TELCOSAT INC. TEST REPORT FOR THE RBB-850 REPEATER,

FCC
PART 22

July 8th , 2013

Manufacturer	Telcosat Inc. 116, 1919- 27Ave, NE Calgary, AB T2E 7E4
Manufacturer's Representative	Aram Sukiasyan Chief Engineer

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INTRODUCTION

1.1 PURPOSE

The purpose of this document is to demonstrate compliance of the RBB-850 to FCC Part 22 and the equivalent sections of Industry Canada's RSS 131

TEST EUT DESCRIPTION

Description of EUT

	Name	Model	Revision	Serial Number
EUT	RBB-850	RBB-850		000001

Classification Cellular Repeater (Base Station)

Frequency Range Uplink 824-849 MHz
Downlink 869-894 MHz

Transmitter duty cycle 100%

Operating Temperature -40°C to +50°C

Output power 25.0 dBm – based on two tone

Functional Description Cellular repeater

METHOD OF OPERATION DURING TESTS

Unless otherwise noted in the test report the EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle, and high channel to perform power, occupied bandwidth, and spurious/harmonic tests. For conducted emissions the device was tuned to its center frequency. While transmitting the EUT was setup to operate at the intended maximum power output available to the end user. For all test cases pre-scans were completed in all modes to determine worst case levels.

3 SUMMARY OF TEST RESULTS

Description of Test	Specification	Results
RF Power Output	FCC §2.1046, §22.913	Pass
Mean Output Power	RSS 131 Issue 2 (2003) Section 6.2	Pass
Input and Output Plots	FCC §2.1049(i)	Pass
Block Edge	FCC §2.1049(i)	Pass
Spurious Emissions at Antenna Terminal	FCC §22.917(a)	Pass
Field Strength of Spurious Radiation	FCC §22.917(a)	Pass
99% Bandwidth	RSS-131 Issue 2 (2003) Section 6.3	Pass
Passband Gain and Bandwidth	RSS 131 Issue 2 (2003) Section 6.1	Pass
Frequency Stability	FCC §2.1055, §22.355	Pass

CONDITIONS DURING TESTING

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

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The customer declares the EUT tested was representative of a production unit. The Telcosat RBB-850 repeater increases the coverage and capacity of existing cellular wireless networks. The customer declares the EUT tested was representative of a production unit. The Telcosat RBB-850 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 900MHz operating band.

The Telcosat RBB-850 also provides feedback cancellation to effectively increase antenna isolation and enable greater operating gain without oscillation. Remote control and supervision is supported through direct IP connection.

There are no end user internal adjustments or firmware adjustments. Factory firmware is not supplied to the end user.

The following model has been tested, Model Number RBB-850, Serial number 000001.

EQUIPMENT UNDER TEST

Telcosat RBB-850 Repeater

Manufacturer: Telcosat Inc. **Model**: RBB-850 **Serial**: 000001

FCC ID: **UDIRRBB850**

IC ID:5842A-RBB850

LIST OF TEST EQUIPMENT USED DURING TESTING.

Equipment	Manufacturer	Model#	Serial#	Cal Date	Cal Due
Spectrum Analyzer	Agilent	E4405B	US41441250	20-Mar-13	20-Mar-14
Spectrum Analyzer	Agilent	E4404B	MY44220519	26-Feb-13	26-Feb-14
Signal Generator	Agilent	E4437B	US39230102	11-Jan-12	11-Jan-14
Power Meter	Agilent	E4416A	GB41293089	3-Aug-11	19-Oct-13
Power Sensor	Agilent	E9322A	MY52140010	26-Apr-12	1-Nov-13
Frequency Counter	Agilent	53132	MY40006238	14-Jun-13	14-Jun-15

TEST ENVIRONMENT

All tests were performed under the following environmental conditions:

Temperature Range	: 20°C - 23°C
Humidity Range	: 50 - 75%
Pressure Range	: 86 - 106kPa
Power Supply Range	: ± 5% of rated voltages

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
824-849MHz Uplink, 869-894MHz Downlink

FCC 2.1033 (c)(6) OPERATING POWER
+25dBm

FCC 2.1033 (c)(7) MAXIMUM POWER RATING
1 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

4 FCC §2.1046 - RF POWER OUTPUT

4.1 Applicable standard

FCC §22.913(a)

4.2 Test Equipment

Equipment	Manufacturer	Model #	Serial #	Cal Date	Cal Due
EPM Power Meter	Agilent	E4416A	GB41293089	03-Aug-2011	19-Oct-2013
Power Sensor	Agilent	E9322A	MY52140010	26-Apr-2012	1-Nov-2013
Signal Generator	Agilent	E4437B	US39230102	11-Jan-2012	11-Jan-2014

4.3 Test Procedure (FCC REQUIREMENTS/ COMPLIANCE RULES)

The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts (57dBm). However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

(1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,

(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in § 22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts (60dBm). The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts (38.45dBm).

NOTE: Telcosat product model RBB850 is a fixed stationary device.

For Downlink configuration, Donor antenna port is connected to Signal Generator and Area Fill antenna port is connected to Peak Power Meter through 20dB attenuator. For uplink configuration, Donor antenna port is connected to Peak Power Meter through 20dB attenuator and Area Fill antenna port is connected to Signal Generator.

4.4 Test Results

WCDMA

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Limit (dBm)
Downlink	Low	871.4	-47	+27.55	+57
	Middle	881.4	-47	+29.10	+57
	High	891.6	-47	+28.66	+57
Uplink	Low	826.4	-47	+26.53	+57
	Middle	836.4	-47	+27.87	+57
	High	846.6	-47	+27.47	+57

GSM

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Limit (dBm)
Downlink	Low	869.2	-47	+21.86	+57
	Middle	881.6	-47	+24.74	+57
	High	893.8	-47	+25.19	+57
Uplink	Low	824.2	-47	+22.01	+57
	Middle	836.6	-47	+23.61	+57
	High	848.8	-47	+23.48	+57

EDGE

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Limit (dBm)
Downlink	Low	869.2	-47	+25.01	+57
	Middle	881.6	-47	+29.03	+57
	High	893.8	-47	+28.31	+57
Uplink	Low	824.2	-47	+25.24	+57
	Middle	836.6	-47	+26.67	+57
	High	848.8	-47	+26.29	+57

The maximum antenna gain to be used on the Downlink path is 27.9dBd.
If transmitting antennas of directional gain greater than 27.9dBd are used , the Downlink output power shall be reduced accordingly.

The maximum antenna gain to be used on the Uplink path is 29.13dBd.
If transmitting antennas of directional gain greater than 29.13dBd are used , the Uplink output power shall be reduced accordingly.

5 RSS 131 SECTION 6.2 - RF POWER OUTPUT

5.1 Applicable Standard

RAA-131 Issue 2(2003) Section 6.2

5.2 Test Equipment

Equipment	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	Agilent	E4404B	MY44220519	26-Feb-2013	26-Feb-2014
Signal Generator	Agilent	E4437B	US39230102	11-Jan-2012	11-Jan-2014

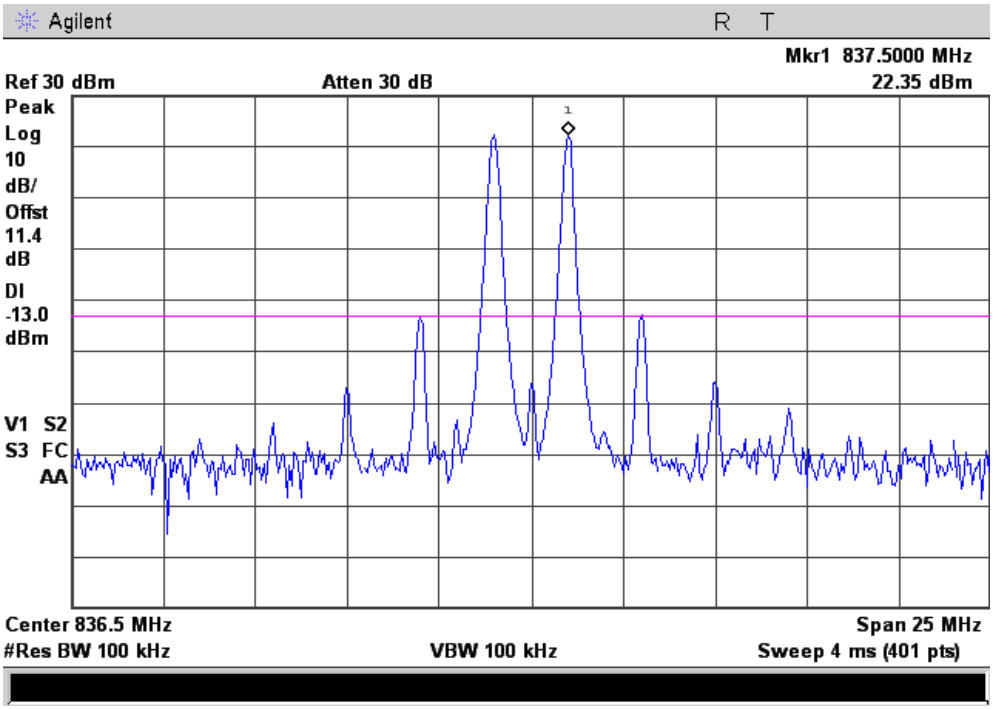
5.3 Test Procedure

For Downlink configuration, Donor antenna port is connected to Signal Generator and Area Fill antenna port is connected to Spectrum Analyzer through 20dB attenuator. For Uplink configuration, Donor antenna port is connected to Spectrum Analyzer through 20dB attenuator and Area Fill antenna port is connected to an Signal Generator .

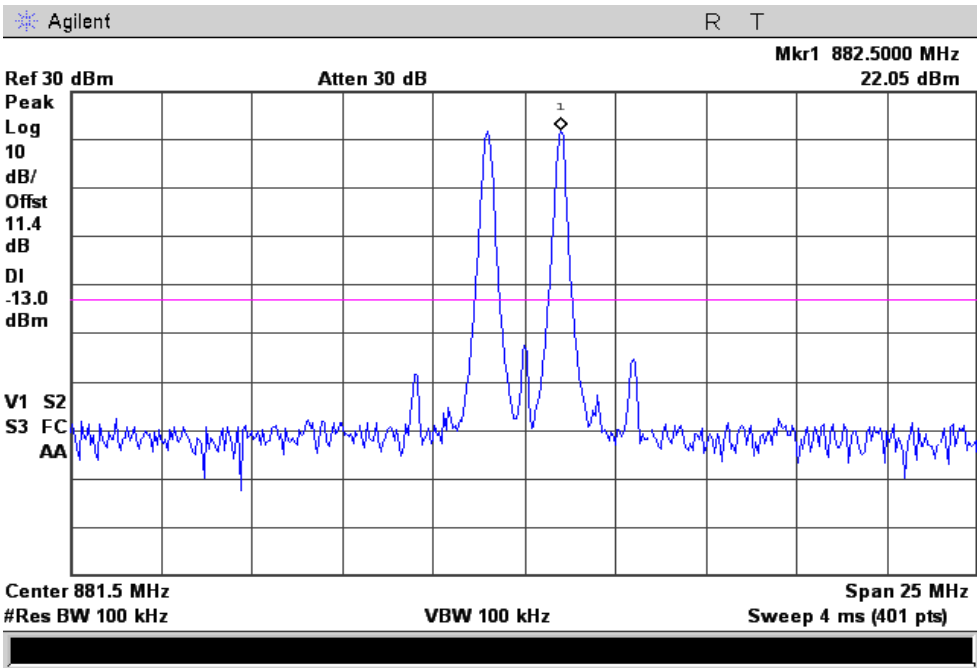
RF signal measured at the output antenna port in accordance with RSS 131, 4.3.1 requirement.

5.4 Test Results

5.4.1 Uplink



5.4.2. Downlink



Highest Measured P_{01}=+22.35dBm

$P_{mean} = P_{01} + 3dB = 22.35 + 3 = 25.35$ dBm

6 FCC 2.1049(i)- INPUT/OUTPUT PLOTS

6.1 Applicable Standard

FCC §2.1033(c)/2.1049(i)

6.2 Test Equipment

Equipment	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	Agilent	E4404B	MY44220519	26-Feb-2013	26-Feb-2014
Signal Generator	Agilent	E4437B	US39230102	11-Jan-2012	11-Jan-2014

6.3 Test Procedure

For downlink configuration, Donor antenna port is connected to Signal Generator and Area Fill antenna port is connected to a Spectrum Analyzer through 20dB attenuator. For uplink configuration, Donor antenna port is connected to Spectrum Analyzer through 20dB attenuator and Area Fill antenna port is connected to Signal Generator.

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 Signal Generator.

