

TELCOSAT INC. TEST REPORT FOR THE RPT 1900 REPEATER,

FCC PART 24 SUBPART E

FEBRUARY 2010

Report No.: FCC 110709-RPT1900

Table of Contents

TEST EUT DESCRIPTION	5
SUMMARY OF RESULTS.....	6
CONDITIONS DURING TESTING	6
EQUIPMENT UNDER TEST (EUT) DESCRIPTION	7
EQUIPMENT UNDER TEST	7
LIST OF TEST EQUIPMENT USED DURING TESTING.....	7
TEMPERATURE AND HUMIDITY DURING TESTING	8
FCC 2.1033(c)(3) USER'S MANUAL	8
FCC 2.1033 (c)(4) TYPE OF EMISSIONS.....	8
FCC 2.1033 (c)(5) FREQUENCY RANGE	8
FCC 2.1033 (c)(6) OPERATING POWER.....	8
FCC 2.1033 (c)(7) MAXIMUM POWER RATING	8
FCC 2.1033 (c)(8) DC VOLTAGES	8
FCC 2.1033 (c)(9) TUNE-UP PROCEDURE	8
FCC 2.1033(c)(10) SCHEMATICS AND CIRCUITRY DESCRIPTION	8
FCC 2.1033(c)(11) LABEL AND PLACEMENT	8
FCC 2.1033(c)(12) SUBMITTAL PHOTOS.....	8
FCC 2.1033 (c)(13) MODULATION INFORMATION	8
FCC 2.1046 / 24.232(a) - RF POWER OUTPUT.....	10
Test Setup	10
Test Equipment	10
Test Conditions	10
Test Data	11
FCC 2.1049(i)- INPUT/OUTPUT PLOTS	12
Test Setup	12
Test Equipment	12
Test Conditions	12
Test Plots.....	13
FCC 24.238 (a) Conducted Spurious Emission	47

FCCID UDIRPT1900	
Test Setup	47
Test Equipment	47
Test Conditions	47
Test Setup Measuring Spurious up to 20 Gigahertz	48
DOWNLINK - EDGE 1930MHz.....	50
START 30MHz STOP 1 GHz	50
DOWNLINK - EDGE 1930MHz.....	50
DOWNLINK - EDGE 1930MHz.....	51
START 2 GHz STOP 20 GHz	51
DOWNLINK - EDGE 1990MHz START 30MHz STOP 1 GHz	51
DOWNLINK - GSM 1990MHz START 30MHz STOP 1 GHz	52
DOWNLINK - GSM 1930MHz.....	53
DOWNLINK - GSM 1930MHz START 30MHz STOP 1 GHz	54
DOWNLINK - GSM 1930MHz START 1 GHz STOP 2 GHz	54
DOWNLINK - GSM 1930MHz START 2 GHz STOP 20 GHz	55
DOWNLINK - GSM 1990MHz.....	55
DOWNLINK - GSM 1990MHz START 30 MHz STOP 1 GHz.....	56
DOWNLINK - GSM 1990MHz START 1 GHz STOP 2 GHz	56
DOWNLINK - GSM 1990MHz START 2 GHz STOP 20 GHz.....	57
DOWNLINK - WCDMA 1930MHz.....	57
DOWNLINK - WCDMA 1990MHz.....	59
DOWNLINK - WCDMA 1990MHz START 30 MHz STOP 1 GHz.	60
DOWNLINK - WCDMA 1990MHz START 1 GHz STOP 2GHz	60
DOWNLINK - WCDMA 1990MHz START 2 GHz STOP 20GHz	61
UPLINK - EDGE 1850MHz	61
UPLINK - EDGE 1910MHz	63
UPLINK - GSM 1850MHz	65
UPLINK - GSM 1850MHz START 30 MHz STOP 1 GHz.....	66
UPLINK - GSM 1850MHz START 1 GHz STOP 2 GHz	66
UPLINK - GSM 1850MHz START 2 GHz STOP 20 GHz	67
UPLINK - GSM 1910MHz	67
UPLINK - WCDMA 1850MHz	69

FCCID UDIRPT1900	
UPLINK - WCDMA 1910MHz	71
99% BANDWIDTH	73
Test Setup	73
Test Equipment	73
Test Conditions	73
Test Plots.....	74
99% BANDWIDTH DOWNLINK - EDGE 1930MHz	74
99% BANDWIDTH DOWNLINK - EDGE 1960MHz	75
99% BANDWIDTH DOWNLINK - EDGE 1990MHz	75
99% BANDWIDTH DOWNLINK - GSM 1930MHz	76
99% BANDWIDTH DOWNLINK - GSM 1960MHz	76
99% BANDWIDTH DOWNLINK - GSM 1990MHz	77
99% BANDWIDTH DOWNLINK - WCDMA 1930MHz	77
99% BANDWIDTH DOWNLINK - WCDMA 1960MHz	78
99% BANDWIDTH DOWNLINK - WCDMA 1990MHz	78
99% BANDWIDTH UPLINK - EDGE 1850MHz.....	79
99% BANDWIDTH UPLINK - EDGE 1880MHz.....	79
99% BANDWIDTH UPLINK - EDGE 1910MHz.....	80
99% BANDWIDTH UPLINK - GSM 1850MHz.....	80
99% BANDWIDTH UPLINK - GSM 1880MHz.....	81
99% BANDWIDTH UPLINK - GSM 1910MHz.....	81
99% BANDWIDTH UPLINK - WCDMA 1850MHz.....	82
99% BANDWIDTH UPLINK - WCDMA 1880MHz.....	82
99% BANDWIDTH UPLINK - WCDMA 1910MHz.....	83
PASSBAND GAIN AND BANDWIDTH.....	84
Test Setup	84
Test Equipment	84
Test Conditions	84
Test Plots.....	85
PASSBAND GAIN UPLINK	85
PASSBAND GAIN DOWNLINK	86
Appendix A: Block Diagram of Test Setup.....	87

TEST EUT DESCRIPTION

Description of EUT

	Name	Model	Revision	Serial Number
EUT	RPT1900	RPT1900		000001

Classification Cellular Repeater (Base Station)

Frequency Range Uplink 1850-1910 MHz
Downlink 1930-1990 MHz

Transmitter Duty cycle 100%

Operating Temperature -40°C to +50°C

Output power 32.80 dBm –PeakPower

Functional Description Cellular Repeater

SUMMARY OF RESULTS

Test	Specification	Results
RF Power Output	FCC 2.1046 / 24.232(a) 32.7dBm PEAK POWER	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
Occupied Bandwidth	FCC 2.1049	Pass

CONDITIONS DURING TESTING

No modifications to the Equipment Under Test (EUT) were necessary during testing.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The Telcosat RPT1900 Repeater increases the coverage and capacity of existing cellular 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 the 1900MHz operating band.

The Telcosat RPT 1900 Repeater also provides optional software selectable narrow band IF filter (10 Megahertz) and programmable PLL for center frequency adjustment. This is a factory adjustment or through an authorized service center. Adjustments cannot be completed by the end user without the factory software. Factory software not supplied to the end user. Band Width and Frequency adjustment performed only by the manufacturer or authorized service center.

The following model has been tested: Model Number RPT1900, Serial number 000001.

EQUIPMENT UNDER TEST**Telcosat RPT1900 Repeater**

Manufacturer: Telcosat Inc. **Model:** RPT 1900 **Serial:** 000001

FCC ID: UDIRPT1900

LIST OF TEST EQUIPMENT USED DURING TESTING.

Equipment	Manufacturer	Model#	Serial#	Cal Date	Cal Due
Signal Generator	Agilent	E4437B	US39230102	02-Nov-09	02-Nov-10
Spectrum Analyzer 2	Agilent/HP	8566B	3407A08370	31-Mar-09	31-Mar-10
RF Power meter	Agilent/HP	E4416A	MY45101929	31-Jan-2008	03-Sep-2010
RG Power Sensor	Agilent/HP	EG327A	US40440846	07-Nov-2009	08-Jan-2011
Spectrum analyzer 1	Agilent	E4404B	MY44220519	02-Nov-09	02-Nov-10

Agilent Signal Generator, model E4437B ESG DP SERIES, Included software, GSM, CDMA, WCDMA, EDGE, MULTIPLE SIMULTANEOUS SIGNAL CAPABILITY

TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within -40°C and +50°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

1850-1910MHz Uplink, 1930-1990MHz Downlink

FCC 2.1033 (c)(6) OPERATING POWER

Out put Range -17.3dBm to +32.7dBm

FCC 2.1033 (c)(7) MAXIMUM POWER RATING

2 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

Description of Operation

AGC FUNCTION

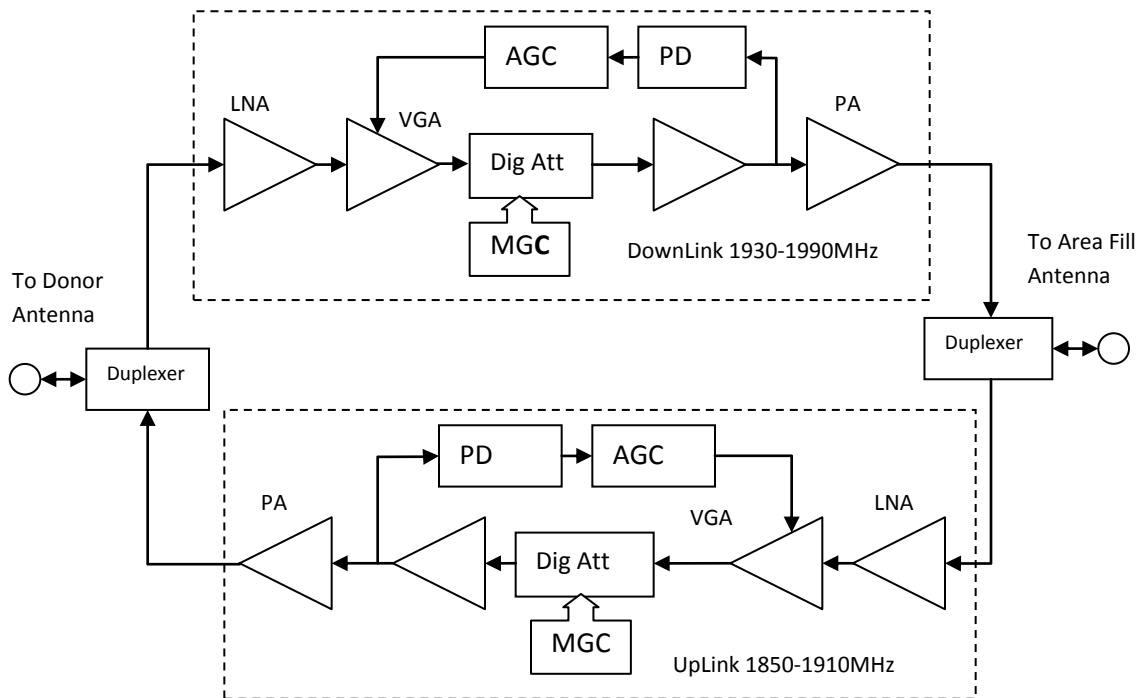
The BDA has an auto AGC function on both signal paths that serve to protect and prevent the saturation of the power amplifier. The amplifier has a directional coupler and power detector at the Input of the high power amplifier to monitor the output power.

When a high signal is received the automatic level control detects the amplitude and sends a feedback signal to a voltage variable gain amplifier which attenuates the signal level so that output power of the amplifier does not exceed the preset limit.

RF INPUT AND RF OUTPUT POWER LEVELS

The RPT1900 repeater has a maximum gain of 90dB. The AGC will control the maximum RF output to +33dBm.

Block Diagram



FCC 2.1046 / 24.232(a) - RF POWER OUTPUT**Test Setup**

See Appendix A:

Test Equipment

Equipment	Manufacturer	Model#	Serial#	Cal Date	Cal Due
Signal Generator	Agilent	E4437B	US39230102	02-Nov-09	02-Nov-10
RF Power Meter	Agilent/HP	E4416A	MY45101929	03-Sep-08	03-Sep-10
RF Power Sensor	Agilent/HP	EG327A	US40440846	07-Nov-2009	08-Jan-2011

Test Conditions

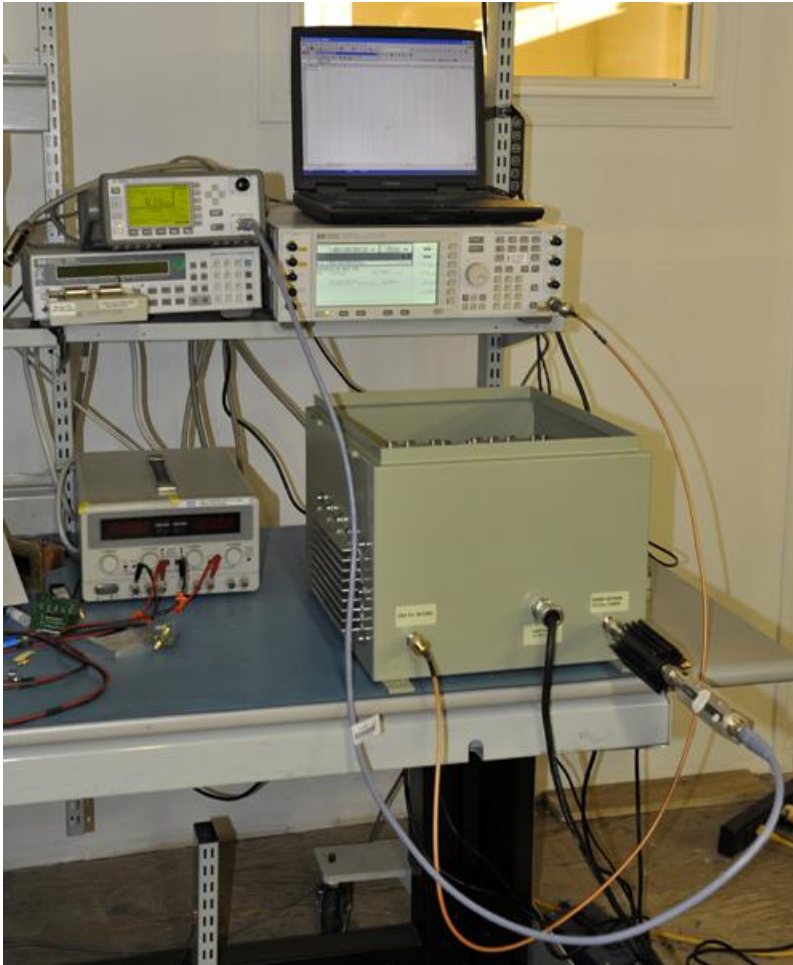
Base stations are limited to 1640 watts EIRP with antenna up to 300 meters HAAT .In no case may the peak output power of a base station transmitter exceed 100 watts.

The 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.

For downlink configuration, 1900MHz Donor antenna port is connected to Signal Generator and Area Fill antenna port is connected to RF Peak Power Meter. For uplink configuration, 1900MHz Donor antenna port is connected to RF Peak Power Meter and 1900MHz Area Fill antenna port is connected to Signal Generator.

EQUIPMENT SETUP SHOWING RF PEAK POWER MEASUREMENT.



Test Data

Downlink RF Peak Power

Modulation	Measured Power (dBm)		
	1930 MHz	1960MHz	1990MHz
EDGE	32.0	31.8	31.0
GSM	28.6	28.5	27.8
WCDMA	31.8	31.5	31.2

Uplink RF Peak Power

Modulation	Measured Power (dBm)		
	1850 MHz	1880MHz	1910MHz
EDGE	30.7	30.1	29.3
GSM	30.5	30.2	29.2
WCDMA	32.7	32.5	32.8

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

FCC 2.1049(i)- INPUT/OUTPUT PLOTS**Test Setup**

See Appendix A.

Test Equipment

Equipment	Manufacturer	Model#	Serial#	Cal Date	Cal Due
Signal Generator	Agilent	E4437B	US39230102	02-Nov-09	02-Nov-10
Spectrum analyzer	Agilent	E4404B	MY44220519	02-Nov-09	02-Nov-10

Test Conditions

For downlink configuration, Donor antenna port is connected to Signal Generator and Area Fill antenna port is connected to a Spectrum Analyzer. For uplink configuration, Donor antenna port is connected to spectrum analyzer and Area Fill antenna port is connected to Signal Generator.

Uplink: 1850 to 1910MHz

Downlink: 1930 to 1990MHz

Test Plots

DOWNLINK - EDGE 1930MHz

ESG Configuration

FREQUENCY		AMPLITUDE		OFFS	
1.931 500 000 00 GHz		-60.00		dBm	
DIGMOD		I/Q		RF ON MOD ON	
Freq: 1.931 500 000 00 GHz		Incr: 5.00000000MHz			
DIGMOD Dig Mod Setup: EDGE					
On					
Mod Type: EDGE		Data: Random			
Filter: EDGE		Symbol Rate: 270.833ksps			
Trig Type: Continuous		Polarity: Neg		Retrigger: On	
Trig Source: Ext		Delay: Off			

Digital Modulation Off On

Multicarrier Off On

Setup Select (EDGE)

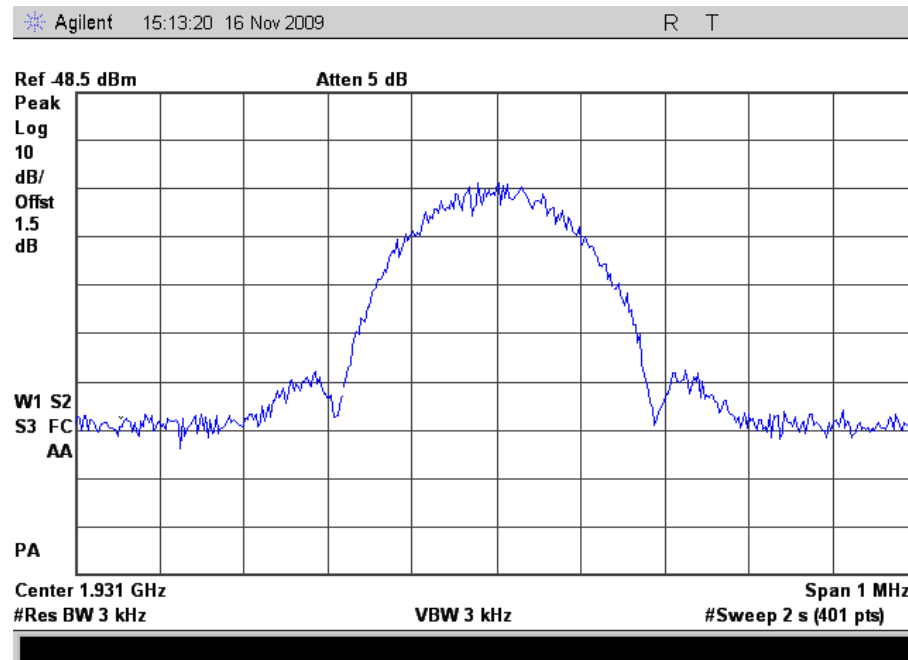
Digital Mod Define

Waveform Statistics

Trigger (Continuous)

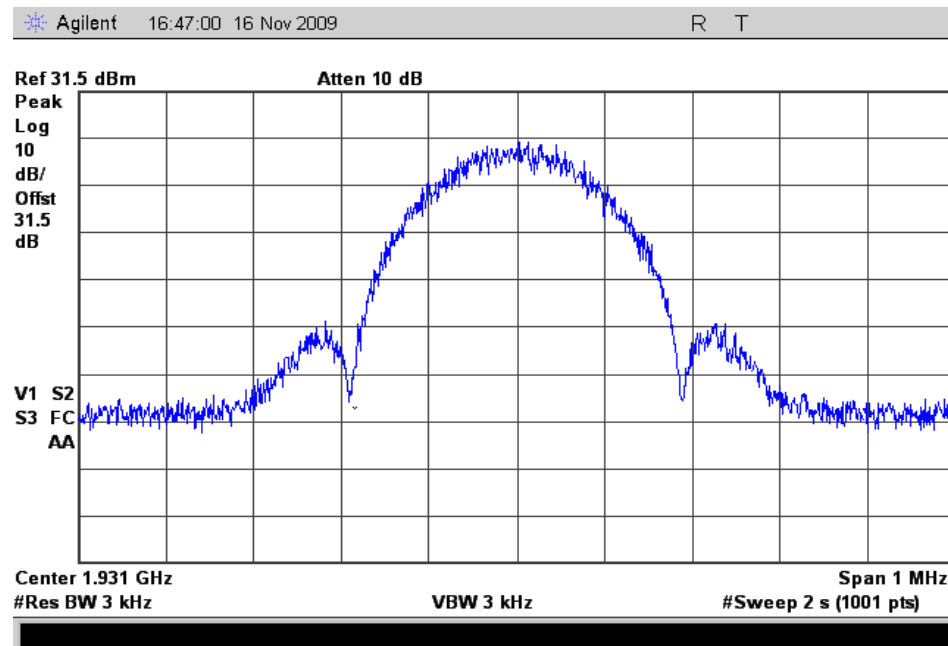
Signal Generator adjusted to -60dBm output. Repeater set to maximum RF gain of 90dB

Input Plot EDGE 1930MHz



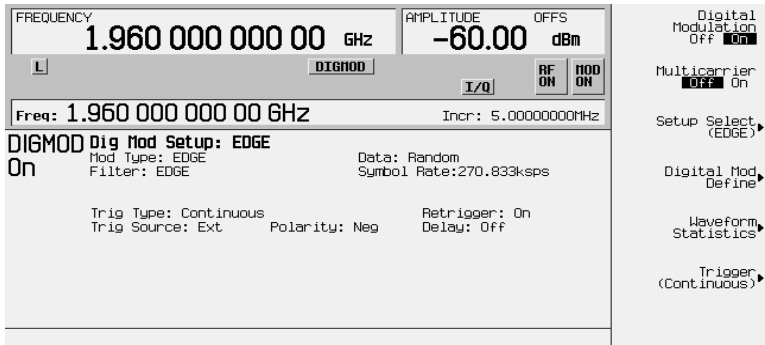
Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot EDGE 1930MHz

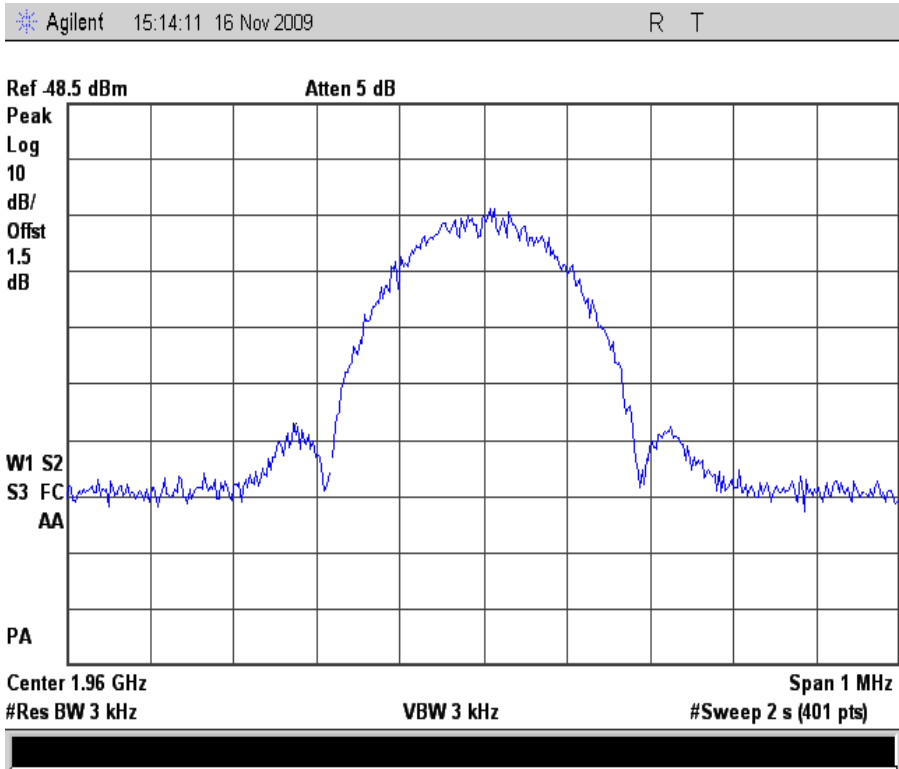


DOWNLINK - EDGE 1960MHz

ESG Configuration

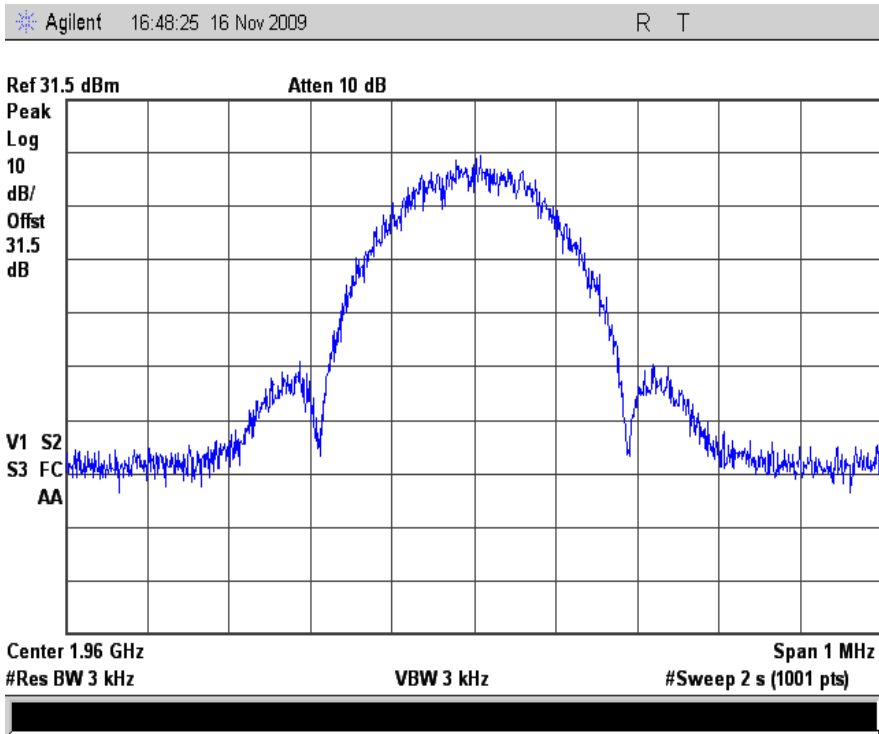


Input Plot EDGE 1960MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot EDGE 1960MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

DOWNLINK - EDGE 1990MHz

ESG Configuration

FREQUENCY
1.988 500 000 00 GHz

AMPLITUDE
-60.00 dBm

OFFS
dBm

L

DIGMOD

L/Q

RF ON

MOD ON

Freq: 1.988 500 000 00 GHz

Incr: 5.00000000MHz

DIGMOD Dig Mod Setup: EDGE

On

Mod Type: EDGE

Filter: EDGE

Data: Random

Symbol Rate: 270.833ksps

Trig Type: Continuous

Trig Source: Ext

Polarity: Neg

Retrigger: On

Delay: Off

Digital Modulation
Off On

Multicarrier
Off On

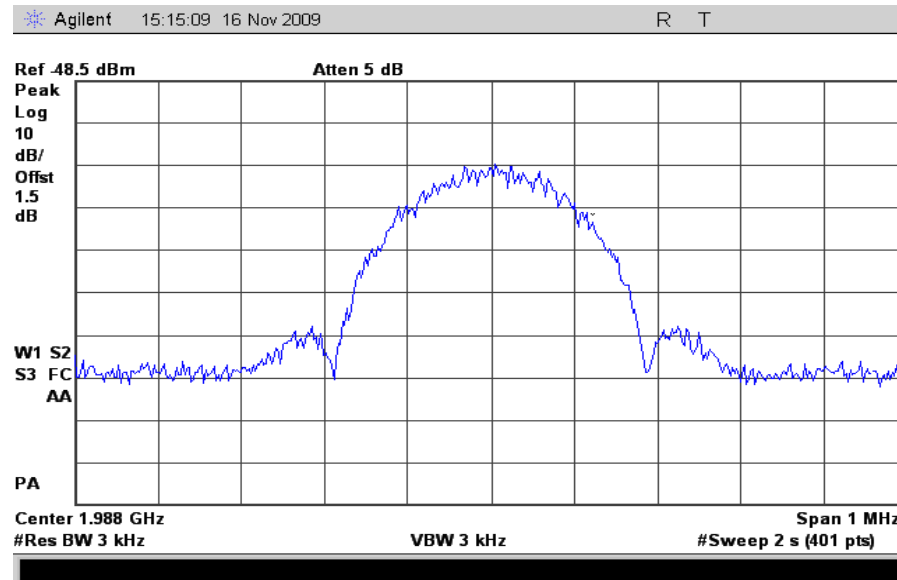
Setup Select
(EDGE)

Digital Mod
Define

Waveform
Statistics

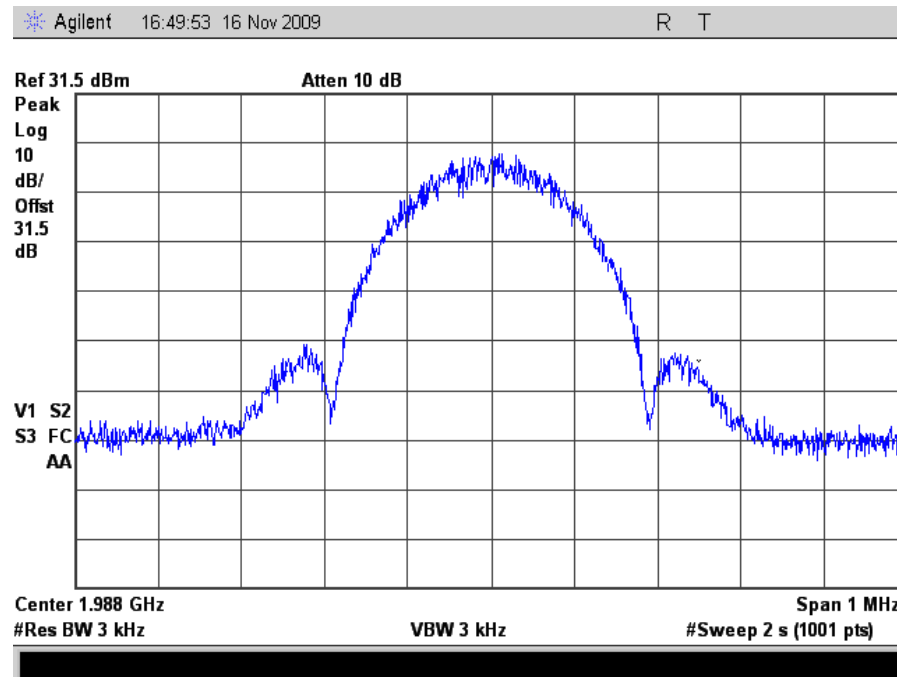
Trigger
(Continuous)

Input Plot ESG



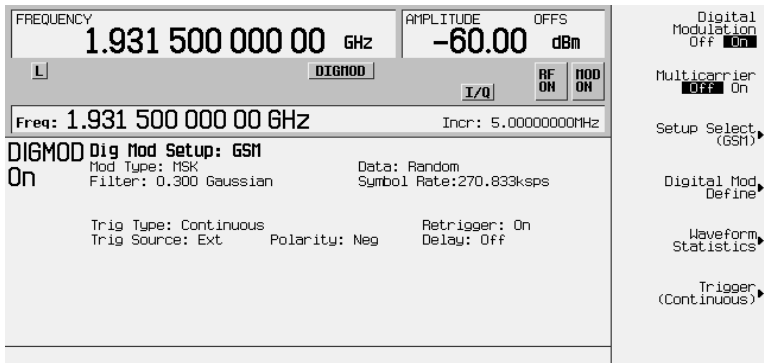
Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot ESG

