EDGE_DL	-52.1	Anten
15	3704.000M	40.5	+0.7	+0.5	+0.0	41.7	94.0 EDGE_UL	-52.3	Anten
16	3919.920M	39.9	+0.7	+0.4	+0.0	41.0	94.0 GSM_DL	-53.0	Anten
17	4069.000M	39.6	+0.7	+0.4	+0.0	40.7	94.0 EDGE_DL	-53.3	Anten
18	3920.000M	37.7	+0.7	+0.4	+0.0	38.8	94.0 WCDMA_DL	-55.2	Anten

FCC 2.1033(c)(14)/2.105324.238(a)/ - FIELD STRENGTH OF SPURIOUS RADIATION

Test Setup Photos



Test Data Sheets

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 #: **88230** Date: 9/26/2008
Test Type: **Radiated Scan** Time: 11:27:45
Equipment: **Nexus RT Digital Repeater** Sequence#: 2
Manufacturer: Powerwave Technologies Tested By: E. Wong
Model: NP50B0-22311
S/N: NA

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer	MY46186290	02/12/2007	02/12/2009	02869
3.0 GHz HPF	1	03/25/2008	03/25/2010	02744
Loop Antenna	2014	06/16/2008	06/16/2010	00314
18-26.5 GHz Horn Antenna	3643A00027	11/27/2006	11/27/2008	02112
Bilog Antenna	2451	01/21/2008	01/21/2010	01995
Pre amp to SA Cable	Cable #10	05/16/2007	05/16/2009	P05050
Cable	Cable15	01/05/2007	01/05/2009	P05198
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
3'-40GHz cable	NA	09/18/2007	09/18/2009	P02945
Heliax Antenna Cable	P5565	09/04/2008	09/04/2010	P05565

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

Function	Manufacturer	Model #	S/N
Nexus RT Digital Repeater*	Powerwave Technologies	NP50B0-22311	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	HP	HSTNNC18C	CND63661JIC7
Ethernet Switch	Linksys	SD205	REF003600624
ESG	Agilent	E4433B	US40052191
Powermeter	HP	E4419B	MY40510694

Test Conditions / Notes:

FCC part 24 (2007) The rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a remote power meter. For uplink configuration, 1900MHz Donor antenna port is connected to remote Power meter and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet switch. All other ports are service ports hence unpopulated. Operation in the 850MHz band is under consideration for this test. Uplink: 1850 to 1910MHz, Downlink: 1930 to 1990MHz. Uplink Modulation: EDGE TX= 1850.5MHz, 1880MHz, 1909.5MHz. Power = 28dBm = 0.63W. Downlink Modulation: EDGE TX=1930.5MHz, 1960MHz, 1989.5MHz. Power = 28dBm = 0.63W. 23°C, 53% relative humidity. Frequency range of measurement = 9 kHz - 20 GHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30MHz RBW=9 kHz, VBW=9 kHz; 30MHz - 1000MHz RBW=120 kHz, VBW=120 kHz; 1000MHz - 20 GHz RBW=1MHz, VBW=1MHz. Note: No emissions found, recorded data represents noise floor level.

Operating Frequency: Uplink 1850-1910MHz Downlink 1930-1990MHz
Channels:
Highest Measured Output Power: 27.99 ERP(dBm)= 0.63 ERP(Watts)
Distance: 3 meters
Limit: 43+10Log(P) 40.99 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
3,976.00	-52.2	Vert	80.19
3,920.00	-53	Horiz	80.99
3,863.00	-55.9	Horiz	83.89
3,703.97	-55.5	Horiz	83.49
3,759.93	-55.2	Vert	83.19
3,816.37	-55.6	Horiz	83.59

BLOCKEDGE

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02869	Agilent	E4440A	MY46186290	021207	021209
36" 40GHz cable	02945	Strolab	NA	NA	091807	091809

Test Conditions

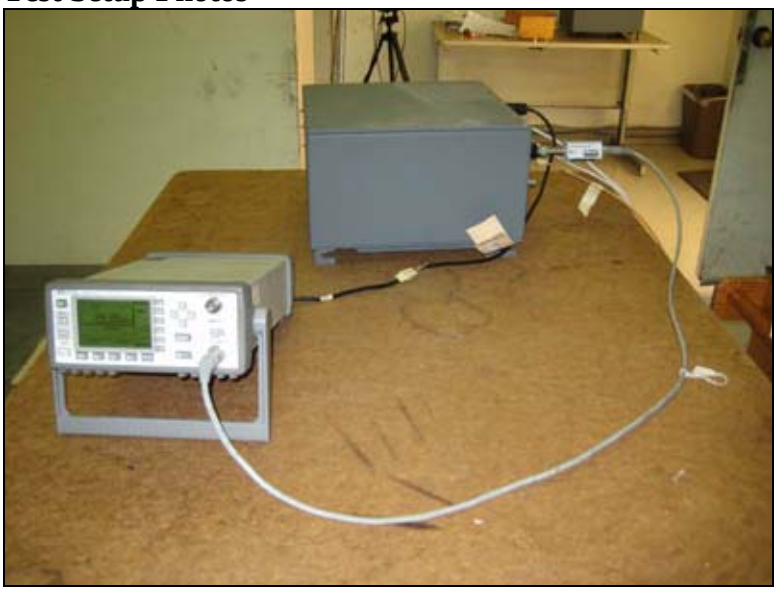
The rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a remote power meter. For uplink configuration, 1900MHz Donor antenna port is connected to remote Power meter and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet switch. Blockedge plot is recorded with a spectrum analyzer at the Antenna port of the device.

Uplink: 1850 to 1910MHz
Downlink: 1930 to 1990MHz

Uplink
Modulation: EDGE, GSM, WCDMA
TX= 1850.5MHz, 1880MHz, 1909.5MHz
Power = 28dBm = 0.63W

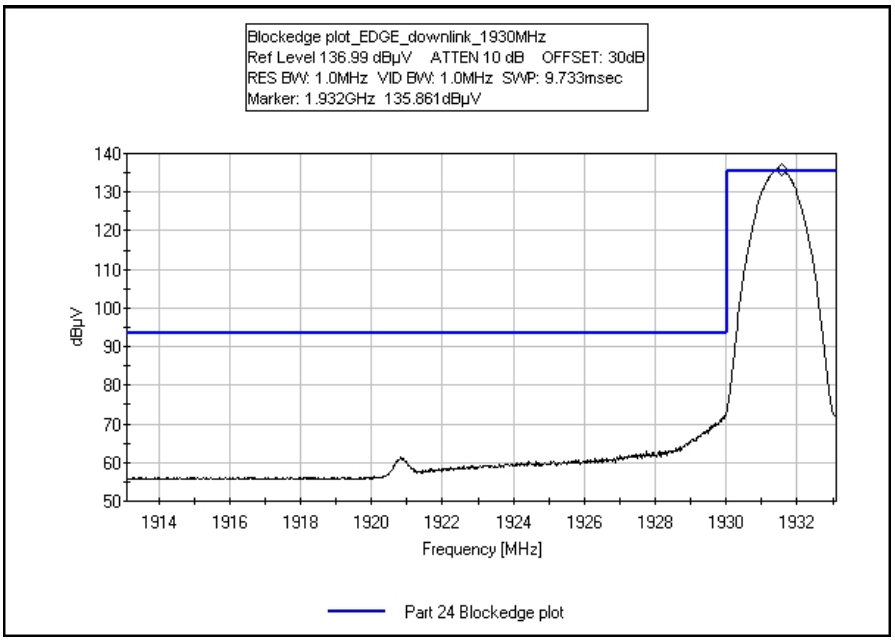
Downlink:
Modulation: EDGE, GSM, WCDMA
TX=1930.5MHz, 1960MHz, 1989.5MHz
Power = 28dBm = 0.63W