Uplink

Frequency: 824 - 849MHz

Modulation: EDGE, GSM and WCDMA

Power : 25dBm

Downlink

Frequency: 869 - 894MHz

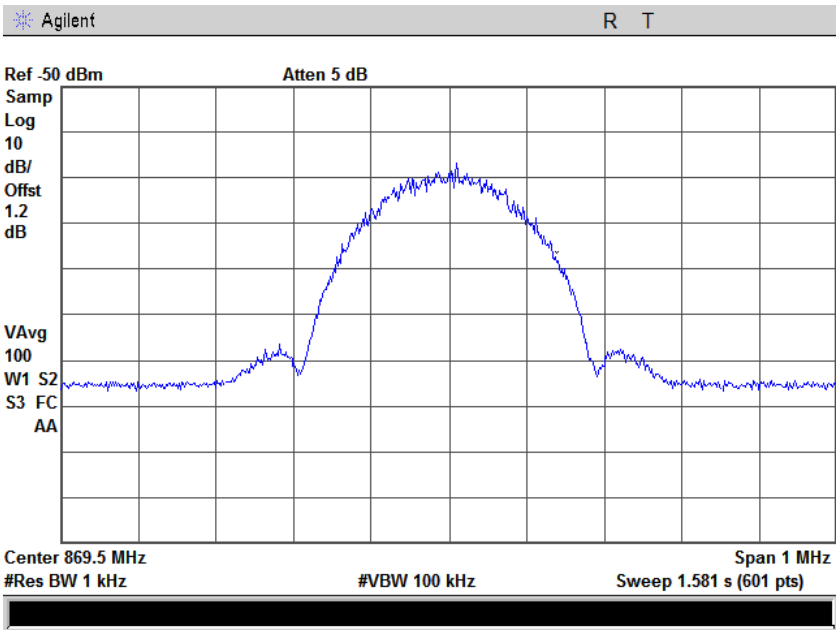
Modulation: EDGE, GSM and WCDMA

Power : 25dBm

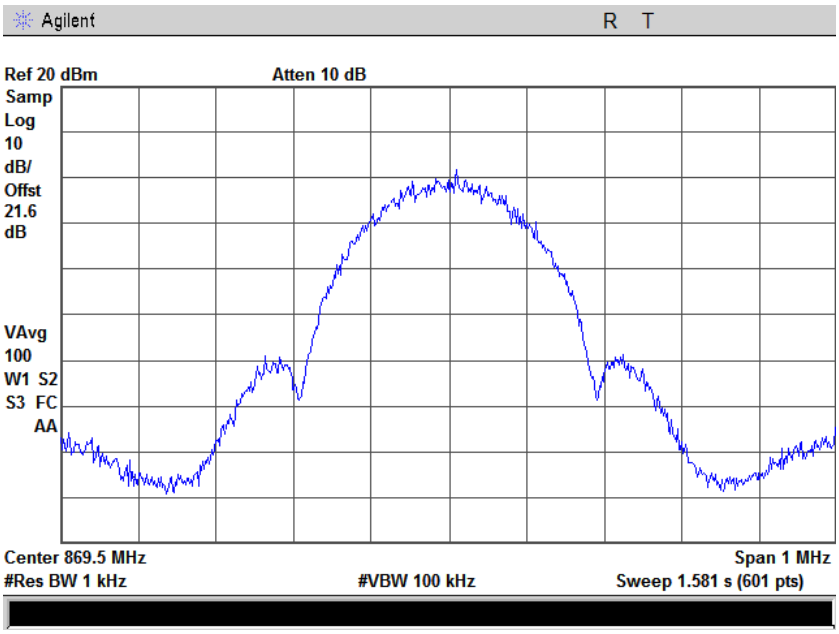
6.4 Test Results

6.4.1 EDGE

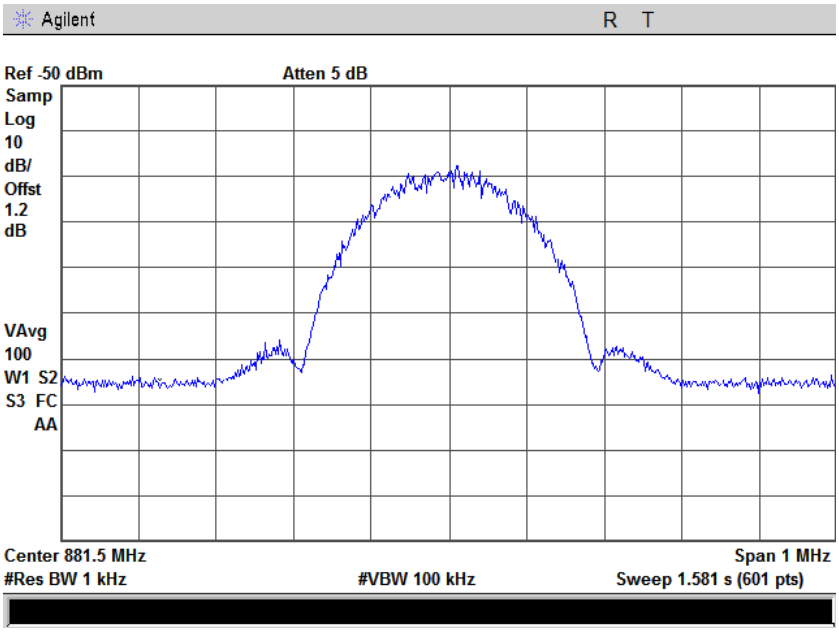
INPUT PLOT DOWNLINK - EDGE 869 MHz



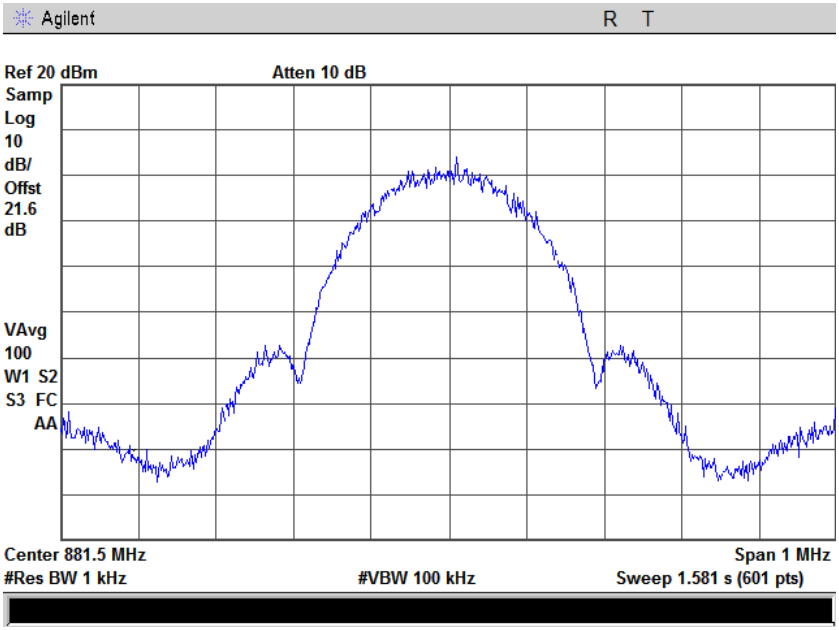
OUTPUT PLOT DOWNLINK - EDGE 869 MHz



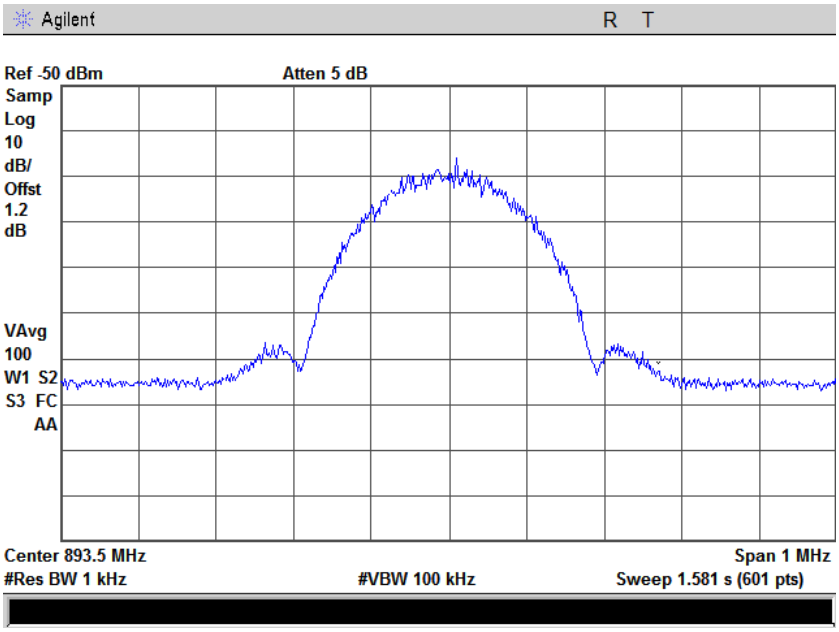
INPUT PLOT DOWNLINK - EDGE 881 MHz



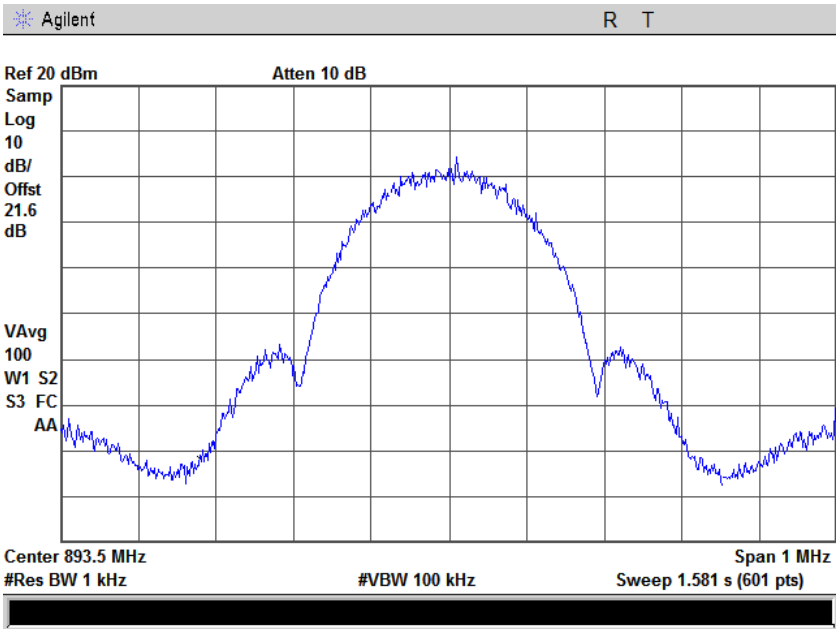
OUTPUT PLOT DOWNLINK - EDGE 881 MHz



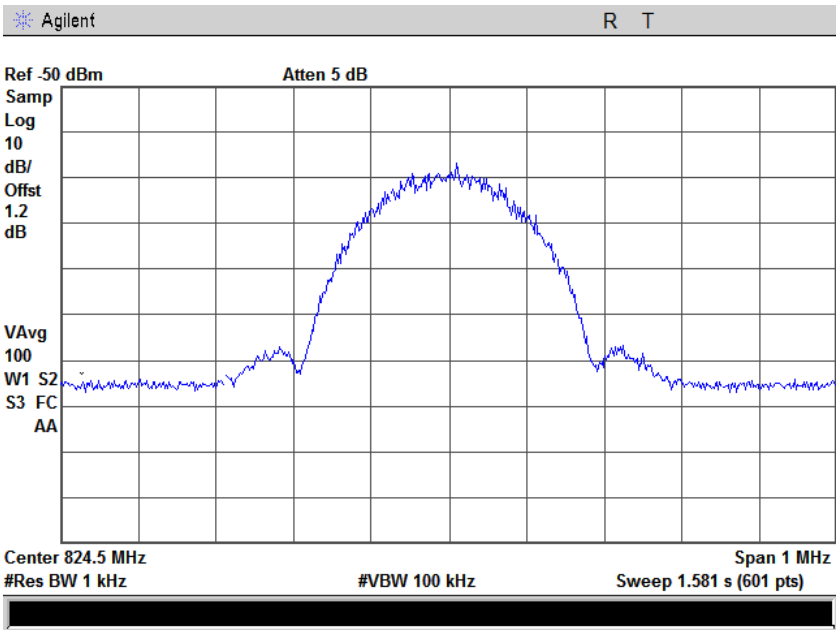
INPUT PLOT DOWNLINK - EDGE 893 MHz



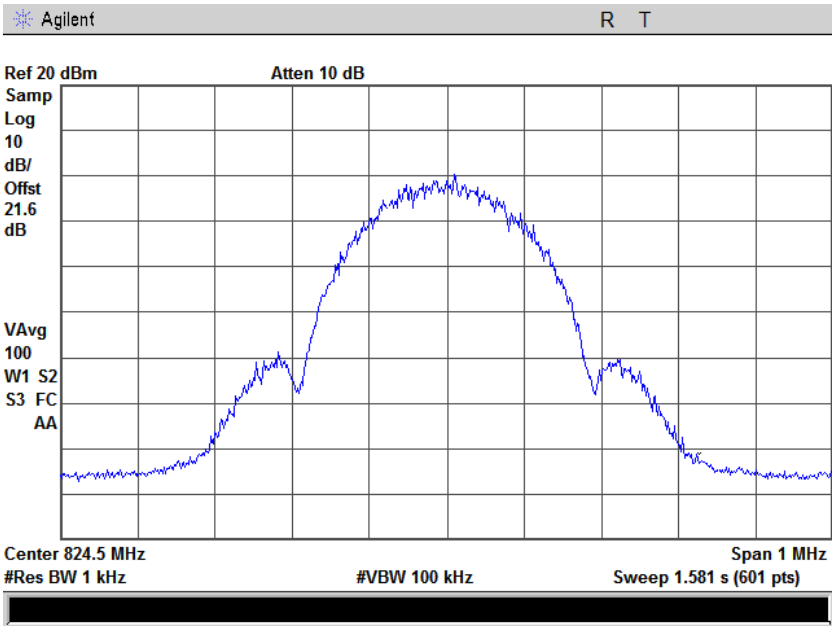
OUTPUT PLOT DOWNLINK - EDGE 893 MHz



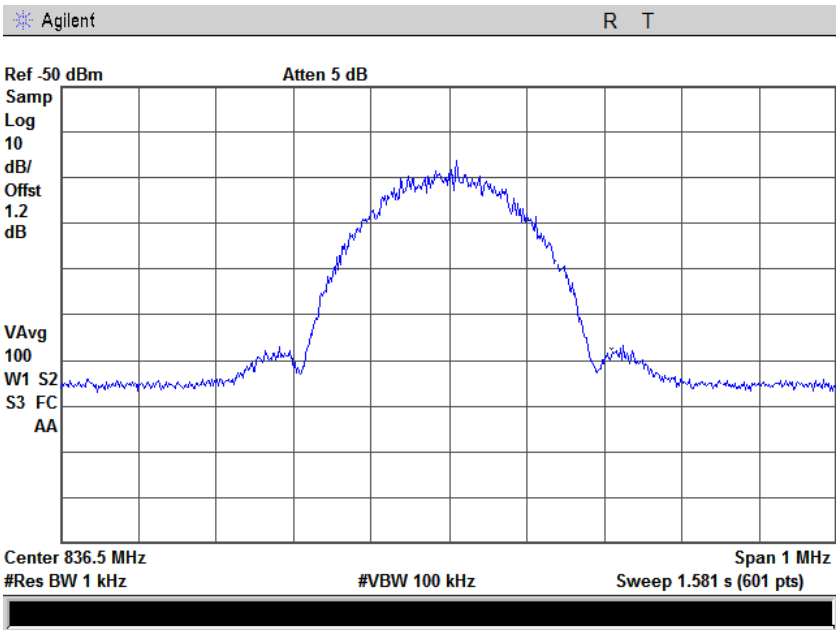
INPUT PLOT UPLINK - EDGE 824 MHz



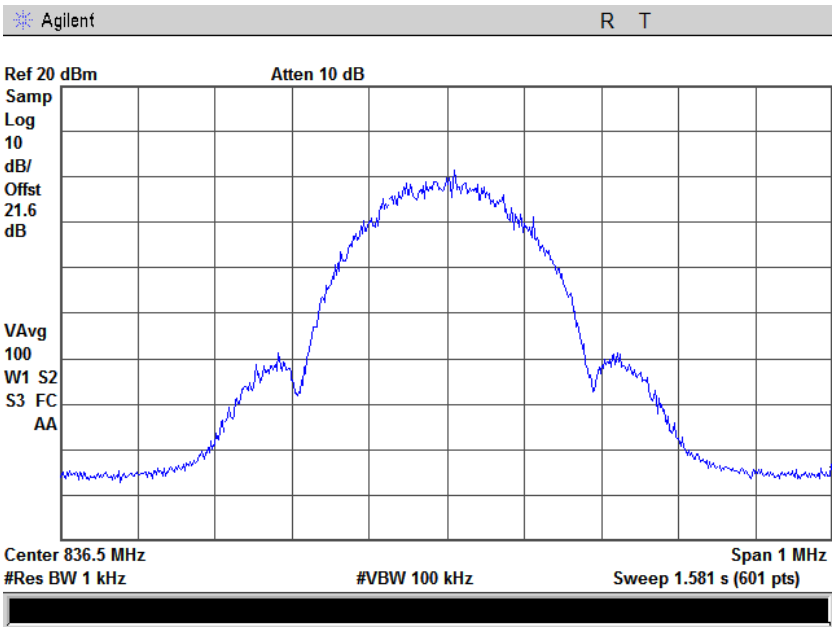
OUTPUT PLOT UPLINK - EDGE 824 MHz



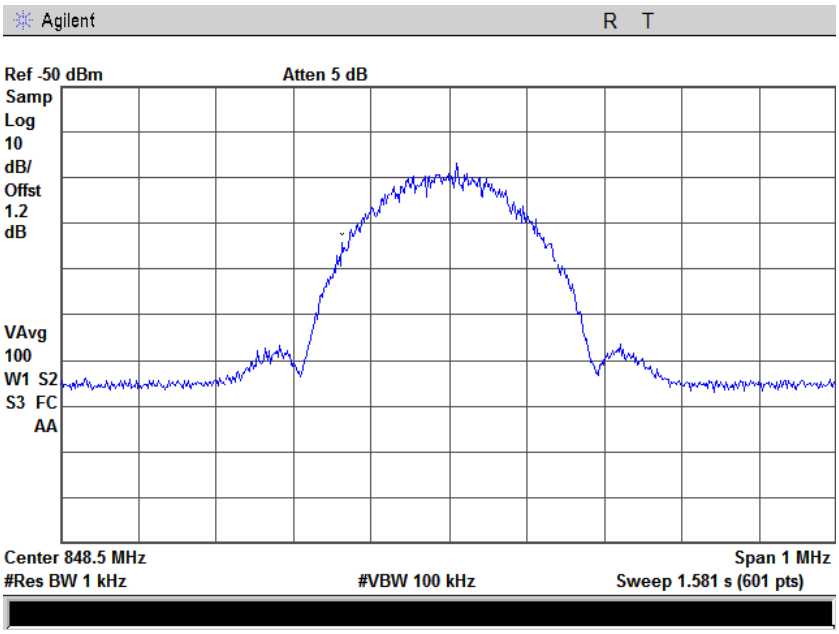
INPUT PLOT UPLINK - EDGE 836 MHz



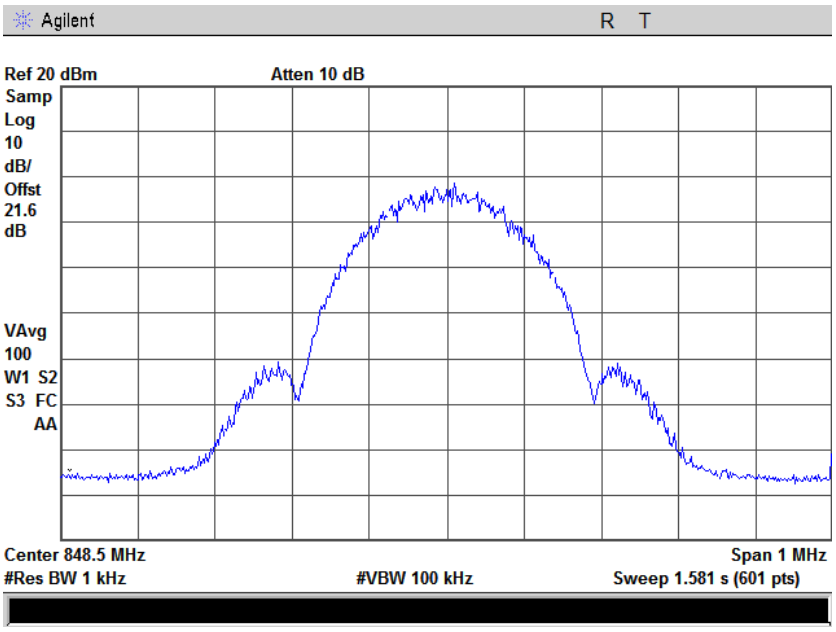
OUTPUT PLOT UPLINK - EDGE 836 MHz



INPUT PLOT UPLINK - EDGE 849 MHz

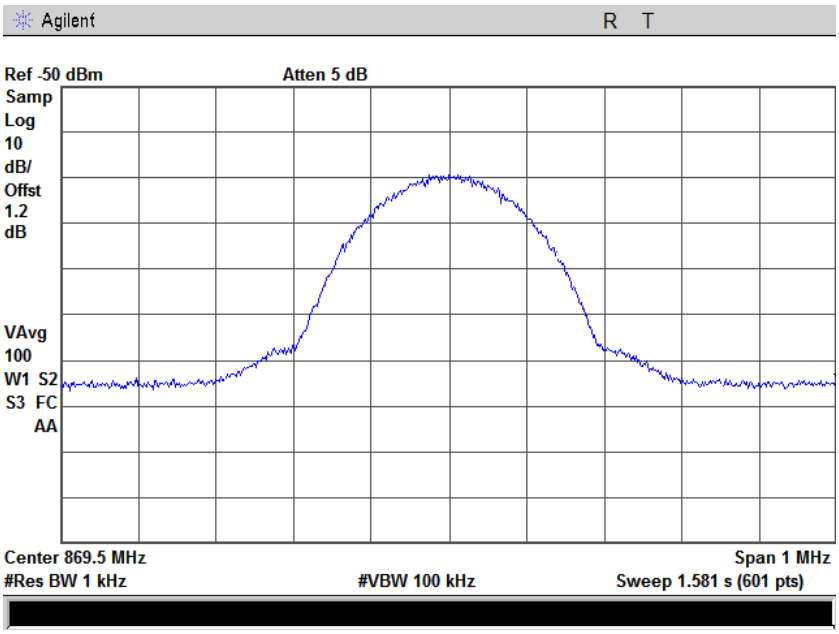


OUTPUT PLOT UPLINK - EDGE 849 MHz

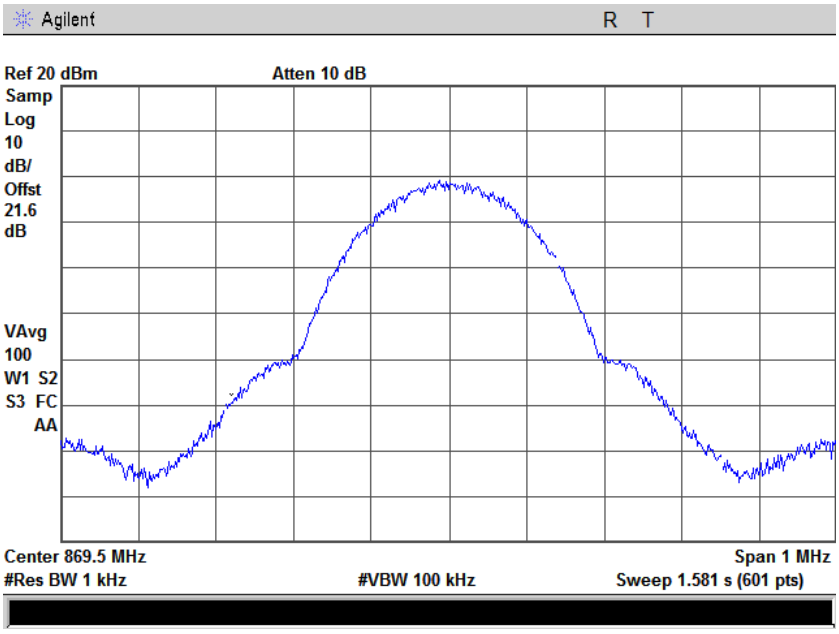


6.4.2 GSM

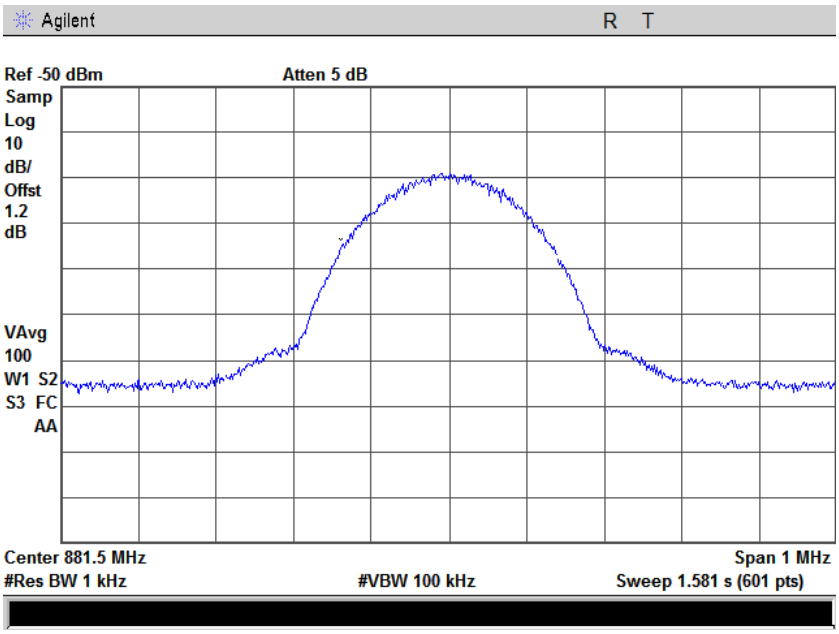
INPUT PLOT DOWNLINK - GSM 869 MHz



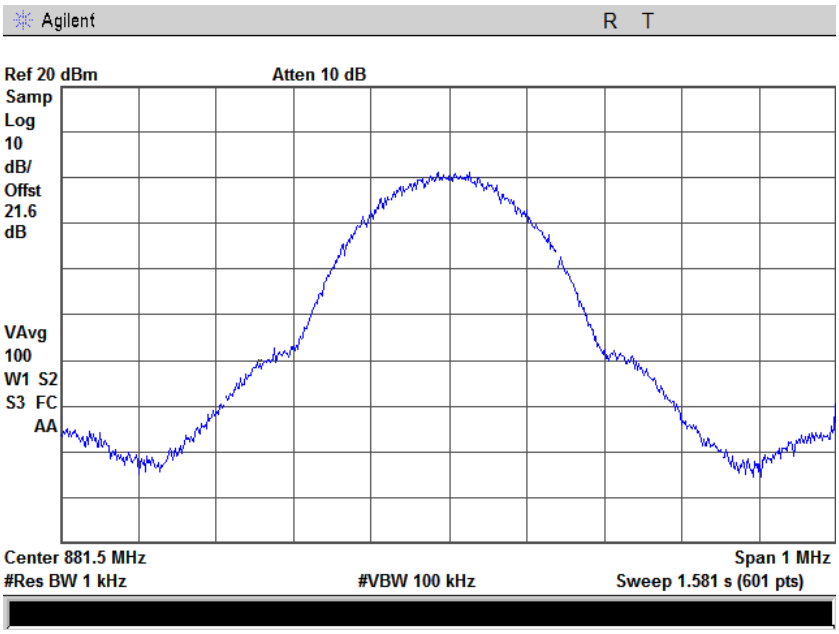
OUTPUT PLOT DOWNLINK - GSM 869 MHz



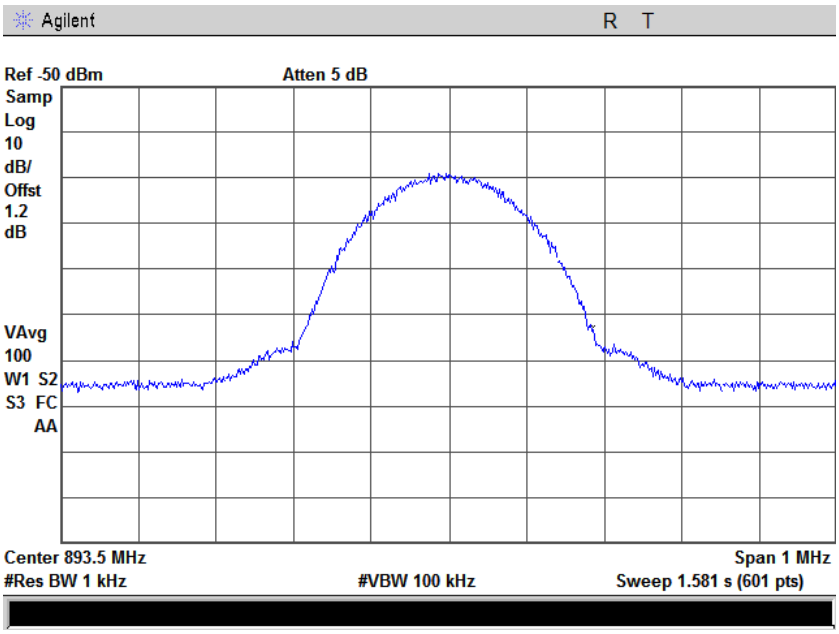
INPUT PLOT DOWNLINK - GSM 881 MHz



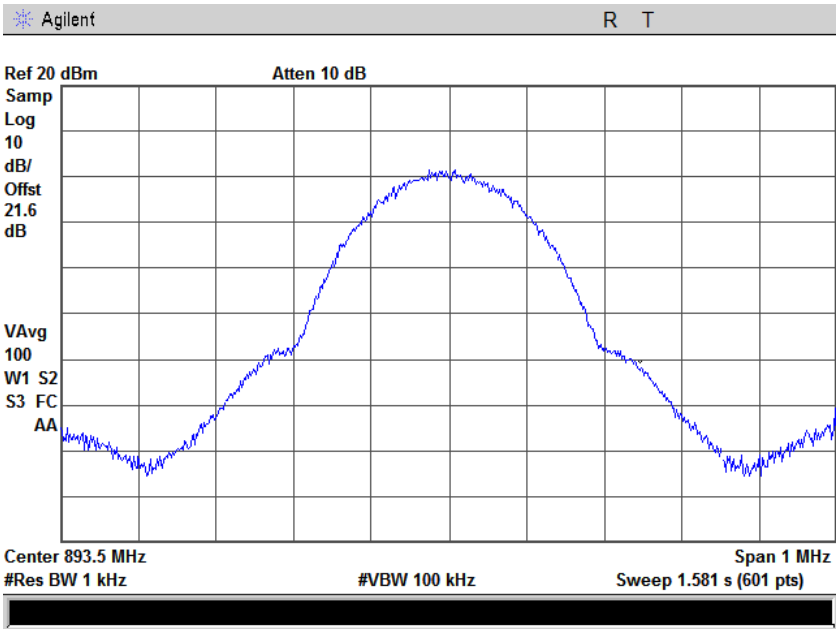
OUTPUT PLOT DOWNLINK - GSM 881 MHz



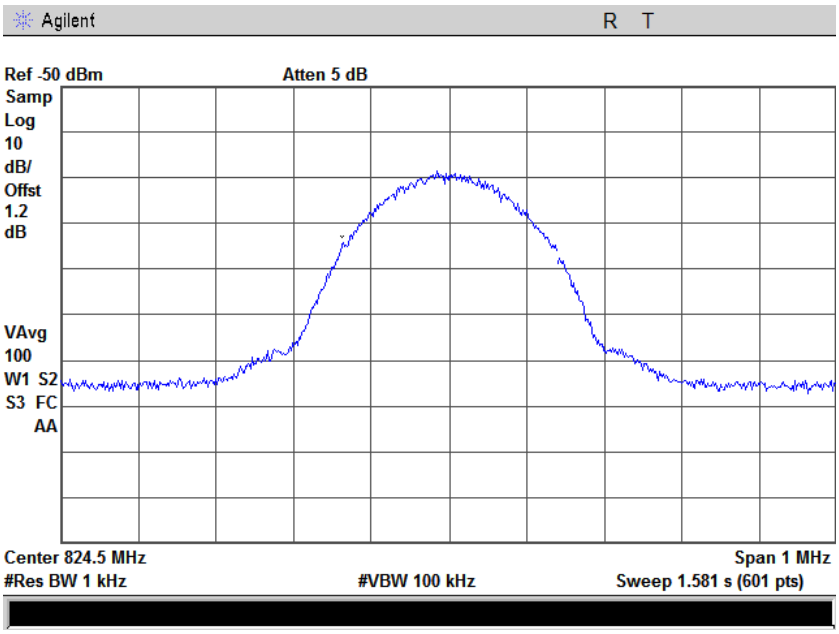
INPUT PLOT DOWNLINK - GSM 893 MHz



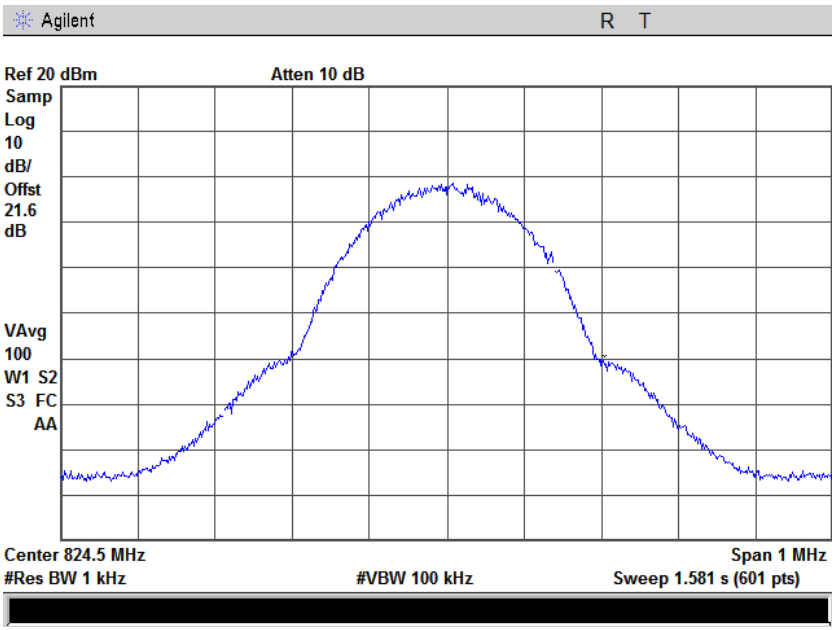
OUTPUT PLOT DOWNLINK - GSM 893 MHz



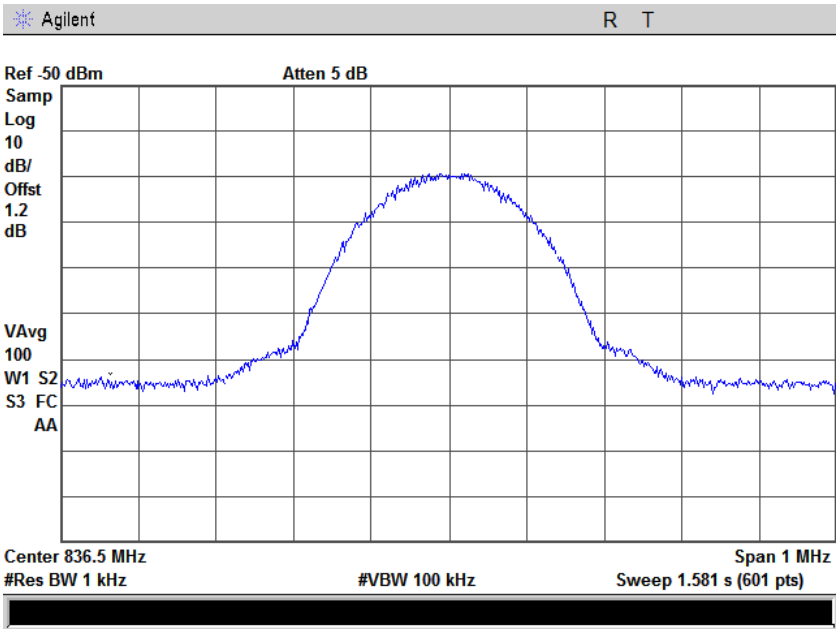
INPUT PLOT UPLINK - GSM 824 MHz