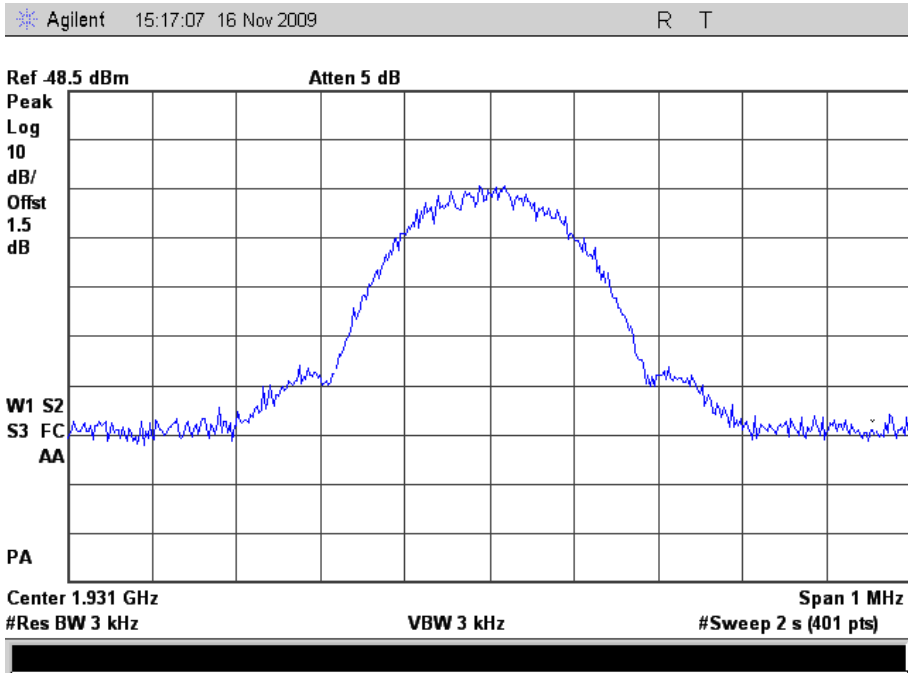


Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

ESG Configuration

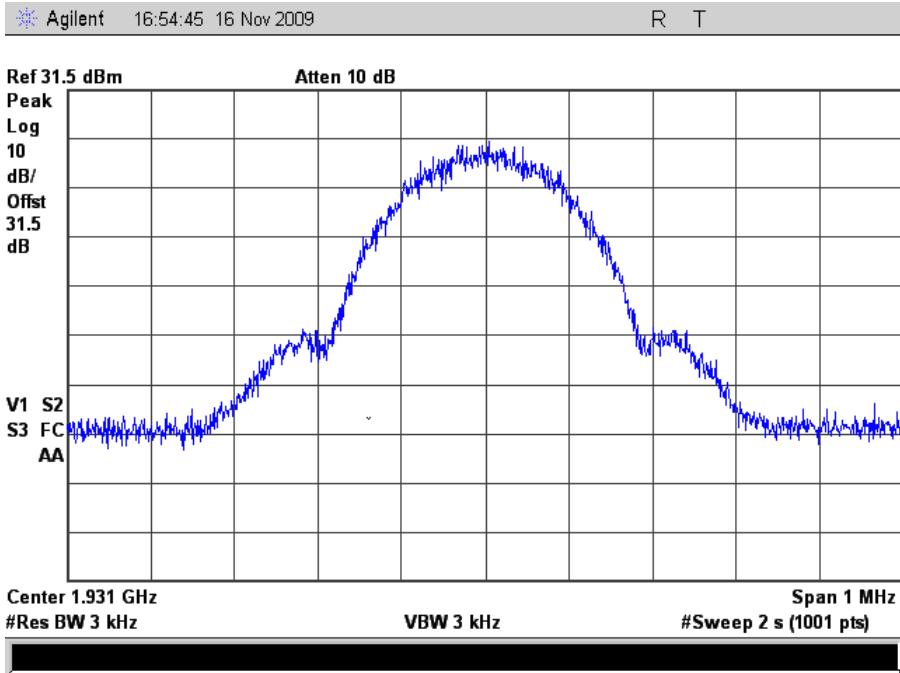


Input Plot GSM 1930MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot GSM 1930 MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

DOWNLINK - GSM 1960MHz

ESG Configuration

FREQUENCY

1.960 000 000 00 GHz

AMPLITUDE

OFFS

-60.00 dBm

L

DIGMOD

I/Q

RF ON

MOD ON

Freq: 1.960 000 000 00 GHz

Incr: 5.00000000MHz

DIGMOD Dig Mod Setup: GSM

Mod Type: MSK

Data: Random

Filter: 0.300 Gaussian

Symbol Rate: 270.833ksps

Trig Type: Continuous

Trig Source: Ext

Polarity: Neg

Retrigger: On

Delay: Off

Digital Modulation

Off

Multicarrier

Off

On

Setup Select

(GSM)

Digital Mod

Define

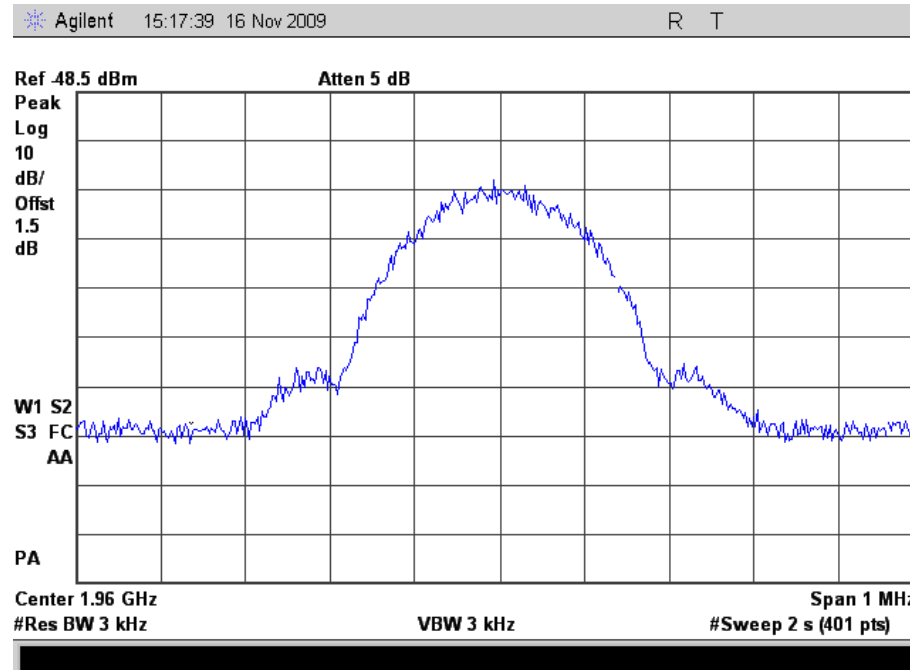
Waveform

Statistics

Trigger

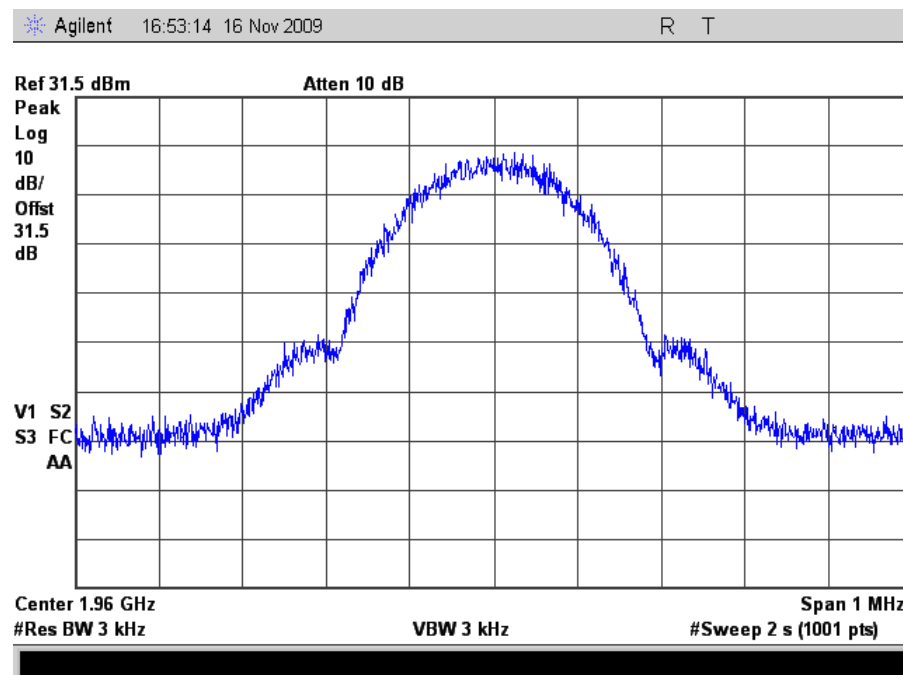
(Continuous)

Input Plot GSM 1960MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot GSM 1960 MHz



DOWNLINK - GSM 1990MHz

ESG Configuration

FREQUENCY		AMPLITUDE		OFFS	
1.988 500 000 00 GHz		-60.00 dBm			
L		DIGMOD		I/Q	
Freq: 1.988 500 000 00 GHz		Incr: 5.00000000MHz			
DIGMOD Dig Mod Setup: GSM					
Mod Type: MSK					
Filter: 0.300 Gaussian					
Data: Random					
Symbol Rate: 270.833ksps					
Trig Type: Continuous					
Trig Source: Ext					
Polarity: Neg					
Retrigger: On					
Delay: Off					

Digital Modulation Off On

Multicarrier Off On

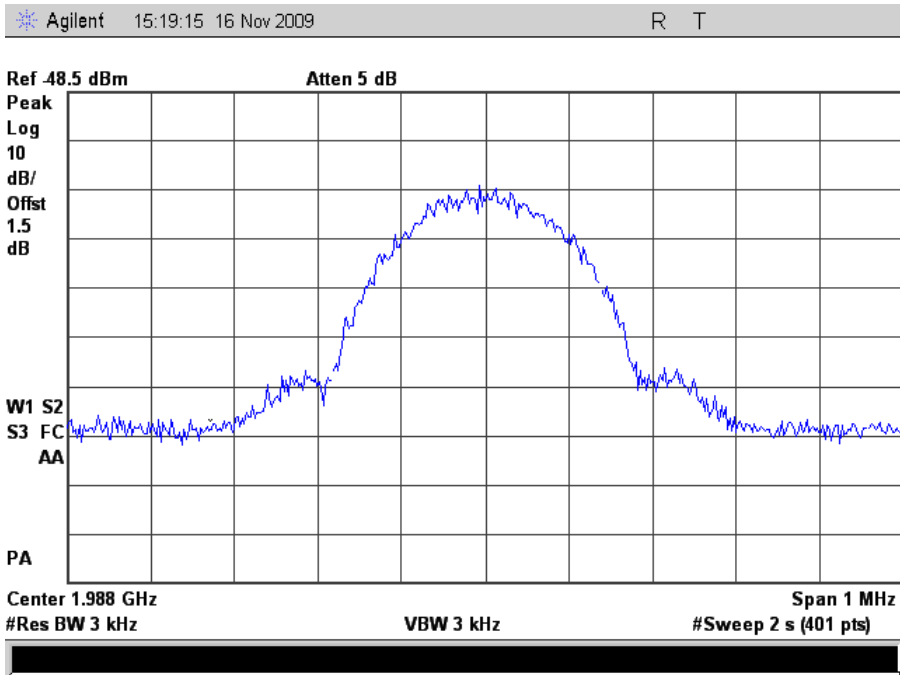
Setup Select (GSM)

Digital Mod Define

Waveform Statistics

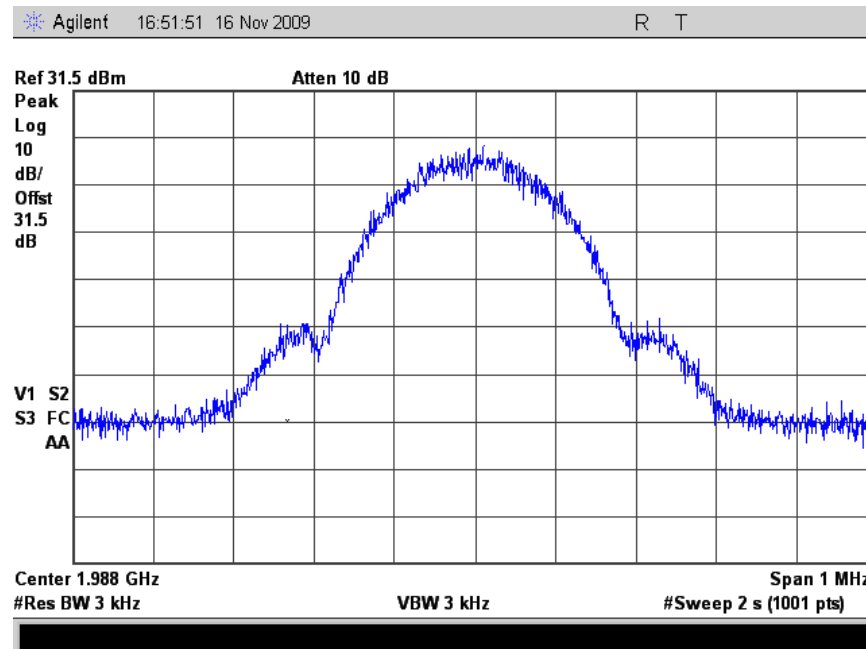
Trigger (Continuous)

Input Plot GSM 1990MHz



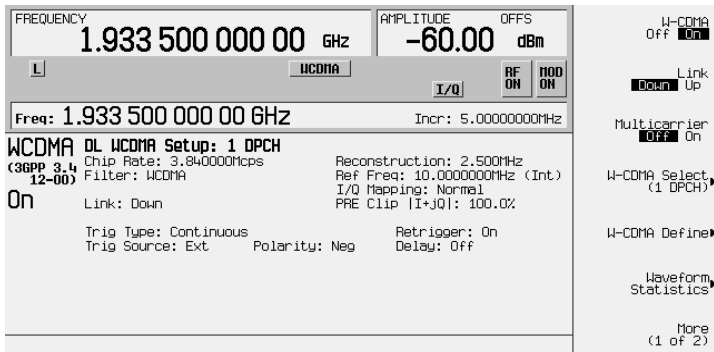
Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot GSM 1990MHz

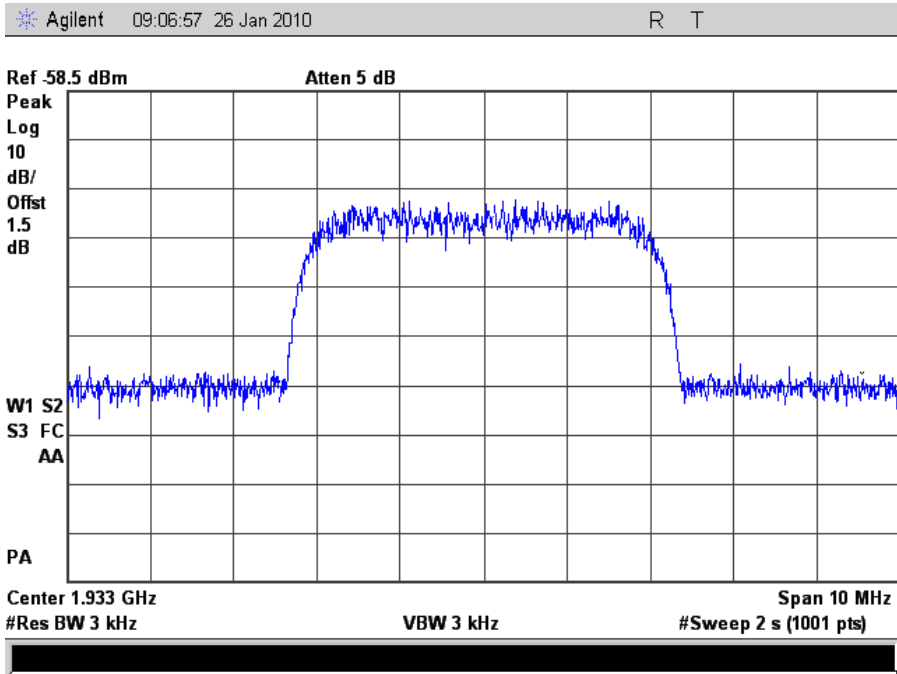


Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

ESG Configuration

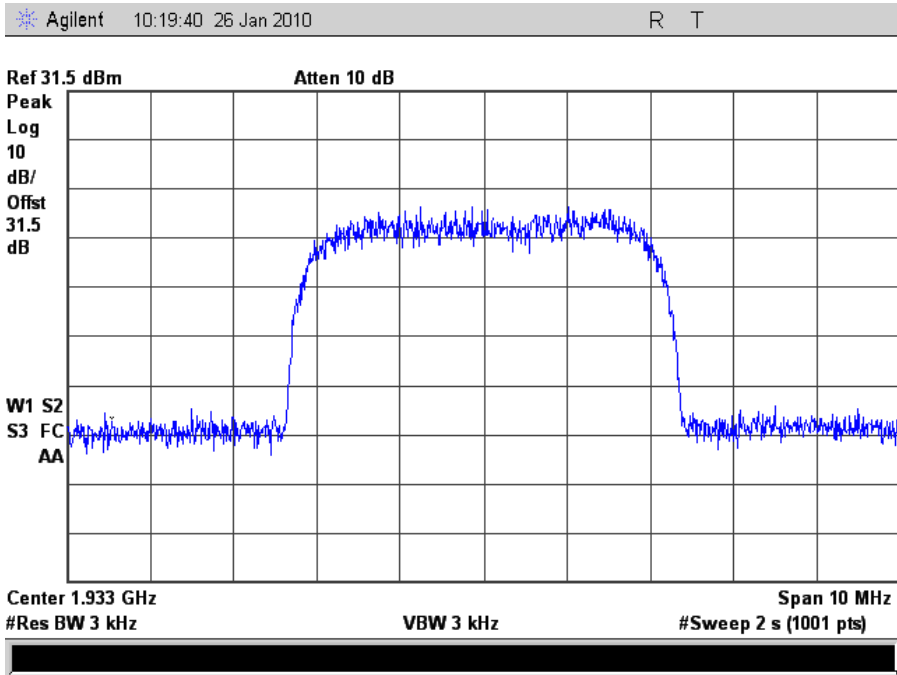


Input Plot WCDMA 1930MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot WCDMA 1930MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

DOWNLINK - WCDMA 1960MHz

ESG Configuration

FREQUENCY

1.960 000 000 00 GHz

AMPLITUDE

OFFS

-60.00 dBm

L

WCDMA

I/Q

RF ON

MOD ON

Freq: 1.960 000 000 00 GHz

Incr: 5.00000000MHz

WCDMA DL WCDMA Setup: 1 DPCH

Chip Rate: 3.840000Mcps

Filter: WCDMA

Reconstruction: 2.500MHz

Ref Freq: 10.000000MHz (Int)

I/Q Mapping: Normal

PRE Clip (I+Q): 100.0%

Link: Down

Trig Type: Continuous

Trig Source: Ext

Polarity: Neg

Retrigger: On

Delay: Off

W-CDMA

Off On

Link

Down Up

Multicarrier

Off On

W-CDMA Select

(1 DPCH)

W-CDMA Define

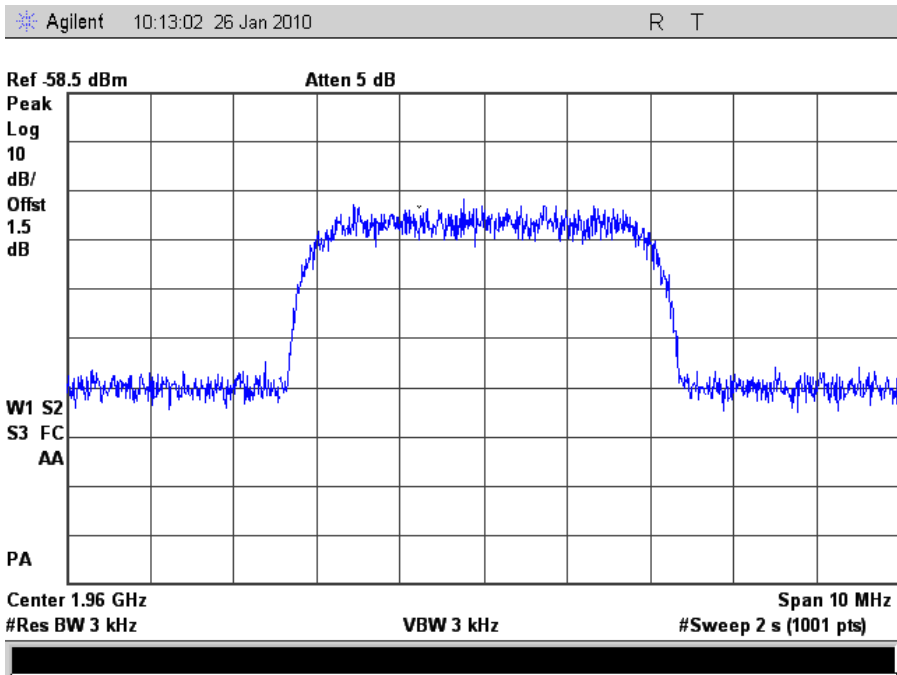
Waveform

Statistics

More

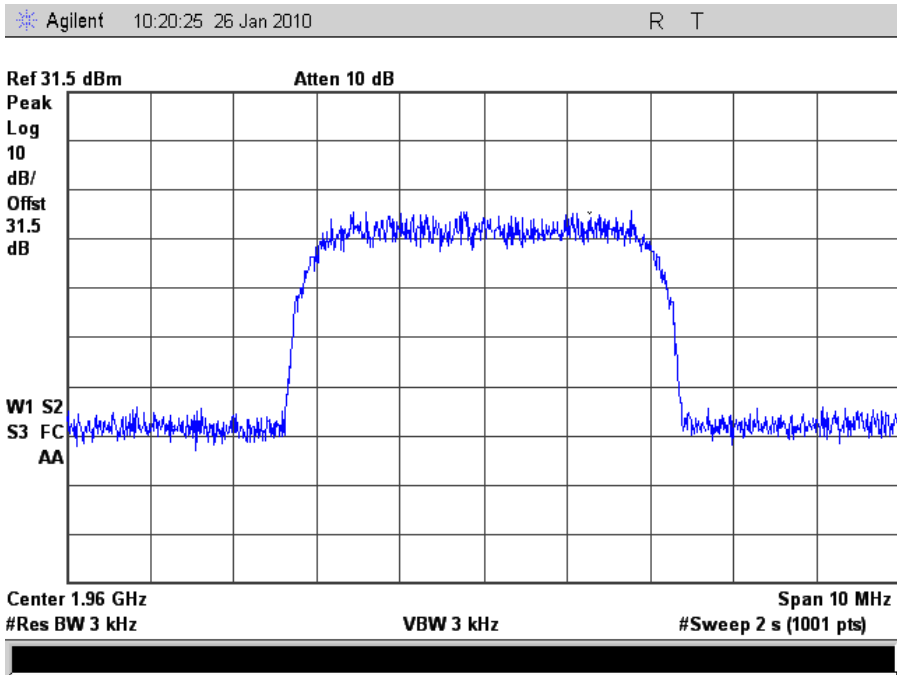
(1 of 2)

Input Plot WCDMA 1960MHZ



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

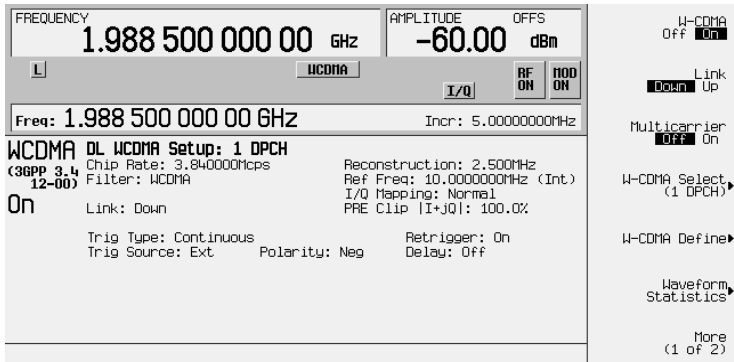
Output Plot WCDMA 1960MHz



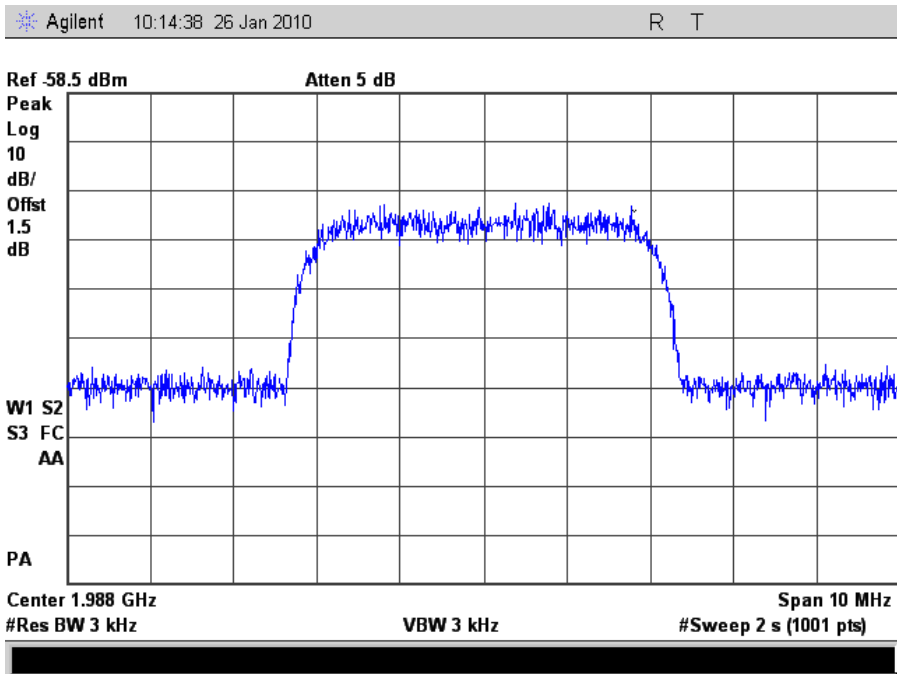
Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

DOWNLINK - WCDMA 1990MHz

ESG Configuration

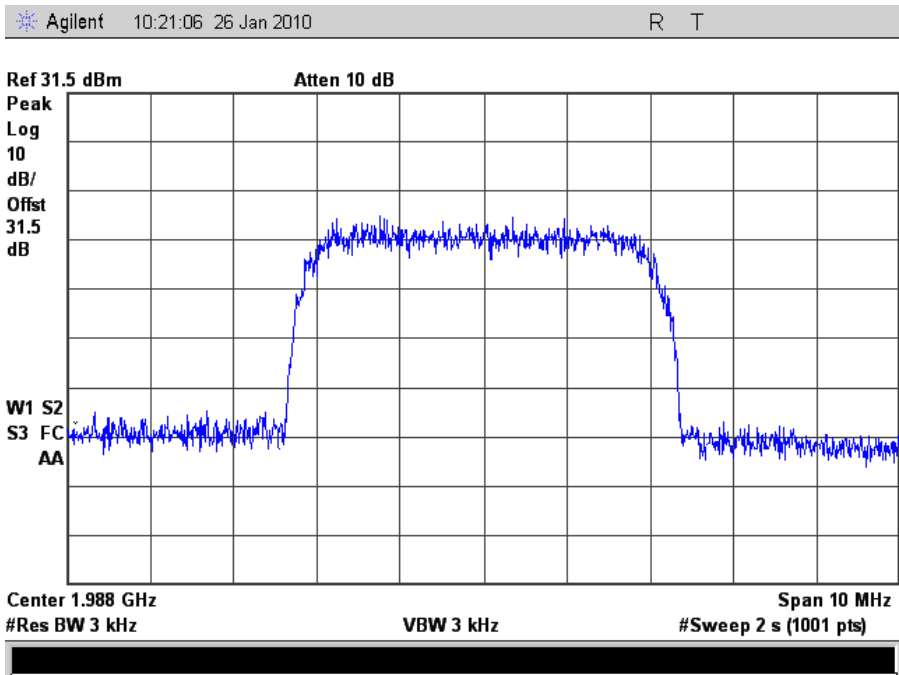


Input Plot WCDMA 1990MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

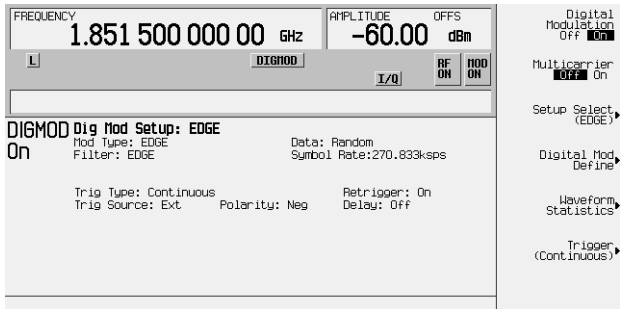
Output Plot WCDMA 1990MHz



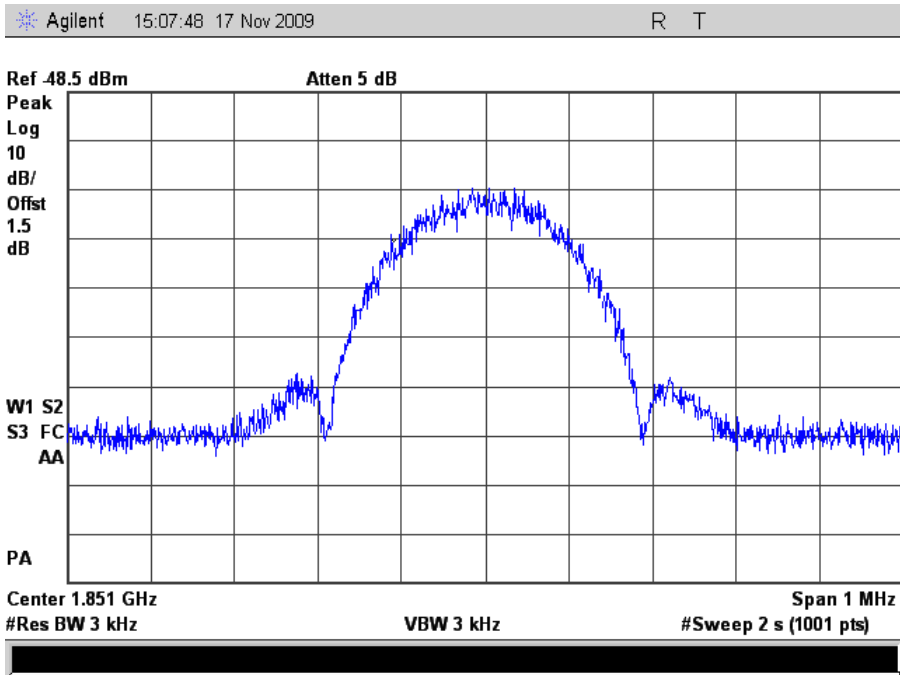
Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

