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REPORT OF MEASUREMENTS
FOR
CELLULAR SPECIALTIES, INC.
CELLULAR REPEATER SYSTEM

MODEL: CS12-555-400

FCC ID: NVR-DR-PROD8

Company Name: Cellular Specialties, Inc. _____

Date of Report: February 16, 2010 _____

Test Report No: R-5240N-1, Rev. A _____

Test Start Date: November 5, 2009 _____

Test Finish Date: February 9, 2010 _____

Test Technician: Matt Seamans _____

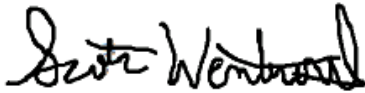
Laboratory Supervisor: Todd Hannemann _____

Report Prepared By: Jamie Ramsey _____

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Certification and Signatures

We certify that this report is a true report of the results obtained from the tests of the equipment stated and relates only to the equipment tested. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.



Scott Wentworth
Branch Manager
NVLAP Approved Signatory



Todd Hannemann
Laboratory Supervisor

Non-Warranty Provision

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Non-Endorsement

This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement, or certification of the product or material tested. This report must not be used by the client to claim product endorsement by NVLAP, NIST or any agency of the U.S. Government.

CERTIFICATION APPLICATION SUMMARY

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

Equipment under Test (EUT): The EUT is a Cellular Repeater System (Cellular Amplifier)

Model: CS12-555-400

FCC ID Number: FCC ID: NVR-DR-PROD8

Applicable Test Standard: FCC Parts 2 & 22

Measurement Procedure: ANSI/TIA-603-C-2004

Device Classification: Mobile

EUT Frequency Range Band: Uplink: 824MHz to 849MHz
Downlink: 869MHz to 894MHz

Power Output Rating for Certification Grant based on Intermodulation Data Composite Power: Uplink: +33.3dBm = 2.14W
Downlink: +27.40dBm = 0.550W

Modulation Type: CDMA (F9W)

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

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 CDMA Modulation type. At the maximum specified input power levels all intermodulation products were at -13dBm or below. 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 CDMA 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.

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 (low, mid & high) 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 CDMA modulation type. The spurious emissions limit is -13dBm as specified in FCC Part 22. 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 an 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 (low, mid & high) 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 ANSI/TIA-603-C-2004. The frequency range of the test was 30MHz – 9GHz. The limit for out of band spurious emissions is -13dBm as specified in Part 22. All emissions were below the specified -13dBm limit. See attached test data.

RF POWER OUTPUT (Composite Power)

The RF Power Output test was performed in conjunction with the intermodulation test using RMS channel power measurements of two CDMA channels with a one channel separation in between. The measurements were taken with the AGC turned off at maximum output power with all intermodulation products below the -13dBm limit. The measured output power matched the manufacturer's rated output power. See attached test data.

FREQUENCY STABILITY MEASUREMENTS

The test sample was placed into a temperature chamber with the DC 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 DC input voltage was varied from 85 to 115% of nominal. The output frequency for both the uplink and downlink stayed within the assigned frequency band. See attached test data.

SECTION 2

EQUIPMENT LISTS

Spurious Radiated Emissions

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
3116	Pre-Amplifier	Miteq	0.1 GHz - 18 GHz	AFS42-35	1/21/2009	1/21/2010
3117	Power Supply	B&K Precision	0-30 Vdc, 3.0 A	1630	1/31/2009	1/31/2010
3258	Double Ridge Guide	EMCO	1 - 18 GHz	3115	8/20/2009	8/20/2010
4029B	Test Site Attenuation	Retlif	3 / 10 Meters	RNH	6/25/2009	6/25/2010
5053	Biconilog	EMCO	26 MHz - 3 GHz	3142C	1/27/2009	1/27/2010
5070	EMI Test Receiver	Rohde & Schwarz	20 Hz - 40 GHz	ESIB40	1/14/2009	3/14/2010

Frequency Stability

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
4997	Digital Thermometer	Omega	N/A		8/5/2009	8/5/2010
5049B	Digital Multimeter	Fluke	N/A	111	8/19/2009	8/19/2010
5052	Power Supply	EPSCO INC.	125vdc - 8A	PS-1000-125	7/24/2008	7/24/2010
5077	Temperature Chamber	Associated Env. Systems	-50 to 150 Deg C	ZFD-531	8/5/2009	8/5/2010
R425B	Spectrum Analyzer	Agilent	100 Hz - 26.5 GHz	E7405A;A	5/11/2009	5/11/2010

Intermodulation Characteristics

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
1345	Attenuator	Narda East	DC - 18GHz	776B-30	6/8/2009	6/8/2010
5133	10 dB Atten.	Narda	DC - 12.4 GHz / 2 W	757C=10	8/18/2009	8/18/2010
5134	10 dB Atten.	Narda	DC - 12.4 GHz / 2 W	757C-10	8/18/2009	8/18/2010
5138	10 dB Atten.	Narda	DC - 11 GHz / 20 W	768-10	8/18/2009	8/18/2010
5070	EMI Test Receiver	Rohde & Schwarz	20 Hz - 40 GHz	ESIB40	1/14/2009	3/14/2010

Occupied Bandwidth

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
5026A	20 dB Attenuator	Narda	DC - 11 GHz	768-20	1/20/2009	1/20/2010
5134	10 dB Atten.	Narda	DC - 12.4 GHz / 2 W	757C-10	8/18/2009	8/18/2010
5138	10 dB Atten.	Narda	DC - 11 GHz / 20 W	768-10	8/18/2009	8/18/2010
R425B	Spectrum Analyzer	Agilent	100 Hz - 26.5 GHz	E7405A;A	5/11/2009	5/11/2010