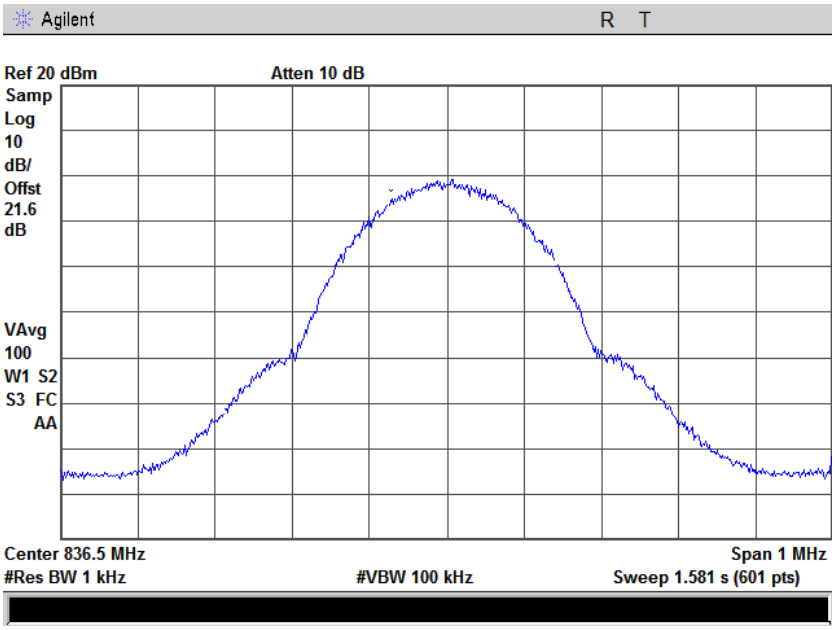
OUTPUT PLOT UPLINK - GSM 824 MHz



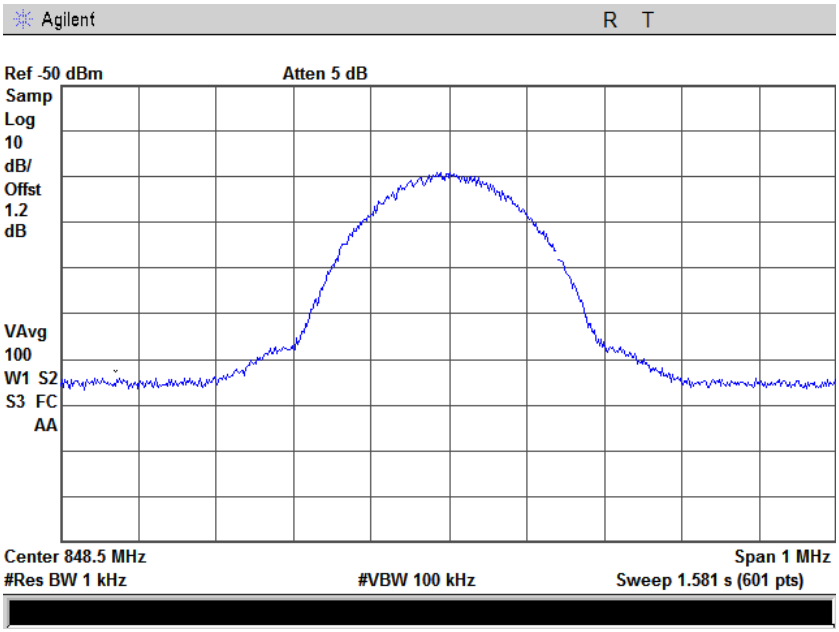
INPUT PLOT UPLINK - GSM 836 MHz



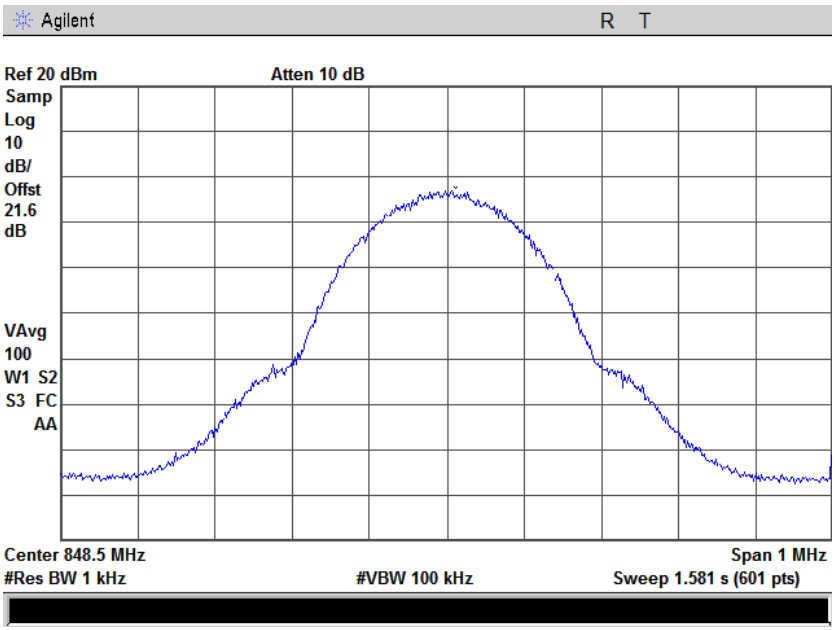
OUTPUT PLOT UPLINK - GSM 836 MHz



INPUT PLOT UPLINK - GSM 849 MHz

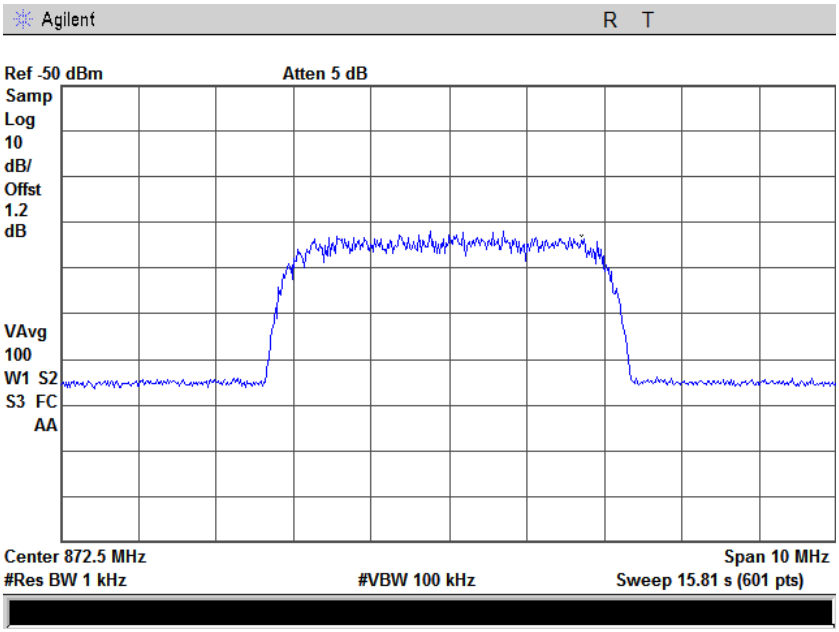


OUTPUT PLOT UPLINK - GSM 849 MHz

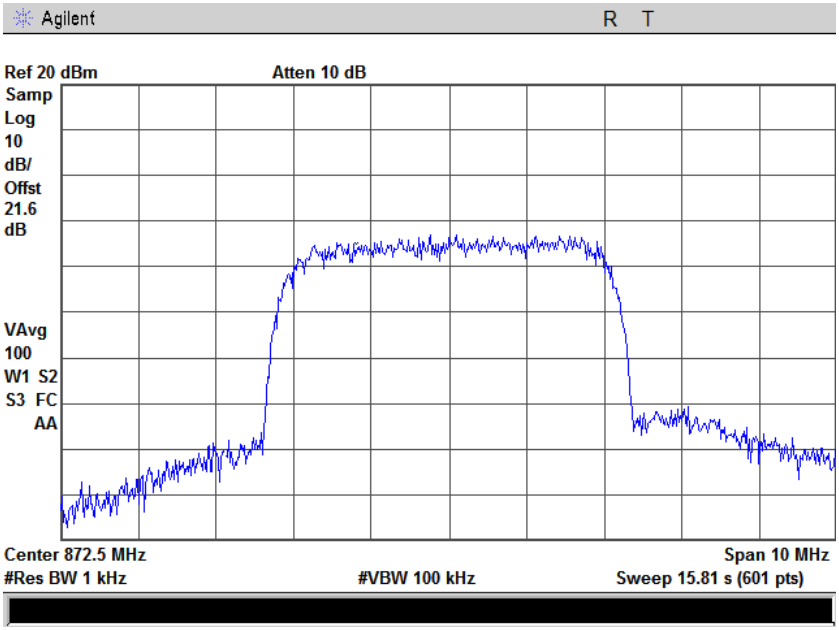


6.4.3 WCDMA

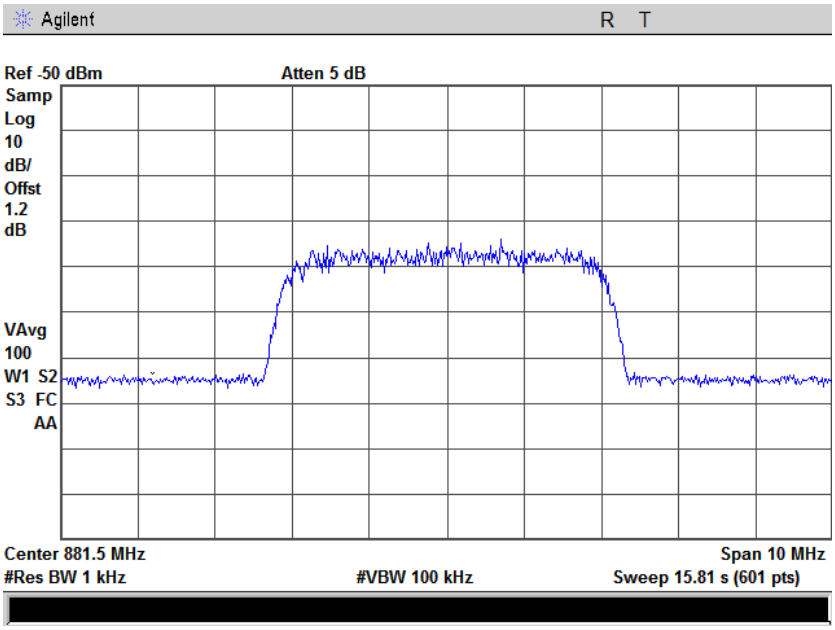
INPUT PLOT DOWNLINK - WCDMA 869 MHz



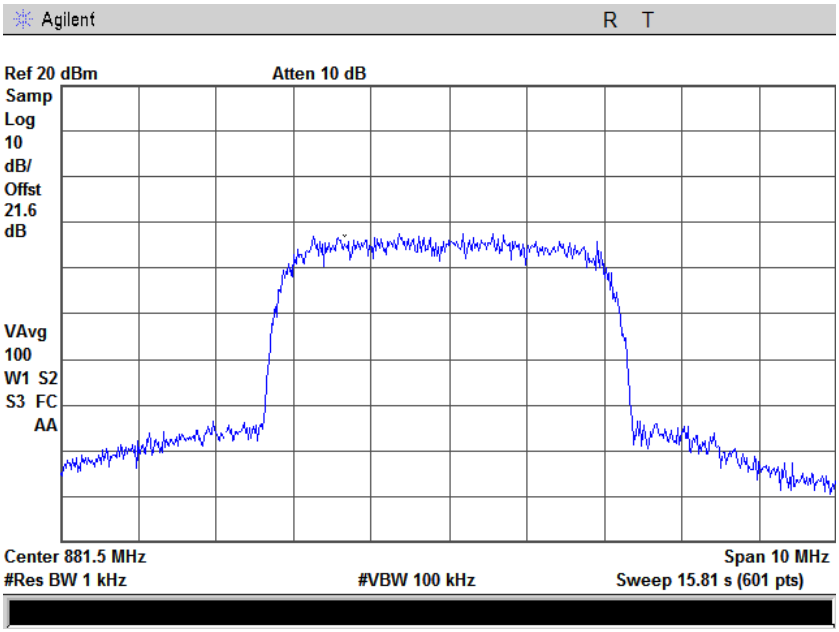
OUTPUT PLOT DOWNLINK - WCDMA 869 MHz



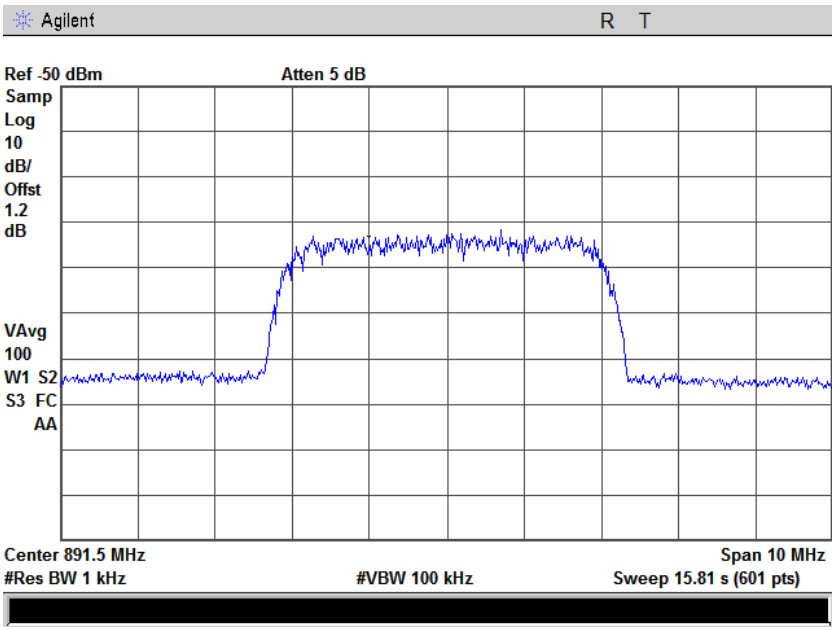
INPUT PLOT DOWNLINK - WCDMA 881 MHz



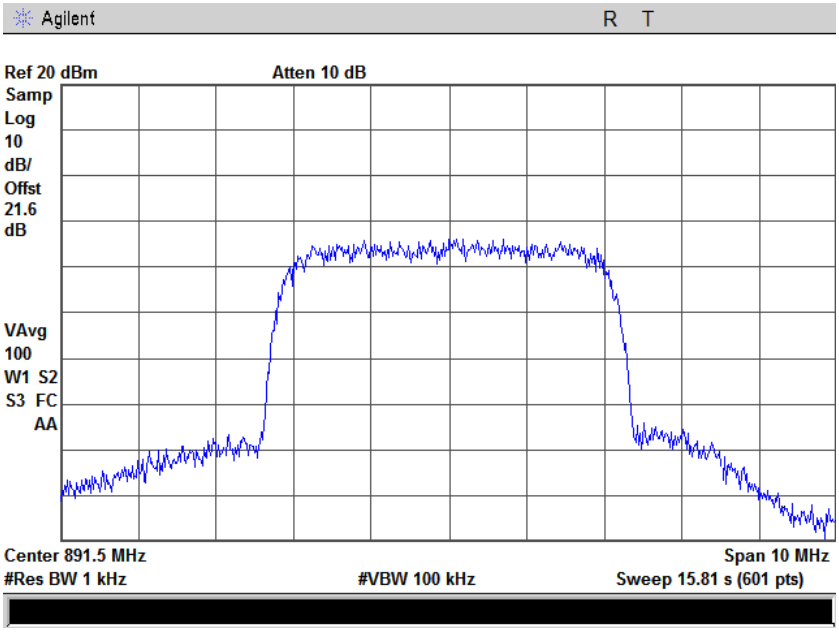
OUTPUT PLOT DOWNLINK - WCDMA 881 MHz



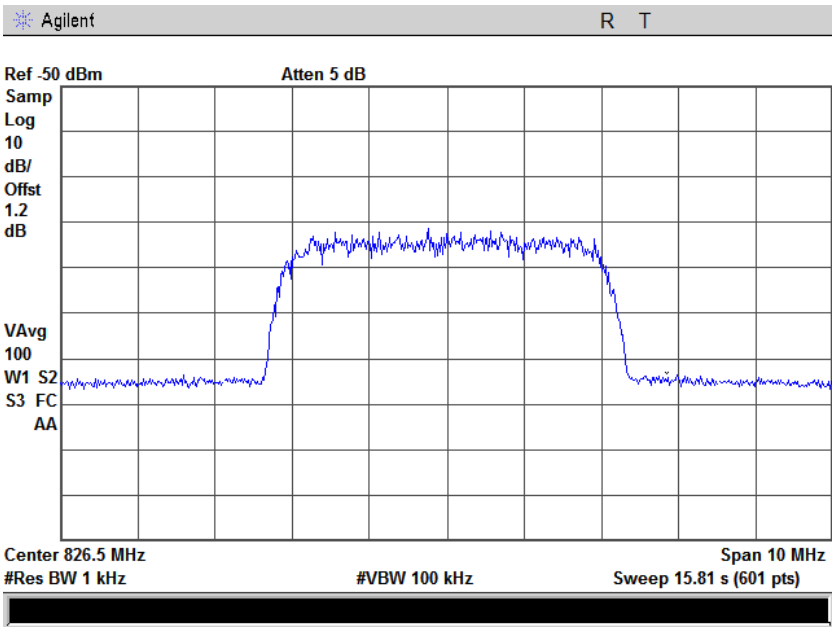
INPUT PLOT DOWNLINK - WCDMA 894 MHz



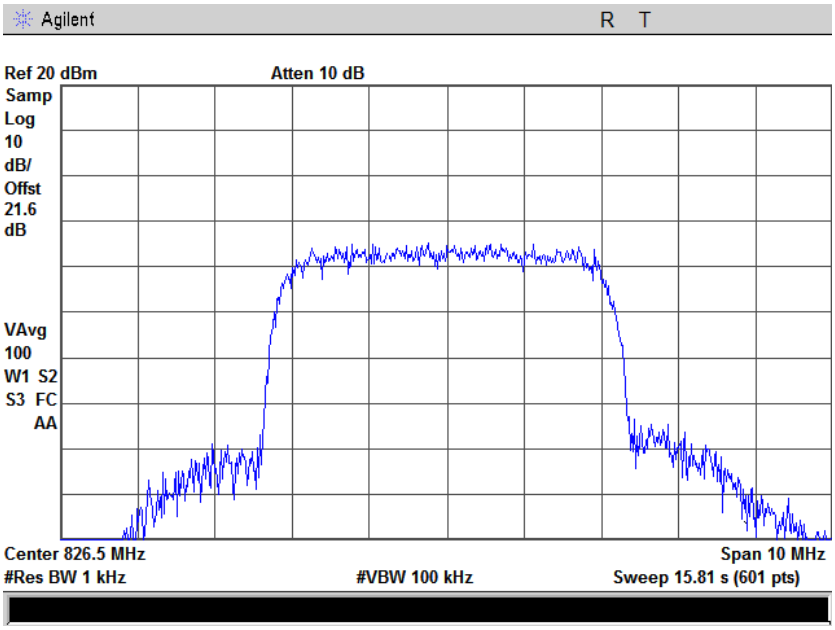
OUTPUT PLOT DOWNLINK - WCDMA 894 MHz



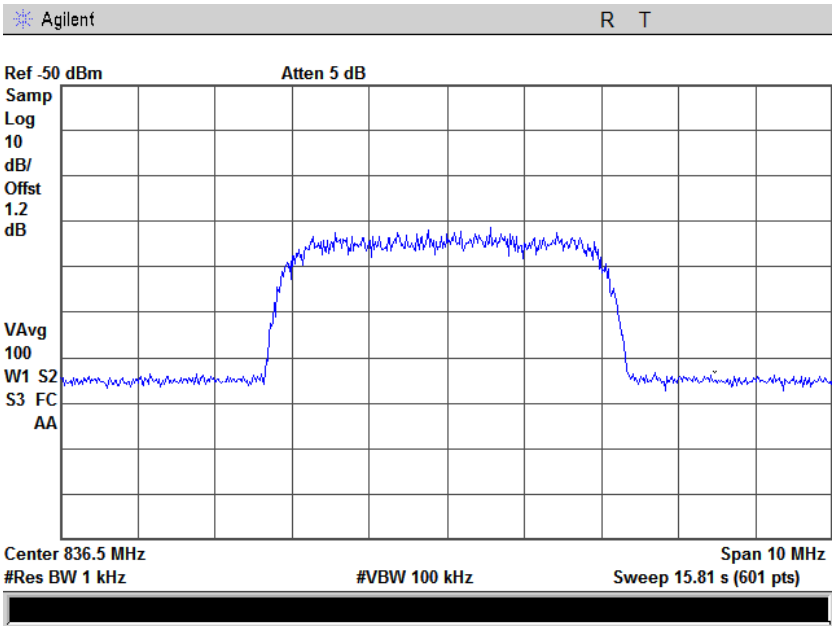
INPUT PLOT UPLINK - WCDMA 824 MHz



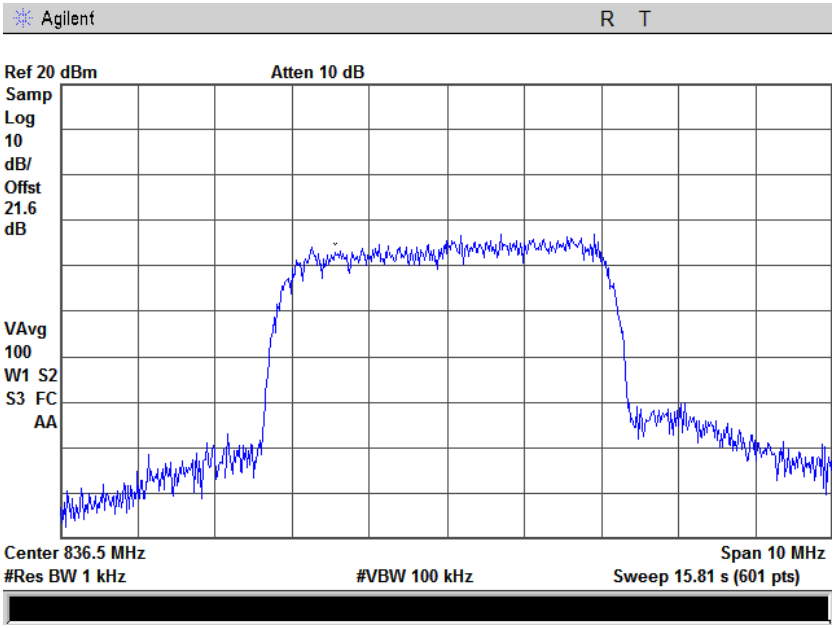
OUTPUT PLOT UPLINK - WCDMA 824 MHz



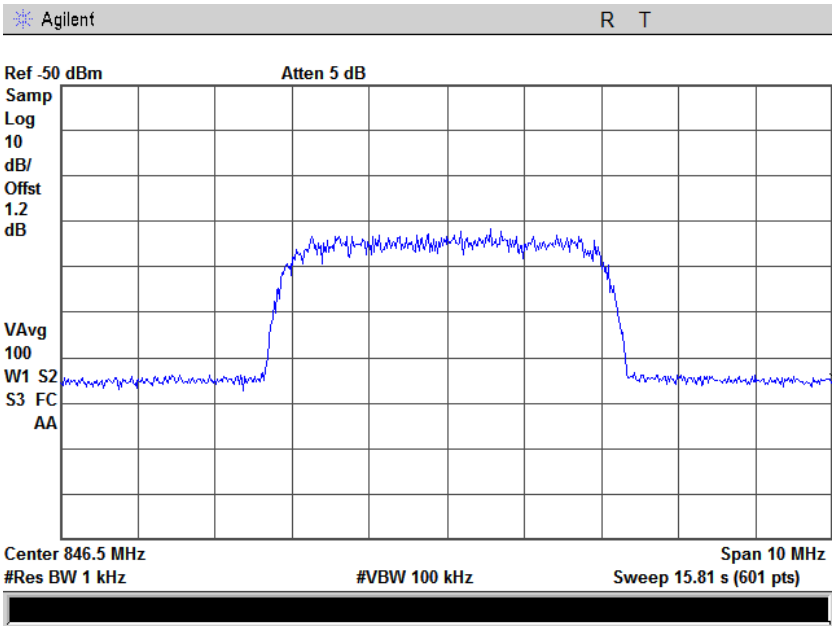
INPUT PLOT UPLINK - WCDMA 836 MHz



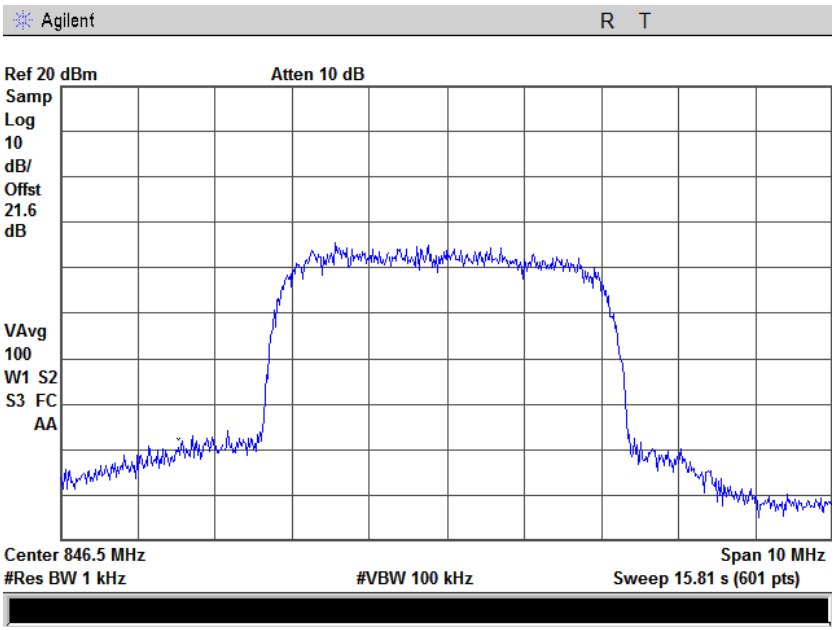
OUTPUT PLOT UPLINK - WCDMA 836 MHz



INPUT PLOT UPLINK - WCDMA 849 MHz



OUTPUT PLOT UPLINK - WCDMA 849 MHz



7 FCC 2.1049(i)- BLOCK EDGE

7.1 Applicable Standard

According to FCC §22.917 , the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log(P).

7.2 Test Equipment

Equipment	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	Agilent	E4404B	MY44220519	26-Feb-2013	26-Feb-2014
Signal Generator	Agilent	E4437B	US39230102	11-Jan-2012	11-Jan-2014

7.3 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through 20dB attenuation.

The center of the spectrum analyzer was set to block edge frequency.