Test Setup Photos

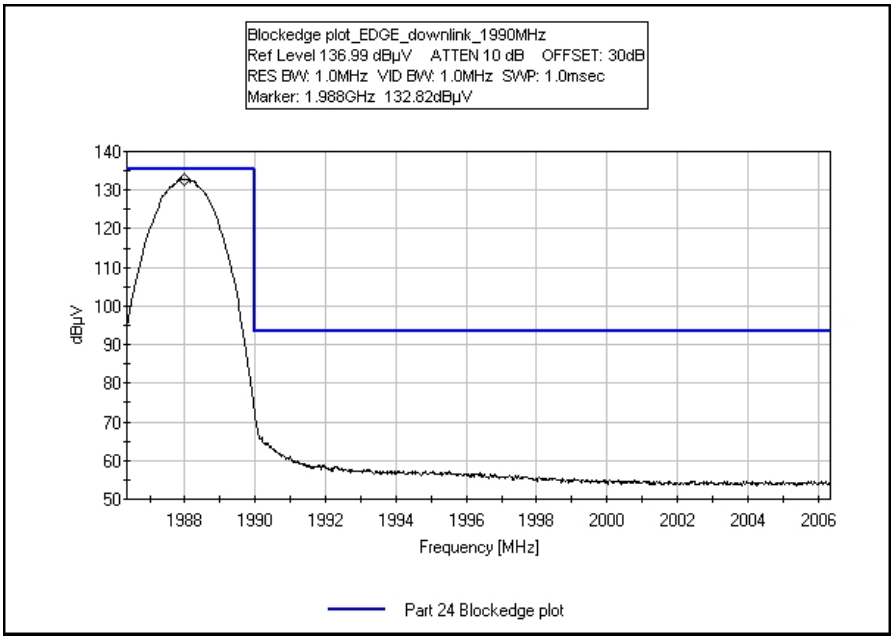


Test Plots

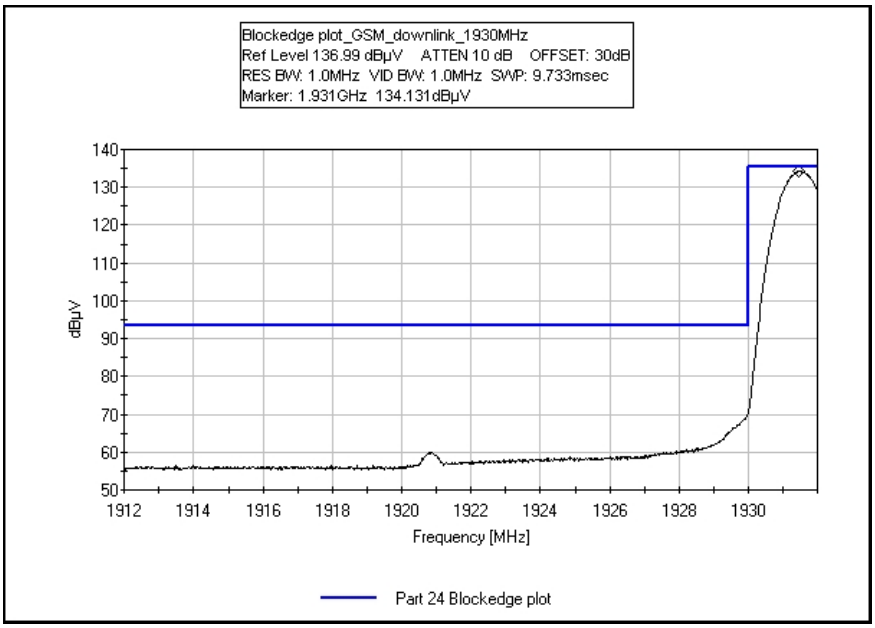
BLOCKEDGE PLOT DOWNLINK - EDGE 1930MHz



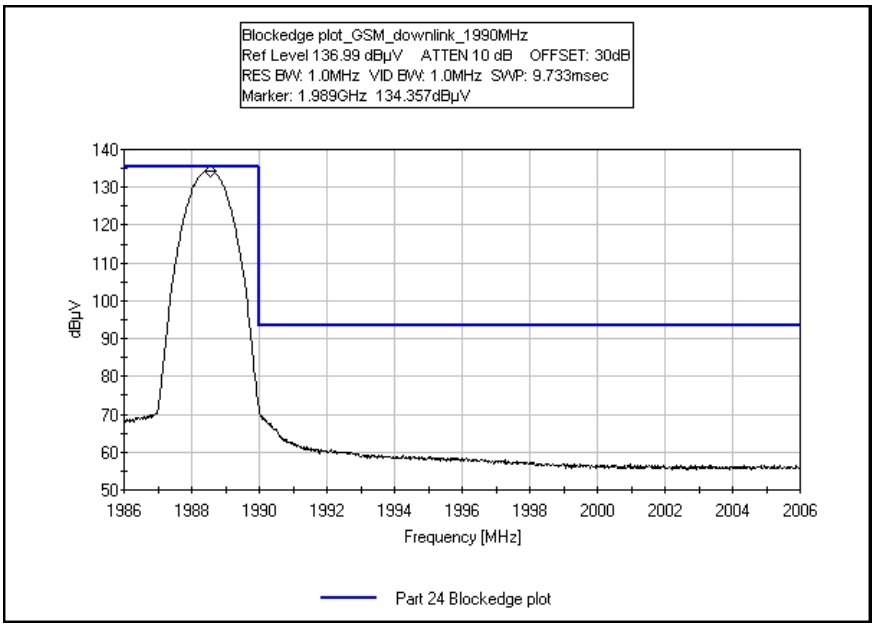
BLOCKEDGE PLOT DOWNLINK - EDGE 1990MHz



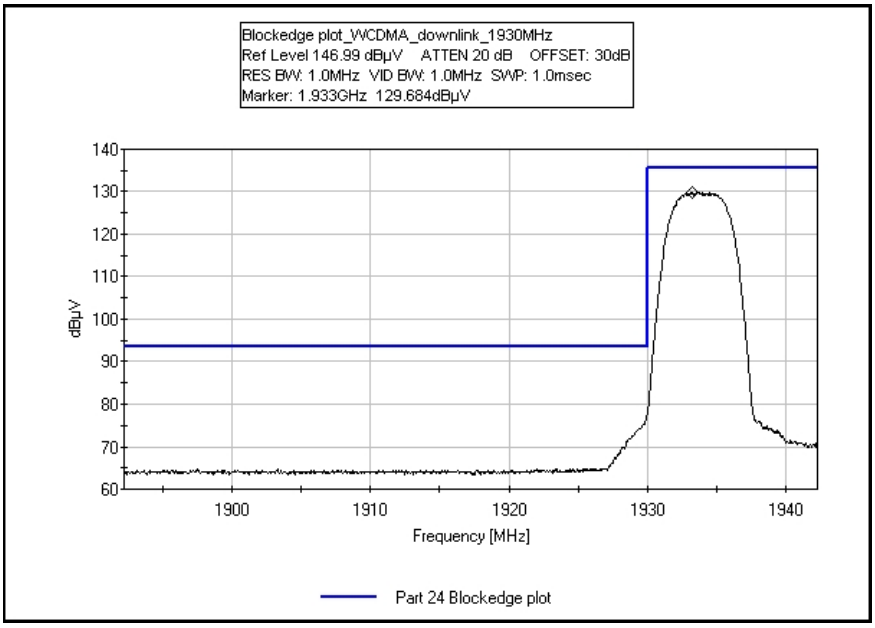
BLOCKEDGE PLOT DOWNLINK - GSM 1930MHz



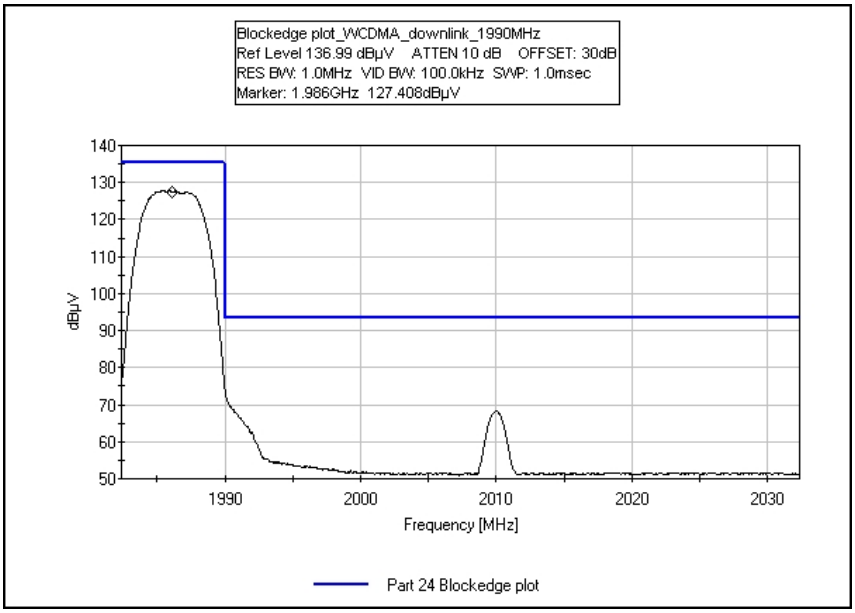
BLOCKEDGE PLOT DOWNLINK - GSM 1990MHz



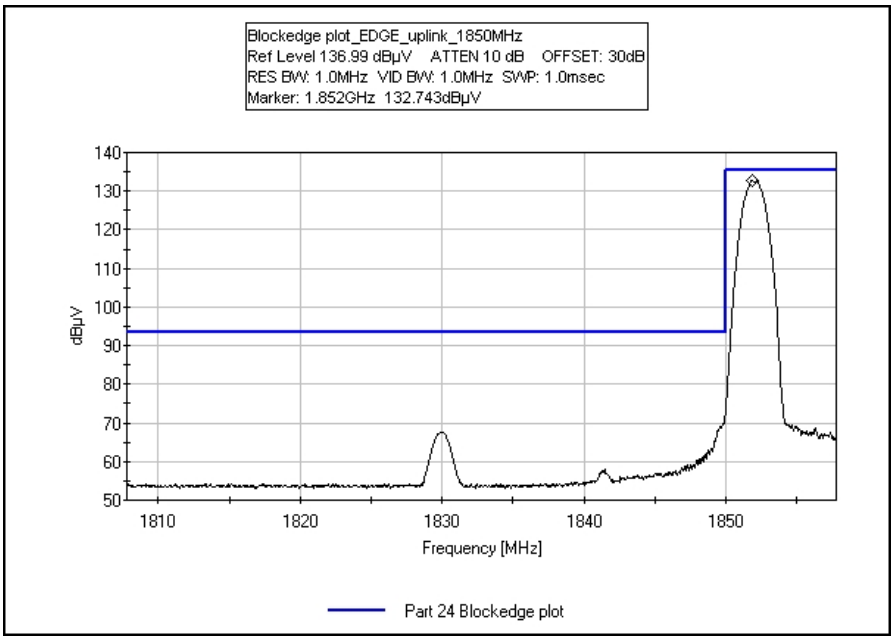
BLOCKEDGE PLOT DOWNLINK - WCDMA 1930MHz



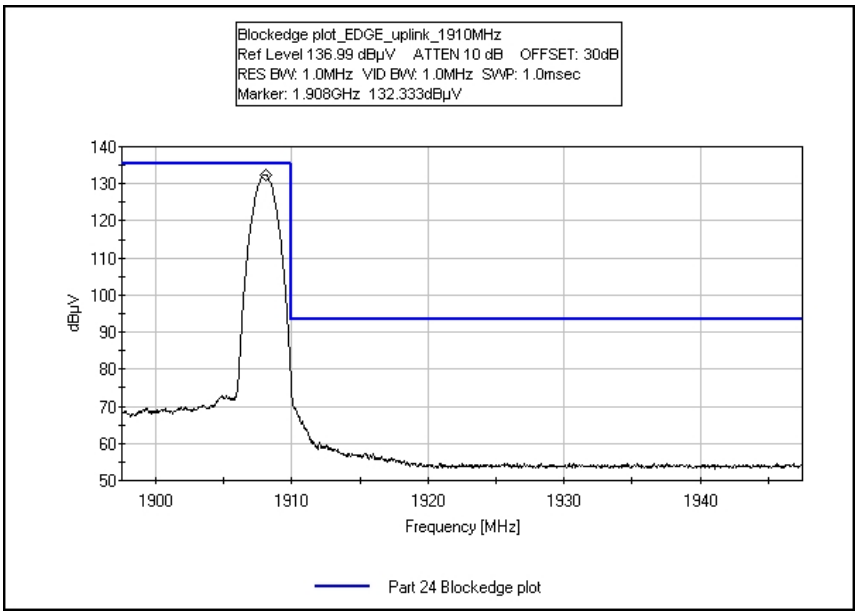
BLOCKEDGE PLOT DOWNLINK - WCDMA 1990MHz



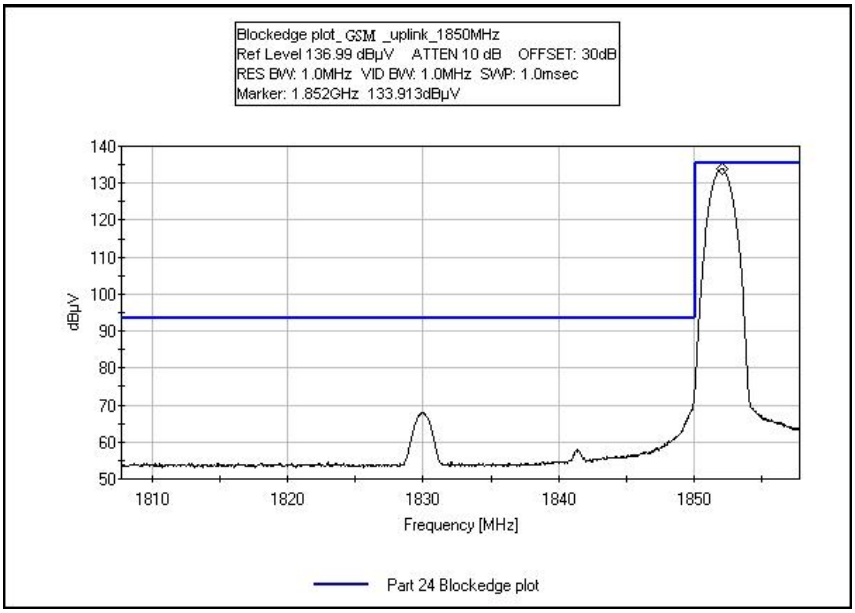
BLOCKEDGE PLOT UPLINK - EDGE 1850MHz



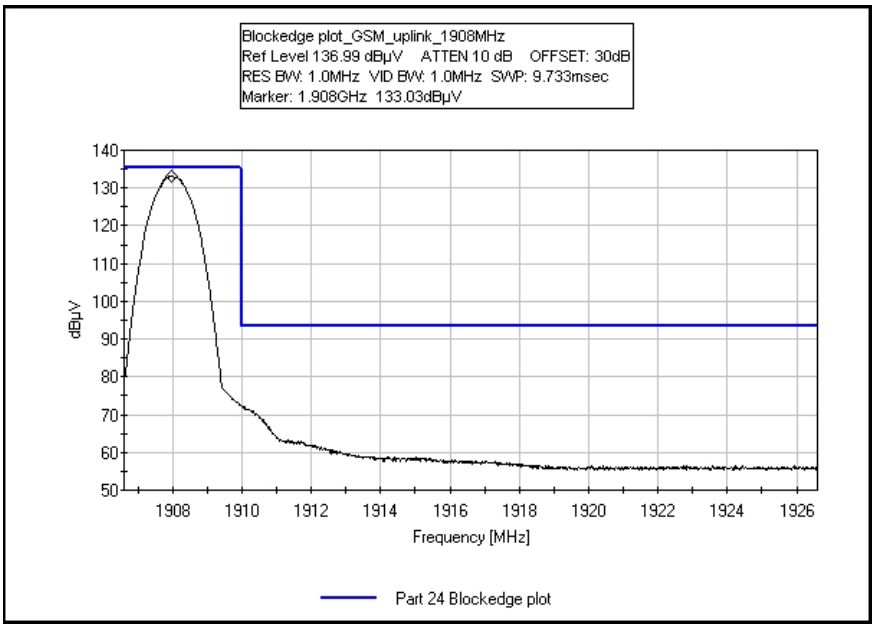
BLOCKEDGE PLOT UPLINK - EDGE 1910MHz



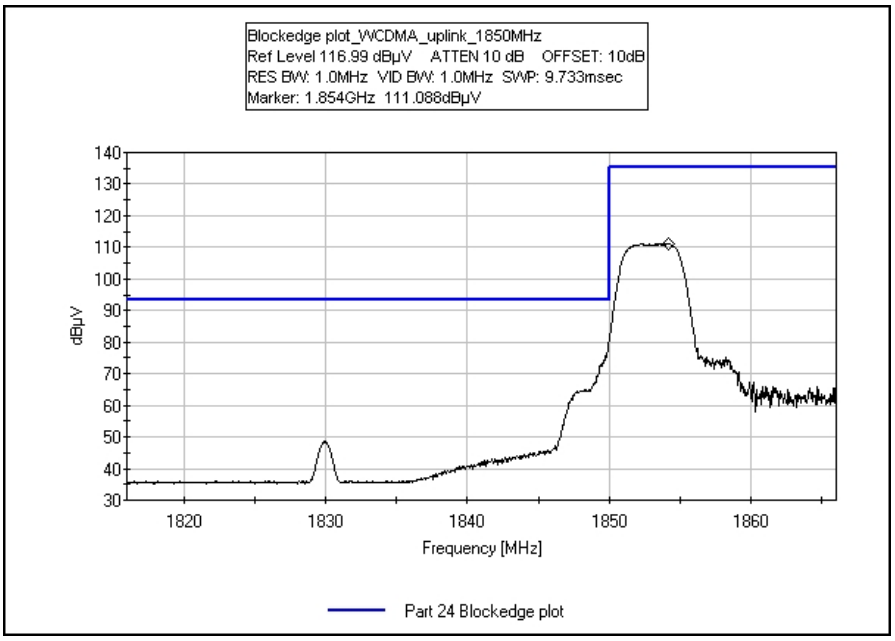
BLOCKEDGE PLOT UPLINK - GSM 1850MHz



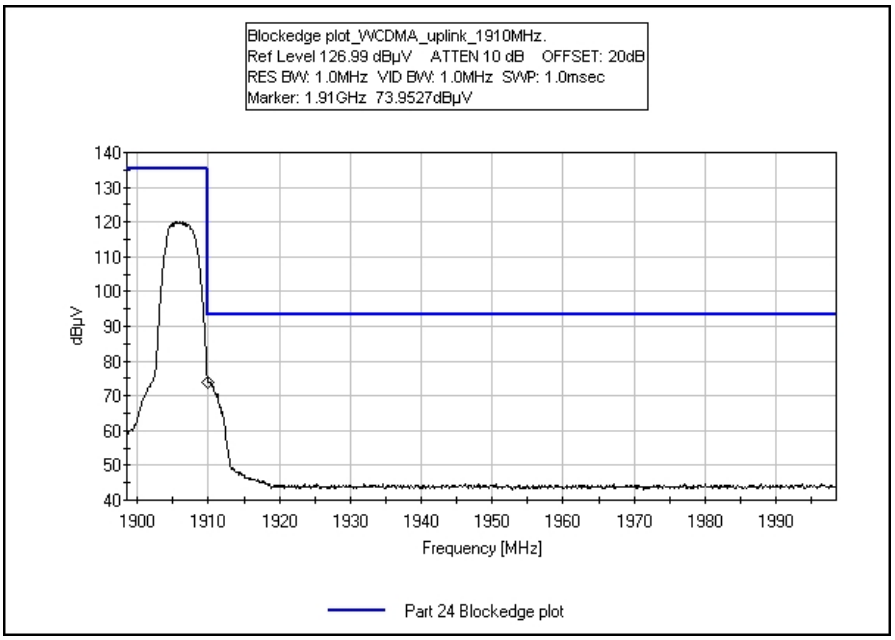
BLOCKEDGE PLOT UPLINK - GSM 1908MHz



BLOCKEDGE PLOT UPLINK - WCDMA 1850MHz



BLOCKEDGE PLOT UPLINK - WCDMA 1910MHz



INTERMODULATION

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02869	Agilent	E4440A	MY46186290	021207	021209
36" 40GHz cable	02945	Strolab	NA	NA	091807	091809

Test Conditions

The rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a remote power meter. For uplink configuration, 1900MHz Donor antenna port is connected to remote Power meter and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet switch.

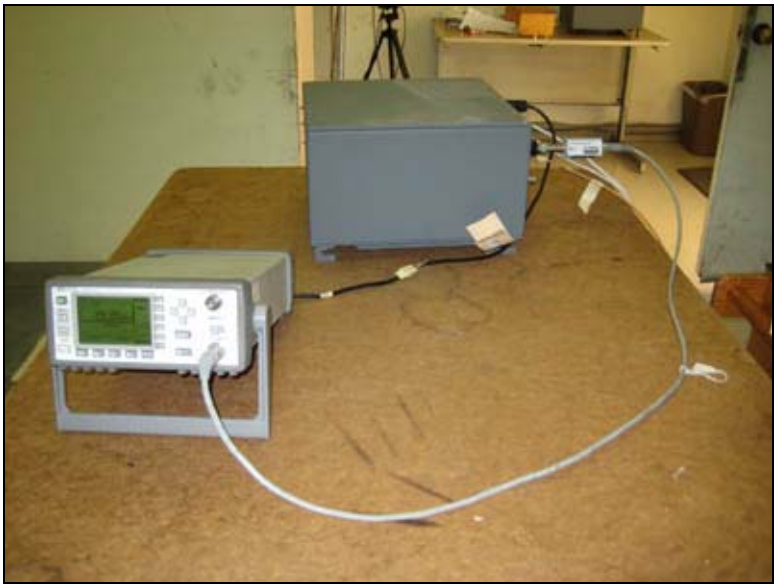
Two modulated signal from the support ESG is injected into the device and the intermodulation product is measured at the RF antenna port under investigation.

Uplink: 1850 to 1910MHz
Downlink: 1930 to 1990MHz

Uplink
Modulation: EDGE, GSM, WCDMA
TX= 1850.5MHz, 1880MHz, 1909.5MHz
Power = 28dBm = 0.63W

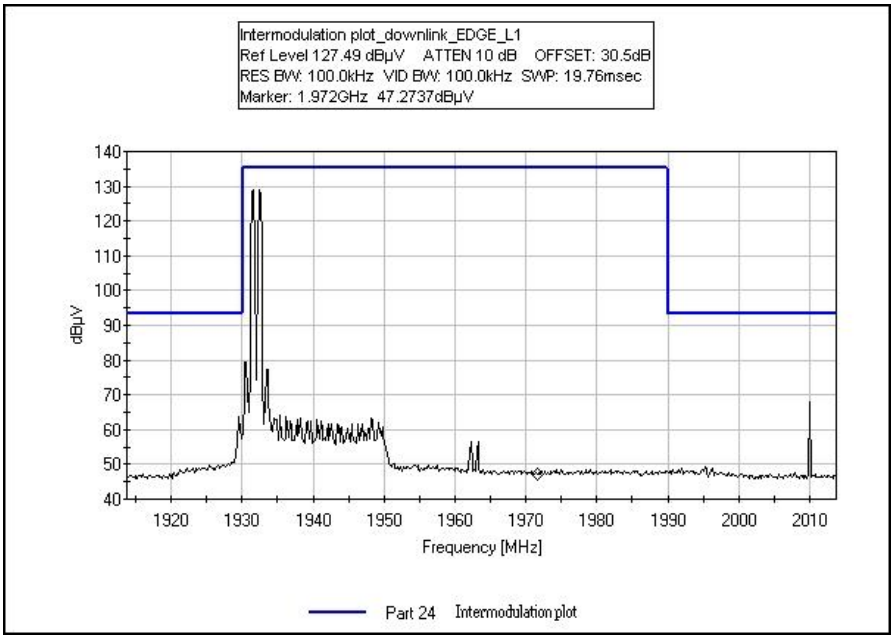
Downlink:
Modulation: EDGE, GSM, WCDMA
TX=1930.5MHz, 1960MHz, 1989.5MHz
Power = 28dBm = 0.63W