UPLINK - EDGE 1850MHz

ESG Configuration

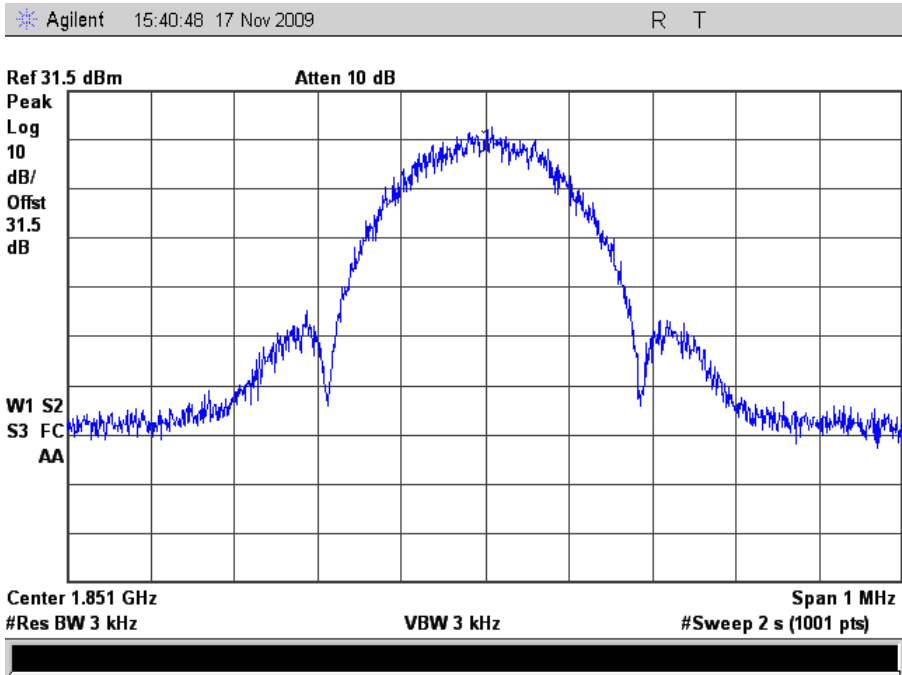


Input Plot EDGE 1850MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot EDGE 1850MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

UPLINK - EDGE 1880MHz

ESG Configuration

FREQUENCY		AMPLITUDE		OFFS	
1.880 000 000 00 GHz		-60.00 dBm			
DIGMOD		I/Q		RF ON MOD ON	
Freq: 1.880 000 000 00 GHz		Incr: 5.00000000MHz			
DIGMOD Dig Mod Setup: EDGE					
Mod Type: EDGE					
Filter: EDGE					
Data: Random					
Symbol Rate: 270.833ksps					
Trig Type: Continuous					
Trig Source: Ext					
Polarity: Neg					
Retrigger: On					
Delay: Off					

Digital Modulation Off

Multicarrier Off On

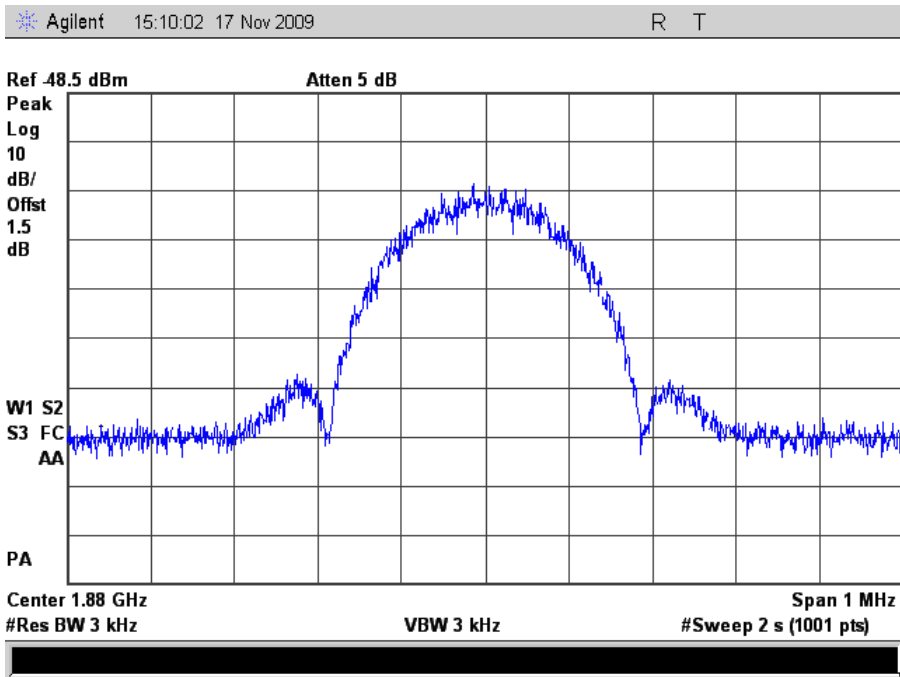
Setup Select (EDGE)

Digital Mod Define

Waveform Statistics

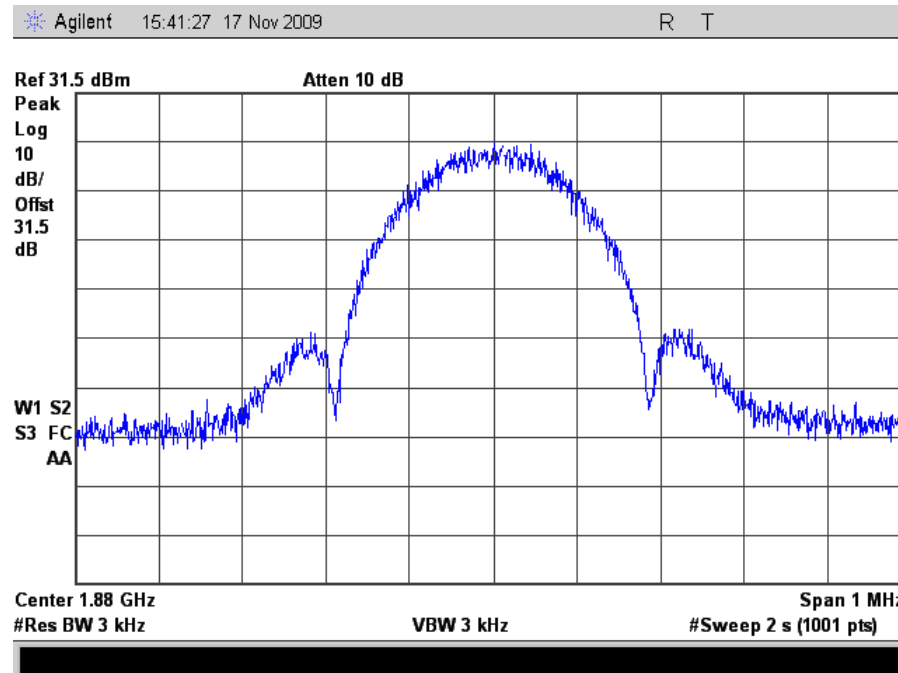
Trigger (Continuous)

Input Plot EDGE 1880MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot EDGE 1880MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

UPLINK - EDGE 1910MHz

ESG Configuration

FREQUENCY		AMPLITUDE		OFFS	
1.908 500 000 00 GHz		-60.00 dBm			
DIGMOD		I/Q		RF ON MOD ON	
Freq: 1.908 500 000 00 GHz		Incr: 5.00000000MHz			
DIGMOD Dig Mod Setup: EDGE					
On					
Mod Type: EDGE		Data: Random			
Filter: EDGE		Symbol Rate: 270.833ksps			
Trig Type: Continuous		Polarity: Neg		Retrigger: On	
Trig Source: Ext		Delay: Off			

Digital Modulation Off ☒

Multicarrier Off ☒

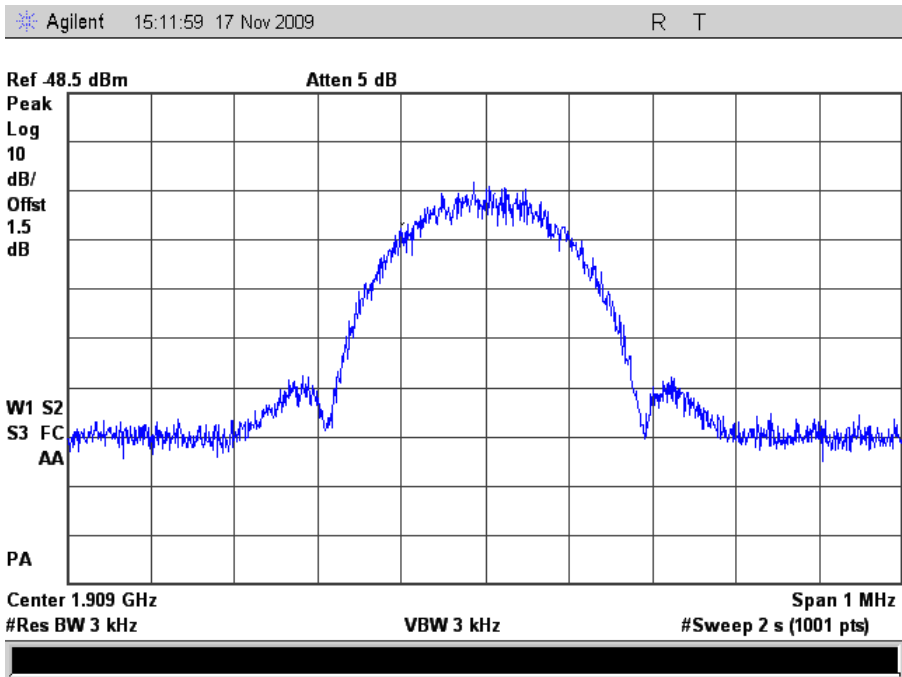
Setup Select (EDGE) ☒

Digital Mod Define ☒

Waveform Statistics ☒

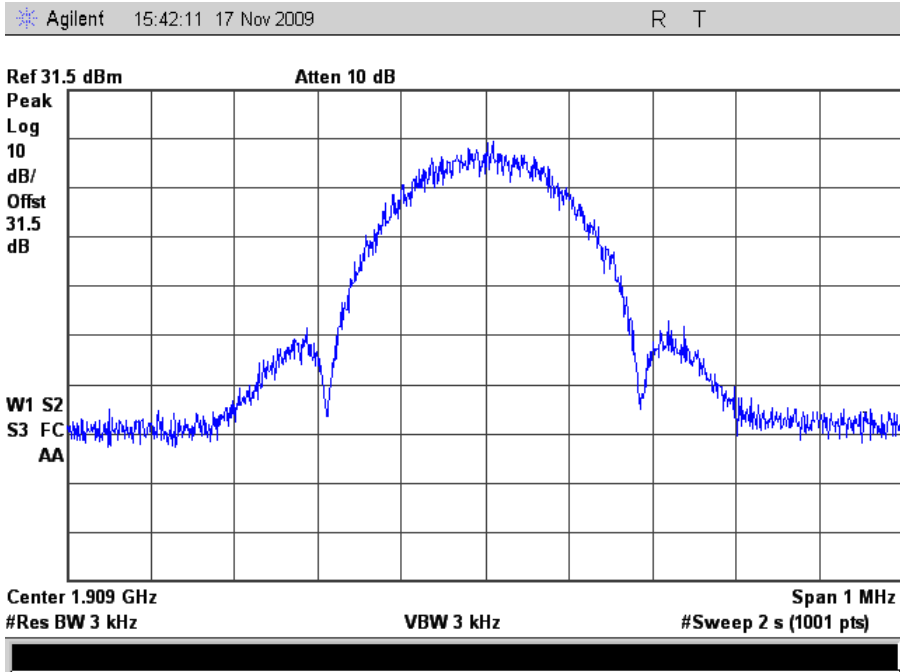
Trigger (Continuous) ☒

Input Plot EDGE 1910MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot EDGE 1910MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

UPLINK - GSM 1850MHz

ESG Configuration

FREQUENCY

1.851 500 000 00 GHz

AMPLITUDE

-60.00 dBm

OFFS

L

DIGMOD

I/Q

RF ON

MOD ON

Freq: 1.851 500 000 00 GHz

Incr: 5.00000000MHz

DIGMOD Dig Mod Setup: GSM

Mod Type: FSK

Filter: 0.300 Gaussian

Data: Random

Symbol Rate: 270.833ksps

Trig Type: Continuous

Trig Source: Ext

Polarity: Neg

Petrigger: On

Delay: Off

Digital Modulation

Off

Multicarrier

Off

On

Setup Select

(GSM)

Digital Mod

Define

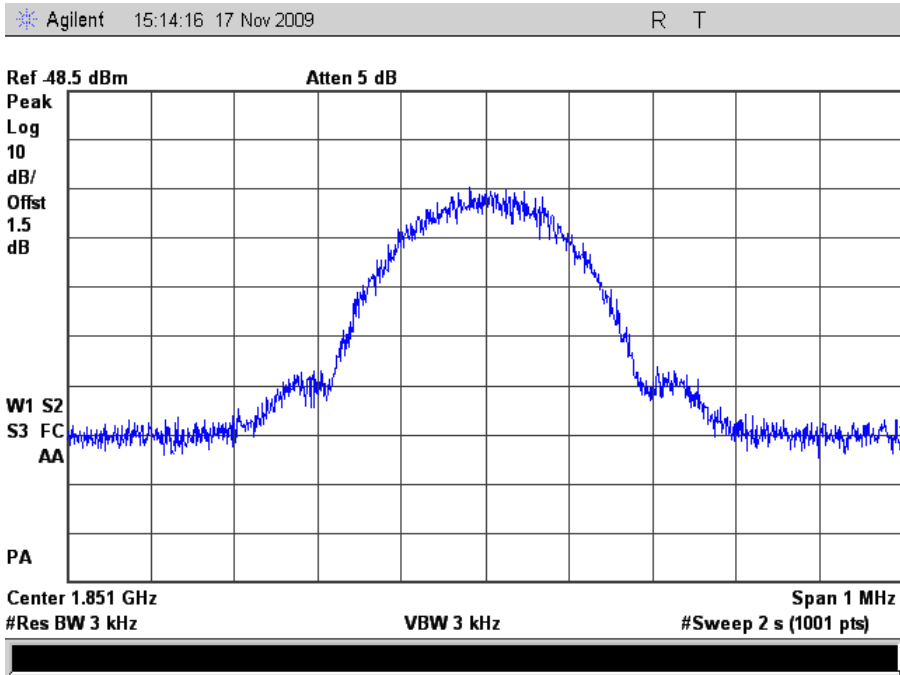
Waveform

Statistics

Trigger

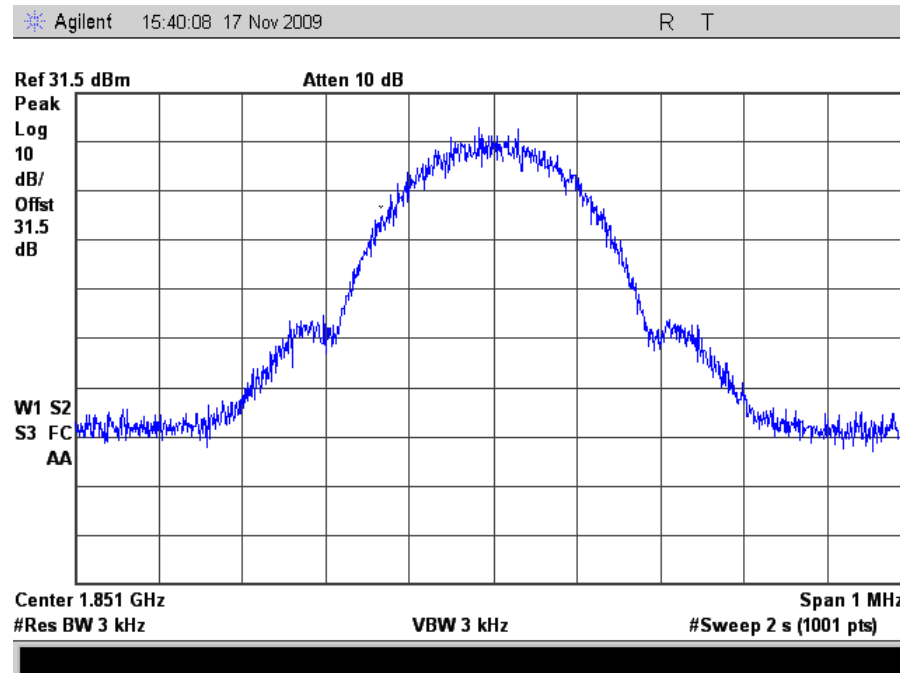
(Continuous)

Input Plot GSM 1850MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot GSM 1850MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

UPLINK - GSM 1880MHz

ESG Configuration

FREQUENCY	1.880 000 000 00 GHz	AMPLITUDE	OFFS	-60.00 dBm
<input type="checkbox"/> L <input type="checkbox"/> DIGMOD		<input type="checkbox"/> RF ON <input type="checkbox"/> MOD ON		<input type="checkbox"/> Digital Modulation Off <input type="checkbox"/> On
Freq: 1.880 000 000 00 GHz		Incr: 5.00000000MHz		
DIGMOD Dig Mod Setup: GSM				
Mod Type: MSK Data: Random				
Filter: 0.300 Gaussian Symbol Rate: 270.833ksps				
Trig Type: Continuous Retrigger: On				
Trig Source: Ext Polarity: Neg Delay: Off				

☐ Multicarrier Off ☐ On

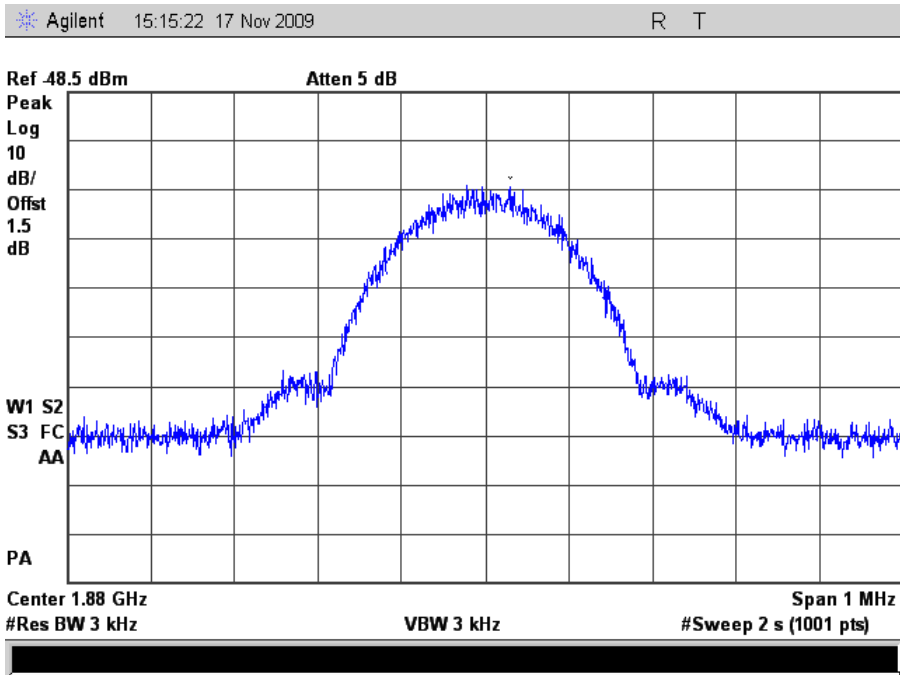
Setup Select (GSM) ☐

Digital Mod Define ☐

Waveform Statistics ☐

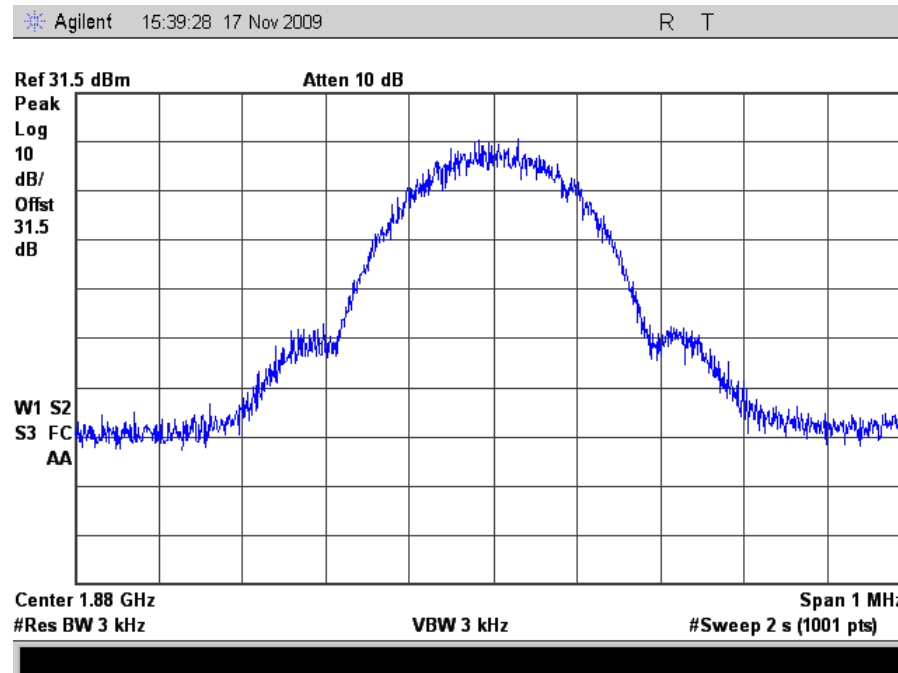
Trigger (Continuous) ☐

Input Plot GSM 1880MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot GSM 1880MHz



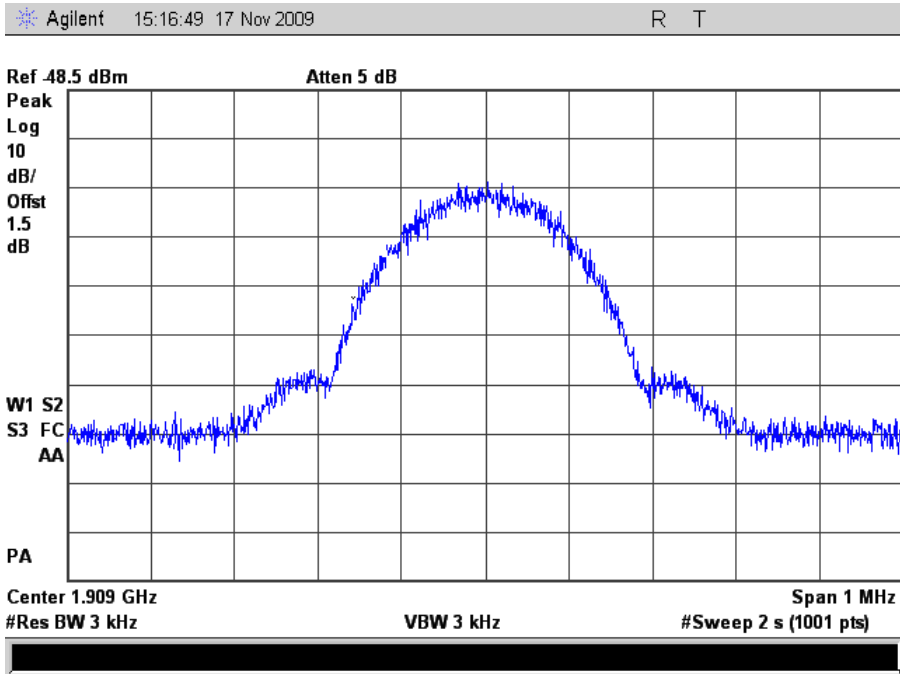
Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

UPLINK - GSM 1910MHz

ESG Configuration

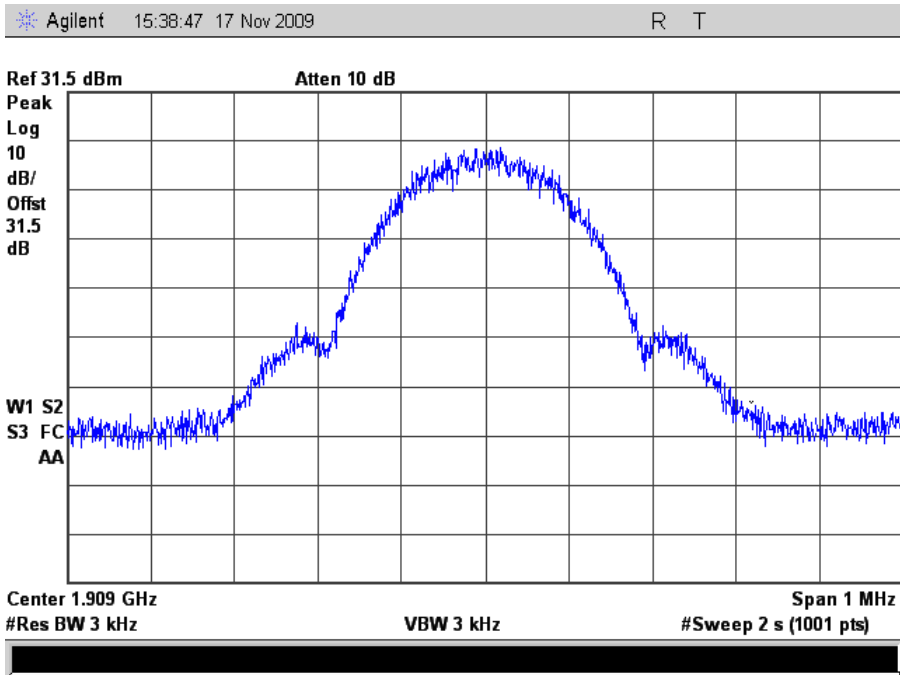
FREQUENCY		AMPLITUDE		OFFS	
1.908 500 000 00 GHz		-60.00 dBm			
DIGMOD		I/Q		RF ON MOD ON	
Freq: 1.908 500 000 00 GHz		Incr: 5.00000000MHz			
DIGMOD Dig Mod Setup: GSM		Data: Random		Digital Modulation Off On	
On		Filter: 0.300 Gaussian		Symbol Rate: 270.833ksps	
Trig Type: Continuous		Polarity: Neg		Retrigger: On	
Trig Source: Ext		Delay: Off			
				Multicarrier Off On	
				Setup Select (GSM)	
				Digital Mod Define	
				Waveform Statistics	
				Trigger (Continuous)	

Input Plot GSM 1910MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot GSM 1910MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

UPLINK - WCDMA 1850MHz

ESG Configuration

FREQUENCY

1.852 500 000 00 GHz

AMPLITUDE

-60.00 dBm

OFFS

L

WCDMA

RF ON

100 ON

Freq: 1.852 500 000 00 GHz

Incr: 5.00000000MHz

WCDMA UL WCDMA Setup: DPCCH

(3GPP 3.4 12-00)

On

Chip Rate: 3.840000Mbps

Reconstruction: 2.500MHz

Ref Freq: 10.00000000MHz (Int)

Filter: WCDMA

I/Q Mapping: Normal

PRE Clip (I+Q): 100.0%

Link: Up

Trig Type: Continuous

Trig Source: Ext

Polarity: Neg

Retrigger: On

Delay: Off

W-CDMA Off

Link

Down

Multicarrier N/A

W-CDMA Select (DPCCH)

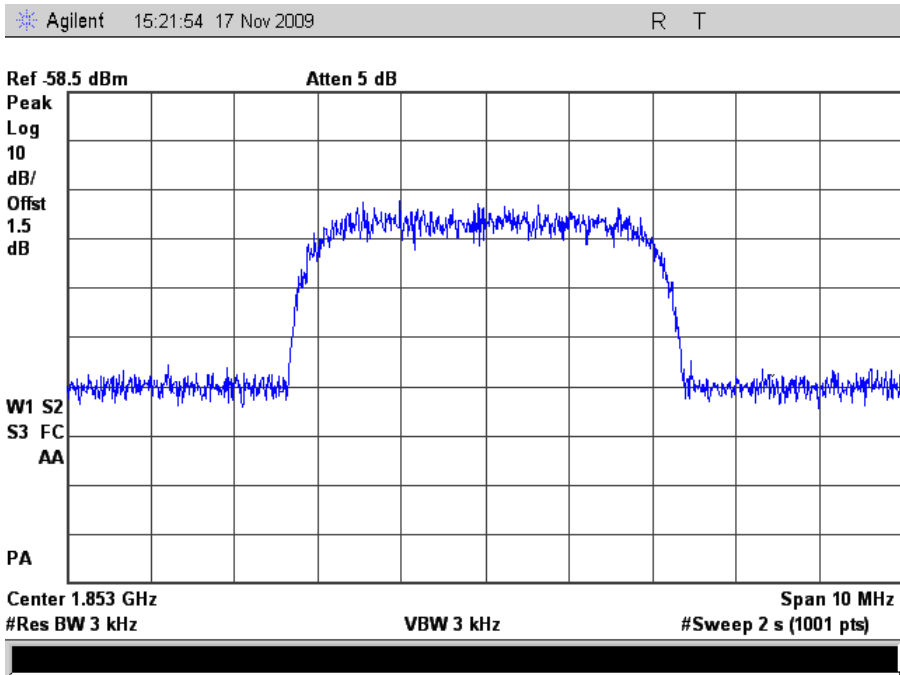
W-CDMA Define

Waveform

Statistics

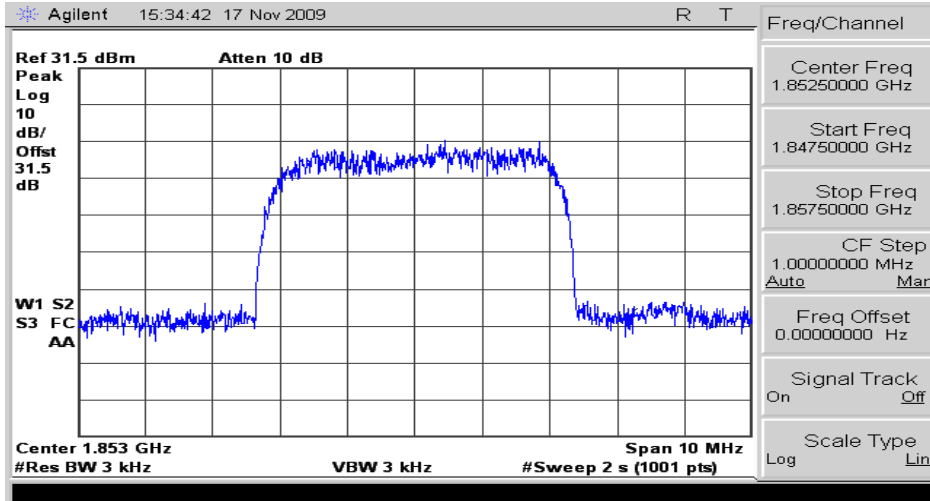
More (1 of 2)

Input Plot WCDMA 1850MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot WCDMA 1850MHZ



Measured at the output terminal of the RPT1900 at full rated power.

Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

UPLINK - WCDMA 1880MHz

ESG Configuration

FREQUENCY

1.880 000 000 00 GHz

AMPLITUDE

OFFS

-60.00 dBm

L

WCDMA

RF ON

RF OFF

RF ON

RF OFF

Down

Link

Link

Multicarrier

N/A

W-CDMA Select

(DPCCH)

W-CDMA Define

Waveform

Statistics

More

(1 of 2)

WCDMA UL WCDMA Setup: DPCCH

Chip Rate: 3.840000Mbps

Reconstruction: 2.500MHz

Ref Freq: 10.000000MHz (Int)

I/Q Mapping: Normal

PRE Clip (I+QI): 100.0%

Link: Up

Trig Type: Continuous

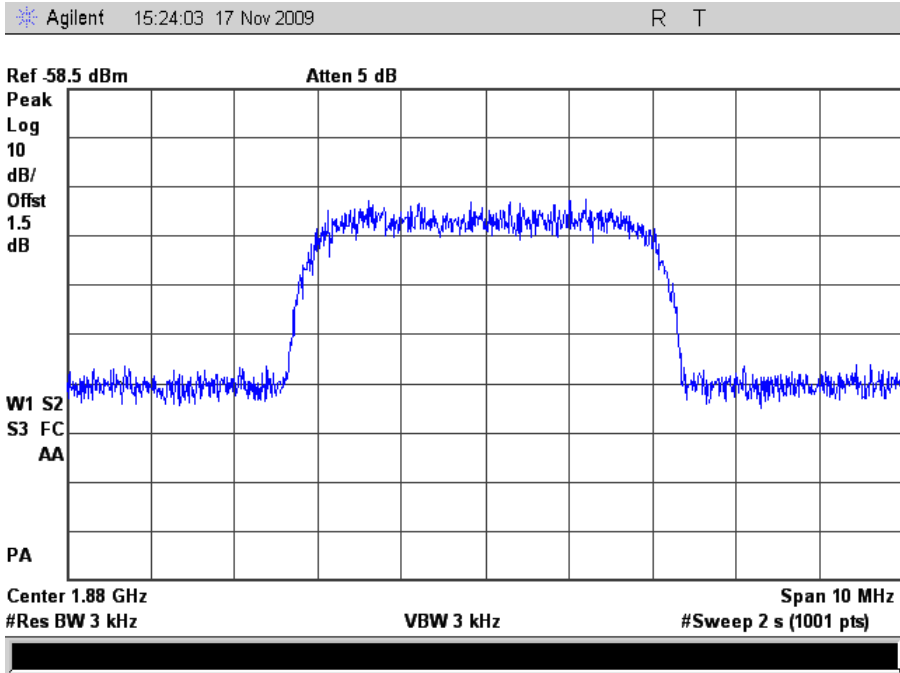
Trig Source: Ext

Polarity: Neg

Retrigger: On

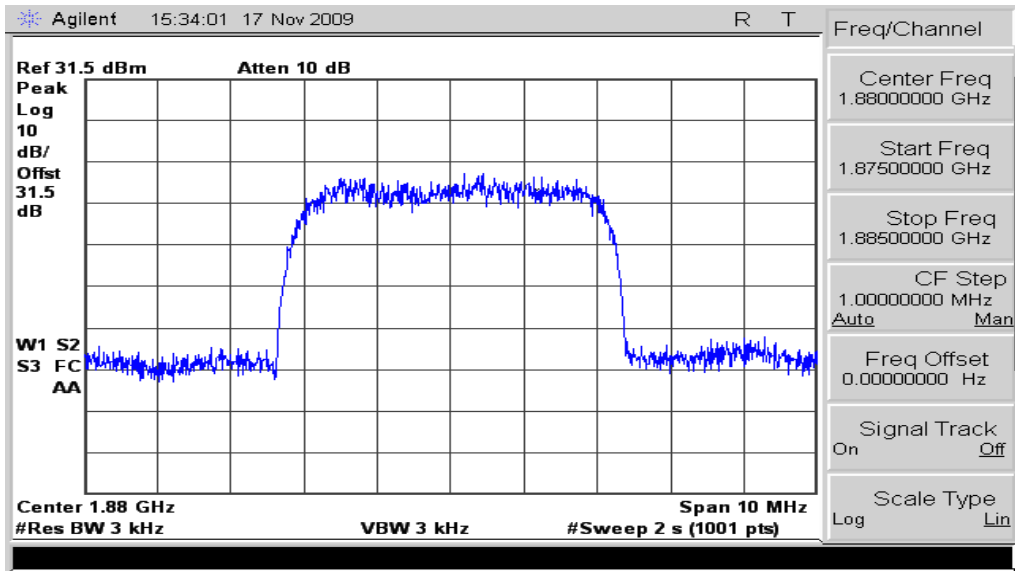
Delay: Off

Input Plot WCDMA 1880MHZ



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot WCDMA 1880MHZ



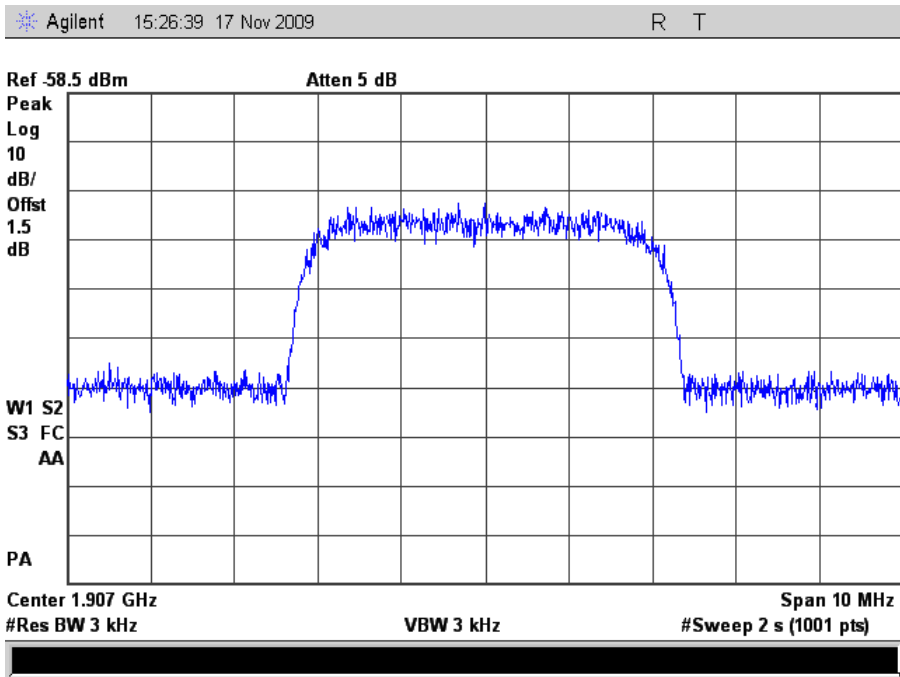
Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

UPLINK - WCDMA 1910MHz

ESG Configuration

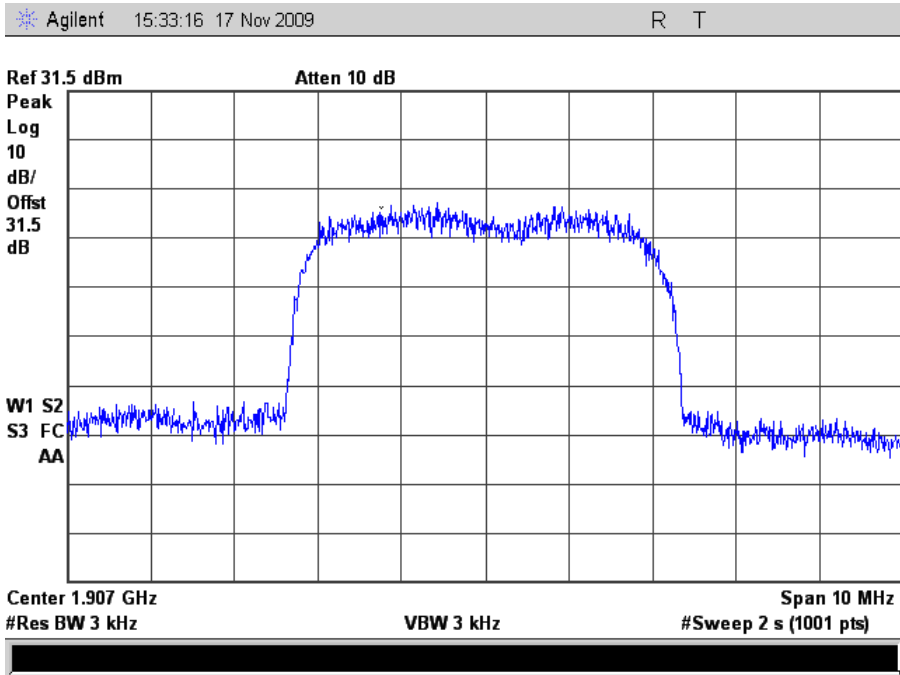
FREQUENCY		AMPLITUDE		OFFS	
1.906 500 000 00 GHz		-60.00 dBm			
L		UCDMA		W-CDMA	
		I/Q		RF ON	
Freq: 1.906 500 000 00 GHz		Incr: 5.00000000MHz			
WCDMA UL WCDMA Setup: DPCCCH		Reconstruction: 2.500MHz		W-CDMA Select (DPCCCH)	
(38PP 3.4 12-00)		Ref Freq: 10.0000000MHz (Int.)		W-CDMA Define	
On		I/Q Mapping: Normal		Waveform Statistics	
Link: Up		PRE Clip [I+Q]: 100.0%		None (1 of 2)	
Trip Type: Continuous		Retrigger: On			
Trip Source: Ext		Delay: Off			
Polarity: Neg					

Input Plot WCDMA 1910MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Output Plot WCMA 1910MHz



Measured at the output terminal of the RPT1900 at full rated power. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

FCC 24.238 (a) Conducted Spurious Emission

Test Setup

See Appendix A

Test Equipment

Equipment	Manufacturer	Model#	Serial#	Cal Date	Cal Due
Signal Generator	Agilent	E4437B	US39230102	02-Nov-09	02-Nov-10
Spectrum Analyzer 2	Agilent/HP	8566B	3407A08370	31-Mar-09	31-Mar-10
Spectrum analyzer 1	Agilent	E4404B	MY44220519	02-Nov-09	02-Nov-10

Test Conditions

For downlink configuration, Donor antenna port is connected to Signal Generator and Area Fill antenna port is connected to Spectrum Analyzer.

For uplink configuration, Donor antenna port is connected to Spectrum Analyzer and Area Fill antenna port is connected to Signal Generator.

The Test plots are recorded with a Spectrum Analyzer 1 in 30MHz to 2GHz and Spectrum Analyzer 2 in 2GHz to 20GHz .

All plots measured at the output terminal of the RPT1900 at a rated power.

Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Uplink:

1850 to 1910MHz

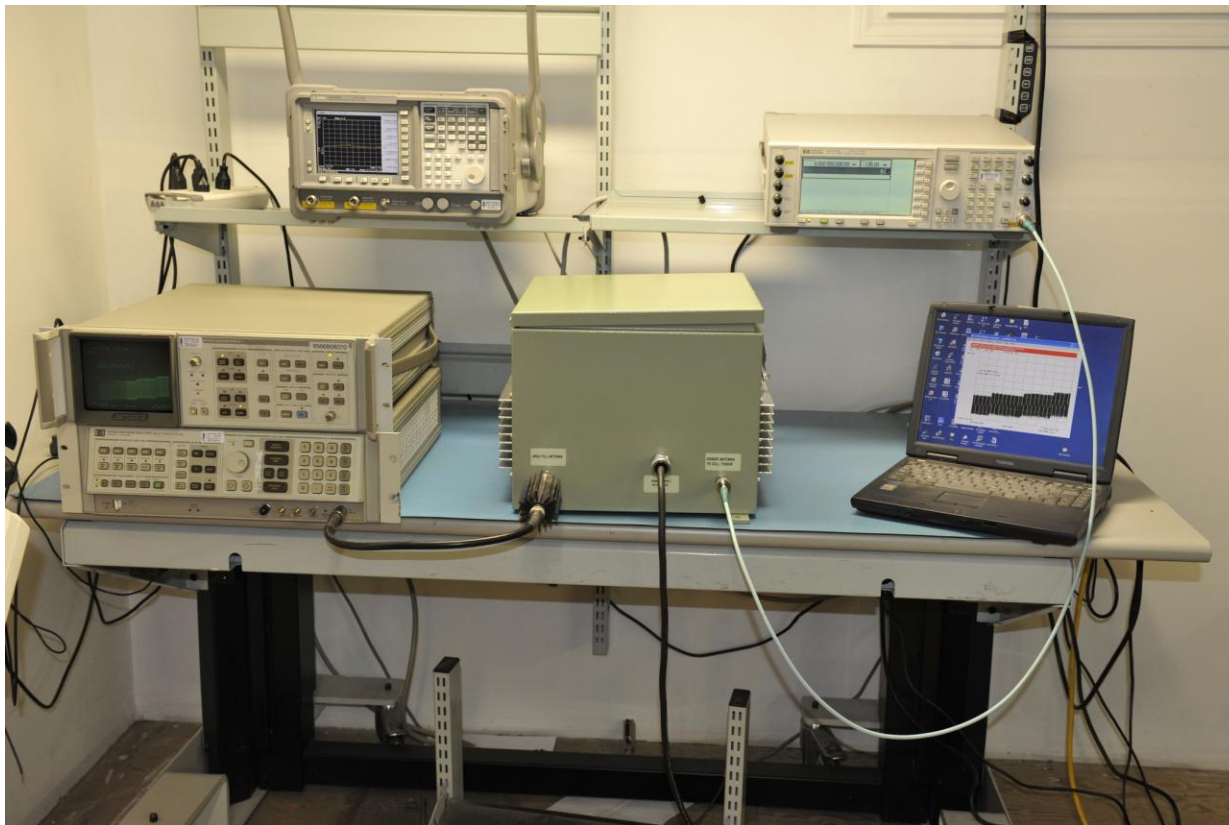
Downlink:

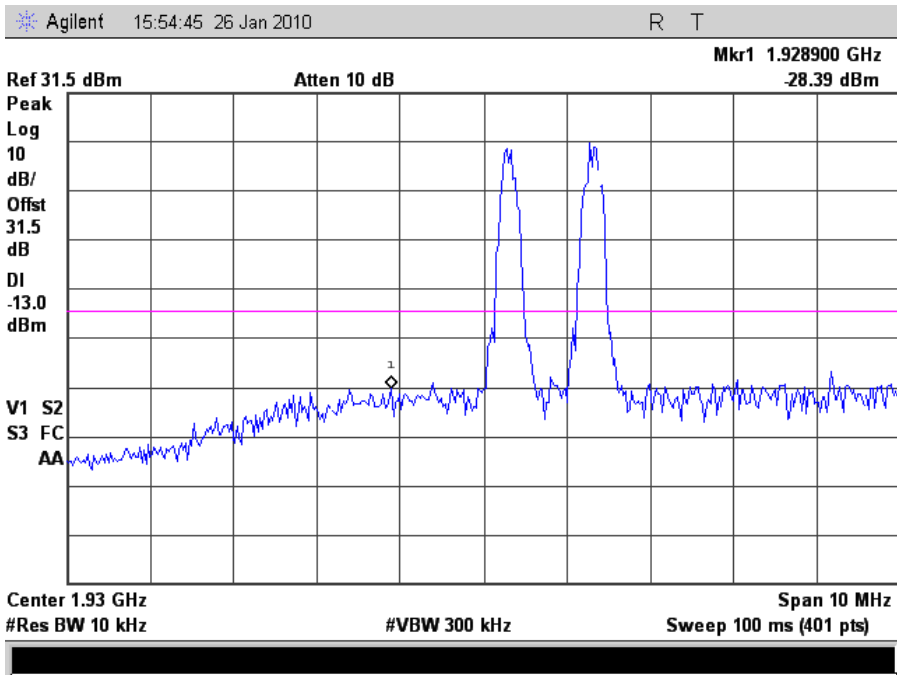
1930 to 1990MHz

Uplink Modulation:

EDGE, GSM, WCDMA

Test Setup Measuring Spurious up to 20 Gigahertz

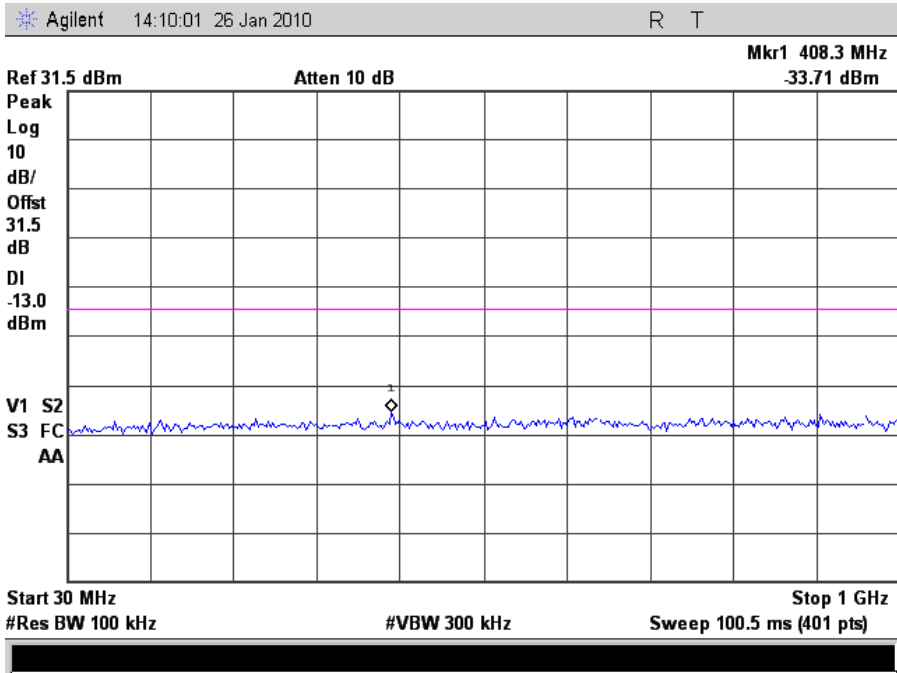




PASS

Measured at the output terminal of the RPT1900 at rated power.

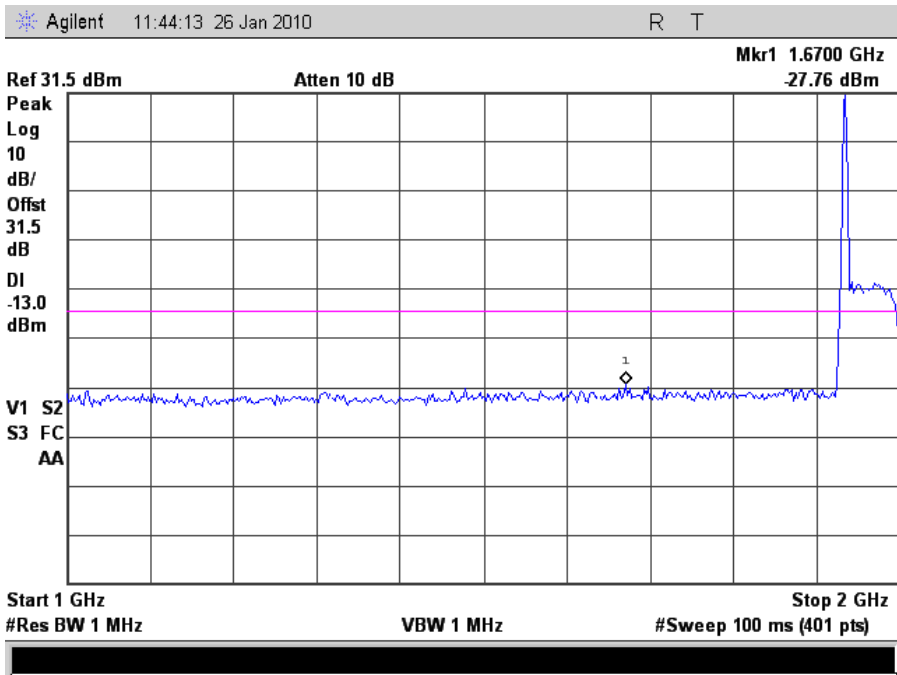
START 30MHz STOP 1 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

DOWNLINK - EDGE 1930MHz
START 1 GHz STOP 2 GHz



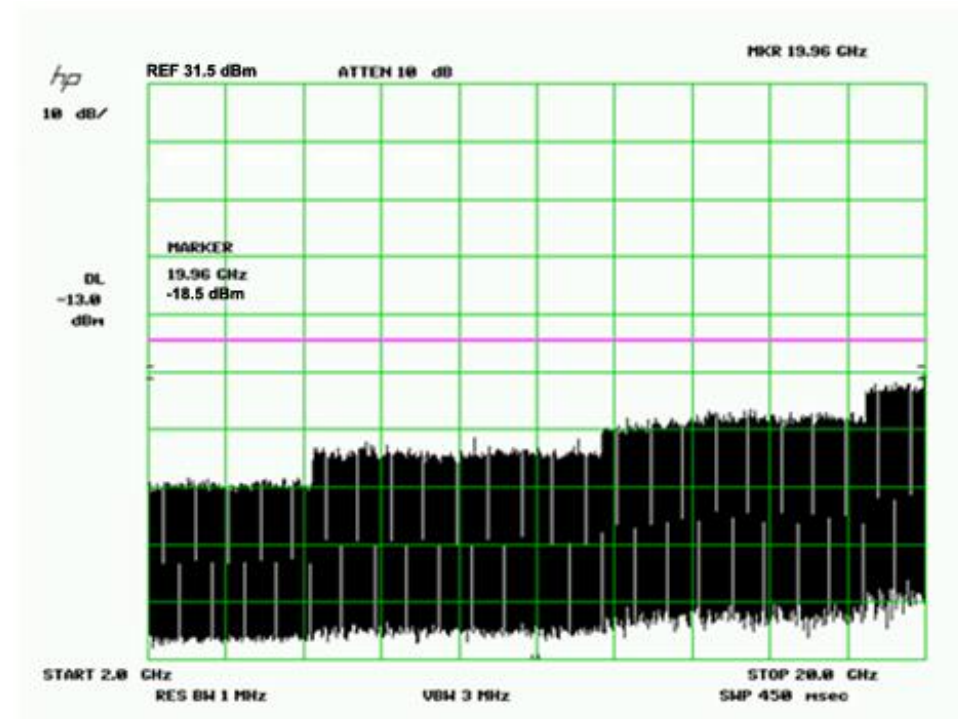
PASS

Measured at the output terminal of the RPT1900 at rated power.

FCCID UDIRPT1900

DOWNLINK - EDGE 1930MHz

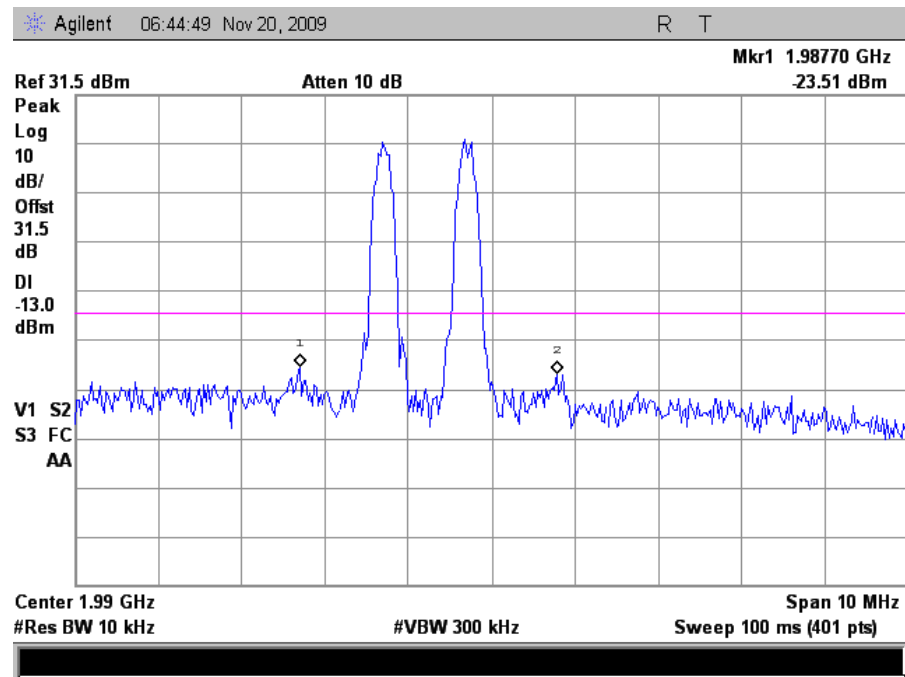
START 2 GHz STOP 20 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

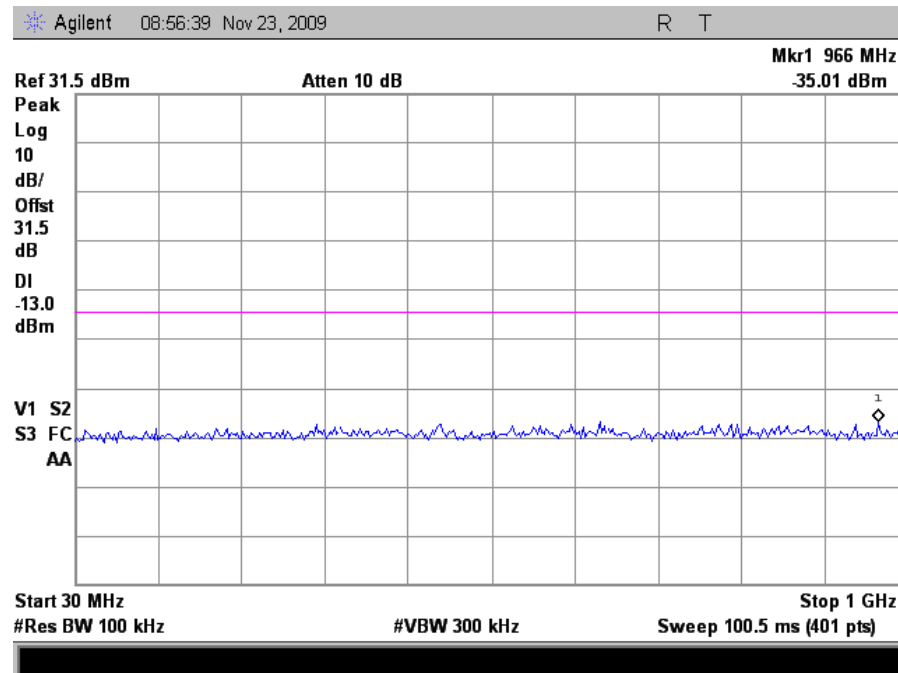
DOWNLINK - EDGE 1990MHz START 30MHz STOP 1 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power .

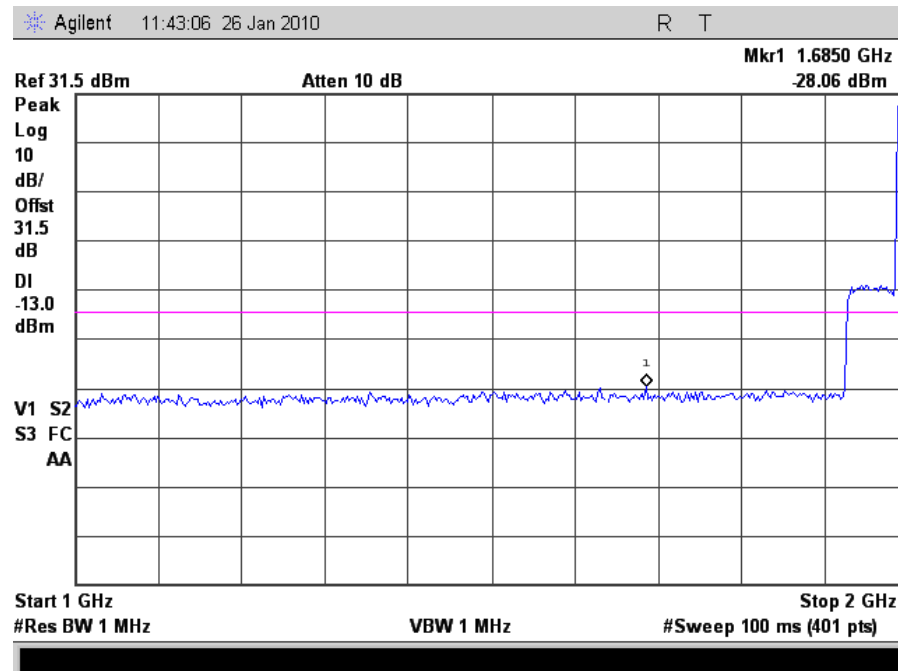
DOWNLINK - GSM 1990MHz START 30MHz STOP 1 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power .

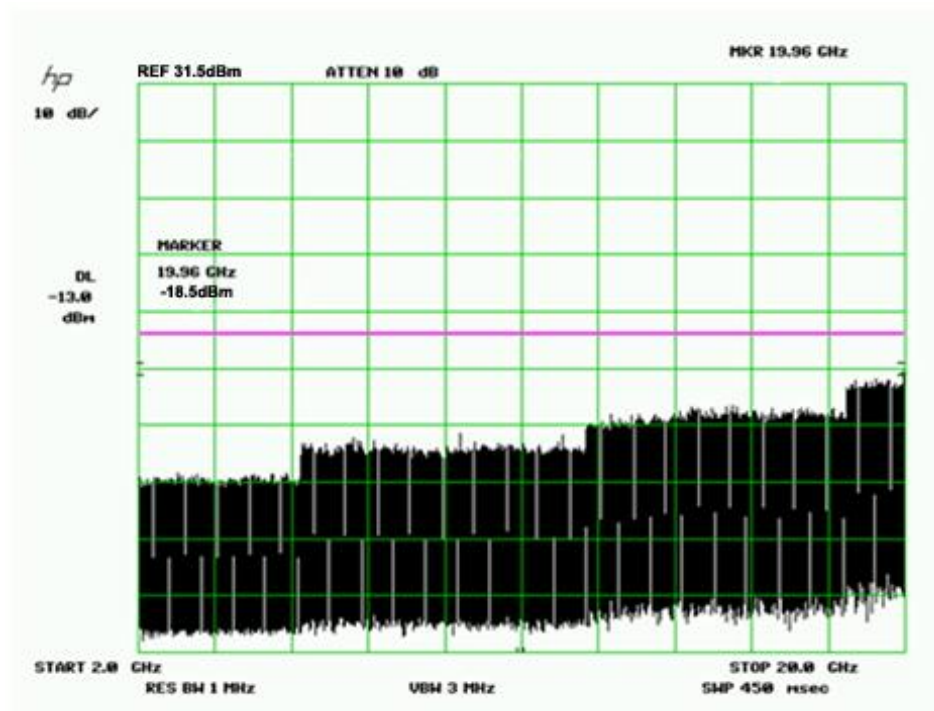
DOWNLINK - EDGE 1990MHz START 1 GHz STOP 2GHz



PASS

Measured at the output terminal of the RPT1900 at rated power .