Uplink

Frequency: 824 - 849MHz

Modulation: EDGE, GSM and WCDMA

Power : 25dBm

Downlink

Frequency: 869 - 894MHz

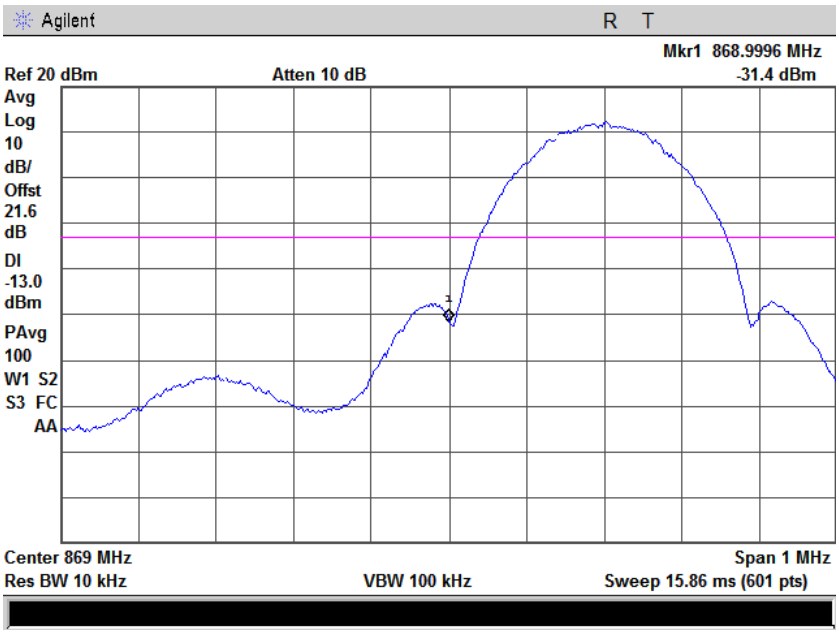
Modulation: EDGE, GSM and WCDMA

Power : 25dBm

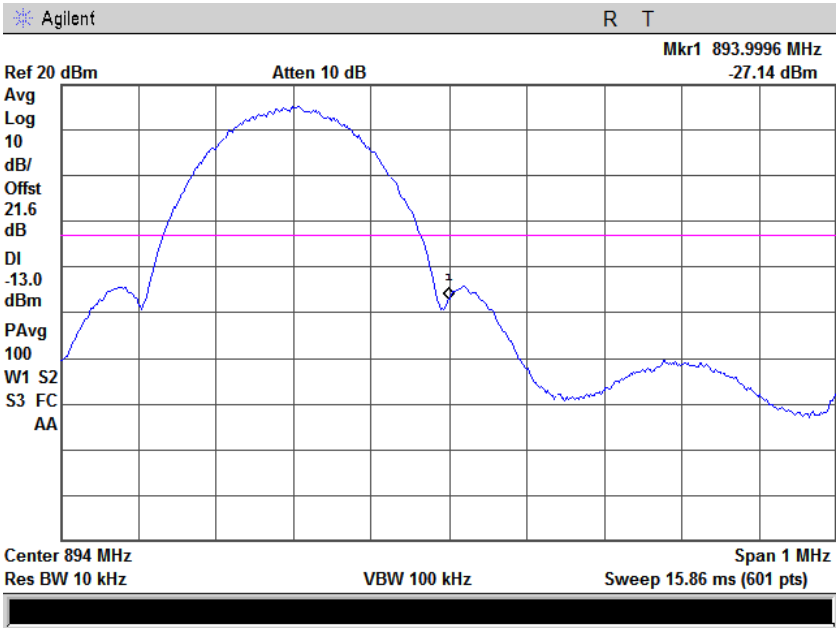
7.4 Test Results

7.4.1 EDGE

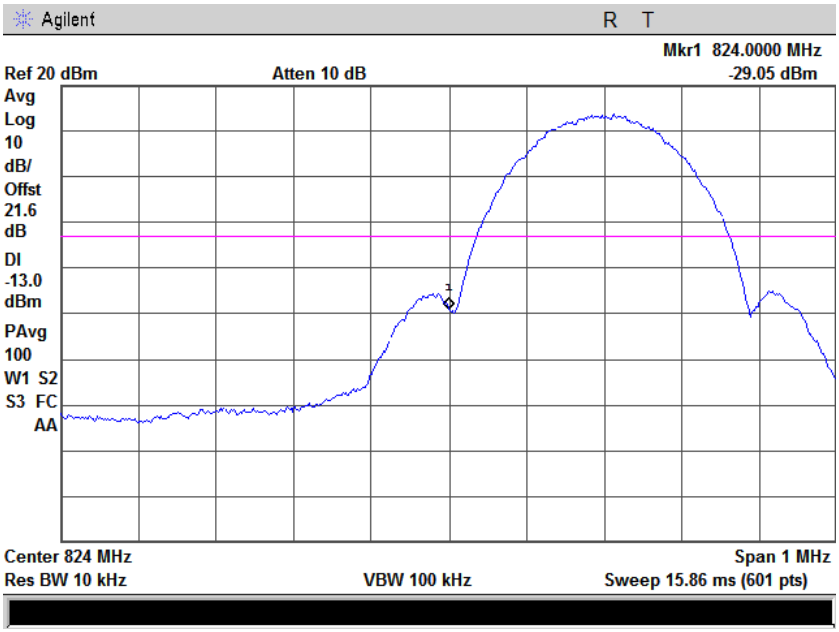
Blockedge Downlink - 869MHz



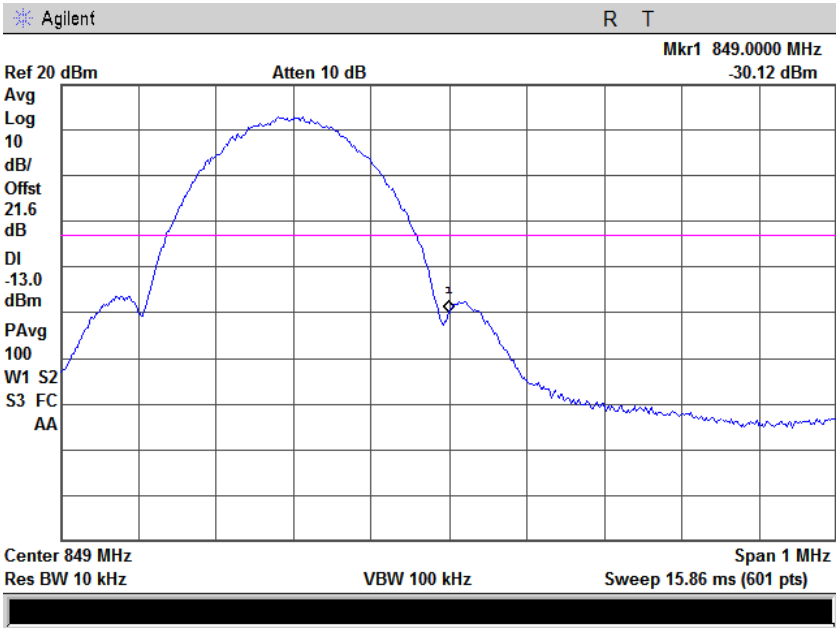
Blockedge Downlink - 894MHz



Blockedge Uplink - 824MHz

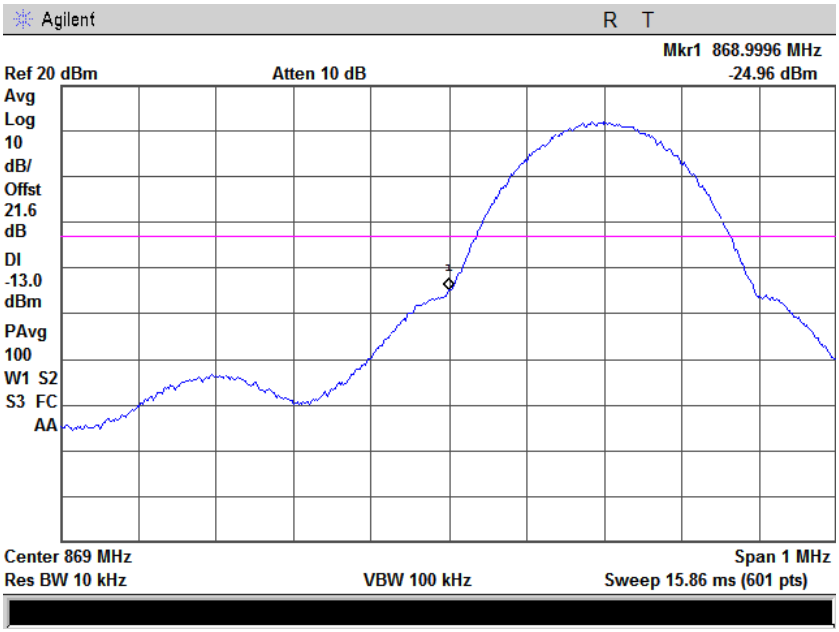


Blockedge Uplink - 849MHz

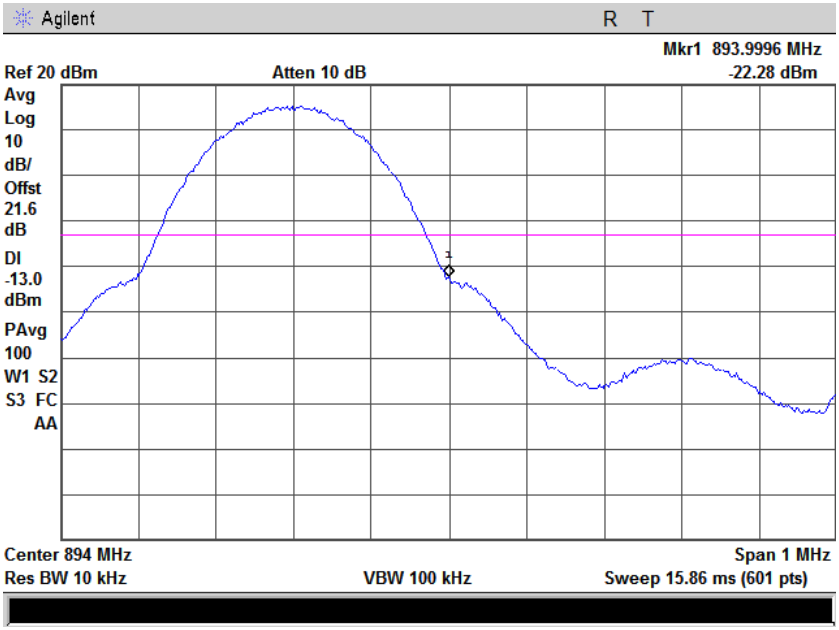


7.4.2 GSM

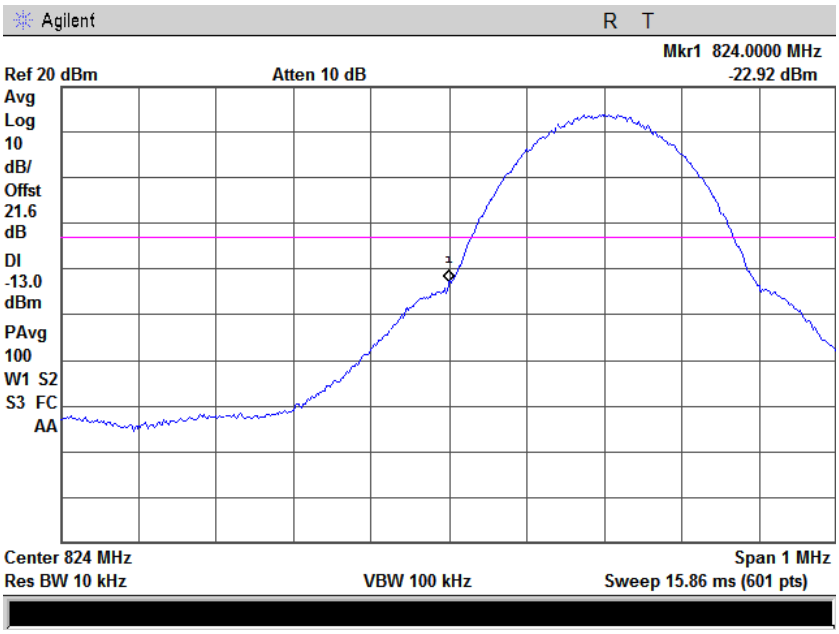
Blockedge Downlink - 869MHz



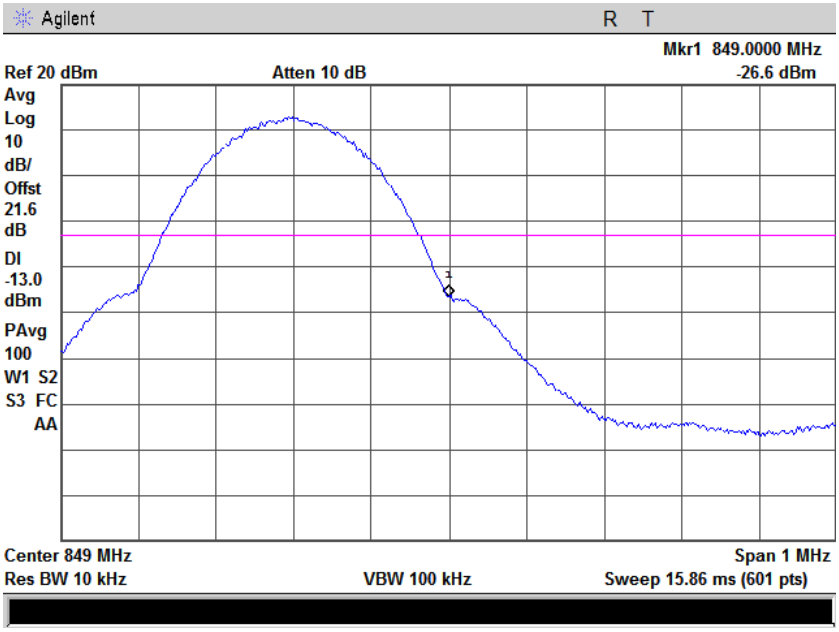
Blockedge Downlink - 894MHz



Blockedge Uplink - 824MHz

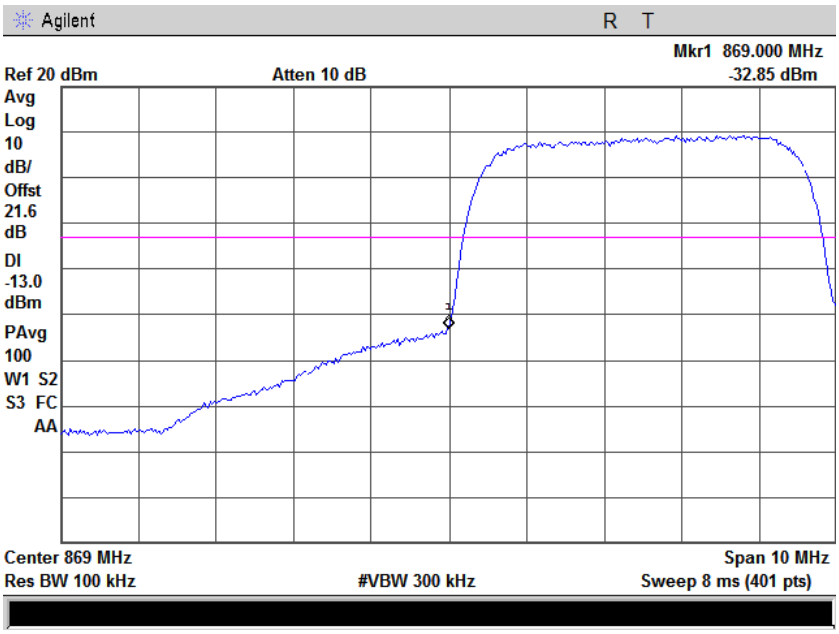


Blockedge Uplink - 849MHz

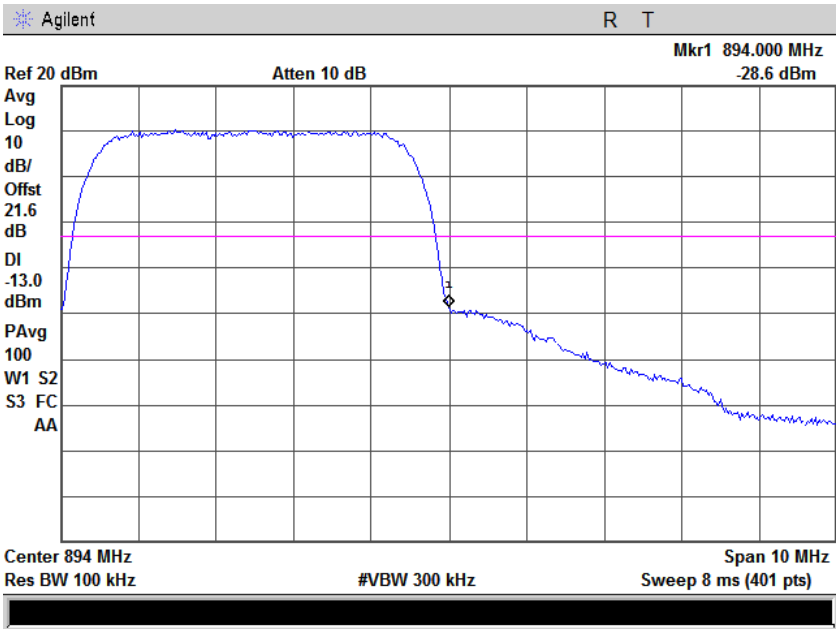


7.4.3 WCDMA

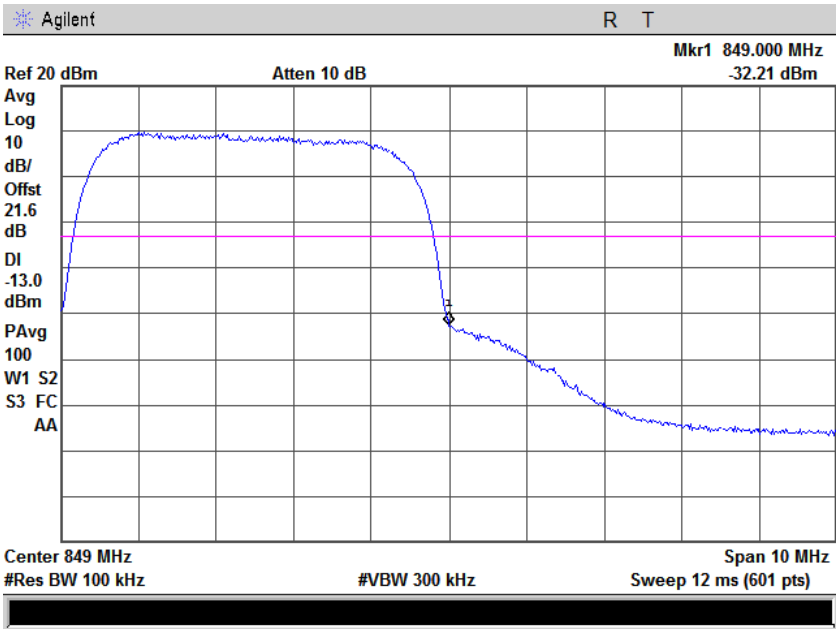
Blockedge Downlink - 869MHz



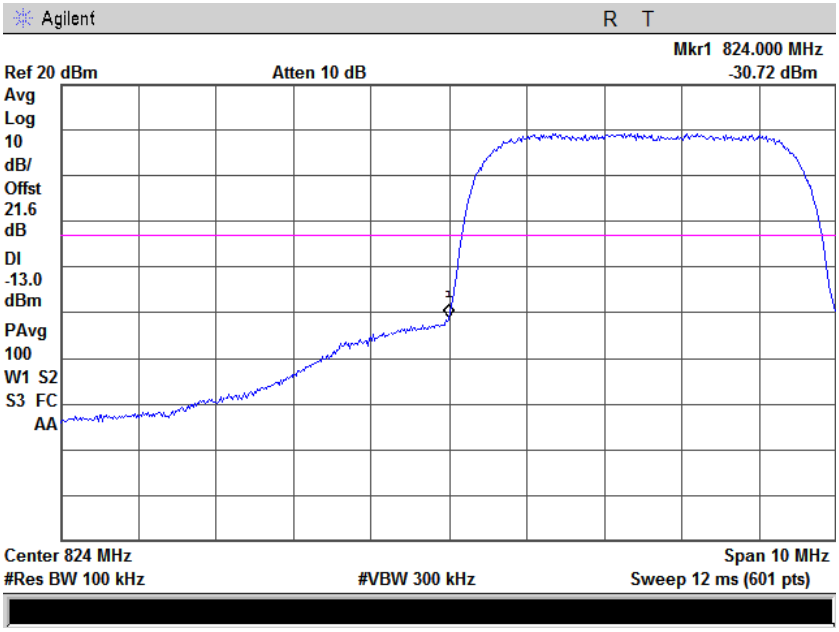
Blockedge Downlink - 894MHz



Blockedge Uplink - 824MHz



Blockedge Uplink - 849MHz



8 FCC §2.1051, §22.917- SPURIOUS EMISSIONS AT ANTENNA TERMINALS

8.1 Applicable Standard

As per FCC §22.917 : The power of any emission outside of authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log(P) dB

8.2 Test Equipment

Equipment	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	Agilent	E4405B	US41441250	20-Mar-2013	20-Mar-2014
Signal Generator	Agilent	E4437B	US39230102	11-Jan-2012	11-Jan-2014

8.3 Test Procedure

For downlink configuration, Donor antenna port is connected to signal generator and Area Fill antenna port is connected to a spectrum analyzer through 20dB attenuator.

For uplink configuration, Donor antenna port is connected to a spectrum analyzer and Area Fill antenna port is connected to an signal analyzer through 20dB attenuator.

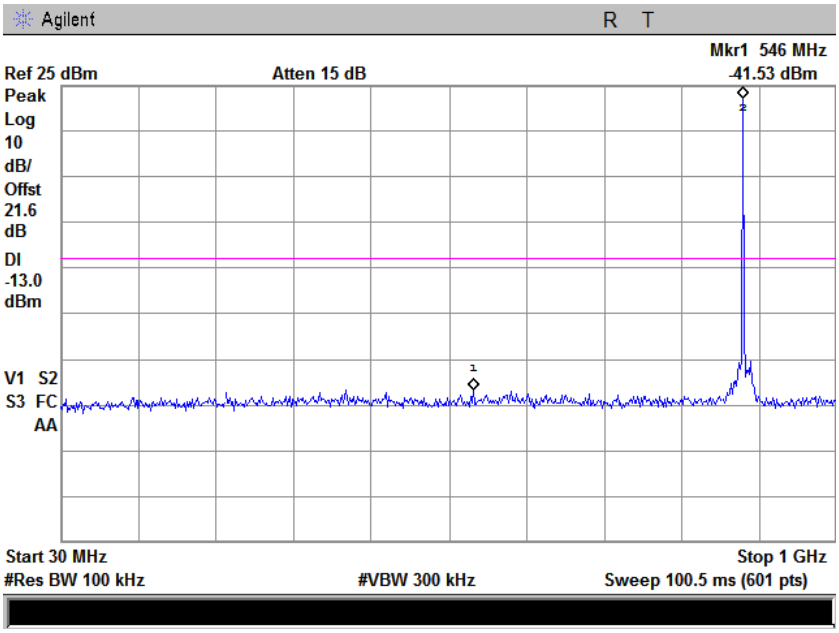
The resolution bandwidth of the spectrum analyzer was set to 100kHz . Sufficient scans were taken to show any out of band emissions up to 10^{th} harmonic.