Spurious Emissions Antenna Ports

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
1345	Attenuator	Narda East	DC - 18GHz	776B-30	6/8/2009	6/8/2010
5133	10 dB Atten.	Narda	DC - 12.4 GHz / 2 W	757C=10	8/18/2009	8/18/2010
5134	10 dB Atten.	Narda	DC - 12.4 GHz / 2 W	757C-10	8/18/2009	8/18/2010
5138	10 dB Atten.	Narda	DC - 11 GHz / 20 W	768-10	8/18/2009	8/18/2010
5070	EMI Test Receiver	Rohde & Schwarz	20 Hz - 40 GHz	ESIB40	1/14/2009	3/14/2010

Test Report No. R-5240N-1, Rev. A
FCC ID: NVR-DR-PROD8

SETUP PHOTOGRAPH
SPURIOUS RADIATED EMISSIONS



Test Setup

Test Report No. R-5240N-1, Rev. A
FCC ID: NVR-DR-PROD8

SETUP PHOTOGRAPHS
SPURIOUS RADIATED EMISSIONS



Horizontal Antenna Polarization, 30 to 1000 MHz



Vertical Antenna Polarization, 30 to 1000 MHz

Test Report No. R-5240N-1, Rev. A
FCC ID: NVR-DR-PROD8

SETUP PHOTOGRAPHS
SPURIOUS RADIATED EMISSIONS



Horizontal Antenna Polarization, 1 to 9 GHz



Vertical Antenna Polarization, 1 to 9 GHz

Test Report No. R-5240N-1, Rev. A
FCC ID: NVR-DR-PROD8

SETUP PHOTOGRAPH
OCCUPIED BANDWIDTH



Test Setup

Test Report No. R-5240N-1, Rev. A
FCC ID: NVR-DR-PROD8

SETUP PHOTOGRAPH
SPURIOUS EMISSIONS AT ANTENNA TERMINALS,
INTERMODULATION (TWO TONE) & RF POWER OUTPUT



Test Report No. R-5240N-1, Rev. A
FCC ID: NVR-DR-PROD8

SETUP PHOTOGRAPH
FREQUENCY STABILITY



Test Setup



Test Setup

Test Report No. R-5240N-1, Rev. A
FCC ID: NVR-DR-PROD8

RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth			
Customer:	Cellular Specialties, Inc.	Test Sample:	Cellular Repeater System	
Model No:	CS12-555-400	Serial No:	See Test Report	
Test Specification:	FCC Part 2	Paragraph:	2.1049	
Operating Mode:	Amplifying input signal			
Notes:	CDMA - Uplink - Output at 836.5 MHz			
Job No:	R-5240N-1		Technician:	M.Seamans
Date:	11/23/2009			

Agilent 10:13:57 Nov 23, 2009

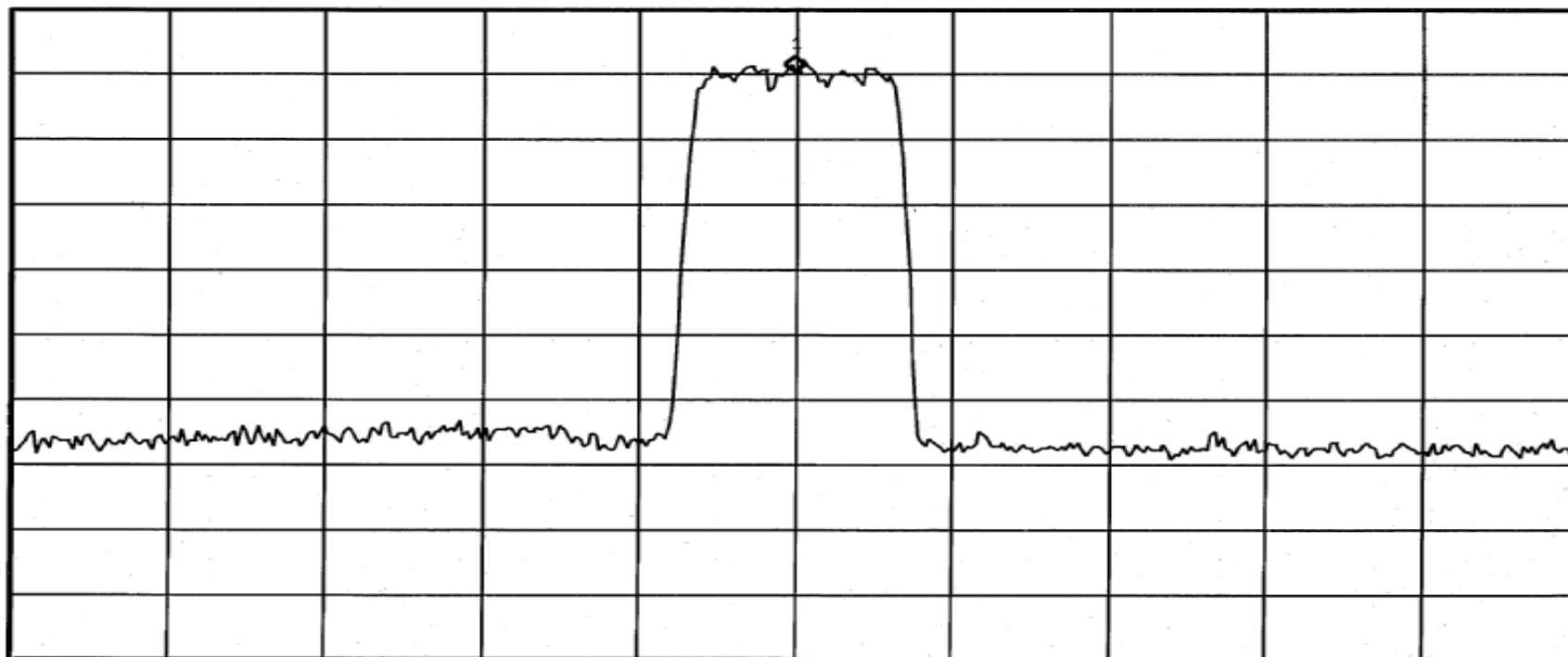
Mkr1 836.500 MHz
25.16 dBm

Ref 35 dBm

Atten 15 dB

Peak
Log
10
dB/
Offst
30.5
dB

V1 S2
S3 FC
AA



Center 836.5 MHz

#Res BW 30 kHz

#VBW 100 kHz

Span 10 MHz
Sweep 11.44 ms (401 pts)

RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth		
Customer:	Cellular Specialties, Inc.	Test Sample:	Cellular Repeater System
Model No:	CS12-555-400	Serial No:	See Test Report
Test Specification:	FCC Part 2	Paragraph: 2.1049	Date: 11/23/2009
Operating Mode:	Amplifying input signal		
Notes:	CDMA - Uplink - Input at 836.5 MHz		

* Agilent 10:23:21 Nov 23, 2009

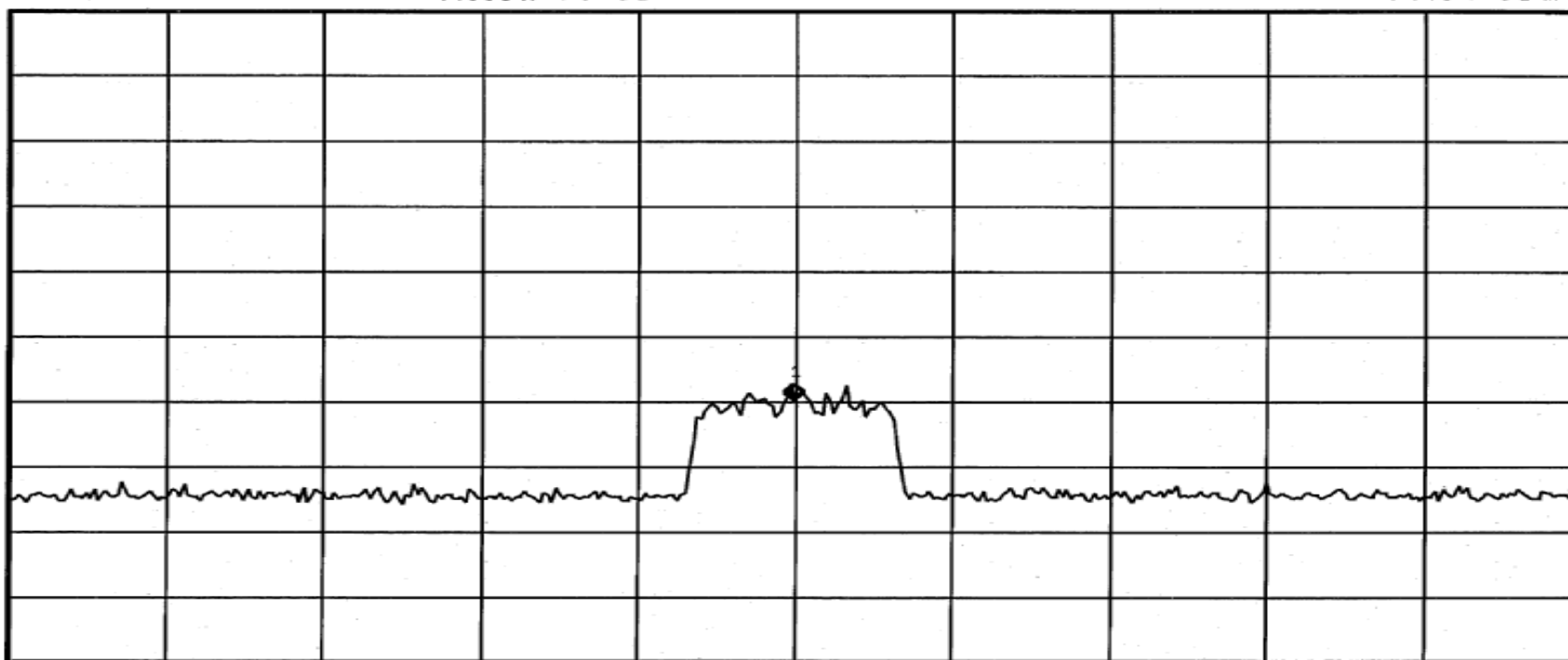
Mkr1 836.500 MHz
-55.04 dBm

Ref 4.54 dBm

Atten 15 dB

Peak
Log
10
dB/

V1 S2
S3 FC
AA



Center 836.5 MHz

#Res BW 30 kHz

#VBW 100 kHz

Span 10 MHz

Sweep 11.44 ms (401 pts)

RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth		
Customer:	Cellular Specialties, Inc.	Test Sample:	Cellular Repeater System
Model No:	CS12-555-400	Serial No:	See Test Report
Test Specification:	FCC Part 2	Paragraph: 2.1049	Date: 11/23/2009
Operating Mode:	Amplifying input signal		
Notes:	CDMA - Uplink - Output at 881.5 MHz		