Test Setup Photos

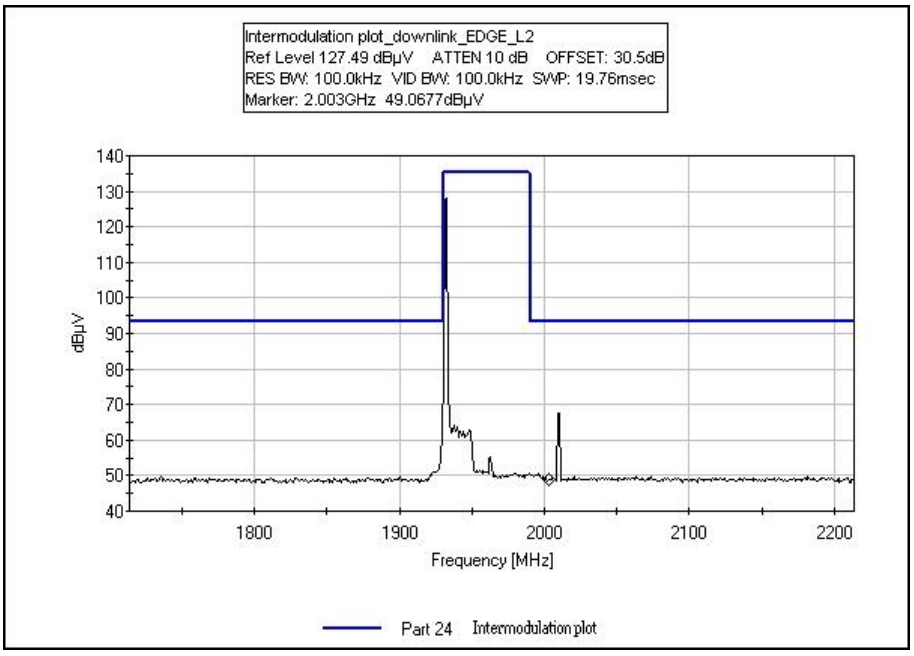


Test Plots

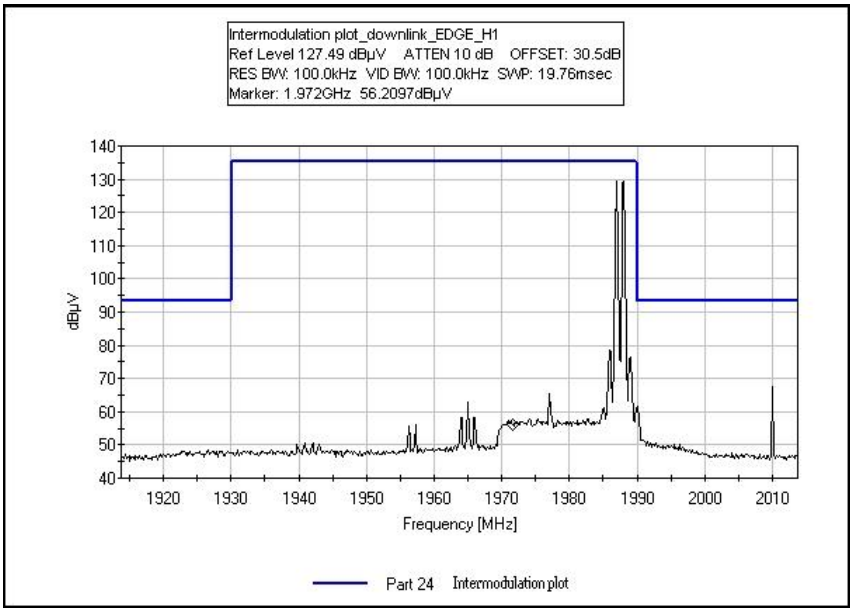
INTERMODULATION PLOT DOWNLINK - EDGE L1



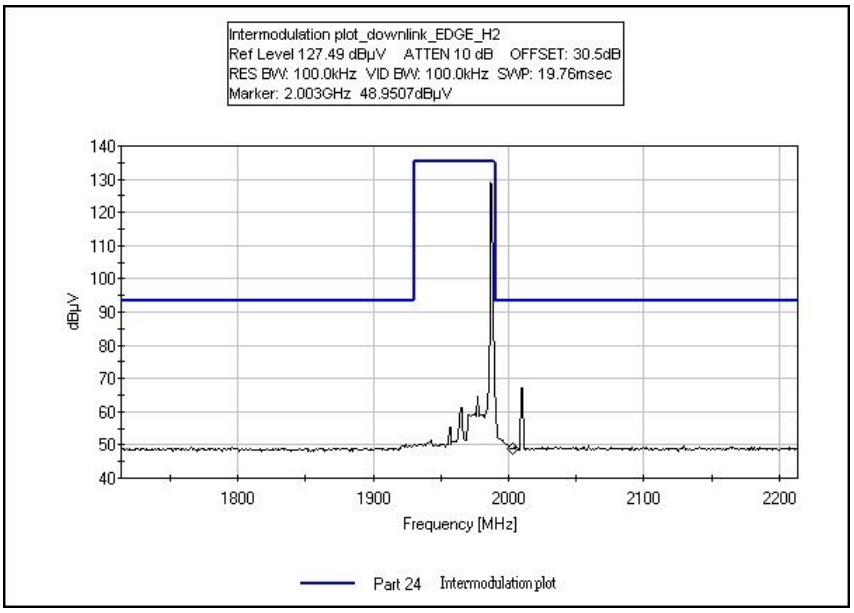
INTERMODULATION PLOT DOWNLINK - EDGE L2



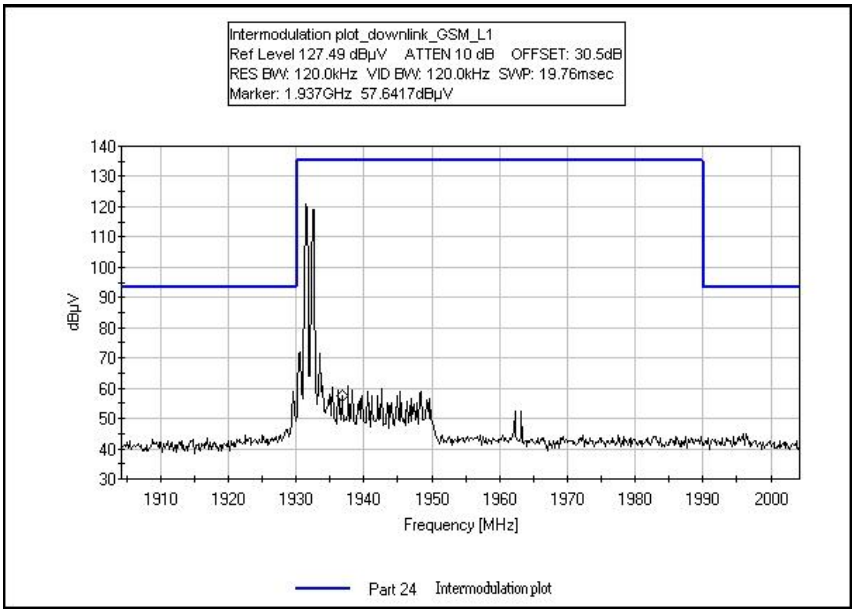
INTERMODULATION PLOT DOWNLINK - EDGE H1



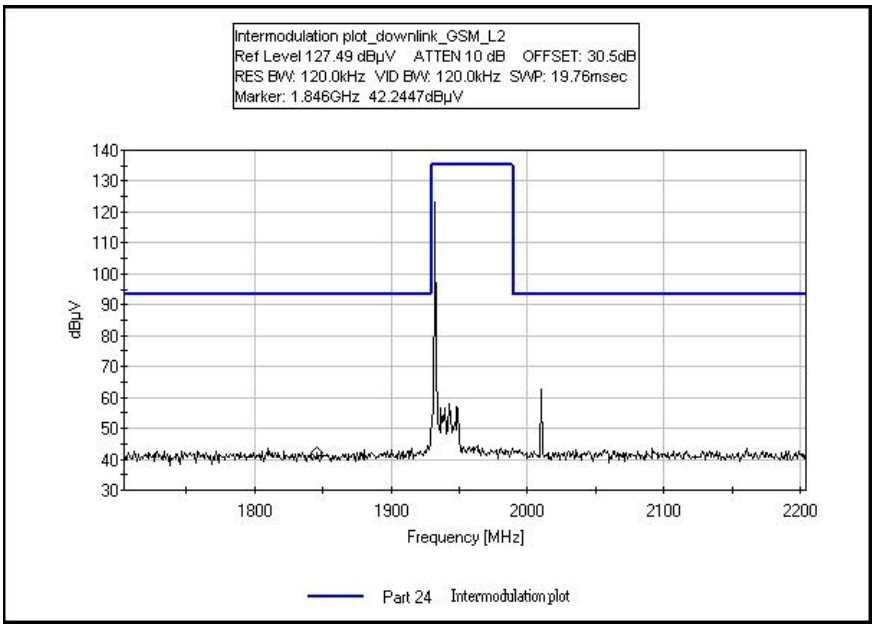
INTERMODULATION PLOT DOWNLINK - EDGE H2



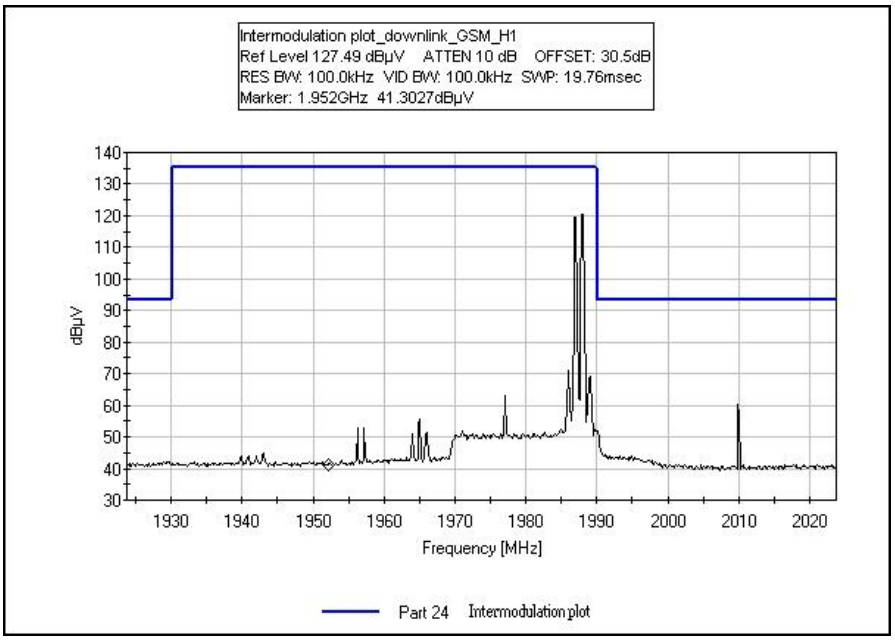
INTERMODULATION PLOT DOWNLINK - GSM L1



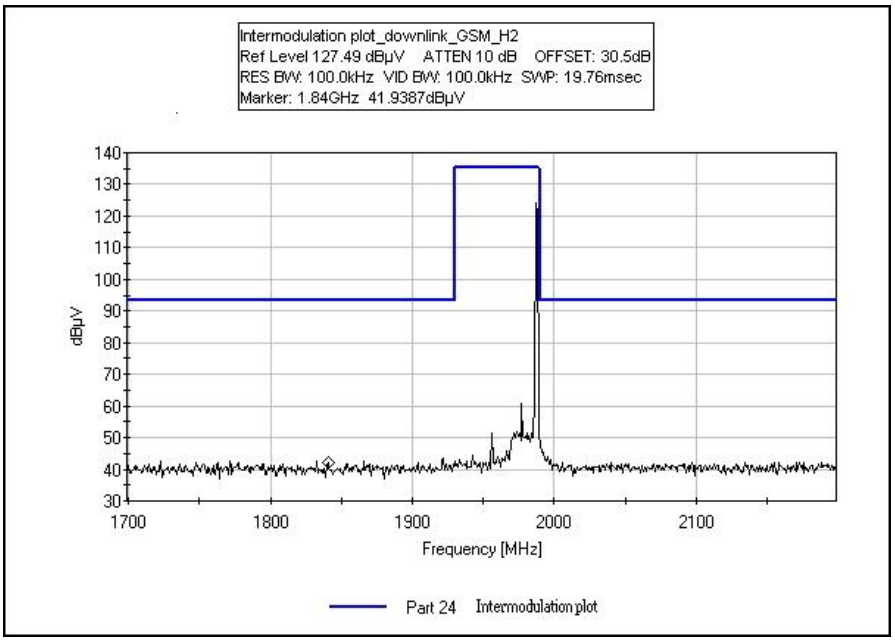
INTERMODULATION PLOT DOWNLINK - GSM L2



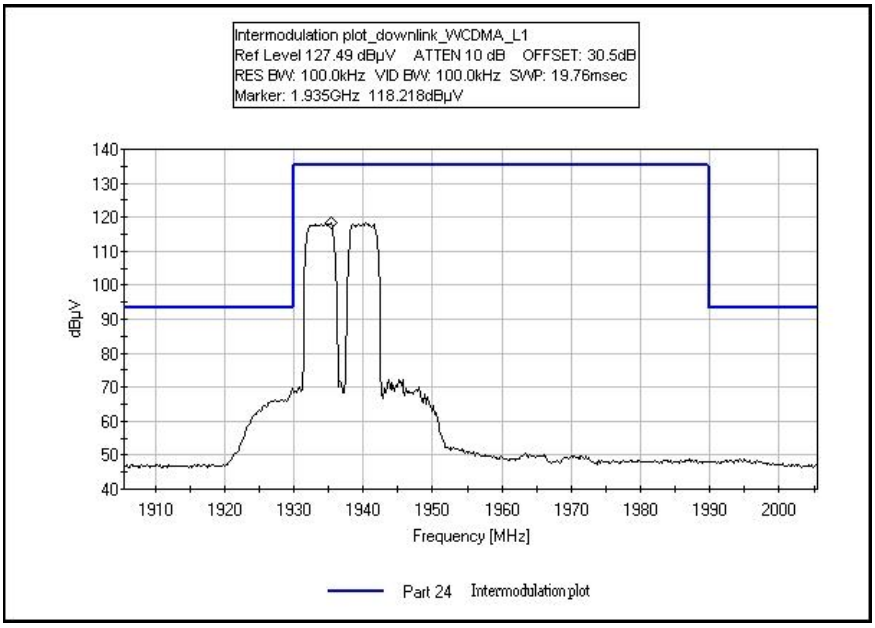
INTERMODULATION PLOT DOWNLINK - GSM H1



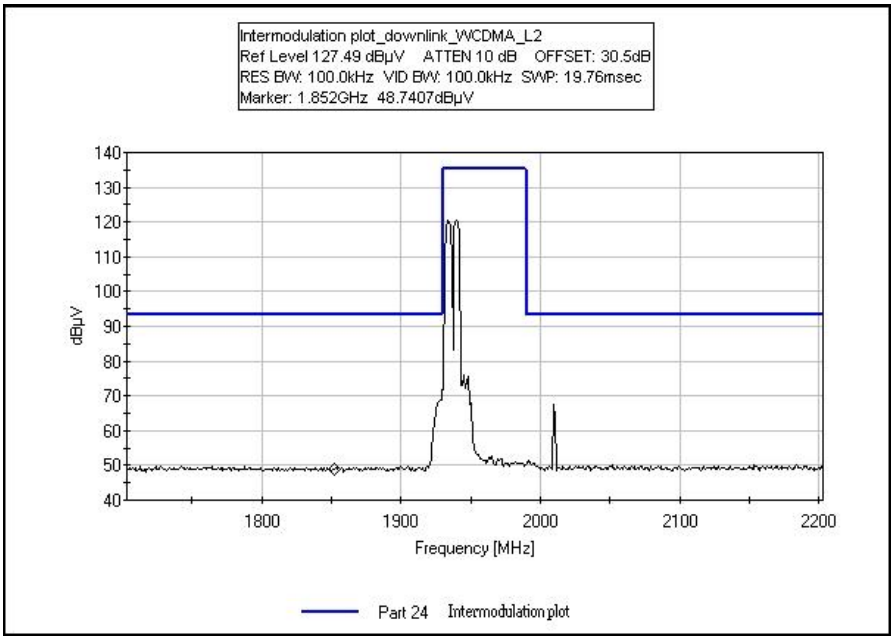
INTERMODULATION PLOT DOWNLINK - GSM H2



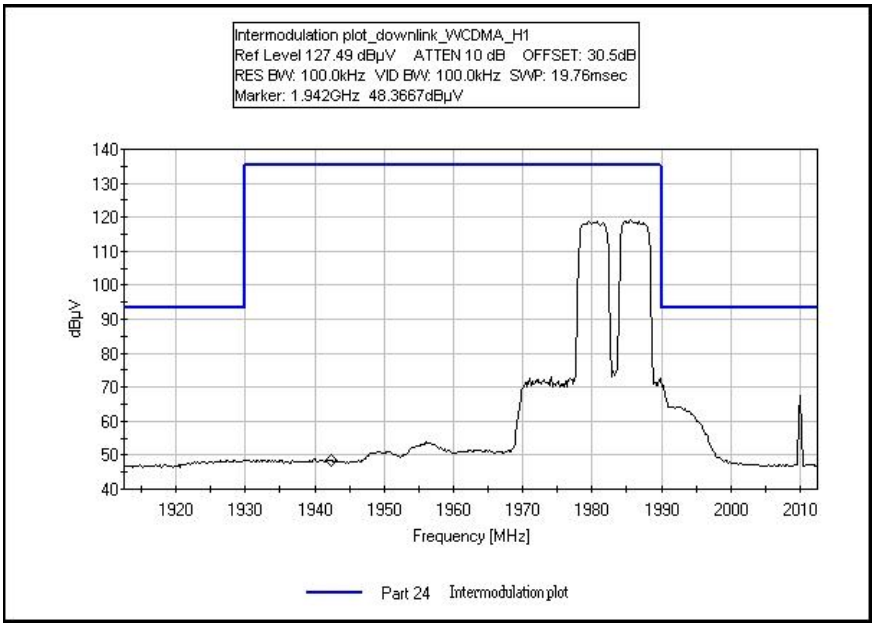
INTERMODULATION PLOT DOWNLINK - WCDMA L1



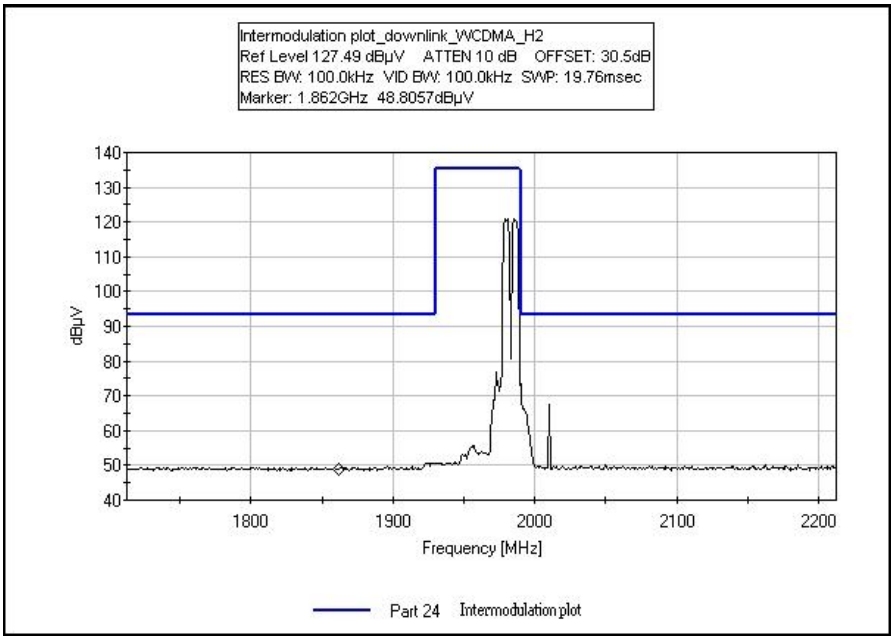
INTERMODULATION PLOT DOWNLINK - WCDMA L2



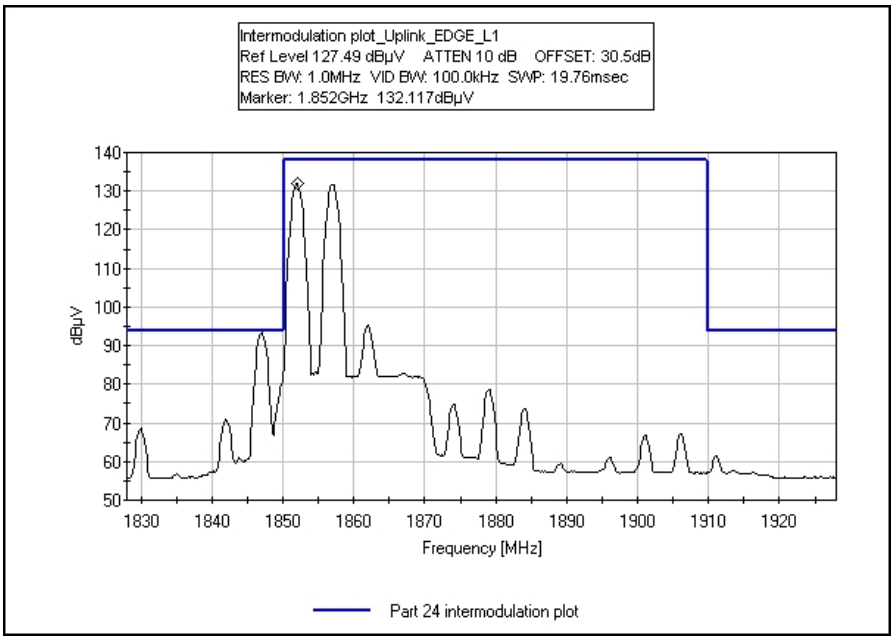
INTERMODULATION PLOT DOWNLINK - WCDMA H1



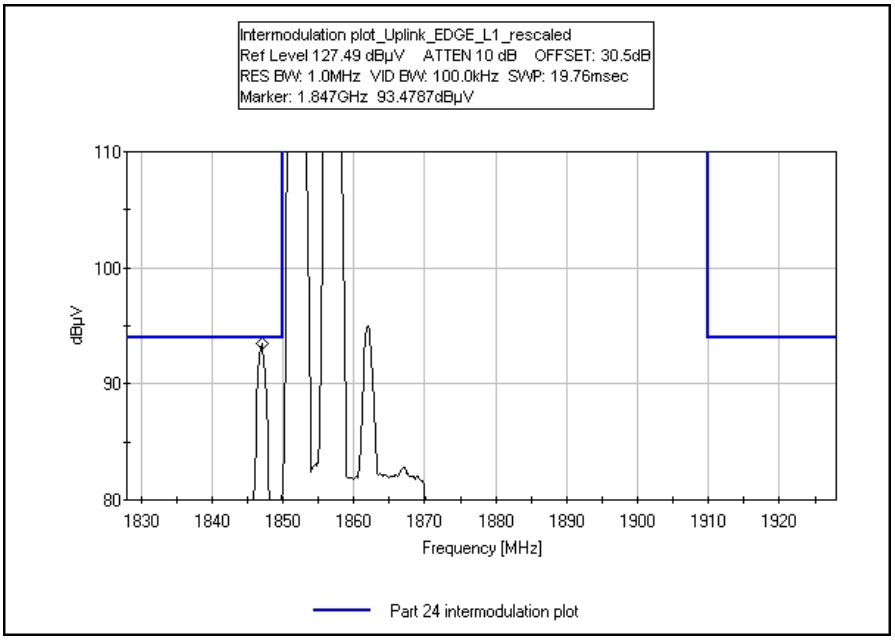
INTERMODULATION PLOT DOWNLINK - WCDMA H2



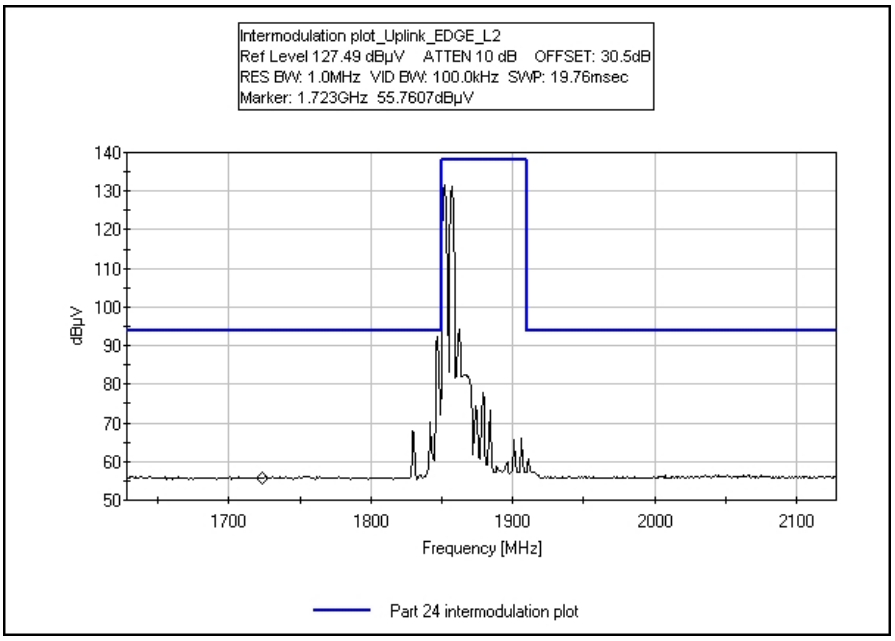
INTERMODULATION PLOT UPLINK - EDGE L1



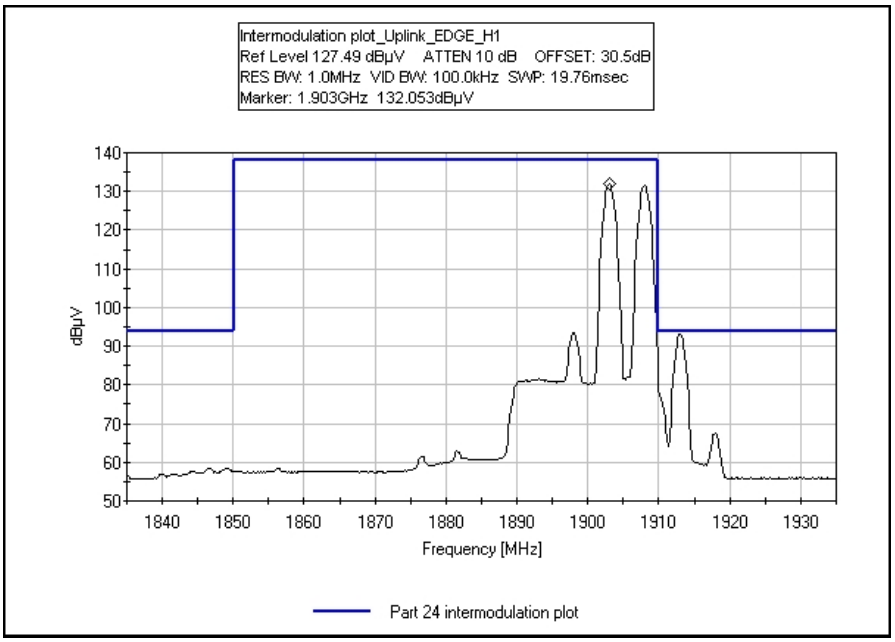
INTERMODULATION PLOT UPLINK - EDGE L1 RESCALED



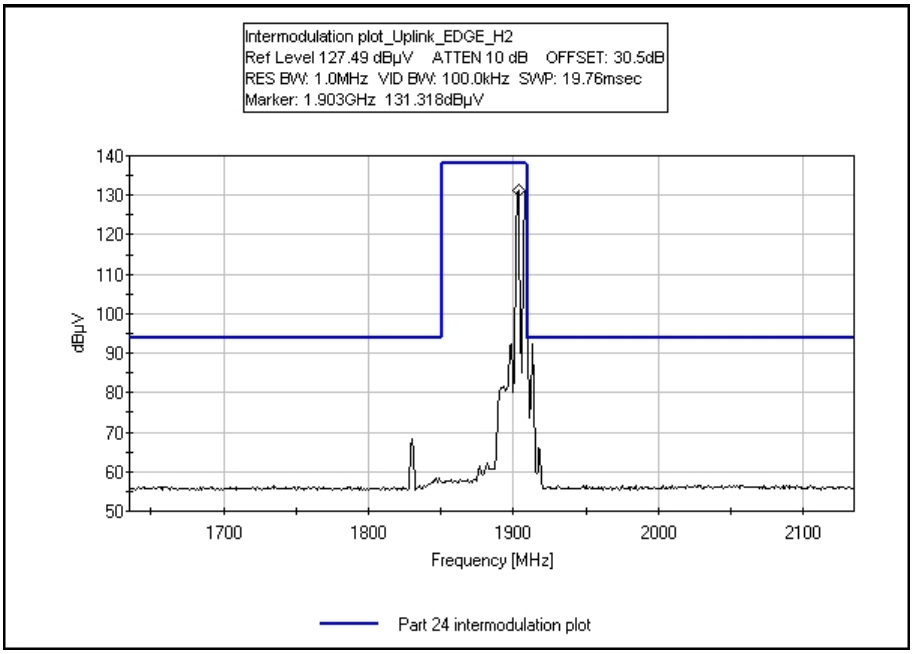
INTERMODULATION PLOT UPLINK - EDGE L2



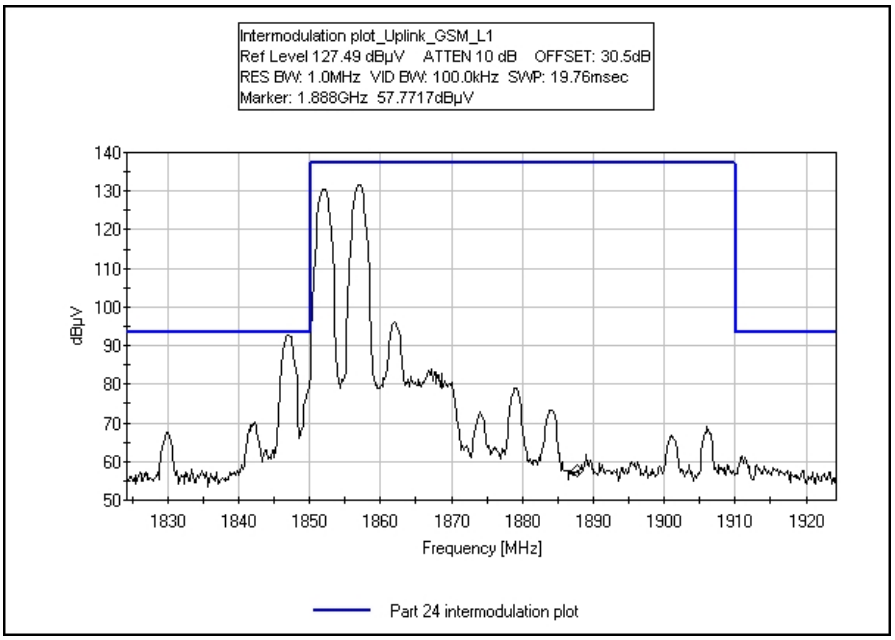