8.4 Test Results

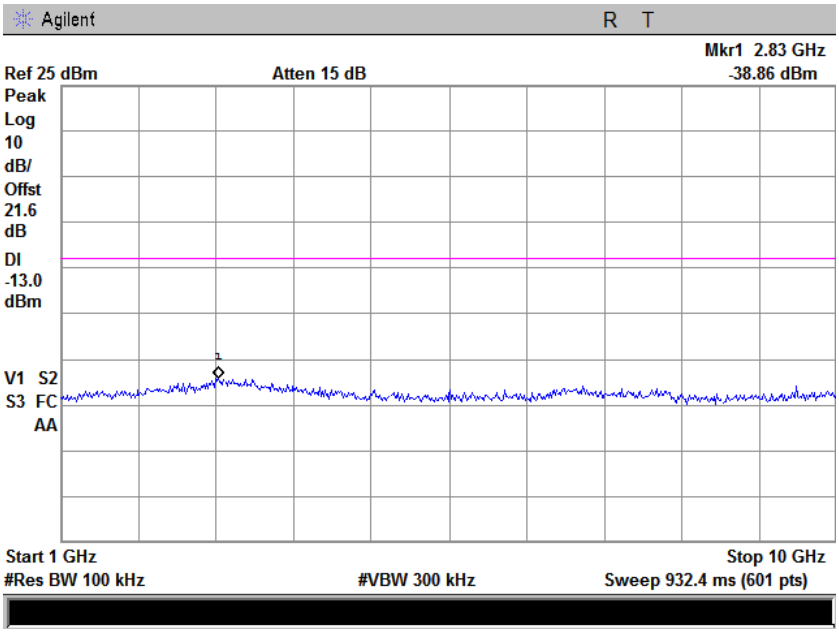
8.4.1 EDGE

Downlink : Frequency - 881.5MHz

Plot 1: 30MHz to 1GHz

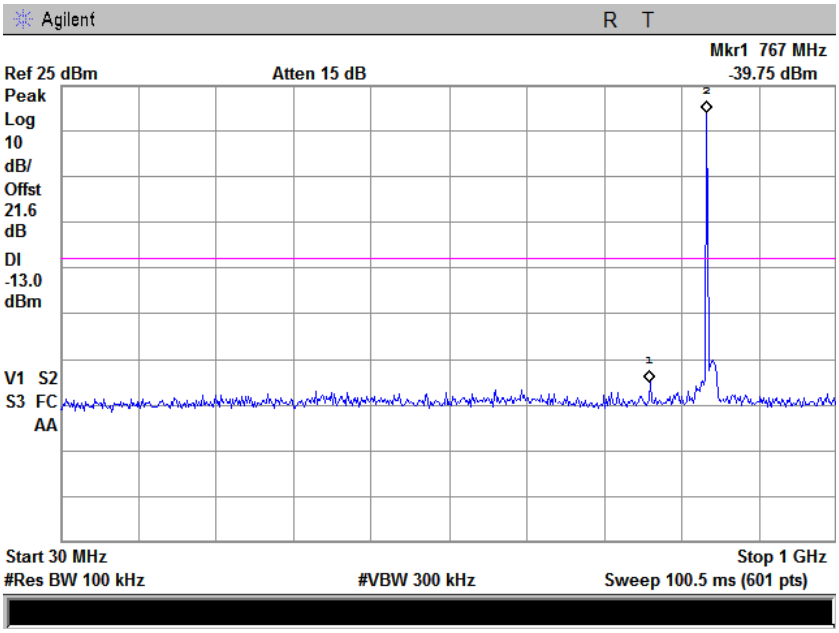


Plot 2: Above 1GHz

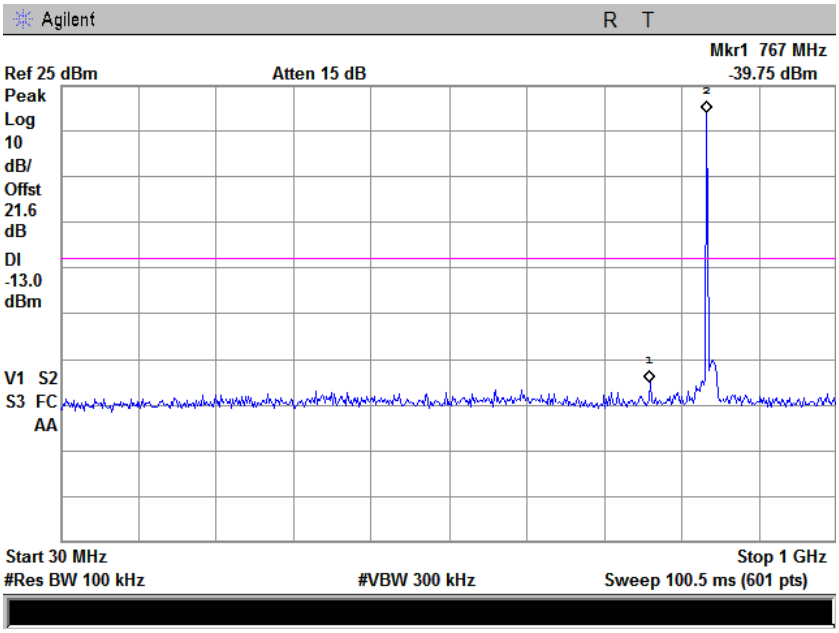


Uplink, Frequency - 836.5MHz

Plot 1: 30MHz to 1GHz



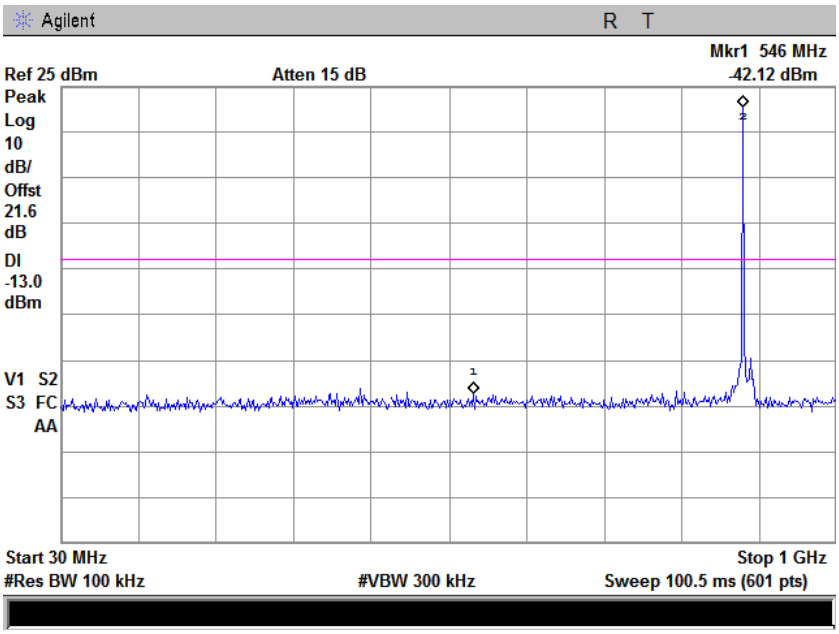
Plot 2: Above 1GHz



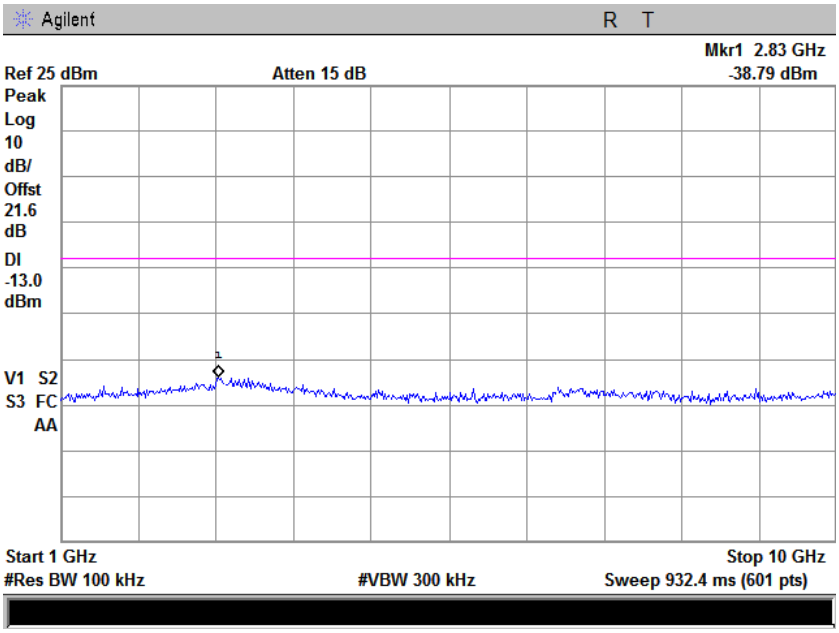
8.4.2 GSM

Downlink, Frequency - 881.5MHz

Plot 1: 30MHz to 1GHz

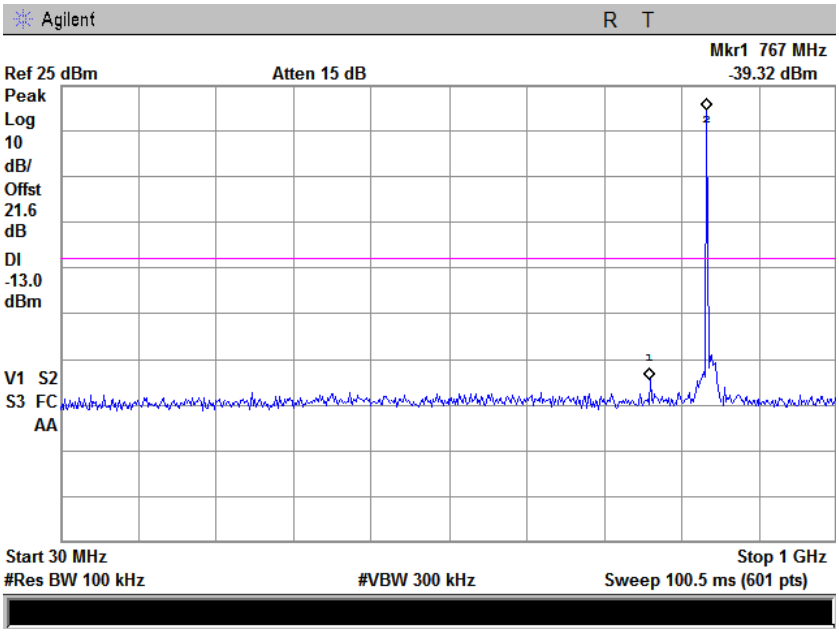


Plot 2: Above 1GHz

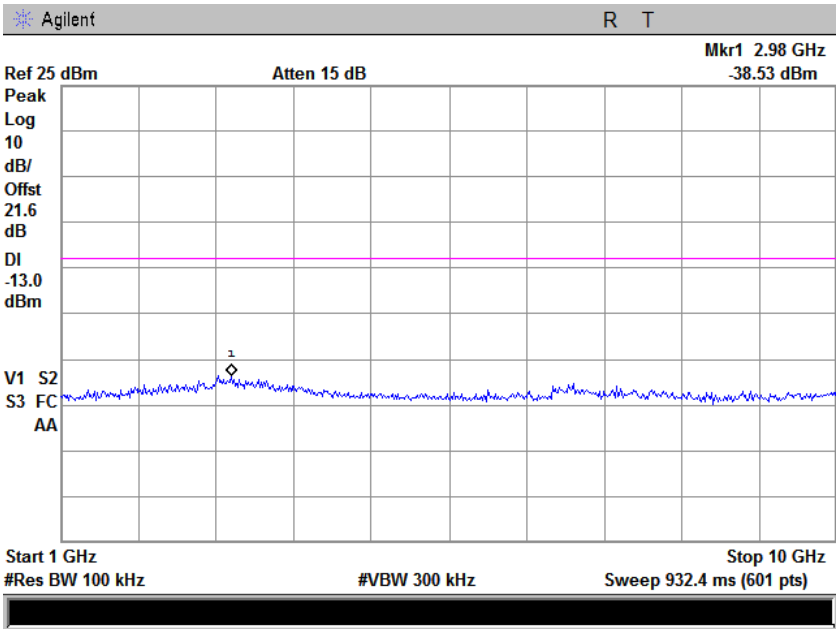


Uplink, Frequency - 836.5MHz

Plot 1: 30MHz to 1GHz



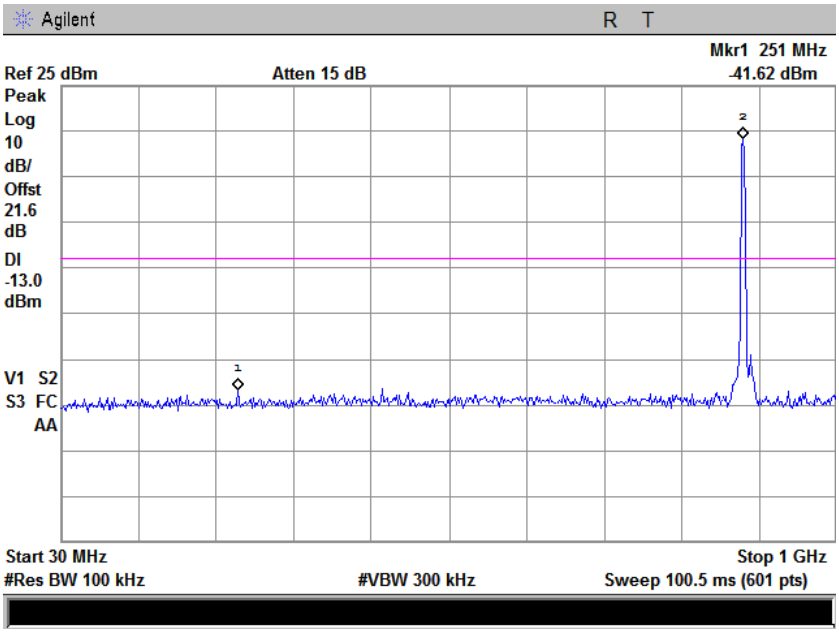
Plot 2: Above 1GHz



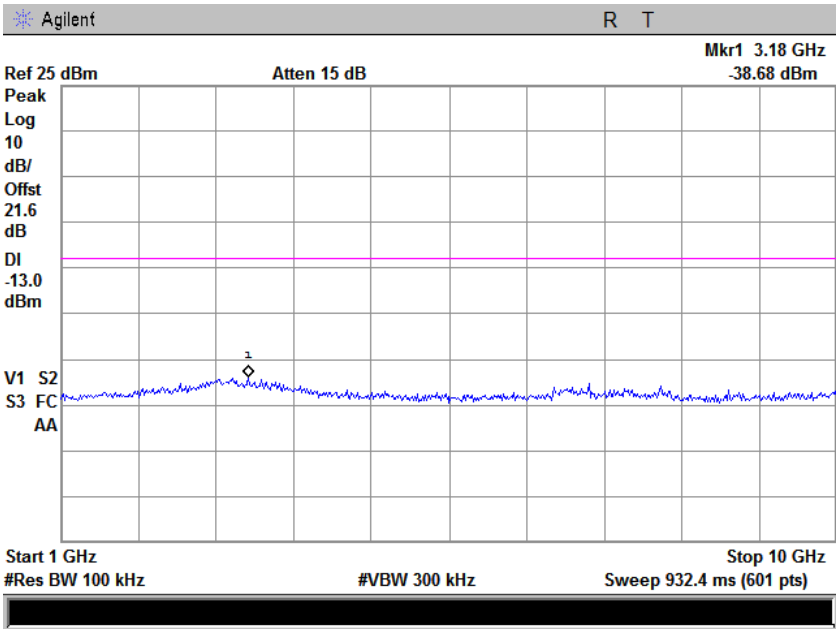
8.4.3 WCDMA

Downlink, Frequency - 881.5MHz

Plot 1: 30MHz to 1GHz

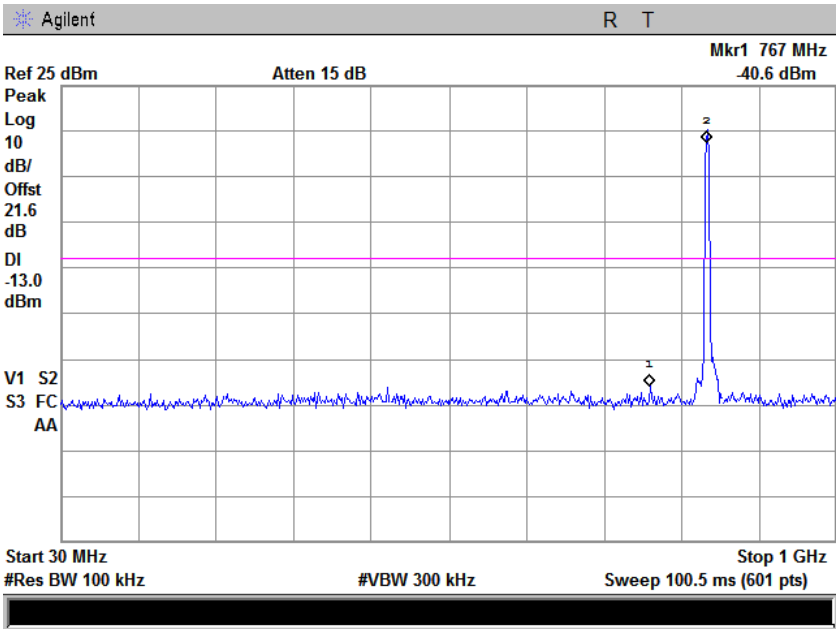


Plot 2: Above 1GHz

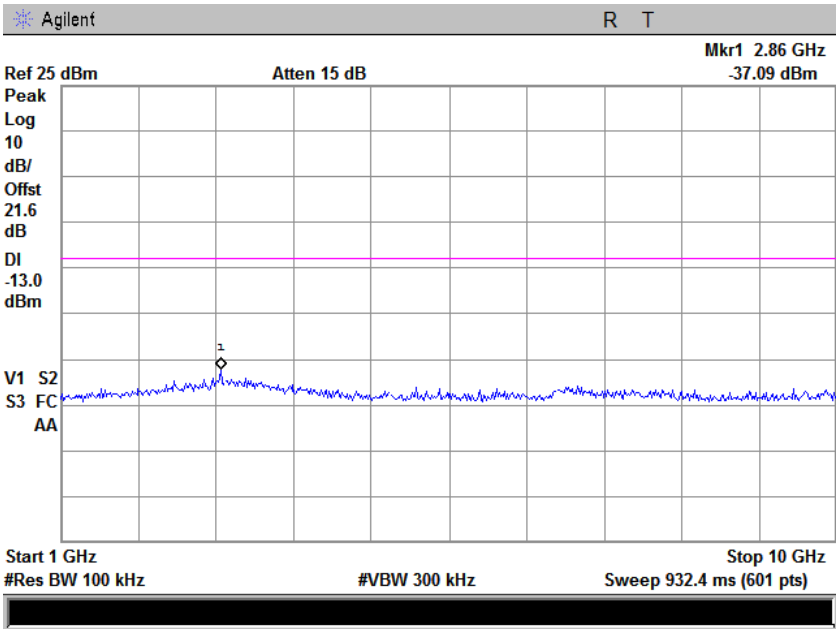


Uplink, Frequency - 836.5MHz

Plot 1: 30MHz to 1GHz



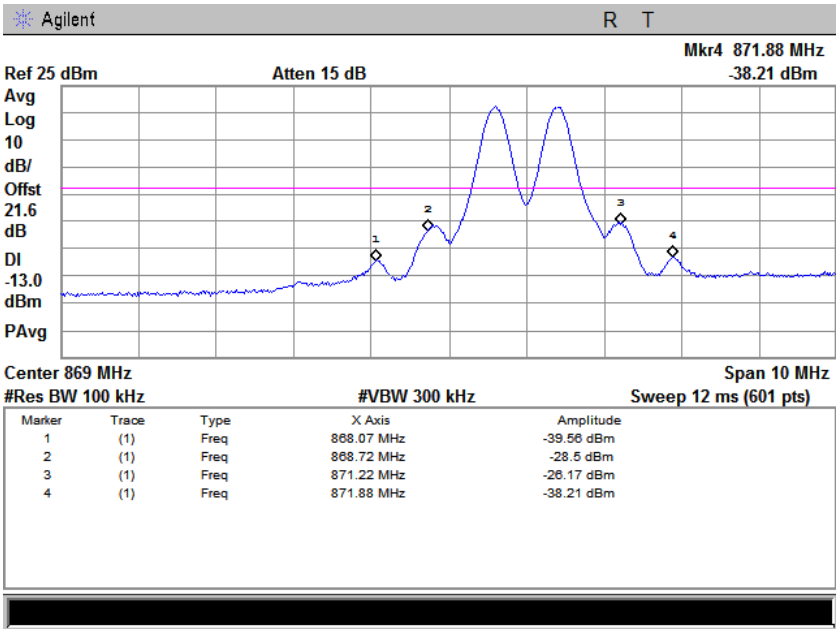
Plot 2: Above 1GHz



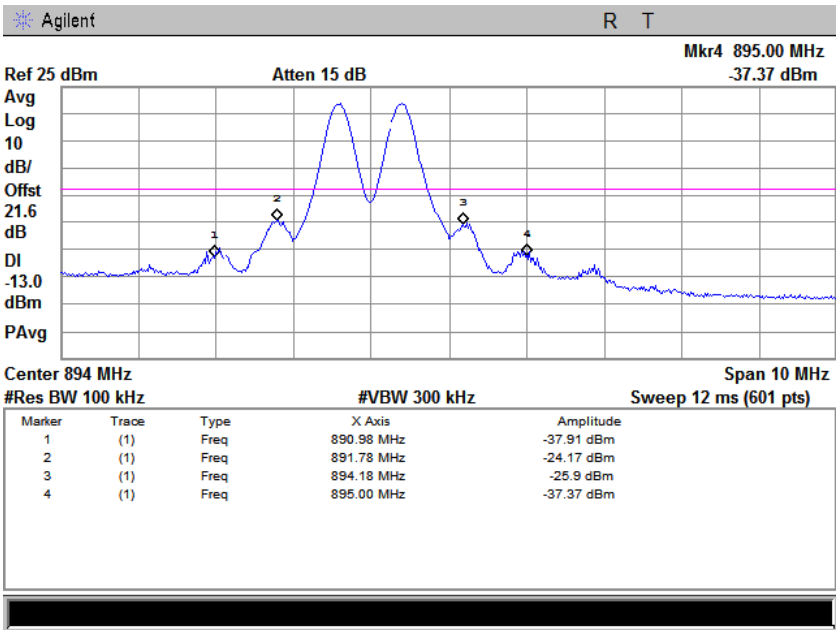
8.4.5 Intermodulation Distortion

8.4.5.1 EDGE

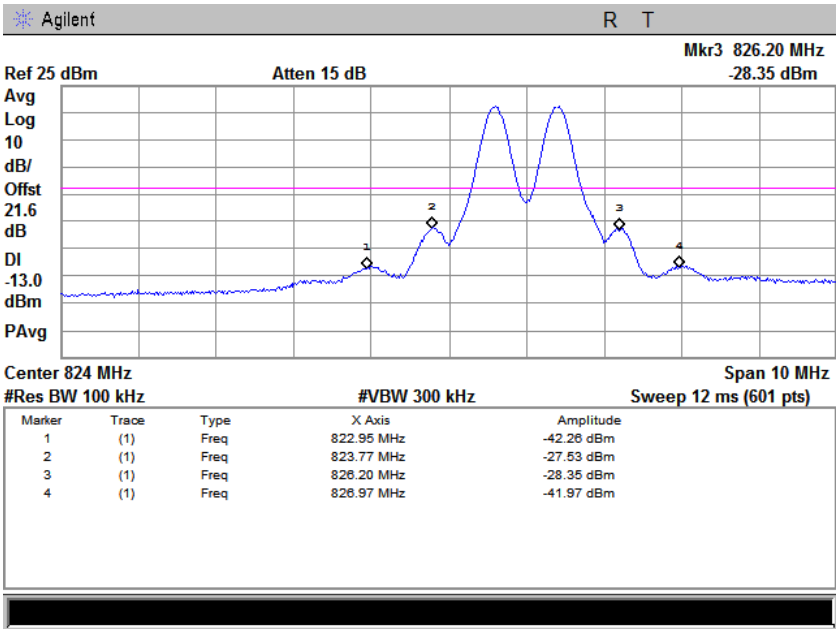
EDGE Downlink , Intermodulation on the lower band edge



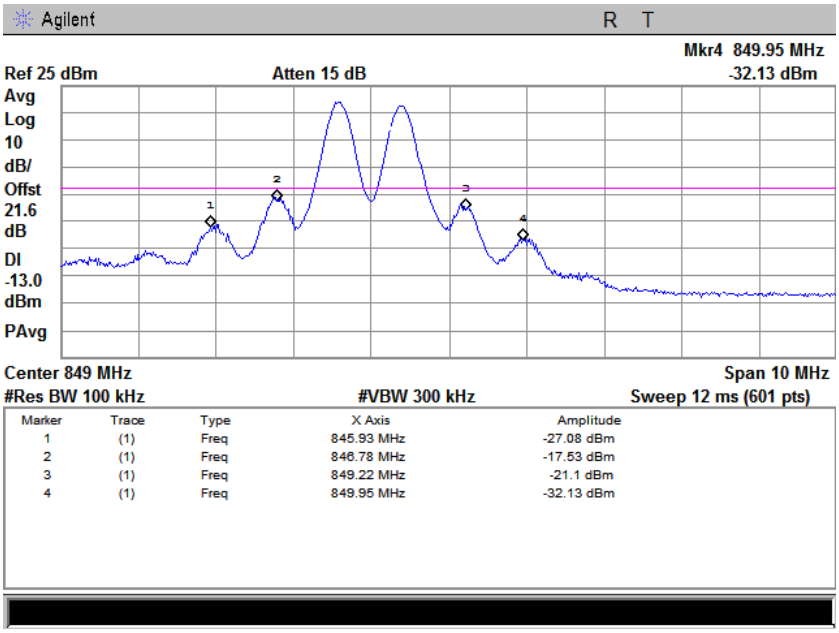
EDGE Downlink , Intermodulation on the upper band edge



EDGE Uplink , Intermodulation on the lower band edge

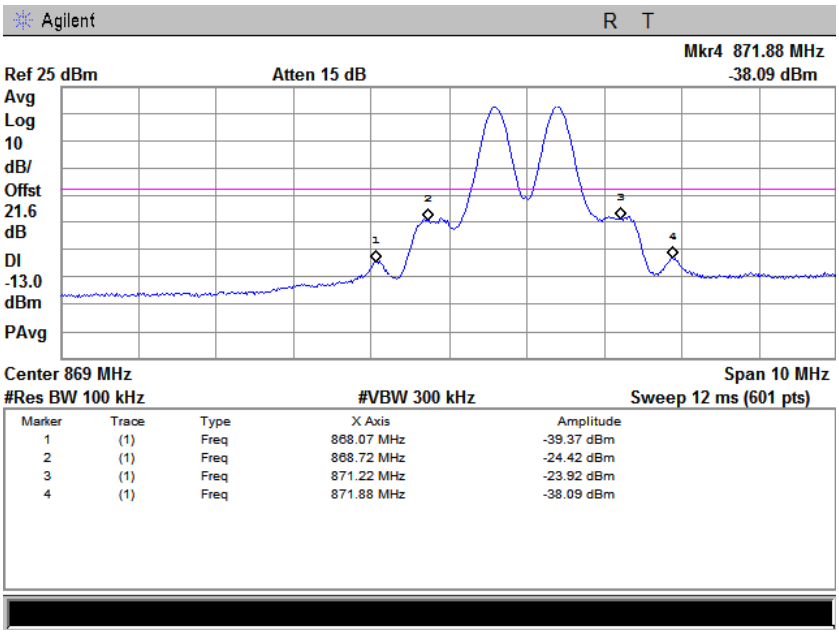


EDGE Uplink , Intermodulation on the upper band edge

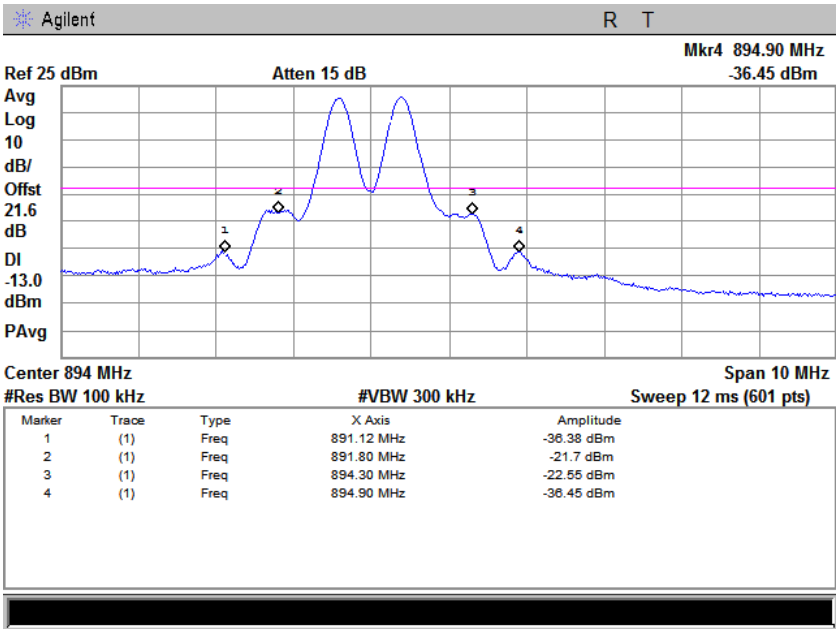


8.4.5.2 GSM

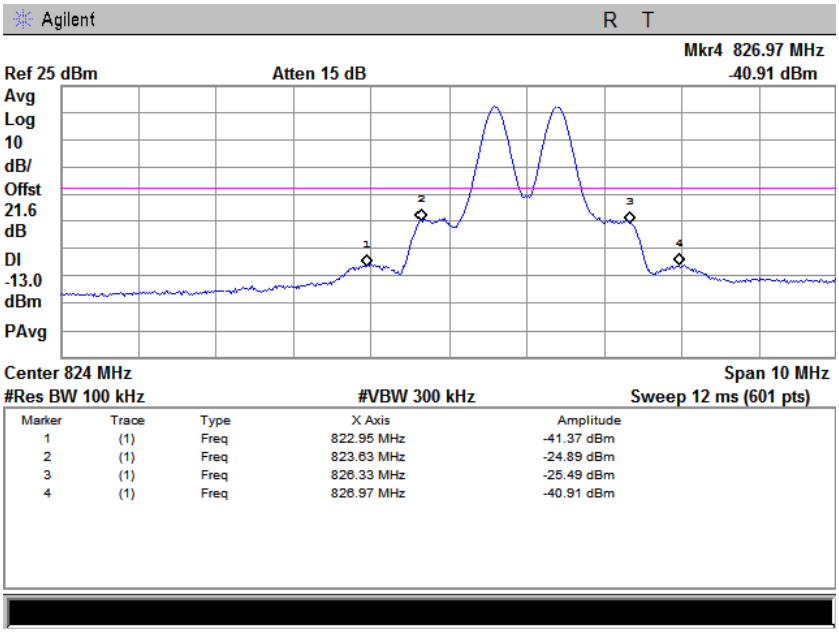
GSM Downlink , Intermodulation on the lower band edge



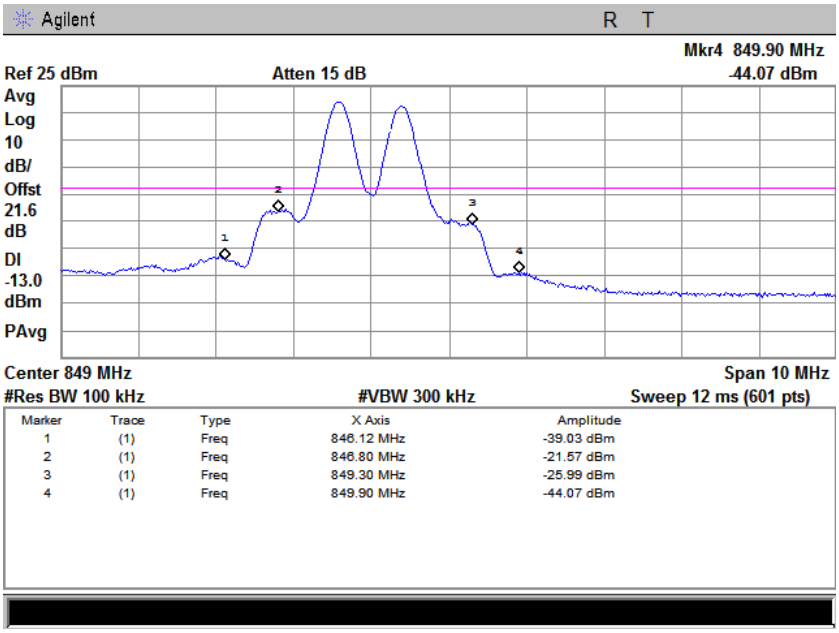
GSM Downlink , Intermodulation on the upper band edge



GSM Uplink , Intermodulation on the lower band edge

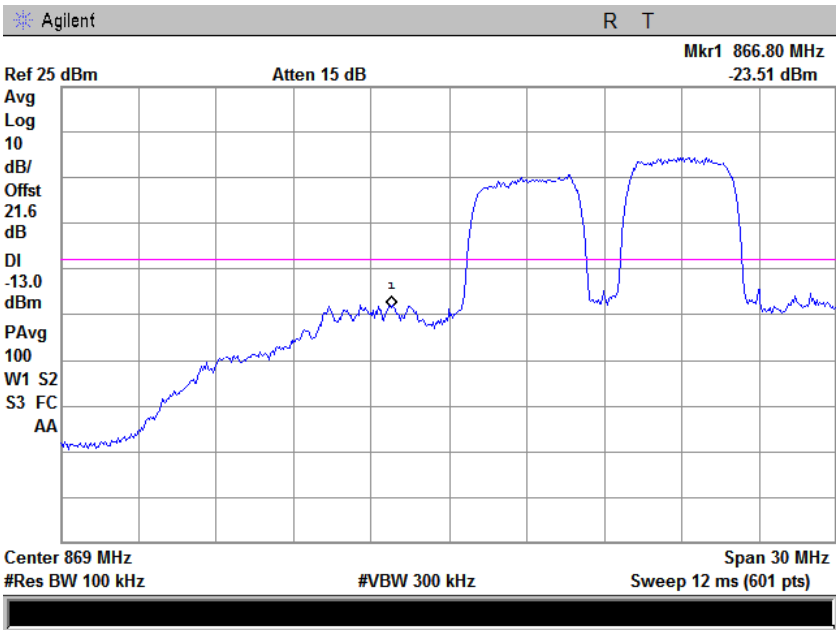


GSM Uplink , Intermodulation on the upper band edge

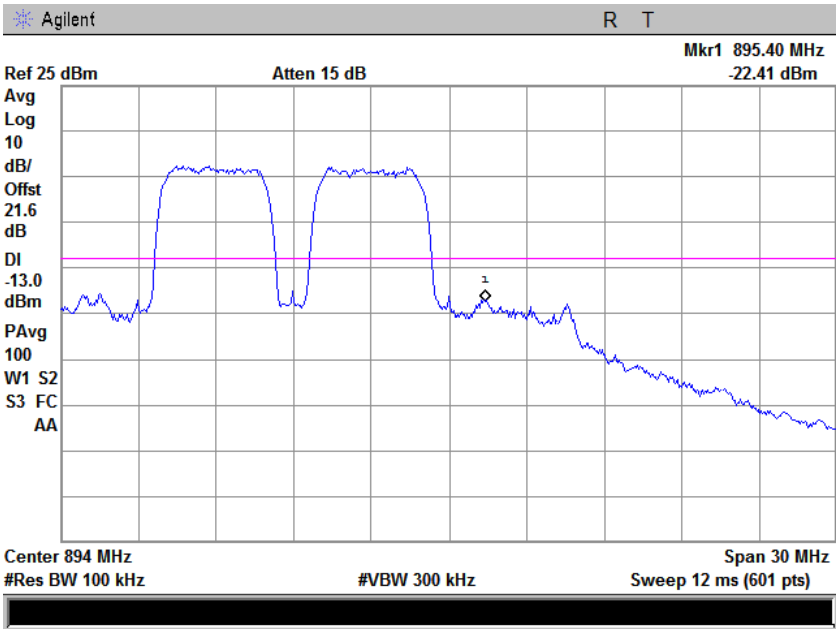


8.4.5.3 WCDMA

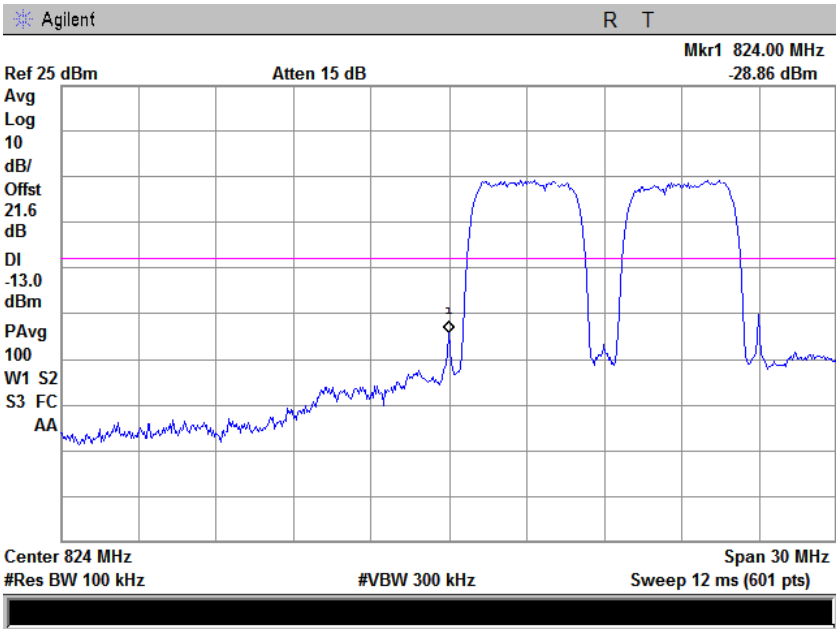
WCDMA Downlink , Intermodulation on the lower band edge



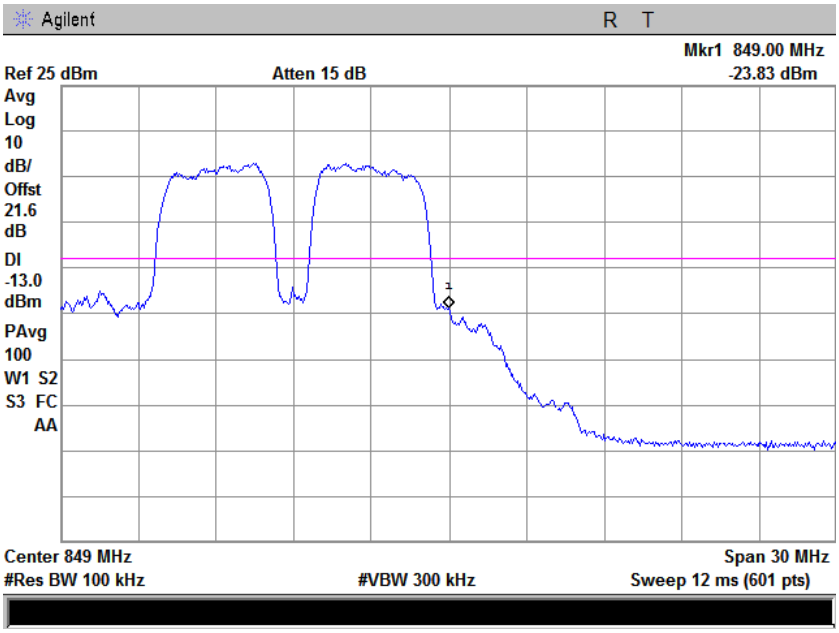
WCDMA Downlink , Intermodulation on the upper band edge



WCDMA Uplink , Intermodulation on the lower band edge



WCDMA Uplink , Intermodulation on the upper band edge



9 RSS-131 - 99% BANDWIDTH

9.1 Applicable Standard

Requirements : RSS-131 Issue 2 (2003) Section 6.3.2

9.2 Test Equipment

Equipment	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	Agilent	E4404B	MY44220519	26-Feb-2013	26-Feb-2014
Signal Generator	Agilent	E4437B	US39230102	11-Jan-2012	11-Jan-2014

9.3 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through 20dB attenuator.

