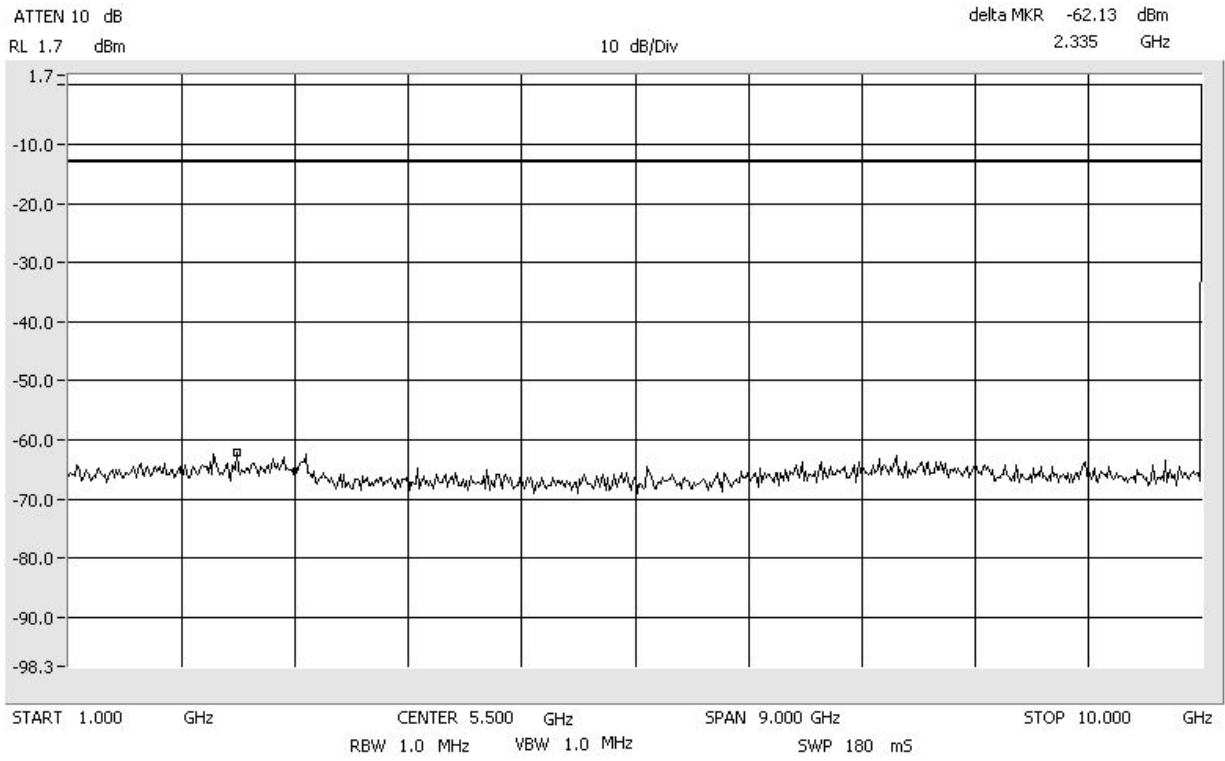
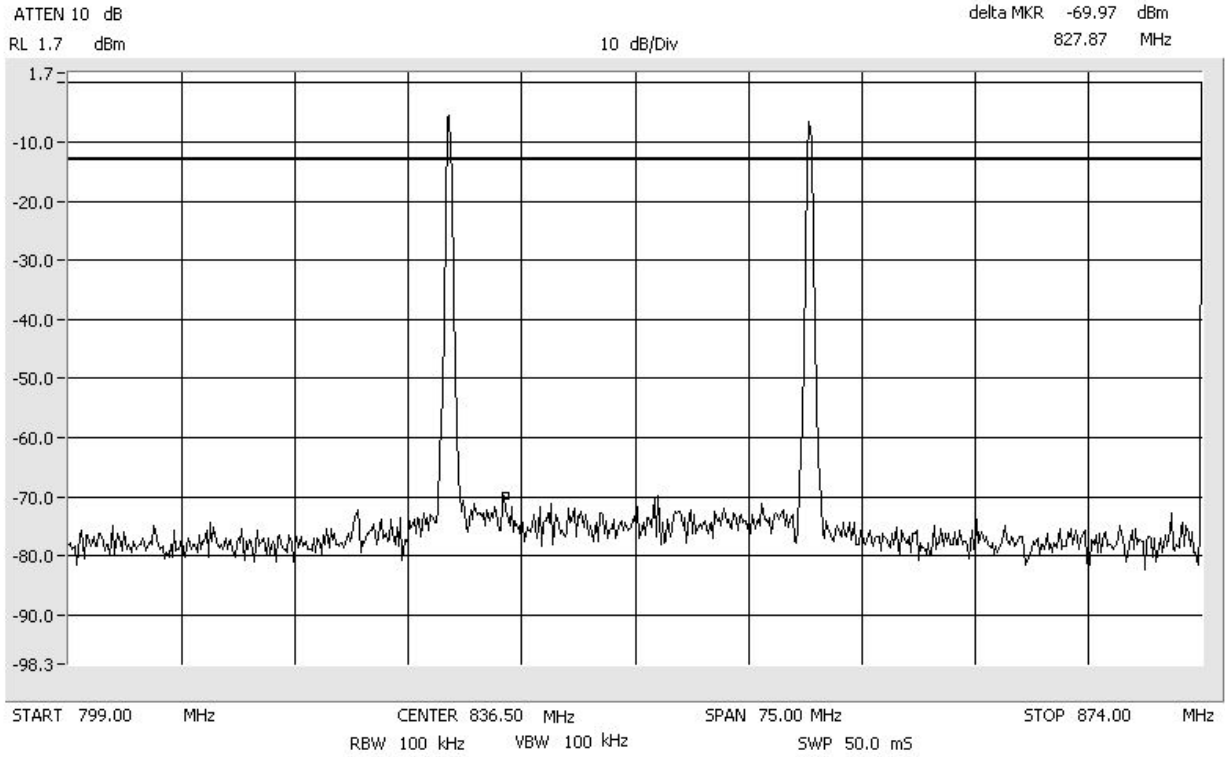


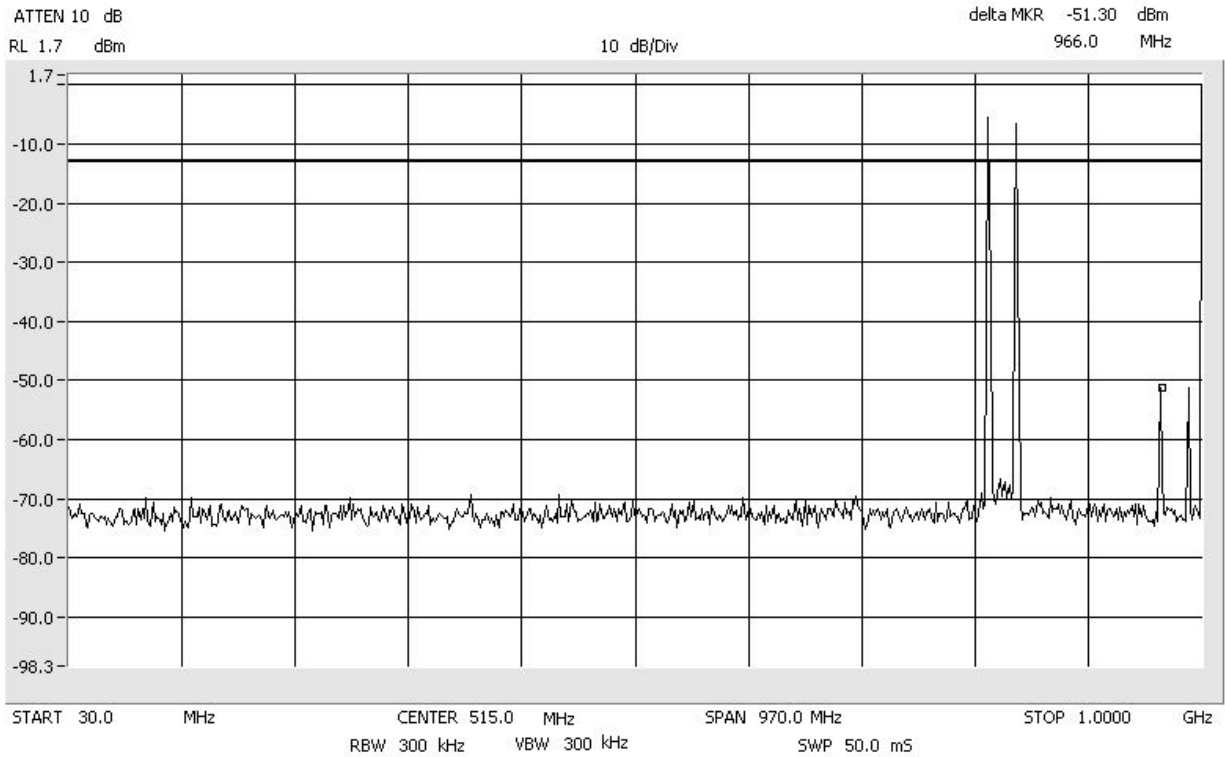
Intermodulation FM\_High CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



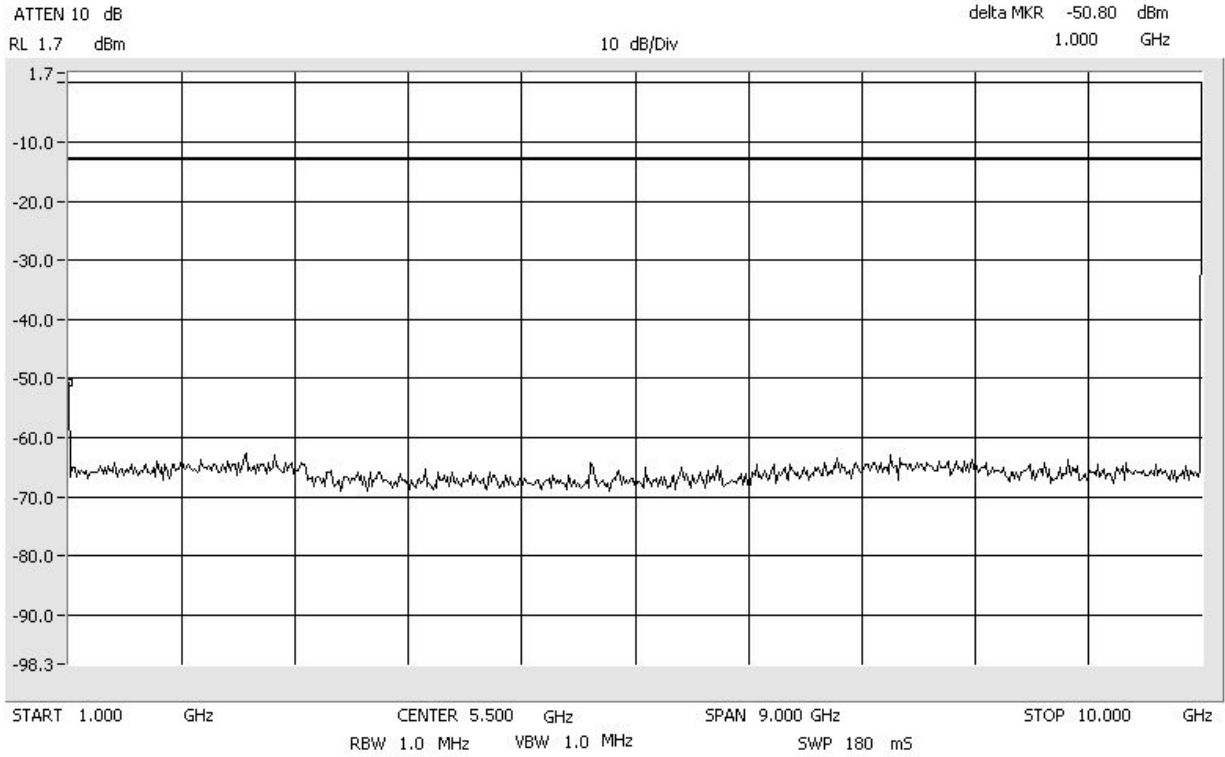
Intermodulation FM\_Apart CELLULAR  
Center: 836.5 MHz Span: 75 MHz RBW/VBW: 100 kHz



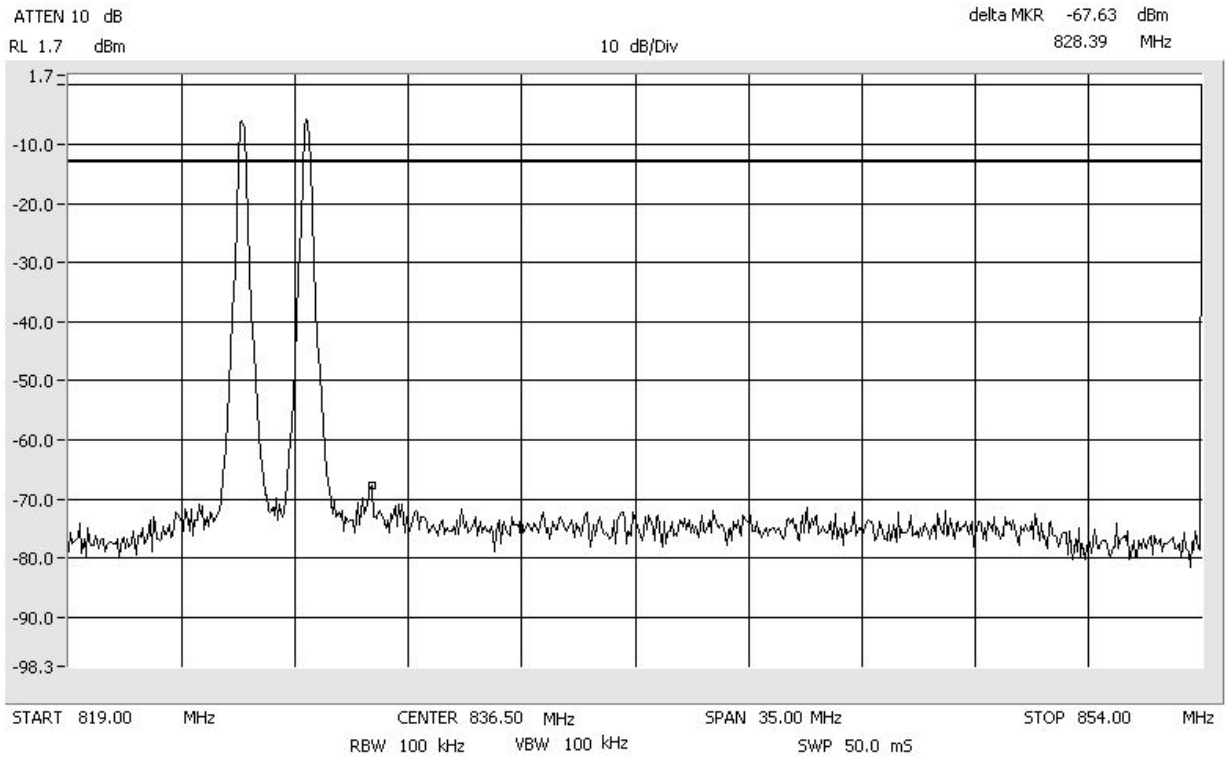
Intermodulation FM\_Apart CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



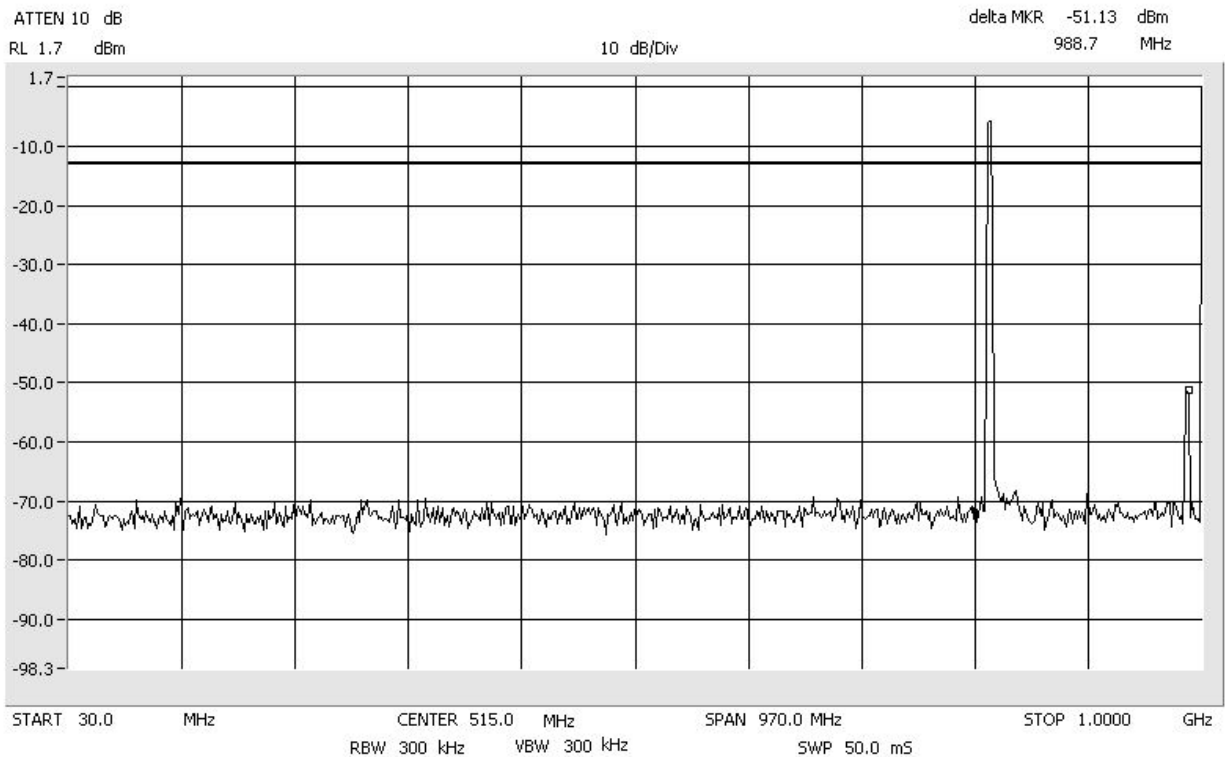
Intermodulation FM\_Apart CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



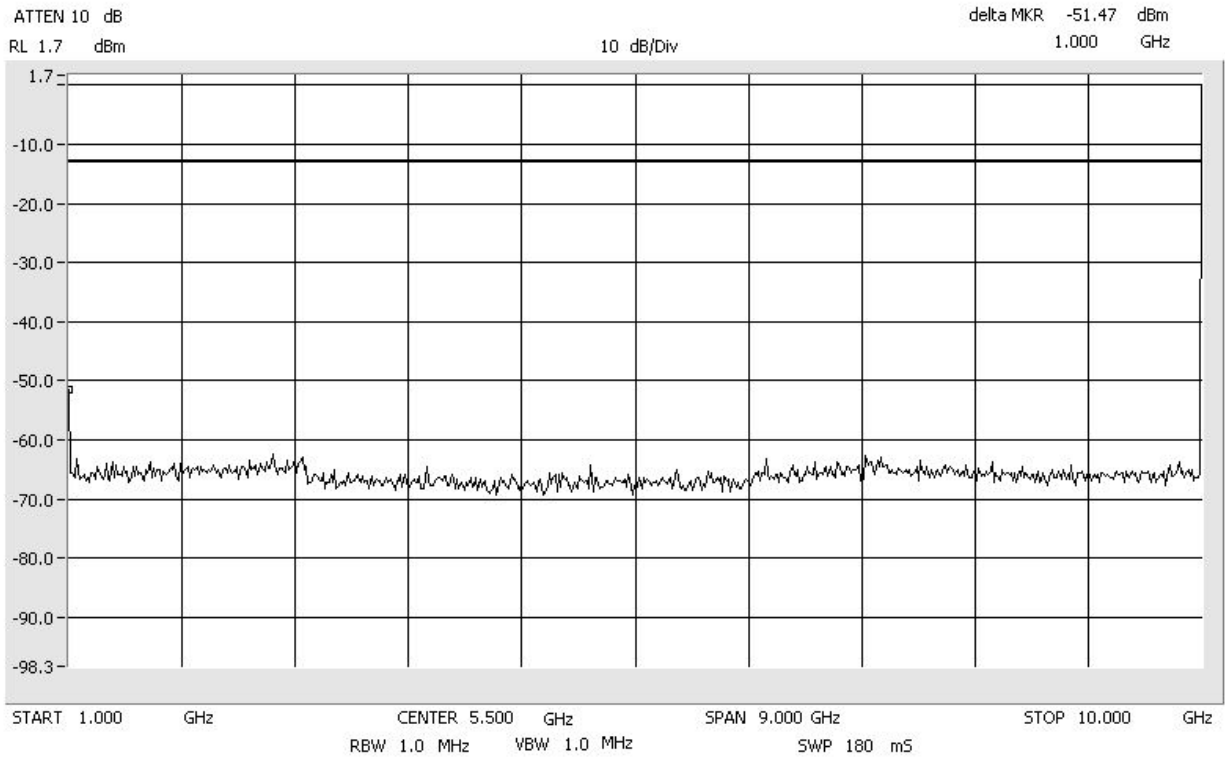
Intermodulation TDMA\_Low CELLULAR  
Center: 836.5 MHz Span: 35 MHz RBW/VBW: 100 kHz



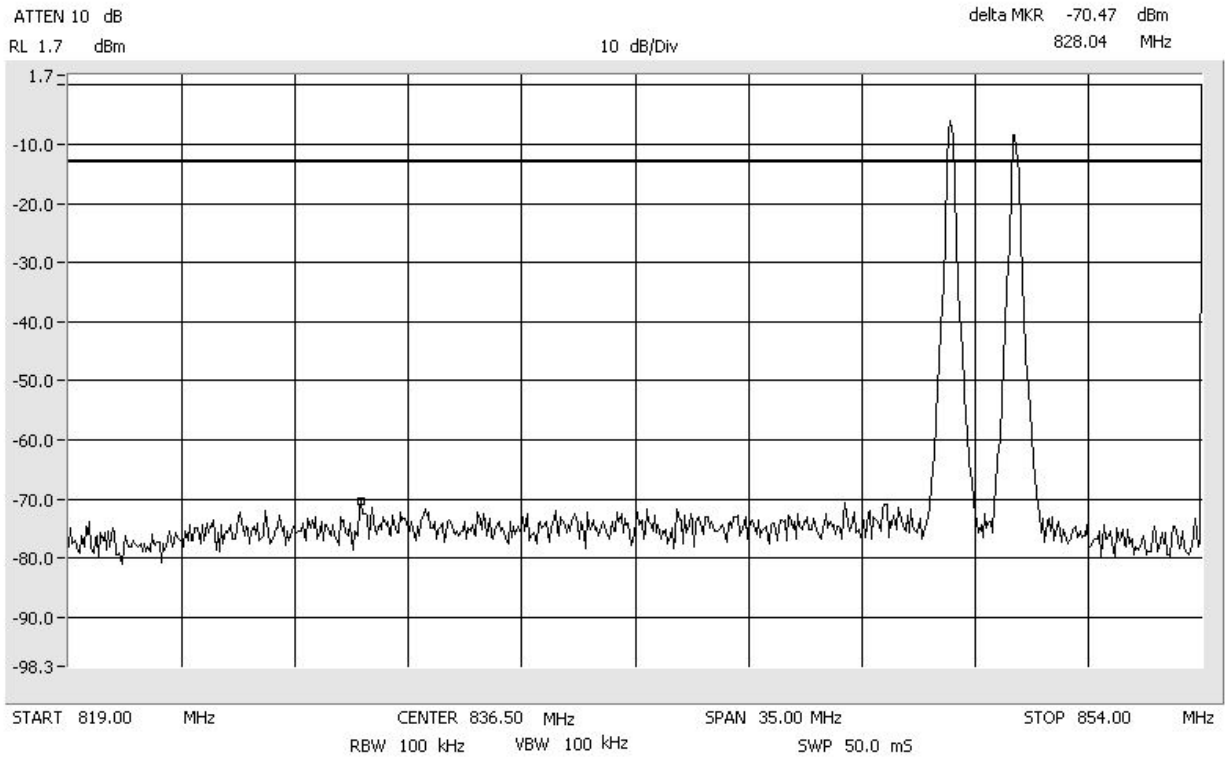
Intermodulation TDMA\_Low CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