INTERMODULATION PLOT UPLINK - EDGE H1



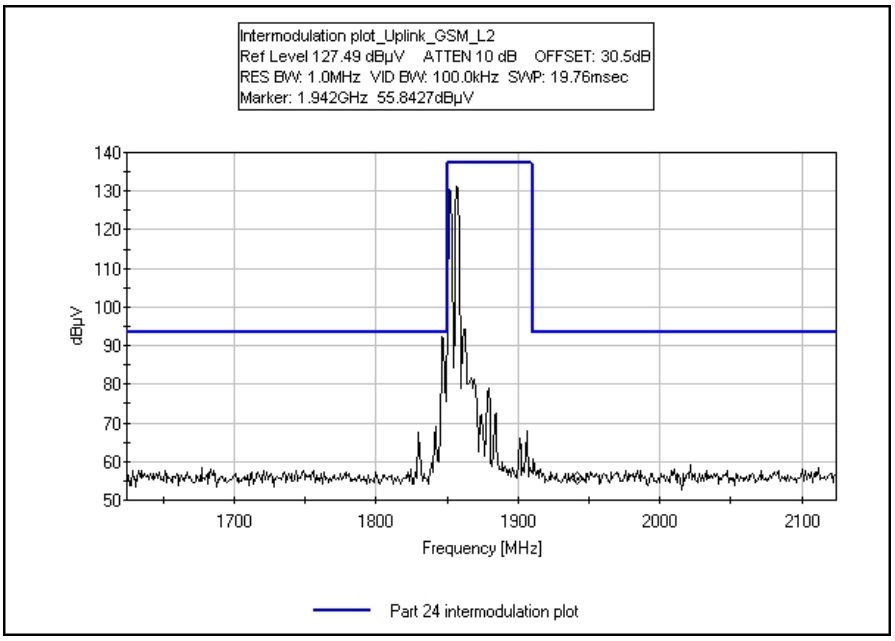
INTERMODULATION PLOT UPLINK - EDGE H2



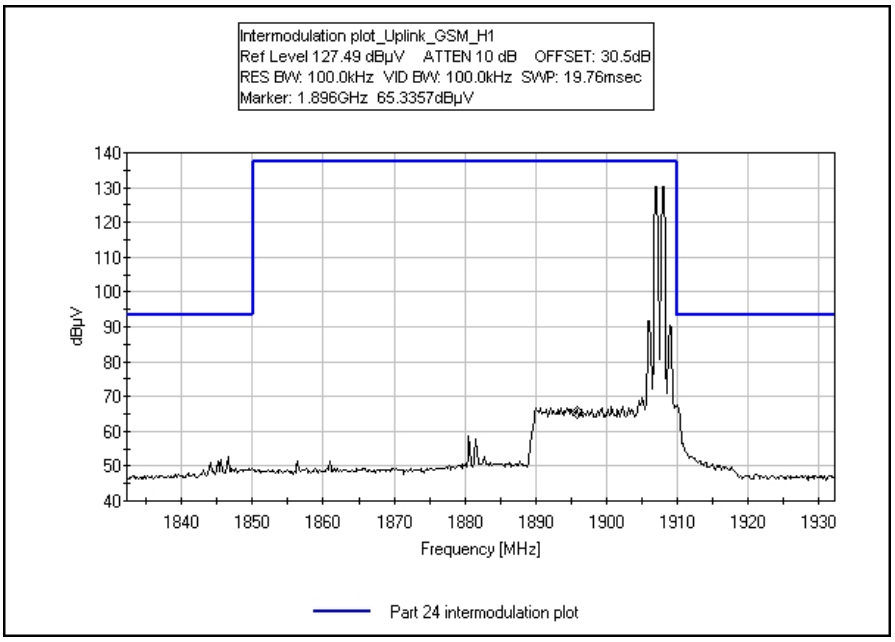
INTERMODULATION PLOT UPLINK - GSM L1



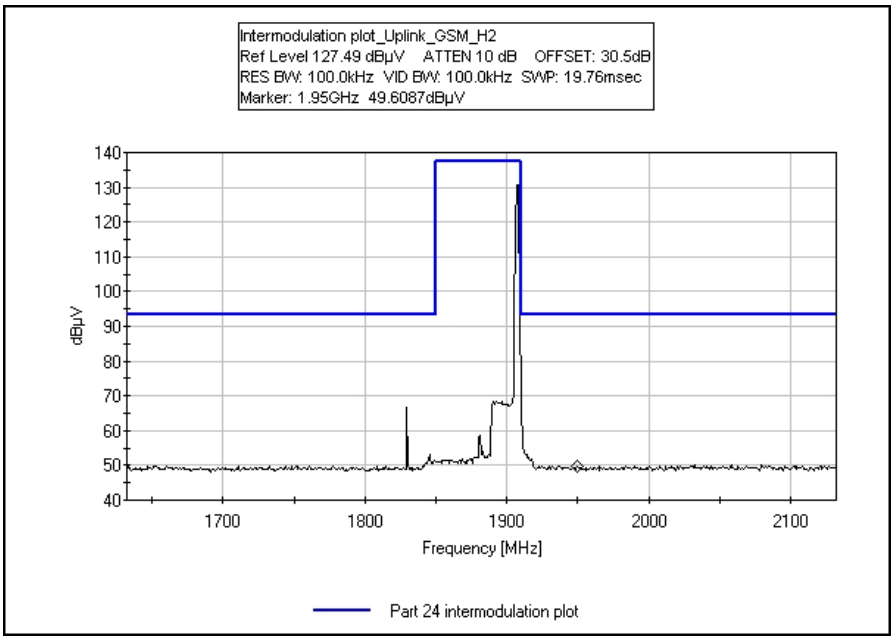
INTERMODULATION PLOT UPLINK - GSM L2



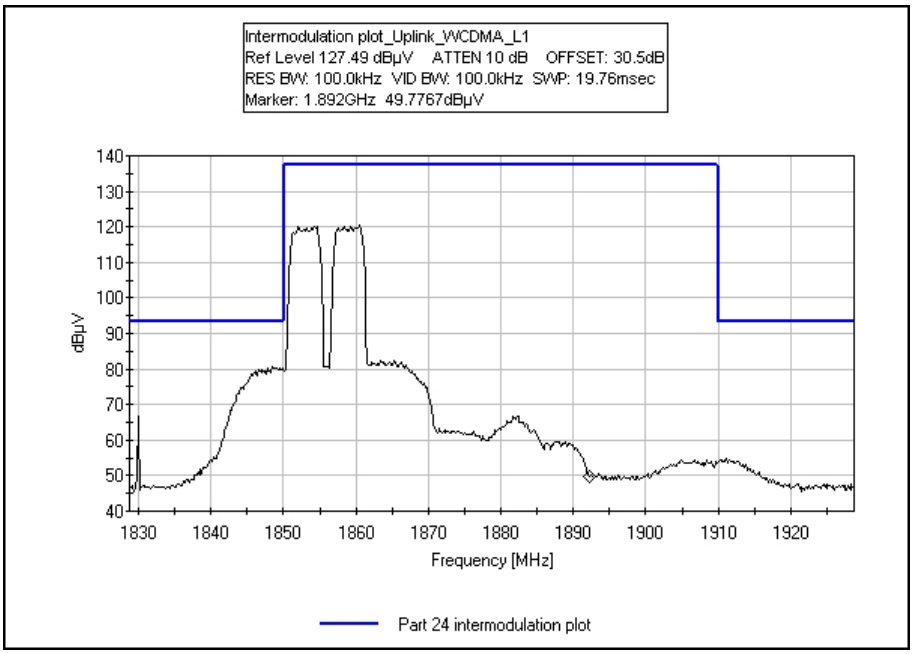
INTERMODULATION PLOT UPLINK - GSM H1



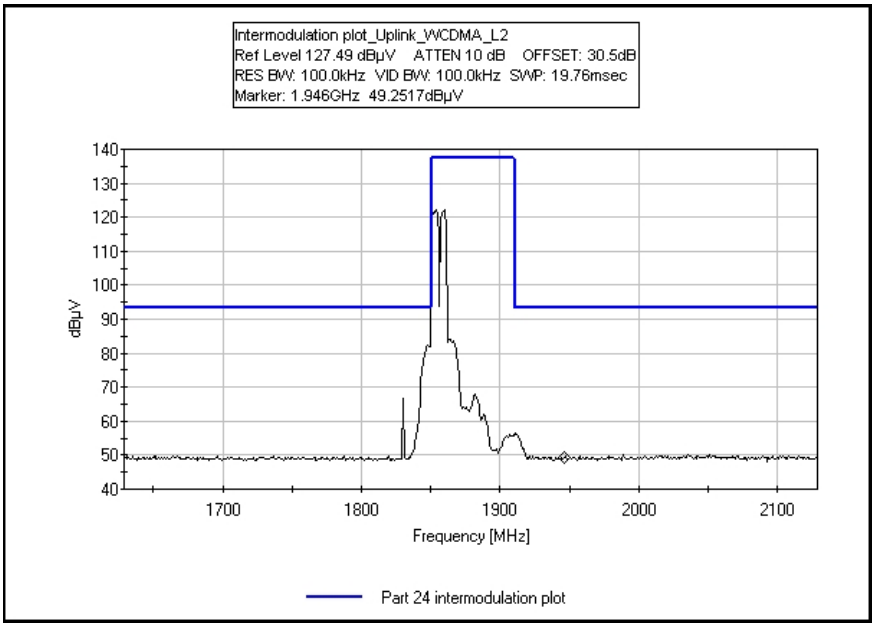
INTERMODULATION PLOT UPLINK - GSM H2



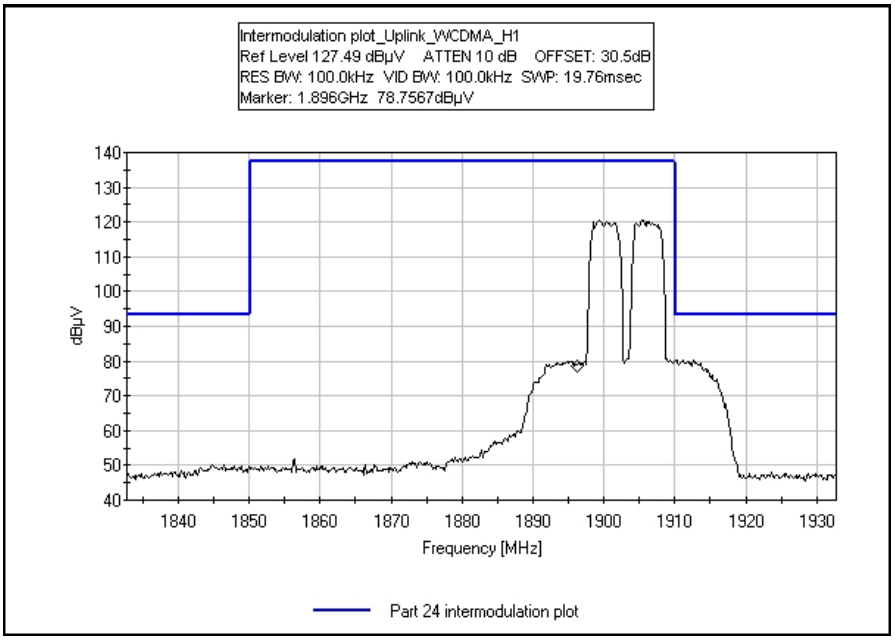
INTERMODULATION PLOT UPLINK - WCDMA L1



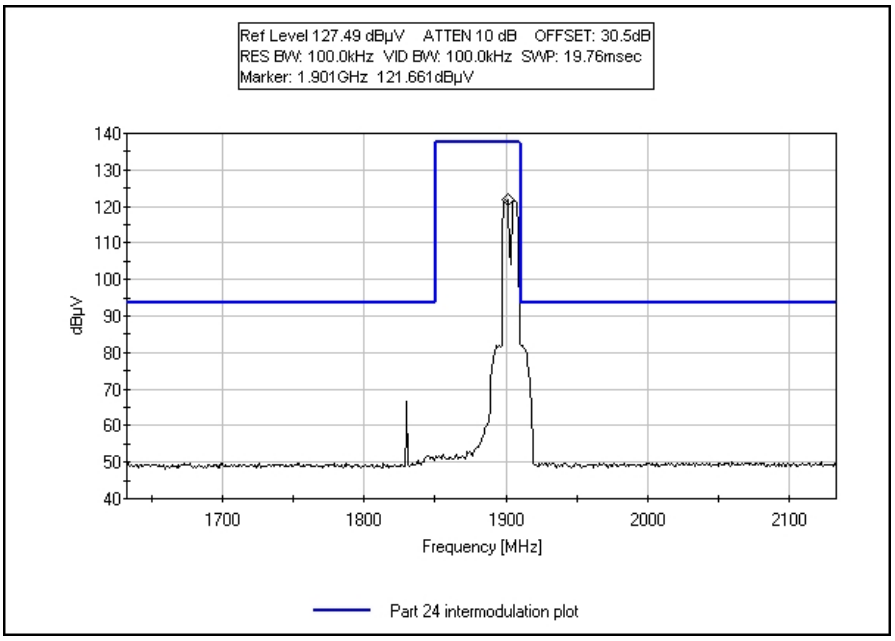
INTERMODULATION PLOT UPLINK - WCDMA L2



INTERMODULATION PLOT UPLINK - WCDMA H1



INTERMODULATION PLOT UPLINK - WCDMA H2



OUT OF BAND REJECTION

Test Equipment

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

Test Conditions

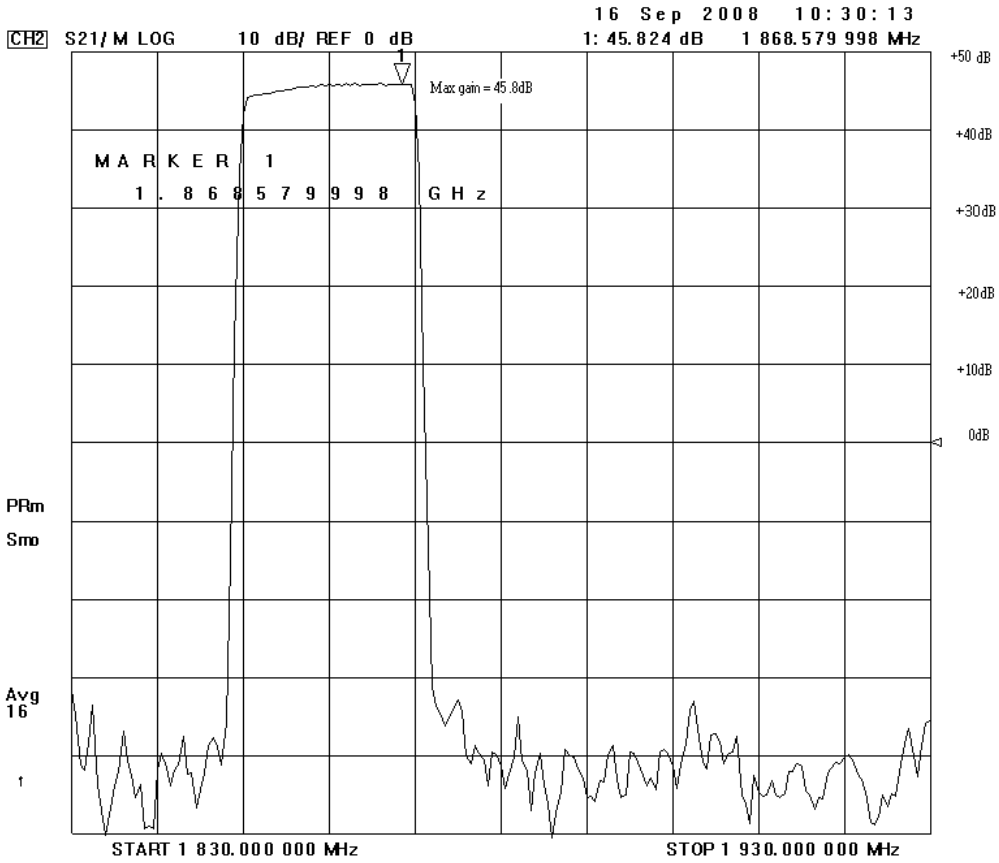
The rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a remote power meter. For uplink configuration, 1900MHz Donor antenna port is connected to remote Power meter and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet switch.

Uplink: 1850 to 1910MHz
Downlink: 1930 to 1990MHz

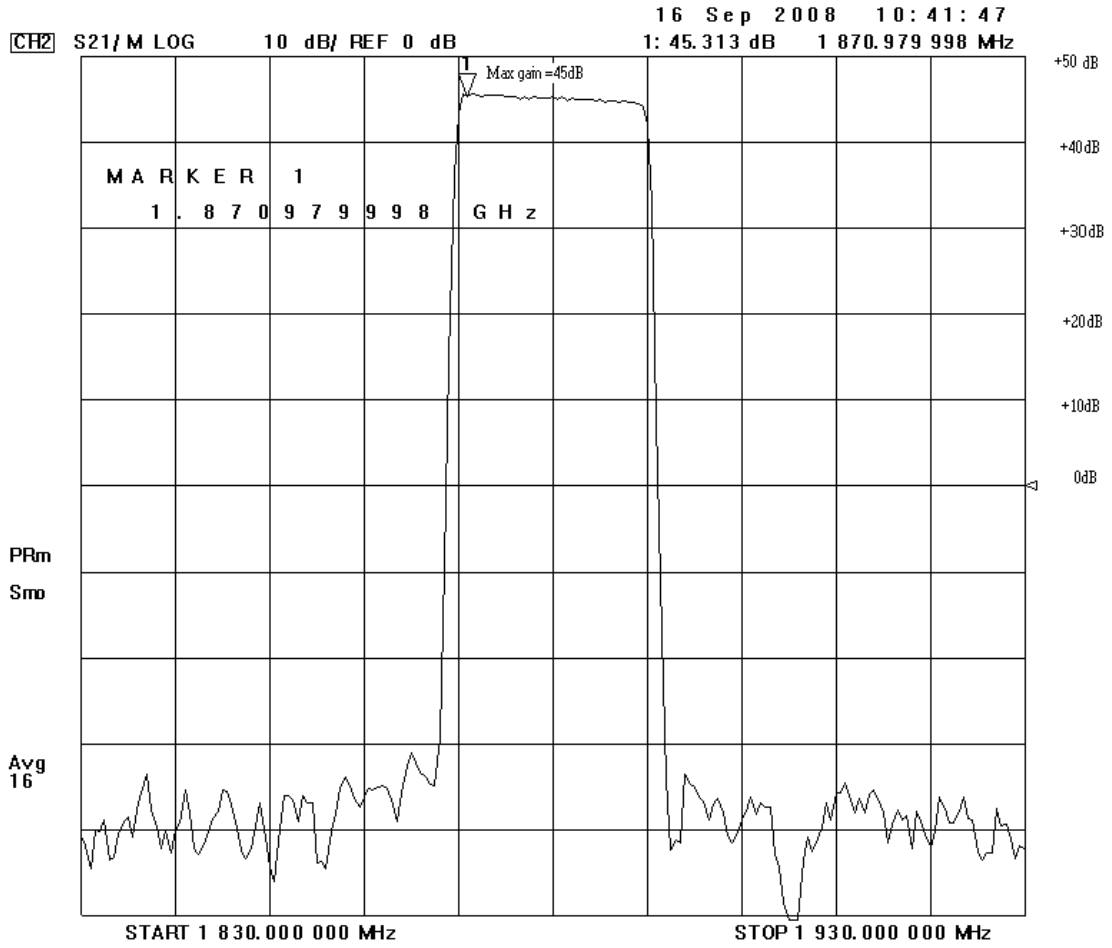
The gain response is measured with a network analyzer in the uplink and down link direction. The total operating band was split into three bands due to the internal programmable block filter.