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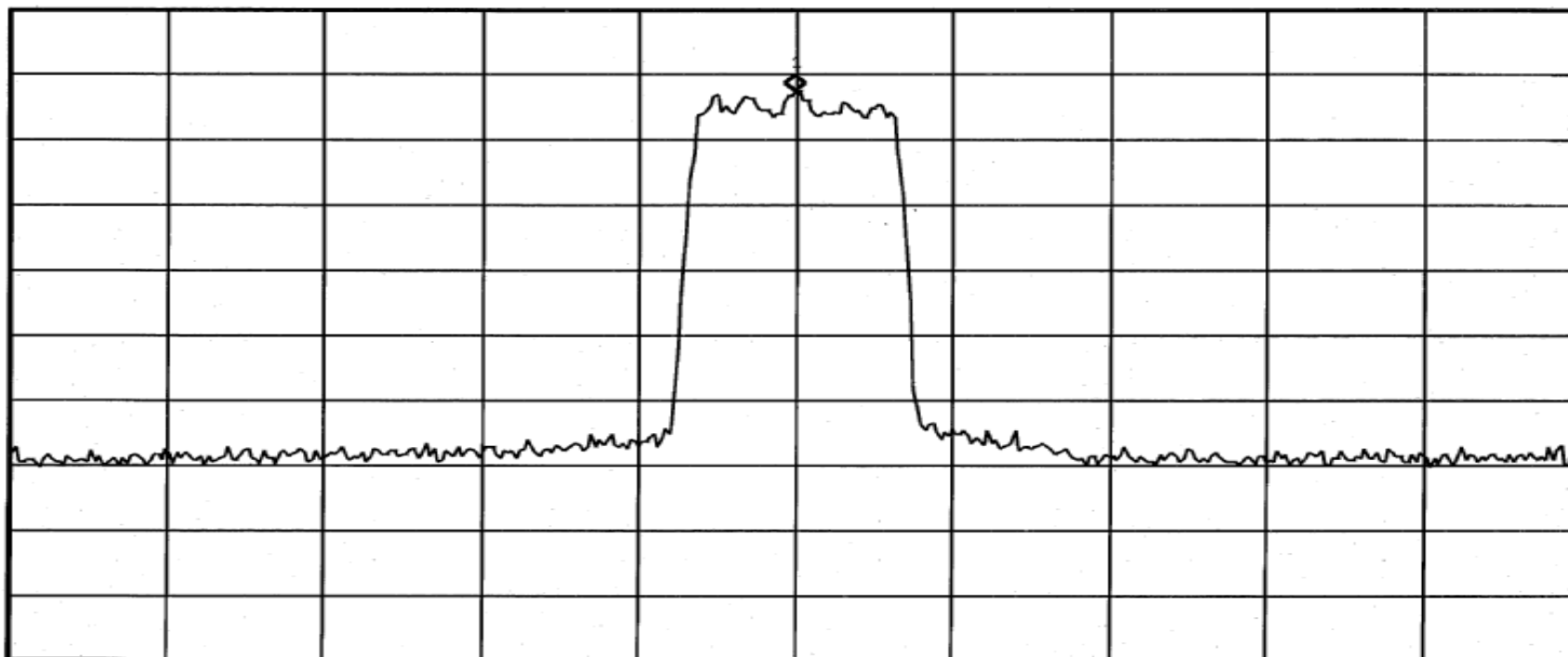
Mkr1 881.500 MHz
22.43 dBm

Ref 35 dBm

Atten 15 dB

Peak
Log
10
dB/
Offst
30.5
dB

V1 S2
S3 FC
AA



Center 881.5 MHz

#Res BW 30 kHz

#VBW 100. kHz

Span 10 MHz

Sweep 11.44 ms (401 pts)

RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth		
Customer:	Cellular Specialties, Inc.	Test Sample:	Cellular Repeater System
Model No:	CS12-555-400	Serial No:	See Test Report
Test Specification:	FCC Part 2	Paragraph:	2.1049
Operating Mode:	Amplifying input signal		
Notes:	CDMA - Uplink - Input at 881.5 MHz		