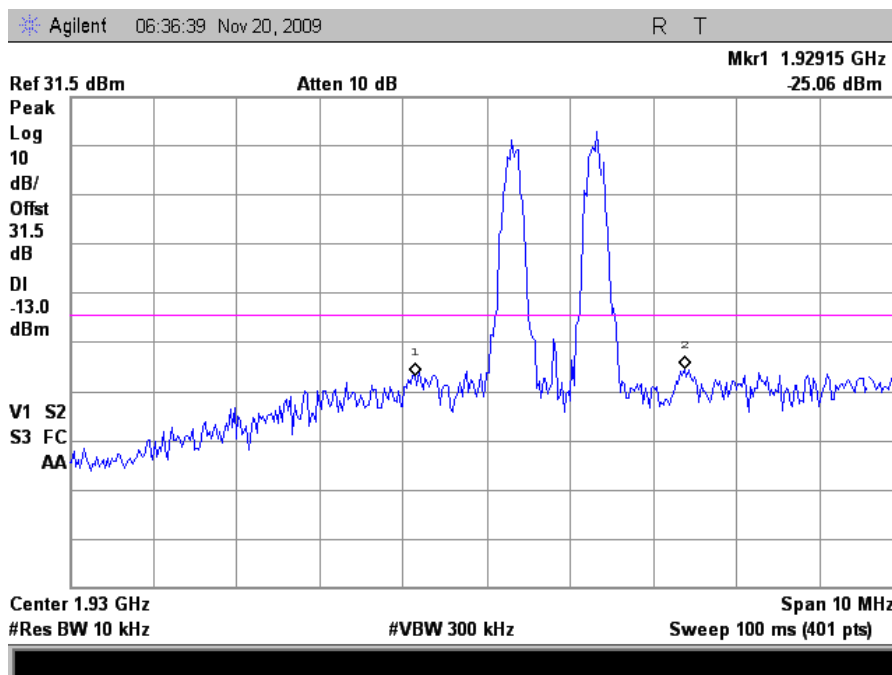
FCCID UDIRPT1900
DOWNLINK - EDGE 1990MHz
START 2 GHz STOP 20GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

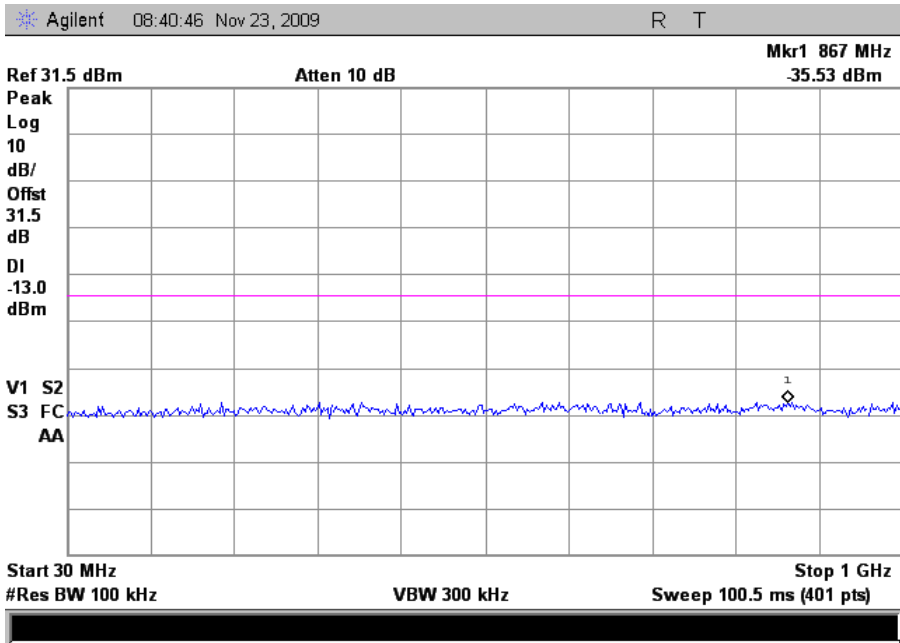
DOWNLINK - GSM 1930MHz



PASS

Measured at the output terminal of the RPT1900 at rated power .

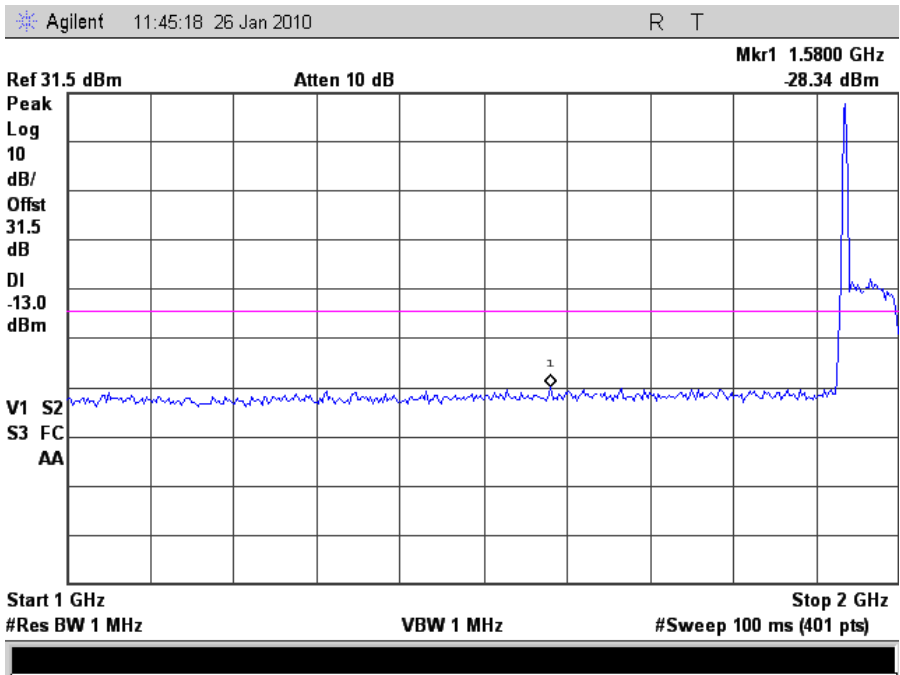
DOWNLINK - GSM 1930MHz START 30MHz STOP 1 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

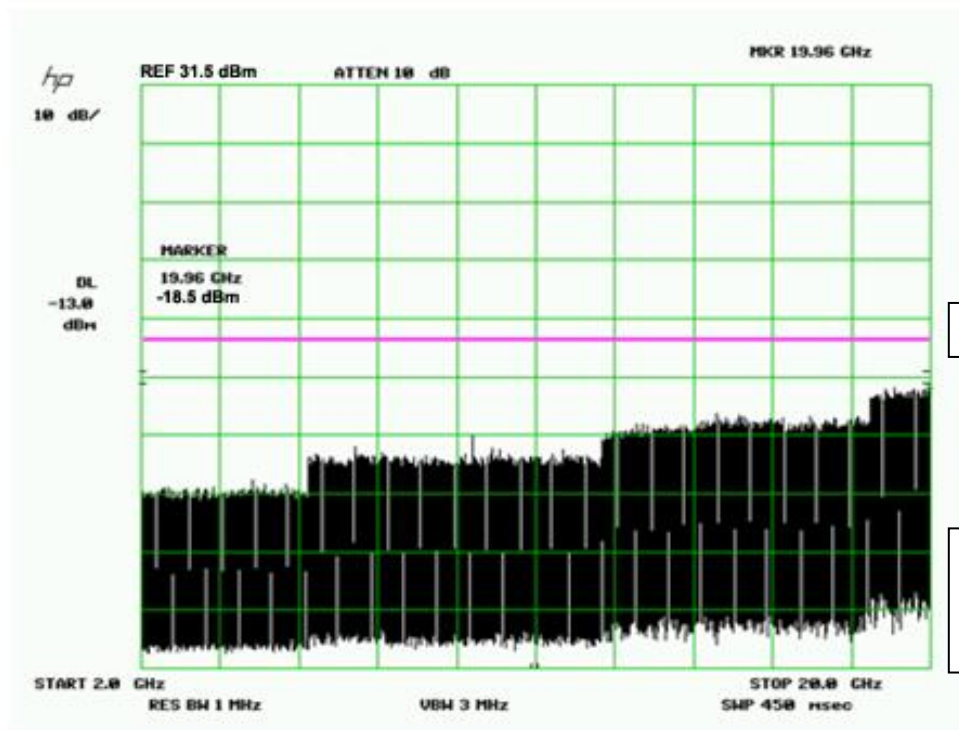
DOWNLINK - GSM 1930MHz START 1 GHz STOP 2 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power .

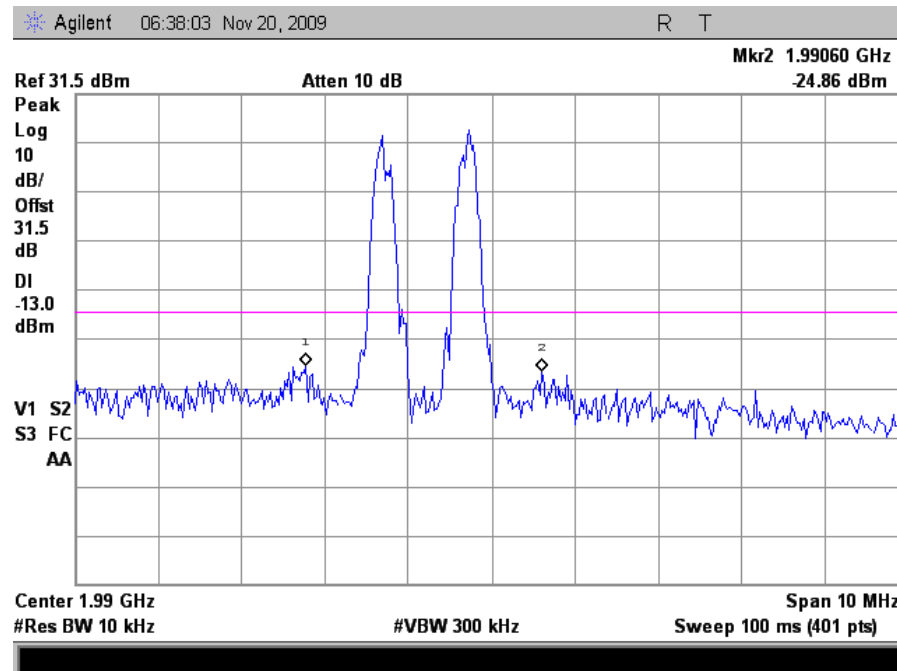
DOWNLINK - GSM 1930MHz START 2 GHz STOP 20 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

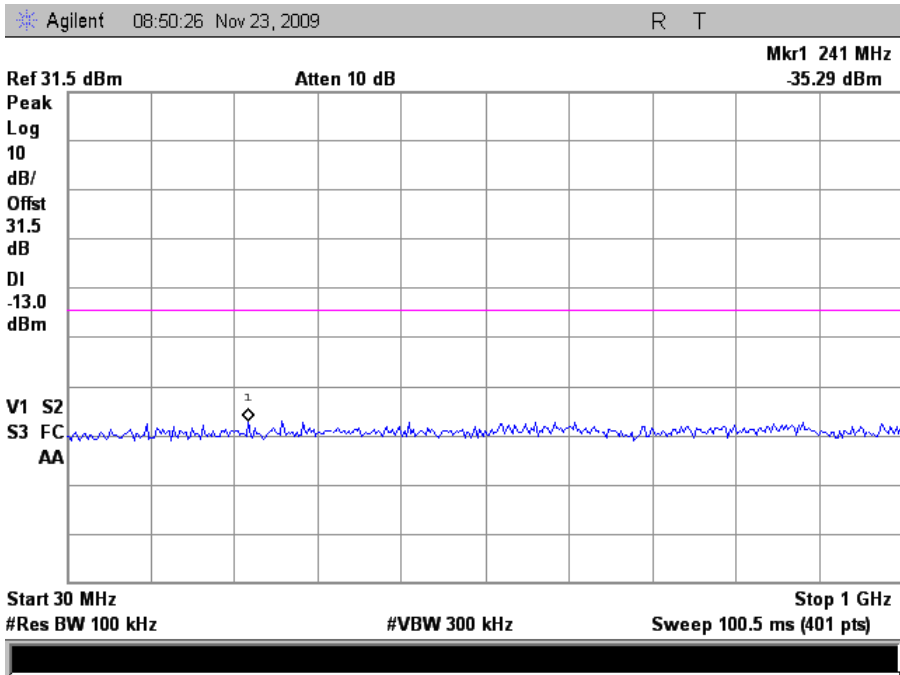
DOWNLINK - GSM 1990MHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

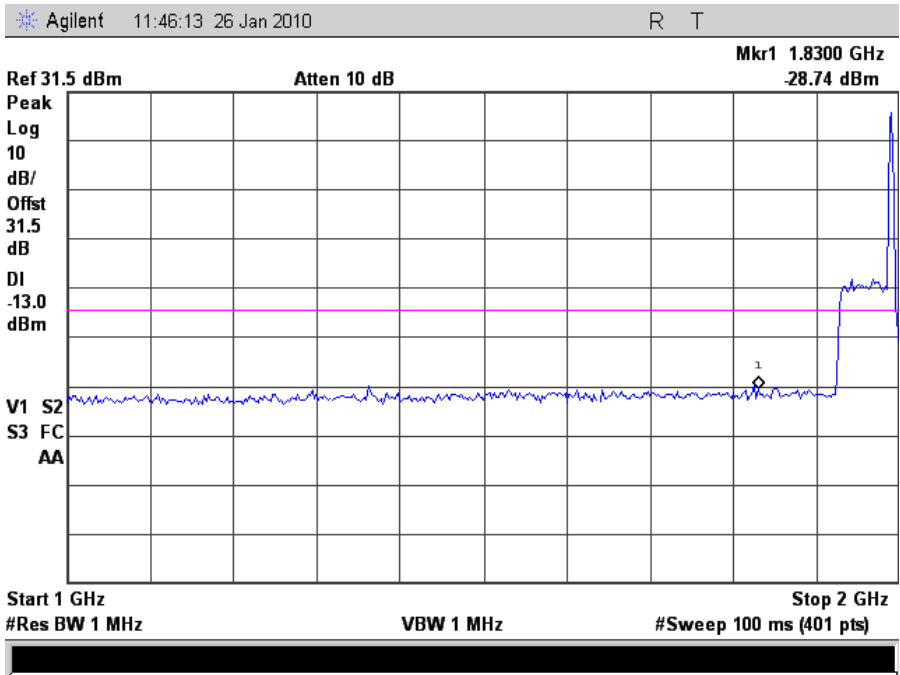
DOWNLINK - GSM 1990MHz START 30 MHz STOP 1 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power .

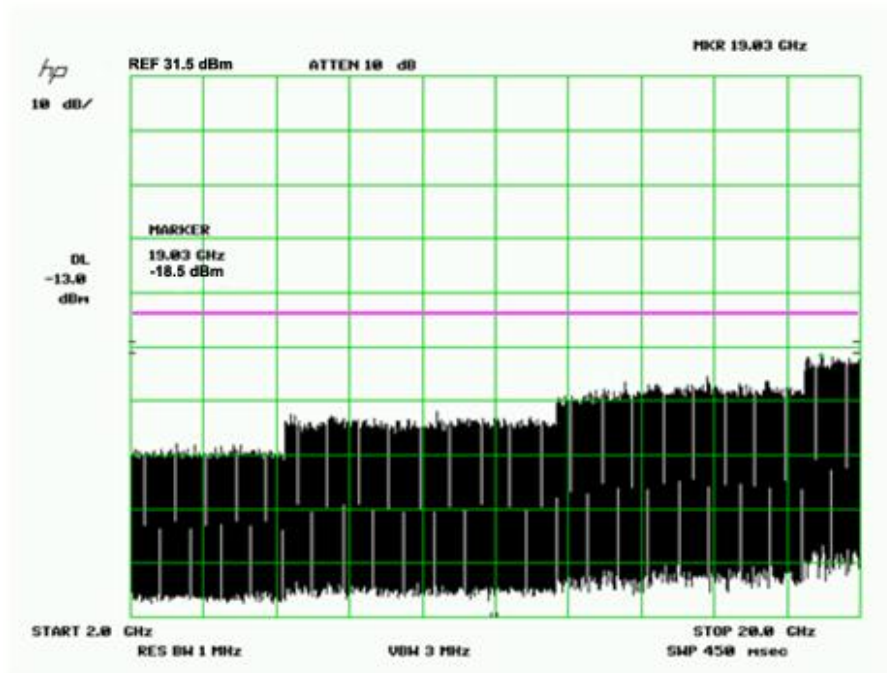
DOWNLINK - GSM 1990MHz START 1 GHz STOP 2 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

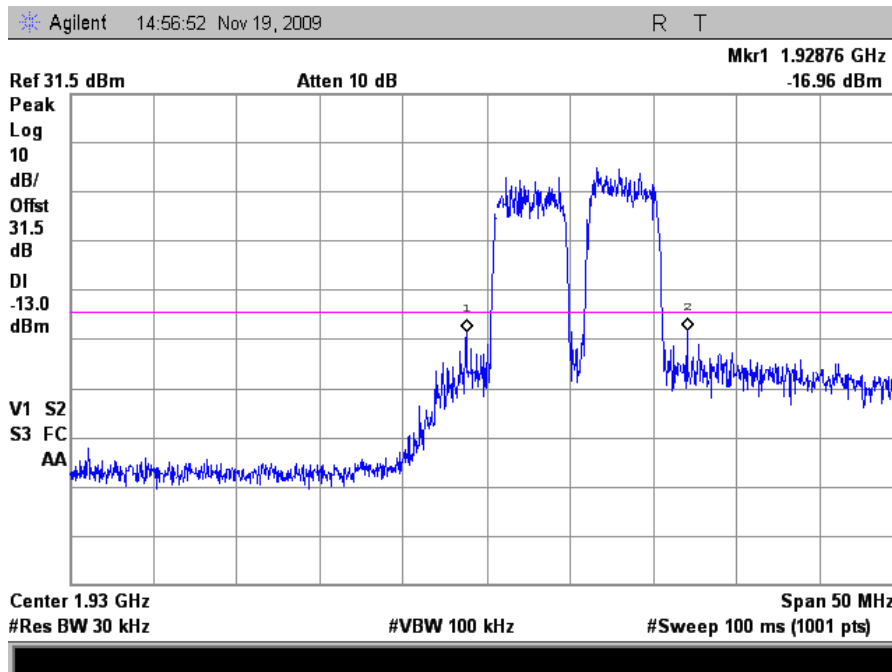
DOWNLINK - GSM 1990MHz START 2 GHz STOP 20 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power .

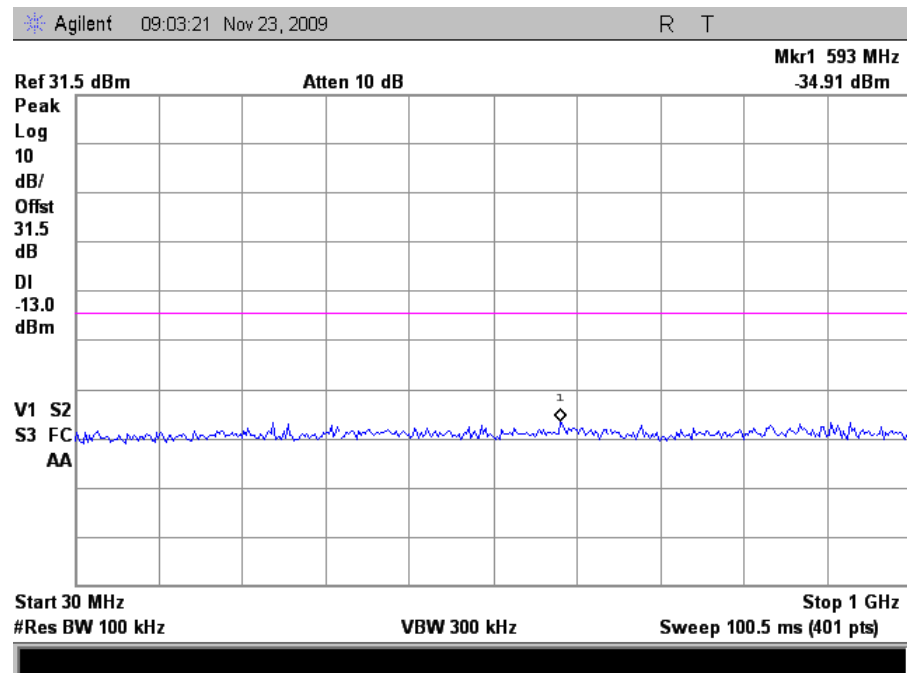
DOWNLINK - WCDMA 1930MHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

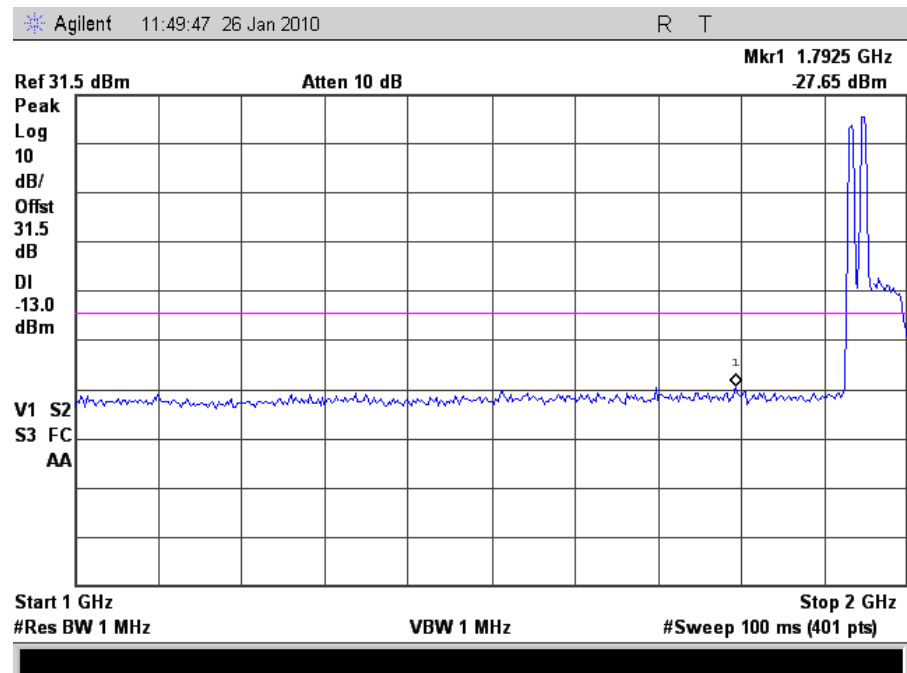
DOWNLINK - WCDMA 1930MHz START 30 MHz STOP 1 GHz.



PASS

Measured at the output terminal of the RPT1900 at rated power.

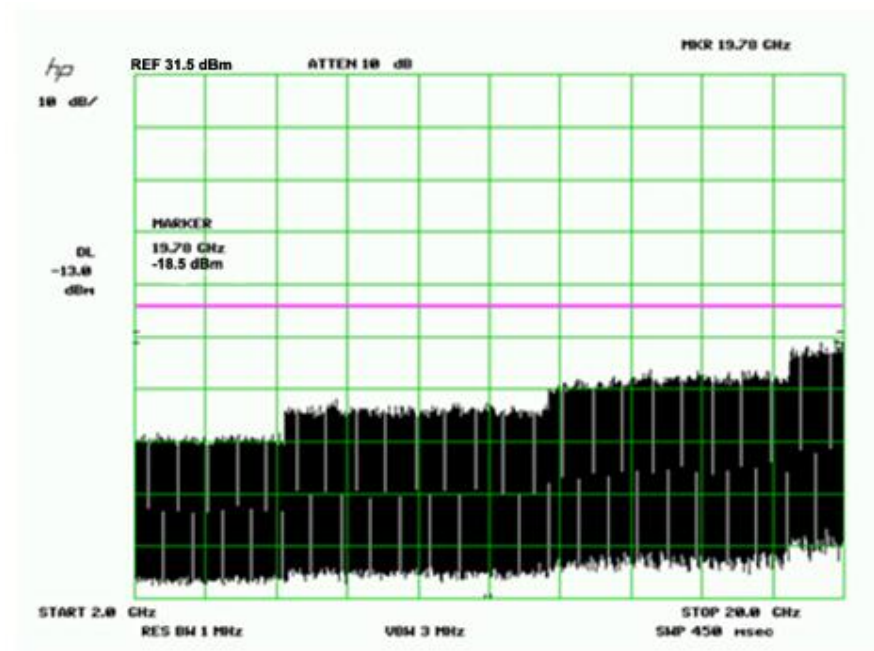
DOWNLINK - WCDMA 1930MHz START 1 GHz STOP 2GHz.



PASS

Measured at the output terminal of the RPT1900 at rated power.

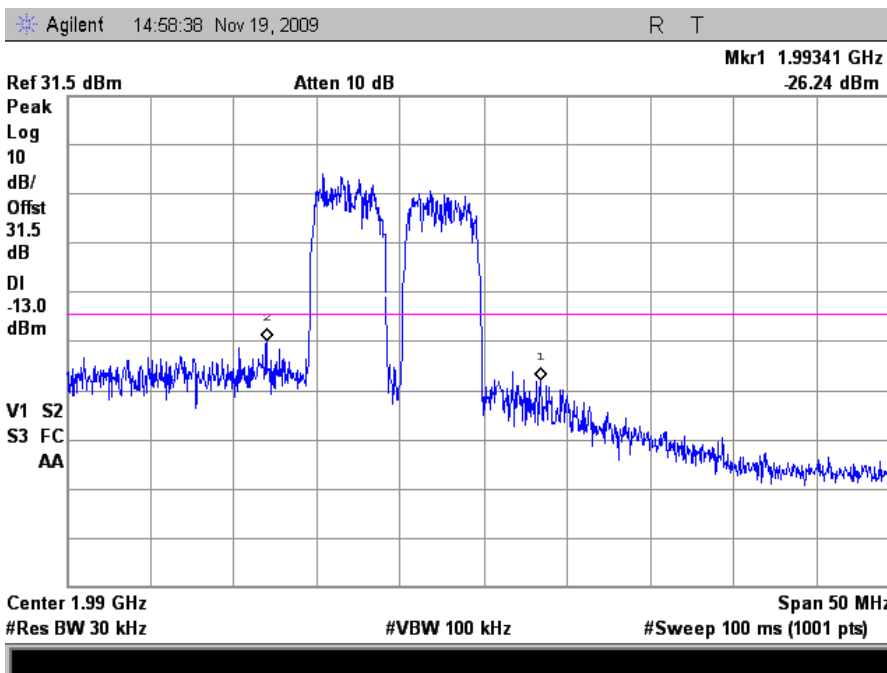
FCCID UDIRPT1900
DOWNLINK - WCDMA 1930MHz START 2 GHz STOP 20GHz.



PASS

Measured at the output terminal of the RPT1900 at rated power.

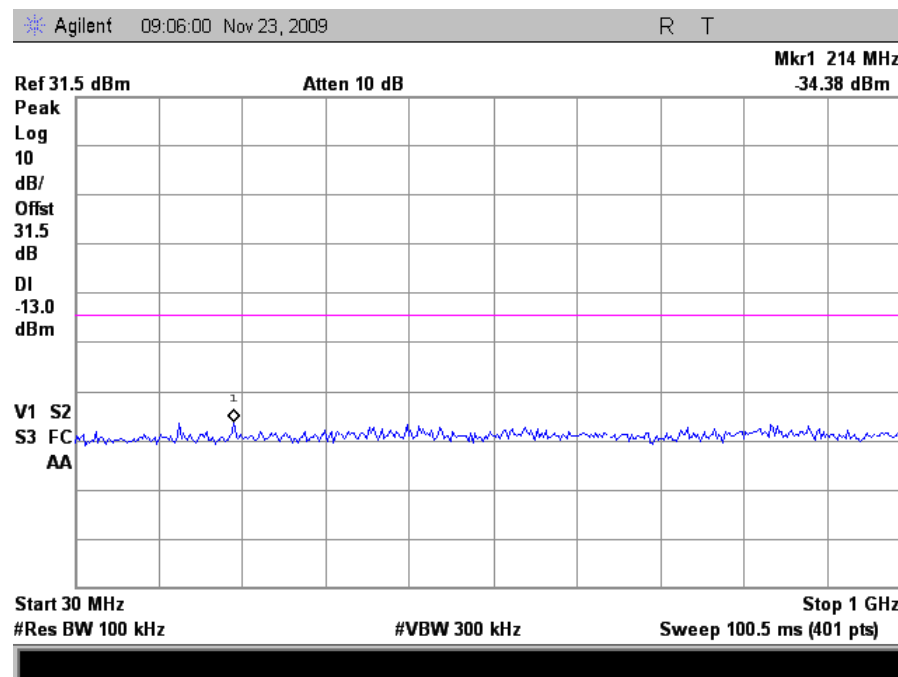
DOWNLINK - WCDMA 1990MHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

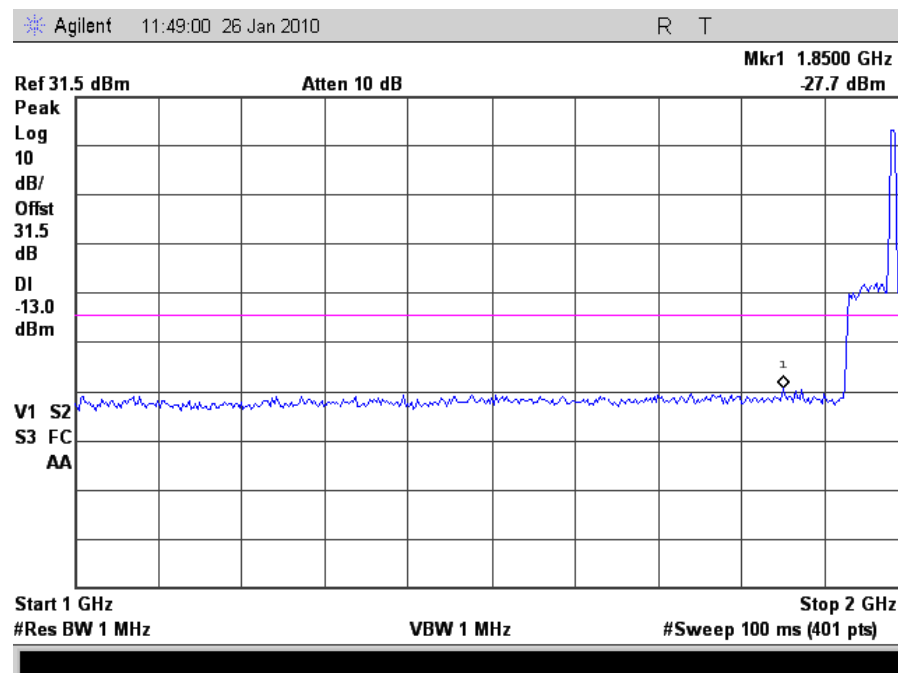
FCCID UDIRPT1900
DOWNLINK - WCDMA 1990MHz START 30 MHz STOP 1 GHz.



PASS

Measured at the output terminal of the RPT1900 at rated power.