Test Setup Photos

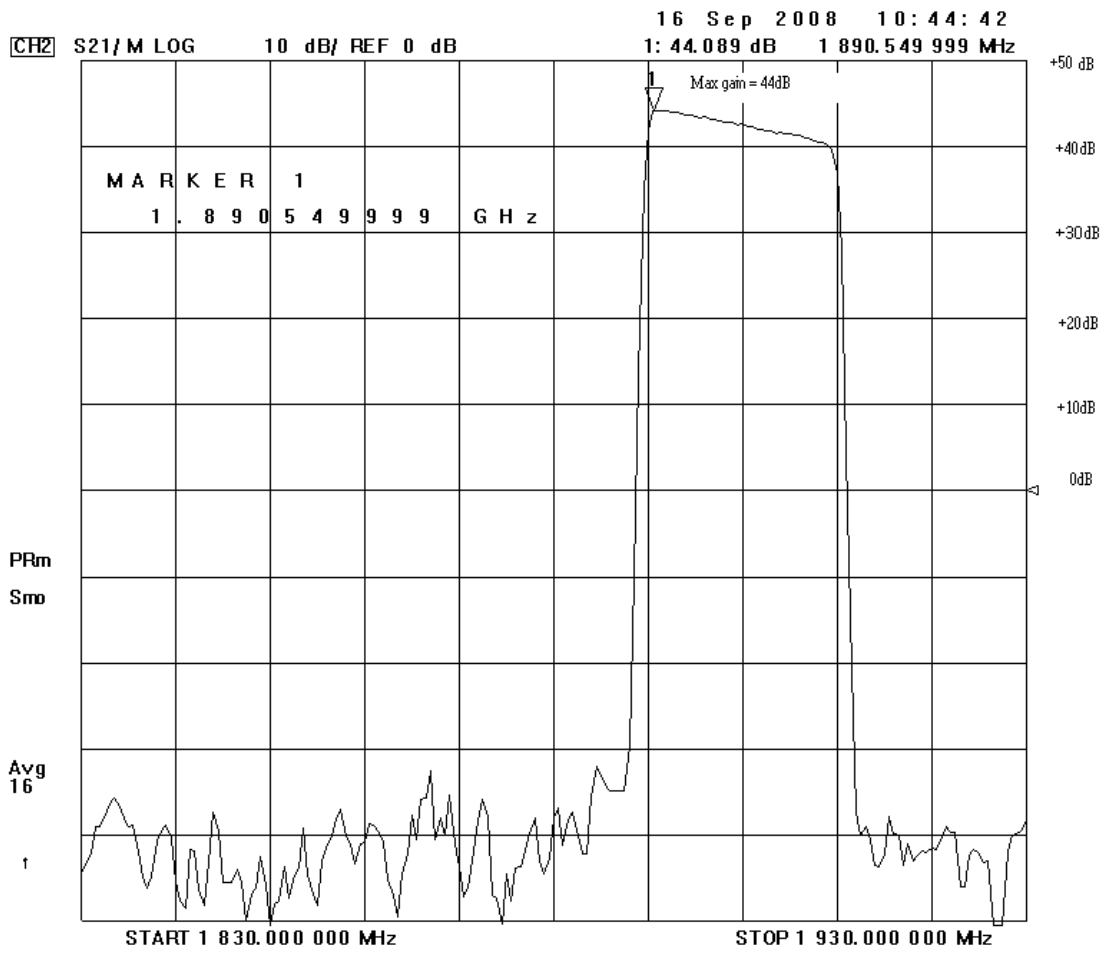
Test Plots



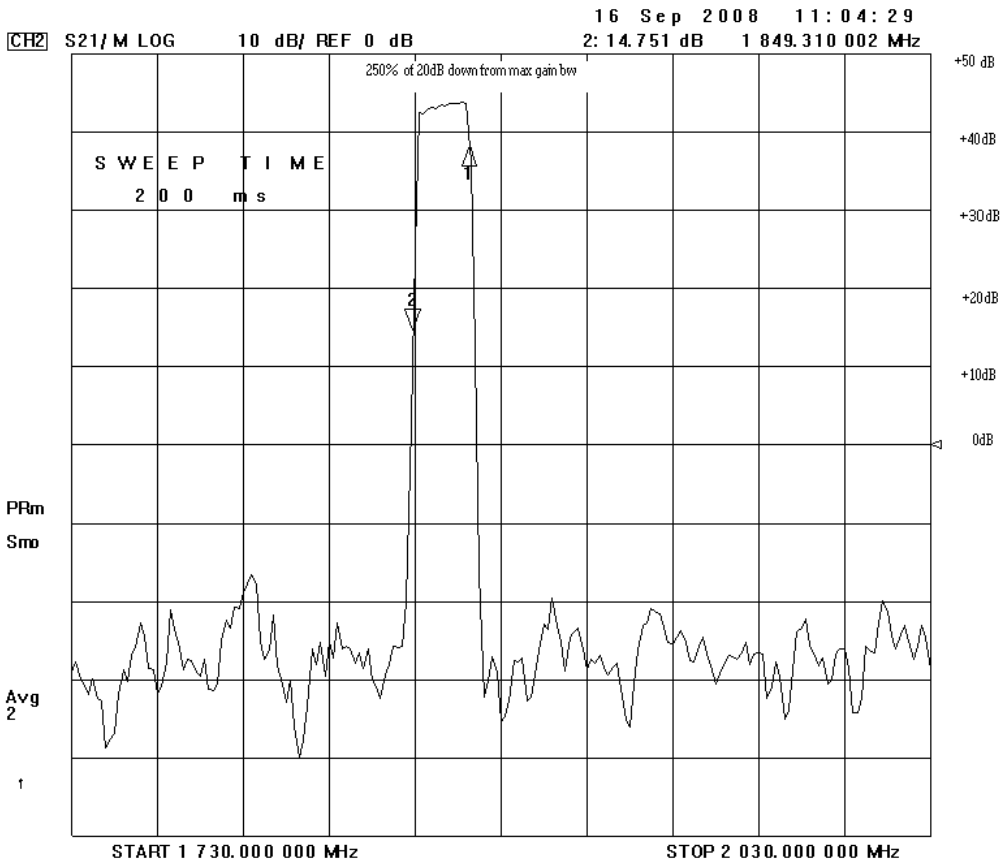
Uplink band1



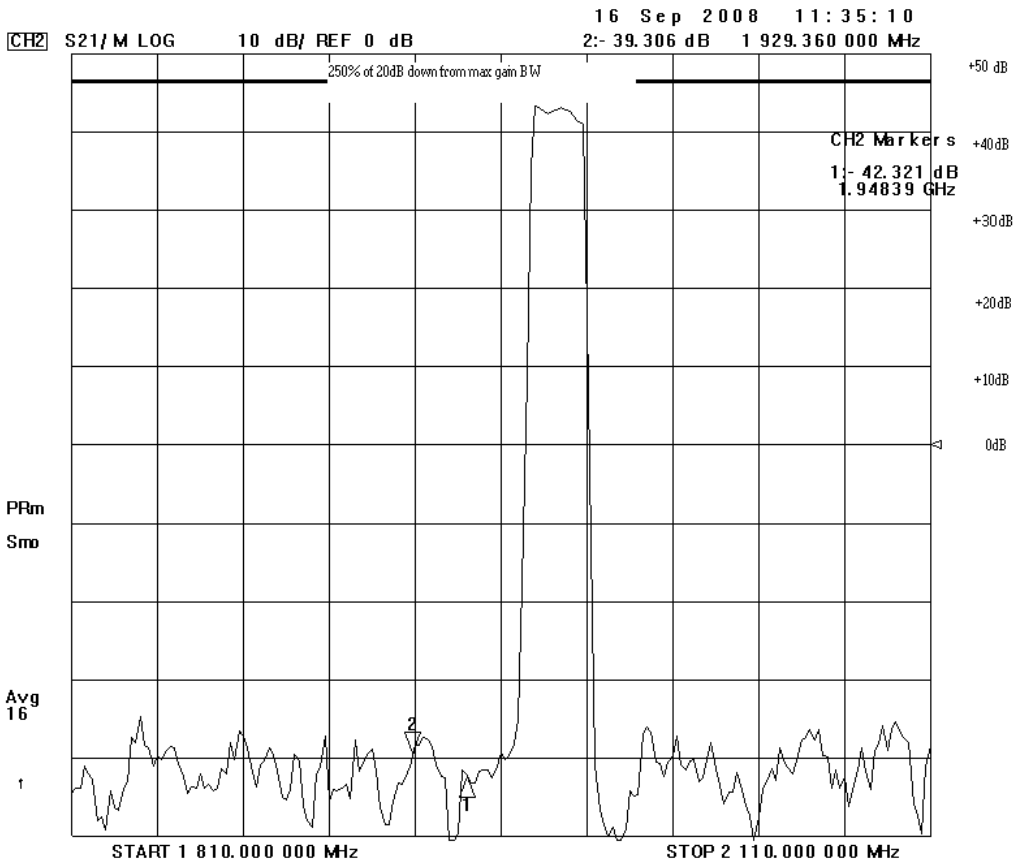
Uplink band2



Uplink band3

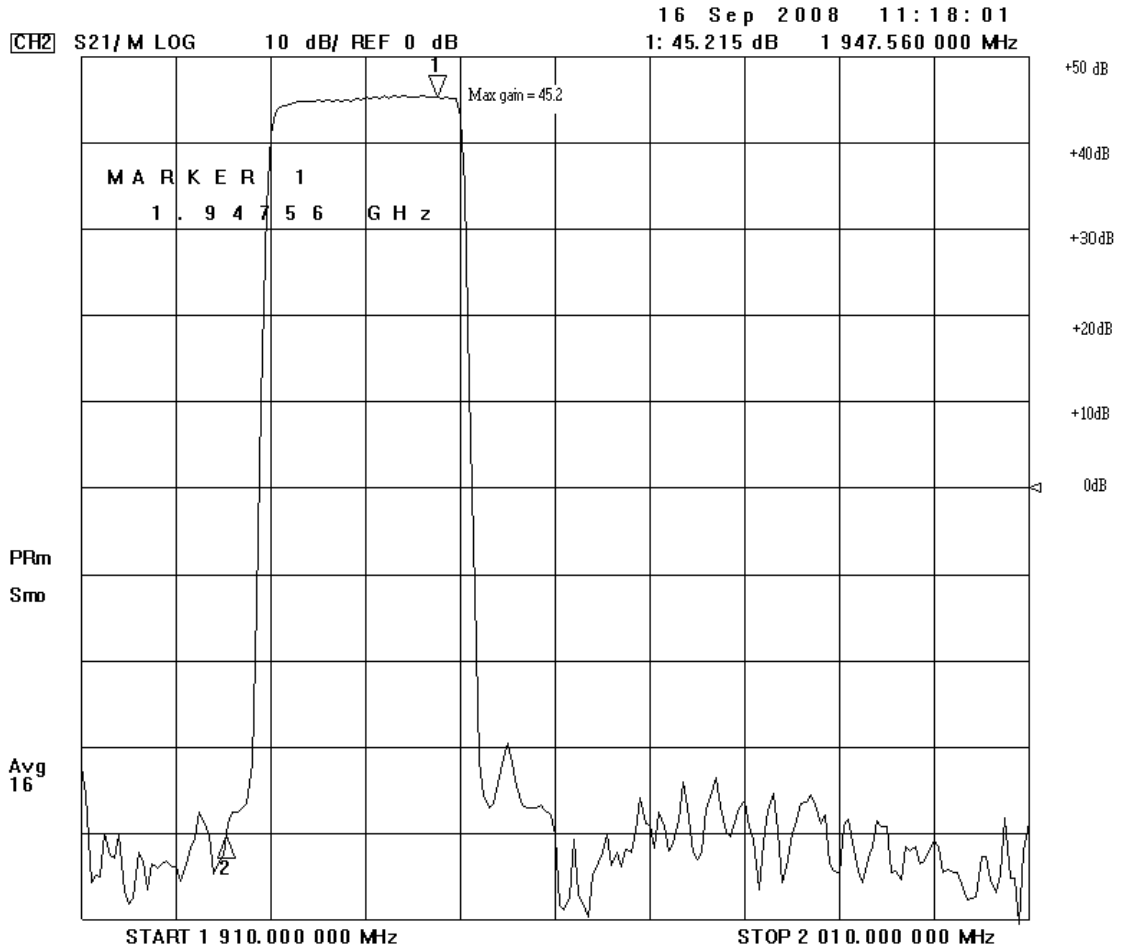


Uplink split 1

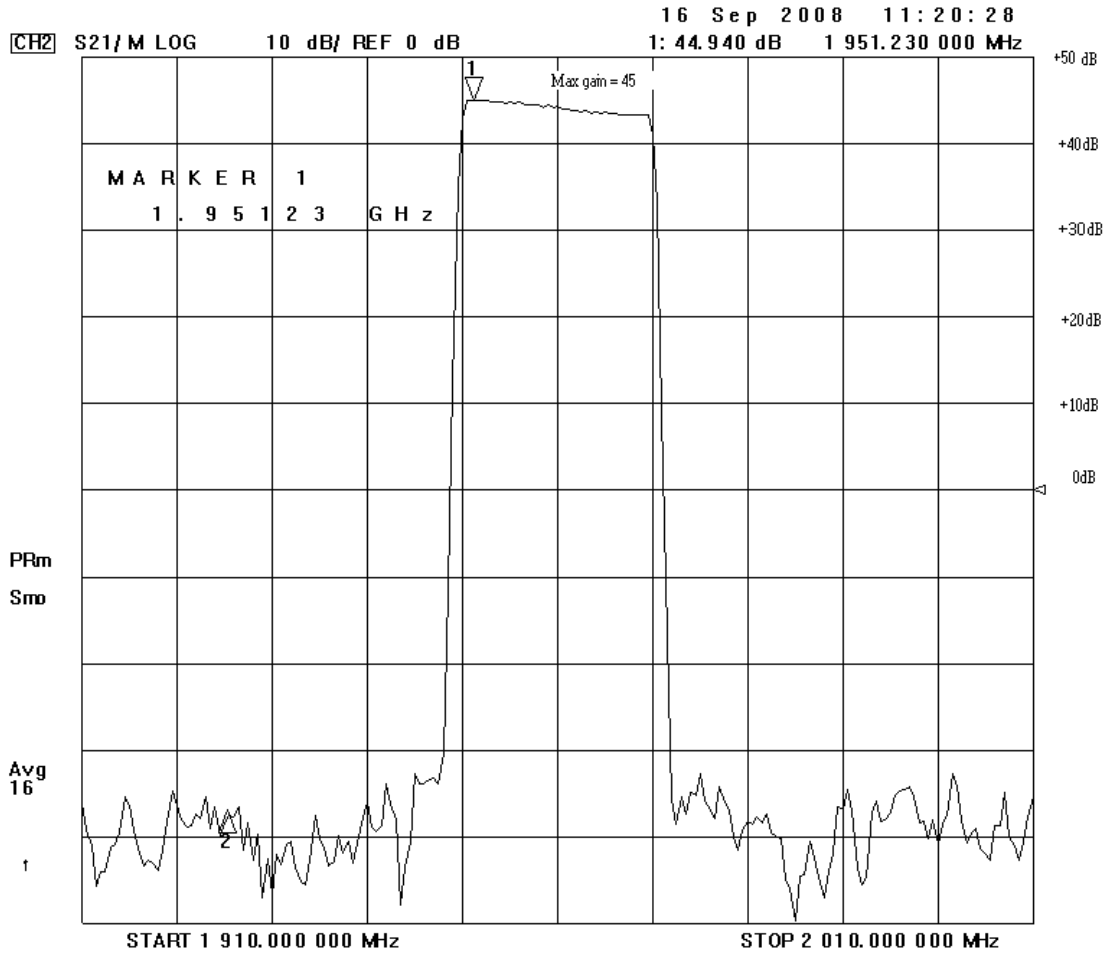


Uplink split 3

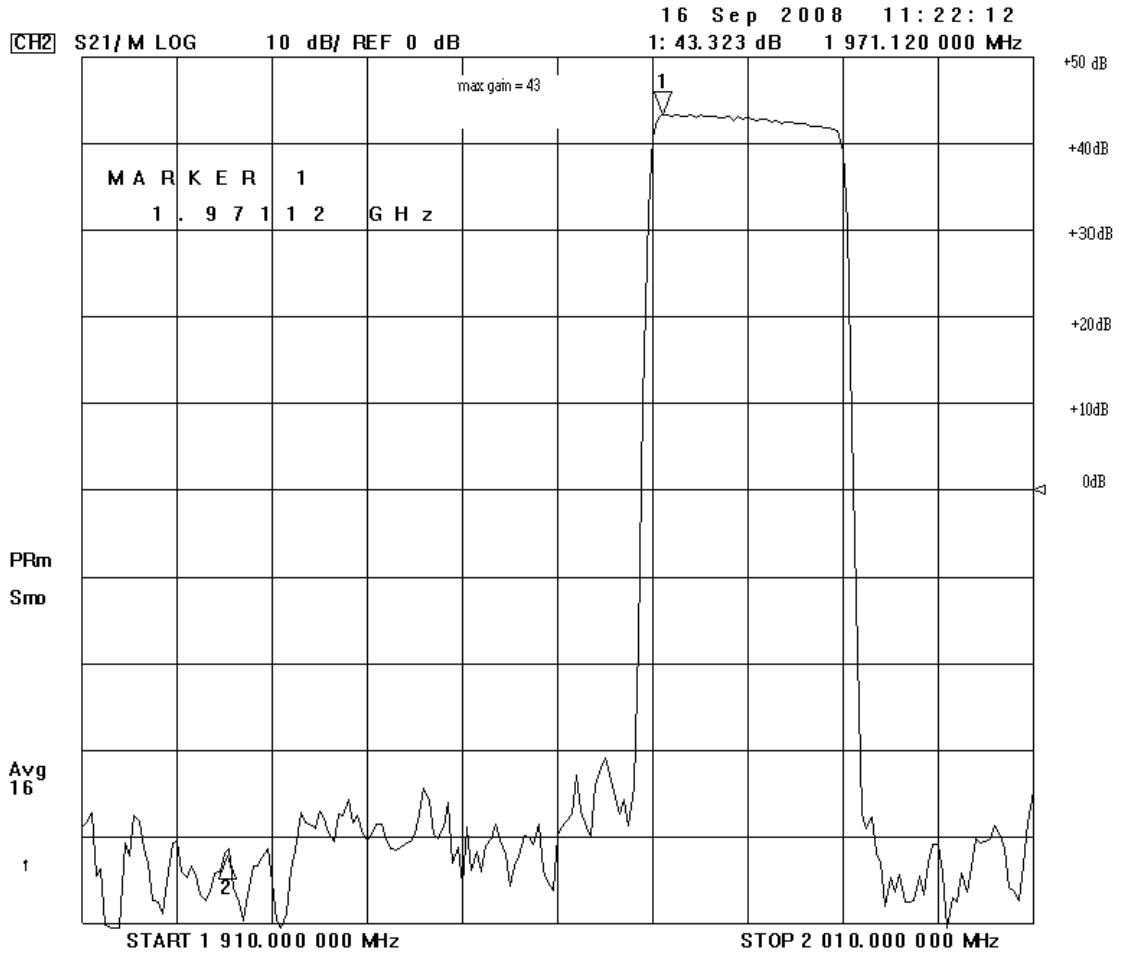
RSS 131 Amplifier gain and Bandwidth:



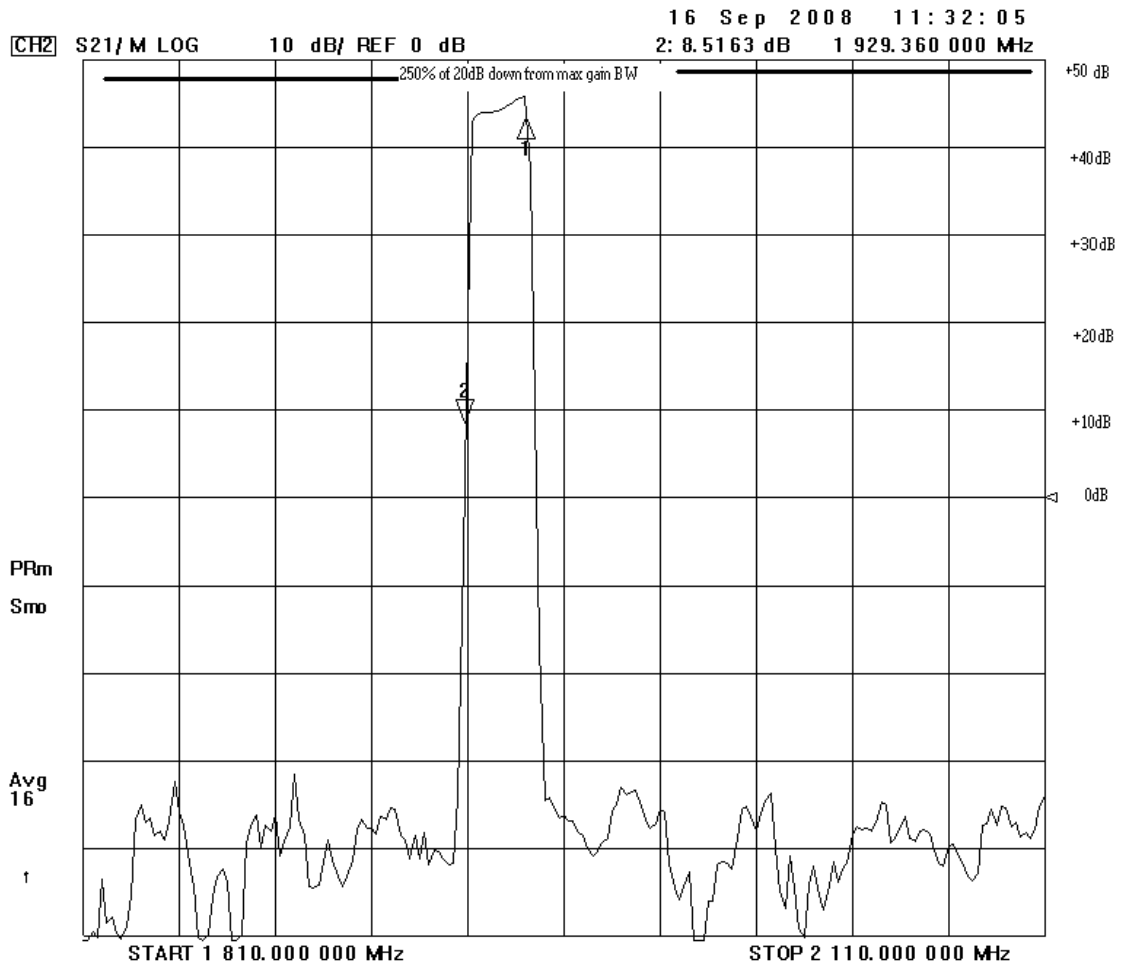
Downlink split 1



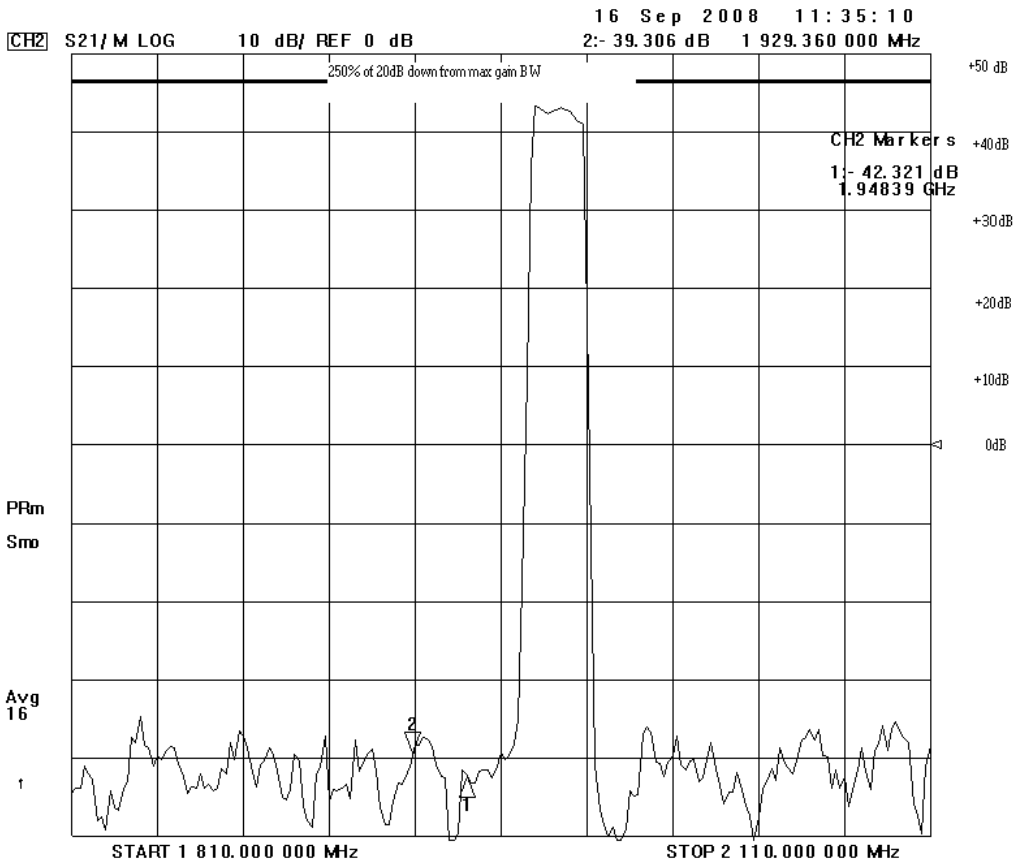
Downlink split 2



Downlink split 3



Downlink split 1



Downlink split 3

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 20dB Bandwidth.

99% BANDWIDTH

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02869	Agilent	E4440A	MY46186290	021207	021209
36" 40GHz cable	02945	Strolab	NA	NA	091807	091809

Test Conditions

The rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a remote power meter. For uplink configuration, 1900MHz Donor antenna port is connected to remote Power meter and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet switch.

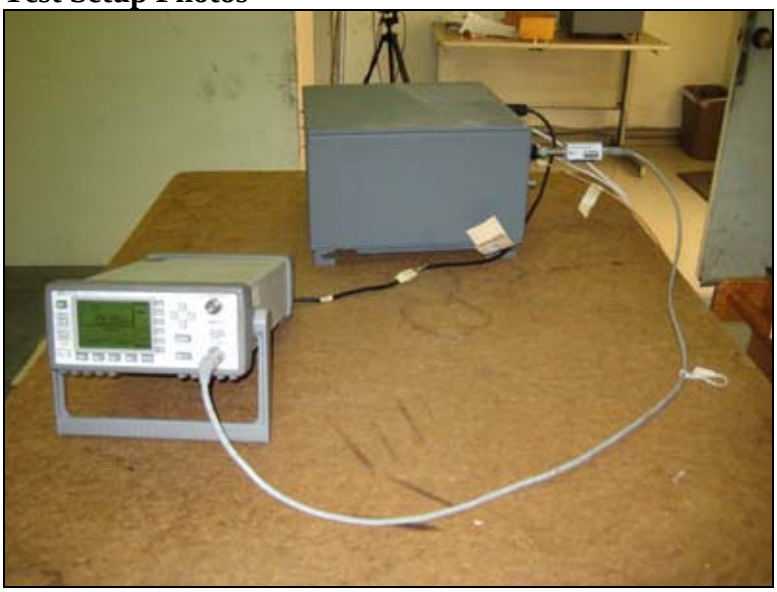
The 99% BW is measured at the RF antenna port under investigation using the occupied bandwidth measurement function of the spectrum analyzer.

Uplink: 1850 to 1910MHz
Downlink: 1930 to 1990MHz

Uplink
Modulation: EDGE, GSM, WCDMA
TX= 1850.5MHz, 1880MHz, 1909.5MHz
Power = 28dBm = 0.63W

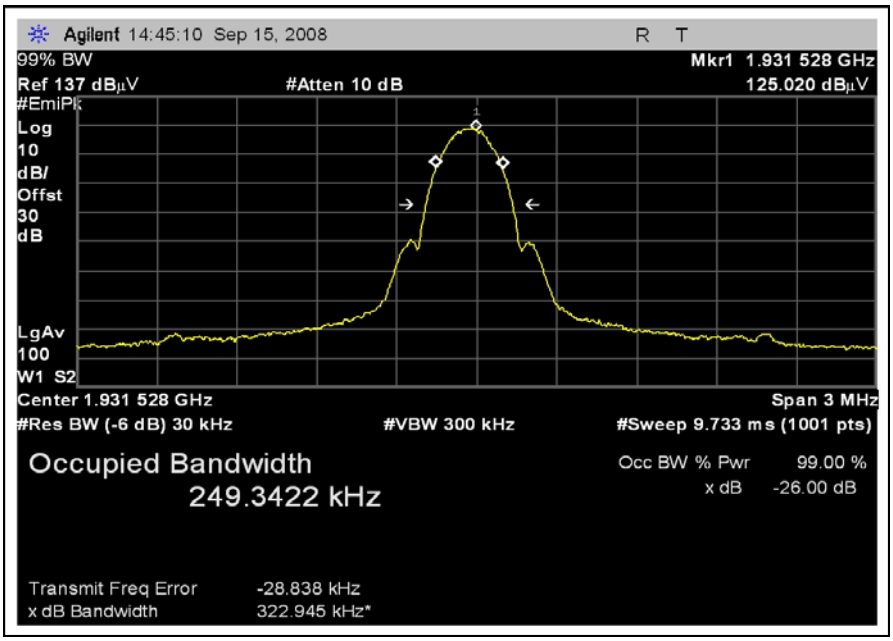
Downlink:
Modulation: EDGE, GSM, WCDMA
TX=1930.5MHz, 1960MHz, 1989.5MHz
Power = 28dBm = 0.63W

Test Setup Photos

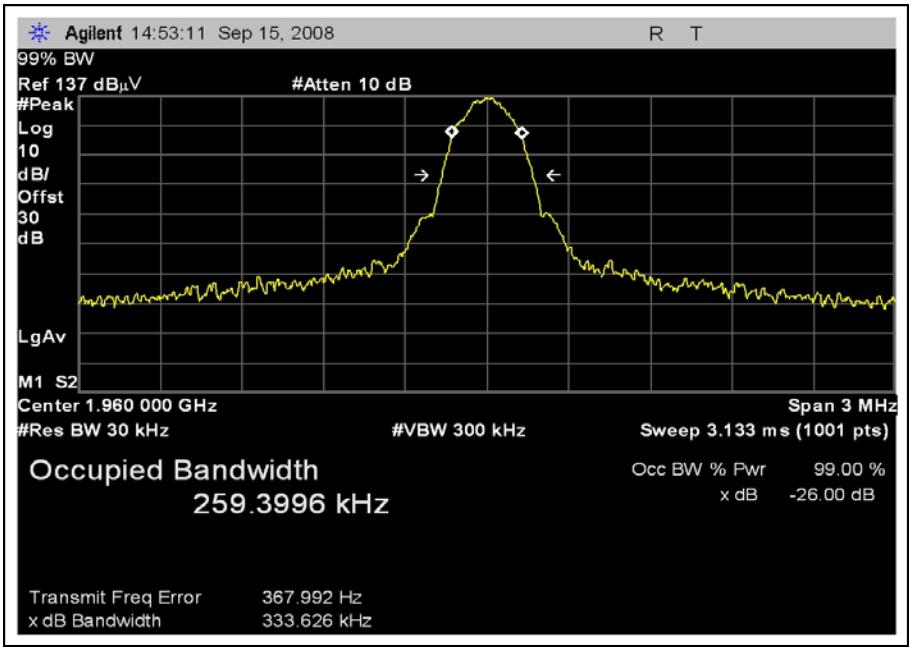


Test Plots

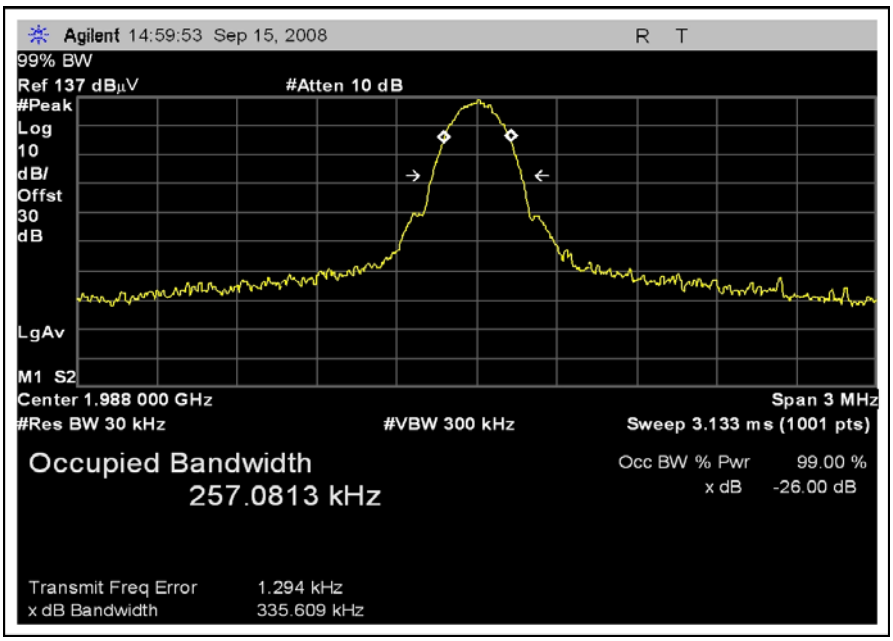
99% BANDWIDTH DOWNLINK - EDGE 1930MHz 249kHz



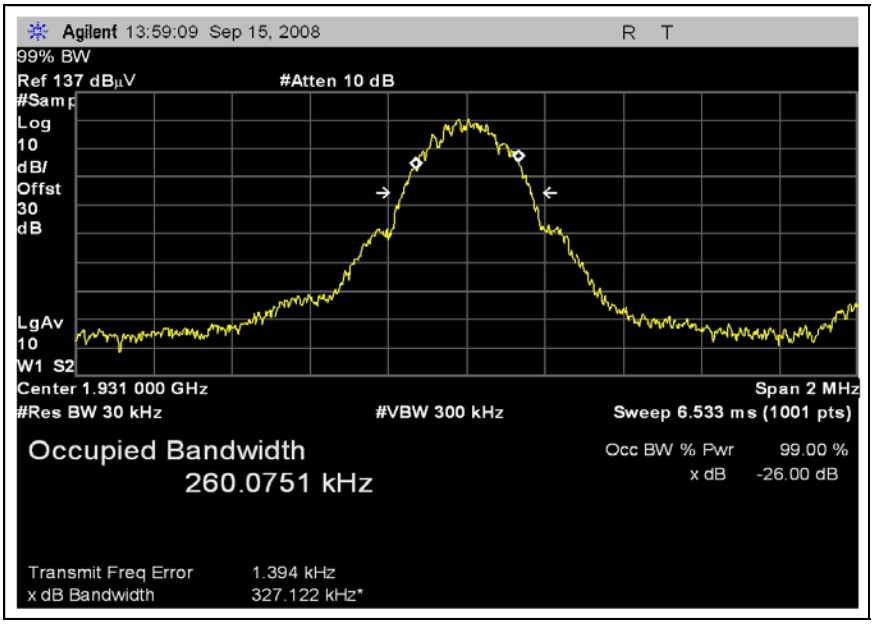
99% BANDWIDTH DOWNLINK - EDGE 1960MHz 259kHz