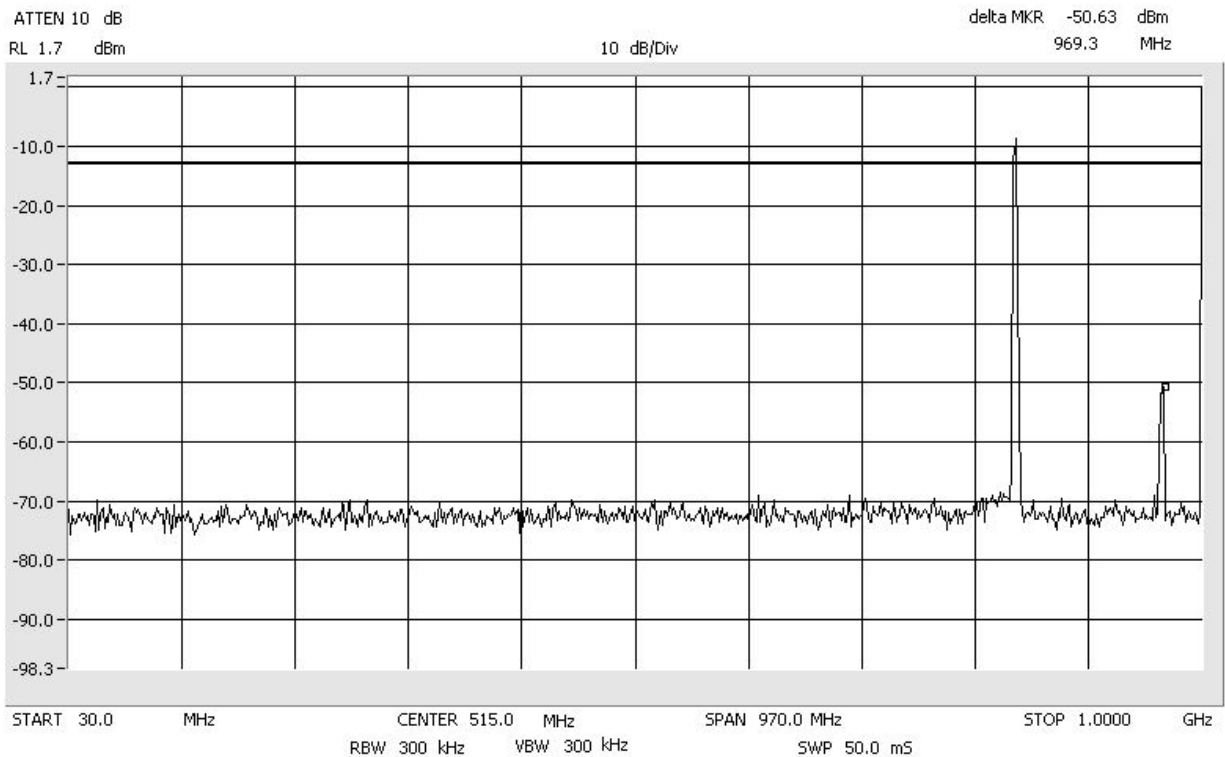
Intermodulation TDMA\_Low CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



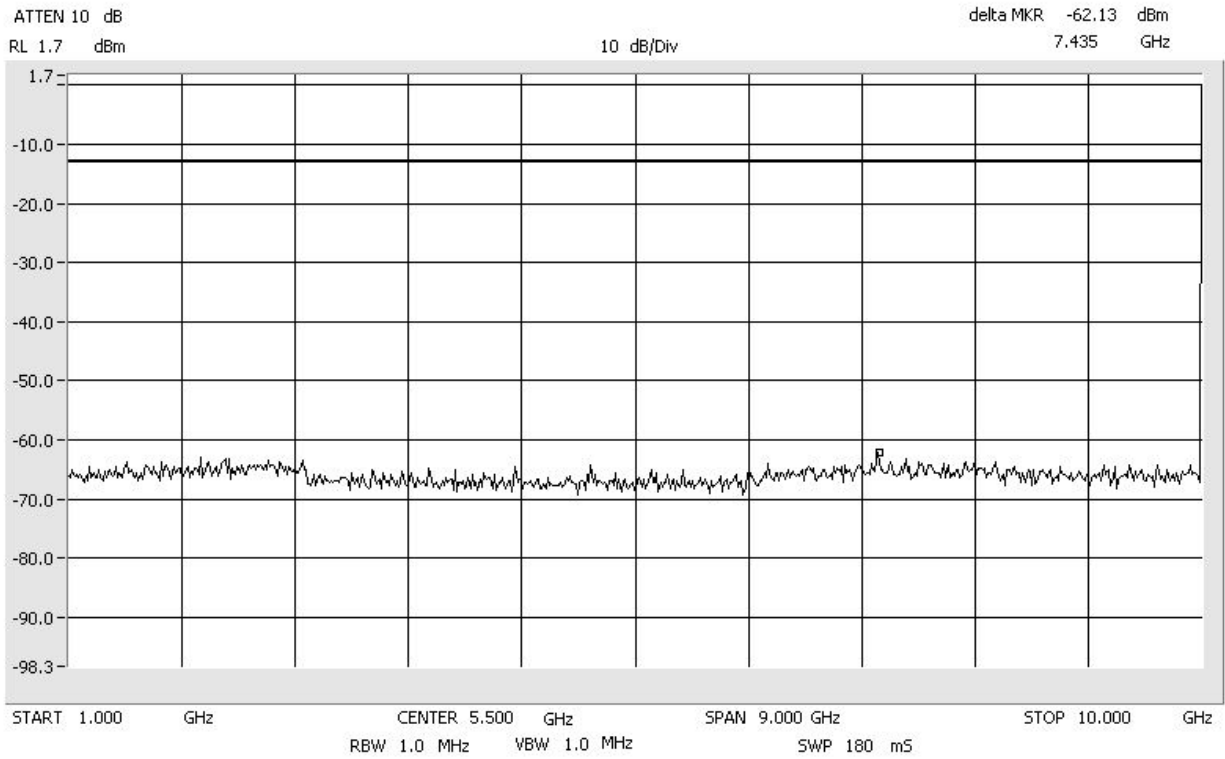
Intermodulation TDMA\_High CELLULAR  
 Center: 836.5 MHz Span: 35 MHz RBW/VBW: 100 kHz



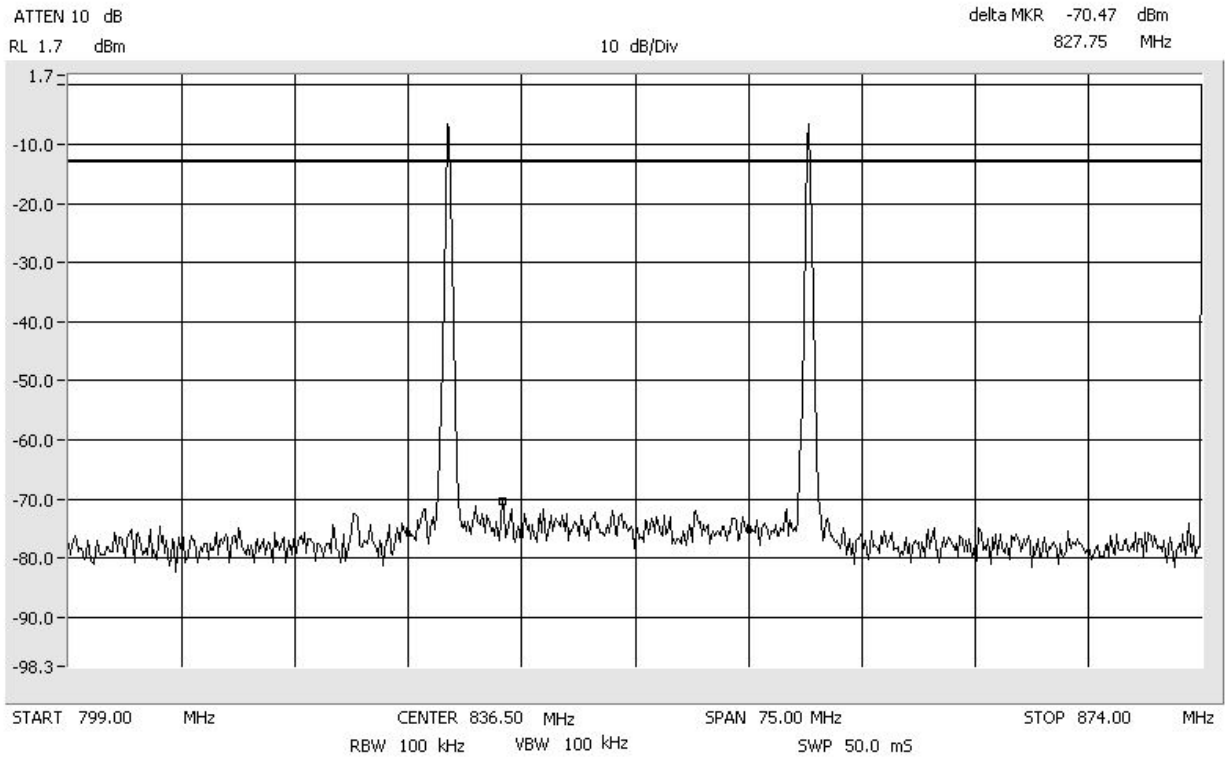
Intermodulation TDMA\_High CELLULAR  
 Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



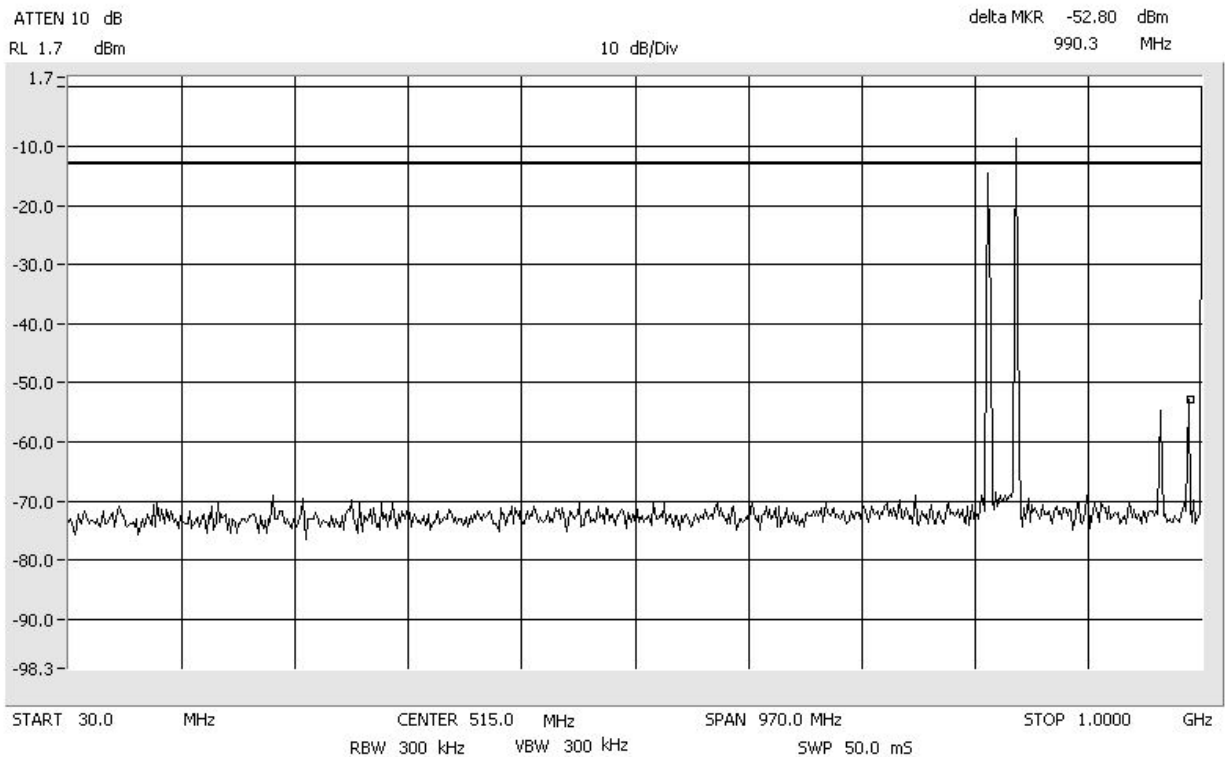
Intermodulation TDMA\_High CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



Intermodulation TDMA\_Apart CELLULAR  
Center: 836.5 MHz Span: 75 MHz RBW/VBW: 100 kHz

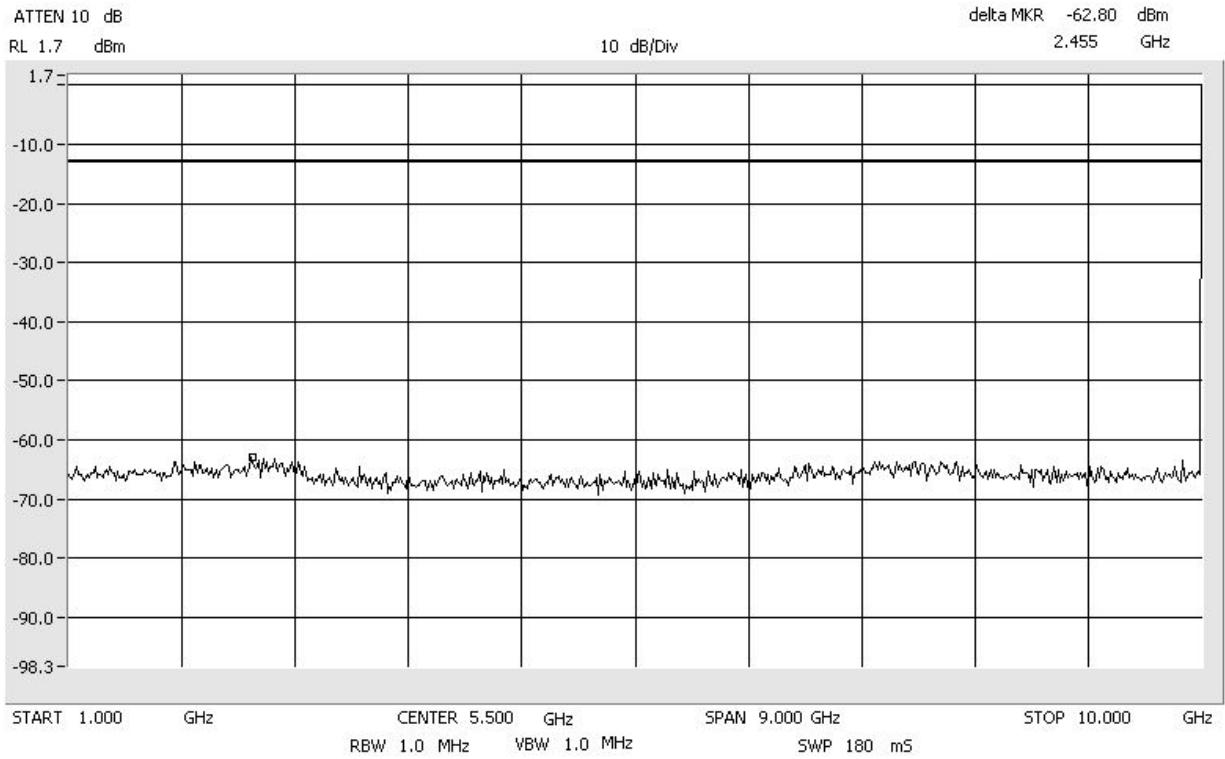


Intermodulation TDMA\_Apart CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz

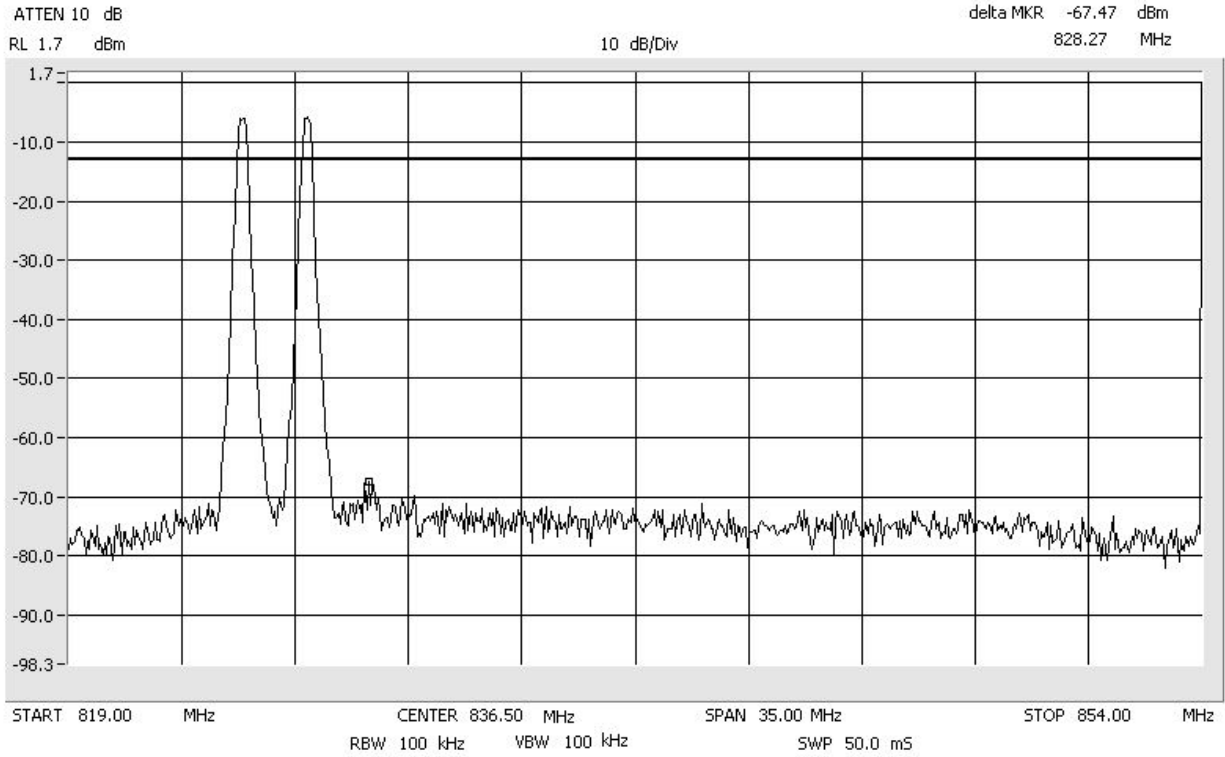




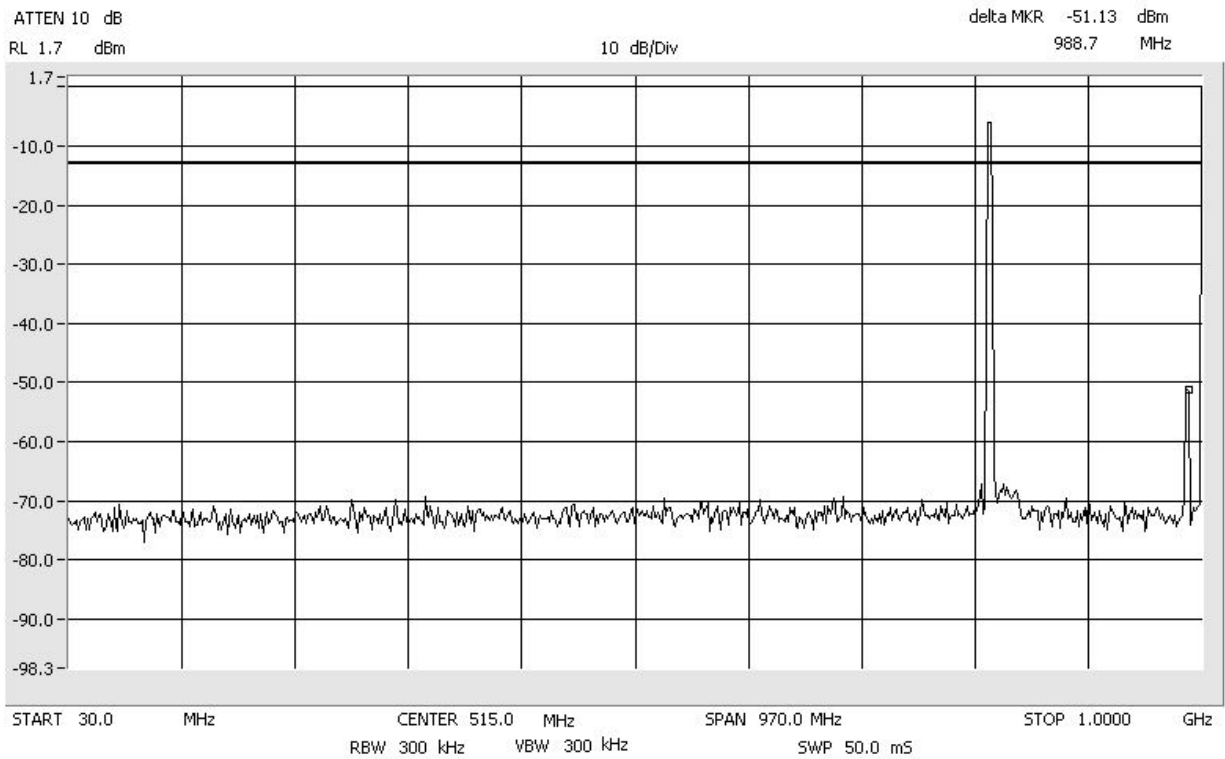
Intermodulation TDMA\_Apart CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



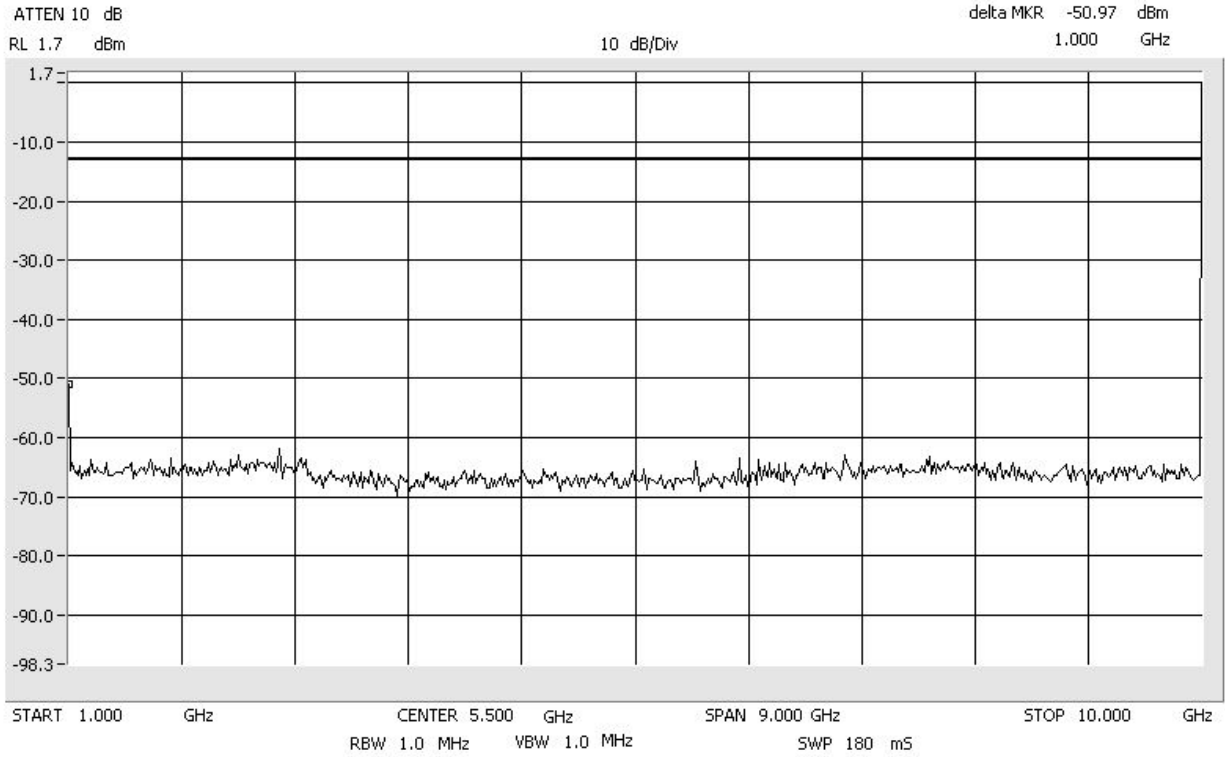
Intermodulation GSM\_Low CELLULAR  
Center: 836.5 MHz Span: 35 MHz RBW/VBW: 100 kHz