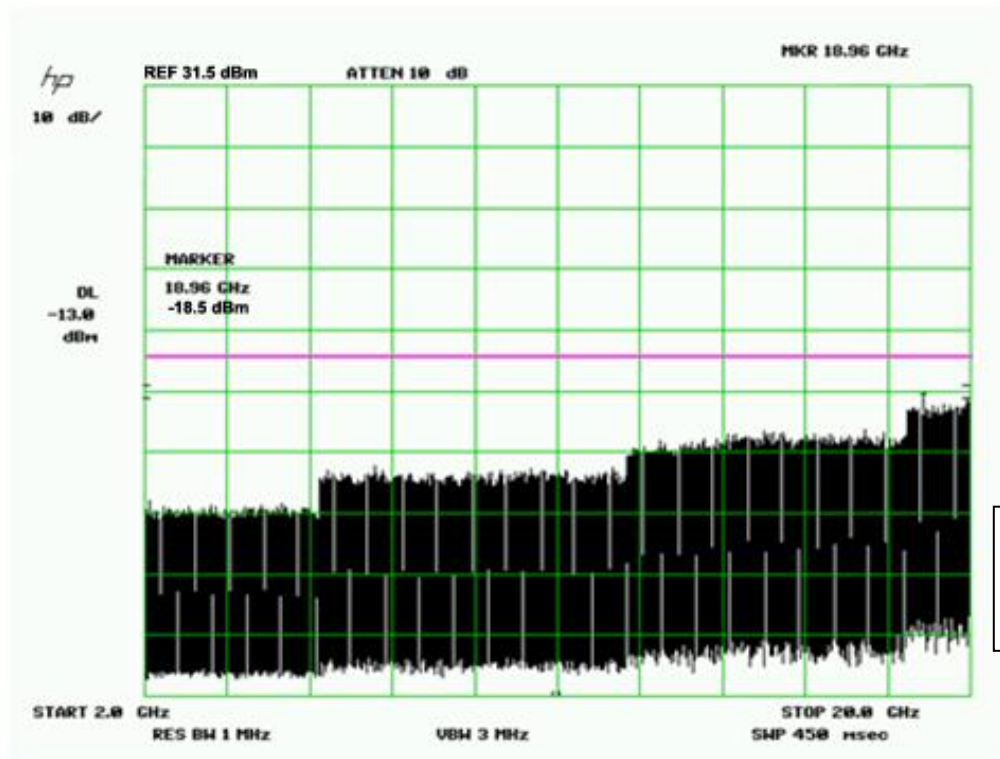
DOWNLINK - WCDMA 1990MHz START 1 GHz STOP 2GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

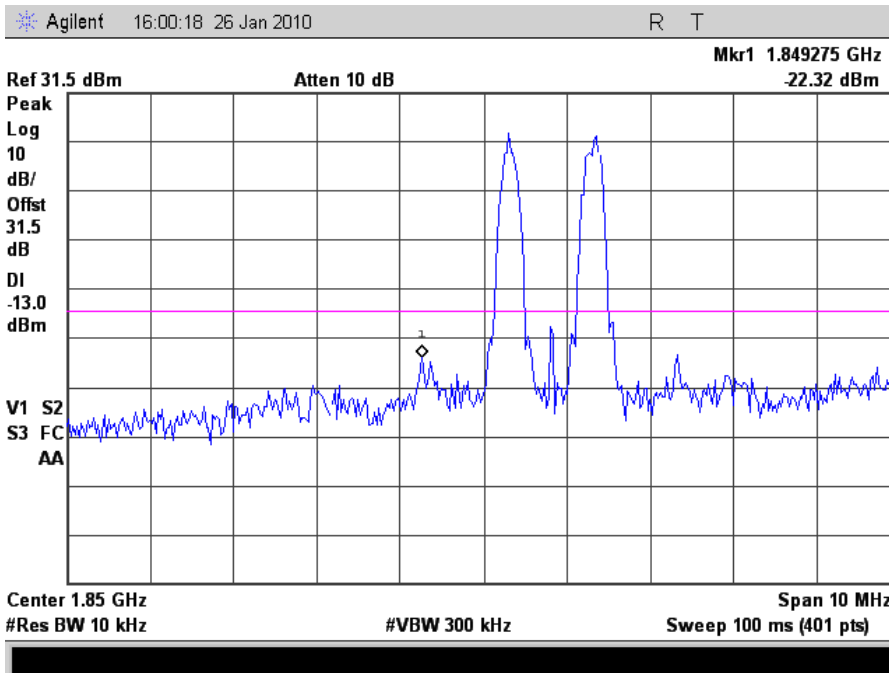
FCCID UDIRPT1900
DOWNLINK - WCDMA 1990MHz START 2 GHz STOP 20GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

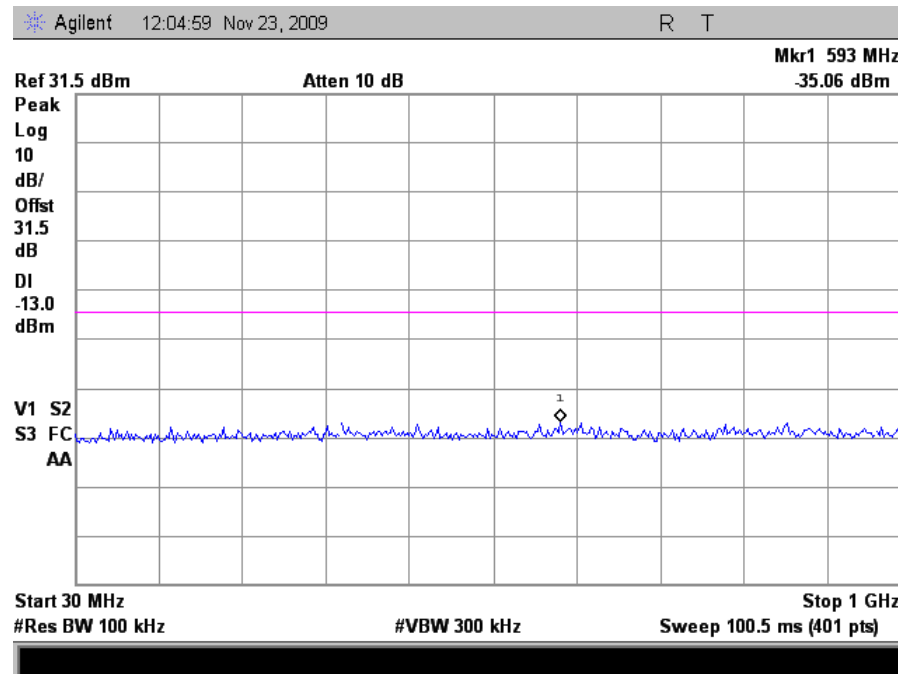
UPLINK - EDGE 1850MHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

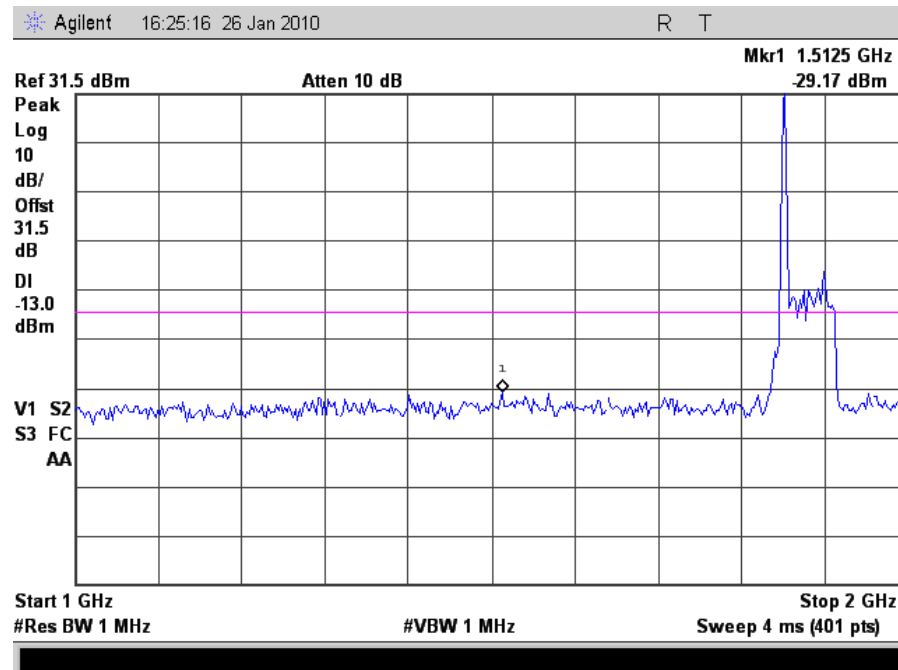
UPLINK - EDGE 1850MHz START 30MHz STOP 1 GHz



PASS

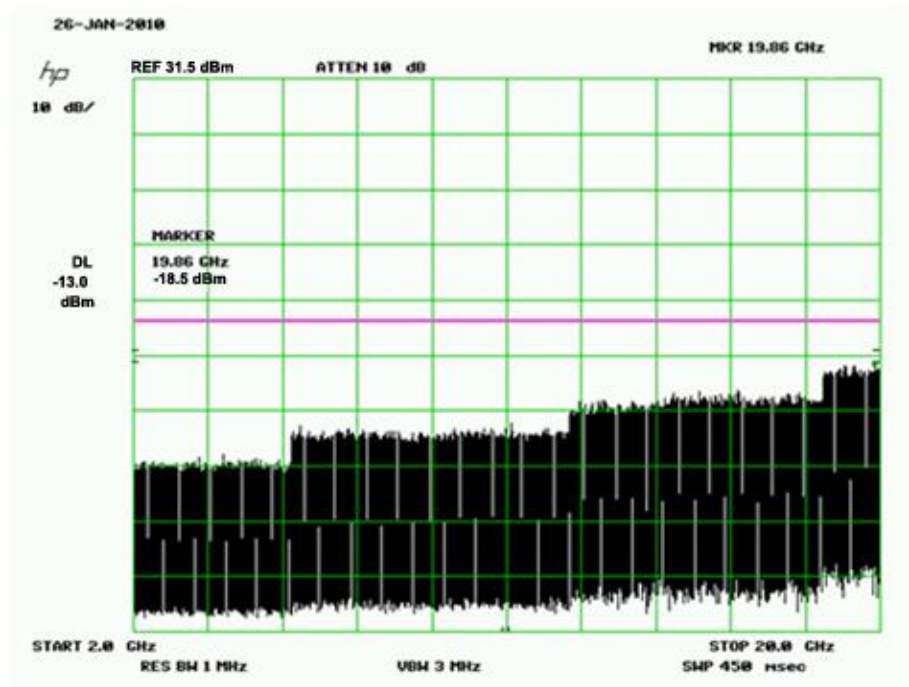
Measured at the output terminal of the RPT1900 at rated power.

UPLINK - EDGE 1850MHz START 1 GHz STOP 2 GHz



PASS

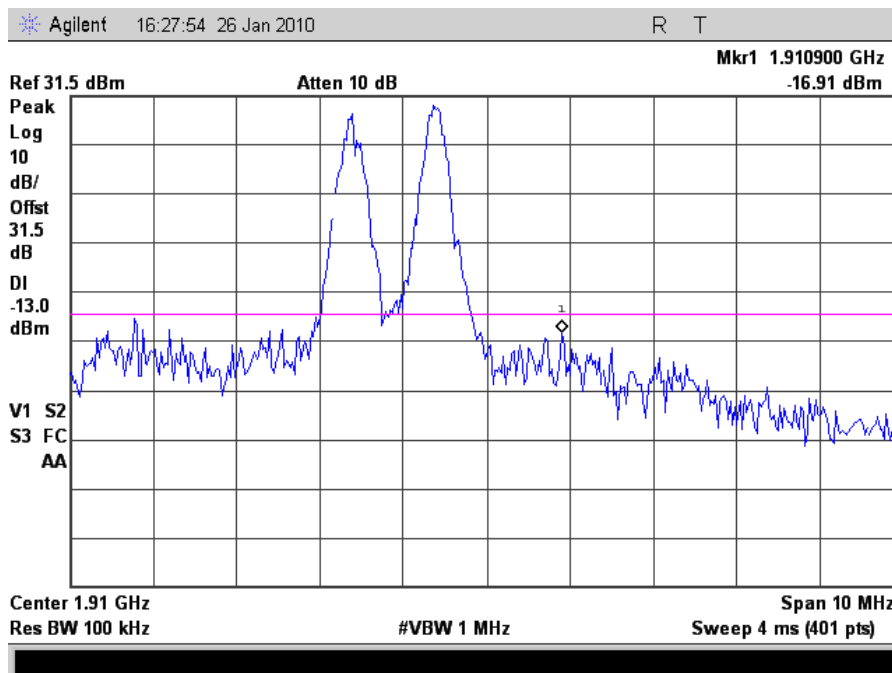
Measured at the output terminal of the RPT1900 at rated power.



PASS

Measured at the output terminal of the RPT1900 at rated power.

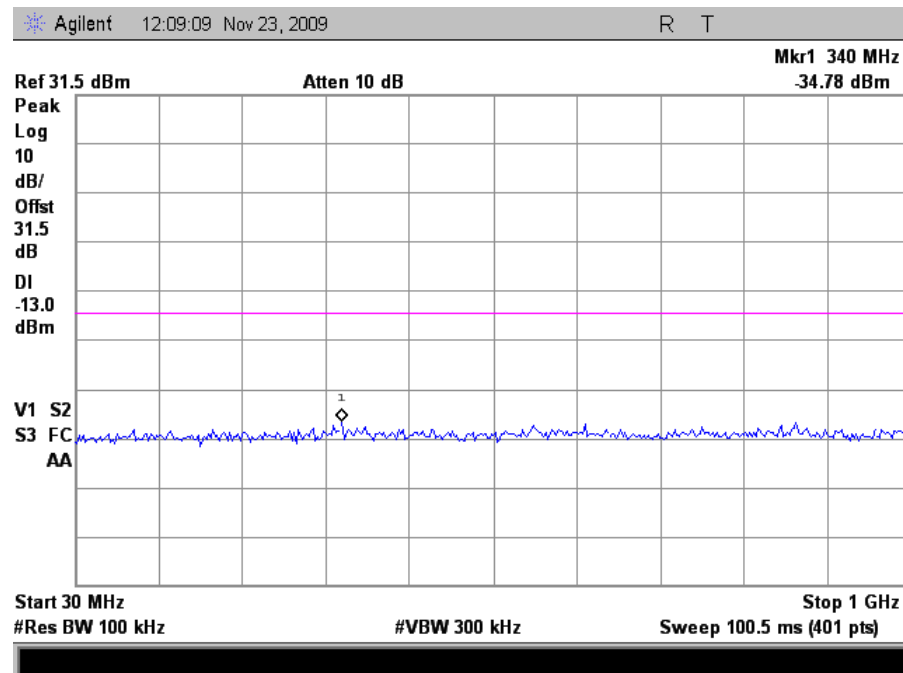
UPLINK - EDGE 1910MHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

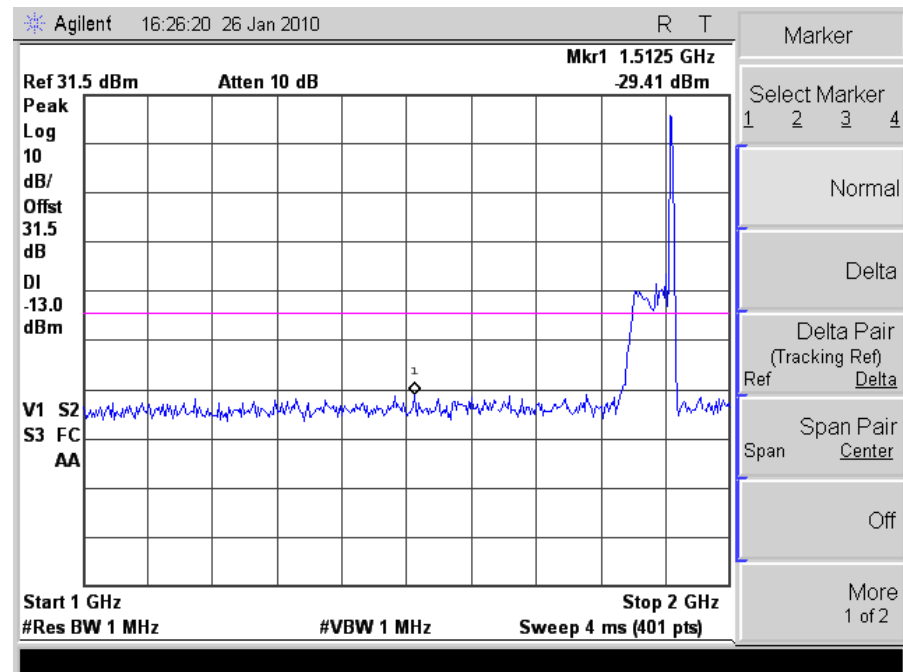
UPLINK - EDGE 1910MHz START 30 MHz STOP 1 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

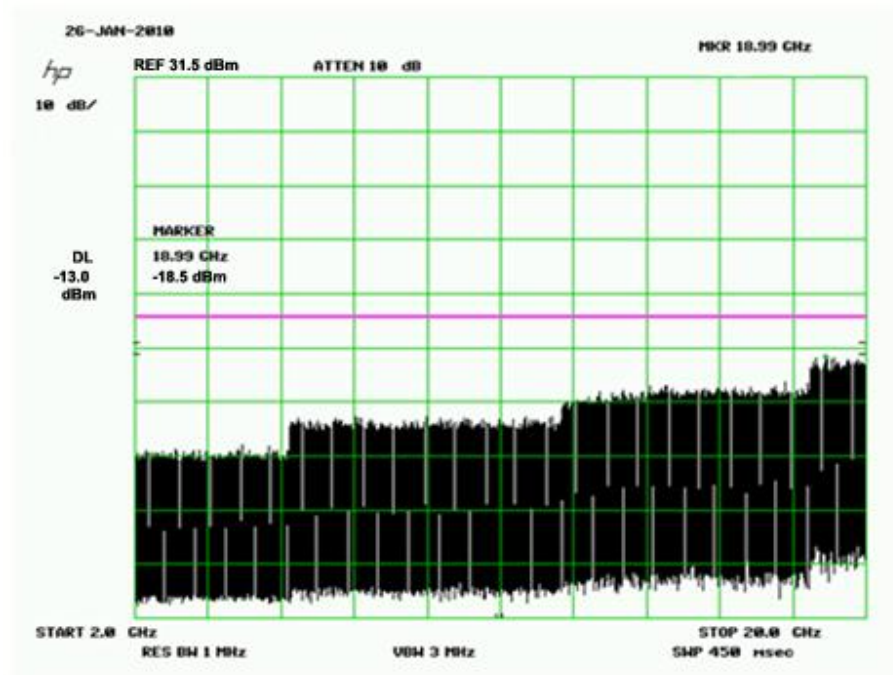
UPLINK - EDGE 1910MHz START 1 GHz STOP 2 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

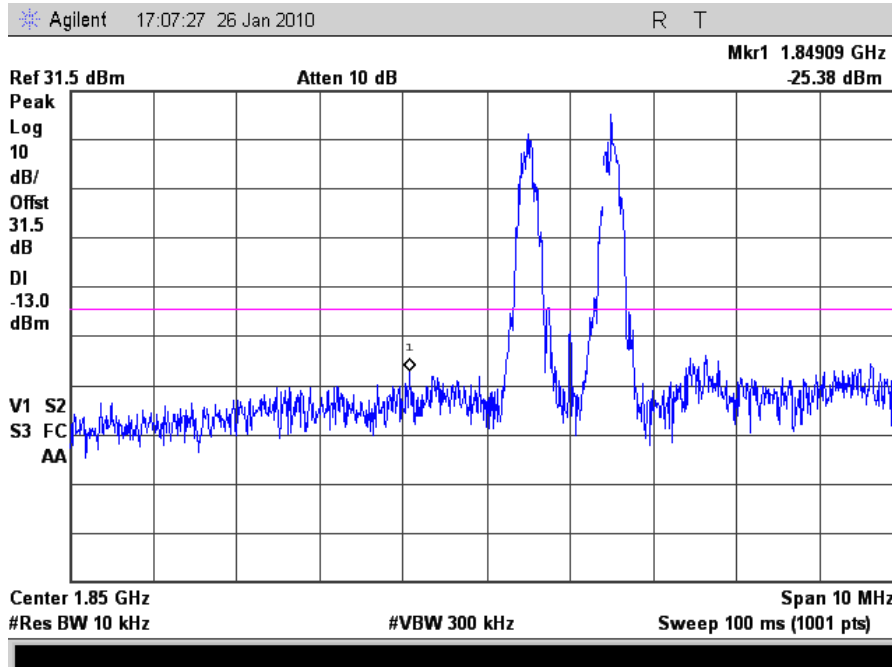
UPLINK - EDGE 1910MHz START 2 GHz STOP 20 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

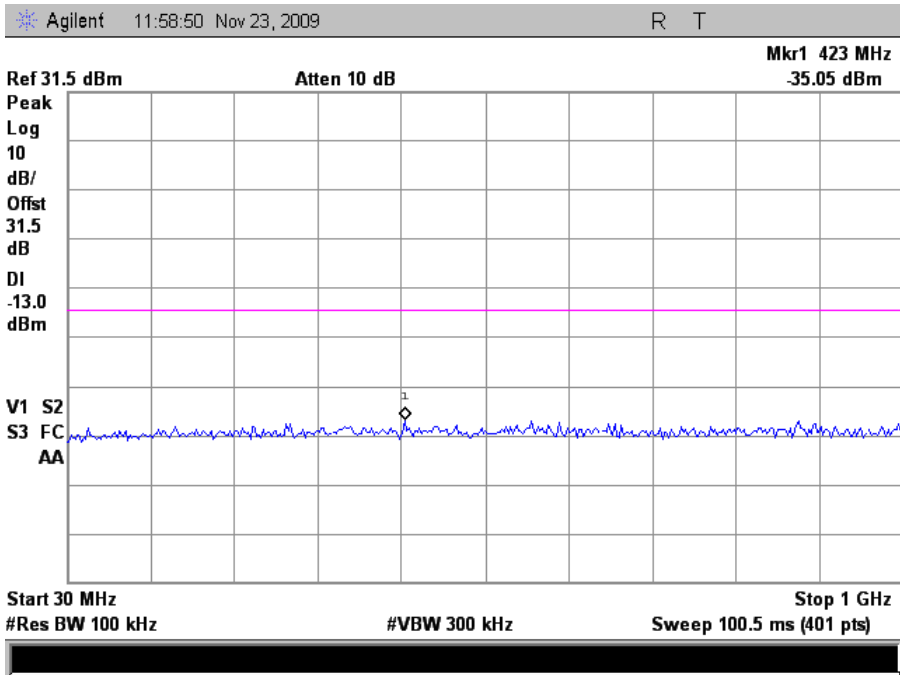
UPLINK - GSM 1850MHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

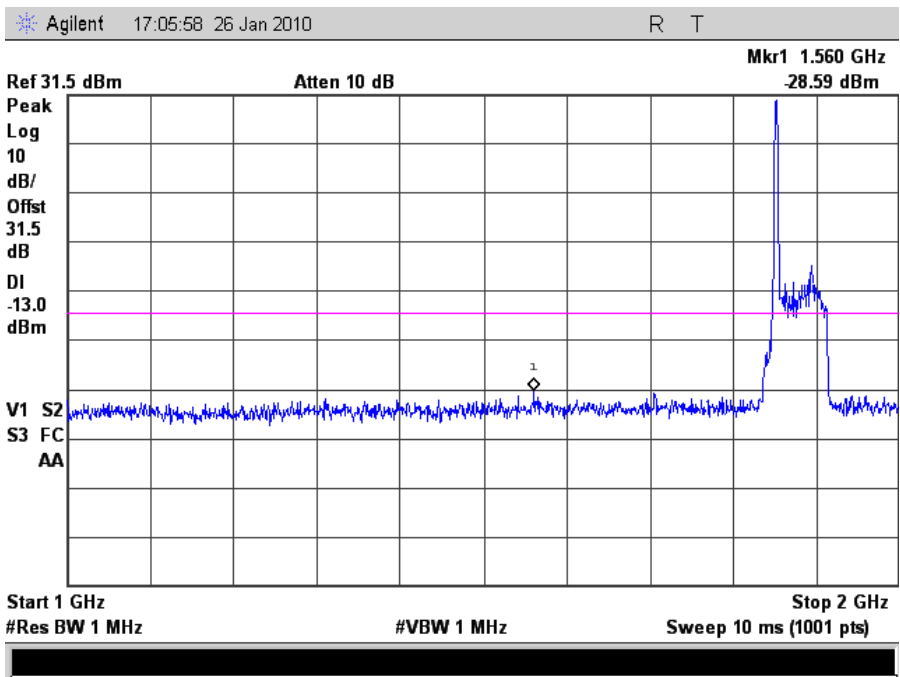
UPLINK - GSM 1850MHz START 30 MHz STOP 1 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

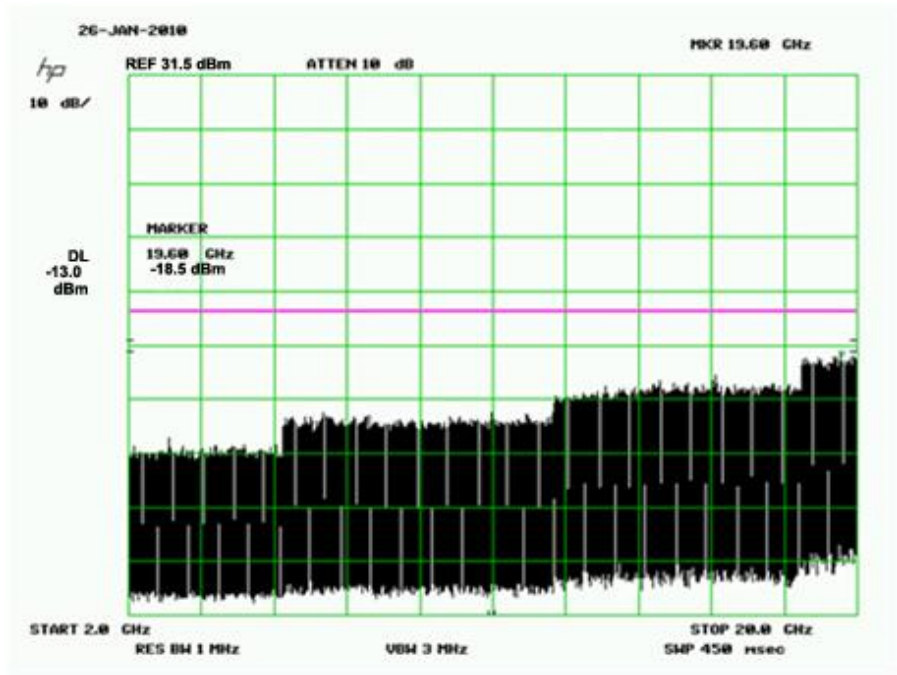
UPLINK - GSM 1850MHz START 1 GHz STOP 2 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

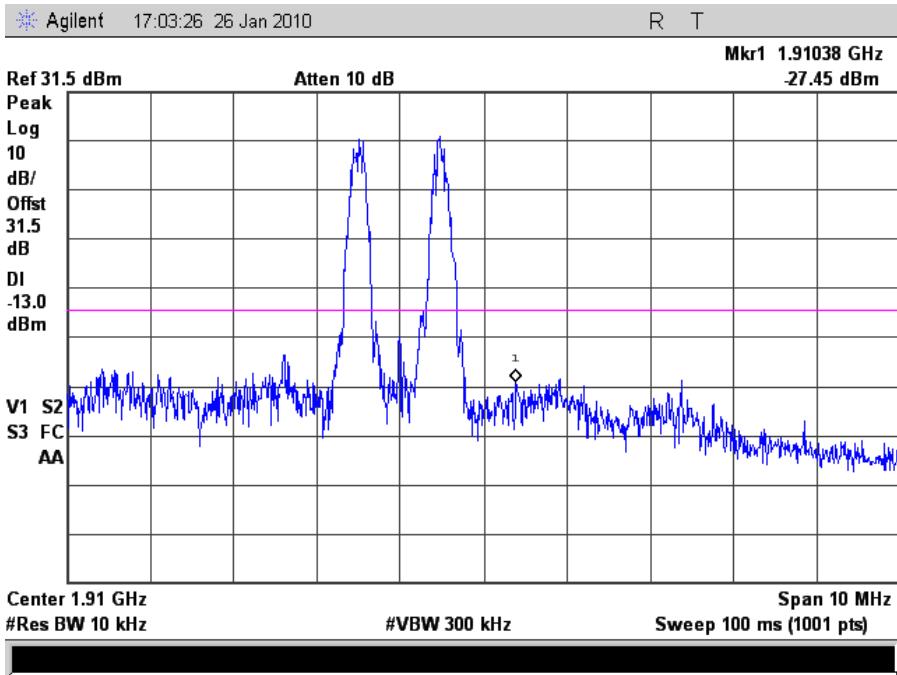
UPLINK - GSM 1850MHz START 2 GHz STOP 20 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

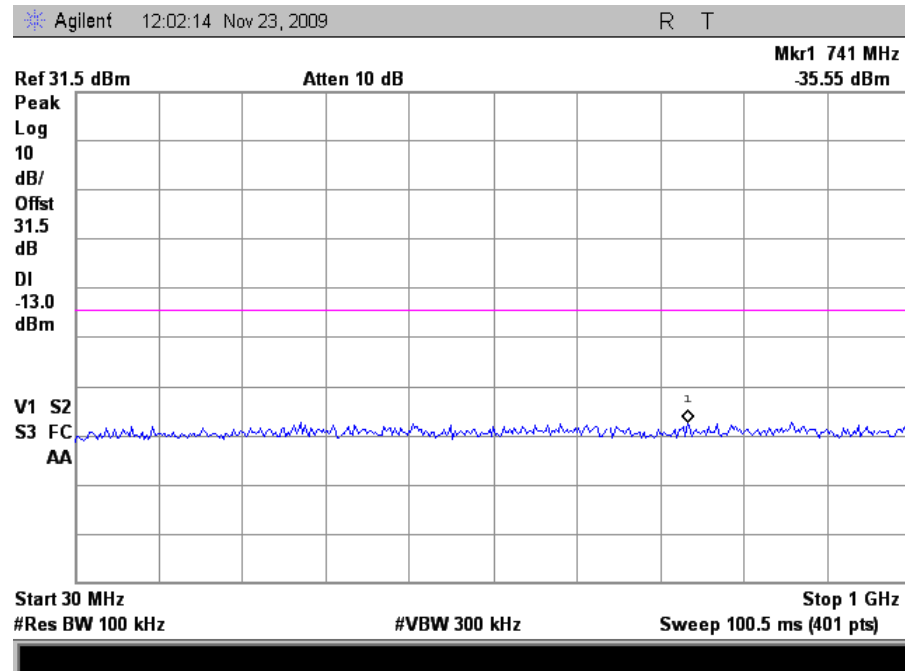
UPLINK - GSM 1910MHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

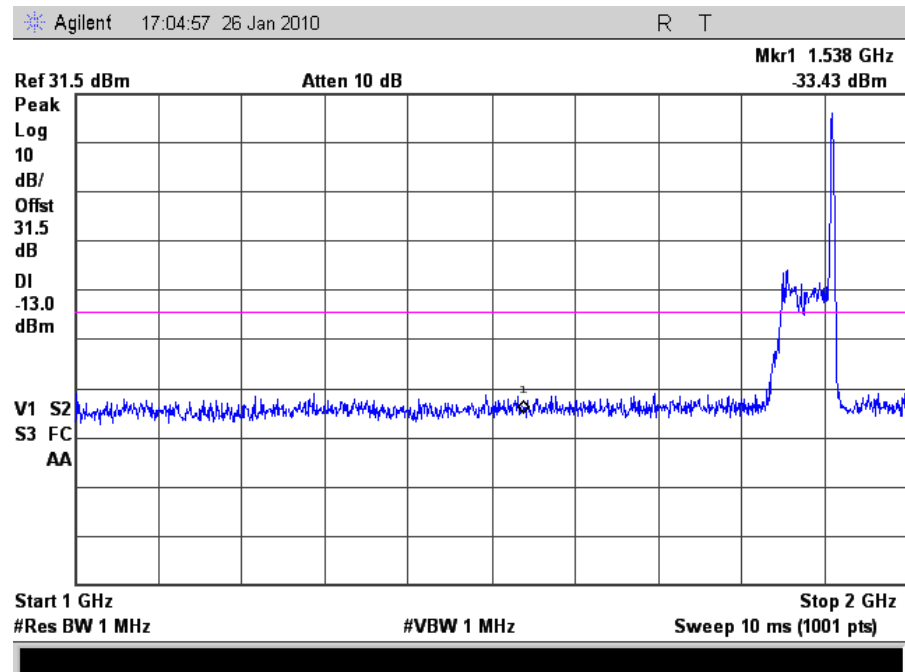
UPLINK - GSM 1910MHz START 30 MHz STOP 1 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