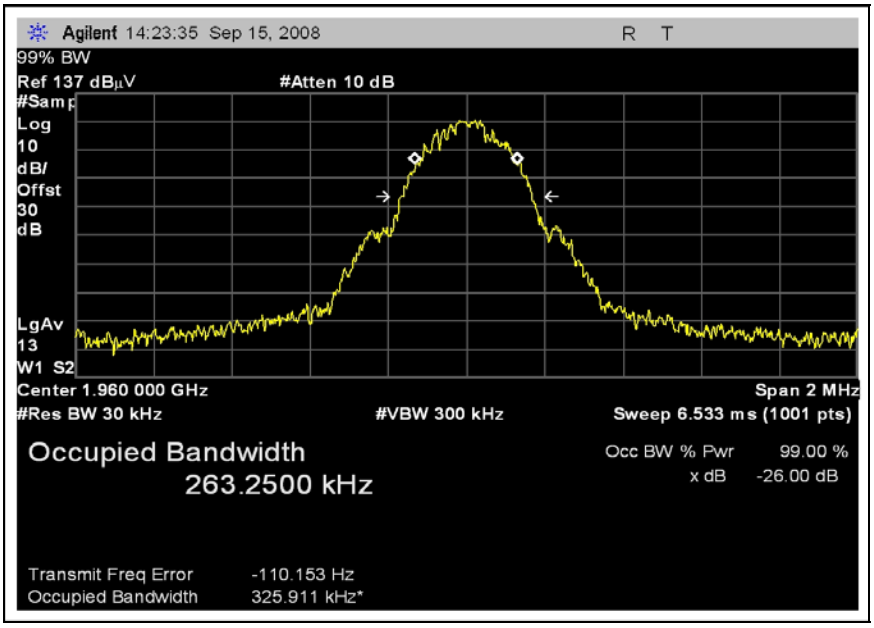
99% BANDWIDTH DOWNLINK - EDGE 1990MHz 257kHz



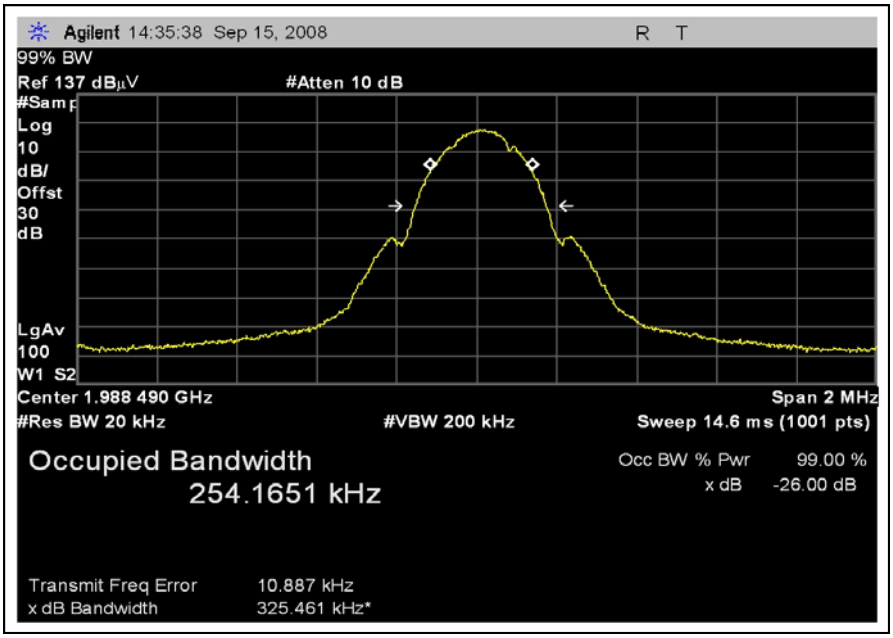
99% BANDWIDTH DOWNLINK - GSM 1930MHz 260kHz



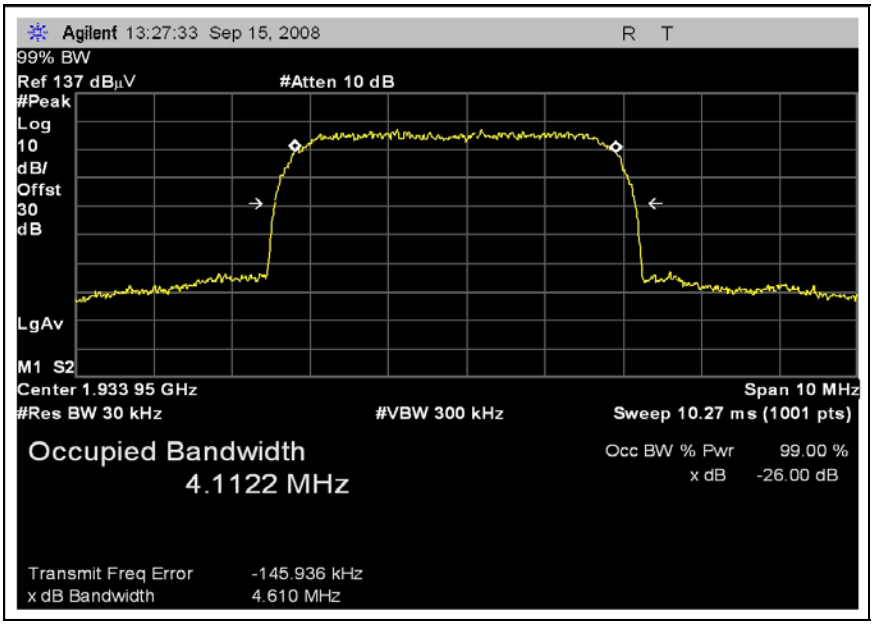
99% BANDWIDTH DOWNLINK - GSM 1960MHz 263kHz



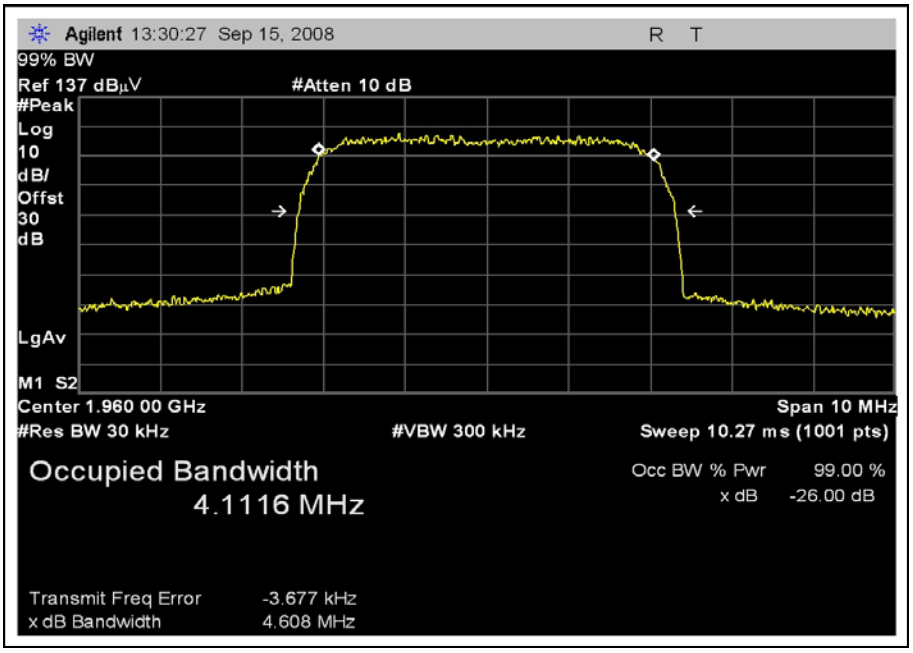
99% BANDWIDTH DOWNLINK - GSM 1990MHz 254kHz



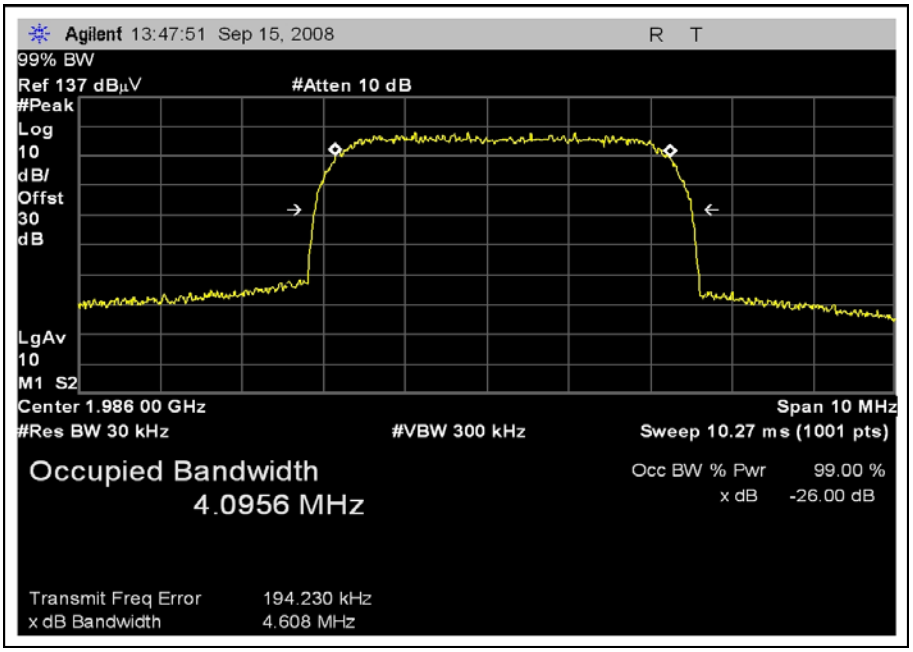
99% BANDWIDTH DOWNLINK - WCDMA 1930MHz 4.1MHz



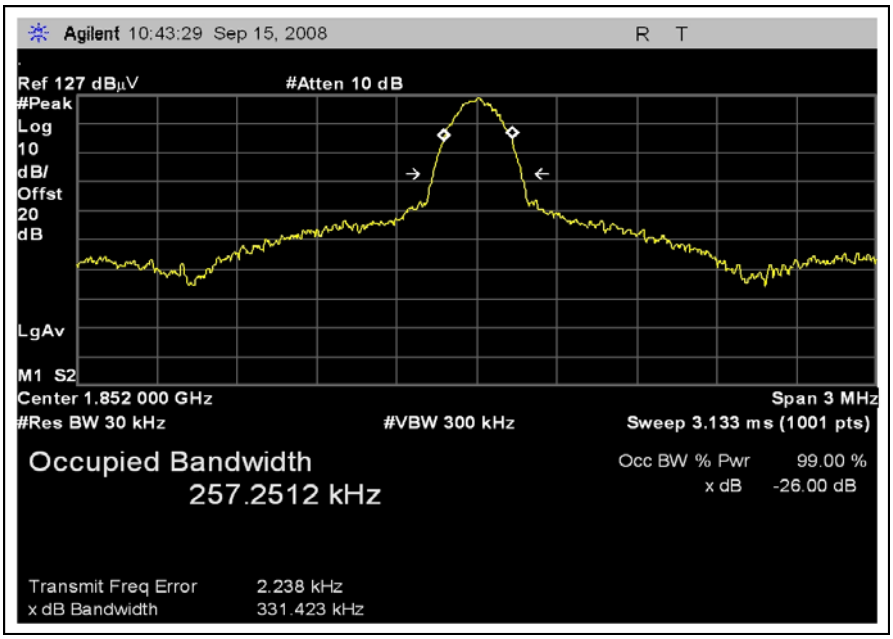
99% BANDWIDTH DOWNLINK - WCDMA 1960MHz 4.1MHz



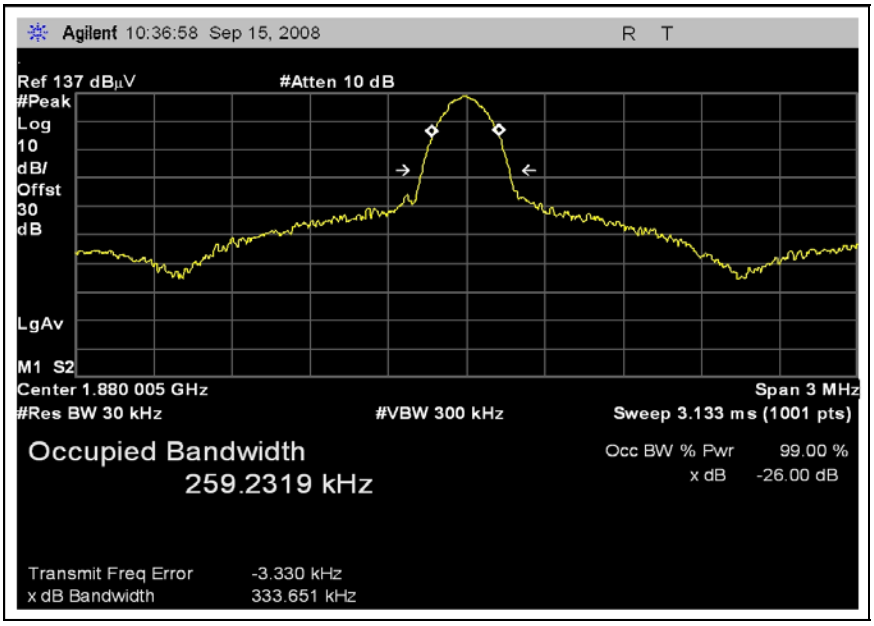
99% BANDWIDTH DOWNLINK - WCDMA 1990MHz 4.1MHz



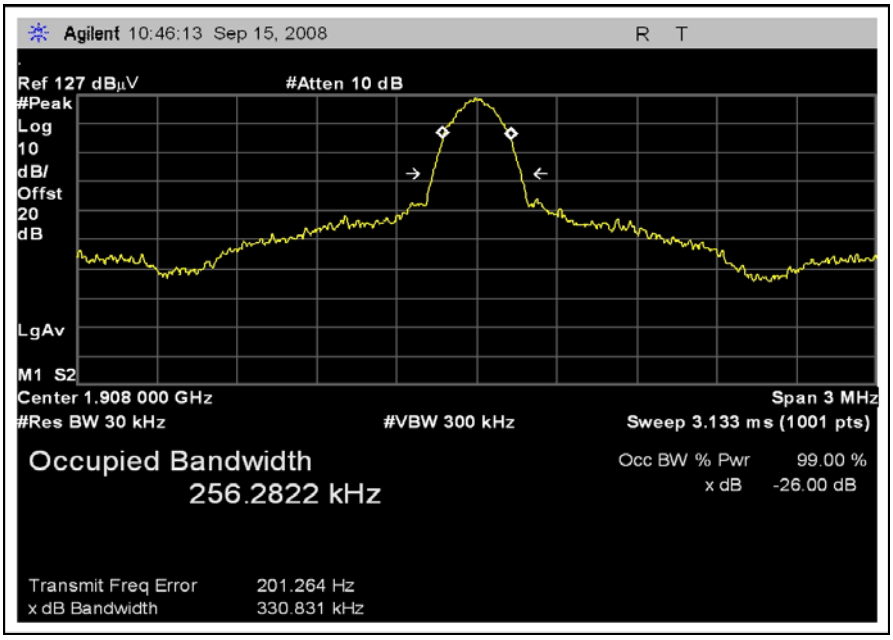
99% BANDWIDTH UPLINK - EDGE 1850MHz 257kHz



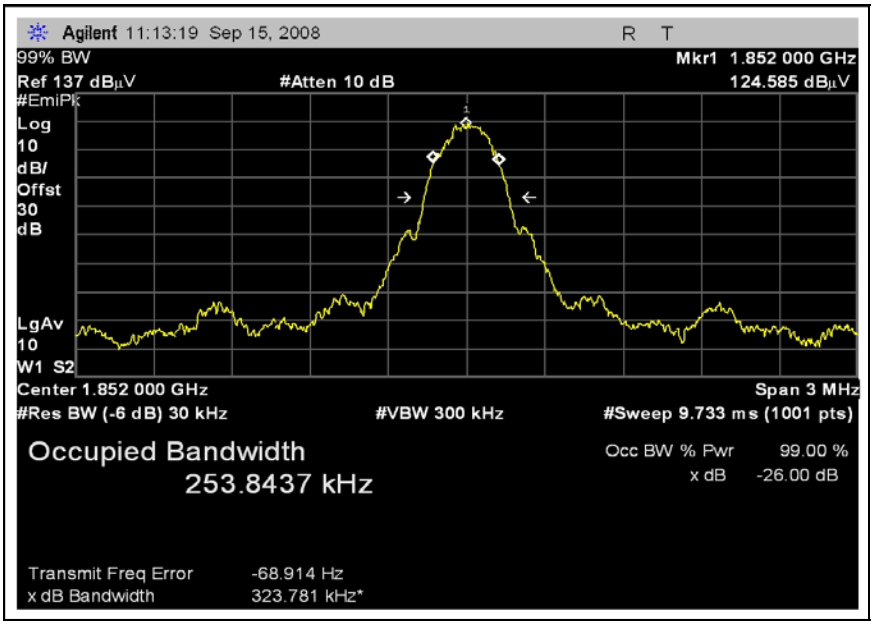
99% BANDWIDTH UPLINK - EDGE 1880MHz 259kHz



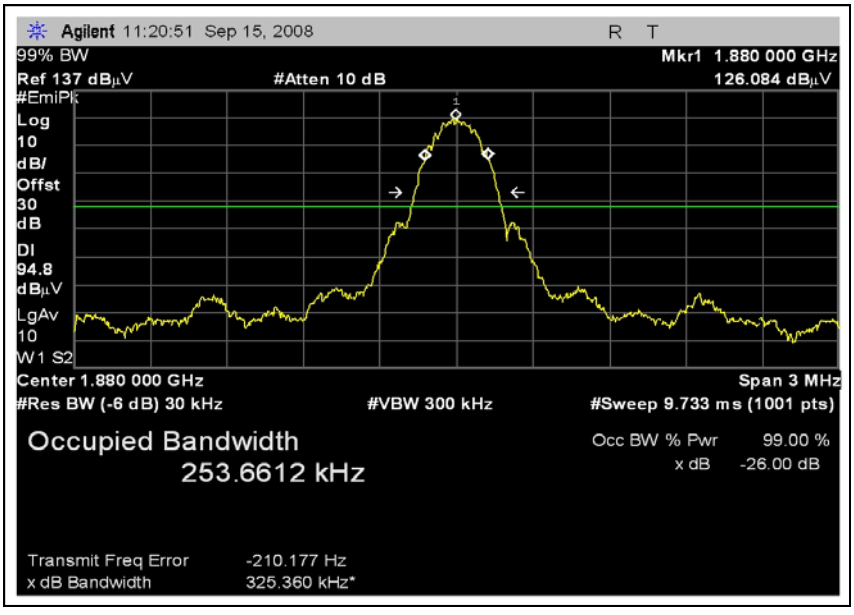
99% BANDWIDTH UPLINK - EDGE 1910MHz 256kHz



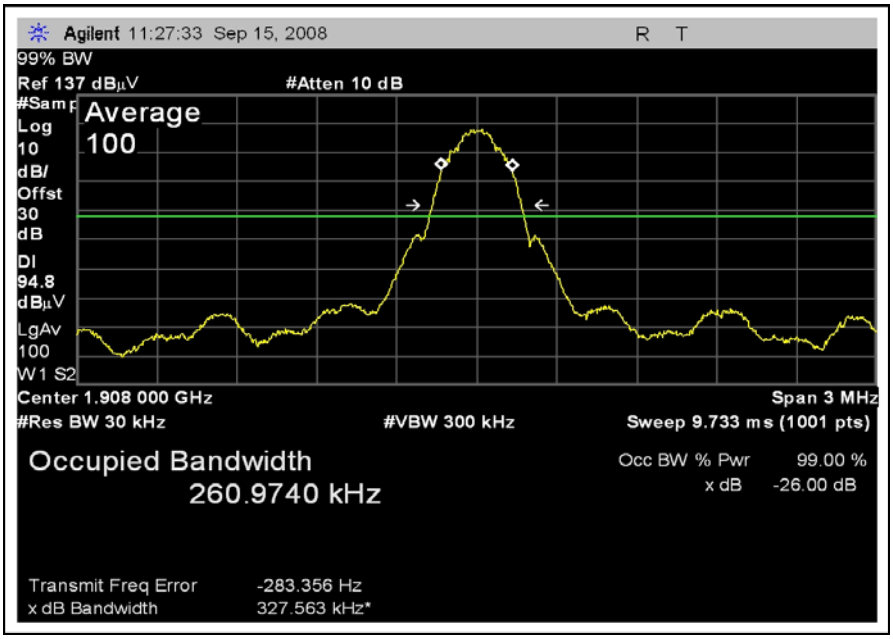
99% BANDWIDTH UPLINK - GSM 1850MHz 253kHz



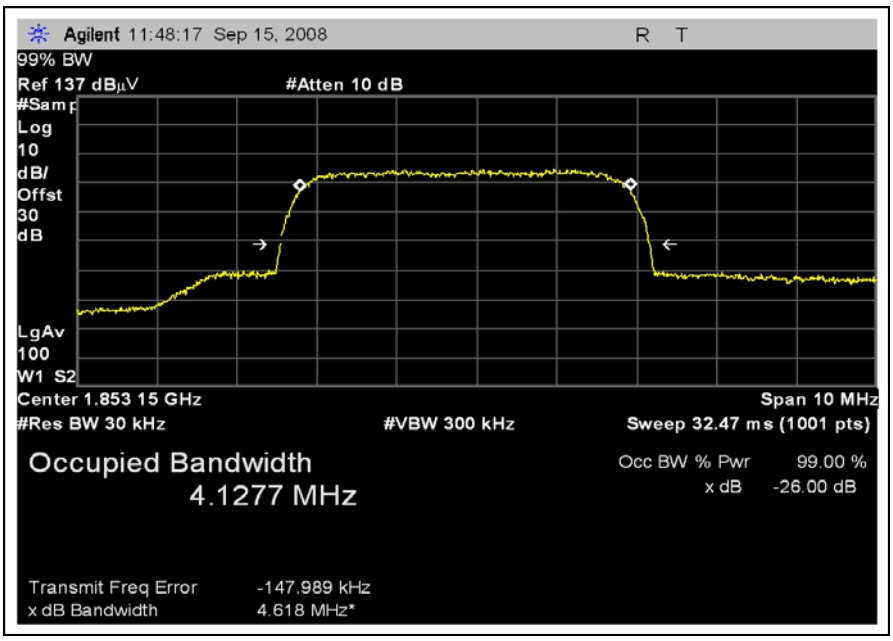
99% BANDWIDTH UPLINK - GSM 1880MHz 253kHz



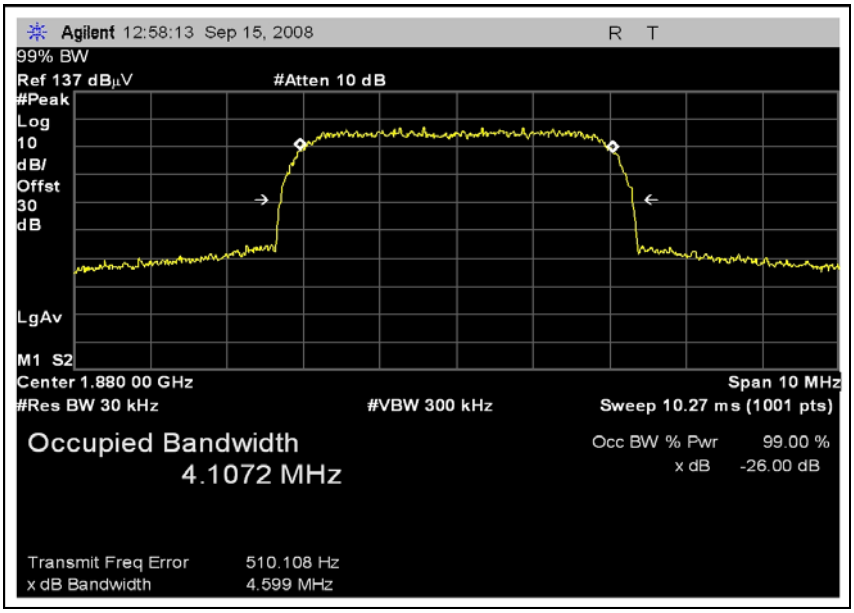
99% BANDWIDTH UPLINK - GSM 1910MHz 261kHz