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

Uplink

Frequency: 824 - 849MHz

Modulation: EDGE, GSM and WCDMA

Power : 25dBm

Downlink

Frequency: 869 - 894MHz

Modulation: EDGE, GSM and WCDMA

Power : 25dBm

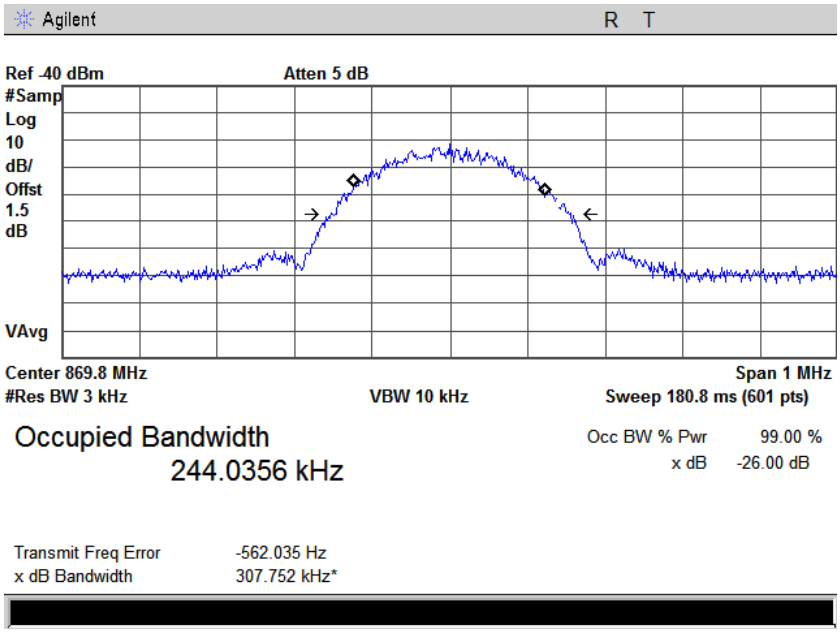
9.4 Test Results

9.4.1 EDGE:

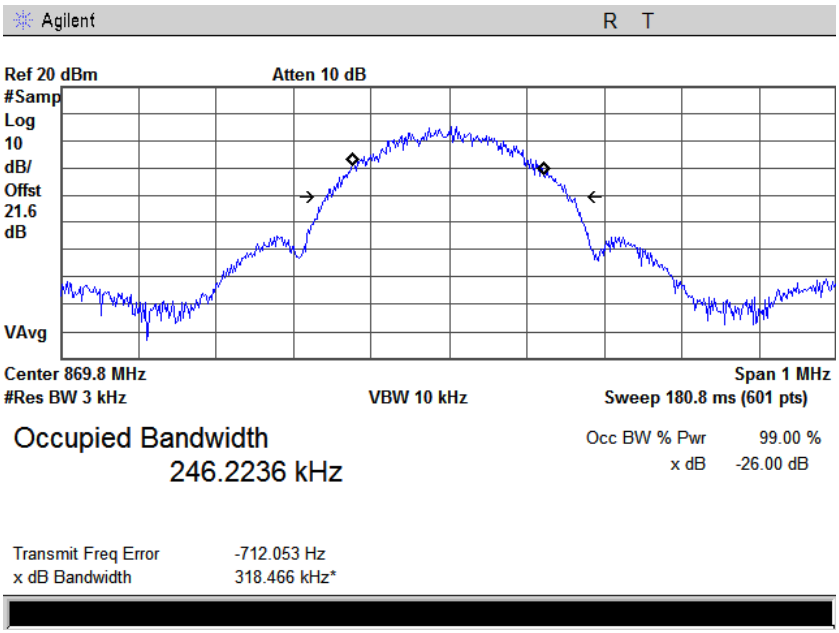
Mode		Channel	Frequency (MHz)	Emission Bandwidth	
				Input (kHz)	Output (kHz)
EDGE	Downlink	Low	869.8	244.0	246.2
		Middle	881.5	249.2	245.3
		High	893.2	246.4	248.0
	Uplink	Low	824.8	246.0	246.3
		Middle	836.5	247.7	246.8
		High	848.2	247.1	246.4

99% BANDWIDTH DOWNLINK - EDGE 869MHz

Input

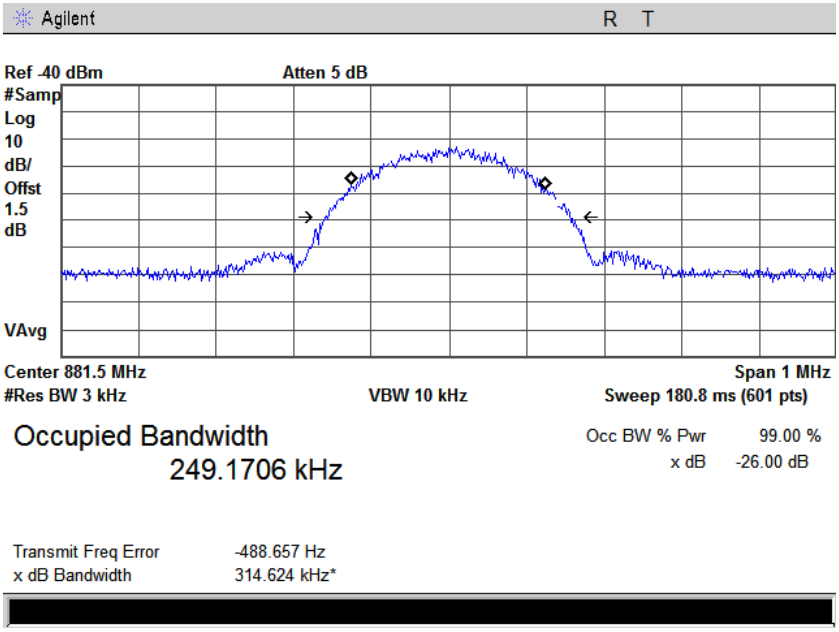


Output

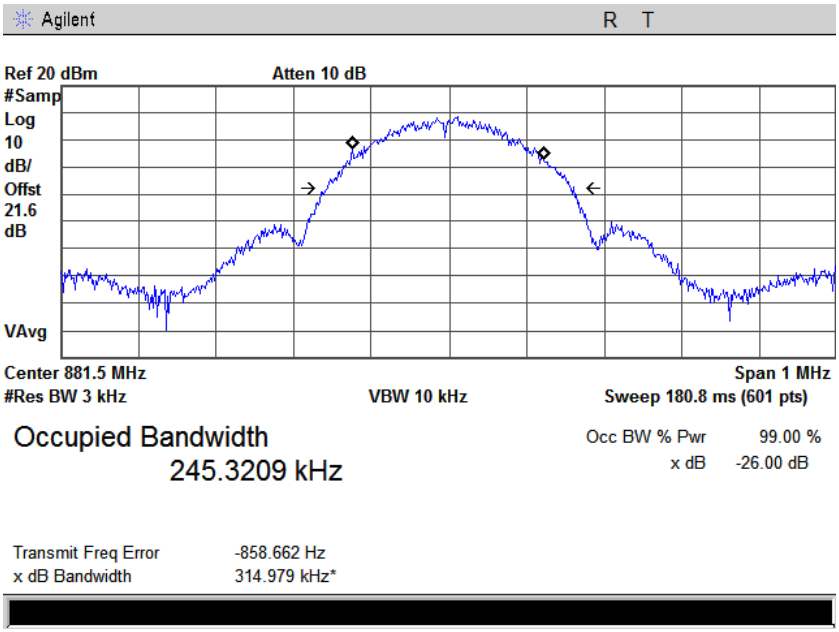


99% BANDWIDTH DOWNLINK - EDGE 881MHz

Input

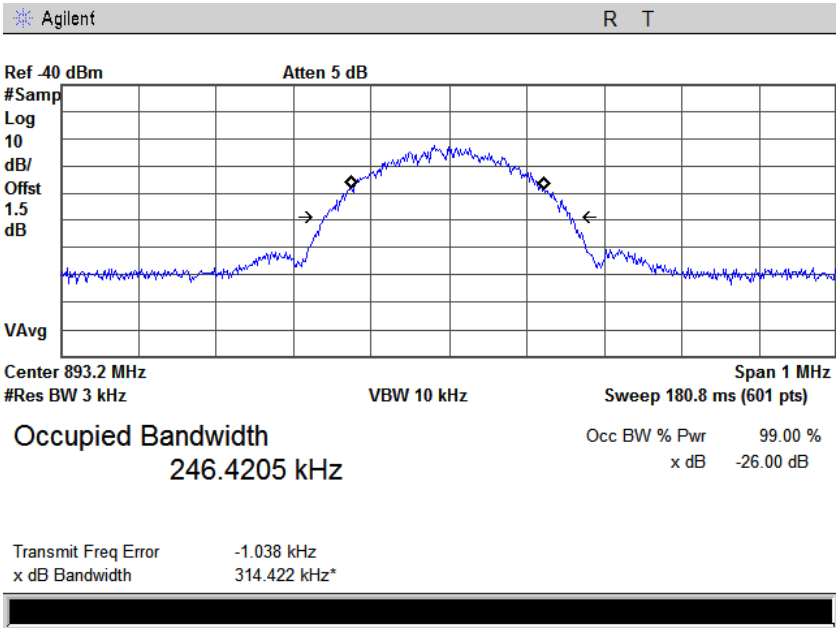


Output

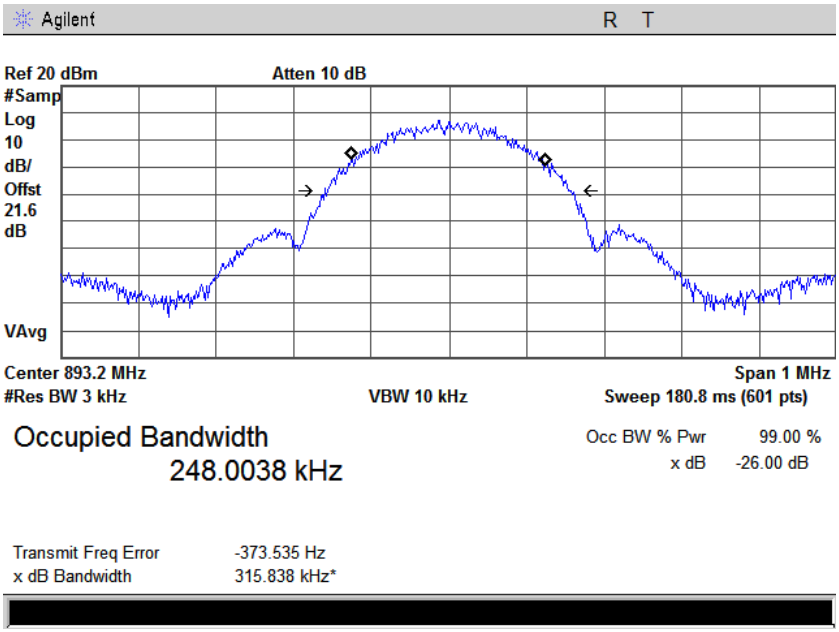


99% BANDWIDTH DOWNLINK - EDGE 894MHz

Input

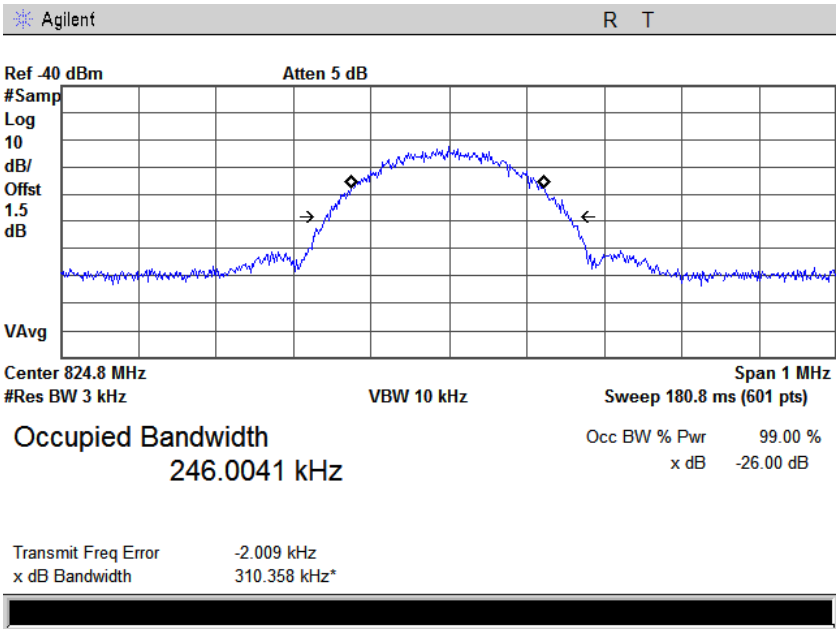


Output

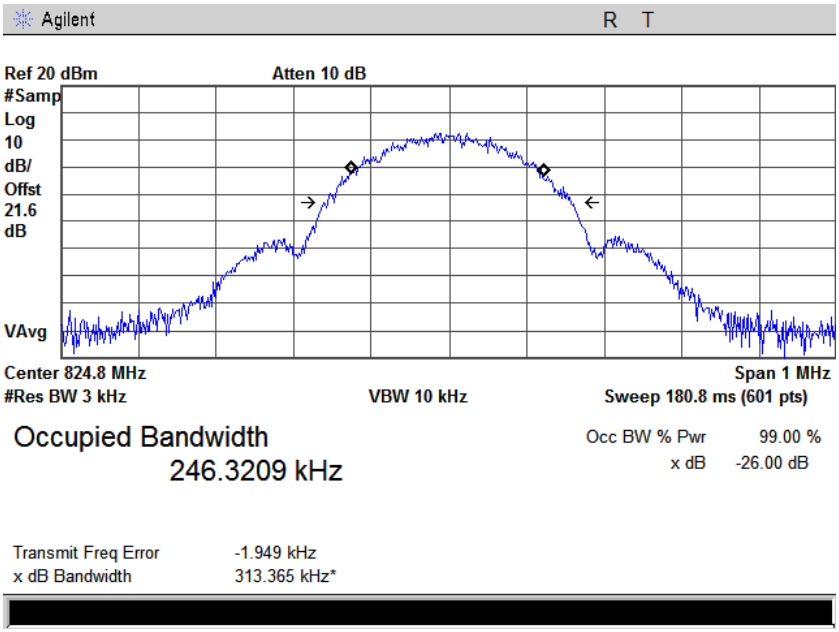


99% BANDWIDTH UPLINK - EDGE 824MHz

Input

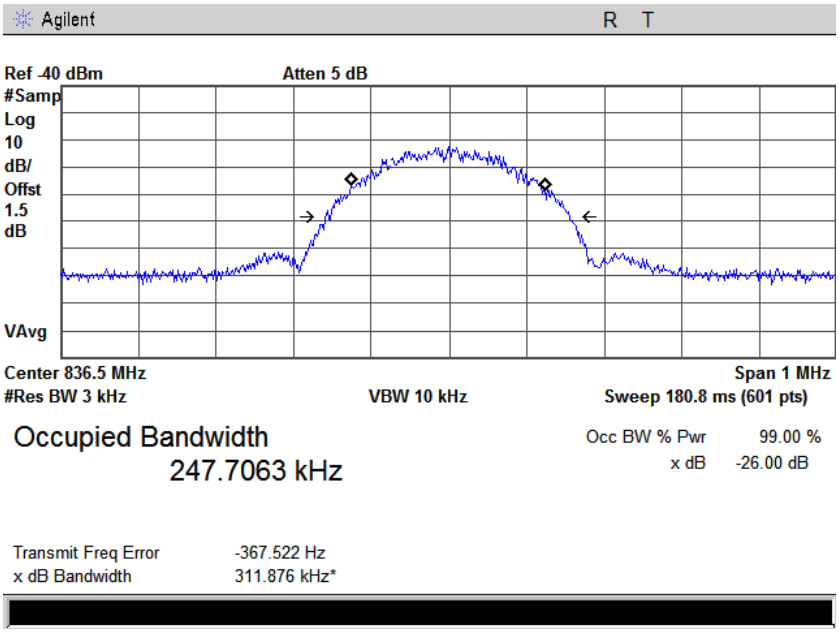


Output

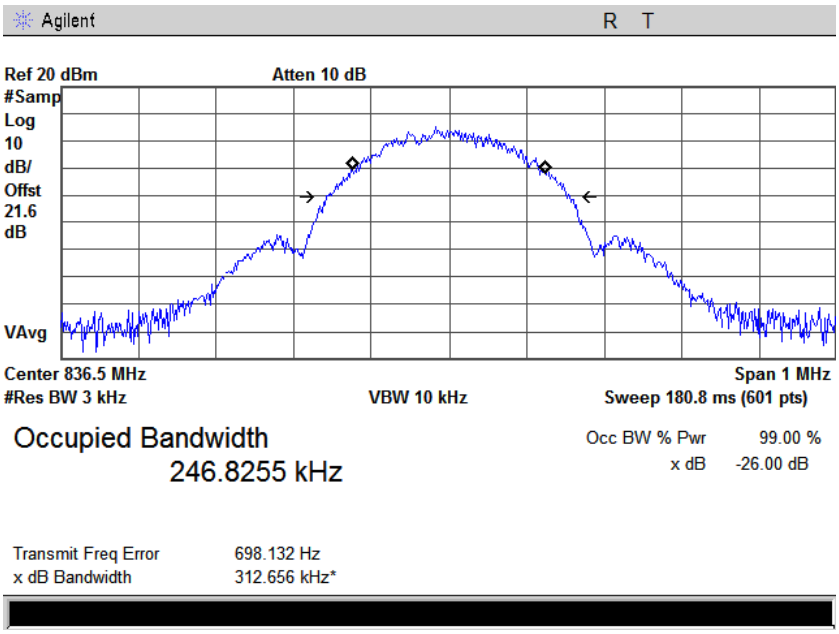


99% BANDWIDTH UPLINK - EDGE 836MHz

Input

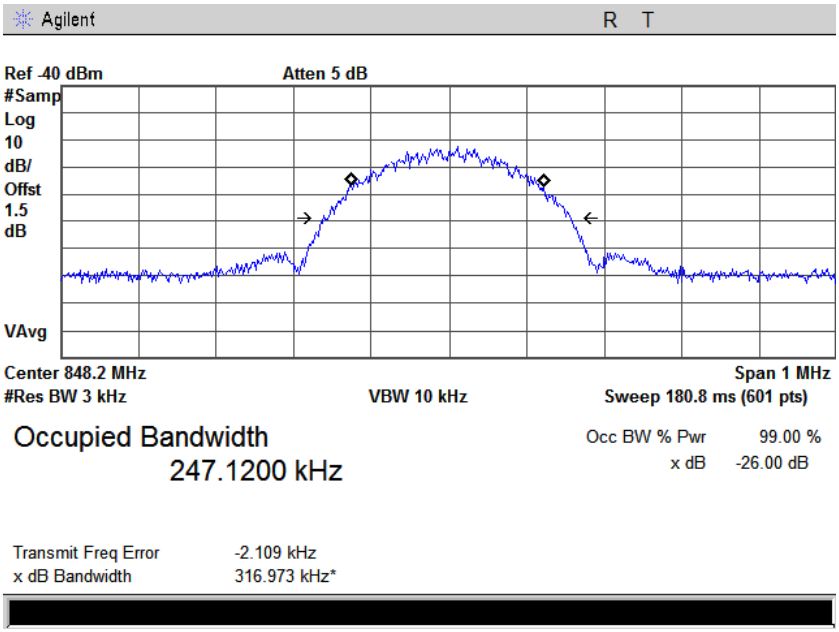


Output

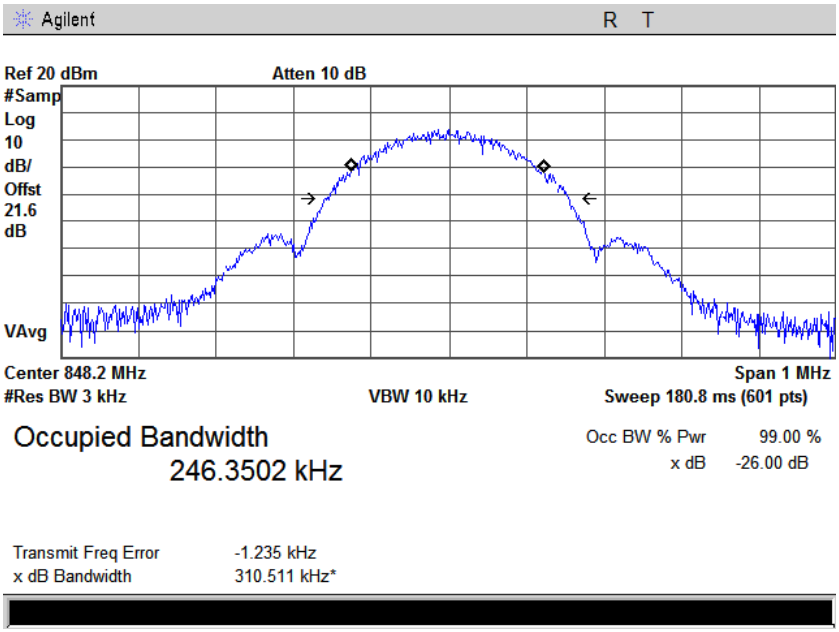


99% BANDWIDTH UPLINK - EDGE 849MHz

Input



Output

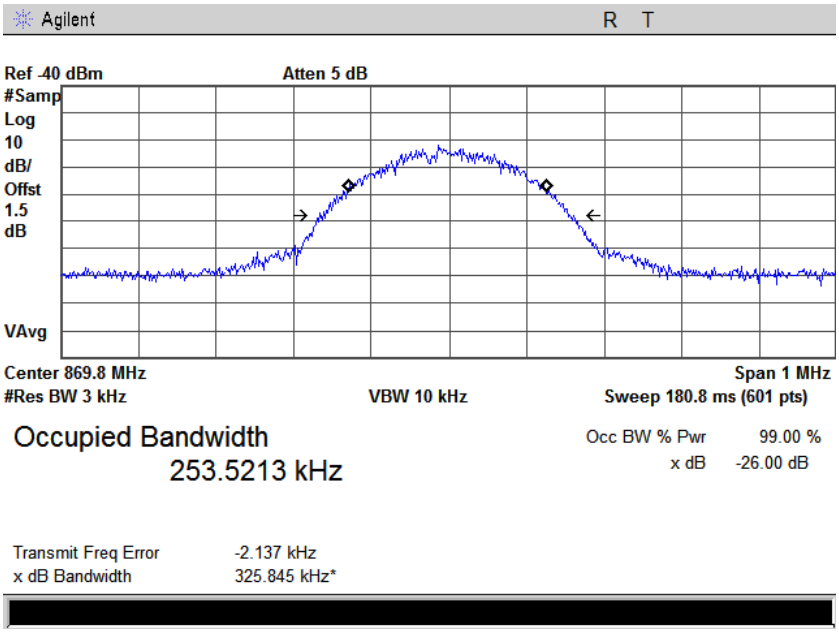


9.4.2 GSM:

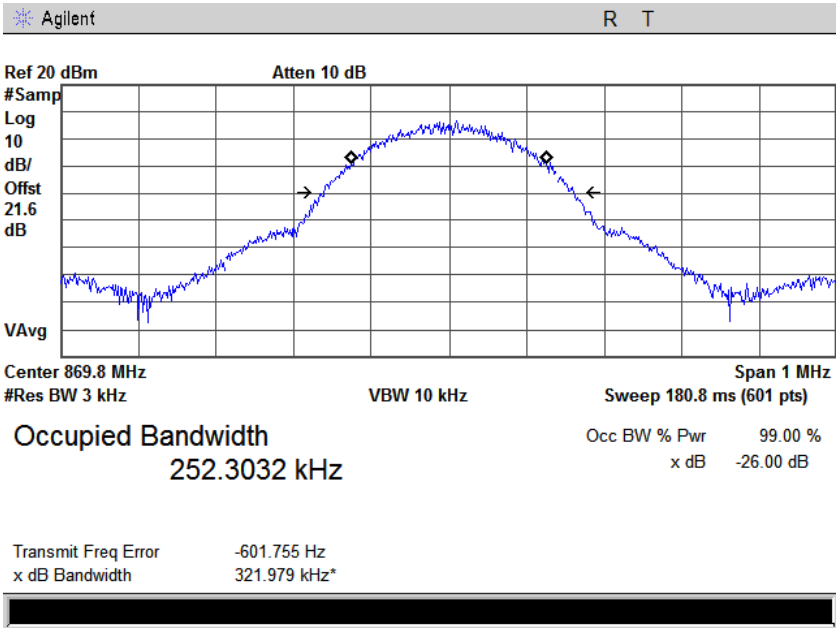
Mode		Channel	Frequency (MHz)	Emission Bandwidth	
				Input (kHz)	Output (kHz)
GSM	Downlink	Low	869.8	253.5	252.3
		Middle	881.5	251.4	254.5
		High	893.8	253.2	254.7
	Uplink	Low	824.8	253.7	254.4
		Middle	836.5	255.4	251.1
		High	848.8	255.8	252.2