Agilent 10:07:37 Nov 23, 2009

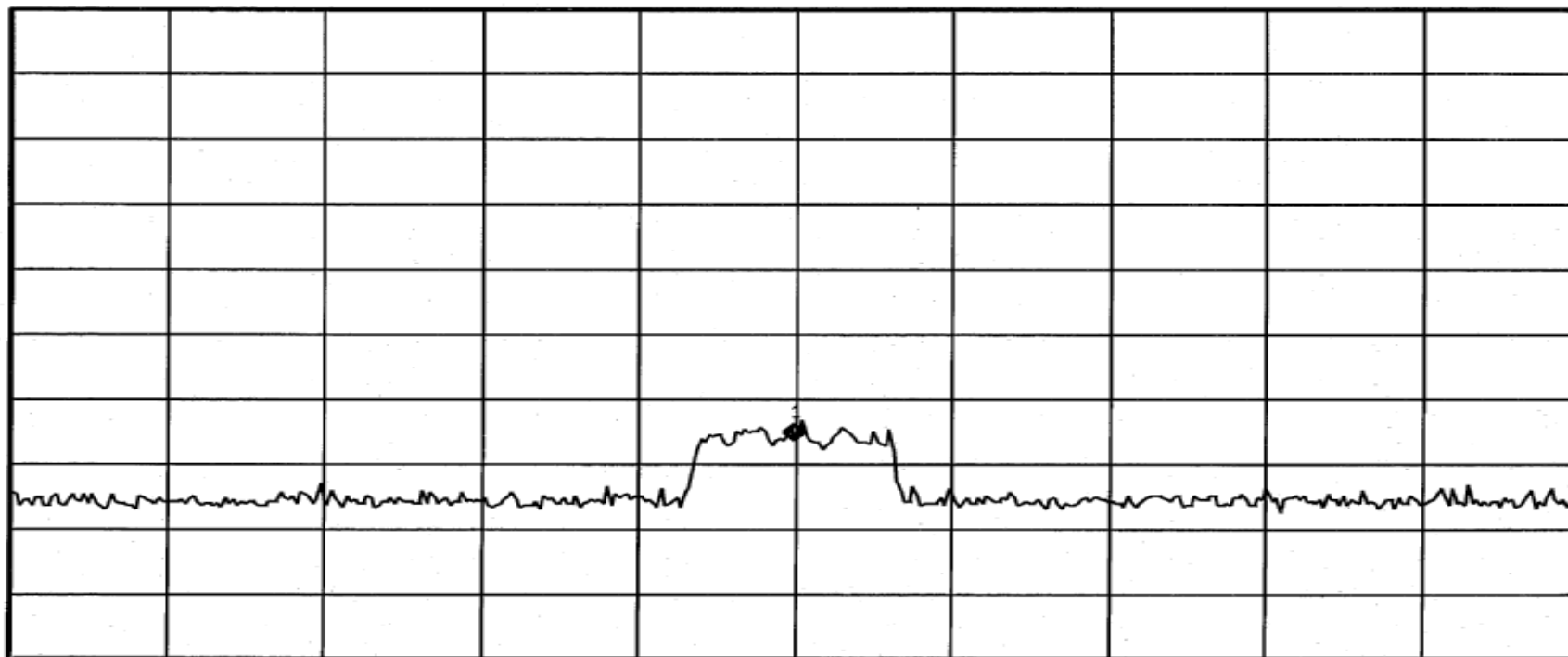
Mkr1 881.500 MHz
- 61.7 dBm

Ref 4.54 dBm

Atten 15 dB

Peak
Log
10
dB/

V1 S2
S3 FC
AA



Center 881.5 MHz

#Res BW 30 kHz

#VBW 100 kHz

Span 10 MHz

Sweep 11.44 ms (401 pts)

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-5240N-1
Test Sample:	Cellular Repeater System		
Model No:	CS12-555-400	Serial No:	See Test Report
Test Specification:	FCC Part 2 Paragraph: 2.1051		
Operating Mode:	Amplifying input signal		
Technician:	T. Hannemann	Date:	2/9/2010
Notes:	Uplink Frequency: 824-849 MHz Downlink Frequency: 869-894 MHz CDMA modulation, RMS Detector, 1.5 MHz Channel Power Measurement		

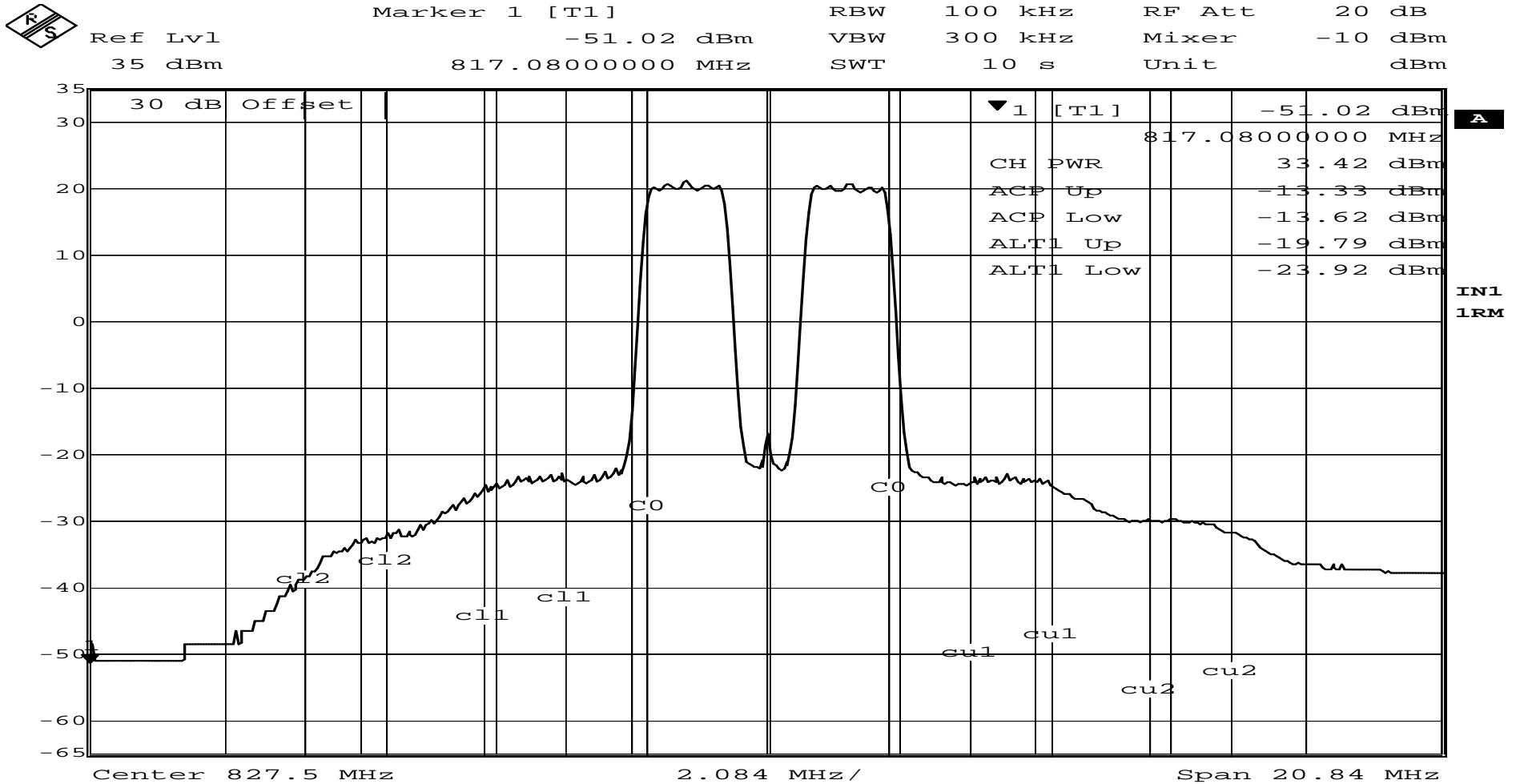
Uplink Input Signal	Test Frequency	Frequencies	Reading	Limit	Downlink Input Signal	Test Frequency	Frequencies	Reading	Limit
dBm	MHz	MHz	dBm	dBm	dBm	MHz	MHz	dBm	dBm
-49.20	824.00				-54.40	869.00			
		1648.00	-24.00	-13.0			1738.00	-24.00	-13.0
		2472.00	-24.00				2607.00	-24.00	
		3296.00	-24.00				3476.00	-24.00	
		4120.00	-24.00				4345.00	-24.00	
		4944.00	-24.00				5214.00	-24.00	
		5768.00	-24.00				6083.00	-24.00	
		6592.00	-24.00				6952.00	-24.00	
		7416.00	-24.00				7821.00	-24.00	
-49.20	824.00	8240.00	-24.00	-13.0	-54.40	869.00	8690.00	-24.00	-13.0
-49.20	836.50				-54.40	881.50			
		1673.00	-24.00	-13.0			1763.00	-24.00	-13.0
		2509.50	-24.00				2644.50	-24.00	
		3346.00	-24.00				3526.00	-24.00	
		4182.50	-24.00				4407.50	-24.00	
		5019.00	-24.00				5289.00	-24.00	
		5855.50	-24.00				5170.50	-24.00	
		6692.00	-24.00				7052.00	-24.00	
		7528.50	-24.00				7933.50	-24.00	
-49.20	836.50	8365.00	-24.00	-13.0	-54.40	881.50	8815.00	-24.00	-13.0
-49.20	849.00				-54.40	894.00			
		1698.00	-24.00	-13.0			1788.00	-24.00	-13.0
		2547.00	-24.00				2682.00	-24.00	
		3396.00	-24.00				3576.00	-24.00	
		4245.00	-24.00				4470.00	-24.00	
		5094.00	-24.00				5364.00	-24.00	
		5943.00	-24.00				6258.00	-24.00	
		6792.00	-24.00				7152.00	-24.00	
		7641.00	-24.00				8046.00	-24.00	
-49.20	849.00	8490.00	-24.00	-13.0	-54.40	894.00	8940.00	-24.00	-13.0