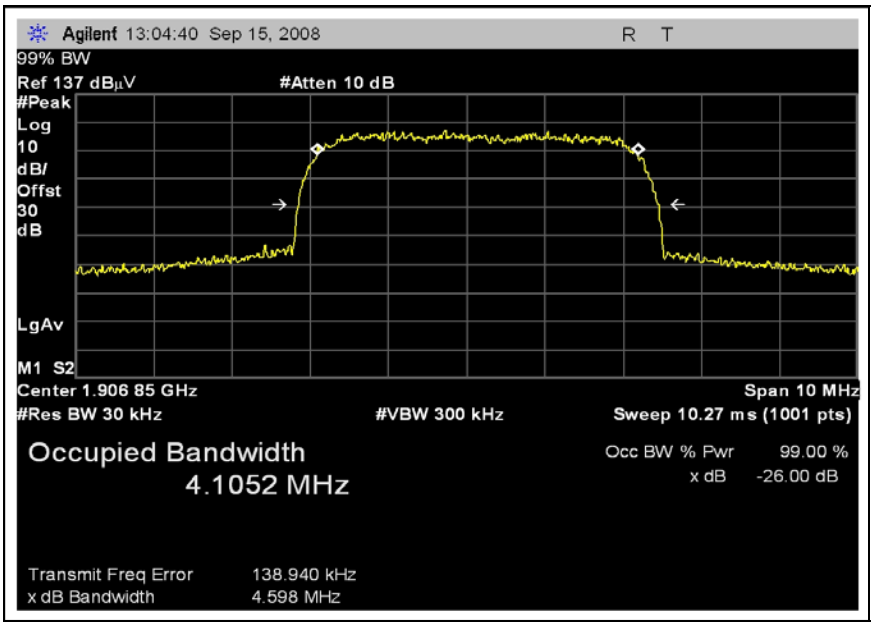
99% BANDWIDTH UPLINK - WCDMA 1850MHz 4.1MHz



99% BANDWIDTH UPLINK - WCDMA 1880MHz 4.1MHz



99% BANDWIDTH UPLINK - WCDMA 1910MHz 4.1MHz



PASSBAND GAIN AND BANDWIDTH

Test Equipment

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

Test Conditions

The rack mount EUT is placed on the wooden table. For downlink configuration, 1900MHz Donor antenna port is connected to remote ESG and 1900MHz Server antenna port is connected to a remote power meter. For uplink configuration, 1900MHz Donor antenna port is connected to remote Power meter and 1900MHz Server antenna port is connected to an ESG. The Ethernet port: Local is connected to a remote support laptop ethernet port; WAN is connected to a remote support ethernet switch

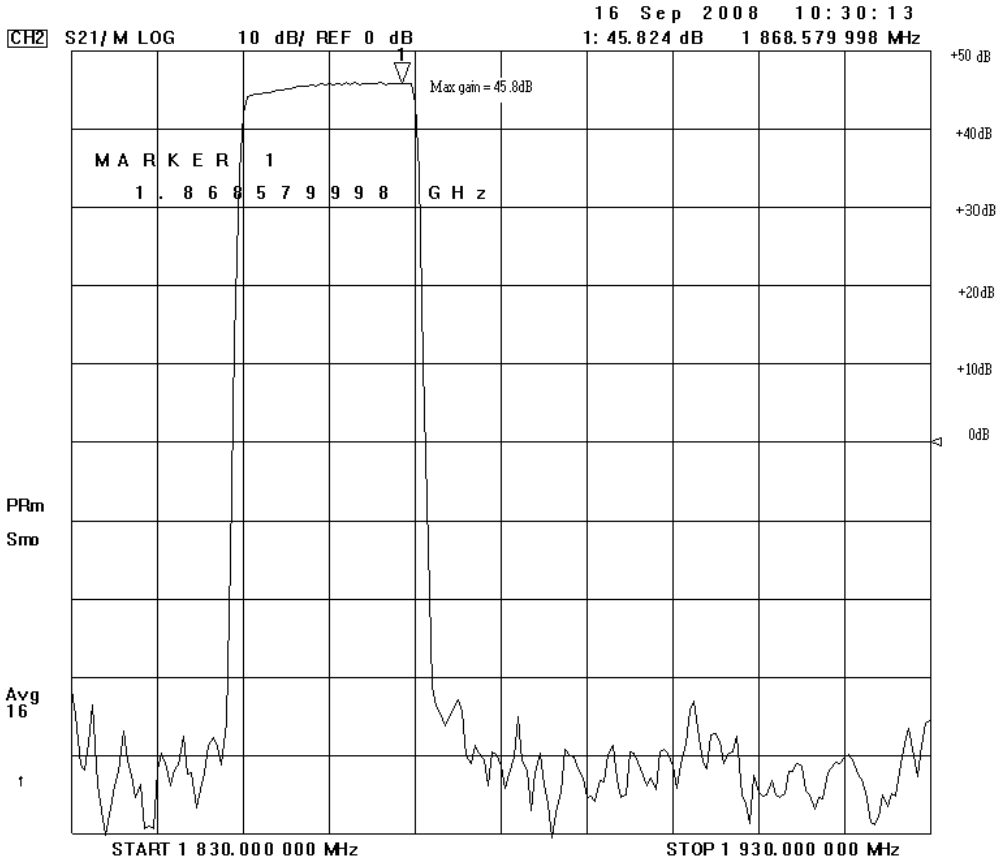
Uplink: 1850 to 1910MHz
Downlink: 1930 to 1990MHz

The gain response is measured with a network analyzer in the uplink and down link direction. The total operating band was split into three bands due to the internal programmable block filter.

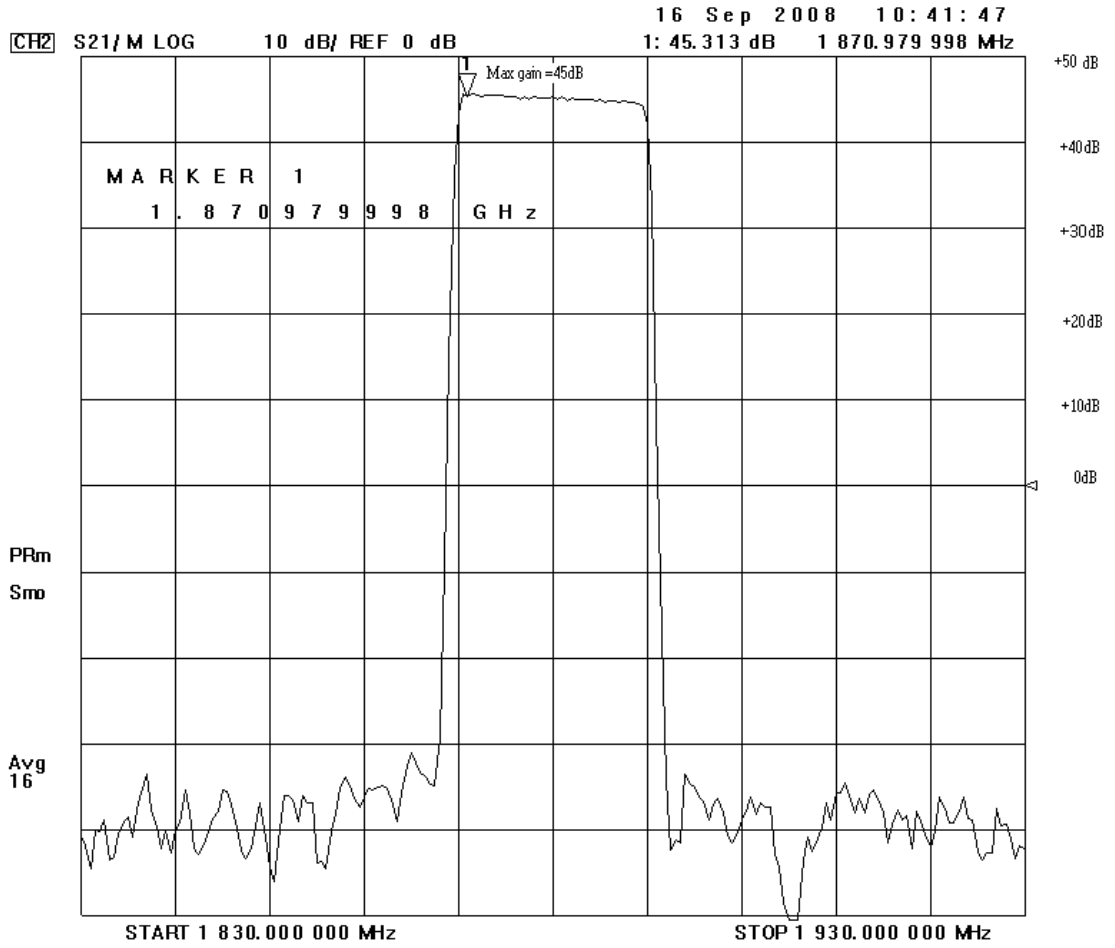
The nominal bandwidth and nominal pass band gain (dB) of the RF enhancer or translator shall be stated by the manufacturer or equipment certification applicant and indicated in the test report.

Test Setup Photos

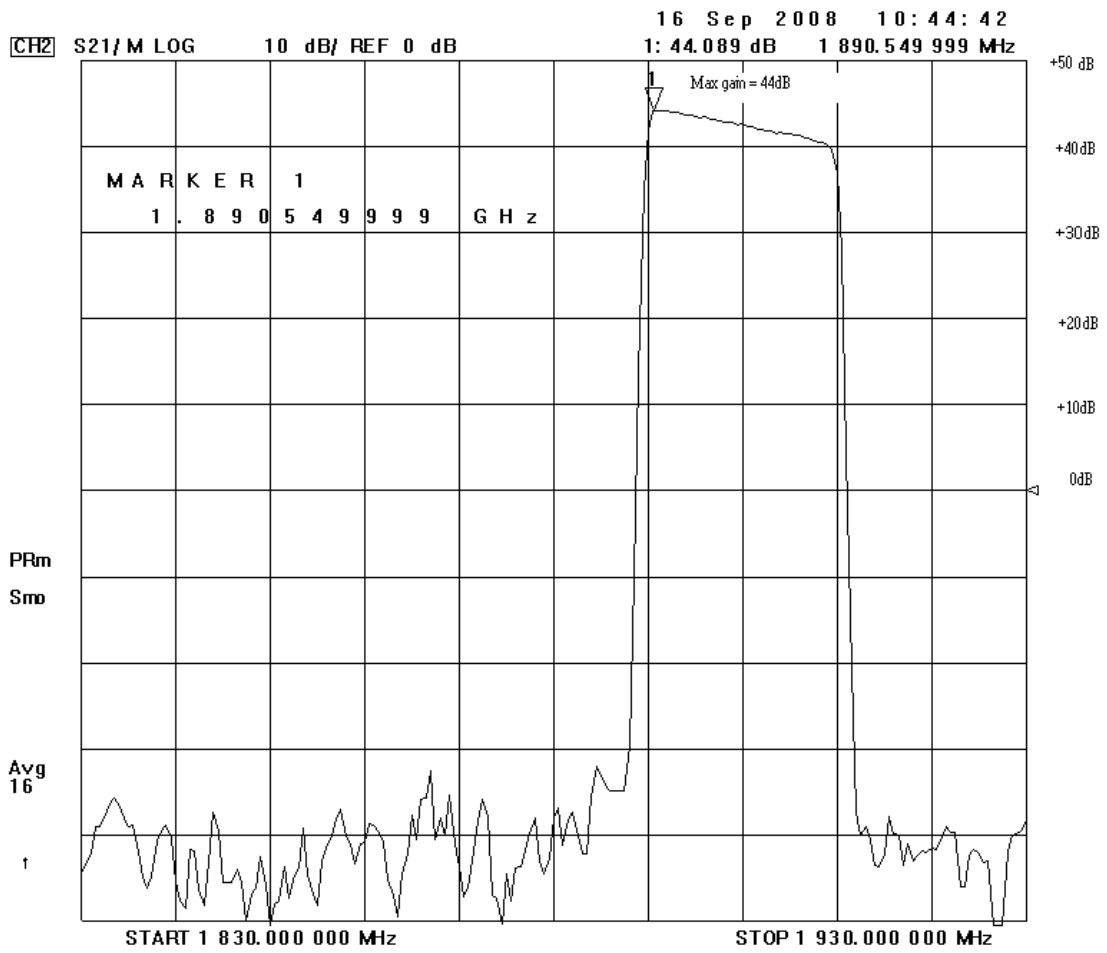
Test Plots



Uplink band 1

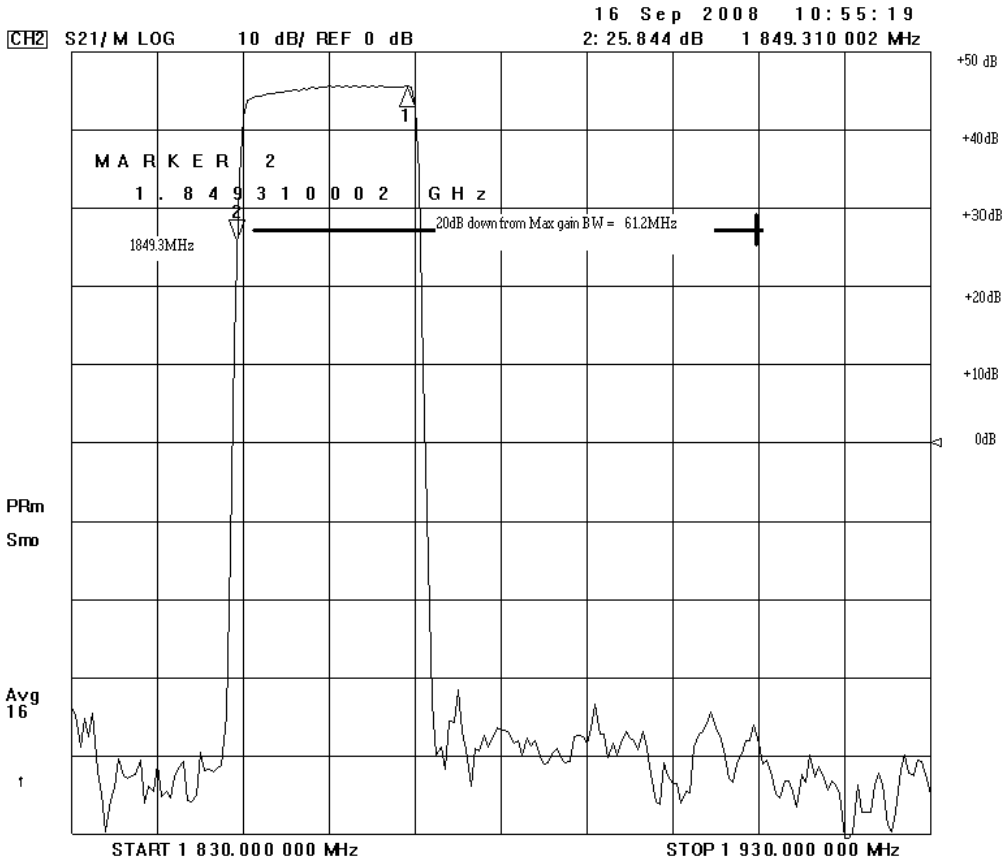


Uplink band 2

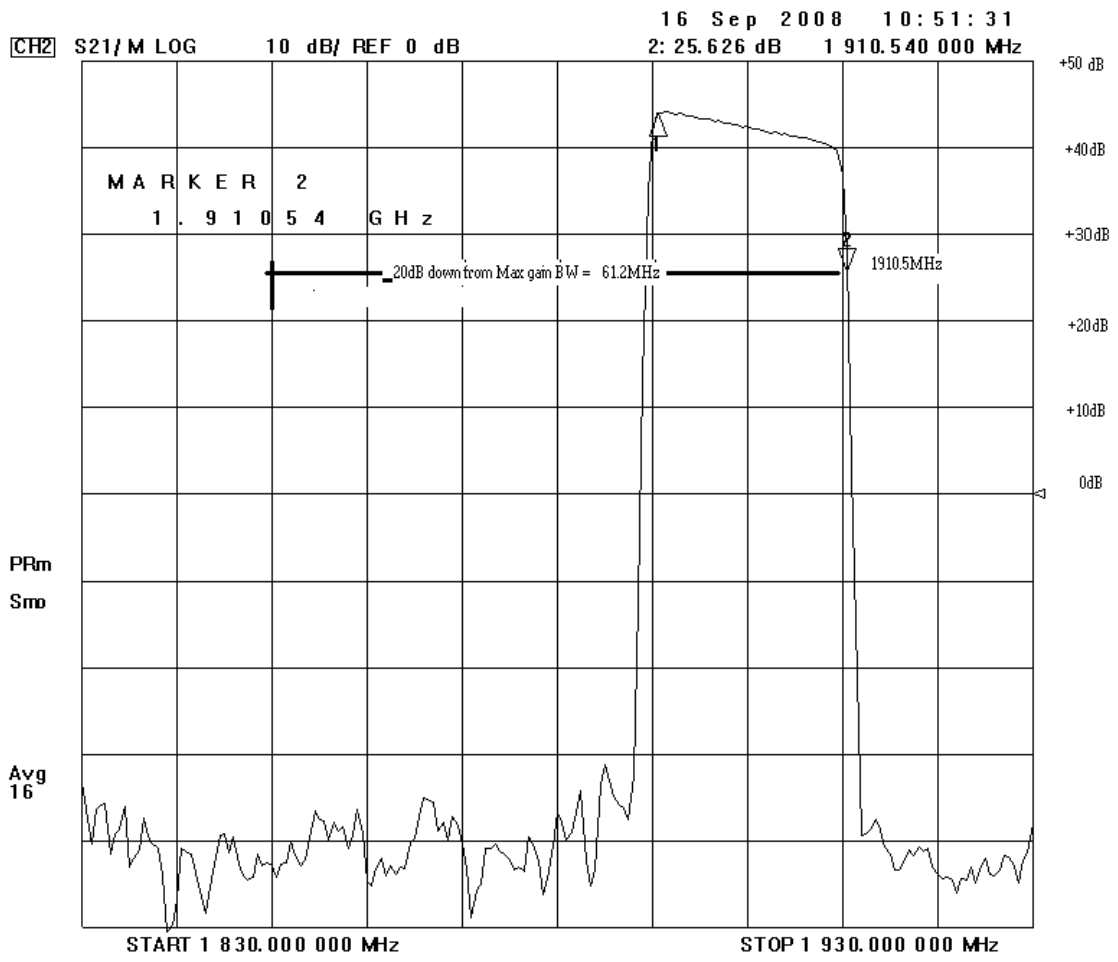


Uplink band 3

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

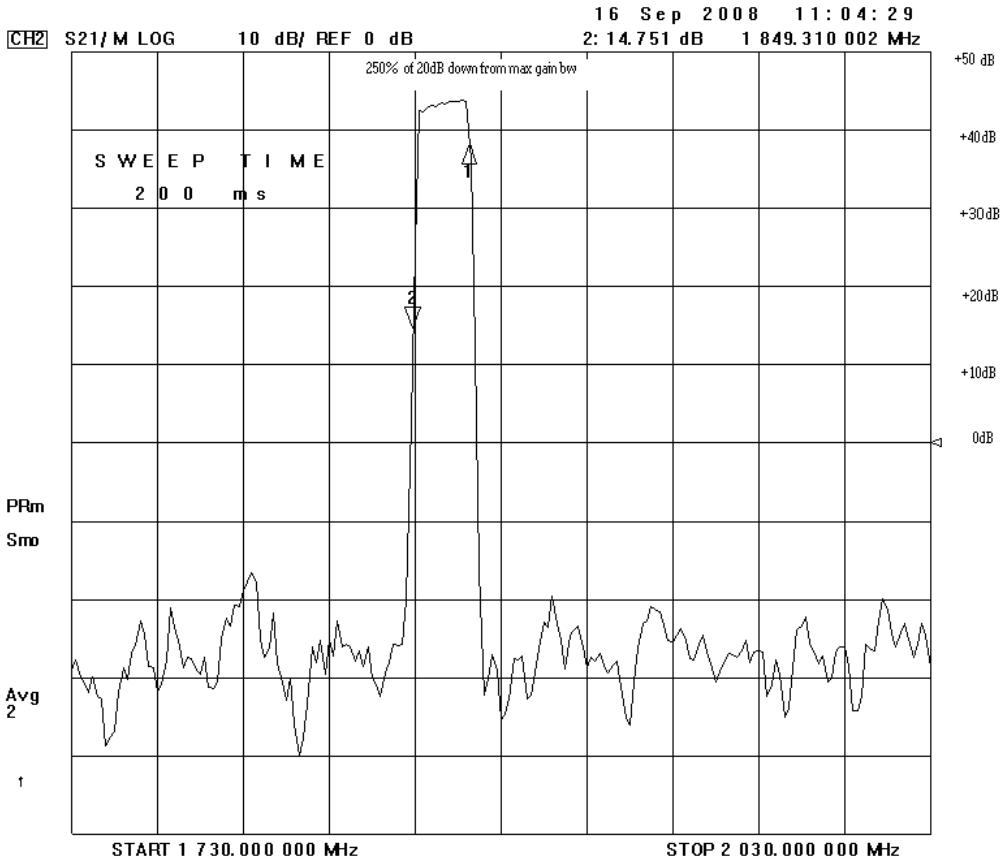


Up link Split 1

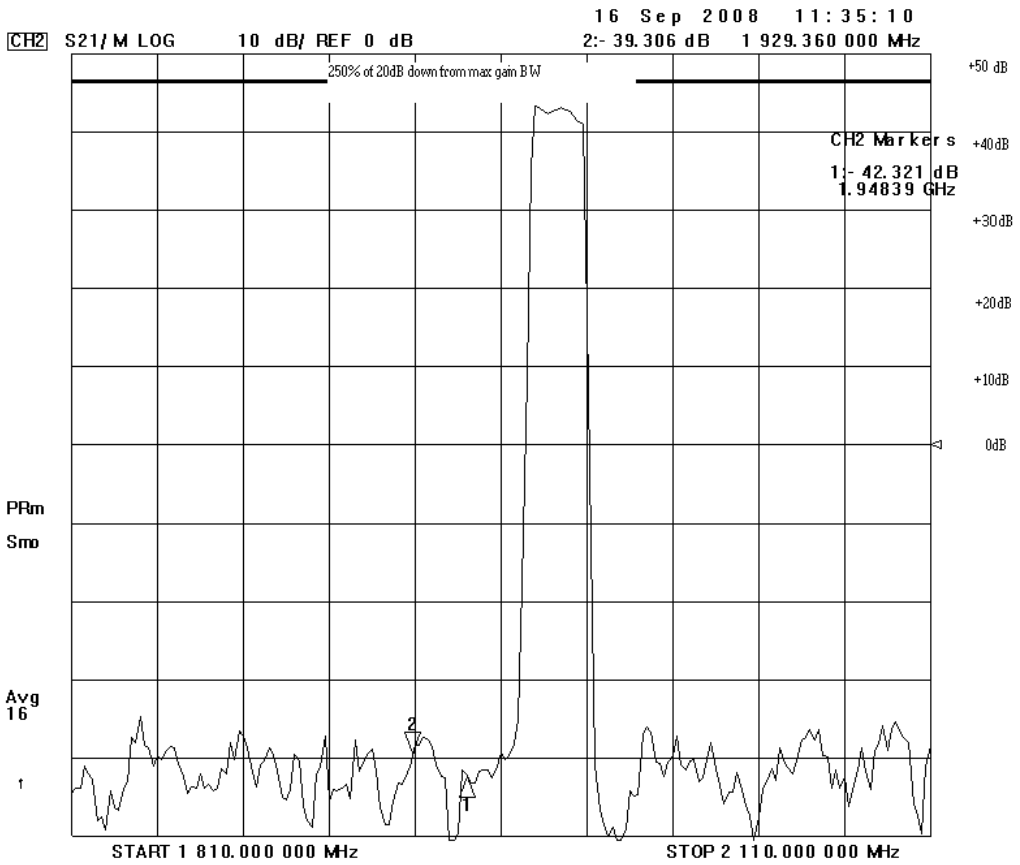


Uplink Split 3

With the aid of a network analyzer, the 20 dB Bandwidth is measured.