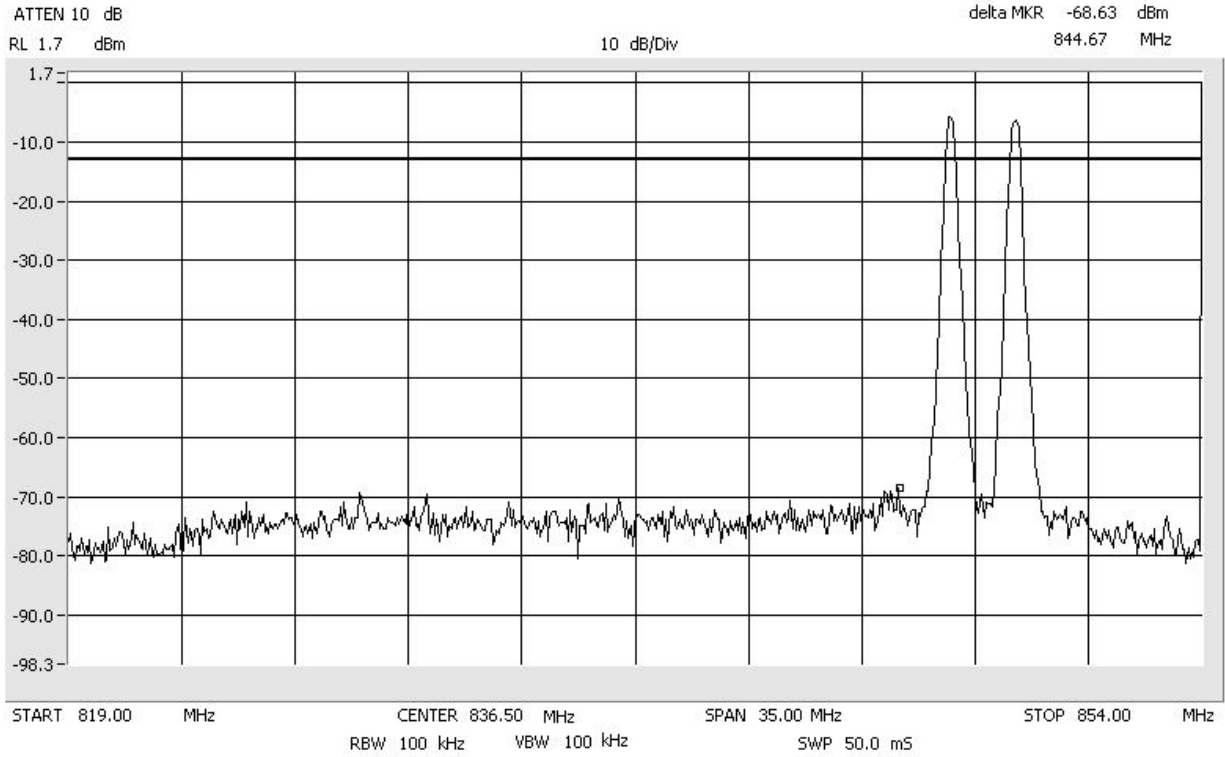
Intermodulation GSM\_Low CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



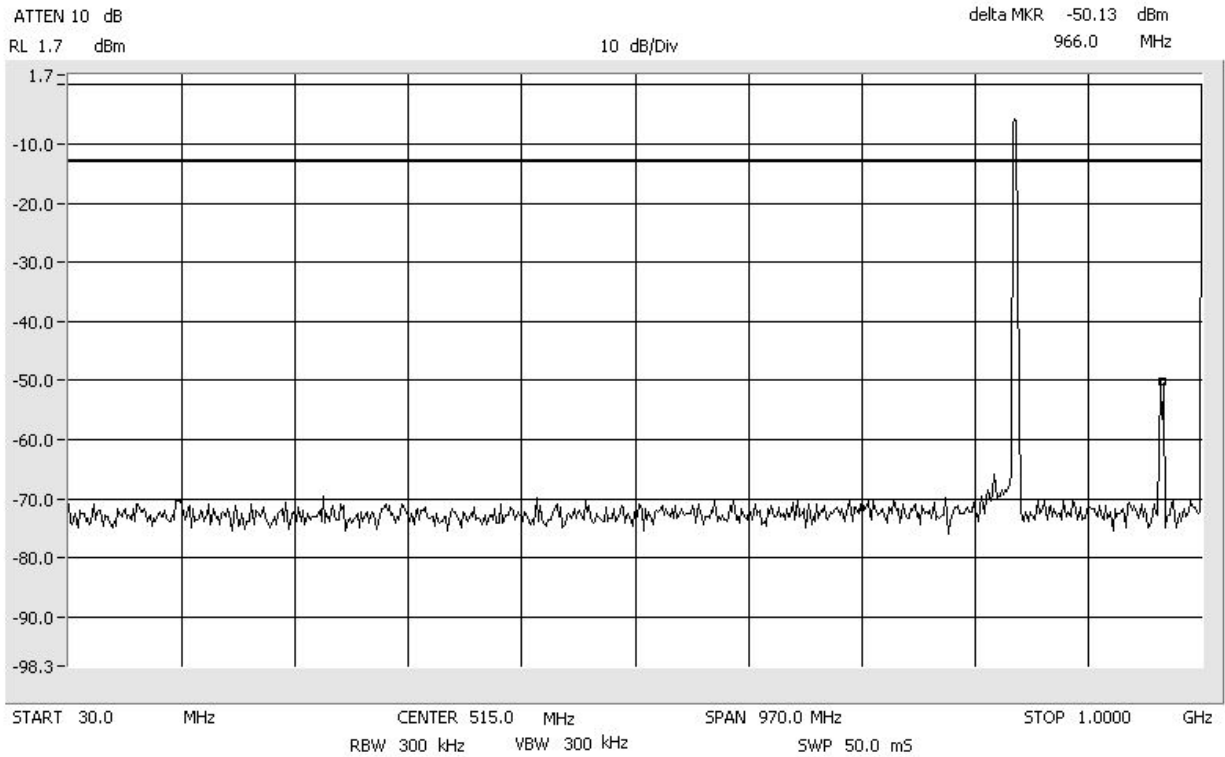
Intermodulation GSM\_Low CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



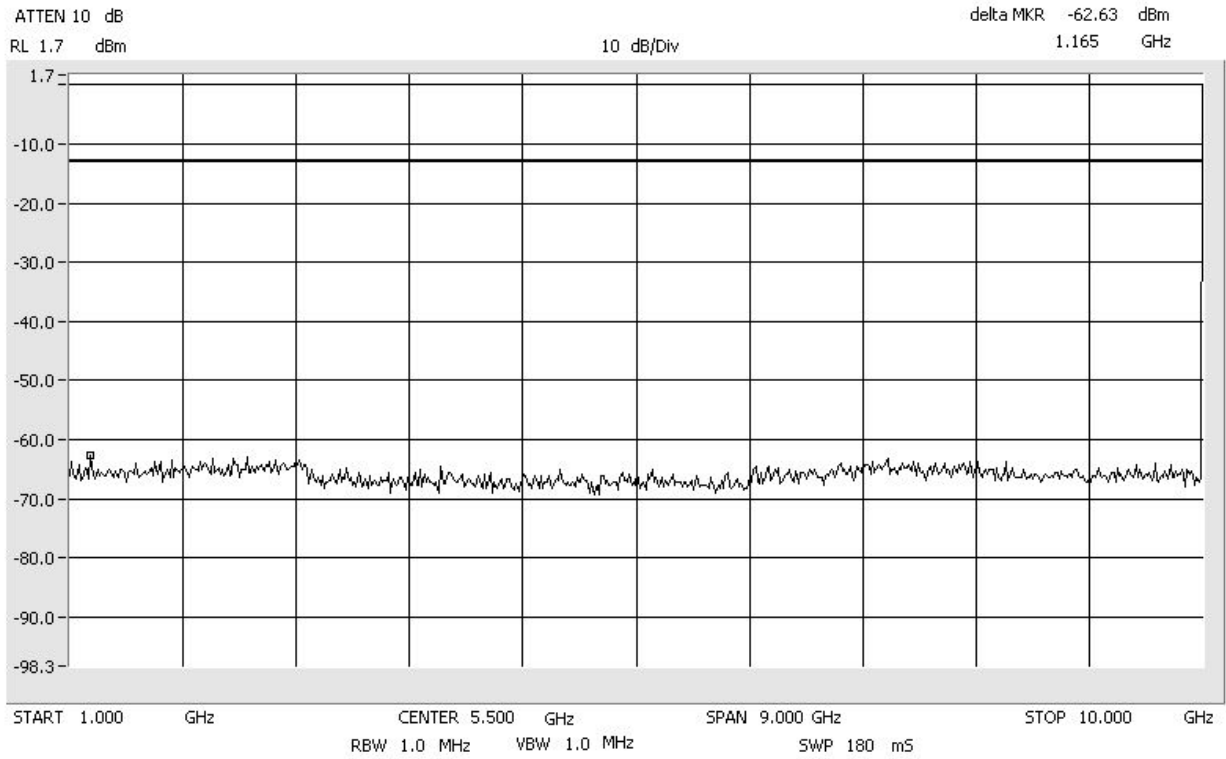
Intermodulation GSM\_High CELLULAR  
Center: 836.5 MHz Span: 35 MHz RBW/VBW: 100 kHz



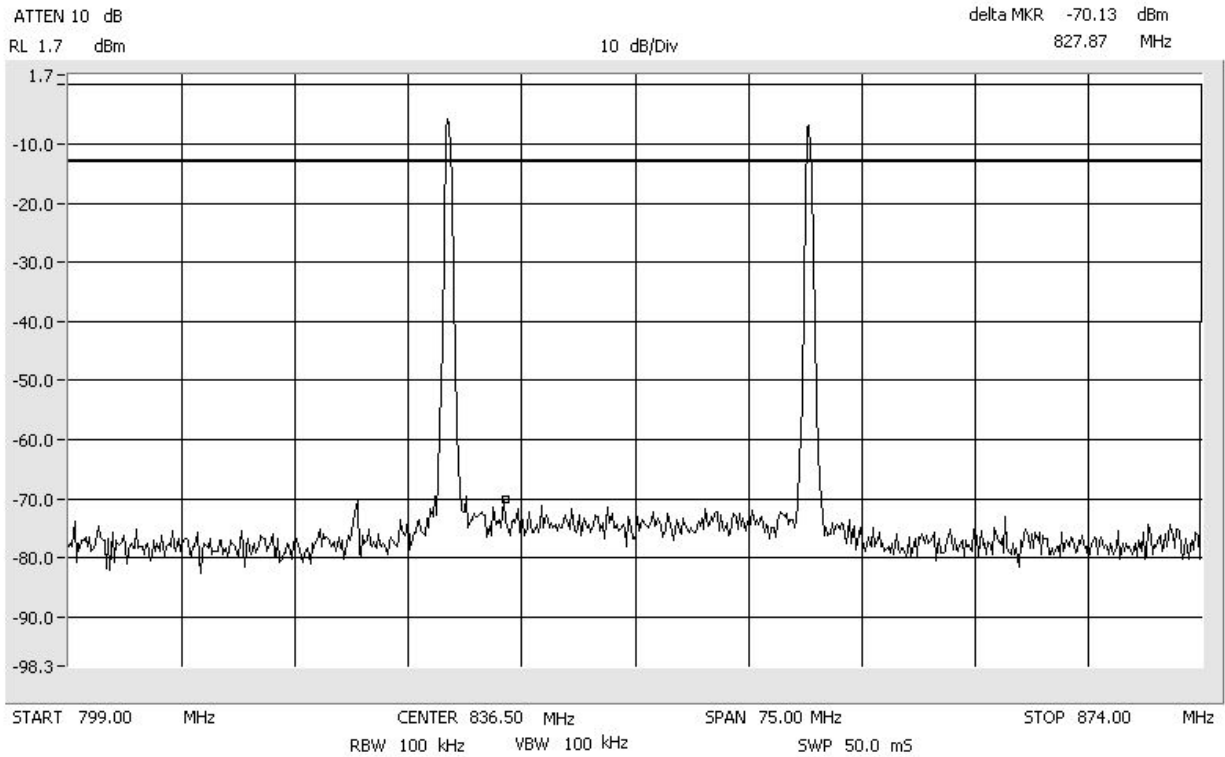
Intermodulation GSM\_High CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



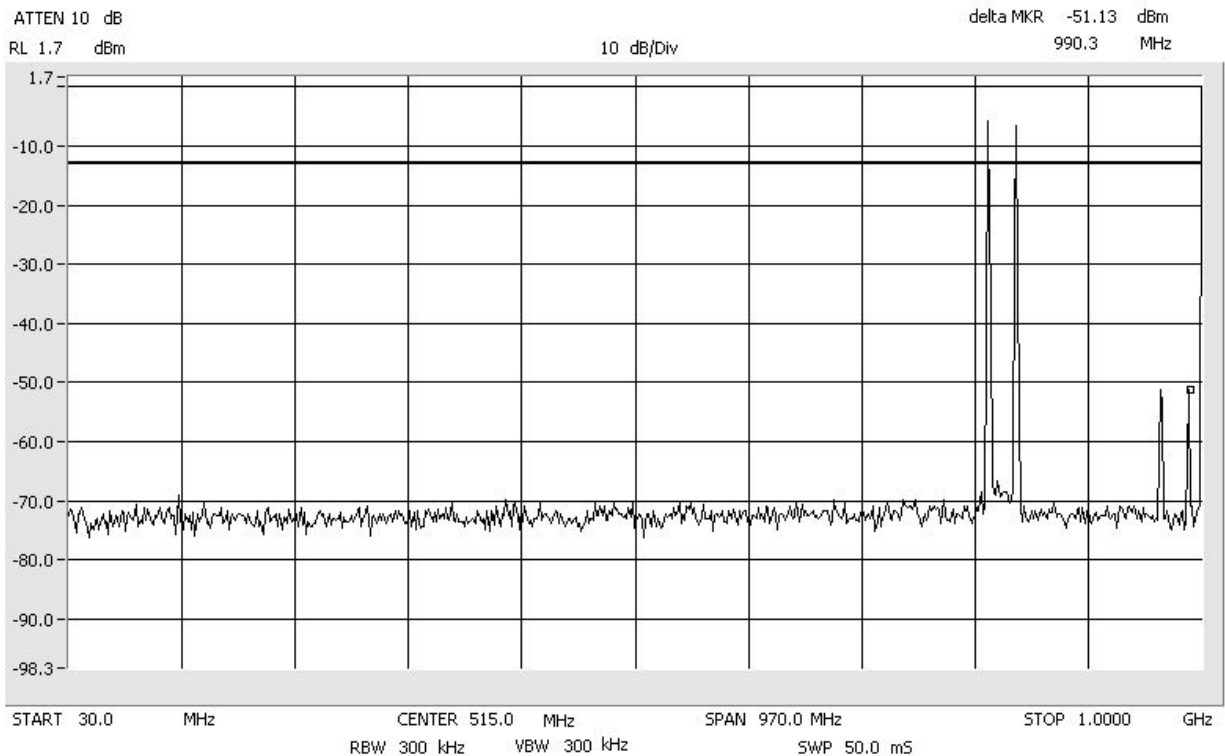
Intermodulation GSM\_High CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



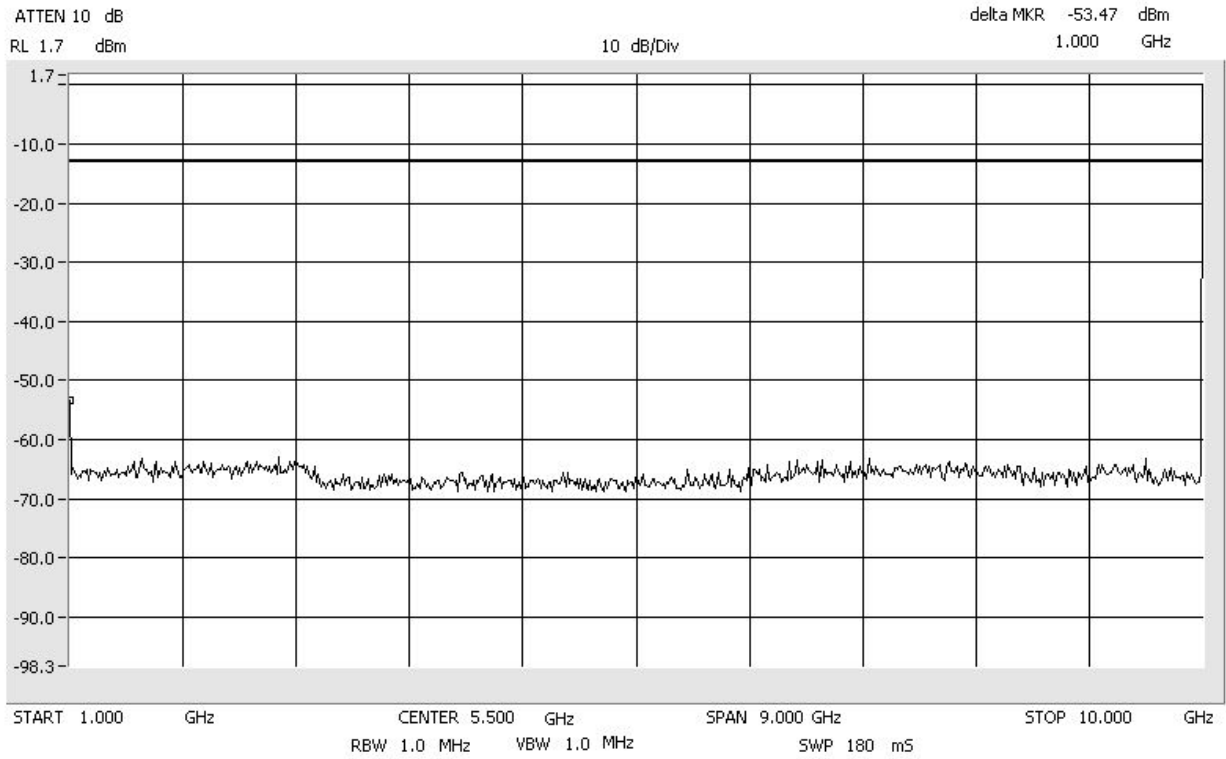
Intermodulation GSM\_Apart CELLULAR  
Center: 836.5 MHz Span: 75 MHz RBW/VBW: 100 kHz



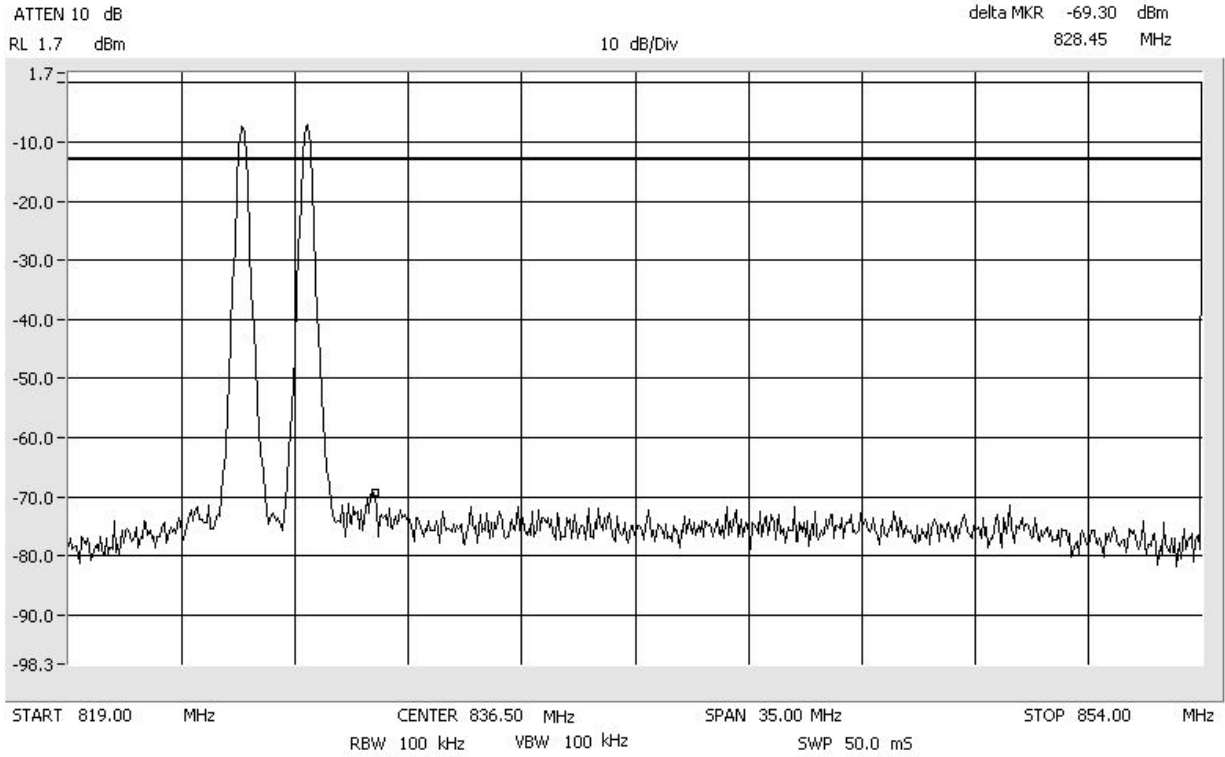
Intermodulation GSM\_Apart CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