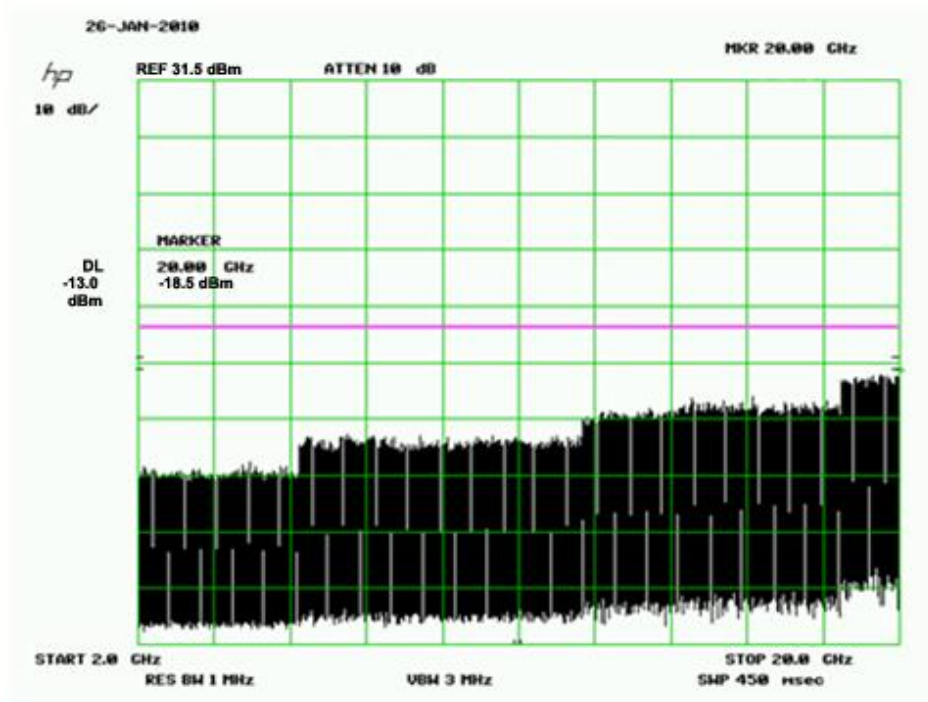
UPLINK - GSM 1910MHz START 1 GHz STOP 2 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

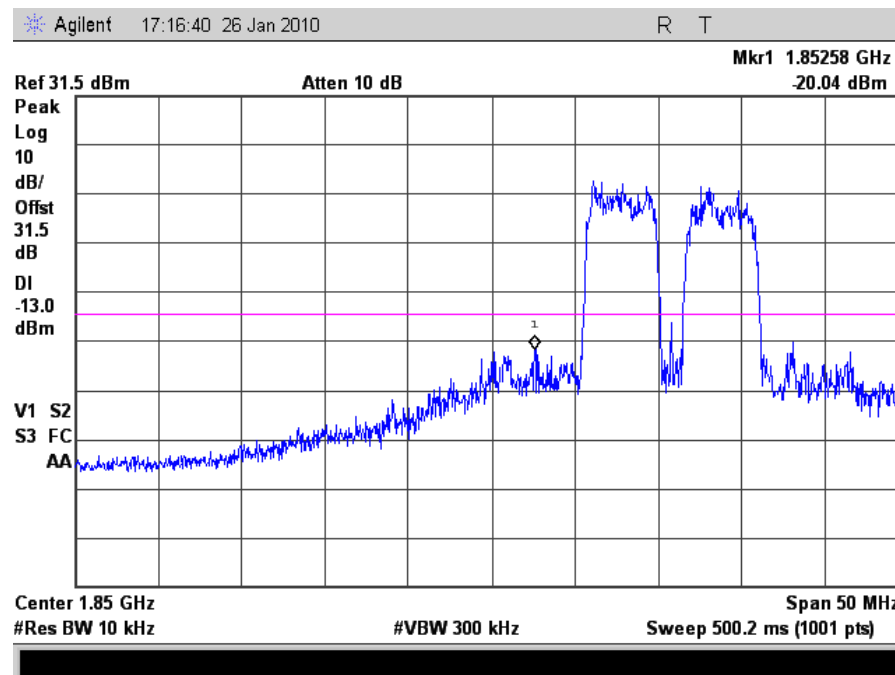
UPLINK - GSM 1910MHz START 2 GHz STOP 20 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

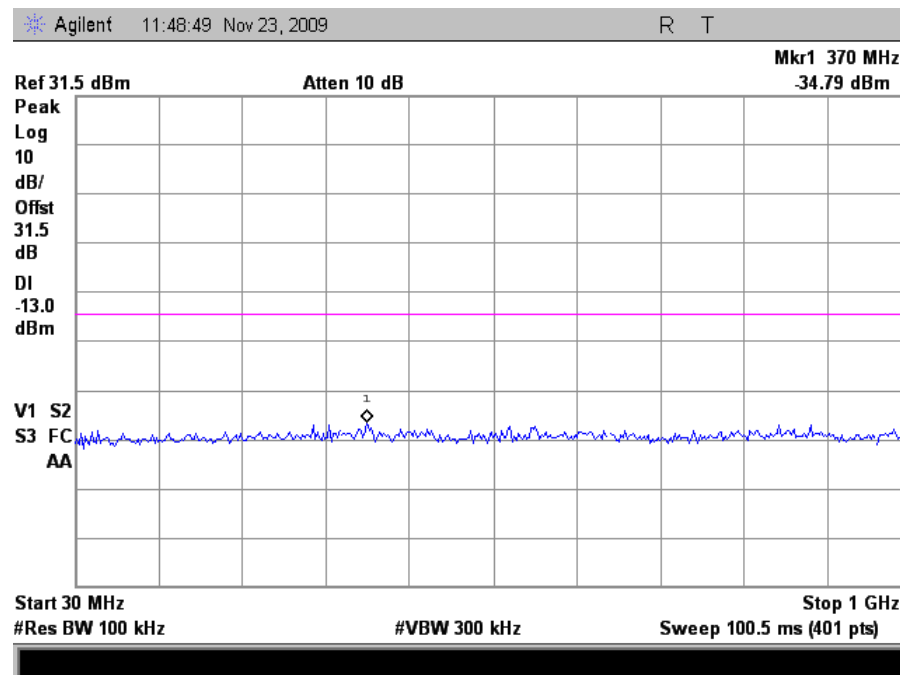
UPLINK - WCDMA 1850MHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

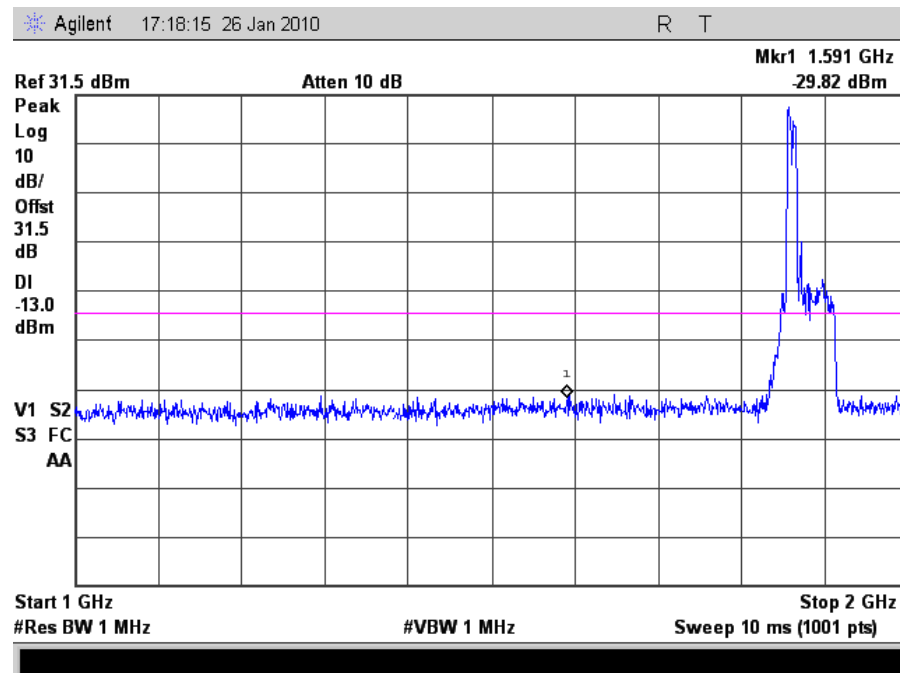
UPLINK - WCDMA 1850MHz START 30 MHz STOP 1 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

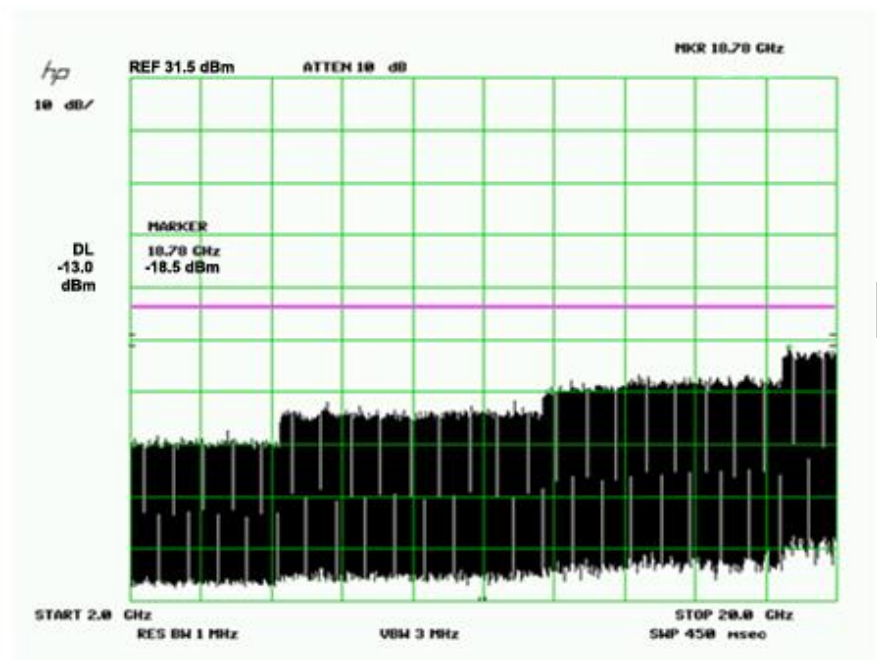
UPLINK - WCDMA 1850MHz START 1 GHz STOP 2 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

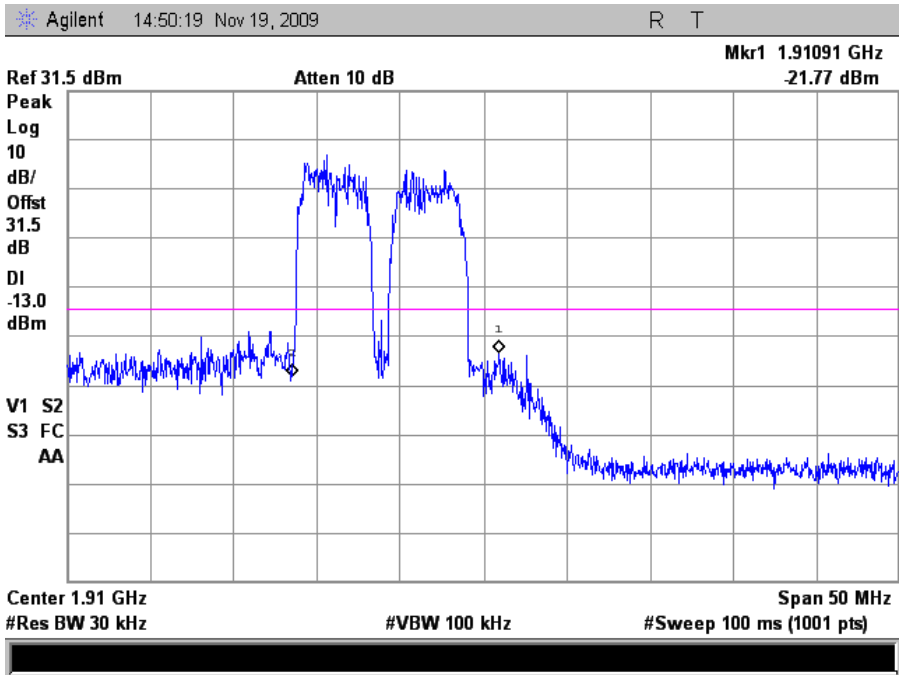
UPLINK - WCDMA 1850MHz START 2 GHz STOP 20 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

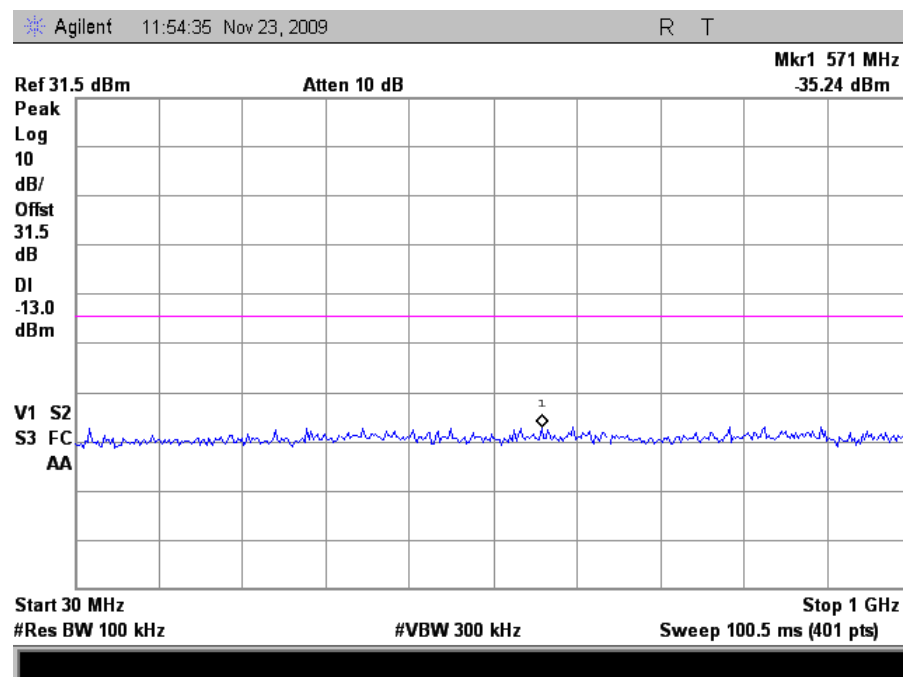
UPLINK - WCDMA 1910MHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

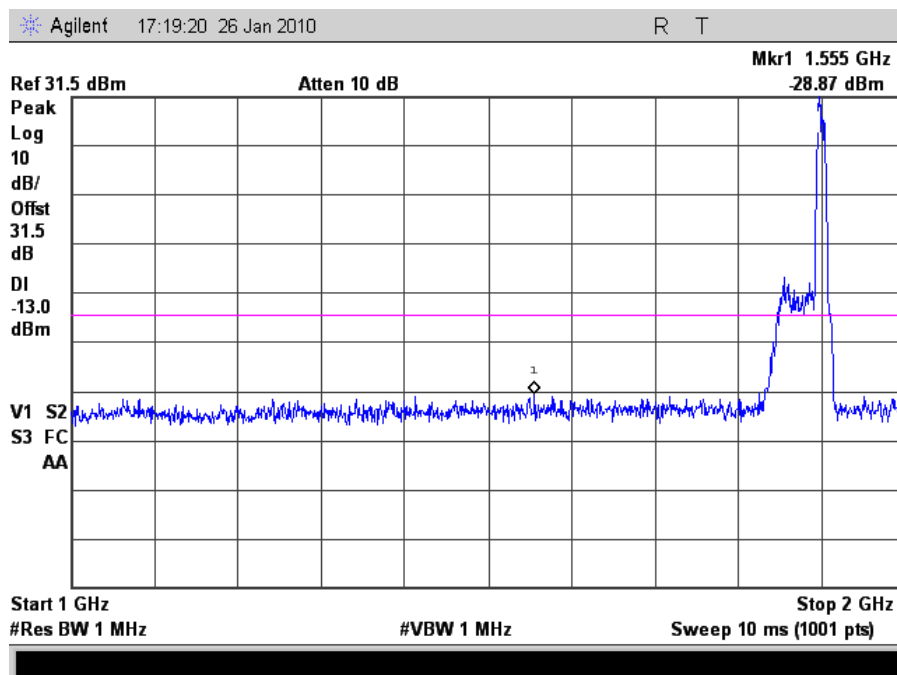
UPLINK - WCDMA 1910MHz START 30 MHz STOP 1 GHz



PASS

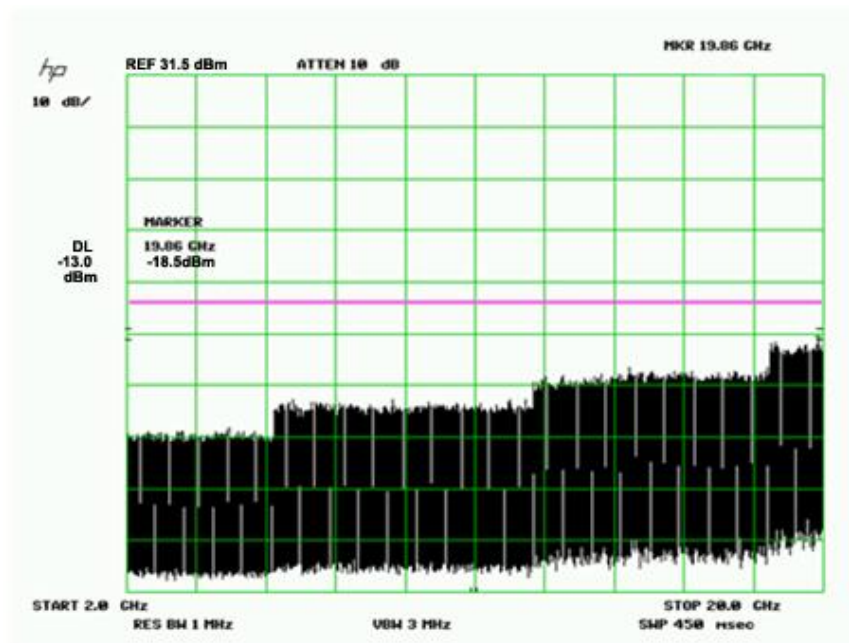
Measured at the output terminal of the RPT1900 at rated power.

UPLINK - WCDMA 1910MHz START 1 GHz STOP 2 GHz



PASS

Measured at the output terminal of the RPT1900 at rated power.

UPLINK - WCDMA 1910MHz START 2 GHz STOP 20 GHz

PASS

Measured at the output terminal of the RPT1900 at rated power.

99% BANDWIDTH**Test Setup**

See Appendix A

Test Equipment

Equipment	Manufacturer	Model#	Serial#	Cal Date	Cal Due
Spectrum Analyzer	Agilent	E4437B	US39230102	02-Nov-09	02-Nov-10
Signal Generator	Agilent	E4404B	MY44220519	02-Nov-09	02-Nov-10

Test Conditions

For downlink configuration, Donor antenna port is connected to Signal Generator and Area Fill antenna port is connected to a Spectrum Analyzer. Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

For uplink configuration, Donor antenna port is connected to Signal Analyzer and Area Fill antenna port is connected to a Signal Analyzer.

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

Spectrum analyzer offset adjusted to allow for inline attenuator and cable losses.

Uplink: 1850 to 1910MHz

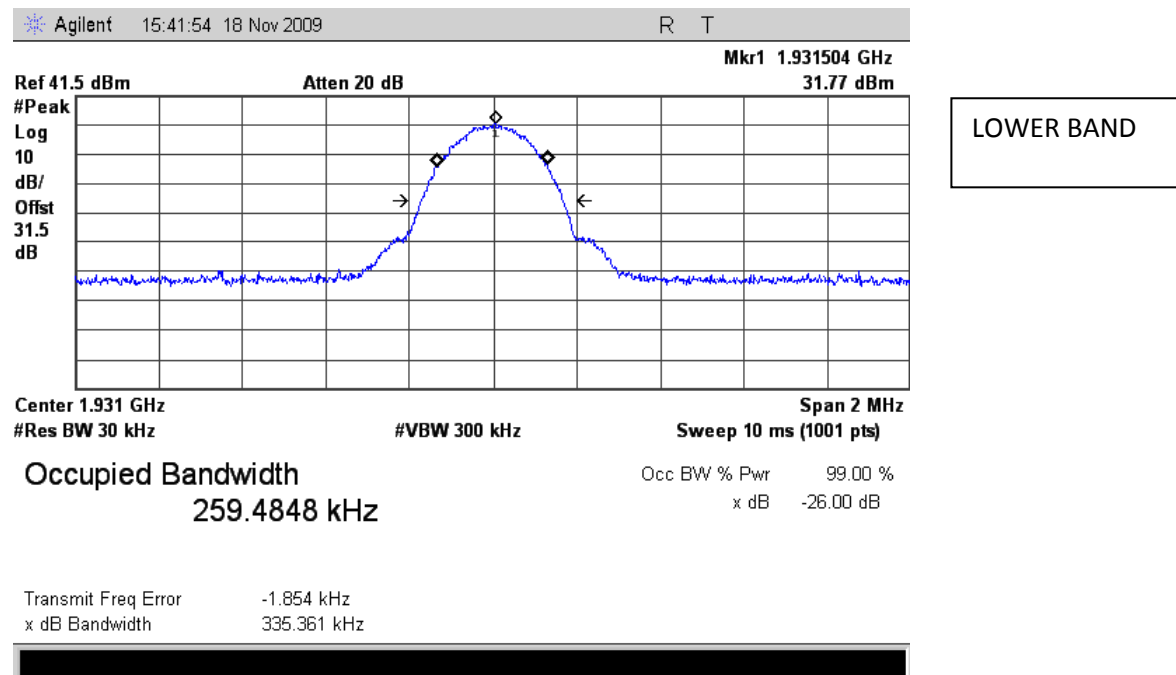
Downlink: 1930 to 1990MHz

Uplink Modulation: EDGE, GSM, WCDMA

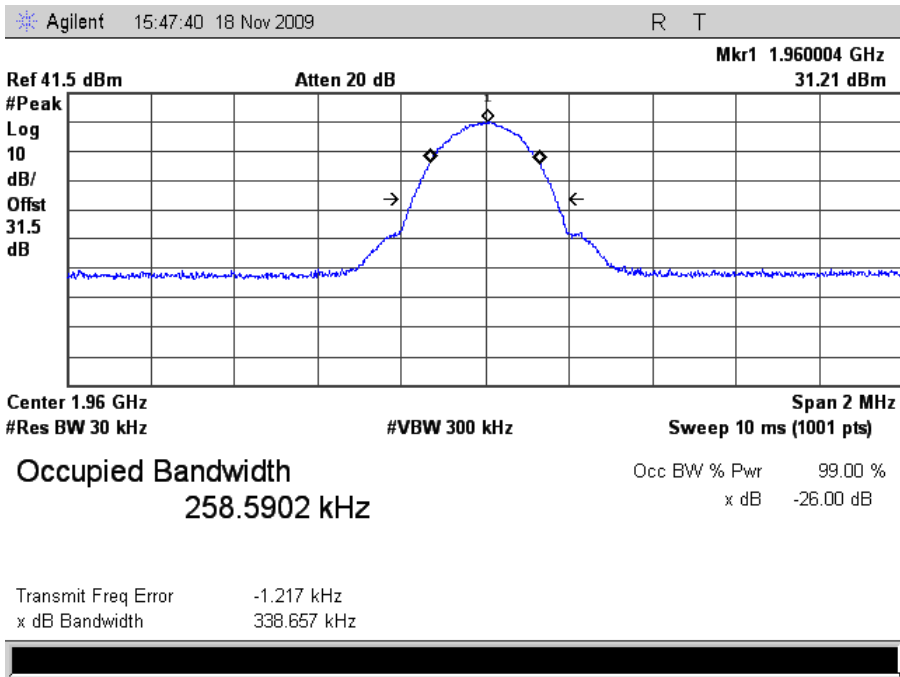
Downlink: Modulation: EDGE, GSM, WCDMA - Power = 32.4dBm