No emissions observed above the baseline of the measurement receiver.

RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Inter-modulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	Cellular Repeater System
Model No:	CS12-555-400	Serial No:	See Test Report
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date: 2/9/2010
Operating Mode:	Amplifying input signal		
Notes:	AMPS Band - CDMA - Downlink		

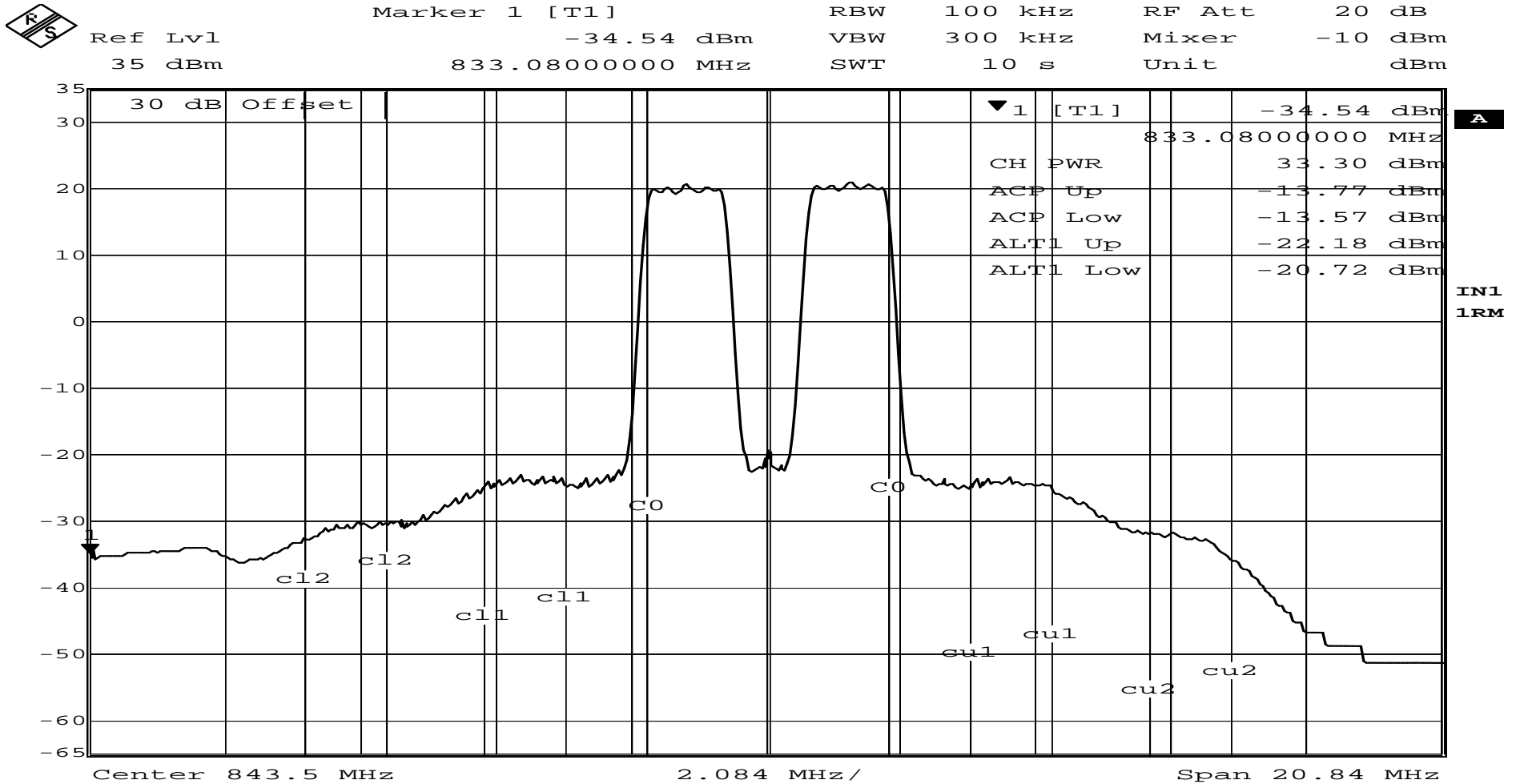


Date: 9.FEB.2010 20:05:49

RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Inter-modulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	Cellular Repeater System
Model No:	CS12-555-400	Serial No:	See Test Report
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date: 2/9/2010
Operating Mode:	Amplifying input signal		
Notes:	AMPS Band - CDMA - Downlink		