99% BANDWIDTH DOWNLINK - GSM 869MHz

Input

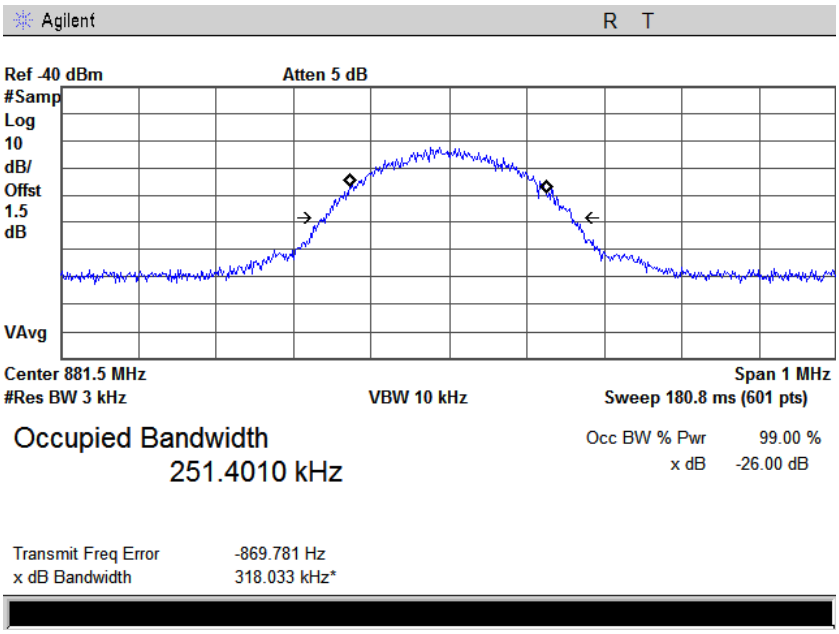


Output

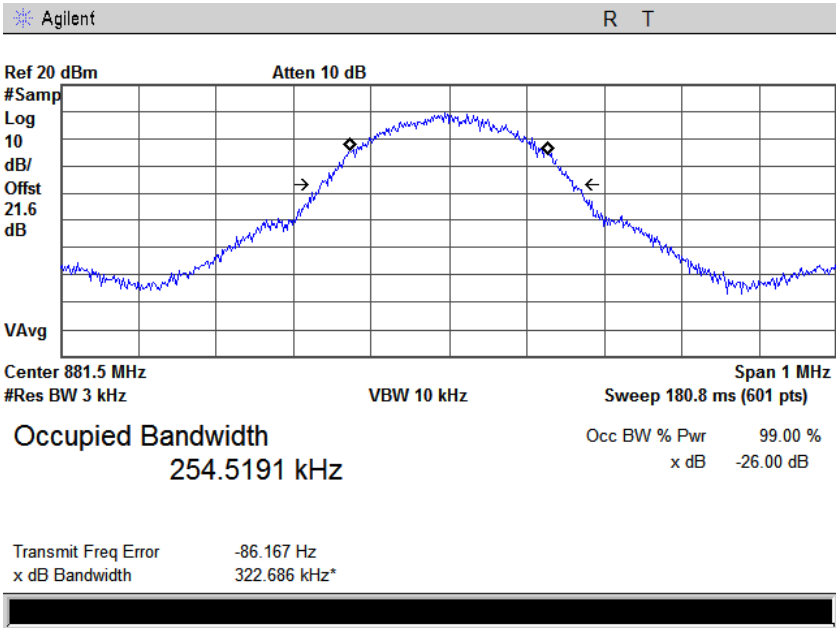


99% BANDWIDTH DOWNLINK - GSM 881MHz

Input

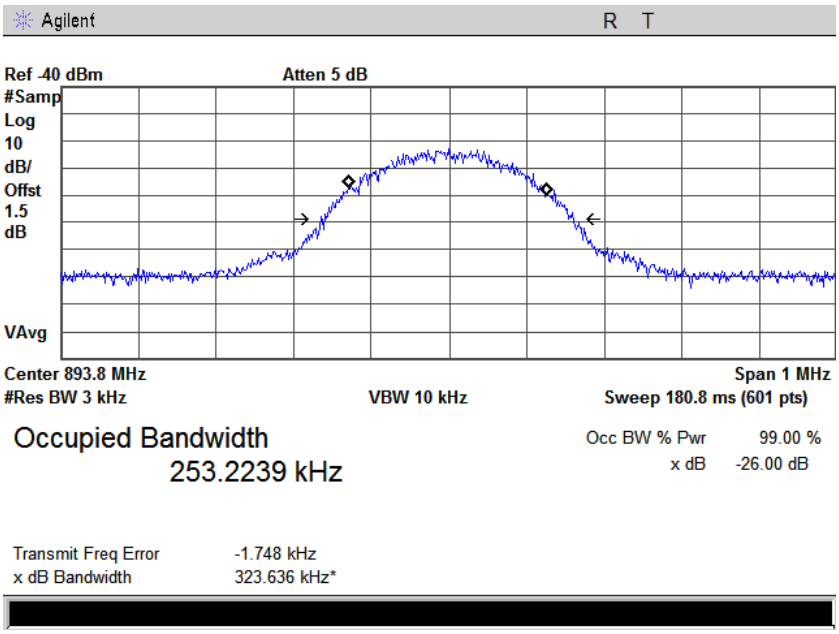


Output

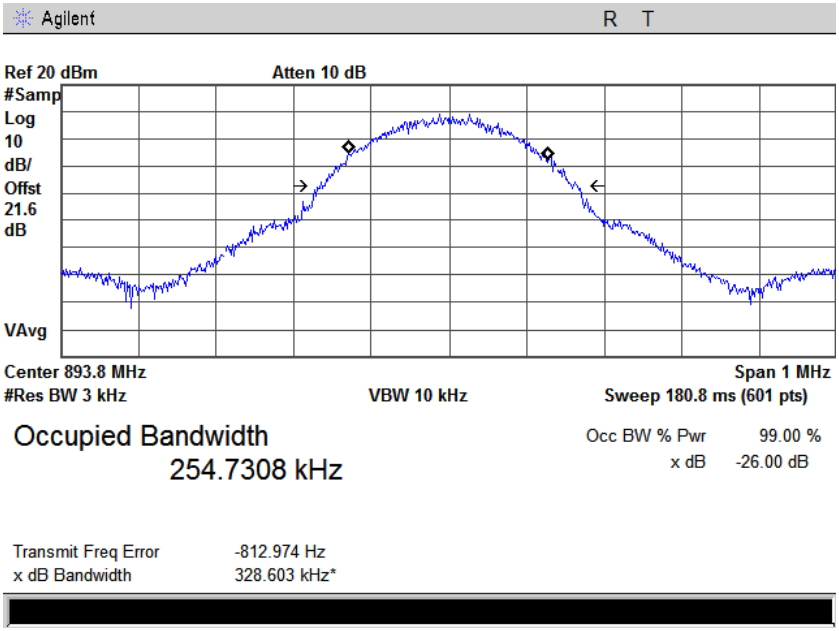


99% BANDWIDTH DOWNLINK - GSM 894MHz

Input

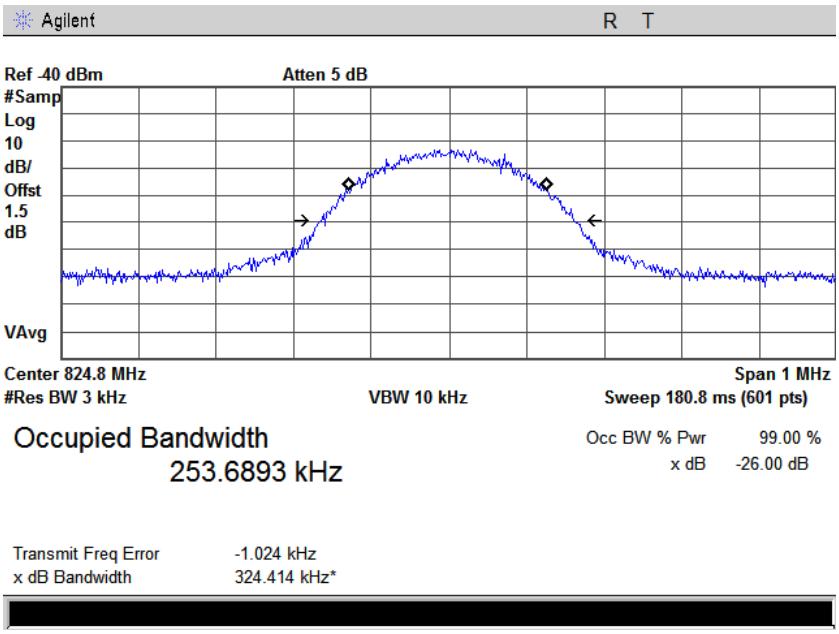


Output

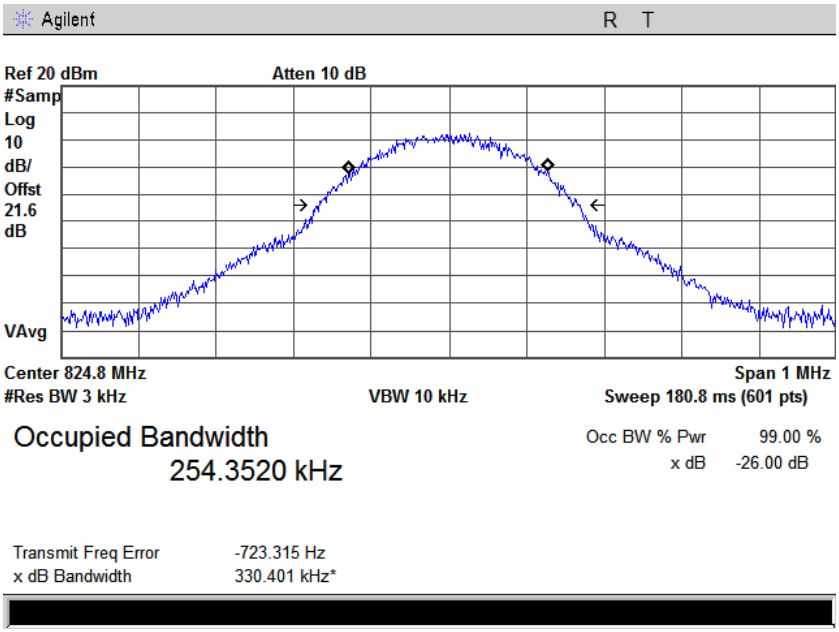


99% BANDWIDTH UPLINK - GSM 824MHz

Input

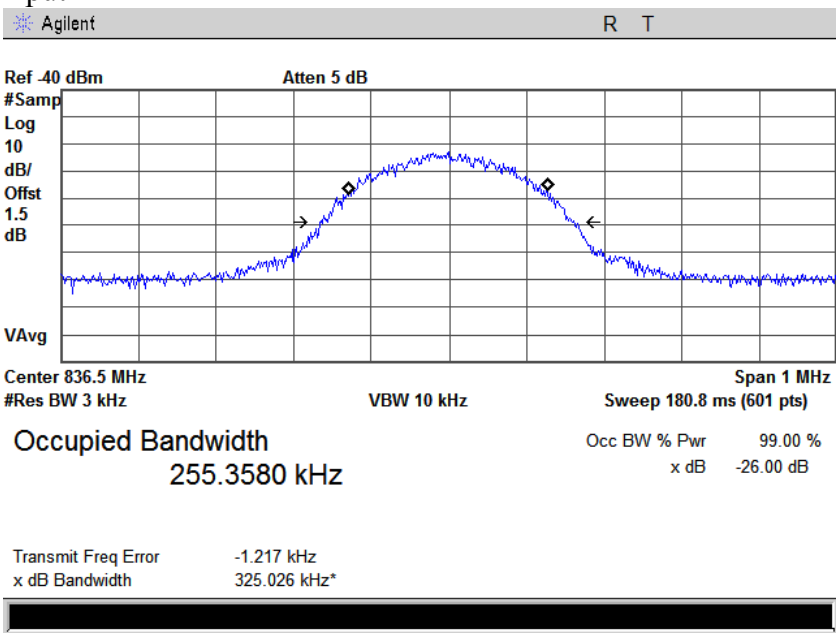


Output

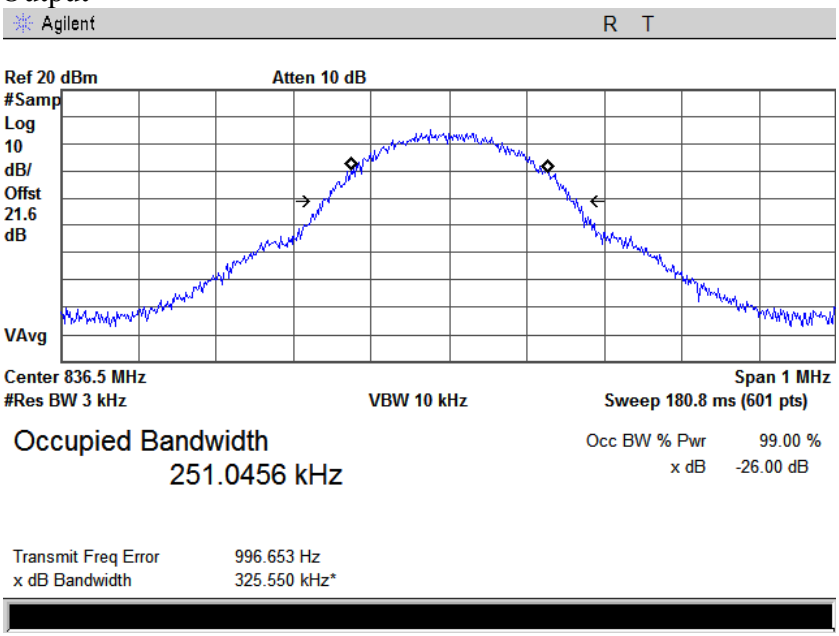


99% BANDWIDTH UPLINK - GSM 836MHz

Input

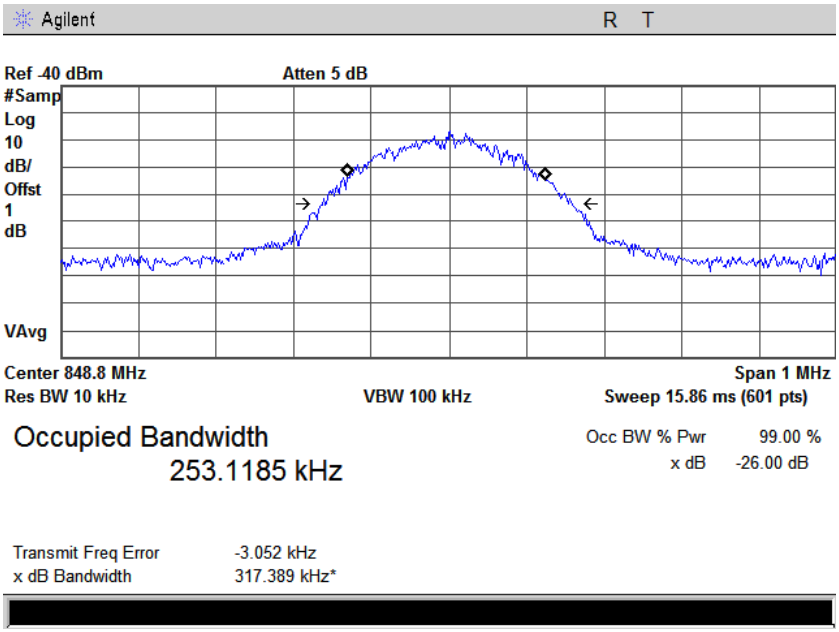


Output

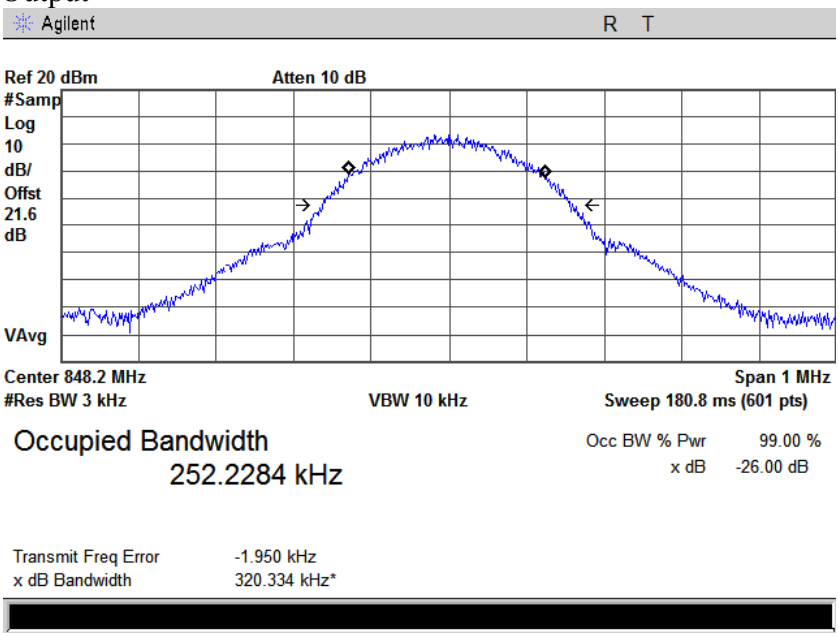


99% BANDWIDTH UPLINK - GSM 849MHz

Input



Output

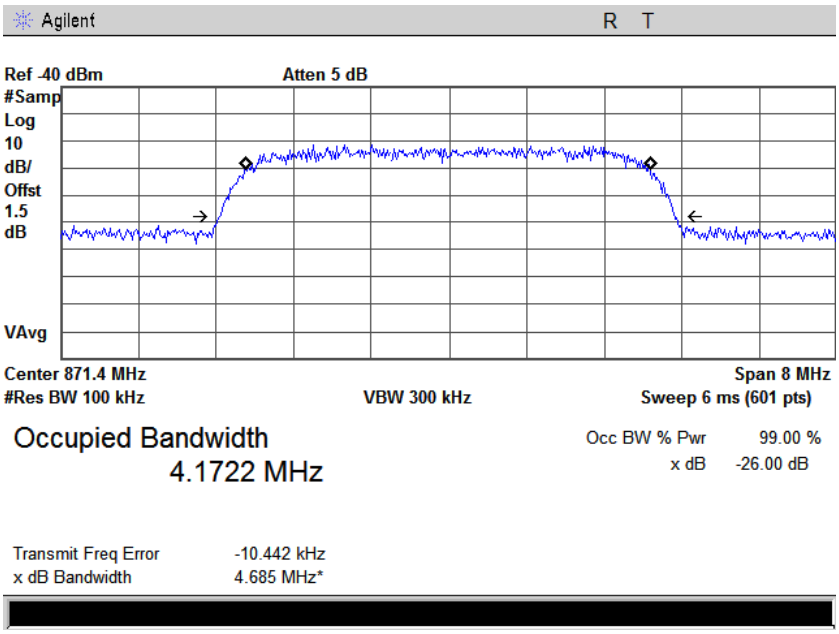


9.4.3 WCDMA:

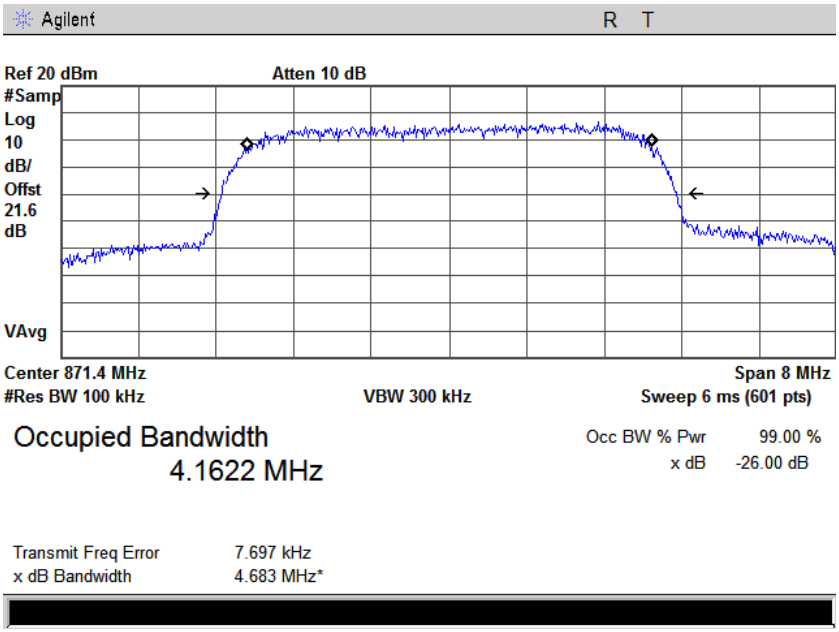
Mode		Channel	Frequency (MHz)	Emission Bandwidth	
				Input (kHz)	Output (kHz)
WCDMA	Downlink	Low	871.4	4172.2	4162.2
		Middle	881.5	4168.6	4156.8
		High	891.6	4186.1	4164.4
	Uplink	Low	826.4	4174.6	4164.1
		Middle	836.5	4161.6	4167.1
		High	846.6	4175.4	4128.5

