



Retlif Testing Laboratories

101 New Boston Road, Goffstown, NH 03045
603-497-4600 - Fax: 603-497-5281

CORPORATE OFFICE
795 Marconi Avenue
Ronkonkoma, NY 11779
631-737-1500 Fax 631-737-1497
(A NY Corporation)

BRANCH LABORATORIES
3131 Detwiler Road
Harleysville, PA 19438
215-256-4133 Fax 215-256-4130

WASHINGTON
REGULATORY OFFICE
703-533-1614 Fax 703-533-1612



REPORT OF MEASUREMENTS
for
CELLULAR SPECIALTIES, INC.
CHANNELIZED DIGITAL REPEATER

MODEL: CSI-DSP85-25X-L7

FCC ID: NVRCSI-DSP25X-L7

Company Name: Cellular Specialties, Inc.

Date of Report: March 16, 2011

Test Report No: R-5440N

Test Start Date: February 22, 2011

Test Finish Date: March 4, 2011

Test Technician: M. Seamans

Laboratory Supervisor: T. Hannemann

Report Prepared By: J. Ramsey

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Scott Wentworth
Branch Manager
NVLAP Approved Signatory



Todd Hannemann
Laboratory Supervisor
iNARTE Certified ATL-0255-T

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FCC ID: NVRCSI-DSP25X-L7

CERTIFICATION APPLICATION SUMMARY

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

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

Model: CSI-DSP85-25X-L7

FCC ID Number: FCC ID: NVRCSI-DSP25X-L7

Applicable Test Standard: FCC Parts 2 & 27

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

Device Classification: Mobile

EUT Frequency Range Band: Uplink: 698 MHz to 716 MHz
Downlink: 728 MHz to 746 MHz

Power Output Rating for Certification Grant: Uplink: +31.23dBm = 1.327W
Downlink: +31.27dBm = 1.339W

Modulation Type: LTE (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 (27.50)
- Occupied Bandwidth (2.1049)
- Spurious Emissions at Antenna Terminals (27.53)
- Effective Radiated Power of Spurious Radiation (27.53)
- Frequency Stability (27.54)



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SECTION 1 SUMMARY OF TEST PROGRAM

RF POWER OUTPUT

The RF Power Output test was performed using RMS channel power measurements of a single LTE channel. The measurements were taken with the AGC turned off at maximum output power with all spurious emissions below the -13dBm limit. The measured output power matched the manufacturer's rated output power. 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 LTE 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 one frequency (mid) within each passband (uplink and downlink). The level of any spurious emission was recorded. Testing was performed in the frequency range of 30MHz to 8GHz. Testing was performed for LTE modulation type. The spurious emissions limit is -13dBm as specified in FCC Part 27. All emissions were below the specified -13dBm limit. See attached test data.

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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 1 frequency (mid) 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 – 8GHz. The limit for out of band spurious emissions is -13dBm as specified in Part 27. All emissions were below the specified -13dBm limit. See attached test data.

FREQUENCY STABILITY MEASUREMENTS

This unit does not perform band translation but frequency stability measurements were performed to the manufacturers rated temperature range of operation. The test sample was placed into a temperature chamber with the 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 0 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 downlink stayed within the assigned frequency band. See attached test data.



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SECTION 2 EQUIPMENT LISTS

Spurious Emissions at Antenna Terminals

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1345	NARDA	ATTENUATOR	DC - 18GHz	776B-30	8/10/2010	8/10/2011
5070	ROHDE & SCHWARZ	EMI TEST RECEIVER	20 Hz - 40 GHz	ESIB40	1/20/2011	1/20/2012
5134	NARDA	10DB ATTENUATOR	DC - 12.4 GHz	757C-10	8/10/2010	8/10/2011