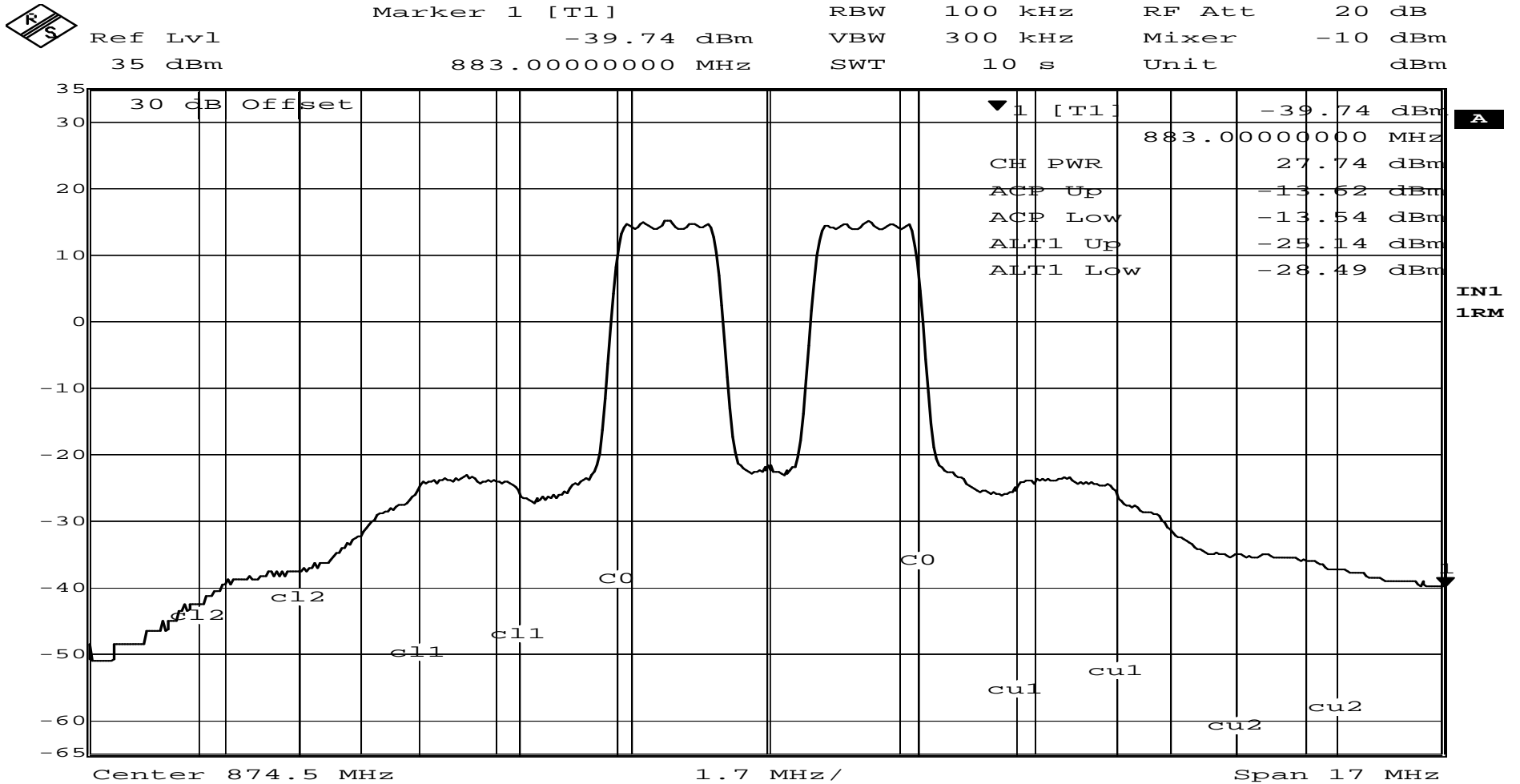


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RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Inter-modulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	Cellular Repeater System
Model No:	CS12-555-400	Serial No:	See Test Report
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:
Operating Mode:	Amplifying input signal		
Notes:	AMPS Band - CDMA - Downlink		