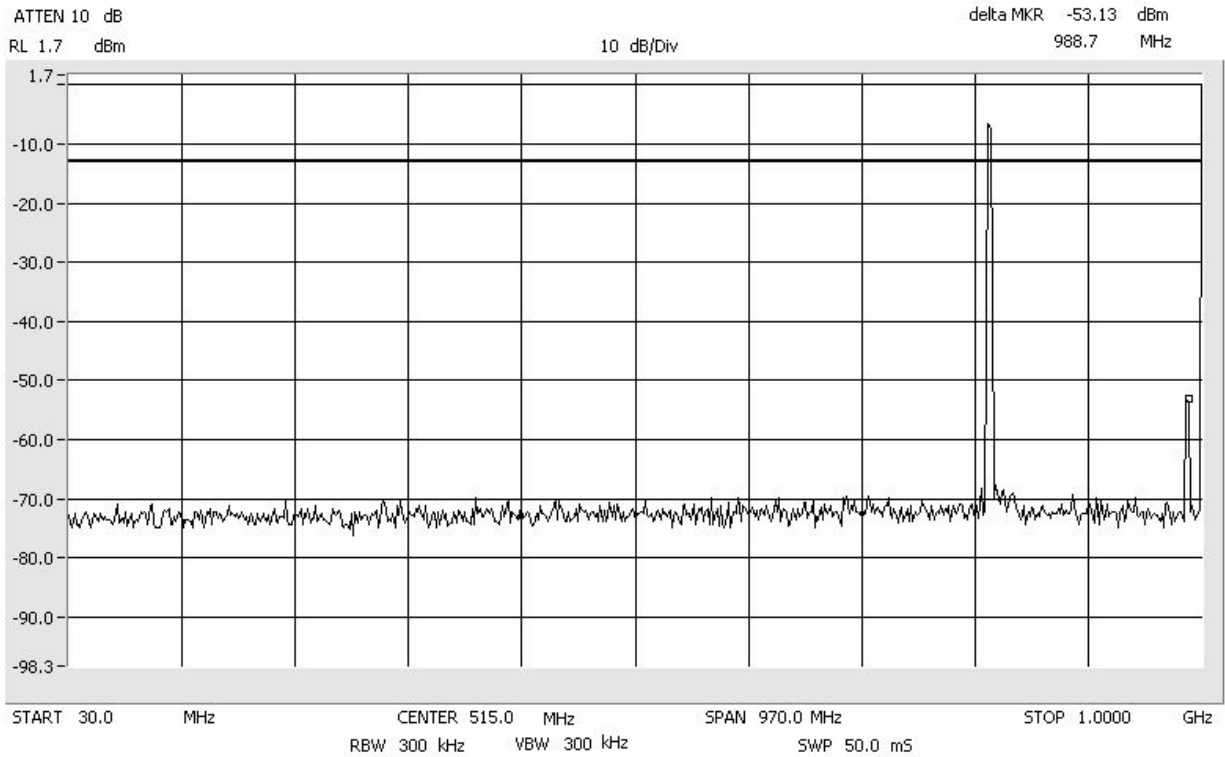
Intermodulation GSM\_Apart CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



Intermodulation      EDGE\_Low      CELLULAR  
Center: 836.5 MHz      Span: 35 MHz      RBW/VBW: 100 kHz

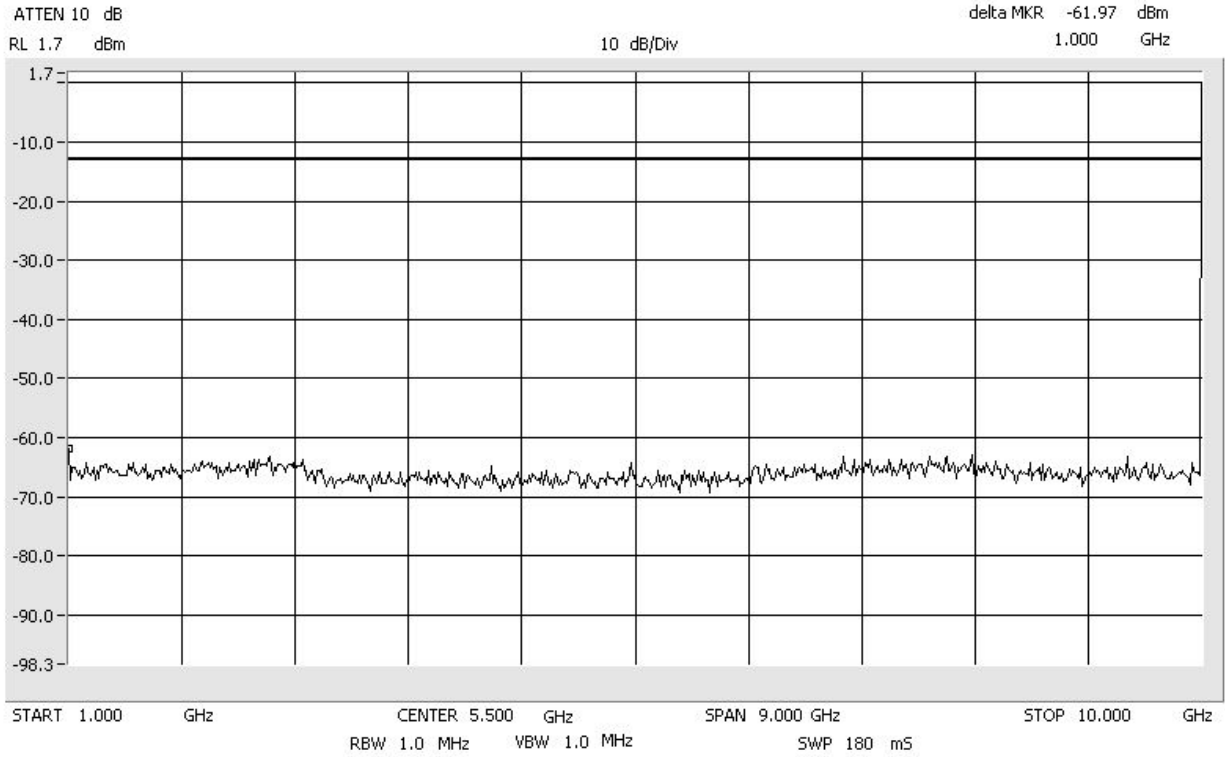


Intermodulation      EDGE\_Low      CELLULAR  
Span: 30 MHz to 1 GHz      RBW/VBW: 300 kHz

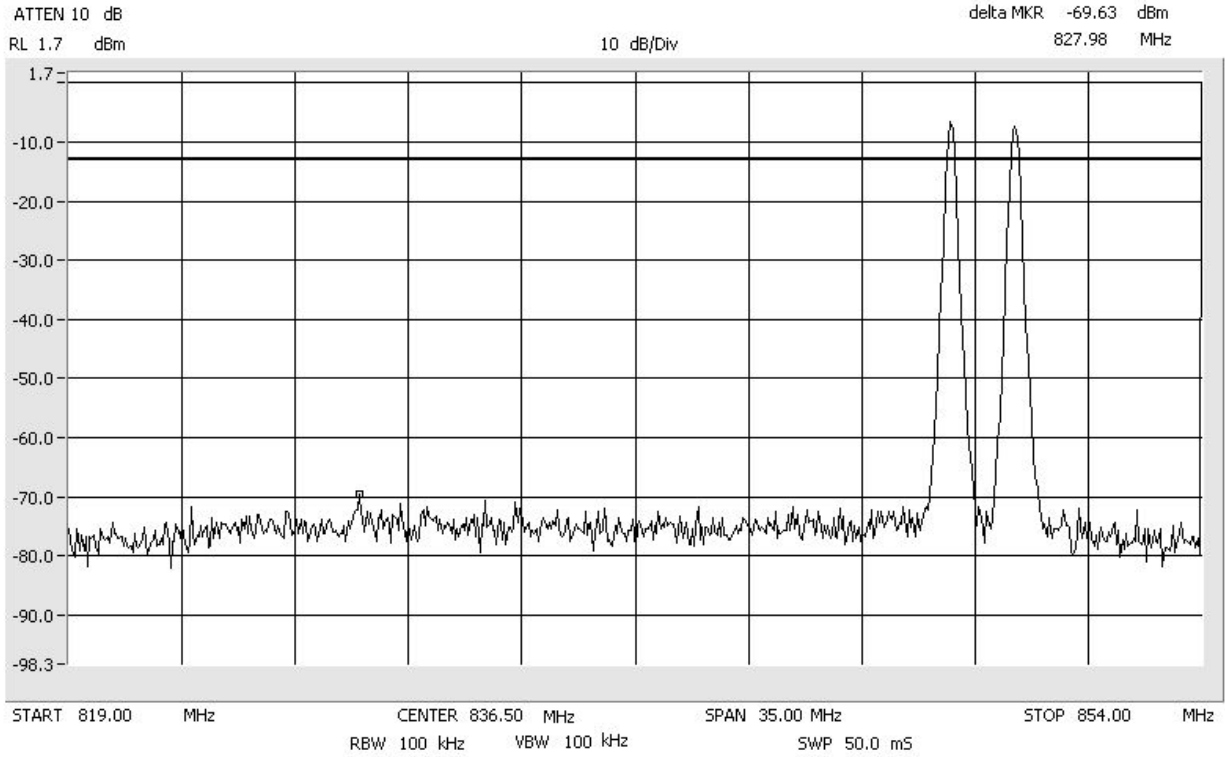




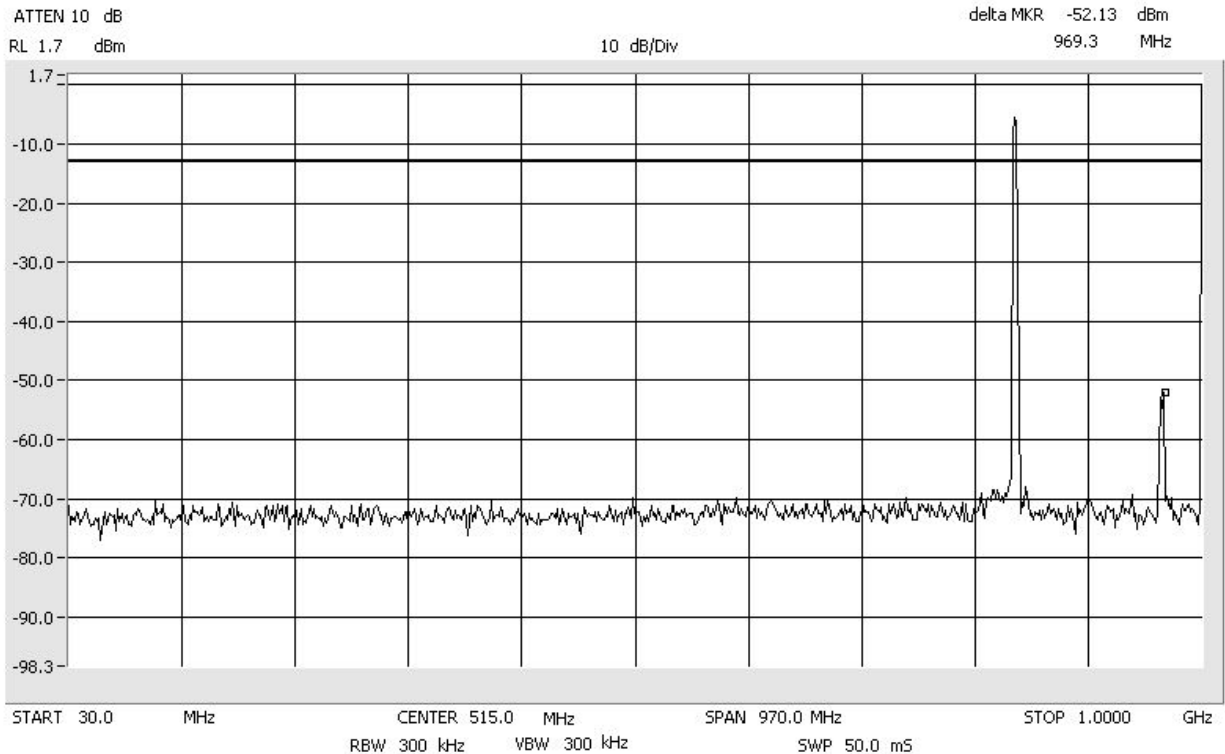
Intermodulation EDGE\_Low CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



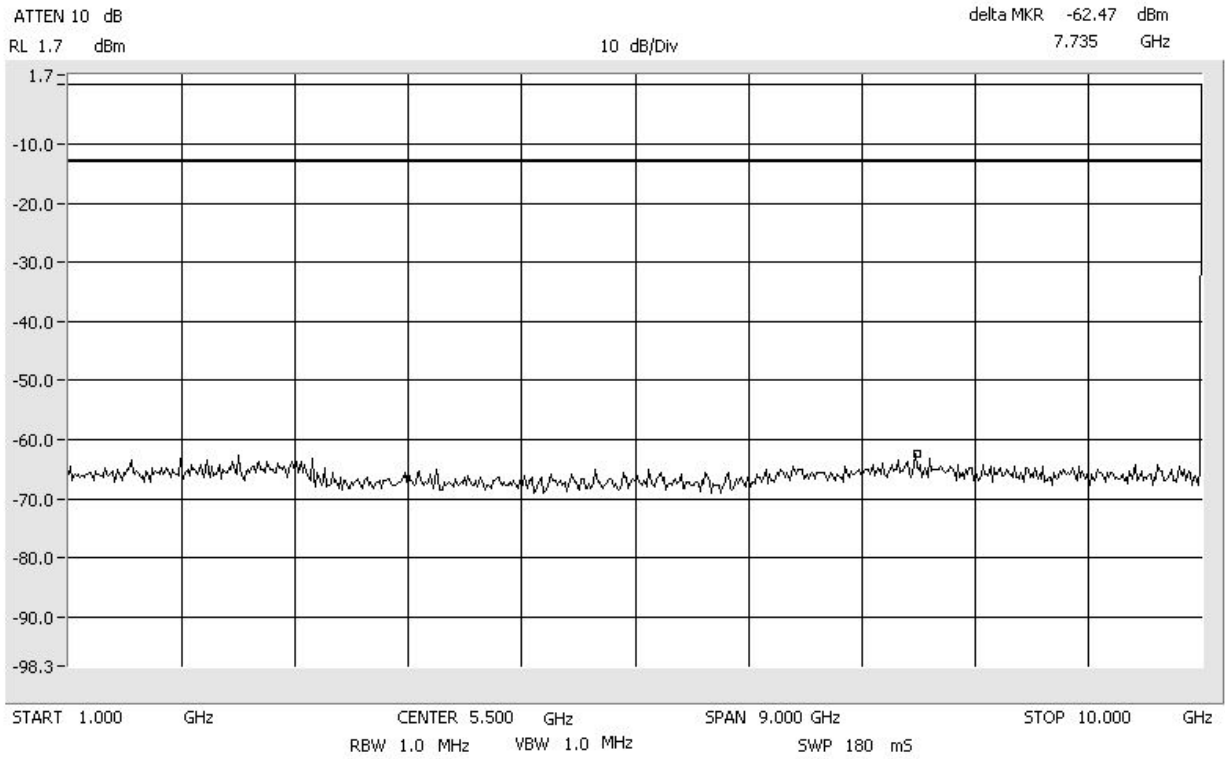
Intermodulation EDGE\_High CELLULAR  
Center: 836.5 MHz Span: 35 MHz RBW/VBW: 100 kHz



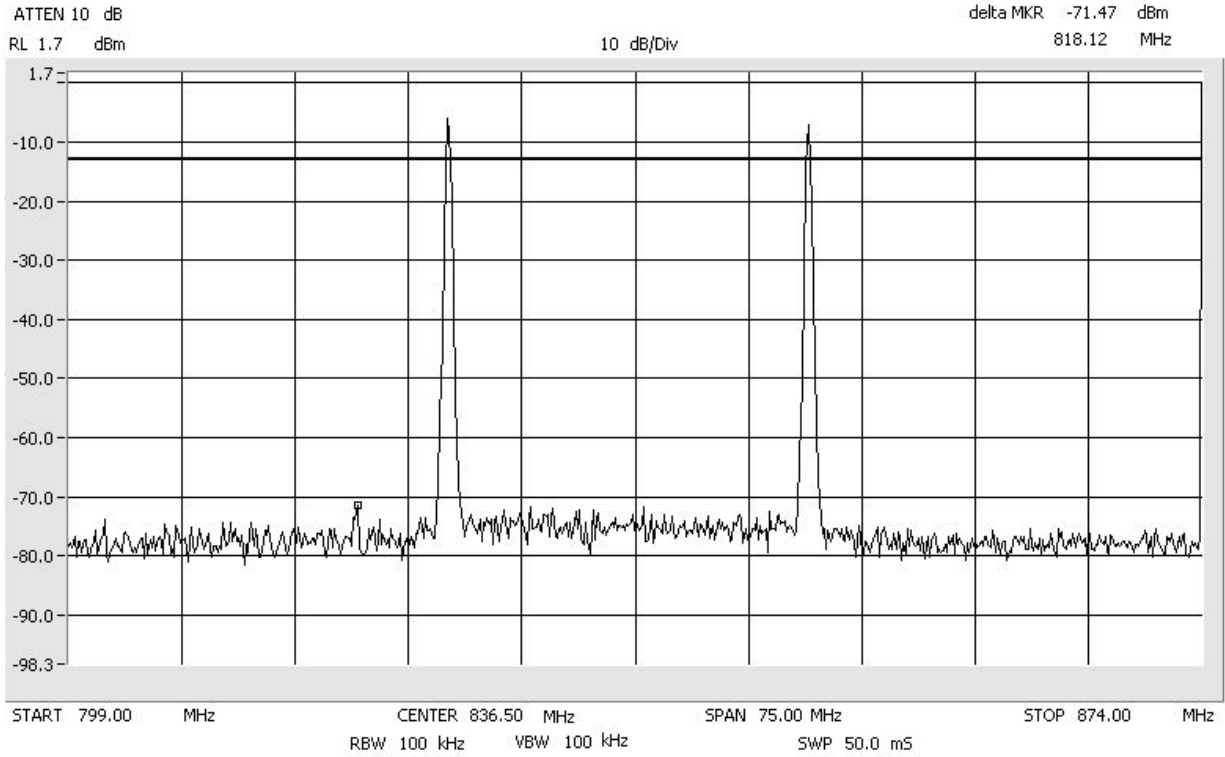
Intermodulation EDGE\_High CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



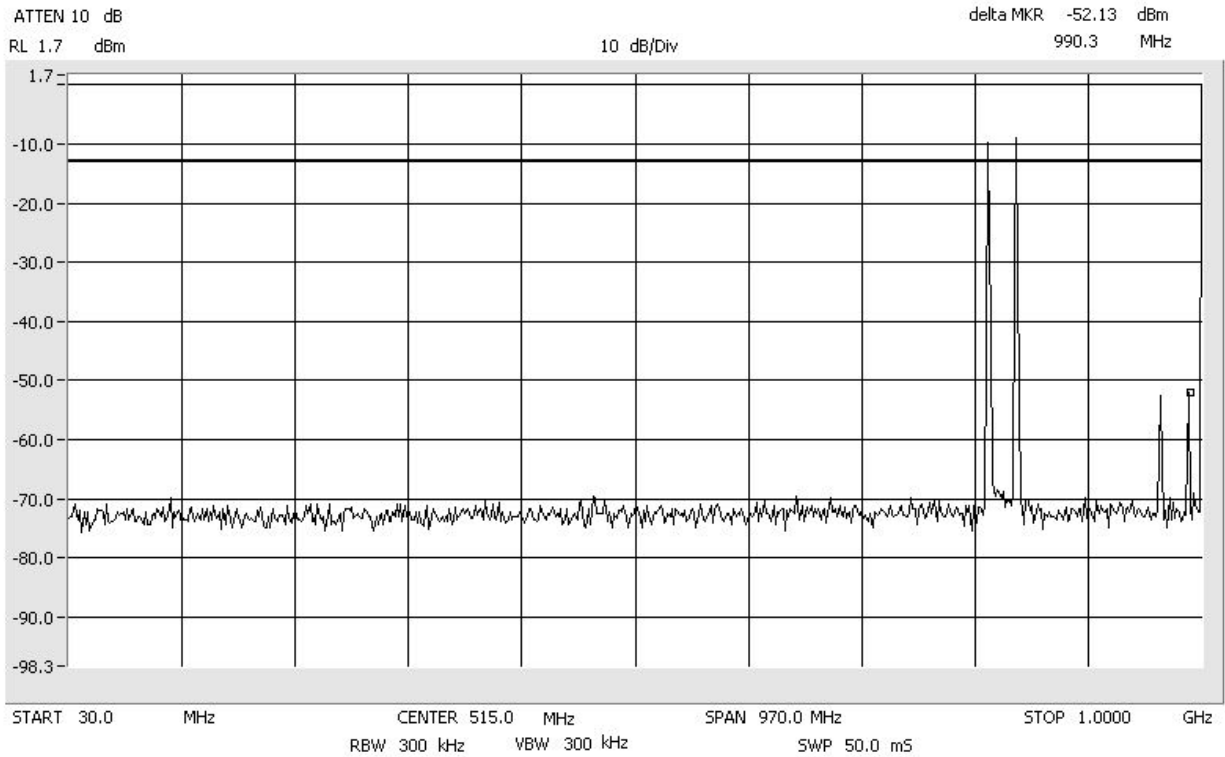
Intermodulation EDGE\_High CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



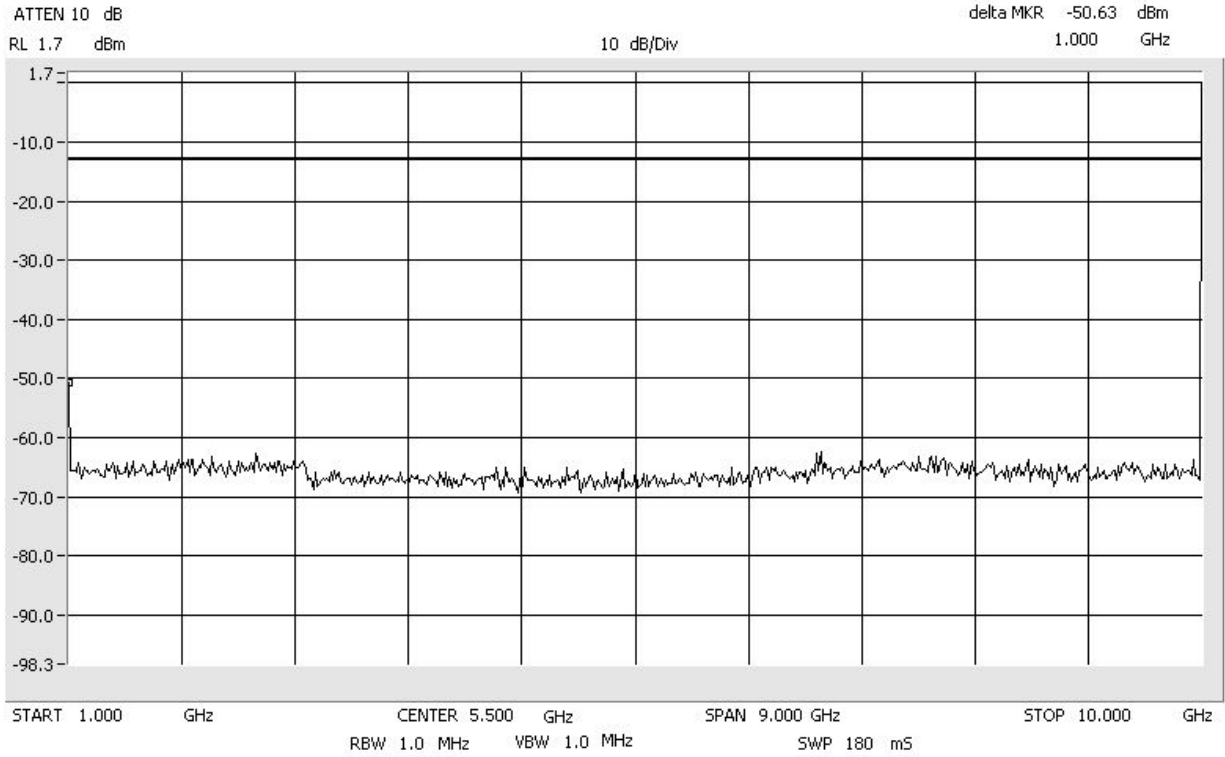
Intermodulation EDGE\_Apart CELLULAR  
Center: 836.5 MHz Span: 75 MHz RBW/VBW: 100 kHz



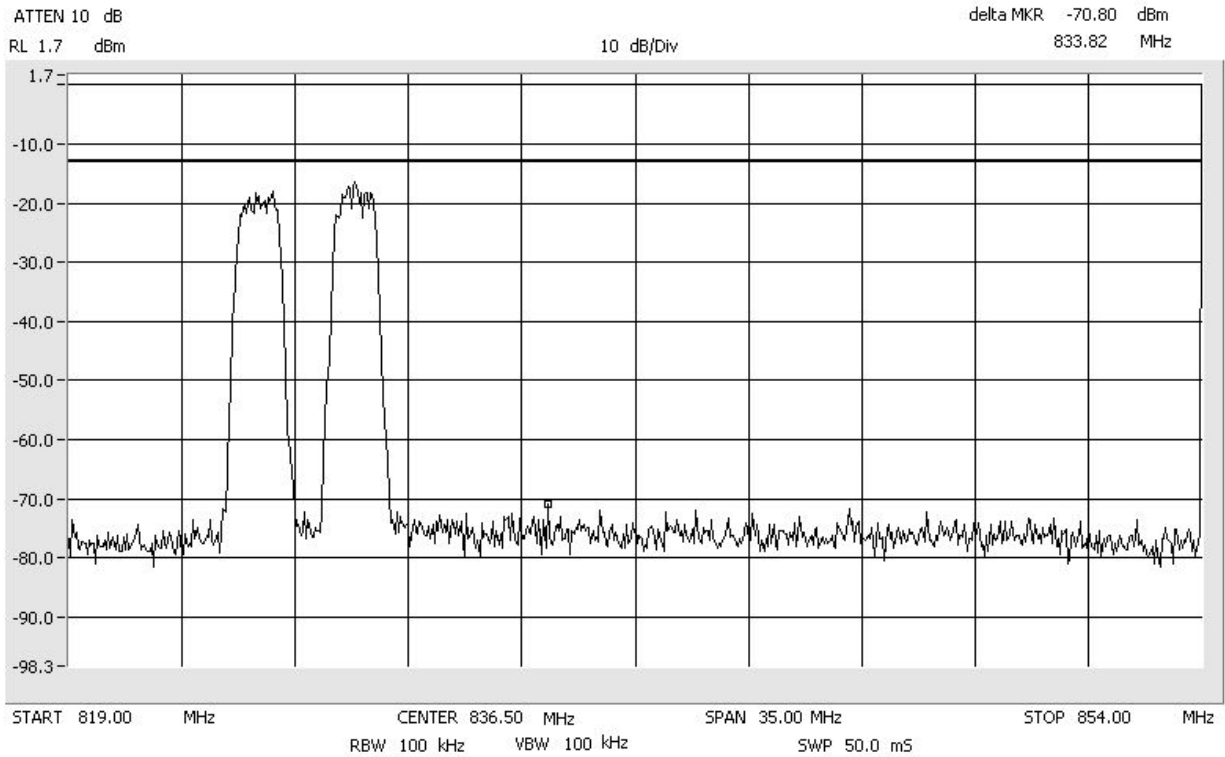
Intermodulation EDGE\_Apart CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



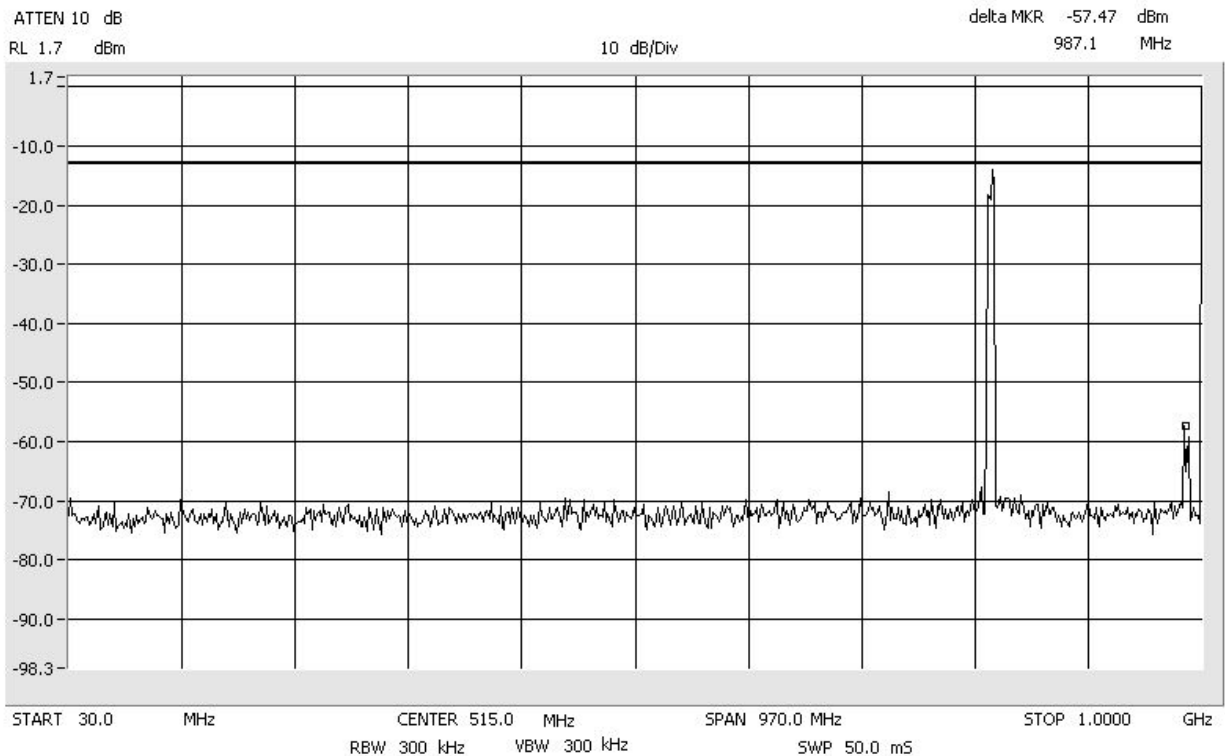
Intermodulation EDGE\_Apart CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



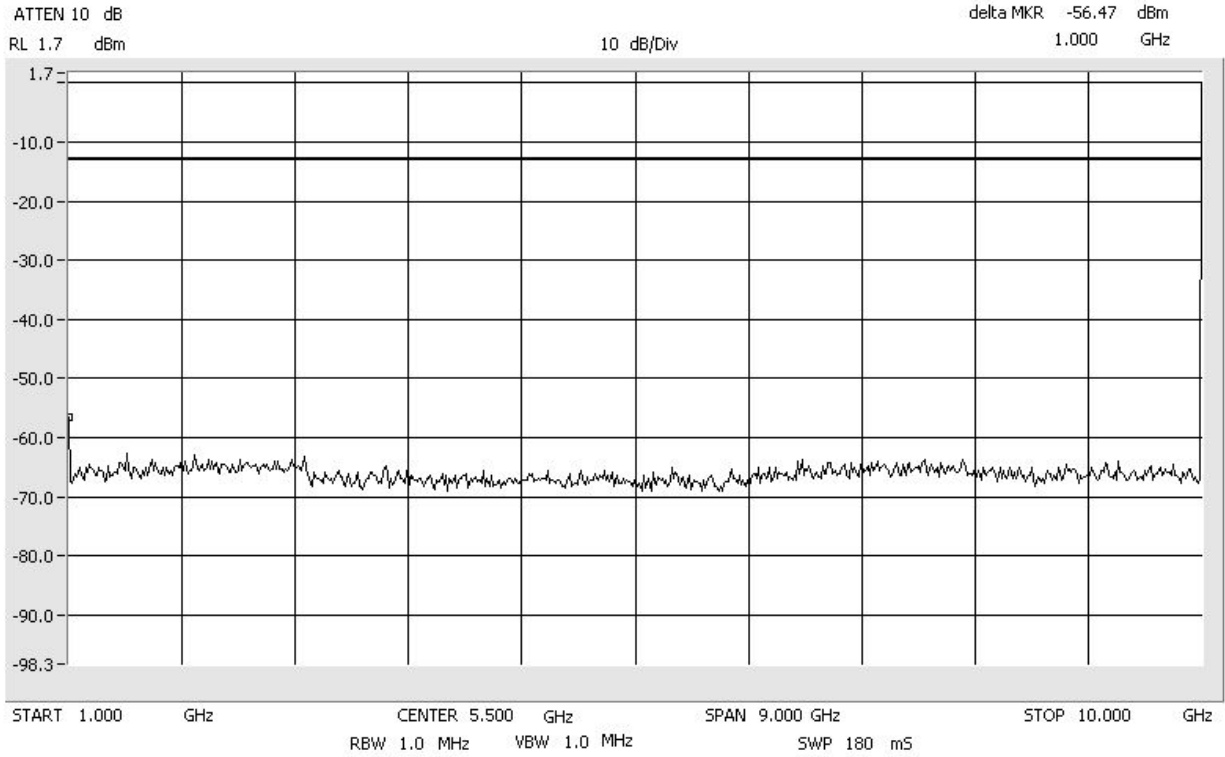
Intermodulation CDMA\_Low CELLULAR  
Center: 836.5 MHz Span: 35 MHz RBW/VBW: 100 kHz



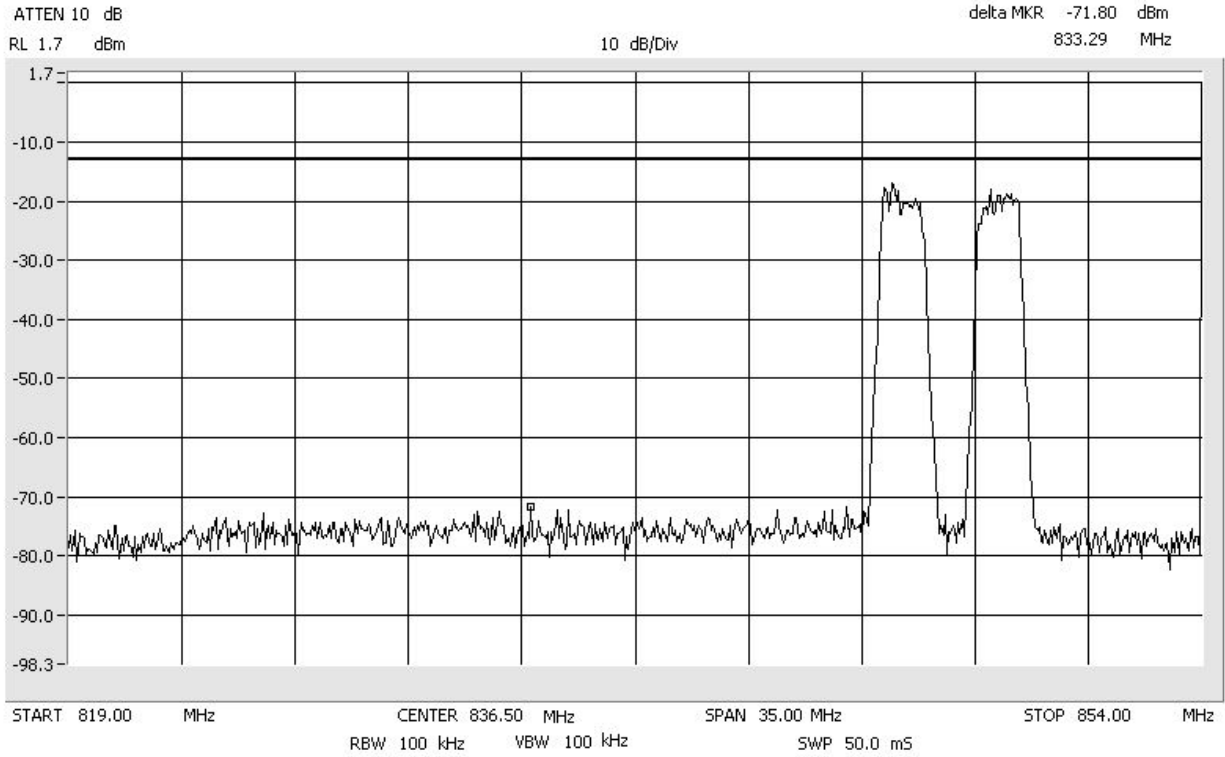
Intermodulation CDMA\_Low CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



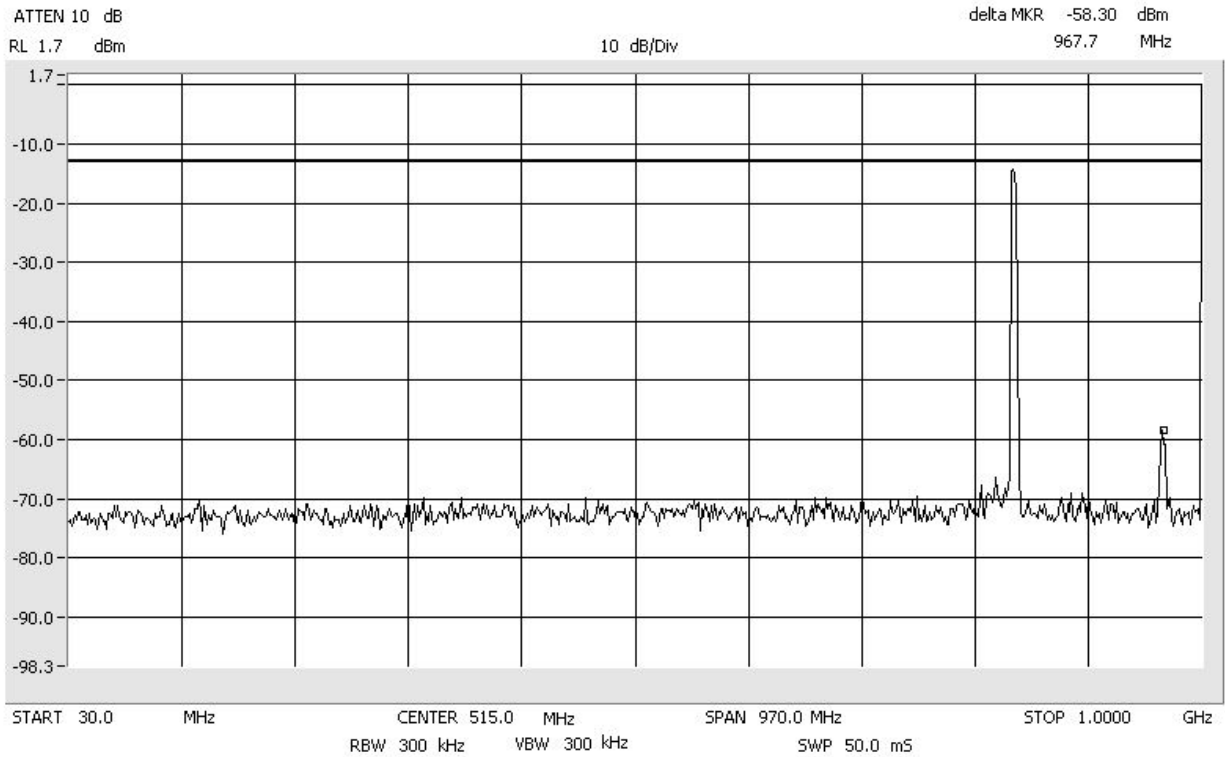
Intermodulation CDMA\_Low CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



Intermodulation CDMA\_High CELLULAR  
Center: 836.5 MHz Span: 35 MHz RBW/VBW: 100 kHz

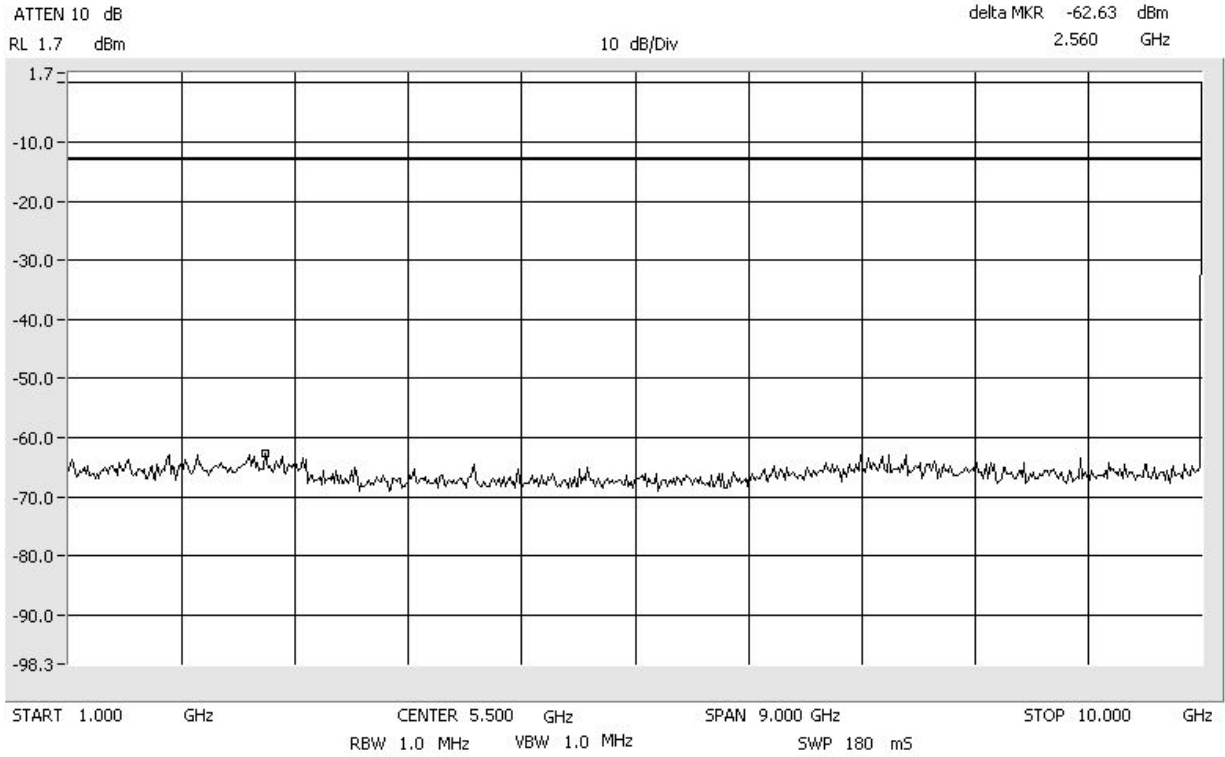


Intermodulation CDMA\_High CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz

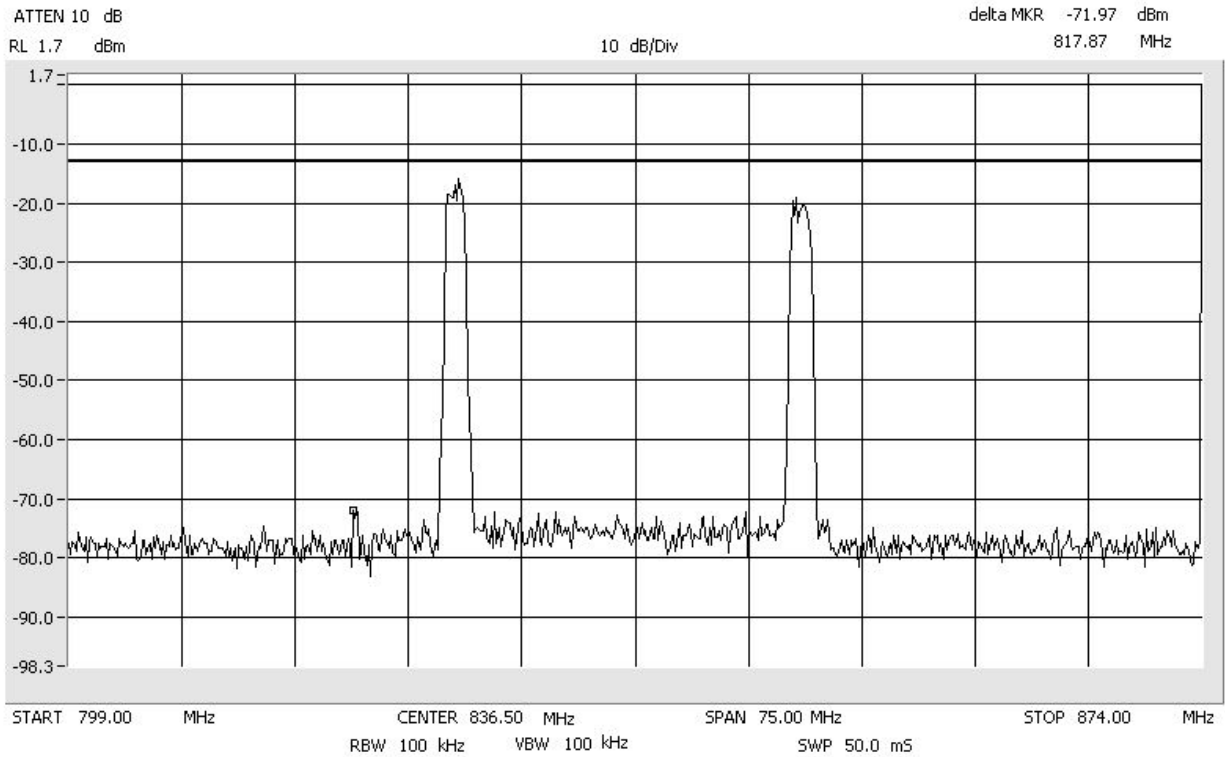




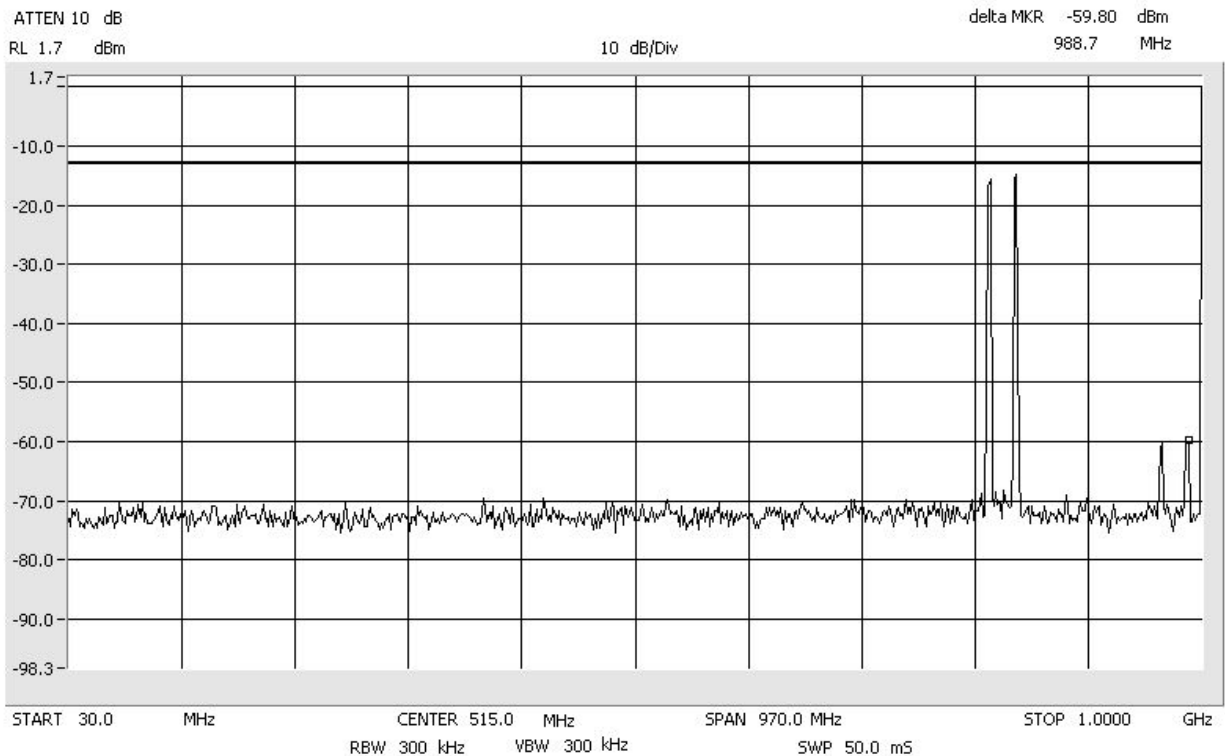
Intermodulation CDMA\_High CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



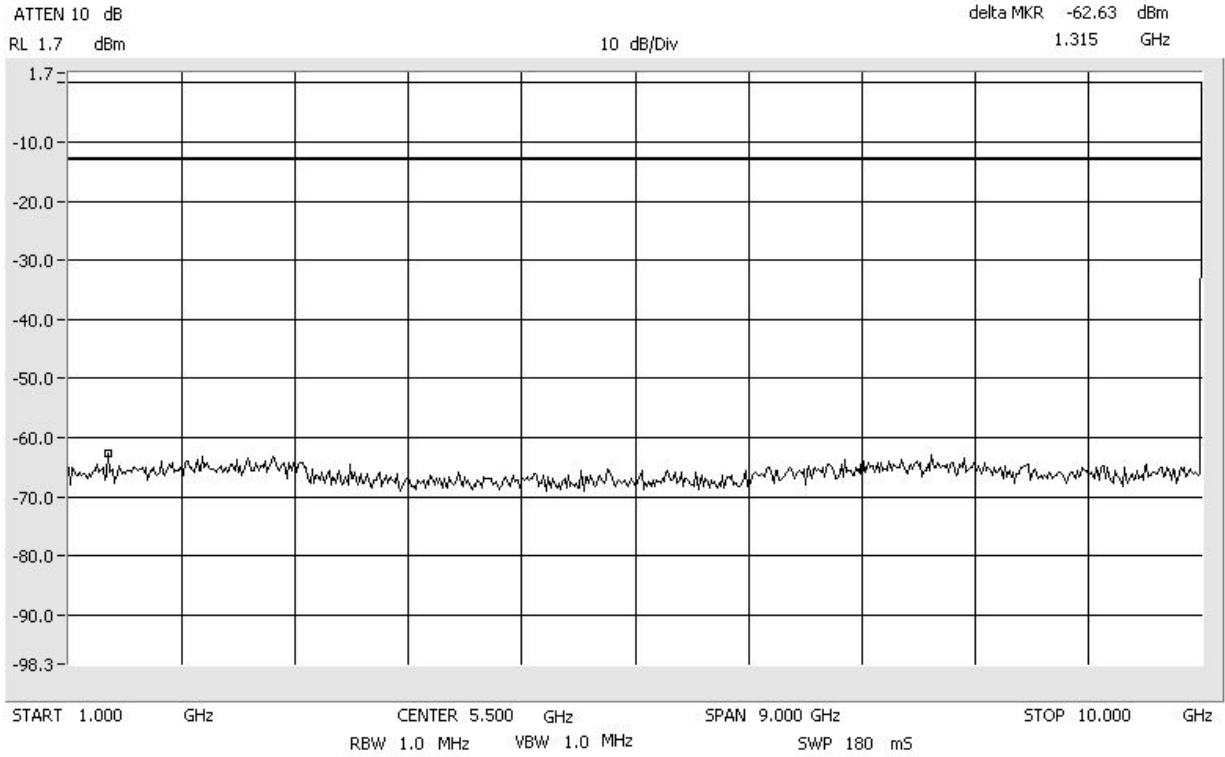
Intermodulation CDMA\_Apart CELLULAR  
Center: 836.5 MHz Span: 75 MHz RBW/VBW: 100 kHz



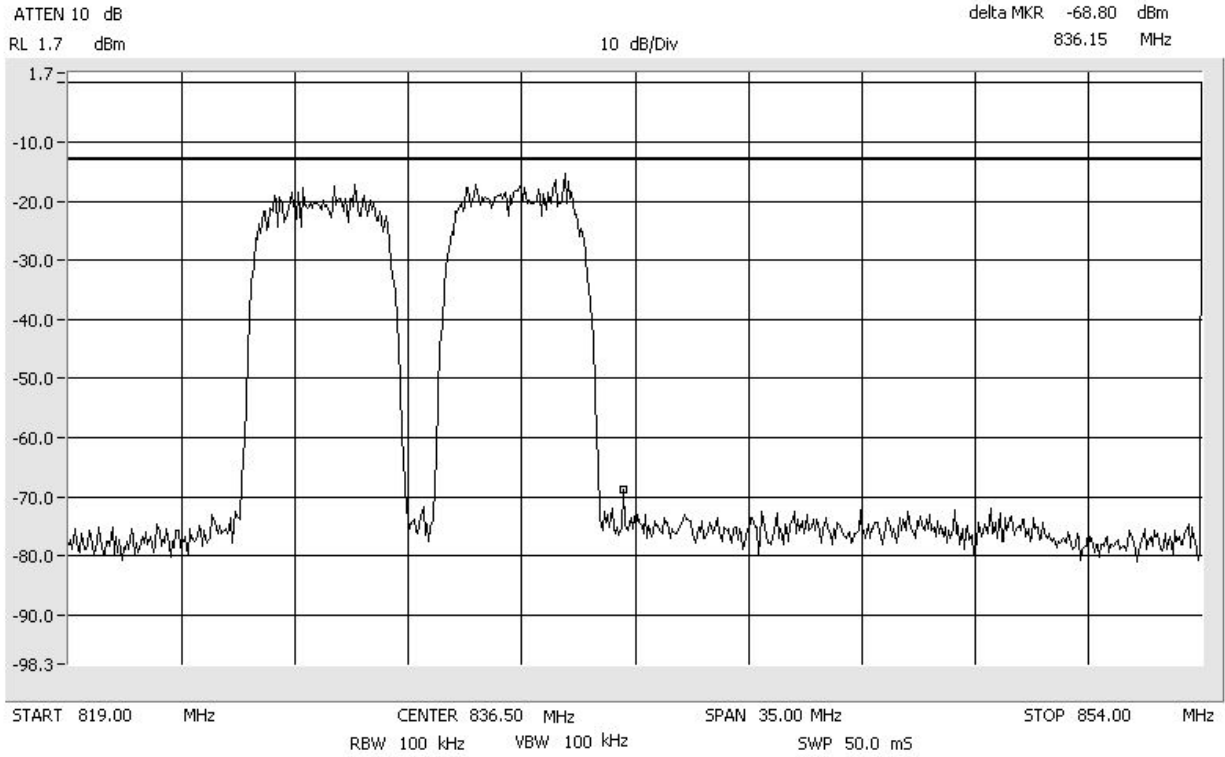
Intermodulation CDMA\_Apart CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



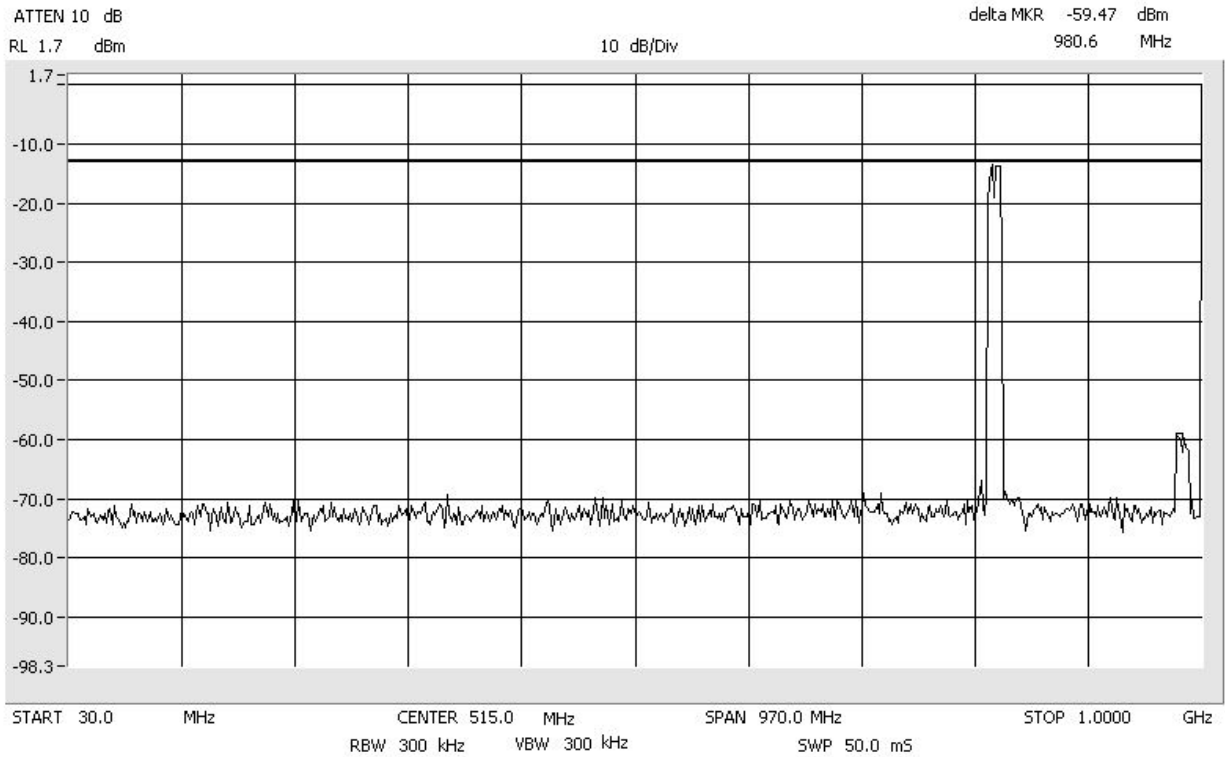
Intermodulation CDMA\_Apart CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



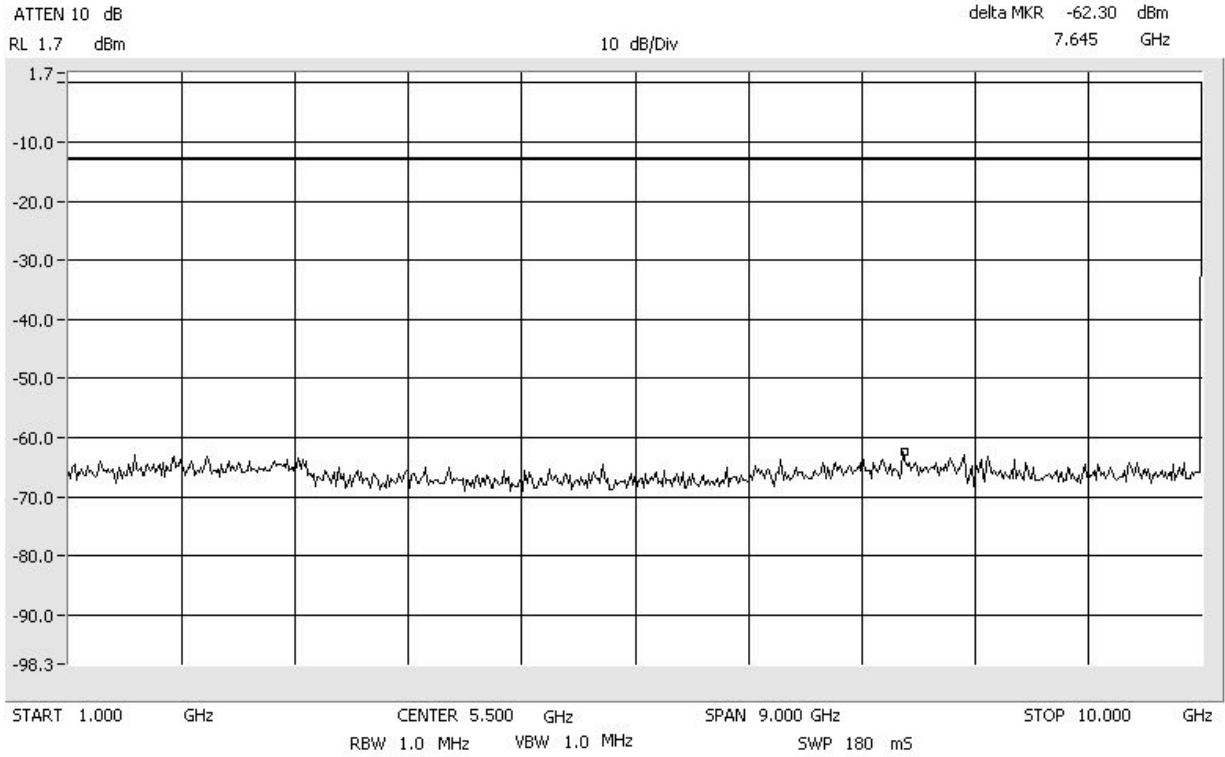
Intermodulation WCDMA\_Low CELLULAR  
Center: 836.5 MHz Span: 35 MHz RBW/VBW: 100 kHz



Intermodulation WCDMA\_Low CELLULAR  
Span: 30 MHz to 1 GHz RBW/VBW: 300 kHz



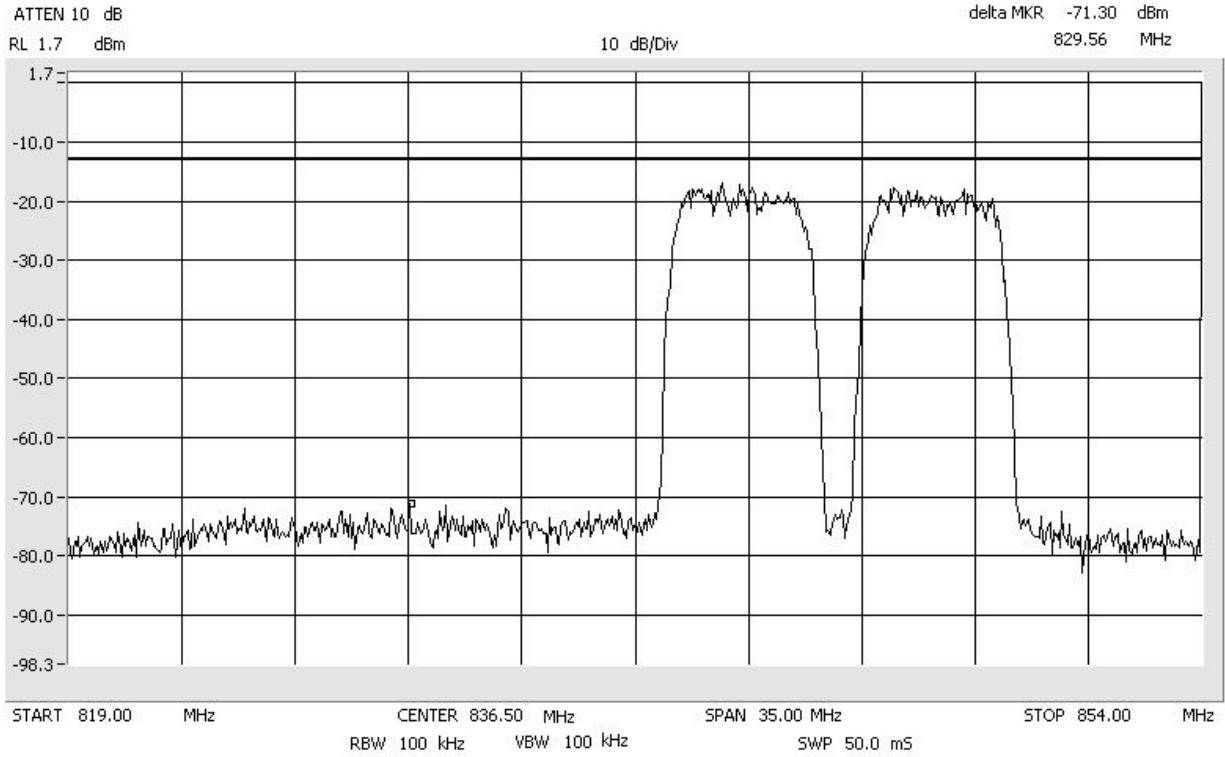
Intermodulation WCDMA\_Low CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



Intermodulation  
Center: 836.5 MHz

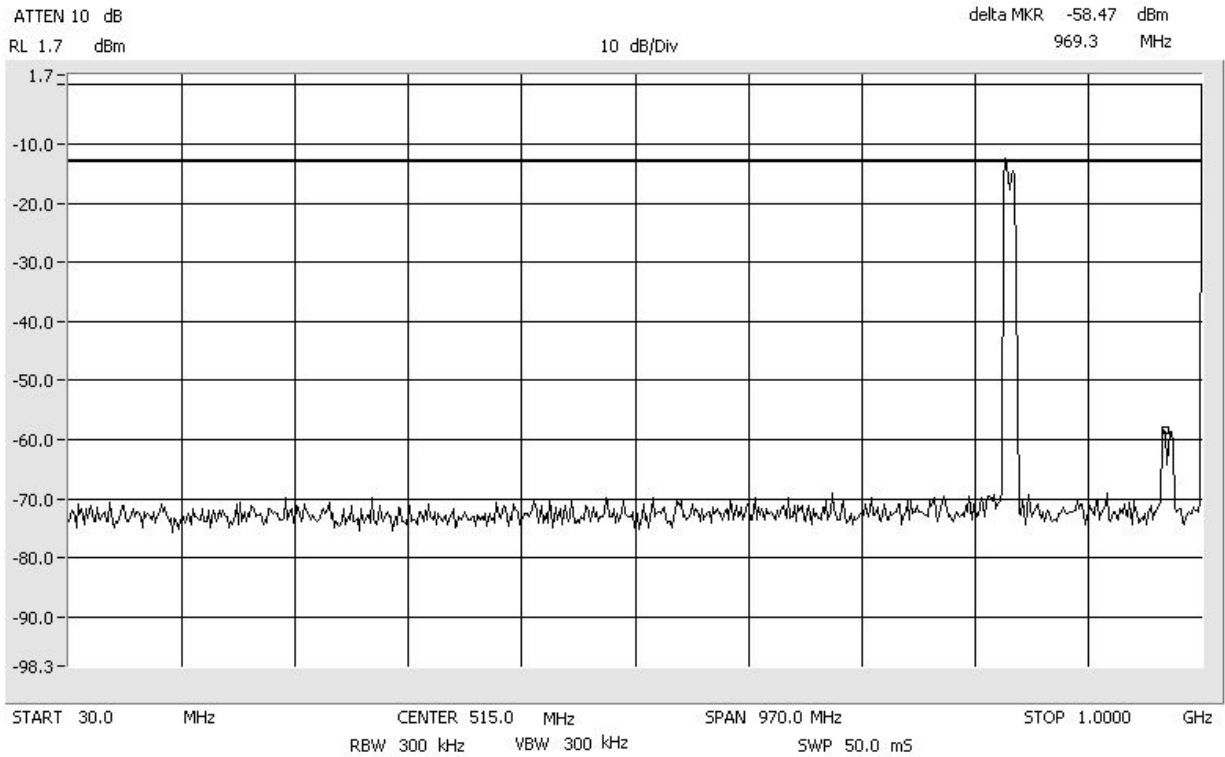
WCDMA\_High  
Span: 35 MHz

CELLULAR  
RBW/VBW: 100 kHz

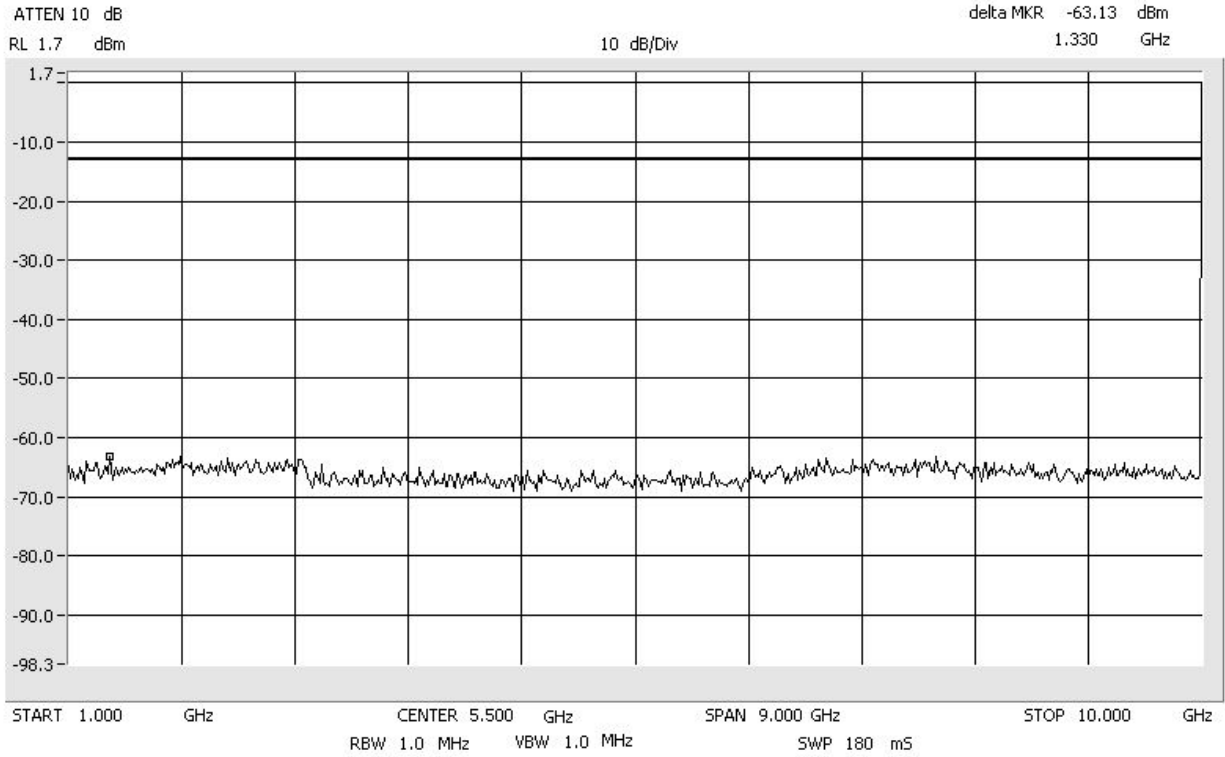


Intermodulation  
Span: 30 MHz to 1 GHz

WCDMA\_High CELLULAR  
RBW/VBW: 300 kHz



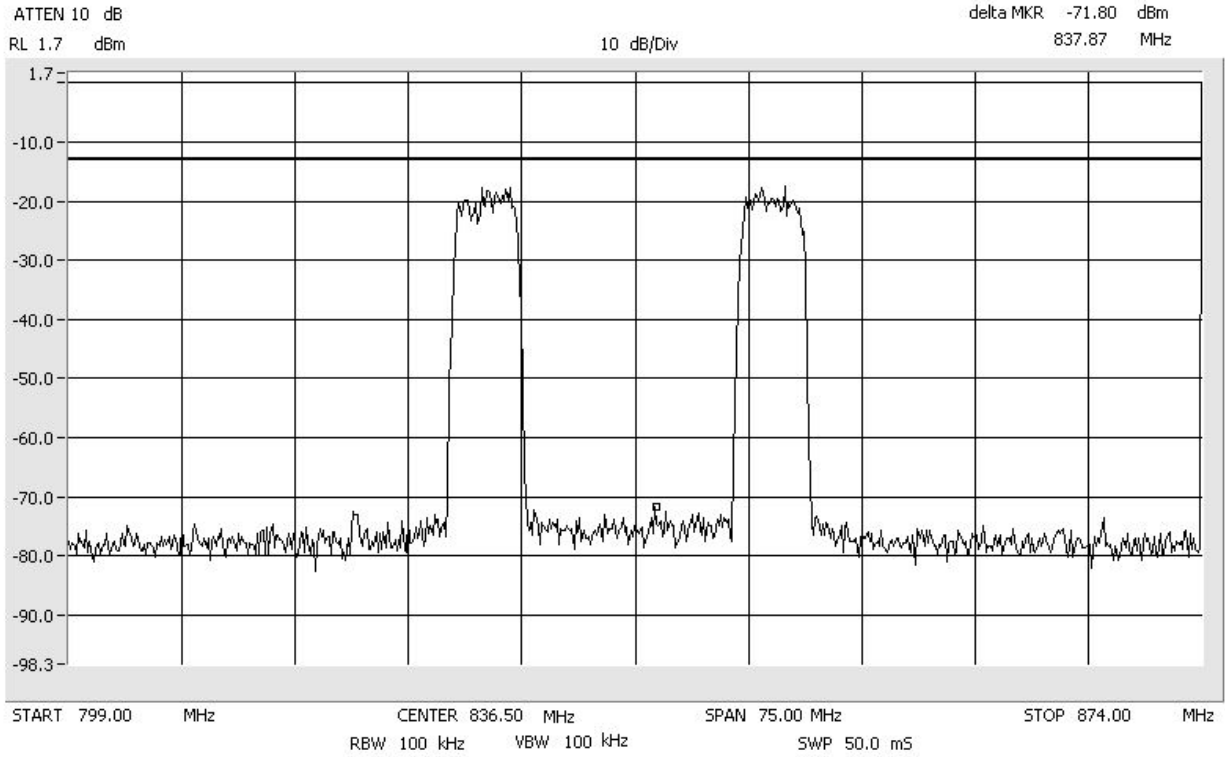
Intermodulation WCDMA\_High CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



Intermodulation  
Center: 836.5 MHz

WCDMA\_Apart  
Span: 75 MHz

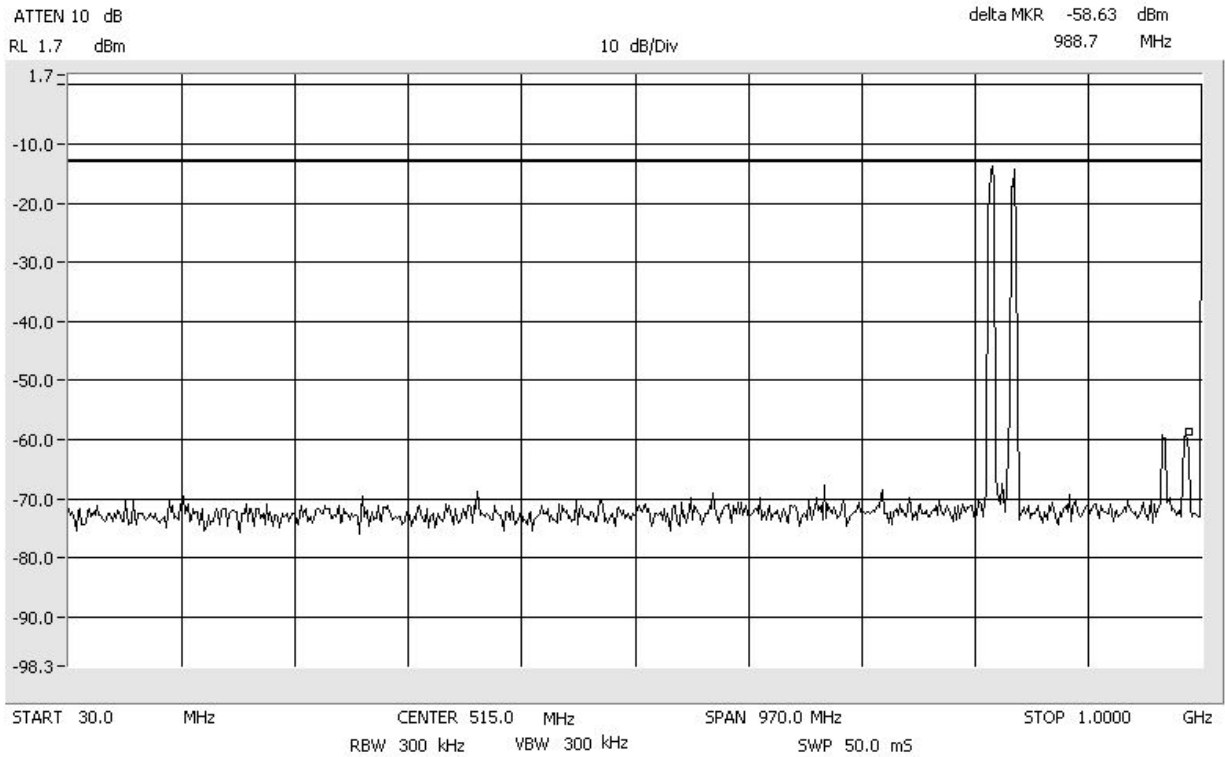
CELLULAR  
RBW/VBW: 100 kHz



Intermodulation  
Span: 30 MHz to 1 GHz

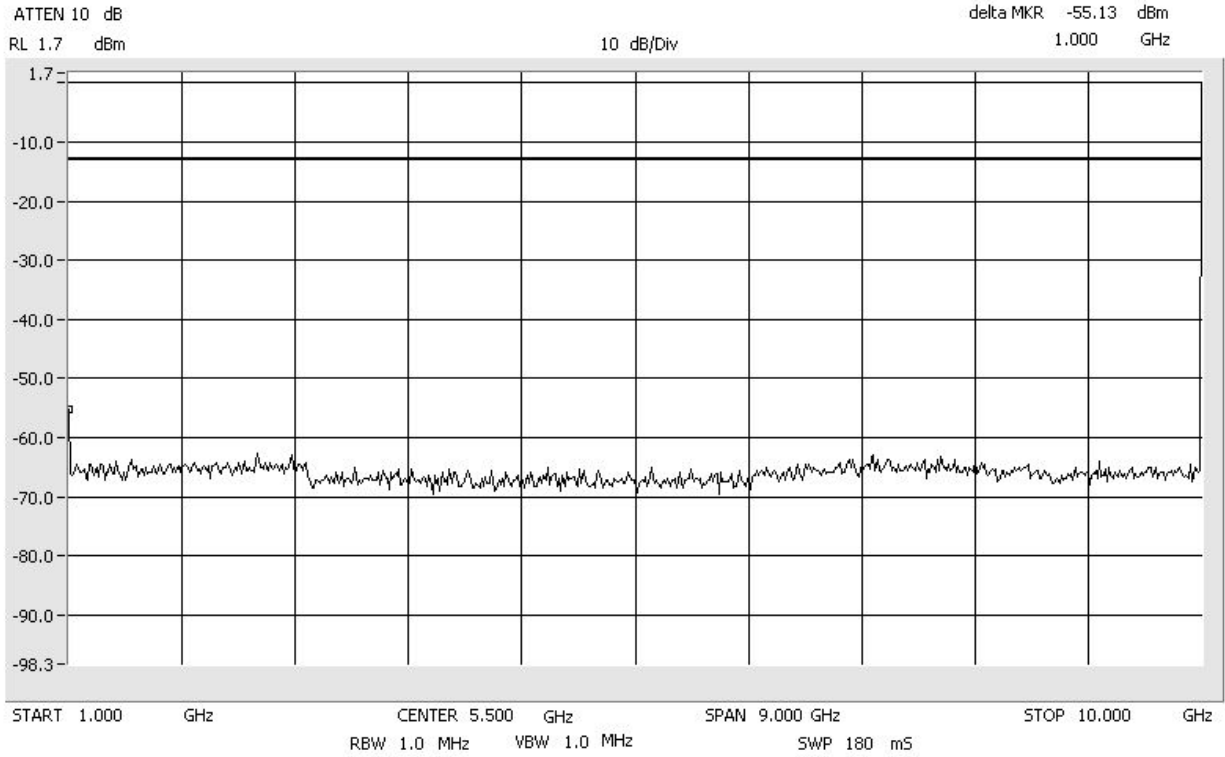
WCDMA\_Apart

CELLULAR  
RBW/VBW: 300 kHz





Intermodulation WCDMA\_Apart CELLULAR  
Span: 1 GHz to 10 GHz RBW/VBW: 1 MHz



## 7.5 Occupied Bandwidth Modulation Test

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[Back to Emission Limits: Section 5.1.3](#)

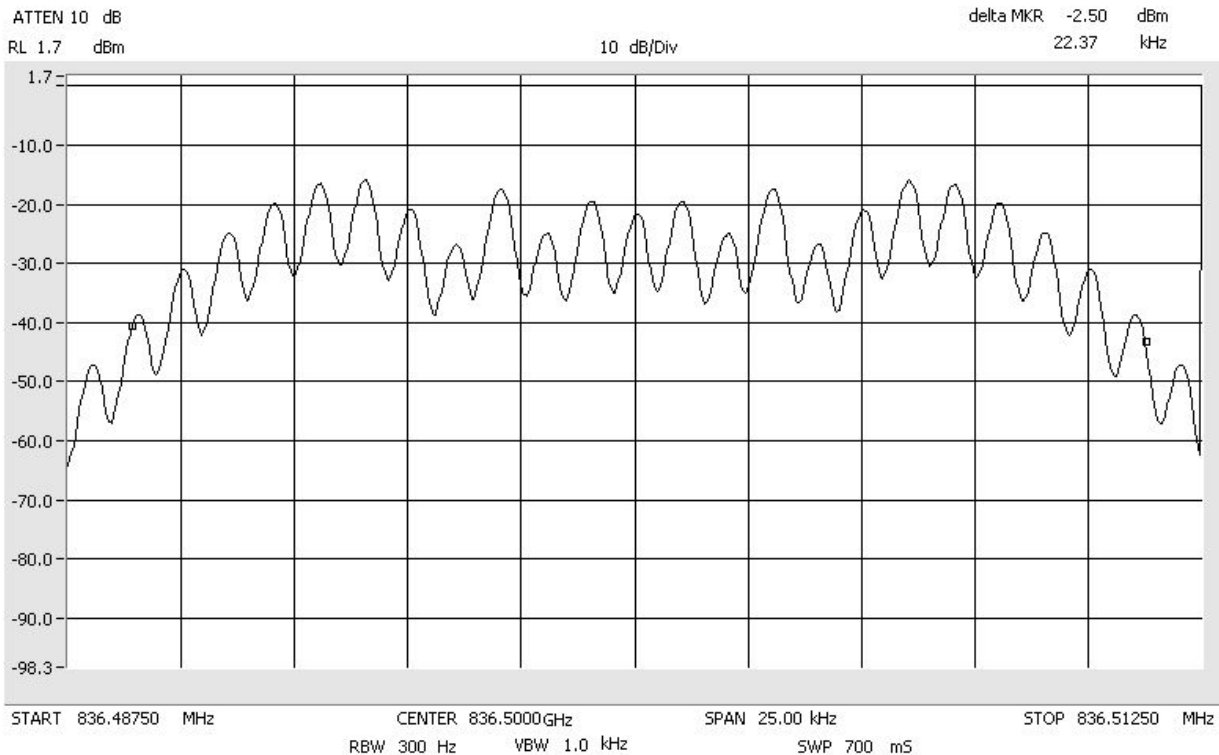
An output Occupied Bandwidth test was done with modulation types: FM, TDMA, GSM, EDGE, CDMA and W-CDMA. The purpose was to determine the amount of occupied bandwidth for the different types of modulation schemes produced by the EUT. The following plots show output signals.

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

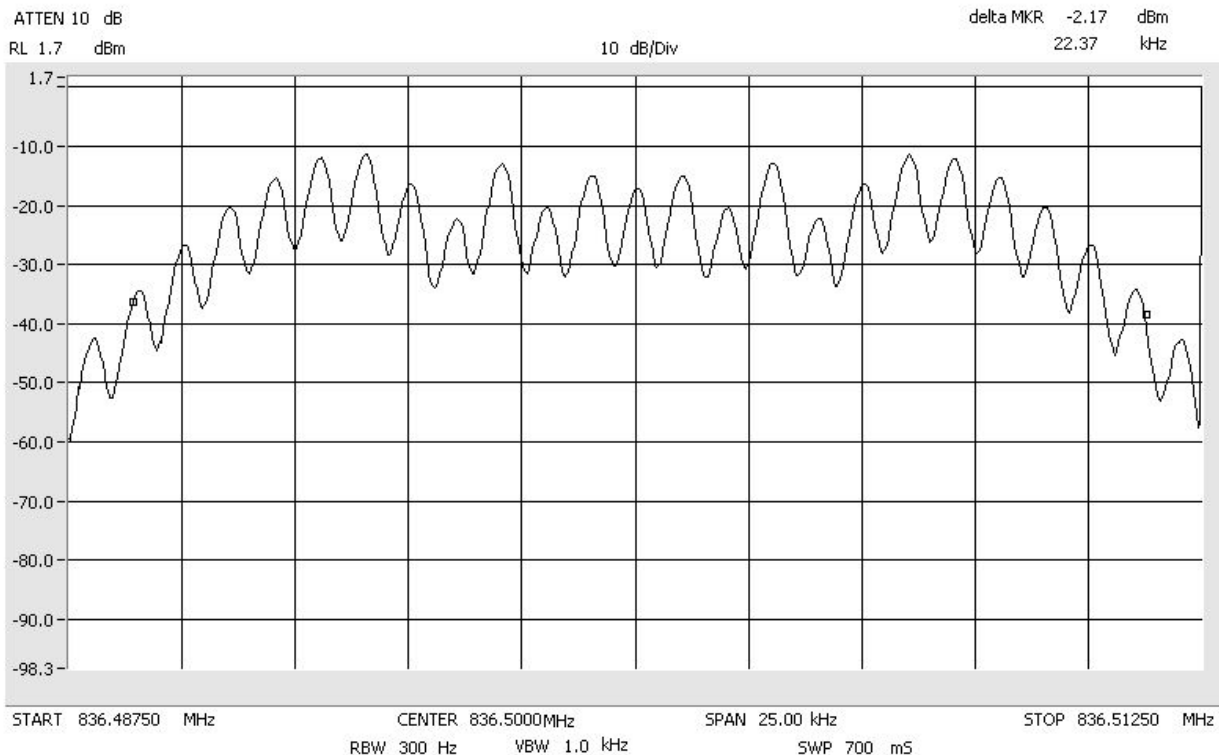
### **Results:**

Pass (see plots)

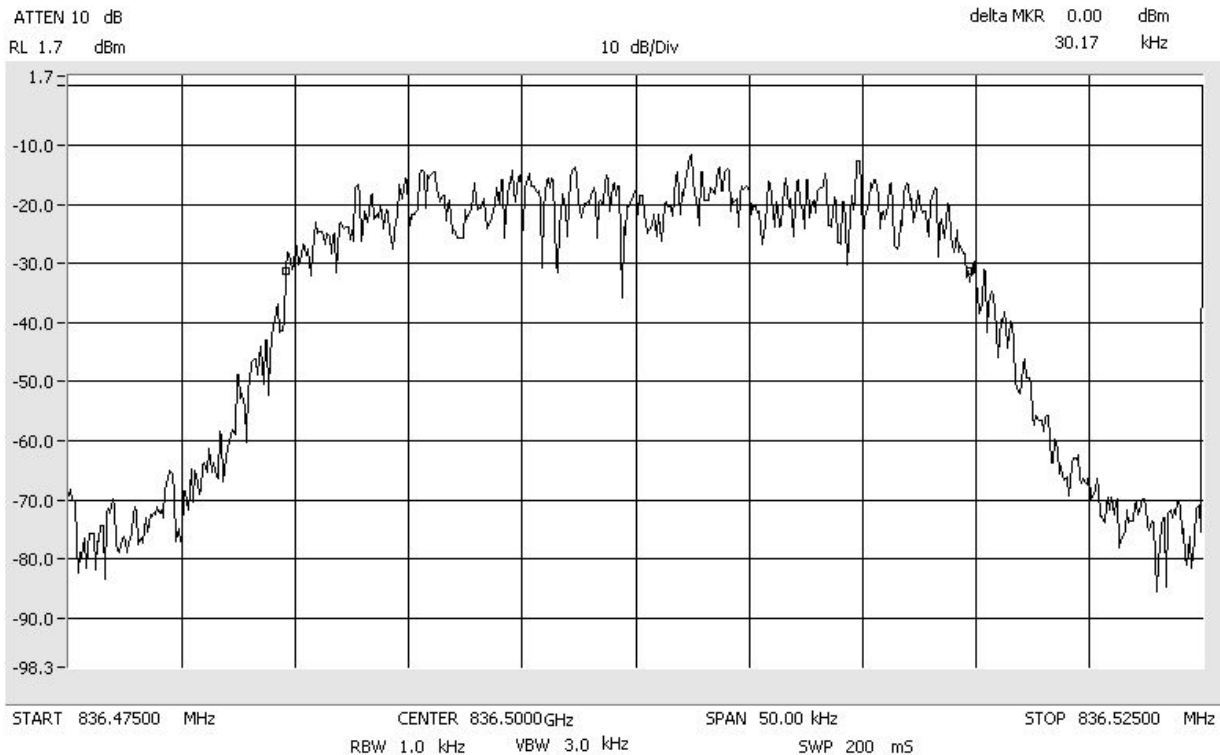
Occupied Bandwidth FM\_Signal\_In  
Span: 25 kHz RBW: 300 Hz VBW: 1 kHz



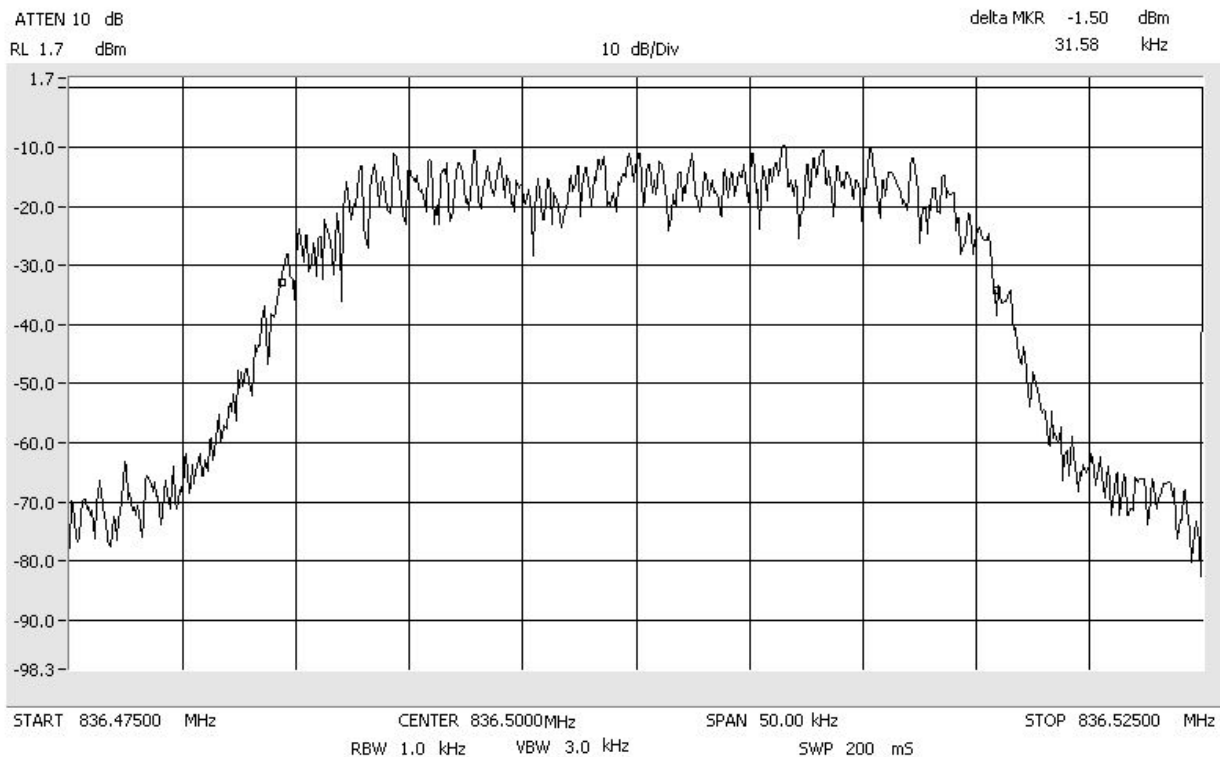
Occupied Bandwidth FM\_Signal\_Out  
Span: 25 kHz RBW: 300 Hz VBW: 1 kHz



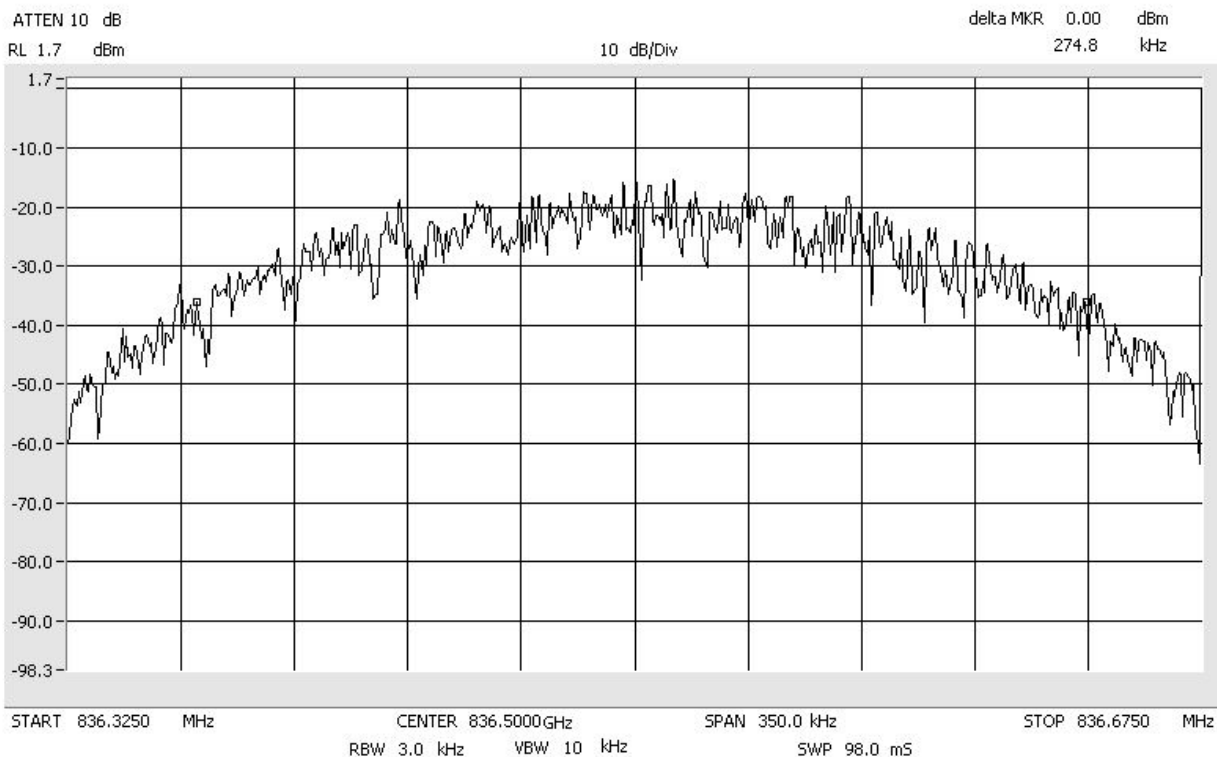
Occupied Bandwidth TDMA\_Signal\_In  
Span: 50 kHz RBW: 1 kHz VBW: 3 kHz



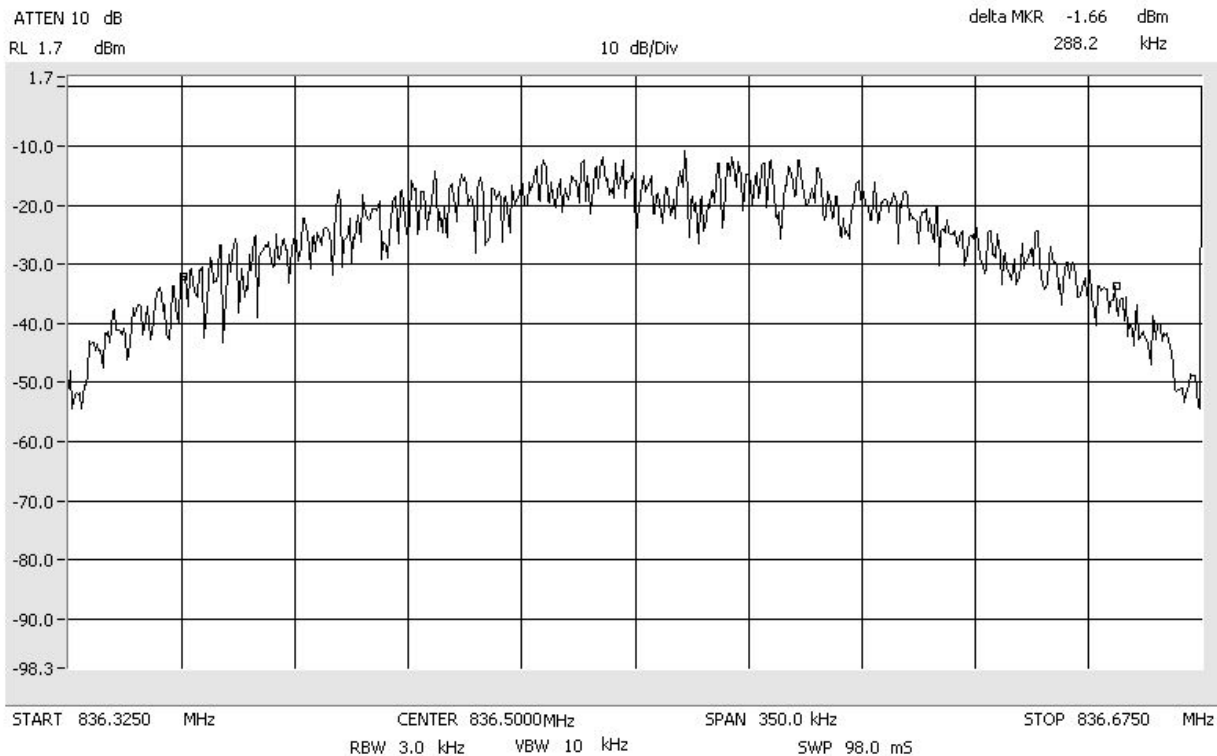
Occupied Bandwidth TDMA\_Signal\_Out  
Span: 50 kHz RBW: 1 kHz VBW: 3 kHz



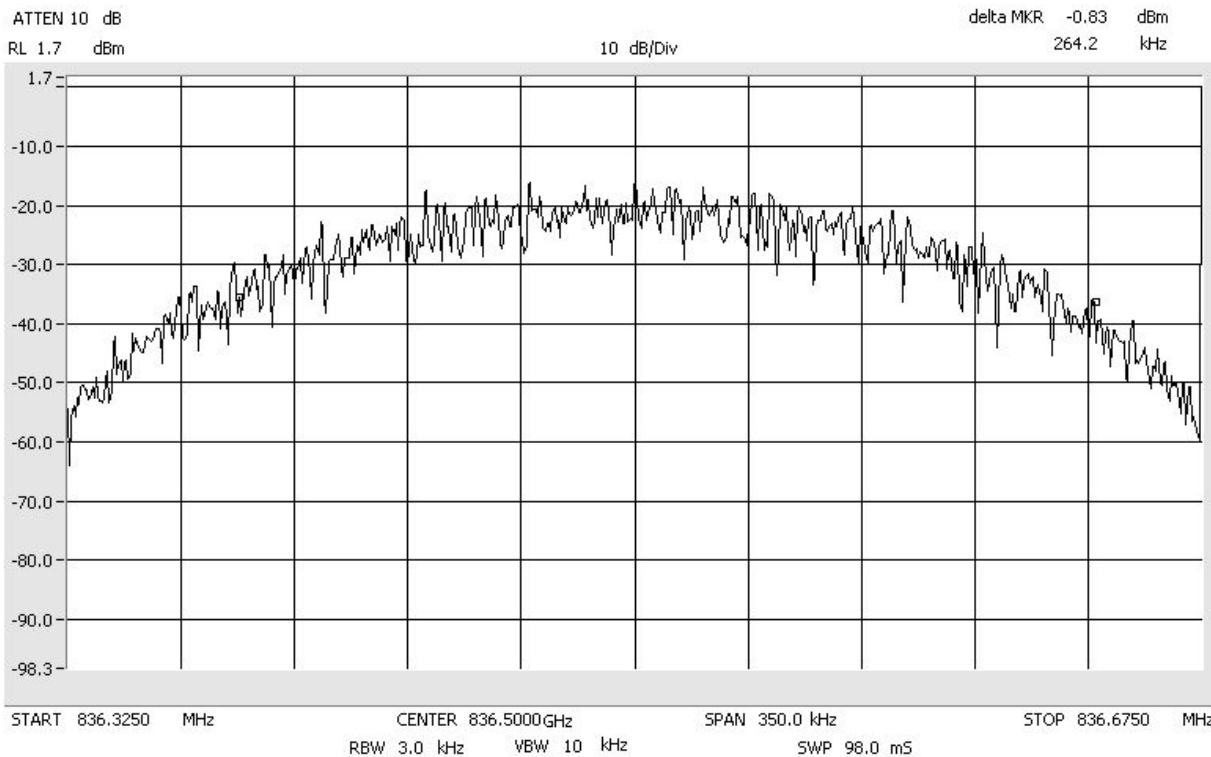
Occupied Bandwidth GSM\_Signal\_In  
Span: 350 kHz RBW: 3 kHz VBW: 10 kHz



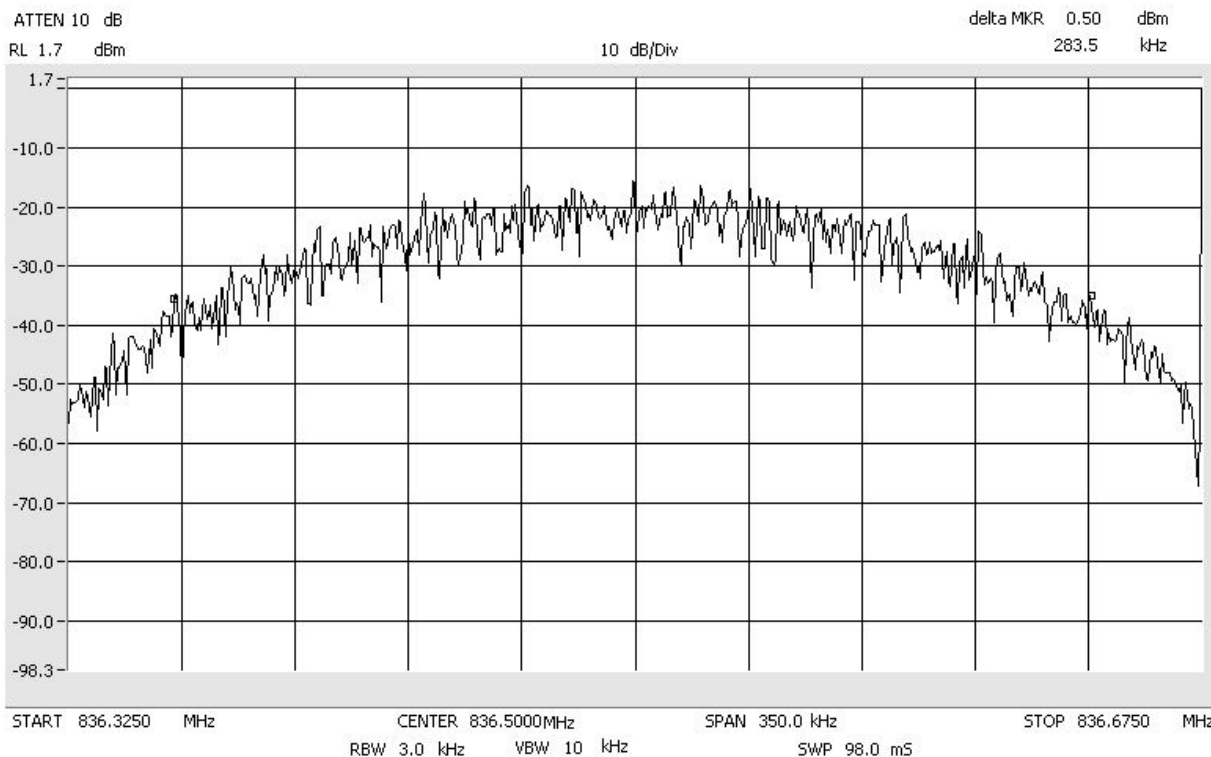
Occupied Bandwidth GSM\_Signal\_Out  
Span: 350 kHz RBW: 3 kHz VBW: 10 kHz



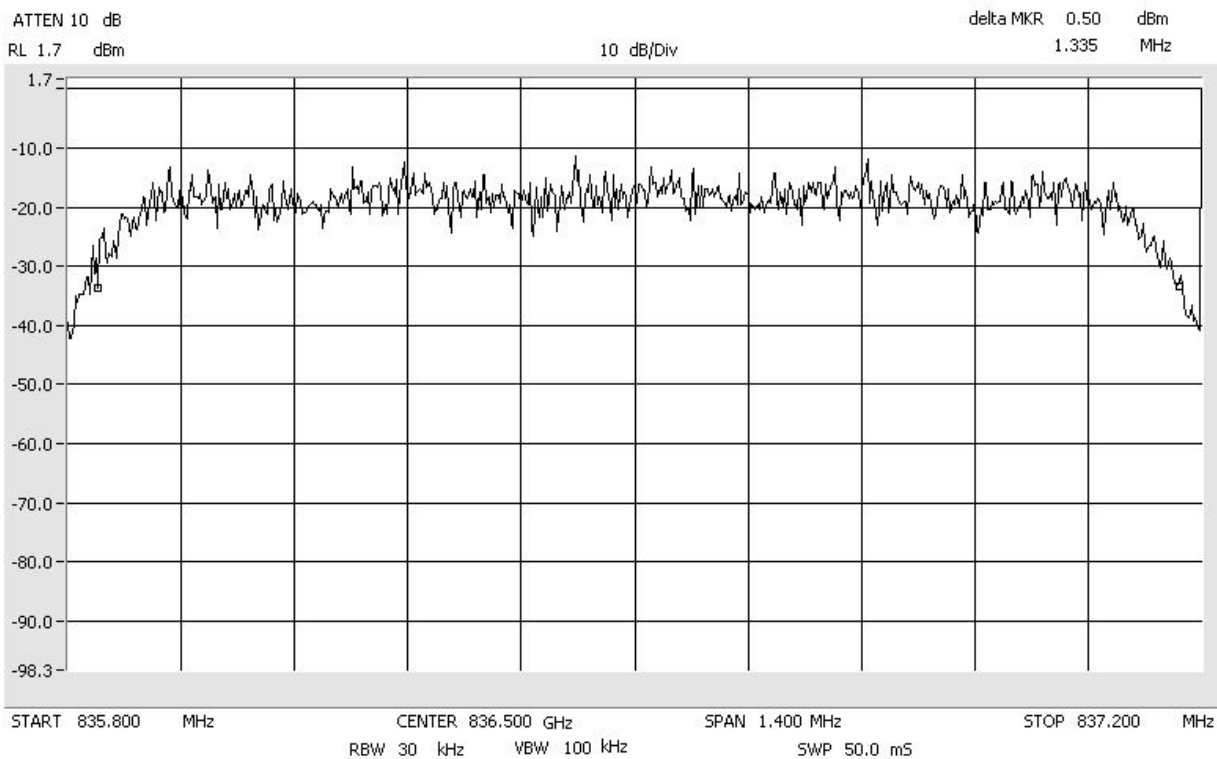
Occupied Bandwidth      EDGE\_Signal\_In  
Span: 350 kHz      RBW: 3 kHz    VBW: 10 kHz



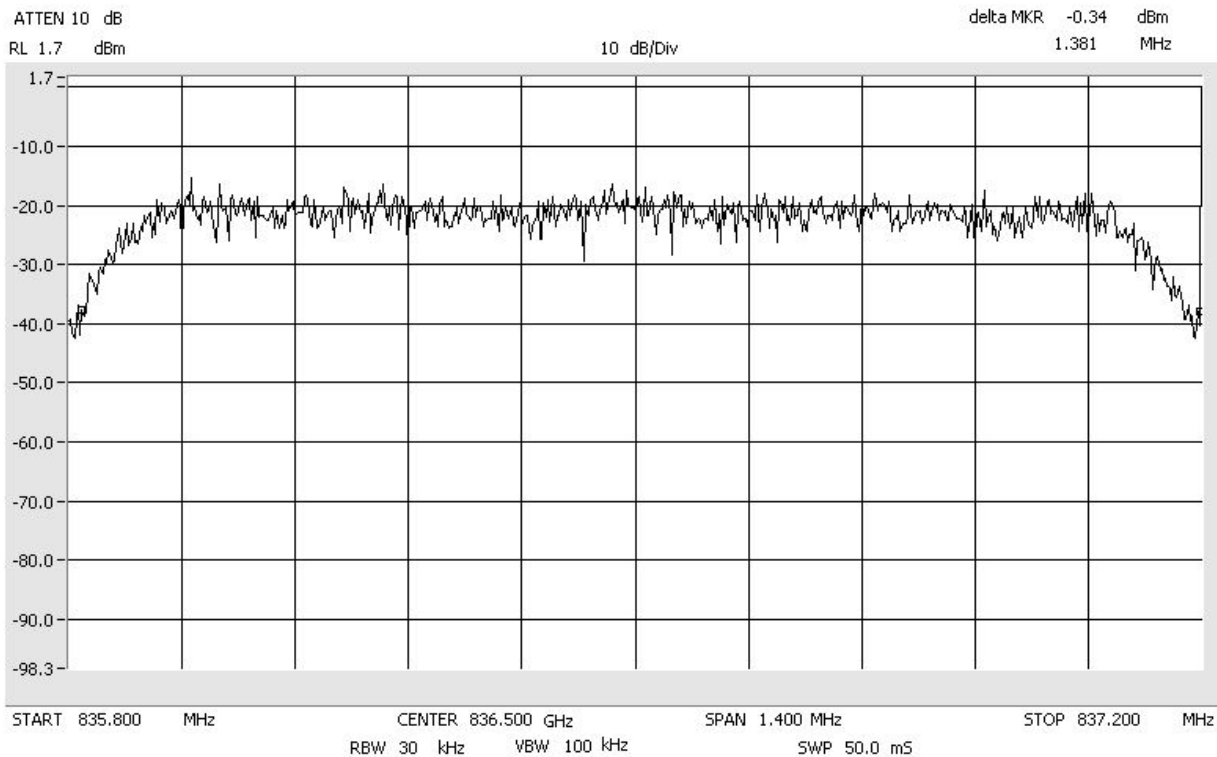
Occupied Bandwidth      EDGE\_Signal\_Out  
Span: 350 kHz      RBW: 3 kHz    VBW: 10 kHz



Occupied Bandwidth CDMA\_Signal\_In  
Span: 1.4 MHz RBW: 30 kHz VBW: 100 kHz

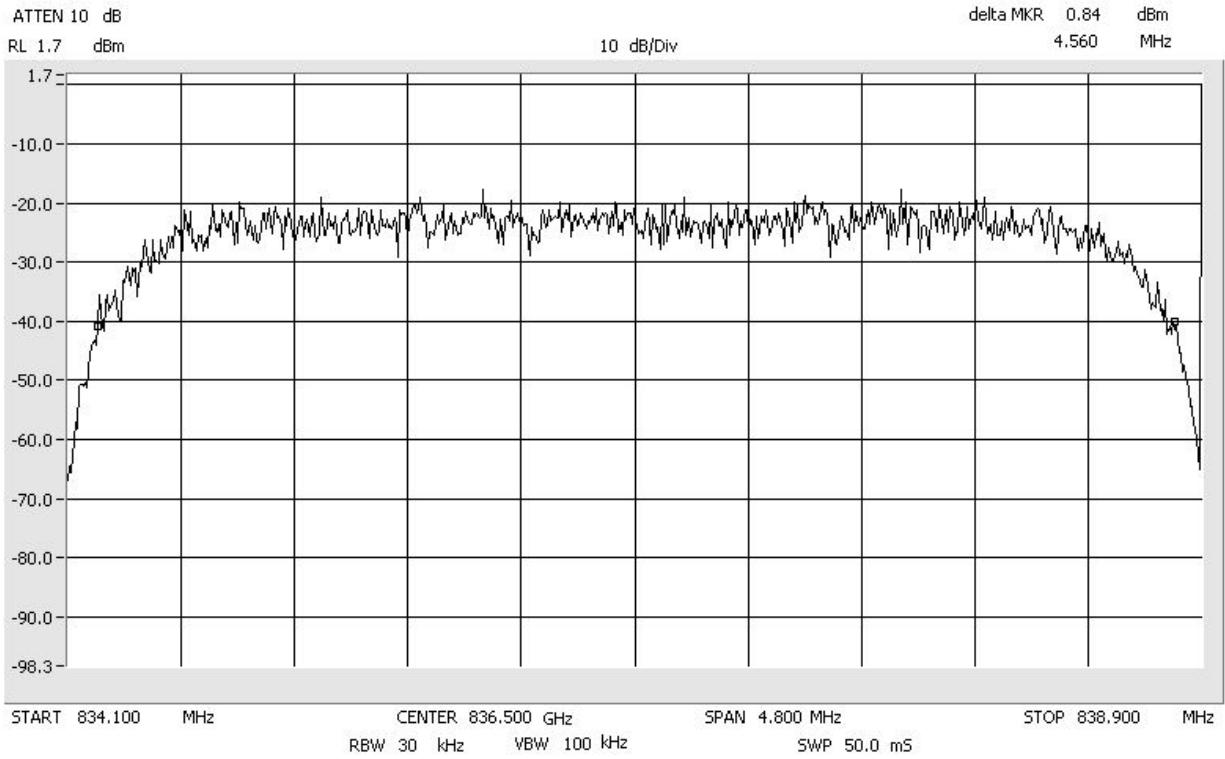


Occupied Bandwidth CDMA\_Signal\_Out  
Span: 1.4 MHz RBW: 30 kHz VBW: 100 kHz



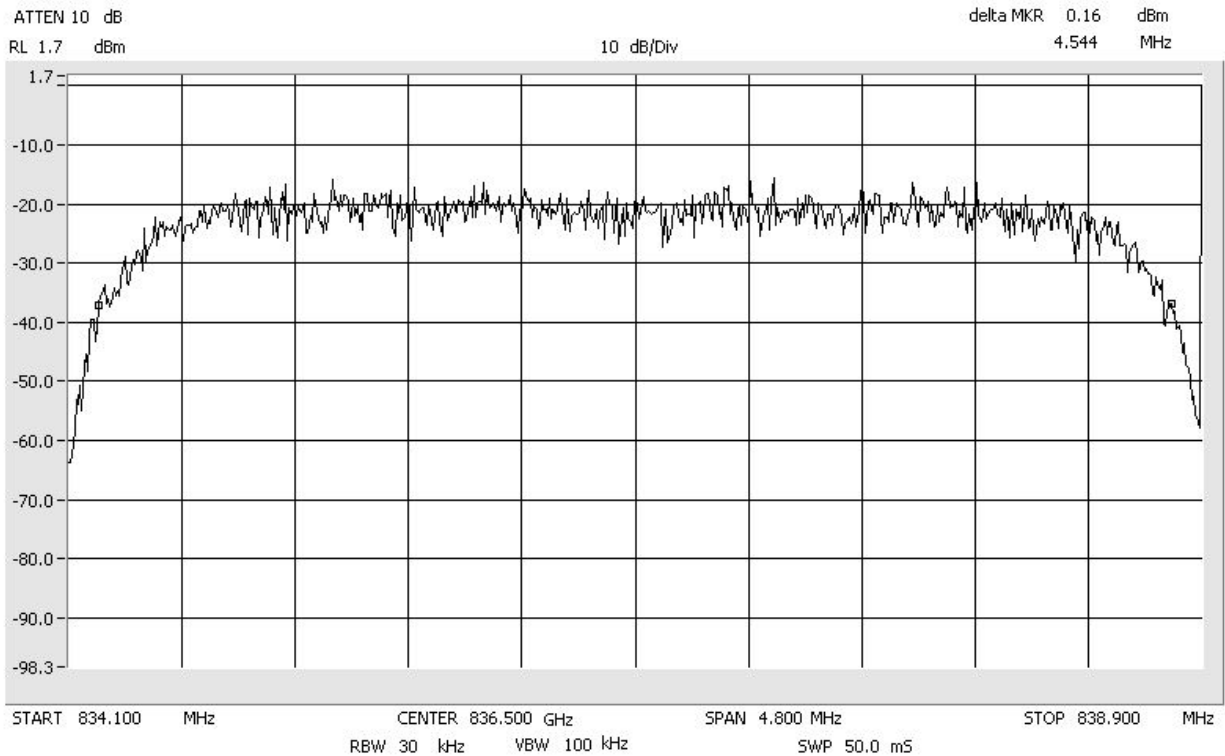
Occupied Bandwidth  
Span: 4.8 MHz

WCDMA\_Signal\_In  
RBW: 30 kHz VBW: 100 kHz



Occupied Bandwidth  
Span: 4.8 MHz

WCDMA\_Signal\_Out  
RBW: 30 kHz VBW: 100 kHz





8.0

## APPENDIX B

Measurement Protocol

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[Back to Emission Limits: Section 5.1.3](#)

# Measurement Protocol

## Environmental conditions of the lab, (ADC)

Temperature: 21 - 26° C  
Relative Humidity: 21 - 24 %  
Atmospheric Pressure: 97.8 - 100.0 kPa

## Test Methodology:

Emission testing is performed according to the procedures in ANSI C63.4-2003.

## Measurement Uncertainty

The test system for conducted emissions is defined as the signal generator(s), the power meter, the spectrum analyzer and the coaxial cable. The equipment comprising the test systems is calibrated prior to testing the EUT.

## Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left un-terminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

## Radiated Emissions

The final level, in dBuV/m, equals the reading from the spectrum analyzer (Level dBuV), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data sheets in Appendix B.

Example:

FREQ (MHz)	LEVEL (dBuV)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL/HGT/AZ (m) (deg)	DELTA1
60.80	42.5Qp +	1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0	-10.9

## Substitution Method

A cabinet (or enclosure) radiated emission scan was also made, at Intertek, with the EUT's antenna replaced with a termination to demonstrate case radiation compliance to the -13 dBm requirement. Radiated emissions from the EUT are measured in the frequency range of 30 to 20,000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. The field strength levels were measured per ANSI C63.4. The EUT is then replaced with a tuned dipole antenna (below 1GHz) or horn antenna (above 1 GHz). The substitute antenna was placed in the same polarization as the test antenna. A signal generator was used to generate a signal level that matched the highest level measured from the EUT. The signal generator level minus the cable loss from the signal generator to the substitute antenna plus the substitute antenna gain equals the spurious power level.

## Test Equipment

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.

## Radiated Emissions Test Data

[Table of Contents; Section 1.0](#)

Document Name: 3158189MIN-002\_Radiated\_Emissions\_Test\_Report\_Part\_22

**Test Engineer:** Simon Khazon

**Date:** 13 August, 2008

**Test Procedure:**

Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

**Test Site Location:**

The test site is a 3 meter Semi-Anechoic Chamber, constructed by Panashield™ Inc. and located inside the building at 7250 Hudson Blvd. Suite 100, Oakdale, MN 55128.

**Test Site Description:**

The 3 meter Semi-Anechoic Chamber is constructed of Panabolt™ modular RF shielding and self-supported with structural steel designed for the local seismic zone rating. The chamber has the nominal size of 20' wide x 29' long x 18' high. All walls and ceiling of the chamber are treated with FFG-1000 Ferrite Grid absorber which was developed specifically to meet international requirements for EMC anechoic chambers for emissions and immunity measurements. To meet high frequency testing white HY-35 hybrid absorber is mounted on the ferrites in specular regions of the chamber.

The chamber has a 2 meter diameter ANSI test volume area and meets the requirements of ANSI C63.4 (1992), EN55022, and FCC Part 15 standards for testing at a 3 meter path length.

FCC Registration Number: 90706

IC Registration Number: 4359