Test Plots

99% BANDWIDTH DOWNLINK - EDGE 1930MHz

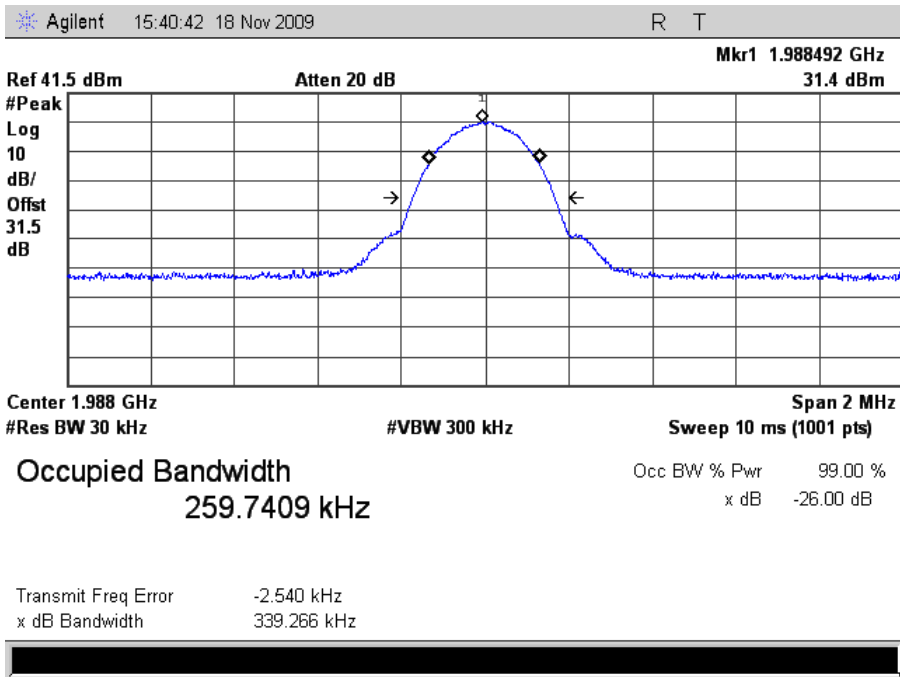


99% BANDWIDTH DOWNLINK - EDGE 1960MHz



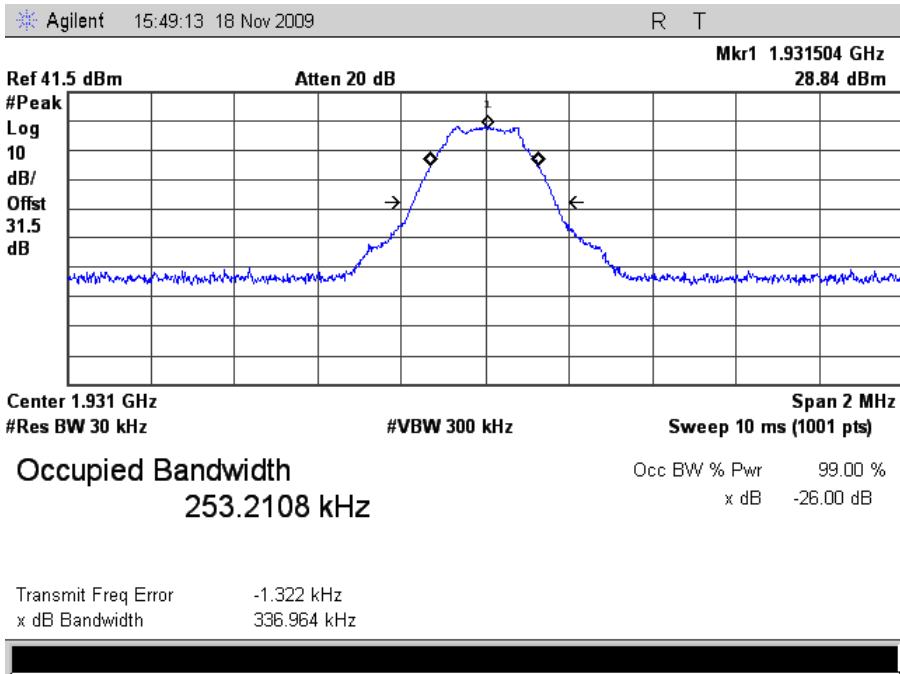
MID BAND

99% BANDWIDTH DOWNLINK - EDGE 1990MHz



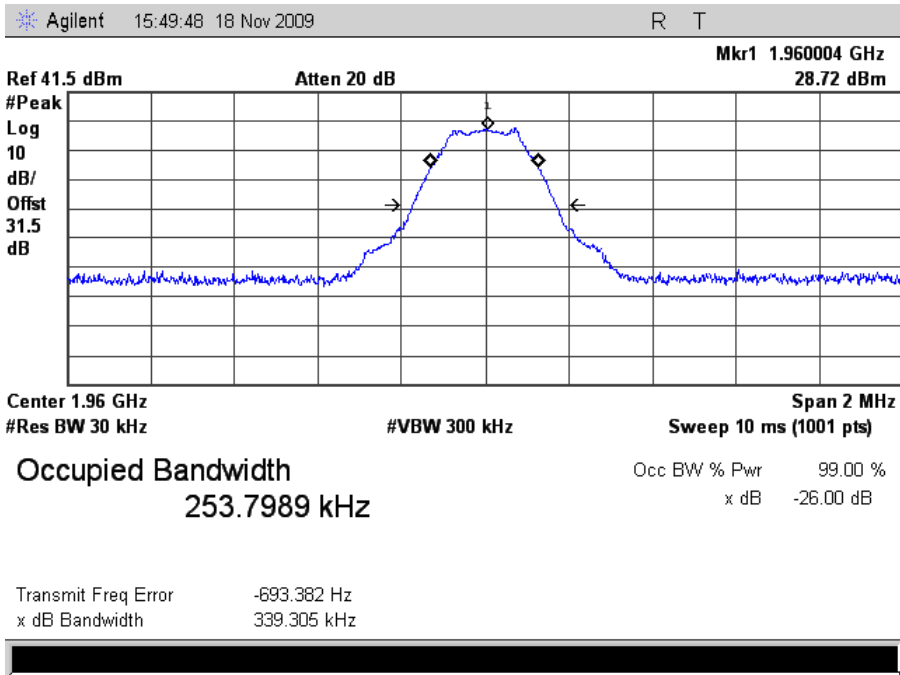
UPPER BAND

FCCID UDIRPT1900
99% BANDWIDTH DOWNLINK - GSM 1930MHz



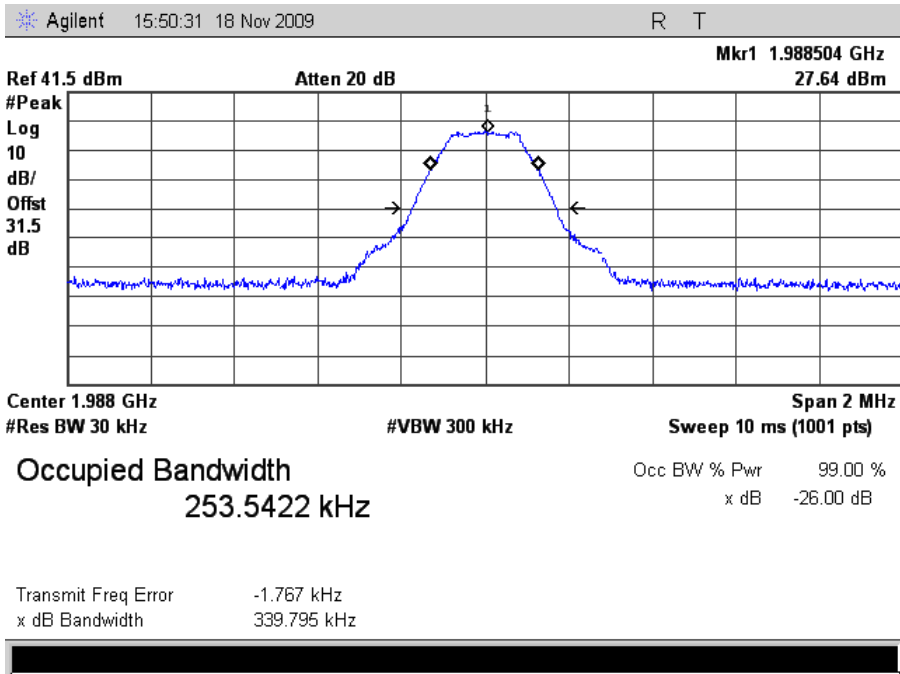
LOWER BAND

99% BANDWIDTH DOWNLINK - GSM 1960MHz



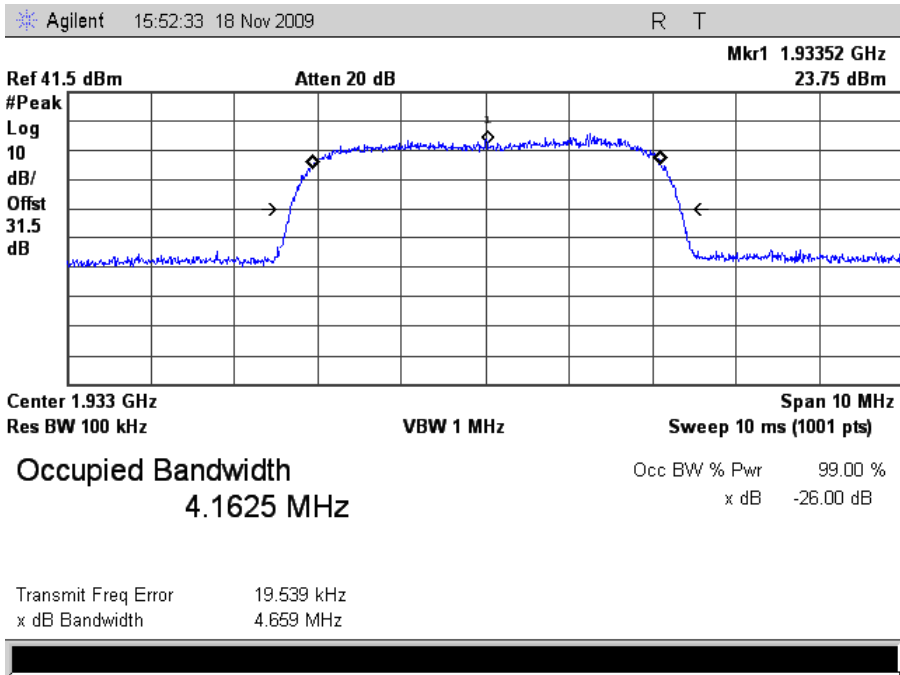
MID BAND

FCCID UDIRPT1900
99% BANDWIDTH DOWNLINK - GSM 1990MHz



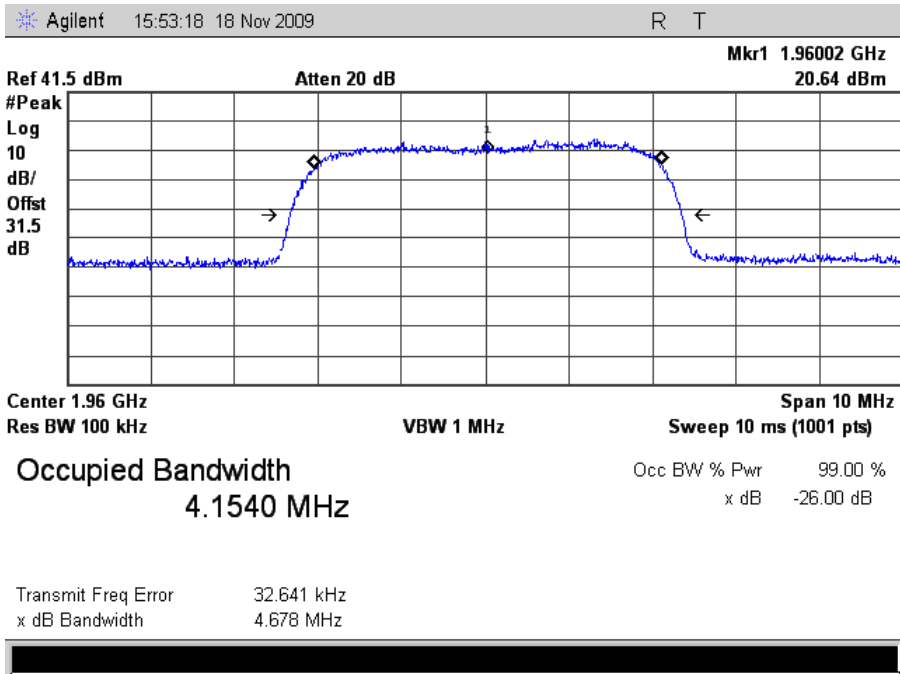
UPPER BAND

99% BANDWIDTH DOWNLINK - WCDMA 1930MHz



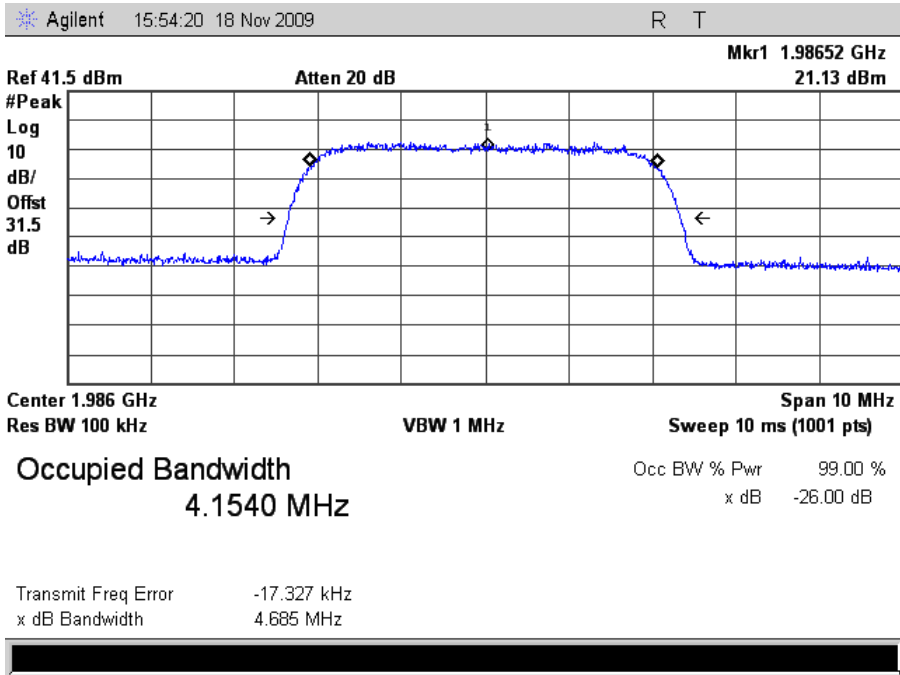
LOWER BAND

FCCID UDIRPT1900
99% BANDWIDTH DOWNLINK - WCDMA 1960MHz



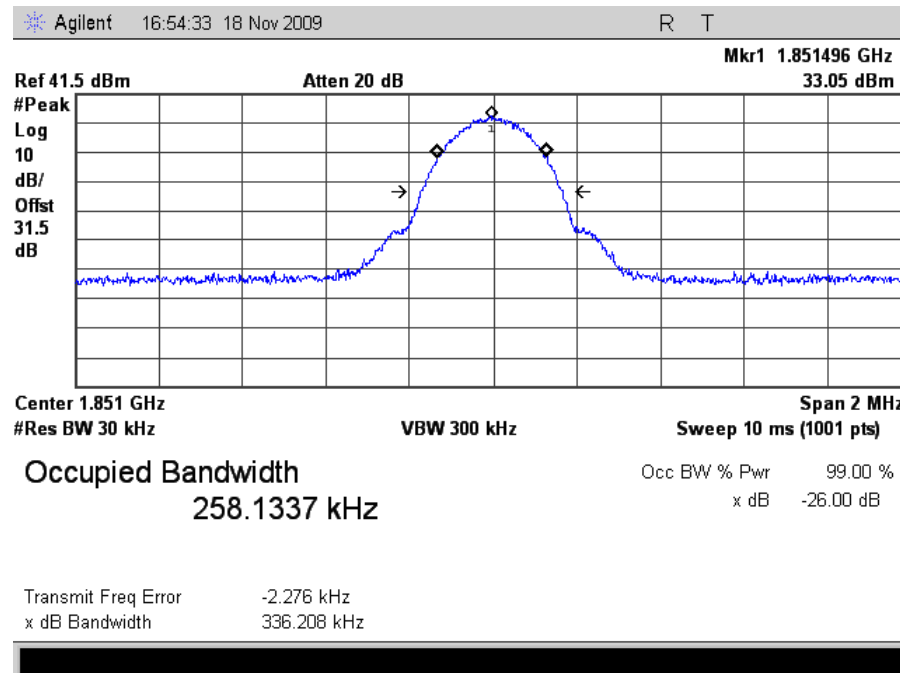
MID BAND

99% BANDWIDTH DOWNLINK - WCDMA 1990MHz



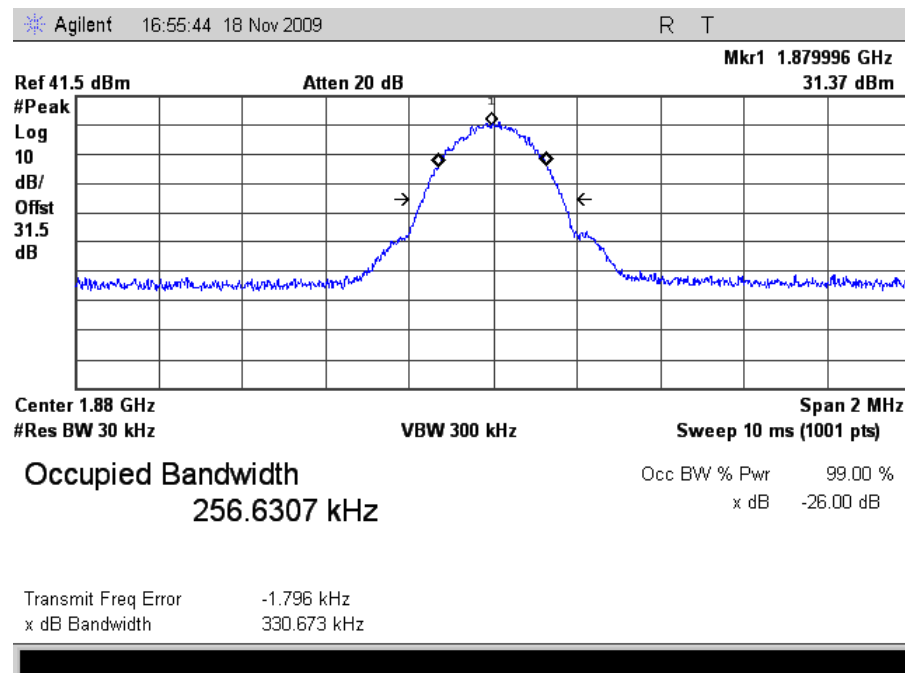
UPPER BAND

99% BANDWIDTH UPLINK - EDGE 1850MHz



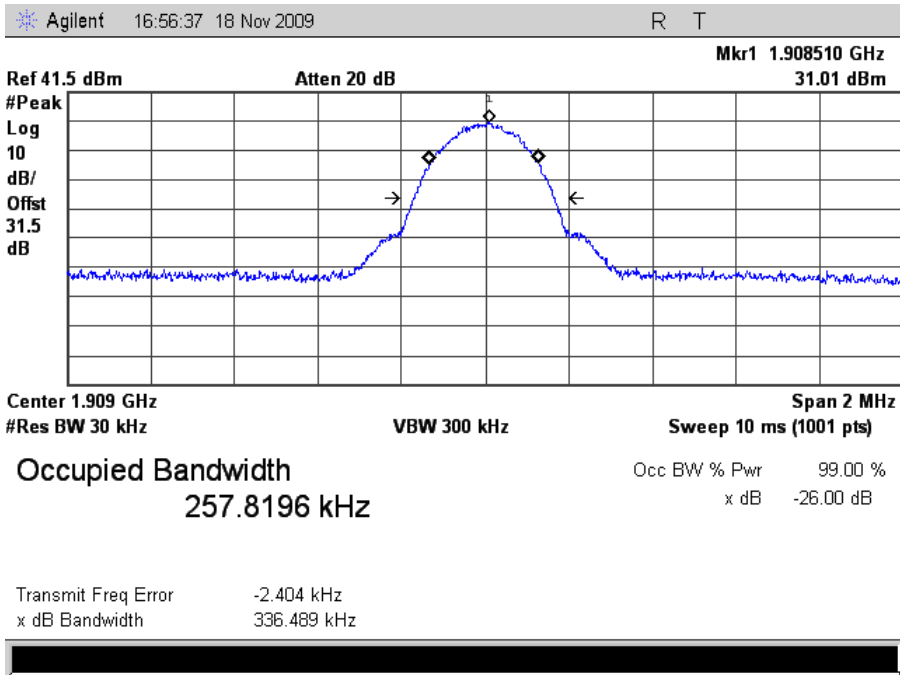
LOWER BAND

99% BANDWIDTH UPLINK - EDGE 1880MHz



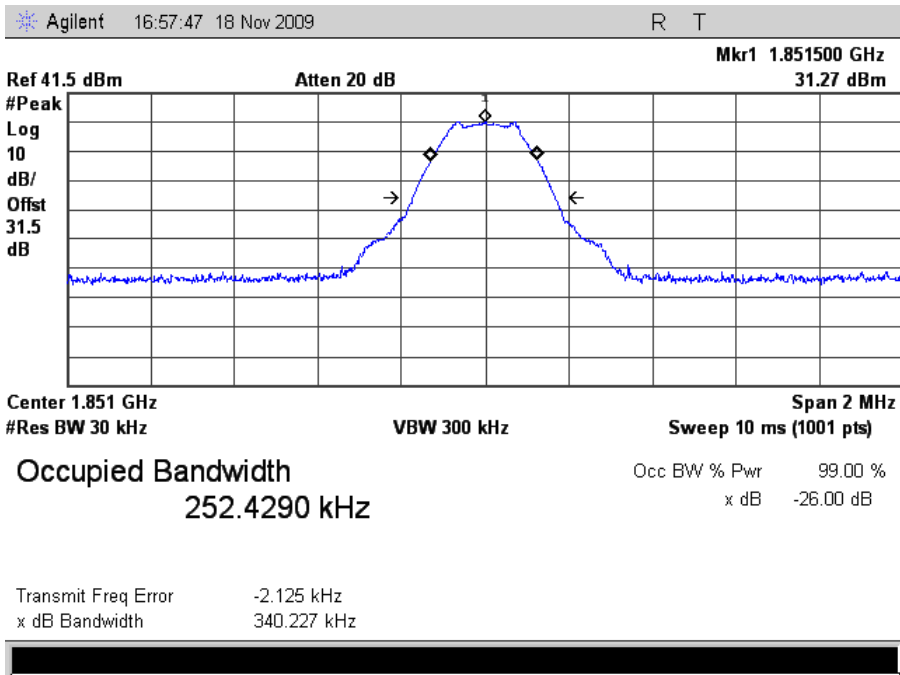
MID BAND

99% BANDWIDTH UPLINK - EDGE 1910MHz



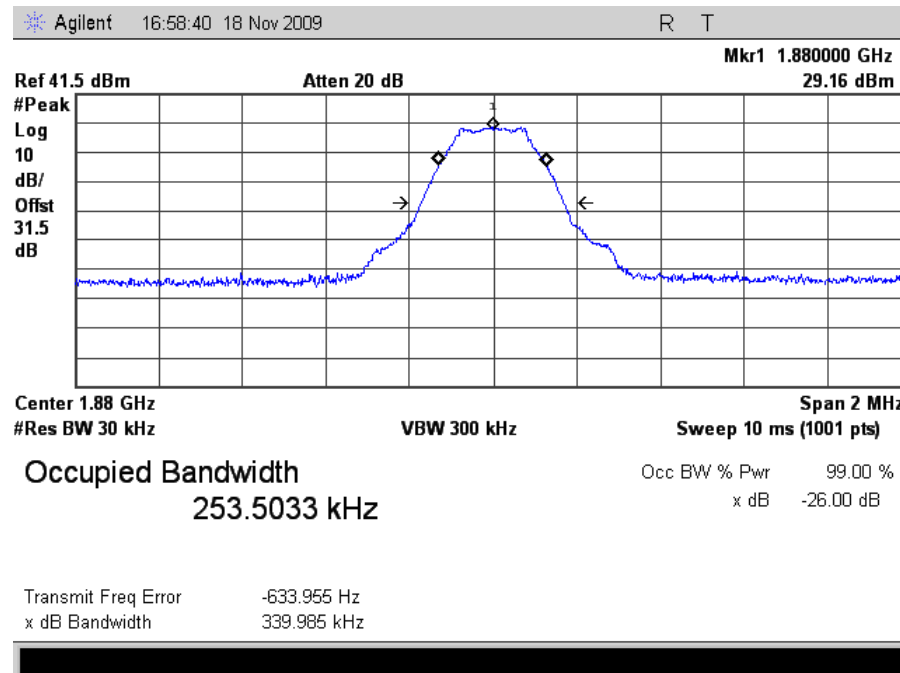
UPPER BAND

99% BANDWIDTH UPLINK - GSM 1850MHz



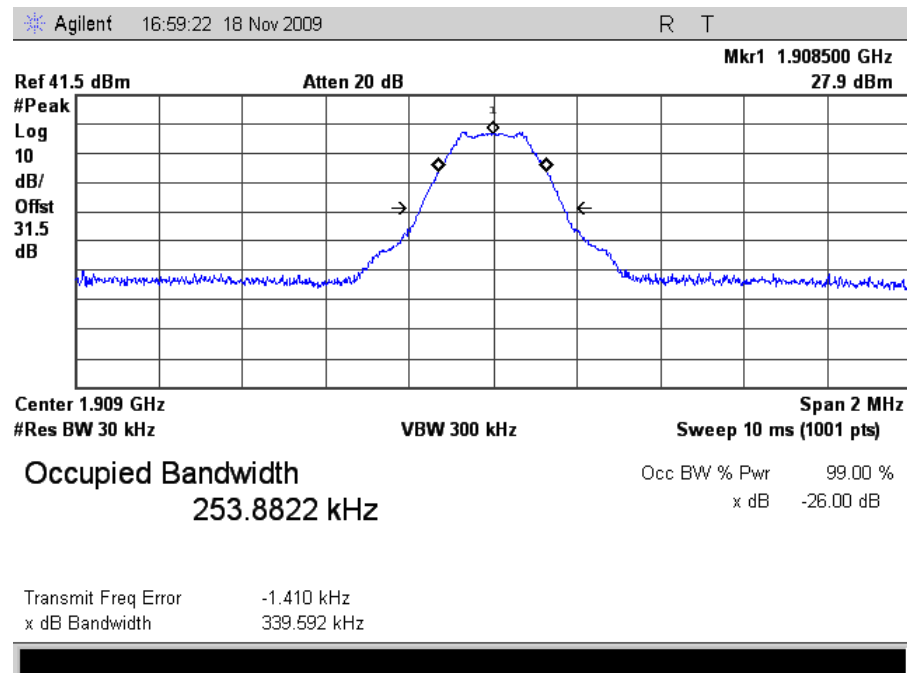
LOWER BAND

99% BANDWIDTH UPLINK - GSM 1880MHz



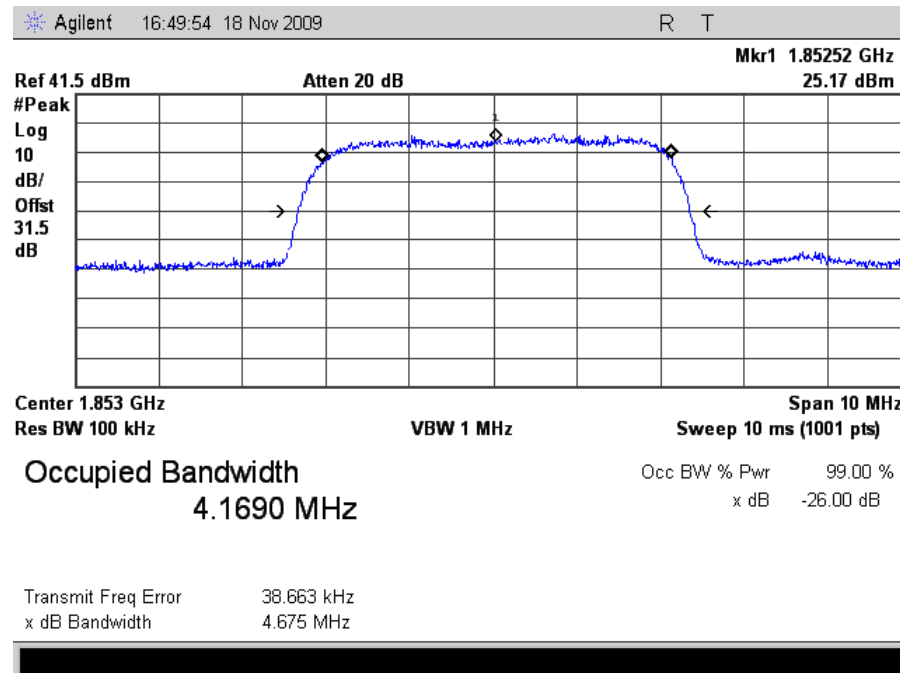
MID BAND

99% BANDWIDTH UPLINK - GSM 1910MHz



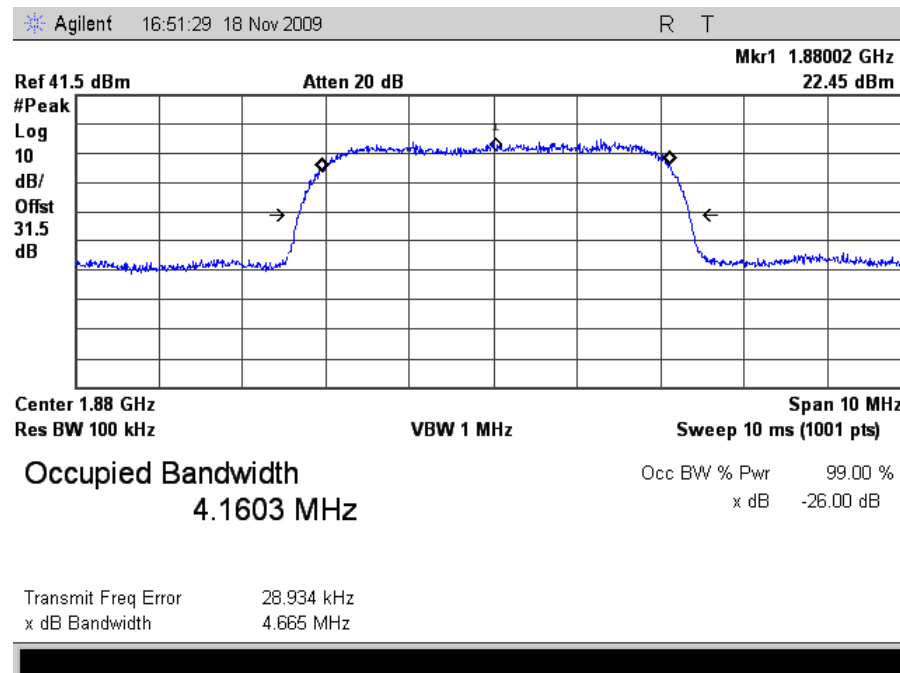
UPPER BAND

99% BANDWIDTH UPLINK - WCDMA 1850MHz



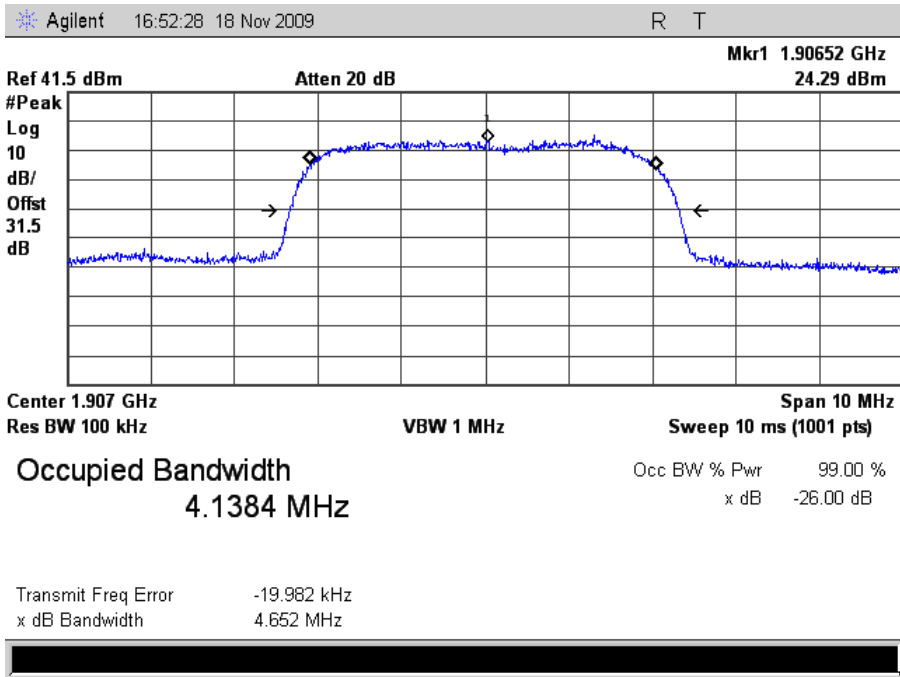
LOWER BAND

99% BANDWIDTH UPLINK - WCDMA 1880MHz



MID BAND

99% BANDWIDTH UPLINK - WCDMA 1910MHz



UPPER BAND

PASSBAND GAIN AND BANDWIDTH

Test Setup

See Appendix A

Test Equipment

Equipment	Manufacturer	Model#	Serial#	Cal Date	Cal Due
Spectrum Analyzer	Agilent	E4437B	US39230102	02-Nov-09	02-Nov-10
Signal Generator	Agilent	E4404B	MY44220519	02-Nov-09	02-Nov-10

Test Conditions

For downlink configuration, Donor antenna port is connected to Signal Generator and Area Fill antenna port is connected to Spectrum Analyzer.

For uplink configuration, Donor antenna port is connected to Spectrum Analyzer and Area Fill antenna port is connected to a Signal Analyzer.

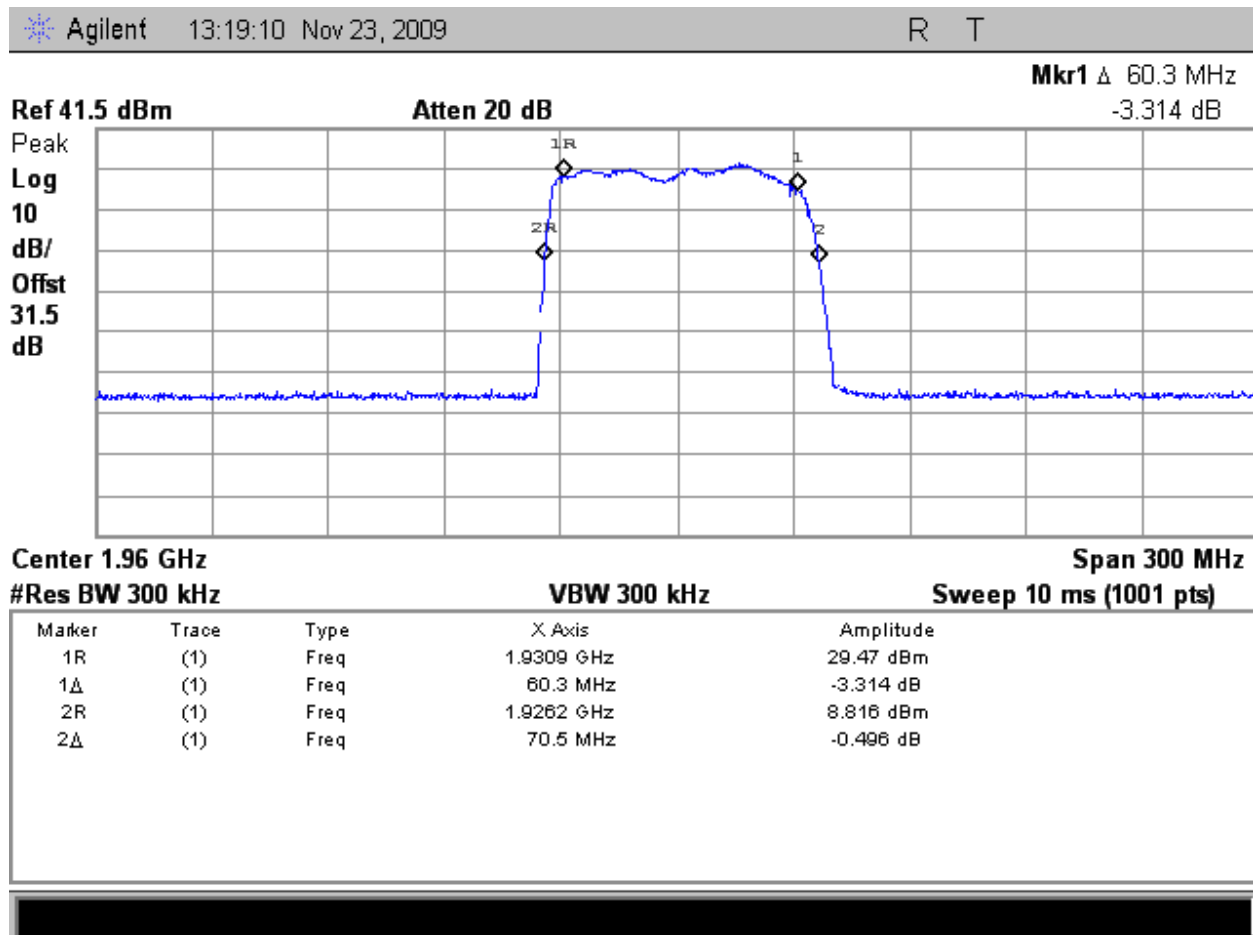
Uplink: 1850 to 1910MHz

Downlink: 1930 to 1990MHz

The gain response is measured with a spectrum analyzer in the uplink and down link direction with ESG output power set to -60dBm.

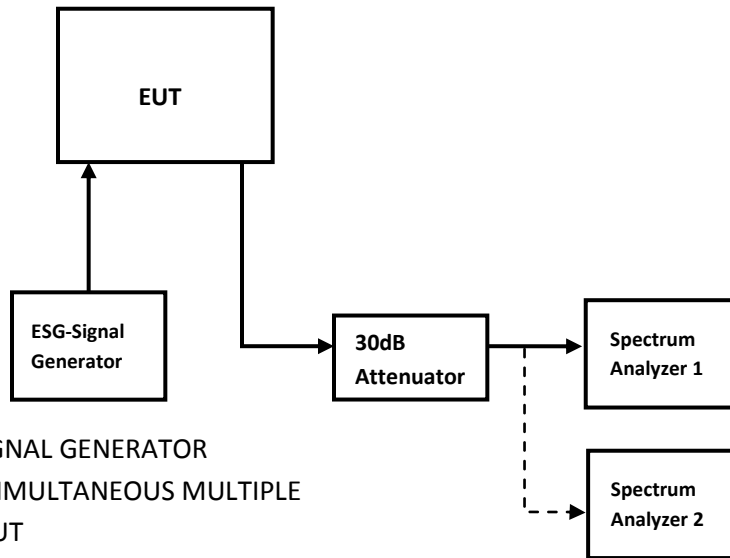
Spectrum analyzer offset adjusted to allow for in line attenuator and cable losses.

PASSBAND GAIN DOWNLINK



Appendix A: Block Diagram of Test Setup

Conducted Emissions, Output Power , Occupied Bandwidth, Passband Gain and Bandwidth



NOTE; ESG-SIGNAL GENERATOR
CAPABLE OF SIMULTANEOUS MULTIPLE
SIGNAL OUTPUT