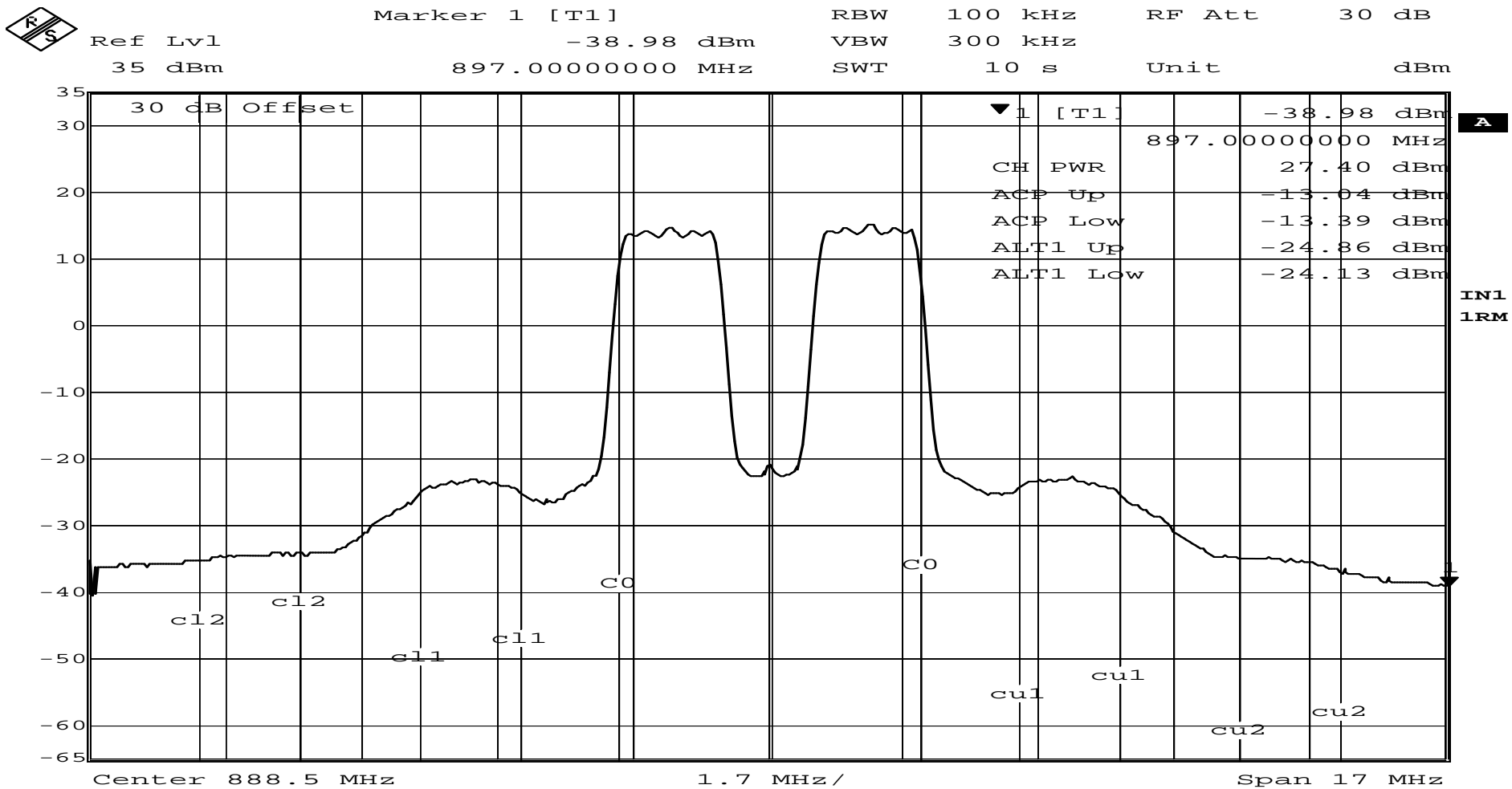


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RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Inter-modulation Characteristics		
Customer:	Cellular Specialties, Inc.	Test Sample:	Cellular Repeater System
Model No:	CS12-555-400	Serial No:	See Test Report
Test Specification:	FCC Part 2	Paragraph: 2.1047	Date:
Operating Mode:	Amplifying input signal		
Notes:	AMPS Band - CDMA - Downlink		



Date: 9.FEB.2010 20:56:11

RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Frequency Stability		
Customer:	Cellular Specialties, Inc.	Job No:	R-5240N-1
Test Sample:	Cellular Repeater System		
Model No:	CS12-555-400	Serial No:	See Test Report
Test Specification:	FCC Part 2 Paragraph: 2.1055		
Operating Mode:	Amplifying input signal		
Technician:	M.Seamans	Date:	11/25/2009
Notes:	Uplink Frequency 836.5 MHz Nominal Voltage = 72 VDC Downlink Frequency 881.5 MHz		

Temp	Test Frequency			Frequency @ 61.2 VDC	Frequency @ 64.8 VDC	Frequency @ 68.4 VDC	Frequency @ 72 VDC	Frequency @ 75.6 VDC	Frequency @ 79.2 VDC	Frequency @ 82.8 VDC
C	MHz			MHz	MHz	MHz	MHz	MHz	MHz	MHz
	(Downlink)									
-30	881.5000			881.49750	881.49750	881.49750	881.49750	881.49750	881.49750	881.49750
-20				881.50000	881.50000	881.50000	881.50000	881.50000	881.50000	881.50000
-10				881.50000	881.50000	881.50000	881.50000	881.50000	881.50000	881.50000
0				881.50000	881.50000	881.50000	881.50000	881.50000	881.50000	881.50000
10				881.50000	881.50000	881.50000	881.50000	881.50000	881.50000	881.50000
20				881.50000	881.50000	881.50000	881.50000	881.50000	881.50000	881.50000
30				881.49750	881.49750	881.49750	881.49750	881.49750	881.49750	881.49750
40				881.50000	881.50000	881.50000	881.50000	881.50000	881.50000	881.50000
50	881.5000			881.50500	881.50500	881.50500	881.50500	881.50500	881.50500	881.50500
	(Uplink)									
-30	836.5000			836.49750	836.49750	836.49750	836.49750	836.49750	836.49750	836.49750
-20				836.50000	836.50000	836.50000	836.50000	836.50000	836.50000	836.50000
-10				836.49750	836.49750	836.49750	836.50000	836.49750	836.49750	836.49750
0				836.49750	836.49750	836.49750	836.49750	836.49750	836.49750	836.49750
10				836.50000	836.50000	836.50000	836.49750	836.50000	836.50000	836.50000
20				836.50000	836.50000	836.50000	836.50000	836.50000	836.50000	836.50000
30				836.50000	836.50000	836.50000	836.50000	836.50000	836.50000	836.50000
40				836.50000	836.50000	836.50000	836.50000	836.50000	836.50000	836.50000
50	836.5000			836.49750	836.49750	836.49750	836.49750	836.49750	836.49750	836.49750