Uplink split 1



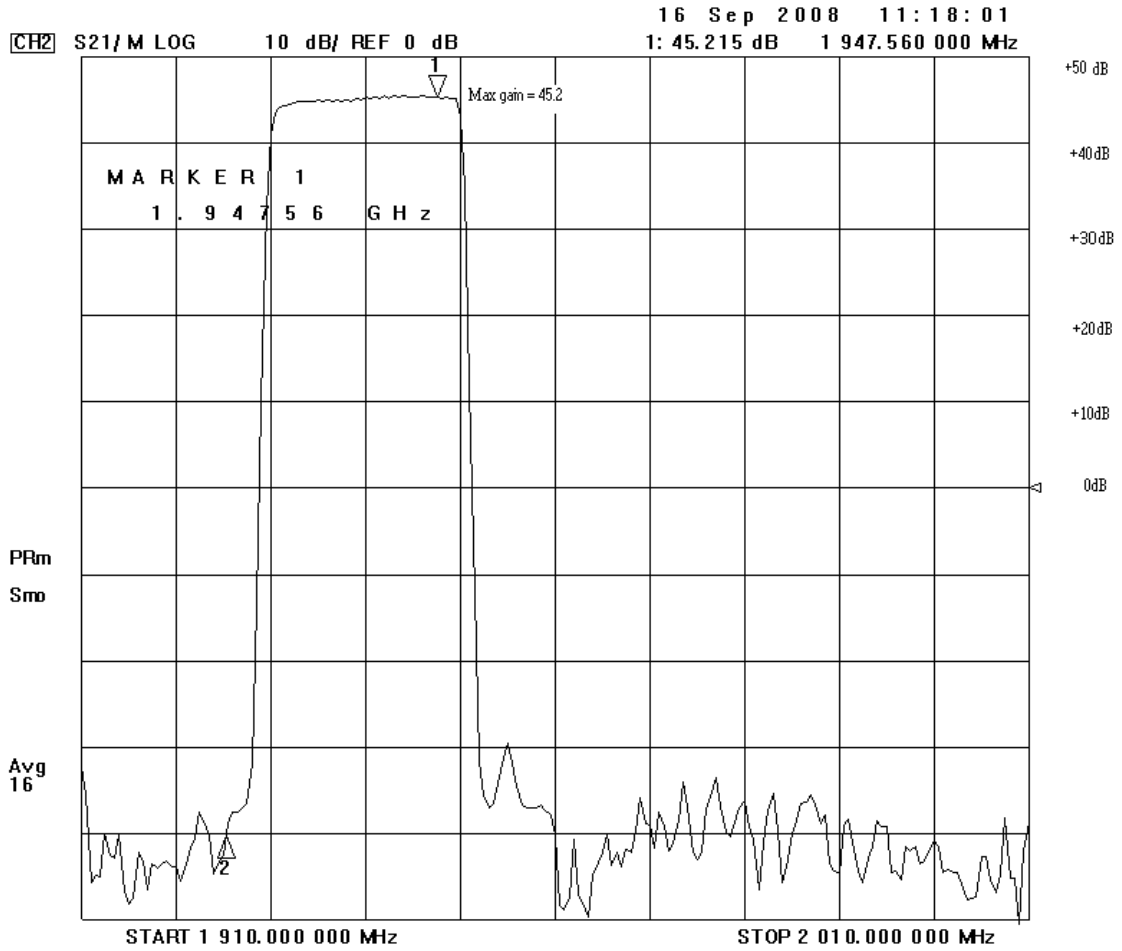
Uplink split3

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 20dB Bandwidth.

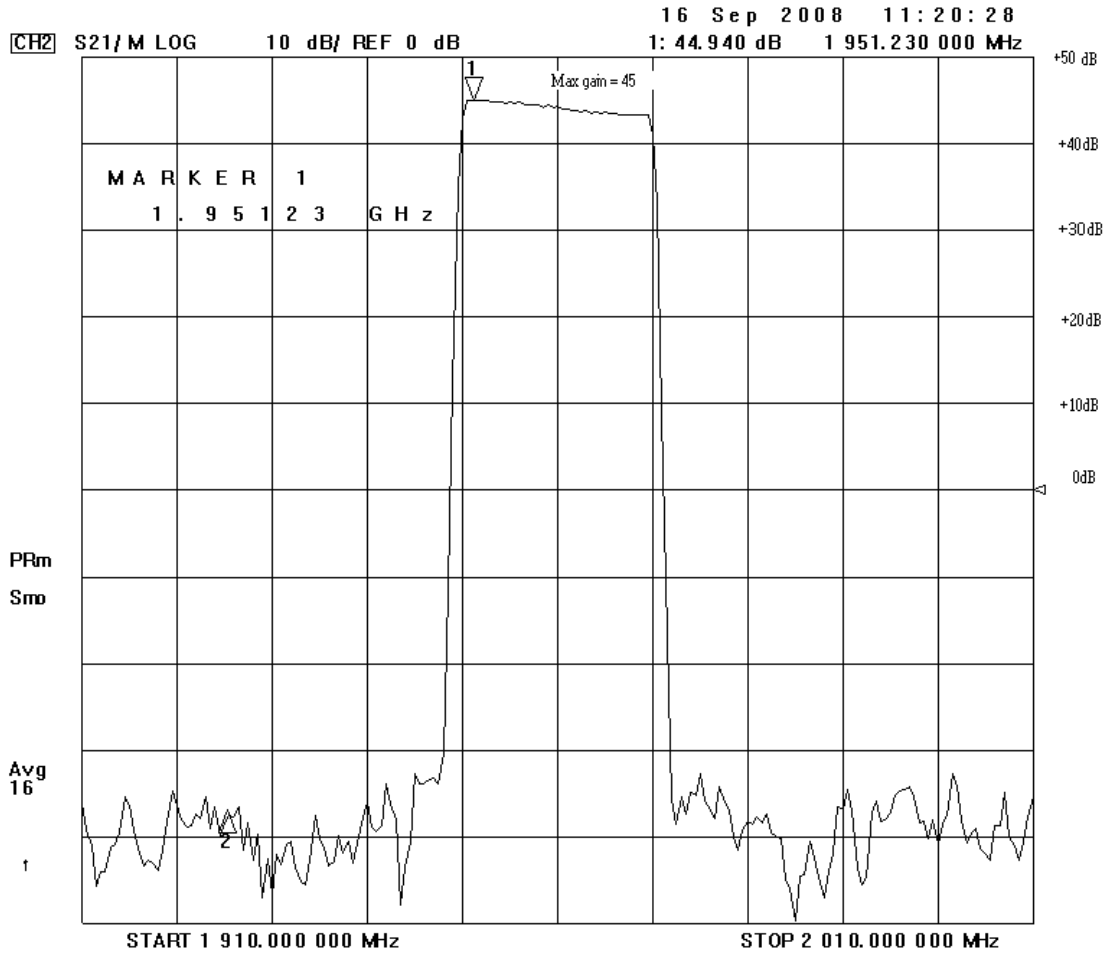
Minimum standard:
The pass band gain response shall not exceed the nominal gain by more than 1 dB. The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer.

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

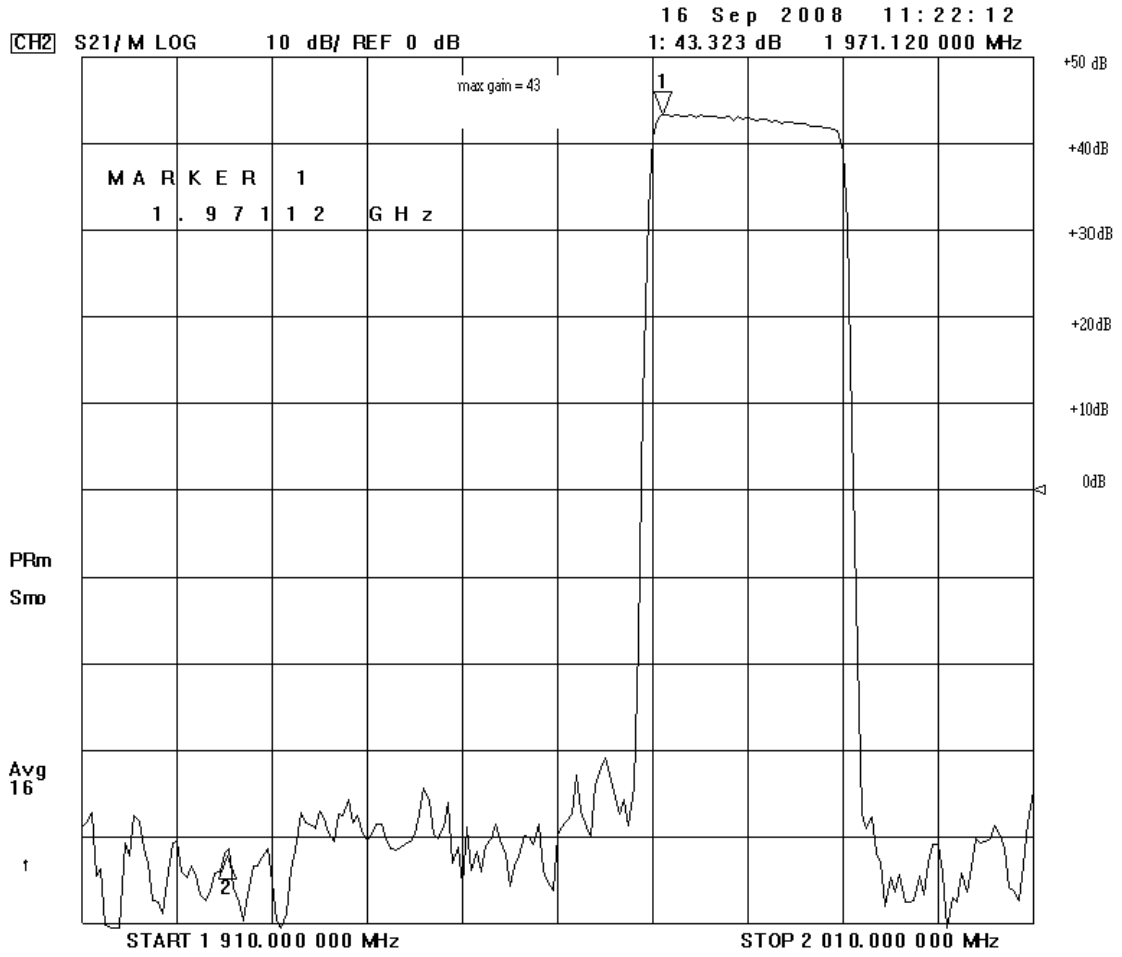
RSS 131 Amplifier gain and Bandwidth:



Downlink split 1

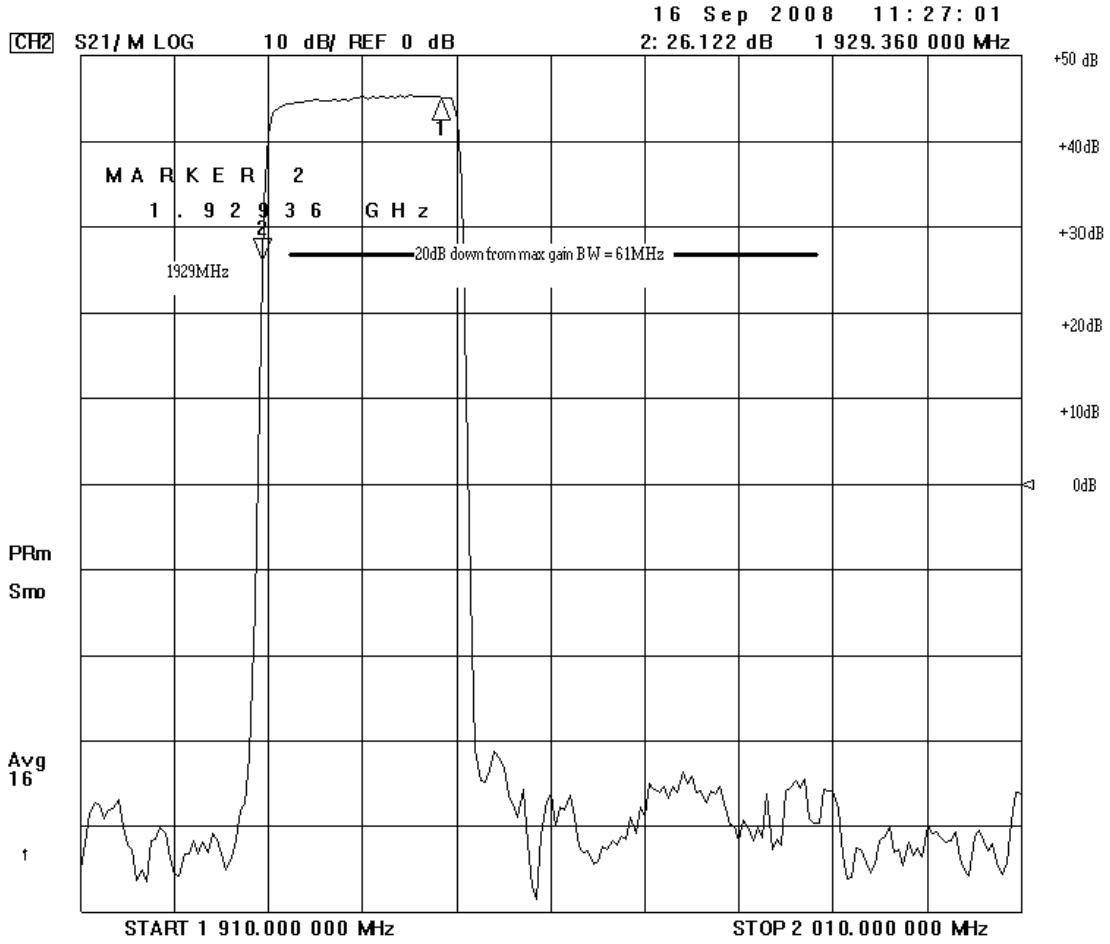


Downlink split 2

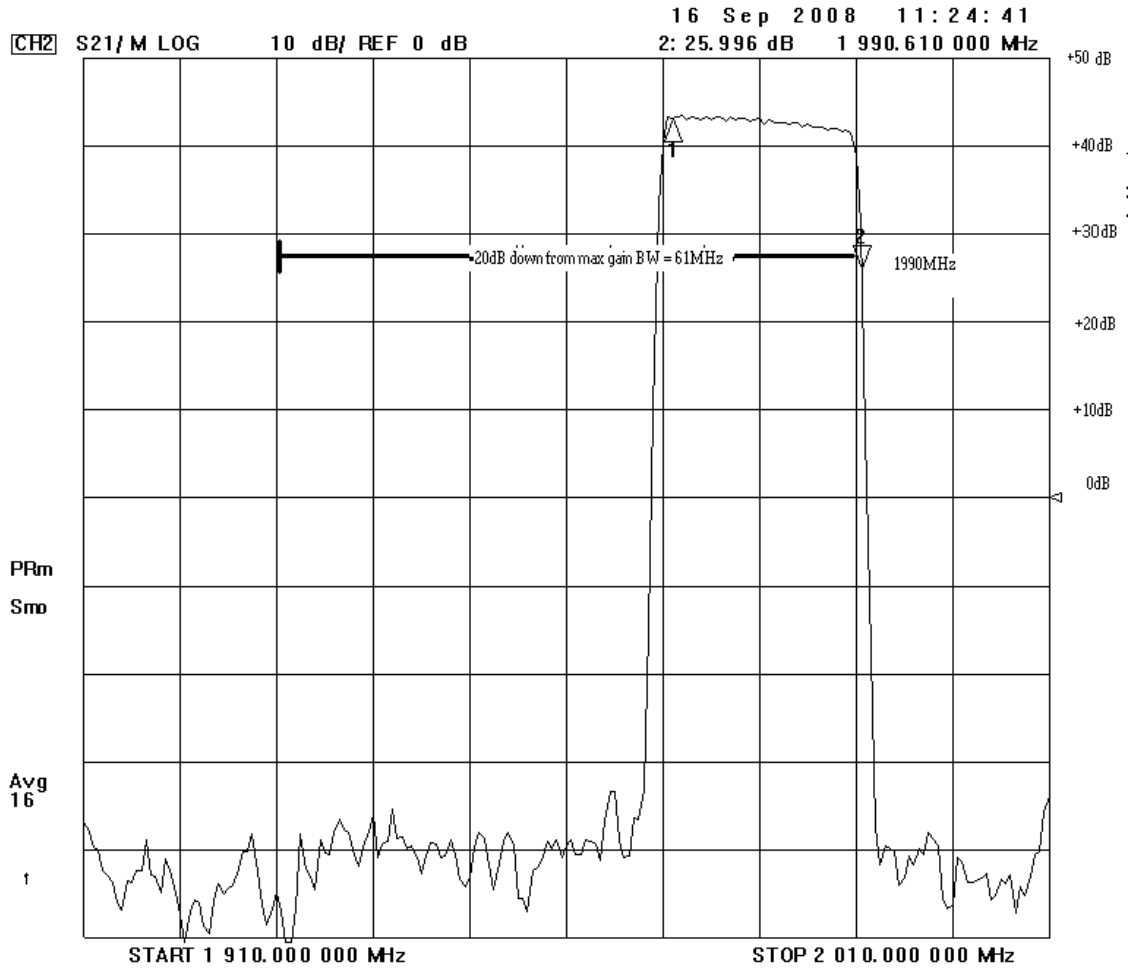


Downlink split 3

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



Downlink split 1



Downlink split 3

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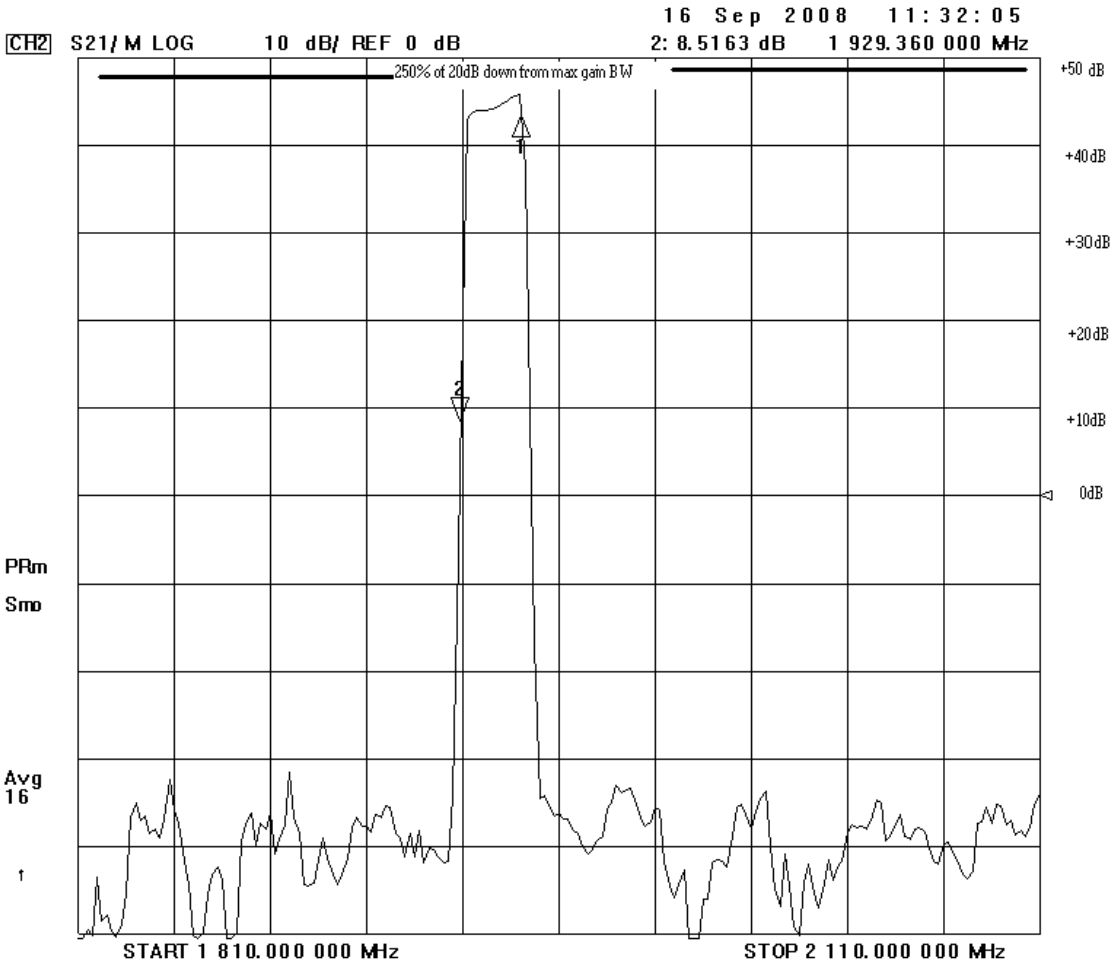
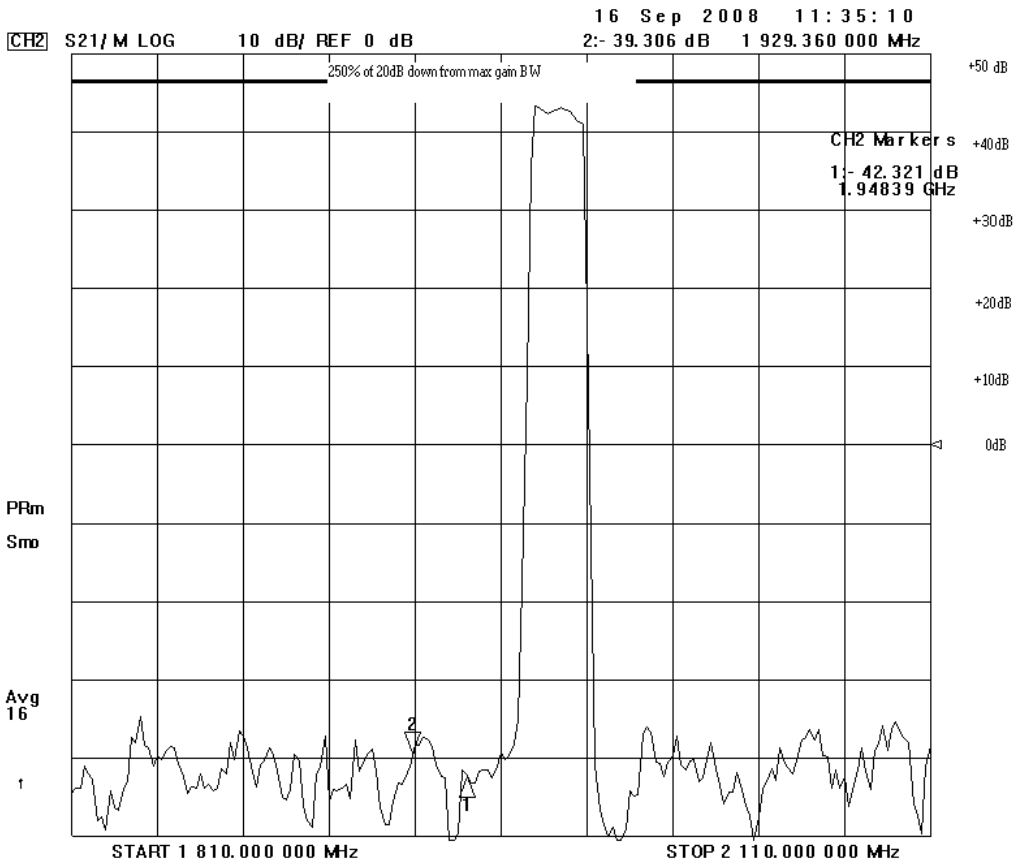


Downlink split 1



Downlink split 3

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