Effective Radiated Power of Spurious Radiation

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1232	AGILENT / HP	PRE-AMPLIFIER	1 - 26.5GHz	8449B	4/22/2010	4/22/2011
3258	EMCO	DOUBLE RIDGED GUIDE ANTENNA	1 GHz - 18GHZ	3115	1/12/2011	1/12/2012
4029	RETLIF	OPEN AREA TEST SITE	3 / 10 Meters	RNH	8/21/2009	8/21/2012
4029B	RETLIF	TEST SITE ATTENUATION	3 / 10 Meters	RNH	6/25/2010	6/25/2011
5053	EMCO	BICONILOG ANTENNA	26 MHz - 3 GHz	3142C	4/21/2010	4/21/2011
5070	ROHDE & SCHWARZ	EMI TEST RECEIVER	20 Hz - 40 GHz	ESIB40	1/20/2011	1/20/2012
R425B	AGILENT / HP	SPECTRUM ANALYZER	100 Hz - 26.5 GHz	E7405A;A	5/28/2010	5/28/2011

Frequency Stability

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1345	NARDA	ATTENUATOR	DC - 18GHz	776B-30	8/10/2010	8/10/2011
4997	OMEGA	DIGITAL THERMOMETER		UNKNOWN	8/11/2010	8/11/2011
5013	POWERSTAT	VARIAC	0-140 V, 10 A, 60 Hz	116B	No Calibration Required	
5049B	FLUKE	DIGITAL MULTIMETER	True RMS Multimeter	111	8/9/2010	8/9/2011
5077	ASSOCIATED ENVIRONME	TEMPERATURE CHAMBER	-50 to 150 C	ZFD-531	8/11/2010	8/11/2011
5134	NARDA	10DB ATTENUATOR	DC - 12.4 GHz	757C-10	8/10/2010	8/10/2011
R425B	AGILENT / HP	SPECTRUM ANALYZER	100 Hz - 26.5 GHz	E7405A;A	5/28/2010	5/28/2011

Occupied Bandwidth & RF Power Output

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1345	NARDA	ATTENUATOR	DC - 18GHz	776B-30	8/10/2010	8/10/2011
5070	ROHDE & SCHWARZ	EMI TEST RECEIVER	20 Hz - 40 GHz	ESIB40	1/20/2011	1/20/2012
5134	NARDA	10DB ATTENUATOR	DC - 12.4 GHz	757C-10	8/10/2010	8/10/2011



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SETUP PHOTOGRAPH
EFFECTIVE RADIATED POWER OF SPURIOUS RADIATION



Test Setup



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SETUP PHOTOGRAPHS
EFFECTIVE RADIATED POWER OF SPURIOUS RADIATION



Horizontal Antenna Polarization, 30 to 1000 MHz



Vertical Antenna Polarization, 30 to 1000 MHz



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Test Report No. R-5440N
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SETUP PHOTOGRAPHS
EFFECTIVE RADIATED POWER OF SPURIOUS RADIATION



Horizontal Antenna Polarization, 1 to 8 GHz



Vertical Antenna Polarization, 1 to 8 GHz



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**SETUP PHOTOGRAPH
OCCUPIED BANDWIDTH
& RF POWER OUTPUT**



Test Setup



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**SETUP PHOTOGRAPH
SPURIOUS EMISSIONS AT ANTENNA TERMINALS**



Test Setup



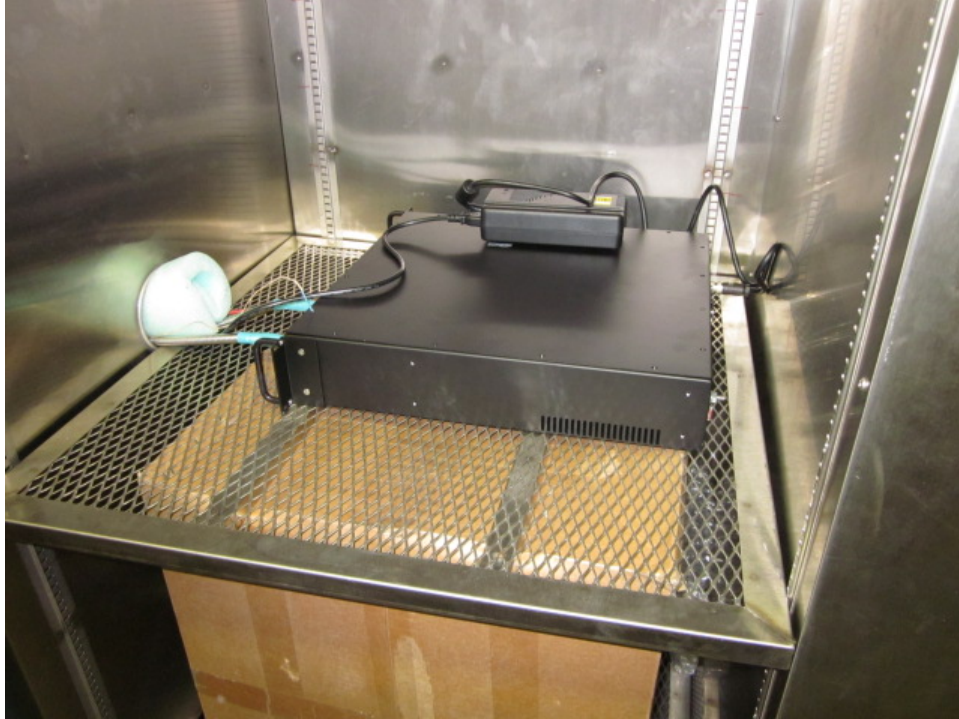
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**SETUP PHOTOGRAPH
FREQUENCY STABILITY**



Test Setup



Test Setup



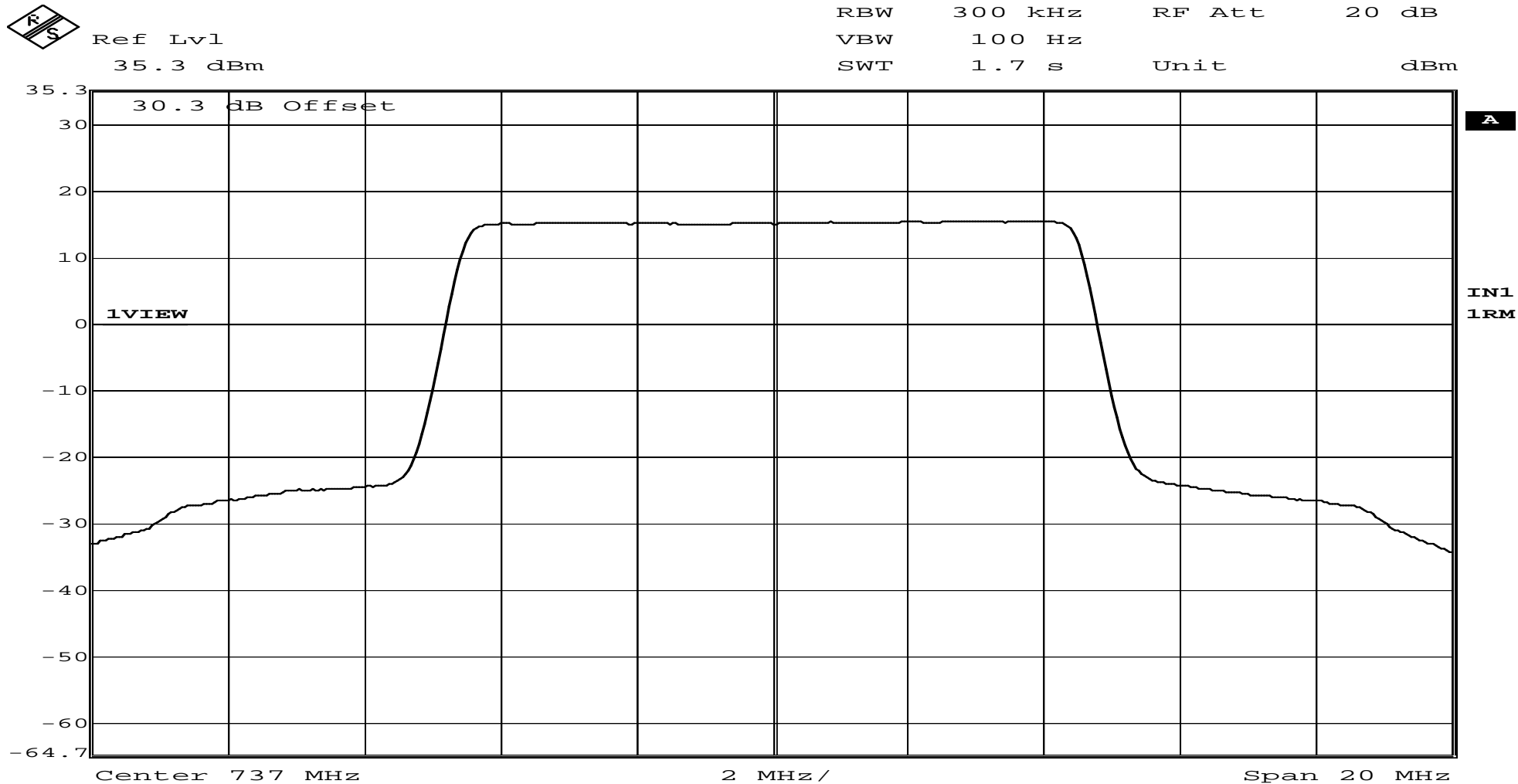
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RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth		
Customer:	Cellular Specialties, Inc.	Test Sample:	Digital Repeater
Model No:	CSI-DSP85-25X-L7	Serial No:	N/A
Test Specification:	FCC Part 2	Paragraph: 2.1049	Date: 3/3/4/2011
Operating Mode:	Amplifying input signal		
Notes:	Downlink, Output Signal		



Date: 4.MAR.2011 10:17:44

RETLIF TESTING LABORATORIES

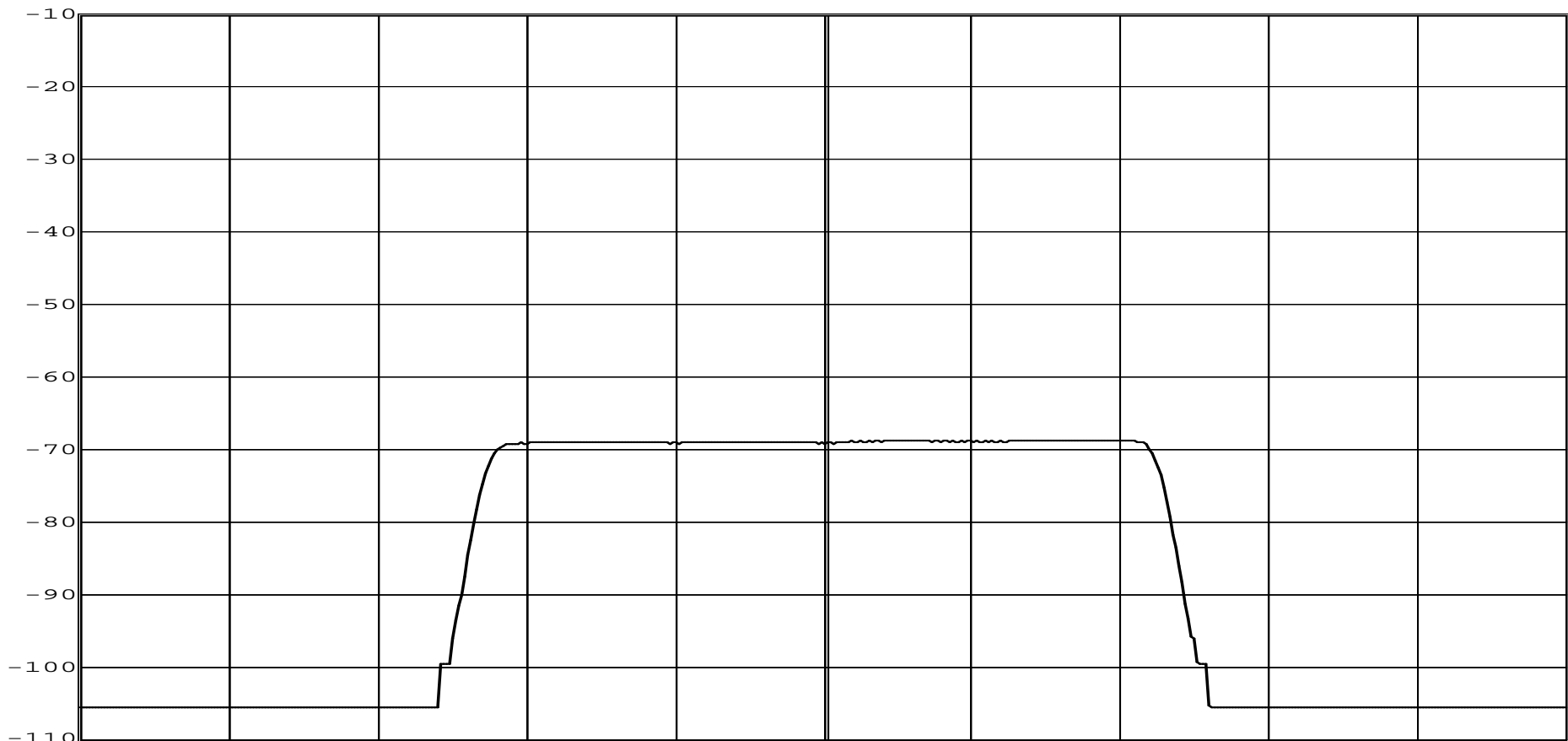
EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth		
Customer:	Cellular Specialties, Inc.	Test Sample:	Digital Repeater
Model No:	CSI-DSP85-25X-L7	Serial No:	N/A
Test Specification:	FCC Part 2	Paragraph: 2.1049	Date: 3/3/4/2011
Operating Mode:	Amplifying input signal		
Notes:	Downlink, Input Signal		



Ref Lvl
-10 dBm

RBW 300 kHz RF Att 0 dB
 VBW 100 Hz
 SWT 1.7 s Unit dBm



A

IN1
1RM

Center 737 MHz

2 MHz /

Span 20 MHz

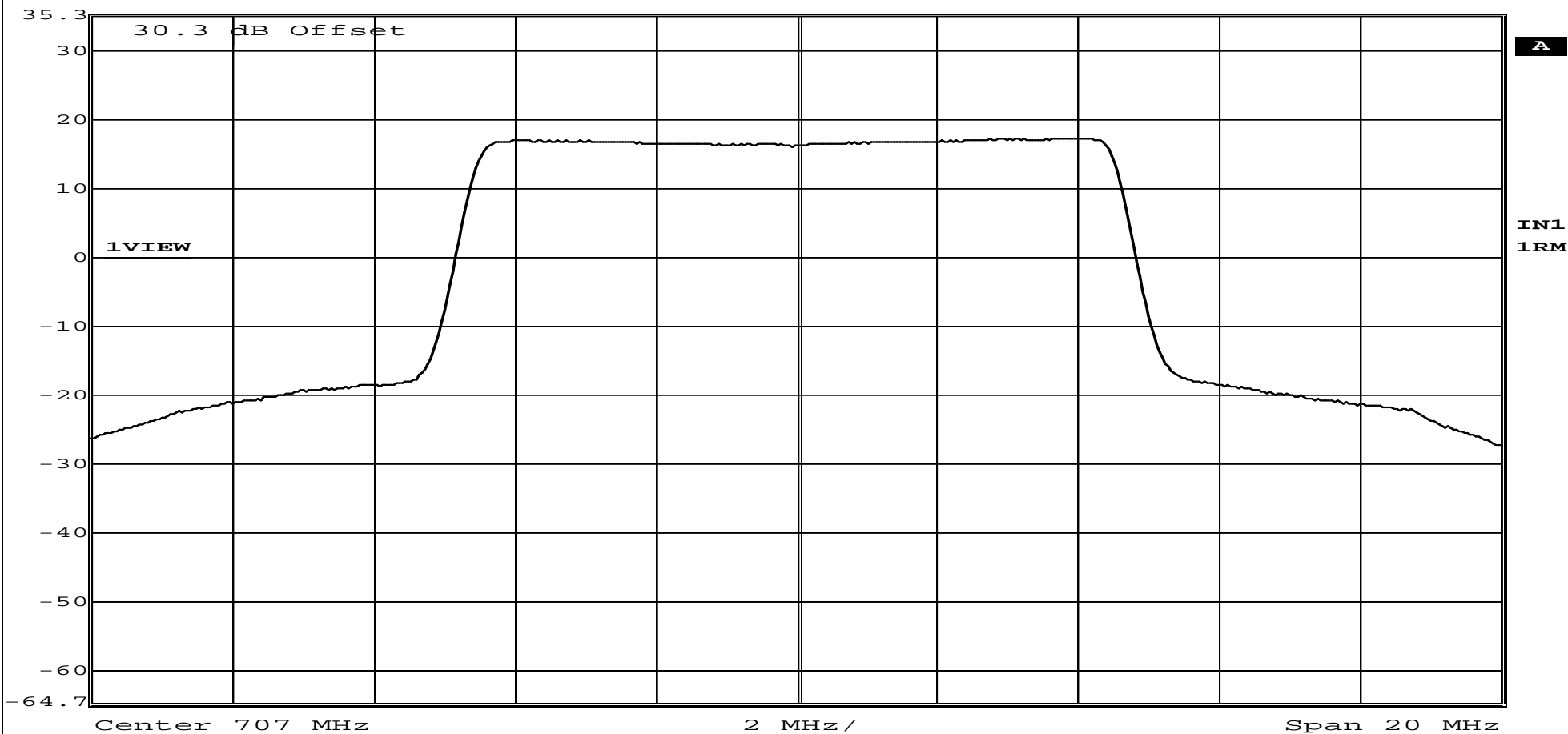
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RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth		
Customer:	Cellular Specialties, Inc.	Test Sample:	Digital Repeater
Model No:	CSI-DSP85-25X-L7	Serial No:	N/A
Test Specification:	FCC Part 2	Paragraph: 2.1049	Date:
Operating Mode:	Amplifying input signal		
Notes:	Uplink, Output Signal		
Job No:	R-5440N		Technician:
			M.Seamans

	Ref Lvl 35.3 dBm	RBW 300 kHz	RF Att 20 dB	
		VBW 100 Hz		
		SWT 1.7 s	Unit dBm	



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RETLIF TESTING LABORATORIES

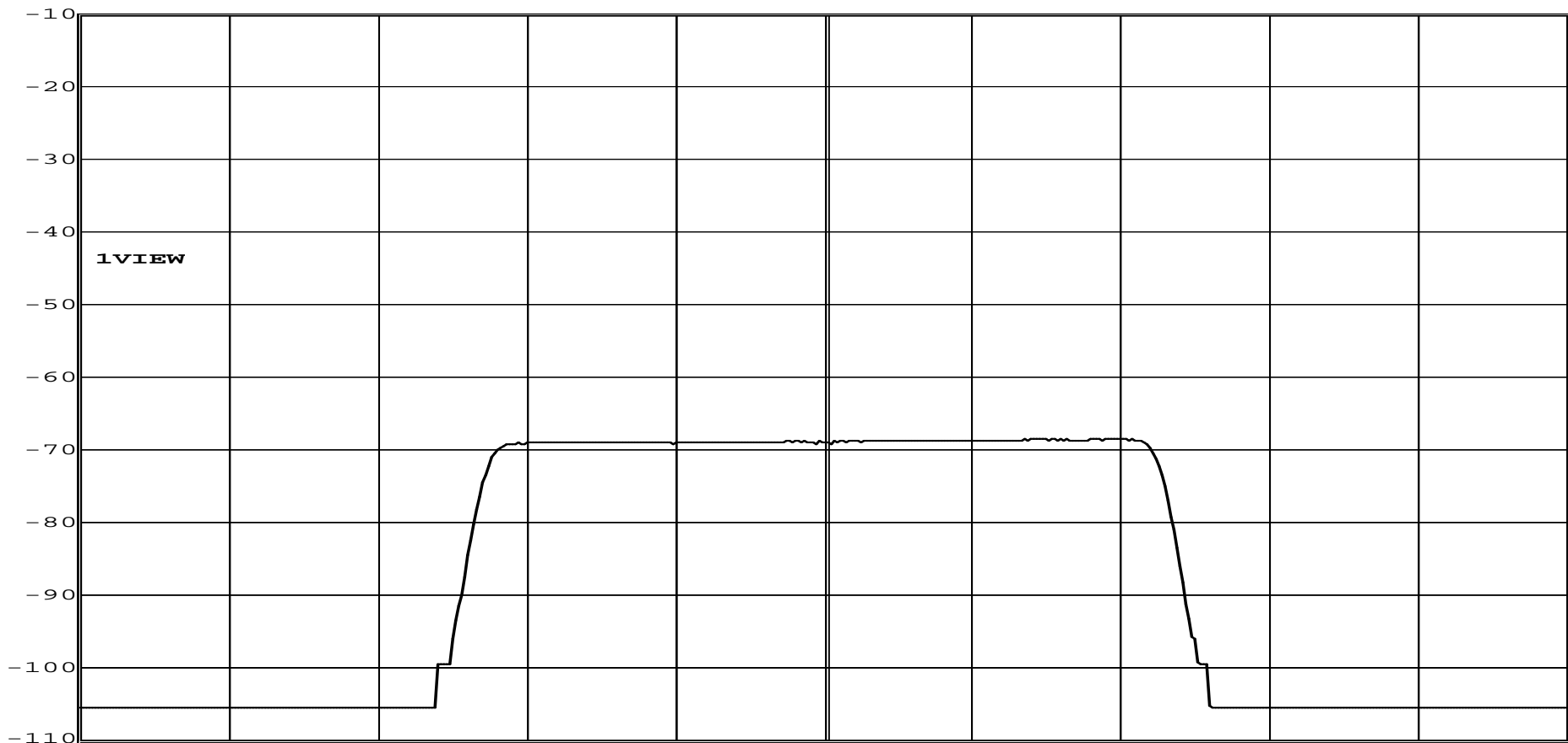
EMISSIONS DATA SHEET

Test Method:	Occupied Bandwidth		
Customer:	Cellular Specialties, Inc.	Test Sample:	Digital Repeater
Model No:	CSI-DSP85-25X-L7	Serial No:	N/A
Test Specification:	FCC Part 2	Paragraph: 2.1049	Date:
Operating Mode:	Amplifying input signal		
Notes:	Uplink, Input Signal		



Ref Lvl
-10 dBm

RBW 300 kHz RF Att 0 dB
 VBW 100 Hz
 SWT 1.7 s Unit dBm



A

IN1
1RM

Center 707 MHz

2 MHz/

Span 20 MHz

Date: 4.MAR.2011 10:27:20