99% BANDWIDTH DOWNLINK - WCDMA 869MHz

Input

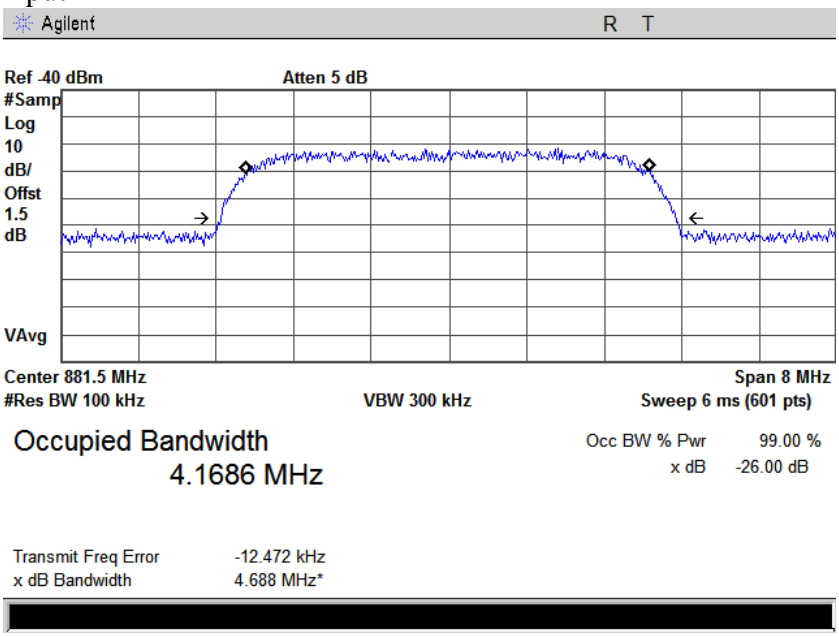


Output

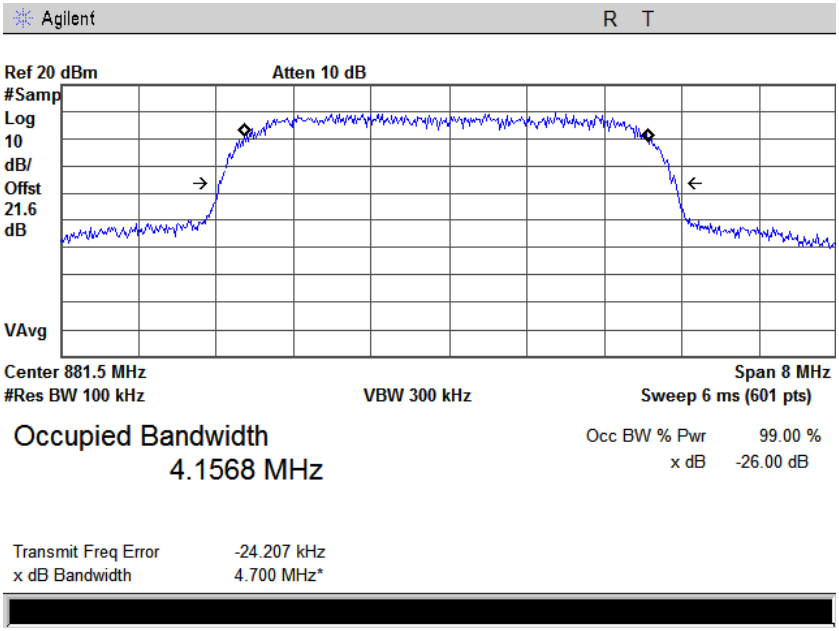


99% BANDWIDTH DOWNLINK - WCDMA 881MHz

Input

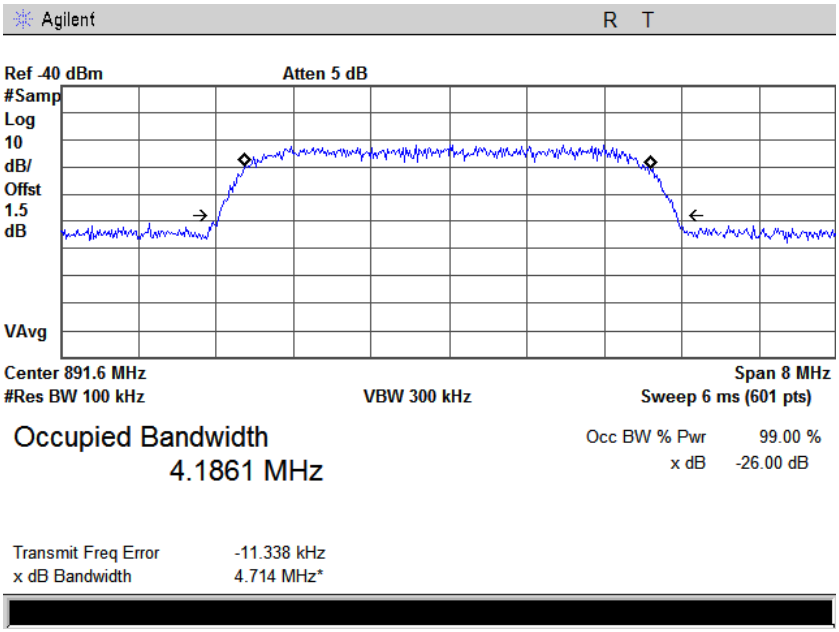


Output

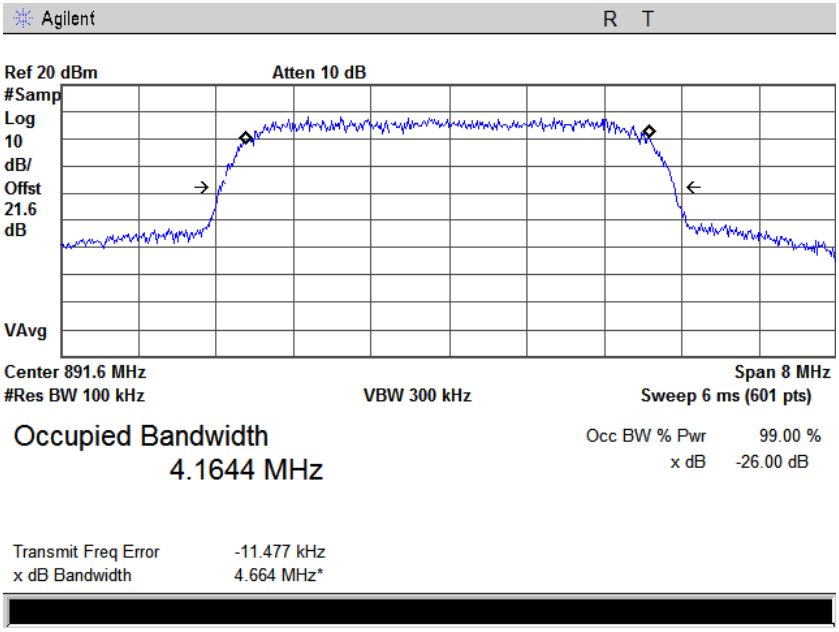


99% BANDWIDTH DOWNLINK - WCDMA 894MHz

Input

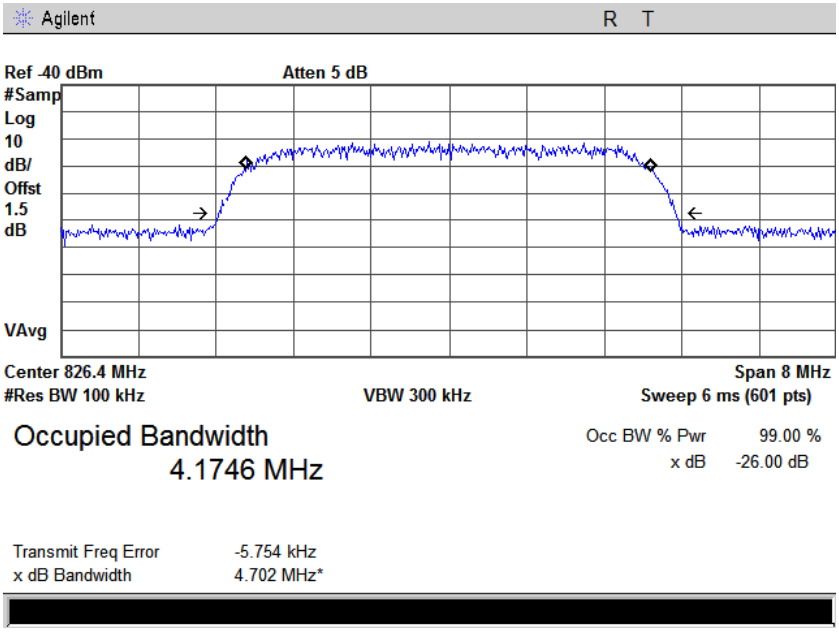


Output

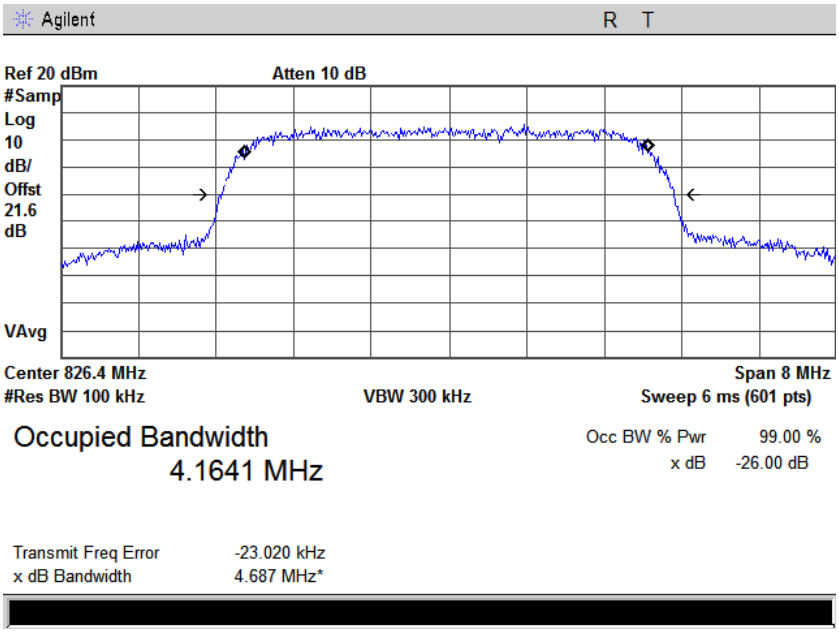


99% BANDWIDTH UPLINK - WCDMA 824MHz

Input

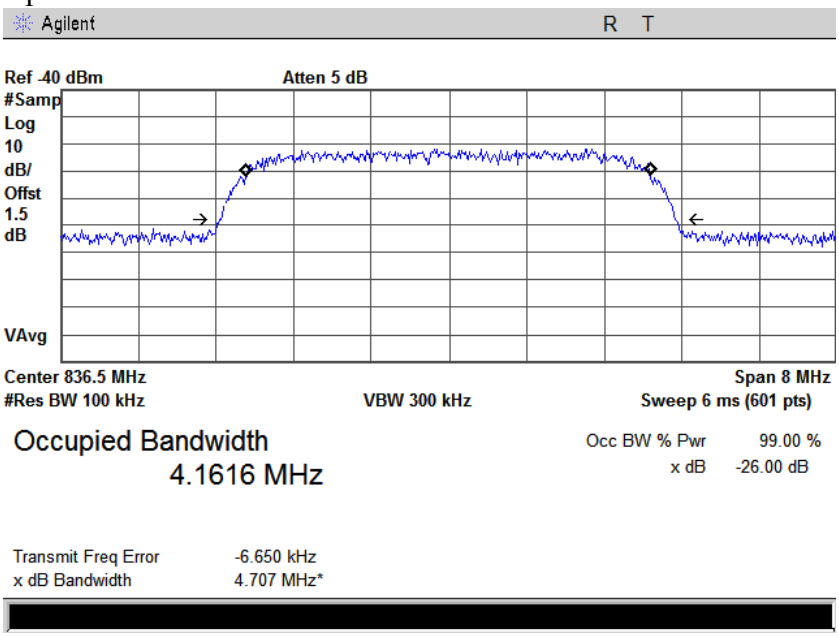


Output

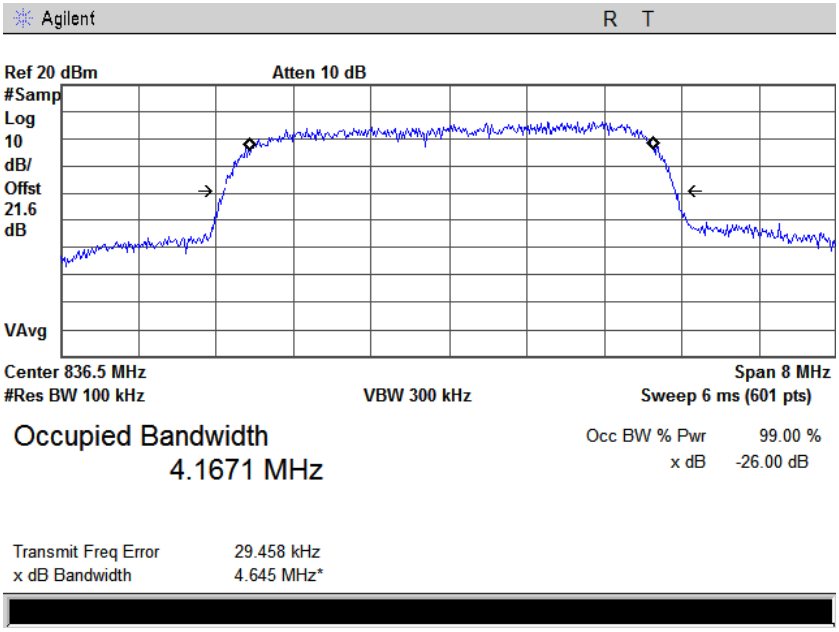


99% BANDWIDTH UPLINK - WCDMA 836MHz

Input

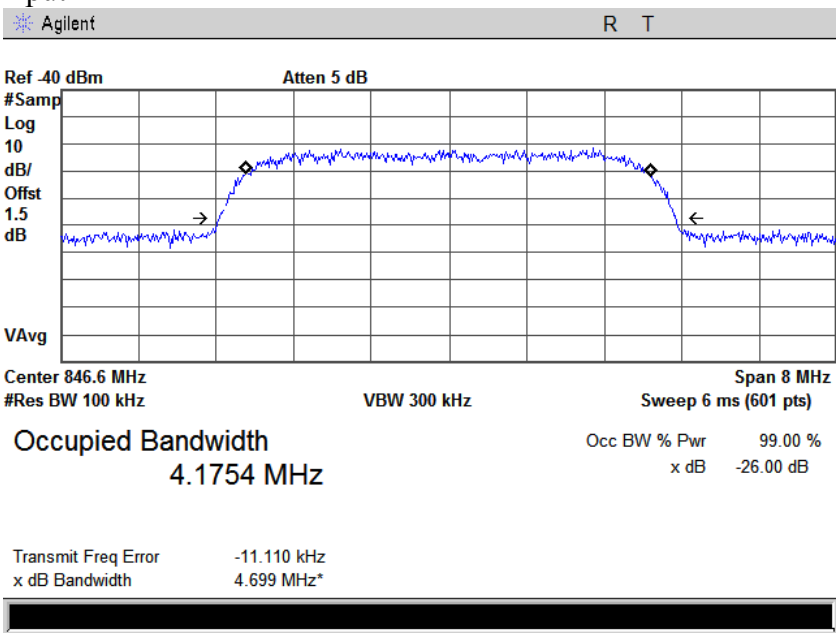


Output

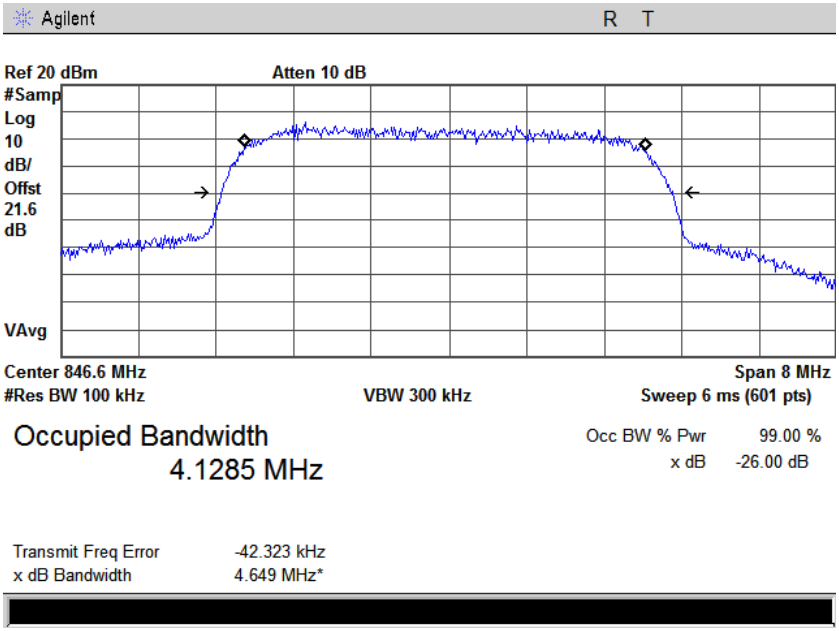


99% BANDWIDTH UPLINK - WCDMA 849MHz

Input



Output



10 RSS-131 PASSBAND GAIN AND BANDWIDTH

10.1 Applicable Standard

Requirements : RSS-131 Issue 2 (2003) Section 6.1.

The passband gain shall not exceed the nominal gain by more than 1.0 dB. The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer. Outside of the 20 dB bandwidth, the gain shall not exceed the gain at the 20 dB point.

10.2 Test Equipment

Equipment	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	Agilent	E4404B	MY44220519	26-Feb-2013	26-Feb-2014
Signal Generator	Agilent	E4437B	US39230102	11-Jan-2012	11-Jan-2014

10.3 Test Procedure

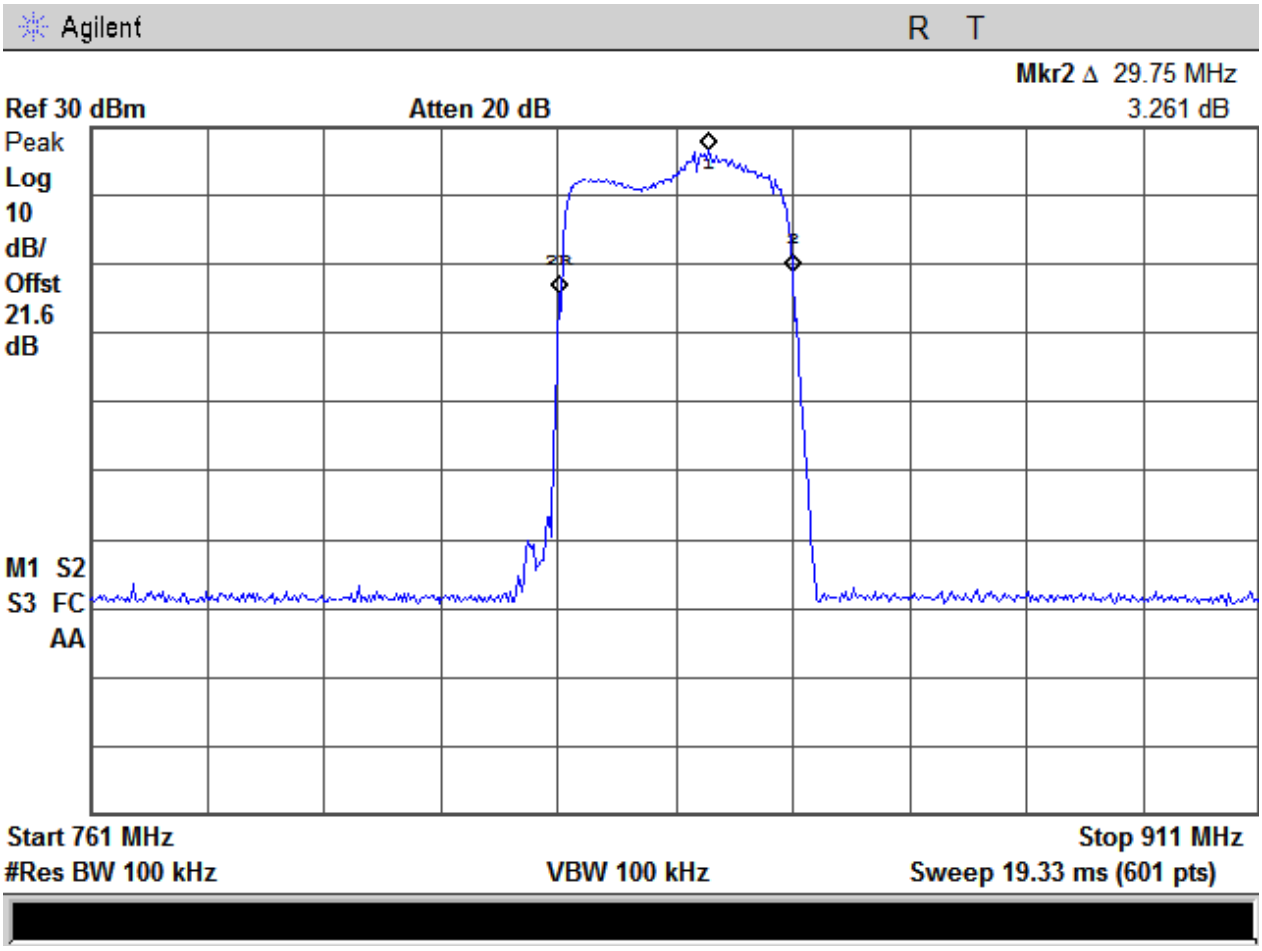
For downlink configuration, Donor antenna port is connected to Signal Generator and Area Fill antenna port is connected to Spectrum Analyzer through 20dB attenuator.

For uplink configuration, Donor antenna port is connected to Spectrum Analyzer through 20dB attenuator and Area Fill antenna port is connected to Signal Generator.

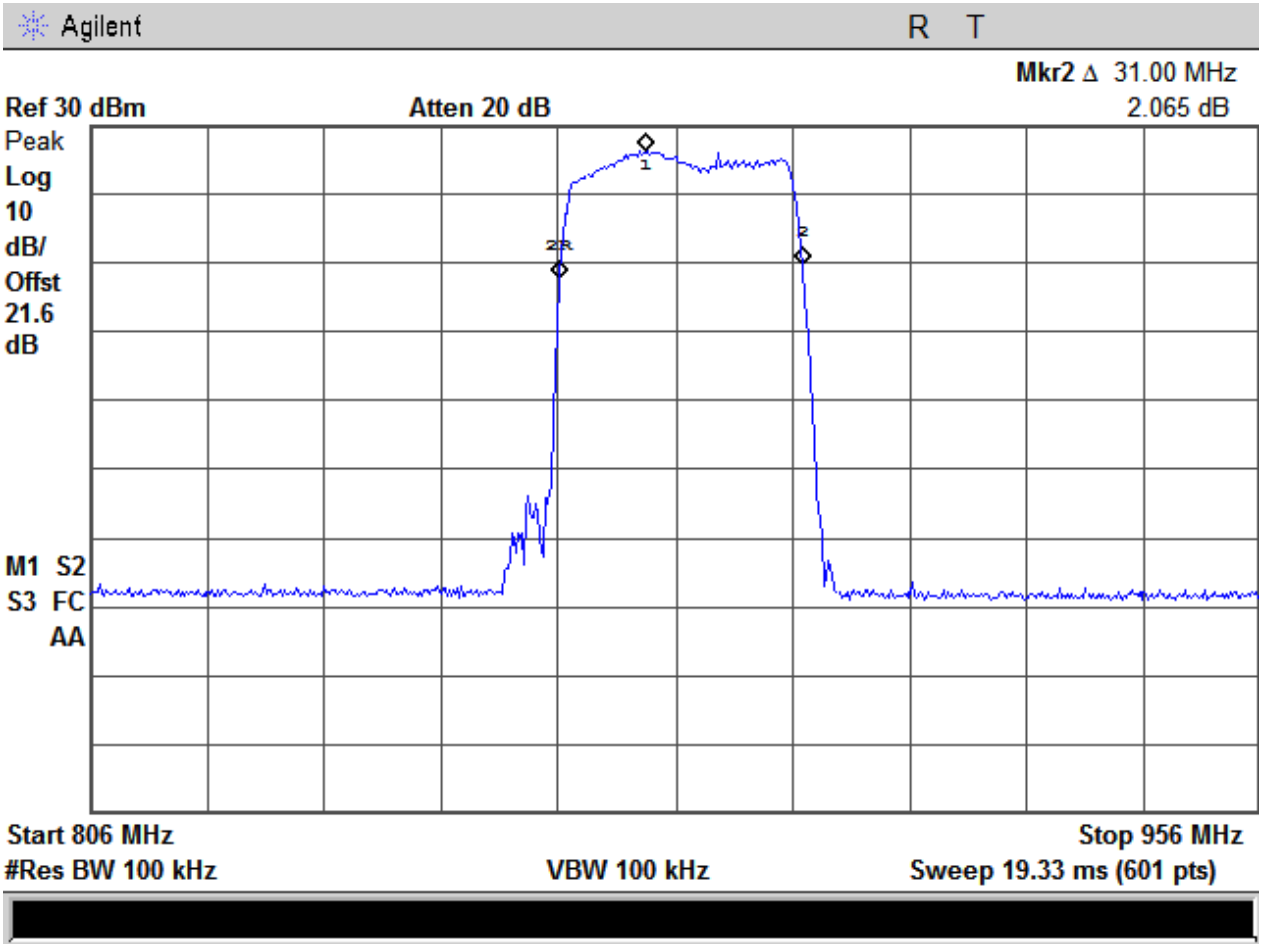
With the aid of a Signal Generator in sweep mode and spectrum analyzer, was measured the gain-versus-frequency response of the EUT from the midband frequency of the passband up to at least f_0 + 250% of the 20 dB bandwidth.

10.4 Test Results

10.4.1 Uplink



10.4.2 Downlink



11 FCC §2.1055 & §22.355 Frequency Stability

11.1 Applicable Standard

§ 22.355 Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3Watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

11.2 Test Equipment

Equipment	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Frequency Counter	Agilent	53132A	MY40006238	14-Jun-2013	14-Jun-2015
Signal Generator	Agilent	E4437B	US39230102	11-Jan-2012	11-Jan-2014

11.3 Test Procedure

For downlink configuration, Donor antenna port is connected to Signal Generator and Area Fill antenna port is connected to Frequency Counter through 20dB attenuator.

For uplink configuration, Donor antenna port is connected to Frequency Counter through 20dB attenuator and Area Fill antenna port is connected to an ESG.

The frequency drift was measured at the EUT input vs EUT output under the ambient temperature with extreme voltage supply (±15%) and under extreme temperature condition.

11.4 Test Results

Frequency Tolerance Test at Extreme Voltage Under Ambient Temperature (+23°C)

	Nominal Carrier Frequency (MHz)	Measured Frequency at EUT Input	Measured Frequency at EUT Output at 120V AC	Frequency Deviation from EUT Output to EUT Input (ppm)
Uplink	836.5	836 500 000.0	836 500 000.0	0
Downlink	881.5	881 500 000.0	881 500 000.0	0

	Nominal Carrier Frequency (MHz)	Measured Frequency at EUT Input	Measured Frequency at EUT Output at 102V AC (-15%)	Frequency Deviation from EUT Output to EUT Input (ppm)
Uplink	836.5	836 500 000.0	836 500 000.0	0
Downlink	881.5	881 500 000.0	881 500 000.0	0

	Nominal Carrier Frequency (MHz)	Measured Frequency at EUT Input	Measured Frequency at EUT Output at 138V AC(+15%)	Frequency Deviation from EUT Output to EUT Input (ppm)
Uplink	836.5	836 500 000.0	836 500 000.0	0
Downlink	881.5	881 500 000.0	881 500 000.0	0

Frequency Tolerance Test at Extreme Temperature.

Measured Data at Low Temperature (-40°C)

	Nominal Carrier Frequency (MHz)	Measured Frequency at EUT Input	Measured Frequency at EUT Output at 120V AC	Frequency Deviation from EUT Output to EUT Input (ppm)
Uplink	836.5	836 500 000.0	836 500 000.0	0
Downlink	881.5	881 500 000.0	881 500 000.0	0

Measured Data at Low Temperature (0°C)

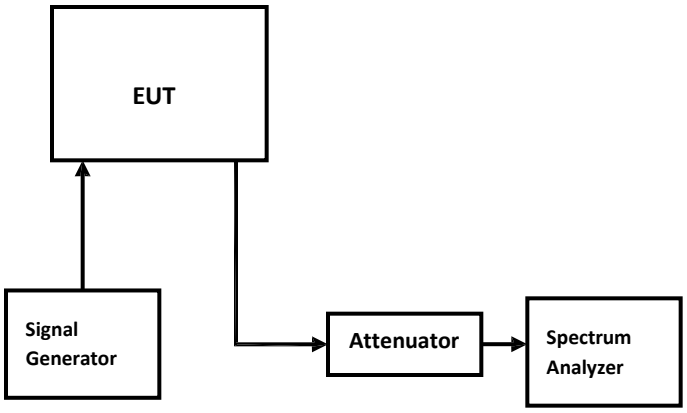
	Nominal Carrier Frequency (MHz)	Measured Frequency at EUT Input	Measured Frequency at EUT Output at 120V AC	Frequency Deviation from EUT Output to EUT Input (ppm)
Uplink	836.5	836 500 000.0	836 500 000.0	0
Downlink	881.5	881 500 000.0	881 500 000.0	0

Measured Data at High Temperature (+50°C)

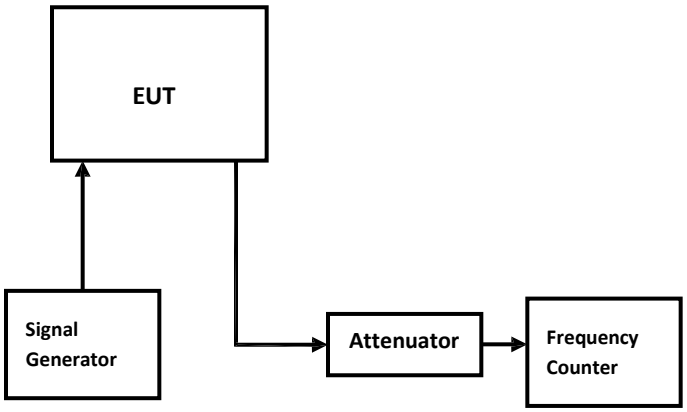
	Nominal Carrier Frequency (MHz)	Measured Frequency at EUT Input	Measured Frequency at EUT Output at 120V AC	Frequency Deviation from EUT Output to EUT Input (ppm)
Uplink	836.5	836 500 000.0	836 500 000.0	0
Downlink	881.5	881 500 000.0	881 500 000.0	0

Appendix A: Block Diagram of Test Setup

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

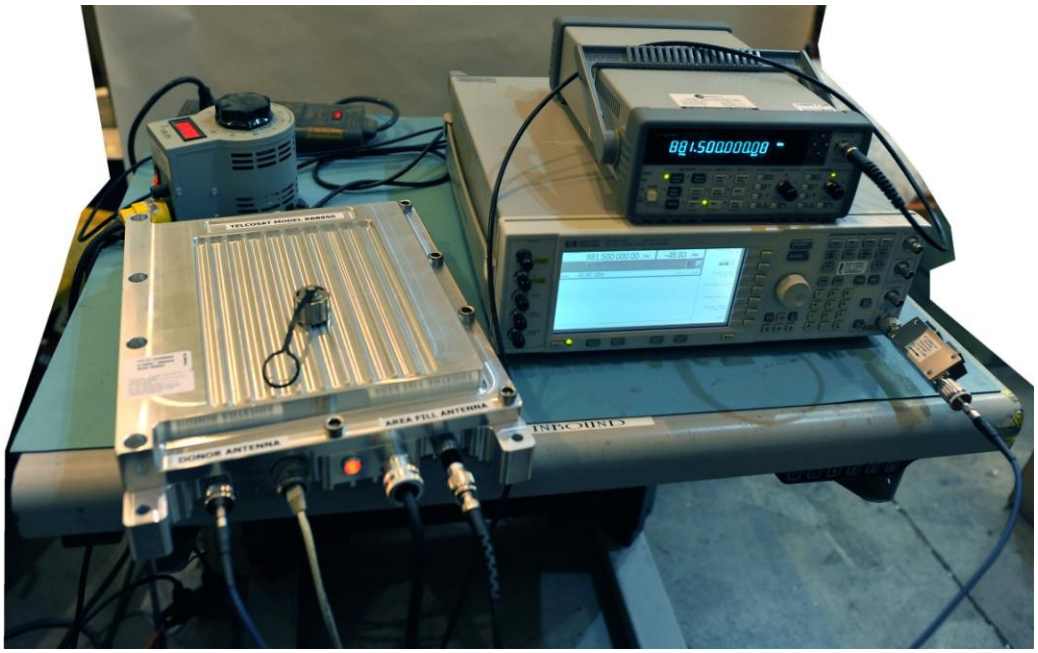


Frequency Stability



Appendix B: Test Setup Photographs

Frequency Stability Setup:



General Test Setup: