

REPORT OF MEASUREMENTS  
FOR  
CELLULAR SPECIALTIES, INC.  
DIGITAL REPEATER  
MODEL: CSI-DSP-SMR-800  
**FCC ID: NVRCSI-DSP85-1W-S**

## CERTIFICATION APPLICATION

*Applicant/Manufacturer:* **Cellular Specialties  
670 North Commercial Street  
Manchester, NH 03101**

*Equipment under Test (EUT):* **The EUT is a Digital Repeater used to amplify signals in the SMR band.**

*Model:* **CSI-DSP-SMR-800**

*FCC ID Number:* **FCC ID: NVRC SI-DSP85-1W-S**

*Applicable Test Standard:* **FCC Parts 2 & 90**

*Device Classification:* **Mobile**

*EUT Frequency Range Band 1:* **Uplink: 806MHz TO 824MHz  
Downlink: 851MHz TO 869MHz**

*EUT Gain:* **Uplink: 84.6dB  
Downlink: 87.4dB**

*Power Output Rating Based on max input single channel (For Certification Grant):* **Uplink: +28.6dBm = .724W  
Downlink: +29.4dBm = .871W**

*Modulation Type:* **TDMA**

*RF Exposure + Antenna Installation:* **See Attached Installation/Users Manual and MPE Evaluation**

*Power Ratings Per Channel:* **See Power Per Channel Test Data**

*Measurements Required by FCC:* **See Report Section 1 (Summary of Test Program) and the following Test Report Data Attachments:**

- RF Power Output**
- Intermodulation Characteristics (Two-Tone)**
- Occupied Bandwidth**
- Spurious Emissions at Antenna Terminals**
- Effective Radiated Power of Spurious Radiation**
- Frequency Stability**

## SECTION 1 SUMMARY OF TEST PROGRAM

### INTERMODULATION CHARACTERISTICS (TWO TONE)

#### Measurement Procedure:

Two signals were injected, in turn, to each uplink and downlink frequency band via a two way power combiner. Testing was performed at both the low band edge and high band edge of each pass band. The output of each signal generator was adjusted so that the two output fundamental frequencies were equal in magnitude. Testing was performed for TDMA Modulation type. At the maximum specified input power levels all intermodulation products were at -13dBm or below for each modulation. See attached test data.

### OCCUPIED BANDWIDTH

#### Measurement Procedure:

For Occupied Bandwidth, measurements were made to compare the input signal to the output signal. The signal generator output was connected to the spectrum analyzer. A TDMA modulation signal was then applied to the carrier. Waveforms were then noted on an X-Y plot. Next, the signal generator was connected to the EUT and the output of the EUT was connected to the spectrum analyzer. The output waveform after amplification was then compared to the original input signal to ensure that no significant differences occurred between the input signal and the amplified signal. Testing was performed at one frequency within each passband (uplink and downlink). See Occupied Bandwidth Data. An explanation of the data is as follows: There are two signals superimposed on each plot, one signal is the waveform before modulation, the other is the modulated carrier. In each case the center of the grid shows a narrowband signal projecting out from the center of the modulation envelope. This signal is actually the stored unmodulated signal.

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

### Measurement Procedure:

The signal generator output was connected in turn to the uplink and downlink input ports of the EUT. The input power level was at the maximum level which was ascertained during the Power Output test. A spectrum analyzer was connected to the output of the EUT. The input test frequencies used were three frequencies within each passband (uplink and downlink). The level of any spurious emission was recorded. Testing was performed in the frequency range of 30MHz to 9GHz. Testing was performed for TDMA modulation types. The spurious emissions limit is -13dBm as specified in FCC Part 90. All emissions were below the specified -13dBm limit. See attached test data.

## EFFECTIVE RADIATED POWER OF SPURIOUS RADIATION

### Measurement Procedure:

The test sample was placed on a 80cm high wooden test stand which was located 3 meters from the test antenna on an FCC listed test site. A signal generator was connected to the input of the amplifier. The signal generator output was set to provide the input power level necessary to achieve maximum output power of the amplifier at 3 frequencies within each passband (uplink and downlink). The effective radiated power of each out of band spurious emission was measured using the substitution method specified in TIA/EIA-603. The frequency range of the test was 30MHz – 9GHz. The limit for out of band spurious emissions is -13dBm as specified in Part 90. All emissions were below the specified -13dBm limit. See attached test data.

## RF POWER OUTPUT

A signal generator was connected in turn to the uplink and downlink input ports of the test sample. The signal generator was set to maximum input rating and the amplifier was operating at maximum gain. The maximum single channel output power for both the uplink and downlink was measured with a spectrum analyzer connected to the output port. The measured output power was 0.724W for the uplink and 0.871W for the downlink which matched the manufacturer's rated output power. See attached test data.

## FREQUENCY STABILITY MEASUREMENTS

The test sample was placed into a temperature chamber with AC input power supplied through a variable power source. A signal generator was used to provide the input signal and the output was measured with a frequency counter. With the test sample operating at maximum output power the test sample's output frequency was measured and recorded at the extremes of the temperature range and at 10 degree increments from -30 degrees C to +50 degrees C while the AC input voltage was varied from 85 to 115% of nominal. The output frequency for both the uplink and the downlink stayed within the assigned frequency band. See attached test data.

# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics			
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater	
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602	
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:	11/14/2006
Operating Mode:	Amplifying input signal			
Notes:	Amps Band - TDMA - Downlink			

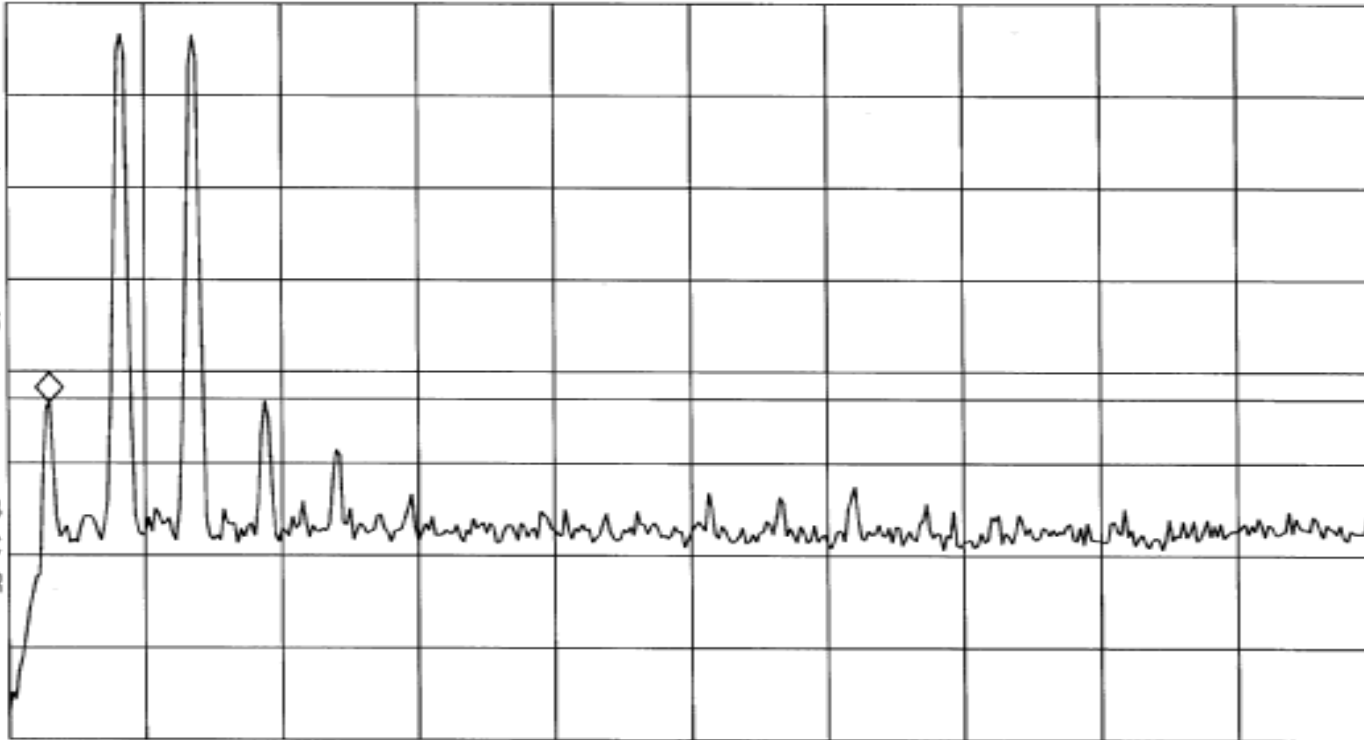
16:07:20 NOV 14, 2006

MKR 850.57 MHz  
-13.39 dBm

REF 30.0 dBm

AT 10 dB

PEAK  
LOG  
10  
dB/  
OFFST  
30.0  
dB  
DL  
-13.0  
dBm



START 850.00 MHz  
#RES BW 30 kHz

#VBW 100 kHz

STOP 869.00 MHz  
SWP 63.3 msec

# RETLIF TESTING LABORATORIES

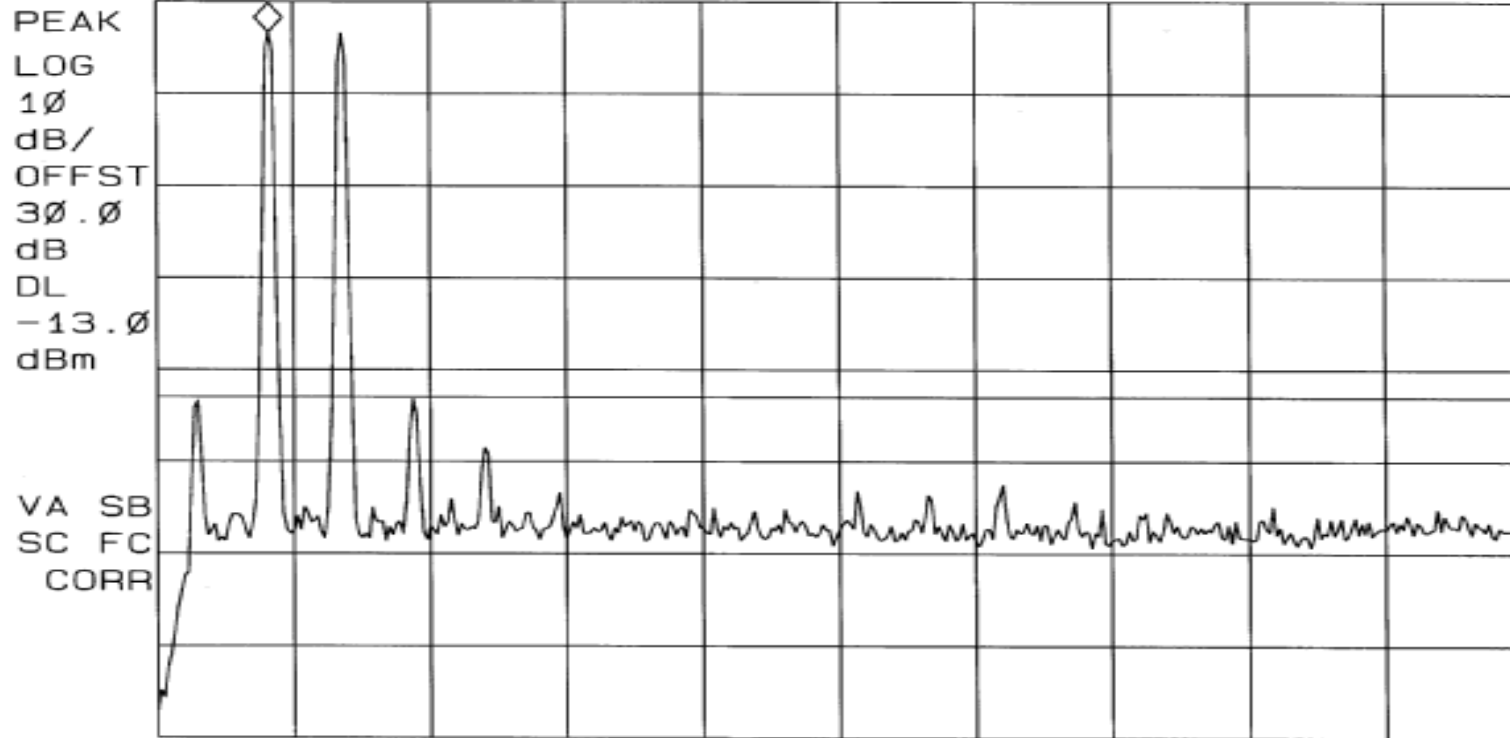
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date: 11/14/2006
Operating Mode:	Amplifying input signal		
Notes:	Amps Band - TDMA - Downlink		

16:07:31 NOV 14, 2006

MKR 851.57 MHz  
26.65 dBm

REF 30.0 dBm AT 10 dB



START 850.00 MHz  
#RES BW 30 KHz

#VBW 100 KHz

STOP 869.00 MHz  
SWP 63.3 msec

# RETLIF TESTING LABORATORIES

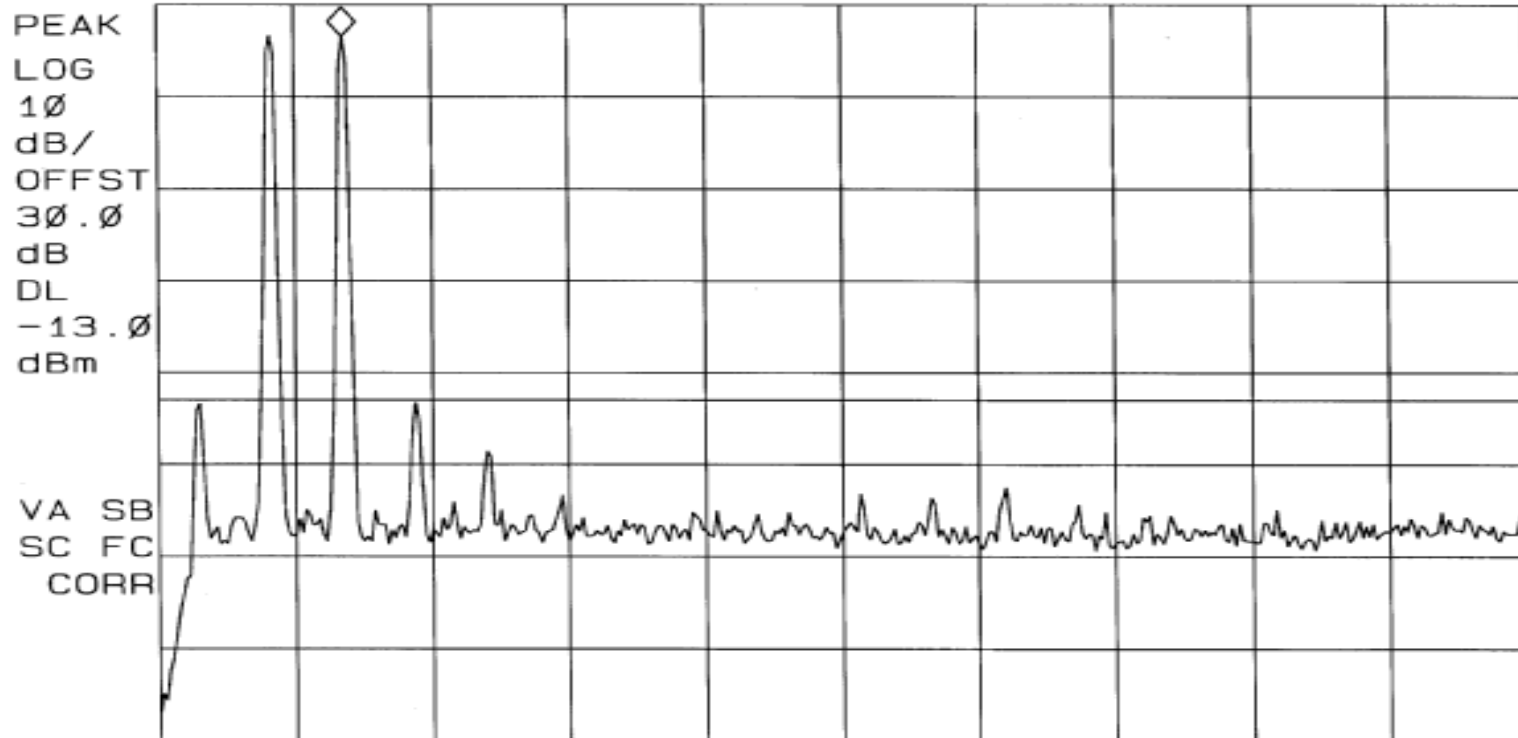
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date: 11/14/2006
Operating Mode:	Amplifying input signal		
Notes:	Amps Band - TDMA - Downlink		

16:07:50 NOV 14, 2006

MKR 852.57 MHz  
26.55 dBm

REF 30.0 dBm AT 10 dB



START 850.00 MHz

#RES BW 30 kHz

#VBW 100 kHz

STOP 869.00 MHz

SWP 63.3 msec



# RETLIF TESTING LABORATORIES

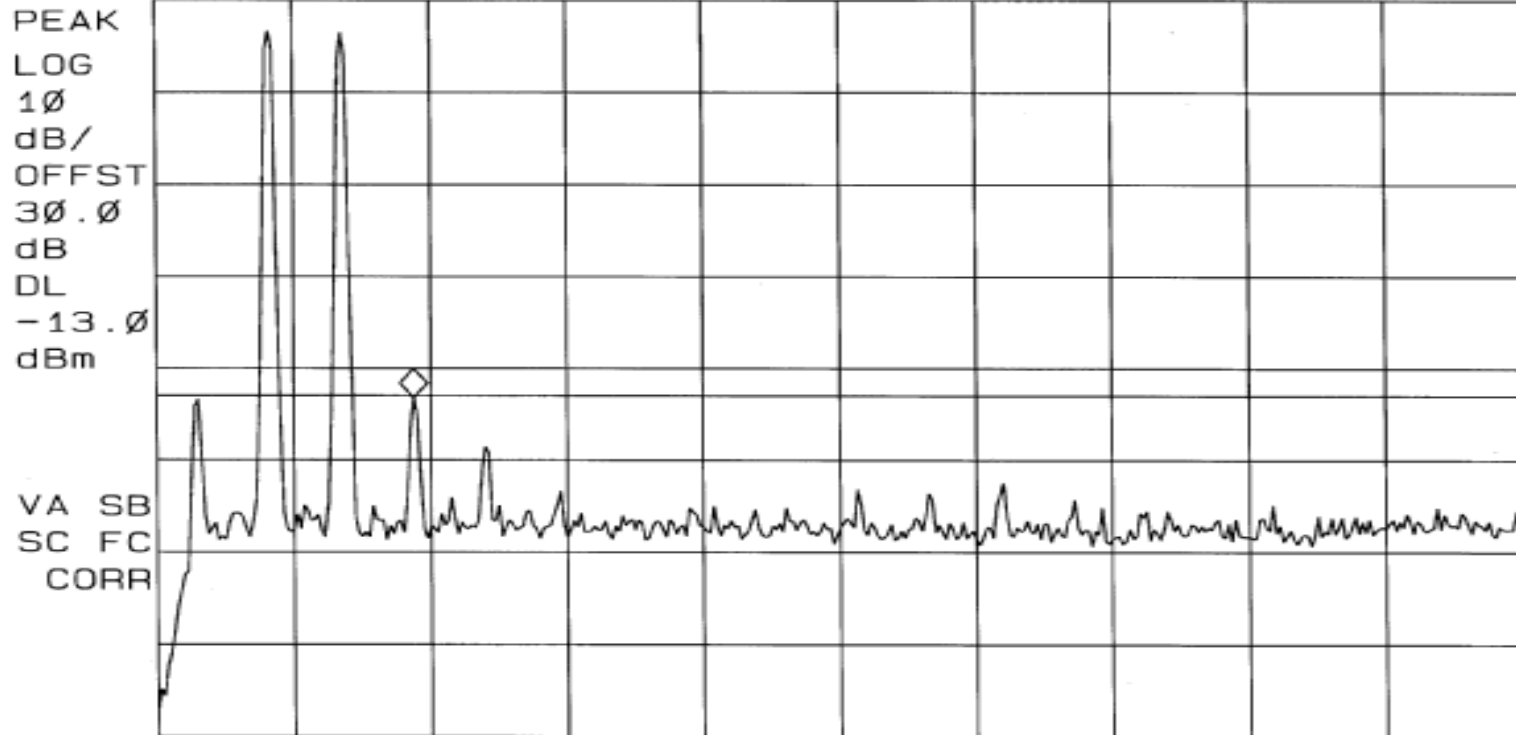
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics			
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater	
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602	
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:	9/12/2006
Operating Mode:	Amplifying input signal			
Notes:	Amps Band - TDMA - Downlink			

16:08:02 NOV 14, 2006

MKR 853.56 MHz  
-13.23 dBm

REF 30.0 dBm AT 10 dB



START 850.00 MHz  
#RES BW 30 KHz

#VBW 100 KHz

STOP 869.00 MHz  
SWP 63.3 msec

# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:
Operating Mode:	Amplifying input signal		
Notes:	Amps Band - TDMA - Downlink		
Job No:	R-4733N-1		Technician:
			M.Seamans

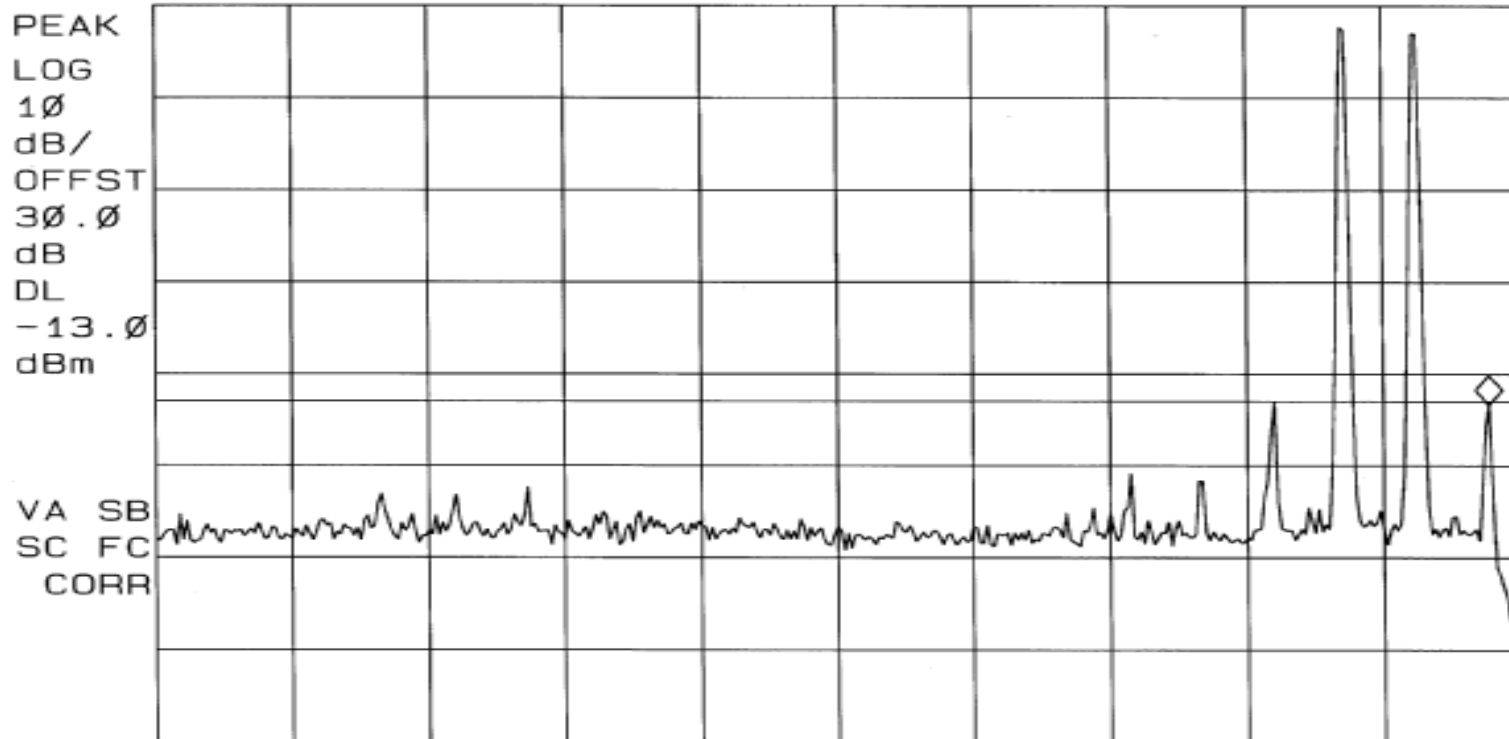
16: 51: 57 NOV 14, 2006

MKR 869.57 MHz

REF 30.0 dBm

AT 10 dB

-13.36 dBm



START 851.00 MHz

#RES BW 30 kHz

#VBW 100 kHz

STOP 870.00 MHz

SWP 63.3 msec

# RETLIF TESTING LABORATORIES

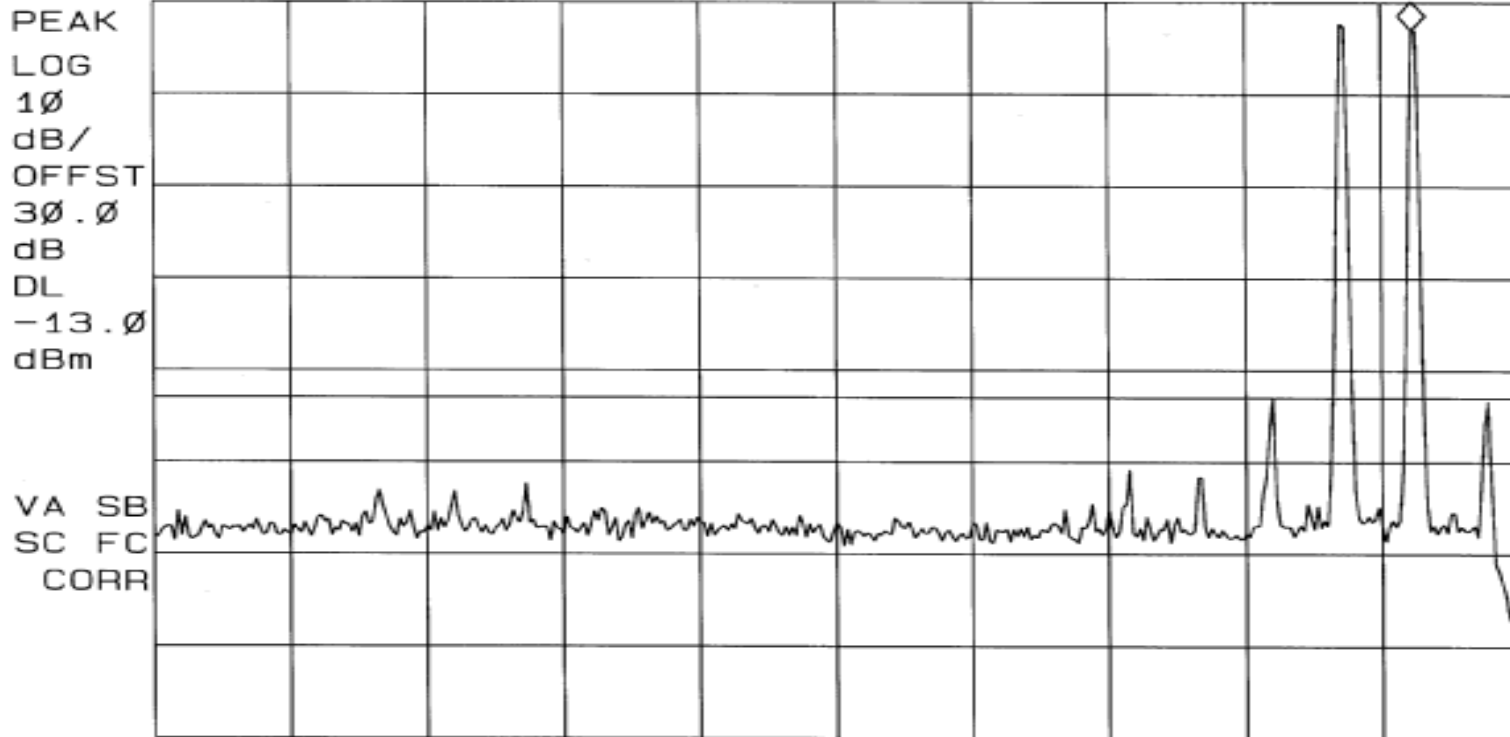
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph:	2.1047
Operating Mode:	Amplifying input signal		
Notes:	Amps Band - TDMA - Downlink		
	Job No:	R-4733N-1	
	Technician:	M.Seamans	
	Date:	11/14/2006	

16: 52: 04 NOV 14, 2006

MKR 868.53 MHz  
26.98 dBm

REF 30.0 dBm AT 10 dB



START 851.00 MHz  
#RES BW 30 KHz

#VBW 100 KHz

STOP 870.00 MHz  
SWP 63.3 msec

# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics			
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater	
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602	
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:	11/14/2006
Operating Mode:	Amplifying input signal			
Notes:	Amps Band - TDMA - Downlink			

16:52:38 NOV 14, 2006

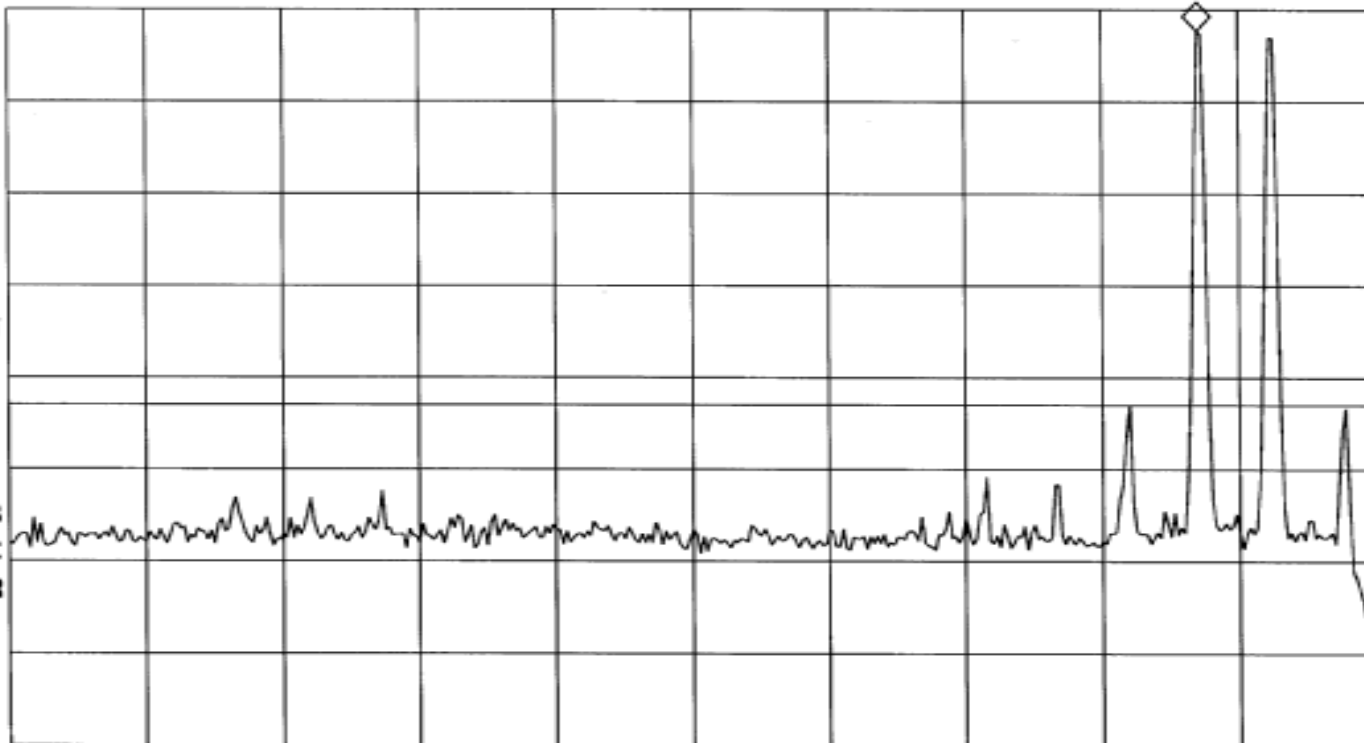
MKR 867.53 MHz

REF 30.0 dBm

AT 10 dB

27.70 dBm

PEAK  
LOG  
10  
dB/  
OFFST  
30.0  
dB  
DL  
-13.0  
dBm



START 851.00 MHz

#RES BW 30 kHz

#VBW 100 kHz

STOP 870.00 MHz

SWP 63.3 msec

# RETLIF TESTING LABORATORIES

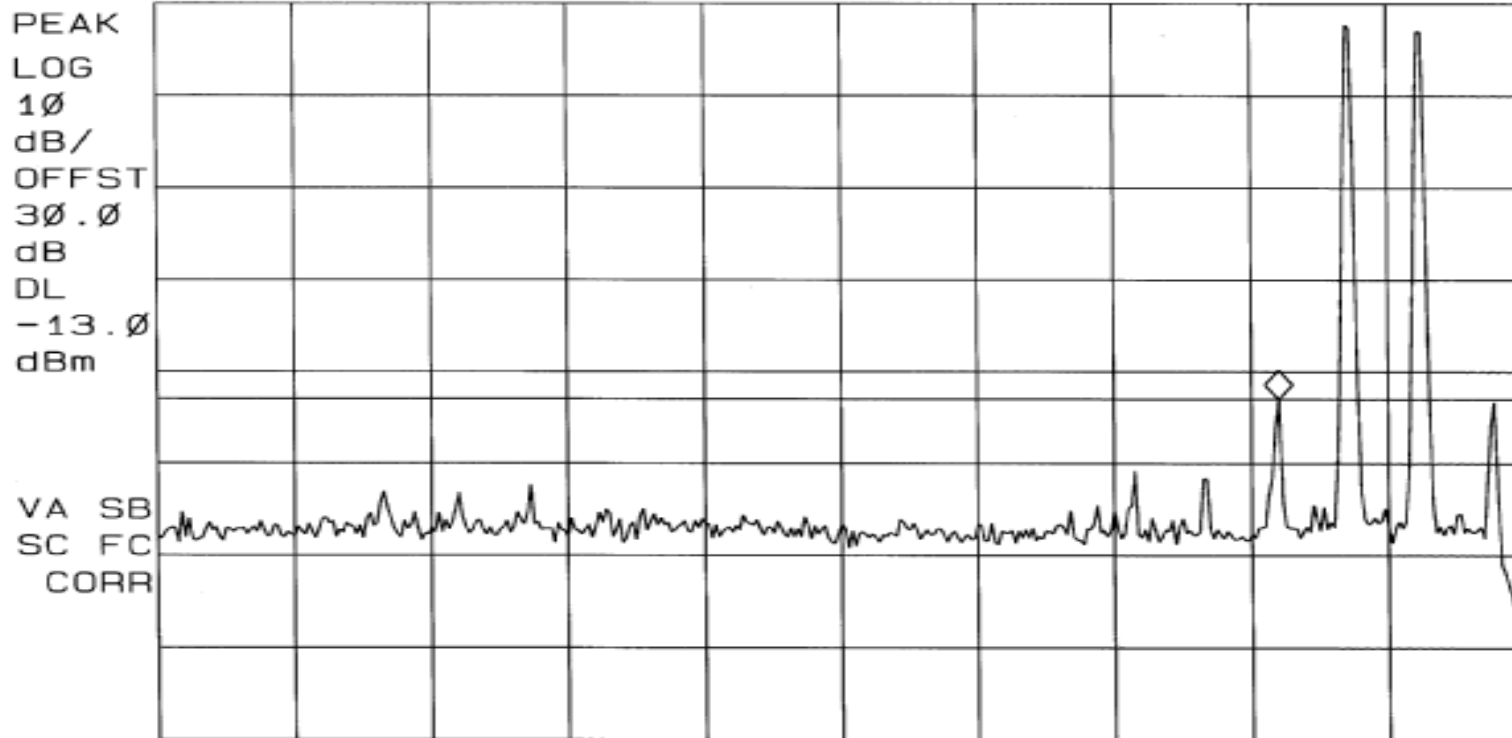
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:
Operating Mode:	Amplifying input signal		
Notes:	Amps Band - TDMA - Downlink		
Job No:	R-4733N-1		Technician:
		M.Seamans	

16: 53: 56 NOV 14, 2006

MKR 866.58 MHz  
-13.01 dBm

REF 30.0 dBm      AT 10 dB



START 851.00 MHz

#RES BW 30 kHz

#VBW 100 kHz

STOP 870.00 MHz

SWP 63.3 msec

# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics			
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater	
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602	
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:	11/14/2006
Operating Mode:	Amplifying input signal			
Notes:	Amps Band - TDMA - Uplink			

15: 38: 45 NOV 14, 2006

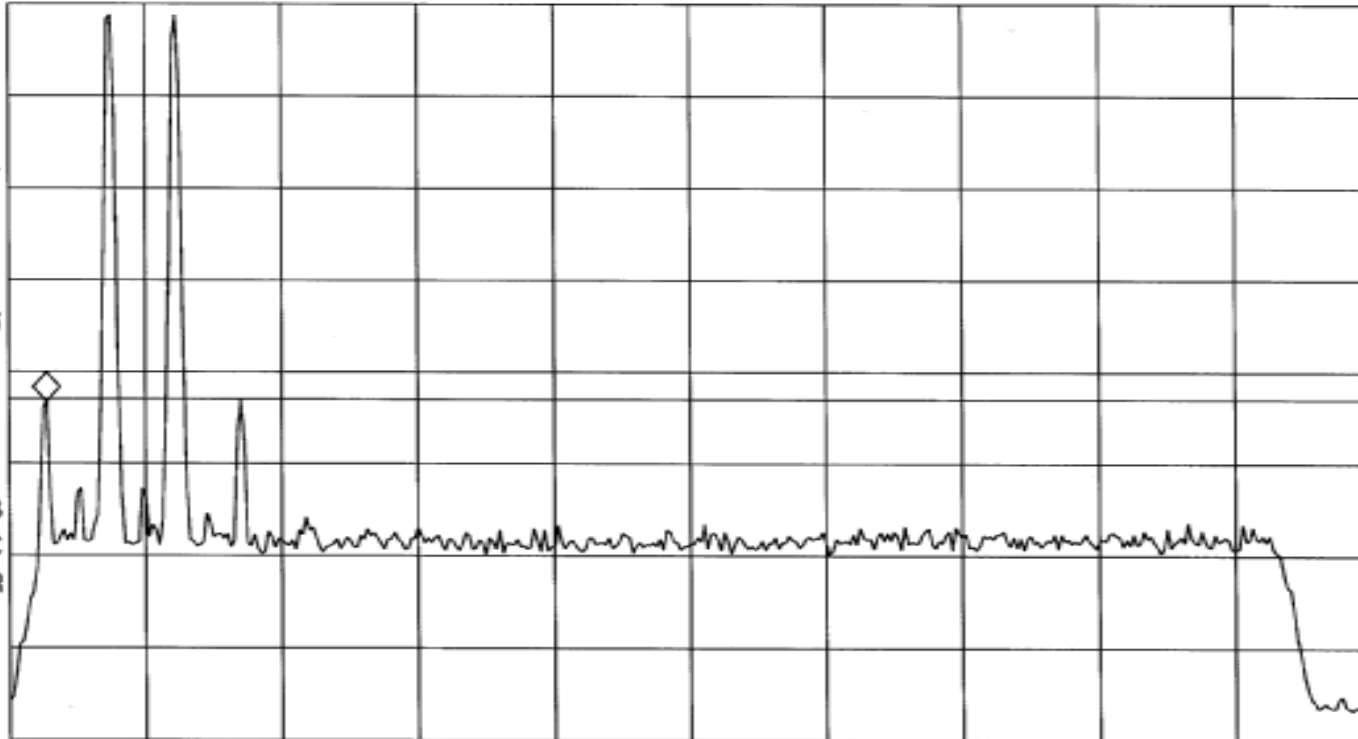
MKR 805.58 MHz  
-13.30 dBm

REF 30.0 dBm

AT 10 dB

PEAK  
LOG  
10  
dB/  
OFFST  
30.0  
dB  
DL  
-13.0  
dBm

VA SB  
SC FC  
CORR



START 805.00 MHz

#RES BW 30 KHz

#VBW 100 KHz

STOP 826.00 MHz

SWP 70.0 msec

# RETLIF TESTING LABORATORIES

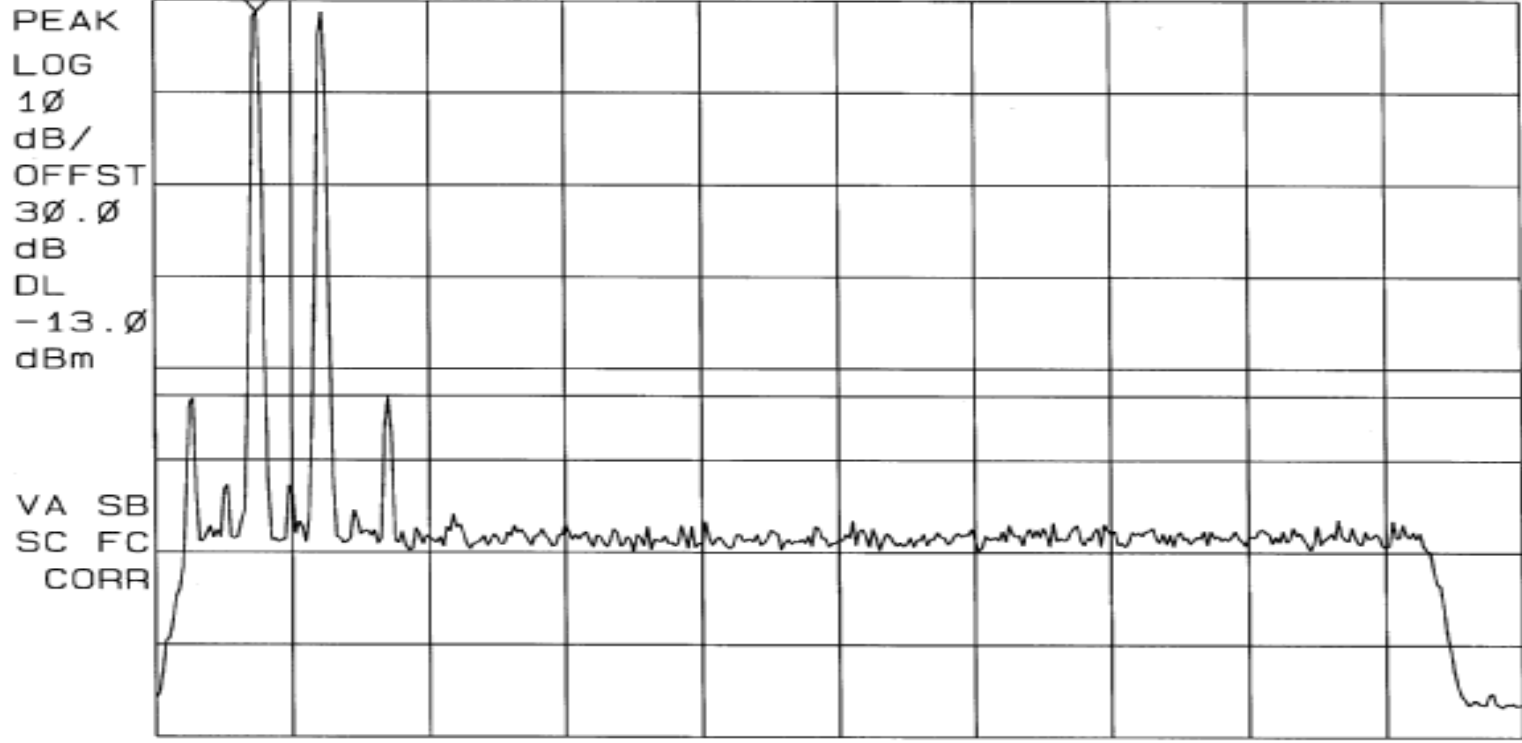
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph:	2.1047
Operating Mode:	Amplifying input signal		
Notes:	Amps Band - TDMA - Uplink		
Job No:	R-4733N-1		Technician:
			M.Seamans
Date:	11/14/2006		

15: 38: 58 NOV 14, 2006

MKR 806.58 MHz  
28.77 dBm

REF 30.0 dBm AT 10 dB



START 805.00 MHz  
#RES BW 30 kHz

#VBW 100 kHz

STOP 826.00 MHz  
SWP 70.0 msec

# RETLIF TESTING LABORATORIES

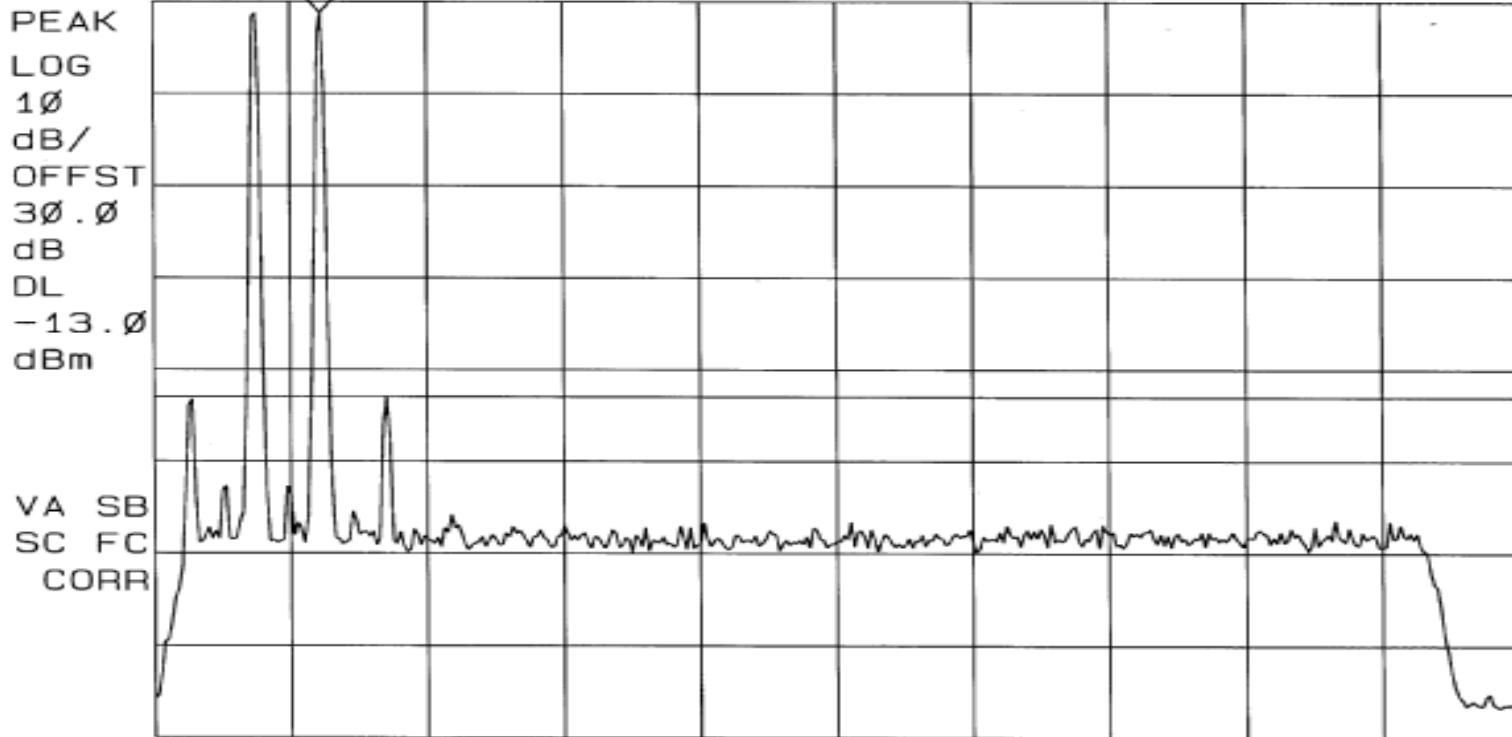
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics			
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater	
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602	
Test Specification:	FCC Part 2	Paragraph:	2.1047	
Operating Mode:	Amplifying input signal			
Notes:	Amps Band - TDMA - Uplink			
Job No:	R-4733N-1		Technician:	M.Seamans
Date:	11/14/2006			

15: 43: 02 NOV 14, 2006

MKR 807.57 MHz  
28.77 dBm

REF 30.0 dBm AT 10 dB



START 805.00 MHz  
#RES BW 30 kHz

#VBW 100 kHz

STOP 826.00 MHz  
SWP 70.0 msec



# RETLIF TESTING LABORATORIES

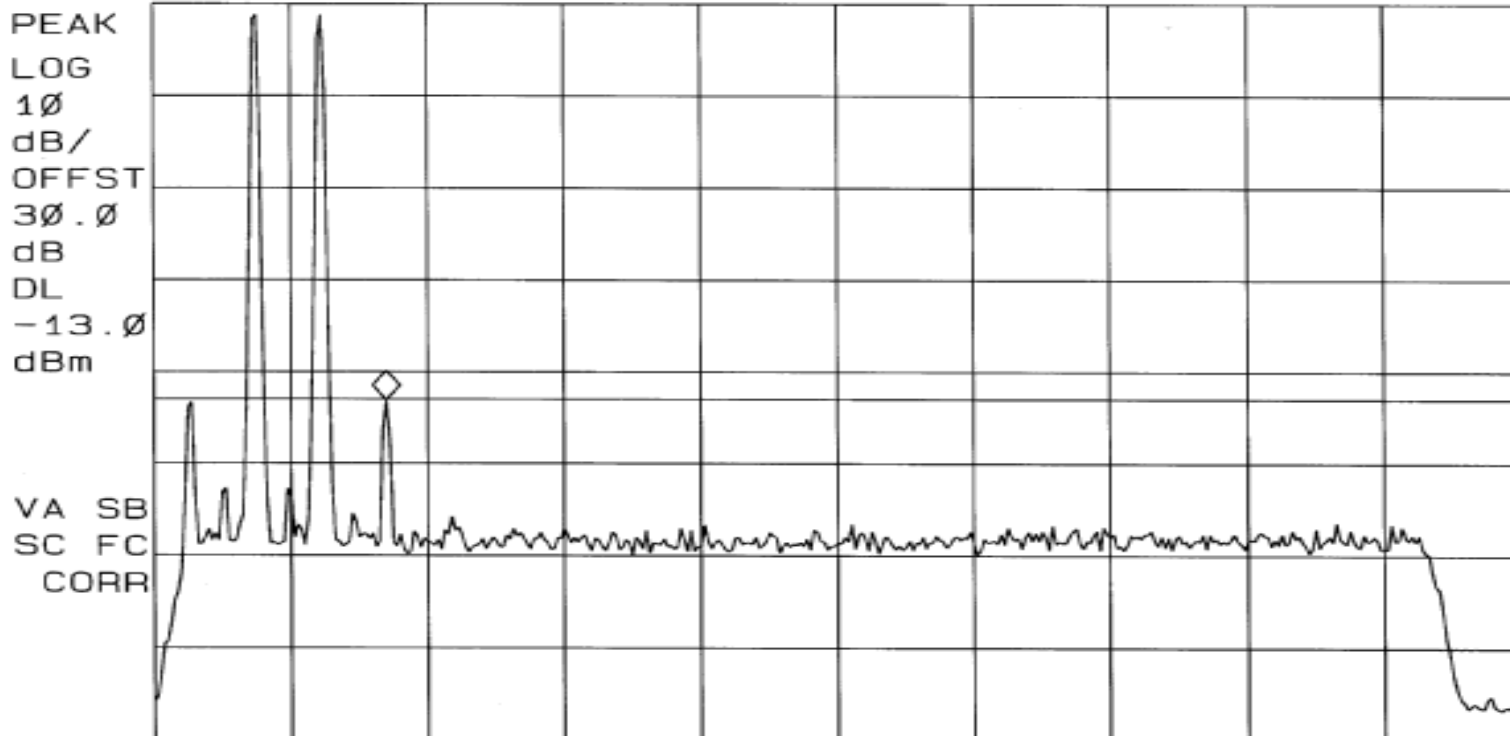
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics			
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater	
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602	
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:	11/14/2006
Operating Mode:	Amplifying input signal			
Notes:	Amps Band - TDMA - Uplink			

15: 43: 09 NOV 14, 2006

MKR 808.57 MHz  
-13.09 dBm

REF 30.0 dBm AT 10 dB



START 805.00 MHz  
#RES BW 30 kHz

#VBW 100 kHz

STOP 826.00 MHz  
SWP 70.0 msec

# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:
Operating Mode:	Amplifying input signal		
Notes:	Amps Band - TDMA - Uplink		
Job No:	R-4733N-1		Technician:
			M.Seamans

16: 51: 57 NOV 14, 2006

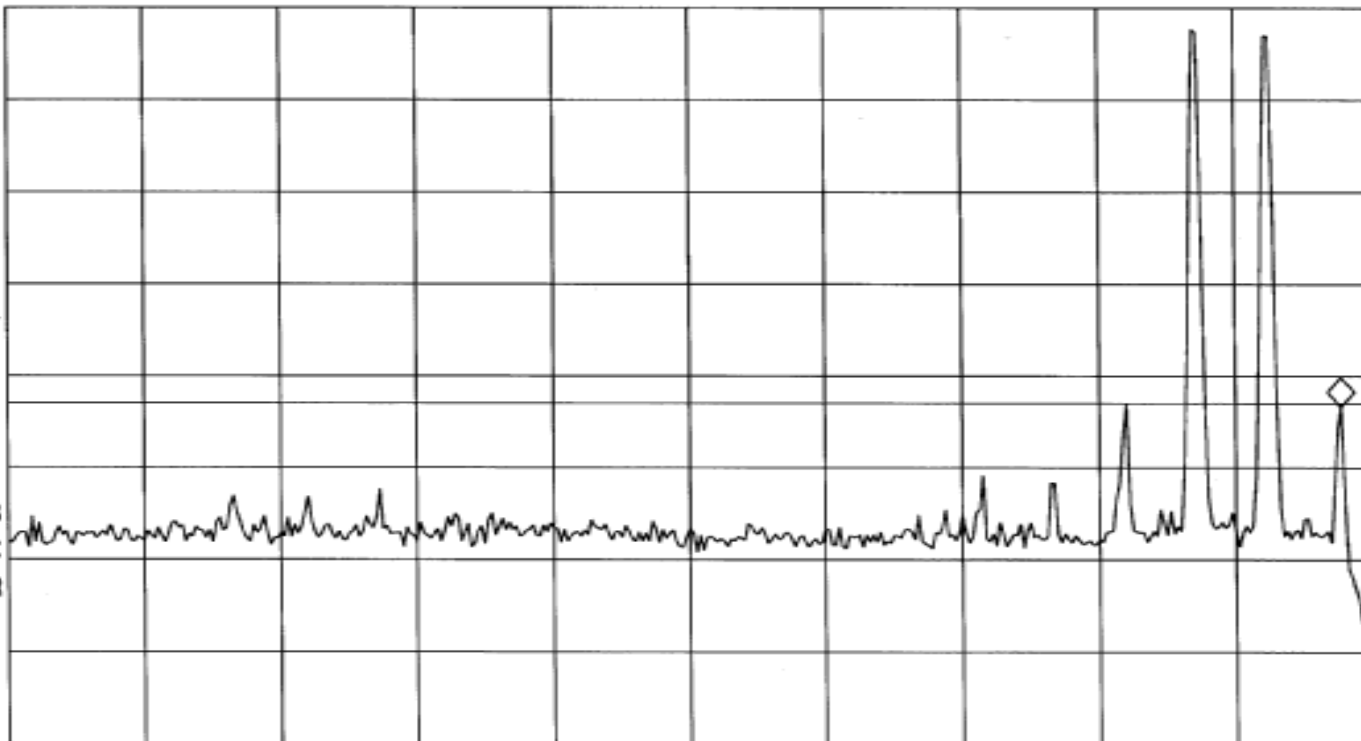
MKR 869.57 MHz

REF 30.0 dBm

AT 10 dB

-13.36 dBm

PEAK  
LOG  
10  
dB/  
OFFST  
30.0  
dB  
DL  
-13.0  
dBm



START 851.00 MHz

#RES BW 30 KHz

#VBW 100 KHz

STOP 870.00 MHz

SWP 63.3 msec

# RETLIF TESTING LABORATORIES

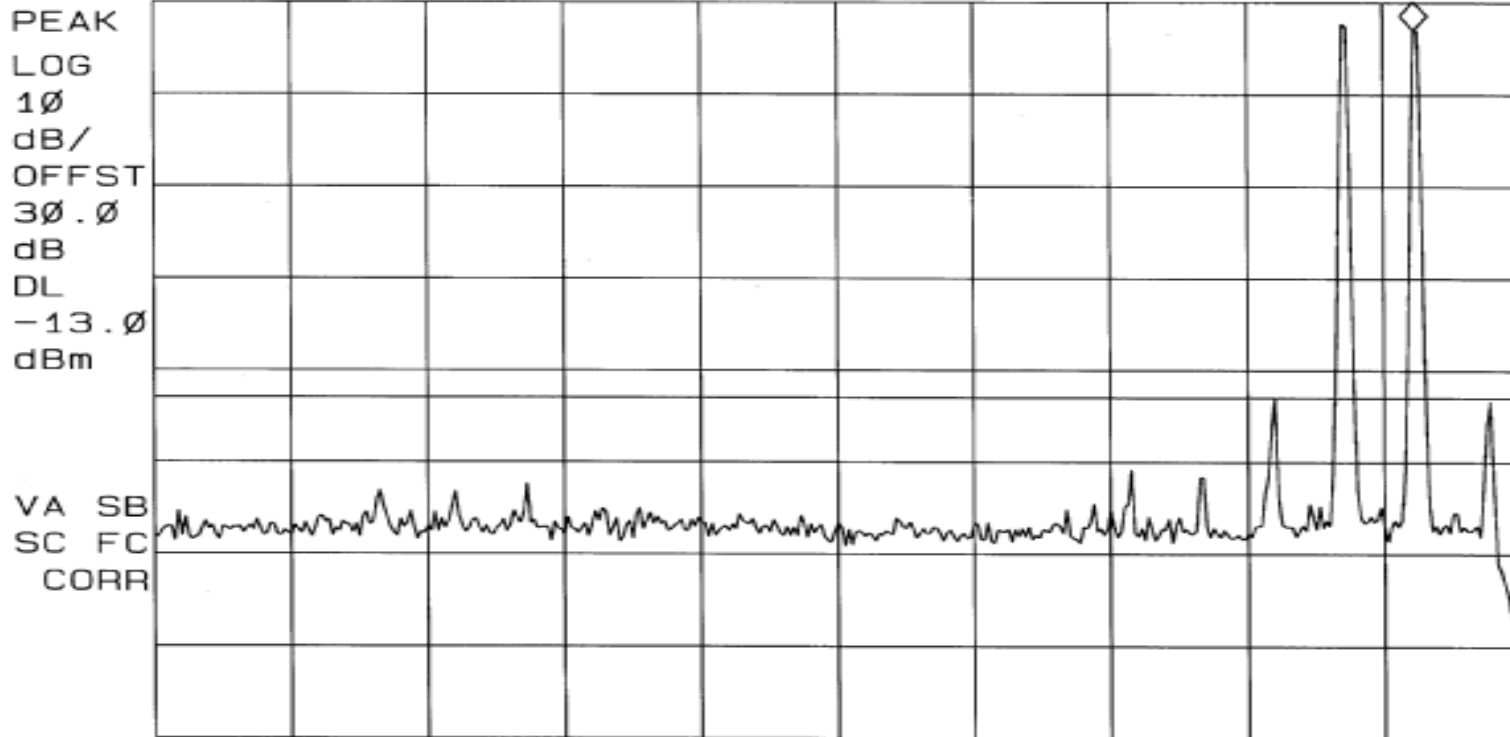
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph:	2.1047
Operating Mode:	Amplifying input signal		
Notes:	Amps Band - TDMA - Uplink		
Job No:	R-4733N-1	Technician:	M.Seamans
Date:	11/14/2006		

16: 52: 04 NOV 14, 2006

MKR 868.53 MHz  
26.98 dBm

REF 30.0 dBm AT 10 dB



START 851.00 MHz  
#RES BW 30 kHz

#VBW 100 kHz

STOP 870.00 MHz  
SWP 63.3 msec

# RETLIF TESTING LABORATORIES

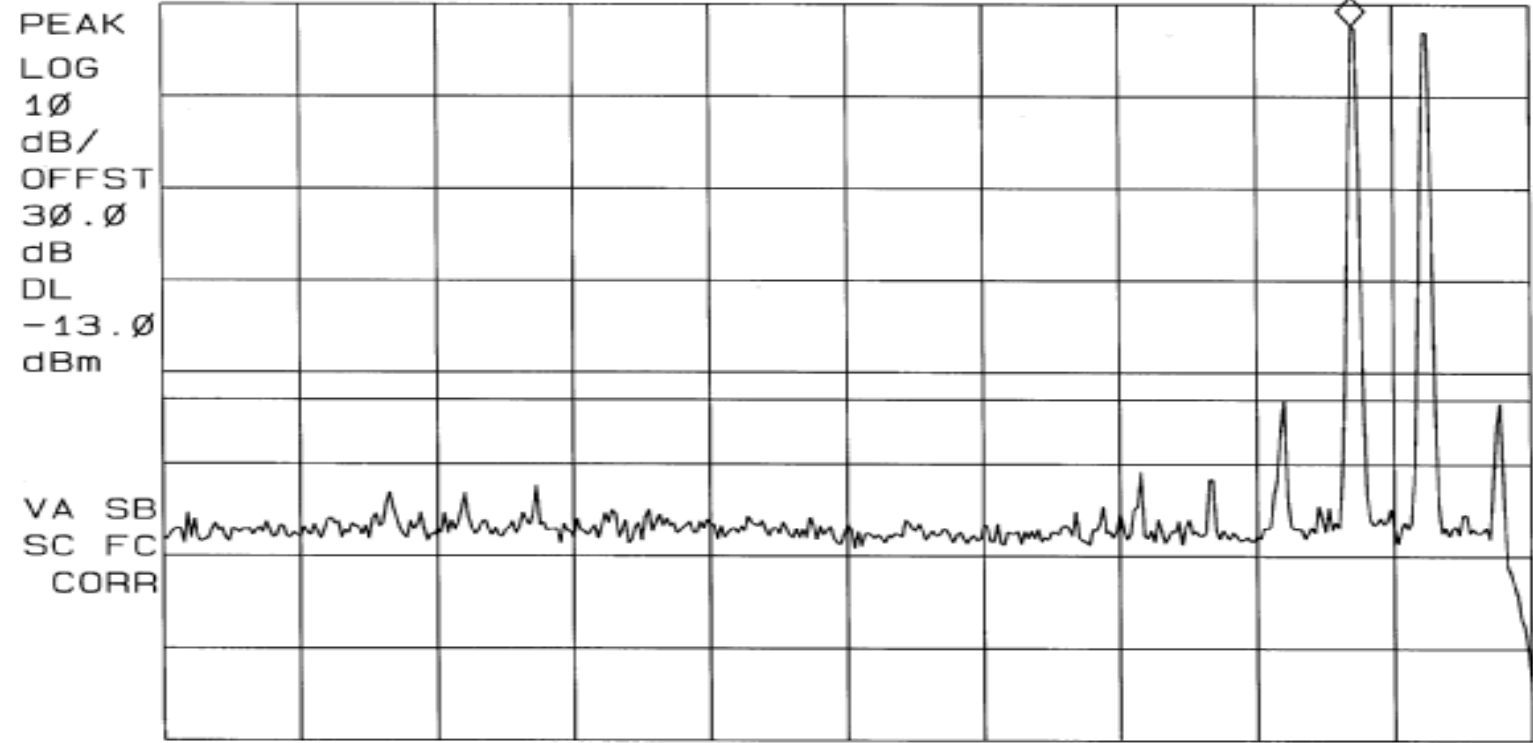
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:
Operating Mode:	Amplifying input signal		
Notes:	Amps Band - TDMA - Uplink		
Job No:	R-4733N-1		Technician:
		M.Seamans	

16:52:38 NOV 14, 2006

REF 30.0 dBm AT 10 dB

MKR 867.53 MHz  
27.70 dBm



START 851.00 MHz STOP 870.00 MHz  
#RES BW 30 kHz #VBW 100 kHz SWP 63.3 msec

# RETLIF TESTING LABORATORIES

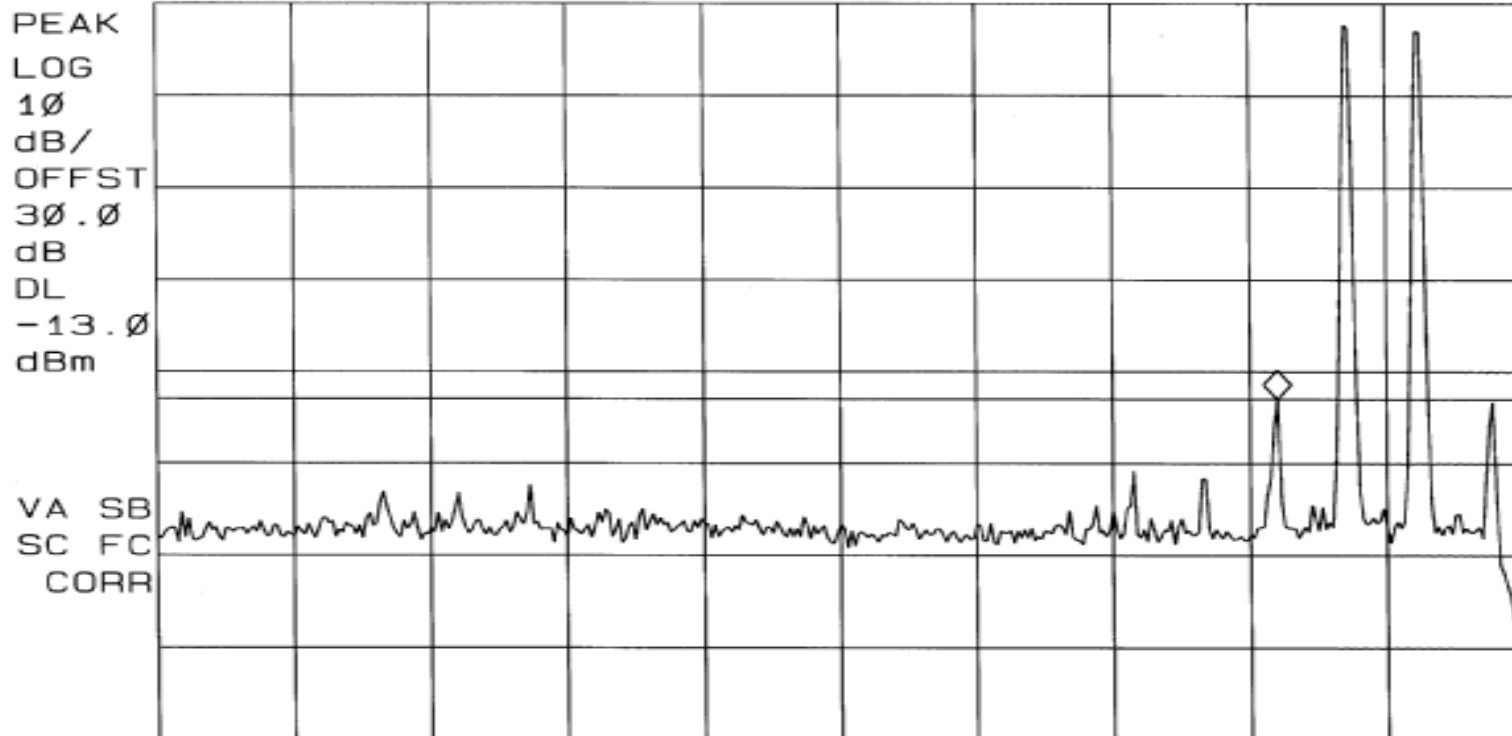
## EMISSIONS DATA SHEET

Test Method:	Intermodulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:
Operating Mode:	Amplifying input signal		
Notes:	Amps Band - TDMA - Uplink		
Job No:	R-4733N-1		Technician:
		M.Seamans	

16:53:56 NOV 14, 2006

MKR 866.58 MHz  
-13.01 dBm

REF 30.0 dBm      AT 10 dB



START 851.00 MHz

#RES BW 30 kHz

#VBW 100 kHz

STOP 870.00 MHz

SWP 63.3 msec

# RETLIF TESTING LABORATORIES

## TABULAR DATA SHEET

Test Method:	RF Power Output		
Customer:	Cellular Specialties, Inc.	Job No:	R-4733N-1
Test Sample:	DSP Amplifier/Repeater		
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2 Paragraph: 2.1046		
Operating Mode:	Amplifying input signal		
Technician:	M.Seamans	Date:	11/14/2006
Notes:	Uplink Frequency Range: 806-824 MHz    Downlink Frequency Range: 851-869 MHz Modulation Type: TDMA		

Test Frequency	Output Reading	Input Reading	Gain	Power					
MHz	dBm	dBm	dB	mW					
Uplink									
815.00	28.60	-56.00	84.60	724.44					
Downlink									
860.00	29.40	-58.00	87.40	870.96					

# RETLIF TESTING LABORATORIES

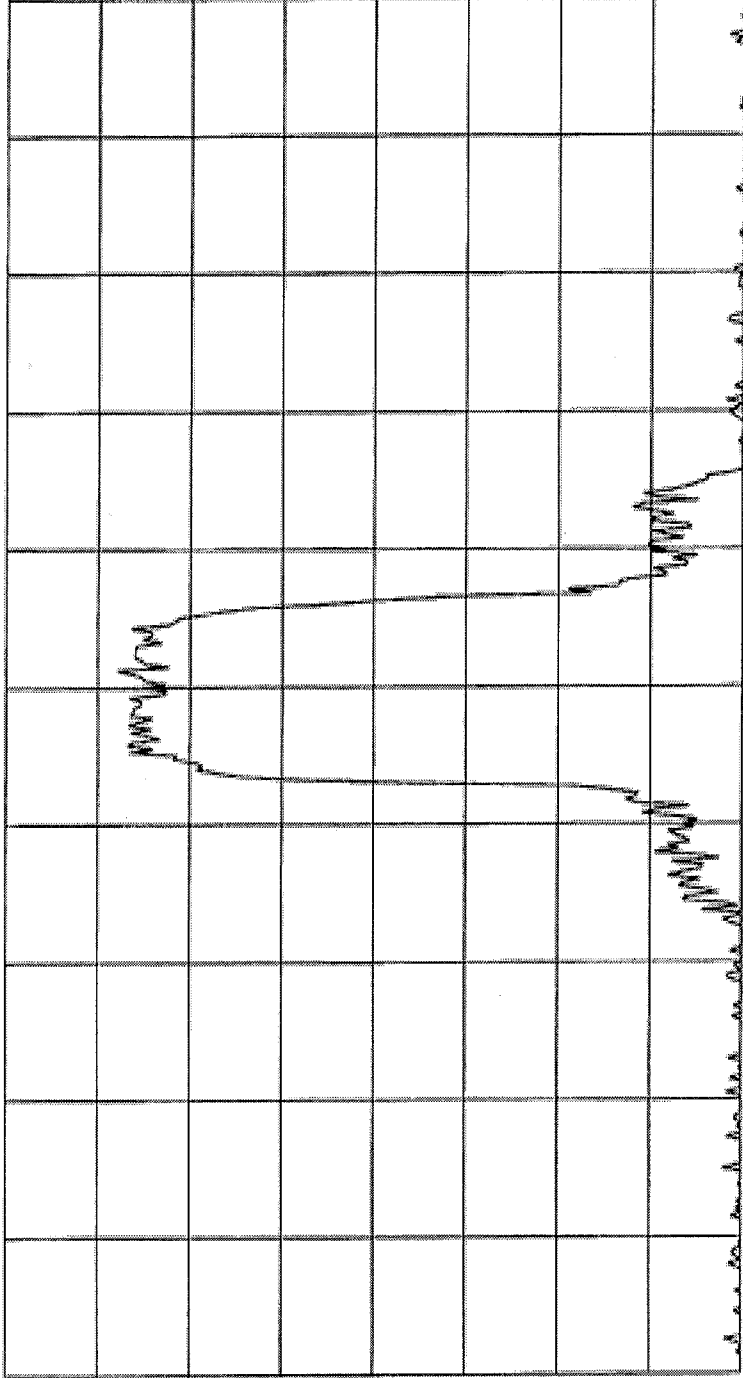
## EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth		
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No.:	CSI-DSP-SMR-800	Serial No.:	CSB0602
Test Specification:	FCC Part 2	Paragraph:	2.1049
Operating Mode:	Amplifying input signal		
Notes:	TDMA - Uplink - Output at 815.00 MHz		
Job No.:	R-4733N-1		
Technician:	M. Seamans		
Date:	11/14/2006		

18:12:09 NOV 14, 2006

REF 30.0 dBm AT 10 dB

PEAK  
LOG  
10  
dB/  
OFFST  
30.0  
dB



WA SB  
SC FC  
CORR

CENTER 815.0000 MHz  
#RES BW 300 Hz

#VBW 1 KHz

SPAN 250.0 KHz  
SWP 8.33 sec

# RETLIF TESTING LABORATORIES

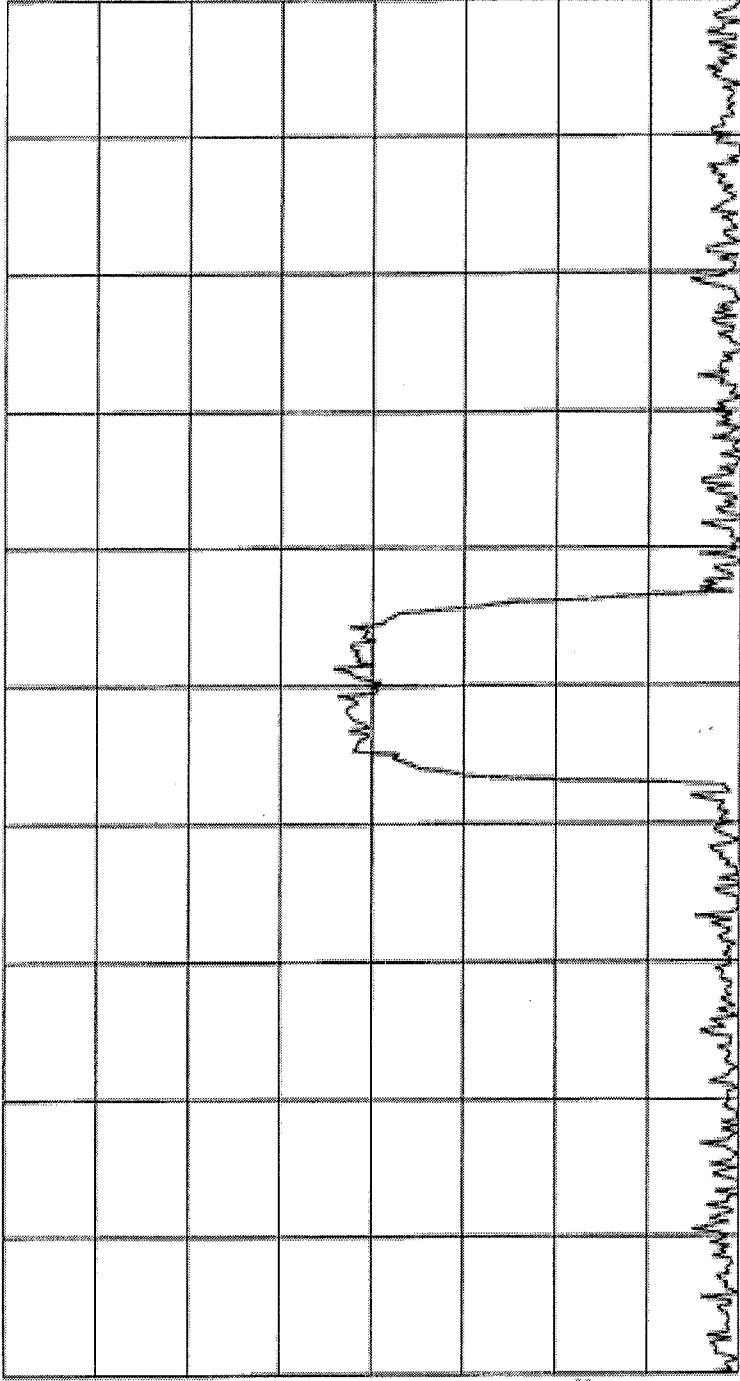
## EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth	Job No:	R-4733N-1
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph:	2.1049
Operating Mode:	Amplifying input signal	Technician:	M. Seamans
Notes:	TDMA - Uplink - Input at 815.00 MHz	Date:	11/14/2006

10:09:38 NOV 15, 2006

REF -32.0 dBm #AT 10 dB

PEAK  
LOG  
10  
dB/



WA SB  
SC FC  
CORR

CENTER 815.0000 MHz  
#RES BW 300 Hz

#VBW 1 KHZ

SPAN 250.0 KHZ  
SWP 8.33 sec



# RETLIF TESTING LABORATORIES

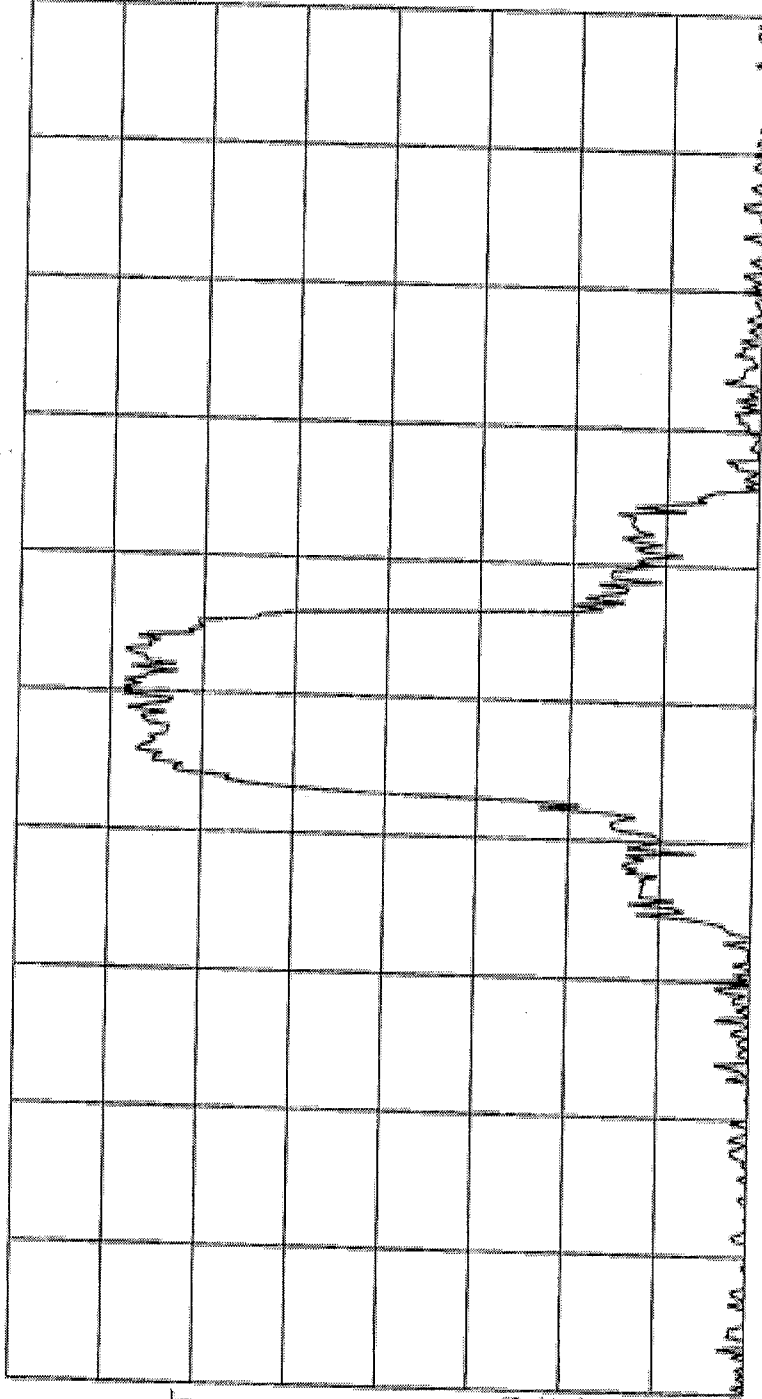
## EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth	Job No:	R-4733N-1
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph:	2.1049
Operating Mode:	Amplifying input signal	Technician:	M. Seamans
Notes:	TDMA - Downlink - Output at 860.00 MHz	Date:	11/14/2006

18:23:09 NOV 14, 2006

REF 30.0 dBm AT 10 dB

PEAK  
LOG  
10  
dB/  
OFFST  
30.0  
dB



WA SB  
SC FC  
CORR

# RETLIF TESTING LABORATORIES

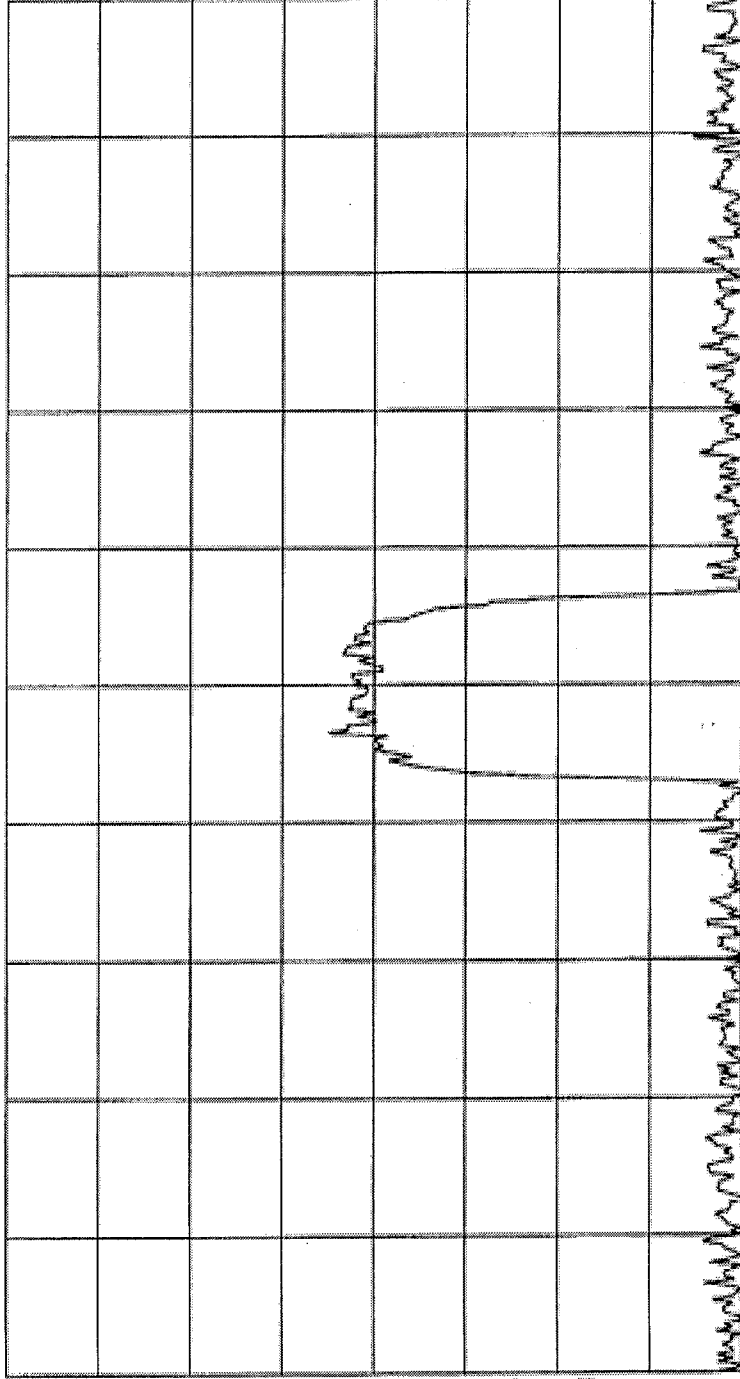
## EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth	Job No:	R-4733N-1
Customer:	Cellular Specialties, Inc.	Test Sample:	DSP Amplifier/Repeater
Model No:	CSI-DSP-SMR-800	Serial No:	CSB0602
Test Specification:	FCC Part 2	Paragraph:	2.1049
Operating Mode:	Amplifying input signal	Technician:	M. Seamans
Notes:	TDMA - Downlink - Input at 860.00 MHz	Date:	11/14/2006

11:10:12:48 NOV 15, 2006

REF -32.0 dBm #AT 10 dB

PEAK  
LOG  
10  
dB/



WA SB  
SC FC  
CORR

CENTER 860.0000 MHz  
#RES BW 300 Hz

#VBW 1 kHz

SPAN 250.0 kHz  
SWP 8.33 sec

# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

<b>Test Method:</b>	Spurious Emissions at the Antenna Terminals 30 MHz to 9 GHz	
<b>Customer:</b>	Cellular Specialties, Inc.	<b>Job No:</b> R-4733N-1
<b>Test Sample:</b>	DSP Amplifier/Repeater	
<b>Model No:</b>	CSI-DSP-SMR-800	<b>Serial No:</b> CSB0602
<b>Test Specification:</b>	FCC Part 2 Paragraph: 2.1051	
<b>Operating Mode:</b>	Amplifying input signal	
<b>Technician:</b>	M.Seamans	<b>Date:</b> 11/14/2006
<b>Notes:</b>	Uplink Frequency: 806-824 MHz      Downlink Frequency: 851-869 MHz TDMA modulation tested	

Uplink Input Signal	Test Frequency	Harmonic Frequencies	Reading	Limit	Downlink Input Signal	Test Frequency	Harmonic Frequencies	Reading	Limit
dBm	MHz	MHz	dBm	dBm	dBm	MHz	MHz	dBm	dBm
-56.00	808.00				-58.00	853.00			
		1616.00	-32.61	-13.0			1706.00	-33.21	-13.0
		2424.00	-30.47				2559.00	-26.88	
		3232.00	-				3412.00	-	
		4040.00	-				4265.00	-	
		4848.00	-				5118.00	-	
		5656.00	-				5971.00	-	
		6464.00	-				6824.00	-	
		7272.00	-				7677.00	-	
-56.00	808.00	8080.00	-	-13.0	-58.00	853.00	8530.00	-	-13.0

For harmonic frequencies with no recorded emissions no emissions were observed above the test equipment noise floor which was a minimum of 20dB below the limit.

# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

<b>Test Method:</b>	Spurious Emissions at the Antenna Terminals 30 MHz to 9 GHz										
<b>Customer:</b>	Cellular Specialties, Inc.	<b>Job No:</b>					R-4733N-1				
<b>Test Sample:</b>	DSP Amplifier/Repeater										
<b>Model No:</b>	CSI-DSP-SMR-800	<b>Serial No:</b>					CSB0602				
<b>Test Specification:</b>	FCC Part 2 Paragraph: 2.1051										
<b>Operating Mode:</b>	Amplifying input signal										
<b>Technician:</b>	M.Seamans	<b>Date:</b>					11/14/2006				
<b>Notes:</b>	Uplink Frequency: 806-824 MHz      Downlink Frequency: 851-869 MHz TDMA modulation tested										

Uplink Input Signal	Test Frequency	Harmonic Frequencies	Reading	Limit	Downlink Input Signal	Test Frequency	Harmonic Frequencies	Reading	Limit	
dBm	MHz	MHz	dBm	dBm	dBm	MHz	MHz	dBm	dBm	
-56.00	815.00				-58.00	860.00				
		1630.00	-34.87	-13.0			1720.00	-32.42	-13.0	
		2445.00	-29.27				2580.00	-26.58		
		3260.00	-				3440.00	-		
		4075.00	-				4300.00	-		
		4890.00	-				5160.00	-		
		5705.00	-				6020.00	-		
		6520.00	-				6880.00	-		
		7335.00	-				7740.00	-		
-56.00	815.00	8150.00	-	-13.0	-58.00	860.00	8600.00	-	-13.0	

For harmonic frequencies with no recorded emissions no emissions were observed above the test equipment noise floor which was a minimum of 20dB below the limit.

RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

**Test Method:** Spurious Emissions at the Antenna Terminals 30 MHz to 9 GHz

**Customer:** Cellular Specialties, Inc. **Job No:** R-4733N-1

**Test Sample:** DSP Amplifier/Repeater

**Model No:** CSI-DSP-SMR-800 **Serial No:** CSB0602

**Test Specification:** FCC Part 2  
Paragraph: 2.1051

**Operating Mode:** Amplifying input signal

**Technician:** M.Seamans **Date:** 11/14/2006

**Notes:** Uplink Frequency: 806-824 MHz      Downlink Frequency: 851-869 MHz  
TDMA modulation tested

Uplink Input Signal	Test Frequency	Harmonic Frequencies	Reading	Limit	Downlink Input Signal	Test Frequency	Harmonic Frequencies	Reading	Limit
dBm	MHz	MHz	dBm	dBm	dBm	MHz	MHz	dBm	dBm
-56.00	822.00				-58.00	867.00			
		1644.00	-33.78	-13.0			1734.00	-33.07	-13.0
		2466.00	-30.89				2601.00	-27.26	
		3288.00	-				2601.00	-	
		4110.00	-				3468.00	-	
		4932.00	-				4335.00	-	
		5754.00	-				6069.00	-	
		6576.00	-				6936.00	-	
		7398.00	-				7803.00	-	
-56.00	822.00	8220.00	-	-13.0	-58.00	867.00	8670.00	-	-13.0

For harmonic frequencies with no recorded emissions no emissions were observed above the test equipment noise floor which was a minimum of 20dB below the limit.

# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

<b>Test Method:</b>	Spurious Radiated Emissions (ERP) 30 MHz to 10GHz		
<b>Customer:</b>	Cellular Specialties, Inc.	<b>Job No:</b>	R-4733N-1
<b>Test Sample:</b>	DSP Amplifier/Repeater		
<b>Model No:</b>	CSI-DSP-SMR-800	<b>Serial No:</b>	CSB0602
<b>Test Specification:</b>	FCC Part 2.1053 TIA/EIA-603 <span style="float: right;">Paragraph: 2.1053</span>		
<b>Operating Mode:</b>	Amplifying input signal		
<b>Technician:</b>	M.Seamans	<b>Date:</b>	11/22/2006
<b>Notes:</b>	Uplink Frequency Range: 806-824 MHz    Testing performed at 3 input frequencies, 808MHz, 815 MHz, 822MHz Peak Detector    Modulation: CW    Testing performed at 3 & 1 meter test distances		

Test Frequency	Antenna Position	Reference Reading	Signal Gen Level	Reference Ant Gain					Corrected Reading	Spurious Limit
MHz	(H/V) - Height	dBuV	dBm	dBI					dBm	dBm
30.00	-	-	-	-					-	-13.00
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
	-	-	-	-					-	-
10000.00	-	-	-	-					-	-13.00

No emissions observed above the noise floor of the test equipment which was a minimum of 10dB below the limit.

# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

<b>Test Method:</b>	Spurious Radiated Emissions (ERP) 30 MHz to 10GHz	
<b>Customer:</b>	Cellular Specialties, Inc.	<b>Job No:</b> R-4733N-1
<b>Test Sample:</b>	DSP Amplifier/Repeater	
<b>Model No:</b>	CSI-DSP-SMR-800	<b>Serial No:</b> CSB0602
<b>Test Specification:</b>	FCC Part 2.1053 TIA/EIA-603 Paragraph: 2.1053	
<b>Operating Mode:</b>	Amplifying input signal	
<b>Technician:</b>	M.Seamans	<b>Date:</b> 11/22/2006
<b>Notes:</b>	Downlink Frequency Range: 851-869 MHz Testing performed at 3 input frequencies, 853MHz, 860MHz, 867MHz Peak Detector Modulation: CW Testing performed at 3 and 1 meter test distances	

Test Frequency	Antenna Position	Reference Reading	Signal Gen Level	Reference Ant Gain				Corrected Reading	Spurious Limit
MHz	(H/V) - Height	dBuV	dBm	dBI				dBm	dBm
30.00	-	-	-	-				-	-13.00
	-	-	-	-				-	
	-	-	-	-				-	
	-	-	-	-				-	
	-	-	-	-				-	
	-	-	-	-				-	
	-	-	-	-				-	
	-	-	-	-				-	
	-	-	-	-				-	
10000.00	-	-	-	-				-	-13.00

No emissions observed above the noise floor of the test equipment which was a minimum of 10dB below the limit.

# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Frequency Stability										
Customer:	Cellular Specialties, Inc.					Job No:	R-4733N-1				
Test Sample:	Digital Repeater										
Model No:	CSI-DSP85-1W-C					Serial No:	ENG060007				
Test Specification:	FCC Part 2 Paragraph: 2.1055										
Operating Mode:	Amplifying input signal										
Technician:	M.Seamans					Date:	11/16/2006				
Notes:	Uplink Frequency 815 MHz      Nominal Voltage = 115 VAC Downlink Frequency 860 MHz										

Temp	Test Frequency	Frequency @								
		97.75 VAC	103.50 VAC	109.25 VAC	115 VAC	120.75 VAC	126.50 VAC	132.25 VAC		
C	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz	MHz
	(Uplink)									
-30	815.0024	815.0023	815.0023	815.0023	815.0023	815.0023	815.0023	815.0023	815.0023	815.0023
-20		815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024
-10		815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024
0		815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024
10		815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024
20		815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024
30		815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024
40		815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024
50	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024	815.0024
	(Downlink)									
-30	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991
-20		859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991
-10		859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991
0		859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991
10		859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991
20		859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991
30		859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991
40		859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991
50	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991	859.9991



## SECTION 2

### EQUIPMENT LISTS

#### Antenna Spurious Emissions

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
4895	Spectrum Analyzer	Hewlett Packard	9kHz - 22GHz	8593EM	9/20/2005	12/20/2006
5016	Attenuator	Narda	DC - 18 GHz	776B-30	2/8/2006	2/8/2007
5039	20 DB Atten. (50 ohm)	Fluke	DC - 12.4 GHz	Y9305	2/7/2006	2/7/2007
R420	Signal Generator	Agilent	250kHz - 3GHz	AT-E4436B	7/25/2005	7/25/2007

#### Spurious Radiated Emissions

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
3116	Pre-Amplifier	Miteq	0.1 GHz - 18 GHz	AFS42-35	8/25/2006	8/25/2007
4003	Double Ridge Guide	Tensor	1 GHz - 18 GHz	4015	3/27/2006	3/27/2007
4003A	Double Ridge Guide	EMCO	1 GHz - 12.4 GHz	3105	10/12/2006	10/12/2007
4029B	Test Site Attenuation	Retlif	3 / 10 Meters	RNH	5/24/2006	5/24/2007
5053	Biconilog	EMCO	26 MHz - 3 GHz	3142C	2/7/2006	2/7/2007
713	EMI Test Receiver	Rohde & Schwarz	20 Hz - 26.5 GHz	ESI26	4/3/2006	4/3/2007
R420	Signal Generator	Agilent	250kHz - 3GHz	AT-E4436B	7/25/2005	7/25/2007

#### RF Power Output/Occupied Bandwidth

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
4895	Spectrum Analyzer	Hewlett Packard	9kHz - 22GHz	8593EM	9/20/2005	12/20/2006
5016	Attenuator	Narda	DC - 18 GHz	776B-30	2/8/2006	2/8/2007
5039	20 DB Atten. (50 ohm)	Fluke	DC - 12.4 GHz	Y9305	2/7/2006	2/7/2007
R420	Signal Generator	Agilent	250kHz - 3GHz	AT-E4436B	7/25/2005	7/25/2007

#### Intermodulation Characteristics (Two Tone)

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
4895	Spectrum Analyzer	Hewlett Packard	9kHz - 22GHz	8593EM	9/20/2005	12/20/2006
5016	Attenuator	Narda	DC - 18 GHz	776B-30	2/8/2006	2/8/2007
5039	20 DB Atten. (50 ohm)	Fluke	DC - 12.4 GHz	Y9305	2/7/2006	2/7/2007
R420	Signal Generator	Agilent	250kHz - 3GHz	AT-E4436B	7/25/2005	7/25/2007

## EQUIPMENT LIST

### Frequency Stability

<b>EN</b>	<b>Type</b>	<b>Manufacturer</b>	<b>Description</b>	<b>Model No.</b>	<b>Cal Date</b>	<b>Due</b>
4895	Spectrum Analyzer	Hewlett Packard	9kHz - 22GHz	8593EM	9/20/2005	12/20/2006
4911	Frequency Counter	Elenco	DC - 1.3 GHz	F-1300	5/31/2006	5/31/2007
4997	Digital Thermometer	Omega	N/A		3/13/2006	3/13/2007
5013	Variac	Powerstat	0 - 140 VAC	116B	7/20/2006	7/20/2007
520N	Digital Multimeter	Wavetek	N/A	25XT	2/16/2006	2/16/2007
557	Temperature Chamber	Associated Env.	-73 C - +177 C	SK 3105	8/31/2006	8/31/2007
R420	Signal Generator	Agilent	250kHz - 3GHz	AT-E4436B	7/25/2005	7/25/2007

## SPURIOUS RADIATED EMISSIONS



SPURIOUS EMISSIONS AT ANTENNA TERMINALS

OCCUPIED BANDWIDTH/RF POWER OUTPUT

INTERMODULATION (TWO TONE)



## FREQUENCY STABILITY



Test Report No. R-4733N-1  
FCC ID: NVRCSE-DSP85-1W-S

**MODEL DSP85-1W-S POWER PER CHANNEL**

<b>Channels</b>	<b>UpLink dBm</b>	<b>DownLink dBm</b>
1	30.0	30.0
2	26.0	26.0
3	23.7	23.7
4	22.0	22.0
5	20.7	20.7
6	19.7	19.7
7	18.8	18.8
8	18.0	18.0
9	17.3	17.3
10	16.7	16.7
11	16.2	16.2
12	15.7	15.7
13	15.2	15.2
14	14.8	14.8
15	14.4	14.4
16	14.0	14.0